



TRAFFIC IMPACT STUDY

Project Pumpkin – Huntley, Illinois

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01. Introduction

Sam Schwartz Consulting (Sam Schwartz) was retained by Jacob & Hefner Associates to conduct a traffic impact study for a proposed industrial development in Huntley, Illinois. The subject site is located on the north side of Freeman Road east of Illinois Route 47 (IL 47) and is currently used for agricultural purposes. An aerial view of the existing study area can be seen in **Figure 1**.

As proposed, the southern portion of the subject site would be developed as an approximate 650,000 square-foot industrial building that would operate as a fulfillment/receive center. Two additional industrial use buildings totaling approximately 1.7 million square feet of gross floor area were assumed for the purposes of this study in accordance with the site master plan. These two buildings on the northern portion of the site are speculative in nature and assumed to operate as storage and distribution facilities. Site access would be provided to Freeman Road via a new roadway and two proposed access driveways, labeled as “New Road”, Access 1, and Access 2 for the purposes of this study. The proposed New Road would align opposite Factory Shops Boulevard approximately one half-mile east of Freeman Road’s intersection with IL 47, providing full access to the site. Access 1 would align opposite the existing Weber Truck Access approximately 920 feet east of New Road, and is envisioned as an inbound-only truck driveway. Access 2 would be located between New Road and Access 1—approximately 590 feet east of New Road and 330 feet west of Access 1—and is envisioned as a right-in/right-out driveway providing passenger vehicle access to the building located on the southern portion of the site.

The following report documents Sam Schwartz’s methodology regarding data collection, traffic forecasting, and analyses performed for this study. As a key influencing element of this study, it must be noted that the current COVID-19 pandemic and resulting state of emergency in the United States has resulted in widespread work-from-home arrangements and significant changes to daily commuting behaviors. Traffic volumes throughout the region continue to be reduced, resulting in the need to consider adjusting field-collected turning movement counts to reflect levels consistent with historic averages. Details of the field data collection process and subsequent adjustments are included in this report, providing a baseline from which existing and future traffic operations were evaluated. Recommended improvements are documented to mitigate anticipated traffic-related impacts resulting from the proposed development and to improve the functionality of the local transportation system.



Not to Scale



Figure 1
Site Location Map

02. Existing Conditions

Sam Schwartz conducted a field visit to collect relevant information pertaining to the site, the surrounding street network, traffic volumes, traffic controls, lane geometry, and infrastructure at the study intersections. Based on these characteristics, existing intersection capacity was evaluated to establish baseline operational conditions for the study area. This section of the report provides a description of these existing characteristics.

2.1. Area Land Use & Connectivity

Located along the north side of Freeman Road east of IL 47, the subject parcel is currently agricultural in use. Adjacent residential land is located to the immediate east of the site, while industrial and commercial uses are present to the immediate west and south of the site, including a Weber Grill Warehouse and the Huntley Automall to the south of Freeman Road, as well as a separate Weber Grill facility between the subject site and IL 47. The vacant Huntley Premium Outlets development is located directly south of the site between the Automall and Weber Grill parcels. To the north of the site, land uses are largely residential and belong primarily to the Village of Huntley, as well as the neighboring communities of Lakewood and Lake in the Hills.

The subject property currently fronts Freeman Road along the entirety of its southern frontage. Approximately one-half mile west of the site, Freeman Road intersects with IL 47, an Illinois Department of Transportation (IDOT) Strategic Regional Arterial (SRA) and Class II truck route that provides regional connectivity to the north and south. Approximately one-quarter mile south of Freeman Road, IL 47 intersects Interstate 90 (I-90) at a full-access, partial cloverleaf interchange.

2.2. Existing Street Characteristics

Field data collection was performed along the primary study roadways of IL 47, Del Webb Boulevard/Oak Creek Parkway, Jim Dhamer Drive/Freeman Road, the Interstate 90 interchange ramps, and the access driveways to the Weber Grill Warehouse south of Freeman Road. Descriptions of these roadways are provided below.

Illinois Route 47 is a north-south multi-lane divided roadway that is designated as an SRA by IDOT. The SRA system is designed to promote throughput on regionally significant corridors with the use of such strategies as access management and limited signalization. At its signalized intersection with Del Webb Boulevard and Oak Creek Parkway, IL 47 provides a dedicated left-turn lane, two dedicated through lanes, and a dedicated right-turn lane on both its north and southbound approaches. At its signalized intersection with Jim Dhamer Drive and Freeman Road, IL 47 provides dual left-turn lanes, three dedicated through lanes, and a dedicated right-turn lane on its southbound approach. On the northbound approach, dual left-turn lanes, four dedicated through lanes, and a dedicated right-turn lane are provided. At its signalized intersection with the I-90 West ramp junction, IL 47 provides two dedicated through lanes and a dedicated right-turn lane on its southbound approach, and dual left-turn lanes and two dedicated through lanes on its northbound approach. Approximately 300 feet south of this intersection, IL 47 intersects with the westbound to southbound I-90 loop ramp and widens to four lanes. Approximately 800 feet further south, IL 47 provides access to eastbound I-90 via a second loop ramp (which is accessed via a shared through/right-turn lane). At its signalized intersection with the I-90 eastbound off-ramp, IL 47 provides four travel lanes in the southbound direction, three travel lanes in the northbound direction, and

no dedicated turning lanes (the ramp at this location is exit-only). Additionally, a free-flow on-ramp to eastbound I-90 diverges from northbound IL 47 approximately 400 feet south of the eastbound off-ramp, providing a dedicated right-turn lane. A 45 MPH speed limit sign is posted on IL 47.

Del Webb Boulevard is an east-west, four-lane Major Collector that terminates at IL 47 approximately 3,000 feet north of Freeman Road's intersection with IL 47, forming the west leg of the intersection. To the west of IL 47, Del Webb Boulevard provides access to Sun City Huntley. At its signalized intersection with IL 47, Del Webb Boulevard provides a dedicated left-turn lane, a dedicated through lane, and a dedicated right-turn lane, plus two receiving lanes on its eastbound approach. A 35 MPH speed limit is posted, and Del Webb Boulevard is under the jurisdiction of the Village of Huntley.

Oak Creek Parkway is an east-west, two-lane Local Road that terminates at IL 47, aligning opposite Del Webb Boulevard. Oak Creek Parkway extends approximately 1,300 feet to the east of IL 47, providing access to several commercial developments and a Weber Grill warehousing facility. At its signalized intersection with IL 47, Oak Creek Parkway provides a dedicated left-turn lane, a shared through/right-turn lane, and a single receiving lane on its westbound approach. A 30 MPH speed limit is posted on Oak Creek Parkway, which is under the jurisdiction of the Village of Huntley.

Jim Dhamer Drive is an east-west, four-lane local road that intersects IL 47 opposite Freeman Road. At its signalized intersection with IL 47, Jim Dhamer Drive provides dual left-turn lanes, two dedicated through lanes, and a dedicated right-turn lane on its eastbound approach. Jim Dhamer Drive has a posted speed limit of 35 MPH and is under the jurisdiction of the Village of Huntley.

Freeman Road is an east-west Minor Collector that runs along the south frontage of the subject site. At its west end, Freeman Road intersects IL 47 approximately 1,600 feet north of IL 47's intersection with the I-90 West ramp junction. Between IL 47 and the Weber Truck Access, Freeman Road provides a four-lane section. East of the Weber Truck Access, Freeman Road narrows to a three-lane section (one travel lane in each direction plus a shared left-turn lane). At its signalized intersection with IL 47, Freeman Road provides dual left-turn lanes, two dedicated through lanes, and a dedicated right-turn lane on its westbound approach. At its minor-leg stop-controlled intersection with Factory Shops Boulevard, Freeman Road provides two dedicated through lanes and a dedicated right-turn lane on its eastbound approach. On the westbound approach, a dedicated left-turn lane and two dedicated through lanes are provided. At both the Weber Truck Access and Weber Employee Access, Freeman Road provides a dedicated through lane and a dedicated right-turn lane on its eastbound approaches, and a dedicated left-turn lane and a dedicated through lane on its westbound approaches. At its unsignalized T intersection with Carriage Way Lane, Freeman Road provides a shared left/through lane on the eastbound approach and a shared through/right-turn lane on the westbound approach. In the study area, Freeman Road has a posted speed limit of 35 MPH and is under the jurisdiction of the Village of Huntley.

Factory Shops Boulevard is a private access driveway which served the Huntley Premium Outlets development on the south side of Freeman Road until its demolition in 2018. With the closure of the outlet mall development, the traffic signal equipment at the intersection of Factory Shops Boulevard and Freeman Road has been turned off and bagged and a minor-leg stop controlled intersection is assumed. The northbound approach at this intersection provides dual left-turn lanes and a dedicated right-turn lane but has been barricaded to prevent traffic from accessing the vacant site to the south. A speed limit of 30 MPH was assumed on Factory Shops Boulevard for the purposes of this study.

The Weber Grill Warehouse development located east of the vacant Huntley Premium Outlets parcel provides three access driveways to Freeman Road, including a **Truck Access** and an **Employee Access**. The truck access is located approximately 920 feet east of Factory Shops Boulevard and provides a dedicated left-turn lane and a dedicated right-turn lane on its northbound approach. The employee access, located approximately 580 feet east of the truck access, provides a single shared left/right-turn lane on its northbound approach. Both driveways were assumed to have speed limits of 30 MPH for the purposes of this study.

Carriage Way Lane is a north-south, two-lane local road located approximately 500 feet from eastern site boundary. At its unsignalized T intersection with Freeman Road, the southbound approach of Carriage Way Lane provides a single shared left/right-turn lane and operates under minor-leg stop control. A 25 MPH speed limit is posted on Carriage Way Lane, which is under the jurisdiction of Rutland Township.

Interstate 90 meets IL 47 at a full-access interchange that was completed in 2013. This interchange is configured as a partial cloverleaf with signalized control at the westbound ramp junction (where the on- and off-ramps align opposite each other) and at the eastbound off-ramp junction. A single-lane, free-flow directional on-ramp is provided onto eastbound I-90 from northbound IL 47. Additionally, two westbound-to-southbound and southbound-to-eastbound single-lane loop ramps provide access to southbound IL 47 and eastbound I-90, respectively. At its signalized intersection with IL 47, the westbound off-ramp provides two westbound right-turn lanes. Signage at this approach restricts right-turn movements during red phases to the inside lane only. The eastbound off-ramp provides dual left-turn lanes and a dedicated right-turn lane. Posted advisory speeds of 30 MPH and 40 MPH are present on the westbound and eastbound off-ramps, respectively. The westbound-to-southbound loop ramp to IL 47 is posted at 25 MPH. All interchange ramps are under the jurisdiction of the Illinois State Toll Highway Authority.

2.3. Existing Traffic Volumes

Intersection turning movement counts (TMCs) were conducted in December 2020 in order to identify existing traffic volumes within the study area. The intersections that were counted for this study are listed below:

- Illinois Route 47 and Oak Creek Parkway/Del Webb Boulevard
- Illinois Route 47 and Jim Dhamer Drive/Freeman Road
- Illinois Route 47 and I-90 westbound ramp junction
- Illinois Route 47 and southbound-to-eastbound I-90 loop ramp
- Illinois Route 47 and I-90 eastbound ramp junction
- Illinois Route 47 and northbound-to-eastbound I-90 direct ramp
- Freeman Road and Factory Shops Boulevard
- Freeman Road and Weber Grill Truck Access
- Freeman Road and Weber Grill Employee Access
- Freeman Road and Carriage Way Lane¹

Volumes on the westbound-to-southbound IL 47 loop ramp were determined using counts performed at the adjacent intersections on IL 47. Counts were performed during the weekday morning and weekday

¹Existing counts utilized from Huntley Commercial Center TIA (by others, collected 2018) based on direction from the Village of Huntley

evening peak periods (6:00-9:00AM and 3:00-7:30PM, respectively) in order to coincide with peak activity on the area roadway network and planned shift schedules for the proposed development. Based on the resulting count data, the observed peak hours took place from 7:15-8:15AM during the weekday morning and from 3:30-4:30PM during the weekday evening. Based on these counts, it can be seen that the study area shows a general commuter pattern on IL 47, with heavier southbound travel (toward I-90) in the morning peak hour and heavier northbound travel (from I-90) in the evening peak hour.

Notably, however, the site is expected to generate little traffic during the street network's peak hours of 7:15AM and 3:30PM. The proposed site is expected to observe a morning peak hour (referred to within the traffic engineering industry as the "peak hour of generator") from 6:00-7:00AM as employees depart and arrive to the facility for their respective shifts. The evening peak hour of generator is anticipated to occur from 5:30-6:30PM during the evening shift change. Conversely, during the morning peak hour of the adjacent street, the site is only expected to generate approximately 20 percent of the trips generated during the peak of generator, and during the PM peak hour of the adjacent street, the site is expected to generate only 13 percent of the peak of generator. As such, the 6:00-7:00AM and 5:30-6:30PM peak hours were utilized to provide a conservative analysis with regard to total site traffic. Combining background and site generated trips, the total network volume in the 6:00AM analysis hour is within 3 percent of the 7:00AM hour. In the evening peak hour, the total network volume in the 5:30PM peak is within 7 percent of the 4:00PM hour.

To supplement these peak period counts and account for the current COVID-19 pandemic, Sam Schwartz obtained historical Average Daily Traffic (ADT) data on IL 47, Del Webb Boulevard, Jim Dhamer Drive, and Freeman Road from the IDOT website for the most recent reporting years (2018-2019). Sam Schwartz sorted the historical data by hour and selected the peak bi-directional traffic volumes during both the morning and evening peak periods. These volumes were compared to the peak hour volumes collected as a part of this study's data collection effort during the morning and evening peak periods. The compiled volumes are summarized in **Table 1**.

Table 1. Bidirectional Traffic Volume Comparison

Roadway	Peak Hour	Field-Collected Bidirectional Traffic Volume [A] ¹	Historical Bidirectional Traffic Volume [B] ²	Difference $\frac{[A] - [B]}{[A]} \times 100$
IL 47	AM	1,800	2,707	-50.4%
	PM	2,454	2,657	-8.3%
Freeman Road	AM	248	349	-40.7%
	PM	483	441	+8.7%
Jim Dhamer Drive	AM	183	152	+16.9%
	PM	249	219	+12.0%
Del Webb Boulevard	AM	321	444	-38.3%
	PM	560	671	-19.6%

¹ Represents Sam Schwartz collected Bidirectional Volume, Year 2020.

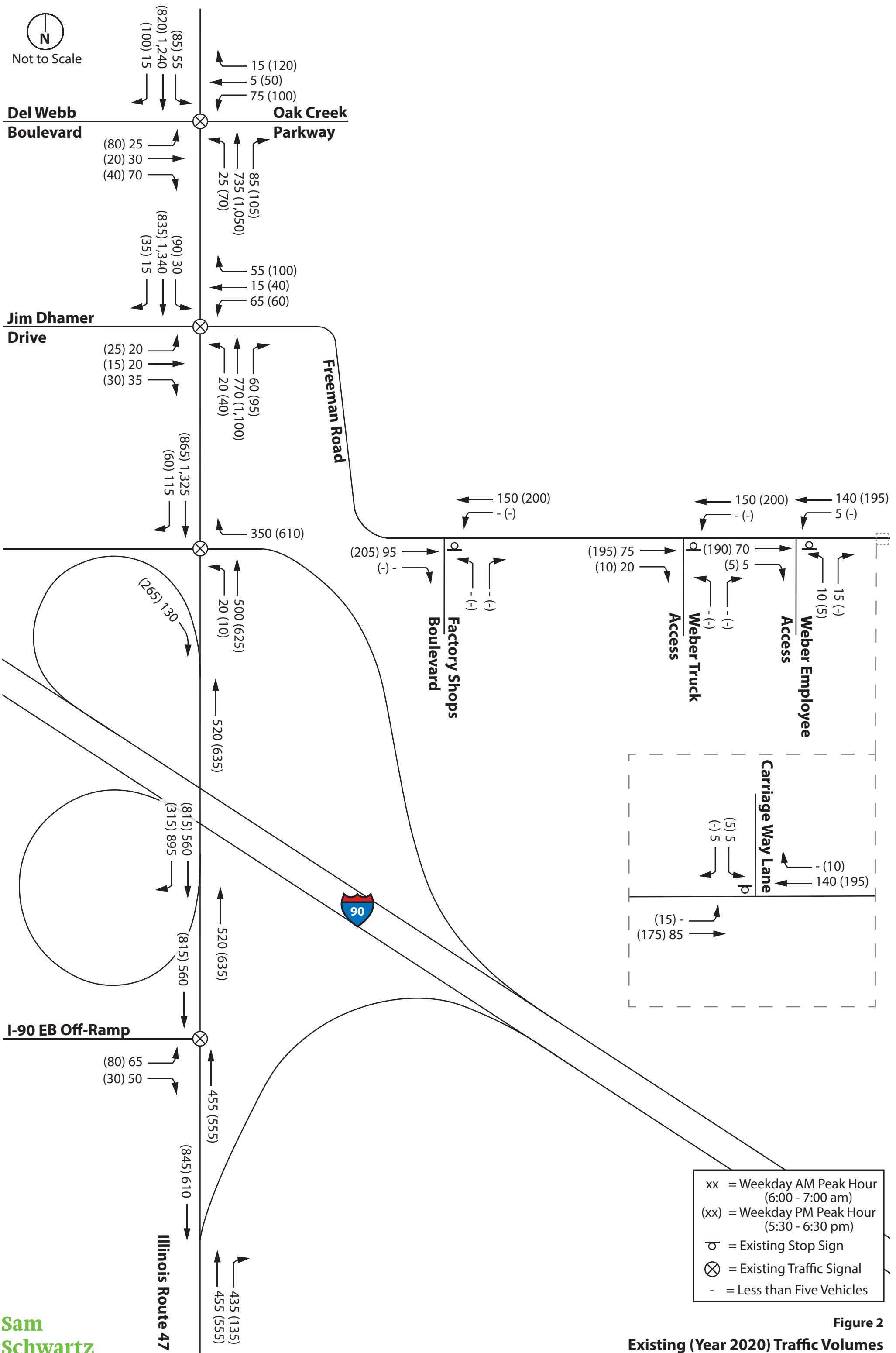
² Represents IDOT Bidirectional Volume. ADT for IL 47 was collected in 2019. All others were collected in 2018.

As shown above, historical hourly volumes on the analyzed roadways were found to range from approximately 17 percent lower to 50 percent higher than 2020 volumes. Considering the difference between historical and 2020 volumes depending on the specific roadway and peak hour, a unique growth

rate was utilized for each roadway in each peak hour of analysis. On roadways where the adjustment factor would have represented a reduction in volume, the 2020 counts were utilized. For all roadways in the study network excluding the private accesses south of Freeman Road and Carriage Way Lane, traffic volumes were adjusted up to a baseline 2018-2019 condition based on the comparison shown in **Table 1**. All I-90 interchange ramps and Oak Creek Parkway were assumed to increase in volumes at the same rate as IL 47.

To account for the remaining growth to a baseline 2020 scenario, Year 2050 ADT projections were obtained from the Chicago Metropolitan Agency for Planning (CMAP) for the major study roadways. These growth rates are described in detail in Section 3.5 (Future Traffic Projections) of this report. These growth rates were applied to all 2018 and 2019 traffic volumes excepting Oak Creek Parkway, the accesses south of Freeman Road, and Carriage Way Lane to establish a baseline 2020 condition.

The volume network was then balanced where applicable throughout the study area, establishing a baseline Year 2020 volume network. Additionally, based on feedback from the Village of Huntley, volumes on Freeman Road west of Factory Shops Boulevard were increased to 200 vehicles per direction during the evening peak hour to more closely align with historical IDOT volumes. The resulting traffic volumes at each intersection during the morning and evening peak hours are illustrated in **Figure 2**. Summaries of the raw TMC counts and the historical IDOT ADT are contained in the Appendix.



2.4. Existing Intersection Operations

The operational effectiveness of transportation facilities is measured in terms of Level of Service (LOS). LOS ranges from LOS A to LOS F, with LOS A being the best level of operation for an intersection and LOS F being the worst. LOS A represents free-flow conditions where motorists experience a high level of comfort and convenience. LOS E represents saturated or at-capacity conditions, and LOS F represents oversaturated conditions.

LOS at a signalized intersection is defined in terms of average control delay (measured in seconds per vehicle), which is portion of total delay experienced by a motorist that is attributable to the traffic signal. LOS A describes operations with minimal delays (up to 10 seconds per vehicle), while LOS F describes operations with delays in excess of 80 seconds per vehicle. At intersections with long cycle lengths, the quantity of red time that is allocated to an approach or movement may near or exceed that 80-second threshold, increasing the likelihood of poor LOS. The LOS criteria for signalized intersections, as defined in the Highway Capacity Manual, Sixth Edition (HCM), are provided in **Table 2**.

Table 2. LOS Criteria for Signalized Intersections

Level of Service (LOS)	Average Delay	Volume-to-Capacity (v/c) Ratio
A	≤ 10.0 seconds	< 1.0
B	> 10.0 and ≤ 20.0 seconds	< 1.0
C	> 20.0 and ≤ 35.0 seconds	< 1.0
D	> 35.0 and ≤ 55.0 seconds	< 1.0
E	> 55.0 and ≤ 80.0 seconds	< 1.0
F	> 80.0 seconds	≥ 1.0

Transportation Research Board. Highway Capacity Manual, Sixth Edition.

For unsignalized intersections, total delay is defined as the total elapsed time from the moment a vehicle stops at the back of the queue until the vehicle departs from the stop bar on the stop-sign controlled approach. This includes the time required for the vehicle to travel from the last-in-queue to the first-in-queue position. The LOS thresholds for unsignalized intersections, which differ from those for signalized intersections, are summarized in **Table 3**. It should also be noted that right-turn movements during red phases were conservatively prohibited at signalized intersections on IL 47 per IDOT criteria.

Table 3. LOS Criteria for Unsignalized Intersections

Level of Service (LOS)	Average Delay	Volume-to-Capacity (v/c) Ratio
A	≤ 10.0 seconds	< 1.0
B	> 10.0 and ≤ 15.0 seconds	< 1.0
C	> 15.0 and ≤ 25.0 seconds	< 1.0
D	> 25.0 and ≤ 35.0 seconds	< 1.0
E	> 35.0 and ≤ 50.0 seconds	< 1.0
F	> 50.0 seconds	≥ 1.0

Transportation Research Board. Highway Capacity Manual, Sixth Edition.

Capacity analysis was performed to analyze the study intersections for the weekday peak hours using Synchro 10 capacity analysis software. HCM 2000 reports were used to evaluate the intersections of IL 47 with the I-90 westbound ramp junction and Freeman Road with Factory Shops Boulevard due to their nonstandard phasing and lane geometries. For all other intersections, HCM 6th Edition reports were used. The results of these analyses are summarized in **Table 4**.

Table 4. Existing (Year 2020) Levels of Service

Intersection	Weekday Morning Peak Hour		Weekday Evening Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
IL 47 / Del Webb Boulevard & Oak Creek Parkway ¹				
Eastbound	55.5	E	45.2	D
Westbound	48.2	D	56.1	E
Northbound	11.5	B	18.4	B
Southbound	12.5	B	17.6	B
<i>Overall</i>	<i>15.9</i>	<i>B</i>	<i>23.4</i>	<i>C</i>
IL 47 / Jim Dhamer Drive & Freeman Road ¹				
Eastbound	57.8	E	56.9	E
Westbound	57.2	E	55.8	E
Northbound	1.6	A	23.1	C
Southbound	9.3	A	12.2	B
<i>Overall</i>	<i>10.8</i>	<i>A</i>	<i>22.5</i>	<i>C</i>
IL 47 / I-90 WB ramp junction ¹				
Westbound	53.6	D	44.5	D
Northbound	6.4	A	11.3	B
Southbound	0.4	A	3.3	A
<i>Overall</i>	<i>9.8</i>	<i>A</i>	<i>17.2</i>	<i>B</i>
IL 47 / I-90 EB ramp junction ¹				
Eastbound	59.1	E	56.6	E
Northbound	1.9	A	1.9	A
Southbound	1.8	A	1.9	A
<i>Overall</i>	<i>7.7</i>	<i>A</i>	<i>6.0</i>	<i>A</i>
Freeman Road / Factory Shops Boulevard ²				
Westbound (Left)	7.4	A	7.7	A
Northbound	9.1	A	10.0	B
Freeman Road / Weber Truck Access ²				
Westbound (Left)	8.5	A	7.7	A
Northbound	9.3	A	10.2	B
Freeman Road / Weber Employee Access ²				
Westbound (Left)	7.4	A	7.7	A
Northbound	9.4	A	10.7	B
Freeman Road / Carriage Way Lane ²				
Eastbound (Left)	7.5	A	7.7	A
Southbound	9.4	A	10.7	B

¹Signalized Intersection

²Two-Way Stop-Controlled Intersection

As the table shows, most intersection approaches in the study area currently operate at acceptable LOS D or better. However, at the signalized intersections of IL 47 with Del Webb Boulevard/Oak Creek Parkway, Jim Dhamer Drive/Freeman Road, and the eastbound I-90 ramp junction, several minor-leg approaches currently operate at LOS E in the morning and evening peak hours. High delay on minor-leg approaches is not uncommon at intersections with major arterials, where high cycle lengths are installed along with the prioritization of the mainline phases.

03. Future Conditions

In order to evaluate future intersection operations, traffic volumes were forecasted for a “build plus five” design year. Based on conversations with the development team indicating that the proposed development would be completed by Year 2022, a Year 2027 design year was selected. Future traffic forecasting was based on three main factors: background traffic growth, background developments, and trips generated by the subject site. Based on the resulting projections, capacity analyses were prepared to evaluate operational conditions after completion of the proposed development. The findings and resulting recommendations are discussed in this section of the report.

3.1. Area Improvement Plans

A review of IDOT's *Proposed Highway Improvement Plans for FY 2021-2026* indicated no planned improvements affecting intersections in the study area. As such, no improvements other than those recommended as a part of this study or the background development studies are included in future Year 2027 conditions.

3.2. Site Development Plan

As proposed, the southern portion of the subject site would be developed as an approximate 650,000 square-foot industrial building (Building A) that would operate as a receive center. Two additional industrial use buildings totaling approximately 1.7 million square feet of gross floor area were assumed for the purpose of this study in accordance with the site master plan. The two buildings on the northern portion of the site (referred to as Building B and Building C) are speculative in nature and assumed to operate as storage and distribution facilities. Site access would be provided to Freeman Road via a new roadway and two proposed access driveways, labeled as “New Road”, Access 1, and Access 2 for the purposes of this study. The proposed New Road would align opposite Factory Shops Boulevard approximately one half-mile east of Freeman Road's intersection with IL 47, providing full access to the site. Access 1 would align opposite the existing Weber Truck Access, approximately 920 feet east of New Road and is envisioned as an inbound-only truck driveway. Access 2 would be located approximately 590 feet east of New Road and 330 feet west of Access 1 and is envisioned as a right-in/right-out driveway providing passenger vehicle access to Building A's parking lot.

New Road would be planned to extend north of Freeman Road along the western boundary of the site. Two driveways labeled as Access 3 and Access 4 (located approximately 320 and 600 feet north of Freeman Road) would provide access to over 1,000 employee parking spaces for Building A. A third driveway (Access 5) located approximately 900 feet north of Freeman Road would provide access for outbound truck traffic associated with Building A. New Road would also extend north of Building A, providing access to Buildings B and C in the northern portion of the site. A preliminary site plan depicting the proposed facility is included in the Appendix.

3.3. Trip Generation

As noted previously, the proposed development is expected to include three industrial-use buildings intended to serve as distribution centers. The southernmost building would total approximately 650,000 square feet and is anticipated to be occupied by a specific end-user and operate as a receive center which accepts bulk inventory and allocates it to fulfillment centers throughout the region. As such, trip

generation for the subject site was performed utilizing data provided by the proposed tenant and shared with Sam Schwartz. Hourly entering and exiting volumes were provided for both car and truck trips for a full 24-hour period. Total passenger car trips were reduced by seven percent to account for carpooling based on census provided Means of Transportation to Work data. Carpooling data from two Census Tracts to the east and west of IL 47 in the study area (8507.01 and 8507.02) were used to determine a reduction factor. Tenant-provided trip generation and census data are included in the Appendix.

While the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition does not provide a land use type that specifically meets the description of a receive center, Sam Schwartz compared the tenant-provided trip generation data to Land Use Code (LUC) 155: High-Cube Fulfillment Center Warehouse (Non-Sort) which most closely matches the expected end user. The comparison calculations are included in the Appendix, which show the tenant-provided trip generation estimates are four times higher in the morning peak hour than ITE estimates and three times higher in the evening peak hour. As such, to provide a more accurate estimate of site generated traffic, tenant-provided data was utilized to estimate trips associated with Building A.

In addition to Building A, the ultimate master plan for the site anticipates two additional industrial-use buildings labeled as Buildings B and C totaling 1,683,000 square feet. While the end users of these buildings are still speculative, it is anticipated based on discussions with the development team that the proposed buildings would serve as storage and distribution facilities. Based on this anticipated use, site-generated trips were projected for a High-Cube Transload and Short-Term Storage Warehouse (ITE LUC 154) using the ITE manual Trip Generation, 10th Edition and Trip Generation, 10th Edition Supplement. The supplement expands on data presented in the 10th edition, including truck trip generation data for the subject land use. ITE Appendix A indicates that LUC 154's peaks of generator are expected to occur at approximately 8:45AM and at 3:00 or 7:00PM, well outside of the 6:00-7:00AM and 5:30-6:30PM peak hours of Building A. Based on the lack of overlap between these peaks of generator, trip generation estimates for Building B and C were based on the peak of adjacent street traffic.

The weekday daily and peak period trip generation rates for a High-Cube Transload and Short-Term Storage Warehouse are shown in **Table 5** for the peak of adjacent street.

Table 5. Building B & C Trip Generation Data

Land Use	Vehicle Type	Daily	Weekday AM Peak	Weekday PM Peak
High Cube Transload and Short-Term Storage Warehouse (LUC 154)	Total Vehicle Trips	T = 1.4(X) 50% in / 50% out	T = 0.08(X) 77% in / 23% out	T = 0.10(X) 28% in / 72% out
	Truck Trips	T = 0.22(X) 50% in / 50% out	T = 0.02(X) 49% in / 51% out	T = 0.01(X) 47% in / 53% out

T = Trips generated

X = Gross square feet of floor area (per 1,000 sq. ft.)

Table 6 summarizes the anticipated incoming and outgoing trips associated with the proposed uses during the morning and evening peak hours. These volumes are rounded to multiples of five, generally yielding a conservative estimate of site trips.

Table 6. Site-Generated Trip Projections

Land Use	Size	Vehicle Type	Weekday						
			Daily	AM Peak		PM Peak			
			Total	In	Out	Total	In	Out	Total
Building A "Project Pumpkin"	649,136 sq. ft.	Cars	2,730	470	120	590	185	360	545
		Trucks	600	15	15	30	5	5	10
		Subtotal	3,330	485	135	620	190	365	555
Buildings B & C	1,683,000 sq. ft.	Cars	1,990	90	10	100	40	110	150
		Trucks	370	15	20	35	10	10	20
		Subtotal	2,360	105	30	135	50	120	170
Total	2,332,136 sq. ft.	Cars	4,720	560	130	690	225	470	695
		Trucks	970	30	35	65	15	15	30
		Total	5,690	590	165	755	240	485	725

It should be noted that the proposed receive center is expected to experience an increase in site traffic during the weeks leading up the holiday season. Facilities of this type typically increase employment during this season to process additional inventory, resulting in higher site-generated trip estimates. While the focus of this report is the non-seasonal condition which is expected to reflect typical conditions throughout the majority of the year, Sam Schwartz performed supplementary analysis of the seasonal condition as well. A description of the estimated seasonal trip generation of the site, as well as underlying methodologies and assumptions, is included in the Appendix.

3.4. Site Trip Assignments

The directional distribution of site-generated traffic is a function of several variables, including existing travel patterns, characteristics of the area street network and traffic control, and peak hour congestion within the study area. The assumed trip distribution percentages are a best estimate using engineering judgment, familiarity with the area, and logical travel paths to likely origins and destinations for site users. Sam Schwartz also referenced the I-90/Illinois Route 47 Interchange Volume Study (Metro Transportation Group, Inc., 2009) to approximate directional distribution, adjusting where necessary to account for unrealized development in the surrounding area. The anticipated directional distributions for car and truck trips to and from the site are shown in **Figure 3** and **Figure 4**. As shown, given the relative lack of connectivity to the east of the subject site, the vast majority (85%) of passenger car traffic is expected to access the site via IL 47 and Freeman Road west of the site. No truck traffic is expected to utilize Freeman Road east of the subject site.

Using the above distributions and routing patterns, site-generated trips were assigned to the street network based on the projected trip generation values for each vehicle type (**Table 6**) and the estimated trip distributions (**Figure 3** and **Figure 4**). Inbound passenger vehicles originating from IL 47 were assumed to exclusively utilize New Road at the west end of the site, while passenger vehicle trips originating from the east were assumed to enter the site via Access 2. Outbound passenger vehicle trips were assumed to utilize both New Road and Access 2 to access IL 47 via Freeman Road. Based on the preference of truck drivers to circulate through a site in a counter-clockwise direction, trucks were assumed to enter the site at Access 1 (at the east end of the site) before circulating and exiting at New Road. The resulting trip assignments for the morning and evening analysis periods are illustrated in **Figure 5** and **Figure 6** respectively.



Del Webb
Boulevard

Jim Dhamer
Drive

I-90 EB Off-Ramp

Sam
Schwartz

Oak Creek
Parkway

Freeman Road

New Road

Factory Shops
Boulevard

Illinois Route 47

SITE

Access 5

Access 4

Access 3

Access 2

Access 1

Weber Truck
Access

Weber Employee
Access

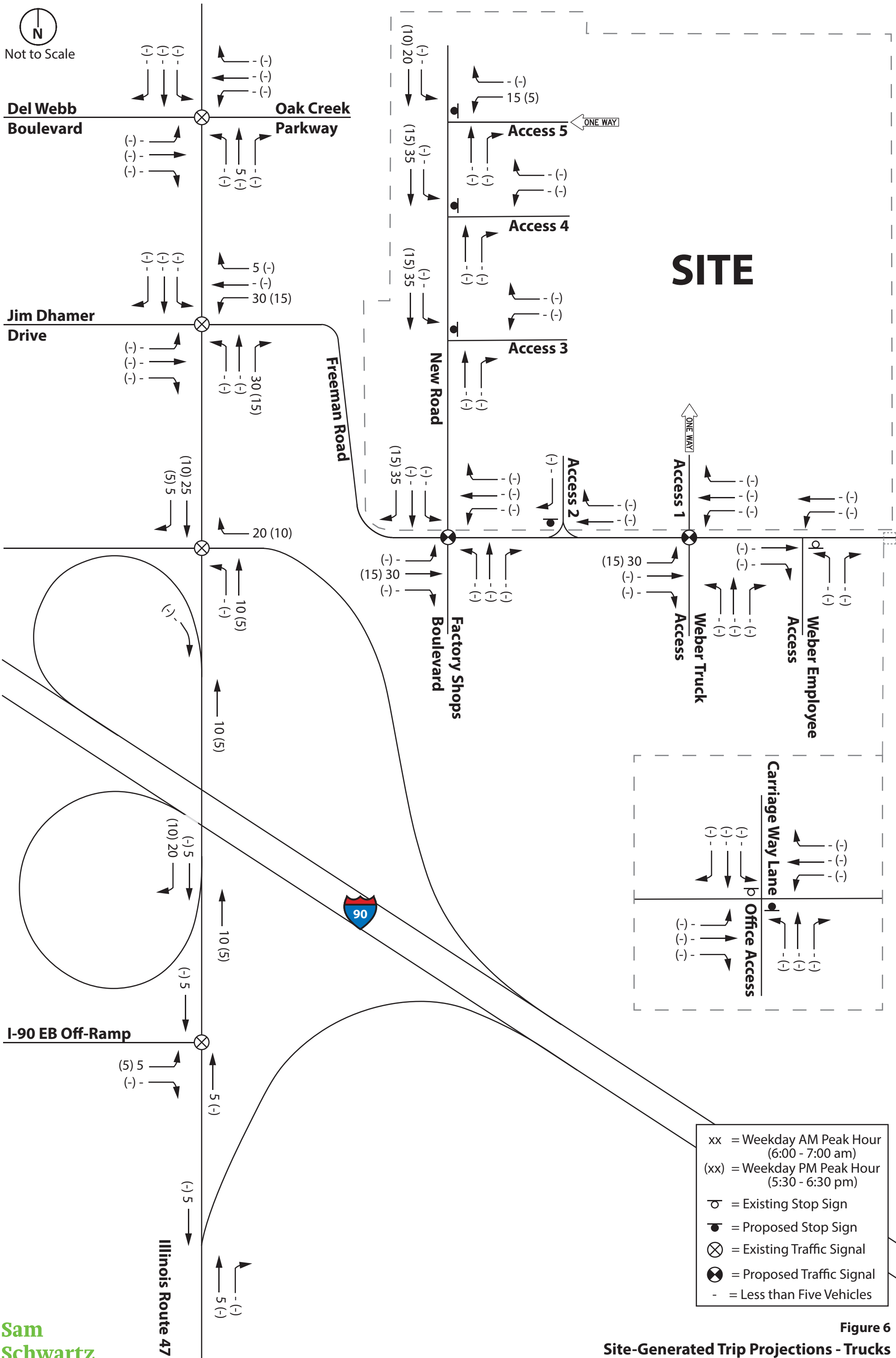
Carriage Way Lane

Office Access

- xx = Weekday AM Peak Hour (6:00 - 7:00 am)
- (xx) = Weekday PM Peak Hour (5:30 - 6:30 pm)
- ⊖ = Existing Stop Sign
- = Proposed Stop Sign
- ⊗ = Existing Traffic Signal
- ⊗ = Proposed Traffic Signal
- = Less than Five Vehicles

Figure 5

Site-Generated Trip Projections - Passenger Cars



3.5. Future Traffic Projections

Future analysis was performed for Year 2027, reflecting build-plus-five conditions given the proposed site's anticipated completion in Year 2022. In order to estimate future background traffic for the Year 2027 design horizon, Year 2050 ADT projections were obtained from CMAP for the major study roadways. Based on the projections provided, compounded annual growth rates were derived for each roadway, as summarized below:

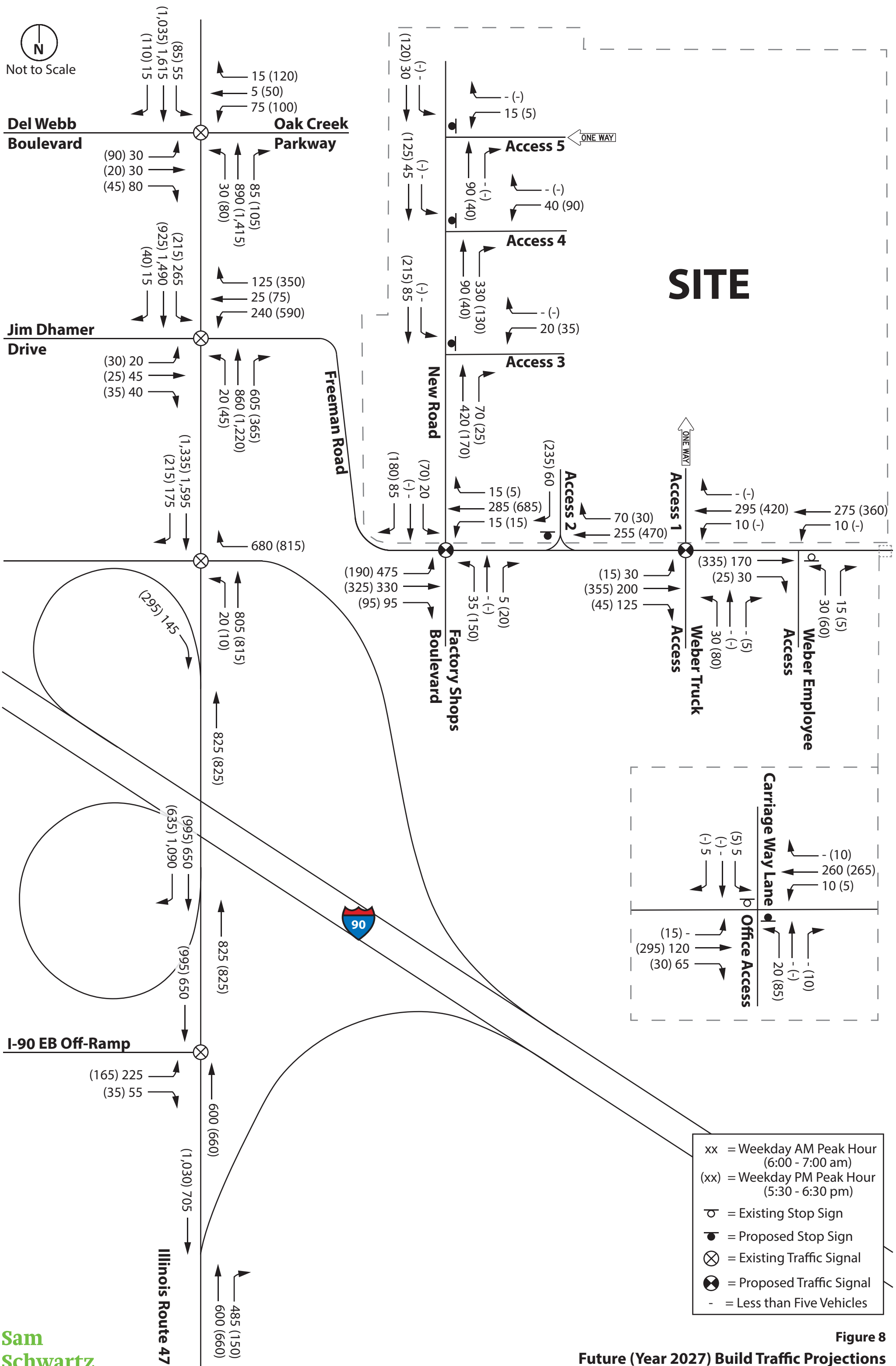
- Del Webb Boulevard: 1.68%
- Jim Dhamer Drive: 1.69%
- Freeman Road: 1.68%
- Illinois Route 47 1.54%

The above growth rates were applied to baseline (2020) traffic volumes in the study area. No growth was applied to Oak Creek Parkway, Factory Shops Boulevard, either of the Weber Grill access driveways, or Carriage Way Lane. In addition, per the direction of the Village of Huntley, two background developments were assumed to be constructed within the 2027 design year assessed in the Future No-Build scenario. The Huntley Commercial Center is a proposed industrial and commercial redevelopment of the currently vacant Huntley Premium Outlets site south of Freeman Road. The Weber Grill Development is a proposed phased development located south of Freeman Road and east of the former Huntley Premium Outlets site.

The Traffic Impact Study (TIS) for the Huntley Commercial Center redevelopment, performed by Kenig, Lindgren, O'Hara, Aboona, Inc. (KLOA), was submitted in 2018 and is included in the Appendix. The proposed site calls for a total of approximately 667,880 square feet of warehouse/industrial space in three separate buildings. An additional 45,145 square feet of retail space was also assumed to occupy the adjacent parcel to the west. All site-related traffic outlined in the KLOA report was assumed to access the site via Factory Shops Boulevard and added to the No-Build condition.

The TIS for the Weber Warehouse Development performed by Sam Schwartz in 2014 is included in the Appendix. The proposed development plan includes two phases: a 757,120 square-foot industrial building and a 392,880 square-foot expansion. The second phase also assumes development of two adjacent buildings, including 270,000 square feet of industrial warehouse space and 40,000 square feet of professional (medical-dental) office space. As construction of the Phase 1 industrial building was complete in 2020 at the time of data collection, site related traffic for this portion of the development is accounted for in existing count data. The remaining Phase 2 traffic was added to the No-Build scenario.

The resulting volumes were balanced across the study area and added to existing volumes to yield Year 2027 Future No-Build traffic projections, illustrated in **Figure 7**. Site-generated trips were then added to the No-Build condition, resulting in the Year 2027 Future Build traffic projections shown in **Figure 8**.



As a basis of comparison, Sam Schwartz referenced the Interchange Volumes Study completed in 2009 by Metro Transportation Group, which studied IL 47's interchange with I-90 and projected volumes to a Year 2030 design horizon. In addition to a flat one-percent background growth rate, the report estimated trip generation for all expected developments in a study area between Big Timber Road to the south, Kreutzer Road to the north, Brier Hill Road to the west, and Powers Road to the east. These expected developments included the assumption of a business park use for the parcel analyzed in this report. The entirety of the Interchange Volumes Study is included as a part of the Appendix.

Comparing the volumes in **Figure 8** to the projections from the Volumes Study, the Year 2027 Build scenario projects significantly lower traffic volumes, particularly on IL 47. On IL 47 between Freeman Road and the I-90 westbound ramp junction, the Volumes Study projected two-way volumes of 4,695 and 6,140 vehicles during the morning and evening peak hours, respectively. Comparatively, the Build scenario analyzed in this report projects 3,255 and 3,180 vehicles on the same segment. The differences in these volume projections are likely attributable to unrealized development assumed in the Volumes Study. These 2030 volume projections are reflected in the Interchange Design Studies (IDS) provided to Sam Schwartz for the intersection of IL 47 with Jim Dhamer/Freeman Road and the IL 47/I-90 interchange indicating, generally, the existing roadway infrastructure in the study area has excess capacity.

3.6. Future Intersection Operations

Capacity analyses were conducted using Synchro 10 software to assess future traffic operations during weekday morning and evening peak hours for future No-Build and Build conditions. The results of these analyses are detailed in the following sections:

Future No-Build Conditions

To assess the impact of background traffic on operations within the study area, capacity analyses were performed for Year 2027 No-Build conditions. All Huntley Commercial Center traffic and Phase 2 traffic associated with the Weber Grill expansion and adjacent warehousing/office uses were added to the No-Build analysis of this report. Based on the assumptions in the Huntley Commercial Center TIS, Sam Schwartz included the signalization of the intersection of Factory Shops Boulevard and Freeman Road in the No-Build condition. And based on Weber Grill TIS, an unsignalized access driveway for the office use building was assumed to be located opposite Carriage Way Lane and operate under minor-leg stop control. Apart from the assumptions listed as a part of background development TIAs, Sam Schwartz did not identify any other planned background improvements in the study area, and so no further improvements were incorporated into the analysis of future No-Build conditions. Based on these assumptions, area traffic operations for this scenario are projected as shown in **Table 7**.

Table 7. Future (Year 2027) No-Build Levels of Service

Intersection	Weekday Morning Peak Hour		Weekday Evening Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
IL 47 / Del Webb Boulevard & Oak Creek Parkway ¹				
Eastbound	55.2	E	44.2	D
Westbound	48.1	D	55.8	E
Northbound	12.0	B	20.7	C
Southbound	14.0	B	18.7	B
<i>Overall</i>	<i>16.6</i>	<i>B</i>	<i>24.2</i>	<i>C</i>
IL 47 / Jim Dhamer Drive & Freeman Road ¹				
Eastbound	56.8	E	56.3	E
Westbound	53.5	D	60.4	E
Northbound	1.4	A	28.8	C
Southbound	13.9	B	18.6	B
<i>Overall</i>	<i>14.0</i>	<i>B</i>	<i>31.8</i>	<i>C</i>
IL 47 / I-90 WB ramp junction ¹				
Westbound	57.0	E	40.0	D
Northbound	7.4	A	15.5	B
Southbound	0.8	A	2.8	A
<i>Overall</i>	<i>12.1</i>	<i>B</i>	<i>16.3</i>	<i>B</i>
IL 47 / I-90 EB ramp junction ¹				
Eastbound	61.1	E	59.0	E
Northbound	1.9	A	2.0	A
Southbound	1.9	A	2.0	A
<i>Overall</i>	<i>9.2</i>	<i>A</i>	<i>6.9</i>	<i>A</i>
Freeman Road / Factory Shops Boulevard ¹				
Eastbound	9.1	A	9.0	A
Westbound	5.6	A	6.1	A
Northbound	10.0	A	10.8	B
<i>Overall</i>	<i>7.9</i>	<i>A</i>	<i>8.0</i>	<i>A</i>
Freeman Road / Weber Truck Access ²				
Westbound (Left)	8.2	A	8.1	A
Northbound	11.6	B	15.4	C
Freeman Road / Weber Employee Access ²				
Westbound (Left)	7.7	A	8.0	A
Northbound	10.9	B	13.6	B
Freeman Road / Carriage Way Lane & Office Access ²				
Eastbound (Left)	7.6	A	7.8	A
Westbound (Left)	7.6	A	7.8	A
Northbound	11.2	B	14.9	B
Southbound	10.3	B	12.4	B

¹Signalized Intersection

²Two-Way Stop-Controlled Intersection

As shown, the majority of intersection approaches are expected to operate at the same LOS under future No-Build conditions as they do under existing conditions. However, some approaches are expected to decrease in LOS with the addition of background growth and other planned developments. At the I-90 westbound off-ramp junction, the westbound approach is projected to drop from LOS D to LOS E in the morning peak hour, dropping the overall intersection LOS from A to B. On the westbound approach of Freeman Road at IL 47, LOS is actually projected to increase to LOS D from LOS E. This is likely attributable to the addition of significant background volume to the lower-delay through and right-turn movements on this approach. As in the existing condition, several minor-leg approaches at the intersections of IL 47 with Del Webb Boulevard/Oak Creek Parkway, Jim Dhamer Drive/Freeman Road, and the I-90 eastbound ramp junction are projected to operate near capacity during the morning and evening peak hours. Apart from the approaches described above, all intersection approaches in the study area are projected to operate at LOS D or better in the No-Build condition.

Future Build Conditions

To assess the impact of the proposed site on traffic operations within the study area, capacity analyses were performed for Year 2027 Build conditions. Consistent with No-Build conditions, background improvements associated with the proposed background developments were included in the future Build analysis, as well as several improvement measures identified to accommodate site traffic.

As stated previously, New Road would align opposite Factory Shops Boulevard and would serve site related passenger cars and some truck movements (mostly outbound maneuvers). The existing T intersection previously operated under traffic signal control before the demolition of the Huntley Premium Outlets development, and the signal equipment is currently offline and bagged. Based on the presence of this existing signal equipment and per the Huntley Commercial Center TIS, a signal was assumed at this location in the No-Build and Build condition. New Road was assumed to provide one inbound lane and three outbound lanes striped as a dedicated left-turn lane, a dedicated through lane, and a dedicated right-turn lane. In order to facilitate permitted northbound and southbound left-turn movements, it is recommended that the northbound approach be restriped to eliminate the dual left-turn configuration and also provide a single dedicated left-turn lane, a dedicated through lane, and a dedicated right-turn lane. A dedicated eastbound left-turn lane was assumed to be constructed in the existing median space on the west leg of Freeman Road. Based on this proposed lane configuration and the projected volumes at this location, protected-permitted phasing was assumed for all left-turning movements at the future intersection. Additionally, right-turn overlap phasing was assumed for the northbound, southbound, and eastbound right-turning movements.

The proposed Access 1 would align opposite the Weber Grill Warehouse Truck Access and serve as a secondary access point, only accommodating inbound truck traffic. Based on conversations with the development team and the Village of Huntley, this intersection was assumed to be signalized under future Build conditions even though projected volumes at this location are not expected to warrant signalization by MUTCD standards. The analysis assumed permitted-only left-turn phasing on the eastbound, westbound, and northbound approaches. The north leg of this intersection was assumed to provide a single receiving lane to align opposite the Weber Grill truck access south of Freeman Road. To accommodate inbound site trips, the existing two-way left-turn lane on the eastbound approach should be re-striped to provide left-turn storage. While signalization of this intersection is projected to reduce delay for outbound vehicles at the Weber Grill truck driveway, it should be noted that even under minor-leg stop-control, the northbound approach would be expected to operate at LOS D or better during both peak hours analyzed.

Access 2 would be located between New Road and Access 1—approximately 590 feet east of New Road and 330 feet west of Access 1—and is envisioned as a right-in/right-out driveway providing passenger vehicle access to the building located on the southern portion of the site. Access 3 and Access 4 were each assumed to provide one inbound and one outbound lane with the outbound lane accommodating shared left/right-turn movements at their intersections with New Road. Access 5 was assumed to operate as an outbound-only truck driveway, providing a single outbound lane on the westbound approach. Minor-leg stop control was assumed on the westbound approaches at each driveway.

In addition to the site-related access improvements described above, signal timing modifications were also assumed at the intersection of Freeman Road with IL 47 based on direction from the Village to dedicate more green time to the westbound left-turn phase without reducing green time allocated to the mainline movements on IL 47. It should be noted that in the Build condition, the northbound right-turn volumes in the morning and evening peak hours at the intersection of IL 47 and Freeman Road are projected to warrant consideration of dual right-turn lanes based on IDOT criteria in the Bureau of Design and Environment Manual (BDE), Section 36-3.05(a). The same is true of the westbound right-turn volumes in the evening peak hour. However, based on the results of the capacity analysis (discussed further), dual right-turn lanes are not recommended in either location, nor are they included in the future Build analysis. A summary of the capacity results for the Year 2027 Build scenario is presented in **Table 8**.

Table 8. Future (Year 2027) Build Levels of Service

Intersection	Weekday Morning Peak Hour		Weekday Evening Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
IL 47 / Del Webb Boulevard & Oak Creek Parkway ¹				
Eastbound	55.2	E	44.2	D
Westbound	48.1	D	55.8	E
Northbound	12.1	B	21.7	C
Southbound	14.9	B	18.9	B
<i>Overall</i>	<i>16.9</i>	<i>B</i>	<i>24.6</i>	<i>C</i>
IL 47 / Jim Dhamer Drive & Freeman Road ¹				
Eastbound	56.8	E	56.6	E
Westbound	54.0	D	62.1	E
Northbound	2.1	A	32.7	C
Southbound	24.3	C	25.5	C
<i>Overall</i>	<i>19.5</i>	<i>B</i>	<i>38.7</i>	<i>D</i>
IL 47 / I-90 WB ramp junction ¹				
Westbound	102.7	F	37.5	D
Northbound	7.1	A	19.2	B
Southbound	1.3	A	2.1	A
<i>Overall</i>	<i>23.8</i>	<i>C</i>	<i>15.6</i>	<i>B</i>

¹Signalized Intersection

²Two-Way Stop-Controlled Intersection

Table 8. Future (Year 2027) Build Levels of Service (continued)

Intersection	Weekday Morning Peak Hour		Weekday Evening Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
IL 47 / I-90 EB ramp junction ¹				
Eastbound	56.2	E	58.9	E
Northbound	3.0	A	2.3	A
Southbound	2.9	A	2.4	A
<i>Overall</i>	12.7	B	8.5	A
Freeman Road / Factory Shops Boulevard & New Road ¹				
Eastbound	11.2	B	21.9	C
Westbound	10.1	B	27.1	C
Northbound	32.9	C	23.9	C
Southbound	24.0	C	24.6	C
<i>Overall</i>	12.7	B	24.5	C
Freeman Road / Access 2 ²				
Southbound	10.4	B	16.2	C
Freeman Road / Weber Truck Access & Access 1 ¹				
Eastbound	0.4	A	0.5	A
Westbound	2.3	A	3.7	A
Northbound	47.7	D	55.0	D
<i>Overall</i>	3.4	A	7.0	A
Freeman Road / Weber Employee Access ²				
Westbound (Left)	7.8	A	8.2	A
Northbound	11.7	B	14.7	B
Freeman Road / Carriage Way Lane & Office Access ²				
Eastbound (Left)	7.8	A	7.8	A
Westbound (Left)	7.6	A	7.9	A
Northbound	12.3	B	17.3	C
Southbound	11.2	B	13.7	B
New Road / Access 3 ²				
Southbound (Left)	9.1	A	8.0	A
Westbound	16.1	C	17.0	C
New Road / Access 4 ²				
Southbound (Left)	8.7	A	7.9	A
Westbound	12.0	B	14.2	B
New Road / Access 5 ²				
Southbound (Left)	7.5	A	7.4	A
Westbound	10.8	B	11.6	B

¹Signalized Intersection

²Two-Way Stop-Controlled Intersection

Given the built-out nature of the I-90 interchange, IL 47, and Freeman Road, most intersection approaches are projected to operate at the same LOS in the Build condition as in the No-Build condition, with some increase in delay expected. Where LOS is shown to decrease between the No-Build and Build conditions, all approaches except one are still expected to operate at LOS D or better. The exception is the westbound approach of the I-90 off-ramp at IL 47, which is projected to drop from LOS E to LOS F in the morning peak hour. However, it should be noted that this approach was analyzed assuming no right-turn movements during red phases, per IDOT standards. This represents a conservative analysis, as right turns are permitted on red phases from the inside lane. With right-turn movements allowed during red phases from the inside lane, it is expected that this approach would operate with less delay than the capacity results indicate.

At the intersection of IL 47 with Freeman Road, signal timing modifications were assumed based on direction from the Village to reallocate green time in the analysis from the eastbound through movements (Jim Dhamer Drive) to the westbound left-turn movements, without reducing green time allocated to the mainline movements on IL 47. Capacity analyses indicate three seconds of green time should be reallocated in the morning peak hour and ten seconds of green time should be reallocated in the evening peak hour once future Build traffic volumes are realized. With these timing adjustments in place, the intersection is expected to operate at the same LOS under Build conditions as in the No-Build condition, and better than existing LOS.

It is noted that, with the addition of site traffic in the Build condition, the northbound right-turn volumes on IL 47 to Freeman Road in the morning and evening peak hours are projected to warrant consideration of dual right-turn lanes based on IDOT criteria in the BDE Manual, Section 36-3.05(a). However, based on projected delay (LOS A and LOS C, respectively) and 95th percentile queuing expected to be accommodated within the available storage and taper on these approaches, dual right-turn lanes are not recommended at this time. This performance, while already acceptable, still represents a conservative scenario in which right-turn movements on red phases were not assumed, per IDOT standard. Likewise, the westbound right-turn volumes on Freeman Road in the evening peak hour at this intersection are also projected to warrant consideration of dual right-turn lanes. As with the northbound approach, dual right-turn lanes were not recommended at this time based on acceptable LOS (LOS D) for this specific movement, as well as accommodation of 95th percentile queues within the provided storage. For the left-turning movements on the westbound approach of Freeman Road at IL 47, 95th percentile queues in the evening peak hour are projected at approximately 450 feet, which would exceed the 280 feet of left-turn storage currently provided. It should be noted that approximately 100 feet of additional storage is provided before the dual left-turn lane taper reduces the width to less than 24 feet. The westbound left-turn lane is currently situated back-to-back with an adjacent left-turn lane, and as such no storage extension was recommended to accommodate these projected queues. It can also be noted that Synchro capacity software projects the westbound left-turn 95th percentile queue at 370 feet, which would be accommodated within the existing storage/taper lengths.

The proposed New Road is assumed to be signalized and should provide one inbound lane and three outbound lanes striped as a dedicated left-turn lane, a dedicated through lane, and a dedicated right-turn lane. In order to facilitate permitted northbound and southbound left-turn movements, it is recommended that the northbound approach be restriped to eliminate the dual left-turn configuration and provide symmetrical geometry to the southbound approach. With these considerations, all approaches are projected to operate at LOS C or better during both peak hours. The eastbound left turns in the morning peak hour and the southbound right turns in the evening peak hour are expected to be the heavy movements and critical queues. The eastbound approach is projected to operate at LOS C or better and

the 95th percentile eastbound left-turn queue is projected at twelve vehicles during the morning peak hour, which is expected to be accommodated within the proposed 305-foot storage length. Outbound movements are projected to operate at LOS C or better. The southbound right-turn lane should provide a minimum of 275 feet of storage to accommodate the 95th percentile queue of 11 vehicles.

Proposed Access 1 was assumed to be signalized per Village of Huntley direction, though projected volumes at this location are not expected to warrant signalization by MUTCD standards. The north leg of the intersection should provide a single receiving lane for inbound truck traffic. On the eastbound approach, the existing two-way left-turn lane should be restriped to provide 240 feet of storage, per BDE standards, which will accommodate the 95th percentile queue of one vehicle during both peak hours. With these improvements in place, Freeman Road approaches at this intersection are expected to operate at LOS B or better during the morning and evening peak hours, with the northbound Weber Grill truck access approach projected to operate at LOS D in both peak hours.

Proposed Access 2 should provide a single approach lane with one receiving lane, restricting turning movements to right-in and right-out only. Assuming minor-leg stop-control, the southbound approach of Access 2 at Freeman Road is projected to operate at LOS C or better during both peak hours analyzed.

All proposed passenger vehicle accesses from Building A to New Road, including Access 3 and Access 4, should provide a single shared left/right-turn lane with one receiving lane on their westbound approaches. As an outbound-only truck driveway, Access 5 should provide only a single shared left/right-turn lane with no receiving lanes. Assuming stop-control on the minor legs, all proposed Building A accesses to New Road are projected to operate at LOS C or better during the morning and evening peak hours.

In addition to analyzing the future performance of the study network during typical traffic conditions, Sam Schwartz also performed capacity analysis for the seasonal condition, when the holiday season is expected to increase trip generation at Building A. A full description of the future Build seasonal condition, along with LOS tables, is included in the Appendix.

04. Recommendations and Conclusions

Based on the analyses detailed in this report, the following recommendations were identified to accommodate site traffic within the study area.

- At Freeman Road/IL 47
 - Signal timing adjustments are not expected to be required as a result of the addition of site traffic associated with the proposed development. However, as additional background traffic is realized in the future, the Village should work with IDOT to modify signal timings to reallocate 3-10 seconds of green time from the eastbound through movements (Jim Dhamer Drive) to the westbound left-turn movements as necessary.
- At Freeman Road/New Road & Factory Shops Boulevard
 - Modify existing signal equipment to include the proposed north leg.
 - Provide a dedicated left-turn lane on the eastbound approach with 305 feet of storage.
 - Provide one inbound lane and three outbound lanes striped as a dedicated left-turn lane, a through lane, and a dedicated right-turn lane on the southbound approach. The right-turn lane should provide a minimum 275-foot storage bay and the left-turn lane should provide a 125-foot storage bay.
 - Reconfigure the northbound approach to provide a single dedicated left-turn lane, a through lane, and a dedicated right-turn lane.
 - Protected-permitted left-turn phasing should be provided on all approaches and flashing yellow left-turn arrows should be considered in future phases of design. Right-turn overlap phases should also be provided for the dedicated right-turn lanes on the northbound, southbound, and eastbound approaches.
- At Freeman Road/Access 1 & Weber Grill Truck Access
 - Provide a single inbound lane on the north leg.
 - Stripe a dedicated eastbound left-turn lane with 240 feet of storage for inbound left-turning vehicles within the existing two-way left-turn lane on Freeman Road.
 - Install a traffic signal, if required by the Village.
- At Freeman Road/Access 2
 - Provide one inbound lane and one outbound lane with movements restricted to right turns in and right turns out only.
 - Post minor-leg stop control for outbound movements.
- At New Road/Access 3 & New Road/Access 4
 - Provide one inbound lane and one outbound lane on the east leg.
 - Post minor-leg stop control.
- At New Road/Access 5
 - Provide one outbound lane on the east leg.
 - Post minor-leg stop control.

In addition to physical improvements identified above, further signal timing adjustments may be required to optimize performance at the signalized intersections during peak seasonal operations at the receive center. During these periods, traffic management personnel should also be utilized to direct traffic internally within the site and at the intersection of Freeman Road and New Road/Factory Shops Boulevard. With these improvements in place, it is anticipated that area traffic operation would be acceptable following completion of the subject site.

Appendix

Site Plan

Seasonal Conditions Analysis

IDOT Hourly Bidirectional Counts

2050 Traffic Projections from CMAP

Tenant-Provided Trip Generation Data

Census Means of Transportation to Work Data

Trip Generation Comparison Data

ITE Trip Generation, 10th Edition Excerpts

IL 47 Intersection Design Studies

IL 47 & I-90 Interchange Volumes Study

Background Development TIAs

Signal Warrant Analysis

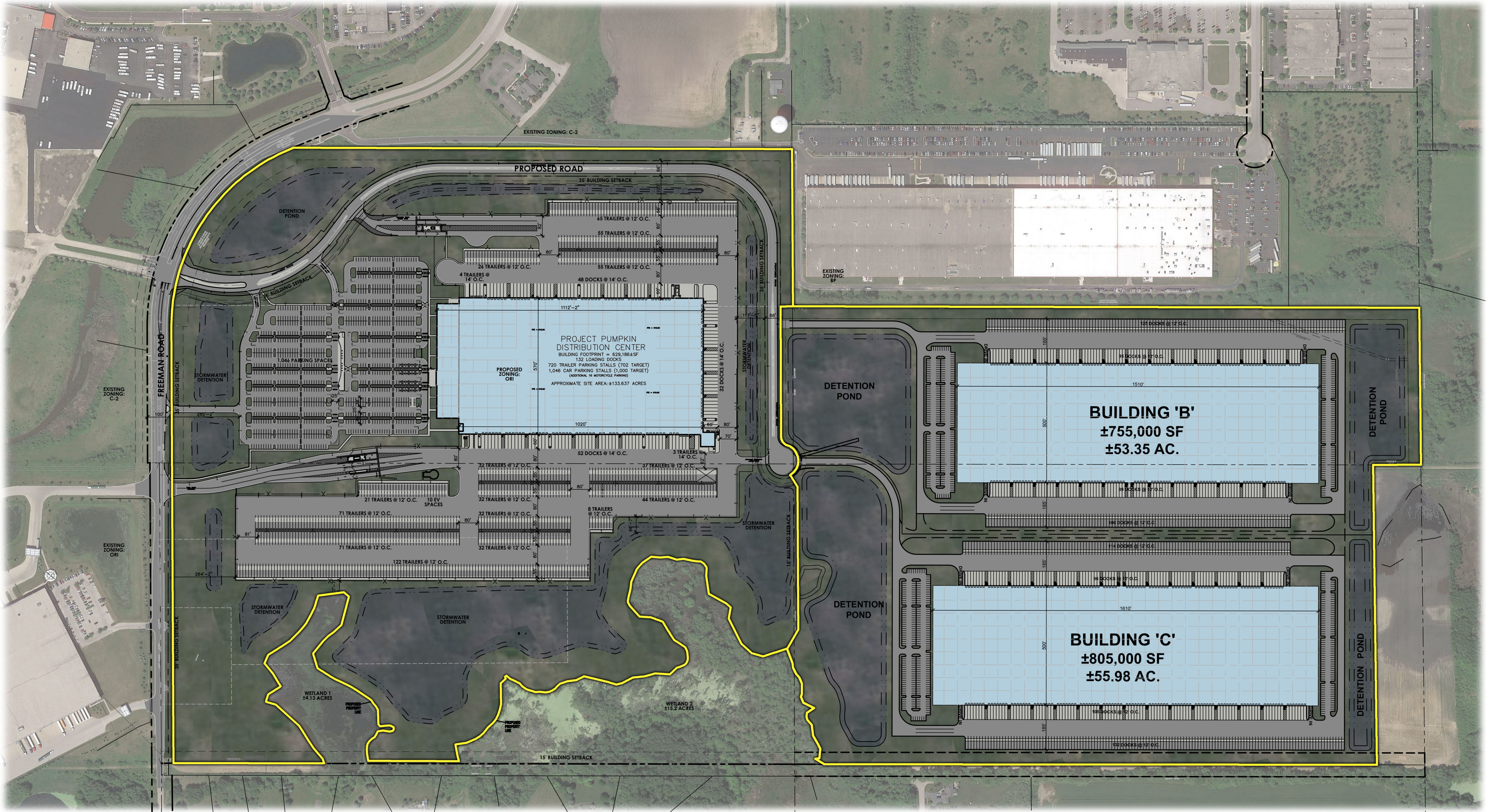
Capacity Analysis Results

Raw Traffic Data

**Sam
Schwartz**

Site Plan

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Feb 08, 2021 12:51 pm - juchewel



01
A1.2

CONCEPTUAL MASTER PLAN

SCALE: 1" = 200'-0"

PROJECT PUMPKIN

VENTURE ONE REAL ESTATE

FREEMAN ROAD
HUNTLEY, ILLINOIS

CONCEPTUAL
DESIGN

01-14-20
Revisions

2/08/21

22-21113-00

CONCEPTUAL
MASTER PLAN

A1.2

Seasonal Conditions Analysis

A.1. Existing Traffic Volumes

As described in section 2.3 of this report, the peaks of generator for the proposed development are typically expected to occur from 6:00-7:00AM and 5:30-6:30PM in the morning and evening peak periods, respectively. However, during the seasonal condition which generally takes place between November and December, the proposed site's peaks of generator are expected to shift to 6:15-7:15AM and 6:00-7:00PM. As in the non-seasonal condition, these peak hours of generator were established as the hours of analysis in order to provide a conservative estimate of site traffic.

Using the same methodologies outlined for the non-seasonal condition, TMCs in the 6:15-7:15AM and 6:00-7:00PM peak hours were adjusted upwards to account for pandemic-related decreases in network traffic. While this baseline Year 2020 scenario was not analyzed using Synchro software, this scenario serves as a baseline to which background and site traffic were added to evaluate Build seasonal conditions.

A.2. Trip Generation

As noted in section 3.3 of this report, the proposed development is planned to consist of three separate industrial use buildings, one of which is envisioned as a "receive center". As in the non-seasonal condition, the anticipated end-user provided seasonal trip generation estimates to Venture One Real Estate, which were subsequently shared with Sam Schwartz. These seasonal traffic projections are outlined below in **Table A1**. Previously calculated trip generation estimates for Buildings B and C are also included, which are not expected to experience seasonal variations.

Table A1. Site-Generated Trip Projections (Seasonal)

Land Use	Size	Vehicle Type	Weekday						
			Daily	AM Peak		PM Peak			
			Total	In	Out	Total	In	Out	Total
Building A "Project Pumpkin"	649,136 sq. ft.	Cars	3,410	580	400	980	495	595	1,090
		Trucks	740	20	20	40	10	10	20
		Subtotal	4,150	600	420	1,020	505	605	1,110
Buildings B & C	1,683,000 sq. ft.	Cars	1,990	90	10	100	40	110	150
		Trucks	370	15	20	35	10	10	20
		Subtotal	2,360	105	30	135	50	120	170
Total	2,332,136 sq. ft.	Cars	5,400	670	410	1,080	535	705	1,240
		Trucks	1,110	35	40	75	20	20	40
		Total	6,510	705	450	1,155	555	725	1,280

As shown, total trips associated with Building A are expected to increase by 65 to 100 percent during the morning and evening peak hours, respectively. Overall, the site's traffic is projected to increase by 53 to 77 percent in the peak hours relative to the non-seasonal condition.

A.3. Future Traffic Projections

As in the non-seasonal condition, future analysis was performed for Year 2027, reflecting build-plus-five conditions given the proposed site's anticipated completion in Year 2022. In order to estimate future background traffic for the Year 2027 design horizon, Year 2050 ADT projections were obtained from CMAP for the major study roadways. Based on the projections provided, compounded annual growth rates were derived for each roadway, as in section 3.5 of this report.

The referenced growth rates were applied to seasonal baseline (2020) traffic volumes in the study area (6:15-7:15AM and 6:00-7:00 PM). No growth was applied to Oak Creek Parkway, Factory Shops Boulevard, either of the Weber Grill access driveways, or Carriage Way Lane assuming that the associated developments are fully built-out.

The resulting volumes were balanced across the study area and added to the seasonal existing volumes to yield Year 2027 Future No-Build traffic projections, illustrated in **Figure A1**. Site-generated seasonal trips were then added to the No-Build seasonal condition, resulting in the Year 2027 Future Build seasonal traffic projections shown in **Figure A2**. All distribution and assignment assumptions are consistent with those utilized in the non-seasonal condition as outlined in **Figure 3** and **Figure 4**.



A.4. Future Intersection Operations

As in the non-seasonal condition, capacity analyses were conducted using Synchro 10 software to assess future traffic operations during weekday morning and evening peak hours for future No-Build and Build seasonal conditions. The results of these analyses are detailed in the following sections:

Future No-Build Conditions (Seasonal)

As noted previously, apart from the access-related improvements outlined in the background development TIAs, there are no planned background improvements in the study area, and so no other background improvements were incorporated into the analysis of future No-Build conditions. Based on this assumption, area traffic operations for this scenario are projected as shown in **Table A2**.

Table A2. Future (Year 2027) No-Build Levels of Service (Seasonal Condition)

Intersection	Weekday Morning Peak Hour		Weekday Evening Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
IL 47 / Del Webb Boulevard & Oak Creek Parkway ¹				
Eastbound	53.3	D	49.5	D
Westbound	47.7	D	56.7	E
Northbound	14.2	B	15.1	B
Southbound	16.3	B	14.4	B
<i>Overall</i>	<i>19.0</i>	<i>B</i>	<i>19.8</i>	<i>B</i>
IL 47 / Jim Dhamer Drive & Freeman Road ¹				
Eastbound	55.9	E	55.8	E
Westbound	52.9	D	58.6	E
Northbound	1.3	A	26.5	C
Southbound	14.4	B	18.3	B
<i>Overall</i>	<i>13.7</i>	<i>B</i>	<i>31.6</i>	<i>C</i>
IL 47 / I-90 WB ramp junction ¹				
Westbound	67.1	E	45.5	D
Northbound	8.7	A	11.4	B
Southbound	1.0	A	2.0	A
<i>Overall</i>	<i>15.6</i>	<i>B</i>	<i>15.2</i>	<i>B</i>
IL 47 / I-90 EB ramp junction ¹				
Eastbound	61.0	E	58.1	E
Northbound	2.0	A	1.9	A
Southbound	2.0	A	2.0	A
<i>Overall</i>	<i>9.0</i>	<i>A</i>	<i>7.1</i>	<i>A</i>
Freeman Road / Factory Shops Boulevard ¹				
Eastbound	9.0	A	8.9	A
Westbound	5.5	A	6.1	A
Northbound	10.0	B	11.3	B
<i>Overall</i>	<i>7.9</i>	<i>A</i>	<i>8.1</i>	<i>A</i>
Freeman Road / Weber Truck Access ²				
Westbound (Left)	8.3	A	8.2	A
Northbound	11.6	B	17.1	C
Freeman Road / Weber Employee Access ²				
Westbound (Left)	7.8	A	8.0	A
Northbound	10.9	B	13.7	B
Freeman Road / Carriage Way Lane & Office Access ²				
Eastbound (Left)	7.6	A	7.8	A
Westbound (Left)	7.6	A	7.7	A
Northbound	11.4	B	14.7	B
Southbound	10.4	B	12.4	B

¹Signalized Intersection

²Two-Way Stop-Controlled Intersection

Most approaches are expected to perform at LOS D or better during both peak hours analyzed in the No-Build seasonal condition. At the intersections of IL 47 with Del Webb Boulevard/Oak Creek Parkway, Jim Dhamer Drive/Freeman Road, and the I-90 eastbound and westbound ramp junctions, several minor-street approaches are projected to operate at LOS E. High delay on minor-leg approaches is not uncommon at intersections with major arterials, where high cycle lengths are installed along with the prioritization of the mainline phases.

Future Build Conditions (Seasonal)

To assess the impact of the proposed site on traffic operations within the study area, capacity analyses were performed for Year 2027 Build seasonal conditions. Consistent with No-Build seasonal conditions, no additional background improvements relative to the No-Build scenario were included in future Build analysis. All site-related geometric traffic improvements recommended as a part of the non-seasonal condition were assumed as incorporated into the Build seasonal condition. However, in addition to the signal timing adjustments described in Section 3.6 of this report, further green time allocation was incorporated at the intersections of Freeman Road with both IL 47 and Factory Shops Boulevard/New Road. It should be noted that these adjustments, in addition to the implementation of traffic management personnel, are expected to adequately handle the surge in traffic projected to be associated with seasonal conditions at the receive center on top of the both background developments incorporated into this study. Therefore, further adjustments to the signal timings outlined as a part of the non-seasonal analysis should only be explored at such a time when all projected area traffic is realized. A summary of the capacity results for the Year 2027 Build scenario is presented in **Table A3**.

Table A3. Future (Year 2027) Build Levels of Service (Seasonal Condition)

Intersection	Weekday Morning Peak Hour		Weekday Evening Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
IL 47 / Del Webb Boulevard & Oak Creek Parkway ¹				
Eastbound	53.3	D	49.5	D
Westbound	47.7	D	56.7	E
Northbound	14.5	B	15.9	B
Southbound	17.8	B	14.5	B
<i>Overall</i>	<i>19.6</i>	<i>B</i>	<i>19.7</i>	<i>B</i>
IL 47 / Jim Dhamer Drive & Freeman Road ¹				
Eastbound	55.9	E	56.6	E
Westbound	53.0	D	70.8	E
Northbound	2.7	A	32.1	C
Southbound	37.3	D	30.8	C
<i>Overall</i>	<i>26.5</i>	<i>C</i>	<i>44.3</i>	<i>D</i>
IL 47 / I-90 WB ramp junction ¹				
Westbound	>120	F	40.0	D
Northbound	7.6	A	18.3	B
Southbound	2.3	A	1.7	A
<i>Overall</i>	<i>40.7</i>	<i>D</i>	<i>15.2</i>	<i>B</i>
IL 47 / I-90 EB ramp junction ¹				
Eastbound	55.6	E	57.3	E
Northbound	3.2	A	2.7	A
Southbound	3.1	A	2.8	A
<i>Overall</i>	<i>12.9</i>	<i>B</i>	<i>10.4</i>	<i>B</i>
Freeman Road / Factory Shops Boulevard & New Road ¹				
Eastbound	55.9	E	>120	F
Westbound	61.0	E	72.6	E
Northbound	33.2	C	35.2	D
Southbound	17.5	B	40.3	D
<i>Overall</i>	<i>50.1</i>	<i>D</i>	<i>113.5</i>	<i>F</i>
Freeman Road / Access 2 ²				
Southbound	12.1	B	27.8	D
Freeman Road / Weber Truck Access & Access 1 ¹				
Eastbound	0.5	A	0.8	A
Westbound	2.4	A	4.8	A
Northbound	47.2	D	53.2	D
<i>Overall</i>	<i>3.2</i>	<i>A</i>	<i>7.1</i>	<i>A</i>

¹Signalized Intersection

²Two-Way Stop-Controlled Intersection

Table A3. Future (Year 2027) Build Levels of Service (Seasonal Condition, continued)

Intersection	Weekday Morning Peak Hour		Weekday Evening Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Freeman Road / Weber Employee Access ²				
Westbound (Left)	7.9	A	8.4	A
Northbound	12.0	B	23.3	C
Freeman Road / Carriage Way Lane & Office Access ²				
Eastbound (Left)	7.8	A	8.0	A
Westbound (Left)	7.7	A	8.0	A
Northbound	13.3	B	19.4	C
Southbound	11.7	B	14.7	B
New Road / Access 3 ²				
Southbound (Left)	10.0	B	9.7	A
Westbound	40.3	E	73.5	F
New Road / Access 4 ²				
Southbound (Left)	9.4	A	9.2	A
Westbound	19.3	C	31.3	D
New Road / Access 5 ²				
Southbound (Left)	7.5	A	7.4	A
Westbound	11.2	B	12.0	B

¹Signalized Intersection

²Two-Way Stop-Controlled Intersection

As expected, the above table shows that most intersection approaches increase in delay with the addition of seasonal site traffic. In most cases, approaches are projected to remain at the same LOS as in the seasonal No-Build condition.

However, compared to the non-seasonal Build condition, several approaches are projected to fail (LOS F).

- At I-90's westbound ramp junction with IL 47, the westbound approach is projected at LOS F during the morning peak hour.
- The eastbound approach at the intersection of Freeman Road and New Road/Factory Shops Boulevard is projected at LOS F during the evening peak hour. As a result, the overall intersection is projected at LOS F.
- At the intersection of Access 3 with New Road (the southernmost Building A parking access), the westbound approach is projected at LOS F during the evening peak hour.

It is common that fulfillment centers engage traffic control personnel during the peak season to dynamically manage the increased volume of employee traffic that is experienced during this time. It is recommended that this strategy be employed for the proposed development, with traffic control personnel stationed internally within the site and at the intersection of Freeman Road with New Road to override or manually control of the signal cabinet. Additionally, a transportation management plan should be considered to disperse shift-change traffic evenly over the course of an hour or more during seasonal operations.