

TECHNICAL MEMORANDUM

Project: Point Ruston

Subject: 2017 Trip Generation Counts with Refined & Calibrated Model

Date: November 20, 2018

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1. Background

Point Ruston, LLC has continued its development of the ASARCO Smelter Site Development that was envisioned by the Master Development Plan and evaluated in the *Final Supplemental Environmental Impact Statement to the ASARCO Smelter Site Master Development Plan Final EIS* (FSEIS).¹ The FSEIS included detailed traffic analyses based on an assumed development program for a mixed-use project that was expected to include residential (apartments, condominiums, and senior housing), office, hotel, restaurants, retail, health club, and supermarket components. The transportation analyses, prepared in 2006 and 2007, reflected a mix of those uses that were based on the best information available at that time considering market conditions. Those analyses were conducted using trip generation rates and equations from the 7th Edition of Institute of Transportation Engineers' (ITE) *Trip Generation Manual* published in 2003.

As is common with planned mixed-use developments, the exact mix of uses that have actually been developed and are now occupied (or expected to be occupied) has evolved and reflects current market conditions that have changed since the original traffic analysis was completed. In May 2014, the City of Tacoma and Point Ruston, LLC jointly recognized the current development plan and expected mix of uses in the *Phased Occupancy Agreement – Building 1, File BLD2014-40000213040*.² That agreement outlined the anticipated mitigation requirements and trigger levels for phased occupancy of the site development according to external trip generation levels at the site driveways. The established trigger levels (450 and 600 PM peak hour trips) were defined in the FSEIS on pages 3.7-51 and were intended to reflect 30% and 60% (respectively) of the project's total estimated external vehicle trip generation identified in Table 3.7-10. For the *Phased Occupancy Agreement*, trip generation estimates for each of the planned uses was prepared by the City of Tacoma using standard rates published in a more recent version of ITE's *Trip Generation Manual* (9th Edition published in 2012) than was used in the FSEIS. The trip generation estimates developed by the City were based on the anticipated development program available at that time.

With the site development partially complete and occupied, trip counts were conducted during the summer of 2014 at the project site driveway to determine actual trip generation of those uses. Using those counts and updated information about the development program, a more refined trip generation model, relying on standard ITE published rates from the same 9th Edition of the *Trip Generation Manual* was created and documented in a technical memorandum titled *2014 Trip Generation Counts with Refined & Calibrated Model*.³ The overall approach and selection of rates and equations for those trip generation estimates were coordinated with City of Tacoma staff.⁴

¹ City of Tacoma – Public Works Department, March 2008.

² City of Tacoma – Planning and Development Services, May 14, 2014.

³ Heffron Transportation, Inc., May 13, 2015.

⁴ Brennan Kidd, PE, PTOE, City of Tacoma Public Works Department/Engineering Division, May 2015.

In November 2017 with more of the site development complete and a variety of additional uses occupied (consisting of retail, restaurant, residential, office, and cinema), trip counts were conducted again to update actual trip generation of the site. The data collection effort and approach were coordinated with City staff.⁵ Using the new counts and updated information about occupied and planned uses, a more refined trip generation model, relying on standard ITE published rates from the most current version (10th Edition published in September 2017) of ITE's *Trip Generation Manual*, has been created. The following sections present the results of the trip counts and analysis, including details regarding:

- 1) Site access trip counts that were performed in November 2017;
- 2) A trip generation model that reflects the actual site elements (based on occupancy, size, and types of uses at the time of the counts); and
- 3) A refined forecast trip generation model that reflects ITE's current recommended practice for estimating trips within mixed-use developments, including the estimation of internal trips.⁶

2. Site Access Trip Generation Counts

Three-day (72-hour) machine traffic counts were commissioned at the four active Point Ruston site access driveways including: 1) Grand Avenue north of Ruston Way; 2) Parking Garage Access / Yacht Club Road; 3) Grand Loop Road / Yacht Club Road; and 4) Bayview Corridor north of Ruston Way beginning November 7, 2017. At the time of the counts, these access driveways provided vehicular access to the site for residents, retail customers, and retail employees, as well as some construction employees. In addition, AM and PM peak period video turning movement counts were performed at each of the same locations on Tuesday, November 7, 2017. All counts were performed by Idax Data Solutions. The video turning movement counts were used to calibrate the machine counts to ensure accuracy. The count data sheets are included as Attachment A.

The site access traffic count data were compiled to document the average weekday daily, AM, and PM peak hour trip generation at the Point Ruston site. Based on detailed review of the data, the hourly trip generation during the PM peak period (4:00 to 6:00 P.M.) during two of the three days was very consistent. However, the counts on Tuesday, November 7, 2018, were noticeably higher. It is noted that Tuesday was election day in Washington state. While general background traffic volumes in the area were not likely materially affected (elections are conducted by mail), there may have been election night parties at Point Ruston restaurant. Point Ruston staff also indicated that day included installation of the temporary holiday ice rink, which could have influenced and inflated the results that day due to extra trips or extra axles⁷ associated with larger vehicles. The results for that day were about 35% higher than the average of the following two days as shown in Figure 1. Based on consultation with City staff, it was agreed that the Tuesday data, which were collected on an election day, were not representative and were excluded. The two-day results were averaged and are shown in Figure 2. The two-day average PM peak hour trip generation was 375 trips (207 in and 168 out).

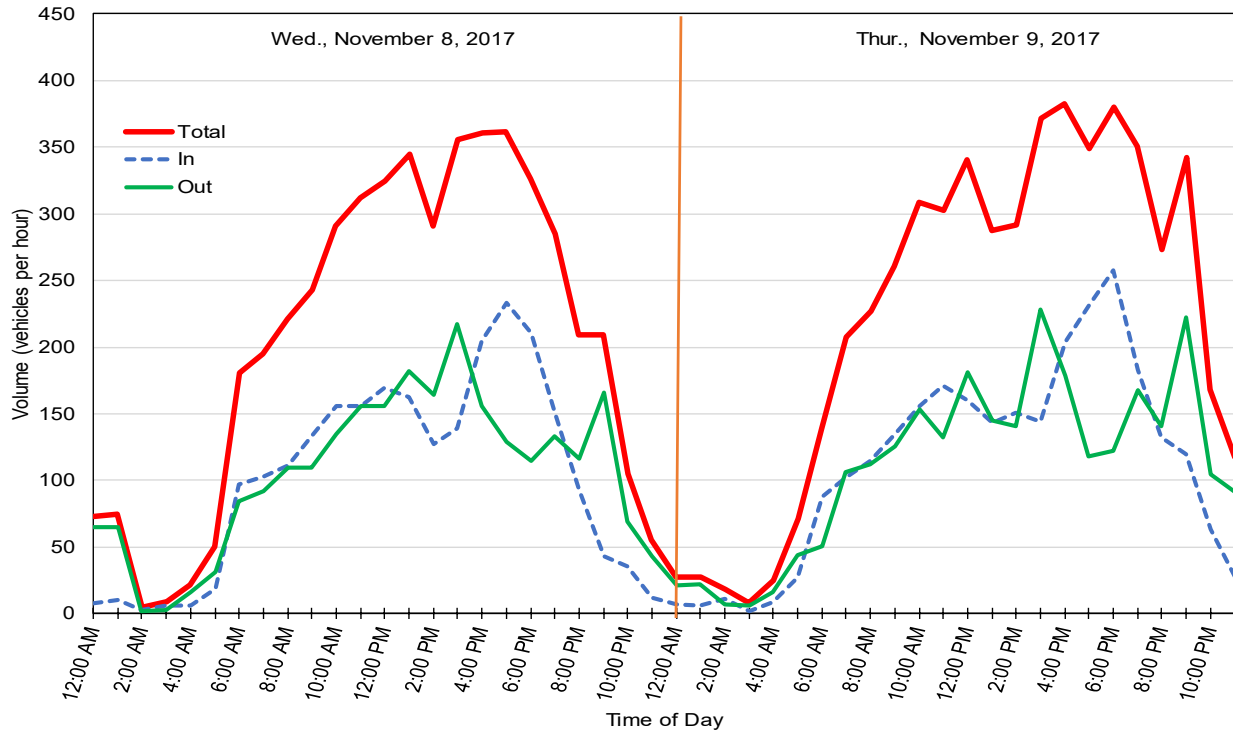
It should be noted that in addition to the trips generated by the occupied uses, the counts also reflect some construction employee traffic currently being generated at the site. Due to the construction schedule requirements of Point Ruston (starting later in the morning to minimize noise impacts to residents), these employee trips occur later than typical construction-related trips and likely coincided with the traditional commuter PM peak period. As a result, the observed trip generation may be slightly inflated beyond what would occur with the occupied uses alone.

⁵ Email communications October and November 2017.

⁶ ITE, *Trip Generation Handbook*, 3rd Edition, September 2017.

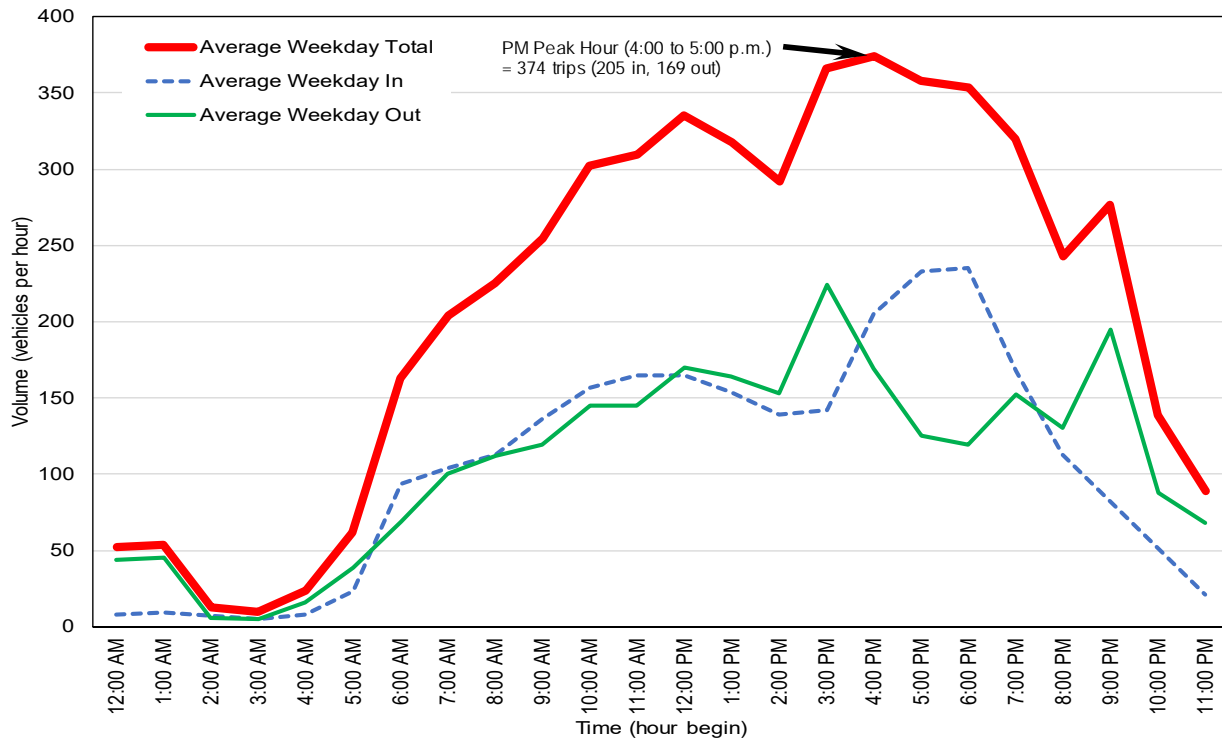
⁷ There were several extra trips from flatbed trucks and trailer vehicles used to deliver the ice rink structure and mechanical cooling equipment for the ice rink.

Figure 1. Point Ruston – Two-Day Traffic Generation



Source: Heffron Transportation, Inc., compiled from counts taken November 8-9, 2017 by Idax Data Solutions.

Figure 2. Point Ruston – Average Weekday Traffic Generation



Source: Heffron Transportation, Inc., compiled from counts taken November 8-9, 2017 by Idax Data Solutions.

Table 1 presents the observed hourly trip generation of the Point Ruston site during the AM and PM peak periods (7:00 to 9:00 A.M. and 4:00 to 6:00 P.M.), as well as the total daily (24-hour) and the averages for both days.

Table 1. Point Ruston – Total Trips by Day and by Hour (AM, PM Peak & Daily (24-Hour))

Hour During Study Periods	Machine Counts by Day of Week		Average
	Wed., Nov. 8, 2017	Thu., Nov. 9, 2017	
AM Peak (7:00 to 9:00 A.M.)			227^a
7:00 to 8:00 A.M.	195	208	202
8:00 to 9:00 A.M.	221	227	224
PM Peak (4:00 to 6:00 P.M.)			375^a
4:00 to 5:00 P.M.	361	383	372
5:00 to 6:00 P.M.	362	349	356
Daily 24-Hour Totals	4,906	5,282	5,370

Source: Heffron Transportation, Inc., compiled from counts taken November 8-9, 2017 by Idax Data Solutions.

a. Reflects average of highest hour on each day (the times for which varied slightly) selected for comparison with trip generation model.

3. Trip Generation Model

3.1. Method Overview

The trip generation model for the Point Ruston site was developed using procedures set forth in ITE’s *Trip Generation Handbook*.⁸ ITE recognizes that “...development sites with two or more complementary uses are now much more common and a method to accurately estimate the external trip generation effects of these types of developments is needed. At a development site consisting of two or more land uses, there is potential for interaction among these uses (referred to as “internal capture trips”), particularly where the trip can be made by walking. As a result, the total generation of external trips (that is, those entering and exiting the overall site) may be less than the simple sum of the trips generated by each discrete land use.” Chapter 6.0 of the handbook presents the recommended methodology for estimating trips at mixed-use development sites, which conforms to the flow chart presented in Chapter 3 with the following steps:

- Estimate baseline vehicle trips;
- Convert baseline vehicle trips to person trips;
- Estimate internal person trips;
- Determine external person trips by mode (walk/bike, transit, and in vehicles);
- Convert person trips to final vehicle trips; and
- Estimate vehicle trip subsets (pass-by / diverted trips).

The recommended methodology is the same procedure presented in in *National Cooperative Highway Research Program (NCHRP) Report 684: Enhancing Trip Capture Estimation for Mixed-Use Developments*.⁹ ITE recommends taking actual counts of similar local uses to determine mode of travel

⁸ Institute of Transportation Engineers, *Trip Generation Handbook*, 3rd Edition, 2017.

⁹ *Transportation Research Board (TRB)*, 2011.

and internalization. The effort to model trip generation at the Point Ruston site based on actual driveway counts are consistent with ITE’s recommended practice. Therefore, a trip generation model that relies on standard published rates for the uses within the development and the current recommended practice for estimating external vehicle trip generation at mixed-use development was prepared and compared to the results of the site driveway counts. The occupied development components used in the model are listed in Table 2. Note that the sizes of each use are listed in terms used in ITE’s *Trip Generation Manual* (e.g. number of units for residential uses and square feet gross floor area (sfgfa) for commercial spaces).

Table 2. Point Ruston – Existing Uses and Occupancies (November 2017)

Building	Type and/or Name of Use	Size
1A	Multi-Family Housing (Mid-Rise)	135 units
1A	Movie Theater (Cinema with 38,525 sfgfa and 9 screens)	729 seats ¹
1A.1.A	Retail (Art Gallery – Blue Octopus)	2,298 sfgla ²
1A.1.B	Retail (South Sound Running)	2,762 sfgla
1A.1.C	High-Turnover Restaurant – Jewel Box Café	2,743 sfgfa ²
1A.2	Quality Restaurant – Stack 571	2,267 sfgfa
1A.3	Quality Restaurant – Mio Sushi	2,105 sfgfa
1C.1	Quality Restaurant – Wild Fin Seafood	6,438 sfgfa
2A	Multi-Family (Mid-Rise)	173 units
2A	Clinic – Franciscan Plastic Surgery (6,240 sfgfa)	12 employees ¹
2A	Clinic – Tranquility Dental (3,076 sfgfa)	4 employees ¹
2A	High-Turnover Restaurant – Two-Town Pub/Eatery	2,386 sfgfa
2A	High-Turnover Restaurant – Dolce Si Bakery	2,386 sfgfa
2A	Health/Fitness Club – NW Fitness 24-7	5,275 sfgfa
2A	Office – Coldwell Banker Bain	1,386 sfgfa
2B East & West	Multi-Family (Mid-Rise)	43 units
18 West	High-Turnover Restaurant – Farrell’s Wood Fired Pizza	7,466 sfgfa
18 West	Retail – Ice Cream Social	1,267 sfgla
18 East	Retail – Purpose Boutique	1,801 sfgla
18 East	Hair Salon – Intaglio	2,147 sfgla

Source: Point Ruston LLC, November 2017.

1. Independent variable used for those uses by ITE (seats for cinema, employees for clinic).
2. sfgfa = square feet gross floor area & sfgla = square feet gross leasable area (the independent variables used for those uses by ITE)

3.2. Selected Trip Generation Rates and Equations

In order to create a trip generation model for the overall site, rates and equations available within ITE’s *Trip Generation Manual* were reviewed to find the best matches to the development that has occurred. Then, the trip generation model was created. Rates and equations for the existing land uses were applied as follows.

Multifamily Housing (Mid-Rise) (Land Use 221) – This residential category “...includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have between three and 10 levels (floors),” which best fits the residential units within the Point Ruston development. The fitted curve equation was applied as recommended by City staff.

Movie Theater (Land Use 444) – The cinema has 38,525 sfgfa with nine movie screens. Due to recent trends in the industry, there are fewer, more luxurious seats with more legroom in each auditorium. Since the number of seats is the primary driver of trip generation for theaters, it provides the best independent variable for the rates available. It should be noted that the description for this land use in the *Trip Generation Manual* states that “Traditional theaters characteristically house a larger number of seats per screen than multiplex theaters. For the eight sites in Land Use 444 with data for both number of movie screens and number of seats, the average number of seats per movie screen was 343.” The Point Ruston 9-screen cinema complex has 729 seats (fewer than 100 seats per screen on average). As a result, the rates for this land use based on floor area and number of screens reflect higher numbers of seats per screen than what is located at Point Ruston. The published ITE rates based on floor area were determined from either one study on a weekday or two studies on Fridays. The rates based on number of seats were developed from a total of seven studies (three weekday and four Friday). These data were collected in the 1980s, 1990s, and 2010s. Independent trip generation studies have found rates that are more comparable to the published ITE rates based on number of seats. A study prepared for a proposed AMC theater in Santa Monica, California,¹⁰ included data collected at the AMC Santa Monica 7 and AMC Broadway 4 theaters in downtown Santa Monica during the weekday PM peak period in August 2011. The study found the average PM peak hour trip generation rate of 0.06 trips per seat. A study of the Bella Botega Cinema in Redmond, Washington was performed in 1997.¹¹ For this study, machine traffic counts were performed at all driveways serving the site over a seven-day period in September 1997. Manual check counts were also performed at each driveway to validate the machine traffic counts. These counts found that the cinema (with 1,873-seats) generated traffic at a rate of 0.04 trips per seat. Based on these data and analyses, the published ITE weekday rate of 0.09 trips per seat is the most reasonable and appropriate for application to the proposed Point Ruston cinema.

Health/Fitness Club (Land Use 492) – The rates for this land use based on floor area were applied to the NW Fitness 24/7 facility.

Clinic (Land Use 630) – The description for this land use category is most consistent with the actual uses at the Point Ruston site, which include a Franciscan Plastic Surgery clinic and a dental office. The plastic surgery clinic at 6,240 sfgfa and the dental office at 3,076 sfgfa are both well below the average size of the facilities studied by ITE for the Medical-Dental Office rates (Land Use 720). The ITE description for the Clinic use (LU 630) states: “A clinic is any facility that provides limited diagnostics and outpatient care but is unable to provide prolonged in-house medical or surgical care.” The Franciscan facility at Point Ruston provides cosmetic procedures, reconstruction, med/spa, and skin care procedures. Tranquility Dental is described at providing gentle dentistry services in a spa-like atmosphere. Since these specialized service uses likely utilize more floor area per employee than the comparable uses in the ITE clinic category, the rates based on total employees were applied. Point Ruston staff obtained information from both businesses about the total number of employees at the time of the counts, which are listed in Table 2.

Small Office Building (Land Use 712) – This land use is described as follows: “A small office building houses a single tenant and is less than or equal to 5,000 gross square feet in size. It is a

¹⁰ *Traffic and Parking Study for the AMC Theater Development Project*, Fehr & Peers, September 2012.

¹¹ *Bella Botega Driveway Traffic Counts and Trip Generation*, Heffron Transportation, Inc. October 20, 1997.

location where affairs of business, commercial or industrial organization, or professional person or firm are conducted.” The published average rate was applied for the small office space.

Shopping Center (Land Use 820) – The Shopping Center category is best suited for application to the general retail spaces at Point Ruston for soft goods, art, and accessories. Trip estimates for the restaurant portions of the site are calculated separately and most of the retail spaces do not open until 10 or 11 A.M. Since the AM peak hour equation has a high y-intercept, which is likely because of restaurant spaces within the Shopping Center category, the average rate is more appropriate for application during the AM peak hour. For PM peak hour conditions, the average rate is applied when total retail is 25,000 sf or less; the equation would be applied when total retail exceeds 25,000 sf.

Hair Salon (Land Use 918) – This land use, described as “...*facilities that specialize in cosmetic and beauty services including hair cutting and styling, skin and nail care, and massage therapy. Hair salons may also contain spa facilities.*” provides the best available fit for the planned use.

Quality Restaurant (Land Use 931) – This land use is described as “...*high-quality, full-service eating establishments with typical duration of stay of at least one hour. Quality restaurants generally do not serve breakfast; some do not serve lunch; all serve dinner.*” Three of the existing restaurants fit this description—Stack 571, Mio Sushi, and Wild Fin Seafood.

High-Turnover (Sit-Down) Restaurant (Land Use 932) – The ITE description for this category states: “*This land use consists of sit-down, full service eating establishments with typical duration of stay of approximately one hour. This type of restaurant is usually moderately priced and frequently belongs to a restaurant chain. Generally, these restaurants serve lunch and dinner; they may also be open for breakfast and are sometimes open 24 hours per day... Some facilities contained within this land use may also contain a bar area for serving food and alcoholic drinks.*” This land use category provides the best fit for four of the existing restaurants—Two-Town Pub/Café, Jewel Box Café, Farrelli’s Wood Fired Pizza, and Dolce Si Bakery. For the AM peak hour, 80% of the published rate was applied to reflect that several locations are not open for breakfast.

3.3. Trip Generation Model Development

The following outlines the steps applied in developing the trip generation model as recommended in the *Trip Generation Handbook*.

1. **Estimate baseline vehicle trips.** Using the standard rates and equations described above, the combined sum of vehicle trip generation, with no adjustment for internal trips between uses (the simple sum of discrete uses), results in a total of 513 PM peak hour trips. When compared to the actual driveway counts, which resulted in a two-day average of 375 PM peak hour trips, it is clear that the site is generating fewer trips than would be predicted by applying rates without adjustments. The driveway counts imply an internal trip capture rate of approximately 27%.
2. **Determine the number of person trips.** The total number of “person trips” generated by the various uses on the site was determined using results from step one above combined with information about the inherent mode of travel and number of persons per vehicle from ITE’s *Trip Generation Handbook*.¹² The rates and assumptions applied for each land use type are summarized in Table 3; the estimates of person trips are summarized in Table 4. As shown, the model estimates a total of 353 AM peak hour person trips and 724 PM peak hour person trips.

¹² Institute of Transportation Engineers, *Trip Generation Handbook, 3rd Edition*, 2014

3. **Determine internal trips.** Internal trips between on-site uses were determined using the methodology in the *Trip Generation Handbook*. An example of an internal trip is when an apartment resident within the site shops at an on-site commercial use or uses an on-site service such as a café or restaurant. The percentage of internal trips depends on the balance of trips generated by the individual land uses—a development that has a balanced mix of uses (retail versus residential trips) will have a higher percentage of internal trips than a development that has one land use that dominates the site’s trip generation. The walking distance among uses within the site are also factored into the methodology and calculations. For the uses that were open at the time of the counts, the average distance between the centroids of the buildings was about 490 feet. When reviewing the distances between various uses and building entrance points, the actual walking distance between uses could range from as little as 50 feet to over 1,100 feet. Since several of the buildings contain more than one type of use, an average distance between uses was assumed to be 500 feet. Based on the published internal capture rates for the site uses, 72 person trips (20.4%) are estimated to be internal during the AM peak hour with 192 (26.5%) internal trips in the PM peak hour. Based on the results of the site driveway counts, the number of external vehicle trips observed, and considering on-going construction activity that is not generated by the on-site land uses, the modeled forecast of internal trips appears to be a reasonable approximation of internal trip patterns and capture.
4. **Determine trips by mode of travel.** After the numbers of internal and external person trips are estimated, they are typically separated by mode of travel to account for trips made by various modes including: single occupant vehicles (SOV), carpools, vanpools, transit, walk, and bicycle. Since the nearest transit stop is more than ½ mile from the site and ‘Journey-to-Work’ survey data from the 2010 Census¹³ indicates that residents and employees in the larger area that surrounds the site use transit at a rate of just under 4%, transit trips to and from the development are likely negligible. Although some of the external person trips may occur by pedestrian and bicycle modes (Journey-to-Work surveys for the same zones indicate less than 1% of commute trips by non-motorized modes). Therefore, all external trips were assumed to occur in vehicles (SOVs, carpools, and vanpools). The external person trips were converted to vehicle trips using the same AVO rates presented previously for each land use, since there are no data to indicate other AVO rates would apply to this site.
5. **Convert person trips by vehicle to final vehicle trips.** The total vehicle trips estimated by the model for Point Ruston are summarized in Table 5. As shown, the cumulative vehicle trips generated by all the land uses included in this analysis are estimated at 226 during the AM peak hour (compared to 227 vehicle trips counted at the site driveways) and 371 trips during the PM peak hour (compared to 375 vehicle trips counted at the site driveways).

As shown, the modeled AM and PM peak hour volumes are nearly identical to the observed driveway counts (within 1%). Based on these results, the trip generation model appears to provide reasonable estimates of external vehicle trip generation by the site. It is also consistent with the current rates and methodology for estimating trip generation at mixed-use developments as recommended by the ITE.

For comparison, the current modeled result reflects a 27.7% reduction in PM peak hour vehicle trips compared to the cumulative sum of ITE vehicle trip estimates for all uses without any adjustment for internalization. This is nearly identical to the rate originally developed for the FSEIS, before it was reduced to the conservatively low 13% (see page 3.7-19 of the FSEIS).

¹³ 2010 Census Journey-to-Work survey data compiled by the Puget Sound Regional Council for Transportation Analysis Zones (TAZs) 682 and 877.

Table 3. Baseline Trip Generation Rates & Equations, AVO Rates, and Mode Assumptions

Land Use (ITE Land Use Code)	ITE Baseline Trip Generation Rates & Equations ^a	Baseline Average Vehicle Occupancy (AVO) Rates ^b		Baseline Vehicle Trip % ^b	
		Inbound	Outbound	Inbound	Outbound
Multifamily Housing (Mid-Rise) (221) – Residential dwelling units located within the same building with at least three other dwelling units in buildings with three to 10 levels.					
AM Peak Hour	$\text{Ln}(T) = 0.98\text{Ln}(X) - 0.98$	1.13	1.09	96.2%	97.8%
PM Peak Hour	$\text{Ln}(T) = 0.96\text{Ln}(X) - 0.63$	1.15	1.21	97.3%	96.2%
Movie Theater (444) – Consists of audience seating, typically less than 10 screens, a lobby, and a refreshment stand.					
AM Peak Hour	N/A (not open)	--	--	--	--
PM Peak Hour	0.09 trips / seat	2.00 ^c	2.00 ^c	100% ^c	100% ^c
Health / Fitness Club (492) – Privately-owned facility focusing on individual fitness or training.					
AM Peak Hour	1.31 trips / 1,000 sfgla	1.17 ^d	1.16 ^d	100% ^d	100% ^d
PM Peak Hour	3.45 trips / 1,000 sfgla	1.21 ^d	1.18 ^d	100% ^d	100% ^d
Clinic (630) – Facility that provides limited diagnostics and outpatient care but not prolonged in-house medical care.					
AM Peak Hour	1.12 trips per employee	1.37 ^e	1.37 ^e	100% ^e	100% ^e
PM Peak Hour	0.85 trips per employee	1.37 ^e	1.37 ^e	100% ^e	100% ^e
Small Office Building (712) – A single tenant building (<5,000 sf) where affairs of business are conducted.					
AM Peak Hour	1.92 trips / 1,000 sfgfa	1.06	1.06	99%	100%
PM Peak Hour	2.45 trips / 1,000 sfgfa	1.11	1.07	100%	99%
Shopping Center Retail (820) – Group of commercial establishments that may include uses such as traditional retail stores, banks, post offices, recreational uses, and others. Because of the small size of the proposed retail, average rates were used.					
AM Peak Hour	0.94 trips / 1,000 sfgfa	1.17	1.16	100%	100%
PM Peak Hour	3.81 trips / 1,000 sfgla ^f $\text{Ln}(T) = 0.74\text{Ln}(X) + 2.89f$	1.21	1.18	100%	100%
Hair Salon (918) – Facilities specializing in cosmetic and beauty services (hair, skin and nail care, and massage therapy).					
AM Peak Hour	1.21 trips / 1,000 sfgfa	1.17 ^d	1.16 ^d	100% ^d	100% ^d
PM Peak Hour	1.45 trips / 1,000 sfgfa	1.21 ^d	1.18 ^d	100% ^d	100% ^d
Quality Restaurant (931) – Full-service eating establishments with typical duration of stay of at least one hour. All serve dinner, some serve lunch, most generally do not serve breakfast.					
AM Peak Hour	0.73 trips / 1,000 sfgfa	1.62 ^g	1.52 ^g	100% ^g	100% ^g
PM Peak Hour	7.80 trips / 1,000 sfgfa	1.62	1.52	100%	100%
High-turnover Sit-Down Restaurant (LU 932) – Consists of sit-down, full service eating establishments with typical duration of stay of approximately one hour. Usually moderately priced and frequently belongs to a restaurant chain. Generally, serve lunch and dinner; may also be open for breakfast. Some may also contain a bar serving food and alcoholic drinks.					
AM Peak Hour	9.94 trips/1,000 sfgfa	1.33 ^g	1.34 ^g	100% ^g	100% ^g
PM Peak Hour	9.77 trips/1,000 sfgfa	1.33	1.34	100%	100%

- Source: Institute of Transportation Engineers (ITE) Trip Generation, 10th Edition, September 2017. "sfgla" = square feet of gross leasable area; sfgfa = square feet of gross floor area. For equations, T = number of trips, X = number of dwelling units.
- Based on data in ITE Trip Generation Handbook, 3rd Edition; Tables B.1, B.2, and B.3, unless noted otherwise. Percentage of vehicle trips inherent in the ITE trip rates; values less than 100% reflect trips made by walk, bike, and transit modes.
- Trip Generation Manual does not include AVO or mode-share data. AVO rates estimated by Heffron Transportation.
- AVO rate and vehicle trip % assumed to be the same as shopping center rates from Trip Generation Handbook.
- AVO and mode shares published for Medical Dental Office Building from Table B.3 of Trip Generation Handbook.
- Average rate applied up to 25,000-sf, then equation applied when retail exceeds 25,000-sf.
- No AM peak hour AVO and mode shares; assumed to be same as PM peak hour.

Table 4. Total Person Trips Generated by Point Ruston (November 2017)

Land Use	Size	AM Peak Hour Person Trips			PM Peak Hour Person Trips		
		In	Out	Total	In	Out	Total
Multifamily Housing (Mid-Rise) (LU 221)	351 units	34	98	132	109	70	179
Movie Theater with Matinee (LU 444)	729 seats	0	0	0	72	59	131
Health/Fitness Club (LU 492)	5,275 sfgfa	4	4	8	13	9	22
Clinic (LU 630)	16 employees	19	6	25	7	12	19
Small Office (LU 712)	1,386 sfgfa	2	1	3	1	2	3
Retail Shopping Center (LU 820)	8,128 sfgla	6	3	9	18	19	37
Hair Salon (LU 918)	2,147 sfgfa	3	1	4	1	3	4
Quality Restaurant (LU 931)	10,810 sfgfa	9	4	13	90	44	134
High-Turnover Restaurant (LU 932)	14,981 sfgfa	87	72	159	121	74	195
Total All Person Trips		164	189	353	432	292	724
Internal Person Trips		36	36	72	96	96	192
% Internal Person Trips			20.4%			26.5%	
Total External Person Trips		128	153	281	336	196	532

Source: Heffron Transportation, Inc., July 2018. Trips estimated using procedures in the ITE Trip Generation Handbook, September 2017.

Table 5. Estimated Driveway Vehicle Trips Generated by Point Ruston

Land Use	Size	AM Peak Hour Vehicle Driveway Trips			PM Peak Hour Vehicle Driveway Trips		
		In	Out	Total	In	Out	Total
Multifamily Housing (Mid-Rise) (LU 221)	351 units	27	68	95	66	42	108
Movie Theater with Matinee (LU 444)	729 seats	0	0	0	31	24	55
Health/Fitness Club (LU 492)	5,275 sfgfa	2	3	5	3	3	6
Clinic (LU 630)	16 employees	11	1	12	2	8	10
Small Office (LU 712)	1,386 sfgfa	1	0	1	0	1	1
Retail Shopping Center (LU 820)	8,128 sfgla	5	0	5	5	6	11
Hair Salon (LU 918)	2,147 sfgfa	1	1	2	0	1	1
Quality Restaurant (LU 931)	10,810 sfgfa	5	3	8	54	19	73
High-Turnover Restaurant (LU 932)	14,981 sfgfa	48	50	98	73	33	106
Total All Vehicle Driveway Trips^a		100	126	226	234	137	371
Observed Driveway Volumes (2-day average) ^b		114	113	227	207	168	375

Source: Heffron Transportation, Inc., August 2018. Trips estimated using procedures in the ITE Trip Generation Handbook, September 2017.

- It is noted that the modeled in/out proportions are slightly different from the count results. These differences are likely due to the influence of some construction worker trips in the driveway counts and due to the time of the observed highest hourly volume (4:00 & 4:30 P.M.) when in/out proportions for restaurant and movie theater uses may be different than at 5:00 P.M.
- Average of two-day counts performed by IDAX, Inc. on November 8 and 9, 2018.

6. **Estimate vehicle trip subsets (pass-by / diverted trips).** Retail and restaurant uses generate two different types of driveway trips—pass-by and new trips—that affect local roadways differently. Pass-by trips are attracted from roadways immediately adjacent to the site. For example, a trip to a restaurant on the site made by a driver already using Ruston Way past the site on a trip home from work or another origin would be considered a pass-by trip. As stated in ITE’s *Trip Generation Handbook*, “...“pass-by” trips do not add new traffic to the adjacent street system and may be reduced from the total external trips generated by a study site.” Non-Pass-by trips consist of both Primary and Diverted trips. Primary trips are single-purpose trips generated by the site and are generally assumed to begin and end at home, although some primary trips could originate at work or other locations. Diverted trips are attracted from traffic on roadways within the vicinity of the generator but require a diversion from a roadway not adjacent to the site to gain direct access to the site. For the purposes of this analysis, non-pass-by trips are assumed to be new, generated by the Point Ruston development, and referred to as new trips.

The proportion of pass-by trips for each land use were estimated using information in the *Trip Generation Handbook*. Of the current and proposed additional uses, the retail space and the restaurants could draw pass-by trips from Ruston Way; however, the retail space is very small and is not expected to draw measurable pass-by trips. Although the average pass-by trip percentage rates published for Quality Restaurant and High-Turnover (Sit-Down) Restaurant (presented in Tables E.29 and E.30 of the *Trip Generation Handbook*) are 44% and 43%, respectively, these averages reflect surveys of sites with higher volumes of traffic on adjacent streets than Ruston Way. For the restaurants, values equal to roughly the 10th percentiles of the reported pass-by survey results published in the *Trip Generation Handbook* for each of these uses were applied. This results in pass-by rates of 26% for Quality Restaurants and 30% for High-Turnover Restaurants, which accounts for the relatively lower volume of traffic on Ruston Way from which those uses could draw trips. The selected pass-by trip percentages and resulting pass-by trip estimates are presented in Table 6. As shown, the restaurants are estimated to generate a total of 31 pass-by trips during the AM peak hour and 51 pass-by trips during the PM peak hour. These are reasonable figures given the existing background traffic volume of about 575 PM peak hour trips on Ruston Way in November 2017. As also shown are the total numbers of non-pass-by trips, those generated exclusively by Point Ruston, estimated at 195 AM peak hour trips (85 in, 110 out) and 320 PM peak hour trips (198 in, 122 out).

The pass-by trip estimates are provided for information and possible future use in evaluating off-site roadway conditions or operations; they are not used in assessing the established mitigation triggers, which are based on total external vehicle driveway trips (pass-by and primary trips).

Table 6. Pass-by & New Trip Estimates for Point Ruston (November 2017)

Land Use	Pass-by Trip %	AM Peak Hour Trips			PM Peak Hour Trips		
		In	Out	Total	In	Out	Total
Quality Restaurant (LU 931)	26%	1	1	2	14	5	19
High-Turnover Restaurant (LU 932)	30%	14	15	29	22	10	32
Total Pass-by Vehicle Trip Estimate	13%	15	16	31	36	15	51
Total Primary Vehicle Trip Estimate	87%	85	110	195	198	122	320
Total Driveway Vehicle Trip Estimate	100%	100	126	226	234	137	371

Source: Heffron Transportation, Inc., Nov. 2018. Trips estimated using procedures in the ITE *Trip Generation Handbook*, September 2017.

4. Conclusions

The trip generation model developed for the Point Ruston site follows the recommended methodology and approach outlined in the most current version of ITE's *Trip Generation Manual* and its *Trip Generation Handbook* (from September 2017) for estimating traffic within mixed-use developments.

Based on the data and analyses presented above, this model provides reasonable estimates of the site's internal and external vehicle trips. The model and input assumptions described herein should be applied for future analyses in support of building and occupancy permits as well as mitigation implementation.

Attachments: Attachment A: Traffic count data sheets
Attachment B: Detailed Calibrated Model Data Calculation Sheets – November 2017

TSM/tsm

PR - 2017 Trip Gen Counts_Calibrated Model - FINAL



Attachment A
Traffic Count Data Sheets

November 20, 2018

Location: GRAND LOOP RD N/O RUSTON WAY
 Date Range: 11/7/2017 - 11/13/2017
 Site Code: 02

Time	Tuesday			Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Mid-Week Average				
	11/7/2017			11/8/2017			11/9/2017			11/10/2017			11/11/2017			11/12/2017			11/13/2017							
	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total		
12:00 AM	3	23	26	4	50	54	5	17	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	30	34
1:00 AM	4	10	14	4	51	55	2	15	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	25	29
2:00 AM	1	1	2	0	1	1	3	4	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	3
3:00 AM	3	1	4	1	1	2	1	6	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3	4
4:00 AM	4	5	9	4	7	11	3	6	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	6	10
5:00 AM	12	10	22	10	9	19	15	14	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	11	23
6:00 AM	35	20	55	45	22	67	45	9	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	42	17	59
7:00 AM	23	24	47	31	20	51	42	19	61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32	21	53
8:00 AM	44	34	78	57	35	92	43	34	77	-	-	-	-	-	-	-	-	-	-	-	-	-	-	48	34	82
9:00 AM	73	30	103	56	49	105	64	43	107	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64	41	105
10:00 AM	88	43	131	80	56	136	82	57	139	-	-	-	-	-	-	-	-	-	-	-	-	-	-	83	52	135
11:00 AM	101	51	152	93	65	158	96	67	163	-	-	-	-	-	-	-	-	-	-	-	-	-	-	97	61	158
12:00 PM	119	84	203	83	70	153	79	92	171	-	-	-	-	-	-	-	-	-	-	-	-	-	-	94	82	176
1:00 PM	111	95	206	93	81	174	78	65	143	-	-	-	-	-	-	-	-	-	-	-	-	-	-	94	80	174
2:00 PM	73	96	169	59	82	141	76	58	134	-	-	-	-	-	-	-	-	-	-	-	-	-	-	69	79	148
3:00 PM	122	133	255	80	118	198	73	114	187	-	-	-	-	-	-	-	-	-	-	-	-	-	-	92	122	213
4:00 PM	139	117	256	118	61	179	113	84	197	-	-	-	-	-	-	-	-	-	-	-	-	-	-	123	87	211
5:00 PM	163	58	221	123	65	188	126	67	193	-	-	-	-	-	-	-	-	-	-	-	-	-	-	137	63	201
6:00 PM	174	120	294	110	75	185	169	74	243	-	-	-	-	-	-	-	-	-	-	-	-	-	-	151	90	241
7:00 PM	132	105	237	86	85	171	126	95	221	-	-	-	-	-	-	-	-	-	-	-	-	-	-	115	95	210
8:00 PM	95	101	196	46	80	126	73	67	140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	71	83	154
9:00 PM	60	185	245	28	121	149	72	146	218	-	-	-	-	-	-	-	-	-	-	-	-	-	-	53	151	204
10:00 PM	64	77	141	19	50	69	46	60	106	-	-	-	-	-	-	-	-	-	-	-	-	-	-	43	62	105
11:00 PM	9	64	73	6	28	34	16	62	78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	51	62
Total	1,652	1,487	3,139	1,236	1,282	2,518	1,448	1,275	2,723	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,445	1,348	2,793
Percent	53%	47%	-	49%	51%	-	53%	47%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	52%	48%	-

1. Mid-week average includes data between Tuesday and Thursday.



Location: POINT LOOP N GARAGE DWY E/O YATCH CLUB RD
 Date Range: 11/7/2017 - 11/13/2017
 Site Code: 03

Time	Tuesday			Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Mid-Week Average		
	11/7/2017			11/8/2017			11/9/2017			11/10/2017			11/11/2017			11/12/2017			11/13/2017					
	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total
12:00 AM	1	2	3	1	4	5	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	1	2	3
1:00 AM	0	0	0	0	2	2	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-	0	2	2
2:00 AM	1	0	1	0	0	0	2	0	2	-	-	-	-	-	-	-	-	-	-	-	-	1	0	1
3:00 AM	0	1	1	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0
4:00 AM	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0
5:00 AM	0	0	0	0	2	2	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	0	1	1
6:00 AM	1	2	3	1	1	2	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2
7:00 AM	1	1	2	3	3	6	3	1	4	-	-	-	-	-	-	-	-	-	-	-	-	2	2	4
8:00 AM	2	0	2	1	0	1	2	2	4	-	-	-	-	-	-	-	-	-	-	-	-	2	1	2
9:00 AM	2	2	4	3	1	4	3	0	3	-	-	-	-	-	-	-	-	-	-	-	-	3	1	4
10:00 AM	3	2	5	3	2	5	5	1	6	-	-	-	-	-	-	-	-	-	-	-	-	4	2	5
11:00 AM	7	0	7	5	1	6	4	3	7	-	-	-	-	-	-	-	-	-	-	-	-	5	1	7
12:00 PM	4	3	7	11	2	13	3	4	7	-	-	-	-	-	-	-	-	-	-	-	-	6	3	9
1:00 PM	11	1	12	5	9	14	3	2	5	-	-	-	-	-	-	-	-	-	-	-	-	6	4	10
2:00 PM	4	7	11	1	5	6	2	5	7	-	-	-	-	-	-	-	-	-	-	-	-	2	6	8
3:00 PM	6	9	15	5	6	11	5	3	8	-	-	-	-	-	-	-	-	-	-	-	-	5	6	11
4:00 PM	13	9	22	11	4	15	13	0	13	-	-	-	-	-	-	-	-	-	-	-	-	12	4	17
5:00 PM	10	5	15	12	4	16	14	5	19	-	-	-	-	-	-	-	-	-	-	-	-	12	5	17
6:00 PM	10	8	18	5	2	7	9	3	12	-	-	-	-	-	-	-	-	-	-	-	-	8	4	12
7:00 PM	5	9	14	3	8	11	6	11	17	-	-	-	-	-	-	-	-	-	-	-	-	5	9	14
8:00 PM	2	6	8	4	9	13	10	12	22	-	-	-	-	-	-	-	-	-	-	-	-	5	9	14
9:00 PM	3	19	22	1	9	10	2	10	12	-	-	-	-	-	-	-	-	-	-	-	-	2	13	15
10:00 PM	2	10	12	0	4	4	1	14	15	-	-	-	-	-	-	-	-	-	-	-	-	1	9	10
11:00 PM	0	5	5	0	1	1	0	6	6	-	-	-	-	-	-	-	-	-	-	-	-	0	4	4
Total	88	101	189	75	79	154	89	86	175	-	-	-	-	-	-	-	-	-	-	-	-	84	89	173
Percent	47%	53%	-	49%	51%	-	51%	49%	-	-	-	-	-	-	-	-	-	-	-	-	-	49%	51%	-

1. Mid-week average includes data between Tuesday and Thursday.

Location: GRAND LOOP RD E/O YACHT CLUB RD
 Date Range: 11/7/2017 - 11/13/2017
 Site Code: 04

Time	Tuesday			Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Mid-Week Average					
	11/7/2017			11/8/2017			11/9/2017			11/10/2017			11/11/2017			11/12/2017			11/13/2017								
	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total	EB	WB	Total
12:00 AM	1	7	8	1	7	8	0	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	5	6
1:00 AM	0	2	2	1	9	10	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4	5
2:00 AM	0	0	0	1	1	2	0	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	1	1
3:00 AM	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0
4:00 AM	1	0	1	1	1	2	4	0	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	0	2
5:00 AM	2	0	2	1	0	1	2	4	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	3
6:00 AM	10	6	16	11	15	26	9	7	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	9	19
7:00 AM	13	14	27	15	11	26	6	14	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	13	24
8:00 AM	12	22	34	13	22	35	10	22	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	22	34
9:00 AM	17	22	39	16	14	30	17	25	42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	20	37
10:00 AM	11	23	34	22	23	45	13	21	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	22	38
11:00 AM	9	22	31	12	35	47	12	22	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	26	37
12:00 PM	15	27	42	17	32	49	13	28	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	29	44
1:00 PM	12	40	52	13	39	52	12	27	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	35	48
2:00 PM	16	35	51	17	33	50	9	34	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	34	48
3:00 PM	12	44	56	5	35	40	13	50	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	43	53
4:00 PM	17	34	51	13	33	46	19	32	51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16	33	49
5:00 PM	17	28	45	15	25	40	10	22	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	25	39
6:00 PM	7	34	41	19	17	36	16	20	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	24	38
7:00 PM	10	24	34	6	23	29	7	36	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	28	35
8:00 PM	5	28	33	6	21	27	2	34	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	28	32
9:00 PM	4	33	37	3	22	25	5	38	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	31	35
10:00 PM	5	20	25	0	8	8	2	21	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	16	19
11:00 PM	1	8	9	1	10	11	1	9	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	9	10
Total	197	473	670	209	436	645	183	471	654	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	196	460	656
Percent	29%	71%	-	32%	68%	-	28%	72%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30%	70%	-

1. Mid-week average includes data between Tuesday and Thursday.

Location: BAY VIEW CORRIDOR N/O RUSTON WAY
 Date Range: 11/7/2017 - 11/13/2017
 Site Code: 05

Time	Tuesday			Wednesday			Thursday			Friday			Saturday			Sunday			Monday			Mid-Week Average					
	11/7/2017			11/8/2017			11/9/2017			11/10/2017			11/11/2017			11/12/2017			11/13/2017								
	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total	NB	SB	Total
12:00 AM	4	4	8	2	4	6	2	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	6
1:00 AM	2	2	4	5	3	8	2	3	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	6
2:00 AM	0	1	1	2	0	2	6	1	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	1	3
3:00 AM	1	0	1	5	2	7	1	0	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	3
4:00 AM	4	9	13	1	8	9	2	10	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	9	11
5:00 AM	11	27	38	8	20	28	10	26	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	24	34
6:00 AM	36	46	82	40	46	86	33	34	67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	36	42	78
7:00 AM	49	60	109	54	58	112	51	72	123	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	51	63	115
8:00 AM	40	60	100	40	53	93	60	54	114	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47	56	102
9:00 AM	56	63	119	58	46	104	51	58	109	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	55	56	111
10:00 AM	57	56	113	51	54	105	56	74	130	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	55	61	116
11:00 AM	56	41	97	46	55	101	59	40	99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	54	45	99
12:00 PM	102	76	178	58	52	110	65	57	122	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	75	62	137
1:00 PM	61	61	122	52	53	105	50	51	101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	54	55	109
2:00 PM	58	50	108	50	44	94	64	44	108	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	57	46	103
3:00 PM	73	59	132	49	58	107	53	61	114	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	58	59	118
4:00 PM	116	61	177	63	58	121	59	63	122	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	79	61	140
5:00 PM	90	35	125	83	35	118	81	24	105	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	85	31	116
6:00 PM	98	55	153	77	21	98	64	25	89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	80	34	113
7:00 PM	50	33	83	57	17	74	44	26	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	25	76
8:00 PM	41	13	54	37	6	43	47	28	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	42	16	57
9:00 PM	35	27	62	11	14	25	41	28	69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	29	23	52
10:00 PM	20	7	27	17	7	24	14	10	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	8	25
11:00 PM	8	10	18	5	4	9	10	14	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	9	17
Total	1,068	856	1,924	871	718	1,589	925	805	1,730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	955	793	1,748
Percent	56%	44%	-	55%	45%	-	53%	47%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	55%	45%	-

1. Mid-week average includes data between Tuesday and Thursday.



Attachment B
Detailed Calibrated Model Data Calculation Sheets

Point Ruston - PM Peak Model

11/16/2018

Test Phase

Open

Proposed Project - Person Trips

Land Use	Size	Trip Rate/Eq from 10th Edition	Vehicle Trips	Inbound %	In	Out	ITE Veh Trips	Inherent in ITE Rates				Person Trips
								AVO Rates	Vehicle Share	Person Trips	Person Trips	
221 Multi-Family (Mid-Rise) - LU 221	351 dus	$\ln(T) = 0.96\ln(X) - 0.63$	61%	90	58	148	1.15	1.21	97.3%	96.2%	179	
255 Continuing Care Retirement - LU 255	0 units	0.16 trips/unit	39%	0	0	0	1.15	1.21	97.3%	96.2%	0	
310 Hotel - LU 310	0 rooms	$T = 0.75(X) - 26.02$	51%	0	0	0	1.31	1.30	98.7%	98.0%	0	
444 Movie Theater - LU 444	729 seats	0.090 trips/seat	55%	36	30	66	2.00	2.00	100.0%	100.0%	132	
492 Health Fitness Club - LU 492	5,275 sfgfa	3.45 trips/1,000 sfgla	57%	10	8	18	1.21	1.18	100.0%	100.0%	22	
630 Clinic - LU 630	16 employees	0.85 trips/employee	36%	5	9	14	1.37	1.37	100.0%	100.0%	19	
710 General Office - LU 710	0 sfgfa	$\ln(T) = 0.95\ln(X) + 0.36$	16%	0	0	0	1.11	1.07	100.0%	99.0%	0	
712 Small Office Building - LU 712	1,386 sfgfa	2.45 trips/1,000 sfgfa	32%	1	2	3	1.11	1.07	100.0%	99.0%	3	
820 Retail - LU 820	8,128 sfgla	3.81 trips/1,000 sfgla	48%	15	16	31	1.21	1.18	100.0%	100.0%	37	
850 Supermarket - LU 850	0 sfgfa	$\ln(T) = 0.75\ln(X) + 3.21$	51%	0	0	0	1.21	1.18	100.0%	100.0%	0	
918 Hair Salon - LU 918	2,147 sfgfa	1.45 trips/1,000 sfgfa	17%	1	2	3	1.21	1.18	100.0%	100.0%	4	
931 Quality Restaurant (LU 931)	10,810 sfgfa	7.80 trips/1,000 sfgfa	67%	56	28	84	1.62	1.52	100.0%	100.0%	133	
932 High Turn Restaurant (LU 932)	14,981 sfgfa	9.77 trips/1,000 sq. ft.	62%	91	55	146	1.33	1.34	100.0%	100.0%	195	
				305	208	513					724	

27.7%

Retail (LU 820) Rate	3.81 trips/1,000 sfgla	if <25,000 sf
Retail (LU 820) Eq	$\ln(T) = 0.74\ln(X) + 2.89$	if >25,000 sf

Weighted Average Baseline AVO/Mode Adjustment

	In	Out
Office	1.333	1.273
Retail	1.231	1.192
Restaurant	1.429	1.422
Cinema	2.028	1.967
Residential	1.211	1.207
Hotel	1.000	1.000

Point Ruston - PM Peak Model

11/16/2018

Total Person Trips

Person Trip Summary	Size	PM Peak Hour		
		In	Out	Total
Multi-Family (Mid-Rise) - LU 221	351 dus	109	70	179
Continuing Care Retirement - LU 255	0 units	0	0	0
Hotel - LU 310	0 rooms	0	0	0
Movie Theater - LU 444	729 seats	73	59	132
Health Fitness Club - LU 492	5,275 sfgfa	13	9	22
Clinic - LU 630	16 employees	7	12	19
General Office - LU 710	0 sfgfa	0	0	0
Small Office Building - LU 712	1,386 sfgfa	1	2	3
Retail - LU 820	8,128 sfgla	18	19	37
Supermarket - LU 850	0 sfgfa	0	0	0
Hair Salon - LU 918	2,147 sfgfa	1	3	4
Quality Restaurant (LU 931)	10,810 sfgfa	89	44	133
High Turn Restaurant (LU 932)	14,981 sfgfa	121	74	195
Total All Person Trips		432	292	724

Total Internal Person Trips

Person Trip Summary	Size	PM Peak Hour		
		In	Out	Total
Office	14,163 sfgfa	6	3	9
Retail	15,550 sfgla	22	19	41
Restaurant	25,791 sfgfa	29	44	73
Cinema/Entertainment	729 seats	10	11	21
Residential	351 dus	29	19	48
Hotel	0 rooms	0	0	0
Total All Internal Person Trips	26.5%	96	96	192
Total All External Person Trips		336	196	532

Total Person Trips

Person Trip Summary	Size	PM Peak Hour		
		In	Out	Total
Office	14,163 sfgfa	8	14	22
Retail	15,550 sfgla	32	31	63
Restaurant	25,791 sfgfa	210	118	328
Cinema/Entertainment	729 seats	73	59	132
Residential	351 dus	109	70	179
Hotel	0 rooms	0	0	0
Total All Person Trips		432	292	724

Total Vehicle Trips (External Person Trips by Vehicle)

Person Trip Summary	Size	PM Peak Hour		
		In	Out	Total
Office	14,163 sfgfa	2	9	11
Retail	15,550 sfgla	8	10	18
Restaurant	25,791 sfgfa	127	52	179
Cinema/Entertainment	729 seats	31	24	55
Residential	351 dus	66	42	108
Hotel	0 rooms	0	0	0
Total All Person Trips		234	137	371

Point Ruston - PM Peak Model

11/16/2018

Total Vehicle Trips

Land Use	Size	PM Peak Hour Vehicle Trips		
		In	Out	Total
Multi-Family (Mid-Rise) - LU 221	351 dus	66	42	108
Continuing Care Retirement - LU 255	0 units	0	0	0
Hotel - LU 310	0 rooms	0	0	0
Movie Theater - LU 444	729 seats	31	24	55
Health Fitness Club - LU 492	5,275 sfgfa	3	3	6
Clinic - LU 630	16 sfgfa	2	8	10
General Office - LU 710	0 sfgfa	0	0	0
Small Office Building - LU 712	1,386 sfgfa	0	1	1
Retail - LU 820	8,128 sfgla	5	6	11
Supermarket - LU 850	0 sfgfa	0	0	0
Hair Salon - LU 918	2,147 sfgfa	0	1	1
Quality Restaurant (LU 931)	10,810 sfgfa	54	19	73
High Turn Restaurant (LU 932)	14,981 sfgfa	73	33	106
Total		234	137	371

Vehicle Trip Generation by Trip Component - Total Site

Land Use	Trip Component %	PM Peak Hour Vehicle Trips		
		In	Out	Total
Office				
Primary Trips	100%	2	9	11
Retail - LU 820				
Primary Trips	100%	8	10	18
Pass-by Trips	0%	0	0	0
Total	100%	8	10	18
Quality Restaurant (LU 931)				
Primary Trips	74%	40	14	54
Pass-by Trips	26%	14	5	19
Total	100%	54	19	73
High Turn Restaurant (LU 932)				
Primary Trips	70%	51	23	74
Pass-by Trips	30%	22	10	32
Total	100%	73	33	106
Cinema/Entertainment				
Primary Trips	100%	31	24	55
Residential				
Primary Trips	100%	66	42	108
Hotel				
Primary Trips	100%	0	0	0
Total Project - Vehicle Trips				
Primary Trips		198	122	320
Pass-by Trips		36	15	51
Total Project Trips		234	137	371

Note: Pass-by rates from Tables E.9 (Shopping Ctr), E.29 (Quality Restaurant), and E.30 (High-Turnover Restaurant) from the Trip Generation Handbook, 3rd Edition (Sept. 2017)

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	Point Ruston			Organization:	Heffron Transportation, Inc.
Project Location:	Tacoma & Ruston, WA			Performed By:	T.S. McBryan, P.E.
Scenario Description:	PM Peak Model - Open Uses			Date:	11/16/2018
Analysis Year:	2017			Checked By:	R.H. Frankel, E.I.T
Analysis Period:	PM Street Peak Hour			Date:	11/16/2018

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office	712, 630	10,702	sfgfa	17	6	11
Retail	492,820,918	15,550	sfgla	52	26	26
Restaurant	931,932	25,791	sfgfa	230	147	83
Cinema/Entertainment	444	729	seats	66	36	30
Residential	221	351	units	148	90	58
Hotel		-	rooms	0	0	0
All Other Land Uses ²				0		
				513	305	208

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.33	0%	0%	1.27	0%	0%
Retail	1.23	0%	0%	1.19	0%	0%
Restaurant	1.43	0%	0%	1.42	0%	0%
Cinema/Entertainment	2.03	0%	0%	1.97	0%	0%
Residential	1.21	0%	0%	1.21	0%	0%
Hotel	1.00	0%	0%	1.00	0%	0%
All Other Land Uses ²		0%	0%		0%	0%

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		500	500		500	
Retail					500	
Restaurant					500	
Cinema/Entertainment					500	
Residential		500	500			
Hotel					500	

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		2	1	0	0	0
Retail	1		9	1	8	0
Restaurant	2	16		9	17	0
Cinema/Entertainment	0	1	6		4	0
Residential	3	3	13	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	724	432	292
Internal Capture Percentage	27%	22%	33%
External Vehicle-Trips ⁵	371	234	137
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	75%	21%
Retail	69%	61%
Restaurant	14%	37%
Cinema/Entertainment	14%	19%
Residential	27%	27%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

³Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

⁴Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made.

⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

⁶Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Point Ruston
Analysis Period:	PM Street Peak Hour

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.33	6	8	1.27	11	14
Retail	1.23	26	32	1.19	26	31
Restaurant	1.43	147	210	1.42	83	118
Cinema/Entertainment	2.03	36	73	1.97	30	59
Residential	1.21	90	109	1.21	58	70
Hotel	1.00	0	0	1.00	0	0

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		3	1	0	0	0
Retail	1		9	1	8	2
Restaurant	4	48		9	21	8
Cinema/Entertainment	1	12	18		5	1
Residential	3	27	13	0		2
Hotel	0	0	0	0	0	

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		2	4	1	4	0
Retail	2		61	19	50	0
Restaurant	2	16		23	17	0
Cinema/Entertainment	0	1	6		4	0
Residential	5	3	27	0		0
Hotel	0	1	11	0	0	

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	6	2	8	2	0	0
Retail	22	10	32	8	0	0
Restaurant	29	181	210	127	0	0
Cinema/Entertainment	10	63	73	31	0	0
Residential	29	80	109	66	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	3	11	14	9	0	0
Retail	19	12	31	10	0	0
Restaurant	44	74	118	52	0	0
Cinema/Entertainment	11	48	59	24	0	0
Residential	19	51	70	42	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P
²Person-Trips
³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator
*Indicates computation that has been rounded to the nearest whole number.

Point Ruston - AM Peak Model

11/16/2018

Test Phase

Open

No AM data, used PM

Proposed Project - Person Trips

Trip Rate/Eq from 10th Edition

Inherent in ITE Rates

Land Use	Size	Vehicle Trips	Inbound %	In	Out	ITE Veh Trips	AVO Rates	Vehicle Share	Person Trips
221 Multi-Family (Mid-Rise) - LU 221	351 dus	$\ln(T) = 0.98\ln(X) - 0.98$	26%	30	87	117	1.13 1.09	96.2% 97.8%	132
255 Continuing Care Retirement - LU 255	0 units	0.14 trips/unit	65%	0	0	0	1.13 1.09	96.2% 97.8%	0
310 Hotel - LU 310	0 rooms	$T = 0.50(X) - 5.34$	59%	0	0	0	1.26 1.26	93.3% 99.0%	0
444 Movie Theater - LU 444	729 seats	0.000 trips/seat	55%	0	0	0	2.00 2.00	100.0% 100.0%	0
492 Health Fitness Club - LU 492	5,275 sfgfa	1.31 trips/1,000 sfgla	51%	4	3	7	1.17 1.16	100.0% 100.0%	8
630 Clinic - LU 630	16 employees	1.120 trips/employee	77%	14	4	18	1.37 1.37	100.0% 100.0%	25
710 General Office - LU 710	0 sfgfa	$T = 0.94(X) + 26.49$	86%	0	0	0	1.06 1.06	99.0% 100.0%	0
712 Small Office Building - LU 712	1,386 sfgfa	1.92 trips/1,000 sfgla	83%	2	1	3	1.06 1.06	99.0% 100.0%	3
820 Retail - LU 820	8,128 sfgla	0.94 trips/1,000 sfgla	62%	5	3	8	1.17 1.16	100.0% 100.0%	9
850 Supermarket - LU 850	0 sfgfa	3.82 trips/1,000 sfgla	60%	0	0	0	1.17 1.16	100.0% 100.0%	0
918 Hair Salon - LU 918	2,147 sfgfa	1.21 trips/1,000 sfgla	83%	2	1	3	1.17 1.16	100.0% 100.0%	4
931 Quality Restaurant (LU 931)	10,810 sfgfa	0.73 trips/1,000 sfgla	67%	5	3	8	1.62 1.52	100.0% 100.0%	13
932 High Turn Restaurant (LU 932)	14,981 sfgfa	9.94 trips/1,000 sq. ft.	55%	65	54	119	1.33 1.34	100.0% 100.0%	159
				127	156	283			353

Weighted Average Baseline AVO/Mode Adjustment

	In	Out
Office	1.313	1.400
Retail	1.182	1.143
Restaurant	1.371	1.333
Cinema		
Residential	1.133	1.126
Hotel	1.000	1.000

Point Ruston - AM Peak Model

11/16/2018

Total Person Trips

Person Trip Summary	Size	AM Peak Hour		
		In	Out	Total
Multi-Family (Mid-Rise) - LU 221	351 dus	34	98	132
Continuing Care Retirement - LU 255	0 units	0	0	0
Hotel - LU 310	0 rooms	0	0	0
Movie Theater - LU 444	729 seats	0	0	0
Health Fitness Club - LU 492	5,275 sfgfa	4	4	8
Clinic - LU 630	16 sfgfa	19	6	25
General Office - LU 710	0 sfgfa	0	0	0
Small Office Building - LU 712	1,386 sfgfa	2	1	3
Retail - LU 820	8,128 sfgla	6	3	9
Supermarket - LU 850	0 sfgfa	0	0	0
Hair Salon - LU 918	2,147 sfgfa	3	1	4
Quality Restaurant (LU 931)	10,810 sfgfa	9	4	13
High Turn Restaurant (LU 932)	14,981 sfgfa	87	72	159
Total All Person Trips		164	189	353

Total Internal Person Trips

Person Trip Summary	Size	AM Peak Hour		
		In	Out	Total
Office	1,402 sfgfa	5	6	11
Retail	15,550 sfgla	4	3	7
Restaurant	25,791 sfgfa	24	6	30
Cinema/Entertainment	729 seats	0	0	0
Residential	351 dus	3	21	24
Hotel	0 rooms	0	0	0
Total All Internal Person Trips	20.4%	36	36	72
Total All External Person Trips		128	153	281

Total Person Trips

Person Trip Summary	Size	AM Peak Hour		
		In	Out	Total
Office	1,402 sfgfa	21	7	28
Retail	15,550 sfgla	13	8	21
Restaurant	25,791 sfgfa	96	76	172
Cinema/Entertainment	729 seats	0	0	0
Residential	351 dus	34	98	132
Hotel	0 rooms	0	0	0
Total All Person Trips		164	189	353

Total Vehicle Trips (External Person Trips by Vehicle)

Person Trip Summary	Size	AM Peak Hour		
		In	Out	Total
Office	1,402 sfgfa	12	1	13
Retail	15,550 sfgla	8	4	12
Restaurant	25,791 sfgfa	53	53	106
Cinema/Entertainment	729 seats			
Residential	351 dus	27	68	95
Hotel	0 rooms	0	0	0
Total All Person Trips		100	126	226

Point Ruston - AM Peak Model

11/16/2018

Total Vehicle Trips

Land Use	Size	AM Peak Hour Vehicle Trips		
		In	Out	Total
Multi-Family (Mid-Rise) - LU 221	351 dus	27	68	95
Continuing Care Retirement - LU 255	0 units	0	0	0
Hotel - LU 310	0 rooms	0	0	0
Movie Theater - LU 444	729 seats			
Health Fitness Club - LU 492	5,275 sfgfa	2	3	5
Clinic - LU 630	16 sfgfa	11	1	12
General Office - LU 710	0 sfgfa	0	0	0
Small Office Building - LU 712	1,386 sfgfa	1	0	1
Retail - LU 820	8,128 sfgla	5	0	5
Supermarket - LU 850	0 sfgfa	0	0	0
Hair Salon - LU 918	2,147 sfgfa	1	1	2
Quality Restaurant (LU 931)	10,810 sfgfa	5	3	8
High Turn Restaurant (LU 932)	14,981 sfgfa	48	50	98
Total		100	126	226

Vehicle Trip Generation by Trip Component - Total Site

Land Use	Trip Component %	AM Peak Hour Vehicle Trips		
		In	Out	Total
Office				
Primary Trips	100%	12	1	13
Retail - LU 820				
Primary Trips	100%	8	4	12
Pass-by Trips	0%	0	0	0
Total	100%	8	4	12
Quality Restaurant (LU 931)				
Primary Trips	74%	4	2	6
Pass-by Trips	26%	1	1	2
Total	100%	5	3	8
High Turn Restaurant (LU 932)				
Primary Trips	70%	34	35	69
Pass-by Trips	30%	14	15	29
Total	100%	48	50	98
Cinema/Entertainment				
Primary Trips	100%	0	0	0
Residential				
Primary Trips	100%	27	68	95
Hotel				
Primary Trips	100%	0	0	0
Total Project - Vehicle Trips				
Primary Trips		85	110	195
Pass-by Trips		15	16	31
Total Project Trips		100	126	226

Note: Pass-by rates same as for PM peak hour and sourced from Tables E.9 (Shopping Ctr), E.29 (Quality Restaurant), and E.30 (High-Turnover Restaurant) from the Trip Generation Handbook, 3rd Edition (Sept. 2017)

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	Point Ruston			Organization:	Heffron Transportation, Inc.
Project Location:	Tacoma & Ruston, WA			Performed By:	T.S. McBryan, P.E.
Scenario Description:	AM Peak Model - Open Uses			Date:	11/16/2018
Analysis Year:	2017			Checked By:	R.H. Frankel, E.I.T
Analysis Period:	AM Street Peak Hour			Date:	11/16/2018

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office	712, 630	10,702	sfgfa	21	16	5
Retail	492,820,918	15,550	sfgla	18	11	7
Restaurant	931,932	25,791	sfgfa	127	70	57
Cinema/Entertainment	444	729	seats	0	0	0
Residential	221	351	units	117	30	87
Hotel		-	rooms	0	0	0
All Other Land Uses ²				0		
				283	127	156

Table 2-A: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.31	0%	0%	1.40	0%	0%
Retail	1.18	0%	0%	1.14	0%	0%
Restaurant	1.37	0%	0%	1.33	0%	0%
Cinema/Entertainment	0.00	0%	0%	0.00	0%	0%
Residential	1.13	0%	0%	1.13	0%	0%
Hotel	1.00	0%	0%	1.00	0%	0%
All Other Land Uses ²		0%	0%		0%	0%

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		500	500		500	
Retail					500	
Restaurant					500	
Cinema/Entertainment					500	
Residential		500	500			
Hotel					500	

Table 4-A: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		2	4	0	0	0
Retail	1		1	0	1	0
Restaurant	3	1		0	2	0
Cinema/Entertainment	0	0	0		0	0
Residential	1	1	19	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	353	164	189
Internal Capture Percentage	20%	22%	19%
External Vehicle-Trips ⁵	226	100	126
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	24%	86%
Retail	31%	38%
Restaurant	25%	8%
Cinema/Entertainment	N/A	N/A
Residential	9%	21%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

³Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

⁴Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

⁶Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Point Ruston
Analysis Period:	AM Street Peak Hour

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.31	16	21	1.40	5	7
Retail	1.18	11	13	1.14	7	8
Restaurant	1.37	70	96	1.33	57	76
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.13	30	34	1.13	87	98
Hotel	1.00	0	0	1.00	0	0

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		2	4	0	0	0
Retail	2		1	0	1	0
Restaurant	24	11		0	3	2
Cinema/Entertainment	0	0	0		0	0
Residential	2	1	20	0		0
Hotel	0	0	0	0	0	

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		4	22	0	0	0
Retail	1		48	0	1	0
Restaurant	3	1		0	2	0
Cinema/Entertainment	0	0	0		0	0
Residential	1	2	19	0		0
Hotel	1	1	6	0	0	

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	5	16	21	12	0	0
Retail	4	9	13	8	0	0
Restaurant	24	72	96	53	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	3	31	34	27	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	6	1	7	1	0	0
Retail	3	5	8	4	0	0
Restaurant	6	70	76	53	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	21	77	98	68	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A
²Person-Trips
³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator
*Indicates computation that has been rounded to the nearest whole number.

Matt Cyr

From: Kidd, Brennan <bkidd@ci.tacoma.wa.us>
Sent: Tuesday, November 20, 2018 1:24 PM
To: Tod McBryan; Matt Cyr
Cc: Spadoni, Lisa; Johnson, David (PDS); Kammerzell, Jennifer; Robert Fredrick
Subject: RE: Response to Comments - Point Ruston 2017-18 Trip Generation Model Baselineing

Thanks, Tod. I appreciate the follow-up and your explanations make sense; everything now looks good from Traffic's perspective.

Brennan

Brennan D. Kidd, PE, PTOE

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From: Tod McBryan [mailto:tod@hefftrans.com]
Sent: Tuesday, November 20, 2018 1:20 PM
To: Kidd, Brennan <bkidd@ci.tacoma.wa.us>; Matt Cyr <MattC@pointruston.com>
Cc: Spadoni, Lisa <lspadoni@ci.tacoma.wa.us>; Johnson, David (PDS) <DJohnson2@ci.tacoma.wa.us>; Kammerzell, Jennifer <jkammerzell@ci.tacoma.wa.us>; Robert Fredrick <Robert@mcconstruction.com>
Subject: RE: Response to Comments - Point Ruston 2017-18 Trip Generation Model Baselineing

Good afternoon Brennan and thank you for the quick review.

I have responded to your comments/questions in red below and made the referenced changes to the document. The final stamped version is attached.

- P.5: Table 1 still references the "72-Hour Machine Counts" although per our discussions, and other associated edits already shown, the memo will just reference the data from 48-hours of counts **Thank you. Yes, I have removed that reference to 72-hour from Table 1.**
- P.10: I would argue against using the term "arbitrarily" [reduced]—I presume there was a basis for assuming a reduced internalization percentage at the time of the FEIS review/approval (before my time at the City)—likely relating to taking a conservative approach (i.e., erring on the side of expected more external vehicle trips) to an unknown mixed use development. Now that the development has reached a certain critical mass with ground-truth driveway counts confirming support for a trip generation model that meets current industry standards of practice, an actual internal capture rate that is nearly the same as originally proposed in the FEIS now has the support going forward. **Understood, the FSEIS did not explain or provide a reason for the reduction. I have revised the text to simply state that it was reduced to the conservatively low value of 13%.**
- P.12: confirm the discussion of pass-by trips for restaurants is just for information and further detail—it does not change the number of external (driveway) trips generated by the development, which is the metric for threshold traffic mitigation per the FSEIS. **I have added a short paragraph just prior to Table 6 that indicates the pass-by estimates are provided for information and possible future use in evaluating off-site roadway conditions or operations, but are not used for assessing the established mitigation triggers.**

- Per Table 5, any speculation on the underestimation by the model for the outbound PM peak hour trips (model says 137 but counts say 168)? Any methodology assumptions that would influence this result to try and make it more representative (I know the total trips is close enough to the mark).

In reviewing the in/out splits for the model results, there are likely a couple reasons that they are not matching precisely.

First, as we noted, we did not attempt to extract any construction worker trips that may have occurred and been counted in the AM or PM peaks. Those would likely increase the AM inbound trips and the PM outbound trips (both of which show up as higher in the counts than the model).

Second, the time of peak hour is likely a factor as well. For example, the selected PM peak hour volume (375 trips) was the average of the two highest values on each day between 4 and 6 pm. One occurred at 4:00 and the other at 4:30 p.m. At those times, the actual inbound percentages for uses like restaurant and movie theater are likely lower than a bit later. In reviewing the average of the counts at 5:00 PM, the total volume is lower (356 trips), but the in/out split (65% in) is a closer match to the modeled result of 63% in. We have elected to use the higher (more conservative) total counted volumes for calibration rather than a lower value with matching in/out splits. I have added a note to Table 5 to acknowledge the differences and explain the likely cause.

Thanks!

Tod

Tod S. McBryan, PE

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phone: 206.527.8410 | email: tod@hefftrans.com

From: Kidd, Brennan <bkidd@ci.tacoma.wa.us>

Sent: Tuesday, November 20, 2018 11:21 AM

To: Matt Cyr <MattC@pointruston.com>; Tod McBryan <tod@hefftrans.com>

Cc: Spadoni, Lisa <lspadoni@ci.tacoma.wa.us>; Johnson, David (PDS) <DJohnson2@ci.tacoma.wa.us>; Kammerzell, Jennifer <jkammerzell@ci.tacoma.wa.us>; Robert Fredrick <Robert@mcconstruction.com>

Subject: RE: Response to Comments - Point Ruston 2017-18 Trip Generation Model Baselineing

Matt, Tod, et al,

On behalf of Traffic Engineering, I have reviewed the supplied updated information concerning the “baselining” of the Point Ruston development’s site-generated trips. The following are my only comments which can be addressed in email reply or incorporation into the final sealed/signed memo:

- P.5: Table 1 still references the “72-Hour Machine Counts” although per our discussions, and other associated edits already shown, the memo will just reference the data from 48-hours of counts
- P.10: I would argue against using the term “arbitrarily” [reduced]—I presume there was a basis for assuming a reduced internalization percentage at the time of the FEIS review/approval (before my time at the City)—likely relating to taking a conservative approach (i.e., erring on the side of expected more external vehicle trips) to an unknown mixed use development. Now that the development has reached a certain critical mass with ground-truth driveway counts confirming support for a trip generation model that meets current industry standards of practice, an actual internal capture rate that is nearly the same as originally proposed in the FEIS now has the support going forward.
- P.12: confirm the discussion of pass-by trips for restaurants is just for information and further detail—it does not change the number of external (driveway) trips generated by the development, which is the metric for threshold traffic mitigation per the FSEIS.
- Per Table 5, any speculation on the underestimation by the model for the outbound PM peak hour trips (model says 137 but counts say 168)? Any methodology assumptions that would influence this result to try and make it more representative (I know the total trips is close enough to the mark).

Brennan

Brennan D. Kidd, PE, PTOE

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From: Matt Cyr [<mailto:MattC@pointruston.com>]

Sent: Tuesday, November 20, 2018 7:37 AM

To: Kidd, Brennan <bkidd@ci.tacoma.wa.us>; Spadoni, Lisa <lspadoni@ci.tacoma.wa.us>

Cc: Johnson, David (PDS) <DJohnson2@ci.tacoma.wa.us>; Kammerzell, Jennifer <jkammerzell@ci.tacoma.wa.us>; Robert Fredrick <Robert@mcconstruction.com>; Tod McBryan <tod@hefftrans.com>

Subject: Response to Comments - Point Ruston 2017-18 Trip Generation Model Baselineing

Importance: High

Brennan and Lisa:

Attached are the following trip generation methodology documents prepared by Heffron Transportation for your review:

- 1) A response to comments memo addressing City comments dated October 18, 2018.
- 2) A clean updated version of the Trip Generation & Calibration Tech Memo
- 3) A 'track changes' version of the Trip Generation & Calibration Tech Memo to help expedite the City's review of the updated memo.

We thank you in advance for expediting the review of this response. To further expedite this review we ask that the City contact Tod McBryan at Heffron Transportation with any comments or questions as they arise. Tod can be reached at 206-527-8410. After the City has completed their review, we will provide a stamped final memo.

Thank you,

Matt Cyr

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