

TECHNICAL MEMORANDUM

Project: Lodge at Saint Edward Park

Subject: Transportation Analysis

Date: July 11, 2016

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Marni Heffron, PE, PTOE

This Transportation Analysis was prepared to support the State Environmental Policy Act (SEPA) review and permit application for the proposed Lodge at Saint Edward Park, located at 14445 Juanita Drive NE within Saint Edward Park in Kenmore, Washington. The site location is shown on Figure 1. This report includes information about the existing roadways, traffic volumes, traffic operations, non-motorized facilities, and transit. It also presents the project's trip generation and parking demand estimates, and then evaluates the potential impact to traffic operations and other elements of the transportation system.

1. Project Description

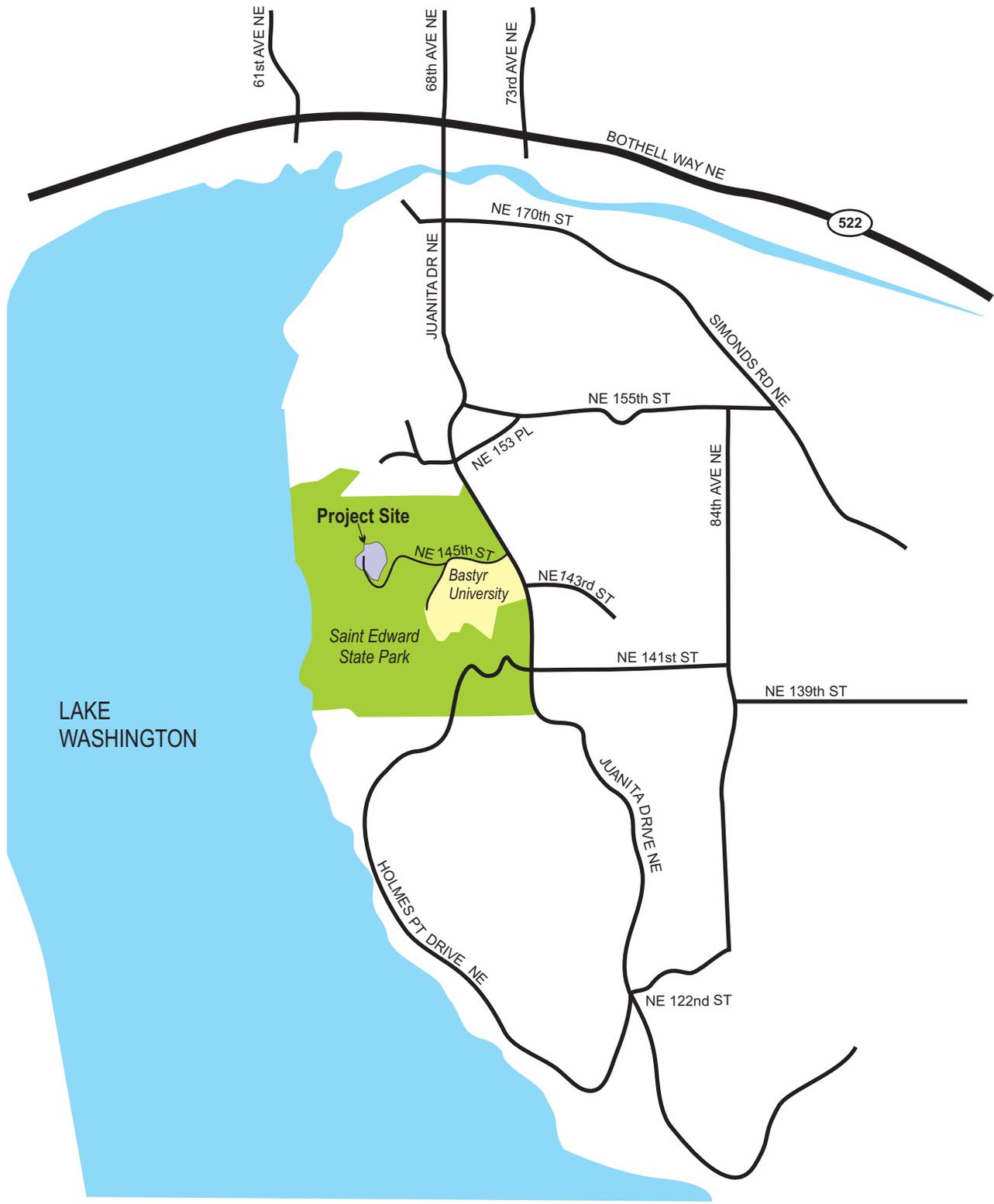
The project would rehabilitate the existing Saint Edward Seminary building and develop it as a park lodging facility. The proposed site plan is shown on Figure 2. The lodge would have 80 to 100 guest rooms, approximately 16,600 square feet (sf) of meeting rooms, a fitness center, and on-site dining facilities. The project would add 153 parking spaces at the site, including 87 in an underground garage and 66 surface spaces. The lodge would serve overnight park visitors and conference guests, and also host meetings and events for daily guests who would not stay overnight at the lodge. The project has an estimated completion date of summer 2017.

The project site is about 5.5 acres in size, located within the 316-acre Saint Edward State Park. Recreational hiking and mountain bike trails are located throughout the park, including trails that access the Lake Washington beachfront. The park also includes picnic facilities, a playground, and the Grotto, a garden alcove that can be rented for weddings and other special events. The Grand Dining Hall, located on the first floor of the Seminary Building, can also currently be rented for events. With the proposed project, event use of the Seminary Building would become a lodge function.

Bastyr University is located on private property that is enveloped by Saint Edward Park on all sides except its frontage along Juanita Drive NE. It shares NE 145th Street with the park, including the project site, as its access road.



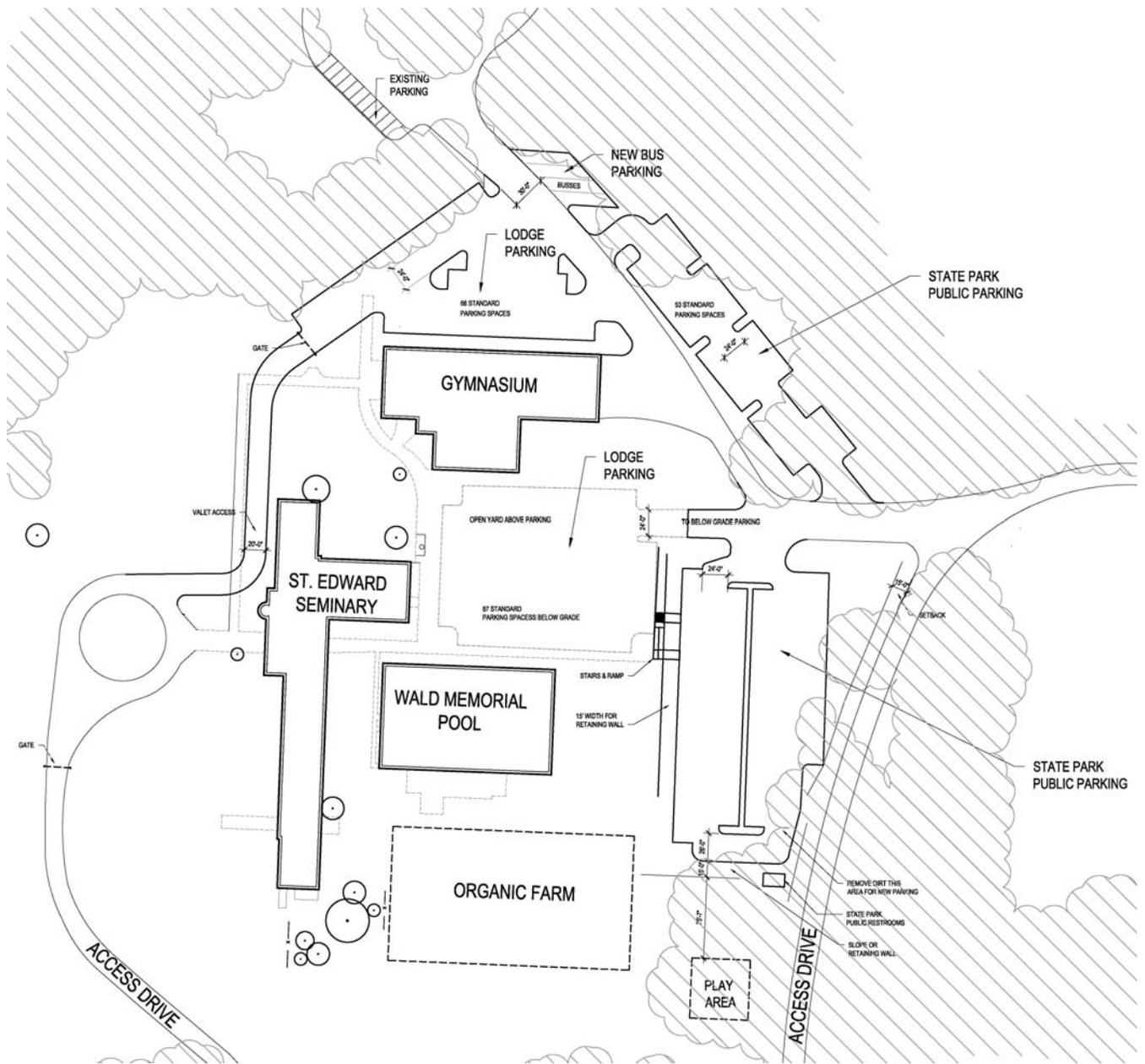
Not to Scale



The Lodge at Saint Edward Park

Figure 1
VICINITY MAP





Source: Jackson Main Architecture, February 26, 2016

The Lodge at Saint Edward Park

Figure 2
SITE PLAN



2. Background Conditions

2.1. Roadway Network

The following two primary streets serve the site.

NE 145th Street is a two-lane local access street that connects the project site to Juanita Drive NE; it also serves as the access road for the Saint Edward Park and Bastyr University. It has no curbs, gutters, sidewalks or shoulders, but an unpaved trail runs roughly parallel to the street along its north side. It has a posted speed limit of 25 miles per hour (mph) for about one-quarter mile west of Juanita Drive, which then reduces to 15 mph as it splits into separate access roads for Bastyr and the seminary site. Its intersection with Juanita Drive NE is controlled with a traffic signal.

Juanita Drive NE provides access to the surrounding arterial street system, connecting SR 522 to the north and NE 116th Street in Kirkland to the south. In the vicinity of the site it is a two-lane minor arterial, with shoulders and marked sharrows (indicating motorists should share the road with bicyclists) in each direction; it has a posted speed limit of 35 mph. North of NE 170th Street (about 1.25 miles north of the site) it becomes 68th Avenue NE, a principal arterial that intersects with Bothell Way NE (State Route [SR] 522).

2.2. Traffic Volumes

Transportation analysis was conducted for the weekday AM and PM peak hours, which are the periods most heavily affected by commute traffic and when the highest vehicle volumes typically occur. AM peak hour turning movement counts were conducted at Juanita Drive NE/NE 145th Street intersection by Idax Data Solutions on Tuesday, January 12, 2016. PM peak hour turning movement counts were conducted by Fehr & Peers on Tuesday, May 3, 2016, as part of the City's analysis of the Saint Edward Ballfields Project, which would upgrade existing ballfields at the park that are currently in disrepair so that they can be used for games and practices.¹ The PM count was conducted on a day with good weather, with evening youth baseball practices and a baseball game occurring at the existing Bastyr ballfields, to capture evening trips generated by recreational activity at the site. The existing peak hour volumes are shown on Figure 3.

Year 2020 was chosen as the future analysis year to reflect conditions with the project at full occupancy. To estimate year 2020 background traffic, a compound annual growth rate was applied to the existing traffic volumes on Juanita Drive NE, and vehicle trips projected to result from growth at Bastyr and the City's planned ballfield project were also added. A background average annual growth rate of 1.1% was determined by comparing existing traffic volumes on Juanita Drive NE to 2035 volumes projected by the City for its Comprehensive Plan.² Vehicle trip rates for Bastyr were obtained from the EIS developed for its 2004 Master Plan.³ The 2009 Master Plan⁴ indicates that Bastyr has chosen to limit its enrollment growth at the Kenmore site, indicating an expected growth in campus population, including students, faculty and staff, of about 3% per year; comparison of totals between 2008 and 2014 indicate a lower growth of about 2.3% over that period. An annual growth rate of 4% was applied to the 2014 campus population to estimate campus growth through 2020. Greater than the Master Plan projected growth of 3% per year, as well as the 2.3% actual growth that occurred between 2008 and 2014, this is expected to be conservatively high.

¹ Fehr & Peers, Saint Edward Ballfields Traffic and Parking Analysis (Updated), May 26, 2016.

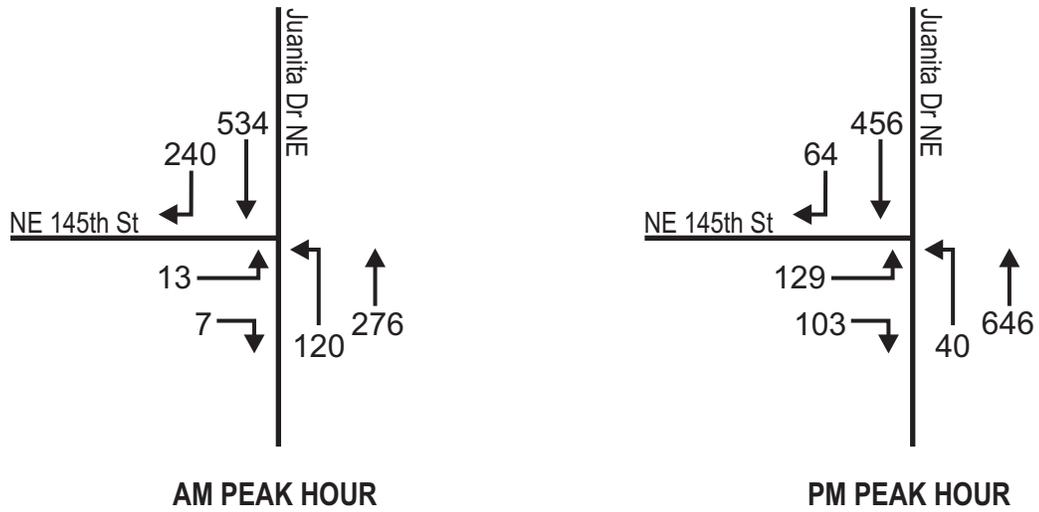
² Fehr & Peers, 2035 traffic forecasts completed for the City of Kenmore Comprehensive Plan, June 2015.

³ City of Kenmore, Bastyr University Campus Master Plan Environmental Impact Statement, December 2004.

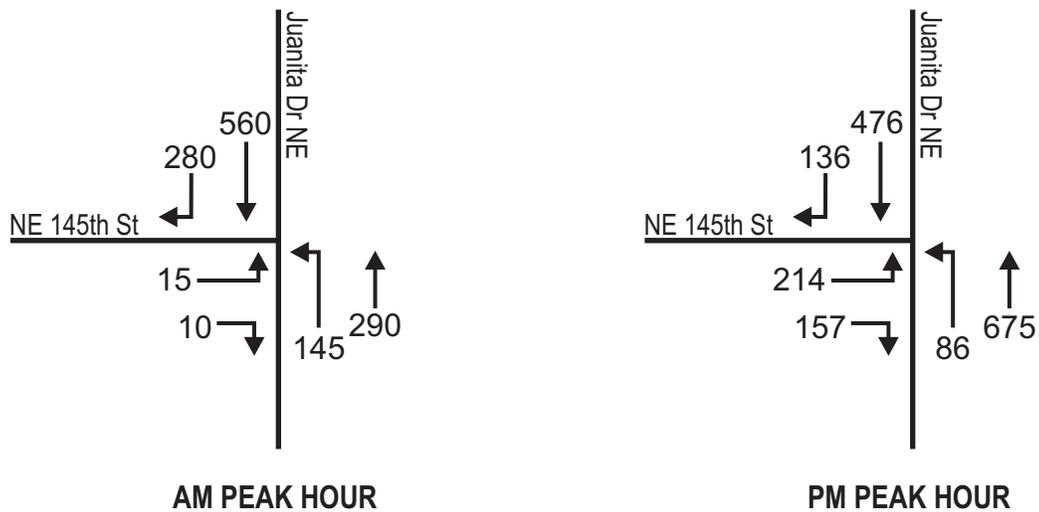
⁴ Robert Sena Campus Planning, Bastyr University Master Plan, December 2009.



EXISTING (2016) CONDITIONS



FUTURE (2020) WITHOUT PROJECT CONDITIONS



The Lodge at
Saint Edward Park

Figure 3
BASELINE TRAFFIC VOLUMES
AM and PM PEAK HOURS



Additional vehicle trips projected to result from the City’s planned ballfield project described above were also included in the future projections. Together, Bastyr growth and the ballfield project are projected to add 73 AM peak hour trips and 257 PM peak hour trips through the intersection. The projected 2020 baseline (without project) peak hour volumes are also shown on Figure 3

2.3. Level of Service

Level of service (LOS) analysis was performed for the Juanita Drive NE/NE 145th Street intersection for the AM and PM peak hours. Level of service is a qualitative measure used to characterize traffic operating conditions. Six letter designations, “A” through “F,” are used to define level of service. LOS A is the best and represents good traffic operations with little or no delay to motorists. LOS F is the worst and indicates poor traffic operations with long delays. More detailed level of service definitions are provided in Attachment A. Levels of service for the study area intersections were analyzed using methodologies presented in the *Highway Capacity Manual*.⁵ The level of service calculations were performed using the *Synchro 8.0* traffic operations analysis software. The model reflects the current intersection geometry and levels of service were reported using the *Synchro* module for the signalized intersection, which refines *Highway Capacity Manual* methods to account for more detailed driving behavior and signal operations. The City of Kenmore *Comprehensive Plan*⁶ identifies an operational standard of LOS E or better for principal arterials, LOS D or better for minor arterials, and LOS C or better for collector arterials. Since Juanita Drive NE is classified by the City as a minor arterial, LOS D or better is identified as acceptable operation for the analysis intersection.

The existing and future-without-project traffic volumes described in the previous section were evaluated. Table 1 shows the results of the analysis for the AM and PM peak hours. As shown, the intersection is currently operating at LOS B during both peak hours, and is expected to operate at LOS C in 2020 for without-project conditions.

Table 1. Level of Service – Baseline Conditions

Intersection	Existing (2016)				Future (2020) Without Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
	LOS ¹	Delay ²	LOS	Delay	LOS	Delay	LOS	Delay
Juanita Drive NE/NE 145 th Street	B	18.9	B	17.7	C	23.4	C	30.1

Source: Heffron Transportation, Inc., July 2016.

1. LOS = Level of service.
2. Delay = Average seconds of delay per vehicle.

2.4. Non-Motorized

As discussed previously, the predominant non-motorized facilities present in the area are the trails that are located throughout the park. In addition, sharrows are provided in both directions on Juanita Drive NE. Future non-motorized improvements identified in the City’s *Comprehensive Plan* in the project vicinity includes walkways and buffered bike lanes along both sides of Juanita Drive NE. Non-motorized improvements between NE 143rd Street and NE 155th Place are included in the Plan’s six-year transportation project list.⁷

⁵ Transportation Research Board. 2010. Highway Capacity Manual. Special Report 209, Washington, DC.

⁶ City of Kenmore, June 2015.

⁷ Ibid.

2.5. Transit

The site is not directly served by public transit. The nearest bus stop is located on NE 155th Street, about one-half mile northeast of the Juanita Drive NE/NE 145th Street intersection. This stop is served by King County Metro (Metro) Route 234, providing daily service between Kenmore, Kirkland, and Bellevue, and Metro Route 244, providing weekday commuter service between Kenmore, Kingsgate, and Overlake (southbound-only in the morning and northbound-only in the evening).⁸

2.6. Parking

Both Bastyr University and Saint Edward Park provide on-site parking. The parking lot for visitors to Saint Edward Park is provided in the vicinity of the project site. As part of the Washington State park system, the park is equipped with a pay station for visitors to purchase a one-day or annual Discover Pass. The existing surface lot for the park has capacity to accommodate 127 automobiles and five buses. Bastyr University accommodates parking for over 500 vehicles within several surface lots provided on site. There is no public on-street parking on either NE 145th Street or Juanita Drive NE in the vicinity of the site.

3. Project Impacts

3.1. Roadway Network

No changes to the existing roadway network are proposed.

3.2. Trip Generation

Trip generation for the proposed project was estimated using a combination of nationally-recognized rates developed by the Institute of Transportation Engineers (ITE), and detailed counts conducted for the Cedarbrook Lodge in Seatac, Washington. The Cedarbrook Lodge counts were performed in 2013, prior to a proposed expansion. At the time, the lodge had 110 guest rooms, about 18,000 sf of meeting rooms, a fitness center, and on-site restaurant, characteristics similar to the proposed Lodge at Saint Edward Park. The data collected and methods applied to derive trip generation and parking rates were documented in the *Cedarbrook Lodge Expansion: Trip Generation and Parking Demand Analysis*,⁹ provided in Attachment B of this memorandum. It is important to note that both the ITE and Cedarbrook observed rates are based upon the unit of “occupied rooms,” but the rates are derived based upon total driveway counts that do not differentiate between which of the on-site facilities the occupants of the vehicles are utilizing. Therefore, the vehicle trip rates account for *all* trips generated by site, including employees, restaurant patrons and conference participants who are not staying at the hotel, and service-related trips, in addition to the trips generated by the hotel occupants.

It is also noted that the proximity of the Cedarbrook Lodge to the Seatac Airport provides greater access to travel alternatives other than a personal vehicle, compared to the project site. However, the Cedarbrook data were collected prior to completion of the Link light rail extension to Seatac, so the majority of off-site trips by alternative mode would have occurred by taxi or shuttle. Use of these modes actually results in higher vehicle trips than those generated by personal vehicles, because each inbound and outbound movement can generate up to two trips—e.g. for one outbound person trip, an empty taxi enters the hotel site, and then departs the site with its customer. Therefore, the vehicle trip rates derived from the Cedarbrook data could be conservatively high for the Lodge at Saint Edward, where the majority of

⁸ King County Metro, Route and schedule information, February 2015.

⁹ Heffron Transportation, February 18, 2013.

vehicle trips would be expected to occur by personal vehicle. However, the parking demand generated by the Lodge at Saint Edward would be higher than estimated for the Cedarbrook Lodge since it would have more personal vehicles that park at the site, and few, if any, taxi trips that do not use parking.

The following sections describe the trip generation rates and estimates for the proposed project.

Trip Generation Rates

Table 2 summarizes the rates applied for the proposed lodge. The detailed data collected for Cedarbrook Lodge indicated that ITE's PM peak hour rate was very close to the derived rate for conditions without a conference (0.68 trips per occupied room observed, compared to the ITE rate of 0.70 trips per occupied room), but that conditions with conference egress resulted in a higher rate of 0.83 trips per occupied room. The PM peak hour rate with a conference was used to estimate the lodge's trip generation.

Table 2. Trip Generation Rates

Land Use	Trip Generation Rate	% Inbound
Hotel (ITE Land Use Code 310) – Place of lodging that provides sleeping accommodations and supporting facilities such as restaurants, cocktail lounges, meeting and banquet rooms or convention facilities, limited recreational facilities (pool, fitness room), and/or other retail and service shops.		
Daily ¹	8.92 / occupied room	50%
AM Peak Hour ¹	0.67 / occupied room	58%
PM Peak Hour (without conference egress) ¹	0.70 / occupied room	49%
PM Peak Hour (with conference egress) ²	0.83 / occupied room	43%

1. Institute of Transportation Engineers (ITE) Trip Generation, 9th Edition, 2012. Daily and PM peak hour (without conference egress) rates corroborated with detailed traffic counts evaluated by Heffron Transportation for the Cedarbrook Lodge in Seatac, WA. When the counts were conducted, the Cedarbrook Lodge was a 110-room full service lodge with conference and banquet meeting rooms, outdoor event space, a fitness center, on-site dining facilities, and 150 parking spaces. (Heffron Transportation, Inc., February 18, 2013.)
2. Derived by Heffron Transportation based on detailed traffic counts conducted at the Cedarbrook Lodge. Number of conference guests averaged 140 per day that conferences occurred.

Project Trips

Table 3 summarizes the proposed lodge's trip generation. Trips were estimated based upon the higher end of the range of guestrooms (80 to 100) that could be provided with the project. As shown, the project is expected to generate 890 daily trips, with 67 occurring during the AM peak hour, and 83 during the PM peak hour. PM peak hour estimates reflect the higher "with conference egress" condition described in the previous section.

Table 3. Vehicle Trip Estimates – Lodge at St Edward Park

Land Use	Daily Trips	AM Peak Hour			PM Peak Hour (with conference egress)		
		In	Out	Total	In	Out	Total
Lodge with 100 rooms	890	39	28	67	36	47	83

Source: Heffron Transportation, Inc., February 2016.

Trip Distribution

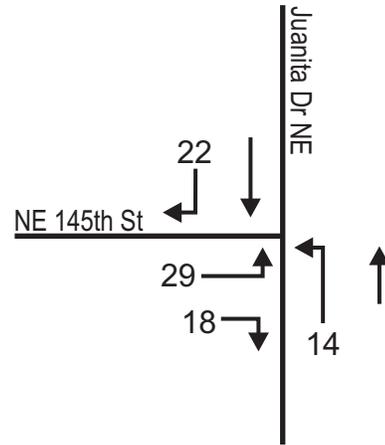
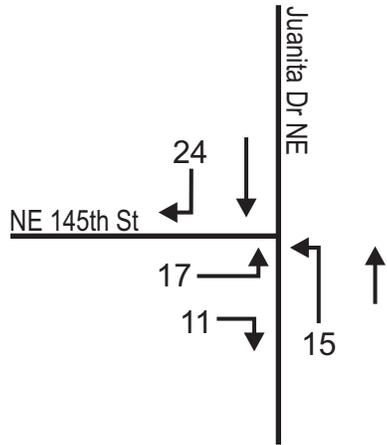
The projected distribution pattern for project-generated vehicle trips was developed based upon observed traffic patterns at Juanita Drive NE/NE 145th Street intersection, which indicate that about 61% of vehicles travel to and from the north, and 39% travel to and from the south. The projected distribution of net new trips generated by the proposed project is shown on Figure 4.

3.3. Traffic Volumes

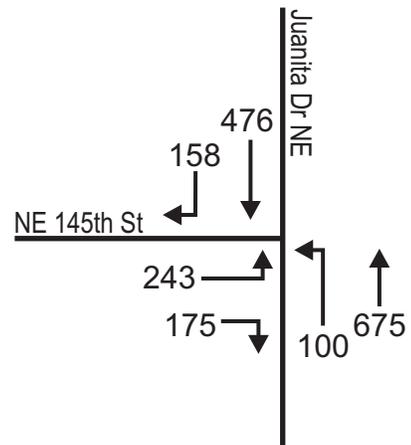
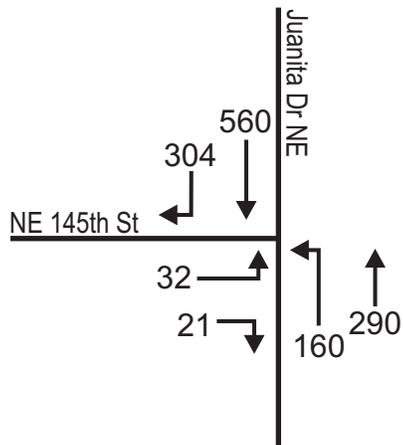
The net new project trips were added to the 2020-without-project volumes to calculate the 2020-with-project volumes, also shown on Figure 4.



NET NEW PROJECT TRIPS



FUTURE (2020) WITH PROJECT CONDITIONS



The Lodge at
Saint Edward Park

Figure 4
TRAFFIC VOLUMES with PROJECT
AM and PM PEAK HOURS



3.4. Level of Service

Levels of service for study area intersections were calculated using the future-with-project traffic volumes and the methodology described earlier in this report. Consistent with the analysis completed for the City’s ballfield project,¹⁰ future “with project” conditions assumes that the signal timings would be optimized to best accommodate the traffic increases. Table 4 shows the results of the level of service analysis; results for the future-without-project condition are shown for comparison. The table shows that trips generated by the project are expected to add average delay to the intersection, but it is expected to still operate at LOS C during both peak hours.

Table 4. Level of Service – Future (2020) Without and With Project

Intersection	Future (2020) Without Project				Future (2020) With Project			
	AM Peak		PM Peak		AM Peak		PM Peak	
	LOS ¹	Delay ²	LOS	Delay	LOS	Delay	LOS	Delay
Juanita Drive NE/NE 145 th Street	C	23.4	C	30.1	C	30.9	C	33.3

Source: Heffron Transportation, Inc., July 2016.

1. LOS = Level of service.
2. Delay = Average seconds of delay per vehicle.

Although no off-site transportation impacts are expected, the project would contribute to citywide transportation improvements through payment of traffic impact fees.

3.5. Emergency Vehicle Access

NE 145th Street between the site and Juanita Drive NE is on Washington State Parks land. The Fire Marshal for the Northshore Fire Department confirmed the existing access road meets emergency access requirements with no changes required.¹¹

3.6. Parking

Parking demand for the proposed lodge was estimated using average rates established by ITE, combined with the Cedarbrook Lodge data described previously and included in Attachment B. Table 5 summarizes the parking rates applied to estimate the peak parking demand generated by the proposed project. Similar to vehicle trip rates, the parking rates account for all vehicles parked at the site, including those generated by employees and restaurant patrons, as well as hotel occupants and conference participants. Both ITE and observed data at the Cedarbrook Lodge indicated that peak parking demand of lodge guests occurs overnight. The Cedarbrook Lodge data indicated a peak parking rate of 0.74 vehicles per occupied room, which was lower than the ITE rate for a hotel in a suburban location. As described previously, the lower observed rate could be due to the lodge’s proximity to Seatac Airport, which is well served by taxi and shuttle service. Therefore, the higher ITE rate was applied to estimate the parking demand generated by overnight guests. The parking demand rate during conference events is based upon the Cedarbrook data since attendees primarily accessed the site by vehicle, similar to what is expected for the proposed project.

¹⁰ Fehr & Peers, May 26, 2016.

¹¹ Meeting between Jeff Laflem, Northshore Fire Department, City of Kenmore staff, and Daniels Real Estate staff on December 1, 2015.

Table 5. Parking Rates

Land Use (ITE Land Use Code)	Peak Parking Rate	Time of Day for Peak Demand
Hotel (310) – Weekday in Suburban Location ¹	0.89 vehicle / occupied room	Overnight
Lodge during conference event ²	0.90 vehicle / daily conference guest	11:45 A.M. – 3:45 P.M.

1. *Institute of Transportation Engineers (ITE) Parking Generation, 4th Edition, 2010.*
2. *Derived by Heffron Transportation based on detailed traffic counts conducted at the Cedarbrook Lodge. The data indicated that overlapping midday demand generated by overnight lodge guests and employees was about half of peak demand; for this project, a midday demand of 0.45 vehicle per occupied room is estimated, or 45 vehicles with 100 occupied rooms.*

Based upon the rates presented in Table 5, a peak overnight demand of 89 vehicles is expected, which would be easily accommodated by the 153 spaces proposed for the lodge. During midday when peak conference-generated demand is expected, the on-site supply is projected to accommodate parking for about 120 conference guests with the lodge at full occupancy for overnight guests [(153 total spaces – 45 spaces for employees and overnight guests) / 0.90 space per conference guest]. The proposed on-site parking is expected to accommodate demand under most conditions. If occasional events are expected to exceed parking demand, this could be accommodated through use of valet parking to stack vehicles more tightly into the existing spaces, or by developing an agreement with Bastyr University to lease its excess parking supply during evenings and/or weekends when the university’s parking demand is lower.

Parking for Saint Edward Park would be separate from the lodge parking. The applicant proposes to construct the same number of parking spaces elsewhere in Saint Edward Park that would be displaced by redevelopment of the Seminary site. With this measure, the project would result in no net change to parking supply for Saint Edward Park, and no adverse impacts to its parking would occur.

3.7. Transit and Non-Motorized

Because the proposed lodge would primarily serve out-of-town visitors and event attendees from throughout the region, it is expected that a negligible number would typically access by transit; analysis presented in this report assumes that all trips generated by the project would occur by vehicle. It is expected that lodge guests would take advantage of the recreational trails provided at the adjacent Saint Edward Park, but the proposed lodge is expected to generate very little non-motorized demand on the surrounding street system. The project would bicycle parking spaces on site, in accordance with Kenmore Municipal Code (KMC) requirements. No adverse transit or non-motorized impacts are anticipated.

5. Conclusions

The proposed lodge would have 80 to 100 guest rooms, approximately 16,600 sf of meeting rooms, a fitness center, on-site dining facilities, and 153 parking spaces. Vehicle trips generated by the project would add delay to the Juanita Drive NE/NE 145th Street intersection, but it is expected to operate at LOS C or better in 2020 with the lodge at full occupancy, and with conference conditions, the same level of service projected for “without project” conditions. Future “with project” conditions analysis assumes that the signal timings would be optimized to best accommodate the traffic increases. The Fire Marshal for the Northshore Fire Department confirmed that the existing access road meets emergency access requirements with no changes required.

The proposed on-site parking is expected to accommodate demand under most conditions. If occasional events are expected to exceed parking demand, this could be accommodated through use of valet parking to stack vehicles more tightly into the existing space, or by developing an agreement with Bastyr University to lease its excess parking during evenings and/or weekends when the university’s parking demand is lower. The applicant proposes to construct the same number of parking spaces elsewhere in Saint Edward Park that would be displaced by redevelopment of the Seminary site. With this measure, the project would result in no net change to parking supply for Saint Edward Park

The project would contribute to improvement of citywide transportation improvements through payment of traffic impact fees.

Attachments: Attachment A – Level of Service Definitions
Attachment B – Cedarbrook Lodge: Trip Generation and Parking Demand Analysis

JAB/mch

Lodge at St Edward Park_Transportation Analysis-DRAFT.docx

ATTACHMENT A

LEVEL OF SERVICE DEFINITIONS

Levels of service (LOS) are qualitative descriptions of traffic operating conditions. These levels of service are designated with letters ranging from LOS A, which is indicative of good operating conditions with little or no delay, to LOS F, which is indicative of stop-and-go conditions with frequent and lengthy delays. Levels of service for this analysis were developed using procedures presented in the *Highway Capacity Manual* (Transportation Research Board, 2010).

Level of service for signalized intersections is defined in terms of delay. Delay can be a cause of driver discomfort, frustration, inefficient fuel consumption, and lost travel time. Specifically, level of service criteria are stated in terms of the average delay per vehicle in seconds. Delay is a complex measure and is dependent on a number of variables including: the quality of progression, cycle length, green ratio, and a volume-to-capacity ratio for the lane group or approach in question. Table A-1 shows the level of service criteria for signalized intersections from the *Highway Capacity Manual*.

Table A-1. Level of Service Criteria

Level of Service	Average Delay Per Vehicle	General Description
A	Less than 10.0 Seconds	Free flow
B	10.1 to 20.0 seconds	Stable flow (slight delays)
C	20.1 to 35.0 seconds	Stable flow (acceptable delays)
D	35.1 to 55.0 seconds	Approaching unstable flow (acceptable delay—occasionally wait through more than one signal cycle before proceeding.
E	55.1 to 80.0 seconds	Unstable flow
F	Greater than 80.0 seconds	Forced flow

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

For unsignalized intersections, level of service is based on the average delay per vehicle for each turning movement. The level of service for a two-way, stop-controlled intersection is determined by the computed or measured control delay and is defined for each minor movement. Delay is related to the availability of gaps in the main street's traffic flow, and the ability of a driver to enter or pass through those gaps. The delay at an all-way, stop-sign (AWSC) controlled intersection is based on saturation headways, departure headways, and service time. Table A-2 shows the level of service criteria for unsignalized intersections from the *Highway Capacity Manual*.

Table A-2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Delay (seconds per vehicle)
A	Less than 10.0
B	10.1 to 15.0
C	15.1 to 25.0
D	25.1 to 35.0
E	35.1 to 50.0
F	Greater than 50.0

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

ATTACHMENT B

CEDARBROOK LODGE – TRIP GENERATION
AND PARKING DEMAND ANALYSIS

TECHNICAL MEMORANDUM

Project: Cedarbrook Lodge Expansion
Subject: Trip Generation and Parking Demand Analysis
Date: February 18, 2013
Author: Tod S. McBryan, P.E. – Principal 

This report presents trip generation and parking demand estimates to support the State Environmental Policy Act (SEPA) review and permit application for the proposed Cedarbrook Lodge Expansion in Seatac, Washington.

1. Project Description

Cedarbrook Lodge, located at 18525-36th Avenue S in Seatac, is a full-service hotel with conference and banquet meeting rooms. The hotel has 110 guest rooms, over 18,000 square feet (sf) of flexible interior meeting space and banquet rooms, outdoor event space, a fitness center, on-site dining facilities, and 150 parking spaces on just over 17 acres. The hotel serves leisure guests, business meetings and conference guests, and also hosts meetings and conferences for local guests that do not stay overnight in guest rooms.

The hotel is proposing to expand its facility by adding up to 90 additional hotel rooms (for a new total of 200 rooms) and a 3,800 square foot spa. No changes are proposed to the conference, meeting, banquet, dining, or other existing facilities at the site.

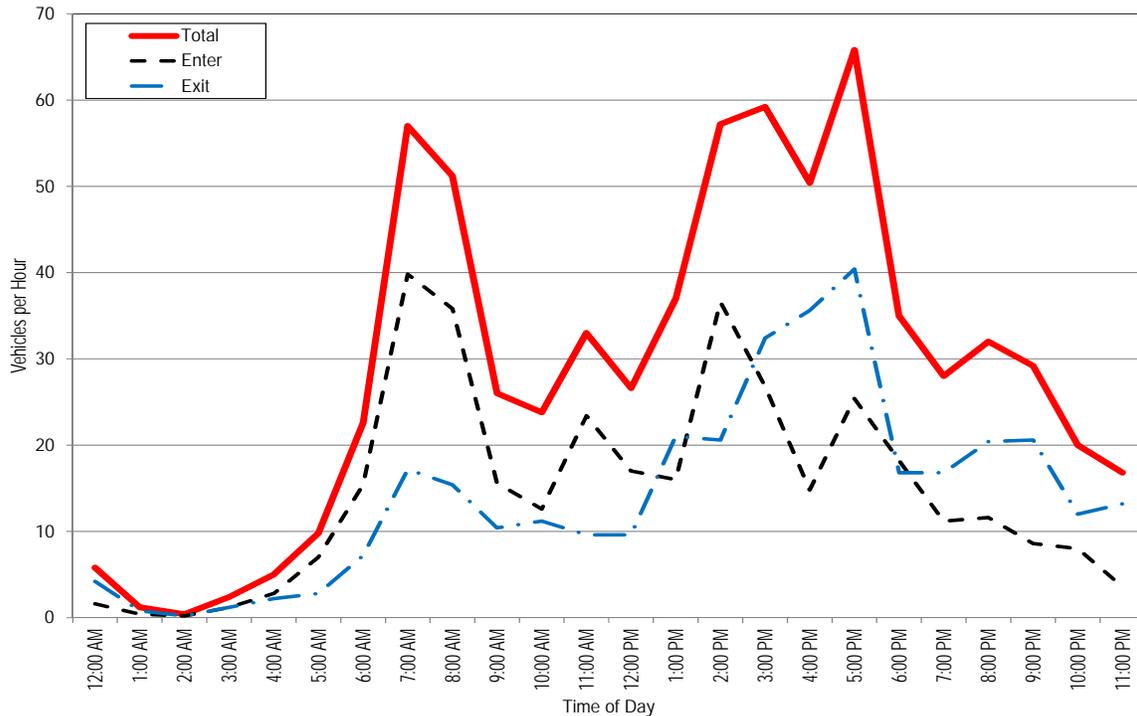
2. Trip Generation

Trip generation for the proposed expansion was estimated using rates developed from new counts performed at the existing hotel. The following sections describe the count effort at the existing hotel, the resulting rates, and the estimated trip generation for the expansion.

2.1. Trip Generation of Existing Hotel

A new machine traffic count was performed at the Cedarbrook Lodge access driveway (at 36th Avenue S north of S 186th Street) beginning on the afternoon of Friday, January 11, 2013 and ending at midnight on Sunday, January 20, 2013. The counts provided five full weekdays and two full weekend days of data. The machines counted the number of vehicles entering and exiting the site and were compiled by 15-minute period. The results from the five weekdays were evaluated to determine the number of trips per day for the average weekday and weekday PM peak hour. Figure 1 shows the average entering, exiting, and total traffic by time of day for the week during the counts. As shown, the arrival and departure patterns are typical of a hotel and conference center. It has distinct peaks in the morning, early afternoon, and the early evening. The highest hourly traffic volume occurred from 5:00 to 6:00 P.M. when the hotel generated 66 trips (25 in, 40 out).

Figure 1. Cedarbrook Lodge Average Weekday Daily Traffic



Source: Heffron Transportation, Inc., January 2013 compiled from machine counts performed by All Traffic Data Services, Inc., January 11 through 20, 2013.

As with many hotels, trip generation at Cedarbrook Lodge is influenced by three key factors—hotel occupancy, conference and banquet activity, and staffing levels. Therefore, it is important to account for these factors when examining the count results. Cedarbrook Lodge provided information about these operating parameters for the period when trip data were collected. During the weekday counts, occupancy ranged from 69% to 94% and averaged 79%. The hotel had active conference and banquet activities with between 100 and 200 guests each day and an average of about 155 guests per day.

2.2. Cedarbrook Lodge Trip Generation Rates

Since this analysis was prepared to evaluate the potential future trip generation of the hotel with the additional guest rooms, the data were further analyzed to determine weighted-average rates based on hotel occupancy. Data for six weekdays (beginning Friday January 11th and ending Friday, January 18th) were reviewed and evaluated. During one of the days (Thursday, January 17th), local attendees of conferences at the site left during the PM peak hour. Since this local conference activity is not related to the number of rooms at the hotel, the PM peak hour data from this day were separated from the weighted average trip generation estimates and presented separately as a peak condition. The results of the analyses indicate that Cedarbrook Lodge generates weekday daily and PM peak hour traffic at the following rates:

- 7.80 Daily Trips per Occupied Room,**
- 0.68 PM Peak Hour Trips per Occupied Room (without a simultaneous large conference egress), and**
- 0.83 PM Peak Hour Trips per Occupied Room (with a simultaneous large conference egress).**

These rates were compared to those published for a Hotel (Land Use 310) in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*.¹ The rates derived for the Cedarbrook Lodge are very close to the ITE published rates, which are 8.92 daily trips per occupied room and 0.70 PM peak hour trips per occupied room. Based on this comparison, the rates determined from the actual counts at Cedarbrook Lodge are reasonable and appropriate for use to estimate future trips for the planned expansion.

2.3. Trip Generation of Planned Expansion

As described, Cedarbrook Lodge is proposing to add up to 90 guest rooms to the existing hotel. Trip generation estimates for the planned expansion were developed using the rates presented in the previous section. Since the proposal would not change the conference or banquet facilities at the site, it is most appropriate to use the PM peak hour rate determined without a simultaneous conference egress. Table 1 summarizes the total net increase in traffic due to the additional guest rooms.

In addition to trips generated by the added guest rooms, it is expected that the 3,800-sf spa addition would generate some new traffic at the site. ITE's *Trip Generation Manual* does not include data for this type of use. Therefore, trip generation estimates for this component of the project were determined based on operational expectations gathered from hotel management. Hotel management expects that the new spa would be used by hotel guests (60% of spa clients) and would attract some non-hotel guests (40% of spa clients) from the local area. Based on these proportions, the spa is expected to attract 12 to 14 guests from the local area on a peak day and 2 to 4 guests on an off peak day. The spa is also expected to require additional staffing that would fluctuate based on hotel occupancy and conference/banquet activity. Hotel management expects the spa to have ten staff on site on a peak day and about four staff on site on a non-peak day. These expectations for the planned spa were used to estimate daily and PM peak hour traffic for this component; the estimates are also presented in Table 1. As shown, the proposed guest room expansion and spa addition are expected to generate 750 new trips per day and 71 new PM peak hour trips.

Table 1. Cedarbrook Lodge Expansion – Increase in Site Trip Generation

Expansion Component	Number / Size	Daily Trips ^a	PM Peak Hour Trips		
			In	Out	Total
New Guest Rooms	90 rooms	700	26	35	61
Spa	3,800-sf	50	2	8	10
Total		750	28	43	71

Source: Heffron Transportation, Inc., January 2013.

a. Daily trips reported as one-way trips. The 700 trips would reflect 350 entering the site and 350 leaving the site each day.

3. Parking Demand

Parking demand at Cedarbrook Lodge is influenced by hotel room occupancy, staffing levels, and conference and banquet activities. The following describes those key factors and their parking

¹ Institute of Transportation Engineers [ITE], *Trip Generation*, 9th Edition, 2012.

demand characteristics at Cedarbrook Lodge. The traffic count data described previously were used to develop parking demand rates unique to the hotel and those rates were used to forecast the increase in peak parking demand that could be expected with the proposed expansion. Each of those elements is also described in the following sections.

3.1. Parking Generation Components

As with trip generation, parking demand at Cedarbrook Lodge is influenced by guest room occupancy, staffing and shifts, and conference/banquet activities and schedules. Each of these components has its own accumulation and peaking characteristics. Parking demand by hotel guests typically peaks overnight between 11:00 P.M. and 6:00 A.M. For reference, check-in time for guests at Cedarbrook Lodge is 4:00 P.M. and check-out is noon.

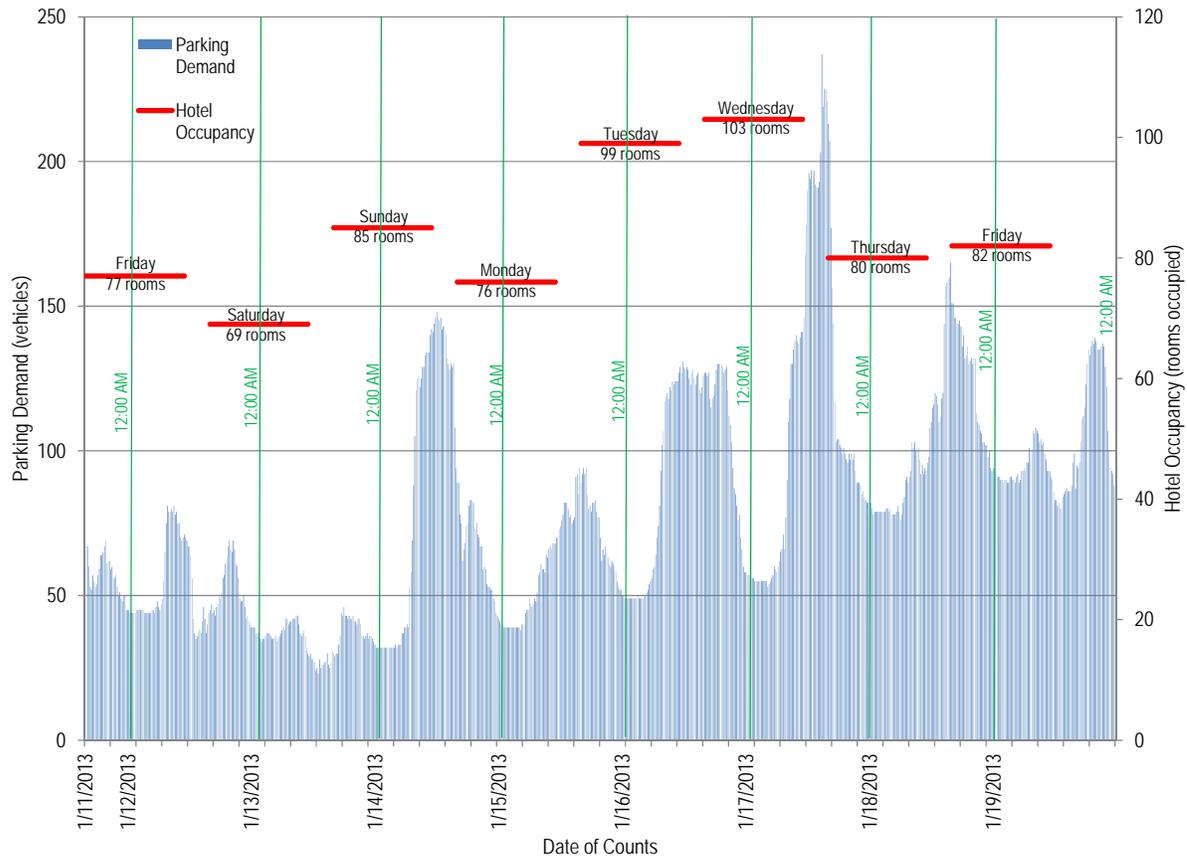
The number of employees on site fluctuates with the hotel occupancy and conference/banquet activity. During the data collection period from January 11th through the 18th, the hotel averaged 71 employees on site each day with a range of 46 to 83. Of those, the largest portion (45 employees or about 63%) was on site during the day shift. The day shift at the hotel is staggered with start times of 7:00, 8:00, 9:00 and 10:00 A.M. The evening shift, which is also staggered (start times of 2:00 3:00 and 4:00 P.M.), had an average of 24 employees (about 34%). Overnight, there are typically just two employees that work from 11:00 P.M. to 7:00 A.M. or midnight to 8:00 A.M.

Conference, banquet, and meeting activity occurred every day of the data collection effort except Sunday, January 13th. Based on the banquet booking, reservation, and parking log data provided by the hotel for the data collection period, the facility hosted between three and six groups each day. Total attendance for the groups ranged from five to 150 and total number of guests on site averaged about 140 per day. The meetings consisted of breakfast meetings, conference sessions, breakout group sessions, lunch meetings, afternoon receptions, dinners, and evening receptions. Conference activity typically began at 7:30 or 8:00 A.M. Some groups had morning meetings and lunch, others had lunch with afternoon meetings, and some groups had meetings through dinner and evening hours as late as 11:00 P.M.

3.2. Parking Demand Accumulation and Rates

The machine traffic counts were compiled by fifteen-minute period and combined with periodic manual counts of parked cars within the hotel parking lots. In addition, the hotel provided its banquet and catering parking log that documented the number of self-parked and valet-parked vehicles associated with each banquet and catering event (the hotel charges for meeting/event guest parking at rates of \$5 for self-park and \$8 for valet parking). The parking accumulation over the study period is shown in Figure 2; the hotel occupancy at midnight of each day is also shown for comparison. The figure demonstrates that peak parking demand typically occurs midday when the largest number of employees is on site and when the conference activity generates its highest demand. The peak demand of over 230 vehicles occurred on Thursday, January 17th at 2:45 P.M. This day had the highest number of banquet guests (over 180) and the largest number on site at the same time in the afternoon. This number was confirmed through review of the hotel's parking log and hotel management noted that stacked valet parking was required to accommodate that level of demand.

Figure 2. Cedarbrook Lodge Parking Demand – January 11 – 19, 2013



Source: Heffron Transportation, Inc., January 2013

As shown, on the one day when there was no conference or banquet activity (Sunday, January 13th), the midday parking demand was lower than the overnight demand. Based on these data and analysis, it is clear that peak parking demand generated overnight at the hotel by guest rooms should be considered separately from demand generated during the day by employees and conference activities. Therefore, parking demand estimates were developed for two conditions—1) peak nighttime demand generated by overnight guests based on the number of occupied rooms; and 2) midday demand generated by conference and banquet guests, guest rooms, as well as employees. The midday peak demand is estimated using a combination of rates based on the number of conference/banquet guests and a midday demand rate based on occupied guestrooms.

The overnight peak demand rate for the hotel guest rooms was determined using a weighted average analysis to reflect the number of occupied rooms during the study period. The resulting weighted average peak parking demand rate is **0.74-parked-vehicles-per-occupied-room**. The peak demand typically occurred at 11:00 or 11:15 P.M. This is the time when most or all registered guests are typically on-site, some afternoon shift employees are still on site, and few if any conference/banquet guests are on site.

The midday peak demand rate for the conference activity was also developed using a weighted average analysis, but was based on the number of conference guests each day. The resulting weighted average peak parking demand rate is **0.90-parked-vehicles-per-daily-conference-guest**. The midday peak demand typically occurred between 11:45 A.M. and 3:45 P.M. This would be the time when the

largest numbers of banquet or conference guests are on-site for meetings and lunch, and the largest number of hotel employees are on site. During midday, the guest rooms generated a lower level of parking demand. Based on the rate determined from Sunday, January 13th, the guest rooms generate midday demand of **0.36-parked-vehicles-per-occupied-room**, which is about 50% of peak overnight rate. When combined, the two rates can be used to estimate the total midday peak parking demand.

3.3. Parking Demand Associated with Planned Expansion

The planned Cedarbrook Lodge expansion would add up to 90 guest rooms and a 3,800-sf spa; however, it would not change meeting or conference facilities. Therefore, peak parking demand estimates for the project were estimated using the rates developed for the guest rooms above. Assuming 100% occupancy, the 90 new guest rooms are expected to generate a peak demand of 67 additional vehicles on site after 11:00 P.M.

During the midday, the new guest rooms would generate an increase in demand of 33 vehicles on site between 11:45 A.M. and 3:45 P.M. It should be noted that, based on year 2012 data provided by the hotel, monthly occupancy averaged about 72% and ranged from a low of about 60% in December to a high of about 92% in August. Therefore, the assumption of 100% occupancy for the new rooms results in a conservative worst-case estimate of peak parking demand.

Parking demand for the spa addition was estimated separately based on the expected operations described previously. The spa is not expected to generate parking demand during the overnight peak hours, but could add demand during the midday peak hours. Assuming a peak day operation as described previously, about 10 employees would work at the spa. Based on current staffing allocation, about seven would work during the day shift and three would work during the afternoon shift. Up to 14 clients per day are expected to be drawn from the local area and would generate additional parking demand on site (drive-in clients). The remaining spa clients are expected to come from hotel guests that are already on site and would not generate additional parking demand. Assuming the peak of 14 daily drive-in spa clients arrive at the site during the hours between 10:00 A.M. and 4:00 P.M., there could be two on site each hour and up to four on site at once, if appointments overlap. Therefore, the combined midday parking demand that could be generated by spa employees and drive-in spa clients would be 11 vehicles (7 employees and 4 clients).

Based on the analysis presented, the Cedarbrook Lodge expansion is expected to generate an increase in overnight peak parking demand of 67 vehicles and an increase in midday peak parking demand of 44 vehicles.

Attachments: Cedarbrook Lodge Traffic and Parking Demand Data and Calculations

TSM/tsm

Cedarbrook Lodge Expansion - Trip Gen and Parking Analysis Memo - FINAL.docx

Cedarbrook Lodge: Weekday PM Peak Hour Trip Generation - Existing Hotel

Day	PM Peak Hour	In	Out	Total	Occ.	Occ. %	Conference Activity (number of guests and time of day)	Conference PM Peak Trips	Total Guests
Fri., 1/11/2013	4:30 to 5:30 PM	28	38	66	77	70%	Alaska Airlines (125 day); Perkins Coie (30 evening); Williams (6 day); WSAC (2-8 day); Otsuka (12 day); WSALPHO (5 day)	Minimal	186
Mon., 1/14/2013	5:00 to 6:00 PM	29	30	59	76	69%	Wizards of the Coast (17 day + dinner); Alaska Airlines (125 day); Hanbleceya (25 evening); AstraZeneca (10 AM + lunch)	Minimal	177
Tues., 1/15/2013	5:00 to 6:00 PM	26	37	63	99	90%	Wizards of the Coast (5-60 day+evening); Washington Trust (24 AM + lunch); Starbucks (14 afternoon + dinner)	Minimal	98
Wed., 1/16/2013	5:00 to 6:00 PM	22	30	52	103	94%	Wizards of the Coast (30-125 day+evening); ICW (12 AM + lunch); Trillium (8 AM + lunch); Rose City (20 Evening)	Minimal	165
Thurs., 1/17/2013	4:30 to 5:30 PM	22	112	134	80	73%	Leading Age (75 AM + lunch); Impact Wash (17 lunch + afternoon); Trillium (8 AM + lunch); WSCPA (7 day+evening); Franciscan (75 AM + lunch); WSHA (18 AM + lunch); Blumenthal (22 lunch + afternoon); WSCPA (7 AM + lunch); Kelley (60-72 afternoon + evening)	Egress ~70	182
Fri., 1/18/2013	4:00 to 5:00 PM	19	38	57	82	75%	Excludes Thursday, 1/17/2013	Minimal	119
Weighted Average (minimal conference impact)		25	34	59	87	79%			
Weighted Average		42%	58%	71	86	78%	All days		
Average Trip Generation Rate w/minimal Conference Impact				0.68			PM Peak Hour Trips per Occupied Room		
Overall Weighted Average Trip Generation Rate for Six Weekdays				0.83			PM Peak Hour Trips per Occupied Room		

Cedarbrook Lodge: Weekday Daily Trip Generation - Existing Hotel

Day	Daily Trips	Occ.	Occ. %
Mon., 1/14/2013	701	76	69%
Tues., 1/15/2013	581	99	90%
Wed., 1/16/2013	600	103	94%
Thurs., 1/17/2013	880	80	73%
Fri., 1/18/2013	715	82	75%
Average	695	88	80%
Weighted Average	686		
Average Daily Trip Generation Rate		7.80	Trips/Occ. Room

Cedarbrook Lodge: Weekday Trip Generation - Expansion

Site Component	Rooms/Size	Daily In	Out	Total
Added Rooms	90	700	26	35
Added Spa	3,800-sf	50	2	8
Total		750	28	43

Cedarbrook Lodge Parking Demand Analysis



Overnight 11 P.M. to 6 A.M. (Hotel-related Parking Demand)

Date	Time of Peak	Occupancy	Occupancy %	Peak Demand	Rate - Veh./ Occ. Rm.
1/11-1/12	11:15 PM	77	70%	50	0.65
1/12-1/13	11:15 PM	69	63%	43	0.62
1/13-1/14	05:45 AM	85	77%	39	0.46
1/14-1/15	11:00 PM	76	69%	49	0.64
1/15-1/16	05:45 AM	99	90%	56	0.57
1/16-1/17	11:00 PM	103	94%	70	0.68
1/17-1/18	11:00 PM	80	73%	84	1.05
1/18-1/19	11:15 PM	82	75%	100	1.22
Average		84	Weighted Average (Occ. Rms)	62	0.74
		76%			

Forecast With Project Overnight Peak Demand

Proposed Additional Rooms	
<input type="text" value="90"/>	
Overnight Peak Demand (With 100% Occupancy) = <input type="text" value="67"/>	

Midday Demand 11 A.M. to 5 P.M. (Hotel-related Parking Demand - Without Conference Activity)

Date	Time	Occupancy	Occupancy %	Avg. Demand	Rate - Veh./ Occ. Rm.
Sunday, January 13, 2013	11AM-5PM	77	70%	28	0.36
Proposed Additional Rooms					
<input type="text" value="90"/>					
Midday Peak Demand (With 100% Occupancy) = <input type="text" value="33"/>					