

Revised August 26, 2016

Mr. Spencer Litteken
Civil Engineer
City of Clayton
10 North Bemiston Avenue
Clayton, Missouri 63105

RE: Parking Needs Study – Proposed Centene Campus Development
Southeast Quadrant of Forsyth Boulevard and Hanley Road
Clayton, Missouri
CBB Job Number 2016-031-21

Dear Mr. Litteken:

As requested, CBB has prepared the following parking needs study to address the expected parking demands associated with the proposed Centene Campus Development in Clayton, Missouri. It is our understanding that Centene Corporation is proposing to develop multiple sub-districts of land along the south side of Forsyth Boulevard between Hanley Road and Forest Park Parkway and the northwest corner of Hanley Road and Carondelet Avenue. CBB completed this work under the on-call services contract with the City. It should be noted that the information in this parking study is based on information submitted by the applicant to the City on August 1, 2016.

The purpose of this parking study was to estimate the peak parking demand of the proposed uses throughout the day assuming the build-out and full occupancy of the site. The parking study will recommend an appropriate number of parking spaces (supply) needed to adequately serve the proposed development. The recommended parking supply was compared to the number of spaces proposed on the current site plan.

Basic Parking Terminology and Concepts

When describing parking characteristics, it is important to understand the terminology. This section defines common parking terms to clarify certain parking topics. The **parking ratio** is the number of parking spaces provided per unit of land use (i.e. 1,000 square feet (SF) of gross floor area (GFA), or per unit, or per seat, etc.). The **parking demand** is the number of parking spaces being occupied by vehicles at a specific land use at a specific moment in time, typically addressing a peak time period. **Parking supply** is the total number of marked parking spaces provided or available to serve the site.



Parking facilities are generally perceived to be full by users and illegal parking and cross-parking (off-site) increases when more than 85-95% of the parking spaces supplied are full. It is generally appropriate to supply 5-10% more parking supply than the peak parking demand. The cushion (or surplus) reduces the need for users to circulate and search the entire area for the last few available parking spaces, reduces user frustration, provides for recurring peak operating load fluctuations, visitors, misparked vehicles, snow cover, vehicle maneuvering, and vacancies created by reserving spaces for specific users. The supply cushion also provides for unusual peaks in activity on the site.

It should be noted that our analyses below assume little or no reservation of parking for specific users which tends to be favorable for shared parking.

Standard Parking Requirements per City Zoning Ordinance

The City's Zoning Ordinance provides minimum off-street parking requirements for a variety of land uses. It is our understanding that the Forsyth TOD District contains roughly half of Sub-district 1, all of Sub-district 2, and nearly all of Sub-district 3. The Forsyth TOD District does not have minimum parking requirements, but instead, the approval of Plan Commission and the Board of Alderman, using a study as a guide, will set the requirement.

Condominiums/Townhomes (119 Units Proposed)

Presumably, the "multiple dwellings" rate would apply for the residential component, which requires two parking spaces per dwelling unit. This would result in a standard code requirement of 238 spaces for the proposed 119 residential units. It should be noted that this rate is considered relatively high by today's standards. That level would typically be applicable to traditional non-urban apartment buildings, which may have higher parking needs than high-rise residential buildings in a more urban Central Business District (CBD).

First Floor Retail (40,235 Square Feet Retail)

The "commercial" rate of one parking space for each three hundred (300) square feet (SF) of GFA would apply to the retail space proposed in the Centene Campus Development. The proposed retail space would result in a need for 135 parking spaces.

Office Space (1,433,420 Square Feet Proposed)

The City code requires one space per 300 SF GFA. As a result, the proposed office space would require 4,779 parking spaces.

Restaurant (Assumed 15,145 SF Quality Restaurant and 1,500 SF Coffee Shop/Café in Tract 3 Building)

The current Clayton Municipal Code indicates that restaurants that meet the following criteria are exempt from the off-street parking requirements.



1. Restaurants located in the CBD not exceeding three thousand (3,000) square feet of gross floor area, excluding permanent storage areas;
2. Cafeterias and kiosks located in office buildings designed to primarily serve the tenants of the building; and
3. Restaurants located in office buildings or commercial spaces which have one hundred fifty thousand (150,000) GSF or more of floor area and which provide parking for such building or space as prescribed by the Zoning Ordinance.

The restaurants proposed in Tract 3 will have over 400,000 SF of office space in the buildings; so it is assumed that adequate parking will be provided by shared parking from the office uses. Therefore, as we interpret the Code, the restaurants proposed in Tract 3 are exempted by the City parking code.

Lodging/Hotel (120 Rooms Proposed)

The City code requires three-fourths (3/4) of one space for each sleeping room or suite. As a result, 90 parking spaces are required for the hotel/corporate lodging use.

Theater (1,650 Auditorium Seats Proposed)

The City code requires one parking space for each four (4) seats. As a result, the 1,650 seat Auditorium would result in 413 parking spaces required.

Parking Requirement by City of Clayton Parking Code - Summary

2 parking spaces per dwelling unit for multiple dwellings (119 Units)	= 238 spaces
1 parking spaces per 300 SF of Retail Space (40,235 SF)	= 135 spaces
1 parking spaces per 300 SF of General Office (1,433,420 SF)	= 4,779 spaces
Restaurant parking (16,645 SF)	= 0 spaces (exempt)
$\frac{3}{4}$ parking spaces per hotel room (120 Rooms)	= 90 spaces
<u>1 parking space per 4 auditorium seats (1650 Seats)</u>	<u>= 413 spaces</u>
Total Required Parking Spaces per Clayton Code	= 5,655 spaces

The straight application of City's Zoning Ordinance would require 5,655 total off-street parking spaces for the uses proposed in the Centene Campus Development.



Estimated Parking Demand Based on Available Reference Materials

Parking data from the Institute of Transportation Engineers (ITE) and the Urban Land Institute (ULI) was investigated in more detail.

ITE Parking Method

In order to quantify the anticipated parking needs for the proposed mix of uses, the Institute of Transportation Engineers *Parking Generation* Manual (4th Edition) was utilized. This manual provides peak parking demand rates for various land uses based on empirical nationwide studies. ITE provides an average peak parking demand rate and an 85th Percentile parking demand rate for each land use (based on square footage for the office space, retail space and restaurant space; the hotel parking is estimated by the number of rooms; residential parking is estimated by number of units; and the theater parking is estimated based on the number of seats). ITE also provides parking demands by time of day as a percentage of peak parking to address temporal differences in the peaking characteristics of the mixed uses.

It should be noted that several of the proposed uses are not specifically listed in the Parking Generation manual. For example, the most comparable residential land use was determined to be ITE Land Use 222 – High-Rise Apartment (on a weekday in Central City, not downtown), ITE Land Use 820 Shopping Center less than 400,000 SF (on a non-Friday weekday, non-December) was used for the ground floor retail component. It should be noted that retail uses that could utilize less than 10,000 SF are not expected to have large variations in parking due to the holiday shopping season; therefore, the non-Friday and non-December retail parking information is considered most applicable.

ITE Land Use 441 – Live Theater (on a weekday with a single show in late evening) was utilized for the auditorium. Land Use 310 - Hotel was used for the corporate lodging. Land Use 931 - Quality Restaurant was used for the restaurant in Sub-district 3. Land Use 936 - Coffee/Donut Shop without drive-thru was used for the 1,500 SF retail in Sub-district 3.

It should be noted that hourly data is not available for High-Rise Apartment, so the hourly data for the related Low/Mid-Rise Apartment land use was utilized. The Live Theater parking demand was estimated based on interpolation of a graph and three theaters that did not have overlapping shows. In addition, where each land use did not provide hourly data for every hour of the day, data is generally limited to the peaks for that specific use. Therefore, engineering judgement was used to estimate the non-peak parking demands not expressly provided by ITE in Parking Generation. For all entries where the percentage of the peak parking that was estimated in the parking demand table below, those values are underlined and italicized. The peak parking demands based on ITE data for the proposed Centene Campus Development are summarized in **Table 1**.



Table 1 Weekday Parking Demand Calculations - ITE's Parking Generation Manual (4th Edition)

Hour Beginning	Land Use 222 – High Rise Apartments (119 Units)			Land Use 820 – Retail (< 400,00SF) (40,235 SF Ground Floor Retail)			Land Use 310 – Hotel (120 Rooms)			Land Use 931 - Quality Restaurant (15,145 SF)			Land Use 701 - Office Building (1,433,420 SF)			Land Use 936 - Coffee/Donut Shop without Drive-Thru Window (1,500 SF)			Land Use 441 - Live Theater (1650 Seats)			Total	
	% of Peak Period	Ave. ITE Peak Demand (1.38/unit)	85 th %-tile ITE Peak Demand (1.52/unit)	% of Peak Period	Ave. ITE Peak Demand (2.55/1000 SF)	85 th %-tile ITE Peak Demand (3.2/1000 SF)	% of Peak Period	Ave. ITE Peak Demand (0.89/room)	85 th %-tile ITE Peak Demand (1.08/room)	% of Peak Period	Ave. ITE Peak Demand (10.60/100 SF)	85 th %-tile ITE Peak Demand (14.20/100 SF)	% of Peak Period	Ave. ITE Peak Demand (2.84/1000 SF)	85 th %-tile ITE Peak Demand (3.45/1000 SF)	% of Peak Period	Ave. ITE Peak Demand (13.56/100 SF)	85 th %-tile ITE Peak Demand (17.33/100 SF)	% of Peak Period	Ave. ITE Peak Demand (0.25/Seat)	85 th %-tile ITE Peak Demand (0.32/Seat)	Ave Peak Demand	85 th %-tile Peak Demand
12:00 4:00 AM	100%	164	181	1%	1	1	85%	91	110	1%	2	2	2%	81	99	5%	1	1	5%	21	26	361	419
5:00 AM	96%	158	174	1%	1	1	85%	91	110	1%	2	2	15%	611	742	25%	5	6	5%	21	26	888	1,061
6:00 AM	92%	151	166	1%	1	1	79%	84	102	1%	2	2	30%	1221	1484	50%	10	13	5%	21	26	1,490	1,794
7:00 AM	74%	122	134	5%	5	6	77%	82	100	2%	3	4	59%	2402	2918	73%	15	19	5%	21	26	2,650	3,207
8:00 AM	64%	105	116	18%	18	23	100%	107	130	5%	8	11	79%	3216	3907	100%	21	26	5%	21	26	3,497	4,238
9:00 AM	50%	82	90	38%	39	49	96%	103	124	10%	16	22	95%	3867	4698	63%	13	16	5%	21	26	4,142	5,025
10:00 AM	50%	82	90	68%	70	88	55%	59	71	15%	24	32	100%	4071	4945	57%	12	15	5%	21	26	4,339	5,268
11:00 AM	50%	82	90	91%	93	117	52%	56	67	20%	32	43	98%	3989	4846	42%	9	11	5%	21	26	4,283	5,201
12:00 PM	50%	82	90	100%	103	129	60%	64	78	51%	82	110	90%	3664	4451	39%	8	10	5%	21	26	4,023	4,894
1:00 PM	50%	82	90	97%	100	125	60%	64	78	56%	90	120	77%	3135	3808	27%	5	7	5%	21	26	3,496	4,255
2:00 PM	50%	82	90	95%	97	122	55%	59	71	40%	64	86	84%	3420	4154	25%	5	6	5%	21	26	3,748	4,556
3:00 PM	50%	82	90	88%	90	113	52%	56	67	27%	43	58	81%	3297	4006	25%	5	6	5%	21	26	3,595	4,366
4:00 PM	44%	72	80	78%	80	100	53%	57	69	27%	43	58	72%	2931	3561	25%	5	6	5%	21	26	3,210	3,900
5:00 PM	59%	97	107	62%	64	80	58%	62	75	39%	63	84	46%	1873	2275	25%	5	6	25%	103	132	2,266	2,758
6:00 PM	69%	113	125	64%	66	82	62%	66	80	71%	114	153	25%	1018	1236	25%	5	6	35%	144	185	1,526	1,867
7:00 PM	66%	108	119	77%	79	99	66%	70	86	100%	161	215	20%	814	989	20%	4	5	60%	248	317	1,484	1,831
8:00 PM	75%	123	136	70%	72	90	68%	73	88	97%	156	209	15%	611	742	10%	2	3	100%	413	528	1,449	1,795
9:00 PM	77%	126	139	42%	43	54	75%	80	97	80%	128	172	10%	407	495	5%	1	1	100%	413	528	1,199	1,486
10:00 PM	92%	151	166	20%	21	26	80%	85	104	60%	96	129	5%	204	247	5%	1	1	100%	413	528	970	1,201
11:00 PM	94%	154	170	10%	10	13	85%	91	110	40%	64	86	2%	81	99	5%	1	1	60%	248	317	650	796

max demand 4,339 5,268



Based on the ITE estimates, the Centene Campus Development is expected to have a peak parking demand at 10:00 a.m. with 4,339 parking spaces occupied for the average demand (typical use) and up to 5,268 parking spaces occupied for the 85th percentile demand (peak use). Given the predominantly office nature of the development, the small amount of restaurant space, retail space, and theater are not expected to have a meaningful impact on parking. In fact, at the peak hour for parking demand, approximately 93% of the total parked cars would be associated with the office uses.

ULI Parking Method

The Urban Land Institute (ULI) Shared Parking Manual is another commonly used source for estimating parking demands of different land uses which also provides hourly and seasonal fluctuations for parking demands at several different land uses based on numerous parking studies by others across the United States.

ULI has elected to adopt the 85th percentile peak hour observations in developing their recommended parking ratios. ULI indicates that the 85th percentile will provide an adequate supply cushion in most locations, but actual demand could be more or less based on a variety of regional/local factors.

The ULI land use of community shopping center was utilized for the ground floor retail, fine/casual dining restaurant was used for the quality restaurant, fast-food restaurant was used for the 1,500 SF coffee shop, Performing Arts Theater was used for the Auditorium, business hotel was used for the hotel, owned residential units with shared space was used for the residential component, and office greater than 500,000 SF was used for the proposed office space. **Table 2** displays the ULI peak parking demand (based on the 85th percentile peak parking demand) by hour in the peak month (December). **Based on the ULI estimates, the recommended parking supply for the Centene Campus Development is 4,630 parking stalls, which is expected to occur at 2:00 p.m.** Given the predominantly office nature of the development, the small amount of restaurant space, retail space, and theater are not expected to have a meaningful impact on parking. In fact, at the peak hour for parking demand, approximately 87% of the total parked cars would be associated with the office uses.



Table 2 Weekday Parking Demand Calculations – ULI Shared Parking Manual (Second Edition)

December																									
Weekday Estimated Peak-Hour Parking Demand																									
	Monthly Adj.	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM	12 AM	Overall Pk	AM Peak Hr	PM Peak Hr	Eve Peak Hr	
		2 PM	10 AM	2 PM	6 PM	Footnote																			
Community Shopping Center (<400 ksf)	100%	1	6	18	35	64	88	105	117	117	117	111	99	94	88	76	59	35	12	-	117	64	117	94	40,235 SF
Employee	100%	3	4	11	21	24	27	28	28	28	28	27	27	27	25	21	11	4	-	28	24	28	27	-	
Fine/Casual Dining Restaurant	100%	-	-	-	-	35	92	173	173	150	92	116	173	219	231	231	231	219	173	58	150	35	150	219	15,145 SF
Employee	100%	-	8	21	32	38	38	38	38	32	32	42	42	42	42	42	42	36	15	38	38	38	42	-	
Fast Food Restaurant	100%	1	2	4	6	10	16	19	19	17	11	10	11	16	15	10	6	4	2	1	17	10	17	16	1,500 SF
Employee	100%	-	1	1	1	2	3	3	3	3	2	2	2	3	3	2	1	1	1	1	3	2	3	3	-
Performing Arts Theater	100%	-	-	-	5	5	5	5	5	5	5	5	5	124	495	495	495	-	-	-	5	5	5	5	1,650 Seats
Employee	100%	-	12	12	23	23	23	35	35	35	35	35	35	116	116	116	116	35	12	6	35	23	35	116	-
Hotel-Business	67%	76	72	64	56	48	48	44	44	48	48	52	56	60	60	64	68	76	80	80	48	48	48	60	120 Rooms
Employee	100%	2	9	27	27	30	30	30	30	30	27	21	12	6	6	6	6	6	3	2	30	30	30	12	-
Residential, Owned, Shared Spaces	100%	202	182	172	162	152	141	131	141	141	141	152	172	182	196	198	200	202	202	202	141	152	141	182	119 Units
Guest	100%	-	2	4	4	4	4	4	4	4	4	4	7	11	18	18	18	18	14	9	4	4	4	11	-
Office >500 ksf	100%	-	3	57	172	287	129	43	129	287	129	43	29	14	6	3	-	-	-	-	287	287	287	14	1,433,420 SF
Employee	100%	112	1,118	2,795	3,541	3,727	3,727	3,354	3,354	3,727	3,727	3,354	1,864	932	373	261	112	37	-	-	3,727	3,727	3,727	932	-
TOTAL DEMAND	Customer	78	85	147	278	453	382	393	491	628	406	341	380	419	542	897	877	352	281	148	628	453	628	419	
	Employee	319	1,334	3,039	3,807	3,996	3,989	3,619	3,629	4,002	3,995	3,630	2,163	1,314	763	650	498	334	258	226	4,002	3,996	4,002	1,314	
	Reserved	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		397	1,419	3,186	4,085	4,449	4,371	4,012	4,120	4,630	4,401	3,971	2,543	1,733	1,305	1,547	1,375	686	539	374	4,630	4,449	4,630	1,733	
																					4,630	4,449	4,630	1,733	

Footnote(s):



Peak Parking Comparison of Various Results

Table 4 compares the City Parking code to the calculated peak parking demand based ITE and ULI Methodologies. As previously mentioned, the recommended site parking supply should be provided on site should be 5-10 percent higher to provide for circulation and parking. A 5% supply cushion was applied to the 85th Percentile parking demand estimates from ITE and ULI, since no specific reduction was taken for the proximity to transit (MetroLink). Table 4 summarizes the estimated parking supply base on the three methods.

Table 4 Parking Comparison – Proposed Centene Campus

<i>Method</i>	<i>Estimated Parking Demand</i>	<i>Estimated Parking Supply</i>		
		<i>Utility Rate</i>	<i>Surplus Spaces</i>	<i>Total Supply</i>
City Code	---	---	---	5,655
ITE (85 th Percentile)	5,268	+ 95%	278	5,546
ULI (85 th Percentile)	4,630	+ 95%	244	4,874

Considering the reference materials (City Code, ITE and ULI), CBB estimates that the proposed Centene Campus Development should provide between 4,874 and 5,546 spaces to accommodate the entire development. A “comfortable number” of parking spaces to be supplied would be around 5,300 spaces.

Proposed Parking Supply on Site Plan

Based on the August 1, 2016 site plan submittal, the proposed parking supply for the development is summarized below.

- Sub-district 1 = 1,876 Parking Stalls
- Sub-district 2 = 1,754 Parking Stalls
- Sub-district 3 = 929 Parking stalls
- Sub-district 4 = 1,659 Parking Stalls
- Total = 6,218 Parking Stalls Proposed**

The current site plan shows a total of 6,318 parking spaces supply as part of the proposed development. As a result, the proposed parking spaces are expected to be sufficient to park the proposed Centene Campus Development. It should be noted that the specific location of the parking stalls was not taken into account for this analysis, as it was based on the entire campus. Each Sub-district may not be self-supporting, and some tenants in Sub-district 3 may need to park in the main parking garage located in Sub-district 2.



We trust that this report adequately addresses the parking demands and recommended supply associated with the proposed Centene Campus Development. Please contact Mr. Brian Rensing or me in our St. Louis office should there be any questions regarding this report.

Sincerely,

A handwritten signature in black ink that reads "Srinivasa R. Yanamanamanda".

Srinivasa R. Yanamanamanda, P.E., PTOE, PTP
President & CEO

SY:bjr