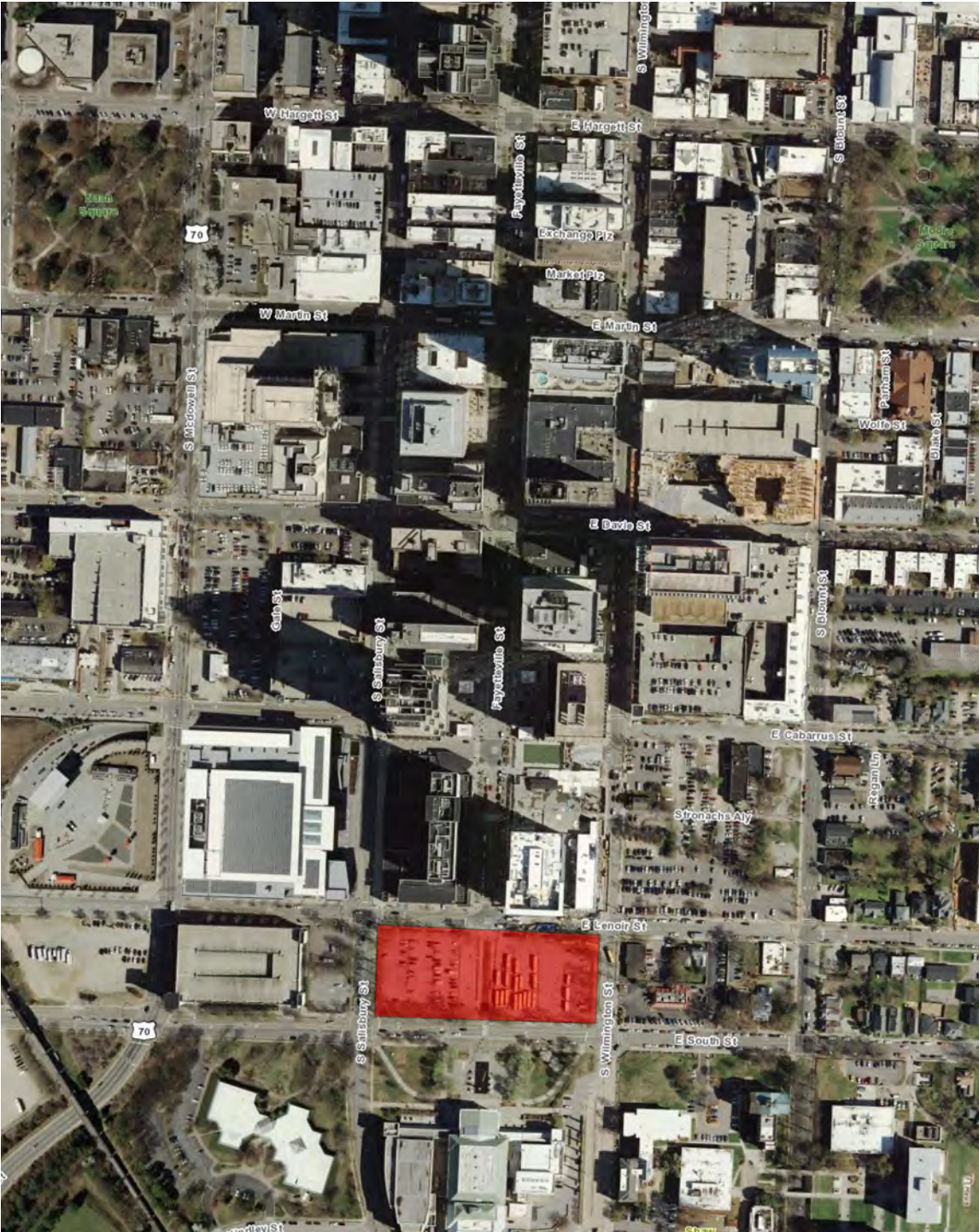


UNDERGROUND PARKING DECK FEASIBILITY STUDY: SITES 2 & 3

RALEIGH, NC



MASTER PLAN REPORT

Final Draft 10.20.2016

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CITY OF RALEIGH PROJECT TEAM

Raleigh Urban Design Center
Beth Nooe, Project Manager



ARCHITECT

LS3P Associates
Megan Bowles, AIA



PARKING, STRUCTURAL, TRAFFIC, AND CIVIL

Kimley-Horn & Associates
Dean Penny

PROJECT OVERVIEW

PROJECT SUMMARY

This feasibility study examines the practicality of constructing an underground parking deck below lots 2 & 3, between Lenoir St. and South St. The purpose of this study is to illustrate how the parking deck allows for better urban design and increased density at the southern end of the Fayetteville Street district, while providing an opportunity to maximize the development potential of this site by meeting associated parking demands.

DESIGN PROCESS

In developing the master plan, the design team worked closely with the City of Raleigh project team to determine long-term needs, create conceptual layouts, and determine estimates of development costs. The team worked with City representatives to confirm vision and priorities for the project.

Major project goals which emerged from these discussions included:

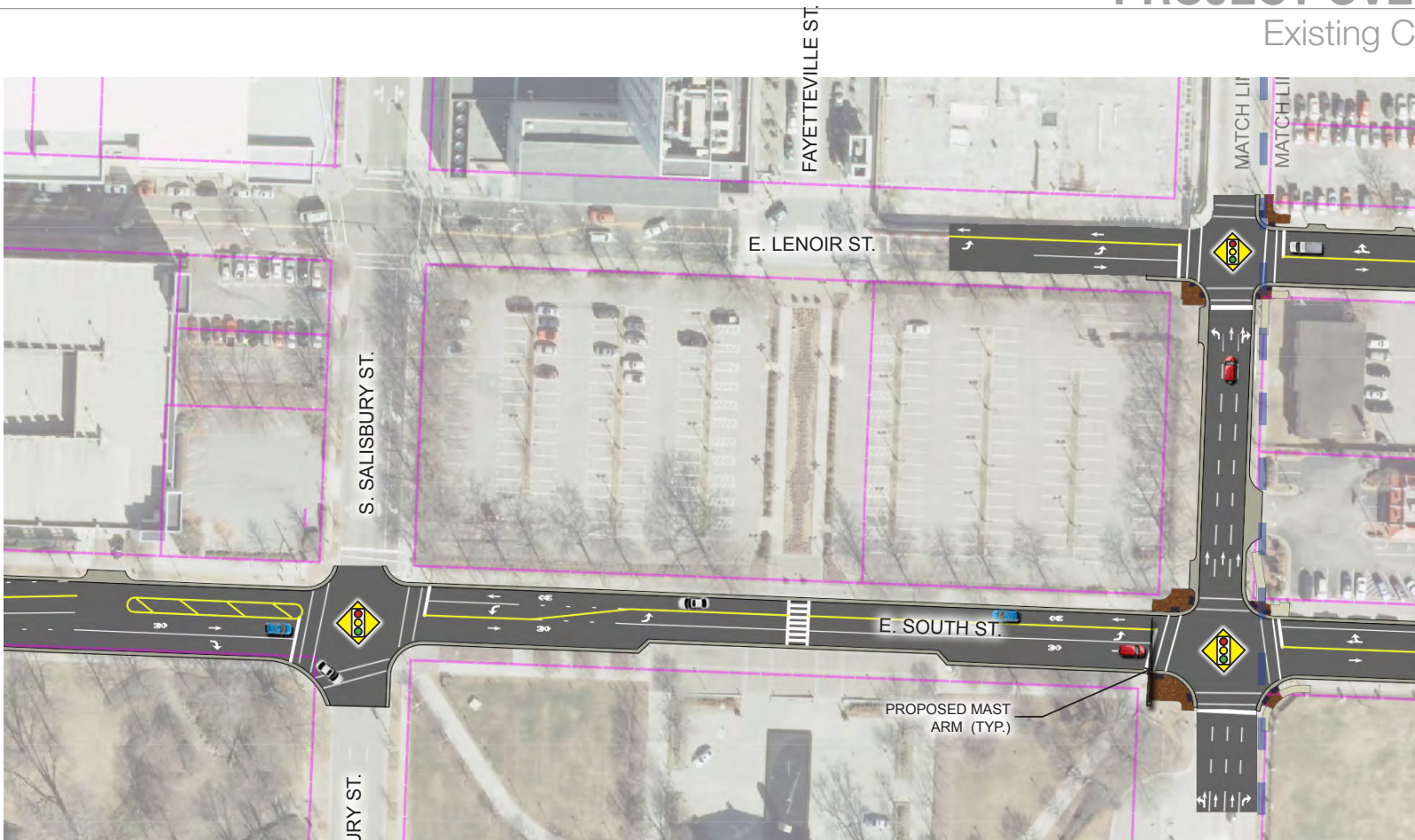
- Determine parking capacity of underground parking, organized by level.
- Determine cost of each level of parking, including incremental costs increase for deeper development.
- Explore vehicular and pedestrian ingress and egress to underground and above ground structures.

Following the visioning sessions, the design team developed conceptual master plans for review. The entire team offered feedback on potential site layouts, and discussions led to one master plan for further development.



SITE CONDITION

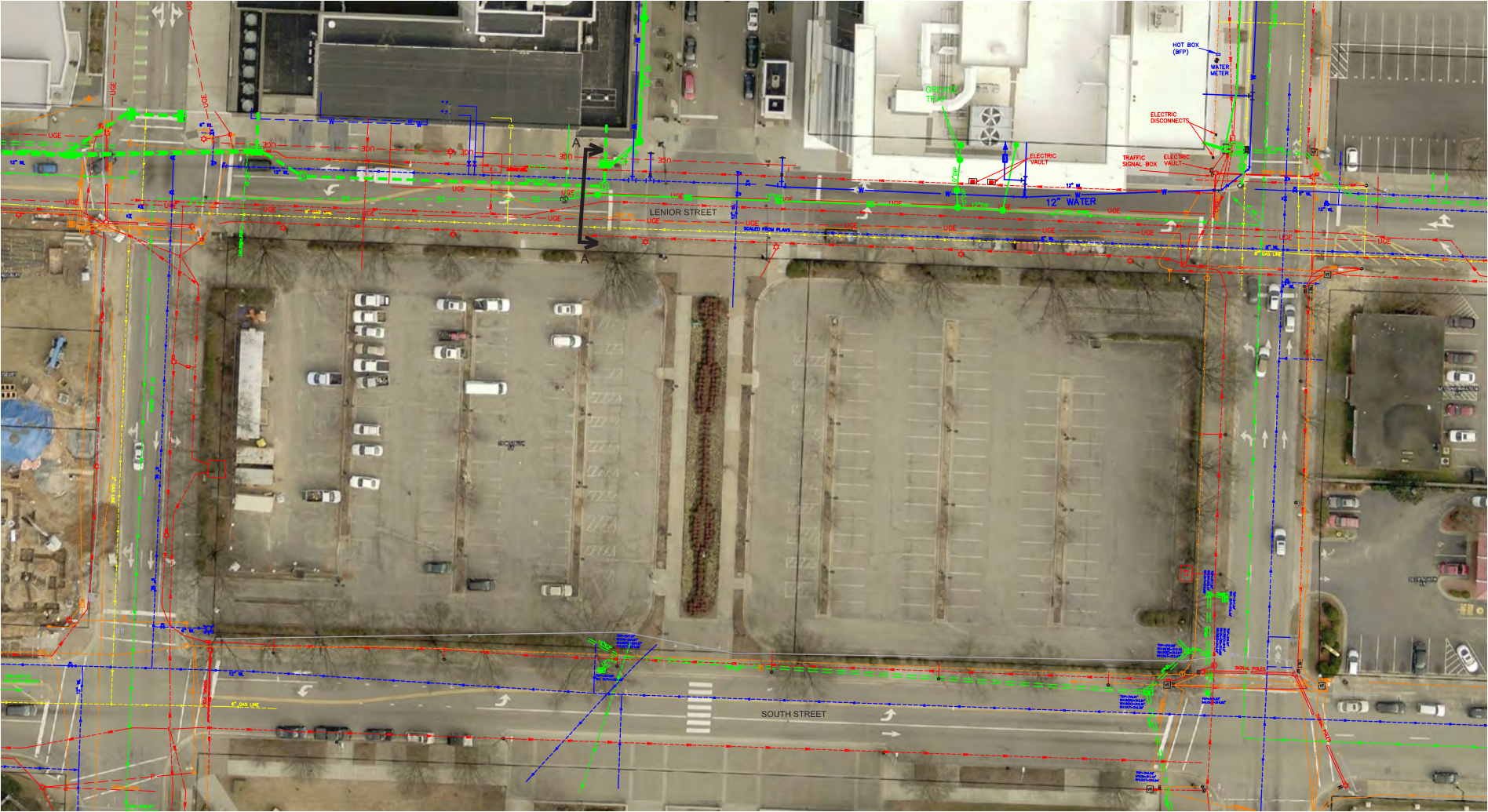
The subject site is currently being used as a surface parking lot, and is bounded on the north edge by Lenoir Street, south edge by South Street, eastern edge by Wilmington Street, and western edge by Salisbury Street. The site is mostly paved with some mature landscaping within its boundaries. The surface is generally flat within the western half, but slopes downward toward Wilmington Street in the eastern half. The Lenoir / Wilmington intersection is approximately 8 feet lower than the middle of the site, and the South / Wilmington Street intersection is an additional 4 feet lower than Lenoir.



TRAFFIC

The city is currently in the process of completing a conversion of the one-way traffic operations for Lenoir and South Streets to two-way. The first phase of this conversion, which includes this block, was completed approximately seven years ago. The second phase is currently in progress. Once completed, this will allow traffic to flow in both east and west directions on each street within this block and beyond. Salisbury Street currently flows southward, and Wilmington Street northward, forming a one-way pair with no current plans to change in the foreseeable future.

The 4 corners of this block are bounded by signalized intersections, where the signal timings are integrated with the downtown signal grid. The most recent traffic analysis we are aware of was completed in 2013 as part of the Lenoir/South two-way conversion. Based on that analysis, each of the four intersection signals currently function at a Level-of-Service C or better for both the AM and PM peak periods. Most of these are LOS B or better, and are expected to continue to function at that level within the foreseeable future.



UTILITIES

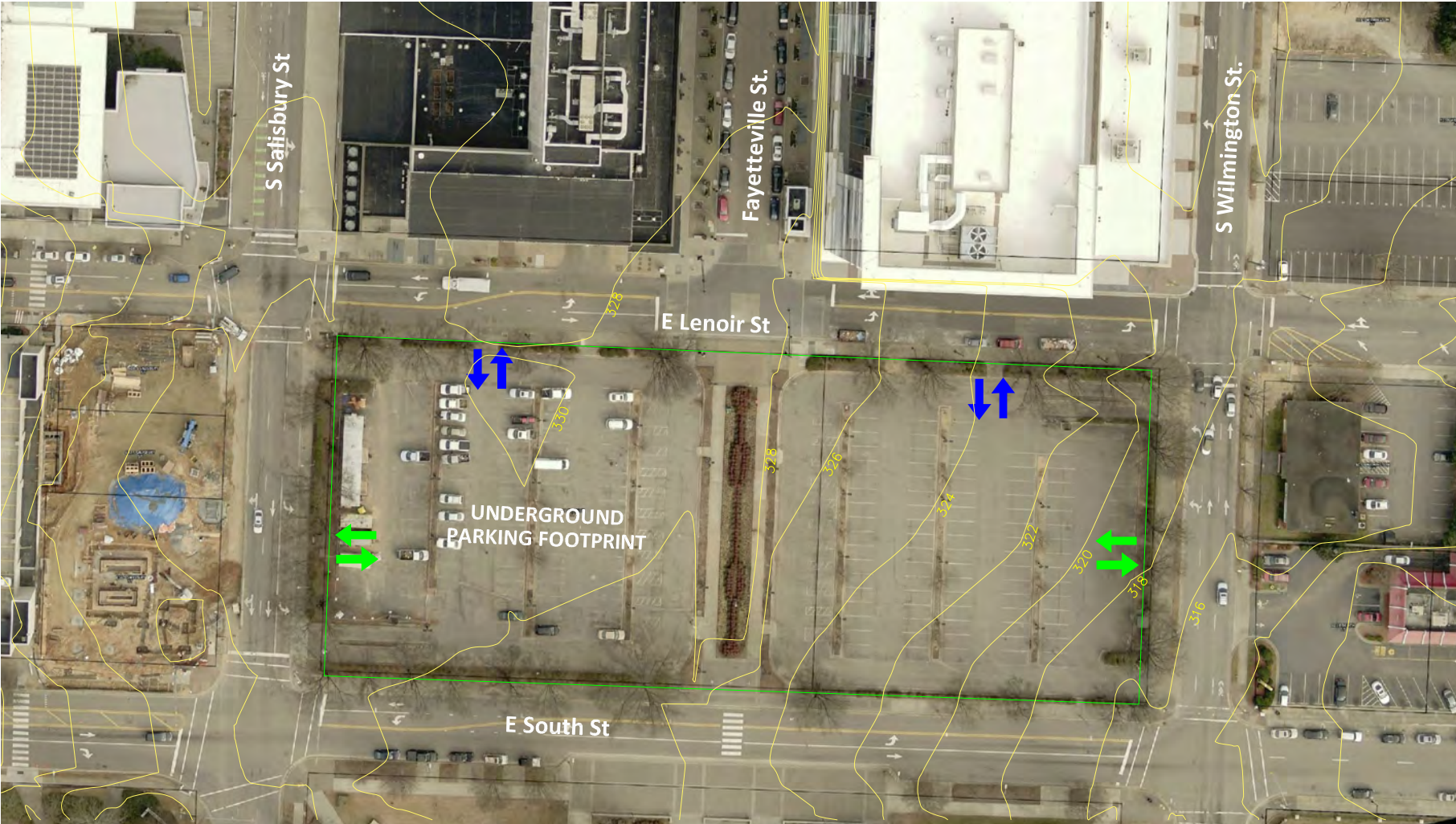
The block is bounded by utilities within the street, where water (potable and fire), sanitary sewer, gas, cable, communications, power, and storm water are all available immediately adjacent to the site. The capacity of each system for accepting additional development is currently unknown, but is presumed to be adequate for the purposes of this study.



SOIL CONDITIONS

Based on excavation and construction of the Performing Arts Parking Deck (one block to the west) and the Marriott hotel and underground parking deck (adjacent block to the north), it is anticipated that the site is underlain with a combination of residual soils, and layers of partially weathered rock conditions found in similar situations within the downtown area. For purposes of this study, no specific geotechnical analysis or investigation was conducted, so any references are based on the adjacent properties. Further analysis will be needed with an investigation of this site upon the next phases of design. Based on the previous adjacent projects, it is possible that hard rock will be encountered at depths of 40 to 50' below grade. It is also anticipated that groundwater may be encountered within approximately 20 to 40 feet below grade. As such, it is highly likely that both rock excavation and ground water collection systems will be required for any excavations below 30 to 40 feet. In addition, the Marriott hotel and underground parking for the convention center encountered contaminated groundwater, which required a collection and treatment system to properly handle and discharge that water from the site. This is a permanent system that is in operation today.

CONCEPT DESIGN



ABOVE GRADE PARKING ACCESS LOCATION



UNDERGROUND PARKING ACCESS LOCATION

CONCEPT 1 UNDERGROUND PARKING

This layout consists of parking bays and drive aisles oriented in the east-west direction in order to take advantage of the longer combined site underground. The layout primarily consists of 60 foot parking bays, with 2-way drive aisles and 90-degree parking stalls that fit within the 30'x30' column grid. Due to the 210' width of the site, one edge of the layout consists of a single loaded parking bay and a one-way drive aisle with angled parking along the edge. A parking ramp for vertical circulation between levels is provided under the western portion of the site oriented in the east-west direction to align with the basic parking layout.

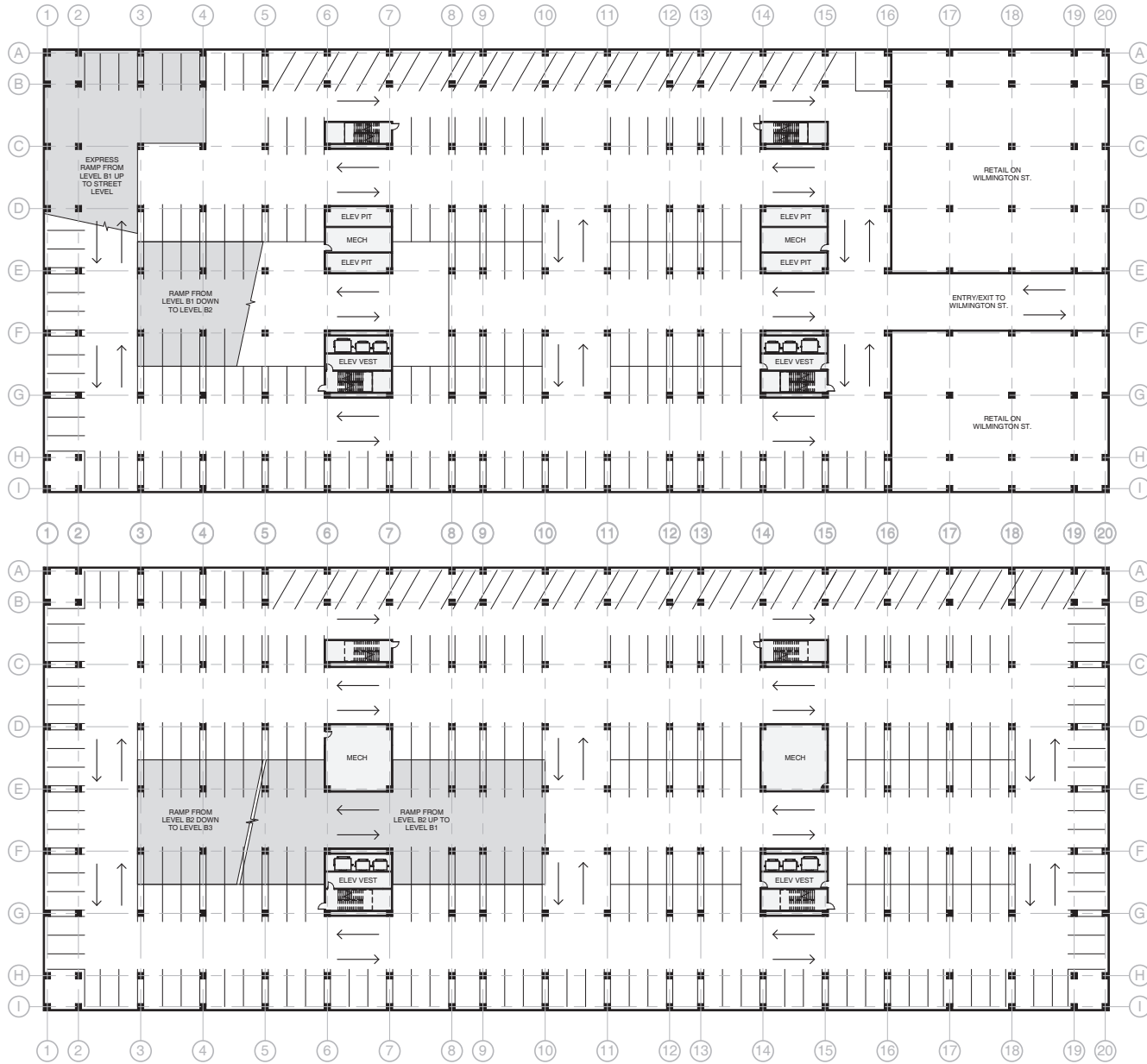
Due to the sloping site, the first level of parking below grade will not extend to the full length of the site toward Wilmington Street. This top level of parking will stop approximately 100' short of the east end, and as such will have fewer spaces. All lower levels of parking will extend the full length of the site.

The concept anticipates the core areas for stairs / elevators from the buildings above, and accommodates those within the parking and circulation patterns. Vehicular access from the streets is anticipated at each end, with ramps that would be required to ramp down from Salisbury Street into the parking level, while the entry from Wilmington Street will be basically on grade with the street.

This parking layout provides a slightly more efficient parking layout, with approximately 275 spaces on a typical level. If 4 below grade parking levels are assumed, a total of 983 parking spaces will be provided with this concept.

CONCEPT DESIGN

Concept 1 Underground Parking



Sublevel 1

Sublevel 2

CONCEPT 1 ABOVE GROUND PARKING

This concept was developed to study possible above ground development and highlight potential constraints imposed from the underground development.

The first level of the parking deck primarily serves as circulation to parking above and below. On the west lot, it is possible to provide limited parking on the first level. Above the first level of transition, the parking footprint extends over the entire lot, with building structure above. Eight levels of parking will provide approximately 879 parking spaces with 114 spaces on a typical level.

The concept anticipates the core areas for stairs / elevators throughout the parking decks, and accommodates those within the parking and circulation patterns. Vehicular access from the streets is anticipated at each end with entrances from Salisbury Street and Lenoir Street.

With east-west oriented parking below grade, the building core is limited to one major bank of vertical circulation in the building core. This will constrain the ability to construct vertically mixed use building types in future development.

CONCEPT DESIGN

Concept 1 Above Ground Parking



Level 1



Level 2

CONCEPT 2 UNDERGROUND PARKING

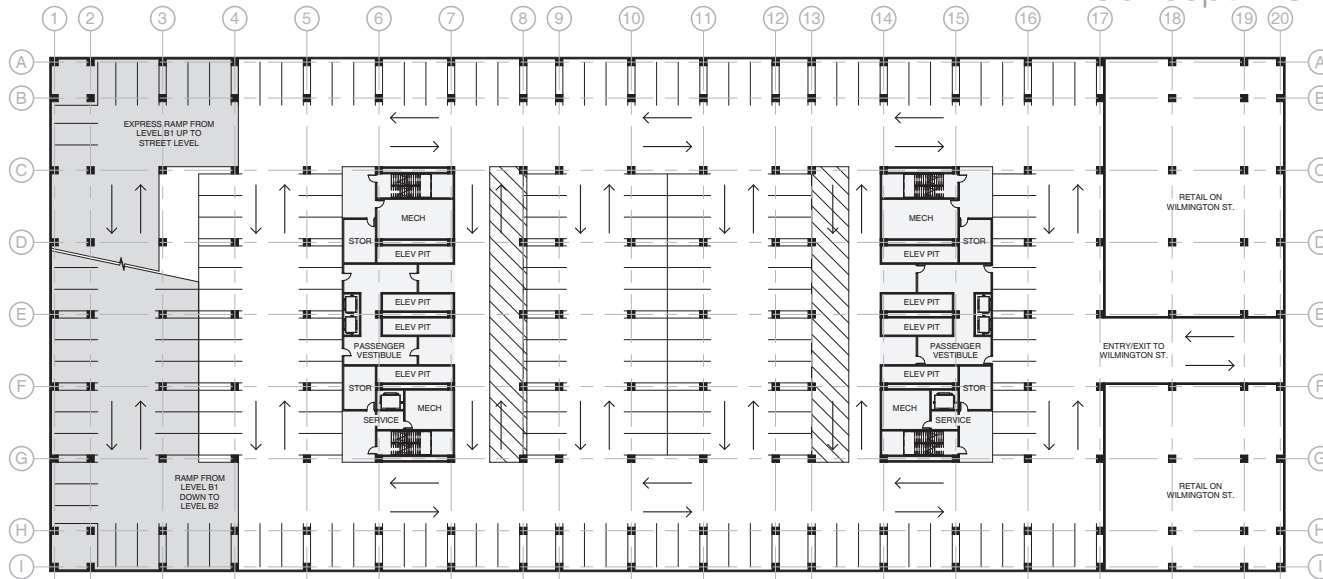
Parking Concept 2 orients the parking bays below grade in the north-south direction. This allows the full footprint for parking to be utilized with all bays incorporating 2-way drive aisles and 90-degree parking. A parking ramp for vertical circulation would be provided at each end of the structure, with all flat floor parking between. Similar to Option 1, the core areas for elevator and stairs from the building above have been accommodated. In addition, it is assumed that vehicular entry would also be provided at each end from Salisbury and Wilmington Streets.

Similar to Concept 1, the upper level of parking would not consist of the entire site, as the eastern edge would terminate approximately 100' from Wilmington Street.

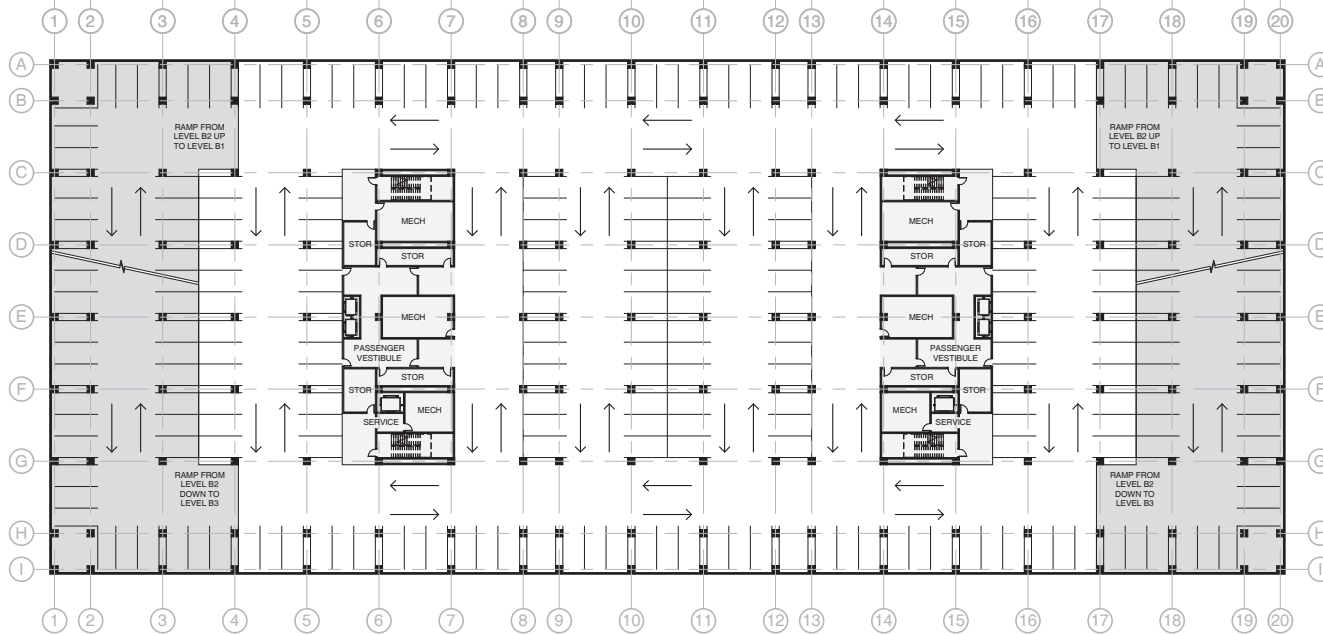
This layout provides slightly fewer spaces per level, 270 spaces +/- . However, one advantage of this concept is to more easily divide the structure into 2 phases, which could be constructed separately, or possibly even operated independently, if desired. Assuming 4 levels below grade, an approximate total of 934 parking spaces would be provided.

CONCEPT DESIGN

Concept 2 Underground Parking



Sublevel 1



Sublevel 2

CONCEPT 2 ABOVE GROUND PARKING

This concept was developed to study possible above ground development and highlight potential constraints imposed from the underground development.

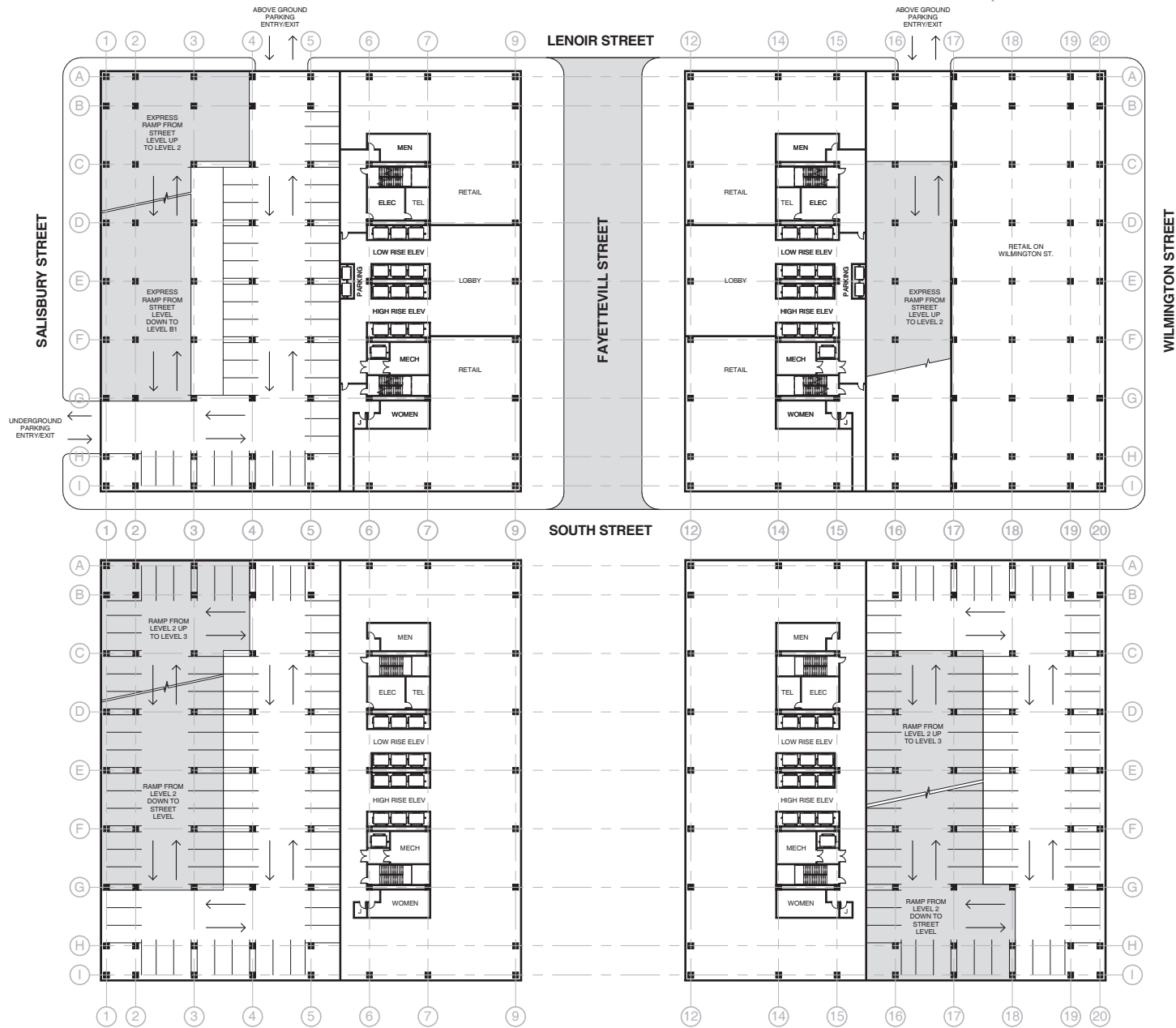
The first level of the parking deck primarily serves as circulation to parking above and below. On the west lot, it is possible to provide limited parking on the first level. Above the first level of transition, the parking footprint is partial on the overall lot, with building structure on the other part of the lot. Eight levels of parking will provide approximately 591 parking spaces with 78 spaces on a typical level.

The concept anticipates the core areas for stairs / elevators throughout the parking decks, and accommodates those within the parking and circulation patterns. Vehicular access from the streets is anticipated at each end with entrances from Salisbury Street and Lenoir Street.

With north-south oriented parking below grade, the building core allows for two banks for vertical circulation through the building core. This will allow for greater flexibility of mixed use building types in future development.

CONCEPT DESIGN

Concept 2 Above Ground Parking



Level 1

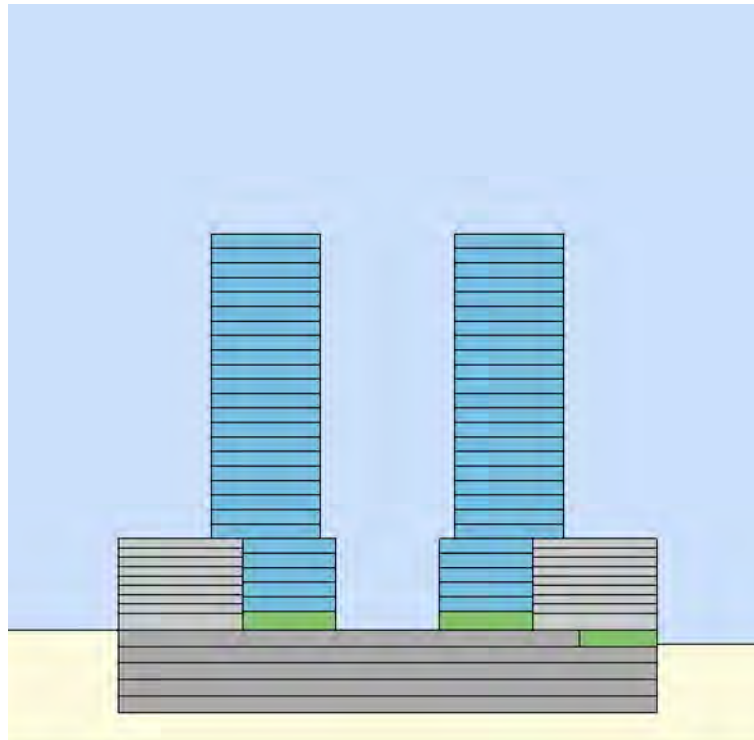
Level 2

PRELIMINARY DESIGN CONCEPTS

The study includes preliminary design concepts for future development. Several draft scenarios have been prepared as a starting point for discussion with the city staff and designers. Each scenario includes area and parking calculations. The purpose of this portion of the study is to illustrate the flexible development options possible above a well-designed underground parking deck.

SCENARIO 1

This option includes partial above ground parking for 8 levels, with street level retail and office in the building structure. In this scenario, the addition of underground parking adds 13 stories of office on each lot.



DEVELOPMENT WITH UNDERGROUND PARKING

West Lot (Salisbury St)	27 stories
Retail (18,000 sf)	1 story
Office (544,500 sf)	26 stories
Parking (600 spaces)	(8 partial stories)
East Lot (Wilmington St)	27 stories
Retail (30,000 sf)	1 story
Office (544,500 sf)	26 stories
Parking (600 spaces)	(8 partial stories)
Provided Parking (975 underground)	2,175 spaces



DEVELOPMENT WITHOUT UNDERGROUND PARKING

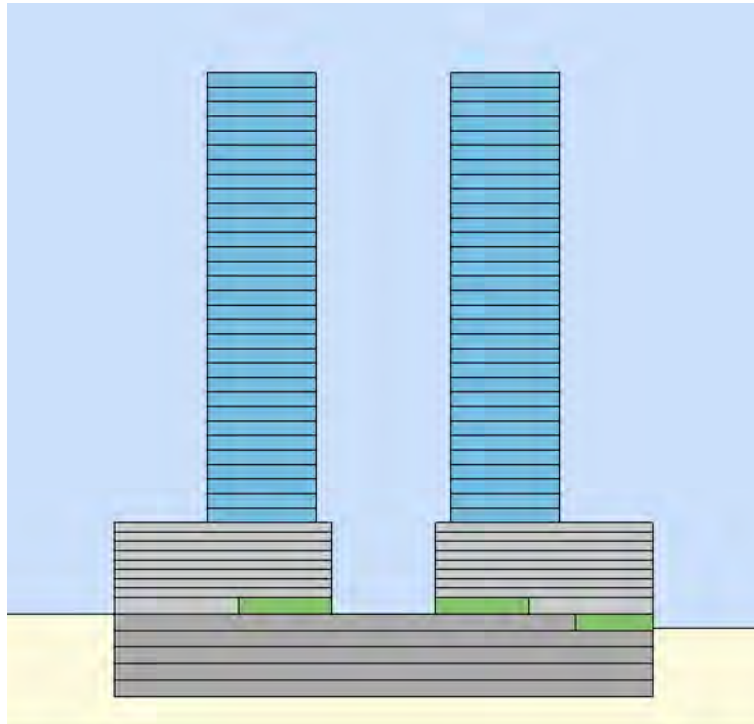
West Lot (Salisbury St)	14 stories
Retail (18,000 sf)	1 story
Office (296,100 sf)	13 stories
Parking (600 spaces)	(8 partial stories)
East Lot (Wilmington St)	14 stories
Retail (30,000 sf)	1 story
Office (296,100 sf)	13 stories
Parking (600 spaces)	(8 partial stories)
Provided Parking	1,200 spaces

- Office (14')
- Street Level Retail (16')
- Above Ground Parking
- Underground Parking



SCENARIO 2

This option includes full above ground parking for 8 levels, with street level retail and office in the building structure above parking. In this scenario, the addition of underground parking adds 11 stories of office on each lot and the building height is maxed out per zoning requirements.

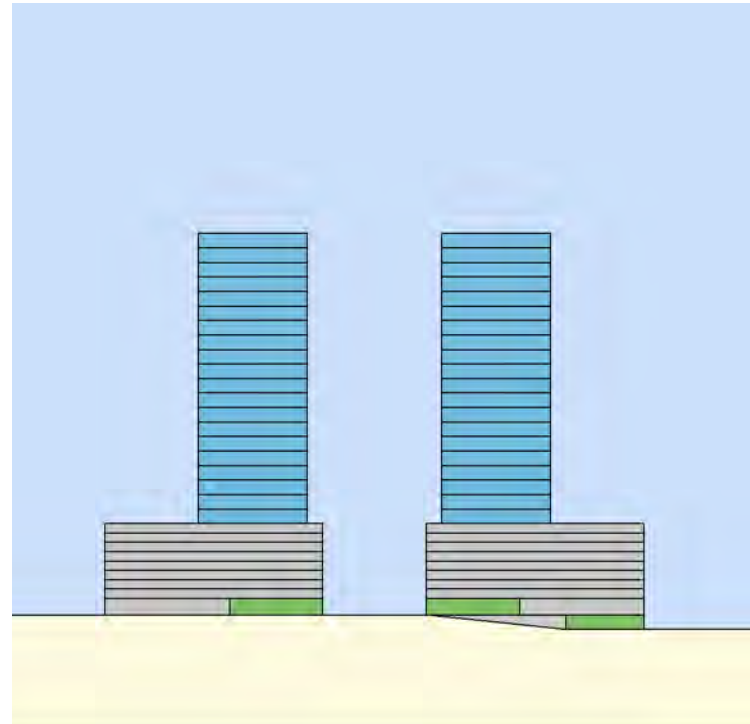


DEVELOPMENT WITH UNDERGROUND PARKING

West Lot (Salisbury St)	40 stories
Retail (18,000 sf)	1 story
Office (680,400 sf)	31 stories
Parking (880 spaces)	8 stories

East Lot (Wilmington St)	40 stories
Retail (18,000 sf)	1 story
Office (680,400 sf)	31 stories
Parking (880 spaces)	8 stories

Provided Parking 2,735 spaces



DEVELOPMENT WITHOUT UNDERGROUND PARKING

West Lot (Salisbury St)	29 stories
Retail (18,000 sf)	1 story
Office (680,400 sf)	20 stories
Parking (880 spaces)	8 stories

East Lot (Wilmington St)	29 stories
Retail (18,000 sf)	1 story
Office (680,400 sf)	20 stories
Parking (880 spaces)	8 stories

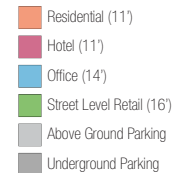
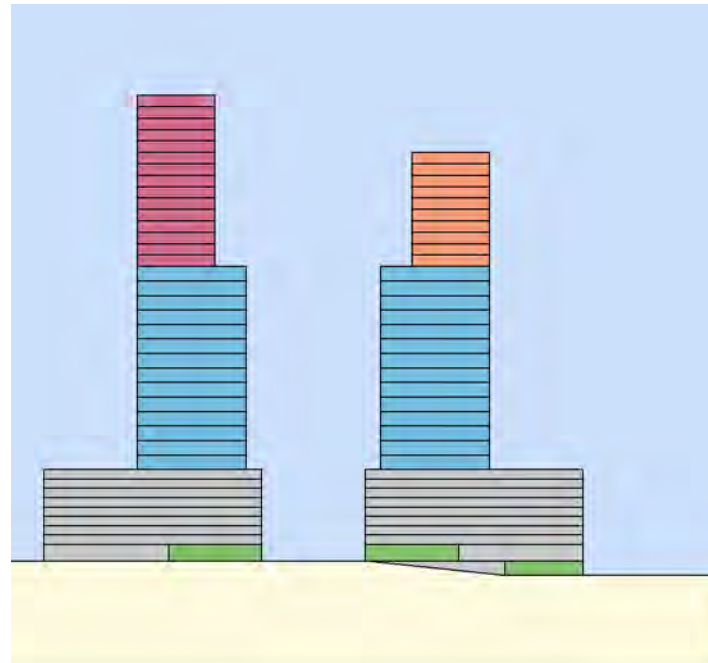
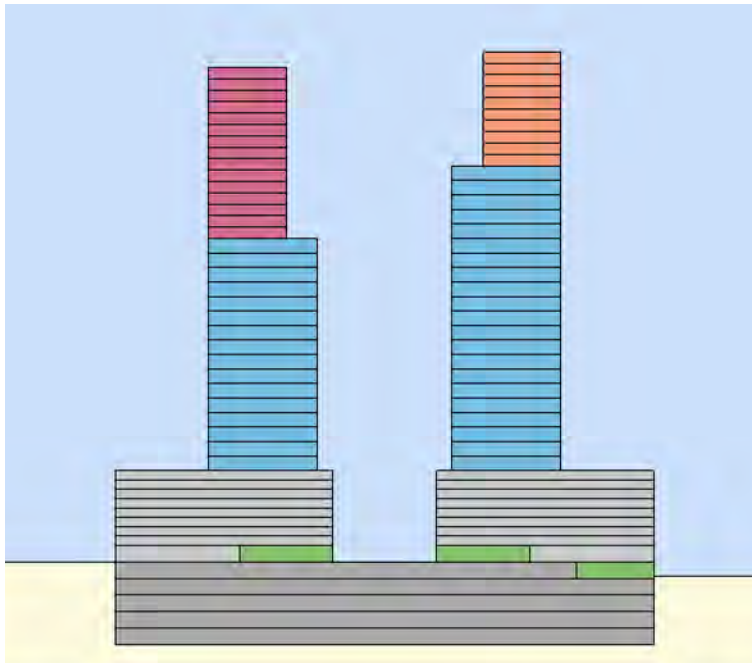
Provided Parking 1,760 spaces





SCENARIO 3

This option includes full above ground parking for 8 levels, with street level retail and residential/hotel over office in the building structure above parking. In this scenario, the addition of underground parking adds 2 stories of office on the west lot, adds 7 stories of office on the east lot, and the building height is maxed out per zoning requirements.



DEVELOPMENT WITH UNDERGROUND PARKING

West Lot (Salisbury St)	40 stories
Retail (18,000 sf)	1 story
Office (403,200 sf)	16 stories
Hotel (420 rooms)	15 stories
Parking (880 spaces)	8 stories

East Lot (Wilmington St)	40 stories
Retail (30,000 sf)	1 story
Office (529,200 sf)	21 stories
Residential (140 units)	10 stories
Parking (8 full levels)	880 spaces

Provided Parking 2,735 spaces (surplus of 500)

DEVELOPMENT WITH UNDERGROUND PARKING

West Lot (Salisbury St)	38 stories
Retail (18,000 sf)	1 story
Office (352,800 sf)	14 stories
Hotel (420 rooms)	15 stories
Parking (880 spaces)	8 stories

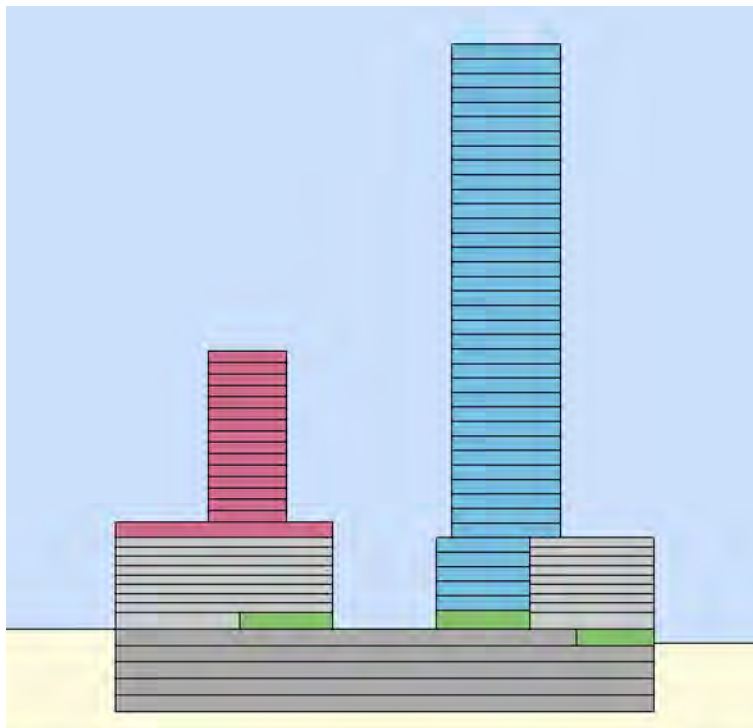
East Lot (Wilmington St)	33 stories
Retail (30,000 sf)	1 story
Office (352,800 sf)	14 stories
Residential (140 units)	10 stories
Parking (8 full levels)	880 spaces

Provided Parking 1,760 spaces



SCENARIO 4

This option includes full above ground parking for 8 levels on the west lot, with street level parking and a 16-story convention hotel above parking. The east lot has partial above ground parking for 8 levels, with street level retail and office in the building structure. In this scenario, the addition of underground parking adds 13 stories on office building on east lot and the building height is maxed out per zoning requirements.

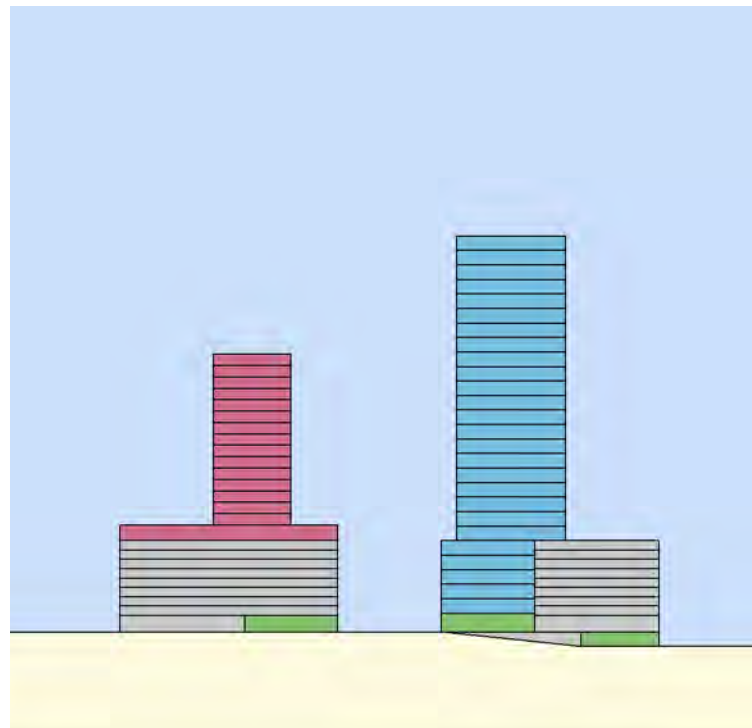


DEVELOPMENT WITH UNDERGROUND PARKING

West Lot (Salisbury St)	25 stories
Retail (18,000 sf)	1 story
Hotel (420 rooms)	16 stories
Parking (880 spaces)	8 stories

East Lot (Wilmington St)	40 stories
Retail (30,000 sf)	1 story
Office (951,300 sf)	39 stories
Parking (600 spaces)	(8 partial stories)

Provided Parking 2,455 spaces (surplus of 340)



DEVELOPMENT WITHOUT UNDERGROUND PARKING

West Lot (Salisbury St)	25 stories
Retail (18,000 sf)	1 story
Hotel (420 rooms)	16 stories
Parking (880 spaces)	8 stories

East Lot (Wilmington St)	27 stories
Retail (30,000 sf)	1 story
Office (623,700 sf)	26 stories
Parking (600 spaces)	(8 partial stories)

Provided Parking 1,480 spaces

- Hotel (11')
- Office (14')
- Street Level Retail (16')
- Above Ground Parking
- Underground Parking



OPINION OF PROBABLE COST

OPINION OF PROBABLE COST SUMMARY

These preliminary construction costs are provided as “concept level” estimates and as such are based on very preliminary estimates as well as average \$/sf costs. In addition to the basic structural costs in \$/sf of floor area, estimates have been included for retaining walls as well as for excavation of soil and rock. The estimates assume that 25% of the area for level B3 and 50% of level B4 will require rock excavation. If additional levels are developed below B4, it would be anticipated that rock excavation would be required. Any additional levels added below B4 will most likely require rock excavation for the full amount thereby resulting in much higher excavation costs.

Finally, when the next phase of design is started, it is recommended that a site specific geotechnical investigation be undertaken to confirm actual site conditions related to rock excavation, groundwater, and other parameters that will directly impact the project costs.

City of Raleigh - Site 2 and 3 Parking Structure Study

Conceptual Design Alternatives Comparison

Comparison Criteria	Above Ground Concept 1	Above Ground Concept 2	Below Grade Concept 1	Below Grade Concept 2
<i>Description</i>	Full Footprint - 3 bays of parking / floor	Half Footprint - 2 bays of parking / floor	East to West oriented drive aisles	North to South oriented drive aisles
General				
Total No. of Parking Spaces	879	591	983	934
Parking Square Footage (below grade includes roof slab)	364,500	207,100	509,000	506,000
Efficiency: Square Foot per Space	415	350	518	542
Year 2016 Hard Construction Costs (Excludes Soft Costs)	\$26,290,000	\$15,590,000	\$38,380,000	\$38,270,000
<i>Cost per Space - Hard Construction Costs Only</i>	\$29,909	\$26,379	\$39,044	\$40,974
<i>Cost / SF - Hard Construction Costs Only</i>	\$72.13	\$75.28	\$75.40	\$75.63
Total Estimated Project Costs (Includes 30% Soft Costs - A/E fees, Material Testing, Contingencies)	\$35,500,000	\$21,100,000	\$51,900,000	\$51,700,000
<i>Cost per Space - Total Project Costs</i>	\$40,400	\$35,800	\$52,800	\$55,400

Notes

- 1 Estimates are preliminary "concept level" estimates, based on average \$/sf costs for various components.
- 2 Estimates for below grade include estimates for rock excavation, retention systems, dewatering, and possible contamination. These costs will vary widely, and should be studied further in future phases of design
- 3 Below grade concept costs include roof level slab that will serve as the base street level slab for building above
- 4 Estimates for all parking levels include mechanical ventilation, sprinklering

