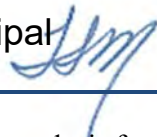


TECHNICAL MEMORANDUM

Project: 2nd & Bell Mixed-Use Project SDCI #3033958-EG
Subject: Transportation Impact Analysis
Date: May 15, 2020
Author: Tod S. McBryan, P.E., Principal 

This technical memorandum presents the transportation impact analysis for the proposed 2nd & Bell Mixed-Use Project SDCI #3033958-EG. It includes a description of the project, the estimated net change in site-generated traffic, and parking demand estimates.

1. Project Description

The project site consists of three adjacent parcels located at 2214, 2016, and 2224 – 2nd Avenue between Blanchard and Bell Streets in Seattle’s Belltown neighborhood. The site is currently occupied by buildings that contain a collection of bars and restaurants (19,240 square feet (sf)), office space (8,500 sf), and 12 apartment units.¹ The site is bounded by 2nd Avenue, an alley, and privately-owned parcels. Figure 1 shows the project site location and vicinity.

Figure 1. Site Vicinity

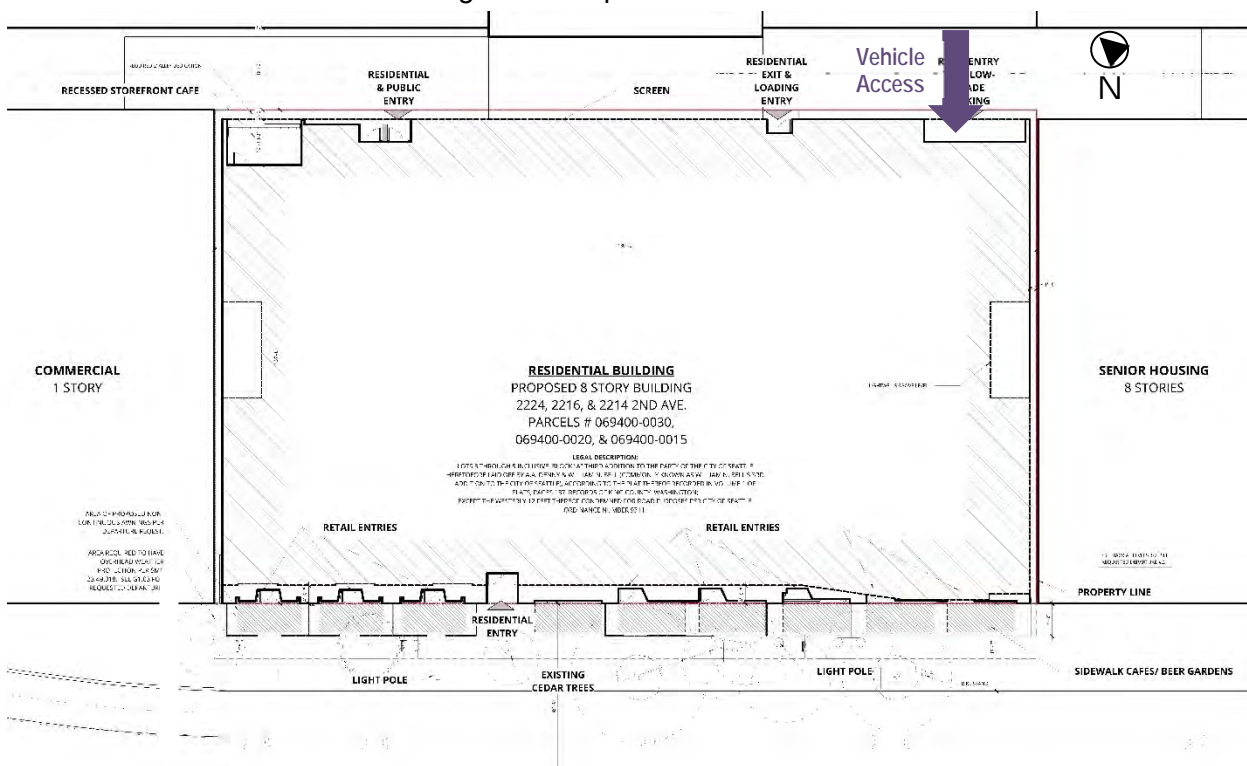


Source: Google Earth, May 2020.

¹ Existing uses and building areas from King County Assessor website data, accessed April 2020.

The proposed project would demolish the existing buildings on site and construct a new eight-story mixed-use building with 175 residential units, about 8,500 sf of neighborhood commercial space, and on-site parking for 85 vehicles accessed from a driveway on the alley. The residential component is planned to consist of 28 studio units, 135 one-bedroom units, and 12 two-bedroom units; the commercial space could be leased as neighborhood retail and/or restaurant/pub spaces. The proposed site plan with its access location is shown in Figure 2.

Figure 2. Proposed Site Plan



Source: Ankrom Moisan Architects, Inc. Coordination Progress Set, Sheet A1.01, April 1, 2020.

2. Trip Generation Estimates

Trip estimates for the project were determined using procedures set forth in the *Trip Generation Handbook*.² The Institute of Transportation Engineers (ITE) recognizes that development projects located in urban environments generate fewer trips than those in suburban settings, and recommends processes to account for non-vehicle trips being made to, from and within a site because it is:

- *Surrounded by compact urban development with nearby complementary land uses (infill site);*
- *Consists of a mix of complementary land uses in any part of an urban region (mixed-use development);*
- *Is served by public transit, in particular if designed specifically to capitalize on transit access to the site (transit-friendly development);*

² Institute of Transportation Engineers, *Trip Generation Handbook*, 3rd Edition, September 2017.

- Is served by corporate transit or corporate-sponsored ridesharing programs designed to improve employee commute options and reduce site-generated parking demand and peak hour traffic; or
- Is in an area that has a noticeable amount of walking and bicycling activity or an area planned for promotion of non-motorized travel (as examples, sites in urban core areas or sites near schools and senior centers).³

The proposed project is considered a “multimodal” site based on these attributes; therefore, the following approach recommended in the *Trip Generation Handbook* was used to estimate trips for each mode of travel.

- Estimate the number of person trips for each land use;
- Estimate the person trips by mode of travel using the local mode of travel factors; and
- Convert the person trips by vehicle into adjusted vehicle trips using the local vehicle occupancy rates for the site.

Each of these steps is described in the following sections. It should be noted that the 10th edition of the *Trip Generation Manual*—released in September 2017—also provides rates and equations for direct calculation of person-trips for some land uses. For the residential trips, the person-trips were also calculated by applying the direct equations and compared to the results using the conversion process described above.

It is noted that the project is also defined as an “Infill” and “Mixed-Use” site by ITE, and it is expected that some internal trips among the site’s uses as well as to and from nearby uses would occur. However, to be conservative, no adjustments were made for internal trips.

2.1. Baseline Trip Generation Factors

Trip generation rates and equations for the following uses were applied to the proposed project and the existing site.

Proposed Project Uses

- Multifamily Housing (Mid-Rise) (221)
- High-Turnover Sit-Down Restaurant (932)

Existing Site Uses

- High-Turnover Sit-Down Restaurant (932)
- Multifamily Housing (Low-Rise) (220)
- General Office (710)

Since the proposed commercial space could be leased in part or entirely as retail, office, or any variety of restaurant spaces (e.g. quality, high-turnover, or fast casual), for this analysis, it was assumed to be entirely leased as high-turnover site-down restaurant space. This provides a conservative worst-case scenario for estimating trip generation.

For the existing collection of bars, restaurants, and taverns, the same high-turnover sit-down restaurant rates were applied. These rates represent a reasonable mid-range for the purpose of estimating trip generation credits for the uses to be removed (e.g. Drinking Place (Land Use 925), Fast Casual Restaurant (Land Use 930), Quality Restaurant (Land Use 931), and Fast Food (Land Use 934)).

Table 1 summarizes the baseline trip generation rates and equations, average vehicle occupancy (AVO) factors, and mode share rates used to estimate person trips for the proposed project, as well as the trips that would be removed with the demolition and removal of existing uses.

³ Institute of Transportation Engineers, *Trip Generation Handbook, 3rd Edition, September 2017, page 11.*

Table 1. Baseline Trip Generation Rates, Equations and AVO 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) – 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). Equations were applied for a General Urban/Suburban setting.					
Daily	$T = 5.45(X) - 1.75$	1.14	1.15	98%	98%
AM Peak Hour	$\ln(T) = 0.98 \ln(X) - 0.98$	1.13	1.09	96%	98%
PM Peak Hour	$\ln(T) = 0.96 \ln(X) - 0.63$	1.15	1.21	97%	96%
High-Turnover Sit-Down Restaurant (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.					
Daily	112.18 trips / 1,000 sfgfa	1.33	1.34	100%	100%
AM Peak Hour	0.98 trips / 1,000 sfgfa ^c	1.33	1.34	100%	100%
PM Peak Hour	9.77 trips / 1,000 sfgfa	1.33	1.34	100%	100%
General Office (710) – An office building that may houses a mixture of tenants including professional services, insurance companies, investment brokers and/or tenant services. Because of the small size compared to the range of ITE study sites, average rates were used.					
Daily	9.74 trips/1,000 sfgfa	1.09	1.07	97%	98%
AM Peak Hour	1.16 trips/1,000 sfgfa	1.06	1.06	99%	100%
PM Peak Hour	1.15 trips/1,000 sfgfa	1.11	1.07	100%	99%
Multifamily Housing (Low-Rise) (220) – Rental dwelling units located within the same building with at least three other dwelling units on one or two levels.					
Daily	$T = 7.56(X) - 40.86$	1.14	1.15	98%	98%
AM Peak Hour	$\ln(T) = 0.95(X) - 0.51$	1.13	1.09	96%	98%
PM Peak Hour	$\ln(T) = 0.89(X) - 0.02$	1.15	1.21	97%	96%

- Source: Institute of Transportation Engineers (ITE) Trip Generation, 10th Edition, 2017. For residential equations, T = number of trips, X = number of dwelling units; for commercial rates, sfgfa = square feet gross floor area.
- 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. Daily AVO rate and/or vehicle trip % estimated by Heffron Transportation based upon the AM and PM peak hour rates.
- Since the existing restaurants, taverns, and pubs on the site are generally not open for breakfast, 10% of the morning trip generation rate was applied. This was also applied for the proposed project.

2.2. Trips Generated by Proposed Project

Person Trips

The total numbers of “person trips” generated by each of the program elements were determined using trip generation rates, equations, and information about the inherent mode of travel and number of persons per vehicle summarized in Table 1. The resulting estimates of person trips are summarized for each site component and the overall combined project in Table 2.

Table 2. Estimated Total **Person** Trips Generated – Proposed 2nd and Bell Mixed-Use Project

Land Use	Size	Daily Trips	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Multifamily Housing (Mid-Rise) (LU 221)	175 units	1,110	17	50	67	56	36	92
High-Turnover (Sit-Down) Restaurant (LU 932)	8,500 sf	1,270	6	5	11	69	42	111
Total All Person Trips		2,380	23	55	78	125	78	203

Source: Heffron Transportation, Inc., April 2020. Trips estimated using procedures in the ITE Trip Generation Handbook, 2017.
 LU = Land Use Code from the ITE Trip Generation Manual.

As described previously, the 10th edition of the *Trip Generation Manual* also provides rates and equations for direct calculation of person-trips for some land uses and analysis periods, including AM and PM peak hour equations for the Multifamily Housing (Mid-Rise) General Urban/Suburban use.⁴ Application of the person-trip equations to the proposed 175 units results in estimates comparable to the Table 2 estimates that were derived by converting from baseline vehicle trips. However, very little person-trip data are available for the restaurant use, so baseline vehicle trips for all uses and analysis periods were converted to person trips by applying the ITE procedure described above.

Mode of Travel and Local Vehicle Occupancy

The Belltown neighborhood has the infrastructure to support strong proportions of walking and transit trips, including services, transit service, and limited parking. Mode-of-travel data for the site were derived from ‘Journey-to-Work’ survey results from the year 2010 Census compiled by the PSRC. From these surveys, results for residents living in and employees working in Transportation Analysis Zones (TAZs) 119 and 122 (the zones that include and surround the project site) were applied. The data indicate that more than 44% of residents living in these zones walk or bike to work or work from home, about 16.5% use transit, and the remaining 39% drive, carpool, or use a taxi (or Transportation Network Company (TNC) such as Uber, Lyft, or town cars).

The 2010 Census information does not include data for commercial uses. Therefore, estimates for the restaurant space mode-of-travel data were based on the percentages of walking, biking, and transit usage for residents in the area. The restaurants are expected to draw customers from the local vicinity with some walking, biking, or using transit (estimated total of 55%). The remaining 45% was assumed to occur in automobiles.

To estimate the number of vehicle trips generated by the project, the total number of person trips estimated to be made in vehicles was divided by the local AVO rate for each of the proposed land uses. The local AVO rate for the proposed residential units was derived from the PSRC ‘Journey-to-Work’ survey results described previously. The survey data indicate an AVO rate of 1.11 would apply to the residential trips in this location in the Belltown neighborhood. The same AVO rates presented previously and used to estimate person trips for the restaurant space were applied to estimate vehicle trips.

Table 3 summarizes the proposed project’s person trips by mode of travel. Person trips by vehicle were converted to vehicle trips by applying the local AVO rates described above. As shown, the project is expected to generate about 820 vehicle trips per day, with 26 vehicle trips during the AM peak hour and 70 vehicle trips during the PM peak hour.

⁴ ITE, Multifamily Housing (Mid-Rise) (Land Use Code 221, General Urban/Suburban): Person trip ends versus dwelling units for AM peak hour of adjacent street: $\text{Ln}(T) = 0.86 \text{Ln}(X) - 0.23$; for PM peak hour of adjacent street: $T = 0.48(X) + 9.24$. September 2017.

Table 3. Mode Shares and **Vehicle Trip Estimates** for 2nd and Bell Mixed Use Project

Type of Trip by Mode	% of Trips	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
			In	Out	Total	In	Out	Total
PERSON TRIPS								
Residential								
Walk, Bike, & Other Trips	44.4%	500	7	23	30	25	16	41
Transit Trips	16.5%	180	3	8	11	9	6	15
Person Trips by Vehicle	39%	430	7	19	26	22	14	36
Total Person Trips	100%	1,110	17	50	67	56	36	92
Restaurant								
Walk, Bike, & Other Trips	45%	570	2	3	5	31	19	50
Transit Trips	10%	130	1	0	1	7	4	11
Person Trips by Vehicle	45%	570	3	2	5	31	19	50
Total Person Trips	100%	1,270	6	5	11	69	42	111
Total Person Trips								
Walk, Bike, & Other Trips	45%	1,070	9	26	35	56	35	91
Transit Trips	10%	310	4	8	12	16	10	26
Person Trips by Vehicle	45%	1,000	10	21	31	53	33	86
Total Person Trips	100%	2,380	23	55	78	125	78	203
VEHICLE TRIPS ¹								
Residential	175 units	390	6	17	23	20	13	33
Restaurant	8,500 sfgfa	430	2	1	3	23	14	37
Total Vehicle Trips		820	8	18	26	43	27	70

Source: Heffron Transportation, Inc., May 2020.

1. Vehicle trips calculated by applying the local AVO for each land use to the person trips by vehicle. Local residential AVO of 1.11 was derived from PSRC Journey-to-Work data; restaurant local AVOs were assumed to be the same as baseline AVOs.

2.3. Estimated Trips Generated by Existing Uses to be Removed

Trip estimates for the existing buildings that would be removed were calculated using the same methods described above. The two existing buildings have commercial space on two floors totaling about 28,700 sf (about 19,000 sf on the ground floor and 9,700 sf on level 2)⁵ and 12 apartment units.⁶ Based on King County Assessor data and building information provided by the project team, the existing restaurant, tavern, and pub spaces total 19,240 sf and consist of Rocco’s (a pizza restaurant), Lava Lounge (bar/tavern), Neon Boots (bar/tavern), Shorty’s (bar/tavern), Rabbit Hole (bar/tavern), and Tula’s Jazz Club. There is also about 8,500 sf of office space. The trip generation rates and approach described previously were applied to the three types of existing uses using the same mode-share and AVO rates.

⁵ Ankrom Moisan Architecture, March 2020.

⁶ King County Assessor, Online Property Records, accessed, April 2020.

Table 4 summarizes the estimated person trips by mode of travel, as well as vehicle trip estimates for the existing uses to be removed. As shown, it is projected that the existing site uses generate about 1,040 vehicle trips per day, with 18 trips during the AM peak hour and 95 trips during the PM peak hour.

Table 4. Mode Shares and Vehicle Trip Estimates for Existing Uses to be Removed

Type of Trip by Mode	% of Trips	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
			In	Out	Total	In	Out	Total
PERSON TRIPS								
Residential								
Walk, Bike, & Other Trips	44.4%	30	1	2	3	3	2	5
Transit Trips	16.5%	10	0	1	1	1	1	2
Person Trips by Vehicle	39%	20	1	2	3	3	1	4
Total Person Trips	100%	60	2	5	7	7	4	11
Restaurant								
Walk, Bike, & Other Trips	45%	1,290	6	5	11	70	43	113
Transit Trips	10%	290	2	1	3	16	9	25
Person Trips by Vehicle	45%	1,300	6	5	11	70	43	113
Total Person Trips	100%	2,880	14	11	25	156	95	251
Office								
Walk, Bike, & Other Trips	13%	10	0	1	1	1	0	1
Transit Trips	24%	20	3	0	3	0	3	3
Person Trips by Vehicle	63%	60	6	1	7	1	6	7
Total Person Trips	100%	90	9	2	11	2	9	11
Total Person Trips								
Walk, Bike, & Other Trips	42%	1,330	7	8	15	74	45	119
Transit Trips	12%	320	5	2	7	17	13	30
Person Trips by Vehicle	46%	1,380	13	8	21	74	50	124
Total Person Trips	100%	3,030	25	18	43	165	108	273
VEHICLE TRIPS¹								
Residential	12 units	20	1	2	3	3	1	4
Restaurant	19,240 sfgfa	970	5	4	9	53	32	85
Office	8,500 sfgfa	50	5	1	6	1	5	6
Total Vehicle Trips		1,040	11	7	18	57	38	95

Source: Heffron Transportation, Inc., May 2020.

1. Vehicle trips calculated by applying the local AVO for each land use to the person trips by vehicle. Local residential and office AVOs of 1.11 and 1.12, respectively, were derived from PSRC Journey-to-Work data; restaurant local AVOs were assumed to be the same as baseline AVOs.

2.4. Net Change in Site Trips

The net new trips expected to be generated by the project consist of the total project-generated trips less the estimated number of trips that could be generated by the existing uses to be removed. The net change in vehicle trips is summarized in Table 5. As shown, the proposed project is anticipated to generate 220 fewer vehicle trips per day and 25 fewer PM peak hour trips. Due to the increase in residential units, the site is expected to generate a net increase of 8 AM peak hour trips.

Table 5. Net New Vehicle Trips

Land Use	Daily Trips	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Proposed Project	820	8	18	26	43	27	70
Existing Uses (To Be Removed)	1,040	11	7	18	57	38	95
Net Change in Site Generated Trips	-220	-3	11	8	-14	-11	-25

Source: Heffron Transportation, Inc., May 2020.

3. Parking Supply and Demand

The proposed 2nd and Bell mixed-use building would have 85 on-site spaces available for residents, which reflects a parking supply ratio of about 0.49 spaces per unit. Although a large portion of residents (estimated at over 44%) are expected to walk or ride transit for their commutes, some may also own vehicles that could be stored on the site during the workday. Per Seattle Municipal Code (SMC) section 23.49.019, no specific number of vehicle parking stalls is required for the project because it is in a Downtown zone (DMR/R).

The project’s residential parking demand was estimated using King County’s *Right-Size-Parking Calculator V2.0*. This tool, originally developed by King County Metro in 2012 and updated in 2017, estimates parking demand based on several factors including site location, unit size, and availability of transit service. The County recognized that constructing too much parking supply can result in higher levels of automobile ownership, vehicle travel, congestion, and development costs. With a grant from the Federal Highway Administration, Metro compiled overnight parking occupancy information at more than 200 multi-family developments in King County over the winter and spring of 2012 and 75 more buildings in 2017. King County Metro then developed a statistical model⁷ to estimate parking use based on building and environmental characteristics.

The *Right-Size-Parking* model covers parcels within King County including the 2nd and Bell project site; therefore, it can be directly applied to the project. The site location, proposed unit mix, unit sizes, estimated rental rates provided by the applicant, and unbundled parking cost ranging from \$50 to \$250 per month were entered into the *Right-Size-Parking* calculator. Based on these project details and the specific characteristics of the area that surrounds the site, the *Right-Size-Parking* model predicts a parking demand ratio of up to 0.33 to 0.40 vehicles per unit (results attached). At this rate, the proposed 175 apartment units would have a peak parking demand of 58 to 70 vehicles overnight, all of which could be accommodated by the proposed on-site parking supply.

⁷ King County Metro, <http://www.rightsizeparking.org/>, accessed May 2020. The model was built using regression analysis with a dependent variable of observed vehicles per occupied residential unit (parking/unit ratio) and nine independent variables: unit size, occupied bedrooms, average rent, parking price, parking stalls, percent affordable units, and gravity measures of employment, population, and transit. The resulting model, based on local data, has an R-squared correlation value of 0.85 (85% of the variation observed in parking use can be explained through the nine variables).

Parking demand for the commercial space was estimated using rates published by ITE in its *Parking Generation* (5th Edition, 2019) for High-Turnover Restaurant (Land Use 932). The rates were adjusted to account for the proportion of trips expected to be made by non-auto modes. Based on these calculations, the commercial space could generate a peak parking demand of up to 53 vehicles, which would peak in the evening. This is about half of the peak parking demand generated by the site's existing uses, which reduces the site's parking overspill to on-street or other off-street parking in the neighborhood.

4. Transportation Management Plan (TMP)

Seattle Municipal Code (SMC) SMC 23.49.019.J states that a TMP will be required when a development is expected to generate 50 or more employee SOV trips in any one PM peak hour (J1), or for a multifamily development that is expected to generate 50 or more vehicle trips in any one PM peak hour or generates overflow parking demand to area streets of 25 or more vehicles (J2). Compared to the existing uses on site that would be removed, the proposed project would result in an estimated net reduction in PM peak hour trips and reduced parking demand overflow to area streets. Even if the new apartments are considered as a new use, the residential component of the project would not generate more than 50 trips and would have no overspill parking impact. Therefore, none of the thresholds would be exceeded by the project, and no TMP would be required.

5. Summary

The proposed project is estimated to generate a net decrease of about 220 vehicle trips per day, with an increase of 8 trips during the AM peak hour, and a decrease of 25 trips during the PM peak hour. The project's on-site parking is expected to accommodate all of its estimated residential demand. The peak demand for the commercial space is forecast to occur at on-street spaces near the site or within available off-street parking in the vicinity and is expected to be less than that generated by the existing uses on the site that would be removed. Overall, the project is not expected to adversely affect transportation conditions in the site vicinity and no transportation mitigation would be required.

Attachments: King County Right-Size Parking Calculator Results

TSM/tsm

2nd and Bell MU Trans Tech Memo - FINAL



King County Multi-Family Residential Parking Calculator V2.0

TOOLS TO BALANCE SUPPLY

Enter a location...



Parking/Unit Ratio (Number of Stalls/Unit)

>0.50 ≤1.22

3 Parcels Selected

Parking/Unit Ratio

0.4

PIN / Address	Size (Sq. Ft.)	Strength of Estimate	Estimated Parking Use Ratio
0694000015 2214 2ND AVE	3,240		0.41
0694000020 2218 2ND AVE	9,719		0.41
0694000030 2224 2ND AVE	6,481		0.4

- Building & Parking Specifications
- Location Characteristics
- Parking Impacts

The preset values below represent subregional (CBD, Urban and Suburban) average/median values (from field work) for building (with no affordable units) and parking specifications. These represent the default values, as a starting point, for which parking use ratios are estimated. Scroll down to view parking optimization estimates and guidance on unbundled and affordable housing options.

	NUMBER OF UNITS	AVERAGE RENT (\$)	RESIDENTIAL AREA (SQ FT)
STUDIOS:	28	\$1,820	455
1 BEDROOMS:	135	\$2,250	585
2 BEDROOMS:	12	\$3,006	925
3+ BEDROOMS:	0	\$0	0
TOTAL:	175	\$2,233	102,815

AFFORDABLE UNITS: 0

PARKING

PARKING STALLS: 85

↑ Parking Oversupplied for this price.

PRICE PER STALL (\$/MO): \$50





King County Multi-Family Residential Parking Calculator V2.0

TOOLS TO BALANCE SUPPLY

Enter a location...



Parking/Unit Ratio (Number of Stalls/Unit)

>0.50 ≤1.22

3 Parcels Selected

Parking/Unit Ratio

0.34

PIN / Address	Size (Sq. Ft.)	Strength of Estimate	Estimated Parking Use Ratio
0694000015 2214 2ND AVE	3,240		0.35
0694000020 2218 2ND AVE	9,719		0.34
0694000030 2224 2ND AVE	6,481		0.34

Building & Parking Specifications | Location Characteristics | Parking Impacts

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3+ BEDROOMS:	0	\$0	0
TOTAL:	175	\$2,233	102,815

AFFORDABLE UNITS: 0

PARKING

PARKING STALLS: 85

↑ Parking Oversupplied for this price.

PRICE PER STALL (\$/MO): \$250

