Kimley»Horn

MEMORANDUM

To: Firat Akcay, City of Miami Beach
Josiel Ferrer, E.I., City of Miami Beach

From: Adrian K. Dabkowski, P.E., PTOE
Omar Kanaan, P.E.

Date: September 25, 2018

Subject: Starwood Properties Office Building
Miami Beach, Florida
Valet Operations Analysis

Kimley-Horn and Associates, Inc. has prepared a valet operations analysis for the proposed redevelopment located at 2318, 2332, and 2340 Collins Avenue in Miami Beach, Florida. Currently, the parcels proposed for redevelopment are occupied by a surface parking lot and AVIS car rental facility. The proposed development consists of a 132,600 square-foot office building and 11,146 square feet of retail. The parking garage includes 306 parking spaces. Self-parking will not be provided. Therefore, all vehicles will be valeted in the on-site parking garage with the exception of taxis/rideshare. A conceptual site plan and project location map are included in Attachment A.

VALET SERVICE AND OPERATIONS

The redevelopment will be served by one (1) valet drop-off station and one (1) valet pick-up station. Both the valet drop-off and pick-up stations are located on the 2nd level of the parking garage, the site plan contained in Attachment A illustrates the location of the valet drop-off and pick-up station locations. The valet drop-off station consists of one (1) storage lane with approximately 13 vehicles of storage between the valet drop-off station and the edge of the property line. The valet pick-up station consists of one (1) storage lane that allows for stacking, internally to the site, for up to three (3) levels of the parking garage, approximately 38 vehicles. Self-parking will not be provided. Therefore, all vehicles will be valeted in the on-site parking garage with the exception of taxis/rideshare.

Both the valet drop-off and pick-up routes are contained internally within the site and are not expected to impact the external roadway network.

TRIP GENERATION

Trip generation for the proposed redevelopment was calculated using rates contained in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*, 10th Edition. Trip generation rates were examined for the weekday A.M. and P.M. peak hours. Please note that a 10.0 percent (10.0%) taxi/rideshare trip factor was applied to the trip generation to account for tenants, guests, and patrons arriving via taxi/rideshare to the site and to determine the number of valet trips. The proposed redevelopment is expected to generate 121 A.M. peak hour valet trips of which 101 enter the site and

20 exit the site and 164 P.M. peak hour valet trips of which 45 enter the site and 119 exit the site. Detailed trip generation calculations are included in Attachment B.

VALET OPERATIONS ANALYSIS

The valet queuing operations analysis was performed based on the methodology outlined in ITE's *Transportation and Land Development,* 1988. The analysis was performed to determine if valet operations could accommodate vehicular queues without extending onto Liberty Avenue. Valet operations were analyzed for the number of valet attendants and required vehicle stacking for the redevelopment proposed traffic.

Valet Assumptions

The queuing analysis used the multiple-channel waiting line model with Poisson arrivals and exponential service times. The queuing analysis is based on the coefficient of utilization, ρ, which is the ratio of the average vehicle arrival rate over the average service rate multiplied by the number of channels.

Valet attendants will be stationed at the on-site valet drop-off and pick-up stations. Valet drop-off trip service time was calculated based on the time it would take a valet parking attendant to obtain and park a drop-off vehicle within the on-site parking garage. Valet pick-up trip service time was calculated based on the time it would take a valet parking attendant to bring a parked vehicle back to a patron at the on-site valet pick-up station. Note that the average mechanical-lift processing time was based on the Klaus Model G61 vehicle lift. The average mechanical-lift processing time was based on the average processing times of parking and retrieving vehicles from all the various positions within the tandem mechanical-lift system. The detailed mechanical-lift processing time analysis is contained in Attachment C. The following summarizes the total valet drop-off and pick-up service times.

The service time for valet drop-off operation corresponds to the following:

- Exchange between valet attendant and driver (0.5 minute)
- Valet attendant drives vehicle from porte-cochere to on-site parking garage (0.9 minutes)
- Valet attendant parks vehicle using mechanical-lift (1.7 minutes)
- Valet attendant returns to valet station (0.8 minutes)
- Total service rate: 3.9 minutes

The service time for valet pick-up operation corresponds to the following:

- Valet attendant proceeds to the garage to retrieve the vehicle (0.8 minutes)
- Valet attendant retrieves moves vehicle from mechanical-lift (1.6 minutes)
- Valet attendant drives vehicle from on-site parking garage to the porte-cochere (1.1 minutes)
- Exchange between valet attendant and driver (0.5 minute)
- Total service rate: 4.0 minutes

The calculated average service time for vehicles valeted from the on-site porte-cochere 3.9 minutes for valet drop-off and 4.0 minutes for valet pick-up. However, to provide a conservative analysis, a service

time of 4.0 minutes for valet drop-off and a service time of 5.0 minutes for valet pick-up was used. Processing times include the time for the exchange between the driver and valet attendants and time to unload and load baggage is assumed for all vehicles valeted. Note that this results in a conservative analysis. Detailed trip length calculations are included in Attachment C.

If the coefficient of utilization (average service rate/valet attendant service capacity) is greater than one (> 1), the calculation methodology does not yield a finite queue length. This result indicates overcapacity conditions for the valet area. The valet attendant service capacity is the number of total trips a valet attendant can make in a one-hour period multiplied by the number of valet attendants.

The analysis determined the required queue storage, *M*, which is exceeded *P* percent of the time. This analysis seeks to ensure that the queue length does not exceed the storage provided at a level of confidence of 95 percent (95%). Thirteen (13) vehicle drop-off spaces are provided in one (1) storage lane. Note that the valet pick-up is contained internal to the site and provides a maximum storage capacity of approximate 38 vehicles in one (1) storage lane.

Valet Analysis

An iterative approach was used to determine the number of valet attendants required to accommodate the proposed redevelopment demand during the analysis hour and ensure that the 95th percentile valet queue does not extend beyond the designated valet service area. Detailed valet analysis worksheets are provided in Attachment D.

Results of the highest demand condition valet operations analysis demonstrate that a total of 12 valet attendants (nine [9] for valet drop-off and three [3] for valet pick-up) may be needed during the A.M. peak hour and 18 valet attendants (five [5] for valet drop-off and 13 for valet pick-up) during the P.M. peak hour.

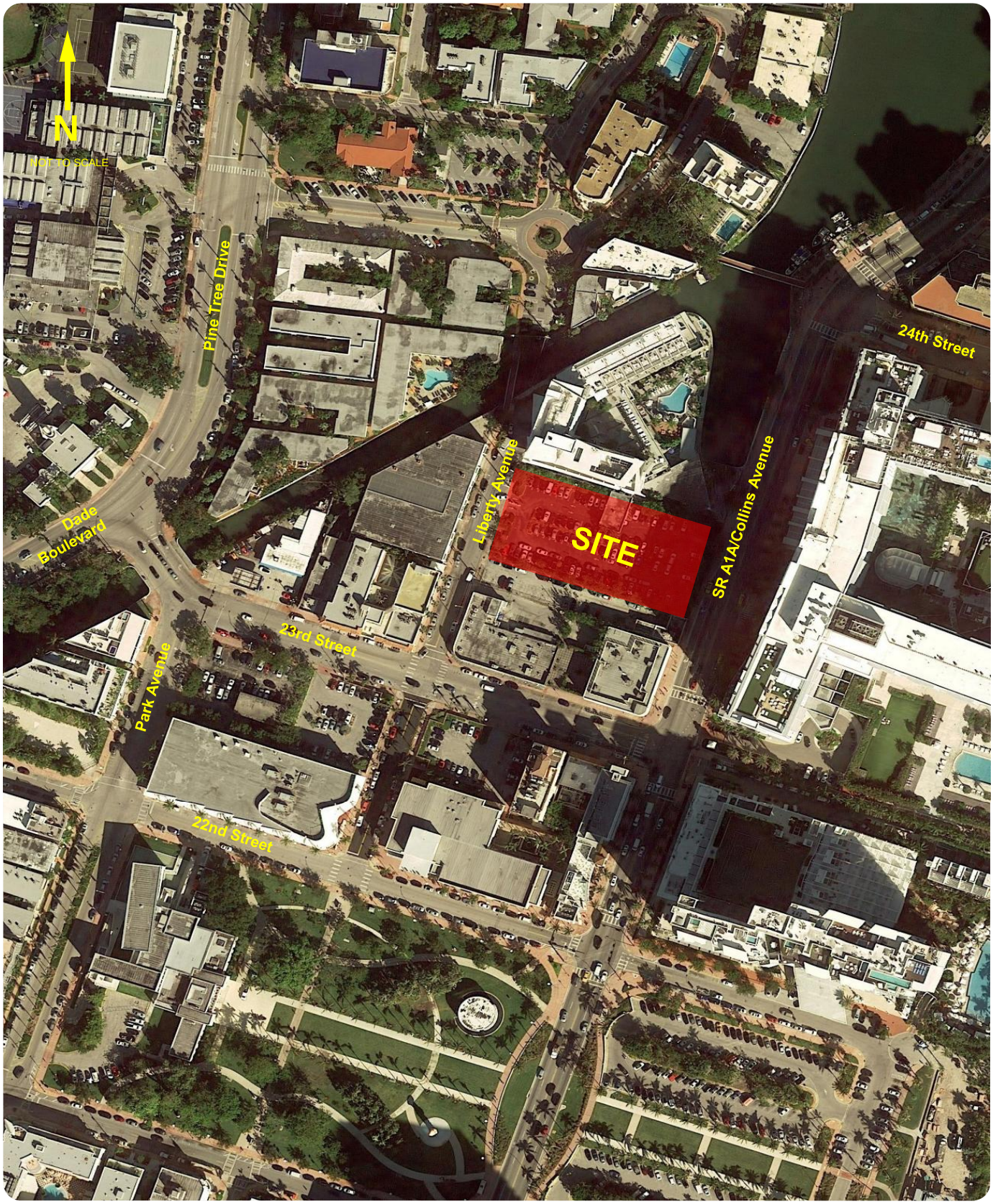
VALET CONCLUSION

Based on the valet operations analysis performed, it was determined that the 95th percentile valet queues will not extend beyond the valet service area onto Liberty Avenue. Based upon the conservative assumptions applied to the A.M. and P.M. peak hour highest traffic demand condition, it was estimated that a total of 12 valet attendants (nine [9] for valet drop-off and three [3] for valet pick-up) may be needed during the A.M. peak hour and 18 valet attendants (five [5] for valet drop-off and 13 for valet pick-up) during the P.M. peak hour. It should be noted that projected vehicular volumes and estimated valet processing times were conservatively assumed in the analysis. If it is determined that valet processing times can be performed more efficiently and/or actual traffic volumes are lower than projected, a reduced number of valet attendants may be adequate to serve the site.

K:\FTL_TPTO\043992000 Starwood Collins Ave\correspondence\memo\valet\Valet Operations Analysis 09 25 18.docx

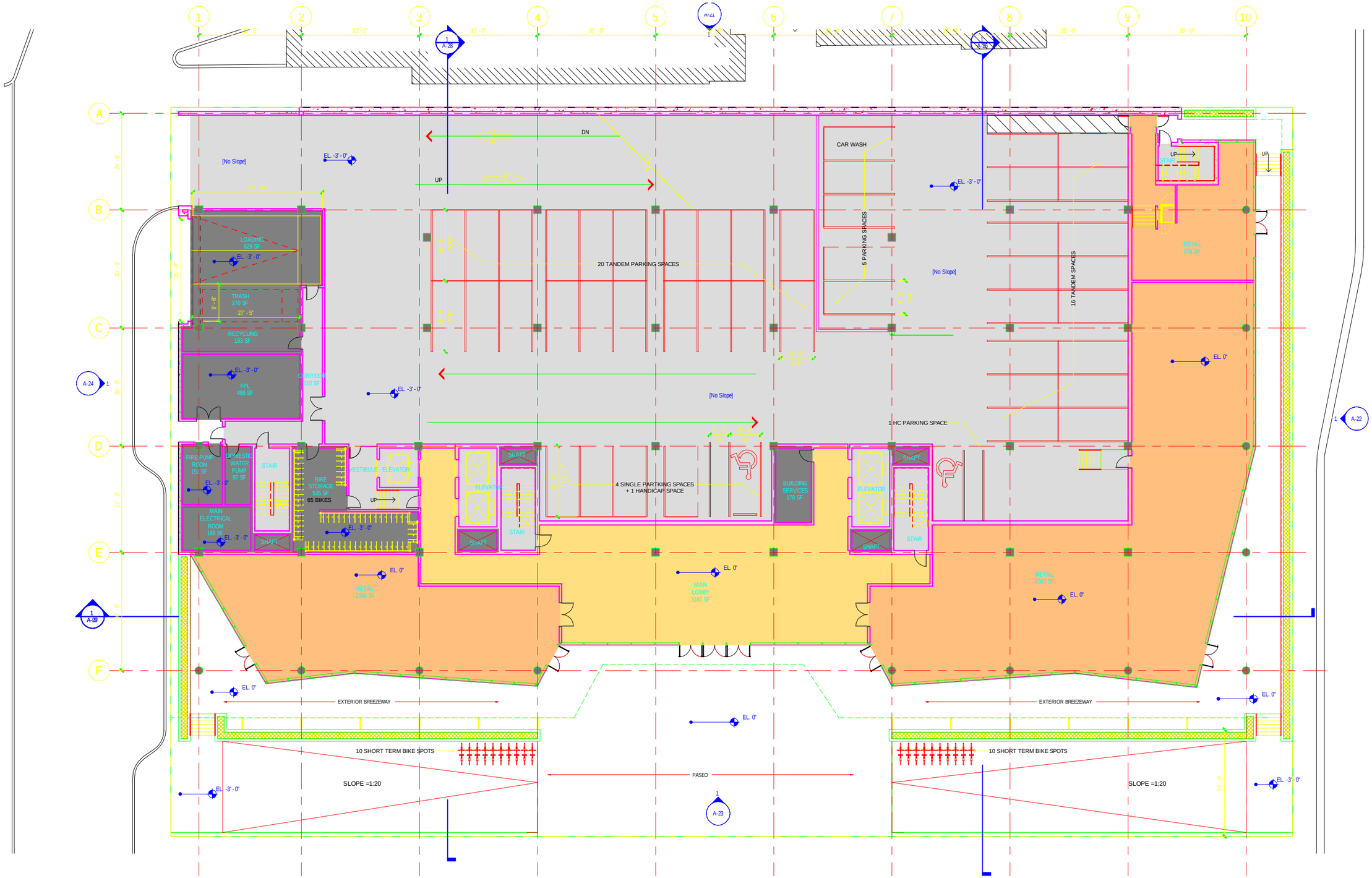
Attachment A

Conceptual Site Plan and Project Location Map



Kimley»Horn

Figure 1
Location Map
Starwood Properties Office Building
Miami Beach, Florida



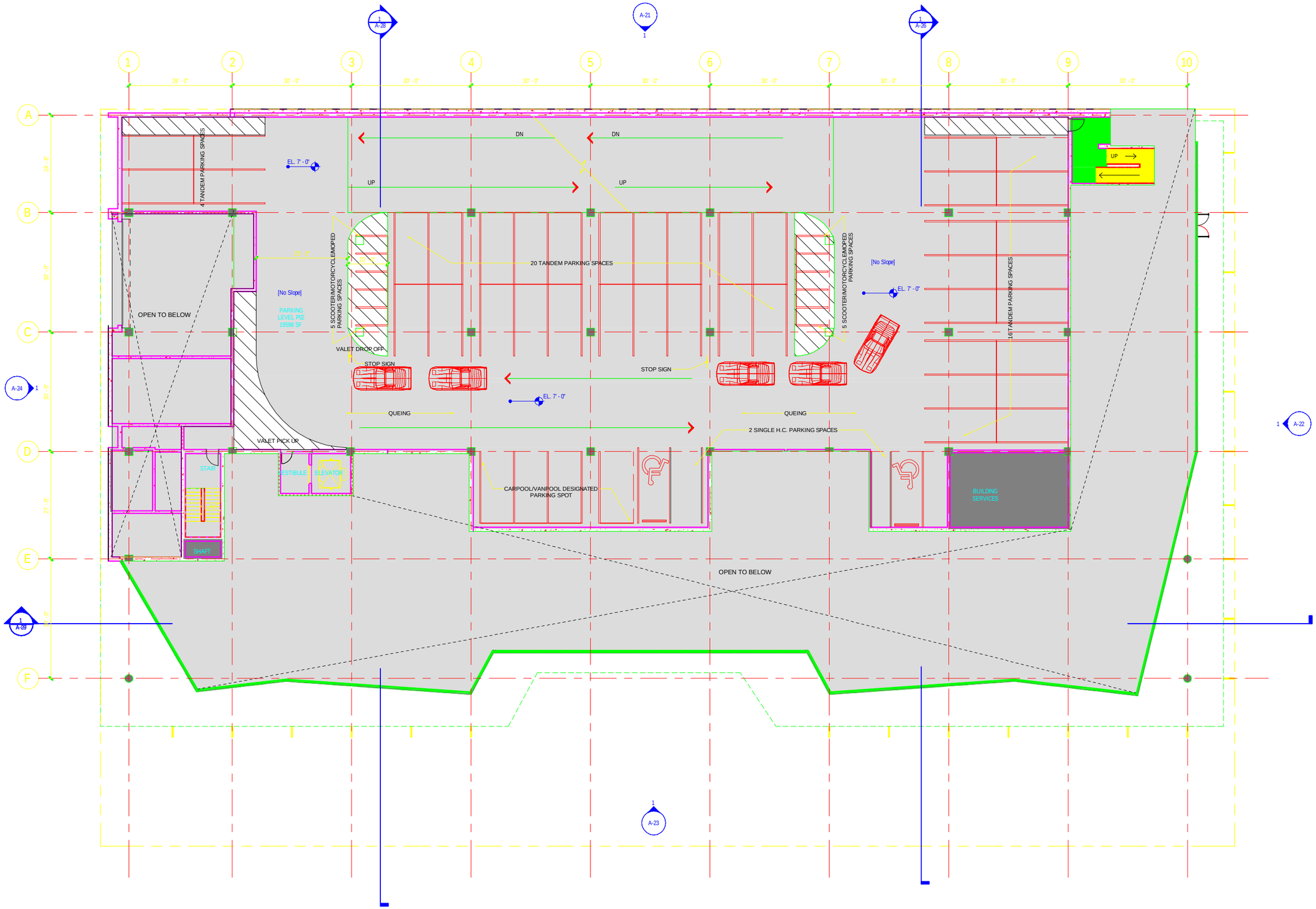
Gensler — STARWOOD CAPITAL GROUP

GROUND & LEVEL 01 FLOOR PLAN

2340 COLLINS AVENUE, MIAMI BEACH, FL 33139 | 09/10/18

A-13

0 1 2 3 6



Gensler — STARWOOD CAPITAL GROUP

LEVEL 2 PARKING FLOOR PLAN

2340 COLLINS AVENUE, MIAMI BEACH, FL 33139 | 09/10/18

A-14

0 1 2 3 6

Attachment B

Trip Generation

AM PEAK HOUR TRIP GENERATION COMPARISON

PROPOSED WEEKDAY AM PEAK HOUR TRIP GENERATION

		ITE TRIP GENERATION CHARACTERISTICS					DIRECTIONAL DISTRIBUTION		GROSS VOLUMES			MULTIMODAL REDUCTION[2]		BASELINE TRIPS			INTERNAL CAPTURE		EXTERNAL TRIPS			PASS-BY CAPTURE		NET NEW TRIPS		
			ITE	ITE		ITE	Percent						MR					IC					PB			
		Land Use	Edition	Code	Scale	Units	In	Out	In	Out	Total	Percent	Trips	In	Out	Total	Percent	Trips	In	Out	Total	Percent	Trips	In	Out	Total
GROUP 2	1	General Office Building	10	710	132.6	ksf	86%	14%	130	21	151	20.0%	30	104	17	121	2.5%	3	103	15	118	0.0%	0	103	15	118
	6	Shopping Center	10	820	11.146	ksf	62%	38%	6	4	10	20.0%	2	5	3	8	37.5%	3	3	2	5	0.0%	0	3	2	5
	7	Avis Car-Rental[1]	n/a	n/a	n/a	n/a	58%	42%	7	5	12	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	7	5	12
	8																									
	9																									
	10																									
	11																									
	12																									
	13																									
	14																									
	15																									
								Total:	136	25	161	20.0%	32	109	20	129	4.7%	6	106	17	123	0.0%	0	113	22	135
																								10 % RIDESHARE TRIPS			12	2	14
																								VALET TRIPS			101	20	121

ITE Land Use Code	Rate or Equation
710	Y=0.94*(X)+26.49
820	Y=0.94(X)
n/a	n/a

Note: **[1]Avis Car-Rental trip generation manually gathered on-site**

[2]Multimodal reduction based on census tract data from the US Census Bureau's *Means of Transportation to Work* survey.

PM PEAK HOUR TRIP GENERATION COMPARISON

PROPOSED WEEKDAY PM PEAK HOUR TRIP GENERATION

		ITE TRIP GENERATION CHARACTERISTICS					DIRECTIONAL DISTRIBUTION		GROSS VOLUMES			MULTIMODAL REDUCTION[1]		BASELINE TRIPS			INTERNAL CAPTURE		EXTERNAL TRIPS			PASS-BY CAPTURE		NET NEW TRIPS		
							Percent																			
		Land Use	ITE Edition	ITE Code	Scale	ITE Units	In	Out	In	Out	Total	Percent	MR Trips	In	Out	Total	Percent	IC Trips	In	Out	Total	Percent	PB Trips	In	Out	Total
GROUP 2	1	General Office Building	10	710	132.6	ksf	16%	84%	24	125	149	20.0%	30	19	100	119	3.4%	4	18	97	115	0.0%	0	18	97	115
	6	Shopping Center	10	820	11.146	ksf	48%	52%	51	56	107	20.0%	21	41	45	86	4.7%	4	38	44	82	34.0%	28	25	29	54
	7	Avis Car-Rental[1]	n/a	n/a	n/a	n/a	54%	46%	7	6	13	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	7	6	13
	8																									
	9																									
	10																									
	11																									
	12																									
	13																									
	14																									
	15																									
		Total:							75	181	256	20.0%	51	60	145	205	3.9%	8	56	141	197	14.1%	28	50	132	182
		10 % RIDESHARE TRIPS																						5	13	18
		VALET TRIPS																						45	119	164

ITE Land Use Code	Rate or Equation
710	LN(Y) = 0.95*LN(X)+0.36
820	LN(Y) = 0.74*LN(X)+2.89
n/a	n/a

Note: **[1]Avis Car-Rental trip generation manually gathered on-site**
[2]Multimodal reduction based on census tract data from the US Census Bureau's *Means of Transportation to Work* survey.

Attachment C

Valet Processing Time

KLAUS Auto-Parksysteme GmbH
Hermann-Krum-Str. 2 · D-88319 Aitrach
Tel. 0 75 65 / 508-0 · Fax 0 75 65 / 508-88
http://www.klaus-autopark.de · e-mail: info@klaus-autopark.de

Stack Parker

CE CONFORMITY

Series G 61 (Horizontal)

EB (Single Platform) = 2 vehicles

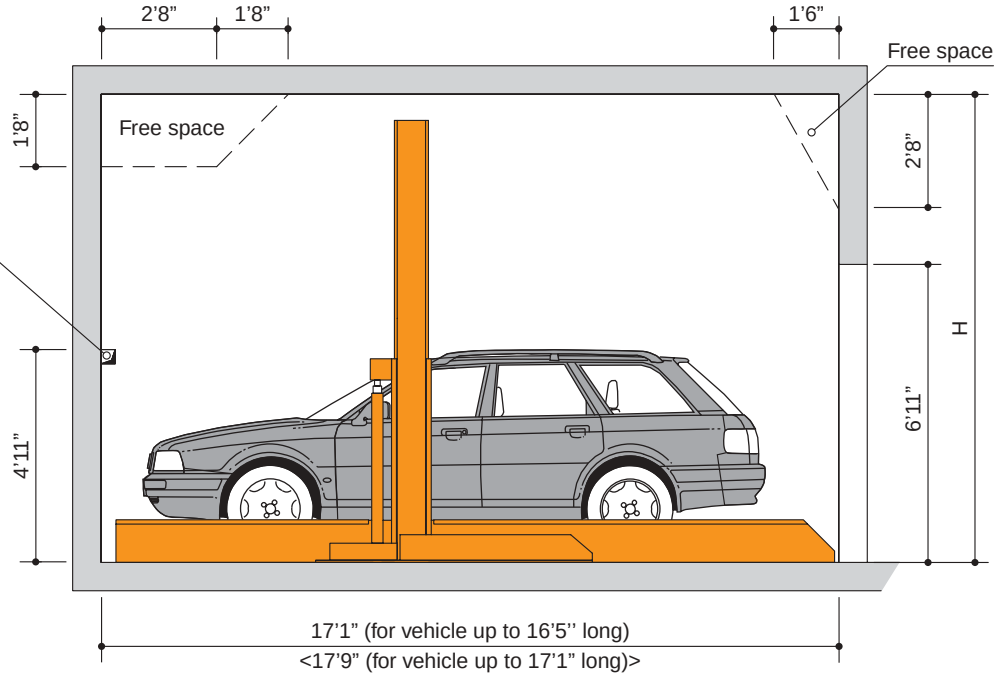
Basement garage

Space requirements are minimum finished dimensions in inch

for dividing walls:

cutting through 10 x 10 (for ducts for cables, pipes etc.) of dividing wall

PLEASE NOTE: Before lowering the platform the lower vehicle must be removed.



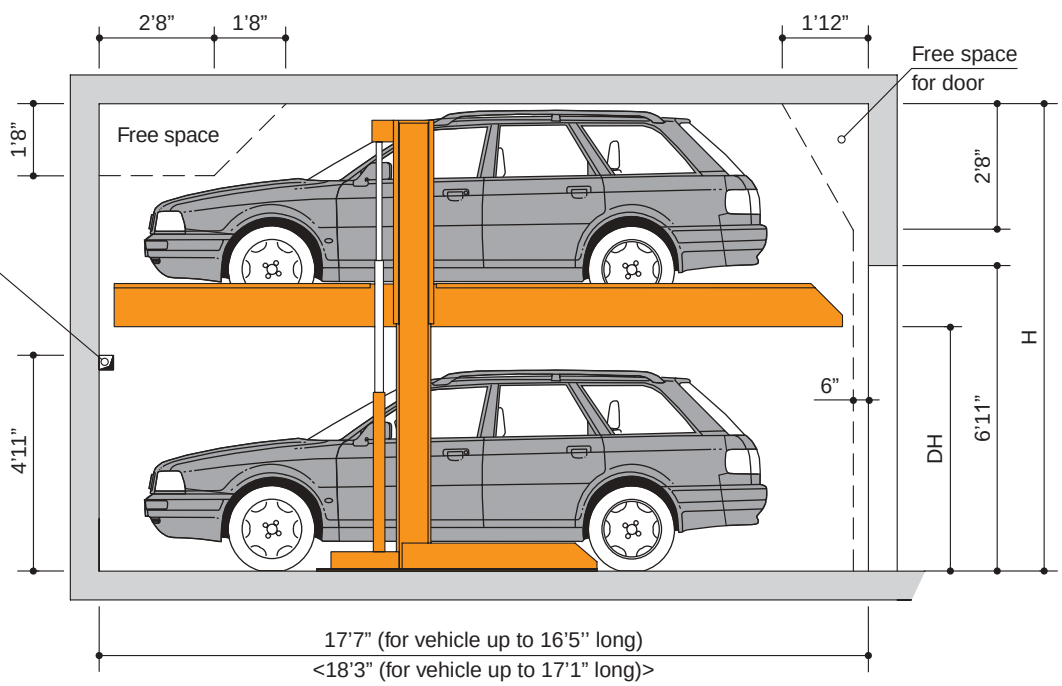
Garage with door in front of the car parking system

Space requirements are minimum finished dimensions in inch

for dividing walls:

cutting through 10 x 10 (for ducts for cables, pipes etc.) of dividing wall

PLEASE NOTE: Before lowering the platform the lower vehicle must be removed.



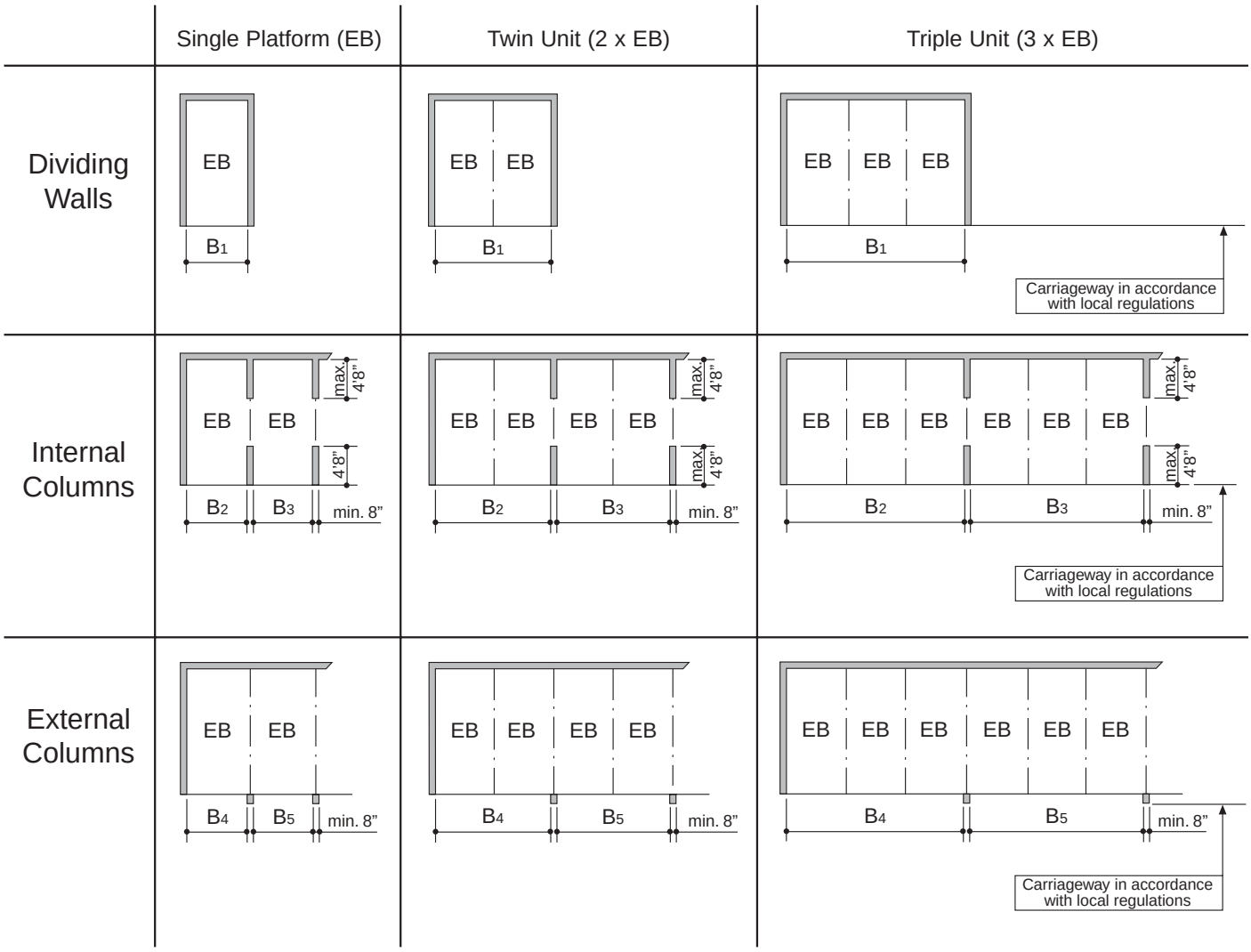
Type	H	DH	Suitable for	Maximum vehicle dimensions
G 61-160	**10'6"**	**5'3"**	upper: standard passenger cars & station wagons, max. veh. height 4'11" lower: standard passenger cars & station wagons, max. veh. height 4'11"	Length 16'5'' <17'1"> Height see "Suitable for" Width 6'3" Weight 2,000 kg Wheel load 500 kg
G 61-170	**10'10"**	**5'7"**	upper: standard passenger cars & station wagons, max. veh. height 4'11" lower: standard passenger cars & station wagons, max. veh. height 5'3"	
G 61-180	**11'2"**	**5'11"**	upper: standard passenger cars & station wagons, max. veh. height 4'11" lower: standard passenger cars & station wagons, max. veh. height 5'8"	
G 61-190	**11'6"**	**6'3"**	upper: standard passenger cars & station wagons, max. veh. height 4'11" lower: standard passenger cars & station wagons, max. veh. height 5'12"	
G 61-200	**11'10"**	**6'7"**	upper: standard passenger cars & station wagons, max. veh. height 4'11" lower: standard passenger cars & station wagons, max. veh. height 6'3"	
G 61-210	**12'2"**	**6'11"**	upper: standard passenger cars & station wagons, max. veh. height 4'11" lower: standard passenger cars & station wagons, max. veh. height 6'7"	

If dimension height "H" is increased by customer, correspondingly higher vehicles may be parked on the upper platform(s).

Widths – Basement Garage

Series G 61 (Horizontal)

All space requirements are minimum finished dimensions in cm



	Usable Platform Width	Dividing Walls B_1	Internal Columns B_2	Internal Columns B_3	External Columns B_4	External Columns B_5
EB	7'7"	8'7"	8'5"	8'3"	8'3"	7'11"
	7'11"	8'11"	8'9"	8'7"	8'7"	8'3"
	8'3"	9'3"	9'1"	8'11"	8'11"	8'7"
2 x EB	7'7"	17'1"	16'11"	16'9"	16'9"	16'6"
	7'11"	17'9"	17'7"	17'5"	17'5"	17'1"
	8'3"	18'5"	18'3"	18'1"	18'1"	17'9"
3 x EB	7'7"	25'8"	25'6"	25'4"	25'4"	24'12"
	7'11"	26'7"	26'5"	26'3"	26'3"	25'12"
	8'3"	27'7"	27'5"	27'3"	27'3"	26'11"

Standard width = parking space width 7'7"

PLEASE NOTE:

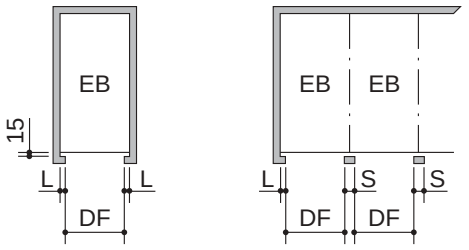
- End parking spaces are generally more difficult to drive into. Therefore we recommend for end parking spaces our wider platforms.
- Parking on standard width platforms with larger vehicles may make getting into and out of the vehicle difficult. This depends on type of vehicle, approach and above all on the individual driver's skill.

Widths – Garage with door in front of the car parking system

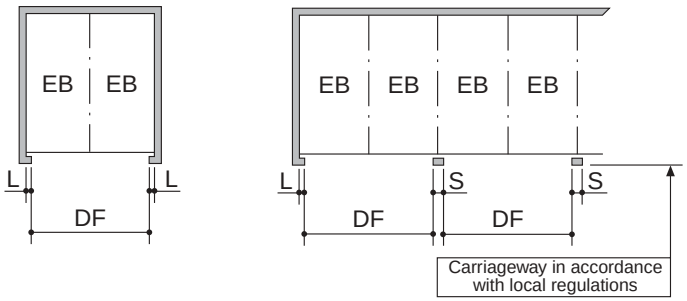
Series G 61 (Horizontal)

All space requirements are minimum finished dimensions in inch

Single Platform (EB)



Twin Unit (2 x EB)

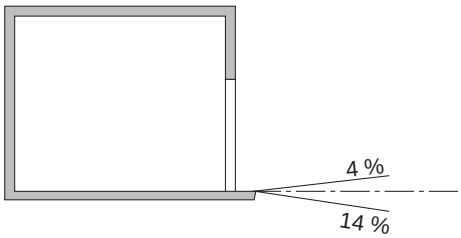


	Usable Platform Width	DF	L	S
EB	7’7”	7’10”	5”	10”
	7’11”	8’3”	5”	10”
	8’3”	8’3”	6”	12”
2 x EB	7’7”	15’7”	9”	1’6”
	7’11”	16’6”	8”	1’4”
	8’3”	17’1”	8”	1’4”

DF = door entrance width

Door dimensions require coordination with door supplier.

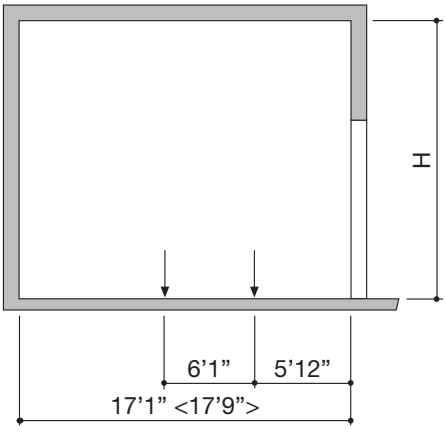
Approach

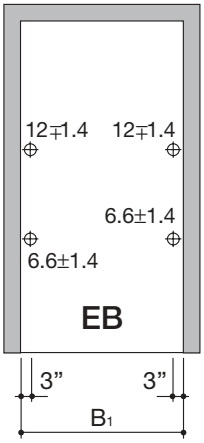


These illustrated maximum approach angles must **NOT** be exceeded. Incorrect approach angles will cause **SERIOUS MANEOUVRING & POSITIONING PROBLEMS** on the parking system for which the local agency of Klaus accepts no responsibility.

Load plan

forces in kN
dimensions in inch





Units are bolted to the floor. Drilling depth approx. 6”.

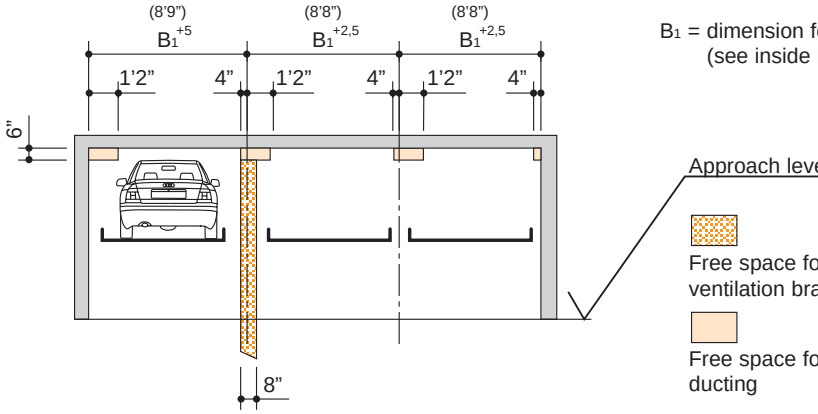
Installation Data

Garage ventilation, drainage, heating, electrical wiring

Series G 61 (Horizontal)

Free space for longitudinal and vertical ducts (e.g. ventilation)

dimensions in inch

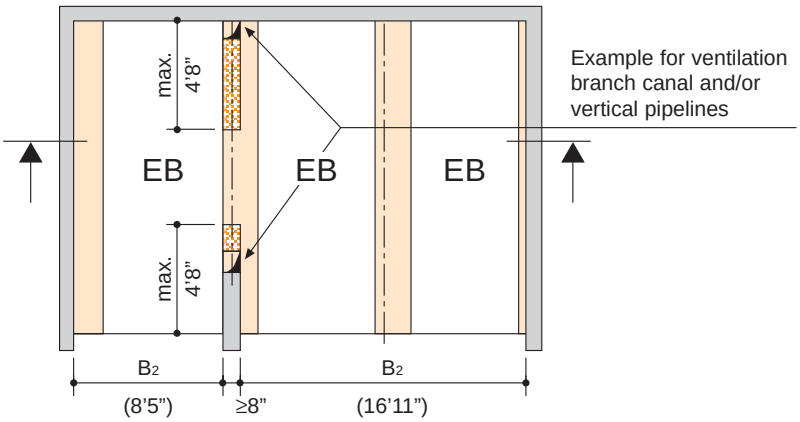


B_1 = dimension for dividing walls (see inside page)

Approach level

Free space for vertical pipelines, ventilation branch canals

Free space for horizontal ducting



Example for ventilation branch canal and/or vertical pipelines

Free space only applicable if vehicle is parked forwards = with FRONT FIRST and driver's door on the left side.

( )-dimensions illustrate an example for usable platform width 7'7"

Electrical Data

dimensions in inch

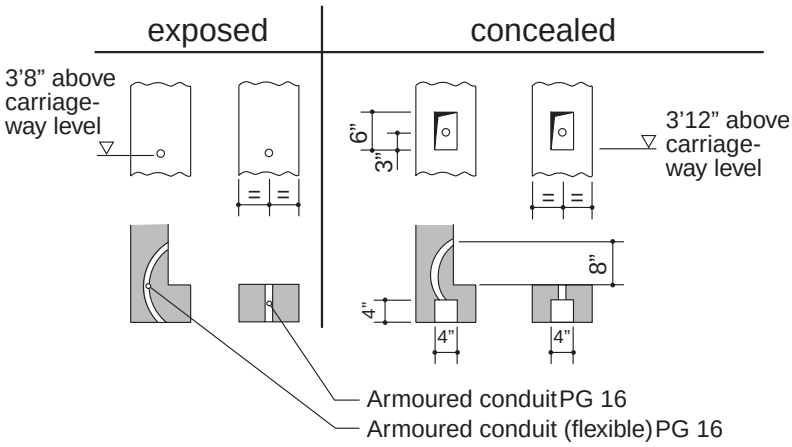
Generally to be effected by customer:

- electrical wiring 5 x 2.5 mm² per unit
- delayed-action mains fuse 3 x 16 A per unit
- "EMERGENCY-OFF"/main power supply switch, lockable, per unit

Electrical wiring:

Electrical wiring is carried out by the customer or by the local agency of Klaus in accordance with our circuit diagram/s. (Please see the respective quotation at hand)

Cable conduits and recesses for operating element



Technical Data as of issue 06/98:

We reserve the right to change this specification without further notice.

Stamp

Units

Low-noise power units mounted to rubber-bonded-to-metal mountings are installed. Nevertheless we recommend to build the parking system's garage separately from the dwelling house.

Safety railings

Any safety railings which become necessary due to the installation of the system at access points, walkways, traffic lanes etc. will have to be provided/paid for by customer.

The following documents can be supplied upon request:

wall recess plans
test sheet on airborne and solid-borne sound

KLAUS

Parking Systems Atlantic, Inc.

Klaus Model G61 Vehicle lift Processing time:

- 7.5 HP Power Pack
- 12 Liters per Minute Valves
- Raising Lift Platform < 30 seconds
  (With Vehicle)
- Lowering Lift Platform < 30 seconds
  (With Vehicle)

When operating Klaus Model G61 Vehicle Lifts with 7.5 HP Power Pack and 12 Liters per Minute Valves, valet can expect the time required to raise platform (With Vehicle) to be no longer than 30 seconds and the time required to lower platform (With Vehicle) no longer than 30 seconds.

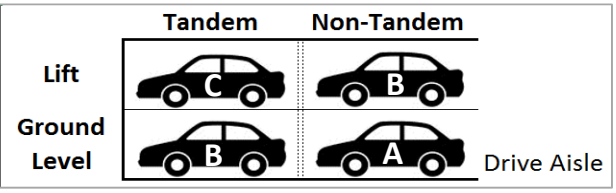
Bruce B. Roden Jr.
KLAUS Parking Systems Atlantic, Inc.
Vice President

655 NW. 128th St, North Miami, Fl 33168
O: (305) 687-5733 | F: (305) 687-5734 | Email: Bruce@klauspark.com
www.klausparking.com | www.multiparking.com

Starwood Properties Office Building On-Site Parking Calculated Average Travel Time	
VALET DROP-OFF	
VEHICLE TRAVEL TIME	**VALET ATTENDANT TRAVEL TIME**
Travel Times (Assume 10 mph speed)	Travel Times (Assume 5 ft/s speed)
To Valet Garage (In vehicle)	**Return from Valet Garage (Walk/Run) to Valet Area**
Distance 0.15 miles	Travel Time 0.9 minutes
Controlled Delay* 0.5 Minutes	Distance 0.05 miles
Average Mechanical-Lift Processing Time 1.7 Minutes	Travel Time 0.8 minutes
Total Time 3.9 Minutes	

Starwood Properties Office Building On-Site Parking Calculated Average Travel Time	
VALET PICK-UP	
VALET ATTENDANT TRAVEL TIME	**VALET ATTENDANT TRAVEL TIME**
Travel Times (Assume 5 ft/s speed)	Travel Times (Assume 10 mph speed)
To Valet Garage (Walk/Run)	**Return from Valet Garage (In Vehicle) to Valet Area**
Distance 0.05 miles	Travel Time 0.8 minutes
Controlled Delay* 0.5 Minutes	Distance 0.18 miles
Average Mechanical Lift Processing Time 1.6 Minutes	Travel Time 1.1 minutes
Total Time 4.0 Minutes	

Vehicle Processing Scenarios

Mechanical Lift Layout	
	

Vehicle A (non-tandem) - Drop-Off

1.	Attendant drives onto lift	10
		10 sec

Vehicle A (non-tandem) - Pick-Up

1.	Attendant drives off of lift	10
		10 sec

Vehicle B (non-tandem): No Vehicle A - Drop-Off

1.	Attendant maneuvers in front of lift	10
2.	Attendant exits vehicle to lower lift	5
3.	Attendant lowers lift	30
4.	Attendant re-enters vehicle and drives onto lift	15
5.	Attendant exits vehicle	5
6.	Attendant raises lift	30
		95 sec

Vehicle B (non-tandem): No Vehicle A - Pick-Up

1.	Attendant lowers lift	30
2.	Attendant enters vehicle and drives off of lift	15
3.	Attendant exits vehicle to raise lift	5
4.	Attendant raises lift	30
5.	Attendant re-enters vehicle	5
		85 sec

Vehicle B (non-tandem): Vehicle A Parked - Drop-Off

1.	Attendant exits Vehicle B	5
2.	Attendant enters Vehicle A	5
3.	Attendant moves Vehicle A to drive aisle	10
4.	Attendant exits Vehicle A	5
5.	Attendant lowers lift	30
6.	Attendant re-enters Vehicle B and drives onto lift	15
7.	Attendant exits Vehicle B	5
8.	Attendant raises lift	30
9.	Attendant re-enters Vehicle A and drives into parking space	15
10.	Attendant exits Vehicle A	5
		125 sec

Vehicle B (non-tandem): Vehicle A Parked - Pick-Up

1.	Attendant moves Vehicle A underneath lift to drive aisle	10
2.	Attendant exits Vehicle A	5
3.	Attendant lowers lift	30
4.	Attendant enters Vehicle B and drives off of lift	15
5.	Attendant exits Vehicle B to raise lift	5
6.	Attendant raises lift	30
7.	Attendant re-enters Vehicle A and drives into parking space	15
8.	Attendant exits Vehicle A	5
9.	Attendant re-enters Vehicle B	5
		120 sec

Vehicle Processing Scenarios

Vehicle B/C (Tandem): Vehicle A and B Parked - Drop-Off

1.	Attendant exits Vehicle C	5
2.	Attendant enters Vehicle A	5
3.	Attendant moves Vehicle A to drive aisle	10
4.	Attendant exits Vehicle A	5
5.	Attendant enters Vehicle B and moves to drive aisle	15
6.	Attendant exits Vehicle B	5
7.	Attendant lowers lift	30
8.	Attendant re-enters Vehicle C and drives into lift	15
9.	Attendant exits Vehicle C	5
10.	Attendant raises lift	30
11.	Attendant re-enters Vehicle B and drives into parking space	15
12.	Attendant exits Vehicle B	5
13.	Attendant re-enters Vehicle A and drives into parking space	15
14.	Attendant exits Vehicle A	5
		165 sec

Vehicle B/C (Tandem): Vehicle A and B Parked - Pick-Up

1.	Attendant moves Vehicle A underneath lift to drive aisle	10
2.	Attendant exits Vehicle A	5
3.	Attendant moves Vehicle B underneath lift to drive aisle	10
4.	Attendant exits Vehicle B	5
5.	Attendant lowers lift	30
6.	Attendant enters Vehicle C and drives of off lift to drive aisle	15
7.	Attendant exits Vehicle C to raise lift	5
8.	Attendant raises lift	30
9.	Attendant re-enters Vehicle B and drives into parking space	15
10.	Attendant exits Vehicle B	5
11.	Attendant re-enters Vehicle A and drives into parking space	15
12.	Attendant exits Vehicle A	5
13.	Attendant re-enters Vehicle C	5
		155 sec

Average Drop-off Processing Time	**99 sec**
Average Pick-up Processing Time	**93 sec**

Attachment D

Valet Analysis

Starwood Properties Office Building

A.M. Peak Hour Drop-off

Arrival Rate

IN	OUT	
101	0	veh/hr

Service Rate

IN	OUT	
4.00	0.00	mins/veh

Number of Valet Attendants (N) =	9	
Level of Confidence =	0.95	
Storage Provided On-Site =	13	vehicles
Total Entering and Exiting Vehicles(q) =	101	veh/hr
Service Capacity per N (60 mins/Service Rate) (Q) =	15.00	veh/hr/pos
Average Service Rate (t) =	4.00	mins/veh
rho (t/Q) =	0.748	

N	N-1		
1	0	P(n=0)=	1.000
2	1	P(n=1)=	6.733
3	2	P(n=2)=	22.669
4	3	P(n=3)=	50.879
		P(0) =	0.11%

Service Time = 4.00 mins/veh

Expected (avg.) number of vehicles in the system	E(m)=	0.97	
Expected (avg.) number of vehicles waiting in queue	E(n)=	7.70	
Mean time in the queue	E(w)=	0.58	mins
Mean time in system	E(t)=	4.58	mins

Proportion of customers who wait (P) (E(w) > 0)=	32.69%
Probability of a queue exceeding a length (M) P(x > M)=	5.00%

Queue length which is exceeded 5.00% of the times is equal to 5.3 vehicles

Starwood Properties Office Building

A.M. Peak Hour Pick-up

Arrival Rate

IN	OUT	
0	20	veh/hr

Service Rate

IN	OUT	
0.00	5.00	mins/veh

Number of Valet Attendants (N) =	3	
Level of Confidence =	0.95	
Storage Provided On-Site =	30	vehicles
Total Entering and Exiting Vehicles(q) =	20	veh/hr
Service Capacity per N (60 mins/Service Rate) (Q) =	12.00	veh/hr/pos
Average Service Rate (t) =	5.00	mins/veh
rho (t/Q) =	0.556	

N	N-1		
1	0	P(n=0)=	1.000
2	1	P(n=1)=	1.667
3	2	P(n=2)=	1.389
4	3	P(n=3)=	0.000
		P(0) =	17.27%

Service Time = 5.00 mins/veh

Expected (avg.) number of vehicles in the system	E(m)=	0.37	
Expected (avg.) number of vehicles waiting in queue	E(n)=	2.04	
Mean time in the queue	E(w)=	1.12	mins
Mean time in system	E(t)=	6.12	mins

Proportion of customers who wait (P) (E(w) > 0)=	29.98%	
Probability of a queue exceeding a length (M) P(x > M)=	5.00%	

Queue length which is exceeded 5.00% of the times is equal to 1.8 vehicles

Starwood Properties Office Building

P.M. Peak Hour Drop-off

Arrival Rate

IN	OUT	
45	0	veh/hr

Service Rate

IN	OUT	
4.00	0.00	mins/veh

Number of Valet Attendants (N) =	5	
Level of Confidence =	0.95	
Storage Provided On-Site =	13	vehicles
Total Entering and Exiting Vehicles(q) =	45	veh/hr
Service Capacity per N (60 mins/Service Rate) (Q) =	15.00	veh/hr/pos
Average Service Rate (t) =	4.00	mins/veh
rho (t/Q) =	0.600	

N	N-1		
1	0	P(n=0)=	1.000
2	1	P(n=1)=	3.000
3	2	P(n=2)=	4.500
4	3	P(n=3)=	4.500
5	4	P(n=4)=	3.375
6	5	P(n=5)=	0.000
7	6	P(n=6)=	0.000
8	7	P(n=7)=	0.000

P(0) = 4.66%

Service Time = 4.00 mins/veh

Expected (avg.) number of vehicles in the system	E(m)=	0.35	
Expected (avg.) number of vehicles waiting in queue	E(n)=	3.35	
Mean time in the queue	E(w)=	0.47	mins
Mean time in system	E(t)=	4.47	mins

Proportion of customers who wait (P) (E(w) > 0)=	23.62%
Probability of a queue exceeding a length (M) P(x > M)=	5.00%

Queue length which is exceeded 5.00% of the times is equal to 1.8 vehicles

Starwood Properties Office Building

P.M. Peak Hour Pick-up

Arrival Rate

IN	OUT	
0	119	veh/hr

Service Rate

IN	OUT	
0.00	5.00	mins/veh

Number of Valet Attendants (N) =	13	
Level of Confidence =	0.95	
Storage Provided On-Site =	30	vehicles
Total Entering and Exiting Vehicles(q) =	119	veh/hr
Service Capacity per N (60 mins/Service Rate) (Q) =	12.00	veh/hr/pos
Average Service Rate (t) =	5.00	mins/veh
rho (t/Q) =	0.763	

N	N-1		
1	0	P(n=0)=	1.000
2	1	P(n=1)=	9.917
3	2	P(n=2)=	49.170
4	3	P(n=3)=	162.535
5	4	P(n=4)=	402.950
6	5	P(n=5)=	799.185
7	6	P(n=6)=	1320.875
8	7	P(n=7)=	1871.240

P(0) = 0.00%

Service Time = 5.00 mins/veh

Expected (avg.) number of vehicles in the system	E(m)=	0.88	
Expected (avg.) number of vehicles waiting in queue	E(n)=	10.79	
Mean time in the queue	E(w)=	0.44	mins
Mean time in system	E(t)=	5.44	mins

Proportion of customers who wait (P) (E(w) > 0)=	27.27%
Probability of a queue exceeding a length (M) P(x > M)=	5.00%

Queue length which is exceeded 5.00% of the times is equal to 5.1 vehicles