KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING
610 SW Alder Street, Suite 700, Portland, OR 97205 P 503.228.5230 F 503.273.8169

July 26, 2016 Project #: 13911.8

David Jardin
Clark County Department of Public Works
1300 Franklin Street, 4th Floor
Vancouver, WA 98666-9810

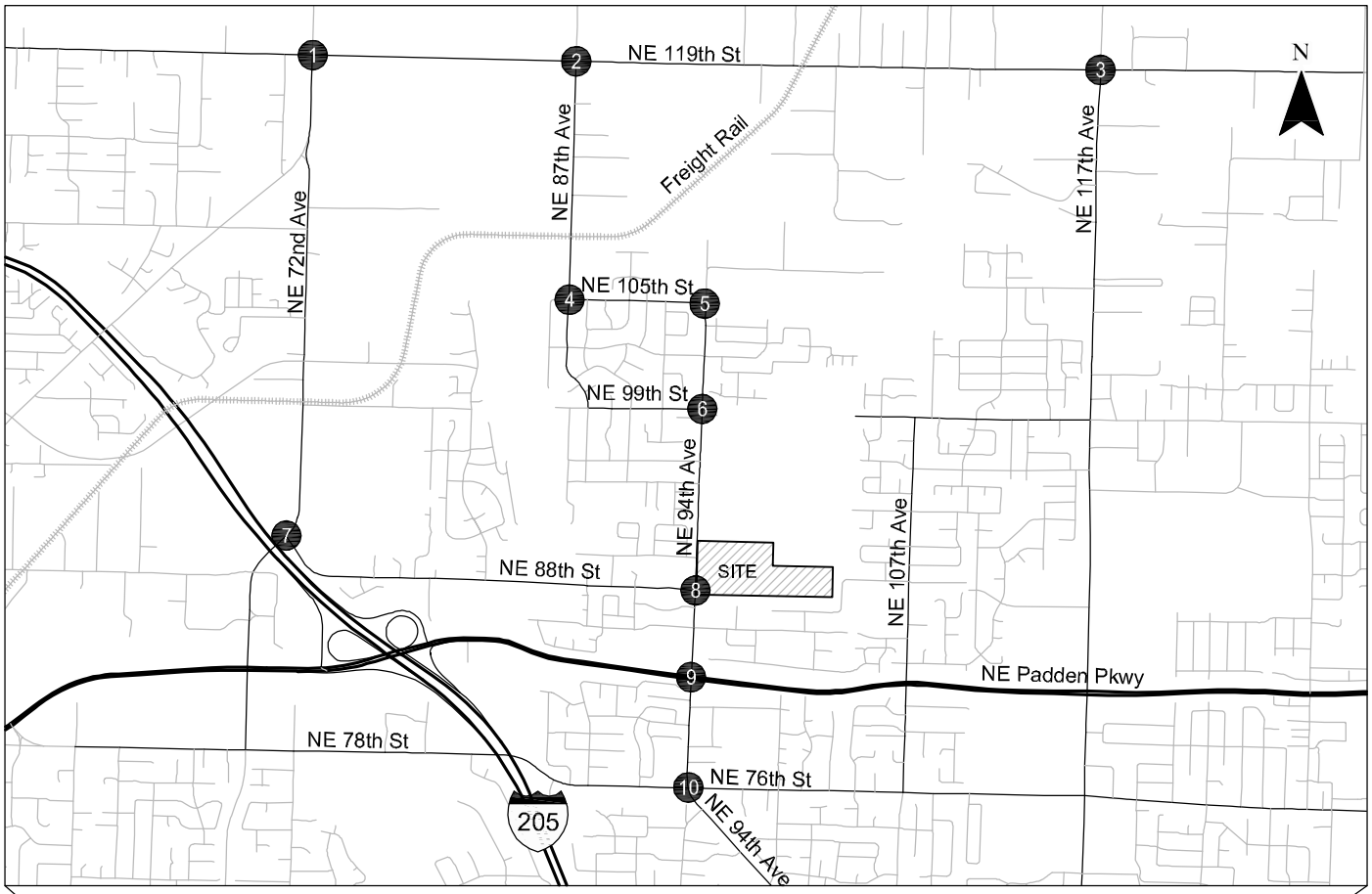
RE: Transportation Impact Study for the Leichner Campus Master Plan - Clark County, Washington

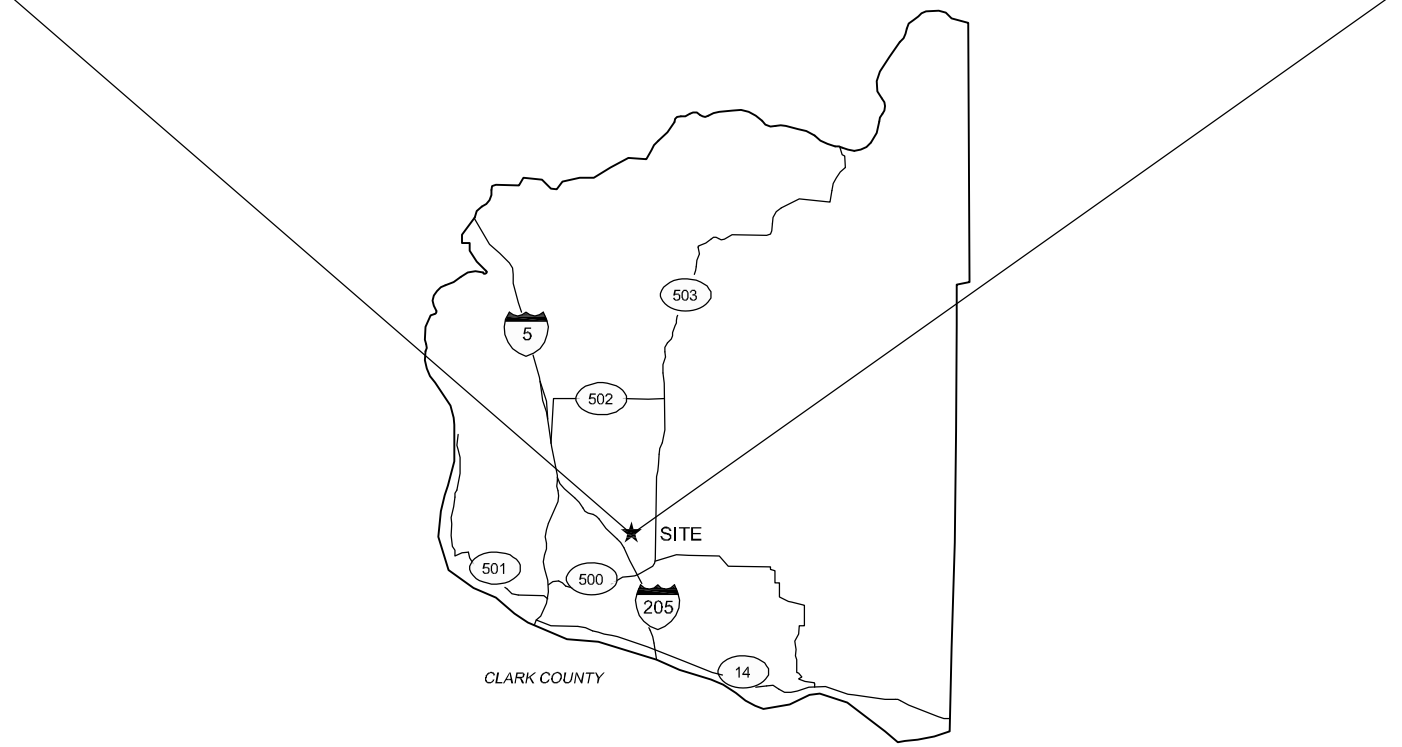
Dear David,

Clark County is proposing a master plan of four vacant parcels zoned light industrial and totaling 35.03 acres, part of a greater 128-acre Leichner Master Plan Development. The master plan site is located east of NE 94th Avenue and will be accessible via NE 88th Street when developed in the future. At this time, there are no specific plans for development but future uses are anticipated to be industrial in nature. Figure 1 illustrates the site vicinity.

This letter presents the results of a transportation impact study for the proposed master plan. This study concludes that the master plan site can be developed while maintaining acceptable traffic operations and safety at the study intersections. Based on the traffic analysis, any future site construction should include the following access-related improvements:

- NE 88th Street should be extended east of NE 94th Avenue into the master plan site and should be stop controlled at its approach to NE 94th Avenue. A stop sign should be installed on the private NE 88th Street (westbound) approach to NE 94th Avenue in accordance with Clark County standards and the *Manual on Uniform Traffic Control Devices*.
- A southbound left-turn lane should be provided on NE 94th Avenue at NE 88th Street to serve the new private roadway (if not already constructed in conjunction with Clark County's NE 94th Avenue improvement project).
- The eastbound and westbound approaches of the NE 88th Street/NE 94th Avenue intersection should be widened to provide separate left-turn and shared through/right-turn lanes if and when warranted by master plan site development.
- The need for signalization at the NE 88th Street/NE 94th Avenue intersection should be analyzed per the warrants included in the *Manual on Uniform Traffic Control Devices* as the site develops. A traffic signal should be installed if and when warranted by master plan site development or other nearby future development.





(##) - Study Intersections

Site Vicinity Map
Clark County, Washington

Figure
1

- Site landscaping, signing and any aboveground utilities should be appropriately located to ensure that adequate sight distance is maintained after build out.

We recommend the appropriate incremental mitigation required at the NE 88th Street/NE 94th Avenue intersection be re-examined with future site development applications. Given the unknown nature of the site tenants, the above mitigations should be revisited at the time actual site tenants are identified. Land uses with lower trip generation (warehousing, for example) are unlikely to require initial turn lane and traffic signal improvements whereas higher trip generating uses in the light industrial land use range will necessitate mitigation sooner. The following sequence of improvements at the intersection could be followed, pending the site trip generation of incremental site buildout and the timing of site build-out:

- Initial construction: use existing single lane westbound approach along NE 88th Street.
    - Estimated to accommodate approximately 77 weekday PM peak hour site-generated trips (10 in/67 out); equivalent to approximately 30% of the total PM peak hour site-generated trips assumed in this study
- Improvement 1: widen westbound approach to provide shared through/left-turn lane and separate westbound right-turn lane
    - Estimated to accommodate approximately 86 weekday PM peak hour site-generated trips (12 in/74 out); equivalent to approximately 34% of the total PM peak hour site-generated trips assumed in this study Improvement
- Improvement 2: signalize the intersection
    - Estimated to be accommodate full buildout of the site, but with lengthy delays and queuing on the westbound intersection approach (weekday PM peak hour 95th percentile queues of approximately 350 feet assuming one percent heavy vehicles at the site – higher truck volumes will lead to longer queues)
- Ultimate Improvement: widen NE 88th Street eastbound approach to provide left-turn lane and separate shared/through right-turn lane and restripe westbound approach to provide left-turn lane and separate shared/through right-turn lane; operate intersection with a traffic signal
    - Estimated to fully accommodate site development

Additional details of the study methodology, findings, and recommendations are provided herein.

INTRODUCTION

The master plan site is located at 9411 NE 94th Avenue and is currently owned by Clark County. The County proposes to master plan the 35.03-acre site for future development under the existing Light Industrial (IL) zoning. Although tenants at the site were not known at the time this report was

prepared, the zoning would allow for a mix of light industrial, warehouse, and/or support office or retail uses (retail is only allowed at a total of 10% of the total building area on site per Clark County Code 40.230.085-1).

Access to the site is proposed via a private roadway to be constructed beginning at NE 94th Avenue and traveling east through the site as an extension of NE 88th Street. No other future vehicular connections to NE 94th Avenue were identified or analyzed. The proposed private roadway will be aligned with the existing west approach to the NE 94th Avenue/NE 88th Street intersection and is proposed to terminate at a cul-de-sac near the east end of the master plan site. Future site development also expected to include a north-south private roadway tentatively identified as NE 96th Street that would be located approximately 500 feet east of NE 94th Avenue. NE 96th Avenue is proposed to terminate at a cul-de-sac near the north side of the development site. No vehicular connections are proposed to the adjacent residential lands to the south or east or to the future park to the north given the County's current desire to avoid mixing industrial and non-industrial traffic on the site.

SCOPE OF THE REPORT

This analysis identifies the transportation-related impacts associated with the proposed master plan and was prepared in accordance with Clark County's transportation impact study requirements. The study scope and overall study area for this project were selected based on a review of the local transportation system and discussions with Clark County staff. As required under Clark County Code 40.350.020, Transportation Concurrency Management, the analysis was prepared to address the following transportation issues:

- Existing land use and transportation system conditions within the site vicinity;
- Existing traffic conditions during the weekday AM and PM peak hours;
- Planned developments and transportation improvements in the study area;
- Future year 2021 weekday AM and PM peak hour background traffic conditions (without site development);
- Trip generation and distribution estimates for the proposed master plan site, including assignment of weekday PM peak hour trips to key concurrency corridor intersections;
- Future year 2021 weekday AM and PM peak hour total traffic conditions (with master plan site development);
- Turn lane needs at the proposed NE 94th Avenue/NE 88th Street intersection; and
- Volume to capacity ratios for applicable concurrency segments.

Study Intersections

Per County staff scoping direction, operational analyses were performed at the following intersections:

- NE 119th Street/NE 72nd Avenue;
- NE 119th Street/NE 87th Avenue;
- NE 119th Street/NE 117th Avenue (SR 503);
- NE 87th Avenue/NE 105th Street;
- NE 105th Street/NE 94th Avenue;
- NE 99th Street/NE 94th Avenue;
- NE 72nd Avenue/NE 88th Street;
- NE 94th Avenue/NE 88th Street;
- NE 94th Avenue/NE Padden Parkway; and
- NE 94th Avenue/NE 76th Street/NE Covington Road.

ANALYSIS METHODOLOGY

Intersection Performance Measures

All level-of-service analyses described in this report were performed in accordance with the procedures stated in the *2000 Highway Capacity Manual* (Reference 1). All intersection level-of-service analyses used the peak 15-minute flow rate that occurred during the weekday AM and PM peak hours. Using the peak 15-minute flow rate ensures that the analyses are based on a reasonable worst-case scenario. For this reason, the analyses reflect conditions that are only likely to occur for 15 minutes out of each average peak hour. The transportation system will likely operate under conditions better than those described in this report during other typical time periods.

The intersection operational analyses presented in this report were completed using the Synchro 9 software tool and/or SIDRA Intersection 7.0[1].

Facility Performance Standards

Level of service analyses for signalized intersections in this report are based on the average control delay per vehicle entering the intersection. For two-way stop-controlled intersections, level of service is based on the intersection's ability to accommodate the most difficult, or critical, movement as overall intersection level of service is not defined by the *2010 Highway Capacity Manual*.

[1] SIDRA was used to assess stop controlled intersections at NE 87th Avenue/NE 105th Street and NE 105th Street/NE 94th Avenue

Clark County Operating Standards

Clark County Code (CCC) Section 40.350.020.G defines the County's LOS standards for roadway segments as well as signalized and unsignalized intersections.

Roadway Segments

Per CCC Section 40.350.020.G.1.a: *"A maximum volume to capacity ratio for each roadway segment shall not exceed nine-tenths (0.9), when measured independently for each direction of travel. The capacity shall be based on the factors described in Table 40.350.020-1, Roadway Capacities."*

Signalized Intersections

Per CCC Section 40.350.020.G.1.b: *"Individual movements at each signalized intersection of regional significance in the unincorporated county shall not exceed an average of two (2) cycle lengths or two hundred forty (240) seconds of delay (whichever is less) per Section 40.350.020.G.1.b.*"

Unsignalized Intersections

Per CCC Section 40.350.020.G.1.c: *"All unsignalized intersections of regional significance in the unincorporated county shall achieve LOS E standards or better (if warrants are not met). If warrants are met, unsignalized intersections of regional significance shall achieve LOS D standards or better. The signalization of unsignalized intersections shall be at the discretion of the Public Works Director and shall not obligate the County to meet this LOS standard. However, proposed developments shall not be required to mitigate their impacts in order to obtain a concurrency approval unless:*

(1) The proposed development adds at least five (5) peak hour trips to a failing intersection approach;
(2) The projected volume to capacity (v/c) ratio for the worst lane movement on the approach with the highest delay exceeds nine-tenths (0.9) during the peak traffic hour; and,
(3) That same movement is worsened by the proposed development."

WSDOT Operating Standards

The NE 117th Avenue/NE 119th Street intersection is operated and maintained by the Washington State Department of Transportation (WSDOT). WSDOT provides a table of LOS standards for state highways of statewide significance (HSS) based on Revised Code of Washington (RCW) 47.06.140(2). Regional transportation planning organizations (RTPOs) and WSDOT jointly develop and establish LOS standards for regionally significant state highways based on RCW 47.80.030(1)(c). Table 1 presents the WSDOT standards for state facilities in Clark County.

Table 1: WSDOT Level of Service Standards for Washington State Highways

Regional Organization/County	LOS for Non-HHS[1]		LOS for HSS[1]	
	Urban	Rural	Urban	Rural
(RTC) Southwest Washington Regional Transportation Council – MA/MP/RTPO	E	C	D	C

[1] HHS=Highway of Statewide Significance

NE 117th Avenue is designated "urban" per the WSDOT *2013 Urban Highway Log* and is a Non-HHS facility. As such, LOS "E" is the applicable WSDOT operating standard.

EXISTING CONDITIONS

The existing conditions analysis identifies the site conditions and the current operational and geometric characteristics of roadways within the study area. The purpose of this section is to provide a basis for comparison to future conditions.

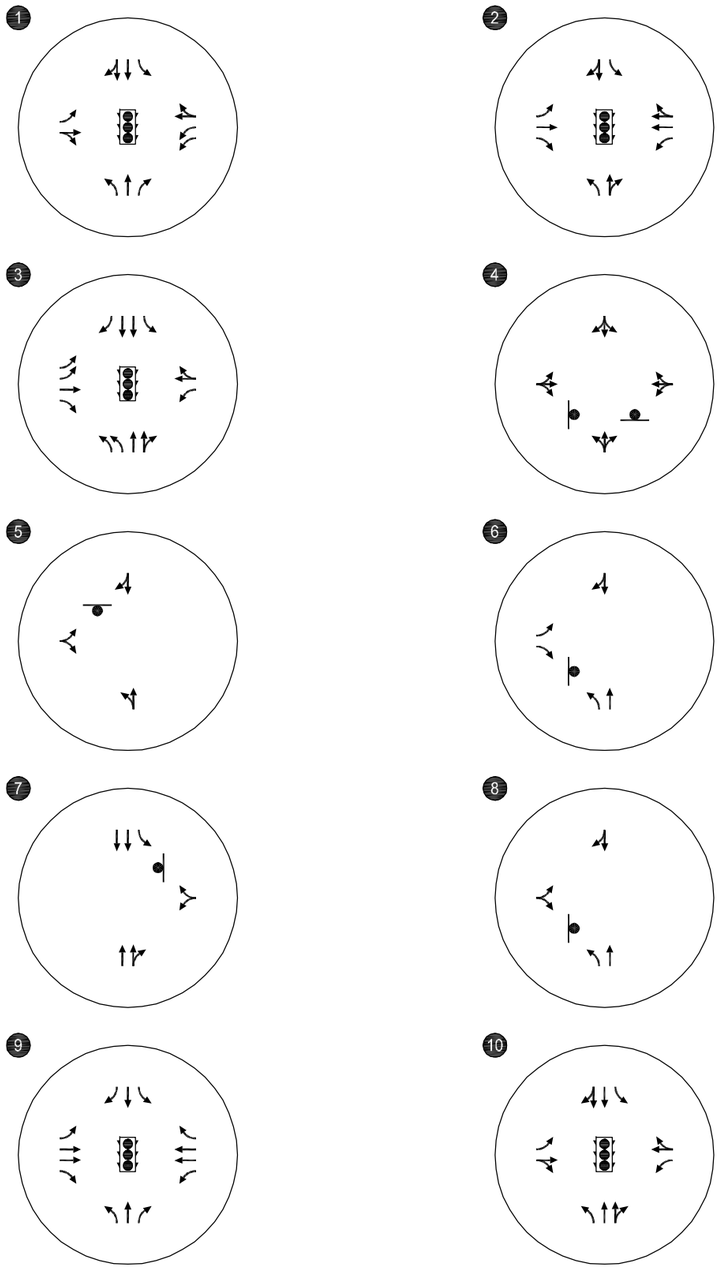
The site and surrounding study area was visited and inventoried in July 2016. At that time, information was collected regarding site conditions, adjacent land uses, existing traffic operations, and transportation facilities in the study area.

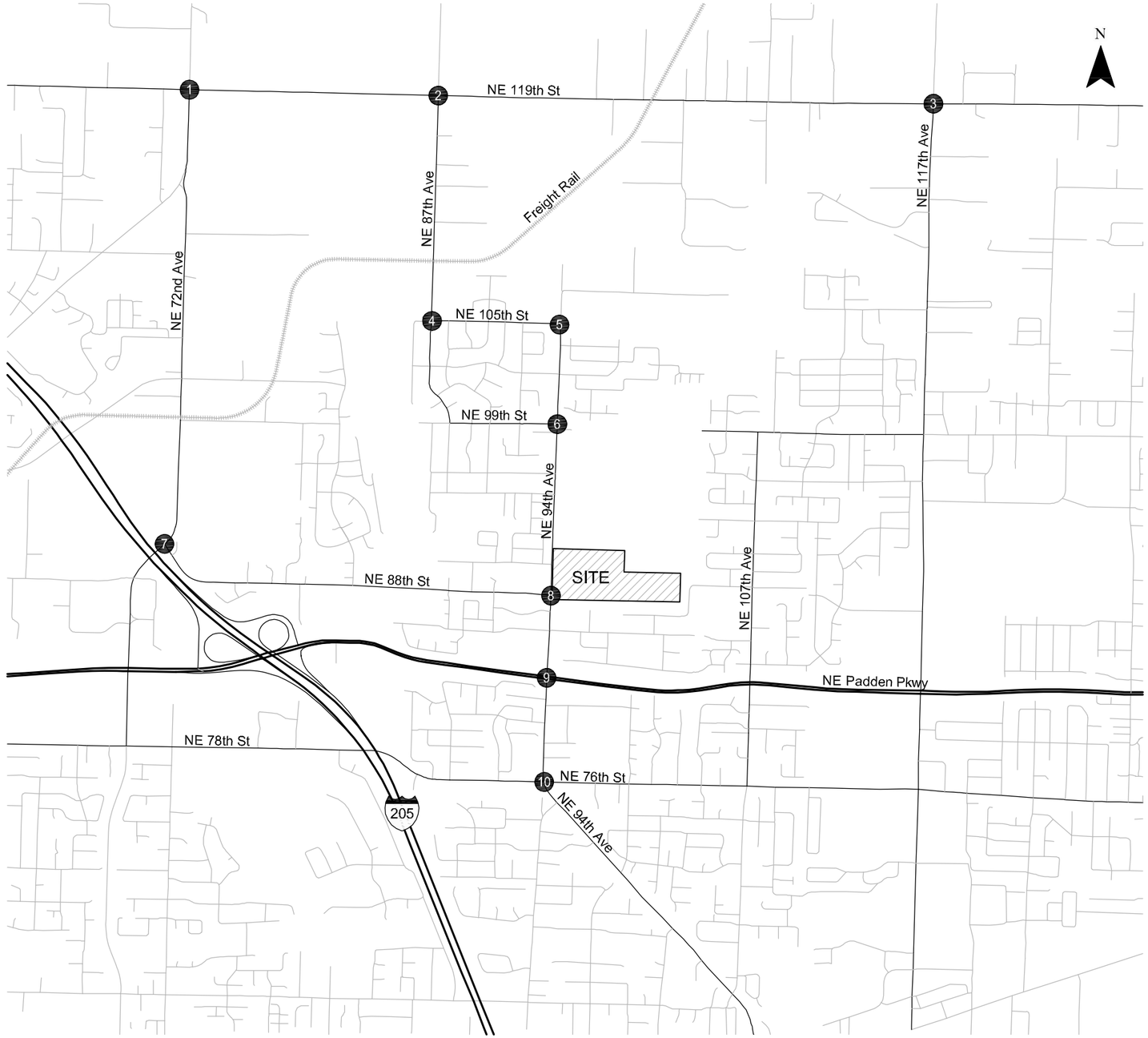
Site Conditions and Adjacent Land Uses

The site is zoned light industrial (IL) and is currently vacant. The intersection of NE 94th Avenue/NE 88th Street extension was constructed in a manner that provides a sidewalk across the future private street serving the site and is stubbed for extension into the site. The site is bordered by NE 94th Avenue to the west, light industrial uses and a former landfill to the north, and residential homes to the east and south.

Transportation Facilities

Figure 2 illustrates the location of the study intersections, as well as existing lane configurations and traffic control devices associated with these intersections. Table 2 summarizes key transportation facilities within the site vicinity.





- Stop Sign
- Traffic Signal

Existing Lane Configurations and Traffic Control Devices
Clark County, Washington

Figure
2

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Table 2 - Existing Roadway Facilities

Roadway	Classification[1]	Cross Section	Speed Limit (mph)	Sidewalks?	Bicycle Lanes?	On-Street Parking?
NE Padden Parkway	Urban Principal Arterial (Pa-4cb)	4 lane	50	No	No	No
NE 94th Avenue north of Padden Pkwy.	Minor Arterial (M-2cb)	2 lane[2]	35	Partial[2]	Partial[2]	Partial[2]
NE 94th Avenue south of Padden Pkwy.	Minor Arterial (M-4cb)	4 lane	35	Yes	Yes	No
NE 88th Street	Urban Collector (C-2)	2 lane	40	No	No	No
NE 99th Street	Minor Arterial (M-2cb)	2 lane	25	Partial[3]	No	Yes
NE 76th Street	Minor Arterial (M-2cb)	3 lane	40	Yes	Yes	No
NE 105th Street	Urban Collector (C-2)	2 lane	35	Partial[4]	No	Partial
NE 72nd Avenue	Urban Principal Arterial (Pr-4cb)	4 lane	25[5]-45	Yes	Yes	No
NE 119th Street (west of NE 72nd Av.)	Urban Minor Arterial (M-2cb)	2 lane	40	No	No	No
NE 119th Street (east of NE 72nd Av.)	Urban Minor Arterial (M-4cb)	2 lane	25	No	No	No

[1] Based on the Clark County *Arterial Atlas*, 2013 (Reference 2)
[2] At the time this report was prepared, NE 94th Avenue was being reconstructed between Padden Parkway and NE 99th Street. The reconstructed roadway will provide a three-lane cross section, pedestrian facilities on both sides, striped bicycle lanes, and will not allow on-street parking. The area north of NE 99th Street provides intermittent pedestrian facilities, has no bicycle lanes, and accommodates intermittent on-street parking.
[3] Sidewalk provided on the south side of the roadway between NE 94th Avenue and a point approximately 300 feet west of NE 92nd Avenue. Sidewalk provided on the north side of the roadway between a point approximately 135 feet east of NE 91st Avenue and NE 89th Avenue.
[4] Sidewalk provided on the south side of the roadway between NE 94th Avenue and a point approximately 125 feet west of NE 92nd Avenue, then intermittently along some residential home frontages.
[5] At the time this report was prepared, the NE 72nd Avenue speed limit was temporarily reduced from 45 to 25 mph north of St. Johns Road for construction.

Transit Facilities

C-TRAN provides transit services within Clark County. There are no fixed-route public transit lines currently operating within a ¼ mile walk from the proposed site (Reference 3).

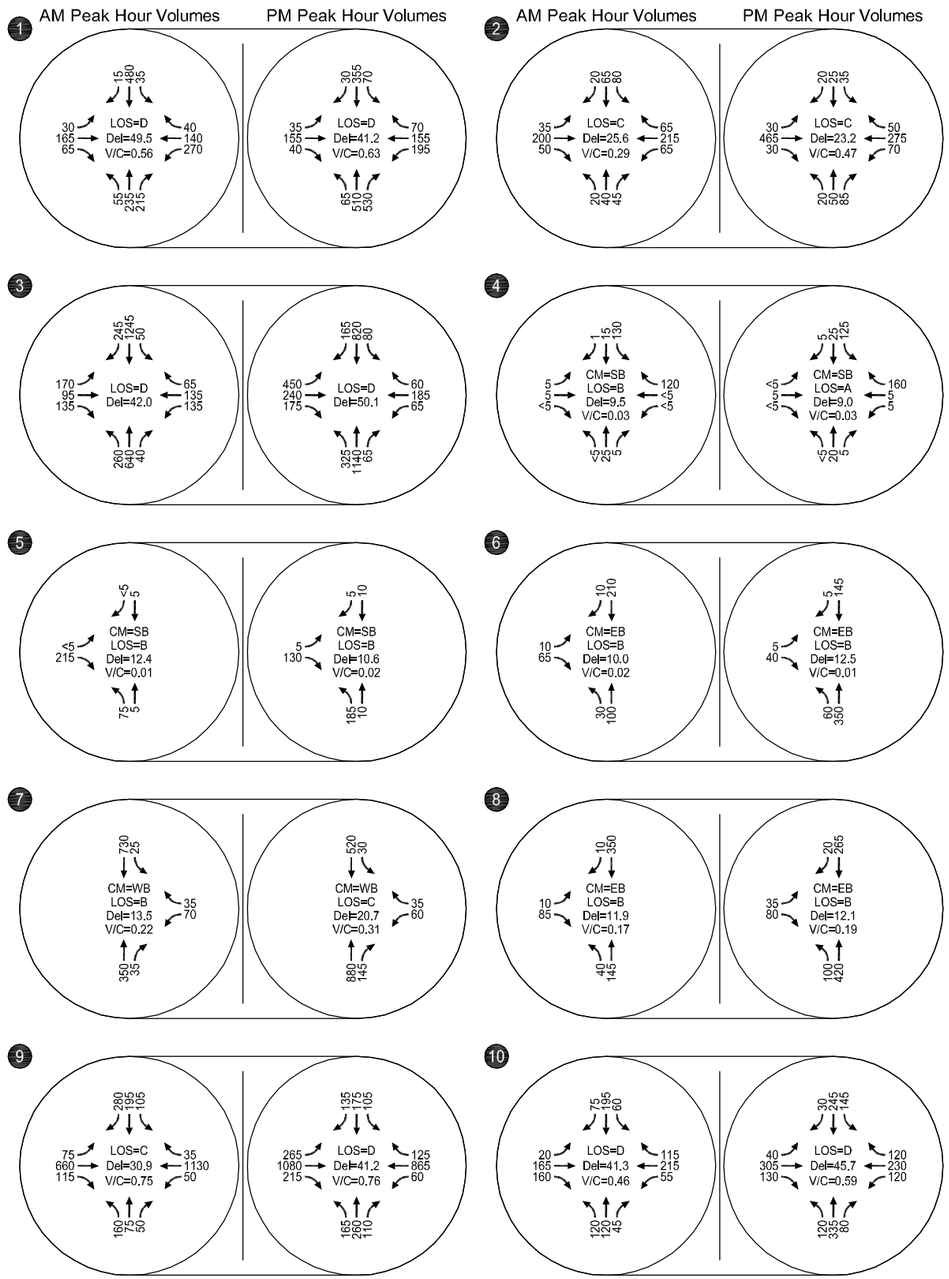
TRAFFIC VOLUMES AND PEAK HOUR OPERATIONS

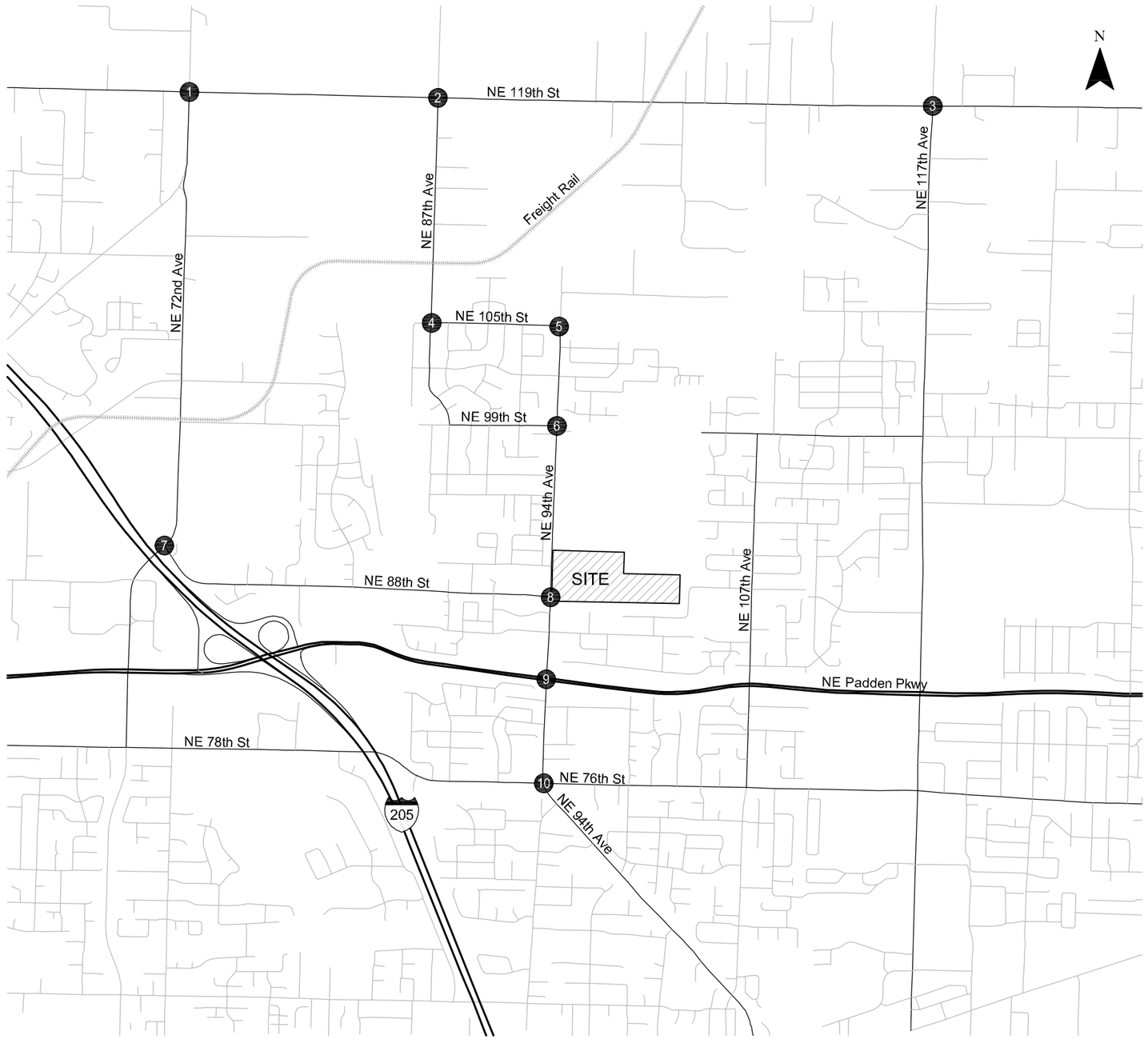
Turning movement counts were conducted at the study intersections on a mid-week day in June 2016 and September 2015 (depending on the location) while local schools were in session. These counts were conducted during the morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM) peak hour periods.

The traffic counts taken in September 2015 were increased assuming a year of background growth at two percent. The June 2016 traffic counts were adjusted to account for the on-going construction of NE 94th Avenue based on historic counts at the study intersections (atypical increases in NE 88th Street traffic volumes and reductions in NE 94th Avenue traffic volumes were noted and attributed to diversions related to the roadway construction). *The traffic count sheets are included in Appendix "A".*

Existing Intersection Operations

Figure 3 summarizes the level-of-service, delay, and capacity analysis results for the study intersections under existing traffic conditions during the weekday AM and PM peak hours. As shown in the figure, the results indicate that all of the study intersections currently operate acceptably during both peak hours per the County's adopted standards enumerated in CCC Section 40.350.020.G. and the related WSDOT standards. *Appendix "B" includes the existing conditions level-of-service worksheets.*





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V/C = CRITICAL CRITICAL VOLUME-TO-CAPACITY RATIO

Existing Traffic Conditions, Weekday AM and PM Peak Hours
Clark County, Washington

Figure 3

TRAFFIC SAFETY

The study intersection crash histories were reviewed in an effort to identify potential intersection safety issues. Crash records were obtained from Clark County's Department of Public Works for a five-year period from January 2011 to December 2015, and are summarized in Table 3[2]. *All crash data are provided in Appendix "C" of this report*.

Table 3 presents a summary of the crash rate experienced at the study intersections in terms of crashes per million entering vehicles (MEV) over the five and a half year period. Clark County generally considers a crash rate greater than 1.0 crashes/MEV to be an indicator that a potential geometric or operational issue may exist and that further evaluations should be considered.

Table 3 - Intersection Crash History

Intersection	5-Year MEV[1]	Crash Type							Crash Severity				Total Crashes	Crash Rate[3] /MEV
		Angle	Turn	Side-swipe	Rear End	Fixed Object	Ped / Bike	Other	PDO[2]	Injury	Fatal	Other		
NE 119th Street/ NE 72nd Avenue	40.28	1	12	1	4	2	0	2	14	8	0	0	22	0.55
NE 88th Street/ NE 72nd Avenue	30.50	0	0	1	0	0	1	0	1	1	0	0	2	0.07
NE 119th Street/ NE 87th Avenue	21.19	3	1	0	6	1	0	0	7	4	0	0	11	0.52
NE 105th Street/ NE 87th Avenue	6.08	0	0	0	0	2	0	0	1	0	0	1	2	0.33
NE 105th Street/ NE 94th Avenue	5.69	0	0	0	1	2	0	0	1	1	0	1	3	0.53
NE 99h Street/ NE 94th Avenue	11.06	0	0	0	0	1	0	0	1	0	0	0	1	0.09
NE 88th Street/ NE 94th Avenue	16.81	0	1	0	0	0	0	0	1	0	0	0	1	0.06
NE Padden Pkwy./ NE 94th Avenue	64.97	5	23	2	19	1	2	1	24	27	1	1	53	0.82
NE 76th Street/ NE Covington Road	34.60	13	17	1	7	1	1	0	18	19	0	3	40	1.16
NE 119th Street/ NE 117th Avenue	68.73	11	5	6	20	1	0	1	31	13	0	0	44	0.64

[1]5-Year Million Entering Vehicles = (Peak Hour Volume x 10 x 365 days/year x 5 years) / 1,000,000
[2]Property Damage Only
[3]Crash Rate = Total Crashes / 5.0 Year MEV

As shown in Table 3, all of the study intersections except NE 76th Street/NE Covington Road had a crash rate below 1.0 crashes/MEV during the analysis period. Clark County has programmed left-turn traffic signal changes at the NE 76th Street/NE Covington Road. The County should monitor the crash experience at this intersection once the modifications are in-place. Further, the study intersections

[2] The Washington State Department of Transportation provided crash data for the SR 503/NE 119th Street intersection for the five-year period from January 1, 2011 through June 1, 2016. Crashes presented in Table 3 at the intersection were recorded through December 2015. Seven additional crashes were reported in 2016.

along NE 94th Avenue at NE Padden Parkway, NE 88th Street, and NE 99th Street are currently being reconstructed and widened to accommodate additional turn lanes as will be described later in this report. As such, no potential safety issues requiring mitigation were identified on the basis of the crash rate comparison alone.

TRANSPORTATION IMPACT STUDY

The Transportation Impact Study identifies how the study area's transportation system will operate in 2021, which corresponds to the assumed master plan build-out horizon year. The impact of traffic generated by future development of the site during typical weekday AM and PM peak hours was examined as follows:

- Planned developments and transportation improvements in the site vicinity were identified and reviewed;
- Year 2021 background traffic conditions (without master plan site development) at the study intersections were analyzed during the weekday AM and PM peak hours;
- Site-generated trips were estimated for the master plan site;
- A trip distribution pattern was developed for the master plan site;
- Year 2021 total traffic conditions (with full build-out and occupancy of the master plan site) were analyzed at the study intersections during the weekday AM and PM peak hours; and
- Link volumes were reviewed on applicable concurrency corridors.

Year 2021 Background Traffic Conditions

The year 2021 background traffic conditions analysis identifies how the study area's transportation system will operate prior to master plan site development. This analysis includes traffic attributed to planned developments within the study area and to general growth in the region, but does not include traffic from the Leichner Master Plan Development site.

Planned Developments and Transportation Improvements

Planned in-process weekday PM peak hour traffic volumes were obtained through the Clark County concurrency model (Clark County East Model), which was modified as directed by County staff[3].

Clark County is currently in the process of improving two roadways in the study area, NE 94th Avenue and NE 119th Street. The NE 94th Avenue corridor improvement project extends from NE Padden Parkway to NE 99th Street and includes reconstruction of the roadway to a two-lane urban minor

[3] Per conversations with Clark County staff, trips associated with developments that are already built were eliminated.

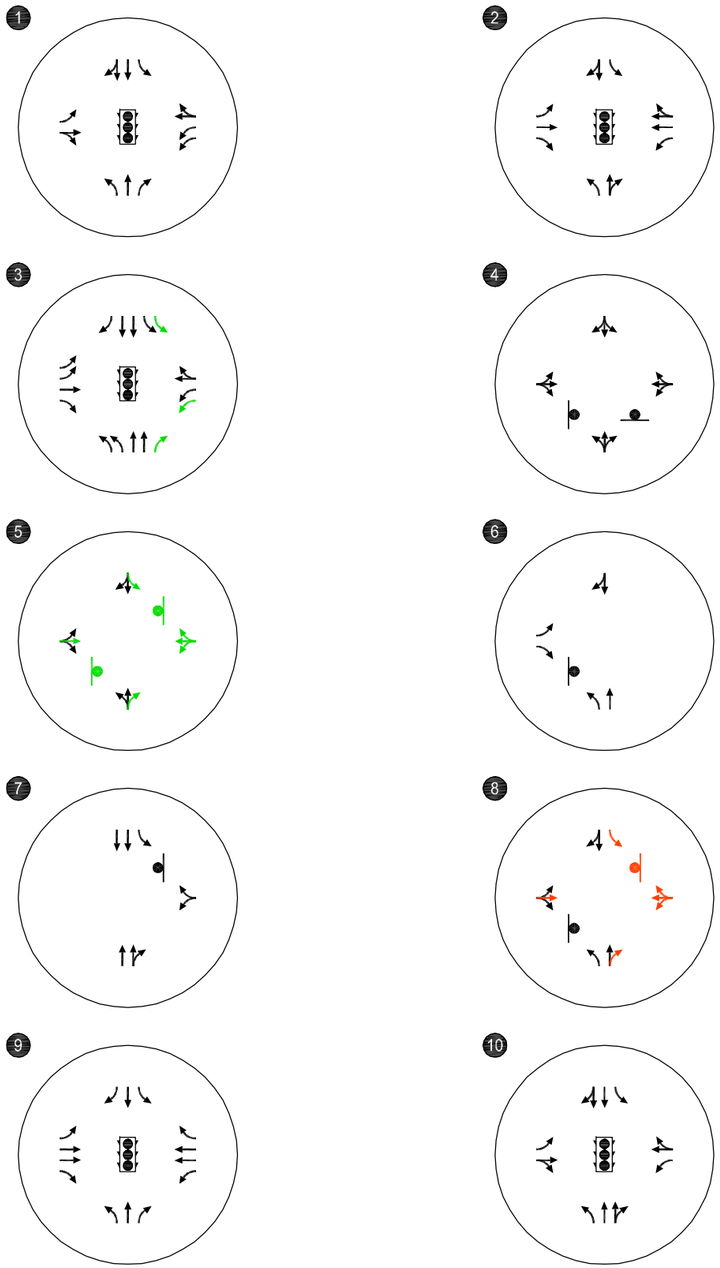
arterial with a center left-turn lane. The improved roadway will include bicycle lanes and sidewalk facilities as well as a stubbed street connection for the proposed NE 88th Street extension (private street) to serve the Leichner Master Plan Development site. The NE 119th Street project includes widening the roadway to a five-lane roadway between NE 72nd Avenue and NE 87th Avenue. The improvement project includes the construction of additional turning and through lanes at the study intersections along the corridor. Both roadway improvement projects are expected to be completed in 2016 and are assumed to be in place for year 2021 capacity analysis purposes.

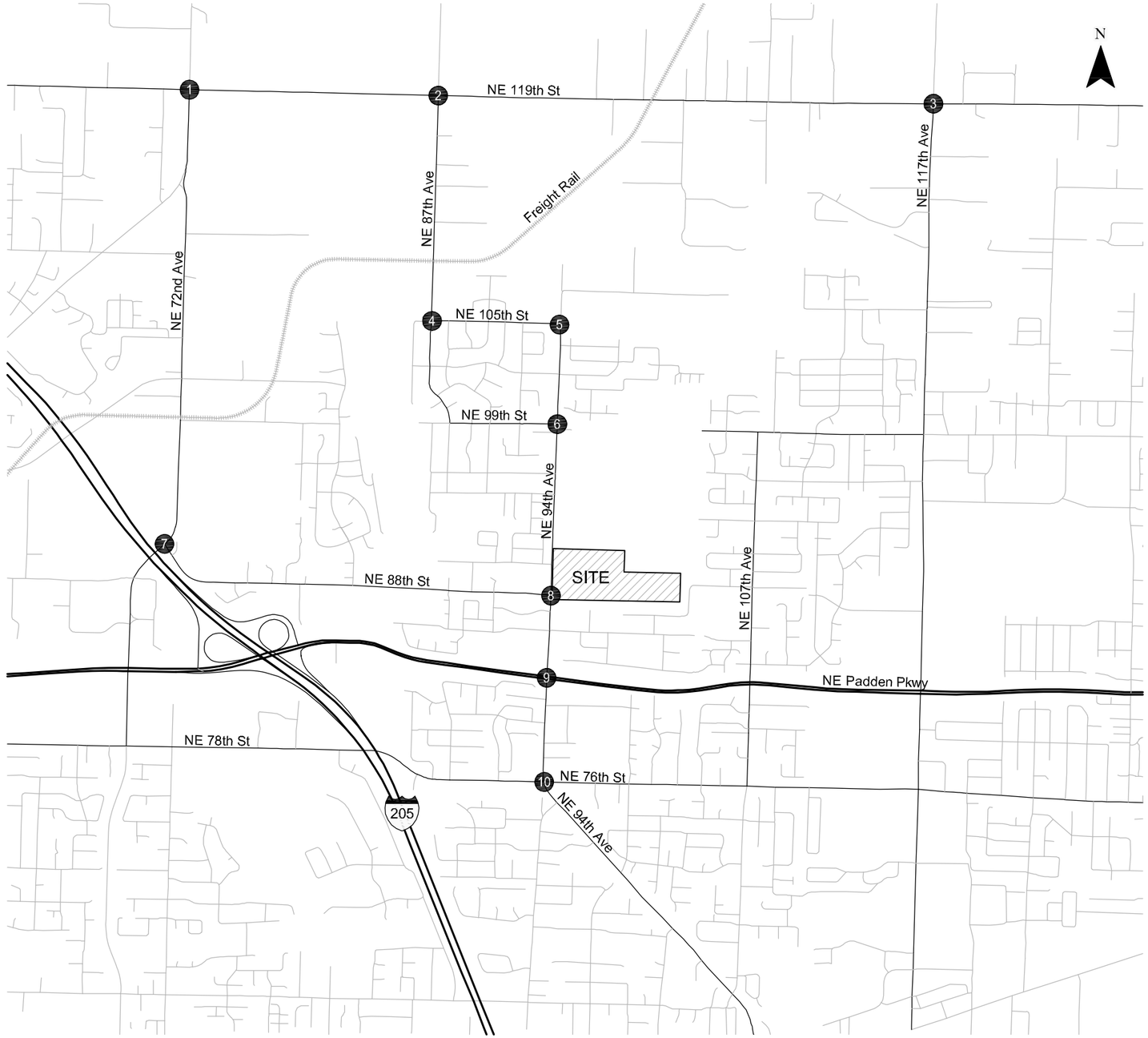
In addition to the two on-going County improvement projects, planned roadway improvements at the intersection of NE 117th Avenue/NE 119th Street were assumed as outlined in Clark County's concurrency model. Planned improvements at this intersection include:

- Addition of a second southbound left turn lane;
- Addition of a second westbound left turn lane; and
- Addition of a northbound right turn lane.

Finally, the current stop control in place at the intersection of NE 105th Street/NE 94th Avenue (southbound approach) will be re-configured and replaced with east-west stop control on NE 105th Street in conjunction with the approved Rivendell Subdivision located on the east side of the intersection.

Each of the above improvements were accounted for in the analysis of both year 2021 background and total conditions. Figure 4 illustrates the planned future lane configurations and traffic control devices associated with the study intersections.





- Stop Sign
- Traffic Signal
- Planned Improvement by Others
- Proposed Improvement with Site Development

Year 2021 Assumed Lane Configurations and Traffic Control Devices
Clark County, Washington

Figure
4

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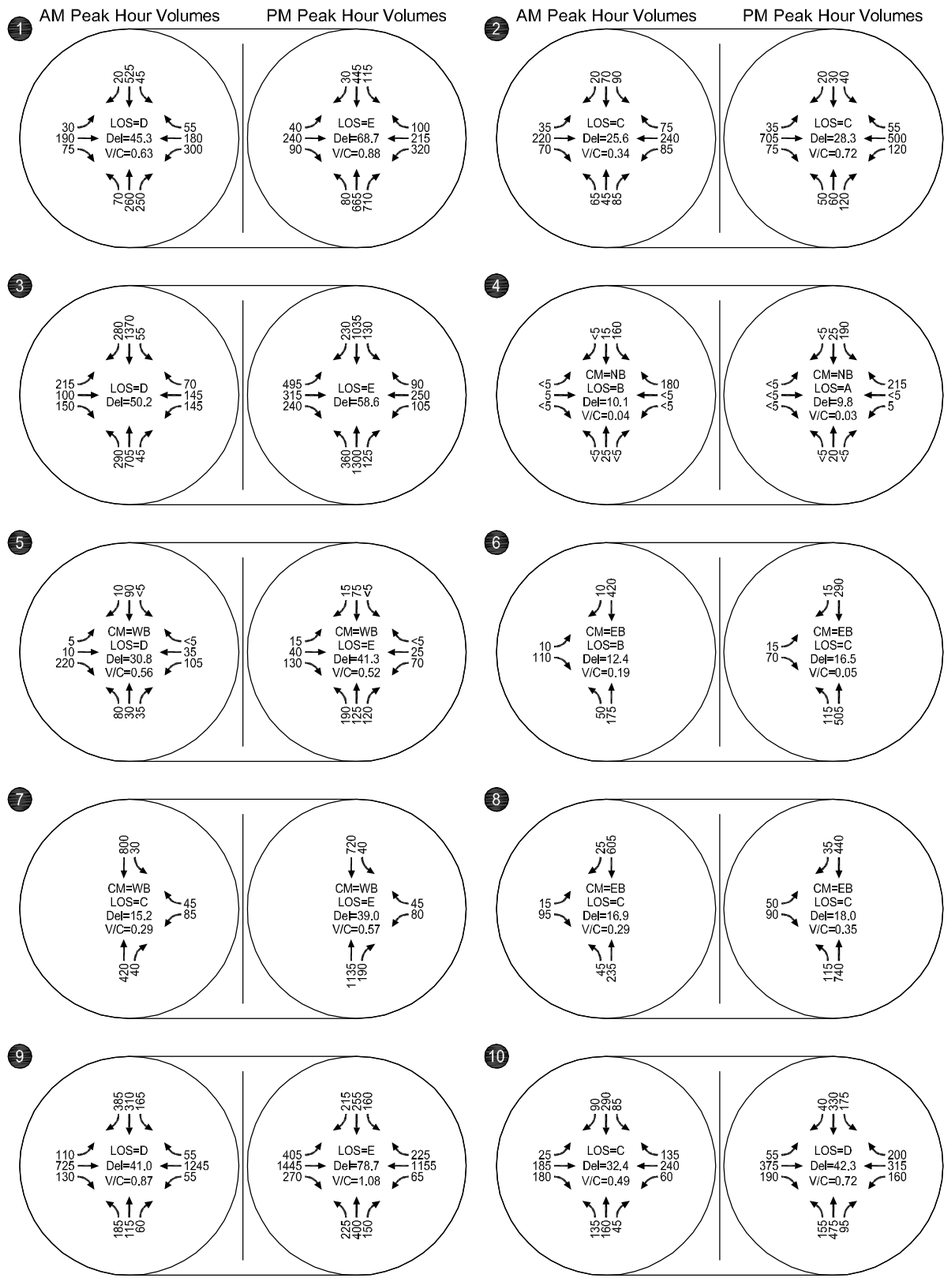
Traffic Volumes

Year 2021[4] future traffic volumes were developed for the AM and PM peak hour conditions in consultation with Clark County staff. The weekday AM and PM peak hour volumes were developed by adjusting existing traffic volumes using a two percent annual growth rate and then adding the in-process trips from the County's modified concurrency model.

Level-of-Service Analysis

Figure 5 summarizes the year 2021 background traffic operations analysis results at the study intersections for the weekday AM and PM peak hours. As shown, all of the study intersections are forecast to continue to operate acceptably with the planned improvements in-place. A*ppendix "D" contains the year 2021 background traffic level-of-service worksheets.*

[4] Weekday AM in-process trips were approximated using the PM peak East Concurrency Model given the lack of any in-process trip data for the AM peak hour.



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2021 Background Traffic Conditions, Weekday AM and PM Peak Hours
Clark County, Washington

Figure 5

Proposed Master Plan

Clark County is master planning the three parcels to facilitate future development by others. Future site development is expected to include one or more light industrial uses that will be accessible via new driveways along the extension of NE 88th Street. Future tenants at the site were not known at the time this report was prepared but could include a mix of light industrial, warehouse, and/or support office or retail uses per the zoning designation (retail is only allowed at a total of 10% of the total building area on site per Clark County Code 40.230.085-1).

Other than the NE 88th Street extension, no other vehicular connections to NE 94th Avenue are proposed. The proposed private roadway will be aligned with the existing west approach to the NE 94th Avenue/NE 88th Street intersection and is proposed to terminate at a cul-de-sac near the east end of the development site. The site is also expected to include a north-south private roadway tentatively identified as NE 96th Street that would be located approximately 500 feet east of NE 94th Avenue. NE 96th Avenue is proposed to terminate at a cul-de-sac near the north side of the master site. No vehicular connections are proposed to the adjacent residential lands to the south or east or to the future park to the north given the County's current desire to avoid mixing industrial and non-industrial traffic.

Completion of site construction and occupancy of the future development is anticipated by the year 2021.

Trip Generation

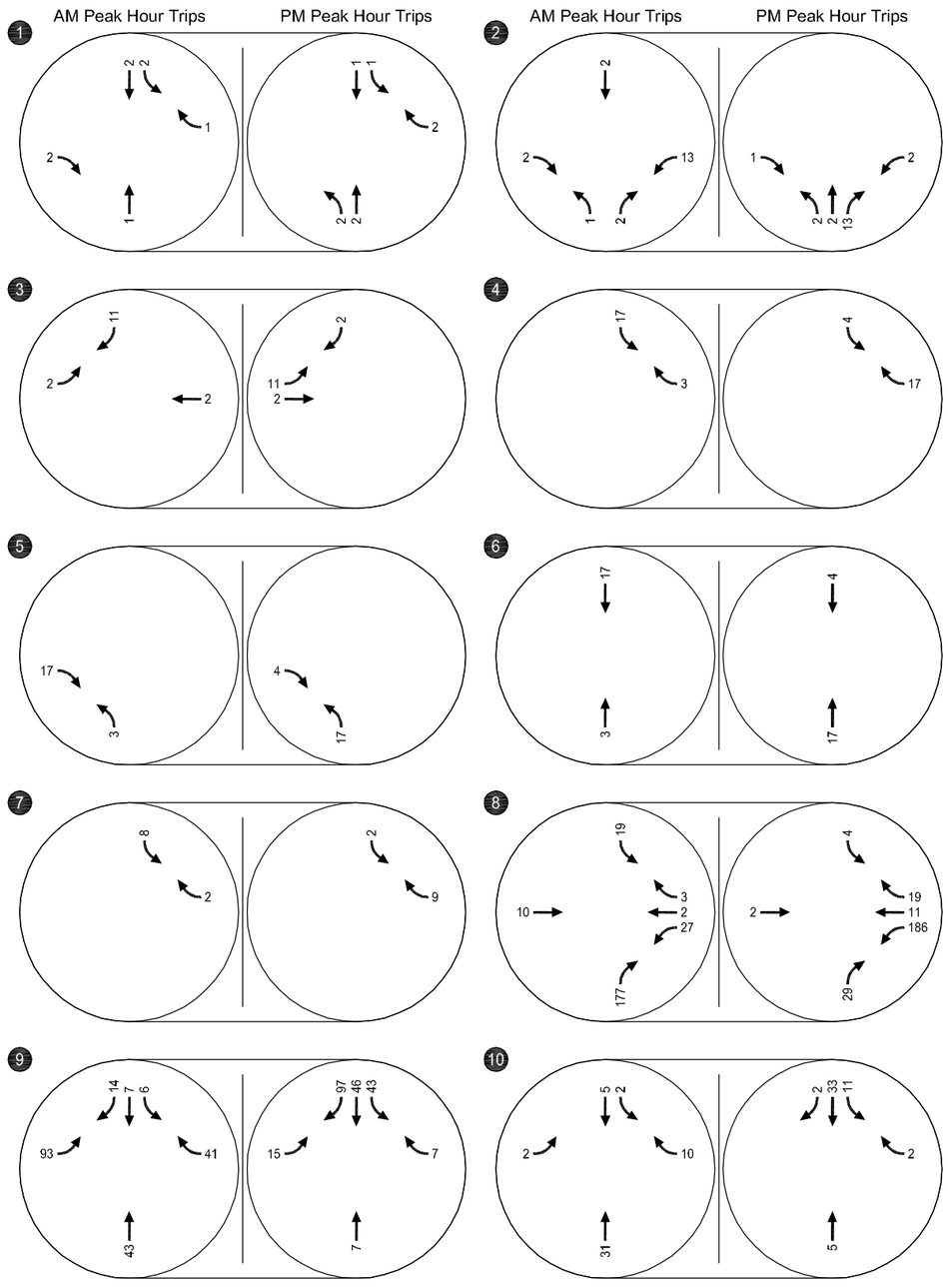
Trip generation estimates for the site were prepared based on information provided in the standard reference manual, *Trip Generation, 9th Edition*, published by the Institute of Transportation Engineers (ITE, Reference 4). Given that the specific uses were unknown at the time this report was prepared but could include industrial or warehousing uses as well as limited office or retail uses, the future tenants were assumed to be approximately 70 percent light industrial and 30 percent warehouse. The associated trip rates provided in *Trip Generation* were used to ensure a conservative analysis that accounts for potential future site trip generation. Table 4 summarizes the estimated site trip generation that was developed assuming 25% site building coverage of the 29.63-acres considered developable (5.4 acres of the site were deemed undevelopable).

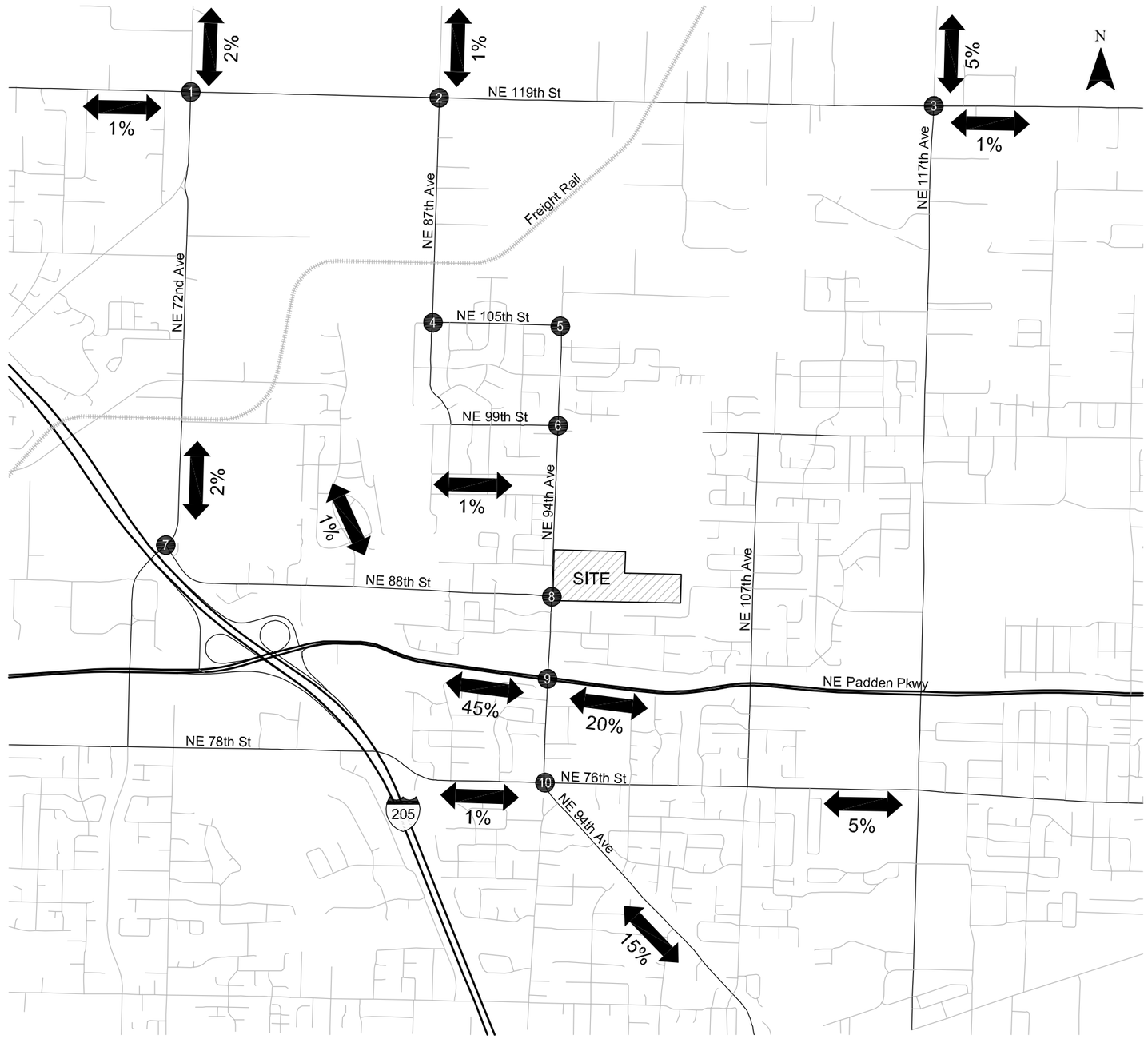
Table 4 - Trip Generation Estimate

Land Use	ITE Land Use Code	Building Size	Daily Trips	Weekday AM Peak Hour			Weekday PM Peak Hour		
				Total Trips	In	Out	Total Trips	In	Out
General Light Industrial	110	225,000 square feet	1,568	207	185	25	218	26	192
Warehousing	150	100,000 square feet	356	30	24	6	32	8	24
Total Net New Trips		325,000 square feet	1,924	237	206	31	250	34	216

Trip Distribution/Assignment

The site-generated trips shown in Table 4 were distributed onto the study area roadways based on a trip distribution pattern derived from the Southwest Washington Regional Transportation Council travel demand model (select zone analysis of Transportation Analysis Zone 347) as well as existing travel patterns in the site vicinity. Figure 6 illustrates the estimated trip distribution pattern and the assignment of site-generated trips at the study intersections during the weekday AM and PM peak hours.





Estimated Trip Distribution Pattern and Weekday AM and PM Peak Hour Site-generated Trip Assignment
Clark County, Washington

Figure
6

YEAR 2021 TOTAL TRAFFIC CONDITIONS

The year 2021 total traffic conditions analysis forecasts how the study area's transportation system will operate with the traffic generated by the master plan uses. The year 2021 background traffic volumes for the weekday AM and PM peak hours (shown in Figure 5) were added to the site-generated traffic (shown in Figure 6) to arrive at the year 2021 total traffic volumes.

Level-of-Service Analysis

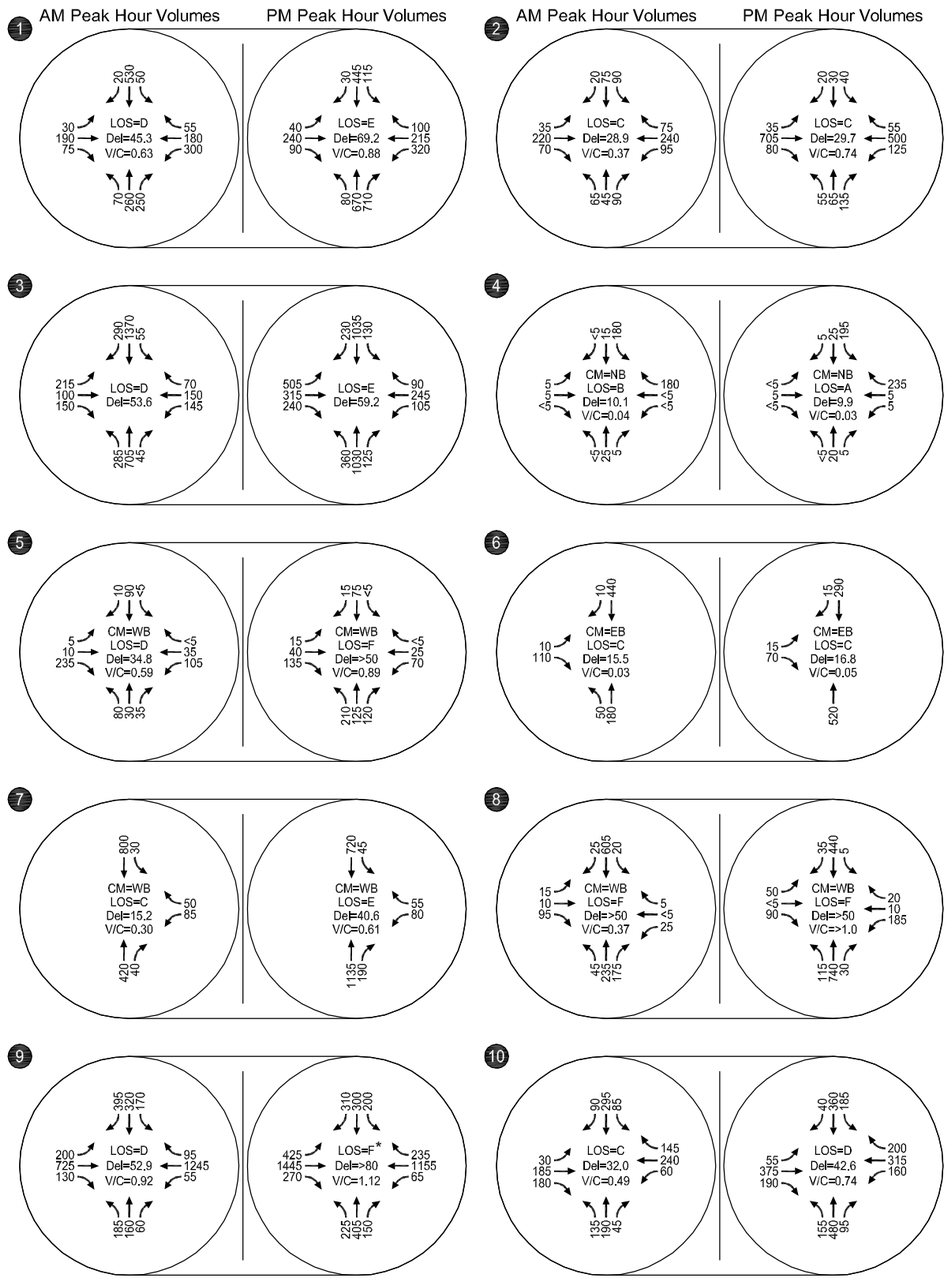
Figure 7 summarizes the year 2021 total traffic conditions at the study intersections for the weekday AM and PM peak hours. As shown in Figure 7, the unsignalized westbound approach at the NE 94th Avenue/NE 88th Street intersection is projected to over-capacity and at LOS F during the PM peak hour upon full site build-out.

Assuming full site development, the intersection operations can be mitigated with two improvements:

- The eastbound and westbound approaches of the NE 88th Street /NE 94th Avenue intersection can be widened to provide separate left-turn and shared through/right-turn lanes. This will increase the capacity of the intersection but will not accommodate full development of the master plan area site development at the trip generation intensity assumed.
- The NE 88th Street/NE 94th Avenue intersection can be signalized if and when warranted per the *Manual on Uniform Traffic Control Devices*.

Given the unknown nature of the site tenants, the above mitigations should be revisited at the time actual site tenants are identified. Land uses with lower trip generation (warehousing, for example) are unlikely to require initial turn lane and traffic signal improvements whereas higher trip generating uses will necessitate mitigation sooner. The following sequence of improvements at the intersection could be followed, pending the site trip generation associated with incremental site buildout and the timing of site build-out:

- Initial construction: use existing single lane westbound approach along NE 88th Street
    - Estimated to accommodate approximately 77 weekday PM peak hour site-generated trips (10 in/67 out); equivalent to approximately 30% of the total PM peak hour site-generated trips assumed in this study
        - Resultant performance metrics for the critical westbound approach are: LOS = F; volume-to-capacity ratio = 0.93; 95th percentile queue of approximately 125 feet



*Maximum Movement Delay = 158.7 Seconds, Satisfying County Code

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = CRITICAL MOVEMENT LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL CRITICAL VOLUME-TO-CAPACITY RATIO

2021 Total Traffic Conditions, Weekday AM and PM Peak Hours
Clark County, Washington

Figure 7

- Improvement 1: widen westbound approach to provide shared through/left-turn lane and separate westbound right-turn lane
    - Estimated to accommodate approximately 86 weekday PM peak hour site-generated trips (12 in/74 out); equivalent to approximately 34% of the total PM peak hour site-generated trips assumed in this study Improvement
        - Resultant performance metrics for the critical westbound through/left movement are: LOS = F; volume-to-capacity ratio = 0.98; 95th percentile queue of approximately 125 feet
- Improvement 2: signalize the intersection
    - Estimated to be accommodate full buildout of the site, but with lengthy delays and queuing on the westbound intersection approach (weekday PM peak hour 95th percentile queues of approximately 350 feet assuming one percent heavy vehicles at the site – higher truck volumes will lead to longer queues)
        - Resultant performance metrics for the overall intersection are: LOS = C; volume-to-capacity ratio = 0.74; 95th percentile queue of approximately 350 feet in the critical shared westbound through/left-turn lane
- Ultimate Improvement: widen NE 88th Street eastbound approach to provide left-turn lane and separate shared/through right-turn lane and restripe westbound approach to provide left-turn lane and separate shared/through right-turn lane; operate intersection with a traffic signal
    - Estimated to fully accommodate site development
        - Resultant performance metrics for the intersection are: Level of Service = C; volume-to-capacity ratio = 0.70; 95th percentile queue of approximately 250 feet in the critical shared westbound left-turn lane, 50 feet in the shared through/right-turn lane

We recommend the appropriate incremental mitigation required at the NE 88th Street/NE 94th Avenue intersection be re-examined with future site development applications. This will allow for determination of improvements commensurate with then-current conditions. Further, the planned future extension of NE 99th Street between NE 94th Avenue and SR 503 to the east is expected to result in trip re-routing both along the NE 94th Avenue corridor as a whole as well as at the site driveway, likely improving conditions compared to those projected in this report without the future connection.

The remaining study intersections continue to satisfy WSDOT and Clark County's intersection operating criteria. *Appendix "E" contains the year 2021 total traffic level-of-service worksheets.*

Site Driveway Queueing Analysis

A 95th percentile queuing analysis was completed at the proposed private roadway that will serve the site on NE 94th Avenue (aligned with NE 88th Street). The 95th percentile queues were found to be 250 feet or less under 2021 total traffic conditions for the AM and PM peak hours for the new westbound left-turn movement assuming signalization and provision of a separate left-turn lane. Accordingly, we recommend that the future on-site north-south street east of NE 94th Avenue be located at least 500 feet east of the signalized intersection to accommodate back-to-back queuing internal to the site. *Appendix "E" contains the 95th percentile queue worksheets.*

CONCURRENCY CORRIDOR V/C RATIOS

Traffic volumes were compared with adopted Clark County capacity thresholds for corridor segments to assess compliance with concurrency requirements. Table 5 shows measured daily bi-direction traffic volumes and the single direction roadway capacity as specified under Clark County Code 40.350.020 Transportation Concurrency Management and table 40.350.020-1. For reference only, the ratio of the observed traffic volumes to the design volumes is also provided for each facility.

Table 5 - Summary of Count Data and Roadway Capacities

Count Location	Road Classification[1]	Single Direction Capacity/Hour	Maximum Volume (vph)[2]	V/C Ratio
NE 119th Street between:				
West of NE 72nd Avenue (EB)	Urban Minor Arterial (M-2cb)	800	687	0.86
West of NE 72nd Avenue (WB)			393	0.49
NE 72nd Avenue and NE 94th Avenue (EB)	Urban Minor Arterial (M-4cb)	1,800[3]	687	0.38
NE 72nd Avenue and NE 94th Avenue (WB)			393	0.22
NE 87th Avenue and NE 90th Street (EB)		900[4]	683	0.76
NE 87th Avenue and NE 90th Street (WB)			417	0.46
NE 108th Avenue and NE 111th Avenue (EB)		900[4]	755	0.84
NE 108th Avenue and NE 111th Avenue (WB)			484	0.54
NE 105th Street between:				
NE 94th Avenue and NE 87th Avenue (EB)	Urban Collector (C-2)	800	114	0.14
NE 94th Avenue and NE 87th Avenue (WB)			189	0.24
NE 88th Street between:				
NE 72nd Avenue and NE 94th Avenue (EB)	Urban Collector (C-2)	600[5]	101	0.17
NE 72nd Avenue and NE 94th Avenue (WB)			116	0.19
NE Padden Parkway between:				
NE 117th Avenue and NE 94th Avenue (EB)	Principal Arterial (Pa-4cb)	2,000	1,112	0.56
NE 117th Avenue and NE 94th Avenue (WB)			1,125	0.56
NE 94th Avenue and Interstate 205 NB On Ramp (EB)	Principal Arterial (Pa-4cb)	2,000	1,478	0.74
NE 94th Avenue and Interstate 205 NB On Ramp (WB)			1,364	0.68
NE 94th Avenue between:				
NE 76th Street and NE Padden Parkway (NB)	Urban Minor Arterial (M-4cb)	1,800	537[6]	0.30
NE 76th Street and NE Padden Parkway (SB)			450[6]	0.25
NE Padden Parkway and NE 88th Street (NB)	Urban Minor Arterial (M-2cb)	900	652[6]	0.72
NE Padden Parkway and NE 88th Street (SB)			580[6]	0.64
NE 88th Street and NE 99th Street (NB)			451[6]	0.50
NE 88th Street and NE 99th Street (SB)			360[6]	0.40
NE 99th Street and NE 105th Street (NB)	Urban Minor Arterial (M-2cb)	800	353[6]	0.44
NE 99th Street and NE 105th Street (SB)			220[6]	0.28

[1]Source: *Clark County Arterial Atlas, 2013* (Reference 2)
[2] vph: vehicles per hour
[3]1,800 based on assumed completion of current widening project to be completed in 2016.
[4] Based on existing 2-lane configuration
[5] Per Clark County Code: For roadways not fully built-out to county standards, the capacity shall be determined based on the current roadway condition. For roadways with lane widths twelve (12) feet and greater, and with paved shoulder widths two (2) feet and greater, the lane capacity shall be eight hundred (800) vehicles per hour. For roadways with lane widths between eleven (11) and twelve (12) feet and with paved shoulder widths two (2) feet and greater, the lane capacity shall be seven hundred (700) vehicles per hour. For roadways with lane widths less than eleven (11) feet, the lane capacity shall be six hundred (600) vehicles per hour.
[6] NE 94th Avenue volume reported based on historic peak hour turn movement count data due to on-going reconstruction of NE 94th Avenue.

As summarized in Table 5, all of the concurrency corridor segments studied are operating below a 0.90 V/C ratio based on the daily single direction capacity from the *County's Transportation Concurrency Management System. The 24-hour traffic volume count sheets are included in Appendix "A."*

SUMMARY AND RECOMMENDATIONS

The results of this transportation impact study indicate that the proposed Leichner Campus Master Plan can be accommodated by the surrounding transportation system assuming provision of the recommended mitigation measures. The findings of this analysis are discussed below.

Findings

- All of the study intersections operate acceptably during the weekday AM and PM peak hours under existing conditions and with future site development with the exception of the unsignalized westbound approach at the NE 88th Street/NE 94th Avenue intersection.
- Acceptable operations can be accommodated at the NE 88th Street/NE 94th Avenue intersection assuming provision of:
    - A southbound left-turn lane on NE 94th Avenue at NE 88th Street to serve the new private roadway;
    - Separate left-turn and shared through/right-turn lanes on the NE 88th Street approaches; and
    - Signalization when warranted.

Recommendations

- NE 88th Street should be extended east of NE 94th Avenue into the master site and should be stop controlled at its approach to NE 94th Avenue. A stop sign should be installed on the private NE 88th Street (westbound) approach to NE 94th Avenue in conjunction with site development in accordance with Clark County standards and the *Manual on Uniform Traffic Control Devices*.
- A southbound left-turn lane should be provided on NE 94th Avenue at NE 88th Street to serve the new private roadway in conjunction with site development (if not already constructed in conjunction with Clark County's NE 94th Avenue improvement project).
- The eastbound and westbound approaches of the NE 88th Street /NE 94th Avenue intersection should be widened to provide separate left-turn and shared through/right-turn lanes.
- The NE 88th Street/NE 94th Avenue intersection should be signalized when warranted per the *Manual on Uniform Traffic Control Devices*.
- We recommend the appropriate incremental mitigation required at the NE 88th Street/NE 94th Avenue intersection be re-examined with future site development applications. Given the unknown nature of the site tenants, the above mitigations should be revisited at the time actual site tenants are identified. Land uses with lower trip generation (warehousing,

for example) are unlikely to require initial turn lane and traffic signal improvements whereas higher trip generating uses in the light industrial land use range will necessitate mitigation sooner. The following sequence of improvements at the intersection could be followed, pending the site trip generation of incremental site buildout and the timing of site build-out:

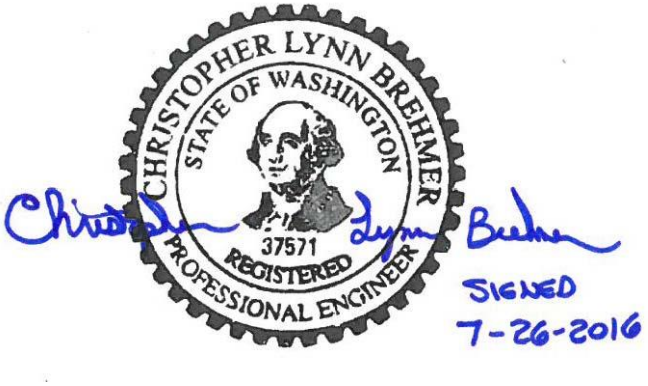
- Initial construction: use existing single lane westbound approach along NE 88th Street.
    - Estimated to accommodate approximately 77 weekday PM peak hour site-generated trips (10 in/67 out); equivalent to approximately 30% of the total PM peak hour site-generated trips assumed in this study
- Improvement 1: widen westbound approach to provide shared through/left-turn lane and separate westbound right-turn lane
    - Estimated to accommodate approximately 86 weekday PM peak hour site-generated trips (12 in/74 out); equivalent to approximately 34% of the total PM peak hour site-generated trips assumed in this study Improvement
- Improvement 2: signalize the intersection
    - Estimated to be accommodate full buildout of the site, but with lengthy delays and queuing on the westbound intersection approach (weekday PM peak hour 95th percentile queues of approximately 350 feet assuming one percent heavy vehicles at the site – higher truck volumes will lead to longer queues)
- Ultimate Improvement: widen NE 88th Street eastbound approach to provide left-turn lane and separate shared/through right-turn lane and restripe westbound approach to provide left-turn lane and separate shared/through right-turn lane; operate intersection with a traffic signal
    - Estimated to fully accommodate site development

- Site landscaping, signing and any aboveground utilities should be appropriately located to ensure that adequate sight distance is maintained after build out.

We trust this transportation impact study adequately addresses the traffic impacts associated with the proposed Leichner Campus Master Plan. Please contact us if you have any questions or comments regarding the contents of this report or the analyses performed.

Sincerely,
KITTELSON & ASSOCIATES, INC.

Chris Brehmer, PE
Principal Engineer



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3. C-Tran. *www.c-tran.com* accessed July 2016.
4. Institute of Transportation Engineers. *Trip Generation, 9th Edition*. 2012.