Draft

7380 Morton Avenue

Transportation Impact Assessment

Report

Prepared for:

Newark Industrial Partners LLC

March 13, 2018

OK17-0231

FEHR & PEERS

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1.0 EXECUTIVE SUMMARY

This report presents the results of the transportation impact assessment (TIA) for the proposed Morton Gateway Industrial Center at 7380 Morton Avenue in the City of Newark, California. The 29.89-acre project site is bounded by Plummer Creek and Central Avenue to the north, the existing Cargill salt plant to the south and east, and industrial uses to the west. The site is bisected by Morton Avenue and is the location of the former Morton Salt Plant. The project would demolish approximately 160,000 square feet of existing vacant development and construct 605,000 square feet of new industrial uses. Vehicle access to both parcels would be provided by multiple driveways on Morton Avenue. The north parcel would also be accessed by a new driveway on Central Avenue.

1.1 PROJECT TRIP GENERATION

The proposed project is estimated to generate 4,180 net new daily trips, 442 AM peak hour trips (363 inbound and 79 outbound), and 567 PM peak hour trips (119 inbound and 448 outbound).

1.2 INTERSECTION LEVEL OF SERVICE ANALYSIS

Traffic operations at 23 key intersections were evaluated during the weekday morning (AM) and afternoon (PM) peak hour under the following scenarios:

- Existing Conditions
- Existing Plus Project Conditions

Based on the City of Newark's impact criteria, the project would cause ***significant impacts*** at the following study intersections:

1. Thornton Avenue/Eastbound SR 84 Ramps (intersection #2) in the PM peak hour
2. Central Avenue/Morton Avenue (intersection #12) in the PM peak hour
3. Central Avenue/Sycamore Avenue (intersection #13) in the AM and PM peak hours
4. Central Avenue/Cherry Street (intersection #14) in the AM peak hour

Implementation of the following mitigation measures would reduce the project impact to ***less-than-significant***:

1. In coordination with Caltrans, optimize the PM peak hour signal timings at the Thornton Avenue/ Eastbound SR 84 Ramps intersection.
2. Install an actuated-uncoordinated signal at the Central Avenue/Morton Avenue intersection with protected northbound and westbound left-turns.
3. Install an actuated-uncoordinated signal at the Central Avenue/Sycamore Street with protected southbound and eastbound left-turns.
4. Optimize AM peak hour signal timings at the Central Avenue/Cherry Street intersection.

1.3 PARKING ANALYSIS

The proposed project would provide 730 parking spaces and it is required to provide 690 spaces. Therefore, the project would provide a surplus of 40 parking spaces.

1.4 SITE PLAN REVIEW

Based on our review of the project site plan, the project would provide adequate access and circulation for passenger vehicles, trucks, cyclists, and pedestrians. We have the following recommendation:

- *Provide secure long-term bicycle parking for each building* – To improve bike accessibility and comply with the City of Newark Zoning Ordinance, which requires one secure long-term bicycle parking space for every 30 vehicle spaces serving each building, provide at least 24 secure bicycle parking spaces for the project.

2.0 INTRODUCTION

This report presents the results of the transportation impact assessment (TIA) conducted by Fehr & Peers for the proposed Morton Gateway Industrial Center at 7380 Morton Avenue in the City of Newark, California. The purpose of this TIA is to identify potentially significant adverse impacts of the proposed project on the surrounding transportation system and to recommend mitigation measures, if needed. The study area for this TIA, discussed further in **Section 2.2,** was developed in consultation with City staff.

This chapter provides a detailed project description and describes the study area, analysis methodologies, analysis scenarios, and significance impact criteria.

2.1 PROJECT DESCRIPTION

The proposed project consists of constructing approximately 605,000 square feet of warehouse and office space in four buildings, along with associated parking and landscaping. The project site is located on a 29.89-acre lot which formerly contained the Morton Salt Plant. The project site is surrounded by other existing industrial land uses. Morton Avenue bisects the project site, with Buildings 1, 2, and 3 located north of Morton Avenue and Building 4 located south of Morton Avenue. The project proposes multiple full access driveways on both sides of Morton Avenue. Access to Buildings 1, 2, and 3 would also be provided through a new driveway on Central Avenue located between Filbert Street and Morton Avenue. The conceptual project site plan is shown on **Figure 1.**

2.2 PROJECT STUDY AREA

The study area was developed in consultation with City of Newark staff. The study area is generally located along the Thornton Avenue, Central Avenue, Cherry Street, and Mowry Avenue corridors. Roadway impacts are evaluated for the study intersections listed in **Table 1** and illustrated on **Figure 2**.

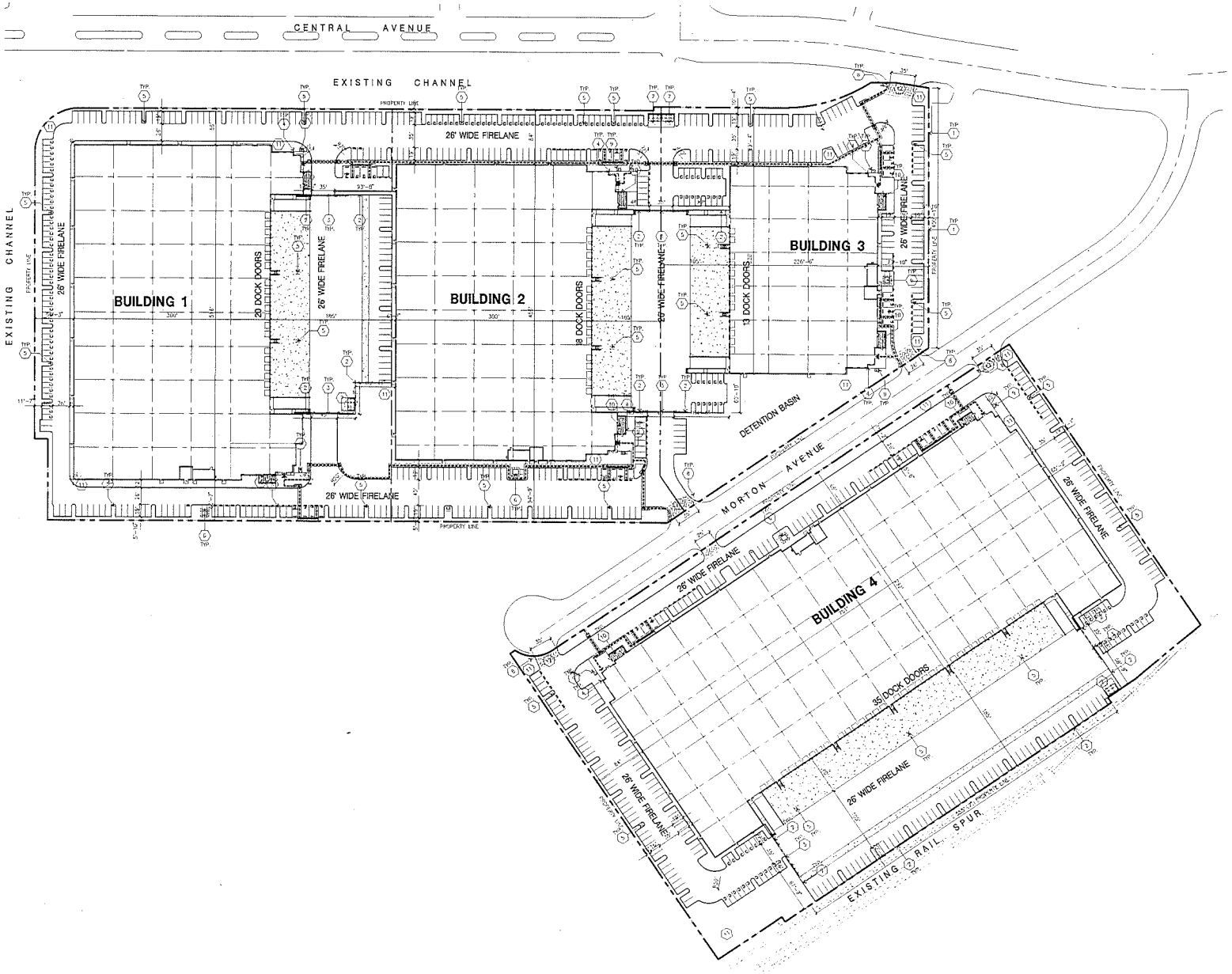

Figure 1

Project Site Plan

TABLE 1: STUDY INTERSECTIONS

Intersection ID	Intersection Name	Control Type[1]
1	Paseo Padre Parkway/Westbound SR 84 Ramps	Signal
2	Thornton Avenue/Eastbound SR 84 Ramps	Signal
3	Thornton Avenue/Gateway Boulevard	Signal
4	Thornton Avenue/Marshlands Road	SSSC
5	Thornton Avenue/Hickory Street	SSSC
6	Thornton Avenue/Willow Street	Signal
7	Thornton Avenue/Southbound I-880 Ramps	Signal
8	Thornton Avenue/Northbound I-880 Ramps	Signal
9	Central Avenue/Willow Street	SSSC
10	Central Avenue/Central Court	SSSC
11	Central Avenue/Filbert Street	SSSC
12	Central Avenue/Morton Avenue	SSSC
13	Central Avenue/Sycamore Street	SSSC
14	Central Avenue/Cherry Street	Signal
15	Central Avenue/Newark Boulevard	Signal
16	Central Avenue/Cedar Boulevard	Signal
17	Central Avenue/Timber Street	SSSC
18	Cherry Street/Robertson Avenue	SSSC
19	Cherry Street/Smith Avenue	Signal
20	Cherry Street/Moores Avenue	SSSC
21	Cherry Street/Mowry Avenue	Signal
22	Mowry Avenue/Southbound I-880 Ramps	Signal
23	Mowry Avenue/Northbound I-880 Ramps	Signal

Notes:

1. SSSC = Side Street Stop Control, Signal = Signalized intersection.

Source: Fehr & Peers, March 2018.

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Project Site # Study Intersection

Figure 2

Project Study Area

OK17-0231_2_StudyArea

2.3 ANALYSIS SCENARIOS

Intersection operations are evaluated during the weekday morning (AM) and weekday afternoon (PM) peak hours for the following scenarios:

- **Existing Conditions:** Represents current conditions, including traffic volume data, intersection signal timings, and intersection operations.
- **Existing Plus Project Conditions:** Represents Existing Conditions plus traffic generated after completion of the project.

The project is anticipated to be constructed in the near-term, therefore Existing Plus Project Conditions would be representative of conditions upon occupancy of the project.

2.4 ANALYSIS METHODS

The operations of roadway facilities are described with the term level of service (LOS), a qualitative description of traffic flow based on such factors as speed, travel time, delay, and freedom to maneuver). Six levels are defined from LOS A, as the best operating conditions, to LOS F, or the worst operating conditions. LOS E represents "at-capacity" operations. When traffic volumes exceed the intersection capacity, stop-and-go conditions result, and operations are designated as LOS F.

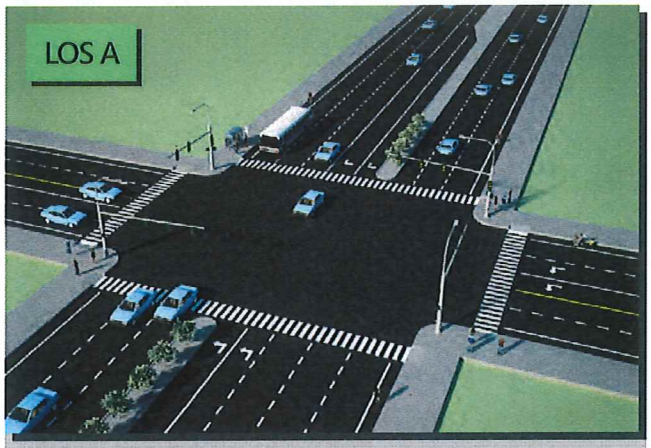
2.4.1 INTERSECTION OPERATIONS

The methods described in the *2010 Highway Capacity Manual* (HCM) were used to prepare the LOS calculation for the study intersections. This analysis methods, which are approved by the City Newark, analyze signalized and unsignalized intersection operations based on average control delay per vehicle. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The average control delay is calculated using the Synchro 9 analysis software package and is correlated to an LOS designation as shown in **Table 2** and on **Figure 3**.

TABLE 2: INTERSECTION LEVEL OF SERVICE DEFINITIONS

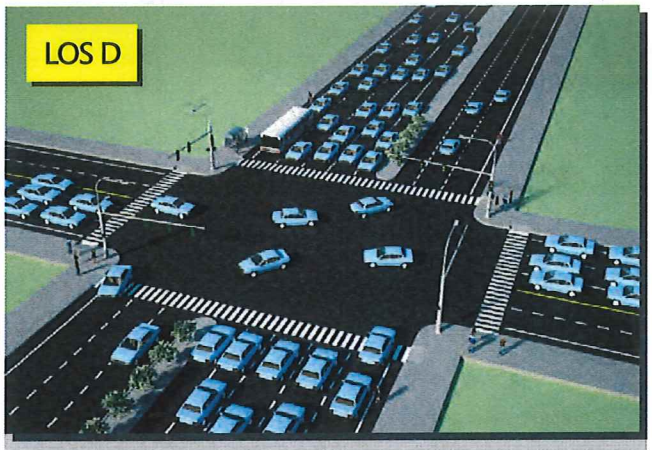
Unsignalized			Signalized	
Description	**Average Total Vehicle Delay (Seconds)**	**Level of Service**	**Average Control Vehicle Delay (Seconds)**	**Description**
No delay for stop-controlled approaches.	≤10.0	A	≤10.0	Free Flow or Insignificant Delays: Operations with low delay, signal progression is extremely favorable and most vehicles arrive during green light phase. Most vehicles do not stop.
Operations with minor delay.	>10.0 and ≤15.0	B	>10.0 and ≤20.0	Stable Operation or Minimal Delays: Generally occurs with good signal progression and/or short cycle lengths. More vehicles stop than with LOS A, causing higher average delay. An occasional approach phase is fully utilized.
Operations with moderate delays.	>15.0 and ≤25.0	C	>20.0 and ≤35.0	Stable Operation or Acceptable Delays: Higher delays resulting from fair signal progression and/or longer cycle lengths. Drivers begin having to wait through more than one red light. Most drivers feel somewhat restricted.
Operations with increasingly unacceptable delays.	>25.0 and ≤35.0	D	>35.0 and ≤55.0	Approaching Unstable or Tolerable Delays: Congestion becomes more noticeable. Longer delays from unfavorable signal progression, long cycle lengths, or high volume to capacity ratios. Drivers may wait through more than one red light. Queues develop and dissipate, without excessive delay.
Operations with high delays, and long queues.	>35.0 and ≤ 50.0	E	>55.0 and ≤ 80.0	Unstable Operation or Significant Delays: Considered limit of acceptable delay. High delays indicate poor signal progression, long cycle lengths and high volume to capacity ratios. Individual cycle failures are frequent and vehicles may wait through several signal cycles. Long queues form upstream from intersection.
Extreme congestion, very high delays and long queues unacceptable to most drivers.	>50.0	F	>80.0	Forced Flow or Excessive Delays: Occurs with oversaturation when flows exceed the intersection capacity. Represents jammed conditions. Many cycle failures. Queues may block upstream intersections.

Source: Transportation Research Board, Special Report 209, *Highway Capacity Manual*, 2010.



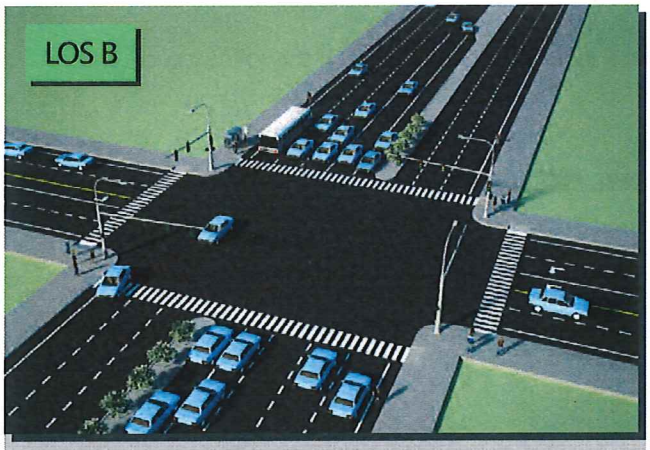
Intersection Operation: Free Flow

Degree of Delay: Negligible Delays



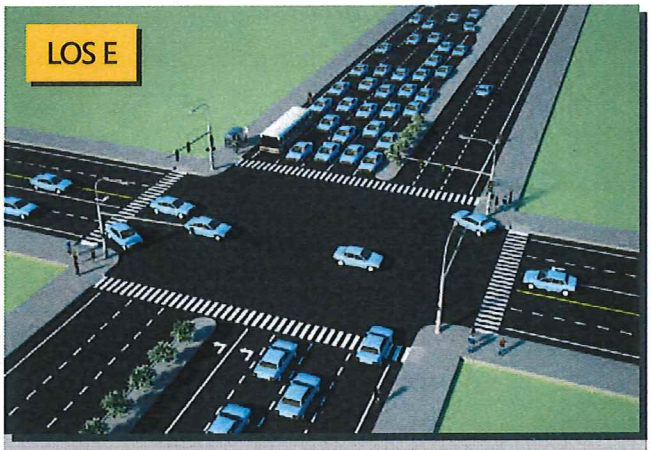
Intersection Operation: Less Stable Flow

Degree of Delay: Long Delays



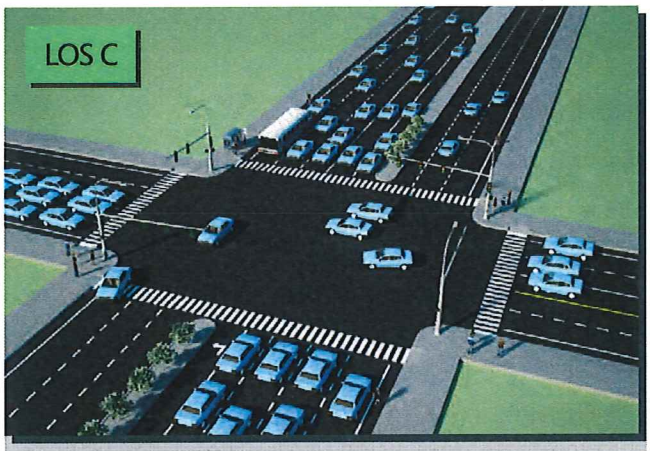
Intersection Operation: Stable Flow

Degree of Delay: Minimal Delays



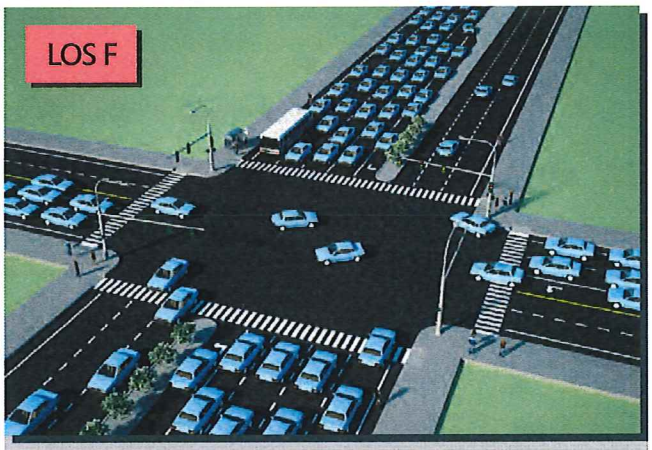
Intersection Operation: Unstable Flow

Degree of Delay: Substantial Delays Can Occur



Intersection Operation: Stable Flow

Degree of Delay: Moderate Delays



Intersection Operation: Unpredictable Flow/Wait Through Multiple Cycles

Degree of Delay: Excessive Delays Can Occur

Figure 3

Signalized Intersection Level of Service Examples

2.5 IMPACT SIGNIFICANCE CRITERIA

Study intersections were evaluated to confirm consistency with the various multi-modal transportation goals and polices presented in the City of Newark's General Plan (adopted December 2013), which seek to provide a safe and efficient transportation system for all users. According to the City of Newark General Plan, the acceptable LOS is LOS D or better. Therefore, the following criteria were used to evaluate the project's impacts to determine their level of significance:

2.5.1 SIGNALIZED INTERSECTIONS

The project would result in a significant impact to signalized intersection operations if the following criteria are met:

- For intersections operating at LOS D or better under Existing Conditions: Degradation of LOS from LOS A-D to LOS E or F
- For intersections operating at LOS E or F under Existing Conditions: Exacerbation of operations by increasing the intersection average delay by more than 4.0 seconds under Existing Plus Project Conditions

2.5.2 UNSIGNALIZED INTERSECTIONS

The project would result in a significant impact to unsignalized intersection operations if the following criteria are met:

- For intersections operating at LOS D or better under Existing Conditions:
    - Degradation of LOS from LOS A-D to LOS E or F, and
    - California MUTCD Signal Warrants 3A or 3B is met for the impacted peak hour
- For intersections operating at LOS E or F under Existing Conditions:
    - Exacerbation of operations by increasing the worst movement delay at an intersection by more than 4.0 seconds under Existing Plus Project Conditions
    - California MUTCD Signal Warrants 3A or 3B is met for the impacted peak hour

2.6 REPORT ORGANIZATION

The remainder of the report is divided into the following chapters:

Chapter 3: Existing Conditions describes the transportation system near the project site, including the surrounding roadway network and current AM and PM peak hour operating conditions of study intersections.

Chapter 4: Project Traffic Estimates describes the project trip generation, distribution and assignment methods used in the traffic impact analysis.

Chapter 5: Existing Plus Project Conditions presents the transportation operations with the project under Existing Plus Project Conditions.

Chapter 6: Parking Analysis compares the proposed off-street parking supply with the estimated parking demand and City of Newark requirements.

Chapter 7: Site Plan Review and Recommendations details the multimodal access and on-site circulation configuration for the project site and provides recommendations.

3.0 EXISTING CONDITIONS

The assessment of Existing Conditions relevant to this study includes an inventory of the street system, traffic volumes on these facilities, and operating conditions at key intersections.

3.1 EXISTING STREET SYSTEM

State Route 84 (SR 84) is a six-lane, east-west freeway that connects Alameda County to San Mateo County via the Dumbarton Bridge. The SR 84 corridor serves as a key link between the US 101 and I-880 corridors, and directly serves motorists from the Union City, Newark, and Fremont areas.

Interstate 880 (I-880) is a north-south freeway that connects San Jose to Oakland. The I-880 corridor serves as a key link between cities in the South Bay and East Bay, and directly serves motorists from the Newark and Fremont areas.

Thornton Avenue is a two-to-four-lane arterial that connects the SR 84 and the I-880 freeways. The arterial serves residential and commercial areas in Newark and is a designated truck route.

Central Avenue is a two-to-four-lane arterial between Willow Street and Fremont Boulevard, serving residential and industrial uses in Newark and Fremont and is a designated truck route. It is the primary access route to the project site.

Cherry Street is a four-lane arterial between Thornton Avenue and Stevenson Boulevard, serving residential and industrial areas in Newark and is a designated truck route.

Mowry Avenue is a three-to-six-lane arterial connecting Cherry Street and Mission Boulevard via I-880 and downtown Fremont. It primarily serves residential and commercial areas in Newark and Fremont as well as some industrial areas south of Cherry Street and is a designated truck route.

Morton Avenue is a cul-de-sac two lane local road connecting the project site to Central Avenue. It primary serves industrial business by proving connectivity to the Newark arterial network.

3.2 EXISTING INTERSECTION VOLUMES AND LANE CONFIGURATIONS

The operations of the study intersections are evaluated for the highest one-hour volume during the weekday morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM) peak period conditions. Existing peak period intersection counts were conducted at the study intersections in September 2017 and January 2018 on clear days with area schools in regular session. These counts formed the basis of the Existing Conditions intersection operations analysis (discussed further in **Section 3.3**). A summary of the count data is provided in **Appendix A**.

Existing lane configurations and signal controls were obtained through field observations and City of Newark and Caltrans signal timing sheets. **Figure 4** presents the existing AM and PM peak-hour turning movement volumes, corresponding lane configurations, and traffic control devices.

3.3 EXISTING INTERSECTION LEVELS OF SERVICE

Existing intersection lane configurations, signal timings, and peak hour turning movement volumes were used to calculate the LOS for the study intersections during the AM and PM peak hours for Existing Conditions. The results of the LOS analysis using the Synchro software program for all study intersections under Existing Conditions are presented in **Table 3** and the corresponding LOS calculation sheets are included in **Appendix B**.

The results of the LOS calculations indicate that the following intersections do not meet the City's LOS D standard under Existing Conditions:

- Intersection #2: signalized Thornton Avenue/Eastbound SR 84 Ramps (LOS E in the PM peak hour)
- Intersection #13: side-street stop-controlled Central Avenue/Sycamore Street (LOS F in the AM peak hour, LOS E in the PM peak hour)
- Intersection #18: side-street stop-controlled Cherry Street/Robertson Avenue (LOS F in the AM and PM peak hours)
- Intersection #20: side-street stop-controlled Cherry Street/Moores Avenue (LOS F in the AM peak hour, LOS E in the PM peak hour)

All other study intersections operate at LOS D or better under Existing Conditions.

TABLE 3: EXISTING INTERSECTION LEVELS OF SERVICE

	Intersection	Control Type[1]	Peak Hour[2]	Delay[3]	LOS[4]
1	Paseo Padre Parkway/Westbound SR 84 Ramps	Signal	AM PM	8 5	A A
2	Thornton Avenue/Eastbound SR 84 Ramps	Signal	AM PM	5 **58**	A **E**
3	Thornton Avenue/Gateway Boulevard	Signal	AM PM	9 8	A A
4	Thornton Avenue/Marshlands Road	SSSC	AM PM	0 (22) 1 (29)	A (C) A (D)
5	Thornton Avenue/Hickory Street	SSSC	AM PM	0 (17) 2 (31)	A (C) A (D)
6	Thornton Avenue/Willow Street	Signal	AM PM	12 14	B B
7	Thornton Avenue/Southbound I-880 Ramps	Signal	AM PM	7 10	A B
8	Thornton Avenue/Northbound I-880 Ramps	Signal	AM PM	11 18	B B
9	Central Avenue/Willow Street	SSSC	AM PM	8 (9) 9 (9)	A (A) A (A)
10	Central Avenue/Central Court	SSSC	AM PM	0 (12) 1 (15)	A (B) A (C)
11	Central Avenue/Filbert Street	SSSC	AM PM	5 (21) 5 (29)	A (C) A (D)
12	Central Avenue/Morton Avenue	SSSC	AM PM	0 (11) 1 (13)	A (B) A (B)
13	Central Avenue/Sycamore Street	SSSC	AM PM	**20 (88)** **6 (43)**	**C (F)** **A (E)**
14	Central Avenue/Cherry Street	Signal	AM PM	39 29	D C
15	Central Avenue/Newark Boulevard	Signal	AM PM	15 13	B B
16	Central Avenue/Cedar Boulevard	Signal	AM PM	25 27	C C
17	Central Avenue/Timber Street	SSSC	AM PM	1 (22) 1 (28)	A (C) A (D)
18	Cherry Street/Robertson Avenue	SSSC	AM PM	**1 (>120)** **2 (120)**	**A (F)** **A (F)**
19	Cherry Street/Smith Avenue	Signal	AM PM	13 6	B A

TABLE 3: EXISTING INTERSECTION LEVELS OF SERVICE

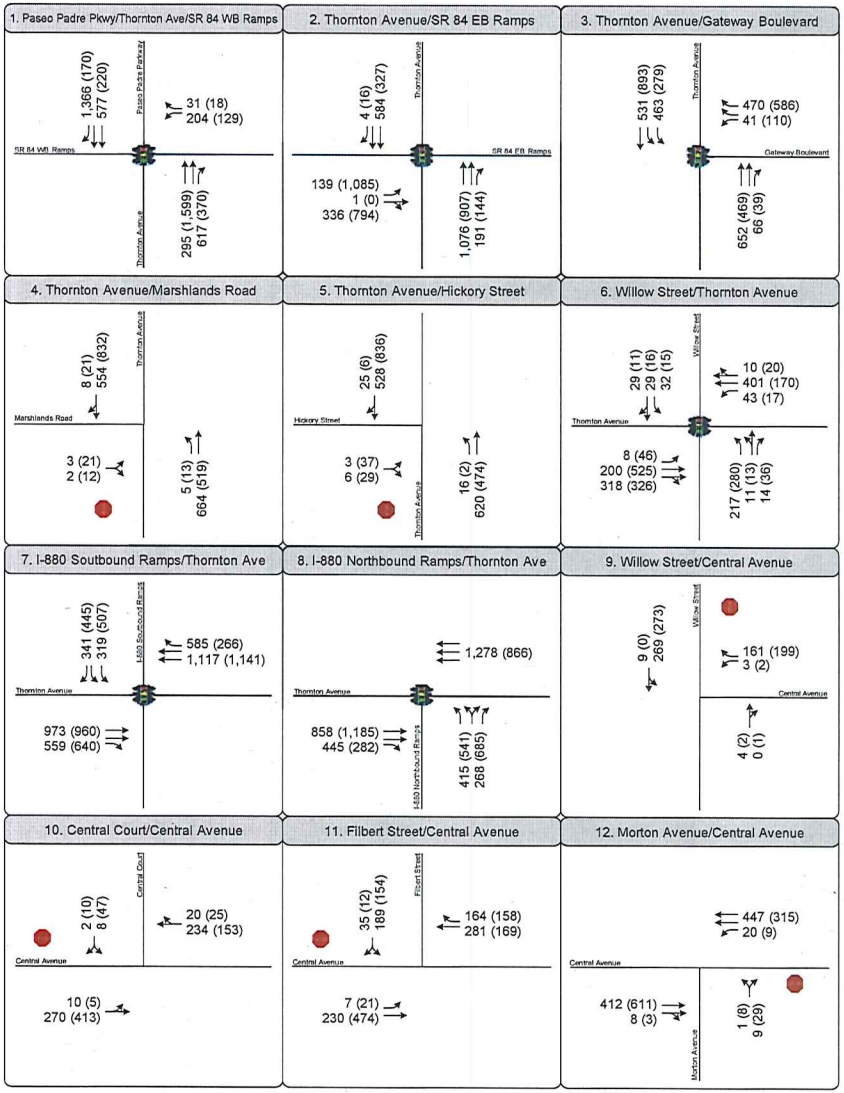
	Intersection	Control Type[1]	Peak Hour[2]	Delay[3]	LOS[4]
20	Cherry Street/Moores Avenue	SSSC	AM PM	**2 (90)** **2 (42)**	**A (F)** **A (E)**
21	Cherry Street/Mowry Avenue	Signal	AM PM	33 26	C C
22	Mowry Avenue/Southbound I-880 Ramps	Signal	AM PM	12 17	B B
23	Mowry Avenue/Northbound I-880 Ramps	Signal	AM PM	12 25	B C

Notes:
1. SSSC = Side Street Stop Control, Signal = Signalized intersection.
2. AM = morning peak hour, PM = evening peak hour
3. Delay calculated using HCM 2010 methodologies. Whole-intersection average delay presented for signalized intersections. Whole intersection average delay and worst movement delay presented in parenthesis for SSSC intersections.

Bold indicates LOS E or F operations.
Source: Fehr & Peers, March 2018

3.4 FIELD OBSERVATIONS

Field observations of the study intersections were conducted during the weekday AM and PM peak periods in January 2018 to confirm the calculated LOS operations and to observe overall transportation characteristics at the study facilities. In all cases, the intersections were observed to operate consistent with the calculated LOS for each peak hour.



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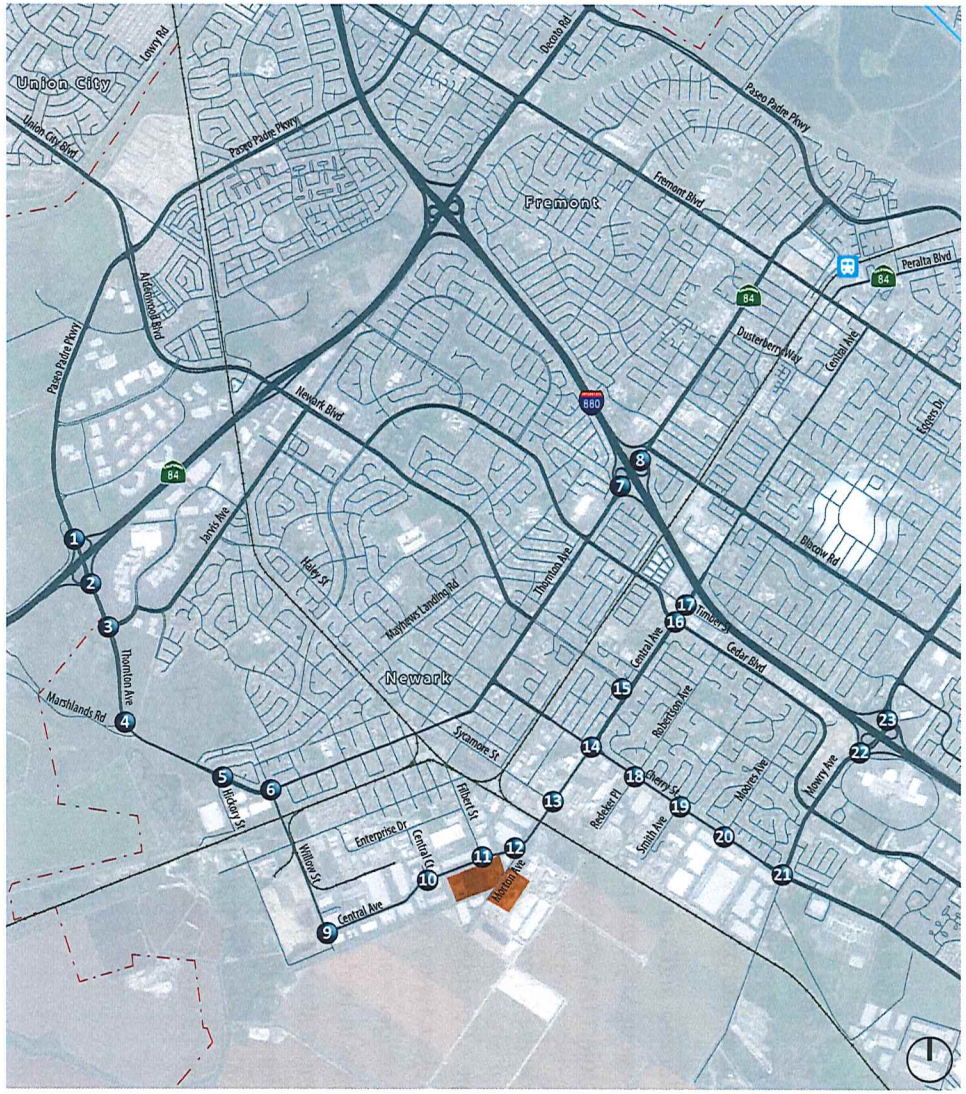
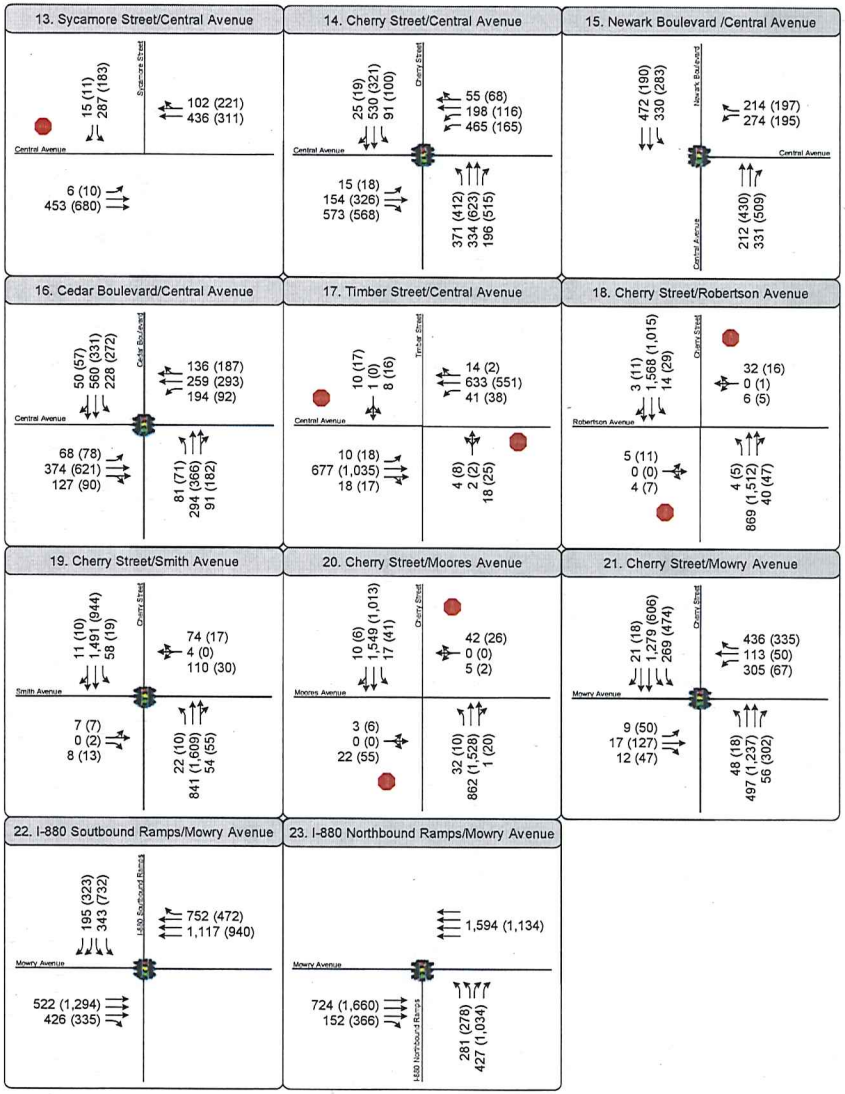
XX (YY) AM (PM) Peak Hour Traffic Volumes | Signalized Intersection | Stop Sign

Project Site | # Study Intersection

Figure 4A

Existing Conditions Peak Hour Intersection Traffic Volumes, Lane Configurations and Traffic Controls





LEGEND

XX (YY) AM (PM) Peak Hour Traffic Volumes | Signalized Intersection | Stop Sign

Project Site | # Study Intersection

Figure 4B

Existing Conditions Peak Hour Intersection Traffic Volumes, Lane Configurations and Traffic Controls

4.0 PROJECT TRAFFIC ESTIMATES

The amount of traffic expected to be generated on the study roadway system by the proposed project is estimated using a three-step process: (1) project trip generation, (2) trip distribution, and (3) trip assignment. The first step estimates the amount of project-generated traffic would be added to the roadway network. The second step estimates the direction of travel to and from the project site. During the third step, the new trips are assigned to specific street segments and intersection turning movements. This process is described in more detail in the following sections.

4.1 TRIP GENERATION

Trip generation is the process of estimating the number of vehicles that would likely access the project on any given day. Data from the Institute of Transportation Engineers' (ITE) *Trip Generation Manual, 9th Edition* was used to estimate vehicle trip generation for the proposed project. Project trip generation was estimated using the Industrial Park land use category (Land Use Code 130); a similar approach has been used for other industrial projects in the City of Newark.

Fehr & Peers considered but did not include the following trip generation adjustments:

- Internalized and Pass-by trips - The proposed project is anticipated to be a mix of office and warehousing uses without other trip-reducing land uses on site. Therefore, trip reductions for internalization and pass-by have not been assumed as part of this analysis.
- Non-motorized and transit project trips - Regularly scheduled transit service is provided along Central Avenue adjacent to the project site. However, transit trip reductions have not been taken for this project to be conservative.

Fehr & Peers made the following adjustment to the trip generation:

- Truck trips – Considering the industrial uses of the project, truck traffic is expected to be generated by the project. Heavy vehicles, such as trucks, have a greater impact on the transportation network than passenger cars. Therefore, the total project trips were increased. Based on the truck percentages in Table J.1 in the ITE *Trip Generation Handbook, 3rd Edition*, this analysis assumes that 13 percent of the project generated trips are trucks. A passenger car equivalent (PCE) is used to account for this traffic on study roadways. PCE rates are based on the size and carrying capacity of vehicles. According to the Transportation Research Board's Special Report 223, heavy-vehicles range from 1.5 to 3.7 PCEs. A PCE rate of 2.0 was applied for this study.

Table 4 summarizes the trip generation for the proposed project. The project would generate 4,180 daily trips, including 442 trips during the AM peak hour (363 inbound and 79 outbound) and 567 trips during the PM peak hour (119 inbound and 448 outbound).

TABLE 4: PROJECT TRIP GENERATION

Land Use Scenario	Quantity[1]	Daily	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Industrial Park[2]	604.8 ksf GFA	3,700	321	70	391	105	397	502
Truck adjustment [3]	13%	480	42	9	51	14	52	65
Industrial Park Total		***4,180***	***363***	***79***	***442***	***119***	***448***	***567***

Notes:
1. 1 ksf GFA = 1,000 square-feet gross floor area
2. ITE *Trip Generation Manual (9th Edition)* Land Use Code 130 (Industrial Park - Adj. Streets, 7-9 AM, 4-6 PM):
   Daily: T = 4.99 * (X) + 678.25
   AM Peak Hour: $T = e^{0.79*\ln(X)+0.91}$ (82% in, 18% out)
   PM Peak Hour: T = 0.78 * (X) + 30.48 (21% in, 79% out)
3. ITE *Trip Generation Handbook (3rd Edition)* Appendix J Land Use Code 130 (Industrial Park), 13 percent trucks with a PCE of 2.0

Source: Fehr & Peers, March 2018.

4.2 PROJECT TRIP DISTRIBUTION AND ASSIGNMENT

The geographical distribution of trips generated by the project is based on the locations of complementary land uses, the street system serving the project, and existing travel patterns in the area. The general directions of approach and departure assumed for the project trips are illustrated on **Figure 5**. Using this trip distribution pattern, the traffic generated by the project was assigned to the street network, and **Figure 6** shows the project-generated peak hour traffic volumes at the study intersections during the weekday AM and PM peak hours.

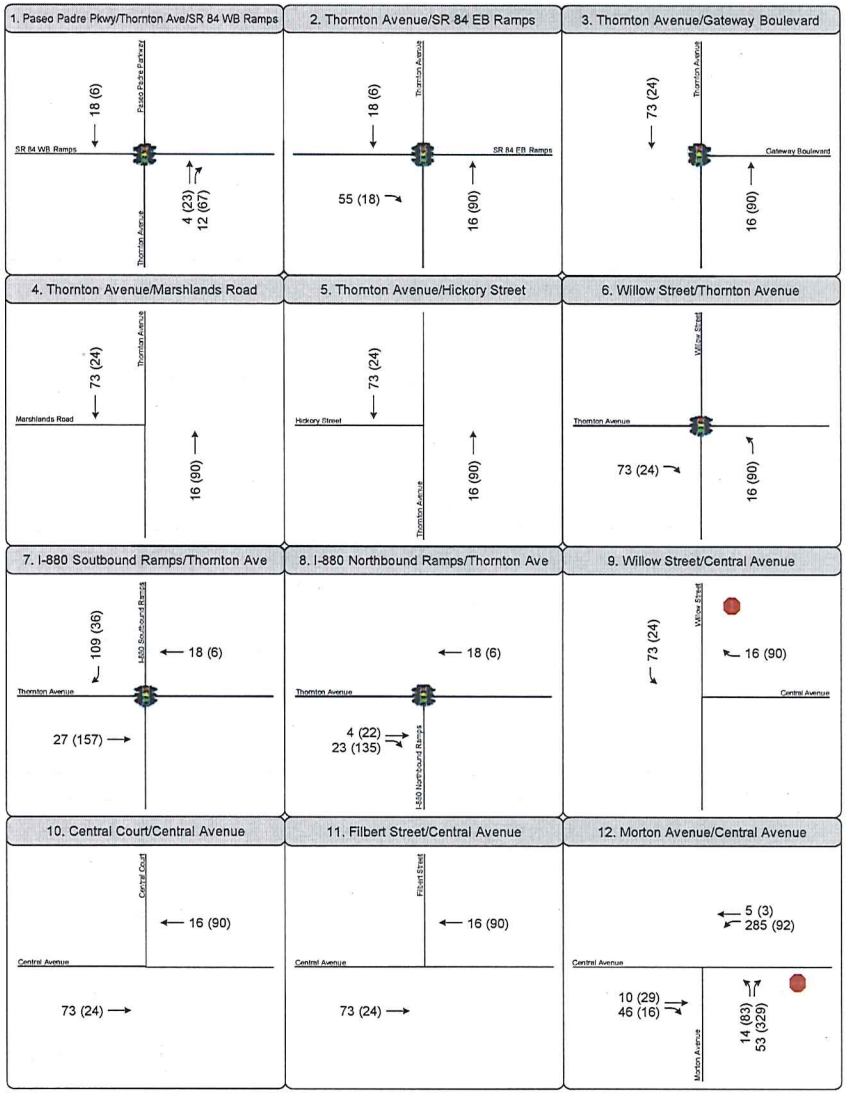
LEGEND

Project Site | # Study Intersection | XX% Project Trip Distribution

Figure 5

Project Trip Distribution

OK17-0231_5_TripDistro



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XX (YY) AM (PM) Peak Hour Traffic Volumes

Signalized Intersection

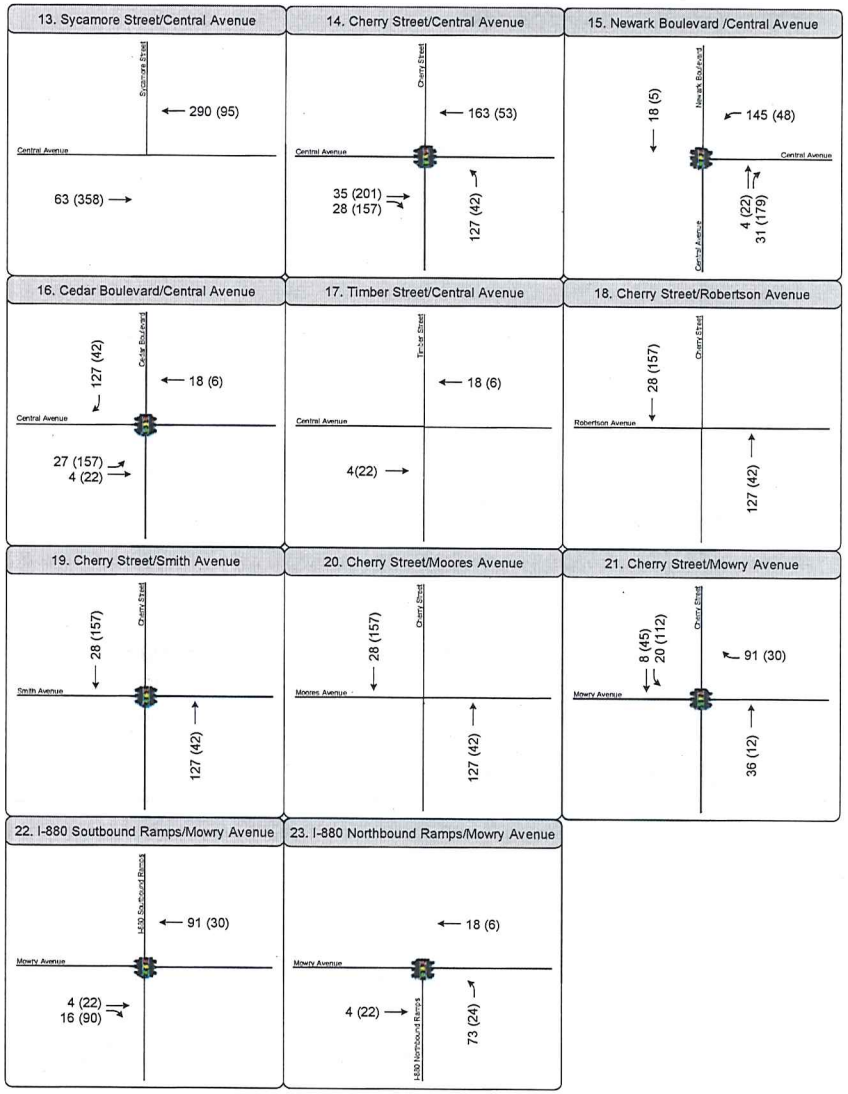
Stop Sign

Project Site

Study Intersection

Figure 6A

Project Trip Assignment



LEGEND

XX (YY) AM (PM) Peak Hour Traffic Volumes | Signalized Intersection | Stop Sign

Project Site | # Study Intersection

Figure 6B

Project Trip Assignment

5.0 EXISTING PLUS PROJECT CONDITIONS

This chapter presents the results of the operations analysis under Existing Plus Project Conditions. Under Existing Plus Project Conditions, project traffic estimated and assigned to the study intersections and roadway segments were added to existing traffic volumes. This scenario isolates the potential impacts of the project by excluding the impacts from other proposed projects.

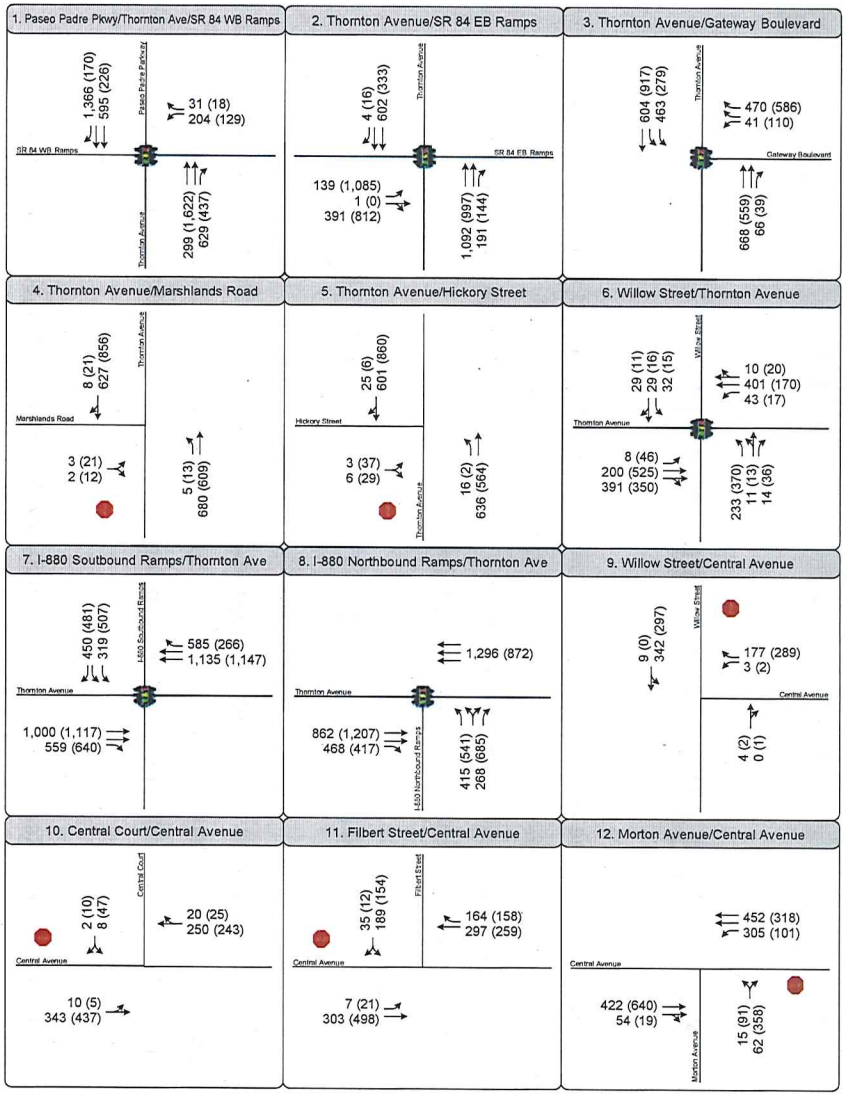
5.1 EXISTING PLUS PROJECT INTERSECTION LEVELS OF SERVICE

Intersection LOS was calculated with the traffic generated by the proposed project to evaluate the operating conditions of the intersections and identify potential impacts to the roadway system. Turning movement traffic volume and intersection lane configuration for the Existing Plus Project Conditions are illustrated on **Figure 7**.

Table 5 provides the results of the intersection LOS calculations for Existing Plus Project Conditions, and compares the results to the Existing Conditions. **Appendix B** contains the corresponding LOS calculation sheets.

The results of the LOS calculations indicate that the following intersections would not meet the City's LOS D standard under Existing Plus Project Conditions:

- Intersection #2: signalized Thornton Avenue/Eastbound SR 84 Ramps (LOS E in the PM peak hour)
- Intersection #5: side-street stop-controlled Thornton Avenue/Hickory Street (LOS E in the PM peak hour)
- Intersection #11: side-street stop-controlled Thornton Avenue/Filbert Street (LOS E in the PM peak hour)
- Intersection #12: side-street stop-controlled Thornton Avenue/Morton Street (LOS F in the PM peak hour)
- Intersection #13: side-street stop-controlled Central Avenue/Sycamore Street (LOS F in the AM and PM peak hours)
- Intersection #14: signalized Central Avenue/Cherry Street (LOS E in the AM peak hour)
- Intersection #18: side-street stop-controlled Cherry Street/Robertson Avenue (LOS F in the AM and PM peak hours)



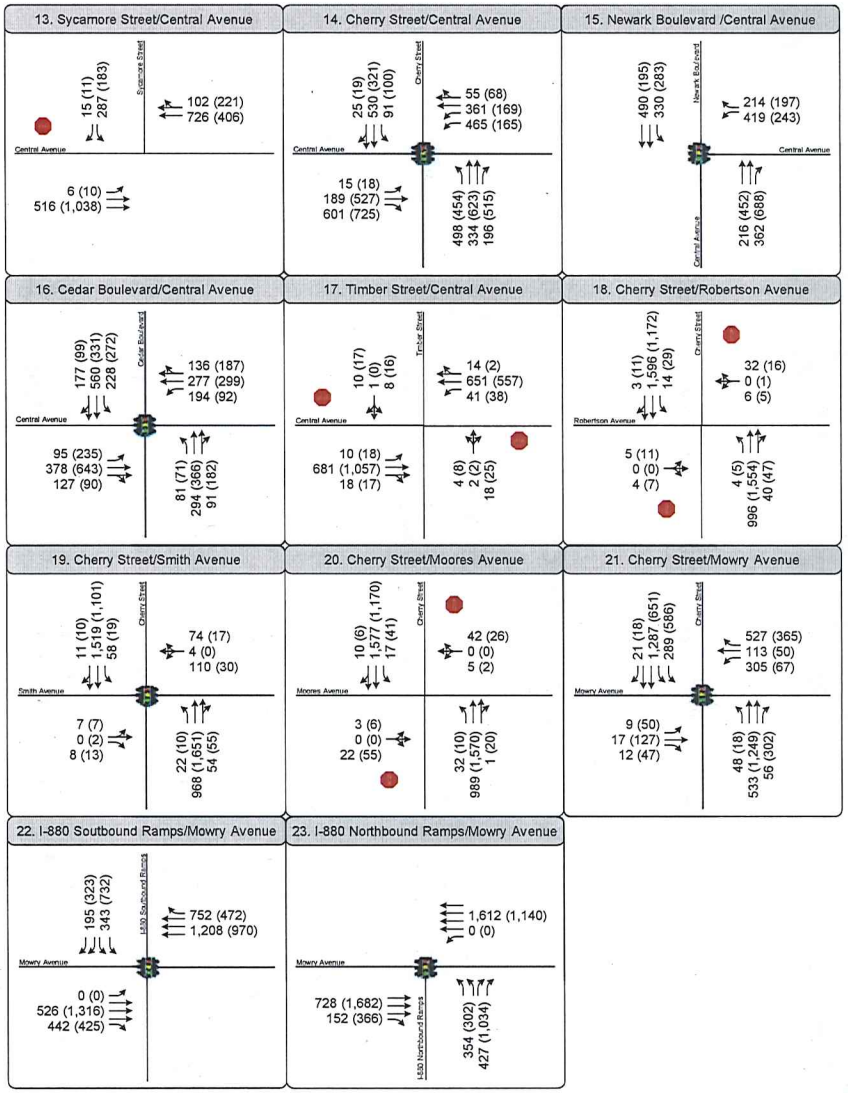
LEGEND

XX (YY) AM (PM) Peak Hour Traffic Volumes | Signalized Intersection | Stop Sign

Project Site | # Study Intersection

Figure 7A

Existing Plus Project Conditions Peak Hour Intersection Traffic Volumes, Lane Configurations and Traffic Controls



LEGEND

XX (YY) AM (PM) Peak Hour Traffic Volumes | Signalized Intersection | Stop Sign

Project Site | # Study Intersection

Figure 7B

Existing Plus Project Conditions Peak Hour Intersection Traffic Volumes, Lane Configurations and Traffic Controls

- Intersection #20: side-street stop-controlled Cherry Street/Moores Avenue (LOS F in the AM and PM peak hours)

TABLE 5: EXISTING PLUS PROJECT INTERSECTION LEVELS OF SERVICE

	Intersection	Control Type[1]	Peak Hour[2]	Existing Conditions		Exiting Plus Project Conditions		Significant Impact?
				Delay[3]	LOS[4]	Delay[3]	LOS[4]	
1	Paseo Padre Parkway/ Westbound SR 84 Ramps	Signal	AM PM	8 5	A A	8 5	A A	No No
2	Thornton Avenue/ Eastbound SR 84 Ramps	Signal	AM PM	5 **58**	A **E**	6 **63**	A **E**	No *Yes*
3	Thornton Avenue/ Gateway Boulevard	Signal	AM PM	9 8	A A	9 8	A A	No No
4	Thornton Avenue/ Marshlands Road	SSSC	AM PM	0 (22) 1 (29)	A (C) A (D)	0 (24) 1 (34)	A (C) A (D)	No No
5	Thornton Avenue/Hickory Street	SSSC	AM PM	0 (17) 2 (31)	A (C) A (D)	0 (19) **2 (36)**	A (C) **A (E)**	No No
6	Thornton Avenue/Willow Street	Signal	AM PM	12 14	B B	12 15	B B	No No
7	Thornton Avenue/ Southbound I-880 Ramps	Signal	AM PM	7 10	A B	7 10	A B	No No
8	Thornton Avenue/ Northbound I-880 Ramps	Signal	AM PM	11 18	B B	11 18	B B	No No
9	Central Avenue/Willow Street	SSSC	AM PM	8 (9) 9 (9)	A (A) A (A)	8 (9) 9 (10)	A (A) A (A)	No No
10	Central Avenue/Central Court	SSSC	AM PM	0 (12) 1 (15)	A (B) A (C)	0 (13) 1 (18)	A (B) A (C)	No No
11	Central Avenue/Filbert Street	SSSC	AM PM	5 (21) 5 (29)	A (C) A (D)	6 (26) **7 (43)**	A (D) **A (E)**	No No
12	Central Avenue/Morton Avenue	SSSC	AM PM	0 (11) 1 (13)	A (B) A (B)	4 (25) **53 (>120)**	A (D) **F (F)**	No *Yes*
13	Central Avenue/Sycamore Street	SSSC	AM PM	**20 (88)** **6 (43)**	**C (F)** **A (E)**	**69 (>120)** **16 (>120)**	**F (F)** **C (F)**	*Yes* *Yes*
14	Central Avenue/Cherry Street	Signal	AM PM	39 29	D C	**68** 51	**E** D	*Yes* No
15	Central Avenue/Newark Boulevard	Signal	AM PM	15 13	B B	21 14	C B	No No
16	Central Avenue/Cedar Boulevard	Signal	AM PM	25 27	C C	25 30	C C	No No
17	Central Avenue/Timber Street	SSSC	AM PM	1 (22) 1 (28)	A (C) A (D)	1 (22) 1 (29)	A (C) A (D)	No No

TABLE 5: EXISTING PLUS PROJECT INTERSECTION LEVELS OF SERVICE

	Intersection	Control Type[1]	Peak Hour[2]	Existing Conditions		Exiting Plus Project Conditions		Significant Impact?
				Delay[3]	LOS[4]	Delay[3]	LOS[4]	
18	Cherry Street/Robertson Avenue	SSSC	AM PM	**1 (>120)** **2 (120)**	**A (F)** **A (F)**	**2 (>120)** **3 (>120)**	**A (F)** **A (F)**	No No
19	Cherry Street/Smith Avenue	Signal	AM PM	13 6	B A	13 7	B A	No No
20	Cherry Street/Moores Avenue	SSSC	AM PM	**2 (90)** **2 (42)**	**A (F)** **A (E)**	**2 (114)** **2 (58)**	**A (F)** **A (F)**	No No
21	Cherry Street/Mowry Avenue	Signal	AM PM	33 26	C C	33 29	C C	No No
22	Mowry Avenue/ Southbound I-880 Ramps	Signal	AM PM	12 17	B B	12 17	B B	No No
23	Mowry Avenue/ Northbound I-880 Ramps	Signal	AM PM	12 25	B C	12 25	B C	No No

Notes:
1. SSSC = Side Street Stop Control, Signal = Signalized intersection.
2. AM = morning peak hour, PM = evening peak hour
3. Delay calculated using HCM 2010 methodologies. Whole-intersection average delay presented for signalized intersections. Whole intersection average delay and worst movement delay presented in parenthesis for SSSC intersections.

Bold indicates LOS E or F operations.
Source: Fehr & Peers, March 2018

5.2 SIGNAL WARRANT ANALYSIS

The peak-hour signal warrant (Warrants 3A and 3B) from the *Manual on Uniform Traffic Control Devices* (MUTCD) was used to evaluate unsignalized intersections that operate at LOS E or F under Existing Plus Project Conditions to determine if a traffic signal is warranted. The following intersections meet Signal Warrants 3A and 3B[1] (see **Appendix C**):

[1] This analysis is intended to examine the general correlation between the current level of development in the region and the need to install new traffic signals. It estimates current traffic compared against a sub-set of the standard traffic signal warrants recommended in the Federal Highway Administration *Manual on Uniform Traffic Control Devices* and associated California MUTCD guidelines. This analysis should not serve as the only basis for deciding whether and when to install a signal. To reach such a decision, the full set of warrants should be investigated by an experienced engineer based on field-measured rather than forecast traffic data and a thorough study of traffic and roadway conditions. Furthermore, the decision to install a signal should not be based solely upon the warrants, since the installation of signals can lead to certain types of collisions. The appropriate agency should undertake regular monitoring of actual

- Central Avenue/Morton Avenue during the PM peak hours
- Central Avenue/Sycamore Street during the AM and PM peak hours

5.3 EXISTING PLUS PROJECT INTERSECTION IMPACTS

This section of the report evaluates the intersection LOS results presented in **Table 5** against the intersection impact significance criteria presented in **Section 2.5**.

Impact 1: Thornton Avenue/Eastbound SR 84 Ramps (Intersection #2) – The addition of project trips at the signalized Thornton Avenue/Eastbound SR 84 Ramps intersection would exacerbate LOS E operating conditions in the PM peak hour and increase the average delay at the intersection by more than 4.0 seconds. Therefore, the impact to this intersection is a **significant impact**.

Impact 2: Central Avenue/Morton Avenue (Intersection #12) – The addition of project trips at the side-street stop-controlled Central Avenue/Morton Avenue intersection would degrade PM peak hour operating conditions from LOS B under Existing Conditions to LOS F under Existing Plus Project Conditions. Because the intersection would meet signal warrants 3A and 3B, the impact to this intersection is a **significant impact**.

Impact 3: Central Avenue/Sycamore Street (Intersection #13) – The addition of project trips at the side-street stop-controlled Central Avenue/Sycamore Street intersection would exacerbate LOS F operating conditions in the AM and PM peak hours and increase the average delay for the worst movement at the intersection by more than 4.0 seconds. Because the intersection meets signal warrants 3A and 3B, the impact to this intersection is a **significant impact**.

Impact 4: Central Avenue/Cherry Street (Intersection #14) – The addition of project trips at the signalized Central Avenue/Cherry Street intersection would degrade AM peak hour operating conditions from LOS D under Existing Conditions to LOS E under Existing Plus Project Conditions. Therefore, the impact to this intersection is a **significant impact**.

The following unsignalized intersections would operate at LOS E or F but would not meet the signal warrants. Although, the addition of project trips would increase the average delay for the worst movement at the intersection by more than 4.0 seconds, the impact is **less-than-significant**.

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traffic conditions and accident data, and timely re-evaluation of the full set of warrants to prioritize and program intersections for signalization.

- Intersection #5: Thornton Avenue/Hickory Street (LOS E in the PM peak hour)
- Intersection #11: Thornton Avenue/Hickory Street (LOS E in the PM peak hour)
- Intersection #18: Cherry Street/Robertson Avenue (LOS F in the AM and PM peak hour)
- Intersection #20: Cherry Street/Moores Avenue (LOS F in the AM and PM peak hour)

Measures to mitigate the significant impact are presented in **Section 5.4.**

5.4 EXISTING PLUS PROJECT IMPACT MITIGATION MEASURES

This section details the mitigation measures for the significant intersection impacts under the Existing Plus Project Conditions.

5.4.1 THORNTON AVENUE/EASTBOUND SR 84 RAMPS (INTERSECTION #2)

The project would result in a significant impact at the Thornton Avenue/Eastbound SR 84 Ramps intersection by exacerbating the LOS E operations during the PM peak hour and increasing the average intersection delay by more than 4.0 seconds.

Mitigation Measure 1:

- *In coordination with Caltrans, optimize the PM peak hour signal timings at the Thornton Avenue/ Eastbound SR 84 Ramps* intersection.

Optimizing PM peak hour signal timings at this intersection to increase the eastbound green time for eastbound movements would improve intersection operations to LOS D, and mitigate the impact to a **less-than-significant** level.

5.4.2 CENTRAL AVENUE/MORTON AVENUE (INTERSECTION #12)

The project would result in a significant impact at the Central Avenue/Morton Avenue intersection by degrading PM peak hour operations from LOS B under Existing Conditions to LOS F under Existing Plus Project Conditions and meeting signal warrants.

Mitigation Measure 2:

- *Install an actuated-uncoordinated signal at the Central Avenue/Morton Avenue intersection with protected northbound and westbound left turns*

Signalizing the intersection would improve intersection operations to LOS A during the AM peak hour and LOS B during the PM peak hour, and mitigate the impact to a **less-than-significant** level.

5.4.3 CENTRAL AVENUE/SYCAMORE STREET (INTERSECTION #13)

The project would result in a significant impact at the Central Avenue/Sycamore Street intersection by degrading AM peak hour operations from LOS E under Existing Conditions to LOS F under Existing Plus Project Conditions and meeting signal warrants. Also, the project would exacerbate the LOS F operations during the PM peak hour and increasing the average intersection delay by more than 4.0 seconds.

Mitigation Measure 3:

- *Install an actuated-uncoordinated signal at the Central Avenue/Sycamore Street intersection with protected southbound and eastbound left turns*

Signalizing the intersection to allow protected left turns would improve intersection operations to LOS A for the AM and PM peak hours, and mitigate the impact to a **less-than-significant** level.

5.4.4 CENTRAL AVENUE/CHERRY STREET (INTERSECTION #14)

The project would result in a significant impact at the Central Avenue/Cherry Street intersection by degrading AM peak hour operations from LOS D under Existing Conditions to LOS E under Existing Plus Project Conditions.

Mitigation Measure 4:

- *Optimize AM peak hour signal timings at the Central Avenue/Cherry Street intersection*

Optimizing AM peak hour signal timings at this intersection to provide increased green time for northbound left turns would improve overall intersection operations to LOS D, and mitigate the impact to a **less-than-significant** level.

Table 6 summarizes the intersection LOS calculations for the mitigation measures.

TABLE 6: MITIGATION MEASURES INTERSECTION LEVELS OF SERVICE

	Intersection	Control Type[1]	Peak Hour[2]	Exiting Plus Project Conditions		Exiting Plus Project Conditions - Mitigated	
				Delay[3]	LOS[4]	Delay[3]	LOS[4]
2	Thornton Avenue/ Eastbound SR 84 Ramps	Signal	AM	6	A	6	A
			PM	**63**	**E**	39	D
12	Central Avenue/Morton Avenue	SSSC/ Signal[4]	AM	4 (25)	A (D)	5	A
			PM	**53 (>120)**	**F (F)**	11	B
13	Central Avenue/Sycamore Street	SSSC/ Signal[4]	AM	**69 (>120)**	**F (F)**	9	A
			PM	**16 (>120)**	**C (F)**	7	A
14	Central Avenue/Cherry Street	Signal	AM	**68**	**E**	53	D
			PM	51	D	51	D

Notes:

1. SSSC = Side Street Stop Control, Signal = Signalized intersection.
2. AM = morning peak hour, PM = evening peak hour
3. Delay calculated using HCM 2010 methodologies. Whole-intersection average delay presented for signalized intersections. Whole intersection average delay and worst movement delay presented in parenthesis for SSSC intersections.
4. Intersections #12 and #13 are SSSC under the Existing Plus Project scenario and signalized under the Existing Plus Project – Mitigated scenario.

Bold indicates intersection operations at LOS E or LOS F.
Source: Fehr & Peers, March 2018

6.0 PARKING ANALYSIS

This chapter compares the proposed project parking supply against the City of Newark's Zoning Ordinance parking requirements. The project site is located in a General Industrial zone, which is intended to accommodate a broad range of manufacturing, warehousing, wholesaling, and distribution uses. Section 17.23.040 of the City of Newark Zoning Ordinance specifies requirements for the provision of on-site parking. For industrial uses, one on-site parking space is required per 1,000 square feet of floor area. For offices, one on-site parking space is required per 300 square feet of gross floor area.

Required parking spaces serving non-residential uses must be located on the same land parcel as the use they serve. Therefore, the parking analysis was conducted for each project building separately as well as for the project overall. **Table 7** compares the proposed on-site parking supply with City requirements for each project building and for the whole project.

TABLE 7: PARKING ANALYSIS

	Unit	Building 1[1]	Building 2[1]	Building 3[1]	Building 4[1]	Project Total[2]
Industrial Space	ksf GFA[3]	153.6	134.2	67.6	214.4	569.8
Office Space	ksf GFA[3]	8.1	7.1	8.5	11.2	34.9
Area Total	ksf GFA[3]	161.7	141.3	76.1	225.6	604.7
Parking Supply[1]	***# of spaces***	***181***	***159***	***136***	***254***	***730***
Industrial Parking Requirement[4]	# of spaces	154	135	68	215	572
Office Parking Requirement[4]	# of spaces	27	24	29	38	118
Total Parking Requirement[4]	***# of spaces***	***181***	***159***	***97***	***253***	***690***
Parking Surplus	***# of spaces***	**0**	**0**	**+39**	**+1**	**+40**

Notes:

1. Parking supply, building numbers, and building sizes (areas) are as indicated on Figure 1 (Project Site Plan).
2. The values in the Project Total column are the sum of the values under the Buildings 1, 2, and 3, and Building 4 columns.
3. 1 ksf GFA = 1,000 square-feet gross floor area
4. Required number of on-site parking spaces per Table 17.23.040 of the City of Newark Zoning Ordinance; Industrial: 1 space per 1,000 GFA; Office: 1 space per 300 GFA.

Source: Fehr & Peers, March 2018.

As shown in **Table 7**, the proposed project would provide 730 parking spaces, which would exceed the 690 spaces required by the City Code by 40 spaces. When considering the project buildings separately, Buildings 1 and 2 would meet, and Buildings 3 and 4 would exceed the Code requirements.

7.0 SITE PLAN REVIEW AND RECOMMENDATIONS

The project site plan (dated February 15, 2018, and shown on **Figure 1**) details the multimodal access and on-site circulation configuration for the project site.

The site plan review consists of the following elements:

- Motor vehicle circulation and access
- Site access and interface with roadway network
- Pedestrian access and circulation within and adjacent to the site
- Bicycle access and circulation within and adjacent to the site
- Emergency vehicle access and circulation
- Truck access and loading/unloading areas

7.1 MOTOR VEHICLE CIRCULATION AND ACCESS

A ring parking access/circulator roadway provides internal access to all sides of Buildings 1, 2, and 3, except for the south side of Building 3. For Building 4, a full ring parking access/circulator roadway is. The on-site circulator roadways would have a minimum width of 26 feet, which would accommodate two vehicles traveling in opposite directions at the same time. Interface areas between the circulator roadway and driveway access points are open and free of obstructions. Parking stalls are provided along one or both sides of most sections of the circulator roadways. The circulator roadways provide adequate space for vehicles maneuvering in and out of the parking spaces.

7.2 SITE ACCESS AND INTERFACE WITH ROADWAY NETWORK

Vehicle access for Buildings 1, 2, and 3 is provided by a full access driveway on Central Avenue and two full access driveways on Morton Avenue. Vehicle access for Building 4 is provided by three full access driveways on Morton Avenue. All movements would be allowed at all driveways. The driveways have throat depths between 25 and 45 feet. The minimum 25-foot throat depth provides adequate space for one vehicle to queue without conflicting with the internal circulator roadway. Trucks would access the site via the driveways on Morton Avenue. The driveways would have adequate lane width to accommodate right- and left-turn movements to/from Morton Avenue. **Section 7.6** discusses truck access in further detail.

7.3 PEDESTRIAN ACCESS AND CIRCULATION

Pedestrian paths of travel through the project site are indicated by a dashed line on the project site plan. Pedestrians would access Buildings 1, 2, and 3 from Central Avenue using a sidewalk on the west side of the Central Avenue driveway. This sidewalk connects to a crosswalk across the circulator roadway, providing direct access to Building 3. Pedestrian access to Buildings 1 and 2 would be provided from Building 3 via internal walkways and striped crosswalks across the circulator roadway. Additional pedestrian access to Buildings 1, 2, and 3 is provided by sidewalks on the west side of both driveways on Morton Avenue connecting to internal walkways and crosswalks across the circulator roadway.

Pedestrians would access Building 4 from two pedestrian paths located near the west and east driveways on Morton Avenue. These paths connect to crosswalks across the circulator roadway, providing direct access to Building 4. Pedestrians walking between Buildings 1, 2, and 3 to the north and Building 4 to the south would cross Morton Avenue. Pedestrians wishing to cross Central Avenue, including pedestrians traveling between the bus stops on Central Avenue and the project site, would likely cross at the Central Avenue/ Morton Avenue intersection, which would be signalized as a result of Mitigation Measure 2, described in Section 5.4.2 of this report, which would provide a signal-protected pedestrian crossing.

7.4 BICYCLE ACCESS, CIRCULATION AND PARKING

Bicyclists would access the project site via all driveways and would use the circulator roadway to access each building entrance. The site design would facilitate bicycle access from the street to each building entrance.

The site plan shows exterior bicycle racks outside every building entrance. The provision of secure, long-term bicycle parking is not shown. For industrial uses, the Newark Zoning Ordinance does not require short-term bicycle parking. Secure, long-term bicycle parking is required for any establishment with 25 or more full time employees. One long-term bicycle parking space per 30 vehicle spaces is required within 100 feet of each building entrance. At least 60 percent of the long-term bicycle parking must be covered either inside a building, under roof overhangs, or in bicycle lockers. Thus, the project is required to provide a minimum of 24 long-term bicycle parking spaces.

7.5 EMERGENCY VEHICLE ACCESS

Service and emergency vehicles would access the project site from any of the six driveways. A ring parking access/circulator roadway provides internal access to all sides of Buildings 1, 2, and 3 except for the south

side of Building 3. For Building 4, a full ring parking access/circulator roadway would be provided. The on-site circulator roadways are designated as fire lanes and would have a minimum width of 26 feet, which would provide adequate space for emergency vehicles to maneuver. All areas of the project site are accessible from at least two directions in the event of blockage of an internal roadway. Therefore, the project would not conflict with existing or planned emergency response routes, nor would it provide inadequate access to accommodate emergency vehicles.

7.6 TRUCK ACCESS AND LOADING/UNLOADING AREAS

Trucks would access the site via the 35-foot wide driveways on Morton Avenue. Truck bays for loading/unloading are provided along the east side of Buildings 1 and 2, along the west side of Building 3, and along the south side of Building 4.

A truck turn analysis (using AutoTurn) of ingress/egress between the public roadway system and the truck bays was performed; the outputs of this analysis are included in **Appendix D**. The analysis was performed using the AASHTO WB-67 truck type (a tractor-trailer combination with a 53-foot trailer); considering the site's proximity to the Interstate system (which allows WB-67 trucks), this vehicle was selected as the design vehicle.

The analysis shows that Morton and Central Avenues would accommodate trucks turning right and left in and out of the project driveways. Within the project site, trucks would have at least one clear path of entry or exit between at least one project driveway and each truck bay. Trucks would not conflict with any parking stalls or curbs while navigating through the site and into and out of the truck bays.

7.7 RECOMMENDATIONS

Based on the site plan analysis above, the following recommendation has been developed to improve site access and on-site circulation.

Provide secure long-term bicycle parking for each building – To improve bike accessibility and comply with the City of Newark Zoning Ordinance of one secure long-term bicycle parking space for every 30 vehicle spaces serving each building, provide at least 24 secure bicycle parking spaces.