9th Street at E. Market Street Parking Feasibility Study

No Build Traffic Analysis, Trip Distribution, and Sensitivity Analysis

Kimley»Horn

Overview

- Study area
- Traffic analysis assumptions
- 2021 No Build traffic analysis results
  - Delay and LOS
  - 95th percentile queues
- Trip distribution
- Sensitivity analysis
- Summary

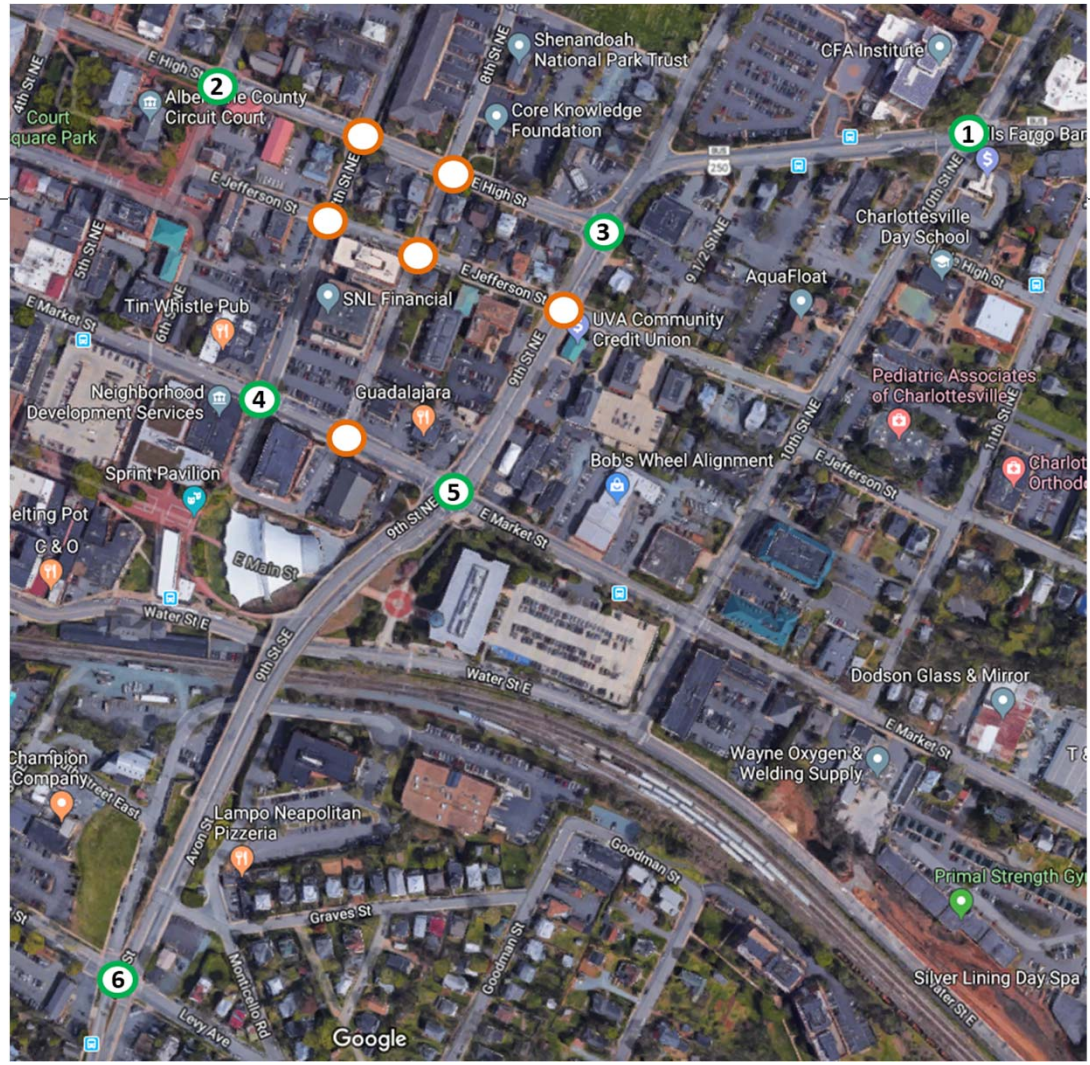
Study Area

Reporting Intersections (Signalized)

1. E. High Street at Locust Avenue/10th Street
2. E. High Street and Park Street
3. E. High Street and 9th Street
4. E. Market Street and 7th Street
5. E. Market Street and 9th Street
6. Avon Street and Garrett Street/Levy Avenue

Modeling Intersections (Unsignalized)

- E. High Street and 7th Street
- E. High Street and 8th Street
- E. Jefferson Street and 7th Street
- E. Jefferson Street and 8th Street
- E. Jefferson Street and 9th Street
- E. Market Street and 8th Street



Reporting Intersection

Modeling Intersection

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Traffic Analysis Assumptions

Traffic Data Collection

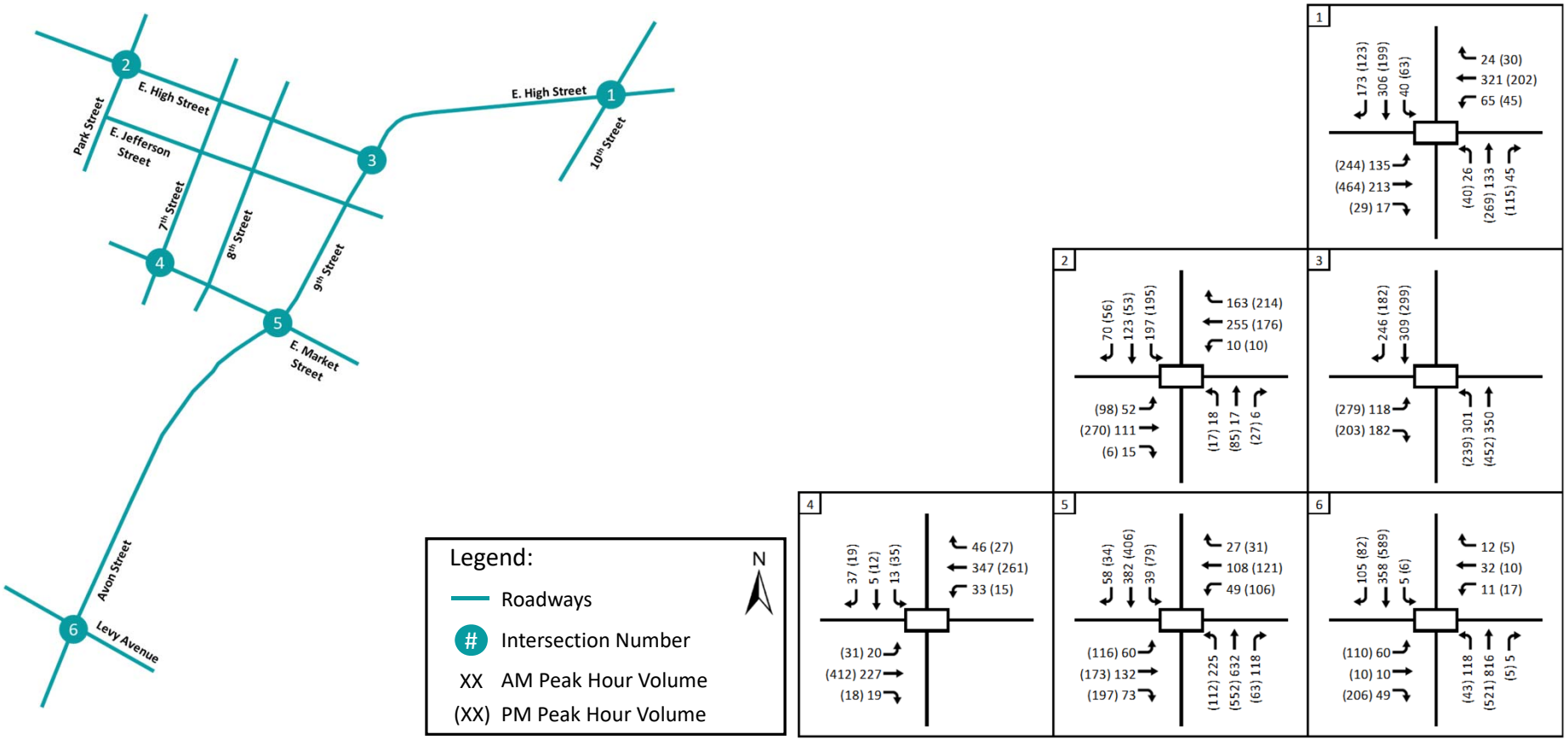
- Vehicle, pedestrian, and bicycle data
- 7 intersections counted for previous efforts (Belmont Bridge and E. High Streetscape)
- 5 intersections collected in 2019
- Traffic volume growth rate of 0.2% (consistent with other studies in the area)
- Existing signal timings provided by the City of Charlottesville

Traffic Analysis Assumptions

- Traffic Analysis Tools
  - Synchro (Version 10)
  - Highway Capacity Manual, 6th Edition
- Measures of Effectiveness
  - Average vehicle delay (sec/veh)
  - Level of Service (LOS)
  - 95th percentile queue length (feet)
  - Volume-to-capacity ratio (v/c)
- Traffic Analysis Scenarios
  - 2021 No Build (AM and PM peak hours)
  - 2021 Build Out (AM and PM peak hours)
- Preferred alternatives from Belmont Bridge and E. High Streetscape were included as background improvements in No Build analysis
- E. High Streetscape Synchro models were utilized as base models

2021 No Build Traffic Analysis Results

2021 No Build Peak Hour Traffic Volumes



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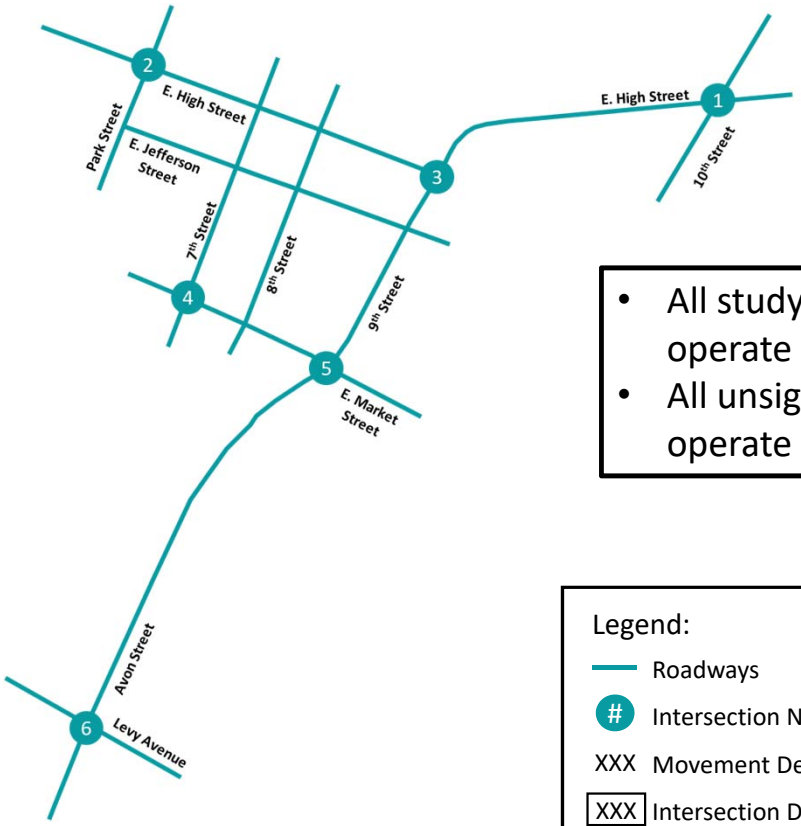
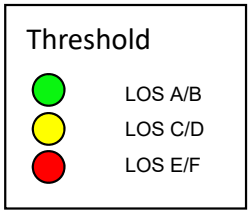
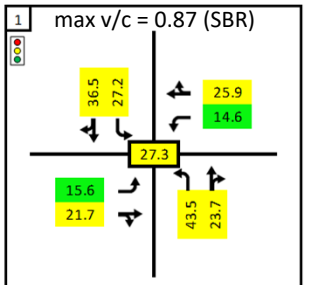
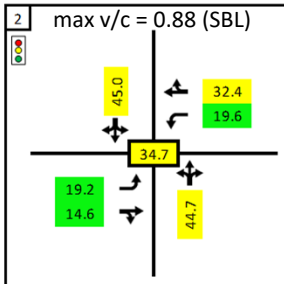
2021 No Build AM Peak - Delay and LOS

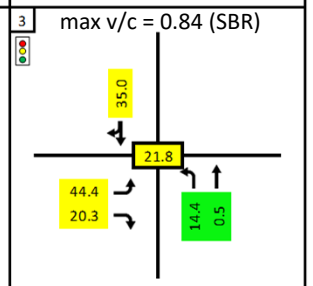


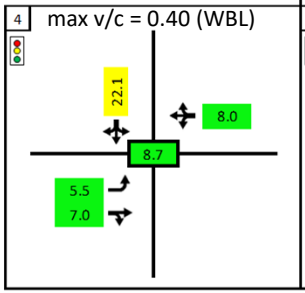
- All study intersections operate at LOS D or better
- All unsignalized movements operate at LOS C or better

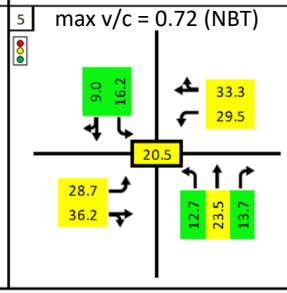


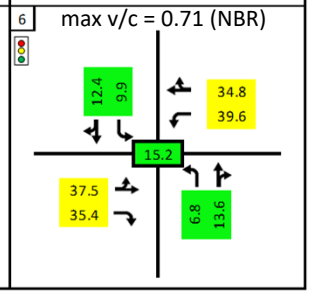


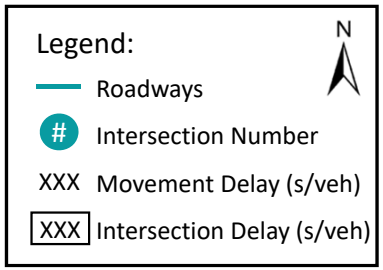












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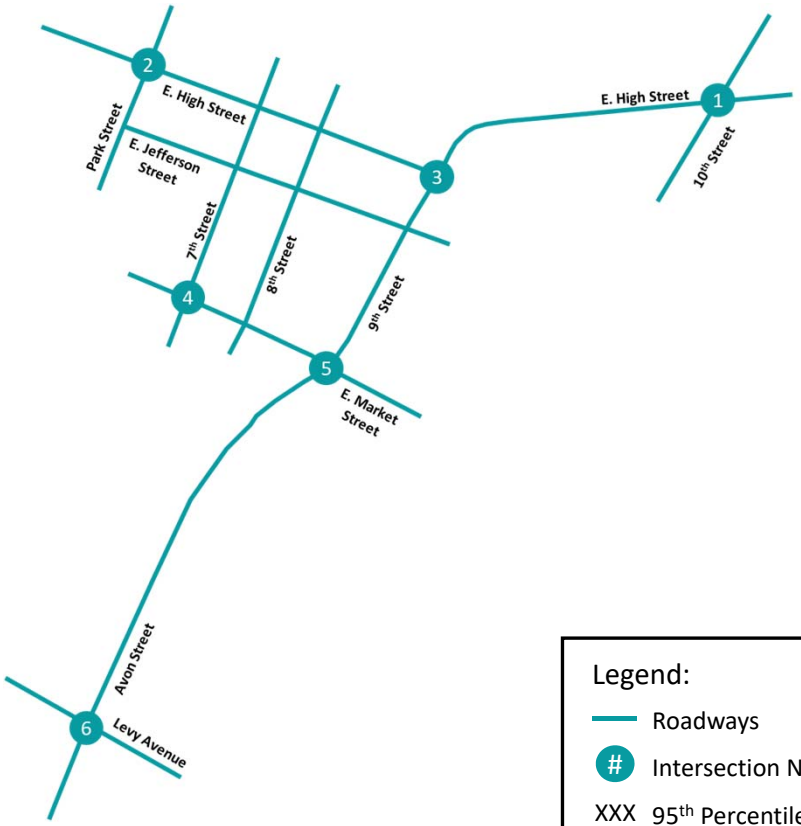
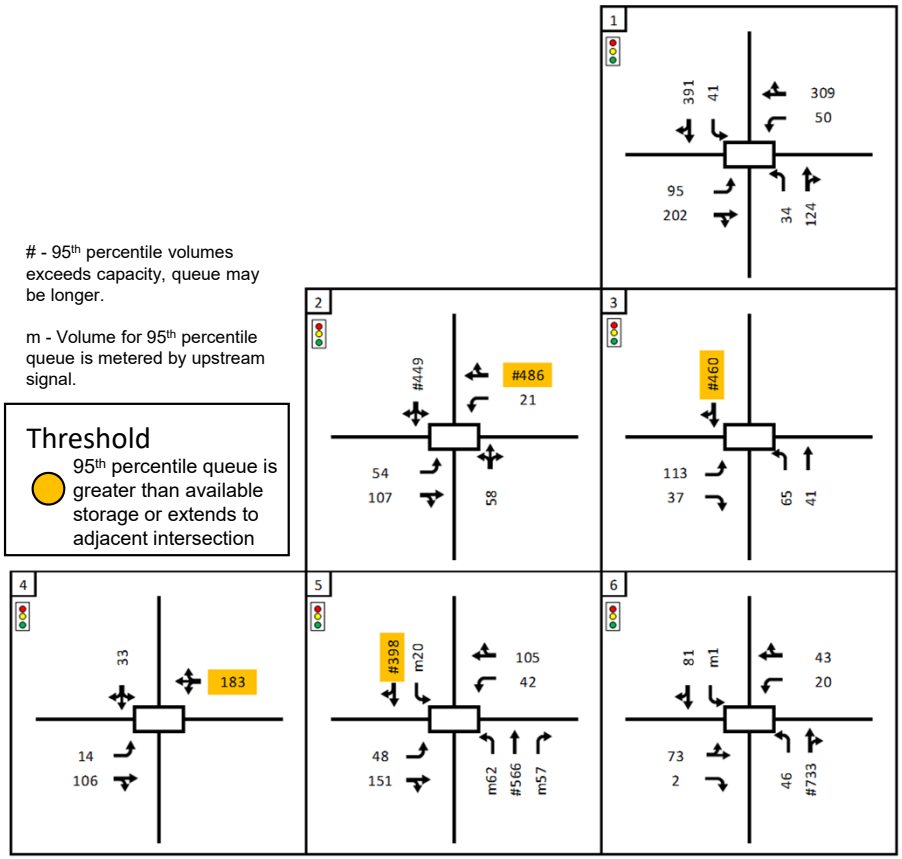
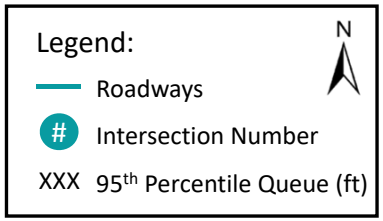
2021 No Build AM Peak - Queues







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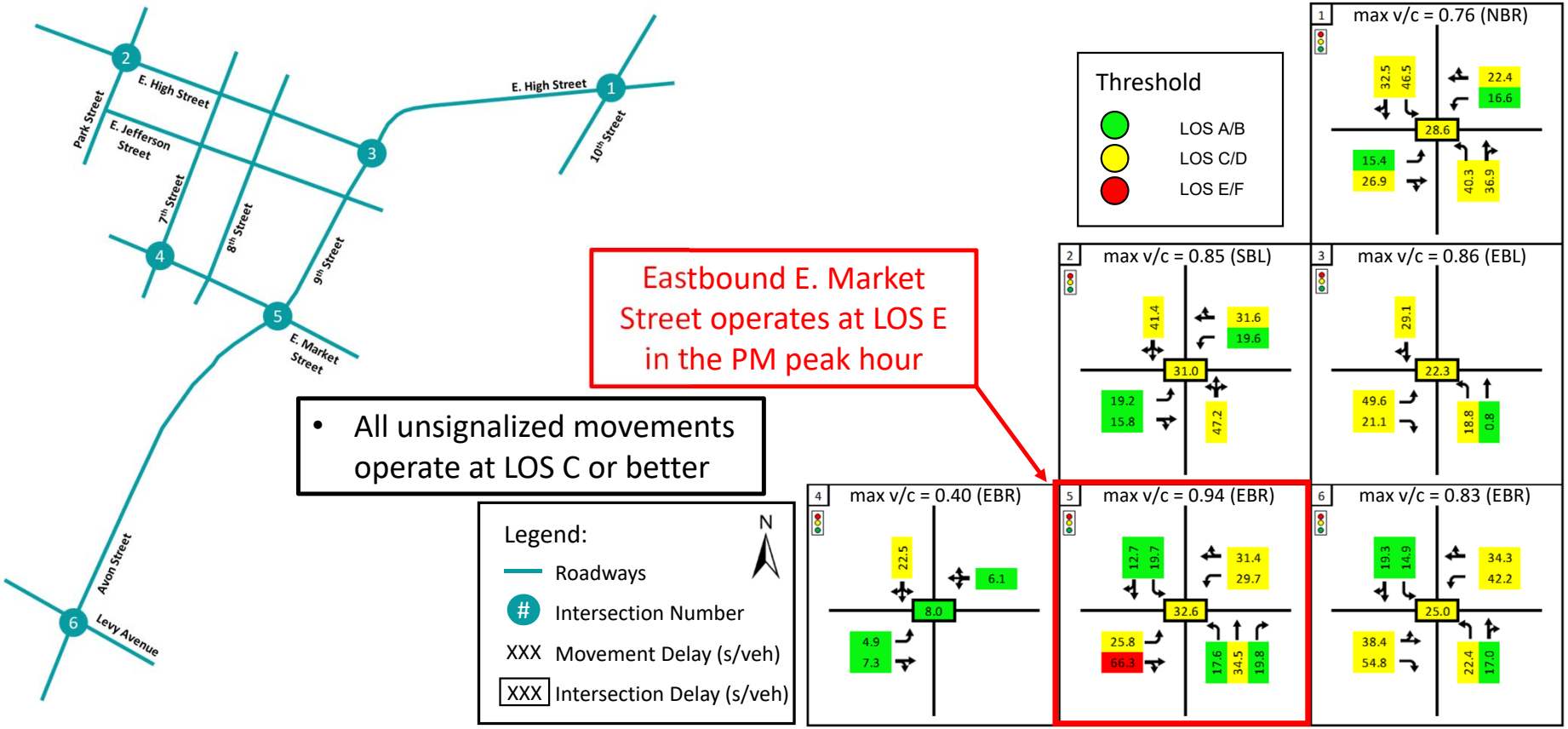
2021 No Build PM Peak - Delay and LOS



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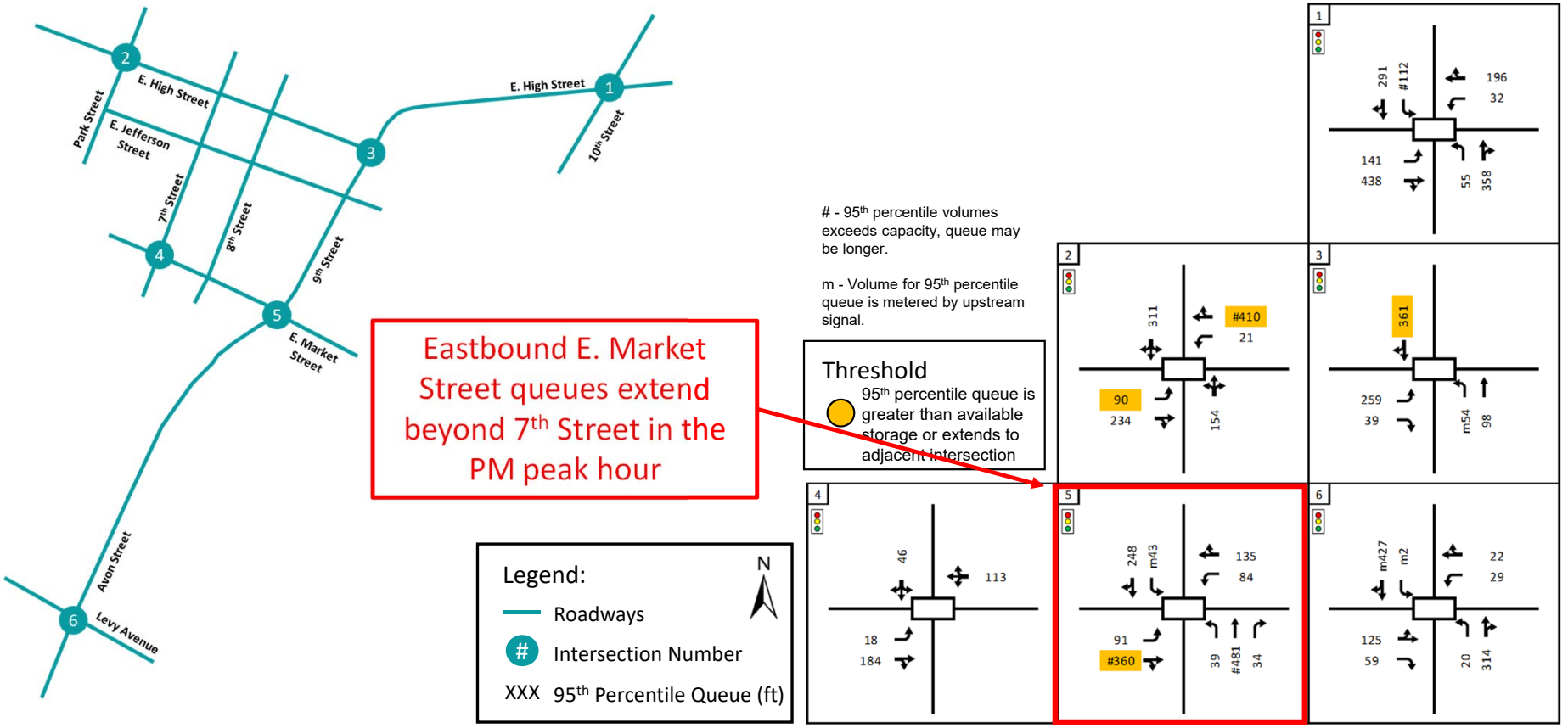
2021 No Build PM Peak - Queues



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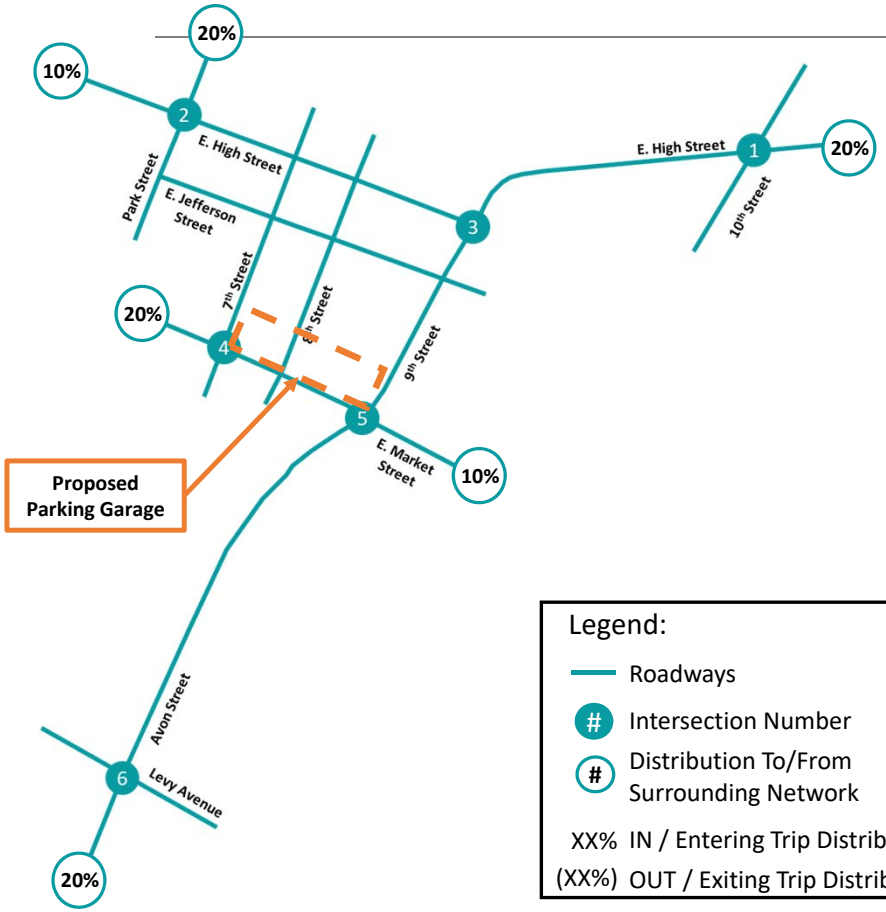
Parking Garage Trip Distribution

Trip Distribution Assumptions

- Commute distances and directions to/from downtown Charlottesville and the surrounding metropolitan area were referenced from 2015 OnTheMap Census data
- Connectivity of downtown Charlottesville to nearby major arterials and freeways was reviewed for optimal commuter routes
- Single parking garage access is assumed to be along 7th Street between E. Market Street and E. Jefferson Street

Parking Garage Trip Distribution



Legend:

N

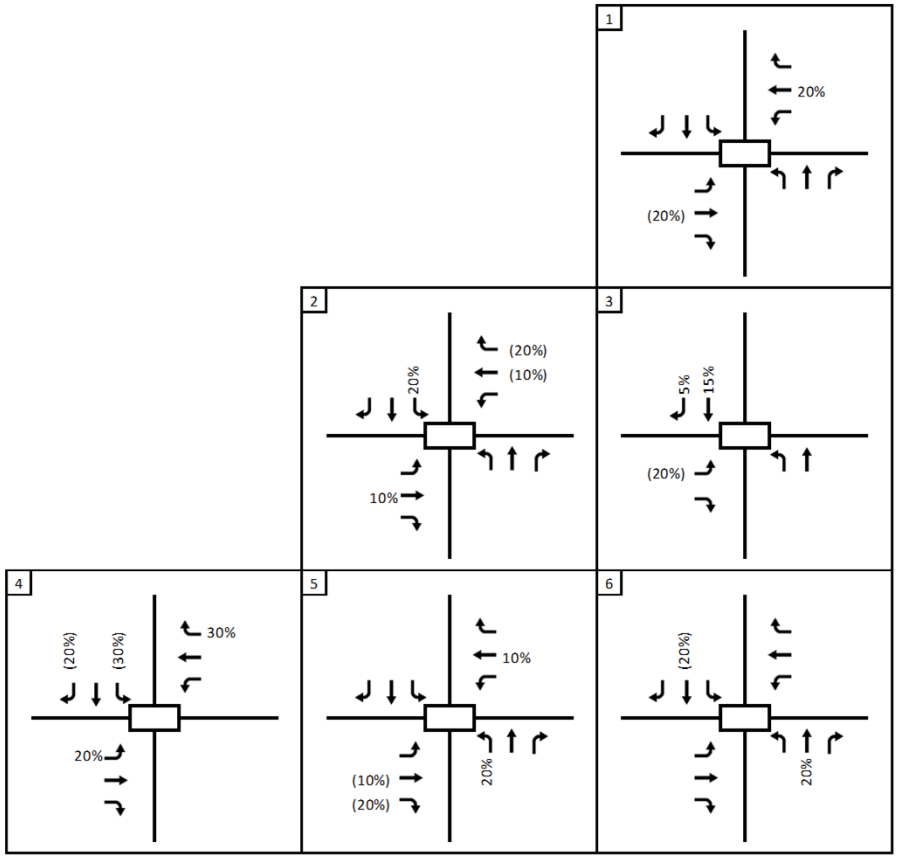
Roadways

Intersection Number

Distribution To/From Surrounding Network

XX% IN / Entering Trip Distribution

(XX%) OUT / Exiting Trip Distribution



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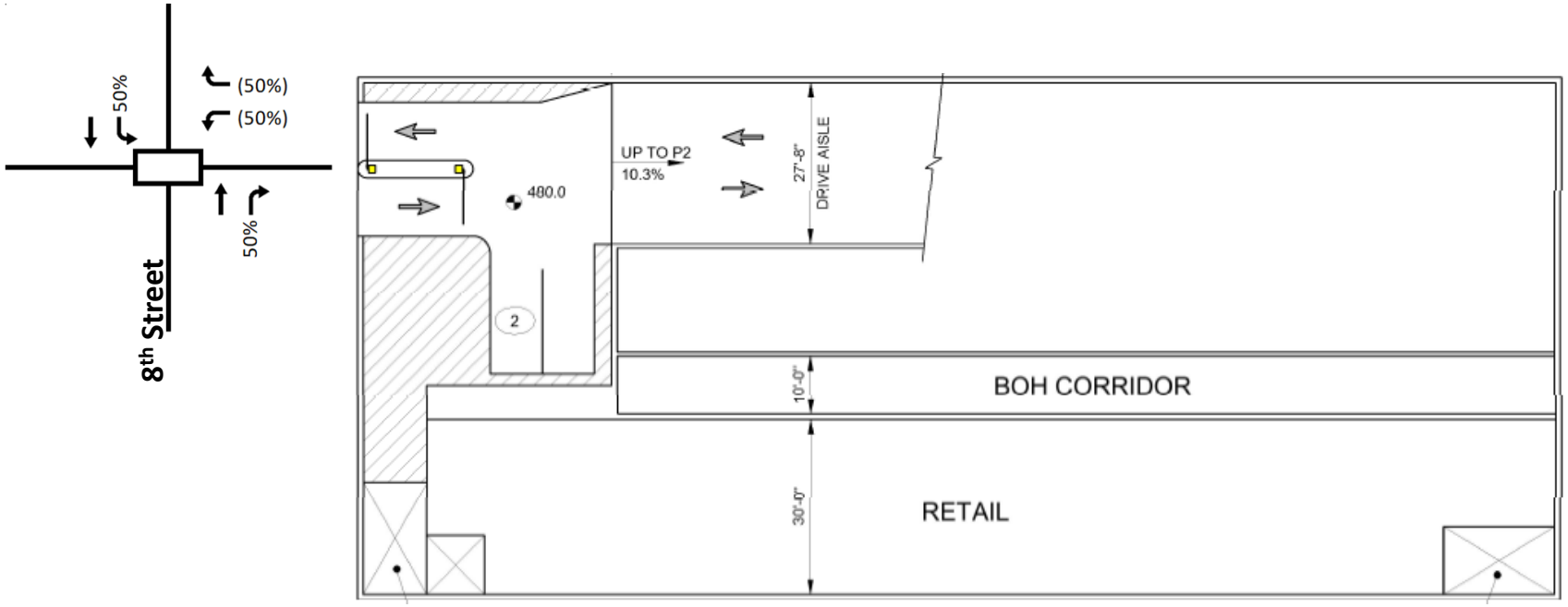
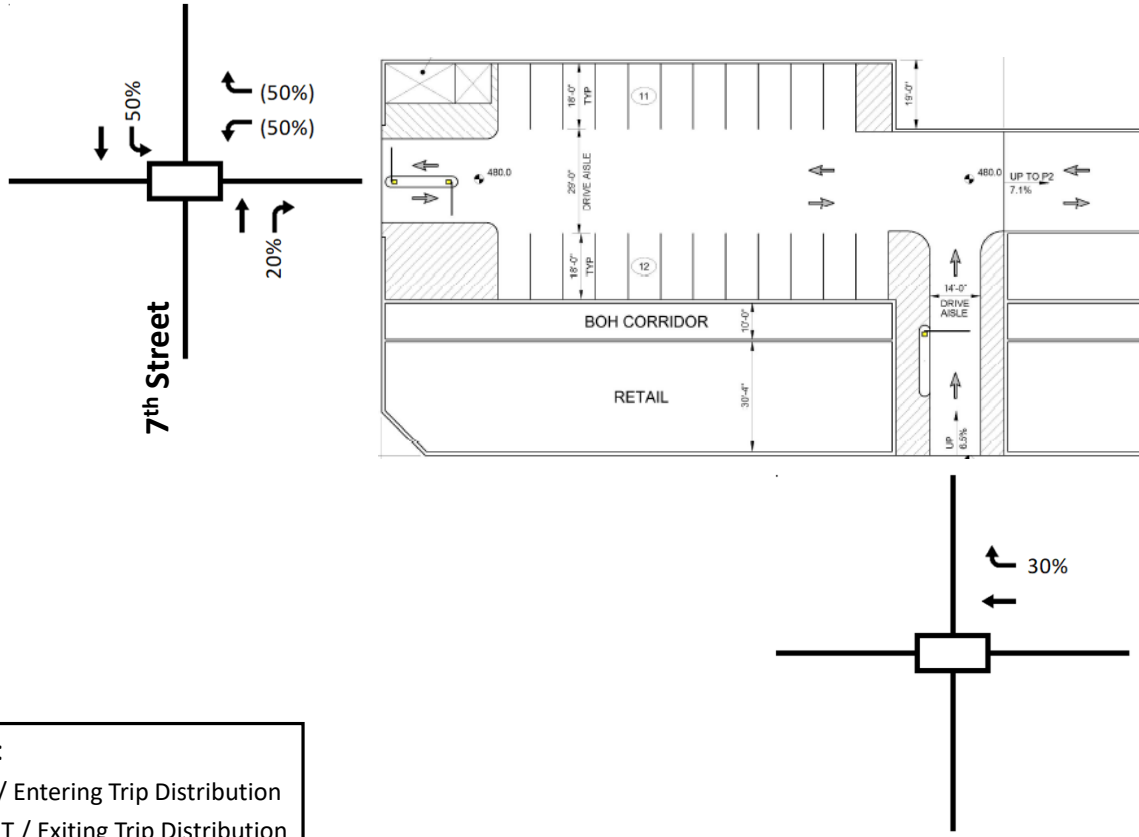
Concept A Trip Distributions



Legend:
XX% IN / Entering Trip Distribution
(XX%) OUT / Exiting Trip Distribution

Concept C Trip Distributions



Legend:
XX% IN / Entering Trip Distribution
(XX%) OUT / Exiting Trip Distribution

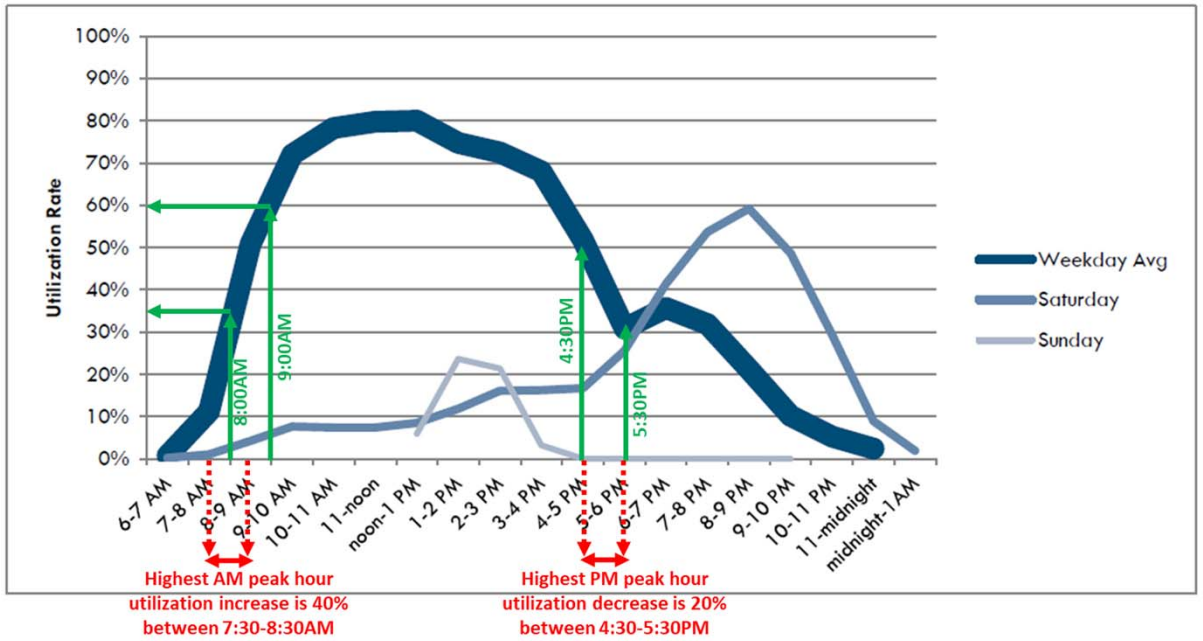
Sensitivity Analysis

Sensitivity Analysis Assumptions

- 2021 No Build models used as basis for analysis
- Analysis conducted for weekday AM and PM peak hours
- Trips generated by the parking garage assigned to the network based on the parking garage trip distribution agreed upon by the City
- Trips increased in the network until the one of the following thresholds are met:
  - **Max v/c ratio at 9th Street and E. Market Street reaches 1.0**
  - **Max v/c ratio for any other study intersection reaches 0.95**
- *Number of trips do not equal the number of parking garage spaces! (see next slide)*

How to get from trips to parking spaces?

Downtown and University Corner Comprehensive Parking Analysis, Figure 15 (E. Market Street Garage)



Traffic analysis peak hours are **8:00-9:00AM** and **4:30-5:30PM**

Methodology

- Parking garage utilization data from the *Comprehensive Parking Analysis study* at the E. Market Street Garage
- Utilization is the ratio of occupied parking spaces divided by the total inventory
- Difference between utilization at the beginning and end of the hour is an approximation of the utilization during the peak hour

Assumptions

- Assumes conservative 40-60% of vehicles arrive/depart the garage during the peak hour
  - Actual AM = ~25%
  - Actual PM = ~20%
- Conservative assumption accounts for some turnover that may occur during the hour
- Does not account for "pass-by" trips (existing vehicles in the network that may use the garage)

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Sensitivity Analysis – 200 New Trips

Approximately 330-500 parking spaces

- ***Study area intersections operate acceptably under the approved thresholds***
- **AM peak hour operates acceptably**
  - Southbound left turn v/c at E. High Street and Park Street reaches **0.90** (timings unchanged)
  - Southbound thru/right turn v/c at 9th Street and E. High Street reaches **0.90** (timings unchanged)
  - All unsignalized movements operate at LOS C or better
- **PM peak hour operates acceptably**
  - Eastbound thru/right turn v/c at 9th Street and E. Market reaches **0.97** (with 3 additional seconds of green time given to eastbound movement)
  - Second highest v/c are eastbound left turn at 9th Street and E. High Street (**0.88**) and southbound left turn at E. High Street and Park Street (**0.85**) (timings unchanged)
  - Northbound movement at 7th Street and E. High Street operates with **LOS E** but only 36.3 sec/veh delay and 3-4 veh (100 ft) queue
  - All other unsignalized movements LOS C or better

Sensitivity Analysis – 300 New Trips

Approximately 500-750 parking spaces

- ***9th Street at E. Market Street intersection reaches capacity in PM peak (eastbound v/c of 1.01)***
- **AM peak hour operates acceptably**
  - Southbound thru/right turn v/c at 9th Street and E. High Street reaches **0.93** (timings unchanged)
  - Southbound left turn v/c at E. High Street and Park Street reaches **0.91** (timings unchanged)
  - All unsignalized movements operate at LOS C or better except westbound left turn at 9th Street and E. Jefferson Street (operates at LOS D)
- **PM peak hour reaches capacity**
  - Eastbound thru/right turn v/c at 9th Street and E. Market reaches **1.01** (with one more sec green time to EB approach, northbound through v/c still acceptable at **0.86**)
  - Second highest v/c are eastbound left turn at 9th Street and E. High Street (**0.89**) and southbound left turn at E. High Street and Park Street (**0.85**) (timings unchanged)
  - Northbound movement at 7th Street and E. High Street operates with **LOS F** (57.2 sec/veh delay and queues extending to around Jefferson St)
  - All other unsignalized movements LOS C or better
  - Still some capacity throughout the network to handle diversions

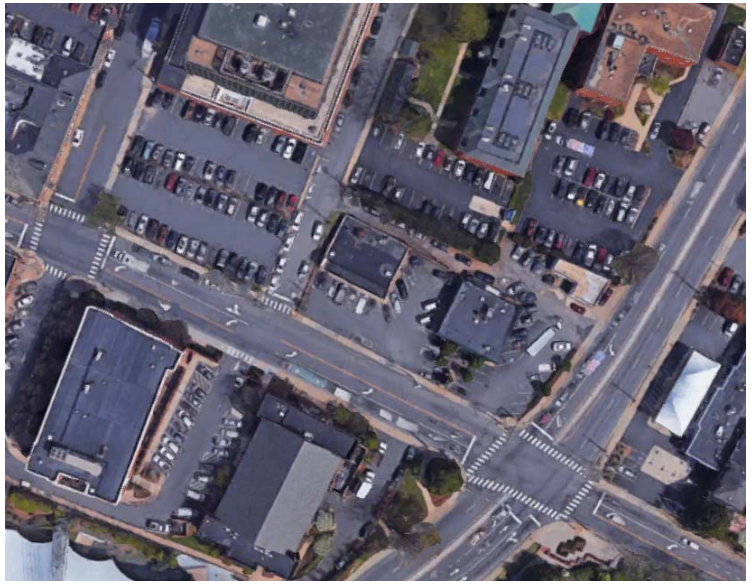
Summary

- Downtown traffic network within study area can accommodate approximately 300 new trips generated by the proposed parking garage or approximately 500-750 new parking spaces (assuming 40-60% of parking garage trips arrive/depart in each peak hour)
- Trips are distributed to six entry/exit points into downtown and the grid network provides internal connectivity
- While the eastbound thru/right turn movement at 9th Street and E. Market Street operates with a v/c greater than 1.0 and the northbound movement at 7th Street and E. High Street operates with LOS F, the network can likely still handle diversions that occur to avoid congestion

Parking Garage Concepts

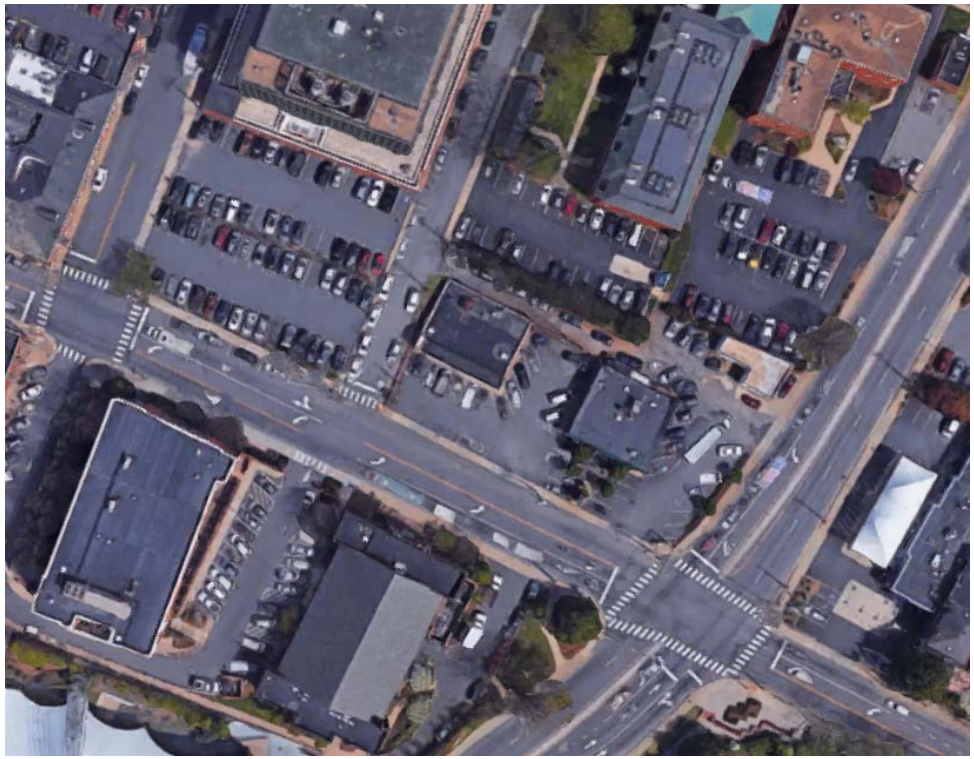
Concepts – Basis of Design

- Provide 90 spaces (minimum) for County use
- Accommodate ground-floor retail with 20’ (minimum) depth
- Charlottesville Parking Ordinance and Zoning requirements
  - Parking geometrics
  - Frontage heights
  - Setbacks
- Utilize one or both lots
- Traffic analysis constraints

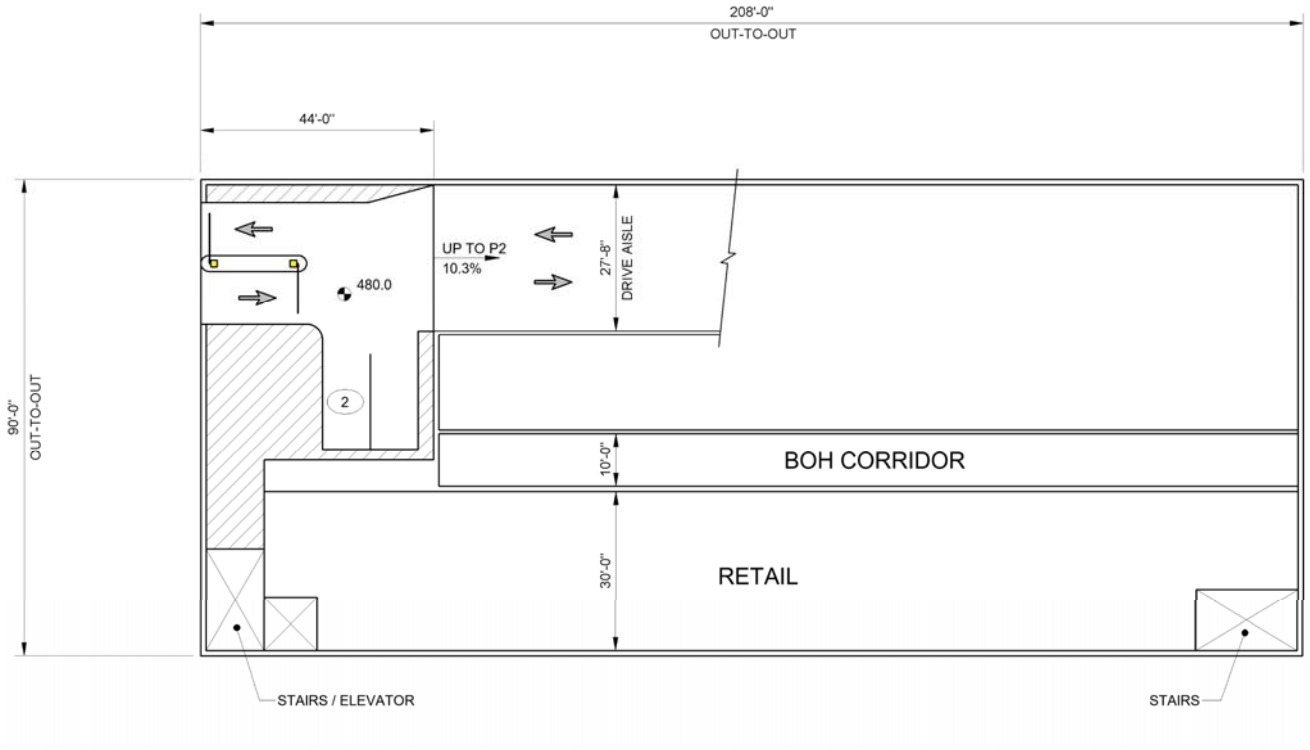


Concepts – Initial Options

- Option A
  - East lot only
  - 125-135 spaces
- ~~Option B~~
  - ~~West lot only~~
  - ~~80-90 spaces~~
- Option C
  - Both lots, single threaded helix
  - 290-310 spaces
- ~~Option D~~
  - ~~Both lots, double~~ threaded helix
  - ~~290-310 spaces~~



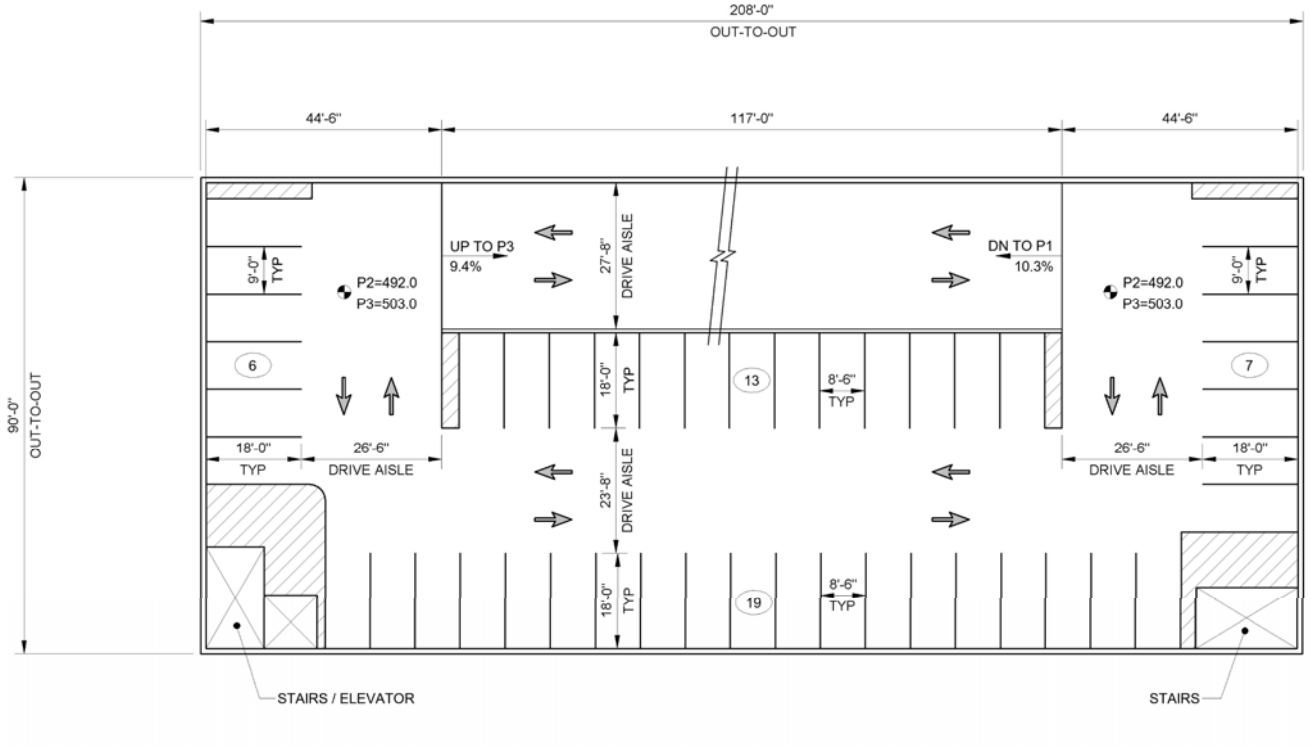
Concepts – Option A



Level	Spaces
P4	45
P3	45
P2	45
P1	2
Subtotal	137
Lost	32
Net	105

LEVEL P1

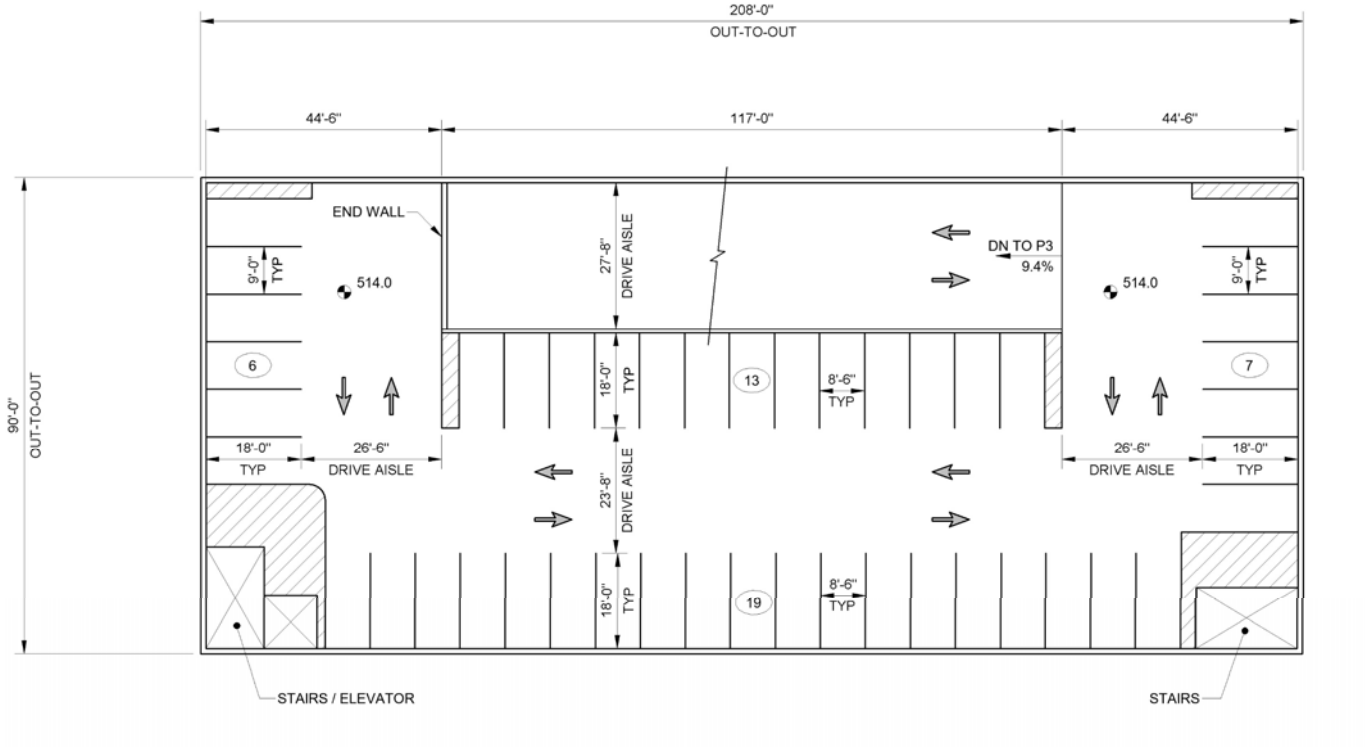
Concepts – Option A



LEVELS P2-P3

Level	Spaces
P4	45
P3	45
P2	45
P1	2
Subtotal	137
Lost	32
Net	105

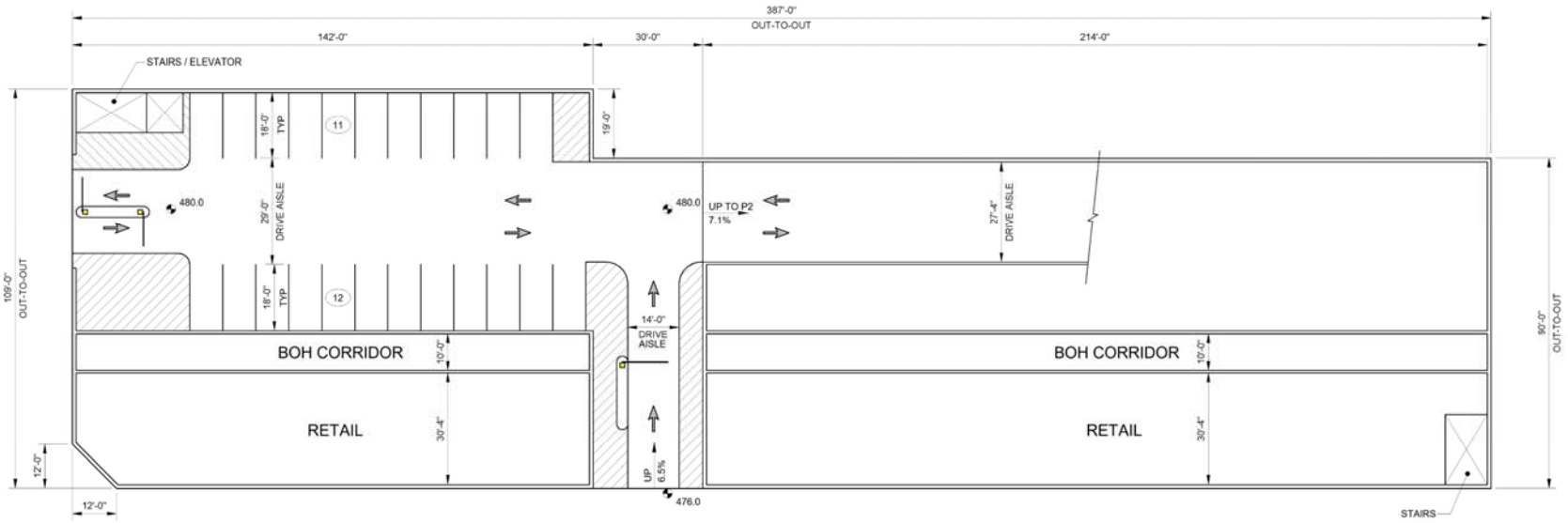
Concepts – Option A



LEVEL P4

Level	Spaces
P4	45
P3	45
P2	45
P1	2
Subtotal	137
Lost	32
Net	105

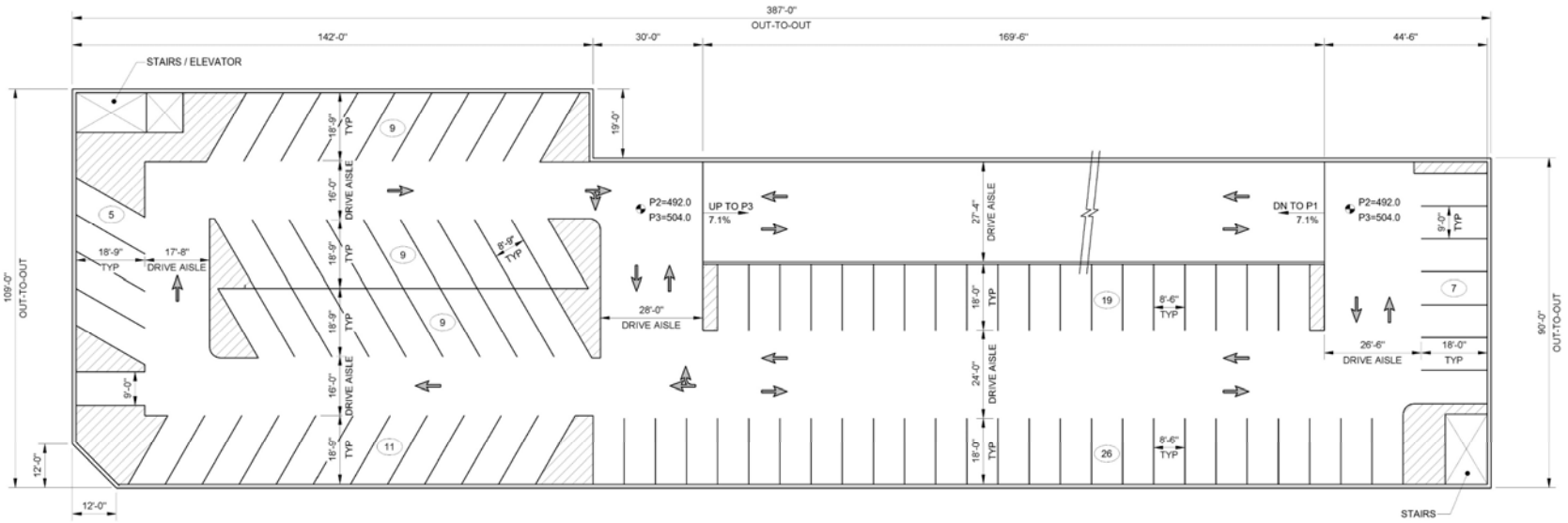
Concepts – Option C



Level	Spaces
P4	97
P3	95
P2	95
P1	23
Subtotal	310
Lost	95
Net	210

LEVEL P1

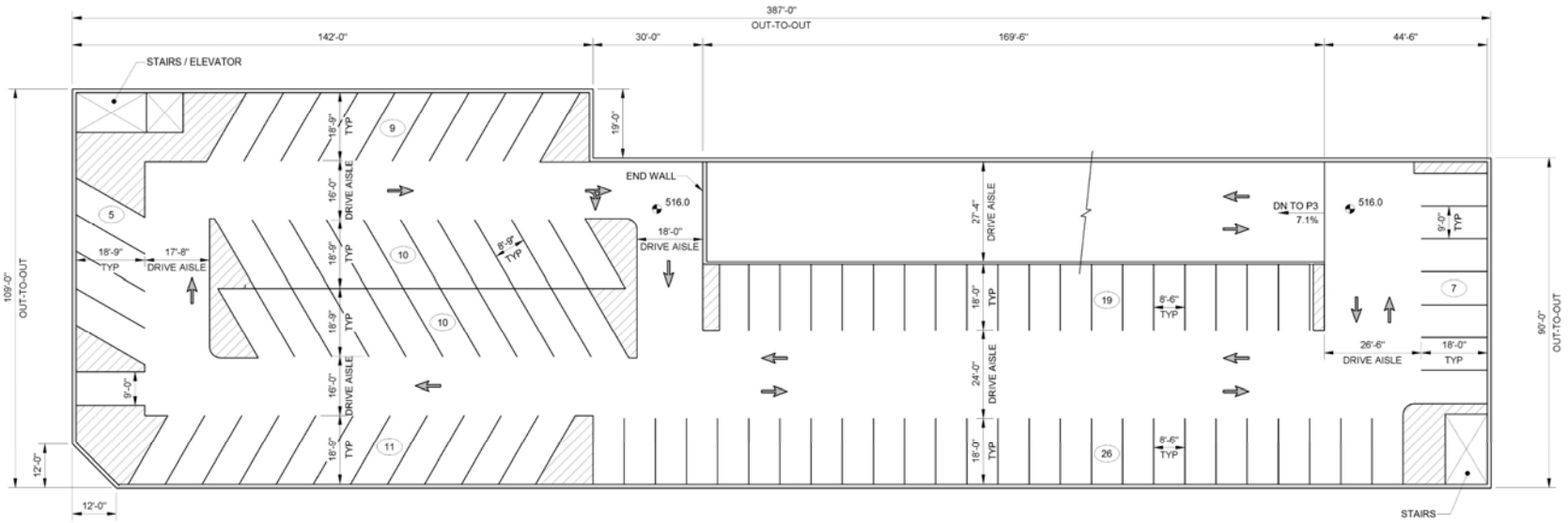
Concepts – Option C



Level	Spaces
P4	97
P3	95
P2	95
P1	23
Subtotal	310
Lost	95
Net	210

LEVELS P2-P3

Concepts – Option C



Level	Spaces
P4	97
P3	95
P2	95
P1	23
Subtotal	310
Lost	95
Net	210

LEVEL P4

Concepts – OPC

	Option A	Option C
Spaces	137	310
Parking Area	60,500 SF	129,000 SF
Efficiency	442 SF/Space	416 SF/Space
Hard Construction Cost	$3.97M	$7.85M
Cost per SF	$65.62 / SF	$60.85 / SF
Cost per Space	$28,980 / Space	$25,330 / Space
Total Project Costs (Hard + 30% Soft Costs)	$4.35M	$8.58M

Elements for Additional Study

- Stormwater
- Mixed-Use Configurations: Retail, Trash / Loading, Back of House
- Geotechnical study
- Public alley
- Encroachments into right-of-way
- 8th Street conversion to two-way