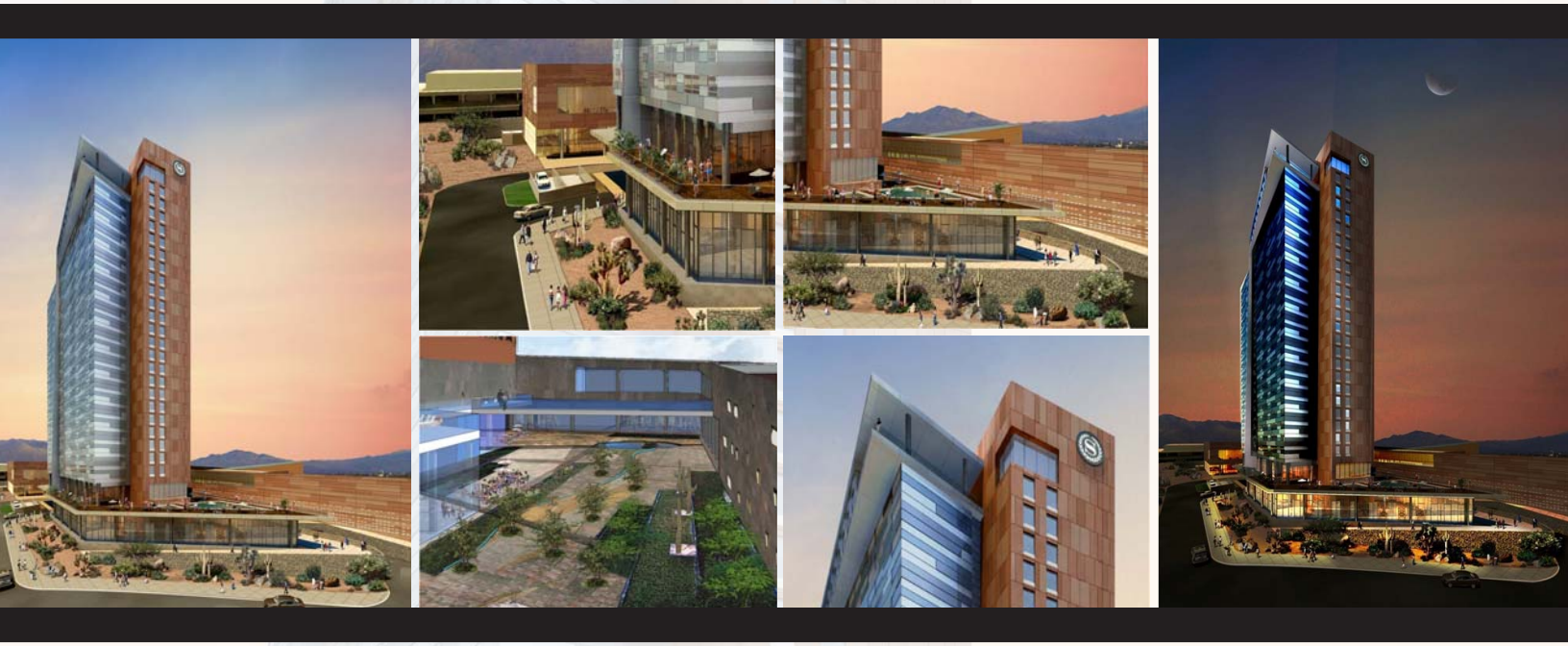
April 20, 2009

Pre-Development Agreement Concept Design

City of Tucson

Rio Nuevo Multipurpose Facilities District



Submitted By:

Garfield Traub Development

Starwood Hotels and Resorts

Turner Construction Company

Sundt Construction

DLR Group

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Architectural Narrative

Project Overview

The new Sheraton Tucson Convention Center Hotel and Phase I expansion of the Tucson Convention Center are currently in the Pre-Design phase of project planning. The City of Tucson will ultimately be the beneficiary of both projects and will continue to oversee operation of the convention center and be involved in the overall design of the complex.

Project Objective

The project objective is to create a full service hotel that will serve as the headquarters hotel for the expanded Tucson Convention Center and to enhance future development of Rio Nuevo. This project will change the skyline and image of Tucson and have a positive impact on visitors to the region. The project will also serve to generate additional city revenue from increased Convention Center bookings due to the expansion and the ability to offer large guestroom blocks to support larger conventions.

Project Description

The project consists of the new hotel and its amenities, the convention center exhibit hall expansion, new meeting rooms, and a new 1,160-car parking garage.

The full-service, 525-room Sheraton Hotel will feature approximately 35,000 SF of function and meeting space, including a 17,400 SF Grand Ballroom. The hotel will also include a full-service, three-meal restaurant and lobby bar, a generous outdoor pool and deck space, and a full service spa and fitness center for guests and visitors.
A premiere roof-top lounge with sunset views of the adjacent mountains and Tucson skyline is optional.

A central courtyard provides relief space between the hotel tower and the meeting facilities while functioning as outdoor dining and event space.

The convention center expansion consists of 35,000 SF of additional exhibit hall space, 30,000 SF of new, city-managed meeting space, and a new east entrance. The hotel portion of the project will be joined to the existing Tucson Convention Center and meeting rooms in several places.

The project will be designed sustainably in accord with standards established for Leadership in Energy and Environmental Design (LEED®), with a focus on minimizing energy usage, maximizing durability, and utilization of both local and recycled materials. The new hotel and meeting space facilities has been registered with the United States Green Building Council and will target LEED® Silver Certification upon completion.

Project Design Concept

The design approach draws upon many sources; buildings, images, and words. We have looked for sources that speak to the Tucson community with authenticity. We listen to the community wishes, for a landmark building which at the same time is true to the heritage of Tucson. We strive to be respectful of the Tucson landscape, its culture and history.

We also strive to create a 'sense of place', for visitors, residents and the passers-by. Our design concept is grounded in nature; rock, water, and light…which are unique in Tucson. It is the springboard for our design. We have designed a project which speaks to the balance of nature; rock, water and light...sensitively and in a heroic way. As such, what we have created is a landmark which is authentic to the Tucson desert, culture, and city.

The tower is an interpretation of rock, water and light. The south façade is the rock, with warm colors and the variegated appearance of strata. The north façade is crystalline, a gem emerging from the rock. Some passages that inspired us:

> **"rock…here in the arid West it's different. Time is more geologic than biologic. It accumulates layer upon layer, incrementally slow until all at once the pattern reverses. A tremendous rock slab suddenly unhinges, crashing from a cliff face; a flash flood washes down an arroyo without warning. Ripping through the strata, erosion lays open the past, exposing the raw edges of history."**
>
> ***~by Scott Thybony, Burntwater***

> **"water, water, water…there is no shortage of water in the desert but exactly the right amount, a perfect ratio of water to rock, of water to sand, insuring that wide free open generous spacing among plants and animals, homes and towns and cities, which makes the arid West so different from any other parts of the nation. There is no lack of water here, unless you try to establish a city where no city should be."**
>
> ***~by Edward Abbey, Desert Solitaire***

> **"No heat waves disturbed the perfect stillness of the surface. By the eye alone one might have supposed it cool. The silvery new grown spines of the chollas gleamed with a curious frostiness, as the sun poured down its light, along with a strange, radiant friendly heat…The ardor…grew gradually almost overwhelming. One decided to retire into one's own shade. But it was still nice to know that such ardor exist."**
>
> ***~by Joseph Wood Krutch, The Desert Year***

Sheraton Tucson Convention Center Hotel

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Guestroom Floors Summary				Net Sq. Ft.	Gross Sq. Ft.
Floors 3-26	**No.of keys**	**Bays**	**Sq.Ft**		
King	272	272	360	97,920	
HC King	11	11	360	3,960	
Double/Double	188	188	384	72,192	
HC Double/Double	7	7	384	2,688	
Deluxe Suite	22	33	560	12,320	
Executive Suite	20	40	720	14,400	
Governor Suite	2	8	2880	2,880	
Hospitality Suite	2	6	720	1,440	
Presidential Suite	1	5	1780	1,780	
Club Lounge	0	5	1780	-	
	525	**575**			
			Subtotal	**209,580**	
Guest Corridor/Circulation	(5'-6" Wide)		1310	30,250	
Elevator Lobby			300	7,500	
Vending			78	1,950	
Telecom			60	1,500	
Housekeeping			200	5,000	
			Subtotal	**46,400**	
			Floors 3-26 Total	**255,980**	**302,056**

Meeting Rooms		Conv. Ctr		Net Sq. Ft.	Gross Sq. Ft.
Function Space					
Grand Ballroom (Salons A-C)	(Seats 1600 at Banquet)			17,400	
Junior Ballroom	(Seats 600)			6,265	
Banquet Rm. A				4,000	
Banquet Rm. B				2,780	
Banquet Rm. B				2,850	
Banquet Rm. C				1,800	
Meeting Rm. A	4 at 1,620 each	6,480			
			Subtotal	**35,095**	
Public Space Support					
Grand Ballroom Prefunction Area		2,000		11,000	
Banquet/Meeting Room prefunction		4,600		6,000	
Public Washrooms Men's & Women's				600	
Men's Restroom First Floor				300	
Women's Restroom First Floor				400	
Family Restroom				70	
Elevator Vestibule First Floor				250	
Men's Restroom Second Floor				400	
Women's Restroom Second Floor				500	
Registration and Storage				150	
			Subtotal	**19,670**	
MEP					
Mechanical/Electrical/Fire Protection		700		1,060	
Electrical		500		500	
Telecom				250	
Water Heaters				400	
			Subtotal	**2,210**	
		Banquet and Meeting Rm Grand Total		**56,975**	**64,952**

Public Space & Back of House				
Lobby/Reception				
	Vestibule		100	
	Main Lobby		4,800	
	Business Center		275	
	Public Restrooms		500	
	Elevator Lobby		300	
		Subtotal	**5,975**	
Food and Beverage Outlets		**Seates**		
	3 Meal Restaurant	150	5,000	
	Coffee Express/ Link	15	500	
	Bar/Lounge	60	900	
	Circulation		350	
		Subtotal	**6,750**	
Back of House				
Front Desk				
	Front Desk		800	
	Luggage Storage		200	
	Bell/Concierge		82	
	Fire Control Center		120	
	Rooms Controler		120	
	DeskClerk/PBX		95	
		Subtotal	**1,417**	
Accounting				
	Controller		120	
	Assist. Controller		80	
	Account. Work Area		410	
	Storage/Pantry etc.		230	
		Subtotal	**840**	
Executive Sales and Catering Offices				
	Reception		250	
	General Manager		170	
	Secretary		80	
	F&B Director		100	
	F&B Director of Outlets		80	
	Revenue Mgmt. Director		100	
	Sales & Marketing Director		120	
	Reservations		150	
	Group Sales Director		100	
	Catering Sales Office Area		900	
	Administrative Support		280	
	MATV/ Data Center		180	
	Conference Room		250	
	Corridor		300	
	Storage / Pantry		200	
		Subtotal	**3,260**	
Kitchen Storage and Support				
	Restaurant Kitchen		1,800	
	Room Service Pantry		200	
	Chef Office		80	
	F&B storage		200	
		Subtotal	**2,280**	
Vertical Circulation Floor 1				
	Stair 1		215	
	Stair 2		188	
	Elevators		450	
		Subtotal	**853**	
Mech/ Elec. Plumbing				
	Engineering		280	
	Linen Chute		95	
	Mechanical		5,750	
	Telecom		144	
	Storage		190	
	Electrical		1,120	
		Subtotal	**7,579**	
Recreation Areas				
	Outdoor Pool & Deck		-	7,000
	Pool Bar		263	
	Spa		5,500	
	Pool Equipment & Storage		790	
	Mens Restrooms		150	
	Womens Restrooms		150	
	Fitness Center		1,520	
		Subtotal	**8,373**	

Employee Areas			
Employee Break		1,500	
Human Resources		1,000	
Men's Lockers/Toilets		650	
Women's Lockers/Toilets		650	
Corridor		150	
	Subtotal	**3,950**	
Housekeeping			
Laundry		2,630	
Housekeeping/ Linens		1,200	
Housekeeping Office		80	
Housekeeping Storage		200	
Cart Storage and Circulation		300	
	Subtotal	**4,410**	
Food and Beverage			
Main Banquet Kitchen		6,200	
F&B Dry Storage		1,200	
F&B refrigerated Storage		1,200	
F&B Director		120	
Dish Room/Scullery		400	
Banquet Prep Area		500	
Liquor Storage		180	
Service Promise/Storage		500	
	Subtotal	**10,300**	
Other Back of Hourse (BOH)			
Receiving/storage/dock	(20' ceiling height)	1,100	
Receiving Office		90	
Maintenance and Engineering		900	
Work Control Center		300	
A/V Storage		225	
Bulk Storage		750	
Locked Storage		120	
	Subtotal	**3,485**	
Meeting Space Support			
Meeting Room Storage		1,200	
Ballroom Storage		3,000	
Support Storage		780	
	Subtotal	**4,980**	
	Total	**64,452**	**76,053**
	Hotel Grand Total	**320,432**	**378,110**

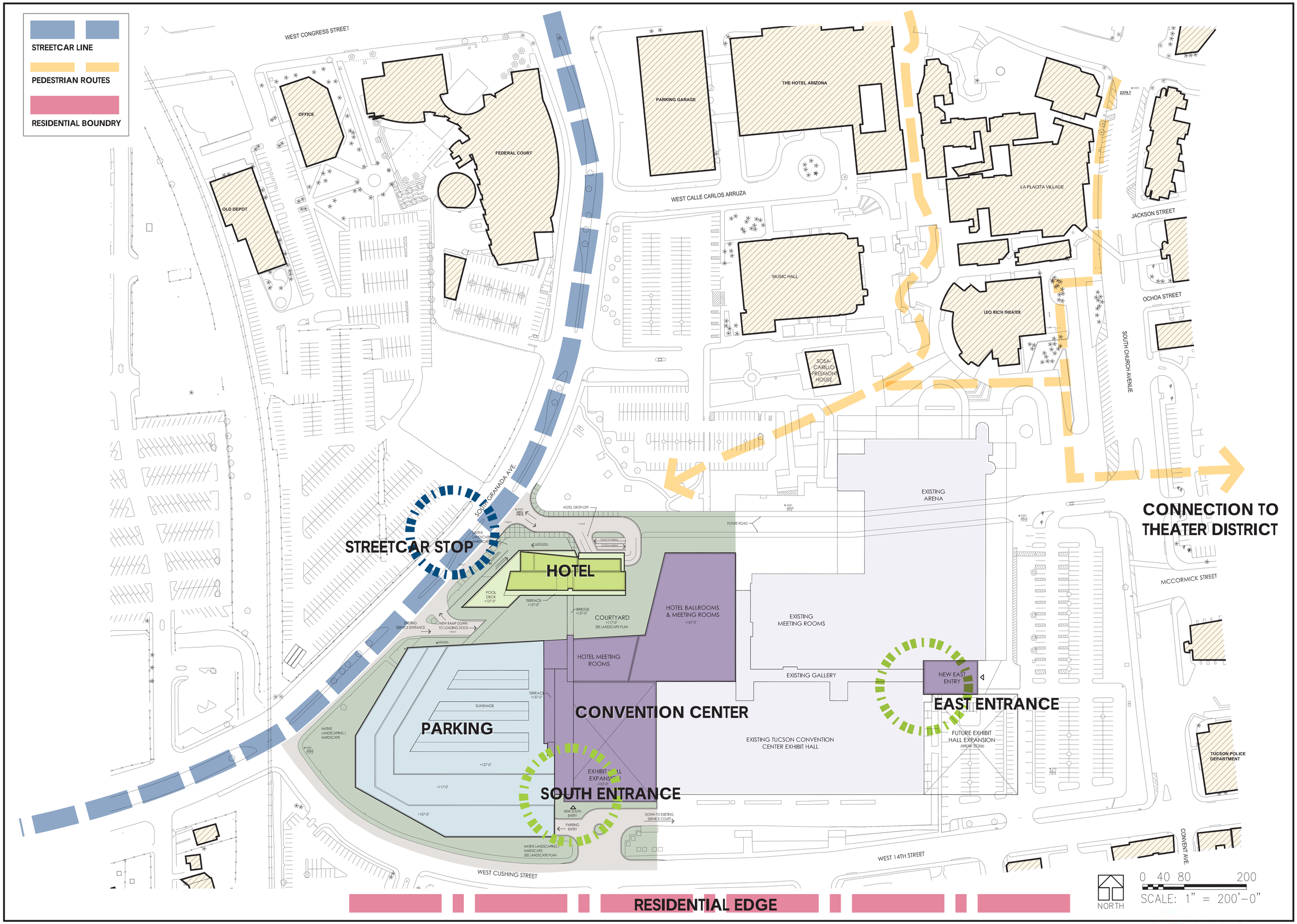
Summary

Total Hotel Net Sq. Ft		320,432	
Total Conference Center Net Sq.Ft		56,975	
Total Project Net Square Feet		**377,407**	
Hotel Gross Square Footage			**378,110**
Meeting Room Gross Square Footage			**64,952**
	Total Project Gross Square Feet		**443,061**

Parking:

30,000 Total meeting space, assume banquet occupancy at 15sf./person	2,000	
Assume 75% Occupancy at any one time 1733 x.75=	1,500	
Assume 50% of occupants are already guests at the hotel and accounted for in guest room parking	750	
Convention Center Expansion- 15,000sf of Banquet type Meeting Space	1000	All outside patron use
Assume 75% Occupancy at any one time 1733 x.75=	750	
Assume non simultaneous occupancy at 25%	188	
Assume average of 2.5 people per car for outside patrons of meeting space 2000/3	**813**	**Total Spaces for Conv. Ctr. & Meeting Rms**
Restaurant and Bar - 125 seats at 50% outside patron use	**63**	**Total Spaces for F&B**
One space per room for Guest parking	**525**	**Total for Guest Rms**
Hotel, Meeting rooms and Convention Center **Grand Total**	**1,400**	**All Uses at Full Capacity**
were utilized at the same time.	**1160**	**Provided**

Convention Center Expansion		Net Sq. Ft.	Gross Sq. Ft.
Function Space			
Meeting Rooms		23,285	
Meeting Rm. A	4 at 1,620 each	6,580	
Exhibit Hall Expansion		33,000	
Public Space Support			
Exhibit Hall Pre-Function		11,600	
Meeting Pre-Function		15,165	
Lobby Level Pre-Function		7,400	
Exhibit Hall Rest Rooms		1,520	
Meeting Room Rest Rooms		600	
CAT Offices		1,800	
Exhibit Hall Storage		4,505	
Meeting Room Storage		1,250	
Back of House			
Mechanical/Electrical		1,530	
Back of House		9,805	
	Subtotal	**118,040**	



SITE ANALYSIS

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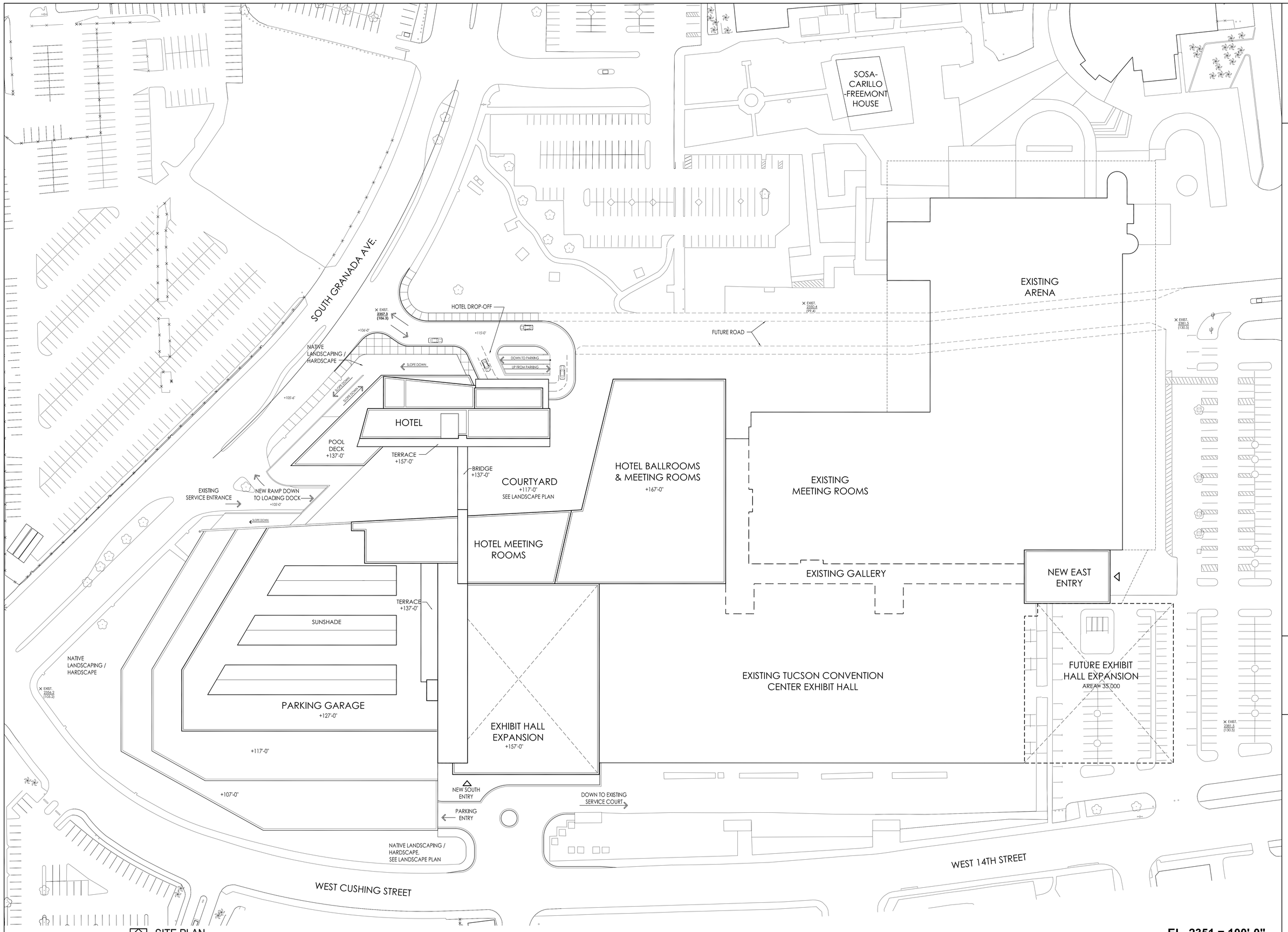

SITE PLAN

SCALE: 1" = 40'-0"

EL. 2351 = 100'-0"

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SITE / VICINITY PLAN
Tucson Hotel & Convention Center

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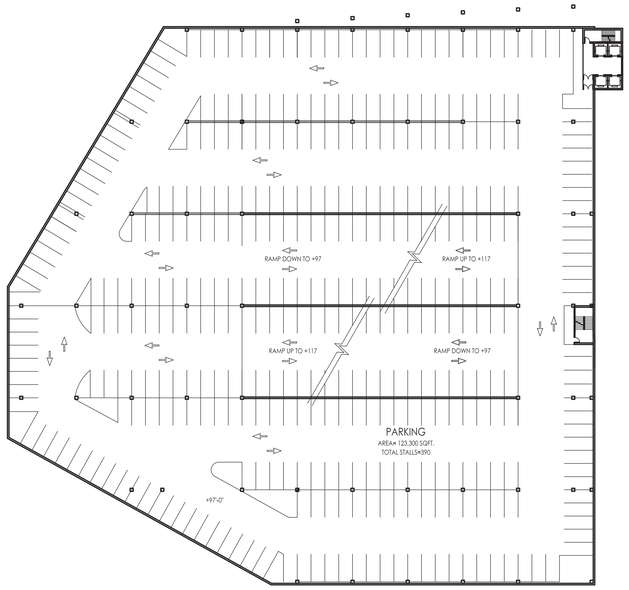
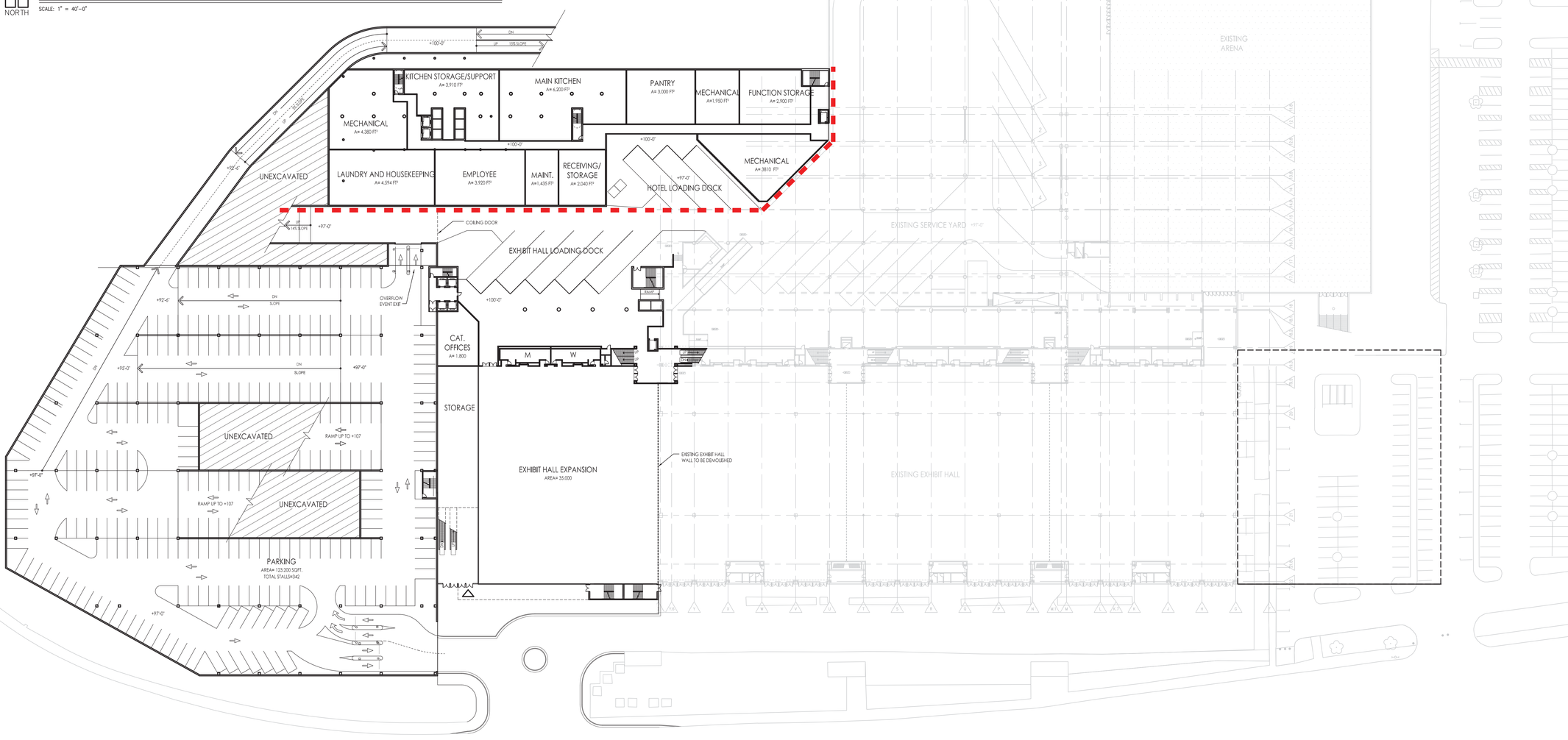


NORTH

FLOOR PLAN - PARKING +107'-0" LEVEL

SCALE: 1" = 40'-0"



NORTH

FLOOR PLAN - +100'-0" LEVEL : HOTEL SERVICE / EXIBIT HALL

SCALE: 1" = 40'-0"

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SERVICE LEVEL PLAN (97'-0"), PARKING LEVELS P1 (97'-0"), & P2 (107'-0")
Tucson Hotel & Convention Center

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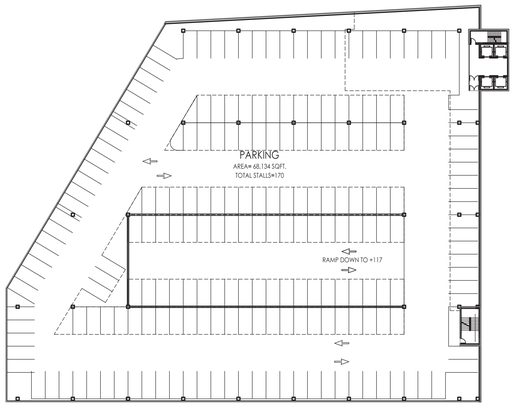
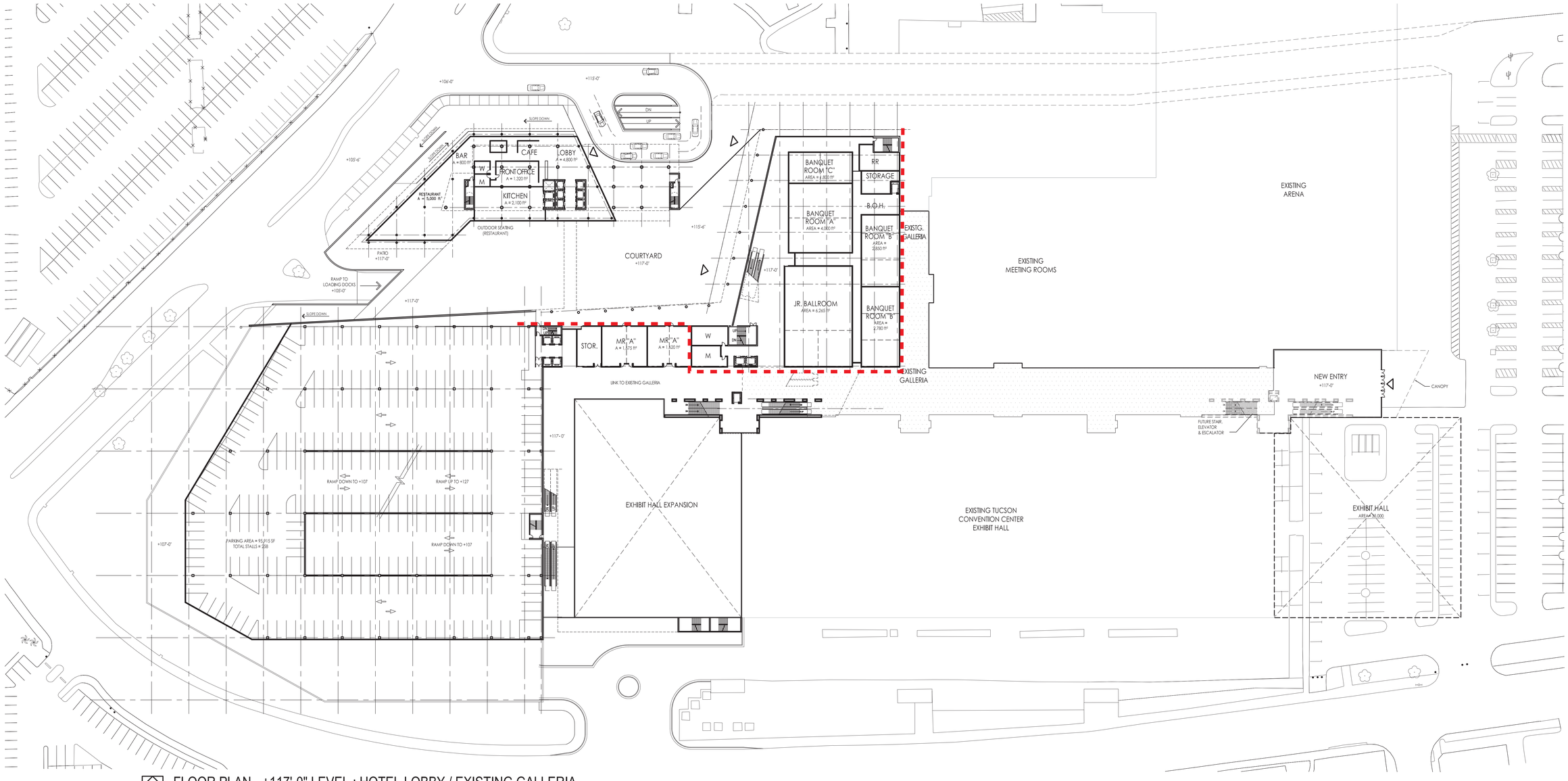


NORTH

FLOOR PLAN - PARKING +127'-0" LEVEL

SCALE: 1" = 40'-0"



NORTH

FLOOR PLAN - +117'-0" LEVEL : HOTEL LOBBY / EXISTING GALLERIA

SCALE: 1" = 40'-0"

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LOBBY LEVEL PLAN (117'-0"), PARKING LEVELS P3 (117'-0") & P4 (127'-0")
Tucson Hotel & Convention Center

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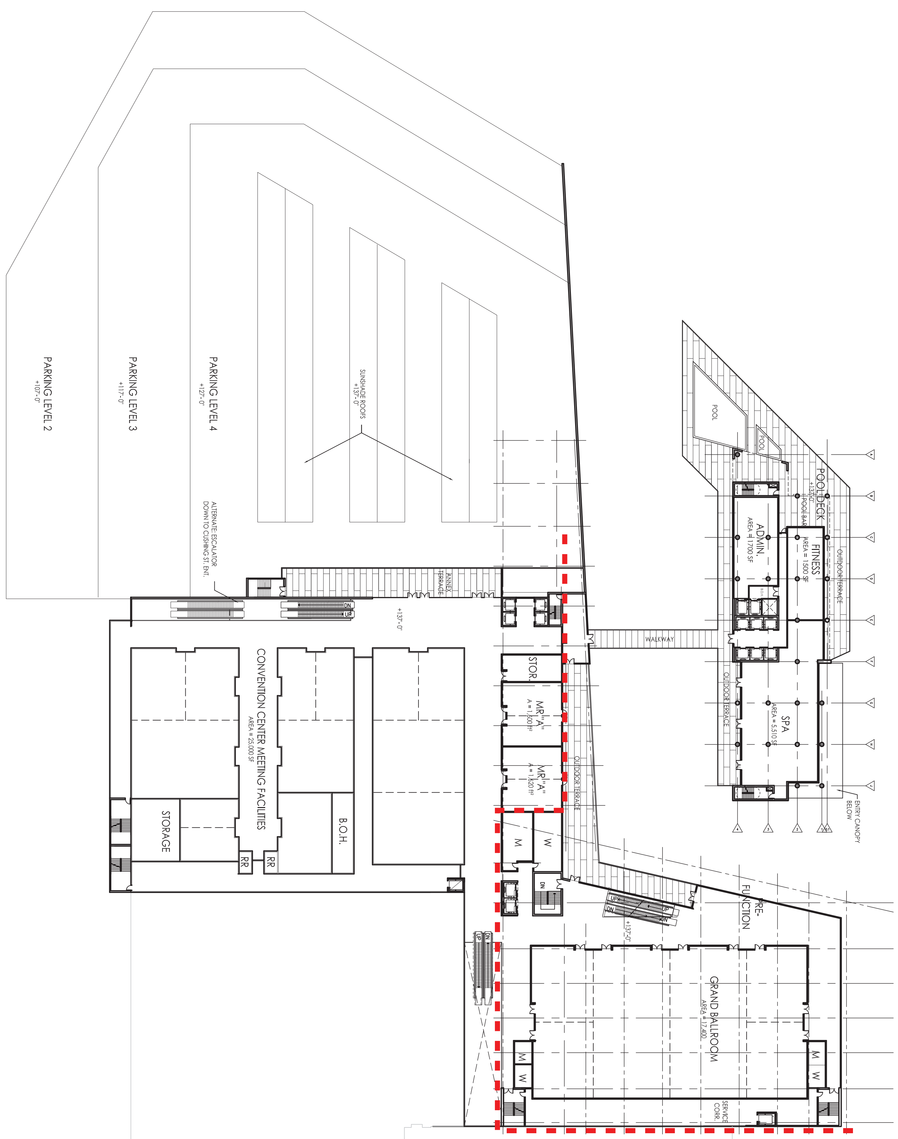
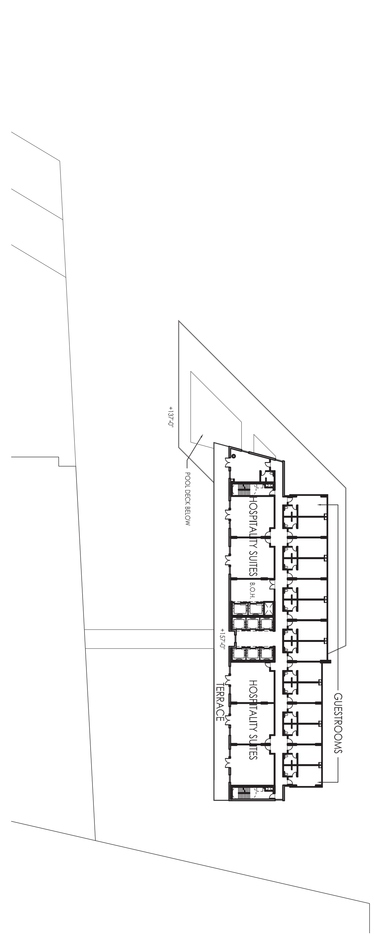


FLOOR PLAN - +137'-0" LEVEL

SCALE: 1" = 40'-0"



FLOOR PLAN - SUITE LEVEL - +157'-0"

SCALE: 1" = 40'-0"

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BALLROOM & POOL LEVEL PLAN (137'-0") & SUITE LEVEL PLAN (157'-0")
Tucson Hotel & Convention Center

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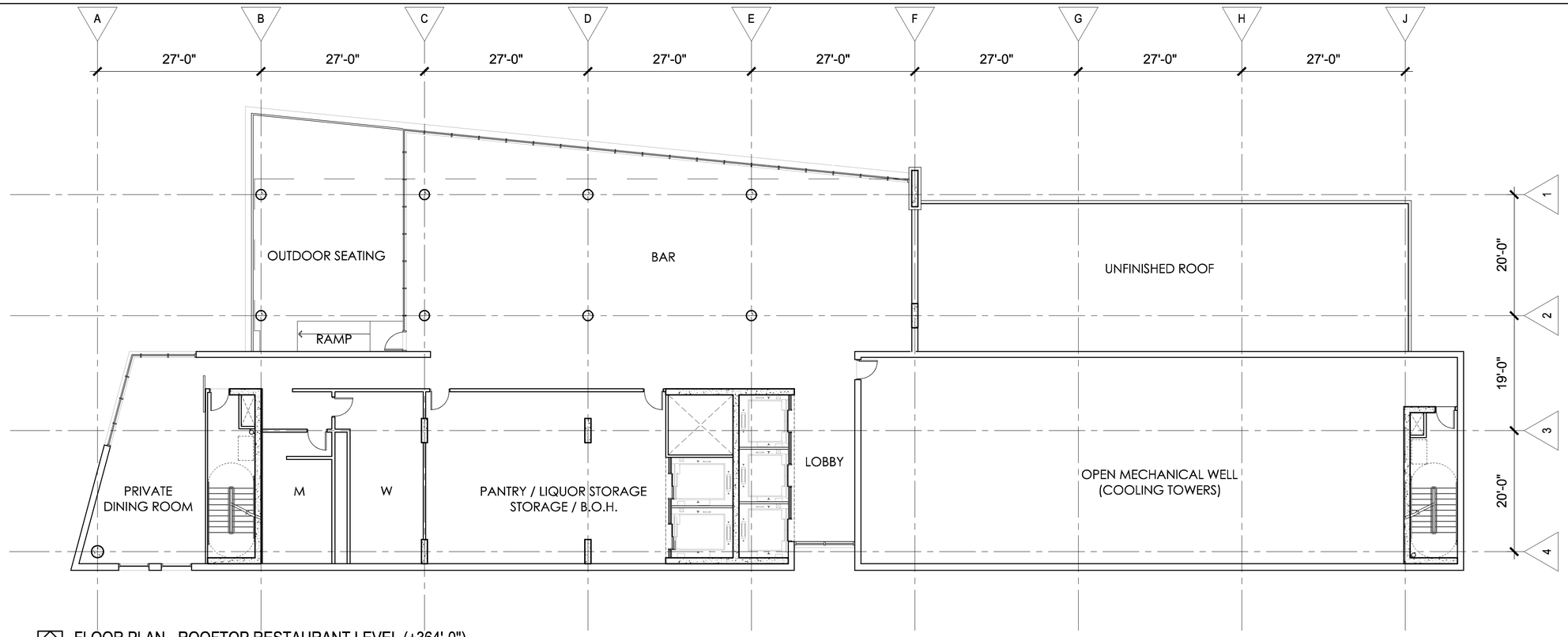


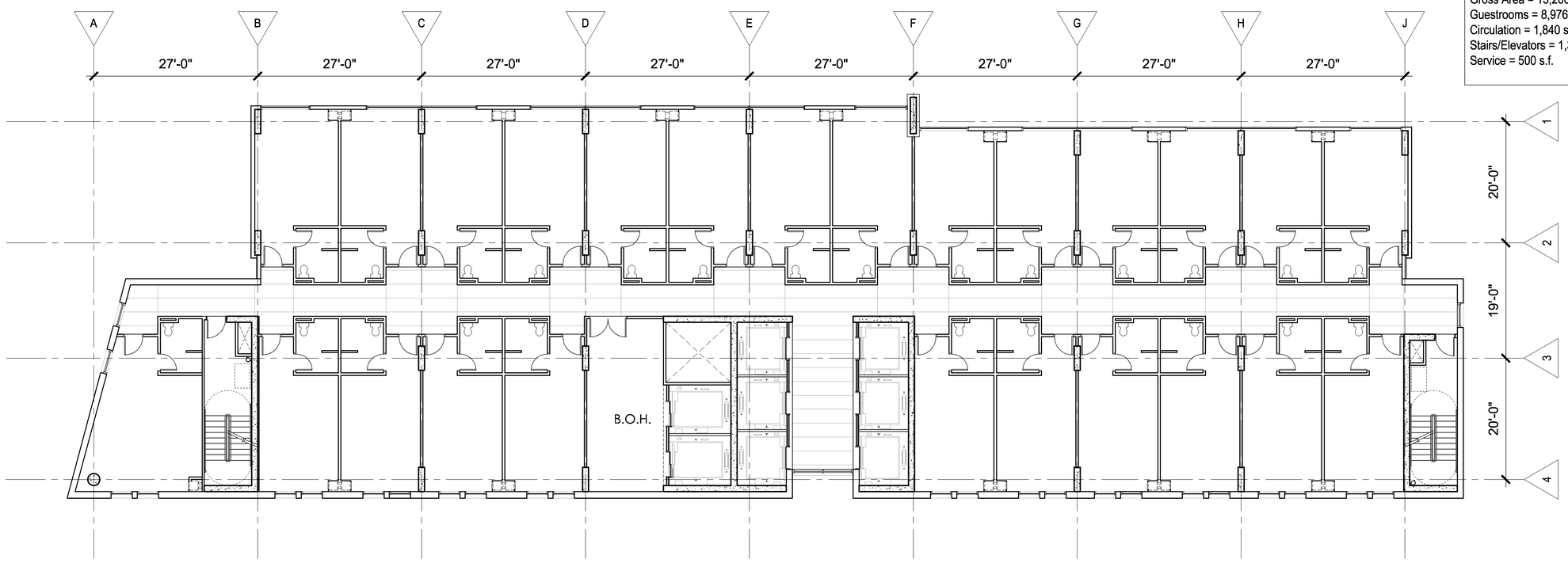
NORTH

FLOOR PLAN - ROOFTOP RESTAURANT LEVEL (+364'-0")

SCALE: 1/8" = 1'-0"

25 Bays / Level
23 Levels = 575 Bays
525 Keys Total

Gross Area = 13,260 s.f.
Guestrooms = 8,976 s.f
Circulation = 1,840 s.f.
Stairs/Elevators = 1,360 s.f.
Service = 500 s.f.



NORTH

FLOOR PLAN - TYPICAL GUESTROOM LEVEL

SCALE: 1/8" = 1'-0"

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FLOOR PLAN - TYP. GUESTROOM, ROOFTOP BAR
Tucson Hotel & Convention Center

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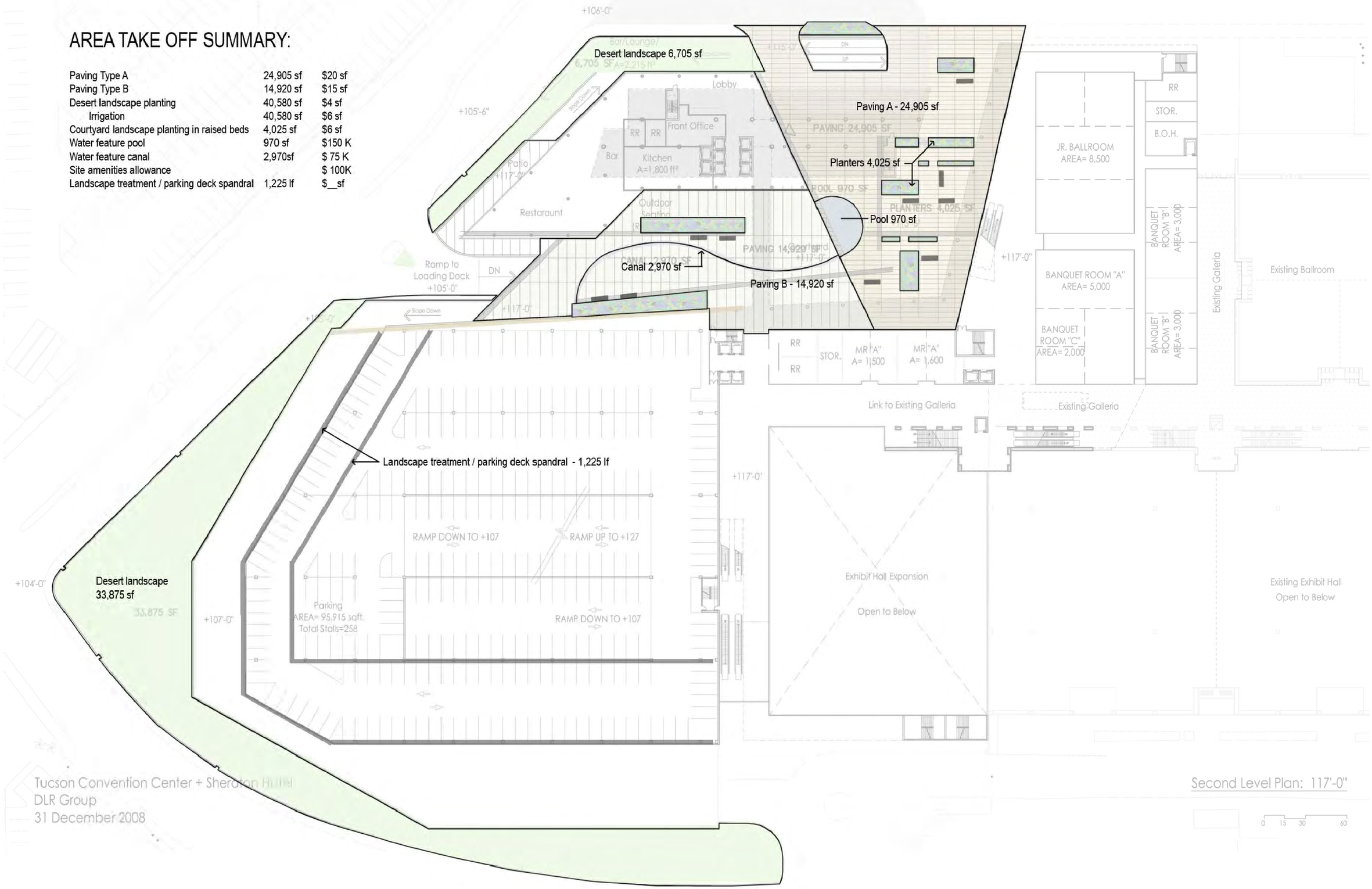
AREA TAKE OFF SUMMARY:

Paving Type A	24,905 sf	$20 sf
Paving Type B	14,920 sf	$15 sf
Desert landscape planting	40,580 sf	$4 sf
Irrigation	40,580 sf	$6 sf
Courtyard landscape planting in raised beds	4,025 sf	$6 sf
Water feature pool	970 sf	$150 K
Water feature canal	2,970sf	$ 75 K
Site amenities allowance		$ 100K
Landscape treatment / parking deck spandral	1,225 lf	$__sf



NORTH

LANDSCAPE PLAN

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LANDSCAPE PLAN
Tucson Hotel & Convention Center

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KEY:

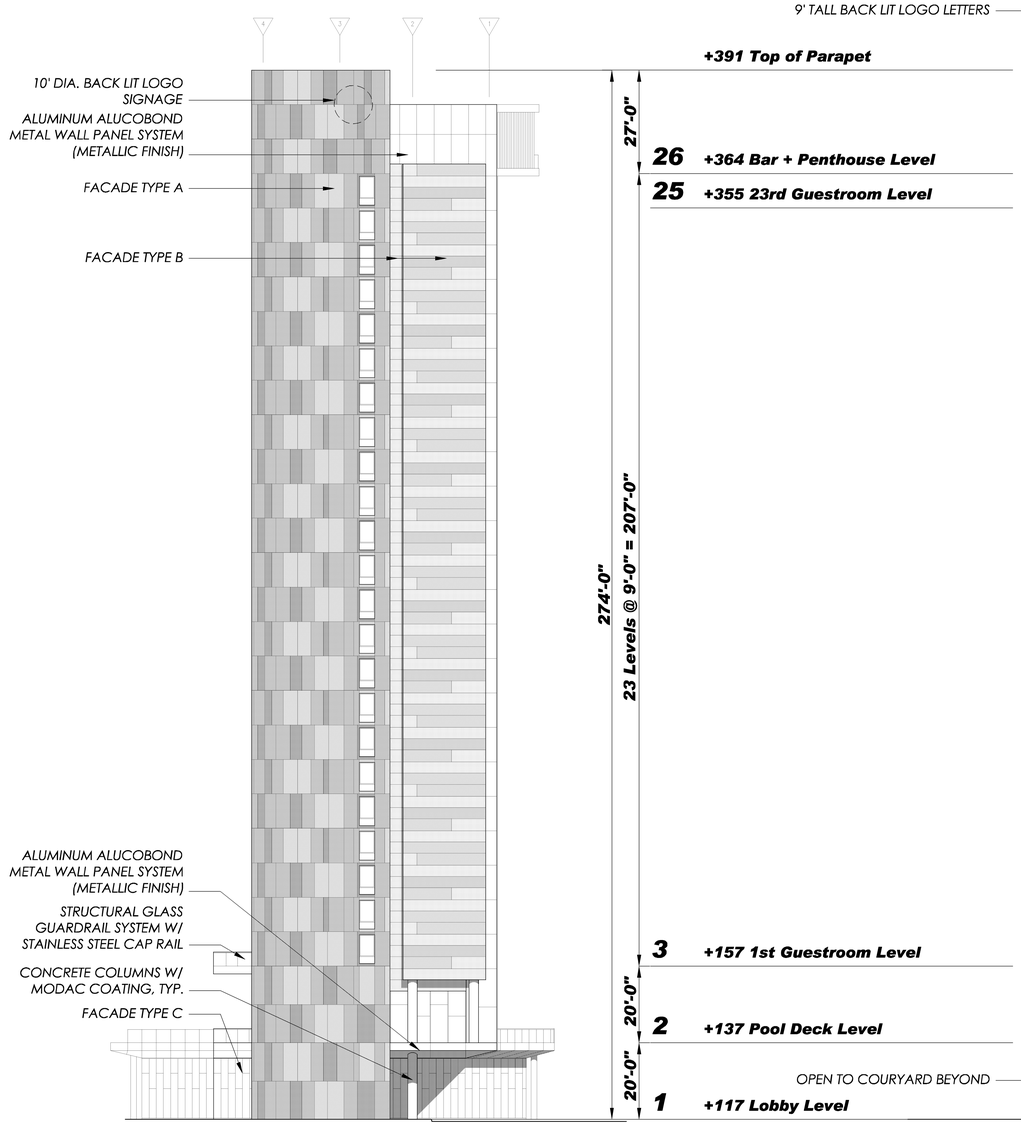
FACADE TYPE A:
ARCHITECTURAL PRECAST CONCRETE PANELS WITH PUNCHED WINDOW OPENINGS.
SEE SHEET A7.1 FOR SYSTEM DETAILS.

FACADE TYPE B:
FOAMED METAL WALL PANEL SYSTEM WITH INTEGRAL WINDOWS. BASIS OF DESIGN: CENTRIA FORMAWALL.
SEE SHEET A7.1 FOR SYSTEM DETAILS.

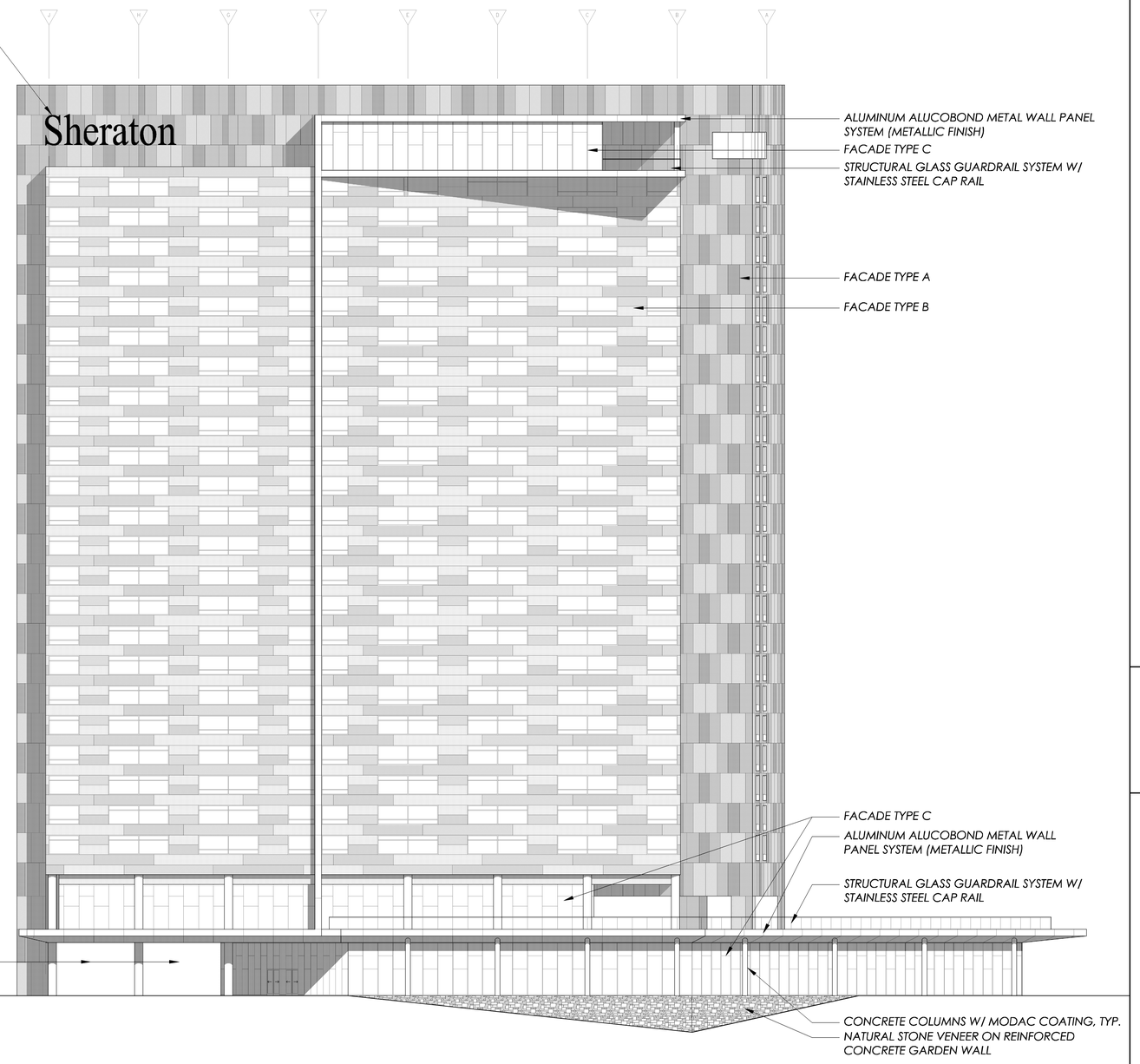
FACADE TYPE C:
ALUMINUM WINDOW WALL SYSTEM WITH CAPPED VERTICAL MULLIONS AND BUTT-GLAZED HORIZONTALS. SYSTEM GLAZED WITH CLEAR (NO TINT) INSULATED GLAZING UNITS WITH LOW-E COATING ON #2 SURFACE.

FACADE TYPE D:
ARCHITECTURAL PRECAST CONCRETE PANELS, 27' x 9' AS SHOWN WITH ARCHITECTURAL REVEALS AND 3 COLOR FINISH SIMILAR TO FACADE TYPE 'A'.

FACADE TYPE E:
SPANDREL ARCHITECTURAL PRECAST CONCRETE PANELS FOR PARKING STRUCTURE. SIMILAR TO FACADE TYPE 'D', BUT ONE COLOR PER LEVEL. EACH PANEL IS ONE COLOR. COLORS TO MATCH FACADE TYPES 'A' & 'D'.



1 A5.1 BUILDING ELEVATION - EAST
SCALE: 1/16" = 1'-0"



2 A5.1 BUILDING ELEVATION - NORTH
SCALE: 1/16" = 1'-0"

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BUILDING ELEVATIONS - EAST, NORTH
Tucson Hotel & Convention Center

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KEY:

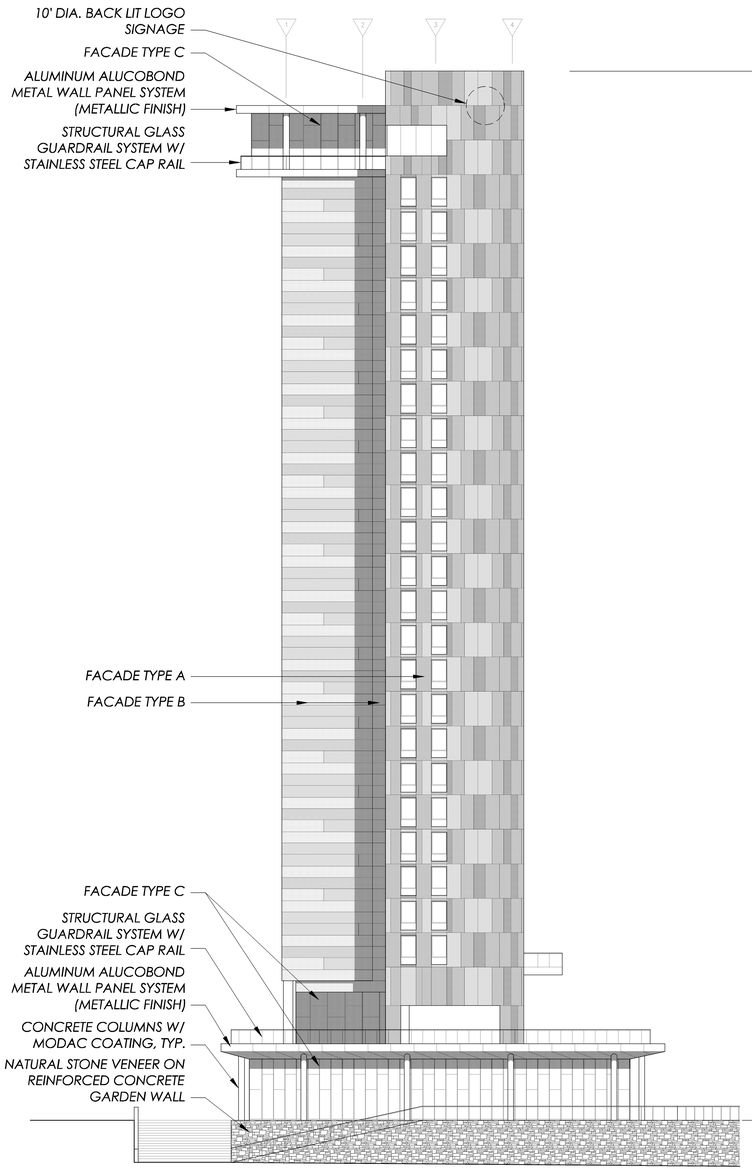
FACADE TYPE A:
ARCHITECTURAL PRECAST CONCRETE PANELS WITH PUNCHED WINDOW OPENINGS.
SEE SHEET A7.1 FOR SYSTEM DETAILS.

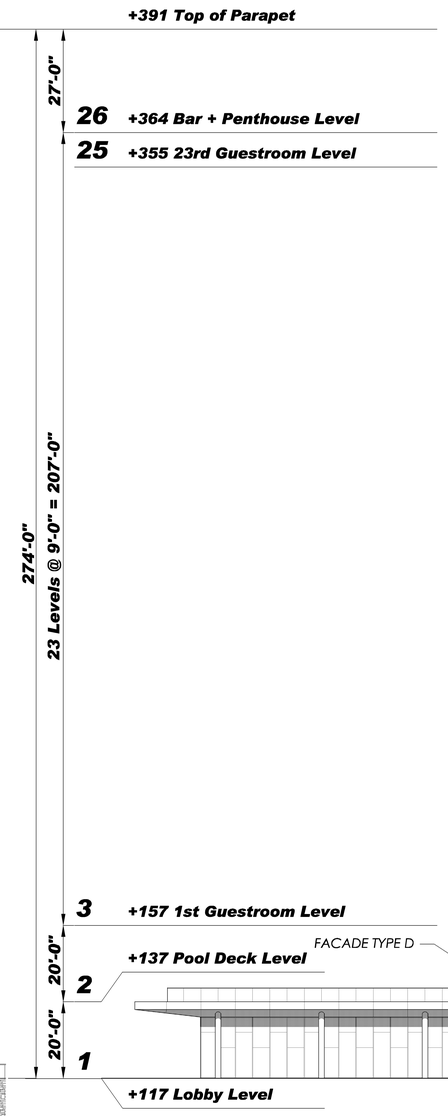
FACADE TYPE B:
FOAMED METAL WALL PANEL SYSTEM WITH INTEGRAL WINDOWS. BASIS OF DESIGN: CENTRIA FORMAWALL.
SEE SHEET A7.1 FOR SYSTEM DETAILS.

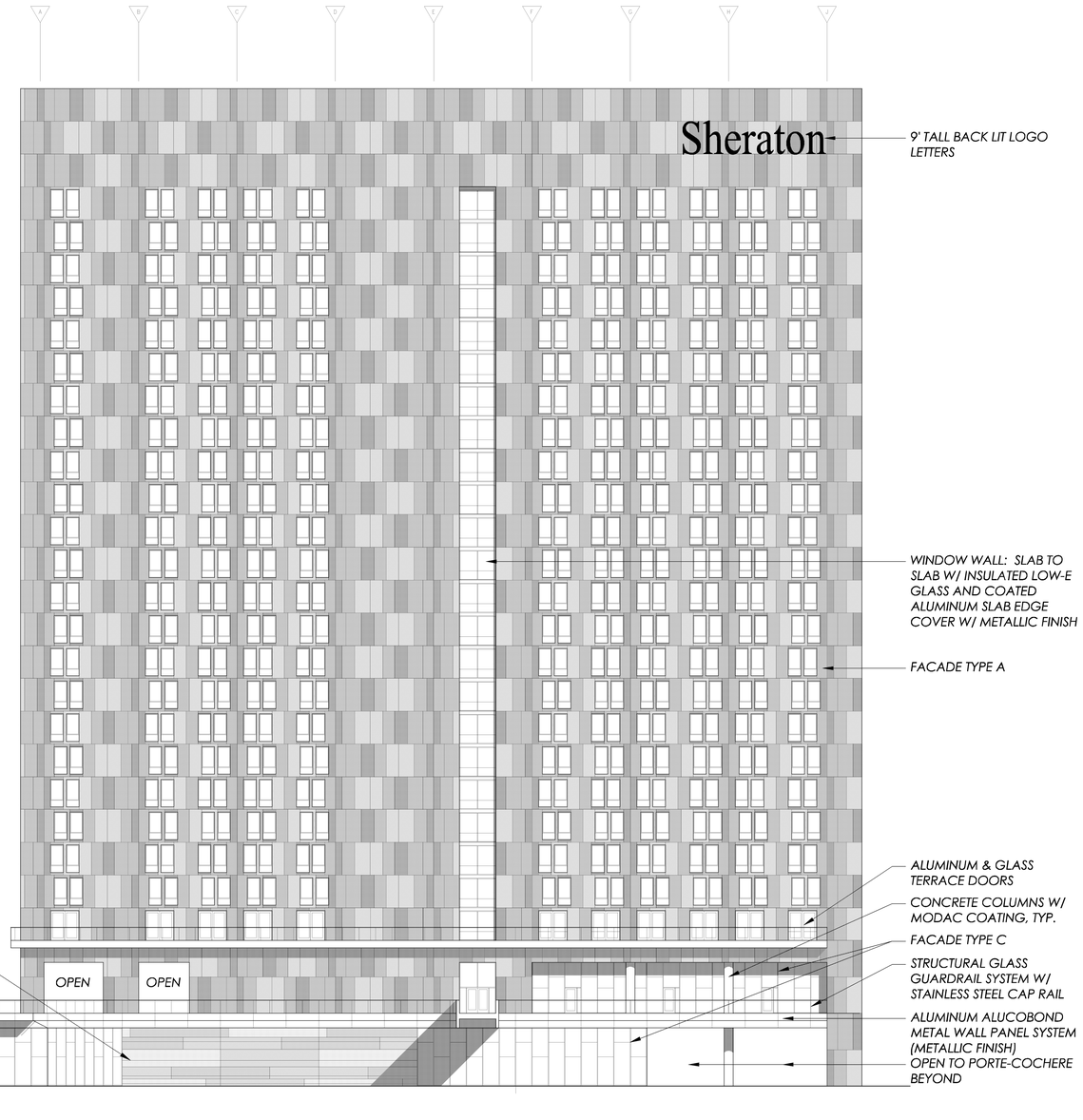
FACADE TYPE C:
ALUMINUM WINDOW WALL SYSTEM WITH CAPPED VERTICAL MULLIONS AND BUTT-GLAZED HORIZONTALS. SYSTEM GLAZED WITH CLEAR (NO TINT) INSULATED GLAZING UNITS WITH LOW-E COATING ON #2 SURFACE.

FACADE TYPE D:
ARCHITECTURAL PRECAST CONCRETE PANELS, 27' x 9' AS SHOWN WITH ARCHITECTURAL REVEALS AND 3 COLOR FINISH SIMILAR TO FACADE TYPE 'A'.

FACADE TYPE E:
SPANDREL ARCHITECTURAL PRECAST CONCRETE PANELS FOR PARKING STRUCTURE. SIMILAR TO FACADE TYPE 'D', BUT ONE COLOR PER LEVEL. EACH PANEL IS ONE COLOR. COLORS TO MATCH FACADE TYPES 'A' & 'D'.







1 / A5.2 BUILDING ELEVATION - WEST
SCALE: 1/16" = 1'-0"

2 / A5.2 BUILDING ELEVATION - SOUTH
SCALE: 1/16" = 1'-0"

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BUILDING ELEVATIONS - WEST, SOUTH
Tucson Hotel & Convention Center

A5.2
30-09104-01
02-05-09

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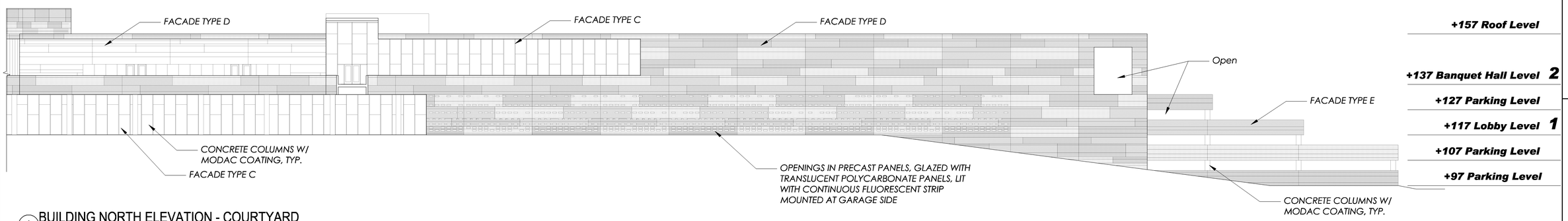
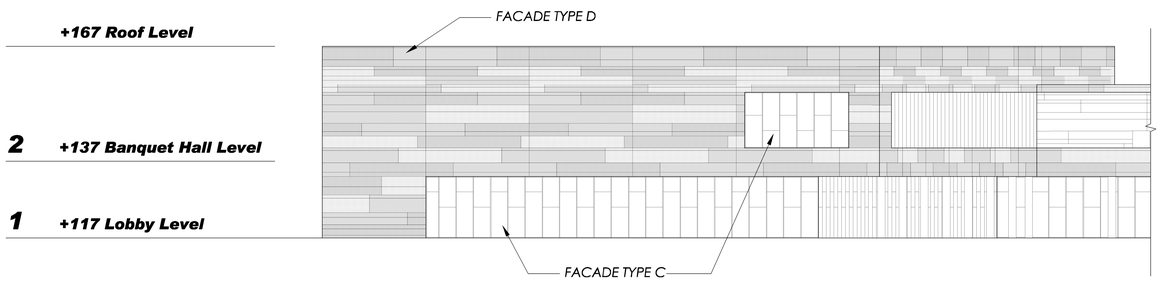


1 A5.4 BUILDING NORTH ELEVATION - COURTYARD

SCALE: 1/16" = 1'-0"



2 A5.4 BUILDING NORTH ELEVATION (cont'd)

SCALE: 1/16" = 1'-0"

KEY:

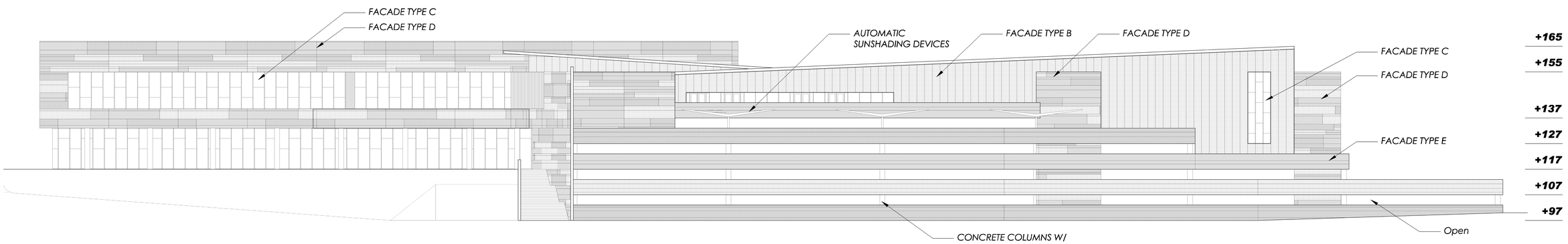
FACADE TYPE A:
ARCHITECTURAL PRECAST CONCRETE PANELS WITH PUNCHED WINDOW OPENINGS.
SEE SHEET A7.1 FOR SYSTEM DETAILS.

FACADE TYPE B:
FOAMED METAL WALL PANEL SYSTEM WITH INTEGRAL WINDOWS. BASIS OF DESIGN: CENTRIA FORMAWALL.
SEE SHEET A7.1 FOR SYSTEM DETAILS.

FACADE TYPE C:
ALUMINUM WINDOW WALL SYSTEM WITH CAPPED VERTICAL MULLIONS AND BUTT-GLAZED HORIZONTALS. SYSTEM GLAZED WITH CLEAR (NO TINT) INSULATED GLAZING UNITS WITH LOW-E COATING ON #2 SURFACE.

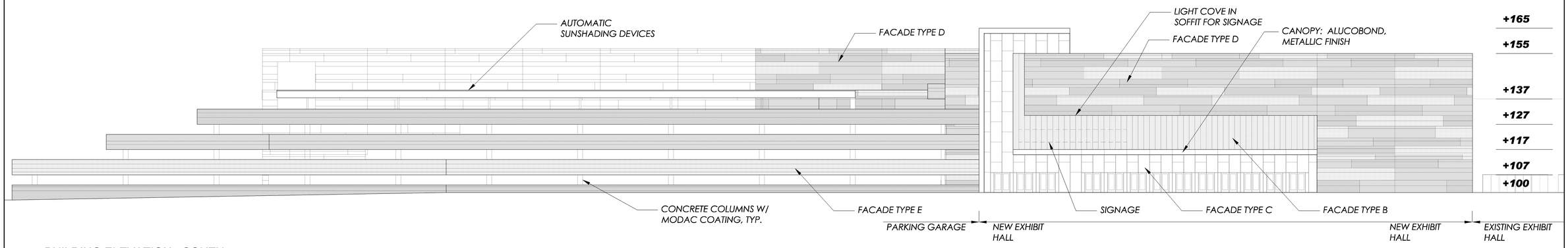
FACADE TYPE D:
ARCHITECTURAL PRECAST CONCRETE PANELS, 27" x 9' AS SHOWN WITH ARCHITECTURAL REVEALS AND 3 COLOR FINISH SIMILAR TO FACADE TYPE 'A'.

FACADE TYPE E:
SPANDREL ARCHITECTURAL PRECAST CONCRETE PANELS FOR PARKING STRUCTURE. SIMILAR TO FACADE TYPE 'D', BUT ONE COLOR PER LEVEL. EACH PANEL IS ONE COLOR. COLORS TO MATCH FACADE TYPES 'A' & 'D'.



3 A5.4 BUILDING WEST ELEVATION - COURTYARD

SCALE: 1/16" = 1'-0"



4 A5.4 BUILDING ELEVATION - SOUTH

SCALE: 1/16" = 1'-0"

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BUILDING ELEVATIONS
Tucson Hotel & Convention Center

A5.3
30-09104-01
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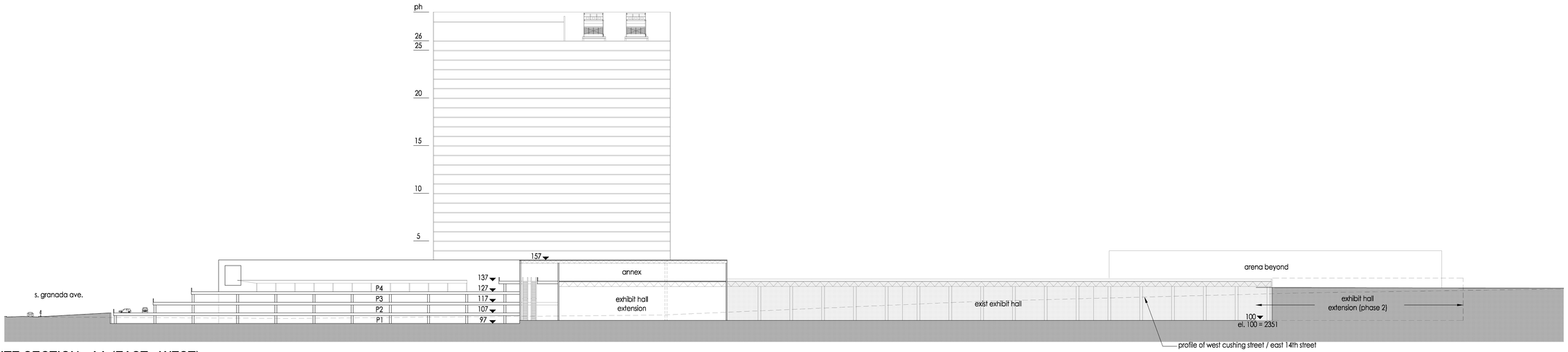
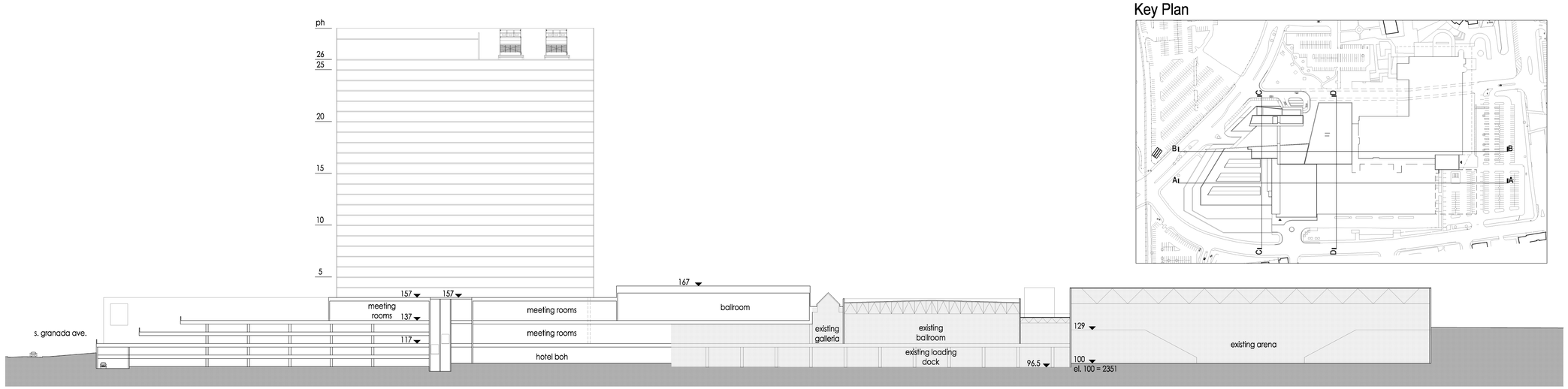


1 A6.1 SITE SECTION - AA (EAST - WEST)

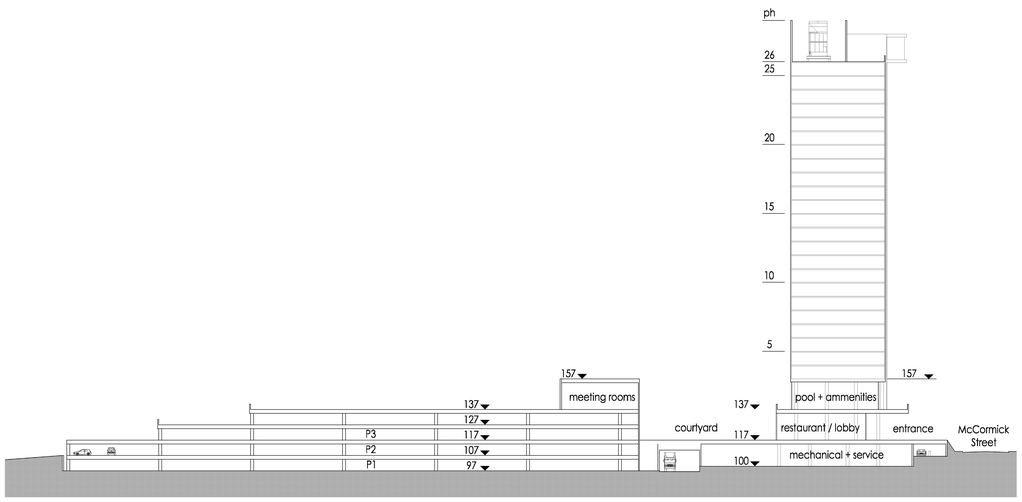
SCALE: 1/16" = 1'-0"



2 A6.1 SITE SECTION - BB (EAST - WEST)

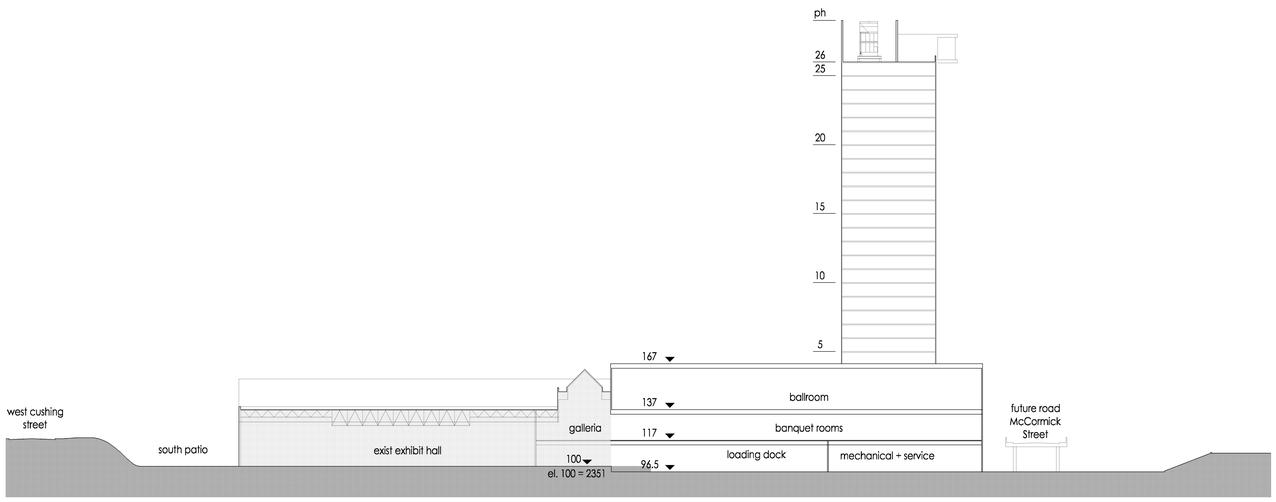
SCALE: 1/16" = 1'-0"

Key Plan



3 A6.1 SITE SECTION - CC (NORTH - SOUTH)

SCALE: 1/16" = 1'-0"



4 A6.1 SITE SECTION - DD (NORTH - SOUTH)

SCALE: 1/16" = 1'-0"

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SITE SECTIONS

Tucson Hotel & Convention Center

A6.1

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Hotel & Convention Center
Tucson, AZ

Conceptual Design Narrative

Prepared for

DLR Group
Architecture
Engineering
Planning
Interiors

February 18, 2009

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I. EXECUTIVE SUMMARY

A. Recommendations

1. Convention Center/Conferencing Space/Parking

a. Heating, Ventilating and Air Conditioning (HVAC) Systems

i. Floor-mounted air handling units with chilled water coils, up-discharge supply fans and filter racks condition each conferencing area. Series fan powered terminal units with electric re-heat provide downstream air distribution.

ii. Chilled water with required heat exchangers provided via NorthWind central utility plant. Variable flow pumping provided via base-mounted pumps.

iii. Ventilation air ducted from wall-mounted louvers.

iv. Relief air ducted to multiple relief fans and routed to rooftop vents or wall-mounted louvers.

b. Exhaust Systems

i. Restrooms/Janitor's Closet:

a) The restrooms are exhausted into a vertical shaft protected with a fire/smoke damper (FSD) at approximately 75 cfm/water closet and/or urinal.

b) A downblast rooftop exhaust fan provides a continuous negative pressure on the vertical exhaust duct.

ii. Enclosed Parking Garage

a) The garage is exhausted at a maximum of 1.5 cfm/sf via local fan rooms. Powered make-up air will be provided on the opposite side.

b) The variable flow fans, controlled by carbon monoxide (CO) sensing system supply and/or exhaust into rated shafts via wall-mounted louvers.

c) Mechanical ventilation is not required if naturally ventilated.

c. Plumbing Systems

i. Domestic Hot Water

a) Multiple water heaters with re-circulation.

ii. Drain, Waste and Vent (DWV)

a) The DWV system is piped in cast iron with separate cast iron vents.

iii. Domestic Water

a) Each water system will be equipped with a water softening system prior to the pumps.

b) The domestic hot and cold water is piped in Type L copper. Hot water piping will be insulated.

iv. Fire Protection Systems

a) All areas are sprinkled per NFPA requirements in Schedule 40 and 10 black iron piping. Standpipes are located in each stairwell.

b) Fire pumps are provided in the parking garage.

d. Mechanical & Plumbing Space Requirements Summary:

Function/Diagram Reference	Size LxWxH (ft)	Location / Adjacencies
Floor air handling unit room footprint	26x20x12	Mechanical room near conferencing space
Chilled water heat exchanger, pumps and accessories	20x20x10	Lower level
Chilled water expansion tank	8x6x10	Lower level
Make-up air units	18x40x10	Roof
Relief fans	20x20x14	Floor or roof
Garage exhaust fan room footprint	12x12xH	All enclosed garage levels
Domestic water heater footprint	24”in diameter	Lower level
Water softener room	30x25xH	Level 1

H – normal floor-to-floor height.

e. Electrical Systems
   i. We would recommend the following on the basis of cost, flexibility, and impact on other trades:
      a) Service conferencing spaces with 480V distribution with step-down transformation at various locations.
   ii. We assume the expansion (estimated load of 500 kVA) would utilize the spare capacity from the existing service.

f. Electrical Space Requirements Summary

Function	Size LxWxH (ft)	Location / Adjacencies
Service entry	Existing	Lower level
Main switch board room (unit subs)	Existing	Lower level
Typical floor electrical room	12x12xH	Centrally located near meeting spaces
Main Point of Presence (MPOP)	Existing	Lower level

H – normal floor-to-floor height.

2. Hotel
   a. HVAC Systems
      i. Hotel:
         a) Four-pipe vertical stacked with electric heat condition the hotel rooms.
         b) Chilled water provided via NorthWind central utility plant.
         c) Ventilation air ducted to each FCU via a wall-mounted louver.
         d) Ventilation air ducted through a sidewall diffuser to each corridor from a tempered rooftop make-up air unit.
   b. Exhaust Systems
      i. Hotel – baseline design exhausts the areas via a sub-ducted exhaust system:
         a) Bathroom

1. The bathroom is exhausted into a rated vertical shaft with a 22” sub duct.
2. A variable speed inline cabinet exhaust fan located on the interstitial mechanical floor powered with emergency power provides a continuous negative pressure on the vertical exhaust duct. A differential pressure sensor at the bottom of the duct provides volume control.

c. Life/Safety Systems

i. Hotel

a) Stairway Pressurization:

1. Stairways, and their associated entrance vestibules, serving floors 55-feet or more above the lowest level of fire department access are provided with pressurization systems designed in accordance with IBC.

b) Elevator Hoistway Pressurization:

1. Elevator hoistways are pressurized with multiple pressurization fans.

c) Elevator Machine Room Pressurization:

1. Activation of a smoke detector at an elevator lobby causes pressurization of the associated elevator machine room to provide a minimum 0.05-inch water column pressure positive relative to the hoistway.

d) Passive Smoke Zones:

1. Each hotel room is treated as a passive zone.
2. The bathroom exhaust vents are not considered a part of the smoke control system, and are not subject to pressure or leakage testing. They will however, exhaust to a sub-ducted arrangement in a vertical riser.

e) Penetrations of Rated Assemblies:

1. All penetrations of rated construction are provided with fire/smoke dampers.

d. Plumbing Systems

i. Hotel

a) Each hotel room will be served by a central domestic hot water system located on the interstitial (14th) floor.

ii. Drain, Waste and Vent (DWV)

a) The DWV system is piped in cast iron with separate cast iron vents within the hotel tower. As an alternate, ABS could be used for vent piping.

iii. Domestic Water

a) Water softening systems will be provided upstream of pumps.

b) The domestic hot, recirculation and cold water are piped in Type L copper. Hot water supply and circulation will be insulated.

iv. Fire Protection Systems

a) All areas are sprinkled per NFPA requirements in Schedule 40 and 10 black iron piping. Standpipes are located in each stairwell on the intermediate landing.

b) The Interior Designer and/or DLR Group will specify sprinkler heads.

c) Fire pumps are provided in the parking garage and the interstitial level.

v. Gas

a) Gas piping shall be schedule 40 steel pipe, with welded fittings. Branch piping may be thread.

b) Gas connections for gas waters heaters, kitchen equipment, and unit appliances and fireplaces (where needed).

vi. Fuel Oil

a) Fuel oil fill piping shall be schedule 40 steel pipe, with welded fittings.

b) Fuel oil piping connectors to emergency generator from fuel oil fill.

e. Mechanical & Plumbing Space Requirements Summary:

Function	Size LxWxH (ft)	Location / Adjacencies
Vertical stacked fan coil unit (FCU) footprint	2x2x7	All hotel levels
Vertical bathroom, dryer and kitchen exhaust shafts	TBD based on room layouts	All levels
Vertical make-up air exhaust shafts	TBD based on corridor layout and make-up air to living units	All levels
Chilled water heat exchanger, pumps and accessories	20x20x14	Lower level and possibly mid level
Chilled water expansion tank	8x6x10	Roof
Garage exhaust fan room footprint	12x12xH	All enclosed garage levels
Reheat room (pressure reducing station with electric water heater) footprint	8x5xH	Levels 12, 15 and 24
Two Domestic booster pump rooms (with backflow preventers) footprint	10x10xH	Lower level
Domestic water heater footprint	20x24x14	Penthouse and mid level
Elevator pressurization fan footprint	TBD based on hoistway config.	Roof
Stairwell pressurization fan footprint	TBD based on stairway config.	Roof
Fire pump room footprint	20x16x14	Lower level
Fire pump room footprint	16x1614	Mid level
Pool water heater room	20x30x12	Near pool (confirm final size with pool consultant)
Atrium smoke exhaust fans (multiple locations with access	16x8x8	If applicable, ceiling space above atrium

to exterior louvers 10'-0" above grade)		
Atrium air handling equipment (can also serve for smoke control; qty 2 with access to exterior louvers for make-up and relief air)	32x12x9	If applicable, mechanical room with access to atrium.
Two Water softener rooms	25x30xH	Lower level

H – normal floor-to-floor height.

f. Electrical Systems
   i. We would recommend the following on the basis of cost, flexibility, and impact on other trades:
      a) The hotel building has a separate electrical service, generator and Fire Command Center.
   ii. Based on the current design, we estimate the electrical load at approximately 3 to 4 MVA.

g. Electrical Space Requirements Summary –Hotel Tower

Function	Size LxWxH (ft)	Location / Adjacencies
Hotel transformer vault	40x30x14	Adjacent to MSB
Hotel main switch board room	40x10x12	Adjacent to transformers
Hotel typical floor electrical room	12x10xH	Centrally located on floor
Electrical switchboards for mech and elevator	18x10x10	Roof level
Hotel fire command center (96sf code min)	16x10xH	Access from building lobby
Hotel generator room	36x20x18	Ground level close to main switchboard room (horizontally or vertically), consideration given to fuel, exhaust and air for cooling.
Hotel MPOP (2xrooms)	20x12xH	Parking level
Hotel building security room	12x10xH	Typically ground floor

H – normal floor-to-floor height.

II. MECHANICAL DESIGN CRITERIA

A. Climatological Data
   1. Outdoor Summer Design: 102F DB/65F WB (ASHRAE 1.0%, Tucson, Arizona)
   2. Outdoor Winter Design: 34F (ASHRAE 99%, Tucson, Arizona)
   3. Indoor Summer/Winter Design:
      a. Hotel: 72F /70F ± 3F
      b. Corridors: 75F/68F ± 3F
      c. Storage/Utility: 85F/70F ± 3F
      d. Elevator Machine Room: 84/65F +/- 3F
      e. Electrical/Telecom Room: 85/65F +/- 3F
      f. Humidity Control: None required

B. Ventilation Criteria
   1. All areas: 20 cfm/person
   2. Exceptions:

a. Lobby: 15 cfm/person
b. Restaurants: 80% of vapor and/or grease exhaust airflow
c. Corridor: 2 air changes per hour (ACH) during normal operation; 10 ACH of exhaust during a life/safety event
d. Storage: 0.12 cfm

C. Exhaust to Outdoors
a. Toilet Rooms: Minimum rate of 2 cfm/sf or 75 cfm per water closet or urinal, whichever is greater
b. Restaurants: Grease exhaust, vapor exhaust directly to the roof (size per food service consultant)
c. Laundry Room: Laundry and dryer exhaust (size per laundry consultant)

D. Internal Heat Gain
1. Lighting: 1.2 watts (w)/sf (square foot)
2. Receptacle Power: 1.5 w/sf
3. Occupants: 250 Btu/hr sensible/250 Btu/hr latent

E. Occupancy Criteria
1. Hotel:
a. Hotel: 2 people/room
b. Multi-Purpose Assembly: 1 person 7 sf
c. Pre-Function: 1 person/33/3 sf

F. Chilled Water (TBD by NorthWind)
1. Entering Water Temperature: 39F
2. Leaving Water Temperature: 49F

G. Building Fabric
1. Façade
a. The façade is assumed to be comprised of concrete and metal panel with R-21 insulation and gypsum board interior.
2. Glazing
a. Operable, double-pane, tinted glazing with low E coating.
b. Aluminum frame with thermal break.
c. U-value = ± 0.40; SC (shading coefficient) = ± 0.45
3. Roof
a. 8-1/2” concrete cover insulated with R-38 insulation.

III. CODES & STANDARDS

A. Air Conditioning and Ventilation Systems
1. The air conditioning design will comply with applicable codes and standards:
a. Codes
i. 2006 International Mechanical Code (IMC), as amended by the State of Arizona
ii. 2006 International Building Code (IBC), as amended by the State of Arizona
iii. 2006 International Fire Code (IFC), as amended by the State of Arizona
iv. 2006 International Energy Code Council
b. Standards
i. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Standards
ii. Air Conditioning and Refrigeration Institute (ARI) Standards
iii. NFPA 90A - Installation of Air Conditioning and Ventilating Systems

iv. Air Moving and Conditioning Association (AMCA) Standards
v. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
vi. USGBC LEED-NC or CS

B. Plumbing Systems
1. Plumbing design will comply with applicable codes and standards, including those listed below:
a. Codes
i. 2006 Uniform Plumbing Code, as amended by the State of Arizona
ii. Americans with Disability Act (ADA)

C. Fire Protection Systems
1. The fire protection design will comply with applicable codes and standards, including those listed below:
a. Codes
i. 2006 International Building Code (IBC), as amended by the State of Arizona
ii. 2006 International Fire Code (IFC), as amended by the State of Arizona
iii. National Fire Protection Association (NFPA) Standards
iv. NFPA 13 - Installation of Sprinkler Systems, 1996
v. NFPA 14 - Standpipes and Hose Systems
vi. NFPA 20 – Stationary Pumps for Fire Protection

D. Electrical Systems
1. The electrical design will comply with applicable codes and standards, including those listed below:
a. Codes
i. 2006 National Electrical Code (NEC), as amended by the State of Arizona

IV. HVAC SYSTEMS – CONVENTION AREA

A. Introduction – Convention Center/Ballrooms/Conferencing Spaces
1. This section describes the various systems for the meeting areas. The objectives of the heating, ventilation and air conditioning systems are to maximize the flexibility of the building in terms of comfort control, operation and maintenance while minimizing first cost, life-cycle cost and overall energy use to maximize value and income of the development.

B. Baseline Design: Floor Vertical Air Handling Unit
1. Description
a. This option includes floor air handling units. The units would include airfoil supply fans, chilled water cooling coil and 80% efficient filters. The units would include a factory fabricated acoustically attenuated discharge plenum serving a looped ductwork system. Each of the air-handling units would be served with chilled water from the central utility plant. A separately metered chilled water loop could be provided. Outside air would be provided for each of the on-floor units with full airside economizer.

C. Indoor Air Quality
1. All spaces would be provided with carbon dioxide concentration reset for outside air control. This would be based on central monitoring on single zone units and room by room monitoring for multiple zone units. Occupancy sensors would also be considered as a method of zone heating, cooling and lighting control.

2. No humidification systems are included in the air handling systems. No internal lining would be provided in the ductwork systems unless explicitly required by the acoustical engineer and where sound traps and other means cannot provide the appropriate acoustical attenuation.

D. Main Lobby

1. The Main Lobby could be served by a displacement system with conditioned air being provided from a dedicated air-handling unit. The air would be supplied at low-level along the walls within the space and along the perimeter glazing. The air would provide excellent comfort conditions within the occupied zone. The air would be allowed to stratify and would be returned from high level to the air-handling units.

E. Toilet Rooms

1. Toilet rooms would be exhausted at the noted rate to a penthouse mounted exhaust fan. A future exhaust stub on each floor would be provided for connection under future tenant improvement.

F. Elevator Equipment Rooms/Server Rooms

1. Chilled water air conditioning units would serve server rooms and elevator equipment rooms throughout the building. These areas would operate 24 hours a day/7 days a week. The specification of all equipment serving 24-hour/7 day a week areas would ensure quality equipment that provides for long life. Redundancy of equipment would be provided for critical areas.

V. CENTRAL SYSTEMS – CONVENTION AREA

A. General

1. The Owner has opted to purchase chilled water from a district energy plant operated by Northwind™ . This deletes the requirement of an onsite chiller plant and will only require a heat exchanger, expansion tank and tertiary pumping station in base and mid-level of the tower.

B. Enclosed Garage Exhaust:

1. The garage will be exhausted at a rate of maximum rate of 1.5 cfm/sf (or airflow calculated with exception) to fan rooms located at opposite corners of the garage. The fan rooms utilize propeller exhaust fans with backdraft dampers exhausting to a common shaft terminating at grade and may require acoustic isolation to ensure adequate noise reduction. The make-up air is provided via the garage entrance. Carbon monoxide sensors will control the speed of the variable speed exhaust fans. The fan rooms would consist of the following:
   a. Multiple propeller fans with variable frequency drives (VFD).

VI. HVAC DISTRIBUTION OPTIONS – CONVENTION AREA

A. Variable Air Volume Overhead System

1. The overhead variable air volume (VAV) system would utilize floor air handling units to supply ducted conditioned air throughout the building. The supply temperature from the air-handling unit is dictated by the call for cooling from the worst zone, i.e. that zone requiring the most cooling to satisfy its set point. Zone control is obtained utilizing a VAV box with electric heat for perimeter zones to offset winter heat losses.
2. Each terminal unit is controlled via the set point of a zone thermostat. The box is provided with a minimum turndown usually 20% of airflow to ensure adequate ventilation airflow at all times. However, this means that if no one is present in the zone, it cannot be completely turned off, which can result in wasted energy. As the temperature of the air leaving the unit is dictated by the zone requiring the most cooling the situation can occur where reheat is required to meet the zone set point. In order to prevent this from occurring, the minimum stop on the VAV box may be

allowed to turn down to a fully closed position, especially in the interior zones of the building. Each load introduced into a space by the arrival of occupant, light and plug loads would be sufficient to ensure the box opened sufficiently to provide ventilation air. Carbon dioxide controls would allow outside air quantities to be reduced.

VII. PLUMBING SYSTEMS – CONVENTION AREA

A. Piping, Insulation Materials and Systems

1. Waste and Vent
   a. Waste and vent systems have historically included cast iron waste risers with separate vent lines to accommodate the hydrostatic pressures in these systems (similar to holding your finger on top of a straw with water – the water will not drain until it is open to the atmosphere). These systems have functioned with little to no maintenance for many years and are very reliable.
2. Sand/Oil Interceptor
   a. A sand/oil interceptor will be provided for the interior garage drains near the dumpsters.
3. Domestic Water
   a. A water softener will be provided upstream.
   b. Type L copper with soldered or brazed joints is recommended for domestic hot and cold water piping systems. The main domestic water risers may be Victaulic joints to accommodate shop fabrication and field installation with mechanical couplings.
   c. Fiberglass insulation is recommended for domestic hot and cold water and hydronic piping.
4. Domestic Water Heating Systems
   a. High efficiency gas-fired water heaters will be utilized.
5. Plumbing Fixtures
   a. Commercial grade plumbing fixtures are anticipated throughout.
6. Fire Protection Systems
   a. Sprinkler Systems
      i. The entire facility are to be protected by an automatic fire protection system in accordance with NFPA 13. A combination stand pipe and fire protection riser is proposed for one of the exit stairwells with a zone valve serving each level. The other stairwell will be provided with a wet standpipe and fire department hose connections. Pipe routing shall be carefully coordinated with the structure.
      ii. The parking garage main header should be looped around the core below the beam line, with branch piping running up between the beam pockets to maximize floor height.

VIII. ELECTRICAL SYSTEMS – CONVENTION AREA

A. Electric Service Voltage

1. The building would be served at 480V three phase (extended from existing service) with required step-down transformation at appropriate locations.

B. Locations of Major Electrical Loads

1. The location of most plant requiring electrical service is determined by criteria that cannot be changed, e.g. elevator plant, floor loads etc.

C. Service Entry Switchboards and Distribution

1. All switchboards could contain digital meters which will log voltage, current and power quality for each phase
2. All switchboards will contain TVSS on the 480/277V side.
3. Service equipment will be sized for the building loads, plus 20% spare capacity.

D. Power Distribution

1. Distribution:
   a. A bus duct through the floors would serve 480/277V panel boards and transformers located as required.
2. Parking Distribution:
   a. A switchboard will be provided in each Main Electrical Room within the parking garage for fans and pumps and will sub feed a lighting and appliance panelboard located within the parking levels to accommodate convenience outlets and lighting.
   b. Parking loads will include but not be limited to the following: Sump Pumps, Sewage Ejectors, Employee Locker Room, Kitchen equipment, Garage Exhaust Fans, and Electric Heat Trace as required for freeze protection.

E. Convenience Outlets

1. 120V convenience power outlets will be provided to meet all applicable codes and standards. Convenience outlets will be provided in all common areas. In addition, outlets will be provided in all utility spaces such as mechanical, electrical and elevator equipment rooms. Convenience outlets will be provided in the mechanical room to allow proper servicing of all equipment and at telecommunications backboards.
2. The maximum number of convenience outlets on one circuit within the commercial areas will be six. Maximum loading of lighting branch circuits will be 60% (i.e., 12 amps). Dedicated circuits will be provided for telephone board, and other specialty areas.

F. Lighting

1. High efficiency lighting will be provided for the building.
2. In Common Areas, lighting will be as directed by the DLR Group but is presently envisioned as follows for the following locations:
   a. Stairwells and corridors - wall mounted fluorescent - 20 footcandles (fc)
   b. Lobby - PL down lights, cove lights and decorative sconces - 20 fc
   c. Plant rooms, Mechanical rooms, electrical rooms - strip fluorescent - 20 fc
   d. Finished lighting will be per the lighting designer.
3. Within the Parking Garage lighting will be provided as follows:
   a. Lobbies - PL down lights, cove lights and decorative sconces - 20 fc
   b. Stairwells - wall mounted fluorescent - 20 fc
   c. Parking - surface mounted Induction luminaries to meet the following luminance criteria

AREA	DAY (A)	NIGHT (A)	UNIFORMITY (B)
Interior parking and drive areas	6	6	3:1
Minimum at perimeters	2	2	
Vehicle entrances (C)	50	6	3:1
Vehicle exits (C)	25	6	3:1
Ramps and Corners	15	15	3:1
Stairwells and pedestrian exits	20	20	3:1

A. Indicates minimum maintained horizontal luminance in footcandles at 30" AFF.
B. Indicates Average to Minimum ratio.
C. Entrance and exit area defined as from edge of building 50 feet into the building.

4. Controls - a lighting control system will be installed in each building to control the building common areas and exterior lighting.
5. Site Lighting: Egress and architectural lighting shall be provided on the exterior of the building within entrance courtyards and doors. This work shall be coordinated with the DLR Group. Local night sky ordinances shall be complied with. The lighting will be controlled by photocell and timer.
6. Egress Lighting: Egress lighting will be a subset of the general building corridor lighting system. Exit signs will be high efficiency LED type and will be supplied from the generator set.
7. At Exterior Entrance Doors, a minimum maintained light level of 2 fc for a distance of 20' from entrances will be provided. Exterior lighting shall be controlled by a "Dusk-to-Dawn" (photocell on - photocell off) circuit controlled by the building lighting control system. Light source shall be low glare, metal halide luminaries.
8. At the Building Façade, the light source shall be low wattage metal halide. Facade lighting shall be controlled by a "Dusk-to-Preset Off" (photocell on - time clock off) circuit controlled by the building lighting control system.

G. Fire Alarm System
1. A completely addressable fire alarm (FA) system including emergency voice evacuation speaker system, smoke detectors and audio/visual alarm devices meeting ADA disability and code requirements will be extended from existing system. Smoke detection will be provided in the following areas:
   a. Lobby
   b. Corridors
   c. Top of stairwells
   d. Electrical Room
   e. Mechanical Room
   f. Telecommunications room
   g. Other spaces as required by code
   h. System will include provisions for connections to future FA devices in future tenant spaces.
2. Smoke detectors will be provided in all elevator lobbies, interfaced with the elevator controller to provide elevator recall functions as required by ASME/ANSI 17.1 elevator code. Elevator controller shutdown will be provided per code for fire or smoke conditions in the elevator machinery room.
3. Ceiling mounted heat detectors will be provided in the following locations:
   a. Trash rooms
   b. Elevator shafts
   c. Elevator pit areas, adjacent to all sprinkler heads.

H. Security Systems
1. A separate card access control system will be utilized to control strategically located entrances and internal doors with extension from existing system.

IX. HVAC SYSTEMS – HOTEL TOWER

A. Introduction – Hotel Tower
1. This section describes the various systems for the hotel tower. The objectives of the heating, ventilation and air conditioning systems are to maximize the flexibility of the building in terms of comfort control, operation and maintenance while minimizing first cost, life-cycle cost and overall energy use to maximize value and income of the development.

B. Baseline Design: Four-pipe vertical stacked fan coil units (FCU) for hotel.
1. Description

a. This system utilizes vertical four-pipe FCU's to air condition the hotel rooms. Typically, one or two FCU's will be used per room and each room will include fan, a chilled water cooling coil, an electric heating coil and filter to condition the supply air to the room.

b. In some cases, the vertical FCU will be ducted to sidewall grilles within a soffit.

c. Vertical stacked FCU's are commonly used. These systems are factory packaged to reduce field labor. Units are delivered to each floor and stacked on top of each other, starting at the bottom floor. Since the piping is integral to the unit, external piping expenses are eliminated. Since control valve connections and controls are factory installed, field installation costs are lower and installed quality is typically higher. These units can be installed with or without ductwork.

C. Hotel Tower Exhaust and Make-Up Air

1. Exhaust – baseline design exhausts the areas via a sub-ducted exhaust system:

a. Hotel Bathroom

i. We recommend 75 cfm per water closet for bathroom exhaust. The exhaust will be ducted to an exhaust shaft riser consisting of a two hour rated shaft with a sheet metal exhaust duct riser. Each exhaust duct connection will be provided with a 22" sub-duct to eliminate the requirement for a fire smoke damper at the shaft penetration.

2. Make-Up Air:

a. Hotel:

i. Units:

a) The exhaust from each of the hotel will need to be made up with make-up air. The recommended option would be to duct outside air from an exterior opening to the air conditioning unit. This would allow the outdoor air to be treated and dehumidified.

ii. Corridor:

a) The recommended solution includes ducting make-up air from air handlers in the interstitial space to the corridors. The penthouse air handlers would be equipped with an air foil supply fan, chilled water cooling coil, electric heat, pre-filters and 80% efficient final filters. The physical requirements of this system are 10'L x 6'W x 5'H and would require direct outdoor access for relief and outside air.

D. Main Lobby

1. The main lobby area would be served by chilled water from the central utility plant. Horizontal fan coil units would be installed and connected to the central system. Perimeter louvers would be provided in the building façade to accommodate outside air intake and/or exhaust systems to be installed under tenant improvement. The system would be sized for 100% outside air and 100% exhaust with heat reclaim to provide excellent indoor air quality without odors, year round.

E. Public Toilet Rooms

1. Toilet rooms would be exhausted at the noted rate to a penthouse mounted exhaust fan. A 12" round exhaust stub on each floor would be provided for connection under future tenant improvement.

F. Elevator Equipment Rooms/Server Rooms

1. Chilled water air conditioning units would serve server rooms and elevator equipment rooms throughout the building. Small server rooms located in the

tenant's space would be served by ceiling mounted AC units. Small fan coil units would serve elevator equipment rooms. These areas would operate 24 hours a day/7 days a week. Thus the design would incorporate separately metered chilled water loops. The specification of all equipment serving 24-hour/7 day a week areas would ensure quality equipment that provides for long life. Redundancy of equipment would be provided for critical areas.

X. CENTRAL SYSTEMS – HOTEL TOWER

A. General

1. The Owner has opted to purchase chilled water from a district energy plant operated by Northwind™. This deletes the requirement of an onsite chiller plant and will only require a heat exchanger, expansion tank and tertiary pumping station in base of the tower.

B. Building Management System:

1. A central building and energy management system can monitor and reduce energy consumption. Tenant's off-hour usage can be monitored and invoiced.

XI. PLUMBING SYSTEMS – HOTEL TOWER

A. Piping, Insulation Materials and Systems

1. Waste and Vent
   a. Waste and vent systems have historically included cast iron waste risers with separate vent lines to accommodate the hydrostatic pressures in these systems (similar to holding your finger on top of a straw with water – the water will not drain until it is open to the atmosphere). These systems have functioned with little to no maintenance for many years and are very reliable. Recently, Sovent® systems have become popular for hotels. This system utilizes a special fitting at each level to accommodate the hydrostatic pressures in the waste lines and thereby eliminating a separate set of piping risers. Although Sovent® systems have been manufactured for many years, their widespread use has only been within the last 10 years as many local plumbing departments would not allow their use. If the owner opts to utilize the Sovent® system, we recommend that the laundry connections remain a conventional waste and vent system to mitigate sudsing
2. Grease Interceptor
   a. A grease interceptor will be provided in the future for grease waste from the kitchen.
3. Domestic Water
   a. A water softener will be provided upstream of the booster pump.
   b. Type L copper with soldered or brazed joints is recommended for domestic hot and cold water piping systems. The main domestic water risers may be Victaulic joints to accommodate shop fabrication and field installation with mechanical couplings. All branch piping is expected to be field installed. Wirsbo PEX piping should be priced as an alternate.
   c. Fiberglass insulation is recommended for domestic hot water, hydronic piping and ductwork.
4. Pressure Zones
   a. The building height will require a domestic water booster pump system in order to provide adequate pressure throughout the building. We recommend a duplex pump system with variable speed drives to maintain a consistent water pressure. The UPC requires the maximum pressure at plumbing fixtures to be 80 psi. The minimum recommended water pressure for proper operation of plumbing fixtures is 25 psi. We recommend the pressures be

limited to a maximum of 75 psi and a minimum of 35 psi. To provide the various pressures throughout the building, pressure-reducing stations connected to a high pressure main designed to serve the top levels of the building will, reduce pressure for the pressure zone they serve. The pressure reducing stations could be located behind a 48" by 48" access panel or in a utility closet, but we recommend locating them in the reheat rooms. Branch piping will run down the corridor of the top floor of each pressure zone and drop down vertically within the hotel units adjacent to the fixtures they serve.

b. Shut Off Valves:
   i. Shut off valves will be provided in the corridor to allow shut down of individual risers for servicing within the hotel.

c. The following are the recommended pressure zones for the hotel:
   i. City Pressure: Levels 1
   ii. Pressure zone #1: Levels 2-6
   iii. Pressure zone #2: Levels 7-16
   iv. Pressure zone #3: Levels 16-Roof

5. Central Water Heating Systems
   a. The proposed central domestic water heating system would include two high efficiency boilers and single tank combination for the hotel. The domestic hot water piping would parallel the domestic cold water piping and include the pressure reducing stations and pressure zones.

6. Plumbing Fixtures
   a. Commercial grade plumbing fixtures are anticipated throughout each hotel room. All bath fixtures to be Kohler. Venco will manufacture the bath inserts. The surrounds will be tile (or stone).

7. Fire Protection Systems
   a. Sprinkler Systems
      i. The entire facility is to be protected by an automatic fire protection system in accordance with NFPA 13. A combination stand pipe and fire protection riser is proposed for one of the exit stairwells with a zone valve serving each level. The other stairwell will be provided with a wet standpipe and fire department hose connections. Pipe routing shall be carefully coordinated with the structure, especially where exposed slabs are provided and sprinkler lines must run in soffits or through metal stud walls serving sidewall sprinkler heads.
      ii. The parking garage main header should be looped around the core below the beam line, with branch piping running up between the beam pockets to maximize floor height.

XII. LIFE/SAFETY SYSTEMS – HOTEL TOWER

A. When the building exceeds high rise heights (usually 75 feet to the floor of the highest habitable level), national and local building and fire codes will require a life safety and smoke control system since the top floor exceeds the 75' height limit. These codes outline the requirements and the intent but the specifics are left to the interpretation of the local building officials. To that end, these are preliminary proposals based on our past experience with similar projects and knowledge of state of the art life safety systems.

1. Stairwell pressurization fans
   a. The stairwells are a critical component of the life safety exiting strategy from the building in the event of a fire. To minimize the potential for smoke collecting in the stairwells and inhibiting the path of egress, code requires these stairwells be pressurized during an event, as triggered by a smoke

detector or fire protection (sprinkler system) flow switch. Due to the height of the tower, we recommend a supply shaft sized at 3000' per minute velocity that would supply air to the stairwell, at every third level, and to the vestibule at every level. Ideally, stair pressurization fans are provided at the top and bottom of the stairwells to provide even pressurization of the shaft but can be provided all from the penthouse if methods for balancing the air flow are provided.

b. Fans will need to be connected to emergency power and their feeder needs to be protected within a rated shaft. The top of the stairwell is required to have a relief damper to relieve a minimum of 2,500 cfm. We recommend a 3' x 3' barometric relief on the to or the side of the stairwell with dampers adjusted to relieve air at .15" water gauge and .25" water gauge static pressure. The stairwell fans need to be located where the chance on induction of smoke during a fire is minimized.

2. Elevator hoistway pressurization fans
   a. The hoistways are a critical component of the life safety exiting strategy from the building in the event of a fire. To minimize the potential for smoke collecting in the hoistways, the AHJ may require these hoistways be pressurized during an event, as triggered by a smoke detector or fire protection (sprinkler system) flow switch
   b. Fans will need to be connected to emergency power and their feeder needs to be protected within a rated shaft. The fans need to be located where the chance on induction of smoke during a fire is minimized.
3. Elevator machine room pressurization fans
4. Two fire pump rooms, one in the parking garage and one at mid level of the tower protect the tower. The City of Tucson may require a fire water storage tank due to water pressure concerns.
   a. The height of the building requires multiple fire pump systems to pressurize the risers in order to meet the upper floors of the tower. Both fire pump rooms will include two electric fire pumps and a jockey pump to maintain pressure at all times in the system.
   b. All pumps shall be connected to emergency power through a transfer switch, which will automatically switch to the alternate power source in the event of a failure. The feeder serving these pumps shall be installed within a two hour rated shaft or provided with two hour rated protection and therefore, is ideally located adjacent to the emergency generator.
5. Firefighter's Command Center
   a. A fire alarm and life safety smoke control panel shall be installed in a rated firefighter's command center. The room should be a minimum one-hour rated and large enough to accommodate several firefighters with airpacks. Life safety diagrams and easily interpreted permanent instructions should be provided for the firefighter's use. A separate HVAC system shall be provided to serve the firefighter's room with separate outside air supply and a rated shaft to maintain a smoke free environment.
6. Emergency power distribution system including emergency generator and generator fuel tank
7. Fire command center equipped with Fire alarm system, emergency communications system, generator controls, elevator controls, and smoke evacuation control equipment.

XIII. ELECTRICAL SYSTEMS – HOTEL TOWER

A. Electric Service Voltage
   1. The hotel tower would be served at 480V three phase.

B. Locations of Major Electrical Loads
   1. The location of most plant requiring electrical service is determined by criteria that can not be changed, e.g. elevator plant, floor loads etc.

C. Service Entry Switchboards and Distribution
   1. All switchboards could contain digital meters which will log voltage, current and power quality for each phase
   2. All switchboards will contain TVSS on the 480/277V side.
   3. Service equipment will be sized for the building loads, plus 20% spare capacity.

D. Power Distribution
   1. Hotel Distribution:
      a. A busduct rising through the hotel floors would serve 480/277V panel boards and transformers located every third floor.
      b. The transformers would serve 120/208V panel boards for convenience loads. The 480/277V panel boards would serve lighting and mechanical loads.
   2. Hotel Common area:
      a. A "House" Switchboard will be provided in the Main Electrical Room within the parking garage. This switchboard will subfeed panel boards located strategically throughout the building, which will provide supply power to convenience outlets, lighting and other miscellaneous equipment.

E. Emergency Generator
   1. Due to the high rise nature of the building, and the requirements of the local jurisdiction a generator is required. A separate generator will be installed for each High rise building. A 480Y/277 volt, 3-phase diesel engine generator will be installed to provide standby power for emergency and legally required stand-by loads. The generator will serve only emergency loads and will not serve optional standby loads. The generator will be located within the parking garage to improve reliability of starting and servicing in cold weather. A belly tank located beneath each generator will provide fuel for the emergency generator and an exhaust muffler and piping system will route exhaust outside.
   2. Emergency Branch: The generator set will serve an emergency system for emergency (NEC Article 700) and Legally Required Standby (NEC Article 701) loads such as egress lighting, fire command center loads, fire alarm systems, one elevator, elevator cab lighting, fire pumps, smoke control fans, pressurization fans, elevator machine room fans, building automation equipment and other loads as defined by the Authority Having Jurisdiction. Emergency panelboards will be distributed vertically in the electrical closets in the project to accommodate loads.

F. Convenience Outlets
   1. 120V convenience power outlets will be provided to meet all applicable codes and standards. Convenience outlets will be provided in all common areas. In addition, outlets will be provided in all utility spaces such as mechanical, electrical and elevator equipment rooms. Convenience outlets will be provided in the mechanical room to allow proper servicing of all equipment and at telecommunications backboards.
   2. The maximum number of convenience outlets on one circuit within the commercial areas will be six. Maximum loading of lighting branch circuits will be 60% (i.e., 12 amps). Dedicated circuits will be provided for telephone board, and other specialty areas.

3. Within the hotel guestrooms, convenience power will be provided by receptacle outlets located in the units as required by and spaced per the NEC. Each kitchen, family room, dining room, living room, bedroom or similar room or area of the dwelling units will have the minimum quantity of receptacle outlets as required in NEC 210.

G. Lighting

1. High efficiency lighting will be provided for the building.
2. In Common Areas, lighting will be as directed by the DLR Group but is presently envisioned as follows for the following locations:
   a. Stairwells and corridors - wall mounted fluorescent - 20 footcandles (fc)
   b. Lobby - PL down lights, cove lights and decorative sconces - 20 fc
   c. Plant rooms, Mechanical rooms, electrical rooms - strip fluorescent - 20 fc
3. Controls:
   a. A lighting control system will be installed in each building to control the building common areas and exterior lighting.
4. Site Lighting:
   a. Egress and architectural lighting shall be provided on the exterior of the building within entrance courtyards and doors. This work shall be coordinated with the DLR Group. Local night sky ordinances shall be complied with. The lighting will be controlled by photocell and timer.
5. Egress Lighting:
   a. Egress lighting will be a subset of the general building corridor lighting system. Exit signs will be high efficiency LED type and will be supplied from the generator set.
6. Lighting will be provided in Hotel Units will be provided as directed by DLR Group.
7. At Exterior Entrance Doors, a minimum maintained light level of 2 fc for a distance of 20' from entrances will be provided. Exterior lighting shall be controlled by a "Dusk-to-Dawn" (photocell on - photocell off) circuit controlled by the building lighting control system. Light source shall be low glare, metal halide luminaries.
8. At the Building Façade, the light source shall be low wattage metal halide. Facade lighting shall be controlled by a "Dusk-to-Preset Off" (photocell on - time clock off) circuit controlled by the building lighting control system.

H. Fire Alarm System

1. A separate complete addressable fire alarm (FA) system including emergency voice evacuation speaker system, smoke detectors and audio/visual alarm devices meeting ADA disability and code requirements will be included in each building. Smoke detection will be provided in the following areas:
   a. Lobby
   b. Corridors
   c. Top of stairwells
   d. Electrical Room
   e. Mechanical Room
   f. Telecommunications room
   g. Hotel units, including all bedrooms
   h. Other spaces as required by code
   i. System will include provisions for connections to future FA devices in future tenant spaces.
2. Smoke detectors will be provided in all elevator lobbies, interfaced with the elevator controller to provide elevator recall functions as required by ASME/ANSI 17.1 elevator code. Elevator controller shutdown will be provided per code for fire or smoke conditions in the elevator machinery room.

3. Ceiling mounted heat detectors will be provided in the following locations:
   a. Trash rooms
   b. Elevator shafts
   c. Elevator pit areas, adjacent to all sprinkler heads.

I. Telecommunications systems
1. The Main Telecom Room for each building (MPOP) shall be located in the lower levels. The telecommunication entrance services, and pathways will be coordinated with the designated service provider. Additional conduits will be routed from the Main Telecom Room to the Telecom Closets located on the hotel unit floors, with junction boxes required to accommodate continuous wiring from the ground level to uppermost Telecom Closet. Raceways and lines will be provided as required by code for emergency communications within the elevator.
2. Voice/data/CATV cabling in the hotel shall rise up through the electrical rooms and shall utilize space on odd floors for distribution equipment.
3. A CATV system will be installed in the hotel to provide media to hotel guestrooms and ancillary hotel rooms.

J. Security Systems
1. A separate card access control system will be utilized to control strategically located entrances and internal doors.

XIV. SUSTAINABLE DESIGN – OVERALL PROJECT

A. General
1. The U.S. Green Building Council is, in the United States, a recognized authority for promoting sustainable development. Ideally, each development would minimize its impact on the environment including:
   a. Sustainable Sites
   b. Water Efficiency
   c. Energy & Atmosphere
   d. Indoor Environmental Quality
   e. Materials & Resources
   f. Innovation and Design Process

B. Sustainable Site Development
1. Light Pollution Reduction
   a. Through proper lighting design, the project can eliminate light trespassing from the building site, improving night sky access and reducing development impact on nocturnal environments.

C. Water Efficiency/Waste Water Reduction
1. General
   a. A goal should be to reduce domestic water consumption and wastewater discharge to 30% below code. This can be accomplished through the use of water efficient plumbing fixtures, water efficient landscaping, innovative wastewater technologies and water use reduction.
2. Water Efficient Landscaping
   a. New, high efficiency irrigation systems can reduce potable water consumption by over 50% by incorporating drip irrigation systems and systems that shut off automatically when there is measurable rainfall.
3. Water Efficient Appliances
   a. Purchasing energy efficient appliances will not only keep monthly ownership fees down, but also reduce entire construction costs since domestic water systems can be reduced in size. As an example, a standard washing machine uses approximately 42 gallons of water per load. The new energy efficient

models use approximately 16 gallons per load. This will assist in reducing the size of the central hot water heating system. For more information on energy efficient appliances go to http://www.waterwiser.org , or http://www.taunton.com/fh/features/materials/toilet/1.htm, or http://www.home.earthlink.net/~wliebold/

b. Water Efficient Fixtures:

i. New water closet technology allows two levels of water flushing (refer to photograph 18), 1.6 gallons for a full flush and 0.8 gallon for a half flush. With water closets using a substantial amount of domestic water in this project type, a potential reduction of 18% (assuming every other flush is a half flush) this deserves serious consideration. These fixtures are modern looking and used extensively throughout Europe and Asia.

D. Energy and Atmosphere

1. General

a. Reducing energy consumption not only is sustainable but can add value to the project through reduced home owner's fees, which can be projected through computer modeling simulations. The environment can be protected by minimizing and eliminating CFCs and HCFCs.

2. Commissioning

a. Developing a formalized commissioning plan to verify and ensure that the fundamental building elements and systems are designed, installed and calibrated to operate as intended, will reduce operating costs, minimize warranty callbacks and improve tenant satisfaction.

3. Exhaust Fan Energy Reduction

a. Variable frequency drives can automatically modulate the dryer, bathroom and kitchen exhaust fans in response to a static pressure controller. This will exhaust only the amount of air required by the tenants when they operate their internal exhaust fans.

4. Lighting

a. Consider utilizing energy efficient CFL fluorescent fixtures throughout the project and minimize incandescent fixtures. Utilize induction lamp lighting in the parking garage. These fixtures not only have substantial energy savings but with a 100,000-hour lamp life, they will reduce maintenance costs and homeowners fees.

5. Energy Management System

a. A central energy management system can monitor and reduce energy consumption. Tenant's heat pumps could be shut down remotely from the concierge desk or through a web access system that would allow tenants to remotely turn on and off their WSHP's.

6. Solar Hot Water (refer to photo 8):

a. For maximum cost and material efficiency, the panels would be integrated into the building façade, such as the mechanical penthouse.

7. "Greenpower"

a. Consider engaging in a two-year contract to purchase "Greenpower" from the utility. Work with the utility company to provide a program for tenants to purchase "Greenpower" on an individual basis.

E. Indoor Environmental Quality

1. General

a. Indoor environmental quality has become critically important in the hospitality industry. Problems with mold and VOCs (Volatile Organic Compounds) have resulted in unsatisfied owners and litigation.

2. Minimum Indoor Air Quality Performance
   a. The project should be designed in accordance with ASHRAE 62-2004 "Ventilation for Acceptable Indoor Air Quality". Consideration should be given to a make-up air system that ensures filtered and treated outside air is delivered to each of the tenant spaces.
3. Environmental Tobacco Smoke Control
   a. Provide smoking areas for the common areas or ban smoking from all public areas.
4. Carbon Dioxide Sensing
   a. Provide carbon dioxide sensing for common areas by monitoring the return on the make-up air handling system and adjusting minimum outside air flows accordingly.
5. Construction IAQ Management Plan
   a. Develop a plan to protect building surfaces, ductwork and air handling systems during construction and to minimize IAQ problems due to inappropriate construction techniques. As an example, ductwork should be cleaned internally, and kept clean and dry with shrink wrap or Visqueen covers. Filters utilized for temporary ventilation during construction should be changed regularly through the course of construction.
6. Indoor Chemical and Pollutant Source Control
   a. Avoid exposure of building occupants to potentially hazardous chemicals. Review the location of the generator exhaust. Employ entry system grilles and grates. Exhaust any areas that chemicals may be stored. Exhaust the trash chutes and trash rooms.
7. Controllability of Systems
   a. Provide a high level of individual occupant control, of thermal ventilation and lighting systems to support optimum health, productivity and comfort conditions. Provide operable windows. Provide one operable window per 200 sf of occupied area. Provide individual temperature control for bedrooms and living area.
8. Thermal Comfort
   a. Provide a thermally comfortable environment. Design systems that comply with ASHRAE standard 55-1992, addenda 1995 for thermal comfort standards. Continuously monitor temperature and humidity through the building energy management system.
9. Daylight and Views
   a. Provide a connection between indoor spaces and outdoor environments through the introduction of sunlight and views into the occupied areas of the building.

F. Materials and Resources
   1. General
      a. A wide variety of new environmentally sensitive products have entered the marketplace recently in response to increased demand. Consider utilizing materials with high recycled content, rapidly renewable materials (such as bamboo flooring), and local/regional materials when available. Institute a construction waste management program that recycles 75% of the construction waste materials.

Structural Systems Narrative

Foundations

Deep foundation systems will be required for the hotel tower and other heavily loaded components, based on preliminary soils engineering and adjacent construction work at the fire command center across Cushing. It is believed that the soils in the area are fairly consistent with those found on the fire command site; however specific detailed borings will need to be completed to determine the best foundation system.

Hotel Tower

The hotel tower superstructure will be reinforced concrete. The floor slabs will be post-tensioned concrete with spans of 27 feet in the East-West direction and a maximum span of 20 feet in the North-South direction. The columns and shear walls will be conventionally reinforced. The size, amount and placement of these elements will depend on the final design.

Hotel Meeting Facilities

The associated meeting facilities to the hotel, meaning the Ballroom, Jr. Ballroom and Meeting room types A, B & C will be steel frame construction. These areas are best served with this construction method due to the desire for long spans with as few columns as possible in the interior spaces.

Exhibit Hall Expansion and Meeting Rooms

The Convention Center Exhibit hall expansion and associated meeting rooms will also be steel frame construction. The new exhibit hall should be constructed with an expansion joint between the proposed and existing structures. The roof of the exhibit hall also serves as the floor to the meeting space above and is assumed to be a truss-girder design to accommodate the contributing loads.

Parking Structure

Standard double tee framing using post-topped sections and inverted tees is planned for the four level parking structure. These tees will be placed on a standard 30 ft. by 60 ft. column grid. The elevated slab above the service ramp and truck dock area will be a split slab construction spanning over the service area while supporting the “courtyard” construction above.