



FARRAGUT MUNICIPAL PLANNING COMMISSION AGENDA

November 19, 2020

7:00 p.m.

This meeting can be viewed live on the Farragut YouTube Channel, www.townoffarragut.org/livestream, Charter Channel 193, and TDS Channel 3." The meeting will be held virtually, authorized by Governor Lee's executive orders regarding the COVID19 pandemic.

Meeting comments may be emailed to comments@townoffarragut.org and must be received by 12:00 p.m. on November 19 to be included in the record of the meeting. Anyone that wishes to provide comments must include their name and address. For questions please e-mail Mark Shipley at mshipley@townoffarragut.org or Bart Hose at bhose@townoffarragut.org.

1. **Approval of agenda**
2. **Approval of minutes – October 15, 2020**
3. **Discussion and public hearing on a re-subdivision plat involving nine lots in the Easton Park Subdivision located on the north side of Turkey Creek Road across from a portion of Anchor Park, Zoned R-3, 2.37 Acres (SITE, Incorporated, Applicant)**
4. **Discussion and public hearing on a final plat for the Ivey Farms Subdivision, Unit 1, Phase 1, located on the north side of Union Road, Zoned R-1/OSR, 6.26 Acres, 26 Lots (SITE, Incorporated, Applicant)**
5. **Discussion and public hearing on a site plan for a parking lot addition at the St. Elizabeth's Episcopal Church, 110 Sugarwood Drive, Zoned C-1, 4.54 Acres (Urban Engineering, Inc., Applicant)**
6. **Discussion and public hearing on a site plan for the property located at 13036 and 13038 Kingston Pike, Zoned C-1, 2 Acres (GBS Engineering, Applicant)**
7. **Discussion and public hearing on a concept plan for the Meadows on McFee, 933 and 1013 McFee Road, Zoned R-1/OSR, 32 Acres, 59 Lots (Homestead Land Holdings, LLC, Applicant)**
8. **Discussion and public hearing on a request to amend Appendix A – Zoning, Chapter 3., Specific District Regulations, Section XII., General Commercial District (C-1), B., 3., as it relates to the outdoor display and or storage of general farm implements and lawn care**

equipment, riding lawn mowers, and related accessories (Farragut Lawn and Tractor, Applicant)

9. Discussion on a rezoning of property situated around the eastern intersection of McFee Road and Boyd Station Road, Parcels 50, 50.01, 54.01, and 9.01, Tax Map 162, 12611 Boyd Station Road, from General Single-Family Residential (R-2) to Open Space Mixed Residential Overlay (R-1/OSMR), 131.25 Acres (OBO Homestead Land Holdings, Applicant)
10. Discussion and public hearing on a request to amend the future land use map in the Comprehensive Land Use Plan Update for a portion of Parcel 003.19, Tax Map 143 (a portion of the property referenced as 133 Concord Road) associated with the Farragut Town Center at Biddle Farms project from Medium Density Residential to Town Center (CHM, LLC, Applicant)
11. Discussion and public hearing on a request to amend the Farragut Zoning Map in association with the Farragut Town Center at Biddle Farms project, 11230 and 11240 Kingston Pike and 133 Concord Road, Parcels 3.02, 3.03, 3.10, and a portion of 3.19, Tax Map 143, from General Commercial (C-1) and General Single-Family Residential (R-2) to Planned Commercial Development (PCD), 43.63 Acres (CHM, LLC, Applicant)

12. Approval of utilities

13. Citizen Forum

Planning Commission Meeting Public Comment Protocol

The Planning Commission welcomes and invites Farragut residents to participate in public meetings.

At the end of each business meeting, there will be time reserved for public comment under the Citizen Forum agenda item. If you are interested in speaking, please fill out a blue comment card and turn it in to the Planning Director or other designated staff member. **For virtual meetings, comments may be emailed to comments@townoffarragut.org and must be received by 12:00 p.m. on the date of the meeting to be included in the record of the meeting. Anyone that wishes to provide comments must include their name and address.** This time is set aside specifically for comments on items that are not on the Planning Commission regular agenda for the meeting. Each speaker will be given five (5) minutes to speak on his/her topic.

During the regular agenda portion of the meeting there may be an allowance for public comment for each agenda item. The Chairman may recognize individuals for public comment based on the following guidelines.

1. The Chairman shall maintain and control the meeting to provide a professional and objective environment;

2. Any Farragut resident, property owner, or business owner interested in speaking should fill out a blue comment card stating which agenda item they would like to comment on and turn in to the Planning Director or other designated staff member;
3. Speakers shall come to the podium and identify themselves by name and street address;
4. Public comment shall be limited to five (5) minutes per individual. Time for public comment may be amended at the discretion of the Chairman. Time is not transferable to other speakers;
5. Speakers should strive to avoid redundancy; each speaker should have their own original viewpoint;
6. Comments shall address issues, not individuals or personalities;
7. Comments may support or oppose issues or measures, but the motives of those with differing views shall not be questioned or attacked;
8. Personal attacks and malicious comments shall not be tolerated;
9. An applicant, and/or their representative(s), for an item on the regular agenda shall be afforded the time necessary to present their request and respond to questions. The five (5) minute limitation shall not apply. However, the Chairman may ask an applicant to stay on point in order to facilitate the efficiency of the meeting.

Each speaker will be asked if they can agree to abide by the Comment Protocol. If so, please be prepared to speak when your name is called.



**MINUTES
FARRAGUT MUNICIPAL PLANNING COMMISSION**

October 15, 2020

MEMBERS PRESENT

Rita Holladay, Chairman
Ed St. Clair, Vice-Chairman
Ron Williams, Mayor
Louise Povlin
Scott Russ
Jon Greene
Betty Dick
Noah Myers
Michael Bellamy

MEMBERS ABSENT

Staff Representatives: Mark Shipley, Community Development Director

This meeting was conducted through a remote Webex session due to Governor Lee's orders and the Knox County Health Department's orders regarding the COVID-19 pandemic.

Chairman Holladay called the meeting to order at 7 p.m. and provided background on why the meeting was being conducted through Webex and where it may be viewed.

1. Approval of agenda

Staff recommended approval of the agenda as submitted.

A motion was made by Mayor Williams to approve the agenda as presented. Motion was seconded by Commissioner Povlin and motion passed 9-0 through a roll call vote.

2. Approval of minutes – September 17, 2020

Staff recommended approval of the minutes as submitted.

A motion was made by Mayor Williams to approve the minutes as submitted. Motion was seconded by Commissioner Myers and motion passed 9-0 through a roll call vote.

3. Discussion and public hearing on a request for a comcast cable line installation along the south side of Parkside Drive west of JCPenney and terminating at 11416 Grigsby Chapel Road (Fulghum, MacIndoe and Associates, Applicant)

Staff reviewed this item and recommended approval subject to the following conditions:

- 1) Please obtain a right of way permit from the Town and satisfy any field related requirements from the engineering staff;

- 2) Please restore any affected areas to their pre-construction condition and ensure that all affected areas are completely stabilized;
- 3) Please notify any affected property owners;
- 4) Please ensure that proper traffic control measures are in place; and
- 5) Please provide an as-built of the fiber installation to the Town once the project is complete.

After an initial motion and second was made, commissioners discussed this item and Commissioner Myers asked if a letter of credit should be provided similar to what has been required for some other recent utility projects. Based on feedback from other commissioners, a motion was made by Commissioner St. Clair to follow staffs' recommendation with the exception of adding as a 6th condition "Providing a letter of credit to ensure any disturbed areas are corrected with the dollar amount to be determined by the Town Engineer." Motion was seconded by Mayor Williams and motion passed 9-0 through a roll call vote.

4. Discussion and public hearing on a re-subdivision plat for the property located at 204 Boring Lane, Parcel 074.00, Tax Map 142, Zoned R-1, 7.57 Acres (Benjamin Moorman, Applicant)

Staff reviewed this item and noted that the applicant has requested a variance from the Subdivision Regulations to not construct a pedestrian facility along the Boring Road frontage. Staff indicated that separate action would be needed on the variance. Staff recommended approval of the variance due to the minor nature of the subdivision and the amount of frontage along which the pedestrian facility would be required. Approval of the variance would also be consistent with similar minor re-subdivisions on non-local streets that have been approved by the Planning Commission. Staff indicated that they have verified that a plat note has been added to indicate that the pedestrian facility requirement will be re-visited by the Planning Commission if any additional re-division of the property is proposed.

Commissioners discussed the variance request and Commissioner Myers asked that the location of the property be clarified by including a reference to the tax map and parcel. Staff indicated that this would be updated in the minutes. A motion was made by Commissioner Povlin to approve the variance for the reasons noted by staff. Motion was seconded by Commissioner St. Clair and motion passed 9-0 through a roll call vote.

Staff then recommended approval of the plat subject to obtaining required signatures.

A motion was made by Commissioner Povlin to follow staffs' recommendation. Motion was seconded by Commissioner Myers and motion passed 9-0 through a roll call vote.

5. Discussion and public hearing on a rezoning of the property at 933 McFee Road from Agricultural (A) to Open Space Residential Overlay (R-1/OSR), 7 Acres (Rackley Engineering, Applicant)

Staff reviewed this item and recommended approval of Resolution PC-20-15 which recommends approval of Ordinance 20-22.

A motion was made by Commissioner Povlin to follow staffs' recommendation. Motion was seconded by Commissioner St. Clair and motion passed 9-0 through a roll call vote.

6. Discussion and public hearing on an amendment to the Farragut Municipal Code, Appendix A., Zoning, Chapter 4., Section XXIX, - Grand Opening Special Events Permit, to provide for different sign related provisions (Town of Farragut, Applicant)

Staff reviewed this item and recommended approval of Resolution PC-20-16 which recommends approval of Ordinance 20-23.

Commissioners reviewed the item and Commissioner Bellamy asked that Section C., 8. be amended to change the phrase "good condition" to "same condition as issued." Staff and commissioners were in agreement with the proposed modification. A motion was made by Commissioner Povlin to approve Resolution PC-20-16 with the modification recommended by Commissioner Bellamy. Motion was seconded by Commissioner Myers and motion passed 9-0 through a roll call vote.

7. Discussion on a request to amend Appendix A – Zoning, Chapter 3., Specific District Regulations, Section XII., General Commercial District (C-1), B., 3., as it relates to the outdoor display and or storage of general farm implements and lawn care equipment, riding lawn mowers, and related accessories (Farragut Lawn and Tractor, Applicant)

For discussion purposes only.

8. Approval of utilities

None

9. Citizen Forum

Staff read into the record citizen comments that were submitted for items that were not on the agenda.

The meeting was adjourned at 9:04 p.m.

Scott Russ, Secretary

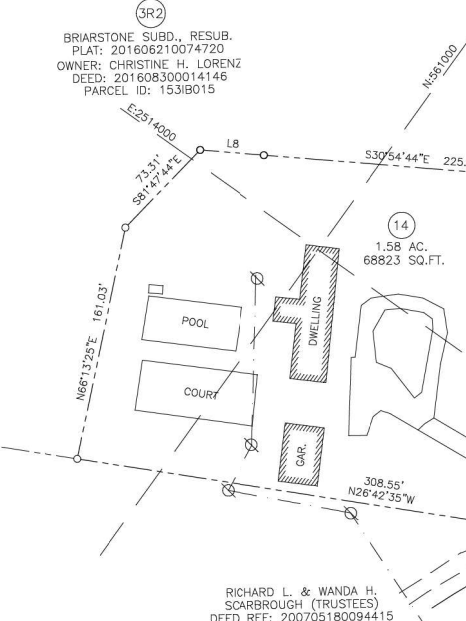
REPORT TO THE FARRAGUT MUNICIPAL PLANNING COMMISSION

PREPARED BY: Bart Hose, Assistant Community Development Director

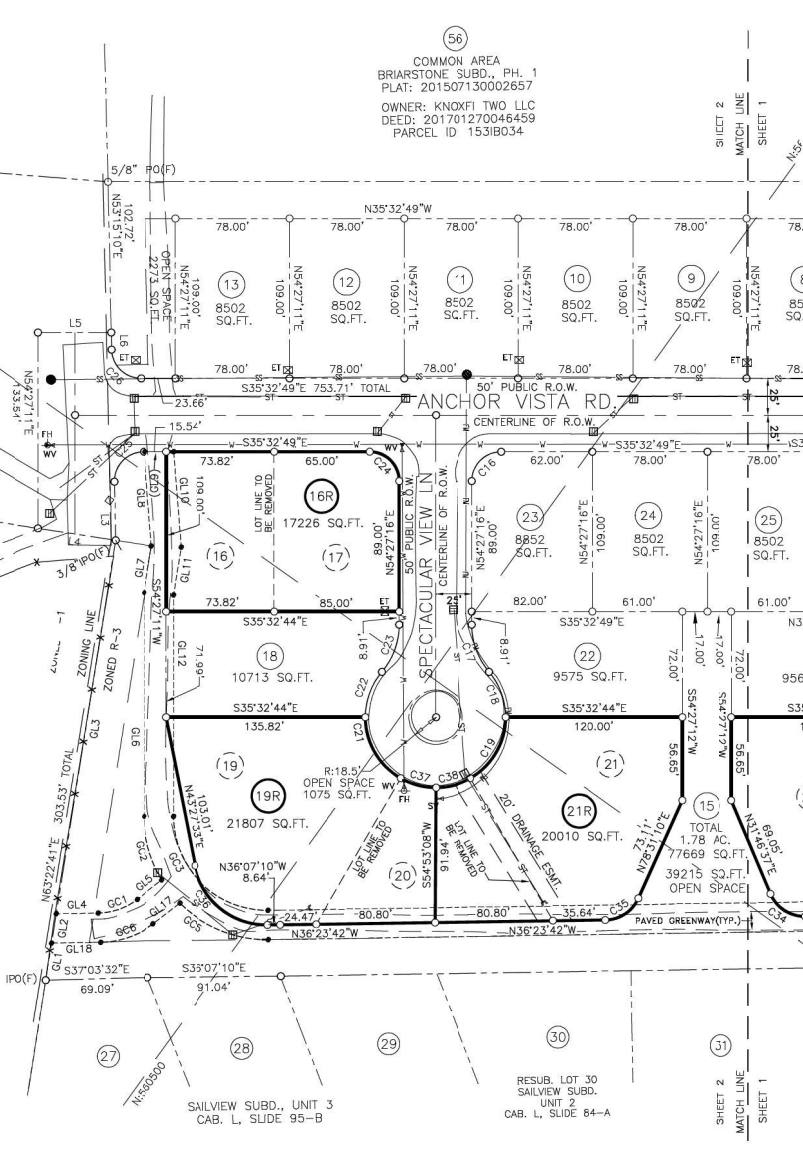
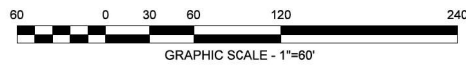
SUBJECT: Discussion and public hearing on a re-subdivision plat involving nine lots in the Easton Park Subdivision located on the north side of Turkey Creek Road across from a portion of Anchor Park, Zoned R-3, 2.37 Acres (SITE, Incorporated, Applicant)

INTRODUCTION AND BACKGROUND: This item involves the re-subdivision/re-platting of nine (9) lots in Unit 2 of the Easton Park Subdivision. The nine (9) existing lots are being combined to form five (5) lots. The number of lots is being reduced to allow the developer to construct the remaining homes in the subdivision without residential fire sprinkler systems. Under the Town's current fire code, a subdivision with more than 30 lots and only a single point of ingress/egress must utilize residential fire sprinklers.

RECOMMENDATION: Included in your packet is the applicant's revised plat. Staff will make a recommendation at the meeting based on whether and how the applicant has addressed all initial staff comments.



- NOTES
1. NOTIFY TENNESSEE ONE-CALL SYSTEM AT 1-800-351-1111 AND AN INDIVIDUAL UTILITY AUTHORITY BEFORE ANY EXCAVATION FOR EXACT LOCATION OF ALL UNDERGROUND UTILITIES.
 2. A FIVE (5) FOOT UTILITY, DRAINAGE AND CONSTRUCTION EASEMENT ON EACH SIDE OF INTERIOR LOT LINES. A TEN (10) FOOT UTILITY, DRAINAGE AND CONSTRUCTION EASEMENT ON INSIDE OF ROAD RIGHTS-OF-WAY AND EXTERIOR LOT LINES.
 3. THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM THE INFORMATION AVAILABLE. THIS SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.
 4. 5/8" IRON PINS SET AT ALL CORNERS UNLESS NOTED OTHERWISE.
 5. PROPERTY IS ZONED "R-3". MINIMUM BUILDING SETBACKS ARE TO CONFORM TO CURRENT REQUIREMENTS OF THE TOWN OF FARRAGUT ZONING ORDINANCE. SEE SETBACK REQUIREMENTS NOTE FOR CURRENT ZONING ORDINANCE.
 6. PROPERTY IS KNOWN AND DESIGNATED AS:
 - TAX MAP 152L, GROUP H, PARCELS 001-002, 008-010, 018-019, AND 021-022
 - DEED REFERENCES: 201608300014165
 - LOTS 16-17, 19-21, 28-29, & 37-38 OF EASTON PARK UNIT 2
 - PLAT REFERENCE: 202001100046127
 7. GRID NORTH IS BASED ON A BEARING OF N32°14'18"E FROM TOWN OF FARRAGUT CONTROL POINT # 23R TO POINT # 24 AND IS NAD83 HORIZONTAL DATUM. DISTANCES HAVE NOT BEEN REDUCED TO GRID.
 8. THE PURPOSE OF THIS PLAT IS TO RESUBDIVIDE THE 9 (NINE) LOTS SHOWN HEREON INTO 5 (FIVE) LOTS AS SHOWN LOWERING THE TOTAL NUMBER OF BUILDABLE LOTS WITHIN THIS DEVELOPMENT TO 30 - NOTE - SHADED AREA SHOWN IS NOT INCLUDED IN THIS PLAT.
 9. PER FLOOD INSURANCE RATE MAP (FIRM) 47083C0356F AND 47096C0357G LAST REVISED MAY 2, 2007 AND AUGUST 5, 2013 RESPECTIVELY, THE PROPERTY IS NOT LOCATED IN A SPECIAL FLOOD HAZARD ZONE.
 10. 15' UTILITY EASEMENT, 7.5' EACH SIDE, OF ALL WATER AND SANITARY SEWER LINES AS INSTALLED. SEE INST. NO. 200908100011396.
 11. 20' DRAINAGE EASEMENT, 10' EACH SIDE, OF ALL STORM SEWER LINES AS INSTALLED.
 12. SEE SHEET 1 FOR CERTIFICATION STAMPS.
 13. THE TOWN OF FARRAGUT IS RESPONSIBLE FOR MAINTENANCE OF THE PAVED GREENWAYS AND MOWING WITHIN THE GREENWAY EASEMENTS SHOWN. ALL OTHER MAINTENANCE (INCLUDING MAINTENANCE OF ALL DRAINAGE DITCHES) WILL REMAIN THE RESPONSIBILITY OF THE AFFECTED LOT OWNERS.



CURVE	LENGTH	RADIUS	CHORD	CHORD BEARING	TANGENT
G01	28.39	44.00	27.90	S54°55'26"E	14.71
G02	45.49	84.00	44.93	N88°56'28"E	23.32
G03	101.17	64.00	90.96	S09°10'01"W	64.64
G04	20.02	175.00	20.01	S03°41'27"W	10.02
G05	67.25	84.00	65.47	N13°10'58"W	35.55
G06	38.72	60.00	38.05	N54°55'26"W	20.06

LEGEND OF SYMBOLS

WV WATER VALVE
FH FIRE HYDRANT
W WATER LINE
JB JUNCTION BOX
AI AREA INLET
CI CURB INLET
ST STORM DRAIN PIPE

● SANITARY MANHOLE
S SEWER LINE
GM GAS METER
GV GAS VALVE
G GAS LINE
U UTILITY POLE
OVERHEAD UTILITY LINES
ET ELECTRIC TRANSFORMER

(NOT INCLUDED)

SETBACK REQUIREMENTS FOR "R-3" ZONE

- Front yard.

a. If the street is classified as an arterial on the Major Road Plan, all principal buildings shall be set back from the nearest point of any right-of-way a minimum of 30 feet;

b. If the street is classified as a major collector on the Major Road Plan, all principal buildings shall be set back from the nearest point of any right-of-way a minimum of 40 feet;

c. If the street is classified as a minor collector on the Major Road Plan, all principal buildings shall be set back from the nearest point of any right-of-way a minimum of 30 feet;

d. If the street is classified as a local street on the Major Road Plan, all principal buildings shall be set back from the nearest point of any right-of-way a minimum of 20 feet; and

e. All agricultural structures, excluding fences, shall be set back a minimum of 35 feet; and

f. All accessory structures, excluding fences, detention basin structures, subdivision walls, entrance pillars, and certain utility structures, shall be set back from the nearest point of any right-of-way a minimum of 25 feet, except as provided for elsewhere in this ordinance or the [Farragut] Municipal Code.

- Side yard.

a. All principal buildings shall be set back a minimum of ten feet; and

b. All accessory structures, excluding fences, shall be set back a minimum of 35 feet; and

c. All agricultural structures, excluding fences, shall be set back a minimum of five feet.

- Rear yard.

a. All principal buildings shall be set back a minimum of 25 feet except when the rear yard abuts a required buffer strip and then all principal buildings shall be set back a minimum of 20 feet.

b. All agricultural structures, excluding fences, shall be set back a minimum of 35 feet; and

c. All accessory structures, excluding fences, shall be set back a minimum of five feet.

CURVE	LENGTH	RADIUS	CHORD	CH. BEARING	TANGENT
G01	28.39	25.00	27.32	N03°19'11"W	16.31
G02	53.01	175.00	52.81	N2°45'36"W	26.71
G03	74.96	175.00	74.00	N69°25'11"W	27.88
G04	67.81	175.00	67.39	N16°25'55"E	34.34
G05	128.11	125.00	122.58	N01°45'35"W	70.32
G06	28.50	125.00	28.50	N32°02'09"E	4.74
G07	27.98	20.00	25.76	N89°27'51"W	16.83
G08	37.48	35.00	36.76	S34°56'03"W	19.50
G09	32.47	48.00	32.08	S49°03'16"E	17.02
G10	50.27	48.00	48.00	S84°27'18"W	27.71
G11	50.27	48.00	48.00	N35°32'44"E	27.71
G12	50.27	48.00	48.00	N24°27'16"E	27.71
G13	32.71	48.00	32.08	N73°58'30"E	17.02
G14	37.48	35.00	36.76	N73°58'30"E	19.50
G15	27.98	20.00	25.76	N14°22'18"E	16.83
G16	31.42	20.00	28.28	N80°32'46"W	20.00
G17	34.96	30.00	34.26	S34°25'18"W	18.23
G18	33.57	48.00	32.89	S34°25'18"W	17.50
G19	50.27	48.00	48.00	S84°27'18"W	27.71
G20	50.27	48.00	48.00	N35°32'44"E	27.71
G21	50.27	48.00	48.00	N24°27'16"E	27.71
G22	33.57	48.00	32.89	N74°29'15"E	17.50
G23	34.96	30.00	34.26	N74°29'15"E	18.23
G24	31.42	20.00	28.28	N89°27'18"E	20.00
G25	31.83	20.00	28.58	N81°08'49"W	20.42
G26	31.00	20.00	27.99	S08°31'11"W	19.29
G27	50.65	175.00	50.47	S2°15'01"E	25.32
G28	88.70	175.00	87.75	S04°26'40"E	45.39
G29	53.32	175.00	53.12	S18°48'16"W	26.87
G30	52.59	125.00	52.00	S15°58'51"W	26.69
G31	86.98	125.00	85.23	S16°30'18"E	45.33
G32	49.64	25.00	41.88	N86°40'49"E	38.32
G33	27.18	25.00	25.86	N6°23'11"W	15.11
G34	29.74	25.00	28.02	N02°18'30"W	16.92
G35	28.40	25.00	26.90	N68°56'16"W	15.95
G36	69.45	50.00	64.21	N03°40'12"E	41.64
G37	25.13	48.00	24.85	S20°32'44"E	12.86
G38	25.13	48.00	24.85	S20°32'44"E	12.86

LINE BEARING DISTANCE

GL1 N63°22'41"E 25.62

GL2 N63°22'41"E 20.30

GL3 N63°22'41"E 257.61

GL4 S36°26'19"E 28.26

GL5 S73°24'33"E 21.66

GL6 N64°27'11"E 152.80

GL7 N63°22'41"E 32.22

GL8 N50°00'15"E 64.44

GL9 S35°32'49"E 20.06

GL10 S50°00'15"W 65.23

GL11 S63°22'41"W 33.01

GL12 S54°27'11"W 150.94

GL13 S36°26'19"E 702.07

GL14 S84°40'09"E 191.55

GL15 N84°40'09"W 201.07

GL16 N36°26'19"W 719.29

GL17 N73°24'33"W 23.00

GL18 N36°26'19"W 33.06

NOTE: DATA COLLECTION AND DRAFTING SERVICES PROVIDED BY SMOKEY MOUNTAIN LAND SURVEYING CO., INC.

SMLS DWG NO. 160078R4

INCORPORATED

CIVIL ENGINEERS & SURVEYORS

EST. 1997

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Knoxville, TN 37932
(865) 777-4160
www.site-incorporated.com

HOWARD T. DAWSON

REGISTERED LAND SURVEYOR

10215 TECHNOLOGY DR.
KNOXVILLE, TN 37932
PH: (865) 777-4160

TENNESSEE No. 00162-20-50

Final Plat of Resub. of Lots 16-17, 19-21, 28-29, & 37-38

Easton Park Unit 2

Turkey Creek Road near Briarstone Lane

Civil District No. 6 of Knox County, Tennessee

~~ Town of Farragut ~~

REVISIONS	NO.	DATE	COMMENTS

ORIGINAL ISSUE: 10/16/2020

SITE PROJECT#: 1926

FILE: 160078R4

PLAT

REPORT TO THE FARRAGUT MUNICIPAL PLANNING COMMISSION

PREPARED BY: Bart Hose, Assistant Community Development Director

SUBJECT: Discussion and public hearing on a final plat for the Ivey Farms Subdivision, Unit 1, Phase 1, located on the north side of Union Road, Zoned R-1/OSR, 6.26 Acres, 26 Lots (SITE, Incorporated, Applicant)

INTRODUCTION AND BACKGROUND: This item involves the final plat for Unit 1, Phase I of the Ivey Farms Subdivision located off Union Road. The plat includes 26 building lots, Baltica Lane, a connection/extension to Pecos Road, and the entranceway section of Ivey Farms Road from Union Road to the traffic circle within the development and Baltica Lane.

DISCUSSION: The developers of this subdivision will be required to complete construction of the traffic circle and entrance along Union Road before any building permits are issued. In addition, the connection to Pecos Road will not be opened until one of the following two things takes place: 1. the number of building permits issued in Phase I reaches 75% of the total buildable lots in that phase; or 2. the final plat for Phase 3 of the Ivey Farms Subdivision is recorded.

RECOMMENDATION: Included in your packet is the applicant's revised plat. Staff will make a recommendation at the meeting based on whether and how the applicant has addressed all initial staff comments.

- NOTES
1. NOTIFY TENNESSEE ONE-CALL SYSTEM AT 1-800-351-1111 AND AN INDIVIDUAL UTILITY AUTHORITY BEFORE ANY EXCAVATION FOR EXACT LOCATION OF ALL UNDERGROUND UTILITIES.
 2. A FIVE (5) FOOT UTILITY, DRAINAGE AND CONSTRUCTION EASEMENT ON EACH SIDE OF INTERIOR LOT LINES. A TEN (10) FOOT UTILITY, DRAINAGE AND CONSTRUCTION EASEMENT ON INSIDE OF ROAD RIGHTS-OF-WAY AND EXTERIOR LOT LINES.
 3. THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM THE INFORMATION AVAILABLE. THIS SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.
 4. 5/8" IRON PINS SET AT ALL CORNERS UNLESS NOTED OTHERWISE.
 5. PROPERTY IS ZONED "OSR". MINIMUM BUILDING SETBACKS ARE TO CONFORM TO CURRENT REQUIREMENTS OF THE TOWN OF FARRAGUT ZONING ORDINANCE. SETBACK REQUIREMENTS:
-FRONT: 20' (FACE GARAGE 30')
-SIDE: 10'
 6. PROPERTY IS KNOWN AND DESIGNATED AS:
-TAX MAP 151, PART OF PARCELS 054 & 054.01
-DEED REFERENCES: 201810290027479 AND 202002250025395
 7. GRID NORTH IS BASED ON THE T.D.O.T. C.O.R.S. NETWORK. THE PURPOSE OF THIS PLAN IS TO CREATE THE 28 LOTS SHOWN HEREON AND TO DEDICATE EASEMENTS AND RIGHT-OF-WAYS AS SHOWN.
 8. PER FLOOD INSURANCE RATE MAP (FIRM) #708300352F LAST REVISED MAY 2, 2007, THE PROPERTY IS NOT LOCATED IN A SPECIAL FLOOD HAZARD ZONE.
 9. 15' UTILITY EASEMENT, 7.5' EACH SIDE, OF ALL WATER AND SANITARY SEWER LINES AS INSTALLED.
 10. 15' UTILITY EASEMENT, 7.5' EACH SIDE, OF ALL WATER AND SANITARY SEWER LINES AS INSTALLED.
 11. PROPERTY OWNERS SHALL BE RESPONSIBLE FOR MAINTENANCE OF STORMWATER IMPROVEMENTS ON THIS PROPERTY.
 12. THIS PLAN CONSISTS OF 28 RESIDENTIAL LOTS TOTALING 6.26 ACRES. -REFER TO PRELIMINARY PLAT OF IVEY FARMS FOR OPEN SPACE CALCULATIONS.
 13. ROUNDABOUT AND ACCESS TO IVEY FARM ROAD MUST BE COMPLETED PRIOR TO ISSUING OF BUILDING PERMITS.

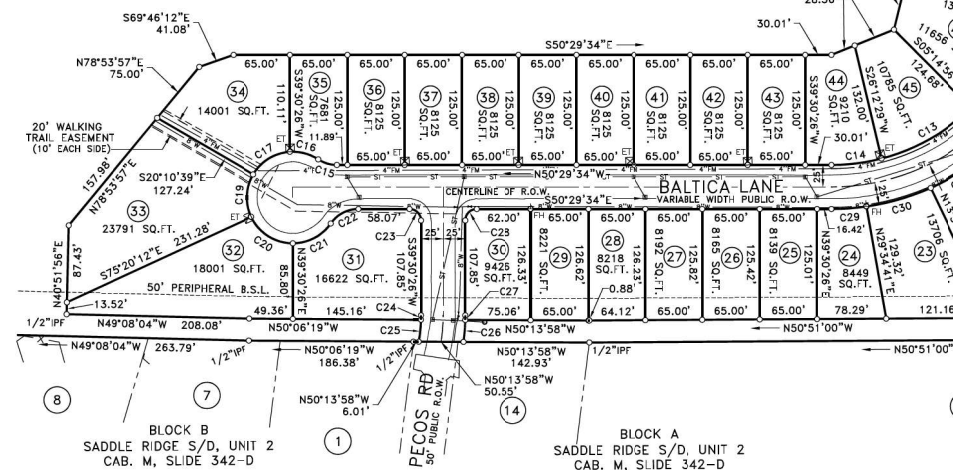
CERTIFICATE OF SURVEY ACCURACY

I hereby certify that the plan shown and described herein is a true and correct survey to the accuracy required by the Farragut Municipal Planning Commission and that the monuments have been placed as shown herein, to the specification of the Subdivision Regulations. This is a Category I Land Survey and the ratio of precision of the unadjusted survey is equal to or greater than 1:10,000.

Surveyor / No. 1301 Date 10-30-20

THIS IS TO CERTIFY THAT THIS SURVEY MEETS THE MINIMUM STANDARDS FOR THE STATE OF TENNESSEE.

SURVEYOR:
HOWARD T. DAWSON, RLS 1301
SITE INCORPORATED
10215 TECHNOLOGY DR.
KNOXVILLE, TN 37932
PH: (865) 777-4160



This is to certify that all property taxes and assessments due on this property have been paid.

Signed: _____ Date: _____
Knox County Trustee

CERTIFICATE OF STREETS APPROVAL

I certify that streets, sidewalks, and other required improvements have been installed in an acceptable manner and according to town specifications, so that a security bond in the amount of \$_____ has been posted with the Planning Commission to assure completion of all required improvements in case of default. Streets (are) (are not) public streets maintained at public expense.

Town Engineer Date
License No. _____

CERTIFICATE OF APPROVAL FOR RECORDING

I hereby certify that the subdivision plan shown hereon has been found to comply with the Subdivision Regulations for Farragut, Tennessee, with the exception of such variances, if any, as are noted in the minutes of the Planning Commission and that it has been approved for recording in the Office of the County Register of Deeds.

Secretary, Planning Commission Date

CERTIFICATE OF APPROVAL OF STREET NAMES

This is to certify that the subdivision shown hereon has been reviewed for compliance with the Knox County Uniform Street Naming & Addressing System Ordinance, and the road names are hereby approved for recording.

Knox County Addressing Division Date

CERTIFICATE OF ELECTRIC, GAS & TELEPHONE AVAILABILITY

This is to certify that every lot within this subdivision has available to it a source for the service identified by signature(s) below which service source is adequate to accommodate the reasonable needs of such lot as to such service within such subdivision.

Do/e GAS- Name, Title, and Agency of Authorized Approving Agent

Do/e ELECTRIC- Name, Title, and Agency of Authorized Approving Agent

Date TELEPHONE- Name, Title, and Agency of Authorized Approving Agent

CERTIFICATION OF COMMON AREAS DEDICATION

As owner, in recording this plat I have designated certain areas of land shown hereon as common areas intended for use by the homeowners within Ivey Farm, Unit 1, Phase I for recreation and related activities. The above described areas are not dedicated for use by the general public, but are dedicated to the common use of the homeowners within the named subdivision.

"Declaration of Covenants and Restrictions," applicable to the above named subdivision, is hereby incorporated and made a part of this plat.

Owner Date

CERTIFICATE OF OWNERSHIP AND DEDICATION

I (we) hereby certify that I am (we are) the owner(s) of the property shown and described hereon as evidenced in Book _____, page _____, County Register's Office, and that I (we) hereby adopt this plan of subdivision with my (our) free consent, establish the minimum building restriction lines, and dedicate all streets, alleys, walks, parks, and other open space to public or private use as noted.

Owner Date

CERTIFICATE OF APPROVAL OF WATER SYSTEM
I hereby certify that it has been certified to us that the water system(s) outlined or indicated on the final subdivision plat entitled Ivey Farm, Unit 1, Phase I have been installed in accordance with current local and state government requirements.

Date Name, Title, and Agency of Authorized Approving Agent

CERTIFICATE OF APPROVAL OF SEWER SYSTEM

I hereby certify that it has been certified to us that the sewer system(s) outlined or indicated on the final subdivision plat entitled Ivey Farm, Unit 1, Phase I have been installed in accordance with current local and state government requirements.

Date Name, Title, and Agency of Authorized Approving Agent

DATA COLLECTION AND DRAFTING SERVICES PROVIDED BY SMOKEY MOUNTAIN LAND SURVEYING CO., INC.
SMLS DWG NO. 180041R2

REVISIONS

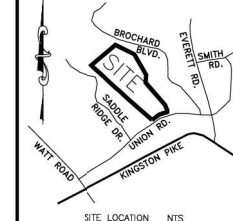
NO.	DATE	COMMENTS

ORIGINAL ISSUE: 10/16/2020

SITE PROJECT#: 1951

FILE: 180041R2

PLAT



SITE, INCORPORATED
EST. 1997
CIVIL ENGINEERS & SURVEYORS
10215 Technology Drive, Suite 304
Knoxville, TN 37932
(865) 777-4160
www.site-incorporated.com

HOWARD T. DAWSON
REGISTERED LAND SURVEYOR
No. 1301
Tennessee No. 003812
2-38-20-501

Final Plat of
Ivey Farms, Unit 1, Phase I
Union Road and Ivey Farms Road
Civil District No. 6 of Knox County, Tennessee
--Town of Farragut--

REPORT TO THE FARRAGUT MUNICIPAL PLANNING COMMISSION

PREPARED BY: Bart Hose, Assistant Community Development Director

SUBJECT: Discussion and public hearing on a site plan for a parking lot addition at the St. Elizabeth's Episcopal Church, 110 Sugarwood Drive, Zoned C-1, 4.54 Acres (Urban Engineering, Inc., Applicant)

INTRODUCTION AND BACKGROUND: This request involves a site plan for a parking lot addition at the St. Elizabeth's Episcopal Church. The addition includes 24 new parking spaces located near the church's entrance off Sugarwood Drive. The property is physically constrained with most of the parking to the north toward Kingston Pike. This project is intended to provide for some additional parking that would be closer to the church entrance.

RECOMMENDATION: Included in your packet is the applicant's revised site plan. Staff will make a recommendation at the meeting based on whether and how the applicant has addressed all initial staff comments.

SITE DEVELOPMENT PLANS

U.E.I. PROJECT NO. 2005014

THE DIOCESE OF EAST TENNESSEE
ST. ELIZABETH'S EPISCOPAL CHURCH

SITE ADDRESS: 110 SUGARWOOD DRIVE, KNOXVILLE, TENNESSEE 37934
CLT MAP 152, PARCEL 22.02



LOCATION MAP

OWNER / DEVELOPER:
THE DIOCESE OF EAST TENNESSEE
ST. ELIZABETH'S EPISCOPAL CHURCH
110 SUGARWOOD DRIVE
KNOXVILLE, TN 37934
(865) 671-2500

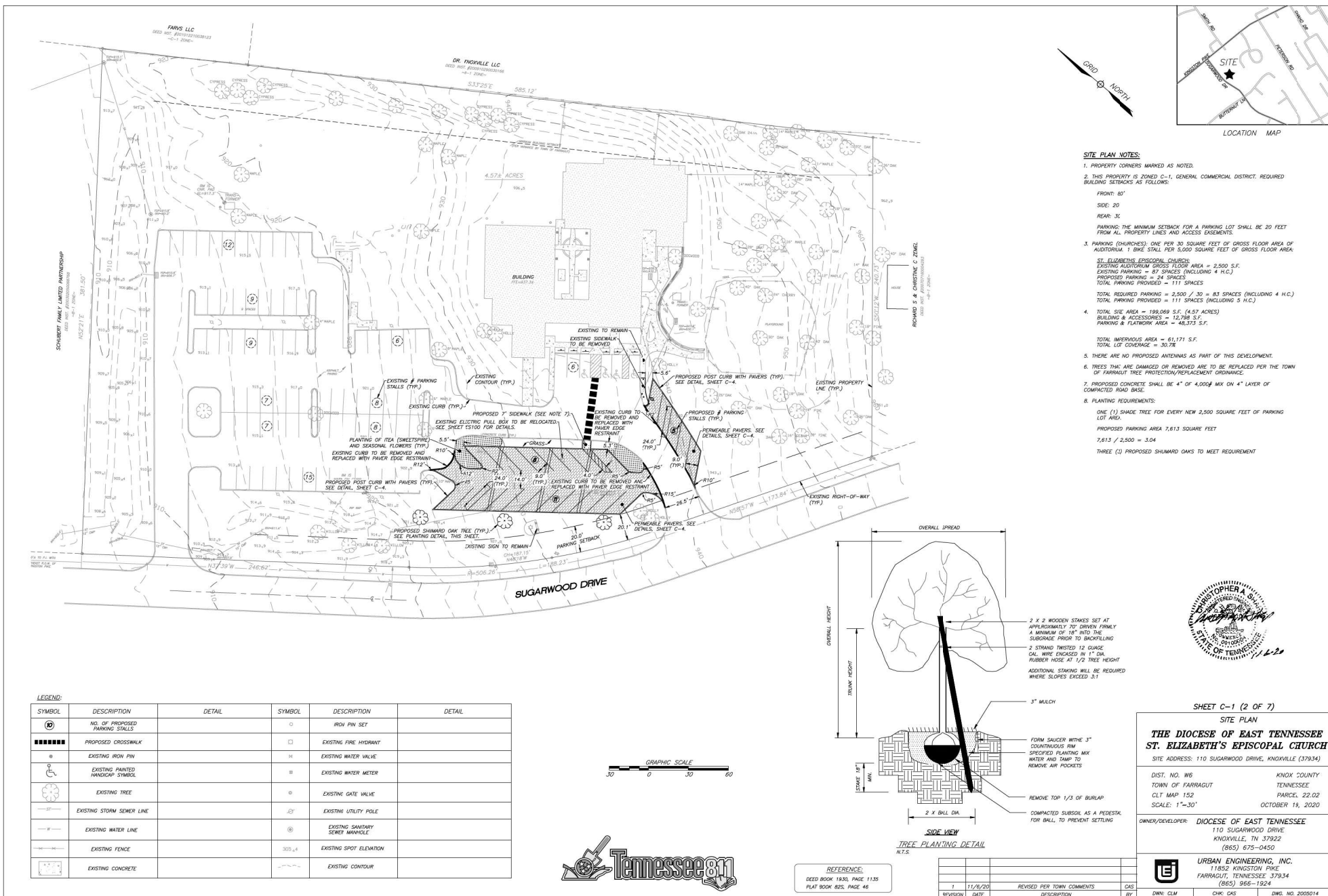
 SITE ENGINEER:
URBAN ENGINEERING, INC.
CHRIS SHARP
11852 KINGSTON PIKE
FARRAGUT, TENNESSEE 37934
(865) 966-1924

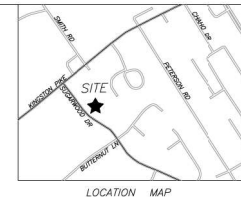
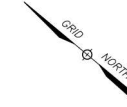
SPECIFICATIONS
EXCEPT WHERE DIRECTED OTHERWISE BY THE PLANS, WORKMANSHIP
AND MATERIAL (BUT NOT MEASUREMENT AND PAYMENT) FOR THIS
PROJECT SHALL BE IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS
AND STANDARDS.
ELECTRICAL — AS DIRECTED BY LCUB
GAS — AS DIRECTED BY KUB
WATER — AS DIRECTED BY FIRST UTILITY DISTRICT
CABLE TV — AS DIRECTED BY CHARTER
TELEPHONE — AS DIRECTED BY TDS
TOWN OF FARRAGUT — ALL APPLICABLE TOWN REGULATIONS
AND ORDINANCES

SHEET INDEX

TITLE	SHEET
TITLE SHEET	C-0
SITE PLAN	C-1
GRADING PLAN	C-2
EROSION AND SEDIMENT CONTROL PLAN	C-3
PAVER DETAILS	C-4
SITE ELECTRICAL PLAN	ES100
SITE PHOTOMETRIC PLAN	ES101

2	11/06/20	TOP SUBMITTAL 2
ISSUE NO.	DATE	DESCRIPTION





GRADING & DRAINAGE NOTES:

1. CLEAR AND GRUB. CLEARING AND GRUBBING INCLUDES THE REMOVAL OF TREES, BRUSH, WEEDS, AND STUMPS FROM THE WORK AREA WITHIN 4' OF THE GROUND SURFACE. REMOVE ALL BUILDINGS, DRIVES, CROSS FENCES, AND MISCELLANEOUS EQUIPMENT.
2. STRIP AND STOCKPILE TOPSOIL NEEDED FOR RESURFACING AND SEEDING. SURROUND TOPSOIL PILES WITH 54" FENCE, STRAW BALES, TEMPORARY SEEDING OR ADDITIONAL MEASURES AS NEEDED TO PREVENT EROSION/SEDIMENTATION.
3. AFTER STRIPPING AND REMOVAL, PROOF ROLL ENTIRE DISTURBED AREA WITH SMOOTH TIRE FULLY LOADED WITH EARTH. REMOVE ANY AREAS WHICH ARE SOFT OR HOLDING UNDER LOAD AND REPLACE WITH NEW MATERIAL MEETING PROJECT SPECIFICATIONS.
4. IF UNSUITABLE SUBGRADE MATERIALS ARE ENCOUNTERED, THE CONTRACTOR IS RESPONSIBLE FOR REMOVAL AND REPLACEMENT WITH APPROVED MATERIAL FROM ONSITE OR APPROVED OFFSITE BORROW AREA. UNSUITABLE MATERIALS ARE THOSE CLASSIFIED AS MH, CH, OH, OL AND PEAT IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM.
5. COMPACTION REQUIREMENTS ARE SUMMARIZED AS FOLLOWS (PLACE IN 8" LIFTS)
 - a. TOP 24 INCHES OF SUBGRADE UNDER PAVED AREAS 100 PERCENT STANDARD PROCTOR - LOWER THAN 24 INCHES
 - b. BELOW PAVED AREAS 90 PERCENT STANDARD PROCTOR
 - c. AREAS WITHIN THE BUILDING ENVELOPE TO BE PREPARED IN ACCORDANCE WITH RECOMMENDATIONS IN REPORT OF GEOTECHNICAL INVESTIGATION AND/OR AS DIRECTED BY THE SOILS ENGINEER.
6. ALL FINISHED YARD AREAS SHALL HAVE A MINIMUM 4 INCHES OF TOPSOIL. YARD FINISHED GRADES SHOWN ARE AFTER PLACEMENT OF 4 INCHES OF TOPSOIL. ALL FINISHED YARD SURFACES SHALL BE SMOOTHLY AND UNIFORMLY GRADED FREE FROM IRREGULARITIES AND SHALL BE FULLY FUNCTIONAL TO PROVIDE POSITIVE DRAINAGE AT ALL LOCATIONS.
7. ALL WORK SHALL BE SEQUENCED AND COMPLETED IN ACCORDANCE WITH THE MINIMUMS OF ENVIRONMENTAL AND CONSERVATION THROUGH CONTROL HANDBOOK AND THE RULES AND REGULATIONS OF THE TOWN OF FARRAGUT.
8. THE TOTAL AREA DISTURBED AS PART OF THIS PROJECT IS 0.3 ACRES.
9. PROPOSED SPOT ELEVATIONS AND PROPOSED CONTOURS ARE AFTER THE INSTALLATION OF TOPSOIL IN GRADED AREAS AND PAVING WITHIN DRIVES AND PARKING LOTS.
10. THERE IS NO AQUATIC BUFFER WITHIN THE PROJECT AREA.



SHEET C-2 (3 OF 7)

GRADING PLAN

**THE DIOCESE OF EAST TENNESSEE
ST. ELIZABETH'S EPISCOPAL CHURCH**

SITE ADDRESS: 110 SUGARWOOD DRIVE, KNOXVILLE (37934)

DIST. NO. W6 KNOX COUNTY
TOWN OF FARRAGUT TENNESSEE
CLT MAP 152 PARCEL 22.02
SCALE: 1"=30' OCTOBER 19, 2020

OWNER/DEVELOPER: DIOCESE OF EAST TENNESSEE

110 SUGARWOOD DRIVE
KNOXVILLE, TN 37922
(865) 675-0450



URBAN ENGINEERING, INC.
11852 KINGSTON PIKE
FARRAGUT, TENNESSEE 37934
(865) 966-1924

DWG. NO. 2080514

ALL WORKMANSHIP AND MATERIALS SHALL BE PER TOWN OF FARRAGUT STANDARD SPECIFICATIONS FOR SITE DEVELOPMENT PERMITS.

REVISION	DATE	REVISION PER TOWN COMMENTS	BY
1	11/6/20		CSE

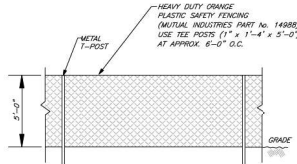
REFERENCE:

DEED BOOK 1930, PAGE 1135
PLAT BOOK 825, PAGE #8



LEGEND:

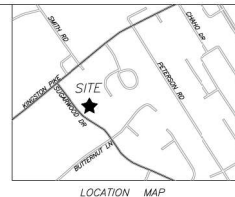
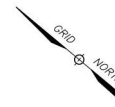
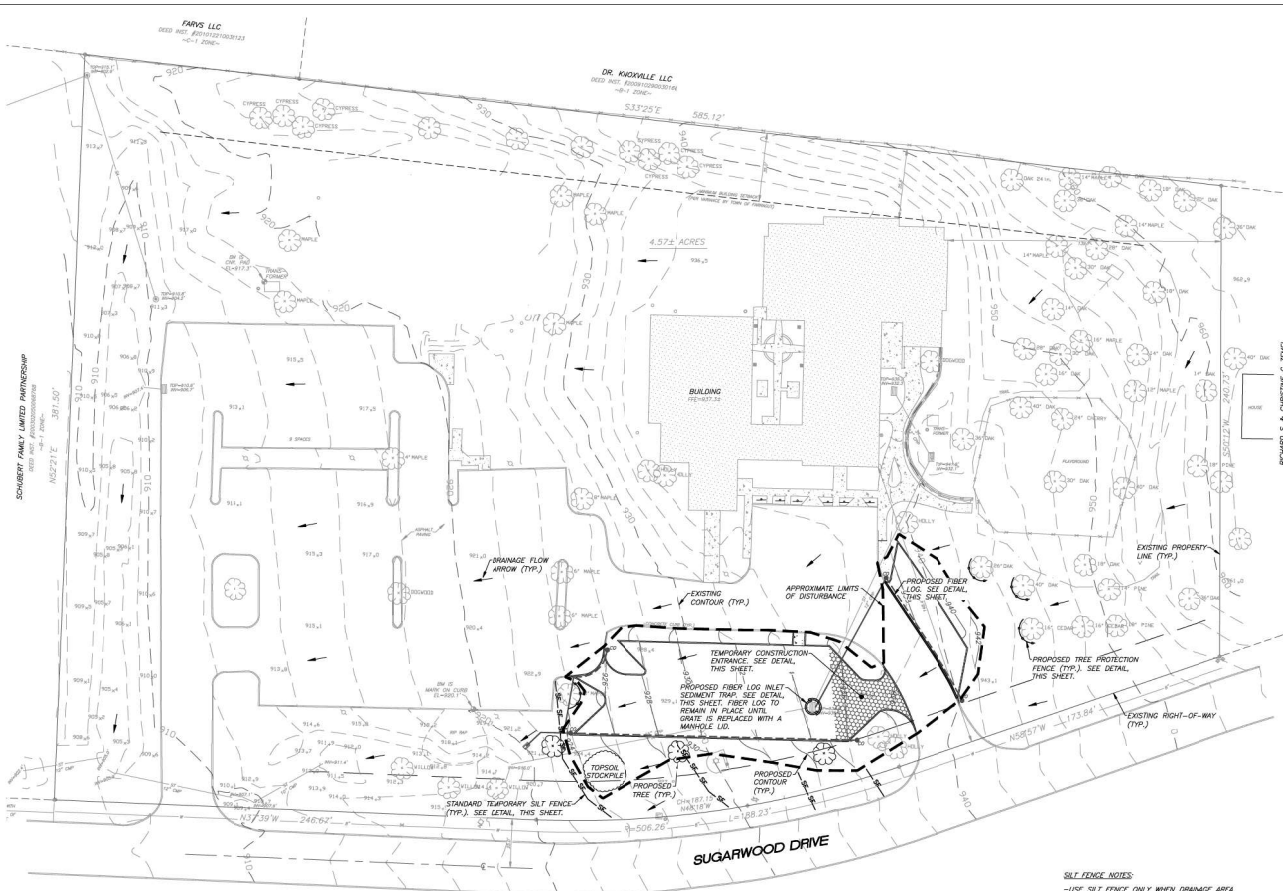
- EXISTING CONTOUR
- PROPOSED CONTOUR
- EXISTING SPOT ELEVATION
- PROPOSED SPOT ELEVATION



FOR PROTECTION OF TREES AND OTHER SPECIFIED SITE FEATURES

TREE PROTECTION FENCE
N.T.S.





EROSION & SEDIMENT CONTROL NOTES

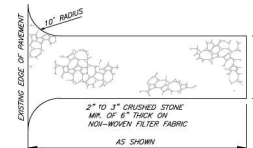
1. THE LOCATIONS OF ALL UNDERGROUND UTILITIES SHOWN HEREON ARE APPROXIMATE AND ARE BASED ON FIELD LOCATION OF VISIBLE STRUCTURES SUCH AS CATCH BASINS, MANHOLES, WATER MAINS, ETC., AND COMPLYING INFORMATION FROM PLANS SUPPLIED BY VARIOUS UTILITY COMPANIES AND GOVERNMENT AGENCIES. THE CONTRACTOR SHALL NOTIFY IN WRITING ALL UTILITY COMPANIES AND GOVERNMENT AGENCIES AND ALSO CALL TOWN ONE-CALL PRIOR TO ANY EXCAVATION WORK TO VERIFY INFORMATION SHOWN AND DETERMINE THE LAYOUT OF THE IRRIGATION SYSTEM AND IF ADDITIONAL IMPROVEMENTS MAY EXIST.
2. THE CONTRACTOR SHALL MEET ON-SITE WITH THE ENGINEER TO APPROVE THE LOCATION OF THE SILT FENCES AND OTHER EROSION CONTROL FEATURES PRIOR TO BREAKING GROUND.
3. THE CONTRACTOR SHALL AVOID TRACKING MUD AND SILT ONTO EXISTING ROADS AND SHALL BE RESPONSIBLE FOR CLEANUP OF ANY VIOLATION.
4. ALL CONSTRUCTION SHALL COMPLY WITH THE STORM WATER POLLUTION PREVENTION PLAN (SWPP) SUBMITTED TO THE TOWN OF FAIRGOUT AND THE TDEC EROSION CONTROL HANDBOOK.
5. ALL UNIMPROVED AREAS SHALL BE LANDSCAPED OR GRASSED. GRASS SPECIFICATIONS AS FOLLOWS:
TOPSOIL TO UNIFORM DEPTH OF 4" (MIN.)
AGRICULTURAL LIME - 3 TONS/ACRE
3.0 LBS. KY 31 FESCUE PER 1,000 SQ. FT.
0.5 LBS. ENGLISH PEE PER 1,000 SQ. FT.
100 LBS. DRY FERTILIZER (12-24-24 OR EQUAL) PER 1,000 SQ. FT.
IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ESTABLISH A FULL, EVEN STAND OF VEGETATION ON THE AREAS TO BE SEED. SPARSE AREAS SHALL BE SCARIFIED AND RESEEDED UNTIL A FULL STAND IS ESTABLISHED.
6. THE CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF CONSTRUCTION OF SITE POLLUTION PREVENTION CONTROLS THROUGHOUT THE LIFE OF THE PROJECT.
7. ADEQUATE DRAINAGE, EROSION AND SEDIMENT CONTROL MEASURES, BEST MANAGEMENT PRACTICES AND/OR OTHER STORMWATER MANAGEMENT PRACTICES SHALL BE PROVIDED AND MAINTAINED AT ALL TIMES DURING CONSTRUCTION. DAMAGES TO ADJACENT PROPERTY AND/OR THE CONSTRUCTION SITE CAUSED BY THE CONTRACTOR'S OR PROPERTY OWNER'S FAILURE TO PROVIDE AND MAINTAIN ADEQUATE DRAINAGE AND EROSION/SEDIMENT CONTROL FOR THE CONSTRUCTION AREA SHALL BE THE RESPONSIBILITY OF THE GRADING PERMITTEE.
8. THE TOTAL AREA DISTURBED AS PART OF THIS PROJECT IS (0.34 ACRE).

SEQUENCE OF WORK ACTIVITIES:

PHASE 1:

1. INSTALL SILT FENCES, TREE PROTECTION FENCE, AND INLET PROTECTION, AND TEMPORARY CONSTRUCTION ENTRANCE.
2. MEET WITH THE ENGINEER AND THE TOWN TO REVIEW BMP INSTALLATION.
3. DEMOLISH FEATURES, AS SHOWN ON THE SITE PLAN (SHEET C-1).
4. STRIP AND STOCKPILE TOPSOIL.
5. CLEAR/GRUB AND DISPOSE OF TIMBER AND TRASH.
6. STABILIZE TOPSOIL BY SILT FENCES AND/OR TEMPORARY SEEDING.
7. CUT/FILL FOR THE OVERALL SITE.
8. INSTALL DRAINAGE AND EROSION EELS PER DETAIL, THIS SHEET.
9. FINALIZE SUB-GRADE, STONE, INSTALL PAVING & FLATWORK AND RESURF TOPSOIL.
10. ESTABLISH VEGETATION ON ALL DISTURBED AREAS PER SEEDING SPECS.
11. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE TDEC EROSION CONTROL HANDBOOK.

ADDITIONAL SEDIMENT CONTROL BMP'S MAY BE REQUIRED AS DICTATED BY SEQUENCE OF CONSTRUCTION.

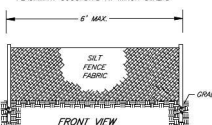


TEMPORARY CONSTRUCTION ENTRANCE
N.T.S.

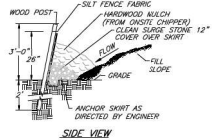
SILT FENCE NOTES

-USE SILT FENCE ONLY WHEN DRAINAGE AREA DOES NOT EXCEED 1/4 ACRE PER 100 FEET OF FENCE AND NEVER IN AREAS OF CONCENTRATED FLOW GREATER THAN ONE CUBIC FEET PER SECOND

-SILT FENCE/STRAW BALE CHECK DAM PLACEMENT SUGGESTED AT MINOR SWALES

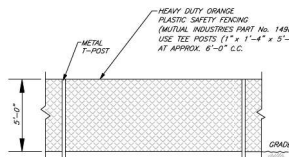


FRONT VIEW



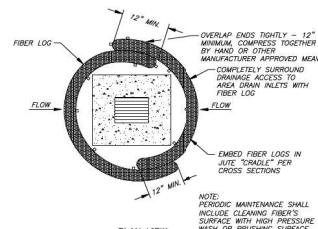
SIDE VIEW

STANDARD TEMPORARY SILT FENCE N.T.S.

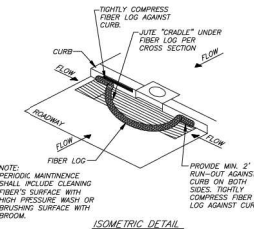


FOR PROTECTION OF TREES AND OTHER SPECIFIED SITE FEATURES

TREE PROTECTION FENCE N.T.S.



PLAN VIEW



ISOMETRIC DETAIL

FIBER LOG INLET SEDIMENT TRAP N.T.S.



REFERENCE:

DEED BOOK 1930, PAGE 1135
PLAT BOOK 825, PAGE 48



SHEET C-3 (4 OF 7)

EROSION & SEDIMENT CONTROL PLAN

THE DIOCESE OF EAST TENNESSEE

ST. ELIZABETH'S EPISCOPAL CHURCH

SITE ADDRESS: 110 SUGARWOOD DRIVE, KNOXVILLE (37934)

DIST. NO. W6 KNOX COUNTY

TOWN OF FAIRGOUT TENNESSEE

CLT MAP 152 PARCEL 22.02

SCALE: 1"=30' OCTOBER 19, 2020

OWNER/DEVELOPER: DIOCESE OF EAST TENNESSEE

110 SUGARWOOD DRIVE

KNOXVILLE, TN 37922

(865) 675-0450



URBAN ENGINEERING, INC.

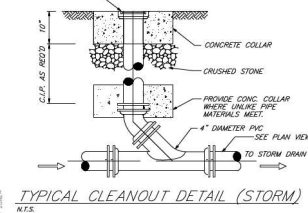
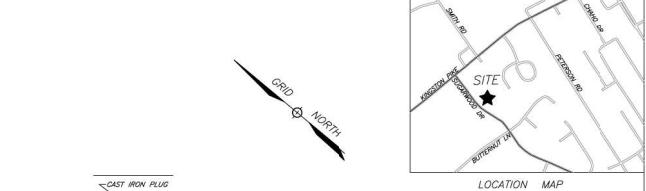
11852 KINGSTON PIKE

FARRAGUT, TENNESSEE 37934

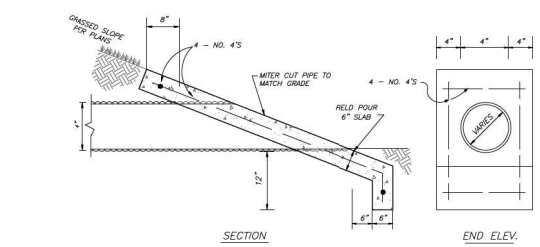
(865) 966-1924

DWG. NO. 2085014

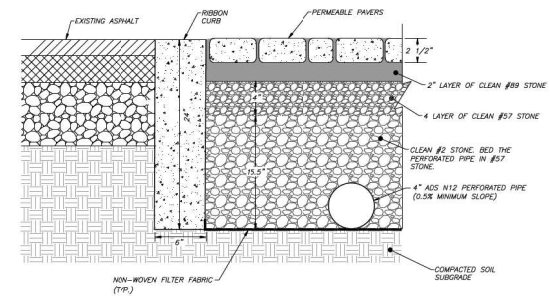
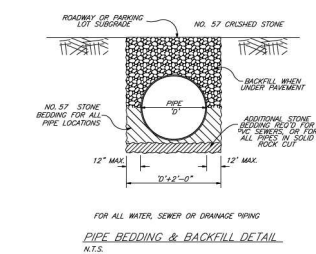
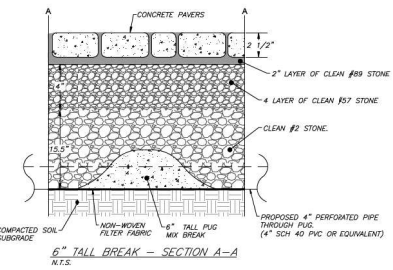
REVISION	DATE	DESCRIPTION	BY
1	11/6/20	REVISED PER TOWN COMMENTS	CSE



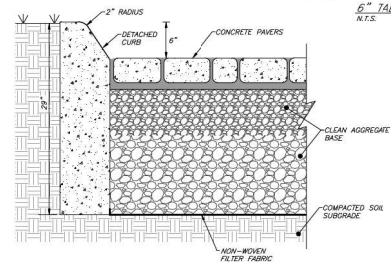
- PERMEABLE PAVER NOTES:**
- 1) THE LOCATIONS OF ALL UNDERGROUND UTILITIES SHOWN HEREIN ARE APPROXIMATE AND ARE BASED ON FIELD LOCATION OF VISIBLE STRUCTURES SUCH AS GUTTER BASINS, MANHOLES, WATER VALVES, ETC., AND COMPLYING INFORMATION FROM PLANS SUPPLIED BY KNOWLEDGE, UTILITY COMPANIES AND GOVERNMENT AGENCIES. THE CONTRACTOR SHALL NOTIFY IN WRITING ALL UTILITY COMPANIES AND GOVERNMENT AGENCIES AND ALSO CALL DOWN ONE-CALL PRIOR TO ANY EXCAVATION WORK TO VERIFY INFORMATION SHOWN AND DETERMINE THE LAYOUT OF THE IRRIGATION SYSTEM AND IF ADDITIONAL IMPROVEMENTS MAY EXIST.
 - 2) PERMEABLE PAVERS SHALL BE BELGRADE AQUA-BLOC OR EQUIVALENT AND SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
 - 3) PVC AGGREGATE DRAINAGE SHALL BE 6\"/>



TYPE 'B' PIPE END DETAIL

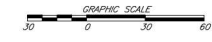


EDGE RESTRAINT WITH PAVERS
N.T.S.



POST CURB WITH PAVERS
N.T.S.

REFERENCE:
DEED BOOK 1930, PAGE 1135
PLAT BOOK 825, PAGE 48



SHEET C-4 (5 OF 7)

PAVER DETAILS
THE DIOCESE OF EAST TENNESSEE
ST. ELIZABETH'S EPISCOPAL CHURCH
SITE ADDRESS: 110 SUGARWOOD DRIVE, KNOXVILLE (37934)

DIST. NO. W6 KNOX COUNTY
TOWN OF FARRAGUT TENNESSEE
CLT MAP 152 PARCEL 22.02
SCALE: 1"=30' OCTOBER 19, 2020

OWNER/DEVELOPER: DIOCESE OF EAST TENNESSEE
110 SUGARWOOD DRIVE
KNOXVILLE, TN 37922
(865) 675-0450



URBAN ENGINEERING, INC.
11852 KINGSTON PIKE
FARRAGUT, TENNESSEE 37934
(865) 966-1924

1	11/6/20	REVISED PER TOWN COMMENTS	CSE
REVISION	DATE	DESCRIPTION	BY



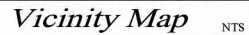
REPORT TO THE FARRAGUT MUNICIPAL PLANNING COMMISSION

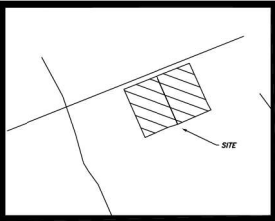
PREPARED BY: Bart Hose, Assistant Community Development Director

SUBJECT: Discussion and public hearing on a site plan for the property located at 13036 and 13038 Kingston Pike, Zoned C-1, 2 Acres (GBS Engineering, Applicant)

INTRODUCTION AND BACKGROUND: This request involves a site plan for the development of two (2) buildings located at 13036 and 13038 Kingston Pike. The site includes two (2) existing lots with shared access, parking, and internal circulation. The development also includes thru access to the Cool Sports development located immediately to the south, and provisions for cross-lot connectivity to the east and west.

RECOMMENDATION: Included in your packet is the applicant's revised site plan. Staff will make a recommendation at the meeting based on whether and how the applicant has addressed all initial staff comments.





VICINITY MAP
NOT TO SCALE

LEGEND

	SEWER MANHOLE
	CURB INLET
	PONDER POLE
	WATER VALVE
	FIRE HYDRANT
	WATER MANHOLE
	IRON ROD FOUND
	IRON ROD SET
	CENTER LINE OF RIGHT-OF-WAY
	BOUNDARY LINE
	WATER LINE
	OVERHEAD UTILITIES
	GAS LINE
	UNDERGROUND TELEPHONE LINE
	STORM PIPE

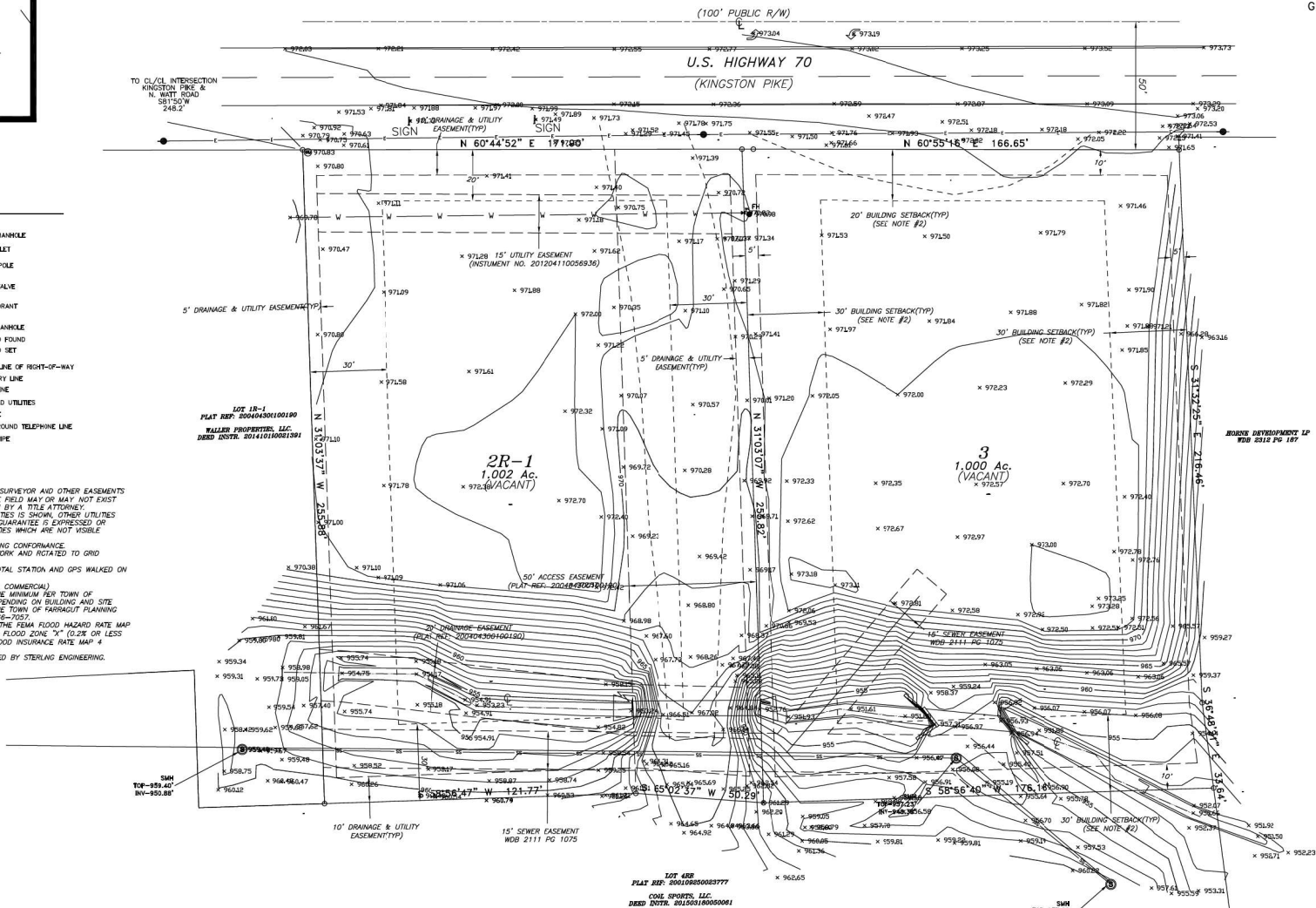
NOTES

1. NO TITLE REPORT WAS FURNISHED TO THIS SURVEYOR AND OTHER EASEMENTS AND/OR EXCEPTIONS NOT APPARENT IN THE FIELD MAY OR MAY NOT EXIST AND MAY BE REVEALED BY A TITLE SEARCH BY A TITLE ATTORNEY.
2. SIGNIFICANT OBSERVABLE EVIDENCE OF UTILITIES IS SHOWN. OTHER UTILITIES MAY EXIST AND MAY NOT BE SHOWN. NO GUARANTEE IS EXPRESSED OR IMPLIED AS TO THE LOCATION OF ANY UTILITIES WHICH ARE NOT VISIBLE FROM THE SURFACE.
3. NO CERTIFICATION IS MADE REGARDING ZONING CONFORMANCE.
4. DATUM NAVSARS OBTAINED FROM TDOT NETWORK AND ROTATED TO GRID BEARING. NO SCALE FACTORS APPLIED.
5. CONTOUR INTERVAL 1' ESTABLISHED WITH TOTAL STATION AND GPS WALKED ON 30'-40' GRID PATTERN.
6. ZONING: TOWN OF FARRAGUT C-1 (GENERAL COMMERCIAL).
7. BUILDING SETBACKS SHOWN HEREON ARE THE MINIMUM PER TOWN OF FARRAGUT ZONING. SETBACKS CAN VARY DEPENDING ON BUILDING AND SITE DESIGN. IT IS ADVISED TO CONSULT WITH THE TOWN OF FARRAGUT PLANNING DEPARTMENT FOR CONFORMANCE AT 865-366-7055.
8. THIS IS TO CERTIFY THAT I HAVE EXAMINED THE FEMA FLOOD HAZARD RATE MAP AND FOUND THAT THE SUBJECT LOCATED IN FLOOD ZONE "X" (0.1% OR LESS CHANCE ANNUAL FLOOD). ACCORDING TO FLOOD INSURANCE RATE MAP 4 70930C03151F, EFFECTIVE DATE MAY 2, 2007.
9. BOUNDARY PORTION OF THIS SURVEY PROVIDED BY STERLING ENGINEERING.



Certification of Category and Accuracy of Survey
I hereby certify that this is a Category 1 survey and the ratio of precision of the land surveyed is 1:10000 as shown herein. This data survey was done in compliance with current Tennessee Standards of Practice.

Surveyor
Tennessee Certificate No. 3014



GRID NORTH(NAD83) NSRS 2007



LEGEND:

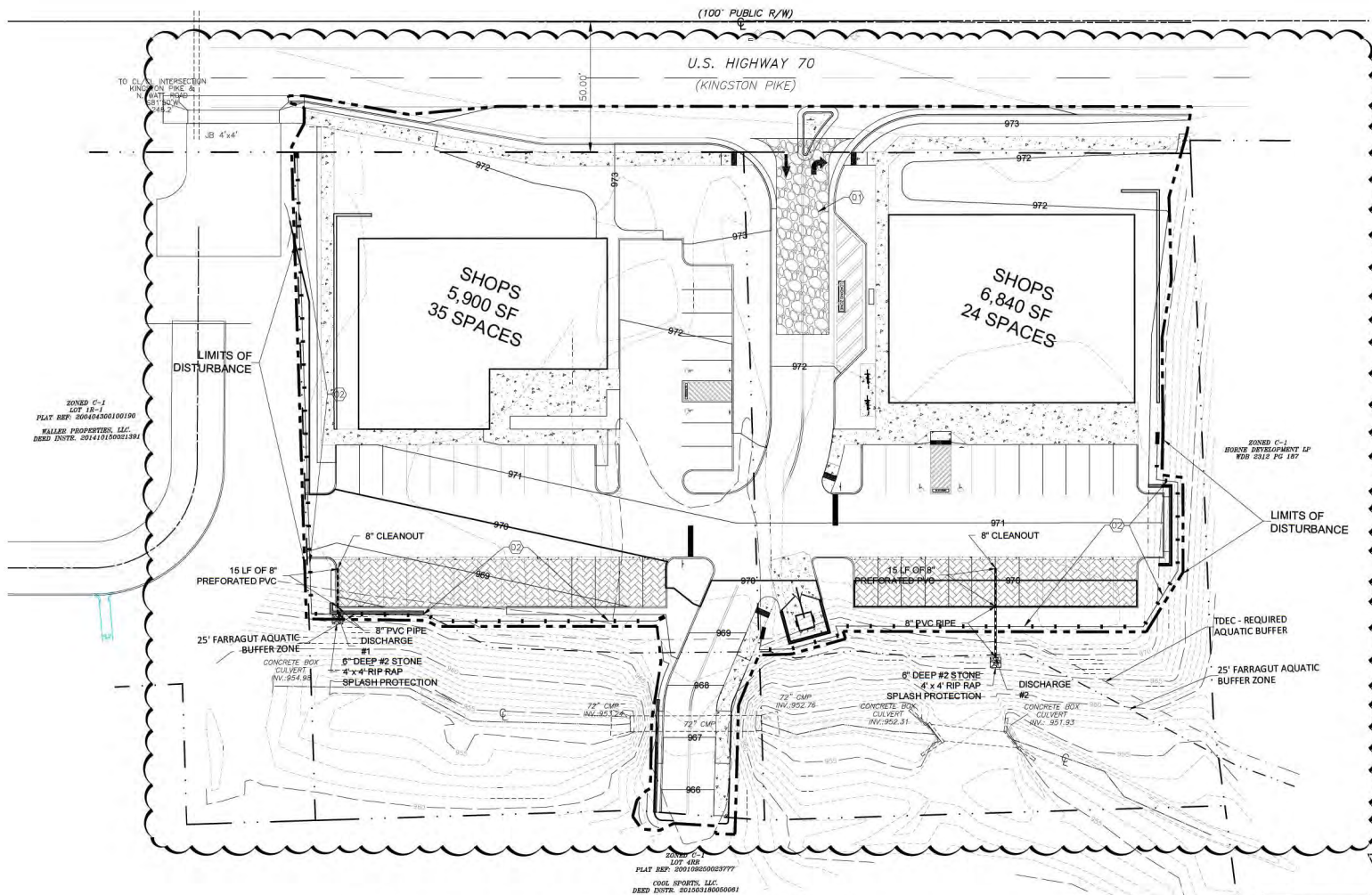
POB	POINT OF BEGINNING
DIR	EXISTING IRON ROD
NIR	NEW IRON ROD
AC	ACRES
SF	SQUARE FEET
WDB	WARRANTY DEED BOOK
MDB	MISC. RECORD BOOK
PG	PAGE
TYP	TYPICAL
R/W	RIGHT-OF-WAY
BR	BOLLARD (POST)
C	CENTERLINE
EN	FIRE HYDRANT (EXISTING)
OM	MANHOLE (EXISTING)
PP	POWER POLE (PP)
I	SIGN (POST)
WM	WATER METER
D-W	WATER VALVE
CMP	CORRUGATED METAL PIPE
BL	BOUNDARY LINE
RO	ROAD RIGHT-OF-WAY LINE
EL	EASEMENT LINE
BS	BUILDING SETBACK LINE
RD	ROAD CENTERLINE
ED	EDGE OF ROAD
EL	ELECTRIC LINE (OVERHEAD)
SL	SEWER LINE (EXISTING)
LC	LAKE/POND/CREEK LINE

CLIENT:
MYERS BROTHERS HOLDINGS LLC
12740 KINGSTON PIKE
SUITE 205
KNOXVILLE, TN 37934
OWNER OF RECORD:
WALLER PROPERTIES, LLC
P.O. BOX 159812
NASHVILLE, TN 37215-0812

TOPOGRAPHIC SURVEY

ABBOTT LAND SURVEYING LLC
STEVEN W. ABBOTT JR., RLS
1109 E. WOODSHIRE DRIVE
KNOXVILLE, TN 37922
OFFICE: (865) 671-1149
EMAIL: survmap@tds.net
www.abbottlandsurveying.com

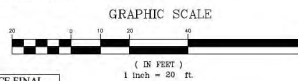
FOR MYERS BROTHERS HOLDINGS LLC
ADDRESS 13036 & 13038 KINGSTON PIKE
DISTRICT 6th COUNTY KNOX CITY KNOXVILLE STATE TN ZIP 37934
PLAT 20040430C100190 & 19960624000628
TAX MAP 151 GROUP PARCEL 084.01 & 085.00
WARRANTY DEED BK. 201410150021391 & 101410209031414
DATE: 07/27/2020 SCALE 1" = 20'
DRAWN BY SWA DRAWING NUMBER 307320



EP + SC PLAN - FINAL PHASE

Scale: 1" = 20'-0"

TOTAL LIMIT OF DISTURBANCE FINAL PHASE = 1.60 ACRES



FINAL PHASE SEQUENCE NOTES:

1. GRADE SITE, INSTALL UTILITIES
2. GRADE FOR PAVEMENT, AND PAVERS
3. FINISH FINAL GRADING, INSTALL ASPHALT, PAVERS, SINDER COURSE, PLACE CURB AND GUTTER AND SIDEWALKS.
4. INSTALL ALL LANDSCAPING
5. STABILIZATION OF SITE, APPLY FOR NOT AND REMOVE SILT FENCE, INLET PROTECTIONS.

THE PROPERTY IS DETERMINED TO BE INSIDE ZONE X. FLOOD INFORMATION TAKEN FROM FIRM MAP PANEL F470830351, PANEL 351 OF 430, REVISED 05/02/2007.

SITE IS LOCATED AT 13036 & 13038 KINGSTON PIKE, CLT MAP 151, PARCELS 085 & 08401. THE VERTICAL DATUM USED NAVD88.

A PRE-CONSTRUCTION MEETING WITH THE TOWN OF FARRAGUT IS REQUIRED PRIOR TO START OF CONSTRUCTION. CONTACT DARRYL SMITH AT 865-966-7057 TO SCHEDULE.

CONTRACTOR IS RESPONSIBLE FOR ALL "AS-BUILT" SURVEYS AS REQUIRED BY THE TOWN OF FARRAGUT TO RELEASE BOND(S) AND CERTIFICATE(S) OF OCCUPANCY.

ADEQUATE DRAINAGE, EROSION AND SEDIMENT CONTROL MEASURES, BEST MANAGEMENT PRACTICES, AND/OR OTHER STORMWATER MANAGEMENT FACILITIES SHALL BE PROVIDED AND MAINTAINED AT ALL TIMES DURING CONSTRUCTION. DAMAGES TO ADJACENT PROPERTY AND/OR THE CONSTRUCTION SITE CAUSED BY THE CONTRACTOR'S OR PROPERTY OWNER'S FAILURE TO PROVIDE AND MAINTAIN ADEQUATE DRAINAGE AND EROSION/SEDIMENT CONTROL FOR THE CONSTRUCTION ARE SHALL BE THE RESPONSIBILITY OF THE GRADING PERMITTEE.



SHEET 4 OF 18

EROSION CONTROL NOTES:

1. THE CONTRACTOR SHALL DESIGNATE A PERSON ON-SITE RESPONSIBLE FOR INSPECTING EROSION PREVENTION AND SEDIMENT CONTROL STRUCTURES AND PRACTICES. WHEN SELECTED, THIS PERSON SHALL BE REQUIRED TO HAVE SUCCESSFULLY COMPLETED THE LEVEL ONE TDEC COURSE ON THE PRINCIPLES OF EROSION PREVENTION AND SEDIMENT CONTROL ON CONSTRUCTION SITES AND A COPY OF THE CERTIFICATE VERIFYING THEY HAVE COMPLETED THE COURSE SHALL BE DISPLAYED AT A PROMINENT LOCATION ON THE CONSTRUCTION SITE.
2. EROSION CONTROL DEVICES SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH TDEC'S EROSION AND SEDIMENT CONTROL HANDBOOK AND TDEC'S CONSTRUCTION ACTIVITY PERMIT REQUIREMENTS. THE DEVICES SHOWN ON THE DRAWINGS ARE THE MINIMUM REQUIRED. THE CONTRACTOR SHALL PROVIDE ADDITIONAL EROSION CONTROL DEVICES AS NEEDED.
3. EROSION AND SEDIMENT CONTROL MEASURES MUST BE INSTALLED PRIOR TO DISTURBANCE OF EXISTING GROUND COVER. THEY MUST REMAIN IN PLACE AND FUNCTIONAL THROUGHOUT THE CONSTRUCTION PERIOD.
4. APPLY TEMPORARY SEEDING WHENEVER GRADING OPERATIONS ARE TEMPORARILY HALTED FOR OVER 14 DAYS AND FINAL GRADING OF EXPOSED SURFACES IS TO BE COMPLETED WITHIN ONE YEAR. APPLY TEMPORARY SEEDING TO STEEP SLOPES (GREATER THAN OR EQUAL TO 30%) WHENEVER GRADING OPERATIONS ARE TEMPORARILY HALTED FOR OVER 7 DAYS AND FINAL GRADING OF EXPOSED SURFACES IS TO BE COMPLETED WITHIN ONE YEAR. APPLY TEMPORARY SEEDING TO SOIL STOCKPILES.
5. APPLY PERMANENT SEEDING WHENEVER GRADING OPERATIONS ARE COMPLETED AND ALL CONSTRUCTION OPERATIONS WILL NOT IMPACT THE DISTURBED AREA. APPLY PERMANENT SEEDING TO ALL NON-CONSTRUCTION AREAS THAT SHOW SIGNS OF EXCESSIVE EROSION.
6. PERMANENT SEEDING SHALL BE DROUGHT TOLERANT, HYBRID KENTUCKY 31 (RESQUE, LANGLUE, LANCER, REBEL, I, FALCON, I, ETC.). SEED AT A RATE OF 6-8 POUNDS PER 1000 SQUARE FEET. USE A SLOW RELEASE STARTER FERTILIZER WITH 1 POUND PER 1000 SQUARE FEET OF NITROGEN. IF GRADING IS PERFORMED DURING THE WINTER MONTHS, SEED MIXTURE SHALL BE SUPPLEMENTED WITH A WINTER RYE OR OTHER APPROPRIATE MIXTURE ASSURE STABILIZATION DURING THE WINTER SEASON.
7. MULCH WITH STRAW AT A RATE OF 100 POUNDS PER 1000 SQUARE FEET OVER THE SEEDING AREAS.
8. IF THE ACTION OF VEHICLES TRAVELING OVER THE GRAVEL OF THE CONSTRUCTION EXIT IS NOT SUFFICIENT TO REMOVE THE MAJORITY OF DIRT AND/OR MUD, THEN THE TIRES MUST BE WASHED BEFORE THE VEHICLES ENTER A PUBLIC ROAD. PROVISIONS MUST BE MADE TO INTERCEPT THE WASH WATER AND TRAP THE SEDIMENT PRIOR IT IS ALLOWED TO LEAVE THE SITE.
9. ALL MATERIALS SPILLED, DROPPED, WASHED OR TRACKED FROM VEHICLES ONTO ROADWAYS OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY.
10. THE CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF SITE CONSTRUCTION POLLUTION PREVENTION CONTROLS THROUGHOUT THE LIFE OF THE PROJECT.
11. UPON COMPLETE STABILIZATION OF THE SITE, SILT FENCES AND OTHER TEMPORARY SILT BARRIERS SHALL BE REMOVED OR OTHERWISE PREVENTED FROM BECOMING A POLLUTANT SOURCE FOR STORMWATER DISCHARGES.
12. GENERAL CONTRACTOR SHALL DEVOTE ON THE PLAN THE TEMPORARY PARKING AND STORAGE AREAS, THE EQUIPMENT MAINTENANCE AND CLEANING AREA(S), EMPLOYEE PARKING AREAS AND AREAS FOR LOCATING PORTABLE FACILITIES, CONCRETE WASH DOWN OFFICE TRAILER AND TOILET FACILITIES.
13. ALL UNDISTURBED AREAS (I.E. STREAM BUFFERS, ARCHEOLOGICAL SITES, ETC.) SHALL BE FIELD MARKED AND KEPT FREE OF CONSTRUCTION EQUIPMENT.

SITE EROSION CONTROL CONSTRUCTION NOTES

- 1) CONSTRUCTION ENTRANCE UNTIL CURB AND GUTTER AND ASPHALT BASE COURSE INSTALLED.
- 2) SILT FENCE (WIRE SUPPORTED) AS DETAILED IN THE TDEC BMP MANUAL (CHAPTER 7.34), PROVIDED AND INSTALLED BY CONTRACTOR.
- 3) INLET PROTECTION TO BE SILT TRACK SEDIMENT CONTROL AT ALL INLETS BY ACF ENVIRONMENT AND AS DETAILED IN THE TDEC BMP MANUAL (CHAPTER 7.35), CONTRACTOR TO PROVIDE AND INSTALL.
- 4) CONCRETE TRUCK WASH DOWN AREA (TDEC BMP MANUAL CHAPTER 7.16), ACTUAL LOCATION TO BE DETERMINED BY THE CONTRACTOR AND THE DEVELOPER'S CONSTRUCTION MANAGEMENT PLAN.
- 5) SURFACE ROUGHING AS DETAILED IN THE TDEC BMP MANUAL (CHAPTER 7.5).
- 6) TOPSOIL THE SITE AS DETAILED IN THE TDEC BMP MANUAL (CHAPTER 7.3), CONTRACTOR TO REUSE THE EXISTING TOP SOIL FROM THE SITE AND TO PURCHASE TOP SOIL IF REQUIRED TO MEET THE REQUIREMENTS OF CHAPTER 7.3.
- 7) SEEDING THE SITE AS DETAILED IN THE TDEC BMP MANUAL (CHAPTER 7.9), PROVIDED AND INSTALLED BY CONTRACTOR.

The Owner is responsible for the installation and maintenance of construction pollution prevention controls throughout the life of the project.



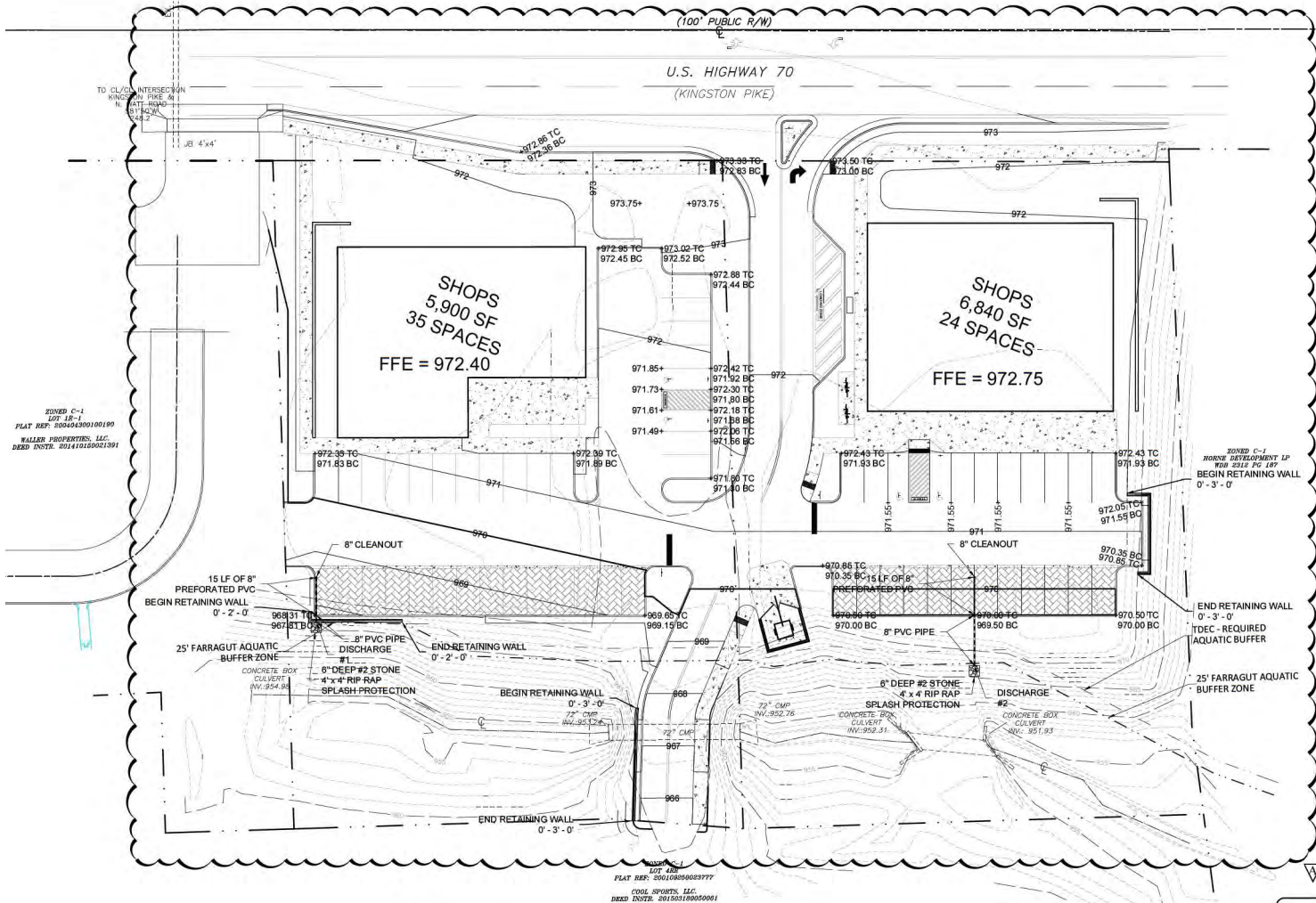
1313 Kalmia Road
Knoxville, TN 37909
Phn: 865.566.0185
Fax: 888.485.7005



REV.	DESCRIPTION	BY	DATE
A	Revised per TOF Comments	THF	11/06/2020
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
PROJECT NAME: 13036 & 13038 Kingston Pike			
DRAWING TITLE: ES + PC Plan - Final Phase			
LOCATION: 13036 & 13038 Kingston Pike			
CLT Map 151 Parcel Numbers 085 & 08401			
Owner: 36-38 Development		JOB NUMBER: 2204-C1.0	
		ISSUE DATE: 10/01/2020	
DRAWN BY: THF		SHEET NO: C1.1	
CHECKED BY: MAB			
FILE NAME: 2204			

SHEET 5 OF 18

5. EROSION PREVENTION AND SEDIMENT CONTROL (EPSC) MEASURES (3.5.3)



SITE GRADING, DRAINAGE & EROSION CONTROL DETAIL
REFERENCE LEGEND
MARK REFERENCED ITEM
HW HEADWALL
BO BASIN OUTLET STRUCTURE
CI CURB INLET
CB CATCH BASIN
RCP REINFORCED CONCRETE PIPE, CLASS III
SRMP SPIRAL RIBBED METAL PIPE, ALUMINIZED
BC BOTTOM OF CURB
TC TOP OF CURB
BW BOTTOM OF WALL
TW TOP OF WALL
IP ELEVATION OF PAVEMENT

STRIPPING AND COMPACTION SCHEDULE
Topsoil stripping depth 2'-3" average. Deeper if required locally.
Required compaction percentages (% max dry density)
Standard Proctor Method ASTM Test # D698
Building Area: 98% Parking Area: 98%

TESTING:
Allow 1 compaction test per ea. 2500 S.F. (Max 50' x 50' area) per lift at building area.
Allow 1 compaction test per each 10,000 S.F. of out or natural grade at building area.
Allow 1 compaction test per ea. 5500 S.F. (Max 75' x 75' area) per lift at parking area.
Allow 1 compaction test per each 40,000 S.F. of out or natural grade at parking area.

Maximum loose lift thickness shall be 8", unless noted otherwise.

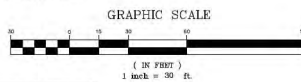
NOTE:
• ALL SLOPES SHALL BE 3:1 OR FLATTER!
• THERE SHALL BE NO CLEARING, GRADING, CONSTRUCTION OR DISTURBANCE OF SOIL AND/OR NATIVE VEGETATION WITHIN THE AQUATIC BUFFER EXCEPT AS PERMITTED BY THE TOWN OF FARRAGUT.
• ALL HANDICAP SPACES SHALL NOT ANY SLOPES IN ANY DIRECTION LOCATED WITHIN THE HANDICAP SPACE OR STRIPED ZONE GREATER THAN 2%.



SITE GRADING PLAN

Scale: 1" = 30'-0"

SEE COVER SHEET FOR LEGEND.



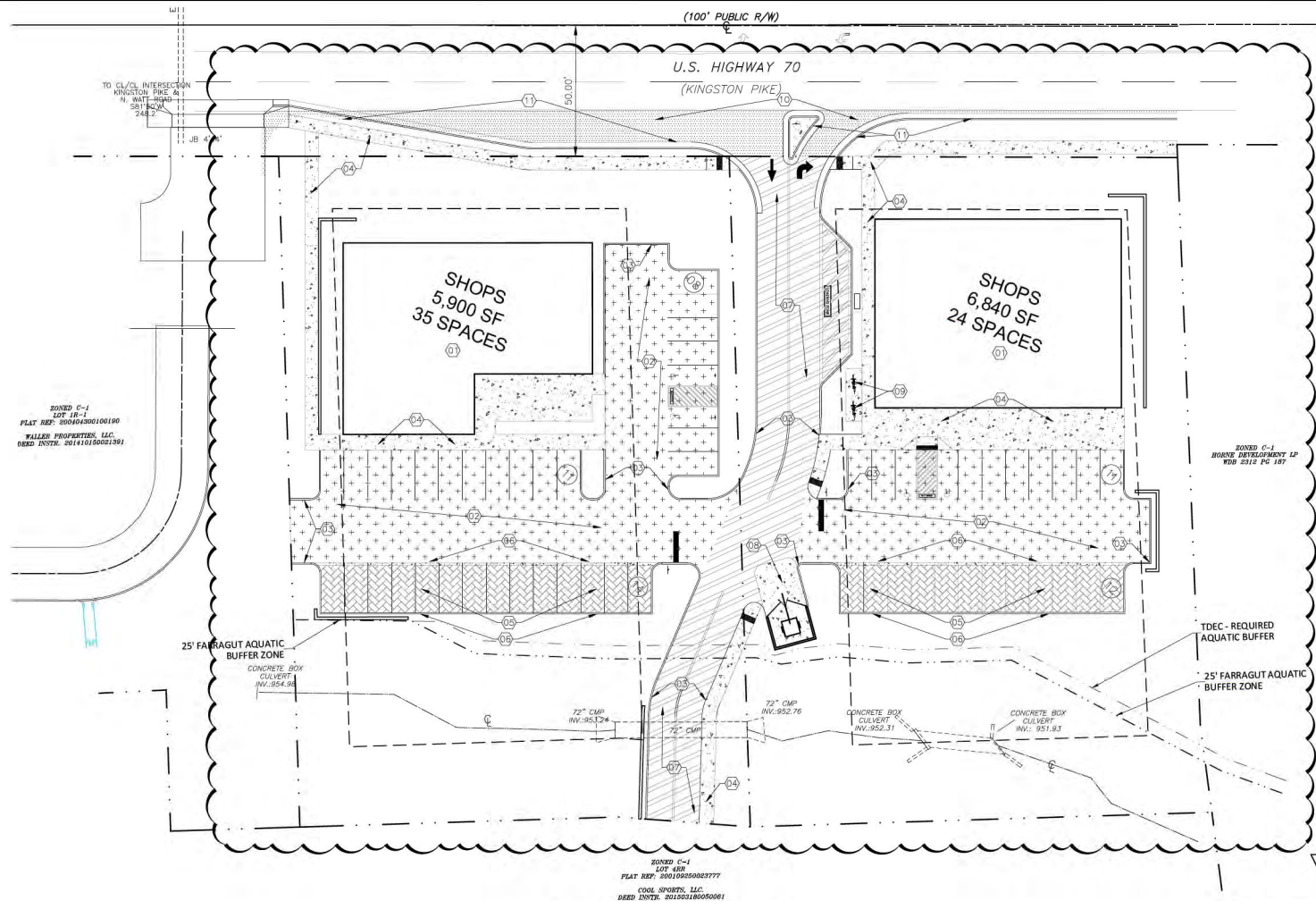
GBS
engineering

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Fax: 888.485.7005



SHEET 10 OF 18

REV.	DESCRIPTION	BY	DATE
A	Revised per TOF Comments	MAB	11/06/2020
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
PROJECT NAME: 13036 & 13038 Kingston Pike		DRAWN BY: THF	SHEET NO:
DRAWING TITLE: Site Grading Plan		CHECKED BY: MAB	
LOCATION: 13036 & 13038 Kingston Pike		FILE NAME: 2204	
CLT Map 151 Parcel Numbers 085 & 08401		JOB NUMBER 2204 - C4.0	
Owner: 36-38 Development		ISSUE DATE: 10/01/2020	C4.0



2008D C-1
LOT 15-1
PLAT REF: 200404300100190
WALLER PROPERTIES, LLC
DEED INSTR: 201410150021291

2008D C-1
HORNE DEVELOPMENT LP
WDB 2312 PG 187

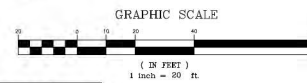
2008D C-1
LOT 80K
PLAT REF: 201501050023777
COOL SPORTS, LLC
DEED INSTR: 201503180050081



SITE PAVING PLAN

Scale: 1" = 20'-0"

SEE COVER SHEET FOR LEGEND.

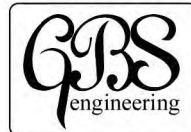
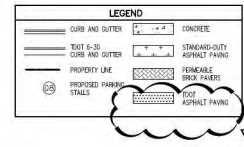


CONSTRUCTION NOTES

- 01 NEW BUILDING (SEE ARCHITECTURAL DRAWINGS), INSTALLED BY CONTRACTOR.
- 02 STANDARD-DUTY ASPHALT PAVEMENT. SEE DRAWING C9.0 DETAIL 2 FOR MORE DETAILS.
- 03 CONCRETE EXTRUDED CURB. SEE SHEET C9.0 DETAIL 3 FOR SPECIFICATIONS. INSTALLED BY CONTRACTOR.
- 04 4" REINFORCED CONCRETE SIDEWALK, 5' WIDE MINIMUM. SEE DRAWING C9.0 FOR MORE DETAILS.
- 05 PERMEABLE PAVERS. SEE SHEET C9.0 DETAIL 9 FOR SPECIFICATIONS.
- 06 NEW CONCRETE HEADER FOR PERMEABLE PAVEMENT SEPARATION. SEE DETAIL 12 ON SHEET C9.0 FOR MORE INFORMATION. CONTRACTOR TO PROVIDE AND INSTALL.
- 07 HEAVY DUTY ASPHALT PAVEMENT. SEE DRAWING C9.0 FOR MORE DETAILS.
- 08 CONCRETE PAVEMENT. SEE DRAWING C9.0 FOR MORE DETAILS.
- 09 NEW BICYCLE RACK. SEE DETAILS FOR MORE DETAIL. CONTRACTOR TO PROVIDE AND INSTALL.
- 10 T-OOT ASPHALT PAVEMENT. SEE DRAWING C9.0 DETAIL X FOR MORE DETAILS.
- 11 T-OOT 6-30 CURB AND GUTTER. SEE SHEET C9.0 DETAIL 15 FOR MORE SPECIFICATIONS. INSTALLED BY CONTRACTOR.

GENERAL PAVING NOTES

01. ALL MANHOLES LIDS MUST BE SET FLUSH WITH ADJACENT PAVERS.
02. SUB GRADE MUST BE COMPACTED TO 95% STANDARD PROCTOR WITH A WATER CONTENT WITHIN 1.5% OF OPTIMUM.
03. STONE BASE MUST BE COMPACTED TO 96% STANDARD PROCTOR WITH A WATER CONTENT WITHIN 1.5% OF OPTIMUM.



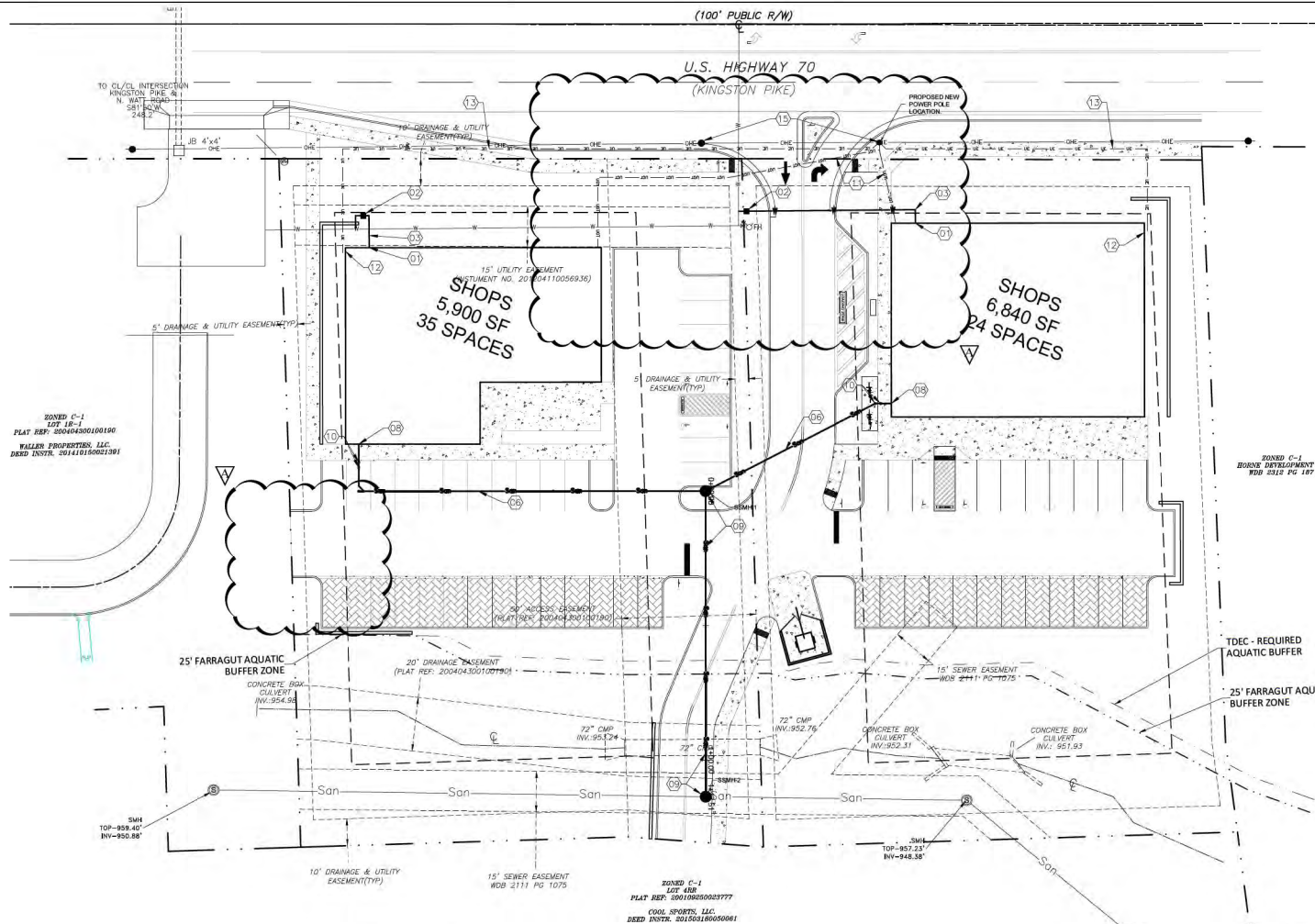
1313 Kalmia Road
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Fax: 888.485.7005



SHEET 11 OF 18

REV.	DESCRIPTION	BY	DATE
A	Revised per TOF Comments	THF	11/06/2020
-	-	-	-
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-	-	-	-
PROJECT NAME: 13036 & 13038 Kingston Pike		DRAWN BY: THF	SHEET NO:
DRAWING TITLE: Site Paving Plan		CHECKED BY: MAB	
LOCATION: 13036 & 13038 Kingston Pike		FILE NAME: 2204	
CLT Map 151 Parcel Numbers 085 & 08401		JOB NUMBER 2204 - C5.0	
Owner: 36-38 Development		ISSUE DATE: 10/01/2020	

C5.0



UTILITY PLAN CONSTRUCTION NOTES

1. CONTRACTOR TO CONNECT TO 1" WATER SERVICE LINE AT THE BUILDING.
2. CONTRACTOR TO COORDINATE WITH FIRST UTILITY DISTRICT FOR THE INSTALLATION OF A NEW 1" WATER METER. CONTRACTOR TO PAY ALL FEES.
3. CONTRACTOR SHALL PROVIDE AND INSTALL NEW 1" WATER SERVICE PER FIRST UTILITY DISTRICT REQUIREMENTS. CONTRACTOR COORDINATE WITH FIRST UTILITY AND PAY ALL FEES.
4. CONTRACTOR TO PROVIDE AND INSTALL NEW 6" DIP WATER MAIN MEETING OR EXCEEDING FIRST UTILITY DISTRICTS STANDARD SPECIFICATIONS.
5. CONTRACTOR TO RELOCATE THE EXISTING FIRE HYDRANT AS SHOWN.
6. CONTRACTOR TO PROVIDE AND INSTALL FLUSHING HYDRANT ASSEMBLY AS SHOWN AND MEETING OR EXCEEDING FIRST UTILITY DISTRICTS STANDARD SPECIFICATIONS.
7. CONTRACTOR TO PROVIDE AND INSTALL 6" PVC SANITARY SEWER SERVICE WITH THE APPROPRIATE CLEANSOUTS TO THE FIRST UTILITY DISTRICT SPECIFICATIONS. MINIMUM SLOPE SHALL BE 1.00 %.
8. CONTRACTOR TO CONNECT TO 6" PVC BUILDING SANITARY SEWER LINE. (4.00' MIN. BELOW FF)
9. CONTRACTOR TO PROVIDE AND INSTALL NEW SANITARY SEWER MANHOLES AND 8" SANITARY SEWER MAIN MEETING OR EXCEEDING FIRST UTILITY DISTRICTS STANDARD SPECIFICATIONS.
10. CONTRACTOR TO PROVIDE AND INSTALL 6" Ø DOUBLE CLEANSOUT.
11. CONTRACTOR TO PROVIDE AND INSTALL TWO 2" Ø CONDUITS FOR UNDERGROUND TELEPHONE/INTERNET SERVICE.
12. CONTRACTOR TO COORDINATE WITH LENOIR CITY UTILITIES BOARD TO PROVIDE A 3-PHASE, 600 AMP SERVICE TO BUILDING.
13. CONTRACTOR SHALL PROVIDE AND INSTALL 4 - 2" Ø PVC CONDUITS FOR ELECTRIC PRIMARY.
14. CONTRACTOR SHALL COORDINATE WITH KUB TO PROVIDE GAS SERVICE AND METER TO BUILDING. CONTRACTOR TO PAY ALL FEES.
15. EXISTING POLE AND OVERHEAD LINES TO BE RELOCATED BY LENOIR CITY UTILITIES BOARD. CONTRACTOR TO PAY ALL FEES.

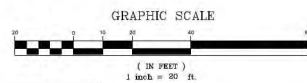
FIRE FLOW CALCULATIONS
 PROPOSED BUILDING TO BE CONSTRUCTED TO MEET THE TYPE V-B CONSTRUCTION.
 IFC APPENDIX B YIELDS THE REQUIRED FIRE FLOWS -
 ASSUME THE MAXIMUM OF 4,000 SF YIELDS A REQUIRED FIRE FLOW OF 1,750 GPM FOR A MINIMUM OF 2 HOURS.
 IFC APPENDIX C YIELDS THE REQUIRED MINIMUM NUMBER OF FIRE HYDRANTS AND SPACING - 1,750 GPM REQUIRES MIN 1 HYDRANTS WITH MAX SPACING OF 500 FEET.
 EXISTING FIRE HYDRANT FLOWS PROVIDED BY FIRST UTILITY DISTRICT OF KNOX COUNTY. HYDRANT WAS FLOWED 01/13/2020, WITH STATIC PRESSURE OF 123 PSI. RESIDUAL PRESSURE OF 115 PSI AND A FLOW OF 1405 GPM.

LOCAL UTILITY PROVIDERS

1. FIRST UTILITY DISTRICT
 WATER
 122 DURWOOD ROAD
 KNOXVILLE, TENNESSEE 37922
 PHONE: 865-966-9741
2. FIRST UTILITY DISTRICT
 SANITARY
 122 DURWOOD ROAD
 KNOXVILLE, TENNESSEE 37922
 PHONE: 865-966-9741
3. LENOIR CITY UTILITIES BOARD
 ELECTRIC
 7598 CREEKWOOD PARK BOULEVARD
 KNOXVILLE, TENNESSEE 37771
 PHONE: 844-687-5282
4. KNOXVILLE UTILITIES BOARD
 NATURAL GAS
 4428 WESTERN AVENUE
 KNOXVILLE, TENNESSEE 37921
 PHONE: 865-524-2911
5. COMCAST
 CABLE
 5720 ASHEVILLE HIGHWAY
 KNOXVILLE, TENNESSEE 37924
 PHONE: 865-537-5411
6. AT&T
 TELEPHONE
 900 SOUTH GAY STREET
 KNOXVILLE, TENNESSEE 37902
 PHONE: 865-564-9900
7. RURAL METRO FIRE DEPARTMENT
 LOCAL FIRE DEPARTMENT
 5211 CALLAHAN ROAD, SUITE 102
 KNOXVILLE, TENNESSEE 37921
 PHONE: 865-960-0239
8. TENNESSEE DEPARTMENT OF TRANSPORTATION
 DOT
 7345 REGION LANE
 KNOXVILLE, TENNESSEE 37914
 PHONE: 865-994-9170

NOTE:
 * UNDERGROUND PRIMARY ELECTRIC SHOWN IS SCHEMATIC. ACTUAL ROUTING OF UNDERGROUND ELECTRIC PRIMARY WILL BE DESIGN BY LENOIR CITY UTILITY BOARD. GBS ENGINEERING ACKNOWLEDGES THIS IS A REQUIREMENT OF THE TOWN OF FARRAGUT, BUT IS NOT CERTIFIED TO DESIGN ELECTRIC PRIMARY.

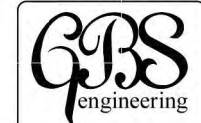
SITE UTILITY PLAN Scale: 1" = 20'-0"



SEE COVER SHEET FOR LEGEND.

STRUCTURE TABLE			
STRUCTURE NAME	DETAILS	PIPES IN	PIPES OUT
SSMH-1	48" RIM = 971.75 SLUMP = 965.5		SSMH1 to SSMH2, 8" PVC INV OUT = 966.00
SSMH-2	48" RIM = 966.35 SLUMP = 949.3	SSMH1 to SSMH2, 8" PVC INV IN = 958.94	

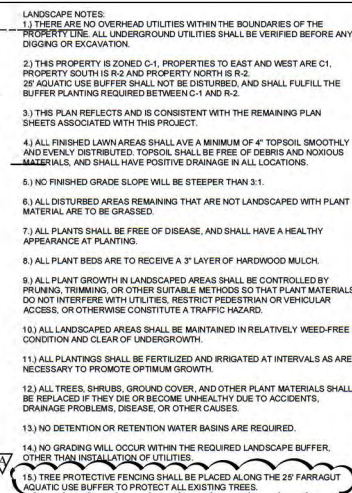
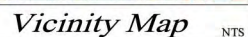
Pipe Table				
NAME	SIZE	LENGTH	SLOPE	MATERIAL
SSMH1 to SSMH2	8"	113.51'	6.31%	PVC



1313 Kalmia Road
 Knoxville, TN 37909
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 Fax: 888.485.7005



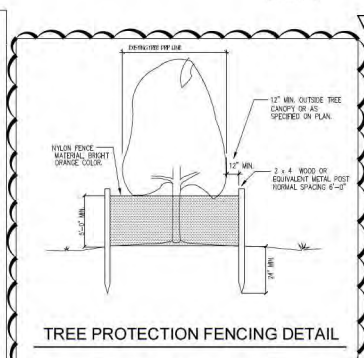
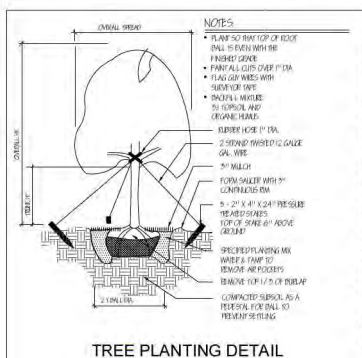
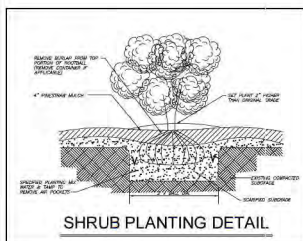
REV	DESCRIPTION	BY	DATE
A	Revised per TOF Comments	THF	11-06-2020
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
PROJECT NAME: Project Site Utility Plan		DRAWN BY: THF	SHEET NO:
DRAWING TITLE: 13036 & 13038 Kingston Pike Knoxville, TN 37934		CHECKED BY: MAB	
LOCATION: CLT Map 151 Parcel Numbers 085 & 08401		FILE NAME: 2204	
Owner: 36-38 Development		JOB NUMBER: 2204 - C6.0	
		ISSUE DATE: 10/01/2020	



SITE: 2.00 ACRES 87,179.13 SF
TOTAL NON-LANDSCAPED AREA = 44,917.16 SF
TOTAL IMPERVIOUS AREA = 40,354.65 SF (40,354.65/87,179.13 = .46)
ZONING C-1 TOTAL 46.3 PERCENT IMPERVIOUS

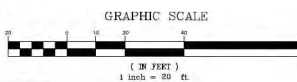
1 SHADE TREE/2500 S.F. NON PLANTED AREA -
NON PLANTED AREA ON SITE 44,917.16 SF
(44,917.16 / 2500) = 17.97 (18)

TREES REQUIRED 18 - TREES PROVIDED 8 (8 NEW)
100% MUST REACH 30' HEIGHT AND WIDTH - 8 SHADE (100%)
6 RIVER BIRCHES SUBSTITUTED
3 REFLECTIVE SUBSTITUTED



SITE LANDSCAPING PLAN

Scale: $1'' = 20'-0''$



SEE COVER SHEET FOR LEGEND.

PLANT SCHEDULE						
SYMBOL	BOTANICAL NAME	COMMON NAME	MINIMUM SIZE	QUANTITY	TYPE	
	CURLEW BUSH	NORTHERN BOPON	2" CALIPER	8	SHORT TREE	
	IRON TREE	IRON TREE	2" CALIPER, 8' H	8	SHORT TREE	
	CORDYLINE CANDICANS	EASTERN REDWOOD	6 FT	5	UNDERSTORY TREE	
	CORDYLINE ALLOTA	FLOWERING DOGWOOD	6 FT	2	UNDERSTORY TREE	
	EUCALYPTUS	ENGLISH DOGWOOD	1 GALLON	22	EVERGREEN SHRUB	
	IMPATIENS PANDOLINA "JUNE"	LITTLE LEAF IMPATIENS	2 GALLON	25	FLOWERING SHRUB	
	E. & C. CORNUS VIGOROSA	SHAW'S PLUM-BERRY HOLLY	5 GALLON	15	SHRUB	
	WEIGELA FLORIDA	WEIGELA	6' HEIGHT	9	UNDERSTORY FLOWERING SHRUB	



SHEET 13 OF 18

SITE LANDSCAPE PLAN PREPARED BY TRAVIS FERRELL,
(DESIGNER WITH BACHELORS DEGREE IN LANDSCAPE DESIGN)



1313 Kalmia Road
Knoxville, TN 37909
Phn: 865.566.0185
Fax: 888.485.7005



REV.	DESCRIPTION	BY	DATE
A	Revised per TOF Comments	THF	11/06/2020
--	--	--	--
--	--	--	--
--	--	--	--
--	--	--	--
--	--	--	--

PROJECT NAME:	13036 & 13038 Kingston Pike	DRAWN BY:	THF	SHEET NO:
DRAWING TITLE:	Site Landscaping Plan	CHECKED BY:	MAB	C7.0
LOCATION:	13036 & 13038 Kingston Pike Knoxville, TN 37934	FILE NAME:	2204	
	CLT Map 151 Parcel Numbers 085 & 08401	JOB NUMBER:	2204 - C7.0	
Owner:	36-38 Development	ISSUE DATE:	10/01/2020	



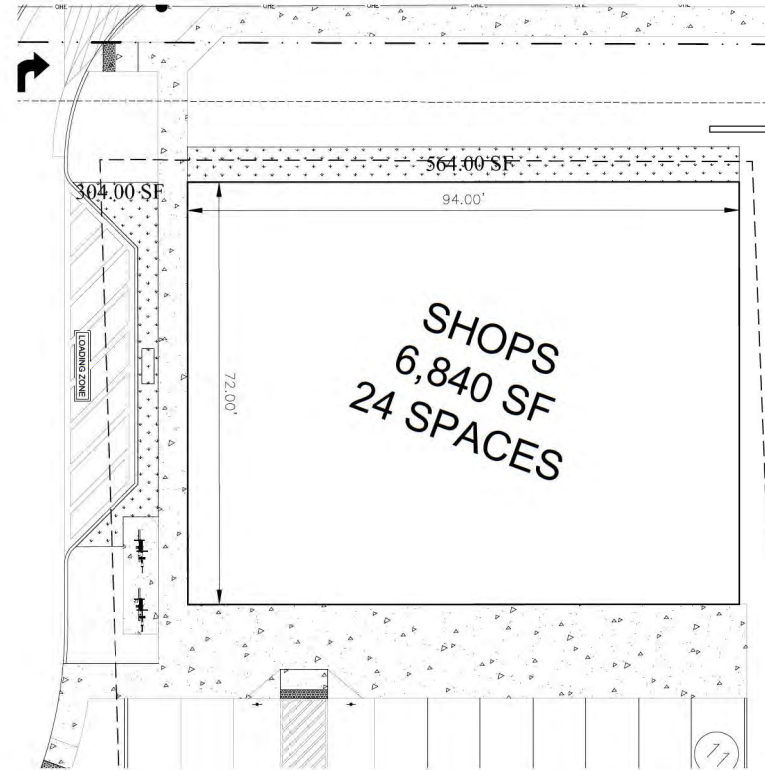
LANDSCAPE CALCULATIONS:
 REQUIRED LANDSCAPE AREA
 LINEAR FOOTAGE OF BUILDING x 2.5' =
 263 LF x 2.5 = 657.50 SF REQUIRED
 PROVIDED LANDSCAPE AREA = 813.58 SF



BUILDING PERIMETER LANDSCAPING

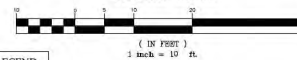
Scale: 1" = 10'-0"

SEE COVER SHEET FOR LEGEND.

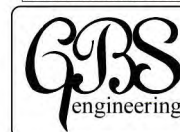


LANDSCAPE CALCULATIONS:
 REQUIRED LANDSCAPE AREA
 LINEAR FOOTAGE OF BUILDING x 2.5' =
 280 LF x 2.5 = 650 SF REQUIRED
 PROVIDED LANDSCAPE AREA 564.00 + 304.00 = 868 SF

GRAPHIC SCALE



(SITE LANDSCAPE PLAN PREPARED BY TRAVIS FERRELL,
 (DESIGNER WITH BACHELORS DEGREE IN LANDSCAPE DESIGN.)

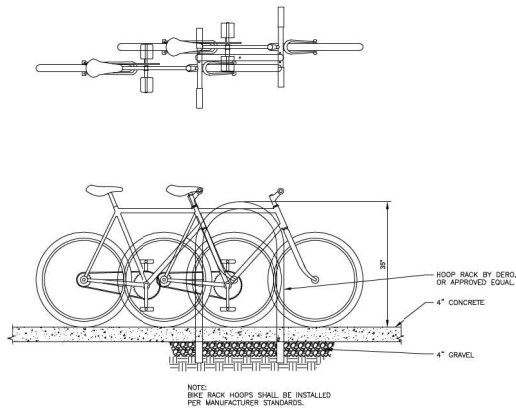


1313 Kalmia Road
 Knoxville, TN 37909
 Phn: 865.566.0185
 Fax: 888.485.7005



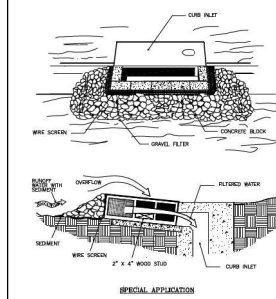
SHEET 14 OF 18

REV.	DESCRIPTION	BY	DATE
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
PROJECT NAME: 13036 & 13038 Kingston Pike		DRAWN BY: THF	SHEET NO: C7.1
DRAWING TITLE: Site Landscaping Plan		CHECKED BY: MAB	
LOCATION: 13036 & 13038 Kingston Pike		FILE NAME: 2204	
CLT Map 151 Parcel Numbers 085 & 08401		JOB NUMBER 2204 - C7.0	
Owner: 8	36-38 Development	ISSUE DATE: 10/01/2020	



09
C.B.O. **BIKE RACK DETAILS**
N.T.S.

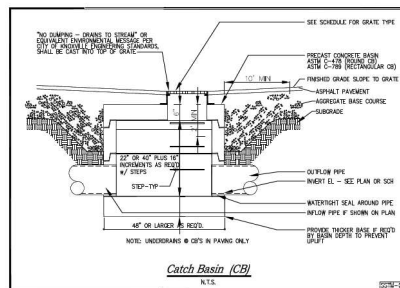
BLOCK & GRAVEL CURB INLET SEDIMENT FILTER



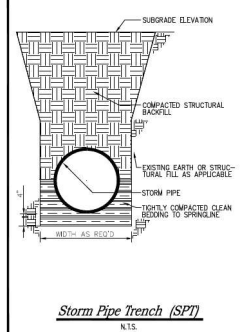
SPECIAL APPLICATION
THIS METHOD OF INLET PROTECTION IS APPLICABLE AT CURB INLETS WHERE AN OVERFLOW CAPABILITY IS NECESSARY TO PREVENT EXCESSIVE PONDING IN FRONT OF THE STRUCTURE.
* GRAVEL SHALL BE VDOT #5, #507 OR #5 COARSE AGGREGATE

SOURCE: VA. DOW

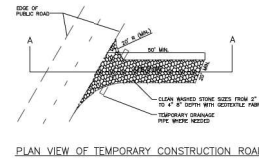
PLATE 3.07-B



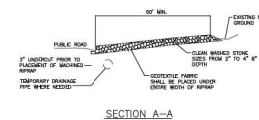
Catch Basin (CB)
N.T.S.



Storm Pipe Trench (SPT)
N.T.S.



PLAN VIEW OF TEMPORARY CONSTRUCTION ROAD



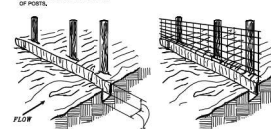
SECTION A-A

CONSTRUCTION EXIT

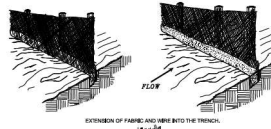
08
C.B.O. N.T.S.

CONSTRUCTION OF A SILT FENCE (WITH WIRE SUPPORT)

1. SET POSTS AND EXCAVATE A 10\"/>

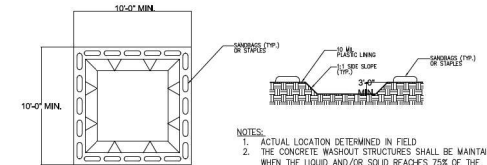


2. ATTACH THE FILTER FABRIC TO THE WIRE FENCE AND EXTEND IT INTO THE TRENCH.



SILT FENCE WITH WIRE SUPPORT

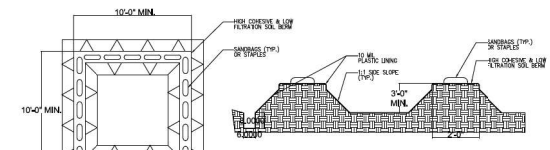
07
C.B.O. N.T.S.



NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY.
3. CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARLY MARKED WITH SIGNAGE NOTING DEVICE.



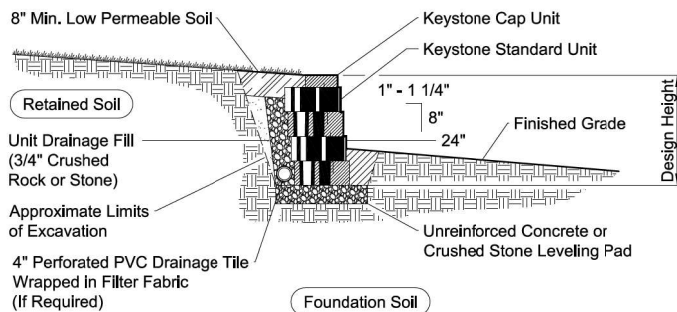
BELOW GRADE WASHOUT STRUCTURE
N.T.S.



NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY TO PROVIDE ADEQUATE HOLDING CAPACITY WITH A MINIMUM 12 INCHES OF FREEBOARD.
3. CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARLY MARKED WITH SIGNAGE NOTING DEVICE.



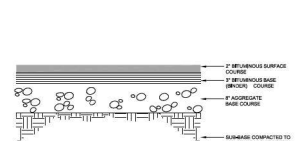
ABOVE GRADE WASHOUT STRUCTURE
N.T.S.



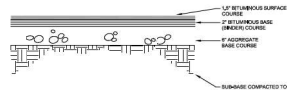
04
C.B.O. **GENERIC RETAINING WALL DETAIL**
N.T.S.

1313 Kalmia Road
Knoxville, TN 37909
Phn: 865.566.0185
Fax: 888.485.7005

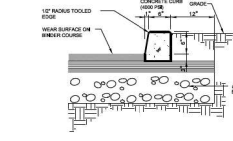
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A	Revised per Town of Farragut Comments	MAB	11/06/2020
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-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
PROJECT NAME: 13036 & 13038 Kingston Pike		DRAWN BY: THF	SHEET NO:
DRAWING TITLE: Detail Sheet		CHECKED BY: MAB	C8.0
LOCATION: 13036 & 13038 Kingston Pike		FILE NAME: 2204	
CLT Map 151 Parcel Numbers 085 & 08401		JOB NUMBER: 2204 - C8.0	
Owner: 36-38 Development		ISSUE DATE: 10/01/2020	



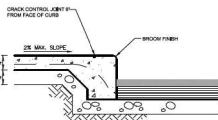
HEAVY DUTY ASPHALT SECTION
1'-0"



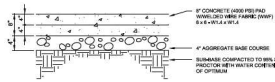
STANDARD DUTY ASPHALT SECTION
1'-0"



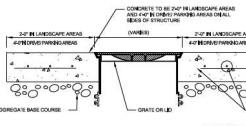
EXTRUDED CONCRETE CURB
1'-0"



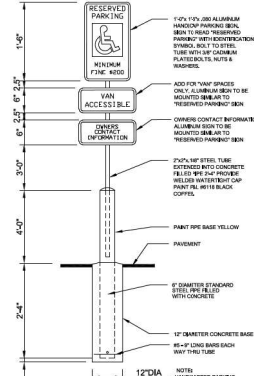
SIDEWALK TURNDOWN DETAIL
1'-0"



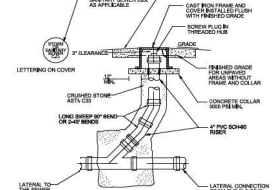
TRASH ENCLOSURE CONCRETE PAD SECTION
1'-0"



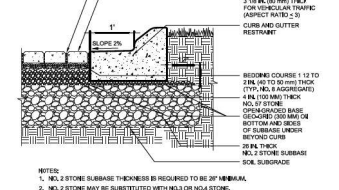
CONCRETE COLLAR DETAIL
1'-0"



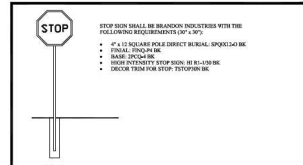
ABOVE GRADE HANDICAP SIGN
1'-0"



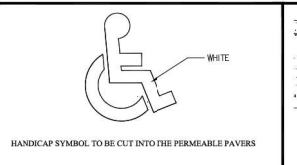
CLEAN OUT DETAIL
1'-0"



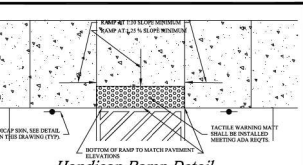
PERMEABLE PAVEMENT SECTION
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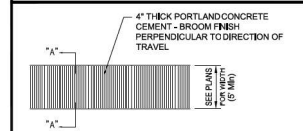
Stop Sign Detail
1'-0"



Handicap Symbol
1'-0"



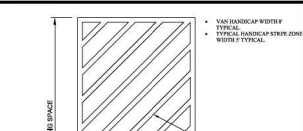
Handicap Ramp Detail
1'-0"



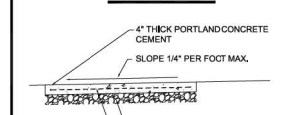
Sidewalk Plan
1'-0"



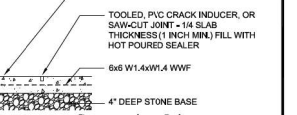
Expansion Joint
1'-0"



Handicap Striping Detail
1'-0"



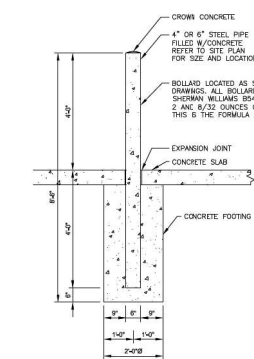
Sidewalk Section A-A
1'-0"



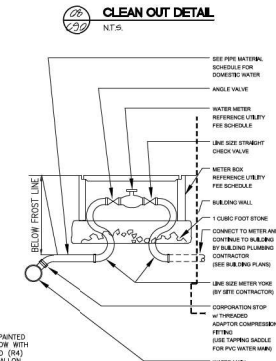
Contraction Joint
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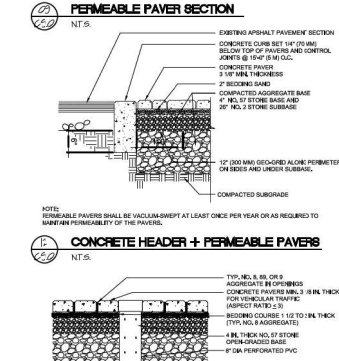
Concrete Sidewalk Joint Details
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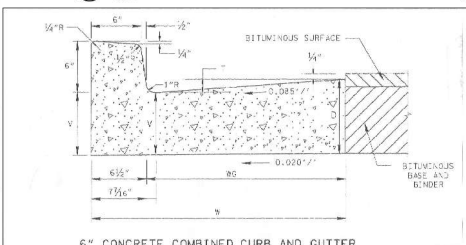
PIPE BOLLARD DETAIL
1'-0"



WATER METER
1'-0"



SECTION OF 8" DIA MONITORING WELL
1'-0"



6" CONCRETE COMBINED CURB AND GUTTER
1'-0"

6" CONCRETE COMBINED CURB AND GUTTER TABLE				
TYPE	TOTAL WIDTH (W) IN INCHES	WIDTH OF GUTTER (WG) IN INCHES	VERTICAL DROP (V) IN INCHES	VERTICAL DEPTH (VD) OF GUTTER AT FLOW LINE
6-30	30	23 1/2	2	D = 1.53"
6-36	36	29 1/2	2 1/2	D = 1.91"
6-42	42	35 1/2	3	D = 2.29"

VERTICAL DEPTH (VD) MUST ALWAYS EXCEED SIX (6) INCHES.

GCS
engineering

1313 Kalmia Road
Knoxville, TN 37909
Phn: 865.566.0185
Fax: 865.485.7005

REV	DESCRIPTION	BY	DATE
1	AS NOTED	THF	10/01/2020
2	AS NOTED	THF	10/01/2020
3	AS NOTED	THF	10/01/2020
4	AS NOTED	THF	10/01/2020
5	AS NOTED	THF	10/01/2020
6	AS NOTED	THF	10/01/2020
7	AS NOTED	THF	10/01/2020
8	AS NOTED	THF	10/01/2020
9	AS NOTED	THF	10/01/2020
10	AS NOTED	THF	10/01/2020

PROJECT NAME: 36-38 Development

DRAWING TITLE: Detail Sheet

LOCATION: 13036 & 13038 Kingston Pike, Knoxville, TN 37934

Owner: 36-38 Development

DRAWN BY: THF

CHECKED BY: MAB

FILE NAME: 2204

JOB NUMBER: 2204-C9.0

ISSUE DATE: 10/01/2020

SHEET NO: C9.0



PERSPECTIVE VIEW



PERSPECTIVE VIEW



WEST ELEVATION
SCALE 1/8"=1'-0"



SOUTH ELEVATION
SCALE 1/8"=1'-0"



EAST ELEVATION
SCALE 1/8"=1'-0"



NORTH ELEVATION
SCALE 1/8"=1'-0"

SPEC BUILDING EXTERIOR ELEVATIONS
13036 KINGSTON PIKE



PERSPECTIVE VIEW



PERSPECTIVE VIEW



WEST ELEVATION
SCALE 1/8"=1'-0"



SOUTH ELEVATION
SCALE 1/8"=1'-0"



EAST ELEVATION
SCALE 1/8"=1'-0"



NORTH ELEVATION
SCALE 1/8"=1'-0"

SPEC BUILDING EXTERIOR ELEVATIONS

REPORT TO THE FARRAGUT MUNICIPAL PLANNING COMMISSION

PREPARED BY: Bart Hose, Assistant Community Development Director

SUBJECT: Discussion and public hearing on a concept plan for the Meadows on McFee, 933 and 1013 McFee Road, Zoned R-1/OSR, 32 Acres, 59 Lots (Homestead Land Holdings, LLC, Applicant)

INTRODUCTION AND BACKGROUND: This request involves a concept plan for the proposed Meadows on McFee Subdivision. The property in question includes the former Gibson Farm property and a portion of the Velma Seal property. The Gibson Farm portion of the property was rezoned by the Board of Mayor and Aldermen last month. The Board is considering the same R-1/OSR zoning for the Seal property area this month.

DISCUSSION: The proposed subdivision includes 59 building lots, a main loop street configuration with two (2) access points along McFee Road, and open-space areas. The proposed internal street/transportation system also includes both street and walking trail connections to the properties located to the north and south of the project.

RECOMMENDATION: Included in your packet is the applicant's revised concept plan. Staff will make a recommendation at the meeting based on whether and how the applicant has addressed all initial staff comments. Any approval will need to be made subject to the final rezoning of the Seal property noted above.

CONCEPT PLAN

THE MEADOWS ON MCFEE

FARRAGUT, TN

CONCEPTUAL: NOT FOR CONSTRUCTION



1013 MCFEE RD & 933 MCFEE RD, FARRAGUT, TN 37934
CLT MAP 162 PARCELS 019 & 014.04
32 ACRES

OCTOBER 19, 2020
REVISED: NOVEMBER 9, 2020

TABLE OF CONTENTS	
1	TITLE PAGE
2	CP.01 EXISTING SITE FEATURES
3	CP.02 CONCEPT LAYOUT
4	CP.03 STREESCAPING PLAN
5	CP.04 ROAD PLAN AND PROFILE
6	CP.05 ROAD PLAN AND PROFILE
7	CP.06 ROAD PLAN AND PROFILE
8	CP.07 DETAILS

DEVELOPER:
HOMESTEAD LAND HOLDINGS, LLC
BOB MOHNEY
122 PERIMETER PARK DR
KNOXVILLE, TN 37922
865-392-5630
bmohney@saddlebrookproperties.com

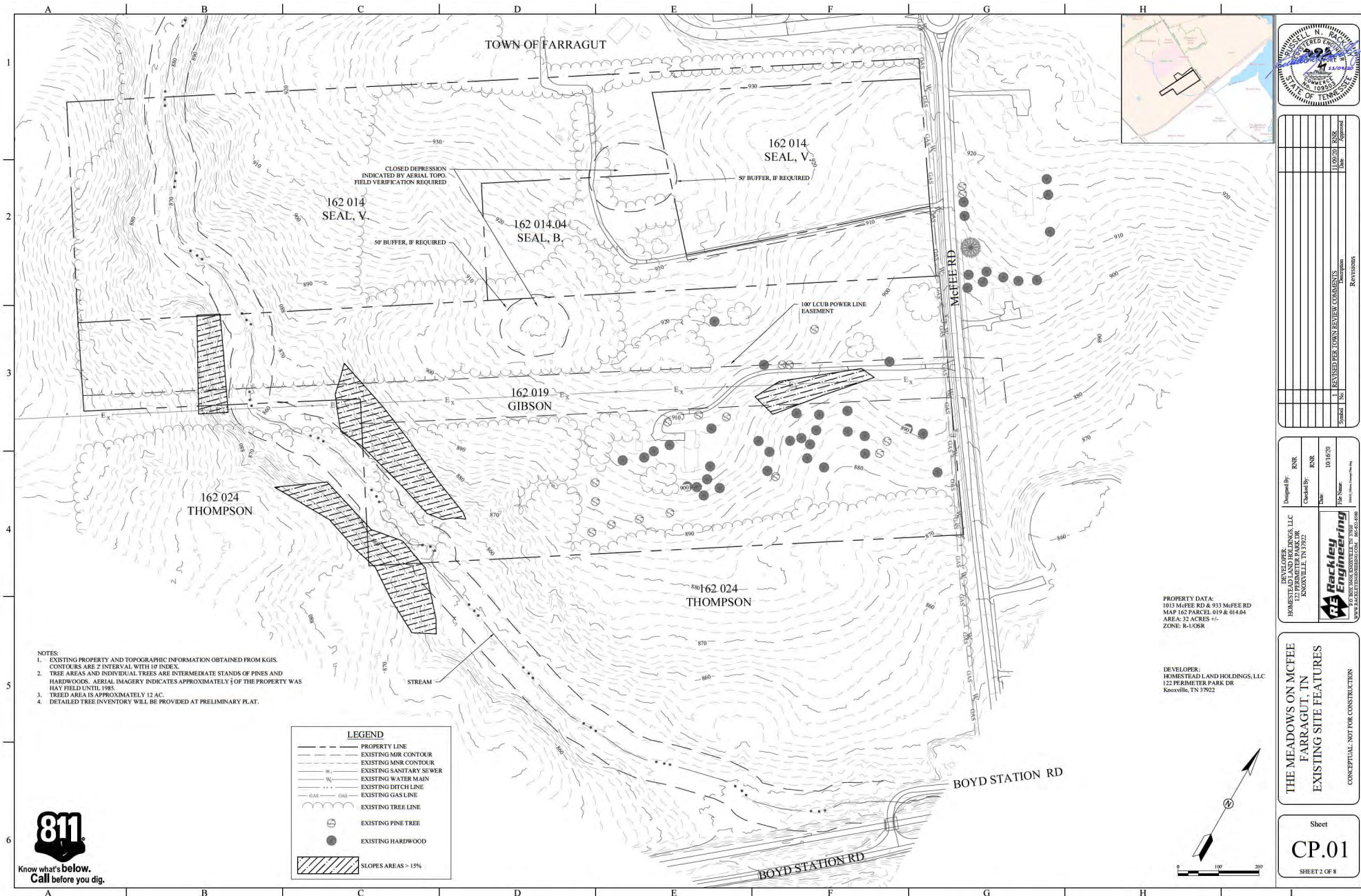
ENGINEERING BY:



P.O. BOX 30456, KNOXVILLE, TN, 37930
WWW.RACKLEYENGINEERING.COM 865-622-6560
mrackley@rackleyengineering.com



UTILITIES:
FUD WATER
FUD SEWER
KUB GAS
LCUB ELECTRIC
TDS COMMUNICATIONS



- NOTES:
1. EXISTING PROPERTY AND TOPOGRAPHIC INFORMATION OBTAINED FROM KGIS.
 2. CONTOURS ARE 2' INTERVAL WITH 10' INDEX.
 3. A 10' DRAINAGE AND UTILITY EASEMENT EXISTS ALONG A STREET RIGHT OF WAY, 10' ALONG EXTERIOR BOUNDARY AND 5' ALONG ALL INTERIOR LOT LINES.
 4. ALL DIMENSIONS ARE SUBJECT TO CHANGE ON FINAL PLAN.
 5. ALL LOTS SHALL HAVE INTERNAL STREET ACCESS ONLY.
 6. ALL ROADS TO BE IN 50' PUBLIC RIGHT OF WAY.
 7. CONSTRUCTION PLANS MUST BE APPROVED BY APPROPRIATE AGENCIES AND PERMITS OBTAINED PRIOR TO ANY CONSTRUCTION ACTIVITY.
 8. ALL STRUCTURES WILL HAVE TO BE LOCATED AT LEAST 50' FROM THE TOP OF SINKHOLE/CLONED CONTOUR AREAS IDENTIFIED ON THE PLAN. CONSTRUCTION WITHIN THE 50' SETBACK MAY BE PERMITTED IF A GEOTECHNICAL STUDY PREPARED BY A REGISTERED ENGINEER STATES THAT BUILDING WITHIN THE 50' SINKHOLE BUFFER IS ACCEPTABLE AND THE STUDY IS APPROVED BY THE TOWN OF FARRAGUT DEPARTMENT OF ENGINEERING. ENGINEERED FOOTINGS MAY BE REQUIRED FOR ANY STRUCTURES WITHIN THE 50' SINKHOLE BUFFER.
 9. DETENTION PONDS WILL REQUIRE 20' TRAVERSABLE ACCESS EASEMENTS ON FINAL PLAN.
 10. ROAD CENTERLINE HORIZONTAL GEOMETRY DATA PROVIDED ON PLAN AND PROFILE SHEETS INCLUDED WITH THE CONCEPT PLAN.



Revisions	Revised Per Town Review Comments	Revised	By	Date
1	REVISED PER TOWN REVIEW COMMENTS	11/02/20	RNR	11/02/20

DESIGNED BY: RNR	CHECKED BY: RNR	DATE: 10/16/20
DRAWN BY: HOMESTEAD AND HOLDINGS, LLC 132 PERIMETER PARK DR KNOXVILLE, TN 37922		DATE: 10/16/20
PROJECT NAME: THE MEADOWS ON MCFEE FARRAGUT, TN CONCEPT LAYOUT		DATE: 10/16/20



Revisions	Description	By	Date
1	REVISED PER TOWN REVIEW COMMENTS	RNR	11/09/20

Designed By:	RNR
Checked By:	RNR
Date:	10/16/20
File Name:	101620
Scale:	As Shown On The Map

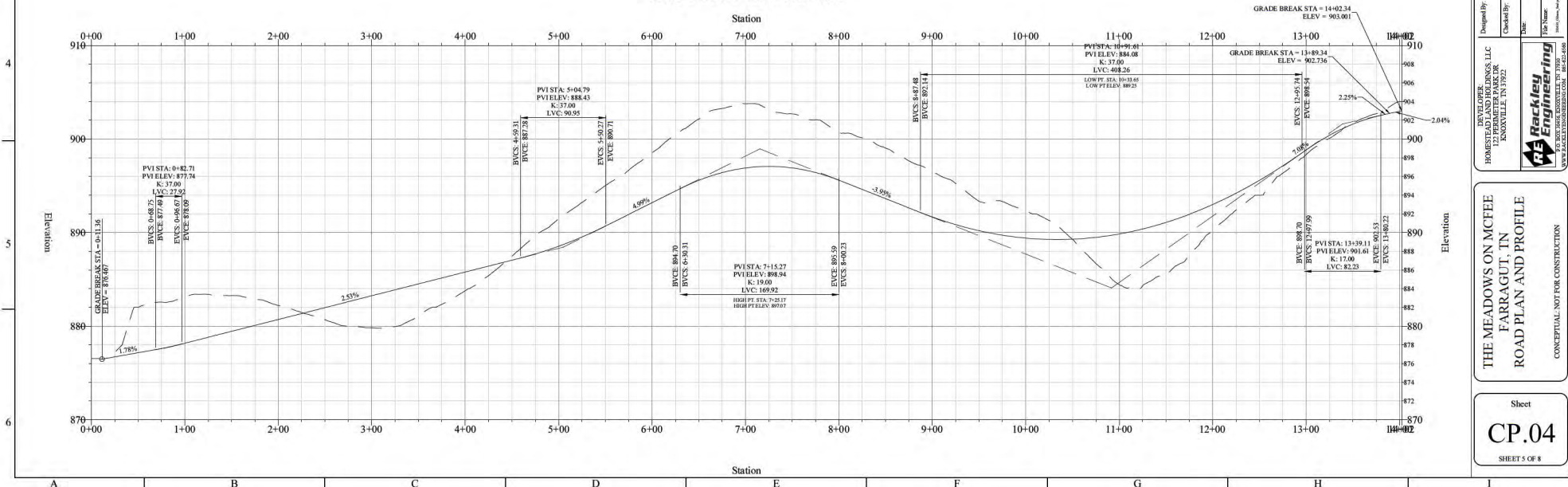
RACKLEY ENGINEERING
 121 PERIMETER PARK DR
 KNOXVILLE, TN 37922
 (615) 582-2200
 WWW.RACKLEYENGINEERING.COM

THE MEADOWS ON MCFEE
FARRAGUT, TN
STREETSCAPING PLAN

Sheet
CP03
SHEET 4 OF 8



RED POPPY DR PROFILE



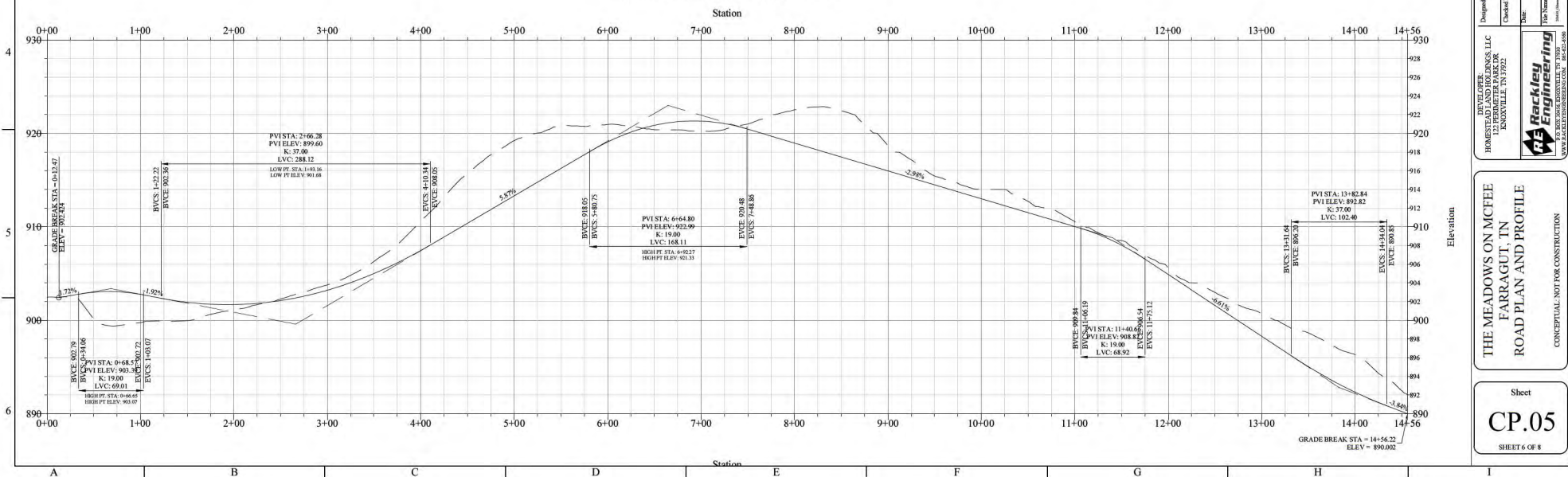
Revisions	By	Date	Description
1	NSK	11/02/20	REVISED PER TOWN REVIEW COMMENTS

Designed By: NSK
 Checked By: NSK
 Date: 10/16/20
 Title: Engineer
 Name: [Redacted]
 License No.: [Redacted]
 State: TN
 Project Name: THE MEADOWS ON MCFEE FARRAGUT, TN ROAD PLAN AND PROFILE
 Project Location: 123 PERIMETER PARK DR, ANOKVILLE, TN 37022
 Scale: AS SHOWN
 Date: 10/16/20

THE MEADOWS ON MCFEE
 FARRAGUT, TN
 ROAD PLAN AND PROFILE
 CONCEPTUAL, NOT FOR CONSTRUCTION



SCARLET SAGE DR PROFILE



Revisions	By	Date	Description
1	MSK	11/09/20	REVISED PER TOWN REVIEW COMMENTS

Designed By:	MSK
Checked By:	MSK
Date:	10/16/20
File Name:	
Scale:	

THE MEADOWS ON MCFEE
FARRAGUT, TN
ROAD PLAN AND PROFILE
CONCEPTUAL, NOT FOR CONSTRUCTION



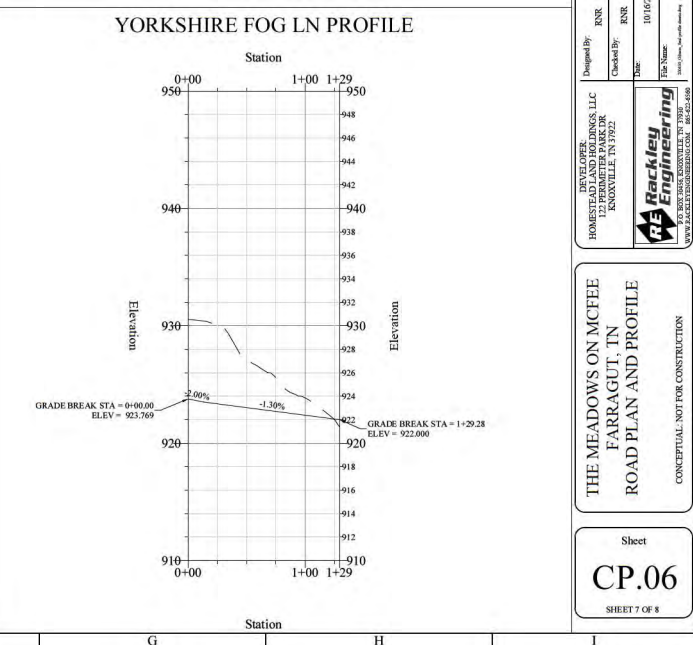
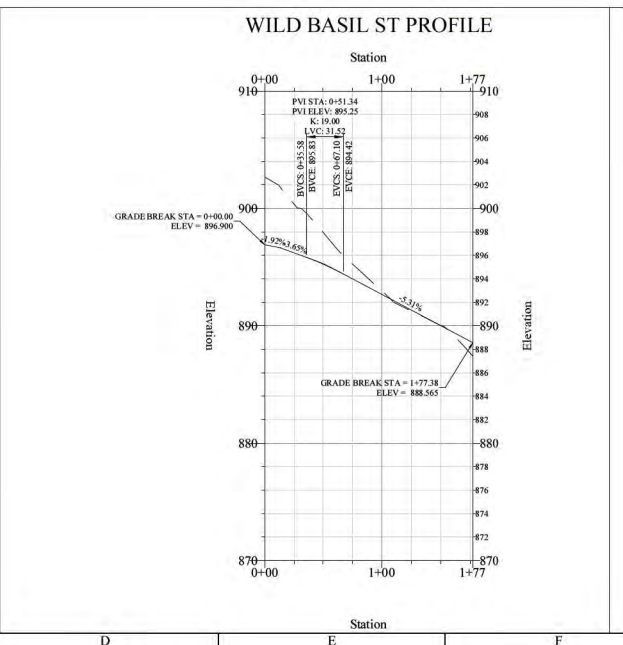
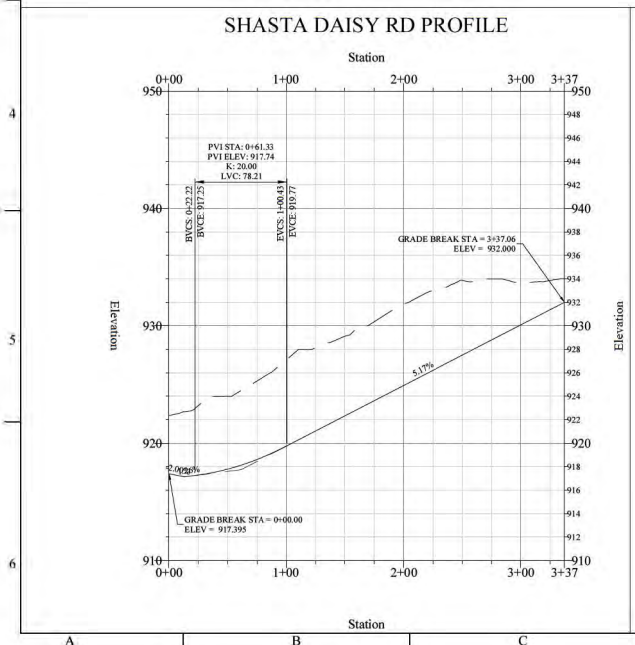
Revisions	Description	By	Date
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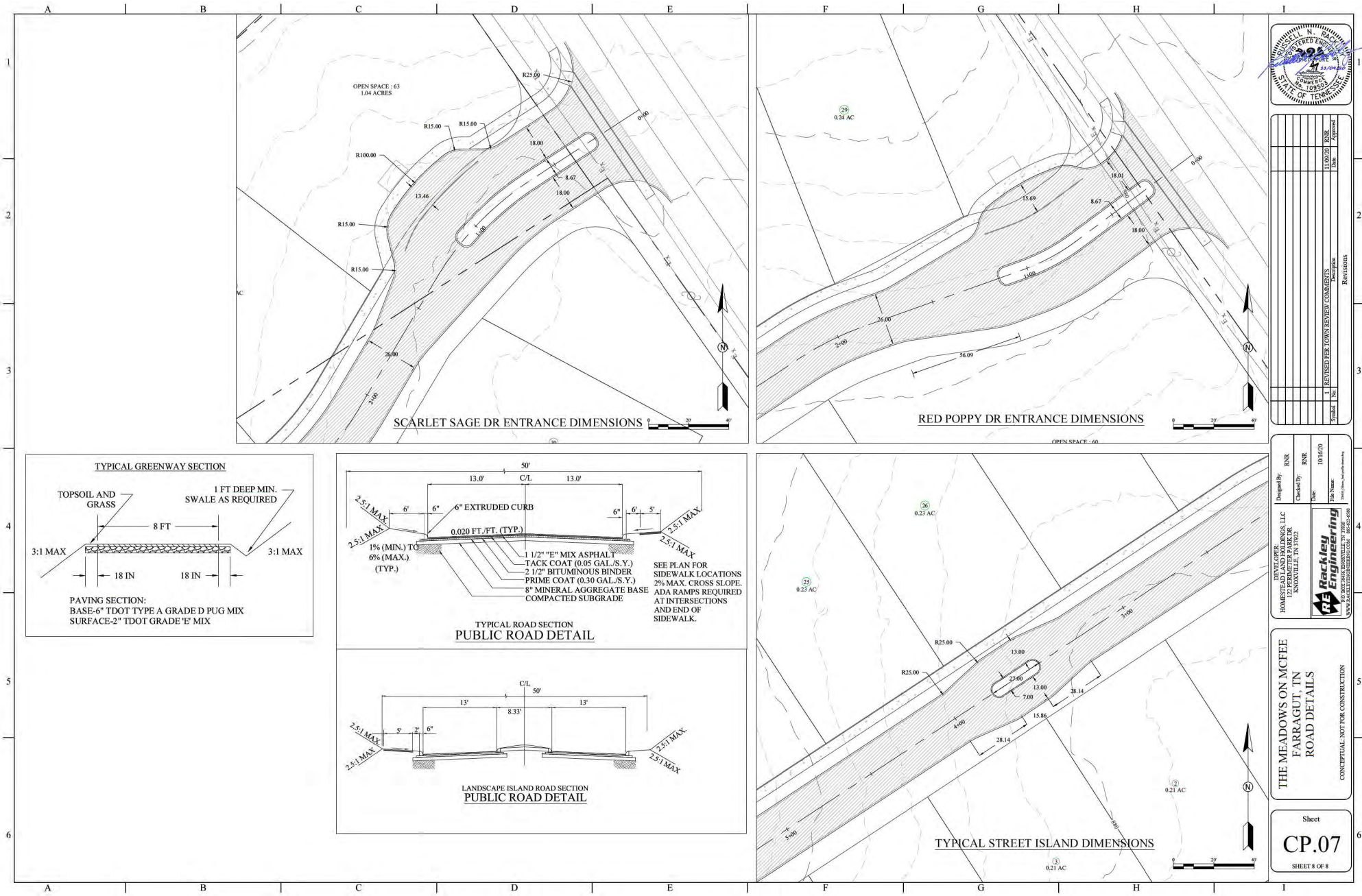
Designed By:	NSK
Checked By:	NSK
Date:	10/16/20
File Name:	
Scale:	1" = 100'
Project Name:	
Project Address:	
Project City:	
Project State:	
Project Zip:	
Project Phone:	
Project Email:	

THE MEADOWS ON MCFEE
FARRAGUT, TN
ROAD PLAN AND PROFILE

CONCEPTUAL, NOT FOR CONSTRUCTION

Sheet
CP.06
SHEET 7 OF 8





Revisions	
Revised Per Town Review Comments	Revisions
1	11/09/20 RSK
2	11/09/20 RSK
3	11/09/20 RSK
4	11/09/20 RSK
5	11/09/20 RSK
6	11/09/20 RSK

Designed By: RSK	10/16/20
Checked By: RSK	
Drawn By: RSK	
Scale: 1"=40'	
File Name: 101620	
Project Name: 101620	
Project Location: 101620	
Project Description: 101620	
Project Status: 101620	
Project Date: 10/16/20	
Project Author: 101620	
Project Reviewer: 101620	
Project Approver: 101620	
Project Signer: 101620	
Project Seal: 101620	
Project Stamp: 101620	
Project Title: 101620	
Project Role: 101620	
Project Contact: 101620	
Project Phone: 101620	
Project Email: 101620	
Project Website: 101620	
Project Address: 101620	
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Project Zip: 101620	
Project Country: 101620	
Project Continent: 101620	
Project Hemisphere: 101620	
Project Timezone: 101620	
Project Currency: 101620	
Project Language: 101620	
Project Units: 101620	
Project System: 101620	
Project Standard: 101620	
Project Code: 101620	
Project Identifier: 101620	
Project Number: 101620	
Project Name: 101620	
Project Title: 101620	
Project Role: 101620	
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Project Standard: 101620	
Project Code: 101620	
Project Identifier: 101620	
Project Number: 101620	
Project Name: 101620	

THE MEADOWS ON MCFEE
FARRAGUT, TN
ROAD DETAILS
CONCEPTUAL, NOT FOR CONSTRUCTION

REPORT TO THE FARRAGUT MUNICIPAL PLANNING COMMISSION

PREPARED BY: Mark Shipley, Community Development Director

SUBJECT: Discussion and public hearing on a request to amend Appendix A – Zoning, Chapter 3., Specific District Regulations, Section XII., General Commercial District (C-1), B., 3., as it relates to the outdoor display and or storage of general farm implements and lawn care equipment, riding lawn mowers, and related accessories (Farragut Lawn and Tractor, Applicant)

INTRODUCTION AND BACKGROUND: This item was discussed last month and is related to provisions in the Farragut Zoning Ordinance that address outdoor display and storage of general farm implements and lawn care equipment, riding lawn mowers, and related accessories. Staff reviewed the current provisions which were specifically created for this type of use. Essentially, the current provisions limit display to a permanent covered porch that extends from the front of the building toward Kingston Pike.

DISCUSSION: As staff noted in the review of this item, the issue has been that the property owner has not been adhering to the current provisions and has recently been cited to municipal court and found liable for violating these provisions. Consequently, the property owner petitioned for the existing language to be re-visited. After reviewing this with the Commission in October, staff was asked to meet with the property owner on site and look at where equipment could be displayed beyond the limits of the current provisions so that the setbacks could be established in the text amendment.

On November 5, staff visited Farragut Lawn and Tractor. After discussing different options, staff is proposing in Ordinance 20-25 that the outdoor storage and/or display of implements and/or equipment shall be situated so that such storage or display is at least 20 feet from the front property line. It will be the responsibility of the property owner to coordinate with Town staff on identifying and marking the 20-foot setback line for clarity and compliance purposes.

The rationale for the 20-foot setback is that this is the same minimum setback for parking lots. So, equipment being stored or displayed would be in the same general location in relation to the abutting street as cars parked in a parking lot. This setback line will have to be identified and marked in consultation with the Town staff so that compliance with the amended provisions can be easily assessed.

As discussed in October, no equipment shall be permitted at any time on sidewalks or accessways and all signage shall comply with the Farragut Sign Ordinance.

RECOMMENDATION: Included in your packet is Resolution PC-20-17 which recommends approval of Ordinance 20-25.

RESOLUTION PC-20-17

FARRAGUT MUNICIPAL PLANNING COMMISSION

A RESOLUTION TO AMEND THE TEXT OF THE FARRAGUT ZONING ORDINANCE, ORDINANCE 86-16, AS AMENDED, PURSUANT TO AUTHORITY GRANTED BY SECTION 13-4-201, TENNESSEE CODE ANNOTATED, BY AMENDING THE FARRAGUT MUNICIPAL CODE, APPENDIX A., ZONING, CHAPTER 3., SPECIFIC DISTRICT REGULATIONS, SECTION XII., GENERAL COMMERCIAL DISTRICT (C-1), B., 3., AS IT RELATES TO THE OUTDOOR DISPLAY AND OR STORAGE OF GENERAL FARM IMPLEMENTS AND LAWN CARE EQUIPMENT, RIDING LAWN MOWERS, AND RELATED ACCESSORIES

WHEREAS, the Tennessee Code Annotated, Section 13-4-201 et seq, provides that the Municipal Planning Commission shall make and adopt a general plan for the physical development of the municipality; and

WHEREAS, the Farragut Municipal Planning Commission has adopted various elements of a zoning plan as an element of the general plan for physical development; and

WHEREAS, a public hearing was held on this request on November 19, 2020;

NOW, THEREFORE, BE IT RESOLVED that the Farragut Municipal Planning Commission hereby recommends approval to the Farragut Board of Mayor and Aldermen of an ordinance, amending Ordinance 86-16, of the Farragut Zoning Ordinance, by adding Ordinance 20-25.

ADOPTED this 19th day of November 2020.

Rita Holladay, Chairman

Scott Russ, Secretary

ORDINANCE: 20-25
PREPARED BY: Shipley
REQUESTED BY: Farragut Lawn and Tractor
1ST READING: _____
2ND READING: _____
PUBLISHED IN: _____
DATE: _____

AN ORDINANCE TO AMEND THE TEXT OF THE FARRAGUT ZONING ORDINANCE, ORDINANCE 86-16, AS AMENDED, PURSUANT TO AUTHORITY GRANTED BY SECTION 13-4-201, TENNESSEE CODE ANNOTATED, BY AMENDING THE FARRAGUT MUNICIPAL CODE, APPENDIX A., ZONING, CHAPTER 3., SECTION XII. B., 3., RETAIL OUTLETS FOR THE SALE OF GENERAL FARM IMPLEMENTS AND LAWN CARE EQUIPMENT SUCH AS TRACTORS (LESS THAN 10,000 POUNDS), RIDING LAWN MOWERS, AND RELATED ACCESSORIES

WHEREAS, the Board of Mayor and Aldermen of the Town of Farragut, Tennessee, wishes to amend Chapter 3., Section XII. B., 3., Retail outlets for the sale of general farm implements and lawn care equipment such as tractors (less than 10,000 pounds), riding lawn mowers, and related accessories, of the Farragut Zoning Ordinance, Ordinance 86-16,

NOW, THEREFORE, BE IT ORDAINED by the Board of Mayor and Aldermen of the Town of Farragut, Tennessee, that the Farragut Zoning Ordinance is hereby amended by replacing it in its entirety as follows:

SECTION 1.

Section XII. B., 3., Retail outlets for the sale of general farm implements and lawn care equipment such as tractors (less than 10,000 pounds), riding lawn mowers, and related accessories.

3. Retail outlets for the sale of general farm implements and lawn care equipment such as tractors (less than 10,000 pounds), riding lawn mowers, and related accessories.
 - a. The outdoor display and/or storage of such implements and equipment shall be permitted provided the following development criteria are met:
 - (1) The outdoor storage and/or display of the implements and/or equipment shall be situated so that it is at least 20 feet from the front property line. It is the responsibility of the property owner to coordinate with Town staff on identifying and marking the 20-foot setback line for clarity and compliance purposes;
 - (2) The equipment and/or implements to be stored and/or displayed outdoors must be removed from the crate or cartons and displayed and/or stored in such a way as to allow for viewing and inspection, but so as not to prevent passage on sidewalks, walkways, or other vehicle ways;
 - (3) Such businesses necessarily involve the use of outdoor areas on the premises for the unloading, uncrating, positioning and repositioning of items that are often

larger and more cumbersome than most retailers handle. The temporary use of outdoor areas of the premises for such purposes during hours of operation shall not be a violation of this ordinance; and

- (4) Such businesses necessarily utilize packaging that is to be destroyed or reused. Such packaging materials shall be stored in areas on the premises to which access shall be restricted by means of a physical barrier such as an opaque fence or similar to a dumpster enclosure and shall comply with Chapter 4, Section I.B. of this ordinance.

SECTION 2.

This ordinance shall take effect from and after its final passage and publication, the public welfare requiring it.

Ron Williams, Mayor

Allison Myers, Town Recorder

Certified to the Farragut Board of Mayor and Aldermen this ____ day of _____, 2020, with approval recommended.

Rita Holladay, Chairman

Scott Russ, Secretary

FARRAGUT MUNICIPAL PLANNING COMMISSION

Sec. XII. - General commercial district (C-1).

- A. *General description.* This district provides space for commercial uses which provide services primarily to community residents of the Town of Farragut. The intent is to permit lands adjacent to major arterial highways as designated by the Farragut Major Road Plan to be used for the provision of general commercial and business services to the community. These commercial uses are intended to be designed to minimize disruption of traffic flows and negative impacts on adjacent residential uses.
- B. *Permitted principal and accessory uses and structures (Non-Mixed Use Town Center as identified in the Comprehensive Land Use Plan).* Unless provided for elsewhere in this section, property and structures located in the General Commercial District (C-1) shall be used only for the following purposes:

1. Generally recognized retail sales. This excludes flea markets and the sale of automobiles and the sale and/or rental of boats, trucks, trailers, construction equipment, mobile homes, and other similar uses as determined by the Board of Zoning Appeals.

The outdoor sale and/or storage of merchandise and/or any other materials shall be permitted provided the following development criteria are met:

- a. Such merchandise and/or materials are displayed or stored in a permanent area designed for such use;
 - b. Such merchandise and/or materials are not displayed or stored on any sidewalks, walkways, parking spaces, or other vehicle ways;
 - c. Required yard setbacks for buildings are met for the storage/display area;
 - d. Access to the display/storage area shall be restricted by means of a physical barrier such as a fence, a berm, landscaping, or other similar means; and
 - e. The total area reserved for outdoor display/storage shall not exceed 2,000 square feet if the net indoor retail floor area is greater than 25,000 square feet, and it shall not exceed 1,000 square feet if the net indoor retail floor area is less than 25,000 square feet.
2. The retail sale of alcoholic beverages, as provided for in the Farragut Municipal Code.
 3. Retail outlets for the sale of general farm implements and lawn care equipment such as tractors (less than 10,000 pounds), riding lawn mowers, and related accessories.
 - a. The outdoor display and/or storage of such implements and equipments-shall be permitted provided the following development criteria are met:
 - (1) The outdoor storage and/or display of the implements and/or equipment shall **be situated so that it is at least 20 feet from the front property line. It is the responsibility of the property owner to coordinate with Town staff on identifying and marking the 20-foot setback line for clarity and compliance purposes.** ~~lie behind a straight line running from side lot line to side lot line that coincides with the rear wall of the principal building located on the property;~~
 - (2) The equipment and/or implements to be stored and/or displayed outdoors must be removed from the crate or cartons and displayed and/or stored in such a way as to allow for viewing and inspection, but so as not to prevent passage on sidewalks, walkways, or other vehicle ways;
 - (3) Such businesses necessarily involve the use of outdoor areas on the premises for the unloading, uncrating, positioning and repositioning of items that are often larger and more cumbersome than most retailers handle. The temporary use of outdoor areas of the premises for such purposes during hours of operation shall not be a violation of this ordinance; and

- (4) Such businesses necessarily utilize packaging that is to be destroyed or reused. Such packaging materials shall be stored in areas on the premises to which access shall be restricted by means of a physical barrier such as an opaque fence or similar to a dumpster enclosure and shall comply with Chapter 4, Section I.B. of this ordinance.

~~b. The outdoor display of merchandise, except as provided for above, is permitted provided such merchandise is displayed in a permanent, covered porch. Such covered porch shall be attached to the principal building and shall meet all setback requirements of the principal building.~~

4. Financial and real estate services.
5. Professional, personal, and business services.
6. Restaurants, tea rooms, cafes, coffee houses, or other similar establishments serving food or beverage that is primarily consumed within the principal building or in designated outdoor seating areas associated with the principal building.

Coffee houses with drive-through service lanes that serve as the principal means for service. The principal location for consumption is offsite.

7. Automotive services, provided such services are for automobiles and light trucks only. Such services may include fuel sales and repairs. Facilities designed to accommodate the refueling and/or servicing of trucks with more than three axles or more than ten wheels are prohibited.
8. Retail rental and leasing of automobiles provided the following development criteria are met:
 - a. Such business is located in a freestanding building; and
 - b. If the premises are fenced, such fencing shall be decorative, shall not exceed three feet in height, and shall be of such design so as not to prevent the ability to see through the fence.
9. Public, governmental, and general offices.
10. Medical, dental, and veterinary facilities.
11. Medical spas.
12. Commercial kennels, provided the following development criteria are met:
 - a. Any outdoor structures (e.g., fences) associated with the kennel shall not be visible from public streets;
 - b. Boarding of animals shall be confined to the interior of a structure designated for this purpose;
 - c. Outdoor fences are permitted solely to provide an area for exercise and waste elimination and shall be used only with on-site supervision. Outdoor fences shall adhere to the following specifications:
 1. Opaque with no openings as viewed from the outside of the fence and a minimum of six feet in height;
 2. Properly maintained and constructed of durable, low maintenance materials that are earth tone, black, or white in color and contain no signage. No chain link fencing shall be permitted;
 3. Set back at least 50 feet from an adjacent property that is not zoned residential or agriculture. Such measurement shall be a straight line distance from the nearest portion of the fence to the nearest portion of the property that is not zoned residential or agriculture;
 4. Set back at least 250 feet from an adjacent property that is zoned residential or agriculture. Such measurement shall be a straight line distance from the nearest

REPORT TO THE FARRAGUT MUNICIPAL PLANNING COMMISSION

PREPARED BY: Bart Hose, Assistant Community Development Director

SUBJECT: Discussion on a rezoning of property situated around the eastern intersection of McFee Road and Boyd Station Road, Parcels 50, 50.01, 54.01, and 9.01, Tax Map 162, 12611 Boyd Station Road, from General Single-Family Residential (R-2) to Open Space Mixed Residential Overlay (R-1/OSMR), 131.25 Acres (OBO Homestead Land Holdings, Applicant)

INTRODUCTION AND BACKGROUND: This rezoning request involves four separate tracts totaling 131.25 acres. The property stretches from McFee Road to Virtue Road and includes approximately 3000 linear feet of frontage along Boyd Station Road. The property also has access to McFee Road located at the southernmost traffic circle and via a small strip of land south of the circle, and to Virtue Road via the easternmost lot in question and a narrow strip of land (see Exhibit 1).

DISCUSSION: The property in question is currently agricultural and open in nature. It is primarily open fields, fence rows, and includes a small cluster of agricultural buildings. The easternmost lot is a narrow, tree covered vacant/open-space area, that is impacted by a transmission line easement and has limited frontage on Virtue Rd. The property also appears to contain several potential sinkhole areas that could impact development.

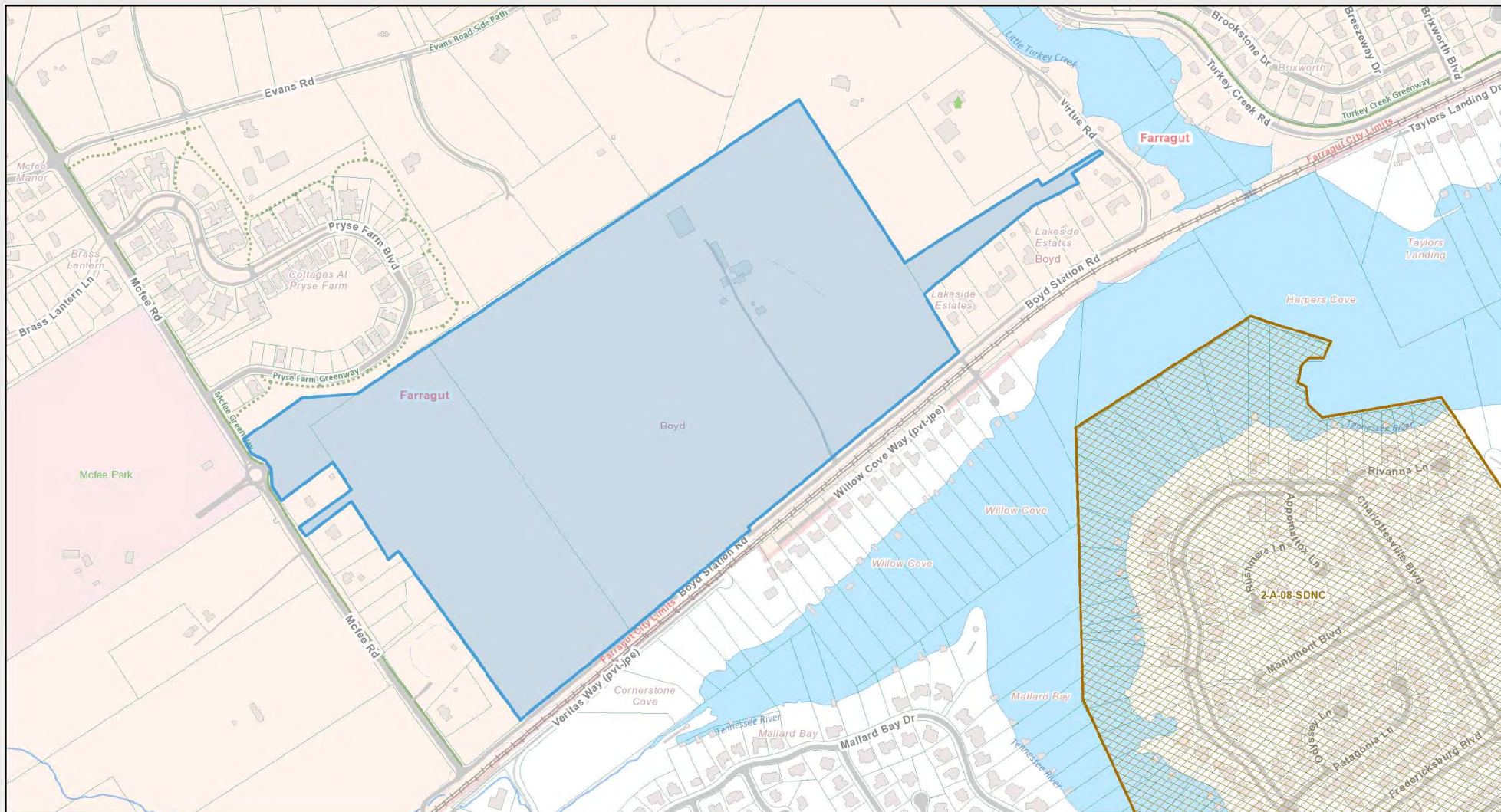
Existing land use in the area immediately around the property is largely low density residential in nature with a mix of open areas, larger residential lots and tracts, and a few public/semi-public uses. The existing Pryse Farm development is an exception to this pattern and is located immediately to the northwest of the subject property. This development can be characterized as a lower density attached single-family residential development (roughly 2.17 units per acre). The surrounding area is also experiencing development pressure and two single-family subdivisions are either under development or under review within the Town. This includes the Brass Lantern development and the Meadows on McFee development. Additional development also continues to occur south of the Town in the Choto area of Knox County (see Exhibit 2).

As noted above, the property has considerable frontage along Boyd Station Road and additional usable access to McFee Road. Access to Virtue Road is limited and likely only suitable for a pedestrian/bicycle trail connection point. McFee Road is classified as a Minor Arterial on the Town's Major Road Plan. Boyd Station Road is classified as a Major Collector and does not currently meet the Town's minimum improvement standards for a roadway of this classification. As such, it would need to be improved to the adopted complete streets cross-section in conjunction with any significant development of the property. Adequate utility services would also need to be provided to support any proposed development and existing utility mains are present in the surrounding area.

The property in question is currently zoned General Single-Family Residential (R-2) and the applicant is requesting Open Space Mixed Residential Overlay (R-1/OSMR). The Town's Future Land Use Map

identifies the area for Open Space Cluster Residential type development. The proposed zoning (R-1/OSMR) would be consistent with this land use designation. The mixed residential aspect of the requested zoning would also be consistent with the Pryse Farm development which is similarly zoned and may allow the owner/developer more flexibility in dealing with potential sinkholes and other design considerations. The mixed residential designation is, however, somewhat less consistent with the existing large lot single-family development that adjoins the property in several locations, and a recent rezoning application for OSMR on the west side of McFee Road was not approved. Given the size of the property in question, careful design could create separation and buffers between these existing homesites and any new mixed residential development (see Exhibits 3 & 4).

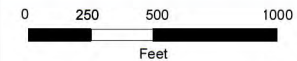
Finally, it should be noted that the property in question is currently divided into four lots/tracts. Two of these lots do not meet the 5-acre minimum area threshold for OSMR zoning and will need to be combined with the other tracts. This includes a smaller lot that adjoins the traffic circle on McFee Road and the narrow tract at the eastern end of the property that adjoins Virtue Road. These lots also provide important transportation access points for the future development of the general area. Any rezoning action should be made contingent upon these lots being formally combined with the larger tracts.



Proposed Rezoning Area

R-2 to R-1/OSMR

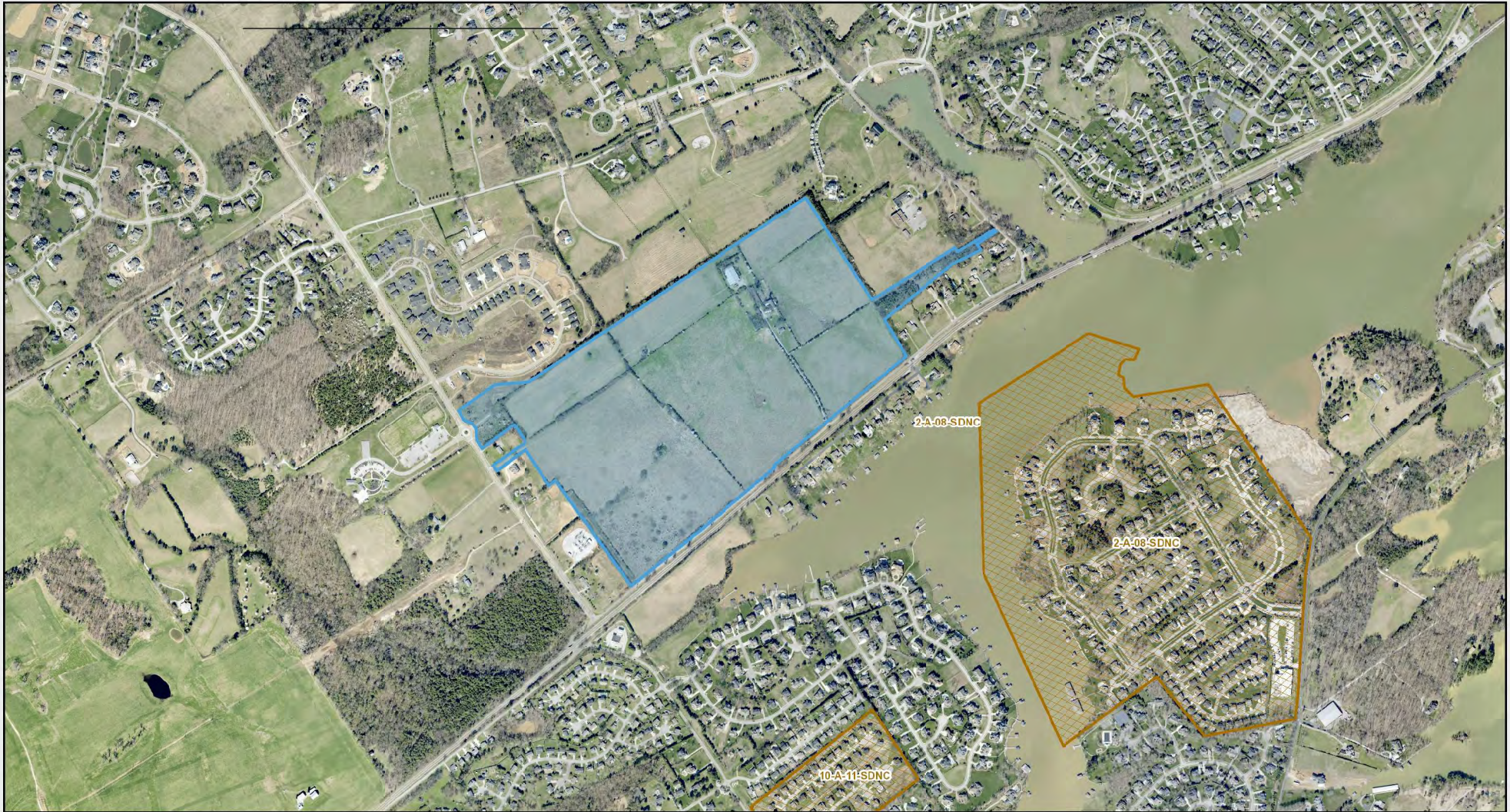
Parcels 50, 50.01, 54.01, 9.01; Tax Map 162



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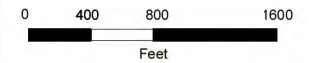
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Proposed Rezoning Area & Surrounding Development

R-2 to R-1/OSMR

Parcels 50, 50.01, 54.01, 9.01; Tax Map 162



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Exhibit 3
Proposed Rezoning Area

R-2 to R-1/OSMR
Parcels 50, 50.01, 54.01, 9.01
Tax Map 162

Legend

- Proposed Rezoning Area
- Parcels
- A, Agricultural
- OS-P, Open Space/Park
- S-1, Community Service
- R-1, Rural Single-Family Residential
- R-2, General Single-Family Residential
- R-1/OSR, Open Space Residential Overlay
- R-1/OSMR, Open Space Mixed Residential Overlay
- Telecommunication Tower Overlay Zone
- Town of Farragut Boundary



0 300 600 1,200
SCALE IN FEET

CONTACTS:

GIS:
Carrie Smith
carrie.smith@aecom.com

1 inch = 600 feet
Map Prepared: 11/12/2020

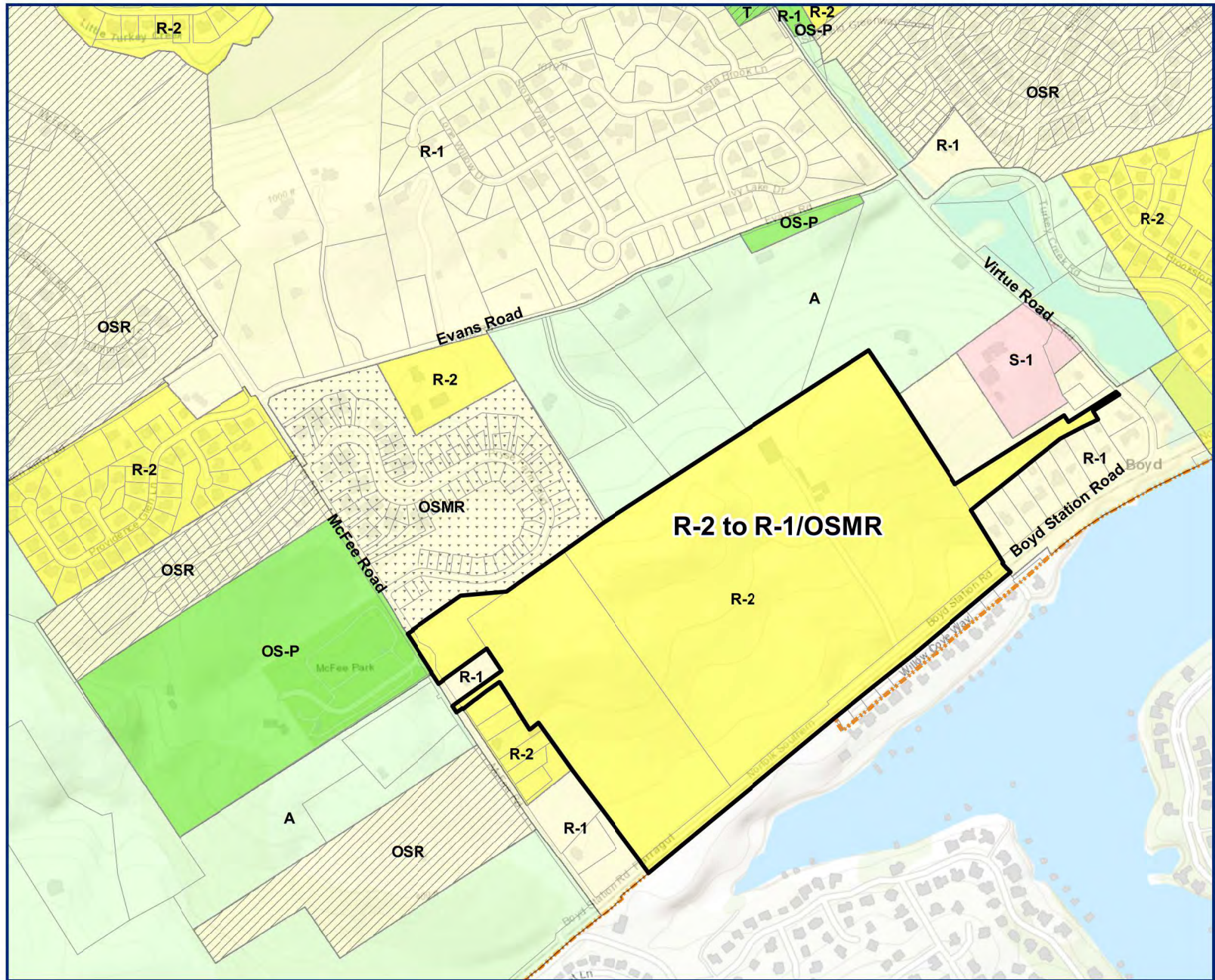




Exhibit 4
Future Land Use
Proposed Rezoning Area

R-2 to R-1/OSMR
Parcels 50, 50.01, 54.01, 9.01
Tax Map 162

Legend

- Proposed Rezoning Area
- Parcels
- Civic/Institutional
- Open Space
- Parks and Rec
- Open Space Cluster Residential
- Very Low Density Residential (2-4 DUs / Acre)
- Low Density Residential (3-6 DUs / Acre)
- Town of Farragut Boundary

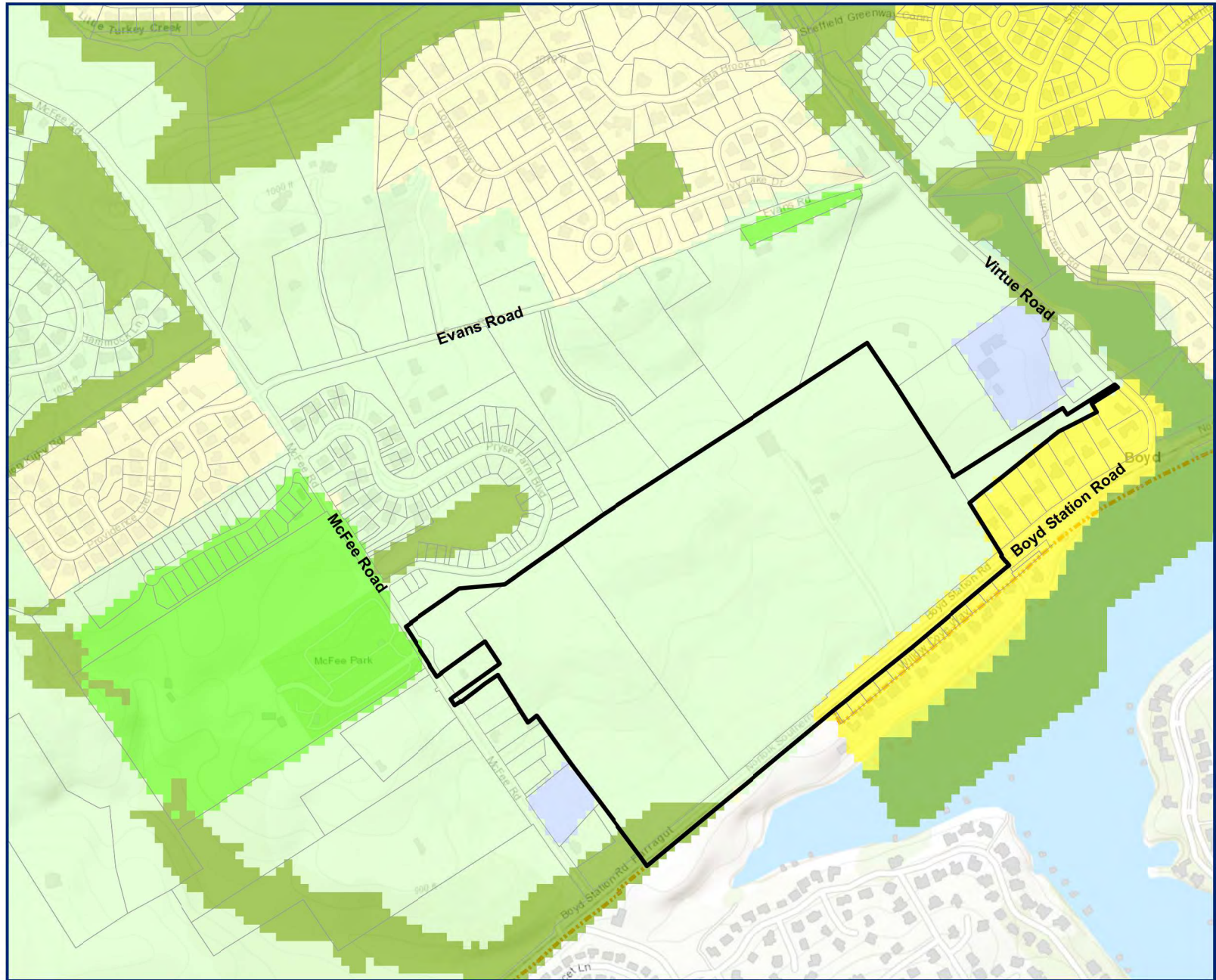


0 300 600 1,200
SCALE IN FEET

CONTACTS:

GIS:
Carrie Smith
carrie.smith@aecon.com

1 inch = 600 feet
Map Prepared: 11/12/2020



REPORT TO THE FARRAGUT MUNICIPAL PLANNING COMMISSION

PREPARED BY: Mark Shipley, Community Development Director

SUBJECT: Discussion and public hearing on a request to amend the future land use map in the Comprehensive Land Use Plan Update for a portion of Parcel 003.19, Tax Map 143 (a portion of the property referenced as 133 Concord Road) associated with the Farragut Town Center at Biddle Farms project from Medium Density Residential to Town Center (CHM, LLC, Applicant)

INTRODUCTION AND BACKGROUND: This agenda item involves a project, the Town Center at Biddle Farms, that has been discussed at a number of Planning Commission and Staff/Developer meetings since March 2020. As conditionally approved through a master concept plan in July, the project would include a Town Center commercial area on the north portion of the property and transition to a multi-family residential development on the southern portion of the property with a large lawn gathering space between the two and a linear park area with a greenway loop on the eastern portion of the development along the floodplain. Collectively, this will be a Planned Commercial Development that will also involve a requested amendment to the Zoning Map.

DISCUSSION: In terms of the future land use map, most of the development proposed for the Town Center at Biddle Farms is shown in an area that is designated as Mixed-Use Town Center. A small area in the southeast portion of the development where some improvements associated with the project are planned is shown as Medium Density Residential. For consistency purposes, the applicant is requesting the area shown as Medium Density Residential be amended to Mixed Use Town Center.

One clarification to note regarding the lines shown on the future land use map is that, unlike a line on a zoning map which typically follows property lines or can be dimensioned and tied to a specific location, the lines on the future land use map are only intended to generally define areas for purposes of demonstrating a certain development vision. Thus, the lines on the future land use map may appear irregular and do not necessarily follow property lines.

In the case of the area envisioned as the Mixed Use Town Center on the future land use, the Board of Mayor and Aldermen has adopted by ordinance both the map and text portion of this particular land use designation because of its importance in encouraging the realization of Strategy 1 in the Comprehensive Land Use Plan Update which is to “Bring About a Downtown.”

RECOMMENDATION: Included in your packet is Resolution PC-20-18 which recommends approval of the requested amendment to the future land use map through Ordinance 20-26. In relation to the Eight Key Strategies identified in the Comprehensive Land Use Plan Update, changing the future land use as provided for in Resolution PC-20-18 would help facilitate a project that would address the following:

1. Bringing About a Downtown (the project would create a main street with many components consistent with a downtown);

2. Repairing Aging Shopping Centers (the project would result in the removal of the old Kroger building and the creation of a new development with a town center street grid with building placement and streetscaping that encourage pedestrian activity, a large central gathering space for community events, a linear park, and improvements to outdated infrastructure);
3. Encouraging Greater Housing Choice (the project would provide for housing in a density, form, and location that would help support the downtown and create a more dynamic and active town center area);
4. Increasing Connectivity (the project includes numerous connections, both vehicular and pedestrian, that tie the project together internally and externally);
5. Enhancing our Identity (the project would create a unique type of development that would focus on activated spaces and pedestrian engagement along with provisions for public gatherings and community events); and
6. Planning for the Remaining Vacant Parcels (the project not only repairs an existing aging shopping center and infrastructure but it also addresses abutting areas and incorporates them into the project to help sustain the project and create an area that will be identified as downtown Farragut).

For these reasons, staff recommends approval of Resolution PC-20-18.

RESOLUTION PC-20-18

FARRAGUT MUNICIPAL PLANNING COMMISSION

A RESOLUTION TO APPROVE AMENDMENTS TO THE FUTURE LAND USE MAP OF THE COMPREHENSIVE LAND USE PLAN UPDATE DECEMBER 2012 FOR A PORTION OF PARCEL 003.19, TAX MAP 143 (A PORTION OF THE PROPERTY REFERENCED AS 133 CONCORD ROAD) ASSOCIATED WITH THE FARRAGUT TOWN CENTER AT BIDDLE FARMS PROJECT FROM MEDIUM DENSITY RESIDENTIAL TO MIXED USE TOWN CENTER

WHEREAS, the Tennessee Code Annotated, Section 13-4-201et seq, provides that the Municipal Planning Commission shall make and adopt a general plan for the physical development of the municipality; and

WHEREAS, the Farragut Municipal Planning Commission has adopted the Comprehensive Land Use Plan Update on December 12, 2012; and

WHEREAS, the Farragut Municipal Planning Commission may periodically amend various aspects of the Comprehensive Land Use Plan Update;

NOW, THEREFORE, BE IT RESOLVED that the Farragut Municipal Planning Commission hereby recommends, through Resolution PC-20-18, approval of Ordinance 20-26 to amend the Future Land Use Map of the Comprehensive Land Use Plan.

ADOPTED this 19th day of November 2020.

Rita Holladay, Chairman

Scott Russ, Secretary

ORDINANCE:	20-26
PREPARED BY:	Shipley
REQUESTED BY:	CHM, LLC
CERTIFIED BY FMPC:	November 19, 2020
PUBLIC HEARING:	_____
PUBLISHED IN:	_____
DATE:	_____
1ST READING:	_____
2ND READING:	_____
PUBLISHED IN:	_____
DATE:	_____

AN ORDINANCE TO AMEND THE FUTURE LAND USE MAP OF THE COMPREHENSIVE LAND USE PLAN UPDATE FOR A PORTION OF PARCEL 003.19, TAX MAP 143 (A PORTION OF THE PROPERTY REFERENCED AS 133 CONCORD ROAD)

WHEREAS, the Board of Mayor and Aldermen of the Town of Farragut, Tennessee, through the Farragut Municipal Planning Commission, created and adopted the Farragut Comprehensive Land Use Plan Update and Future Land Use Map; and,

WHEREAS, the Tennessee Code Annotated, Section 13-4-201 et seq, provides that the Municipal Planning Commission shall make and adopt a general plan for the physical development of the municipality; and

WHEREAS, the Farragut Municipal Planning Commission adopted the Farragut Comprehensive Land Use Plan Update and Future Land Use Map by Resolution PC-12-18 on December 20, 2012; and

WHEREAS, the Tennessee Code Annotated, Section 13-4-202 et seq, provides that the Municipal Planning Commission and the chief legislative body may adopt parts of the Comprehensive Land Use Plan Update that correspond generally with one (1) or more of the functional subdivisions of the subject matter of the plan; and

WHEREAS, the Board of Mayor and Alderman of the Town of Farragut has adopted the Mixed-Use Town Center portion of the Future Land Use Map of the Farragut Comprehensive Land Use Plan Update; and

WHEREAS, the Board of Mayor and Alderman of the Town of Farragut may periodically amend the map of the Mixed-Use Town Center Land Use of the Farragut Comprehensive Land Use Plan Update;

NOW, THEREFORE, BE IT ORDAINED by the Board of Mayor and Aldermen of the Town of Farragut that the Future Land Use Map in the Comprehensive Land Use Plan Update is amended as follows:

SECTION 1.

Changing the property referenced as a portion of Parcel 003.19, Tax Map 143 (a portion of the property referenced as 133 Concord Road) from what is currently shown as Medium Density Residential on the Future Land Use Map to Mixed Use Town Center (see Exhibit A).

SECTION 2.

This ordinance shall take effect from and after its final passage and publication, the public welfare requiring it.

Ron Williams, Mayor

Allison Myers, Town Recorder

Certified to the Farragut Board of Mayor and Aldermen this ____ day of _____, 2020,
with approval recommended.

Rita Holladay, Chairman

Scott Russ, Secretary

FARRAGUT MUNICIPAL PLANNING COMMISSION



Exhibit A
Ordinance 20-26

Future Land Use Map Amendment
A portion of Parcel 3.19
Tax Map 143
A Portion of the Property
133 Concord Road

From
Medium Density Residential
to
Mixed Use Town Center

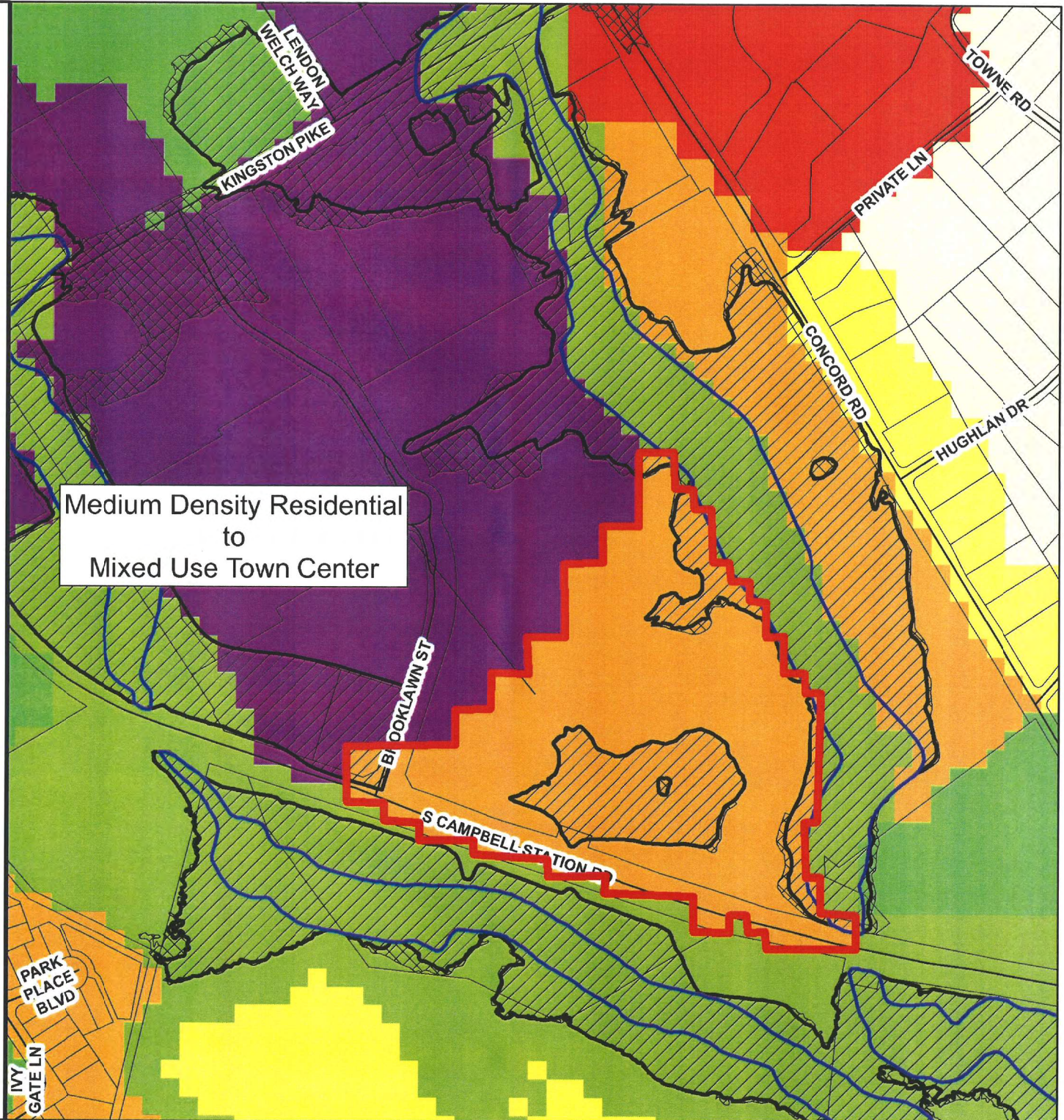
Medium Density Residential
to
Mixed Use Town Center

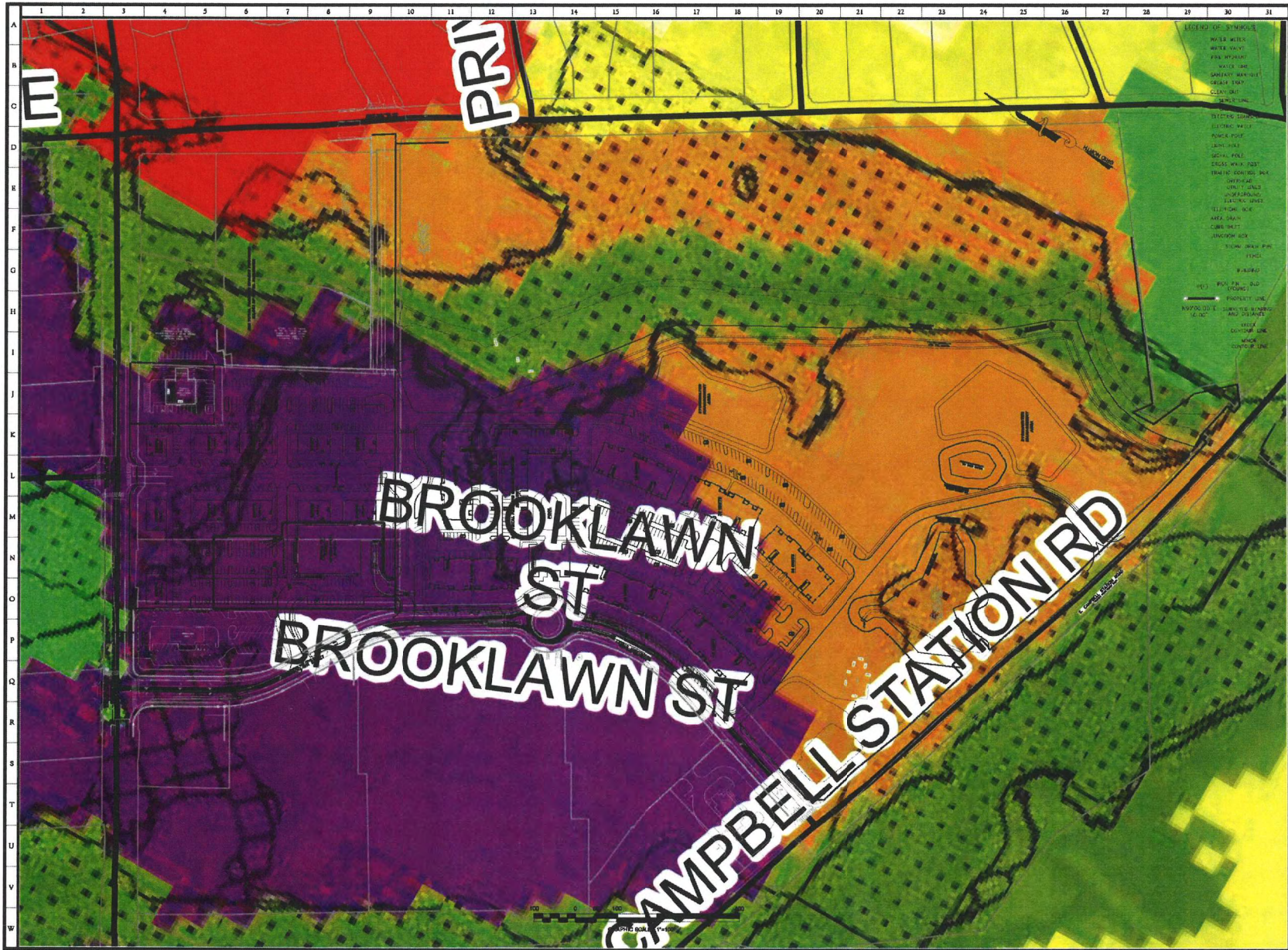
Legend

-  Subject Area
-  Floodway
-  100 year Flood Zone
-  500 year Flood Zone
-  Streets
-  Parcels
-  Commercial
-  Open Space
-  Parks and Rec
-  Very Low Density Residential (2-4 DUs / Acre)
-  Low Density Residential (3-6 DUs / Acre)
-  Med Density Residential (6-8 DUs / Acre)
-  Mixed Use Town Center (8-15 DUs / Acre)



1 in = 400 ft





SITE, INCORPORATED
CIVIL ENGINEERS & SURVEYORS

10215 Technology Drive, Suite 300
Knoxville, TN 37932
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CONCEPTUAL

Conceptual Site Plan

Farragut Town Center
Kingston Pike, Brooklawn Street, & Concord Road
Civil District No. 6 of Knox County, Tennessee
Town of Farragut

REVISIONS

NO.	DATE	DESCRIPTION

ORIGINAL ISSUE: 06/13/2020
SITH PROJECT#: 1994
FILE#: CSP-16

CSP-16

REPORT TO THE FARRAGUT MUNICIPAL PLANNING COMMISSION

PREPARED BY: Mark Shipley, Community Development Director

SUBJECT: Discussion and public hearing on a request to amend the Farragut Zoning Map in association with the Farragut Town Center at Biddle Farms project, 11230 and 11240 Kingston Pike and 133 Concord Road, Parcels 3.02, 3.03, 3.10, and a portion of 3.19, Tax Map 143, from General Commercial (C-1) and General Single-Family Residential (R-2) to Planned Commercial Development (PCD), 43.63 Acres (CHM, LLC, Applicant)

INTRODUCTION AND BACKGROUND: Related to the previous agenda item, the applicant pursuing the Town Center at Biddle Farms project is requesting a zoning map amendment that would establish the Planned Commercial Development District (PCD) as the zoning district for their planned mixed-use project. Having more than one zoning district can create confusion in terms of what regulations apply and, since this is a planned commercial/residential project, the PCD is the logical choice.

As shown as part of Ordinance 20-27, a small portion of the project is currently zoned PCD. However, most of the project is zoned General Commercial (C-1) with the southeast end of the project, which does not include any proposed buildings, zoned General Single-Family Residential (R-2).

DISCUSSION: After a lengthy discussion at the staff/developer meeting on August 4, the general consensus that emerged was that the Town Center at Biddle Farms project, with its unique characteristics and surrounding plan of development, would be a good candidate for a Planned Commercial Development, especially given that a concept plan has already been presented and conditionally approved. The idea of using the PCD for this project was presented to the Planning Commission at their meeting on August 20 and was favorably received.

Since that time, the applicant has been working on putting together the information required for a rezoning request for the PCD District. Based on the information submitted, the applicant will be requesting some text amendments that will be considered at the December meeting. The project components that would involve requested text amendments were discussed in general terms with the Planning Commission at their July 16 meeting. The text amendment application was not submitted at that time because the applicant was still working through the details of their project to determine what, if any, amendments may need to be requested.

For purposes of this agenda item, staff would note that a rezoning to PCD would permit the applicant to develop under the existing language. The applicant understands that if future text amendments are not approved the project will need to be amended to comply with the established provisions.

RECOMMENDATION: Since the master concept plan that was submitted with this rezoning and that was conditionally approved by the Planning Commission in July will require text amendments, staff recommends that any approval of the rezoning will be conditioned upon the understanding that when the more detailed site and landscape plans are submitted, such plans shall be in compliance with all applicable regulations in place at that time.

Included in the packet is the applicant's revised rezoning package. This includes the Traffic Impact Study and a third-party review of the study. Staff will review the information provided and update the Commission at the meeting.

As noted in the previous item, in relation to the Eight Key Strategies identified in the Comprehensive Land Use Plan Update, changing the zoning map as provided for in Resolution PC-20-19 would help facilitate a project that would address the following:

1. Bringing About a Downtown (the project would create a main street with many components consistent with a downtown);
2. Repairing Aging Shopping Centers (the project would result in the removal of the old Kroger building and the creation of a new development with a town center street grid with building placement and streetscaping that encourage pedestrian activity, a large central gathering space for community events, a linear park, and improvements to outdated infrastructure);
3. Encouraging Greater Housing Choice (the project would provide for housing in a density, form, and location that would help support the downtown and create a more dynamic and active town center area);
4. Increasing Connectivity (the project includes numerous connections, both vehicular and pedestrian, that tie the project together internally and externally);
5. Enhancing our Identity (the project would create a unique type of development that would focus on activated spaces and pedestrian engagement along with provisions for public gatherings and community events); and
6. Planning for the Remaining Vacant Parcels (the project not only repairs an existing aging shopping center and infrastructure but it also addresses abutting areas and incorporates them into the project to help sustain the project and create an area that will be identified as downtown Farragut).

Resolution PC-20-19 recommends approval of Ordinance 20-27 which would rezone all of the property to be included in the Town Center at Biddle Farms mixed use project as PCD.

RESOLUTION PC-20-19

FARRAGUT MUNICIPAL PLANNING COMMISSION

A RESOLUTION TO APPROVE AN AMENDMENT TO THE FARRAGUT ZONING MAP, ORDINANCE 86-16, TO RECOMMEND THE APPROVAL OF THE REZONING OF THE PROPERTY AT 11230 AND 11240 KINGSTON PIKE AND 133 CONCORD ROAD, PARCELS 3.02, 3.03, 3.10, AND A PORTION OF 3.19, TAX MAP 143, FROM GENERAL COMMERCIAL (C-1) AND GENERAL SINGLE-FAMILY RESIDENTIAL (R-2) TO PLANNED COMMERCIAL DEVELOPMENT (PCD)

WHEREAS, the Tennessee Code Annotated, Section 13-4-201et seq, provides that the Municipal Planning Commission shall make and adopt a general plan for the physical development of the municipality; and

WHEREAS, the Farragut Municipal Planning Commission has adopted various elements of a zoning plan as an element of the general plan for physical development; and

WHEREAS, a public hearing was held on this request on November 19, 2020;

NOW, THEREFORE, BE IT RESOLVED that the Farragut Municipal Planning Commission hereby recommends approval of Ordinance 20-27 to the Farragut Board of Mayor and Aldermen, an ordinance amending the Farragut Zoning Ordinance and Map, Ordinance 86-16, by rezoning the above noted property.

ADOPTED this 19th day of November 2020.

Rita Holladay, Chairman

Scott Russ, Secretary

ORDINANCE:	20-27
PREPARED BY:	Shipley
REQUESTED BY:	CHM, LLC
CERTIFIED BY FMPC:	November 19, 2020
PUBLIC HEARING:	_____
PUBLISHED IN:	_____
DATE:	_____
1ST READING:	_____
2ND READING:	_____
PUBLISHED IN:	_____
DATE:	_____

AN ORDINANCE AMENDING THE ZONING ORDINANCE OF THE TOWN OF FARRAGUT, TENNESSEE, ORDINANCE 86-16, AS AMENDED, PURSUANT TO SECTION 13-4-201, TENNESSEE CODE ANNOTATED.

BE IT ORDAINED by the Board of Mayor and Aldermen of the Town of Farragut, Tennessee, that the Farragut Zoning Ordinance, Ordinance 86-16, as amended, is hereby amended as follows:

SECTION 1.

The Farragut Zoning Ordinance, Ordinance 86-16, as amended, is hereby amended by rezoning 11230 and 11240 Kingston Pike and 133 Concord Road, Parcels 3.02, 3.03, 3.10, and a portion of 3.19, Tax Map 143, from General Commercial (C-1) and General Single-Family Residential (R-2) to Planned Commercial Development (PCD) (See Exhibit A).

SECTION 2.

This ordinance shall take effect from and after its final passage and publication, the public welfare requiring it.

Ron Williams, Mayor

Allison Myers, Town Recorder

Certified to the Farragut Board of Mayor and Aldermen this ____ day of _____, 2020,
with approval recommended by the Farragut Municipal Planning Commission (FMPC).

Rita Holladay, Chairman

Scott Russ, Secretary



**Exhibit A
Ordinance 20-27**

**Rezone
Parcel 3.02, 3.03, 3.10,
and a portion of 3.19
Tax Map 143
11230 and 11240 Kingston Pike
and 133 Concord Road**

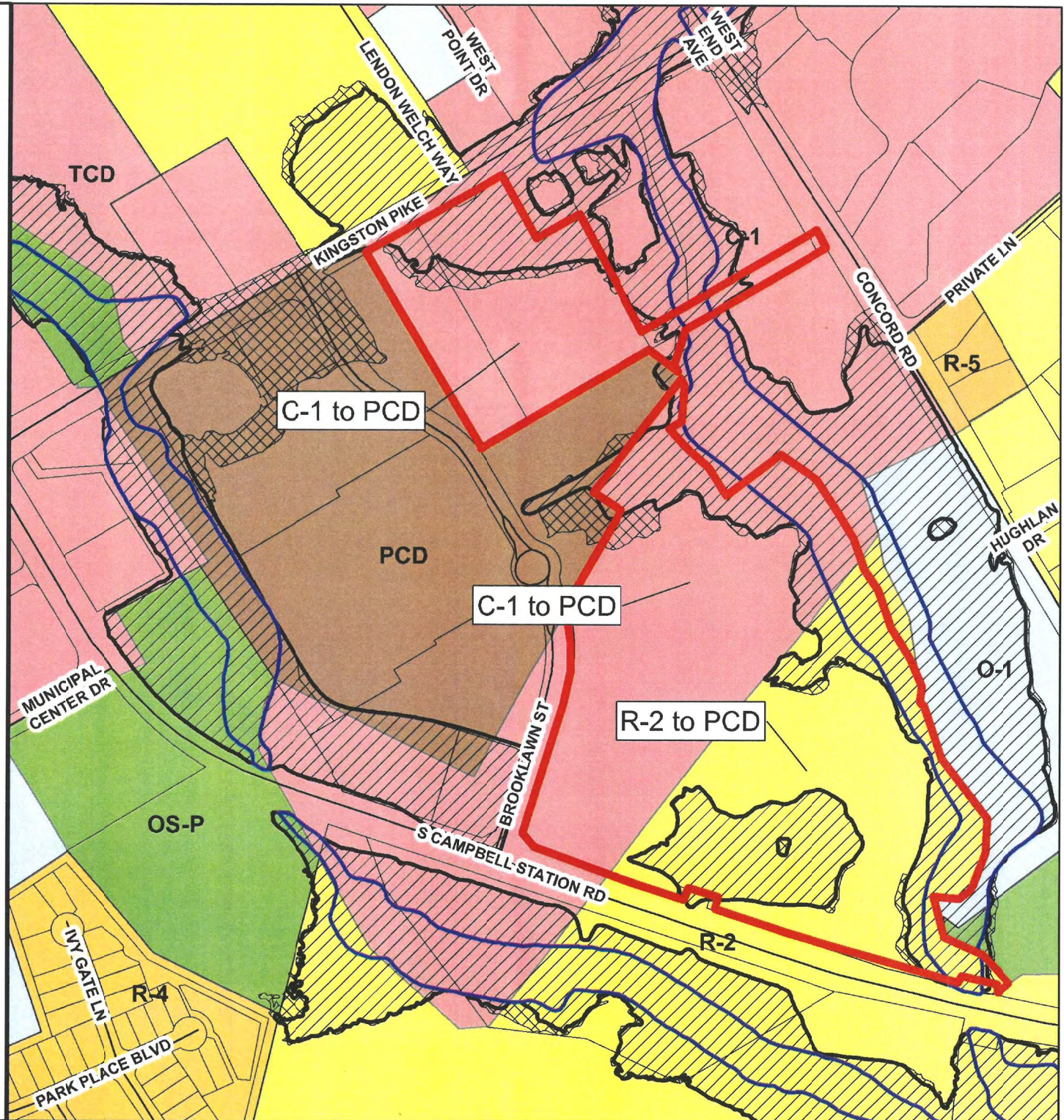
From
C-1 (General Commercial) and
R-2 (General Single-Family Residential)
to
PCD (Planned Commercial Development)

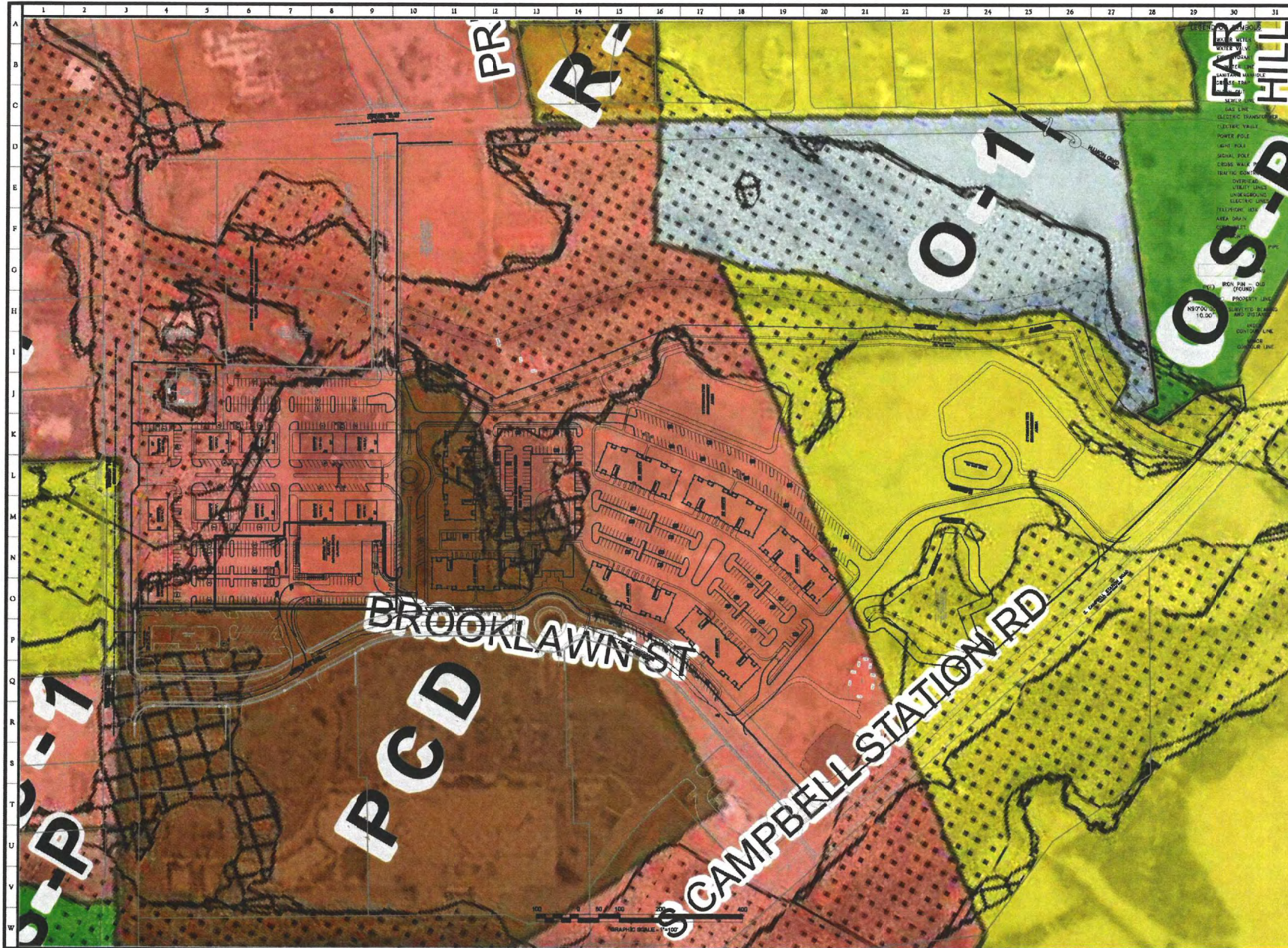
Legend

- Subject Property
- Floodway
- 100 year Flood Zone
- 500 year Flood Zone
- Streets
- Parcels
- OS-P, Open Space/Park
- R-2, General Single-Family Residential
- R-4, Attached Single-Family Residential
- R-5, Two-Family Residential
- O-1, Office
- Town Center District
- C-1, General Commercial
- PCD, Planned Commercial Development



1 in = 400 ft





CONCEPTUAL

Conceptual Site Plan
Farragut Town Center
 Kingston Pike, Brooklawn Street, & Concord Road
 Civil District No. 6 of Knox County, Tennessee
 Town of Farragut

NO.	DATE	REVISIONS

ORIGINAL ISSUE: 05/15/2002
 SITE PROJECT#: 1994
 FILE: CSP-16

CSP-16



November 2, 2020

Mr. Darryl W. Smith, P.E.
Town Engineer
Town of Farragut
11408 Municipal Center Drive
Farragut, Tennessee 37934

**RE: Traffic Impact Study Report Review
Farragut Town Center at Biddle Farms
Farragut, TN**

Dear Mr. Smith:

Cannon & Cannon, Inc. (CCI) appreciates the opportunity to review the traffic impact study report for the proposed Farragut Town Center at Biddle Farms development prepared by CDM Smith. It is our understanding that the proposed development will consist of a grocery store, retail shops, and multi-family residential units. We further understand that the development will be located east of the existing Kroger development. Access to Kingston Pike and Campbell Station Road will be provided via Brooklawn Street, and the development will also have access to Concord Road. The development is expected to produce between 6,000 and 7,000 new daily trips.

We have reviewed the report for this traffic impact study, and it is our opinion that the overall report content, conclusions, and recommendations were developed using sound engineering methods and assumptions. The utilization of 2016 counts due to current traffic conditions with Covid was appropriate. The annual growth rates of 2.5% for 2020 existing traffic and 3.5% for 2025 background traffic are reasonable as is the factoring of the count at Brooklawn and the driveway accesses by 10%. CDM Smith acknowledged the traffic issues at the intersections of Kingston Pike with Campbell Station Road and Kingston Pike with Concord Road, and they provided potential mitigation measures for these issues.

Regarding traffic generated by the proposed development, we have no issues with the methods utilized and the assumptions made for the trip generation estimates. We further agree that it was appropriate to provide separate trip distributions for the residential and commercial components. Based on the capacity analysis comparisons of background traffic without the development and projected traffic with the development, we agree that the two critical intersections (Kingston at Campbell Station and Kingston at Concord) may experience unstable conditions without mitigation, but that these conditions will not significantly worsen due to traffic generated by the proposed development.

Sincerely,

Brian J. Haas, P.E., PTOE
Project Manager

TEL **865.670.8555**
CANNON-CANNON.COM

KNOXVILLE 8550 Kingston Pike
Knoxville, TN 37919
FAX 865.670.8866

FARRAGUT TOWN CENTER AT BIDDLE FARMS

Town of Farragut

TRAFFIC IMPACT STUDY

***Prepared for :
CHM, LLC***

Prepared By:



October 2020



10/29/2020

October 2020

Prepared by

CDM SMITH
Alexander Place
1100 Marion Street, Suite 300
Knoxville, Tennessee 37921

Project No. 245285

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INTRODUCTION

CDM Smith is pleased to submit this report to address any traffic impact and access for the development of the Biddle Farms Property, a mixed-use retail commercial and residential development. This traffic study required the collection of traffic data, generation of anticipated traffic volumes for the proposed site and development of projected traffic volumes for normal growth and from the potential site. Analyses of the resulting traffic projections were conducted to determine the capacity and levels of service for the site access to Kingston Pike, Campbell Station Road South, and Concord Road. This study will evaluate the development's impact and determine if any mitigation measures are necessary to minimize the traffic impact including improved roadway geometrics and traffic control devices.

Project Description

The proposed development of the Biddle Farms is a mixed retail commercial and residential development on a total of approximately 29.3 acres with current zoning of C-1 and PCD, which could permit development of 295,000 square-feet of retail commercial. This study will address the site with a proposed PCD zoning and the development of a 20,442-square foot grocery with 42,000 square feet of retail shops and approximately 290 multi-family residential units. The retail commercial development will be of a town center concept which includes shops adjacent to local street facilities with on-street parking. **Figure 1** shows the proposed site plan. The proposed access is to Brooklawn Street serving the Farragut Town Center with intersections to Kingston Pike (US 11/70) and South Campbell Station Road. The site would utilize an existing access to Concord Road to the east.

Site Location

The proposed development is to be located in the Town of Farragut at the old Kroger site with access opposite Lendon Welch Way at Kingston Pike. The site is bound by Kingston Pike to the north, Brooklawn Street to the west and Concord Road to the east. The site is southeast of the Kingston Pike and Campbell Station Road intersection. **Figure 2** illustrates the site location relative to local and regional access.

SITE PLAN Biddle Farms

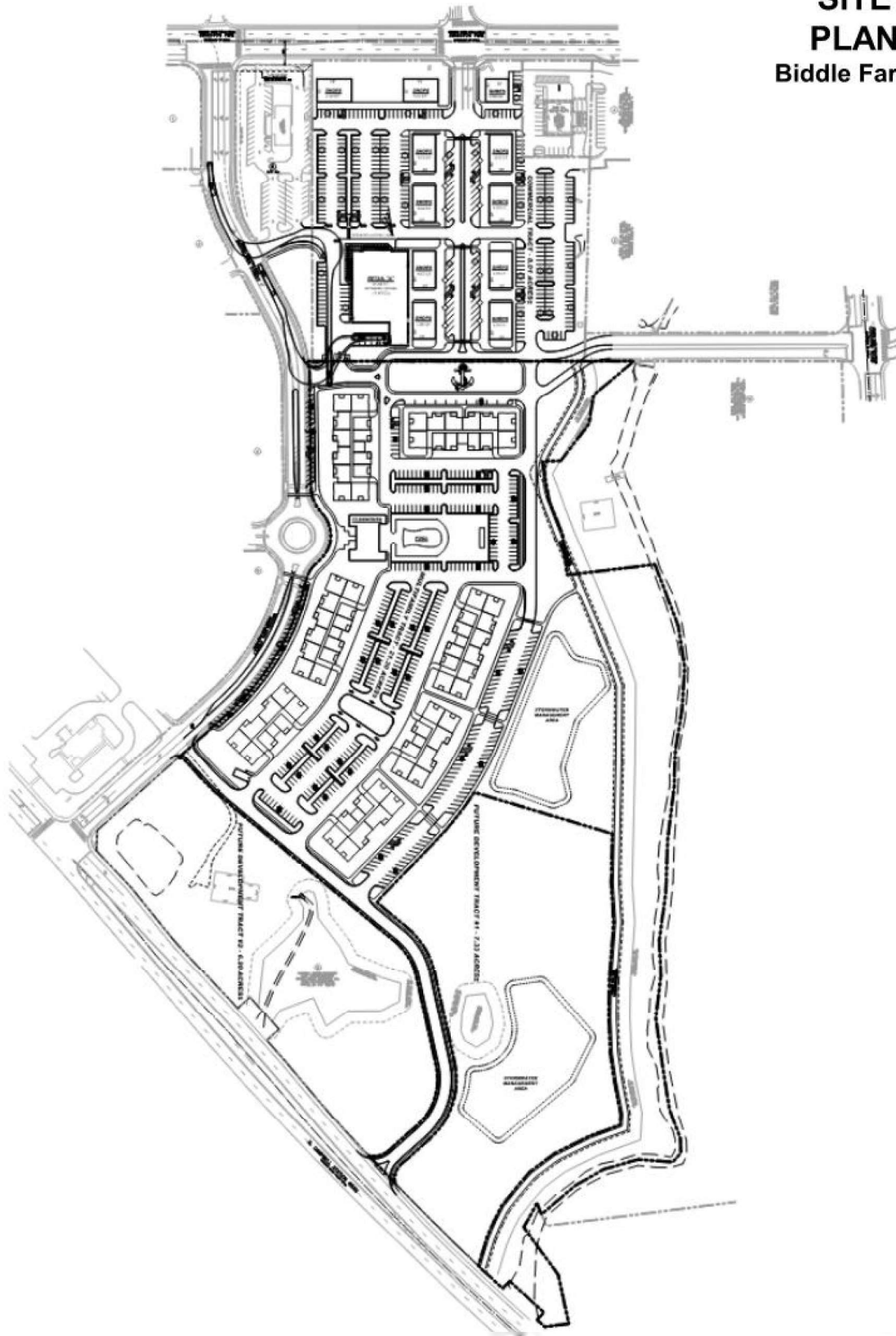
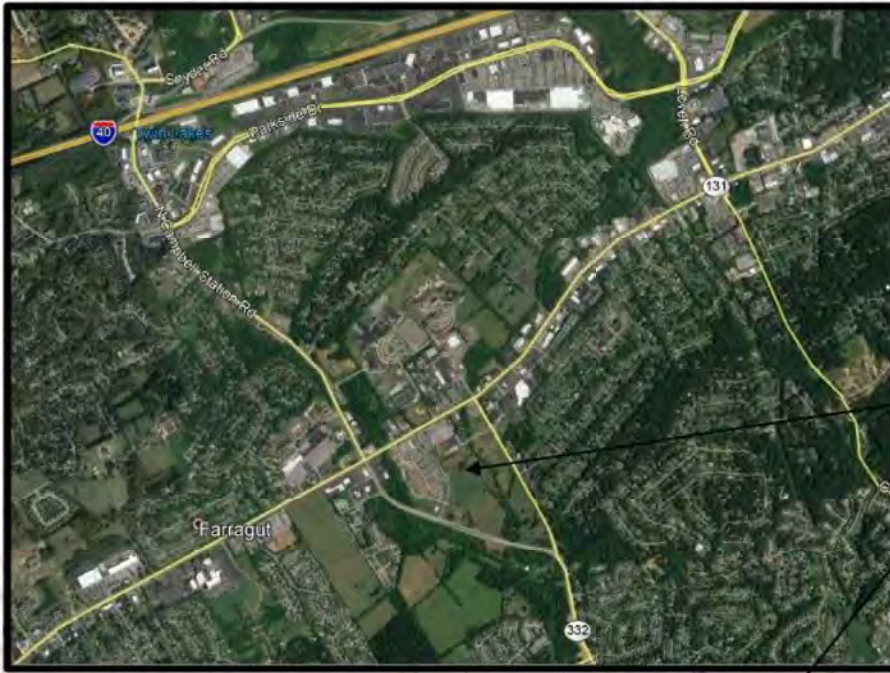


Figure 1



VICINITY MAP Biddle Farms

SITE

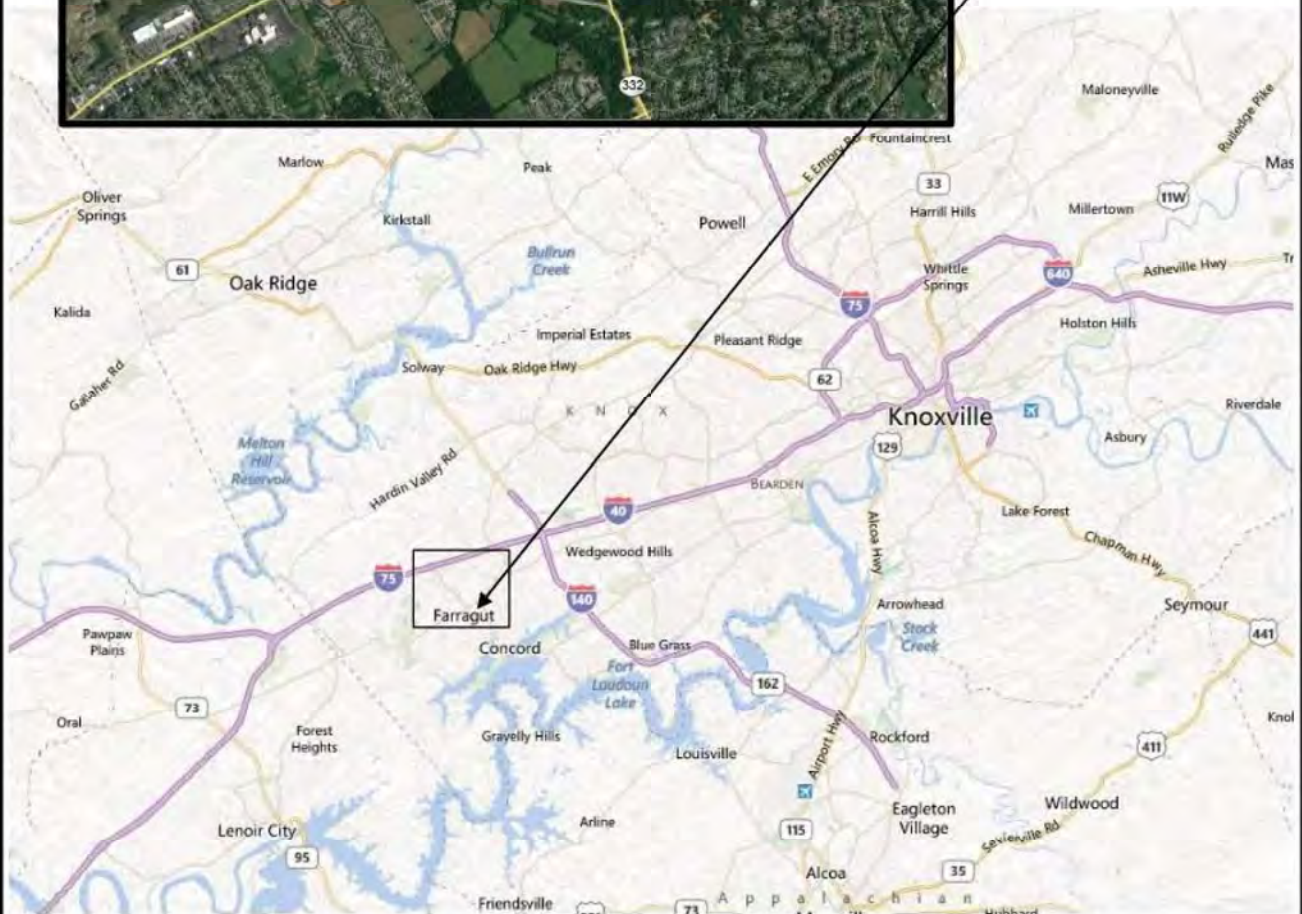


Figure 2

LOCAL AND REGIONAL ACCESS

Local Access

The proposed local access is to Brooklawn Street with intersections to Kingston Pike (US 11/70) and South Campbell Station Road. Brooklawn Street is a 2-lane section with a posted speed limit of 25mph connecting Kingston Pike and South Campbell Station Road. Kingston Pike (US 11/70) is a 5-lane east and west arterial through Farragut with the posted speed for 45 mph extending to Lenoir City to the west and Knoxville central business district (CBD) to the east. Kingston Pike has an average daily traffic (ADT) of 22,260 to the west of the site and 34,790 to the east.

Campbell Station Road South is a 5-lane arterial extending north and south of the site between Concord Road (SR 332) to the south and Hardin Valley Road to the north. Campbell Station Road has an interchange with Interstate 40/75 to the north of the site. The posted speed limit of Campbell Station Road is 45 mph and has an average daily traffic volume of 26,890 north of Kingston Pike and 11,350 south of Kingston Pike, adjacent to the site.

The existing access to Concord Road will also be utilized by the proposed development. Concord Road is a 2-lane roadway extending south from Kingston Pike to Northshore Drive. Its posted speed is 30 mph and has an approximate ADT of 10,750 adjacent to the site.

Regional Access

Regional access to this site is also from Kingston Pike accessing east and west of the site with available access south of the site. Northshore Drive is a 2-lane regional minor arterial extending east and west of the site between Papermill Road to the east and Loudon County to the west. Northshore Drive serves much residential development with some neighborhood centers to the west. To the east, Northshore Drive serves again much residential development but with more available commercial development as it extends into City of Knoxville limits.

Interstate 40/75 access is provided from Campbell Station Road to the north, Watt Road to the west, and Lovell Road (SR 131) east of site. Interstate 40 is an east and west six-lane facility running through Knoxville to the east and Nashville to the west. Interstate 75 extends north to Lexington, Kentucky, and to the west, I-75 turns south to Chattanooga, Tennessee. The Interstate 40/75 facility has a 2019 ADT of 125,370 east of Campbell Station Road and north of the site.

EXISTING TRAFFIC CONDITIONS

Existing Traffic Control

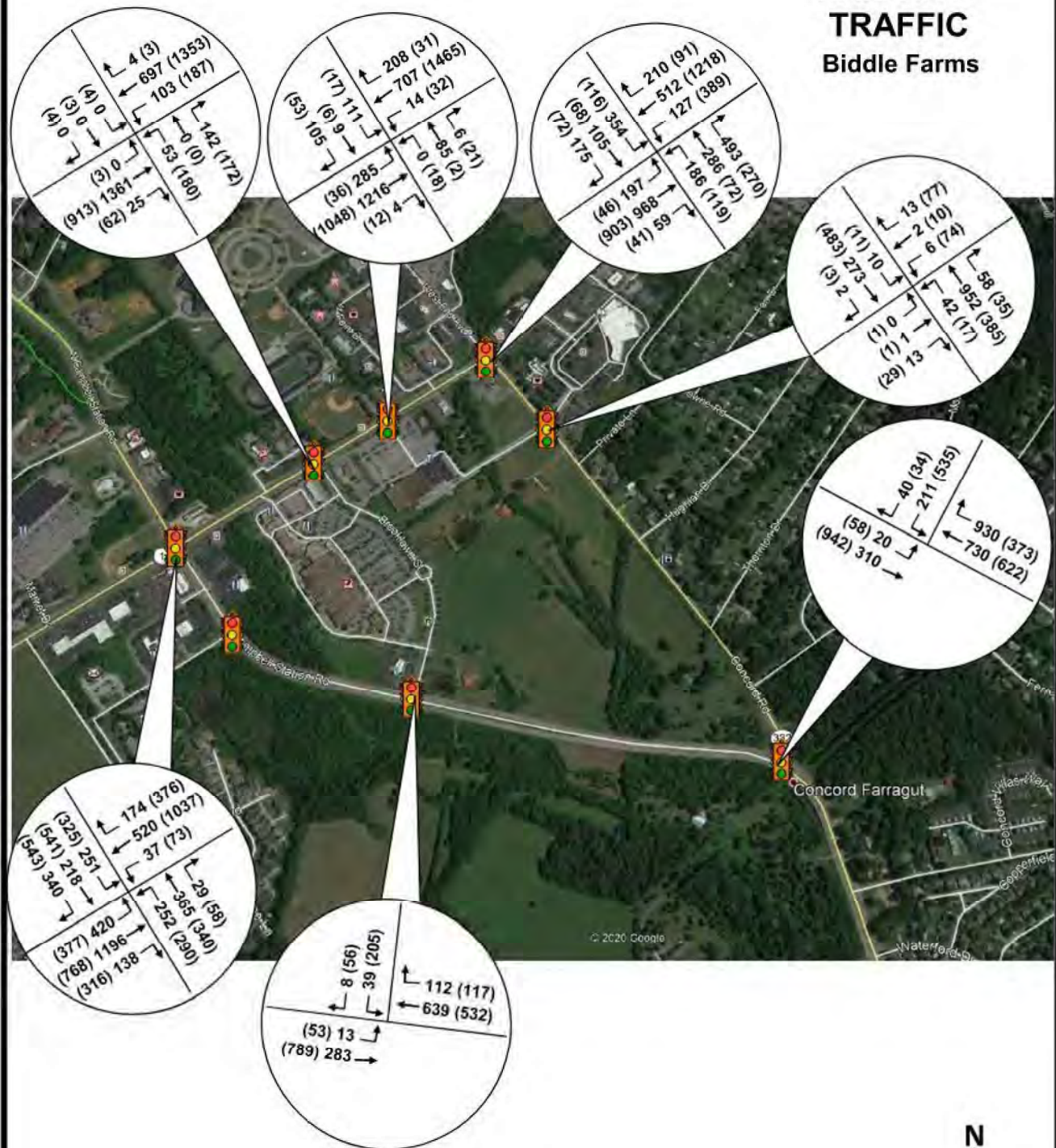
The proposed site accesses from Brooklawn Street to Kingston Pike and South Campbell Station Road are signalized. Signals are accessible to and from the site at Kingston Pike at Lendon Welch Way. Kingston Pike intersections with Campbell Station Road to the west and Concord Road to the east of the site are signalized. The South Campbell Station Road intersection with Concord Road is signalized. Brooklawn Street is a local street with a roundabout provided to serve the development and as a possible deterrent of cut-through traffic.

Existing Traffic Volumes

Current traffic counts were not conducted due to the COVID-19 pandemic which affects the 2020 traffic conditions. Traffic patterns have been affected due to many individuals working from home and schools not fully opened. Therefore, turning movement counts for the signalized intersections were provided by the Town of Farragut from a study performed in April 2016. The peak hours determined for Kingston Pike and Campbell Station Road were between 7:30-8:30AM and 5:00-6:00PM. The intersection of Kingston Pike and Campbell Station Road is the critical intersection in the vicinity of the site. With the peak hours of the development typically between 7:00-9:00AM and 4:00-6:00PM, the peak hour found using the Kingston Pike and Campbell Station Road turning movement count was appropriate for this study. The 2016 turning movements were factored up by 10-percent, reflecting a 2.5-percent annual growth rate from 2016 to 2020. This rate of growth was determined from the historical ADT traffic data available from the Tennessee Department of Transportation (TDOT). The TDOT data for count stations nearby the site show annual growth rates (between 2016 and 2018) ranging from 1.73-percent along South Campbell Station Road, 3.1-percent along Concord Road and -6.73-percent along Kingston Pike east of Concord Road. The count stations show traffic volumes trending up from 2012 and dipping in 2018 with another increase in 2019. The 2.5-percent annual growth rate provides a realistic, yet conservative, estimate for 2020 traffic volumes.

Current traffic was collected for the driveway accesses along Brooklawn Street. These turning movements were also factored 10-percent for an effect of the possible COVID-19 traffic conditions. Traffic along Brooklawn Street may not have been as affected by the pandemic conditions due to the nature of the traffic being more grocery and other essential supplies. This adjustment is to account for the possible reduction in 2020 traffic conditions related to COVID-19. **Figures 3 and 3B** illustrate the AM and PM peak-hour turning movements for 2020.

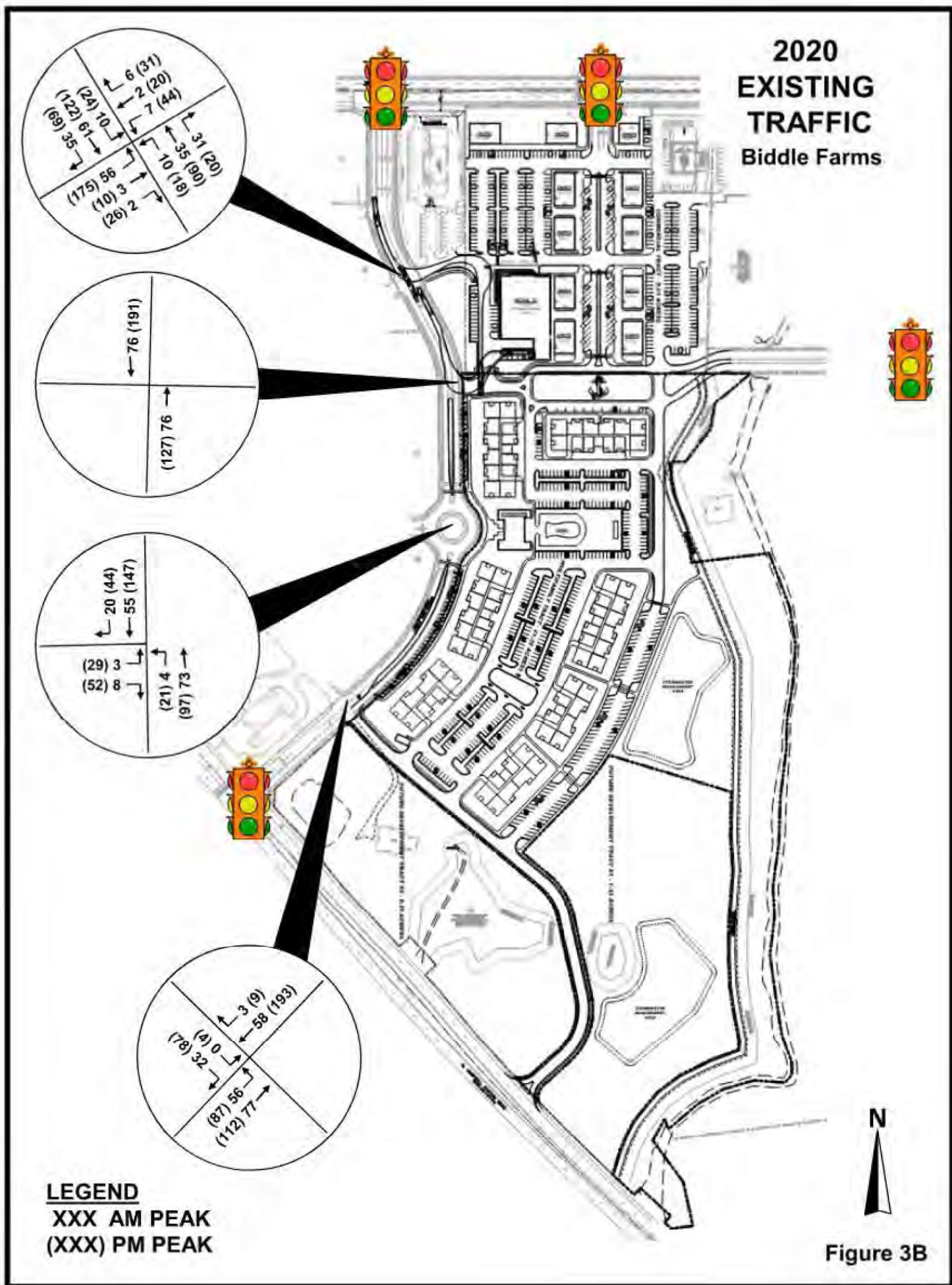
2020 EXISTING TRAFFIC Biddle Farms



LEGEND
XXX AM PEAK
(XXX) PM PEAK



Figure 3A



Existing Capacity and Level of Service

In order to evaluate the current operations of the traffic control devices, capacity and level of service were calculated using the **2000 Highway Capacity Manual, Special Report 209** published by the Transportation Research Board (TRB). Signalized and unsignalized intersections are evaluated based on estimated intersection delays, which are related to level of service (LOS).

Level of service and capacity are measurements of an intersection's ability to accommodate traffic volumes. Levels of service for intersections range from A to F. LOS A is the best, and LOS F is failing. For signalized intersections, LOS A has an average estimated delay of less than 10 seconds per vehicle, and LOS F has an estimated delay of greater than 80 seconds. LOS C and D are typical design values. Within urban areas, LOS D (delay between 35 and 55 seconds) is considered acceptable by the Institute of Transportation Engineers (ITE) for signalized intersections.

Unsignalized intersection levels of service have lower thresholds of delays. LOS F exceeds estimated delays of 50 seconds per vehicle. For urban arterials, minor approaches may frequently experience levels of service E. Full level of service descriptions for unsignalized and signalized intersections are presented in **Tables 1 and 2**, respectively.

Table 1
LEVEL-OF-SERVICE (LOS) DESCRIPTION
FOR SIGNALIZED INTERSECTIONS

LOS	Average Control Delay per Vehicle (seconds)	Description
A	≤ 10.0	Very low delay with extremely favorable progression. Most vehicles don't stop.
B	> 10.0 and ≤ 20.0	Generally good progression. Increase number of stops from that described for LOS "A" resulting in higher delays
C	> 20.0 and ≤ 35.0	Fair progression with increased delay. Number of stopping vehicles become significant; however, many still pass through the intersection without stopping. Stable flow.
D	> 35.0 and ≤ 55.0	The influence of congestion becomes more noticeable. Longer delays resulting from unfavorable progression, longer cycles, or high V/C ratios. Approaching unstable flow.
E	> 55.0 and ≤ 80.0	Limit of acceptable delay. Long delays associated with poor progression, long cycles, or high V/C ratios.
F	> 80.0	Unacceptable operation resulting from oversaturation (flow rates exceed capacity). Poor progression, long cycles, and high V/C ratios.

SOURCE: Highway Capacity Manual, TRB Special Report 209

Table 2
SERVICE (LOS) DESCRIPTION
FOR TWO-WAY STOP INTERSECTIONS

Level of Service	Average Control Delay per Vehicle (seconds)
A	≤ 10.0
B	> 10.0 and ≤ 15.0
C	> 15.0 and ≤ 25.0
D	> 25.0 and ≤ 35.0
E	> 35.0 and ≤ 50.0
F	> 50.0

SOURCE: Highway Capacity Manual, TRB Special Report 209

A second measure of performance that is particularly valuable under signalized operation is the volume-to-capacity ratio (V/C). This reflects the portion of capacity that is being utilized. As the V/C exceeds 0.90, the movement or intersection is less able to absorb additional traffic demand, so that relatively small increases in traffic volume can lead to significant increases in delay and possible failing conditions.

Analyses were conducted using the **Synchro** Software, developed by Trafficware. **Table 3** presents the signalized analyses of the study intersections. Intersection lane group levels of service are illustrated in **Figures 4A and 4B**.

TABLE 3
2020 EXISTING
CAPACITY AND LEVEL OF SERVICE

INTERSECTION	TRAFFIC CONTROL	PEAK PERIOD	w Optimized Signal Timing		
			V/C	DELAY	LOS
Kingston Pike (US 11/70) & Campbell Station Road	SIGNAL	AM	0.98	37.7	D
		PM	1.08	65.5	E
Kingston Pike (US 11/70) & Brooklawn Street	SIGNAL	AM	0.68	9.7	A
		PM	0.65	27.4	C
Kingston Pike (US 11/70) & Lendon Welch Way	SIGNAL	AM	0.84	18.0	B
		PM	0.62	15.0	B
Kingston Pike (US 11/70) & Concord Road (SR 332)	SIGNAL	AM	0.91	40.3	D
		PM	0.87	39.2	D
Campbell Station Road So. & Brooklawn Street	SIGNAL	AM	0.28	2.7	A
		PM	0.47	21.3	C
Campbell Station Road So. & Concord Road (SR 332)	SIGNAL	AM	0.62	16.2	B
		PM	0.54	17.0	B
Concord Road (SR 332) & Site Access	SIGNAL	AM	0.33	3.3	A
		PM	0.38	12.6	B
Brooklawn Street & Petco/Old Kroger Access	STOP EB/WB	AM	0.087/0.02	10.2/9.4	B/A
		PM	0.426/0.168	16.5/12.1	C/B
Brooklawn Street & Kroger Roundabout	Roundabout	AM	0.10	3.4	A
		PM	0.16	4.0	A
Brooklawn Street & Pinnacle Access	STOP EB	AM	0.04	8.7	A
		PM	0.11	10.1	B

Note: Average vehicle delay estimated in seconds.

Current conditions at all study intersections are LOS E or better. Intersections are operating with a minimum LOS C except for the Kingston Pike intersections with Campbell Station Road and Concord Road. The PM peak hour for the intersection of Kingston Pike at Campbell Station Road is a LOS E and operates over capacity with a V/C ratio of 1.08, thereby an operation that is unstable and experiencing saturated traffic flows resulting in significant congestion with adverse traffic queues. The Kingston Pike intersection with Concord Road is a LOS D during the peak hours with a capacity ratio exceeding 0.90 indicating traffic conditions becoming unstable.

2020 EXISTING LEVELS OF SERVICE Biddle Farms

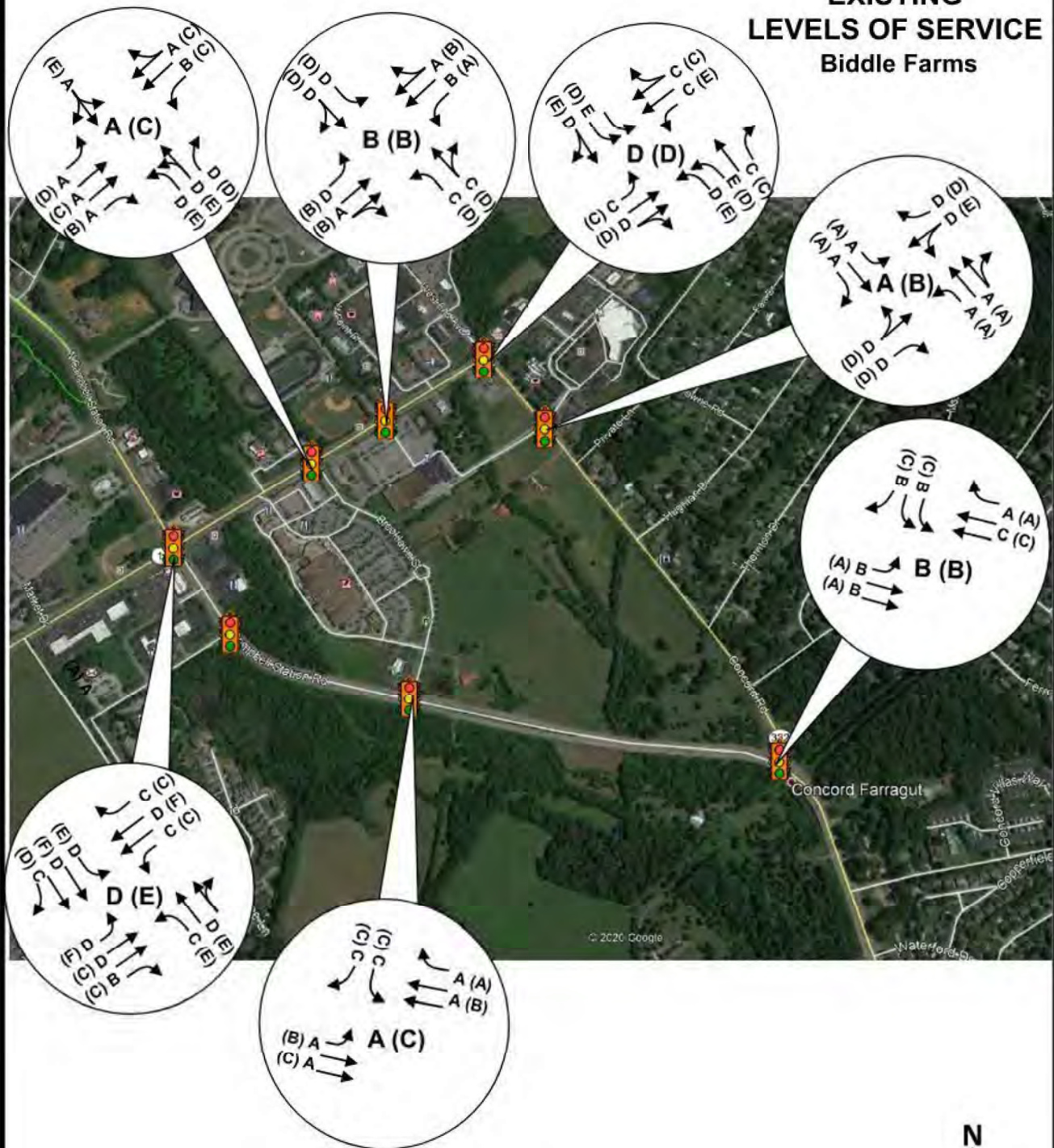
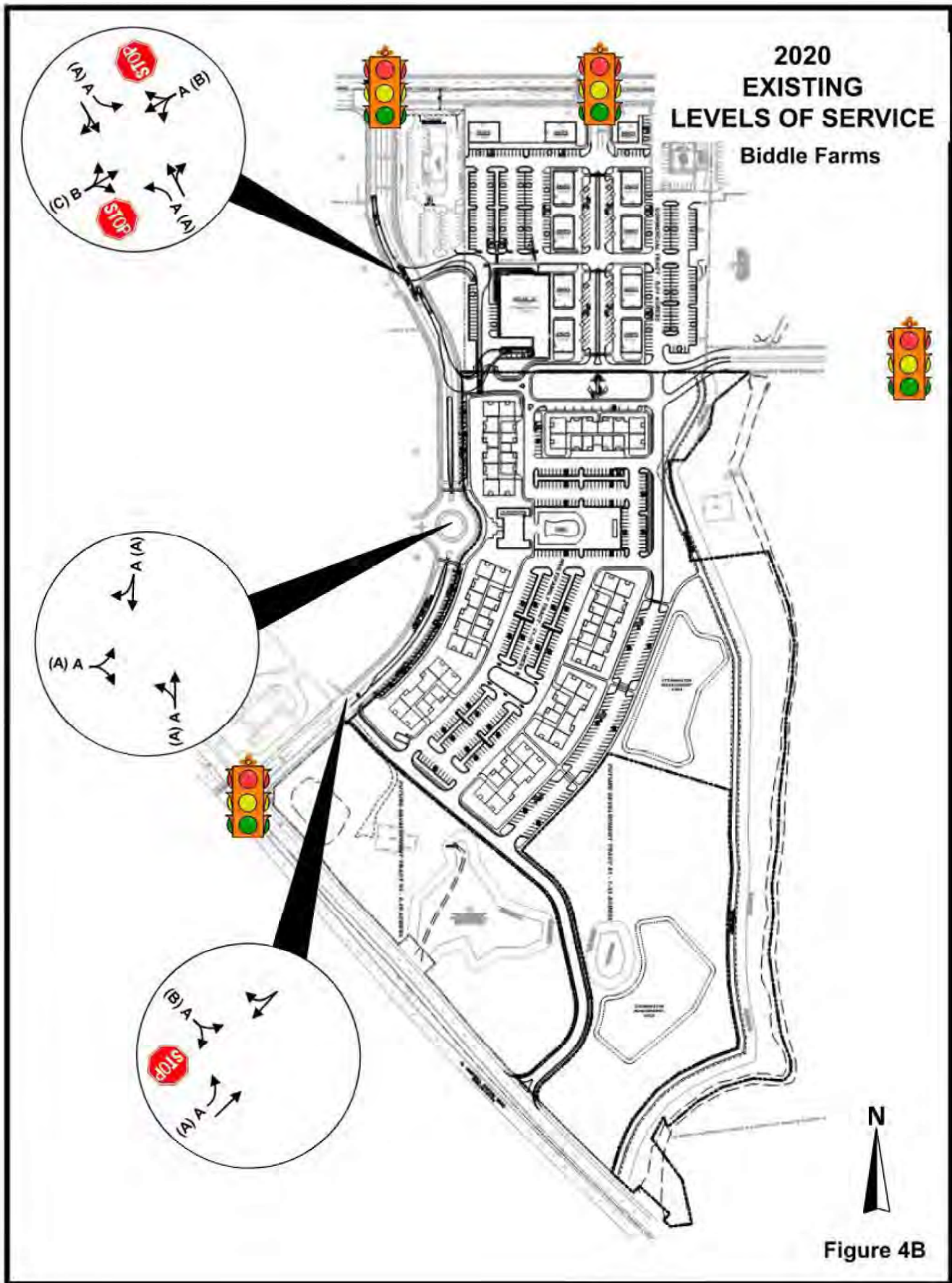


Figure 4A



BACKGROUND TRAFFIC CONDITIONS

Background traffic is traffic that can be anticipated regardless of the proposed development. Traffic within the study area should continue to grow due to other development. This background traffic is projected for the purpose of establishing a baseline for the evaluation of the subject site impacts.

Background Traffic Volumes

Historical traffic data is reviewed to determine traffic growth trends in the study area. Using the TDOT count stations in the vicinity of the site, annual growth rates over the past 5 and 10 years was determined. These stations and respective annual growth rates include the following:

Concord Road (Sta 455)	4.9% (5-year history)
Concord Road (Sta 139)	2.6% (5-year history)
Campbell Station Road (Sta 294)	2.7% (5-year history)
Campbell Station Road (Sta 454)	4.5% (10-year history)
Kingston Pike (Sta 363)	2.0% (10-year history)
Kingston Pike (Sta 138)	4.4% (5-year history)

This evaluation determined an annual growth rates ranged between a negligible rate and 5.0-percent. For the purpose of this study, background traffic volumes were, therefore, developed assuming an annual compounded growth rate of 3.5-percent. Background traffic is projected for the year 2025 thereby reflecting an 18.8-percent growth (compounded 3.5-percent for 5 years) applied to the through traffic volumes on Kingston Pike, Campbell Station Road, and Concord Road. Build-out of the site is assumed in the next five years. Actual build-out, however, will largely depend on the housing and retail markets.

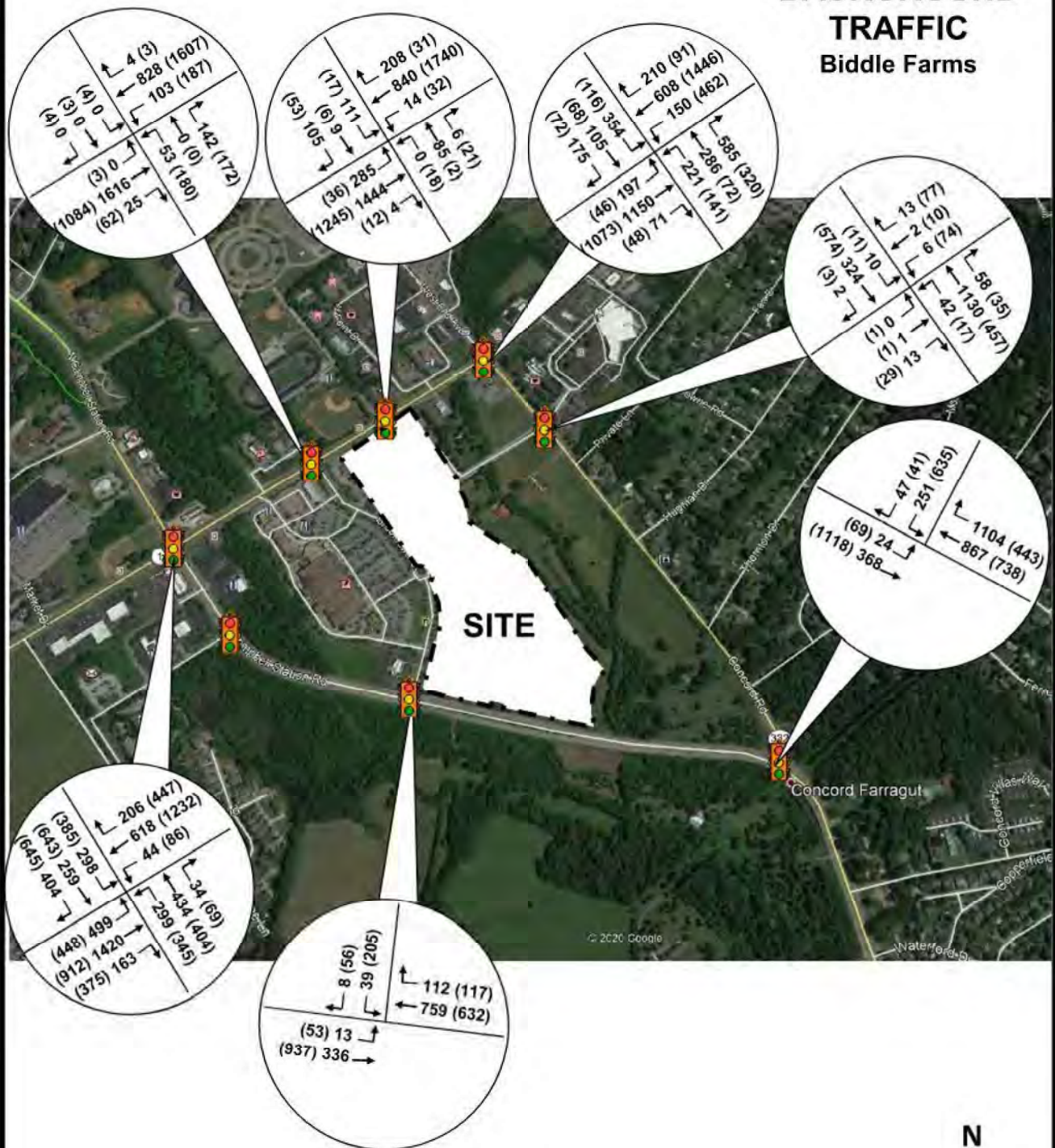
Figure 5 illustrates the grown turning movements reflecting the 2025 background traffic growth.

Background Capacity and Level of Service

Analyses were performed for the 2025 background conditions. The results of these analyses are presented in **Table 4**. The levels of service for Year 2025 are maintained from existing conditions.

The Kingston Pike intersections with Campbell Station Road and Concord Road will deteriorate to unacceptable levels of service with a PM peak hour LOS F and capacity ratio of 1.36 for Campbell Station Road and a LOS E and capacity ratio of 1.06 for Concord Road during the AM peak hour. Concord Road PM peak hour will also experience a capacity ratio exceeding 0.90 also indicating unstable traffic condition.

2025 BACKGROUND TRAFFIC Biddle Farms



LEGEND

XXX AM PEAK
(XXX) PM PEAK



Figure 5

TABLE 4
2025 BACKGROUND
CAPACITY AND LEVEL OF SERVICE

INTERSECTION	TRAFFIC CONTROL	PEAK PERIOD	w Optimized Signal Timing		
			V/C	DELAY	LOS
Kingston Pike (US 11/70) & Campbell Station Road <i>w NB, SB, and EB Double Left-turn Lanes Mitigation</i>	SIGNAL	AM	0.98	47.6	D
		PM	1.36	102.4	F
		AM	0.86	32.2	C
		PM	1.08	51.2	D
Kingston Pike (US 11/70) & Brooklawn Street	SIGNAL	AM	0.70	8.4	A
		PM	0.76	15.8	B
Kingston Pike (US 11/70) & Lendon Welch Way	SIGNAL	AM	0.80	21.5	C
		PM	0.71	6.7	A
Kingston Pike (US 11/70) & Concord Road (SR 332) <i>w NB Double Right-Turn Lanes Mitigation</i>	SIGNAL	AM	1.06	67.8	E
		PM	0.91	39.8	D
		AM	0.92	45.8	D
		PM	0.93	44.3	D
Campbell Station Road So. & Brooklawn Street	SIGNAL	AM	0.31	3.0	A
		PM	0.47	14.2	B
Campbell Station Road So. & Concord Road (SR 332)	SIGNAL	AM	0.80	22.0	C
		PM	0.63	17.7	B
Concord Road (SR 332) & Site Access	SIGNAL	AM	0.40	2.7	A
		PM	0.42	10.4	B
Brooklawn Street & Petco/Old Kroger Access	STOP EB/WB	AM	0.087/0.02	10.2/9.4	B/A
		PM	0.426/0.168	16.5/12.1	C/B
Brooklawn Street & Kroger Roundabout	Roundabout	AM	0.06	3.2	A
		PM	0.15	4.0	A
Brooklawn Street & Pinnacle Access	STOP EB	AM	0.04	8.7	A
		PM	0.11	10.1	B

Note: Average vehicle delay estimated in seconds.

With background left-turn volumes exceeding 300vph for the northbound, southbound, and eastbound approaches of the Kingston Pike and Campbell Station Road intersection, double left-turn lanes are needed for the intersection capacity and the reduction in the delay. Double left-turn movements for the Kingston Pike and Campbell Station Road intersection would be very difficult with the current development of the intersection corners. The provision of these double left-turn lanes would require several design exceptions if they were to be considered by the Town of Farragut, minimizing any right-of-way required.

For the Kingston Pike intersection with Concord Road, the LOS E and capacity can be mitigated with northbound double right-turn lanes. **Figures 6A and 6B** illustrate the background intersection lane group levels of service without and with mitigation, respectively.

[illegible]

Figure 6A

**2025
BACKGROUND
LEVELS OF SERVICE
With MITIGATION
Biddle Farms**

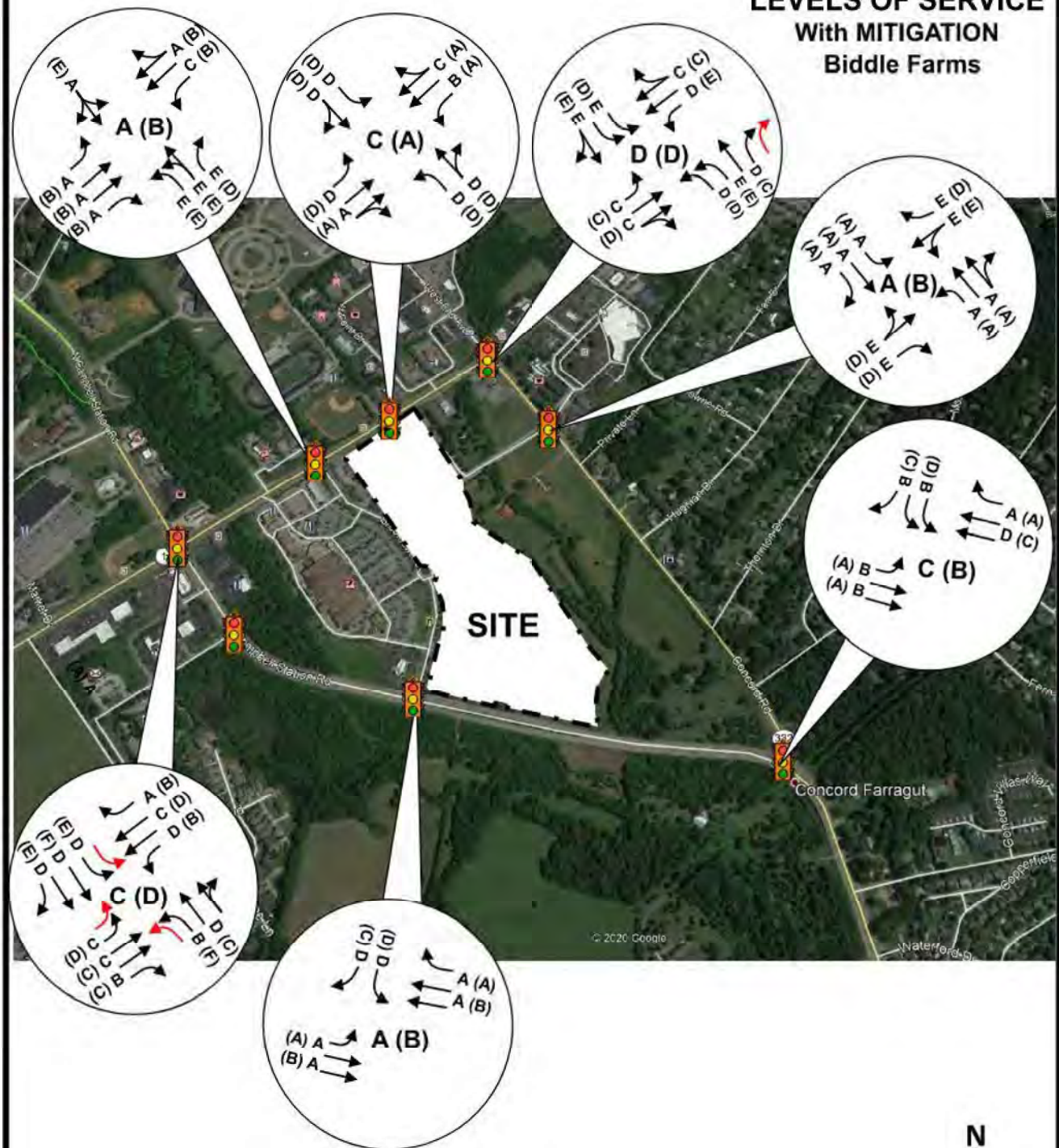


Figure 6B

PROJECT IMPACTS

Project conditions are developed by generating traffic based on the proposed land use, distributing the trips to the transportation network, and conducting analyses for capacity and level of service.

Trip Generation

Project traffic was determined using the publication, **Trip Generation, 10th Edition**. This reference is published by the Institute of Transportation Engineers (ITE) and represents national data collected for many different land uses including industrial, residential and commercial uses. **Trip Generation** is an essential tool in calculating the traffic, which may be generated by a proposed development. The study generated traffic for the approximate 29.3 acres of mixed commercial-residential development with a 20,442 square-foot Aldi's grocery with 42,000 of retail shops and approximately 290 multi-family units. The grocery land use utilized the ITE land use code (LUC 850) and the retail shops used the LUC for shopping center (LUC 820). The trip generation for the residential land use, however, utilized local trip generation rates adopted by the Knoxville-Knox County Metropolitan Planning Commission in July of 2000 for multi-family residential developments. Local trip rates were studied in accordance with the publication, **Trip Generation, 6th Edition**.

Some trip generation studies have included surveys addressing pass-by traffic. This is traffic already on the adjacent street that is attracted to the proposed development. Studies conducted for pass-by traffic have suggested that a percentage of the traffic generated by commercial retail, such as the land use at hand, may originate from the existing traffic flow; therefore, the project does not necessarily introduce all new traffic to the transportation system.

Pass-by traffic percentages differ relative to specific land uses and their densities. Some studies have shown varied results; however, the ITE publications, **Transportation and Land Development** by Virgil G. Stover and Frank J. Koepke, and **Trip Generation** have combined these studies to suggest uniform rates for given land uses. These rates range from 14-percent for hardware stores to 60-percent for neighborhood shopping centers, gross leasable area less than 100,000 square feet. Service stations and fast-food restaurants also exhibit high pass-by rates of 58-percent and 45-percent, respectively.

With the above in mind, a 20-percent pass-by and 5-percent internal trips were assumed for the proposed development. From the trip generation calculations, the proposed site may generate approximately 8,480 daily weekday trips. After the consideration of pass-by traffic and internal trips, approximately 6,730 new daily trips (Primary) may be generated for a typical weekday. Table 5 presents the trip generation of this proposed site.

TABLE 5 TRIP GENERATION

Land Use	Land-Use Code	Units	Daily Trips	AM Peak-Hour Trips		PM Peak-Hour Trips	
				Enter	Exit	Enter	Exit
Knox Co Multi-Family ⁽¹⁾	220Knox	290 units	2,485	31	111	112	92
<i>Internal Trips Reduction</i>		10%	249	3	11	11	9
Residential Primary Trips			2,237	28	100	101	83
Shopping Center ⁽²⁾	820	42,000 sqft.	3,333	107	66	137	149
Supermarket ⁽²⁾	850	20,442 sqft.	2,662	47	31	121	117
<i>Shopping Center Uses Sub-Total</i>		62,442 sqft.	5,995	154	97	258	266
<i>Pass-By Trips</i>		20%	1,199	31	19	52	53
<i>Internal/Shared Trips</i>		5%	300	8	5	13	13
Commercial Retail Primary Trips			4,496	116	73	194	200
Total Generated Trips			8,480	185	208	370	358
Total Primary Trips			6,733	143	173	294	282

References: (1) Knoxville-Knox Co. Planning trip generation rates adopted July of 2000

(2) Institute of Transportation Engineers-Trip Generation, 10th Edition

The trip generation was also conducted for the current zoning and the possible development of 295,000 square feet of retail commercial. This trip generation used a shopping center land use (LUC 820). The trip generation of the currently proposed development and the possible development with the current zoning is compared in Table 6. The comparison of the trip generation found the proposed site would produce fewer trips than the possible development with the current zoning. With the same pass-by rate of 20-percent applied to the current zoning trip generation, the primary daily trips generated were 10,037 and the PM peak hour trips were 968. This results in up to 3,300 fewer daily trips and 390 fewer PM peak hour trips with the proposed mixed commercial and residential development. An additional approximate 75 trips might be generated during the AM peak hour with the mixed-use commercial and residential site as compared to the current zoning.

**TABLE 6 TRIP GENERATION
COMPARISON WITH CURRENT ZONING**

Land Use	Land-Use Code	Units	Daily Trips	AM Peak-Hour Trips		PM Peak-Hour Trips	
				Enter	Exit	Enter	Exit
<u>CURRENT ZONING</u>							
Shopping Center ⁽¹⁾	820	295,000 sqft.	12,546	186	114	581	629
	<i>Pass-By Trips</i>	20%	2,509	37	23	116	126
	<i>Commercial Retail Primary Trips</i>		10,037	149	91	465	503
<u>PROPOSED DEVELOPMENT</u>							
Mixed Multi-Family & Commercial	Total Generated Trips		8,480	185	208	370	358
	<i>Pass-By Trips</i>		1,199	31	19	52	53
	<i>Internal/Shared Trips</i>		548	11	16	24	23
	<i>Total Primary Trips</i>		6,733	143	173	294	282
Change in Trips Generated			-4,066	-1	94	-211	-271
Change in Primary Trips Generated			-3,304	-5	81	-171	-221

References: (1) Institute of Transportation Engineers-Trip Generation, 10th Edition

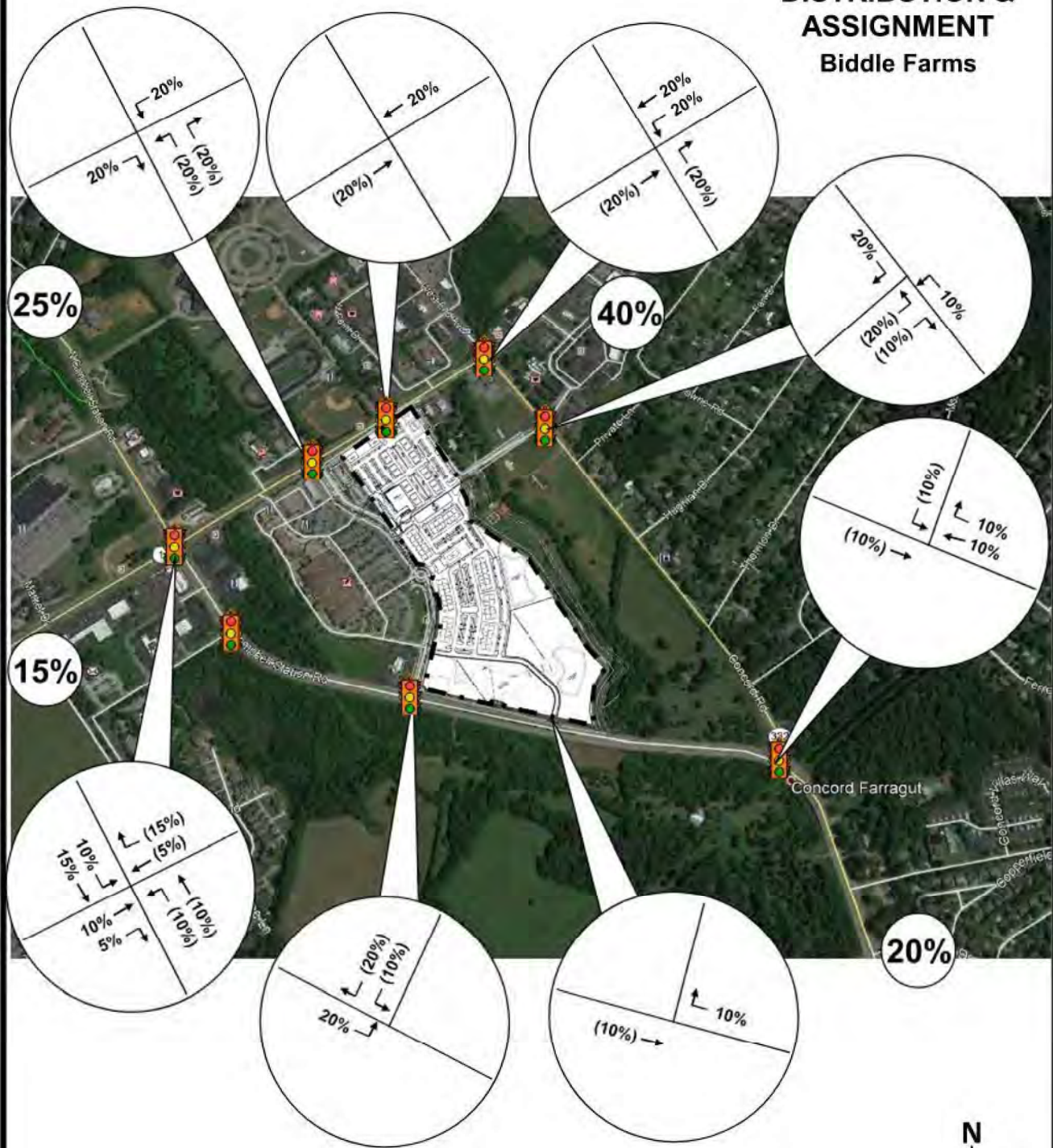
Trip Distribution and Assignment

The proposed Biddle Farms should have both a localized and some regional area of influence. The retail commercial development should have a more neighborhood area of influence, a radius of approximately five miles; whereas, the residential could have some regional influence as it should exhibit commuter traffic patterns. The commercial trip distribution and assignment considered the current distribution of the current Kroger center and traffic entering and exiting Brooklawn Street. The residential distribution assumed a similar pattern exhibited by morning peak hour commuter traffic. The primary distribution, therefore assumes the following:

	<u>Commercial</u>	<u>Residential</u>
Kingston Pike (US 11/70) West	15%	15%
Kingston Pike (US 11/70) East	30%	40%
So. Campbell Station Road/Concord Road (SR 332) South	30%	20%
No. Campbell Station Road North	20%	25%
Concord Road (SR 332) within the Site Vicinity	5%	

Figures 7A and 7B illustrate the primary trip assignment for the primary residential trips, and **Figures 8A and 8B** illustrate the primary trip assignment for the commercial development.

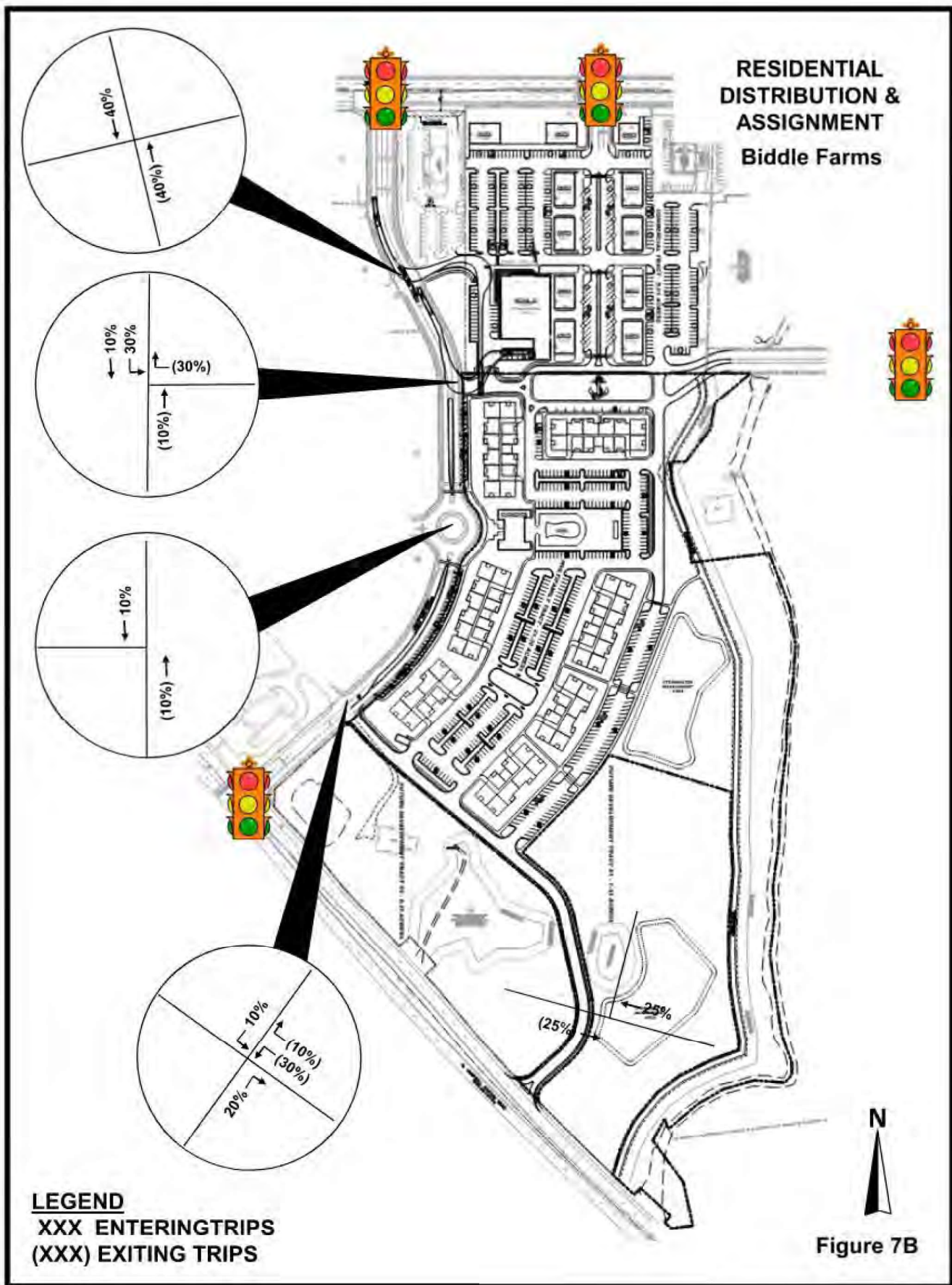
RESIDENTIAL DISTRIBUTION & ASSIGNMENT Biddle Farms



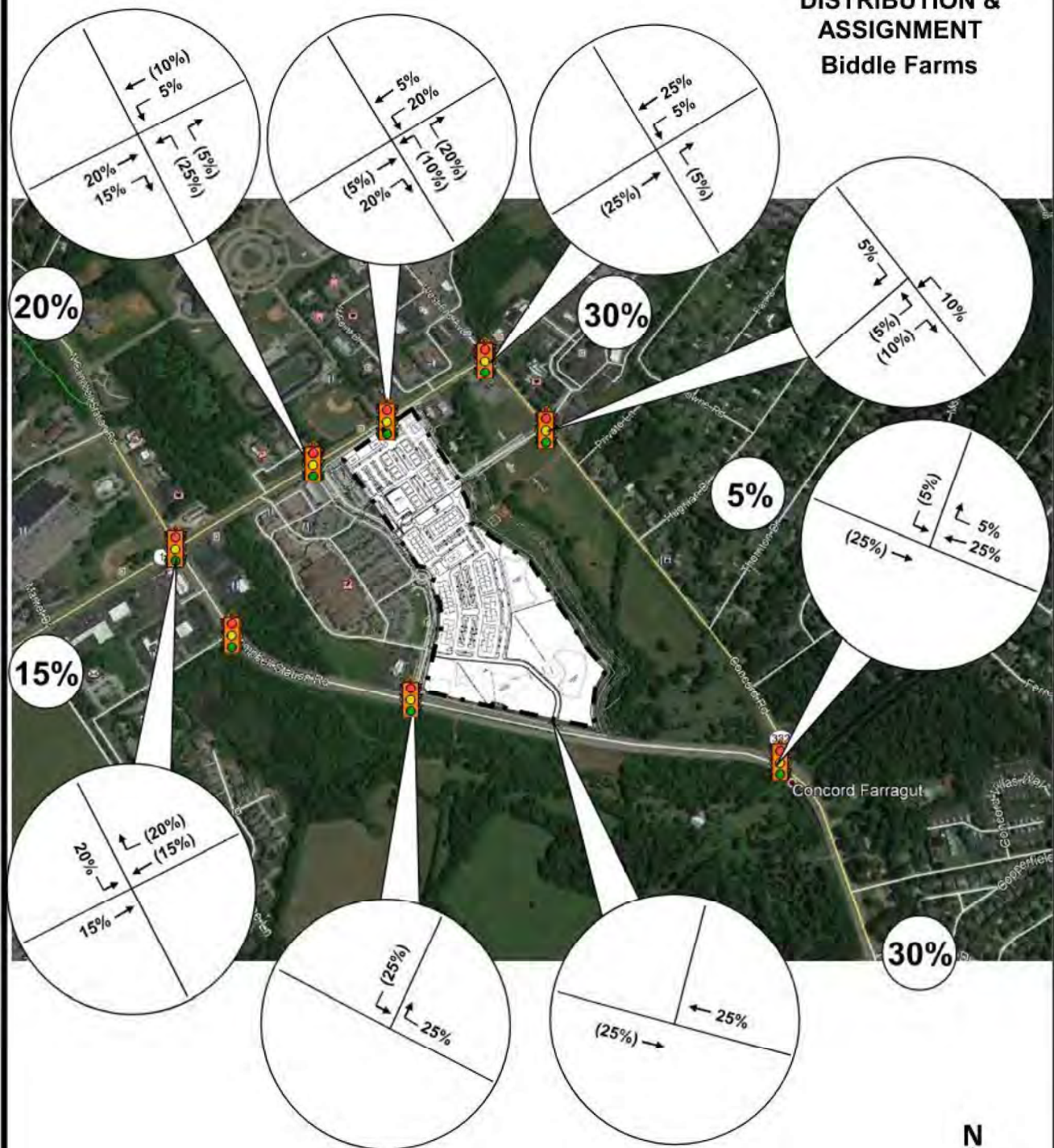
LEGEND
XXX ENTERING TRIPS
(XXX) EXITING TRIPS



Figure 7A



**COMMERCIAL RETAIL
PRIMARY
DISTRIBUTION &
ASSIGNMENT
Biddle Farms**



LEGEND
XXX ENTERING TRIPS
(XXX) EXITING TRIPS



Figure 8A

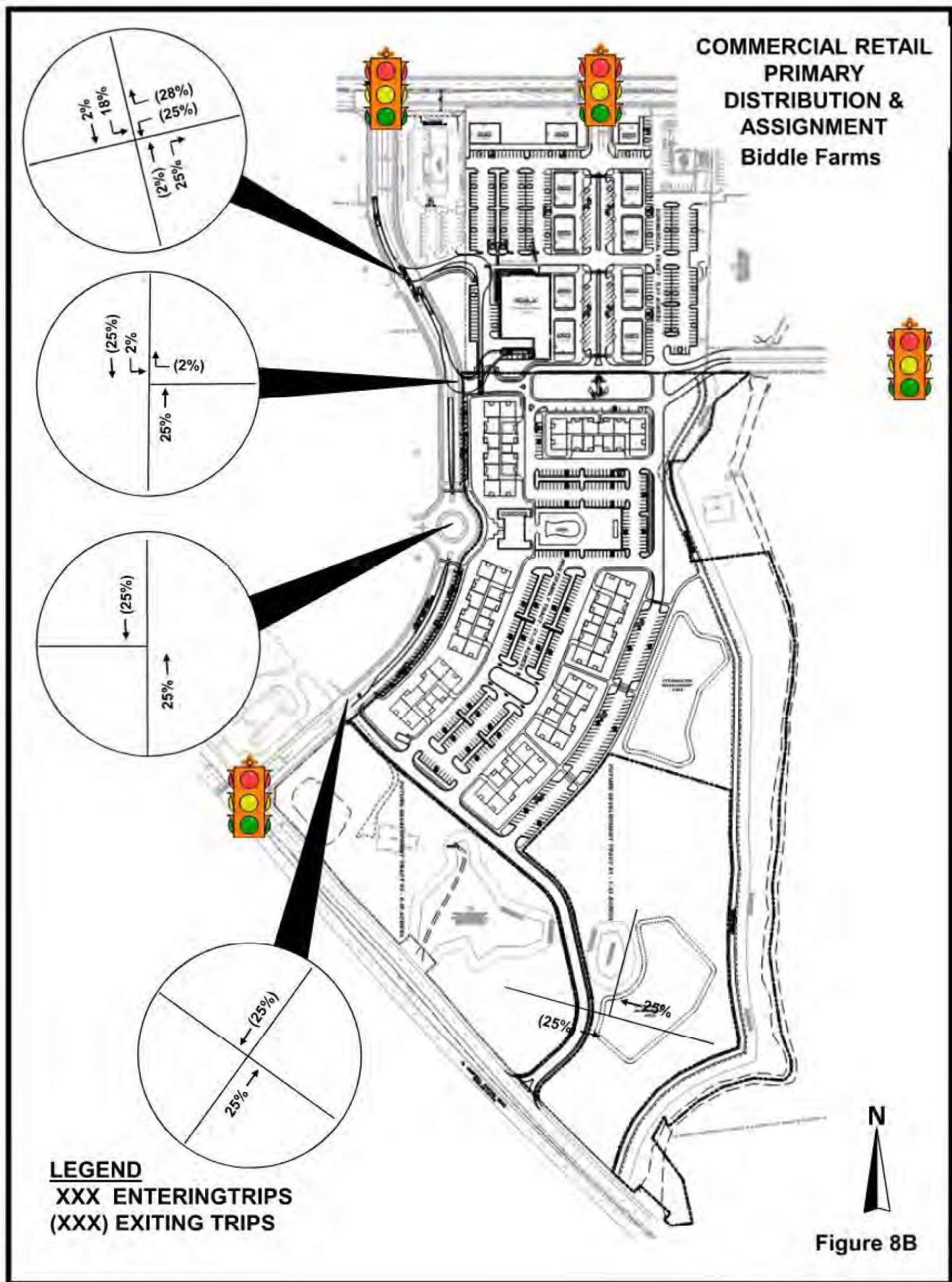


Figure 8B

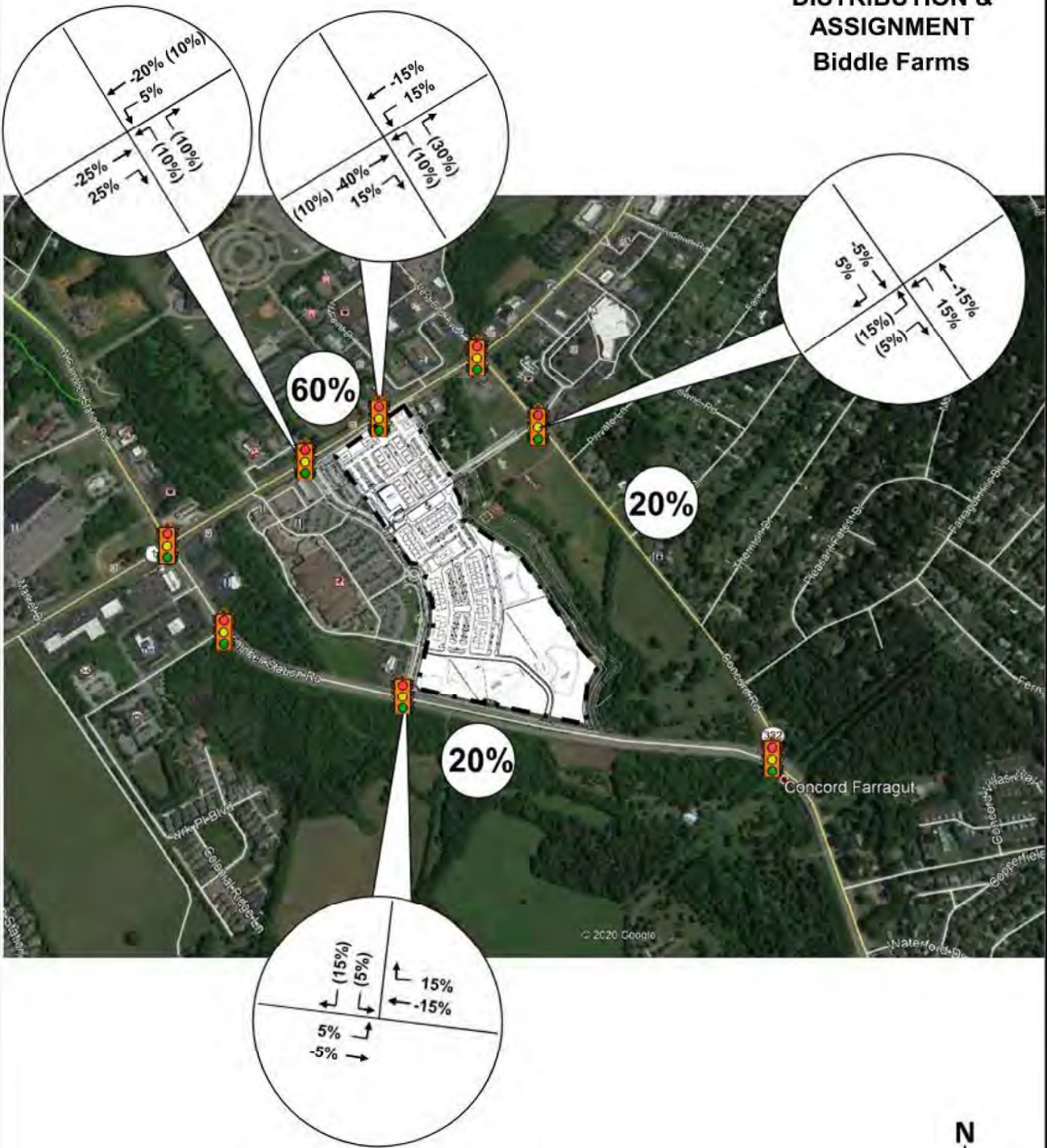
The pass-by trips for the retail commercial uses were assumed 60-percent from Kingston Pike and 20-percent from either Campbell Station Road and Concord Road. **Figures 9A and 9B** illustrate the pass-by assignments for the AM peak hour, and **Figures 10A and 10B** illustrate the PM peak hour assignment.

Project Traffic Volumes

By multiplying the trips generated by the trip assignments, the primary and pass-by trips were developed for the study intersections; **Figures 11A and 11B** illustrate the resulting peak hour primary trips, and **Figures 12A and 12B** illustrated the Pass-by trips associated with the proposed site. The total site trips (Primary+Pass-by) are illustrated in **Figures 13A and 13B**.

The impact of the site related traffic to the critical intersection of Kingston Pike and Campbell Station Road is limited and not considered significant as it's not more than 3.5-percent. The site trips did not account for more than 8.8-percent for than any of the study intersections with the greater impact of site trips determined for the site access to and from Concord Road.

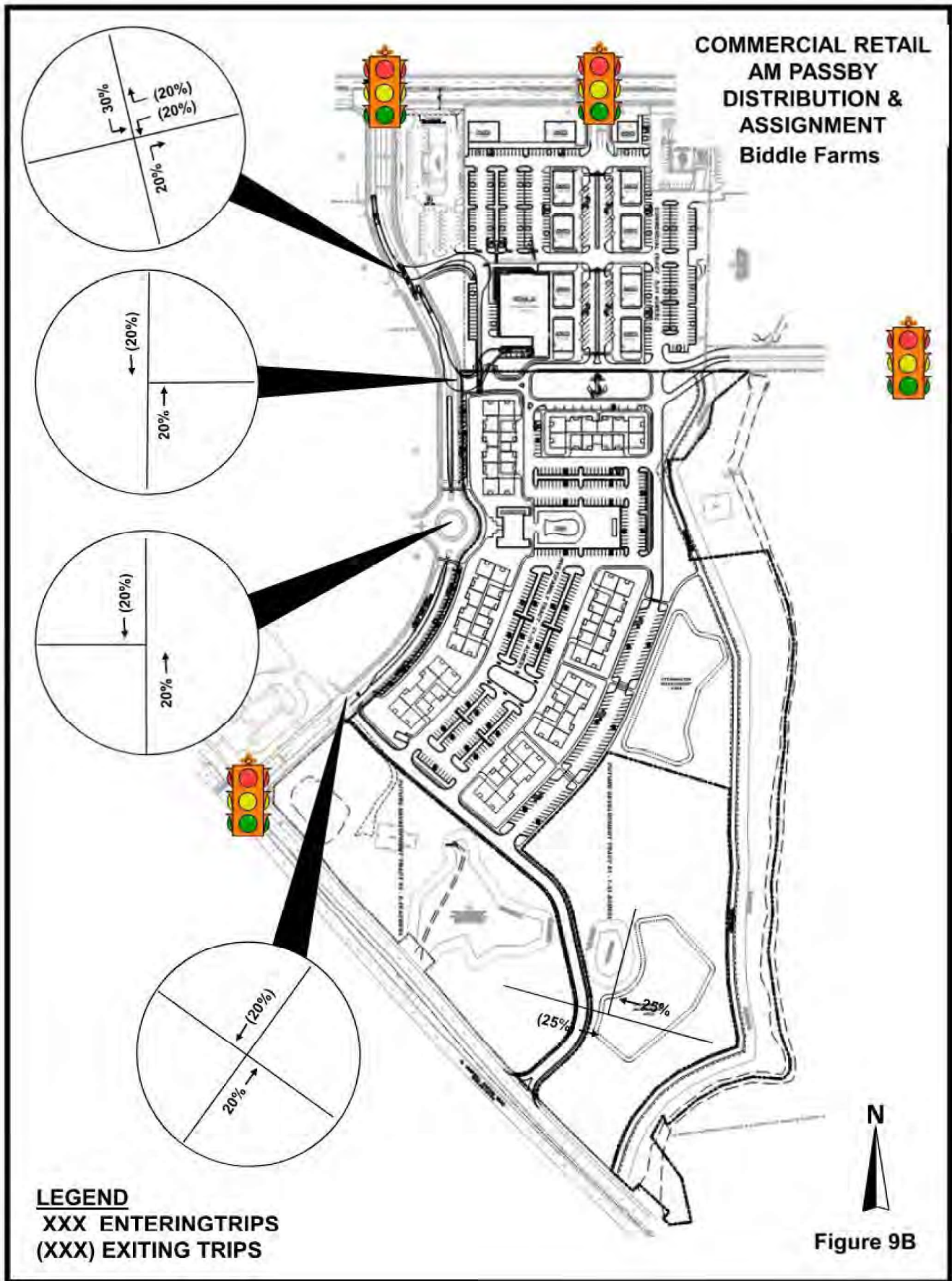
**COMMERCIAL RETAIL
AM PASS-BY
DISTRIBUTION &
ASSIGNMENT
Biddle Farms**



LEGEND
XXX ENTERING TRIPS
(XXX) EXITING TRIPS



Figure 9A



**DISTRIBUTION & ASSIGNMENT
Biddle Farms**

60%

20%

20%

Callout 1 (Top Left):
 -35% (15%)
 10%
 15%
 15%
 (5%)
 (20%)

Callout 2 (Top Center):
 -25%
 25%
 (20%)
 (15%)
 (5%) -25%
 10%

Callout 3 (Top Right):
 -11%
 11%
 (9%)
 (11%)
 -9%
 9%

Callout 4 (Bottom):
 (8%)
 (12%)
 8%
 -8%
 12%
 -12%

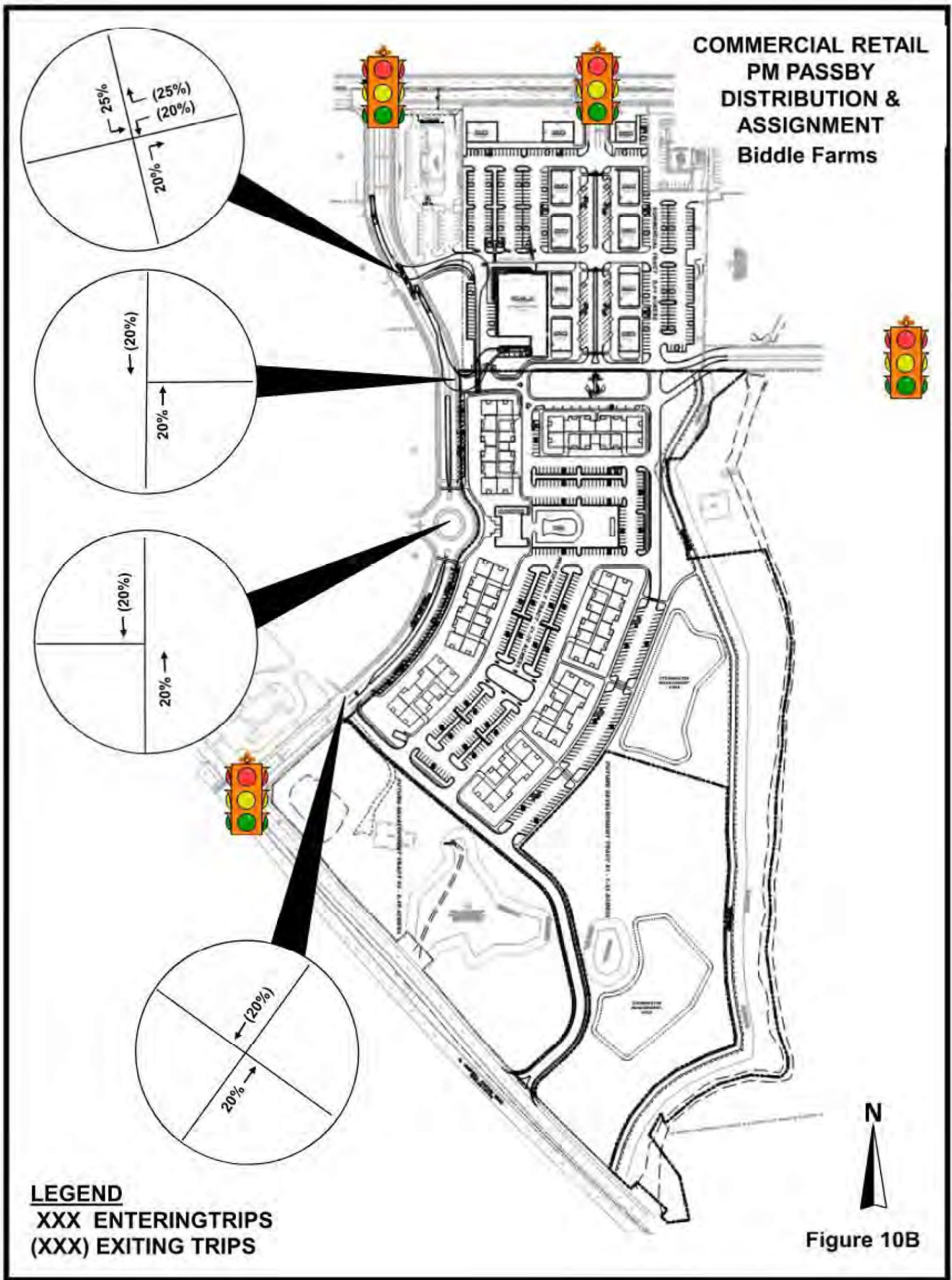
© 2020 Google

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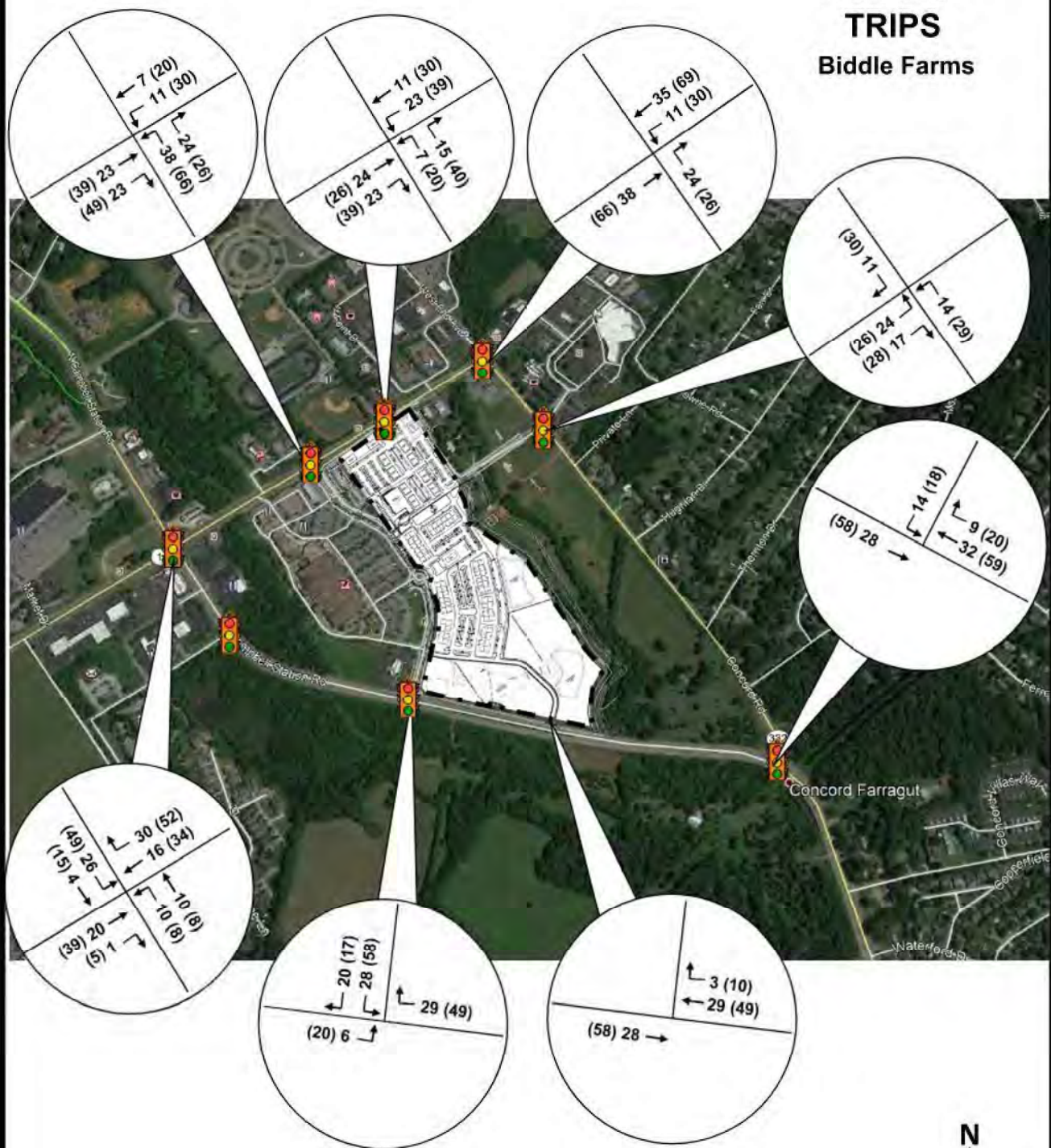
XXX ENTERING TRIPS
(XXX) EXITING TRIPS



Figure 10A



PRIMARY TRIPS Biddle Farms

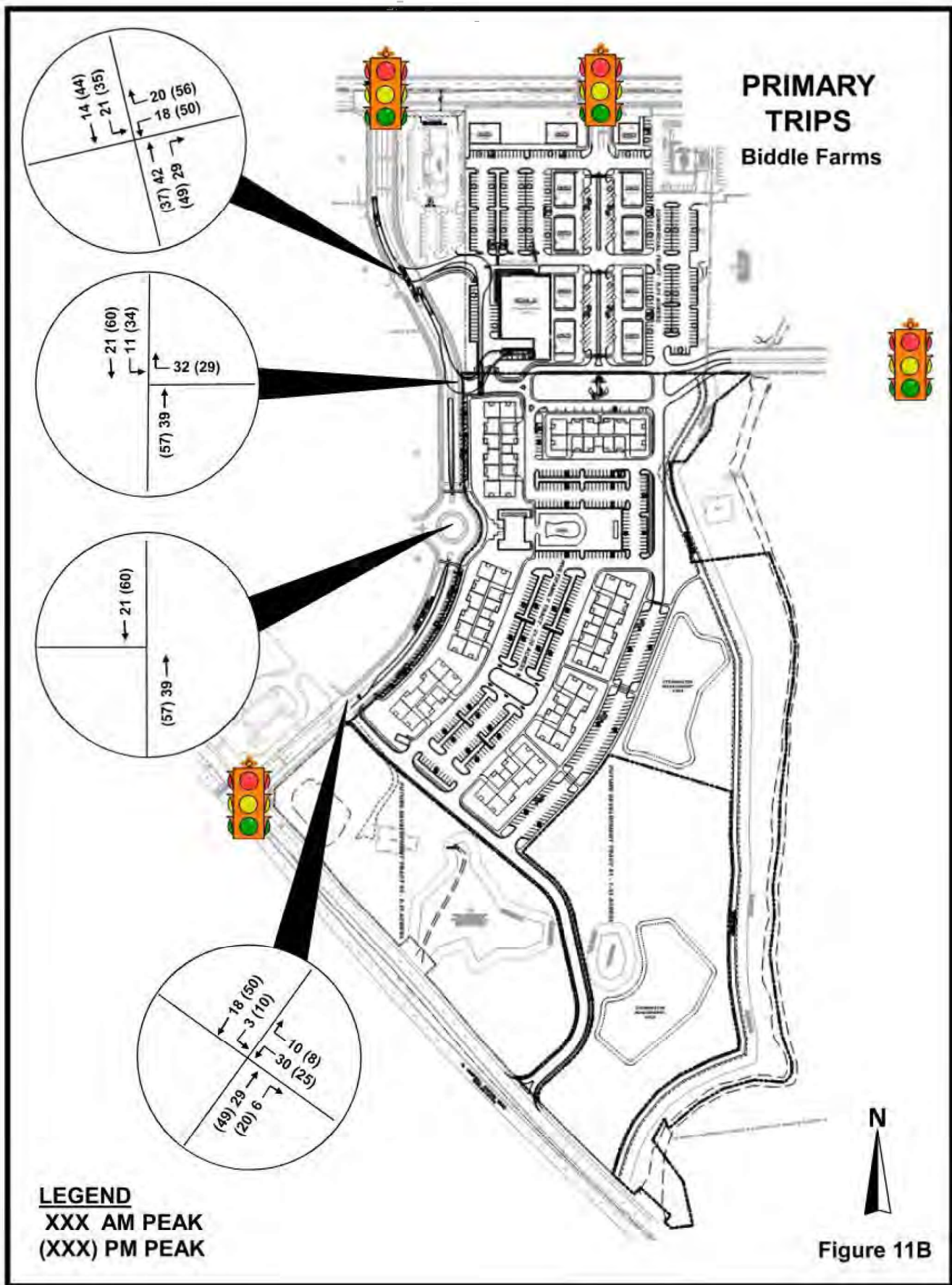


LEGEND

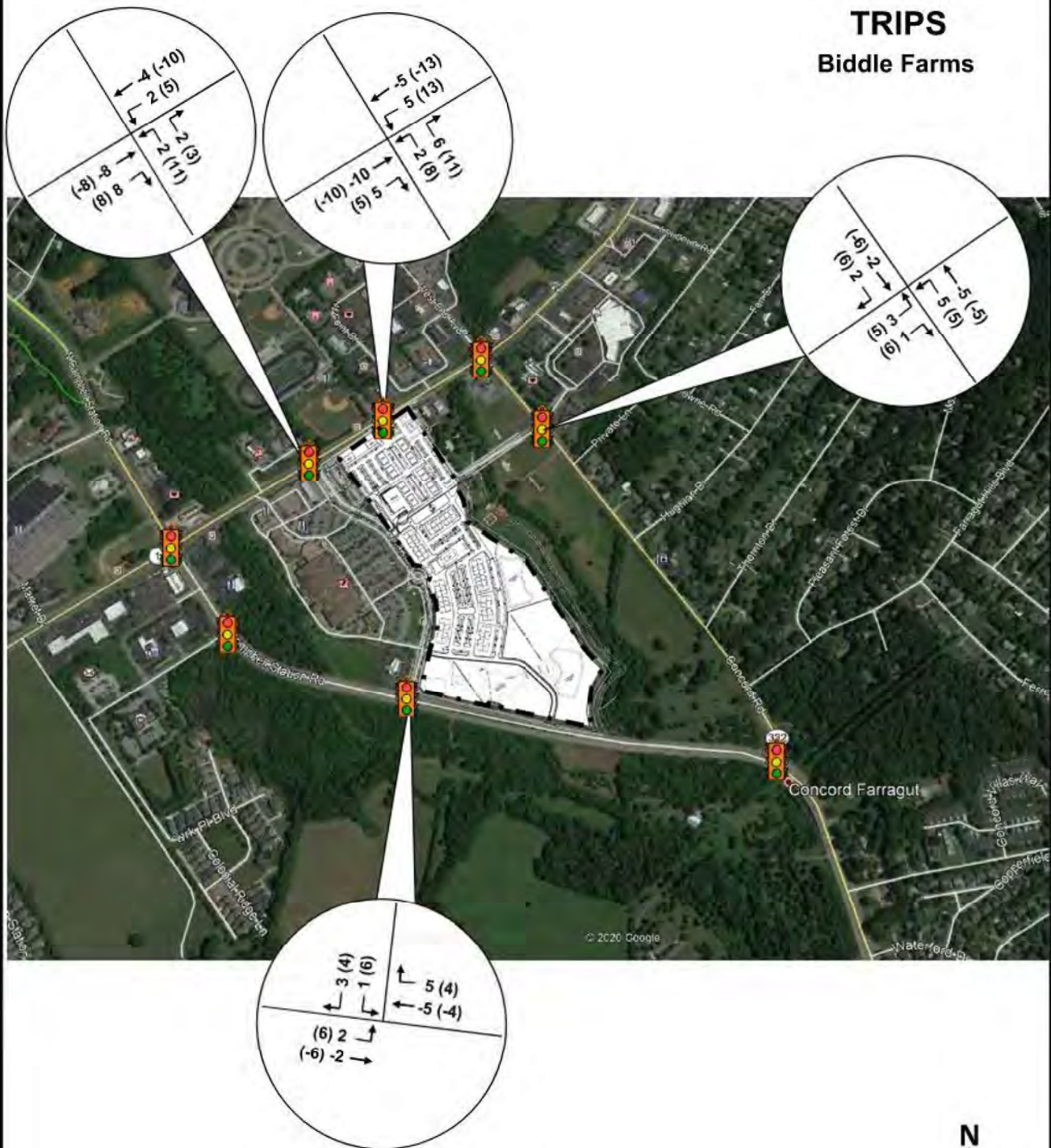
XXX AM PEAK
(XXX) PM PEAK



Figure 11A



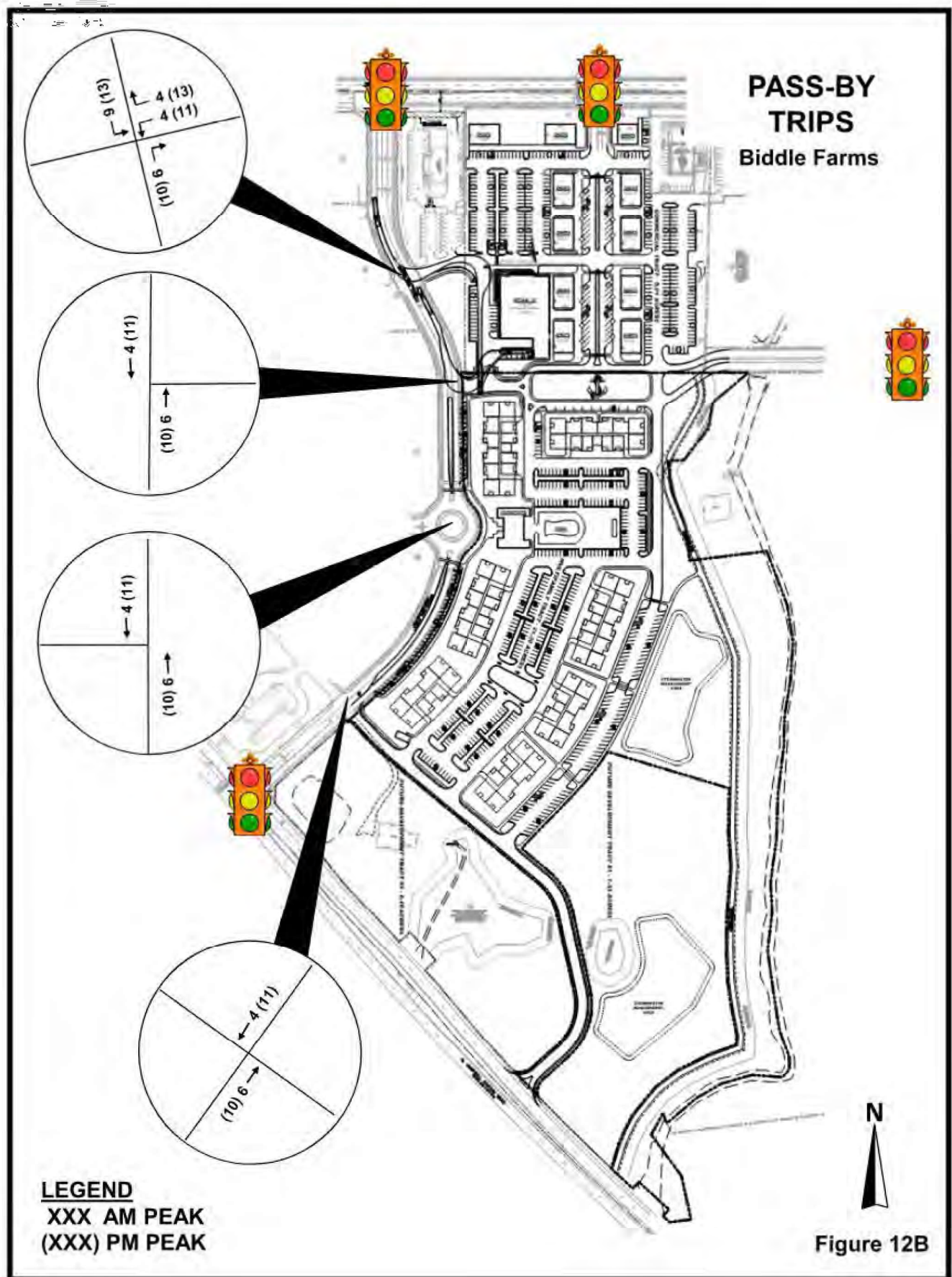
PASS-BY TRIPS Biddle Farms



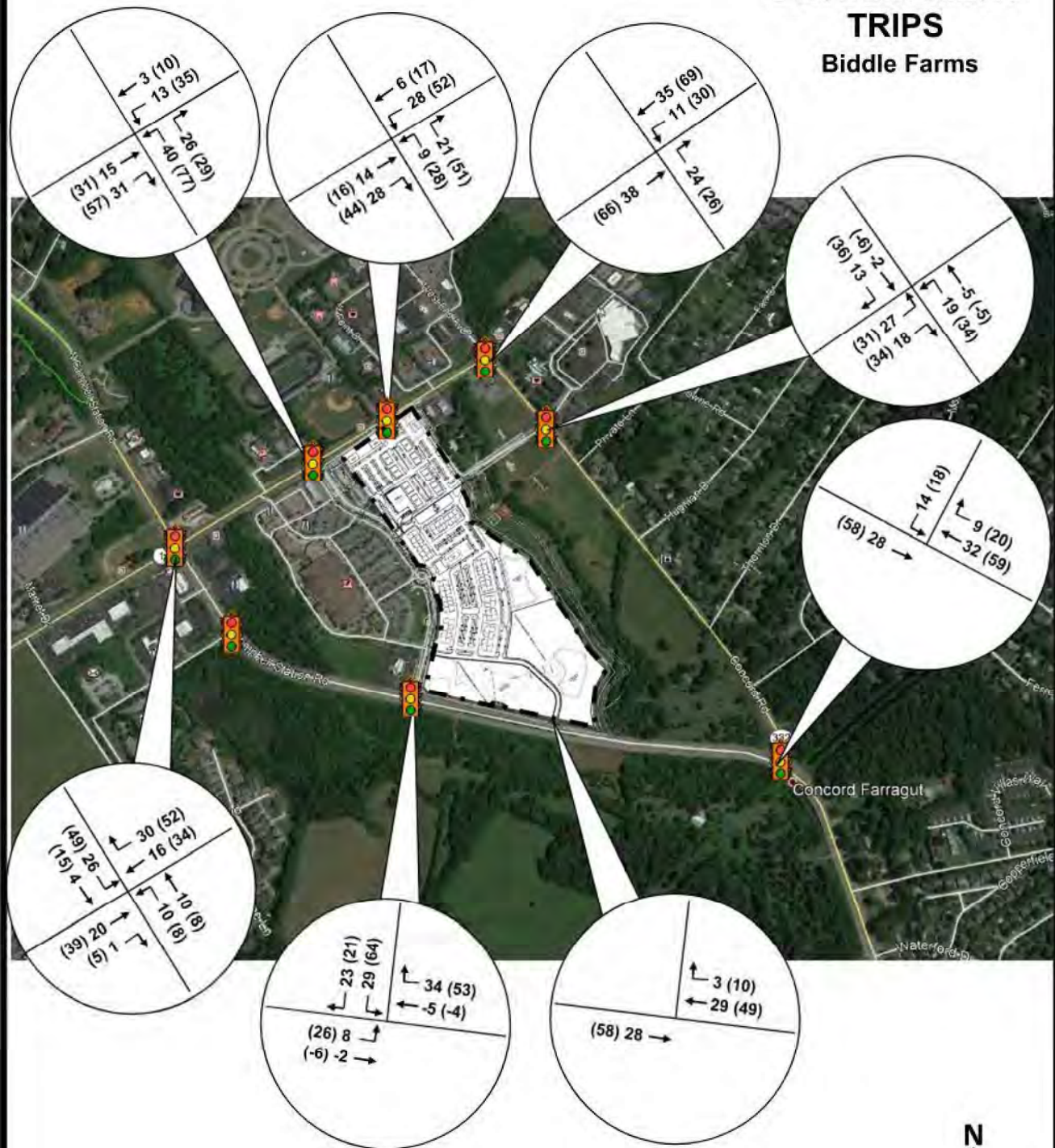
LEGEND
XXX AM PEAK
(XXX) PM PEAK



Figure 12A



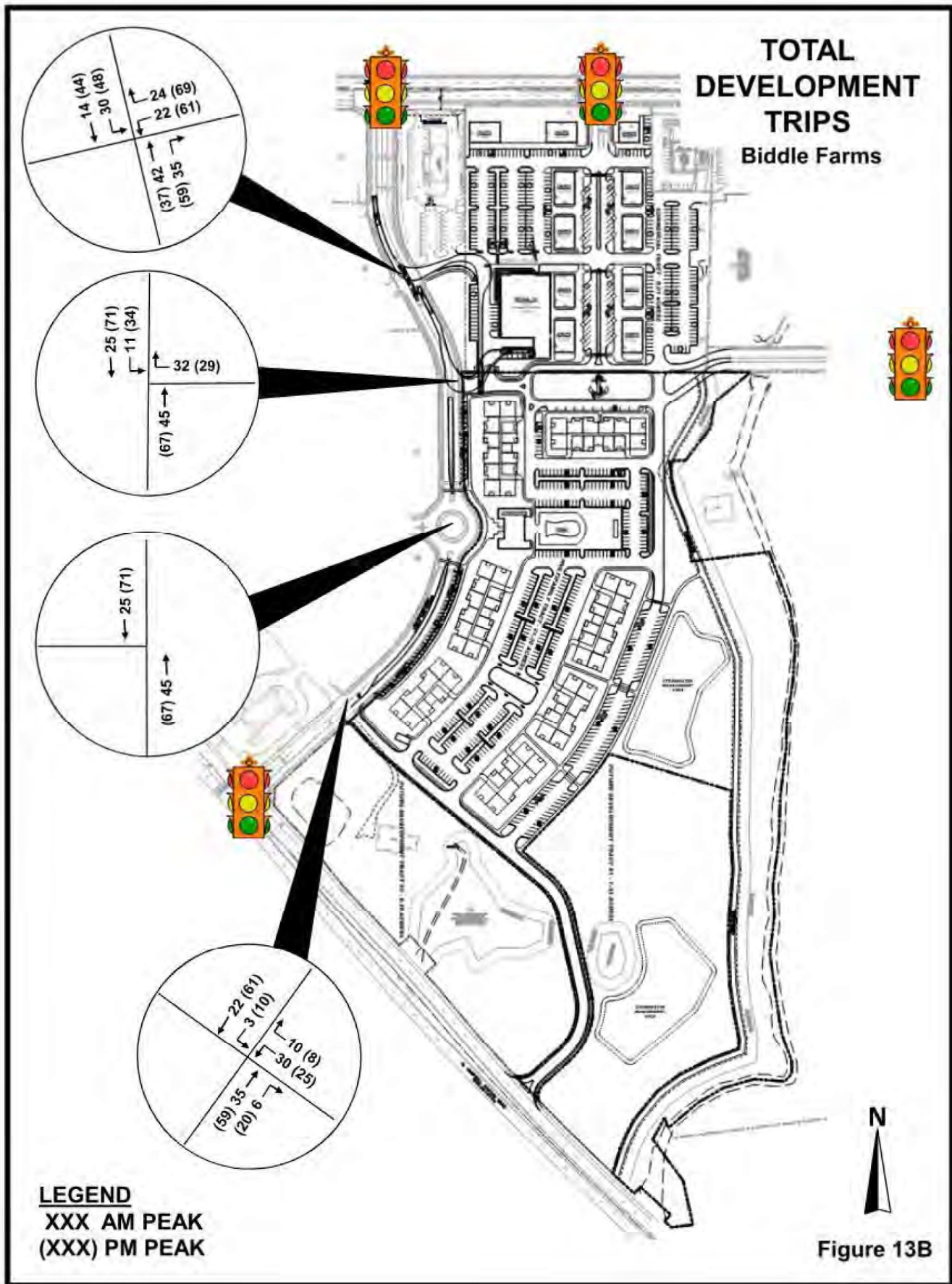
TOTAL DEVELOPMENT TRIPS Biddle Farms



LEGEND
 XXX AM PEAK
 (XXX) PM PEAK



Figure 13A



Total Projected Traffic Volumes

Background and site traffic volumes were added together to develop post-development traffic volumes for the year 2025. **Figures 14A and 14B** illustrate the 2025 traffic projections, which were analyzed to assess any mitigation measures identified including traffic control devices and roadway and intersection geometry.

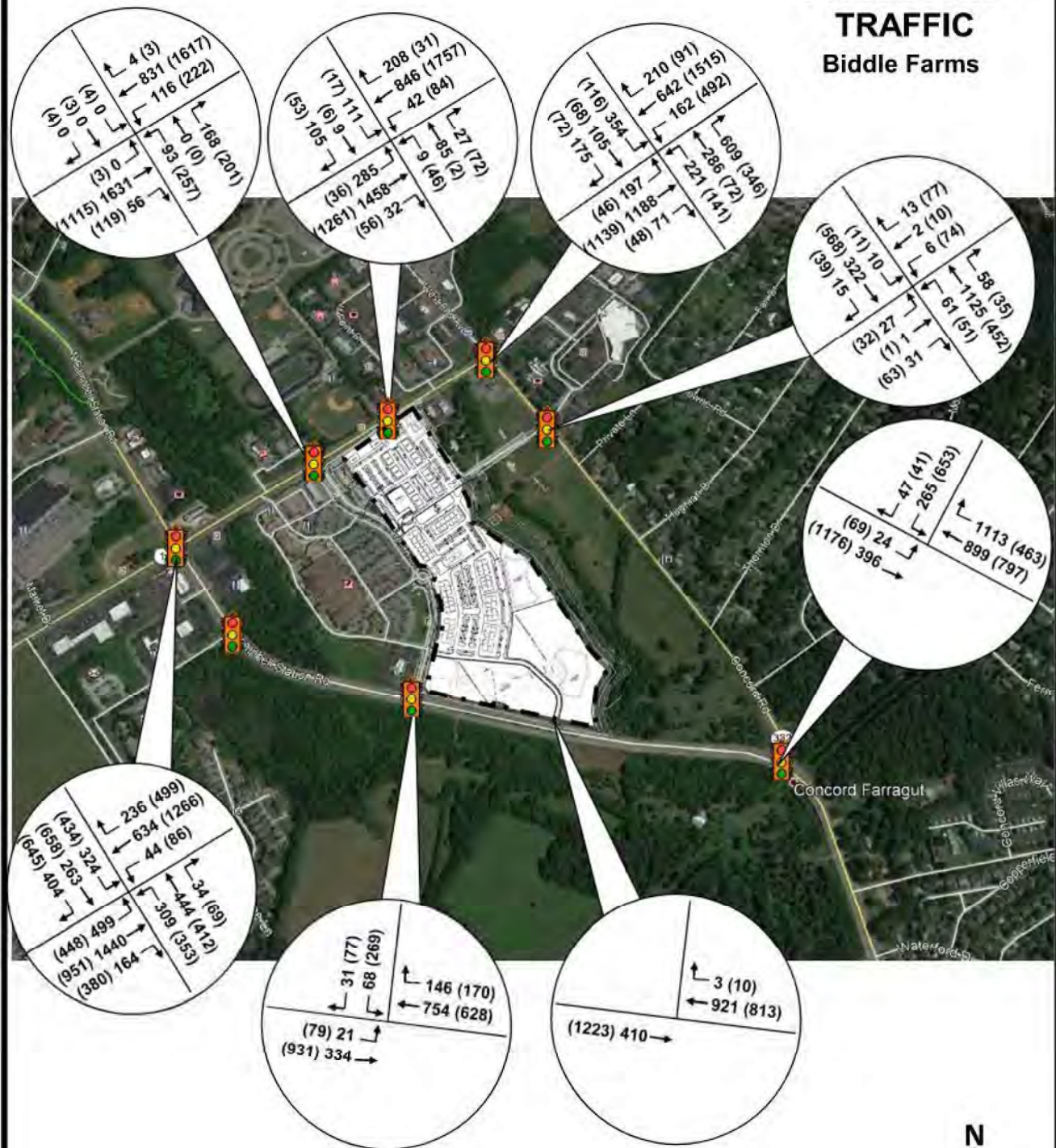
Projected Capacity and Level of Service

Analysis of the 2025 projected traffic was conducted. **Table 7** presents the capacity and levels of service for the study intersections. A summary of the capacity and LOS analyses is presented in **Table 8**. **Figures 15A and 15B** illustrate the lane group levels of service for the study intersections. **Figure 16** illustrates the lane group levels of service with mitigation.

From the analyses conducted, changes in capacity ratios and delays are minimal for the study intersections, and levels of service did not change significantly from the background traffic conditions. Analyses determined that the proposed site development did not result in any significant changes from the analyses conducted for the background traffic conditions which found that the Kingston Pike intersections with Campbell Station Road and Concord Road may experience a LOS F during the PM peak hour and an E during the AM peak hour, respectively; the site impact increase the average intersection delay less than 6 seconds for either intersection and the increase in the V/C ratio not more than 4-percent.

With double left-turn lanes provided for the northbound, southbound, and eastbound approaches of the Kingston Pike and Campbell Station Road intersection, the LOS and intersection capacity may be mitigated to the existing 2020 traffic conditions. For the intersection of Kingston Pike and Concord Road, an added northbound right-turn lane, providing for double right-turn movement would return the intersection to its current 2020 LOS and capacity. The site impact on these intersections are not significant and the need for this mitigation is due to background traffic conditions. The provision of the double left-turn lanes for the intersection of Kingston Pike and Campbell Station Road would be very challenging with design exceptions as previously stated in the background section of this report. The site has a minimal impact on the intersection.

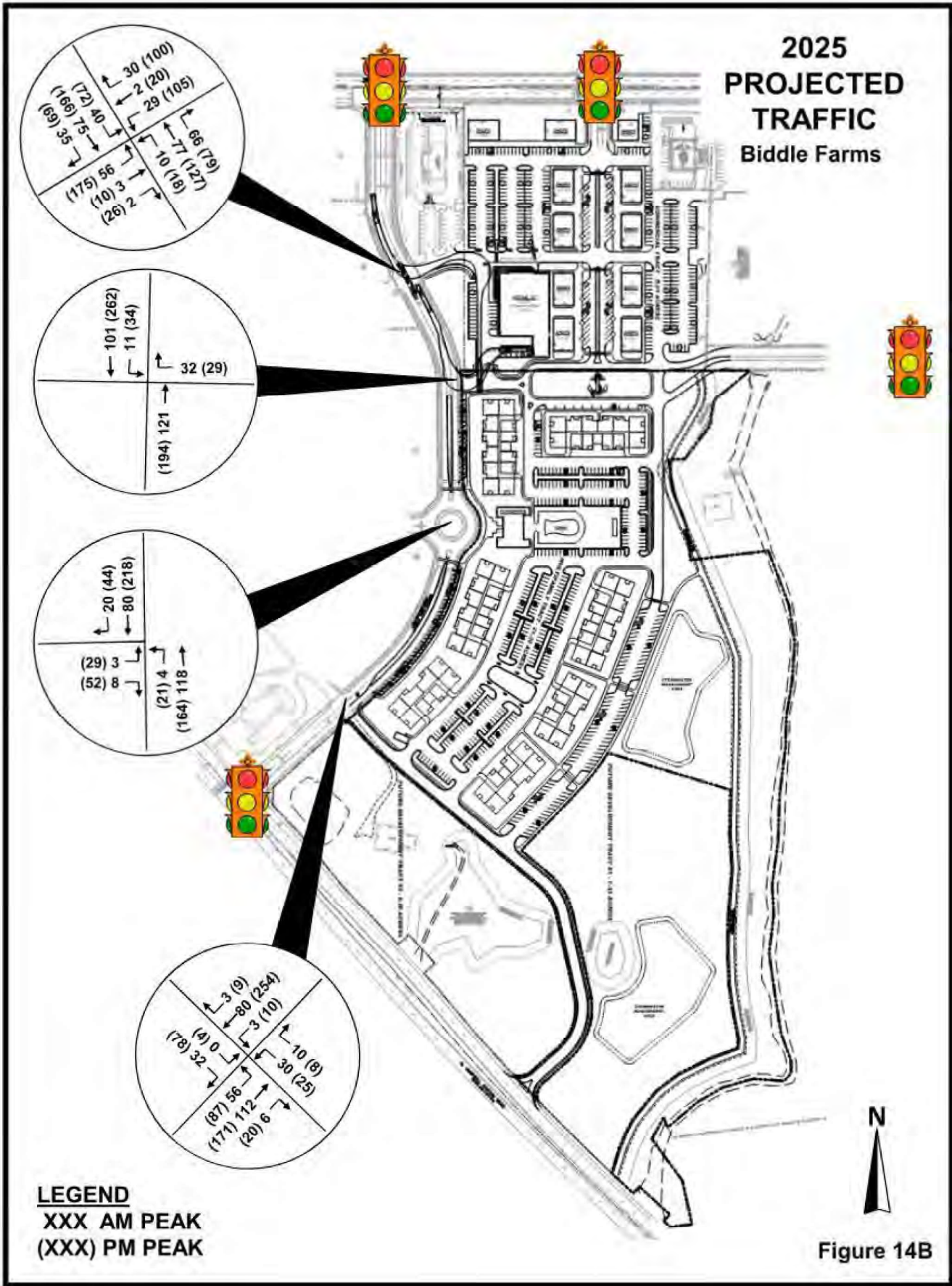
2025 PROJECTED TRAFFIC Biddle Farms



LEGEND
 XXX AM PEAK
 (XXX) PM PEAK



Figure 14A



**Table 7
2025 PROJECTED
CAPACITY AND LEVEL OF SERVICE**

INTERSECTION	TRAFFIC CONTROL	PEAK PERIOD	w Optimized Signal Timing		
			V/C	DELAY	LOS
Kingston Pike (US 11/70) & Campbell Station Road <i>w NB, SB, and EB Double Left-turn Lanes Mitigation</i>	SIGNAL	AM	1.01	52.6	D
		PM	1.40	101.1	F
		AM	0.86	32.2	C
		PM	1.08	51.2	D
Kingston Pike (US 11/70) & Brooklawn Street	SIGNAL	AM	0.80	12.0	B
		PM	0.80	20.0	B
Kingston Pike (US 11/70) & Lendon Welch Way	SIGNAL	AM	0.82	22.7	C
		PM	0.74	8.4	A
Kingston Pike (US 11/70) & Concord Road (SR 332) <i>w NB Double Right-Turn Lanes Mitigation</i>	SIGNAL	AM	1.08	73.5	E
		PM	0.93	44.7	D
		AM	0.92	45.8	D
		PM	0.93	44.6	D
Campbell Station Road So. & Brooklawn Street	SIGNAL	AM	0.32	5.0	A
		PM	0.51	16.0	B
Campbell Station Road So. & Concord Road (SR 332)	SIGNAL	AM	0.80	22.9	C
		PM	0.66	18.3	B
Concord Road (SR 332) & Site Access	SIGNAL	AM	0.41	4.8	A
		PM	0.45	8.0	A
Brooklawn Street & Petco/Old Kroger Access	STOP EB/WB	AM	0.116/0.092	12.1/10.5	B/B
		PM	0.704/0.502	38.5/19.6	E/C
Brooklawn Street Proposed Grocery/Apartment Access	STOP WB	AM	0.04	9.1	A
		PM	0.04	9.5	A
Brooklawn Street & Kroger Roundabout	Roundabout	AM	0.10	3.4	A
		PM	0.22	4.6	A
Brooklawn Street & Pinnacle Access	STOP EB/WB	AM	0.04/0.07	8.9/11.4	A/B
		PM	0.12/0.11	10.8/17.1	B/C

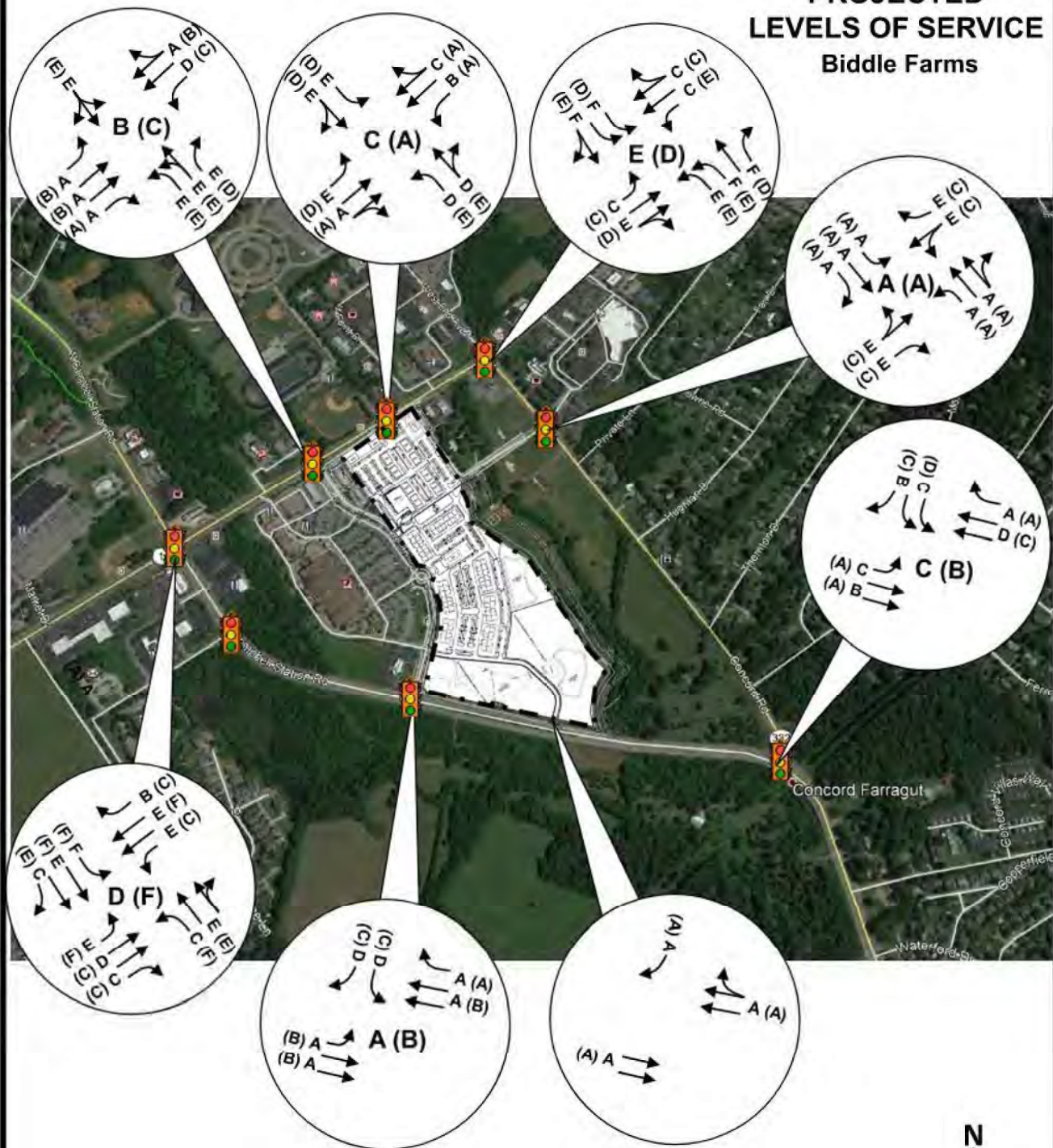
Note: Average vehicle delay estimated in seconds.

**TABLE 8
CAPACITY AND LEVEL OF SERVICE SUMMARY**

INTERSECTION	TRAFFIC CONTROL	PEAK PERIOD	2020 EXISTING TRAFFIC			2025 BACKGROUND TRAFFIC			2025 PROJECTED TRAFFIC		
			V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS
Kingston Pike (US 1170) & Campbell Station Road w NB, SB, and EB Double Left-turn Lanes Mitigation	SIGNAL	AM	0.98	37.7	D	0.98	47.6	D	1.01	52.6	D
		PM	1.08	65.5	E	1.36	102.4	F	1.40	101.1	F
		AM				0.85	29.7	C	0.86	32.2	C
		PM				1.07	46.4	D	1.08	51.2	D
Kingston Pike (US 1170) & Brooklawn Street	SIGNAL	AM	0.68	9.7	A	0.70	8.4	A	0.80	12.0	B
		PM	0.65	27.4	C	0.76	15.8	B	0.80	20.0	B
Kingston Pike (US 1170) & Lendon Welch Way	SIGNAL	AM	0.84	18.0	B	0.80	21.5	C	0.82	22.7	C
		PM	0.62	15.0	B	0.71	6.7	A	0.74	8.4	A
Kingston Pike (US 1170) & Concord Road (SR 332) w NB Double Right-Turn Lanes Mitigation	SIGNAL	AM	0.91	40.3	D	1.06	67.8	E	1.08	73.5	E
		PM	0.87	39.2	D	0.91	39.8	D	0.93	44.7	D
		AM				0.92	43.8	D	0.92	45.8	D
		PM				0.91	42.1	D	0.93	44.3	D
Campbell Station Road So. & Brooklawn Street	SIGNAL	AM	0.28	2.7	A	0.31	3.0	A	0.32	5.0	A
		PM	0.47	21.3	C	0.47	14.2	B	0.51	16.0	B
Campbell Station Road So. & Concord Road (SR 332)	SIGNAL	AM	0.62	16.2	B	0.80	22.0	C	0.80	22.9	C
		PM	0.54	17.0	B	0.63	17.7	B	0.66	18.3	B
Concord Road (SR 332) & Site Access	SIGNAL	AM	0.33	3.3	A	0.40	2.7	A	0.41	4.8	A
		PM	0.38	12.6	B	0.42	10.4	B	0.45	8.0	A
Brooklawn Street & Petco/Old Kroger Access	STOP EB/WB	AM	0.087/0.02	10.2/9.4	B/A	0.087/0.02	10.2/9.4	B/A	0.116/0.092	12.1/10.5	B/B
		PM	0.426/0.168	16.5/12.1	C/B	0.426/0.168	16.5/12.1	C/B	0.704/0.502	38.5/19.6	E/C
Brooklawn Street Proposed Grocery/Apartment Access	STOP WB	AM	-	-	-	-	-	-	0.04	9.1	A
		PM	-	-	-	-	-	-	0.04	9.5	A
Brooklawn Street & Kroger Roundabout	Roundabout	AM	0.10	3.4	A	0.06	3.2	A	0.10	3.4	A
		PM	0.16	4.0	A	0.15	4.0	A	0.22	4.6	A
Brooklawn Street & Pinnacle Access	STOP EB/WB	AM	0.04	8.7	A	0.04	8.7	A	0.04/0.07	8.9/11.4	A/B
		PM	0.11	10.1	B	0.11	10.1	B	0.12/0.11	10.8/17.1	B/C

Note: Average vehicle delay estimated in seconds.

2025 PROJECTED LEVELS OF SERVICE Biddle Farms



LEGEND
C AM PEAK LOS
(C) PM PEAK LOS



Figure 15A

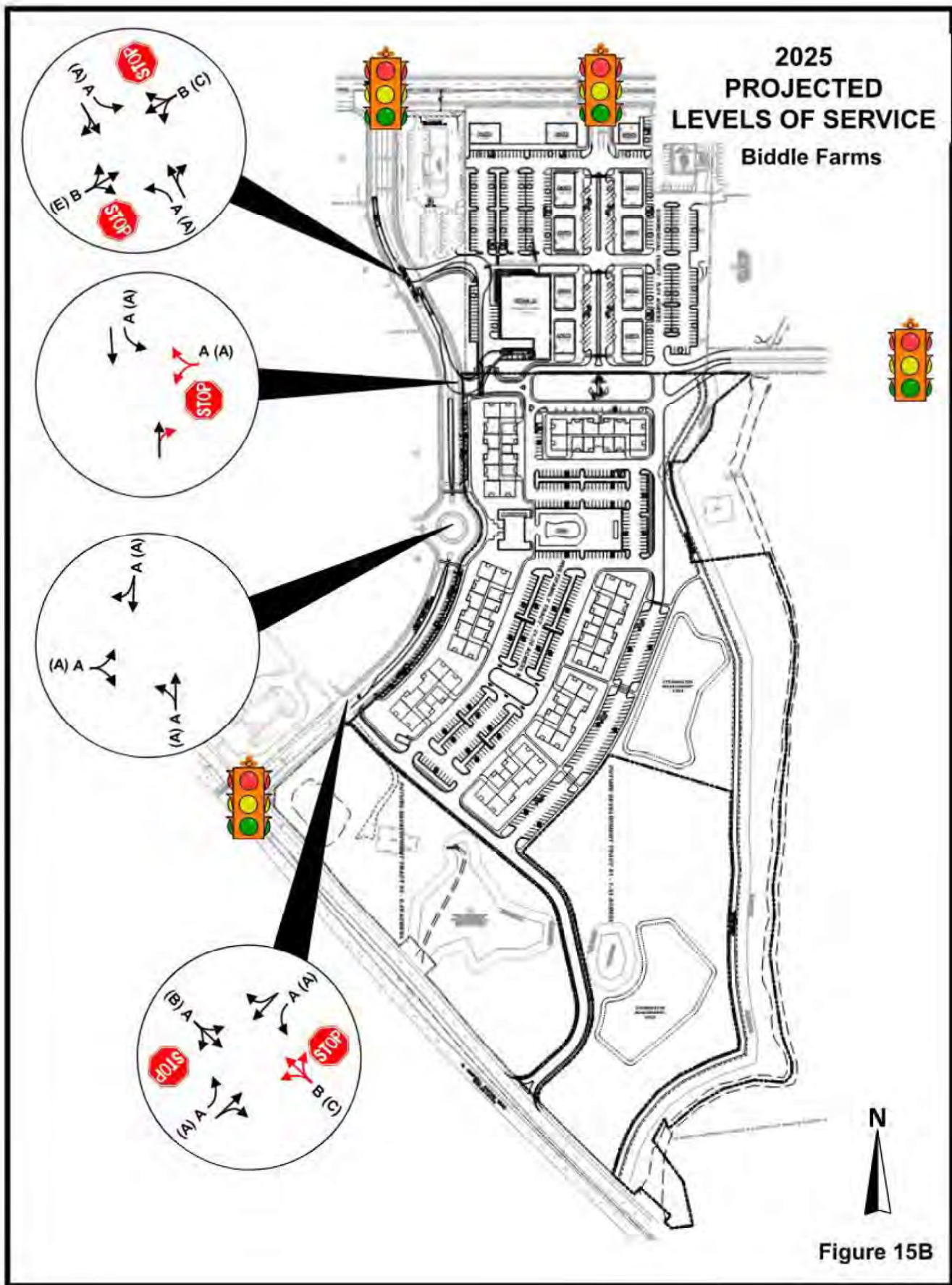
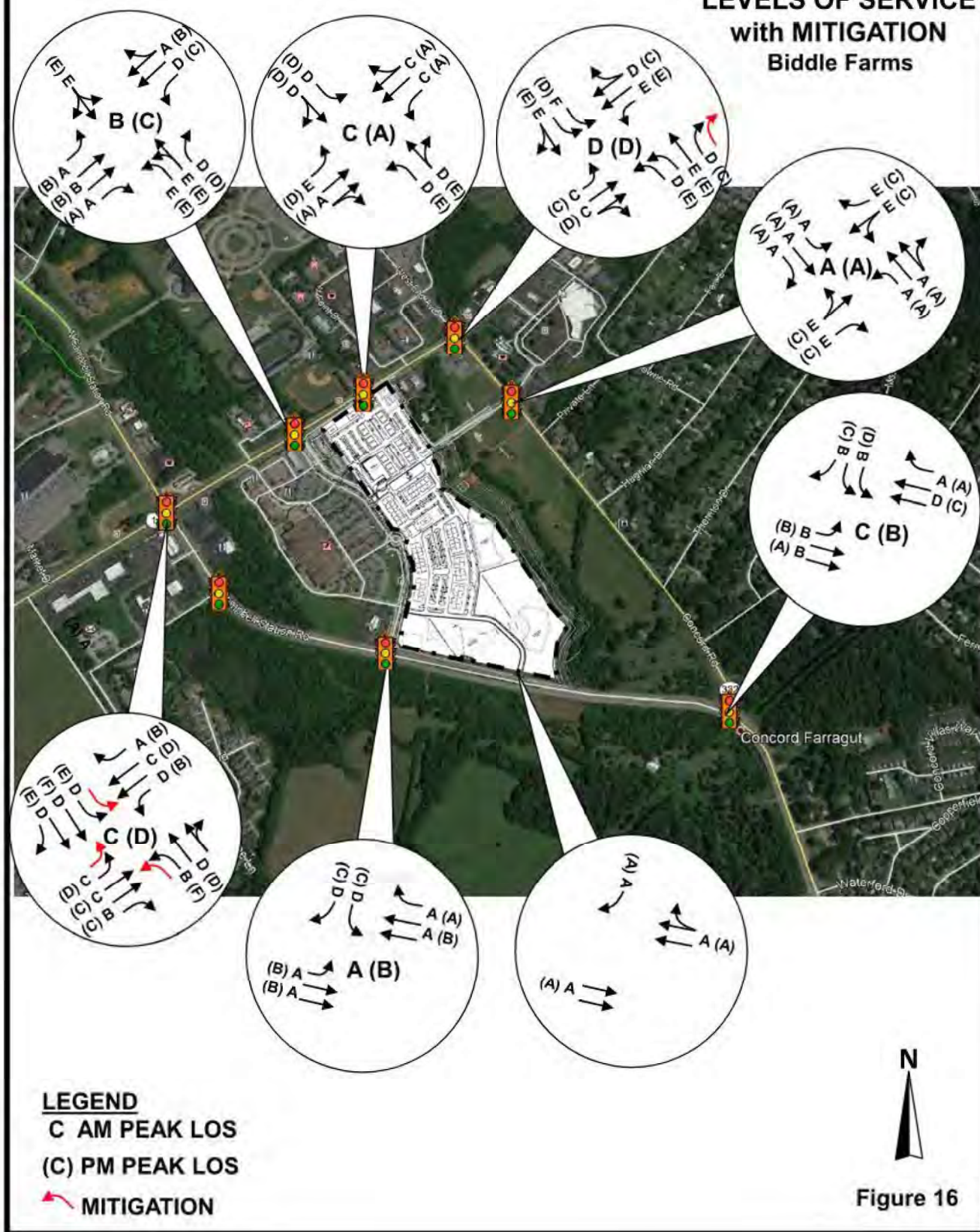


Figure 15B

**2025
PROJECTED
LEVELS OF SERVICE
with MITIGATION
Biddle Farms**



RECOMMENDATIONS

The analyses conducted and the review of the traffic volumes identified the following recommendations:

- Minimize landscaping, using low growing vegetation, and signing at the planned site accesses.

Intersection design should conform to the recommended standards and practices of the American Association of State Highway and Transportation Officials, the Institute of Transportation Engineers, Tennessee Department of Transportation (TDOT), and the Town of Farragut.

CONCLUSION

The study of the Biddle Farms, a proposed mixed commercial and residential development evaluated the projected traffic conditions. Background traffic was determined using a 3.5-percent annual compounded growth rate until the horizon year 2025. Traffic associated with the proposed project was then generated and distributed to the proposed site accesses. The proposed site may generate approximately 8,480 daily weekday trips. After the consideration of pass-by traffic and internal trips, approximately 6,730 new daily trips (Primary) may be generated for a typical weekday. Using the identified turning movements for the projected traffic conditions, unsignalized and signalized capacity and level of service analyses were conducted using the **2000 Highway Capacity Manual**.

Current conditions for study intersections are LOS E or better. Intersections are operating with a minimum LOS C except for the Kingston Pike intersections with Campbell Station Road and Concord Road. The PM peak hour for the intersection of Kingston Pike at Campbell Station Road is a LOS E and operates over capacity with a V/C ratio of 1.08, thereby an operation that is unstable and experiencing saturated traffic flows resulting in significant congestion with adverse traffic queues. The Kingston Pike intersection with Concord Road is a LOS D during the peak hours with a capacity ratio exceeding 0.90 indicating traffic conditions becoming unstable.

From the analyses conducted, changes in intersection capacity and delays are minimal for the study intersections, and levels of service did not change significantly from the background traffic conditions. Analyses determined that the proposed site development did not result in any significant changes from the analyses conducted for the background traffic conditions which found that the Kingston Pike intersections with Campbell Station Road and Concord Road may experience a LOS F during the PM peak hour and an E during the AM peak hour, respectively; the site impact increase the average intersection delay less than 6 seconds for either intersection and the increase in the V/C ratio not more than 4-percent. The poor levels of service for the Kingston Pike intersections with Campbell Station Road and Concord Road would occur regardless of the proposed development.

The proposed site does not have a significant impact on the adjacent road network as traffic projections and intersection analyses found little impact resulting from the proposed development. This impact is minimized with the proposed signalized accesses available to the site thereby affectively distributing the trips generated by the mixed-use development. The proposed development is a lower trip generator than the zoned property which could possibly develop an

approximate 295,000 square feet of retail uses. The comparison of the trip generation found the proposed site reduces the trip generation potential as compared to the possible development with the current zoning. With the same pass-by rate of 20-percent applied to the trip generation of a 295,000 square foot center, the daily trips generated may be 3,300 fewer daily trips and 390 fewer PM peak hour trips with the proposed mixed commercial and residential development. An additional approximate 75 trips might be generated during the AM peak hour with the mixed-use commercial and residential site but is not significant as it is managed with numerous accesses to the adjacent street network.

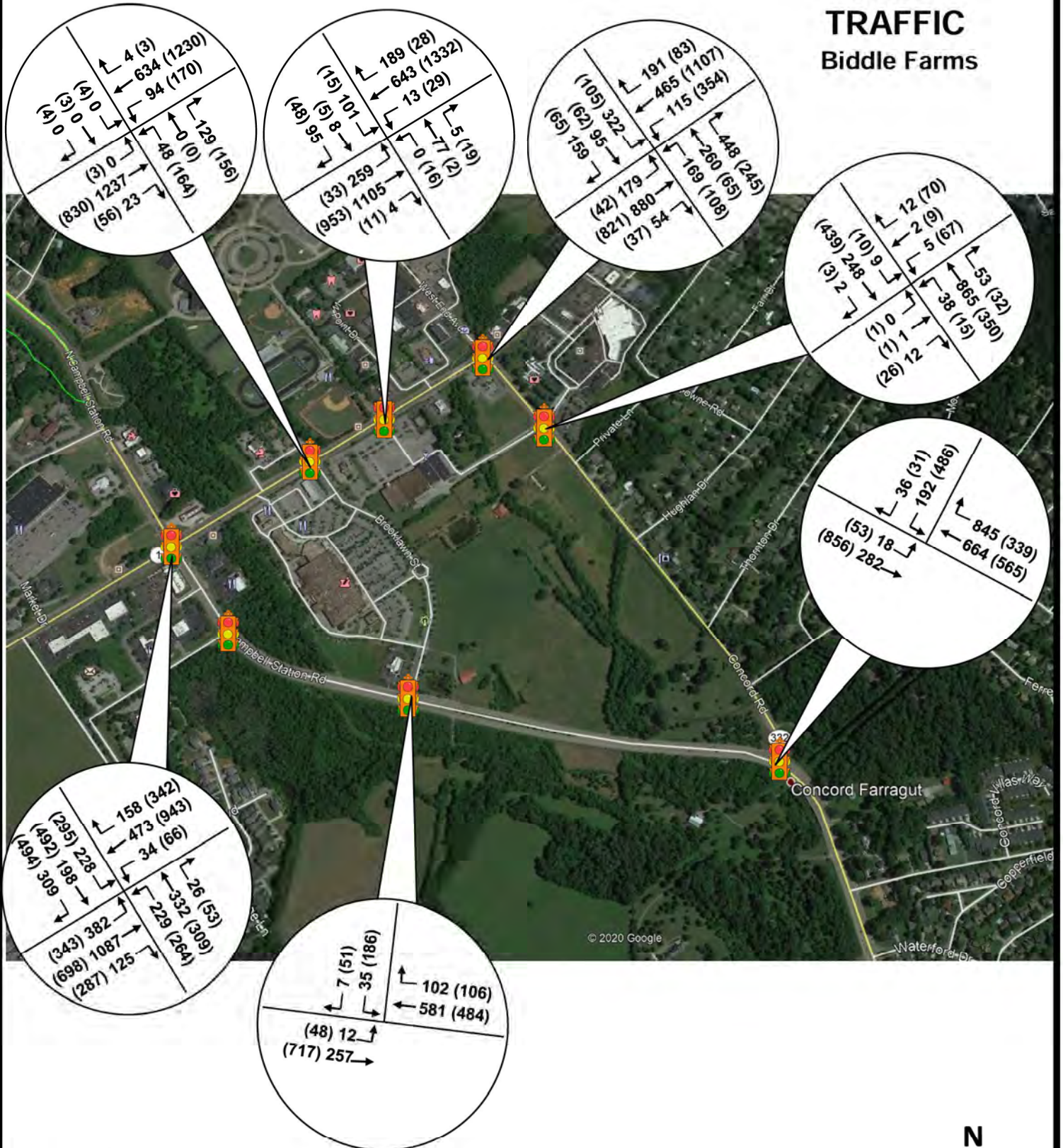
The proposed site access for the site was found to operate at acceptable levels of service; however, the adjacent Kingston Pike intersections with Campbell Station Road and Concord Road may experience lower and unacceptable levels of service as the background traffic will have a significant impact on the intersections' capacities. Background left-turn volumes exceed 300vph for the northbound, southbound, and eastbound approaches of the Kingston Pike and Campbell Station Road intersection thereby requiring double left-turn lanes. Double left-turn lanes for the Kingston Pike and Campbell Station Road intersection would be very difficult with the current development of the intersection corners. The provision of these double left-turn lanes would require several design exceptions if they were to be considered by the Town of Farragut, minimizing any right-of-way required.

Mitigation of background traffic impacts for the of Kingston Pike intersection with Concord Road is an additional northbound right-turn lane. The mitigation of both Kingston Pike intersections with Campbell Station Road and Concord Road would return level of service and capacity back to that currently experienced for the 2020 traffic conditions. The development of the Biddle Farms property did not determine any required mitigation as its impacts were not significant and acceptable levels of service provided for the accesses to the site.

APPENDIX

2016 Traffic
Trip Generation
Synchro Reports
Traffic Count Data

2016 TRAFFIC Biddle Farms



LEGEND
 XXX AM PEAK
 (XXX) PM PEAK



TRIP GENERATION

21-Oct-20

			AVERAGE						
LAND USE	L.U.C	SIZE	DAILY	AM PEAK			PM PEAK		
			TRAFFIC	ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
APARTMENT	220	290	2,123	31	103	133	102	60	162
KNOX CO MULTI-FAMILY	225	290	2,619	35	124	160	115	94	209
0	0	0	0	0	0	0	0	0	0
SHOPPING CENTER	820	42,000	1,586	24	15	39	77	83	160
SUPERMARKET	850	20,442	2,183	47	31	78	96	93	189
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
SHOPPING CENTER	820	62,442	2,357	36	22	59	114	124	238
0	0	0	0	0	0	0	0	0	0
SHOPPING CENTER	820	295,000	11,136	172	105	277	539	584	1,124
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
			22,003	345	401	746	1,044	1,038	2,082

			REGRESSION						
LAND USE	L.U.C	SIZE	DAILY	AM PEAK			PM PEAK		
			TRAFFIC	ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
APARTMENT	220	290	2,152	30	101	131	96	56	152
KNOX CO MULTI-FAMILY	225	290	2,485	31	111	143	112	92	204
0	0	0	0	0	0	0	0	0	0
SHOPPING CENTER	820	42,000	3,333	107	66	173	137	149	286
SUPERMARKET	850	20,442	2,662	N/A	N/A	N/A	121	117	238
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
SHOPPING CENTER	820	62,442	4,365	113	70	183	184	199	383
0	0	0	0	0	0	0	0	0	0
SHOPPING CENTER	820	295,000	12,546	186	114	299	581	629	1,210
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
			27,542	468	461	929	1,232	1,242	2,474

			SATURDAY				SUNDAY			
LAND USE	L.U.C	SIZE	DAILY	PEAK			DAILY	PEAK		
			TRAFFIC	ENTER	EXIT	TOTAL	TRAFFIC	ENTER	EXIT	TOTAL
APARTMENT	220	290	3,541	N/A	N/A	280	2,596	N/A	N/A	284
KNOX CO MULTI-FAMILY	225	290	1,853	74	77	151	170	77	71	148
0	0	0	0	0	0	0	0	0	0	0
SHOPPING CENTER	820	42,000	5,205	162	150	312	886	57	60	117
SUPERMARKET	850	20,442	3,631	108	104	211	3,403	N/A	N/A	387
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
SHOPPING CENTER	820	62,442	6,656	222	205	427	1,318	85	89	174
0	0	0	0	0	0	0	0	0	0	0
SHOPPING CENTER	820	295,000	17,430	757	698	1,455	6,225	403	420	823
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
			38,315	1,322	1,233	2,836	14,597	623	639	1,934

Queues

1: Concord Rd/West End Ave & Kingston Pike

10/27/2020



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	207	1081	135	768	190	292	503	389	307
v/c Ratio	0.63	0.96	0.48	0.65	0.47	0.88	0.83	0.91	0.83
Control Delay	26.1	38.1	29.9	28.4	45.8	65.6	23.3	71.0	48.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.1	38.1	29.9	28.4	45.8	65.6	23.3	71.0	48.0
Queue Length 50th (ft)	84	360	61	197	60	182	58	128	141
Queue Length 95th (ft)	m112	#497	108	263	#105	#326	#116	#220	#237
Internal Link Dist (ft)		746		717		568			373
Turn Bay Length (ft)	150		150		180		300	180	
Base Capacity (vph)	331	1124	295	1180	400	343	620	427	430
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.96	0.46	0.65	0.47	0.85	0.81	0.91	0.71

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: Concord Rd/West End Ave & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	197	968	59	127	512	210	186	286	493	354	105	175
Future Volume (vph)	197	968	59	127	512	210	186	286	493	354	105	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		6.5	6.5	6.5	6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	1.00	1.00	0.97	1.00	
Frt	1.00	0.99		1.00	0.96		1.00	1.00	0.85	1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3513		1687	3325		3433	1900	1599	3502	1705	
Flt Permitted	0.36	1.00		0.18	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	685	3513		327	3325		3433	1900	1599	3502	1705	
Peak-hour factor, PHF	0.95	0.95	0.95	0.94	0.94	0.94	0.98	0.98	0.98	0.91	0.91	0.91
Adj. Flow (vph)	207	1019	62	135	545	223	190	292	503	389	115	192
RTOR Reduction (vph)	0	4	0	0	44	0	0	0	126	0	63	0
Lane Group Flow (vph)	207	1077	0	135	724	0	190	292	377	389	244	0
Heavy Vehicles (%)	0%	2%	0%	7%	5%	1%	2%	0%	1%	0%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2			6					8			
Actuated Green, G (s)	31.8	31.8		34.1	34.1		11.7	17.5	29.9	12.3	18.1	
Effective Green, g (s)	31.8	31.8		34.1	34.1		11.7	17.5	29.9	12.3	18.1	
Actuated g/C Ratio	0.32	0.32		0.34	0.34		0.12	0.18	0.30	0.12	0.18	
Clearance Time (s)	6.5	6.5		6.5	6.5		6.5	6.5	6.5	6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	330	1117		280	1133		401	332	478	430	308	
v/s Ratio Prot	0.06	c0.31		0.06	c0.22		0.06	c0.15	0.10	c0.11	0.14	
v/s Ratio Perm	0.14			0.10					0.14			
v/c Ratio	0.63	0.96		0.48	0.64		0.47	0.88	0.79	0.90	0.79	
Uniform Delay, d1	31.0	33.5		25.3	27.8		41.3	40.2	32.1	43.3	39.2	
Progression Factor	0.57	0.60		1.00	1.00		0.97	0.97	0.89	1.00	1.00	
Incremental Delay, d2	2.8	16.3		1.3	2.8		0.9	21.6	8.1	22.0	13.0	
Delay (s)	20.6	36.4		26.6	30.5		40.9	60.4	36.8	65.3	52.2	
Level of Service	C	D		C	C		D	E	D	E	D	
Approach Delay (s)		33.9			29.9			44.6			59.5	
Approach LOS		C			C			D			E	
Intersection Summary												
HCM 2000 Control Delay		40.3			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.91										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			26.0				
Intersection Capacity Utilization		85.5%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

3: S Campbell Station Rd/N Campbell Station Rd & Kingston Pike

10/27/2020

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	457	1300	150	40	559	187	271	423	326	283	442
v/c Ratio	0.86	0.88	0.20	0.24	0.80	0.30	0.68	0.66	0.88	0.42	0.59
Control Delay	48.9	37.0	2.7	21.9	34.7	7.6	25.2	35.8	50.6	37.3	10.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.9	37.0	2.7	21.9	34.7	7.6	25.2	35.8	50.6	37.3	10.1
Queue Length 50th (ft)	247	427	0	17	197	46	138	134	154	84	59
Queue Length 95th (ft)	#470	#585	27	38	#265	69	242	184	#206	104	78
Internal Link Dist (ft)		673			937			607		627	
Turn Bay Length (ft)	300		350	160		350	150		300		325
Base Capacity (vph)	533	1475	735	169	701	620	406	640	371	679	752
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.88	0.20	0.24	0.80	0.30	0.67	0.66	0.88	0.42	0.59

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

3: S Campbell Station Rd/N Campbell Station Rd & Kingston Pike

10/27/2020

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		 			 			 			 		
Traffic Volume (vph)	420	1196	138	37	520	174	252	365	29	251	218	340	
Future Volume (vph)	420	1196	138	37	520	174	252	365	29	251	218	340	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	
Satd. Flow (prot)	1736	3574	1524	1805	3505	1599	1719	3527		1752	3406	1553	
Flt Permitted	0.44	1.00	1.00	0.28	1.00	1.00	0.58	1.00		0.33	1.00	1.00	
Satd. Flow (perm)	801	3574	1524	528	3505	1599	1046	3527		605	3406	1553	
Peak-hour factor, PHF	0.92	0.92	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.77	0.77	0.77	
Adj. Flow (vph)	457	1300	150	40	559	187	271	392	31	326	283	442	
RTOR Reduction (vph)	0	0	92	0	0	74	0	6	0	0	0	100	
Lane Group Flow (vph)	457	1300	58	40	559	113	271	417	0	326	283	342	
Heavy Vehicles (%)	4%	1%	6%	0%	3%	1%	5%	1%	4%	3%	6%	4%	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov	
Protected Phases	5	2		1	6	7	3	8		7	4	5	
Permitted Phases	2		2	6		6	8			4		4	
Actuated Green, G (s)	38.7	38.7	38.7	17.4	17.4	31.7	30.4	18.0		34.2	19.9	44.2	
Effective Green, g (s)	38.7	38.7	38.7	17.4	17.4	31.7	30.4	18.0		34.2	19.9	44.2	
Actuated g/C Ratio	0.39	0.39	0.39	0.17	0.17	0.32	0.30	0.18		0.34	0.20	0.44	
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	537	1383	589	130	609	506	401	634		370	677	686	
v/s Ratio Prot	0.21	c0.36		0.01	c0.16	0.03	0.08	0.12		c0.13	0.08	0.12	
v/s Ratio Perm	0.12		0.04	0.04		0.04	0.12			c0.17		0.10	
v/c Ratio	0.85	0.94	0.10	0.31	0.92	0.22	0.68	0.66		0.88	0.42	0.50	
Uniform Delay, d1	27.9	29.5	19.5	35.4	40.6	25.1	28.8	38.1		27.3	35.0	20.0	
Progression Factor	1.00	1.00	1.00	0.57	0.66	1.20	0.68	0.81		1.00	1.00	1.00	
Incremental Delay, d2	12.3	13.6	0.3	1.3	20.7	0.2	4.4	5.2		20.9	1.9	0.6	
Delay (s)	40.2	43.1	19.9	21.3	47.4	30.2	23.9	36.0		48.3	36.9	20.5	
Level of Service	D	D	B	C	D	C	C	D		D	D	C	
Approach Delay (s)		40.6			42.0			31.3			33.5		
Approach LOS		D			D			C			C		
Intersection Summary													
HCM 2000 Control Delay			37.7									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.98										
Actuated Cycle Length (s)			100.0									Sum of lost time (s)	26.0
Intersection Capacity Utilization			84.2%									ICU Level of Service	E
Analysis Period (min)			15										
c Critical Lane Group													

Queues

5: S Campbell Station Rd & Municipal Dr.

10/27/2020



Lane Group	EBL	SET	NWL	NWT
Lane Group Flow (vph)	154	441	46	655
v/c Ratio	0.62	0.18	0.07	0.25
Control Delay	45.1	4.6	0.8	0.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	45.1	4.6	0.8	0.9
Queue Length 50th (ft)	79	5	1	8
Queue Length 95th (ft)	99	122	2	8
Internal Link Dist (ft)	392	607		1164
Turn Bay Length (ft)			70	
Base Capacity (vph)	605	2510	698	2572
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.25	0.18	0.07	0.25
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

5: S Campbell Station Rd & Municipal Dr.

10/27/2020



Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	75	33	281	89	41	583
Future Volume (vph)	75	33	281	89	41	583
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5		6.5		6.5	6.5
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.96		0.96		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1761		3364		1805	3471
Flt Permitted	0.97		1.00		0.50	1.00
Satd. Flow (perm)	1761		3364		943	3471
Peak-hour factor, PHF	0.70	0.70	0.84	0.84	0.89	0.89
Adj. Flow (vph)	107	47	335	106	46	655
RTOR Reduction (vph)	21	0	17	0	0	0
Lane Group Flow (vph)	133	0	424	0	46	655
Heavy Vehicles (%)	0%	0%	2%	8%	0%	4%
Turn Type	Prot		NA		Perm	NA
Protected Phases	4		6			2
Permitted Phases					2	
Actuated Green, G (s)	12.9		74.1		74.1	74.1
Effective Green, g (s)	12.9		74.1		74.1	74.1
Actuated g/C Ratio	0.13		0.74		0.74	0.74
Clearance Time (s)	6.5		6.5		6.5	6.5
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	227		2492		698	2572
v/s Ratio Prot	c0.08		0.13			c0.19
v/s Ratio Perm					0.05	
v/c Ratio	0.59		0.17		0.07	0.25
Uniform Delay, d1	41.0		3.8		3.5	4.1
Progression Factor	1.00		1.23		0.14	0.14
Incremental Delay, d2	3.8		0.1		0.2	0.2
Delay (s)	44.9		4.8		0.7	0.8
Level of Service	D		A		A	A
Approach Delay (s)	44.9		4.8			0.8
Approach LOS	D		A			A
Intersection Summary						
HCM 2000 Control Delay			7.4		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.30			
Actuated Cycle Length (s)			100.0		Sum of lost time (s)	13.0
Intersection Capacity Utilization			37.2%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Queues

7: S Campbell Station Rd & Brooklawn St

10/27/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	16	345	695	122	48	10
v/c Ratio	0.03	0.15	0.33	0.08	0.11	0.03
Control Delay	1.8	2.0	1.0	0.1	31.0	15.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1.8	2.0	1.0	0.1	31.0	15.9
Queue Length 50th (ft)	1	11	5	0	24	0
Queue Length 95th (ft)	3	13	9	0	49	11
Internal Link Dist (ft)		1164	2181		270	
Turn Bay Length (ft)	175			125		200
Base Capacity (vph)	510	2230	2117	1512	424	387
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.15	0.33	0.08	0.11	0.03
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

7: S Campbell Station Rd & Brooklawn St

10/27/2020

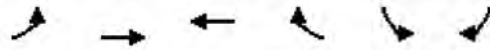


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↱↱	↱↱	↰	↰	↰
Traffic Volume (vph)	13	283	639	112	39	8
Future Volume (vph)	13	283	639	112	39	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	3406	3505	1615	1805	1615
Flt Permitted	0.32	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	606	3406	3505	1615	1805	1615
Peak-hour factor, PHF	0.82	0.82	0.92	0.92	0.81	0.81
Adj. Flow (vph)	16	345	695	122	48	10
RTOR Reduction (vph)	0	0	0	24	0	8
Lane Group Flow (vph)	16	345	695	98	48	2
Heavy Vehicles (%)	0%	6%	3%	0%	0%	0%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	65.5	65.5	56.5	80.0	23.5	23.5
Effective Green, g (s)	65.5	65.5	56.5	80.0	23.5	23.5
Actuated g/C Ratio	0.66	0.66	0.56	0.80	0.24	0.24
Clearance Time (s)	6.5	6.5	6.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	426	2230	1980	1292	424	379
v/s Ratio Prot	0.00	c0.10	c0.20	0.02	c0.03	
v/s Ratio Perm	0.02			0.04		0.00
v/c Ratio	0.04	0.15	0.35	0.08	0.11	0.01
Uniform Delay, d1	6.6	6.6	11.8	2.1	30.1	29.3
Progression Factor	0.29	0.28	0.06	0.01	1.00	1.00
Incremental Delay, d2	0.0	0.1	0.4	0.1	0.5	0.0
Delay (s)	1.9	2.0	1.2	0.1	30.6	29.3
Level of Service	A	A	A	A	C	C
Approach Delay (s)		2.0	1.0		30.4	
Approach LOS		A	A		C	
Intersection Summary						
HCM 2000 Control Delay			2.7		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.28			
Actuated Cycle Length (s)			100.0		Sum of lost time (s)	17.5
Intersection Capacity Utilization			31.0%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Queues

11: S Campbell Station Rd & Concord Rd

10/27/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	26	397	760	969	229	43
v/c Ratio	0.10	0.25	0.55	0.63	0.15	0.06
Control Delay	14.1	15.6	26.8	2.2	17.4	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.1	15.6	26.8	2.2	17.4	5.4
Queue Length 50th (ft)	13	108	178	0	44	0
Queue Length 95th (ft)	16	120	285	27	68	20
Internal Link Dist (ft)		2181	561		478	
Turn Bay Length (ft)	160			225	300	250
Base Capacity (vph)	258	1570	1376	1547	1523	726
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.25	0.55	0.63	0.15	0.06
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

11: S Campbell Station Rd & Concord Rd

10/27/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	←	↑↑	↑↑	↑	←	↑
Traffic Volume (vph)	20	310	730	930	211	40
Future Volume (vph)	20	310	730	930	211	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1671	3610	3539	1599	3502	1615
Flt Permitted	0.26	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	453	3610	3539	1599	3502	1615
Peak-hour factor, PHF	0.78	0.78	0.96	0.96	0.92	0.92
Adj. Flow (vph)	26	397	760	969	229	43
RTOR Reduction (vph)	0	0	0	189	0	24
Lane Group Flow (vph)	26	397	760	780	229	19
Heavy Vehicles (%)	8%	0%	2%	1%	0%	0%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	43.5	43.5	35.0	78.5	43.5	43.5
Effective Green, g (s)	43.5	43.5	35.0	78.5	43.5	43.5
Actuated g/C Ratio	0.44	0.44	0.35	0.78	0.44	0.44
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	221	1570	1238	1359	1523	702
v/s Ratio Prot	0.00	c0.11	0.21	c0.25	0.07	
v/s Ratio Perm	0.05			0.24		0.01
v/c Ratio	0.12	0.25	0.61	0.57	0.15	0.03
Uniform Delay, d1	24.5	17.9	26.9	4.2	17.1	16.1
Progression Factor	0.75	0.84	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.4	2.3	1.8	0.2	0.1
Delay (s)	18.5	15.5	29.2	6.0	17.3	16.2
Level of Service	B	B	C	A	B	B
Approach Delay (s)		15.7	16.2		17.1	
Approach LOS		B	B		B	
Intersection Summary						
HCM 2000 Control Delay			16.2		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.62			
Actuated Cycle Length (s)			100.0		Sum of lost time (s)	19.5
Intersection Capacity Utilization			72.2%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

Queues

16: Concord Rd & Site Access

10/27/2020



Lane Group	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	2	28	13	21	44	1052	11	310	2
v/c Ratio	0.02	0.22	0.13	0.17	0.04	0.33	0.02	0.18	0.00
Control Delay	43.0	20.3	46.4	20.8	1.4	1.6	1.0	1.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.0	20.3	46.4	20.8	1.4	1.6	1.0	1.0	0.0
Queue Length 50th (ft)	1	0	8	0	3	49	0	14	0
Queue Length 95th (ft)	4	5	19	13	8	75	m1	m26	m0
Internal Link Dist (ft)	382		246			410		568	
Turn Bay Length (ft)		125		100	100		100		200
Base Capacity (vph)	427	385	360	379	982	3205	460	1700	1615
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.07	0.04	0.06	0.04	0.33	0.02	0.18	0.00

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

16: Concord Rd & Site Access

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1	13	6	2	13	42	952	58	10	273	2
Future Volume (vph)	0	1	13	6	2	13	42	952	58	10	273	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected		1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1900	1615		1830	1615	1805	3546		1805	1881	1615
Flt Permitted		1.00	1.00		0.84	1.00	0.57	1.00		0.27	1.00	1.00
Satd. Flow (perm)		1900	1615		1601	1615	1086	3546		509	1881	1615
Peak-hour factor, PHF	0.46	0.46	0.46	0.63	0.63	0.63	0.96	0.96	0.96	0.88	0.88	0.88
Adj. Flow (vph)	0	2	28	10	3	21	44	992	60	11	310	2
RTOR Reduction (vph)	0	0	27	0	0	20	0	2	0	0	0	0
Lane Group Flow (vph)	0	2	1	0	13	1	44	1050	0	11	310	2
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type		NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	custom
Protected Phases		4			8!			2			6	4!
Permitted Phases	4		4	8		8	2			6		6
Actuated Green, G (s)		4.2	4.2		4.2	4.2	86.8	86.8		86.8	86.8	91.0
Effective Green, g (s)		4.2	4.2		4.2	4.2	86.8	86.8		86.8	86.8	91.0
Actuated g/C Ratio		0.04	0.04		0.04	0.04	0.87	0.87		0.87	0.87	0.91
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		79	67		67	67	942	3077		441	1632	1615
v/s Ratio Prot		0.00						c0.30			0.16	0.00
v/s Ratio Perm			0.00		c0.01	0.00	0.04			0.02		0.00
v/c Ratio		0.03	0.02		0.19	0.01	0.05	0.34		0.02	0.19	0.00
Uniform Delay, d1		45.9	45.9		46.3	45.9	0.9	1.2		0.9	1.0	0.4
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		0.67	0.66	1.00
Incremental Delay, d2		0.1	0.1		1.4	0.1	0.1	0.3		0.1	0.2	0.0
Delay (s)		46.1	46.0		47.7	46.0	1.0	1.5		0.7	0.9	0.4
Level of Service		D	D		D	D	A	A		A	A	A
Approach Delay (s)		46.0			46.6			1.5			0.9	
Approach LOS		D			D			A			A	

Intersection Summary

HCM 2000 Control Delay	3.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	47.8%	ICU Level of Service	A
Analysis Period (min)	15		

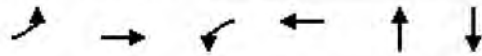
! Phase conflict between lane groups.

c Critical Lane Group

Queues

18: Kingston Pike & Lendon Welsch Way

10/27/2020



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	306	1312	16	1039	154	281
v/c Ratio	0.82	0.64	0.07	0.77	0.33	0.80
Control Delay	43.0	4.0	5.4	17.6	32.6	48.0
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	43.0	4.1	5.4	17.6	32.6	48.0
Queue Length 50th (ft)	90	15	1	178	79	145
Queue Length 95th (ft)	#229	24	m2	264	84	#210
Internal Link Dist (ft)		449		746	93	431
Turn Bay Length (ft)	150		125			
Base Capacity (vph)	409	2062	215	1345	467	353
Starvation Cap Reductn	0	143	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.68	0.07	0.77	0.33	0.80

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

18: Kingston Pike & Lendon Welsch Way

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	285	1216	4	14	707	208	0	85	6	111	9	105
Future Volume (vph)	285	1216	4	14	707	208	0	85	6	111	9	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5			6.5			6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.97			0.99			0.94	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.98	
Satd. Flow (prot)	1687	3573		1805	3360			1883			1697	
Flt Permitted	0.12	1.00		0.17	1.00			1.00			0.75	
Satd. Flow (perm)	206	3573		320	3360			1883			1302	
Peak-hour factor, PHF	0.93	0.93	0.93	0.88	0.88	0.88	0.59	0.59	0.59	0.80	0.80	0.80
Adj. Flow (vph)	306	1308	4	16	803	236	0	144	10	139	11	131
RTOR Reduction (vph)	0	0	0	0	26	0	0	2	0	0	32	0
Lane Group Flow (vph)	306	1312	0	16	1013	0	0	152	0	0	249	0
Heavy Vehicles (%)	7%	1%	0%	0%	4%	3%	0%	0%	0%	1%	0%	4%
Turn Type	pm+pt	NA		pm+pt	NA			NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	62.3	53.8		41.3	39.3			24.7			24.7	
Effective Green, g (s)	62.3	53.8		41.3	39.3			24.7			24.7	
Actuated g/C Ratio	0.62	0.54		0.41	0.39			0.25			0.25	
Clearance Time (s)	6.5	6.5		6.5	6.5			6.5			6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	372	1922		161	1320			465			321	
v/s Ratio Prot	c0.14	0.37		0.00	0.30			0.08				
v/s Ratio Perm	c0.38			0.04							c0.19	
v/c Ratio	0.82	0.68		0.10	0.77			0.33			0.78	
Uniform Delay, d1	23.3	16.9		17.7	26.4			30.8			35.1	
Progression Factor	1.43	0.18		0.51	0.52			1.00			1.00	
Incremental Delay, d2	10.9	1.5		0.2	3.7			1.9			11.2	
Delay (s)	44.2	4.6		9.2	17.4			32.7			46.3	
Level of Service	D	A		A	B			C			D	
Approach Delay (s)		12.1			17.3			32.7			46.3	
Approach LOS		B			B			C			D	
Intersection Summary												
HCM 2000 Control Delay			18.0			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			19.5			
Intersection Capacity Utilization			77.9%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

22: Brooklawn St & Kingston Pike

10/27/2020



Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR
Lane Group Flow (vph)	1479	27	111	753	30	30	160
v/c Ratio	0.66	0.02	0.46	0.28	0.24	0.24	0.38
Control Delay	8.4	0.0	11.5	2.4	47.8	47.8	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.4	0.0	11.5	2.4	47.8	47.8	2.8
Queue Length 50th (ft)	231	0	16	39	18	18	0
Queue Length 95th (ft)	530	m0	m20	63	48	48	1
Internal Link Dist (ft)	937			449		417	
Turn Bay Length (ft)		100	125		200		200
Base Capacity (vph)	2254	1151	241	2675	308	308	419
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.02	0.46	0.28	0.10	0.10	0.38

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

22: Brooklawn St & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1361	25	103	697	4	53	0	142	0	0	0
Future Volume (vph)	0	1361	25	103	697	4	53	0	142	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5	6.5	6.5		6.5	6.5	6.5			
Lane Util. Factor		0.95	1.00	1.00	0.95		0.95	0.95	1.00			
Frt		1.00	0.85	1.00	1.00		1.00	1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00		0.95	0.95	1.00			
Satd. Flow (prot)		3539	1615	1805	3498		1715	1715	1599			
Flt Permitted		1.00	1.00	0.11	1.00		0.95	0.95	1.00			
Satd. Flow (perm)		3539	1615	214	3498		1715	1715	1599			
Peak-hour factor, PHF	0.92	0.92	0.92	0.93	0.93	0.93	0.89	0.89	0.89	0.25	0.25	0.25
Adj. Flow (vph)	0	1479	27	111	749	4	60	0	160	0	0	0
RTOR Reduction (vph)	0	0	10	0	0	0	0	0	142	0	0	0
Lane Group Flow (vph)	0	1479	17	111	753	0	30	30	18	0	0	0
Heavy Vehicles (%)	0%	2%	0%	0%	3%	25%	0%	0%	1%	0%	0%	0%
Turn Type	pm+pt	NA	custom	pm+pt	NA		Split	NA	pm+ov			
Protected Phases	5	2	3	1	6		8	8	1	4	4	
Permitted Phases	2		2	6					8			
Actuated Green, G (s)		59.8	62.8	71.3	71.3		6.2	6.2	11.2			
Effective Green, g (s)		59.8	62.8	71.3	71.3		6.2	6.2	11.2			
Actuated g/C Ratio		0.60	0.63	0.71	0.71		0.06	0.06	0.11			
Clearance Time (s)		6.5	6.5	6.5	6.5		6.5	6.5	6.5			
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0	3.0			
Lane Grp Cap (vph)		2116	1014	232	2494		106	106	179			
v/s Ratio Prot		c0.42	c0.00	c0.02	0.22		c0.02	0.02	0.01			
v/s Ratio Perm			0.01	0.32					0.01			
v/c Ratio		0.70	0.02	0.48	0.30		0.28	0.28	0.10			
Uniform Delay, d1		13.9	7.0	20.8	5.2		44.8	44.8	39.9			
Progression Factor		0.56	1.00	0.50	0.42		1.00	1.00	1.00			
Incremental Delay, d2		0.9	0.0	0.9	0.2		1.5	1.5	0.2			
Delay (s)		8.6	7.0	11.4	2.4		46.2	46.2	40.1			
Level of Service		A	A	B	A		D	D	D			
Approach Delay (s)		8.6			3.6			41.8			0.0	
Approach LOS		A			A			D			A	
Intersection Summary												
HCM 2000 Control Delay			9.7			HCM 2000 Level of Service			A			
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			32.5			
Intersection Capacity Utilization			63.7%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th TWSC
9: Brooklawn St & Pinnacle Access

10/27/2020

Intersection

Int Delay, s/veh 3.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	32	56	77	58	3
Future Vol, veh/h	0	32	56	77	58	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	75	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	35	61	84	63	3

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	271	65	66
Stage 1	65	-	-
Stage 2	206	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	718	999	1536
Stage 1	958	-	-
Stage 2	829	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	689	999	1536
Mov Cap-2 Maneuver	689	-	-
Stage 1	920	-	-
Stage 2	829	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.7	3.1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1536	-	999	-	-
HCM Lane V/C Ratio	0.04	-	0.035	-	-
HCM Control Delay (s)	7.4	-	8.7	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

HCM 6th TWSC
23: Petco Access & Brooklawn St

10/27/2020

Intersection

Int Delay, s/veh 3.5

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	10	61	35	10	35	31	56	3	2	7	2	6
Future Vol, veh/h	10	61	35	10	35	31	56	3	2	7	2	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	66	38	11	38	34	61	3	2	8	2	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	72	0	0	104	0	0	189	201	85	187	203	55
Stage 1	-	-	-	-	-	-	107	107	-	77	77	-
Stage 2	-	-	-	-	-	-	82	94	-	110	126	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1528	-	-	1488	-	-	771	695	974	774	693	1012
Stage 1	-	-	-	-	-	-	898	807	-	932	831	-
Stage 2	-	-	-	-	-	-	926	817	-	895	792	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1528	-	-	1488	-	-	756	685	974	761	683	1012
Mov Cap-2 Maneuver	-	-	-	-	-	-	756	685	-	761	683	-
Stage 1	-	-	-	-	-	-	892	801	-	925	825	-
Stage 2	-	-	-	-	-	-	911	811	-	883	786	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.7	1	10.2	9.4
HCM LOS			B	A

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SERSWLn1
Capacity (veh/h)	758	1488	-	-	1528	-	831
HCM Lane V/C Ratio	0.087	0.007	-	-	0.007	-	0.02
HCM Control Delay (s)	10.2	7.4	-	-	7.4	-	9.4
HCM Lane LOS	B	A	-	-	A	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	0.1

HCM 6th Roundabout
26: Brooklawn St & Kroger Roundabout

10/27/2020

Intersection			
Intersection Delay, s/veh	3.1		
Intersection LOS	A		
Approach	EB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	12	83	82
Demand Flow Rate, veh/h	12	85	83
Vehicles Circulating, veh/h	61	3	4
Vehicles Exiting, veh/h	26	70	84
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	2.8	3.2	3.1
Approach LOS	A	A	A
Lane	Left	Left	Left
Designated Moves	LR	LT	TR
Assumed Moves	LR	LT	TR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	12	85	83
Cap Entry Lane, veh/h	1297	1376	1374
Entry HV Adj Factor	1.000	0.981	0.986
Flow Entry, veh/h	12	83	82
Cap Entry, veh/h	1297	1350	1354
V/C Ratio	0.009	0.062	0.060
Control Delay, s/veh	2.8	3.2	3.1
LOS	A	A	A
95th %tile Queue, veh	0	0	0

Queues

1: Concord Rd/West End Ave & Kingston Pike

10/27/2020



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	49	1015	414	1393	129	78	293	178	216
v/c Ratio	0.26	0.78	0.90	0.71	0.54	0.50	0.57	0.36	0.82
Control Delay	17.6	41.2	55.0	23.6	64.6	64.8	19.7	52.4	68.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.6	41.2	55.0	23.6	64.6	64.8	19.7	52.4	68.3
Queue Length 50th (ft)	15	403	257	449	52	61	81	68	142
Queue Length 95th (ft)	31	#495	#431	540	86	110	138	76	150
Internal Link Dist (ft)		746		717		568			373
Turn Bay Length (ft)	150		150		180		300	180	
Base Capacity (vph)	186	1296	490	1971	253	270	538	489	288
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.78	0.84	0.71	0.51	0.29	0.54	0.36	0.75

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

1: Concord Rd/West End Ave & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	903	41	389	1218	91	119	72	270	116	68	72
Future Volume (vph)	46	903	41	389	1218	91	119	72	270	116	68	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		6.5	6.5	6.5	6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	1.00	1.00	0.97	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	1.00	0.85	1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3498		1770	3502		3335	1827	1538	3502	1745	
Flt Permitted	0.15	1.00		0.10	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	283	3498		180	3502		3335	1827	1538	3502	1745	
Peak-hour factor, PHF	0.93	0.93	0.93	0.94	0.94	0.94	0.92	0.92	0.92	0.65	0.65	0.65
Adj. Flow (vph)	49	971	44	414	1296	97	129	78	293	178	105	111
RTOR Reduction (vph)	0	3	0	0	4	0	0	0	62	0	31	0
Lane Group Flow (vph)	49	1012	0	414	1389	0	129	78	231	178	185	0
Heavy Vehicles (%)	0%	2%	14%	2%	2%	2%	5%	4%	5%	0%	1%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2			6					8			
Actuated Green, G (s)	49.4	44.9		78.6	67.6		10.3	9.4	36.6	17.5	16.6	
Effective Green, g (s)	49.4	44.9		78.6	67.6		10.3	9.4	36.6	17.5	16.6	
Actuated g/C Ratio	0.40	0.36		0.63	0.54		0.08	0.08	0.29	0.14	0.13	
Clearance Time (s)	6.5	6.5		6.5	6.5		6.5	6.5	6.5	6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	166	1256		459	1893		274	137	450	490	231	
v/s Ratio Prot	0.01	0.29		c0.20	0.40		c0.04	0.04	0.11	0.05	c0.11	
v/s Ratio Perm	0.11			c0.37					0.04			
v/c Ratio	0.30	0.81		0.90	0.73		0.47	0.57	0.51	0.36	0.80	
Uniform Delay, d1	24.0	36.1		35.3	21.8		54.7	55.8	36.8	48.7	52.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	5.6		20.6	2.6		1.3	5.3	1.0	0.5	17.4	
Delay (s)	25.0	41.7		56.0	24.4		56.0	61.2	37.8	49.2	70.0	
Level of Service	C	D		E	C		E	E	D	D	E	
Approach Delay (s)		41.0			31.6			46.1			60.6	
Approach LOS		D			C			D			E	
Intersection Summary												
HCM 2000 Control Delay			39.2			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			125.0			Sum of lost time (s)			26.0			
Intersection Capacity Utilization			81.2%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

3: S Campbell Station Rd/N Campbell Station Rd & Kingston Pike

10/27/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	410	835	343	79	1127	409	315	433	353	588	590
v/c Ratio	1.08	0.53	0.38	0.30	1.09	0.47	0.94	0.75	0.97	1.01	0.87
Control Delay	106.5	27.1	3.6	20.6	97.9	14.7	71.2	57.3	73.8	92.5	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	106.5	27.1	3.6	20.6	97.9	14.7	71.2	57.3	73.8	92.5	44.4
Queue Length 50th (ft)	~321	261	0	31	~540	132	201	172	222	~257	382
Queue Length 95th (ft)	#526	325	55	57	#676	218	#383	232	#401	#382	#602
Internal Link Dist (ft)		673			937			607		627	
Turn Bay Length (ft)	300		350	160		350	150		300		325
Base Capacity (vph)	378	1582	897	261	1033	863	335	578	364	580	679
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.08	0.53	0.38	0.30	1.09	0.47	0.94	0.75	0.97	1.01	0.87

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

3: S Campbell Station Rd/N Campbell Station Rd & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (vph)	377	768	316	73	1037	376	290	340	58	325	541	543
Future Volume (vph)	377	768	316	73	1037	376	290	340	58	325	541	543
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3462		1770	3539	1583
Flt Permitted	0.09	1.00	1.00	0.34	1.00	1.00	0.20	1.00		0.29	1.00	1.00
Satd. Flow (perm)	173	3539	1583	629	3539	1583	363	3462		539	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	410	835	343	79	1127	409	315	370	63	353	588	590
RTOR Reduction (vph)	0	0	193	0	0	79	0	11	0	0	0	57
Lane Group Flow (vph)	410	835	150	79	1127	330	315	422	0	353	588	533
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6	7	3	8		7	4	5
Permitted Phases	2		2	6		6	8			4		4
Actuated Green, G (s)	65.5	54.6	54.6	40.9	36.5	56.0	40.0	20.5		40.0	20.5	43.0
Effective Green, g (s)	65.5	54.6	54.6	40.9	36.5	56.0	40.0	20.5		40.0	20.5	43.0
Actuated g/C Ratio	0.52	0.44	0.44	0.33	0.29	0.45	0.32	0.16		0.32	0.16	0.34
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	378	1545	691	245	1033	791	335	567		364	580	626
v/s Ratio Prot	c0.20	0.24		0.01	0.32	0.06	0.15	0.12		c0.15	0.17	c0.15
v/s Ratio Perm	c0.37		0.09	0.09		0.14	0.15			0.16		0.18
v/c Ratio	1.08	0.54	0.22	0.32	1.09	0.42	0.94	0.74		0.97	1.01	0.85
Uniform Delay, d1	39.8	26.0	21.9	29.6	44.2	23.4	36.3	49.8		37.4	52.2	38.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	70.9	1.4	0.7	0.8	56.2	0.4	33.9	8.6		38.7	40.9	10.8
Delay (s)	110.7	27.3	22.6	30.4	100.4	23.8	70.2	58.4		76.1	93.1	48.8
Level of Service	F	C	C	C	F	C	E	E		E	F	D
Approach Delay (s)		47.8			77.6			63.3			72.1	
Approach LOS		D			E			E			E	
Intersection Summary												
HCM 2000 Control Delay	65.5			HCM 2000 Level of Service					E			
HCM 2000 Volume to Capacity ratio	1.08											
Actuated Cycle Length (s)	125.0			Sum of lost time (s)					26.0			
Intersection Capacity Utilization	102.2%			ICU Level of Service					G			
Analysis Period (min)	15											
c Critical Lane Group												

Queues

5: S Campbell Station Rd & Municipal Dr.

10/27/2020



Lane Group	EBL	SET	NWL	NWT
Lane Group Flow (vph)	262	1048	49	587
v/c Ratio	0.77	0.42	0.15	0.24
Control Delay	57.5	8.5	6.7	6.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	57.5	8.5	6.7	6.2
Queue Length 50th (ft)	181	156	10	63
Queue Length 95th (ft)	222	220	21	78
Internal Link Dist (ft)	392	607		1164
Turn Bay Length (ft)			70	
Base Capacity (vph)	589	2496	327	2474
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.44	0.42	0.15	0.24
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

5: S Campbell Station Rd & Municipal Dr.

10/27/2020



Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	150	62	777	103	46	546
Future Volume (vph)	150	62	777	103	46	546
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5		6.5		6.5	6.5
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.96		0.98		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1752		3530		1805	3505
Flt Permitted	0.97		1.00		0.24	1.00
Satd. Flow (perm)	1752		3530		463	3505
Peak-hour factor, PHF	0.81	0.81	0.84	0.84	0.93	0.93
Adj. Flow (vph)	185	77	925	123	49	587
RTOR Reduction (vph)	15	0	6	0	0	0
Lane Group Flow (vph)	247	0	1042	0	49	587
Heavy Vehicles (%)	0%	2%	0%	4%	0%	3%
Turn Type	Prot		NA		Perm	NA
Protected Phases	4		6			2
Permitted Phases					2	
Actuated Green, G (s)	22.3		84.7		84.7	84.7
Effective Green, g (s)	22.3		84.7		84.7	84.7
Actuated g/C Ratio	0.19		0.71		0.71	0.71
Clearance Time (s)	6.5		6.5		6.5	6.5
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	325		2491		326	2473
v/s Ratio Prot	c0.14		c0.30			0.17
v/s Ratio Perm					0.11	
v/c Ratio	0.76		0.42		0.15	0.24
Uniform Delay, d1	46.3		7.4		5.8	6.2
Progression Factor	1.00		1.00		0.74	0.86
Incremental Delay, d2	9.7		0.5		0.9	0.2
Delay (s)	56.0		7.9		5.3	5.6
Level of Service	E		A		A	A
Approach Delay (s)	56.0		7.9			5.6
Approach LOS	E		A			A
Intersection Summary						
HCM 2000 Control Delay			13.6		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.49			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	13.0
Intersection Capacity Utilization			57.3%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Queues

7: S Campbell Station Rd & Brooklawn St

10/27/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	62	928	578	127	259	71
v/c Ratio	0.15	0.48	0.36	0.09	0.40	0.11
Control Delay	18.6	26.6	13.8	0.1	30.7	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.6	26.6	13.8	0.1	30.7	6.2
Queue Length 50th (ft)	30	306	60	0	148	0
Queue Length 95th (ft)	58	357	77	1	190	23
Internal Link Dist (ft)		1164	2181		270	
Turn Bay Length (ft)	175			125		200
Base Capacity (vph)	458	1950	1608	1428	654	630
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.48	0.36	0.09	0.40	0.11
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

7: S Campbell Station Rd & Brooklawn St

10/27/2020

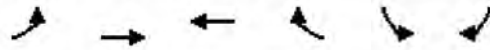


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	←	↑↑	↑↑	↑	←	↑
Traffic Volume (vph)	53	789	532	117	205	56
Future Volume (vph)	53	789	532	117	205	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	3574	3574	1615	1805	1615
Flt Permitted	0.33	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	634	3574	3574	1615	1805	1615
Peak-hour factor, PHF	0.85	0.85	0.92	0.92	0.79	0.79
Adj. Flow (vph)	62	928	578	127	259	71
RTOR Reduction (vph)	0	0	0	25	0	45
Lane Group Flow (vph)	62	928	578	102	259	26
Heavy Vehicles (%)	0%	1%	1%	0%	0%	0%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	65.5	65.5	52.7	96.2	43.5	43.5
Effective Green, g (s)	65.5	65.5	52.7	96.2	43.5	43.5
Actuated g/C Ratio	0.55	0.55	0.44	0.80	0.36	0.36
Clearance Time (s)	6.5	6.5	6.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	407	1950	1569	1294	654	585
v/s Ratio Prot	0.01	c0.26	0.16	0.03	c0.14	
v/s Ratio Perm	0.07			0.03		0.02
v/c Ratio	0.15	0.48	0.37	0.08	0.40	0.04
Uniform Delay, d1	13.7	16.7	22.5	2.5	28.5	24.8
Progression Factor	1.38	1.53	0.58	0.01	1.00	1.00
Incremental Delay, d2	0.2	0.8	0.6	0.1	1.8	0.1
Delay (s)	19.0	26.3	13.7	0.1	30.3	24.9
Level of Service	B	C	B	A	C	C
Approach Delay (s)		25.8	11.3		29.1	
Approach LOS		C	B		C	
Intersection Summary						
HCM 2000 Control Delay			21.3		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.47			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	17.5
Intersection Capacity Utilization			44.4%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Queues

11: S Campbell Station Rd & Concord Rd

10/27/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	63	1024	684	410	569	36
v/c Ratio	0.15	0.53	0.44	0.30	0.47	0.06
Control Delay	7.7	8.6	25.3	0.8	32.3	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.7	8.6	25.3	0.8	32.3	8.6
Queue Length 50th (ft)	11	126	199	0	176	0
Queue Length 95th (ft)	24	168	254	15	229	23
Internal Link Dist (ft)		2181	561		478	
Turn Bay Length (ft)	160			225	300	250
Base Capacity (vph)	426	1950	1569	1381	1199	565
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.53	0.44	0.30	0.47	0.06
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

11: S Campbell Station Rd & Concord Rd

10/27/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	58	942	622	373	535	34
Future Volume (vph)	58	942	622	373	535	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	3574	3574	1553	3467	1568
Flt Permitted	0.32	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	607	3574	3574	1553	3467	1568
Peak-hour factor, PHF	0.92	0.92	0.91	0.91	0.94	0.94
Adj. Flow (vph)	63	1024	684	410	569	36
RTOR Reduction (vph)	0	0	0	93	0	24
Lane Group Flow (vph)	63	1024	684	317	569	12
Heavy Vehicles (%)	0%	1%	1%	4%	1%	3%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	65.5	65.5	51.4	92.9	41.5	41.5
Effective Green, g (s)	65.5	65.5	51.4	92.9	41.5	41.5
Actuated g/C Ratio	0.55	0.55	0.43	0.77	0.35	0.35
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	407	1950	1530	1286	1199	542
v/s Ratio Prot	0.01	c0.29	0.19	0.09	c0.16	
v/s Ratio Perm	0.07			0.12		0.01
v/c Ratio	0.15	0.53	0.45	0.25	0.47	0.02
Uniform Delay, d1	19.3	17.3	24.3	3.8	30.7	25.9
Progression Factor	0.49	0.44	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.9	0.9	0.5	1.3	0.1
Delay (s)	9.5	8.5	25.2	4.2	32.1	26.0
Level of Service	A	A	C	A	C	C
Approach Delay (s)		8.5	17.3		31.7	
Approach LOS		A	B		C	
Intersection Summary						
HCM 2000 Control Delay			17.0		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.54			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	19.5
Intersection Capacity Utilization			52.5%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Queues

16: Concord Rd & Site Access

10/27/2020



Lane Group	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	2	40	107	97	19	467	12	525	3
v/c Ratio	0.01	0.18	0.63	0.35	0.03	0.17	0.02	0.35	0.00
Control Delay	43.0	14.8	65.9	12.3	3.2	3.0	3.2	4.3	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
Total Delay	43.0	14.8	65.9	12.3	3.2	3.0	3.2	4.8	0.0
Queue Length 50th (ft)	1	0	80	0	2	32	1	88	0
Queue Length 95th (ft)	7	21	116	34	9	59	7	164	0
Internal Link Dist (ft)	382		246			410		568	
Turn Bay Length (ft)		125		100	100		100		200
Base Capacity (vph)	440	440	362	478	680	2791	741	1515	1615
Starvation Cap Reductn	0	0	0	0	0	0	0	572	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.09	0.30	0.20	0.03	0.17	0.02	0.56	0.00

Intersection Summary

HCM Signalized Intersection Capacity Analysis

16: Concord Rd & Site Access

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	1	29	74	10	77	17	385	35	11	483	3
Future Volume (vph)	1	1	29	74	10	77	17	385	35	11	483	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected		0.98	1.00		0.96	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1854	1615		1820	1599	1805	3461		1805	1881	1615
Flt Permitted		0.91	1.00		0.75	1.00	0.44	1.00		0.48	1.00	1.00
Satd. Flow (perm)		1734	1615		1426	1599	845	3461		919	1881	1615
Peak-hour factor, PHF	0.73	0.73	0.73	0.79	0.79	0.79	0.90	0.90	0.90	0.92	0.92	0.92
Adj. Flow (vph)	1	1	40	94	13	97	19	428	39	12	525	3
RTOR Reduction (vph)	0	0	35	0	0	85	0	3	0	0	0	0
Lane Group Flow (vph)	0	2	5	0	107	12	19	464	0	12	525	3
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	3%	3%	0%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	custom
Protected Phases		4			8!			2			6	4!
Permitted Phases	4		4	8		8	2			6		6
Actuated Green, G (s)		14.3	14.3		14.3	14.3	96.7	96.7		96.7	96.7	111.0
Effective Green, g (s)		14.3	14.3		14.3	14.3	96.7	96.7		96.7	96.7	111.0
Actuated g/C Ratio		0.12	0.12		0.12	0.12	0.81	0.81		0.81	0.81	0.92
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		206	192		169	190	680	2788		740	1515	1615
v/s Ratio Prot								0.13			c0.28	0.00
v/s Ratio Perm		0.00	0.00		c0.08	0.01	0.02			0.01		0.00
v/c Ratio		0.01	0.02		0.63	0.06	0.03	0.17		0.02	0.35	0.00
Uniform Delay, d1		46.6	46.7		50.4	46.9	2.3	2.6		2.3	3.1	0.3
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.0	0.1		7.5	0.1	0.1	0.1		0.0	0.6	0.0
Delay (s)		46.6	46.7		57.9	47.0	2.4	2.7		2.3	3.8	0.3
Level of Service		D	D		E	D	A	A		A	A	A
Approach Delay (s)		46.7			52.7			2.7			3.7	
Approach LOS		D			D			A			A	

Intersection Summary

HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

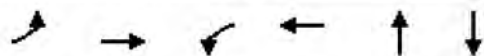
! Phase conflict between lane groups.

c Critical Lane Group

Queues

18: Kingston Pike & Lendon Welsch Way

10/27/2020



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	39	1140	34	1592	53	130
v/c Ratio	0.24	0.47	0.10	0.66	0.22	0.43
Control Delay	11.0	10.2	9.1	13.9	28.5	24.0
Queue Delay	0.0	0.7	0.0	0.3	0.0	0.0
Total Delay	11.0	10.9	9.1	14.2	28.5	24.0
Queue Length 50th (ft)	10	224	9	397	18	33
Queue Length 95th (ft)	23	273	21	478	46	37
Internal Link Dist (ft)		449		746	93	431
Turn Bay Length (ft)	150		125			
Base Capacity (vph)	160	2419	355	2395	243	299
Starvation Cap Reductn	0	836	0	276	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.72	0.10	0.75	0.22	0.43
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

18: Kingston Pike & Lendon Welsch Way

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	1048	12	32	1465	31	18	2	21	17	6	53
Future Volume (vph)	36	1048	12	32	1465	31	18	2	21	17	6	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5			6.5			6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.93			0.91	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.99	
Satd. Flow (prot)	1570	3532		1805	3520			1732			1624	
Flt Permitted	0.08	1.00		0.24	1.00			0.82			0.91	
Satd. Flow (perm)	139	3532		449	3520			1446			1502	
Peak-hour factor, PHF	0.93	0.93	0.90	0.94	0.94	0.94	0.78	0.78	0.78	0.58	0.58	0.58
Adj. Flow (vph)	39	1127	13	34	1559	33	23	3	27	29	10	91
RTOR Reduction (vph)	0	1	0	0	1	0	0	23	0	0	69	0
Lane Group Flow (vph)	39	1139	0	34	1591	0	0	30	0	0	61	0
Heavy Vehicles (%)	15%	2%	6%	0%	2%	14%	0%	0%	0%	12%	0%	3%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	80.3	80.3		79.7	79.7			18.5			18.5	
Effective Green, g (s)	80.3	80.3		79.7	79.7			18.5			18.5	
Actuated g/C Ratio	0.66	0.66		0.66	0.66			0.15			0.15	
Clearance Time (s)	6.5	6.5		6.5	6.5			6.5			6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	131	2343		326	2318			221			229	
v/s Ratio Prot	0.01	c0.32		0.00	c0.45							
v/s Ratio Perm	0.19			0.07				0.02			c0.04	
v/c Ratio	0.30	0.49		0.10	0.69			0.14			0.26	
Uniform Delay, d1	13.3	10.1		9.2	12.9			44.3			45.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1.3	0.7		0.1	1.7			1.3			0.6	
Delay (s)	14.6	10.8		9.3	14.5			45.6			45.9	
Level of Service	B	B		A	B			D			D	
Approach Delay (s)		11.0			14.4			45.6			45.9	
Approach LOS		B			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			15.0			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			121.0			Sum of lost time (s)			19.5			
Intersection Capacity Utilization			57.2%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

22: Brooklawn St & Kingston Pike

10/27/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	3	992	67	199	1442	112	113	215	16
v/c Ratio	0.02	0.50	0.06	0.56	0.61	0.61	0.62	0.45	0.17
Control Delay	13.3	21.5	0.1	28.3	17.4	69.1	69.5	6.2	47.8
Queue Delay	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0
Total Delay	13.3	21.5	0.1	28.3	19.7	69.1	69.5	6.2	47.8
Queue Length 50th (ft)	1	243	0	51	291	96	97	0	8
Queue Length 95th (ft)	6	428	0	124	660	137	138	26	24
Internal Link Dist (ft)		937			449		417		100
Turn Bay Length (ft)	125		100	125		200		200	
Base Capacity (vph)	154	1985	1046	389	2367	310	310	488	189
Starvation Cap Reductn	0	0	0	0	752	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.50	0.06	0.51	0.89	0.36	0.36	0.44	0.08

Intersection Summary

HCM Signalized Intersection Capacity Analysis

22: Brooklawn St & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	913	62	187	1353	3	180	0	172	4	3	4
Future Volume (vph)	3	913	62	187	1353	3	180	0	172	4	3	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5		6.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.98	
Satd. Flow (prot)	1805	3539	1615	1787	3573		1715	1715	1615		1771	
Flt Permitted	0.09	1.00	1.00	0.20	1.00		0.95	0.95	1.00		0.98	
Satd. Flow (perm)	164	3539	1615	377	3573		1715	1715	1615		1771	
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.80	0.80	0.80	0.69	0.69	0.69
Adj. Flow (vph)	3	992	67	199	1439	3	225	0	215	6	4	6
RTOR Reduction (vph)	0	0	33	0	0	0	0	0	169	0	6	0
Lane Group Flow (vph)	3	992	34	199	1442	0	112	113	46	0	10	0
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	custom	pm+pt	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2	3	1	6		8	8	1	4	4	
Permitted Phases	2		2	6					8			
Actuated Green, G (s)	63.4	62.5	66.5	83.1	75.7		13.9	13.9	28.0		3.0	
Effective Green, g (s)	63.4	62.5	66.5	83.1	75.7		13.9	13.9	28.0		3.0	
Actuated g/C Ratio	0.49	0.48	0.51	0.64	0.58		0.11	0.11	0.22		0.02	
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5		6.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	91	1701	826	393	2080		183	183	347		40	
v/s Ratio Prot	0.00	0.28	c0.00	c0.05	c0.40		0.07	c0.07	0.01		c0.01	
v/s Ratio Perm	0.02		0.02	0.27					0.01			
v/c Ratio	0.03	0.58	0.04	0.51	0.69		0.61	0.62	0.13		0.25	
Uniform Delay, d1	38.6	24.4	15.8	28.0	19.0		55.5	55.5	41.2		62.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.1	1.5	0.0	1.0	1.9		5.9	6.1	0.2		3.3	
Delay (s)	38.7	25.8	15.9	29.1	20.9		61.4	61.6	41.4		65.7	
Level of Service	D	C	B	C	C		E	E	D		E	
Approach Delay (s)		25.2			21.9			51.7			65.7	
Approach LOS		C			C			D			E	
Intersection Summary												
HCM 2000 Control Delay			27.4			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			32.5			
Intersection Capacity Utilization			69.1%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th TWSC
9: Brooklawn St & Pinnacle Access

10/27/2020

Intersection

Int Delay, s/veh 3.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	78	87	112	193	9
Future Vol, veh/h	4	78	87	112	193	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	75	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	85	95	122	210	10

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	527	215	220
Stage 1	215	-	-
Stage 2	312	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	512	825	1349
Stage 1	821	-	-
Stage 2	742	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	476	825	1349
Mov Cap-2 Maneuver	476	-	-
Stage 1	764	-	-
Stage 2	742	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.1	3.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1349	-	797	-	-
HCM Lane V/C Ratio	0.07	-	0.112	-	-
HCM Control Delay (s)	7.9	-	10.1	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.4	-	-

HCM 6th TWSC
23: Petco Access & Brooklawn St

10/27/2020

Intersection

Int Delay, s/veh 7.6

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	24	122	69	18	90	20	175	10	26	44	20	31
Future Vol, veh/h	24	122	69	18	90	20	175	10	26	44	20	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	26	133	75	20	98	22	190	11	28	48	22	34

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	120	0	0	208	0	0	400	383	171	391	409	109
Stage 1	-	-	-	-	-	-	223	223	-	149	149	-
Stage 2	-	-	-	-	-	-	177	160	-	242	260	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1468	-	-	1363	-	-	560	550	873	568	532	945
Stage 1	-	-	-	-	-	-	780	719	-	854	774	-
Stage 2	-	-	-	-	-	-	825	766	-	762	693	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1468	-	-	1363	-	-	510	532	873	528	514	945
Mov Cap-2 Maneuver	-	-	-	-	-	-	510	532	-	528	514	-
Stage 1	-	-	-	-	-	-	766	706	-	839	762	-
Stage 2	-	-	-	-	-	-	762	755	-	713	681	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.8	1.1	16.5	12.1
HCM LOS			C	B

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SERSWLn1
Capacity (veh/h)	539	1363	-	-	1468	-	613
HCM Lane V/C Ratio	0.426	0.014	-	-	0.018	-	0.168
HCM Control Delay (s)	16.5	7.7	-	-	7.5	-	12.1
HCM Lane LOS	C	A	-	-	A	-	B
HCM 95th %tile Q(veh)	2.1	0	-	-	0.1	-	0.6

HCM 6th Roundabout
26: Brooklawn St & Kroger Roundabout

10/27/2020

Intersection			
Intersection Delay, s/veh	3.8		
Intersection LOS	A		
Approach	EB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	89	128	208
Demand Flow Rate, veh/h	91	130	212
Vehicles Circulating, veh/h	163	33	23
Vehicles Exiting, veh/h	72	221	140
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	3.8	3.5	4.0
Approach LOS	A	A	A
Lane	Left	Left	Left
Designated Moves	LR	LT	TR
Assumed Moves	LR	LT	TR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	91	130	212
Cap Entry Lane, veh/h	1169	1334	1348
Entry HV Adj Factor	0.978	0.984	0.980
Flow Entry, veh/h	89	128	208
Cap Entry, veh/h	1143	1313	1321
V/C Ratio	0.078	0.097	0.157
Control Delay, s/veh	3.8	3.5	4.0
LOS	A	A	A
95th %tile Queue, veh	0	0	1

Queues

1: Concord Rd/West End Ave & Kingston Pike

10/27/2020



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	214	1327	163	889	240	311	636	385	304
v/c Ratio	0.60	1.05	0.44	0.58	0.79	1.08	1.06	1.02	0.91
Control Delay	15.7	60.7	26.2	27.9	77.3	126.5	80.8	111.0	75.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.7	60.7	26.2	27.9	77.3	126.5	80.8	111.0	75.3
Queue Length 50th (ft)	31	~651	75	283	109	~306	~409	~184	218
Queue Length 95th (ft)	m57	#795	147	364	#189	#498	#686	#289	#379
Internal Link Dist (ft)		746		717		568			373
Turn Bay Length (ft)	150		150		180		300	180	
Base Capacity (vph)	396	1264	371	1542	304	288	598	376	353
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	1.05	0.44	0.58	0.79	1.08	1.06	1.02	0.86

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: Concord Rd/West End Ave & Kingston Pike

10/27/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	197	1150	71	150	608	210	221	286	585	354	105	175
Future Volume (vph)	197	1150	71	150	608	210	221	286	585	354	105	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		6.5	6.5	6.5	6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	1.00	1.00	0.97	1.00	
Frt	1.00	0.99		1.00	0.96		1.00	1.00	0.85	1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3512		1687	3338		3433	1900	1599	3502	1705	
Flt Permitted	0.28	1.00		0.07	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	527	3512		129	3338		3433	1900	1599	3502	1705	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	214	1250	77	163	661	228	240	311	636	385	114	190
RTOR Reduction (vph)	0	3	0	0	25	0	0	0	53	0	45	0
Lane Group Flow (vph)	214	1324	0	163	864	0	240	311	583	385	259	0
Heavy Vehicles (%)	0%	2%	0%	7%	5%	1%	2%	0%	1%	0%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2			6					8			
Actuated Green, G (s)	61.1	48.5		80.5	61.4		12.0	20.5	46.0	14.5	23.0	
Effective Green, g (s)	61.1	48.5		80.5	61.4		12.0	20.5	46.0	14.5	23.0	
Actuated g/C Ratio	0.45	0.36		0.60	0.45		0.09	0.15	0.34	0.11	0.17	
Clearance Time (s)	6.5	6.5		6.5	6.5		6.5	6.5	6.5	6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	357	1261		371	1518		305	288	544	376	290	
v/s Ratio Prot	0.06	c0.38		0.08	0.26		0.07	c0.16	c0.20	c0.11	0.15	
v/s Ratio Perm	0.21			0.18					0.16			
v/c Ratio	0.60	1.05		0.44	0.57		0.79	1.08	1.07	1.02	0.89	
Uniform Delay, d1	23.2	43.2		27.9	27.1		60.2	57.2	44.5	60.2	54.8	
Progression Factor	0.70	0.55		1.00	1.00		0.99	0.99	0.96	1.00	1.00	
Incremental Delay, d2	1.9	35.8		0.8	1.6		11.9	74.3	57.8	52.7	27.4	
Delay (s)	18.1	59.5		28.7	28.6		71.3	130.7	100.5	112.9	82.2	
Level of Service	B	E		C	C		E	F	F	F	F	
Approach Delay (s)		53.7			28.6			102.5			99.3	
Approach LOS		D			C			F			F	
Intersection Summary												
HCM 2000 Control Delay			67.8			HCM 2000 Level of Service			E			
HCM 2000 Volume to Capacity ratio			1.06									
Actuated Cycle Length (s)			135.0			Sum of lost time (s)			26.0			
Intersection Capacity Utilization			96.6%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

3: S Campbell Station Rd/N Campbell Station Rd & Kingston Pike

10/27/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	542	1543	177	48	672	224	325	509	324	282	439
v/c Ratio	0.98	0.87	0.21	0.42	0.85	0.31	0.86	0.99	1.01	0.57	0.54
Control Delay	71.9	37.8	4.0	53.8	49.1	5.2	36.0	64.2	93.1	58.7	19.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.9	37.8	4.0	53.8	49.1	5.2	36.0	64.2	93.1	58.7	19.4
Queue Length 50th (ft)	424	640	5	19	251	2	54	238	~241	123	184
Queue Length 95th (ft)	#668	755	45	46	#342	0	#293	#357	#442	172	286
Internal Link Dist (ft)		673			937			607		627	
Turn Bay Length (ft)	300		350	160		350	150		300		325
Base Capacity (vph)	551	1765	837	114	792	727	384	513	320	498	814
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.98	0.87	0.21	0.42	0.85	0.31	0.85	0.99	1.01	0.57	0.54

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

3: S Campbell Station Rd/N Campbell Station Rd & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	499	1420	163	44	618	206	299	434	34	298	259	404
Future Volume (vph)	499	1420	163	44	618	206	299	434	34	298	259	404
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1736	3574	1524	1805	3505	1599	1719	3528		1752	3406	1553
Flt Permitted	0.15	1.00	1.00	0.15	1.00	1.00	0.47	1.00		0.20	1.00	1.00
Satd. Flow (perm)	272	3574	1524	283	3505	1599	856	3528		373	3406	1553
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	542	1543	177	48	672	224	325	472	37	324	282	439
RTOR Reduction (vph)	0	0	86	0	0	50	0	4	0	0	0	76
Lane Group Flow (vph)	542	1543	91	48	672	174	325	505	0	324	282	363
Heavy Vehicles (%)	4%	1%	6%	0%	3%	1%	5%	1%	4%	3%	6%	4%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6	7	3	8		7	4	5
Permitted Phases	2		2	6		6	8			4		4
Actuated Green, G (s)	65.4	65.4	65.4	30.5	30.5	51.0	39.7	19.5		40.3	19.8	58.3
Effective Green, g (s)	65.4	65.4	65.4	30.5	30.5	51.0	39.7	19.5		40.3	19.8	58.3
Actuated g/C Ratio	0.48	0.48	0.48	0.23	0.23	0.38	0.29	0.14		0.30	0.15	0.43
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	549	1731	738	104	791	681	380	509		320	499	745
v/s Ratio Prot	c0.28	0.43		0.01	c0.19	0.04	0.13	0.14		c0.15	0.08	0.14
v/s Ratio Perm	c0.20		0.06	0.09		0.07	0.12			c0.15		0.09
v/c Ratio	0.99	0.89	0.12	0.46	0.85	0.25	0.86	0.99		1.01	0.57	0.49
Uniform Delay, d1	38.9	31.6	19.1	51.9	50.1	28.9	41.9	57.7		42.0	53.6	27.6
Progression Factor	1.00	1.00	1.00	0.83	0.76	0.26	0.37	0.42		1.00	1.00	1.00
Incremental Delay, d2	34.8	7.4	0.3	3.1	10.7	0.2	16.6	37.4		53.5	4.6	0.5
Delay (s)	73.7	39.0	19.4	46.1	48.8	7.6	32.0	61.8		95.5	58.2	28.1
Level of Service	E	D	B	D	D	A	C	E		F	E	C
Approach Delay (s)		45.8			38.9			50.2			57.1	
Approach LOS		D			D			D			E	
Intersection Summary												
HCM 2000 Control Delay			47.6									
HCM 2000 Volume to Capacity ratio			0.98									
Actuated Cycle Length (s)			135.0									
Intersection Capacity Utilization			96.0%									
Analysis Period (min)			15									
c Critical Lane Group												

Queues

5: S Campbell Station Rd & Municipal Dr.

10/27/2020



Lane Group	EBL	SET	NWL	NWT
Lane Group Flow (vph)	118	459	45	752
v/c Ratio	0.63	0.17	0.06	0.27
Control Delay	64.6	1.3	0.4	0.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	64.6	1.3	0.4	0.6
Queue Length 50th (ft)	87	15	0	3
Queue Length 95th (ft)	147	24	1	4
Internal Link Dist (ft)	392	607		1164
Turn Bay Length (ft)			70	
Base Capacity (vph)	500	2734	746	2795
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.24	0.17	0.06	0.27
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

5: S Campbell Station Rd & Municipal Dr.

10/27/2020



Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	75	33	333	89	41	692
Future Volume (vph)	75	33	333	89	41	692
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5		6.5		6.5	6.5
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.96		0.97		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1761		3385		1805	3471
Flt Permitted	0.97		1.00		0.49	1.00
Satd. Flow (perm)	1761		3385		927	3471
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	36	362	97	45	752
RTOR Reduction (vph)	14	0	9	0	0	0
Lane Group Flow (vph)	104	0	450	0	45	752
Heavy Vehicles (%)	0%	0%	2%	8%	0%	4%
Turn Type	Prot		NA		Perm	NA
Protected Phases	4		6			2
Permitted Phases					2	
Actuated Green, G (s)	13.3		108.7		108.7	108.7
Effective Green, g (s)	13.3		108.7		108.7	108.7
Actuated g/C Ratio	0.10		0.81		0.81	0.81
Clearance Time (s)	6.5		6.5		6.5	6.5
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	173		2725		746	2794
v/s Ratio Prot	c0.06		0.13			c0.22
v/s Ratio Perm					0.05	
v/c Ratio	0.60		0.17		0.06	0.27
Uniform Delay, d1	58.3		3.0		2.7	3.3
Progression Factor	1.00		0.41		0.07	0.10
Incremental Delay, d2	5.5		0.1		0.1	0.2
Delay (s)	63.8		1.3		0.3	0.6
Level of Service	E		A		A	A
Approach Delay (s)	63.8		1.3			0.6
Approach LOS	E		A			A

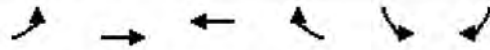
Intersection Summary

HCM 2000 Control Delay	6.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Queues

7: S Campbell Station Rd & Brooklawn St

10/27/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	14	365	825	122	42	9
v/c Ratio	0.03	0.15	0.34	0.08	0.12	0.03
Control Delay	2.4	2.3	1.0	0.1	45.8	22.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.4	2.3	1.0	0.1	45.8	22.1
Queue Length 50th (ft)	1	15	4	0	31	0
Queue Length 95th (ft)	3	20	13	m0	65	16
Internal Link Dist (ft)		1164	2181		270	
Turn Bay Length (ft)	175			125		200
Base Capacity (vph)	492	2459	2400	1539	354	324
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.15	0.34	0.08	0.12	0.03

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

7: S Campbell Station Rd & Brooklawn St

10/27/2020

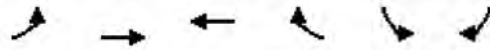


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	13	336	759	112	39	8
Future Volume (vph)	13	336	759	112	39	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	3406	3505	1615	1805	1615
Flt Permitted	0.29	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	547	3406	3505	1615	1805	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	365	825	122	42	9
RTOR Reduction (vph)	0	0	0	18	0	7
Lane Group Flow (vph)	14	365	825	104	42	2
Heavy Vehicles (%)	0%	6%	3%	0%	0%	0%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	97.5	97.5	88.5	115.0	26.5	26.5
Effective Green, g (s)	97.5	97.5	88.5	115.0	26.5	26.5
Actuated g/C Ratio	0.72	0.72	0.66	0.85	0.20	0.20
Clearance Time (s)	6.5	6.5	6.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	418	2459	2297	1375	354	317
v/s Ratio Prot	0.00	c0.11	c0.24	0.01	c0.02	
v/s Ratio Perm	0.02			0.05		0.00
v/c Ratio	0.03	0.15	0.36	0.08	0.12	0.01
Uniform Delay, d1	6.1	5.8	10.5	1.6	44.6	43.6
Progression Factor	0.42	0.37	0.08	0.00	1.00	1.00
Incremental Delay, d2	0.0	0.1	0.3	0.1	0.7	0.0
Delay (s)	2.6	2.3	1.1	0.1	45.3	43.7
Level of Service	A	A	A	A	D	D
Approach Delay (s)		2.3	1.0		45.0	
Approach LOS		A	A		D	
Intersection Summary						
HCM 2000 Control Delay			3.0		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.31			
Actuated Cycle Length (s)			135.0		Sum of lost time (s)	17.5
Intersection Capacity Utilization			34.3%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Queues

11: S Campbell Station Rd & Concord Rd

10/27/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	26	400	942	1200	273	51
v/c Ratio	0.16	0.26	0.72	0.78	0.16	0.06
Control Delay	15.9	13.2	41.3	5.1	19.7	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.9	13.2	41.3	5.1	19.7	4.9
Queue Length 50th (ft)	8	64	392	47	67	0
Queue Length 95th (ft)	20	85	476	91	94	23
Internal Link Dist (ft)		2181	561		478	
Turn Bay Length (ft)	160			225	300	250
Base Capacity (vph)	158	1510	1308	1534	1699	809
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.26	0.72	0.78	0.16	0.06
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

11: S Campbell Station Rd & Concord Rd

10/27/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	24	368	867	1104	251	47
Future Volume (vph)	24	368	867	1104	251	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1671	3610	3539	1599	3502	1615
Flt Permitted	0.15	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	268	3610	3539	1599	3502	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	400	942	1200	273	51
RTOR Reduction (vph)	0	0	0	126	0	26
Lane Group Flow (vph)	26	400	942	1074	273	25
Heavy Vehicles (%)	8%	0%	2%	1%	0%	0%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	56.5	56.5	47.3	112.8	65.5	65.5
Effective Green, g (s)	56.5	56.5	47.3	112.8	65.5	65.5
Actuated g/C Ratio	0.42	0.42	0.35	0.84	0.49	0.49
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	140	1510	1239	1413	1699	783
v/s Ratio Prot	0.00	c0.11	0.27	c0.37	0.08	
v/s Ratio Perm	0.07			0.30		0.02
v/c Ratio	0.19	0.26	0.76	0.76	0.16	0.03
Uniform Delay, d1	43.2	25.7	38.8	5.0	19.4	18.2
Progression Factor	0.50	0.50	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.4	4.4	3.9	0.2	0.1
Delay (s)	22.2	13.1	43.3	8.9	19.6	18.2
Level of Service	C	B	D	A	B	B
Approach Delay (s)		13.7	24.0		19.4	
Approach LOS		B	C		B	
Intersection Summary						
HCM 2000 Control Delay			22.0		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.80			
Actuated Cycle Length (s)			135.0		Sum of lost time (s)	19.5
Intersection Capacity Utilization			82.9%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

Queues

16: Concord Rd & Site Access

10/27/2020



Lane Group	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	1	14	9	14	46	1291	11	352	2
v/c Ratio	0.01	0.16	0.12	0.16	0.05	0.39	0.03	0.20	0.00
Control Delay	61.0	30.2	64.4	30.2	1.0	1.4	1.4	1.1	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.0	30.2	64.4	30.2	1.0	1.4	1.4	1.1	0.0
Queue Length 50th (ft)	1	0	8	0	3	67	1	26	0
Queue Length 95th (ft)	7	23	27	23	8	93	m2	m44	m0
Internal Link Dist (ft)	382		246			410		568	
Turn Bay Length (ft)		125		100	100		100		200
Base Capacity (vph)	288	257	250	257	971	3301	367	1748	1615
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	3	0	1	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.05	0.04	0.06	0.05	0.39	0.03	0.20	0.00

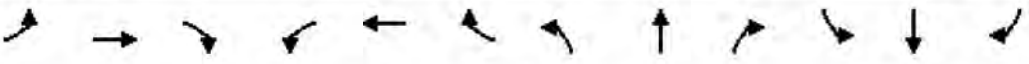
Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

16: Concord Rd & Site Access

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔	↔	↔		↔	↔	↔
Traffic Volume (vph)	0	1	13	6	2	13	42	1130	58	10	324	2
Future Volume (vph)	0	1	13	6	2	13	42	1130	58	10	324	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected		1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1900	1615		1829	1615	1805	3550		1805	1881	1615
Flt Permitted		1.00	1.00		0.87	1.00	0.55	1.00		0.21	1.00	1.00
Satd. Flow (perm)		1900	1615		1648	1615	1045	3550		395	1881	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1	14	7	2	14	46	1228	63	11	352	2
RTOR Reduction (vph)	0	0	14	0	0	14	0	1	0	0	0	0
Lane Group Flow (vph)	0	1	0	0	9	0	46	1290	0	11	352	2
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type		NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	custom
Protected Phases		4			8!			2			6	4!
Permitted Phases	4		4	8		8	2			6		6
Actuated Green, G (s)		4.1	4.1		4.1	4.1	121.9	121.9		121.9	121.9	126.0
Effective Green, g (s)		4.1	4.1		4.1	4.1	121.9	121.9		121.9	121.9	126.0
Actuated g/C Ratio		0.03	0.03		0.03	0.03	0.90	0.90		0.90	0.90	0.93
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		57	49		50	49	943	3205		356	1698	1615
v/s Ratio Prot		0.00						0.36			0.19	0.00
v/s Ratio Perm			0.00		0.01	0.00	0.04			0.03		0.00
v/c Ratio		0.02	0.01		0.18	0.01	0.05	0.40		0.03	0.21	0.00
Uniform Delay, d1		63.5	63.5		63.8	63.5	0.7	1.0		0.7	0.8	0.3
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.27	1.11	1.00
Incremental Delay, d2		0.1	0.1		1.7	0.1	0.1	0.4		0.1	0.2	0.0
Delay (s)		63.6	63.5		65.5	63.5	0.8	1.4		0.9	1.1	0.3
Level of Service		E	E		E	E	A	A		A	A	A
Approach Delay (s)		63.6			64.3			1.4			1.1	
Approach LOS		E			E			A			A	

Intersection Summary

HCM 2000 Control Delay	2.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		

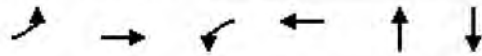
! Phase conflict between lane groups.

c Critical Lane Group

Queues

18: Kingston Pike & Lendon Welsch Way

10/27/2020



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	310	1574	15	1139	99	245
v/c Ratio	0.82	0.69	0.09	0.73	0.22	0.71
Control Delay	51.8	7.0	9.9	22.5	42.2	54.3
Queue Delay	0.0	0.3	0.0	0.0	0.0	0.0
Total Delay	51.8	7.3	9.9	22.5	42.2	54.3
Queue Length 50th (ft)	166	47	3	281	69	176
Queue Length 95th (ft)	257	296	m6	322	121	277
Internal Link Dist (ft)		449		746	93	431
Turn Bay Length (ft)	150		125			
Base Capacity (vph)	440	2279	159	1568	441	344
Starvation Cap Reductn	0	200	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.76	0.09	0.73	0.22	0.71

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

18: Kingston Pike & Lendon Welsch Way

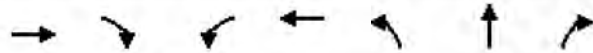
10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	285	1444	4	14	840	208	0	85	6	111	9	105
Future Volume (vph)	285	1444	4	14	840	208	0	85	6	111	9	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5			6.5			6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.97			0.99			0.94	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.98	
Satd. Flow (prot)	1687	3573		1805	3374			1882			1698	
Flt Permitted	0.12	1.00		0.11	1.00			1.00			0.79	
Satd. Flow (perm)	209	3573		215	3374			1882			1380	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	310	1570	4	15	913	226	0	92	7	121	10	114
RTOR Reduction (vph)	0	0	0	0	15	0	0	2	0	0	23	0
Lane Group Flow (vph)	310	1574	0	15	1124	0	0	97	0	0	222	0
Heavy Vehicles (%)	7%	1%	0%	0%	4%	3%	0%	0%	0%	1%	0%	4%
Turn Type	pm+pt	NA		pm+pt	NA			NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	90.5	82.2		64.0	62.2			31.5			31.5	
Effective Green, g (s)	90.5	82.2		64.0	62.2			31.5			31.5	
Actuated g/C Ratio	0.67	0.61		0.47	0.46			0.23			0.23	
Clearance Time (s)	6.5	6.5		6.5	6.5			6.5			6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	378	2175		123	1554			439			322	
v/s Ratio Prot	c0.13	0.44		0.00	0.33			0.05				
v/s Ratio Perm	c0.42			0.06							c0.16	
v/c Ratio	0.82	0.72		0.12	0.72			0.22			0.69	
Uniform Delay, d1	30.4	18.5		20.2	29.4			41.8			47.3	
Progression Factor	1.56	0.34		0.82	0.67			1.00			1.00	
Incremental Delay, d2	10.2	1.6		0.3	2.3			1.2			6.0	
Delay (s)	57.7	7.8		16.8	22.0			43.0			53.3	
Level of Service	E	A		B	C			D			D	
Approach Delay (s)		16.0			22.0			43.0			53.3	
Approach LOS		B			C			D			D	
Intersection Summary												
HCM 2000 Control Delay	21.5			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.80											
Actuated Cycle Length (s)	135.0			Sum of lost time (s)			19.5					
Intersection Capacity Utilization	81.6%			ICU Level of Service			D					
Analysis Period (min)	15											
c Critical Lane Group												

Queues

22: Brooklawn St & Kingston Pike

10/27/2020



Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR
Lane Group Flow (vph)	1757	27	112	904	29	29	154
v/c Ratio	0.68	0.02	0.60	0.31	0.30	0.30	0.49
Control Delay	4.3	0.0	26.1	1.5	67.8	67.8	8.1
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Total Delay	4.3	0.0	26.1	1.6	67.8	67.8	8.1
Queue Length 50th (ft)	151	0	26	44	26	26	0
Queue Length 95th (ft)	m206	m0	m61	47	61	61	33
Internal Link Dist (ft)	937			449		417	
Turn Bay Length (ft)		100	125		200		200
Base Capacity (vph)	2595	1259	188	2884	235	235	317
Starvation Cap Reductn	0	0	0	681	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.02	0.60	0.41	0.12	0.12	0.49

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

22: Brooklawn St & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1616	25	103	828	4	53	0	142	0	0	0
Future Volume (vph)	0	1616	25	103	828	4	53	0	142	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5	6.5	6.5		6.5	6.5	6.5			
Lane Util. Factor		0.95	1.00	1.00	0.95		0.95	0.95	1.00			
Frt		1.00	0.85	1.00	1.00		1.00	1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00		0.95	0.95	1.00			
Satd. Flow (prot)		3539	1615	1805	3499		1715	1715	1599			
Flt Permitted		1.00	1.00	0.09	1.00		0.95	0.95	1.00			
Satd. Flow (perm)		3539	1615	164	3499		1715	1715	1599			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1757	27	112	900	4	58	0	154	0	0	0
RTOR Reduction (vph)	0	0	7	0	0	0	0	0	141	0	0	0
Lane Group Flow (vph)	0	1757	20	112	904	0	29	29	13	0	0	0
Heavy Vehicles (%)	0%	2%	0%	0%	3%	25%	0%	0%	1%	0%	0%	0%
Turn Type	pm+pt	NA	custom	pm+pt	NA		Split	NA	pm+ov			
Protected Phases	5	2	3	1	6		8	8	1	4	4	
Permitted Phases	2		2	6					8			
Actuated Green, G (s)		95.1	97.8	106.1	106.1		6.7	6.7	11.2			
Effective Green, g (s)		95.1	97.8	106.1	106.1		6.7	6.7	11.2			
Actuated g/C Ratio		0.70	0.72	0.79	0.79		0.05	0.05	0.08			
Clearance Time (s)		6.5	6.5	6.5	6.5		6.5	6.5	6.5			
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0	3.0			
Lane Grp Cap (vph)		2493	1169	183	2749		85	85	132			
v/s Ratio Prot		c0.50	c0.00	c0.02	0.26		c0.02	0.02	0.00			
v/s Ratio Perm			0.01	0.46					0.00			
v/c Ratio		0.70	0.02	0.61	0.33		0.34	0.34	0.10			
Uniform Delay, d1		11.7	5.2	27.7	4.2		62.0	62.0	57.2			
Progression Factor		0.32	1.00	0.90	0.32		1.00	1.00	1.00			
Incremental Delay, d2		0.7	0.0	4.0	0.2		2.4	2.4	0.3			
Delay (s)		4.5	5.2	29.0	1.5		64.4	64.4	57.5			
Level of Service		A	A	C	A		E	E	E			
Approach Delay (s)		4.5			4.6			59.4			0.0	
Approach LOS		A			A			E			A	
Intersection Summary												
HCM 2000 Control Delay			8.4			HCM 2000 Level of Service			A			
HCM 2000 Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			135.0			Sum of lost time (s)			32.5			
Intersection Capacity Utilization			70.8%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

1: Concord Rd/West End Ave & Kingston Pike

10/27/2020



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	214	1327	163	889	240	311	636	385	304
v/c Ratio	0.68	0.93	0.84	0.68	0.59	0.93	0.81	0.90	0.85
Control Delay	25.9	30.1	61.5	32.5	56.4	80.8	27.9	77.3	59.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.9	30.1	61.5	32.5	56.4	80.8	27.9	77.3	59.0
Queue Length 50th (ft)	53	371	78	287	93	240	151	154	182
Queue Length 95th (ft)	m101	#650	#203	366	#160	#411	206	#244	#286
Internal Link Dist (ft)		746		717		568			373
Turn Bay Length (ft)	150		150		180		300	180	
Base Capacity (vph)	338	1425	194	1312	406	340	789	426	411
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.93	0.84	0.68	0.59	0.91	0.81	0.90	0.74

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: Concord Rd/West End Ave & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	197	1150	71	150	608	210	221	286	585	354	105	175
Future Volume (vph)	197	1150	71	150	608	210	221	286	585	354	105	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		6.5	6.5	6.5	6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	1.00	0.88	0.97	1.00	
Frt	1.00	0.99		1.00	0.96		1.00	1.00	0.85	1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3512		1687	3338		3433	1900	2814	3502	1705	
Flt Permitted	0.18	1.00		0.09	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	335	3512		154	3338		3433	1900	2814	3502	1705	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	214	1250	77	163	661	228	240	311	636	385	114	190
RTOR Reduction (vph)	0	4	0	0	28	0	0	0	68	0	52	0
Lane Group Flow (vph)	214	1323	0	163	861	0	240	311	568	385	252	0
Heavy Vehicles (%)	0%	2%	0%	7%	5%	1%	2%	0%	1%	0%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2			6					8			
Actuated Green, G (s)	60.6	48.6		55.8	46.2		14.2	21.2	30.8	14.6	21.6	
Effective Green, g (s)	60.6	48.6		55.8	46.2		14.2	21.2	30.8	14.6	21.6	
Actuated g/C Ratio	0.51	0.41		0.46	0.39		0.12	0.18	0.26	0.12	0.18	
Clearance Time (s)	6.5	6.5		6.5	6.5		6.5	6.5	6.5	6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	316	1422		194	1285		406	335	722	426	306	
v/s Ratio Prot	c0.07	c0.38		0.07	0.26		0.07	c0.16	0.06	c0.11	0.15	
v/s Ratio Perm	0.27			0.32					0.14			
v/c Ratio	0.68	0.93		0.84	0.67		0.59	0.93	0.79	0.90	0.82	
Uniform Delay, d1	19.7	34.1		27.7	30.6		50.1	48.7	41.5	52.0	47.4	
Progression Factor	1.19	0.59		1.00	1.00		0.98	0.98	0.95	1.00	1.00	
Incremental Delay, d2	4.0	9.3		26.5	2.8		2.2	29.6	5.3	22.1	16.3	
Delay (s)	27.5	29.2		54.2	33.4		51.3	77.2	44.7	74.1	63.7	
Level of Service	C	C		D	C		D	E	D	E	E	
Approach Delay (s)		29.0			36.6			54.6			69.5	
Approach LOS		C			D			D			E	
Intersection Summary												
HCM 2000 Control Delay			43.8			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			26.0			
Intersection Capacity Utilization			89.2%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

3: S Campbell Station Rd/N Campbell Station Rd & Kingston Pike

10/27/2020

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	542	1543	177	48	672	224	325	509	324	282	439
v/c Ratio	0.68	0.84	0.20	0.37	0.50	0.25	0.56	0.88	0.78	0.51	0.66
Control Delay	22.2	30.9	2.9	39.2	24.9	2.9	15.8	37.8	46.9	49.6	24.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.2	30.9	2.9	39.2	24.9	2.9	15.8	37.8	46.9	49.6	24.9
Queue Length 50th (ft)	126	541	0	18	128	0	22	166	99	106	187
Queue Length 95th (ft)	165	651	36	37	160	0	49	#282	#148	152	283
Internal Link Dist (ft)		673			937			607		627	
Turn Bay Length (ft)	300		350	160		350	150		300		325
Base Capacity (vph)	914	1837	869	130	1340	881	579	578	416	553	728
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.84	0.20	0.37	0.50	0.25	0.56	0.88	0.78	0.51	0.60

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

3: S Campbell Station Rd/N Campbell Station Rd & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	499	1420	163	44	618	206	299	434	34	298	259	404
Future Volume (vph)	499	1420	163	44	618	206	299	434	34	298	259	404
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95		0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3367	3574	1524	1805	3505	1599	3335	3528		3400	3406	1553
Flt Permitted	0.23	1.00	1.00	0.10	1.00	1.00	0.50	1.00		0.21	1.00	1.00
Satd. Flow (perm)	803	3574	1524	182	3505	1599	1768	3528		734	3406	1553
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	542	1543	177	48	672	224	325	472	37	324	282	439
RTOR Reduction (vph)	0	0	88	0	0	48	0	5	0	0	0	103
Lane Group Flow (vph)	542	1543	89	48	672	176	325	504	0	324	282	336
Heavy Vehicles (%)	4%	1%	6%	0%	3%	1%	5%	1%	4%	3%	6%	4%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6	7	3	8		7	4	5
Permitted Phases	2		2	6		6	8			4		4
Actuated Green, G (s)	60.4	60.4	60.4	45.9	45.9	56.4	30.0	19.5		30.0	19.5	37.6
Effective Green, g (s)	60.4	60.4	60.4	45.9	45.9	56.4	30.0	19.5		30.0	19.5	37.6
Actuated g/C Ratio	0.50	0.50	0.50	0.38	0.38	0.47	0.25	0.16		0.25	0.16	0.31
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	790	1798	767	118	1340	838	579	573		416	553	570
v/s Ratio Prot	0.10	c0.43		0.01	c0.19	0.02	0.05	c0.14		c0.07	0.08	0.09
v/s Ratio Perm	0.24		0.06	0.14		0.09	0.09			0.13		0.13
v/c Ratio	0.69	0.86	0.12	0.41	0.50	0.21	0.56	0.88		0.78	0.51	0.59
Uniform Delay, d1	19.9	26.1	15.7	41.6	28.3	18.7	37.4	49.1		37.9	45.9	34.7
Progression Factor	1.00	1.00	1.00	0.82	0.80	0.22	0.36	0.40		1.00	1.00	1.00
Incremental Delay, d2	2.5	5.6	0.3	2.2	1.3	0.1	1.2	17.0		8.9	3.3	1.6
Delay (s)	22.4	31.6	16.0	36.3	24.1	4.3	14.8	36.6		46.9	49.2	36.3
Level of Service	C	C	B	D	C	A	B	D		D	D	D
Approach Delay (s)		28.2			20.0			28.1			43.0	
Approach LOS		C			B			C			D	
Intersection Summary												
HCM 2000 Control Delay	29.7			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.85											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			26.0					
Intersection Capacity Utilization	86.2%			ICU Level of Service			E					
Analysis Period (min)	15											
c Critical Lane Group												

Queues

5: S Campbell Station Rd & Municipal Dr.

10/27/2020



Lane Group	EBL	SET	NWL	NWT
Lane Group Flow (vph)	118	459	45	752
v/c Ratio	0.60	0.17	0.06	0.27
Control Delay	55.6	1.6	0.5	0.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	55.6	1.6	0.5	0.9
Queue Length 50th (ft)	75	19	0	3
Queue Length 95th (ft)	132	25	1	4
Internal Link Dist (ft)	392	607		1164
Turn Bay Length (ft)			70	
Base Capacity (vph)	518	2681	731	2739
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.23	0.17	0.06	0.27
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

5: S Campbell Station Rd & Municipal Dr.

10/27/2020

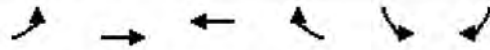


Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	75	33	333	89	41	692
Future Volume (vph)	75	33	333	89	41	692
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5		6.5		6.5	6.5
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.96		0.97		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1761		3385		1805	3471
Flt Permitted	0.97		1.00		0.49	1.00
Satd. Flow (perm)	1761		3385		927	3471
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	36	362	97	45	752
RTOR Reduction (vph)	16	0	11	0	0	0
Lane Group Flow (vph)	102	0	448	0	45	752
Heavy Vehicles (%)	0%	0%	2%	8%	0%	4%
Turn Type	Prot		NA		Perm	NA
Protected Phases	4		6			2
Permitted Phases					2	
Actuated Green, G (s)	12.3		94.7		94.7	94.7
Effective Green, g (s)	12.3		94.7		94.7	94.7
Actuated g/C Ratio	0.10		0.79		0.79	0.79
Clearance Time (s)	6.5		6.5		6.5	6.5
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	180		2671		731	2739
v/s Ratio Prot	c0.06		0.13			c0.22
v/s Ratio Perm					0.05	
v/c Ratio	0.57		0.17		0.06	0.27
Uniform Delay, d1	51.3		3.1		2.8	3.4
Progression Factor	1.00		0.49		0.11	0.19
Incremental Delay, d2	4.0		0.1		0.2	0.2
Delay (s)	55.3		1.6		0.5	0.9
Level of Service	E		A		A	A
Approach Delay (s)	55.3		1.6			0.9
Approach LOS	E		A			A
Intersection Summary						
HCM 2000 Control Delay			5.8		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.31			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	13.0
Intersection Capacity Utilization			38.6%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Queues

7: S Campbell Station Rd & Brooklawn St

10/27/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	14	365	825	122	42	9
v/c Ratio	0.03	0.15	0.36	0.08	0.11	0.03
Control Delay	4.9	4.5	1.3	0.1	40.0	20.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.9	4.5	1.3	0.1	40.0	20.4
Queue Length 50th (ft)	1	16	4	0	27	0
Queue Length 95th (ft)	7	42	12	m0	59	14
Internal Link Dist (ft)		1164	2181		270	
Turn Bay Length (ft)	175			125		200
Base Capacity (vph)	477	2398	2321	1530	368	336
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.15	0.36	0.08	0.11	0.03

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

7: S Campbell Station Rd & Brooklawn St

10/27/2020

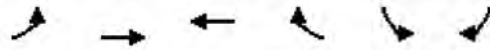


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	13	336	759	112	39	8
Future Volume (vph)	13	336	759	112	39	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	3406	3505	1615	1805	1615
Flt Permitted	0.28	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	536	3406	3505	1615	1805	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	365	825	122	42	9
RTOR Reduction (vph)	0	0	0	20	0	7
Lane Group Flow (vph)	14	365	825	102	42	2
Heavy Vehicles (%)	0%	6%	3%	0%	0%	0%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	84.5	84.5	75.6	100.1	24.5	24.5
Effective Green, g (s)	84.5	84.5	75.6	100.1	24.5	24.5
Actuated g/C Ratio	0.70	0.70	0.63	0.83	0.20	0.20
Clearance Time (s)	6.5	6.5	6.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	402	2398	2208	1347	368	329
v/s Ratio Prot	0.00	c0.11	c0.24	0.02	c0.02	
v/s Ratio Perm	0.02			0.05		0.00
v/c Ratio	0.03	0.15	0.37	0.08	0.11	0.01
Uniform Delay, d1	6.1	5.9	10.7	1.8	38.9	38.0
Progression Factor	0.90	0.75	0.10	0.00	1.00	1.00
Incremental Delay, d2	0.0	0.1	0.3	0.1	0.6	0.0
Delay (s)	5.6	4.5	1.4	0.1	39.5	38.1
Level of Service	A	A	A	A	D	D
Approach Delay (s)		4.6	1.3		39.3	
Approach LOS		A	A		D	
Intersection Summary						
HCM 2000 Control Delay			3.6		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.31			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	17.5
Intersection Capacity Utilization			34.3%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Queues

11: S Campbell Station Rd & Concord Rd

10/27/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	26	400	942	1200	273	51
v/c Ratio	0.16	0.26	0.73	0.79	0.17	0.06
Control Delay	13.3	11.4	37.9	5.4	18.6	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.3	11.4	37.9	5.4	18.6	5.0
Queue Length 50th (ft)	5	44	349	45	60	0
Queue Length 95th (ft)	15	63	432	94	87	22
Internal Link Dist (ft)		2181	561		478	
Turn Bay Length (ft)	160			225	300	250
Base Capacity (vph)	167	1519	1294	1528	1648	787
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.26	0.73	0.79	0.17	0.06
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

11: S Campbell Station Rd & Concord Rd

10/27/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	24	368	867	1104	251	47
Future Volume (vph)	24	368	867	1104	251	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1671	3610	3539	1599	3502	1615
Flt Permitted	0.15	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	272	3610	3539	1599	3502	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	400	942	1200	273	51
RTOR Reduction (vph)	0	0	0	145	0	27
Lane Group Flow (vph)	26	400	942	1055	273	24
Heavy Vehicles (%)	8%	0%	2%	1%	0%	0%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	50.5	50.5	41.3	97.8	56.5	56.5
Effective Green, g (s)	50.5	50.5	41.3	97.8	56.5	56.5
Actuated g/C Ratio	0.42	0.42	0.34	0.81	0.47	0.47
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	145	1519	1218	1389	1648	760
v/s Ratio Prot	0.00	c0.11	0.27	c0.36	0.08	
v/s Ratio Perm	0.07			0.30		0.01
v/c Ratio	0.18	0.26	0.77	0.76	0.17	0.03
Uniform Delay, d1	37.8	22.6	35.2	5.4	18.2	17.1
Progression Factor	0.47	0.48	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.4	4.8	3.9	0.2	0.1
Delay (s)	18.3	11.3	40.0	9.3	18.4	17.1
Level of Service	B	B	D	A	B	B
Approach Delay (s)		11.7	22.8		18.2	
Approach LOS		B	C		B	
Intersection Summary						
HCM 2000 Control Delay			20.7		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.80			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	19.5
Intersection Capacity Utilization			82.9%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

Queues

16: Concord Rd & Site Access

10/27/2020



Lane Group	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	1	14	9	14	46	1291	11	352	2
v/c Ratio	0.01	0.14	0.11	0.14	0.05	0.39	0.03	0.20	0.00
Control Delay	53.0	27.3	56.4	27.3	1.1	1.5	0.2	0.2	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.0	27.3	56.4	27.3	1.1	1.5	0.2	0.2	0.0
Queue Length 50th (ft)	1	0	7	0	3	66	0	2	0
Queue Length 95th (ft)	7	22	24	22	8	93	m0	m2	m0
Internal Link Dist (ft)	382		246			410		568	
Turn Bay Length (ft)		125		100	100		100		200
Base Capacity (vph)	324	287	281	287	962	3272	362	1732	1615
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.05	0.03	0.05	0.05	0.39	0.03	0.20	0.00

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

16: Concord Rd & Site Access

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1	13	6	2	13	42	1130	58	10	324	2
Future Volume (vph)	0	1	13	6	2	13	42	1130	58	10	324	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected		1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1900	1615		1829	1615	1805	3550		1805	1881	1615
Flt Permitted		1.00	1.00		0.87	1.00	0.55	1.00		0.21	1.00	1.00
Satd. Flow (perm)		1900	1615		1648	1615	1045	3550		394	1881	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1	14	7	2	14	46	1228	63	11	352	2
RTOR Reduction (vph)	0	0	14	0	0	14	0	1	0	0	0	0
Lane Group Flow (vph)	0	1	0	0	9	0	46	1290	0	11	352	2
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type		NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	custom
Protected Phases		4			8!			2			6	4!
Permitted Phases	4		4	8		8	2			6		6
Actuated Green, G (s)		4.1	4.1		4.1	4.1	106.9	106.9		106.9	106.9	111.0
Effective Green, g (s)		4.1	4.1		4.1	4.1	106.9	106.9		106.9	106.9	111.0
Actuated g/C Ratio		0.03	0.03		0.03	0.03	0.89	0.89		0.89	0.89	0.92
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		64	55		56	55	930	3162		350	1675	1615
v/s Ratio Prot		0.00						c0.36			0.19	0.00
v/s Ratio Perm			0.00		c0.01	0.00	0.04			0.03		0.00
v/c Ratio		0.02	0.01		0.16	0.01	0.05	0.41		0.03	0.21	0.00
Uniform Delay, d1		56.0	56.0		56.3	56.0	0.7	1.1		0.7	0.9	0.3
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		0.08	0.09	1.00
Incremental Delay, d2		0.1	0.1		1.3	0.1	0.1	0.4		0.1	0.2	0.0
Delay (s)		56.1	56.0		57.6	56.0	0.8	1.5		0.2	0.2	0.3
Level of Service		E	E		E	E	A	A		A	A	A
Approach Delay (s)		56.1			56.7			1.5			0.2	
Approach LOS		E			E			A			A	

Intersection Summary

HCM 2000 Control Delay	2.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		

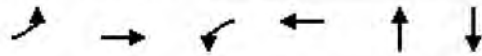
! Phase conflict between lane groups.

c Critical Lane Group

Queues

18: Kingston Pike & Lendon Welsch Way

10/27/2020



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	310	1574	15	1139	99	245
v/c Ratio	0.82	0.69	0.09	0.73	0.24	0.74
Control Delay	46.1	6.2	9.9	21.9	39.1	52.1
Queue Delay	0.0	0.3	0.0	0.0	0.0	0.0
Total Delay	46.1	6.5	9.9	21.9	39.1	52.1
Queue Length 50th (ft)	127	60	3	241	62	154
Queue Length 95th (ft)	216	106	m5	327	111	#271
Internal Link Dist (ft)		449		746	93	431
Turn Bay Length (ft)	150		125			
Base Capacity (vph)	429	2266	164	1555	417	331
Starvation Cap Reductn	0	181	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.75	0.09	0.73	0.24	0.74

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

18: Kingston Pike & Lendon Welsch Way

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	285	1444	4	14	840	208	0	85	6	111	9	105
Future Volume (vph)	285	1444	4	14	840	208	0	85	6	111	9	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5			6.5			6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.97			0.99			0.94	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.98	
Satd. Flow (prot)	1687	3573		1805	3374			1882			1698	
Flt Permitted	0.12	1.00		0.11	1.00			1.00			0.79	
Satd. Flow (perm)	207	3573		212	3374			1882			1380	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	310	1570	4	15	913	226	0	92	7	121	10	114
RTOR Reduction (vph)	0	0	0	0	17	0	0	2	0	0	26	0
Lane Group Flow (vph)	310	1574	0	15	1122	0	0	97	0	0	219	0
Heavy Vehicles (%)	7%	1%	0%	0%	4%	3%	0%	0%	0%	1%	0%	4%
Turn Type	pm+pt	NA		pm+pt	NA			NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	80.5	72.2		56.5	54.7			26.5			26.5	
Effective Green, g (s)	80.5	72.2		56.5	54.7			26.5			26.5	
Actuated g/C Ratio	0.67	0.60		0.47	0.46			0.22			0.22	
Clearance Time (s)	6.5	6.5		6.5	6.5			6.5			6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	376	2149		123	1537			415			304	
v/s Ratio Prot	c0.13	0.44		0.00	0.33			0.05				
v/s Ratio Perm	c0.42			0.06							c0.16	
v/c Ratio	0.82	0.73		0.12	0.73			0.23			0.72	
Uniform Delay, d1	27.3	17.0		18.2	26.6			38.4			43.3	
Progression Factor	1.48	0.32		0.93	0.72			1.00			1.00	
Incremental Delay, d2	10.2	1.6		0.3	2.4			1.3			7.9	
Delay (s)	50.6	7.1		17.3	21.6			39.7			51.2	
Level of Service	D	A		B	C			D			D	
Approach Delay (s)		14.2			21.6			39.7			51.2	
Approach LOS		B			C			D			D	
Intersection Summary												
HCM 2000 Control Delay	20.2			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.82											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			19.5					
Intersection Capacity Utilization	81.6%			ICU Level of Service			D					
Analysis Period (min)	15											
c Critical Lane Group												

Queues

22: Brooklawn St & Kingston Pike

10/27/2020



Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR
Lane Group Flow (vph)	1757	27	112	904	29	29	154
v/c Ratio	0.71	0.02	0.62	0.32	0.27	0.27	0.44
Control Delay	7.3	0.0	25.6	1.5	59.1	59.1	5.4
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Total Delay	7.3	0.0	25.6	1.6	59.1	59.1	5.4
Queue Length 50th (ft)	178	0	22	40	23	23	0
Queue Length 95th (ft)	286	m0	m56	47	55	55	17
Internal Link Dist (ft)	937			449		417	
Turn Bay Length (ft)		100	125		200		200
Base Capacity (vph)	2484	1222	180	2814	264	264	350
Starvation Cap Reductn	0	0	0	489	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.02	0.62	0.39	0.11	0.11	0.44

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

22: Brooklawn St & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1616	25	103	828	4	53	0	142	0	0	0
Future Volume (vph)	0	1616	25	103	828	4	53	0	142	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5	6.5	6.5		6.5	6.5	6.5			
Lane Util. Factor		0.95	1.00	1.00	0.95		0.95	0.95	1.00			
Frt		1.00	0.85	1.00	1.00		1.00	1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00		0.95	0.95	1.00			
Satd. Flow (prot)		3539	1615	1805	3499		1715	1715	1599			
Flt Permitted		1.00	1.00	0.08	1.00		0.95	0.95	1.00			
Satd. Flow (perm)		3539	1615	150	3499		1715	1715	1599			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1757	27	112	900	4	58	0	154	0	0	0
RTOR Reduction (vph)	0	0	8	0	0	0	0	0	140	0	0	0
Lane Group Flow (vph)	0	1757	19	112	904	0	29	29	14	0	0	0
Heavy Vehicles (%)	0%	2%	0%	0%	3%	25%	0%	0%	1%	0%	0%	0%
Turn Type	pm+pt	NA	custom	pm+pt	NA		Split	NA	pm+ov			
Protected Phases	5	2	3	1	6		8	8	1	4	4	
Permitted Phases	2		2	6					8			
Actuated Green, G (s)		80.3	83.0	91.3	91.3		6.5	6.5	11.0			
Effective Green, g (s)		80.3	83.0	91.3	91.3		6.5	6.5	11.0			
Actuated g/C Ratio		0.67	0.69	0.76	0.76		0.05	0.05	0.09			
Clearance Time (s)		6.5	6.5	6.5	6.5		6.5	6.5	6.5			
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0	3.0			
Lane Grp Cap (vph)		2368	1117	176	2662		92	92	146			
v/s Ratio Prot		c0.50	c0.00	c0.02	0.26		c0.02	0.02	0.00			
v/s Ratio Perm			0.01	0.46					0.01			
v/c Ratio		0.74	0.02	0.64	0.34		0.32	0.32	0.10			
Uniform Delay, d1		13.0	5.8	30.7	4.6		54.6	54.6	49.9			
Progression Factor		0.49	1.00	0.68	0.29		1.00	1.00	1.00			
Incremental Delay, d2		1.1	0.0	4.9	0.2		2.0	2.0	0.3			
Delay (s)		7.6	5.8	25.9	1.6		56.6	56.6	50.2			
Level of Service		A	A	C	A		E	E	D			
Approach Delay (s)		7.6			4.3			52.0			0.0	
Approach LOS		A			A			D			A	
Intersection Summary												
HCM 2000 Control Delay			9.6			HCM 2000 Level of Service			A			
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			32.5			
Intersection Capacity Utilization			70.8%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

1: Concord Rd/West End Ave & Kingston Pike

10/27/2020



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	50	1218	502	1671	153	78	348	126	152
v/c Ratio	0.37	0.96	0.97	0.79	0.64	0.51	0.61	0.31	0.70
Control Delay	21.2	36.0	69.7	24.3	69.3	64.8	21.8	57.0	60.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.2	36.0	69.7	24.3	69.3	64.8	21.8	57.0	60.2
Queue Length 50th (ft)	10	352	369	574	64	55	70	51	97
Queue Length 95th (ft)	m25	#675	#598	684	#137	95	122	87	167
Internal Link Dist (ft)		746		717		568			373
Turn Bay Length (ft)	150		150		180		300	180	
Base Capacity (vph)	135	1266	519	2112	239	259	569	401	277
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	1	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.96	0.97	0.79	0.64	0.30	0.61	0.31	0.55

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: Concord Rd/West End Ave & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	1073	48	462	1446	91	141	72	320	116	68	72
Future Volume (vph)	46	1073	48	462	1446	91	141	72	320	116	68	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		6.5	6.5	6.5	6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	1.00	1.00	0.97	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	1.00	0.85	1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3499		1770	3508		3335	1827	1538	3502	1745	
Flt Permitted	0.10	1.00		0.08	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	183	3499		143	3508		3335	1827	1538	3502	1745	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	1166	52	502	1572	99	153	78	348	126	74	78
RTOR Reduction (vph)	0	3	0	0	3	0	0	0	56	0	30	0
Lane Group Flow (vph)	50	1215	0	502	1668	0	153	78	292	126	122	0
Heavy Vehicles (%)	0%	2%	14%	2%	2%	2%	5%	4%	5%	0%	1%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2			6					8			
Actuated Green, G (s)	49.5	45.6		86.0	75.6		10.6	9.6	43.5	14.9	13.9	
Effective Green, g (s)	49.5	45.6		86.0	75.6		10.6	9.6	43.5	14.9	13.9	
Actuated g/C Ratio	0.38	0.35		0.66	0.58		0.08	0.07	0.33	0.11	0.11	
Clearance Time (s)	6.5	6.5		6.5	6.5		6.5	6.5	6.5	6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	118	1227		518	2040		271	134	514	401	186	
v/s Ratio Prot	0.01	0.35		c0.25	0.48		c0.05	0.04	0.15	c0.04	c0.07	
v/s Ratio Perm	0.15			c0.39					0.04			
v/c Ratio	0.42	0.99		0.97	0.82		0.56	0.58	0.57	0.31	0.65	
Uniform Delay, d1	26.8	42.0		40.2	21.7		57.5	58.3	35.5	52.9	55.7	
Progression Factor	0.91	0.45		1.00	1.00		0.96	0.95	0.91	1.00	1.00	
Incremental Delay, d2	2.1	21.6		31.3	3.8		2.7	6.2	1.4	0.5	8.0	
Delay (s)	26.4	40.5		71.6	25.5		57.9	61.5	33.8	53.3	63.7	
Level of Service	C	D		E	C		E	E	C	D	E	
Approach Delay (s)		39.9			36.1			43.9			59.0	
Approach LOS		D			D			D			E	
Intersection Summary												
HCM 2000 Control Delay		39.8			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.91										
Actuated Cycle Length (s)		130.0			Sum of lost time (s)			26.0				
Intersection Capacity Utilization		90.5%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

3: S Campbell Station Rd/N Campbell Station Rd & Kingston Pike

10/27/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	487	991	408	93	1339	486	375	514	418	699	701
v/c Ratio	1.29	0.60	0.43	0.39	1.13	0.64	1.40	0.88	1.56	1.19	0.99
Control Delay	183.1	27.7	3.3	22.7	95.2	12.8	224.1	38.2	305.7	149.8	62.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	183.1	27.7	3.3	22.7	95.2	12.8	224.1	38.2	305.7	149.8	62.4
Queue Length 50th (ft)	~474	319	0	37	~681	86	~354	195	~497	~374	499
Queue Length 95th (ft)	#693	389	56	m41	#814	336	#547	#302	#703	#500	#772
Internal Link Dist (ft)		673			937			607		627	
Turn Bay Length (ft)	300		350	160		350	150		300		325
Base Capacity (vph)	377	1646	954	241	1184	764	268	583	268	585	710
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.29	0.60	0.43	0.39	1.13	0.64	1.40	0.88	1.56	1.19	0.99

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

3: S Campbell Station Rd/N Campbell Station Rd & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	448	912	375	86	1232	447	345	404	69	385	643	645
Future Volume (vph)	448	912	375	86	1232	447	345	404	69	385	643	645
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3462		1770	3539	1583
Flt Permitted	0.11	1.00	1.00	0.29	1.00	1.00	0.67	1.00		0.67	1.00	1.00
Satd. Flow (perm)	201	3539	1583	539	3539	1583	1242	3462		1242	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	487	991	408	93	1339	486	375	439	75	418	699	701
RTOR Reduction (vph)	0	0	218	0	0	46	0	11	0	0	0	90
Lane Group Flow (vph)	487	991	190	93	1339	440	375	503	0	418	699	611
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6	7	3	8		7	4	5
Permitted Phases	2		2	6		6	8			4		4
Actuated Green, G (s)	60.5	60.5	60.5	43.5	43.5	59.0	21.5	21.5		21.5	21.5	45.0
Effective Green, g (s)	60.5	60.5	60.5	43.5	43.5	59.0	21.5	21.5		21.5	21.5	45.0
Actuated g/C Ratio	0.47	0.47	0.47	0.33	0.33	0.45	0.17	0.17		0.17	0.17	0.35
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	377	1646	736	241	1184	718	268	572		268	585	627
v/s Ratio Prot	c0.23	0.28		0.02	c0.38	0.07	c0.17	0.15		c0.19	0.20	0.18
v/s Ratio Perm	c0.37		0.12	0.11		0.20	0.06			c0.07		0.21
v/c Ratio	1.29	0.60	0.26	0.39	1.13	0.61	1.40	0.88		1.56	1.19	0.97
Uniform Delay, d1	40.6	25.8	21.1	34.8	43.2	26.9	53.7	53.0		53.0	54.2	41.9
Progression Factor	1.00	1.00	1.00	0.53	0.64	0.82	0.42	0.39		1.00	1.00	1.00
Incremental Delay, d2	149.8	1.6	0.8	0.7	67.1	1.1	200.2	17.0		269.4	103.7	29.3
Delay (s)	190.4	27.4	22.0	19.1	94.9	23.1	222.6	37.5		322.3	157.9	71.2
Level of Service	F	C	C	B	F	C	F	D		F	F	E
Approach Delay (s)		68.3			73.1			115.6			162.3	
Approach LOS		E			E			F			F	

Intersection Summary

HCM 2000 Control Delay	102.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.36		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	26.0
Intersection Capacity Utilization	117.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Queues

5: S Campbell Station Rd & Municipal Dr.

10/27/2020



Lane Group	EBL	SET	NWL	NWT
Lane Group Flow (vph)	230	1114	50	704
v/c Ratio	0.76	0.43	0.16	0.27
Control Delay	63.7	4.5	7.8	6.9
Queue Delay	0.0	0.1	0.0	0.0
Total Delay	63.7	4.6	7.8	6.9
Queue Length 50th (ft)	175	58	11	86
Queue Length 95th (ft)	249	m82	24	104
Internal Link Dist (ft)	392	607		1164
Turn Bay Length (ft)			70	
Base Capacity (vph)	544	2607	319	2575
Starvation Cap Reductn	0	534	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.42	0.54	0.16	0.27

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

5: S Campbell Station Rd & Municipal Dr.

10/27/2020

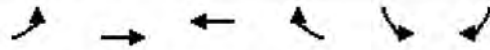


Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	150	62	922	103	46	648
Future Volume (vph)	150	62	922	103	46	648
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5		6.5		6.5	6.5
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.96		0.98		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1753		3541		1805	3505
Flt Permitted	0.97		1.00		0.23	1.00
Satd. Flow (perm)	1753		3541		434	3505
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	67	1002	112	50	704
RTOR Reduction (vph)	13	0	4	0	0	0
Lane Group Flow (vph)	217	0	1110	0	50	704
Heavy Vehicles (%)	0%	2%	0%	4%	0%	3%
Turn Type	Prot		NA		Perm	NA
Protected Phases	4		6			2
Permitted Phases					2	
Actuated Green, G (s)	21.5		95.5		95.5	95.5
Effective Green, g (s)	21.5		95.5		95.5	95.5
Actuated g/C Ratio	0.17		0.73		0.73	0.73
Clearance Time (s)	6.5		6.5		6.5	6.5
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	289		2601		318	2574
v/s Ratio Prot	c0.12		c0.31			0.20
v/s Ratio Perm					0.12	
v/c Ratio	0.75		0.43		0.16	0.27
Uniform Delay, d1	51.7		6.7		5.2	5.7
Progression Factor	1.00		0.59		1.00	1.05
Incremental Delay, d2	10.2		0.2		1.0	0.3
Delay (s)	61.9		4.2		6.2	6.3
Level of Service	E		A		A	A
Approach Delay (s)	61.9		4.2			6.3
Approach LOS	E		A			A
Intersection Summary						
HCM 2000 Control Delay			11.3		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.49			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	13.0
Intersection Capacity Utilization			61.2%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Queues

7: S Campbell Station Rd & Brooklawn St

10/27/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	58	1018	687	127	223	61
v/c Ratio	0.14	0.48	0.38	0.09	0.39	0.11
Control Delay	10.3	10.8	13.5	0.1	36.8	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.3	10.8	13.5	0.1	36.8	8.0
Queue Length 50th (ft)	14	140	81	0	146	0
Queue Length 95th (ft)	29	167	101	0	220	33
Internal Link Dist (ft)		1164	2181		270	
Turn Bay Length (ft)	175			125		200
Base Capacity (vph)	450	2130	1820	1444	576	557
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.48	0.38	0.09	0.39	0.11
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

7: S Campbell Station Rd & Brooklawn St

10/27/2020

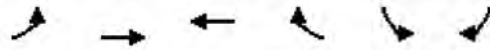


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↱↱	↱↱	↰	↰	↰
Traffic Volume (vph)	53	937	632	117	205	56
Future Volume (vph)	53	937	632	117	205	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	3574	3574	1615	1805	1615
Flt Permitted	0.30	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	572	3574	3574	1615	1805	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	1018	687	127	223	61
RTOR Reduction (vph)	0	0	0	23	0	42
Lane Group Flow (vph)	58	1018	687	104	223	19
Heavy Vehicles (%)	0%	1%	1%	0%	0%	0%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	77.5	77.5	64.9	106.4	41.5	41.5
Effective Green, g (s)	77.5	77.5	64.9	106.4	41.5	41.5
Actuated g/C Ratio	0.60	0.60	0.50	0.82	0.32	0.32
Clearance Time (s)	6.5	6.5	6.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	398	2130	1784	1321	576	515
v/s Ratio Prot	0.01	c0.28	0.19	0.03	c0.12	
v/s Ratio Perm	0.08			0.04		0.01
v/c Ratio	0.15	0.48	0.39	0.08	0.39	0.04
Uniform Delay, d1	12.1	14.8	20.2	2.3	34.4	30.5
Progression Factor	0.87	0.68	0.64	0.02	1.00	1.00
Incremental Delay, d2	0.2	0.7	0.6	0.1	2.0	0.1
Delay (s)	10.6	10.7	13.4	0.2	36.3	30.6
Level of Service	B	B	B	A	D	C
Approach Delay (s)		10.7	11.4		35.1	
Approach LOS		B	B		D	
Intersection Summary						
HCM 2000 Control Delay			14.2		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.47			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	17.5
Intersection Capacity Utilization			47.2%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Queues

11: S Campbell Station Rd & Concord Rd

10/27/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	75	1215	802	482	690	45
v/c Ratio	0.21	0.61	0.48	0.34	0.58	0.08
Control Delay	6.3	7.5	25.3	0.8	37.5	8.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.3	7.5	25.3	0.8	37.5	8.5
Queue Length 50th (ft)	14	125	247	0	245	0
Queue Length 95th (ft)	22	147	306	14	308	27
Internal Link Dist (ft)		2181	561		478	
Turn Bay Length (ft)	160			225	300	250
Base Capacity (vph)	360	1993	1685	1418	1186	566
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.61	0.48	0.34	0.58	0.08
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

11: S Campbell Station Rd & Concord Rd

10/27/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	69	1118	738	443	635	41
Future Volume (vph)	69	1118	738	443	635	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	3574	3574	1553	3467	1568
Flt Permitted	0.27	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	514	3574	3574	1553	3467	1568
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	1215	802	482	690	45
RTOR Reduction (vph)	0	0	0	95	0	30
Lane Group Flow (vph)	75	1215	802	387	690	15
Heavy Vehicles (%)	0%	1%	1%	4%	1%	3%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	72.5	72.5	60.0	104.5	44.5	44.5
Effective Green, g (s)	72.5	72.5	60.0	104.5	44.5	44.5
Actuated g/C Ratio	0.56	0.56	0.46	0.80	0.34	0.34
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	346	1993	1649	1326	1186	536
v/s Ratio Prot	0.01	c0.34	0.22	0.10	c0.20	
v/s Ratio Perm	0.11			0.15		0.01
v/c Ratio	0.22	0.61	0.49	0.29	0.58	0.03
Uniform Delay, d1	22.8	19.3	24.3	3.3	35.1	28.4
Progression Factor	0.32	0.32	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	1.3	1.0	0.6	2.1	0.1
Delay (s)	7.7	7.4	25.3	3.8	37.2	28.5
Level of Service	A	A	C	A	D	C
Approach Delay (s)		7.4	17.3		36.7	
Approach LOS		A	B		D	

Intersection Summary

HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues

16: Concord Rd & Site Access

10/27/2020



Lane Group	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	2	32	91	84	18	535	12	624	3
v/c Ratio	0.01	0.16	0.61	0.35	0.03	0.19	0.02	0.40	0.00
Control Delay	49.0	17.7	72.4	14.2	2.8	2.7	1.5	2.2	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Total Delay	49.0	17.7	72.4	14.2	2.8	2.7	1.5	2.6	0.0
Queue Length 50th (ft)	2	0	75	0	2	36	1	43	0
Queue Length 95th (ft)	10	31	128	48	8	64	m1	m60	m0
Internal Link Dist (ft)	382		246			410		568	
Turn Bay Length (ft)		125		100	100		100		200
Base Capacity (vph)	379	379	312	416	625	2867	711	1554	1615
Starvation Cap Reductn	0	0	0	0	0	0	0	452	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.08	0.29	0.20	0.03	0.19	0.02	0.57	0.00

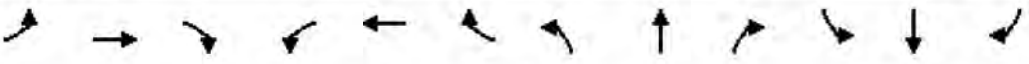
Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

16: Concord Rd & Site Access

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔	↔	↔		↔	↔	↔
Traffic Volume (vph)	1	1	29	74	10	77	17	457	35	11	574	3
Future Volume (vph)	1	1	29	74	10	77	17	457	35	11	574	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected		0.98	1.00		0.96	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1854	1615		1820	1599	1805	3468		1805	1881	1615
Flt Permitted		0.91	1.00		0.75	1.00	0.40	1.00		0.45	1.00	1.00
Satd. Flow (perm)		1731	1615		1426	1599	757	3468		861	1881	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	1	32	80	11	84	18	497	38	12	624	3
RTOR Reduction (vph)	0	0	29	0	0	75	0	3	0	0	0	0
Lane Group Flow (vph)	0	2	3	0	91	9	18	532	0	12	624	3
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	3%	3%	0%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	custom
Protected Phases		4			8!			2			6	4!
Permitted Phases	4		4	8		8	2			6		6
Actuated Green, G (s)		13.5	13.5		13.5	13.5	107.5	107.5		107.5	107.5	121.0
Effective Green, g (s)		13.5	13.5		13.5	13.5	107.5	107.5		107.5	107.5	121.0
Actuated g/C Ratio		0.10	0.10		0.10	0.10	0.83	0.83		0.83	0.83	0.93
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		179	167		148	166	625	2867		711	1555	1615
v/s Ratio Prot								0.15			c0.33	0.00
v/s Ratio Perm		0.00	0.00		c0.06	0.01	0.02			0.01		0.00
v/c Ratio		0.01	0.02		0.61	0.05	0.03	0.19		0.02	0.40	0.00
Uniform Delay, d1		52.3	52.3		55.8	52.5	2.0	2.3		2.0	2.9	0.3
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		0.51	0.55	1.00
Incremental Delay, d2		0.0	0.0		7.4	0.1	0.1	0.1		0.0	0.3	0.0
Delay (s)		52.3	52.4		63.1	52.6	2.1	2.4		1.0	1.9	0.3
Level of Service		D	D		E	D	A	A		A	A	A
Approach Delay (s)		52.4			58.1			2.4			1.9	
Approach LOS		D			E			A			A	

Intersection Summary

HCM 2000 Control Delay	10.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		

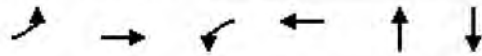
! Phase conflict between lane groups.

c Critical Lane Group

Queues

18: Kingston Pike & Lendon Welsch Way

10/27/2020



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	39	1366	35	1925	45	83
v/c Ratio	0.31	0.55	0.13	0.81	0.19	0.31
Control Delay	27.7	2.2	3.6	5.7	31.0	22.4
Queue Delay	0.0	0.0	0.0	0.5	0.0	0.0
Total Delay	27.7	2.2	3.6	6.2	31.0	22.5
Queue Length 50th (ft)	2	31	4	131	16	19
Queue Length 95th (ft)	m27	45	m6	144	54	69
Internal Link Dist (ft)		449		746	93	431
Turn Bay Length (ft)	150		125			
Base Capacity (vph)	130	2499	278	2390	236	266
Starvation Cap Reductn	0	0	0	35	0	0
Spillback Cap Reductn	0	0	0	147	0	2
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.55	0.13	0.86	0.19	0.31

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

18: Kingston Pike & Lendon Welsch Way

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	1245	12	32	1740	31	18	2	21	17	6	53
Future Volume (vph)	36	1245	12	32	1740	31	18	2	21	17	6	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5			6.5			6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.93			0.91	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.99	
Satd. Flow (prot)	1570	3533		1805	3523			1730			1626	
Flt Permitted	0.05	1.00		0.18	1.00			0.86			0.93	
Satd. Flow (perm)	78	3533		337	3523			1525			1524	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	1353	13	35	1891	34	20	2	23	18	7	58
RTOR Reduction (vph)	0	1	0	0	1	0	0	20	0	0	50	0
Lane Group Flow (vph)	39	1365	0	35	1924	0	0	25	0	0	33	0
Heavy Vehicles (%)	15%	2%	6%	0%	2%	14%	0%	0%	0%	12%	0%	3%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	89.3	89.3		86.9	86.9			18.5			18.5	
Effective Green, g (s)	89.3	89.3		86.9	86.9			18.5			18.5	
Actuated g/C Ratio	0.69	0.69		0.67	0.67			0.14			0.14	
Clearance Time (s)	6.5	6.5		6.5	6.5			6.5			6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	112	2426		255	2354			217			216	
v/s Ratio Prot	0.01	c0.39		0.00	c0.55							
v/s Ratio Perm	0.22			0.09				0.02			c0.02	
v/c Ratio	0.35	0.56		0.14	0.82			0.12			0.15	
Uniform Delay, d1	20.8	10.4		11.5	15.7			48.6			48.9	
Progression Factor	3.02	0.15		0.32	0.23			1.00			1.00	
Incremental Delay, d2	1.6	0.8		0.2	2.3			1.1			0.3	
Delay (s)	64.4	2.3		3.9	5.9			49.7			49.2	
Level of Service	E	A		A	A			D			D	
Approach Delay (s)		4.1			5.8			49.7			49.2	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay	6.7			HCM 2000 Level of Service			A					
HCM 2000 Volume to Capacity ratio	0.71											
Actuated Cycle Length (s)	130.0			Sum of lost time (s)			19.5					
Intersection Capacity Utilization	64.8%			ICU Level of Service			C					
Analysis Period (min)	15											
c Critical Lane Group												

Queues

22: Brooklawn St & Kingston Pike

10/27/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	3	1178	67	203	1750	98	98	187	11
v/c Ratio	0.02	0.58	0.07	0.69	0.72	0.59	0.59	0.42	0.12
Control Delay	3.3	8.1	0.1	23.4	9.7	69.5	69.5	6.4	49.3
Queue Delay	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Total Delay	3.3	8.1	0.1	23.4	10.0	69.5	69.5	6.4	49.3
Queue Length 50th (ft)	0	76	0	33	75	84	84	0	6
Queue Length 95th (ft)	m1	m239	m1	m90	#938	143	143	42	26
Internal Link Dist (ft)		937			449		417		100
Turn Bay Length (ft)	125		100	125		200		200	
Base Capacity (vph)	130	2016	1030	296	2415	244	244	445	255
Starvation Cap Reductn	0	0	0	0	178	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.58	0.07	0.69	0.78	0.40	0.40	0.42	0.04

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

22: Brooklawn St & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	1084	62	187	1607	3	180	0	172	4	3	4
Future Volume (vph)	3	1084	62	187	1607	3	180	0	172	4	3	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5		6.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.98	
Satd. Flow (prot)	1805	3539	1615	1787	3573		1715	1715	1615		1774	
Flt Permitted	0.06	1.00	1.00	0.14	1.00		0.95	0.95	1.00		0.98	
Satd. Flow (perm)	119	3539	1615	269	3573		1715	1715	1615		1774	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	1178	67	203	1747	3	196	0	187	4	3	4
RTOR Reduction (vph)	0	0	32	0	0	0	0	0	148	0	4	0
Lane Group Flow (vph)	3	1178	35	203	1750	0	98	98	39	0	7	0
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	custom	pm+pt	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2	3	1	6		8	8	1	4	4	
Permitted Phases	2		2	6					8			
Actuated Green, G (s)	64.6	63.7	67.3	84.9	77.5		12.7	12.7	27.4		2.8	
Effective Green, g (s)	64.6	63.7	67.3	84.9	77.5		12.7	12.7	27.4		2.8	
Actuated g/C Ratio	0.50	0.49	0.52	0.65	0.60		0.10	0.10	0.21		0.02	
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5		6.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	70	1734	836	347	2130		167	167	340		38	
v/s Ratio Prot	0.00	0.33	c0.00	c0.07	c0.49		c0.06	0.06	0.01		c0.00	
v/s Ratio Perm	0.02		0.02	0.32					0.01			
v/c Ratio	0.04	0.68	0.04	0.59	0.82		0.59	0.59	0.12		0.19	
Uniform Delay, d1	50.2	25.3	15.5	33.0	20.8		56.1	56.1	41.5		62.5	
Progression Factor	0.25	0.36	1.00	0.53	0.43		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.1	1.0	0.0	1.5	2.3		5.2	5.2	0.2		2.4	
Delay (s)	12.4	10.2	15.5	19.1	11.1		61.3	61.3	41.7		64.9	
Level of Service	B	B	B	B	B		E	E	D		E	
Approach Delay (s)		10.4			12.0			51.7			64.9	
Approach LOS		B			B			D			E	
Intersection Summary												
HCM 2000 Control Delay			15.8			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			32.5			
Intersection Capacity Utilization			76.1%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

1: Concord Rd/West End Ave & Kingston Pike

10/27/2020



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	50	1218	502	1671	153	78	348	126	152
v/c Ratio	0.37	1.00	0.96	0.81	0.62	0.50	0.36	0.31	0.69
Control Delay	22.7	44.5	66.4	25.3	65.5	62.1	13.2	54.3	56.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.7	44.5	66.4	25.3	65.5	62.1	13.2	54.3	56.4
Queue Length 50th (ft)	12	343	~377	574	61	53	35	48	91
Queue Length 95th (ft)	m23	#655	#595	689	#130	93	48	84	159
Internal Link Dist (ft)		746		717		568			373
Turn Bay Length (ft)	150		150		180		300	180	
Base Capacity (vph)	135	1220	524	2067	247	270	969	412	288
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	1.00	0.96	0.81	0.62	0.29	0.36	0.31	0.53

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: Concord Rd/West End Ave & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	1073	48	462	1446	91	141	72	320	116	68	72
Future Volume (vph)	46	1073	48	462	1446	91	141	72	320	116	68	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		6.5	6.5	6.5	6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	1.00	0.88	0.97	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	1.00	0.85	1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3499		1770	3508		3335	1827	2707	3502	1745	
Flt Permitted	0.09	1.00		0.08	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	180	3499		153	3508		3335	1827	2707	3502	1745	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	1166	52	502	1572	99	153	78	348	126	74	78
RTOR Reduction (vph)	0	3	0	0	3	0	0	0	58	0	32	0
Lane Group Flow (vph)	50	1215	0	502	1668	0	153	78	290	126	120	0
Heavy Vehicles (%)	0%	2%	14%	2%	2%	2%	5%	4%	5%	0%	1%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2			6					8			
Actuated Green, G (s)	46.1	42.2		81.4	71.0		10.6	9.4	42.1	14.7	13.5	
Effective Green, g (s)	46.1	42.2		81.4	71.0		10.6	9.4	42.1	14.7	13.5	
Actuated g/C Ratio	0.37	0.34		0.65	0.57		0.08	0.08	0.34	0.12	0.11	
Clearance Time (s)	6.5	6.5		6.5	6.5		6.5	6.5	6.5	6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	117	1181		522	1992		282	137	911	411	188	
v/s Ratio Prot	0.01	c0.35		c0.25	0.48		c0.05	0.04	0.08	c0.04	c0.07	
v/s Ratio Perm	0.14			0.37					0.02			
v/c Ratio	0.43	1.03		0.96	0.84		0.54	0.57	0.32	0.31	0.64	
Uniform Delay, d1	26.9	41.4		38.2	22.2		54.9	55.8	30.8	50.5	53.4	
Progression Factor	1.04	0.48		1.00	1.00		0.96	0.95	0.86	1.00	1.00	
Incremental Delay, d2	2.1	31.8		29.7	4.4		2.1	5.3	0.2	0.4	6.9	
Delay (s)	30.1	51.6		67.9	26.6		54.7	58.5	26.8	50.9	60.3	
Level of Service	C	D		E	C		D	E	C	D	E	
Approach Delay (s)		50.8			36.2			38.4			56.1	
Approach LOS		D			D			D			E	
Intersection Summary												
HCM 2000 Control Delay			42.1			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			125.0			Sum of lost time (s)			26.0			
Intersection Capacity Utilization			90.5%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

3: S Campbell Station Rd/N Campbell Station Rd & Kingston Pike

10/27/2020

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	487	991	408	93	1339	486	375	514	418	699	701
v/c Ratio	0.78	0.59	0.43	0.35	1.00	0.59	1.07	0.85	0.85	1.01	0.98
Control Delay	38.8	25.6	4.0	17.4	44.6	7.5	90.7	32.7	68.4	86.2	60.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.8	25.6	4.0	17.4	44.6	7.5	90.7	32.7	68.4	86.2	60.0
Queue Length 50th (ft)	143	299	11	30	499	38	~127	181	160	~303	472
Queue Length 95th (ft)	205	367	66	m24	#711	185	#209	#279	#240	#435	#744
Internal Link Dist (ft)		673			937			607		627	
Turn Bay Length (ft)	300		350	160		350	150		300		325
Base Capacity (vph)	624	1684	954	268	1344	823	349	606	489	693	713
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.59	0.43	0.35	1.00	0.59	1.07	0.85	0.85	1.01	0.98

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

3: S Campbell Station Rd/N Campbell Station Rd & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	448	912	375	86	1232	447	345	404	69	385	643	645
Future Volume (vph)	448	912	375	86	1232	447	345	404	69	385	643	645
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95		0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	3433	3462		3433	3539	1583
Flt Permitted	0.10	1.00	1.00	0.29	1.00	1.00	0.31	1.00		0.46	1.00	1.00
Satd. Flow (perm)	353	3539	1583	539	3539	1583	1112	3462		1671	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	487	991	408	93	1339	486	375	439	75	418	699	701
RTOR Reduction (vph)	0	0	201	0	0	76	0	11	0	0	0	94
Lane Group Flow (vph)	487	991	207	93	1339	410	375	503	0	418	699	607
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6	7	3	8		7	4	5
Permitted Phases	2		2	6		6	8			4		4
Actuated Green, G (s)	59.5	59.5	59.5	47.5	47.5	59.0	21.5	21.5		24.5	24.5	43.0
Effective Green, g (s)	59.5	59.5	59.5	47.5	47.5	59.0	21.5	21.5		24.5	24.5	43.0
Actuated g/C Ratio	0.48	0.48	0.48	0.38	0.38	0.47	0.17	0.17		0.20	0.20	0.34
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	623	1684	753	268	1344	747	349	595		489	693	626
v/s Ratio Prot	0.12	0.28		0.02	c0.38	0.05	0.07	c0.15		0.08	c0.20	c0.14
v/s Ratio Perm	0.26		0.13	0.11		0.21	0.11			0.09		0.24
v/c Ratio	0.78	0.59	0.28	0.35	1.00	0.55	1.07	0.85		0.85	1.01	0.97
Uniform Delay, d1	33.2	23.8	19.7	29.0	38.7	23.5	50.3	50.1		47.8	50.2	40.3
Progression Factor	1.00	1.00	1.00	0.48	0.60	0.55	0.37	0.37		1.00	1.00	1.00
Incremental Delay, d2	6.3	1.5	0.9	0.6	20.0	0.6	68.7	13.5		13.6	36.3	28.0
Delay (s)	39.6	25.4	20.7	14.5	43.3	13.5	87.1	32.1		61.4	86.6	68.3
Level of Service	D	C	C	B	D	B	F	C		E	F	E
Approach Delay (s)		28.0			34.3			55.3			73.8	
Approach LOS		C			C			E			E	

Intersection Summary

HCM 2000 Control Delay	46.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	26.0
Intersection Capacity Utilization	100.1%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Queues

5: S Campbell Station Rd & Municipal Dr.

10/27/2020



Lane Group	EBL	SET	NWL	NWT
Lane Group Flow (vph)	230	1114	50	704
v/c Ratio	0.76	0.43	0.16	0.28
Control Delay	61.2	3.8	7.6	6.5
Queue Delay	0.0	0.1	0.0	0.0
Total Delay	61.2	3.9	7.6	6.5
Queue Length 50th (ft)	167	66	10	79
Queue Length 95th (ft)	240	m98	22	97
Internal Link Dist (ft)	392	607		1164
Turn Bay Length (ft)			70	
Base Capacity (vph)	524	2591	316	2560
Starvation Cap Reductn	0	382	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.44	0.50	0.16	0.28

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

5: S Campbell Station Rd & Municipal Dr.

10/27/2020

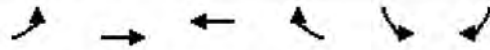


Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations	←	→	←	→	←	→
Traffic Volume (vph)	150	62	922	103	46	648
Future Volume (vph)	150	62	922	103	46	648
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5		6.5		6.5	6.5
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.96		0.98		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1753		3541		1805	3505
Flt Permitted	0.97		1.00		0.23	1.00
Satd. Flow (perm)	1753		3541		434	3505
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	67	1002	112	50	704
RTOR Reduction (vph)	14	0	5	0	0	0
Lane Group Flow (vph)	216	0	1109	0	50	704
Heavy Vehicles (%)	0%	2%	0%	4%	0%	3%
Turn Type	Prot		NA		Perm	NA
Protected Phases	4		6			2
Permitted Phases					2	
Actuated Green, G (s)	20.7		91.3		91.3	91.3
Effective Green, g (s)	20.7		91.3		91.3	91.3
Actuated g/C Ratio	0.17		0.73		0.73	0.73
Clearance Time (s)	6.5		6.5		6.5	6.5
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	290		2586		316	2560
v/s Ratio Prot	c0.12		c0.31			0.20
v/s Ratio Perm					0.12	
v/c Ratio	0.74		0.43		0.16	0.28
Uniform Delay, d1	49.6		6.6		5.1	5.7
Progression Factor	1.00		0.49		0.97	1.00
Incremental Delay, d2	9.9		0.3		1.0	0.3
Delay (s)	59.5		3.6		6.0	6.0
Level of Service	E		A		A	A
Approach Delay (s)	59.5		3.6			6.0
Approach LOS	E		A			A
Intersection Summary						
HCM 2000 Control Delay			10.6		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.49			
Actuated Cycle Length (s)			125.0		Sum of lost time (s)	13.0
Intersection Capacity Utilization			61.2%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Queues

7: S Campbell Station Rd & Brooklawn St

10/27/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	58	1018	687	127	223	61
v/c Ratio	0.14	0.48	0.38	0.09	0.39	0.11
Control Delay	9.4	10.7	12.6	0.1	35.9	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.4	10.7	12.6	0.1	35.9	7.9
Queue Length 50th (ft)	13	130	74	0	141	0
Queue Length 95th (ft)	27	155	93	1	215	32
Internal Link Dist (ft)		1164	2181		270	
Turn Bay Length (ft)	175			125		200
Base Capacity (vph)	453	2130	1809	1438	570	552
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.48	0.38	0.09	0.39	0.11
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

7: S Campbell Station Rd & Brooklawn St

10/27/2020

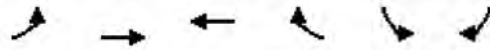


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	53	937	632	117	205	56
Future Volume (vph)	53	937	632	117	205	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	3574	3574	1615	1805	1615
Flt Permitted	0.30	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	570	3574	3574	1615	1805	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	1018	687	127	223	61
RTOR Reduction (vph)	0	0	0	24	0	42
Lane Group Flow (vph)	58	1018	687	103	223	19
Heavy Vehicles (%)	0%	1%	1%	0%	0%	0%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	74.5	74.5	62.0	101.5	39.5	39.5
Effective Green, g (s)	74.5	74.5	62.0	101.5	39.5	39.5
Actuated g/C Ratio	0.60	0.60	0.50	0.81	0.32	0.32
Clearance Time (s)	6.5	6.5	6.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	399	2130	1772	1311	570	510
v/s Ratio Prot	0.01	c0.28	0.19	0.02	c0.12	
v/s Ratio Perm	0.08			0.04		0.01
v/c Ratio	0.15	0.48	0.39	0.08	0.39	0.04
Uniform Delay, d1	11.6	14.3	19.7	2.4	33.4	29.6
Progression Factor	0.81	0.69	0.61	0.02	1.00	1.00
Incremental Delay, d2	0.2	0.7	0.6	0.1	2.0	0.1
Delay (s)	9.6	10.6	12.6	0.1	35.4	29.7
Level of Service	A	B	B	A	D	C
Approach Delay (s)		10.5	10.7		34.2	
Approach LOS		B	B		C	
Intersection Summary						
HCM 2000 Control Delay			13.7		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.47			
Actuated Cycle Length (s)			125.0		Sum of lost time (s)	17.5
Intersection Capacity Utilization			47.2%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Queues

11: S Campbell Station Rd & Concord Rd

10/27/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	75	1215	802	482	690	45
v/c Ratio	0.21	0.62	0.49	0.34	0.57	0.08
Control Delay	6.9	7.7	25.6	0.8	35.5	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.9	7.7	25.6	0.8	35.5	8.1
Queue Length 50th (ft)	13	130	243	0	232	0
Queue Length 95th (ft)	22	159	304	14	294	27
Internal Link Dist (ft)		2181	561		478	
Turn Bay Length (ft)	160			225	300	250
Base Capacity (vph)	355	1958	1638	1412	1206	575
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.62	0.49	0.34	0.57	0.08
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

11: S Campbell Station Rd & Concord Rd

10/27/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	69	1118	738	443	635	41
Future Volume (vph)	69	1118	738	443	635	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	3574	3574	1553	3467	1568
Flt Permitted	0.27	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	507	3574	3574	1553	3467	1568
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	1215	802	482	690	45
RTOR Reduction (vph)	0	0	0	98	0	29
Lane Group Flow (vph)	75	1215	802	384	690	16
Heavy Vehicles (%)	0%	1%	1%	4%	1%	3%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	68.5	68.5	56.0	99.5	43.5	43.5
Effective Green, g (s)	68.5	68.5	56.0	99.5	43.5	43.5
Actuated g/C Ratio	0.55	0.55	0.45	0.80	0.35	0.35
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	340	1958	1601	1316	1206	545
v/s Ratio Prot	0.01	c0.34	0.22	0.10	c0.20	
v/s Ratio Perm	0.11			0.15		0.01
v/c Ratio	0.22	0.62	0.50	0.29	0.57	0.03
Uniform Delay, d1	22.8	19.3	24.6	3.4	33.2	26.8
Progression Factor	0.35	0.32	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	1.4	1.1	0.6	2.0	0.1
Delay (s)	8.4	7.6	25.7	3.9	35.1	26.9
Level of Service	A	A	C	A	D	C
Approach Delay (s)		7.6	17.5		34.6	
Approach LOS		A	B		C	
Intersection Summary						
HCM 2000 Control Delay			17.5		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.64			
Actuated Cycle Length (s)			125.0		Sum of lost time (s)	19.5
Intersection Capacity Utilization			59.9%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Queues

16: Concord Rd & Site Access

10/27/2020



Lane Group	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	2	32	91	84	18	535	12	624	3
v/c Ratio	0.01	0.16	0.61	0.34	0.03	0.19	0.02	0.40	0.00
Control Delay	47.0	17.1	69.3	13.9	2.8	2.7	1.5	2.5	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Total Delay	47.0	17.1	69.3	13.9	2.8	2.7	1.5	2.9	0.0
Queue Length 50th (ft)	1	0	71	0	2	36	1	44	0
Queue Length 95th (ft)	9	30	124	47	8	64	m1	m63	m0
Internal Link Dist (ft)	382		246			410		568	
Turn Bay Length (ft)		125		100	100		100		200
Base Capacity (vph)	380	380	313	417	621	2852	707	1546	1615
Starvation Cap Reductn	0	0	0	0	0	0	0	444	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.08	0.29	0.20	0.03	0.19	0.02	0.57	0.00

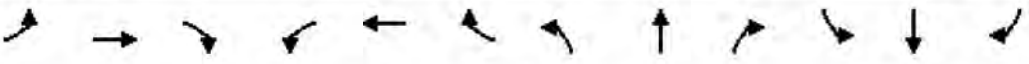
Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

16: Concord Rd & Site Access

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↗	↘		↗	↘	↗	↘	↗	↘	↗	↘
Traffic Volume (vph)	1	1	29	74	10	77	17	457	35	11	574	3
Future Volume (vph)	1	1	29	74	10	77	17	457	35	11	574	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected		0.98	1.00		0.96	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1854	1615		1820	1599	1805	3468		1805	1881	1615
Flt Permitted		0.91	1.00		0.75	1.00	0.40	1.00		0.45	1.00	1.00
Satd. Flow (perm)		1729	1615		1426	1599	756	3468		861	1881	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	1	32	80	11	84	18	497	38	12	624	3
RTOR Reduction (vph)	0	0	29	0	0	75	0	3	0	0	0	0
Lane Group Flow (vph)	0	2	3	0	91	9	18	532	0	12	624	3
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	3%	3%	0%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	custom
Protected Phases		4			8!			2			6	4!
Permitted Phases	4		4	8		8	2			6		6
Actuated Green, G (s)		13.2	13.2		13.2	13.2	102.8	102.8		102.8	102.8	116.0
Effective Green, g (s)		13.2	13.2		13.2	13.2	102.8	102.8		102.8	102.8	116.0
Actuated g/C Ratio		0.11	0.11		0.11	0.11	0.82	0.82		0.82	0.82	0.93
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		182	170		150	168	621	2852		708	1546	1615
v/s Ratio Prot								0.15			c0.33	0.00
v/s Ratio Perm		0.00	0.00		c0.06	0.01	0.02			0.01		0.00
v/c Ratio		0.01	0.02		0.61	0.05	0.03	0.19		0.02	0.40	0.00
Uniform Delay, d1		50.1	50.1		53.4	50.3	2.0	2.3		2.0	3.0	0.3
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		0.52	0.63	1.00
Incremental Delay, d2		0.0	0.0		6.8	0.1	0.1	0.1		0.0	0.3	0.0
Delay (s)		50.1	50.1		60.2	50.4	2.1	2.5		1.1	2.2	0.3
Level of Service		D	D		E	D	A	A		A	A	A
Approach Delay (s)		50.1			55.5			2.5			2.2	
Approach LOS		D			E			A			A	

Intersection Summary

HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		

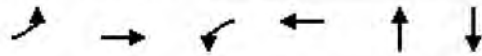
! Phase conflict between lane groups.

c Critical Lane Group

Queues

18: Kingston Pike & Lendon Welsch Way

10/27/2020



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	39	1366	35	1925	45	83
v/c Ratio	0.32	0.56	0.13	0.81	0.19	0.30
Control Delay	23.8	2.4	3.5	5.9	29.6	21.6
Queue Delay	0.0	0.0	0.0	0.7	0.0	0.0
Total Delay	23.8	2.4	3.5	6.6	29.6	21.6
Queue Length 50th (ft)	2	31	4	126	16	18
Queue Length 95th (ft)	m25	44	m6	139	52	66
Internal Link Dist (ft)		449		746	93	431
Turn Bay Length (ft)	150		125			
Base Capacity (vph)	123	2457	275	2364	241	275
Starvation Cap Reductn	0	80	0	58	0	0
Spillback Cap Reductn	0	0	0	169	1	2
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.57	0.13	0.88	0.19	0.30

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

18: Kingston Pike & Lendon Welsch Way

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	1245	12	32	1740	31	18	2	21	17	6	53
Future Volume (vph)	36	1245	12	32	1740	31	18	2	21	17	6	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5			6.5			6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.93			0.91	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.99	
Satd. Flow (prot)	1570	3533		1805	3523			1730			1626	
Flt Permitted	0.05	1.00		0.17	1.00			0.85			0.93	
Satd. Flow (perm)	83	3533		332	3523			1496			1525	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	1353	13	35	1891	34	20	2	23	18	7	58
RTOR Reduction (vph)	0	1	0	0	1	0	0	20	0	0	49	0
Lane Group Flow (vph)	39	1365	0	35	1924	0	0	25	0	0	34	0
Heavy Vehicles (%)	15%	2%	6%	0%	2%	14%	0%	0%	0%	12%	0%	3%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	84.3	84.3		82.6	82.6			18.5			18.5	
Effective Green, g (s)	84.3	84.3		82.6	82.6			18.5			18.5	
Actuated g/C Ratio	0.67	0.67		0.66	0.66			0.15			0.15	
Clearance Time (s)	6.5	6.5		6.5	6.5			6.5			6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	108	2382		251	2327			221			225	
v/s Ratio Prot	0.01	c0.39		0.00	c0.55							
v/s Ratio Perm	0.23			0.09				0.02			c0.02	
v/c Ratio	0.36	0.57		0.14	0.83			0.11			0.15	
Uniform Delay, d1	20.8	10.8		12.0	15.9			46.2			46.4	
Progression Factor	2.53	0.16		0.32	0.23			1.00			1.00	
Incremental Delay, d2	1.8	0.9		0.2	2.4			1.1			0.3	
Delay (s)	54.3	2.6		4.0	6.1			47.2			46.7	
Level of Service	D	A		A	A			D			D	
Approach Delay (s)		4.0			6.0			47.2			46.7	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay	6.7			HCM 2000 Level of Service			A					
HCM 2000 Volume to Capacity ratio	0.72											
Actuated Cycle Length (s)	125.0			Sum of lost time (s)			19.5					
Intersection Capacity Utilization	64.8%			ICU Level of Service			C					
Analysis Period (min)	15											
c Critical Lane Group												

Queues

22: Brooklawn St & Kingston Pike

10/27/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	3	1178	67	203	1750	98	98	187	11
v/c Ratio	0.02	0.57	0.06	0.70	0.71	0.58	0.58	0.42	0.12
Control Delay	3.7	7.9	0.1	23.3	10.8	66.4	66.4	6.7	47.3
Queue Delay	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Total Delay	3.7	7.9	0.1	23.3	11.0	66.4	66.4	6.7	47.3
Queue Length 50th (ft)	0	77	0	30	92	81	81	0	6
Queue Length 95th (ft)	m1	271	m1	m#92	#935	137	137	41	25
Internal Link Dist (ft)		937			449		417		100
Turn Bay Length (ft)	125		100	125		200		200	
Base Capacity (vph)	137	2066	1055	292	2452	253	253	440	265
Starvation Cap Reductn	0	0	0	0	167	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.57	0.06	0.70	0.77	0.39	0.39	0.42	0.04

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

22: Brooklawn St & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	1084	62	187	1607	3	180	0	172	4	3	4
Future Volume (vph)	3	1084	62	187	1607	3	180	0	172	4	3	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5		6.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.98	
Satd. Flow (prot)	1805	3539	1615	1787	3573		1715	1715	1615		1774	
Flt Permitted	0.07	1.00	1.00	0.14	1.00		0.95	0.95	1.00		0.98	
Satd. Flow (perm)	124	3539	1615	272	3573		1715	1715	1615		1774	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	1178	67	203	1747	3	196	0	187	4	3	4
RTOR Reduction (vph)	0	0	32	0	0	0	0	0	148	0	4	0
Lane Group Flow (vph)	3	1178	35	203	1750	0	98	98	39	0	7	0
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	custom	pm+pt	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2	3	1	6		8	8	1	4	4	
Permitted Phases	2		2	6					8			
Actuated Green, G (s)	62.2	61.3	64.9	81.5	74.1		12.4	12.4	26.1		1.5	
Effective Green, g (s)	62.2	61.3	64.9	81.5	74.1		12.4	12.4	26.1		1.5	
Actuated g/C Ratio	0.50	0.49	0.52	0.65	0.59		0.10	0.10	0.21		0.01	
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5		6.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	73	1735	838	343	2118		170	170	337		21	
v/s Ratio Prot	0.00	0.33	c0.00	c0.06	c0.49		c0.06	0.06	0.01		c0.00	
v/s Ratio Perm	0.02		0.02	0.32					0.01			
v/c Ratio	0.04	0.68	0.04	0.59	0.83		0.58	0.58	0.12		0.34	
Uniform Delay, d1	48.4	24.3	14.8	31.8	20.3		53.8	53.8	40.1		61.3	
Progression Factor	0.31	0.38	1.00	0.55	0.55		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.2	1.6	0.0	1.6	2.3		4.7	4.7	0.2		9.2	
Delay (s)	15.2	10.8	14.8	19.1	13.4		58.5	58.5	40.2		70.5	
Level of Service	B	B	B	B	B		E	E	D		E	
Approach Delay (s)		11.0			14.0			49.6			70.5	
Approach LOS		B			B			D			E	
Intersection Summary												
HCM 2000 Control Delay			17.0			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			125.0			Sum of lost time (s)			32.5			
Intersection Capacity Utilization			76.1%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

1: Concord Rd/West End Ave & Kingston Pike

10/27/2020



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	214	1368	176	926	240	311	662	385	304
v/c Ratio	0.61	1.08	0.46	0.59	0.81	1.07	1.09	1.06	0.91
Control Delay	19.7	69.7	29.3	28.5	82.9	125.0	87.9	123.4	78.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.7	69.7	29.3	28.5	82.9	125.0	87.9	123.4	78.1
Queue Length 50th (ft)	35	~716	91	307	114	~313	~461	~198	229
Queue Length 95th (ft)	m56	#857	167	395	#200	#507	#859	#304	#390
Internal Link Dist (ft)		746		717		568			373
Turn Bay Length (ft)	150		150		180		300	180	
Base Capacity (vph)	395	1271	381	1574	296	291	610	362	352
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	1.08	0.46	0.59	0.81	1.07	1.09	1.06	0.86

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: Concord Rd/West End Ave & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	197	1188	71	162	642	210	221	286	609	354	105	175
Future Volume (vph)	197	1188	71	162	642	210	221	286	609	354	105	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		6.5	6.5	6.5	6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	1.00	1.00	0.97	1.00	
Frt	1.00	0.99		1.00	0.96		1.00	1.00	0.85	1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3513		1687	3342		3433	1900	1599	3502	1705	
Flt Permitted	0.27	1.00		0.07	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	508	3513		125	3342		3433	1900	1599	3502	1705	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	214	1291	77	176	698	228	240	311	662	385	114	190
RTOR Reduction (vph)	0	3	0	0	21	0	0	0	51	0	43	0
Lane Group Flow (vph)	214	1365	0	176	905	0	240	311	611	385	261	0
Heavy Vehicles (%)	0%	2%	0%	7%	5%	1%	2%	0%	1%	0%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2			6					8			
Actuated Green, G (s)	63.4	50.5		84.5	65.1		12.1	21.5	49.0	14.5	23.9	
Effective Green, g (s)	63.4	50.5		84.5	65.1		12.1	21.5	49.0	14.5	23.9	
Actuated g/C Ratio	0.45	0.36		0.60	0.46		0.09	0.15	0.35	0.10	0.17	
Clearance Time (s)	6.5	6.5		6.5	6.5		6.5	6.5	6.5	6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	349	1267		382	1554		296	291	559	362	291	
v/s Ratio Prot	0.06	c0.39		0.09	0.27		0.07	0.16	c0.21	c0.11	0.15	
v/s Ratio Perm	0.22			0.19					0.17			
v/c Ratio	0.61	1.08		0.46	0.58		0.81	1.07	1.09	1.06	0.90	
Uniform Delay, d1	24.0	44.8		30.8	27.5		62.8	59.2	45.5	62.8	56.8	
Progression Factor	0.95	0.55		1.00	1.00		1.00	0.99	0.93	1.00	1.00	
Incremental Delay, d2	2.1	44.6		0.9	1.6		14.5	70.5	64.9	65.1	27.7	
Delay (s)	24.9	69.1		31.7	29.1		77.5	129.1	107.2	127.9	84.5	
Level of Service	C	E		C	C		E	F	F	F	F	
Approach Delay (s)		63.1			29.5			106.9			108.8	
Approach LOS		E			C			F			F	
Intersection Summary												
HCM 2000 Control Delay		73.5			HCM 2000 Level of Service			E				
HCM 2000 Volume to Capacity ratio		1.08										
Actuated Cycle Length (s)		140.0			Sum of lost time (s)			26.0				
Intersection Capacity Utilization		99.2%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

3: S Campbell Station Rd/N Campbell Station Rd & Kingston Pike

10/27/2020

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	542	1565	178	48	689	257	336	520	352	286	439
v/c Ratio	1.00	0.92	0.22	0.39	0.90	0.35	0.84	1.00	1.02	0.53	0.53
Control Delay	77.0	44.2	5.3	59.7	62.4	7.5	34.2	66.9	93.7	58.5	19.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.0	44.2	5.3	59.7	62.4	7.5	34.2	66.9	93.7	58.5	19.8
Queue Length 50th (ft)	~450	707	11	22	262	0	47	253	~289	128	192
Queue Length 95th (ft)	#696	#877	54	57	#423	3	#290	#370	#492	177	296
Internal Link Dist (ft)		673			937			607		627	
Turn Bay Length (ft)	300		350	160		350	150		300		325
Base Capacity (vph)	544	1707	809	122	763	735	409	520	346	537	821
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.00	0.92	0.22	0.39	0.90	0.35	0.82	1.00	1.02	0.53	0.53

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

3: S Campbell Station Rd/N Campbell Station Rd & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	499	1440	164	44	634	236	309	444	34	324	263	404
Future Volume (vph)	499	1440	164	44	634	236	309	444	34	324	263	404
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1736	3574	1524	1805	3505	1599	1719	3529		1752	3406	1553
Flt Permitted	0.15	1.00	1.00	0.15	1.00	1.00	0.50	1.00		0.18	1.00	1.00
Satd. Flow (perm)	280	3574	1524	291	3505	1599	908	3529		334	3406	1553
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	542	1565	178	48	689	257	336	483	37	352	286	439
RTOR Reduction (vph)	0	0	82	0	0	48	0	4	0	0	0	72
Lane Group Flow (vph)	542	1565	96	48	689	209	336	516	0	352	286	367
Heavy Vehicles (%)	4%	1%	6%	0%	3%	1%	5%	1%	4%	3%	6%	4%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6	7	3	8		7	4	5
Permitted Phases	2		2	6		6	8			4		4
Actuated Green, G (s)	65.6	65.6	65.6	30.5	30.5	54.0	42.4	20.5		45.6	22.1	61.6
Effective Green, g (s)	65.6	65.6	65.6	30.5	30.5	54.0	42.4	20.5		45.6	22.1	61.6
Actuated g/C Ratio	0.47	0.47	0.47	0.22	0.22	0.39	0.30	0.15		0.33	0.16	0.44
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	542	1674	714	110	763	690	401	516		346	537	755
v/s Ratio Prot	0.28	c0.44		0.01	c0.20	0.05	0.13	0.15		c0.17	0.08	0.14
v/s Ratio Perm	c0.19		0.06	0.08		0.08	0.12			c0.16		0.10
v/c Ratio	1.00	0.93	0.13	0.44	0.90	0.30	0.84	1.00		1.02	0.53	0.49
Uniform Delay, d1	41.0	35.2	21.1	56.9	53.3	29.9	42.6	59.7		41.6	54.2	27.9
Progression Factor	1.00	1.00	1.00	0.93	0.87	0.34	0.41	0.43		1.00	1.00	1.00
Incremental Delay, d2	38.7	11.2	0.4	2.7	15.6	0.2	13.9	39.0		52.9	3.8	0.5
Delay (s)	79.7	46.4	21.5	55.7	62.1	10.5	31.2	64.7		94.5	58.0	28.4
Level of Service	E	D	C	E	E	B	C	E		F	E	C
Approach Delay (s)		52.3			48.5			51.5			57.9	
Approach LOS		D			D			D			E	
Intersection Summary												
HCM 2000 Control Delay		52.6			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		1.01										
Actuated Cycle Length (s)		140.0			Sum of lost time (s)			26.0				
Intersection Capacity Utilization		98.1%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

5: S Campbell Station Rd & Municipal Dr.

10/27/2020



Lane Group	EBL	SET	NWL	NWT
Lane Group Flow (vph)	118	465	45	774
v/c Ratio	0.64	0.17	0.06	0.28
Control Delay	67.3	1.4	0.5	0.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	67.3	1.4	0.5	0.7
Queue Length 50th (ft)	91	18	1	5
Queue Length 95th (ft)	153	26	1	5
Internal Link Dist (ft)	392	607		1164
Turn Bay Length (ft)			70	
Base Capacity (vph)	495	2753	746	2812
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.24	0.17	0.06	0.28
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

5: S Campbell Station Rd & Municipal Dr.

10/27/2020



Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	75	33	339	89	41	712
Future Volume (vph)	75	33	339	89	41	712
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5		6.5		6.5	6.5
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.96		0.97		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1761		3387		1805	3471
Flt Permitted	0.97		1.00		0.48	1.00
Satd. Flow (perm)	1761		3387		921	3471
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	36	368	97	45	774
RTOR Reduction (vph)	14	0	9	0	0	0
Lane Group Flow (vph)	104	0	456	0	45	774
Heavy Vehicles (%)	0%	0%	2%	8%	0%	4%
Turn Type	Prot		NA		Perm	NA
Protected Phases	4		6			2
Permitted Phases					2	
Actuated Green, G (s)	13.6		113.4		113.4	113.4
Effective Green, g (s)	13.6		113.4		113.4	113.4
Actuated g/C Ratio	0.10		0.81		0.81	0.81
Clearance Time (s)	6.5		6.5		6.5	6.5
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	171		2743		746	2811
v/s Ratio Prot	c0.06		0.13			c0.22
v/s Ratio Perm					0.05	
v/c Ratio	0.61		0.17		0.06	0.28
Uniform Delay, d1	60.6		2.9		2.7	3.3
Progression Factor	1.00		0.46		0.10	0.13
Incremental Delay, d2	5.9		0.1		0.1	0.2
Delay (s)	66.6		1.5		0.4	0.6
Level of Service	E		A		A	A
Approach Delay (s)	66.6		1.5			0.6
Approach LOS	E		A			A

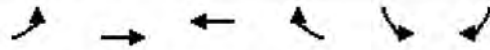
Intersection Summary

HCM 2000 Control Delay	6.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	38.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Queues

7: S Campbell Station Rd & Brooklawn St

10/27/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	23	363	820	159	74	34
v/c Ratio	0.05	0.15	0.36	0.11	0.19	0.09
Control Delay	2.7	2.9	1.6	0.1	46.2	14.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.7	2.9	1.6	0.1	46.2	14.0
Queue Length 50th (ft)	2	15	7	0	55	0
Queue Length 95th (ft)	5	22	13	m0	102	30
Internal Link Dist (ft)		1164	2181		270	
Turn Bay Length (ft)	175			125		200
Base Capacity (vph)	482	2396	2273	1507	393	378
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.15	0.36	0.11	0.19	0.09

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

7: S Campbell Station Rd & Brooklawn St

10/27/2020

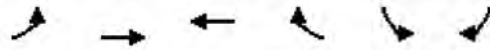


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	21	334	754	146	68	31
Future Volume (vph)	21	334	754	146	68	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	3406	3505	1615	1805	1615
Flt Permitted	0.28	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	539	3406	3505	1615	1805	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	363	820	159	74	34
RTOR Reduction (vph)	0	0	0	24	0	27
Lane Group Flow (vph)	23	363	820	135	74	7
Heavy Vehicles (%)	0%	6%	3%	0%	0%	0%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	98.5	98.5	88.2	118.7	30.5	30.5
Effective Green, g (s)	98.5	98.5	88.2	118.7	30.5	30.5
Actuated g/C Ratio	0.70	0.70	0.63	0.85	0.22	0.22
Clearance Time (s)	6.5	6.5	6.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	413	2396	2208	1369	393	351
v/s Ratio Prot	0.00	c0.11	c0.23	0.02	c0.04	
v/s Ratio Perm	0.04			0.06		0.00
v/c Ratio	0.06	0.15	0.37	0.10	0.19	0.02
Uniform Delay, d1	7.2	6.9	12.5	1.8	44.7	43.0
Progression Factor	0.39	0.39	0.11	0.00	1.00	1.00
Incremental Delay, d2	0.1	0.1	0.3	0.1	1.1	0.1
Delay (s)	2.8	2.8	1.7	0.1	45.7	43.1
Level of Service	A	A	A	A	D	D
Approach Delay (s)		2.8	1.5		44.9	
Approach LOS		A	A		D	
Intersection Summary						
HCM 2000 Control Delay			5.0		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.32			
Actuated Cycle Length (s)			140.0		Sum of lost time (s)	17.5
Intersection Capacity Utilization			34.2%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Queues

11: S Campbell Station Rd & Concord Rd

10/27/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	26	430	977	1210	288	51
v/c Ratio	0.16	0.28	0.74	0.79	0.17	0.06
Control Delay	15.9	13.1	43.1	5.4	20.8	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.9	13.1	43.1	5.4	20.8	5.0
Queue Length 50th (ft)	7	91	426	53	74	0
Queue Length 95th (ft)	19	117	514	121	103	23
Internal Link Dist (ft)		2181	561		478	
Turn Bay Length (ft)	160			225	300	250
Base Capacity (vph)	160	1534	1322	1533	1688	805
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.28	0.74	0.79	0.17	0.06
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

11: S Campbell Station Rd & Concord Rd

10/27/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	24	396	899	1113	265	47
Future Volume (vph)	24	396	899	1113	265	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1671	3610	3539	1599	3502	1615
Flt Permitted	0.14	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	244	3610	3539	1599	3502	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	430	977	1210	288	51
RTOR Reduction (vph)	0	0	0	126	0	26
Lane Group Flow (vph)	26	430	977	1084	288	25
Heavy Vehicles (%)	8%	0%	2%	1%	0%	0%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	59.5	59.5	49.7	117.2	67.5	67.5
Effective Green, g (s)	59.5	59.5	49.7	117.2	67.5	67.5
Actuated g/C Ratio	0.42	0.42	0.36	0.84	0.48	0.48
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	137	1534	1256	1412	1688	778
v/s Ratio Prot	0.00	c0.12	0.28	c0.37	0.08	
v/s Ratio Perm	0.08			0.31		0.02
v/c Ratio	0.19	0.28	0.78	0.77	0.17	0.03
Uniform Delay, d1	45.6	26.3	40.2	5.2	20.5	19.1
Progression Factor	0.49	0.48	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.5	4.8	4.1	0.2	0.1
Delay (s)	22.9	13.0	45.0	9.3	20.7	19.1
Level of Service	C	B	D	A	C	B
Approach Delay (s)		13.6	25.2		20.4	
Approach LOS		B	C		C	
Intersection Summary						
HCM 2000 Control Delay		22.9		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.80				
Actuated Cycle Length (s)		140.0		Sum of lost time (s)		19.5
Intersection Capacity Utilization		83.9%		ICU Level of Service		E
Analysis Period (min)		15				
c Critical Lane Group						

Queues

16: Concord Rd & Site Access

10/27/2020



Lane Group	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	30	34	9	14	66	1286	11	350	16
v/c Ratio	0.37	0.27	0.10	0.13	0.07	0.40	0.03	0.21	0.01
Control Delay	74.9	23.9	63.4	28.0	1.5	2.0	2.0	1.7	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.0	23.9	63.4	28.0	1.5	2.0	2.0	1.7	0.0
Queue Length 50th (ft)	27	0	8	0	6	81	1	37	0
Queue Length 95th (ft)	61	36	27	23	14	125	m2	m56	m0
Internal Link Dist (ft)	382		246			410		568	
Turn Bay Length (ft)		125		100	100		100		200
Base Capacity (vph)	241	310	255	294	939	3186	350	1687	1615
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	9	0	0	11	0	24	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.11	0.04	0.05	0.07	0.41	0.03	0.21	0.01

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

16: Concord Rd & Site Access

10/27/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↗	↘		↗	↘	↗	↘	↗	↘	↗	↘
Traffic Volume (vph)	27	1	31	6	2	13	61	1125	58	10	322	15
Future Volume (vph)	27	1	31	6	2	13	61	1125	58	10	322	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected		0.95	1.00		0.96	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1812	1615		1829	1615	1805	3550		1805	1881	1615
Flt Permitted		0.73	1.00		0.77	1.00	0.55	1.00		0.21	1.00	1.00
Satd. Flow (perm)		1381	1615		1460	1615	1047	3550		392	1881	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	29	1	34	7	2	14	66	1223	63	11	350	16
RTOR Reduction (vph)	0	0	32	0	0	13	0	1	0	0	0	0
Lane Group Flow (vph)	0	30	2	0	9	1	66	1285	0	11	350	16
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	custom
Protected Phases		4			8!			2			6	4!
Permitted Phases	4		4	8		8	2			6		6
Actuated Green, G (s)		7.2	7.2		7.2	7.2	123.8	123.8		123.8	123.8	131.0
Effective Green, g (s)		7.2	7.2		7.2	7.2	123.8	123.8		123.8	123.8	131.0
Actuated g/C Ratio		0.05	0.05		0.05	0.05	0.88	0.88		0.88	0.88	0.94
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		71	83		75	83	925	3139		346	1663	1615
v/s Ratio Prot								c0.36			0.19	0.00
v/s Ratio Perm		c0.02	0.00		0.01	0.00	0.06			0.03		0.01
v/c Ratio		0.42	0.02		0.12	0.01	0.07	0.41		0.03	0.21	0.01
Uniform Delay, d1		64.4	63.1		63.4	63.0	1.0	1.5		1.0	1.2	0.3
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.32	1.14	1.00
Incremental Delay, d2		4.0	0.1		0.7	0.0	0.1	0.4		0.1	0.2	0.0
Delay (s)		68.4	63.2		64.1	63.1	1.1	1.9		1.4	1.5	0.3
Level of Service		E	E		E	E	A	A		A	A	A
Approach Delay (s)		65.6			63.5			1.8			1.5	
Approach LOS		E			E			A			A	

Intersection Summary

HCM 2000 Control Delay	4.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		

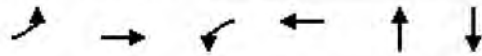
! Phase conflict between lane groups.

c Critical Lane Group

Queues

18: Kingston Pike & Lendon Welsch Way

10/27/2020



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	310	1620	46	1146	131	245
v/c Ratio	0.82	0.76	0.31	0.74	0.30	0.76
Control Delay	56.4	7.0	14.1	23.9	42.5	59.3
Queue Delay	0.0	0.4	0.0	0.0	0.0	0.0
Total Delay	56.4	7.5	14.1	23.9	42.5	59.3
Queue Length 50th (ft)	178	195	10	286	91	186
Queue Length 95th (ft)	260	93	m16	351	152	#311
Internal Link Dist (ft)		449		746	93	431
Turn Bay Length (ft)	150		125			
Base Capacity (vph)	447	2137	148	1552	434	324
Starvation Cap Reductn	0	163	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.82	0.31	0.74	0.30	0.76

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

18: Kingston Pike & Lendon Welsch Way

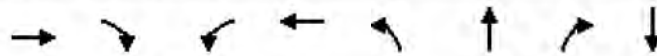
10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	285	1458	32	42	846	208	9	85	27	111	9	105
Future Volume (vph)	285	1458	32	42	846	208	9	85	27	111	9	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5			6.5			6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.97			0.97			0.94	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.98	
Satd. Flow (prot)	1687	3563		1805	3375			1836			1698	
Flt Permitted	0.11	1.00		0.09	1.00			0.97			0.73	
Satd. Flow (perm)	200	3563		171	3375			1784			1267	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	310	1585	35	46	920	226	10	92	29	121	10	114
RTOR Reduction (vph)	0	1	0	0	14	0	0	8	0	0	22	0
Lane Group Flow (vph)	310	1619	0	46	1132	0	0	123	0	0	223	0
Heavy Vehicles (%)	7%	1%	0%	0%	4%	3%	0%	0%	0%	1%	0%	4%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	93.5	82.6		68.3	63.9			33.5			33.5	
Effective Green, g (s)	93.5	82.6		68.3	63.9			33.5			33.5	
Actuated g/C Ratio	0.67	0.59		0.49	0.46			0.24			0.24	
Clearance Time (s)	6.5	6.5		6.5	6.5			6.5			6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	378	2102		134	1540			426			303	
v/s Ratio Prot	c0.13	c0.45		0.01	0.34							
v/s Ratio Perm	c0.41			0.16				0.07			c0.18	
v/c Ratio	0.82	0.77		0.34	0.73			0.29			0.74	
Uniform Delay, d1	32.6	21.6		21.8	31.1			43.5			49.2	
Progression Factor	1.69	0.24		0.77	0.67			1.00			1.00	
Incremental Delay, d2	9.5	1.9		1.2	2.4			1.7			9.0	
Delay (s)	64.6	7.2		18.0	23.3			45.2			58.1	
Level of Service	E	A		B	C			D			E	
Approach Delay (s)		16.4			23.1			45.2			58.1	
Approach LOS		B			C			D			E	
Intersection Summary												
HCM 2000 Control Delay	22.7			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.82											
Actuated Cycle Length (s)	140.0			Sum of lost time (s)			19.5					
Intersection Capacity Utilization	81.8%			ICU Level of Service			D					
Analysis Period (min)	15											
c Critical Lane Group												

Queues

22: Brooklawn St & Kingston Pike

10/27/2020



Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	1773	27	126	907	101	1	183	3
v/c Ratio	0.73	0.02	0.80	0.34	0.43	0.01	0.51	0.04
Control Delay	5.4	0.0	48.9	2.0	67.9	59.0	10.3	57.7
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	5.4	0.0	48.9	2.1	67.9	59.0	10.3	57.7
Queue Length 50th (ft)	148	0	59	46	46	1	0	2
Queue Length 95th (ft)	m196	m0	m#115	60	76	7	52	13
Internal Link Dist (ft)	937			449		417		100
Turn Bay Length (ft)		100	125		200		200	
Base Capacity (vph)	2421	1203	158	2693	462	251	360	236
Starvation Cap Reductn	0	0	0	604	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.02	0.80	0.43	0.22	0.00	0.51	0.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

22: Brooklawn St & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1631	25	116	831	4	93	1	168	1	1	1
Future Volume (vph)	0	1631	25	116	831	4	93	1	168	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5	6.5	6.5		6.5	6.5	6.5		6.5	
Lane Util. Factor		0.95	1.00	1.00	0.95		0.97	1.00	1.00		1.00	
Frt		1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.95	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (prot)		3539	1615	1805	3499		3502	1900	1599		1785	
Flt Permitted		1.00	1.00	0.06	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (perm)		3539	1615	119	3499		3502	1900	1599		1785	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1773	27	126	903	4	101	1	183	1	1	1
RTOR Reduction (vph)	0	0	9	0	0	0	0	0	164	0	1	0
Lane Group Flow (vph)	0	1773	18	126	907	0	101	1	19	0	2	0
Heavy Vehicles (%)	0%	2%	0%	0%	3%	25%	0%	0%	1%	0%	0%	0%
Turn Type	pm+pt	NA	custom	pm+pt	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2	3	1	6		8	8	1	4	4	
Permitted Phases	2		2	6					8			
Actuated Green, G (s)		88.0	91.3	100.0	100.0		9.4	9.4	14.9		1.3	
Effective Green, g (s)		88.0	91.3	100.0	100.0		9.4	9.4	14.9		1.3	
Actuated g/C Ratio		0.63	0.65	0.71	0.71		0.07	0.07	0.11		0.01	
Clearance Time (s)		6.5	6.5	6.5	6.5		6.5	6.5	6.5		6.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)		2224	1053	151	2499		235	127	170		16	
v/s Ratio Prot		0.50	c0.00	c0.03	0.26		c0.03	0.00	0.00		c0.00	
v/s Ratio Perm			0.01	c0.56					0.01			
v/c Ratio		0.80	0.02	0.83	0.36		0.43	0.01	0.11		0.13	
Uniform Delay, d1		19.4	8.6	43.7	7.7		62.7	60.9	56.6		68.8	
Progression Factor		0.26	1.00	0.73	0.29		1.00	1.00	1.00		1.00	
Incremental Delay, d2		1.1	0.0	22.3	0.3		1.3	0.0	0.3		3.5	
Delay (s)		6.1	8.6	54.3	2.5		64.0	61.0	56.9		72.3	
Level of Service		A	A	D	A		E	E	E		E	
Approach Delay (s)		6.2			8.8			59.4			72.3	
Approach LOS		A			A			E			E	
Intersection Summary												
HCM 2000 Control Delay			12.0			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			32.5			
Intersection Capacity Utilization			75.9%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

1: Concord Rd/West End Ave & Kingston Pike

10/27/2020



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	214	1368	176	926	240	311	662	385	304
v/c Ratio	0.67	0.94	0.87	0.69	0.58	0.91	0.85	0.91	0.86
Control Delay	24.8	27.3	69.8	34.9	59.1	79.9	33.5	83.3	64.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.8	27.3	69.8	34.9	59.1	79.9	33.5	83.3	64.2
Queue Length 50th (ft)	38	454	98	323	102	254	117	168	203
Queue Length 95th (ft)	m81	#716	#239	423	#168	#421	#182	#262	#310
Internal Link Dist (ft)		746		717		568			373
Turn Bay Length (ft)	150		150		180		300	180	
Base Capacity (vph)	372	1455	204	1346	413	343	783	421	406
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.94	0.86	0.69	0.58	0.91	0.85	0.91	0.75

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: Concord Rd/West End Ave & Kingston Pike

10/27/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	197	1188	71	162	642	210	221	286	609	354	105	175
Future Volume (vph)	197	1188	71	162	642	210	221	286	609	354	105	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		6.5	6.5	6.5	6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	1.00	0.88	0.97	1.00	
Frt	1.00	0.99		1.00	0.96		1.00	1.00	0.85	1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3513		1687	3342		3433	1900	2814	3502	1705	
Flt Permitted	0.17	1.00		0.08	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	315	3513		138	3342		3433	1900	2814	3502	1705	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	214	1291	77	176	698	228	240	311	662	385	114	190
RTOR Reduction (vph)	0	4	0	0	23	0	0	0	275	0	48	0
Lane Group Flow (vph)	214	1364	0	176	903	0	240	311	387	385	256	0
Heavy Vehicles (%)	0%	2%	0%	7%	5%	1%	2%	0%	1%	0%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA	Prot	Prot	NA	
Protected Phases	5	2		1	6		3	8	8	7	4	
Permitted Phases	2			6								
Actuated Green, G (s)	67.2	53.7		62.8	51.5		15.7	23.3	23.3	15.7	23.3	
Effective Green, g (s)	67.2	53.7		62.8	51.5		15.7	23.3	23.3	15.7	23.3	
Actuated g/C Ratio	0.52	0.41		0.48	0.40		0.12	0.18	0.18	0.12	0.18	
Clearance Time (s)	6.5	6.5		6.5	6.5		6.5	6.5	6.5	6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	317	1451		201	1323		414	340	504	422	305	
v/s Ratio Prot	0.07	c0.39		c0.08	0.27		0.07	c0.16	0.14	c0.11	0.15	
v/s Ratio Perm	0.28			0.35								
v/c Ratio	0.68	0.94		0.88	0.68		0.58	0.91	0.77	0.91	0.84	
Uniform Delay, d1	20.9	36.6		34.6	32.5		54.0	52.4	50.8	56.5	51.5	
Progression Factor	1.16	0.48		1.00	1.00		0.96	0.95	0.90	1.00	1.00	
Incremental Delay, d2	3.5	9.1		31.8	2.9		1.8	26.8	6.5	23.7	17.8	
Delay (s)	27.9	26.5		66.5	35.4		53.9	76.7	52.3	80.2	69.4	
Level of Service	C	C		E	D		D	E	D	F	E	
Approach Delay (s)		26.6			40.3			58.9			75.4	
Approach LOS		C			D			E			E	
Intersection Summary												
HCM 2000 Control Delay		45.8			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.92										
Actuated Cycle Length (s)		130.0			Sum of lost time (s)			26.0				
Intersection Capacity Utilization		90.9%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

3: S Campbell Station Rd/N Campbell Station Rd & Kingston Pike

10/27/2020

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	542	1565	178	48	689	257	336	520	352	286	439
v/c Ratio	0.69	0.85	0.20	0.36	0.50	0.29	0.57	0.88	0.81	0.49	0.66
Control Delay	23.9	33.6	3.0	46.1	31.4	5.2	11.9	39.3	50.4	51.7	27.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.9	33.6	3.0	46.1	31.4	5.2	11.9	39.3	50.4	51.7	27.5
Queue Length 50th (ft)	137	605	0	22	170	0	22	228	117	115	214
Queue Length 95th (ft)	177	717	38	49	219	0	31	#308	#169	162	308
Internal Link Dist (ft)		673			937			607		627	
Turn Bay Length (ft)	300		350	160		350	150		300		325
Base Capacity (vph)	911	1839	870	133	1369	897	593	589	437	589	731
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.85	0.20	0.36	0.50	0.29	0.57	0.88	0.81	0.49	0.60

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

3: S Campbell Station Rd/N Campbell Station Rd & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	499	1440	164	44	634	236	309	444	34	324	263	404
Future Volume (vph)	499	1440	164	44	634	236	309	444	34	324	263	404
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95		0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3367	3574	1524	1805	3505	1599	3335	3529		3400	3406	1553
Flt Permitted	0.22	1.00	1.00	0.09	1.00	1.00	0.51	1.00		0.18	1.00	1.00
Satd. Flow (perm)	786	3574	1524	164	3505	1599	1798	3529		636	3406	1553
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	542	1565	178	48	689	257	336	483	37	352	286	439
RTOR Reduction (vph)	0	0	88	0	0	43	0	4	0	0	0	94
Lane Group Flow (vph)	542	1565	90	48	689	214	336	516	0	352	286	345
Heavy Vehicles (%)	4%	1%	6%	0%	3%	1%	5%	1%	4%	3%	6%	4%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6	7	3	8		7	4	5
Permitted Phases	2		2	6		6	8			4		4
Actuated Green, G (s)	65.6	65.6	65.6	50.8	50.8	63.2	33.1	21.6		34.9	22.5	41.7
Effective Green, g (s)	65.6	65.6	65.6	50.8	50.8	63.2	33.1	21.6		34.9	22.5	41.7
Actuated g/C Ratio	0.50	0.50	0.50	0.39	0.39	0.49	0.25	0.17		0.27	0.17	0.32
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	777	1803	769	119	1369	857	593	586		434	589	575
v/s Ratio Prot	0.10	c0.44		0.01	c0.20	0.02	0.05	c0.15		c0.08	0.08	0.09
v/s Ratio Perm	0.25		0.06	0.14		0.11	0.09			0.14		0.13
v/c Ratio	0.70	0.87	0.12	0.40	0.50	0.25	0.57	0.88		0.81	0.49	0.60
Uniform Delay, d1	21.5	28.4	17.0	46.6	30.0	19.5	40.2	52.9		39.7	48.5	37.1
Progression Factor	1.00	1.00	1.00	0.92	0.97	0.38	0.23	0.40		1.00	1.00	1.00
Incremental Delay, d2	2.7	6.0	0.3	2.1	1.3	0.1	1.2	16.8		11.0	2.8	1.8
Delay (s)	24.3	34.3	17.3	45.3	30.4	7.5	10.4	38.0		50.7	51.4	38.9
Level of Service	C	C	B	D	C	A	B	D		D	D	D
Approach Delay (s)		30.6			25.2			27.2			46.1	
Approach LOS		C			C			C			D	
Intersection Summary												
HCM 2000 Control Delay			32.2			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)				26.0		
Intersection Capacity Utilization			88.2%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

Queues

5: S Campbell Station Rd & Municipal Dr.

10/27/2020



Lane Group	EBL	SET	NWL	NWT
Lane Group Flow (vph)	118	465	45	774
v/c Ratio	0.62	0.17	0.06	0.28
Control Delay	61.5	1.5	0.4	0.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	61.5	1.5	0.4	0.5
Queue Length 50th (ft)	83	21	1	5
Queue Length 95th (ft)	142	23	1	5
Internal Link Dist (ft)	392	607		1164
Turn Bay Length (ft)			70	
Base Capacity (vph)	506	2722	738	2778
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.23	0.17	0.06	0.28
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

5: S Campbell Station Rd & Municipal Dr.

10/27/2020

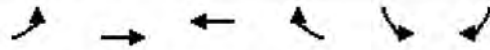


Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	75	33	339	89	41	712
Future Volume (vph)	75	33	339	89	41	712
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5		6.5		6.5	6.5
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.96		0.97		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1761		3387		1805	3471
Flt Permitted	0.97		1.00		0.48	1.00
Satd. Flow (perm)	1761		3387		921	3471
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	36	368	97	45	774
RTOR Reduction (vph)	15	0	10	0	0	0
Lane Group Flow (vph)	103	0	455	0	45	774
Heavy Vehicles (%)	0%	0%	2%	8%	0%	4%
Turn Type	Prot		NA		Perm	NA
Protected Phases	4		6			2
Permitted Phases					2	
Actuated Green, G (s)	12.9		104.1		104.1	104.1
Effective Green, g (s)	12.9		104.1		104.1	104.1
Actuated g/C Ratio	0.10		0.80		0.80	0.80
Clearance Time (s)	6.5		6.5		6.5	6.5
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	174		2712		737	2779
v/s Ratio Prot	c0.06		0.13			c0.22
v/s Ratio Perm					0.05	
v/c Ratio	0.59		0.17		0.06	0.28
Uniform Delay, d1	56.0		3.0		2.7	3.3
Progression Factor	1.00		0.48		0.07	0.07
Incremental Delay, d2	5.3		0.1		0.2	0.2
Delay (s)	61.3		1.5		0.3	0.5
Level of Service	E		A		A	A
Approach Delay (s)	61.3		1.5			0.5
Approach LOS	E		A			A
Intersection Summary						
HCM 2000 Control Delay			5.9		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.31			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	13.0
Intersection Capacity Utilization			38.8%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Queues

7: S Campbell Station Rd & Brooklawn St

10/27/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	23	363	820	159	74	34
v/c Ratio	0.05	0.15	0.37	0.11	0.19	0.09
Control Delay	3.2	3.1	1.7	0.1	42.9	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.2	3.1	1.7	0.1	42.9	13.2
Queue Length 50th (ft)	2	19	6	0	51	0
Queue Length 95th (ft)	6	26	12	m0	95	29
Internal Link Dist (ft)		1164	2181		270	
Turn Bay Length (ft)	175			125		200
Base Capacity (vph)	473	2371	2232	1498	395	380
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.15	0.37	0.11	0.19	0.09

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

7: S Campbell Station Rd & Brooklawn St

10/27/2020

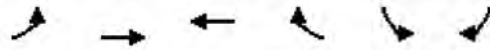


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	21	334	754	146	68	31
Future Volume (vph)	21	334	754	146	68	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	3406	3505	1615	1805	1615
Flt Permitted	0.28	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	533	3406	3505	1615	1805	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	363	820	159	74	34
RTOR Reduction (vph)	0	0	0	26	0	27
Lane Group Flow (vph)	23	363	820	133	74	7
Heavy Vehicles (%)	0%	6%	3%	0%	0%	0%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	90.5	90.5	80.2	108.7	28.5	28.5
Effective Green, g (s)	90.5	90.5	80.2	108.7	28.5	28.5
Actuated g/C Ratio	0.70	0.70	0.62	0.84	0.22	0.22
Clearance Time (s)	6.5	6.5	6.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	408	2371	2162	1350	395	354
v/s Ratio Prot	0.00	c0.11	c0.23	0.02	c0.04	
v/s Ratio Perm	0.04			0.06		0.00
v/c Ratio	0.06	0.15	0.38	0.10	0.19	0.02
Uniform Delay, d1	7.1	6.7	12.5	1.9	41.3	39.8
Progression Factor	0.48	0.44	0.12	0.00	1.00	1.00
Incremental Delay, d2	0.1	0.1	0.4	0.1	1.0	0.1
Delay (s)	3.5	3.1	1.8	0.1	42.4	39.9
Level of Service	A	A	A	A	D	D
Approach Delay (s)		3.1	1.5		41.6	
Approach LOS		A	A		D	
Intersection Summary						
HCM 2000 Control Delay			4.9		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.33			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	17.5
Intersection Capacity Utilization			34.2%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Queues

11: S Campbell Station Rd & Concord Rd

10/27/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	26	430	977	1210	288	51
v/c Ratio	0.16	0.28	0.74	0.79	0.17	0.06
Control Delay	13.9	11.0	40.7	5.6	20.0	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.9	11.0	40.7	5.6	20.0	5.1
Queue Length 50th (ft)	7	57	396	51	70	0
Queue Length 95th (ft)	16	75	484	124	98	23
Internal Link Dist (ft)		2181	561		478	
Turn Bay Length (ft)	160			225	300	250
Base Capacity (vph)	165	1541	1314	1529	1656	790
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.28	0.74	0.79	0.17	0.06
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

11: S Campbell Station Rd & Concord Rd

10/27/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	24	396	899	1113	265	47
Future Volume (vph)	24	396	899	1113	265	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1671	3610	3539	1599	3502	1615
Flt Permitted	0.14	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	247	3610	3539	1599	3502	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	430	977	1210	288	51
RTOR Reduction (vph)	0	0	0	137	0	27
Lane Group Flow (vph)	26	430	977	1073	288	24
Heavy Vehicles (%)	8%	0%	2%	1%	0%	0%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	55.5	55.5	45.7	107.2	61.5	61.5
Effective Green, g (s)	55.5	55.5	45.7	107.2	61.5	61.5
Actuated g/C Ratio	0.43	0.43	0.35	0.82	0.47	0.47
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	141	1541	1244	1398	1656	764
v/s Ratio Prot	0.00	c0.12	0.28	c0.36	0.08	
v/s Ratio Perm	0.07			0.31		0.01
v/c Ratio	0.18	0.28	0.79	0.77	0.17	0.03
Uniform Delay, d1	41.9	24.2	37.8	5.4	19.7	18.3
Progression Factor	0.46	0.43	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.4	5.0	4.1	0.2	0.1
Delay (s)	19.7	10.9	42.8	9.5	19.9	18.4
Level of Service	B	B	D	A	B	B
Approach Delay (s)		11.4	24.4		19.7	
Approach LOS		B	C		B	
Intersection Summary						
HCM 2000 Control Delay			21.9		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.80			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	19.5
Intersection Capacity Utilization			83.9%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

Queues

16: Concord Rd & Site Access

10/27/2020



Lane Group	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	30	34	9	14	66	1286	11	350	16
v/c Ratio	0.35	0.26	0.10	0.12	0.07	0.41	0.03	0.21	0.01
Control Delay	68.6	22.2	58.4	26.2	1.5	2.1	1.5	1.5	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.6	22.2	58.4	26.2	1.5	2.1	1.5	1.5	0.0
Queue Length 50th (ft)	25	0	7	0	5	80	1	32	0
Queue Length 95th (ft)	57	34	26	22	14	123	m1	m46	m0
Internal Link Dist (ft)	382		246			410		568	
Turn Bay Length (ft)		125		100	100		100		200
Base Capacity (vph)	260	331	274	315	932	3163	348	1675	1615
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.10	0.03	0.04	0.07	0.41	0.03	0.21	0.01

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

16: Concord Rd & Site Access

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↗	↘		↗	↘	↘	↗↘		↘	↗	↘
Traffic Volume (vph)	27	1	31	6	2	13	61	1125	58	10	322	15
Future Volume (vph)	27	1	31	6	2	13	61	1125	58	10	322	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected		0.95	1.00		0.96	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1812	1615		1829	1615	1805	3550		1805	1881	1615
Flt Permitted		0.73	1.00		0.77	1.00	0.55	1.00		0.21	1.00	1.00
Satd. Flow (perm)		1381	1615		1457	1615	1047	3550		391	1881	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	29	1	34	7	2	14	66	1223	63	11	350	16
RTOR Reduction (vph)	0	0	32	0	0	13	0	1	0	0	0	0
Lane Group Flow (vph)	0	30	2	0	9	1	66	1285	0	11	350	16
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	custom
Protected Phases		4			8!			2			6	4!
Permitted Phases	4		4	8		8	2			6		6
Actuated Green, G (s)		7.0	7.0		7.0	7.0	114.0	114.0		114.0	114.0	121.0
Effective Green, g (s)		7.0	7.0		7.0	7.0	114.0	114.0		114.0	114.0	121.0
Actuated g/C Ratio		0.05	0.05		0.05	0.05	0.88	0.88		0.88	0.88	0.93
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		74	86		78	86	918	3113		342	1649	1615
v/s Ratio Prot								c0.36			0.19	0.00
v/s Ratio Perm		c0.02	0.00		0.01	0.00	0.06			0.03		0.01
v/c Ratio		0.41	0.02		0.12	0.01	0.07	0.41		0.03	0.21	0.01
Uniform Delay, d1		59.5	58.3		58.6	58.2	1.1	1.5		1.0	1.2	0.3
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		0.93	0.94	1.00
Incremental Delay, d2		3.6	0.1		0.7	0.0	0.2	0.4		0.1	0.2	0.0
Delay (s)		63.1	58.4		59.2	58.3	1.2	1.9		1.0	1.3	0.3
Level of Service		E	E		E	E	A	A		A	A	A
Approach Delay (s)		60.6			58.6			1.9			1.3	
Approach LOS		E			E			A			A	

Intersection Summary

HCM 2000 Control Delay	4.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		

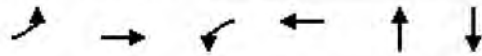
! Phase conflict between lane groups.

c Critical Lane Group

Queues

18: Kingston Pike & Lendon Welsch Way

10/27/2020



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	310	1620	46	1146	131	245
v/c Ratio	0.83	0.78	0.32	0.77	0.30	0.73
Control Delay	54.7	7.2	16.8	27.5	39.3	53.3
Queue Delay	0.0	0.5	0.0	0.0	0.0	0.0
Total Delay	54.7	7.7	16.8	27.5	39.3	53.3
Queue Length 50th (ft)	152	221	9	266	83	167
Queue Length 95th (ft)	m260	81	m20	393	143	#283
Internal Link Dist (ft)		449		746	93	431
Turn Bay Length (ft)	150		125			
Base Capacity (vph)	428	2082	146	1497	439	335
Starvation Cap Reductn	0	146	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.84	0.32	0.77	0.30	0.73

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

18: Kingston Pike & Lendon Welsch Way

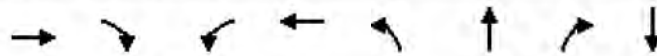
10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	285	1458	32	42	846	208	9	85	27	111	9	105
Future Volume (vph)	285	1458	32	42	846	208	9	85	27	111	9	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5			6.5			6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	0.97			0.97			0.94	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.98	
Satd. Flow (prot)	1687	3563		1805	3375			1836			1698	
Flt Permitted	0.10	1.00		0.08	1.00			0.97			0.74	
Satd. Flow (perm)	186	3563		160	3375			1784			1286	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	310	1585	35	46	920	226	10	92	29	121	10	114
RTOR Reduction (vph)	0	1	0	0	16	0	0	8	0	0	24	0
Lane Group Flow (vph)	310	1619	0	46	1130	0	0	123	0	0	221	0
Heavy Vehicles (%)	7%	1%	0%	0%	4%	3%	0%	0%	0%	1%	0%	4%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	85.5	74.6		61.5	57.1			31.5			31.5	
Effective Green, g (s)	85.5	74.6		61.5	57.1			31.5			31.5	
Actuated g/C Ratio	0.66	0.57		0.47	0.44			0.24			0.24	
Clearance Time (s)	6.5	6.5		6.5	6.5			6.5			6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	375	2044		131	1482			432			311	
v/s Ratio Prot	c0.14	c0.45		0.01	0.33							
v/s Ratio Perm	c0.40			0.15				0.07			c0.17	
v/c Ratio	0.83	0.79		0.35	0.76			0.29			0.71	
Uniform Delay, d1	32.2	21.6		21.6	30.7			40.1			45.1	
Progression Factor	1.57	0.24		0.97	0.78			1.00			1.00	
Incremental Delay, d2	9.6	2.2		1.2	2.9			1.7			7.2	
Delay (s)	60.3	7.4		22.1	27.0			41.7			52.3	
Level of Service	E	A		C	C			D			D	
Approach Delay (s)		15.9			26.8			41.7			52.3	
Approach LOS		B			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			23.1			HCM 2000 Level of Service					C	
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			19.5			
Intersection Capacity Utilization			81.8%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

22: Brooklawn St & Kingston Pike

10/27/2020



Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	1773	27	126	907	101	1	183	3
v/c Ratio	0.76	0.02	0.84	0.34	0.41	0.01	0.49	0.04
Control Delay	9.8	0.0	52.2	2.4	62.5	55.0	9.4	53.3
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	9.8	0.0	52.2	2.5	62.5	55.0	9.4	53.3
Queue Length 50th (ft)	187	0	49	47	42	1	0	2
Queue Length 95th (ft)	#898	m0	m#114	63	71	7	48	12
Internal Link Dist (ft)	937			449		417		100
Turn Bay Length (ft)		100	125		200		200	
Base Capacity (vph)	2344	1178	150	2640	498	270	370	254
Starvation Cap Reductn	0	0	0	552	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.02	0.84	0.43	0.20	0.00	0.49	0.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

22: Brooklawn St & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1631	25	116	831	4	93	1	168	1	1	1
Future Volume (vph)	0	1631	25	116	831	4	93	1	168	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5	6.5	6.5	6.5		6.5	6.5	6.5		6.5	
Lane Util. Factor		0.95	1.00	1.00	0.95		0.97	1.00	1.00		1.00	
Frt		1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.95	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (prot)		3539	1615	1805	3499		3502	1900	1599		1785	
Flt Permitted		1.00	1.00	0.06	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (perm)		3539	1615	105	3499		3502	1900	1599		1785	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1773	27	126	903	4	101	1	183	1	1	1
RTOR Reduction (vph)	0	0	10	0	0	0	0	0	162	0	1	0
Lane Group Flow (vph)	0	1773	17	126	907	0	101	1	21	0	2	0
Heavy Vehicles (%)	0%	2%	0%	0%	3%	25%	0%	0%	1%	0%	0%	0%
Turn Type	pm+pt	NA	custom	pm+pt	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2	3	1	6		8	8	1	4	4	
Permitted Phases	2		2	6					8			
Actuated Green, G (s)		78.3	81.6	90.3	90.3		9.1	9.1	14.6		1.3	
Effective Green, g (s)		78.3	81.6	90.3	90.3		9.1	9.1	14.6		1.3	
Actuated g/C Ratio		0.60	0.63	0.69	0.69		0.07	0.07	0.11		0.01	
Clearance Time (s)		6.5	6.5	6.5	6.5		6.5	6.5	6.5		6.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)		2131	1013	144	2430		245	133	179		17	
v/s Ratio Prot		0.50	c0.00	c0.04	0.26		c0.03	0.00	0.00		c0.00	
v/s Ratio Perm			0.01	c0.57					0.01			
v/c Ratio		0.83	0.02	0.88	0.37		0.41	0.01	0.11		0.12	
Uniform Delay, d1		20.6	9.1	43.5	8.2		57.9	56.2	51.9		63.8	
Progression Factor		0.45	1.00	0.58	0.33		1.00	1.00	1.00		1.00	
Incremental Delay, d2		2.1	0.0	29.0	0.3		1.1	0.0	0.3		3.1	
Delay (s)		11.3	9.1	54.4	3.0		59.0	56.3	52.2		66.9	
Level of Service		B	A	D	A		E	E	D		E	
Approach Delay (s)		11.3			9.2			54.6			66.9	
Approach LOS		B			A			D			E	
Intersection Summary												
HCM 2000 Control Delay			14.6			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			32.5			
Intersection Capacity Utilization			75.9%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th TWSC
9: Brooklawn St & Pinnacle Access

10/27/2020

Intersection												
Int Delay, s/veh	3.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	32	30	0	10	56	112	6	3	80	3
Future Vol, veh/h	0	0	32	30	0	10	56	112	6	3	80	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	70	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	35	33	0	11	61	122	7	3	87	3
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	348	346	89	360	344	126	90	0	0	129	0	0
Stage 1	95	95	-	248	248	-	-	-	-	-	-	-
Stage 2	253	251	-	112	96	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	607	577	969	596	579	924	1505	-	-	1457	-	-
Stage 1	912	816	-	756	701	-	-	-	-	-	-	-
Stage 2	751	699	-	893	815	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	580	552	969	556	554	924	1505	-	-	1457	-	-
Mov Cap-2 Maneuver	580	552	-	556	554	-	-	-	-	-	-	-
Stage 1	875	814	-	725	672	-	-	-	-	-	-	-
Stage 2	712	670	-	859	813	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	8.9		11.3		2.4		0.3					
HCM LOS	A		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	1505	-	-	969	617	1457	-	-				
HCM Lane V/C Ratio	0.04	-	-	0.036	0.07	0.002	-	-				
HCM Control Delay (s)	7.5	-	-	8.9	11.3	7.5	-	-				
HCM Lane LOS	A	-	-	A	B	A	-	-				
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.2	0	-	-				

HCM 6th TWSC
23: Petco Access & Brooklawn St

10/27/2020

Intersection

Int Delay, s/veh 4.1

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	40	75	35	10	77	66	56	3	2	29	2	30
Future Vol, veh/h	40	75	35	10	77	66	56	3	2	29	2	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	43	82	38	11	84	72	61	3	2	32	2	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	156	0	0	120	0	0	347	365	101	332	348	120
Stage 1	-	-	-	-	-	-	187	187	-	142	142	-
Stage 2	-	-	-	-	-	-	160	178	-	190	206	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1424	-	-	1468	-	-	607	563	954	621	576	931
Stage 1	-	-	-	-	-	-	815	745	-	861	779	-
Stage 2	-	-	-	-	-	-	842	752	-	812	731	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1424	-	-	1468	-	-	568	542	954	599	555	931
Mov Cap-2 Maneuver	-	-	-	-	-	-	568	542	-	599	555	-
Stage 1	-	-	-	-	-	-	791	723	-	835	774	-
Stage 2	-	-	-	-	-	-	804	747	-	782	709	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	2	0.5	12.1	10.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SERSWLn1
Capacity (veh/h)	574	1468	-	-	1424	-	724
HCM Lane V/C Ratio	0.116	0.007	-	-	0.031	-	0.092
HCM Control Delay (s)	12.1	7.5	-	-	7.6	-	10.5
HCM Lane LOS	B	A	-	-	A	-	B
HCM 95th %tile Q(veh)	0.4	0	-	-	0.1	-	0.3

HCM 6th Roundabout
26: Brooklawn St & Kroger Roundabout

10/27/2020

Intersection			
Intersection Delay, s/veh	3.4		
Intersection LOS	A		
Approach	EB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	12	132	109
Demand Flow Rate, veh/h	12	135	111
Vehicles Circulating, veh/h	89	3	4
Vehicles Exiting, veh/h	26	98	134
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	2.9	3.4	3.3
Approach LOS	A	A	A
Lane	Left	Left	Left
Designated Moves	LR	LT	TR
Assumed Moves	LR	LT	TR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	12	135	111
Cap Entry Lane, veh/h	1260	1376	1374
Entry HV Adj Factor	1.000	0.981	0.984
Flow Entry, veh/h	12	132	109
Cap Entry, veh/h	1260	1349	1353
V/C Ratio	0.010	0.098	0.081
Control Delay, s/veh	2.9	3.4	3.3
LOS	A	A	A
95th %tile Queue, veh	0	0	0

HCM 6th TWSC
30: Brooklawn St & Grocery Access

10/27/2020

Intersection

Int Delay, s/veh 1.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↗		↘	↘
Traffic Vol, veh/h	0	32	121	0	11	101
Future Vol, veh/h	0	32	121	0	11	101
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	35	132	0	12	110

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	-	132	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	6.22	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.318	-
Pot Cap-1 Maneuver	0	917	0
Stage 1	0	-	0
Stage 2	0	-	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	917	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.1	0	0.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBTWBLn1	SBL	SBT
Capacity (veh/h)	-	917	1453
HCM Lane V/C Ratio	-	0.038	0.008
HCM Control Delay (s)	-	9.1	7.5
HCM Lane LOS	-	A	A
HCM 95th %tile Q(veh)	-	0.1	0

Queues

1: Concord Rd/West End Ave & Kingston Pike

10/27/2020



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	50	1290	502	1746	153	78	376	126	152
v/c Ratio	0.36	1.01	0.98	0.83	0.64	0.51	0.67	0.31	0.70
Control Delay	18.5	44.1	73.6	26.8	71.5	67.8	27.6	57.0	60.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.5	44.1	73.6	26.8	71.5	67.8	27.6	57.0	60.2
Queue Length 50th (ft)	7	~453	~399	638	64	64	142	51	97
Queue Length 95th (ft)	m17	#720	#619	759	#136	114	220	87	167
Internal Link Dist (ft)		746		717		568			373
Turn Bay Length (ft)	150		150		180		300	180	
Base Capacity (vph)	138	1281	512	2096	239	259	563	401	277
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	1.01	0.98	0.83	0.64	0.30	0.67	0.31	0.55

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: Concord Rd/West End Ave & Kingston Pike

10/27/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	1139	48	462	1515	91	141	72	346	116	68	72
Future Volume (vph)	46	1139	48	462	1515	91	141	72	346	116	68	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		6.5	6.5	6.5	6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	1.00	1.00	0.97	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	1.00	0.85	1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3501		1770	3509		3335	1827	1538	3502	1745	
Flt Permitted	0.09	1.00		0.08	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	165	3501		141	3509		3335	1827	1538	3502	1745	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	1238	52	502	1647	99	153	78	376	126	74	78
RTOR Reduction (vph)	0	3	0	0	3	0	0	0	56	0	30	0
Lane Group Flow (vph)	50	1287	0	502	1743	0	153	78	320	126	122	0
Heavy Vehicles (%)	0%	2%	14%	2%	2%	2%	5%	4%	5%	0%	1%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2			6					8			
Actuated Green, G (s)	50.7	46.2		86.0	75.0		10.6	9.6	42.9	14.9	13.9	
Effective Green, g (s)	50.7	46.2		86.0	75.0		10.6	9.6	42.9	14.9	13.9	
Actuated g/C Ratio	0.39	0.36		0.66	0.58		0.08	0.07	0.33	0.11	0.11	
Clearance Time (s)	6.5	6.5		6.5	6.5		6.5	6.5	6.5	6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	121	1244		510	2024		271	134	507	401	186	
v/s Ratio Prot	0.01	0.37		c0.25	0.50		c0.05	0.04	0.16	c0.04	c0.07	
v/s Ratio Perm	0.15			c0.40					0.05			
v/c Ratio	0.41	1.03		0.98	0.86		0.56	0.58	0.63	0.31	0.65	
Uniform Delay, d1	27.1	41.9		40.9	23.1		57.5	58.3	36.8	52.9	55.7	
Progression Factor	0.82	0.44		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.8	32.2		35.5	5.1		2.7	6.3	2.6	0.5	8.0	
Delay (s)	24.0	50.8		76.5	28.2		60.2	64.6	39.4	53.3	63.7	
Level of Service	C	D		E	C		E	E	D	D	E	
Approach Delay (s)		49.8			39.0			47.9			59.0	
Approach LOS		D			D			D			E	
Intersection Summary												
HCM 2000 Control Delay		44.7			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.93										
Actuated Cycle Length (s)		130.0			Sum of lost time (s)			26.0				
Intersection Capacity Utilization		92.4%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

Queues

3: Kingston Pike & N Campbell Station Rd

10/27/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	487	1034	413	93	1376	542	384	523	472	715	701
v/c Ratio	1.39	0.68	0.45	0.37	1.19	0.66	1.45	1.04	1.29	1.03	0.96
Control Delay	224.3	33.1	3.8	26.5	120.9	13.7	246.2	76.4	192.6	92.9	54.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	224.3	33.1	3.8	26.5	120.9	13.7	246.2	76.4	192.6	92.9	54.6
Queue Length 50th (ft)	~498	365	0	44	~731	101	~446	~247	~506	~338	485
Queue Length 95th (ft)	#717	444	60	m38	#860	450	#622	#344	#720	#464	#754
Internal Link Dist (ft)		673			937			607		627	
Turn Bay Length (ft)	300		350	160		350	150		300		325
Base Capacity (vph)	350	1510	912	250	1156	821	265	502	365	694	732
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.39	0.68	0.45	0.37	1.19	0.66	1.45	1.04	1.29	1.03	0.96

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

3: Kingston Pike & N Campbell Station Rd

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	448	951	380	86	1266	499	353	412	69	434	658	645
Future Volume (vph)	448	951	380	86	1266	499	353	412	69	434	658	645
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3463		1770	3539	1583
Flt Permitted	0.12	1.00	1.00	0.28	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Satd. Flow (perm)	219	3539	1583	516	3539	1583	1863	3463		1863	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	487	1034	413	93	1376	542	384	448	75	472	715	701
RTOR Reduction (vph)	0	0	237	0	0	43	0	10	0	0	0	88
Lane Group Flow (vph)	487	1034	176	93	1376	499	384	513	0	472	715	613
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6	7	3	8		7	4	5
Permitted Phases	2		2	6		6	8			4		4
Actuated Green, G (s)	55.5	55.5	55.5	42.5	42.5	64.0	18.5	18.5		25.5	25.5	47.0
Effective Green, g (s)	55.5	55.5	55.5	42.5	42.5	64.0	18.5	18.5		25.5	25.5	47.0
Actuated g/C Ratio	0.43	0.43	0.43	0.33	0.33	0.49	0.14	0.14		0.20	0.20	0.36
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	350	1510	675	250	1156	779	265	492		365	694	651
v/s Ratio Prot	c0.23	0.29		0.02	c0.39	0.11	0.16	0.15		0.21	0.20	0.16
v/s Ratio Perm	c0.36		0.11	0.10		0.21	c0.05			c0.05		0.23
v/c Ratio	1.39	0.68	0.26	0.37	1.19	0.64	1.45	1.04		1.29	1.03	0.94
Uniform Delay, d1	40.0	30.2	24.0	35.9	43.8	24.5	56.2	55.8		51.4	52.2	40.2
Progression Factor	1.00	1.00	1.00	0.63	0.69	1.04	0.44	0.42		1.00	1.00	1.00
Incremental Delay, d2	192.8	2.5	0.9	0.6	91.5	1.2	221.5	51.3		150.9	42.1	21.9
Delay (s)	232.8	32.7	25.0	23.1	121.7	26.5	246.4	74.7		202.3	94.4	62.1
Level of Service	F	C	C	C	F	C	F	E		F	F	E
Approach Delay (s)		81.4			91.5			147.4			109.4	
Approach LOS		F			F			F			F	

Intersection Summary

HCM 2000 Control Delay	101.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.40		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	26.0
Intersection Capacity Utilization	119.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Queues

5: S Campbell Station Rd & Municipal Dr.

10/27/2020



Lane Group	EBL	SET	NWL	NWT
Lane Group Flow (vph)	230	1137	50	723
v/c Ratio	0.76	0.44	0.16	0.28
Control Delay	63.8	4.1	7.0	6.3
Queue Delay	0.0	0.1	0.0	0.0
Total Delay	63.8	4.2	7.0	6.3
Queue Length 50th (ft)	175	53	11	87
Queue Length 95th (ft)	249	m105	34	167
Internal Link Dist (ft)	392	607		1164
Turn Bay Length (ft)			70	
Base Capacity (vph)	530	2608	310	2576
Starvation Cap Reductn	0	460	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.43	0.53	0.16	0.28

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

5: S Campbell Station Rd & Municipal Dr.

10/27/2020



Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	150	62	943	103	46	665
Future Volume (vph)	150	62	943	103	46	665
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5		6.5		6.5	6.5
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.96		0.99		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1753		3543		1805	3505
Flt Permitted	0.97		1.00		0.22	1.00
Satd. Flow (perm)	1753		3543		422	3505
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	67	1025	112	50	723
RTOR Reduction (vph)	13	0	4	0	0	0
Lane Group Flow (vph)	217	0	1133	0	50	723
Heavy Vehicles (%)	0%	2%	0%	4%	0%	3%
Turn Type	Prot		NA		Perm	NA
Protected Phases	4		6			2
Permitted Phases					2	
Actuated Green, G (s)	21.4		95.6		95.6	95.6
Effective Green, g (s)	21.4		95.6		95.6	95.6
Actuated g/C Ratio	0.16		0.74		0.74	0.74
Clearance Time (s)	6.5		6.5		6.5	6.5
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	288		2605		310	2577
v/s Ratio Prot	c0.12		c0.32			0.21
v/s Ratio Perm					0.12	
v/c Ratio	0.75		0.43		0.16	0.28
Uniform Delay, d1	51.8		6.7		5.2	5.7
Progression Factor	1.00		0.52		0.88	0.95
Incremental Delay, d2	10.6		0.3		1.0	0.3
Delay (s)	62.3		3.8		5.6	5.7
Level of Service	E		A		A	A
Approach Delay (s)	62.3		3.8			5.7
Approach LOS	E		A			A

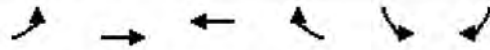
Intersection Summary

HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues

7: S Campbell Station Rd & Brooklawn St

10/27/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	86	1012	683	185	292	84
v/c Ratio	0.23	0.52	0.44	0.13	0.44	0.13
Control Delay	12.5	13.7	15.9	0.2	33.9	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.5	13.7	15.9	0.2	33.9	6.0
Queue Length 50th (ft)	21	144	79	0	185	0
Queue Length 95th (ft)	41	178	97	0	269	35
Internal Link Dist (ft)		1164	2181		270	
Turn Bay Length (ft)	175			125		200
Base Capacity (vph)	393	1965	1556	1401	659	643
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.52	0.44	0.13	0.44	0.13
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

7: S Campbell Station Rd & Brooklawn St

10/27/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↱↱	↰↰	↰	↰	↰
Traffic Volume (vph)	79	931	628	170	269	77
Future Volume (vph)	79	931	628	170	269	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	3574	3574	1615	1805	1615
Flt Permitted	0.28	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	529	3574	3574	1615	1805	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	86	1012	683	185	292	84
RTOR Reduction (vph)	0	0	0	37	0	53
Lane Group Flow (vph)	86	1012	683	148	292	31
Heavy Vehicles (%)	0%	1%	1%	0%	0%	0%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	71.5	71.5	56.6	104.1	47.5	47.5
Effective Green, g (s)	71.5	71.5	56.6	104.1	47.5	47.5
Actuated g/C Ratio	0.55	0.55	0.44	0.80	0.37	0.37
Clearance Time (s)	6.5	6.5	6.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	373	1965	1556	1293	659	590
v/s Ratio Prot	0.01	c0.28	0.19	0.04	c0.16	
v/s Ratio Perm	0.11			0.05		0.02
v/c Ratio	0.23	0.52	0.44	0.11	0.44	0.05
Uniform Delay, d1	15.3	18.4	25.6	2.8	31.2	26.7
Progression Factor	0.80	0.69	0.58	0.00	1.00	1.00
Incremental Delay, d2	0.3	0.9	0.8	0.2	2.2	0.2
Delay (s)	12.5	13.6	15.7	0.2	33.4	26.9
Level of Service	B	B	B	A	C	C
Approach Delay (s)		13.5	12.4		31.9	
Approach LOS		B	B		C	
Intersection Summary						
HCM 2000 Control Delay			16.0		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.51			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	17.5
Intersection Capacity Utilization			51.2%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Queues

11: S Campbell Station Rd & Concord Rd

10/27/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	75	1278	866	503	710	45
v/c Ratio	0.22	0.63	0.51	0.35	0.61	0.08
Control Delay	7.4	8.1	25.3	0.8	38.9	8.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.4	8.1	25.3	0.8	38.9	8.7
Queue Length 50th (ft)	13	148	269	0	257	0
Queue Length 95th (ft)	27	211	331	14	323	28
Internal Link Dist (ft)		2181	561		478	
Turn Bay Length (ft)	160			225	300	250
Base Capacity (vph)	340	2020	1712	1420	1160	554
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.63	0.51	0.35	0.61	0.08
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

11: S Campbell Station Rd & Concord Rd

10/27/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	69	1176	797	463	653	41
Future Volume (vph)	69	1176	797	463	653	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	3574	3574	1553	3467	1568
Flt Permitted	0.25	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	466	3574	3574	1553	3467	1568
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	1278	866	503	710	45
RTOR Reduction (vph)	0	0	0	99	0	30
Lane Group Flow (vph)	75	1278	866	404	710	15
Heavy Vehicles (%)	0%	1%	1%	4%	1%	3%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	73.5	73.5	61.0	104.5	43.5	43.5
Effective Green, g (s)	73.5	73.5	61.0	104.5	43.5	43.5
Actuated g/C Ratio	0.57	0.57	0.47	0.80	0.33	0.33
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	325	2020	1677	1326	1160	524
v/s Ratio Prot	0.01	c0.36	0.24	0.10	c0.20	
v/s Ratio Perm	0.12			0.16		0.01
v/c Ratio	0.23	0.63	0.52	0.30	0.61	0.03
Uniform Delay, d1	23.6	19.1	24.2	3.3	36.2	29.1
Progression Factor	0.39	0.35	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	1.4	1.1	0.6	2.4	0.1
Delay (s)	9.5	8.0	25.3	3.9	38.6	29.2
Level of Service	A	A	C	A	D	C
Approach Delay (s)		8.1	17.4		38.0	
Approach LOS		A	B		D	
Intersection Summary						
HCM 2000 Control Delay			18.3		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.66			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	19.5
Intersection Capacity Utilization			62.0%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Queues

16: Concord Rd & Site Access

10/27/2020



Lane Group	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	36	68	91	84	55	529	12	617	42
v/c Ratio	0.20	0.24	0.47	0.28	0.10	0.20	0.02	0.43	0.03
Control Delay	27.8	9.5	34.5	9.3	3.9	3.2	3.5	5.1	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.8	9.5	34.5	9.3	3.9	3.2	3.5	5.1	0.0
Queue Length 50th (ft)	13	0	35	0	5	27	1	80	0
Queue Length 95th (ft)	37	30	75	33	18	53	6	168	0
Internal Link Dist (ft)	382		246			410		568	
Turn Bay Length (ft)		125		100	100		100		200
Base Capacity (vph)	417	578	454	583	575	2676	667	1450	1615
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.12	0.20	0.14	0.10	0.20	0.02	0.43	0.03

Intersection Summary

HCM Signalized Intersection Capacity Analysis

16: Concord Rd & Site Access

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	1	63	74	10	77	51	452	35	11	568	39
Future Volume (vph)	32	1	63	74	10	77	51	452	35	11	568	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected		0.95	1.00		0.96	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1812	1615		1820	1599	1805	3467		1805	1881	1615
Flt Permitted		0.67	1.00		0.73	1.00	0.39	1.00		0.46	1.00	1.00
Satd. Flow (perm)		1266	1615		1379	1599	746	3467		866	1881	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	1	68	80	11	84	55	491	38	12	617	42
RTOR Reduction (vph)	0	0	60	0	0	74	0	5	0	0	0	0
Lane Group Flow (vph)	0	36	8	0	91	10	55	524	0	12	617	42
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	3%	3%	0%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	custom
Protected Phases		4			8!			2			6	4!
Permitted Phases	4		4	8		8	2			6		6
Actuated Green, G (s)		8.4	8.4		8.4	8.4	51.7	51.7		51.7	51.7	60.1
Effective Green, g (s)		8.4	8.4		8.4	8.4	51.7	51.7		51.7	51.7	60.1
Actuated g/C Ratio		0.12	0.12		0.12	0.12	0.75	0.75		0.75	0.75	0.87
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		153	196		167	194	558	2593		647	1407	1615
v/s Ratio Prot								0.15			c0.33	0.00
v/s Ratio Perm		0.03	0.01		c0.07	0.01	0.07			0.01		0.02
v/c Ratio		0.24	0.04		0.54	0.05	0.10	0.20		0.02	0.44	0.03
Uniform Delay, d1		27.4	26.8		28.6	26.8	2.4	2.6		2.2	3.3	0.6
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.8	0.1		3.6	0.1	0.4	0.2		0.1	1.0	0.0
Delay (s)		28.2	26.9		32.2	26.9	2.7	2.8		2.3	4.3	0.6
Level of Service		C	C		C	C	A	A		A	A	A
Approach Delay (s)		27.4			29.7			2.8			4.0	
Approach LOS		C			C			A			A	

Intersection Summary

HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	69.1	Sum of lost time (s)	9.0
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		

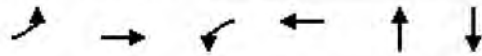
! Phase conflict between lane groups.

c Critical Lane Group

Queues

18: Kingston Pike & Lendon Welsch Way

10/27/2020



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	39	1432	91	1944	130	83
v/c Ratio	0.32	0.63	0.36	0.82	0.50	0.30
Control Delay	20.3	3.5	4.8	6.4	39.4	22.2
Queue Delay	0.0	0.3	0.0	1.1	0.1	0.0
Total Delay	20.3	3.8	4.8	7.5	39.4	22.2
Queue Length 50th (ft)	3	37	9	130	63	18
Queue Length 95th (ft)	m18	42	m12	144	132	69
Internal Link Dist (ft)		449		746	93	431
Turn Bay Length (ft)	150		125			
Base Capacity (vph)	129	2285	264	2376	259	273
Starvation Cap Reductn	0	294	0	39	0	0
Spillback Cap Reductn	0	0	0	211	2	3
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.72	0.34	0.90	0.51	0.31

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

18: Kingston Pike & Lendon Welsch Way

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	1261	56	84	1757	31	46	2	72	17	6	53
Future Volume (vph)	36	1261	56	84	1757	31	46	2	72	17	6	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5			6.5			6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	0.99		1.00	1.00			0.92			0.91	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.99	
Satd. Flow (prot)	1570	3511		1805	3523			1713			1626	
Flt Permitted	0.05	1.00		0.13	1.00			0.84			0.91	
Satd. Flow (perm)	79	3511		242	3523			1467			1499	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	1371	61	91	1910	34	50	2	78	18	7	58
RTOR Reduction (vph)	0	3	0	0	1	0	0	41	0	0	49	0
Lane Group Flow (vph)	39	1429	0	91	1943	0	0	89	0	0	34	0
Heavy Vehicles (%)	15%	2%	6%	0%	2%	14%	0%	0%	0%	12%	0%	3%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	87.9	83.2		94.3	86.4			19.4			19.4	
Effective Green, g (s)	87.9	83.2		94.3	86.4			19.4			19.4	
Actuated g/C Ratio	0.68	0.64		0.73	0.66			0.15			0.15	
Clearance Time (s)	6.5	6.5		6.5	6.5			6.5			6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	107	2247		270	2341			218			223	
v/s Ratio Prot	0.01	0.41		c0.02	c0.55							
v/s Ratio Perm	0.23			0.22				c0.06			0.02	
v/c Ratio	0.36	0.64		0.34	0.83			0.41			0.15	
Uniform Delay, d1	41.1	14.2		20.5	16.3			50.1			48.1	
Progression Factor	0.85	0.18		0.27	0.26			1.00			1.00	
Incremental Delay, d2	1.7	1.1		0.5	2.4			5.6			0.3	
Delay (s)	36.6	3.7		6.0	6.6			55.7			48.4	
Level of Service	D	A		A	A			E			D	
Approach Delay (s)		4.6			6.6			55.7			48.4	
Approach LOS		A			A			E			D	
Intersection Summary												
HCM 2000 Control Delay	8.4			HCM 2000 Level of Service			A					
HCM 2000 Volume to Capacity ratio	0.74											
Actuated Cycle Length (s)	130.0			Sum of lost time (s)			19.5					
Intersection Capacity Utilization	82.0%			ICU Level of Service			E					
Analysis Period (min)	15											
c Critical Lane Group												

Queues

22: Brooklawn St & Kingston Pike

10/27/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	3	1212	129	241	1761	279	1	218	11
v/c Ratio	0.02	0.67	0.14	0.89	0.79	0.66	0.00	0.43	0.12
Control Delay	4.0	10.2	0.7	46.9	13.3	62.4	48.0	5.6	49.3
Queue Delay	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0
Total Delay	4.0	10.2	0.7	46.9	14.0	62.4	48.0	5.6	49.3
Queue Length 50th (ft)	0	75	0	82	97	117	1	0	6
Queue Length 95th (ft)	m1	m253	m10	m#212	#1002	160	7	41	26
Internal Link Dist (ft)		937			449		417		100
Turn Bay Length (ft)	125		100	125		200		200	
Base Capacity (vph)	143	1796	950	272	2242	504	273	509	255
Starvation Cap Reductn	0	0	0	0	179	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.67	0.14	0.89	0.85	0.55	0.00	0.43	0.04

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

22: Brooklawn St & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 		 				 	
Traffic Volume (vph)	3	1115	119	222	1617	3	257	1	201	4	3	4
Future Volume (vph)	3	1115	119	222	1617	3	257	1	201	4	3	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5		6.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.97	1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1805	3539	1615	1787	3573		3502	1900	1615		1774	
Flt Permitted	0.07	1.00	1.00	0.11	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (perm)	134	3539	1615	205	3573		3502	1900	1615		1774	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	1212	129	241	1758	3	279	1	218	4	3	4
RTOR Reduction (vph)	0	0	67	0	0	0	0	0	164	0	4	0
Lane Group Flow (vph)	3	1212	62	241	1761	0	279	1	54	0	7	0
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	custom	pm+pt	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2	3	1	6		8	8	1	4	4	
Permitted Phases	2		2	6					8			
Actuated Green, G (s)	58.0	56.9	62.4	80.1	72.5		15.6	15.6	32.3		2.8	
Effective Green, g (s)	58.0	56.9	62.4	80.1	72.5		15.6	15.6	32.3		2.8	
Actuated g/C Ratio	0.45	0.44	0.48	0.62	0.56		0.12	0.12	0.25		0.02	
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5		6.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	73	1548	775	329	1992		420	228	401		38	
v/s Ratio Prot	0.00	0.34	c0.00	c0.09	c0.49		c0.08	0.00	0.02		c0.00	
v/s Ratio Perm	0.02		0.03	0.36					0.02			
v/c Ratio	0.04	0.78	0.08	0.73	0.88		0.66	0.00	0.14		0.19	
Uniform Delay, d1	60.1	31.3	18.3	38.6	25.1		54.7	50.4	38.0		62.5	
Progression Factor	0.28	0.35	0.41	0.60	0.50		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.1	1.8	0.0	4.9	3.7		3.9	0.0	0.2		2.4	
Delay (s)	16.7	12.9	7.4	27.9	16.2		58.6	50.4	38.1		64.9	
Level of Service	B	B	A	C	B		E	D	D		E	
Approach Delay (s)		12.4			17.6			49.6			64.9	
Approach LOS		B			B			D			E	
Intersection Summary												
HCM 2000 Control Delay			20.0			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			32.5			
Intersection Capacity Utilization			79.2%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

1: Concord Rd/West End Ave & Kingston Pike

10/27/2020



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	50	1290	502	1746	153	78	376	126	152
v/c Ratio	0.36	1.01	0.98	0.83	0.64	0.51	0.40	0.31	0.70
Control Delay	17.6	45.6	73.6	26.8	71.5	67.8	17.3	57.0	60.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.6	45.6	73.6	26.8	71.5	67.8	17.3	57.0	60.2
Queue Length 50th (ft)	7	~456	~399	638	64	64	70	51	97
Queue Length 95th (ft)	m18	#720	#619	759	#136	114	103	87	167
Internal Link Dist (ft)		746		717		568			373
Turn Bay Length (ft)	150		150		180		300	180	
Base Capacity (vph)	138	1281	512	2096	239	259	949	401	277
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	1.01	0.98	0.83	0.64	0.30	0.40	0.31	0.55

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: Concord Rd/West End Ave & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	1139	48	462	1515	91	141	72	346	116	68	72
Future Volume (vph)	46	1139	48	462	1515	91	141	72	346	116	68	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5		6.5	6.5	6.5	6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	1.00	0.88	0.97	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	1.00	0.85	1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3501		1770	3509		3335	1827	2707	3502	1745	
Flt Permitted	0.09	1.00		0.08	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	165	3501		141	3509		3335	1827	2707	3502	1745	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	1238	52	502	1647	99	153	78	376	126	74	78
RTOR Reduction (vph)	0	3	0	0	3	0	0	0	56	0	30	0
Lane Group Flow (vph)	50	1287	0	502	1743	0	153	78	320	126	122	0
Heavy Vehicles (%)	0%	2%	14%	2%	2%	2%	5%	4%	5%	0%	1%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2			6					8			
Actuated Green, G (s)	50.7	46.2		86.0	75.0		10.6	9.6	42.9	14.9	13.9	
Effective Green, g (s)	50.7	46.2		86.0	75.0		10.6	9.6	42.9	14.9	13.9	
Actuated g/C Ratio	0.39	0.36		0.66	0.58		0.08	0.07	0.33	0.11	0.11	
Clearance Time (s)	6.5	6.5		6.5	6.5		6.5	6.5	6.5	6.5	6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	121	1244		510	2024		271	134	893	401	186	
v/s Ratio Prot	0.01	0.37		c0.25	0.50		c0.05	0.04	0.09	c0.04	c0.07	
v/s Ratio Perm	0.15			c0.40					0.03			
v/c Ratio	0.41	1.03		0.98	0.86		0.56	0.58	0.36	0.31	0.65	
Uniform Delay, d1	27.1	41.9		40.9	23.1		57.5	58.3	33.1	52.9	55.7	
Progression Factor	0.76	0.48		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.8	32.2		35.5	5.1		2.7	6.3	0.2	0.5	8.0	
Delay (s)	22.5	52.4		76.5	28.2		60.2	64.6	33.3	53.3	63.7	
Level of Service	C	D		E	C		E	E	C	D	E	
Approach Delay (s)		51.3			39.0			44.1			59.0	
Approach LOS		D			D			D			E	
Intersection Summary												
HCM 2000 Control Delay			44.6			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			26.0			
Intersection Capacity Utilization			92.4%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Queues

3: Kingston Pike & N Campbell Station Rd

10/27/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	487	1034	413	93	1376	542	384	523	472	715	701
v/c Ratio	0.81	0.60	0.43	0.35	0.98	0.63	1.15	0.94	0.93	1.03	1.00
Control Delay	43.4	25.8	4.4	16.4	39.1	8.3	119.3	50.6	79.1	92.9	66.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.4	25.8	4.4	16.4	39.1	8.3	119.3	50.6	79.1	92.9	66.9
Queue Length 50th (ft)	154	323	18	35	544	79	~196	242	193	~338	~509
Queue Length 95th (ft)	#222	392	77	m21	#744	267	#236	#320	#298	#464	#781
Internal Link Dist (ft)		673			937			607		627	
Turn Bay Length (ft)	300		350	160		350	150		300		325
Base Capacity (vph)	600	1728	963	267	1401	860	335	555	509	694	699
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.60	0.43	0.35	0.98	0.63	1.15	0.94	0.93	1.03	1.00

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

3: Kingston Pike & N Campbell Station Rd

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	448	951	380	86	1266	499	353	412	69	434	658	645
Future Volume (vph)	448	951	380	86	1266	499	353	412	69	434	658	645
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95		0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	3433	3463		3433	3539	1583
Flt Permitted	0.09	1.00	1.00	0.28	1.00	1.00	0.33	1.00		0.46	1.00	1.00
Satd. Flow (perm)	321	3539	1583	516	3539	1583	1205	3463		1656	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	487	1034	413	93	1376	542	384	448	75	472	715	701
RTOR Reduction (vph)	0	0	190	0	0	69	0	10	0	0	0	91
Lane Group Flow (vph)	487	1034	223	93	1376	473	384	513	0	472	715	610
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6	7	3	8		7	4	5
Permitted Phases	2		2	6		6	8			4		4
Actuated Green, G (s)	63.5	63.5	63.5	51.5	51.5	65.0	20.5	20.5		25.5	25.5	44.0
Effective Green, g (s)	63.5	63.5	63.5	51.5	51.5	65.0	20.5	20.5		25.5	25.5	44.0
Actuated g/C Ratio	0.49	0.49	0.49	0.40	0.40	0.50	0.16	0.16		0.20	0.20	0.34
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	599	1728	773	267	1401	791	335	546		509	694	614
v/s Ratio Prot	0.12	0.29		0.02	c0.39	0.06	0.07	c0.15		0.10	c0.20	c0.14
v/s Ratio Perm	0.28		0.14	0.12		0.24	0.11			0.09		0.24
v/c Ratio	0.81	0.60	0.29	0.35	0.98	0.60	1.15	0.94		0.93	1.03	0.99
Uniform Delay, d1	36.4	24.0	19.8	28.9	38.8	23.2	53.4	54.1		50.3	52.2	42.8
Progression Factor	1.00	1.00	1.00	0.46	0.58	0.60	0.43	0.43		1.00	1.00	1.00
Incremental Delay, d2	8.3	1.5	0.9	0.5	15.4	0.8	94.3	25.6		23.1	42.1	34.4
Delay (s)	44.7	25.6	20.7	13.8	37.9	14.7	117.1	48.9		73.3	94.4	77.2
Level of Service	D	C	C	B	D	B	F	D		E	F	E
Approach Delay (s)		29.4			30.6			77.8			82.8	
Approach LOS		C			C			E			F	

Intersection Summary

HCM 2000 Control Delay	51.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	26.0
Intersection Capacity Utilization	101.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Queues

5: S Campbell Station Rd & Municipal Dr.

10/27/2020



Lane Group	EBL	SET	NWL	NWT
Lane Group Flow (vph)	230	1137	50	723
v/c Ratio	0.76	0.44	0.16	0.28
Control Delay	63.8	4.0	10.3	9.7
Queue Delay	0.0	0.1	0.0	0.0
Total Delay	63.8	4.1	10.3	9.7
Queue Length 50th (ft)	175	71	11	87
Queue Length 95th (ft)	249	m101	72	354
Internal Link Dist (ft)	392	607		1164
Turn Bay Length (ft)			70	
Base Capacity (vph)	530	2608	310	2576
Starvation Cap Reductn	0	427	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.43	0.52	0.16	0.28

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

5: S Campbell Station Rd & Municipal Dr.

10/27/2020



Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	150	62	943	103	46	665
Future Volume (vph)	150	62	943	103	46	665
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5		6.5		6.5	6.5
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.96		0.99		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1753		3543		1805	3505
Flt Permitted	0.97		1.00		0.22	1.00
Satd. Flow (perm)	1753		3543		422	3505
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	67	1025	112	50	723
RTOR Reduction (vph)	13	0	4	0	0	0
Lane Group Flow (vph)	217	0	1133	0	50	723
Heavy Vehicles (%)	0%	2%	0%	4%	0%	3%
Turn Type	Prot		NA		Perm	NA
Protected Phases	4		6			2
Permitted Phases					2	
Actuated Green, G (s)	21.4		95.6		95.6	95.6
Effective Green, g (s)	21.4		95.6		95.6	95.6
Actuated g/C Ratio	0.16		0.74		0.74	0.74
Clearance Time (s)	6.5		6.5		6.5	6.5
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	288		2605		310	2577
v/s Ratio Prot	c0.12		c0.32			0.21
v/s Ratio Perm					0.12	
v/c Ratio	0.75		0.43		0.16	0.28
Uniform Delay, d1	51.8		6.7		5.2	5.7
Progression Factor	1.00		0.51		1.35	1.50
Incremental Delay, d2	10.6		0.3		1.0	0.3
Delay (s)	62.3		3.8		8.0	8.8
Level of Service	E		A		A	A
Approach Delay (s)	62.3		3.8			8.8
Approach LOS	E		A			A

Intersection Summary

HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues

7: S Campbell Station Rd & Brooklawn St

10/27/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	86	1012	683	185	292	84
v/c Ratio	0.23	0.52	0.44	0.13	0.44	0.13
Control Delay	11.0	12.4	15.9	0.2	33.9	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.0	12.4	15.9	0.2	33.9	6.0
Queue Length 50th (ft)	20	133	79	0	185	0
Queue Length 95th (ft)	38	165	97	0	269	35
Internal Link Dist (ft)		1164	2181		270	
Turn Bay Length (ft)	175			125		200
Base Capacity (vph)	393	1965	1556	1401	659	643
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.52	0.44	0.13	0.44	0.13
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

7: S Campbell Station Rd & Brooklawn St

10/27/2020

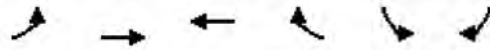


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑	↑↑	↱	↰	↱
Traffic Volume (vph)	79	931	628	170	269	77
Future Volume (vph)	79	931	628	170	269	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	3574	3574	1615	1805	1615
Flt Permitted	0.28	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	529	3574	3574	1615	1805	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	86	1012	683	185	292	84
RTOR Reduction (vph)	0	0	0	37	0	53
Lane Group Flow (vph)	86	1012	683	148	292	31
Heavy Vehicles (%)	0%	1%	1%	0%	0%	0%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	71.5	71.5	56.6	104.1	47.5	47.5
Effective Green, g (s)	71.5	71.5	56.6	104.1	47.5	47.5
Actuated g/C Ratio	0.55	0.55	0.44	0.80	0.37	0.37
Clearance Time (s)	6.5	6.5	6.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	373	1965	1556	1293	659	590
v/s Ratio Prot	0.01	c0.28	0.19	0.04	c0.16	
v/s Ratio Perm	0.11			0.05		0.02
v/c Ratio	0.23	0.52	0.44	0.11	0.44	0.05
Uniform Delay, d1	15.3	18.4	25.6	2.8	31.2	26.7
Progression Factor	0.69	0.62	0.58	0.00	1.00	1.00
Incremental Delay, d2	0.3	0.9	0.8	0.2	2.2	0.2
Delay (s)	10.9	12.3	15.7	0.2	33.4	26.9
Level of Service	B	B	B	A	C	C
Approach Delay (s)		12.2	12.4		31.9	
Approach LOS		B	B		C	
Intersection Summary						
HCM 2000 Control Delay			15.4		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.51			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	17.5
Intersection Capacity Utilization			51.2%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Queues

11: S Campbell Station Rd & Concord Rd

10/27/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	75	1278	866	503	710	45
v/c Ratio	0.22	0.63	0.51	0.35	0.61	0.08
Control Delay	7.9	8.4	25.3	0.8	38.9	8.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.9	8.4	25.3	0.8	38.9	8.7
Queue Length 50th (ft)	14	162	269	0	257	0
Queue Length 95th (ft)	27	212	331	14	323	28
Internal Link Dist (ft)		2181	561		478	
Turn Bay Length (ft)	160			225	300	250
Base Capacity (vph)	340	2020	1712	1420	1160	554
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.63	0.51	0.35	0.61	0.08
Intersection Summary						

HCM Signalized Intersection Capacity Analysis

11: S Campbell Station Rd & Concord Rd

10/27/2020



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	←	↑↑	↑↑	↑	←	↑
Traffic Volume (vph)	69	1176	797	463	653	41
Future Volume (vph)	69	1176	797	463	653	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	3574	3574	1553	3467	1568
Flt Permitted	0.25	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	466	3574	3574	1553	3467	1568
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	1278	866	503	710	45
RTOR Reduction (vph)	0	0	0	99	0	30
Lane Group Flow (vph)	75	1278	866	404	710	15
Heavy Vehicles (%)	0%	1%	1%	4%	1%	3%
Turn Type	pm+pt	NA	NA	pm+ov	Prot	Perm
Protected Phases	1	6	2	8	8	
Permitted Phases	6			2		8
Actuated Green, G (s)	73.5	73.5	61.0	104.5	43.5	43.5
Effective Green, g (s)	73.5	73.5	61.0	104.5	43.5	43.5
Actuated g/C Ratio	0.57	0.57	0.47	0.80	0.33	0.33
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	325	2020	1677	1326	1160	524
v/s Ratio Prot	0.01	c0.36	0.24	0.10	c0.20	
v/s Ratio Perm	0.12			0.16		0.01
v/c Ratio	0.23	0.63	0.52	0.30	0.61	0.03
Uniform Delay, d1	23.6	19.1	24.2	3.3	36.2	29.1
Progression Factor	0.42	0.36	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	1.4	1.1	0.6	2.4	0.1
Delay (s)	10.3	8.3	25.3	3.9	38.6	29.2
Level of Service	B	A	C	A	D	C
Approach Delay (s)		8.4	17.4		38.0	
Approach LOS		A	B		D	
Intersection Summary						
HCM 2000 Control Delay			18.4		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.66			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	19.5
Intersection Capacity Utilization			62.0%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Queues

16: Concord Rd & Site Access

10/27/2020



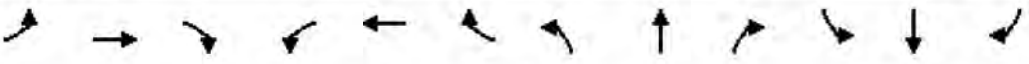
Lane Group	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	36	68	91	84	55	529	12	617	42
v/c Ratio	0.20	0.24	0.47	0.28	0.10	0.20	0.02	0.43	0.03
Control Delay	27.8	9.5	34.5	9.3	3.9	3.2	3.5	5.1	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.8	9.5	34.5	9.3	3.9	3.2	3.5	5.1	0.0
Queue Length 50th (ft)	13	0	35	0	5	27	1	80	0
Queue Length 95th (ft)	37	30	75	33	18	53	6	168	0
Internal Link Dist (ft)	382		246			410		568	
Turn Bay Length (ft)		125		100	100		100		200
Base Capacity (vph)	417	578	454	583	575	2676	667	1450	1615
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.12	0.20	0.14	0.10	0.20	0.02	0.43	0.03

Intersection Summary

HCM Signalized Intersection Capacity Analysis

16: Concord Rd & Site Access

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔	↔	↔		↔	↔	↔
Traffic Volume (vph)	32	1	63	74	10	77	51	452	35	11	568	39
Future Volume (vph)	32	1	63	74	10	77	51	452	35	11	568	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected		0.95	1.00		0.96	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1812	1615		1820	1599	1805	3467		1805	1881	1615
Flt Permitted		0.67	1.00		0.73	1.00	0.39	1.00		0.46	1.00	1.00
Satd. Flow (perm)		1266	1615		1379	1599	746	3467		866	1881	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	1	68	80	11	84	55	491	38	12	617	42
RTOR Reduction (vph)	0	0	60	0	0	74	0	5	0	0	0	0
Lane Group Flow (vph)	0	36	8	0	91	10	55	524	0	12	617	42
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	3%	3%	0%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	custom
Protected Phases		4			8!			2			6	4!
Permitted Phases	4		4	8		8	2			6		6
Actuated Green, G (s)		8.4	8.4		8.4	8.4	51.7	51.7		51.7	51.7	60.1
Effective Green, g (s)		8.4	8.4		8.4	8.4	51.7	51.7		51.7	51.7	60.1
Actuated g/C Ratio		0.12	0.12		0.12	0.12	0.75	0.75		0.75	0.75	0.87
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		153	196		167	194	558	2593		647	1407	1615
v/s Ratio Prot								0.15			c0.33	0.00
v/s Ratio Perm		0.03	0.01		c0.07	0.01	0.07			0.01		0.02
v/c Ratio		0.24	0.04		0.54	0.05	0.10	0.20		0.02	0.44	0.03
Uniform Delay, d1		27.4	26.8		28.6	26.8	2.4	2.6		2.2	3.3	0.6
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.8	0.1		3.6	0.1	0.4	0.2		0.1	1.0	0.0
Delay (s)		28.2	26.9		32.2	26.9	2.7	2.8		2.3	4.3	0.6
Level of Service		C	C		C	C	A	A		A	A	A
Approach Delay (s)		27.4			29.7			2.8			4.0	
Approach LOS		C			C			A			A	

Intersection Summary

HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	69.1	Sum of lost time (s)	9.0
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		

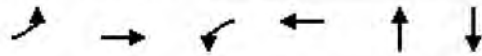
! Phase conflict between lane groups.

c Critical Lane Group

Queues

18: Kingston Pike & Lendon Welsch Way

10/27/2020



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	39	1432	91	1944	130	83
v/c Ratio	0.32	0.63	0.36	0.82	0.50	0.30
Control Delay	19.7	3.2	4.8	6.4	39.4	22.2
Queue Delay	0.0	0.2	0.0	1.1	0.1	0.0
Total Delay	19.7	3.5	4.8	7.5	39.4	22.2
Queue Length 50th (ft)	1	37	9	130	63	18
Queue Length 95th (ft)	m18	44	m12	144	132	69
Internal Link Dist (ft)		449		746	93	431
Turn Bay Length (ft)	150		125			
Base Capacity (vph)	129	2285	264	2376	259	273
Starvation Cap Reductn	0	242	0	39	0	0
Spillback Cap Reductn	0	0	0	210	2	3
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.70	0.34	0.90	0.51	0.31

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

18: Kingston Pike & Lendon Welsch Way

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	1261	56	84	1757	31	46	2	72	17	6	53
Future Volume (vph)	36	1261	56	84	1757	31	46	2	72	17	6	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5		6.5	6.5			6.5			6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	0.99		1.00	1.00			0.92			0.91	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.99	
Satd. Flow (prot)	1570	3511		1805	3523			1713			1626	
Flt Permitted	0.05	1.00		0.13	1.00			0.84			0.91	
Satd. Flow (perm)	79	3511		242	3523			1467			1499	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	1371	61	91	1910	34	50	2	78	18	7	58
RTOR Reduction (vph)	0	3	0	0	1	0	0	41	0	0	49	0
Lane Group Flow (vph)	39	1429	0	91	1943	0	0	89	0	0	34	0
Heavy Vehicles (%)	15%	2%	6%	0%	2%	14%	0%	0%	0%	12%	0%	3%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	87.9	83.2		94.3	86.4			19.4			19.4	
Effective Green, g (s)	87.9	83.2		94.3	86.4			19.4			19.4	
Actuated g/C Ratio	0.68	0.64		0.73	0.66			0.15			0.15	
Clearance Time (s)	6.5	6.5		6.5	6.5			6.5			6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	107	2247		270	2341			218			223	
v/s Ratio Prot	0.01	0.41		c0.02	c0.55							
v/s Ratio Perm	0.23			0.22				c0.06			0.02	
v/c Ratio	0.36	0.64		0.34	0.83			0.41			0.15	
Uniform Delay, d1	41.1	14.2		20.5	16.3			50.1			48.1	
Progression Factor	0.81	0.16		0.27	0.26			1.00			1.00	
Incremental Delay, d2	1.7	1.1		0.5	2.4			5.6			0.3	
Delay (s)	35.1	3.4		6.0	6.6			55.7			48.4	
Level of Service	D	A		A	A			E			D	
Approach Delay (s)		4.3			6.6			55.7			48.4	
Approach LOS		A			A			E			D	
Intersection Summary												
HCM 2000 Control Delay	8.3			HCM 2000 Level of Service			A					
HCM 2000 Volume to Capacity ratio	0.74											
Actuated Cycle Length (s)	130.0			Sum of lost time (s)			19.5					
Intersection Capacity Utilization	82.0%			ICU Level of Service			E					
Analysis Period (min)	15											
c Critical Lane Group												

Queues

22: Brooklawn St & Kingston Pike

10/27/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	3	1212	129	241	1761	279	1	218	11
v/c Ratio	0.02	0.67	0.14	0.89	0.79	0.66	0.00	0.43	0.12
Control Delay	4.7	12.7	0.6	46.3	12.4	62.4	48.0	5.6	49.3
Queue Delay	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0
Total Delay	4.7	12.7	0.6	46.3	13.0	62.4	48.0	5.6	49.3
Queue Length 50th (ft)	0	107	0	87	81	117	1	0	6
Queue Length 95th (ft)	m1	m407	m8	m#212	#1002	160	7	41	26
Internal Link Dist (ft)		937			449		417		100
Turn Bay Length (ft)	125		100	125		200		200	
Base Capacity (vph)	143	1796	950	272	2242	504	273	509	255
Starvation Cap Reductn	0	0	0	0	179	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.67	0.14	0.89	0.85	0.55	0.00	0.43	0.04

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

22: Brooklawn St & Kingston Pike

10/27/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	1115	119	222	1617	3	257	1	201	4	3	4
Future Volume (vph)	3	1115	119	222	1617	3	257	1	201	4	3	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5		6.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.97	1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1805	3539	1615	1787	3573		3502	1900	1615		1774	
Flt Permitted	0.07	1.00	1.00	0.11	1.00		0.95	1.00	1.00		0.98	
Satd. Flow (perm)	134	3539	1615	205	3573		3502	1900	1615		1774	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	1212	129	241	1758	3	279	1	218	4	3	4
RTOR Reduction (vph)	0	0	67	0	0	0	0	0	164	0	4	0
Lane Group Flow (vph)	3	1212	62	241	1761	0	279	1	54	0	7	0
Heavy Vehicles (%)	0%	2%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	custom	pm+pt	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	5	2	3	1	6		8	8	1	4	4	
Permitted Phases	2		2	6					8			
Actuated Green, G (s)	58.0	56.9	62.4	80.1	72.5		15.6	15.6	32.3		2.8	
Effective Green, g (s)	58.0	56.9	62.4	80.1	72.5		15.6	15.6	32.3		2.8	
Actuated g/C Ratio	0.45	0.44	0.48	0.62	0.56		0.12	0.12	0.25		0.02	
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5		6.5	6.5	6.5		6.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	73	1548	775	329	1992		420	228	401		38	
v/s Ratio Prot	0.00	0.34	c0.00	c0.09	c0.49		c0.08	0.00	0.02		c0.00	
v/s Ratio Perm	0.02		0.03	0.36					0.02			
v/c Ratio	0.04	0.78	0.08	0.73	0.88		0.66	0.00	0.14		0.19	
Uniform Delay, d1	60.1	31.3	18.3	38.6	25.1		54.7	50.4	38.0		62.5	
Progression Factor	0.32	0.43	0.25	0.58	0.44		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.2	2.8	0.0	4.9	3.7		3.9	0.0	0.2		2.4	
Delay (s)	19.7	16.3	4.7	27.2	14.9		58.6	50.4	38.1		64.9	
Level of Service	B	B	A	C	B		E	D	D		E	
Approach Delay (s)		15.2			16.4			49.6			64.9	
Approach LOS		B			B			D			E	
Intersection Summary												
HCM 2000 Control Delay			20.4			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)			32.5			
Intersection Capacity Utilization			79.2%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th TWSC
9: Brooklawn St & Pinnacle Access

10/27/2020

Intersection												
Int Delay, s/veh	3.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	4	0	78	25	0	8	87	171	20	10	254	9
Future Vol, veh/h	4	0	78	25	0	8	87	171	20	10	254	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	70	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	0	85	27	0	9	95	186	22	11	276	10

Major/Minor	Minor2		Minor1		Major1		Major2		Major2		Major2	
Conflicting Flow All	695	701	281	733	695	197	286	0	0	208	0	0
Stage 1	303	303	-	387	387	-	-	-	-	-	-	-
Stage 2	392	398	-	346	308	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	357	363	758	336	366	844	1276	-	-	1363	-	-
Stage 1	706	664	-	637	610	-	-	-	-	-	-	-
Stage 2	633	603	-	670	660	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	331	334	758	280	336	844	1276	-	-	1363	-	-
Mov Cap-2 Maneuver	331	334	-	280	336	-	-	-	-	-	-	-
Stage 1	654	659	-	590	565	-	-	-	-	-	-	-
Stage 2	580	558	-	590	655	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	10.8		17.1		2.5		0.3	
HCM LOS	B		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1276	-	-	713 334	1363	-	-
HCM Lane V/C Ratio	0.074	-	-	0.125 0.107	0.008	-	-
HCM Control Delay (s)	8	-	-	10.8 17.1	7.7	-	-
HCM Lane LOS	A	-	-	B C	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.4 0.4	0	-	-

HCM 6th TWSC
23: Petco Access & Brooklawn St

10/27/2020

Intersection

Int Delay, s/veh 13.7

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	72	166	69	18	127	79	175	10	26	105	20	100
Future Vol, veh/h	72	166	69	18	127	79	175	10	26	105	20	100
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	78	180	75	20	138	86	190	11	28	114	22	109

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	224	0	0	255	0	0	661	638	218	614	632	181
Stage 1	-	-	-	-	-	-	374	374	-	221	221	-
Stage 2	-	-	-	-	-	-	287	264	-	393	411	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1345	-	-	1310	-	-	376	394	822	404	398	862
Stage 1	-	-	-	-	-	-	647	618	-	781	720	-
Stage 2	-	-	-	-	-	-	720	690	-	632	595	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1345	-	-	1310	-	-	297	366	822	360	369	862
Mov Cap-2 Maneuver	-	-	-	-	-	-	297	366	-	360	369	-
Stage 1	-	-	-	-	-	-	609	582	-	736	709	-
Stage 2	-	-	-	-	-	-	601	680	-	564	560	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	1.8	0.6	38.5	19.6
HCM LOS			E	C

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SERSWLn1
Capacity (veh/h)	326	1310	-	-	1345	-	487
HCM Lane V/C Ratio	0.704	0.015	-	-	0.058	-	0.502
HCM Control Delay (s)	38.5	7.8	-	-	7.8	-	19.6
HCM Lane LOS	E	A	-	-	A	-	C
HCM 95th %tile Q(veh)	5	0	-	-	0.2	-	2.8

HCM 6th Roundabout
26: Brooklawn St & Kroger Roundabout

10/27/2020

Intersection			
Intersection Delay, s/veh	4.3		
Intersection LOS	A		
Approach	EB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	89	201	285
Demand Flow Rate, veh/h	91	205	291
Vehicles Circulating, veh/h	242	33	23
Vehicles Exiting, veh/h	72	300	215
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	4.2	4.0	4.6
Approach LOS	A	A	A
Lane	Left	Left	Left
Designated Moves	LR	LT	TR
Assumed Moves	LR	LT	TR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	91	205	291
Cap Entry Lane, veh/h	1078	1334	1348
Entry HV Adj Factor	0.978	0.983	0.980
Flow Entry, veh/h	89	201	285
Cap Entry, veh/h	1054	1311	1321
V/C Ratio	0.084	0.154	0.216
Control Delay, s/veh	4.2	4.0	4.6
LOS	A	A	A
95th %tile Queue, veh	0	1	1

HCM 6th TWSC
30: Brooklawn St & Grocery Access

10/27/2020

Intersection

Int Delay, s/veh 1

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations		↗	↘	↑	↑	
Traffic Vol, veh/h	0	29	34	262	194	0
Future Vol, veh/h	0	29	34	262	194	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	50	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	32	37	285	211	0

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	-	211	211
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	6.22	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.318	2.218
Pot Cap-1 Maneuver	0	829	1360
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	829	1360
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

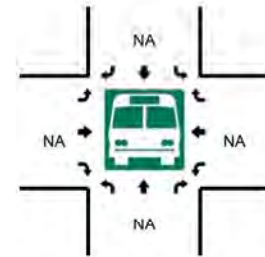
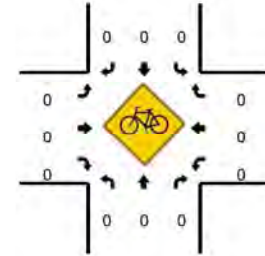
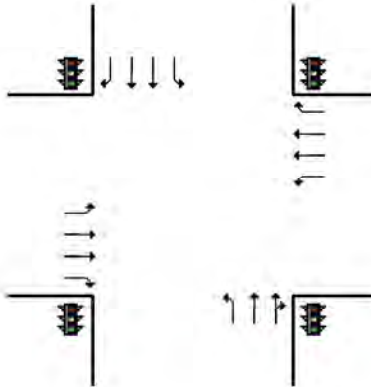
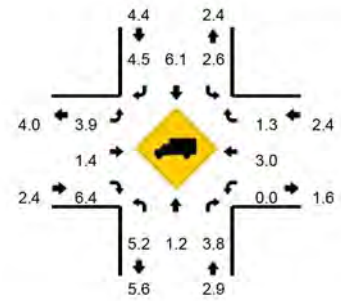
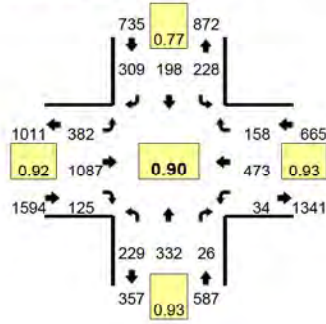
Approach	WB	SE	NW
HCM Control Delay, s	9.5	0.9	0
HCM LOS	A		

Minor Lane/Major Mvmt	NWTWBLn1	SEL	SET
Capacity (veh/h)	-	829	1360
HCM Lane V/C Ratio	-	0.038	0.027
HCM Control Delay (s)	-	9.5	7.7
HCM Lane LOS	-	A	A
HCM 95th %tile Q(veh)	-	0.1	0.1

LOCATION: N Campbell Station -- Kingston Pike
CITY/STATE: Farragut, TN

QC JOB #: 13729569
DATE: Thu, Apr 14 2016

Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM



15-Min Count Period Beginning At	N Campbell Station (Northbound)				N Campbell Station (Southbound)				Kingston Pike (Eastbound)				Kingston Pike (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	22	58	3	0	23	19	23	0	75	173	23	0	2	42	34	0	497	
7:15 AM	43	94	10	0	45	25	36	0	87	242	21	0	6	85	50	0	744	
7:30 AM	59	89	5	0	59	54	76	0	92	261	33	0	3	112	30	0	873	
7:45 AM	71	82	4	0	64	63	112	0	98	297	33	0	10	127	33	0	994	3108
8:00 AM	43	81	8	0	56	37	56	0	107	294	32	0	10	110	46	0	880	3491
8:15 AM	56	80	9	0	49	44	65	0	85	235	27	0	11	124	49	0	834	3581
8:30 AM	48	90	21	0	45	34	63	0	79	163	35	0	20	115	56	0	769	3477
8:45 AM	59	75	11	0	58	52	71	0	79	162	33	0	11	103	35	0	749	3232

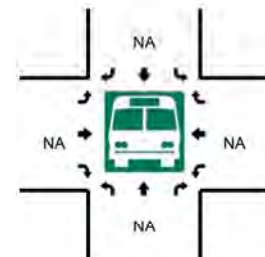
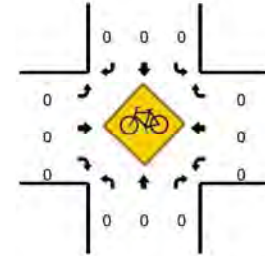
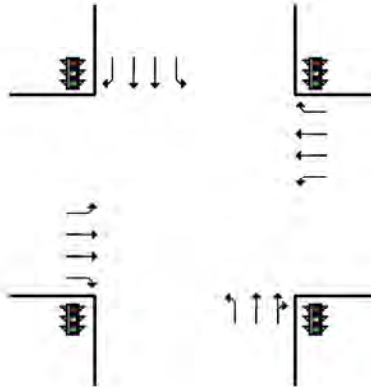
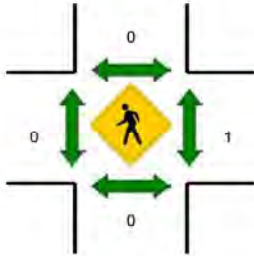
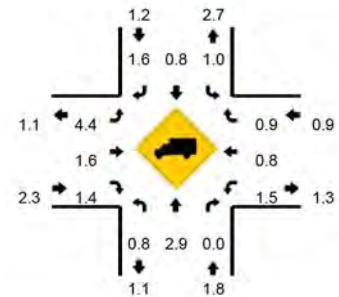
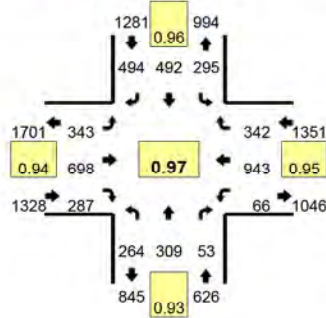
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	284	328	16	0	256	252	448	0	392	1188	132	0	40	508	132	0	3976
Heavy Trucks	12	4	0	0	4	8	4	0	24	16	8	0	0	12	0	0	92
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Railroad																	
Stopped Buses																	

Comments:

LOCATION: N Campbell Station -- Kingston Pike
CITY/STATE: Farragut, TN

QC JOB #: 13729571
DATE: Thu, Apr 14 2016

Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:00 PM -- 5:15 PM



15-Min Count Period Beginning At	N Campbell Station (Northbound)				N Campbell Station (Southbound)				Kingston Pike (Eastbound)				Kingston Pike (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
2:00 PM	51	69	22	0	74	67	71	0	69	148	41	0	29	193	71	0	905	
2:15 PM	52	51	14	0	64	80	81	0	61	181	48	0	20	177	86	0	915	
2:30 PM	44	68	20	0	62	73	81	0	71	146	51	0	14	193	75	0	898	
2:45 PM	64	46	18	0	84	77	93	0	58	141	46	0	18	214	84	0	943	3661
3:00 PM	70	74	27	0	85	88	84	0	72	156	63	0	16	186	80	0	1001	3757
3:15 PM	41	67	19	0	71	77	83	0	88	201	66	0	21	192	62	0	988	3830
3:30 PM	68	71	26	0	78	105	76	0	67	180	50	0	20	232	88	0	1061	3993
3:45 PM	50	59	16	0	64	48	93	0	72	160	61	0	16	259	92	0	990	4040
4:00 PM	72	80	20	0	86	124	109	0	55	125	59	0	22	236	82	0	1070	4109
4:15 PM	56	69	13	0	61	99	96	0	79	154	55	0	15	252	84	0	1033	4154
4:30 PM	50	85	18	0	63	93	104	0	66	114	48	0	14	192	87	0	934	4027
4:45 PM	49	54	18	0	66	102	116	0	87	182	54	0	27	262	98	0	1115	4152
5:00 PM	67	83	15	0	70	144	121	0	75	175	102	0	18	242	76	0	1188	4270
5:15 PM	62	57	18	0	72	116	130	0	94	179	66	0	17	236	97	0	1144	4381
5:30 PM	69	87	13	0	79	119	130	0	82	155	47	0	11	224	77	0	1093	4540
5:45 PM	66	82	7	0	74	113	113	0	92	189	72	0	20	241	92	0	1161	4586

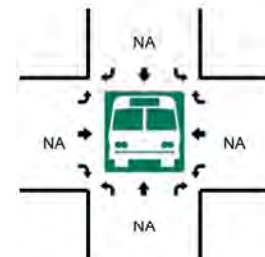
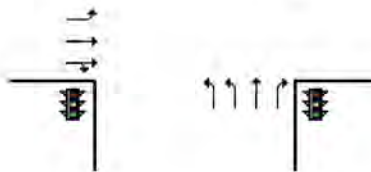
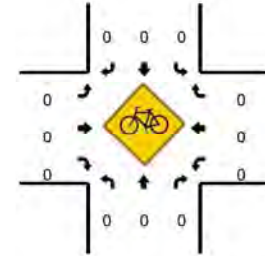
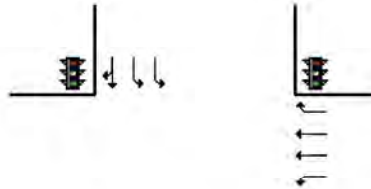
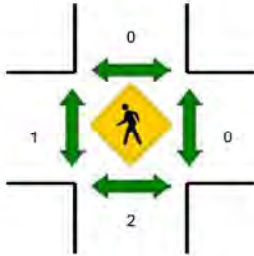
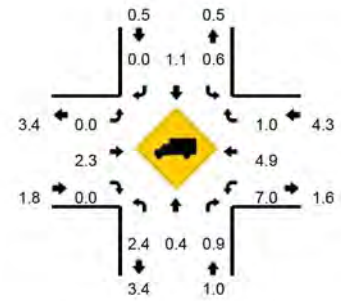
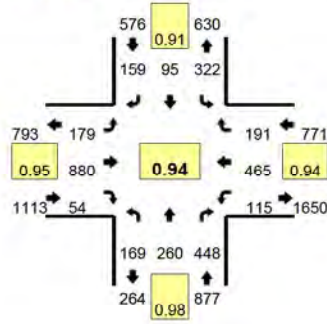
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	268	332	60	0	280	576	484	0	300	700	408	0	72	968	304	0	4752
Heavy Trucks	4	4	0	0	8	0	12	0	16	8	8	0	0	8	4	0	72
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Railroad																	
Stopped Buses																	

Comments:

LOCATION: West End Ave/Concord Rd -- Kingston Pike
CITY/STATE: Knoxville, TN

QC JOB #: 13729562
DATE: Thu, Apr 14 2016

Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM



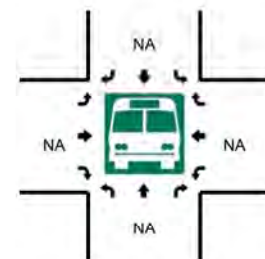
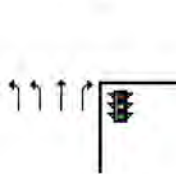
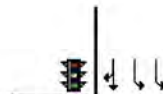
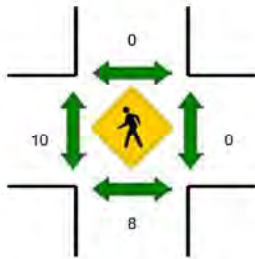
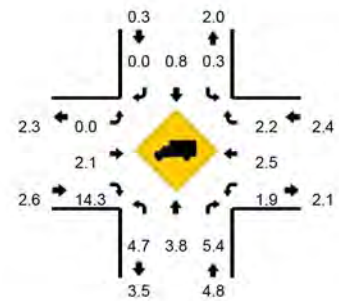
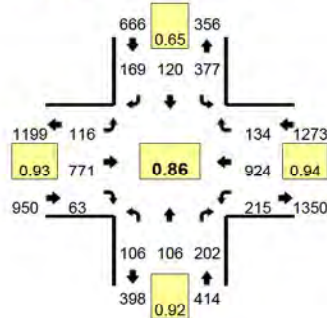
15-Min Count Period Beginning At	West End Ave/Concord Rd (Northbound)				West End Ave/Concord Rd (Southbound)				Kingston Pike (Eastbound)				Kingston Pike (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	13	46	77	0	24	8	17	0	30	122	4	0	17	63	44	0	465	
7:15 AM	24	79	128	0	52	15	34	0	56	182	9	0	10	105	71	0	765	
7:30 AM	36	48	149	0	68	24	34	0	41	247	5	0	17	124	43	0	836	
7:45 AM	44	66	112	0	97	26	36	0	42	245	11	0	27	134	45	0	885	2951
8:00 AM	47	85	93	0	75	22	41	0	60	210	19	0	32	106	52	0	842	3328
8:15 AM	42	61	94	0	82	23	48	0	36	178	19	0	39	101	51	0	774	3337
8:30 AM	20	10	111	0	28	16	18	0	9	205	7	0	31	124	15	0	594	3095
8:45 AM	14	9	103	0	20	4	6	0	9	203	7	0	30	132	9	0	546	2756
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	176	264	448	0	388	104	144	0	168	980	44	0	108	536	180	0	3540	
Heavy Trucks	8	4	8	0	4	4	0	0	0	4	0	0	16	32	4	0	84	
Pedestrians	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	4	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: West End Ave/Concord Rd -- Kingston Pike
CITY/STATE: Knoxville, TN

QC JOB #: 13729564
DATE: Thu, Apr 14 2016

Peak-Hour: 3:15 PM -- 4:15 PM
Peak 15-Min: 3:45 PM -- 4:00 PM



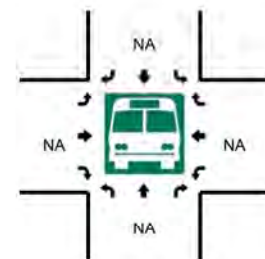
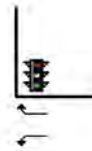
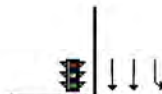
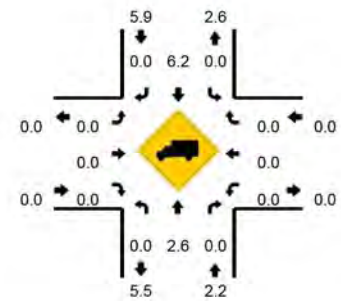
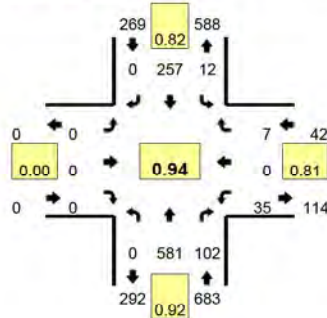
15-Min Count Period Beginning At	West End Ave/Concord Rd (Northbound)				West End Ave/Concord Rd (Southbound)				Kingston Pike (Eastbound)				Kingston Pike (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
2:00 PM	20	12	45	0	33	15	23	0	18	199	9	0	45	230	32	0	681	
2:15 PM	25	18	61	0	24	10	18	0	30	168	11	0	45	206	22	0	638	
2:30 PM	11	17	49	0	26	14	14	0	29	189	9	0	54	226	33	0	671	
2:45 PM	15	16	54	0	43	30	53	0	19	173	10	0	53	218	29	0	713	2703
3:00 PM	14	24	56	0	34	12	27	0	31	203	7	0	40	206	41	0	695	2717
3:15 PM	30	38	47	0	41	21	14	0	34	189	11	0	42	222	55	0	744	2823
3:30 PM	25	31	40	0	119	33	68	0	36	194	21	0	49	223	27	0	866	3018
3:45 PM	28	20	59	0	159	40	59	0	24	223	21	0	68	233	30	0	964	3269
4:00 PM	23	17	56	0	58	26	28	0	22	165	10	0	56	246	22	0	729	3303
4:15 PM	17	15	57	0	32	22	21	0	10	196	10	0	71	247	21	0	719	3278
4:30 PM	25	10	61	0	27	21	35	0	11	155	14	0	67	242	19	0	687	3099
4:45 PM	26	14	45	0	23	26	22	0	9	184	13	0	64	284	19	0	729	2864
5:00 PM	36	14	63	0	25	12	7	0	6	207	6	0	79	276	15	0	746	2881
5:15 PM	21	18	59	0	25	16	16	0	9	218	9	0	94	259	21	0	765	2927
5:30 PM	28	20	55	0	31	19	20	0	15	184	11	0	92	293	26	0	794	3034
5:45 PM	23	13	68	0	24	15	22	0	12	212	11	0	89	279	21	0	789	3094
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	112	80	236	0	636	160	236	0	96	892	84	0	272	932	120	0	3856	
Heavy Trucks	4	0	8		4	4	0		0	24	28		4	12	0		88	
Pedestrians		16				0				0				0			16	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: N Campbell Station -- Brooklawn St
CITY/STATE: Farragut, TN

QC JOB #: 13729507
DATE: Thu, Apr 14 2016

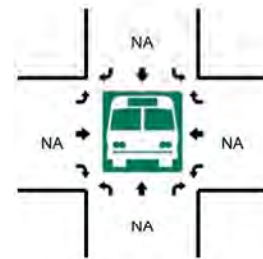
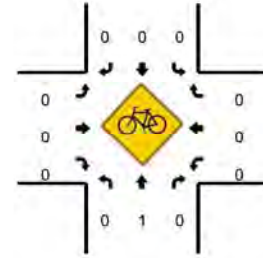
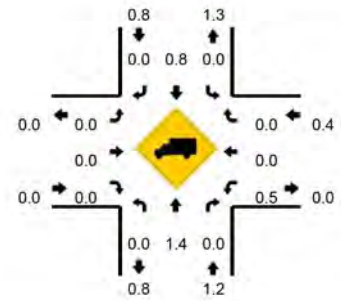
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:30 AM -- 7:45 AM



15-Min Count Period Beginning At	N Campbell Station (Northbound)				N Campbell Station (Southbound)				Brooklawn St (Eastbound)				Brooklawn St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	83	12	0	4	39	0	0	0	0	0	0	1	0	1	0	140	
7:15 AM	0	162	23	0	2	52	0	0	0	0	0	0	4	0	3	0	246	
7:30 AM	0	153	17	0	3	81	0	0	0	0	0	0	9	0	1	0	264	
7:45 AM	0	144	16	0	0	71	0	0	0	0	0	0	9	0	2	0	242	892
8:00 AM	0	122	46	0	7	53	0	0	0	0	0	0	13	0	1	0	242	994
8:15 AM	0	136	29	0	8	51	0	0	0	0	0	0	15	0	3	0	242	990
8:30 AM	0	153	9	0	6	64	0	0	0	0	0	0	12	0	1	0	245	971
8:45 AM	0	125	15	0	4	65	0	0	0	0	0	0	10	0	3	0	222	951
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	612	68	0	12	324	0	0	0	0	0	0	36	0	4	0	1056	
Heavy Trucks	0	16	0	0	0	8	0	0	0	0	0	0	0	0	0	0	24	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Comments:

QC JOB #: 13729509
DATE: Thu, Apr 14 2016

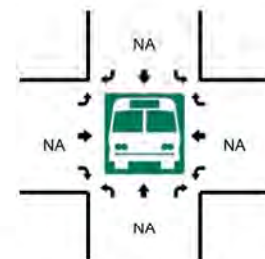
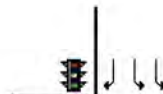
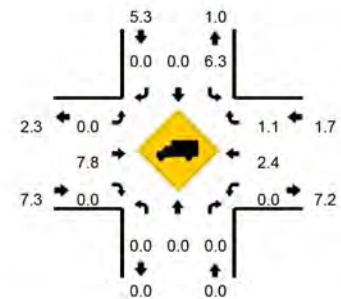
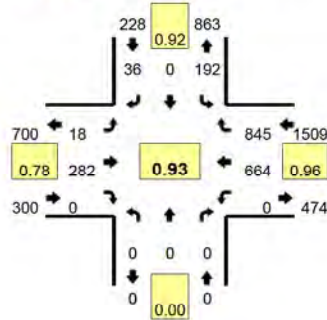
[illegible]

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>) 1-877-580-2212

LOCATION: Concord Rd -- S Campbell Station Rd
CITY/STATE: Farragut, TN

QC JOB #: 13729510
DATE: Thu, Apr 14 2016

Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:45 AM -- 8:00 AM



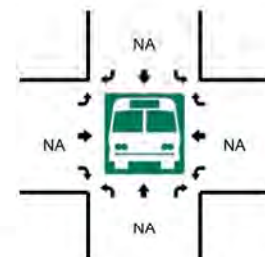
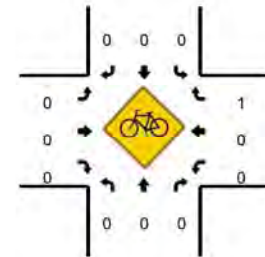
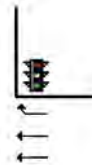
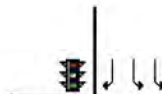
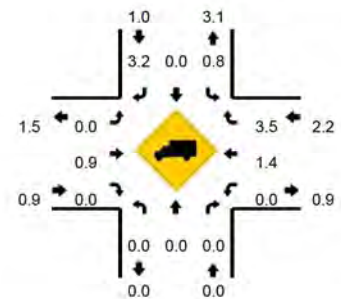
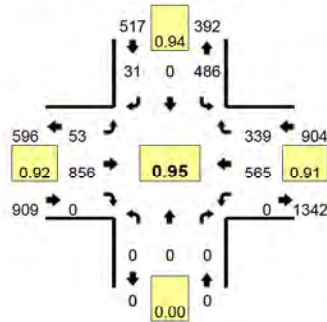
15-Min Count Period Beginning At	Concord Rd (Northbound)				Concord Rd (Southbound)				S Campbell Station Rd (Eastbound)				S Campbell Station Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	0	0	24	0	8	0	2	41	0	0	0	89	139	0	303	
7:15 AM	0	0	0	0	29	0	12	0	2	46	0	0	0	179	195	0	463	
7:30 AM	0	0	0	0	36	0	9	0	8	68	0	0	0	167	227	0	515	
7:45 AM	0	0	0	0	66	0	10	0	2	100	0	0	0	151	216	0	545	1826
8:00 AM	0	0	0	0	61	0	5	0	6	68	0	0	0	167	207	0	514	2037
8:15 AM	0	0	0	0	63	0	13	0	3	60	0	0	0	156	163	0	458	2032
8:30 AM	0	0	0	0	56	0	6	0	9	72	0	0	0	152	107	0	402	1919
8:45 AM	0	0	0	0	46	0	11	0	7	75	0	0	0	126	62	0	327	1701
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	0	0	0	264	0	40	0	8	400	0	0	0	604	864	0	2180	
Heavy Trucks	0	0	0	0	20	0	0	0	0	24	0	0	0	24	16	0	84	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Comments:

LOCATION: Concord Rd -- S Campbell Station Rd
CITY/STATE: Farragut, TN

QC JOB #: 13729512
DATE: Thu, Apr 14 2016

Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:15 PM -- 5:30 PM



15-Min Count Period Beginning At	Concord Rd (Northbound)				Concord Rd (Southbound)				S Campbell Station Rd (Eastbound)				S Campbell Station Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	107	0	11	0	21	168	0	0	0	100	77	0	484	
4:15 PM	0	0	0	0	89	0	11	0	7	174	0	0	0	117	73	0	471	
4:30 PM	0	0	0	0	104	0	12	0	17	163	0	0	0	107	75	0	478	
4:45 PM	0	0	0	0	84	0	9	0	13	181	0	0	0	102	88	0	477	1910
5:00 PM	0	0	0	0	123	0	10	0	12	236	0	0	0	134	76	0	591	2017
5:15 PM	0	0	0	0	132	0	5	0	15	215	0	0	0	150	97	0	614	2160
5:30 PM	0	0	0	0	127	0	9	0	10	195	0	0	0	135	88	0	564	2246
5:45 PM	0	0	0	0	104	0	7	0	16	210	0	0	0	146	78	0	561	2330

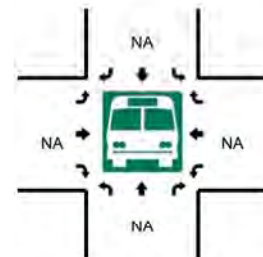
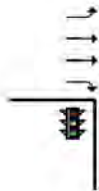
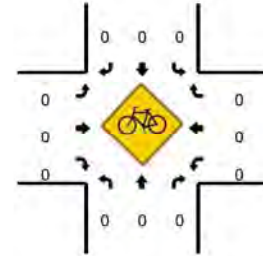
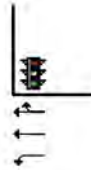
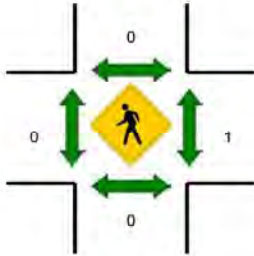
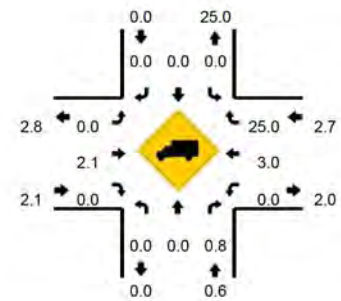
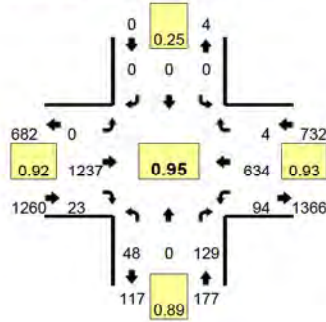
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	528	0	20	0	60	860	0	0	0	600	388	0	2456
Heavy Trucks	0	0	0	0	4	0	0	0	0	4	0	0	0	4	12	0	24
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Comments:

LOCATION: Brooklawn St -- Kingston Pike
CITY/STATE: Knoxville, TN

QC JOB #: 13729519
DATE: Thu, Apr 14 2016

Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM



15-Min Count Period Beginning At	Brooklawn St (Northbound)				Brooklawn St (Southbound)				Kingston Pike (Eastbound)				Kingston Pike (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	8	0	13	0	0	0	0	0	0	177	1	0	8	71	1	0	279	
7:15 AM	9	0	19	0	0	0	0	0	0	277	4	0	12	131	3	0	455	
7:30 AM	5	0	27	0	0	0	0	0	0	308	2	0	17	146	2	0	507	
7:45 AM	8	0	42	0	0	0	0	0	0	325	8	0	20	166	1	0	570	1811
8:00 AM	13	0	30	0	0	0	0	0	0	339	7	0	27	151	1	0	568	2100
8:15 AM	22	0	30	0	0	0	0	0	0	265	6	0	30	171	0	0	524	2169
8:30 AM	22	0	18	0	1	0	0	0	0	193	7	0	23	160	0	0	424	2086
8:45 AM	17	0	24	0	0	0	0	0	0	205	4	0	8	134	0	0	392	1908

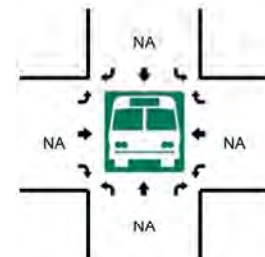
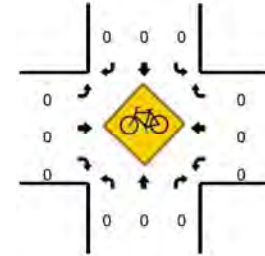
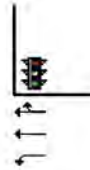
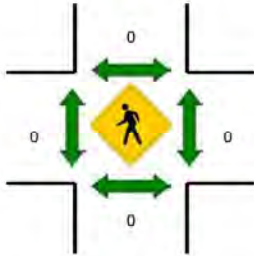
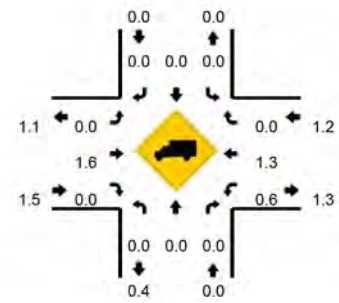
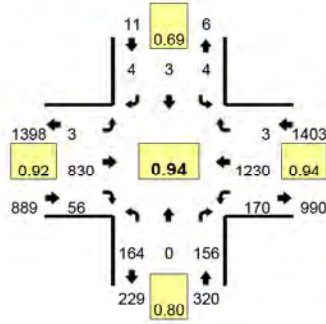
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	32	0	168	0	0	0	0	0	0	1300	32	0	80	664	4	0	2280
Heavy Trucks	0	0	4	0	0	0	0	0	0	28	0	0	0	16	0	0	48
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Railroad																	
Stopped Buses																	

Comments:

LOCATION: Brooklawn St -- Kingston Pike
CITY/STATE: Knoxville, TN

QC JOB #: 13729521
DATE: Thu, Apr 14 2016

Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:45 PM -- 6:00 PM



15-Min Count Period Beginning At	Brooklawn St (Northbound)				Brooklawn St (Southbound)				Kingston Pike (Eastbound)				Kingston Pike (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	38	0	36	0	0	0	0	0	1	175	15	0	57	310	1	0	633	
4:15 PM	63	2	38	0	0	0	2	0	0	185	11	0	47	277	1	0	626	
4:30 PM	51	0	25	0	0	1	1	0	0	165	7	0	41	273	0	0	564	
4:45 PM	44	2	24	0	0	1	0	0	2	221	10	0	37	328	0	0	669	2492
5:00 PM	44	0	38	0	1	1	2	0	2	215	13	0	32	296	2	0	646	2505
5:15 PM	39	0	33	0	1	0	1	0	0	209	15	0	42	300	1	0	641	2520
5:30 PM	37	0	49	0	2	1	0	0	0	180	14	0	46	312	0	0	641	2597
5:45 PM	44	0	36	0	0	1	1	0	1	226	14	0	50	322	0	0	695	2623

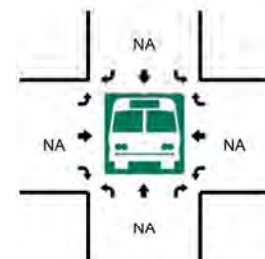
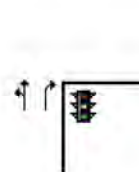
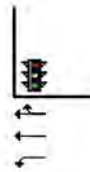
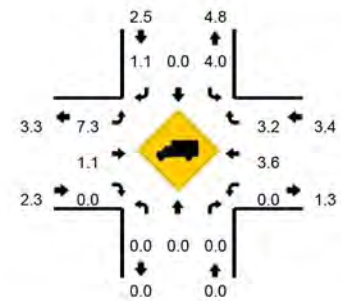
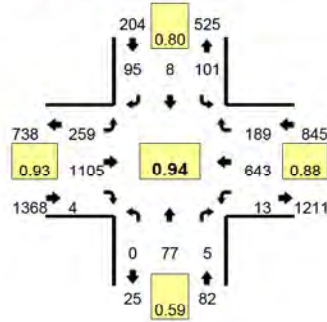
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	176	0	144	0	0	4	4	0	4	904	56	0	200	1288	0	0	2780
Heavy Trucks	0	0	0	0	0	0	0	0	0	8	0	0	0	8	0	0	16
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Railroad																	
Stopped Buses																	

Comments:

LOCATION: Lendon Welsh Way -- Kingston Pike
CITY/STATE: Farragut, TN

QC JOB #: 13729565
DATE: Thu, Apr 14 2016

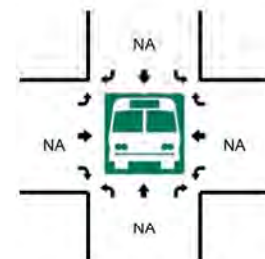
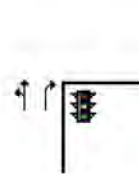
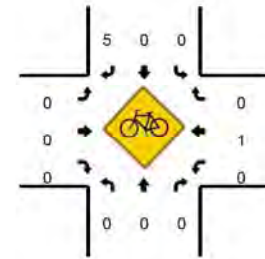
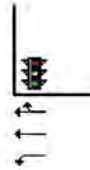
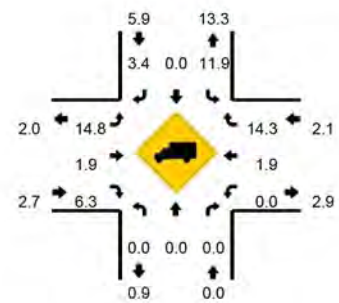
Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 8:00 AM -- 8:15 AM



15-Min Count Period Beginning At	Lendon Welsh Way (Northbound)				Lendon Welsh Way (Southbound)				Kingston Pike (Eastbound)				Kingston Pike (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	0	0	3	1	6	0	14	167	0	0	1	78	7	0	277	
7:15 AM	0	1	1	0	15	0	6	0	41	257	2	0	0	144	26	0	493	
7:30 AM	0	3	0	0	23	0	13	0	54	282	0	0	2	154	39	0	570	
7:45 AM	0	11	2	0	25	1	20	0	47	314	1	0	3	175	62	0	661	2001
8:00 AM	0	34	1	0	23	3	32	0	82	283	1	0	5	147	51	0	662	2386
8:15 AM	0	29	2	0	30	4	30	0	76	226	2	0	3	167	37	0	606	2499
8:30 AM	0	0	2	0	11	0	9	0	2	215	2	0	2	173	8	0	424	2353
8:45 AM	1	0	3	0	1	0	4	0	7	218	3	0	3	142	2	0	384	2076
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	136	4	0	92	12	128	0	328	1132	4	0	20	588	204	0	2648	
Heavy Trucks	0	0	0	0	12	0	0	0	8	12	0	0	0	32	0	0	64	
Pedestrians	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	12	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Railroad																		
Stopped Buses																		

Comments:

QC JOB #: 13729567
DATE: Thu, Apr 14 2016

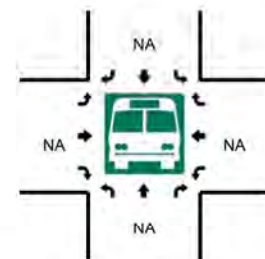
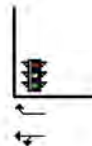
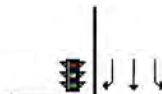
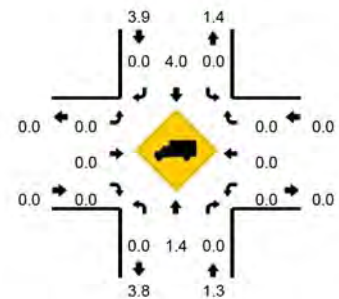
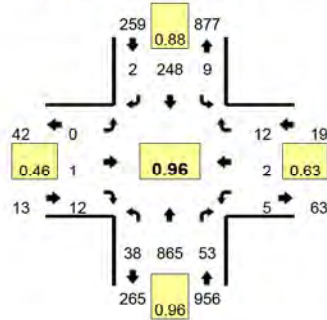


Comments:

LOCATION: Concord Rd -- Shopping Center Dr/Old Kroger Dr
CITY/STATE: Farragut, TN

QC JOB #: 13729516
DATE: Thu, Apr 14 2016

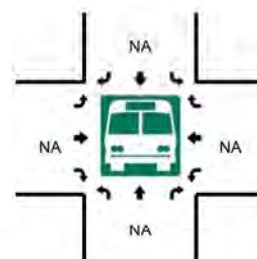
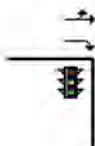
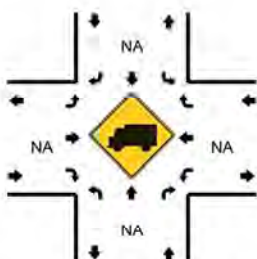
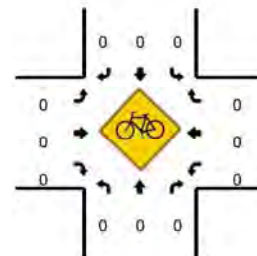
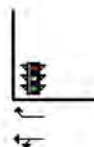
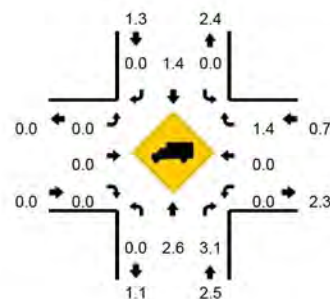
Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 8:00 AM -- 8:15 AM



15-Min Count Period Beginning At	Concord Rd (Northbound)				Concord Rd (Southbound)				Shopping Center Dr/Old Kroger Dr (Eastbound)				Shopping Center Dr/Old Kroger Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	1	144	4	0	3	24	1	0	0	0	1	0	2	0	3	0	183	
7:15 AM	2	224	15	0	3	31	1	0	0	1	1	0	0	0	3	0	281	
7:30 AM	4	229	23	0	0	45	1	0	0	1	1	0	0	2	6	0	312	
7:45 AM	10	222	11	0	2	62	0	0	0	0	1	0	2	0	2	0	312	1088
8:00 AM	15	225	8	0	3	68	1	0	0	0	3	0	1	0	2	0	326	1231
8:15 AM	9	189	11	0	4	73	0	0	0	0	7	0	2	0	2	0	297	1247
8:30 AM	2	135	14	0	6	51	0	0	0	0	0	0	4	0	6	0	218	1153
8:45 AM	1	110	8	0	1	37	0	0	1	0	2	0	2	1	5	0	168	1009
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	60	900	32	0	12	272	4	0	0	0	12	0	4	0	8	0	1304	
Heavy Trucks	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	4	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Railroad																		
Stopped Buses																		

Comments:

QC JOB #: 13729518
DATE: Thu, Apr 14 2016

[illegible]

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>) 1-877-580-2212

Project ID: 20-190014-002
 Location: Brooklawn St & Petco Dwy/Old Kroger Access Dwy
 City: Knoxville

Day: Tuesday
 Date: 10/06/2020

Groups Printed - Cars, PU, Vans - Heavy Trucks

	Brooklawn St Northbound							Brooklawn St Southbound							Petco Dwy/Old Kroger Access Dwy Eastbound							Petco Dwy/Old Kroger Access Dwy Westbound							
Start Time	Left	Thru	Rgt	Uturn	Peds	App Total		Left	Thru	Rgt	Uturn	Peds	App Total		Left	Thru	Rgt	Uturn	Peds	App Total		Left	Thru	Rgt	Uturn	Peds	App Total		
7:00 AM	0	4	1	0	0	5		0	1	1	0	0	2		3	0	0	0	0	3		0	0	0	0	0	0	10	
7:15 AM	2	6	0	0	0	8		0	6	7	0	0	13		8	2	1	0	0	11		0	0	0	0	0	0	32	
7:30 AM	1	5	5	0	0	11		0	7	6	0	0	13		8	0	0	0	0	8		1	1	1	0	0	3	35	
7:45 AM	3	7	9	0	0	19		5	8	10	0	0	23		9	2	1	0	0	12		1	2	1	0	0	4	58	
Total	6	22	15	0	0	43		5	22	24	0	0	51		28	4	2	0	0	34		2	3	2	0	0	7	135	
8:00 AM	1	9	11	0	0	21		2	16	11	1	0	30		11	0	0	0	0	11		1	0	1	0	0	2	64	
8:15 AM	4	11	7	0	0	22		2	21	7	0	0	30		17	1	1	0	0	19		1	0	3	0	0	4	75	
8:30 AM	1	5	1	0	0	7		0	10	4	0	0	14		14	0	4	0	0	18		3	0	0	0	0	3	42	
8:45 AM	1	5	1	0	0	7		0	9	6	0	0	15		18	1	0	0	1	19		0	1	1	0	0	2	43	
Total	7	30	20	0	0	57		4	56	28	1	0	89		60	2	5	0	1	67		5	1	5	0	0	11	224	
BREAK																													
3:00 PM	5	6	5	0	0	16		1	16	21	0	0	38		32	1	2	0	0	35		5	1	7	0	0	13	102	
3:15 PM	5	27	9	0	0	41		6	20	8	0	0	34		42	3	6	0	0	51		2	5	2	0	0	9	135	
3:30 PM	5	21	8	0	0	34		13	38	14	0	0	65		37	5	6	0	0	48		21	2	10	0	0	33	180	
3:45 PM	4	13	0	0	0	17		2	30	18	0	0	50		44	0	5	0	0	49		16	9	13	0	0	38	154	
Total	19	67	22	0	0	108		22	104	61	0	0	187		155	9	19	0	0	183		44	17	32	0	0	93	571	
4:00 PM	2	21	1	0	0	24		1	23	23	0	0	47		36	1	7	0	0	44		1	2	3	0	0	6	121	
4:15 PM	7	17	0	0	0	24		1	20	9	0	0	30		30	1	7	0	0	38		1	2	1	0	0	4	96	
4:30 PM	4	19	0	0	0	23		3	17	13	0	0	33		29	1	3	0	0	33		3	3	1	0	0	7	96	
4:45 PM	6	13	0	0	2	19		3	28	19	0	0	50		38	1	5	0	0	44		5	1	1	0	1	7	120	
Total	19	70	1	0	2	90		8	88	64	0	0	160		133	4	22	0	0	159		10	8	6	0	1	24	433	
5:00 PM	5	16	2	0	0	23		2	18	20	0	0	40		31	1	10	0	0	42		1	4	3	0	0	8	113	
5:15 PM	8	8	0	0	0	16		0	12	16	0	0	28		30	3	1	0	0	34		5	2	0	0	0	7	85	
5:30 PM	3	18	0	0	0	21		3	32	10	0	0	45		34	1	8	0	0	43		5	4	1	0	0	10	119	
5:45 PM	0	12	2	0	0	14		0	31	20	1	0	52		29	5	6	0	0	40		2	2	1	0	0	5	111	
Total	16	54	4	0	0	74		5	93	66	1	0	165		124	10	25	0	0	159		13	12	5	0	0	30	428	
Grand Total	67	243	62	0	2	372		44	363	243	2	0	652		500	29	73	0	1	602		74	41	50	0	1	165	1791	
Apprch %	18.0	65.3	16.7	0.0	0.5			6.7	55.7	37.3	0.3	0.0			83.1	4.8	12.1	0.0	0.2			44.8	24.8	30.3	0.0	0.6			
Total %	3.7	13.6	3.5	0.0	0.1	20.8		2.5	20.3	13.6	0.1	0.0	36.4		27.9	1.6	4.1	0.0	0.1	33.6		4.1	2.3	2.8	0.0	0.1	9.2		
Cars, PU, Vans	67	243	61	0		371		44	355	241	2		642		496	29	73	0		598		74	41	50	0		165	1776	
% Cars, PU, Vans	100.0	100.0	98.4	0.0		99.7		100.0	97.8	99.2	100.0		98.5		99.2	100.0	100.0	0.0		99.3		100.0	100.0	100.0	0.0		100.0	99.2	
Heavy Trucks	0	0	1	0		1		0	8	2	0		10		4	0	0	0		4		0	0	0	0	0	0	15	
%Heavy Trucks	0.0	0.0	1.6	0.0		0.3		0.0	2.2	0.8	0.0		1.5		0.8	0.0	0.0	0.0		0.7		0.0	0.0	0.0	0.0	0.0	0.0	0.8	

Project ID: 20-190014-002
 Location: Brooklawn St & Petco Dwy/Old Kroger Access Dwy
 City: Knoxville

PEAK HOURS

Day: Tuesday
 Date: 10/06/2020

AM

Start Time	Brooklawn St Northbound						Brooklawn St Southbound						Petco Dwy/Old Kroger Access Dwy Eastbound						Petco Dwy/Old Kroger Access Dwy Westbound						Int. Total
	Left	Thru	Rgt	Uturn	App. Total		Left	Thru	Rgt	Uturn	App. Total		Left	Thru	Rgt	Uturn	App. Total		Left	Thru	Rgt	Uturn	App. Total		
7:45 AM	3	7	9	0	19		5	8	10	0	23		9	2	1	0	12		1	2	1	0	4		58
8:00 AM	1	9	11	0	21		2	16	11	1	30		11	0	0	0	11		1	0	1	0	2		64
8:15 AM	4	11	7	0	22		2	21	7	0	30		17	1	1	0	19		1	0	3	0	4		75
8:30 AM	1	5	1	0	7		0	10	4	0	14		14	0	4	0	18		3	0	0	0	3		42
Total Volume	9	32	28	0	69		9	55	32	1	97		51	3	6	0	60		6	2	5	0	13		239
% App. Total	13.0	46.4	40.6	0.0	100		9.3	56.7	33.0	1.0	100		85.0	5.0	10.0	0.0	100		46.2	15.4	38.5	0.0	100		
PHF					0.784						0.808						0.789						0.813		0.797
Cars, PU, Vans	9	32	28	0	69		9	54	32	1	96		50	3	6	0	59		6	2	5	0	13		237
% Cars, PU, Vans	100.0	100.0	100.0	0.0	100.0		100.0	98.2	100.0	100.0	99.0		98.0	100.0	100.0	0.0	98.3		100.0	100.0	100.0	0.0	100.0		99.2
Heavy Trucks	0	0	0	0	0		0	1	0	0	1		1	0	0	0	1		0	0	0	0	0		2
% Heavy Trucks	0.0	0.0	0.0	0.0	0.0		0.0	1.8	0.0	0.0	1.0		2.0	0.0	0.0	0.0	1.7		0.0	0.0	0.0	0.0	0.0		0.8

PM

Start Time	Brooklawn St Northbound						Brooklawn St Southbound						Petco Dwy/Old Kroger Access Dwy Eastbound						Petco Dwy/Old Kroger Access Dwy Westbound						Int. Total
	Left	Thru	Rgt	Uturn	App. Total		Left	Thru	Rgt	Uturn	App. Total		Left	Thru	Rgt	Uturn	App. Total		Left	Thru	Rgt	Uturn	App. Total		
3:15 PM	5	27	9	0	41		6	20	8	0	34		42	3	6	0	51		2	5	2	0	9		135
3:30 PM	5	21	8	0	34		13	38	14	0	65		37	5	6	0	48		21	2	10	0	33		180
3:45 PM	4	13	0	0	17		2	30	18	0	50		44	0	5	0	49		16	9	13	0	38		154
4:00 PM	2	21	1	0	24		1	23	23	0	47		36	1	7	0	44		1	2	3	0	6		121
Total Volume	16	82	18	0	116		22	111	63	0	196		159	9	24	0	192		40	18	28	0	86		590
% App. Total	13.8	70.7	15.5	0.0	100		11.2	56.6	32.1	0.0	100		82.8	4.7	12.5	0.0	100		46.5	20.9	32.6	0.0	100		
PHF					0.707						0.754						0.941						0.566		0.819
Cars, PU, Vans	16	82	17	0	115		22	106	63	0	191		159	9	24	0	192		40	18	28	0	86		584
% Cars, PU, Vans	100.0	100.0	94.4	0.0	99.1		100.0	95.5	100.0	0.0	97.4		100.0	100.0	100.0	0.0	100.0		100.0	100.0	100.0	0.0	100.0		99.0
Heavy Trucks	0	0	1	0	1		0	5	0	0	5		0	0	0	0	0		0	0	0	0	0		6
% Heavy Trucks	0.0	0.0	5.6	0.0	0.9		0.0	4.5	0.0	0.0	2.6		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		1.0

Project ID: 20-190014-003
 Location: Brooklawn St & Kroger Marketplace Roundabout Dwy
 City: Knoxville

Day: Tuesday
 Date: 10/06/2020

Groups Printed - Cars, PU, Vans - Heavy Trucks

Start Time	Brooklawn St Northbound						Brooklawn St Southbound						Kroger Marketplace Roundabout Dwy Eastbound						Kroger Marketplace Roundabout Dwy Westbound						Int. Total
	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	
7:00 AM	1	5	0	0	0	6	0	1	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	8
7:15 AM	2	8	0	0	0	10	0	2	5	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	17
7:30 AM	1	11	0	0	0	12	0	4	3	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	19
7:45 AM	1	19	0	0	0	20	0	7	4	0	0	11	0	0	1	0	0	1	0	0	0	0	0	0	32
Total	5	43	0	0	0	48	0	14	12	0	0	26	0	0	2	0	0	2	0	0	0	0	0	0	76
8:00 AM	0	21	0	0	0	21	0	15	2	0	0	17	0	0	4	0	0	4	0	0	0	0	0	0	42
8:15 AM	1	19	0	0	0	20	0	16	7	0	0	23	3	0	0	0	0	3	0	0	0	0	0	0	46
8:30 AM	2	7	0	0	0	9	0	12	5	0	0	17	0	0	2	0	0	2	0	0	0	0	0	0	28
8:45 AM	0	7	0	0	0	7	0	3	5	0	0	8	0	0	1	0	0	1	0	0	0	0	0	0	16
Total	3	54	0	0	0	57	0	46	19	0	0	65	3	0	7	0	0	10	0	0	0	0	0	0	132
BREAK																									
3:00 PM	6	14	0	0	0	20	0	16	8	0	0	24	4	0	12	0	0	16	0	0	0	0	0	0	60
3:15 PM	8	34	0	0	0	42	0	20	7	0	0	27	5	0	12	0	0	17	0	0	0	0	0	0	86
3:30 PM	2	27	0	0	0	29	0	53	12	1	0	66	9	0	14	0	0	23	0	0	0	0	0	0	118
3:45 PM	4	10	0	0	0	14	0	42	10	0	0	52	5	0	15	0	0	20	0	0	0	0	0	0	86
Total	20	85	0	0	0	105	0	131	37	1	0	169	23	0	53	0	0	76	0	0	0	0	0	0	350
4:00 PM	5	17	0	0	0	22	0	19	11	0	0	30	7	0	6	0	0	13	0	0	0	0	0	0	65
4:15 PM	4	16	0	0	0	20	0	20	9	0	0	29	7	0	10	0	0	17	0	0	0	0	0	0	66
4:30 PM	6	16	0	0	0	22	0	15	8	0	0	23	7	0	12	0	0	19	0	0	0	0	0	0	64
4:45 PM	3	14	0	0	1	17	0	24	13	0	0	37	4	0	18	0	2	22	0	0	0	0	0	0	76
Total	18	63	0	0	1	81	0	78	41	0	0	119	25	0	46	0	2	71	0	0	0	0	0	0	271
5:00 PM	6	14	0	1	0	21	0	21	9	0	0	30	9	0	14	0	0	23	0	0	0	0	0	0	74
5:15 PM	3	14	0	0	0	17	0	10	8	0	0	18	3	0	11	0	0	14	0	0	0	0	0	0	49
5:30 PM	5	11	0	0	0	16	0	30	12	1	0	43	10	0	18	0	0	28	0	0	0	0	0	0	87
5:45 PM	2	8	0	1	0	11	0	32	8	0	0	40	5	0	18	0	0	23	0	0	0	0	0	0	74
Total	16	47	0	2	0	65	0	93	37	1	0	131	27	0	61	0	0	88	0	0	0	0	0	0	284
Grand Total	62	292	0	2	1	356	0	362	146	2	0	510	78	0	169	0	2	247	0	0	0	0	0	0	1113
Apprch %	17.4	82.0	0.0	0.6	0.3		0.0	71.0	28.6	0.4	0.0		31.6	0.0	68.4	0.0	0.8		0.0	0.0	0.0	0.0	0.0	0.0	
Total %	5.6	26.2	0.0	0.2	0.1	32.0	0.0	32.5	13.1	0.2	0.0	45.8	7.0	0.0	15.2	0.0	0.2	22.2	0.0	0.0	0.0	0.0	0.0	0.0	
Cars, PU, Vans	62	291	0	2		355	0	355	144	2		501	78	0	169	0		247	0	0	0	0	0	0	1103
% Cars, PU, Vans	100.0	99.7	0.0	100.0		99.7	0.0	98.1	98.6	100.0		98.2	100.0	0.0	100.0	0.0		100.0	0.0	0.0	0.0	0.0	0.0	0.0	99.1
Heavy Trucks	0	1	0	0		1	0	7	2	0		9	0	0	0	0		0	0	0	0	0	0	0	10
% Heavy Trucks	0.0	0.3	0.0	0.0		0.3	0.0	1.9	1.4	0.0		1.8	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9

Project ID: 20-190014-003
 Location: Brooklawn St & Kroger Marketplace Roundabout D
 City: Knoxville

PEAK HOURS

Day: Tuesday
 Date: 10/06/2020

AM

	Brooklawn St Northbound						Brooklawn St Southbound						Kroger Marketplace Roundabout Dwy Eastbound						Kroger Marketplace Roundabout Dwy Westbound					
Start Time	Left	Thru	Rgt	Uturn	App. Total		Left	Thru	Rgt	Uturn	App. Total		Left	Thru	Rgt	Uturn	App. Total		Left	Thru	Rgt	Uturn	App. Total	Int. Total
Peak Hour Analysis from 07:00 AM to 09:00 AM																								
Peak Hour for Entire Intersection Begins at 07:45 AM																								
7:45 AM	1	19	0	0	20		0	7	4	0	11		0	0	1	0	1		0	0	0	0	0	32
8:00 AM	0	21	0	0	21		0	15	2	0	17		0	0	4	0	4		0	0	0	0	0	42
8:15 AM	1	19	0	0	20		0	16	7	0	23		3	0	0	0	3		0	0	0	0	0	46
8:30 AM	2	7	0	0	9		0	12	5	0	17		0	0	2	0	2		0	0	0	0	0	28
Total Volume	4	66	0	0	70		0	50	18	0	68		3	0	7	0	10		0	0	0	0	0	148
% App. Total	5.7	94.3	0.0	0.0	100		0.0	73.5	26.5	0.0	100		30.0	0.0	70.0	0.0	100		0.0	0.0	0.0	0.0	0.0	0
PHF					0.833						0.739						0.625							0.804
Cars, PU, Vans	4	66	0	0	70		0	50	17	0	67		3	0	7	0	10		0	0	0	0	0	147
% Cars, PU, Vans	100.0	100.0	0.0	0.0	100.0		0.0	100.0	94.4	0.0	98.5		100.0	0.0	100.0	0.0	100.0		0.0	0.0	0.0	0.0	0.0	99.3
Heavy Trucks	0	0	0	0	0		0	0	1	0	1		0	0	0	0	0		0	0	0	0	0	1
% Heavy Trucks	0.0	0.0	0.0	0.0	0.0		0.0	0.0	5.6	0.0	1.5		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.7

PM

	Brooklawn St Northbound						Brooklawn St Southbound						Kroger Marketplace Roundabout Dwy Eastbound						Kroger Marketplace Roundabout Dwy Westbound						
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total				
Peak Hour Analysis from 03:00 PM to 06:00 PM																									
Peak Hour for Entire Intersection Begins at 03:15 PM																									
3:15 PM	8	34	0	0	42	0	20	7	0	27	5	0	12	0	17	0	0	0	0	0	86				
3:30 PM	2	27	0	0	29	0	53	12	1	66	9	0	14	0	23	0	0	0	0	0	118				
3:45 PM	4	10	0	0	14	0	42	10	0	52	5	0	15	0	20	0	0	0	0	0	86				
4:00 PM	5	17	0	0	22	0	19	11	0	30	7	0	6	0	13	0	0	0	0	0	65				
Total Volume	19	88	0	0	107	0	134	40	1	175	26	0	47	0	73	0	0	0	0	0	355				
% App. Total	17.8	82.2	0.0	0.0	100	0.0	76.6	22.9	0.6	100	35.6	0.0	64.4	0.0	100	0.0	0.0	0.0	0.0	0.0	0				
PHF	0.637					0.663					0.793										0.752				
Cars, PU, Vans	19	87	0	0	106	0	129	40	1	170	26	0	47	0	73	0	0	0	0	0	349				
% Cars, PU, Vans	100.0	98.9	0.0	0.0	99.1	0.0	96.3	100.0	100.0	97.1	100.0	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	98.3				
Heavy Trucks	0	1	0	0	1	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	6				
% Heavy Trucks	0.0	1.1	0.0	0.0	0.9	0.0	3.7	0.0	0.0	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7				

Project ID: 20-190014-004

Location: Brooklawn St & Kroger Truck Ent Southern Dwy/Pinnacle Access

City: Knoxville

Day: Tuesday

Date: 10/06/2020

Groups Printed - Cars, PU, Vans - Heavy Trucks

	Brooklawn St Northbound						Brooklawn St Southbound						Kroger Truck Ent Southern Dwy/Pinnacle Access Eastbound						Kroger Truck Ent Southern Dwy/Pinnacle Access Westbound							
Start Time	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Int. Total	
7:00 AM	2	6	0	0	0	8	0	1	1	0	0	2	0	0	2	0	0	2	0	0	0	0	0	0	12	
7:15 AM	4	10	0	0	0	14	0	2	0	0	0	2	0	0	3	0	0	3	0	0	0	0	0	0	19	
7:30 AM	2	12	0	0	0	14	0	4	0	0	0	4	0	0	4	0	0	4	0	0	0	0	0	0	22	
7:45 AM	11	20	0	0	0	31	0	8	0	0	0	8	0	0	3	0	0	3	0	0	0	0	0	0	42	
Total	19	48	0	0	0	67	0	15	1	0	0	16	0	0	12	0	0	12	0	0	0	0	0	0	95	
8:00 AM	17	23	0	0	0	40	0	17	2	0	0	19	0	0	10	0	0	10	0	0	0	0	0	0	69	
8:15 AM	11	10	0	0	0	29	0	15	0	0	2	15	0	0	0	0	0	0	0	0	0	0	0	0	52	
8:30 AM	12	9	0	0	0	21	0	13	1	0	0	14	0	0	8	0	0	8	0	0	0	0	0	0	43	
8:45 AM	12	7	0	0	0	19	0	4	1	0	0	5	0	0	11	0	0	11	0	0	0	0	0	0	35	
Total	52	57	0	0	0	109	0	49	4	0	2	53	0	0	37	0	0	37	0	0	0	0	0	0	199	
BREAK																										
3:00 PM	18	20	0	0	0	38	0	26	3	0	0	29	0	0	21	0	0	21	2	0	0	0	0	2	90	
3:15 PM	23	41	0	0	0	64	0	29	2	0	0	31	1	0	20	0	0	21	0	0	0	0	0	0	116	
3:30 PM	20	26	0	0	0	46	0	61	2	0	0	63	3	0	14	0	0	17	0	0	0	0	0	0	126	
3:45 PM	18	15	0	0	0	33	0	59	1	0	0	60	0	0	16	0	0	16	0	0	0	0	0	0	109	
Total	79	102	0	0	0	181	0	175	8	0	0	183	4	0	71	0	0	75	2	0	0	0	0	2	441	
4:00 PM	25	19	0	0	0	44	0	24	2	0	0	26	2	0	13	0	0	15	0	0	0	0	0	0	85	
4:15 PM	18	18	0	0	0	36	0	26	3	0	0	29	2	0	21	0	0	23	0	0	0	0	0	0	88	
4:30 PM	24	18	0	0	0	42	1	25	3	0	0	29	4	0	25	0	0	29	0	1	0	0	0	1	101	
4:45 PM	24	16	0	0	0	40	0	37	5	0	2	42	2	0	22	0	0	24	0	0	0	0	0	0	106	
Total	91	71	0	0	0	162	1	112	13	0	2	125	10	0	81	0	0	91	0	1	0	0	0	1	380	
5:00 PM	17	19	0	0	0	36	0	33	2	0	0	35	1	0	26	0	2	27	0	0	0	0	0	0	98	
5:15 PM	23	17	0	0	0	40	0	21	1	0	0	22	1	0	23	0	0	24	0	0	0	0	0	0	86	
5:30 PM	19	15	0	0	0	34	0	46	1	0	0	47	0	0	19	0	0	19	0	0	0	0	0	0	100	
5:45 PM	21	11	0	0	0	32	0	52	0	0	0	52	0	0	26	0	0	26	0	0	0	0	0	0	110	
Total	80	62	0	0	0	142	0	152	4	0	0	156	2	0	94	0	2	96	0	0	0	0	0	0	394	
Grand Total	321	340	0	0	0	661	1	503	30	0	4	534	16	0	295	0	2	311	2	1	0	0	0	3	1509	
Apprch %	48.6	51.4	0.0	0.0	0.0		0.2	94.2	5.6	0.0	0.7		5.1	0.0	94.9	0.0	0.6		66.7	33.3	0.0	0.0	0.0			
Total %	21.3	22.5	0.0	0.0	0.0	43.8	0.1	33.3	2.0	0.0	0.3	35.4	1.1	0.0	19.5	0.0	0.1	20.6	0.1	0.1	0.0	0.0	0.0	0.2		
Cars, PU, Vans	318	339	0	0	0	657	1	496	30	0	0	527	16	0	293	0	0	309	1	1	0	0	0	2	1495	
% Cars, PU, Vans	99.1	99.7	0.0	0.0	0.0	99.4	100.0	98.6	100.0	0.0	0.0	98.7	100.0	0.0	99.3	0.0	0.0	99.4	50.0	100.0	0.0	0.0	0.0	66.7	99.1	
Heavy Trucks	3	1	0	0	0	4	0	7	0	0	0	7	0	0	2	0	0	2	1	0	0	0	0	1	14	
%Heavy Trucks	0.9	0.3	0.0	0.0	0.0	0.6	0.0	1.4	0.0	0.0	0.0	1.3	0.0	0.0	0.7	0.0	0.6	0.6	50.0	0.0	0.0	0.0	0.0	33.3	0.9	

Project ID: 20-190014-004

Location: Brooklawn St & Kroger Truck Ent Southern Dwy/PI

City: Knoxville

PEAK HOURS

Day: Tuesday

Date: 10/06/2020

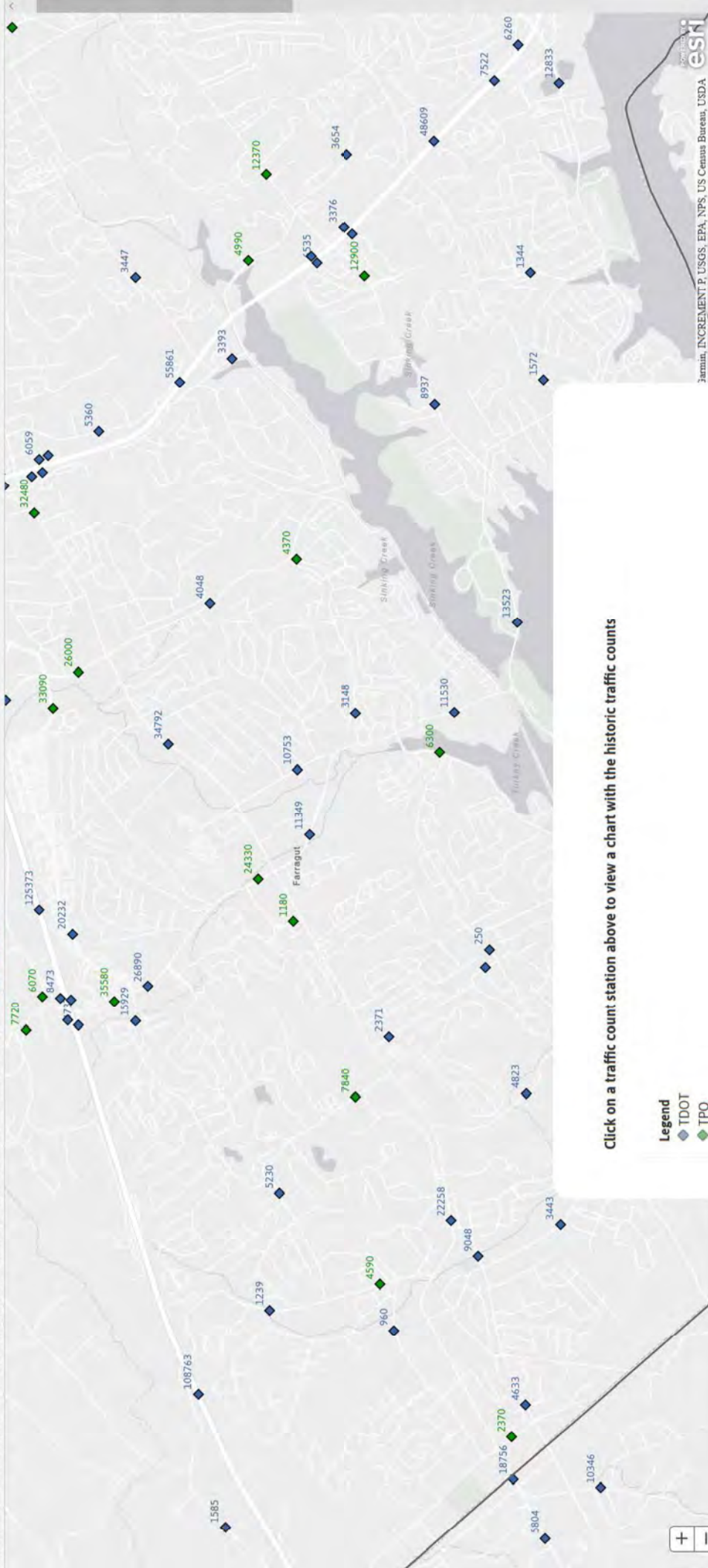
AM

Start Time	Brooklawn St Northbound						Brooklawn St Southbound						Truck Ent Southern Dwy/Pinnacle Access Eastbound						Truck Ent Southern Dwy/Pinnacle Access Westbound						Int. Total
	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	
7:45 AM	11	20	0	0	0	31	0	8	0	0	0	8	0	0	3	0	0	3	0	0	0	0	0	0	42
8:00 AM	17	23	0	0	0	40	0	17	2	0	0	19	0	0	10	0	0	10	0	0	0	0	0	0	69
8:15 AM	11	18	0	0	0	29	0	15	0	0	0	15	0	0	8	0	0	8	0	0	0	0	0	0	52
8:30 AM	12	9	0	0	0	21	0	13	1	0	0	14	0	0	8	0	0	8	0	0	0	0	0	0	43
Total Volume	51	70	0	0	0	121	0	53	3	0	0	56	0	0	29	0	0	29	0	0	0	0	0	0	206
% App. Total	42.1	57.9	0.0	0.0	0.0	100	0.0	94.6	5.4	0.0	0.0	100	0.0	0.0	100.0	0.0	0.0	100	0.0	0.0	0.0	0.0	0.0	0.0	0
PHF	0.756						0.737						0.725						0.746						0.746
Cars, PU, Vans	51	70	0	0	0	121	0	53	3	0	0	56	0	0	29	0	0	29	0	0	0	0	0	0	206
% Cars, PU, Vans	100.0	100.0	0.0	0.0	0.0	100.0	0.0	100.0	100.0	0.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

PM

	Brooklawn St Northbound						Brooklawn St Southbound						Truck Ent Southern Dwy/Pinnacle Access Eastbound						Truck Ent Southern Dwy/Pinnacle Access Westbound						
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total				
Peak Hour Analysis from 03:00 PM to 06:00 PM																									
Peak Hour for Entire Intersection Begins at 03:00 PM																									
3:00 PM	18	20	0	0	38	0	26	3	0	29	0	0	21	0	21	2	0	0	0	2	90				
3:15 PM	23	41	0	0	64	0	29	2	0	31	1	0	20	0	21	0	0	0	0	0	116				
3:30 PM	20	26	0	0	46	0	61	2	0	63	3	0	14	0	17	0	0	0	0	0	126				
3:45 PM	18	15	0	0	33	0	59	1	0	60	0	0	16	0	16	0	0	0	0	0	109				
Total Volume	79	102	0	0	181	0	175	8	0	183	4	0	71	0	75	2	0	0	0	2	441				
% App. Total	43.6	56.4	0.0	0.0	100	0.0	95.6	4.4	0.0	100	5.3	0.0	94.7	0.0	100	100.0	0.0	0.0	0.0	0.0					
PHF	0.707						0.726						0.893						0.250						0.875
Cars, PU, Vans	78	101	0	0	179	0	166	8	0	176	4	0	71	0	75	1	0	0	0	1	431				
% Cars, PU, Vans	98.7	99.0	0.0	0.0	98.9	0.0	96.0	100.0	0.0	96.2	100.0	0.0	100.0	0.0	100.0	50.0	0.0	0.0	0.0	50.0	97.7				
Heavy Trucks	1	1	0	0	2	0	7	0	0	7	0	0	0	0	0	1	0	0	0	1	10				
% Heavy Trucks	1.3	1.0	0.0	0.0	1.1	0.0	4.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0	50.0	0.0	0.0	0.0	50.0	2.3				

To see favorites here, select then ⚙️, and drag to the Favorites Bar folder. Or import from another browser. Import favorites



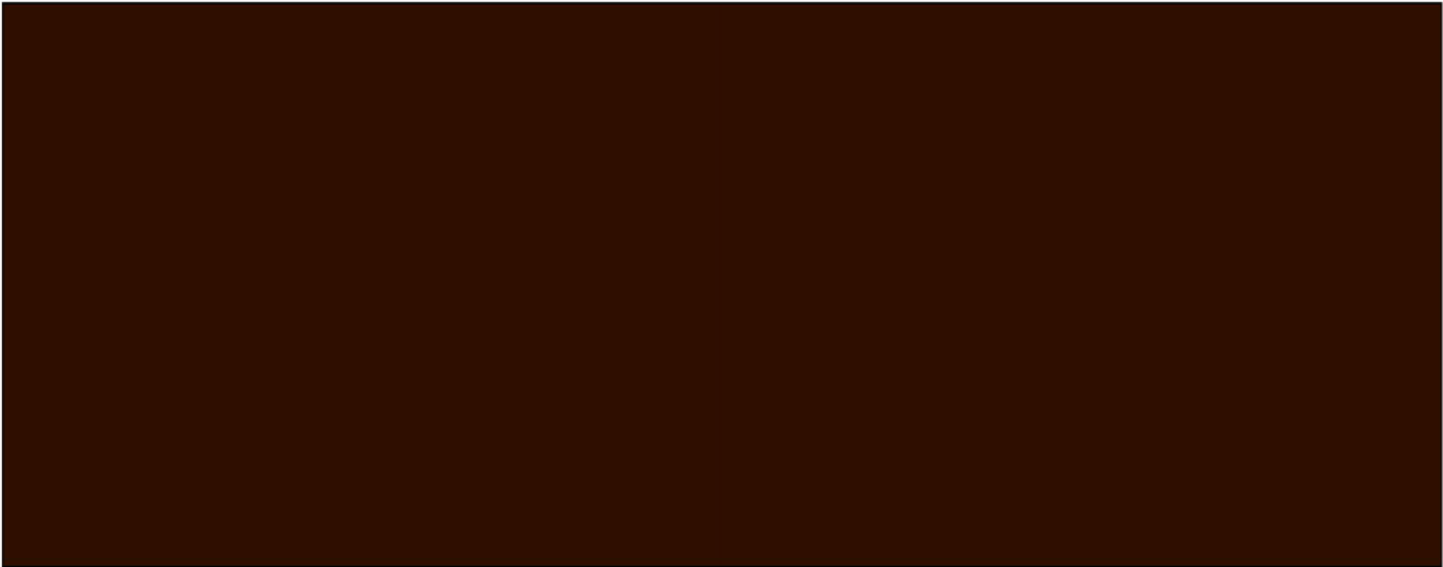
- Legend**
- TDOT
 - TPO
 - Discontinued

Click on a traffic count station above to view a chart with the historic traffic counts

+ -

Find address or place





**CDM
Smith**





November 2, 2020

Mr. Darryl W. Smith, P.E.
Town Engineer
Town of Farragut
11408 Municipal Center Drive
Farragut, Tennessee 37934

**RE: Traffic Impact Study Report Review
Farragut Town Center at Biddle Farms
Farragut, TN**

Dear Mr. Smith:

Cannon & Cannon, Inc. (CCI) appreciates the opportunity to review the traffic impact study report for the proposed Farragut Town Center at Biddle Farms development prepared by CDM Smith. It is our understanding that the proposed development will consist of a grocery store, retail shops, and multi-family residential units. We further understand that the development will be located east of the existing Kroger development. Access to Kingston Pike and Campbell Station Road will be provided via Brooklawn Street, and the development will also have access to Concord Road. The development is expected to produce between 6,000 and 7,000 new daily trips.

We have reviewed the report for this traffic impact study, and it is our opinion that the overall report content, conclusions, and recommendations were developed using sound engineering methods and assumptions. The utilization of 2016 counts due to current traffic conditions with Covid was appropriate. The annual growth rates of 2.5% for 2020 existing traffic and 3.5% for 2025 background traffic are reasonable as is the factoring of the count at Brooklawn and the driveway accesses by 10%. CDM Smith acknowledged the traffic issues at the intersections of Kingston Pike with Campbell Station Road and Kingston Pike with Concord Road, and they provided potential mitigation measures for these issues.

Regarding traffic generated by the proposed development, we have no issues with the methods utilized and the assumptions made for the trip generation estimates. We further agree that it was appropriate to provide separate trip distributions for the residential and commercial components. Based on the capacity analysis comparisons of background traffic without the development and projected traffic with the development, we agree that the two critical intersections (Kingston at Campbell Station and Kingston at Concord) may experience unstable conditions without mitigation, but that these conditions will not significantly worsen due to traffic generated by the proposed development.

Sincerely,

Brian J. Haas, P.E., PTOE
Project Manager

TEL **865.670.8555**
CANNON-CANNON.COM

KNOXVILLE 8550 Kingston Pike
Knoxville, TN 37919
FAX 865.670.8866

FARRAGUT TOWN CENTER

@ Biddle Farms



6312 Kingston Pike, Suite C
Knoxville, TN 37919 (865)588-5171

PCD Rezoning and Land Use Map Amendment Package
November 2020

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- 1) PCD Objectives
- 2) Rezoning Exhibit
- 3) Survey Exhibits
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- 5) Conceptual Grading Plan
- 6) Conceptual Utility Plan
- 7) Conceptual Landscape Plans
- 8) Conceptual Tree Preservation & Env. Sensitive Area Maps
- 9) Site Lighting Elements and Preliminary Photometric plan
- 10) Public Gathering, Hardscape, and Paving Elements
- 11) Architectural Design Statement
- 12) Architectural Design Elements
- 13) Architectural Elevations and Multi-Family Unit Footprints
- 14) Conceptual Iconic Element at Entrance
- 15) Conceptual Signage Vision and Location Plan
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- 17) Town Right of Way Dedication Exhibit & Cross Sections
- 18) Hydrology Study Summary and Recommendations
- 19) Traffic Study Summary and Recommendations
- 20) Construction Schedule and Phasing Exhibits

The materials presented in this package outline the conceptual design intent for the project as of November 2020, and will be further developed in the design phase of the project.



PCD PLANNING OBJECTIVES

Introduction:

The concept site plan is the product of the merger of:

- The Town of Farragut's desire and vision to create a "downtown" for the community in which a village scale could be complimented with a mixed-use blend of commercial, office, residential, and public place components; with
- Private development goals of advancing high quality and distinctive retail/commercial and multi-family residential for the community of Farragut.

into a single master planned development on the site known as Biddle Farms.

The existing site is occupied by a tired retail strip, a collection of independent out parcels, an extensive flood plain, storm water retention for the Kroger retail development west of the site, and a natural all-season creek that flows north to south through the long axis of the site.

This fusion of public and private objectives is guided by a vision document and design guidelines created by the Town of Farragut. Those guidelines seek a development pattern that promotes a pedestrian friendly setting where outdoor browsing and dining, special events, and street activities can animate the

Site Evaluation:

The site possesses challenges and opportunities. Key elements of which are, the flood plain and the creek, that both govern net site usability. Out parcels separately owned must be honored within the overall property boundary and access for their continued use protected.

The existing retail complex is seen as outdated and is not considered worthy of protection.

Much of the site was built in compliance with FEMA regulations and marginally meet the federal guidelines that standard imposes. Farragut imposes a greater standard which negatively affects all the existing structures and infrastructure.

As part of a master planning effort, the hydrology of the area must be evaluated and the storm water management governing retention, storage, outflow, and water quality must be applied to moderate flooding that occasions the site and improve impacts on neighboring sites downstream from the subject parcel.

The development vision, while it considers the entirety of the Biddle Farm, will focus on a select portion of the site assigned to the development vision. This section will largely overlay the existing impervious surfaces

development in a 24/7 setting, and where residents within the Town Center can enjoy the "downtown" as an added quality of life amenity.

By contrast to the pedestrian experience, parking lots are directed to be largely shielded from public view along the internal street. Street parking by exception using angled or parallel spaces along internal and some external streets are intended to serve as both calm traffic and convenient access to commercial venues.

The primary frontage on Kingston Pike seeks a "main street" intersection aligned with the existing signal in serving the high school to the north. Brooklawn Street shall define the westerly border, Concord Road the easterly border, and Campbell Station Road the southern border.

Within limits of environmental restrictions all four street shall seek interconnectivity through the site so to allow both vehicular and pedestrian movement to access the "town center" from any direction and discharge accordingly.

A limited number of older structures that were part of the Biddle farm may be viewed as of historic value and were to be considered in the planning. of the prior retail occupancies and extend southerly along Brooklawn Street. Much of the remaining lands will be held in reserve for "open space" and storm water detention. This open space could prove of value as a public place suitable for informal events, open air activities, and leisure enjoyment.

The creek with its wooded shoulders, offers an ideal opportunity to have a lineal park reaching through the site offering pedestrian, bicycle, and accessible movement as a natural outdoor promenade for area residents to enjoy.

An existing retention pond in service to Kroger should be consolidated into a master storm water management system allowing for a more compact allocation of lands to complete the Town Center composition.

A roundabout on Brooklawn Street offers some traffic calming along that "cut through" drive. The integration of residential occupancy in any mixed-use setting should seek roads with moderated speeds and traffic lanes that encourage more cautious movement.

FARRAGUT TOWN CENTER

at Biddle Farms

A Special Observation:

Within the time of the master planning and staff coordination of the proposed development the impact of the Corona Virus emerged and forever has changed much of the lifestyle and value system all seek to enjoy. The impact of this crisis may stay with all of us for a long time, impacting the ideals of group gatherings, and social activities for the foreseeable future. Planning has and will continue to seek an optimistic view that a measure of the “old normal” will return, where sidewalk dining, and events of community interest (art festivals, car shows, community concerts, etc.) will again be allowed and invited. The plan however also seeks to consider the necessary dependency upon retail and service access without leaving the car. This standard has now become a public health consideration. Measures to address this “new normal” should also consider the best way to protect the pedestrian experience while not imposing hardships on either consumers or the service/store entities that cater to their needs.

The Design Response:

Through the design process virtual images were generated to offer texture to the two-dimensional planning proposals as they unfolded. These images sought to offer assurances on scale, pedestrian comfort, landscape applications that deviate from rigid interpretation of the design guidelines, parking, signage, and exterior character and finish. Great care was taken in seeking proportions sufficient for comfort but not too expansive they “institutionalize” the streetscape or setting.

The integration of residential occupancies into a unified campus offers challenges and benefits. While retail is an amenity when convenient enough to walk to it, it can be an intrusive neighbor when noise, trash and service demands are considered.

Vertical mixed use was thus strongly resisted in favor of a horizontal plan where commercial users, and their vehicles would not overlap the private and more sanctified accommodations of the residents who would choose to line in the Town Center. Pedestrian connectivity is promoted with a “village square” that both commercial and residential share. Pedestrian promenades down “main street” and around the square connect access from all four street edges and insure by treatment the internal street system appears like a pedestrian area you can drive through rather than a vehicular area you can walk by.

Objectionable views of service areas are managed to a minimum. Residential buildings facing the public streets of the development shield exposure to the parking fields of the residents and offer residents a secure parking domain free of non-residential demand.

Brooklawn Street is changed from a three-way street with suicide center lane, to a two-lane street with diagonal parking. This softens the street face for residences, calms through traffic, and offers more landscaping opportunity than with just a planted parkway between sidewalk and curb.

The commercial portions of the complex seek a one- and two-story statured heights allowing for store ceilings as high as 18 to 20 feet within. False second floor facades animate the street elevations and offer both material and height variations that create an appearance of independent structures attached instead of the more typical retail ribbon façade in most shopping districts.

The residential structures seeking compact adjacency to the commercial are proposed at four stories with 9 and 10' ceiling heights. While taller their vertical proportions will not oversize that of the neighboring commercial structures. Dwellings will address the street with private porch like entries and with raised stoops and porches reflective of traditional designs.

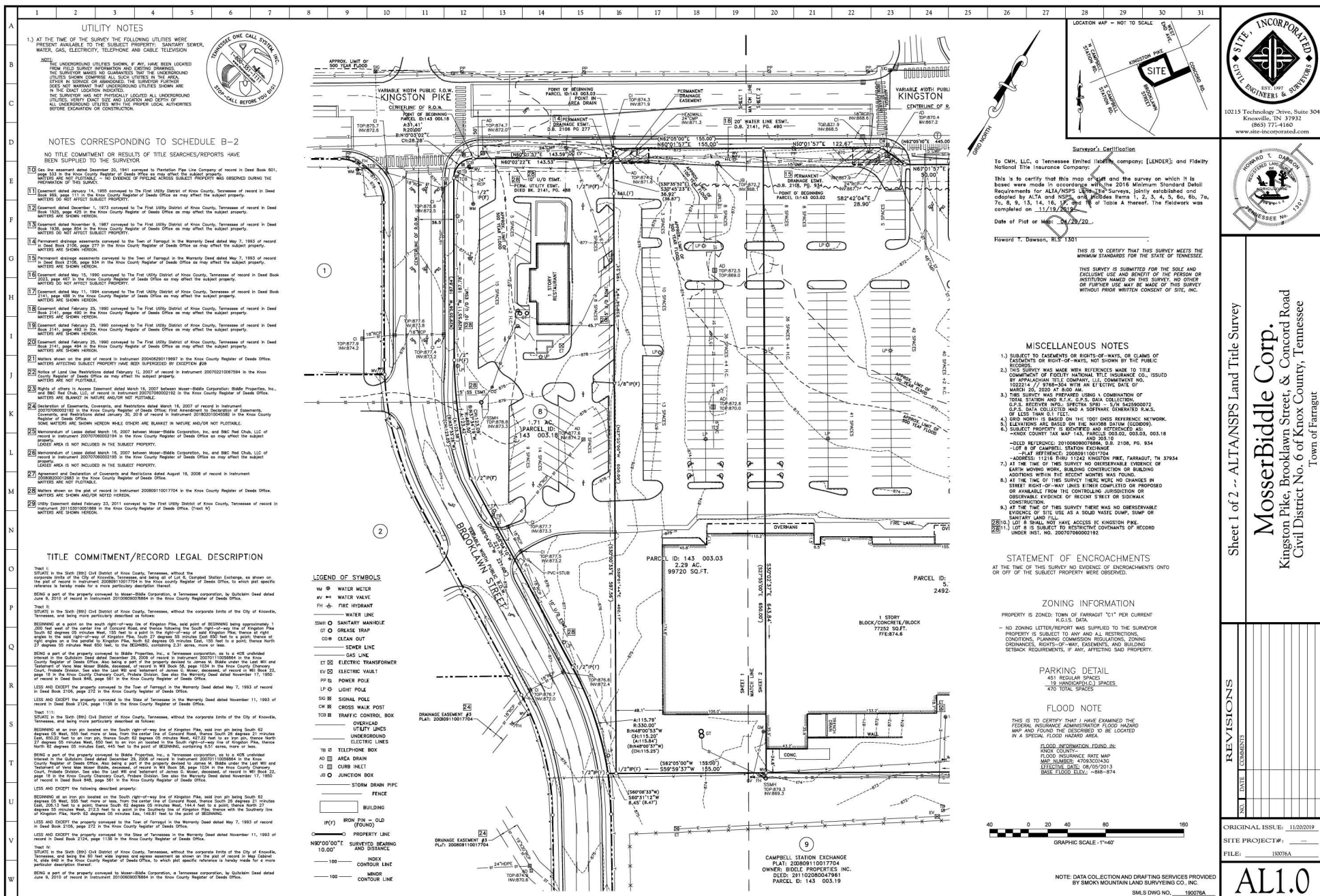
The overall appearance borrows from traditional proportions and materials while seeking a current appeal reflecting the taste and expectations of a New Town Center.

Summary:

The plan, the street images, the narrative are offerings that are intended to show objective. More work is needed to carry the vision instruments to fulfillment. Engineering, environmental, and regulatory standards will guide the next evolution of the Town Center. Some flexibility toward full compliance with all regulatory and constructability standards will be necessary. This plan intends to subscribe the goals it portrays even if changes are essentially demanded.

A community vision paints a picture that does not consider economic reason. A private development requires economic balance between vision and performance. Much of the images shown are untested in the market. The development team recognizes the risk associated with unproven solutions and accepts this risk depending upon the collaborative understanding from the Town of Farragut in the efforts that have preceded this submittal. Staff and applicant agree with balance both missions can be fulfilled.

It is the hope of the development team this submittal would be found sound and representative of both the community vision and the development opportunity, each of which need to succeed before future physical implementation can begin.



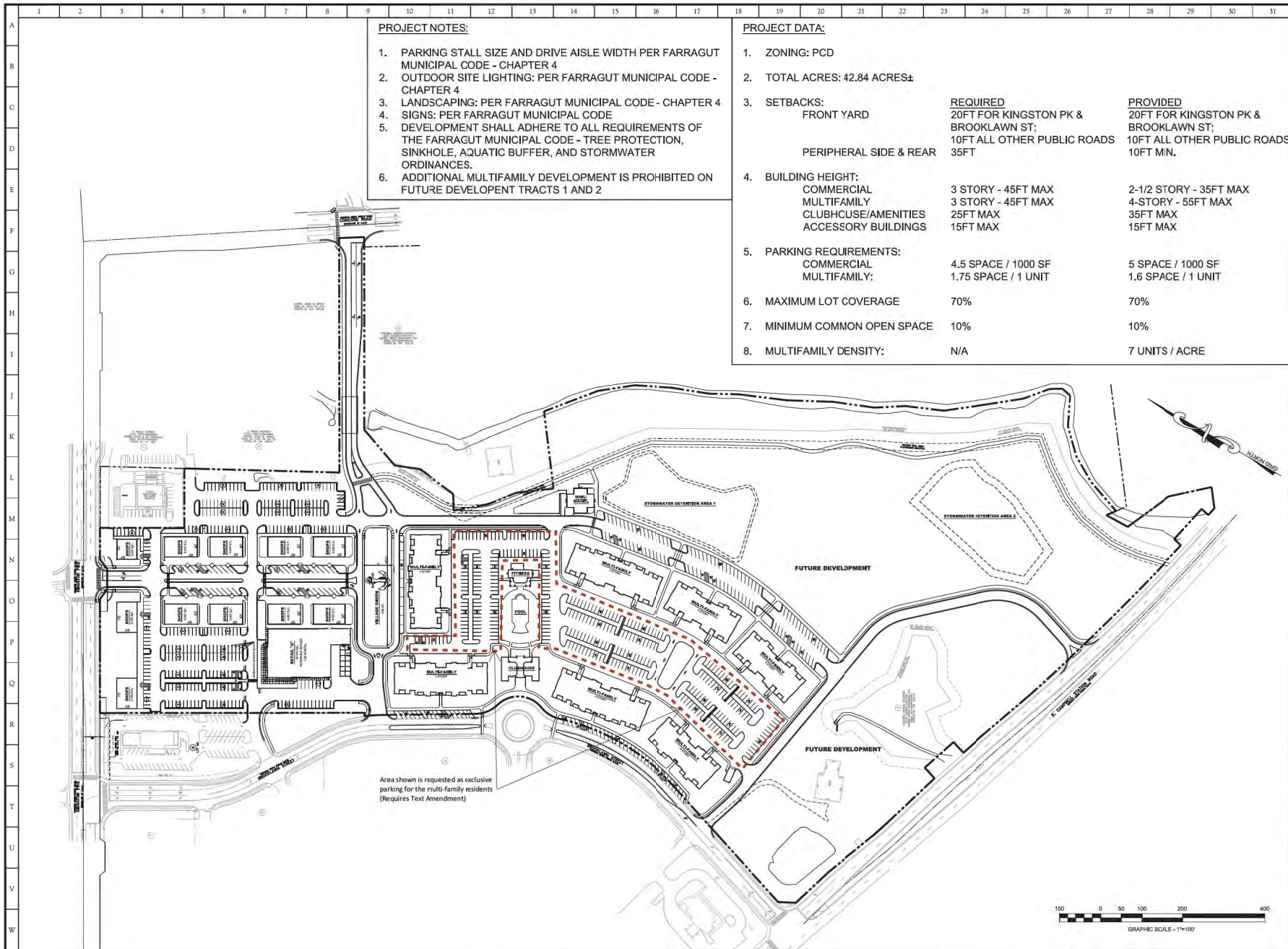
Sheet 1 of 2 -- ALTANSPS Land Title Survey

MosserBiddle Corp.
Kingston Pike, Brooklawn Street, & Concord Road
Civil District No. 6 of Knox County, Tennessee
Tenn. of Tenn.

[illegible]ORIGINAL ISSUE: 11/20/2019

FILE: 150076A

AL1.0



PROJECT NOTES:

1. PARKING STALL SIZE AND DRIVE AISLE WIDTH PER FARRAGUT MUNICIPAL CODE - CHAPTER 4
2. OUTDOOR SITE LIGHTING: PER FARRAGUT MUNICIPAL CODE - CHAPTER 4
3. LANDSCAPING: PER FARRAGUT MUNICIPAL CODE - CHAPTER 4
4. SIGNS: PER FARRAGUT MUNICIPAL CODE
5. DEVELOPMENT SHALL ADHERE TO ALL REQUIREMENTS OF THE FARRAGUT MUNICIPAL CODE - TREE PROTECTION, SINKHOLE, AQUATIC BUFFER, AND STORMWATER ORDINANCES.
6. ADDITIONAL MULTIFAMILY DEVELOPMENT IS PROHIBITED ON FUTURE DEVELOPMENT TRACTS 1 AND 2

PROJECT DATA:

1. ZONING: PCD		
2. TOTAL ACRES: 42.84 ACRES±		
3. SETBACKS:	REQUIRED	PROVIDED
FRONT YARD	20FT FOR KINGSTON PK & BROOKLAWN ST;	20FT FOR KINGSTON PK & BROOKLAWN ST;
PERIPHERAL SIDE & REAR	10FT ALL OTHER PUBLIC ROADS	10FT ALL OTHER PUBLIC ROADS
	35FT	10FT MIN.
4. BUILDING HEIGHT:		
COMMERCIAL	3 STORY - 45FT MAX	2-1/2 STORY - 35FT MAX
MULTIFAMILY	3 STORY - 45FT MAX	4-STORY - 55FT MAX
CLUBHOUSE/AMENITIES	25FT MAX	35FT MAX
ACCESSORY BUILDINGS	15FT MAX	15FT MAX
5. PARKING REQUIREMENTS:		
COMMERCIAL	4.5 SPACE / 1000 SF	5 SPACE / 1000 SF
MULTIFAMILY:	1.75 SPACE / 1 UNIT	1.6 SPACE / 1 UNIT
6. MAXIMUM LOT COVERAGE	70%	70%
7. MINIMUM COMMON OPEN SPACE	10%	10%
8. MULTIFAMILY DENSITY:	N/A	7 UNITS / ACRE



CONCEPT PLAN

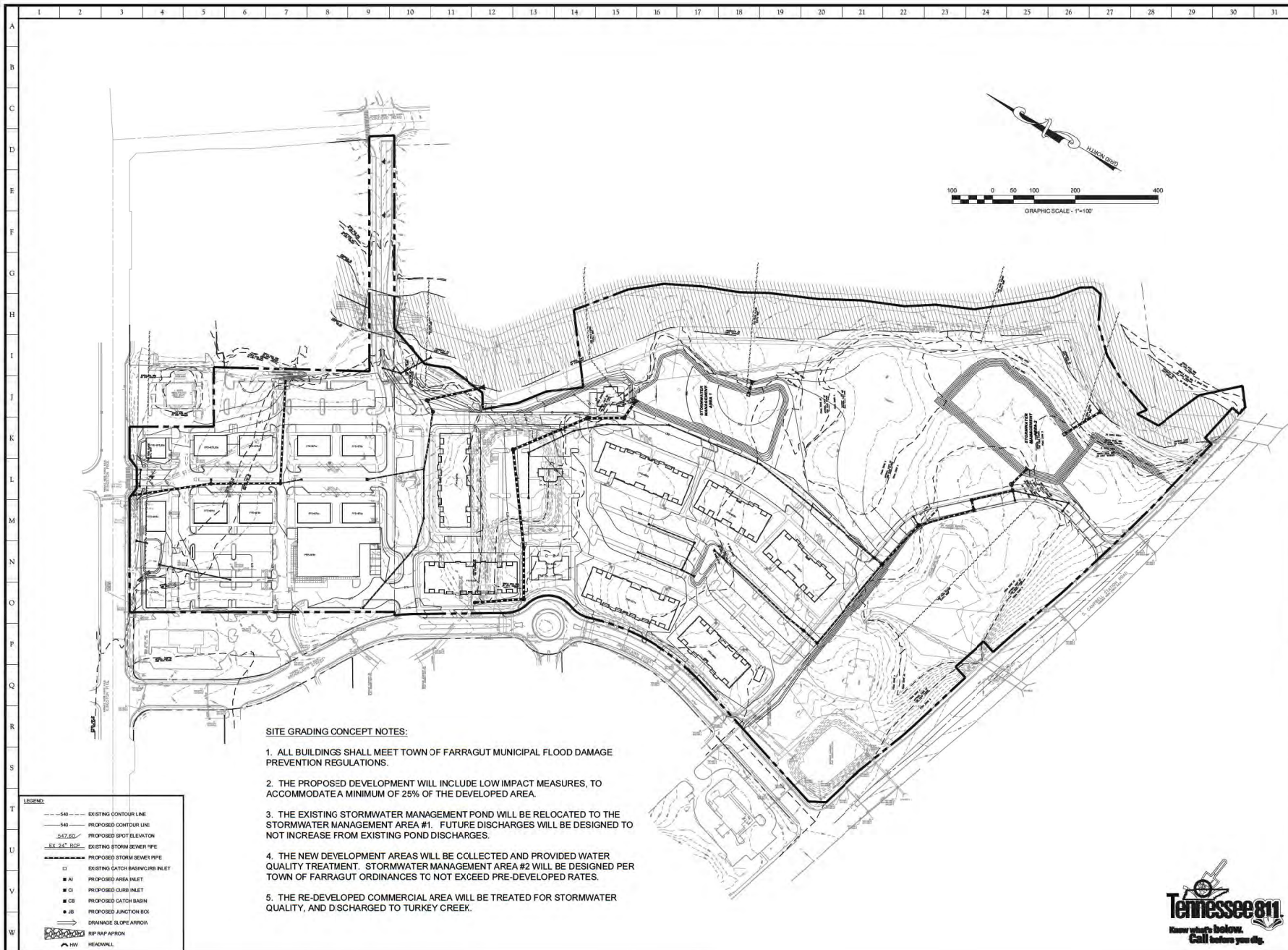
PCD Concept Plan

Farragut Town Center at Biddle Farms
Kingston Pike, Brooklawn Street, & Concord Road
Civil District No. 6 of Knox County, Tennessee
Town of Farragut

REVISIONS	
NO.	DATE / COMMENTS
1	11/09/2020 Revised per Town Comments

ORIGINAL ISSUE: 10/19/2020
SITE PROJECT#: 1994
FILE: 1994 PCD Concept Plan

CP-1



SITE GRADING CONCEPT NOTES:

1. ALL BUILDINGS SHALL MEET TOWN OF FARRAGUT MUNICIPAL FLOOD DAMAGE PREVENTION REGULATIONS.
2. THE PROPOSED DEVELOPMENT WILL INCLUDE LOW IMPACT MEASURES, TO ACCOMMODATE A MINIMUM OF 25% OF THE DEVELOPED AREA.
3. THE EXISTING STORMWATER MANAGEMENT POND WILL BE RELOCATED TO THE STORMWATER MANAGEMENT AREA #1. FUTURE DISCHARGES WILL BE DESIGNED TO NOT INCREASE FROM EXISTING POND DISCHARGES.
4. THE NEW DEVELOPMENT AREAS WILL BE COLLECTED AND PROVIDED WATER QUALITY TREATMENT. STORMWATER MANAGEMENT AREA #2 WILL BE DESIGNED PER TOWN OF FARRAGUT ORDINANCES TO NOT EXCEED PRE-DEVELOPED RATES.
5. THE RE-DEVELOPED COMMERCIAL AREA WILL BE TREATED FOR STORMWATER QUALITY, AND DISCHARGED TO TURKEY CREEK.

LEGEND:

---	EXISTING CONTOUR LINE
---	PROPOSED CONTOUR LINE
247.60	PROPOSED SPOT ELEVATION
EX 24" SDR	EXISTING STORM SEWER PIPE
---	PROPOSED STORM SEWER PIPE
□	EXISTING CATCH BASIN/CURB INLET
■ AI	PROPOSED AREA INLET
■ CI	PROPOSED CURB INLET
■ CB	PROPOSED CATCH BASIN
■ JB	PROPOSED JUNCTION BOX
→	DRAINAGE SLOPE ARROW
⬢	RIP RAP APRON
⬢	HEADWALL



10215 Technology Drive, Suite 304
Knoxville, TN 37932
(865) 777-4160
www.site-incorporated.com

CONCEPTUAL

Conceptual Grading Plan

Farragut Town Center at Biddle Farms
Kingston Pike, Brooklawn Street, & Concord Road
Civil District No. 6 of Knox County, Tennessee
Town of Farragut

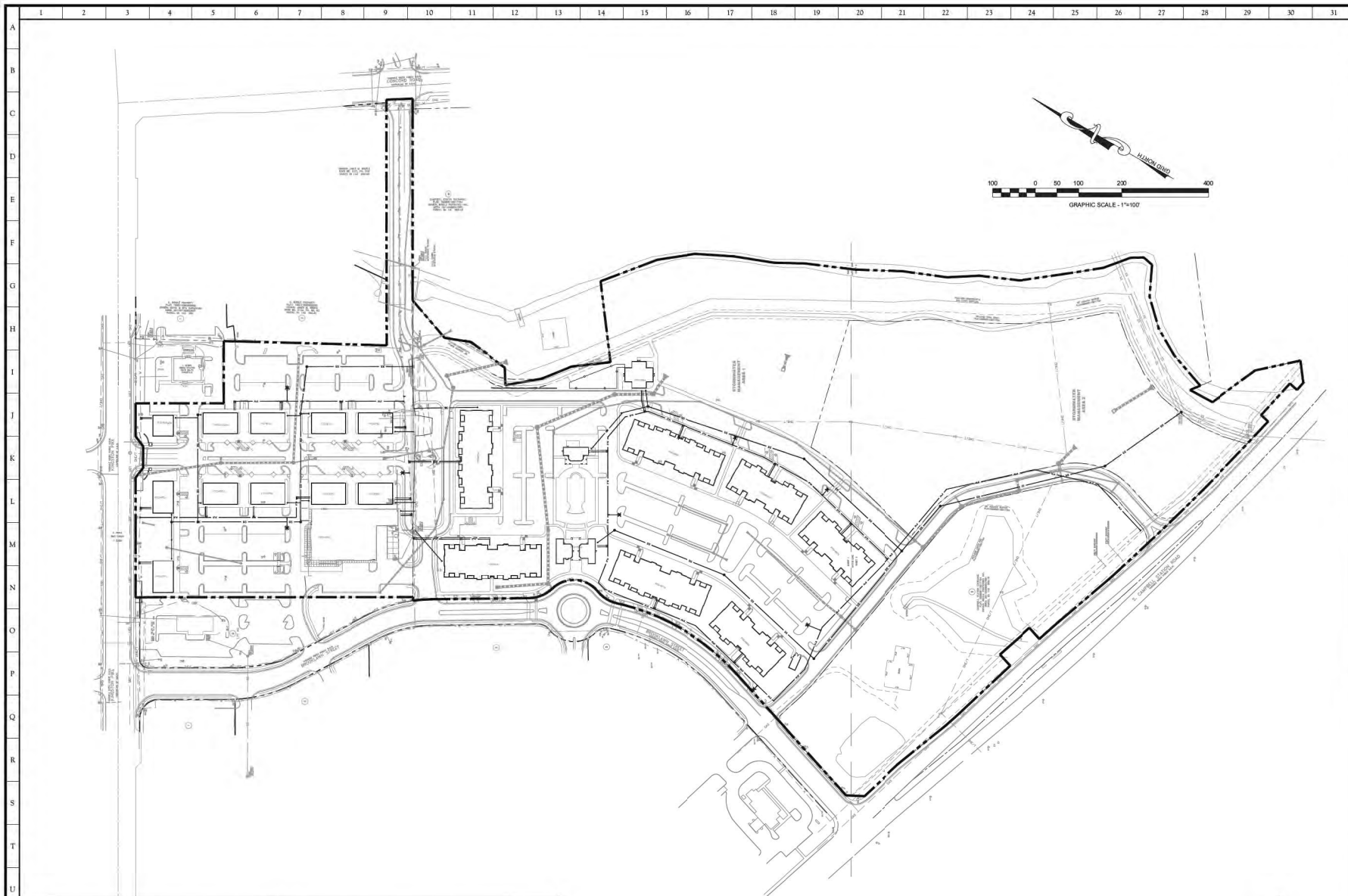
REVISIONS

NO.	DATE	COMMENTS
1	10/26/20	Revised per Town Comments

ORIGINAL ISSUE: 11-09-2020
SITE PROJECT#: 1994
FILE: CGP-18



CGP1



CONCEPTUAL

Conceptual Utility Plan
Farragut Town Center at Biddle Farms
 Kingston Pike, Brooklawn Street, & Concord Road
 Civil District No. 6 of Knox County, Tennessee
 Town of Farragut

REVISIONS	
NO.	DATE COMMENTS
1	11/05/03 Revised per Town Comments

ORIGINAL ISSUE: 10/19/2003
 SITE PROJECT#: 1994

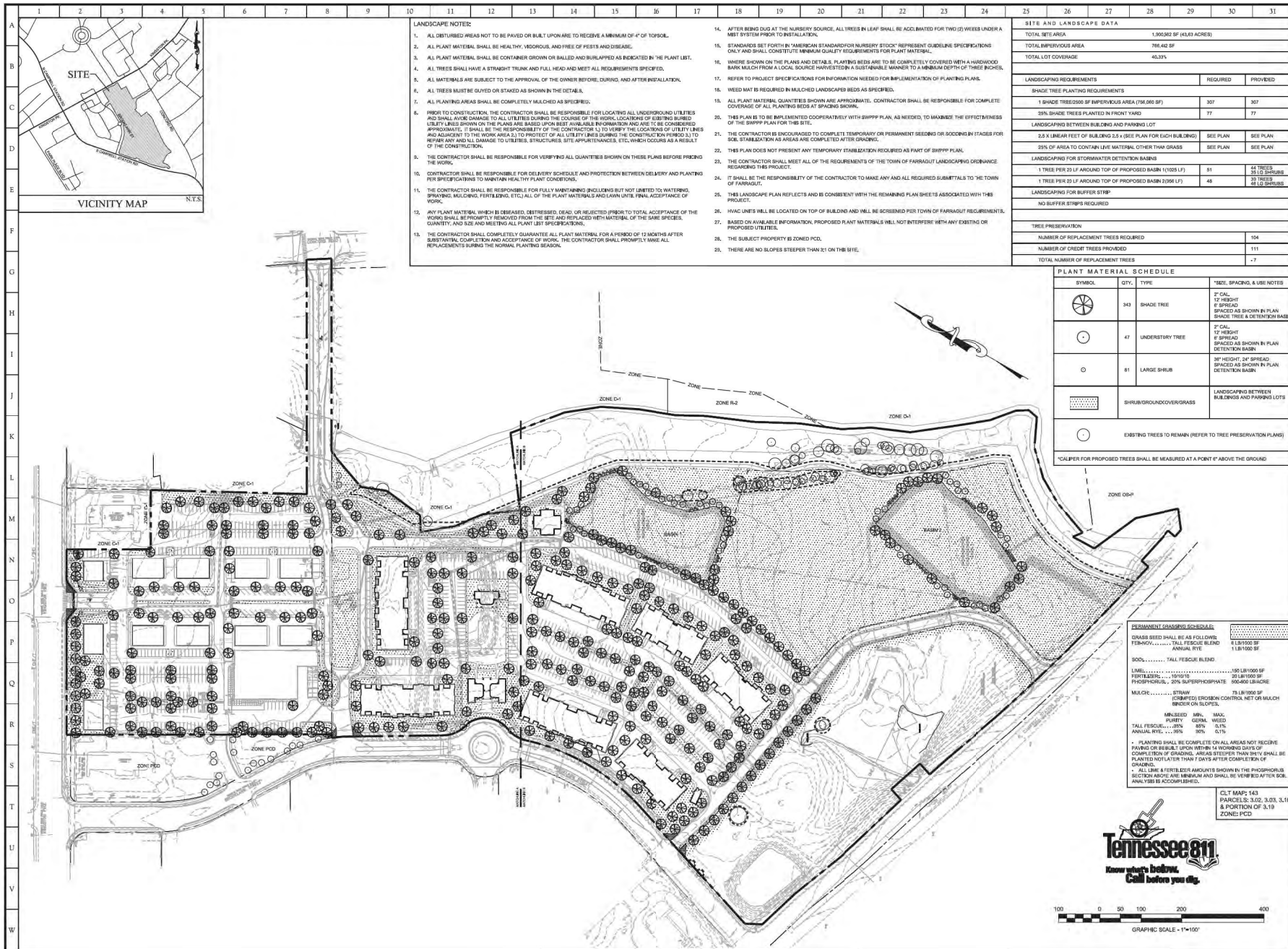
FILE: 1994-Utility

CUP1

Contacts

Water	Sanitary Sewer	Gas	Electric	Telephone
Edwin Deyton First Utility District of Knox Co. 122 Durwood Road Knoxville, TN 37922 Phone: (865) 966-9741 Fax: (865) 675-4955	Edwin Deyton First Utility District of Knox Co. 122 Durwood Road Knoxville, TN 37922 Phone: (865) 966-9741 Fax: (865) 675-4955	Knoxville Utilities Board New Service Department 4525 Middlebrook Pike Knoxville, TN 37919 Phone: (865) 558-2555	Jay Hines Lenoir City Utilities Board 7698 Greewood Park Blvd. Lenoir City, TN 37771 Phone: (865) 986-6591 Fax: (865) 986-0605	Tom Nitz TDS Telecom 701 Concord Road Knoxville, TN 37933 Phone: (865) 671-4546 Fax: (865) 671-4595





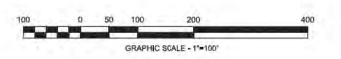
LANDSCAPE NOTES:

1. ALL DISTURBED AREAS NOT TO BE PAVED OR BUILT UPON ARE TO RECEIVE A MINIMUM OF 4" OF TOPSOIL.
2. ALL PLANT MATERIAL SHALL BE HEALTHY, VIGOROUS, AND FREE OF PESTS AND DISEASE.
3. ALL PLANT MATERIAL SHALL BE CONTAINER GROWN OR BALLED AND BURLAPPED AS INDICATED IN THE PLANT LIST.
4. ALL TREES SHALL HAVE A STRAIGHT TRUNK AND FULL HEAD AND MEET ALL REQUIREMENTS SPECIFIED.
5. ALL MATERIALS ARE SUBJECT TO THE APPROVAL OF THE OWNER BEFORE, DURING, AND AFTER INSTALLATION.
6. ALL TREES MUST BE GUYED OR STAKED AS SHOWN IN THE DETAILS.
7. ALL PLANTING AREAS SHALL BE COMPLETELY MULCHED AS SPECIFIED.
8. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES AND SHALL AVOID DAMAGE TO ALL UTILITIES DURING THE COURSE OF THE WORK. LOCATIONS OF EXISTING BURIED UTILITY LINES SHOWN ON THE PLANS ARE BASED UPON BEST AVAILABLE INFORMATION AND ARE TO BE CONSIDERED APPROXIMATE. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE LOCATION OF UTILITY LINES AND ADJACENT TO THE WORK AREA TO PROTECT OF ALL UTILITY LINES DURING THE CONSTRUCTION PERIOD AND TO REPAIR ANY AND ALL DAMAGE TO UTILITIES, STRUCTURES, SITE APPURTENANCES, ETC. WHICH OCCURS AS A RESULT OF THE CONSTRUCTION.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL QUANTITIES SHOWN ON THESE PLANS BEFORE PRICING THE WORK.
10. CONTRACTOR SHALL BE RESPONSIBLE FOR DELIVERY SCHEDULE AND PROTECTION BETWEEN DELIVERY AND PLANTING PER SPECIFICATIONS TO MAINTAIN HEALTHY PLANT CONDITIONS.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FULLY MAINTAINING INCLUDING BUT NOT LIMITED TO: WATERING, PRUNING, MULCHING, FERTILIZING, ETC. ALL OF THE PLANT MATERIALS AND AREAS UNTIL FINAL ACCEPTANCE OF WORK.
12. ANY PLANT MATERIAL WHICH IS DAMAGED, DIES, OR DEFECTIVE PRIOR TO TOTAL ACCEPTANCE OF THE WORK SHALL BE PROMPTLY REMOVED FROM THE SITE AND REPLACED WITH MATERIAL OF THE SAME SPECIES, QUANTITY, AND SIZE MEETING ALL PLANT SPECIFICATIONS.
13. THE CONTRACTOR SHALL COMPLETELY GUARANTEE ALL PLANT MATERIAL FOR A PERIOD OF 12 MONTHS AFTER SUBSTANTIAL COMPLETION AND ACCEPTANCE OF WORK. THE CONTRACTOR SHALL PROMPTLY MAKE ALL REPLACEMENTS DURING THE NORMAL PLANTING SEASON.
14. AFTER BEING DUG AT THE NURSERY SOURCE, ALL TREES IN LEAF SHALL BE ACCLIMATED FOR TWO (2) WEEKS UNDER A MIST SYSTEM PRIOR TO INSTALLATION.
15. STANDARDS SET FORTH IN "AMERICAN STANDARD FOR NURSERY STOCK" REPRESENT GUIDELINE SPECIFICATIONS ONLY AND SHALL CONSTITUTE MINIMUM QUALITY REQUIREMENTS FOR PLANT MATERIAL.
16. WHERE SHOWN ON THE PLANS AND DETAILS, PLANTING BEDS ARE TO BE COMPLETELY COVERED WITH A WOODCHUNK BARK MULCH FROM A LOCAL SOURCE HARVESTED IN A SUSTAINABLE MANNER TO A MINIMUM DEPTH OF THREE INCHES.
17. REFER TO PROJECT SPECIFICATIONS FOR INFORMATION NEEDED FOR IMPLEMENTATION OF PLANTING PLANS.
18. WEED MAT IS REQUIRED IN MULCHED LANDSCAPE BEDS AS SPECIFIED.
19. ALL PLANT MATERIAL QUANTITIES SHOWN ARE APPROXIMATE. CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLETE COVERAGE OF ALL PLANTING AREAS AT FINISHING STAGES.
20. THIS PLAN IS TO BE IMPLEMENTED COOPERATIVELY WITH SWPPP PLAN, AS NEEDED, TO MAXIMIZE THE EFFECTIVENESS OF THE SWPPP PLAN FOR THIS SITE.
21. THE CONTRACTOR IS ENCOURAGED TO COMPLETE TEMPORARY OR PERMANENT SEEDING OR SOCCING IN STAGES FOR SOIL STABILIZATION AS AREAS ARE COMPLETED AFTER GRADING.
22. THIS PLAN DOES NOT PRESENT ANY TEMPORARY STABILIZATION REQUIRED AS PART OF SWPPP PLAN.
23. THE CONTRACTOR SHALL MEET ALL OF THE REQUIREMENTS OF THE TOWN OF FARRAGUT LANDSCAPING ORDINANCE REGARDING THIS PROJECT.
24. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MAKE ANY AND ALL REQUIRED SUBMITTALS TO THE TOWN OF FARRAGUT.
25. THIS LANDSCAPE PLAN REFLECTS AND IS CONSISTENT WITH THE REMAINING PLAN SHEETS ASSOCIATED WITH THIS PROJECT.
26. HVAC UNITS WILL BE LOCATED ON TOP OF BUILDING AND WILL BE SCREENED FOR TOWN OF FARRAGUT REQUIREMENTS.
27. BASED ON AVAILABLE INFORMATION, PROPOSED PLANT MATERIALS WILL NOT INTERFERE WITH ANY EXISTING OR PROPOSED UTILITIES.
28. THE SUBJECT PROPERTY IS ZONED PCD.
29. THERE ARE NO SLOPES STEEPER THAN 3:1 ON THIS SITE.

SITE AND LANDSCAPE DATA		
TOTAL SITE AREA	1,300,982 SF (ALES ACRES)	
TOTAL IMPERVIOUS AREA	786,402 SF	
TOTAL LOT COVERAGE	40.3%	
LANDSCAPING REQUIREMENTS		
	REQUIRED	PROVIDED
SHADE TREE PLANTING REQUIREMENTS		
1 SHADE TREES/2000 SF IMPERVIOUS AREA (750,000 SF)	307	307
35% SHADE TREES PLANTED IN FRONT YARD	77	77
LANDSCAPING BETWEEN BUILDING AND PARKING LOT		
2.0 X LINEAR FEET OF BUILDING 2.5 X (SEE PLAN FOR EACH BUILDING)	SEE PLAN	SEE PLAN
25% OF AREA TO CONTAIN LIVE MATERIAL, OTHER THAN GRASS	SEE PLAN	SEE PLAN
LANDSCAPING FOR STORMWATER DETENTION BASINS		
1 TREE PER 20 LF AROUND TOP OF PROPOSED BASIN (1025 LF)	51	44 TREES 55.0% SHRUBS
1 TREE PER 20 LF AROUND TOP OF PROPOSED BASIN (2056 LF)	48	35 TREES 55.0% SHRUBS
LANDSCAPING FOR BUFFER STRIP		
NO BUFFER STRIPS REQUIRED		
TREE PRESERVATION		
NUMBER OF REPLACEMENT TREES REQUIRED	104	
NUMBER OF CREDIT TREES PROVIDED	111	
TOTAL NUMBER OF REPLACEMENT TREES	- 7	

PLANT MATERIAL SCHEDULE			
SYMBOL	QTY.	TYPE	*SIDE, SPACING, & USE NOTES
	343	SHADE TREE	2' CAL 12' HEIGHT SPACED AS SHOWN IN PLAN SHADE TREE & DETENTION BASIN
	47	UNDERSTORY TREE	2' CAL 12' HEIGHT SPACED AS SHOWN IN PLAN DETENTION BASIN
	81	LARGE SHRUB	30' HEIGHT, 24' SPREAD SPACED AS SHOWN IN PLAN DETENTION BASIN
		SHRUB/GROUND COVER/GRASS	LANDSCAPING BETWEEN BUILDINGS AND PARKING LOTS
		EXISTING TREES TO REMAIN (REFER TO TREE PRESERVATION PLANS)	
*CALIPER FOR PROPOSED TREES SHALL BE MEASURED AT A POINT 4" ABOVE THE GROUND			

PERMANENT GRASSING SCHEDULE	
GRASS SEED SHALL BE AS FOLLOWS:	
FEBRUARY.....TALL FESCUE BLEND	1 LB/1000 SF
ANNUAL RYE	1 LB/1000 SF
SOIL.....TALL FESCUE BLEND	
LIME.....100 LB/1000 SF	
FERTILIZER.....10 LB/1000 SF	
PHOSPHORUS.....20% SUPERPHOSPHATE	500-600 LB/ACRE
MULCH.....STRAW	75 LB/1000 SF
CHARMED EROSION CONTROL NET OR MULCH	INDICATED ON SLOPES
MIXED MIN. MAX. PURITY	50% 80% 51%
TALL FESCUE.....35% 80% 51%	
ANNUAL RYE.....35% 80% 51%	
* PLANTING SHALL BE COMPLETE ON ALL AREAS NOT RECEIVING PAVING OR REBUILT UPON WITHIN 14 WORKING DAYS OF COMPLETION OF GRADING. AREAS STEEPER THAN 3:1 SHALL BE PLANTED NOT LATER THAN 7 DAYS AFTER COMPLETION OF GRADING.	
* ALL LIME & FERTILIZER AMOUNTS SHOWN IN THE PHOSPHORUS SECTION ABOVE ARE MINIMUM AND SHALL BE VERIFIED BY SOIL ANALYSIS AS ACCOMPLISHED.	



CONCEPTUAL

Conceptual Landscape Plan - Overall

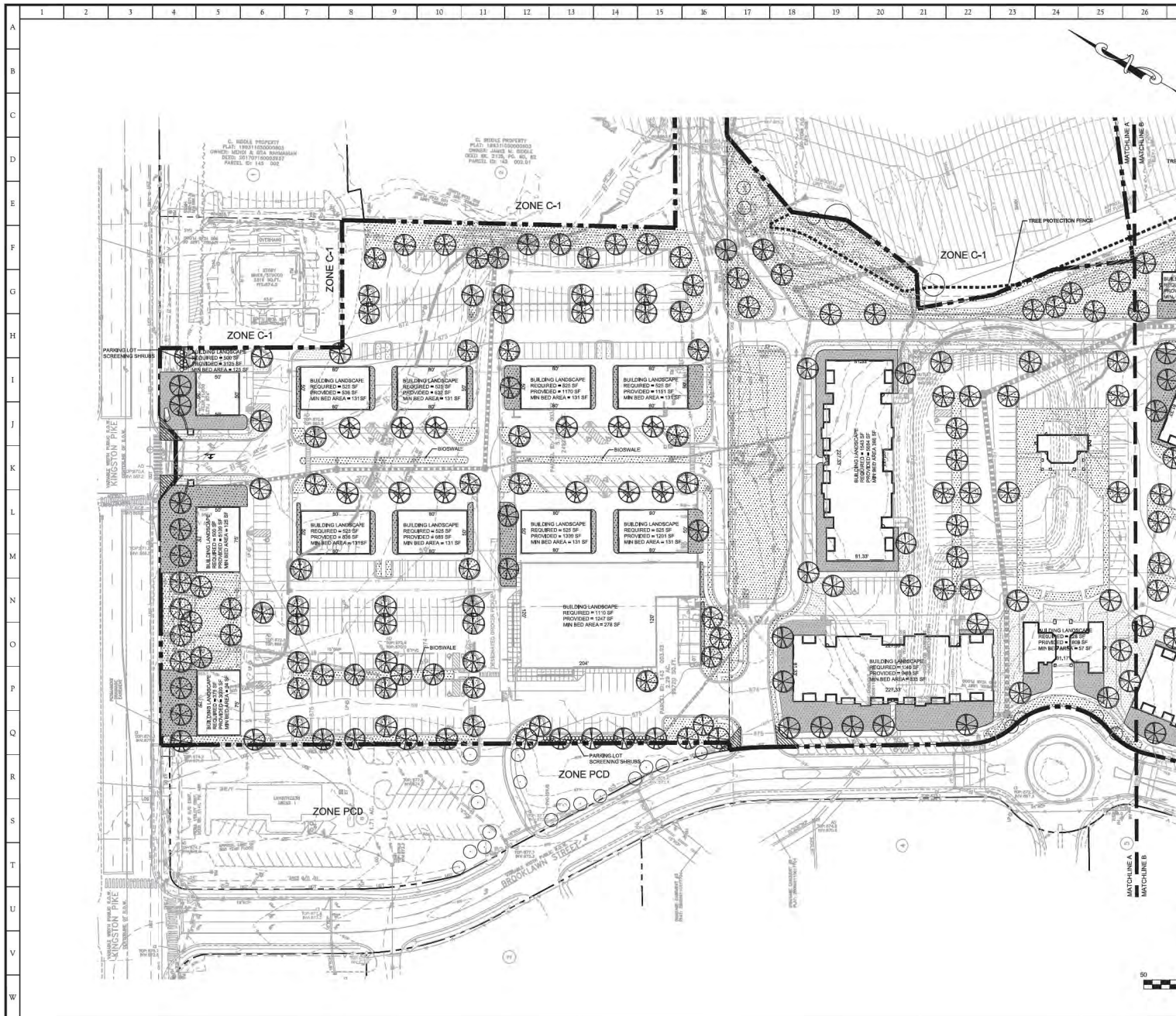
Farragut Town Center at Biddle Farms
Kingston Pike, Brooklawn Street, & Concord Road
Civil District No. 6 of Knox County, Tennessee
Town of Farragut

REVISIONS	
NO.	DATE / COMMENTS
1	11/09/2020 Revised per Town Committee

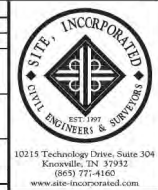
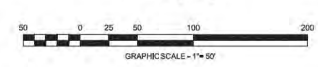
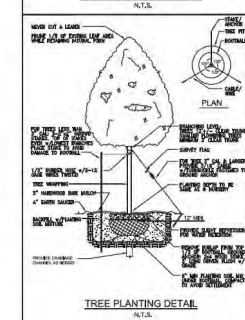
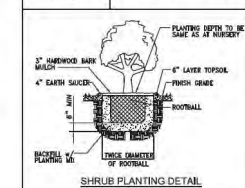
ORIGINAL ISSUE: 10/19/2020
SITE PROJECT#: 1994

FILE: Landscape

L1.0



PLANT LEGEND	
SYMBOL	TYPE
	SHADE TREE
	UNDERSTORY TREE
	LARGE SHRUB
	GRASS
	EXISTING TREES TO REMAIN (REFER TO TREE PRESERVATION PLAN)



CONCEPTUAL

Conceptual Landscape Plan - North

Proposed Redevelopment Kingston Pike, Brooklawn Street, & Concord Road Civil District No. 6 of Knox County, Tennessee Town of Farragut

REVISIONS

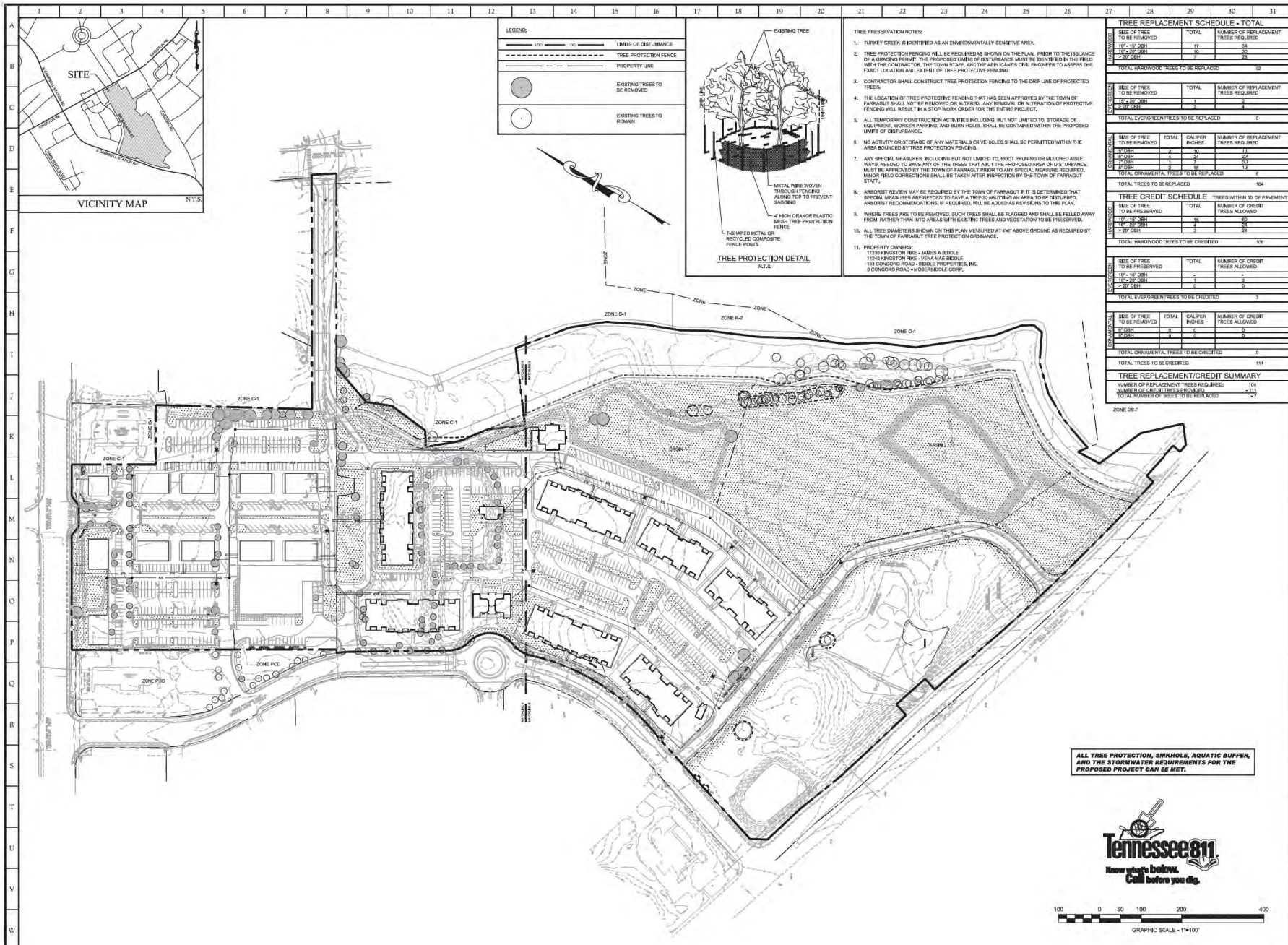
NO.	DATE	COMMENTS
1	11/09/2020	Revised per Town Comments

ORIGINAL ISSUE: 10/19/2020

SITE PROJECT#: 1994

FILE: Landscape

L1.1



10215 Technology Drive, Suite 304
Knoxville, TN 37932
(865) 777-4160
www.site-incorporated.com

CONCEPTUAL

Conceptual Tree Preservation Plan - Overall

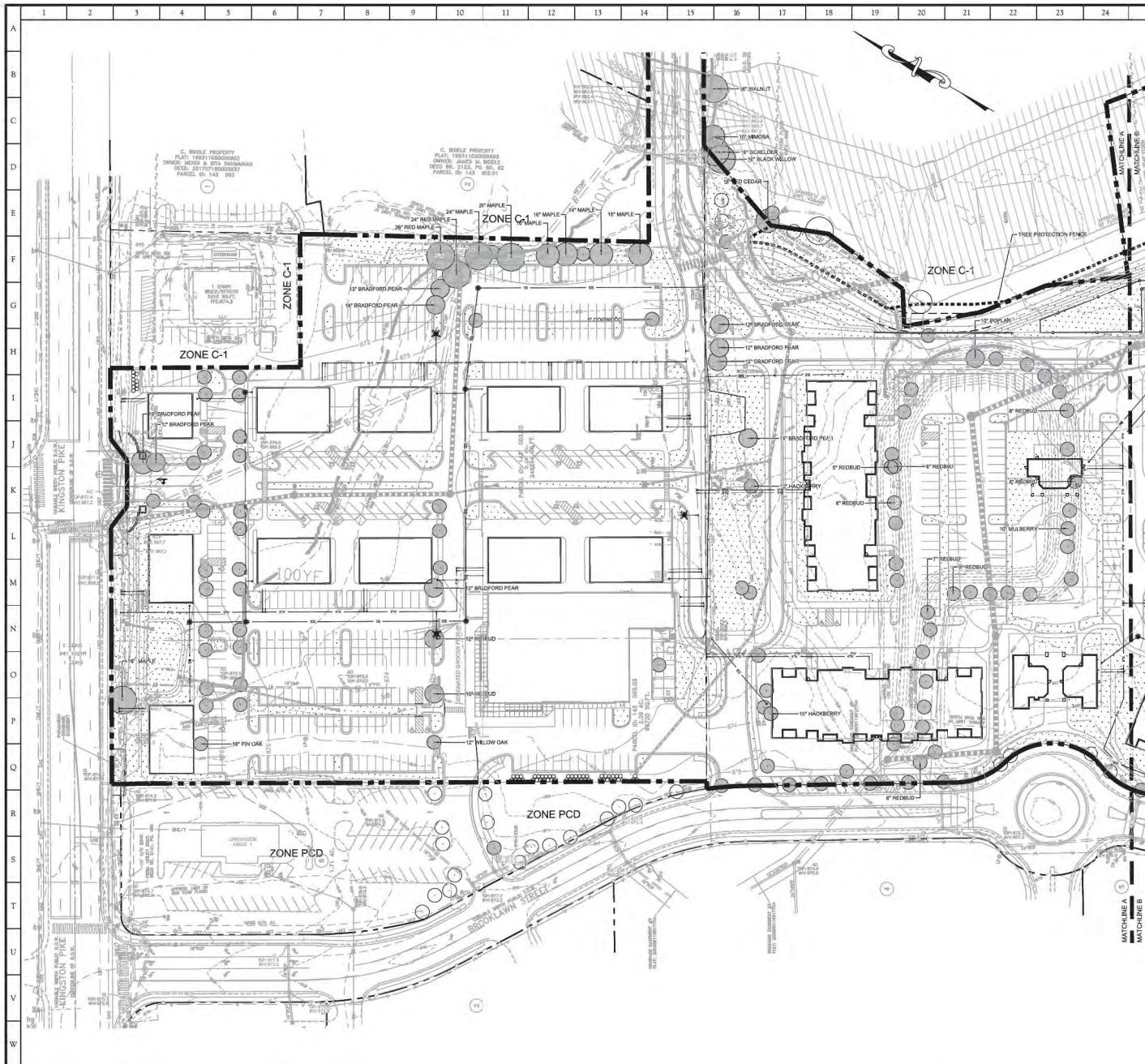
Farragut Town Center at Biddle Farms
Kingston Pike, Brooklawn Street, & Concord Road
Civil District No. 6 of Knox County, Tennessee
Town of Farragut

REVISIONS	
NO.	DATE
1	11/09/2020

ORIGINAL ISSUE: 10/19/2020
SITE PROJECT#: 1994

FILE: Landscape

L2.0



- TREE PRESERVATION NOTES:**
1. TURKEY CREEK IS IDENTIFIED AS AN ENVIRONMENTALLY-SENSITIVE AREA.
 2. TREE PROTECTION FENCING WILL BE REQUIRED AS SHOWN ON THE PLAN, PRIOR TO THE BEGINNING OF A SHADING STUDY. THE PROPOSED LIMITS OF DISTURBANCE MUST BE IDENTIFIED BY THE FIELD WITH THE CONTRACTOR, THE TOWN STAFF, AND THE APPLICANT'S CIVIL ENGINEER TO ASSESS THE EXACT LOCATION AND EXTENT OF TREE PROTECTIVE FENCING.
 3. CONTRACTOR SHALL CONSTRUCT TREE PROTECTION FENCING TO THE DUMP LINE OF PROTECTED TREES.
 4. THE LOCATION OF TREE PROTECTIVE FENCING HAS BEEN APPROVED BY THE TOWN OF FARRAGUT. FENCING SHALL NOT BE REMOVED OR ALTERED. ANY REMOVAL OR ALTERATION OF PROTECTIVE FENCING WILL RESULT IN A STOP WORK ORDER FOR THE ENTIRE PROJECT.
 5. ALL TEMPORARY CONSTRUCTION ACTIVITIES INCLUDING BUT NOT LIMITED TO STORAGE OF EQUIPMENT, WORKER PARKING, AND BURN HOLDS, SHALL BE CONTAINED WITHIN THE PROPOSED LIMITS OF DISTURBANCE.
 6. NO ACTIVITY OR STORAGE OF ANY MATERIALS OR VEHICLES SHALL BE PERMITTED WITHIN THE AREA BOUNDED BY TREE PROTECTION FENCING.
 7. ANY SPECIAL MEASURES, INCLUDING BUT NOT LIMITED TO, ROOT PRUNING OR MULCHED ARMS, NEEDED TO SAVE ANY OF THE TREES THAT ABUT THE PROPOSED AREA OF DISTURBANCE, MUST BE APPROVED BY THE TOWN OF FARRAGUT PRIOR TO ANY SPECIAL MEASURES REQUIRED. MINOR FIELD CORRECTIONS SHALL BE TAKEN AFTER INSPECTION BY THE TOWN OF FARRAGUT STAFF.
 8. ARBOREST REVIEW MAY BE REQUIRED BY THE TOWN OF FARRAGUT IF IT IS DETERMINED THAT SPECIAL MEASURES ARE NEEDED TO SAVE A TREE(S) AND THAT AN AREA TO BE NOTIFIED. ARBOREST RECOMMENDATIONS, IF REQUIRED, WILL BE ADDED AS REVISIONS TO THIS PLAN.
 9. WHERE TREES ARE TO BE REMOVED, SUCH TREES SHALL BE FLAGGED AND SHALL BE FELLED AWAY FROM, RATHER THAN INTO AREAS WITH EXISTING TREES AND VEGETATION TO BE PRESERVED.
 10. ALL TREE DIAMETERS SHOWN ON THIS PLAN MEASURED AT 4'-4\"/>

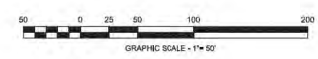
LEGEND

- 100' LIMITS OF DISTURBANCE
- TREE PROTECTION FENCING
- PROPERTY LINE
- EXISTING TREES TO BE REMOVED
- EXISTING TREES TO REMAIN

NOTES:

TREES THAT ARE NOT LABELED ARE NOT QUALIFIED FOR CROWN OR REPLACEMENT DUE TO SIZE, SPECIES, OR LOCATION WITHIN THE BUFFER. TREES ARE TO BE REMOVED OR REPLACED MORE THAN 5' FROM THE LIMITS OF PROJECT DEVELOPMENT.

ALL TREE PROTECTION, SINKHOLE, AQUATIC BUFFER, AND THE STORMWATER REQUIREMENTS FOR THE PROPOSED PROJECT CAN BE MET.



ATKINS SITE, INCORPORATED
CIVIL ENGINEERS & SURVEYORS
 10215 Technology Drive, Suite 304
 Knoxville, TN 37932
 (615) 777-4160
 www.atkins-incorporated.com

CONCEPTUAL

Conceptual Tree Preservation Plan - North

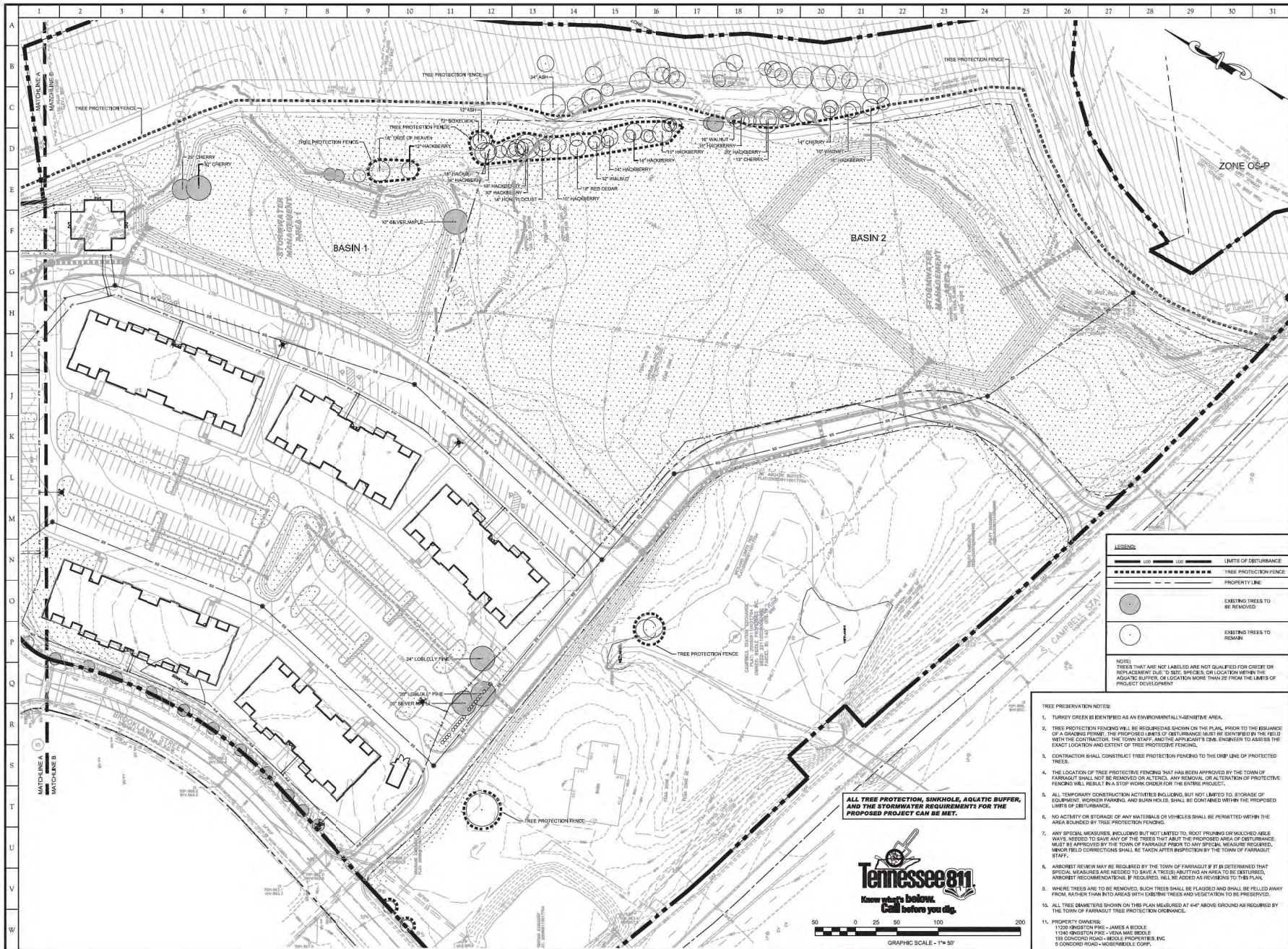
Proposed Redevelopment

Kingston Pike, Brooklawn Street, & Concord Road
 Civil District No. 6 of Knox County, Tennessee
 Town of Farragut

REVISIONS		
NO.	DATE	COMMENTS
1	11/09/2020	Revised per Town Comments

ORIGINAL ISSUE: 10/19/2020
 SITE PROJECT#: 1994
 FILE: L2.1

L2.1



10215 Technology Drive, Suite 304
Knoxville, TN 37932
(865) 777-4160
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Proposed Redevelopment Kingston Pike, Brooklawn Street, & Concord Road Civil District No. 6 of Knox County, Tennessee Town of Farragut

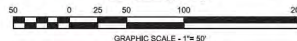
REVISIONS	
NO.	DATE
1	11-20-2020
2	11-20-2020
3	11-20-2020
4	11-20-2020
5	11-20-2020
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7	11-20-2020
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29	11-20-2020
30	11-20-2020
31	11-20-2020

ORIGINAL ISSUE: 10/19/2020
SITE PROJECT#: 1994
FILE: L2.2

11. PROPERTY OWNERS:
1100 KNOXTON PIKE - JAMES A. BOOLE
1140 KNOXTON PIKE - VERA MARE BOOLE
130 CONCORD ROAD - BOOLE PROPERTIES, INC.
9 CONCORD ROAD - MOOREHEAD & CO., INC.

- LEGEND**
- 1. TURKEY CREEK IS IDENTIFIED AS AN ENVIRONMENTALLY-SENSITIVE AREA.
 - 2. TREE PROTECTION FENCING WILL BE REQUIRED AS SHOWN ON THE PLAN, PRIOR TO THE ISSUANCE OF A GRADING PERMIT. THE PROPOSED LIMITS OF DISTURBANCE MUST BE IDENTIFIED BY THE FIELD WITH THE CONTRACTOR, THE TOWN STAFF, AND THE APPLICANT'S CIVIL ENGINEER TO ASSURE THE EXACT LOCATION AND EXTENT OF TREE PROTECTIVE FENCING.
 - 3. CONTRACTOR SHALL CONSTRUCT TREE PROTECTIVE FENCING TO THE DRIP LINE OF PROTECTED TREES.
 - 4. THE LOCATION OF TREE PROTECTIVE FENCING THAT HAS BEEN APPROVED BY THE TOWN OF FARRAGUT SHALL NOT BE REMOVED OR ALTERED. ANY REMOVAL OR ALTERATION OF PROTECTIVE FENCING WILL RESULT IN A STOP WORK ORDER FOR THE ENTIRE PROJECT.
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 - 6. NO ACTIVITY OR STORAGE OF ANY MATERIALS OR VEHICLES SHALL BE PERMITTED WITHIN THE AREA BOUNDED BY TREE PROTECTIVE FENCING.
 - 7. ANY SPECIAL MEASURES INCLUDING BUT NOT LIMITED TO, ROOT PRUNING OR MULCHED ARBOR WAYS, NEEDED TO SAVE ANY OF THE TREES THAT ADJUT THE PROPOSED AREA OF DISTURBANCE, MUST BE APPROVED BY THE TOWN OF FARRAGUT PRIOR TO ANY SPECIAL MEASURE REQUIRED. MAJOR FIELD CORRECTIONS SHALL BE TAKEN AFTER INSPECTION BY THE TOWN OF FARRAGUT STAFF.
 - 8. AN ARBORIST REVIEW MAY BE REQUIRED BY THE TOWN OF FARRAGUT IF IT IS DETERMINED THAT SPECIAL MEASURES ARE NEEDED TO SAVE A TREE ADJUTING AN AREA TO BE DISTURBED. ARBORIST RECOMMENDATIONS, IF REQUIRED, WILL BE ADDED AS REVISIONS TO THIS PLAN.
 - 9. WHERE TREES ARE TO BE REMOVED, SUCH TREES SHALL BE FLAGGED AND SHALL BE FIELLED AWAY FROM WATERWAYS AND INTO AREAS WITH EXISTING TREES AND VEGETATION TO BE PRESERVED.
 - 10. ALL TREE DIAMETERS SHOWN ON THIS PLAN MEASURED AT 4'-6" ABOVE GROUND AS REQUIRED BY THE TOWN OF FARRAGUT TREE PROTECTION ORDINANCE.
 - 11. PROPERTY OWNERS:
1100 KNOXTON PIKE - JAMES A. BOOLE
1140 KNOXTON PIKE - VERA MARE BOOLE
130 CONCORD ROAD - BOOLE PROPERTIES, INC.
9 CONCORD ROAD - MOOREHEAD & CO., INC.

ALL TREE PROTECTION, SINKHOLE, AQUATIC BUFFER, AND THE STORMWATER REQUIREMENTS FOR THE PROPOSED PROJECT CAN BE MET.



FARRAGUT TOWN CENTER *at Biddle Farms*

Site Lighting Elements

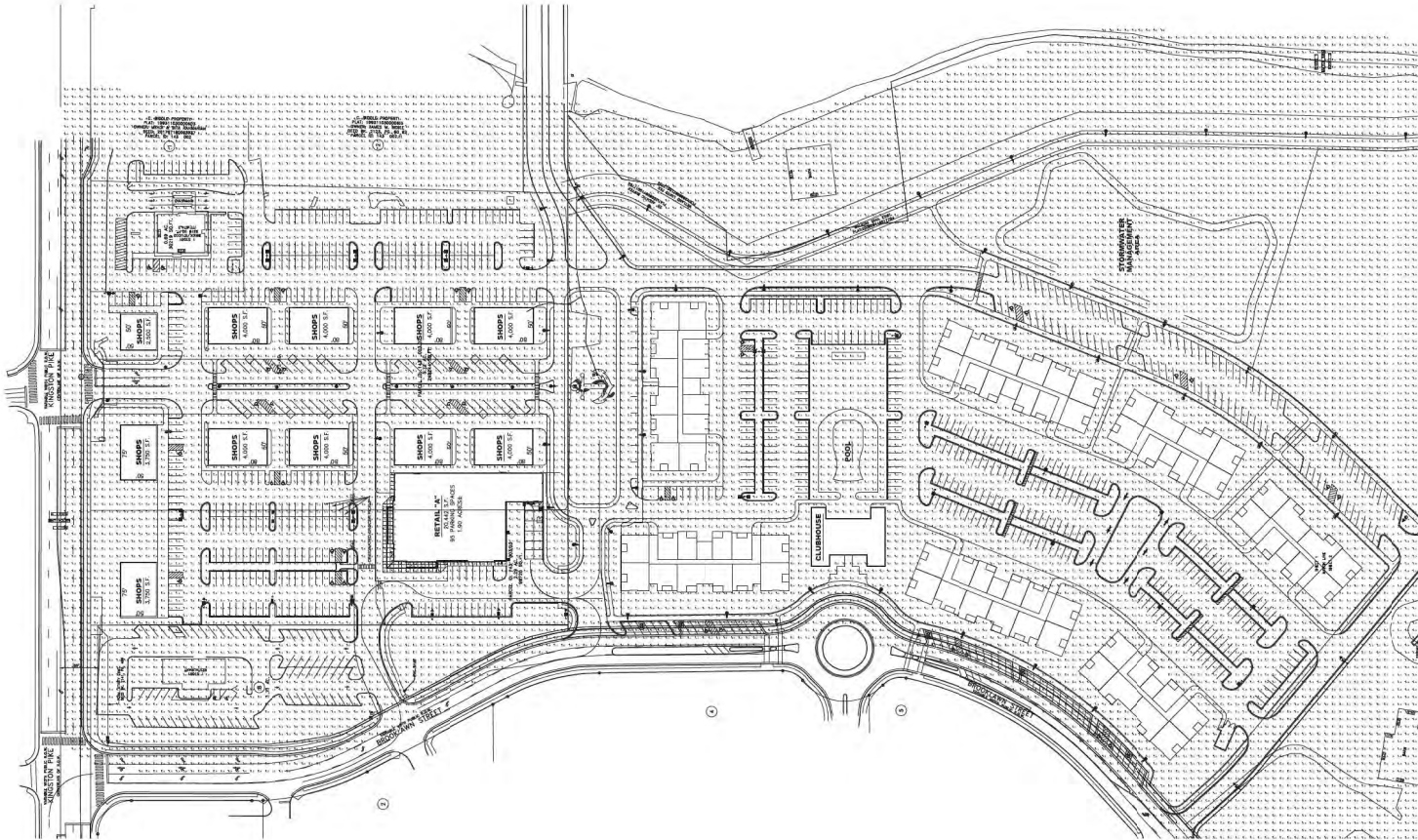
The overall objective of the site lighting for the proposed project is to develop a safe, warm, and inviting center where hours of use and operation extend past normal daylight hours. The site is divided into the areas of in response to the different site lighting needs that can be found throughout the site.

All lighting for the proposed project will meet the Town's outdoor lighting requirements and the lighting requirements specific to the Mixed-Use Town Center land use.

- Main parking fields will include 28' tall, tapered metal poles with rectangular, flat lens, LED fixtures with either one, two, or three heads per pole. Higher poles in the parking fields allow the use of fewer strategically placed poles to avoid conflicts with landscaping and parking while providing more uniform light levels.
- Streets adjacent to parking or proposed buildings may utilize the same fixture and pole type as the main parking fields, but the pole height will be reduced to 18' to 20' in these areas to reduce the visual impact on adjoining streets.
- Public street and common space area lighting will be provided utilizing decorative pole types and fixtures as shown on the site images previously provided for the project. Fixture types will be LED, and poles will be in the 16' to 18' range in height.
- Pedestrian area lighting will be provided with a mixture of building wall mounted and decorative pole mounted lights. A diverse group of fixtures will be utilized for pedestrian area lighting to add energy and character to the center. Fixtures will be LED and mounted between 10' and 16' range in height.
- Service Areas not illuminated by poles will be illuminated by wall mounted rectangular fixtures similar in appearance to the lights in the main parking fields. Fixtures will be LED and mounted at approximately 16' in height.



REVISIONS		
REV #	DATE	BY:



BASED ON THE INFORMATION PROVIDED, ALL DIMENSIONS AND LUMINAIRE LOCATIONS SHOWN REPRESENT RECOMMENDED POSITIONS. THE ENGINEER AND/OR ARCHITECT MUST DETERMINE APPLICABILITY OF THE LAYOUT TO EXISTING OR FUTURE FIELD CONDITIONS.

THIS LIGHTING PATTERN REPRESENTS ILLUMINATION LEVELS CALCULATED FROM LABORATORY DATA TAKEN UNDER CONTROLLED CONDITIONS UTILIZING CURRENT INDUSTRY STANDARD LAMP RATINGS IN ACCORDANCE WITH ILLUMINATING ENGINEERING SOCIETY APPROVED METHODS. ACTUAL PERFORMANCE OF ANY MANUFACTURER'S LUMINAIRE MAY VARY DUE TO VARIATION IN ELECTRICAL VOLTAGE, TOLERANCE IN LAMPS AND OTHER VARIABLE FIELD CONDITIONS.

Calculation Summary							
LABEL	QTY	AVG	MAX	MIN	AVG/FOOT	MAX/FOOT	FOOTCAND
NEW ENTRANCE DRIVE	PC	2.43	4.3	0.1	20.20	41.40	10
RESIDENTIAL ENTRANCE	PC	1.90	3.3	0.4	6.56	35.00	10
RESIDENTIAL PARKING	PC	1.31	4.3	0.2	6.55	31.00	
RETAIL PARKING	PC	2.43	4.3	0.5	4.88	9.40	
SCORE PARKING	PC	1.94	3.2	0.1	2.73	4.37	
WALKWAY DRIVE	PC	1.27	3.0	0.2	0.80	10.00	

Luminaire Schedule							
WLS13526 FARRAGUT TOWNE CENTER @ BIDDLE FARMS FARRAGUT, TN BY: HOLLY FARRAGUT DRIVE ON FOR PROJECT AT BIDDLEFARMS.COM							
Symbol	Qty	Label	Size	Sum. Lumens	LF/F	Description	Sum. Watts
	8	H	22500	0.000	WLS-H-100-T-400	10' MOUNTING HEIGHT	130
	12	H	22500	0.000	WLS-H-100-T-400	10' MOUNTING HEIGHT	130
	8	C	22500	0.000	WLS-H-100-T-400	10' MOUNTING HEIGHT	130
	4	C	22500	0.000	WLS-H-100-T-400	10' MOUNTING HEIGHT	130
	3	D	4070	0.000	WLS-H-100-H-10-100	14' MOUNTING HEIGHT	91
	9	E	12300	0.000	WLS-H-100-H-10-100-400	20' POSE	161
	40	F	7410	0.000	WLS-H-100-H-10-100-400	20' POSE	80
	11	G	8977	0.000	WLS-H-100-H-10-100-400	20' POSE	90

FARRAGUT TOWNE CENTER @
BIDDLE FARMS
FARRAGUT, TN

WLS LIGHTING
a WLS company

1919 WINDSOR PLACE
FORT WORTH, TX 76110
WWW.WSLIGHTING.COM

WLS-13526 DATE -10/13/20 SCALE: 1"=50'

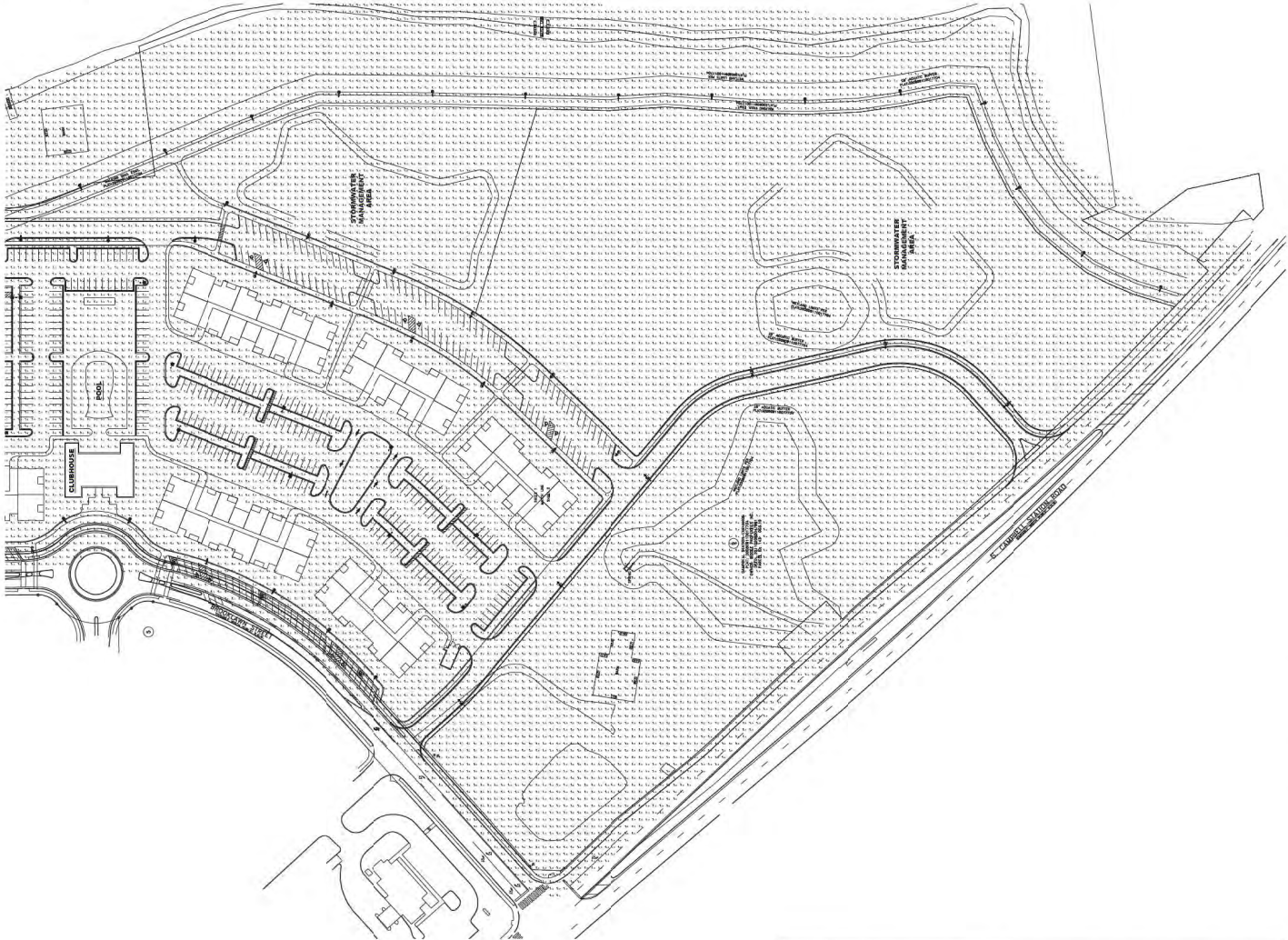
800-633-8711

PM: HOLLY

BY: J.P.

SHEET 1 OF 2

REVISIONS		
REV #	DATE	BY:



BASED ON THE INFORMATION PROVIDED, ALL DIMENSIONS AND LUMINAIRE LOCATIONS SHOWN REPRESENT RECOMMENDED POSITIONS. THE ENGINEER AND/OR ARCHITECT MUST DETERMINE APPLICABILITY OF THE LAYOUT TO EXISTING OR FUTURE FIELD CONDITIONS.

THIS LIGHTING PATTERN REPRESENTS ILLUMINATION LEVELS CALCULATED FROM LABORATORY DATA TAKEN UNDER CONTROLLED CONDITIONS UTILIZING CURRENT INDUSTRY STANDARD LAMP RATINGS IN ACCORDANCE WITH ILLUMINATING ENGINEERING SOCIETY APPROVED METHODS. ACTUAL PERFORMANCE OF ANY MANUFACTURER'S LUMINAIRE MAY VARY DUE TO VARIATION IN ELECTRICAL VOLTAGE, TOLERANCE IN LAMPS AND OTHER VARIABLE FIELD CONDITIONS.

Calculation Summary								
Label	Color	Avg	Max	Min	Avg/Ft ²	Max/Ft ²	Ft/Candle	Ft/Candle
MAIN ENTRANCE DRIVE	Pc	2.62	6.3	0.1	26.20	66.60	10	10
RESIDENTIAL ENTRANCE	Pc	1.90	5.3	0.2	6.56	35.00		
RESIDENTIAL PARKING	Pc	1.31	4.3	0.2	6.55	31.00		
RETAIL PARKING	Pc	2.63	6.7	0.5	4.86	9.40		
STORE PARKING	Pc	1.94	3.2	0.1	2.77	4.37		
WALKWAY DRIVE	Pc	1.27	3.6	0.2	6.65	10.00		

Luminaire Schedule									
W1212126 FARRAGUT TOWNE CENTER - B BIDDING PHASE FARRAGUT, TN PM: HOLLY PARKER DRAFT OR FOR PRICING AT HOLLY@WLSLIGHTING.COM									
Symbol	Qty	Label	Size	Summa	LF	Description	Sum	Watts	
	8	N	22000	0.000	WLS-A-100-T-40K	24" MOUNTING HEIGHT	130		
	12	N	22000	0.000	WLS-A-100-T-40K	24" MOUNTING HEIGHT	130		
	8	E	22000	0.000	WLS-A-100-T-40K	24" MOUNTING HEIGHT	130		
	4	E	22000	0.000	WLS-A-100-T-40K	24" MOUNTING HEIGHT	130		
	3	S	4070	0.000	WLS-W-100-W-40-40K	14" MOUNTING HEIGHT	91		
	9	S	12300	0.000	WLS-W-100-W-40-40K	20" POSE	181		
	40	S	7410	0.000	WLS-W-100-W-40-40K	20" POSE	84		
	11	E	8977	0.000	WLS-W-100-W-40-40K	20" POSE	90		

FARRAGUT TOWNE CENTER @
BIDDLE FARMS
FARRAGUT, TN

WLS LIGHTING
a WLS company

1919 WINDSOR PLACE
FORT WORTH, TX 76110
WWW.WLSLIGHTING.COM

WLS-13526 DATE -10/13/20 SCALE: 1"=50'

800-633-8711

PM: HOLLY

BY: J.P.

SHEET 2 OF 2

FARRAGUT TOWN CENTER *at Biddle Farms*

Public Gathering Spaces, Hardscape, and Paving Elements

One of the most important objectives of the proposed Town Center design is to incorporate vibrant and inviting public gathering spaces that seamlessly connect the retail and multi-family portions of the project and provide the citizens of the Town of Farragut with gathering space for public events that take advantage of the available amenities that the project offers. The seamless connection is achieved through the following elements:

- The removal of walking barriers by treating the streets without vertical curbs such that the entirety of the expanse is near level and fluid when entirely assigned to pedestrian access.
- The treatment of the driving surfaces in the village center with pavers to promote the impression of a walking surface you could drive on rather than a driving surface you could walk on.
- Pressing landscape to the edges to frame the village square instead of populating this public place bringing sidewalks closer to the building faces to isolate a central area within that pedestrian boundary that could be outdoor “flex space”.

Additionally, hardscape design is a natural extension of the storefront and provides connectivity between different buildings, parking areas and pedestrian paths. Diverse scoring patterns, colored concrete, and stamping enrich the sidewalk and enhance the sense of place. Combined with landscape areas, tree wells, benches, planters, pedestrian level lighting and other site amenities, a well-designed hardscape encourages a more relaxed and friendly Town Center experience.



Architectural Design Statement

The overall objective of the Development Team has been to create an inviting mixed use community that blends commercial and residential occupancies into a walkable environment that emulates the key principles of Traditional Neighborhood Planning and Design while honoring the image and identity of the Town of Farragut as advanced in their development guidelines.

To affect this outcome the land planning effort and architectural imaging sought to promote the following key distinctions that comprise Traditional Neighborhood Design while offering an expression of style and finish consistent with the qualities that hallmark Farragut.:

- Create a Town Center that offers a site arrangement that capitalizes on the natural assets within the site, the access arrangements currently serving the site, and the existing commercial and historic occupancies of the site to be preserved.
- Seek an expanded focus on pedestrian friendly design and pedestrian interconnectivity with all buildings within the town center, both residential and commercial, able to move seamlessly on a network of walkways, trails and promenades interfacing with priority over the vehicular demands generated by the service activities and public events that will coexist within the development.
- Place buildings to the street to create intimate relationships with the public way between indoor and outdoor environments.
- To the extent possible, shield from the public way from large or expansive parking areas such that the street experience features finished and landscaped fades that create a pedestrian environment with priority over the vehicular environment.
- Fashion a street scape that invites leisure activities such as outdoor display, dining, and occasional event venues that celebrate community through healthy interaction by both business and residential constituents.
- Express the structures with a modeling of massing, material and detail that avoids long straight walls and unarticulated facades while concurrently promoting expanded “eyes on the street” (windows viewing the public way) to enhance a sense of interest, personal scale and a measure of perceived public safety.
- Use rich materials consistent with quality expressions of architecture, and workmanship associated with durable performance.
- Landscape with a view to maturity with trees and shrubbery that improve the overall quality of appearance and outdoor comfort over time.
- Visually manage service areas and infrastructure to minimize negative impact on neighboring uses

- Screen rooftop mounted equipment utilizing building elements to shield from public view.
- Develop well-engineered responses to storm water management, flood plain capacities, and environmental features worthy of protection and enrichment.
- Create a “living place” that attracts residents and merchants seeking a synergistic environment that offers 24/7 occupancy.
- Promote opportunities through design and site arrangement for managed and spontaneous public events through the creation of a “sense of space” within the town center. along its public river walk, and at outdoor open space suitable for unstructured park-like relaxation.

It is the hope both the plan and the character studies advanced provide both inspiration and responsive direction to the future of the Town of Farragut.



FARRAGUT TOWN CENTER

at Biddle Farms

Architectural Elements

Central to the creation of a walkable mixed-use setting are features of **scale, safety, convenience, and character**. Each of these important standards has been used to advance concepts to the stage they are offered today.

The traditional site design standards guiding the current town center plan offer direction, but the market itself also offers important criteria that will activate their acceptance and maintain their continuing value for a project well-conceived and executed.

Consumer preference is undergoing major changes. The changes are found in everything from housing, work, school entertainment and shopping are hard to ignore. The Virus along with a preexisting trend toward internet dependency on everything we do has impacted what the future resident, business tenant, and surrounding community will expect from such an undertaking.

Please then explore briefly the key elements identified and how they have been incorporated into the planning for this important development:

Scale:

Farragut is a TOWN, and proud of its status as such. It is not an urban settlement. Within “towns” you would expect to find everything proportioned closer to the scale of an individual than that of a larger population. To that end every element of the plan must consider how to moderate the overall size of the concept such that in all areas offer a physical relationship that is comfortable and selectively even intimate. Affording the individual both personal space as well as promoting congregate place are the blended objectives.

This is best accomplished by integrating detail and rhythms that promote the experience of living, working, or shopping even when portions of the overall complex are nearly devoid of others, so as not to feel “overwhelming”. Concurrently the scale should allow community gatherings of fellowship to feel secure and personal. The tools in this arsenal reside in the character of the street scape, and the cadence of features that link all parts together.

- The frequency of spacing trees along the public promenades.
- The comforting width of walkways that invite shared use.
- The heights of streetlights adorned with season banners the add day and night value to the street scape.
- The stature of doorways, windows, and canopies offering incremental shade and relief along the main street.
- The invitation to enjoy either the inside or outside parts of a vender’s offering.

- The use of appropriately scaled signs directed at the individual rather than the highway.
- The richness of materials employed that show detail and craftsmanship.
- The feature accents of street furniture,
- plus others....

...all combine to establish scale that when occupied offers a warm and comforting reaction and promotes a continuing invitation to explore the range of venues and passages offered for inspection.



FARRAGUT TOWN CENTER

at Biddle Farms

Safety:

Scale is a natural companion to “perceived” safety. When coupled with the planning principles of *Crime Prevention Through Environmental Design* (CPTED) the physical place that is created advances the perception of safety to a functional level of improved safety.

- The use of “Eyes on the street” is a phrase often used to promote the frequency of windows facing public and private areas as a form of courteous intimidation to those who would do harm.
 - The avoidance of easily accessed blind or obscure service areas that can harbor mischief.
 - The use of lighting the softly distributes light instead of introducing glaring light the obscures areas around it.
 - The management of shrubs and landscape kept low and arranged to avoid creating hiding areas.
 - The organization of the plan in ways that make wayfinding intuitive.
 - The structuring of street crossing that declare with feature pavement “the pedestrian has priority”.
- ...all contribute to the sense of place that feels and functions with personal safety as a priority



Convenience:

Convenience is not measured in distance; it is measured in time! The human reaction to the question of “How far is it from here?” is to respond with a time reference such as, “About 20 minutes away”. Time can be an obstacle unless the experience of time is filled with interest along the way.

The integration of mixed use in a 24/7 setting makes daily activities feel convenient. Even if just walking the dog, the setting allows the effort to engage with views and points of interest that make the activity fulfilling the time index feels less of a compromise.

Convenience can also be a competitor to the mission of a well-ordered environment. Today everything from class work and vocation, to shopping and worship can be done with a click of a button from a comfortable chair at home. This tendency to hibernate is contrary to building community. When the experience of place can activate “mobility” over “time efficiency” and the activities of our daily routine are enriched because they can occur both time efficiently and within a pleasing setting, then the best form of convenience has resulted. When personal mobility becomes an alternate to driving or Ubering, society becomes healthier and more engaged with the place they live, work, and shop and the people they share that place with.

Character:

When considering what makes one place more inviting and interesting than another, the distinction derived from its appearance can often be the measure of difference. More than just the look of structures, it is the full assemblage of all parts of the created environment that create the signature of something special.

Measured uniformness has value in building a cohesive feel to a settlement of many parts and functions.

- The treatment of the walking surfaces,
- The range and appeal of exterior materials,
- The selection of landscape species and their orderly application and maintenance,
- The timeless execution of facades and focal points,
- The invitation of patina as an expression of maturity;

...can all be unifying parts of what individually might be seen as an assortment of separate functions and features.

A theme need not be expressed in a style, **but rather in an experience** that serves the overall objective. The Town Center thus must offer a holistic experience unified with elements of sight, sound, textures and potentially even fragrances, while still allowing variety of expression within that range of consistent quality, that combined keep all the parts feeling as members of a unified family of thought.

FARRAGUT TOWN CENTER

at Biddle Farms

The Application:

The mixed-use nature of the Town Center is evidenced by the fusion of residential and business uses into one cohesive composition. In true town fashion these are not competitive but complementary interests. Both rely on each other to optimize the experience that can only be fashioned with the merger of these important parts.

Scale: The public face of each sector shares a common pattern of materials and forms. Both have been enveloped with brick, siding, and window/door treatments of preferred quality as a testament to durable and traditional flavors.

The exterior faces have been fashioned with varying applications of these materials so to generate a measure of variety without appearing as random or disconnected parts.

The scale of the main street seeks a human scale with statured two-story or appearance thereof facades offering both vertical and horizontal modeling, while avoiding the conventional lineal alignment often found in commercial centers.

The scale of the residential structures, while higher by floor count, is rusticated with bolder forms at the lower levels, slowly stepping back to lighter forms as the building elevation rises to the roof level. The scale is also moderated by the horizontal animation of the plans and the treatment of exterior materials on the façade to emulate attached narrower independent facades, avoiding one monolithic building statement.

Safety: The arrangement of all structures is such that none have a “backside”. All buildings are surrounded by publicly exposed facades (*with exception of one small and secured service lane between grocery and other retail elements*). Each façade is companioned by a pedestrian network that abuts parking and invites ready access to front and rear approaches, and selectively to area gardens between structures that connect all sides with walkable interconnectivity.

In the commercial sector, along the main street, parking is brought to the curb for quick access, while in most areas the bulk of the parking field is fragmented into smaller separate zones and held away from the “public street” frontage

The intimate context of the main streets and the public square offer clear oversight from store fronts and residential windows. The larger parking fields offer shielded box lighting to insure nighttime legibility for patrons after dark.

In the residential sector, the buildings compose a collar around an internal parking domain set aside exclusively for residents, awarding them a safe relationship between vehicle and dwelling door. Concurrently the outward face of this collar orients to the public thoroughfares with a public entry duplicating invitation for guest. Here again windows, doors, and walkways surround buildings and advance “eyes of the street” as a prevention to unwanted activity.

Resident parking is lighted similar to the commercial parking fields, while street lighting along the public road perimeter mirrors the scale and treatment of the main streets in the commercial zones.

Convenience: Both the commercial and residential areas merge around the town square, the central hub of all development interaction. From this hub, ready access to home, shopping, park areas, and external routing are easily and quickly affected.

Within the residential sector, residential amenities are centrally located within reach if not line of sight from dwellings that surround this lifestyle feature.

The convenience internally is matched by the convenience directed to adjacent features equally important to the Town Center, such as shopping across Brooklawn Blvd, education across Kingston Pike, town government offices to the west, and professional services along the frontages of the external public roads. For many within, an unusually large number of daily destinations are within a few minute walk or bike ride.

Character: Today’s market seeks expressions that offer reflections of the past, housed in settings appropriate to current lifestyle and technologies. Achieving both a classical sense of form with traditional materials and applications, while expressing the “NOW” demands of our current wants requires a balance of elements that offer both collective distinction and harmonious interplay.

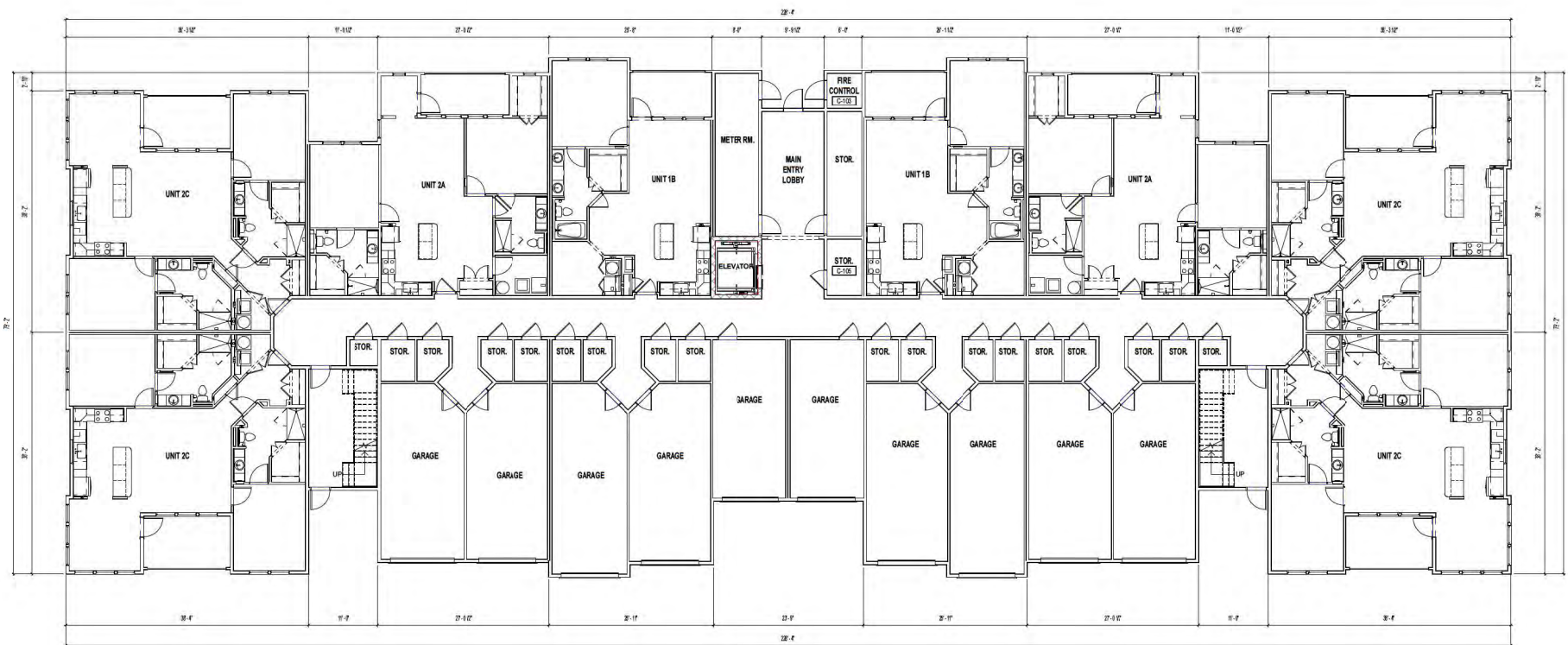
The combination of all the elements that speak to our physical senses; sight, smell, touch, sound, and even taste, are the palate that has guided the design representations. More will come into focus as the design is refined through the continuing advancement of this proposal and through the life of its successful operations.

This proposal seeks to establish a feel and identity that would hallmark Farragut as a representation of its self-image and a center piece of its community’s leisure lifestyle.

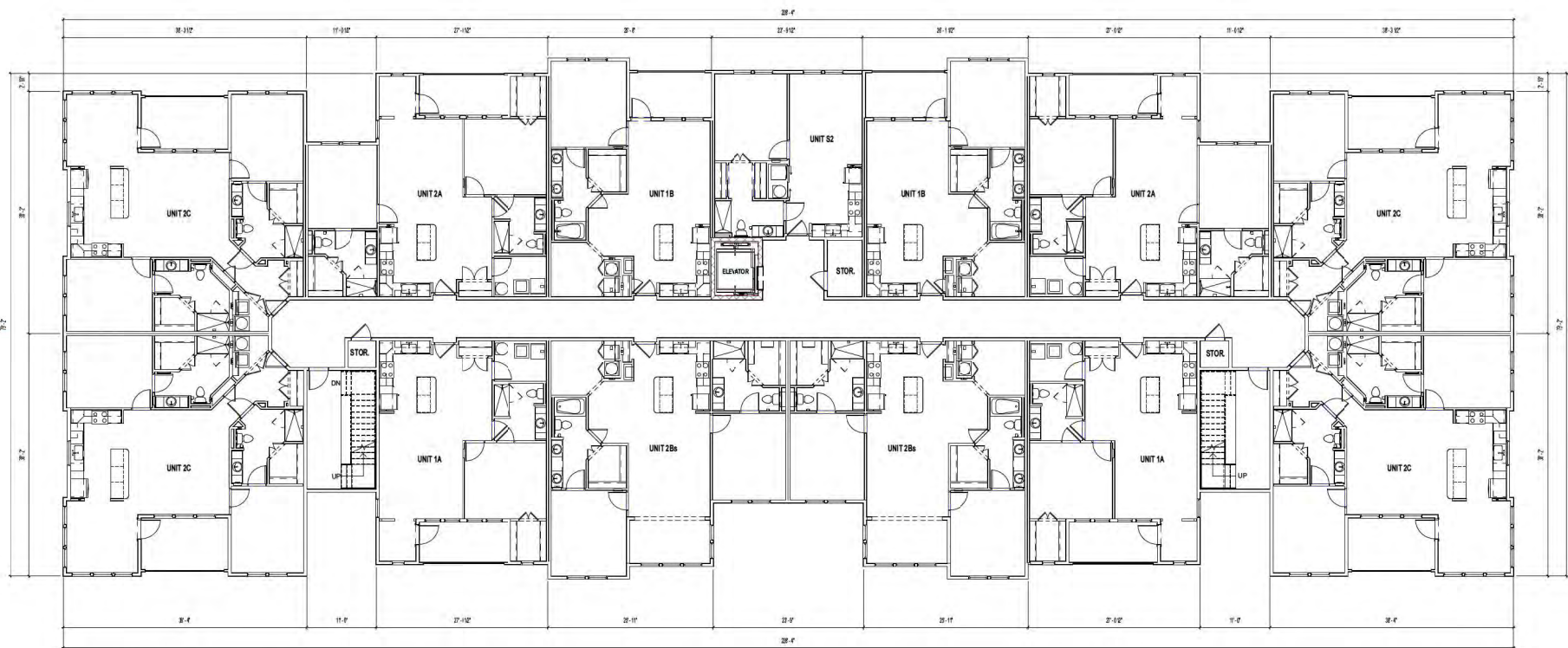
Summary:

It is unlikely the lessons learned from the Corona virus will ever go away. Magnified home deliveries, quick pick up and Uber/Lift accommodations, de-congested public places, touch free appointments, work at home preference are all here for the long term. Accommodation for this new paradigm must also be considered as many seek the efficiencies in time they afford.

The proposal has evolved since the design process began, in recognition of this changing condition and the permanence it has already vested in the lives of all residents. Continuing lessons remain ahead and the need for flexibility should never be forgotten. **Static pictures are not as vital as moving pictures.** The presentation offers a point of beginning but not the final outcome. That will continuously model as we move together in the future.



H1 BUILDING TYPE A - GROUND LEVEL PLAN
1/8" = 1'-0"



H1 BLDG. TYPE A - 2ND LEVEL PLAN
1/8" = 1'-0"

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2555 TEMPLETRAIL

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PROJECT No. 5461 DATE: 10/15/20

FARRAGUT TOWN CENTER @ BIDDLE FARMS

FARRAGUT, TN

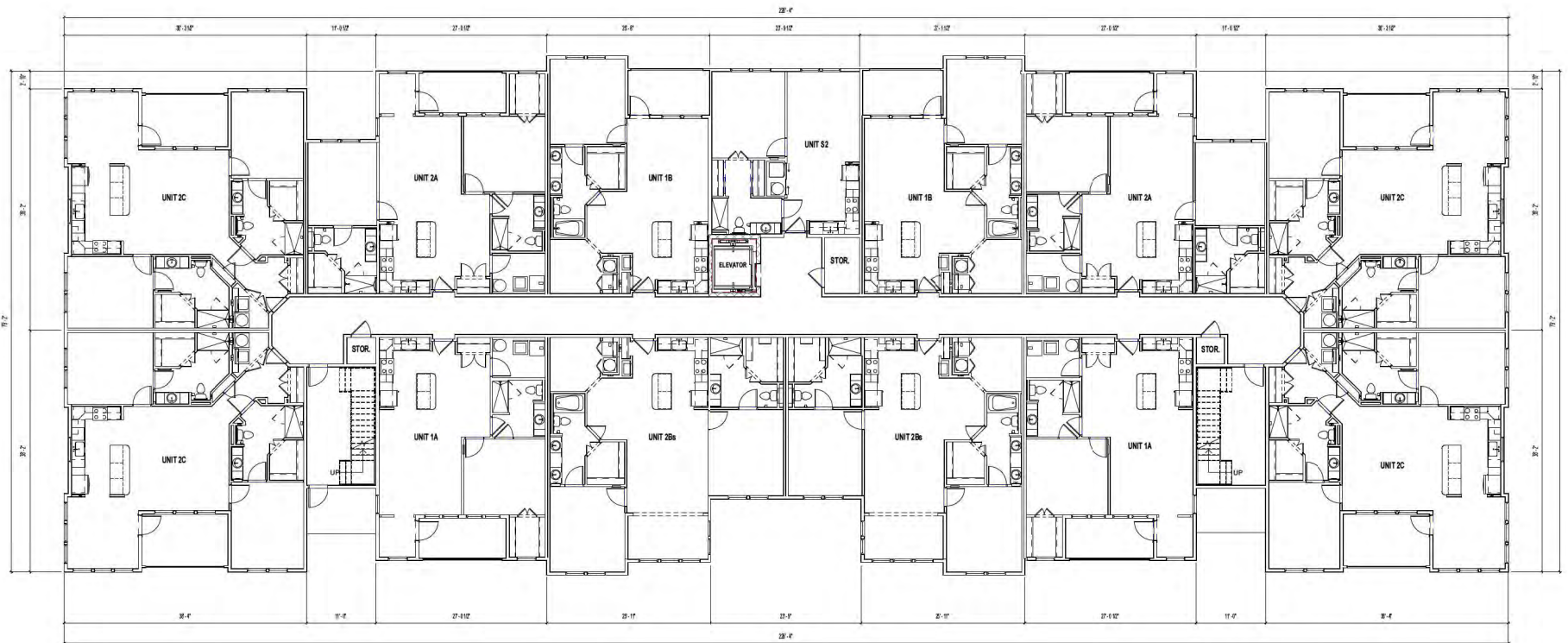
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H1 BLDG. TYPE A - 3RD. LEVEL PLAN
1/8" = 1'-0"

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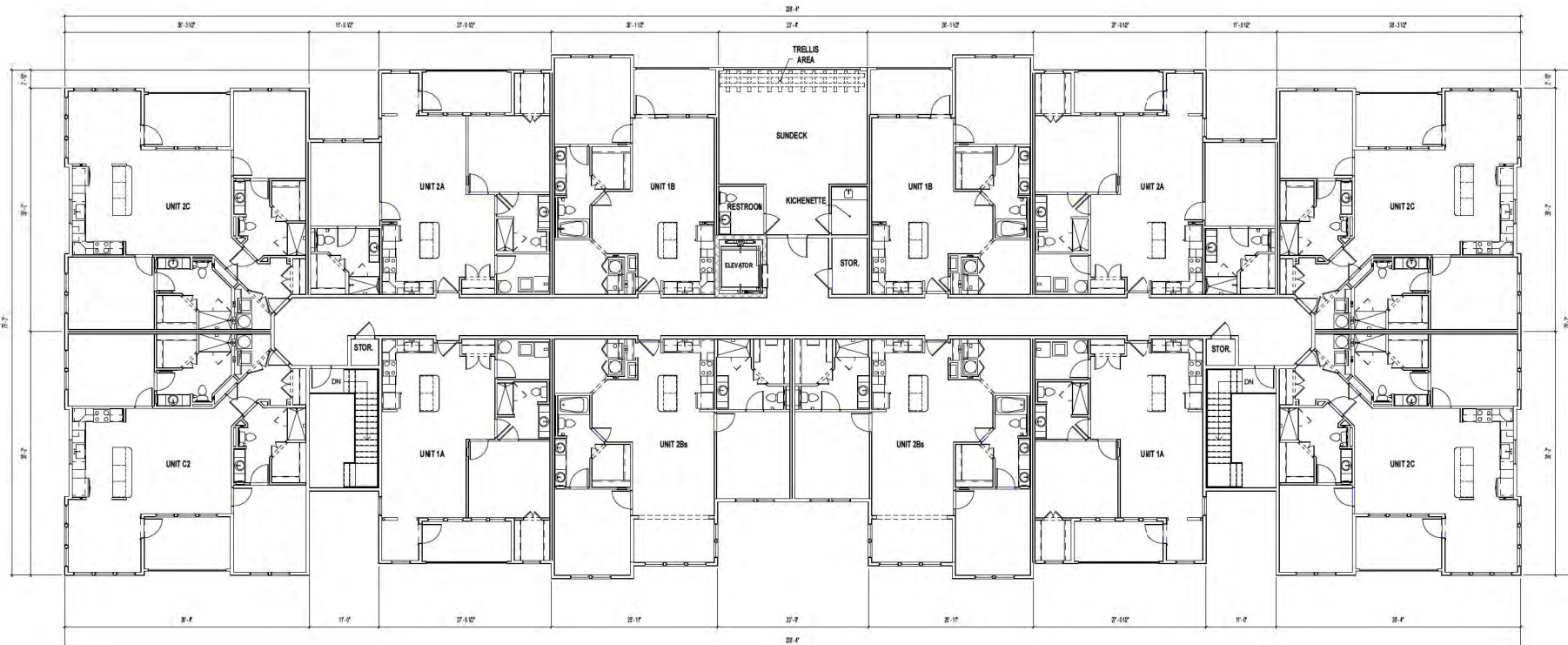
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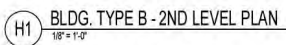
H1 BLDG. TYPE A - 4TH LEVEL PLAN
1/8" = 1'-0"

BUILDING TYPE A - 4TH LEVEL PLAN

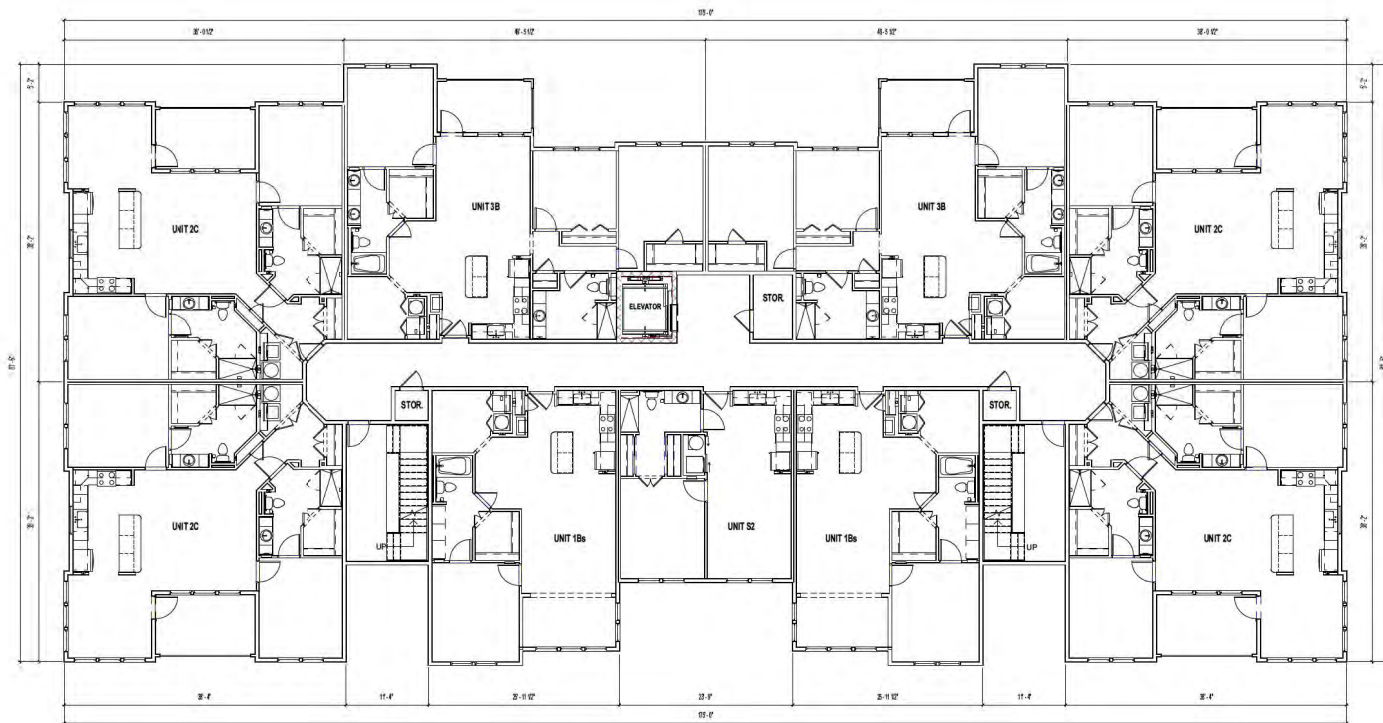
FARRAGUT TOWN CENTER @ BIDDLE FARMS



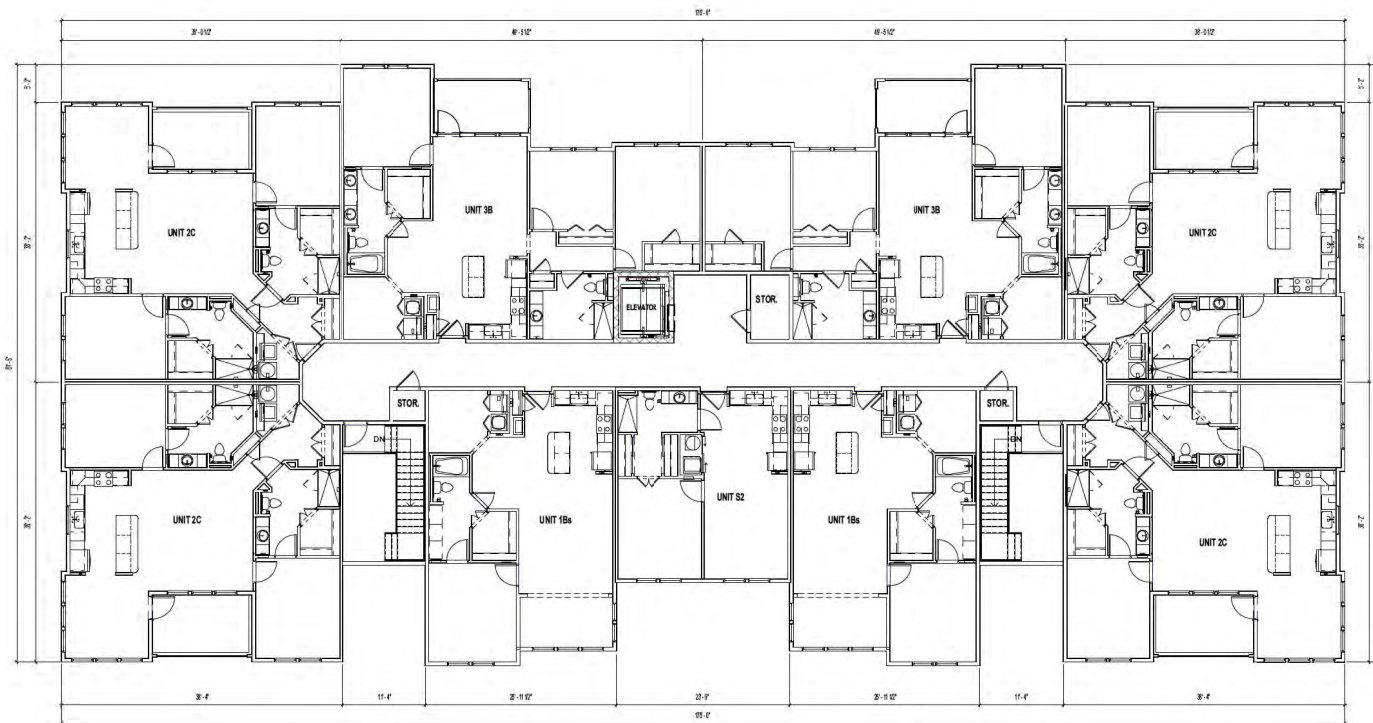
BUILDING TYPE B - GROUND LEVEL PLAN | FARRAGUT TOWN CENTER @ BIDDLE FARMS



BUILDING TYPE B - 2ND LEVEL PLAN | FARRAGUT TOWN CENTER @ BIDDLE FARMS



H1 BLDG. TYPE B - 3RD LEVEL PLAN
1/8" = 1'-0"



1 BLDG. TYPE B - 4TH LEVEL PLAN
1/8" = 1'-0"

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FARRAGUT TOWN CENTER @ BIDDLE FARMS

FARRAGUT, TN

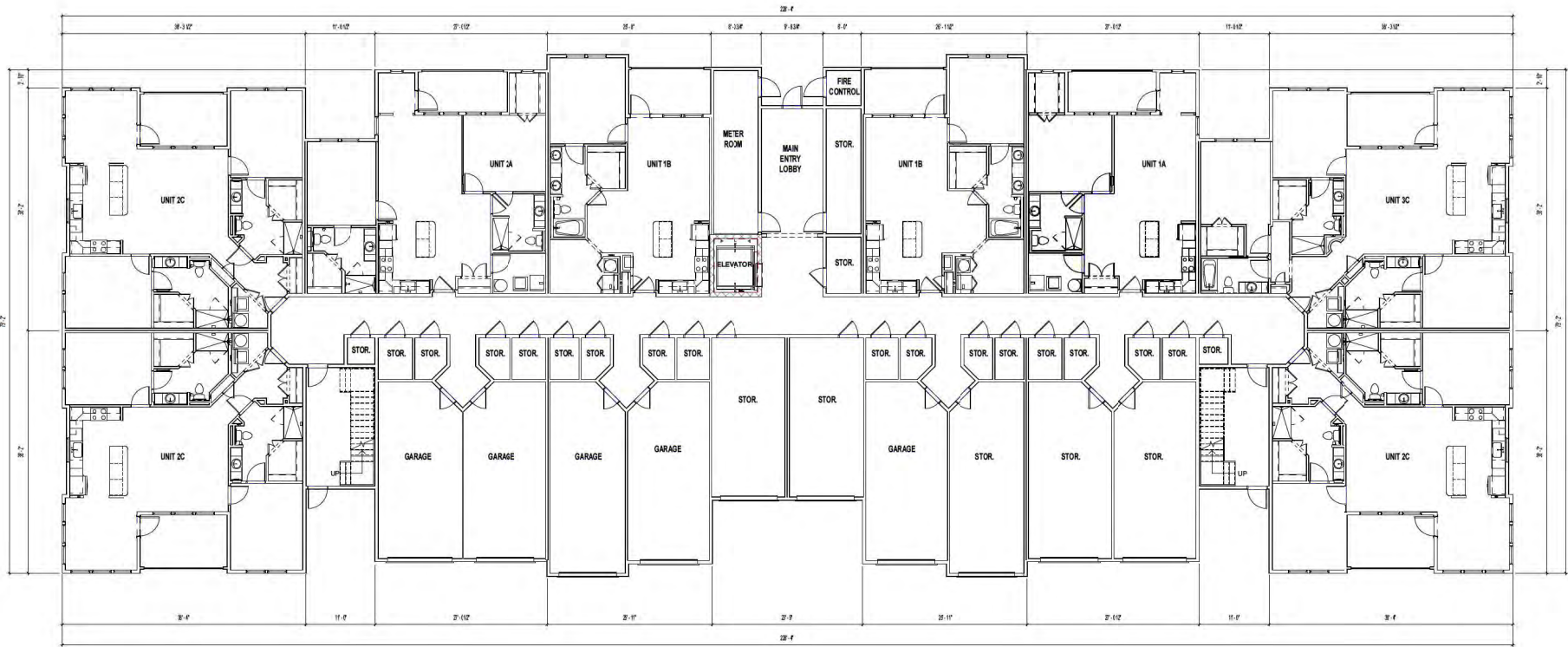
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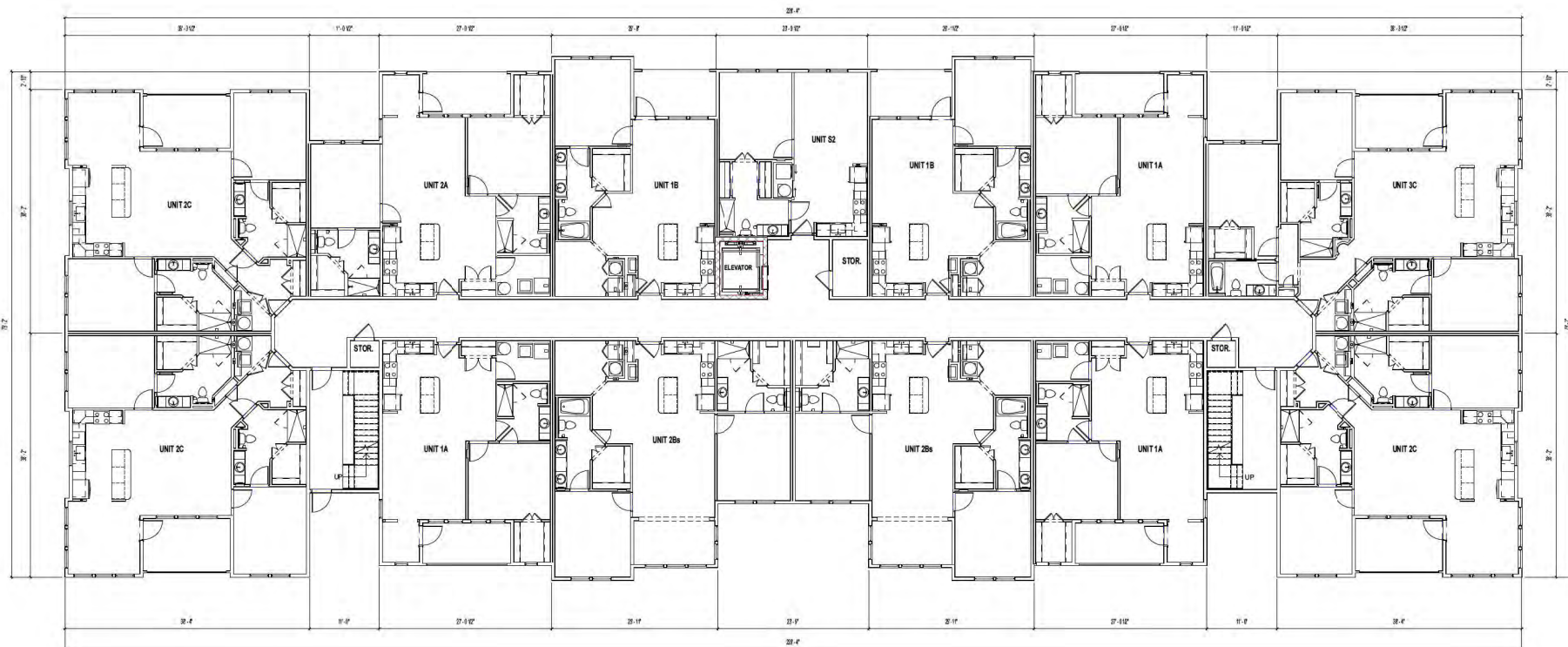
H1 BLDG. TYPE C - GROUND LEVEL PLAN
1/8" = 1'-0"

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FARRAGUT TOWN CENTER BUILDING TYPE C - GROUND LEVEL PLAN @ BIDDLE FARMS



H1 BLDG TYPE C - 2ND LEVEL PLAN
1/8" = 1'-0"

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BLDG. TYPE C - 2ND LEVEL PLAN

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FARRAGUT TOWN CENTER @ BIDDLE FARMS

FARRAGUT, TN

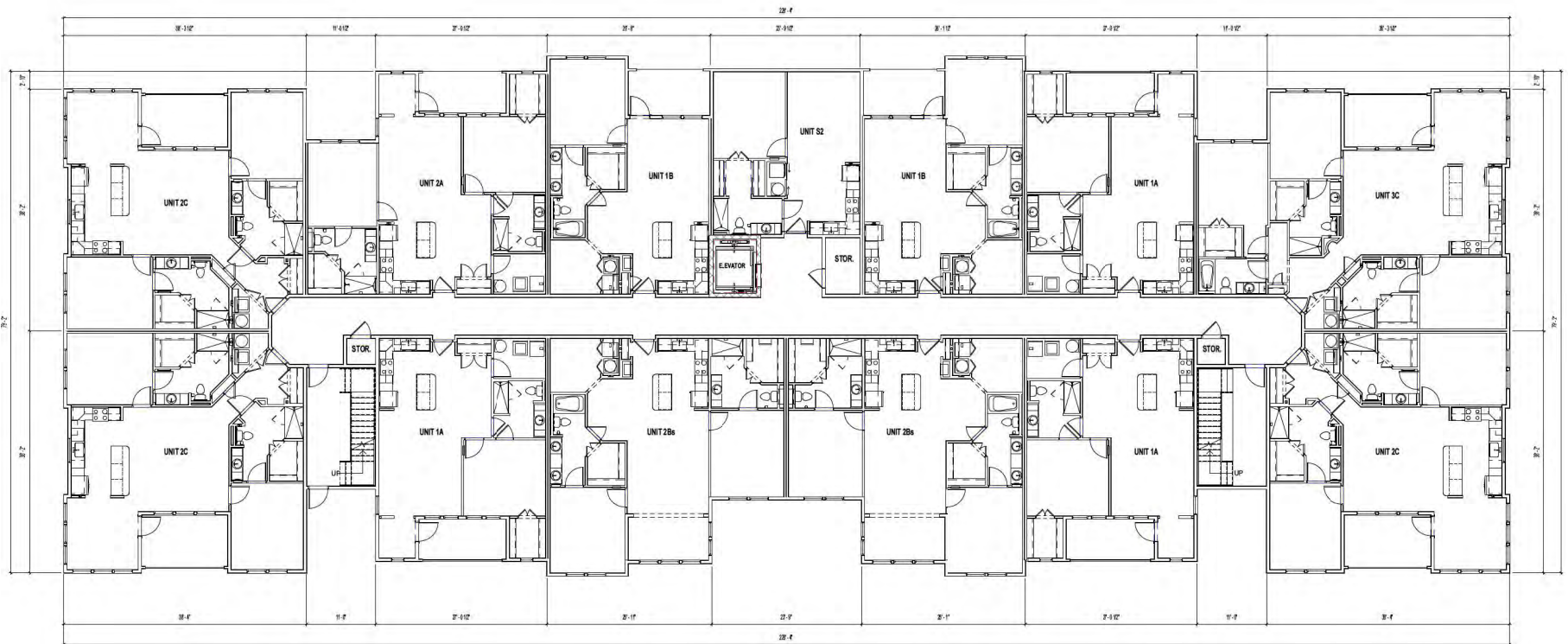
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H1 BLDG TYPE C - 3RD LEVEL PLAN
1/8" = 1'-0"

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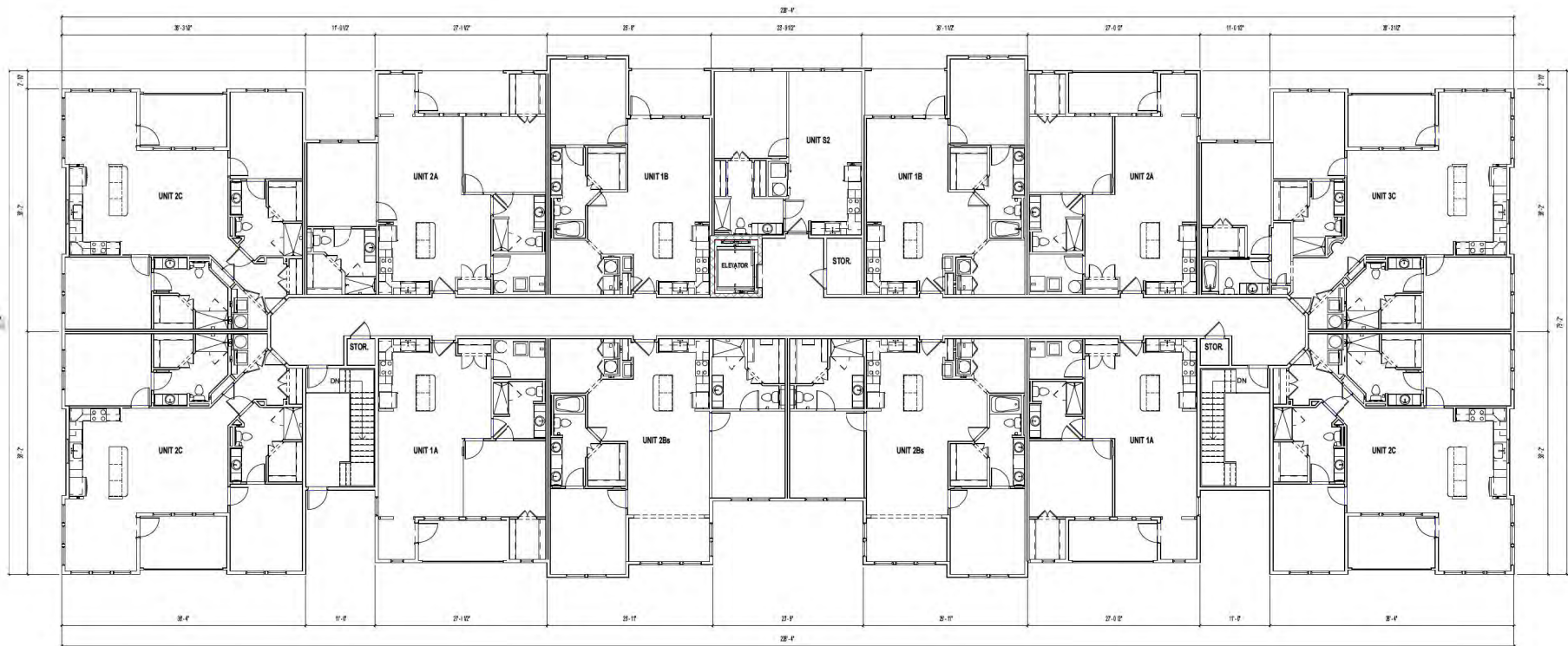
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H1 BLDG. TYPE C - 4TH LEVEL PLAN
1/8" = 1'-0"

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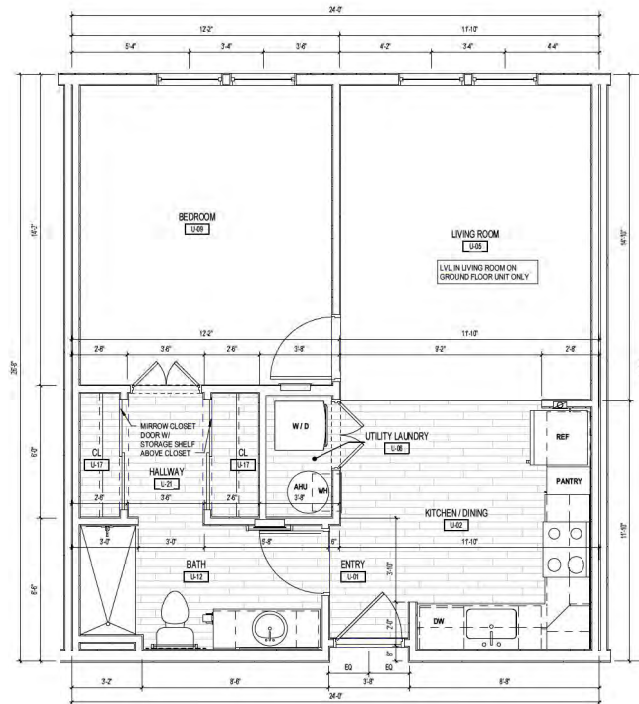
FARRAGUT TOWN CENTER @ BIDDLE FARMS

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H5 UNIT S2 - DIMENSIONS & REFERENCE PLAN
38' x 11'0"

AREA - S2
1BR - 1 BATH
GROSS LIVING (HVAC) = 611 Sq. Ft.
NET RENTABLE = 573 Sq. Ft.

FARRAGUT TOWN CENTER UNIT S2 - 1BR. UNIT PLAN @ BIDDLE FARMS



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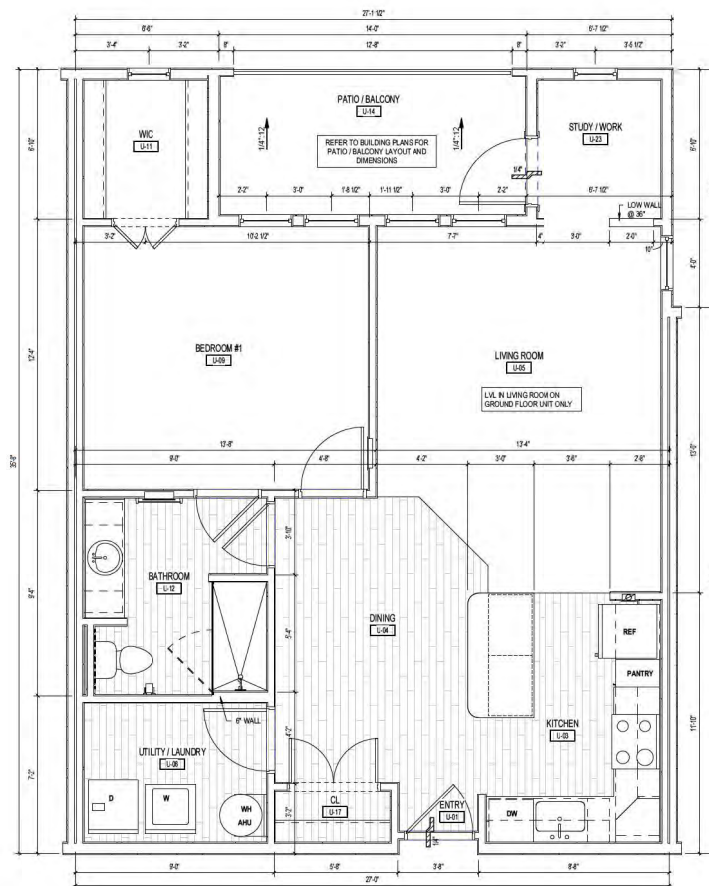
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H5 UNIT 1A - DIMENSION & REFERENCE PLAN
3/8" = 1'-0"

AREA - UNIT 1A	
1BR - 1 BATH	
GROSS LIVING (HVAC) = 888 Sq. Ft.	
PATIO / BALCONY = 93 Sq. Ft.	
NET RENTABLE = 813 Sq. Ft.	

FARRAGUT TOWN CENTER UNIT 1A - 1BR UNIT PLAN @ BIDDLE FARMS



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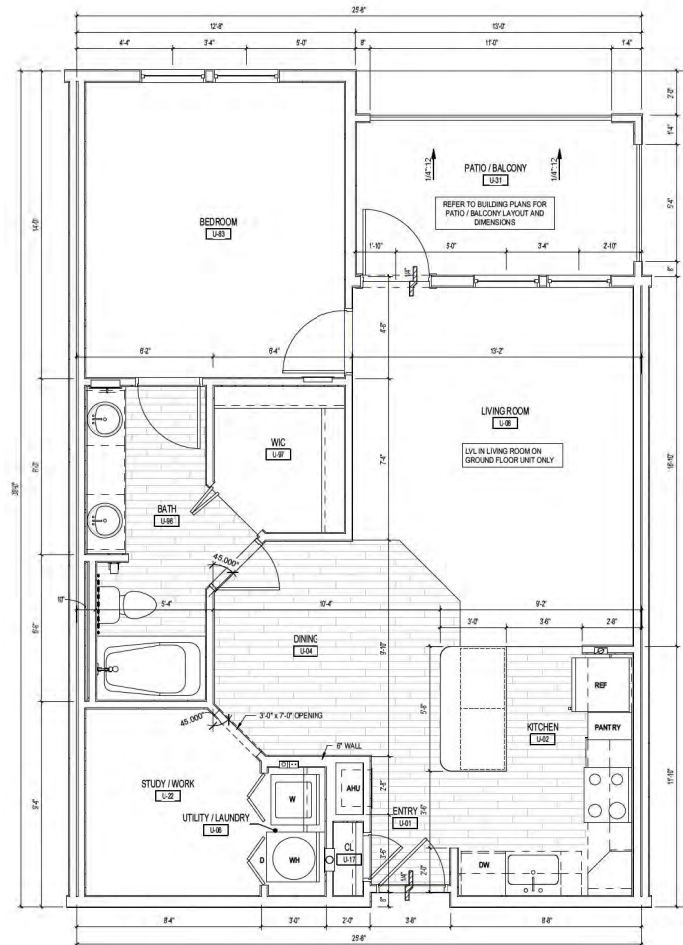
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H5 UNIT 1B - DIMENSION & REFERENCE PLAN
3/8" = 1'-0"

AREA - UNIT 1B	
1 BR. - 1 BATH	
GROSS LIVING (BYAO) =	852 Sq. ft.
PATIO/BALCONY =	95 Sq. ft.
NET RENTABLE =	802 Sq. ft.

UNIT 1B - 1BR. UNIT PLAN

FARRAGUT TOWN CENTER @ BIDDLE FARMS



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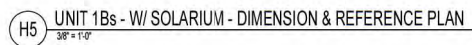
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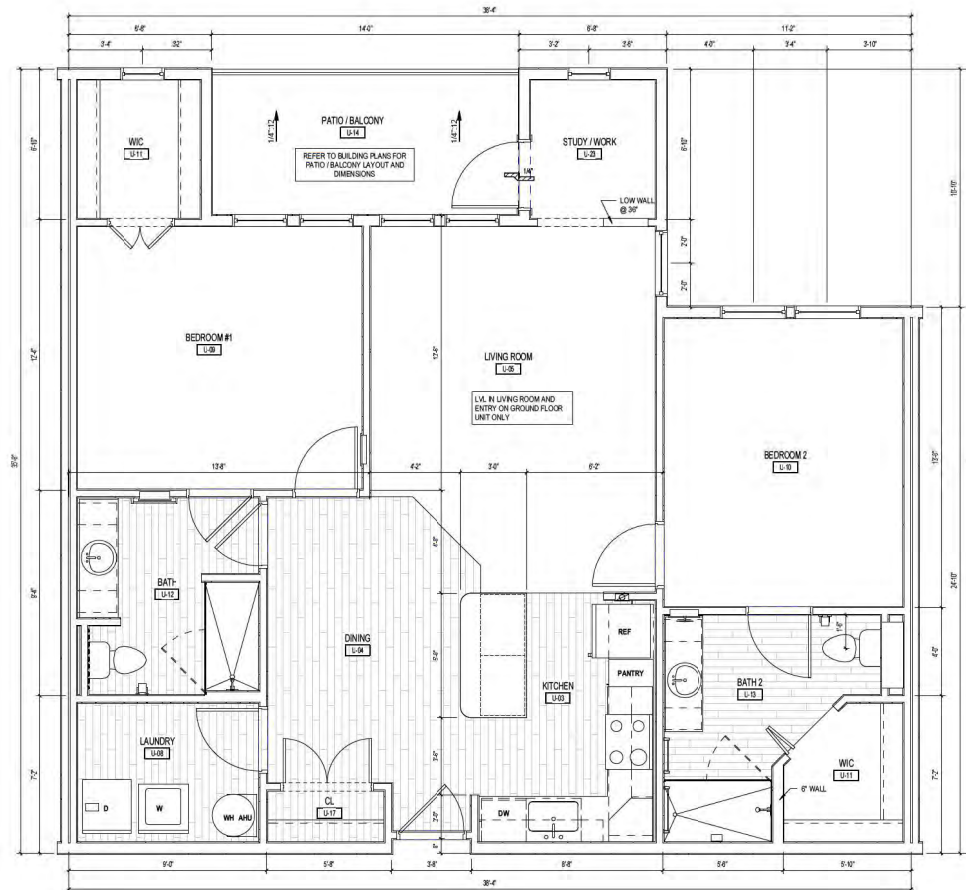
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1 BR WITH SOLARIUM UNIT 1Bs | FARRAGUT TOWN CENTER
@ BIDDLE FARMS



H5 UNIT 2A - DIMENSION & REFERENCE PLAN
3/8" = 1'-0"

AREA - UNIT 2A	
2 BR. - 2 BATH	
GROSS LIVING (PVAC) =	1,163 Sq. Ft.
PATIO/BALCONY =	13 Sq. Ft.
NET RENTABLE	~ 1,096 Sq. Ft.

UNIT 2A - 2BR UNIT PLAN

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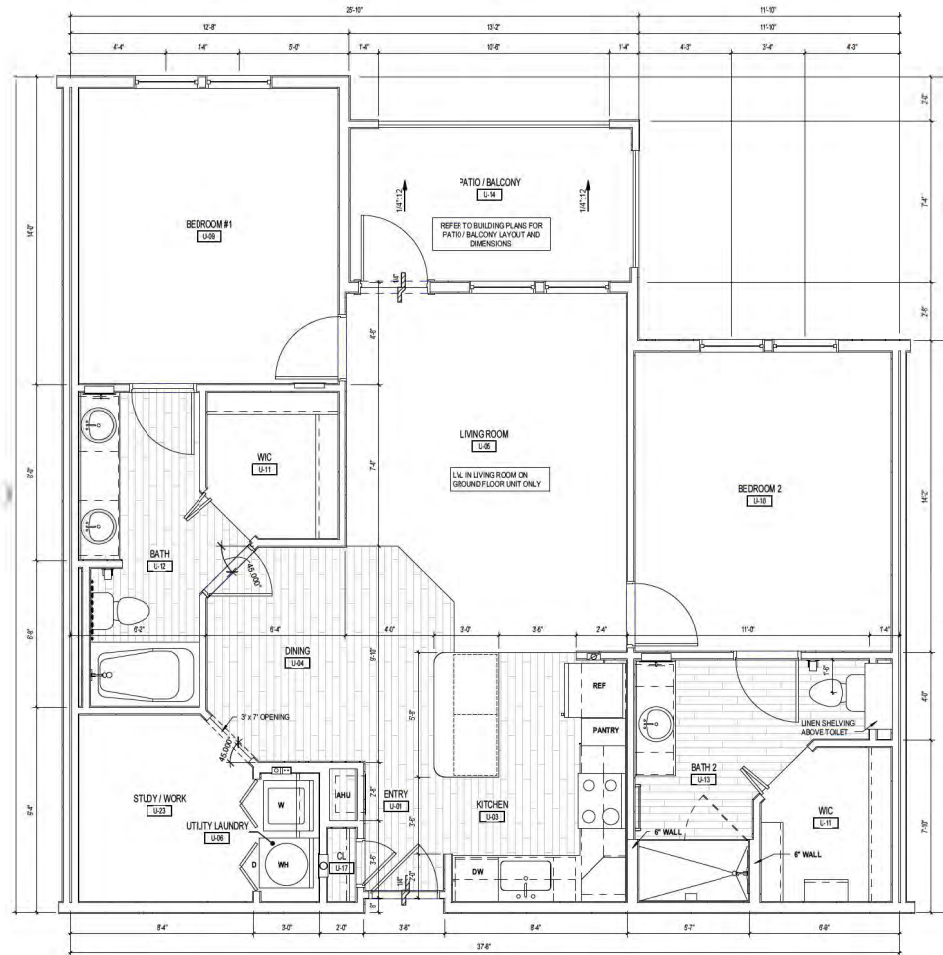
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AREA - UNIT 2B	
2BR - 2 BATH	
GROSS LIVING (HVA2)	= 1,164 Sq. ft.
PATIO/BALCONY	= 97 Sq. ft.
NET RENTABLE	= 1,103 Sq. ft.



FARRAGUT TOWN CENTER UNIT 2B - 2BR UNIT PLAN @ BIDDLE FARMS

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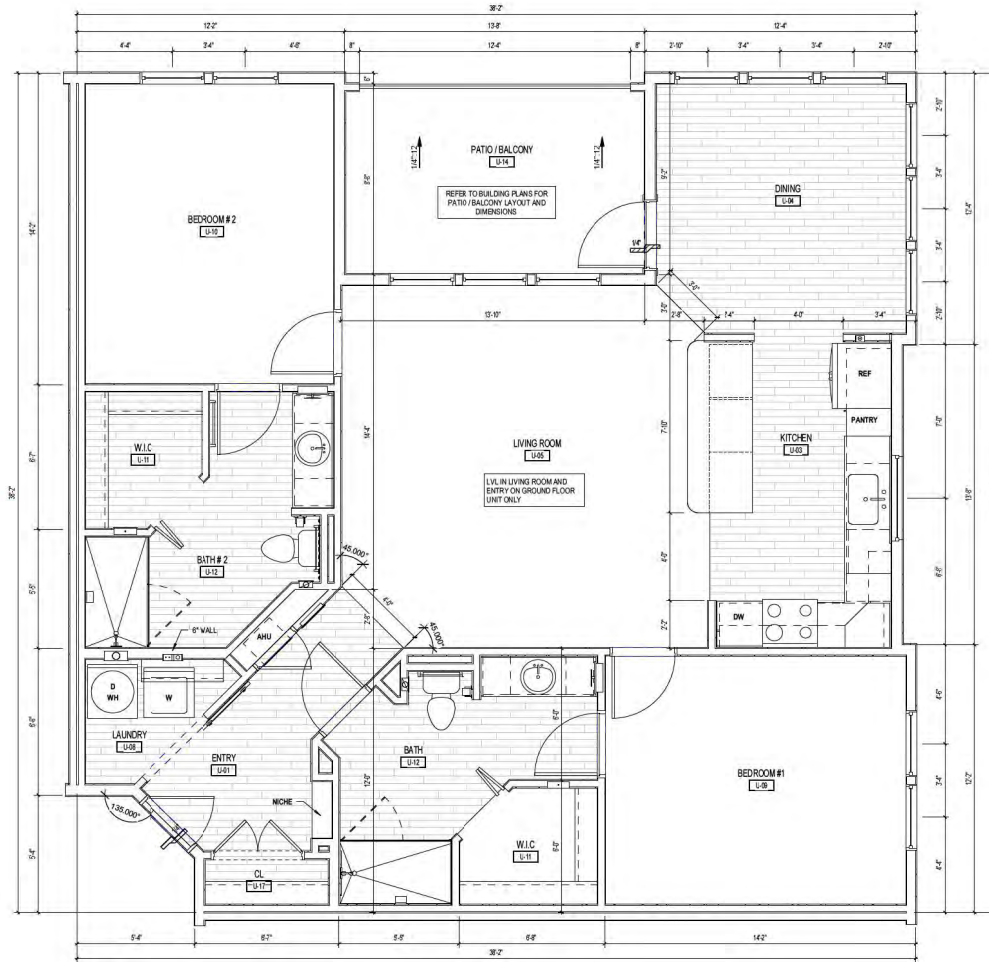
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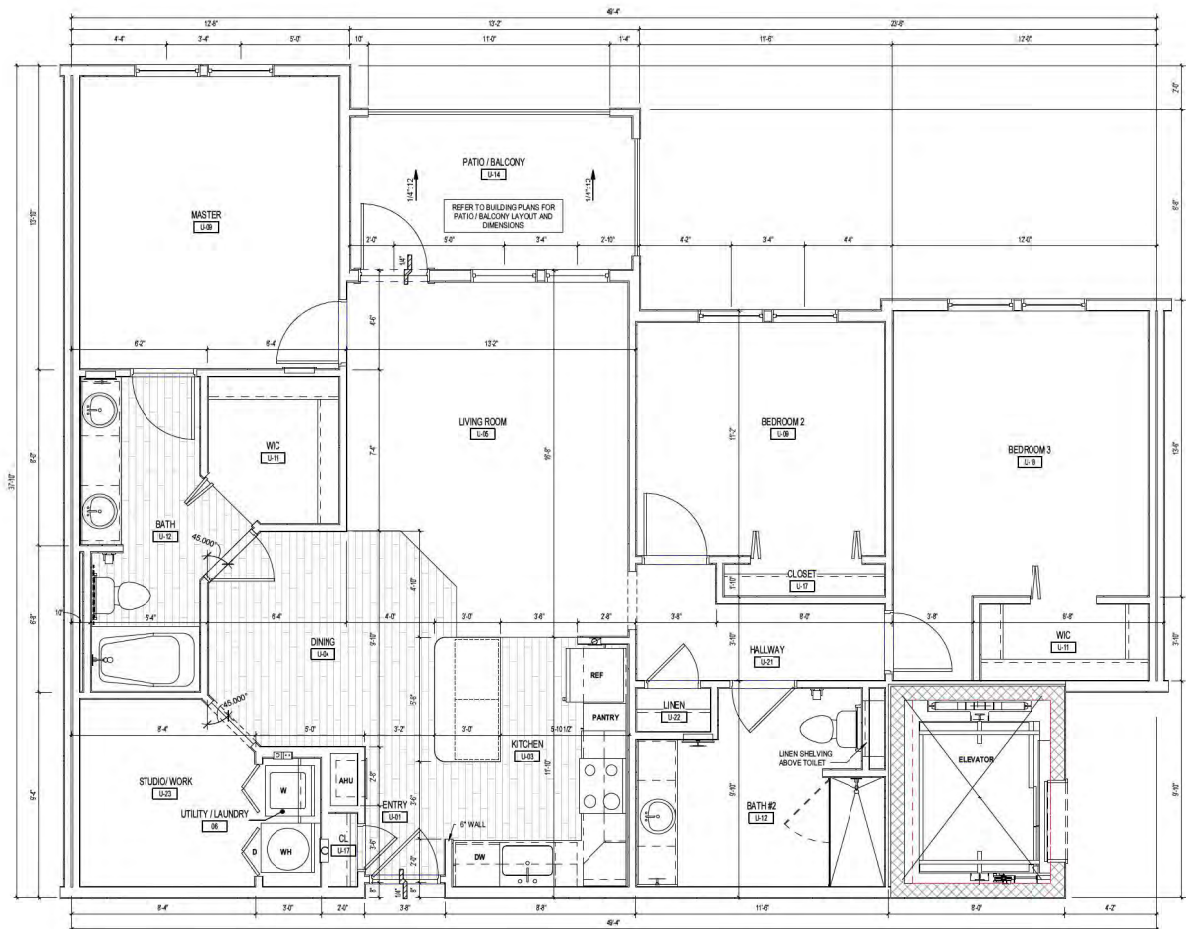


H5 UNIT 2C - DIMENSIONS & REFERENCE PLAN
3/8" = 1'-0"

AREA - UNIT 2C	
2 BR - 2 BATH	
GROSS LIVING (HVAQ) =	1,297 Sq. Ft.
PATIO/BALCONY =	112 Sq. Ft.
NET RENTABLE =	1,228 Sq. Ft.



FARRAGUT TOWN CENTER UNIT 2C - 2BR UNIT PLAN @ BIDDLE FARMS



H4 UNIT 3B - DIMENSION & REFERENCE PLAN
38' x 1'-0"

AREA - UNIT 3B	
3 BR - 2 BATH	
GROSS LIVING (H4) = 1,292 Sq. Ft.	
PATIO/BALCONY = 98 Sq. Ft.	
NET RENTABLE	= 1,291 Sq. Ft.

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FARRAGUT TOWN CENTER UNIT 3B - 3BR UNIT PLAN @ BIDDLE FARMS

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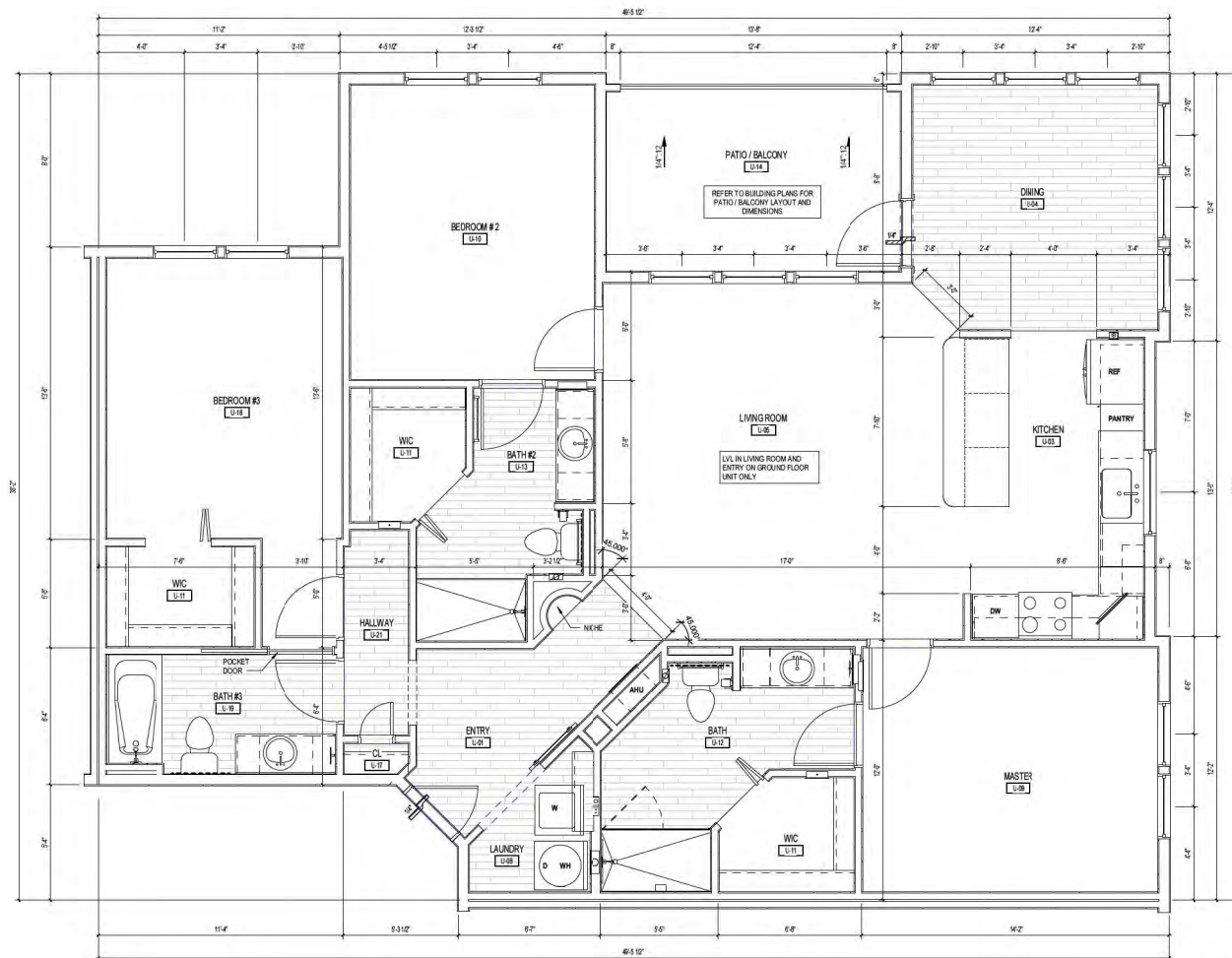
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H5 UNIT 3C - DIMENSIONS & REFERENCE PLAN
3/8" = 1'-0"

AREA - UNIT 3C	
3BR - 3 BATH	
GROSS LIVING (PVAQ) = 1,579 Sq. Ft.	
PATIO/BALCONY = 112 Sq. Ft.	
NET RENTABLE = 1,498 Sq. Ft.	



FARRAGUT TOWN CENTER UNIT 3C - 3BR UNIT PLAN @ BIDDLE FARMS

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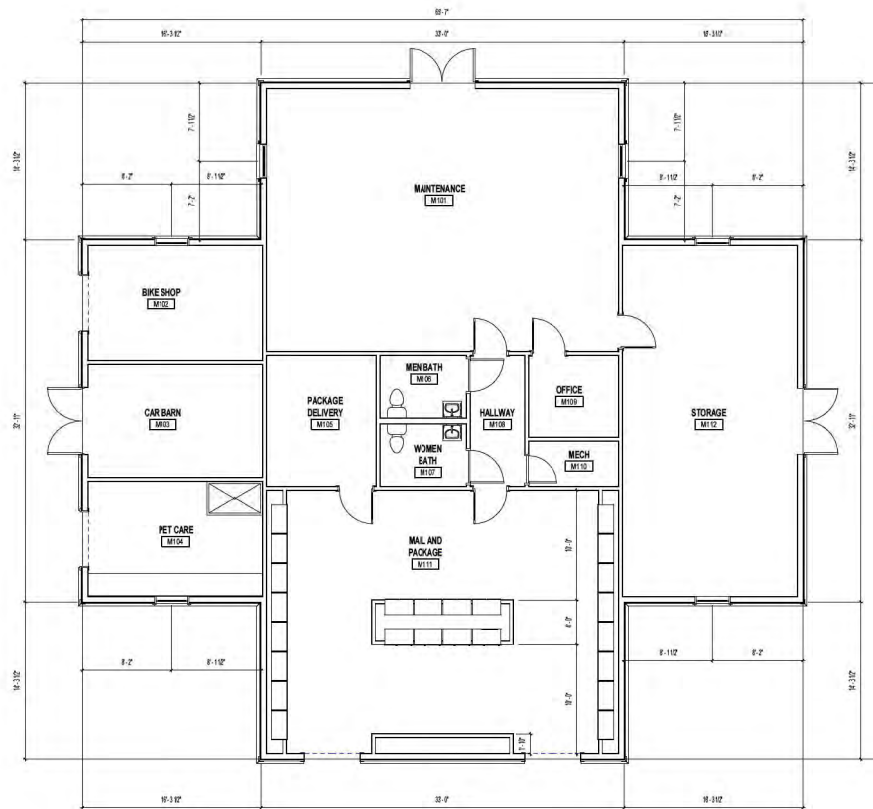
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H1 MAINT. BLDG. - GROUND LEVEL
3/16" = 1'-0"

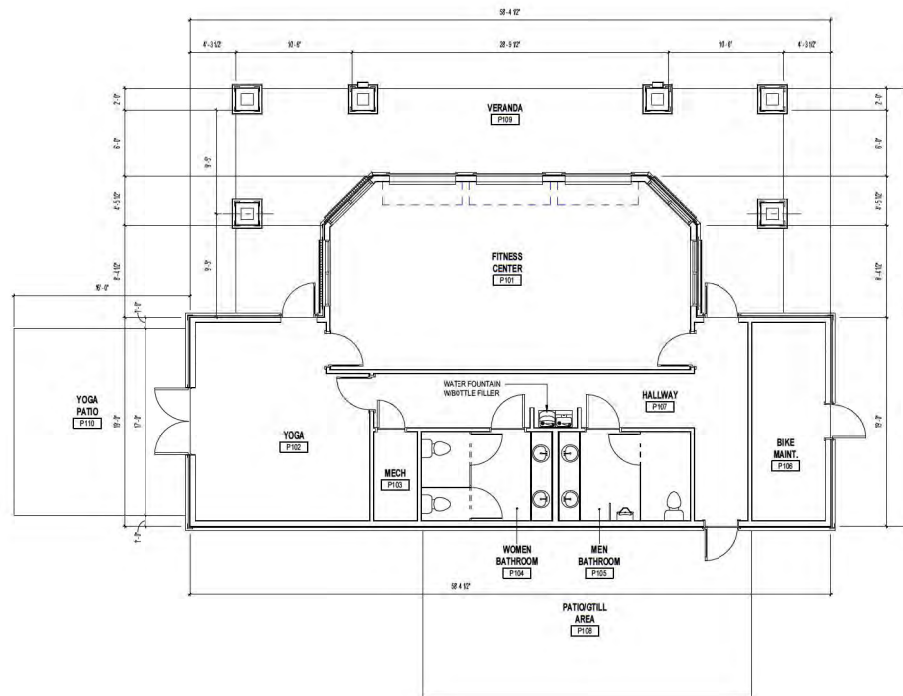
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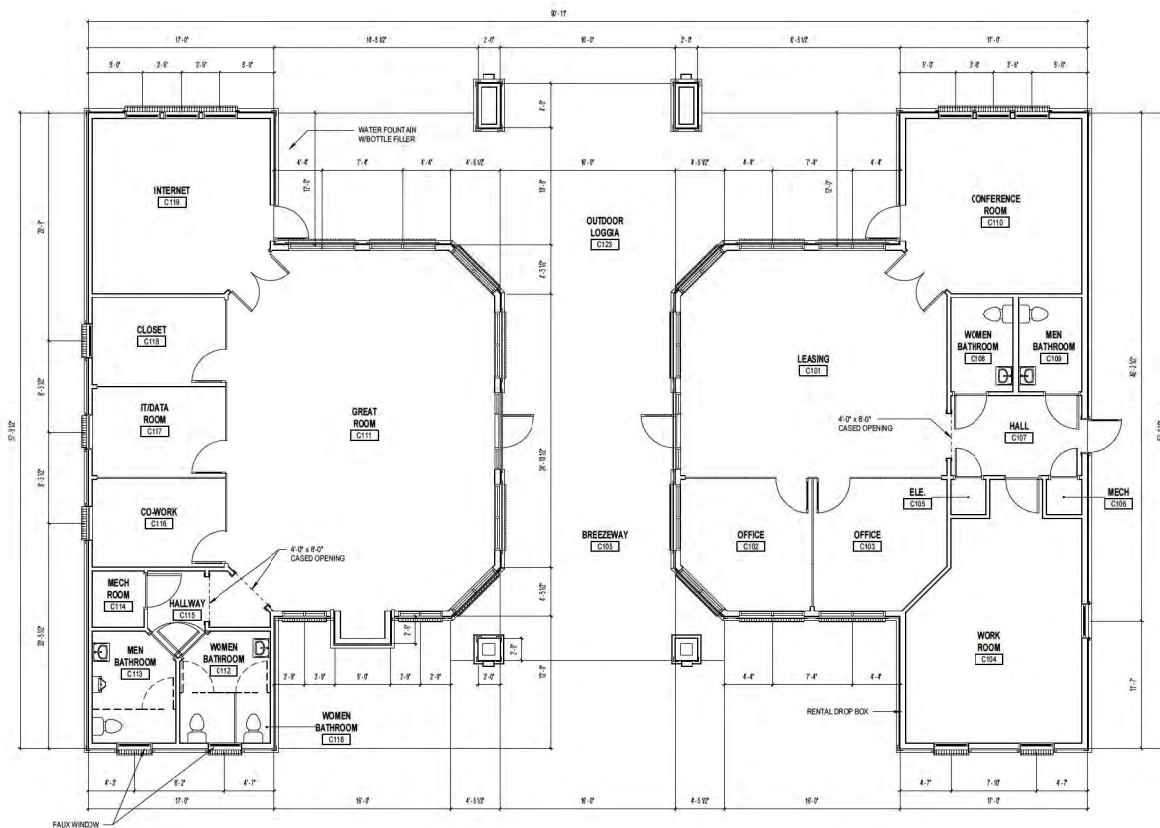
MAINTENANCE BUILDING FLOOR PLAN

FARRAGUT TOWN CENTER @ BIDDLE FARMS



H1 POOL/FITNESS. BLDG. - GROUND LEVEL
3/16" = 1'-0"

10/14/2020 4:53:09 PM



H1 CH. GROUND LEVEL
3/16" = 1'-0"

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CLUBHOUSE FLOOR PLAN

FARRAGUT TOWN CENTER @ BIDDLE FARMS



BUILDING MAIN ENTRY
(SECONDARY ENTRIES AT STAIRS
AT REAR OF BUILDING)

BUILDING TYPE A - FRONT ELEVATION

BUILDING HEIGHT 49'- 1"



BUILDING TYPE A - SIDE ELEVATION

BUILDING HEIGHT 49'- 1"

ALL ELEVATIONS TO CONTAIN A
MINIMUM OF 75% FACE BRICK PER
JURISDICTIONAL REQUIREMENTS

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BUILDING TYPE A - ELEVATIONS **FARRAGUT TOWN CENTER @ BIDDLE FARMS**

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BUILDING TYPE A - REAR ELEVATION BUILDING HEIGHT 49' - 1"

ALL ELEVATIONS TO CONTAIN A
MINIMUM OF 75% FACE BRICK PER
JURISDICTIONAL REQUIREMENTS

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CLUBHOUSE - FRONT ELEVATION

CLUBHOUSE - SIDE ELEVATION



MONUMENT - FRONT

MONUMENT - SIDE

ALL ELEVATIONS TO CONTAIN A
MINIMUM OF 75% FACE BRICK PER
JURISDICTIONAL REQUIREMENTS



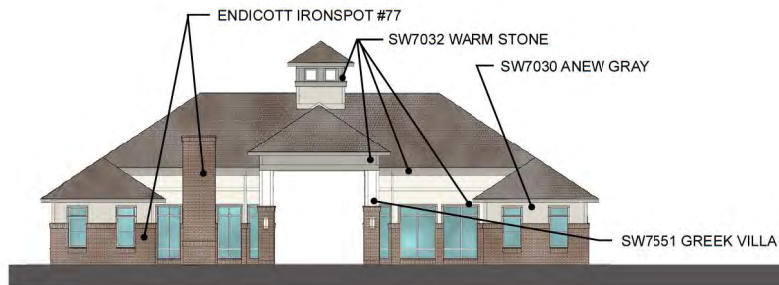
BUILDING TYPE A - FRONT ELEVATION

BUILDING MAIN ENTRY
(SECONDARY ENTRIES AT STAIRS
AT REAR OF BUILDING)

BUILDING HEIGHT 49'- 1"

BUILDING TYPE A - SIDE ELEVATION

ALL ELEVATIONS TO CONTAIN A
MINIMUM OF 75% FACE BRICK PER
JURISDICTIONAL REQUIREMENTS



CLUBHOUSE - FRONT ELEVATION



CLUBHOUSE - SIDE ELEVATION



MONUMENT - FRONT

MONUMENT - SIDE



SW7030
ANEW GRAY
BODY 1



SW7541
GRECIAN IVORY
BODY 2



SW7032
WARM STONE
TRIM 1



SW7019
GAUNTLET GRAY
TRIM 2 & RAILING



SW7009
GREEK VILLA
TRIM 3 COLUMNS



CERTAINTEED
WEATHERED WOOD



ENDICOTT FACE BRICK
MED. IRONSPOT#77
VELOUR TEXTURE



ENDICOTT FACE BRICK
LIGHT SANDSTONE
VELOUR TEXTURE



SW7541 GRECIAN IVORY

SW7019 GAUNTLET GRAY

FACE BRICK - LIGHT SANDSTONE

SW7541 GRECIAN IVORY

SW7030 ANEW GRAY

SW6076 TURKISH COFFEE

FACE BRICK - LIGHT SANDSTONE

SW7030 ANEW GRAY

SW7019 GAUNTLET GRAY

SW6076 TURKISH COFFEE



SW7030
ANEW GRAY
BODY 1



SW7541
GRECIAN IVORY
TRIM 1



SW6076
TURKISH COFFEE
BODY 2



SW7019
GAUNTLET GRAY
TRIM 2 & RAILING



ENDICOTT FACE BRICK
LIGHT SANDSTONE
VELOUR TEXTURE

ALL ELEVATIONS TO CONTAIN A
MINIMUM OF 75% FACE BRICK PER
JURISDICTIONAL REQUIREMENTS



10/14/2020 4:53:09 PM



BUILDING HEIGHT 49'-1"

**FARRAGUT TOWN CENTER
@ BIDDLE FARMS**

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2555 TEMPLETRAIL

WINTER PARK, FLORIDA 32789

TEL: 407-628-0595

PROJECT No: 5461 DATE: 10/15/20

FARRAGUT, TN

FAX: 407-628-1057

AA2600210
3

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BUILDING HEIGHT 49'-1"

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FARRAGUT TOWN CENTER *at Biddle Farms*

Conceptual Iconic Element at Main Street Entrance

Main Street Entry Iconic Element - The tower elements will straddle the sidewalk into the development as a pedestrian gateway and flank the drive lane as vehicle gateway. The flanking walls are intended as both a grade wall as well as project identification. The towers borrow from historic gateway formations and employs brick as the primary structure face. The vertical tiers contain a mid-level with a back lit panel that could be used for "feature events" as if an illuminated street poster. The top circle could contain the development logo.



FARRAGUT TOWN CENTER *at Biddle Farms*

Conceptual Signage Vision

The overall objective of the proposed Town Center's conceptual signage vision is provide a consistent, effective, and unified approach to assist the citizens of the Town of Farragut convenient identification of the tenants of the project, and allows the tenants ample opportunities to promote their brands and assist in navigation to their store locations.

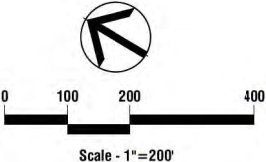
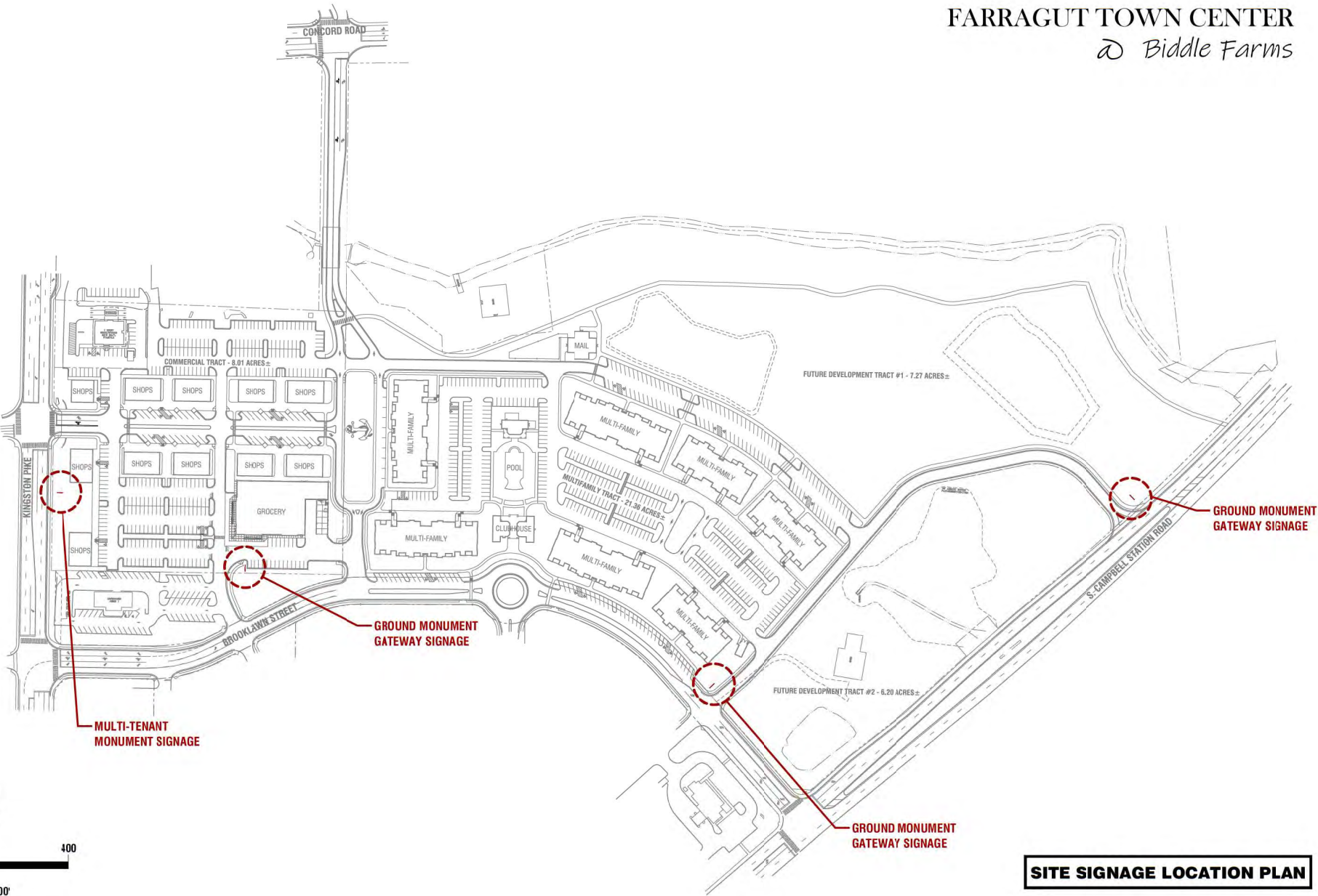
All Signage shall meet the Farragut Municipal Code signage requirements.

Several types of signage proposed for the project include:

- **Multi-Tenant Monument Signage** - The priority of this signage is frontage identification for the users that would otherwise be lined up in a lineal row all facing the street in the manner of the prior retail development. In the aggregate the proposition does not increase the global allocation of signage found in more conventional solutions. Rather it repositions it to add orientation, invitation, and retail activity to the Main Street, which is the focus of the "town center" concept.
- **Ground Monument Gateway Signage** - The ground monument signage similarly replaces a host of individual signs had the site been platted to allow for each building and tenant to have their own "fee simple" parcel. Their positioning along the secondary roads is in return replacing signage for many internal users organized in another development pattern than a town center model.
- **Primary Building Signage** – This signage is proposed to present a consistent approach regarding signage size and presentation while allowing retailers the opportunity to present their brand with little or no compromise. Both wall signage and under canopy blade signage are proposed.
- **Wayfinding & Accent Signage** – This signage, often cast at corners or suspended from cross arms of light standards that support multiple suspended signage shingles in a series with arrows pointing in the direction of each institution are



FARRAGUT TOWN CENTER
Biddle Farms



SITE SIGNAGE LOCATION PLAN

FARRAGUT TOWN CENTER

by Biddle Farms

THIS PROPERTY WILL BE
RETAINED BY THE BIDDLE
FAMILY AND IS LOCATED IN
THE AQUATIC BUFFER AREA
THAT CANNOT BE DISTURBED

- OPEN/GREEN SPACE TO BE MAINTAINED BY
THE DEVELOPER (7.20 ACRES±)
- OPEN/GREEN SPACE TO BE DEDICATED AND
MAINTAINED BY THE TOWN (5.60 ACRES±)

PROPOSED VILLAGE
GREEN

EXISTING HORSE
BARN

PROPOSED WALKING
TRAIL (20' EASEMENT
PROVIDED)

FUTURE DEVELOPMENT TRACT #1 - 7.27 ACRES±

8' SIDEWALK ADJACENT
TO PARKING AND WITHIN
WALKING TRAIL LOOP

KINGSTON PIKE

BROOKLAWN STREET

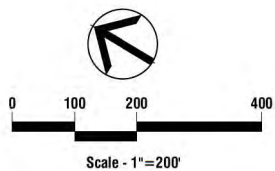
PROPOSED
PEDESTRIAN
PATH

PROPOSED
PEDESTRIAN
PATH

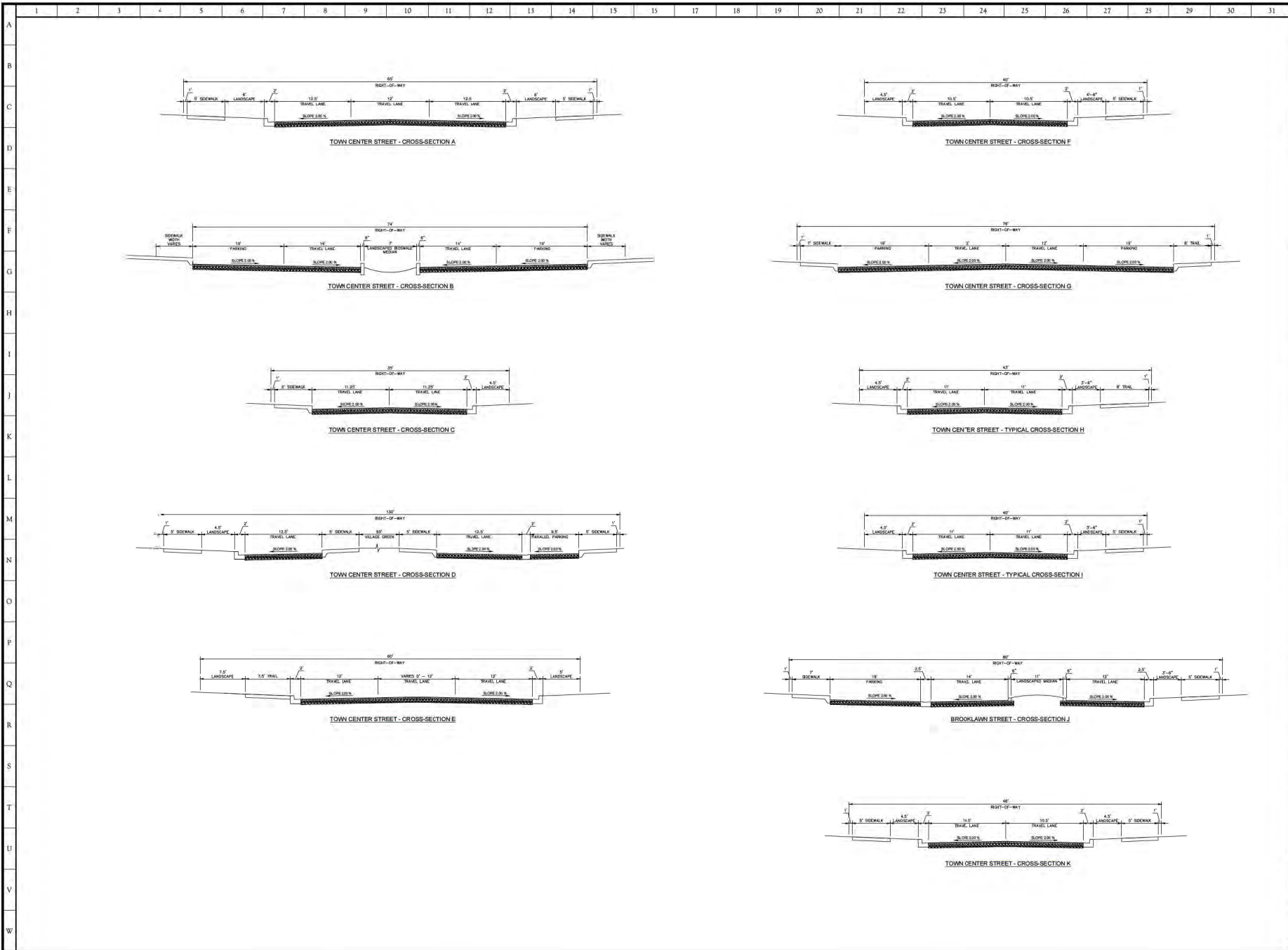
FUTURE DEVELOPMENT TRACT #2 - 6.20 ACRES±

HIGHLIGHTED AREA
DENOTES 3,400±
WALKING TRAIL LOOP

S. CAMPBELL STATION ROAD



**COMMON SPACE AND PEDESTRIAN
ACCESS EXHIBIT**



EXHIBIT

Proposed Town Center Street Cross Sections

Farragut Town Center at Biddle Farms
 Kingston Pike, Brooklawn Street, & Concord Road
 Civil District No. 6 of Knox County, Tennessee
 Town of Farragut

REVISIONS	
NO.	DATE COMMENTS
1	11/06/2020 Revised per 1st Set Comments

ORIGINAL ISSUE: 10/19/2020
 SITE PROJECT # 1994
 FILE: 1994XS

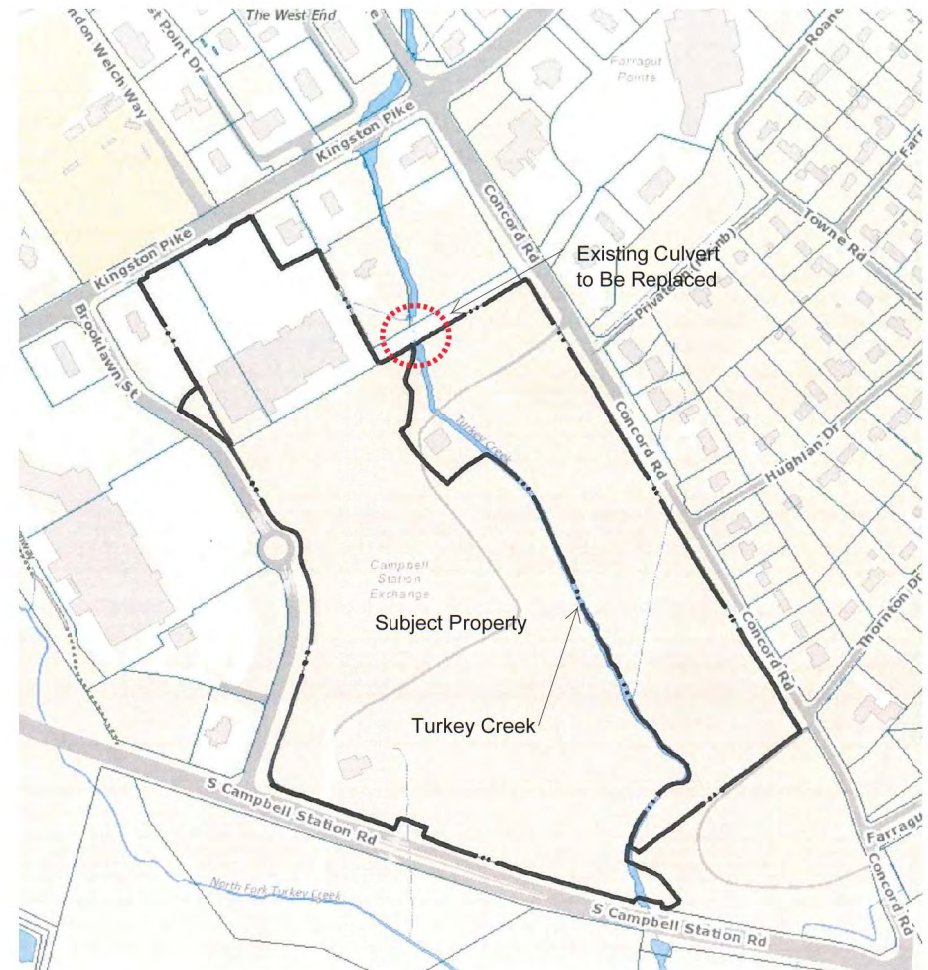
XS

Hydraulic & Hydrology Study Summary and Recommendations

Hydraulic and hydrology models were requested and received from FEMA for both Turkey Creek and North Fork Turkey Creek. The results of both models match the effective results as shown in the Flood Insurance Study (FIS) number 47093CV001B. Both models were updated with new ground data as gathered by our project surveyor. The Base Flood Elevation (BFE) results for both Turkey Creek and North Turkey Creek models were verified to become the Existing Conditions Model (ECM).

From this point, the ECM was used to create the Proposed Conditions Model (PCM). The PCM included the conceptual layout for the development called "Farragut Town Center at Biddle Farms" provided by SITE Inc.

Based upon the results of the hydrology study, not only can the proposed development be constructed, but along with the new bridge over Turkey Creek and other measures undertaken will also help alleviate some of the existing conditions.



Traffic Impact Study Summary and Recommendations

The study of the Biddle Farms, a proposed mixed commercial and residential development evaluated the projected traffic conditions. Background traffic was determined using a 3.5-percent annual compounded growth rate until the horizon year 2025. Traffic associated with the proposed project was then generated and distributed to the proposed site accesses. The proposed site may generate approximately 8,480 daily weekday trips. After the consideration of pass-by traffic and internal trips, approximately 6,730 new daily trips (Primary) may be generated for a typical weekday. Using the identified turning movements for the projected traffic conditions, unsignalized and signalized capacity and level of service analyses were conducted using the **2000 Highway Capacity Manual**.

Current conditions for study intersections are LOS E or better. Intersections are operating with a minimum LOS C except for the Kingston Pike intersections with Campbell Station Road and Concord Road. The PM peak hour for the intersection of Kingston Pike at Campbell Station Road is a LOS E and operates over capacity with a V/C ratio of 1.08, thereby an operation that is unstable and experiencing saturated traffic flows resulting in significant congestion with adverse traffic queues. The Kingston Pike intersection with Concord Road is a LOS D during the peak hours with a capacity ratio exceeding 0.90 indicating traffic conditions becoming unstable.

From the analyses conducted, changes in intersection capacity and delays are minimal for the study intersections, and levels of service did not change significantly from the background traffic conditions. Analyses determined that the proposed site development did not result in any significant changes from the analyses conducted for the background traffic conditions which found that the Kingston Pike intersections with Campbell Station Road and Concord Road may experience a LOS F during the PM peak hour and an E during the AM peak hour, respectively; the site impact increase the average intersection delay less than 6 seconds for either intersection and the increase in the V/C ratio not more than 4-percent. The poor levels of service for the Kingston Pike intersections with Campbell Station Road and Concord Road would occur regardless of the proposed development.

The proposed site does not have a significant impact on the adjacent road network as traffic projections and intersection analyses found little impact resulting from the proposed development. This impact is minimized with the proposed signalized accesses available to the site thereby affectively distributing the trips generated by the mixed-use development. The proposed development is a lower trip generator than the zoned property which could possibly develop an approximate 295,000 square feet of retail uses. The comparison of the trip generation found the proposed site reduces the trip generation potential as compared to the possible development with the current zoning. With the same pass-by rate of 20-percent applied to the trip generation of a 295,000 square foot center, the daily trips generated may be 3,300 fewer daily trips and 390 fewer PM peak hour trips with the proposed mixed commercial and residential development. An additional approximate 75 trips might be generated during the AM peak hour with the

mixed-use commercial and residential site but is not significant as it is managed with numerous accesses to the adjacent street network.

RECOMMENDATIONS

The analyses conducted and the review of the traffic volumes identified the following recommendations:

Minimize landscaping, using low growing vegetation, and signing at the planned site accesses.

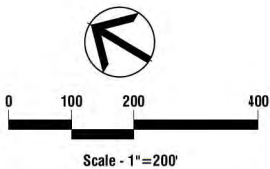
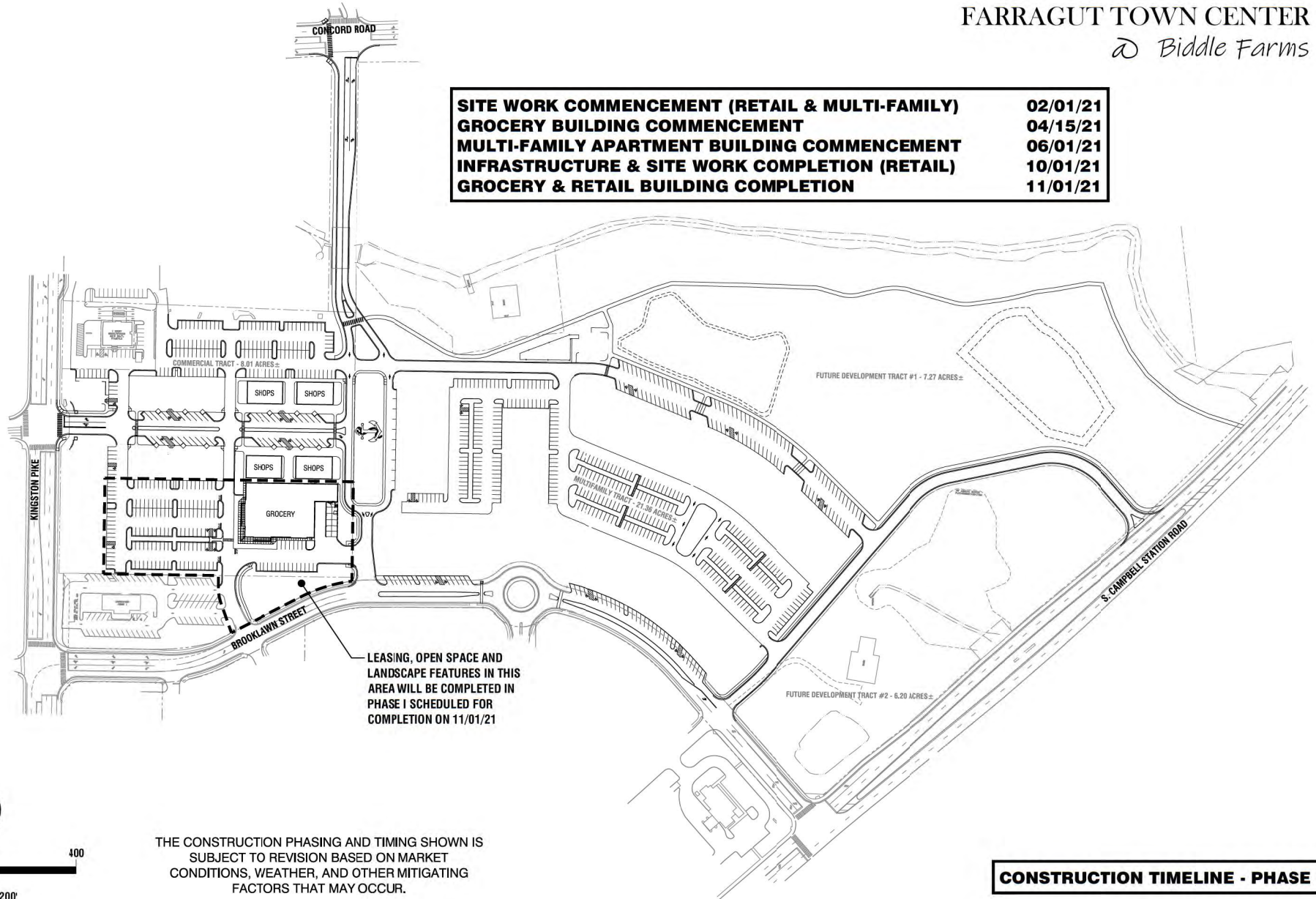
Intersection design should conform to the recommended standards and practices of the American Association of State Highway and Transportation Officials, the Institute of Transportation Engineers, Tennessee Department of Transportation (TDOT), and the Town of Farragut. The proposed site access for the site was found to operate at acceptable levels of service; however, the adjacent Kingston Pike intersections with Campbell Station Road and Concord Road may experience lower and unacceptable levels of service as the background traffic will have a significant impact on the intersections' capacities. Background left-turn volumes exceed 300vph for the northbound, southbound, and eastbound approaches of the Kingston Pike and Campbell Station Road intersection thereby requiring double left-turn lanes. Double left-turn lanes for the Kingston Pike and Campbell Station Road intersection would be very difficult with the current development of the intersection corners. The provision of these double left-turn lanes would require several design exceptions if they were to be considered by the Town of Farragut, minimizing any right-of-way required.

Mitigation of background traffic impacts for the of Kingston Pike intersection with Concord Road is an additional northbound right-turn lane. The mitigation of both Kingston Pike intersections with Campbell Station Road and Concord Road would return level of service and capacity back to that currently experienced for the 2020 traffic conditions. The development of the Biddle Farms property did not determine any required mitigation as its impacts were not significant and acceptable levels of service provided for the accesses to the site.

FARRAGUT TOWN CENTER

Biddle Farms

SITE WORK COMMENCEMENT (RETAIL & MULTI-FAMILY)	02/01/21
GROCERY BUILDING COMMENCEMENT	04/15/21
MULTI-FAMILY APARTMENT BUILDING COMMENCEMENT	06/01/21
INFRASTRUCTURE & SITE WORK COMPLETION (RETAIL)	10/01/21
GROCERY & RETAIL BUILDING COMPLETION	11/01/21



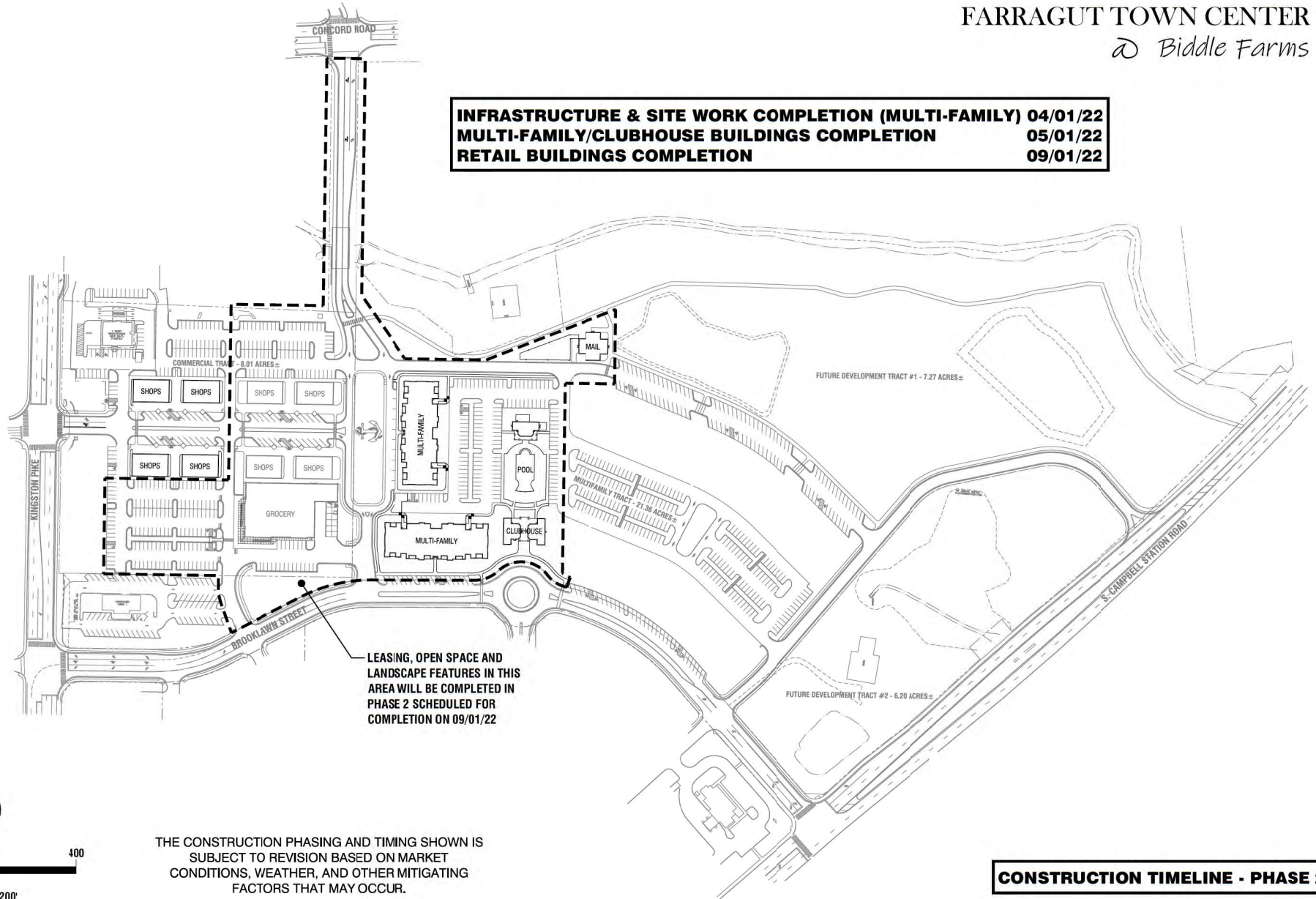
THE CONSTRUCTION PHASING AND TIMING SHOWN IS SUBJECT TO REVISION BASED ON MARKET CONDITIONS, WEATHER, AND OTHER MITIGATING FACTORS THAT MAY OCCUR.

CONSTRUCTION TIMELINE - PHASE 1

FARRAGUT TOWN CENTER

Biddle Farms

INFRASTRUCTURE & SITE WORK COMPLETION (MULTI-FAMILY)	04/01/22
MULTI-FAMILY/CLUBHOUSE BUILDINGS COMPLETION	05/01/22
RETAIL BUILDINGS COMPLETION	09/01/22

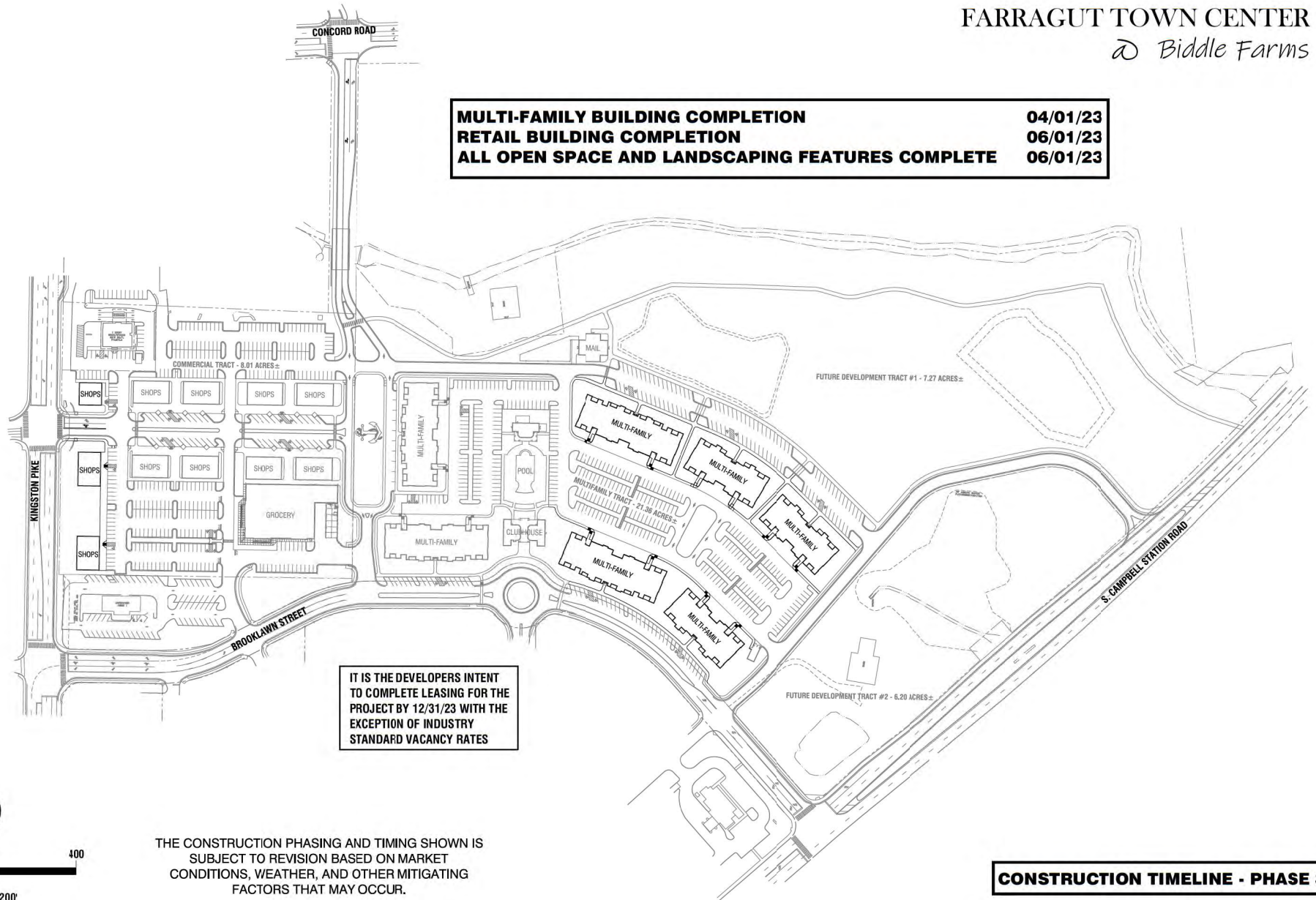


CONSTRUCTION TIMELINE - PHASE 2

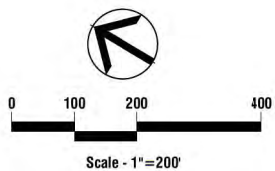
FARRAGUT TOWN CENTER

Biddle Farms

MULTI-FAMILY BUILDING COMPLETION 04/01/23
RETAIL BUILDING COMPLETION 06/01/23
ALL OPEN SPACE AND LANDSCAPING FEATURES COMPLETE 06/01/23



IT IS THE DEVELOPERS INTENT
TO COMPLETE LEASING FOR THE
PROJECT BY 12/31/23 WITH THE
EXCEPTION OF INDUSTRY
STANDARD VACANCY RATES



THE CONSTRUCTION PHASING AND TIMING SHOWN IS
SUBJECT TO REVISION BASED ON MARKET
CONDITIONS, WEATHER, AND OTHER MITIGATING
FACTORS THAT MAY OCCUR.

CONSTRUCTION TIMELINE - PHASE 3