DAVID EVANS
AND ASSOCIATES INC.

March 13, 2019

CITY OF MUKILTEO

Received by Email
08/20/20

City of Mukilteo
11930 Cyrus Way
Mukilteo, WA 98275

SUBJECT: Electroimpact – Master Development Agreement Amendment #2

To Whom It May Concern:

David Evans and Associates, Inc. (DEA) has been asked to provide a review and update for the proposed Electroimpact SEPA determination for the existing Electroimpact campus expansion located in Mukilteo, Washington. Electroimpact is proposing to revise the original Master Development Agreement (MDA) and Amendment #1 to add Lots 30, 31, 32, and 33 of the Harbour Pointe Business Park and address the development of Lot 8 of the Puget Acres Development. Adding these properties necessitates amending the original SEPA documentation. This letter report is intended to serve as the basis to support an amended SEPA threshold determination as it pertains to traffic impacts.

Purpose of this Amendment

Electroimpact plans to add Lots 30, 31, 32, and 33 of the Harbour Pointe Business Park and develop an existing owned parcel, Lot 8 of the Puget Acres Development to its MDA. The purpose of this MDA amendment is to take into account the new lots, new construction and/or tenant improvements, or changes in use to the buildings since the original MDA was adopted. Adding properties necessitates amending the original SEPA documentation. Refer to **Figure 1** for a project Vicinity Map showing the location of the original Electroimpact lots and the proposed Harbour Pointe Business Park and Puget Acres Development locations. Attached is a layout of the Electroimpact Master Plan, including the Main Campus, Satellite Campus, and the new lots.

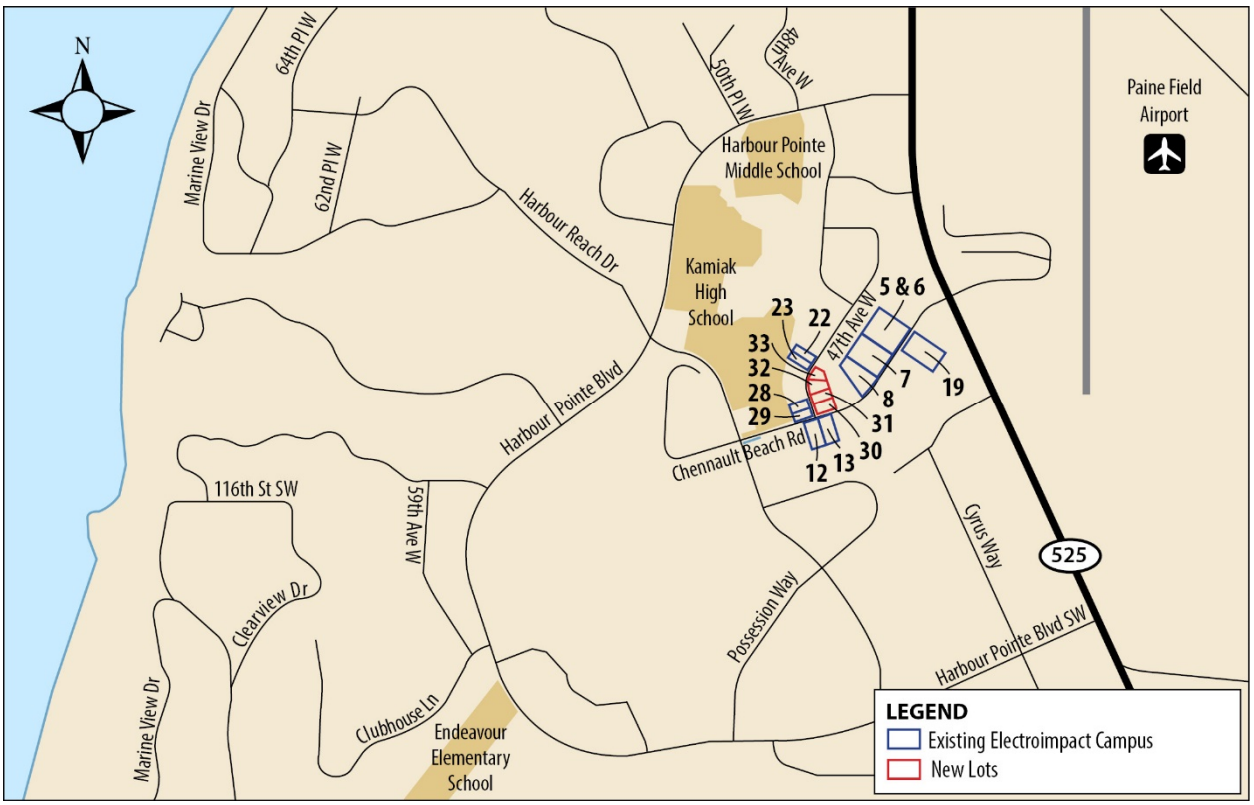
Previous Analysis

This letter is to be used in conjunction with the site's previously-recorded MDA, the Development Agreement Traffic Analysis Report (November 27, 2009) prepared by Lovell-Sauerland & Associates, Inc. (LSA) and the MDA Amendment #1 prepared by David Evans and Associates, Inc. (October 8, 2015), and associated Transportation Concurrency Evaluation and Determination of Transportation Impact Fees forms for those developments.

This letter is not meant to change any of the previous traffic analysis, rather to amend the development details and to review the analysis conducted for the previous work vs. the new additional lots.

The original LSA 2009 MDA analysis and 2015 MDA Amendment #1 are attached to this letter for reference.

Figure 1. Vicinity Map



Additional Lot Traffic Review & Updates

The following sections discuss the traffic components identified in the original MDA, and how they have remained the same or changed since the original submittal.

Local Traffic Volumes

Based on Mukilteo Development Standards and WSDOT Roadway Classifications, Mukilteo Speedway (SR 525) is classified as an Urban Principal Arterial, and Chennault Beach Road is classified as an Urban Major Collector. No additional traffic counts have been conducted by either the Washington State Department of Transportation (WSDOT) or the City of Mukilteo for Chennault Beach Road. However, WSDOT has conducted yearly counts along SR 525 in the general project vicinity (Russell Road). These counts have remained nearly identical since conducting the original MDA analysis, registering a bi-directional traffic volume of 36,000 vehicles per day. The most previous analysis and update of the MDA had traffic counts of 35,000 vehicles per day. This equates to less than a 0.65% increase in traffic per year, well below the established average of 1% - 2% per year growth in a steady or growing economy.

Original MDA, Previous Reductions, and Previous Analysis

The original 2009 MDA analysis included a total building area of 65,800 square feet on the Satellite Campus (Lots 12 and 13). In 2013, DEA provided an updated traffic impact memorandum identifying that the total square footage to be built on the site was 29,700 square feet for both Lot 12 and Lot 13 rather than the proposed 44,000 square feet and 21,800 square feet, respectively. This resulted in a reduction in overall traffic impacts to the local corridors analyzed in the original MDA. With the reduction of building area identified in the previous MDA, it was found that the changes identified in the MDA updates (including the addition of Lots 22, 23, 28, and 29) would not result in a substantial change to the previously-calculated traffic analysis results.

Proposed Lot Additions and Updates

The following sections discuss the traffic components for the proposed new lots and revisions to existing Electroimpact owned lots.

Proposed Lot Additions

The proposed lots to be added to the MDA are 30, 31, 32, and 33 of the Harbour Pointe Business Park. Below are some basic lot information details:

Development	Lot No.	Parcel No.	Acres	Zoning	Current Use
Harbour Pointe	30	00715100003000	0.45	683 Special Training & Schooling	Training Facility
Harbour Pointe	31	00715100003100	0.46	683 Special Training & Schooling	Training Facility
Harbour Pointe	32	00715100003200	0.51	683 Special Training & Schooling	Undeveloped/ Parking
Harbour Pointe	33	00715100003300	.37	683 Special Training & Schooling	Undeveloped/ Parking

Proposed Lot Development

Lot 8 of the Puget Acres development is planned to be redeveloped for use by Electroimpact. It previously had the Wally World building, which has since been removed, and the Larry Bay building which currently sits vacant. This site's traffic impacts had previously been identified, permitted, and impact fees paid. Any new buildings on Lot 8 (assuming all existing structures are removed) would permit the use of existing trip generation as a credit towards new development prior to the payment of new credits. Additional trip generation and credit information will follow in upcoming sections. Below are some basic lot information details:

Development	Lot No.	Parcel No.	Acres	Zoning	Current Use
Puget Acres	8	00548700000800	1.72	399 Other Miscellaneous Manufacturing	Old Larry Bay "Vacant" space/ Parking

Trip Generation for Proposed Lot Additions

Site trip generation is determined using the trip generation rates identified in the most current version of the *Institute of Transportation Engineers (ITE) Trip Generation Manual*. The current version of the Trip Generation Manual is the 10th Edition (2017), while the original MDA study used trip generation rates from the 8th Edition (2008).

Four additional new lots (30, 31, 32, and 33) will be added to the overall Electroimpact campus. The combination of these four sides include one building and parking areas associated with the existing training operations within the building. The site currently has 21,435 total building square feet of gross square footage area (GFA) that would classify as "General Office Building" per the *ITE Trip Generation Manual.* This space has previously been identified and permitted (under its former ownership) and Transportation Impact Fees paid. The Electroimpact land usage for the building (per the ITE Trip Generation Manual) will change from "General Office Building" to be "Manufacturing" within the same building footprint. General Office Building has a PM peak hour rate of 1.15 trips per 1,000 square feet of GFA. Manufacturing has a trip generation rate in the PM peak hour of 0.67 trips per 1,000 square feet of GFA. Under the change of building usage, there will be an overall reduction in trips associated with the site. Refer the trip generation calculation below:

Existing: 21,435 GFA * 1.15 trips/1,000 GFA = 25 PM peak hour trips

Proposed: 21,435 GFA * 0.67 trips/1,000 GFA = 14 PM peak hour trips

Result: Net reduction of 11 PM peak hour trips

Manufacturing LUC 140 Trip Generation rates from the 10th Edition of the Trip Generation Manual can be found in the attached documents.

Trip Generation for Proposed Lot Additions

The Puget Acres Lot 8 site originally had two buildings located on the site. It previously had the Wally World building, which has since been removed, and the Larry Bay building which currently sits vacant. It is the intent of Electroimpact to remove the remaining Larry Bay building, and to construct a new building. This MDA update shall include the new Lot 8 site to the overall Electroimpact campus, but no exact space (or square footage) has been defined.

When Electroimpact identifies a new building to be placed on Lot 8, a Trip Generation and Impact Fee calculation will be required. This new trip generation analysis will be identified for the time periods of

Average Daily Traffic (ADT) and the PM peak hour, based on the total square footage of the proposed building. The overall trip generation will be based on the ITE Trip Generation Manual and the respective land use code (LUC) of the proposed building. All trip generation analysis on Lot 8 shall also include the reduction of trips as a result of the removal of the previously permitted buildings currently or previously permitted on site (i.e. Wally World and Larry Bay buildings). Development on Lot 8 shall also include the credited 11 PM peak hour trips from the conversion of Lots 30, 31, 32, and 33, identified above.

Trip Distribution

As local traffic patterns remain similar to those of the past MDA traffic analysis, it is assumed that the original traffic distributions and modeling results would be similar between 2009, the subsequent MDA updates, and now. The LSA analysis showed a distribution of 44% of vehicles to the south, 42% to the north, and 14% to the west. It is likely that any new developments or conversions of buildings on Harbour Pointe Lots 30, 31, 32, 33, and Puget Acres Lot 8 would follow this similar pattern.

Site Access

All site access points for the four (4) combined Harbour Pointe lots will be from 47th Avenue. Puget Acres Lot 8 will have one (1) access point along Chennault Beach Road, plus internal connections between Lot 8 and Lot 7's parking areas.

Transportation Concurrency and Transportation Impact Fees

The Transportation Impact Fee calculations are based on the *City of Mukilteo Transportation Concurrency Evaluation and Determination of Transportation Impact Fees* form and Mukilteo Code Chapter 3.107. This takes into account all of the projects associated with the Transportation Impact Fee Ordinance Project List.

The Transportation Impact Fee calculation below is an example of what would be used when Electroimpact develops the proposed Puget Acres Lot 8. This fee calculation is part of the impact fee form.

New PM Peak Hour Trips (PHTs) x Fee per PM PHT ($1,875.00) – Credited Impact Fee Value =
Transportation Impact Fee Owed

Conclusions

This letter identifies that Electroimpact is proposing to revise the original MDA and subsequent updates to add Lots 30, 31, 32, and 33 of Harbour Pointe Business Park and revised information for Lot 8 of Puget Acres Business Park. Adding these properties necessitates amending the original SEPA documentation. The following bullet points are provided to identify and serve as support for the amended SEPA documentation as it pertains to traffic impacts.

- Electroimpact would like to add Lots 30, 31, 32, and 33 as an update to the original 2009 MDA and subsequent MDA updates.

- Lot 8 of Puget Acres is included in this updated MDA, however impacts were previously permitted.
- Traffic assumptions, including traffic volumes, trip generation, distribution, and site access from the 2009 study, remain unchanged.
- The planned new development is consistent with what was previously anticipated.

If you have any questions about this Master Development Agreement Amendment letter, or any addressed topics, please contact me at: (425) 586-9769 or aow@deainc.com.

Sincerely,

DAVID EVANS AND ASSOCIATES, INC.

Anthony Wilen, P.E., LEED-AP
Transportation Engineer

Attachments: 2009 Original Master Development Agreement (MDA)
Proposed Electroimpact Master Plan
LUC 140 Trip Generation

File Name: P:\E\ELIM00000009\0600INFO\0670Reports\Updated MDA\2019-03-13_Transportation Impact Update Letter.docx

Traffic Impact Analysis
Development Agreement Supplement

for

ELECTROIMPACT INC.

Main Campus Building B and Satellite Campus Expansion
4413 / 4708 Chennault Beach Road
Mukilteo, Washington

November 2009

Prepared by: 11/27/09
Robert L. Long P.E.

Lovell-Sauerland & Associates, Inc.
19217 36th Avenue W. Suite 106
Lynnwood, Washington 98036

LSA No. 5183

Electroimpact Inc.

Main Campus Building B and Satellite Campus Expansion
Traffic Impact Study

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A. PROJECT IDENTIFICATION:

Name of Project: **Electroimpact Inc.,** Main Campus Building B and Satellite Campus Expansion

Project Address: 4413 / 4708 Chennault Beach Road
Mukilteo, Washington 98275

Applicant's Name:
Electroimpact Inc.,
4413 Chennault Beach Road
Mukilteo, Washington 98275
(206) 348-8090
Contact: Walt Roestel

Traffic Engineer:
Lovell-Sauerland & Associates, Inc.
19217 36th Avenue W. Suite 106
Lynnwood, Washington 98036
(425) 775-1591
Contact: Robert L. Long, PE

Scope/Background. Electroimpact Inc. (applicant) has retained Lovell-Sauerland and Associates, Inc. (LSA) to prepare this report documenting the traffic impacts of Electroimpact Inc. main and satellite campus expansions located in Mukilteo, Washington. The following study examines trip generation and distribution of the proposed expansions; and also evaluates the site access revisions to the main and satellite campuses. This document is a supplement to a development agreement with the City of Mukilteo.

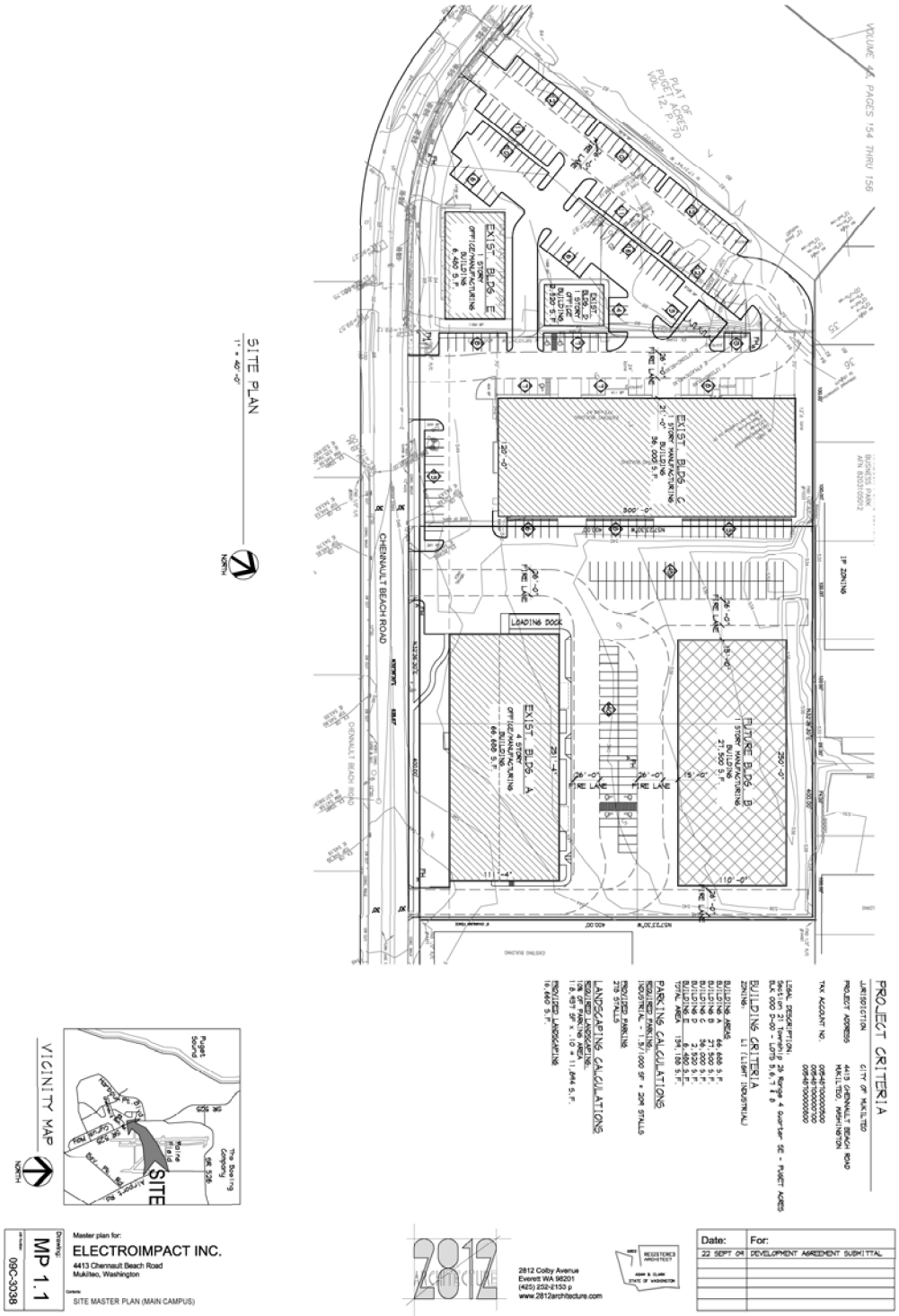
Electroimpact Inc. provides heavy machine tools for the aerospace industry. The proposed expansion includes the construction of a 27,500 sf manufacturing building (Building B) on the main campus; and a 21,800 sf addition (Lot 12) and new 49,000 sf building (Lot 13) at Electroimpact's satellite (Lot 12 and 13) campus. The main campus is located at 4413 Chennault Beach Road and the satellite campus (Lot 12 and 13) at 4708 Chennault Beach Road about 300 feet southwest of the main campus.

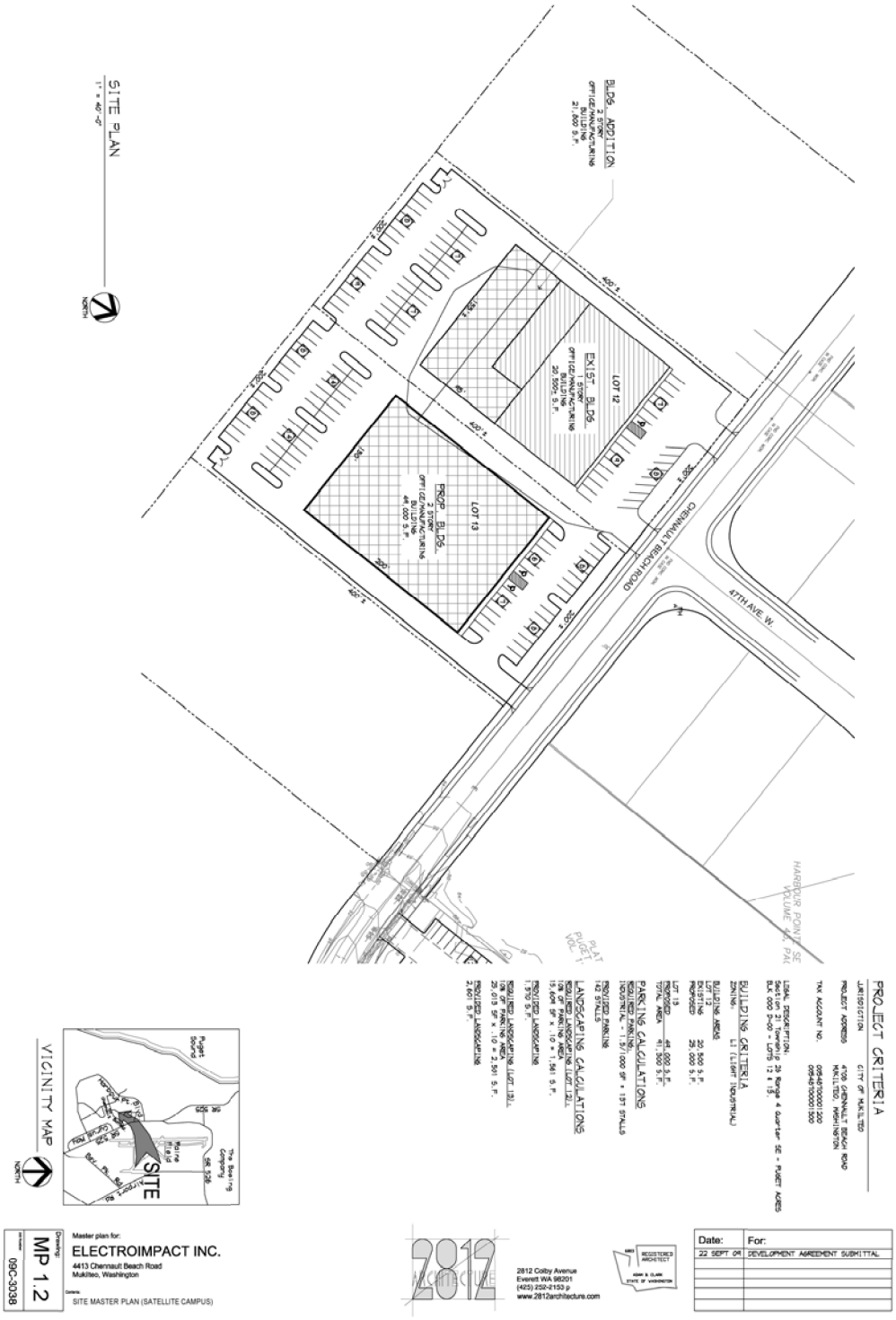
Electroimpact Inc. main and satellite campuses are located on Chennault Beach Rd in Mukilteo, Washington. The main campus is about 600 feet southwest of Mukilteo Speedway (SR-525) located on the northwest side of Chennault Beach Rd. The satellite campus is about 1,700 feet southwest of Mukilteo Speedway (SR-525) and located on the southeast side of Chennault Beach Rd. Both campuses are surrounded by industrial and commercial uses with Kamiak High School campus located northwest of the Electroimpact campuses. See attached vicinity maps and site plans for the main and satellite campus expansions.

Chennault Beach Rd is classified as a minor arterial street with 7,600 average daily traffic volume in 2008 (per *Mukilteo's draft 2009 Transportation Plan*). Chennault Beach Rd runs in a northeasterly/ southwesterly direction between Mukilteo Speedway (SR-525) and Harbour Reach Dr and is about a half mile in length. Per *Mukilteo's 2008 Transportation Plan*, 2002 PM peak hour volumes indicate that 65% of the traffic was northeast bound and 35% of the traffic was southwest bound in the PM peak hour.

The following sections of the report provide an evaluation of the trip generation, distribution and site access for the main, satellite lot 12 and satellite lot 13 campus expansions.

Vicinity Map

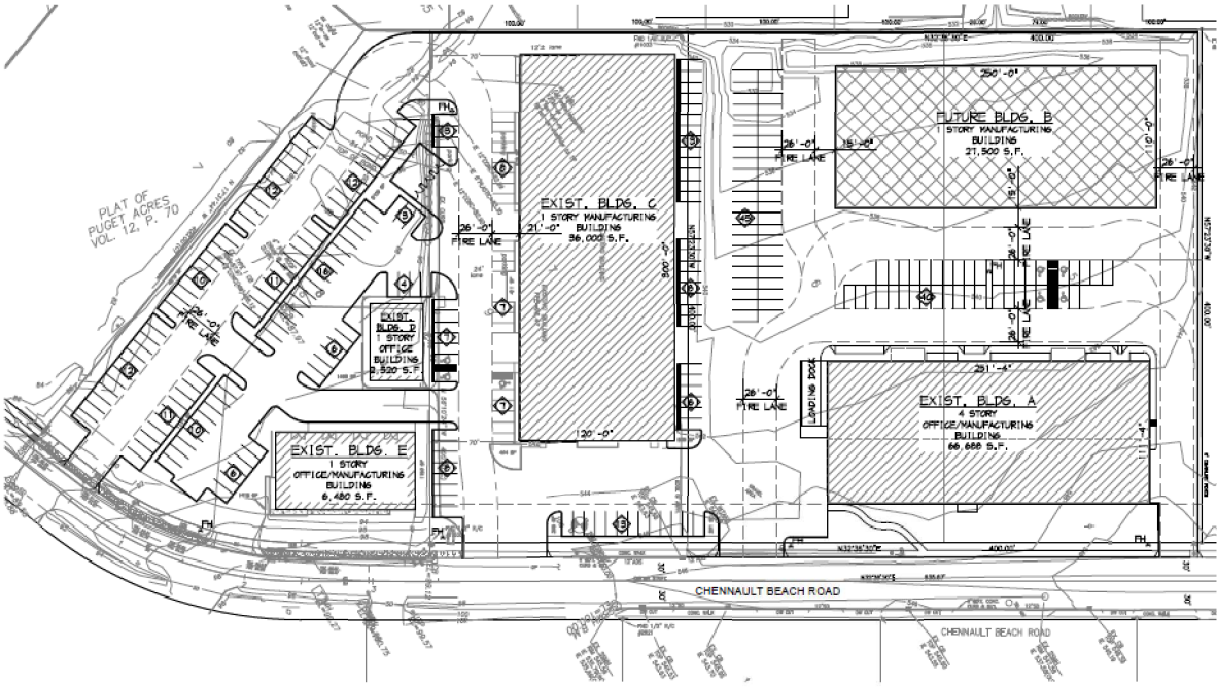

SITE PLAN
1" = 40'-0"
NORTH
CHENNAULT BEACH ROAD
EXIST BLDG E
OFFICE/MANUFACTURING BUILDING
6,460 S.F.
EXIST BLDG D
1 STORY OFFICE BUILDING
2,520 S.F.
EXIST BLDG C
1 STORY MANUFACTURING BUILDING
36,000 S.F.
EXIST BLDG A
OFFICE/MANUFACTURING BUILDING
69,488 S.F.
FUTURE BLDG B
1 STORY MANUFACTURING BUILDING
21,500 S.F.
LOADING DOCK
FIRE LANE
VICINITY MAP
SITE
Boeing Field
The Boeing Company
Renton
Seattle
Bellevue
Mercer Island
Mukilteo
Everett
Paine Field
Snohomish
Marysville
Arlington
Stanwood
Camano Island
Tulalip
Lynnwood
Edmonds
Mountlake Terrace
Shoreline
Kenmore
Bothell
Woodinville
Redmond
Kirkland
Medina
Clyde Hill
Bellevue
Mercer Island
Renton
Tukwila
Burien
Des Moines
Kent
Auburn
Federal Way
Puyallon
Tacoma
Puyallup
Sumner
Bonney Lake
Enumclaw
Maple Valley
Covington
Kent
Auburn
Federal Way
Puyallup



Satellite Campus Site Plan

B. BUILDING B- MAIN CAMPUS

Expansion Improvement: Construction of a 27,500 sf manufacturing building (Building B) and southwesterly shift of existing southwest access on the main Electroimpact campus.



B-1. BUILDING B- MAIN CAMPUS TRIP GENERATION

The construction of the new manufacturing building B will result in new traffic. The amount of new traffic, trip generation is determined using trip generation rates provided in the *Institute of Transportation Engineers Trip Generation Report, 8th Edition* (*ITE manual*). For the purpose of this evaluation the total proposed gross building area of 27,500 sf will be used to evaluate the estimated trip generation. No credit or reduction for pass-by, diverted link or internal trip capture generated by the current site development will be realized.

The total number of trips generated by the proposed building B expansion has been estimated using the ITE average vehicle trip rates for land use c*ode 140, Manufacturing*. Per the ITE manual the following description is given for land use code 140: "Manufacturing facilities are areas where the primary activity is the conversion of raw materials or parts into finished products. Size and type of activity may vary substantially from one facility to another. In addition to the actual production of goods, manufacturing facilities generally also have office, warehouse, research and associated functions."

An average rate per 1,000 sq ft was obtained from the *ITE Manual* to determine the total number of new project trips [3.82 ADT and 0.73 p.m. peak trips (4 to 6 PM) per 1,000 sq ft]. The following table summarizes the projects trip generation using the ITE manual generation rates:

Electro impact- Building B Main Campus ***Traffic Generation[1,2] Table***	
Total Average Weekday Trips (ADT): ITE Code 140 –Manufacturing	
27,500 sq. ft. at 3.82 ADT/1000 sq. ft	105.1
PM Peak Hour Trips of Adjacent Street Traffic 4 to 6 PM: ITE Code 140 –Manufacturing	
27,500 sq. ft. at 0.73 PM peak/1000 sq. ft	20.1
Inbound Trips (36%)	7.2
Outbound Trips (64%)	12.9

1. Trips rates are average trip rates from ITE Trip Generation Report, 8th Edition- Manufacturing ITE Code 140.
2. No reductions for pass-by, diverted link or internal trip capture have been applied.

Manufacturing
(140)

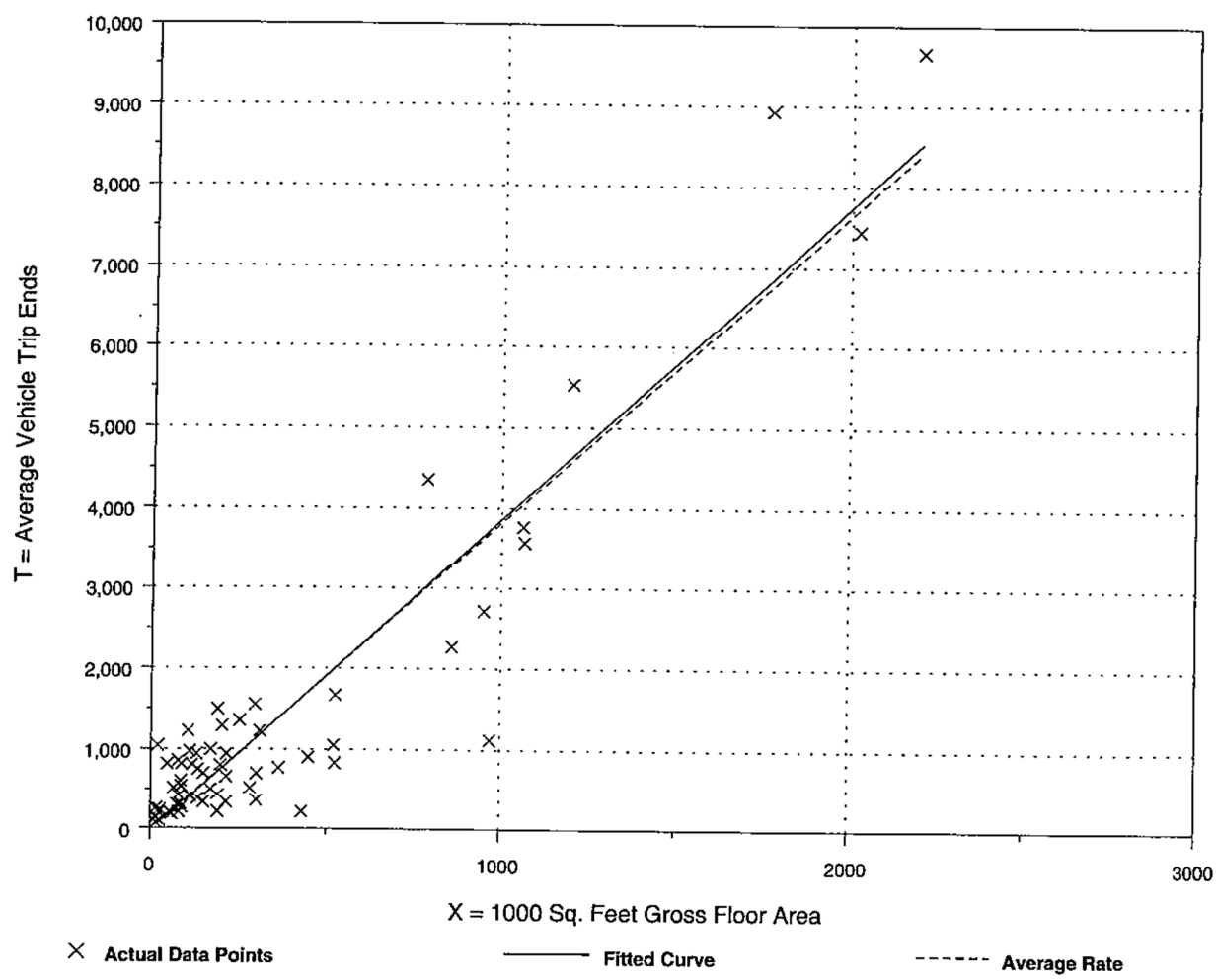
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday

Number of Studies: 62
Average 1000 Sq. Feet GFA: 349
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
3.82	0.50 - 52.05	3.07

Data Plot and Equation



Fitted Curve Equation: T = 3.88(X) - 20.70

R^2 = 0.87

Manufacturing
(140)

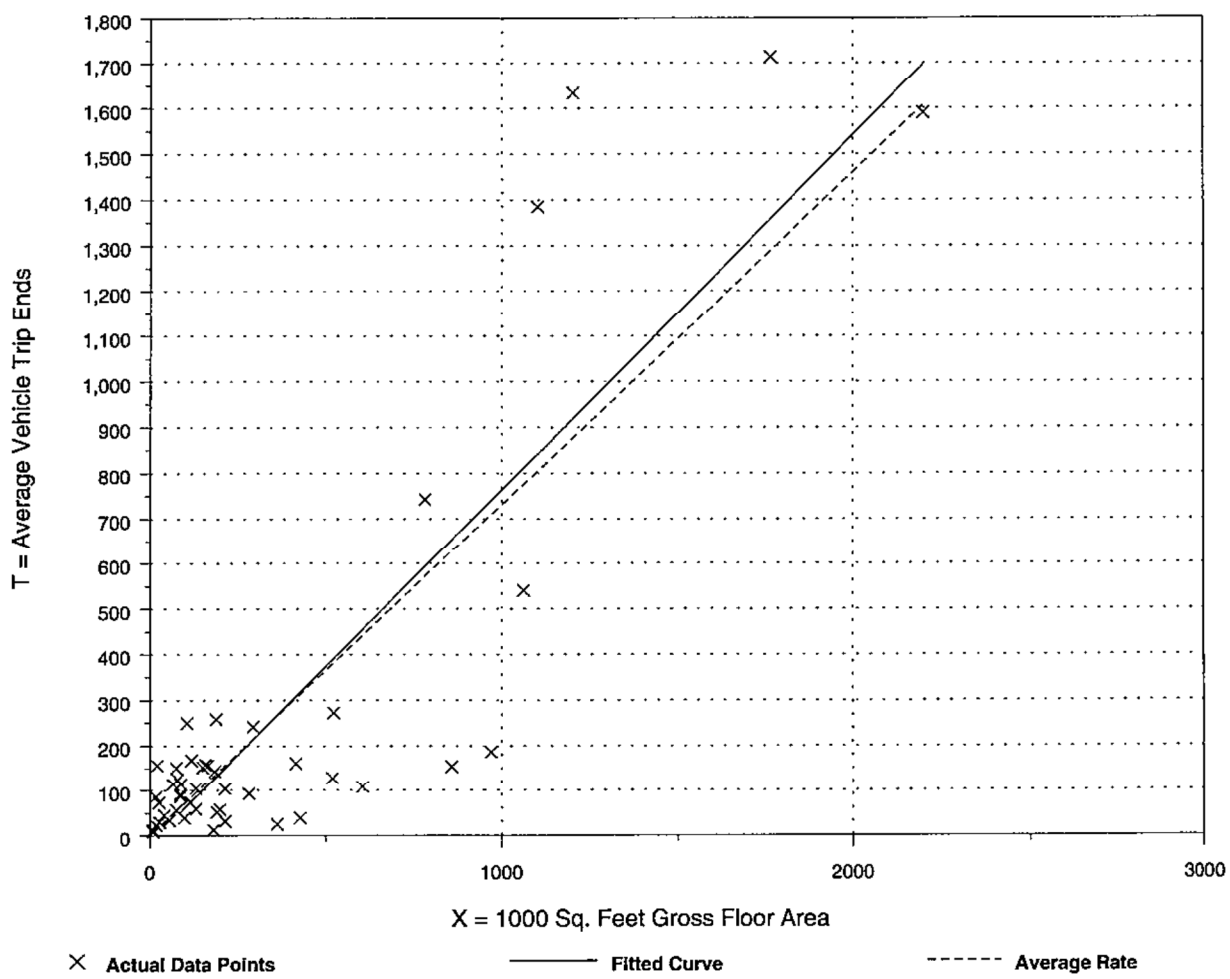
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 56
Average 1000 Sq. Feet GFA: 318
Directional Distribution: 36% entering, 64% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
0.73	0.07 - 7.85	1.01

Data Plot and Equation



Fitted Curve Equation: T = 0.78(X) - 15.97

R^2 = 0.75

B-2. BUILDING B- MAIN CAMPUS TRIP DISTRIBUTIONS

The project trip distributions estimate the likely origins and destinations of new trips and their likely routes on the street system. The direction from which site traffic will approach or depart the development will vary depending on several factors including, but not limited to surrounding land uses; population densities; and condition and efficiency of the local street system (which influence travel times). The attached distributions were estimated by evaluating existing driveway movements, average daily trip counts on local streets (per Mukilteo's Transportation Plan) and surrounding population densities.

There are currently three future road connections that are planned for in the city of Mukilteo that could impact the attached distributions: 1) Paine Field Blvd extension (north of the site connecting SR-526 to 5th St/Mukilteo Blvd), 2) Harbour Pointe Blvd S./121st St SW extension/connection (south of the site), and 3) Harbour Reach Dr Extension (south of the site connecting Harbour Reach Dr/Harbour Pointe Blvd S. to Beverly Park Rd). Any one of these new extension improvements could impact the trip distributions, however it is not anticipated that they will be completed within the next 6-years and thus the attached distributions do not assume there completion.

Generally, it was estimated that 14% of the trips will travel west of the site, 42% will travel north and 44% to the south. No direct easterly travel is possible due to the location of Pain Field (Snohomish County Airport) directly east of the site. The attached distribution maps provide trip distribution for average daily trips (ADT) and PM peak with directional (inbound/outbound) assignments.

Building B Main Campus General Trip Distribution: (see attached Distribution Maps)

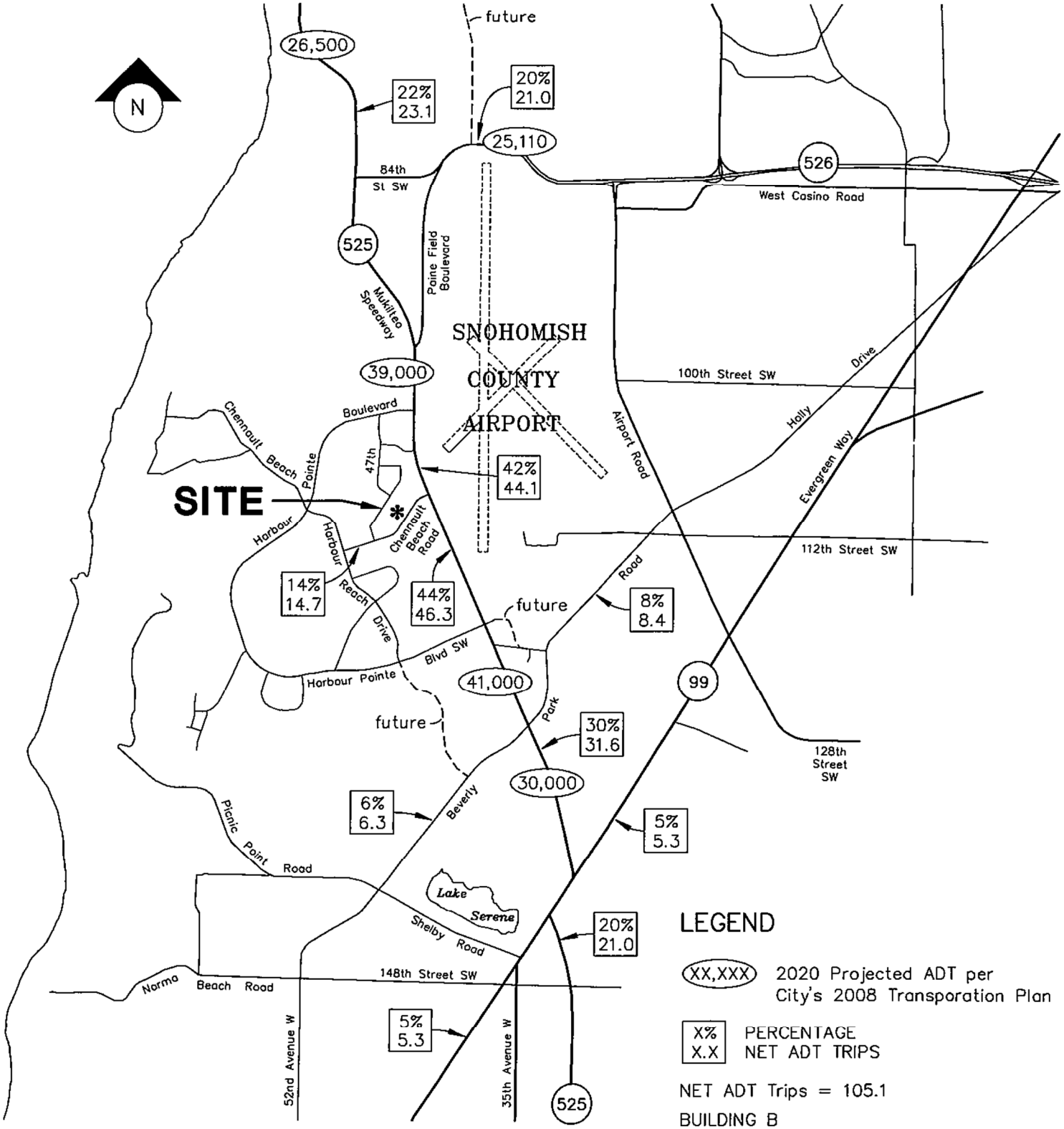
Development: 27,500 sf Manufacturing Building

South = 44%
- ADT = 46.3 trips
- PM Peak = 8.9 trips (5.7 outbound / 3.2 inbound)

North = 42%
- ADT = 44.1 trips
- PM Peak = 8.4 trips (5.4 outbound / 3.0 inbound)

West = 14%
- ADT = 14.7 trips
- PM Peak = 2.8 trips (1.8 outbound / 1.0 inbound)

ELECTROIMPACT INC.
ADT DISTRIBUTION – BUILDING B



LEGEND

(XX,XXX) 2020 Projected ADT per City's 2008 Transporation Plan

X%
X.X

PERCENTAGE NET ADT TRIPS

NET ADT Trips = 105.1

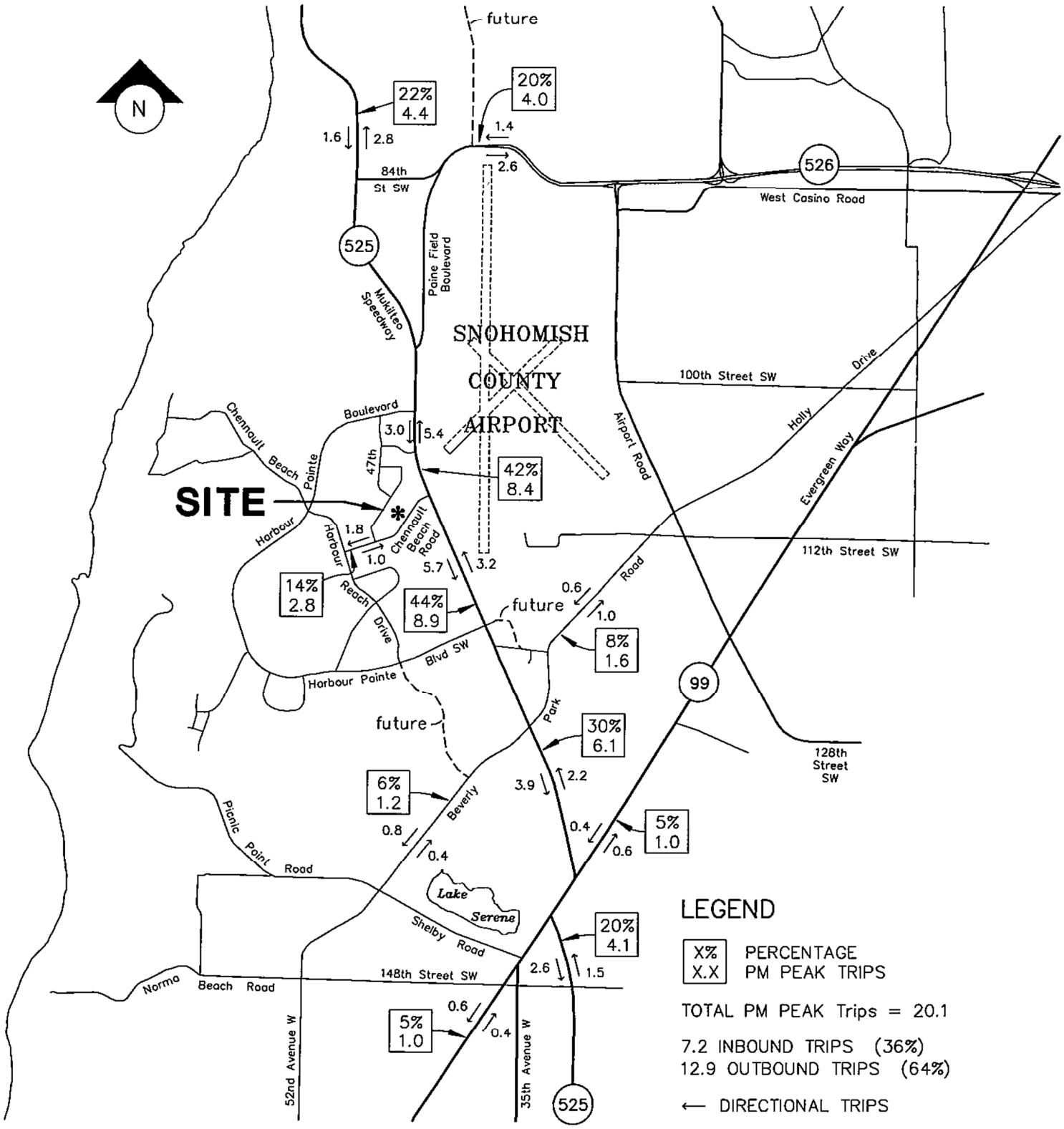
BUILDING B
27,500 SQUARE FEET – MANUFACTURING

ADT Trips = Average Daily Trips

Lovell–Sauerland & Associates, Inc.
Engineers/Surveyors/Planners/Development Consultants
19217 36th Avenue W., Suite 106 Lynnwood, WA 98036 (425) 775–1591 LSAengineering.com

LSA No. 5183

ELECTROIMPACT INC.
PM PEAK DISTRIBUTION – BUILDING B



LEGEND

X% / X.X	PERCENTAGE PM PEAK TRIPS

TOTAL PM PEAK Trips = 20.1

7.2 INBOUND TRIPS (36%)
12.9 OUTBOUND TRIPS (64%)

← DIRECTIONAL TRIPS

BUILDING B
27,500 SQUARE FEET – MANUFACTURING

LSA Lovell-Sauerland & Associates, Inc.
Engineers/Surveyors/Planners/Development Consultants
19217 36th Avenue W., Suite 106 Lynnwood, WA 98036 (425) 775-1591 LSAengineering.com

LSA No. 5183

B-3. BUILDING B- MAIN CAMPUS SITE ACCESS

Currently access to the main campus site is provided at four locations along the northwest side of Chennault Beach Rd. An site access evaluation for the northeast access as performed and found to be adequate by David Evans and Associates, Inc. in October 2007. With the site expansion of the main Electroimpact campus the current southwest access is proposed to be shifted about 140 feet to the southwest to facilitate additional parking onsite. The shifted access point will nearly align (slightly shifted to the northeast) with an existing access point on the opposite (southeasterly) side of Chennault Beach Rd. The following evaluation analyzes the new proposed location of the southwest access point.

The WSDOT Design Manual M22-01.05, June 2009 will be used to evaluate if the available site distance of the proposed new location is adequate. Section 1310.09 and Exhibits 1310-22a in the WSDOT Design Manual contains the criteria to review adequate intersection sight distance (see attached WSDOT Exhibits 22a). As implemented by the David Evans October 2007 sight distance evaluation the entering car setback will be reduced to 10 feet (from the preferred 18 ft) due to the fact the access point is for an existing commercial/industrial site access (not a new street or highway intersection) and the relevantly low accident history along Chennault Beach Rd in the vicinity of the site.

An evaluation of the existing accident history along Chennault Beach Rd has been investigate to determine if there are any current safety concerns along the street corridor in the vicinity of the Electroimpact campuses. Accident history report obtained from the City of Mukilteo Police Department indicated that there have been 10 documented accidents on Chennault Beach Rd between the Mukilteo Speedway (SR-525) and Harbour Reach Rd between 2007 and 2009 (see attached report). Of the 10 accidents only two of them were known to be serious enough to cause injury. Additionally, only one accident occurred in the vicinity of the main campus (4400 block of Chennault Beach Rd) and two accidents occurred in the vicinity of the satellite campus (4700 block of Chennault Beach Rd). With only three accidents over the past three years and an anticipated average daily trips of 7,600 vehicles (per Mukilteo's 2008 Transportation Plan) the average annual accident rate over the last three years equates to 0.36 accidents per million vehicles. In the vicinity of the Electroimpact campuses the accident rate is significantly below 1.0 accident per million vehicles; with only one accident occurring per year on average, this is not enough to establish pattern or identify the corridor as a "high accident" location in the vicinity of the Electroimpact campuses.

A visual site inspection of the available sight distance at the proposed shifted southwest access points was performed in November 2009. Existing vegetation impedes the sight distance lines in its current condition; however with the proposed site development and expansion of the parking areas the sight obscuring vegetation will be removed. Attached photos demonstrate the existing line of sight conditions. Some of the existing street trees will be retained, but the low understory brush will be removed and shall be replaced with low growing (less that 18" in height) landscaping vegetation. With the removal of the sight obscuring vegetation it is estimated that there will be about 340 ft of available site distance to the northeast (to the left when exiting) and over 600 ft to the southwest (to the right when exiting).

The following calculations evaluate the required sight distance per WSDOT standards:

MAIN CAMPUS- SOUTHWEST ACCESS POINT:

Right Turn Movement- Looking Left (northeast)

Available Sight Distance (after vegetation removal) = 340 ft
Posted Speed Limit (V) = 35 mph
Street Gradient = 6% to 3% downhill
Design Vehicle = Single Unit Truck (SU) (typical delivery truck or bus, no large semi-truck deliveries will enter or exit at this access point)

Intersection Sight Distance Equation (per WSDOT Ex. 1310-22a)

$S_i = (1.47)\ (V)\ (T_g)$

Time Gap (T_g) Calculation:

T_g for SU (single unit trucks) vehicle = 9.5 sec
T_g for P (passenger car) vehicle = 7.5 sec
T_g credit for right turn maneuvers = -1.0 sec
Net SU T_g = 8.5 sec (9.5-1.0)
Net P T_g = 6.5 sec (7.5-1.0)

Right Turn Sight Distance Calculation for a SU vehicle:

$S_i = (1.47)\ (35\ \text{mph})\ (8.5\ \text{sec}) = 437.3\ \text{ft}$

Right Turn Sight Distance Calculation for a passenger car:

$S_i = (1.47)\ (35\ \text{mph})\ (6.5\ \text{sec}) = 334.4\ \text{ft}$

Solve for Available Design Speed (V) using Available Sight Distance (340 ft)

340 ft = (1.47) (? mph) (8.5 sec)
Available Design Speed = 27.2 mph

Thus, an approaching Vehicle traveling along Chennault Beach Rd would need to slow down to at least 27.2 mph once an existing vehicle from the site made an exiting maneuver. It is noted that a standard passenger car (P vehicle) would have adequate sight distance (334.4 ft) to maintain a posted speed limit of 35 mph.

Check Stopping Sight Distance for Safety considerations of the Available 340 ft of sight distance.

Solve for acceptable approaching Design Speed of a vehicle to stop with 340 ft of available sight distance. Using WSDOT table and Equations Ex 1260-3 and 1260-4 (attached).

$S = (1.47)(V)(2.5) + (V^2)/(30((11.2/32.2)+G))$

- G = Grade of street in % ,
- deceleration rate = 11.2 ft/sec
- perception/reaction time = 2.5 sec

Set S at 340 ft and G at -6%, V = 40.59 mph

Thus, an approaching vehicle traveling along Chennault Beach Rd could be traveling at 40.59 mph and would have adequate time to react (2.5 sec) and break (decelerate at 11.2 ft/sec) to stop and avoid a collision at the proposed new intersection location (340 ft).

Left Turn Movement- Looking right (southwest)

Available Sight Distance (after vegetation removal) = 600 ft
Posted Speed Limit (V) = 35 mph
Street Gradient = 6% to 3% uphill
Design Vehicle = Single Unit Truck (SU) or buss (no large semi-truck deliveries will enter or exit at this access point)

Intersection Sight Distance Equation (per WSDOT Ex. 1310-22a)

$S_i = (1.47)\ (V)\ (T_g)$

Time Gap (T_g) Calculation:

T_g for SU vehicle = 9.5 sec
T_g addition to account for 6% uphill grade climb (add 0.2 sec per each percent that exceeds 3%)
(3 x 0.2 sec) = 0.6 sec
Net T_g = 10.1 sec (9.5 + 0.6)

Left Turn Sight Distance Calculation:

$S_i = (1.47)\ (35\ \text{mph})\ (10.6\ \text{sec}) = 519.6\ \text{ft}$

Thus, with 600 feet of available sight distance a single-unit (SU) vehicle has adequate sight distance to maintain a posted speed limit of 35 mph.

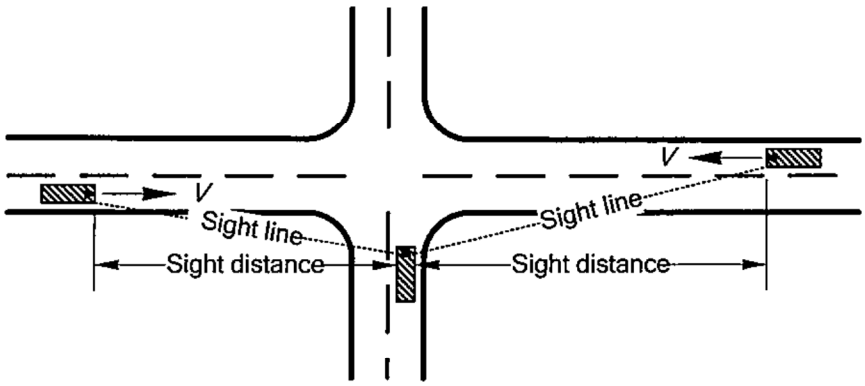
The preceding calculations show that the available sight distance (340 ft) is limited to the northeast and a vehicle would need to slow to about 27 mph to allow for a single-unit truck (SU vehicle) to exiting the new shifted access point. A passenger car (P vehicle) does have adequate sight distance to exit and allow the approaching vehicle on Chennault Beach Rd to maintain the posted speed limit of 35 mph. To the southwest the available sight distance (600 ft) is more than adequate to allow approaching vehicles maintain the posted speed limit of 35 mph.

To increase the available sight distance to the northeast the access point could be shifted northeasterly to the apex of the curve in Chennault Beach Rd alignment, however doing this would shift the access point away from the near alignment of an access point on the opposite side of the street and closer to an opposing access point northeast of the proposed location. This location would create a potential left turn exit conflict with the opposing access point that could increase the chance of a head-on collision with a left-turning exiting vehicle form the opposing access point. Thus, a shift of the access to the apex of the curve in Chennault Beach Rd would not be ideal.

Chennault Beach Rd terminates at a stop controlled T-intersection about 1,300 feet southwest of the shifted access point; consequently having a southwest bound vehicle on Chennault Beach Rd reduce its speed to 27 mph (for single-unit trucks which are less common) is a more acceptable condition than potentially creating a hazardous exiting collision condition. The evaluation of an exiting passenger car (P vehicle) does provide adequate sight distance (334.4 ft) to exit while allowing an approaching vehicle on Chennault Beach Rd to maintain the posted speed limit of 35 mph. There are many driveway and access points along this section of Chennault Beach Rd and consequently a driver should not be overly surprised by exiting or entering vehicles along the street. The proposed shifted location for the southwesterly is not ideal to maintain the 35 mph flow of traffic for all vehicles on Chennault Beach Rd, however it is adequate for a majority of the vehicles (passenger cars).

Main Campus Southwest Access Looking Northeast (left while exiting)

Main Campus Southwest Access Looking Southwest (right while exiting)



$S_i = 1.47Vt_g$
Where: S_i = Intersection sight distance (ft) V = Design speed of the through roadway (mph) t_g = Time gap for the minor roadway traffic to enter or cross the through roadway (sec)

Intersection Sight Distance Equation
Table 1

Design Vehicle	Time Gap (t_g) in Sec
Passenger car (P)	7.5
Single-unit trucks and buses (SU & BUS)	9.5
Combination trucks (WB-40, WB-50, & WB-67)	11.5

Note:
Values are for a stopped vehicle to turn left onto a two-lane two-way roadway with no median and grades 3% or less.

Intersection Sight Distance Gap Times (t_g)
Table 2

Adjust the t_g values listed in Table 2 as follows:

Crossing or right-turn maneuvers:

All vehicles	subtract 1.0 sec

Multilane roadways:

Left turns, for each lane in excess of one, to be crossed and for medians wider than 4 ft:

Passenger cars	add 0.5 sec
All trucks and buses	add 0.7 sec

Crossing maneuvers, for each lane in excess of two, to be crossed and for medians wider than 4 ft:

Passenger cars	add 0.5 sec
All trucks and buses	add 0.7 sec

Note: Where medians are wide enough to store the design vehicle, determine the sight distance as two maneuvers.

Crossroad grade greater than 3%:

All movements upgrade for each percent that exceeds 3%:

All vehicles	add 0.2 sec

Sight Distance at Intersections
Exhibit 1310-22a

Design Speed (mph)	Stopping Sight Distance (ft)					
	Downgrade			Upgrade		
	-3%	-6%	-9%	3%	6%	9%
25	158	165	173	147	143	140
30	205	215	227	190	184	179
35	258	271	288	237	229	222
40	315	333	354	289	278	269
45	378	401	428	345	331	320
50	447	474	508	405	389	375
55	520	553	594	470	450	433
60	599	638	687	539	515	495
65	683	729	786	612	585	561
70	772	826	892	690	658	631
75	867	928	1004	773	736	705
80	966	1037	1123	860	818	782

Design Stopping Sight Distance on Grades
Exhibit 1260-3

For stopping sight distances on grades between those listed, interpolate between the values given or use the equation in Exhibit 1260-4.

$$S = 1.47Vt + \frac{V^2}{30\left[\left(\frac{a}{32.2}\right) \pm \frac{G}{100}\right]}$$

Where:

S = Stopping sight distance on grade (ft)
V = Design speed (mph)
t = Perception/reaction time (2.5 sec)
a = Deceleration rate (11.2 ft/sec^2)
G = Grade (%)

Stopping Sight Distance on Grades
Exhibit 1260-4

(3) Crest Vertical Curves

Use Exhibit 1260-5 or the equations in Exhibit 1260-6 to find the minimum crest vertical curve length to provide stopping sight distance when given the algebraic difference in grades. When using the equations in Exhibit 1260-6, use h_1=3.50 feet and h_2=0.50 foot. Exhibit 1260-5 does not use the sight distance greater than the length of curve equation. When the sight distance is greater than the length of curve and the length of curve is critical, the $S>L$ equation given in Exhibit 1260-6 may be used to find the minimum curve length.

When a new crest vertical curve is built or an existing one is rebuilt with grades less than 3%, provide design stopping sight distance from Exhibit 1260-1. For grades 3% or greater, provide stopping sight distance from 1260.04(2).

Robert Long

From: Cynthia Thomas [cthomas@ci.mukilteo.wa.us]
Sent: Monday, November 16, 2009 2:37 PM
To: Robert Long
Subject: Accident Stats

Robert,
Listed below are the statistics you requested. If you have any other questions, please feel free to contact me.
Thank you.
Cindy Thomas

CITY OF MUKILTEO

POLICE DEPARTMENT

11-16-09

TO: Robert Long

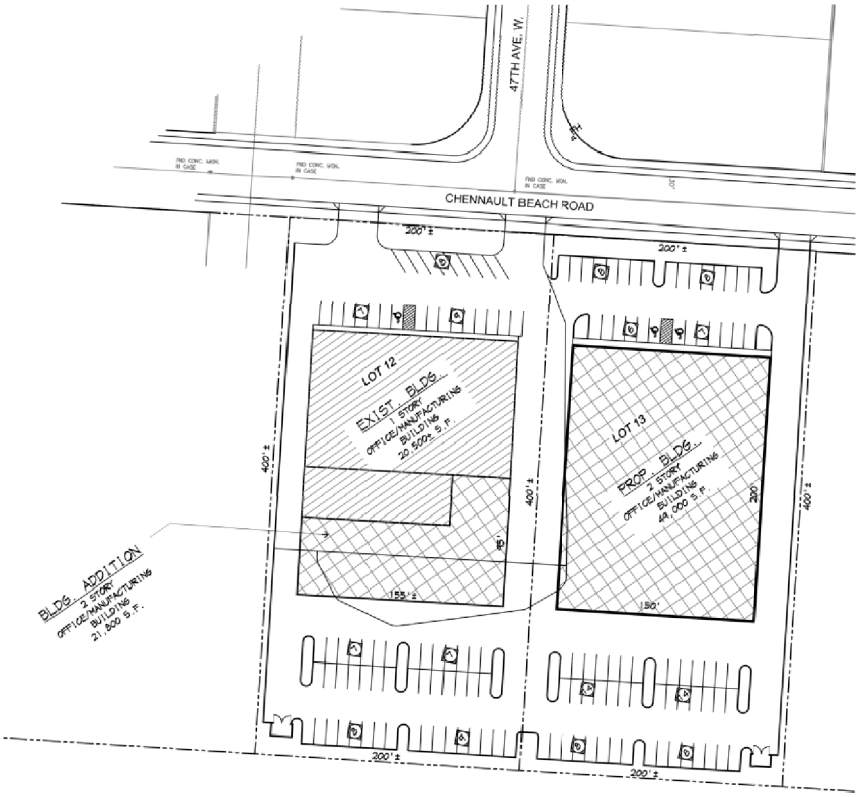
FROM: Cindy Thomas, Supervisor LE Records

RE: Accident Stats from 2007-2009 on Chennault Beach Road, between Harbour Reach and Mukilteo Speedway

Case/Type	Date	Time	# Cars	Injury	Location
07-2023/Hit&Run	10/22/07	13:02 hrs.	2 cars	UNK	6200 Chennault Bch Rd
08-246/Hit&Run	02/09/08	13:00 hrs.	2 cars	YES	Chennault/Speedway
08-468/Traffic AC	03/18/08	07:12 hrs.	2 cars	NO	Chennault/Harbour Reach
08-524/Hit&Run	03/27/08	00:51 hrs.	1 car	NO	4400 Chennault Bch Rd
08-762/Traffic AC	05/05/08	11:45 hrs.	2 cars	UNK	4300 Chennault Bch Rd
08-1245/Traffic AC	07/19/08	02:22 hrs.	2 cars	NO	4700 Chennault Bch Rd
08-2197/Traffic AC	12/17/08	17:25 hrs.	2 cars	YES	4700 Chennault Bch Rd
08-2242/Hit&Run	12/30/08	15:58 hrs.	3 cars	NO	5700 Chennault Bch Rd
09-453/Traffic AC	03/24/09	00:01 hrs.	1 car	NO	4332 Chennault Bch Rd
09-546/Traffic AC	04/08/09	07:25 hrs.	2 cars	NO	4200 Chennault Bch Rd

C. Lot 12- SATELLITE CAMPUS

Expansion Improvement: Construction of a 21,800 sf manufacturing building expansion and westerly shift of existing east access on lot 12 (joint access with lot 13) to align with 47th Ave W on the Electroimpact satellite campus.



C-1. LOT 12- SATELLITE CAMPUS TRIP GENERATION

The construction of a 21,800 sf expansion of an existing manufacturing building will result in new traffic. The amount of new traffic, trip generation is determined using trip generation rates provided in the *Institute of Transportation Engineers Trip Generation Report, 8th Edition* (*ITE manual*). For the purpose of this evaluation the total proposed building expansion area of 21,800 sf will be used to evaluate the estimated trip generation. No credit or reduction for pass-by, diverted link or internal trip capture generated by the current site development will be realized.

The total number of trips generated by the proposed building B expansion has been estimated using the ITE average vehicle trip rates for land use c*ode 140, Manufacturing*. Per the ITE manual the following description is given for land use code 140: "Manufacturing facilities are areas where the primary activity is the conversion of raw materials or parts into finished products. Size and type of activity may vary substantially from one facility to another. In addition to the actual production of goods, manufacturing facilities generally also have office, warehouse, research and associated functions."

An average rate per 1,000 sq ft was obtained from the *ITE Manual* to determine the total number of new project trips [3.82 ADT and 0.73 p.m. peak trips (4 to 6 PM) per 1,000 sq ft]. The following table summarizes the projects trip generation using the ITE manual generation rates:

Electro impact- Lot 12 Satellite Campus ***Traffic Generation[1,2] Table***	
Total Average Weekday Trips (ADT): ITE Code 140 –Manufacturing	
21,800 sq. ft. at 3.82 ADT/1000 sq. ft	83.3
PM Peak Hour Trips of Adjacent Street Traffic 4 to 6 PM: ITE Code 140 –Manufacturing	
21,800 sq. ft. at 0.73 PM peak/1000 sq. ft	15.9
Inbound Trips (36%)	5.7
Outbound Trips (64%)	10.2

3. Trips rates are average trip rates from ITE Trip Generation Report, 8th Edition- Manufacturing ITE Code 140.
4. No reductions for pass-by, diverted link or internal trip capture have been applied.

Manufacturing
(140)

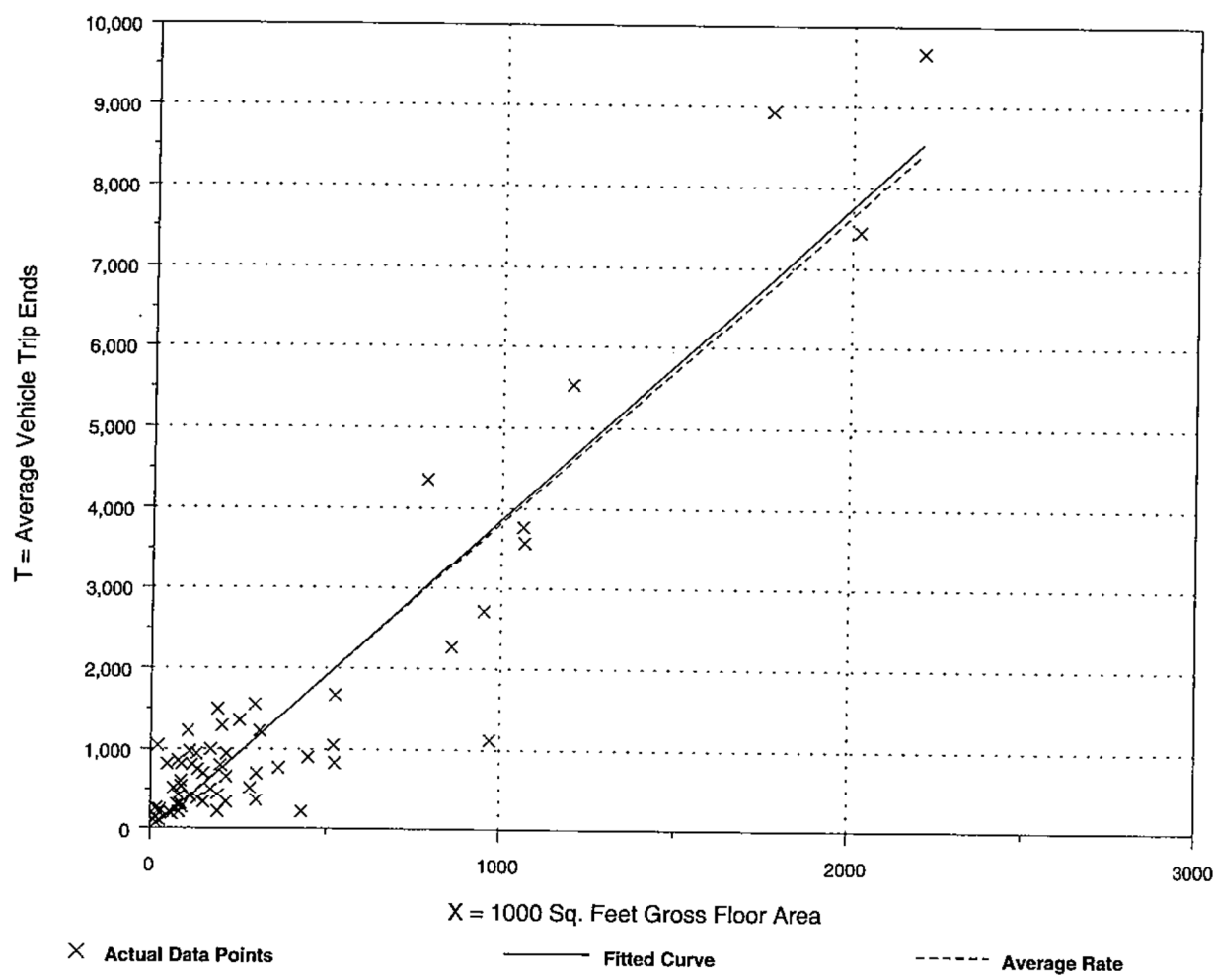
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday

Number of Studies: 62
Average 1000 Sq. Feet GFA: 349
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
3.82	0.50 - 52.05	3.07

Data Plot and Equation



Fitted Curve Equation: T = 3.88(X) - 20.70

R^2 = 0.87

Manufacturing
(140)

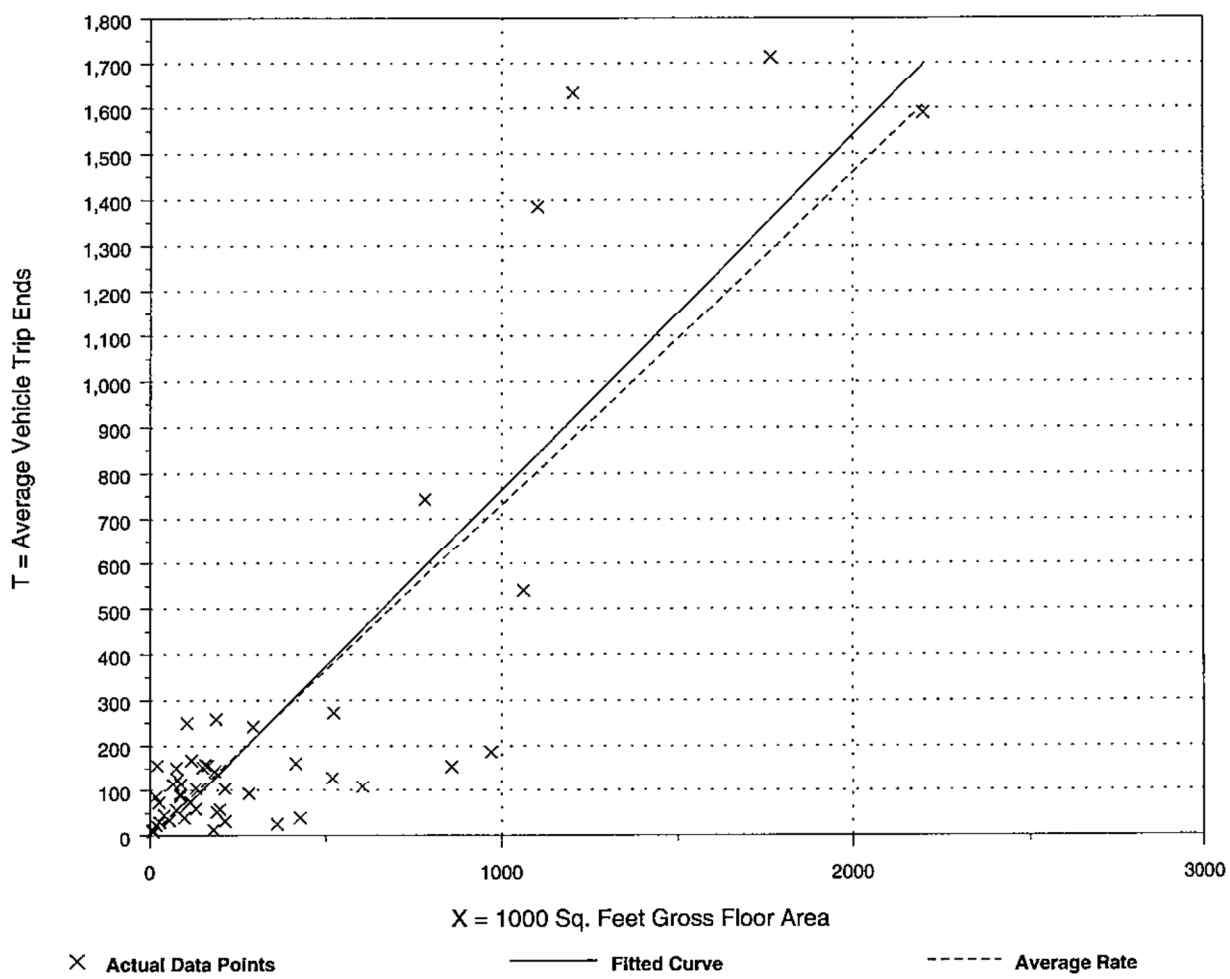
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 56
Average 1000 Sq. Feet GFA: 318
Directional Distribution: 36% entering, 64% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
0.73	0.07 - 7.85	1.01

Data Plot and Equation



Fitted Curve Equation: T = 0.78(X) - 15.97

R^2 = 0.75

C-2. LOT 12- SATELLITE CAMPUS TRIP DISTRIBUTIONS

The project trip distributions estimate the likely origins and destinations of new trips and their likely routes on the street system. The direction from which site traffic will approach or depart the development will vary depending on several factors including, but not limited to surrounding land uses; population densities; and condition and efficiency of the local street system (which influence travel times). The attached distributions were estimated by evaluating existing driveway movements, average daily trip counts on local streets (per Mukilteo's Transportation Plan) and surrounding population densities.

There are currently three future road connections that are planned for in the city of Mukilteo that could impact the attached distributions: 1) Paine Field Blvd extension (north of the site connecting SR-526 to 5th St/Mukilteo Blvd), 2) Harbour Pointe Blvd S./121st St SW extension/connection (south of the site), and 3) Harbour Reach Dr Extension (south of the site connecting Harbour Reach Dr/Harbour Pointe Blvd S. to Beverly Park Rd). Any one of these new extension improvements could impact the trip distributions, however it is not anticipated that they will be completed within the next 6-years and thus the attached distributions do not assume there completion.

Generally, it was estimated that 14% of the trips will travel west of the site, 42% will travel north and 44% to the south. No direct easterly travel is possible due to the location of Pain Field (Snohomish County Airport) directly east of the site. The attached distribution maps provide trip distribution for average daily trips (ADT) and PM peak with directional (inbound/outbound) assignments.

Lot 12- Satellite Campus Building Expansion General Trip Distribution: (see attached Distribution Maps)

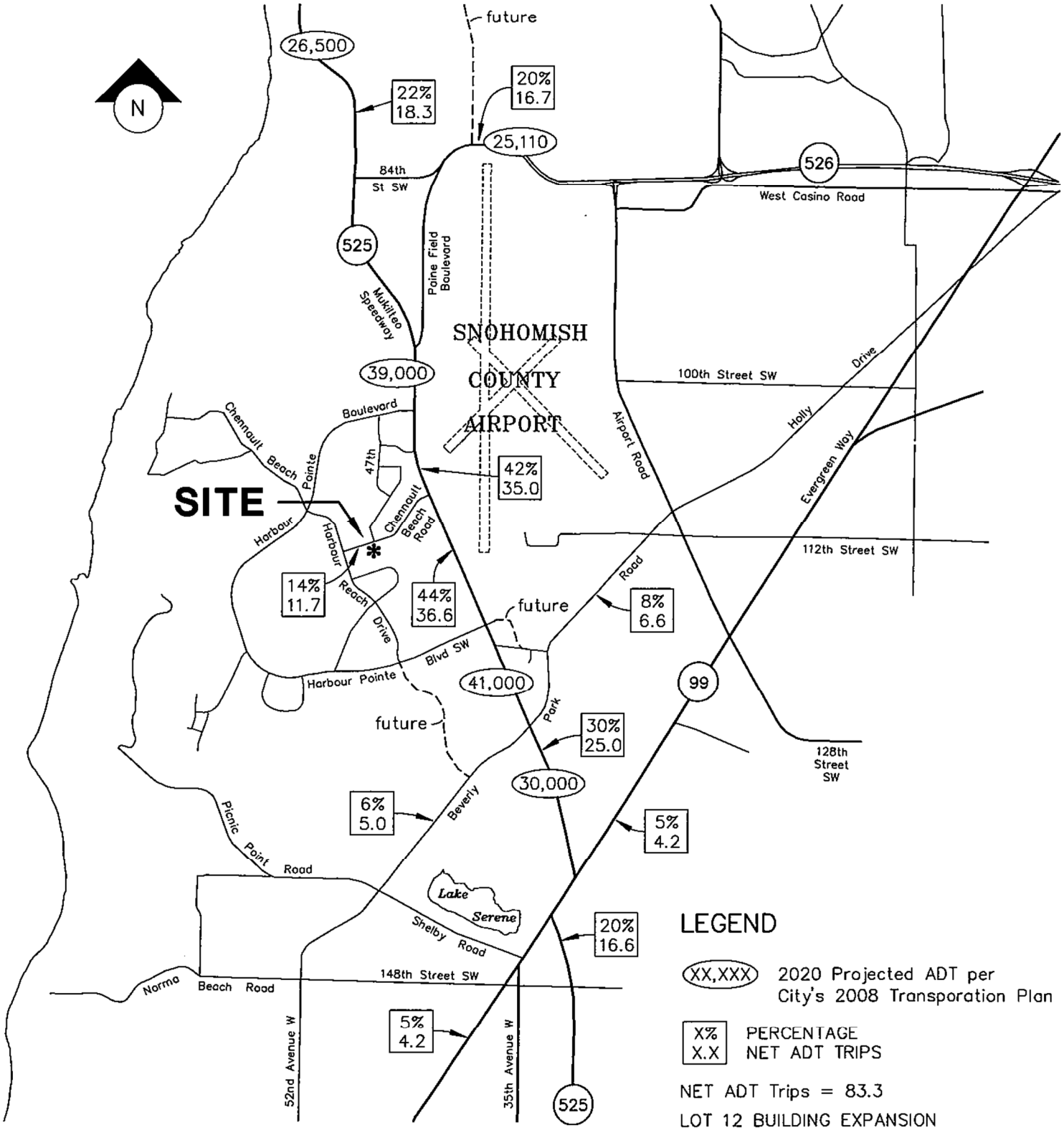
Development: 21,800 sf Manufacturing Building Expansion

South = 44%
- ADT = 36.6 trips
- PM Peak = 7.0 trips (4.5 outbound / 2.5 inbound)

North = 42%
- ADT = 35.0 trips
- PM Peak = 6.7 trips (4.3 outbound / 2.4 inbound)

West = 14%
- ADT = 11.7 trips
- PM Peak = 2.2 trips (1.4 outbound / 0.8 inbound)

ELECTROIMPACT INC.
ADT DISTRIBUTION – LOT 12



LEGEND

(XX,XXX) 2020 Projected ADT per City's 2008 Transporation Plan

X%	PERCENTAGE
X.X	NET ADT TRIPS

NET ADT Trips = 83.3

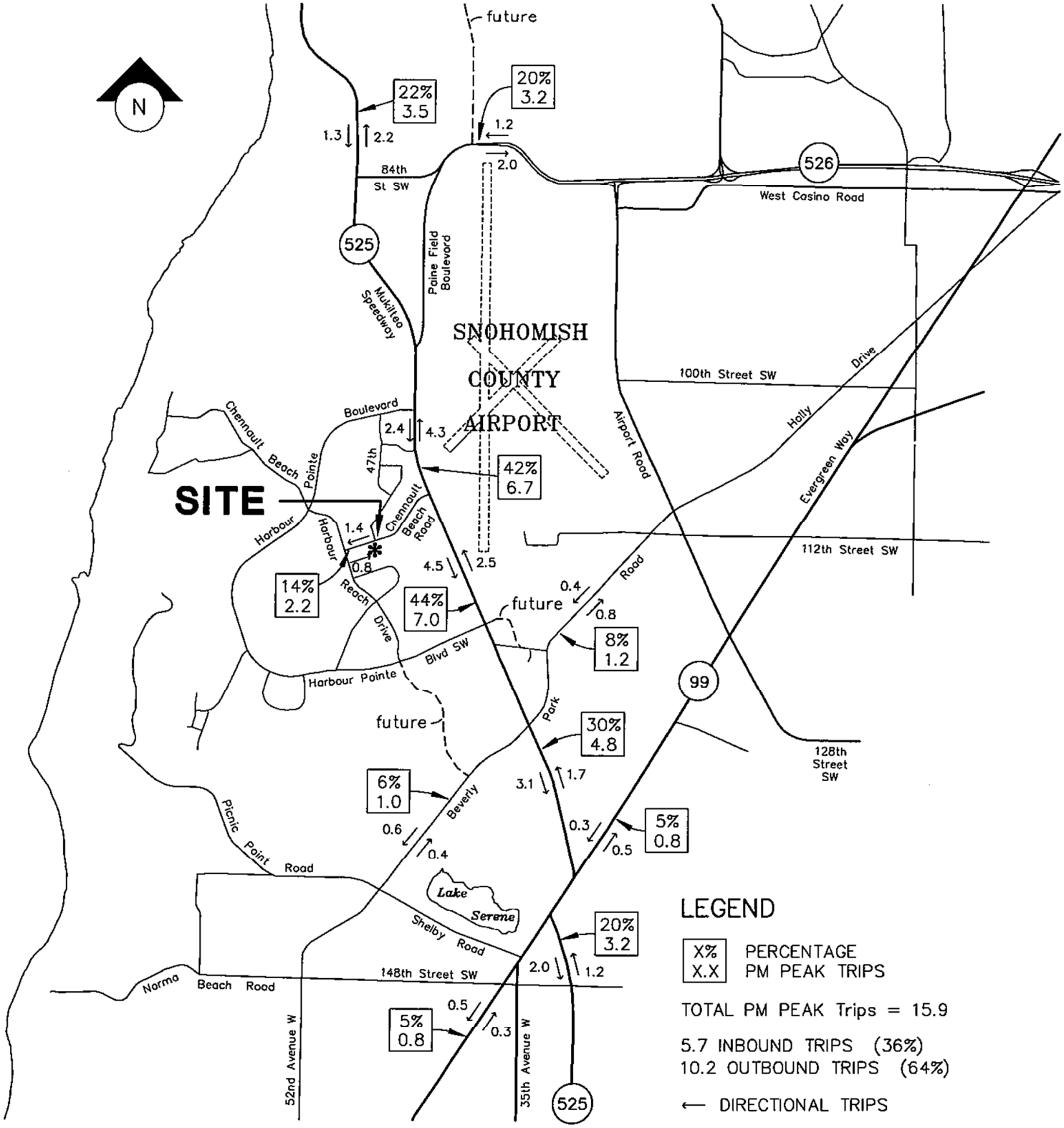
LOT 12 BUILDING EXPANSION
21,800 SQUARE FEET – MANUFACTURING

ADT Trips = Average Daily Trips

Lovell-Sauerland & Associates, Inc.
Engineers/Surveyors/Planners/Development Consultants
19217 36th Avenue W., Suite 106 Lynnwood, WA 98036 (425) 775-1591 LSAengineering.com

LSA No. 5183

ELECTROIMPACT INC.
PM PEAK DISTRIBUTION - LOT 12



LEGEND

X% / X.X	PERCENTAGE PM PEAK TRIPS

TOTAL PM PEAK Trips = 15.9

5.7 INBOUND TRIPS (36%)
10.2 OUTBOUND TRIPS (64%)

← DIRECTIONAL TRIPS

LOT 12 BUILDING EXPANSION
21,800 SQUARE FEET – MANUFACTURING

Lovell-Sauerland & Associates, Inc.
Engineers/Surveyors/Planners/Development Consultants
19217 36th Avenue W., Suite 106 Lynnwood, WA 98036 (425) 775-1591 LSAengineering.com

LSA No. 5183

C-3. LOT 12- SATELLITE CAMPUS SITE ACCESS

Currently access to Lot 12- satellite campus site is provided at two locations along the southeast side of Chennault Beach Rd. With the site expansion of the satellite campus the current northeast access is proposed to be slightly shifted about +/-10 feet to the southwest. The shifted access point will better align (slightly shifted to the northeast) with the existing intersection of 47th Ave W on the opposite side of Chennault Beach Rd. The northeast access point will serve as a joint access between Lot 12 and 13 of the Electroimpact Satellite Campus. The following evaluation analyzes the new proposed location of the northeast access point.

The WSDOT Design Manual M22-01.05, June 2009 will be used to evaluate if the available site distance of the proposed new location is adequate. Section 1310.09 and Exhibits 1310-22a in the WSDOT Design Manual contains the criteria to review adequate intersection sight distance (see attached WSDOT Ex 22a).

A visual site inspection of the available sight distance at the proposed shifted northeast access points was performed in November 2009. The alignment of Chennault Beach Rd along the satellite campus is relatively straight and constant grade with a slight incline (+/-3%) to the northeast. Attached photos demonstrate the existing line of sight conditions. During the site evaluation it is estimated that there is over 650 feet of available site distance in both the northeast and southwest directions.

The following calculations evaluate the required sight distance per WSDOT standards:

LOT 12- SATELLITE CAMPUS- NORTHEAST ACCESS POINT:

Right Turn Movement- Looking Left (southwest)

Available Sight Distance = 650 ft
Posted Speed Limit (V) = 35 mph
Street Gradient = 3% downhill
Design Vehicle = Large semi-truck deliveries may occur (WB-67)

Intersection Sight Distance Equation (per WSDOT Ex. 1310-22a)

$S_i = (1.47)\ (V)\ (T_g)$

Time Gap (T_g) Calculation:

T_g for WB-67 (combination semi-trucks) vehicle = 11.5 sec
T_g for P (passenger car) vehicle = 7.5 sec
T_g credit for right turn maneuvers = -1.0 sec
Net WB-67 T_g = 10.5 sec (11.5-1.0)
Net P T_g = 6.5 sec (7.5-1.0)

Right Turn Sight Distance Calculation for a WB-67 vehicle:

$S_i = (1.47)\ (35\ \text{mph})\ (10.5\ \text{sec}) = 540.2\ \text{ft}$

Right Turn Sight Distance Calculation for a passenger car:

$S_i = (1.47)\ (35\ \text{mph})\ (6.5\ \text{sec}) = 334.4\ \text{ft}$

Thus, with 650 feet of available sight distance both large truck and passenger car vehicles have adequate sight distance to maintain a posted speed limit of 35 mph.

Left Turn Movement- Looking right (northeast)

Available Sight Distance = 650 ft
Posted Speed Limit (V) = 35 mph
Street Gradient = 3% uphill
Design Vehicle = Large semi-truck deliveries may occur (WB-67)

Intersection Sight Distance Equation (per WSDOT Ex. 1310-22a)

$S_i = (1.47)\ (V)\ (T_g)$

Time Gap (T_g) Calculation:

T_g for WB-67 (combination semi-trucks) vehicle = 11.5 sec
T_g for P (passenger car) vehicle = 7.5 sec
T_g for center turn median add 0.7 sec trucks and 0.5 sec for right passenger cars
Net WB-67 T_g = 12.2 sec (11.5+.07)
Net P T_g = 8.0 sec (7.5+0.5)

Left Turn Sight Distance Calculation for a WB-67 vehicle:

$S_i = (1.47)\ (35\ \text{mph})\ (12.2\ \text{sec}) = 627.7\ \text{ft}$

Left Turn Sight Distance Calculation for a passenger car:

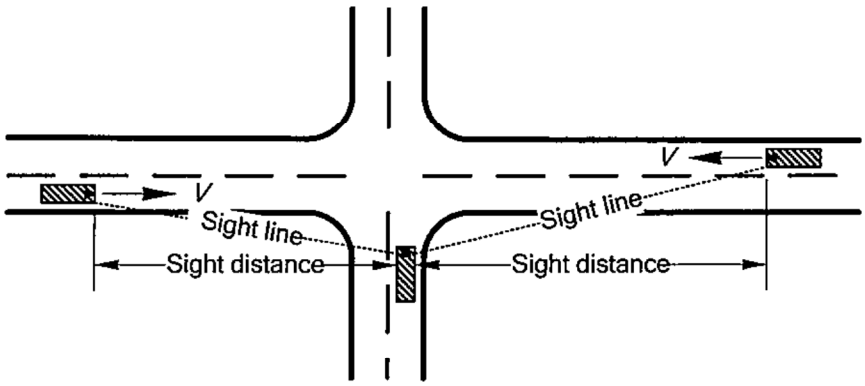
$S_i = (1.47)\ (35\ \text{mph})\ (8.0\ \text{sec}) = 411.6\ \text{ft}$

Thus, with over 650 feet of available sight distance, both large truck and passenger car vehicles have adequate sight distance to maintain a posted speed limit of 35 mph.

The preceding calculations show that the available sight distance (650 ft) will provide for adequate sight distance for exiting vehicles for the northeast access point of Lot 12- Satellite campus.

Lot 12- Satellite Campus Northeast Access Looking Northeast (right while exiting)

Lot 12- Satellite Campus Northeast Access Looking Southwest (left while exiting)



$S_i = 1.47Vt_g$
Where: S_i = Intersection sight distance (ft) V = Design speed of the through roadway (mph) t_g = Time gap for the minor roadway traffic to enter or cross the through roadway (sec)

Intersection Sight Distance Equation
Table 1

Design Vehicle	Time Gap (t_g) in Sec
Passenger car (P)	7.5
Single-unit trucks and buses (SU & BUS)	9.5
Combination trucks (WB-40, WB-50, & WB-67)	11.5

Note:
Values are for a stopped vehicle to turn left onto a two-lane two-way roadway with no median and grades 3% or less.

Intersection Sight Distance Gap Times (t_g)
Table 2

Adjust the t_g values listed in Table 2 as follows:

Crossing or right-turn maneuvers:

All vehicles	subtract 1.0 sec

Multilane roadways:

Left turns, for each lane in excess of one, to be crossed and for medians wider than 4 ft:

Passenger cars	add 0.5 sec
All trucks and buses	add 0.7 sec

Crossing maneuvers, for each lane in excess of two, to be crossed and for medians wider than 4 ft:

Passenger cars	add 0.5 sec
All trucks and buses	add 0.7 sec

Note: Where medians are wide enough to store the design vehicle, determine the sight distance as two maneuvers.

Crossroad grade greater than 3%:

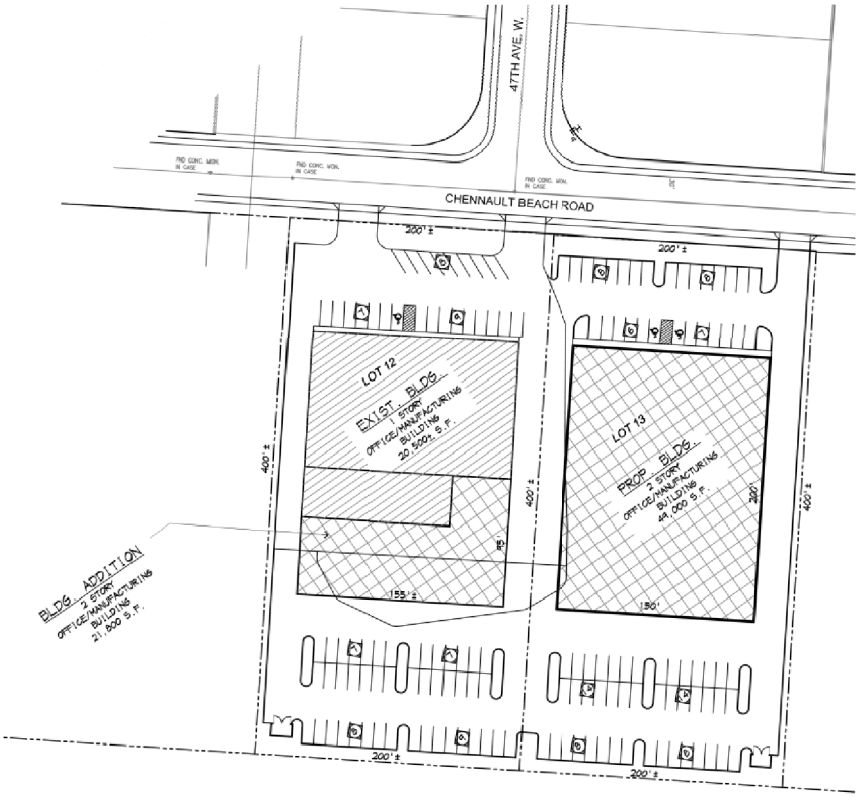
All movements upgrade for each percent that exceeds 3%:

All vehicles	add 0.2 sec

Sight Distance at Intersections
Exhibit 1310-22a

D. Lot 13- SATELLITE CAMPUS

Expansion Improvement: Construction of a 44,000 sf manufacturing building a new driveway access point near the northeast corner of Lot 13 of the Electroimpact satellite campus.



D-1. LOT 13- SATELLITE CAMPUS TRIP GENERATION

The construction of a 44,000 sf manufacturing building will result in new traffic. The amount of new traffic, trip generation is determined using trip generation rates provided in the *Institute of Transportation Engineers Trip Generation Report, 8th Edition* (*ITE manual*). For the purpose of this evaluation the total proposed gross building area of 44,000 sf will be used to evaluate the estimated trip generation. No credit or reduction for pass-by, diverted link or internal trip capture generated by the current site development will be realized.

The total number of trips generated by the proposed building B expansion has been estimated using the ITE average vehicle trip rates for land use c*ode 140, Manufacturing*. Per the ITE manual the following description is given for land use code 140: "Manufacturing facilities are areas where the primary activity is the conversion of raw materials or parts into finished products. Size and type of activity may vary substantially from one facility to another. In addition to the actual production of goods, manufacturing facilities generally also have office, warehouse, research and associated functions."

An average rate per 1,000 sq ft was obtained from the *ITE Manual* to determine the total number of new project trips [3.82 ADT and 0.73 p.m. peak trips (4 to 6 PM) per 1,000 sq ft]. The following table summarizes the projects trip generation using the ITE manual generation rates:

Electro impact- Lot 13 Satellite Campus ***Traffic Generation[1,2] Table***	
Total Average Weekday Trips (ADT): ITE Code 140 –Manufacturing	
44,000 sq. ft. at 3.82 ADT/1000 sq. ft	168.1
PM Peak Hour Trips of Adjacent Street Traffic 4 to 6 PM: ITE Code 140 –Manufacturing	
44,000 sq. ft. at 0.73 PM peak/1000 sq. ft	32.1
Inbound Trips (36%)	11.6
Outbound Trips (64%)	20.5

5. Trips rates are average trip rates from ITE Trip Generation Report, 8th Edition- Manufacturing ITE Code 140.
6. No reductions for pass-by, diverted link or internal trip capture have been applied.

Manufacturing
(140)

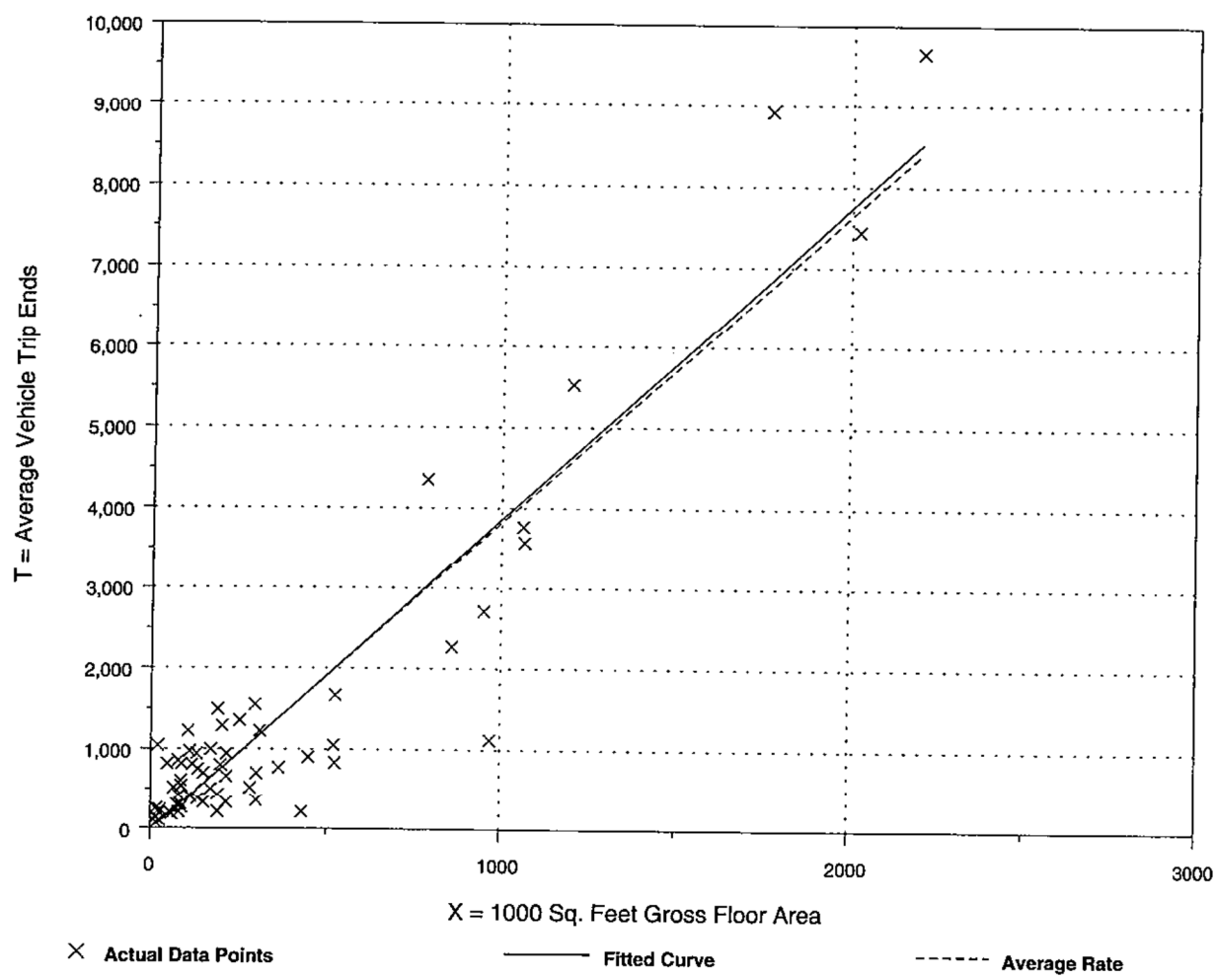
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday

Number of Studies: 62
Average 1000 Sq. Feet GFA: 349
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
3.82	0.50 - 52.05	3.07

Data Plot and Equation



Fitted Curve Equation: T = 3.88(X) - 20.70

R^2 = 0.87

Manufacturing
(140)

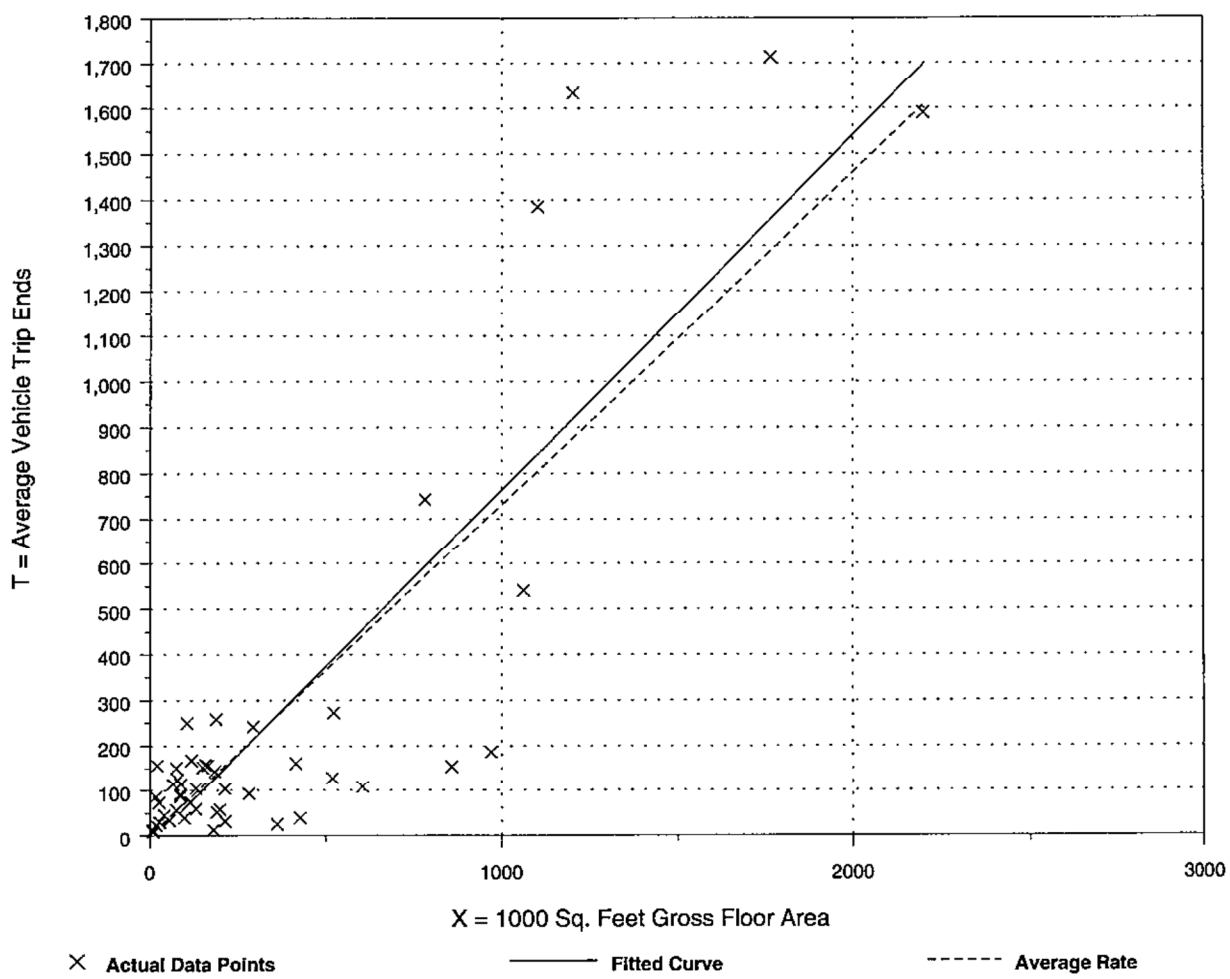
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 56
Average 1000 Sq. Feet GFA: 318
Directional Distribution: 36% entering, 64% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
0.73	0.07 - 7.85	1.01

Data Plot and Equation



Fitted Curve Equation: T = 0.78(X) - 15.97

R^2 = 0.75

D-2. LOT 13- SATELLITE CAMPUS TRIP DISTRIBUTIONS

The project trip distributions estimate the likely origins and destinations of new trips and their likely routes on the street system. The direction from which site traffic will approach or depart the development will vary depending on several factors including, but not limited to surrounding land uses; population densities; and condition and efficiency of the local street system (which influence travel times). The attached distributions were estimated by evaluating existing driveway movements, average daily trip counts on local streets (per Mukilteo's Transportation Plan) and surrounding population densities.

There are currently three future road connections that are planned for in the city of Mukilteo that could impact the attached distributions: 1) Paine Field Blvd extension (north of the site connecting SR-526 to 5th St/Mukilteo Blvd), 2) Harbour Pointe Blvd S./121st St SW extension/connection (south of the site), and 3) Harbour Reach Dr Extension (south of the site connecting Harbour Reach Dr/Harbour Pointe Blvd S. to Beverly Park Rd). Any one of these new extension improvements could impact the trip distributions, however it is not anticipated that they will be completed within the next 6-years and thus the attached distributions do not assume there completion.

Generally, it was estimated that 14% of the trips will travel west of the site, 42% will travel north and 44% to the south. No direct easterly travel is possible due to the location of Pain Field (Snohomish County Airport) directly east of the site. The attached distribution maps provide trip distribution for average daily trips (ADT) and PM peak with directional (inbound/outbound) assignments.

Lot 13- Satellite Campus Building Expansion General Trip Distribution: (see attached Distribution Maps)

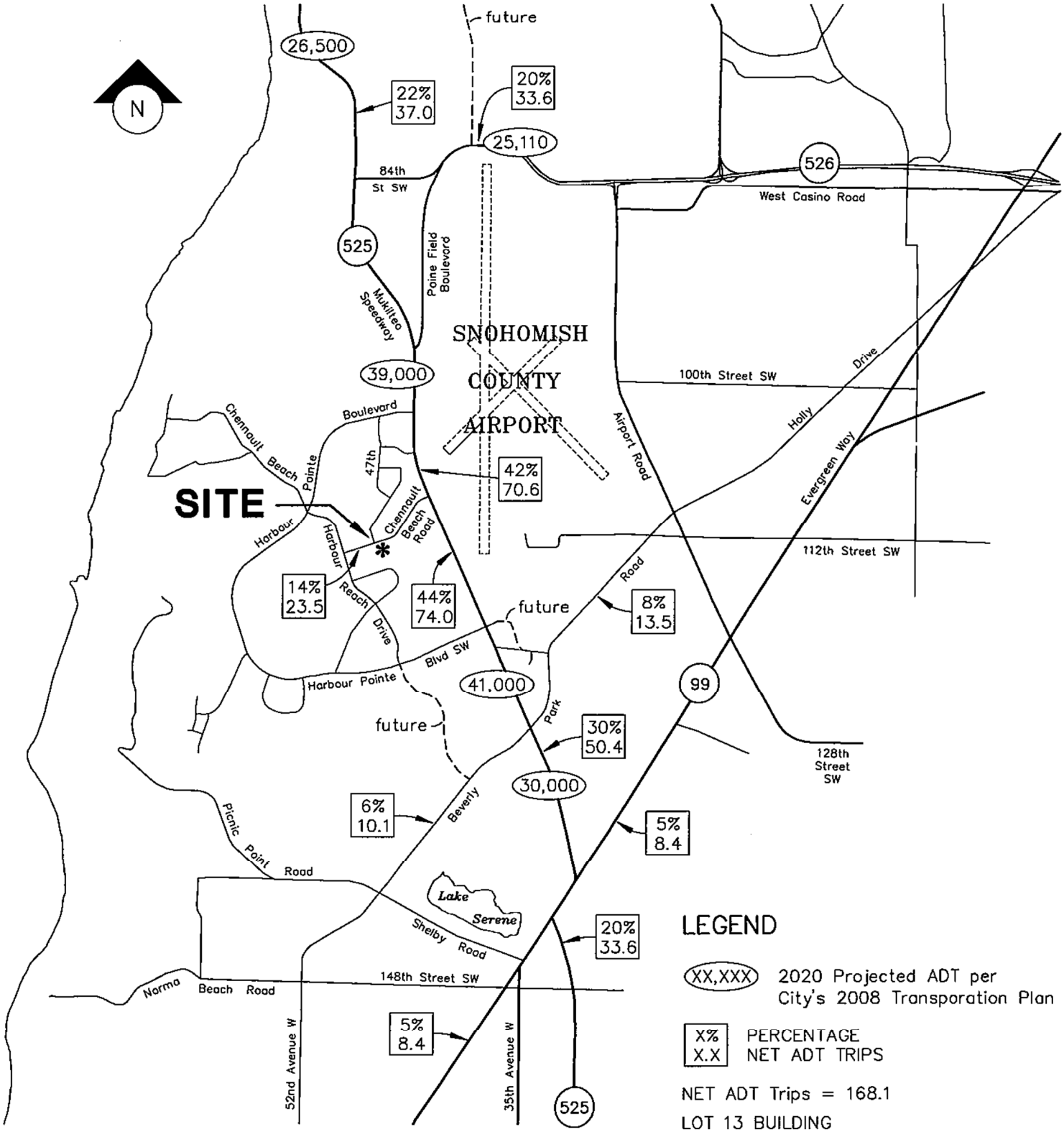
Development: 44,000 sf Manufacturing Building

South = 44%
- ADT = 74.0 trips
- PM Peak = 14.1 trips (9.0 outbound / 5.1 inbound)

North = 42%
- ADT = 70.6 trips
- PM Peak = 13.5 trips (8.6 outbound / 4.9 inbound)

West = 14%
- ADT = 23.5 trips
- PM Peak = 4.5 trips (2.9 outbound / 1.6 inbound)

ELECTROIMPACT INC.
ADT DISTRIBUTION – LOT 13



LEGEND

(XX,XXX) 2020 Projected ADT per City's 2008 Transporation Plan

[X% / X.X] PERCENTAGE / NET ADT TRIPS

NET ADT Trips = 168.1

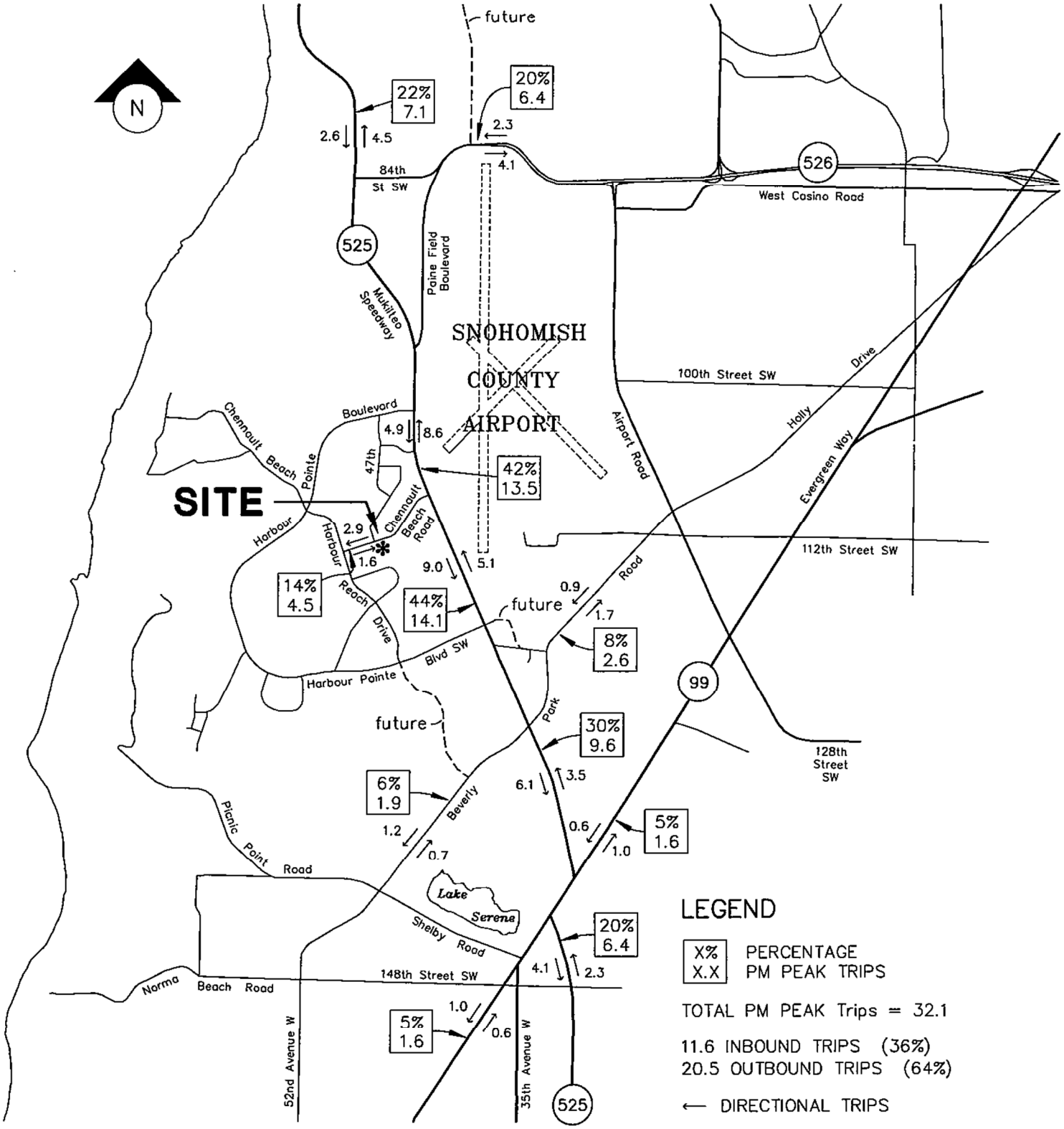
LOT 13 BUILDING
44,000 SQUARE FEET – MANUFACTURING

ADT Trips = Average Daily Trips

Lovell-Sauerland & Associates, Inc.
Engineers/Surveyors/Planners/Development Consultants
19217 36th Avenue W., Suite 106 Lynnwood, WA 98036 (425) 775-1591 LSAengineering.com

LSA No. 5183

ELECTROIMPACT INC.
PM PEAK DISTRIBUTION - LOT 13



LEGEND

X% / X.X	PERCENTAGE / PM PEAK TRIPS

TOTAL PM PEAK Trips = 32.1

11.6 INBOUND TRIPS (36%)
20.5 OUTBOUND TRIPS (64%)

← DIRECTIONAL TRIPS

LOT 13 BUILDING
44,000 SQUARE FEET – MANUFACTURING

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LSA No. 5183

D-3. LOT 13- SATELLITE CAMPUS SITE ACCESS

Currently Lot 13 of the satellite campus is undeveloped. Two proposed access points for the Lot 13 site will be provided; one at the far northeast corner and one at the southwest corner (a shared access point with Lot 12) along Chennault Beach Rd. The shared access point at lot 12 was previously evaluated in this report and has adequate sight distance of 650 feet. The new northeast access point for lot 13 will be located about 200 feet northeast of the shared lot 12/lot 13 access point. The following evaluation analyzes the new proposed location of the northeast access point.

The WSDOT Design Manual M22-01.05, June 2009 will be used to evaluate if the available site distance of the proposed new location is adequate. Section 1310.09 and Exhibits 1310-22a in the WSDOT Design Manual contains the criteria to review adequate intersection sight distance (see attached WSDOT Ex 22a).

A visual site inspection of the available sight distance at the proposed northeast access point was performed in November 2009. The alignment of Chennault Beach Rd along the satellite campus is relatively straight and constant grade with a slight incline (+/-3%) to the southwest. Towards the northeast the street inclines to a 6% grade and bends to the north (along the frontage of the main campus) about 250 feet northeast of the northeast corner of Lot 13 of the satellite campus. At the proposed northeast access point existing vegetation impedes the sight distance lines in its current condition; however with the proposed site development areas the sight obscuring vegetation will be removed along the southwesterly line of site. Northeast of the site existing evergreen trees along the back of the sidewalk (appearing to be located in existing right-of-way) will need to be trimmed back to facilitate sight distance to the northeast. With the removal of the sight obscuring vegetation it is estimated that there will be about 500 ft of available site distance to the northeast (to the right when exiting) and over 650 ft to the southwest (to the left when exiting). Attached photos demonstrate the existing line of sight conditions.

The following calculations evaluate the required sight distance per WSDOT standards:

LOT 13- SATELLITE CAMPUS- NORTHEAST ACCESS POINT:

Right Turn Movement- Looking Left (southwest)

Available Sight Distance = 650 ft
Posted Speed Limit (V) = 35 mph
Street Gradient = 3% downhill
Design Vehicle = Large semi-truck deliveries may occur (WB-67)

Intersection Sight Distance Equation (per WSDOT Ex. 1310-22a)

$$S_i = (1.47)\ (V)\ (T_g)$$

Time Gap (T_g) Calculation:

T_g for WB-67 (combination semi-trucks) vehicle = 11.5 sec
T_g for P (passenger car) vehicle = 7.5 sec
T_g credit for right turn maneuvers = -1.0 sec
Net WB-67 T_g = 10.5 sec (11.5-1.0)
Net P T_g = 6.5 sec (7.5-1.0)

Right Turn Sight Distance Calculation for a WB-67 vehicle:

S_i = (1.47) (35 mph) (10.5 sec) = 540.2 ft

Right Turn Sight Distance Calculation for a passenger car:

S_i = (1.47) (35 mph) (6.5 sec) = 334.4 ft

Thus, with 650 feet of available sight distance, both large truck and passenger car vehicles have adequate sight distance to maintain a posted speed limit of 35 mph.

Left Turn Movement- Looking right (northeast)

Available Sight Distance = 500 ft
Posted Speed Limit (V) = 35 mph
Street Gradient = 6% uphill
Design Vehicle = Large semi-truck deliveries may occur (WB-67) however large combination semi-trucks will rarely make left turns and thus both single-unit deliver trucks and passenger cars will also be evaluated.

Intersection Sight Distance Equation (per WSDOT Ex. 1310-22a)

S_i = (1.47) (V) (T_g)

Time Gap (T_g) Calculation:

T_g for WB-67 (combination semi-trucks) vehicle = 11.5 sec
T_g for SU vehicle = 9.5 sec
T_g for P (passenger car) vehicle = 7.5 sec
T_g addition to account for 6% uphill grade climb (add 0.2 sec per each percent that exceeds 3%)
(3 x 0.2 sec) = 0.6 sec
Net WB-67 T_g = 12.1 sec (11.5+0.6)
Net SU T_g = 10.1 sec (9.5+ 0.6)
Net P T_g = 8.1 sec (7.5+ 0.6)

Left Turn Sight Distance Calculation for a WB-67 vehicle:

S_i = (1.47) (35 mph) (12.1 sec) = 622.5 ft

Left Turn Sight Distance Calculation for a SU vehicle:

S_i = (1.47) (35 mph) (10.1 sec) = 519.6 ft

Left Turn Sight Distance Calculation for a passenger car:

S_i = (1.47) (35 mph) (8.1 sec) = 416.7 ft

For a southwest bound approaching vehicle along Chennault Beach Rd maintaining a posted speed limit of 35 mph only an exiting passenger car (P vehicle) has adequate sight distance (416.7 ft) with the available 500 ft of sight distance.

Solve for Available Design Speed (V) using Available Sight Distance (500 ft) for a large truck (WB-67)

500 ft = (1.47) (? mph) (12.1 sec)
Available Design Speed = 28.1 mph

Solve for Available Design Speed (V) using Available Sight Distance (500 ft) for a single unit truck (SU)

500 ft = (1.47) (? mph) (10.1 sec)
Available Design Speed = 33.7 mph

Thus, an approaching Vehicle traveling along Chennault Beach Rd would need to slow down to at least 28.1 mph to accommodate and left-turning exiting combination truck (WB-67) or 33.7 mph for a single-unit truck (SU).

Check Stopping Sight Distance for Safety considerations of the Available 500 ft of sight distance.

Solve for acceptable approaching Design Speed of a vehicle to stop with 500 ft of available sight distance. Using WSDOT table and Equations Ex 1260-3 and 1260-4 (attached).

$S = (1.47)(V)(2.5) + (V^2)/(30((11.2/32.2)+G))$

- G = Grade of street in % ,
- deceleration rate = 11.2 ft/sec
- perception/reaction time = 2.5 sec

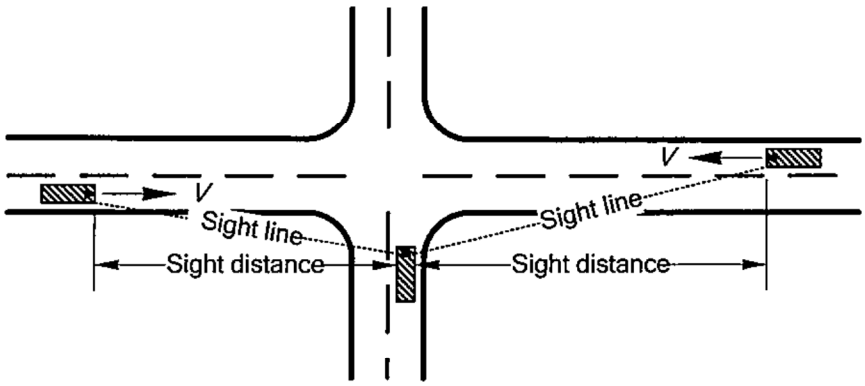
Set S at 500 ft and G at -6%, V = 51.73 mph

Thus, an approaching vehicle traveling along Chennault Beach Rd could be traveling at 51.7 mph and would have adequate time to react (2.5 sec) and break (decelerate at 11.2 ft/sec) to stop and avoid a collision at the proposed new intersection location (500 ft).

The above calculations show that the available sight distance (650 ft- once vegetation is removed) to the southwest is adequate for exiting vehicles, including large combination semi-trucks (WB-67). However, to the northeast the available sight distance (500 feet) to maintain the 35 mph posted travel speeds on Chennault Beach Rd is merely adequate for a passenger car (P vehicle). An exiting left-turning large combination semi-truck would require a southwest bound approaching vehicle on Chennault Beach Rd to reduce its travel speed to 28.1 mph, and likewise an exiting small single-unit delivery truck (SU) would require an approaching car to slow to 33.7 mph. Left-turn trucks exiting the Lot 13 satellite campuses will not be common due to the fact the main truck route (SR-525) is located east of the site. As previously discussed, Chennault Beach Rd terminates at a stop controlled T-intersection, this termination is about 1,000 feet southwest of the proposed northeast access point for satellite campus Lot 13. The preceding evaluation indicates there is plenty of distance for an approaching vehicle to recognize, react and slow down or stop if needed. Therefore, the adverse impact to vehicle traffic on Chennault Beach Rd is slight and the proposed access points for the Electroimpact satellite campus Lot 13 are adequate and safe.

Lot 13- Satellite Campus Northeast Access Looking Northeast (right while exiting)

Lot 1- Satellite Campus Northeast Access Looking Southwest (left while exiting)



$S_i = 1.47Vt_g$
Where: S_i = Intersection sight distance (ft) V = Design speed of the through roadway (mph) t_g = Time gap for the minor roadway traffic to enter or cross the through roadway (sec)

Intersection Sight Distance Equation
Table 1

Design Vehicle	Time Gap (t_g) in Sec
Passenger car (P)	7.5
Single-unit trucks and buses (SU & BUS)	9.5
Combination trucks (WB-40, WB-50, & WB-67)	11.5

Note:
Values are for a stopped vehicle to turn left onto a two-lane two-way roadway with no median and grades 3% or less.

Intersection Sight Distance Gap Times (t_g)
Table 2

Adjust the t_g values listed in Table 2 as follows:

Crossing or right-turn maneuvers:

All vehicles	subtract 1.0 sec

Multilane roadways:

Left turns, for each lane in excess of one, to be crossed and for medians wider than 4 ft:

Passenger cars	add 0.5 sec
All trucks and buses	add 0.7 sec

Crossing maneuvers, for each lane in excess of two, to be crossed and for medians wider than 4 ft:

Passenger cars	add 0.5 sec
All trucks and buses	add 0.7 sec

Note: Where medians are wide enough to store the design vehicle, determine the sight distance as two maneuvers.

Crossroad grade greater than 3%:

All movements upgrade for each percent that exceeds 3%:

All vehicles	add 0.2 sec

Sight Distance at Intersections
Exhibit 1310-22a

Design Speed (mph)	Stopping Sight Distance (ft)					
	Downgrade			Upgrade		
	-3%	-6%	-9%	3%	6%	9%
25	158	165	173	147	143	140
30	205	215	227	190	184	179
35	258	271	288	237	229	222
40	315	333	354	289	278	269
45	378	401	428	345	331	320
50	447	474	508	405	389	375
55	520	553	594	470	450	433
60	599	638	687	539	515	495
65	683	729	786	612	585	561
70	772	826	892	690	658	631
75	867	928	1004	773	736	705
80	966	1037	1123	860	818	782

Design Stopping Sight Distance on Grades
Exhibit 1260-3

For stopping sight distances on grades between those listed, interpolate between the values given or use the equation in Exhibit 1260-4.

$$S = 1.47Vt + \frac{V^2}{30\left[\left(\frac{a}{32.2}\right) \pm \frac{G}{100}\right]}$$

Where:

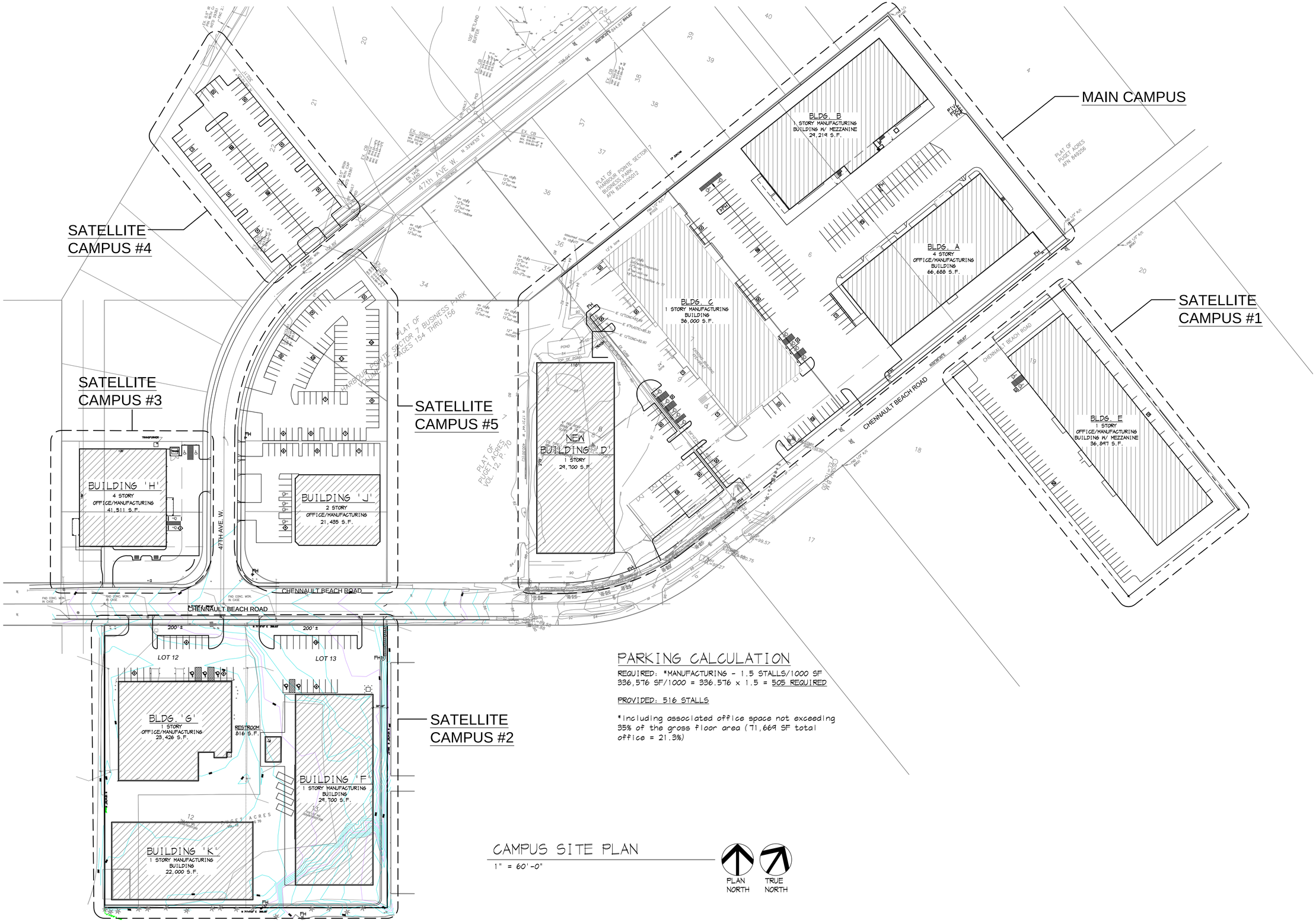
S = Stopping sight distance on grade (ft)
V = Design speed (mph)
t = Perception/reaction time (2.5 sec)
a = Deceleration rate (11.2 ft/sec^2)
G = Grade (%)

Stopping Sight Distance on Grades
Exhibit 1260-4

(3) Crest Vertical Curves

Use Exhibit 1260-5 or the equations in Exhibit 1260-6 to find the minimum crest vertical curve length to provide stopping sight distance when given the algebraic difference in grades. When using the equations in Exhibit 1260-6, use h_1=3.50 feet and h_2=0.50 foot. Exhibit 1260-5 does not use the sight distance greater than the length of curve equation. When the sight distance is greater than the length of curve and the length of curve is critical, the $S>L$ equation given in Exhibit 1260-6 may be used to find the minimum curve length.

When a new crest vertical curve is built or an existing one is rebuilt with grades less than 3%, provide design stopping sight distance from Exhibit 1260-1. For grades 3% or greater, provide stopping sight distance from 1260.04(2).



PARKING CALCULATION

REQUIRED: *MANUFACTURING - 1.5 STALLS/1000 SF
336,576 SF/1000 = 336.576 x 1.5 = 505 REQUIRED

PROVIDED: 516 STALLS

*including associated office space not exceeding 35% of the gross floor area (71,669 SF total office = 21.3%)

CAMPUS SITE PLAN

1" = 60'-0"

PLAN NORTH

TRUE NORTH

Date:	For:
31 JAN 14	PRELIMINARY - FOR REVIEW

REGISTERED ARCHITECT
6893
ADAM B. CLARK
STATE OF WASHINGTON

2812 Colby Avenue
Everett WA 98201
(425) 252-2153 p
www.2812architecture.com

2812 ARCHITECTURE

A Master Plan for:
ELECTROIMPACT INC.
Chennault Beach Road and 47th Avenue West
Mukilteo, Washington

Contents:
CAMPUS SITE PLAN

Drawing:
A1.1

Job Number:
18c-4038

Land Use: 140
Manufacturing

Description

A manufacturing facility is an area where the primary activity is the conversion of raw materials or parts into finished products. Size and type of activity may vary substantially from one facility to another. In addition to the actual production of goods, manufacturing facilities generally also have office, warehouse, research, and associated functions. General light industrial (Land Use 110) and industrial park (Land Use 130) are related uses.

Additional Data

Time-of-day distribution data for this land use are presented in Appendix A. For the 17 general urban/suburban sites with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 6:30 and 7:30 a.m. and 3:00 and 4:00 p.m., respectively.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), California, Minnesota, New Jersey, New York, Oregon, Pennsylvania, South Dakota, Texas, Vermont, and Washington.

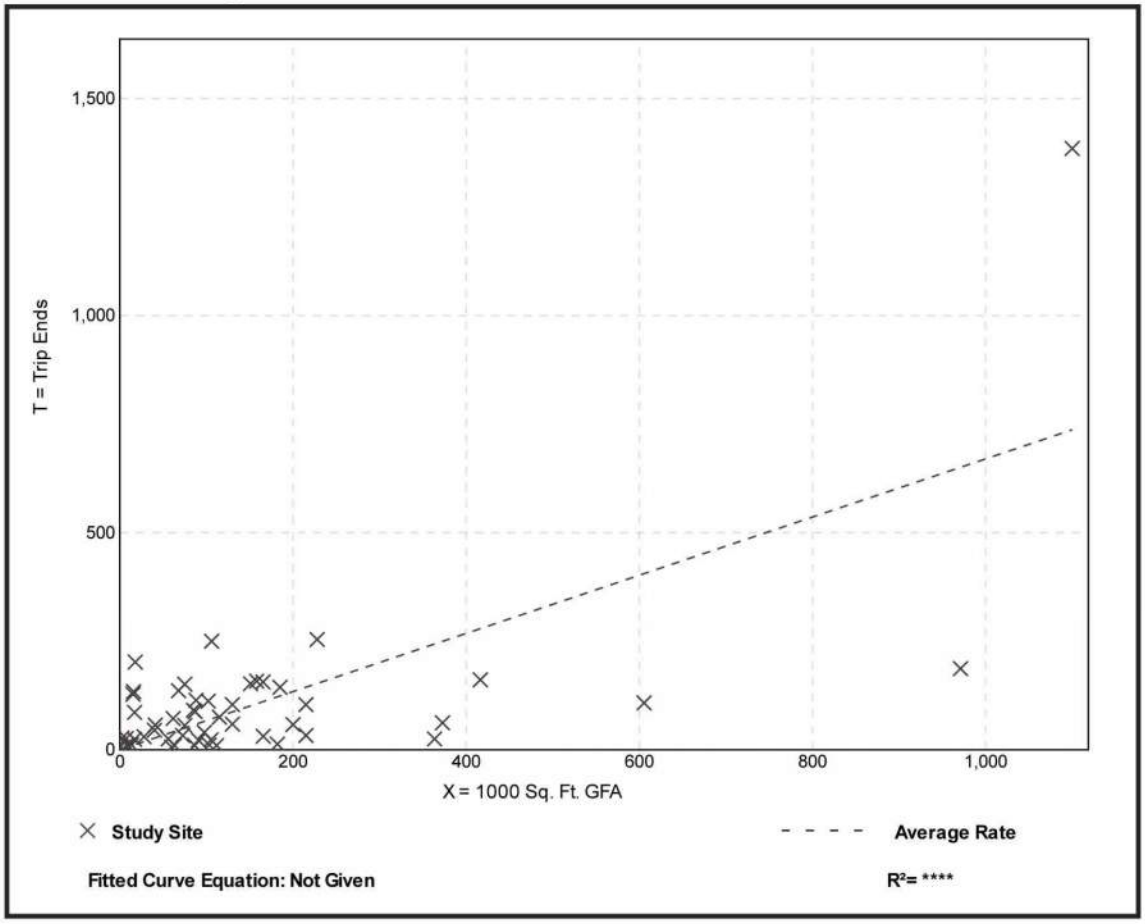
Source Numbers

177, 184, 241, 357, 384, 418, 443, 583, 598, 611, 728, 747, 875, 940, 969

Manufacturing
(140)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	52
1000 Sq. Ft. GFA:	152
Directional Distribution:	31% entering, 69% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.67	0.07 - 11.37	0.94

Data Plot and Equation