



SUBDIVISION REPORT - CONCEPT/USE ON REVIEW

▶ **FILE #:** 5-SB-21-C **AGENDA ITEM #:** 32
5-D-21-UR **AGENDA DATE:** 5/13/2021

▶ **SUBDIVISION:** CATATOGA
▶ **APPLICANT/DEVELOPER:** URBAN ENGINEERING, INC.
OWNER(S): HMH Development, Inc.

TAX IDENTIFICATION: 117 117 01203 130AA00214 [View map on KGIS](#)

JURISDICTION: County Commission District 6

STREET ADDRESS: 1737 N. Campbell Station Rd. (0 Long Farm Way)

▶ **LOCATION:** West side of N. Campbell Station Rd., north of Yarnell Rd.

SECTOR PLAN: Northwest County

GROWTH POLICY PLAN: Rural Area

WATERSHED: Conner Creek and Hickory Creek

▶ **APPROXIMATE ACREAGE:** 62.5 acres

▶ **ZONING:** PR (Planned Residential)

▶ **EXISTING LAND USE:** Kennel and vacant land

▶ **PROPOSED USE:** Detached residential subdivision

SURROUNDING LAND USE AND ZONING: The area consists primarily of agricultural and rural to low density residential uses in the A, RA, and PR zones.

▶ **NUMBER OF LOTS:** 120

SURVEYOR/ENGINEER: Chris Sharp, P.E.

ACCESSIBILITY: Access is via N. Campbell Station Road, a minor arterial with a pavement width of 19.5 feet within a right-of-way width of 70 feet.

▶ **SUBDIVISION VARIANCES REQUIRED:** **VARIANCES:**

- 1) REDUCE THE K VALUE FROM 25 TO 15 AT THE INTERSECTION OF ROAD 'A' AND N. CAMPBELL STATION ROAD.
- 2) REDUCE THE K VALUE FROM 25 TO 20 BETWEEN ROAD 'B' STATIONS 1+02.83 AND 2+50.34.
- 3) REDUCE THE TANGENT BETWEEN REVERSE CURVES FROM 50' TO 25' BETWEEN STATIONS 16+42.82 AND 16+68.28.
- 4) REDUCE THE TANGENT BETWEEN REVERSE CURVES FROM 50' TO 31' BETWEEN STATIONS 19+86.39 AND 20+18.12.
- 5) REDUCE THE TANGENT BETWEEN REVERSE CURVES FROM 50' TO 45' BETWEEN STATIONS 48+16.38 AND 48+62.33.
- 6) REDUCE THE TANGENT BETWEEN REVERSE CURVES FROM 50' TO 44' BETWEEN STATIONS 49+09.15 AND 49+53.62.
- 7) REDUCE THE TANGENT BETWEEN REVERSE CURVES FROM 50'

- TO 39' BETWEEN STATIONS 26+95.89 AND 27+35.05.
- 8) REDUCE THE TANGENT BETWEEN BROKEN BACK CURVES FROM 150' TO 99' BETWEEN STATIONS 29+72.53 AND 30+71.78.
 - 9) REDUCE THE TANGENT BETWEEN BROKEN BACK CURVES FROM 150' TO 43' BETWEEN STATIONS 32+82.68 AND 33+26.05.
 - 10) REDUCE THE TANGENT BETWEEN BROKEN BACK CURVES FROM 150' TO 113' BETWEEN STATIONS 34+28.69 AND 35+42.33.

ALTERNATIVE DESIGN STANDARDS REQUIRING PLANNING COMMISSION APPROVAL:

ROAD 'A':

- 1) REDUCE THE CENTERLINE RADIUS FROM 250' TO 150' BETWEEN STATIONS 3+53.81 AND 3+91.67.
- 2) REDUCE THE CENTERLINE RADIUS FROM 250' TO 150' BETWEEN STATIONS 4+72.37 AND 5+10.22.
- 3) REDUCE THE CENTERLINE RADIUS FROM 250' TO 125' BETWEEN STATIONS 10+64.35 AND 12+55.31.
- 4) REDUCE THE CENTERLINE RADIUS FROM 250' TO 125' BETWEEN STATIONS 13+62.62 AND 15+23.22.

ROAD 'B':

- 1) REDUCE THE CENTERLINE RADIUS FROM 250' TO 150' BETWEEN STATIONS 15+61.50 AND 16+42.82.
- 2) REDUCE THE CENTERLINE RADIUS FROM 250' TO 150' BETWEEN STATIONS 19+45.16 AND 19+86.39.
- 3) REDUCE THE CENTERLINE RADIUS FROM 250' TO 150' BETWEEN STATIONS 45+75.28 AND 48+16.38.
- 4) REDUCE THE CENTERLINE RADIUS FROM 250' TO 150' BETWEEN STATIONS 25+97.12 AND 26+95.89.
- 5) REDUCE THE CENTERLINE RADIUS FROM 250' TO 150' BETWEEN STATIONS 35+42.33 AND 36+31.41.
- 6) REDUCE THE CENTERLINE RADIUS FROM 250' TO 125' BETWEEN STATIONS 10+64.94 AND 12+47.06.
- 7) REDUCE THE CENTERLINE RADIUS FROM 250' TO 200' BETWEEN STATIONS 20+ 18.12 AND 21+32.23.
- 8) REDUCE THE CENTERLINE RADIUS FROM 250' TO 200' BETWEEN STATIONS 21+94.76 AND 22+53.90.
- 9) REDUCE THE CENTERLINE RADIUS FROM 250' TO 200' BETWEEN STATIONS 27+35.05 AND 29+72.53.
- 10) REDUCE THE CENTERLINE RADIUS FROM 250' TO 100' BETWEEN STATIONS 16+68.28 AND 17+20.50.
- 11) REDUCE THE CENTERLINE RADIUS FROM 250' TO 100' BETWEEN STATIONS 33+26.05 AND 34+28.69.

ALTERNATIVE DESIGN STANDARDS REQUIRING KNOX COUNTY ENGINEERING AND PUBLIC WORKS APPROVAL:

- 1) INCREASE THE INTERSECTION GRADE FROM 1 % TO 3% AT THE INTERSECTION OF ROAD 'A' AND N. CAMPBELL STATION ROAD.
- 2) INCREASE THE INTERSECTION GRADE FROM 1 % TO 2% AT THE INTERSECTION OF ROAD 'A' AND ROAD 'B'.
- 3) INCREASE THE INTERSECTION GRADE FROM 1% TO 1.99% AT THE INTERSECTION OF ROAD 'B' AND ROAD 'B'.
- 4) INCREASE THE INTERSECTION GRADE FROM 1% TO 3% AT THE INTERSECTION OF ROAD 'B' AND ROAD 'C'.
- 5) INCREASE THE INTERSECTION GRADE FROM 1% TO 2% AT THE INTERSECTION OF ROAD 'B' AND ROAD 'D'.

STAFF RECOMMENDATION:

- **APPROVE** variances 1-10 and alternative design standards 1-11 on the recommendations of the Knox County Department of Engineering and Public Works and because the site conditions restrict compliance with the Subdivision Regulations and the proposed variances will not create a traffic hazard.

APPROVE the Concept Plan subject to 10 conditions.

1. Connection to sanitary sewer and meeting any other relevant requirements of the utility provider.
2. Provision of street names that are consistent with the Uniform Street Naming and Addressing System within Knox County (County Ord. 91-1-102).
3. Implementing the street and intersection improvements recommendations outlined in the Catatoga Subdivision Transportation Impact Study (AJAX Engineering, revised April 21, 2021). The design details and timing of the installation of the improvements shall be worked out with the Knox County Department of Engineering and Public Works during the design plan stage for the subdivision.
4. Providing a 200-FT sight distance easement on the final plat for the northeast corner of the common area / potential clubhouse/dock/pool/parking area lot, as shown on the Concept Plan.
5. Providing a 25-FT buffer around the community lake starting from the high water line, as shown on the Concept Plan.
6. Meeting all applicable requirements of the Knox County Zoning Ordinance.
7. Meeting all applicable requirements of the Knox County Department of Engineering and Public Works.
8. Placing a note on the final plat that all lots will have access only to the internal street system.
9. Submitting to Planning staff prior to final plat review by the Planning Commission or Planning staff, the certification of design plan approval form as required by the Knoxville-Knox County Subdivision Regulations.
10. Prior to certification of the final plat for the subdivision, establishing a property owners association that will be responsible for the maintenance of the common areas, recreational amenities, and drainage system.

- **APPROVE the development plan for up to 120 detached dwelling units on individual lots, subject to 1 condition.**

- 1) Meeting all applicable requirements of the Knox County Zoning Ordinance.

With the conditions noted, this plan meets the requirements for approval in the PR district and the criteria for approval of a use on review.

COMMENTS:

This proposal is for a 120-lot residential subdivision on 62.50 acres at a density of 1.92 du/ac. The property was recently rezoned from A (Agricultural) to PR (Planned Residential) up to 1.93 du/ac. Access to the site is from N. Cambell Station Road and will require the installation of a southbound right-turn lane and a northbound left-turn lane. The community lake and surrounding common area are proposed as an amenity for the neighborhood and may include a clubhouse, dock, pool, and parking area.

The proposed roads require the approval of several variances and alternative design standards. Staff is recommending approval of all the requested deviations because the majority of them are for horizontal curve radii or tangents between curves, which will passively reduce the speed of vehicles and increase safety, and the vertical curve (K value) and intersection grade deviations are acceptable based on the site conditions.

There are approximately 44.1 acres of this 62.5-acre property in the Hillside Protection (HP) area. Based on the Hillside & Ridgetop Protection Plan land disturbance guidelines, the maximum recommended land disturbance in the HP area is 32.8 acres (see the attached slope analysis). The proposed land disturbance within the HP area is 33.2 acres according to the applicant. This is .4 acres (1.2%) more than recommended by the Hillside and Ridgetop Protection Plan guidelines.

The developer is currently seeking a rezoning of the 18.86-acre parcel to the west of this property (5-I-21-RZ / 5-B-21-SP). Road 'D' is a stub out road that will provide access to the property whether it is a future phase of the subject development or another development. This potential additional density was incorporated into the transportation impact study to ensure the conclusions and recommendations of the study are based on the maximum number of vehicle trips anticipated from this development.

DEVELOPMENT STANDARDS FOR USES PERMITTED ON REVIEW (ARTICLE 4.10 – SECTION 2)

The planning commission, in the exercise of its administrative judgment, shall be guided by adopted plans and

policies, including the general plan and the following general standards:

1) THE PROPOSED USE IS CONSISTENT WITH THE ADOPTED PLANS AND POLICIES, INCLUDING THE GENERAL PLAN AND SECTOR PLAN.

A. The Northwest County Sector Plan recommends RR (Rural Residential) uses for this site with a maximum of 2 du/ac. The property was rezoned to PR up to 1.93 du/ac and the proposed subdivision has a density of 1.92 du/ac.

2) THE USE IS IN HARMONY WITH THE GENERAL PURPOSE AND INTENT OF THE ZONING ORDINANCE.

A. The PR (Planned Residential) zone is intended to provide optional methods of land development which encourage more imaginative solutions to environmental design problems. Residential areas thus established would be characterized by a unified building and site development program, open space for recreation and provision for commercial, religious, educational, and cultural facilities which are integrated with the total project by unified architectural and open space treatment. Each planned unit development shall be compatible with the surrounding or adjacent zones. Such compatibility shall be determined by the planning commission by review of the development plans.

B. The proposed subdivision will have detached residential lot sizes that are comparable to those in recently developed subdivisions in the area. Several large lot residential properties border the subject property to the south and east. The development does not propose to reduce the peripheral setback.

C. The property was rezoned to PR up to 1.93 du/ac and the proposed subdivision has a density of 1.92 du/ac.

3) THE USE IS COMPATIBLE WITH THE CHARACTER OF THE NEIGHBORHOOD WHERE IT IS PROPOSED, AND WITH THE SIZE AND LOCATION OF BUILDINGS IN THE VICINITY.

A. The proposed single-family detached subdivision has a similar character as other residential subdivisions in this area but not the larger lot residential properties to the south and east of the subject property.

B. On the western portion of the development, the lots adjacent to the southern boundary line have depths of approximately 190-FT which will provide some separation from the location of the houses and rear of the lots.

C. On the eastern portion of the development, the lots adjacent to the eastern boundary line have depths of approximately 130-FT. The adjacent property is heavily wooded and the new houses should not impact the property.

4) THE USE WILL NOT SIGNIFICANTLY INJURE THE VALUE OF ADJACENT PROPERTY.

A. The use of the property for single-family residential should not significantly injure the value of the adjacent properties.

5) THE USE WILL NOT DRAW ADDITIONAL TRAFFIC THROUGH RESIDENTIAL AREAS.

A. The development will have direct access to N. Campbell Station Road which is a minor arterial street.

6) THE NATURE OF DEVELOPMENT IN THE SURROUNDING AREA IS NOT SUCH AS TO POSE A POTENTIAL HAZARD TO THE PROPOSED USE OR TO CREATE AN UNDESIRABLE ENVIRONMENT FOR THE PROPOSED USE.

A. There are no known uses in the area that could be a potential hazard or create an undesirable environment for the proposed residential use.

ESTIMATED TRAFFIC IMPACT: A traffic impact study was prepared by the applicant. The findings of that study were used in formulating the recommendations of this staff report.

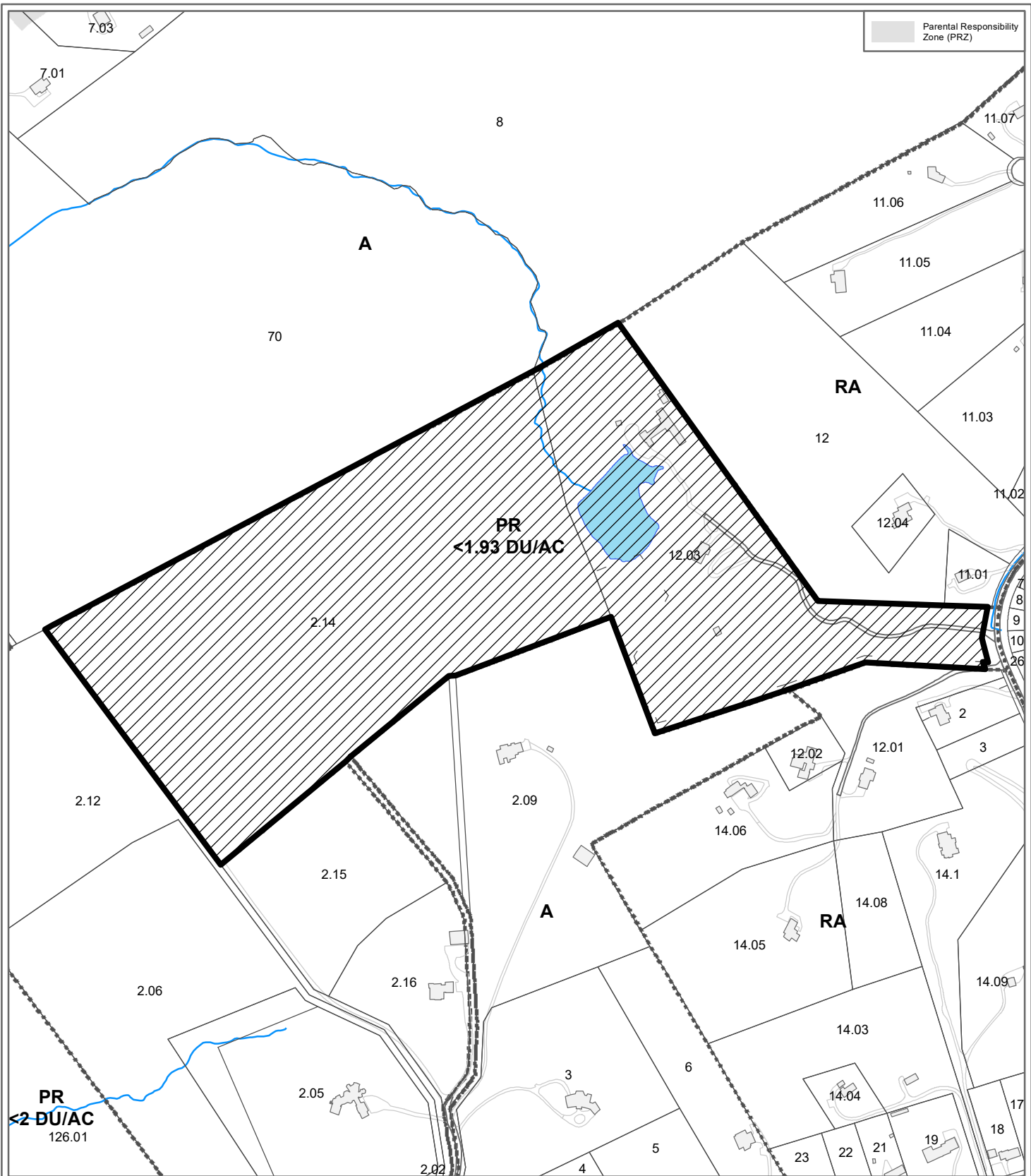
ESTIMATED STUDENT YIELD: 49 (public school children, grades K-12)

Schools affected by this proposal: Hardin Valley Elementary, Hardin Valley Middle, and Hardin Valley Academy.

- Potential new school population is estimated using locally-derived data on public school student yield generated by new housing.
- Students are assigned to schools based on current attendance zones as determined by Knox County Schools. Students may request transfers to different zones, and zone boundaries are subject to change.
- Estimates presume full build-out of the proposed development. Build-out is subject to market forces, and timing varies widely from proposal to proposal.
- Student yields from new development do not reflect a net addition of children in schools. Additions occur incrementally over the build-out period. New students may replace current population that ages through the system or moves from the attendance zone.

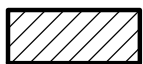
Knoxville-Knox County Planning Commission's approval or denial of this concept plan request is final, unless the action is appealed to Knox County Chancery Court. The date of the Knox County Chancery Court hearing will depend on when the appeal application is filed.

Knoxville-Knox County Planning Commission's approval or denial of this use on review request is final, unless the action is appealed to the Knox County Board of Zoning Appeals. The date of the Knox County Board of Zoning Appeals hearing will depend on when the appeal application is filed.



**5-D-21-UR / 5-SB-21-C
CONCEPT PLAN/USE ON REVIEW**

Petitioner: Urban Engineering, Inc.



Detached residential subdivision in PR (Planned Residential)

Map No: 117

Jurisdiction: County



Original Print Date: 4/13/2021

Revised:

Knoxville - Knox County Planning Commission * City / County Building * Knoxville, TN 37902

CATEGORY	ACRES	RECOMMENDED LAND DISTURBANCE FACTOR	ACRES OF DISTURBANCE
Non-Hillside	20.28	N/A	N/A
0-15% Slope	23.43	1.00	23.4
15-25% Slope	17.57	0.50	8.8
25-40% Slope	2.66	0.20	0.5
Greater than 40% Slope	0.44	0.10	0.0
Ridgetops	0		0.0
Maximum Land Disturbance Guideline (Hillside & Ridgetop Protection Plan)	44.1		32.8
Proposed Land Disturbance (Applicant)			33.2

From Hillside & Ridgetop Protection Plan, page 33

LOW DENSITY AND RURAL RESIDENTIAL USES

Density and Land Disturbance Guidelines

As proposals for changes to the zoning map and development plans/concept plans are considered, the following factors are recommended to determine the overall allowable density for residential rezonings and the overall land disturbance allowable in new development or subdivisions for those portions of parcels that are within the Hillside and Ridgetop Protection Area. These factors should be codified as regulations in the future. The areas of the Growth Policy Plan referenced below are presented on page 18.

Table 3: Residential Density and Land Disturbance Guidelines
for Recommendations on Changes to the Zoning Map and Development Plan/
Concept Plan Review within the Hillside and Ridgetop Protection Area
that is within the Urban Growth and the Planned Growth Area

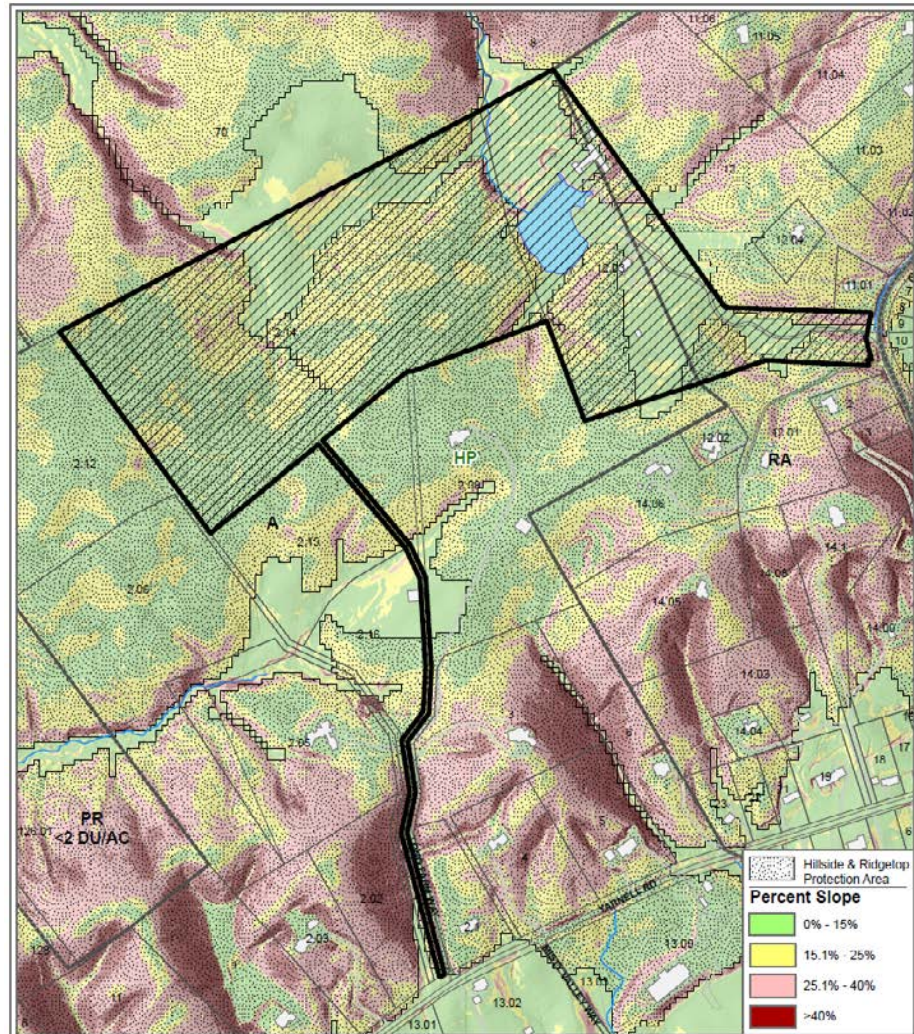
Percent of Slope	Recommended Maximum Density Factor*	Recommended Maximum Land Disturbance Factor**
0 - 15	Knox County: 5 dua City of Knoxville: 6 dua	100%
15 - 25	2 dua	50%
25 - 40	0.5 dua	20%
40 or more	0.2 dua	10%
Ridgetops***	***	***

dua: dwelling units per acre

* These factors should be considered guidelines to determine an overall recommended residential density for requests for changes to the zoning map to planned residential (RP-1 in the city and PR in the county) zone districts that are considered by the Metropolitan Planning Commission prior to being considered by the appropriate legislative body. The resulting zone district development right would be considered a budget for dwelling units to be applied over the entire proposed development.

** Until such time as regulations are codified by the appropriate legislative body, these factors should be considered guidelines to determine an overall recommended land disturbance area for development plans and concept plans that are considered for approval by the Metropolitan Planning Commission. The overall land disturbance area would be considered a budget for land disturbance to be applied over the entire proposed development.

*** Ridgetops are generally the more level areas on the highest elevations of a ridge. Because the shapes of Knox County ridges are so varied (see pages 8 - 9), the ridgetop area should be determined on a case-by-case basis with each rezoning and related development proposal.



**5-SB-21-C / 5-D-21-UR
SLOPE ANALYSIS**

Original Print Date: 10/19/2020 Revised: Knoxville - Knox County Planning Commission * City / County Building * Knoxville, TN 37902

Subject Property

Petitioner:
Map No.: 117

Jurisdiction: County

0 620
Feet

N

CONCEPT PLAN / USE ON REVIEW

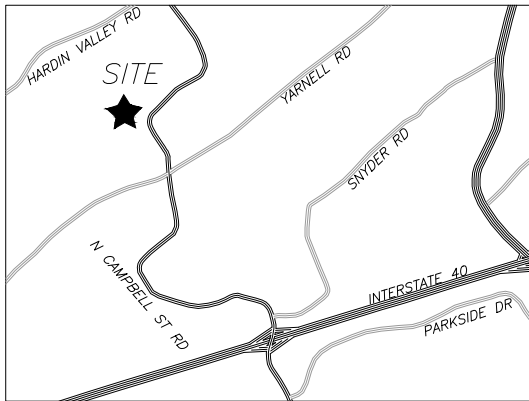
U.E.I. PROJECT NO. 2008021

CATATOGA

SITE ADDRESS: 1737 NORTH CAMPBELL STATION ROAD, KNOXVILLE, TENNESSEE 37932
TAX PARCELS 117-012.03 & 130A002.14

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LOCATION MAP

OWNER:
HMH DEVELOPMENT, INC.
12125 HARDIN VALLEY ROAD
KNOXVILLE, TN 37932
(865) 414-5347

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 LENOIR CITY UTILITIES BOARD
GAS - AS DIRECTED BY KNOXVILLE UTILITIES BOARD
WATER & SEWER - AS DIRECTED BY WEST KNOX UTILITY DISTRICT
TELEPHONE - AS DIRECTED BY AT&T
CABLE - AS DIRECTED BY COMCAST
SITE DEVELOPMENT - KNOX COUNTY STANDARDS AND SPECIFICATIONS

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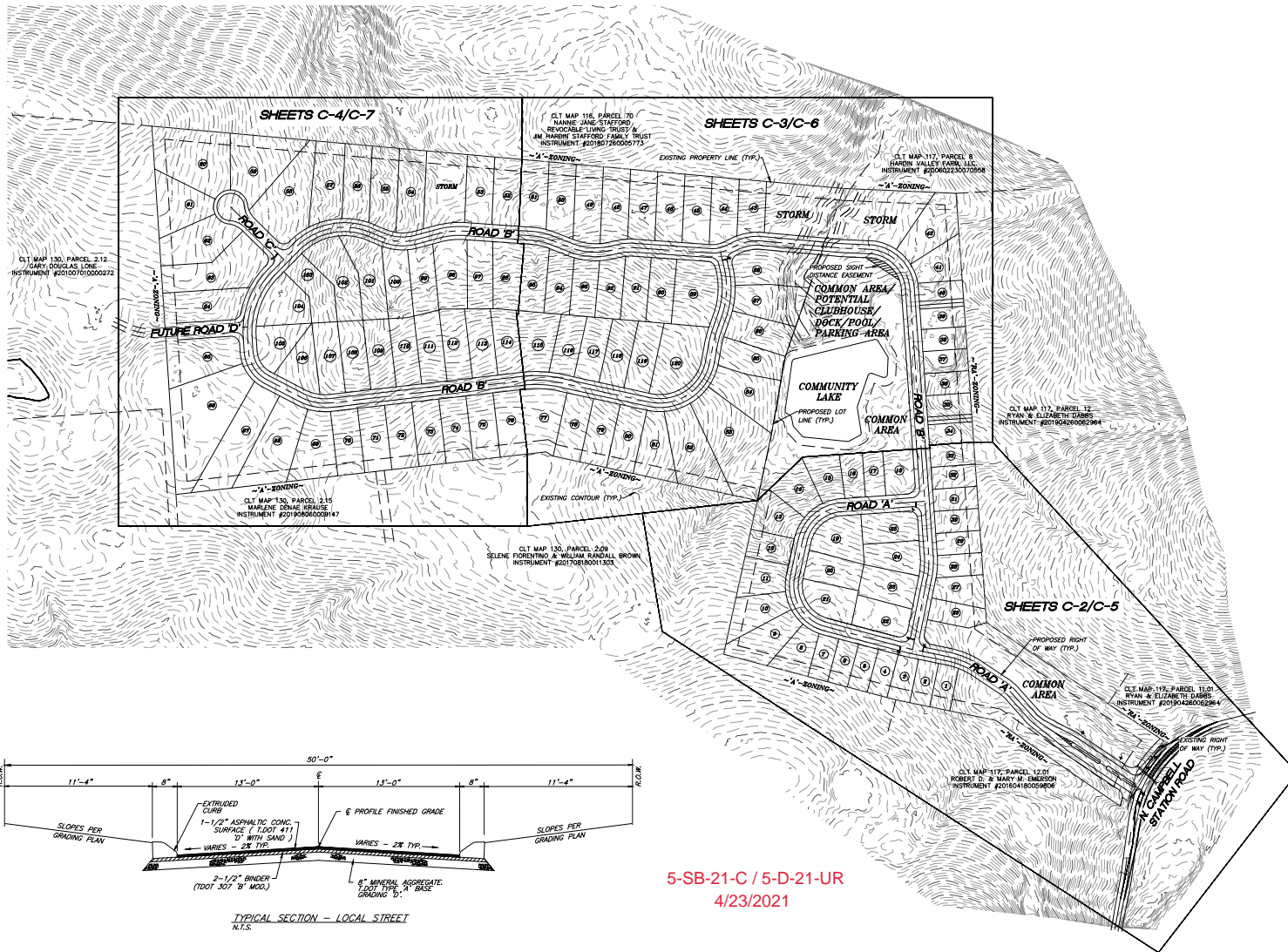
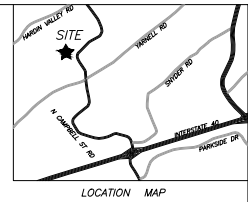
VARIANCE REQUESTS:

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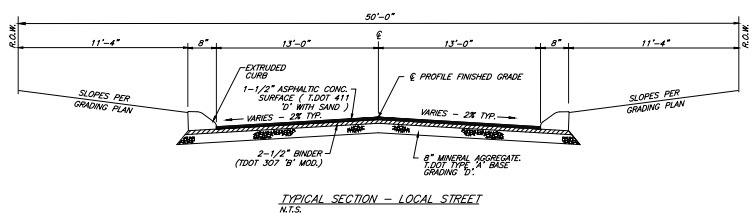
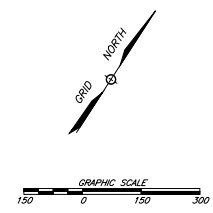
5-SB-21-C / 5-D-21-UR
4/23/2021

MPC FILE# 5-SB-21-C / 5-D-21-UR

ISSUE NO.	DATE	GENERAL REVISIONS DESCRIPTION
2	4/26/21	GENERAL REVISIONS DESCRIPTION



- SITE PLAN NOTES:**
1. THIS PROPERTY IS ZONED "TR". REQUIRED BUILDING SETBACKS ARE AS FOLLOWS:
FRONT: HOUSES, TWENTY (20) FEET
REAR/SIDE: THIRTY FIVE (35) FEET (MINIMUM)
SIDE: FIVE (5) FEET
REAR: FIFTEEN (15) FEET
 2. 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 VALVES, ETC., AND COMPILING INFORMATION FROM PLANS SUPPLIED BY VARIOUS UTILITY COMPANIES AND GOVERNMENT AGENCIES. THE CONTRACTORS SHALL NOTIFY IN WRITING ALL UTILITY COMPANIES AND GOVERNMENT AGENCIES AND ALSO CALL TENN 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.
 3. HORIZONTAL COORDINATES ARE TENNESSEE STATE PLANE. VERTICAL DATUM IS NAVD83.
 4. ALL WORK SHALL BE IN ACCORDANCE WITH KNOX COUNTY'S SPECIFICATIONS FOR SITE DEVELOPMENT.
 5. THE CURRENT TOTAL AREA OF THE DEVELOPMENT IS 62.57 ACRES.
 RIGHT OF WAY DEDICATION AREA = 0.07 ACRE
 TOTAL AREA AFTER RIGHT OF WAY DEDICATION = 62.50 ACRES
 6. THE DEVELOPMENT PROPOSES 120-UNITS (1.92 UNITS PER ACRE).
 7. PROPOSED OPEN SPACE (INCLUDING EASEMENTS, & AREAS WITHIN STORM WATER DETENTION AREAS) = 84.48 ACRES (16.14)
 8. THE PROPOSED LOTS SHALL HAVE VEHICULAR ACCESS TO INTERNAL ROADS ONLY.
 9. A HOMEOWNERS ASSOCIATION SHALL BE ESTABLISHED TO ADDRESS MAINTENANCE OF THE COMMON AREAS.
 10. 10' UTILITY AND DRAINAGE EASEMENTS SHALL BE RESERVED ALONG ALL EXTERIOR BOUNDARY LINES AND PUBLIC RIGHT OF WAY. UTILITY AND DRAINAGE EASEMENTS SHALL BE RESERVED ALONG ALL INTERIOR LOT LINES EXCEPT WHEN UNDER BUILDINGS.
 11. THE TOTAL AREA OF THE PROPERTY COVERED BY HILLSIDE PROTECTION IS 43.6 ACRES. THE TOTAL AREA OF DISTURBANCE WITHIN THE HILLSIDE PROTECTION AREA IS 33.2 ACRES.



5-SB-21-C / 5-D-21-UR
4/23/2021

SHEET C-1 2 OF 14

TYPICAL SECTION / KEY SHEET

CATATOGA

SITE ADDRESS: 1737 NORTH CAMPBELL STATION ROAD (37932)

DEVELOPER: HMH DEVELOPMENTS, INC.
12125 HARDIN VALLEY ROAD
KNOXVILLE, TN 37932
(865) 414-5347

DIST. NO. W6 KNOX CO., TN.
SCALE: 1"=150' MARCH 29, 2021
TAX PARCELS 117-012.03 & 130A4002.14



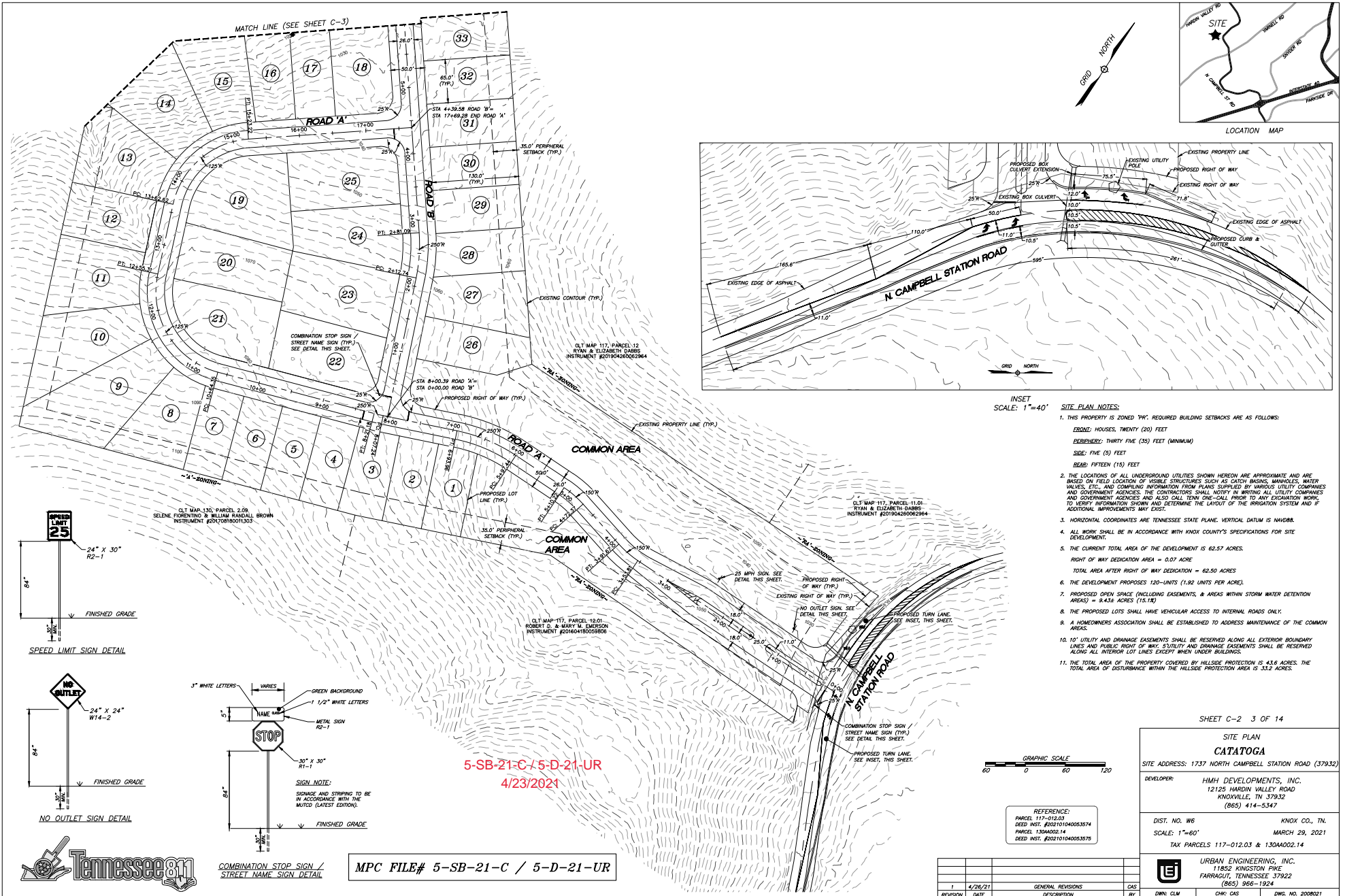
MPC FILE# 5-SB-21-C / 5-D-21-UR

REFERENCE:
PARCEL 117-012.03
DEED INST. #202101040053574
PARCEL 130A4002.14
DEED INST. #202101040053575

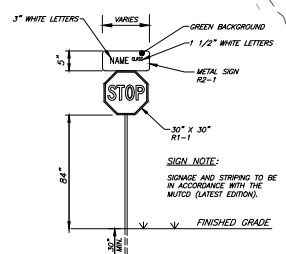
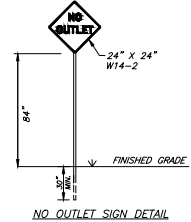
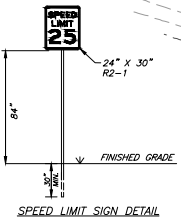
REVISION	DATE	DESCRIPTION	BY
1	4/26/21	GENERAL REVISIONS	CAS

URBAN ENGINEERING, INC.
11852 KINGSTON PKE
FARRAGUT, TENNESSEE 37922
(865) 966-1924

DWN: CLM CHK: CAS DWS: NO. 2008021



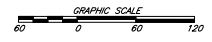
- INSET SCALE: 1"=40'**
- SITE PLAN NOTES:**
- THIS PROPERTY IS ZONED 'TR'. REQUIRED BUILDING SETBACKS ARE AS FOLLOWS:
 FRONT: HOUSES, TWENTY (20) FEET
 REAR: THIRTY FIVE (35) FEET (MINIMUM)
 SIDE: FIVE (5) FEET
 BEAR: FIFTEEN (15) FEET
 - THE LOCATIONS OF ALL UNDERGROUND UTILITIES SHOWN HEREON ARE APPROXIMATE AND ARE BASED ON FIELD LOCATION OF VISIBLE STRUCTURES SUCH AS CATCH BASINS, MANHOLES, WATER VALVES, 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 TENU ONE-CALL PRIOR TO ANY EXCAVATION WORK TO VERIFY INFORMATION SHOWN AND DETERMINE THE LAYOUT OF THE UTILITY SYSTEM AND IF ADDITIONAL IMPROVEMENTS MAY EXIST.
 - HORIZONTAL COORDINATES ARE TENNESSEE STATE PLANE, VERTICAL DATUM IS NAVD83.
 - ALL WORK SHALL BE IN ACCORDANCE WITH KNOX COUNTY'S SPECIFICATIONS FOR SITE DEVELOPMENT.
 - THE CURRENT TOTAL AREA OF THE DEVELOPMENT IS 62.57 ACRES.
 RIGHT OF WAY DEDICATION AREA = 0.07 ACRE
 TOTAL AREA AFTER RIGHT OF WAY DEDICATION = 62.50 ACRES
 - THE DEVELOPMENT PROPOSES 120-UNITS (1.92 UNITS PER ACRE).
 - PROPOSED OPEN SPACE (INCLUDING EASEMENTS, & AREAS WITHIN STORM WATER DETENTION AREAS) = 9.436 ACRES (15.1%).
 - THE PROPOSED LOTS SHALL HAVE VEHICULAR ACCESS TO INTERNAL ROADS ONLY.
 - A HOMEOWNERS ASSOCIATION SHALL BE ESTABLISHED TO ADDRESS MAINTENANCE OF THE COMMON AREAS.
 - 10' UTILITY AND DRAINAGE EASEMENTS SHALL BE RESERVED ALONG ALL EXTERIOR BOUNDARY LINES AND PUBLIC RIGHT OF WAY. STURDY AND DRAINAGE EASEMENTS SHALL BE RESERVED ALONG ALL INTERIOR LOT LINES EXCEPT WHEN UNDER BUILDINGS.
 - THE TOTAL AREA OF THE PROPERTY COVERED BY HILLSIDE PROTECTION IS 43.6 ACRES. THE TOTAL AREA OF DISTURBANCE WITHIN THE HILLSIDE PROTECTION AREA IS 33.2 ACRES.



COMBINATION STOP SIGN / STREET NAME SIGN DETAIL

MPC FILE# 5-SB-21-C / 5-D-21-UR

5-SB-21-C / 5-D-21-UR
 4/23/2021



REFERENCE:
 PARCEL 117-012.03
 DEED INST. #002101040053574
 PARCEL 130A002.14
 DEED INST. #002101040053575

REVISION	DATE	DESCRIPTION	CAS	BY
1	4/26/21	GENERAL REVISIONS	CAS	

SHEET C-2 3 OF 14

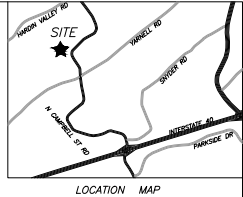
SITE PLAN
CATATOGA
 SITE ADDRESS: 1737 NORTH CAMPBELL STATION ROAD (37932)
 DEVELOPER: HMM DEVELOPMENTS, INC.
 12125 HARDSH VALLEY ROAD
 KNOXVILLE, TN 37932
 (865) 414-5347

DIST. NO. W6 KNOX CO., TN.
 SCALE: 1"=60' MARCH 29, 2021
 TAX PARCELS 117-012.03 & 130A002.14

URBAN ENGINEERING, INC.
 11852 KINGSTON PIKE
 FARRAGUT, TENNESSEE 37922
 (865) 966-1924

DWG. NO. 2008021

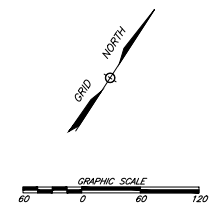
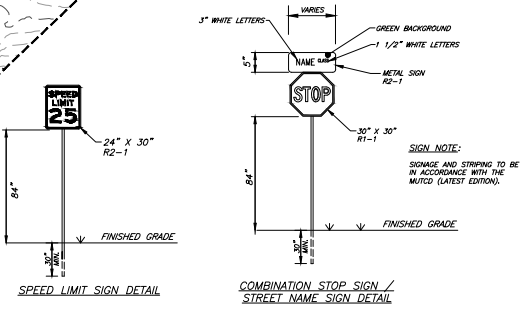




- SITE PLAN NOTES:**
1. THIS PROPERTY IS ZONED 'FR'. REQUIRED BUILDING SETBACKS ARE AS FOLLOWS:
 FRONT: HOUSES, TWENTY (20) FEET
 REAR/YEARLY: THIRTY FIVE (35) FEET (MINIMUM)
 SIDE: FIVE (5) FEET
 REAR: FIFTEEN (15) FEET
 2. THE LOCATIONS OF ALL UNDERGROUND UTILITIES SHOWN HEREON ARE APPROXIMATE AND ARE BASED ON FIELD LOCATION OF VISIBLE STRUCTURES SUCH AS CATCH BASINS, MANHOLES, WATER VALVES, ETC., AND COMPANY INFORMATION FROM PLANS SUPPLIED BY RELEVANT UTILITY COMPANIES AND GOVERNMENT AGENCIES. THE CONTRACTORS SHALL NOTIFY IN WRITING ALL UTILITY COMPANIES AND GOVERNMENT AGENCIES AND ALSO CALL TREN OWN-CALL PRIOR TO ANY EXCAVATION WORK. TO VERIFY INFORMATION SHOWN AND DETERMINE THE LAYOUT OF THE IRRIGATION SYSTEM AND IF ADDITIONAL IMPROVEMENTS MAY EXIST.
 3. HORIZONTAL COORDINATES ARE TENNESSEE STATE PLANE. VERTICAL DATUM IS NAVD83.
 4. ALL WORK SHALL BE IN ACCORDANCE WITH KNOX COUNTY'S SPECIFICATIONS FOR SITE DEVELOPMENT.
 5. THE CURRENT TOTAL AREA OF THE DEVELOPMENT IS 62.57 ACRES.
 RIGHT OF WAY DEDICATION AREA = 0.07 ACRE
 TOTAL AREA AFTER RIGHT OF WAY DEDICATION = 62.50 ACRES
 6. THE DEVELOPMENT PROPOSES 120-UNITS (1.92 UNITS PER ACRE).
 7. PROPOSED OPEN SPACE (INCLUDING EASEMENTS, & AREAS WITHIN STORM WATER DETENTION AREAS) = 9.433 ACRES (15.1%)
 8. THE PROPOSED LOTS SHALL HAVE VEHICULAR ACCESS TO INTERNAL ROADS ONLY.
 9. A HOMEOWNERS ASSOCIATION SHALL BE ESTABLISHED TO ADDRESS MAINTENANCE OF THE COMMON AREAS.
 10. UTILITY AND DRAINAGE EASEMENTS SHALL BE RESERVED ALONG ALL EXTERIOR BOUNDARY LINES; AND PUBLIC RIGHT OF WAY, UTILITY AND DRAINAGE EASEMENTS SHALL BE RESERVED ALONG ALL INTERIOR LOT LINES EXCEPT WHEN UNDER BUILDINGS.
 11. THE TOTAL AREA OF THE PROPERTY COVERED BY HILLSIDE PROTECTION IS 43.6 ACRES. THE TOTAL AREA OF DISTURBANCE WITHIN THE HILLSIDE PROTECTION AREA IS 34.2 ACRES.

5-SB-21-C / 5-D-21-UR
4/23/2021

MPC FILE# 5-SB-21-C / 5-D-21-UR



SHEET C-3 4 OF 14

SITE PLAN
CATATOGA

825 ADDRESS: 1737 NORTH CAMPBELL STATION ROAD (379.32)

DEVELOPER: HMM DEVELOPMENTS, INC.
12125 HARBIN VALLEY ROAD
KNOXVILLE, TN 37932
(865) 414-5347

DIST. NO. W6 KNOX CO., TN.
SCALE: 1"=60' MARCH 29, 2021
TAX PARCELS 117-012.03 & 130A002.14

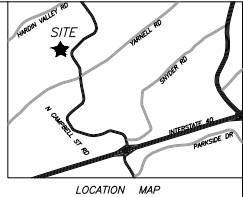
URBAN ENGINEERING, INC.
11852 KINGSTON PIKE
FARRAGUT, TENNESSEE 37922
(865) 966-1924

DWG. NO. 2008021

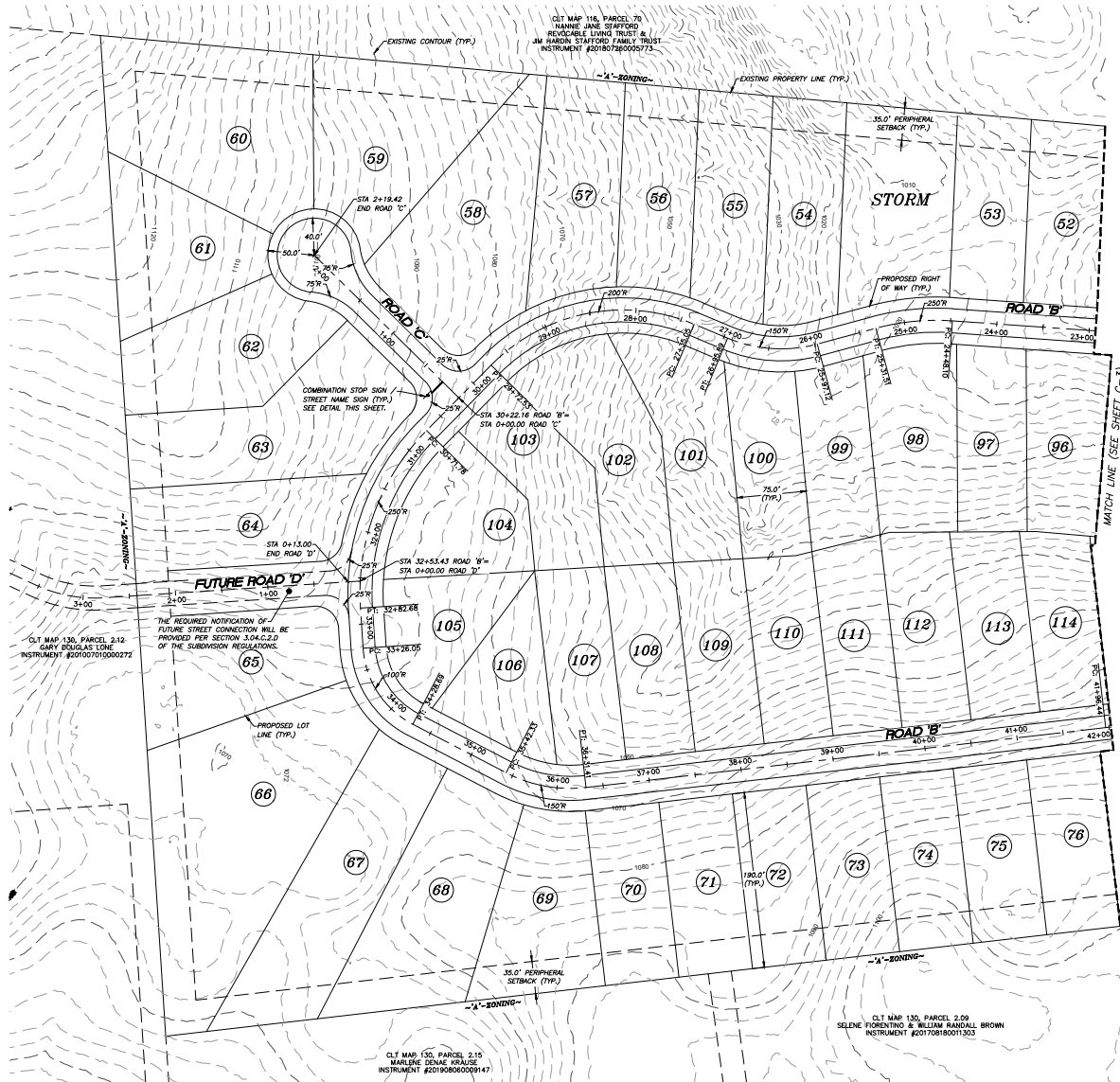
REVISION	DATE	DESCRIPTION	CAS	BY
1	4/26/21	GENERAL REVISIONS	CAS	



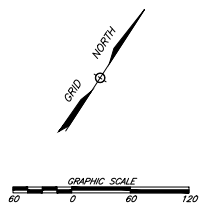
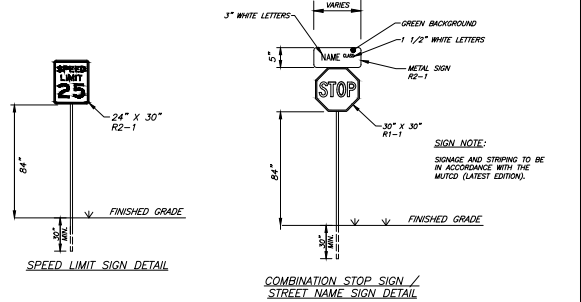
REFERENCE:
PARCEL: 117-012.03
DEED INSTR. #202101040053574
PARCEL: 130A002.14
DEED INSTR. #202101040053575



5-SB-21-C / 5-D-21-UR
4/23/2021



- SITE PLAN NOTES:**
1. THIS PROPERTY IS ZONED 'UR'. REQUIRED BUILDING SETBACKS ARE AS FOLLOWS:
 FRONT: HOUSES, TWENTY (20) FEET
 REAR/YEARLY: THIRTY FIVE (35) FEET (MINIMUM)
 SIDE: FIVE (5) FEET
 REAR: FIFTEEN (15) FEET
 2. 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 VALVES, ETC., AND COMPILING INFORMATION FROM PLANS SUPPLIED BY UTILITY COMPANIES AND GOVERNMENT AGENCIES. THE CONTRACTORS SHALL NOTIFY IN WRITING ALL UTILITY COMPANIES AND GOVERNMENT AGENCIES AND ALSO CALL THEM 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.
 3. HORIZONTAL COORDINATES ARE TENNESSEE STATE PLANE. VERTICAL DATUM IS NAVD83.
 4. ALL WORK SHALL BE IN ACCORDANCE WITH KNOX COUNTY'S SPECIFICATIONS FOR SITE DEVELOPMENT.
 5. THE CURRENT TOTAL AREA OF THE DEVELOPMENT IS 62.57 ACRES.
 RIGHT OF WAY DEDICATION AREA = 0.07 ACRE
 TOTAL AREA AFTER RIGHT OF WAY DEDICATION = 62.50 ACRES
 6. THE DEVELOPMENT PROPOSES 120-UNITS (1.92 UNITS PER ACRE).
 7. PROPOSED OPEN SPACE (INCLUDING EASEMENTS, & AREAS WITHIN STORM WATER DETENTION AREAS) = 9.434 ACRES (15.1%).
 8. THE PROPOSED LOTS SHALL HAVE VEHICULAR ACCESS TO INTERNAL ROADS ONLY.
 9. A HOMEOWNERS ASSOCIATION SHALL BE ESTABLISHED TO ADDRESS MAINTENANCE OF THE COMMON AREAS.
 10. UTILITY AND DRAINAGE EASEMENTS SHALL BE RESERVED ALONG ALL EXTERIOR BOUNDARY LINES; AND PUBLIC RIGHT OF WAY, UTILITY AND DRAINAGE EASEMENTS SHALL BE RESERVED ALONG ALL INTERIOR LOT LINES EXCEPT WHEN UNDER BUILDINGS.
 11. THE TOTAL AREA OF THE PROPERTY COVERED BY HILLSIDE PROTECTION IS 4.86 ACRES. THE TOTAL AREA OF DISTURBANCE WITHIN THE HILLSIDE PROTECTION AREA IS 3.82 ACRES.



SHEET C-4 5 OF 14

SITE PLAN
CATATOGA
 SITE ADDRESS: 1737 NORTH CAMPBELL STATION ROAD (37932)

DEVELOPER: **HMH DEVELOPMENTS, INC.**
 12125 HARDIN VALLEY ROAD
 KNOXVILLE, TN 37932
 (865) 414-5347

DIST. NO. W6 KNOX CO., TN.
 SCALE: 1"=60' MARCH 29, 2021
 TAX PARCELS 117-012.03 & 130A002.14

URBAN ENGINEERING, INC.
 11852 KINGSTON PIKE
 FARRAGUT, TENNESSEE 37922
 (865) 966-1924

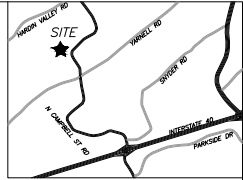
DWG. NO. 2008021

REVISION	DATE	DESCRIPTION	CAS	BY
1	4/26/21	GENERAL REVISIONS	CAS	

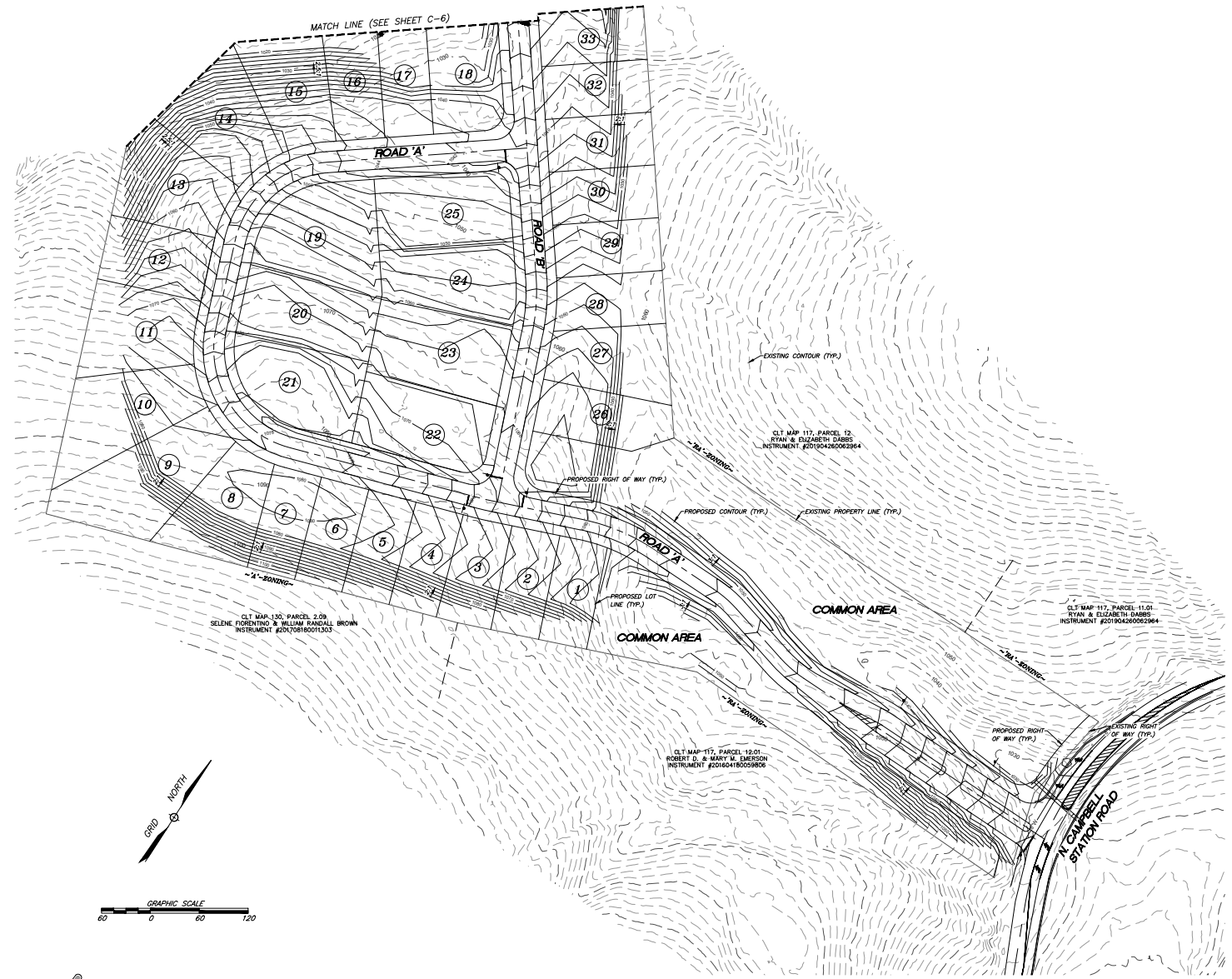
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 DEED INST. #0621040053574
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MPC FILE# 5-SB-21-C / 5-D-21-UR





LOCATION MAP



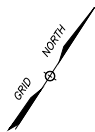
- GRADING PLAN NOTES:**
1. THE LOCATIONS OF ALL UNDERGROUND UTILITIES SHOWN HEREON ARE APPROXIMATE AND ARE BASED ON FIELD LOCATION OF VISIBLE STRUCTURES SUCH AS CATCH BASINS, MANHOLES, WATER VALVES, ETC., AND COMPILED INFORMATION FROM PLANS SUPPLIED BY WATERS UTILITY COMPANIES AND GOVERNMENT AGENCIES. THE CONTRACTORS SHALL NOTIFY IN WRITING ALL UTILITY COMPANIES AND GOVERNMENT AGENCIES AND ALSO CALL TERRY 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. ALL WORK SHALL BE IN ACCORDANCE WITH THE KNOX COUNTY'S SPECIFICATIONS FOR SITE DEVELOPMENT.
 3. THE PROPOSED SITE FEATURES SHOWN ON THIS DRAWING ARE SUBJECT TO FINAL ENGINEERING. THIS DRAWING IS NOT INTENDED FOR CONSTRUCTION.

CLT MAP 130, PARCEL 2.09
SELENE ROBERTINO & WILLIAM RANDALL BROWN
INSTRUMENT #201708180011303

CLT MAP 117, PARCEL 12
RYAN & ELIZABETH DABBS
INSTRUMENT #2016420002984

CLT MAP 117, PARCEL 11.01
RYAN & ELIZABETH DABBS
INSTRUMENT #2016420002984

CLT MAP 117, PARCEL 12.01
ROBERT D. & MARY M. EMERSON
INSTRUMENT #2016410002980



5-SB-21-C / 5-D-21-UR
4/23/2021

SHEET C-5 6 OF 14

PRELIMINARY GRADING PLAN
CATATOGA
SITE ADDRESS: 1737 NORTH CAMPBELL STATION ROAD (37932)
DEVELOPER: **HMH DEVELOPMENTS, INC.**
12125 HARDIN VALLEY ROAD
KNOXVILLE, TN 37932
(865) 414-5347

DIST. NO. W6 KNOX CO., TN
SCALE: 1"=60' MARCH 29, 2021
TAX PARCELS 117-012.03 & 130A002.14

URBAN ENGINEERING, INC.
11852 KINGSTON PIKE
FARRAGUT, TENNESSEE 37922
(865) 966-1924

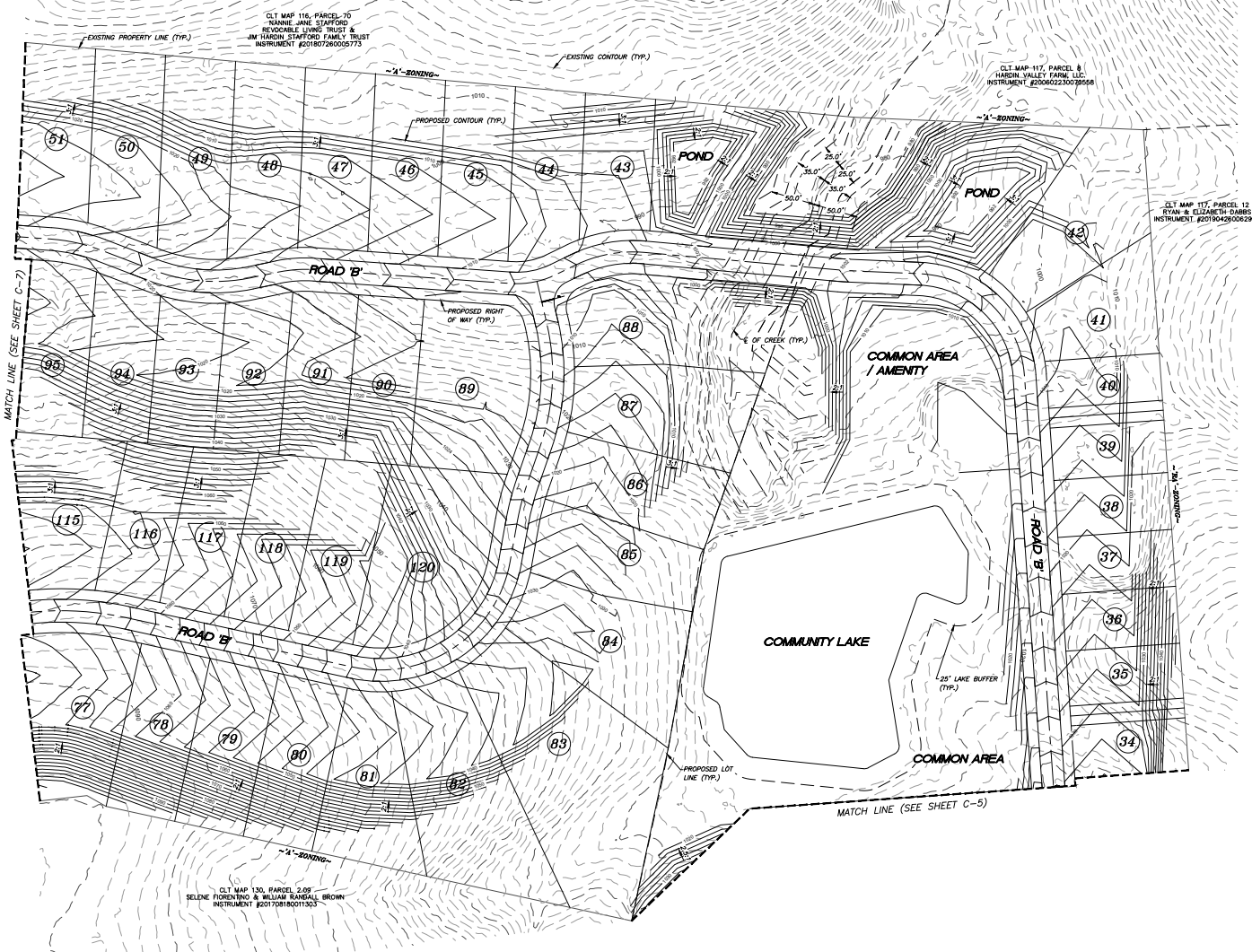
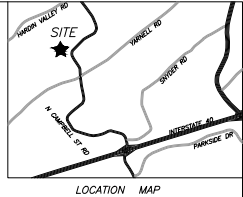
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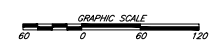
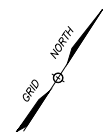
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DEED INST. #201610400283574
PARCEL 130A002.14
DEED INST. #201610400283575

REVISION	DATE	DESCRIPTION	BY
1	4/26/21	GENERAL REVISIONS	CAS



- GRADING PLAN 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 VALVES, ETC., AND COMPILED INFORMATION FROM PLANS SUPPLIED BY WATKINS UTILITY COMPANIES AND GOVERNMENT AGENCIES. THE CONTRACTORS SHALL NOTIFY IN WRITING ALL UTILITY COMPANIES AND GOVERNMENT AGENCIES AND ALSO CALL TERNY 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. ALL WORK SHALL BE IN ACCORDANCE WITH THE KNOX COUNTY'S SPECIFICATIONS FOR SITE DEVELOPMENT.
 3. THE PROPOSED SITE FEATURES SHOWN ON THIS DRAWING ARE SUBJECT TO FINAL ENGINEERING. THIS DRAWING IS NOT INTENDED FOR CONSTRUCTION.

5-SB-21-C / 5-D-21-UR
4/23/2021



SHEET C-6 7 OF 14

PRELIMINARY GRADING PLAN
CATATOGA

SITE ADDRESS: 1737 NORTH CAMPBELL STATION ROAD (379.32)

DEVELOPER: **HMH DEVELOPMENTS, INC.**
12125 HARDIN VALLEY ROAD
KNOXVILLE, TN 37932
(865) 414-5347

DIST. NO. W6 KNOX CO., TN.
SCALE: 1"=60' MARCH 29, 2021
TAX PARCELS 117-012.03 & 130A002.14

URBAN ENGINEERING, INC.
11852 KINGSTON PIKE
FARRAGUT, TENNESSEE 37922
(865) 966-1924

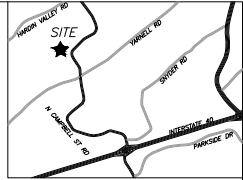
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REVISION	DATE	DESCRIPTION	CAS	BY
1	4/26/21	GENERAL REVISIONS	CAS	

MPC FILE# 5-SB-21-C / 5-D-21-UR

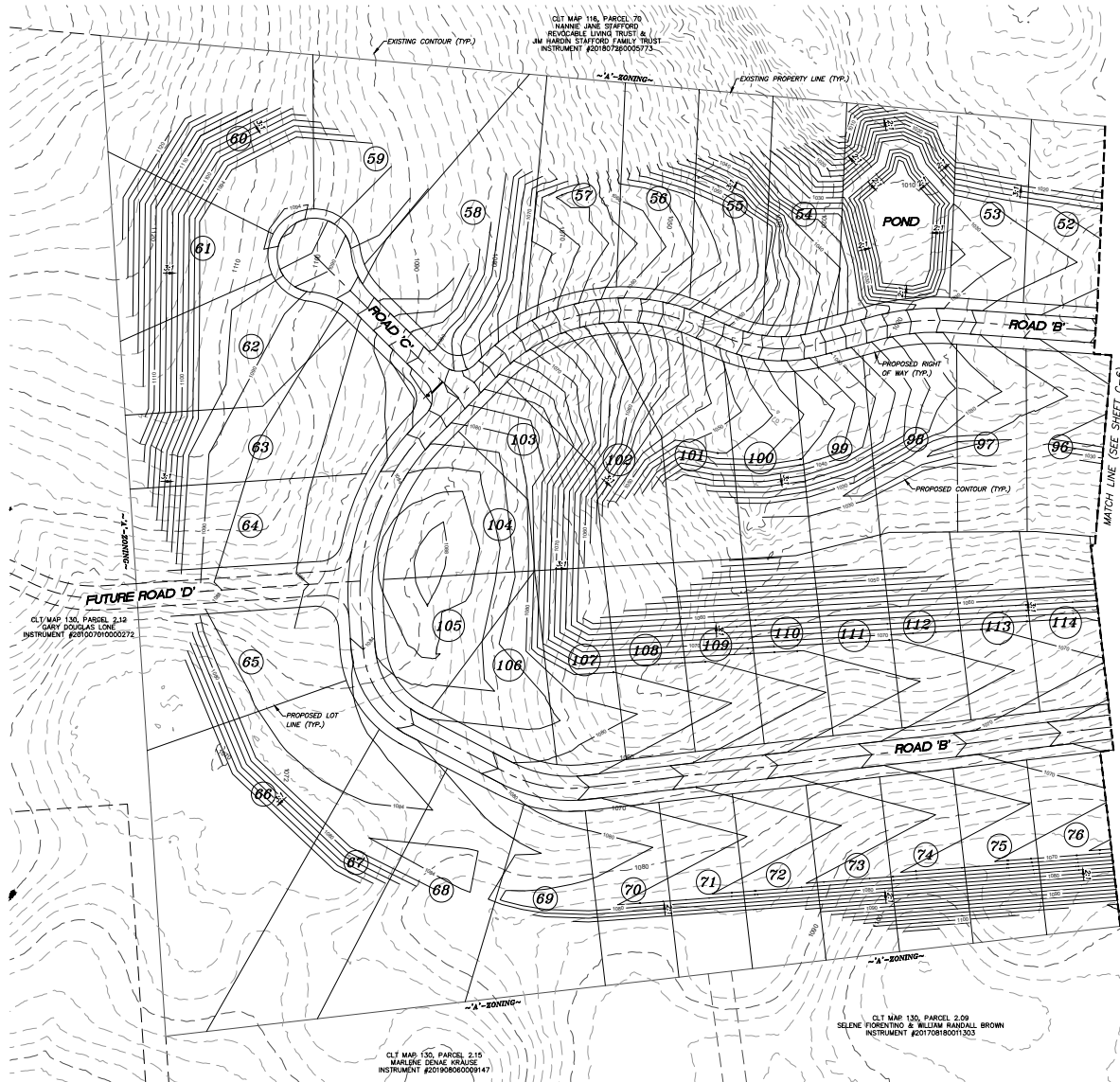
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PARCEL 130A002.14
DEED INST. #20210140053575



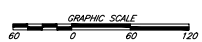
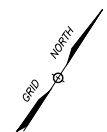


LOCATION MAP

- GRADING PLAN 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 VALVES, ETC., AND COMPILED INFORMATION FROM PLANS SUPPLIED BY WATERS UTILITY COMPANIES AND GOVERNMENT AGENCIES. THE CONTRACTORS SHALL NOTIFY IN WRITING ALL UTILITY COMPANIES AND GOVERNMENT AGENCIES AND ALSO CALL TERN 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. ALL WORK SHALL BE IN ACCORDANCE WITH THE KNOX COUNTY'S SPECIFICATIONS FOR SITE DEVELOPMENT.
 3. THE PROPOSED SITE FEATURES SHOWN ON THIS DRAWING ARE SUBJECT TO FINAL ENGINEERING. THIS DRAWING IS NOT INTENDED FOR CONSTRUCTION.



5-SB-21-C / 5-D-21-UR
4/23/2021



SHEET C-7 8 OF 14

PRELIMINARY GRADING PLAN
CATATOGA
SITE ADDRESS: 1737 NORTH CAMPBELL STATION ROAD (37932)
DEVELOPER: **HMH DEVELOPMENTS, INC.**
12125 HARDIN VALLEY ROAD
KNOXVILLE, TN 37932
(865) 414-5347

DIST. NO. W6 KNOX CO., TN.
SCALE: 1"=60' MARCH 29, 2021
TAX PARCELS 117-012.03 & 130A002.14

URBAN ENGINEERING, INC.
11852 KINGSTON PIKE
FARRAGUT, TENNESSEE 37922
(865) 966-1924

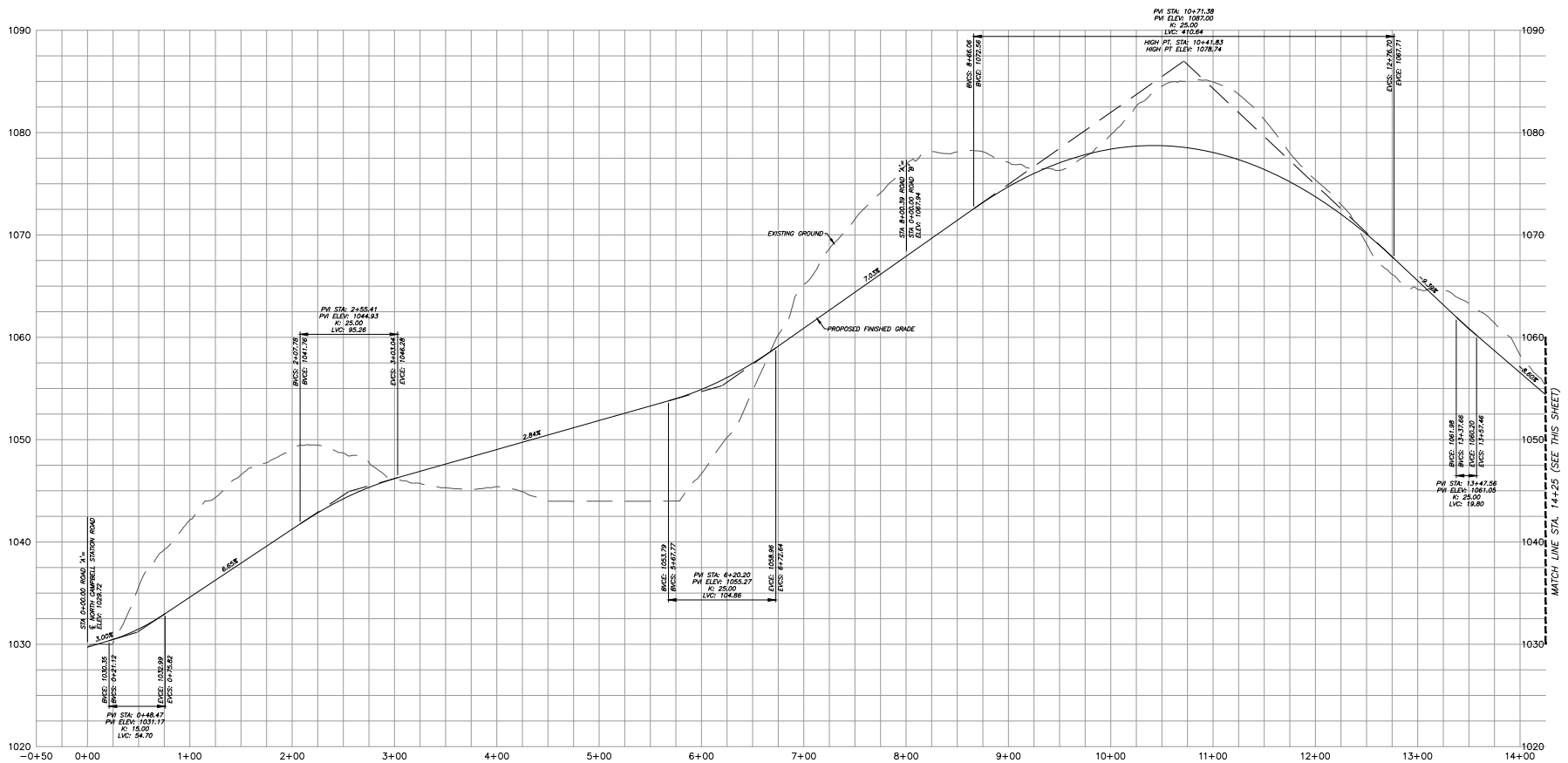
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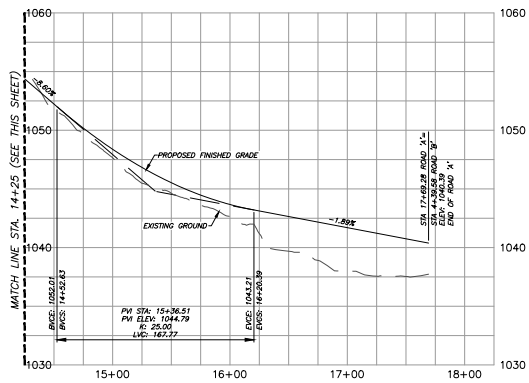
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REFERENCE:
PARCEL 117-012.03
DEED INST. #202101040053574
PARCEL 130A002.14
DEED INST. #202101040053575

REVISION	DATE	DESCRIPTION	CAS	BY
1	4/26/21	GENERAL REVISIONS	CAS	



PROFILE VIEW: ROAD 'A'
 1"=50' (HORIZONTAL)
 1"=5' (VERTICAL)




PROFILE VIEW: ROAD 'A'
 1"=50' (HORIZONTAL)
 1"=5' (VERTICAL)

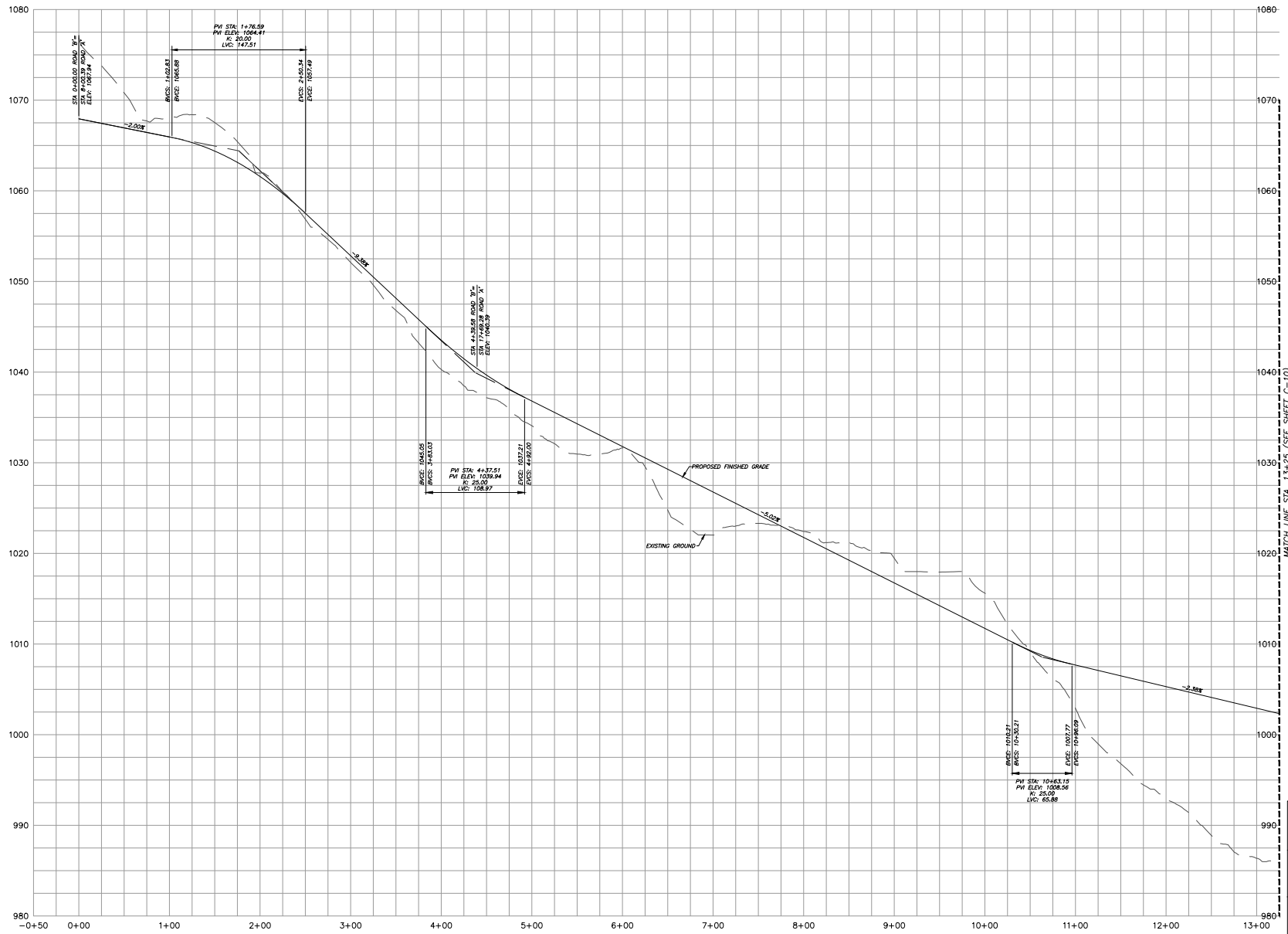
5-SB-21-C / 5-D-21-UR
 4/23/2021

MPC FILE# 5-SB-21-C / 5-D-21-UR

SHEET C-8 9 OF 14

ROAD 'A' PROFILE
CATATOGA
 SITE ADDRESS: 1737 NORTH CAMPBELL STATION ROAD (37932)
 DEVELOPER: HMH DEVELOPMENTS, INC.
 12125 HARDY VALLEY ROAD
 KNOXVILLE, TN 37932
 (865) 414-5347
 DIST. NO. W6 KNOX CO., TN
 SCALE: AS NOTED MARCH 29, 2021
 TAX PARCELS 117-012.03 & 130AA002.14
 URBAN ENGINEERING, INC.
 11852 KINGSTON PIKE
 FARRAGUT, TENNESSEE 37922
 (865) 966-1924
 DWN: CLM CHK: CAS DWG. NO. 2008021

REVISION	DATE	DESCRIPTION	BY
1	4/26/21	GENERAL REVISIONS	CAS



MATCH LINE STA. 13+25 (SEE SHEET C-10)

5-SB-21-C / 5-D-21-UR
4/23/2021

SHEET C-9 10 OF 14

ROAD 'B' PROFILE
CATATOGA
SITE ADDRESS: 1737 NORTH CAMPBELL STATION ROAD (379.32)
DEVELOPER: **HMH DEVELOPMENTS, INC.**
12125 HARDY VALLEY ROAD
KNOXVILLE, TN 37932
(865) 414-5347
DIST. NO. W6 KNOX CO., TN
SCALE: AS NOTED MARCH 29, 2021
TAX PARCELS 117-012.03 & 130AA002.14

PROFILE VIEW: ROAD 'B'
1"=50' (HORIZONTAL)
1"=5' (VERTICAL)

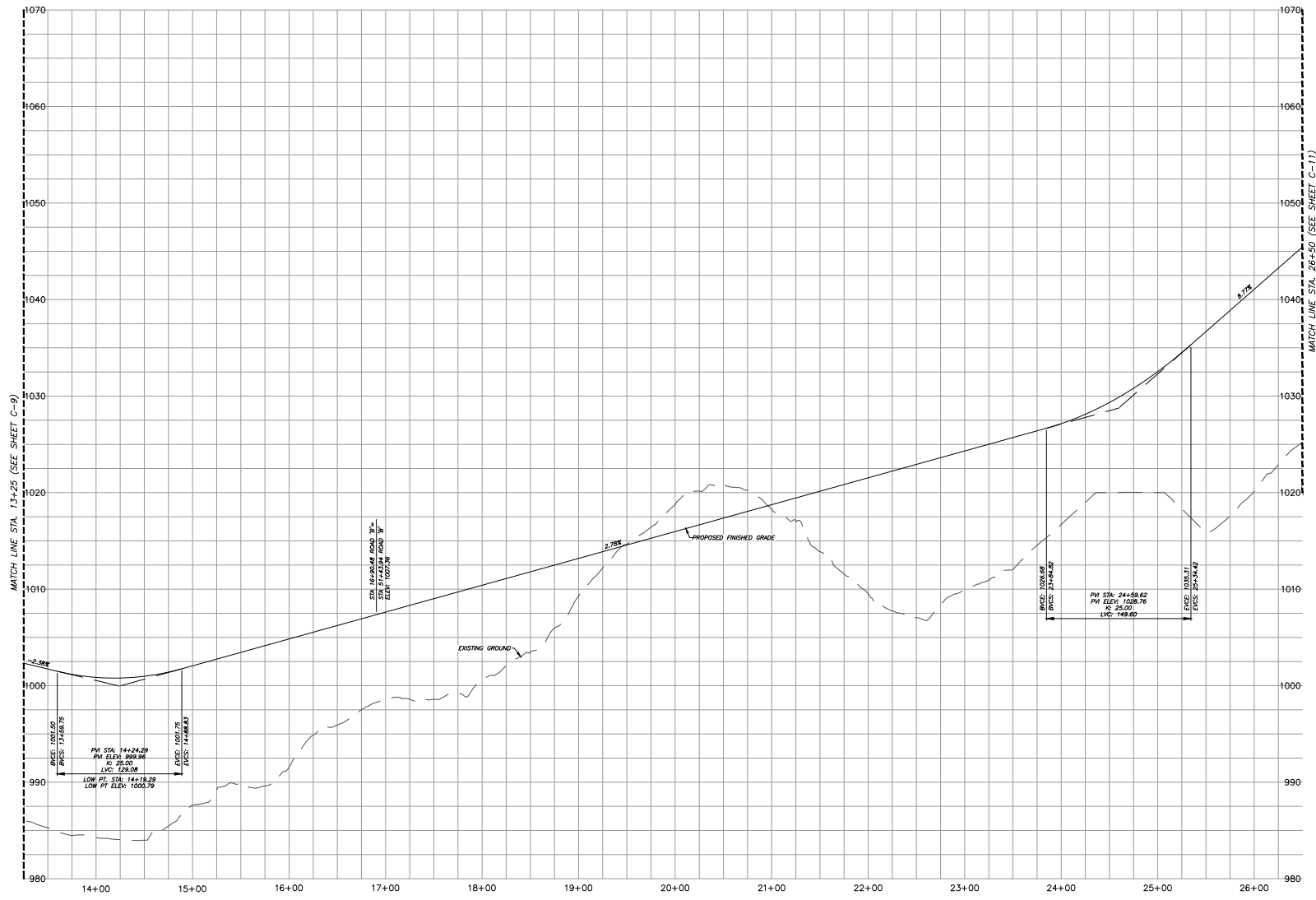
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REVISION	DATE	DESCRIPTION	BY
1	4/26/21	GENERAL REVISIONS	CAS

DWG. NO.	2008021
CHKD.	CAS
DWN.	CLM




URBAN ENGINEERING, INC.
11852 KINGSTON PIKE
FARRAGUT, TENNESSEE 37922
(865) 966-1924



PROFILE VIEW: ROAD 'B'
 1"=50' (HORIZONTAL)
 1"=5' (VERTICAL)

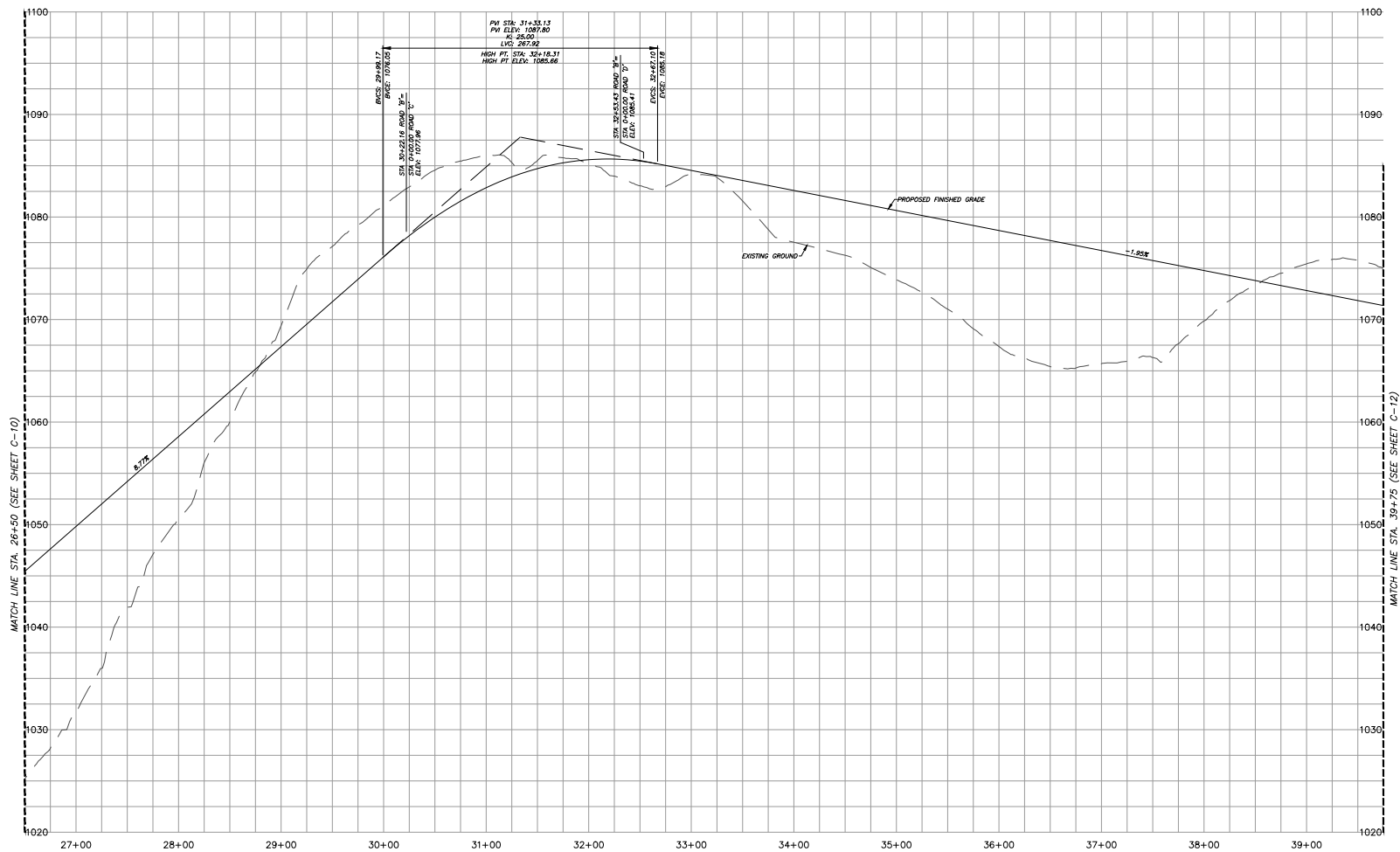
5-SB-21-C / 5-D-21-UR
 4/23/2021

SHEET C-10 11 OF 14

ROAD 'B' PROFILE	
CATATOGA	
SITE ADDRESS: 1737 NORTH CAMPBELL STATION ROAD (379.32)	
DEVELOPER:	HMH DEVELOPMENTS, INC. 12125 HARDY VALLEY ROAD KNOXVILLE, TN 37932 (865) 414-5347
DIST. NO. W6	KNOX CO., TN.
SCALE: AS NOTED	MARCH 29, 2021
TAX PARCELS 117-012.03 & 130A002.14	
 URBAN ENGINEERING, INC. 11852 KINGSTON PIKE FARRAGUT, TENNESSEE 37922 (865) 966-1924	
DWG. NO.	2008021

MPC FILE# 5-SB-21-C / 5-D-21-UR


REVISION	DATE	DESCRIPTION	BY
1	4/26/21	GENERAL REVISIONS	CAS



PROFILE VIEW: ROAD 'B'
 1"=50' (HORIZONTAL)
 1"=5' (VERTICAL)

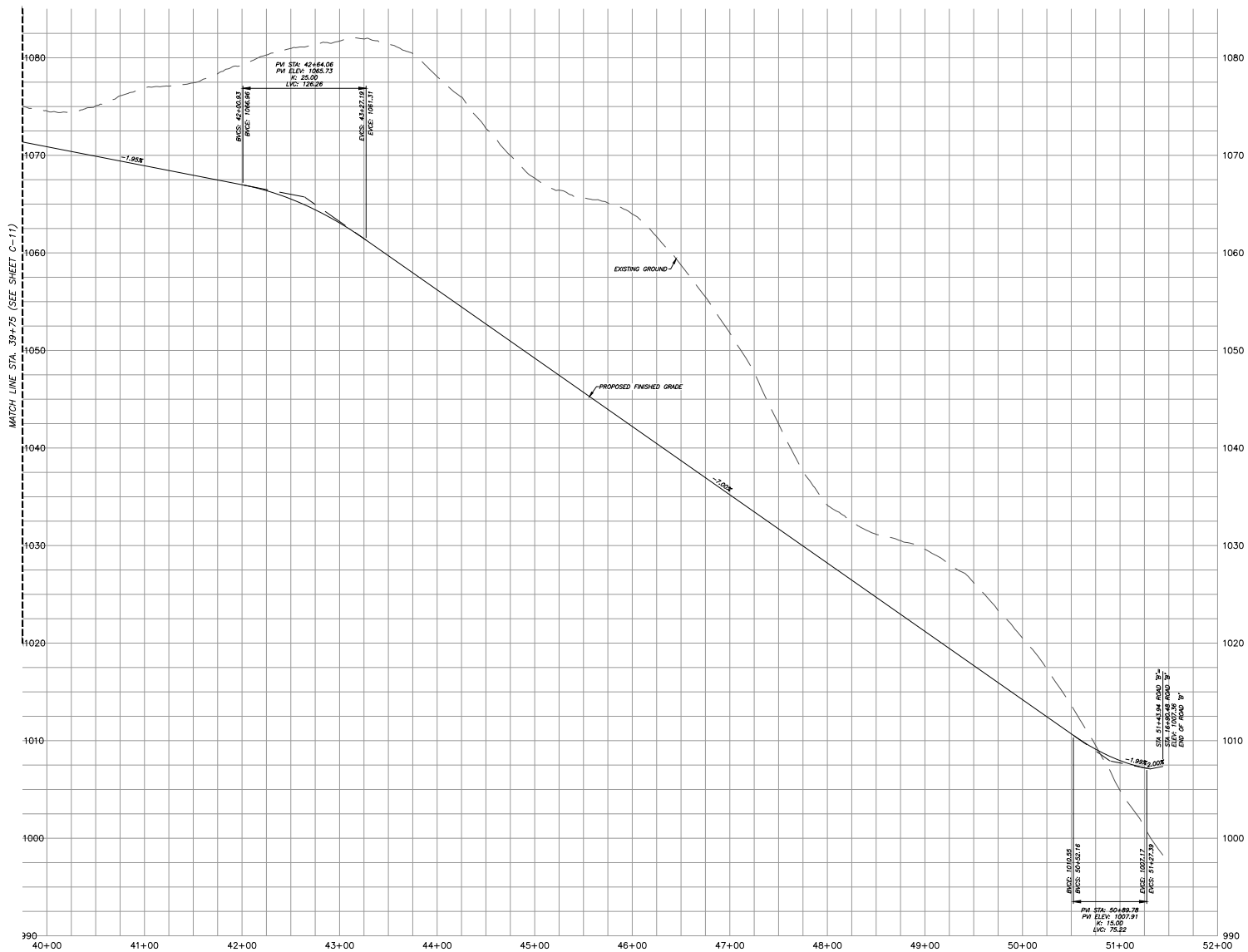
5-SB-21-C / 5-D-21-UR
 4/23/2021

SHEET C-11 12 OF 14

ROAD 'B' PROFILE
CATATOGA
 SITE ADDRESS: 1737 NORTH CAMPBELL STATION ROAD (379.32)
 DEVELOPER: HMM DEVELOPMENTS, INC.
 12125 HARDY VALLEY ROAD
 KNOXVILLE, TN 37932
 (865) 414-5347
 DIST. NO. W6 KNOX CO., TN
 SCALE: AS NOTED MARCH 29, 2021
 TAX PARCELS 117-012.03 & 130A002.14
 URBAN ENGINEERING, INC.
 11852 KINGSTON PIKE
 FARRAGUT, TENNESSEE 37922
 (865) 966-1924
 DWN: CLM CHK: CAS DWG. NO. 2008021

MPC FILE# 5-SB-21-C / 5-D-21-UR

REVISION	DATE	DESCRIPTION	BY
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PROFILE VIEW: ROAD 'B'
 1"=50' (HORIZONTAL)
 1"=5' (VERTICAL)

MPC FILE# 5-SB-21-C / 5-D-21-UR

REVISION	DATE	DESCRIPTION	BY	CHK	DWG. NO.
1	4/26/21	GENERAL REVISIONS	CAS		

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SHEET C-12 13 OF 14

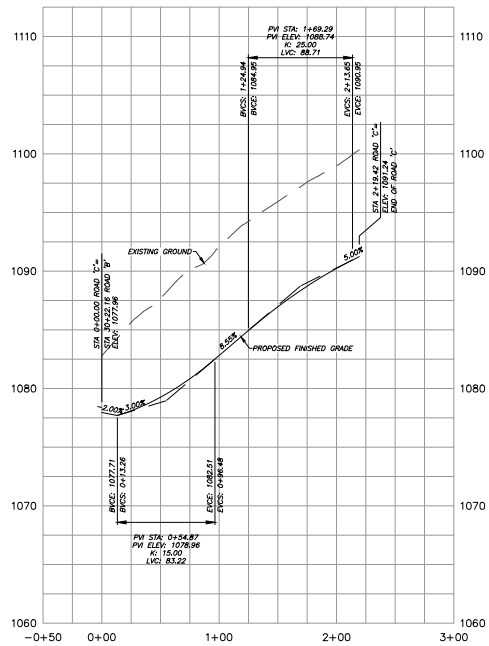
ROAD 'B' PROFILE
CATATOGA
 SITE ADDRESS: 1737 NORTH CAMPBELL STATION ROAD (379.32)

DEVELOPER: **HMH DEVELOPMENTS, INC.**
 12125 HARDY VALLEY ROAD
 KNOXVILLE, TN 37932
 (865) 414-5347

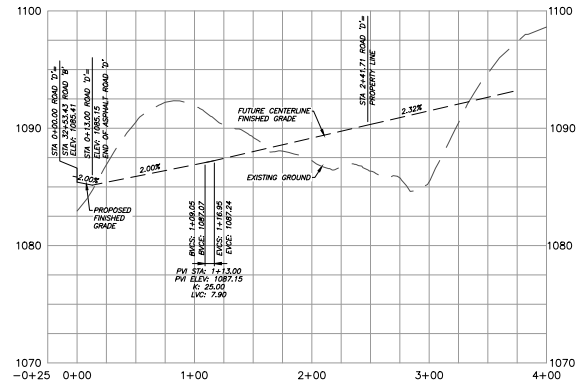
DIST. NO. W6 KNOX CO., TN
 SCALE: AS NOTED MARCH 29, 2021
 TAX PARCELS 117-012.03 & 130AA002.14

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

DWG. NO. 2008021



PROFILE VIEW: ROAD 'C'
 1"=50' (HORIZONTAL)
 1"=5' (VERTICAL)




PROFILE VIEW: ROAD 'D'
 1"=50' (HORIZONTAL)
 1"=5' (VERTICAL)

5-SB-21-C / 5-D-21-UR
 4/23/2021

MPC FILE# 5-SB-21-C / 5-D-21-UR

REVISION	DATE	DESCRIPTION	BY
1	4/26/21	GENERAL REVISIONS	CAS

SHEET C-13 14 OF 14

ROAD 'C' & 'D' PROFILES
CATATOGA
 SITE ADDRESS: 1737 NORTH CAMPBELL STATION ROAD (379.32)
 DEVELOPER: HMM DEVELOPMENTS, INC.
 12125 HARDY VALLEY ROAD
 KNOXVILLE, TN 37932
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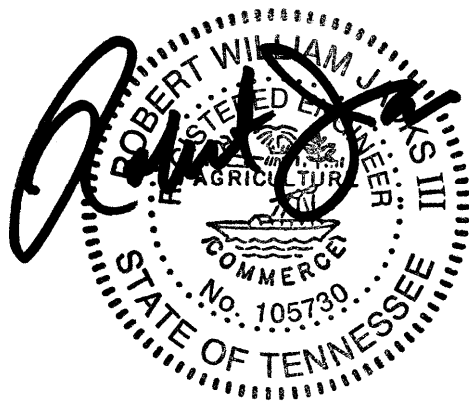


Transportation Impact Study Catatoga Subdivision Knox County, Tennessee



Revised April 2021

HMH Development, Inc.
12125 Hardin Valley Road
Knoxville, TN 37932



4/21/2021

5-SB-21-C
5-D-21-UR
Revised: 4/21/2021

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EXECUTIVE SUMMARY

Preface:

HMH Development, Inc. is proposing a residential development off North Campbell Station Road between Yarnell Road and Hardin Valley Road in West Knox County, TN. This proposed residential development is named “Catatoga Subdivision”. This development will consist of a maximum of 155 single-family detached residential houses on 80± acres. This development is anticipated to be fully built-out and occupied by the year 2026. This study's primary purpose is to determine and evaluate the potential impacts of the development on the adjacent transportation system. The study includes a review of the primary access roads and intersections and is a Level 1 study established by Knoxville/Knox County Planning. Recommendations and mitigation measures will be offered if transportation operations have been projected to be below recognized engineering standards.

Study Results:

The findings of this study include the following:

- At full build-out and occupancy, the Catatoga Subdivision with a maximum of 155 single-family detached residential houses is calculated to generate 1,557 trips on an average weekday. Of these trips, 115 are estimated to occur during the AM peak hour and 155 trips in the PM peak hour in the year 2026.
- The development will have one entrance at North Campbell Station Road and will create a new unsignalized t-intersection. This intersection is projected to operate with minimal delays with adequate vehicular capacity. While outside the scope of this study but included in the manual traffic count, the existing intersection of North Campbell Station Road at Yarnell Road less than a half-mile to the south of the proposed development currently operates with high vehicle delays on the eastbound and westbound approaches on Yarnell Road.

Recommendations:

The following recommendations are offered based on the study analyses. The recommendations are offered to minimize the traffic impacts of the proposed development on the adjacent road system while attempting to achieve an acceptable traffic flow and safety level.

- It is recommended that a southbound right-turn lane be constructed on North Campbell Station Road at the subdivision entrance, Road "A". It is recommended that this right-turn lane be 50 feet in length with an 80-foot taper or the maximum length available within the right-of-way without encroachment to the adjacent north property.
- It is recommended that a northbound left-turn lane be constructed on North Campbell Station Road at the subdivision entrance, Road "A". It is recommended that this left-turn lane have a 50-foot storage length with a minimum 12:1 lane taper.
- It is recommended that a Stop Sign (R1-1) be installed, and a 24" white stop bar be applied to the Road "A" approach pavement at the intersection at North Campbell Station Road. The stop bar should be applied at a minimum of 4 feet away from the edge of North Campbell Station Road and should be placed at the desired stopping point that provides the maximum sight distance.
- Intersection sight distance on Road "A" at North Campbell Station Road must not be impacted by future landscaping or signage. Based on Inrix speed data of 36.8 mph and 37.4 mph in the northbound and southbound directions on North Campbell Station Road, the required intersection sight distance (ISD) is 368 feet to the south and 374 feet to the north at Road "A". Based on a 4% grade on North Campbell Station Road and the Inrix speed data, the stopping sight distance (SSD) is calculated to be 255 feet for northbound and 290 feet for southbound vehicles. The sight distance was verified in October 2020 and was determined to be adequate.
- It is recommended that a 25-mph Speed Limit Sign (R2-1) be posted near the front of Road "A" off North Campbell Station Road. It is also recommended that a "No Outlet" (W14-2aL) sign be posted near the front of Road "A". This sign can be posted below the street name sign.
- Stop Signs (R1-1) and 24" white stop bars should be installed on the new internal streets, as shown in the report.
- Sight distance at the new internal intersections in the development must not be

impacted by new signage or future landscaping. With a speed limit of 25-mph in the development, the intersection sight distance requirement is 250 feet. The stopping sight distance required is 155 feet for a level road grade. The site designer should ensure that sight distance lengths are met.

- All drainage grates and covers for the residential development need to be pedestrian and bicycle safe.
- Sidewalks should have appropriate ADA-compliant curbed ramps at intersection corners, and the sidewalks are recommended to be 5 feet minimum in width. Crosswalks should be marked on the road pavement where pedestrians are expected to cross.
- The United States Postal Service (USPS) has implemented changes to its delivery guidelines in new residential subdivisions. If directed by the local post office, the designer should include an area within the development with a parking area for a centralized mail delivery center.
- Since the proposed layout of the Catatoga Subdivision only includes one means of ingress and egress and will have more than 150 houses, the subdivision entrance is recommended to be designed and constructed with a boulevard roadway section. At a minimum, the boulevard section should have a 10-foot median with 2 – 18-foot lanes within 60 feet of right-of-way. Typically, in Knox County, the boulevard road section is designed and constructed to the first intersecting street within the development. However, after discussion with Knox County Engineering, it was determined that it would be acceptable to keep the proposed boulevard design as shown in Figure 3.
- All road grade and intersection elements internally and externally should be designed to AASHTO, TDOT, and Knox County specifications and guidelines to ensure proper operation.

DESCRIPTION OF EXISTING CONDITIONS

■ STUDY AREA:

The proposed location of this new residential development is shown on a map in Figure 1. The proposed development will be located off North Campbell Station Road between Hardin Valley Road to the north and Yarnell Road to the south in West Knox County, TN. The residential development will comprise several internal paved roads built for a maximum of 155 single-family residential houses on 80± acres. Transportation impacts associated with the proposed development were analyzed at the following existing roadways and intersections, where the most significant impact is expected and as requested by Knoxville/Knox County Planning:

- o North Campbell Station Road at Yarnell Road
- o North Campbell Station Road at Road "A" (Subdivision Entrance)

The proposed development property is in a rural area of West Knox County, TN, that is rapidly becoming more urbanized. There are many single-family residences, unused/woodland properties, and farm properties near this development. The proposed site property is currently undeveloped except for one residential house and a larger building recently but formerly used as a dog and cat kennel boarding business (Catatoga Kennels). The east side of the proposed development site is entirely forested, except for the buildings and a small lake. The western portion of the proposed site is currently used for farm production and has pockets of forest.



The development will be potentially comprised of two properties. The main property is 62.5 acres and will contain 120 house lots. The other property is 17.5 acres and currently has a property agreement option that could provide area for an additional 35 house lots.

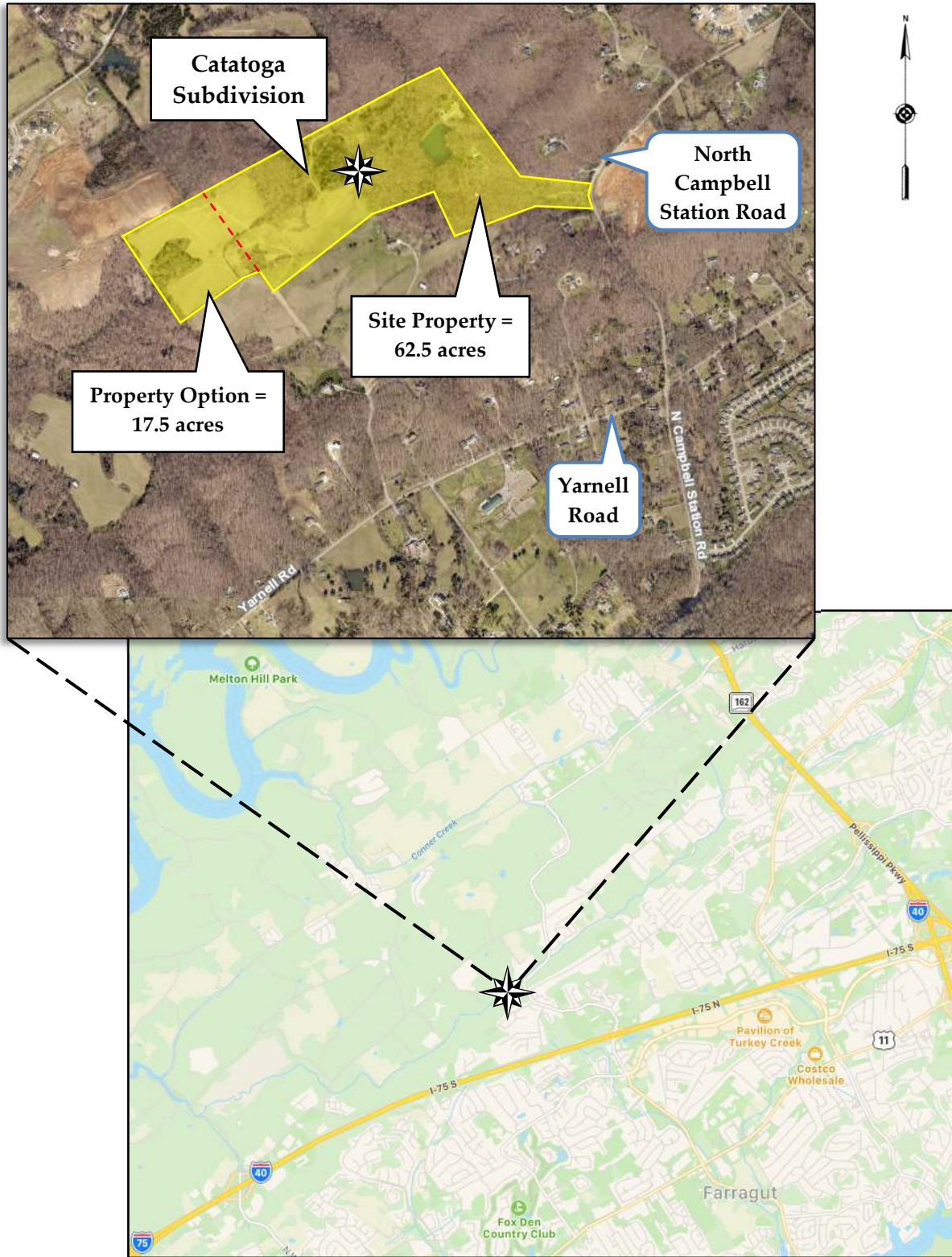


Figure 1
Location Map

■ **EXISTING ROADWAYS:**

Table 1 lists the characteristics of the key existing roadway adjacent to the development property and included in the study:

TABLE 1
STUDY CORRIDOR CHARACTERISTICS

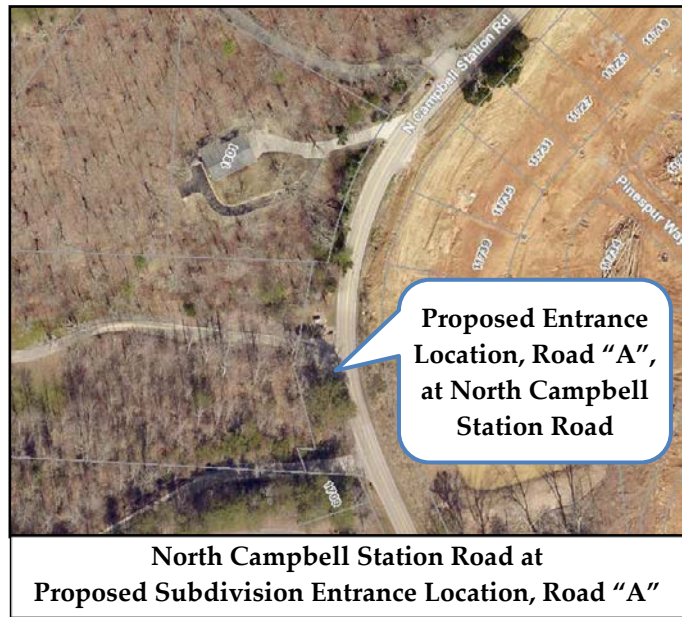
NAME	CLASSIFICATION ¹	SPEED LIMIT	LANES	ROAD WIDTH ²	TRANSIT ³	PEDESTRIAN FACILITIES	BICYCLE FACILITIES
North Campbell Station Road	Minor Arterial	30 mph	2 undivided	21 feet	None	No sidewalks along roadway	No bike lanes

¹ 2018 Major Road Plan by Knoxville/Knox County Planning

² Edge of pavement near project site

³ According to Knoxville Area Transit System Map

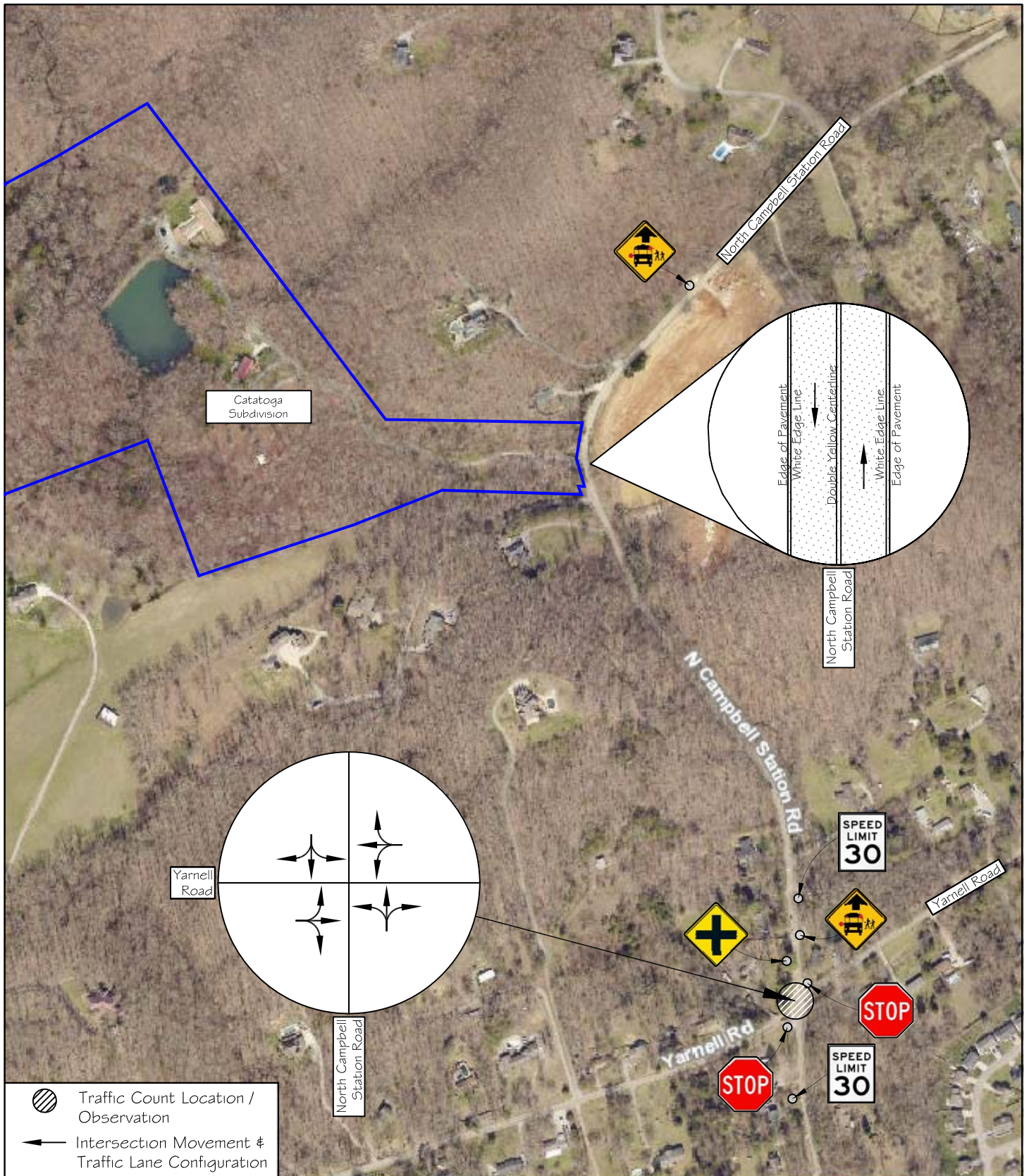
North Campbell Station Road is classified as a Minor Arterial and traverses in a general north-south direction but makes several turns in its length. On its south side, North Campbell Station Road begins at the signalized intersection of Kingston Pike (US 11/US 70/SR 1) in the Town of Farragut, and on its north side, the road terminates at a t-intersection with Hardin Valley Road for a total length of 4.8 miles. North Campbell Station Road provides access to Interstate 40/75 at Exit 373. This Interstate access is 2.3 miles to the south of the proposed Catatoga Subdivision entrance on North Campbell Station Road.



At the location of the subdivision's proposed entrance, Road "A", North Campbell Station Road currently consists of a 2-lane pavement section with faded white edge lines and a double yellow centerline. Pavement widths along North Campbell Road are assumed to be variable. Within several hundred feet of the subdivision's proposed access point, the pavement was measured to slightly fluctuate between 21 feet in width to just over 22 feet. Roadway lighting is not present in the adjacent area along North Campbell Station Road.

North Campbell Station Road makes an approximately 75° horizontal turn at a substantial road curve at the subdivision's proposed access point. The subdivision's proposed access point will intersect North Campbell Station Road near where the existing driveway is located for Catatoga Kennels and near the center of this existing horizontal curve.

Figure 2 shows the lane configurations of the roadways and intersections examined in the study, the study traffic count location, and traffic signage in the near vicinity. The traffic signage shown only includes warning and regulatory signage. The pages following Figure 2 give an overview of the site study area with photographs.




 11812 Black Road
 Knoxville, TN 37932
 Phone: (865) 556-0042
 Email: ajaxengineering@gmail.com

NOT TO SCALE


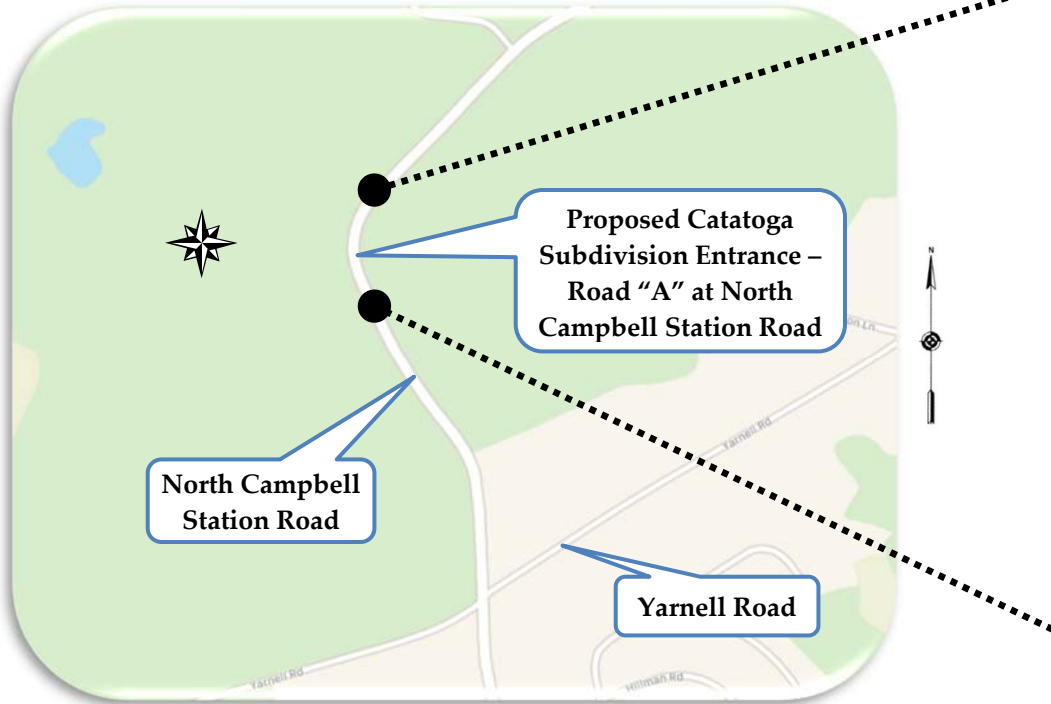

NORTH

FIGURE 2
 Catatoga Subdivision
 Traffic Count Location, Traffic Signage &
 Existing Lane Configurations

PHOTO EXHIBITS

6



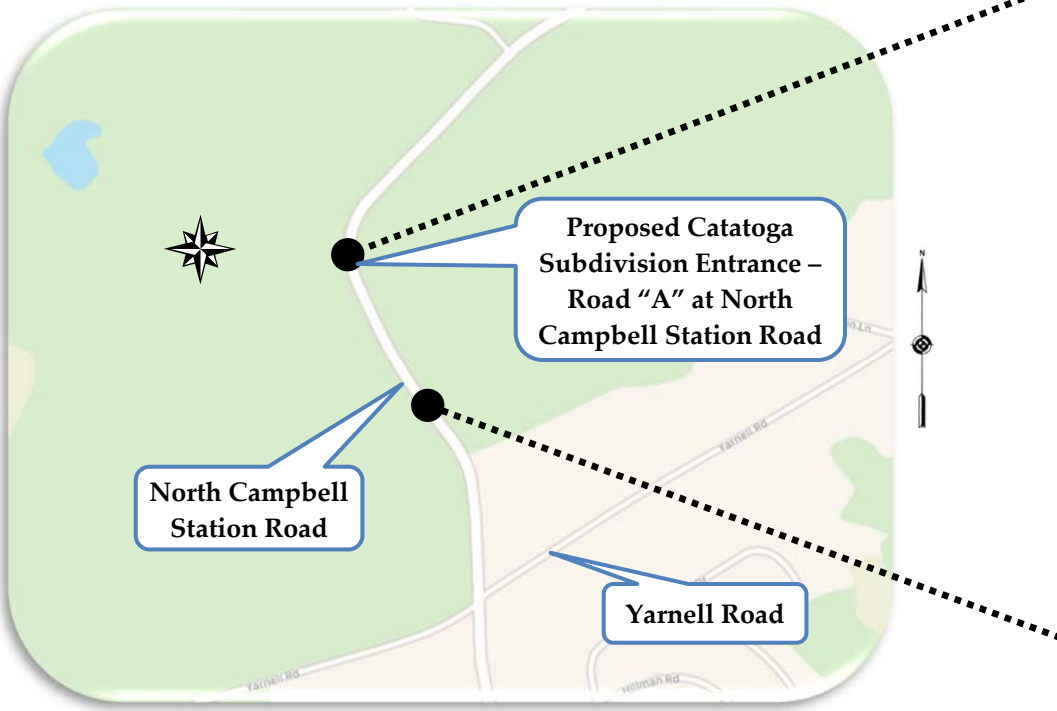
North Campbell Station Road



View of North Campbell Station Road at Proposed Catatoga Entrance, Road "A" (Looking South)

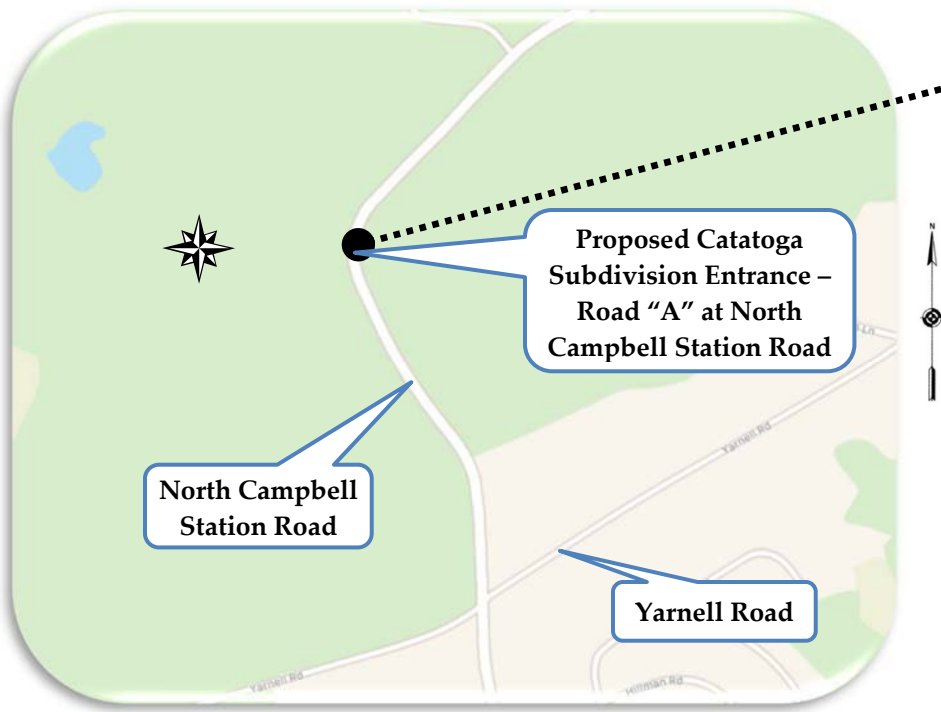


View of North Campbell Station Road at Proposed Catatoga Entrance, Road "A" (Looking North)



North Campbell Station Road





North Campbell Station Road

Proposed Catatoga Subdivision Entrance - Road "A" at North Campbell Station Road

Yarnell Road

North Campbell Station Road



View of Project Site off North Campbell Station Road at Existing Catatoga Kennels Property Driveway (Looking West)

■ **EXISTING TRANSPORTATION VOLUMES PER MODE:**

There is one yearly vehicular traffic count location near the project site and one semi-yearly location. The yearly count is conducted by the Tennessee Department of Transportation (TDOT), and the Knoxville Transportation Planning Organization (TPO) conducts the other. The traffic count location data is the following:

- Existing vehicular roadway traffic:
 - TDOT reported an Average Annual Daily Traffic (AADT) on North Campbell Station Road, south of the project site and south of Yarnell Road, at 5,593 vehicles per day in 2018. From 2008 – 2018, this count station has indicated a 3.8% average annual growth rate.
 - The Knoxville TPO reported an Average Daily Traffic (ADT) on North Campbell Station Road, south of Hardin Valley Road and north of the project site, at 5,700 vehicles per day in 2019. This count location has had sporadic counts conducted. From 2010 – 2019, this count station has indicated a 6.3% average annual growth rate.

All the researched historical traffic count data for this report can be viewed in Appendix A.

- Existing bicycle and pedestrian volumes:

The average daily pedestrian and bicycle traffic along and around the study corridor is not known. No pedestrians or bicyclists were observed during the manual traffic counts. Due to the topography, lack of shoulders, road widths, and road traffic volumes, it is not expected that pedestrians or bicyclists occur in the study area on any regular basis.

■ **ON-STREET PARKING:**

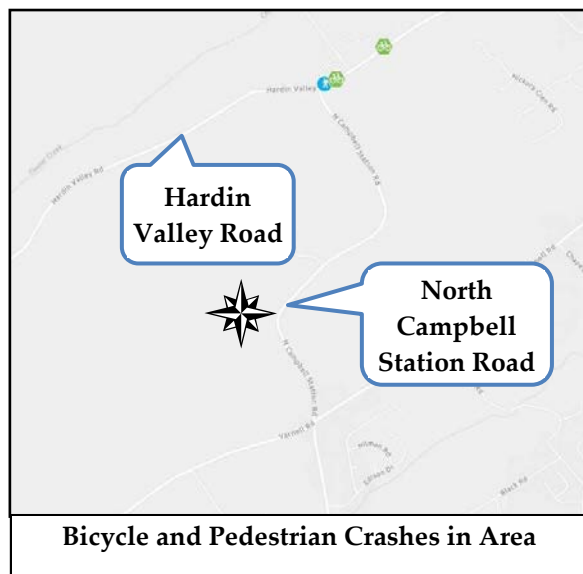
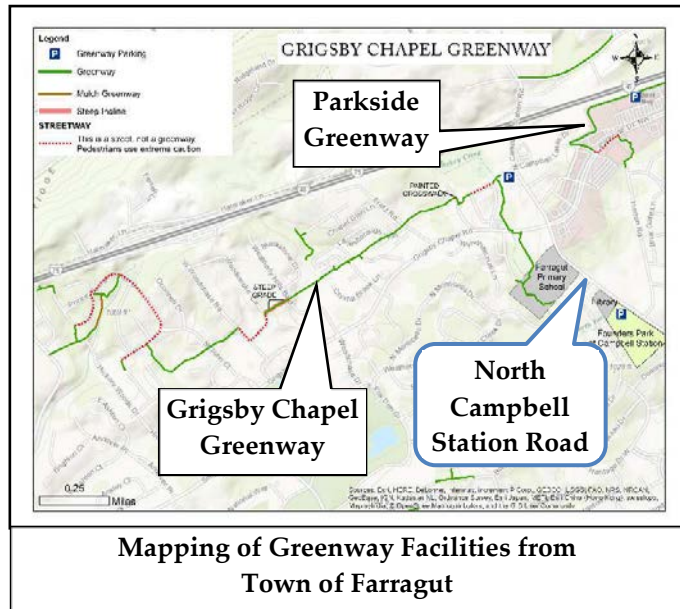
Currently, on-street parking is not allowed on North Campbell Station Road adjacent to the project site.

■ **PEDESTRIAN AND BICYCLE FACILITIES:**

Bicycle lanes are not currently available within the project site study area except for further south near the Interstate System. The Parkside Greenway and the Grigsby Chapel Greenway are located to the south, approximately 2.5 miles (by roadway) to the south of the proposed residential development.

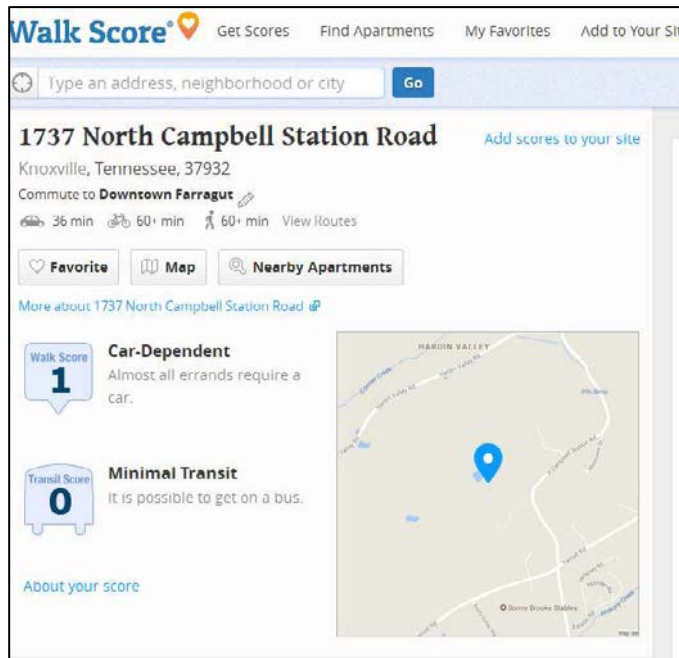
The Parkside Greenway is an asphalt trail that is 2 miles in length. It runs parallel to Interstate 40/75 from Lovell Road to near North Campbell Station Road. Grigsby

Chapel Greenway is an asphalt trail that is 2.4 miles in length. It also runs roughly parallel to Interstate 40/75 and has a short section to the south towards Farragut Primary School.



The Knoxville Regional Transportation Planning Organization (TPO) provided a 2020 update to bicycle and pedestrian crash data for Knox County and a few other surrounding counties. According to the data, three of these incidents occurred within the vicinity of the study area. All of them occurred on Hardin Valley Road near North Campbell Station Road. Two bicycle crashes with no injuries occurred in 2014 due to vehicle drivers' failing to yield. One pedestrian crash occurred in 2018 and resulted in an injury. Not enough information was provided to determine the cause of this crash.

■ **WALK SCORE:**



A private company offers an online website at walkscore.com that grades and gives scores to locations within the United States based on “walkability”, “bikeability”, and transit availability. According to the website, the numerical values assigned for the Walk Score and the Bike Score are based on the distance to the closest amenity in various relevant categories (businesses, schools, parks, etc.) and are graded from 0 to 100. The Transit Score measures how well a location is served by public transit based on distance and type of nearby transit. The Transit Score is also graded from 0 to 100.

Appendix B shows maps and other information for the Walk Score, Bike Score, and Transit Score at the approximate property site address (1737 North Campbell Station Road). The project location is graded with a Walk Score of 1. This Walk Score indicates that the site is entirely dependent on vehicles for errands and travel. The site is not given a bicycle score and a transit score of 0 due to the lack of transit opportunities.

■ **TRANSIT SERVICES:**

The City of Knoxville has a network of public transit opportunities offered by Knoxville Area Transit (KAT). Bus service is not available in this area of Knox County. The overall KAT bus system map is in Appendix C. The closest public transit bus service is 6.8 miles away to the southeast (by roadway) on Sherrill Boulevard at Park West Hospital. This KAT service is Route 16, “Cedar Bluff Connector”. It operates on weekdays and weekends, and this route map is also included in Appendix C. Other transit services include the East Tennessee Human Resource Agency (ETHRA) and the Community Action Committee (CAC), which provides transportation services when requested. Private taxis and ride-sharing opportunities are also available in the study area.

PROJECT DESCRIPTION

■ LOCATION AND SITE PLAN:

The proposed plan layout given by Urban Engineering, Inc. is shown in Figure 3. As shown in the figure, three new streets will be constructed for the subdivision. The total length of the three new streets in the subdivision will be 7,133 feet (1.35 miles). A fourth street, Road “D”, is shown on the plan as a stub-out, and this road would be fully constructed if the 17.5-acre property to the west is purchased and developed. The subdivision entrance, Road “A”, will intersect North Campbell Station Road at a new t-intersection. This entrance will be approximately 0.4 miles to the northwest of the existing North Campbell Station Road at Yarnell Road intersection.

The current plan shown in Figure 3 shows 120 single-family detached house lots on 60.5 acres. The developer has a property option for the 17.5-acre parcel adjacent and to the west. This property would provide enough space to provide up to an additional 35 single-family detached house lots if this property is purchased.

In addition to home sites, the subdivision will contain common areas that will also incorporate stormwater control facilities. It will also include an existing 1.5-acre lake and provide a lakeside clubhouse for subdivision residents.

The single-family residential detached lots will average between 9,500 -20,000 square feet (~ 0.22 acre - 0.46 acre) in size, with a few lots up to nearly an acre. Each home will have a garage and driveway. Concrete sidewalks are proposed for this development. A portion of the sidewalks will be along Road “B”, and the other portion will be to the rear of lots that back up to each other.



The schedule for completion of this new residential development is dependent on economic factors and construction timelines. This project is also contingent on permitting, design, and other issues. However, for this study, it was assumed that the total construction build-out of the development and full occupancy would occur within the next five years (2026).

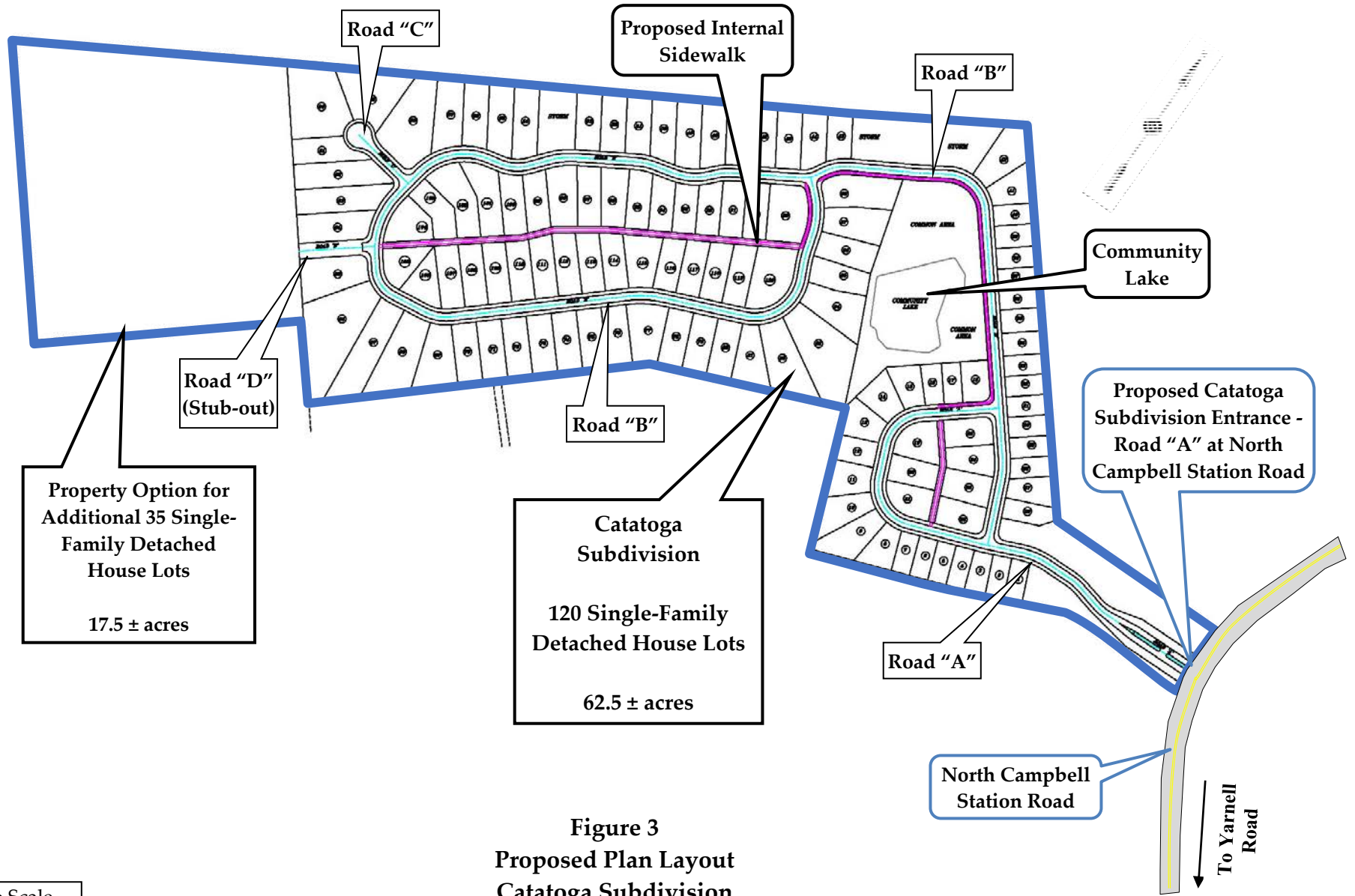


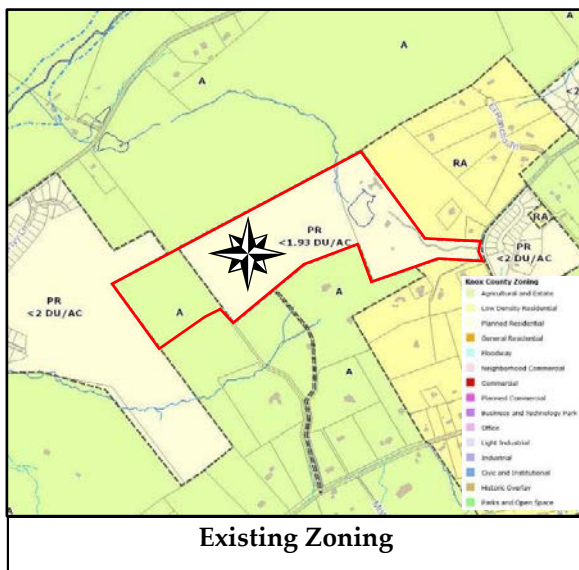
Figure 3
Proposed Plan Layout
Catatoga Subdivision

Not to Scale

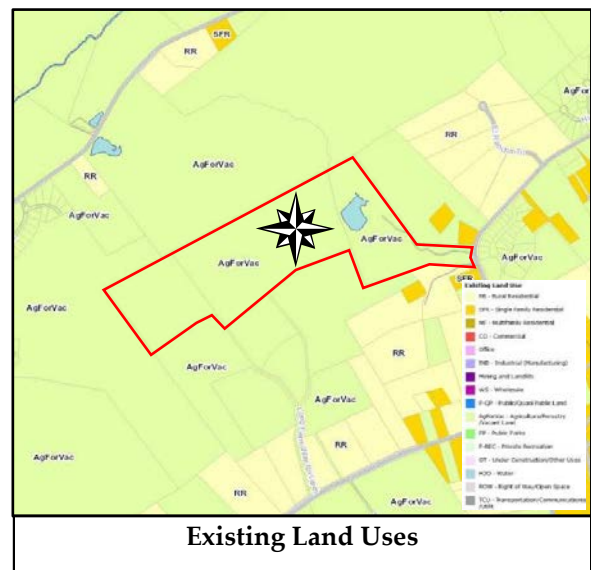
■ **PROPOSED USES AND ZONING REQUIREMENTS:**

The main development property of 62.5 acres comprises two parcels, and both are zoned as Planned Residential (PR) with a density of less than 1.93 dwelling units per acre. The adjacent property 17.5-acre parcel to the west that could be purchased is zoned as Agricultural (A). The 17.5-acre parcel will be requested to be re-zoned to Planned Residential (PR) if purchased for this development. The most recent published zoning map is provided in Appendix D. The Planned Residential (PR) zone allows for various land uses primarily within the residential realm. Uses permitted in this zone include single-family dwellings, duplexes, and multi-dwelling structures and developments. The existing adjacent surrounding land uses are the following:

- The properties to the northwest are zoned as Planned Residential (PR) and exist in the recently constructed Vining Mill Subdivision. Directly to the north, one large property is zoned Agricultural (A) and is entirely undeveloped with farm area and forest.
- To the northeast and southeast, all the properties are zoned as Single-Family Residential (RA). These properties consist of standalone single-family residences within a large amount of forested area.
- To the south, three properties are zoned as Agricultural (A) and consist of standalone single-family homes, undeveloped properties, and forest.



Existing Zoning



Existing Land Uses

■ **DEVELOPMENT DENSITY:**

The Catatoga Subdivision's proposed density is based on a maximum of 155 houses on 80 acres. The density computes to 1.93 dwelling units per acre, equal to the maximum allowed for the property's Planned Residential (PR) designation.

■ **ON-SITE CIRCULATION:**

The total length of the three new streets within the development will be 7,133 feet (1.35 miles) in length and will be designed and constructed to Knox County, TN specifications. The new streets shown in Figure 3 are labeled Road "A" thru Road "D". Road "D" will be a stub-out for a potential connection to the 17.5-acre parcel to the west. All of the development internal roadways will be asphalt paved and include 8" extruded concrete curbs. The lane widths internally will be 13 feet each for a total 26-foot pavement width. The street right-of-way within the development will be 50 feet. Concrete sidewalks are being proposed along Road "B" and internally between the rear lots in some areas. Knox County will maintain the streets in the subdivision after construction, and these will be dedicated public roads.

■ **SERVICE AND DELIVERY VEHICLE ACCESS AND CIRCULATION:**

Besides residential passenger vehicles, the new streets will also provide access for service, delivery, maintenance, and fire protection/rescue vehicles. None of these other types of vehicles will impact roadway operations other than when they occasionally enter and exit the development. It is expected that curbside garbage collection services will be available for this residential subdivision. The new roads will be designed and constructed to Knox County specifications and expected to be adequate for fire protection and rescue vehicles. The subdivision's internal roadways are anticipated to accommodate the larger vehicle types and standard passenger vehicles.

TRAFFIC ANALYSIS OF EXISTING AND PROJECTED CONDITIONS

■ EXISTING TRAFFIC CONDITIONS:

Over the past year, the Covid-19 pandemic has not only closed schools and eliminated school-related traffic, but overall general traffic has been affected due to stay-at-home orders, work layoffs, job furloughs, and general anxiety with travel outside the home. More recently, while overall travel has noticeably increased and returned closer to pre-pandemic levels in the area, there is still a potential reduction in overall travel. This reduction can be attributed to some school-age children and families choosing to learn virtually online and due to professions and jobs that have transitioned to at-home work for the time being. Knox County Planning recently compiled traffic count data in Fall 2020 and determined that overall traffic volumes are still reduced compared to Fall 2019 before the pandemic. A few of the Fall 2020 traffic counts compiled by Knox County Planning showed slight increases, but most count locations in the County have shown decreases ranging from 5% up to 30%.

For this study, an 8-hour traffic count was conducted at the existing unsignalized intersection of North Campbell Station Road at Yarnell Road as requested by Knox County Engineering. Knox County Engineering specifically requested this traffic count location and length since they are in the process of potentially improving this intersection outside and not related to the impacts of this development.

Manual traffic counts were obtained on Tuesday, March 9th, 2021, for a total of eight hours. The counts were conducted to tabulate the morning and afternoon peak periods. Local county public schools were in session when the traffic counts were conducted. Based on the traffic volumes counted, the AM and PM peak hours of traffic were observed at 7:15 – 8:15 AM and 3:15 - 4:15 PM at the intersection.

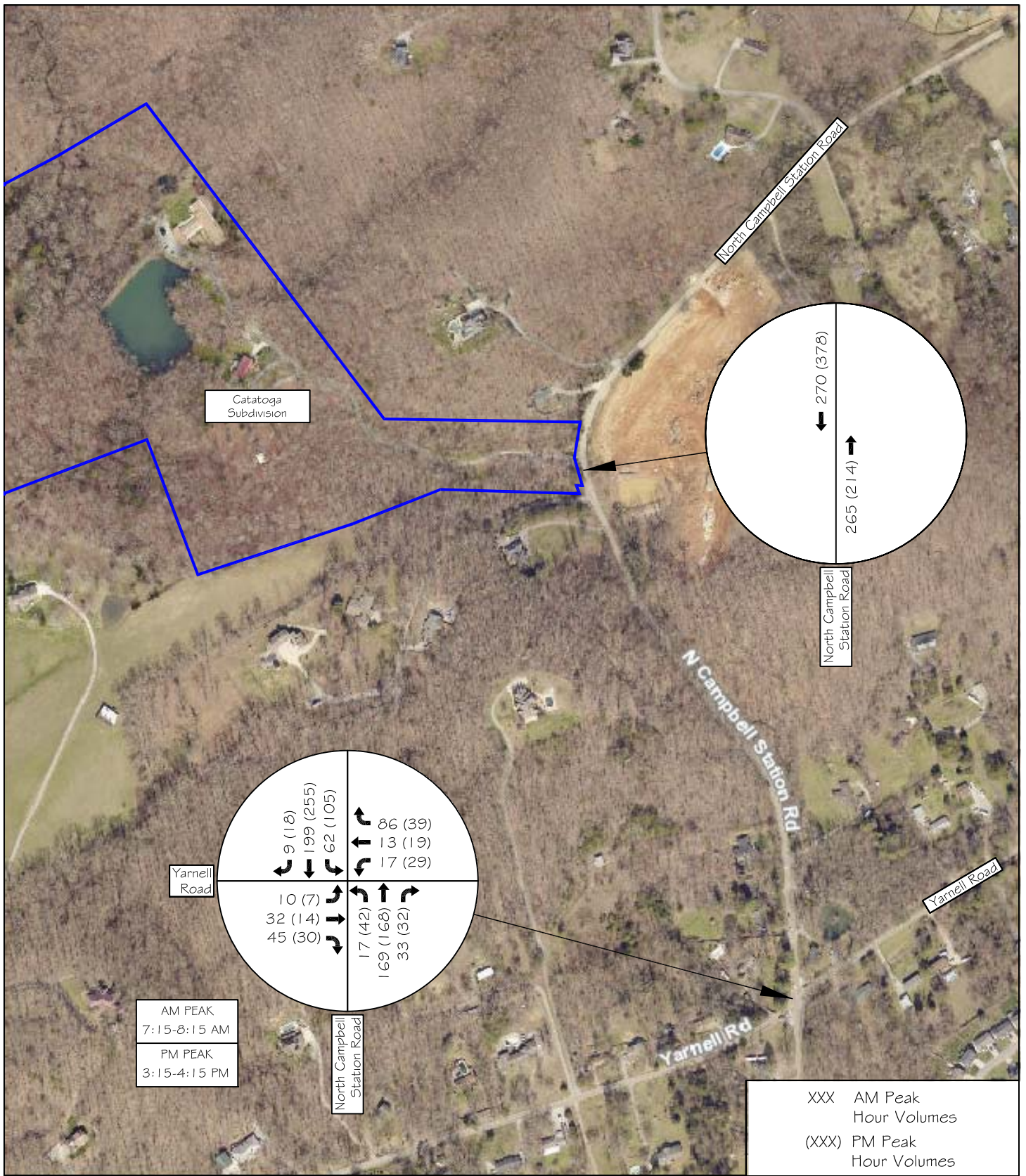
The afternoon peak hour of traffic at the intersection is noticeably earlier than most typical locations. This earlier peak hour is suspected due to Hardin Valley school's relative proximity and earlier dismissals compared to later traditional work-related peak flows. The manual tabulated traffic counts can be reviewed in Appendix E, and some observations are listed below.

Many Knox County school buses were observed during the traffic counts. However, most of the

traffic observed during the traffic counts were typical passenger vehicles with some large trucks and heavy vehicles. Large trucks and heavy vehicles were primarily observed in the eastbound and westbound approaches on Yarnell Road. No bicyclists or pedestrians were observed during the traffic counts.

As discussed earlier, Knox County Planning has determined that traffic volumes in the area are still potentially reduced due to the ongoing pandemic. At the direction of Knox County Planning, to account for potentially reduced traffic volumes due to the pandemic, this study has increased the tabulated traffic volumes by a factor of 20%. This percentage is an average value based on the local area sampling of traffic volumes comparing Fall 2019 traffic volumes with the recently obtained Fall 2020 traffic volumes.

Figure 4a shows the volumes from the existing traffic counts during the AM and PM peak hours observed at the intersection of North Campbell Station Road at Yarnell Road. Figure 4b shows the volumes from the existing traffic counts during the AM and PM peak hours observed at the intersection increased with the 20% factor. The traffic volumes shown on North Campbell Station Road at the subdivision entrance's proposed location are synthesized from the northbound and southbound volumes at the intersection of North Campbell Station Road at Yarnell Road. For this study, it is assumed that the trips generated from a few single-family homes to the north of Yarnell Road on North Campbell Station Road do not appreciably alter the traffic volumes between the two locations.



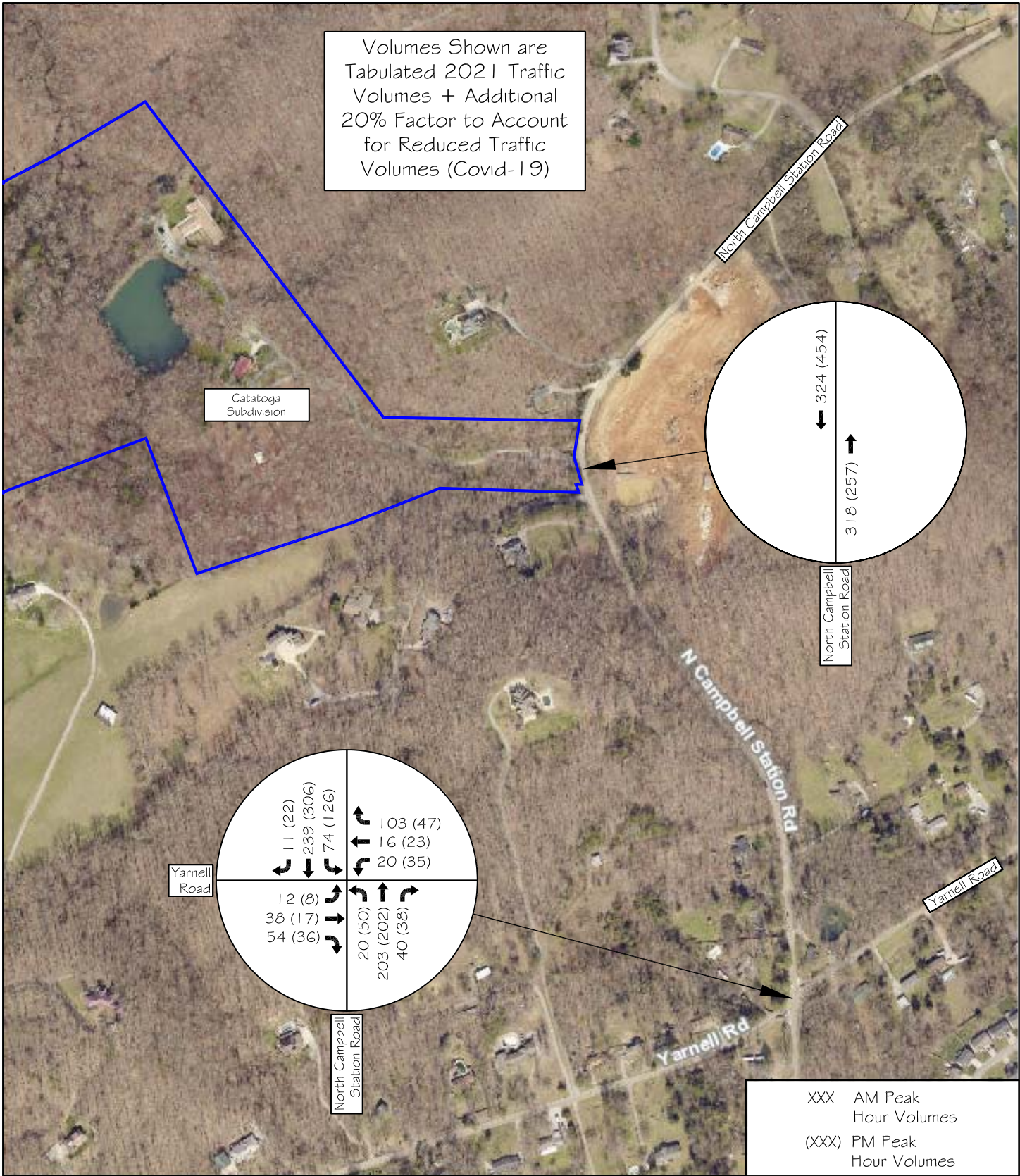
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NORTH

FIGURE 4a
 Catatoga Subdivision
 2021 Peak Hour Traffic Volumes - EXISTING TRAFFIC CONDITIONS

Volumes Shown are Tabulated 2021 Traffic Volumes + Additional 20% Factor to Account for Reduced Traffic Volumes (Covid-19)



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FIGURE 4b

Catatoga Subdivision

2021 Peak Hour Traffic Volumes with 20% Factor Increase - EXISTING TRAFFIC CONDITIONS

Capacity analyses were undertaken to determine the Level of Service (LOS) for the unsignalized intersection of North Campbell Station Road at Yarnell Road for both the existing year 2021 traffic volumes shown in Figure 4a and Figure 4b with a 20% factor increase. The capacity analyses were calculated by following the Highway Capacity Manual (HCM) methods and Synchro Traffic Software (Version 8).

Methodology:

LOS is a qualitative measurement developed by the transportation profession to express how well an intersection or roadway performs based on a driver's perception. LOS designations include LOS A through LOS F. The designation of LOS A signifies a roadway or intersection operating at best, while LOS F signifies road operations at worst. This grading system provides a reliable, straightforward means to communicate road operations to the public. The HCM lists level of service criteria for unsignalized intersections and signalized intersections.



LOS is defined by delay per vehicle (seconds), and roadway facilities are also characterized by the volume-to-capacity ratio (v/c). For example, a delay of 20 seconds at an unsignalized intersection would indicate LOS C. This delay represents the additional delay a motorist would experience traveling through the intersection. Also, for example, a v/c ratio of 0.75 for an approach at an unsignalized intersection would indicate that it is operating at 75% of its available capacity. LOS designations, which are based on delay, are reported differently for unsignalized and signalized intersections. This difference is primarily due to motorists having different expectations between the two road facilities. Generally, for most instances, the LOS D / LOS E boundary is considered the upper limit of acceptable delay during peak periods in urban and suburban areas.

For unsignalized intersections, LOS is measured in terms of delay (in seconds). This measure is an attempt to quantify delay that includes travel time, driver discomfort, and fuel consumption. For unsignalized intersections, the analysis assumes that the mainline

thru and right-turn traffic does not stop and is not affected by the traffic on the minor side streets. Thus, the LOS for a two-way stop (or yield) controlled intersection is defined by the delay for each minor approach and major street left-turn movements. Table 2 lists the level of service criteria for unsignalized intersections. The analysis results of unsignalized intersections using the HCM methodologies are conservative due to the more significant vehicle gap parameters used in the method. More often, in normal road conditions, drivers are more willing to accept smaller gaps in traffic than what is modeled using the HCM methodology. The unsignalized intersection methodology also does not account for more significant gaps sometimes produced by nearby upstream and downstream signalized intersections. For unsignalized intersections, in most instances, the upper limit of acceptable delay during peak hours is the LOS D/E boundary at 35 seconds.

Capacity calculations at the intersection from the existing peak hour traffic are shown in Tables 3a and 3b. Table 3a shows the results based on the existing tabulated traffic counts. Table 3b shows the results based on the existing tabulated traffic counts with a 20% factor increase. The intersection in the tables is shown with a LOS designation, delay (in seconds), and v/c ratio (volume/capacity) for the AM and PM peak hours. Appendix F includes the worksheets from the capacity analyses for the existing peak hour vehicular traffic.

The intersection of North Campbell Station Road at Yarnell Road was calculated only for the existing conditions. It was not calculated for the future conditions since they are not required for this Level 1 study. The calculations and results provided for this intersection in the existing conditions are offered in this study as a courtesy.

As shown in the tables, the northbound and southbound approaches at the intersection are calculated to operate at LOS A with minimal vehicle delays. However, the eastbound and westbound approaches at the intersection are calculated to operate poorly, especially in the existing conditions with a 20% growth factor. When the tabulated traffic volumes are increased by 20%, the results indicate LOS E and LOS F with considerable vehicle delays in the PM peak hour for the eastbound and westbound approaches.

TABLE 2
LEVEL OF SERVICE AND DELAY FOR UNSIGNALIZED INTERSECTIONS



LEVEL OF SERVICE	DESCRIPTION	CONTROL DELAY (seconds/vehicle)
A	Little or no delay	0 - 10
B	Short Traffic Delays	>10 - 15
C	Average Traffic Delays	>15 - 25
D	Long Traffic Delays	>25 - 35
E	Very Long Traffic Delays	>35 - 50
F	Extreme Traffic Delays	>50

Source: Highway Capacity Manual, 6th Edition

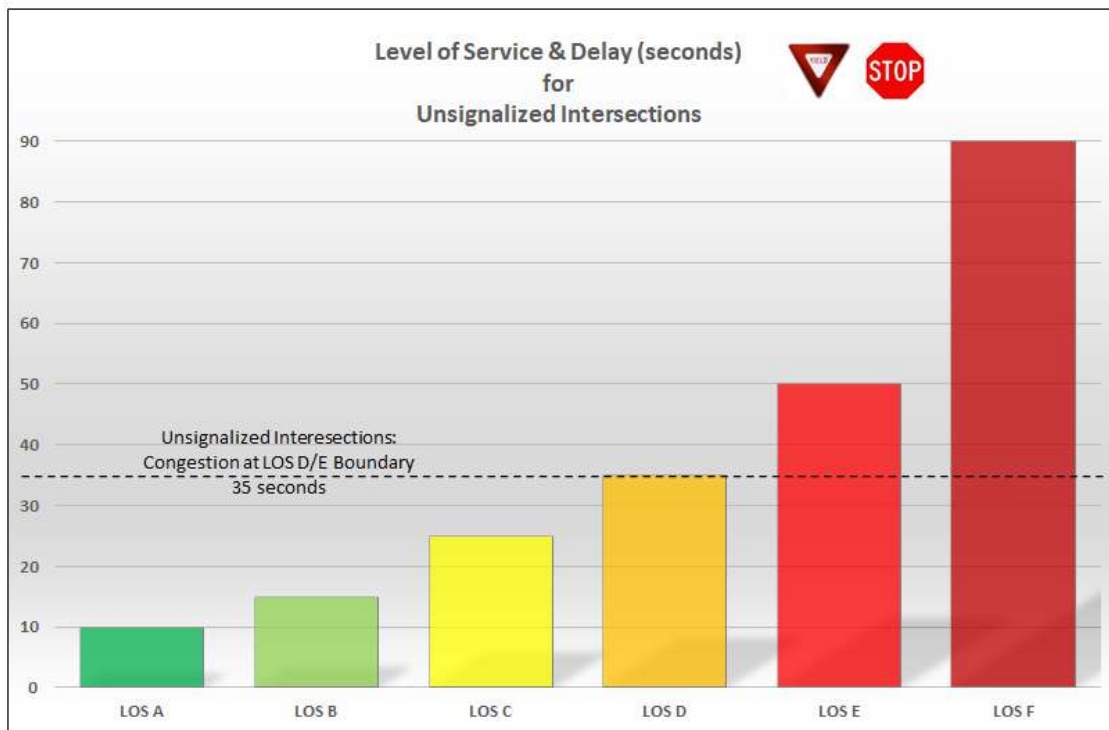


TABLE 3a
2021 INTERSECTION CAPACITY ANALYSIS RESULTS -
EXISTING TRAFFIC CONDITIONS

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS ^a	DELAY ^b (seconds)	v/c ^c	LOS ^a	DELAY ^b (seconds)	v/c ^c
North Campbell Station Road at Yarnell Road	 Unsignalized	Eastbound Left/Thru/Right	C	17.8	0.320	C	25.0	0.310
		Westbound Left/Thru/Right	B	14.6	0.300	D	32.9	0.490
		Northbound Left/Thru/Right	A	0.8	0.020	A	1.7	0.040
		Southbound Left/Thru/Right	A	2.6	0.070	A	4.0	0.150

Note: All analyses were calculated in Synchro 8 software and reported with HCM 2000 methodology

^a Level of Service

^b Average Delay (sec/vehicle)

^c Volume-to-Capacity Ratio

TABLE 3b
2021 INTERSECTION CAPACITY ANALYSIS RESULTS -
EXISTING TRAFFIC CONDITIONS (+20%)

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS ^a	DELAY ^b (seconds)	v/c ^c	LOS ^a	DELAY ^b (seconds)	v/c ^c
North Campbell Station Road at Yarnell Road	 Unsignalized	Eastbound Left/Thru/Right	D	25.0	0.470	E	46.9	0.540
		Westbound Left/Thru/Right	C	19.4	0.440	F	97.7	0.890
		Northbound Left/Thru/Right	A	0.8	0.020	A	1.8	0.050
		Southbound Left/Thru/Right	A	2.8	0.090	A	4.5	0.190

Note: All analyses were calculated in Synchro 8 software and reported with HCM 2000 methodology

^a Level of Service

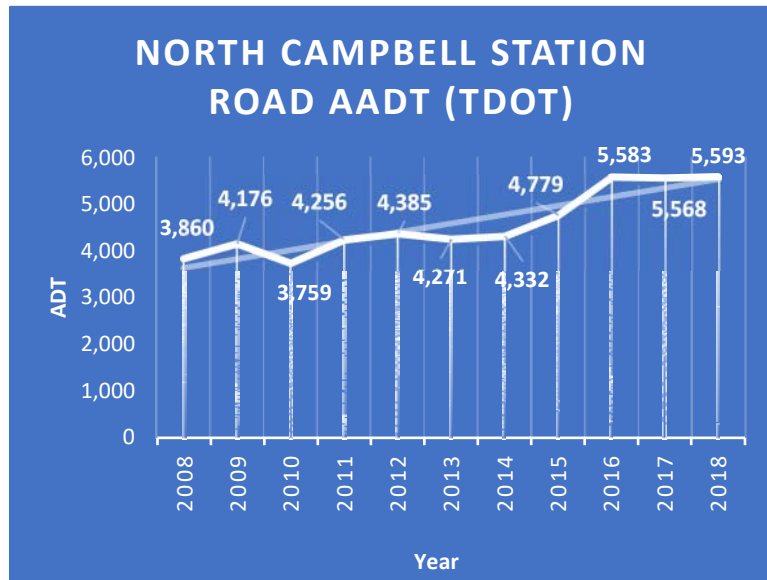
^b Average Delay (sec/vehicle)

^c Volume-to-Capacity Ratio

■ **OPENING YEAR TRAFFIC CONDITIONS (WITHOUT THE PROJECT):**

Opening year traffic volumes represent the future condition the proposed study area is potentially subject to even without the proposed project being developed (no-build option). As previously stated, the build-out and full occupancy for this proposed development is assumed to occur in 2026. This horizon year corresponds to five years for this residential development to reach full capacity and occupancy.

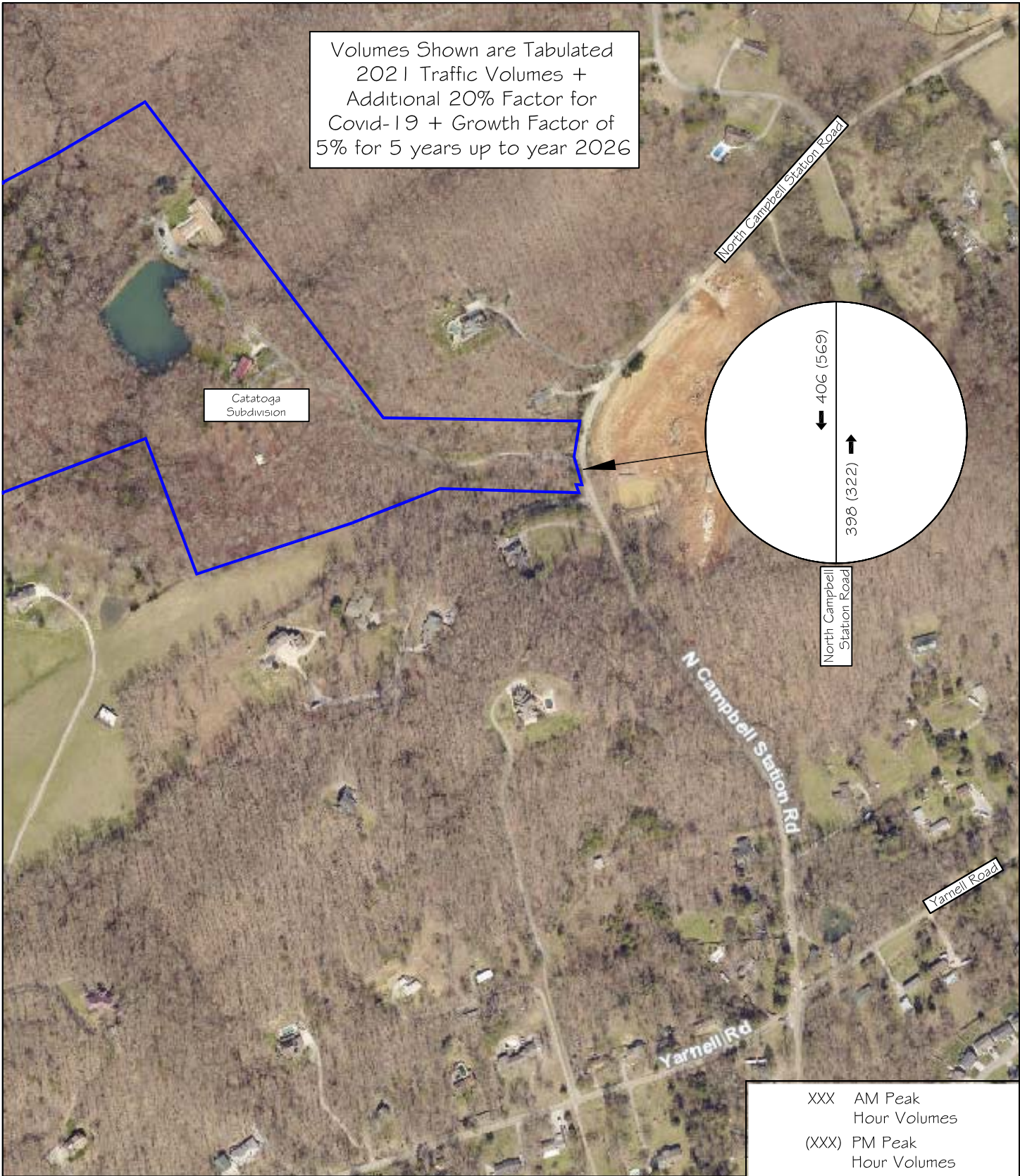
Vehicular traffic on North Campbell Station Road has shown significant growth over the past few years, according to the permanent traffic count stations and as shown in Appendix A. To conservatively account for potential traffic growth in the study area, an average annual growth rate of 5% was used to calculate future growth up to 2026 for the studied location. This growth rate



is applied on top of the 20% factor applied to the tabulated existing traffic counts to account for reduced traffic levels from the current pandemic. The results of this growth rate applied to the existing 2021 traffic volumes from Figure 4b (with 20% factor) are shown in Figure 5. Figure 5 shows the projected opening year traffic volumes at the proposed entrance in 2026 during the AM and PM peak hours without the project.

Capacity analyses were not conducted for the projected conditions at the North Campbell Station Road at Road “A” intersection in 2026 without the project being developed since this intersection does not exist in this scenario.

Volumes Shown are Tabulated
 2021 Traffic Volumes +
 Additional 20% Factor for
 Covid-19 + Growth Factor of
 5% for 5 years up to year 2026



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FIGURE 5

Catatoga Subdivision

2026 Peak Hour Traffic Volumes -
 OPENING YEAR TRAFFIC (WITHOUT THE
 PROJECT)

■ **TRIP GENERATION:**

The estimated amount of traffic generated by the proposed residential development was calculated based upon rates and equations for peak hour trips provided by Trip Generation Manual, 10th Edition, a publication of the Institute of Transportation Engineers (ITE). A generated trip is a single or one-direction vehicle movement that is either entering or exiting the study site. The Trip Generation Manual is the traditional and most popular resource for determining trip generation rates when traffic impact studies are produced. The Manual lists and includes data for various land uses and correlates trips generated based on different variables such as dwelling units, square footage, etc. The data from ITE for the proposed land use is shown in Appendix G. A summary of this information is presented in the following table:

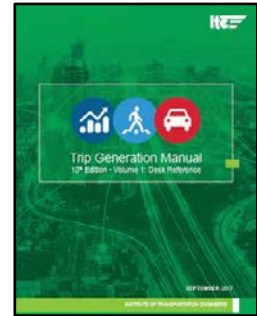


TABLE 4
TRIP GENERATION FOR CATATOGA SUBDIVISION
155 Single-Family Detached Houses

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Single-Family Detached Housing	155 Houses	1,557	25%	75%		63%	37%	
				29	86	115	98	57	155
Total New Volume Site Trips			1,557	29	86	115	98	57	155

ITE Trip Generation Manual, 10th Edition

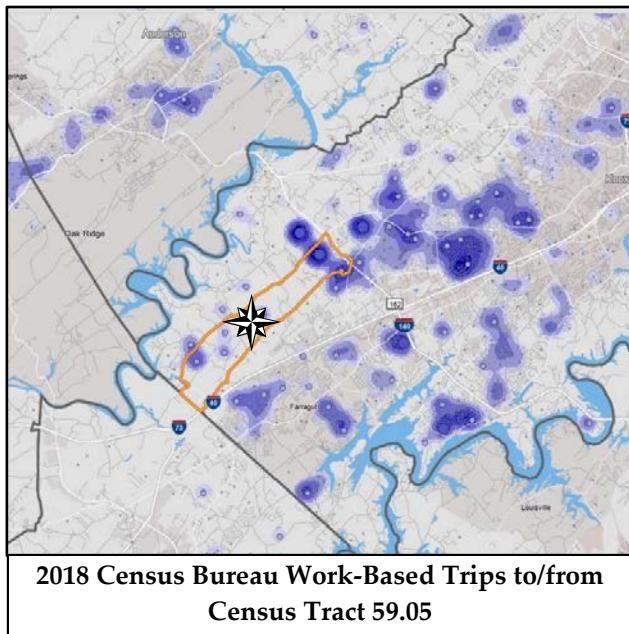
Trips calculated by using Fitted Curve Equation

For the proposed residential subdivision, with a maximum of 155 single-family detached houses, it is estimated that 29 vehicles will enter and 86 will exit, for a total of 115 generated trips during the AM Peak Hour in the year 2026. Similarly, it is estimated that 98 vehicles will enter, and 57 will exit, for a total of 155 generated trips during the PM Peak Hour in the year 2026. The calculated trips generated for an average weekday are expected to be 1,557 vehicles for the proposed development in 2026. No trip reductions were included in the analysis.

■ **TRIP DISTRIBUTION AND ASSIGNMENT:**

Figure 6 shows the projected distribution for traffic entering and exiting the proposed subdivision. The percentages shown only pertain to the trips generated by the new proposed residential dwellings in the development calculated from the ITE Trip Generation Manual and shown in Table 4.

The percentages assumed and shown in Figure 6 are based on several sources and factors. The first source is based on the traffic count results at the intersection of North Campbell Station Road at Yarnell Road. The turning movement counts from this intersection were assumed to be a reasonable estimate for the Catatoga Subdivision travel patterns.



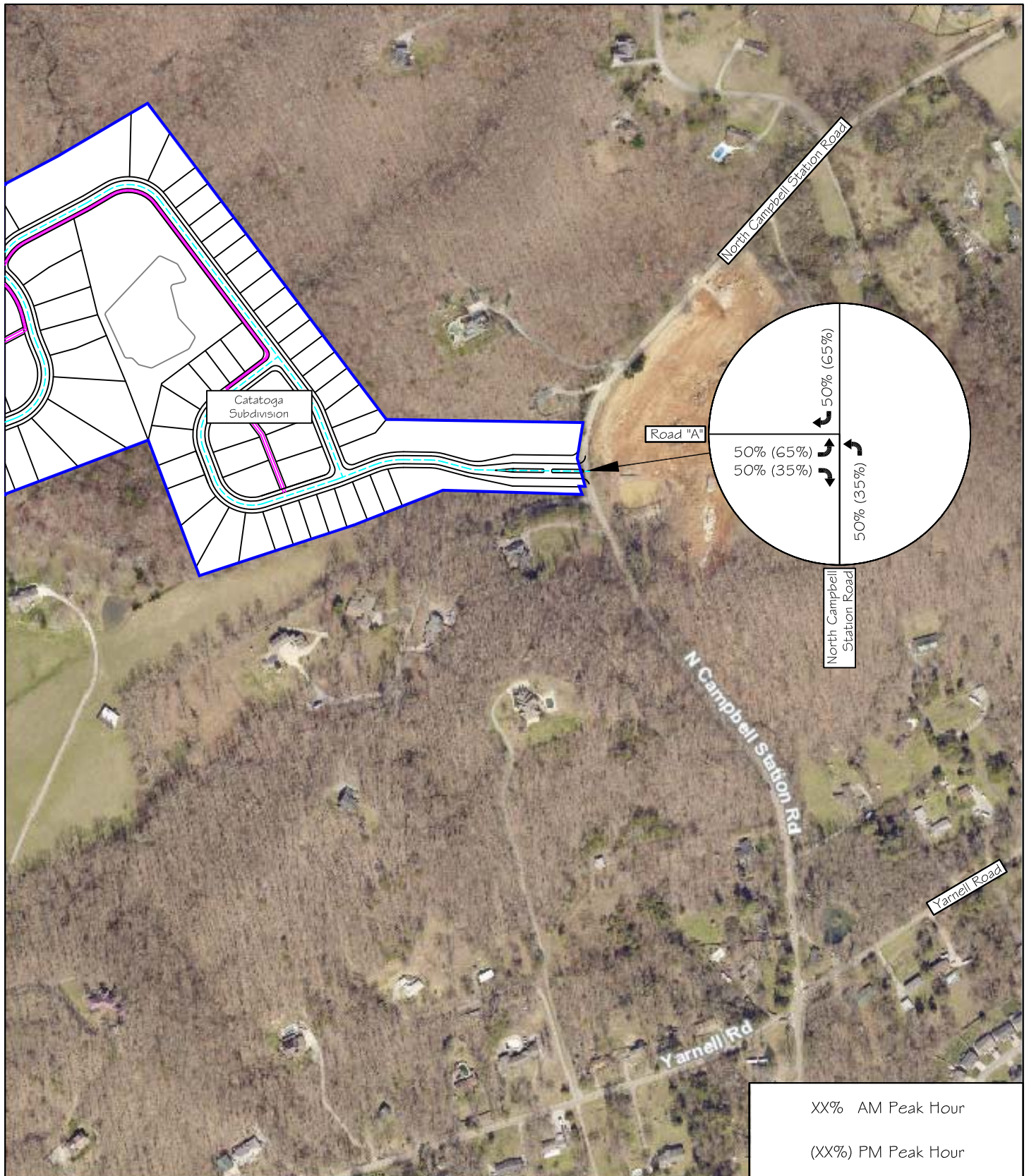
The second source is based on work-related trips in the area. Work-based trips will be a significant driver of generated trips by the development. These trips are more likely to travel to and from the north and east. This assertion is based on data from the United States Census Bureau website for Census Tract 59.05, where the development property is located. Based on 2018 (latest available) census data and shown in Appendix H, most work-based trips are to and from the north and east. Those trips correspond to the Pellissippi Parkway Corridor, Oak Ridge, Middlebrook Pike area, and trips further northeast towards downtown Knoxville.

In addition to employment centers and commercial development, some traffic will travel to and from various public and private elementary, middle, and high schools. This site development property is currently zoned for Hardin Valley Elementary, Middle School, and High School. All these public schools are to the north of the proposed subdivision, approximately 1.5 miles away off Hardin Valley Road.

The Knox County Schools Transportation Department has developed Parental Responsibility

Zones (PRZ) to determine whether a student is offered transportation services to and from school. According to the Knox County School system, the PRZ is defined as being 1.5 miles for grades 6 – 12 and 1.0 miles for grades K – 5 from the point where the students' parcel is accessed and the point where the busses unload at the school. Even though this proposed subdivision is close to the PRZ limit of 1.5 miles, it is not believed that any of the homes will be officially within this zone.

Figure 7 shows the Traffic Assignment of the computed trips generated by the subdivision (from Table 4) and applying the intersection movement volumes based on the assumed distribution of trips shown in Figure 6.



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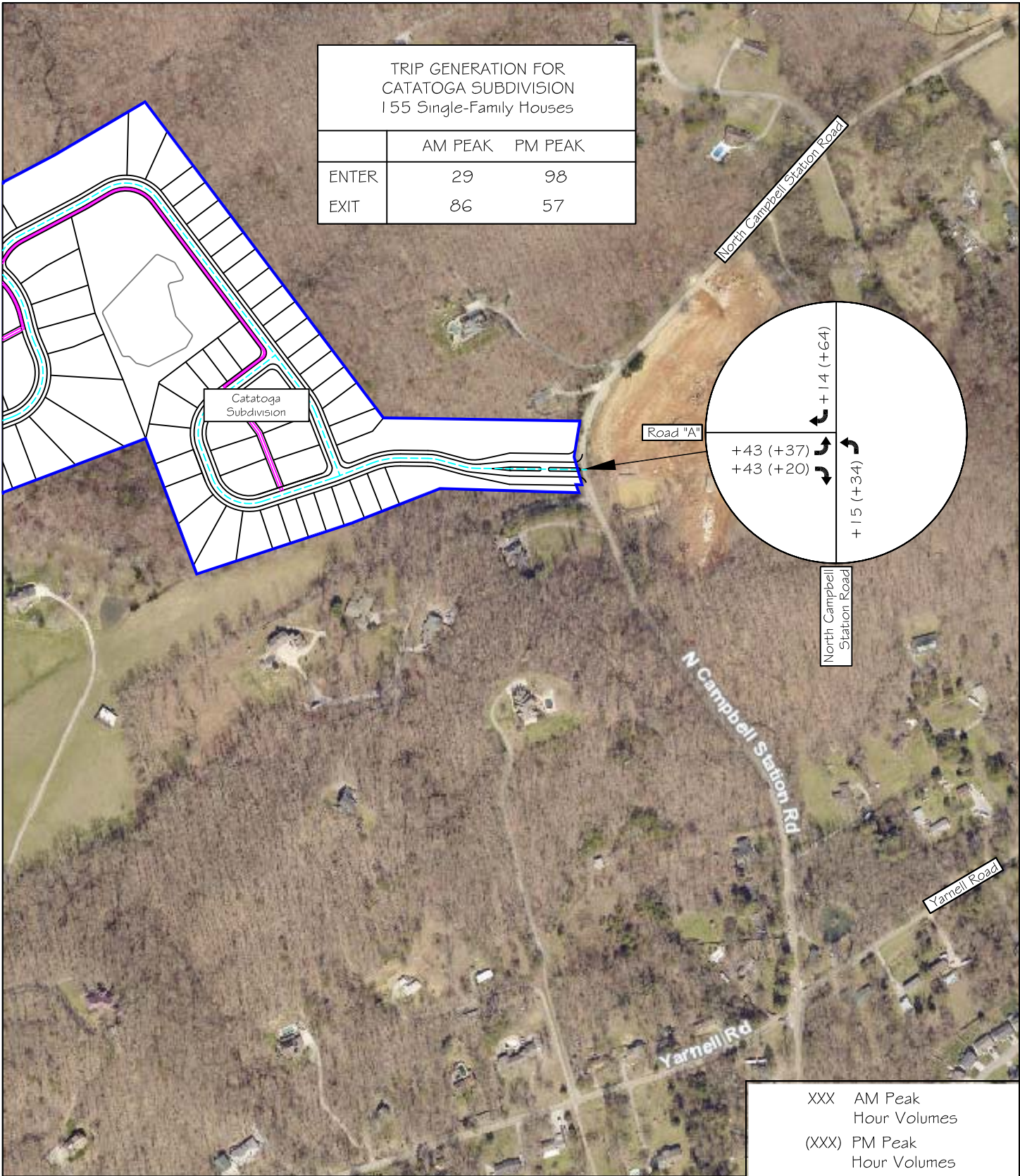


FIGURE 6

Catatoga Subdivision

Directional Distribution of Generated Traffic during AM and PM Peak Hour

TRIP GENERATION FOR CATATOGA SUBDIVISION 155 Single-Family Houses		
	AM PEAK	PM PEAK
ENTER	29	98
EXIT	86	57



XXX AM Peak
Hour Volumes
(XXX) PM Peak
Hour Volumes



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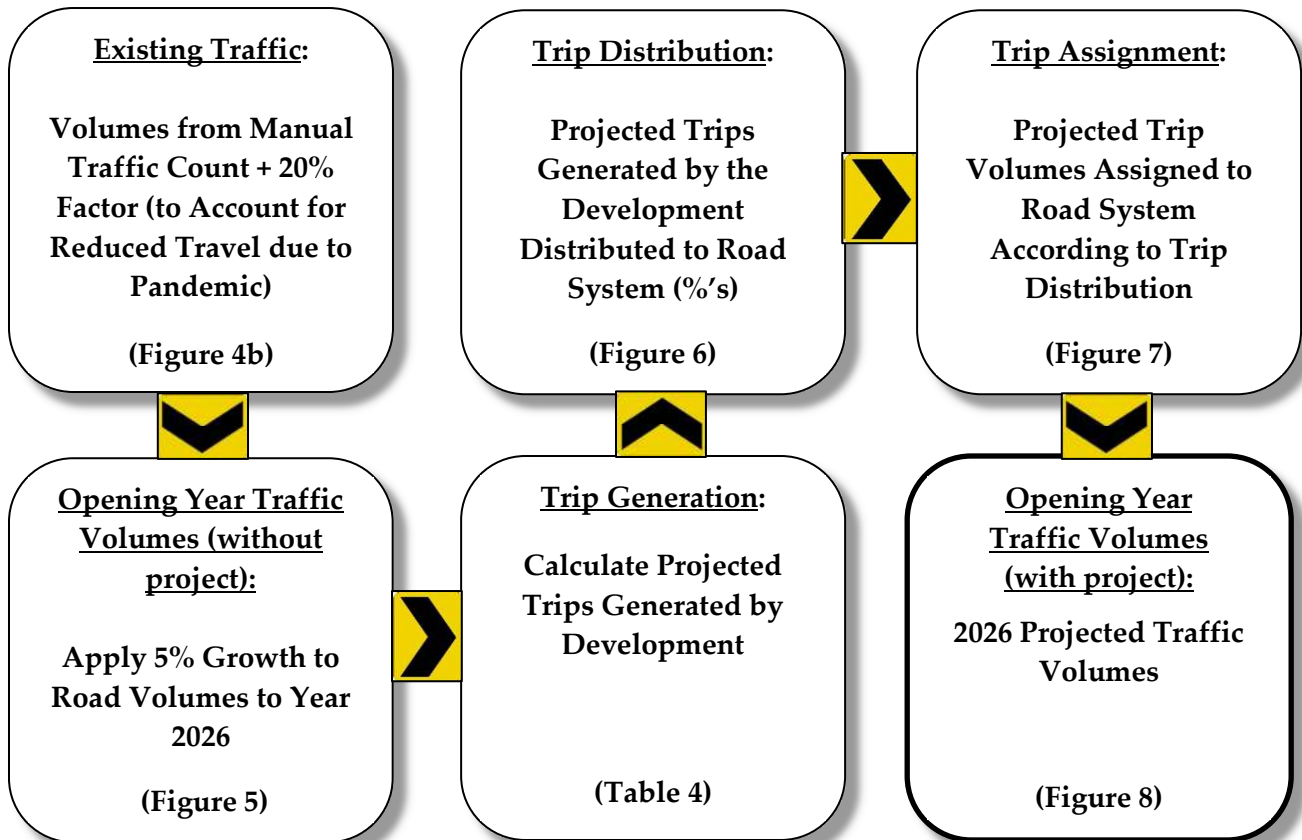
FIGURE 7

Catatoga Subdivision

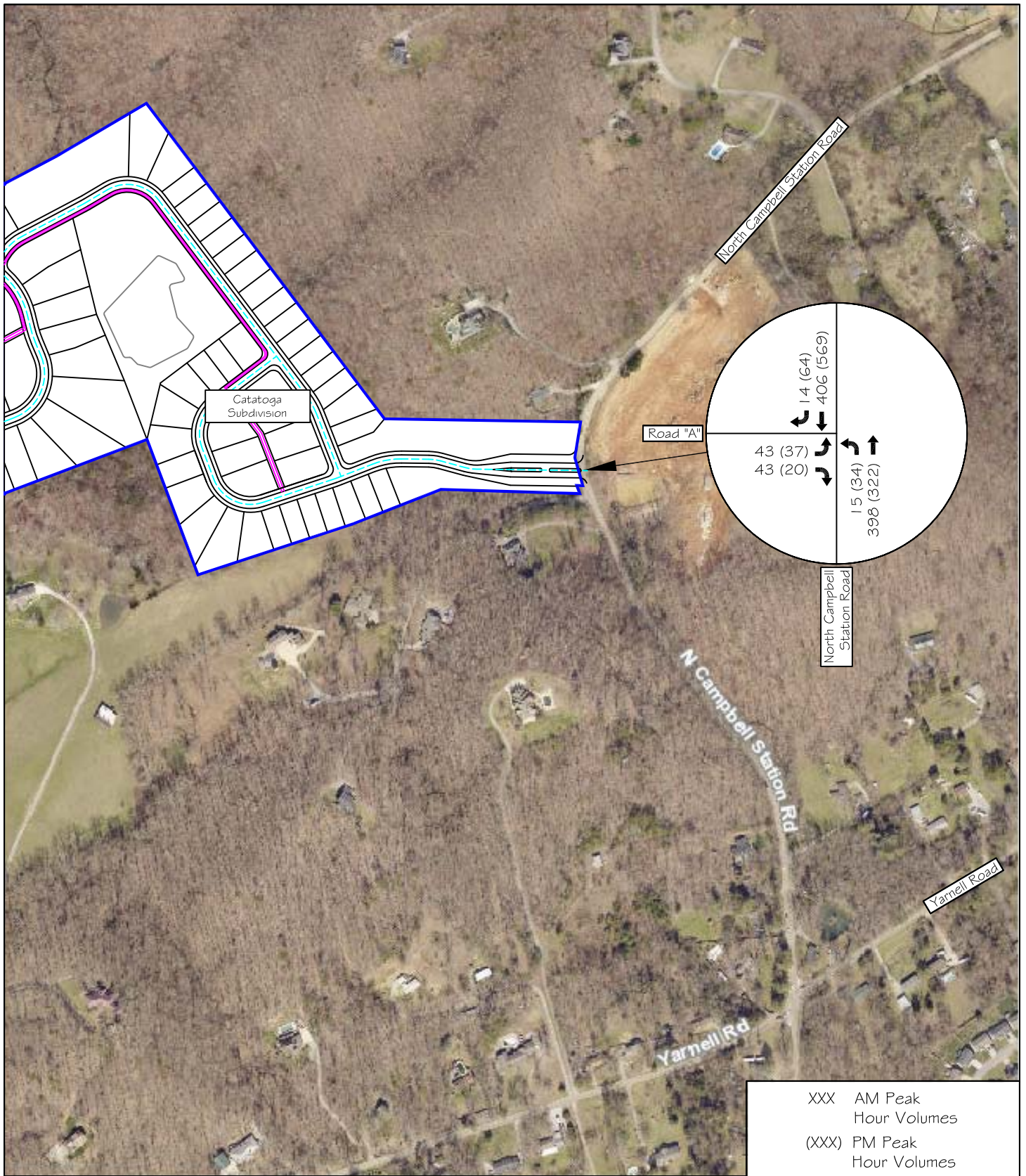
Traffic Assignment of Generated Traffic
during AM and PM Peak Hour

■ **OPENING YEAR TRAFFIC CONDITIONS (WITH PROJECT):**

Overall, several additive steps were taken to estimate the total opening year projected traffic volumes at the studied intersection when the Catatoga Subdivision is entirely constructed and occupied by 2026. The steps are illustrated below for clarity:



To calculate the total future projected traffic volumes at the studied intersection, the calculated peak hour traffic (from ITE Trip Generation) generated by the new Catatoga Subdivision was added to the 2026 opening year traffic (Figure 5) by following the predicted directional distributions and assignments (Figures 6 and 7). This procedure was completed to obtain the total projected traffic volumes when the development is fully built-out and occupied in 2026. Figure 8 shows the projected AM and PM peak hour volumes at the studied intersection for 2026 with the development traffic.



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FIGURE 8


Catatoga Subdivision

2026 Peak Hour Traffic Volumes -
 OPENING YEAR TRAFFIC (WITH PROJECT)

Capacity analyses were conducted to determine the projected Level of Service for vehicles at the proposed entrance intersection with the development traffic in the year 2026. Appendix F includes the worksheets for these capacity analyses.

As calculated, the traffic generated from the proposed residential subdivision with the projected volumes on North Campbell Station Road resulted in adequate LOS and vehicle delays at the intersection. The entrance exiting lane is expected to operate at LOS C in the projected AM and PM peak hours.

TABLE 5
2026 INTERSECTION CAPACITY ANALYSIS RESULTS -
OPENING YEAR (2026 WITH PROJECT)

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS ^a	DELAY ^b (seconds)	v/c ^c	LOS ^a	DELAY ^b (seconds)	v/c ^c
North Campbell Station Road at Road "A"	 Unsignalized	Eastbound Left/Right	C	17.0	0.240	C	21.9	0.230
		Northbound Left	A	0.5	0.020	A	1.3	0.040

Note: All analyses were calculated in Synchro 8 software and reported with HCM 2000 methodology

^a Level of Service

^b Average Delay (sec/vehicle)

^c Volume-to-Capacity Ratio

■ **POTENTIAL SAFETY ISSUES:**

The study area was investigated for potential existing and future safety issues. A couple of features of the adjacent transportation system are discussed in the following pages.

➤ **EVALUATION OF TURN LANE THRESHOLDS**

An evaluation of the need for separate auxiliary turn lanes on North Campbell Station Road for entering vehicles into the development at Road "A" in the year 2026 was conducted. The design policy used for these turn lane evaluations is based on "Knox County's Access Control and Driveway Design Policy". This design policy relates vehicle volume thresholds based on prevailing speeds for two-lane and four-lane roadways. This Knox County policy is based on TDOT and nationally accepted guidelines for unsignalized intersections.

The prevailing speeds chosen for this evaluation are based on data obtained by the County from "Inrix". According to Wikipedia, Inrix "provides location-based data and analytics, such as traffic and parking, to automakers, cities and road authorities worldwide, and in turn-by-turn navigation applications like Google Waze." Knox County has obtained access to this data from Inrix. Their data has indicated that the historical average daily speeds on North Campbell Station Road have been 36.8 mph and 37.4 mph in the northbound and southbound directions, respectively. Thus, the speed classification for this evaluation was 36 to 45 mph.

Based on the entering projected 2026 AM and PM peak hour traffic volumes at the Road "A" subdivision entrance and the Inrix speed data on North Campbell Station Road, there is a need for a separate northbound left-turn lane and a southbound right-turn lane on North Campbell Station Road. The Knox County turn lane policy worksheets are in Appendix I.

➤ **EVALUATION OF SIGHT DISTANCE**

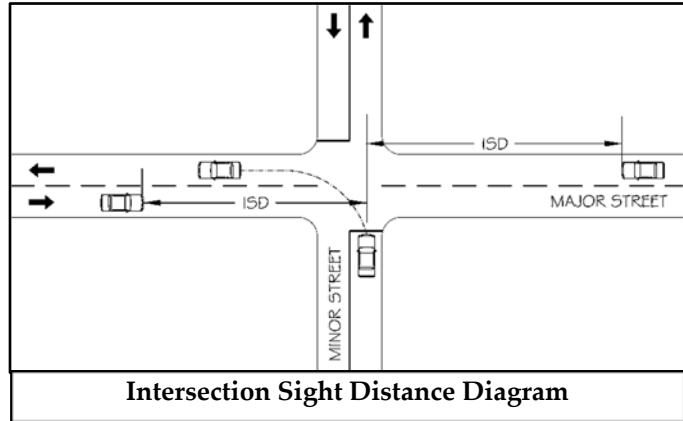
For intersections, sight distance evaluations have two categories: Stopping Sight Distance (SSD) and Intersection Sight Distance (ISD).

Methodology:

SSD is the distance required for a motorist to perceive, react, and the vehicle to come to a complete stop before colliding with an object in the road. For evaluating intersections,

this object would be another vehicle entering the intersection from a minor street. SSD can be considered the minimum visibility distance standard for evaluating the safety of an intersection.

ISD is based on the time required to perceive, react, and complete the desired traffic maneuver once a motorist on a minor street decides to perform a traffic maneuver. Three traffic maneuvers are available for vehicles stopped on a minor street at a 4-way intersection: left-turn



from the minor road, right-turn from the minor road, and a crossing maneuver from the minor road across the major road. For turns from the minor street, ISD is needed to allow a stopped motorist on a minor street to turn onto a major street without being overtaken by an approaching vehicle. The most critical (longest) ISD is for left-turns from the minor street. The ISD for this maneuver includes the time to turn left and to clear half of the intersection without conflicting with the oncoming traffic from the left and accelerating to the road's operating speed without causing the approaching vehicles from the right to reduce their speed substantially. SSD can be considered the desirable visibility distance standard for evaluating the safety of an intersection. In general, SSD is generally more critical than ISD; however, the ISD must be at least the same distance or greater than SSD to provide safe operations at an intersection.

Based on Inrix speed data of 36.8 mph and 37.4 mph in the northbound and southbound directions on North Campbell Station Road, the required intersection sight distance (ISD) is 368 feet to the south and 374 feet to the north at Road "A" based on Knox County policy of requiring 10 feet of sight distance per 1-mph of speed. Based on a 4% grade on North Campbell Station Road and the Inrix speed data, the stopping sight distance (SSD) is calculated to be 255 feet for northbound and 290 feet for southbound vehicles.

In October 2020, Urban Engineering, Inc. measured the available sight distance from the proposed entrance location on North Campbell Station Road. Sight distance was determined to be just over 400 feet to the north and just shy of 500 feet to the south. This certification was provided in a

letter and is shown in Appendix J.

Images of the existing sight distances are presented in the following with the required ISD and the actual measured sight distance.



View of Sight Distance on North Campbell Station Road at Proposed Entrance Road "A" Intersection (Looking Northeast)



View of Sight Distance on North Campbell Station Road at Proposed Entrance Road "A" Intersection (Looking Southeast)

CONCLUSIONS & RECOMMENDATIONS

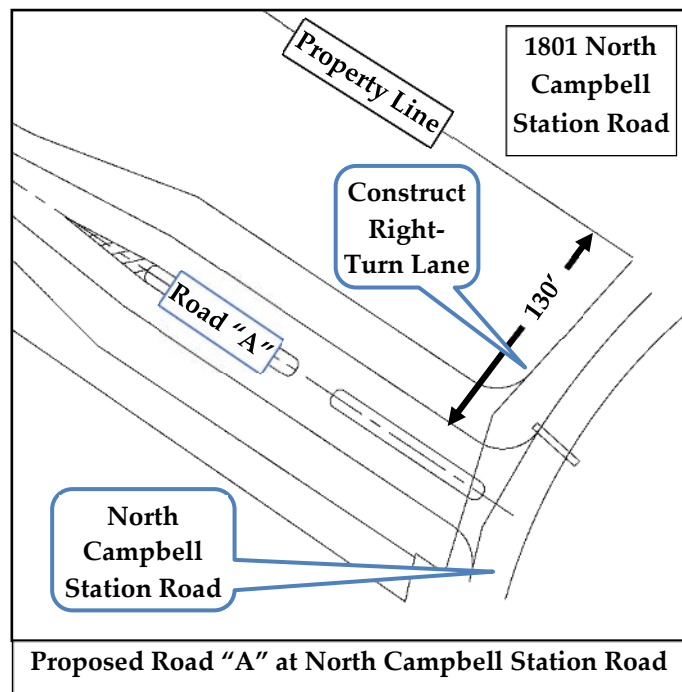
The following is an overview of recommendations to minimize the traffic impacts of the proposed development on the adjacent road system while attempting to achieve an acceptable traffic flow and safety level.



North Campbell Station Road at Road "A": The intersection of North Campbell Station Road at Road "A" was calculated to operate very well with respect to level of service in the projected conditions in 2026.

1a) A separate exiting left-turn lane or right-turn lane on Road "A" at North Campbell Station Road is not required based on the projected 2026 traffic volumes and capacity analysis.

1b) A southbound right-turn lane is warranted based on the projected traffic volumes. There is limited space between the development property line at North Campbell Station Road and the adjacent property to the north (1801 North Campbell Station Road). Approximately 130 feet exists between the property line to the north and the proposed northern edge of Road "A". With this constraint, it is recommended that this southbound right-turn lane be 50



feet in length with an 80-foot taper or the maximum length available within the right-of-way without encroaching the adjacent property. The new southbound right-turn lane should be marked with a right-turn pavement marking arrow symbol.

1c) A separate northbound left-turn lane on North Campbell Station Road is warranted for entering traffic into the subdivision at Road "A". The previously mentioned Synchro

Traffic Software includes SimTraffic. The Synchro portion of the software performs the macroscopic calculations for intersections, and SimTraffic performs micro-simulation and animation of vehicular traffic. SimTraffic (Version 8) software was utilized to estimate the vehicle queue lengths for the northbound approach at the intersection.

Based on the software results from the projected 2026 volumes, the 95th percentile vehicle queue lengths were calculated for the proposed northbound left-turn lane. The 95th percentile vehicle queue is the recognized measurement in the traffic engineering profession as the design standard used when considering queue lengths and means a 95% certainty that the vehicle queue will not extend beyond that point. The calculated vehicle queue results were based on averaging the outcome obtained during ten traffic simulations and the results from the SimTraffic software are in the Appendix. The calculated 95th percentile vehicle queue lengths for the northbound left-turn lane are 25 feet in the AM peak hour and 40 feet in the PM peak hour in 2026. These results indicate that a northbound left-turn lane with 50 feet of storage is adequate, which is the minimum allowable storage length of a left-turn lane in Knox County. Based on the vehicle speeds and the physical constraints of North Campbell Station Road, it is recommended the left-turn lane taper be a minimum of 12:1.

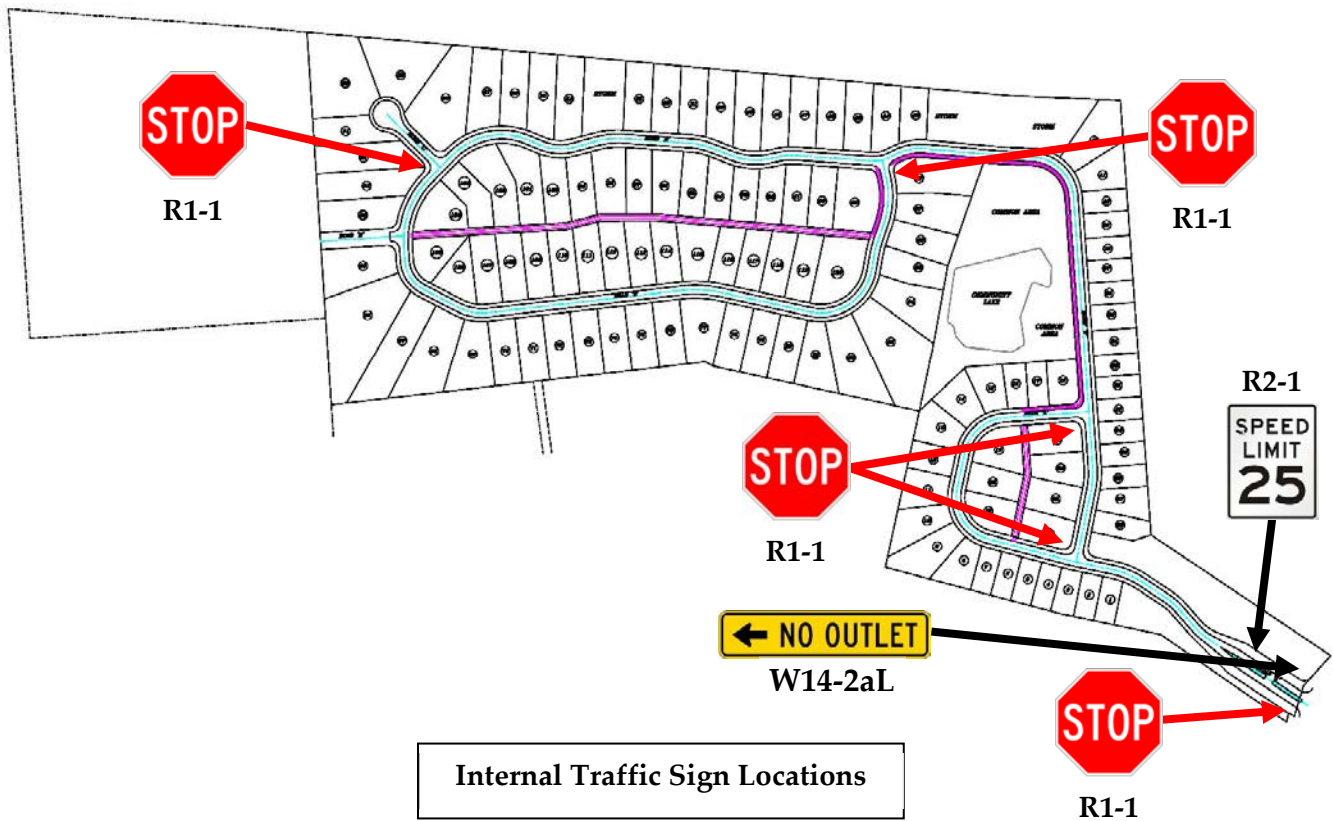
- 1d) It is recommended that a Stop Sign (R1-1) be installed, and a 24" white stop bar be applied to the pavement of the Road "A" approach at North Campbell Station Road. The stop bar should be applied at a minimum of 4 feet away from the edge of North Campbell Station Road and should be placed at the desired stopping point that provides the maximum sight distance.

- 1e) Intersection sight distance at Road "A" must not be impacted by future landscaping or signage. Based on Inrix speed data of 36.8 mph and 37.4 mph in the northbound and southbound directions on North Campbell Station Road, the required intersection sight distance (ISD) is 368 feet to the south and 374 feet to the north at Road "A". Based on a 4% grade on North Campbell Station Road and the Inrix speed data, the stopping sight distance (SSD) is calculated to be 255 feet for northbound and 290 feet for southbound vehicles. In October 2020, Urban Engineering, Inc. measured the available sight distance from the proposed entrance location on North Campbell Station Road. Sight distance was determined to be just over 400 feet to the north and just shy of 500 feet to the south.



Catatoga Subdivision Internal Roads: The current concept plan shows three new roads being constructed within the development, as shown in Figure 3. If Road “D” and other roads are proposed and constructed for the additional 17.5-acre available parcel, they should follow the same recommendations listed below.

- 2a) It is recommended that a 25-mph Speed Limit Sign (R2-1) be posted near the front of Road “A” off North Campbell Station Road. It is also recommended that a “No Outlet” (W14-2aL) sign be posted near the front of Road “A”. This sign can be posted below the street name sign.
- 2b) Stop Signs (R1-1) with 24” white stop bars and other traffic signage should be installed at the locations, as shown below:



- 2c) Sight distance at the new internal intersections in the development must not be impacted by new signage or future landscaping. With a speed limit of 25-mph in the development, the intersection sight distance requirement is 250 feet. The stopping sight distance required is 155 feet for a level road grade. The site designer should ensure that

sight distance lengths are met.

2d) All drainage grates and covers for the residential development need to be pedestrian and bicycle safe.

2e) Sidewalks should have appropriate ADA-compliant curbed ramps at intersection corners, and the sidewalks are recommended to be 5 feet minimum in width. Crosswalks should be marked on the road pavement where pedestrians are expected to cross.

2f) The United States Postal Service (USPS) has recently implemented changes to its delivery guidelines in new residential subdivisions. If directed by the local post office, the designer should include an area within the development with a parking area for a centralized mail delivery center.



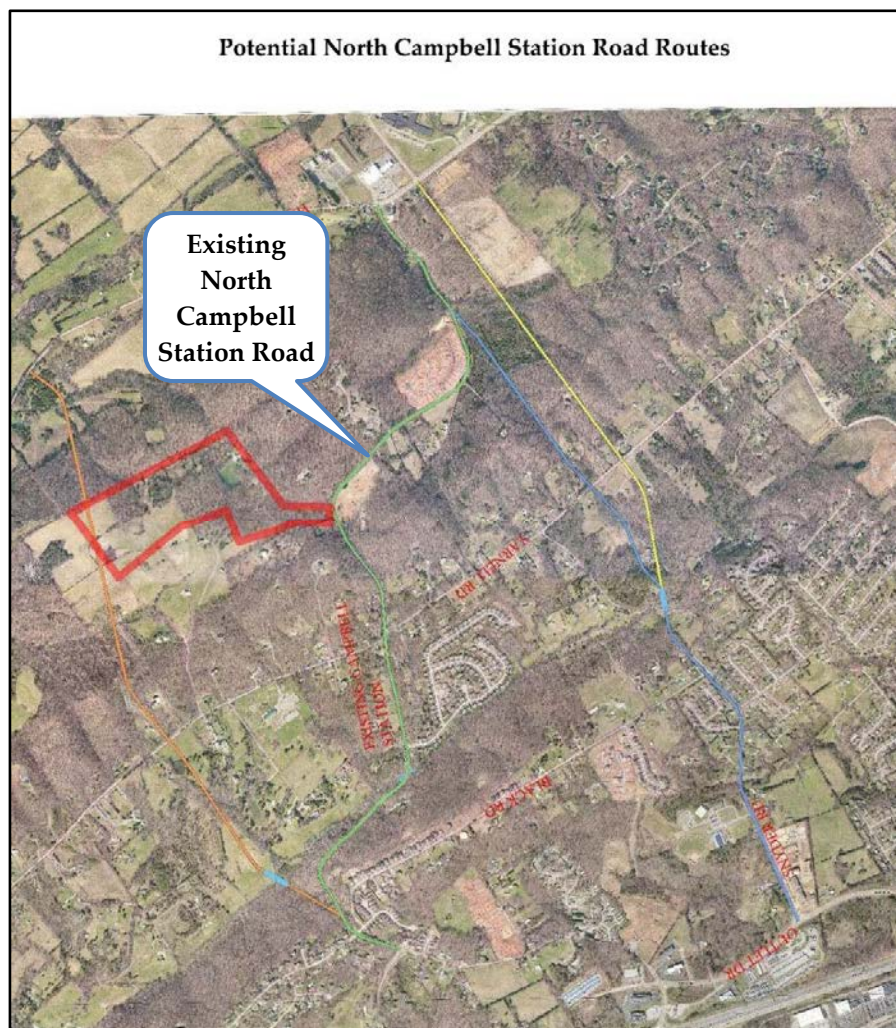
Centralized USPS Delivery Center

2g) For residential subdivisions with a single access point and more than 150 houses, the County has a long-standing unwritten design policy requiring a boulevard road typical section at the entrance. This policy is to ensure access to the subdivision during potential emergencies. Since the proposed layout of the Catatoga Subdivision only includes one means of ingress and egress and will potentially have 155 houses, the subdivision entrance is recommended to be designed and constructed with a boulevard roadway section. At a minimum, the boulevard section should have a 10-foot median with 2 – 18-foot lanes within 60 feet of right-of-way. For this policy in Knox County, a boulevard road section is typically designed and constructed to the first intersecting street within the development. However, after discussion with Knox County Engineering, it was determined that it would be acceptable to keep the proposed boulevard design shown in Figure 3.

2h) All road grade and intersection elements internally and externally should be designed to AASHTO, TDOT, and Knox County specifications and guidelines to ensure proper operation.



Future Transportation Issue: Knox County Engineering has indicated that they are in the planning stages of potentially re-routing North Campbell Station Road in between Hardin Valley Road and the Interstate system to the south. This investigation is due to high north and south traffic volumes and North Campbell Station Road safety issues. Re-routing the road would provide a more efficient and safer route between the two areas. The project is identified in the Knoxville Regional Transportation Planning Organization’s Mobility Plan 2045. This project listing indicates that this re-routing will be 3.3 miles in length and has a horizon year of 2030. Three potential alternative routes are being investigated and are shown below for informational purposes. It is not believed that a final route has been selected. One of these routes is shown clipping the northwest corner of the proposed Catatoga Subdivision property. If this project is completed, thru traffic volumes on North Campbell Station Road at Road “A” will potentially be reduced due to traffic shifting to the new route for north and south travel. Whatever route is chosen will impact North Campbell Station Road's projected traffic volumes shown in this report.



APPENDIX A

HISTORICAL TRAFFIC COUNT DATA

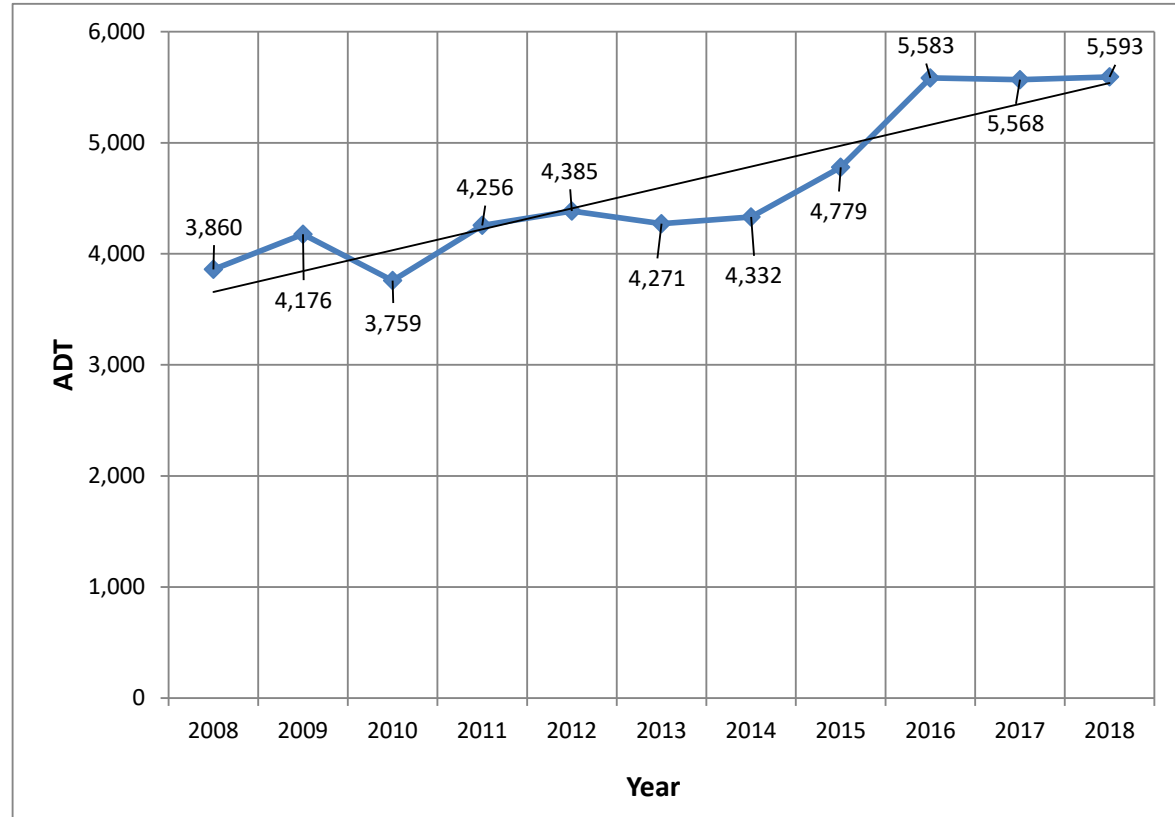
Historical Traffic Counts

Organization: TDOT

Station ID #: 000303

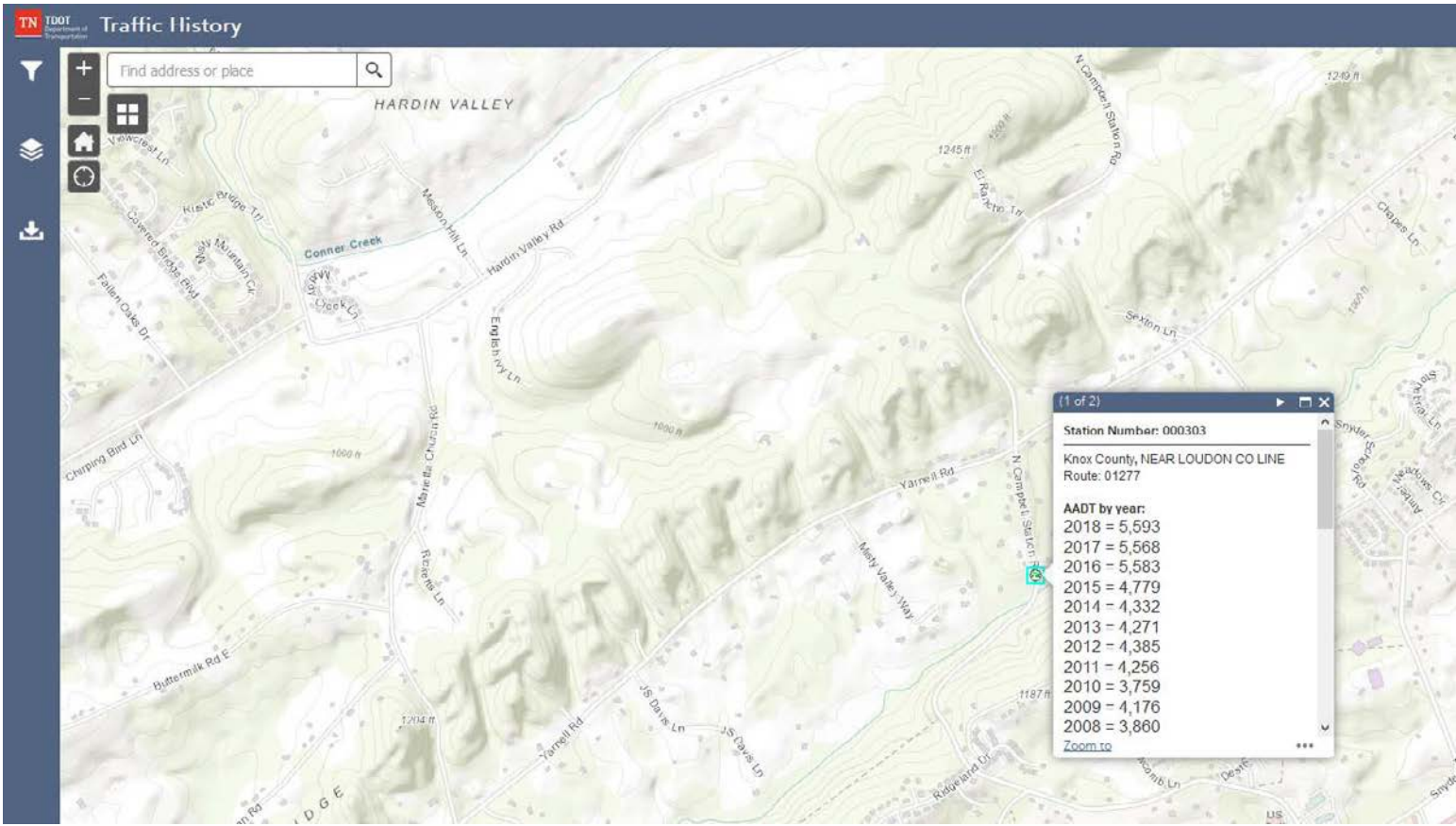
Location: North Campbell Station Road, south of Yarnell Road

YEAR	ADT	Trendline
2008	3,860	↓
2009	4,176	
2010	3,759	
2011	4,256	
2012	4,385	
2013	4,271	
2014	4,332	
2015	4,779	
2016	5,583	
2017	5,568	
2018	5,593	



2008 - 2018 Growth Rate = 44.9%

Average Annual Growth Rate = 3.8%



Historical Traffic Counts

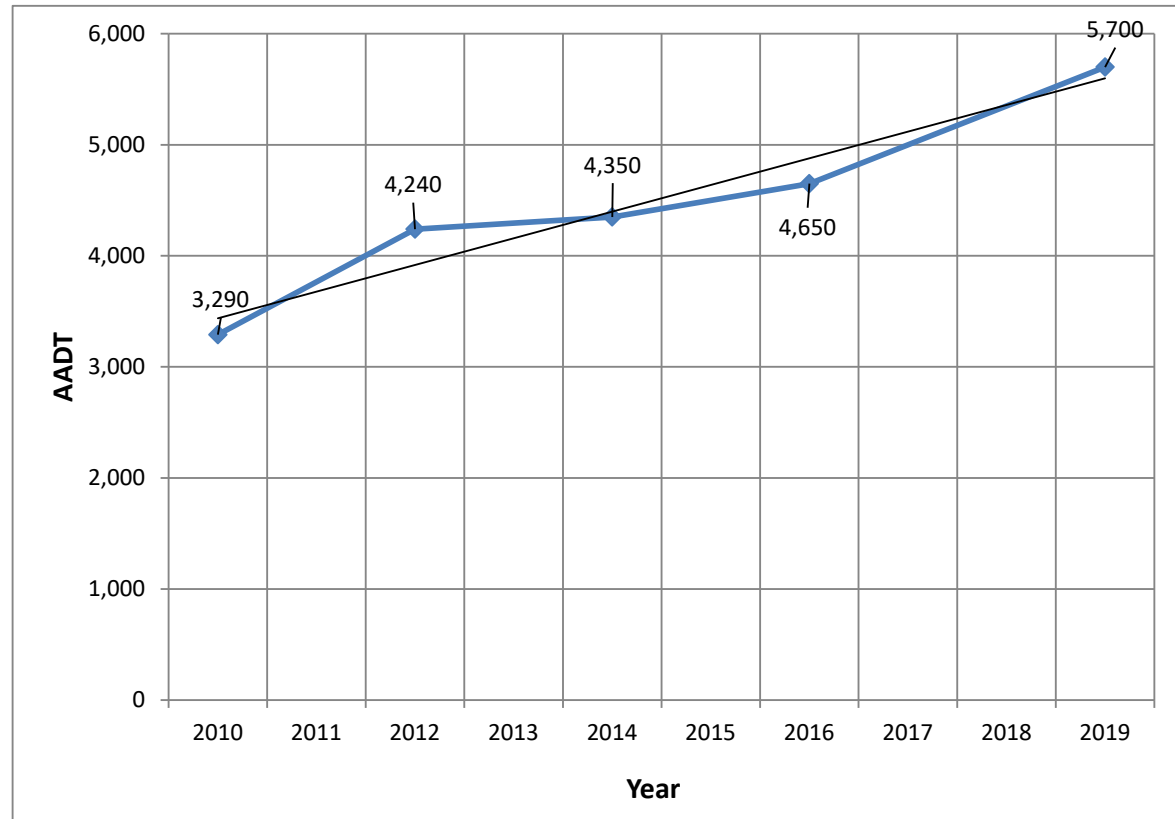
Organization: Knoxville TPO

Station ID #: 093M354

Location: North Campbell Station Road, south of Hardin Valley Road

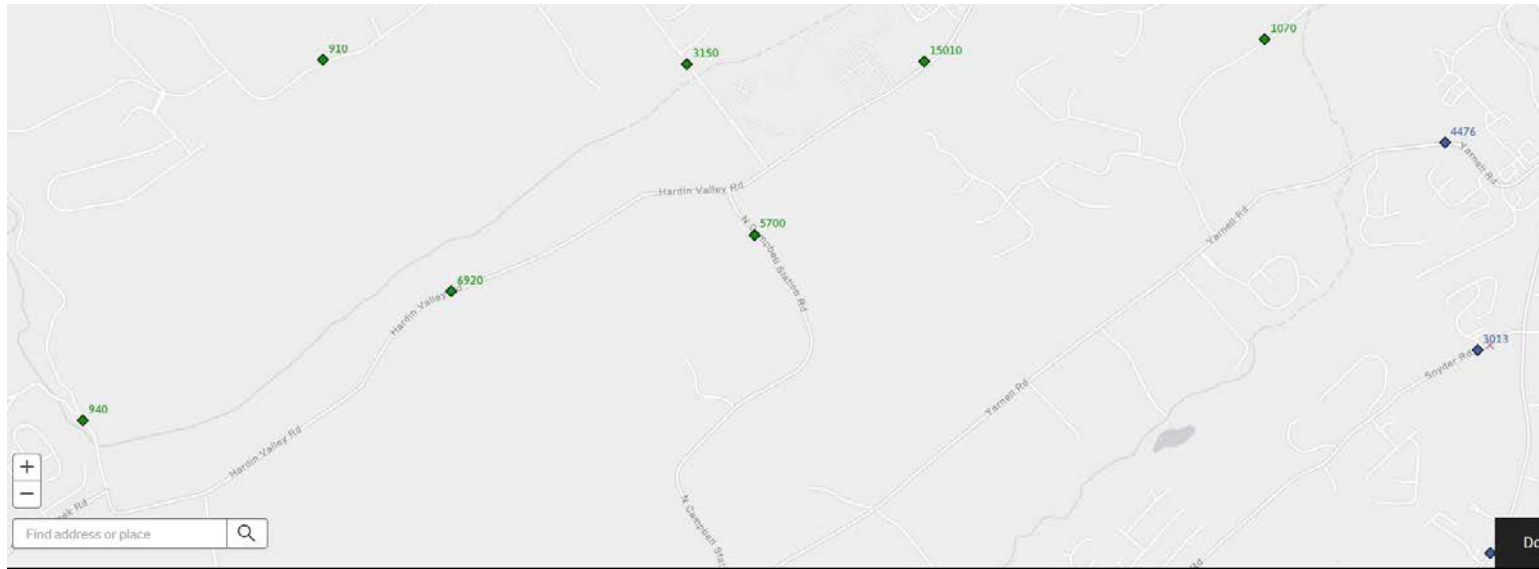
YEAR	AADT
2009	-
2010	3,290
2011	-
2012	4,240
2013	-
2014	4,350
2015	-
2016	4,650
2017	-
2018	-
2019	5,700

Trendline

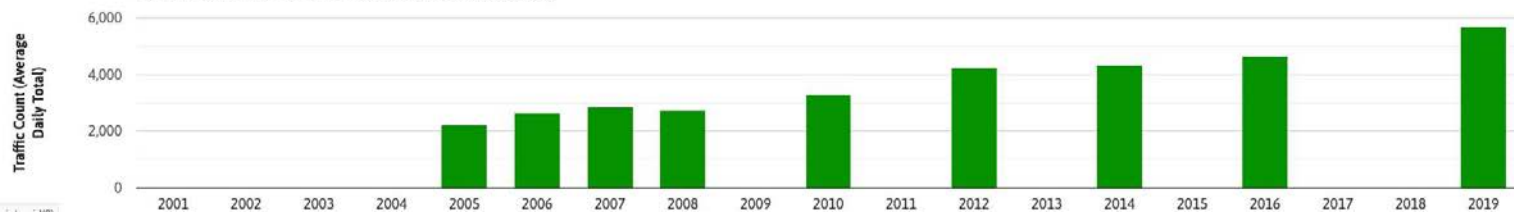


2010 - 2019 Growth Rate = 73.3%

Average Annual Growth Rate = 6.3%



Campbell Station Rd - S of Hardin Valley Rd (Station ID: 093M354)




APPENDIX B

WALK SCORE

WALKSCORE


(from walkscore.com)




Walk Score  [Get Scores](#) [Find Apartments](#) [My Favorites](#) [Add to Your Site](#)

Type an address, neighborhood or city


1737 North Campbell Station Road [Add scores to your site](#)

Knoxville, Tennessee, 37932

Commute to **Downtown Farragut** 

 36 min  60+ min  60+ min [View Routes](#)

[Favorite](#) [Map](#) [Nearby Apartments](#)

[More about 1737 North Campbell Station Road](#) 


Walk Score
1

Car-Dependent
Almost all errands require a car.

Transit Score
0

Minimal Transit
It is possible to get on a bus.

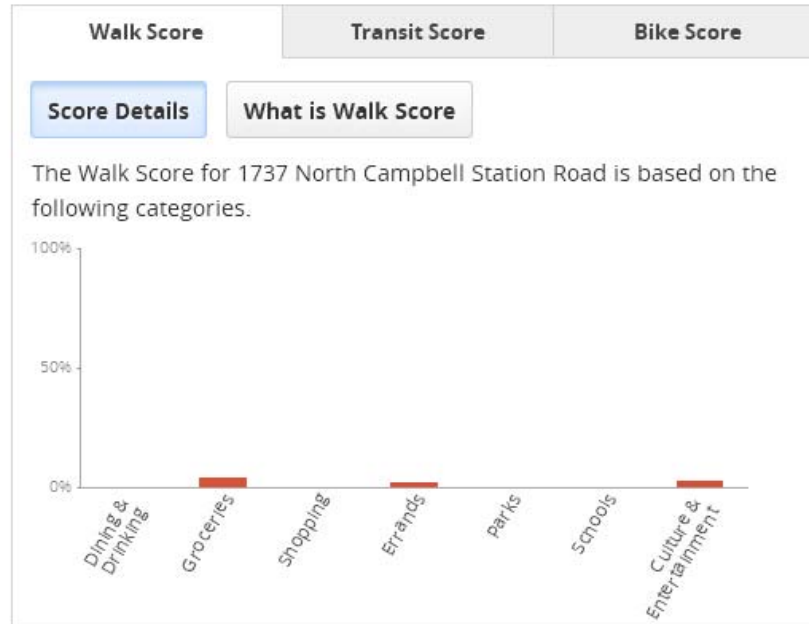
[About your score](#)



Scores for 1737 North Campbell Station Road



Walk Score
1



Scores for 1737 North Campbell Station Road



Walk Score
1

Walk Score	Transit Score	Bike Score
<p>Transit Score measures how well a location is served by public transit based on the distance and type of nearby transit lines.</p>		
90-100	Rider's Paradise World-class public transportation	
70-89	Excellent Transit Transit is convenient for most trips	
50-69	Good Transit Many nearby public transportation options	
25-49	Some Transit A few nearby public transportation options	
0-24	Minimal Transit It is possible to get on a bus	

Scores for 1737 North Campbell Station Road

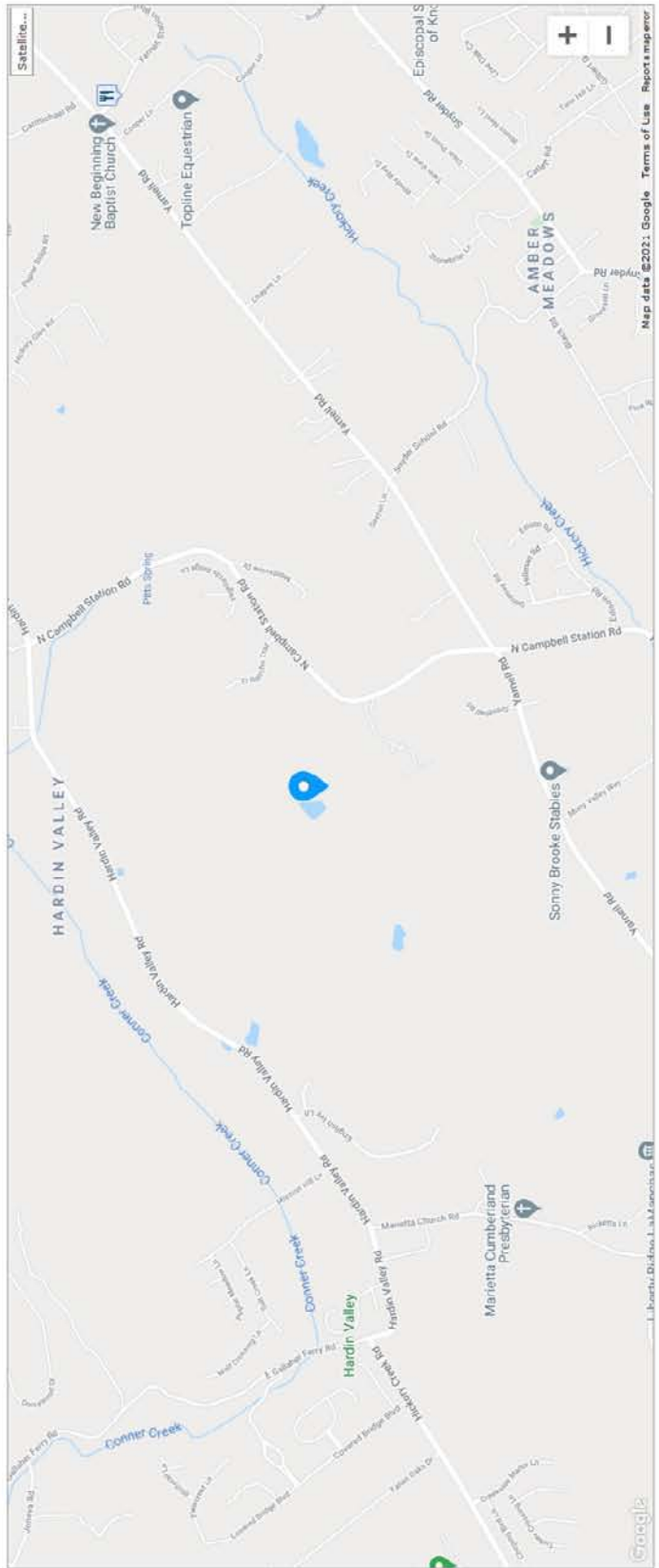


Walk Score
1

Walk Score	Transit Score	Bike Score
Bike Score measures whether an area is good for biking based on bike lanes and trails, hills, road connectivity, and destinations.		
90-100	Biker's Paradise	Daily errands can be accomplished on a bike
70-89	Very Bikeable	Biking is convenient for most trips
50-69	Bikeable	Some bike infrastructure
0-49	Somewhat Bikeable	Minimal bike infrastructure

What's Nearby

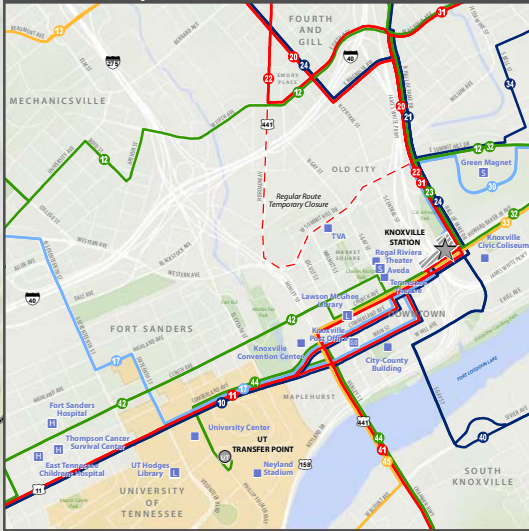
- Restaurants:**
 - Auntie Anne's 1.7mi
- Coffee:**
 - Starbucks 2.6mi
- Bars:**
 - Big Kahuna Wings 4mi
- Groceries:**
 - Food City - Hardin Valley 3mi
- Parks:**
 - Milton Hill Park 3.1mi
- Schools:**
 - Hardin Valley Elementary Sch... 1mi
- Shopping:**
 - Garhouse Antique Market 2mi
- Entertainment:**
 - Redbox .9mi
- Errands:**
 - U.S. Bank Branch .8mi
- Search Nearby:**



APPENDIX C

KNOXVILLE AREA TRANSIT MAP AND INFORMATION

Knoxville City Center



Legend

- Transfer Point
- Lift Service Area Boundary

Points of Interest

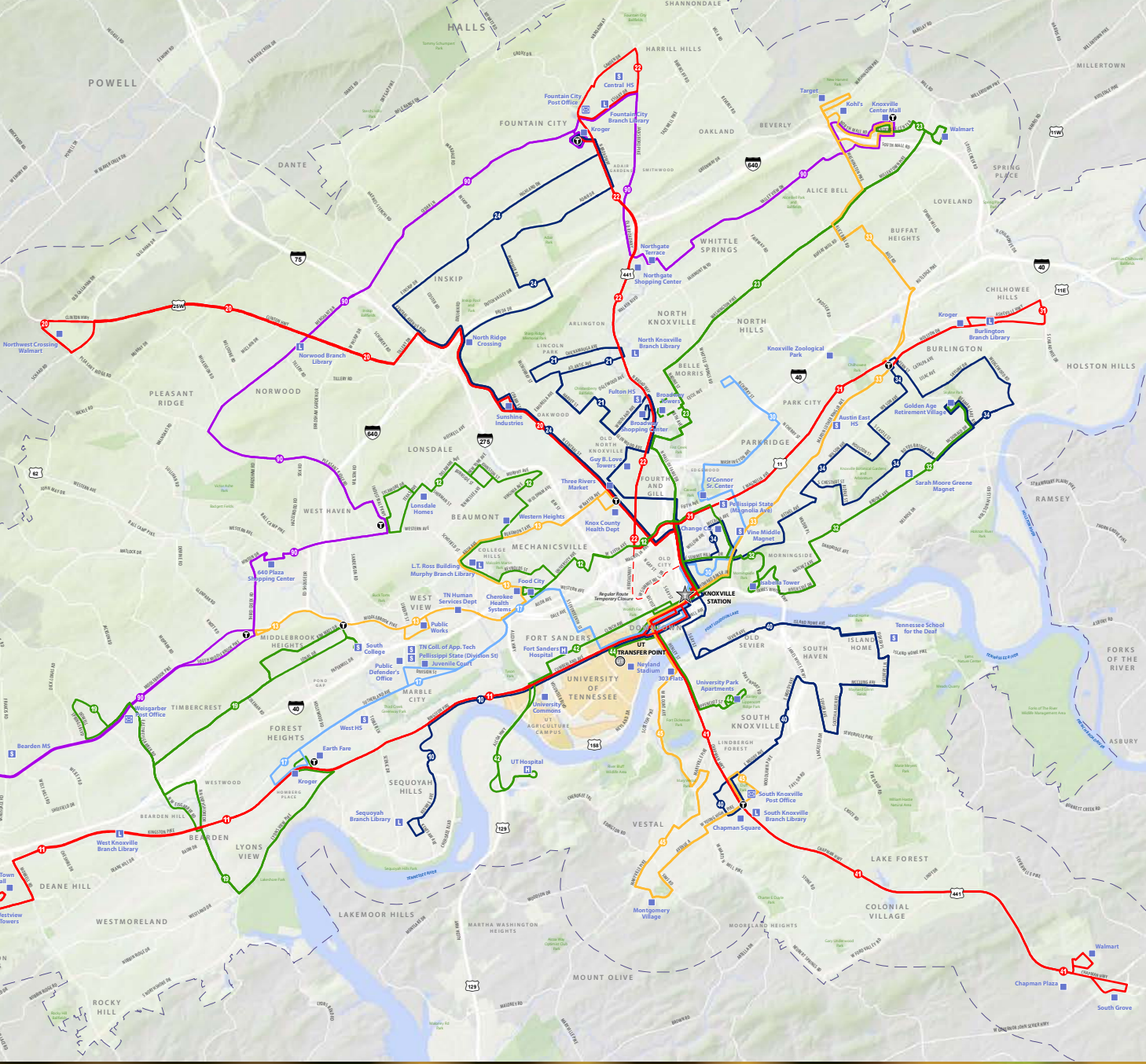
- Hospital
- Library
- School
- Point of Interest
- Post Office

Distances

0 5 10 Minutes Walking

0 5 10 Minutes Biking

0 0.5 1 Map Scale in Miles



FARE INFORMATION

With a base fare of \$1.50, KAT offers a variety of passes. Please note that only the fares marked with an asterisk can be purchased when boarding the bus. Others are available at KAT's Customer Service Counter at Knoxville Station (301 Church Ave.) or by mail via katbus.com.

FARE TYPE	REGULAR FARE	REDUCED FARE
One-Ride Pass*	\$1.50	\$0.75
1 Day Pass*	\$4.00	\$2.00
7 Day Pass	\$15.00	\$7.50
30 Day Pass	\$50.00	\$25.00
20 Ride Pass*	\$25.00	\$12.50
Transfer*	\$0.50	\$0.25

REDUCED FARE INFORMATION

A reduced fare is available to those who qualify. Qualifying individuals include seniors age 65 or over, Medicare card holders, students under the age of 18, and persons with disabilities. Proper identification (Medicare card or a valid KAT I.D. card) is required before boarding. For more information on how to obtain a discounted-fare I.D. visit katbus.com/fares or call 637-3000.

BUS STOPS ONLY!

KAT buses stop ONLY at locations designated by bus stop signs. Generally, bus stops are located at least every 1/4 mile along the route.

KAT HOLIDAYS

KAT buses do not run on the following holidays:

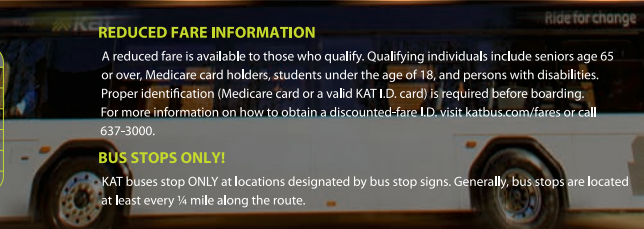
- New Year's Day
- Thanksgiving
- Independence Day
- Christmas

Please note that KAT's Knoxville Station Customer Service counter is also closed during those days.

KAT buses run on a Saturday schedule on the following holidays:

- Martin Luther King, Jr. Day
- Day after Thanksgiving
- Memorial Day
- Christmas Eve
- Labor Day

KAT's administrative offices are closed on all holidays listed above.



16 CEDAR BLUFF CONNECTOR

(Weekdays and Saturdays)



Legend

- Route Timepoint
- Transfer Point
- Bus Stop

Points of Interest

- Hospital
- Library
- Point of Interest
- School
- Park & Ride
- Post Office

0 0.25 0.5

Miles

Map revised: 02.21



CEDAR BLUFF CONNECTOR

(Weekdays and Saturdays)

SERVES:

- ★ Cedar Bluff
- ★ Knoxville Catholic High School
- ★ Kroger at The Landing
- ★ Parkwest Hospital
- ★ Social Security Administration
- ★ Walmart
- ★ Windsor Square



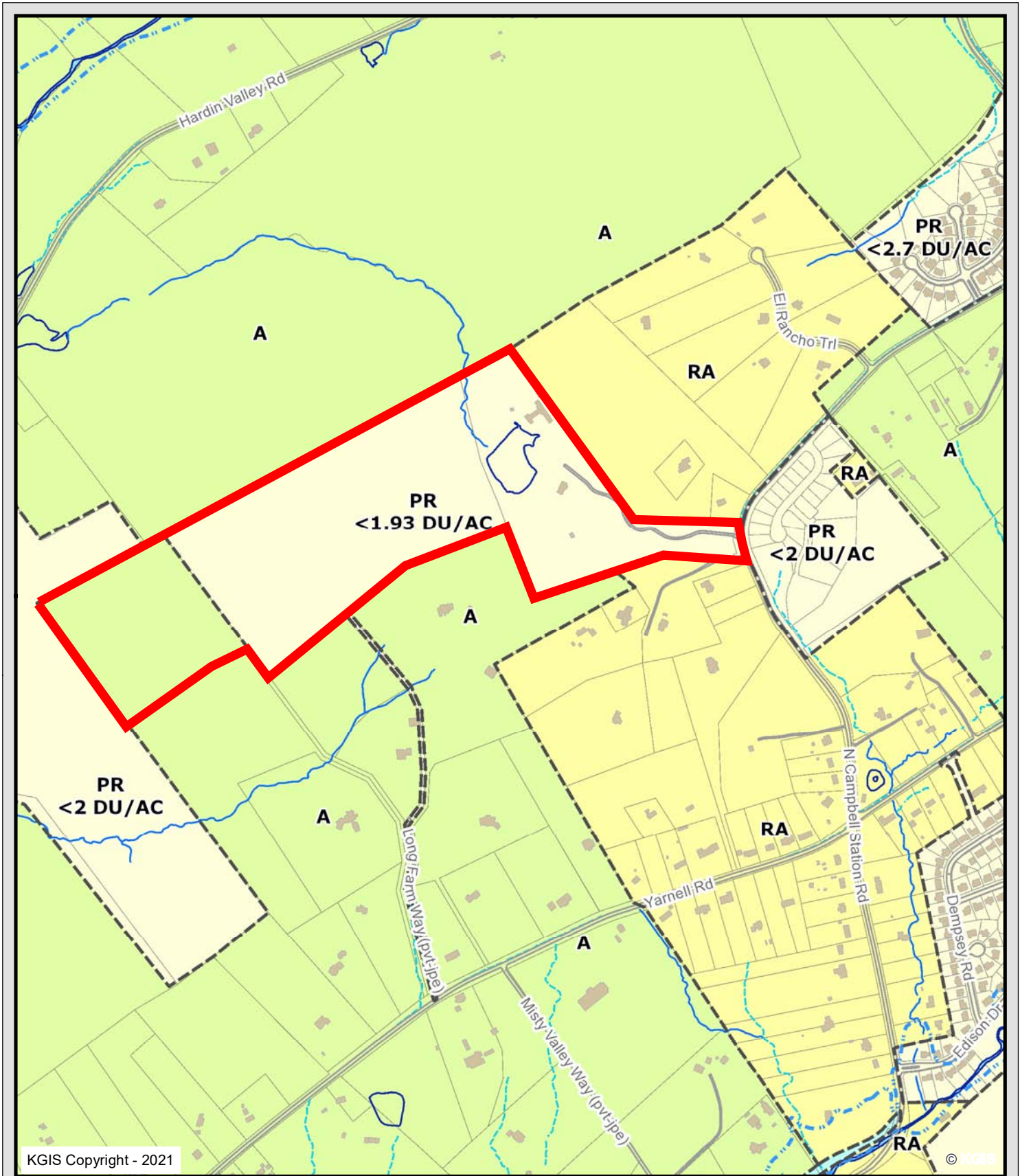
Information Updated: February 1, 2021

Going from Wal Mart to Windsor Square				Going from Windsor Square to Wal Mart			
T Transfer to:							Rts. 11 & 90
Walmart	Park Village at Woodpark	Parkwest Hospital	Windsor Square	Parkwest Hospital	Cedar Bluff at Fox Lonas	Walmart	
①	②	③	④	⑤	⑥	⑦	
WEEKDAY SCHEDULE							
A.M.	6:15	6:27	6:32	6:42	6:50	6:54	7:10
	7:15	7:27	7:32	7:42	7:50	7:54	8:10
	8:15	8:27	8:32	8:42	8:50	8:54	9:10
	9:15	9:27	9:32	9:42	9:50	9:54	10:10
	10:15	10:27	10:32	10:42	10:50	10:54	11:10
	11:15	11:27	11:32	11:42	11:50	11:54	12:10
P.M.	12:15	12:27	12:32	12:42	12:50	12:54	1:10
	1:15	1:27	1:32	1:42	1:50	1:54	2:10
	2:15	2:27	2:32	2:42	2:50	2:54	3:10
	3:15	3:27	3:32	3:42	3:50	3:54	4:10
	4:15	4:27	4:32	4:42	4:50	4:54	5:10
	5:15	5:27	5:32	5:42	5:50	5:54	6:10
	6:15	6:27	6:32	6:42	6:50	6:54	7:10
	7:15	7:27	7:32	7:42	7:50	7:54	8:10
	8:15	8:27	8:32	8:42	8:50	8:54	9:10
	9:15	9:27	9:32	9:42	9:50	9:54	10:10
SATURDAY SCHEDULE							
A.M.	7:15	7:27	7:32	7:42	7:50	7:54	8:10
	8:15	8:27	8:32	8:42	8:50	8:54	9:10
	9:15	9:27	9:32	9:42	9:50	9:54	10:10
	10:15	10:27	10:32	10:42	10:50	10:54	11:10
	11:15	11:27	11:32	11:42	11:50	11:54	12:10
P.M.	12:15	12:27	12:32	12:42	12:50	12:54	1:10
	1:15	1:27	1:32	1:42	1:50	1:54	2:10
	2:15	2:27	2:32	2:42	2:50	2:54	3:10
	3:15	3:27	3:32	3:42	3:50	3:54	4:10
	4:15	4:27	4:32	4:42	4:50	4:54	5:10
	5:15	5:27	5:32	5:42	5:50	5:54	6:10
	6:15	6:27	6:32	6:42	6:50	6:54	7:10
	7:15	7:27	7:32	7:42	7:50	7:54	8:10
	8:15	8:27	8:32	8:42	8:50	8:54	9:10
	9:15	9:27	9:32	9:42	9:50	9:54	10:10

Need help reading this schedule?
 Need other general information on how to ride?
 Visit www.katbus.com or call 865-637-3000

APPENDIX D

ZONING MAP



KGIS Copyright - 2021

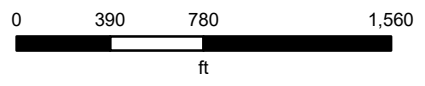
© KGIS

Zoning Map

Knoxville - Knox County - KUB Geographic Information System



Printed: 3/13/2021 at 3:58:06 PM



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APPENDIX E

MANUAL TRAFFIC COUNT DATA

TRAFFIC COUNT DATA

Major Street: North Campbell Station Road (SB-NB)
 Minor Street: Yarnell Road (WB-EB)
 Traffic Control: Stop Control on Yarnell Road

3/9/2021 (Tuesday)
 Sunny, Warm
 Conducted by: Ajax Engineering

TIME BEGIN	North Campbell Station Road			Yarnell Road			North Campbell Station Road			Yarnell Road			VEHICLE TOTAL	PEAK HOUR
	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND				
	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT		
7:00 AM	8	27	1	3	2	14	4	29	5	0	2	10	105	
7:15 AM	5	28	2	5	4	23	5	48	9	4	8	14	155	7:15 AM - 8:15 AM
7:30 AM	24	63	3	4	2	15	4	32	7	2	7	15	178	
7:45 AM	19	60	3	2	3	30	3	46	9	3	14	11	203	
8:00 AM	14	48	1	6	4	18	5	43	8	1	3	5	156	
8:15 AM	19	47	1	3	1	19	5	30	4	2	4	6	141	
8:30 AM	6	37	0	4	4	4	5	27	4	0	1	11	103	
8:45 AM	0	30	1	5	0	3	2	23	5	1	5	6	81	
TOTAL	95	340	12	32	20	126	33	278	51	13	44	78	1122	
11:00 AM	4	25	0	1	1	0	8	8	13	3	3	5	71	
11:15 AM	1	22	0	2	2	2	4	4	4	1	2	3	47	
11:30 AM	1	25	1	3	8	4	9	9	5	1	0	8	74	11:30 AM - 12:30 PM
11:45 AM	2	33	3	5	7	3	10	10	5	0	5	11	94	
12:00 PM	2	29	0	4	4	3	4	4	2	3	1	6	62	
12:15 PM	1	33	2	11	0	1	4	4	2	2	4	4	68	
12:30 PM	3	42	0	3	2	1	7	7	1	0	1	3	70	
12:45 PM	3	30	4	8	5	3	9	9	4	4	3	5	87	
TOTAL	17	239	10	37	29	17	55	55	36	14	19	45	573	
2:00 PM	6	29	5	6	2	4	9	41	3	2	3	6	116	
2:15 PM	6	38	3	3	4	2	7	46	5	0	0	6	120	
2:30 PM	4	30	1	3	5	12	5	47	9	1	2	8	127	
2:45 PM	12	39	2	10	8	8	7	40	6	0	4	6	142	
3:00 PM	9	28	0	9	3	8	4	33	9	3	4	5	115	
3:15 PM	10	56	5	8	3	14	7	53	7	4	4	4	175	3:15 PM - 4:15 PM
3:30 PM	37	64	7	7	6	10	13	36	8	1	4	7	200	
3:45 PM	50	85	5	5	4	11	11	42	13	0	2	12	240	
4:00 PM	8	50	1	9	6	4	11	37	4	2	4	7	143	
4:15 PM	5	45	2	7	6	10	13	50	12	3	3	12	168	
4:30 PM	1	40	0	7	8	6	12	39	9	1	6	11	140	
4:45 PM	3	33	2	8	7	5	15	49	12	3	3	9	149	
5:00 PM	6	34	6	15	15	13	11	49	11	3	4	9	176	
5:15 PM	8	43	2	10	8	14	26	51	8	2	2	7	181	
5:30 PM	6	49	0	11	9	8	14	55	14	0	6	8	180	
5:45 PM	7	37	2	6	4	14	12	50	11	1	6	12	162	
TOTAL	178	700	43	124	98	143	177	718	141	26	57	129	2534	

2021 AM Peak Hour 7:15 AM - 8:15 AM

TIME BEGIN	North Campbell Station Road			Yarnell Road			North Campbell Station Road			Yarnell Road		
	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND		
	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT
7:15 AM	5	28	2	5	4	23	5	48	9	4	8	14
7:30 AM	24	63	3	4	2	15	4	32	7	2	7	15
7:45 AM	19	60	3	2	3	30	3	46	9	3	14	11
8:00 AM	14	48	1	6	4	18	5	43	8	1	3	5
TOTAL	62	199	9	17	13	86	17	169	33	10	32	45
PHF	0.65	0.79	0.75	0.71	0.81	0.72	0.85	0.88	0.92	0.63	0.57	0.75
TRUCK %	0.0%	3.5%	11.1%	5.9%	15.4%	2.3%	5.9%	5.3%	0.0%	10.0%	0.0%	0.0%

2021 PM Peak Hour 3:15 PM - 4:15 PM

TIME BEGIN	North Campbell Station Road			Yarnell Road			North Campbell Station Road			Yarnell Road		
	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND		
	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT
3:15 PM	10	56	5	8	3	14	7	53	7	4	4	4
3:30 PM	37	64	7	7	6	10	13	36	8	1	4	7
3:45 PM	50	85	5	5	4	11	11	42	13	0	2	12
4:00 PM	8	50	1	9	6	4	11	37	4	2	4	7
TOTAL	105	255	18	29	19	39	42	168	32	7	14	30
PHF	0.53	0.75	0.64	0.81	0.79	0.70	0.81	0.79	0.62	0.44	0.88	0.63
TRUCK %	2.9%	1.2%	0.0%	0.0%	0.0%	5.1%	0.0%	4.8%	3.1%	14.3%	14.3%	0.0%

APPENDIX F

CAPACITY ANALYSES – HCM WORKSHEETS (SYNCHRO 8)

EXISTING TRAFFIC CONDITIONS

HCM Unsignalized Intersection Capacity Analysis

7: N. Campbell Station Road & Yarnell Road

3/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	10	32	45	17	13	86	17	169	33	62	199	9
Sign Control		Stop			Stop			Free			Free	
Grade		-6%			5%			-1%			-2%	
Peak Hour Factor	0.63	0.57	0.75	0.71	0.81	0.72	0.85	0.88	0.92	0.65	0.79	0.75
Hourly flow rate (vph)	16	56	60	24	16	119	20	192	36	95	252	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	826	717	258	787	705	210	264			228		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	826	717	258	787	705	210	264			228		
tC, single (s)	7.2	6.5	6.2	7.2	6.7	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.6	4.1	3.3	2.3			2.2		
p0 queue free %	93	83	92	90	95	86	98			93		
cM capacity (veh/h)	218	328	786	228	316	830	1277			1352		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	132	159	248	359								
Volume Left	16	24	20	95								
Volume Right	60	119	36	12								
cSH	412	532	1277	1352								
Volume to Capacity	0.32	0.30	0.02	0.07								
Queue Length 95th (ft)	34	31	1	6								
Control Delay (s)	17.8	14.6	0.8	2.6								
Lane LOS	C	B	A	A								
Approach Delay (s)	17.8	14.6	0.8	2.6								
Approach LOS	C	B										
Intersection Summary												
Average Delay			6.4									
Intersection Capacity Utilization			46.2%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

7: N. Campbell Station Road & Yarnell Road

3/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Volume (veh/h)	12	38	54	20	16	103	20	203	40	74	239	11
Sign Control		Stop			Stop			Free			Free	
Grade		-6%			5%			-1%			-2%	
Peak Hour Factor	0.63	0.57	0.75	0.71	0.81	0.72	0.85	0.88	0.92	0.65	0.79	0.75
Hourly flow rate (vph)	19	67	72	28	20	143	24	231	43	114	303	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	990	859	310	942	844	252	317			274		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	990	859	310	942	844	252	317			274		
tC, single (s)	7.2	6.5	6.2	7.2	6.7	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.6	4.1	3.3	2.3			2.2		
p0 queue free %	88	75	90	82	92	82	98			91		
cM capacity (veh/h)	155	266	735	160	255	786	1221			1301		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	158	191	298	431
Volume Left	19	28	24	114
Volume Right	72	143	43	15
cSH	334	439	1221	1301
Volume to Capacity	0.47	0.44	0.02	0.09
Queue Length 95th (ft)	60	54	1	7
Control Delay (s)	25.0	19.4	0.8	2.8
Lane LOS	D	C	A	A
Approach Delay (s)	25.0	19.4	0.8	2.8
Approach LOS	D	C		

Intersection Summary			
Average Delay		8.4	
Intersection Capacity Utilization	53.4%		ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

7: N. Campbell Station Road & Yarnell Road

3/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Volume (veh/h)	7	14	30	29	19	39	42	168	32	105	255	18
Sign Control		Stop			Stop			Free			Free	
Grade		-6%			5%			-1%			-2%	
Peak Hour Factor	0.44	0.88	0.63	0.81	0.79	0.62	0.81	0.79	0.62	0.53	0.75	0.64
Hourly flow rate (vph)	16	16	48	36	24	63	52	213	52	198	340	28
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1167	1118	354	1148	1107	238	368			264		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1167	1118	354	1148	1107	238	368			264		
tC, single (s)	7.2	6.6	6.2	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.1	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	86	90	93	73	86	92	96			85		
cM capacity (veh/h)	114	160	695	130	171	793	1202			1294		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	79	123	316	566
Volume Left	16	36	52	198
Volume Right	48	63	52	28
cSH	258	248	1202	1294
Volume to Capacity	0.31	0.49	0.04	0.15
Queue Length 95th (ft)	32	63	3	14
Control Delay (s)	25.0	32.9	1.7	4.0
Lane LOS	C	D	A	A
Approach Delay (s)	25.0	32.9	1.7	4.0
Approach LOS	C	D		

Intersection Summary			
Average Delay		8.1	
Intersection Capacity Utilization	49.6%		ICU Level of Service
Analysis Period (min)	15		A

HCM Unsignalized Intersection Capacity Analysis

7: N. Campbell Station Road & Yarnell Road

3/16/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Volume (veh/h)	8	17	36	35	23	47	50	202	38	126	306	22
Sign Control		Stop			Stop			Free			Free	
Grade		-6%			5%			-1%			-2%	
Peak Hour Factor	0.44	0.88	0.63	0.81	0.79	0.62	0.81	0.79	0.62	0.53	0.75	0.64
Hourly flow rate (vph)	18	19	57	43	29	76	62	256	61	238	408	34
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1401	1341	425	1377	1328	286	442			317		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1401	1341	425	1377	1328	286	442			317		
tC, single (s)	7.2	6.6	6.2	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.1	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	73	83	91	46	76	90	95			81		
cM capacity (veh/h)	67	110	634	80	119	745	1128			1237		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	95	148	379	680
Volume Left	18	43	62	238
Volume Right	57	76	61	34
cSH	176	167	1128	1237
Volume to Capacity	0.54	0.89	0.05	0.19
Queue Length 95th (ft)	69	159	4	18
Control Delay (s)	46.9	97.7	1.8	4.5
Lane LOS	E	F	A	A
Approach Delay (s)	46.9	97.7	1.8	4.5
Approach LOS	E	F		

Intersection Summary			
Average Delay		17.4	
Intersection Capacity Utilization	58.7%		ICU Level of Service B
Analysis Period (min)		15	

OPENING YEAR TRAFFIC CONDITIONS (WITH PROJECT)

HCM Unsignalized Intersection Capacity Analysis

2: North Campbell Station Road & Catatoga Subdivision Road "A"

3/16/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	43	43	15	398	406	14
Sign Control	Stop			Free	Free	
Grade	0%			5%	-5%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	48	48	17	442	451	16
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	934	459	467			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	934	459	467			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	84	92	98			
cM capacity (veh/h)	293	606	1105			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	96	459	467			
Volume Left	48	17	0			
Volume Right	48	0	16			
cSH	395	1105	1700			
Volume to Capacity	0.24	0.02	0.27			
Queue Length 95th (ft)	23	1	0			
Control Delay (s)	17.0	0.5	0.0			
Lane LOS	C	A				
Approach Delay (s)	17.0	0.5	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization		44.8%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

2: North Campbell Station Road & Catatoga Subdivision Road "A"

3/16/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	37	20	34	322	569	64
Sign Control	Stop			Free	Free	
Grade	0%			5%	-5%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	41	22	38	358	632	71
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1101	668	703			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1101	668	703			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	82	95	96			
cM capacity (veh/h)	227	462	904			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	63	396	703			
Volume Left	41	38	0			
Volume Right	22	0	71			
cSH	276	904	1700			
Volume to Capacity	0.23	0.04	0.41			
Queue Length 95th (ft)	22	3	0			
Control Delay (s)	21.9	1.3	0.0			
Lane LOS	C	A				
Approach Delay (s)	21.9	1.3	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization		55.3%		ICU Level of Service		B
Analysis Period (min)			15			

APPENDIX G

ITE TRIP GENERATION RATES

Land Use: 210

Single-Family Detached Housing

Description

Single-family detached housing includes all single-family detached homes on individual lots. A typical site surveyed is a suburban subdivision.

Additional Data

The number of vehicles and residents had a high correlation with average weekday vehicle trip ends. The use of these variables was limited, however, because the number of vehicles and residents was often difficult to obtain or predict. The number of dwelling units was generally used as the independent variable of choice because it was usually readily available, easy to project, and had a high correlation with average weekday vehicle trip ends.

This land use included data from a wide variety of units with different sizes, price ranges, locations, and ages. Consequently, there was a wide variation in trips generated within this category. Other factors, such as geographic location and type of adjacent and nearby development, may also have had an effect on the site trip generation.

Single-family detached units had the highest trip generation rate per dwelling unit of all residential uses because they were the largest units in size and had more residents and more vehicles per unit than other residential land uses; they were generally located farther away from shopping centers, employment areas, and other trip attractors than other residential land uses; and they generally had fewer alternative modes of transportation available because they were typically not as concentrated as other residential land uses.

Time-of-day distribution data for this land use are presented in Appendix A. For the six general urban/suburban sites with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 7:15 and 8:15 a.m. and 4:00 and 5:00 p.m., respectively. For the two sites with Saturday data, the overall highest vehicle volume was counted between 3:00 and 4:00 p.m. For the one site with Sunday data, the overall highest vehicle volume was counted between 10:15 and 11:15 a.m.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in California, Connecticut, Delaware, Illinois, Indiana, Maryland, Minnesota, Montana, New Jersey, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont, and Virginia.

Source Numbers

100, 105, 114, 126, 157, 167, 177, 197, 207, 211, 217, 267, 275, 293, 300, 319, 320, 356, 357, 367, 384, 387, 407, 435, 522, 550, 552, 579, 598, 601, 603, 614, 637, 711, 716, 720, 728, 735, 868, 903, 925, 936

Single-Family Detached Housing (210)

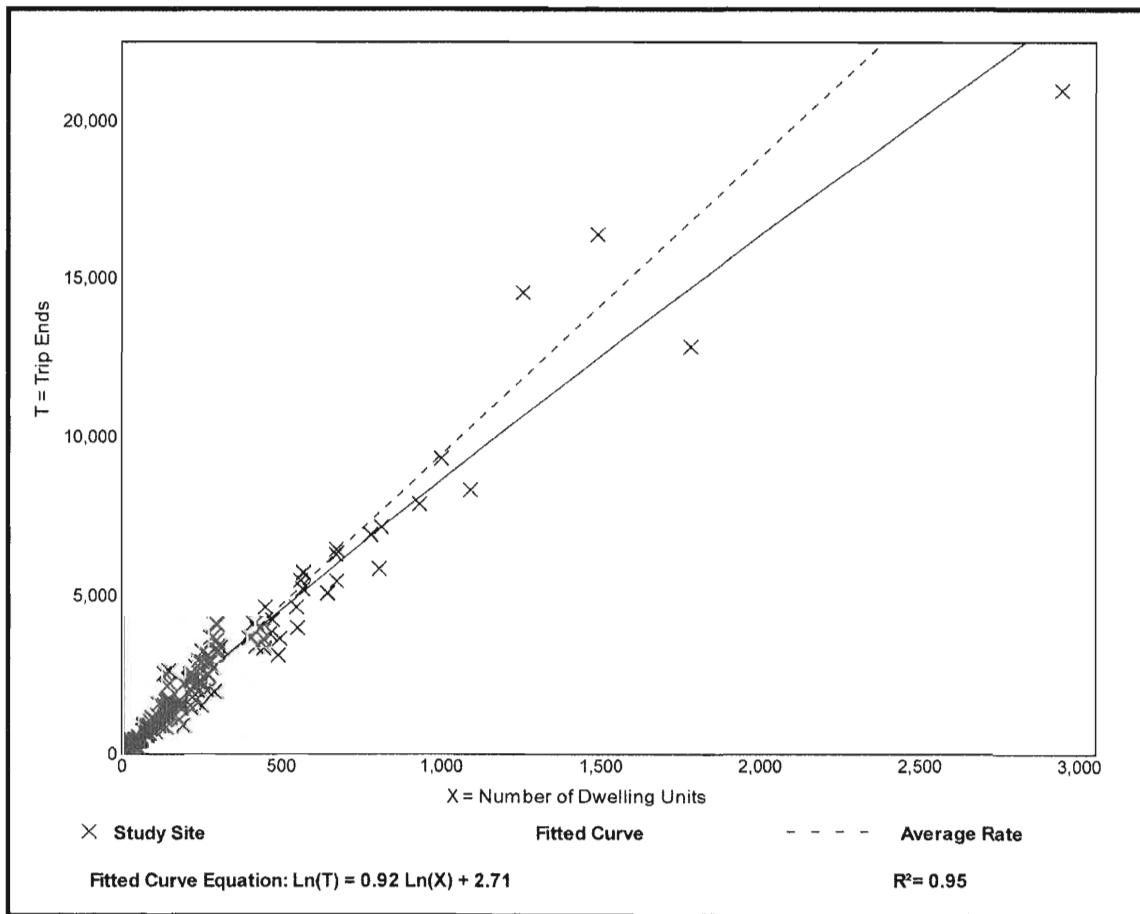
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 159
Avg. Num. of Dwelling Units: 264
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.44	4.81 - 19.39	2.10

Data Plot and Equation



Single-Family Detached Housing (210)

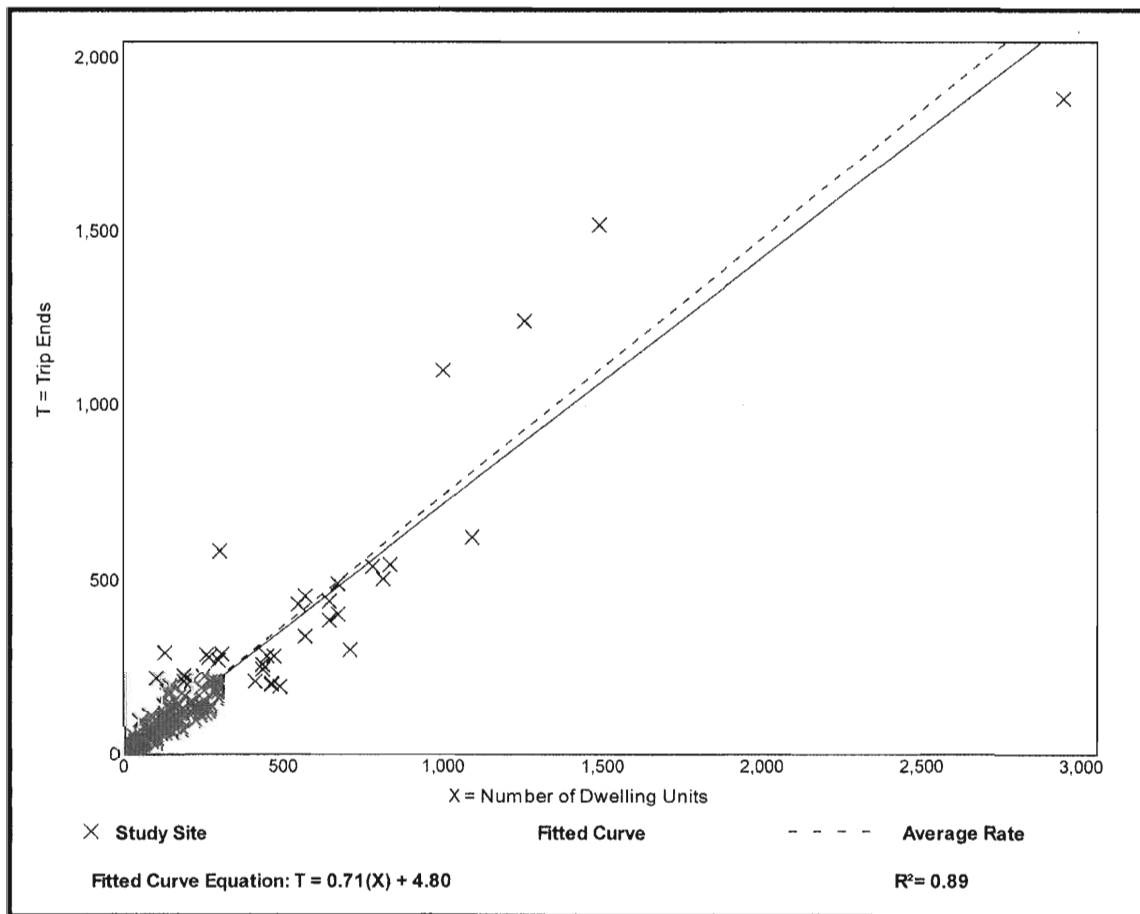
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban
 Number of Studies: 173
 Avg. Num. of Dwelling Units: 219
 Directional Distribution: 25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.74	0.33 - 2.27	0.27

Data Plot and Equation



Single-Family Detached Housing (210)

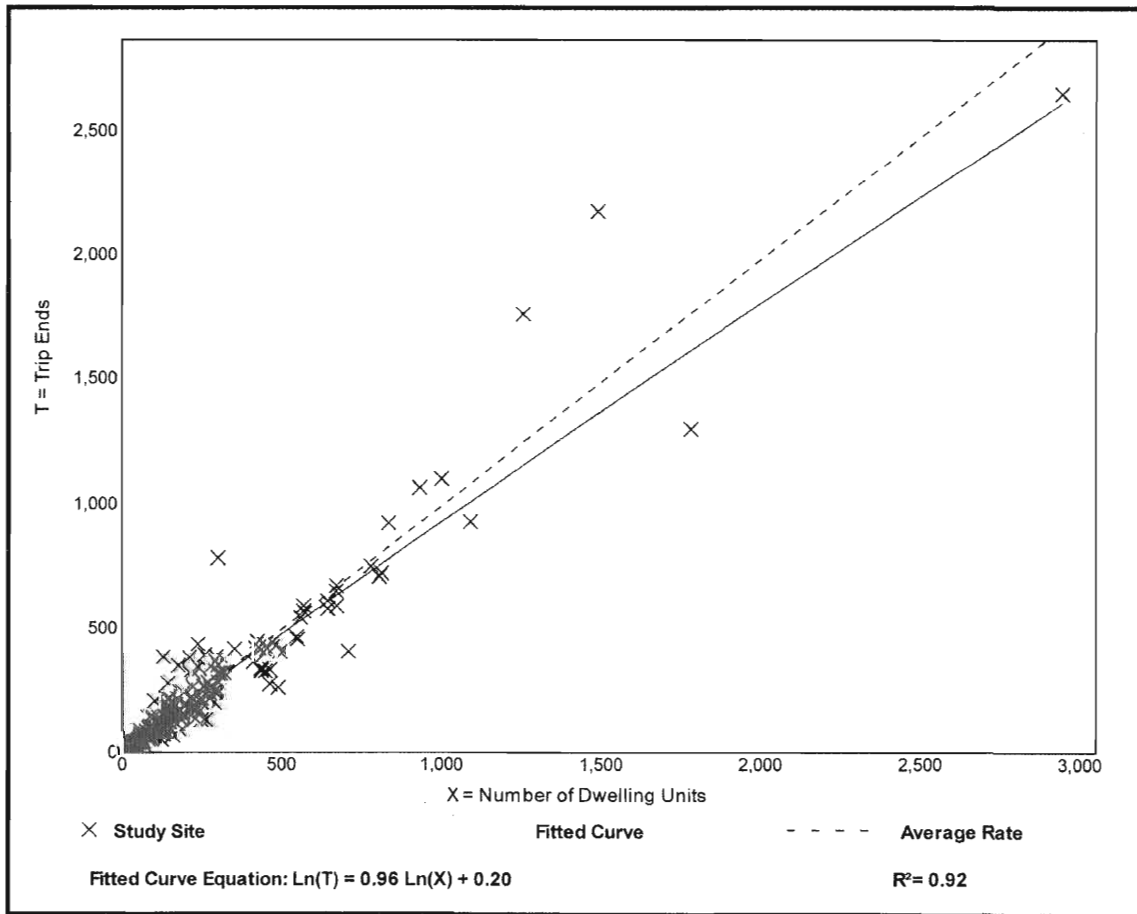
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban
 Number of Studies: 190
 Avg. Num. of Dwelling Units: 242
 Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

Data Plot and Equation



TRIP GENERATION FOR CATATOGA SUBDIVISION

155 Single-Family Detached Houses

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Single-Family Detached Housing	155 Houses	1,557	25%	75%		63%	37%	
				29	86	115	98	57	155
Total New Volume Site Trips			1,557	29	86	115	98	57	155

ITE Trip Generation Manual, 10th Edition
 Trips calculated by using Fitted Curve Equation

TRIP GENERATION FOR CATATOGA SUBDIVISION

155 Single-Family Detached Houses

155 Residential Houses = X

Weekday:

Fitted Curve Equation: $\ln(T) = 0.92 \ln(X) + 2.71$

$$\ln(T) = 0.92 * 5.04 + 2.71$$

$$\ln(T) = 7.35$$

$$\underline{\underline{T = 1,557 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 7 and 9 am:

Fitted Curve Equation: $T = 0.71(X) + 4.80$

$$T = 0.71 * 155 + 4.80$$

$$\underline{\underline{T = 115 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 4 and 6 pm:

Fitted Curve Equation: $\ln(T) = 0.96 \ln(X) + 0.2$

$$\ln(T) = 0.96 * 5.04 + 0.20$$

$$\ln(T) = 5.04$$

$$\underline{\underline{T = 155 \text{ trips}}}$$

APPENDIX H

2018 CENSUS BUREAU DATA

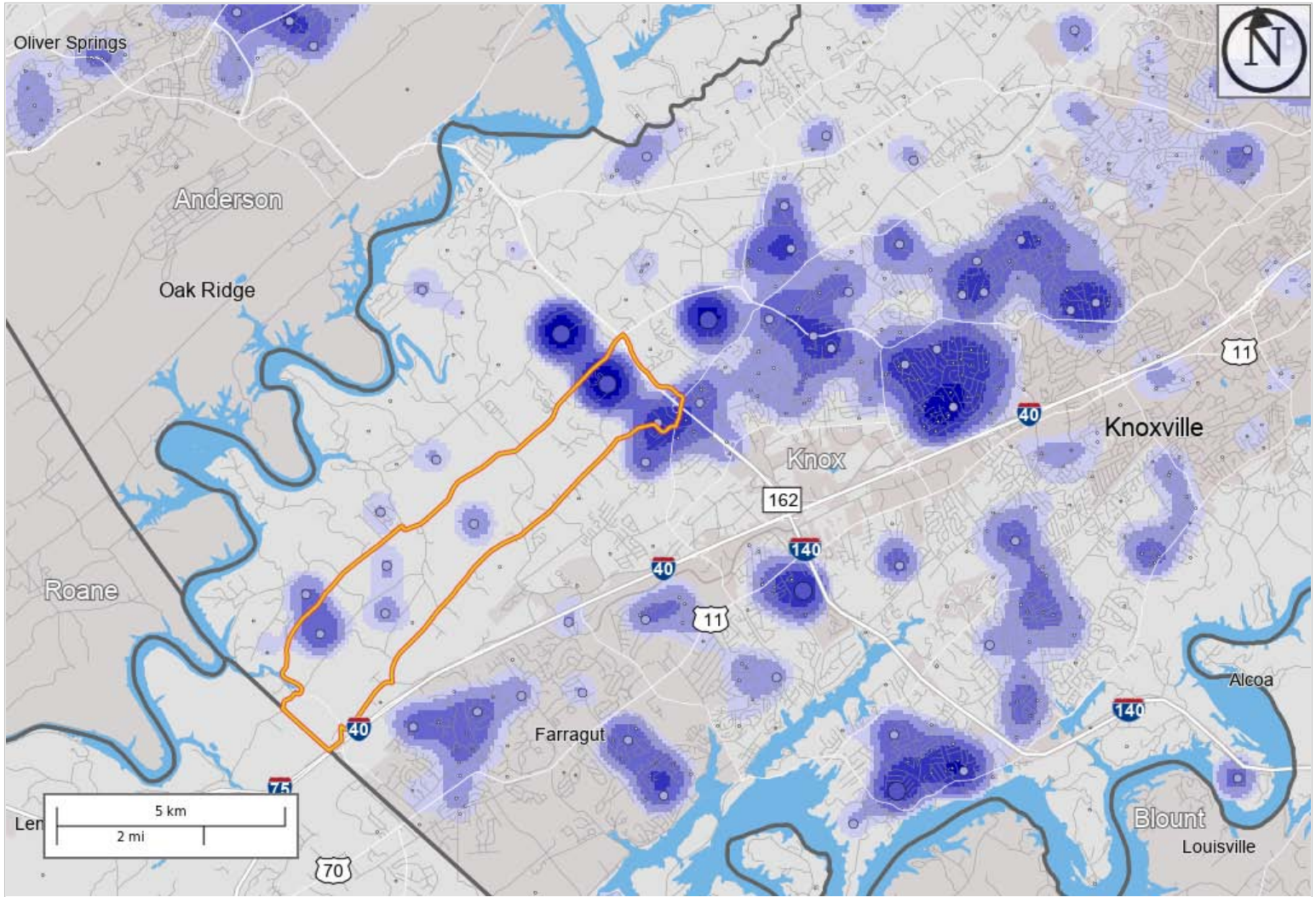
Distance/Direction Report - Work to Home

All Jobs for All Workers in 2018

Created by the U.S. Census Bureau's OnTheMap <https://onthemap.ces.census.gov> on 03/17/2021

Counts and Density of Home Locations for All Jobs in Work Selection Area in 2018

All Workers



Map Legend

Job Density [Jobs/Sq. Mile]

- 5 - 6
- 7 - 11
- 12 - 19
- 20 - 30

Job Count [Jobs/Census Block]

- 1 - 2
- 3 - 6
- 7 - 13

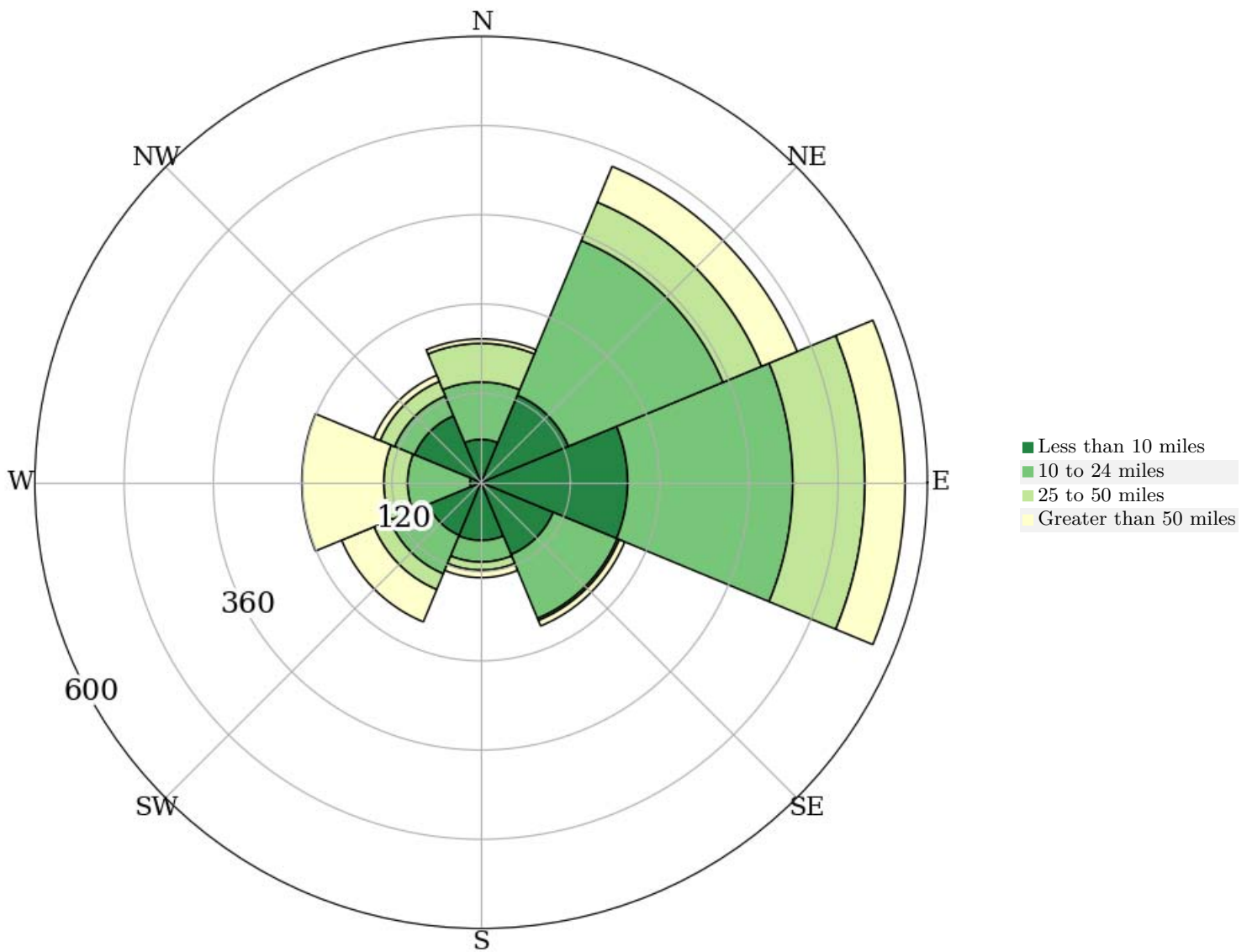
Selection Areas

- 🔴 Analysis Selection



All Jobs for All Workers in 2018

Distance and Direction from Work Census Block to Home Census Block, Employed in Selection Area



All Jobs for All Workers in 2018

Distance from Work Census Block to Home Census Block, Employed in Selection Area

Distance	2018	
	Count	Share
Total All Jobs	2,160	100.0
Less than 10 miles	754	34.9
10 to 24 miles	815	37.7
25 to 50 miles	295	13.7
Greater than 50 miles	296	13.7

Additional Information

Analysis Settings

Analysis Type	Distance/Direction
Selection area as	Work
Year(s)	2018
Job Type	All Jobs
Selection Area	59.05 (Knox, TN) from Census Tracts
Selected Census Blocks	40
Analysis Generation Date	03/17/2021 15:21 - OnTheMap 6.8
Code Revision	5dc8e60ec2609d78ebfa7d4b188db13aacbb1ba6
LODES Data Version	20201117_1559

Data Sources

Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2nd Quarter of 2002-2018).

Notes

1. Race, Ethnicity, Educational Attainment, and Sex statistics are beta release results and are not available before 2009.
2. Educational Attainment is only produced for workers aged 30 and over.
3. Firm Age and Firm Size statistics are beta release results for All Private jobs and are not available before 2011 and in 2018.

APPENDIX I

KNOX COUNTY TURN LANE THRESHOLD WORKSHEETS

TABLE 5A

LEFT-TURN LANE VOLUME THRESHOLDS
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH

(If the left-turn volume exceeds the table value a left -turn lane is needed)

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149	250	180	140	110	80	70
150 - 199	200	140	105	90	70	60
200 - 249	160	115	85	75	65	55
250 - 299	130	100	75	65	60	50
300 - 349	110	90	70	60	55	45
350 - 399	100	80	65	55	50	40
400 - 449	90	70	60	50	45	35
450 - 499	80	65	55	45	40	30
500 - 549	70	60	45	35	35	25
550 - 599	65	55	40	35	30	25
600 - 649	60	45	35	30	25	25
650 - 699	55	35	35	30	25	20
700 - 749	50	35	30	25	20	20
750 or More	45	35	25	25	20	20

406 + 14 = 420

398

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	=/ > 600
100 - 149	70	60	50	45	40	35
150 - 199	60	55	45	40	35	30
200 - 249	55	50	40	35	30	30
250 - 299	50	45	35	30	30	30
300 - 349	45	40	35	30	25	25
350 - 399	40	35	30	25	25	20
400 - 449	35	30	25	20	20	20
450 - 499	30	25	20	20	20	20
500 - 549	25	25	20	20	20	15
550 - 599	25	20	20	20	20	15
600 - 649	25	20	20	20	20	15
650 - 699	20	20	20	20	20	15
700 - 749	20	20	20	20	15	15
750 or More	20	20	20	15	15	15

North Campbell
Station Road at
Road "A"

2026 Projected AM
NB Left Turns = 15

Turn Lane NOT
Warranted

* Or through volume only if a right-turn lane exists

TABLE 5B

RIGHT-TURN LANE VOLUME THRESHOLDS
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	<100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25 25 - 49 50 - 99						
100 - 149 150 - 199						
200 - 249 250 - 299					Yes	Yes
300 - 349 350 - 399			Yes	Yes	Yes	Yes
400 - 449 450 - 499		Yes	Yes	Yes	Yes	Yes
500 - 549 550 - 599	Yes	Yes	Yes	Yes	Yes	Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

406

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600
14 Fewer Than 25 25 - 49 50 - 99				Yes	Yes	Yes
100 - 149 150 - 199		Yes		Yes	Yes	Yes
200 - 249 250 - 299	Yes	Yes		Yes	Yes	Yes
300 - 349 350 - 399	Yes	Yes		Yes	Yes	Yes
400 - 449 450 - 499	Yes	Yes		Yes	Yes	Yes
500 - 549 550 - 599	Yes	Yes	Yes	Yes	Yes	Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

North Campbell Station Road at Road "A"
2026 Projected AM SB Right Turns = 14
Turn Lane NOT Warranted

* Or through volume only if a left-turn lane exists.

TABLE 5A

LEFT-TURN LANE VOLUME THRESHOLDS
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH

(If the left-turn volume exceeds the table value a left -turn lane is needed)

569 + 64 = 633

322

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149	250	180	140	110	80	70
150 - 199	200	140		90	70	60
200 - 249	160	115		75	65	55
250 - 299	130	100		65	60	50
300 - 349	110	90		60	55	45
350 - 399	100	80		55	50	40
400 - 449	90	70		50	45	35
450 - 499	80	65		45	40	30
500 - 549	70	60		35	35	25
550 - 599	65	55		35	30	25
600 - 649	60	45	35	30	25	25
650 - 699	55	35	35	30	25	20
700 - 749	50	35	30	25	20	20
750 or More	45	35	25	25	20	20

North Campbell Station Road at Road "A"
2026 Projected AM NB Left Turns = 34
Turn Lane Warranted

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	=/ > 600
100 - 149	70	60	50	45	40	35
150 - 199	60	55	45	40	35	30
200 - 249	55	50	40	35	30	30
250 - 299	50	45	35	30	30	30
300 - 349	45	40	35	30	25	25
350 - 399	40	35	30	25	25	20
400 - 449	35	30	30	25	20	20
450 - 499	30	25	25	20	20	20
500 - 549	25	25	20	20	20	15
550 - 599	25	20	20	20	20	15
600 - 649	25	20	20	20	20	15
650 - 699	20	20	20	20	20	15
700 - 749	20	20	20	15	15	15
750 or More	20	20	20	15	15	15

* Or through volume only if a right-turn lane exists

TABLE 5B

RIGHT-TURN LANE VOLUME THRESHOLDS
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	<100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25 25 - 49 50 - 99						
100 - 149 150 - 199						
200 - 249 250 - 299					Yes	Yes
300 - 349 350 - 399			Yes	Yes	Yes	Yes
400 - 449 450 - 499		Yes	Yes	Yes	Yes	Yes
500 - 549 550 - 599	Yes	Yes	Yes	Yes	Yes	Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600
Fewer Than 25 25 - 49 50 - 99					Yes	Yes
100 - 149 150 - 199		Yes	Yes	Yes	Yes	Yes
200 - 249 250 - 299	Yes	Yes	Yes	Yes	Yes	Yes
300 - 349 350 - 399	Yes	Yes	Yes	Yes	Yes	Yes
400 - 449 450 - 499	Yes	Yes	Yes	Yes	Yes	Yes
500 - 549 550 - 599	Yes	Yes	Yes	Yes	Yes	Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

569

64

North Campbell
Station Road at
Road "A"

2026 Projected AM
SB Right Turns = 64

Turn Lane
Warranted

* Or through volume only if a left-turn lane exists.

APPENDIX J

SIGHT DISTANCE CERTIFICATION LETTER



URBAN ENGINEERING, INC.

CIVIL ENGINEERS • LAND PLANNERS • LAND SURVEYORS

October 22, 2020

Knox County Engineering and Public Works
Mr. Leo LaCamera, P.E. and Mr. Aaron Fritz, P.E.
205 West Baxter Avenue
Knoxville, TN 37917

And

Ms. Tarren Barrett, P.E.
Knoxville Regional TPO and MPC
400 Main Street, Suite 403
Knoxville, TN 37902

Re: 11-C-20-RZ / 11-A-20-SP

Dear Leo, Aaron and Tarren:

Sight distance was evaluated facing north and south from the proposed ingress / egress location. The posted speed along N Campbell Station Road at the project site is 30 MPH. Per the Knox County Subdivision Regulations, the required minimum available sight distance is 300 feet. In both directions, the available sight distance will exceed the minimum distance.

Attached to this letter you will find line of sight profiles in both directions, along with photographs taken from the entrance location facing both directions. Please do not hesitate to contact me if you have questions or comments about this letter or attachments.

Sincerely,

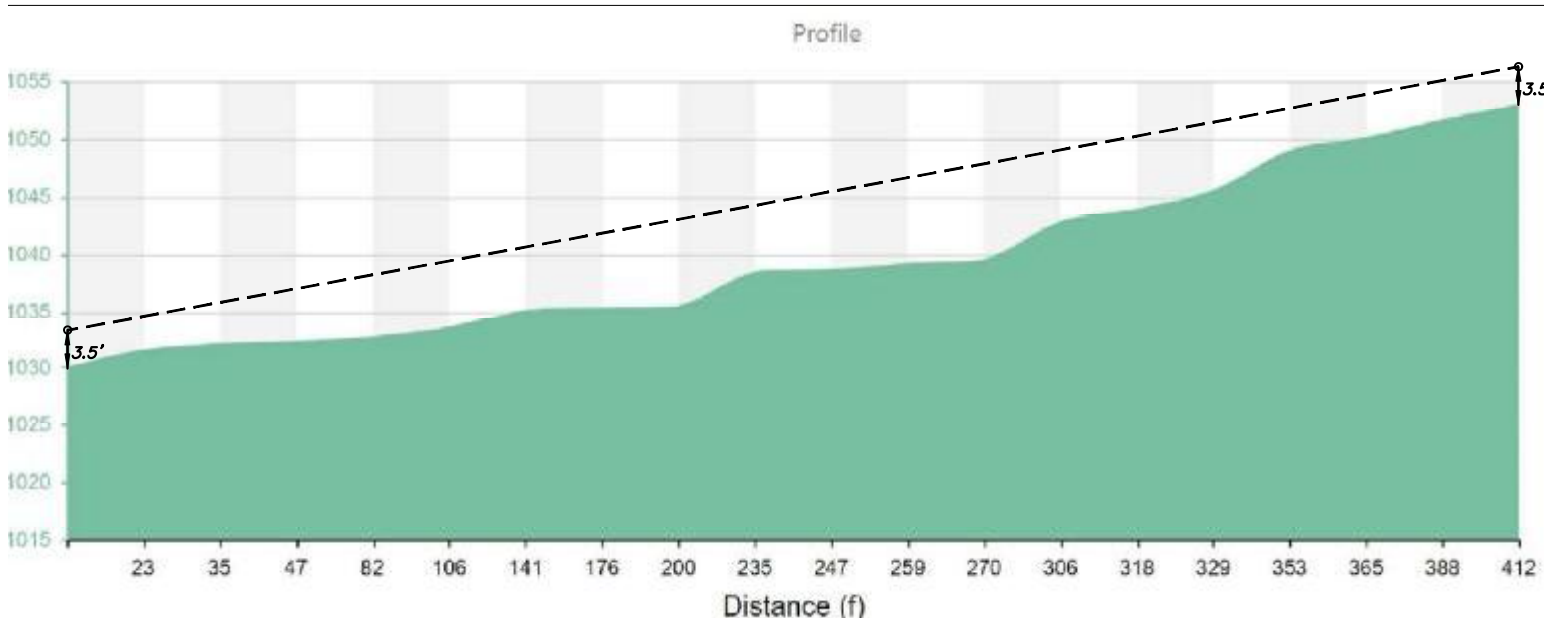
Urban Engineering, Inc.



Chris Sharp, P.E.



LINE OF SIGHT – N.T.S.



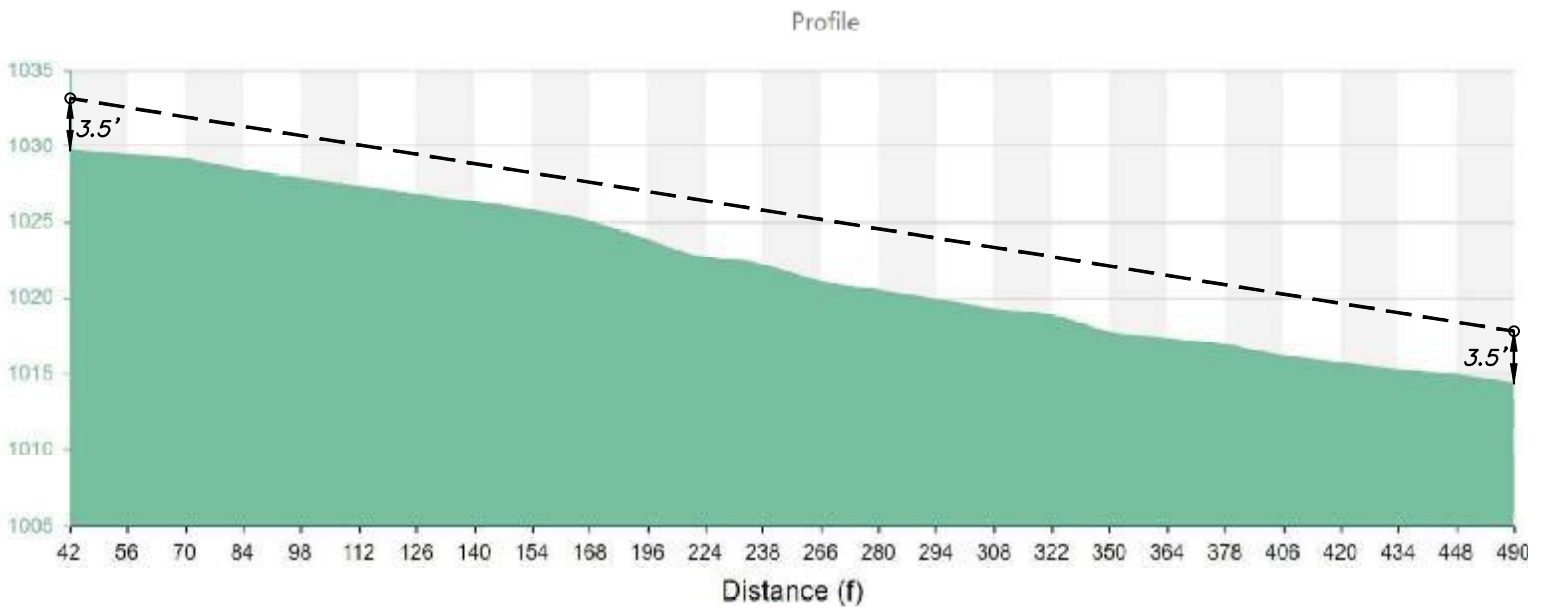
LINE OF SIGHT PROFILE – N.T.S.

SIGHT DISTANCE – NORTH
CATATOGA KENNELS

DISTRICT W6 CLT MAP 117 SCALE: N.T.S.	KNOX COUNTY, TN PARCEL 12.03 OCTOBER 21, 2020
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LINE OF SIGHT – N.T.S.



LINE OF SIGHT PROFILE – N.T.S.

SIGHT DISTANCE – SOUTH
CATATOGA KENNELS

*DISTRICT W6
CLT MAP 117
SCALE: N.T.S.*

*KNOX COUNTY, TN
PARCEL 12.03
OCTOBER 21, 2020*



URBAN ENGINEERING, INC.

CIVIL ENGINEERS • LAND PLANNERS • LAND SURVEYORS



Sight Distance From Ingress/Egress – North



Sight Distance From Ingress/Egress – South

APPENDIX K

SIMTRAFFIC VEHICLE QUEUE RESULTS

Queuing and Blocking Report
With Project with Improvements

4/21/2021

Intersection: 2: North Campbell Station Road & Catatoga Subdivision Road "A"

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	72	33
Average Queue (ft)	31	6
95th Queue (ft)	56	25
Link Distance (ft)	389	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		50
Storage Blk Time (%)		0
Queuing Penalty (veh)		0

Queuing and Blocking Report
With Project and Improvements

4/21/2021

Intersection: 2: North Campbell Station Road & Catatoga Subdivision Road "A"

Movement	EB	NB	NB	SB
Directions Served	LR	L	T	R
Maximum Queue (ft)	61	37	9	4
Average Queue (ft)	24	14	0	0
95th Queue (ft)	49	40	9	3
Link Distance (ft)	389		349	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		50		50
Storage Blk Time (%)		0		
Queuing Penalty (veh)		0		

APPENDIX L

RESPONSE LETTER TO ADDRESS REVIEW COMMENTS



11812 Black Road
Knoxville, Tennessee 37932
Phone (865) 556-0042
ajaxengineering@gmail.com

April 21, 2021

PROJECT NAME: Catatoga Subdivision TIS

TO: Knoxville-Knox County Planning

SUBJECT: TIS Comment Response Document for Catatoga Subdivision
(5-SB-21-C)
Review Comments dated April 16, 2021

Dear Knoxville-Knox County Planning Staff:

The following comment response document is submitted to address comments dated April 16, 2021, and is included at the end of the revised report.

1. **As referenced in the TIS, there is a desire to provide multiple access points within subdivisions that contain more than 150 homes and when this is not feasible then a boulevard roadway section is recommended to be constructed from the entrance back to the first intersecting street. According to the site plan that has been submitted and also shown in the TIS, the boulevard extends only a relatively short distance into the site and instead should be extended to the first intersection of Road "A" and Road "B". Please coordinate with the site engineer to redesign as appropriate and include documentation of any necessary considerations made for transition/taper of the boulevard median in relation to potential driveway locations for lots 1-3.**

Response: After discussion with Knox County Engineering and after attending the developer's meeting, it was determined that it would be acceptable to keep the original boulevard design submitted initially. This discussion is updated on page 43 in the Recommendations.

2. **The TIS provided an analysis of left turn lane warrants based on 2-lane roadways with a prevailing speed of 35 mph or less and a left-turn lane was very nearly warranted. We understand that the warrant tables were selected based on the posted speed limit of 30 mph on Campbell Station Rd however historical average speed data available to Knoxville-Knox County through an online application of archived travel**

time data known as "INRIX" indicates that this section of N. Campbell Station Rd has a daily average speed of 36.8 mph and 37.4 mph in the northbound and southbound directions respectively. Therefore, we are requesting that the left turn lane warrant analysis be conducted using the warrants for 2-lane roadways with a prevailing speed of 36 to 45 mph and the recommendations be revised accordingly including the necessity for installation of a potential northbound left turn lane and its required storage length.

Response: The study has been updated to reflect the new external vehicle speed data from Inrix. The updated results indicate a need for a left-turn lane on North Campbell Station Road in addition to a right-turn lane based on this speed data. This left-turn lane should have 50 feet of storage length based on the queue calculations. This updated discussion is shown on pages 37 and 40.

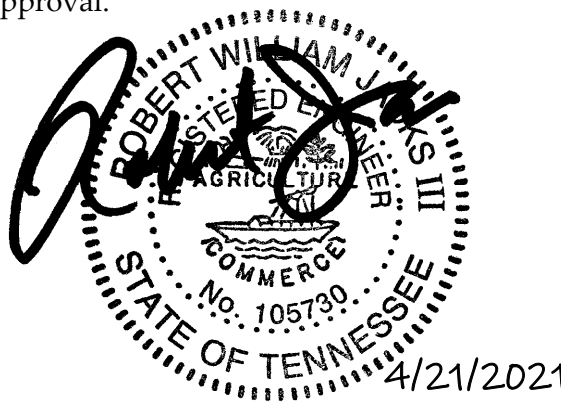
In addition to the requested revisions, other changes in the report include the following:

- Updated Title Page
- Updated Table of Contents
- Updated Page Footers
- Updated Recommendations
- Updated sight distance discussion on page 38 due to new Inrix data
- Added Appendix K to include vehicle queue results
- Added Appendix L to include this response letter

If you have any questions or further comments, please feel free to contact me at any time. I look forward to your review and approval.

Sincerely,

Ajax Engineering, LLC
Robert W. Jacks, P.E.



Ajax Engineering, LLC
11812 Black Road
Knoxville, TN 37932
ajaxengineering@gmail.com
© 2021 Ajax Engineering, LLC





Development Request

DEVELOPMENT

- Development Plan
- Planned Development
- Use on Review / Special Use
- Hillside Protection COA

SUBDIVISION

- Concept Plan
- Final Plat

ZONING

- Plan Amendment
 - SP
 - OYP
- Rezoning

Urban Engineering, Inc.

Engineer

Applicant Name

Affiliation

5/13/2021

File Number(s)

Date Filed

Meeting Date (if applicable)

5-SB-21-C/5-D-21-UR

CORRESPONDENCE

All correspondence related to this application should be directed to the approved contact listed below.

- Applicant
- Owner
- Option Holder
- Project Surveyor
- Engineer
- Architect/Landscape Architect

Chris Sharp, P.E.

Urban Engineering, Inc.

Name

Company

11852 Kingston Pike

Knoxville

TN

37934

Address

City

State

ZIP

(865) 966-1924

chris@urban-eng.com

Phone

Email

CURRENT PROPERTY INFO

HMH Development, Inc.

2926 Swafford Road (37932)

(865) 414-5347

Owner Name (if different)

Owner Address

Owner Phone

1737 N. Campbell Station Road & 0 Long Farm Way

117 01203 & 130AA00214

Property Address

Parcel ID

WKUD

WKUD

No

Sewer Provider

Water Provider

Septic (Y/N)

STAFF USE ONLY

West side of N Campbell Station Road, due North of Yarnell Road

62.6 ac +/-

General Location

Tract Size

6

PR <1.93 du/ac

AgForVac

City County

District

Zoning District

Existing Land Use

Northwest County

RR (hp)

Rural Area

Planning Sector

Sector Plan Land Use Classification

Growth Policy Plan Designation

DEVELOPMENT REQUEST

- Development Plan Use on Review / Special Use Hillside Protection COA
 Residential Non-Residential

Home Occupation (specify) _____

Other (specify) _____

Related City Permit Number(s)

SUBDIVISION REQUEST

Proposed Subdivision Name _____

Unit / Phase Number Combine Parcels Divide Parcel Total Number of Lots Created _____

Other (specify) _____

Attachments / Additional Requirements

Related Rezoning File Number

ZONING REQUEST

Zoning Change Proposed Zoning _____

Plan Amendment Change Proposed Plan Designation(s) _____

Proposed Density (units/acre) Previous Rezoning Requests _____

Other (specify) _____

Pending Plat File Number

STAFF USE ONLY

PLAT TYPE

- Staff Review Planning Commission

ATTACHMENTS

- Property Owners / Option Holders Variance Request

ADDITIONAL REQUIREMENTS

- Design Plan Certification (*Final Plat*)
 Use on Review / Special Use (*Concept Plan*)
 Traffic Impact Study
 COA Checklist (*Hillside Protection*)

Fee 1	Total
0406 7,500	7,500.00
Fee 2	
Fee 3	

AUTHORIZATION

By signing below, I certify I am the property owner, applicant or the owners authorized representative.

Chris Sharp

Digitally signed by Chris Sharp
Date: 2021.03.26 10:05:00 -04'00'

Urban Engineering, Inc.

Applicant Signature

Please Print

Date

Phone Number

Email

Marc Payne

Digitally signed by Marc Payne
Date: 2021.03.26 14:53:04 -04'00'

Marc Payne

3/26/2021

Staff Signature

Please Print

Date