TELECARE - MILTON
TRAFFIC IMPACT ANALYSIS

CITY OF MILTON, WA

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June 2017

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TELECARE - MILTON
TRAFFIC IMPACT ANALYSIS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

TELECARE - MILTON
TRAFFIC IMPACT ANALYSIS

1. INTRODUCTION

This study serves to examine traffic impacts related to the proposed Telecare - Milton project. The main goals of this study focus on the assessment of existing traffic conditions and intersection congestion, forecasts of newly generated project traffic, and estimations of future delay. The first task includes the collection of general roadway information, road improvement information, entering sight distance data, and peak hour traffic counts. Next, a detailed level of service analysis of the existing volumes is made to determine present intersection congestion levels. Based on this analysis, forecasts of future travel patterns on the street system are developed using trip generation and trip distribution techniques. Following this forecast, future service levels for the key intersections are investigated. As a final step, appropriate conclusions and possible mitigation measures are defined.

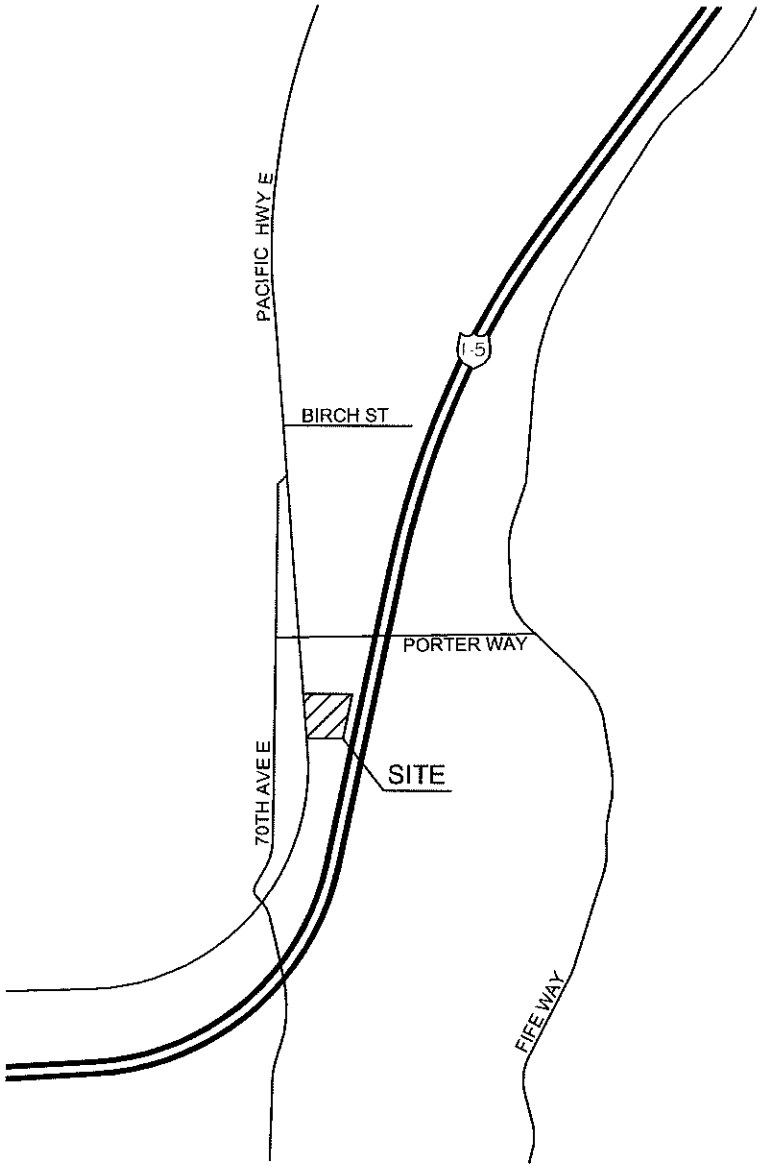
2. PROJECT DESCRIPTION

The Telecare - Milton project is a medical development proposed for construction in the City of Milton. The proposed facility is a mental health care facility that will support 16 beds with patients confined to the premise. The project is located on the east side of Pacific Highway E, just south of the Porter Way intersection. Access to the site will be provided by one new driveway onto Pacific Highway E. Surrounding development is a mixture of residential and commercial land uses. Figure 1 on the following page shows the site location and the primary arterials. The anticipated buildout year of the project is 2018, which was used as the horizon analysis year. The general configuration of the project is given in the site plan shown in Figure 2.

3. EXISTING CONDITIONS

3.1 Surrounding Roadways

The site will primarily be served by *Pacific Highway E (SR-99)*, which is a north-south multilane state highway that borders the west side of the site. The speed limit is 45 mph across the project frontage. The cross section is the area is two-lanes of travel in either direction with a center left turn lane available in most areas. Additional turn lanes are provided at major intersections. Paving is asphalt with around 12 foot lanes. Shoulders are paved. Grades are mild in the area.



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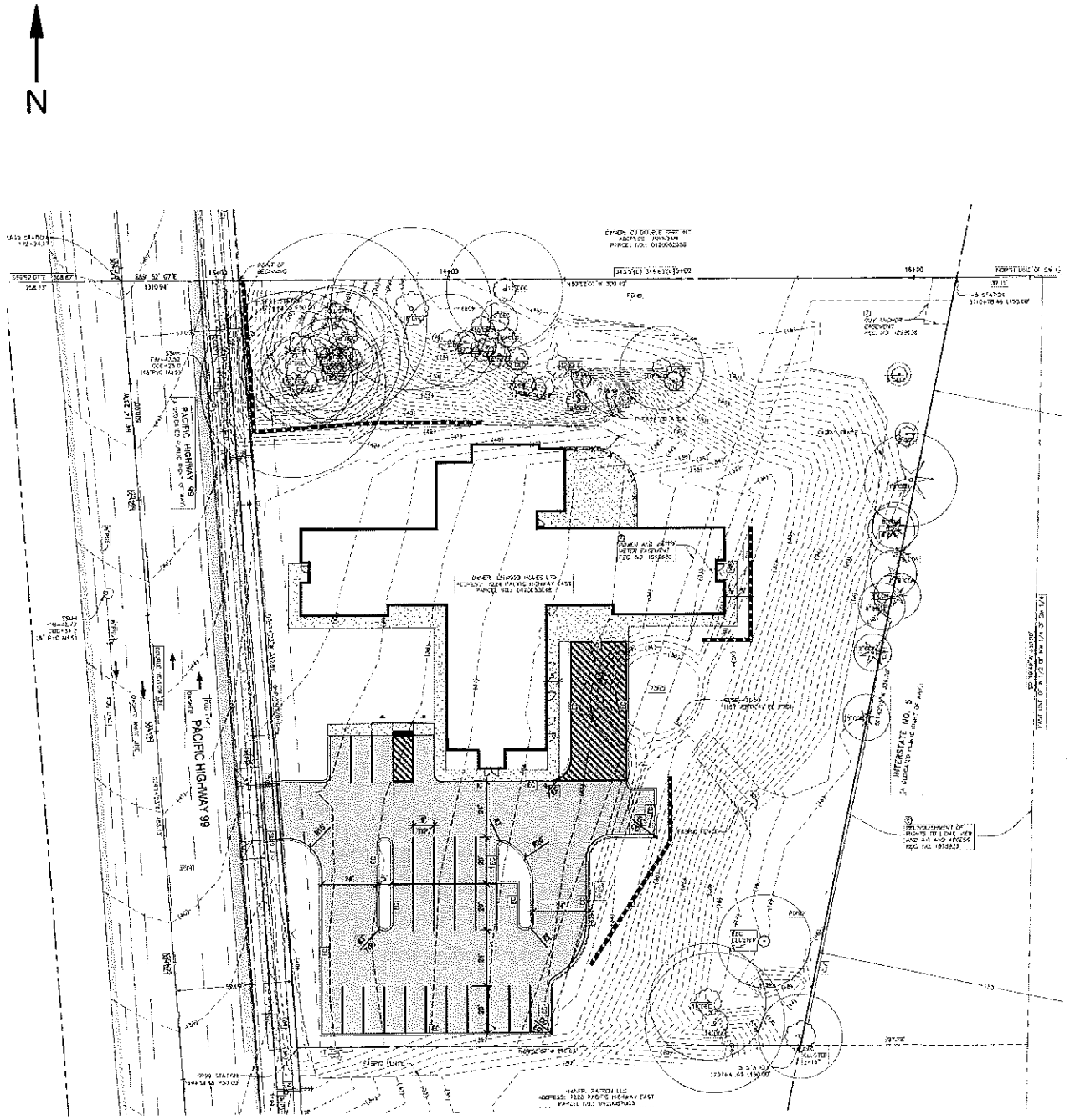
TELECARE - MILTON
VICINITY MAP & ROADWAY SYSTEM
FIGURE 1



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SITE PLAN
FIGURE 2

3.2 Roadway Improvements

A review of the latest City of Milton Transportation Improvement Program indicates there are no improvements planned in the vicinity of the project.

3.3 Peak Hour Volumes

Field data collected for this study was taken in June of 2017. The traffic count was taken during the evening peak period between the hours of 4 PM and 6 PM. This specific peak period was targeted for analysis purposes since it generally represents the worst case scenario with respect to traffic conditions for residential developments. The PM peak period typically has higher volumes than the AM peak period due to the greater number of recreation and shopping trips associated with the late afternoon period. Existing PM peak hour volumes on Pacific Highway E at the proposed project entrance can be found in Figure 3 on the following page. Count data can be found in the appendix.

3.4 Non-Motorist Traffic

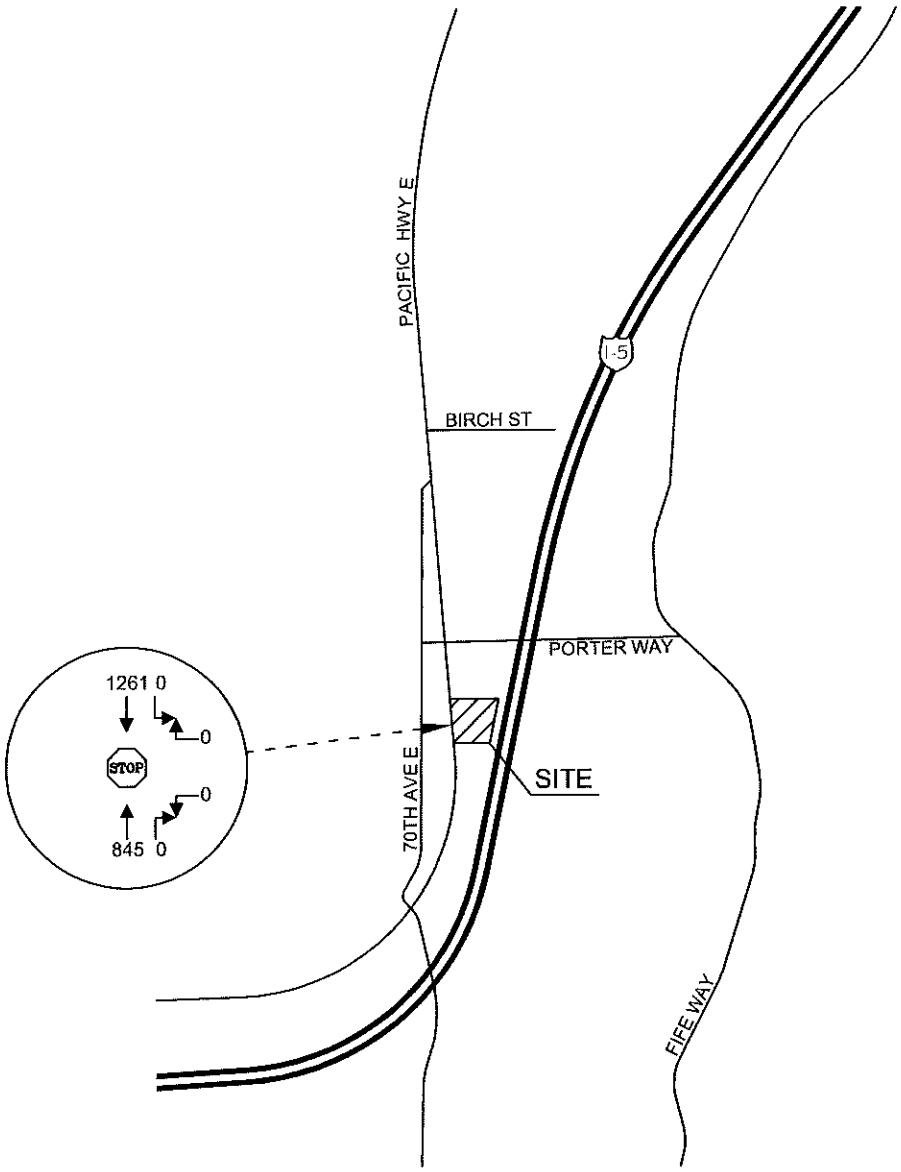
Observations for pedestrian and bicycle activity were made at the key arterials and intersections of interest. During the evening peak hour little to no pedestrian traffic was observed. Crosswalk are provided at major signalized intersections.

3.5 Transit Service

A review of the Pierce Transit regional bus schedule shows that the nearest transit service is provided by Route 500 with service along Pacific Highway E. This route runs from downtown Tacoma to the Federal Way Transit Center between 5:14 AM and 10:26 PM. The nearest stop is located at Pacific Highway E & Porter Way.

3.6 Sight Distance at Access Driveways

Access to the primary roadway system is provided onto Pacific Highway E. Field measurements were performed to determine whether or not adequate entering sight distance (ESD) can be provided for project traffic. Sight distance requirements were obtained from the *American Association of State Highway and Transportation Officials* (AASHTO) standards for left- and right-turn movements. Table 1, on page 8, summarizes the recommended and available sight distance at the proposed project entrance.



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EXISTING PM PEAK HOUR VOLUMES
FIGURE 3

Table 1

Entering Sight Distance (ESD)

Measurements given in feet

Roadway	Posted Speed Limit	Direction	Recommended	Available
Pacific Hwy E	45 mph	North	500	>600
		South	500	>600

Based on field measurements, sight distance requirements are met. The area has only minor vertical and horizontal curvature. With no other sight distance hindrances present, requirements are easily met.

4. FUTURE TRAFFIC CONDITIONS

4.1 Trip Generation

Trip generation is used to determine the magnitude of project impacts on the surrounding street system and incorporated into the city of Federal way's traffic model in order to determine traffic impacts. Data presented in this report was derived from a staffing standpoint based on the spreadsheet attached to this report as received from Telecare. The focus is to determine the PM peak hour between 4 PM and 6 PM. In addition the AM peak hour and an estimate for daily trips is also calculated. Table 1 shows the trip generation values expected for the 16 beds on the site based on proposed operations. Included is the Average Weekday Daily Trips (AWDT) and AM and PM peak hour trips.

TABLE 2

Project Trip Generation

Time Period	Volume
AWDT	**70 vpd**
AM Peak Inbound	17 vph
AM Peak Outbound	5 vph
AM Peak Total	**22 vph**
PM Peak Inbound	0 vph
PM Peak Outbound	10 vph
PM Peak Total	**10 vph**

(vpd: vehicles per day; vph: vehicles per hour)

4.2 Distribution & Assignment

Trip distribution describes the process by which project generated trips are dispersed on the street network surrounding the site. The trips generated by the project are expected to follow the general trip pattern as shown in Figure 4 on the following page. Figure 4 gives a best guess estimate of how traffic is likely to travel to and from the site during the critical peak hour. These distribution percentages are based primarily on existing traffic patterns.

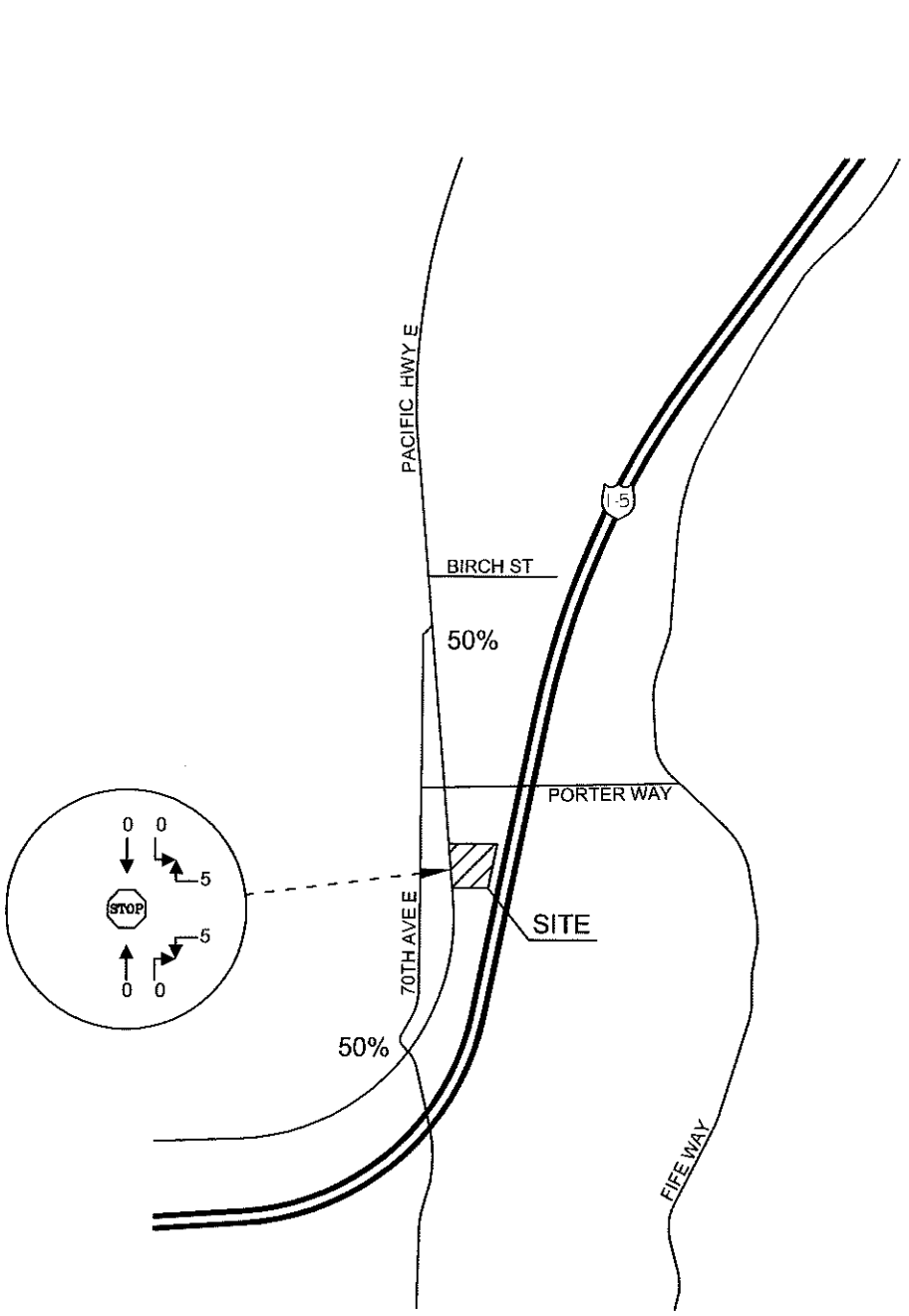
4.3 Peak Hour Volumes

The anticipated buildout year of 2018 was used as the horizon study year in order to assess future impacts. A 3 percent annual background growth rate was applied to the existing volumes to approximate 2018 volumes. Figure 5 represents 2018 traffic without the project. Figure 6 shows cumulative 2018 volumes with project-generated trips added.

4.4 Future Level of Service

Peak hour delays were determined through the use of the *Highway Capacity Manual 2010.* Capacity analysis is used to determine level of service (LOS) which is an established measure of congestion for transportation facilities. LOS is defined for a variety of facilities including intersections, freeways, arterials, etc. A complete definition of level of service and related criteria can be found in the HCM.

The methodology for determining the LOS at unsignalized intersections strives to determine the potential capacities for the various vehicle movements and ultimately determines the average total delay for each movement. *Potential Capacity* represents the number of additional vehicles that could effectively utilize a particular movement, which is essentially the equivalent of the difference between the movement capacity and the existing movement volume. *Total delay* is described as the elapsed time from when a vehicle stops at the end of a queue until the vehicle departs from the stop line. *Average total delay* is simply the mean total delay over the entire stream. A number of factors influence potential capacity and total delay including the availability/usefulness of gaps.



NEW PM PEAK HOUR TRIPS
INBOUND: 0 VPH
OUTBOUND: 10 VPH

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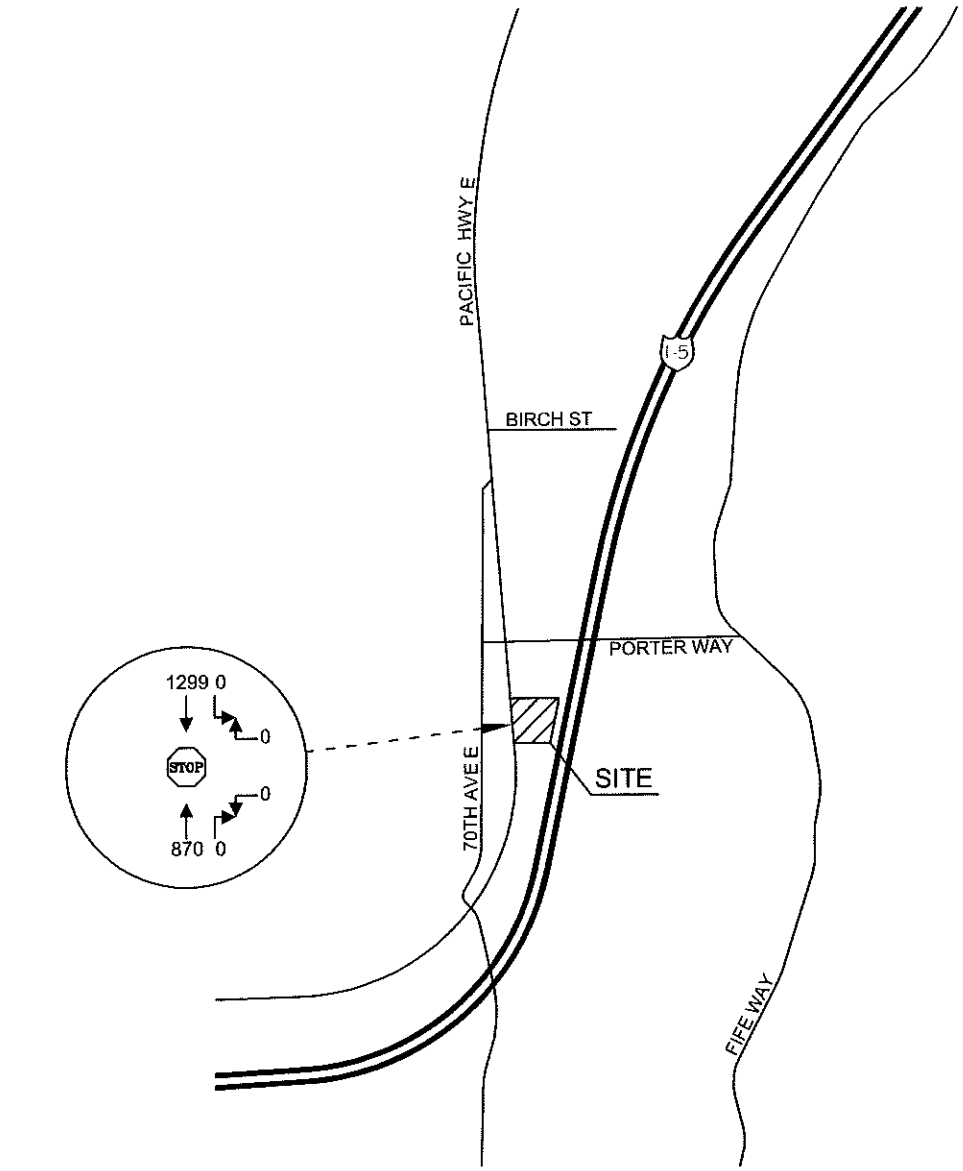
PM PEAK HOUR TRIP DISTRIBUTION & ASSIGNMENT
FIGURE 4



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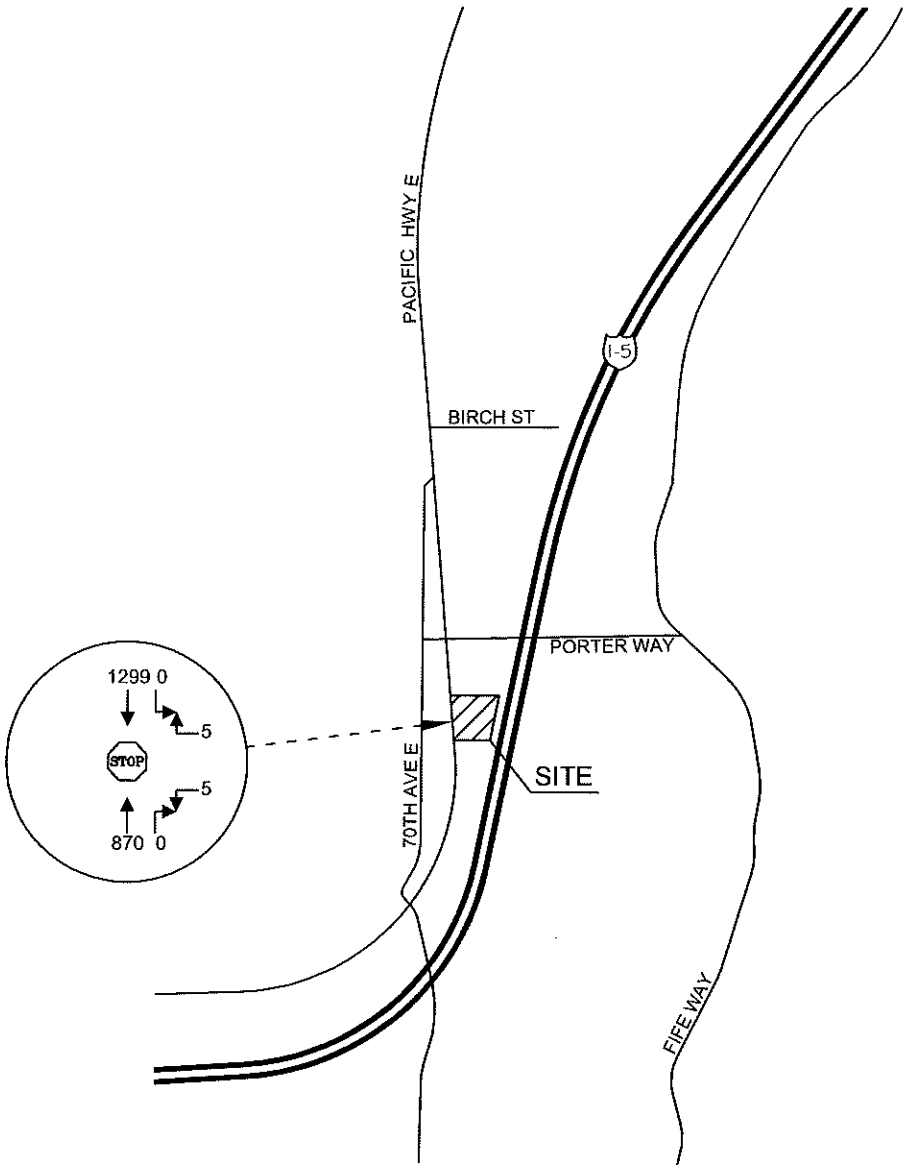
TELECARE - MILTON
2018 PM PEAK HOUR VOLUMES WITHOUT PROJECT
FIGURE 5



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TELECARE - MILTON
2018 PM PEAK HOUR VOLUMES WITH PROJECT
FIGURE 6

The range for intersection level of service is LOS A to LOS F with the former indicating the best operating conditions with low control delays and the latter indicating the worst conditions with heavy control delays. Detailed descriptions of intersection LOS are given in the 2010 Highway Capacity Manual. Level of service calculations were made through the use of the Synchro 9 program, which follows procedures of the HCM for unsignalized intersections. Level of service results and accompanying approach delays are shown below in Table 3. These results reflect 2018 future traffic conditions with project trips added to the street system. Future 2018 LOS results indicate moderate delays at the project entrance on Pacific Highway E.

TABLE 3
Future 2018 Level of Service
Delays given in Seconds Per Vehicle

Intersection	Control	Approach	LOS	Delay
Pacific Highway E & Project Entrance	TWSC	Westbound	D	31.3

(TWSC: Two-Way Stop Control)

4.5. Project Parking

Per City of Milton code, parking is required at a minimum level of 1 space for each 3 beds. The six spaces required would not support the facility adequately. The facility will have 16 beds, a maximum of 17 employees on site at one time with 30 employees total each day. The project would be adequately served with the 25 parking spaces as proposed on the site plan. The additional spaces are desired to accommodate the overlap of staffing, parking for transport of patients and other support.

5. SUMMARY & MITIGATION

The Telecare - Milton medical development proposes to construct a 16 bed mental health facility in the City of Milton. The project is located on the east side of Pacific Highway E, just south of the Porter Way intersection with a single access planned onto Pacific Highway E. The site will be a mild generator of new trips. Roughly 70 total daily trips are expected to be generated on a typical weekday with 22 trips during the AM peak hour and 10 trips during the PM peak hour. Future delays at the project entrance will be moderate at LOS D.

Based on the findings of this report, no mitigation is recommended at this time.

TELECARE - MILTON
TRAFFIC IMPACT ANALYSIS

APPENDIX

LEVEL OF SERVICE

The following are excerpts from the *2010 Highway Capacity Manual - Transportation Research Board Special Report 209.*

Quality of service requires quantitative measures to characterize operational conditions within a traffic stream. Level of service (LOS) is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience.

Six LOS are defined for each type of facility that has analysis procedures available. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each level of service represents a range of operating conditions and the driver's perception of those conditions.

Level-of-Service definitions

The following definitions generally define the various levels of service for arterials.

Level of service A represents primarily free-flow operations at average travel speeds, usually about 90 percent of the free-flow speed for the arterial classification. Vehicles are seldom impeded in their ability to maneuver in the traffic stream. Delay at signalized intersections is minimal.

Level of service B represents reasonably unimpeded operations at average travel speeds, usually about 70 percent of the free-flow speed for the arterial classification. The ability to maneuver in the traffic stream is only slightly restricted and delays are not bothersome.

Level of service C represents stable operations; however, ability to maneuver and change lanes in midblock locations may be more restricted than in LOS B, and longer queues, adverse signal coordination, or both may contribute to lower average travel speeds of about 50 percent of the average free-flow speed for the arterial classification.

Level of service D borders on a range in which small increases in flow may cause substantial increases in approach delay and hence decreases in arterial speed. LOS D may be due to adverse signal progression, inappropriate signal timing, high volumes, or some combination of these. Average travel speeds are about 40 percent of free-flow speed.

Level of service E is characterized by significant delays and average travel speeds of one-third the free-flow speed or less. Such operations are caused by some combination of adverse progression, high signal density, high volumes, extensive delays at critical intersections, and inappropriate signal timing.

Level of service F characterizes arterial flow at extremely low speeds, from less than one-third to one-quarter of the free-flow speed. Intersection congestion is likely at critical signalized locations, with long delays and extensive queuing.

These definitions are general and conceptual in nature, and they apply primarily to uninterrupted flow. Levels of service for interrupted flow facilities vary widely in terms of both the user's perception of service quality and the operational variables used to describe them.

For each type of facility, levels of service are defined based on one or more operational parameters that best describe operating quality for the subject facility type. While the concept of level of service attempts to address a wide range of operating conditions, limitations on data collection and availability make it impractical to treat the full range of operational parameters for every type of facility. The parameters selected to define levels of service for each facility type are called "measures of effectiveness" or "MOE's", and represent available measures that best describe the quality of operation on the subject facility type.

Each level of service represents a range of conditions, as defined by a range in the parameters given. Thus, a level of service is not a discrete condition, but rather a range of conditions for which boundaries are established.

The following tables describe levels of service for signalized and unsignalized intersections. Level of service for signalized intersections is defined in terms of average control delay. Delay is a measure of driver discomfort, frustration, fuel consumption and lost travel time, as well as time from movements at slower speeds and stops on intersection approaches as vehicles move up in queue position or slow down upstream of an intersection. Level of service for unsignalized intersections is determined by the computed or measured control delay and is determined for each minor movement.

Signalized Intersections - Level of Service

Level of Service	Control Delay per Vehicle (sec)
A	≤10
B	>10 and ≤20
C	>20 and ≤35
D	>35 and ≤55
E	>55 and ≤80
F	>80

Unsignalized Intersections - Level of Service

Level of Service	Average Total Delay per Vehicle (sec)
A	≤10
B	>10 and ≤15
C	>15 and ≤25
D	>25 and ≤35
E	>35 and ≤50
F	>50

As described in the 2010 Highway Capacity Manual, level of service breakpoints for all-way stop controlled (AWSC) intersections are somewhat different than the criteria used for signalized intersections. The primary reason for this difference is that drivers expect different levels of performance from distinct kinds of transportation facilities. The expectation is that a signalized intersection is designed to carry higher traffic volumes than an AWSC intersection. Thus a higher level of control delay is acceptable at a signalized intersection for the same level of service.

AWSC Intersections - Level of Service

Level of Service	Average Total Delay per Vehicle (sec)
A	≤10
B	>10 and ≤15
C	>15 and ≤25
D	>25 and ≤35
E	>35 and ≤50
F	>50

King County E&T - Staffing Pattern

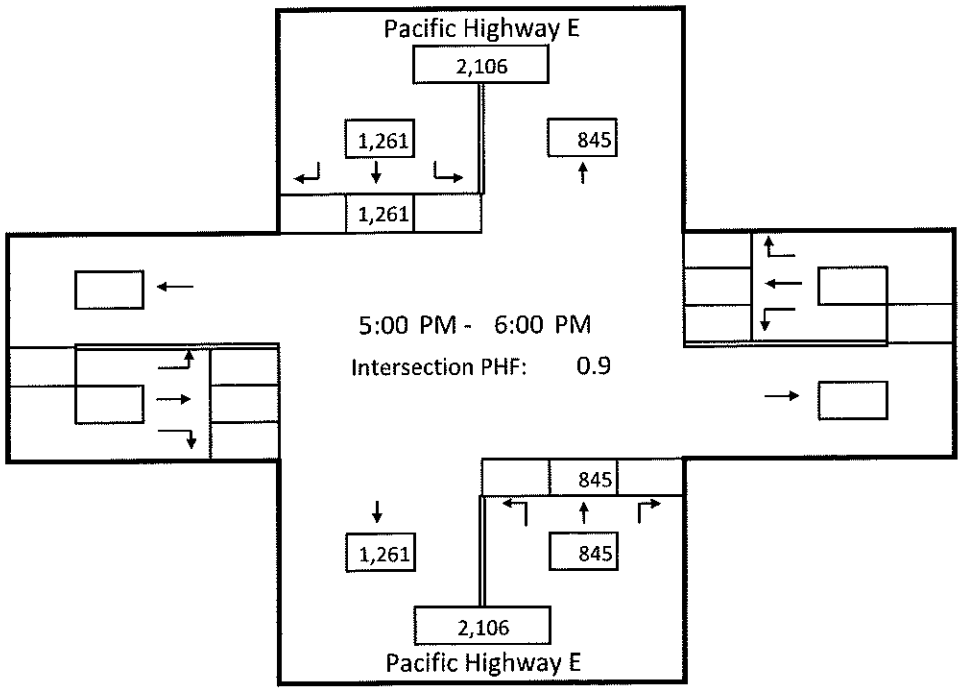
Position	Mon	Tues	Wed	Thur	Fri	Sat	Sun	Total Shifts	Total FTEs
AM									
Regional Director - Operations	0.15	0.15	0.15	0.15	0.15	-	-	0.75	0.15
Administrator	1.00	1.00	1.00	1.00	1.00	-	-	5.00	1.00
DON	1.00	1.00	1.00	1.00	1.00	-	-	5.00	1.00
Clinical Director	1.00	1.00	1.00	1.00	1.00	-	-	5.00	1.00
Director of Social Services	1.00	1.00	1.00	1.00	1.00	-	-	5.00	1.00
Rehab Therapists	1.00	1.00	1.00	1.00	1.00	1.00	1.00	7.00	1.40
Social Workers	1.00	1.00	2.00	2.00	2.00	1.00	1.00	10.00	2.00
RN	1.00	1.00	1.00	1.00	1.00	1.00	1.00	7.00	1.40
LVNs/LPTs	1.00	1.00	1.00	1.00	1.00	1.00	1.00	7.00	1.40
Mental Health Specialist	3.00	3.00	3.00	3.00	3.00	3.00	3.00	21.00	4.20
Peer Counselor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	7.00	1.40
Nurse Practioner	1.00	1.00	1.00	1.00	1.00	1.00	1.00	7.00	1.40
BOM	1.00	1.00	1.00	1.00	1.00	-	-	5.00	1.00
Medical Records Tech	1.00	1.00	1.00	1.00	1.00	-	-	5.00	1.00
Unit Clerks/Trans. Coord	1.00	1.00	1.00	1.00	1.00	1.00	1.00	7.00	1.40
Administrative Assistant	1.00	1.00	1.00	1.00	1.00	-	-	5.00	1.00
	17.15	**17.15**	**18.15**	**18.15**	**18.15**	**10.00**	**10.00**	**108.75**	**21.75**
PM									
LVNs/LPTs	1.00	1.00	1.00	1.00	1.00	1.00	1.00	7.00	1.40
Mental Health Specialist	3.00	3.00	3.00	3.00	3.00	3.00	3.00	21.00	4.20
Peer Counselor	2.00	2.00	2.00	2.00	2.00	2.00	2.00	14.00	2.80
RN	1.00	1.00	1.00	1.00	1.00	1.00	1.00	7.00	1.40
	7.00	**7.00**	**7.00**	**7.00**	**7.00**	**7.00**	**7.00**	**49.00**	**9.80**
NOC									
Mental Health Specialist	3.00	3.00	3.00	3.00	3.00	3.00	3.00	21.00	4.20
RN	1.00	1.00	1.00	1.00	1.00	1.00	1.00	7.00	1.40
LVN	1.00	1.00	1.00	1.00	1.00	1.00	1.00	7.00	1.40
	5.00	**5.00**	**5.00**	**5.00**	**5.00**	**5.00**	**5.00**	**35.00**	**7.00**
Total Facility Staffing	**29.15**	**29.15**	**30.15**	**30.15**	**30.15**	**22.00**	**22.00**	**192.75**	**38.55**

Heath & Associates, Inc.
2214 Tacoma Road
Puyallup, WA 98371

Project Name: **Telecare - Milton**
Intersection: Pacific Highway E & Porter Way
Jurisdiction: City of Milton

Date of Count: 6/13/2017
Project Number: 3967

Time Period	Southbound Pacific Highway E				Westbound Entrance				Northbound Pacific Highway E				Eastbound				
	HV	R	T	L	HV	R	T	L	HV	R	T	L	HV	R	T	L	Total
4:00 PM	7		282						8		149						431
4:15 PM	8		274						10		186						460
4:30 PM	12		283						13		191						474
4:45 PM	17		275						11		196						471
5:00 PM	7		245						13		195						440
5:15 PM	5		311						17		275						586
5:30 PM	8		327						10		214						541
5:45 PM	2		378						2		161						539
Total	66		2,375						84		1,567						
Peak Hour	**5:00 PM**		**to**	**6:00 PM**													
Peak Total	22		1,261						42		845						
Heavy Veh.	2.8%								5.4%								
PHF	0.83								0.77								



Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	5	870	0	0	1299
Future Vol, veh/h	5	5	870	0	0	1299
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	6	0	0	3
Mvmt Flow	6	6	967	0	0	1443

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1689	484	0	0	967	0
Stage 1	967	-	-	-	-	-
Stage 2	722	-	-	-	-	-
Critical Hdwy	6.8	6.9	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	86	534	-	-	720	-
Stage 1	334	-	-	-	-	-
Stage 2	447	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	86	534	-	-	720	-
Mov Cap-2 Maneuver	86	-	-	-	-	-
Stage 1	334	-	-	-	-	-
Stage 2	447	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	31.3	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	148	720	-
HCM Lane V/C Ratio	-	-	0.075	-	-
HCM Control Delay (s)	-	-	31.3	0	-
HCM Lane LOS	-	-	D	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-