



# SUBDIVISION REPORT - CONCEPT/USE ON REVIEW

► **FILE #:** 9-SB-20-C

**AGENDA ITEM #:** 20

9-D-20-UR

**AGENDA DATE:** 9/10/2020

► **SUBDIVISION:** BRAKEBILL ROAD SUBDIVISION

► **APPLICANT/DEVELOPER:** URBAN ENGINEERING, INC.

OWNER(S): RCB Real Estate, LLC

TAX IDENTIFICATION: 72 267 & 26701

[View map on KGIS](#)

JURISDICTION: County Commission District 8

STREET ADDRESS: 521 & 601 Brakebill Rd.

► **LOCATION:** West side of Brakebill Rd., south side of Hammer Rd.

SECTOR PLAN: East County

GROWTH POLICY PLAN: Urban Growth Area

WATERSHED: Sinking East Creek, Swan Pond, & Holtston and French Broad

► **APPROXIMATE ACREAGE:** 100.6 acres

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

► **EXISTING LAND USE:** Vacant

► **PROPOSED USE:** Detached and attached residential subdivision

SURROUNDING LAND USE AND ZONING: North: Residences / A (Agricultural), PR (Planned Residential) & RA (Low Density Residential)

South: Vacant land, residence / A (Agricultural)

East: Residences, place of worship, vacant land / A (Agricultural)

West: Residences, vacant land / A (Agricultural) & PR (Planned Residential)

► **NUMBER OF LOTS:** 322

SURVEYOR/ENGINEER: Chris Sharp / Urban Engineering, Inc.

ACCESSIBILITY: Access is via Brakebill Rd., a major collector street with an 17'-20' pavement width within a 55' right-of-way, and Hammer Rd., a minor collector street with a 16' pavement width within a 50' right-of-way.

► **SUBDIVISION VARIANCES**

**REQUIRED:**

**1) REDUCE THE TANGENT BETWEEN BROKE BACK CURVES ON ROAD 'C' FROM 150 TO 118.25' BETWEEN STATIONS 13+01.59 AND 14+19.84.**

**2) REDUCE THE TANGENT BETWEEN BROKE BACK CURVES ON ROAD 'E' FROM 150 TO 23.27' BETWEEN STATIONS 2+34. 16 AND 2+57.53.**

**ALTERNATIVE DESIGN STANDARDS REQUIRING APPROVAL BY THE PLANNING COMMISSION:**

- 1) REDUCE THE CENTERLINE RADIUS ON ROAD 'C' FROM 250' TO 125' BETWEEN STATIONS 14+19.84 AND 15+40.65.
- 2) REDUCE THE CENTERLINE RADIUS ON ROAD 'C' FROM 250' TO 175' BETWEEN STATIONS 19+63.65 AND 22+95.82.
- 3) REDUCE THE CENTERLINE RADIUS ON ROAD 'D' FROM 250' TO 125' BETWEEN STATIONS 1+06.77 AND 1+44.96.
- 4) REDUCE THE CENTERLINE RADIUS ON ROAD 'E' FROM 250' TO 150' BETWEEN STATIONS 0+37.03 AND 0+98.00.
- 5) REDUCE THE CENTERLINE RADIUS ON ROAD 'E' FROM 250' TO 200' BETWEEN STATIONS 2+57.53 AND 5+59.28.
- 6) REDUCE THE MINIMUM K VALUE ON ROAD 'C' FROM 25 TO 20 BETWEEN STATIONS 1+67.56 AND 4+12.42, 17+ 10.67 AND 18+61.15, 35+27.18 AND 38+01.64.
- 7) REDUCE THE MINIMUM K VALUE ON ROAD 'D' FROM 25 TO 20 BETWEEN STATIONS 12+04.79 AND 13+09.63.
- 8) REDUCE THE MINIMUM STREET FRONTAGE FOR THE ATTACHED RESIDENTIAL LOTS IN THE ROAD 'E' AND ROAD 'F' CUL-DE-SAC FROM 25' TO 16.3', AND 25' TO 20' FOR ALL OTHER ATTACHED RESIDENTIAL LOTS.

**ALTERNATIVE DESIGN STANDARDS APPROVED BY KNOX COUNTY ENGINEERING AND PUBLIC WORKS:**

- 1) INCREASE THE MAXIMUM INTERSECTION GRADE FROM 1 % TO 2%.

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**STAFF RECOMMENDATION:**

- **APPROVE variance 1-2 and alternative design standards 1-8 based 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 and alternative design standards will not create a traffic hazard.**

**APPROVE the Concept Plan subject to 13 conditions.**

1. Connection to sanitary sewer and meeting any other relevant requirements of the utility provider.
2. Provision of street names which are consistent with the Uniform Street Naming and Addressing System within Knox County (Ord 91-1-102).
3. Installation of all sidewalks required by the Knox County sidewalk ordinance (Ord 19-12-101) or as otherwise required by Knox County Engineering and Public Works, and the two pedestrian paths from Road 'A' and Road 'E' to the clubhouse and pool amenity area, as identified on the concept plan. All sidewalks that are not required by the Knox County Department of Engineering and Public Works are to be maintained by the homeowners association, as noted on the concept plan. If the sidewalk on Road 'C' is removed east of Road 'A' during the design plan phase, and pedestrian path shall be provided from Road 'C' to Road 'A' in the common area adjacent to Lots 201 and 232. An alternative location for this pedestrian path can be approved by Planning Commission staff and the Knox County Department of Engineering and Public Works during the design plan phase. A bond shall be provided to the Knox County Department of Engineering and Public Works by the developer in an amount sufficient to guarantee the installation of the sidewalks and pedestrian paths.
4. Installation of a sidewalk on Brakebill Road as required by Knox County Engineering and Public Works during the design plan phase.
5. Implementation of the street and intersection improvement recommendations outlined in the Transportation Impact Study (TIS) prepared by Ajax Engineering (August 31, 2020), as revised, and reviewed and approved by Planning Commission staff, Knox County Engineering and Public Works, Knoxville Department of Engineering, and Tennessee Department of Transportation (TDOT). 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, Knoxville Department of Engineering and TDOT during the design plan stage for the subdivision and the required road improvements shall be completed prior to approval of the final plat for the subdivision.
6. The widening of Brakebill Road from Strawberry Plains Pike through the intersection of Hammer Road to a minimum width of 20', including the installation of the left turn lane at the subdivision entrance, shall be completed prior to the approval of a final plat for the subdivision.
7. The widening of Hammer Road from Brakebill Road to the Hammer Road subdivision entrance (Road 'B'), to a minimum width of 18', with tapers on the west side of the entrance if necessary, shall be completed prior to



the approval of a final plat for the subdivision.

8. Providing guest parking on Road 'E' and/or Road 'F' for the attached dwellings. The parking can be provided in one parking lot as shown on the concept plan or dispersed in smaller groupings of parking spaces with review and approval by Planning Commission staff and the Knox County Department of Engineering and Public Works. Any parking lot consisting of 6 or parking spaces shall be setback 10' from the front lot line (street lot line) and 10' from side lot lines.

9. Providing a note on the final plat that lots 196-201 shall have a minimum driveway depth of 25' from the front lot line (street lot line) and lots 78-88 and 184-195 shall have a minimum driveway depth of 30' from the front lot line (street lot line).

10. Placing a note on the final plat that all lots will have access only to the internal street system.

11. Meeting all applicable requirements of the Knox County Department of Engineering and Public Works.

12. 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, sidewalks and drainage system.

13. Submitting to Planning Commission 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 (Section 2.08, Design Plan -- Major Subdivisions).

► **APPROVE the Development Plan for up to 227 detached residential units and 95 attached residential 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 zone and the other criteria for approval of a Use on Review.

**COMMENTS:**

Summary

This proposal is to develop 227 detached and 95 attached residential lots on this 110.6-acre tract with a density of 3.20 du/ac. The proposed subdivision will have access to both Brakebill Road and Hammer Road. The Brakebill Road access will be approximately .5 miles from the Strawberry Plains Pike intersection and .85 miles from the Asheville Highway intersection.

The proposed attached residential units will be developed in clusters of two (semi-detached) units with the exception of one cluster with three units. Most of the lots will have a lot width of at least 25', however, the lots on the end of the cul-de-sac radii will have lot frontage widths as low as 16.3'. The middle unit in the one proposed 3-unit cluster will have a lot width of 20'. While this is not an issue with an apartment or condominium development, with each unit being tied to a lot, the lots do not meet the minimum lot frontage requirement of 25'. The applicant is requesting a variance from the minimum lot frontage requirement for these lots.

Background

This site was rezoned to PR (Planned Residential) at a density of up to 9 du/ac by Knox County Commission on March 26, 2018 (2-C-18-RZ). In 2018, phase 1 of a mixed-use development was approved with 246 detached and 78 attached residential lots (5-SB-18-C / 5-E-18-UR). The proposal included a future multi-family complex on 14.04 acres and 4.10 acres of commercial area, which would have required a separate Use on Review approval by the Planning Commission. The PR zone allows 1 acre of commercial uses for each 100 dwelling units. The current proposal does not include multi-family or commercial uses.

Plan Recommendations

The East County Sector Plan, adopted in 2010 (see Exhibit B), recommends that future Brakebill Road improvements include "complete streets" elements (such as bike lanes and sidewalks) and to construct new roads to improve connectivity and access in the general area. Brakebill Road is also recommended to be a greenway connector, which means pedestrian facilities should be installed for access to potential greenway corridors to the north and south. These road improvements become increasingly important if the large undeveloped area to the east of Brakebill Road is developed as recommended by the East County Sector Plan (ECO-2) with a mix of business park, technology (research and development) park, town center, or office/medium density residential uses. The subject site is designated as medium density residential/office (MDR/O) on the sector plan.

This subdivision proposal includes widening Brakebill Road from Strawberry Plains Pike to Hammer Road and a sidewalk may be required by Knox County Engineering and Public Works along the Brakebill Road frontage and potentially to the Strawberry Plains Pike intersection. The future road connection proposed in the sector plan would extend Rufus Graham Road (Huckleberry Springs Road) from Strawberry Plains Pike to Brakebill Road. This road extension is proposed because the existing Brakebill Road intersection at Strawberry Plains Pike is too close to the I-40 interchange and cannot be adequately improved to handle the potential future traffic as the area northeast of the interchange continues to build-out. This would also create a better connection between Asheville Highway and Strawberry Plains Pike.

#### Transportation Impact Study (TIS)

The TIS prepared by Ajax Engineering (see excerpts in Exhibit A) outlines extensive improvements needed at the Strawberry Plains Pike intersection which are not anticipated to be required as part of this development proposal. The issues at this intersection are known and are not easily fixed without requiring significant changes to other portions of Strawberry Plains Pike and the interstate ramps. As outlined above, new road connections are needed in this area which will reduce traffic to this intersection and functionally improve the road network.

The recommended road improvements that will be required for this proposal is widening Brakebill Road to a minimum of 20 feet from Strawberry Plains Pike to Hammer Road, and Hammer Road to a minimum of 18 feet from Brakebill Road to the Road 'B' access. A left turn lane is recommended at the Brakebill Road and Road 'A' intersection. The design of the left turn lane will be finalized during design plan review as required by Knox County Engineering and Public Works because the current design does not meet the Knox County design standards. The internal streets are to be posted at 25 MPH.

#### Open Space / Amenities

The primary amenity proposed for this subdivision is a clubhouse and pool which is accessed by vehicle from Brakebill Road and there are pedestrian connections to Road 'A' and Road 'E'. The intent is to convert the existing house for use as the clubhouse. The large common area on the west and southwest portion of the property does not have a programmed use at this time but there is a note on the plan that states it could be used for unpaved trails. The subdivision includes sidewalks on all streets, however, most of these will be elective and not required by the Knox County sidewalk ordinance. The main entry road, Road 'A', may meet the threshold of 1,000 average daily trips (ADT) to require a sidewalk on one side of the road and if so, would be maintained by Knox County. Any road segments with sidewalks that do not meet this ADT threshold will be maintained by the HOA. If the sidewalk shown on Road 'C' is removed during the design plan phase, staff is recommending that a pedestrian path be provided between Road 'C' and Road 'A' in the common area adjacent to Lots 201 & 232.

#### EFFECT OF THE PROPOSAL ON THE SUBJECT PROPERTY, SURROUNDING PROPERTY AND THE COMMUNITY AS A WHOLE

1. The proposed residential subdivision will have minimal impact on local services since utilities are available to serve this site.
2. The proposed low density residential development is compatible with the scale and intensity of other development that has occurred in this area near the interchange of I-40 and Strawberry Plains Pike.
3. The proposed residential subdivision at a density of 3.2 du/ac, is consistent in use and density with the approved rezoning for the property (PR up to 9 du/ac).
4. With the recommended street improvements identified in the Transportation Impact Study, traffic flow in the area should continue to function at acceptable levels.

#### CONFORMITY OF THE PROPOSAL TO CRITERIA ESTABLISHED BY THE KNOX COUNTY ZONING ORDINANCE

1. With the recommended conditions, the proposed subdivision is consistent with all relevant requirements of the PR zoning, as well as other criteria for approval of a use on review.
2. The development is consistent with the following general standards for uses permitted on review: The proposal is consistent with the adopted plans and policies of the General Plan and Sector Plan. The use is in harmony with the general purpose and intent of the Zoning Ordinance. The use will not significantly injure the value of adjacent property. The use will not draw additional traffic through residential areas since the development has access to two collector streets.

#### CONFORMITY OF THE PROPOSAL TO ADOPTED PLANS

1. The East County Sector Plan proposes medium density residential/office uses for this site. The proposed subdivision at a density of 3.2 du/ac is consistent with the sector plan.
2. This site is located within the Urban Growth Area on the Knoxville-Knox County-Farragut Growth Policy Plan map.

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.

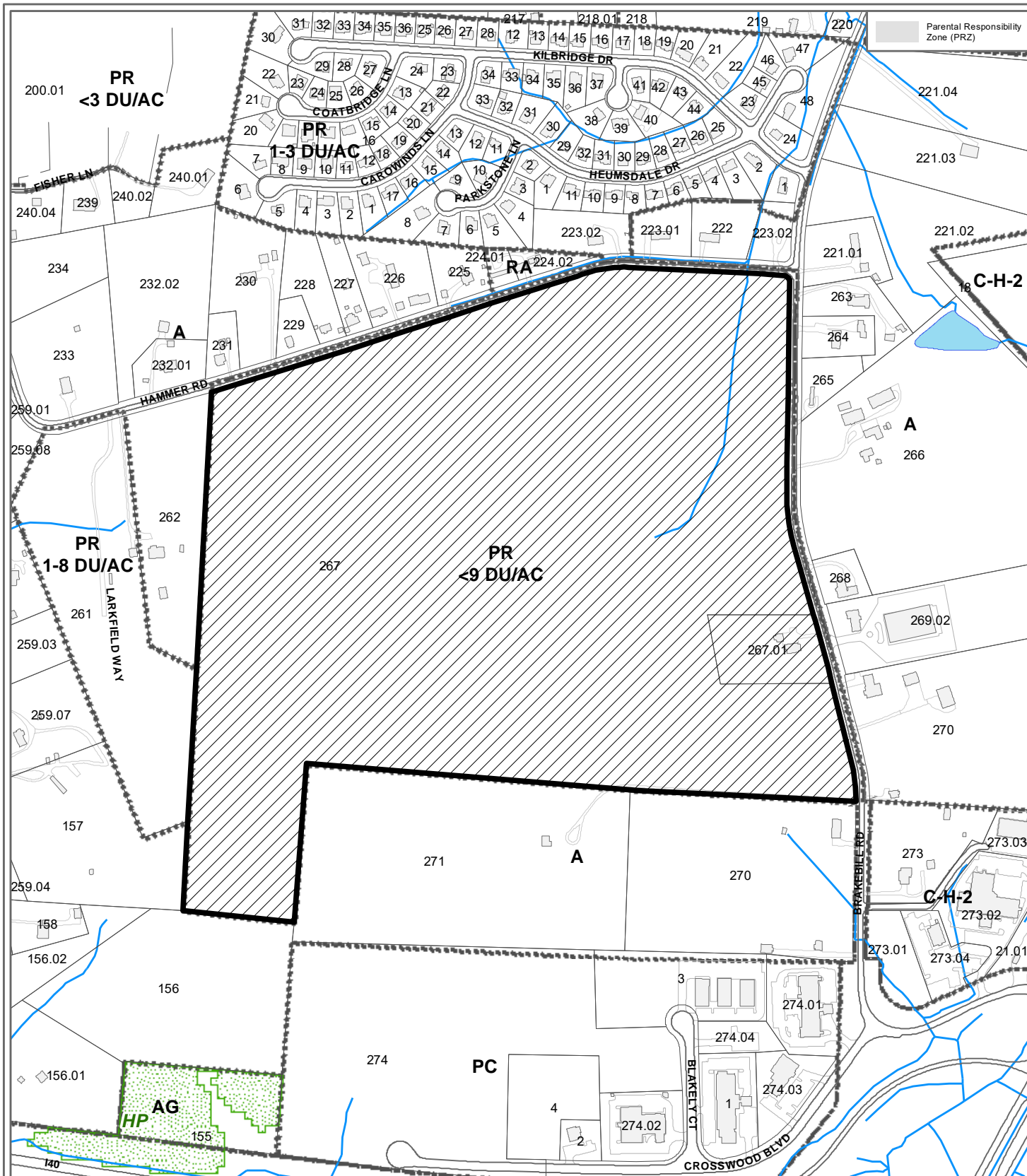
ESTIMATED STUDENT YIELD: 78 (public school children, grades K-12)

Schools affected by this proposal: Sunnyview Pr/Chilhowee Int, Carter Middle, and Carter High.

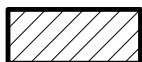
- Potential new school population is estimated using locally-derived data on public school student yield generated by new housing.
- Students are assigned to schools based on current attendance zones as determined by Knox County Schools. Students may request transfers to different zones, and zone boundaries 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.



**9-SB-20-C / 9-D-20-UR  
CONCEPT PLAN/USE ON REVIEW**



Detached and attached residential subdivision in PR (Planned Residential)

Original Print Date: 8/13/2020  
Knoxville - Knox County Planning Commission \* City / County Building \* Knoxville, TN 37902

Revised:

Petitioner: Urban Engineering, Inc.  
Brakebill Road Subdivision

Map No: 72

Jurisdiction: County

0 500  
Feet

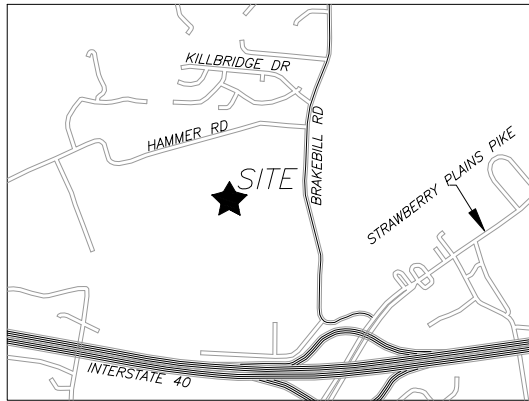


USE ON REVIEW

U.E.I. PROJECT NO. 2003005

# BRAKEBILL ROAD SUBDIVISION

SITE ADDRESS: 521 & 601 BRAKEBILL ROAD, KNOXVILLE, TENNESSEE 37924  
CLT MAP 72, PARCELS 267 & 267.01



LOCATION MAP

## ALTERNATIVE DESIGN STNADARDS:

### ROAD C:

- 1) REDUCE THE CENTERLINE RADIUS FROM 250' TO 125' BETWEEN STATIONS 14+19.84 AND 15+40.65.
- 2) REDUCE THE CENTERLINE RADIUS FROM 250' TO 175' BETWEEN STATIONS 19+63.65 AND 22+95.82.
- 3) REDUCE THE TANGENT BETWEEN BROKE BACK CURVES FROM 150 TO 118.25' BETWEEN STATIONS 13+01.59 AND 14+19.84.

### ROAD D:

- 1) REDUCE THE CENTERLINE RADIUS FROM 250' TO 125' BETWEEN STATIONS 1+06.77 AND 1+44.96.

### ROAD E:

- 1) REDUCE THE CENTERLINE RADIUS FROM 250' TO 150' BETWEEN STATIONS 0+37.03 AND 0+98.00.
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- 3) REDUCE THE TANGENT BETWEEN BROKE BACK CURVES FROM 150 TO 23.27' BETWEEN STATIONS 2+34.16 AND 2+57.53.

### INTERSECTION GRADES:

- 1) INCREASE THE MAXIMUM INTERSECTION GRADE FROM 1% TO 2%.

## VARIANCE REQUESTS:

### ROAD C:

- 1) REDUCE THE MINIMUM K VALUE FROM 25 TO 20 BETWEEN STATIONS 1+67.56 AND 4+12.42, 17+10.67 AND 18+61.15, 35+27.18 AND 38+01.64.

### ROAD D:

- 2) REDUCE THE MINIMUM K VALUE FROM 25 TO 20 BETWEEN STATIONS 12+04.79 AND 13+09.63.

DEVELOPER:  
MAVERICK DEVELOPMENT GROUP, LLC  
3200 NORTH HAWTHORNE STREET  
CHATTANOOGA, TN 37406  
(423) 668-6030



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

## SHEET INDEX

### TITLE

TITLE SHEET

TYPICAL SECTIONS & KEY SHEET

SITE PLAN

PRELIMINARY GRADING PLAN

ROADWAY PROFILES

### SHEET

C-0

C-1

C-2 THUR C-6

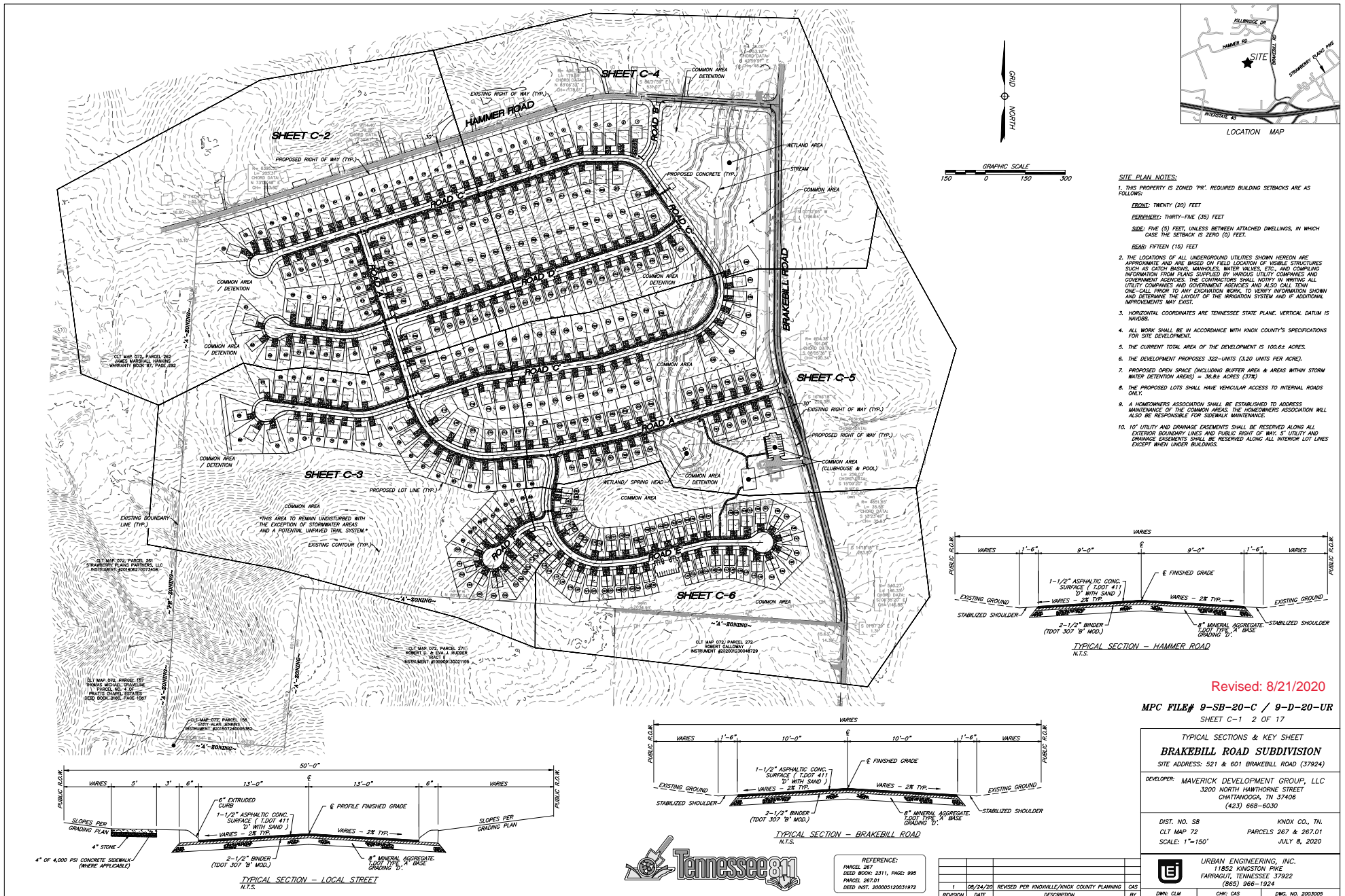
C-7 THRU C-11

C-12 THRU C-16

9-SB-20-C  
9-D-20-UR  
Revised: 8/21/2020

2	8/24/20	MPC AND ENGINEERING COMMENTS
ISSUE NO.	DATE	DESCRIPTION













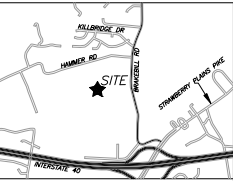




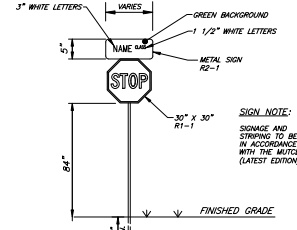
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PARCEL 267  
DEED BOOK 1311, PAGE 985  
PARCEL 267.01  
DEED INSTR. 200005120031972

REVISION	DATE	REVISION PER KNOXVILLE KNOX COUNTY PLANNING	DESCRIPTION	BY
1	08/24/20	REVISED PER KNOXVILLE KNOX COUNTY PLANNING	CAS	

DWN: CLM	CHK: CAS	DWG. NO. 2003005
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- SITE PLAN NOTES:**
1. THIS PROPERTY IS ZONED "PR". REQUIRED BUILDING SETBACKS ARE AS FOLLOWS:  
**FRONT:** TWENTY (20) FEET  
**PERIPHERY:** THIRTY-FIVE (35) FEET  
**SIDE:** FIVE (5) FEET, UNLESS BETWEEN ATTACHED DWELLINGS, IN WHICH CASE THE SETBACK IS ZERO (0) 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 COMPLYING INFORMATION FROM PLANS SUPPLIED BY MANHOLE UTILITY COMPANIES AND GOVERNMENT AGENCIES. THE CONTRACTORS SHALL NOTIFY IN WRITING ALL UTILITY COMPANIES AND GOVERNMENT AGENCIES AND ALSO CALL TEN-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 100.6± ACRES.
  6. THE DEVELOPMENT PROPOSES 332± UNITS (3.20 UNITS PER ACRE).
  7. PROPOSED OPEN SPACE (INCLUDING BUFFER AREA & AREAS WITHIN STORM WATER DETENTION AREAS) = 36.8± ACRES (37%).
  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. THE HOMEOWNERS ASSOCIATION WILL ALSO BE RESPONSIBLE FOR SIDEWALK MAINTENANCE.
  10. 10' UTILITY AND DRAINAGE EASEMENTS SHALL BE RESERVED ALONG ALL EXTERIOR BOUNDARY LINES AND PUBLIC RIGHT OF WAY. 5' UTILITY AND DRAINAGE EASEMENTS SHALL BE RESERVED ALONG ALL INTERIOR LOT LINES EXCEPT WHEN UNDER BUILDINGS.



COMBINATION STOP SIGN / STREET NAME SIGN DETAIL

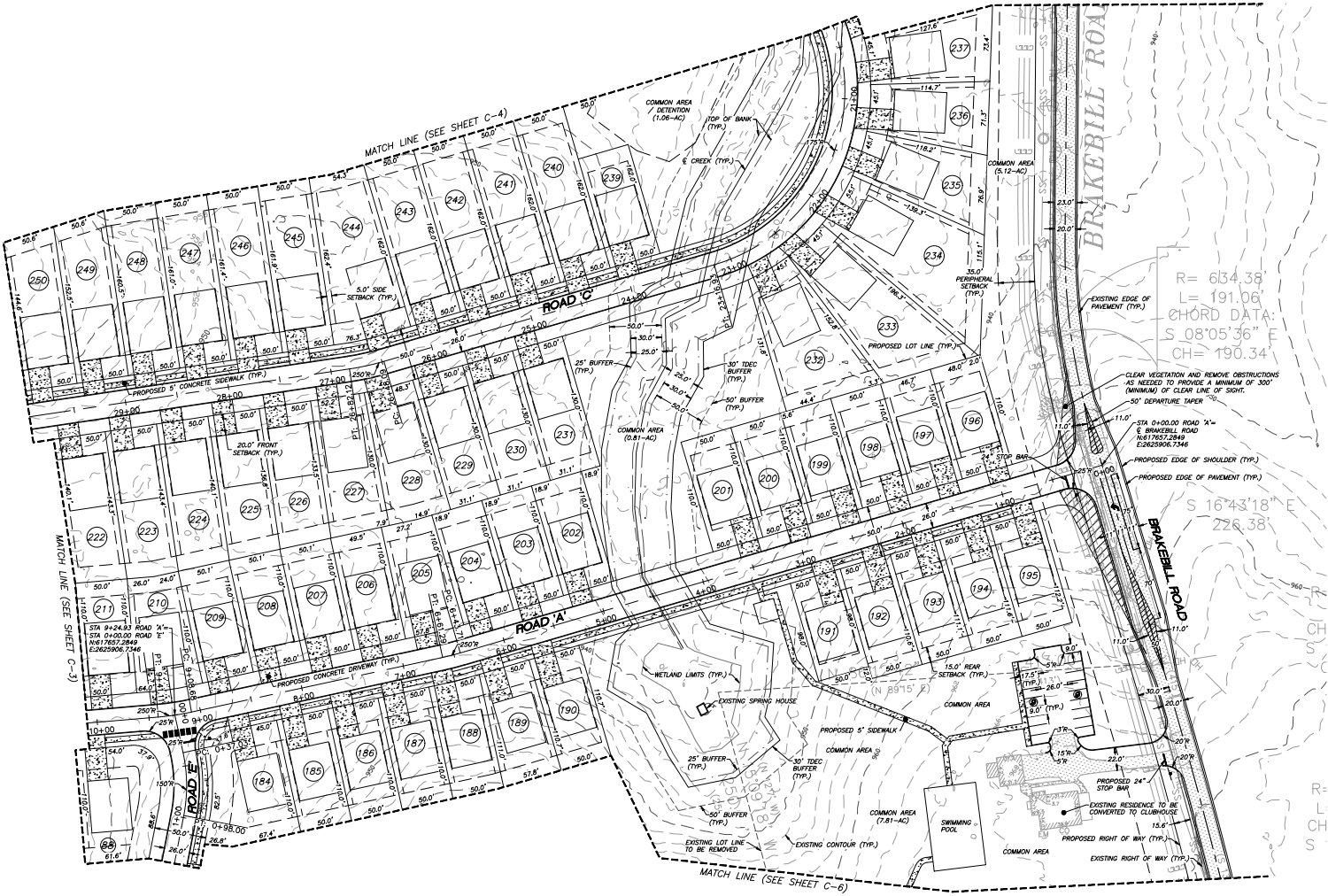
MPC FILE# 9-SB-20-C / 9-D-20-UR  
SHEET C-5 6 OF 17

**SITE PLAN**  
**BRAKERBILL ROAD SUBDIVISION**  
SITE ADDRESS: 521 & 601 BRAKERBILL ROAD (37924)

DEVELOPER: MAVERICK DEVELOPMENT GROUP, LLC  
3200 NORTH HANFORD STREET  
CHATTANOOGA, TN 37406  
(423) 668-6030

DIST. NO. 58 KNOX CO., TN.  
CLT MAP 72 PARCELS 267 & 267.01  
SCALE: 1"=50' JULY 8 2020

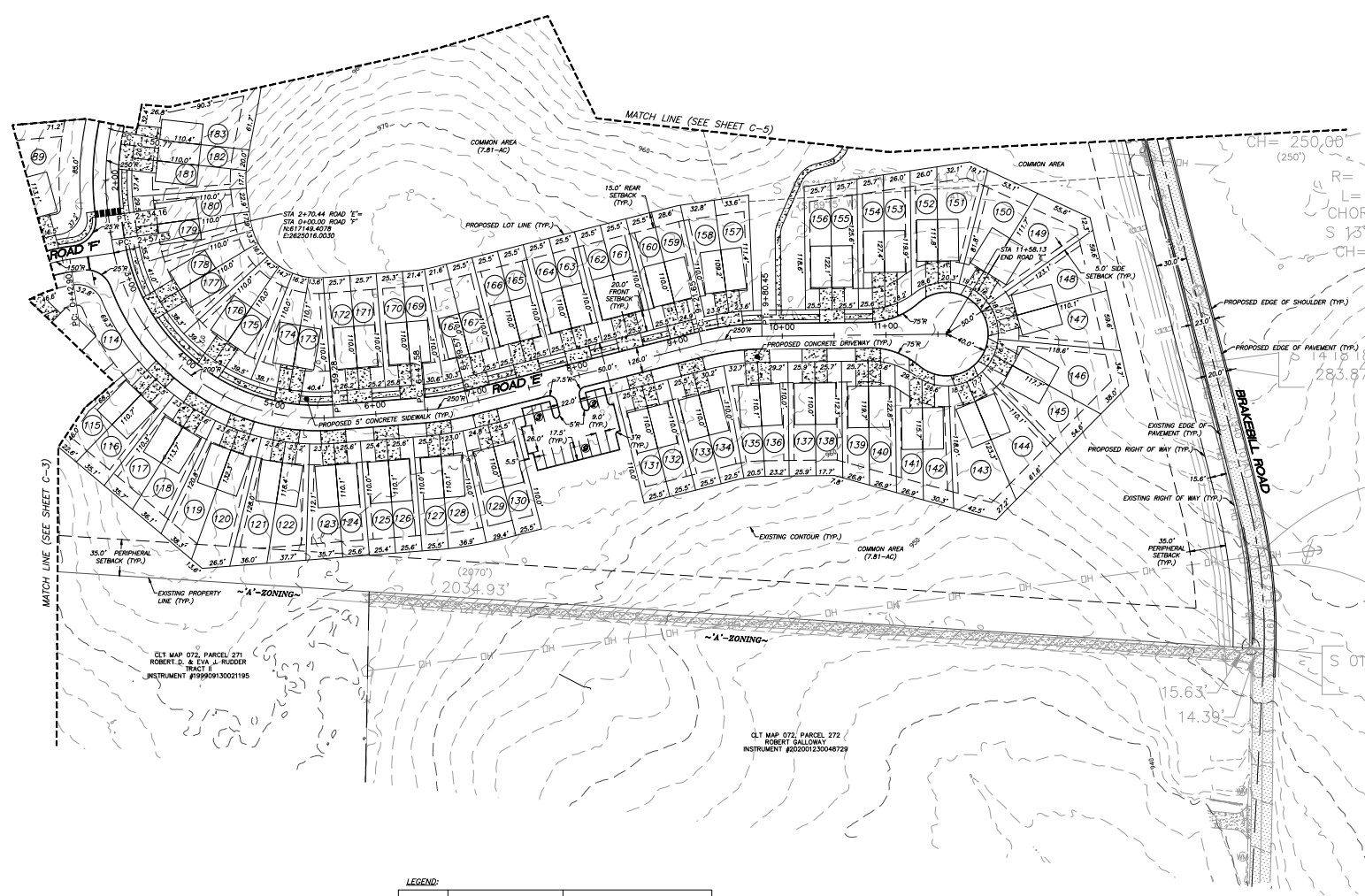
URBAN ENGINEERING, INC.  
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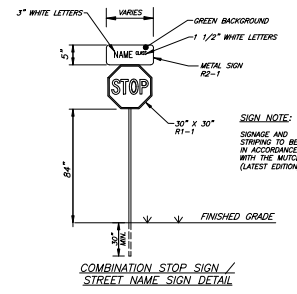
LEGEND:

SYMBOL	DESCRIPTION	DETAIL
STOP SIGN / STREET NAME	PROPOSED STOP SIGN/STREET NAME SIGN	SEE DETAIL, THIS SHEET
12" PAINTED STOP BAR		
6" PAINTED CROSSWALK		

Revised: 8/21/2020

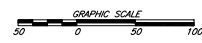


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  4. ALL WORK SHALL BE IN ACCORDANCE WITH KNOX COUNTY'S SPECIFICATIONS FOR SITE DEVELOPMENT.
  5. THE CURRENT TOTAL AREA OF THE DEVELOPMENT IS 100.6± ACRES.
  6. THE DEVELOPMENT PROPOSES 332-UNITS (3,320 UNITS PER ACRE).
  7. PROPOSED OPEN SPACE (INCLUDING BUFFER AREA & AREAS WITHIN STORM WATER DETENTION AREAS) = 36.8± ACRES (37%).
  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. THE HOMEOWNERS ASSOCIATION WILL ALSO BE RESPONSIBLE FOR SIDEWALK MAINTENANCE.
  10. 10' UTILITY AND DRAINAGE EASEMENTS SHALL BE RESERVED ALONG ALL EXISTING BOUNDARY LINES AND PUBLIC RIGHT OF WAY. 5' UTILITY AND DRAINAGE EASEMENTS SHALL BE RESERVED ALONG ALL INTERIOR LOT LINES EXCEPT WHEN UNDER BUILDINGS.



MPC FILE# 9-SB-20-C / 9-D-20-UR  
SHEET C-6 7 OF 17

SYMBOL	DESCRIPTION	DETAIL
	STOP SIGN / STREET NAME	PROPOSED STOP SIGN/STREET NAME SIGN SEE DETAIL THIS SHEET
	12" PAINTED STOP BAR	
	6" PAINTED CROSSWALK	



REFERENCE:  
PARCEL 267  
DEED BOOK 3311, PAGE 985  
PARCEL 267.01  
DEED INSTR. 200005120031972

REVISION	DATE	REVISED PER KNOXVILLE/KNOX COUNTY PLANNING	CAS
1	08/24/20	REVISED PER KNOXVILLE/KNOX COUNTY PLANNING	CAS

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DIST. NO. 58 KNOX CO., TN.  
CLT MAP 72 PARCELS 267 & 267.01  
SCALE: 1"=50' JULY 8 2020

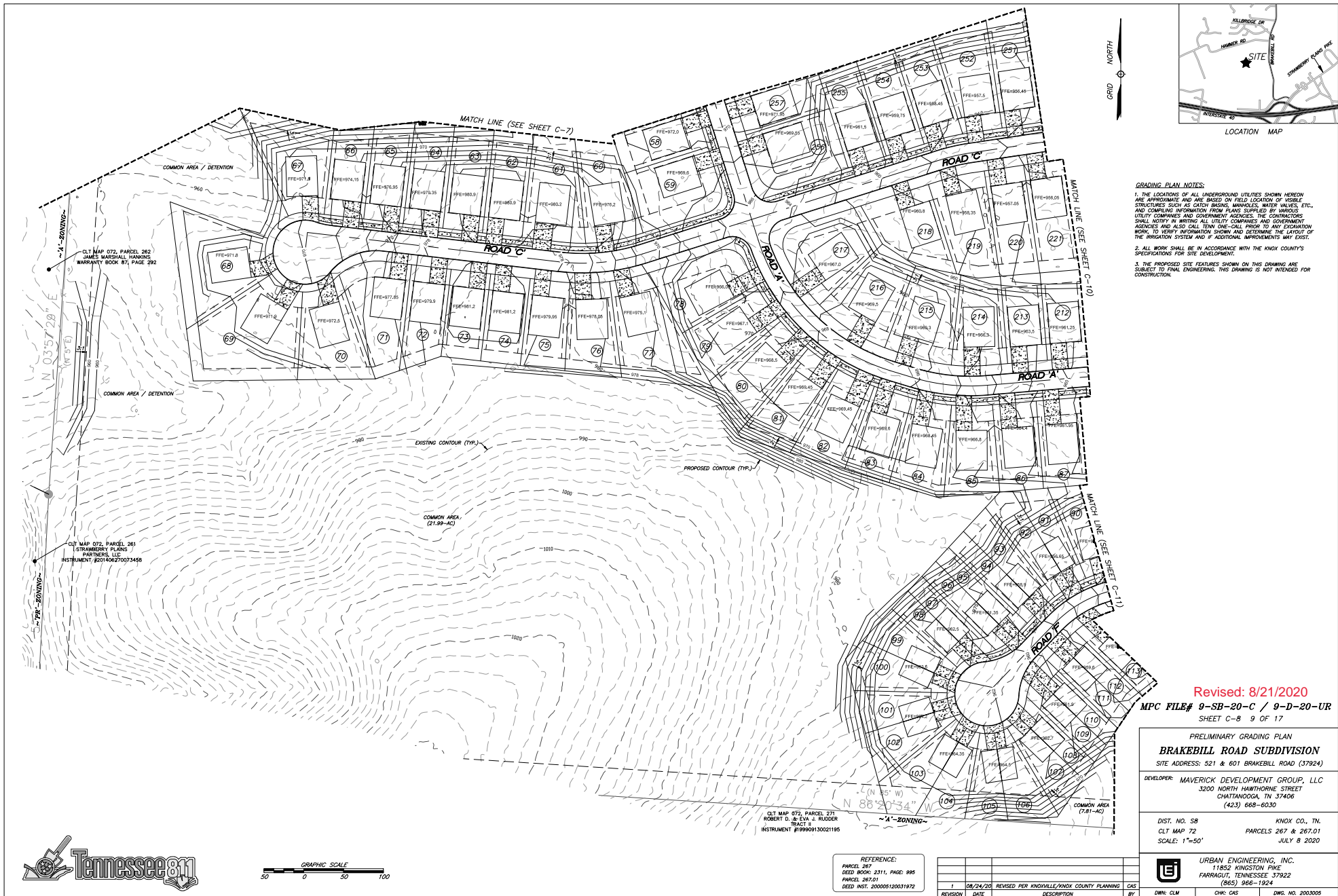
URBAN ENGINEERING, INC.  
11852 KINGSTON PIKE  
FARMGUT, TENNESSEE 37922  
(865) 966-1924

DWG. NO. 2003005

Revised: 8/21/2020

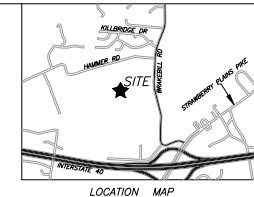




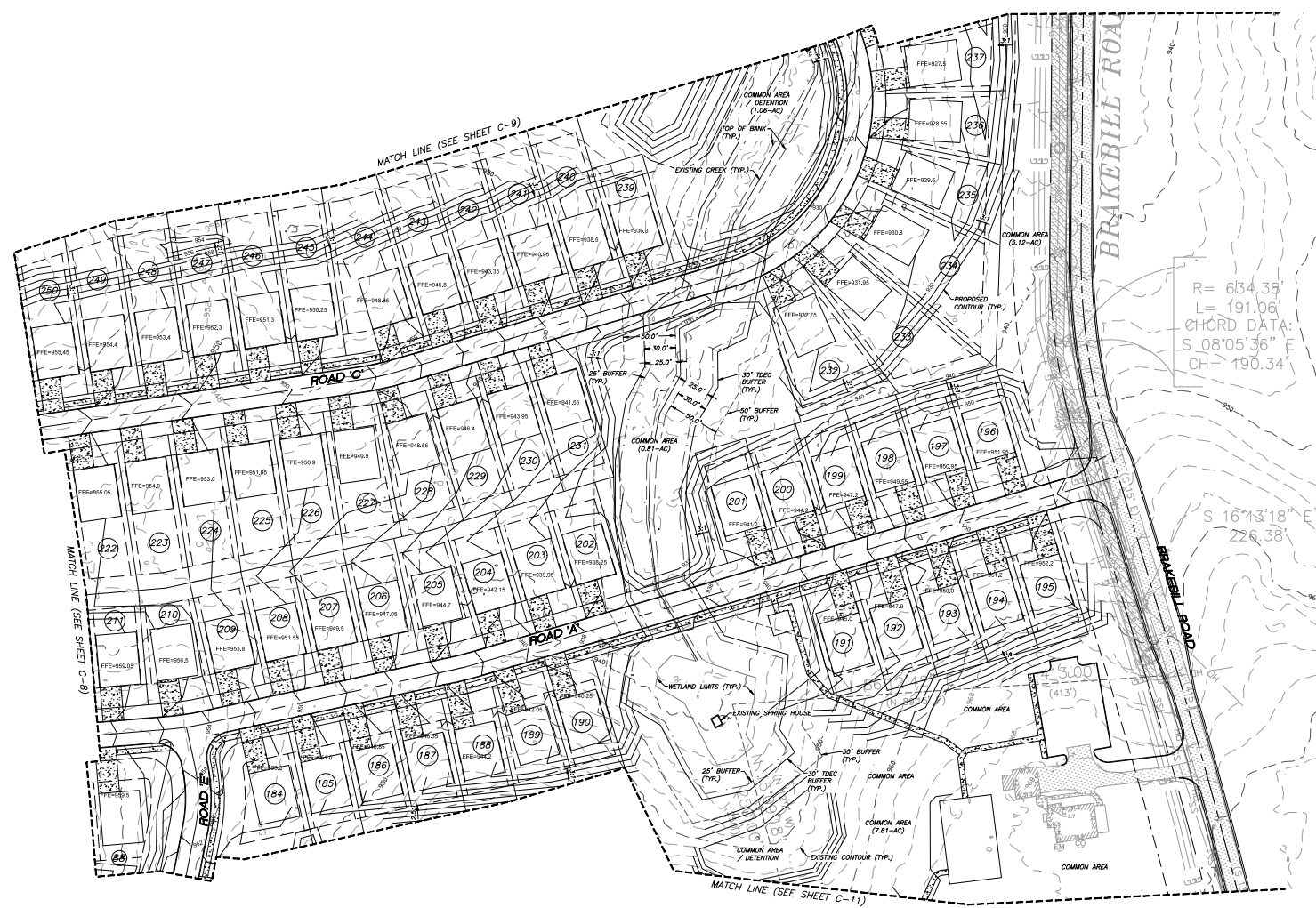




1	08/24/20	REVISED PER KNOXVILLE/KNOX COUNTY PLANNING	CAS
REVISION	DATE	DESCRIPTION	BY



- 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 CORRELATION INFORMATION FROM PLANS SUPPLIED BY HARBOR UTILITY COMPANIES AND GOVERNMENT AGENCIES. THE CONTRACTORS SHALL NOTIFY BY WRITING ALL UTILITY COMPANIES AND GOVERNMENT AGENCIES AND ALSO CALL TALK 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.



REFERENCE:  
PARCEL 267  
DEED BOOK 1311, PAGE 985  
PARCEL 267.01  
DEED INSTR. 200005120031972


REVISION	DATE	DESCRIPTION	BY
1	08/24/20	REVISED PER KNOXVILLE AND KNOX COUNTY PLANNING	CAS

Revised: 8/21/2020  
MPC FILE# 9-SB-20-C / 9-D-20-UR  
SHEET C-10 11 OF 17

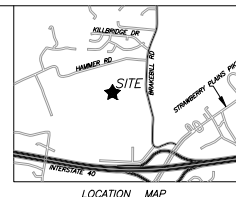
PRELIMINARY GRADING PLAN  
**BRAKEBILL ROAD SUBDIVISION**  
SITE ADDRESS: 521 & 601 BRAKEBILL ROAD (37924)

DEVELOPER: MAVERICK DEVELOPMENT GROUP, LLC  
3200 NORTH HAWTHORNE STREET  
CHATTANOOGA, TN 37408  
(423) 668-6030

DIST. NO. 58 KNOX CO., TN.  
CLT MAP 72 PARCELS 267 & 267.01  
SCALE: 1"=50' JULY 8 2020

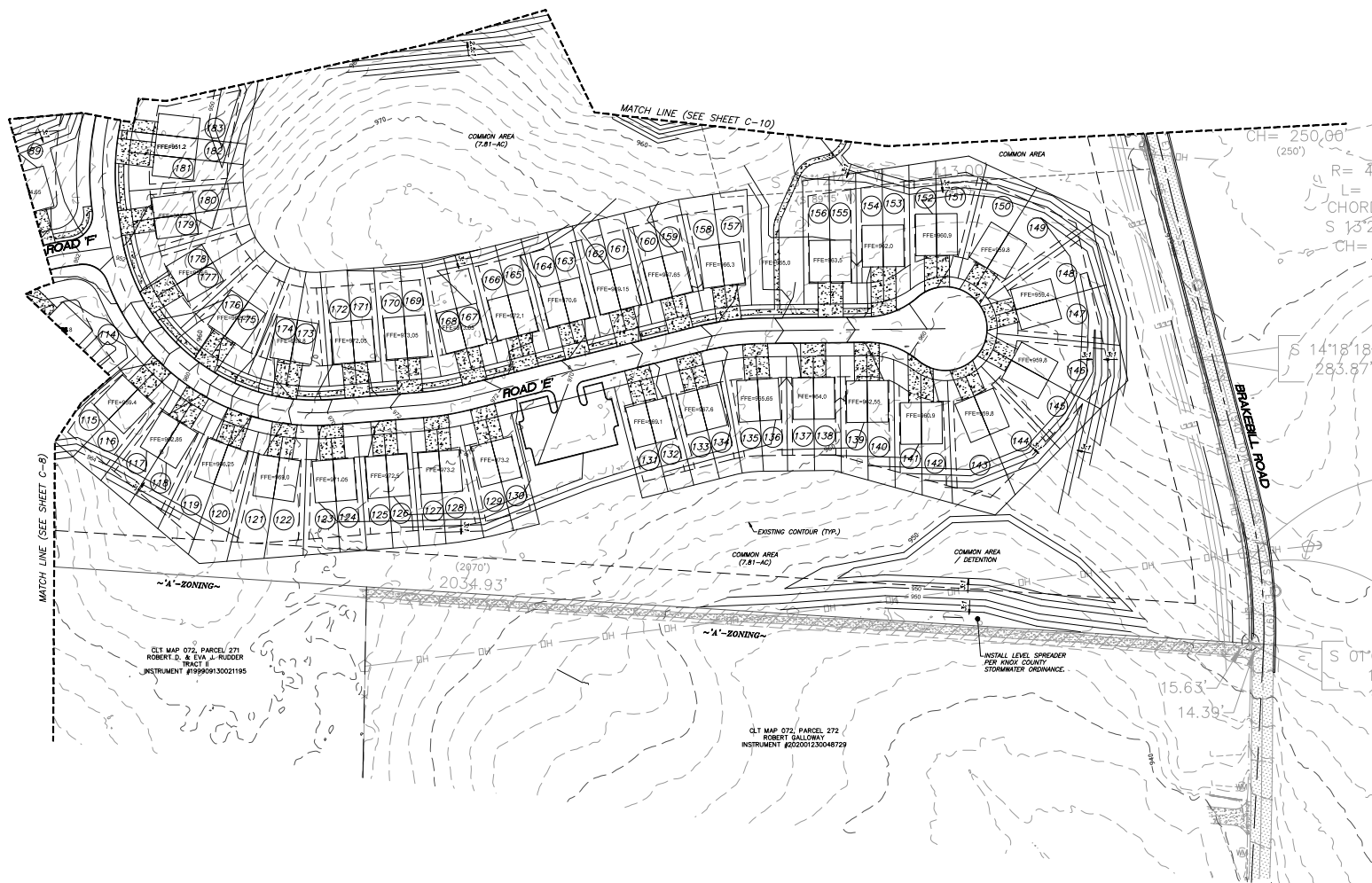
 URBAN ENGINEERING, INC.  
11852 KINGSTON PIKE  
FARRAGUT, TENNESSEE 37922  
(865) 966-1924

DWN: CLM CHG: CAS DWG. NO. 2003005



**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 COMING INFORMATION FROM PLANS SUPPLIED BY MAJOR UTILITY COMPANIES AND GOVERNMENT AGENCIES. THE CONTRACTORS SHALL NOTIFY IN WRITING ALL UTILITY COMPANIES AND GOVERNMENT AGENCIES AND ALSO CALL TELL 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.
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**MPC FILE# 9-SB-20-C / 9-D-20-UR**

SHEET C-11 12 OF 17

**PRELIMINARY GRADING PLAN**

**BRAKEBILL ROAD SUBDIVISION**

SITE ADDRESS: 521 & 601 BRAKEBILL ROAD (37924)

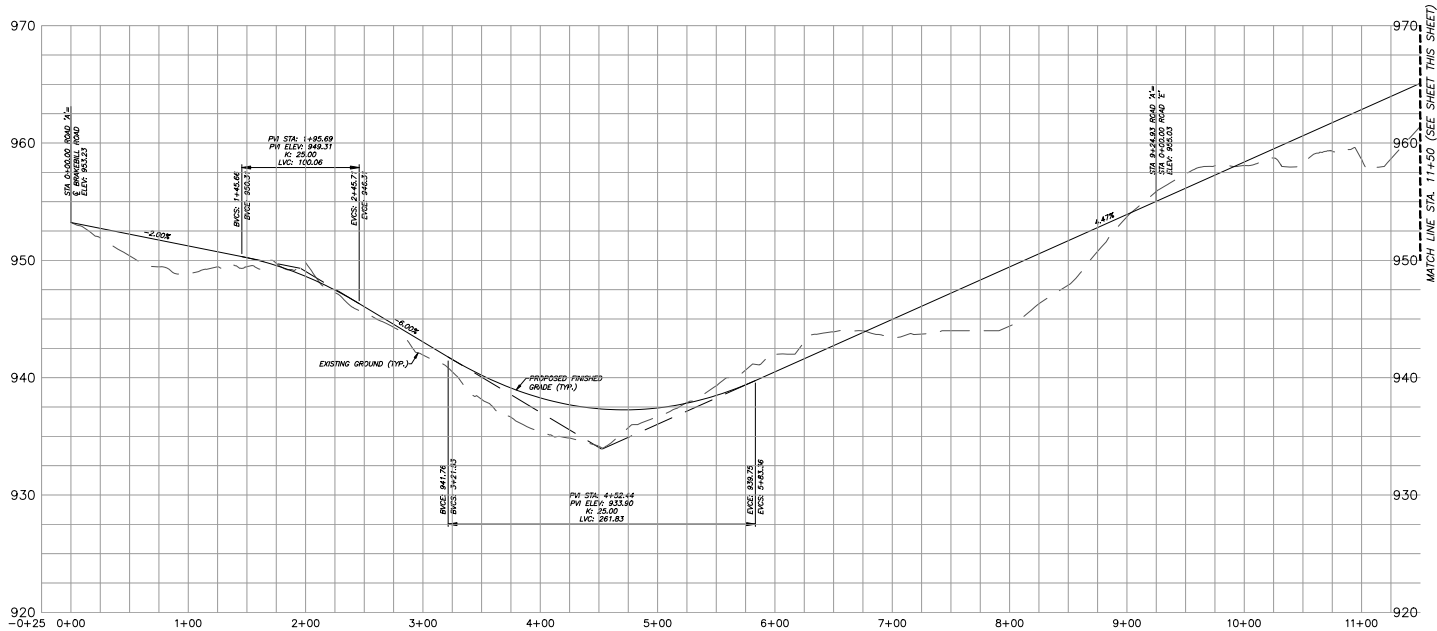
DEVELOPER: MAVERICK DEVELOPMENT GROUP, LLC  
3200 NORTH HAWTHORNE STREET  
CHATTANOOGA, TN 37406  
(423) 668-6030

DIST. NO. 58 KNOX CO., TN.  
CLT MAP 72 PARCELS 267 & 267.01  
SCALE: 1"=50' JULY 8 2020

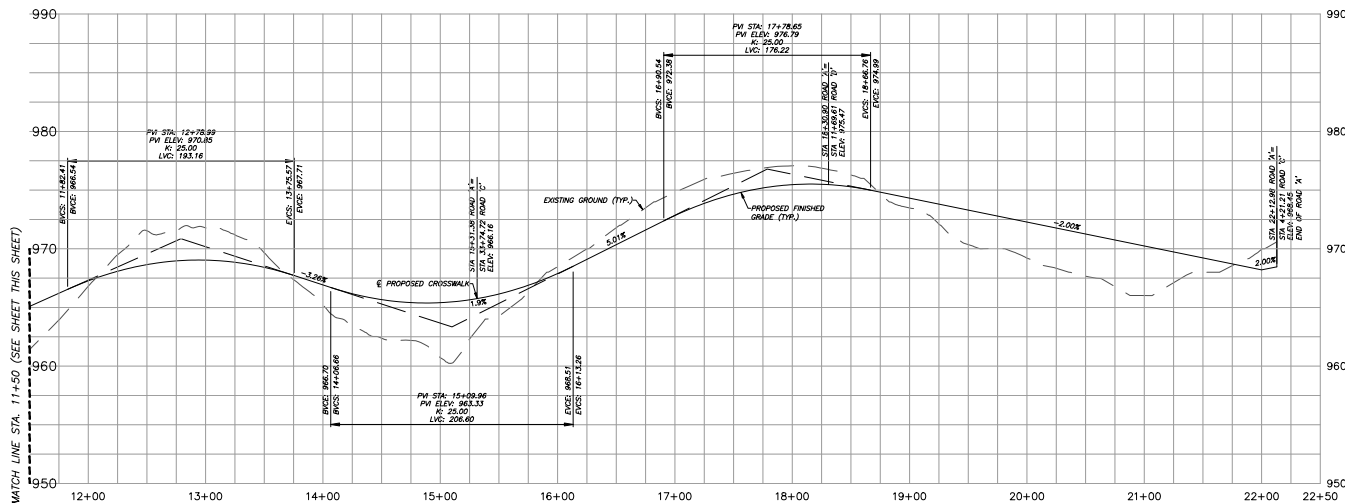
URBAN ENGINEERING, INC.  
11852 KINGSTON PIKE  
FARRAGUT, TENNESSEE 37922  
(865) 966-1924

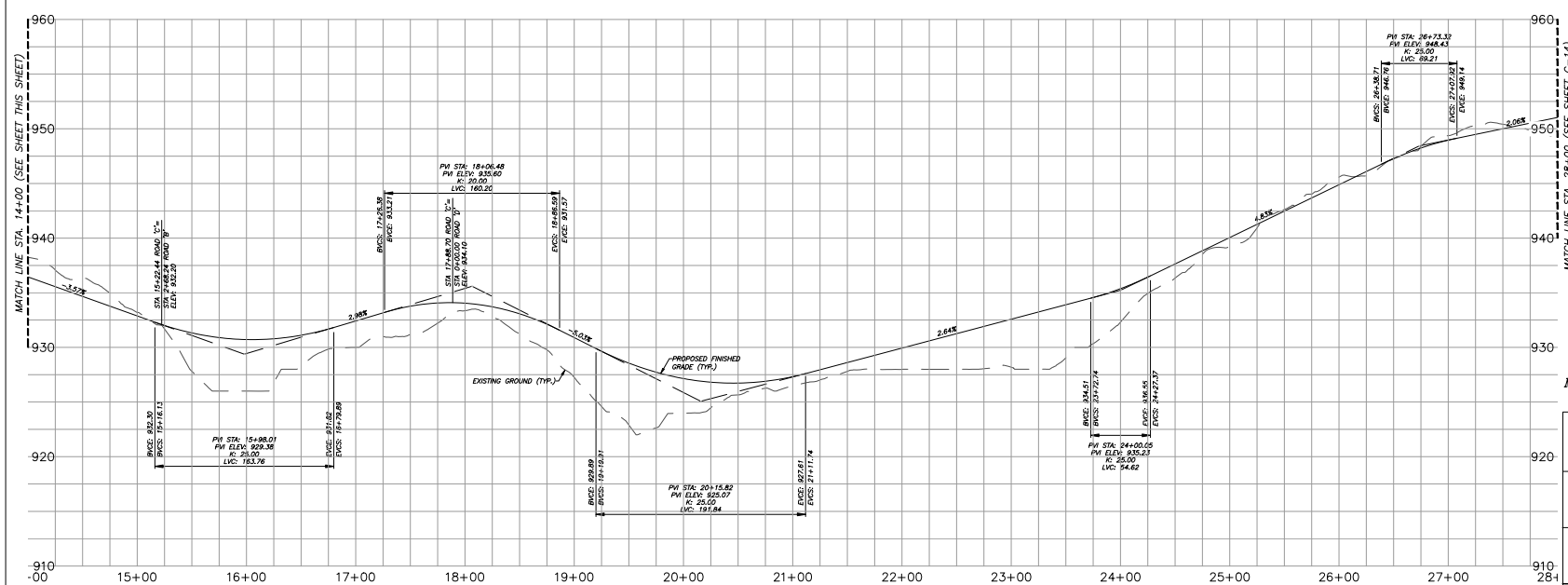
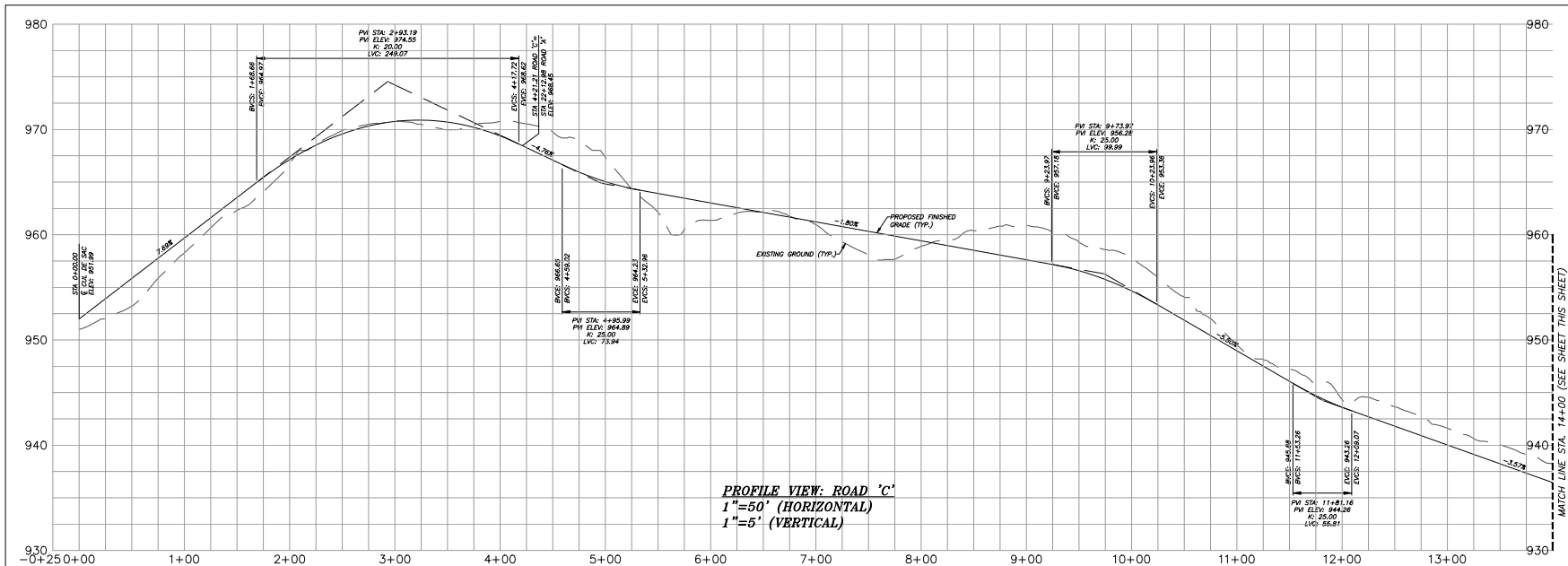
DWN: CLM	CHK: CAS	DWG. NO. 2003005
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PROFILE VIEW: ROAD 'A'  
1"=50' (HORIZONTAL)  
1"=5' (VERTICAL)



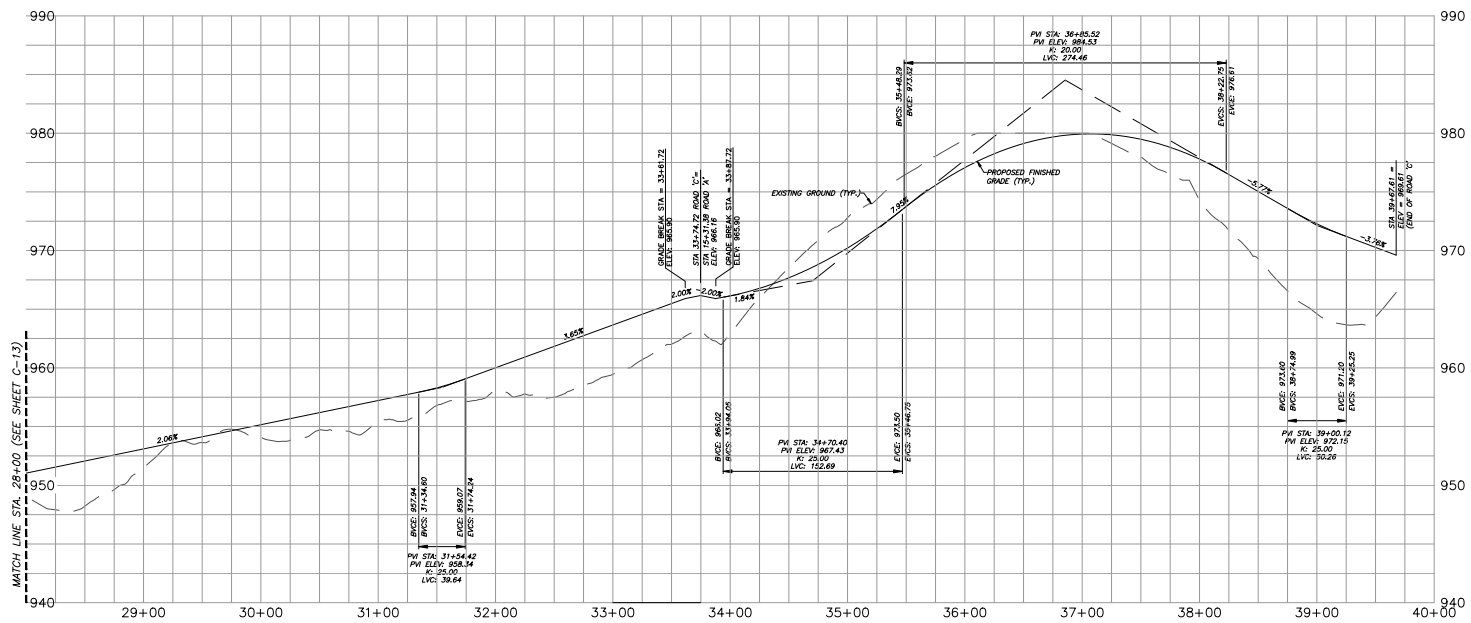


Revised: 8/21/2020

MPC FILE# 9-SB-20-C / 9-D-20-UR  
SHEET C-13 14 OF 17

ROAD PROFILES	
<b>BRAKEBILL ROAD SUBDIVISION</b>	
SITE ADDRESS: 521 & 601 BRAKEBILL ROAD (37924)	
DEVELOPER: MAVERICK DEVELOPMENT GROUP, LLC	
3200 NORTH HANTHORNE STREET	
CHATTANOOGA, TN 37406	
(423) 668-6030	
DIST. NO. 58	KNOX CO., TN.
CLT. MAP 72	PARCELS 267 & 267.01
SCALE: AS NOTED	JULY 8, 2020
URBAN ENGINEERING, INC.	
11852 KINGSTON PIKE	
FARRAGUT, TENNESSEE 37922	
(865) 956-1924	
DWG. NO. 2003005	


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1	08/24/20	REVISED PER KNOXVILLE AND KNOX COUNTY PLANNING	CAS



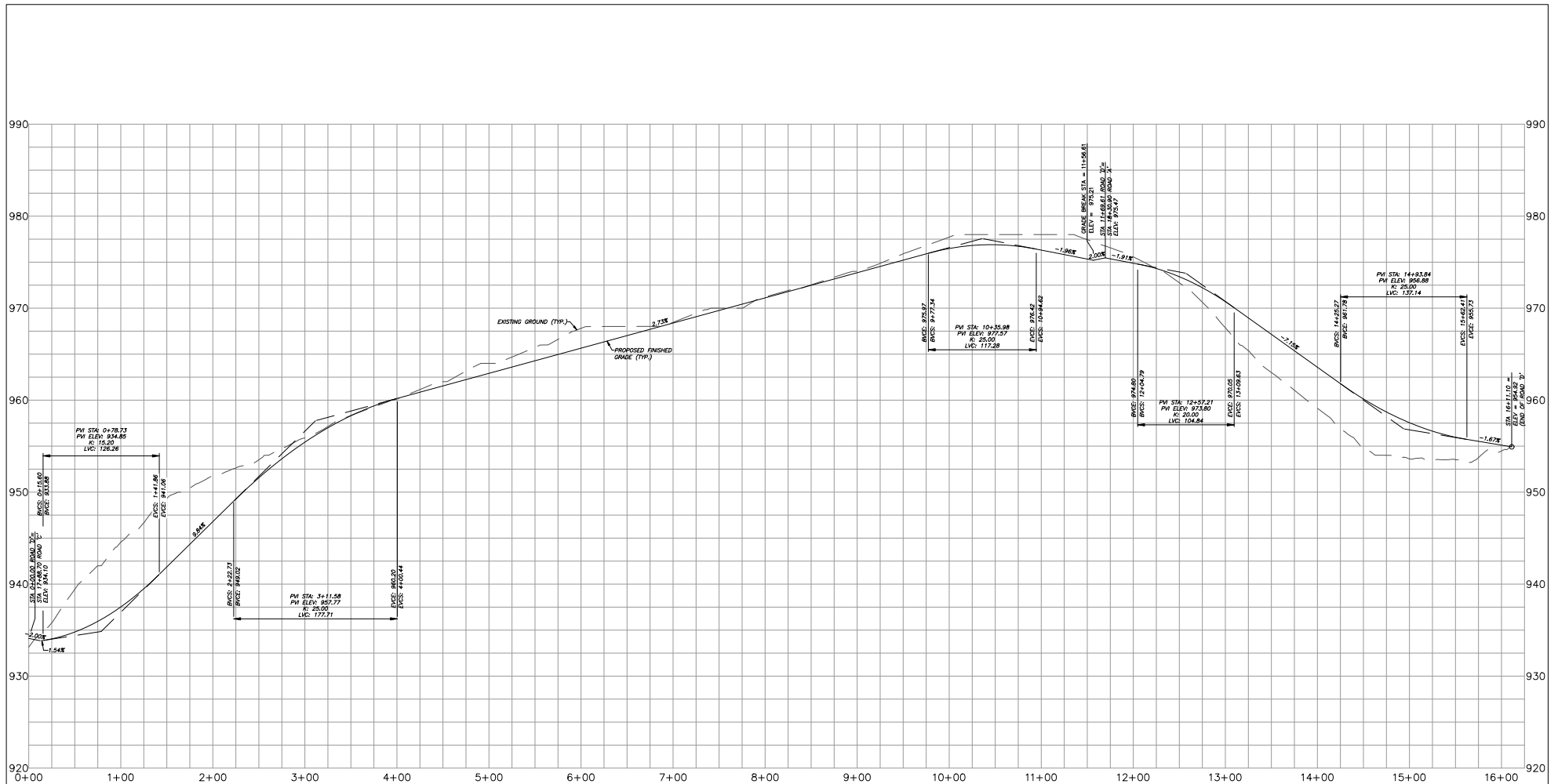
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1"=5' (VERTICAL)

Revised: 8/21/2020

MPC FILE# 9-SB-20-C / 9-D-20-UR  
SHEET C-14 15 OF 17

ROAD PROFILES	
<b>BRAKEBILL ROAD SUBDIVISION</b>	
SITE ADDRESS: 521 & 601 BRAKEBILL ROAD (37924)	
DEVELOPER: MAVERICK DEVELOPMENT GROUP, LLC 3200 NORTH HANTHORNE STREET CHATTANOOGA, TN 37408 (423) 668-6030	
DIST. NO. 58	KNOX CO., TN.
CLT MAP 72	PARCELS 267 & 267.01
SCALE: AS NOTED	JULY 8, 2020
 <b>URBAN ENGINEERING, INC.</b> 11852 KINGSTON PIKE FARRAGUT, TENNESSEE 37922 (865) 956-1924	
DWN: CLM	CHK: CAS
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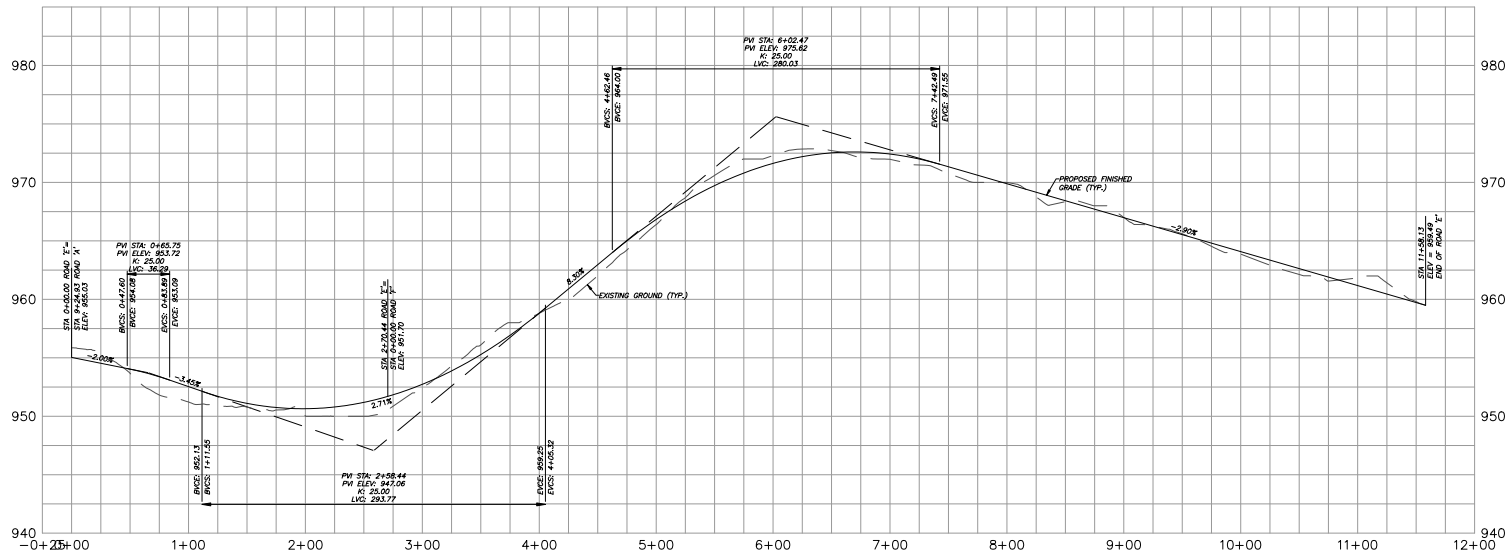
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Revised: 8/21/2020

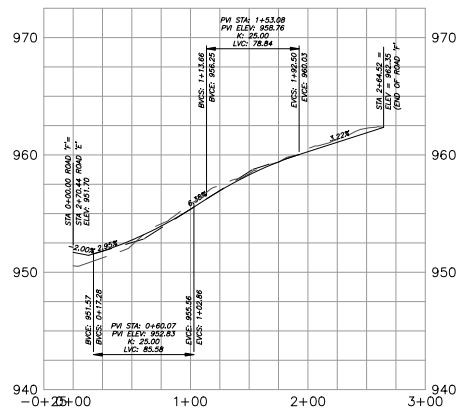
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SHEET C-15 16 OF 17

ROAD PROFILES	
<b>BRAKEBILL ROAD SUBDIVISION</b>	
SITE ADDRESS: 521 & 601 BRAKEBILL ROAD (37924)	
DEVELOPER: MAVERICK DEVELOPMENT GROUP, LLC 3200 NORTH HANWORTH STREET CHATTANOOGA, TN 37406 (423) 668-6030	
DIST. NO. 58	KNOX CO., TN.
CLT. MAP 72	PARCELS 267 & 267.01
SCALE: AS NOTED	JULY 8, 2020
URBAN ENGINEERING, INC. 11852 KINGSTON PIKE FARRAGUT, TENNESSEE 37922 (865) 956-1924	
DWN: CLM	CHK: CAS
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REVISION	DATE	DESCRIPTION	BY
1	08/24/20	REVISED PER KNOXVILLE KNOX COUNTY PLANNING	CAS



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



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

Revised: 8/21/2020

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ROAD PROFILES												
<b>BRAKEBILL ROAD SUBDIVISION</b>												
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DEVELOPER: MAVERICK DEVELOPMENT GROUP, LLC 3200 NORTH HAWTHORNE STREET CHATTANOOGA, TN 37408 (423) 668-6030												
DIST. NO. 58	KNOX CO., TN.											
CLT MAP 72	PARCELS 267 & 267.01											
SCALE: AS NOTED	JULY 8, 2020											
 <b>URBAN ENGINEERING, INC.</b> 11852 KINGSTON PIKE FARRAGUT, TENNESSEE 37922 (865) 956-1924												
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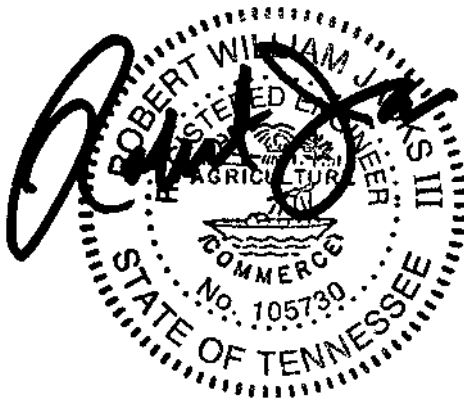


# Transportation Impact Study Brakebill Road Subdivision Knox County, Tennessee



Revised August 2020

Prepared for:  
Maverick Development Group, LLC  
3200 North Hawthorne Street  
Chattanooga, TN 37406



8/24/2020

9-SB-20-C  
9-D-20-UR  
Revised: 8/31/2020

## EXECUTIVE SUMMARY

### **Preface:**

Maverick Development Group, LLC is proposing to construct a residential development adjacent to Brakebill Road and Hammer Road in East Knox County, TN. In this report, the name of this proposed residential development is referred to as “Brakebill Road Subdivision,” and this development will consist of 227 single-family detached houses and 95 single-family attached houses on 100.6± acres. This development is anticipated to be fully built-out and occupied by the year 2025. The primary purpose of this study is to determine and evaluate the potential impacts of the Brakebill Road Subdivision on the adjacent transportation system. The study includes a review of the primary access roads and the major surrounding intersections and is a Level 2 study as set forth by the Knoxville-Knox County Planning. Recommendations and mitigation measures will be offered where traffic operations have been projected to be below traffic engineering standards.

### **Study Results:**

The findings of this study include the following:

- At full build-out and occupancy, the Brakebill Road Subdivision with 227 single-family detached houses and 95 single-family attached houses is expected to generate approximately 3,123 trips on an average weekday. Of these trips, 217 of these trips are estimated to occur during the AM peak hour and 298 trips in the PM peak hour at full build-out and occupancy in the year 2025.
- A total of three new unsignalized intersections will be created externally on existing roads by this new development. These intersections are projected to operate with minimal delays. Of the four existing intersections examined in the study, all of them are expected to need modifications to meet the projected traffic volumes in the year 2025.
- Based on the review of the vehicle crash history and the study observations on Brakebill Road, it was determined that the narrowness of Brakebill Road could be a contributing factor to vehicle crashes, and these crashes could be reduced with remediation strategies.

**Recommendations:**

An overview of the recommendations for the external roadways and intersections is provided in Figure 10 at the end of the report. A discussion of these recommendations is offered in the following based on the study analyses. The recommendations marked with an asterisk indicate an existing need and are not associated with the projected transportation impacts of the proposed subdivision.

- Minor traffic signal timing changes might be required in the projected conditions at the existing signalized intersection of Asheville Highway (US 25W/Hwy 11E) at Brakebill Road to optimize traffic flows and reduce vehicle queues.
- \* • A 24" white stop bar needs to be installed on the eastbound approach of Hammer Road at Brakebill Road to improve visibility of the stop condition.
- The new Hammer Road at Road "B" intersection will require a white stop bar and Stop Sign (R1-1) on the Road "B" approach. Required sight distance at this proposed intersection needs to be verified by a licensed land surveyor and designed accordingly in the design plans. Larger curb radii should be considered to facilitate right-turns due to the narrowness of Hammer Road.
- The new Brakebill Road at Clubhouse Driveway intersection will require a 24" white stop bar and Stop Sign (R1-1) on the Clubhouse Driveway approach. Required sight distance at this proposed intersection needs to be verified by a licensed land surveyor and designed accordingly in the design plans. Larger curb radii should be considered to facilitate right-turns due to the narrowness of Brakebill Road.
- The new Brakebill Road at Road "A" intersection will require a separate northbound left-turn lane on Brakebill Road with a storage length of 75 feet. This lane should be constructed before the residential subdivision is opened to residents. The new intersection will require a 24" white stop bar and Stop Sign (R1-1) on the Road "A" approach. Required sight distance at this proposed intersection needs to be verified by a licensed land surveyor and designed accordingly in the design plans. Larger curb radii should be considered to facilitate right-turns due to the narrowness of Brakebill Road.
- Based on the projected traffic volumes in 2025, the existing turn lanes at the Strawberry Plains Pike and Interstate 40 On/Off-Ramps (north side) intersection will need to be modified. The projected results in the study show that an additional northbound left-turn lane will be required due to this traffic movement exceeding 300 vehicles per hour in the PM peak hour. Adding a second



northbound left-turn lane will require constructing a second lane on the westbound Interstate 40 On-Ramp and merging these lanes either before the entrance to westbound Interstate 40 or further downstream. The existing northbound left-turn lane has approximately 190 feet of storage. Based on the projected volumes, the second left-turn lane should also be constructed with 190 feet of storage. The projected 2025 volumes and calculations also indicate that the existing westbound Interstate 40 Off-Ramp double left-turn lanes will need to be lengthened by 25 feet to a total of 225 feet. Both modifications at this intersection are projected to be required due to overall traffic growth in the area and not directly due to the proposed residential subdivision.

- \* • The existing Strawberry Plains Pike at Brakebill Road intersection currently meets warrants for traffic signalization based on the existing traffic counts and during an analysis by the Tennessee Department of Transportation in 2010. This intersection is presently operating with a reduced level of service and has high vehicle delays for eastbound left-turns. It is recommended that this intersection have a traffic signal installed and coordinated with the existing traffic signal to the south at the Strawberry Plains Pike and Interstate 40 On/Off-Ramps (north side) intersection. Based on the projected volumes in 2025 and a preliminary traffic signal design, the existing northbound left-turn lane at the Strawberry Plains Pike at Brakebill Road will need to be increased by 50 feet in length to a minimum of 200 feet. This traffic signal should be constructed before the residential subdivision is opened to residents. As part of this work, some items such as pavement markings, vegetation removal, and retroreflective bi-directional raised pavement markings need to be refreshed and re-installed as first identified in the TDOT Road Safety Audit Review (RSAR).
- \* • Based on the narrowness of Brakebill Road and the recent past crash history, it is recommended that remediation strategies be employed to attempt to reduce future vehicle crashes. While this road was evaluated and deemed not to meet the benchmark for TDOT safety funding, Brakebill Road crash history indicates that a substantial amount of crashes involved opposite direction sideswipe and road departure crashes. The recommended strategies include identifying and removing/re-locating roadside hazards, installing advance warning signage on two existing horizontal curves, replacing and correcting existing warning road signage, replacing pavement markings, and installing rumble strips on the centerline and the edge line of Brakebill Road. Eventually, Brakebill Road will

need to be widened and upgraded since it is a major collector and is an important link between Asheville Highway (US 25W/Hwy 11E) and Strawberry Plains Pike at Interstate 40. The current pavement width of Brakebill Road adjacent to the development site is approximately 18.5 feet, and it would be beneficial to widen and upgrade the road to facilitate travel in between Strawberry Plains Pike and Asheville Highway (US 25W/Hwy 11E).

- \* • Pavement markings on Brakebill Road, especially within the Knoxville City limits, is recommended to be reapplied.
- It is recommended that 25-mph speed limit signs be posted on Road “A” and Road “B” for vehicles traveling into the new residential subdivision.
- Stop Signs (R1-1) and 24” white stop bars should be installed internally on the new streets, as shown in the report.
- Sight distance at the new intersections in the Brakebill Road Subdivision must not be impacted by new signage or future landscaping. For a posted speed limit of 25-mph, the intersection sight distance requirement is 250 feet. The stopping sight distance required is 155 feet for a level road grade. The road layout designer should ensure that these sight distance lengths are met, and they should be labeled on the plans.
- All drainage grates and covers for the residential development need to be pedestrian and bicycle safe.
- The internal sidewalks that are proposed for the development should have appropriate ADA compliant curbed ramps at intersection corners, and the sidewalks are recommended to be 5 feet minimum in width.
- The United States Postal Service (USPS) has recently implemented changes to its guidelines for delivery 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.
- Traffic calming measures might be needed for this development. Sections of the horizontal alignment for proposed Road “A”, “C”, and “D” within the development have long and straight road segments. The possible need for traffic calming measures inside the development will need to be coordinated with Knox County Engineering and Public Works during the detailed design phase.
- 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.

## 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 level of traffic flow and safety. An overview of the recommendations for the external roads and intersections is shown at the end of this report section in Figure 10.



**Asheville Highway (US 25W/Hwy 11E) at Brakebill Road:** This intersection was calculated to operate adequately with respect to the level of service during the existing conditions and during the projected conditions when the Brakebill Road Subdivision is completed and fully occupied in the year 2025. Some minor signal timing changes might be required in the future at the intersection to optimize the level of service and reduce queue lengths.



**Hammer Road at Brakebill Road:** The intersection at Hammer Road and Brakebill Road was calculated to operate very well with respect to level of service under unsignalized conditions in the year 2025.

- 2a) A separate left-turn lane or right-turn lane on Brakebill Road onto Hammer Road is not required based on the projected 2025 traffic volumes.
- 2b) The intersection of Hammer Road at Brakebill Road currently operates as a two-way stop-controlled T-intersection. At this intersection, Hammer Road operates under a stop condition but does not currently have a white stop bar installed. It is recommended that a 24" white stop bar be installed to increase the visibility of the stop condition at this approach.
- 2c) Vegetation in the southwest corner needs to be better controlled and maintained in the future to improve sight distance at this intersection.



**Hammer Road at Road "B":** The intersection of Hammer Road at Road "B" was calculated to operate very well with respect to level of service under unsignalized conditions in the year 2025. The capacity analysis shows that only a single exiting lane for left and right exiting vehicles is required at the Road "B" entrance.

- 3a) A separate left-turn lane or right-turn lane on Hammer Road onto Road “B” is not required based on the projected 2025 traffic volumes.
- 3b) It is recommended that a Stop Sign (R1-1) and a 24” white stop bar be applied to the pavement of the Road “B” approach at Hammer Road. The stop bar should be applied at a minimum of 4 feet away from the edge of Hammer Road and should be placed at the desired stopping point that provides the maximum sight distance.
- 3c) Intersection sight distance at Road “B” must not be impacted by future landscaping or signage. A licensed land surveyor must verify the available sight distance at this proposed location. Based on a grade of 8% on Hammer Road and a posted speed limit of 30 mph, the required ISD is 300 feet looking towards the north and south, and the SSD is calculated to be 225 feet for eastbound vehicles (-8%) and 185 feet for westbound vehicles (+8%).
- 3d) Due to the narrowness of Hammer Road, it is recommended that a larger curb radius be designed and constructed that would facilitate right-turns off and on to Hammer Road at the Road “B” intersection. A larger curb radius would allow school buses and larger maintenance and delivery vehicles the opportunity to turn freely without overlapping into opposing traffic lanes.



**Brakebill Road at Clubhouse Driveway:** The intersection of Brakebill Road at the Clubhouse Driveway was not analyzed with respect to level of service. Only minor amounts of traffic will utilize this driveway. It is expected that this intersection will operate very well, but sight distance must be provided for safe operations. A licensed land surveyor must verify the available sight distance at this proposed location. Based on a grade of 5% on Brakebill Road and an 85<sup>th</sup> percentile speed of 40 mph, the required ISD is 400 feet looking towards the north and south, and the SSD is calculated to be 330 feet for northbound vehicles (-5%) and 285 feet for southbound vehicles (+5%).



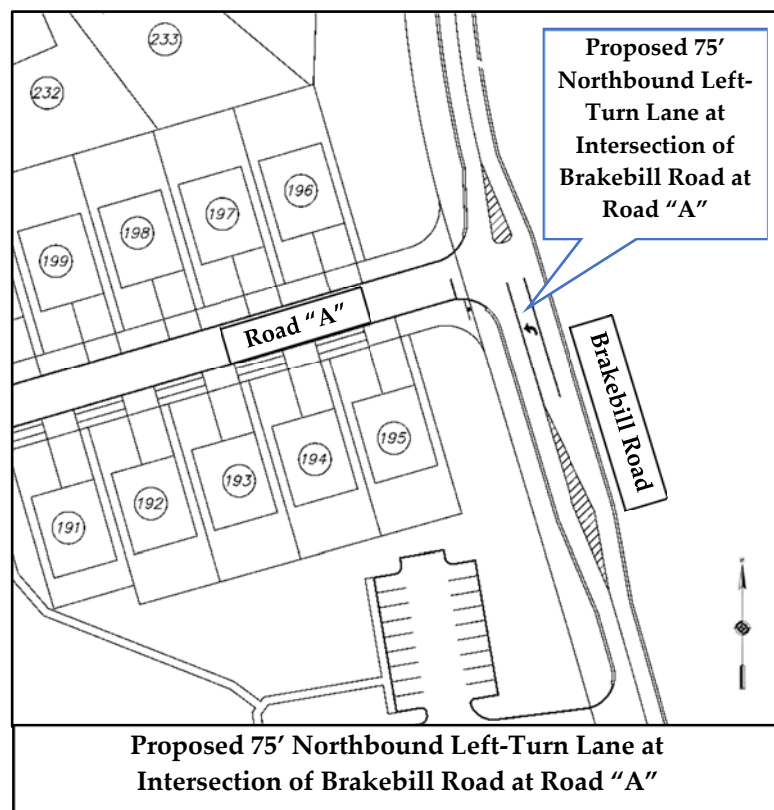
**Brakebill Road at Road “A”:** The intersection of Brakebill Road at Road “A” was calculated to operate very well with respect to level of service under unsignalized conditions in the year 2025. The capacity analysis shows that only a single exiting lane for left and right exiting vehicles is required at the Road “A” entrance.

- 5a) A separate southbound right-turn lane on Brakebill Road onto Road "A" is not required based on the projected 2025 traffic volumes. Even though the threshold for the northbound left-turn lane is not fully met, it is nonetheless recommended that this lane be provided.

To estimate the required northbound left-turn storage length on Brakebill Road at Road "A", SimTraffic (Version 8) software was utilized, which performs micro-simulation and animation of vehicular traffic and calculates various vehicle parameters such as intersection vehicle queue lengths. Based on the software results from the projected volumes, the 95<sup>th</sup> percentile vehicle queue distance was calculated. The 95<sup>th</sup> percentile queue is the recognized measurement in the traffic engineering profession as the design standard used when considering queue distances. A 95<sup>th</sup> percentile queue means that there is a 95% certainty the vehicle queue will not extend beyond that point. The calculated queue results were based on averaging the outcome obtained during ten traffic simulations. The vehicle queue results from the SimTraffic software are in Appendix M. The 95<sup>th</sup> percentile queue for northbound left-turns on Brakebill Road at Road "A" was calculated to be 21 feet during the projected AM peak hour and 49 feet during the projected PM peak hour. Based on these results, the proposed storage length should have a minimum length of 75 feet, which is the Knox County standard minimum length for left-turn storage lanes.

- 5b) It is recommended that a Stop Sign (R1-1) and a 24" white stop bar be applied to the pavement of the Road "A" approach. The stop bar should be applied at a minimum of 4 feet away from the edge of Brakebill Road and should be placed at the desired stopping point that provides the maximum sight distance.
- 5c) Intersection sight distance at Road "A" must not be impacted by future landscaping or signage. A licensed land surveyor must verify the available sight distance at this proposed location. Based on a grade of 5% on Brakebill Road and an observed 85<sup>th</sup> percentile speed of 40 mph, the required ISD is 400 feet looking towards the north and south, and the SSD is calculated to be 330 feet for northbound vehicles (-5%) and 285 feet for southbound vehicles (+5%).

- 5d) Due to the narrowness of Brakebill Road, it is recommended that a larger curb radius be designed and constructed that would facilitate right-turns off and on to Brakebill Road at the Road "A" intersection. This would allow school buses and larger maintenance and delivery vehicles the opportunity to turn freely without overlapping into opposing traffic lanes. See the following exhibit that shows the proposed left-turn lane on Brakebill Road at Road "A". Urban Engineering, Inc. designed this layout.





**Strawberry Plains Pike at Interstate 40 On/Off-Ramps (north side):** This intersection was calculated to operate adequately with respect to the level of service during the existing conditions and during the projected conditions when the Brakebill Road Subdivision is completed and fully occupied in the year 2025. However, the v/c ratio of the intersection in the year 2025 without the project generated trips included in the analysis was calculated to be 0.970 during the PM peak hour. A v/c ratio of 1 would indicate that the traffic volumes are at the roadway capacity. This high v/c ratio at this intersection is primarily due to the projected amount of northbound left-turn vehicles.

The projected northbound left-turn lane volume in the PM peak hour was calculated to be 360 vehicles in 2025. Single left-turn lanes that are experiencing more than 300 vehicles/hour are many times recommended to be increased to dual left-turn lanes. In the future, if dual left-turn lanes for the northbound approach are constructed, the physical space for adding an additional northbound left-turn should be available by building a second lane in the existing 30-foot-wide grass median. The stormwater drainage system will need to be re-configured to construct an additional lane in the grass median. An additional lane would also need to be built for the westbound Interstate 40 On-Ramp. Options for constructing an additional lane on the westbound Interstate 40 On-Ramp could include merging the lanes downstream of the intersection and before the entrance to Interstate 40 or continuing the On-Ramp dual lanes to the entrance of Interstate 40 and merging the lanes further downstream on Interstate 40. Merging further downstream might be a better alternative due to a large amount of truck traffic.

Nonetheless, adding a second northbound left-turn lane would significantly reduce the v/c ratio at this intersection and increase the level of service. This additional lane could be expected to be needed soon based on the projected growth. A recommendation for extending the double westbound left-turn lanes of the Interstate 40 Off-Ramp by 25 feet is discussed in the following section. Both modifications at this intersection are projected needs due to overall traffic growth in the area, but not directly due to the proposed residential subdivision.





**Strawberry Plains Pike at Brakebill Road:** This intersection was calculated to be currently operating poorly with respect to the level of service for eastbound left-turns and operate extremely poor in the year 2025 without the project, or with the project generated traffic. While there are not excessive amounts of motorists attempting this turning movement, the number of conflicting volumes causes extreme delays for the eastbound left-turns trying to turn towards northbound Strawberry Plains Pike. Many times, eastbound left-turn drivers require the median space on Strawberry Plains Pike to provide a temporary haven before completing the left-turn entering the flow of northbound traffic. Drivers using the median as a haven potentially obstruct and conflict with the northbound left-turning vehicles. Competition for sight distance and physical space within the median occurs between northbound left-turns and eastbound left-turns when the eastbound left-turn movement uses the median as a mid-way haven.

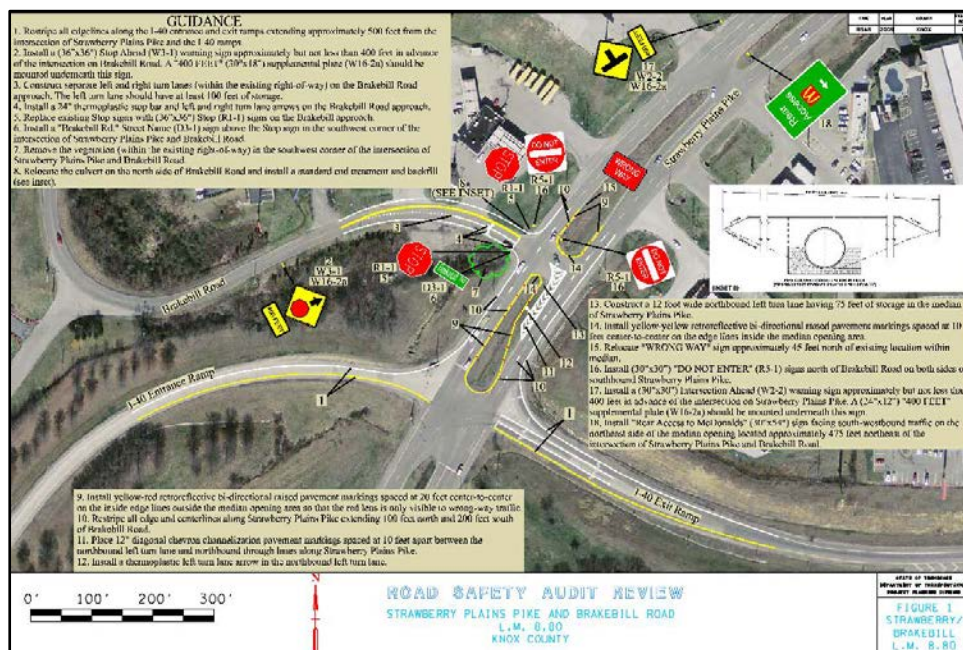


**View of Median of Strawberry Plains Pike at Brakebill Road  
(Looking South)**

- 7a) In 2010, the intersection of Strawberry Plains Pike at Brakebill Road was selected by TDOT to undergo a Road Safety Audit Review (RSAR). This intersection was identified by the TDOT safety needs planning process and was evaluated since the crash ratio at the time of the study in 2010 met the threshold for safety improvements. As part of the review, traffic counts were obtained, and the intersection was determined as meeting MUTCD (Manual on Uniform Traffic Control Devices) Warrants for traffic signalization. However, traffic signalization was deemed “undesirable” due to the short distance (approximately 270 feet) between this intersection and the signalized intersection of Strawberry Plains Pike at the Interstate 40 On/Off-Ramps (north side). The TDOT RSAR report for this intersection in 2010 is in Appendix N. An overview of the 2010 TDOT recommended upgrades and changes at the intersection included the following:
- i. Re-striping and installation of pavement markings and raised markings
  - ii. Replacement and installation of new traffic signage
  - iii. Vegetation removal



- iv. Relocation of an existing stormwater culvert
- v. Construction of a new northbound left-turn lane at the intersection of Strawberry Plains Pike at Brakebill Road
- vi. Construction of a separate eastbound left-turn lane at the intersection of Strawberry Plains Pike at Brakebill Road



From the field review for this current traffic study, it appears that these recommendations were installed and constructed. However, some items such as pavement markings, vegetation removal, and retroreflective bi-directional raised pavement markings need to be refreshed and re-installed. However, most importantly, the construction of the recommended left-turn lane at the intersection of Strawberry Plains Pike at Brakebill Road was completed as prescribed.

- 7b) As an investigation into potential remediation for this intersection, and as a follow up to the TDOT review that indicated this intersection met warrants for traffic signalization in 2010; this intersection was re-examined with the 2020 (+2% adjusted 2018 volumes) traffic volumes with respect to traffic signal warrants. The traffic counts at this intersection were conducted from 7-9 am, 11 am–1 pm, and 2-6 pm for a total of 8 hours.

The Manual on Uniform Traffic Control Devices – 2009 Edition (MUTCD) presents nine different warrants that have been developed by the traffic engineering profession to determine whether a traffic signal is warranted. These warrants cover a broad range of minimum elements required to indicate whether a traffic signal is justified for any particular location. These elements consist of traffic volumes, pedestrian volumes, crash history, and other factors. The MUTCD explicitly states that a traffic control signal should not be installed unless one or more of the signal warrants in the manual are met. However, the satisfaction of a warrant does not entirely in itself justify the need for a traffic signal. Sometimes further engineering studies and judgments also need to be applied before justifying the need for a traffic signal to be installed. These additional studies are a particularly important step in ensuring that the installation of a traffic signal will not bring about degradations in safety and efficiencies.

The MUTCD defines nine different warrants, two of which are potentially applicable for this intersection at this time and are explained below:



#### Warrant 1, Eight-Hour Vehicular Volume:

Warrant 1 is comprised of 2 conditions – A and B. The Minimum Vehicular Volume, Condition A, is intended for application where the volume of intersecting traffic is the principal reason for consideration of signal installation. The Interruption of Continuous Traffic, Condition B, is intended for use at locations where Condition A is not satisfied and where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street.



#### Warrant 2, Four-Hour Vehicular Volume:

The Four-Hour Vehicular Volume signal warrant conditions are intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal.

The intersection of Strawberry Plains Pike at Brakebill Road was evaluated for justification for a traffic signal based on the MUTCD Warrants listed above and

the 2020 (+2% adjusted 2018 volumes) traffic count volumes. Brakebill Road was used as the minor side street for the warrant analysis, and Strawberry Plains Pike was the major street. According to the Federal Highway Administration (FHWA), the traffic signal warrants are intentionally written in a manner that provides a large amount of flexibility to engineers in terms of how they determine the number of moving lanes and the volume of approaching traffic used in the analysis. The decisions as to which approach lanes on the major and minor streets and the corresponding traffic volumes are determined by the engineering judgment of the engineer conducting the study or by the methods established by local and state agencies. Ultimately, the decision of the reviewing agency to determine whether right-turn volumes from the minor street should be included.



For the intersection of Strawberry Plains Pike at Brakebill Road, when the analysis includes right-turn volumes from Brakebill Road (the minor street approach), this intersection currently meets traffic signal warrants. The intersection meets Warrant #1, Condition B, and Warrant 2 based on the 2020 (+2% adjusted 2018 volumes) existing volumes collected for this study. However, if the right-turn volumes from Brakebill Road are not included, the intersection does not meet signal warrants. Nonetheless, justification could be made for a traffic signal at this location currently since it does meet a traffic signal warrant when including right-turns from the minor street approach. The results of the traffic signal warrant assessment at this intersection for the existing volumes of 2020 (+2% adjusted 2018 volumes) are in Appendix O, and Table 10 presents the results.

**TABLE 10**  
**TRAFFIC SIGNAL WARRANT SUMMARY**

INTERSECTION	VOLUME WARRANT (REQUIRED NUMBER OF HOURS SATISFIED)			
	WARRANT 1			WARRANT 2
	CONDITION #1A (8 hours)	CONDITION #1B (8 hours)	CONDITION 1A & 1B - COMBINATION (8 hours)	(4 hours)
2020 (2% Adjusted 2018) - Existing Volumes Strawberry Plains Pike at Brakebill Road (100% of Right Turns Included on Brakebill Road)	Not Satisfied	Satisfied	Satisfied	Satisfied
2020 (2% Adjusted 2018) - Existing Volumes Strawberry Plains Pike at Brakebill Road (0% of Right Turns Included on Brakebill Road)	Not Satisfied	Not Satisfied	Not Satisfied	Not Satisfied

- 7c) With the results of the traffic signal warrant analysis indicating that this intersection could be justified to have a traffic signal installed, Synchro Traffic Software (Version 8) was used to design a preliminary plan for traffic signalization. This preliminary design included coordinating the existing traffic signal at Strawberry Plains Pike at the Interstate 40 On/Off-Ramps (north side) with the proposed traffic signal at Strawberry Plains Pike at Brakebill Road. Based on an 80-second actuated-coordinated cycle, the preliminary design resulted in a much-improved level of service for eastbound left-turns on Brakebill Road at Strawberry Plains Pike. The level of service results of this initial design for the two intersections are shown in Table 11, and Appendix G includes the worksheets for these capacity analyses. The results shown in Table 11 consists of the recommended addition of a northbound left-turn lane at the intersection of Strawberry Plains Pike at the Interstate 40 On/Off-Ramps (north side). Also, the results of the calculated vehicle queue lengths based on the preliminary traffic signal design are shown in Table 12.

**TABLE 11**  
**2025 INTERSECTION CAPACITY ANALYSIS RESULTS -**  
**OPENING YEAR (WITH PROJECT) WITH PRELIMINARY NEW TRAFFIC SIGNAL DESIGN**

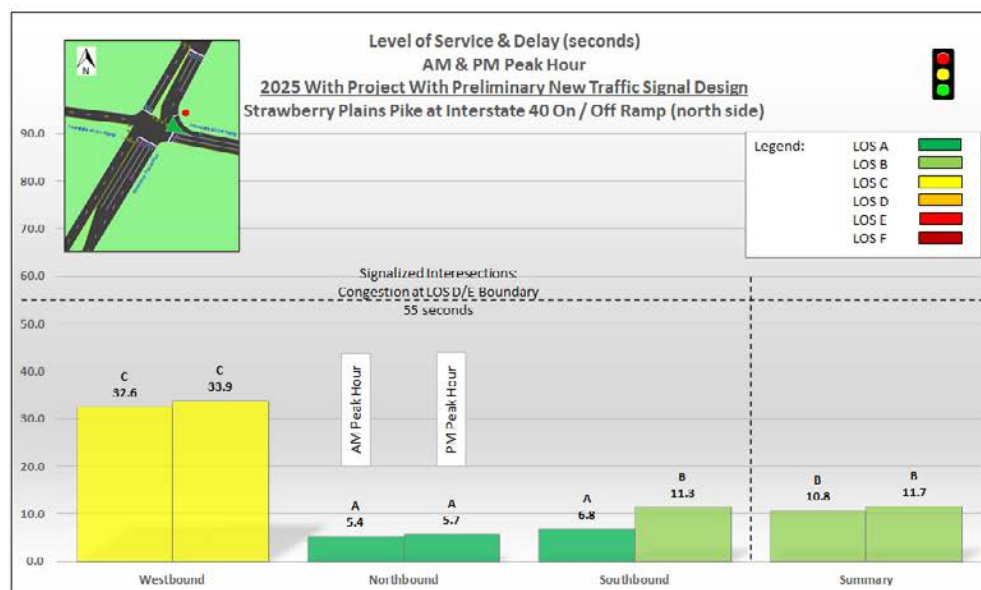
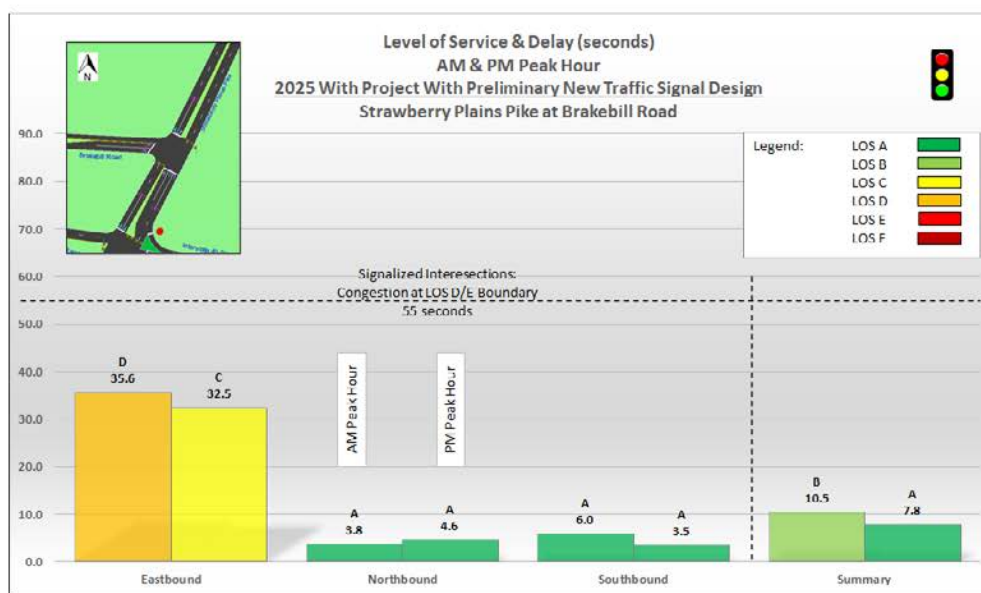
INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS	DELAY (seconds)	V/C	LOS	DELAY (seconds)	V/C
Strawberry Plains Pike at Brakebill Road		Eastbound	D	35.6		C	32.5	
		Northbound	A	3.8		A	4.6	
		Southbound	A	6.0		A	3.5	
		Summary	B	10.5	0.550	A	7.8	0.700
Strawberry Plains Pike at Interstate 40 On / Off Ramp (north side)		Westbound	C	32.6		C	33.9	
		Northbound	A	5.4		A	5.7	
		Southbound	A	6.8		B	11.3	
		Summary	B	10.8	0.540	B	11.7	0.530

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

<sup>a</sup> Level of Service

<sup>b</sup> Average Delay (sec/vehicle)

<sup>c</sup> Volume-to-Capacity Ratio



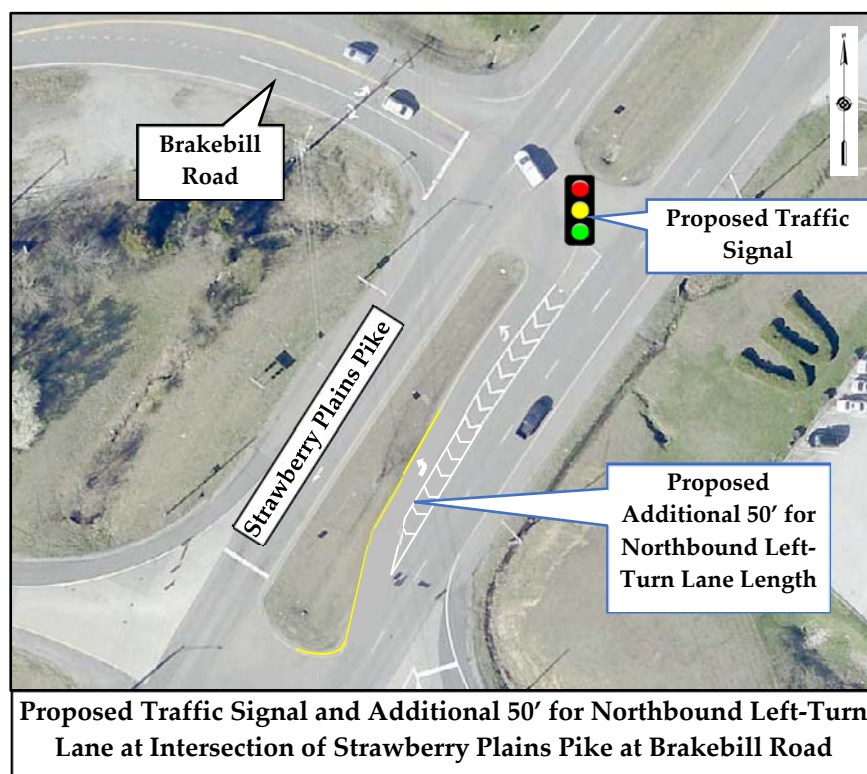


**TABLE 12**  
**TURN LANE STORAGE & VEHICLE QUEUE SUMMARY -**  
**2025 PROJECTED PEAK HOUR TRAFFIC VOLUMES WITH PRELIMINARY NEW TRAFFIC SIGNAL DESIGN**

INTERSECTION	APPROACH/ MOVEMENT	EXISTING STORAGE (ft)	PROPOSED STORAGE (ft)	SIMTRAFFIC 95 <sup>th</sup> PERCENTILE QUEUE LENGTH (ft)	
				AM PEAK HOUR	PM PEAK HOUR
Strawberry Plains Pike at Brakebill Road	Eastbound Left	120	120	90	83
	Northbound Left/U-Turn	150	200	97	175
Strawberry Plains Pike at I-40 On/Off Ramps	Westbound Left #1	200	225	156	196
	Westbound Left #2	200	225	214	243
	Northbound Left #1	190	190	126	131
	Northbound Left #2	-	190	199	202

Note: 95<sup>th</sup> percentile queues were calculated in SimTraffic 8 software

The results from SimTraffic of the queue analysis shown in Table 12 indicate that some of the turn lane lengths will need to be increased based on the projected volumes and the outcome of the preliminary signal timing design. The left northbound lane at Strawberry Plains Pike at Brakebill Road was calculated to have a 95<sup>th</sup> percentile queue length of 175 feet with an existing storage length of 150 feet in the PM peak hour. Meeting this storage would require this turn lane to be lengthened to its maximum length available in between the two intersections. An additional 50 feet is potentially possible but will require careful consideration since this additional length will encroach the intersection of Strawberry Plains Pike at Interstate 40 On/Off-Ramps (north side). The existing eastbound left-turn lane on Brakebill Road with 120 feet of storage is projected to be adequate operating with a traffic signal. See the following exhibit for clarification. Additionally, the channelized I-40 Westbound Off-Ramp right-turn lane will most likely need to be realigned to facilitate motorists making right-turns from the I-40 Off-Ramp when the northbound left-turn lane at the Strawberry Plains Parkway at Brakebill Road is extended.



**Double Left-Turn on Interstate 40 Off-Ramp at Strawberry Plains Pike (Looking West)**

Based on the 2025 projected volumes, other turn lane lengths will also need to be increased, and this includes the turn lanes at the intersection of Strawberry Plains Pike at the Interstate 40 On/Off-Ramps (north side). The results indicated that the existing Interstate 40 Off-Ramp westbound dual left-turn lane storage lengths could be exceeded by what is currently available. In the projected PM Peak Hour, the vehicle queues for the westbound double left-turn lanes will exceed the existing storage length available. Distributing the projected queue lengths of 196 feet and 243 feet

across both lanes results in a total queue length of 219.5 feet in both lanes (196 feet + 243 feet / 2 lanes = 219.5 feet). Adding 25 feet to both left-turn lanes to a total of 225 feet would provide enough storage based on the projected volumes.

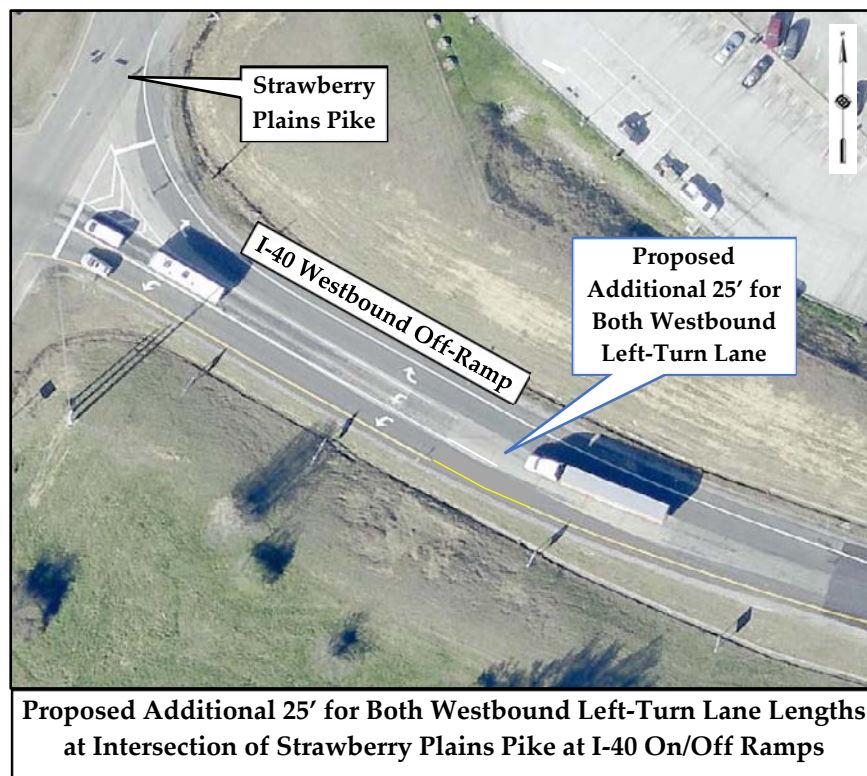


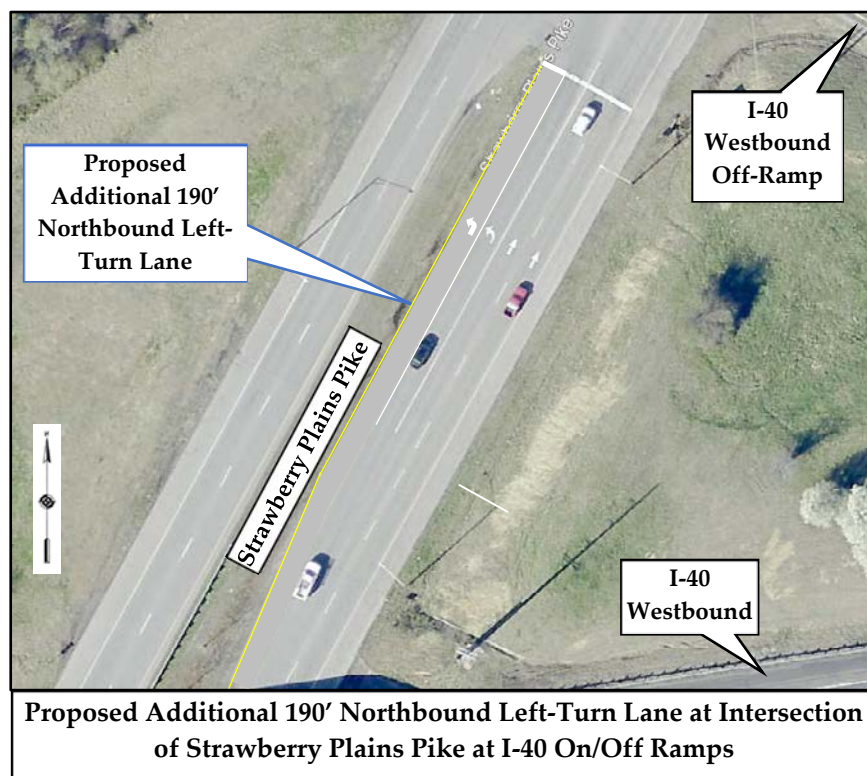


**Single Left-Turn on Strawberry Plains Pike at  
Interstate 40 On/Off-Ramps  
(Looking North)**

As discussed earlier, the addition of a second northbound left-turn lane at the intersection of Strawberry Plains Pike at the Interstate 40 On/Off-Ramps (north side) with a similar storage lane length of 190 feet should be sufficient to handle the projected volumes. The software results indicated that the northbound left-turn lanes would have a 95<sup>th</sup> percentile queue of 131 feet and 202 feet in the PM Peak Hour. In actuality, the expected queue lengths could be more evenly distributed between the two lanes, which would result in a required length of 180 feet in both lanes

(131 feet + 202 feet / 2 lanes = 166.5 feet). Thus, adding an additional northbound left-turn lane with a similar length as the existing storage length of 190 feet should be sufficient. See the following exhibits that show the proposed modifications to the turn lanes.





Further analysis of the coordinated signal system at these two intersections should be optimized based on the actual future volumes instead of the projected volumes. Using the actual future volumes versus the projected volumes from this study could reduce the projected peak queue lengths and the potential turn lane storage extensions required.

- 7d) It is recommended that this intersection be signalized. Signalization is recommended even though in 2010, TDOT deemed signalization as “undesirable” while meeting signal warrants.

This intersection currently meets warrants for traffic signalization, and it is projected to continue to meet signalization warrants in the future. It is recommended that this intersection be signalized before the Brakebill Road Subdivision is opened to residents. If this intersection is not signalized and experiences the potential increased traffic volumes, excessive vehicle delays will occur. Without remediation, this intersection could experience increased vehicle crashes due to impatient drivers. Possible issues to consider related to installing a

traffic signal at the intersection of Strawberry Plains Pike at Brakebill Road include the following:

- a. Shorter traffic signal cycle lengths are recommended since queue lengths tend to be shorter for short cycle lengths and will be necessary due to the short distance between the two intersections.
- b. The traffic signals on Strawberry Plains Pike at both intersections in the northbound and southbound approaches need to be carefully designed with respect to placement and visibility. The signal heads on these approaches will need to be installed with louvers or optically programmed signals to restrict signal visibility to these traffic lanes. Screening will be required to eliminate drivers from driving thru or not recognizing the first set of signal heads in the progression thru the two sets of signalized intersections.
- c. Advance traffic warning signage will be necessary for the approach of Brakebill Road at Strawberry Plains Pike due to the horizontal curvature of Brakebill Road. To highlight this need, it was observed during the field review that the current Stop Ahead Sign (W3-1) on the Brakebill Road approach was obscured by vegetation.



**Sign Obscured by Vegetation on  
Brakebill Road Approach**





**Brakebill Road:** From the results discussed earlier in this report, it was shown that the calculated crash rates on Brakebill Road were not high enough to receive consideration for TDOT safety funding. Nonetheless, the narrowness of the roadway, the shoulder drop-offs, and the lack of a clear zone outside the roadway are potential factors in the road crashes. Based on evaluating the obtained individual traffic crash reports from Brakebill Road over the past three years, 10 of the 17 crashes indicated that the narrowness of Brakebill Road could have been a contributable factor. These ten crashes were either opposite direction sideswipes or road departures. As one can easily conclude, research has indicated that narrow roads have a significant influence on these types of crashes. Pictures showing the various pavement drop-offs and roadside hazards on Brakebill Road are shown below:



The most logical recommendation would include widening Brakebill Road. Brakebill Road is a major collector and an essential link between Asheville Highway (US 25E/Hwy 11E) and Strawberry Plains Pike at Interstate 40. Improving Brakebill Road with appropriate horizontal and vertical alignments, lane widths, shoulders, and clear zones would potentially significantly decrease the number of vehicle crashes. It is expected that

this road in the future will need to be widened and improved. In the interim, and to accommodate traffic growth and development in the area, several strategies should be employed to reduce the number of opposite direction sideswipes, and roadway departure crashes.

To determine appropriate strategies to potentially reduce traffic crashes on Brakebill Road, resources from the FHWA were reviewed. The following measures are recommended to be implemented on Brakebill Road:

- a. Identify and remove or re-locate roadside hazards (ditches, utility poles, and trees): Research has indicated that increasing the clear zone prevents crashes. Most of the road departure crashes on Brakebill Road involved striking trees and utility poles. The next most common object struck was roadside ditches. According to research, 80% of all fatal crashes at curves are roadway departure crashes. (Source: Fatality Analysis Reporting System). Roadside hazards that have been identified and documented along Brakebill Road are shown in a picture summary located at the end of this section.

- b. Advance Warning Signs: Warning signs call attention to unexpected conditions on or next to the roadway. It is recommended that Advance Warning Signs be installed on Brakebill Road in advance of two of the horizontal curves where evidence of crash clusters



have occurred. Advance Warning Curve Signs should be placed before the horizontal curve in both directions, just to the north of 524 Brakebill Road.

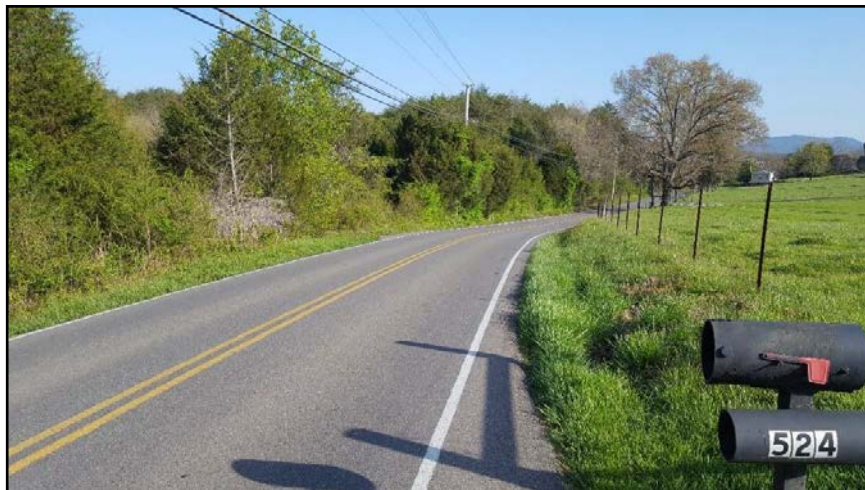
Advisory Speed Plaques (W13-1P) may be used to supplement the warning signs if a subsequent engineering study supports it. The other location where an Advance Warning Curve Sign (W1-2R) should be installed is before the horizontal curve on Brakebill Road heading southbound near the intersection of Brakebill Road at Palmer



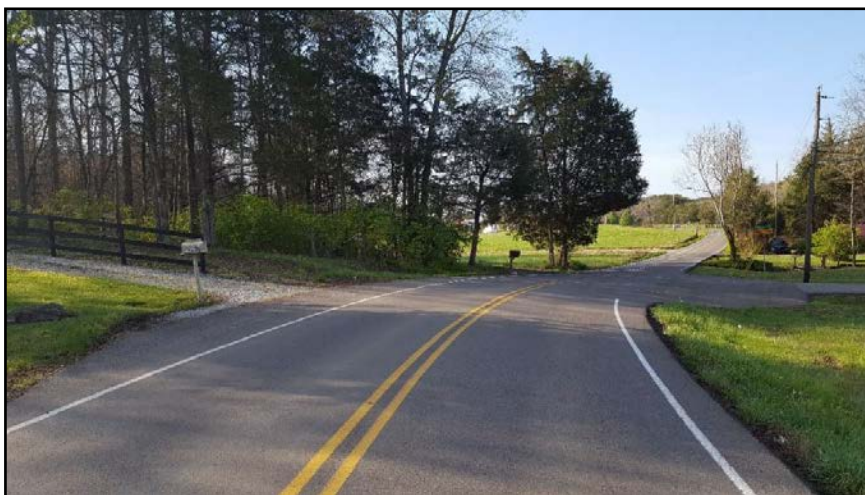
**Deteriorated Curve Sign for NB Traffic on  
Brakebill Road near Kilbridge Drive**



Lane. An Advance Warning Curve Sign (W1-2L) is already posted for the northbound direction on Brakebill Road but should be replaced due to its deteriorated nature and lack of reflectivity.



**Horizontal Curve on Brakebill Road near 524 Brakebill Road  
(Looking North)**



**Horizontal Curve on Brakebill Road near Palmer Lane  
(Looking South)**

Another advance warning sign on Brakebill Road that needs correction is the existing Advance Turn Sign (W1-1L) near 604 Brakebill Road for southbound traffic. It is currently leaning and needs to be reset and stabilized.



**Leaning Sign near  
604 Brakebill Road**

- c. Installation of Rumble Strips (along the edgeway and the center of the road): According to the FHWA, edgeway and centerline rumble strips are an effective countermeasure to reduce vehicle departure crashes, head-on collisions, and opposite direction sideswipe crashes. A table from NCHRP Report 641, Guidance for the Design and Application of Shoulder and Centerline Rumble Strips, is shown below, which shows the reduction in crash history based on before and after research studies on urban and rural two-lane roads.

Center line Rumble Strip – Reduction in crash frequency from before to after rumble strip implementation for head-on and opposite direction sideswipe fatal and injury collisions		
	Percent reduction in crash frequency from before to after rumble strip implementation	Standard Error
Rural two-lane roads	45%	6%
Urban two-lane roads	64%	27%
<i>Excerpt from Table 67 of NCHRP Report 641.</i>		
Shoulder Rumble Strip – Reduction in crash frequency from before to after rumble strip implementation for single-vehicle run-off-road fatal and injury crashes		
	Percent reduction in crash frequency from before to after rumble strip implementation	Standard Error
Rural two-lane roads	36%	10%
Rural freeways	17%	7%
<i>Excerpt from Table 28 of NCHRP Report 641.</i>		



The results from the NCHRP (National Cooperative Highway Research Program) report show significant reductions in head-on, opposite direction sideswipes, and roadway departure crashes after installation of rumble strips on two-lane roadways. It is recommended both centerline and edge line rumble strips are installed on Brakebill Road at a minimum at the two horizontal curves identified above where Advance Curve Signs are recommended. In the recent past, clusters of crashes have occurred at these horizontal curves and could be reduced in the future with the installation of rumble strips. Other horizontal curves on Brakebill Road should be considered as well or the entire length of Brakebill Road. TDOT provides a standard installation detail (T-M-16) for asphalt shoulder rumble stripe for non-access-controlled routes.

Some potential issues to consider related to installing rumble strips involve the following:

- i. Pavement: The asphalt pavement of the roadway needs to be of sufficient thickness and quality to install rumble strips.
- ii. Bicyclists: Rumble strips can be detrimental to bicycle travel and hazardous to bicyclists. However, currently, there is little evidence of regular bicycle travel on Brakebill Road.
- iii. Noise: Rumble strips can be a nuisance with respect to the noise generated from vehicles traveling over the strips. The sound is beneficial to the driver inside the vehicle to give a warning but can be a nuisance to those who live nearby. Brakebill Road is not a densely populated area, but there are residences adjacent to the two horizontal curves where rumble strips are recommended. There are options to reduce noise by reducing rumble strip widths, installing sinusoidal-shaped rumble strips which do not produce as much noise, and by discontinuing rumble strips near intersections and major driveways.

These potential issues are not expected to be a severe impediment to installing rumble strips on Brakebill Road. These measures should be beneficial to reducing the number of opposite direction sideswipes, and departure crashes on Brakebill Road. A picture summary of the identified roadside hazards along Brakebill Road is listed in the following pages. These identified roadside

hazards are comprised of vegetation obstructions, drainage ditches, utility poles, trees, and road shoulder drop-offs.



**Roadside vegetation obscures sight distance for turning vehicles at Crosswood Boulevard and Brakebill Road  
(Looking Northwest)**



**Steep road/shoulder drop-off and deteriorated pavement near 701 Brakebill Road Driveway  
(Looking North)**



**Large trees and utility poles adjacent to the roadway near 512 Brakebill Road with shoulder drop-off into the drainage ditch  
(Looking North)**



**Large trees and utility poles adjacent to the roadway near 508 Brakebill Road with shoulder drop-off into the drainage ditch  
(Looking North)**

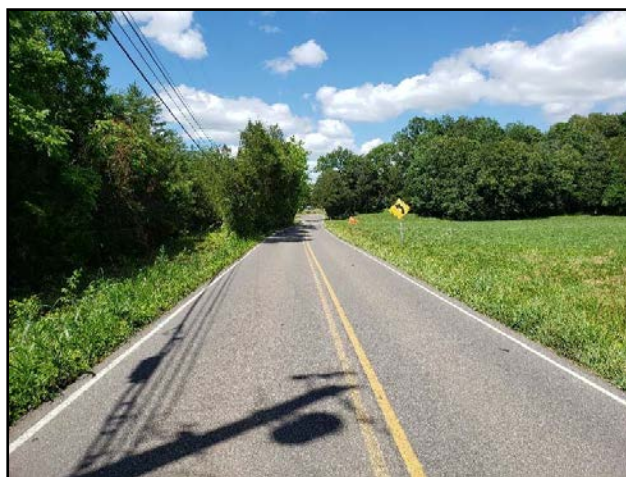




**Large trees and utility poles adjacent to the roadway near 428 Brakebill Road with shoulder drop-off into the drainage ditch  
(Looking South)**





**Large trees adjacent to the roadway just south of Kilbridge Drive with shoulder drop-off into the drainage ditch  
(Looking North)**



**Large trees adjacent to roadway near 420 Brakebill Road with shoulder drop-off into the drainage ditch  
(Looking North)**



**Utility poles adjacent to roadway near 322 Brakebill Road with shoulder drop-off  
(Looking South)**

	
<p><b>Large trees adjacent to roadway near 320 Brakebill Road (Looking North)</b></p>	<p><b>Shoulder drop-off with evidence of vehicle scraping asphalt near 320 Brakebill Road (Looking North)</b></p>

- d. **Pavement Markings:** The existing pavement markings along Brakebill Road are faded and are recommended to be refreshed. The pavement markings on Brakebill Road within the City limits are notably diminished and need the markings to be re-applied.

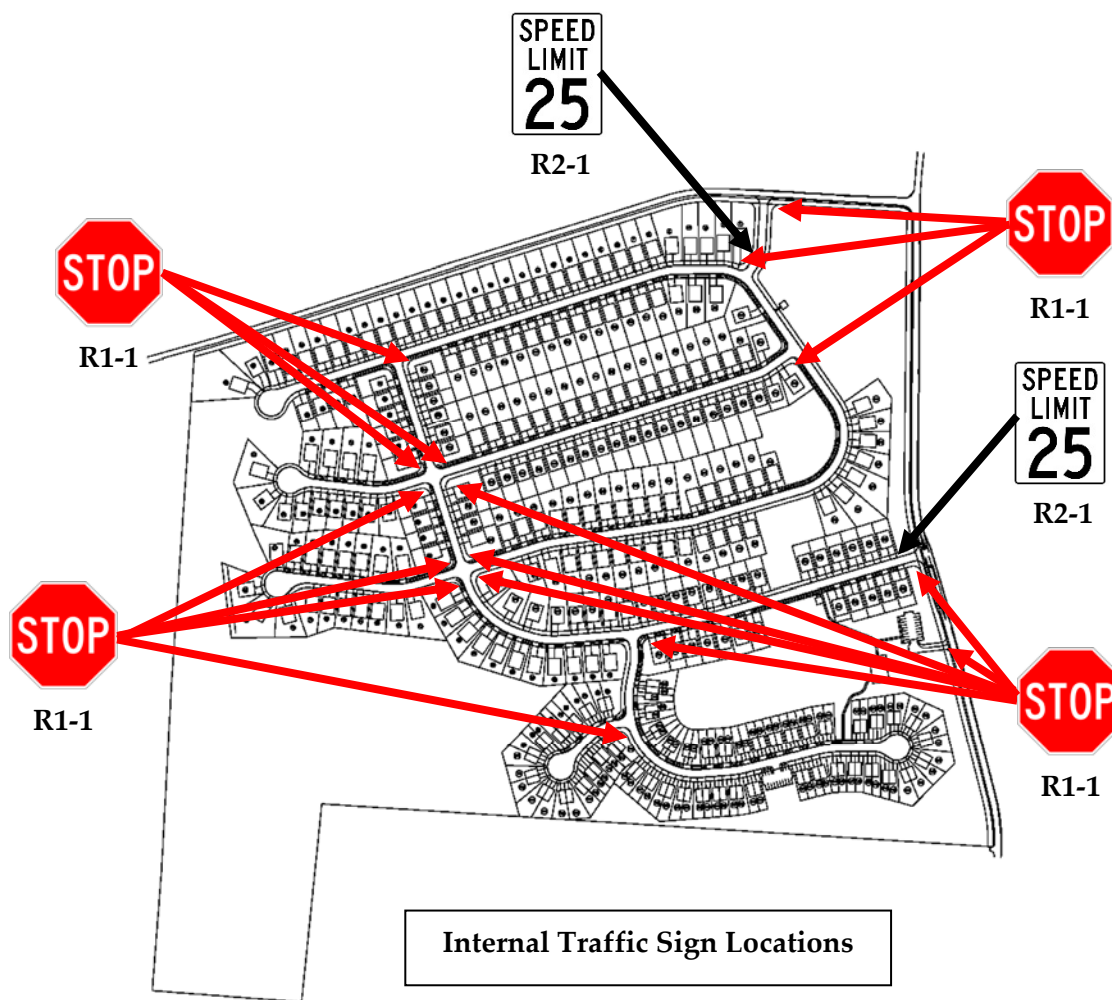






**Brakebill Road Subdivision Internal Roads:** The current concept plan shows six new streets being constructed within the development, as shown in Figure 3.

- 9a) It is recommended that 25-mph Speed Limit Signs (R2-1) be posted near the front of both new streets, Road "A" and Road "B", off Brakebill Road and Hammer Road, respectively.
- 9b) Stop Signs (R1-1) with 24" white stop bars and the other traffic signage should be installed at the locations as shown below:



- 9c) Sight distance at the new intersections in the subdivision must not be impacted by new signage or future landscaping. For a posted speed limit of 25-mph in the subdivision, the intersection sight distance requirement is 250 feet. The stopping



sight distance required is 155 feet for a level road grade. The road layout designer should ensure that these sight distance lengths are met, and they should be labeled on the plans.

- 9d) All drainage grates and covers for the residential development need to be pedestrian and bicycle safe.
- 9e) The internal sidewalks that are proposed for the development should have appropriate ADA compliant curbed ramps at intersection corners, and the sidewalks are recommended to be 5 feet minimum in width.
- 9f) The United States Postal Service (USPS) has recently implemented changes to its guidelines for delivery 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.



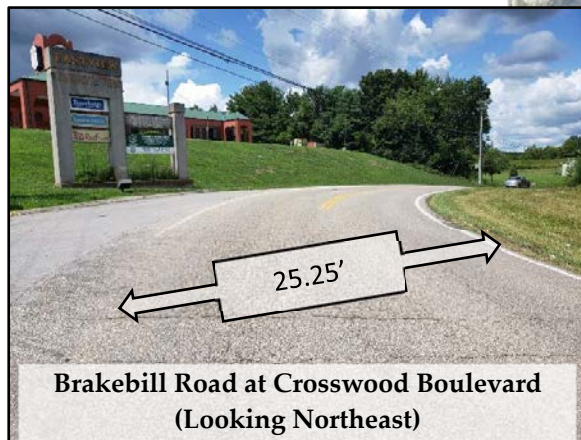
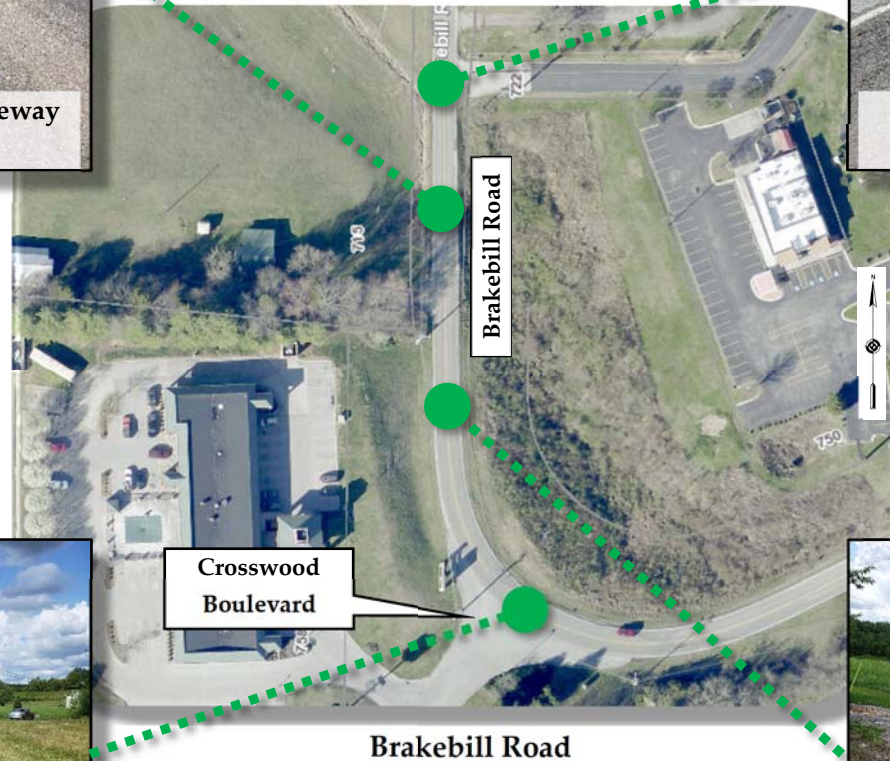
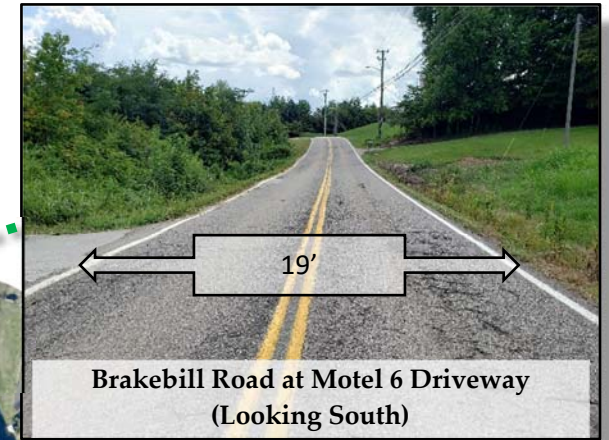
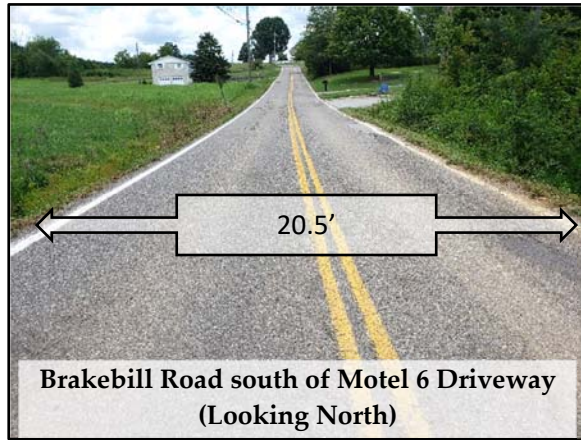
- 9g) Traffic calming measures might be needed for this development. Sections of the horizontal alignment for proposed Road "A", "C", and "D" within the development have long and straight road segments. The possible need for traffic calming measures inside the development will need to be coordinated with Knox County Engineering and Public Works during the detailed design phase.
- 9h) 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.



**Brakebill Road Widths (Addendum):** As requested in the TIS Comment Response Document for Brakebill Road Subdivision dated August 19, 2020, road width information was collected on Brakebill Road in between Hammer Road and the 90-degree curve at the intersection with Crosswood Boulevard.

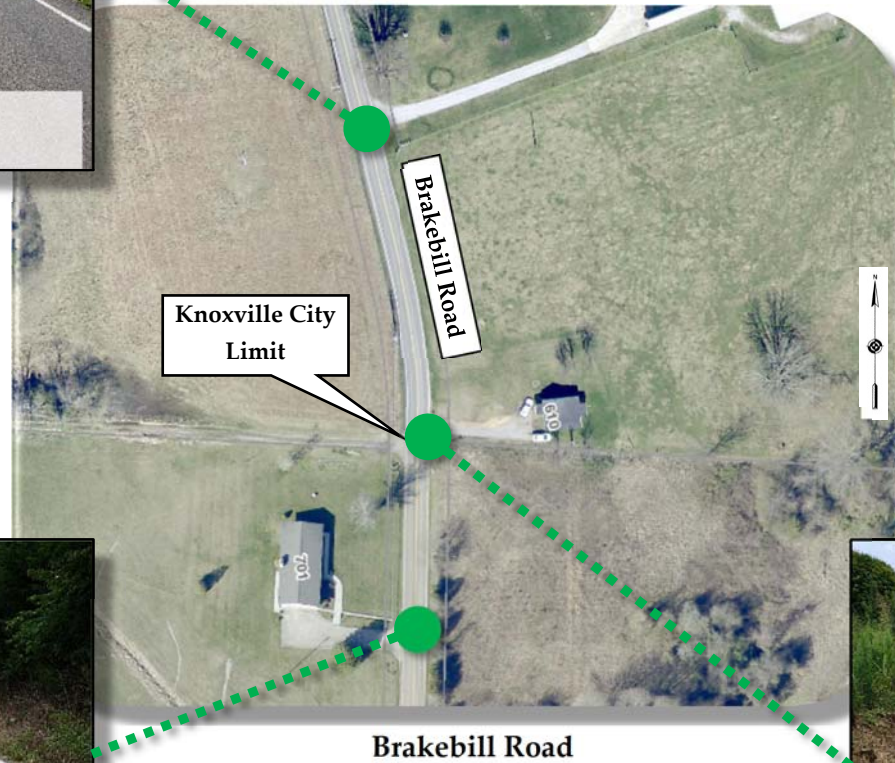
The information shown on the following pages lists the pavement width measurements that were made and shows photographs of these road width measurements locations. These road measurements are not the absolute minimum and maximum widths but are a representative sample of the roads. They were taken at driveways and other locations that are readily identifiable on Brakebill Road.

# EXHIBIT A



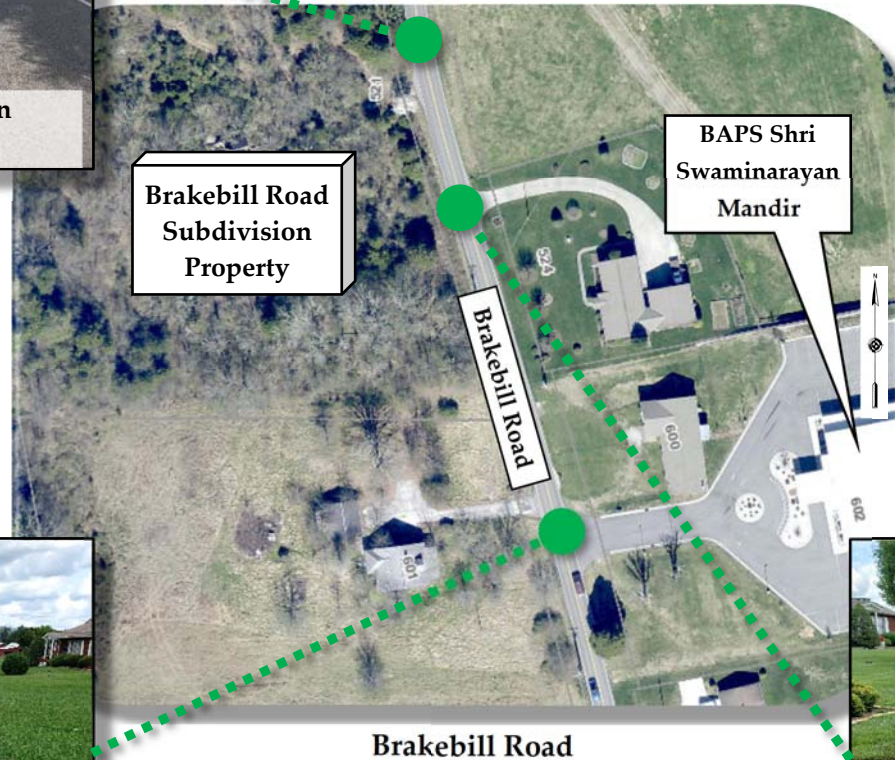
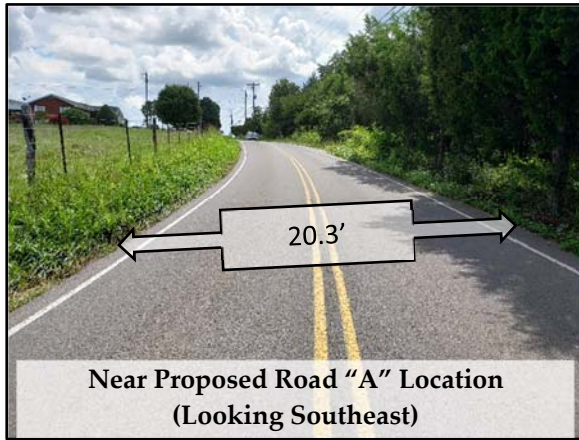


# EXHIBIT A



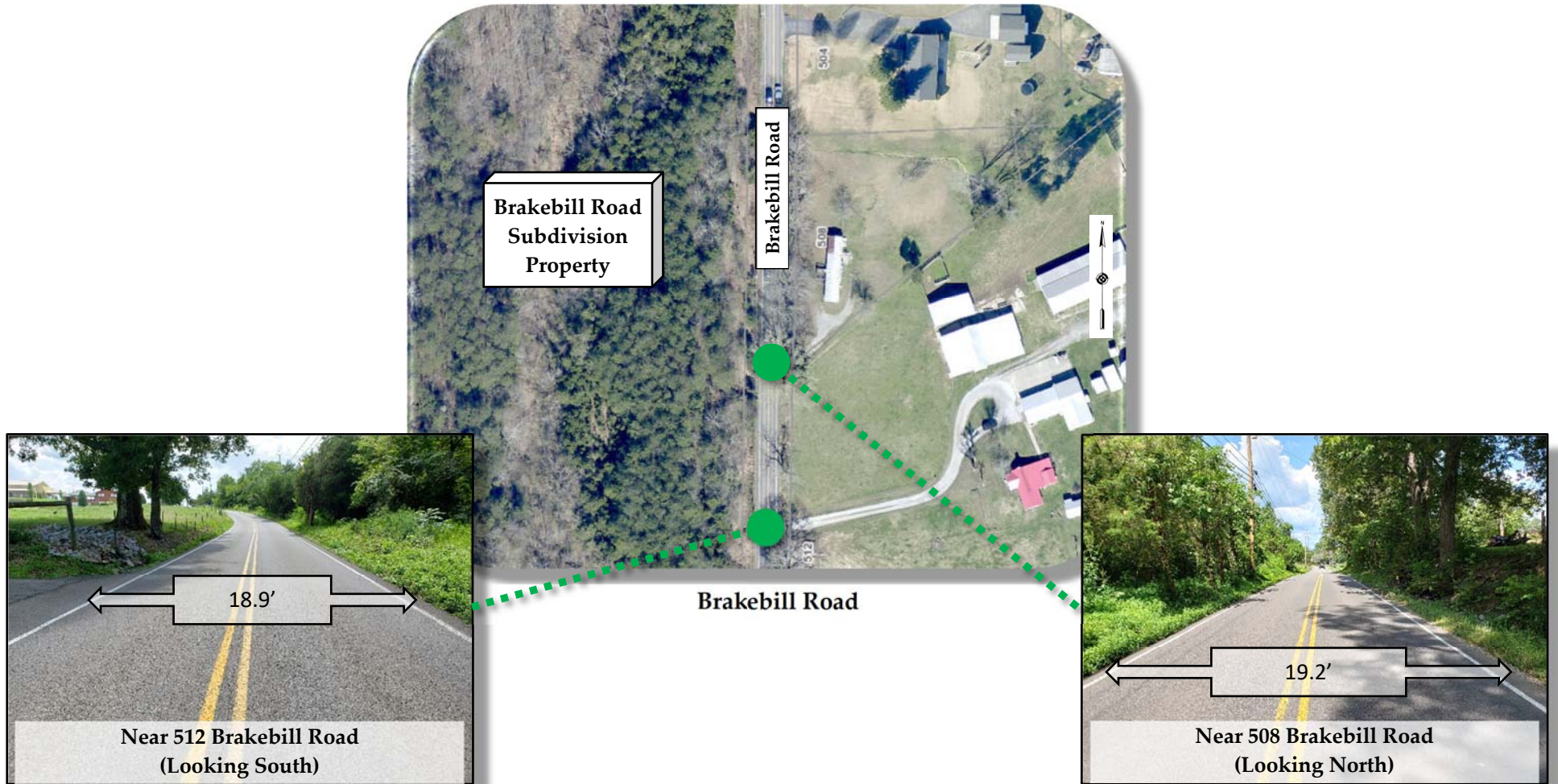


# EXHIBIT A



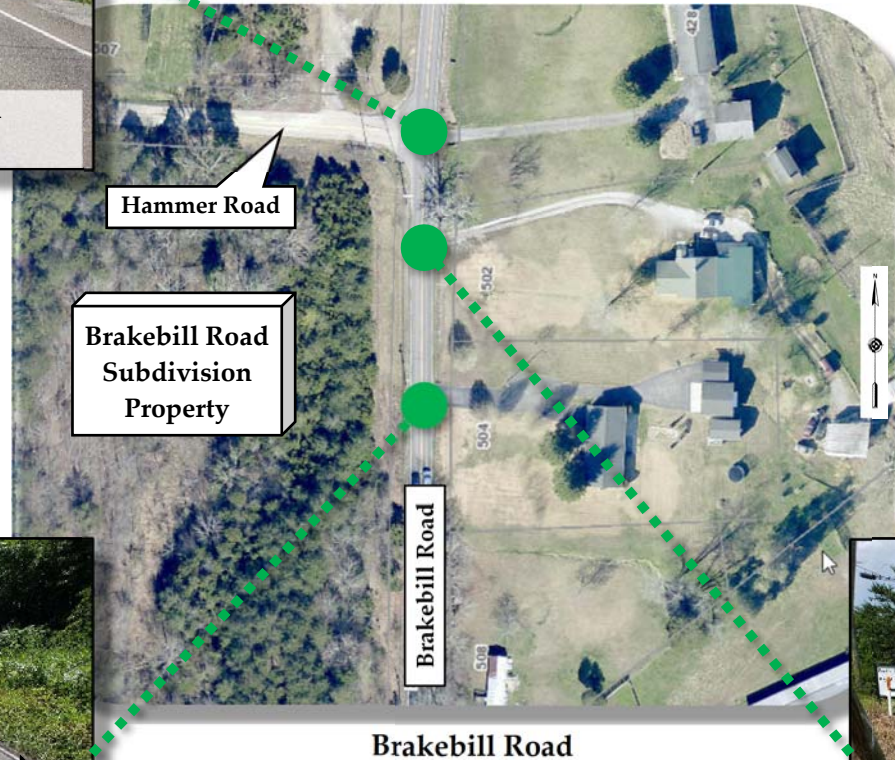
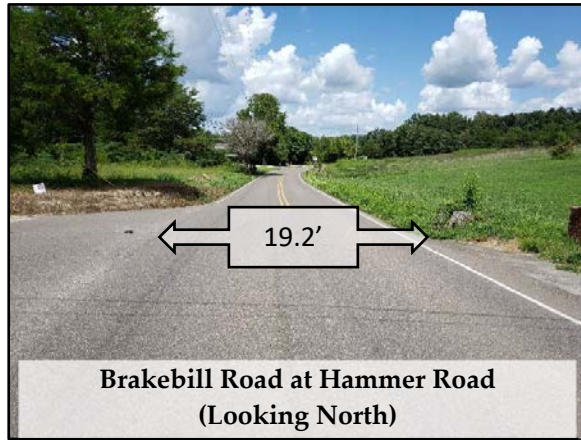
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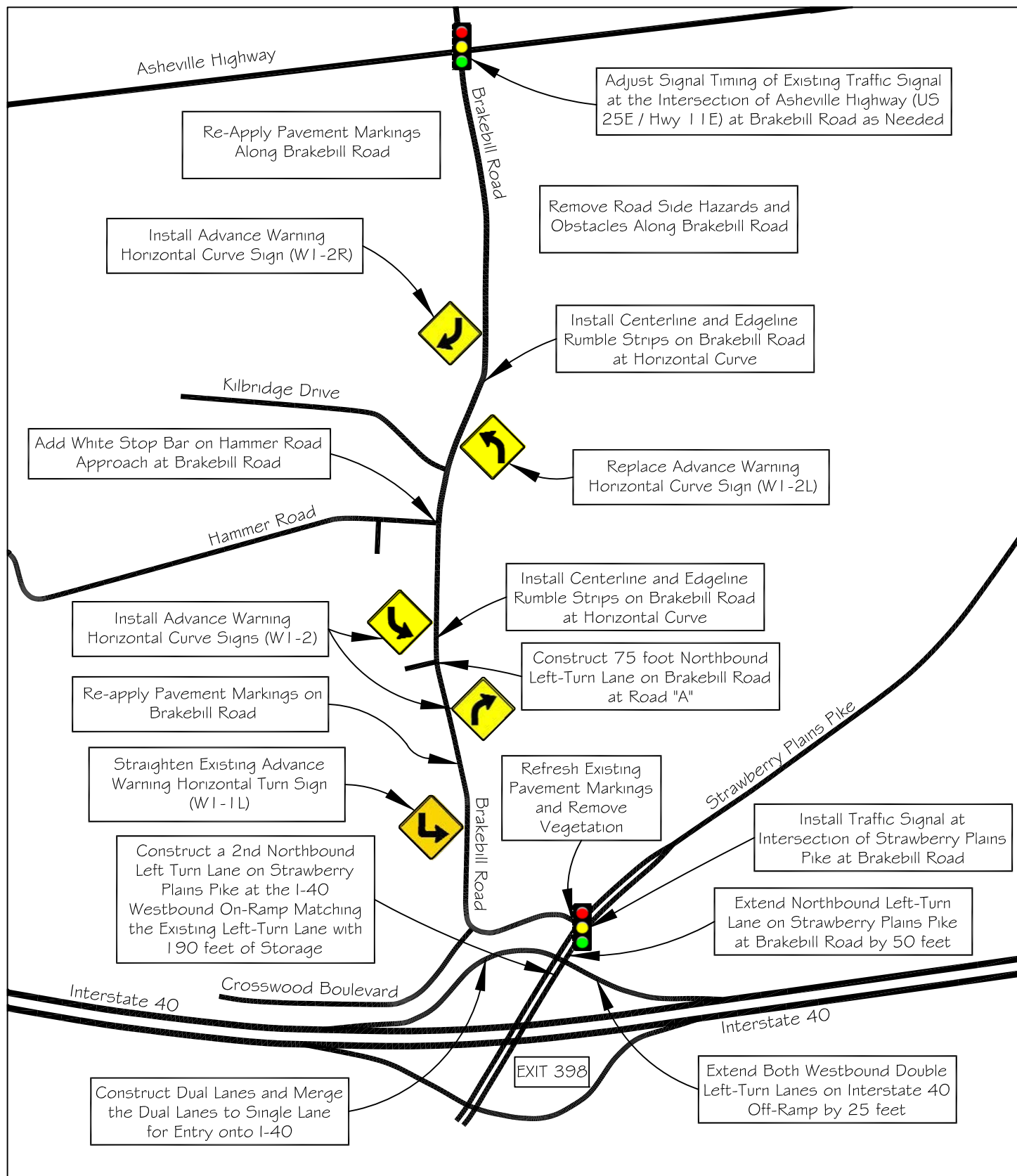




# EXHIBIT A



# EXHIBIT A



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

NOT TO SCALE



FIGURE 10

Brakebill Road Subdivision

Summary of Recommended External  
Road Improvements



proposal which is no longer feasible, nor necessary given I-140. Long range plans still call for expansion to four lanes.

MPC occasionally gets asked: “what’s so scenic about East Knox County’s portion of John Sevier Highway that is designated a Tennessee Parkway?” It is a fair question because billboards happen to be allowed along some Tennessee Parkways, like John Sevier Highway. The following summary outlines the difference between the two designations.

### Scenic Highways:

Under State law, several roads in Knox County are designated Scenic Highways, like John Sevier Highway between Alcoa and Chapman Highways. The provisions of this 1971 act prohibit junkyards and billboards within 2,000 feet of the designated highway. With few exceptions, the act also limits



*This part of John Sevier Highway is a state-designated Tennessee Parkway (a meaningless designation in areas with zoning).*

building height to 35 feet within 1,000 feet of a designated route. If a local government has adopted or adopts a more stringent standard, such as design standards for signs, buildings and landscaping, the local provision shall guide scenic highway protection.

### Tennessee Parkway:

There is also a provision for Tennessee Parkways, which has the same restriction on junkyards and trash dumping as the Scenic Highway (see above). However, billboards are not regulated in such areas as East Knox County, which is comprehensively zoned. The Parkway designation, which does affect building height, is made by the Tennessee Department of Transportation (TDOT) Commissioner. A change to the zoning ordinance creating local standards protecting or enhancing scenic qualities is an alternative that could improve scenic quality.

Local measures such as the Knoxville-Knox County Forest Protection and Tree Planting Plan (adopted 2007) call for conservation of the landscape along Thorngrove Pike, Kodak Road and Huckleberry Springs Road. Legislation could also be introduced to the State legislature to have these roads or other roads designated as Scenic Highways. Code changes, such as sign control and landscape standards, would be needed to conserve such beautiful landscapes.

### Congestion and Other Issues

Several intersections are slightly congested at peak evening hours, including John Sevier/Asheville Highway intersection, the John Sevier/National

Drive intersection and Huckleberry Springs Road. Adopted transportation plans currently contain proposals for turn lanes and similar improvements to reduce congestion.

While traffic carrying capacity is good, several issues remain:

- Inadequate roads in the Urban Growth Boundary and Planned Growth Area: the existing road system is a series of rural roads that are not consistently improved to recognized traffic engineering standards (for example, adequate width). Road alignment and connectivity is also a problem. The roads around the Strawberry Plains Pike/I-40 interchange, including connections to Brakebill Road and Asheville Highway have long been recognized as a problem. Road systems where development is warranted should enable safe access, while allowing through traffic to move efficiently. Until recent years, much of the development has been directly adjacent to the existing roads. New local connecting roads, as opposed to cul-de-sacs, offer alternative means for people to reach a destination and can provide internal access to future parks and other community facilities.
- Road design should be in relation to the natural and cultural setting: known as “Context Sensitive Solutions.” The basic objective of CSS is to respect or enhance the landscape and surrounding communities when designing a road system. This can mean sign standards, tree planting and

## Special Land Use Districts

There are several areas that are capable of sustaining different mixes of land uses. In other words, a broad brush of proposing only one land use may not be prudent in view of changing conditions and the dynamics of the local economy (for example, the reuse of older commercial properties and mining sites for other land development purposes). All the following proposed districts are well located in terms of good transportation systems and generally have good infrastructure.

### E Co-1: Holston River Gateway

**Recommended uses:** This river-oriented site, which is currently zoned Planned Commercial, surrounds the existing shopping center. A portion of the site is used as a borrow pit (that is, for soil extraction). Several uses are appropriate: (1) a planned commercial development, (2) a mixed use project (which could include various types of residential structures, and office and commercial uses), or (3) low and medium density residential uses. If residential units are developed, road and



*An example of townhouses in a mixed use center*

sidewalk connections to the shopping center and pedestrian/bicycle connections to Sunnyview School are warranted. The Community Mixed Use Center designation (see page 32) would be appropriate.

**Recommended zoning:** A planned zone should be used in its development (appropriate zoning in regard to these concepts: PC, PC-1, PR, RP-1 or 2, TC or TC-1, TND-1).

### E Co-2: Brakebill Road area

**Recommended uses:** This area is located less than one-half mile from the Strawberry Plains/I-40 Interchange and can be developed more intensively in view of its topography and nearby infrastructure (highways and utilities). A variety of uses are appropriate: a business park, a technology (research and development) park (see the description in the preceding land use categories), a town center, or office/medium density residential uses.

Some of the design features and guidelines that should be included in a master plan for the site's development include:

- Extension of Huckleberry Lane to connect to Brakebill Road
- Stream protection
- Bicycle/pedestrian systems
- Architectural guidelines: form, scale and material of buildings
- Lighting (pedestrian-oriented and shielded from surrounding properties)
- Best management practices for storm water and Green Building techniques



*This proposed mixed use site contains approximately 270 acres, which has potential for a variety of uses, including office and technology park buildings.*

**Recommended zoning:** A planned zone should be used in its development (appropriate zoning in regard to these concepts: EC, PC, PC-1, PR, RP-1 or 2, TC or TC-1, TND-1).

### E Co-3: Carter Town Center

**Recommended uses:** The concept for a town center was introduced in 2001. The center should be created to include mixed use development, allowing low and medium density residential with respect to the variety of public facilities that exist in the area, namely the three schools, the parks, library, senior center and Lyon's Creek greenway (proposed). A mix of pedestrian-oriented commercial uses and vertical mixed uses should be allowed (for instance, apartments or office space above a shop). The road and sidewalk network should be developed to connect future neighborhood and retail developments to those resources and each other to realize a town center.

The low density and rural residential areas that surround the town center should be connected with new roads and sidewalks as they develop in the future.

## COMMUNITY FACILITY PLAN

This portion of the plan is directed to future parks, school improvements and other public facilities that are needed for community growth and provided in a prudent manner in relation to the conservation of scenic, historical environmental assets.

### Parks, Greenways and Recreation Facilities

The greatest need in East Knox County is to begin a neighborhood park acquisition program so that future residents will be within walking distance of recreation space as neighborhoods develop. Presently, East Knox County does not have any neighborhood parks.

#### *Recommendations: Park Acquisition*

**Neighborhood parks**—Acquire space for new neighborhood parks (five to 10 acres each) in the general vicinity indicated on the plan map: Ruggles



*An example of a neighborhood park—the kind of improvement that is needed with future growth*

Ferry Park, Sunnyview Park, Hammer Road Park, Swan Pond Creek Park, Flint Gap Park, Perry Road Park, Pine Grove Park, Sinking Creek Park, Lyons Creek Park and Corum Road Park. At Flint Gap Park consider partnering with existing church to provide a park. At Sunnyview, acquire about five acres for a public park and school activities.

**Community parks**—set aside 10-20 acres for a community park in Midway's Northwest quadrant.

Create a community park in the vicinity of Drinnen Spring in Riverdale, providing 10 to 20 acres for both active and passive recreation opportunities.

#### *Recommendations: Greenways and Greenway Connectors*

**French Broad Conservation Area Greenway**—Preserve an open space system along the River. Provide a trail system, using a combination of land near the



*The French Broad is recognized as a blueway.*

river and space along Thorngrove Road and Kodak Road. Consider a horse trail as part of this system.

**Greenway Connectors**—Asheville Highway, Brakebill Road, John Sevier Highway and Ruggles Ferry Road (all within the city and county growth areas) are the most significant roads that should be improved to safely accommodate both pedestrians and bicyclists.

**Mule Hollow Greenway**—Develop a trail and open space corridor along the ridge that continues along the river or John Sevier Highway.

**Swan Pond Creek and Ramsey Greenways**—Create a trail along this creek, providing a connection from current and future neighborhoods to the Forks of the River Park and to the Ramsey House.

**Tuckahoe Creek Greenway**—Create an open space system along this state scenic river resource,



*Side paths, such as this one, are a type of greenway connector.*



## TRANSPORTATION PLAN

The Transportation Plan shown on the following page provides an overview of the projects that are recommended including projects in the Knoxville Regional Transportation Planning Organization (TPO) Long Range Mobility Plan (LRMP), and those that have been identified during the process of updating this sector plan.

Prior to implementation of some of these projects, there should be opportunities for additional public input to address issues of impacts related to adjacent land use, neighborhood protection, and environmental and cultural resource protection. These are principles that are important in developing a sustainable transportation system. It is vital to develop and maintain a transportation network that is accessible, provides mobility to all residents, and does not adversely impact the environment. To meet these goals this plan recommends several implementation tools such as conservation corridors, complete streets, and

greenway connectors. The following two principles should guide all future roadway projects including designing road cross-sections and intersections of transportation projects.

### Context Sensitive Design

Road design in relation to the natural and cultural setting is often referred to as context sensitive design. This is a process that addresses the physical setting of a potential project and preserves scenic, aesthetic, historic, environmental and other resources, while maintaining mobility and safety. This facility planning should revolve around a collaborative, interdisciplinary approach that incorporates the desires and concerns of a community in order to achieve solutions.

The basic objective of context sensitive design is to respect or enhance the landscape and surrounding communities when designing a road system. This can mean sign standards, tree planting and conservation, and creating sidewalks that are

comfortably separated from fast moving traffic. Related to these principles are Tennessee State scenic road designations (see background section of this plan). An additional tool that would be appropriate in the East County Sector are Scenic Road Corridor designations. These designations should be used in conjunction with a zoning overlay, whereby natural beauty can be conserved and new development/redevelopment is created in relation to design standards. Such standards should include provisions for landscaping, sign size, lighting and buffering of storage yards. Two roadways that should be considered for this designation are Asheville Highway and E. Governor John Sevier Highway.



*A scenic portion of John Sevier Highway, which should be conserved through context sensitive design*

### Complete Streets

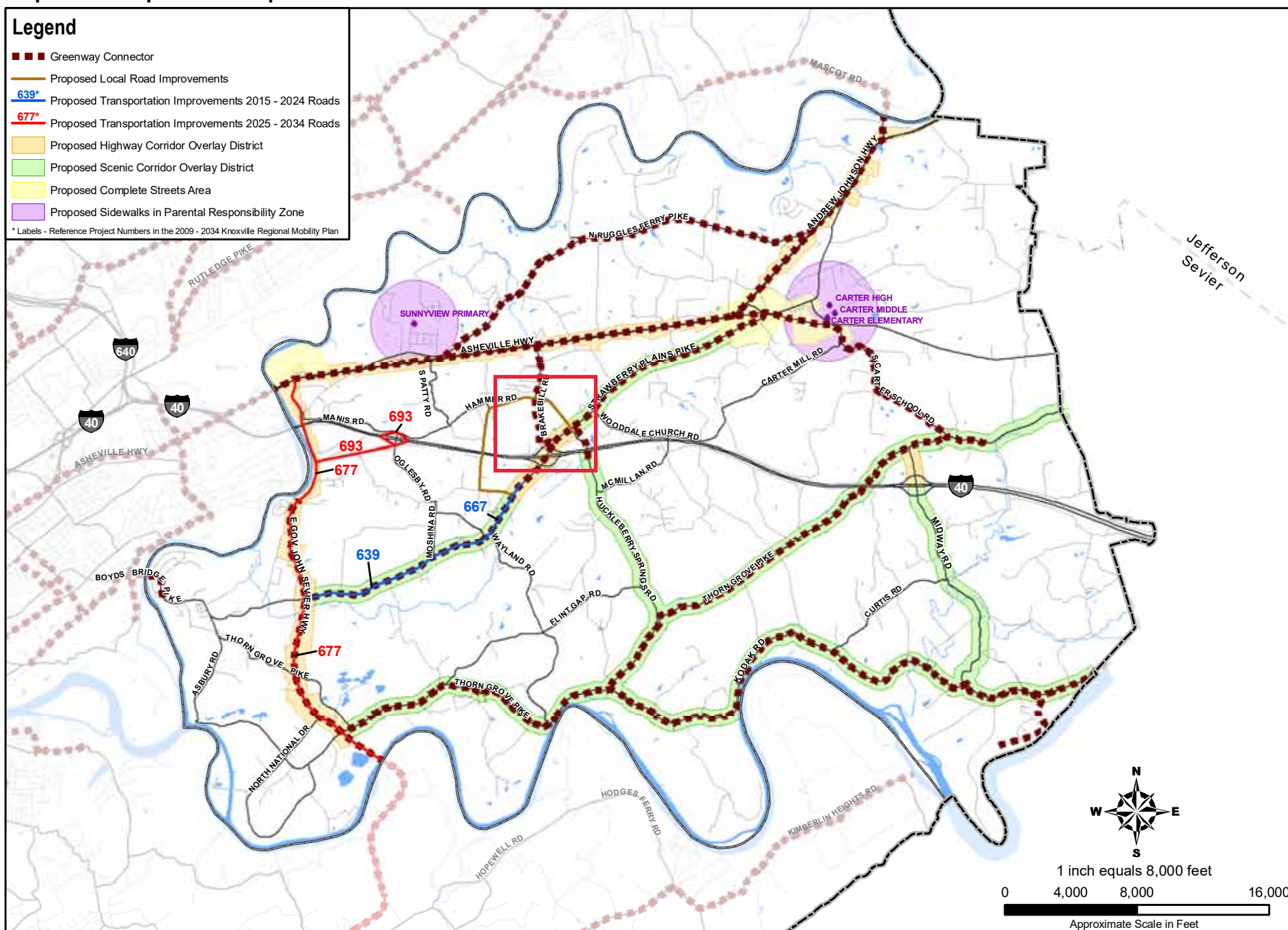
Any road project, public or private, should adhere to the principle of creating complete streets. Complete streets are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and transit riders of all ages and



*An example of a complete street*



# Map 13: Transportation Improvement Plan



abilities are able to safely move along and across a complete street. The pedestrian and bicycle facilities that are depicted in Map 13 should be considered a priority in establishing complete streets within East County.

Some considerations for more detailed road designs include:

1. John Sevier Highway (see the John Sevier Highway Corridor Proposal of the land use plan section)
2. Strawberry Plains Pike
3. Brakebill Road 3. Asheville Highway/Andrew Johnson Highway (see Asheville Highway Corridor Proposal in the Land Use Plan section)
4. Thorngrove Pike/Kodak Road

Several intersections are slightly congested at peak evening hours, including John Sevier/Asheville Highway intersection, the John Sevier/National Drive intersection and Huckleberry Springs Road. Although, currently unfunded, adopted transportation plans already contain proposals to add turn lanes and similar improvements to reduce congestion.

Roads systems, where development is warranted, should enable safe access while allowing through traffic to move efficiently. Until recent years, much of the development in the region has been directly adjacent to the existing roads. New local connecting roads, as opposed to cul-de-sacs, offer alternative means for people to reach a destination and can

provide internal access to future parks and other community facilities. For example, if the area around Brakebill Road Mixed Use area (ECO2) develops, potential local road improvements should include the new roads depicted on the Transportation Plan map. The proposals include connections to the ECO2 mixed use area from Union School Road to Brakebill Road and from Brakebill Road to Huckleberry Springs Road.

### Summary of Recommended Projects

The Long Range Mobility Plan (LRMP) is a 25-year plan that makes recommendations for state and federally funded road projects. MPC and the community recognize the importance of ongoing community involvement in future planning of the Sector. All future roadway and alternative transportation improvements should be made with the participation of community stakeholders. Only four projects for the district have been included in the LRMP for the East County Sector:

- Project 639—expansion of Strawberry Plains Pike to four-lanes from Moshina Road to John Sevier Highway;
- Project 677—widening a 9.2 mile section of Governor John Sevier Highway from 2 lanes to 4 lanes;
- Project 693—a new interchange at Governor John Sevier Highway, Hammer Road and Oglesby Road; and
- Project 667—widening Strawberry Plains Pike from 2-lanes to 4-lanes from Moshina Road to south of I-40.

Funding for these projects has not been programmed.

### Additional recommendations include:

- As development of new town centers occurs in the Holston River Mixed Use area (ECO1) and Carter Town Center (ECO3) greenway connectors such as, bicycle and pedestrian connections should be made between commercial, residential and institutional uses within the centers and to existing areas.
- Any future development within Parental Responsibility Zones should include greenway connectors from Sunnyview Elementary to nearby uses and between Carter High School, Carter Middle School and Carter Elementary School to existing and proposed uses. The Greenway Connectors could include side paths, bike lanes or sidewalks.



## DEVELOPMENT REQUEST

### DEVELOPMENT

- ☐ Development Plan  
☐ Planned Development  
☒ Use on Review / Special Use

### SUBDIVISION

- ☒ Concept Plan  
☐ Final Plat

### ZONING

- ☐ Plan Amendment  
☐ Rezoning

Urban Engineering, Inc.

Engineer

Applicant Name

Affiliation

7/27/2020

9/10/2020

9-SB-20-C 9-D-20-UR

Date Filed

Meeting Date (if applicable)

File Number(s)

## 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

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

RCB Real Estate, LLC

9337 Bradmore Lane, Ooltewah, TN 37363 (423) 668-6030

Owner Name (if different)

Owner Address

Owner Phone

521 + 601 Brakebill Rd

072 267 + 267.01

Property Address

Parcel ID

~~521 and 601 Brakebill Road (37924)~~

West side of Brakebill Rd  
South side of Hammer Rd.

100.6 Acres

General Location

Tract Size

Knox County

PR < 9 du/ac

Jurisdiction (specify district above)

☐ City ☒ County

Zoning District

East County

MDR / O

Urban Growth

Planning Sector

Sector Plan Land Use Classification

Growth Policy Plan Designation

Single Family Residence / Vacant

No

KUB

KUB

Existing Land Use

Septic (Y/N)

Sewer Provider

Water Provider



# REQUEST

DEVELOPMENT	<input type="checkbox"/> Development Plan	<input checked="" type="checkbox"/> Use on Review / Special Use
	<input checked="" type="checkbox"/> Residential	<input type="checkbox"/> Non-Residential
SUBDIVISION	<input type="checkbox"/> Home Occupation (specify): _____	
	<input type="checkbox"/> Other (specify): <u>Detached Residential Subdivision</u>	
	<u>Brakehill Road Subdivision</u>	
	<input checked="" type="checkbox"/> Proposed Subdivision Name	Unit / Phase Number
ZONING	<input checked="" type="checkbox"/> Parcel Change	
	<input type="checkbox"/> Combine Parcels	<input checked="" type="checkbox"/> Divide Parcel
	Total Number of Lots Created: <u>328</u>	
	<input type="checkbox"/> Other (specify): _____	
	<input type="checkbox"/> Attachments / Additional Requirements	
	<input type="checkbox"/> Zoning Change: _____ Proposed Zoning	
<input type="checkbox"/> Plan Amendment Change: _____ Proposed Plan Designation(s)		
Proposed Density (units/acre)		Previous Rezoning Requests
<input type="checkbox"/> Other (specify): _____		

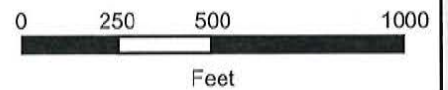
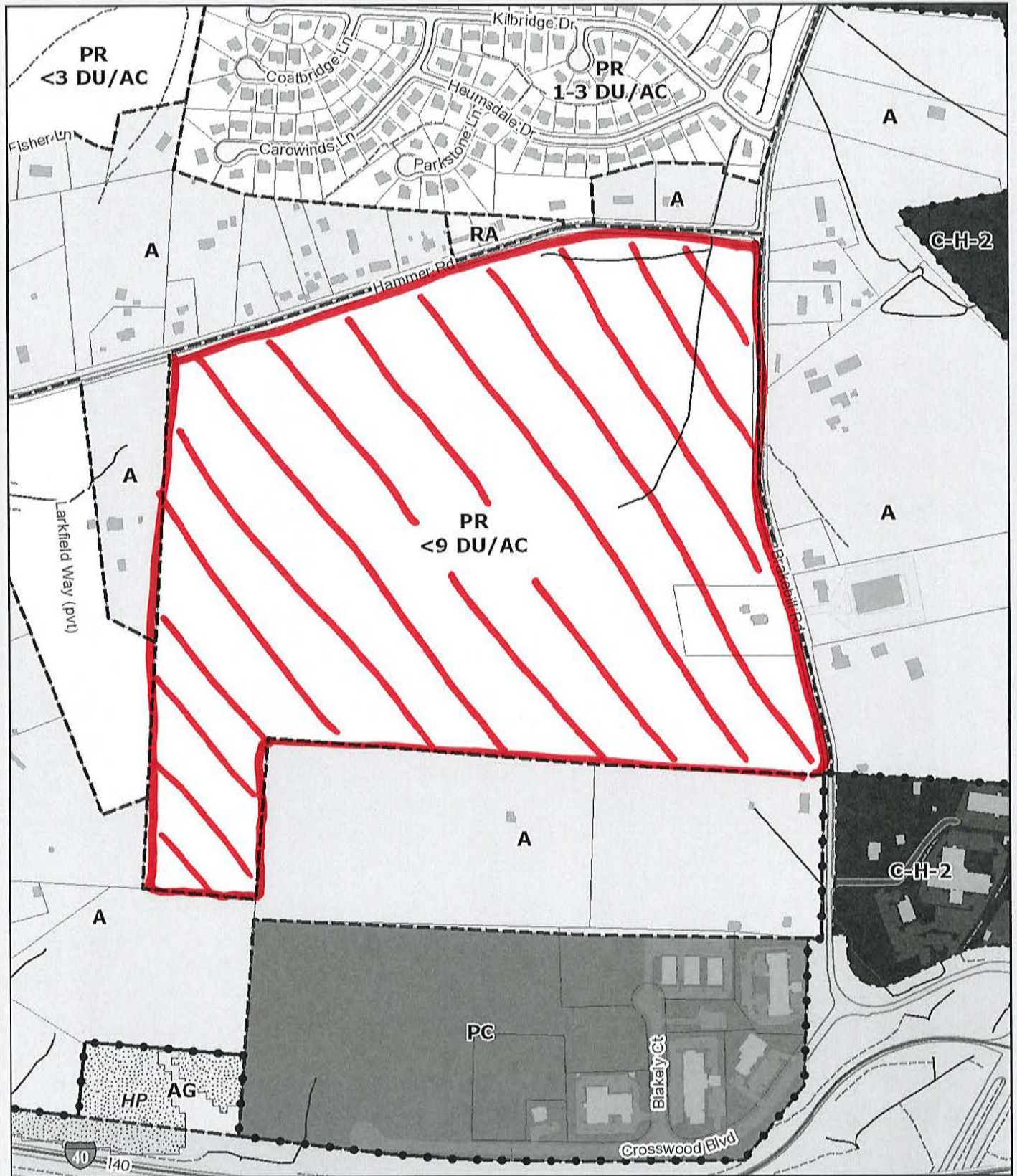
STAFF USE ONLY	<b>PLAT TYPE</b>	<b>FEE 1:</b>	<b>TOTAL:</b>  <u>\$10,340</u>
	<input type="checkbox"/> Staff Review <input type="checkbox"/> Planning Commission	<u>0108</u> <u>Concept Plan fee</u>	
	<b>ATTACHMENTS</b>	<b>FEE 2:</b>	
	<input type="checkbox"/> Property Owners / Option Holders <input type="checkbox"/> Variance Request		
	<b>ADDITIONAL REQUIREMENTS</b>	<b>FEE 3:</b>	
	<input type="checkbox"/> Design Plan Certification (Final Plat only)		
	<input checked="" type="checkbox"/> Use on Review / Special Use (Concept Plan only)		
	<input type="checkbox"/> Traffic Impact Study		

## AUTHORIZATION

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

<u>Christopher A Sharp</u>	<u>CHRIS SHARP</u>	<u>7/24/20</u>
Applicant Signature	Please Print	Date
<u>(765) 966-1924</u>	<u>CHRIS@URBAN-ENG.COM</u>	
Phone Number	Email	
<u>Michael Reynolds</u>	<u>Michael Reynolds</u>	<u>7/24/2020</u>
Staff Signature	Please Print	Date





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