PARKING STANDARDS

601.101 – GENERAL PLANNING REQUIREMENTS

1.1 INTRODUCTION

A. General Planning Requirements includes standards for planning new surface and structured parking.

B. Design Requirements offer more detailed requirements for parking and are contained in General Design Requirements.

1.2 OVERALL PLANNING REQUIREMENTS FOR PARKING

A. This section identifies general planning considerations and requirements when evaluating a site for new surface and/or structured parking.

B. User Group. Determine who will use the parking. Requirements for visitor parking are different than those for employee parking. This is essential to understanding the design standards, refer to Design Quality Level in 601.202 *Parking Standards – General Design Requirements*.

1. For mixed user group parking areas, determine and identify the percentage for each user group.

C. Parking Supporting a Building Type/Use. Parking that supports a hospital is more restrictive than outpatient facilities or office building uses. Consideration for what use the parking serves will influence the requirements. Planning efforts shall identify the Building/Use it is supporting. This is essential to understanding the design standards, refer to Design Quality Level in 601.202 *Parking Standards – General Design Requirements*.

D. Number of Spaces. Determine the number of parking spaces needed. This information must be tracked, updated and documented during the planning and design phases by the design team.

1. Review zoning requirements. Coordinate with specific governmental planning and zoning regulations for provisional requirements. This effort may require allocation of spaces for different occupancies on medical campuses.
2. Verify Current Inventory. Existing parking count is required to help determine the number of spaces needed. Evaluation of quality of parking
3. Analyze Demands. Determination of the number of potential spaces needed.
    a. Peak Demands. Evaluate parking usage based on days of the week and times of day. Peak days (Design Days) of week are typically Monday thru Friday for medical campuses. Peak times of the day (Design Hour) are between the hours of 6 am and 6 pm. Consider hospital employee shift change overlap.
4. Document and Track Parking Counts. Parking tabulations shall include existing to remain, existing to be removed, new spaces, and a total parking count at project completion. Account for all building types (hospitals, outpatient centers, administrative buildings, etc.) and their required parking for a medical campus. The following table is an example of how the parking shall be documented.

a. Site Plans. Site plans shall indicate allocation of parking spaces for the different uses on campus (hospitals, outpatient centers, administrative buildings, etc.). In addition, plans shall show parking space counts by row.

Example: Parking Tabulation Table

Parking for Hospital Use	Existing spaces to remain	Existing spaces to be removed	New spaces to be constructed	Total proposed parking spaces	Zoning and ADA Required spaces
Standard vehicle space	250	20	40	270	200
ADA standard spaces	25	2	6	29	20
ADA van accessible	3	0	1	4	4
Other	0	0	0	0	0
TOTAL	278	22	47	283	224

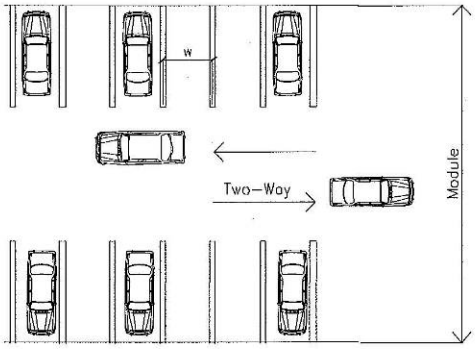
E. Area Required. For planning purposes, assume an above-average efficient parking area (structured and surface parking) requires approximately 400 square feet per vehicle. The four case studies for parking structures are listed below which support area per vehicle.

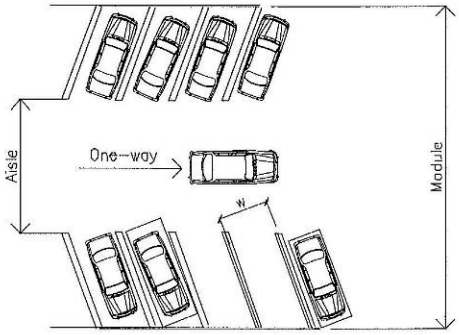
Case Study Comparison square feet per parking space	MBMC	BHC	BJH	SLCH
Total no. of parking spaces	325	868	1,939	616
Gross area parking structure	120,915	332,319	740,332	434,227
Average square feet per parking space	**372.05**	**382.86**	**381.81**	**704.91**

F. Expansion/Growth. Planning for future expansion should be considered (and documented) early in the planning process since it can have impact on the area required which may influence site selection, location, traffic flow, utilities, etc.

G. Circulation. Determine circulation pattern - one-way or two-way traffic flow. There are advantages and disadvantages to both circulation patterns. (One-way traffic flow should never be combined with 90° parking.)

Advantages of Two-Way Traffic Flow	Advantages of One-Way Traffic Flow
Wider drive aisles allow vehicles to pass	Easier for parkers to enter and exit parking spaces
Wider drive aisles are safer for pedestrians	More likely to be centered in angled parking spaces
Better sight lines when looking for a parking space	Less circulation conflict and reduced accidents
Traffic flow is expected and not confusing	Better visibility when backing out of a parking space
Most efficient - maximum spaces per area	Results in improved flow capacity





H. Parking Location. Parking areas should be located so they are easy to navigate to and such that pedestrian travel distance is minimized. In general, locate parking immediately adjacent to the building it serves but not more than 250' from the building entrance. Proximity of parking to building depends on Design Quality Level. Proximity of parking to building also depends on the pedestrian environment. Refer to 601.202 *Parking Standards – General Design Requirements* for additional information.

1. Strategic Campus Plan. Review current Strategic Campus Plan for coordination with site selection for parking.
2. Traffic studies. As determined by Director of Design or as required by Authorities Having Jurisdiction (AHJ), provide traffic studies to understand potential impact on existing infrastructure. Coordinate with AHJ's and identify any
3. Engineering reports. As determined by Director of Design or as required, provide:
    a. Geotechnical reports that identify soil conditions and other subsurface information that may affect the site selection and/or parking footprint.
    b. Engineering analysis and reports for storm water management.
4. Surveys. As determined by Director of Design or as required, provide civil engineering surveys that identify property information, utilities, zoning restrictions, grading, improvements, and other information that may affect the site selection and/or parking footprint.

I. Special Considerations. There are other factors that may affect the planning effort and should be considered.

1. Type of parking. Whether the facility will be self-park, attendant-park, or some combination of the two should be considered early in the design as it can influence some of the project characteristics including wayfinding and proximity to entrance.
2. User Group Separation. It is important to recognize situations that may require user groups within a parking area to be separated. This can minimize confusion and reduce the time it takes to find an open parking. The following should be considered for separation:
    a. Emergency visitor parking. When the project requires spaces to be built for emergency department visitor parking, those spaces should permit immediate, clear and direct access to free, short-term parking.
    b. Physician parking. When projects require physician parking, it should be offered in a manner so that the time to enter the garage, park and enter the hospital is minimized. This space clearly needs to be considered and balanced with visitor parking and ADA requirements
    c. Clergy

d. Employee recognition
e. Shuttle parking
f. Courier service parking

3. Cost of parking. For pay-to-park facilities including permit parking, the cost to park should be considered. Consideration and planning of remote pay stations in areas beyond the garage should also be reviewed.

2.1 PLANNING REQUIREMENTS FOR SURFACE PARKING

A. This section identifies requirements and considerations for planning new surface parking. The section above titled Overall Planning Requirements for Parking are also applicable to this section.

B. Review Strategic Campus Plan. Coordinate potential surface parking areas with those areas identified in the campus Strategic Campus Plan.

C. Consider Level Sites. Review existing surveys and consider

D. Orientation. In general, orient surface parking such that drive lanes are perpendicular to building. This allows pedestrians travel along the same path of vehicles in lieu of cross traffic pedestrian patterns.

E. Storm Water Management. Consider the impact on existing infrastructure and potential strategies to deal with the increase in impervious areas.

2.2 PLANNING REQUIREMENTS FOR STRUCTURED PARKING

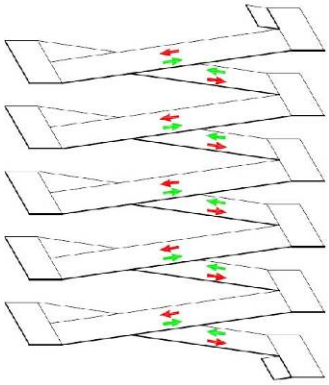
A. This section identifies requirements and considerations for planning new structured parking. The section above titled Overall Planning Requirements for Parking are also applicable to this section.

B. Types of Parking Structures/Circulation. Parking Structures are identified by the ramping conditions and vehicular circulation. Identifying the number of vehicles needed and the available site area will determine the available footprint and the number of parking levels required. Once established, the following types of parking structures should be considered:

1. Low to Medium Rise. The types within this group are very common structures. In general, these structures are easy to navigate. These types are not recommended when structures exceed 5 elevated levels because the ramp's vertical rise is no more than one level per 180 degree turn. Can be either pre-cast or site-cast concrete. The types are as follows:

   a. Sloping Floor Type - Double Ramp
   b. Sloping Floor Type - Single Ramp
   c. Side-By-Side Helix

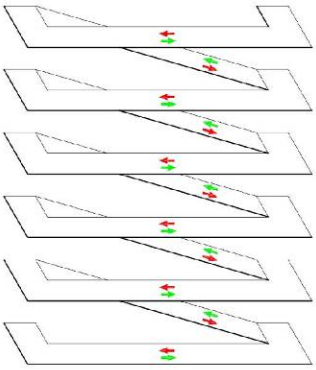
Low to Medium Rise Circulation Diagrams



Sloping Floor - Double Ramp

Characteristics:

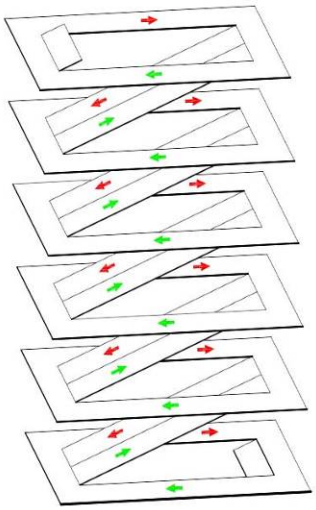
- *122' wide x 155' long, min., small site footprint*
- *Easy to navigate – simple circulation pattern*
- *Two-way traffic drive aisles*
- *Permits 90 deg parking*
- *Both sides sloping can be difficult to conceal parking*
- *Not pedestrian friendly due to sloping ramps*
- *Expansion potential only at end bays*
- *Rise per 180 deg turn: 1 level*
- *No inbound/outbound vehicle separation*



Sloping Floor - Single Ramp

Characteristics:

- *122' wide x 255' long, min., typical site footprint*
- *Very easy to navigate – simple circulation pattern*
- *Two-way traffic drive aisles*
- *Permits 90 deg parking*
- *One level side can be easier to conceal parking*
- *Level side is pedestrian friendly*
- *Expansion potential at end bays and level side*
- *Rise per 180 deg turn: 1 level*
- *No inbound/outbound vehicle separation*



Side-By-Side Helix

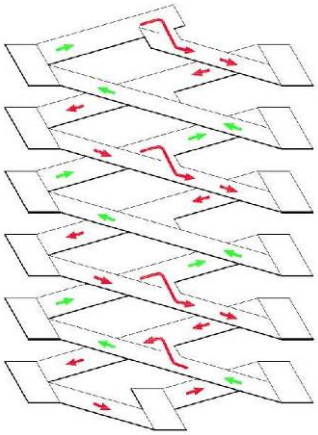
Characteristics:

- *183' wide x 255' long, min., large site footprint*
- *Very easy to navigate – simple circulation pattern*
- *Two-way traffic drive aisles*
- *Permits 90 deg parking*
- *All level sides, easier to conceal parking*
- *Level decks, pedestrian friendly*
- *Expansion potential at end bays and all level sides*
- *Rise per 180 deg turn: 1 level*
- *Some inbound/outbound vehicle separation*

2. Medium to High Rise. The types within this group allow drivers to reach the upper level in fewer turns, thus reducing the time it takes for drivers to search for available parking. In most instances, the inbound and outbound traffic is separated because of the helix design. Typically these are site-cast structures only. For parking structures greater than five elevated parking deck levels, consider the following types:

   a. Double-Threaded Helix Type - One Way Travel
   b. Double-Threaded Helix Type - Two Way Travel
   c. End-To-End Helix - Both Bays Sloped
   d. End-To-End Helix - One Bay Sloped

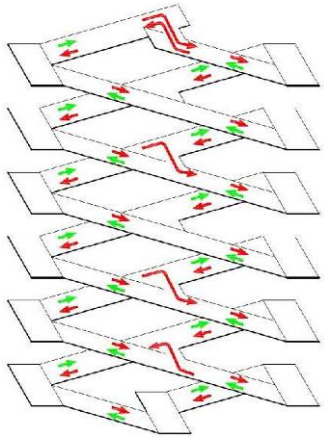
Medium to High Rise Circulation Diagrams



Double Threaded Helix – One Way Travel

Characteristics:

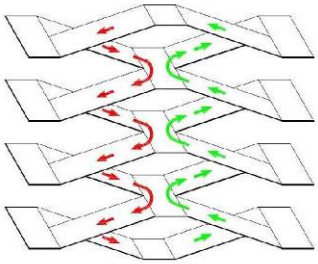
- *110' wide x 255' long, min., typ. site footprint*
- *Difficult to navigate for inexperienced users*
- *One-way traffic drive aisles – less efficient*
- *Only permits angled parking*
- *Both sides sloping can be difficult to conceal parking*
- *Not pedestrian friendly due to sloping ramps*
- *Expansion potential only at end bays*
- *Rise per 180 deg turn: 2 levels*
- *good inbound/outbound vehicle separation*



Double Threaded Helix – Two Way Travel

Characteristics:

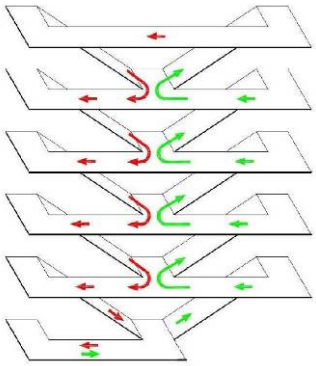
- *122' wide x 255' long, min., typ. site footprint*
- *Difficult to navigate for inexperienced users*
- *Two-way traffic drive aisles – avg efficiency*
- *Permits 90 deg parking*
- *Both sides sloping can be difficult to conceal parking*
- *Not pedestrian friendly due to sloping ramps*
- *Expansion potential only at end bays*
- *Rise per 180 deg turn: 2 levels*
- *No inbound/outbound vehicle separation*



End To End Helix – Both Sides Sloped

Characteristics:

- *110' wide x 255' long, min., typ. site footprint*
- *Difficult to navigate for inexperienced users*
- *One-way traffic drive aisles – less efficient*
- *Only permits angled parking*
- *Both sides sloping can be difficult to conceal parking*
- *Not pedestrian friendly due to sloping ramps*
- *Expansion potential only at end bays*
- *Rise per 180 deg turn: 1 level*
- *good inbound/outbound vehicle separation*



End To End Helix – One Side Sloped

Characteristics:

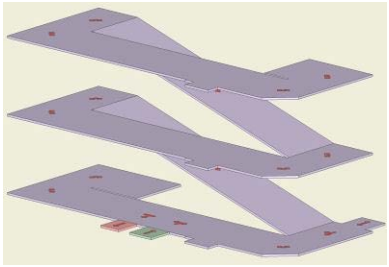
- *122 wide x 255' long, min., typ. site footprint*
- *Difficult to navigate for inexperienced users*
- *One-way traffic drive aisles – less efficient*
- *Only permits angled parking*
- *One level side can be easier to conceal parking*
- *Level side is pedestrian friendly*
- *Expansion potential at end baysand level side*
- *Rise per 180 deg turn: 1 level*
- *good inbound/outbound vehicle separation*

C. Characteristics of Parking Structure/Circulation Types. The following matrix considers the common types of parking structures and evaluates them based on the criteria.

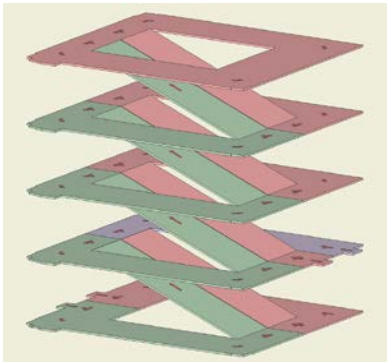
			Parking Efficiency	Ease of Vehicular Navigation	Inbound outbound separation	Pedestrian Friendly	Aesthetics (exterior cladding potential)	Expansion potential	Affordability - Cost	Use of Site Area
Parking Structure/Circulation Types	Low to medium rise (up to 5 elevated levels)	Sloping Floors Double Ramp	avg	good	poor	avg	poor	avg	avg	good
		Sloping Floor – Single Ramp	good	good	poor	avg	avg	avg	good	avg
		Side By Side Helix	good	avg	avg	good	good	good	good	poor
	Medium to high rise (over 5 elevated levels)	Double Helix - One-Way Travel	avg	poor	good	poor	poor	poor	avg	avg
		Double Helix - Two-Way Travel	avg	poor	avg	poor	poor	poor	avg	avg
		End To End Helix - Both Sides Sloped	avg	poor	good	poor	poor	poor	poor	avg
		End To End Helix – One Side Sloped	avg	poor	good	avg	avg	avg	avg	avg

D. Case Studies – Parking Structure/Circulation Type. The following diagrams depict the BJC parking structures studied for the development of the parking standards and are included herein for reference.

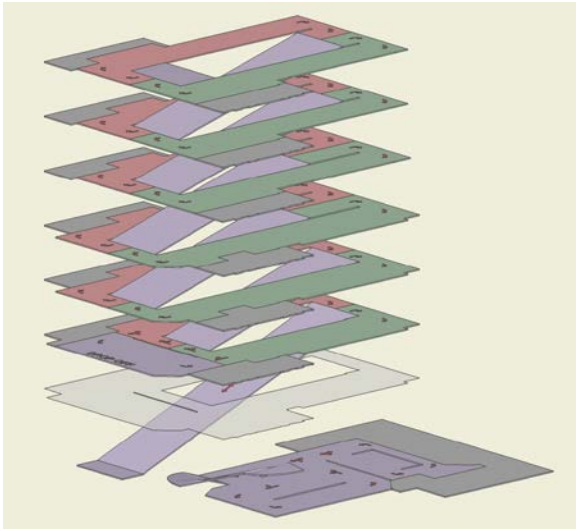
1. MBMC - Main Garage. This structure is an example of the Sloping Floor Single Ramp type. It is an above ground, freestanding 3 level (2 elevated decks) cast-in-place and post-tensioned concrete structure. The drive aisles are 2-way travel and 90 degree parking making it a very efficient layout. The level side is oriented to entrance court with the stair/elevator lobby along the level side which creates a better pedestrian environment.



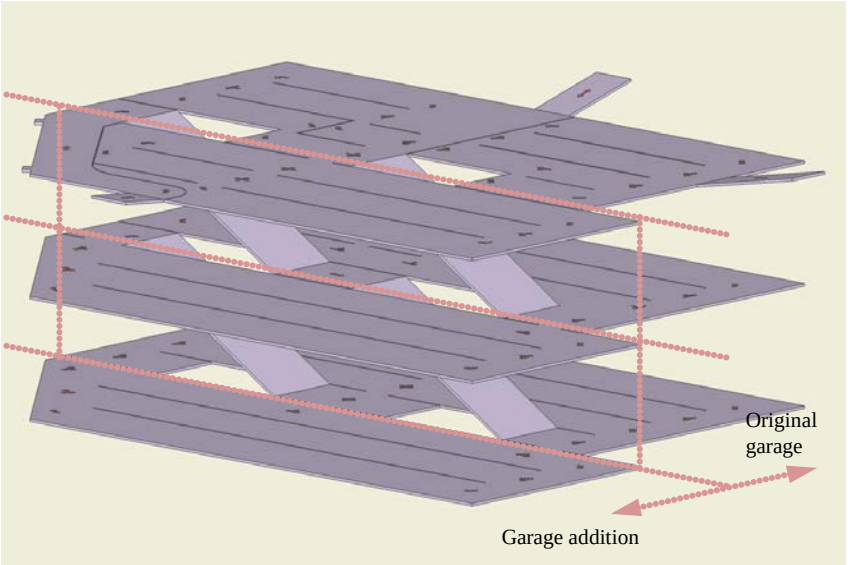
2. BHC – William Street Garage. This structure is an example of the Side By Side Helix type. It is an above ground, freestanding 5 level (4 elevated decks) cast-in-place and post-tensioned concrete structure. The drive aisles are one-way travel with 70 degree angled parking making it a fairly efficient layout and easy to navigate. The level sides along the entire perimeter creates a better pedestrian environment and permits expansion in a variety of directions. The footprint does, however, require significant site area due to the structure being 4 modules wide (module equals a drive aisle and its associated parking).



3. SLCH – Main Garage. This structure most closely resembles a Side-By-Side Helix type. It is a 7 level (6 elevated levels and 1 below grade level). The structure itself is very complex as it sits beneath the SouthWest Tower. Free-to-park Emergency Department parking is located on the lowest level and the upper parking levels are pay to park. It is a cast-in-place post-tensioned concrete structure. The at-grade entrance/exit leads to a non-parked speed ramp up over the ground floor ED. Parking is both single and double-loaded along one-way drive aisles.



4. BJH – South Garage. This garage is unique in many ways, but primarily due to it being entirely below ground. It was built in 2 phases - the original structure is the northern-most half of the current footprint and was built in the mid 1970's. The addition in the 1980's is comprised of flat parking plates and utilizes the ramping in the original construction. Both structures are cast-in-place post-tensioned concrete. This garage resembles two Sloping Floor Single Ramp Types, placed end to end with additional level parking to the sides. Most of the drive aisles are two-way travel and most of the spaces are oriented 90 degrees. The parking has user group segregation for visitors, physicians and staff. Internal ramping is parked. Access is controlled and is a pay-to-park facility.



E. Case Studies – Parking Count. The following matrix indicates the number of parking spaces by level for each of the case studied.

	MBMC		BHC		SLCH		BJH	
	Total no. spaces	ADA spaces	Total no. spaces	ADA spaces	Total no. spaces	ADA spaces	Total no. spaces	ADA spaces
8th elevated level								
7th elevated level					77	2		
6th elevated level					108	2		
5th elevated level					84	2		
4th elevated level			135	3	110	2		
3rd elevated level			201	2	110	2		
2nd elevated level	79	2	200	2	79	2		
1st elevated level (north entry)	128	2	185	32	0	0		
Primary Entrance Level (south entry/exit)	112	10	147		0	0	537	0
Lower level 1					48	2	650	52
Lower level 2							752	0
TOTAL	319	14	868	39	616	14	1,939	52
Average number of spaces per floor	**106**		**173**		**88**		**646**	

F. Core Rooms. The following represent typical rooms in a parking garage. These rooms contribute to the gross parking area and thus affect the efficiency. Therefore the room sizes should not be greater than what is needed for the expected functions.

1. Stair. A minimum of 2 stairs are required. Additional stairs may be required by code or for convenience. Maximum distance between stairs should not exceed 300'. Stairs should be no less than 44" clear in width. One stair shall be associated with the garage elevators and serve as the primary vertical circulation point and shall connect all levels of the garage.

   a. Enclosed Stair. When the stair is connected to an enclosed elevator lobby the stairs shall be enclosed also. Particular attention regarding the structural detailing of the supports and walls for enclosed stairs with respect to isolation of the post-tensioned garage structure needs to be developed.

2. Elevator Lobby. The elevator lobby shall be located in the garage as close to the building it serves. High visibility of the elevator lobby (from outside the garage and from within the garage) is required. Consider full height glass walls in the lobby at all levels. Graphics and signs should be located in this area to remind customers where they parked. Automated pay stations, when applicable, may also be located in these areas.

   a. Enclosed and conditioned Lobby preferred.

   b. Open Lobby. Where open lobbies exit directly to drive aisles, provide clear levels of protection. Such protection may include lobbies raised 6" above the parking deck or painted bollards. Painted striping alone on the floor level is not sufficient protection for pedestrians.

   c. Lobby at grade. Pedestrian access at the grade level should be separated from vehicular ingress and egress. Pedestrian access is usually adjacent to stair/elevator towers. It is also desirable to place a dedicated pedestrian aisle adjacent to a vehicle entry/exit because pedestrians are naturally attracted to these openings. Access locations should be restricted to a few locations for security reasons.

3. Elevator. Provide a minimum of 2 elevator cabs for parking structures up to 1,000 vehicles. For every 750 additional parking spaces, provide one additional elevator cab.

    a. 1 – 1,000 vehicles: 2 elevator cabs
    b. 1,001 – 1,750 vehicles: 3 elevator cabs
    c. 1,751 – 2,500 vehicles: 4 elevator cabs

4. Elevator Equipment Room. Depending on the type of elevator selected, as required by the elevator manufacturer.
5. Sprinkler Room. As required.
6. Office. When pay-to-park types are planned, a garage office shall be located adjacent to the primary public entrance and exits.
7. Electrical Room. As required.
8. Mechanical Room. As required.
9. Storage. Space shall be provided for maintenance equipment and materials. Coordinate with entity specific storage requirements.

END OF DOCUMENT 601.201

RESPONSIBILITY MATRIX

The following matrix identifies those individuals, roles or departments responsible for maintaining the accuracy of the information and those responsible for providing input. Refer to Preface for detailed explanation.

	BJC HealthCare													Hospital/Entity				
	PD&C																	
	Corporate Architect	Corporate Engineer	Director of Planning	Director of Design	Director of Construction	Other:	Clinical Asset Management (CAM)	Risk Management	Real Estate	Ergonomics	Infection Prevention (IP)	Info Systems, Data, Telecom (IS)	Other:	Standards Review Committee	Facilities Engineering	Housekeeping	Security	Other:
Primary Authorship	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Secondary Authorship	☒	☒	☐	☒	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐

DOCUMENT REVISION HISTORY

The following able indicates the date the document originated and any subsequent revisions.

Document 601.101		
Issue	Description of Issue	Prepared by
2012 v2	Original Issue	G. Zipfel
2016 v1	Re-organization of Planning/Design Standard, misc. updates	G. Zipfel
2018 v1	Re-numbered, misc. updates	G. Zipfel