Stolfus

Memorandum

To: City of Steamboat Springs

From: Josh Sender, PE

Date: ~~4/15/2021~~ Revised 1/18/2023

Re: Steamboat Base Camp Parking Study

This study evaluates estimated parking demands for the Steamboat Base Camp redevelopment site, located in the northeast corner of the Shield Drive/Curve Court intersection. Base parking requirements were assumed to match the requirements of the Community Development Code (CDC) as shown below.

Land Use		Per CDC Table 300-1	Required Spaces
Multifamily Residential			116.5 ~~120~~
Studio	29 ~~30~~ units	1.5 space/ DU	~~45~~ 43.5
1 BR	30 units	1.5 space/ DU	45
3 BR	14 ~~15~~ units	2 space/ DU	~~30~~ 28
Food and Beverage			~~14~~ 12.1
Retail/Service <3,001SF	2,550 SF	1 space/ 300 ~~150~~ SF	~~10~~ 8.5
Office	1,072 SF	1 space/ 300 SF	~~4~~ 3.6
~~Lounge/Lobby~~	~~1159 SF~~	~~N/A~~	~~0~~
Studio, Instruction	3,493 4094 SF	1 space/ 300 SF	~~14~~ 11.6
		Total:	140.2 ~~148~~

Peak parking demand for residential uses is known to be staggered from those of the commercial uses. Applying data from Parking Generation, 4th Edition published by the Institute of Transportation Engineers, the table on the following page shows how parking on the site is expected to fluctuate throughout a typical weekday. Parking Generation does not provide data for all time periods with every land use type. The percentages highlighted in grey on the following page include various documented assumption. Excerpts from Parking Generation are attached to this memo for reference.

As shown in the far right column of the table on the following page, shared parking demand for the site is expected to peak at ~~128~~ spaces from ~~6:00~~ a.m. to ~~7:00~~ a.m. (highlighted in yellow). It is noted that the site meets CDC 406.D criteria for reduced parking based on transit access, but this reduction has not been applied in order to provide a more conservative parking estimate.

(119), 5:00 AM to 6:00 AM

Weekday Hourly Parking Demand as a % of Peak Period

Parking Generation Land Use	221 - Low/Mid-Rise Apartment	492 - Health/ Fitness Club	701 - Office Building	820 - Shopping Center	
CDC Classification	Multifamily Residential	Studio, Instruction	Office	Retail/Service, General Indoor (<3001SF)	Shared Parking Demand
CDC Pkg Spaces Required	**116.5**	**11.6**	**3.6**	**8.5**	**140.2**
12:00-4:00	100%	0%	0	0	117
5:00	96%	61%	0%	0%	119
6:00	92%	84%	0%	0%	117
7:00	74%	91%	59%	9%	100
8:00	64%	100%	79%	60%	94
9:00	64%	50%	95%	82%	91
10:00	64%	51%	100%	77%	91
11:00	64%	48%	98%	93%	92
12:00	64%	42%	90%	100%	91
13:00	64%	47%	77%	100%	91
14:00	64%	38%	84%	97%	90
15:00	64%	41%	81%	96%	90
16:00	44%	61%	72%	89%	68
17:00	59%	84%	46%	93%	88
18:00	69%	91%	25%	100%	100
19:00	66%	100%	0%	93%	96
20:00	75%	50%	0%	96%	101
21:00	77%	0%	0%	87%	97
22:00	92%	0%	0%	0%	107
23:00	94%	0%	0%	0%	110

Assumptions:

221 – Low/Mid Rise Apartment
Parking Generation does not provide data from 9:00 a.m. to 4:00 p.m., so the higher 8:00 a.m. parking percentage was maintained in the calculation to be conservative.

492 – Health/Fitness Club
Parking Generation percentages from 4:00 p.m. to 8:00 p.m. were copied to 5:00 a.m. to 9:00 a.m. to reflect both an evening and a morning peak given the anticipated instructional fitness use type.

701 - Office Building
The "Weekday Suburban" percentages of peak were used, as they are more representative of the Project location. Further, the numbers are more conservative than the Urban, which might have more public transportation options and require less parking.

820 - Shopping Center
Parking Generation does not have a land use category for smaller Retail/Service, thus the Shopping Center percentages were used, as this was the closest option. A combination of the DECEMBER non-Friday Weekday, Friday, and Saturday percentages was used (the highest percentage between the three at each specific time throughout the day) in order to represent the most conservative scenario.

Weekday Hourly Parking Demand as a % of Peak Period

Parking Generation Land Use	221 - Low/ Mid- Rise Apartment	492 - Health/ Fitness Club	850 - Supermarket	936 - Coffee/ Donut Shop	Shared Parking Demand
CDC Classification	Multifamily Residential	Studio, Instruction	Grocery Store/ Market	Restaurant/ Tavern	
CDC Parking Spaces Required	120	14	4	10	148
12:00-4:00	100%				120
5:00	96%	61%	20%	20%	127
6:00	92%	84%	40%	40%	128
7:00	74%	91%	73%	73%	112
8:00	64%	100%	100%	100%	105
9:00	64%	50%	63%	63%	93
10:00	64%	51%	63%	57%	93
11:00	64%	48%	71%	42%	91
12:00	64%	42%	94%	39%	91
13:00	64%	47%	100%	27%	91
14:00	64%	38%	95%	15%	88
15:00	64%	41%	96%	15%	88
16:00	44%	61%	97%	15%	67
17:00	59%	84%	92%	15%	88
18:00	69%	91%	79%	15%	101
19:00	66%	100%	60%	15%	98
20:00	75%	50%	60%	15%	101
21:00	77%		60%		95
22:00	92%				111
23:00	94%				113

Assumptions:

SUPERSEDED

221 – Low/Mid Rise Apartment
Parking Generation does not provide data from 9:00 a.m. to 4:00 p.m., so the higher 8:00 a.m. parking percentage was maintained in the calculation to be conservative.

492 – Health/Fitness Club
Parking Generation percentages from 4:00 p.m. to 8:00 p.m. were copied to 5:00 a.m. to 9:00 a.m. to reflect both an evening and a morning peak given the anticipated instructional fitness use type.

850 – Supermarket
Parking Generation does not provide data from 5:00 a.m. to 10:00 a.m. and from 8:00 p.m. to 10:00 p.m. The morning percentages were assumed to follow a similar pattern as the coffee shop use given that this market may also serve those interested in early morning activities. The percentage from 7:00 p.m. was extended through 10:00 p.m. to reflect potentially longer store operating hours.

936 – Coffee/Donut Shop
Parking Generation does not provide data from 5:00 a.m. to 7:00 a.m. and from 2:00 p.m. to 9:00 p.m. Some use of this café may be anticipated during these morning hours, while the peak use is likely to remain from 8:00 a.m. to 9:00 a.m. Afternoon and evening percentages were added to reflect that this café may also serve prepackaged food and beverages, but minimal use is anticipated during these times.

4th Edition

Parking Generation

ite

Institute of Transportation Engineers

Land Use: 221
Low/Mid-Rise Apartment

Description

Low/mid-rise apartments are rental dwelling units located within the same building with at least three other dwelling units: for example, quadraplexes and all types of apartment buildings. The study sites in this land use have one, two, three, or four levels. High-rise apartment (Land Use 222) is a related use.

Database Description

The database consisted of a mix of suburban and urban sites. Parking demand rates at the suburban sites differed from those at urban sites and, therefore, the data were analyzed separately.

- Average parking supply ratio: 1.4 parking spaces per dwelling unit (68 study sites). This ratio was the same at both the suburban and urban sites.
- Suburban site data: average size of the dwelling units at suburban study sites was 1.7 bedrooms, and the average parking supply ratio was 0.9 parking spaces per bedroom (three study sites).
- Urban site data: average size of the dwelling units was 1.9 bedrooms with an average parking supply ratio of 1.0 space per bedroom (11 study sites).

Saturday parking demand data were only provided at two suburban sites. One site with 1,236 dwelling units had a parking demand ratio of 1.33 vehicles per dwelling unit based on a single hourly count between 10:00 and 11:00 p.m. The other site with 55 dwelling units had a parking demand ratio of 0.92 vehicles per dwelling unit based on counts between the hours of 12:00 and 5:00 a.m.

Sunday parking demand data were only provided at two urban sites. One site with 15 dwelling units was counted during consecutive hours between 1:00 p.m. and 5:00 a.m. The peak parking demand ratio at this site was 1.00 vehicle per dwelling unit. The peak parking demand occurred between 12:00 and 5:00 a.m. The other site with 438 dwelling units had a parking demand ratio of 1.10 vehicles per dwelling unit based on a single hourly count between 11:00 p.m. and 12:00 a.m.

Four of the urban sites were identified as affordable housing.

Several of the suburban study sites provided data regarding the number of bedrooms in the apartment complex. Although these data represented only a subset of the complete database for this land use, they demonstrated a correlation between number of bedrooms and peak parking demand. Study sites with an average of less than 1.5 bedrooms per dwelling unit in the apartment complex reported peak parking demand at 92 percent of the average peak parking demand for all study sites with bedroom data. Study sites with less than 2.0 but greater than or equal to 1.5 bedrooms per dwelling unit reported peak parking demand at 98 percent of the average. Study sites with an average of 2.0 or greater bedrooms per dwelling unit reported peak parking demand at 13 percent greater than the average.

For the urban study sites, the parking demand data consisted of single or discontinuous hourly counts and therefore a time-of-day distribution was not produced. The following table presents a time-of-day distribution of parking demand at the suburban study sites.

Land Use: 221
Low/Mid-Rise Apartment

Based on Vehicles per Dwelling Unit (Suburban)	*Weekday*	
Hour Beginning	Percent of Peak Period	Number of Data Points*
12:00–4:00 a.m.	100	14
5:00 a.m.	96	14
6:00 a.m.	92	14
7:00 a.m.	74	1
8:00 a.m.	64	1
9:00 a.m.	–	0
10:00 a.m.	–	0
11:00 a.m.	–	0
12:00 p.m.	–	0
1:00 p.m.	–	0
2:00 p.m.	–	0
3:00 p.m.	–	0
4:00 p.m.	44	1
5:00 p.m.	59	1
6:00 p.m.	69	1
7:00 p.m.	66	9
8:00 p.m.	75	9
9:00 p.m.	77	10
10:00 p.m.	92	14
11:00 p.m.	94	14

* Subset of database

Parking studies of apartments should attempt to obtain information on occupancy rate and on the mix of apartment sizes (in other words, number of bedrooms per apartment and number of units in the complex). Future parking studies should also indicate the number of levels contained in the apartment building.

Additional Data

- Apartment occupancy can affect parking demand ratio. In the United States, successful apartment complexes commonly have a vacancy rate between 5 and 10 percent.[1]

Study Sites/Years

Canada:

Central City, Not Downtown:
Brooks, AB (1998)

Puerto Rico:

Central City, Not Downtown:
Mayaguez, PR (2007)

[1] Rental and Homeowner Vacancy Rates for the United States: 1960 and 1965 to 2009, U.S. Census Bureau. http://www.census.gov/hhes/www/housing/hvs/qtr309/q309tab1.html

Land Use: 492
Health/Fitness Club

Description

Health/fitness clubs are privately owned facilities that primarily focus on individual fitness or training. Typically, they provide exercise classes; weightlifting, fitness and gymnastics equipment; spas; locker rooms; and small restaurants or snack bars. This land use may also include ancillary facilities, such as swimming pools; whirlpools; saunas; tennis, racquetball and handball courts; and limited retail. These facilities are membership clubs that may allow access to the general public for a fee. Racquet/tennis club (Land Use 491), athletic club (Land Use 493) and recreational community center (Land Use 495) are related uses.

Database Description

The database consisted of all suburban sites with the exception of two urban sites. Parking demand rates at the two urban sites were similar to those of the suburban sites and, therefore, the data were combined and analyzed together.

- Average parking supply ratios: 5.7 spaces per 1,000 square feet (sq. ft.) gross floor area (GFA) (11 study sites) and 0.15 spaces per member (five study sites).
- Average employee density: 0.57 employees per 1,000 sq. ft. GFA (nine study sites).

The majority of the data were collected during the winter.

Parking demand counts were submitted for only single-hour observations between 6:00 and 7:00 p.m. for 14 of the 27 study sites. Multi-hour continuous counts at the other 13 study sites indicate the peak period was typically in the same hour as the single counts.

The following table presents time-of-day distribution of parking demand for the study sites.

Based on Vehicles per 1,000 sq. ft. GFA	***Weekday***		***Saturday***	
Hour Beginning	Percent of Peak Period	Number of Data Points*	Percent of Peak Period	Number of Data Points*
12:00–4:00 a.m.	–	0	–	0
5:00 a.m.	–	0	–	0
6:00 a.m.	20	2	–	0
7:00 a.m.	20	2	–	0
8:00 a.m.	20	2	76	2
9:00 a.m.	26	2	94	2
10:00 a.m.	51	4	95	2
11:00 a.m.	48	5	100	3
12:00 p.m.	42	5	87	3
1:00 p.m.	47	5	82	3
2:00 p.m.	38	5	78	3
3:00 p.m.	41	5	73	3
4:00 p.m.	61	5	77	3
5:00 p.m.	84	5	72	3
6:00 p.m.	91	5	68	2
7:00 p.m.	100	3	94	1
8:00 p.m.	50	1	–	0
9:00 p.m.	–	0	–	0
10:00 p.m.	–	0	–	0
11:00 p.m.	–	0	–	0

* Subset of database

Land Use: 701
Office Building

Description

ITE defines office uses in several categories. In reviewing the statistics for office parking demand, it was found that five of the basic office land uses had virtually no difference in parking demand characteristics. The following section merges these uses together for analysis purposes. ***Analysts should continue to record the specific ITE land use category for data that they submit.***

710: General Office Building: A general office building houses multiple tenants; it is a location where affairs of businesses, commercial or industrial organizations, or professional persons or firms are conducted. An office building or buildings may contain a mixture of tenants including professional services, insurance companies, investment brokers and tenant services, such as a bank or savings and loan institution, a restaurant or cafeteria and service retail facilities. Corporate headquarters building (Land Use 714), single tenant office building (Land Use 715), office park (Land Use 750) and research and development center (Land Use 760) are related uses.

714: Corporate Headquarters Building: A corporate headquarters building is a single-tenant office building that houses the corporate headquarters of a company or organization, which generally consists of offices, meeting rooms, space for file storage and data processing, a restaurant or cafeteria and other service functions. General office building (Land Use 710), single-tenant office building (Land Use 715), office park (Land Use 750) and research and development center (Land Use 760) are related uses.

715: Single-Tenant Office Building: A single-tenant office building generally contains offices, meeting rooms and space for file storage and data processing of a single business or company, as well as possibly other service functions, including a restaurant or cafeteria. General office building (Land Use 710), corporate headquarters building (Land Use 714), office park (Land Use 750) and research and development center (Land Use 760) are related uses.

750: Office Park: Office parks are usually suburban subdivisions or planned unit developments containing general office buildings and support services, such as banks, restaurants and service stations, arranged in a park- or campus-like atmosphere. General office building (Land Use 710), corporate headquarters building (Land Use 714), single-tenant office building (Land Use 715) and research and development center (Land Use 760) are related uses.

760: Research and Development Center: Research and development centers are offices or office-related facilities or groups of facilities devoted almost exclusively to research and development activities. The range of specific types of businesses contained in this land use category varies significantly. Research and development centers may contain offices and light-fabrication areas. General office building (Land Use 710), corporate headquarters building (Land Use 714), single-tenant office building (Land Use 715) and office park (Land Use 750) are related uses.

Database Description

The database consisted of a mix of suburban and urban sites. Parking demand differed between the area types for one independent variable—1,000 square feet (sq. ft.) gross floor area (GFA)—but not for another, employees. Therefore, parking demand was analyzed separately for 1,000 sq. ft. and was combined for employees.

- Average parking supply ratios: 4.0 spaces per 1,000 sq. ft. GFA (90 study sites) and 1.1 spaces per employee (49 study sites).
- Average employee density: 3.4 employees per 1,000 sq. ft. GFA (54 study sites). Employee densities for corporate headquarter buildings and research and development centers tended to be slightly lower than the average.

Land Use: 701
Office Building

As noted, peak parking demand rates were different between sites located in suburban settings and those located in urban settings for the independent variable 1,000 sq. ft. GFA. The individual site surveys did not enable a quantitative explanation of the factors that caused the difference. One potential explanation may relate to differences in the availability of alternative modes (for example, transit, bike and pedestrian) available at the urban sites. Of the studies with data on transit availability and presence of a transportation demand management (TDM) program, the suburban sites reported about 55 percent with available transit services and 20 percent with TDM programs. The urban sites reported almost 100 percent with available transit and 63 percent with TDM programs of some form.

Weekend parking demand data were available at two study sites. At one site, the Saturday peak demand was less than 10 percent of peak weekday demand at the same site. At the other site, the Saturday and Sunday demand approached 90 percent of the weekday peak demand for the same site. It was not possible to derive reliable weekend parking demand rates due to lack of information on the nature of work conducted during the weekend at the two sites.

The following table presents the time-of-day distributions of parking demand variation for suburban and urban sites. The only sites included in the table data were those that submitted at least four consecutive hours of parking demand observations. (*Note: the majority of the parking demand data in the overall database consisted of one or two hourly observations.*)

Based on Vehicles per 1,000 sq. ft. GFA	***Weekday Suburban***		***Weekday Urban***	
Hour Beginning	Percent of Peak Period	Number of Data Points*	Percent of Peak Period	Number of Data Points*
12:00–4:00 a.m.	–	0	–	0
5:00 a.m.	–	0	–	0
6:00 a.m.	–	0	–	0
7:00 a.m.	59	1	19	2
8:00 a.m.	79	10	64	4
9:00 a.m.	95	12	91	5
10:00 a.m.	100	12	99	5
11:00 a.m.	98	12	99	5
12:00 p.m.	90	12	98	5
1:00 p.m.	77	7	96	5
2:00 p.m.	84	7	100	5
3:00 p.m.	81	6	99	5
4:00 p.m.	72	6	90	5
5:00 p.m.	46	6	58	3
6:00 p.m.	25	1	–	0
7:00 p.m.	–	0	–	0
8:00 p.m.	–	0	–	0
9:00 p.m.	–	0	–	0
10:00 p.m.	–	0	–	0
11:00 p.m.	–	0	–	0

* Subset of database

Land Use: 820
Shopping Center

Description

A shopping center is an integrated group of commercial establishments that is planned, developed, owned and managed as a unit. A shopping center's composition is related to its market area in terms of size, location and type of store. A shopping center provides on-site parking facilities sufficient to serve its own parking demands. Specialty retail center (Land Use 814) is a related use.

Database Description

The independent variable used to describe building size for this land use is 1,000 square feet (sq. ft.) gross leasable area (GLA). This independent variable is commonly used in the shopping center industry and is typically readily available for centers being planned. For smaller centers without an enclosed mall or peripheral buildings, the GLA is generally the same as the gross floor area (GFA) of the building.

The parking demand database includes data from 197 shopping centers. The surveyed shopping centers include strip, neighborhood, community, regional and super regional centers, as defined by the Urban Land Institute[1] (ULI) in the table below. The highest proportion of study sites was community shopping center, followed in order by regional, neighborhood, super regional and strip shopping centers. Some of these centers contained non-merchandising facilities, such as office space, movie theaters, restaurants, post offices, banks, health clubs and recreational facilities (for example, ice skating rinks or indoor miniature golf courses). Some of the shopping centers, in addition to the integrated unit of shops in one building or enclosed around a mall, may have included out parcels (peripheral buildings or pads located on the perimeter of the center, adjacent to the streets and major access points). These buildings were typically drive-in banks, retail stores, restaurants, or small offices.

Center Type	Strip	Neighborhood	Community	Regional	Super Regional
Building Area (GLA)	< 30,000	30,000 to 100,000	100,000 to 400,000	400,000 to 800,000	> 800,000
Typical Anchor and Tenant Type	Small Businesses	Anchored by supermarket and/or drug store with variety of supporting stores	Anchored by general merchandise stores or discount retailer	Anchored by department stores with variety of stores	Anchored by several department stores with variety of stores

Future data submissions should attempt to provide information on the composition of each study site (types and number of stores within the shopping centers).

[1] *Parking Requirements for Shopping Centers,* 2nd Edition, Urban Land Institute, 1999, page 8.

Land Use: 820
Shopping Center

The following tables present the time-of-day distributions for parking demand.

December

	Non-Friday Weekday		*Friday*		*Saturday*	
Hour Beginning	Percent of Peak Period	Number of Data Points*	Percent of Peak Period	Number of Data Points*	Percent of Peak Period	Number of Data Points*
12:00–4:00 a.m.	–	0	–	0	–	0
5:00 a.m.	–	0	–	0	–	0
6:00 a.m.	–	0	–	0	–	0
7:00 a.m.	9	1	–	0	–	0
8:00 a.m.	16	1	60	1	39	1
9:00 a.m.	55	5	82	3	68	2
10:00 a.m.	57	7	77	7	77	12
11:00 a.m.	84	9	92	7	93	12
12:00 p.m.	84	6	100	7	100	12
1:00 p.m.	83	10	100	7	94	12
2:00 p.m.	94	11	91	7	97	12
3:00 p.m.	90	12	88	7	96	12
4:00 p.m.	81	9	88	7	89	12
5:00 p.m.	93	10	86	7	83	12
6:00 p.m.	100	8	84	7	72	12
7:00 p.m.	93	7	–	0	–	0
8:00 p.m.	96	2	–	0	–	0
9:00 p.m.	87	1	–	0	–	0
10:00 p.m.	–	0	–	0	–	0
11:00 p.m.	–	0	–	0	–	0

* Subset of database

Non-December

	Non-Friday Weekday		*Friday*		*Saturday*	
Hour Beginning	Percent of Peak Period	Number of Data Points*	Percent of Peak Period	Number of Data Points*	Percent of Peak Period	Number of Data Points*
12:00–4:00 a.m.	–	0	–	0	–	0
5:00 a.m.	–	0	–	0	–	0
6:00 a.m.	–	0	–	0	–	0
7:00 a.m.	5	1	–	0	13	1
8:00 a.m.	18	2	–	0	27	2
9:00 a.m.	38	4	–	0	60	3
10:00 a.m.	68	5	63	5	75	6
11:00 a.m.	91	7	79	6	90	10
12:00 p.m.	100	8	100	9	100	10
1:00 p.m.	97	8	92	10	100	10
2:00 p.m.	95	8	83	10	98	10
3:00 p.m.	88	8	76	10	91	9
4:00 p.m.	78	8	70	11	76	8
5:00 p.m.	62	6	73	10	67	7
6:00 p.m.	64	5	77	10	72	2
7:00 p.m.	77	3	92	4	51	1
8:00 p.m.	70	2	89	4	52	1
9:00 p.m.	42	2	–	0	44	1
10:00 p.m.	–	–	–	0	29	1
11:00 p.m.	–	0	–	0	–	0

* Subset of database