DEVELOPMENT PLAN REPORT

FILE #: 7-A-24-DP **AGENDA ITEM #: 25**

AGENDA DATE: 7/11/2024

APPLICANT:	**URBAN ENGINEERING, INC.**
OWNER(S):	David and Tonya Hobbs OKR GP
TAX ID NUMBER:	103 M A 001, 002, 003 **View map on KGIS**
JURISDICTION:	County Commission District 6
STREET ADDRESS:	0 SPRING BLUFF WAY
LOCATION:	**Southeast side of Hardin Valley Rd, east side of Award Winning Way, northwest side of Spring Bluff Way**
APPX. SIZE OF TRACT:	**3.55 acres**
GROWTH POLICY PLAN:	Planned Growth Area
ACCESSIBILITY:	Access is via Hardin Valley Rd, a minor arterial street with 45 ft of pavement width within 92 ft of right-of-way. Access is via Spring Bluff Way, a private street with 26 ft of pavement width within 40 ft of right-of-way.
UTILITIES:	Water Source: West Knox Utility District
	Sewer Source: West Knox Utility District
WATERSHED:	Conner Creek
ZONING:	**PC (Planned Commercial), TO (Technology Overlay)**
EXISTING LAND USE:	**Agriculture/Forestry/Vacant Land**
PROPOSED USE:	**Commercial development**
HISTORY OF ZONING:	The TO zoning was placed on this property in 1983 (12-FF-83-RZ). The a portion of the property was rezoned from A to PC in 2005 (12-Q-05-RZ). The other portion of the property was rezoned in 2006 from BP to OC (4-S-06-RZ).
SURROUNDING LAND USE AND ZONING:	North: Rural residential, public/quasi public land - BP (Business and Technology Park), TO (Technology Overlay)
	South: Office - PC (Planned Commercial), TO (Technology Overlay)
	East: Agriculture/forestry/vacant land - PC (Planned Commercial), TO (Technology Overlay)
	West: Agriculture/forestry/vacant land - OB (Office, Medical, and Related Services), TO (Technology Overlay)
NEIGHBORHOOD CONTEXT:	This property is a part of the commerical node along Hardin Valley Road just west of the interchange with Pellissippi Parkway. To the north is Pellissippi State Community College and to the west is mostly single family subdivisions.

STAFF RECOMMENDATION:

Approve the development plan for a retail building with approximately 18,125 sq ft of floor area, subject to 6 conditions.

1) Implementing the recommendations of the Transportation Impact Study for The Village at Hardin Valley by Ajax Engineering, June 2024, as revised and approved by Planning, Knox County Engineering and Public Works (see Exhibit B). A Memorandum of Understanding with Knox County Engineering and Public Works for completing off site road improvements may be required per Chapter 54, Article V of the Knox County Code (Ord. O-23-4-102).
2) Providing a sidewalk along the entire Spring Bluff Rd frontage per the Knox County Sidewalk Ordinance (Chapter 54, Article IV of the Knox County Code).
3) Providing a detailed landscape plan during permitting for review and approval by Planning staff.
4) Meeting all applicable requirements of the Knox County Engineering and Public Works.
5) Meeting all other applicable requirements of the Knox County Zoning Ordinance.
6) Obtaining TTCDA approval of the development plans (Case 5-B-24-TOB).

With the conditions noted, this plan meets the requirements for approval in the PC district and the criteria for approval of a development plan.

COMMENTS:

The proposal is for a new retail building at Hardin Valley Rd and Award Winning Way on this 3.55-acre lot. The proposed building is 18,125 sq ft and 24.5 ft tall.

There are 3 proposed driveways. The Hardin Valley Rd driveway will have an eastbound right turn lane and restrict left out movements. There are 2 existing driveways on Spring Bluff Way that will remain. The parking in the rear of this site is currently shared with the existing retail development to the south. The easternmost entrance will be shared with Chick-Fil-A (under construction). Hardin Valley Rd and Award Winning Way have existing sidewalks. Per the Knox County Sidewalk Ordinance, a sidewalk is required along the frontage of Spring Bluff Way.

DEVELOPMENT PLAN ANALYSIS PER ARTICLE 6, SECTION 6.50.06 (APPROVAL OR DENIAL)
In the exercise of its administrative judgment, the Planning Commission shall determine if the proposed plan is in harmony with the general purpose and intent of the zoning ordinance and adopted plans.

1) ZONING ORDINANCE
PC (Planned Commercial), TO (Technology Overlay):
A. PC Zone: It is not the intent of this zone to restrict potential development by limiting uses. In general, uses permitted shall include office, commercial services and light distribution centers. This retail/office building proposal is consistent with the intent of the PC zone.
B. The PC zone is intended for a unified grouping of commercial buildings which do not require or desire a central business district location. It is the objective of this zone to achieve the highest quality site design, building arrangement, landscaping and traffic circulation patterns possible. This property is apart of the Village at Hardin Valley subdivision, which includes Southeast Bank and Chick-Fil-A on Hardin Valley Rd to the east and the retail development to the south. Since brick is the primary material for the existing buildings, the front elevation for this building will be at least 40% brick and brick will be incorporated around the entire building.
C. TO Zone: Properties in the TO (Technology Overlay) zone require approval of site plans based on design guidelines provided by the TN Technology Corridor Development Authority (TTCDA). This request is scheduled to be heard at the July 8, 2024 TTCDA meeting (Case 5-B-24-TOB).

2) KNOX COUNTY COMPREHENSIVE PLAN - IMPLEMENTATION POLICIES
A. Policy 4.2: Require pedestrian and vehicular connectivity with development. - The main drive aisle is aligned with Chick-Fil-A next door to the east and Chick-Fil-A's only vehicular access is through this property. Additionally, a sidewalk will be required along Spring Bluff Way connecting to Chick-Fil-A. Currently, the parking in the rear is an overflow lot for King University in the retail development to the south. The two driveways on Spring Bluff Way have painted crosswalks connecting the two retail developments.

3) FUTURE LAND USE MAP
CMU (Corridor Mixed-use):
A. The property is classified as CMU (Corridor Mixed-use) on the Future Land Use Map. Corridor Mixed-Use areas are appropriate for moderate-scale walkable mixed-use development occurring along major corridors. This development will be easily accessible to the multifamily buildings on Greenland Way and offices on Award Winning Way.

4) STATE SCENIC ROADWAYS
A. Hardin Valley Rd is a designated state scenic highway. Any signage will be limited to 100 sq ft and will not

have moving lights per Tennessee Code Annotated § 54-17-109. A blank monument sign has been proposed. It is 83.97 sq ft, which is within the maximum size. Any future signage will have to be approved by the TTCDA Board.

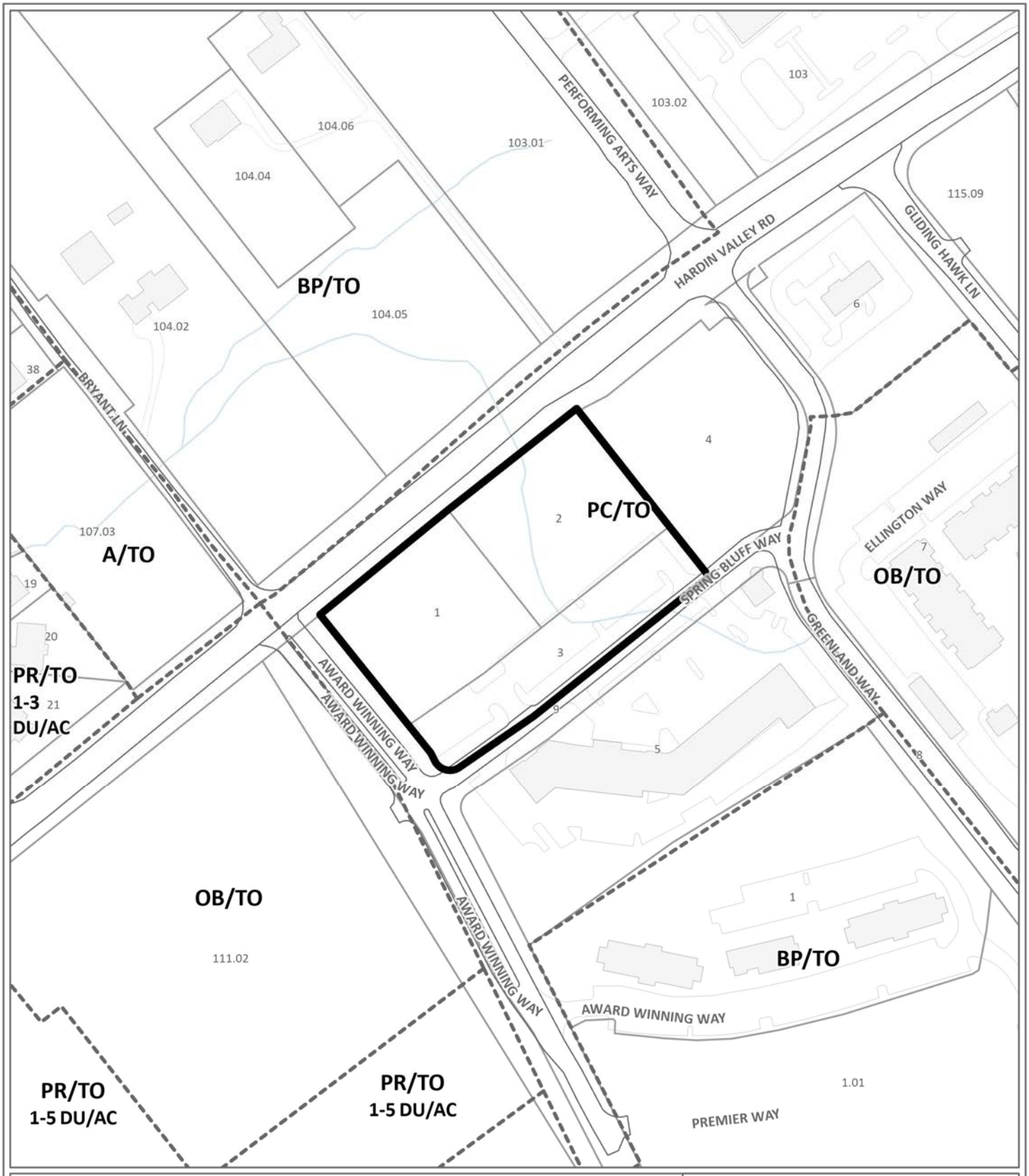
5) HARDIN VALLEY MOBILITY PLAN
A. There are several recommendations for widening Hardin Valley to a median-divided facility to lessen congestion and address safety issues. While this is a long-term plan, the current proposal of Knox County is to widen Hardin Valley Rd from 3 lanes to 5 at this location. The driveway on Hardin Valley Rd will restrict left exit movements and Hardin Valley Road will have an eastbound right turn lane per recommendation from the traffic study.

6) KNOXVILLE - FARRAGUT - KNOX COUNTY GROWTH POLICY PLAN
A. The property is within the Planned Growth Area. The purposes of the Planned Growth Boundary designation are to encourage a reasonably compact pattern of development, promote the expansion of the Knox County economy, offer a wide range of housing choices, and coordinate the actions of the public and private sectors, particularly with regard to the provision of adequate roads, utilities, schools, drainage and other public facilities and services. The proposed development is not in opposition to any of these criteria.

ESTIMATED TRAFFIC IMPACT: Not required.

ESTIMATED STUDENT YIELD: Not applicable.

The Planning Commission's approval or denial of this development plan request is final, unless the action is appealed either to the Board of Zoning Appeals or to a court of competent jurisdiction within thirty (30) days of the decision being appealed (Knox County, Tennessee Code of Ordinances, Appendix A, Zoning, 6.50.08).



DEVELOPMENT PLAN **7-A-24-DP**

Petitioner: Urban Engineering, Inc.

Commercial development in PC (Planned Commercial), TO (Technology Overlay)

Map No: 103
Jurisdiction: County

0 200
Feet

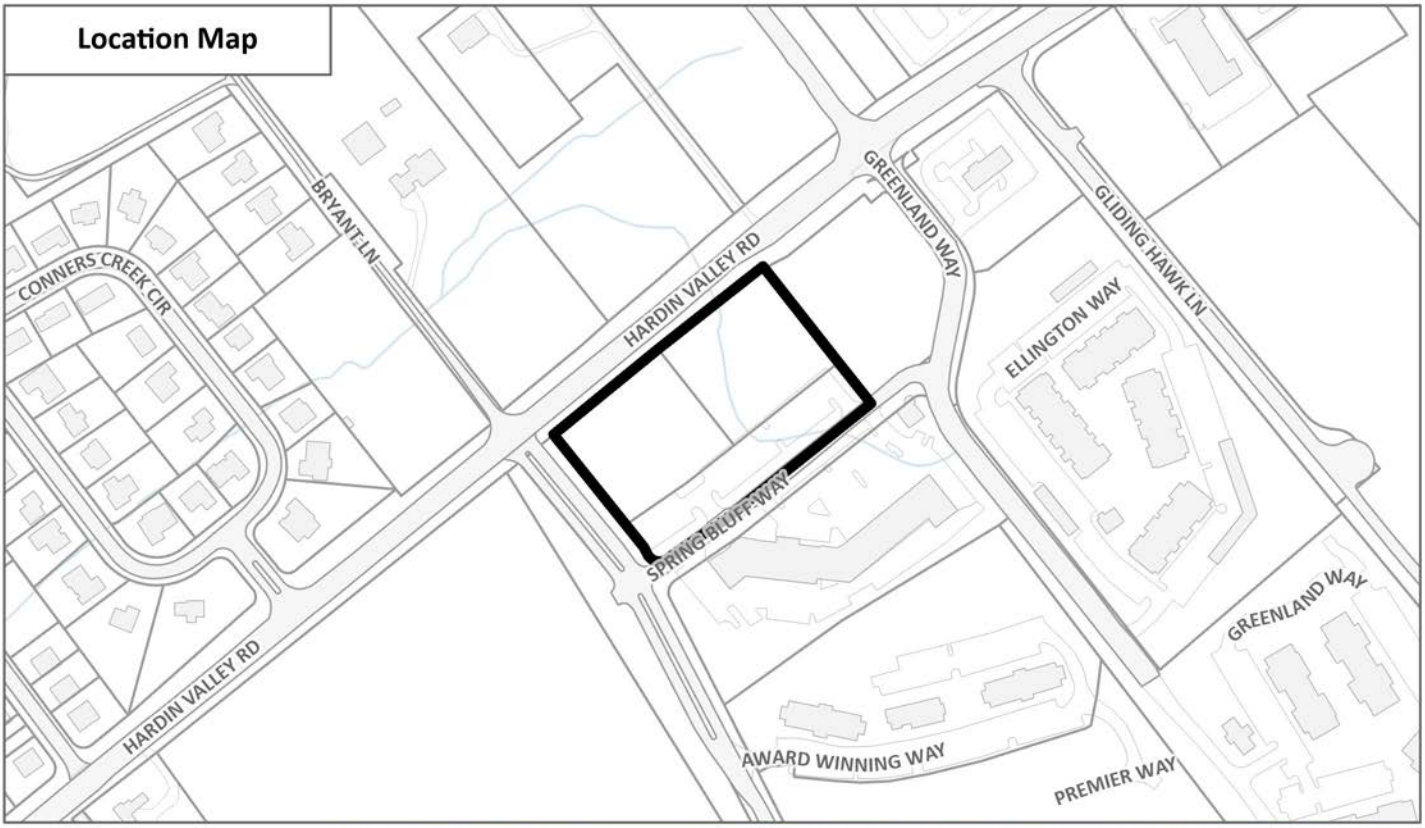
N

Original Print Date: 6/12/2024

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

Exhibit A. Contextual Images

Location Map



Aerial Map

CONTEXTUAL MAPS 1 **7-A-24-DP**

Case boundary

0 360

Feet

N

A New Mixed-Use Commercial Development named:

Village at Hardin Valley

TBD
Knoxville, TN 37932

7 Rendering
NTS

1. DO NOT SCALE DRAWINGS. IF DIMENSIONS ARE IN QUESTION, CONTRACTOR SHALL OBTAIN CLARIFICATION, IN WRITING, FROM THE ARCHITECT.
2. INTERIOR AND EXTERIOR WALL AND PARTITION DIMENSIONS ARE FROM FACE OF STUD TO FACE OF STUD UNLESS NOTED OTHERWISE. MASONRY DIMENSIONS ARE FROM OUTSIDE EDGE TO OUTSIDE EDGE UNLESS NOTED OTHERWISE.
3. CONTRACTOR SHALL COMPLY WITH ALL LOCAL, STATE, AND FEDERAL CODES, REGULATIONS AND ORDINANCES AND SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED FOR CONSTRUCTION.
4. FIRE EXTINGUISHER(S) ARE REQUIRED IN THE SPACE PER NFPA 10. MOUNT CABINETS AND EXTINGUISHERS AT LOCATIONS SHOWN ON THE DRAWINGS OR AS DIRECTED BY THE FIRE/BUILDING INSPECTOR.
5. CONSTRUCTION MATERIALS SPECIFIED AND NOTED ON THE DRAWINGS ARE REPRESENTATIVE OF THE GENERAL DESIGN INTENT.
6. GENERAL CONTRACTOR TO VERIFY CONDITIONS PRIOR TO BIDDING. IF CONDITIONS ARE DIFFERENT THAN SHOWN IN DRAWINGS, CONTACT ARCHITECT IMMEDIATELY.
7. WHERE A DETAIL IS SHOWN OR A NOTE IS DESCRIBED FOR ONE CONDITION, IT SHALL APPLY FOR ALL LIKE OR SIMILAR CONDITIONS EVEN THOUGH NOT SPECIFICALLY NOTED ON THE DRAWINGS.
8. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PROTECT SURROUNDINGS PROPERTY, STREETS, WALKS, ETC. DURING CONSTRUCTION ACTIVITIES AND SHALL BE RESPONSIBLE FOR REPAIRING ANY DAMAGE CAUSED AS A RESULT.
9. CONTRACTOR TO COORDINATE LOCATION OF TEMPORARY CONSTRUCTION BARRIERS WITH OWNER. MEANS OF EGRESS EXIT ACCESS ROUTES MUST REMAIN OPEN AND ACCESSIBLE TO ALL OCCUPANTS.

6 General Notes
NTS

JURISDICTION:	KNOX COUNTY
ZONING DISTRICT:	PC PLANNED COMMERCIAL
OVERLAY DISTRICT:	TO-1 TECHNOLOGY OVERLAY
PARCEL ID:	103MA001, 103MA002, & 103MA004
DEVELOPMENT TYPE:	COMMERCIAL (RETAIL / RESTAURANT)
USE PERMITTED:	YES

5 Zoning Review
NTS

GROSS AREA (SLAB LINE):	17,301 SF
LEASABLE AREA* (BAY 1):	1,513 SF
LEASABLE AREA* (BAYS 2-9):	1,452 SF
LEASABLE AREA* (BAY 10):	2,502 SF
LEASABLE AREA* (ALL BAYS):	5,467 SF

*DOES NOT INCLUDE THICKNESS OF EXTERIOR OR DEMISING WALLS.

4 Area Calculations
NTS

Owner:
OKR GP
11707 Couch Mill Road
Knoxville, TN 37932
Contact: David Hobbs
T: 865.964.9254
E: david.hobbs.1971@gmail.com

Architect:
Studio Four Design, Inc.
414 Clinch Avenue
Knoxville, TN 37902
Contact: Stacy Cox, AIA
T: 865.523.5001
E: scox@s4dinc.com

Civil Engineer:
Urban Engineering
10330 Hardin Valley Rd
Knoxville, TN 37932
Contact: Chris Sharp, PE
T: 865.966.1924
E: chris@urban-eng.com

Landscape Architect:
The Penland Studio
2110 Holderwood Ln
Knoxville, TN 37922
Contact: Ben J. Pethel, ASLA
T: 865.335.3584
E: bpethel@penlandstudio.com

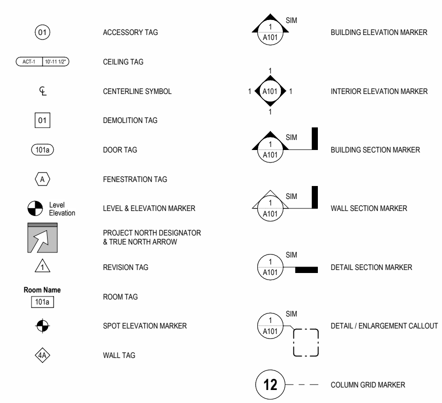
Structural Engineer:
Elam Structural Engineering, LLC
P.O. Box 30799
Knoxville, Tennessee 37930
Contact: Josh Elam, PE
T: 865.607.3517
E: elam@elamse.com

M/E/P Engineer:
Proficient Engineering
4110 Sutherland Ave
Knoxville, TN 37919
Contact: Tommy Wasmund, PE
T: 865.409.5755
E: twasmund@proficientengineering.com

3 Project Contacts
NTS

		TTCDA Review Set 03.25.2024
TITLE		
T0.0	Cover Sheet	●
SURVEY		
V1.1	Plat	●
LIFE SAFETY		
LS1.1	Life Safety Plan	
CIVIL		
C-1	Site Demolition Plan	●
C-2	Site Plan	●
LANDSCAPE		
L1.1	Landscape Plan	●
L1.2	Landscape Plant Schedule, Notes, & Details	●
L1.3	Landscape Details	●
ARCHITECTURAL		
A1.1	Floor Plan	●
A1.2	Roof Plan	●
A1.3	Floor Plan Enlargements	●
A3.1	Building Elevations	●
A3.2	Building Elevations	●
A4.1	Building & Wall Sections	
A5.1	Signage & Enclosure Drawings	●
A6.1	Door Schedule & Storefront Elevations	
A6.3	Details	
ELECTRICAL		
E3.0	Site Plan - Lighting	●
E3.1	Site Plan - Photometrics	●

2 Sheet List
NTS



1 Symbols
NTS

Studio Four Design, Inc.
Architecture | Interiors
414 Clinch Avenue | Knoxville, TN 37902
865.523.5001 | studiofourdesign.com

A New Mixed-Use Commercial Development named:
Village at Hardin Valley
TBD
Knoxville, TN 37932

NOT FOR
SD
CONSTRUCTION

Project Phase: Schematic Design

Issue Date: 03.25.2024

Revisions

#	Description	Date

Job Number: 23091

Cover Sheet

T0.0

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Checked By:
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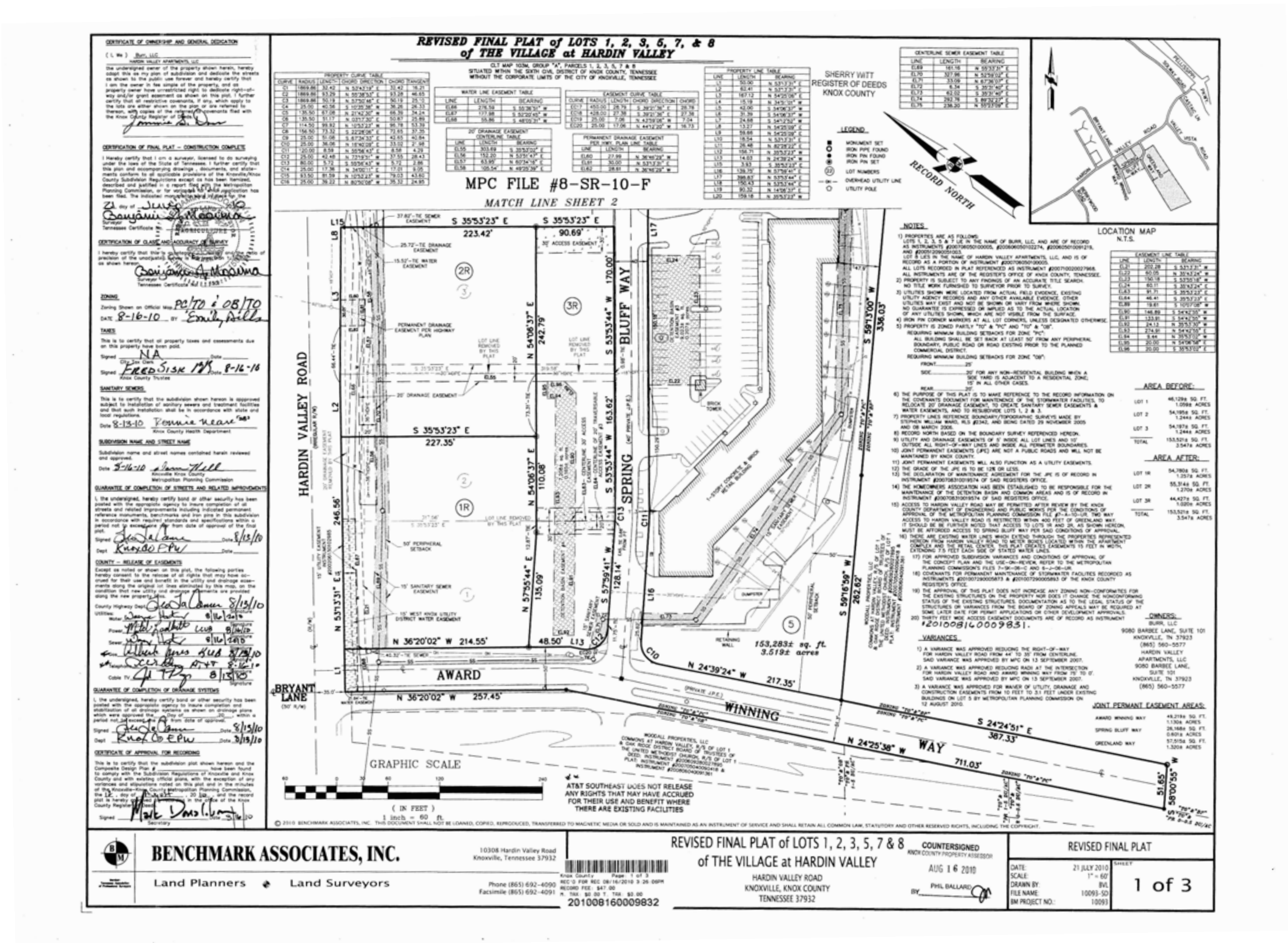

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Revisions

#	Description	Date

Job Number: 23091

Plat

V1.1

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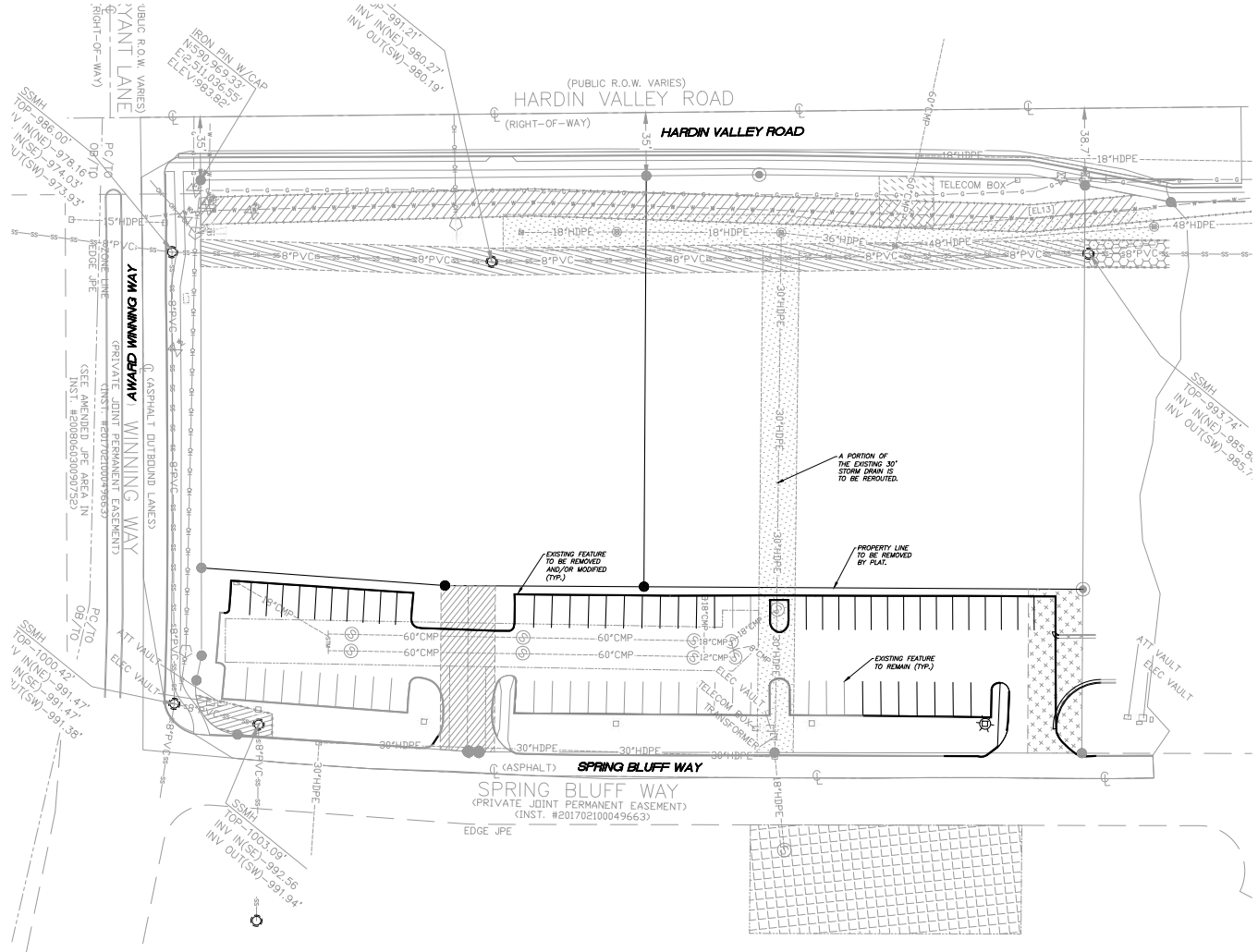


ALL WORKMANSHIP AND MATERIALS SHALL BE PER KNOX COUNTY STANDARD SPECIFICATIONS FOR SITE DEVELOPMENT PERMITS.

GRAPHIC SCALE
30 0 30 60

REFERENCE:
PARCEL 1
DEED INST. #201606060070861
PLAT INST. #201008160009832
PARCELS 2 & 3
DEED INST. #201605260068749
PLAT INST. #201008160009832

Certification of Concept Plan by Registered Engineer
I hereby certify that I am a registered engineer, licensed to practice engineering under the laws of the State of Tennessee. I further certify that the plan and accompanying drawings, documents and statements conform, to the best of my knowledge, to all applicable provisions of the Knoxville-Knox County Subdivision Regulations except as has been itemized and described in a report filed with the Planning Commission.
Registered Engineer
Christopher A. Sharp, P.E.
Tennessee License No. 108984
Date: 5/28/2024

SHEET C-1

SITE DEMOLITION PLAN
THE VILLAGE AT HARDIN VALLEY
SITE ADDRESS: 0 SPRING BLUFF WAY (37932)

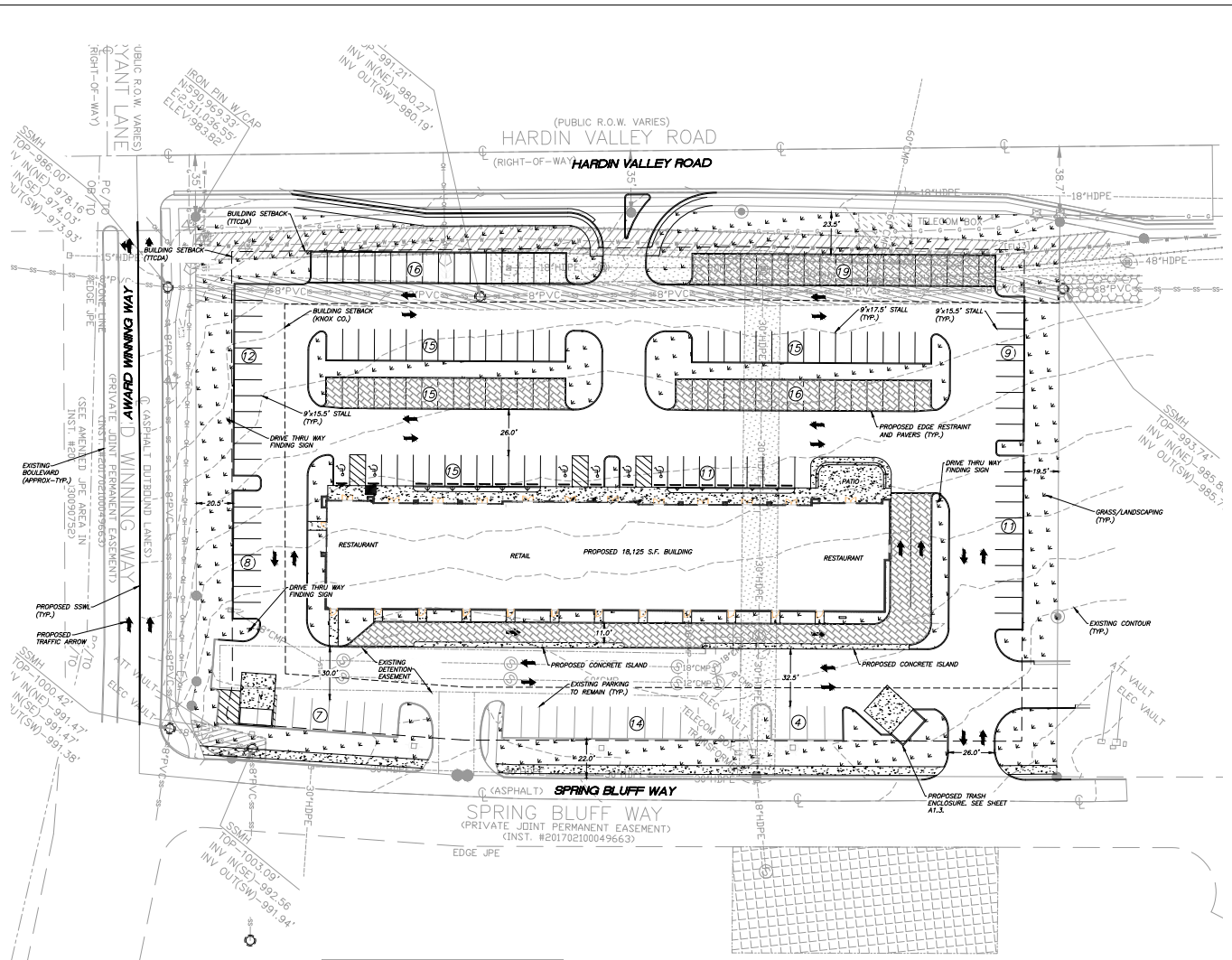
OWNER:
OKR GP
11707 COUCH MILL ROAD
KNOXVILLE, TN 37932

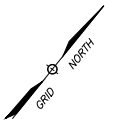
DIST. NO. W6 — KNOX CO., TN.
SCALE: 1"=30' — MAY 28, 2024
TAX MAP: 103 INSERT: M GROUP: A PARCELS: 1, 2, 3

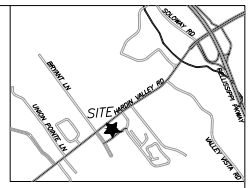
REVISION	DATE	DESCRIPTION	BY
1	6/21/24	REVISED PER PLANNING & EPW COMMENTS	CAS

URBAN ENGINEERING, INC.
10330 HARDIN VALLEY RD, #201
KNOXVILLE, TENNESSEE 37932
(865) 966-1924

DWN: CLM | CHK: CAS | DWG. NO. 2403010







LOCATION MAP

SITE PLAN NOTES:

1. PROPERTY CORNERS MARKED AS NOTED.
2. THIS PROPERTY IS ZONED PC/TO. REQUIRED BUILDING SETBACKS AS FOLLOWS:

PC ZONE

PERIPHERY BOUNDARY: ALL BUILDINGS SHALL BE SET BACK AT LEAST FIFTY (50) FEET FROM ANY PERIPHERAL BOUNDARY OF THE PROJECT, OR ANY PUBLIC STREET OR ROAD EXISTING PRIOR TO THE PC, PLANNED COMMERCIAL ZONE.

TECHNOLOGY OVERLAY

FRONT: 20 FEET / 60 FEET*
SIDE: 20 FEET
REAR: 20 FEET
*WITH PARKING IN FRONT YARD

3. THE LOCATIONS OF ALL UNDERGROUND UTILITIES SHOWN HEREON ARE APPROXIMATE AND ARE BASED ON FIELD LOCATION OF VISIBLE STRUCTURES SUCH AS CATCH BASINS, MANHOLES, WATER VALVES, ETC., AND COMPILING INFORMATION FROM PLANS SUPPLIED BY VARIOUS UTILITY COMPANIES AND GOVERNMENT AGENCIES. THE CONTRACTORS SHALL NOTIFY IN WRITING ALL UTILITY COMPANIES AND GOVERNMENT AGENCIES AND ALSO CALL TENN ONE-CALL PRIOR TO ANY EXCAVATION WORK, TO VERIFY INFORMATION SHOWN AND DETERMINE THE LAYOUT OF THE IRRIGATION SYSTEM AND IF ADDITIONAL IMPROVEMENTS MAY EXIST.
4. SIGNAGE AND STRIPING TO CONFORM TO THE MUTCD, LATEST EDITION.
5. HORIZONTAL COORDINATES ARE TENNESSEE STATE PLANE. VERTICAL DATUM IS NAVD88.
6. ALL WORK SHALL BE IN ACCORDANCE WITH KNOX COUNTY'S SPECIFICATIONS FOR SITE DEVELOPMENT.
7. GROUND AREA COVERAGE (GAC) SHALL NOT EXCEED 25%. SEE LOT COVERAGE SUMMARY.
8. FLOOR AREA RATIO (FAR) SHALL NOT EXCEED 30%. SEE LOT COVERAGE SUMMARY.
9. IMPERVIOUS AREA SHALL NOT EXCEED 70% SEE LOT COVERAGE SUMMARY.
10. SEE ARCHITECTURAL AND LANDSCAPE PLANS FOR MONUMENT SIGN LOCATION AND DETAIL.

PARKING NOTES:

1. THIRTY PERCENT (30%) OF THE PARKING SPACES MAY BE DESIGNATED FOR COMPACT CARS. THE MINIMUM SIZE OF A COMPACT CAR SPACE SHALL BE 8 FT. x 16 FT.
2. PARKING AREAS SHALL BE LANDSCAPED ACCORDING TO SECTION 3.4 REQUIREMENTS.
3. SURFACE PARKING AREAS SHOULD BE LOCATED TO THE SIDE OR TO THE REAR OF BUILDINGS. IF PARKING IS REQUESTED TO BE LOCATED IN FRONT OF A BUILDING, THE PARKING SHALL BE SEPARATED FROM THE FRONT PROPERTY LINE BY A 20 FT. LANDSCAPE BUFFER.
4. REQUIRED PARKING (RESTAURANT/RETAIL)

TTCDA:

RESTAURANT:

MINIMUM – 7.5 PER 1000 SQ. FT. OF GROSS FLOOR AREA
5000/1000 = 5 5 * 7.5 = 37.5
MINIMUM SPACES REQUIRED = 68

MAXIMUM – 15 PER 1000 SQ. FT. OF GROSS FLOOR AREA
5000/1000 = 5 5 * 15 = 75
MAXIMUM SPACES REQUIRED = 112

RETAIL:

MINIMUM – 3 PER 1000 SQ. FT. OF GROSS FLOOR AREA
12625/1000 = 12.625 12.625 * 3 = 38
MINIMUM SPACES REQUIRED = 38

MAXIMUM – 4.5 PER 1000 SQ. FT. OF GROSS FLOOR AREA
12625/1000 = 12.625 12.625 * 4.5 = 57
MAXIMUM SPACES REQUIRED = 57

TOTAL MINIMUM SPACES REQUIRED = 80

TOTAL MAXIMUM SPACES REQUIRED = 169

KNOX COUNTY:

RESTAURANT:

ONE (1) PER THREE (3) EMPLOYEES, PLUS ONE (1) PER ONE HUNDRED (100) SQUARE FEET OF USABLE FLOOR SPACE, OR ONE (1) PER THREE (3) FIXED SEATS, WHICHEVER IS THE GREATER.

27 (EMPLOYEES) / 3 = 9
5000 / 100 = 50
REQUIRED PARKING = 59

RETAIL:

ONE (1) PER ONE HUNDRED (100) SQUARE FEET OF RETAIL FLOOR SPACE.
12625 / 100 = 126
REQUIRED PARKING = 126

TOTAL REQUIRED PARKING = 169

PROPOSED PARKING: 187 (INCLUDING 6 HANDICAP)

LOT COVERAGE SUMMARY	
CURRENT USE	VACANT / PARKING AREA
PROPOSED USE	RESTAURANT / RETAIL
ZONING	PC/TO
TOTAL AREA	3.55-ACRES (154,492± S.F.)
EXISTING WALKS AND ASPHALT	28,548 S.F.
PROPOSED BUILDING AREA RESTAURANT	5,500 S.F.
PROPOSED BUILDING AREA RETAIL	12,625 S.F.
TOTAL BUILDING AREA	18,125 S.F.
PROPOSED WALKS AND ASPHALT	67,211 S.F.
PERMEABLE PAVER AREA	15,035 S.F.
TOTAL IMPERVIOUS AREA	98,849 S.F.
IMPERVIOUS AREA RATIO (IAR)	64.0%
GROUND AREA COVERAGE (GAC)	11.7%
FLOOR AREA RATIO (FAR)	11.7%

ALL WORKMANSHIP AND MATERIALS SHALL BE PER KNOX COUNTY STANDARD SPECIFICATIONS FOR SITE DEVELOPMENT PERMITS.

Certification of Concept Plan by Registered Engineer
I hereby certify that I am a registered engineer, licensed to practice engineering under the laws of the State of Tennessee. I further certify that the plan and accompanying drawings, documents and statements conform, to the best of my knowledge, to all applicable provisions of the Knoxville-Knox County Subdivision Regulations except as has been itemized and described in a report filed with the Planning Commission.
Registered Engineer _____
Christopher A. Sharp, P.E.
Tennessee License No. 108984
Date: 5/28/2024

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PARCELS 2 & 3
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PLAT INST. #201008160009832

GRAPHIC SCALE
30 0 30 60

REVISION	DATE	DESCRIPTION	BY
1	6/21/24	REVISED PER PLANNING & EPW COMMENTS	CAS

SHEET C-2

SITE PLAN
THE VILLAGE AT HARDIN VALLEY
SITE ADDRESS: 0 SPRING BLUFF WAY (37932)

OWNER:
OKR GP
11707 COUCH MILL ROAD
KNOXVILLE, TN 37932

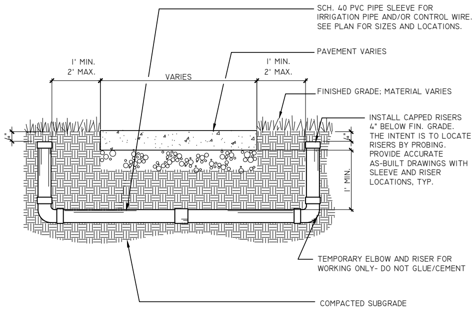
DIST. NO. W6 KNOX CO., TN.
SCALE: 1"=30' MARCH 25, 2024
TAX MAP: 103 INSERT: M GROUP: A PARCELS: 1, 2, 3

URBAN ENGINEERING, INC.
10330 HARDIN VALLEY RD, #201
KNOXVILLE, TENNESSEE 37932
(865) 966-1924

DWN: CLM CHK: CAS DWG. NO. 2403010

VILLAGE AT HARDIN VALLEY- PLANT LIST

QUANTITY	SYMBOL	COMMON NAME	BOTANICAL NAME	ROOTS	MIN. SIZE @ INSTALLATION	REMARKS
DECIDUOUS TREES						
3	ARO	October Glory Red Maple	*Acer rubrum 'October Glory'*	B&B	2" Cal.	Specimen
2	MVA	Sweetbay Magnolia	*Magnolia virginiana*	B&B	6'-8'Ht.	Matched Specimen, 3 Canes, Branched @ 3' Ht.
2	NSA	Wildfire Blackgum	*Nyssa sylvatica 'Wildfire'*	B&B	2" Cal.	Specimen
3	PYA	Akebono Cherry	*Prunus yedoensis 'Akebono'*	B&B	2" Cal.	Specimen, Single Leader
4	QLA	Overcup Oak	*Quercus lyrata*	B&B	2" Cal.	Specimen
4	TDM	Bald Cypress	*Taxodium distichum*	B&B	2" Cal.	Full Crowns
5	UPA	Allee Lacebark Elm	*Ulmus parvifolia 'Emer II' Allee*	B&B	2" Cal.	Specimen
10	ZSG	Green Vase Zelkova	*Zelkova serrata 'Green Vase'*	B&B	2" Cal.	Specimen
33	***20***	***8***	***5***	**TOTAL DECIDUOUS, PARKING SHADE, YARD SHADE, ORNAMENTAL**		
EVERGREEN TREES						
2	NRS	Nellie R. Stevens Holly*	*Ilex x 'Nellie R. Stevens'*	B&B	6' Ht.	Full to Ground @ 15' O.C.
27	JCH	Hetzii Juniper*	Juniperus chinensis "Hetzii Columnaris"	B&B	7' Ht.	Full to Ground @ 5' O.C.
29	***37***		***46.8%***	**TOTAL EVERGREEN, TOTAL LARGE YARD (Lg. Evergreen & Shade), EVERGREEN PERCENTAGE**		
SHRUBS						
25	AGR	Rose Creek Abelia*	*Abelia grandiflora 'Rose Creek'*	Cont.	3 Gal.	Full Plants @ 48" O.C.
33	HPJ	Little Lime Hydrangea	*Hydrangea paniculata 'Jane'*	Cont.	3 Gal.	Full Plants @ 48" O.C.
39	ICB	Dwarf Burford Holly*	*Ilex cornuta 'Burfordii Nana'*	Cont.	3 Gal.	Full Plants @ 48" O.C.
21	IVH	Henry's Garnet Sweetspire	*Itea virginica 'Henry's Garnet'*	Cont.	3 Gal.	Full Plants @ 48" O.C.
18	PLS	Schip Laurel*	*Prunus laurocerasus 'Schipkaensis'*	Cont.	36" Ht. (Min.)	Full Plants @ 60" O.C.
30	RMI	Peach Drift Rose	*Rosa x 'Meiggili'*	Cont.	3 Gal.	Full Plants @ 36" O.C.
25	TOE	Emerald Green Arborvitae*	*Thuja occidentalis 'Emerald Green'*	Cont.	5' Ht. (Min.)	Full to Ground @ 48" O.C.
GROUND COVERS & PERENNIALS						
119	DDM-A	Stella D'Oro Daylily (Daylilly/Daffodil Mix)	*Hemerocallis 'Stella D'Oro'*	Cont.	1 Gal.	Full Plants @ 18" O.C. - See Detail 5/L2.2
205	JCB	Blue Pacific Juniper*	*Juniperus conferta 'Blue Pacific'*	Cont.	3 Gal.	Full Plants @ 36" O.C.
349	LMB	Big Blue Liriope*	*Liriope muscari 'Big Blue'*	Cont.	4" Pots	Full Plants @ 18" O.C.
23	MCA	Pink Muhly Grass	*Muhlenbergia capillaris*	Cont.	3 Gal.	Full Plants @ 36" O.C.
357	DDM-B	Dutch Master Daffodil (Daylilly/Daffodil Mix)	*Narcissus 'Dutch Master'*	Bulbs	DN2	3 bulbs/group @ 18" O.C. - See Detail 5/L2.2
65	PAH	Hameln Pennisetum	*Pennisetum allopecuroides 'Hameln'*	Cont.	1 Gal.	Full Plants @ 30" O.C.
LAWNS						
11,050		Seeded Lawns - Fescue Blend		Seed	SF	See Notes and Specifications
24,400		Sodded Lawns - Fescue Blend		Sod	SF	See Notes and Specifications



1 / L2.1 IRRIGATION SLEEVE DETAIL
SCALE: 1/2"=1'=0"

TTCDA NOTES:

1. TTCDA GUIDELINES 3.1.4: AT LEAST 25% OF PROPOSED/EXISTING TREES SHALL BE EVERGREEN. 47% OF THE PROPOSED TREES ARE EVERGREEN.
2. TTCDA GUIDELINES 3.1.5: FOR DEVELOPMENT SITES, AT LEAST 10 LARGE MATURING TREES ARE REQUIRED PER ACRE OF YARD SPACE. 0.7 ACRES OF YARD SPACE X 10 = 7 (MIN.) LARGE TREES REQUIRED. 8 LARGE MATURING TREES ARE PROPOSED IN YARD SPACE OPEN AREAS.
3. TTCDA GUIDELINES 3.1.7: EVERGREEN PLANT MATERIAL SHOULD BE USED TO SCREEN PARKING AND TO PROVIDE TRANSITIONS BETWEEN LAND USES. EVERGREEN SHRUBS ARE PROPOSED TO SCREEN PARKING.
4. TTCDA GUIDELINES 3.3.3: AREAS AROUND THE BUILDINGS EQUAL TO AT LEAST 50% OF EACH FRONT AND SIDE ELEVATIONS SHALL BE LANDSCAPED WITH ORNAMENTAL TREES, SHRUBS AND BEDDING PLANTS.
5. TTCDA GUIDELINES 3.3.6: LANDSCAPING SHOULD BE USED TO SCREEN MECHANICAL EQUIPMENT AND OTHER UNSIGHTLY BUILDING ELEMENTS. EVERGREEN SHRUBS ARE PROPOSED TO SCREEN THE DUMPSTER ENCLOSURES AND MECHANICAL EQUIPMENT.
6. TTCDA GUIDELINES 3.4.1: PARKING AREAS SHOULD BE SCREENED FROM PUBLIC RIGHTS-OF-WAY. SHRUBS ARE PROPOSED TO SCREEN PARKING FROM PUBLIC STREETS.
7. TTCDA GUIDELINES 3.4.3: TREES SHALL BE REQUIRED AT THE RATE OF ONE (1) MEDIUM OR LARGE MATURING CANOPY TREE FOR EVERY TEN PARKING SPACES PROVIDED. 196 PARKING SPACES= 20 SHADE TREES REQUIRED. 20 SHADE TREES ARE PROPOSED AT THE PARKING AREAS.
8. TTCDA GUIDELINES 3.4.4: IN ADDITION TO THE PLANTING OF REQUIRED CANOPY TREES, PLANTING AREAS FOR ORNAMENTAL TREES, SHRUBBERY AND BEDDING PLANTS SHALL BE NO LESS THAN FIVE (5) PERCENT OF THE SURFACE AREA DEVOTED TO PARKING. 74,320 SF X .05= 3,715 SF MINIMUM REQUIRED. AT LEAST 3,715 SF OF PLANTING ADJACENT TO PARKING IS PROPOSED.

LANDSCAPE NOTES:

1. EXAMINE SITE UPON WHICH WORK IS TO BE PERFORMED. PROVIDE PERCOLATION TESTS, PH TESTS AND OTHER TESTS NECESSARY TO ASCERTAIN THAT ADEQUATE GROWING CONDITIONS WILL BE PROVIDED FOR THE PLANTS. IF PERCOLATION TEST OR SUBSOIL CONDITIONS INDICATE RETENTION OF WATER IN PLANTING AREAS, AS SHOWN BY SEEPAGE OR OTHER EVIDENCE INDICATING PRESENCE OF UNDERGROUND WATER, RECTIFY UNSATISFACTORY CONDITIONS BEFORE BACKFILLING. DO NOT PROCEED WITH WORK UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED. COMMENCEMENT OF PLANTING WORK INDICATES SITE CONDITIONS HAVE BEEN ACCEPTED BY CONTRACTOR.
2. UNDERGROUND UTILITIES EXIST ON SITE. VERIFY LOCATIONS AND DEPTHS BEFORE COMMENCING WITH PLANTING WORK.
3. COORDINATE PROTECTION OF EXISTING TREES AND VEGETATION TO REMAIN PRIOR TO GROUND BREAK. PROTECT EXISTING TREES AND VEGETATION SHOWN TO REMAIN THROUGHOUT CONSTRUCTION.
4. PLANT MATERIAL SHALL BE INSTALLED IN THE DORMANT SEASON UNLESS SPECIFIED OTHERWISE.
5. FOR LANDSCAPING BEDS (AREAS OF MASS PLANTING OF SHRUBS AND/OR GROUND COVERS) TO BE ESTABLISHED IN AREAS THAT HAVE NOT BEEN ALTERED OR DISTURBED BY EXCAVATION, GRADING, OR STRIPPING OPERATIONS, PREPARE SOIL BY TILLING TO A HOMOGENEOUS MIXTURE OF FINE TEXTURE, FREE OF LUMPS, CLODS OR STONES LARGER THAN 2" IN GREATEST DIMENSION, ROOTS AND OTHER EXTRANEOUS MATERIAL TO A DEPTH OF NOT LESS THAN 4"; ELIMINATING UNEVEN AREAS AND LOW SPOTS; REMOVING FOREIGN MATERIALS; SPREADING 8" MINIMUM TOPSOIL. DEFINE BEDS WITH TRENCHED EDGING AT LAWNS.
6. IF QUANTITY OF STOCKPILED TOPSOIL IS INSUFFICIENT, PROVIDE ADDITIONAL TOPSOIL AS REQUIRED TO ACHIEVE A MINIMUM 8" DEPTH AT PLANTING BEDS. ENSURE THAT TOPSOIL IS STERILE, FERTILE, FRIABLE, NATURAL LOAM, TYPICAL FOR LOCALITY; CAPABLE OF SUSTAINING VIGOROUS PLANT GROWTH; TAKEN FROM WELL-DRAINED SITE; FREE OF SUBSOIL, CLAY LUMPS OR STONES LARGER THAN 2" IN GREATEST DIMENSION, PLANTS, WEEDS, AND ROOTS; HAVING PH VALUE OF 5.5 MINIMUM AND 7.0 MAXIMUM; CONTAINING 4 PERCENT MINIMUM ORGANIC MATTER. AMEND TOPSOIL WITH FERTILIZER AND/OR LIME AS REQUIRED TO PROMOTE VIGOROUS PLANT GROWTH.
7. ASSURE THAT BEDS DRAIN AWAY FROM STRUCTURES.
8. CONTRACTOR SHALL STAKE THE LOCATION OF ALL GROUND COVER BEDS, SHRUBS AND TREES FOR APPROVAL PRIOR TO INSTALLATION.
9. CONTRACTOR SHALL ERADICATE WEEDS AND NON-SPECIFIED PLANT MATERIAL AT LEAST THREE (3) WEEKS PRIOR TO PLANT/SEED INSTALLATION.
10. PROVIDE AND INSTALL ONLY PLANTS THAT ARE FREE FROM DISEASE AND PESTS, AND THAT COMPLY WITH THE LATEST EDITION OF PUBLICATION ANSI Z60.1, "AMERICAN STANDARDS FOR NURSERY STOCK," BY THE AMERICAN ASSOCIATION OF NURSERYMEN.
11. ADD PRE-EMERGENT HERBICIDE UNDERNEATH AND ON TOP OF MULCH IN LANDSCAPE BEDS.
12. MULCH TREE RINGS WITH 3" DEPTH OF APPROVED SHREDDED HARDWOOD BARK MULCH IN A FOUR FOOT DIAMETER FOR TREES IN LAWN AREAS.
13. UNLESS NOTED OTHERWISE, MULCH BEDS WITH 3" DEPTH OF APPROVED SHREDDED HARDWOOD MULCH.
14. PLANT GROUND COVERS THROUGH MULCH.
15. REMOVE STRINGS AND OTHER TIES FROM PLANT MATERIAL.
16. REMOVE UPPER 1/3 OF BURLAP FROM PLANT ROOT BALLS.
17. DO NOT PIERCE TREE ROOT BALLS WITH SUPPORT STAKES.
18. ADD FERTILIZER AS REQUIRED FOR OPTIMUM PLANT PERFORMANCE AND PRE-EMERGENT HERBICIDE.
19. DO NOT MAKE SUBSTITUTIONS REGARDING PLANT SIZES OR SPECIES WITHOUT WRITTEN PERMISSION OF THE LANDSCAPE ARCHITECT.
20. PLANT MATERIAL, MULCH, AND OTHER RELATED LANDSCAPE PRODUCTS MUST BE PRE-TREATED FOR FIRE ANTS.
21. WARRANTY MATERIALS AND WORKMANSHIP FOR TWELVE MONTHS FROM THE DATE OF SUBSTANTIAL COMPLETION. ANY TREE WHICH FAILS TO SURVIVE TWELVE (12) MONTHS SHALL BE REPLACED WITHIN SIX (6) MONTHS OF LOSS.
22. THE LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR MAKING REPAIRS NECESSITATED BY DAMAGE OCCURRING DURING THE PERFORMANCE OF THEIR WORK.
23. CONTRACTOR SHALL REMOVE STAKES AND GUY WIRES FOR TREES APPROVED BY THE LANDSCAPE ARCHITECT DURING THE WARRANTY INSPECTION.
24. SEED AREAS DISTURBED DURING CONSTRUCTION WITH APPROVED FESCUE BLEND.
25. ESTABLISH LAWNS AS INDICATED ON PLANS. SEE LAWN NOTES FOR ADDITIONAL REQUIREMENTS.
26. INSTALL APPROVED RIVER GRAVEL AND/OR RIVER COBBLES AS SHOWN ON THE LANDSCAPE PLAN.
27. RIVER COBBLES SHALL BE SIMILAR IN COLOR TO APPROVED RIVER GRAVEL. SUBMIT SAMPLES OF 3" AVG. DIAMETER AND 6" AVG. DIAMETER FOR APPROVAL BY THE LANDSCAPE ARCHITECT.
28. PROVIDE METAL BED EDGING AS SHOWN ON THE PLAN.
29. SEE LANDSCAPE DETAILS AND WRITTEN SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

LAWN NOTES:

1. SEED ALL LAWN AREAS AND ALL DISTURBED AREAS WITHIN THE PROJECT LIMITS WITH APPROVED FESCUE BLEND.
2. VERIFY SUBGRADE IS AT PROPER LEVELS FOR TOPSOIL AND SOD OR SEED INSTALLATION. PROCEED WITH AND COMPLETE LAWNS AND GRASSES AS RAPIDLY AS PORTIONS OF SITE BECOME AVAILABLE, WORKING WITHIN SEASONAL LIMITATIONS.
3. FOR NEW LAWNS, PREPARE SOIL BY TILLING TO A HOMOGENEOUS MIXTURE OF FINE TEXTURE, FREE OF LUMPS, CLODS OR STONES LARGER THAN 2" IN GREATEST DIMENSION, ROOTS AND OTHER EXTRANEOUS MATERIAL TO A DEPTH OF NOT LESS THAN 4"; ELIMINATING UNEVEN AREAS AND LOW SPOTS; REMOVING FOREIGN MATERIALS; SPREADING TOPSOIL TO A 4" MINIMUM DEPTH FOR SEEDED LAWNS OR TO A 3" MINIMUM DEPTH FOR SODDED LAWNS.
4. IF QUANTITY OF STOCKPILED TOPSOIL IS INSUFFICIENT, PROVIDE ADDITIONAL TOPSOIL AS REQUIRED. ENSURE THAT TOPSOIL IS FERTILE, FRIABLE, NATURAL LOAM, TYPICAL FOR LOCALITY; CAPABLE OF SUSTAINING VIGOROUS PLANT GROWTH; TAKEN FROM WELL-DRAINED SITE; FREE OF SUBSOIL, CLAY LUMPS OR STONES LARGER THAN 2" IN GREATEST DIMENSION, PLANTS, WEEDS, AND ROOTS; HAVING PH VALUE OF 5.5 MINIMUM AND 7.0 MAXIMUM; CONTAINING 6 PERCENT MINIMUM ORGANIC MATTER. AMEND TOPSOIL WITH FERTILIZER AND/OR LIME AS REQUIRED TO PROMOTE VIGOROUS LAWN GROWTH.
5. REFURBISH EXISTING LAWNS TO REMAIN WHICH HAVE NOT BEEN DISTURBED BY CONSTRUCTION. INCLUDE CORE AERATION, OVERSEEDING, STRAW AT THIN OR BARE AREAS AND FERTILIZER AS REQUIRED.
6. PROVIDE FERTILIZER, WITH NOT LESS THAN 6 PERCENT TOTAL NITROGEN, 12 PERCENT PHOSPHORIC ACID, AND 12 PERCENT SOLUBLE POTASH. PROVIDE NITROGEN IN A FORM THAT WILL BE AVAILABLE TO LAWN DURING INITIAL PERIOD OF GROWTH; AT LEAST 50% OF NITROGEN TO BE ORGANIC FORM. PROVIDE LIME FROM NATURAL DOLOMITIC LIMESTONE CONTAINING NOT LESS THAN 85% OF TOTAL CARBONATES WITH A MINIMUM OF 30% MAGNESIUM CARBONATES, GROUND SO THAT NOT LESS THAN 90% PASSES A 10-MESH SIEVE AND NOT LESS THAN 50% PASSES A 100-MESH SIEVE.
7. LIMIT PREPARATION TO AREAS WHICH SHALL BE SEEDED OR SODDED IMMEDIATELY.
8. WATER THOROUGHLY AND ALLOW SURFACE MOISTURE TO DRY BEFORE SEEDING OR SODDING. DO NOT CREATE A MUDDY CONDITION. DO NOT SEED OR SOD WHEN THE GROUND IS FROZEN.
9. FOR SODDED AREAS:
   - 9.1. COMPLY WITH AMERICAN SOD PRODUCERS ASSOCIATION (ASPA) "GUIDELINE SPECIFICATIONS FOR SODDING" FOR HARVESTING AND INSTALLING SOD.
   - 9.2. TIME SOD DELIVERY SO THAT IT WILL BE PLACED WITHIN 24 HOURS AFTER STRIPPING. PROTECT SOD AGAINST DRYING AND BREAKING.
   - 9.3. PROVIDE STRONGLY ROOTED CULTIVATED GRASS SOD, NOT LESS THAN 1 YEAR OLD, FREE OF WEEDS AND UNDESIRABLE NATIVE GRASSES PRINCIPALLY COMPOSED OF : 47% WARRIOR TALL FESCUE, 33% BANDIT TALL FESCUE AND 20% BRAVO 2 TALL FESCUE (OR APPROVED BLEND OF 3 TALL FESCUE VARIETIES IN SIMILAR PROPORTIONS.) BROKEN PADS OR PADS WITH UNEVEN ENDS WILL NOT BE ACCEPTABLE. SOD PADS INCAPABLE OF SUPPORTING THEIR OWN WEIGHT.
10. MAINTAIN LAWNS UNTIL GRASS IS WELL ESTABLISHED AND EXHIBITS A VIGOROUS GROWING CONDITION AND NOT LESS THAN 60 DAYS FROM DATE OF SUBSTANTIAL COMPLETION. IF SEEDED IN FALL CONTINUE MAINTENANCE THE FOLLOWING SPRING UNTIL ACCEPTABLE LAWN IS ESTABLISHED.
11. WARRANTY LAWNS FOR ONE YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION.
12. SEE WRITTEN SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

IRRIGATION SLEEVING NOTES:

1. CONTRACTOR SHALL PROVIDE THE LANDSCAPE ARCHITECT, THE ARCHITECT, AND THE OWNER WITH AS-BUILT DRAWINGS OF THE SLEEVE LOCATIONS AND STUB-UPS.
2. IRRIGATION SYSTEMS SHALL BE INDEPENDENTLY METERED UNLESS OTHERWISE DIRECTED BY THE OWNER.
3. SLEEVES UNDER PAVEMENT SHALL BE SCHEDULE 40 PVC, SIZED AS NOTED. SEE SLEEVE DETAIL FOR ADDITIONAL REQUIREMENTS.
4. THE INTENT OF THE IRRIGATION SLEEVE PLAN IS TO PROVIDE ACCESS TO PLANTING BEDS WITHOUT PAVEMENT CUTTING AND MINIMAL DISTURBANCE TO LANDSCAPING FOR LANDSCAPE IRRIGATION THAT MAY BE INSTALLED IN THE FUTURE.

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865.523.5001 | studiofourdesign.com

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2110 Holderwood Lane
Knoxville, Tennessee 37922
bpethel@penlandstudio.com
865.335.3584
www.PenlandStudio.com

A New Mixed-Use Commercial Development named:
Village at Hardin Valley
TBD
Knoxville, TN 37932

NOT FOR SD CONSTRUCTION

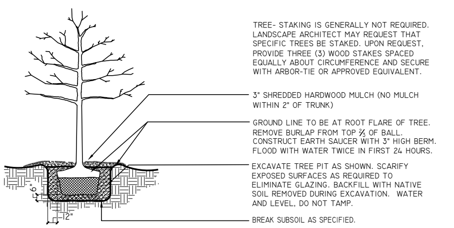
Project Phase: Schematic Design

Issue Date: 05.28.2024		
Revisions		
#	**Description**	**Date**
	Staff Comments	**6/24/24**

Job Number: 23091

Landscape
Plant Schedule
Notes & Details

L2.1



1 L2.2 TREE PLANTING & GUYING TO 3" CAL.
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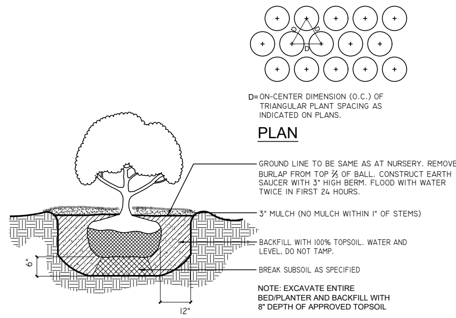

4 L2.2 SHRUB PLANTING DETAIL
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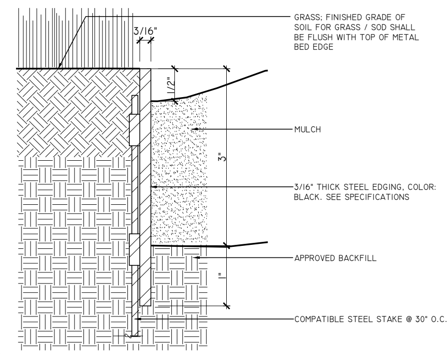

7 L2.2 METAL BED EDGE
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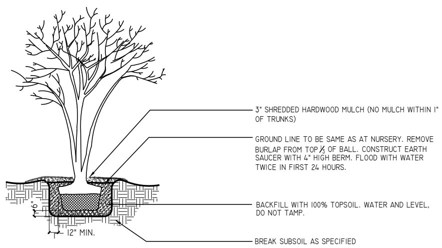

2 L2.2 TREE PLANTING - MULTI-STEM TREE
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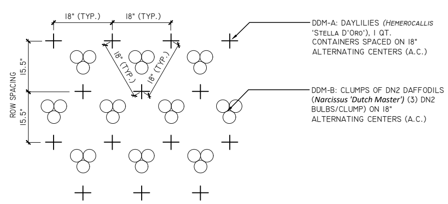

5 L2.2 COLOR BED SPACING
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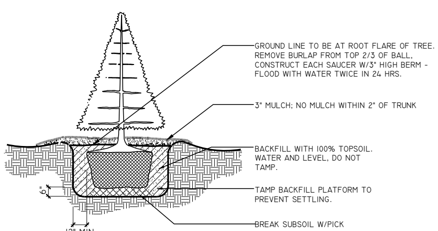
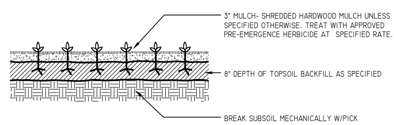


3 L2.2 EVERGREEN TREE - TO 8' HT.
SCALE: NOT TO SCALE



6 L2.2 GROUND COVER/PERENNIAL PLANTING
SCALE: NOT TO SCALE

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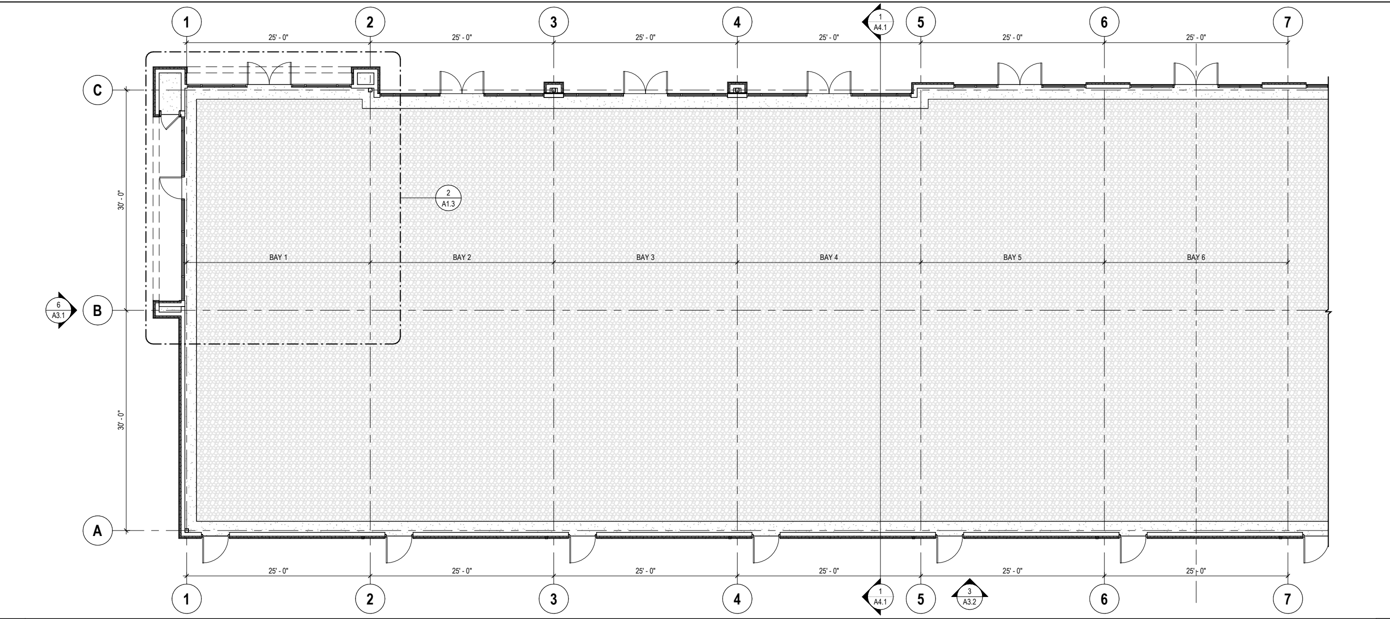
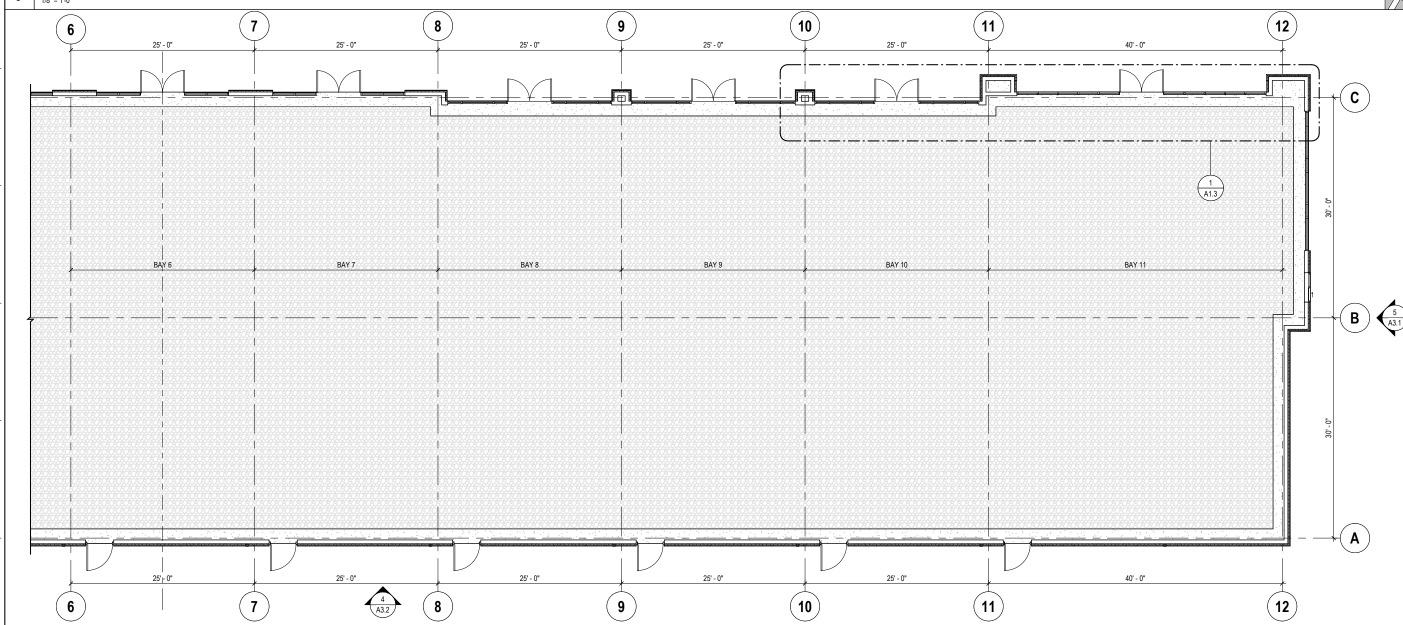
Landscape Details

L2.2



3 **Floor Plan - West Side**
1/8" = 1'-0"

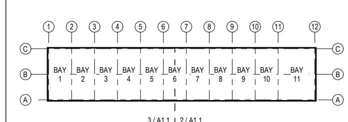


2 **Floor Plan - East Side**
1/8" = 1'-0"

CONCRETE FOUNDATION WALL / PARTIAL SLAB

CRUSHED STONE - SEE SECTIONS AND STRUCTURAL

2 **Floor Plan Legend**
NTS



1 **Key Plan**
NTS

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Revisions		
#	Description	Date

Job Number: 23091

Floor Plan

A1.1

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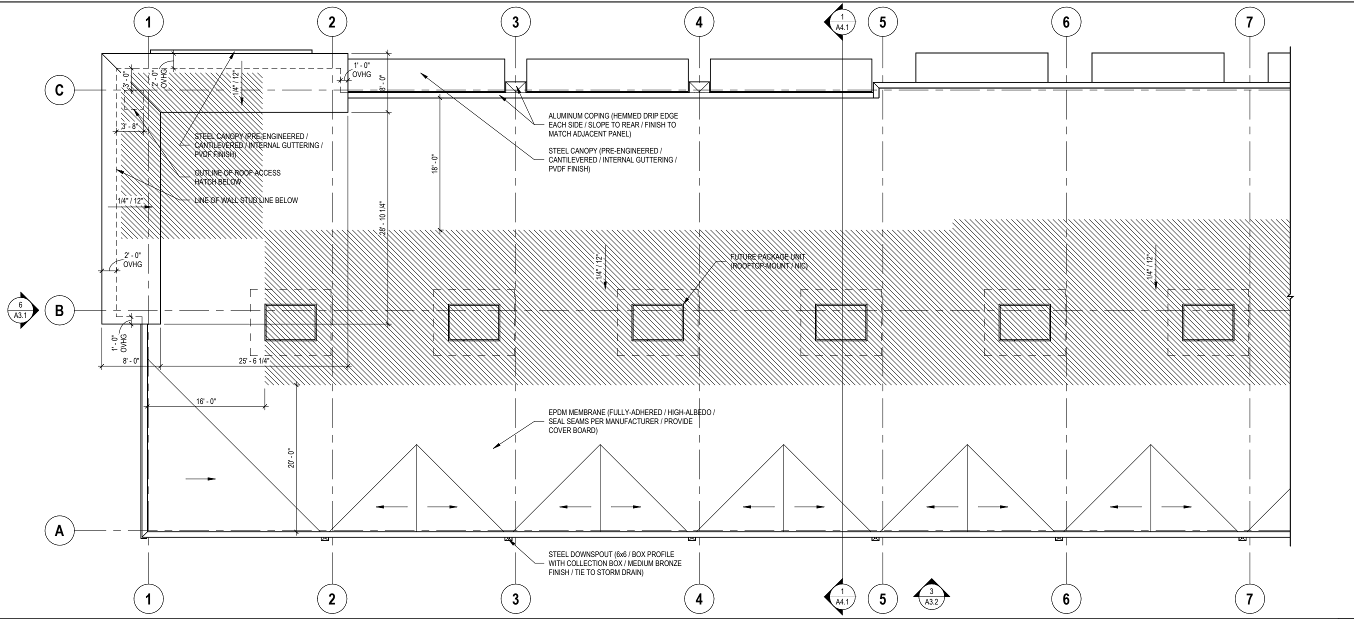
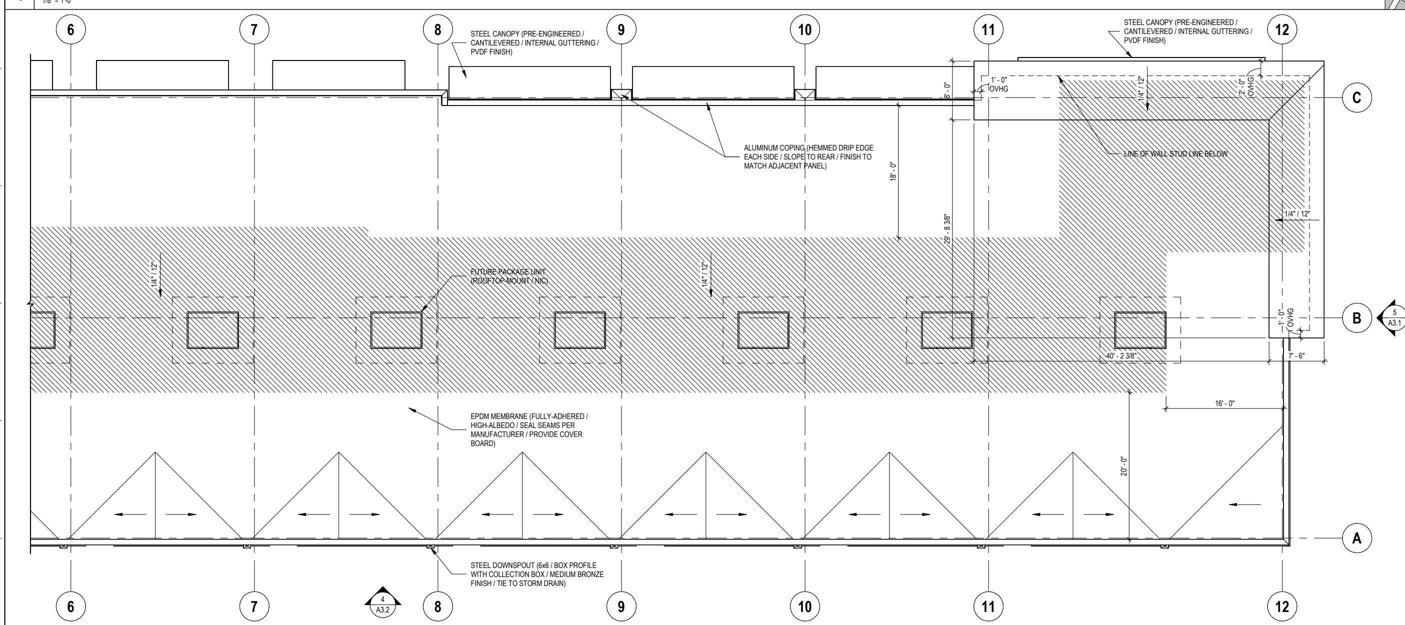


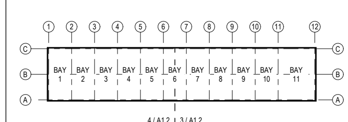
4 **Roof Plan - West Side**
1/8" = 1'-0"



3 **Roof Plan - East Side**
1/8" = 1'-0"

ZONE FOR FUTURE MECHANICAL EQUIPMENT	
ROOF ACCESS HATCH (SHOWN BELOW OVERHANG)	
FUTURE ROOFTOP PACKAGE UNIT, NIC	

2 **Roof Plan Legend**
NTS



1 **Key Plan**
NTS

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Revisions

#	Description	Date

Job Number: 23091

Roof Plan

A1.2

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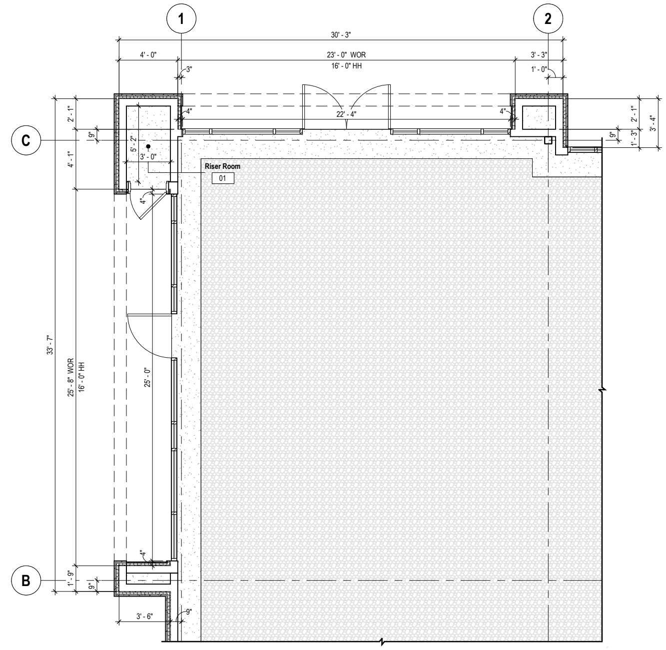
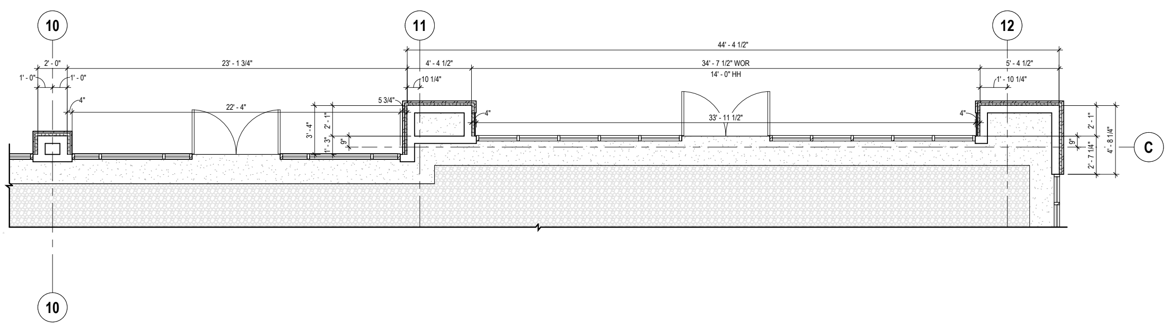


2 Enlarged Floor Plan at West End
1/4" = 1'-0"



1 Enlarged Floor Plan at East End
1/4" = 1'-0"

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Revisions

#	Description	Date

Job Number: 23091

Floor Plan Enlargements

A1.3

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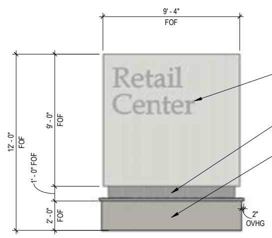
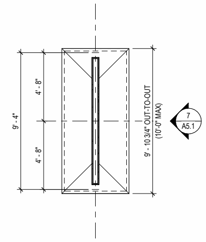
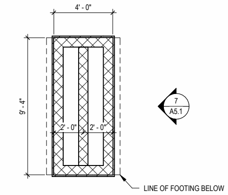


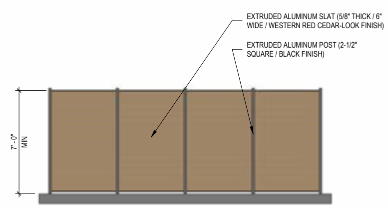
7 **Monument Sign Elevation - Face**
1/4" = 1'-0"



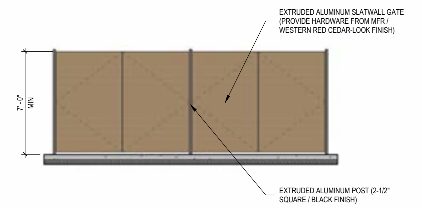
6 **Monument Sign Plan - Upper**
1/4" = 1'-0"



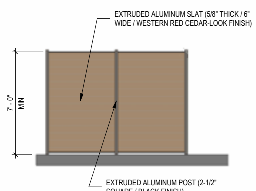
5 **Monument Sign Plan - Base**
1/4" = 1'-0"



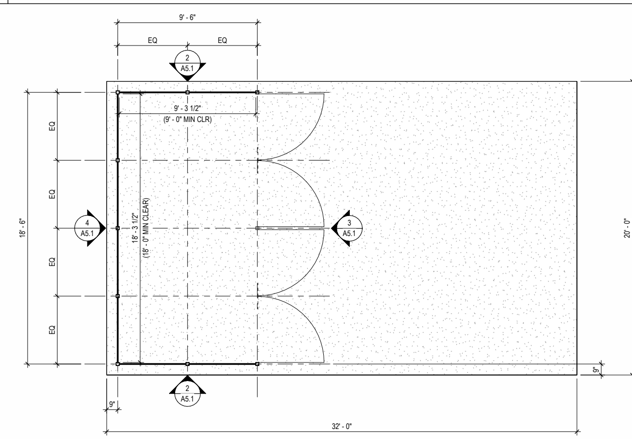
4 **Trash Enclosure Elevation - Rear**
1/4" = 1'-0"



3 **Trash Enclosure Elevation - Front**
1/4" = 1'-0"



2 **Trash Enclosure Elevation - Side**
1/4" = 1'-0"



1 **Trash Enclosure Plan**
1/4" = 1'-0"

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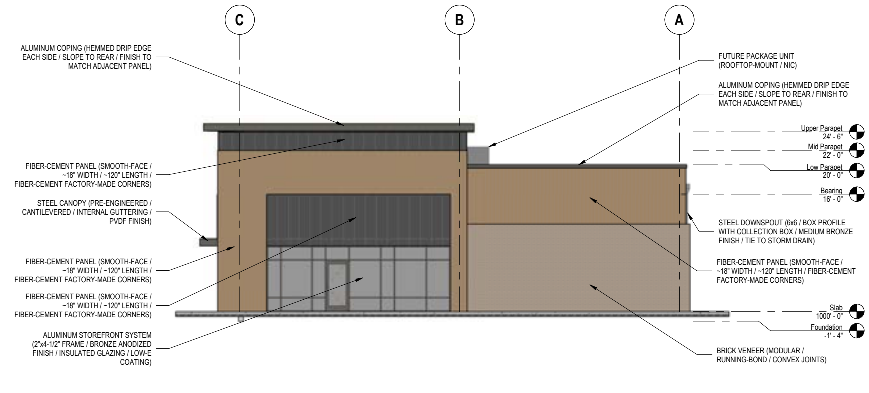
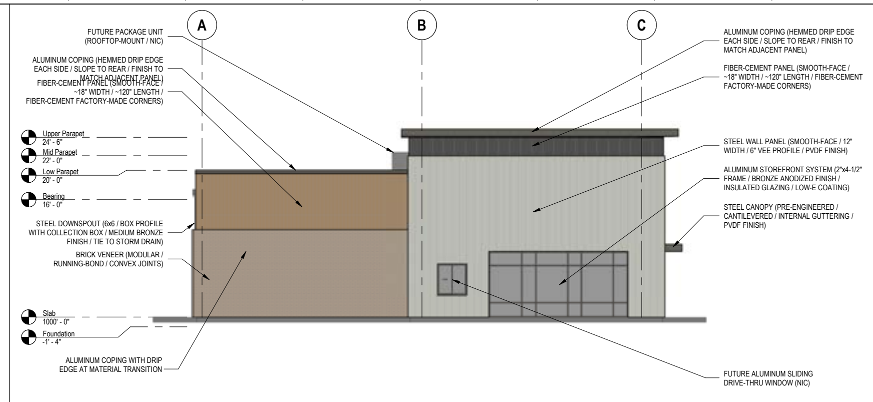
Signage & Enclosure Drawings

A5.1



6 **Building Elevation - Side (West)**
1/8" = 1'-0"



5 **Building Elevation - Side (East)**
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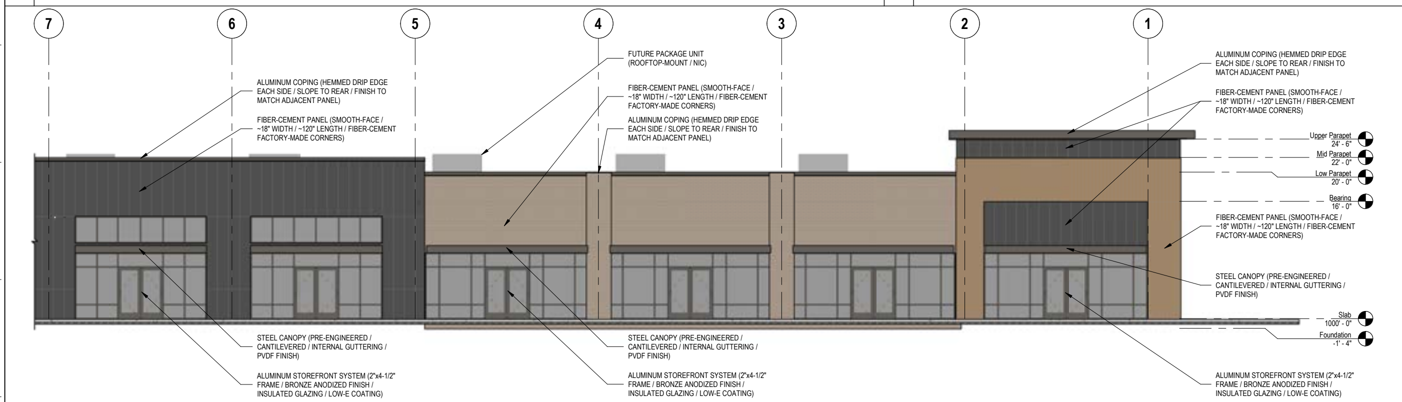
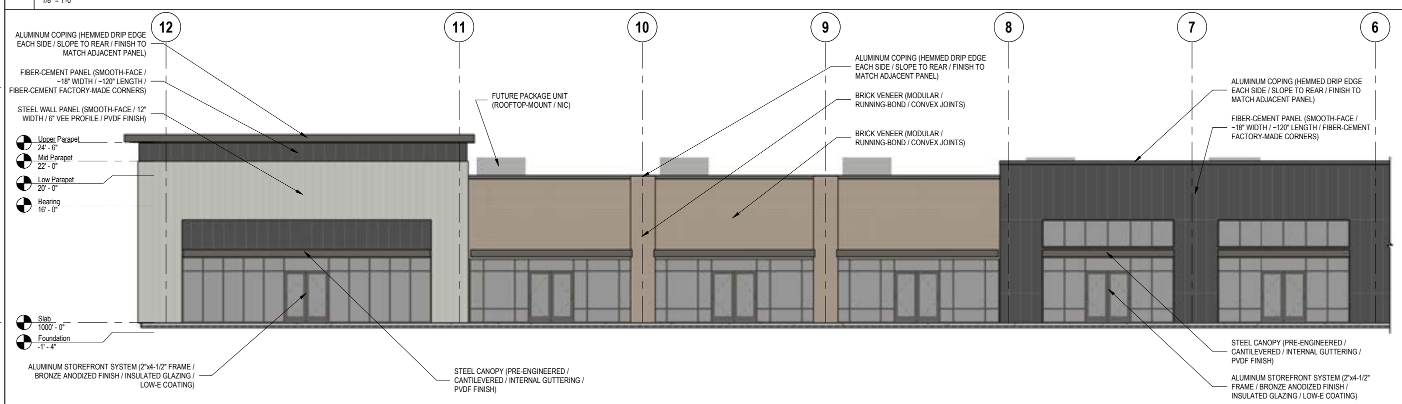


4 **Building Elevation - Front (North) - West Side**
1/8" = 1'-0"



3 **Building Elevation - Front (North) - East Side**
1/8" = 1'-0"

THIN STONE

MANUFACTURER:	GENERAL SHALE
TYPE:	BLUE RIDGE REAGANT
ATTACHMENT:	BRICK TIES
MATERIAL:	BRICK VENEER
THICKNESS:	~3-5/8"

SMOOTH FIBER-CEMENT PANEL

MANUFACTURER:	NICHIHA
TYPE:	AWP 3030 - ILLUMINATION
ATTACHMENT:	PANEL & CLIP SYSTEM
MATERIAL:	FIBER-CEMENT
THICKNESS:	5/8"
FINISH:	FACTORY PAINTED
COLOR:	GRAPHITE

WOOD-LOOK FIBER-CEMENT PANEL

MANUFACTURER:	NICHIHA
TYPE:	AWP 3030 - VINTAGE WOOD
ATTACHMENT:	PANEL & CLIP SYSTEM
MATERIAL:	FIBER-CEMENT
THICKNESS:	5/8"
FINISH:	FACTORY PAINTED
COLOR:	CEDAR

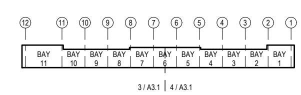
METAL PANEL

MANUFACTURER:	MORIN
TYPE:	Z-12
ATTACHMENT:	CONCEALED FASTENER
MATERIAL:	STEEL
THICKNESS:	24 GAUGE
FINISH:	PVDF
COLOR:	DRIFTWOOD

TRIM / ACCENT METAL

MANUFACTURER:	VARIOUS
MATERIAL:	STEEL
THICKNESS:	24 GAUGE
FINISH:	PVDF
COLOR:	MEDIUM BRONZE

2 **Material Legend**
NTS



1 **Key Elevation (Front)**
NTS

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Building Elevations

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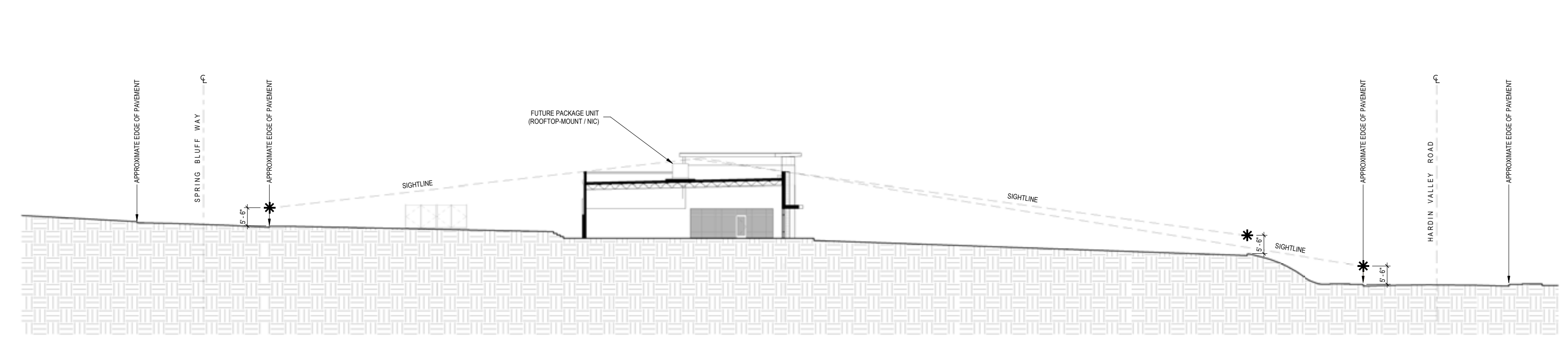

1 Site Section - Transverse
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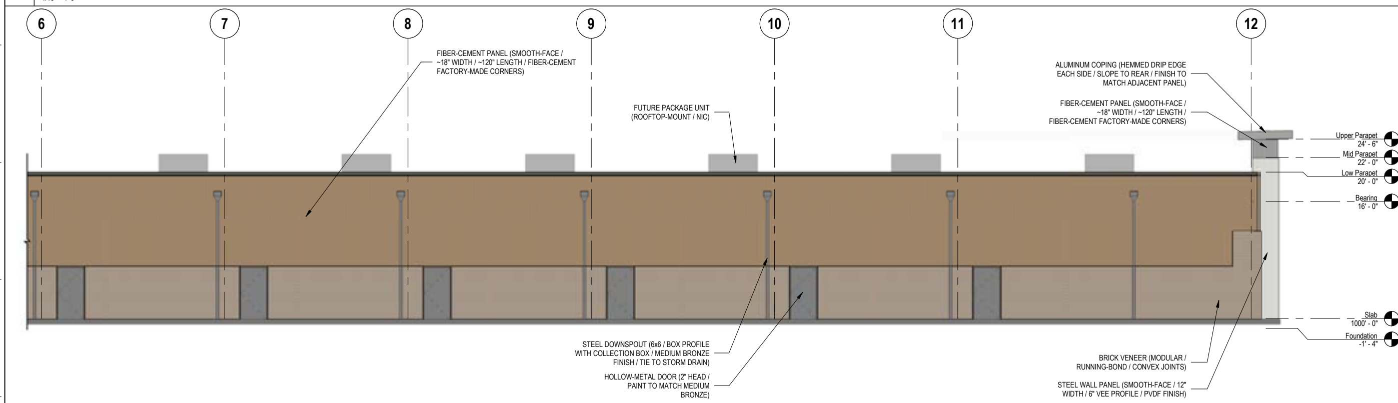
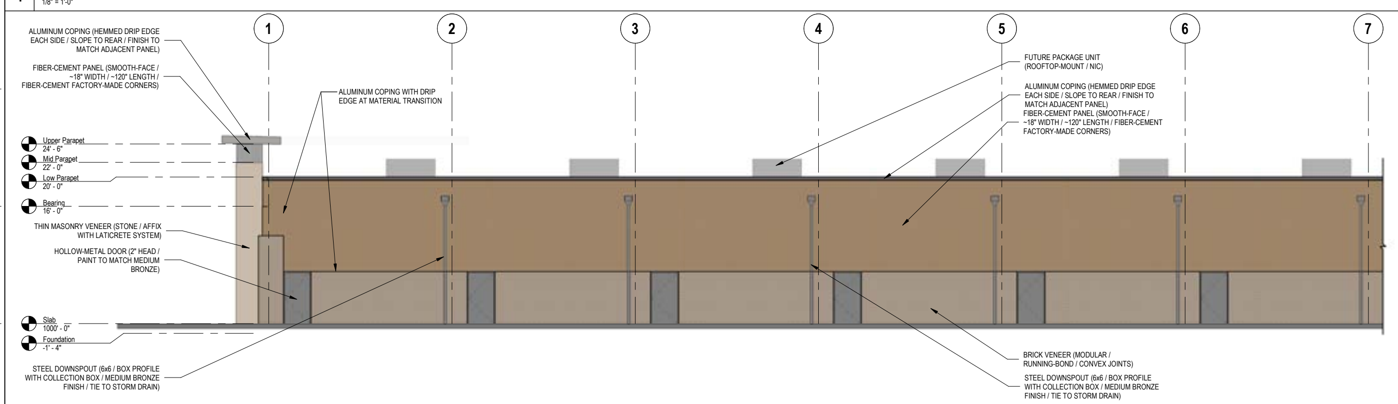


4 Building Elevation - Rear (South) - East Side
1/8" = 1'-0"



3 Building Elevation - Rear (South) - West Side
1/8" = 1'-0"

THIN STONE

MANUFACTURER:	GENERAL SHALE
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THICKNESS:	~3-5/8"

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MATERIAL:	FIBER-CEMENT
THICKNESS:	5/8"
FINISH:	FACTORY PAINTED
COLOR:	CEDAR

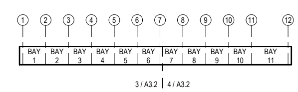
METAL PANEL

MANUFACTURER:	MORIN
TYPE:	Z-12
ATTACHMENT:	CONCEALED FASTENER
MATERIAL:	STEEL
THICKNESS:	24 GAUGE
FINISH:	PVDF
COLOR:	DRIFTWOOD

TRIM / ACCENT METAL

MANUFACTURER:	VARIOUS
MATERIAL:	STEEL
THICKNESS:	24 GAUGE
FINISH:	PVDF
COLOR:	MEDIUM BRONZE

2 Material Legend
NTS



1 Key Elevation (Rear)
NTS

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Building Elevations

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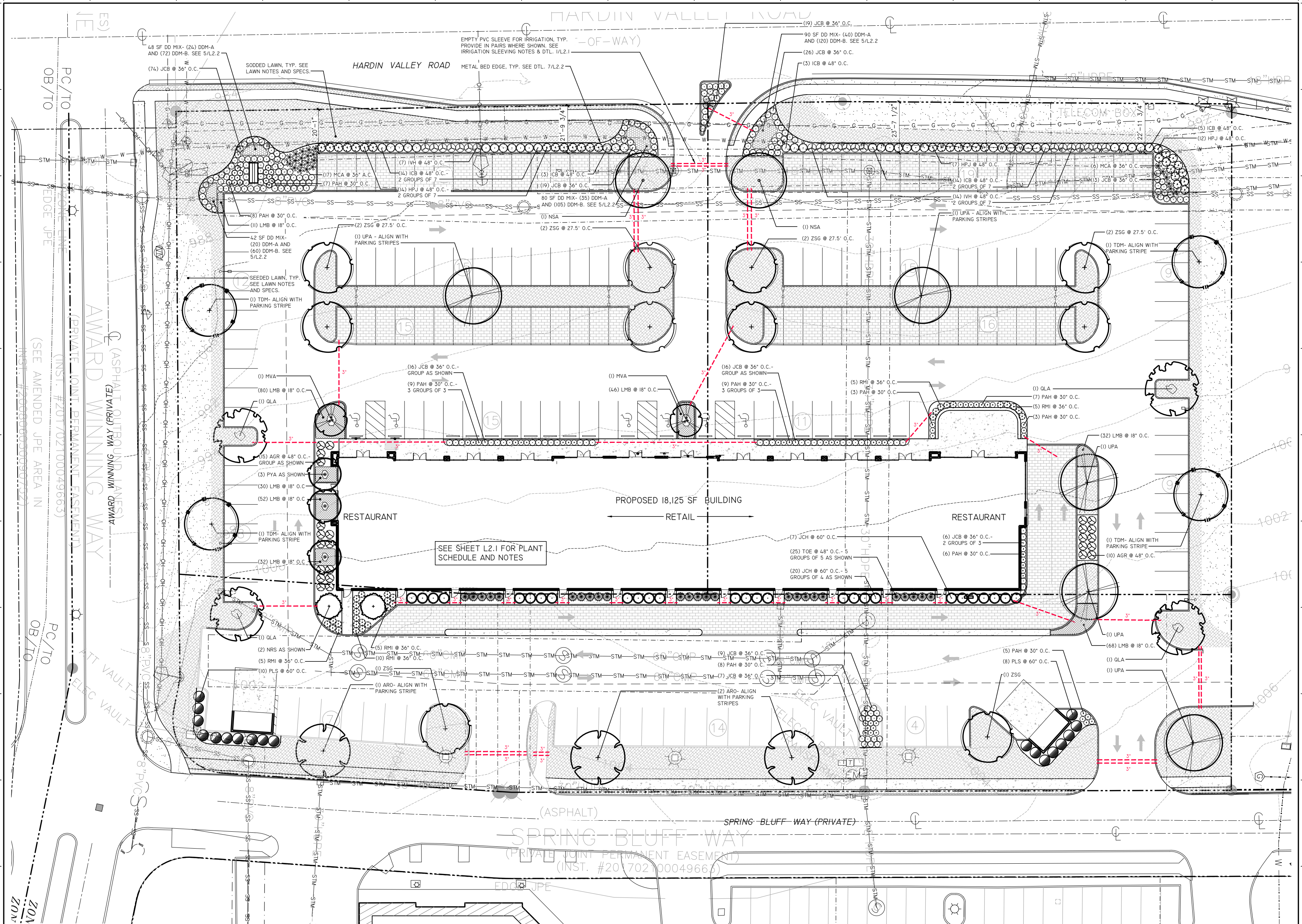

1 **Landscape Plan**
1" = 20'-0"

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Knoxville, Tennessee 37922
bpethel@penlandstudio.com
865.335.3584
www.PenlandStudio.com

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	Staff Comments	6/24/24

Job Number: 23091

Landscape Plan

L1.1

Luminaire Schedule

Symbol	Qty	Label	Arrangement	LLF	Luminaire Lumens	Description	Luminaire Watts	Total Watts	[MANUFAC]
	9	SB	Single	0.900	5468	SIGNIFY OPF-S-A01-730-T4M-AR1-UNV-HIS	41.88	376.92	SIGNIFY CANADA LTD
	6	SB2	Back-Back	0.900	2665	SIGNIFY OPF-S-P01-730-T4M-AR1-UNV	14.8	177.6	SIGNIFY CANADA LTD
	15	SC	Single	0.900	2864	SIGNIFY GWS-A02-740-T4M-UNV	16.89	253.35	GARDCO

Calculation Summary

Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
BACK SIDEWALK	Illuminance	Fc	1.16	1.6	0.4	2.90	4.00
BNDR	Illuminance	Fc	0.04	0.2	0.0	N.A.	N.A.
FRONT SIDEWALK	Illuminance	Fc	0.98	2.4	0.0	N.A.	N.A.
SITE	Illuminance	Fc	0.85	2.5	0.1	8.50	25.00

SESCO LIGHTING

Sales Rep:

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Contact: (865) 633-9288

Processed By: BRADY ISBILL

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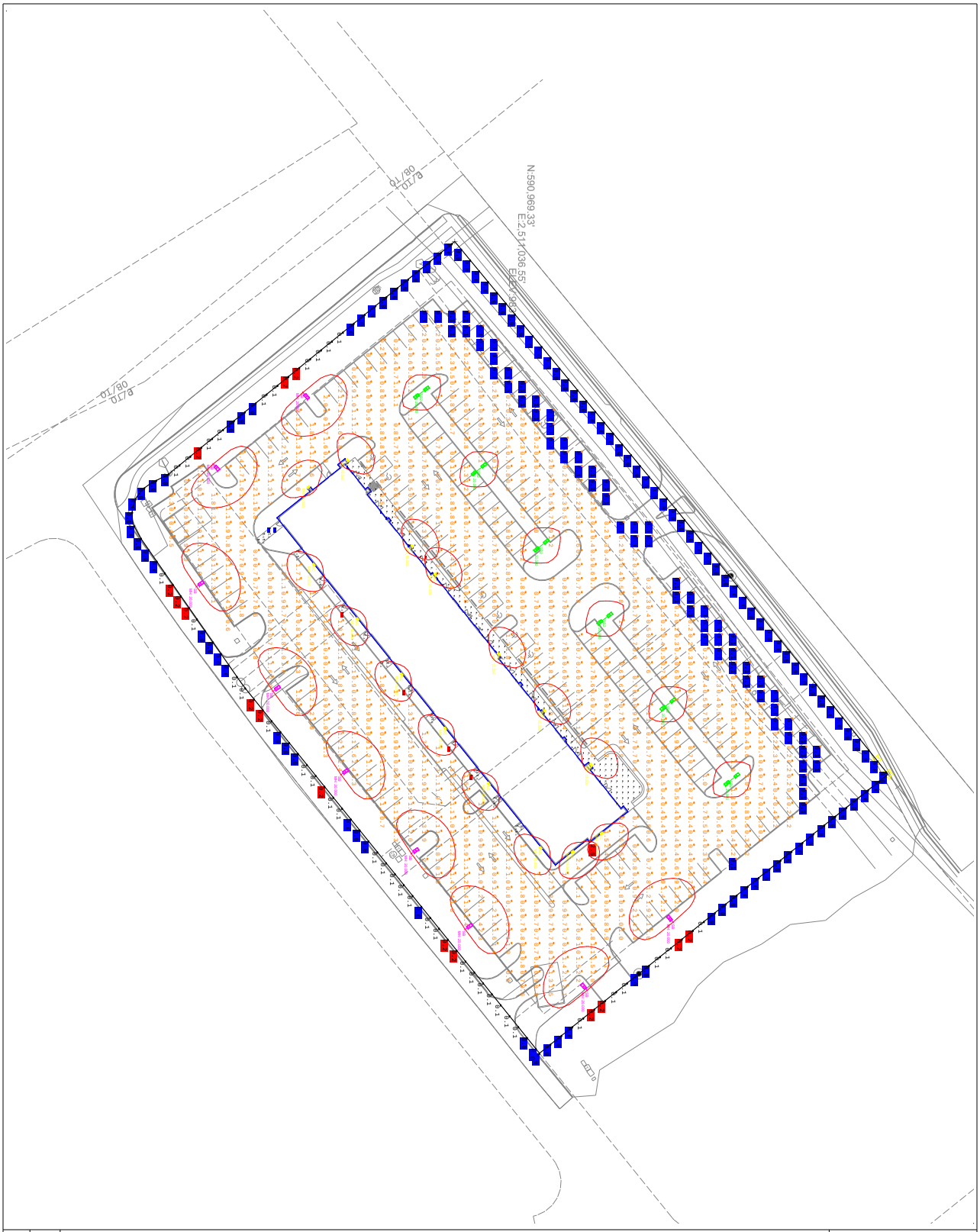
VILLAGE AT HARDIN VALLEY SITE CALC

Date:6/25/2024



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Date:6/25/2024

VILLAGE AT
HARDIN VALLEY
SITE CALC

Sales Rep:

Office: KNOXVILLE, TENNESSEE

Contact: (865) 633-9288

Processed By: BRADY ISBILL

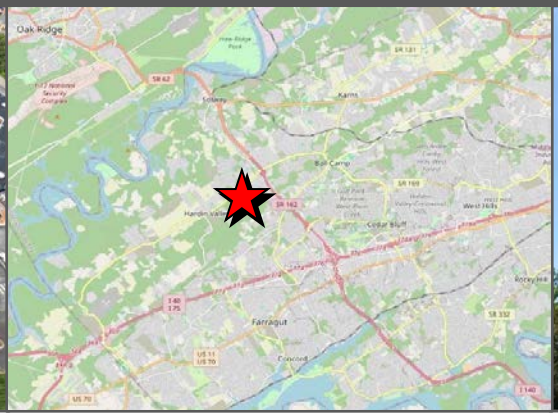
Filename: 2024-6-25- VILLAGE AT HARDIN VALLEY SITE CALC.AGI

SESCO LIGHTING

AJAX ENGINEERING

CIVIL ENGINEERING / TRAFFIC ENGINEERING

Transportation Impact Study
The Village at Hardin Valley
Knox County, Tennessee



Revised June 2024

Prepared for:
OKR, GP
11421 Sam Lee Road
Knoxville, TN 37932

ROBERT WILLIAM JAX III
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
No. 105730
STATE OF TENNESSEE
6/20/2024

11812 Black Road / Knoxville, TN 37932 • (865) 556-0042 • ajaxengineering@gmail.com

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EXECUTIVE SUMMARY

Preface:

OKR, GP proposes a commercial development on a 3.55 +/- acre property southwest of the signalized intersection of Hardin Valley Road at Performing Arts Way and Greenland Way in Northwest Knox County, TN. The proposed development will include a strip retail plaza with a floor area of 15,625 ft² plus a 4,000 ft² coffee/donut shop with a drive-through window. The development is named and referenced in this study as "The Village at Hardin Valley". The development proposes three entrances, one on Hardin Valley Road to the north and two on Spring Bluff Way to the south. The development is anticipated to be fully built and occupied by the end of 2025. In addition, adjacent to the proposed site, a Chick-fil-A restaurant is currently being constructed, and its customers will solely enter and exit via The Village at Hardin Valley development property. This restaurant is expected to be open for business before The Village at Hardin Valley development is fully constructed and occupied.

The primary purpose of this study is to determine and evaluate the potential combined impacts of the developments on the adjacent transportation system. The study includes a review of the primary access roads and intersections, and it is a Level 1 study established by Knoxville/Knox County Planning. Recommendations and mitigation measures are offered to accommodate the new commercial development if transportation operations are projected to be below recognized engineering standards.

Study Results:

The significant findings of this study include the following:

- The Village at Hardin Valley development, with a strip retail plaza and a coffee/donut shop with a drive-through, is estimated to generate 3,022 trips at full build-out and occupancy on an average weekday. Of these daily trips, 381 are projected to occur during the AM peak hour and 262 in the PM peak hour in 2025. However, some of these trips are expected to be comprised of motorists already traveling through the adjacent Hardin Valley Road corridor and, to a lesser extent, the other adjacent roadways. The Chick-fil-A restaurant will also generate significant vehicle trips. Between The Village at Hardin Valley and the Chick-fil-A restaurant, some generated trips are projected to be internal to the developments and will not impact the external road system.

- The Village at Hardin Valley development will have three entrances and they are expected to operate adequately with respect to vehicle delays and queues.
- During peak hours, motorists exiting the development towards the west on Hardin Valley Road via Award Winning Way will experience high delays at the intersection, particularly in the AM peak hour. This experience and occurrence will likely shift the vast majority of westbound exiting motorists away from Award Winning Way and shift the demand to the traffic signal slightly east of the development to continue their intended travel to the west.
- The signalized intersection of Hardin Valley Road at Performing Arts Way and Greenland Way is projected to operate with reasonable vehicle delays and queues even with the future projected trips from the Chick-fil-A restaurant and The Village at Hardin Valley development. This reasonable outcome is possible due to a Knox County Engineering project to increase the number of thru lanes on Hardin Valley Road within the next 12 months. This project will provide two thru lanes of traffic on Hardin Valley Road, eastbound and westbound, at the intersection. However, the northbound left-turn lane vehicle storage on Greenland Way should be increased at this intersection. Knox County Engineering should fine-tune the signal timing as the various projects come to fruition and completion.
- The projected 2025 traffic volumes will warrant the construction of a separate eastbound right-turn lane on Hardin Valley Road at the proposed North Entrance for The Village at Hardin Valley.

Recommendations:

The following is a summary of recommendations based on the study analyses. The recommendations are offered to minimize the impacts of the proposed developments on the adjacent transportation system while attempting to achieve an acceptable traffic flow and improved safety. More details regarding all these recommendations are discussed at the end of the report.

Hardin Valley Road at Performing Arts Way and Greenland Way:

- It is recommended that the northbound left-turn lane on Greenland Way at this intersection be extended to provide a minimum storage of 125 feet. However, due to the readily available existing unused pavement in the center of the road, providing up to 175 feet of storage on Greenland Way will fully ensure that vehicles in this left-turn lane do not block northbound vehicles in the shared

thru/right lane approaching Hardin Valley Road during extreme peak traffic periods. This modification can easily be accomplished by solely re-striping Greenland Way's pavement. The bank entrance should include a "Do Not Block Driveway" sign facing northbound traffic on Greenland Way on the south side of the bank entrance to reduce the potential of vehicles blocking this entrance.

- Knox County Engineering should adjust the signal timing for the AM, Mid-Day, and PM peaks to optimize traffic flows while minimizing the potential of vehicle queues spilling outside their designated storage lanes. These adjustments should occur once the lane additions are provided on Hardin Valley Road and when the Chick-fil-A restaurant and The Village at Hardin Valley all become fully operational. Fine-tuning the signal timing may be needed several times as each piece is added to the road system.

Hardin Valley Road at Bryant Lane and Award Winning Way:

- It is recommended that the northbound lanes on Award Winning Way be defined and marked on the pavement. The width of the northbound exiting approach of Award Winning Way at Hardin Valley Road is 24 feet, allowing for two 12-foot lanes, but it is not marked as such. The approach should be delineated with a white lane line to provide a separate shared left/thru lane and an exclusive right-turn lane. The lanes should include shared white left/thru arrows and white right-turn arrows along its length. These lane designations should be applied from Hardin Valley Road to Spring Bluff Way, approximately 300 feet in length.

Hardin Valley Road at the Proposed North Entrance:

- This entrance intersection will be constructed with a right-in/right-out configuration, but it will allow left turns into the development from the east on Hardin Valley Road. Exiting left-turn movements to the west will not be allowed at this entrance. This entrance should be constructed with this configuration as proposed due to the limited internal vehicle storage available within the site. It is recommended that the following be considered in the design and construction of the entrance:
  - i) The entering and exiting lanes should have a width and inner radius to facilitate the largest expected-sized vehicle entering and exiting at Hardin Valley Road. The layout and elements of the intersection should follow Knox County Engineering standards.
  - ii) The island separating the entering and exiting movements should be raised

concrete and sized adequately to dissuade illegal, restricted left-turning movements to the west on Hardin Valley Road.

iii) Traffic signage with breakaway posts at this intersection should include a Stop Sign (R1-1). The Stop Sign (R1-1) should be supplemented with a 24" white stop bar on the exiting lane approaching Hardin Valley Road, a minimum of 4 feet away from the road edge. Other signs that should be posted at the entrance include a Keep Right Sign (R4-7) at the head of the island for exiting vehicles, a No Left Turn Sign (R3-2) at Hardin Valley facing the exiting lane, and a Do Not Enter Sign (R5-1) facing the exiting lane but on the outside edge of the entering lane.

- It is recommended that the sidewalk at the proposed North Entrance be installed with pavement markings, detectable warning surfaces, and other items to reduce the potential turning vehicle conflicts with pedestrians. Details regarding the appropriate and desired treatments to reduce pedestrian conflicts and inappropriate vehicle movements should be discussed during the detailed design review with Knox County Engineering.
- The intersection sight distance from the North Entrance at Hardin Valley Road must not be impacted by future landscaping, signage, or vegetation. Based on the posted speed limit of 40-mph on Hardin Valley Road, the required ISD is 400 feet, looking to the west for exiting right-turning vehicles. The available sight distance was visually estimated to be greater than 999 feet to the west on Hardin Valley Road. The site designer must also verify that this distance will be available based on the final site plans.
- The construction of a separate eastbound right-turn lane on Hardin Valley Road for vehicles entering the proposed North Entrance is warranted based on the projected 2025 AM peak hour traffic volumes. It is not projected to be warranted in the 2025 PM peak hour. Due to the existing site limitations along Hardin Valley Road, which include extensive underground utilities, it is recommended that the eastbound right-turn lane be designed and constructed with a minimal lane taper but with a maximum deceleration length possible within the confines of the frontage limits. The civil site designer should coordinate the design of this turn lane with Knox County, and it should include a white right-turn arrow and lane line on the pavement for this exclusive lane. As part of this eastbound right-turn lane provision, the existing sidewalk on the south side of Hardin Valley Road will need to be modified and reconstructed.

The Village at Hardin Valley Internal Drive/Parking Lot Aisleways:

- Stop Signs (R1-1) with 24" white stop bars are recommended to be installed at the internal locations, as shown in the report.
- Sight distance at the new internal aisleway intersections must not be impacted by new signage, parked cars, or future landscaping. With an assumed speed of 15-mph in the development, the internal intersection sight distance is 170 feet. The required stopping sight distance is 80 feet for a level road grade. The site designer should ensure that internal sight distance lengths are met.
- All drainage grates and covers for the commercial development must be pedestrian and bicycle safe.
- Internal sidewalks are proposed adjacent to the front of The Village at Hardin Valley building. Sidewalks should have appropriate ADA-compliant ramps, and the internal sidewalks are recommended to be 5 feet minimum in width to meet Knox County regulations.
- Internal guide signs should direct vehicular customers of the coffee/donut shop to the drive-thru lane's location. White pavement lane markings, arrows, or messages should also be considered to facilitate orderly vehicular movements.
- All road and intersection elements should be designed according to AASHTO and Knox County specifications and guidelines to ensure proper operation.

Greenland Way at Spring Bluff Way:

- The prior traffic impact study for the Chick-fil-A restaurant by TWM, Inc. recommended that a 100-foot eastbound right-turn lane be constructed on Spring Bluff Way at Greenland Way and a 100-foot southbound right-turn lane be constructed on Greenland Way at Spring Bluff Way. The findings of this current study did not indicate that an eastbound right-turn lane on Spring Bluff Way at Greenland Way would be necessary. While the findings also did not indicate a need for a southbound right-turn lane on Greenland Way at Spring Bluff Way, this current study agrees with this recommendation due to the known popularity of Chick-fil-A restaurants and the planned coffee/donut shop. A southbound right-turn lane at this intersection would ensure that entering vehicle queues from this direction will not extend back to the traffic signal on Hardin Valley Road.

DESCRIPTION OF EXISTING CONDITIONS

- **STUDY AREA:**

The proposed location of this new commercial development is shown on a map in Figure 1. The commercial development will comprise a single building with internal aisleways and parking areas on 3.55 ± acres. The building will include retail shops and a coffee/donut shop with a single-lane drive-through window. The proposed main entrance to the development will be on the property's north side at Hardin Valley Road, with two other proposed entrances to the south at Spring Bluff Way.

View of Development Site from Opposite Side of Hardin Valley Road (Looking Southeast)

The adjacent Hardin Valley Road corridor is occupied with educational, commercial, office, retail, and residential properties near the proposed development site. The proposed development will be constructed in an aggressively growing area of Knox County. The Chick-fil-A restaurant is currently undergoing construction and will be adjacent to The Village at Hardin Valley.

The development site is flat and was initially graded as part of the construction and development of the commercial building development of Spring Bluff Way. This commercial building is currently occupied by the Knoxville campus for King University, as well as a Japanese restaurant, a fitness center, a pizza shop, and others. The proposed development property has an open grassed lawn and has been regularly maintained. The development will be located on three existing parcels, one of which is an asphalt parking lot that provides overflow parking for the university and businesses along Spring Bluff Way. This parking lot will be removed and incorporated into the overall development plan for The Village at Hardin Valley. Road access to the proposed development will occur primarily via Hardin Valley Road to the north, with secondary access provided via Spring Bluff Way to the south, which intersects Award Winning Way and Greenland Way to the west and east, respectively.

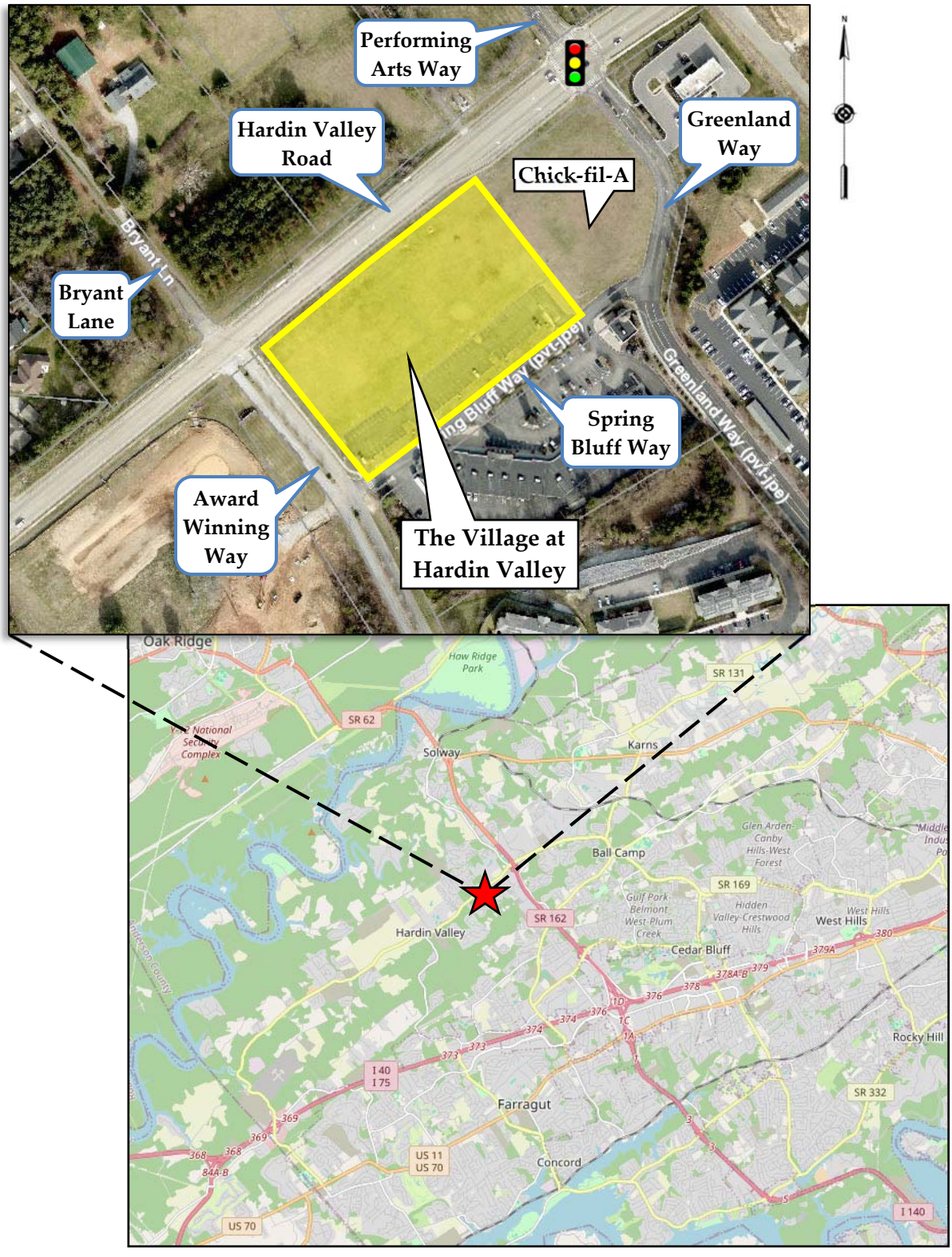


Figure 1
Location Map

- **EXISTING ROADWAYS:**

Table 1 lists the characteristics of the existing primary access roadways adjacent to the development property and included in the study:

TABLE 1
STUDY CORRIDOR CHARACTERISTICS

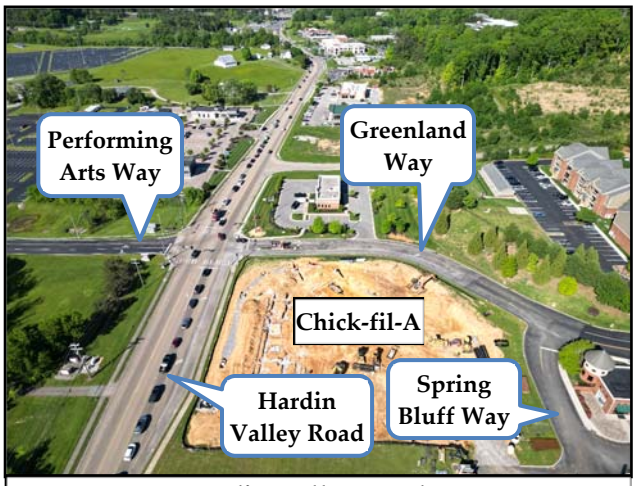
NAME	CLASSIFICATION [1]	SPEED LIMIT	LANES	ROAD WIDTH [2]	TRANSIT [3]	PEDESTRIAN FACILITIES	BICYCLE FACILITIES
Hardin Valley Road	Minor Arterial	40 mph	3 lanes with TWLTL	43.5 feet	None	5' sidewalks on both sides of roadway	No bike lanes
Performing Arts Way	Private	20 mph	3 lanes	38 feet	None	None	No bike lanes
Greenland Way	Private	Not Posted	2 lanes with TWLTL	38.5 feet	None	None	No bike lanes
Spring Bluff Way	Private	Not Posted	2 lanes	26 feet	None	None	No bike lanes
Award Winning Way	Private	Not Posted	3 lanes / boulevard	50.5 feet	None	5' sidewalk on East Side between Hardin Valley Road & Spring Bluff Way	No bike lanes
Bryant Lane	Local	25 mph	2 lanes	16 feet	None	None	No bike lanes

[1] 2018 Major Road Plan by Knoxville/Knox County Planning
[2] Edge of curb face to edge of curb face or edge of pavements near project site
[3] According to Knoxville Area Transit System Map

Hardin Valley Road is classified as a minor arterial and traverses in a generally northeast-southwest direction. Hardin Valley Road is 6.1 miles long. This road runs between Ball Camp Byington Road on its northeast side to the intersection with Hickory Creek Road and Gallaher Ferry Road on its southwest end at a recently constructed roundabout. Just to the east of the study area, Hardin Valley Road provides access to Pellissippi Parkway (SR 162) for travel to the south towards Interstate 40/75/140 and to the north towards Oak Ridge, TN. The posted speed limit on Hardin Valley Road is 40 mph at the development property.

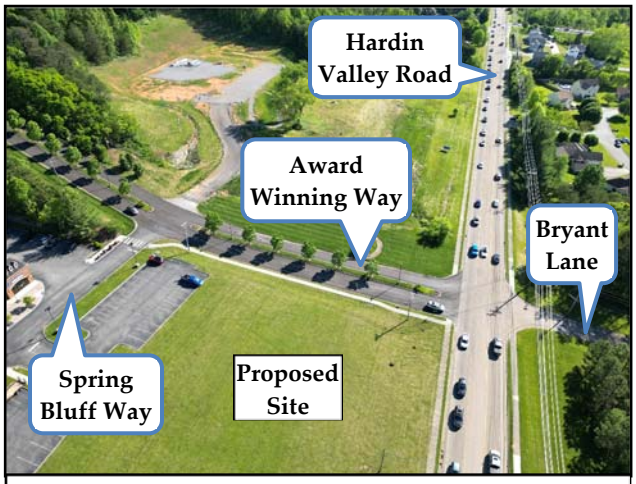
There are 5-foot wide concrete sidewalks on both sides of Hardin Valley Road, and the roadway is lined with 6" concrete curbs and 24" gutters on its edge. The sidewalks begin just west of the Pellissippi Parkway interchange on the east end and terminate on the west end at North Campbell Station Road, approximately 2.5 miles long. Hardin Valley Road has three lanes with a center two-way left-turn lane (TWLTL) adjacent to the development property.

Hardin Valley Road intersects Performing Arts Way and Greenland Way to the east of the development site, and it operates as a signalized intersection. The intersection has crosswalks on all the approaches and provides push buttons and signal heads for pedestrian crossings. The Chick-fil-A restaurant under construction will be on the southwest corner of the signalized intersection. Performing Arts Way and Greenland Way are both private roadways. Performing Arts Way has two lanes approaching from the north at the intersection, one with a shared left/thru lane and the other with an exclusive right-turn lane at the traffic signal. Performing Arts Way provides one of three access points to Pellissippi State Community College to the north, and it is the furthest entrance to the west and south of the campus.



Hardin Valley Road at Performing Arts Way and Greenland Way (Looking East)

At the traffic signal, Greenland Way has a boulevard typical section with two northbound lanes: a separate left-turn lane and a shared thru/right-turn lane. The single southbound lane on Greenland Way is separated from the northbound lanes by a raised 6-foot median. Greenland Way provides access to Spring Bluff Way to the south of the signalized intersection. In addition to the businesses in the large building to the south along Spring Bluff Way, Greenland Way provides road access to a bank on the southeast corner of the traffic signal and the Enclave of Hardin Valley, a multi-unit luxury apartment complex further to the south. This road has single lanes in each direction, with a center lane, and ends within the apartment complex to the south.



Hardin Valley Road at Bryant Lane and Award Winning Way (Looking West)

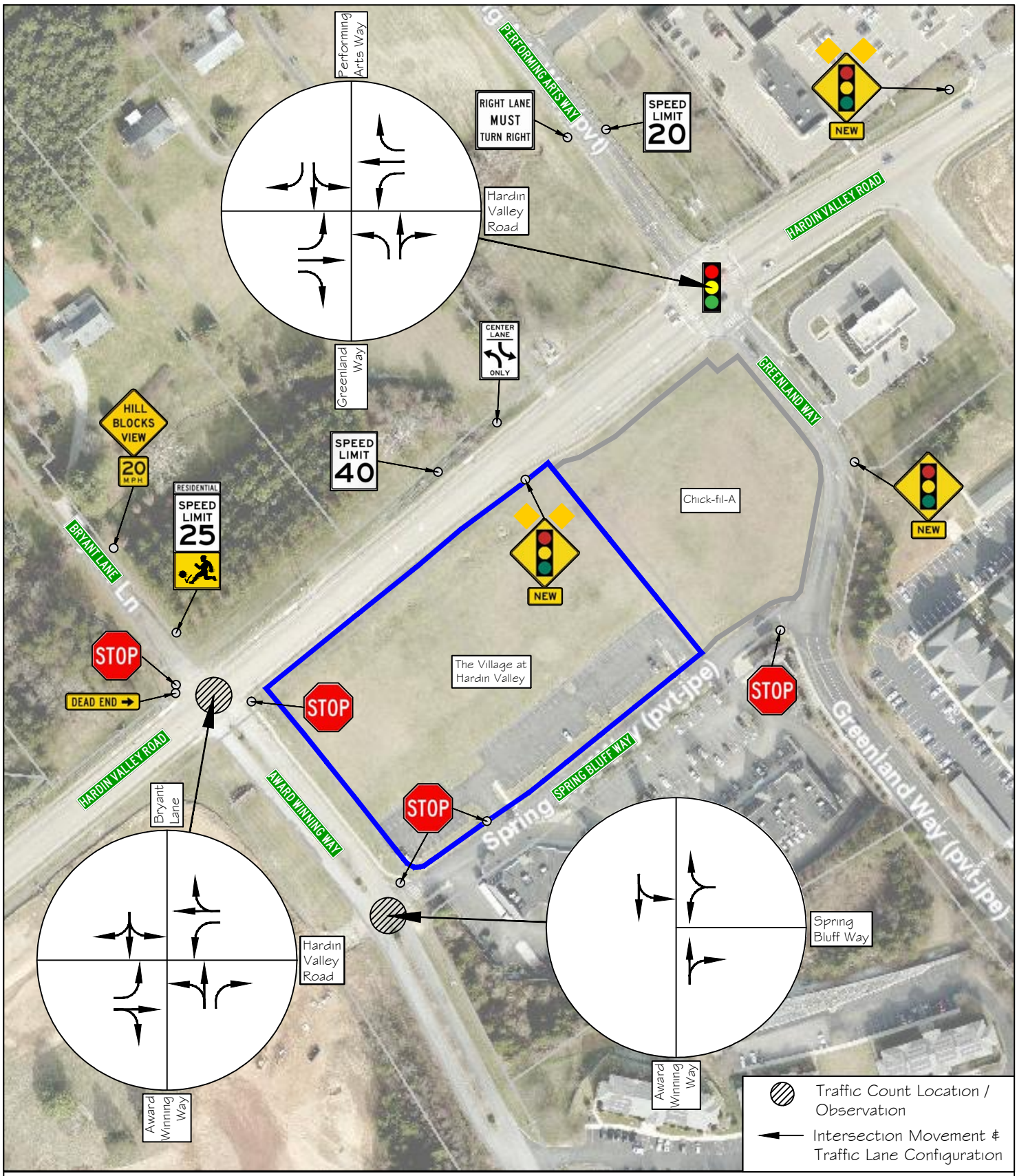
Hardin Valley Road intersects Bryant Lane and Award Winning Way adjacent and to the west of the development site, and it operates as a two-way stop-controlled unsignalized intersection.

Bryant Lane is a local, narrow, lightly traveled roadway with two lanes of traffic. It provides road access to seven single-family detached houses and ends at a cul-de-sac approximately 2,400 feet to the north off Hardin Valley Road. At Hardin Valley Road, the southbound approach of Bryant Lane has a shared left, thru, and right lane.

Award Winning Way has a boulevard typical section with two lanes on its northbound approach at the intersection with Hardin Valley Road and Bryant Lane, with the approach operating with a shared left/thru lane and a right-turn lane. However, these lanes are not marked or designated on the pavement. The boulevard's two northbound lanes have a width of 24 feet, a raised median of 9 feet, and a southbound lane of 17.5 feet. Award Winning Way provides access to Spring Bluff Way south of Hardin Valley Road. In addition to the businesses along Spring Bluff Way, Award Winning Way provides road access to three buildings further to the south currently occupied by several tenants, including mortgage lenders, financial service providers, and others. On the west side of Award Winning Way, opposite the proposed development site, Valley Church recently graded the property for a community center that will be built in the future.

Within the next 12 months, Knox County Engineering plans to provide additional lanes on Hardin Valley Road within the study area. Currently, Hardin Valley Road experiences large vehicle queues and delays, particularly in the eastbound direction toward Pellissippi Parkway during peak hours. These additional lanes on Hardin Valley Road will be carved out mostly within the existing road footprint by reducing the width of the existing lanes and slightly widening the roadway at narrow points. This additional laneage will be provided between Bryant Lane/Award Winning Way on the west side and up to the Pellissippi Parkway interchange to the east. It will provide two lanes in each direction, with a center lane for turning movements. The two lanes in the eastbound direction on Hardin Valley Road will begin at the intersection with Bryant Lane/Award Winning Way. The two lanes in the westbound direction will end at the intersection with Bryant Lane/Award Winning Way. A 270-foot taper to the east will merge the two lanes into one past this intersection to the west. This project is still under design review but was incorporated into the study analyses in the projected 2025 conditions.

Figure 2 shows the existing lane configurations of the intersections examined in the study, the traffic count locations, and the current traffic signage in the study area. The traffic signage shown in Figure 2 only includes warning and regulatory signage near the development site. The pages following Figure 2 give a further overview of the site study area with photographs.



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

NOT TO SCALE

NORTH

FIGURE 2

The Village at Hardin Valley

Traffic Count Locations, Traffic Signage & Existing Lane Configurations

PHOTO EXHIBITS

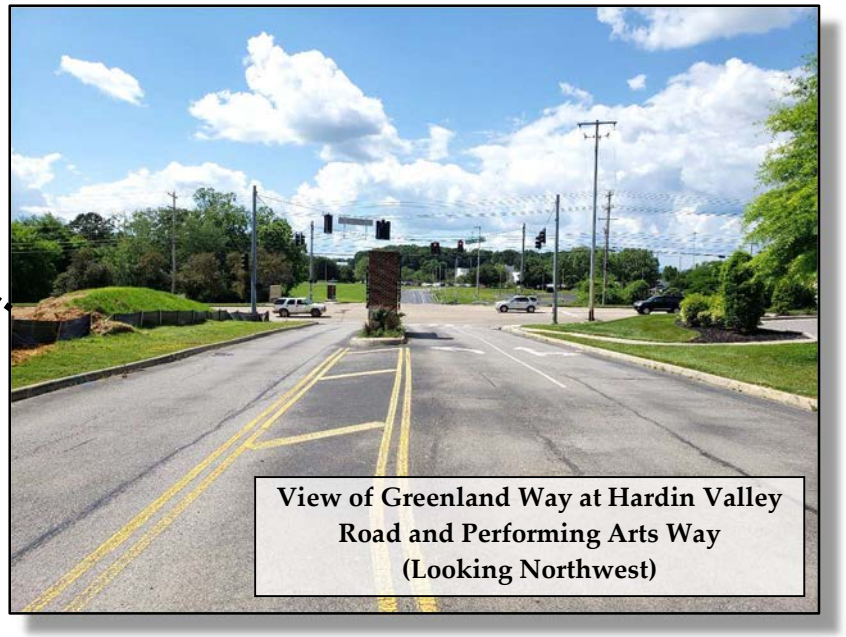
Proposed Development Site

Aerial View of Proposed Development Site (Looking Southeast)

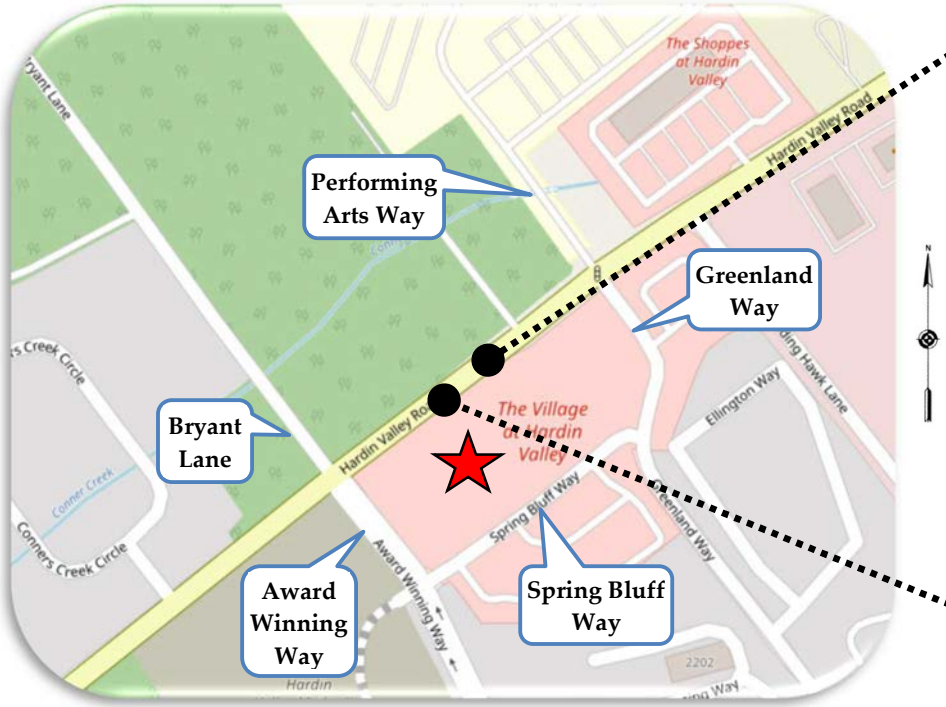
Aerial View of Proposed Development Site (Looking Northeast)

Intersection of Hardin Valley Road at Performing Arts Way and Greenland Way

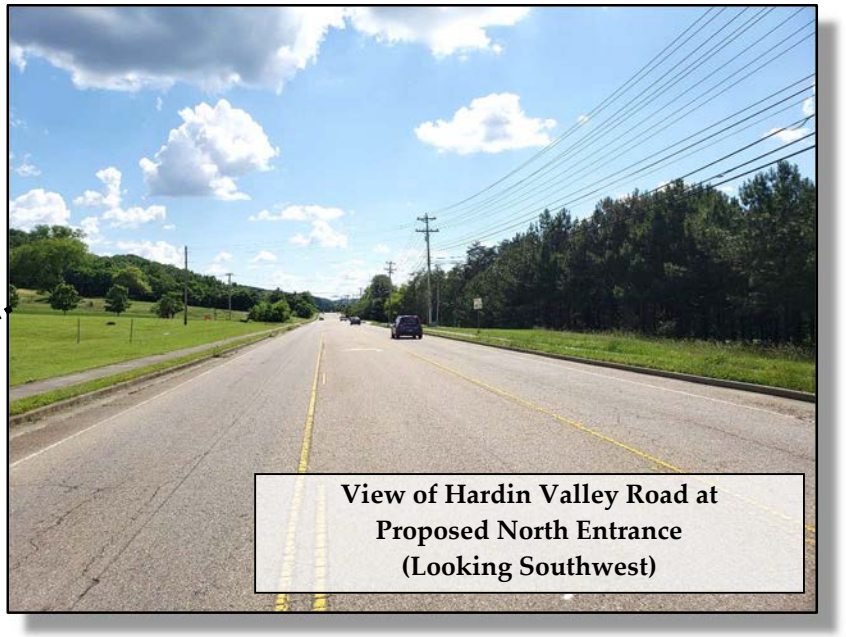
View of Hardin Valley Road at Performing Arts Way and Greenland Way (Looking Southwest)



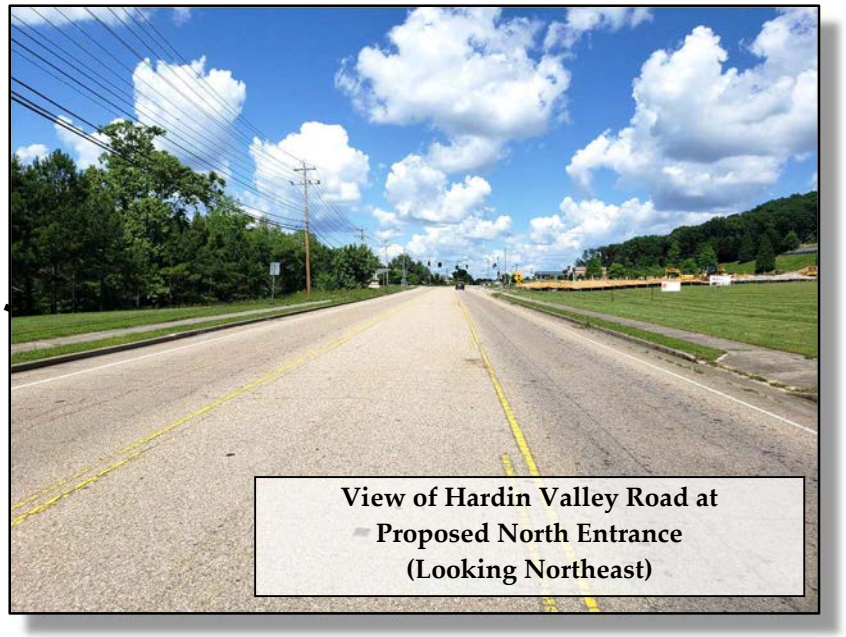
View of Greenland Way at Hardin Valley Road and Performing Arts Way (Looking Northwest)



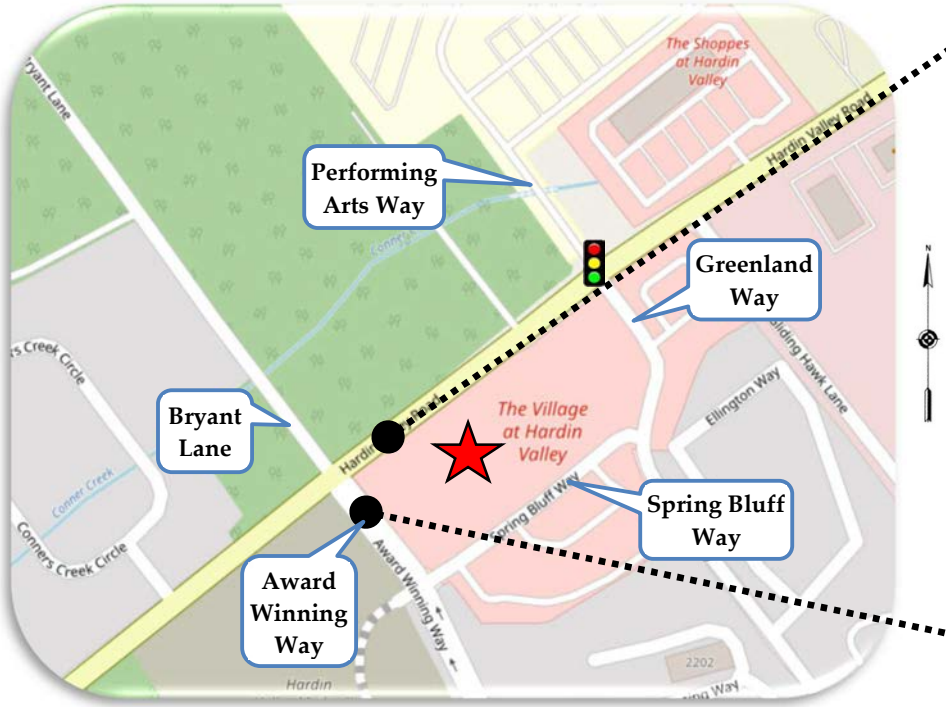
Hardin Valley Road at Proposed North Entrance



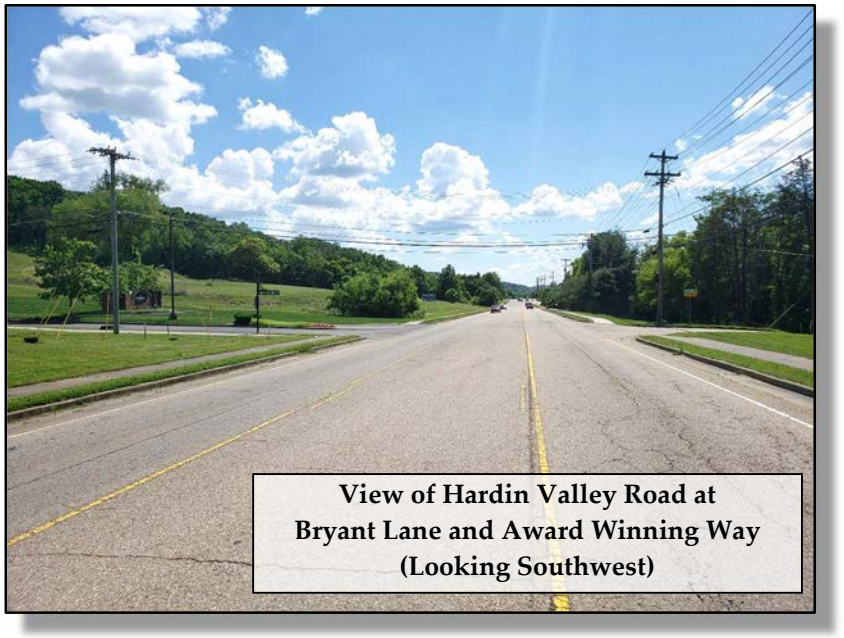
View of Hardin Valley Road at Proposed North Entrance (Looking Southwest)



View of Hardin Valley Road at Proposed North Entrance (Looking Northeast)

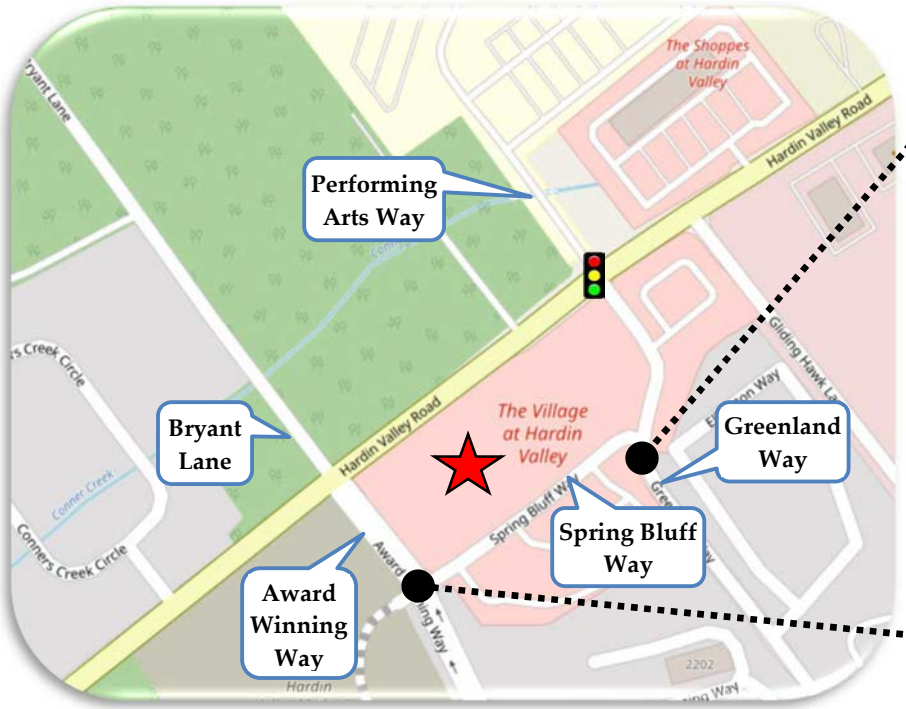


Intersection of Hardin Valley Road at Bryant Lane and Award Winning Way

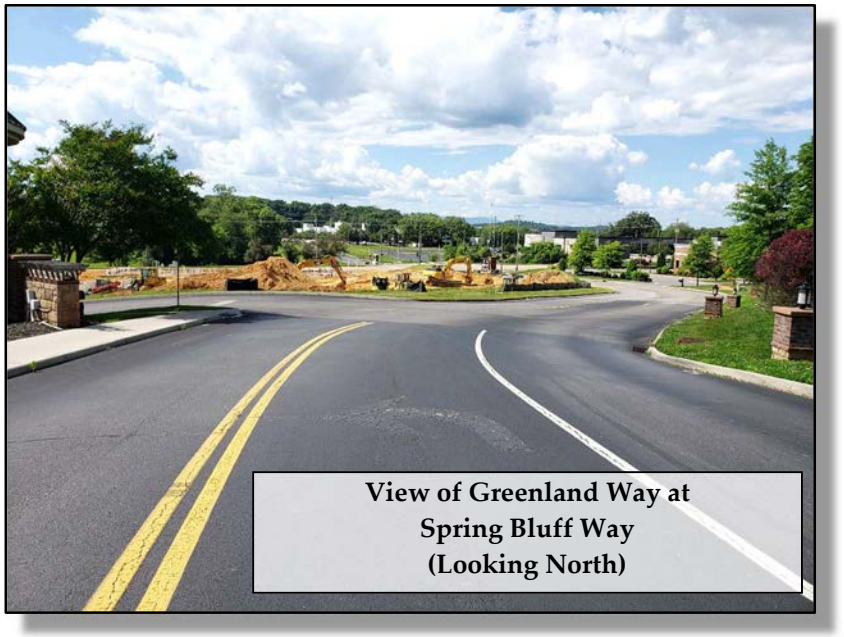


View of Hardin Valley Road at Bryant Lane and Award Winning Way (Looking Southwest)

View of Award Winning Way at Hardin Valley Road and Bryant Lane (Looking Northwest)



Spring Bluff Way



View of Greenland Way at Spring Bluff Way (Looking North)

View of Spring Bluff Way at Award Winning Way (Looking Northeast)

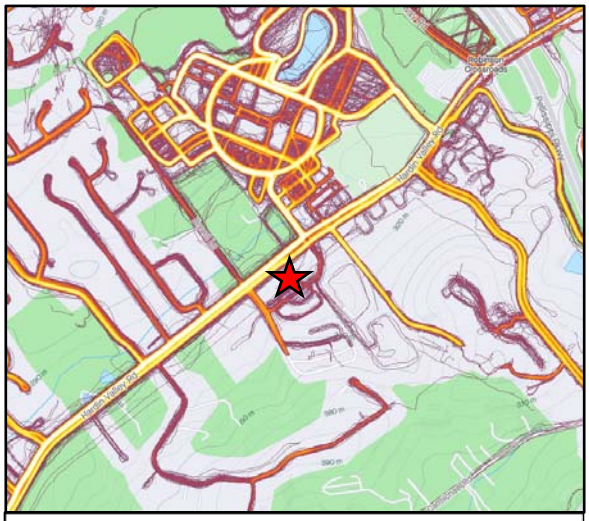
- **EXISTING TRANSPORTATION VOLUMES PER MODE**:

One annual vehicular traffic count location is near the study area, and the Tennessee Department of Transportation (TDOT) conducts this count. The count location data is the following and can be viewed with further details in Appendix A:

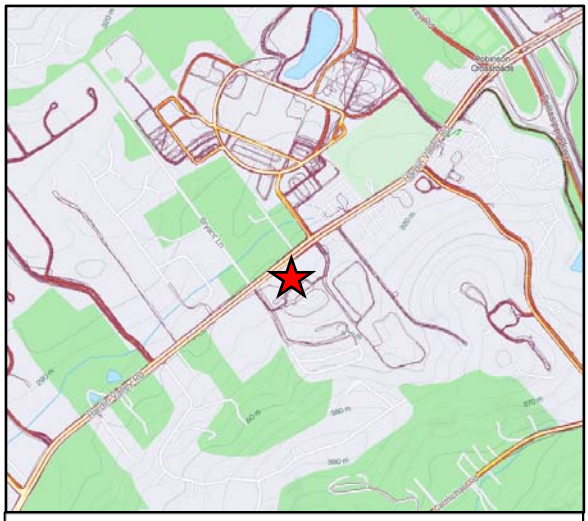
- Existing vehicular roadway traffic:
  - TDOT reported an Average Daily Traffic (ADT) on Hardin Valley Road, west of Pellissippi Parkway and east of the proposed development site, at 19,435 vehicles per day in 2023. From 2013 to 2023, this count station has indicated a 2.2% average annual traffic growth rate.

- Existing bicycle and pedestrian volumes:
  The average daily pedestrian and bicycle traffic along Hardin Valley Road and the other studied adjacent roads is unknown. Nonetheless, with sidewalks on both sides of Hardin Valley Road, this corridor was observed to have a fair amount of pedestrian and bicyclist activity during the traffic counts. During the 8-hour traffic count for this study, a total of eight bicyclists and 51 pedestrians were observed traveling eastbound and westbound on Hardin Valley Road. In the afternoon, many pedestrians were joggers of high school age.

  An online website, strava.com, provides "heat" maps detailing routes taken by pedestrians, joggers, and bicyclists. The provided heat maps show the last two years of data, are updated monthly, and are gathered from individuals allowing their smart devices to track and compile their routes (millions of users). The activities in the maps are shown on the roads with color intensities with darker colors signifying higher activity. The Strava heat maps show some bicycle activity along Hardin Valley Road and on the nearby roads of Award Winning Way, Greenland Way, and Performing Arts Way. However, quite a bit of pedestrian activity is shown along all the roads adjacent to the development site, particularly on Hardin Valley Road, where sidewalks are provided on both sides.



Strava Heat Map for Pedestrian and Joggers

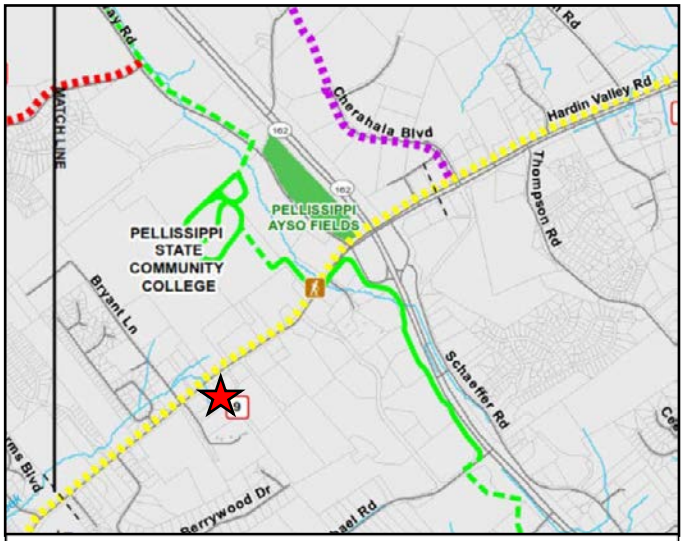


Strava Heat Map for Bicyclists

- **PEDESTRIAN AND BICYCLE FACILITIES**:

Bicycle lanes are unavailable on Hardin Valley Road or on any of the streets adjacent to the proposed development site. The closest bicycle facilities are half a mile away to the northeast at Pellissippi State Community College on the Pellissippi Parkway Greenway. The Pellissippi Parkway Greenway runs from Pellissippi State Community College south to Carmichael Road and parallels Pellissippi Parkway to the west. The greenway is paved and is approximately one mile in length.

Knox County completed a Greenway Corridor Study in 2020. This study evaluated potential alignments for greenways throughout Knox County. The study identified and evaluated one of the corridors, Beaver Creek West. This corridor would run from Melton Hill Park in Hardin Valley to Interstate 75 in Powell. One of the preferred routes for this corridor is shown along Hardin Valley Road in front of the proposed development site on the north side of Hardin Valley Road. As shown in the image from the greenway study, the

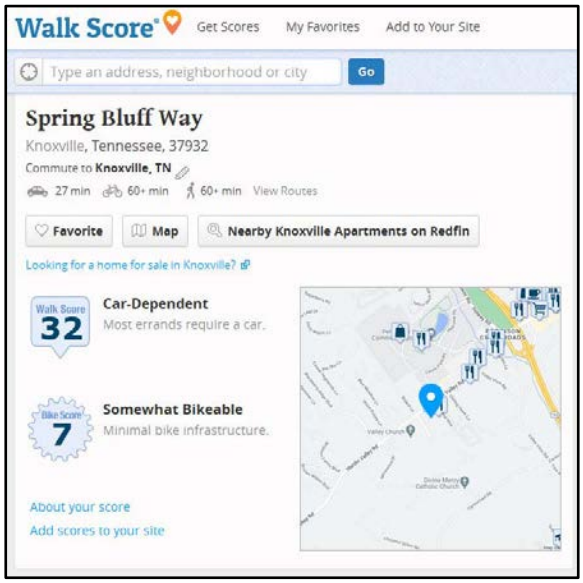


Knox County Greenway Corridor Study (2020)
Beaver Creek West Greenway
Potential Routes

yellow dashed lines are the preferred route, the red dashed line is the alternate route, and the purple line is a proposed connector route. The construction of The Village at Hardin Valley is not expected to impact this preferred route if and when it is constructed in the future.

- **WALK SCORE**:

A private company offers a website at walkscore.com that grades and gives scores to locations within the United States based on "walkability", "bikeability", and transit availability based on a patented system. According to the website, the numerical values assigned for the Walk Score and the Bike Score are based on the distance to the closest amenity in various relevant categories (businesses, schools, parks, etc.) and are graded from 0 to 100.



Appendix B shows maps and other information for the Walk, Transit, and Bike Score at the development property at Spring Bluff Way. The project site location is graded with a Walk Score of 32. This Walk Score indicates that the site is car-dependent and that most trips require a vehicle to travel to and from the development property. The site is not given a Transit Score since public transportation is unavailable at the development site. The site has a Bike Score of 7, indicating minimal bike infrastructure but somewhat bikeable. These scores indicate that the development site has some potential for generating alternate transportation modes to and from the site.

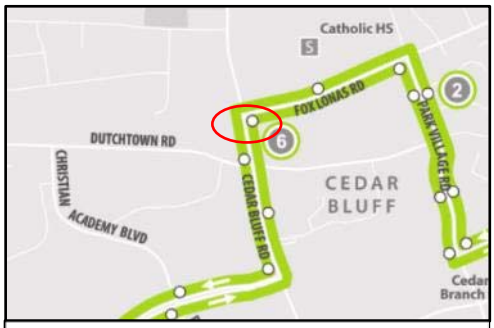
Overall, it is assumed that some pedestrian and bicycle traffic in the surrounding area will likely occur to and from the proposed The Village at Hardin Valley Road. It is suspected that most of these non-vehicular trips would occur to and from the nearby apartments and businesses. Ultimately, the new development is not expected to generate measurable bicycle or pedestrian trips that would significantly reduce vehicle trips. Thus, these potential vehicle trip reductions are ignored for the study analyses.

- **TRANSIT SERVICES**:

The City of Knoxville has a network of public transit opportunities offered by Knoxville Area

Transit (KAT). Bus service is not available near the development site. The overall KAT bus system map is provided in Appendix C.

The closest public transit bus service is 5.4 miles to the east at the corner of North Cedar Bluff Road and Fox Lonas Road and is Route 16, "Cedar Bluff". It operates on weekdays and Saturdays, and this route map is included in Appendix C. Since the COVID-19 pandemic, KAT had to reduce its service schedule due to workforce shortages. These changes took place on August 29th, 2022, and the reduced schedule for this route is also included in Appendix C. However, KAT increased services on April 8, 2024, for some routes on Sundays and evenings, but this did not include Route 16. Other transit services in the area include the East Tennessee Human Resource Agency (ETHRA) and the Community Action Committee (CAC), which provides transportation services when requested.

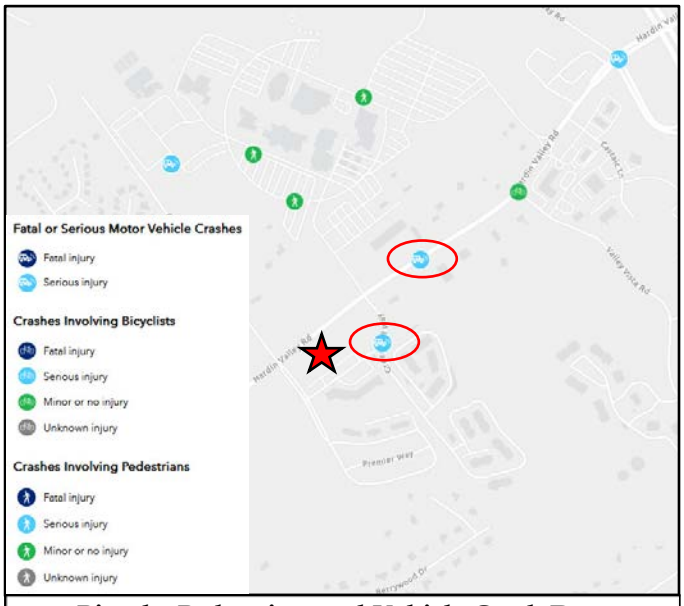


KAT Route 16, "Cedar Bluff"

Since the distance to the nearest public bus service is several miles away, with limited sidewalks or bike lanes available to access the bus stop without using a private vehicle, the proposed development is not expected to have any reduced vehicle trips due to public transit usage.

- **CRASH DATA**:

The Knoxville TPO provides a website that lists bicycle, pedestrian, and vehicle severe or fatal crashes from October 2016 to September 2021. The data shows that two of these incidents occurred near the development site during that time period. The closest incident occurred on Greenland Way on July 24th, 2019, and involved a motor vehicle with a serious injury. No data is given as to the cause of the crash. The next nearest incident occurred on July 6th, 2019, and involved a motor vehicle with a serious injury, and no data is given as to the cause of the crash.



Bicycle, Pedestrian, and Vehicle Crash Data in Study Area

PROJECT DESCRIPTION

- **LOCATION AND SITE PLAN:**

Hardin Valley Road at the Location of the Proposed North Entrance for the Development Property (Looking Northwest)

The proposed plan layout with a 15,560 ft² strip retail plaza and a 4,000 ft² coffee/donut shop is provided by Urban Engineering, Inc. and is shown in Figure 3. The design proposes three entrances for the development: the main entrance at Hardin Valley Road to the north and two secondary entrances to the southeast and southwest at Spring Bluff Way.

The North Entrance on Hardin Valley Road is proposed to have full access for all movements except for exiting left turns towards the west. The North Entrance for the proposed development will tie into Hardin Valley Road, 537 feet west of the signalized intersection and 267 feet east of the unsignalized intersection with Award Winning Way and Bryant Lane (centerline to centerline). The secondary entrances on Spring Bluff Way will be approximately 200 feet west and east of Greenland Way and Award Winning Way, respectively. The Chick-fil-A restaurant under construction will be provided sole external road access via the Southeast Entrance, shown as part of The Village at Hardin Valley. Chick-fil-A will not have direct external road access to Hardin Valley Road or Greenland Way. However, restaurant patrons will be able to enter and exit at any of the three proposed entrances for The Village at Hardin Valley due to the interconnected parking lots and aisleways that will be provided.

The site plan in Figure 3 shows one building for The Village at Hardin Valley. The building will include several individual units, allowing for a mix of retail shops and the coffee/donut shop. The building will be one-story in height and will include a drive-through lane for the coffee/donut shop at the rear of the site. The drive-through lane will be accompanied with a narrow, 3-foot raised barrier to direct drive-through traffic flow and separate it from the two-way traffic in the adjacent parking lot aisleway. The drive-through pick-up window will be located on the east end of the building, with the drive-through lane for the shop having a counter-clockwise direction. The drive-thru lane will have a slip lane at the east end of the building at the drive-through pick-

up window. The order board will be located near the southeast corner of the building. It is expected that any vehicle queues from the drive-thru will extend along the southern side of the building and, in worst-case situations, will be able to stack around the western end of the building. With the proposed layout, it is not expected that there will be any conflicts with the heavy traffic movements and vehicle queues to and from the Chick-fil-A restaurant. Guide signs will be provided internally to notify vehicular customers of the coffee/donut shop where to enter the drive-thru lane. Coffee/donut shop customers entering from the North Entrance will be directed towards the southwest of the building. Customers from the Southwest Entrance will be able to enter the drive-thru via the opening in the concrete raised barrier, or if the queue is substantial enough, they will be required to travel around the building in a counter-clockwise direction. Similarly, internal guide signs will notify customers from the Southeast Entrance to travel around the building in a counter-clockwise direction to enter the drive-thru lane.

The internal site design shows 187 parking spaces, including six ADA-accessible parking spaces. The standard parking spaces will be 17.5 feet x 9 feet. Two trash dumpsters will be located on the south corners of the property. Sidewalks and concrete areas will be provided in front of the building.

The schedule for completing this new commercial development depends on construction timelines. This project is also contingent on permitting, design, and other regulatory approvals. The Village at Hardin Valley is expected to be built within a short timeframe to coincide closely with the opening of the Chick-fil-A restaurant. Based on this forecast, this study assumed that the total construction build-out of both developments with full occupancy and operations would occur by the end of next year (2025).

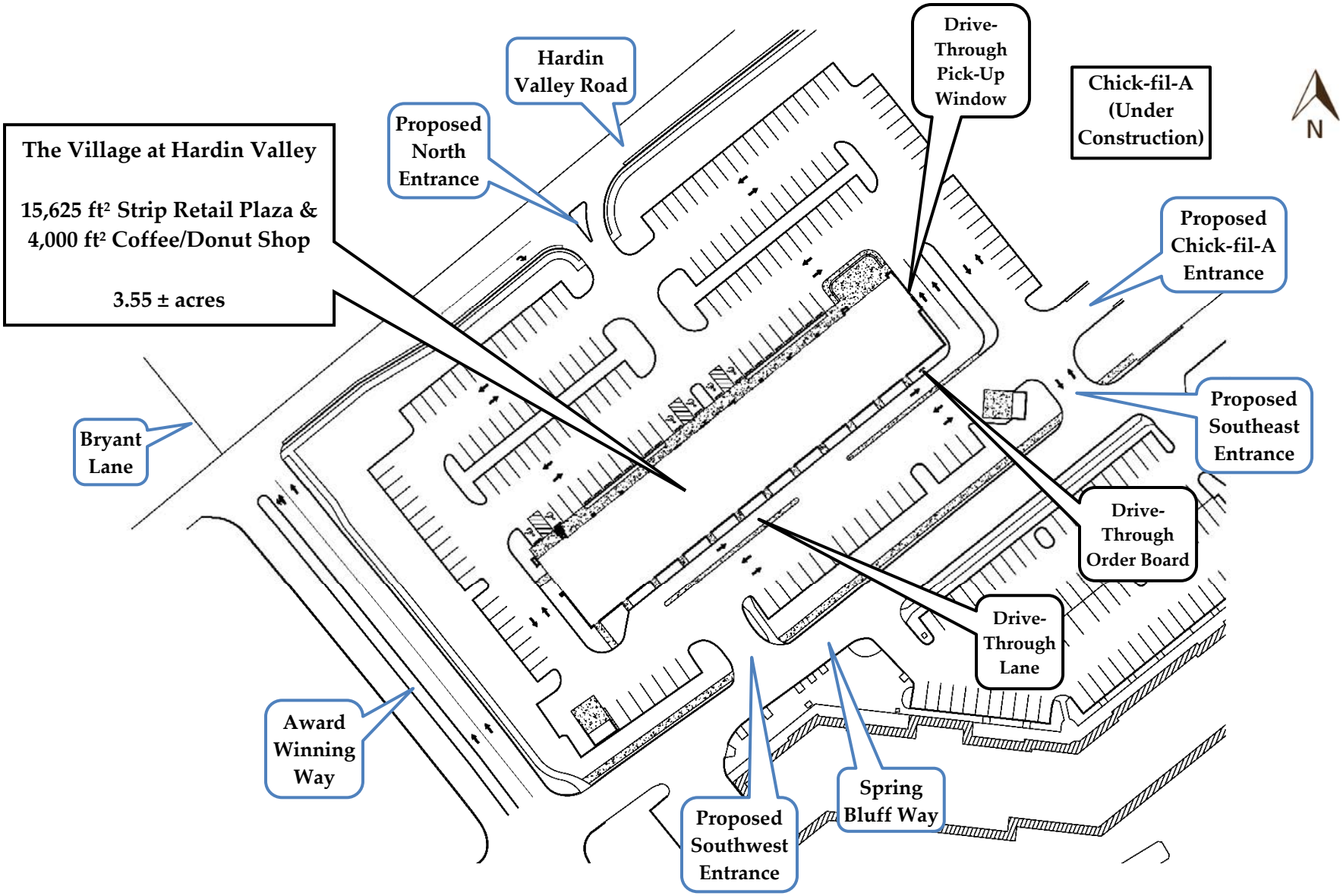


Figure 3
Proposed Plan Layout
The Village at Hardin Valley

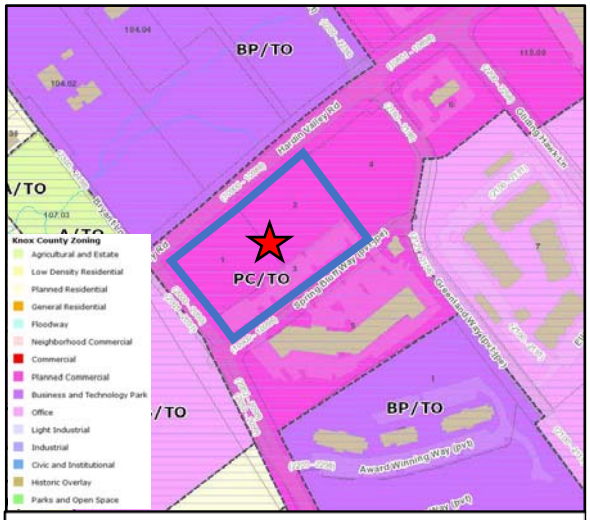
Not to Scale

- **PROPOSED USES AND ZONING REQUIREMENTS:**

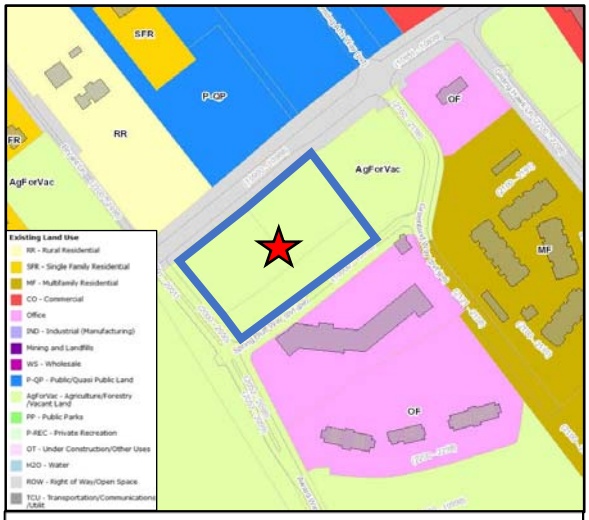
The three existing parcels comprising The Village at Hardin Valley property are in Knox County and are zoned as Planned Commercial (PC). Uses permitted in the Planned Commercial (PC) zone include a variety of developments and in general, include office and commercial services. All the properties in this area along Hardin Valley Road are overlaid with a Technology (TO) zone. According to the Knoxville/Knox County Planning website, the Technology (TO) overlay zone is described as a means to "encourage technology and related land uses while preserving forested ridges, rolling hills, and broad valleys. The zoning is fairly flexible and allows most types of office and light industry, with limits on retail development". This overlay designation and the PC zoning were not changed for the proposed development. The most recently published online KGIS zoning map is provided in Appendix D. The existing adjacent surrounding zoning and land uses are the following:

- Hardin Valley Road binds the development site to the north and northwest. Across Hardin Valley Road, two parcels are zoned Business and Technology Park (BP), and they are occupied by single-family detached houses, with one owned by the State of Tennessee. The parcel to the northwest and across Hardin Valley Road has road access to Bryant Lane to the west. To the northeast, the other parcel across Hardin Valley Road has a shared private driveway to the south and will be approximately 320 feet northeast of the proposed North Entrance for The Village at Hardin Valley.
- One property is adjacent to the east-northeast and includes the parcel currently under construction for the Chick-fil-A restaurant. This property is zoned as Planned Commercial (PC) and will have external road access via the entrances provided for The Village at Hardin Valley. The Chick-fil-A restaurant will have two drive-through lanes, 62 interior seats, 20 exterior seats, and 72 parking spots.
- Spring Bluff Way binds the development to the south. On the other side of Spring Bluff Way, the parcel to the south is occupied by a large single building and parking areas for several businesses and King University. This property to the south is zoned as Planned Commercial (PC) and has access to Hardin Valley Road via Spring Bluff Way to Award Winning Way and Greenland Way to the west and east.
- Award Winning Way binds the development property to the west. Across Award Winning Way, one parcel is zoned as Office (OB) and is owned by Valley Church. This Church began grading operations for a new community center but currently has not progressed beyond installing a detention pond, erosion control features, and establishing a building pad. It is unknown when the community center will begin

building construction. Once completed, the community center will have singular road access via Award Winning Way and is not expected to have direct access to Hardin Valley Road to the north.



KGIS Existing Zoning Map



KGIS Existing Land Use Map

- **ON-SITE CIRCULATION:**

The internal road surfaces will be asphalt paved, designed, and constructed according to Knox County's regulations. The developer will maintain the parking areas and internal pavement in the development after construction, and it will remain privately owned. The drive-through lane will operate in a counter-clockwise direction, beginning at the rear of the site (south) and ending on the east side of the building where the drive-through window will be located.

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

Besides customer passenger vehicles, the internal pavement areas will provide access to service, delivery, maintenance, and fire protection/rescue vehicles. In particular, the site will be designed for delivery trucks. None of these non-passenger vehicle types should impact adjacent roadway operations other than when they occasionally enter and exit the development.

The development's internal pavement will accommodate the larger vehicle types and customers' standard passenger vehicles. The internal pavement areas will be designed and constructed to Knox County's specifications and are expected to be adequate for fire protection and rescue vehicles, trash collection trucks, single-unit delivery trucks, and delivery trucks.

ANALYSIS OF EXISTING AND PROJECTED CONDITIONS

- **EXISTING TRAFFIC CONDITIONS:**

This study conducted traffic counts at two intersections near the proposed development site on Thursday, May 2nd, 2024. An 8-hour traffic count was conducted at the unsignalized intersection of Hardin Valley Road at Bryant Lane and Award Winning Way, and an informal, brief traffic count was conducted at the unsignalized t-intersection of Award Winning Way at Spring Bluff Way only during the identified peak hours on Hardin Valley Road. Manual traffic counts were conducted to identify and tabulate the morning and afternoon peak period volumes and the travel directions near the proposed development site. Local public schools were in session when the traffic counts were conducted. The identified peak hours in the morning and afternoon were 7:30 – 8:30 a.m. and 4:45 – 5:45 p.m. The manual tabulated traffic counts can be reviewed in Figure 4a and Appendix E. Figure 4a also includes the volumes at the signalized intersection tabulated in 2023 for the Chick-fil-A traffic impact study conducted by TWM, Inc. The intersection counts from this study for Greenland Way at Spring Bluff Way are also included in Figure 4a. Some observations of the vehicular traffic at the intersections tabulated for this study include the following:

Hardin Valley Road at Bryant Lane and Award Winning Way

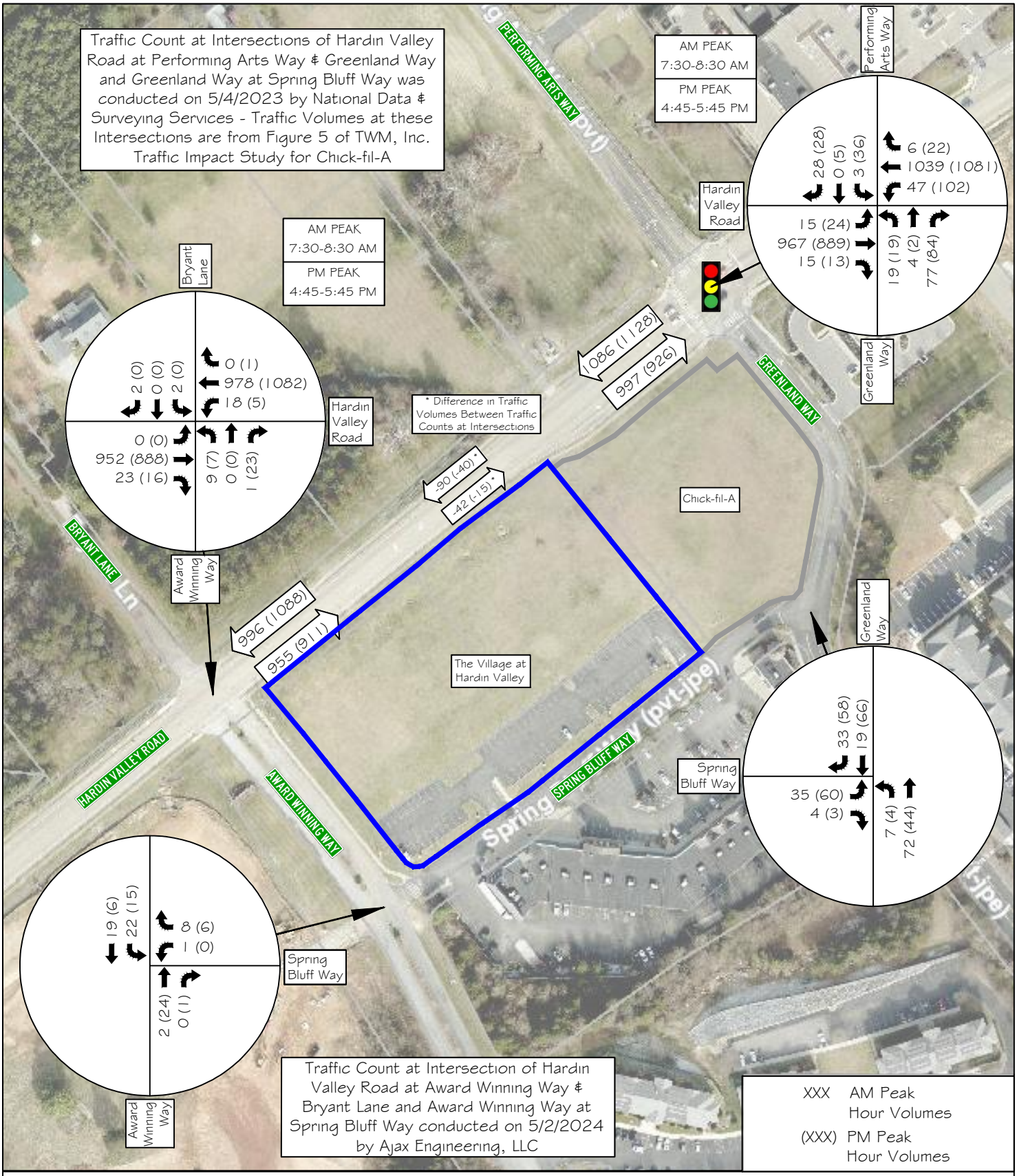
- In the morning, two pedestrians and no bicyclists were observed on the Hardin Valley Road sidewalks. In the mid-day hours, four pedestrians were observed. In the afternoon, eight bicyclists and 45 pedestrians traveled on the Hardin Valley Road sidewalks. One person on rollerblades was also observed on the sidewalk. Many of the pedestrians observed in the late afternoon occurred in groups. These groups were presumed to be students from the nearby Hardin Valley Academy High School's athletic teams based on appearance.
- Most vehicles at this intersection were passenger vehicles, but school buses, semi-tractor trailer trucks, single-unit trucks, trash collection, and construction vehicles with trailers were observed. Several dump trucks and concrete mixer trucks were also observed, with several dump trucks turning to and from the west on Award Winning Way, which were assumed to be associated with the construction of Chick-fil-A.
- In the peak times, substantial vehicle backups occurred for eastbound traffic on Hardin Valley Road from the adjacent signalized intersection. These backups were especially evident during the afternoon when the nearby Hardin Valley school students were released for the day, coinciding with many students leaving the Pellissippi State

Community College campus. At times, the vehicle backups on Hardin Valley Road extended to the west as far as could be visibly seen.

- Many motorists turning left from Award Winning Way to westbound Hardin Valley Road used the center TWLTL as a temporary refuge. These two-stage turns allowed motorists to cross the eastbound lane of Hardin Valley Road and wait in the center for an appropriate gap in traffic in the westbound flow.
- During the eastbound vehicle backups, many courteous drivers were observed allowing motorists to enter Hardin Valley Road from Award Winning Way.

Since the two traffic counts at the adjacent intersections on Hardin Valley Road were conducted a year apart, and to conserve resources, Knox County Engineering suggested that only the intersection of Hardin Valley Road at Bryant Lane and Award Winning Way be conducted for this study and that the volumes between the two intersections be adjusted accordingly to balance the incoming and outgoing eastbound and westbound traffic volumes on Hardin Valley Road. Initially, it was expected that the current traffic count would show higher volumes on Hardin Valley Road than the one conducted last year in 2023. However, the opposite was observed. Thus, the volumes newly tabulated at the intersection of Hardin Valley Road at Bryant Lane and Award Winning Way were adjusted upwards to match the higher volumes observed at the signalized intersection conducted in 2023 for the Chick-fil-A traffic impact study. This adjustment was accomplished by increasing the current tabulated volumes based on the proportionality of the individual movements at the intersections. Figure 4b reflects the adjusted intersection traffic volumes between the two intersections and balances and normalizes all the traffic volumes to the year 2023.

Note: the volumes presented in the study between the intersections of Hardin Valley Road at Performing Arts Way and Greenland Way and Greenland Way at Spring Bluff Way do not "balance" due to the presence of the bank entrance between the two. Likewise, the volumes between the two proposed entrances on Spring Bluff Way also do not "balance" due to the businesses located on the south side of Spring Bluff Way.



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

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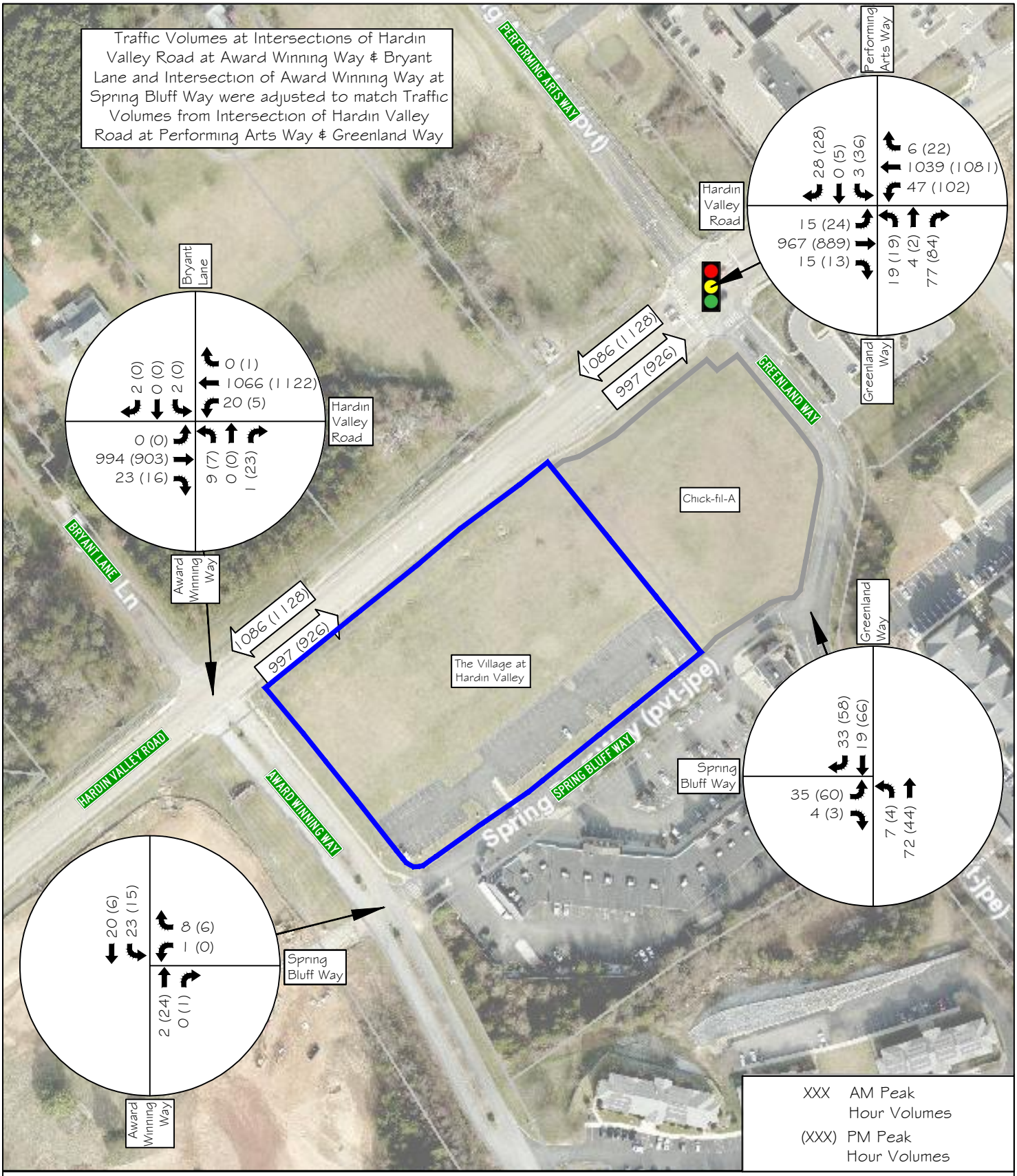
FIGURE 4a

The Village at Hardin Valley

Peak Hour Traffic Volumes - EXISTING TRAFFIC CONDITIONS (Unadjusted)



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

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FIGURE 4b

The Village at Hardin Valley

Peak Hour Traffic Volumes - EXISTING TRAFFIC CONDITIONS (Adjusted to 2023 Traffic Volumes)

Capacity analyses were undertaken to determine the Level of Service (LOS) for the 2023 intersection traffic volumes on Hardin Valley Road, as shown in Figure 4b. The capacity analyses were calculated following the Highway Capacity Manual (HCM) methods and utilizing Synchro Traffic Software (Version 11).

Methodology:

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

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

For unsignalized intersections, LOS is measured in terms of delay (in seconds). This measure is an attempt to quantify delay, including travel time, driver discomfort, and fuel consumption. For unsignalized intersections, the analysis assumes that the mainline thru and right-turn traffic does not stop and is not affected by the traffic on the minor side streets. Thus, the LOS for a two-way stop (or yield) controlled intersection is defined by

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

For signalized intersections, LOS is based on delay (in seconds) for various movements within the intersection and the overall operation of all the traffic entering the intersection. This delay measures driver discomfort, frustration, fuel consumption, and lost travel time and depends on traffic signal cycle lengths, lengths of green phases, and the quality of traffic progression. This control delay includes deceleration/acceleration delay, queue move-up time, and stopped delay time. For signalized intersections, in most instances, the upper limit of acceptable delay during peak hours is the LOS D/E boundary at 55 seconds. Table 3 lists the level of service criteria for signalized intersections.

TABLE 2
LEVEL OF SERVICE AND DELAY FOR UNSIGNALIZED INTERSECTIONS

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

Source: Highway Capacity Manual, 7th Edition

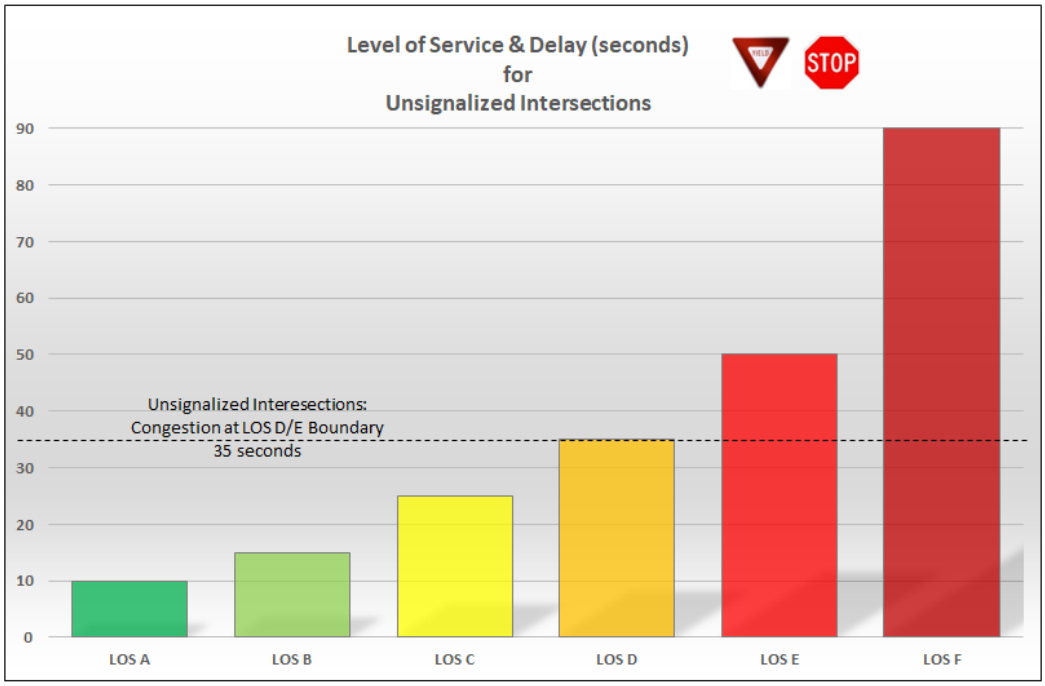
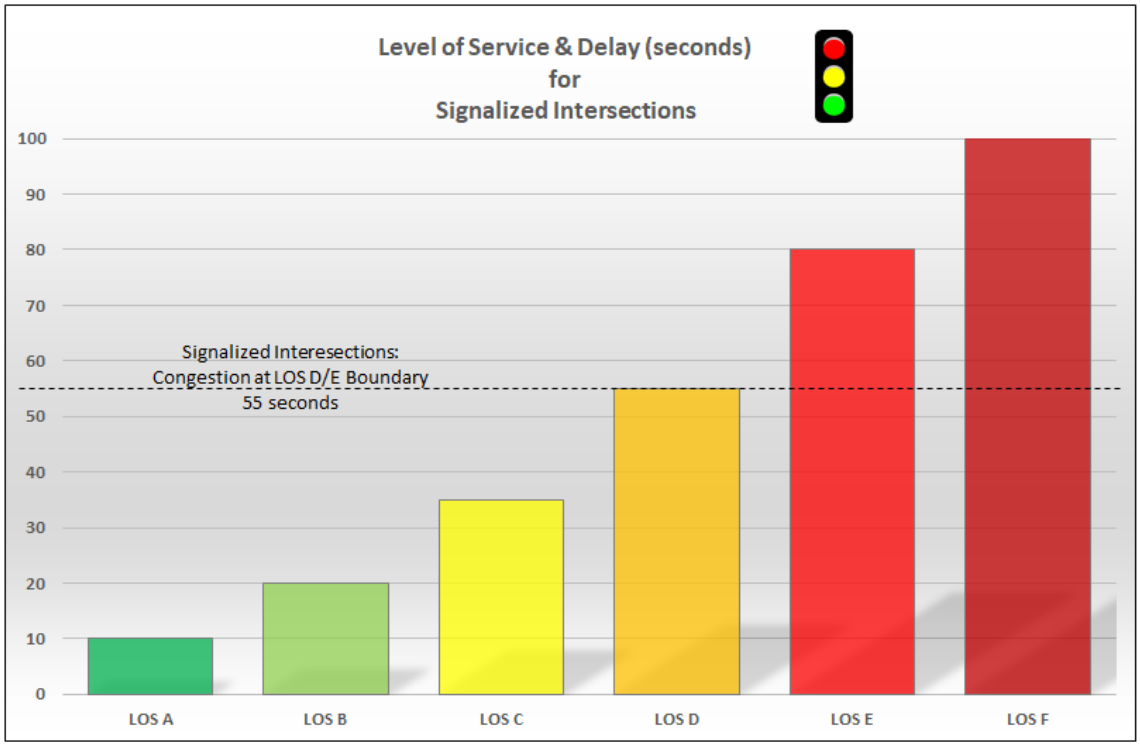


TABLE 3
LEVEL OF SERVICE AND DELAY FOR SIGNALIZED INTERSECTIONS

LEVEL OF SERVICE	DESCRIPTION	CONTROL DELAY (seconds/vehicle)
A	Operation with very low control delay. Progression is extremely favorable and most vehicles do not stop at all.	≤10.0
B	Generally good level of progression. More vehicles stop than with LOS A, causing higher levels of average delay.	> 10 - 20
C	Higher delays with individual cycle failures may begin at this level. Many vehicles may still pass through without stopping.	> 20 - 35
D	Approaching unstable flow. The influence of congestion becomes more noticeable. Many vehicles stop.	> 35 - 55
E	Considered the limit of acceptable delay. High delays indicated by poor progression, long cycle lengths, and high v/c ratios.	> 55 - 80
F	Unacceptable delay occurs. Progression is extremely poor with long cycle lengths and high v/c ratios.	>80

Source: Highway Capacity Manual, 7th Edition



Intersection capacity results from the "normalized" 2023 peak hour traffic volumes are shown in Table 4. The intersections in the table are shown with a LOS designation, delay (in seconds), and v/c ratio (volume/capacity) for the AM and PM peak hours. Appendix F includes the worksheets for these peak hour capacity analyses. The existing intersections along Spring Bluff Way were not included in the analyses for the 2023 conditions.

As shown in Table 4, the signalized intersection is calculated to operate with average LOS and reasonable vehicle delays in the 2023 conditions. The unsignalized intersection of Hardin Valley Road at Bryant Lane and Award Winning Way is calculated with good to average LOS and reasonable vehicle delays for the mainline approach. However, the northbound and southbound approaches operate with high vehicle delays due to the large conflicting volumes on Hardin Valley Road.

TABLE 4
2023 INTERSECTION CAPACITY ANALYSIS RESULTS -
EXISTING TRAFFIC CONDITIONS

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS [a]	DELAY [b] (seconds)	v/c [c]	LOS [a]	DELAY [b] (seconds)	v/c [c]
Hardin Valley Road (WB & EB) at Performing Arts Way (SB) and Greenland Way (NB)	Signalized	Eastbound	C	23.2		C	20.4	
		Westbound	B	18.5		B	19.5	
		Northbound	C	20.9		B	18.8	
		Southbound	A	7.8		C	30.4	
		Summary	C	20.5	0.88	C	20.2	0.86
Hardin Valley Road (WB & EB) at Bryant Lane (SB) and Award Winning Way (NB)	Unsignalized	Northbound Left/Thru	E	37.7	0.141	D	26.7	0.063
		Northbound Right	C	17.6	0.007	C	16.8	0.107
		Eastbound Left	A	0.0	-	A	0.0	-
		Westbound Left	B	11.0	0.040	B	10.1	0.007
		Southbound Left/Thru/Right	E	45.4	0.120	A	0.0	-

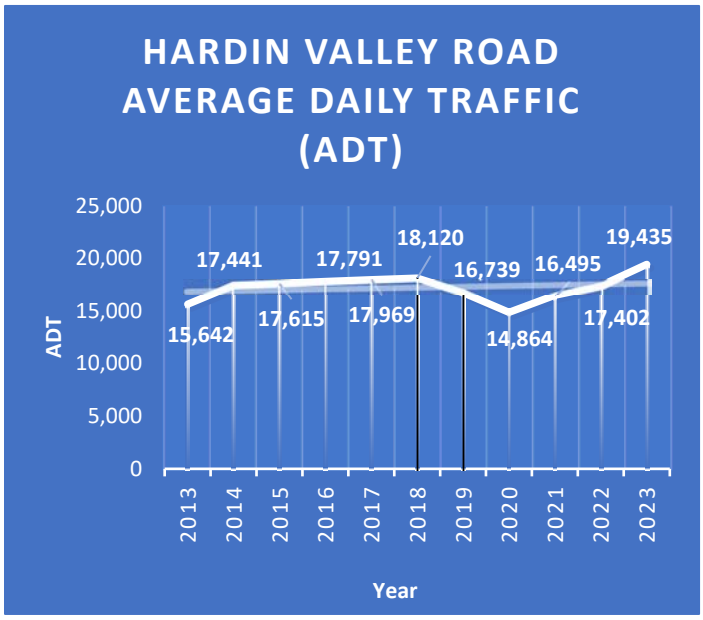
Note: All analyses were calculated in Synchro 11 software and reported with HCM 6th Edition methodology
[a] Level of Service , [b] Average Delay (sec/vehicle) , [c] Volume-to-Capacity Ratio

The signal timing used to analyze the Hardin Valley Road at Performing Arts Way and Greenland Way intersection was obtained from Knox County Engineering and is included in Appendix F. The traffic signal operates in an actuated-uncoordinated system. The signal timings were not changed or optimized for the existing analysis and were used as given.

- **PROJECTED TRAFFIC CONDITIONS WITHOUT THE PROJECT:**

Horizon year traffic conditions represent the projected traffic volumes in the study area without the proposed project being developed (no-build option). This proposed development's build-out and full occupancy are assumed to occur by 2025. While the Chick-fil-A restaurant will be operational before The Village at Hardin Valley, they are both analyzed together in the projected conditions in this study with a horizon year of 2025. While the Chick-fil-A restaurant was previously analyzed in a separate study, its trips are accounted for and included in the analysis for The Village at Hardin Valley due to its interconnection and sharing of entrances.

According to the nearby TDOT count station, vehicular traffic on Hardin Valley Road has grown moderately over the past ten years. The data in Appendix A shows that this road has experienced an annual growth of 2.2% over the past ten years. While the count station recorded a significant drop in volumes in 2020 due to the pandemic, it has since recorded traffic volumes in line with past growth.



For this study, an annual growth rate of +3% was used to calculate future growth on the studied intersections up to 2025 to account for potential traffic growth in the study area. This growth rate is the same assumption used in the Chick-fil-A restaurant's traffic impact study. The annual growth rate of 3% was applied to the existing 2023 intersection volumes to estimate the future volumes in the horizon year of 2025 without the potential development traffic.

Capacity analyses were undertaken to determine the projected LOS in 2025 without the projects at the intersections on Hardin Valley Road. The signal timings were not changed or optimized for the capacity analyses in the projected conditions without the project. While not requested in the Planning scope of work, results were also determined for the unsignalized intersection of Award Winning Way at Spring Bluff Way and Greenland Way at Spring Bluff Way. The results are shown in Table 5, and Appendix F includes the capacity analysis worksheets.

As expected, the results in Table 5 show moderately worse vehicle delays for all the signalized

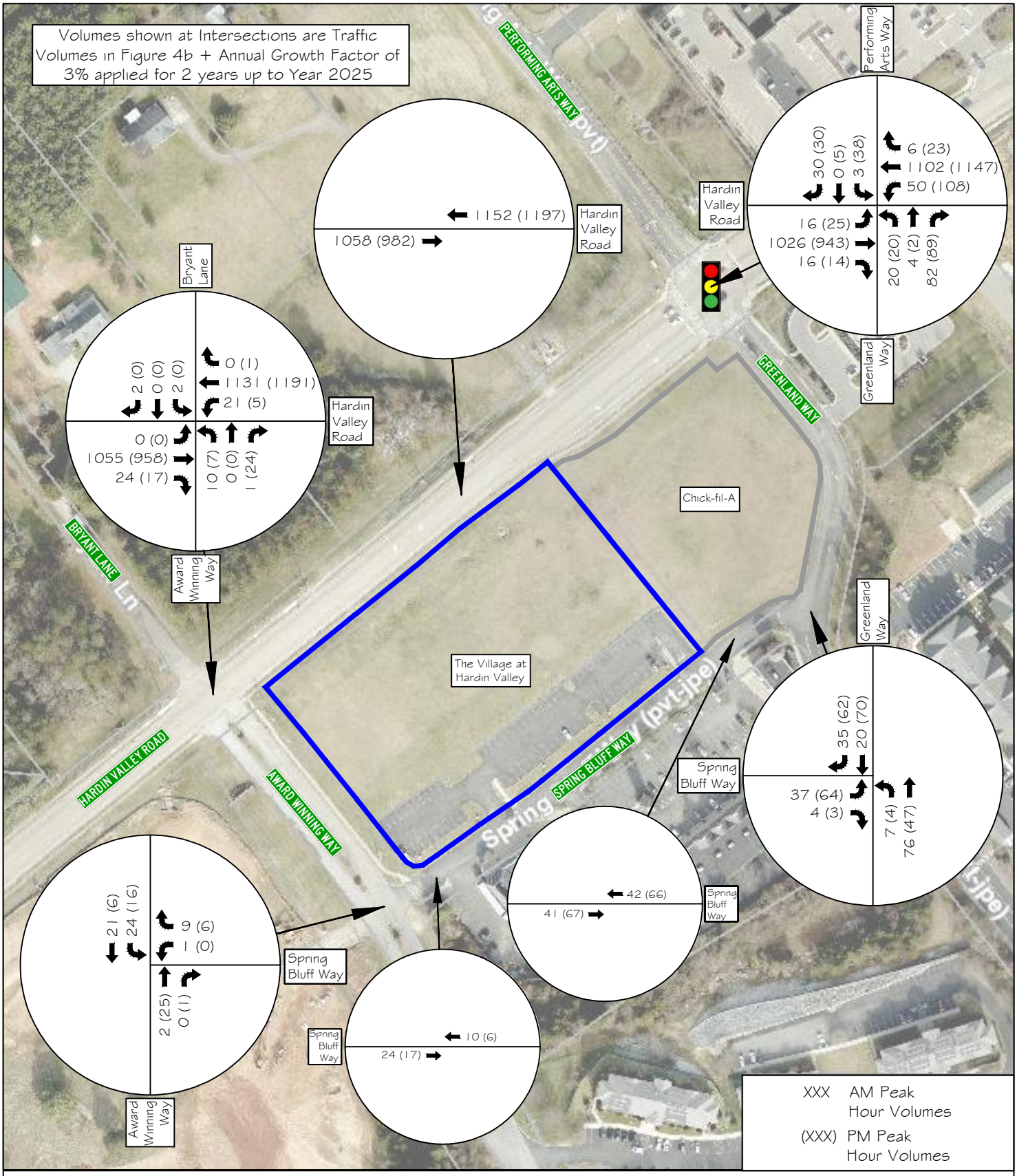
intersection approaches in the 2025 projected conditions without the developments' generated trips versus the 2023 conditions. However, these results for the traffic signal do not consider Knox County's proposed lane additions on Hardin Valley Road. The intersections at Spring Bluff Way are calculated with minimal vehicle delays. The results also show increased delays on the northbound and southbound approaches of Award Winning Way and Bryant Lane at Hardin Valley Road in the projected conditions.

TABLE 5
2025 INTERSECTION CAPACITY ANALYSIS RESULTS -
PROJECTED TRAFFIC CONDITIONS WITHOUT THE PROJECT

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS [a]	DELAY [b] (seconds)	v/c [c]	LOS [a]	DELAY [b] (seconds)	v/c [c]
Hardin Valley Road (WB & EB) at Performing Arts Way (SB) and Greenland Way (NB)	Signalized	Eastbound	C	29.3		C	23.8	
		Westbound	C	22.7		C	24.0	
		Northbound	C	20.8		B	18.6	
		Southbound	A	8.2		C	31.3	
		Summary	C	25.3	0.93	C	23.9	0.91
Hardin Valley Road (WB & EB) at Bryant Lane (SB) and Award Winning Way (NB)	Unsignalized	Northbound Left/Thru	E	42.8	0.174	D	28.9	0.069
		Northbound Right	C	18.7	0.008	C	17.9	0.120
		Eastbound Left	A	0.0	-	A	0.0	-
		Westbound Left	B	11.4	0.045	B	10.4	0.008
		Southbound Left/Thru/Right	F	51.7	0.136	A	0.0	-
Award Winning Way (SB & NB) at Spring Bluff Way (WB)	Unsignalized	Westbound Left/Right	A	8.6	0.021	A	8.5	0.012
		Southbound Left	A	7.3	0.023	A	7.4	0.024
Greenland Way (SB & NB) at Spring Bluff Way (EB)	Unsignalized	Northbound Left	A	7.4	0.007	A	7.5	0.003
		Eastbound Left/Right	B	10.1	0.089	B	10.2	0.111

Note: All analyses were calculated in Synchro 11 software and reported with HCM 6th Edition methodology
[a] Level of Service , [b] Average Delay (sec/vehicle) , [c] Volume-to-Capacity Ratio

Figure 5 shows the projected 2025 horizon year traffic volumes at the intersections without the projects during the AM and PM peak hours. This figure also introduces traffic volumes on Spring Bluff Way for accounting and informational purposes only.



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

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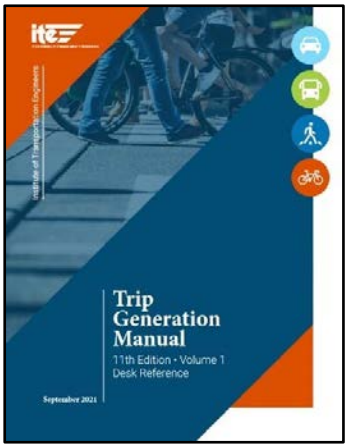
FIGURE 5

The Village at Hardin Valley

2025 Peak Hour Traffic Volumes - PROJECTED TRAFFIC CONDITIONS WITHOUT THE PROJECT

- **TRIP GENERATION:**



A generated trip is a single or one-direction vehicle movement entering or exiting the study site. The estimated amount of traffic the proposed commercial development will generate was calculated based on rates and equations provided by the Trip Generation Manual, 11th Edition, an Institute of Transportation Engineers (ITE) publication. The Trip Generation Manual is the most popular resource for determining trip generation rates when transportation impact studies are produced. The Manual includes data for various land uses and provides a method for calculating generated trips based on development variables such as the number of dwelling units and building square footage. The data and calculations from ITE for the proposed land uses in this study are shown in Appendix G.

For this development, the closest land uses represented in the Trip Generation Manual for The Village at Hardin Valley are Land Use #822, Strip Retail Plaza (<40k ft²) and Land Use #937, Coffee/Donut Shop with Drive-Through Window.

The description for Land Use #822 is "a strip retail plaza is an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit." For Land Use #822, the gross leasable area in the ITE data is set at less than 40,000 square feet, and the The Village at Hardin Valley will be below this limit with 15,625 ft². The description for Land Use #937 is "any coffee and donut restaurant that has a drive-through window as well as a walk-in entrance area at which a patron can purchase and consume items." This description exactly represents the proposed 4,000 ft² coffee/donut shop at The Village at Hardin Valley.

As shown in Table 6a, the total weekday traffic trips generated by The Village at Hardin Valley could be expected to be 3,022 vehicles. The AM peak hour is calculated with 381 vehicle trips, and the PM peak hour with 262 vehicles.

TABLE 6a
TRIP GENERATION FOR THE VILLAGE AT HARDIN VALLEY
15,625 ft² Strip Retail Plaza (<40k) and 4,000 ft² Coffee/Donut Shop with Drive-Through Window

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	TRIPS GENERATED IN AM PEAK HOUR			TRIPS GENERATED IN PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#822	Strip Retail Plaza (<40k)	15.6	888	60%	40%		50%	50%	
				23	15	38	53	53	106
#937	Coffee/Donut Shop with Drive-Through Window	4.0	2,134	51%	49%		50%	50%	
				175	168	343	78	78	156
Total New Volume Site Trips			**3,022**	**198**	**183**	**381**	**131**	**131**	**262**

Data from ITE Trip Generation Manual, 11th Edition
Land Use #822 calculated by using Fitted Curve Equations, Land Use #937 calculated by using Average Rates

Furthermore, as a broad category, generated trips can be categorized further as primary (new), pass-by, and internal trips.

> *Methodology:*
> Not all trips generated by a development are primary (new) trips. For some land uses, the trips generated by a proposed development are captured from the adjacent street system and do not generate an entirely "new" trip. A pass-by trip is an intermediate stop between an existing origin and a destination without a route diversion. These types of trips are known as pass-by trips and are assumed to already occur on the adjacent street. Considerable research has examined these trip types, and national and local rates have been published. Research has shown that fast food restaurants and larger convenience markets can experience pass-by trip rates of 75% and greater.
>
> Other trips a development generates that should not be added to the adjacent street or intersections are internal. These trips are self-explanatory and can be categorized for developments with complementary land uses such as retail, residential, office, hotel, and restaurants. For example, a customer of a retail shop may decide to eat at the adjacent restaurant in the same development. Similarly, nearby residents within a reasonable distance may walk and eat at an adjacent restaurant instead of using a vehicle for travel.

The Knoxville/Knox County Metropolitan Planning Commission (the previous name for Knoxville/Knox County Planning) produced a memo on March 12th, 1997, to establish the agreed

upon pass-by trip rates for several land uses in Knox County for transportation studies. These land uses included fast-food restaurants, supermarkets, convenience markets, and shopping centers. In Knox County's memo, shopping centers, which would characterize the retail portion of The Village at Hardin Valley development, are allowed a pass-by rate of up to 30% of gross leasable area (GLA). For this study, a pass-by rate of 10% was used for a conservative analysis. Knox County allows up to 25% pass-by rates for fast-food restaurants. A 25% rate was used for the proposed coffee/donut shop, and this rate was also used in the previous traffic impact study for the proposed Chick-fil-A restaurant by TWM, Inc.

Furthermore, since The Village at Hardin Valley and the Chick-fil-A restaurant will be interconnected, have complementary land uses, share road entrances, and thus, are highly likely to share some patrons, a minor amount of internal trip reductions were calculated and used in the analyses. These internal trips were calculated using OTISS (Online Traffic Impact Study Software) Pro 5.0 software. OTISS Pro 5.0 is an online add-on tool for the ITE Trip Generation website application. The internal trip reductions calculated in the OTISS software are based on NCHRP Report 684 methods.

Thus, considering internal trips, pass-by trips, and the overall trip generation volumes for both developments, it is estimated that 252 vehicles will enter and 228 will exit, for a total of 480 new trips during the AM peak hour in 2025. Similarly, it is estimated that 183 vehicles will enter and 164 will exit, for a total of 347 new trips during the PM peak hour in the year 2025. The difference between the total external and new primary trips will be the pass-by trips comprised of vehicles already traveling by the development properties. A summary of these trips is provided in Table 6b. This table shows the breakdown of trips for each land use and the totals.

The trips for the Chick-fil-A restaurant shown in Table 6b were obtained from the previous traffic impact study by TWM, Inc. These calculated generated trips in the previous TWM, Inc. study were derived from a local traffic count at a similar, nearby Chick-fil-A restaurant in the West Knoxville area and did not use ITE trip generation data.

TABLE 6b
TRIP GENERATION FOR THE VILLAGE AT HARDIN VALLEY & CHICK-FIL-A RESTAURANT WITH INTERNAL AND PASS-BY VEHICLE TRIPS

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	TRIPS GENERATED IN AM PEAK HOUR			TRIPS GENERATED IN PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#822	Strip Retail Plaza (<40k)	15.6	888	60%	40%		50%	50%	
				23	15	38	53	53	106
#937	Coffee/Donut Shop with Drive-Through Window	4.0	2,134	51%	49%		50%	50%	
				175	168	343	78	78	156
#934 *	Chick-fil-A Restaurant	5.4	-	53%	47%		56%	44%	
				137	122	259	115	90	205
	Total Vehicle Trips Before Reductions			**335**	**305**	**640**	**246**	**221**	**467**
	Internal Vehicle Trips - Strip Retail Center			-2	-2	-4	-4	-7	-11
	Internal Vehicle Trips - Coffee/Donut Shop			-2	-1	-3	-7	-2	-9
	Internal Vehicle Trips - Chick-fil-A Restaurant			0	-1	-1	0	-2	-2
	Internal Vehicle Trips - Total			-4	-4	-8	-11	-11	-22
	External Vehicle Trips - Strip Retail Center			21	13	34	49	46	95
	External Vehicle Trips - Coffee/Donut Shop			173	167	340	71	76	147
	External Vehicle Trips - Chick-fil-A Restaurant			137	121	258	115	88	203
	External Vehicle Trips - Total			**331**	**301**	**632**	**235**	**210**	**445**
	Pass-by Vehicle Trips - Strip Retail Center			-2	-1	-3	-5	-5	-10
	Pass-by Vehicle Trips - Coffee/Donut Shop			-43	-42	-85	-18	-19	-37
	Pass-by Vehicle Trips - Chick-fil-A Restaurant			-34	-30	-64	-29	-22	-51
	Pass-by Vehicle Trips - Total			-79	-73	-152	-52	-46	-98
	Total New Vehicle Trips - Strip Retail Center			19	12	31	44	41	85
	Total New Vehicle Trips - Coffee/Donut Shop			130	125	255	53	57	110
	Total New Vehicle Trips - Chick-fil-A Restaurant			103	91	194	86	66	152
	Total New Vehicle Trips			**252**	**228**	**480**	**183**	**164**	**347**

* Local study trip generation results by TWM, Inc.
Internal Vehicle Trips calculated according to NCHRP Report 684 methods in the OTISS Pro 5.0 software
Pass-by Trip Assumed Percentages: 10% for Land Use #822 and 25% for Land Uses #937 and #934 in the AM and PM Peak Hour

- **TRIP DISTRIBUTION AND ASSIGNMENT:**

The projected trip distribution and assignment for The Village at Hardin Valley and the Chick-fil-A restaurant are based on the existing traffic volumes, observed directional vehicle flows, and engineering judgment.

For the primary generated trips for The Village at Hardin Valley, nearly all were assumed to be comprised of traffic to and from the east and west via Hardin Valley Road, with some of the trips to and from the Pellissippi State Community College campus via Performing Arts Way, the apartment residents on Greenland Way and the businesses on Award Winning Way. The North Entrance at Hardin Valley Road was assumed to be where most pass-by trips would occur for the retail development and the coffee/donut shop in The Village at Hardin Valley. Pass-by trips for Chick-fil-A were derived from the previous traffic impact study by TWM, Inc. and inputted as closely as possible.

With many land uses, potential directions of movement, and several entrances, the inbound and outbound share of trips was assumed and broken down to estimate the overall distribution at the three entrances, as shown in Table 7. The percentages shown in the table take into account the assumptions presented in the previous study for the Chick-fil-A restaurant, the distribution of existing traffic, and the internal layout of The Village at Hardin Valley and the Chick-fil-A restaurant. The assumed distribution also considers the impact of the additional entrances provided by The Village at Hardin Valley and

TABLE 7
THE VILLAGE AT HARDIN VALLEY
ASSUMED DRIVEWAY DISTRIBUTION

ENTRANCE	LAND USE DESCRIPTION	AM PEAK HOUR		PM PEAK HOUR	
		INBOUND	OUTBOUND	INBOUND	OUTBOUND
North Entrance	Strip Retail Plaza (<40k)	90%	30%	85%	50%
	Coffee/Donut Shop with Drive-Through Window	85%	30%	80%	50%
	Chick-fil-A	20%	5%	10%	15%
Southwest Entrance	Strip Retail Plaza (<40k)	4%	29%	4%	20%
	Coffee/Donut Shop with Drive-Through Window	3%	6%	3%	6%
	Chick-fil-A	0%	5%	0%	5%
Southeast Entrance	Strip Retail Plaza (<40k)	6%	41%	11%	30%
	Coffee/Donut Shop with Drive-Through Window	12%	64%	17%	44%
	Chick-fil-A	80%	90%	90%	80%

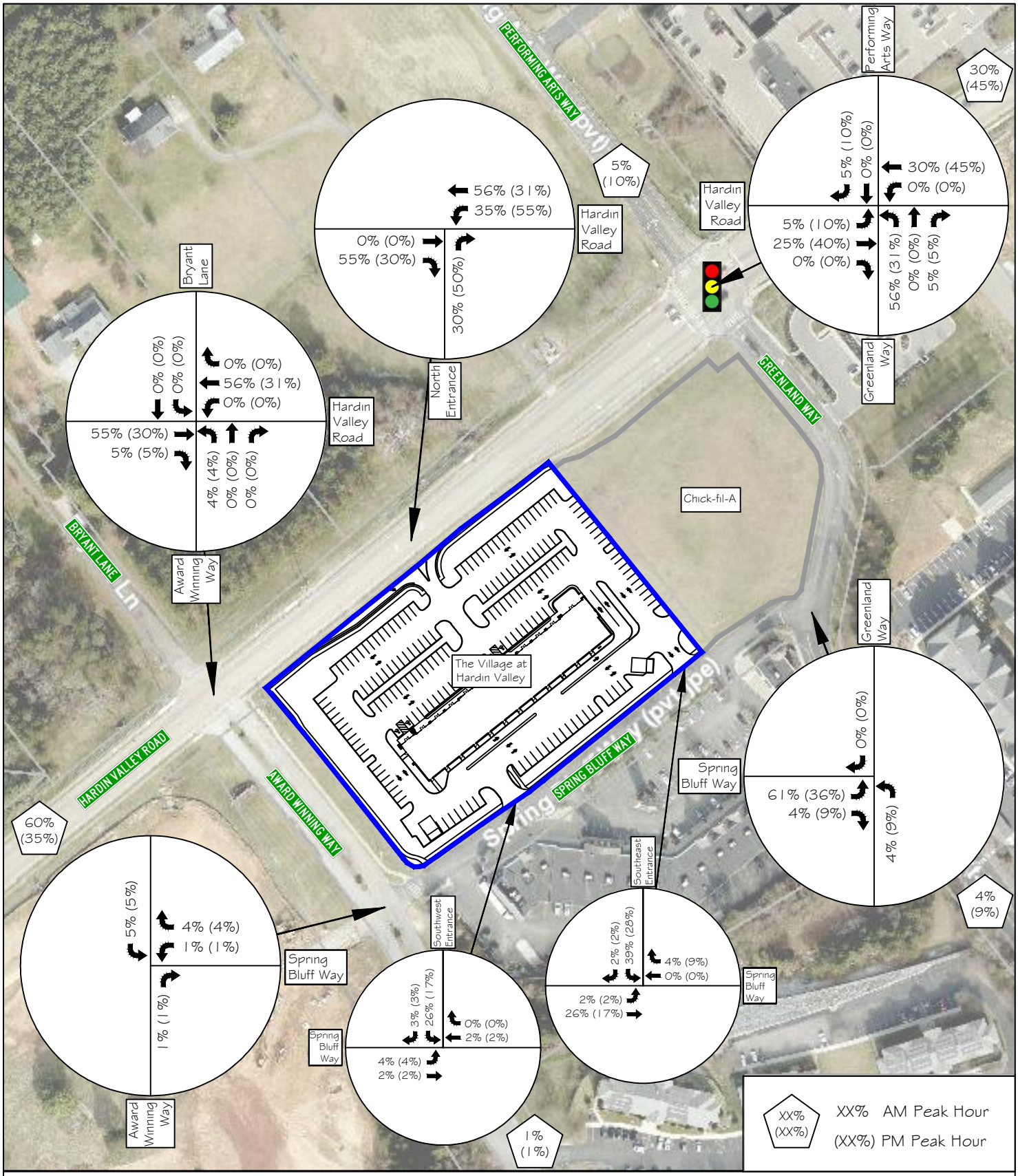
its effect on the customers' travel patterns for Chick-fil-A, which were not accounted for in the previous study.

The assumed directional trip distributions for the three land uses at the three entrances are shown in Figures 6a – 6c. Figure 6a shows the trip distribution for the strip retail plaza. Figures 6b and 6c include the assumed trip distribution for the coffee/donut shop and the Chick-fil-A restaurant, respectively.

The percentages shown in Figures 6a – 6c only pertain to the trips generated by The Village at Hardin Valley and the Chick-fil-A restaurant calculated from the data shown in Tables 6a and 6b. Since the development will have three entrances with several directions of movement, the OTISS Pro 5.0 software was used to calculate the trip distribution and assignment volumes at the entrances based on the assumed percentages. The spreadsheets produced by this online software are presented in Appendix H.

Figures 7a – 7c show the traffic assignment of the computed trips generated by the developments based on the assumed distribution of trips shown in Figures 6a – 6c. Figure 7a shows the assignment of the total new generated trips, Figure 7b shows the assigned pass-by trips at the entrances, and Figure 7c shows the total external trips generated by The Village at Hardin Valley and the Chick-fil-A restaurant. Since the pass-by trips are "captured" by the developments from the adjacent roads, the pass-by trips shown in Figure 7b entering the developments are subsequently removed (subtracted) from the adjacent thru movements.

Note: The intersection percentages and volumes shown in the figures at the proposed Southwest and Southeast Entrances at Spring Bluff Way are shown for accounting and informational purposes only.



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

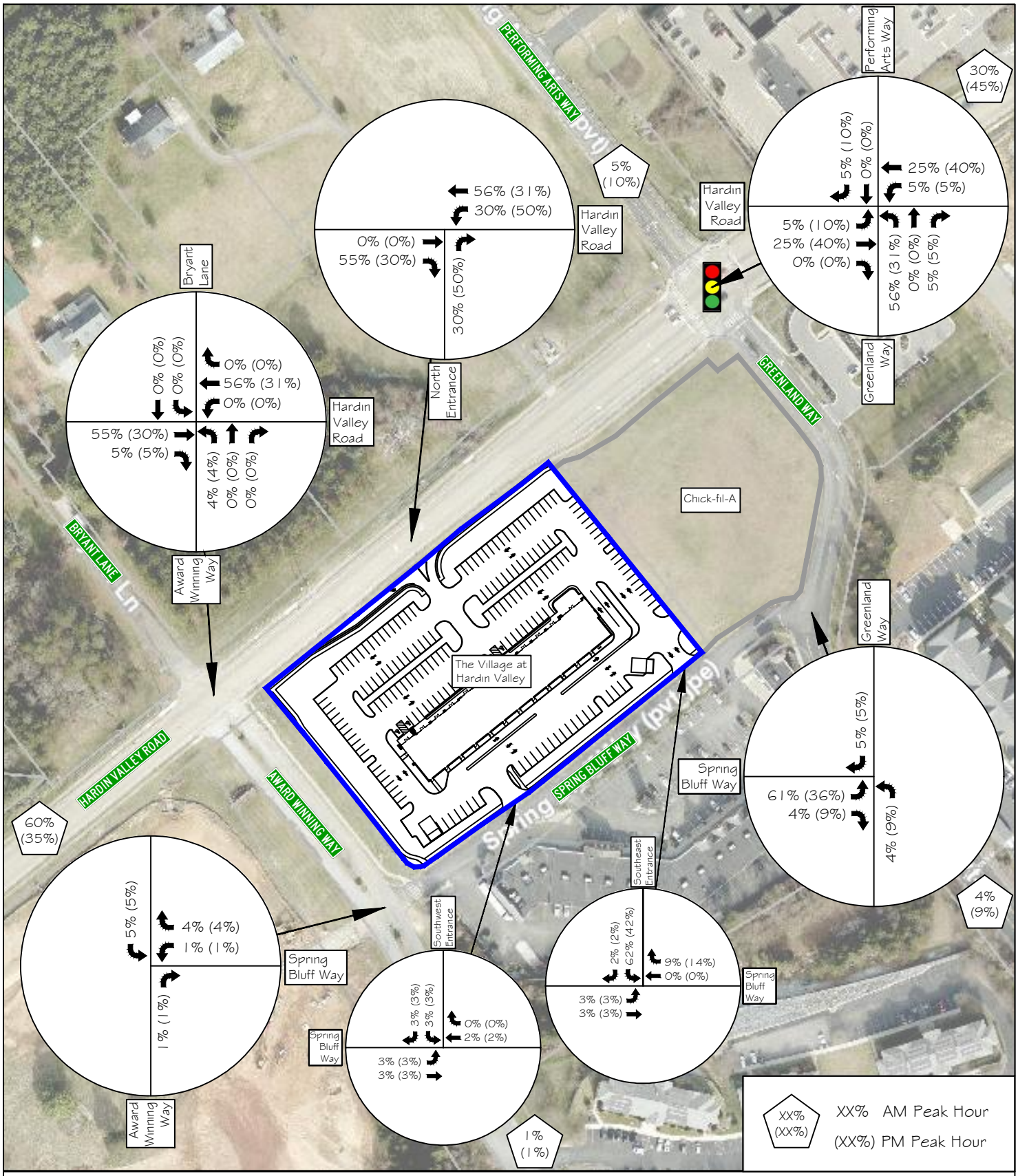
NOT TO SCALE

NORTH

FIGURE 6a

The Village at Hardin Valley

Directional Distribution of Generated Traffic during AM and PM Peak Hour for Strip Retail Plaza



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11812 Black Road
Knoxville, TN 37932
Phone: (865) 556-0042
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FIGURE 6b

The Village at Hardin Valley

Directional Distribution of Generated Traffic during AM and PM Peak Hour for Coffee/Donut Shop with Drive-Through

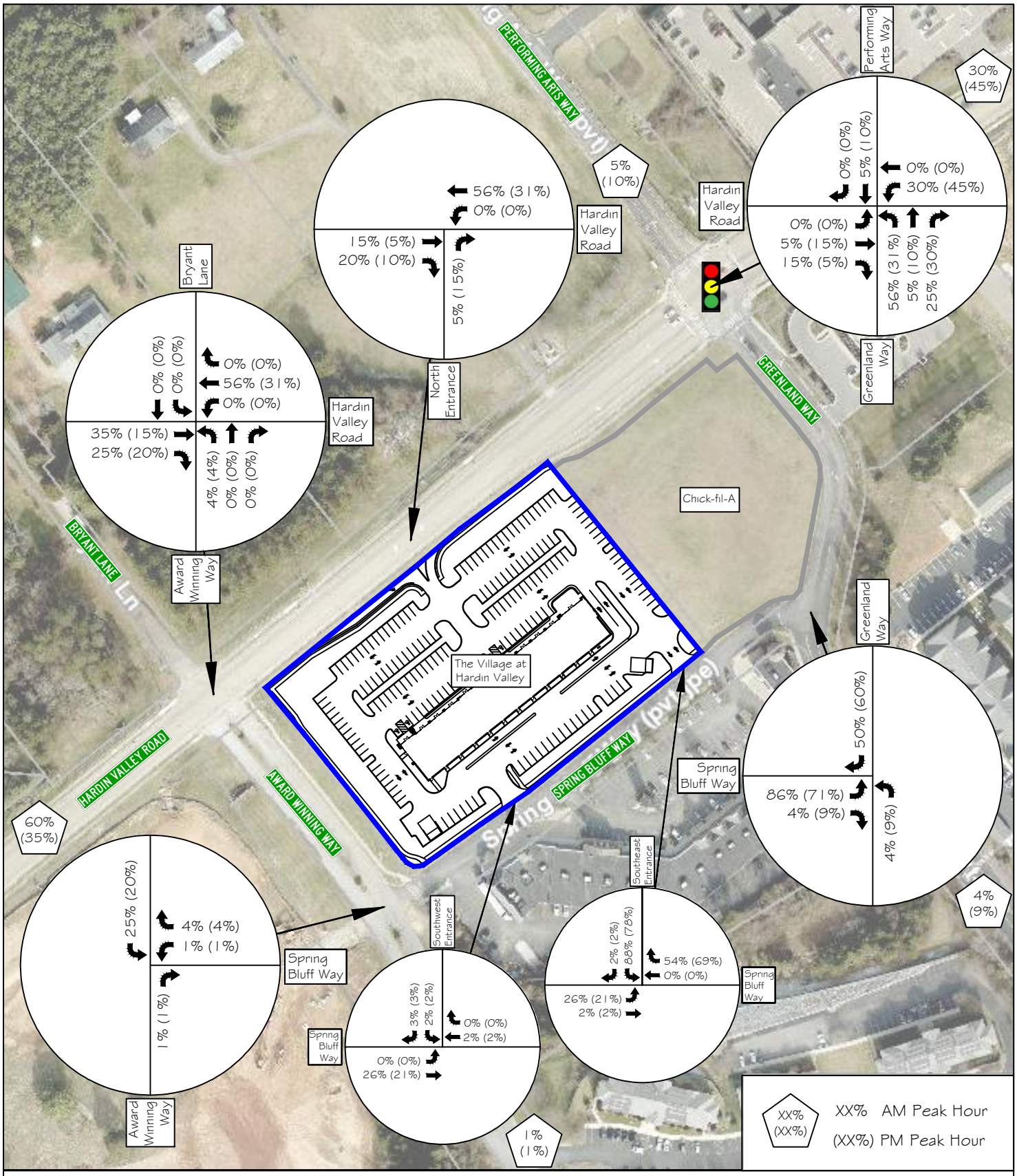

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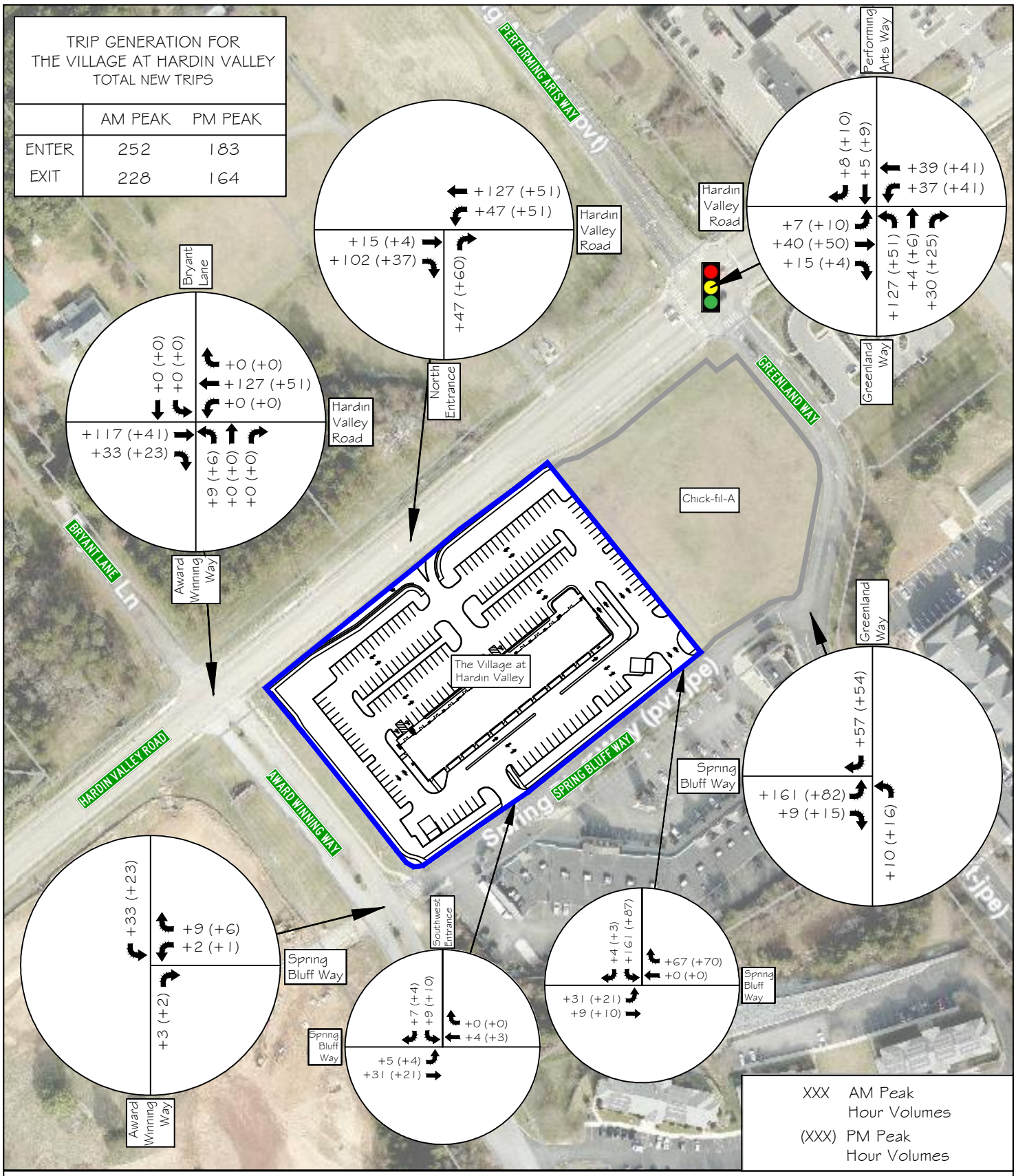
FIGURE 6c

The Village at Hardin Valley

Directional Distribution of Generated Traffic during AM and PM Peak Hour for Chick-fil-A Restaurant



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11812 Black Road
Knoxville, TN 37932
Phone: (865) 556-0042
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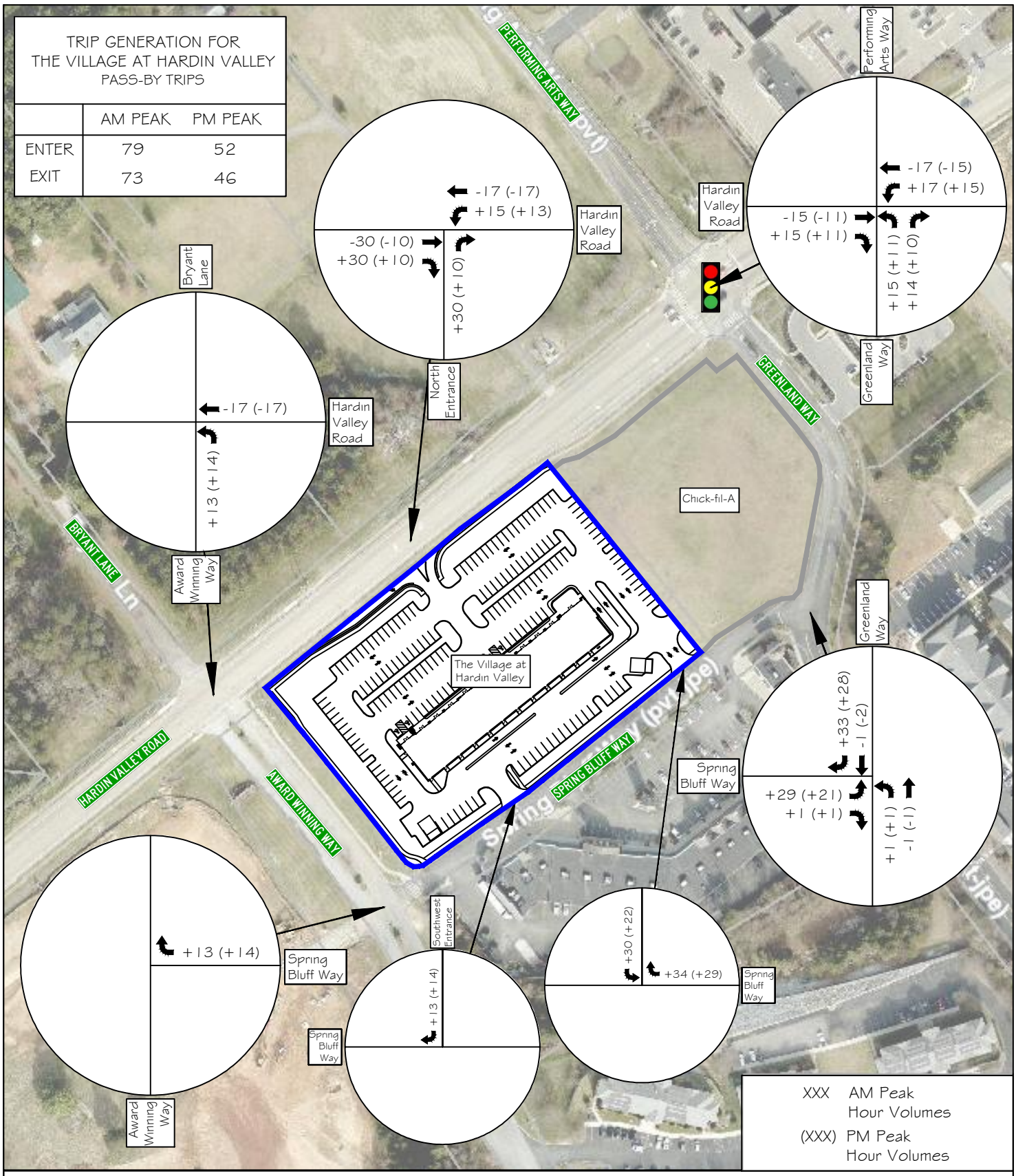
FIGURE 7a

The Village at Hardin Valley

Traffic Assignment of Generated Trips during AM and PM Peak Hour - Total New Trips



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Phone: (865) 556-0042
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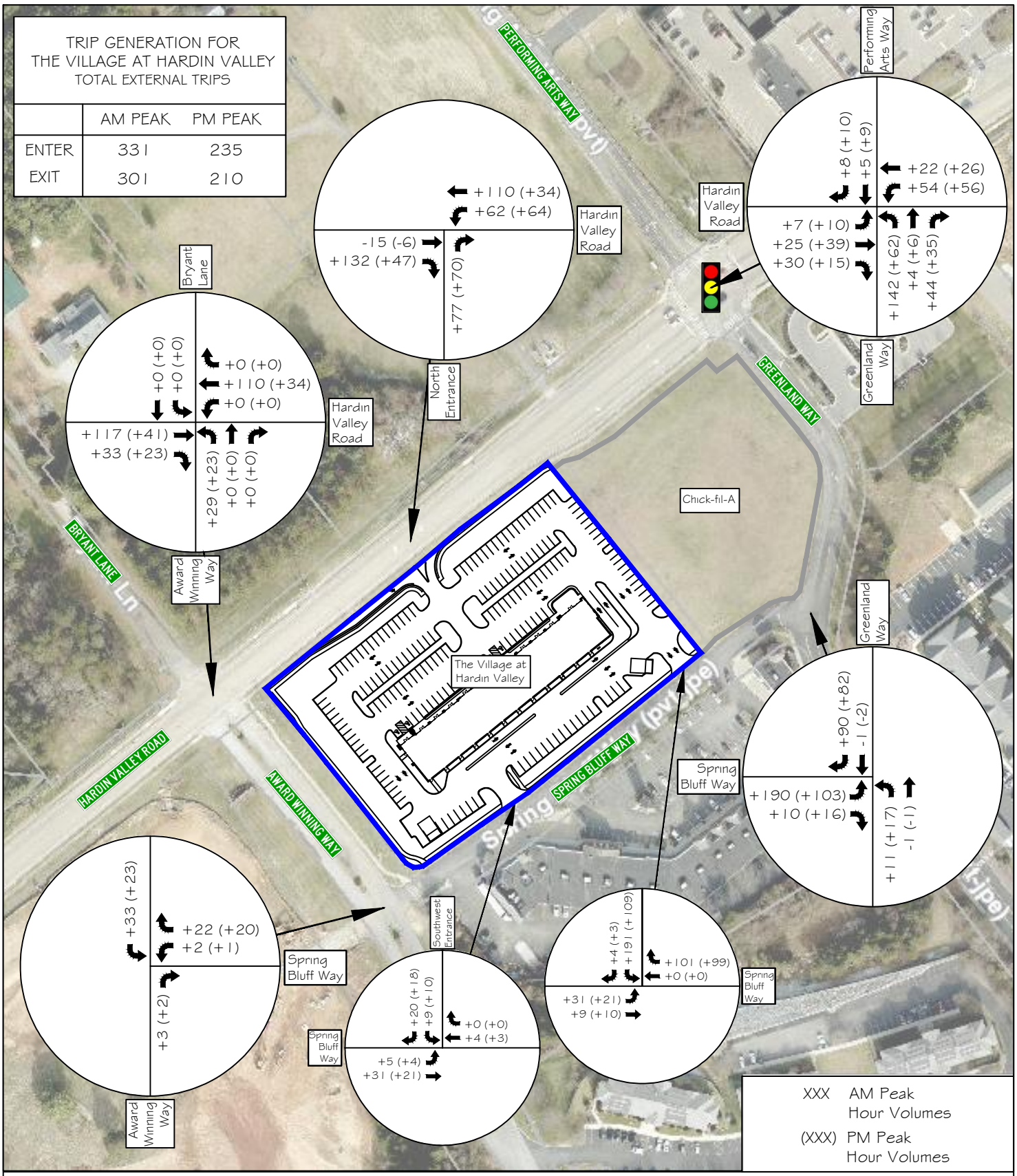
FIGURE 7b

The Village at Hardin Valley

Traffic Assignment of Generated Trips during AM and PM Peak Hour - Pass-By Trips



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Email: ajaxengineering@gmail.com

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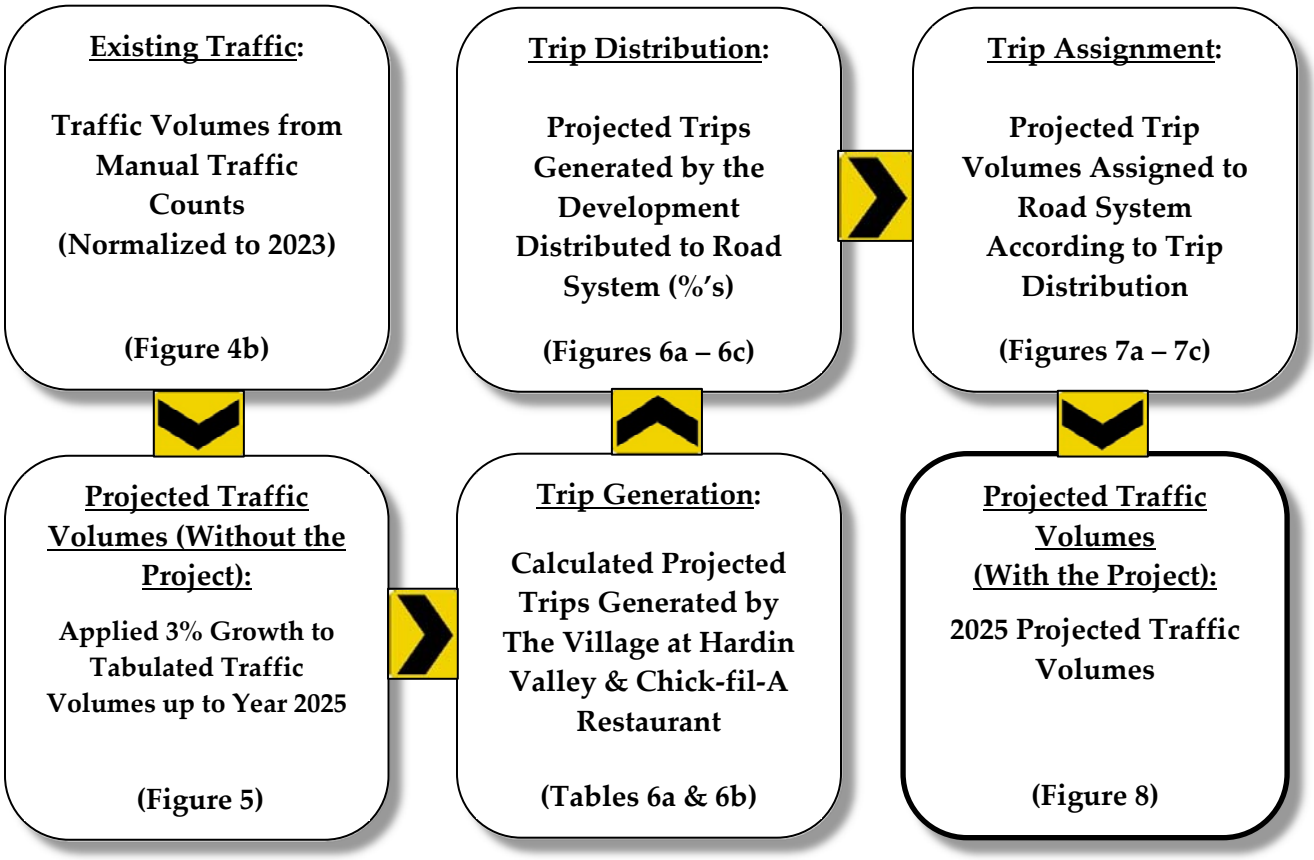
FIGURE 7c

The Village at Hardin Valley

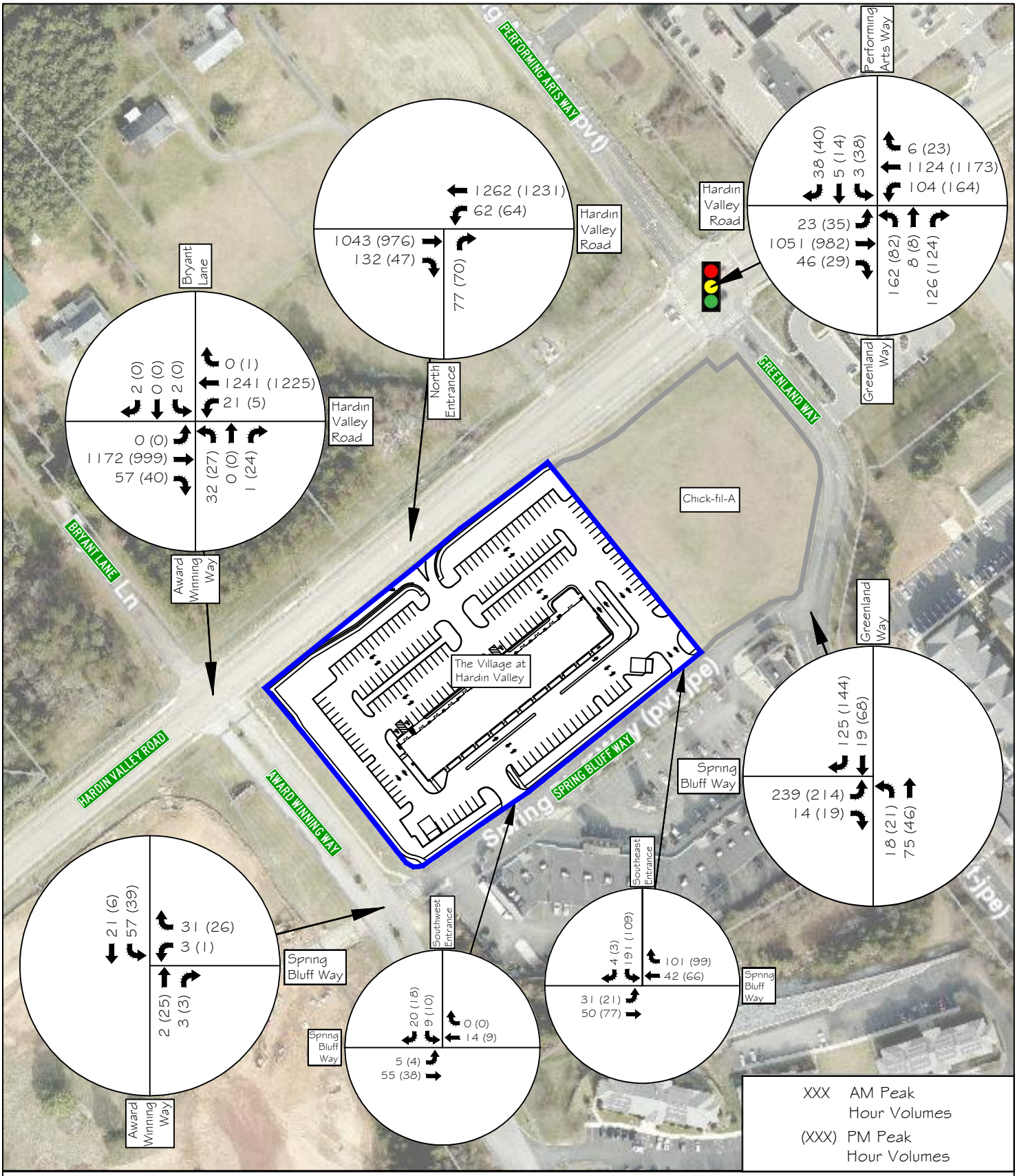
Traffic Assignment of Generated Trips during AM and PM Peak Hour - Total External Trips

- **PROJECTED TRAFFIC CONDITIONS WITH THE PROJECT:**

Overall, several additive steps were taken to estimate the total projected traffic volumes at the intersections when The Village at Hardin Valley and the Chick-fil-A restaurant are both fully constructed and operational in 2025. The steps are illustrated below for clarity and review:



The calculated peak hour trips generated by The Village at Hardin Valley and the Chick-fil-A restaurant were added to the 2025 projected horizon year traffic (Figure 5) by following the predicted trip distributions and assignments (Figures 6a – 6c & 7a – 7c). This procedure was completed to obtain the total projected traffic volumes at the studied intersections when the proposed developments are entirely built with full business operations in 2025. Figure 8 shows the projected 2025 AM and PM peak hour volumes with the generated traffic at the entrances and the adjacent studied intersections. Note: the volumes between the intersections of Hardin Valley Road at Performing Arts Way and Greenland Way and Greenland Way at Spring Bluff Way do not balance due to the presence of the bank entrance between the two. Likewise, the volumes between the two proposed entrances on Spring Bluff Way also do not balance due to the businesses located on the south side of Spring Bluff Way.



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

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FIGURE 8

The Village at Hardin Valley

2025 Peak Hour Traffic Volumes - PROJECTED TRAFFIC CONDITIONS WITH THE PROJECT

Capacity analyses were conducted to determine the projected LOS with the development traffic in 2025, shown in Figure 8. Intersection capacity results from the projected 2025 peak hour traffic are shown in Table 8.

Appendix F includes the worksheets for the projected 2025 peak hour capacity analyses. The signal timings were not changed or optimized for the results of the projected 2025 conditions shown in the table. However, the number of lanes on Hardin Valley Road is modified in the projected analyses to reflect Knox County's project, which will provide additional lanes and be completed by 2025. As shown in Table 8, with the additional thru lanes on Hardin Valley Road, the signalized intersection of Hardin Valley Road at Performing Arts Way and Greenland Way is projected to operate with better LOS and reduced vehicle delays than shown in the previous results without the project shown in Table 5. The unsignalized intersections are all calculated to operate adequately with relatively reasonable vehicle delays in the projected 2025 conditions, except for the intersection of Hardin Valley Road at Bryant Lane and Award Winning Way. The northbound (and southbound approach) are projected to experience high vehicle delays, particularly in the AM peak hour.

TABLE 8
2025 INTERSECTION CAPACITY ANALYSIS RESULTS -
PROJECTED TRAFFIC CONDITIONS WITH THE PROJECT

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS [a]	DELAY [b] (seconds)	v/c [c]	LOS [a]	DELAY [b] (seconds)	v/c [c]
Hardin Valley Road (WB & EB) at Performing Arts Way (SB) and Greenland Way (NB)	Signalized	Eastbound	B	19.2		B	14.9	
		Westbound	B	14.1		B	12.6	
		Northbound	C	31.6		C	23.4	
		Southbound	A	9.7		C	25.1	
		Summary	B	18.3	0.72	B	14.9	0.63
Hardin Valley Road (WB & EB) at Bryant Lane (SB) and Award Winning Way (NB)	Unsignalized	Northbound Left/Thru	F	97.4	0.667	E	37.4	0.280
		Northbound Right	C	21.5	0.009	C	19.0	0.129
		Eastbound Left	A	0.0	-	A	0.0	-
		Westbound Left	B	12.4	0.051	B	10.7	0.008
		Southbound Left/Thru/Right	F	68.0	0.176	A	0.0	-
Hardin Valley Road (WB & EB) at North Entrance (NB)	Unsignalized	Northbound Right	C	15.9	0.206	B	14.1	0.165
		Westbound Left	B	12.7	0.128	B	11.5	0.114
Award Winning Way (SB & NB) at Spring Bluff Way (WB)	Unsignalized	Westbound Left/Right	A	8.9	0.074	A	8.7	0.052
		Southbound Left	A	7.4	0.056	A	7.5	0.060
Greenland Way (SB & NB) at Spring Bluff Way (EB)	Unsignalized	Northbound Left	A	7.7	0.019	A	7.8	0.017
		Eastbound Left	C	15.5	0.544	B	12.3	0.362
		Eastbound Right	A	8.5	0.023	A	8.8	0.025

Note: All analyses were calculated in Synchro 11 software and reported with HCM 6th Edition methodology
[a] Level of Service , [b] Average Delay (sec/vehicle) , [c] Volume-to-Capacity Ratio

- **POTENTIAL TRANSPORTATION SAFETY ISSUES:**

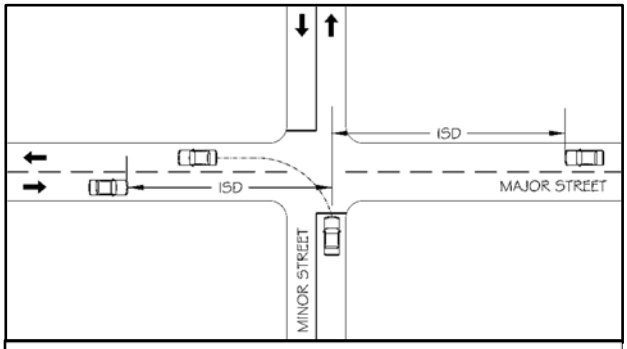
The study area was investigated for potential existing and future safety issues when The Village at Hardin Valley development is constructed. These transportation features are discussed in the following pages.

o EVALUATION OF SIGHT DISTANCE

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

Methodology:
SSD is the distance required for a motorist on a major street to perceive, react, and the vehicle to come to a complete stop before colliding with an object on the road. For evaluating intersections, this object would be another vehicle entering the intersection from a minor street. SSD can be considered the minimum visibility distance standard for evaluating the safety of an intersection.

ISD is the required visibility distance standard for evaluating the safety of an intersection per section 3.04.J.5 in the Knoxville-Knox County Subdivision Regulations. ISD is based on the time required to perceive, react, and complete the desired traffic maneuver once a motorist on a minor street decides to perform a traffic maneuver.



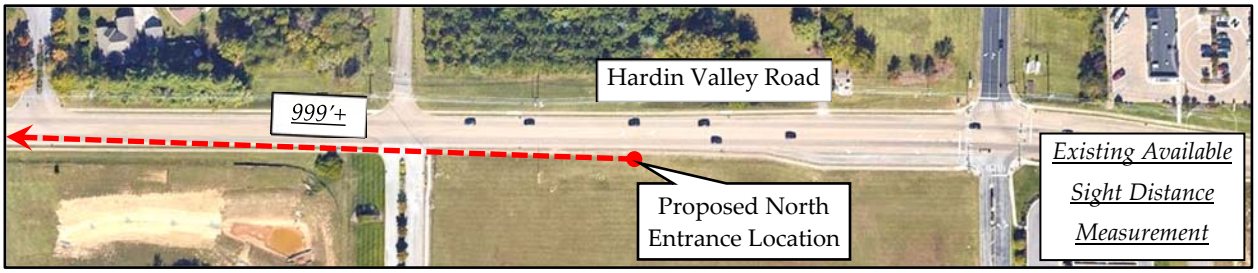
Intersection Sight Distance Diagram

Three traffic maneuvers are available for vehicles stopped on a minor street at a 4-way intersection: (1) left-turn, (2) right-turn, (3) or a crossing maneuver across the major street. For turns from the minor street, ISD is needed to allow a stopped motorist to turn onto a major street without being overtaken by an approaching vehicle. The most critical ISD is for left turns from the minor street. The ISD for this maneuver includes the time to turn left and clear half of the intersection without conflicting with the oncoming traffic from the left and accelerating to the road's operating speed without causing the approaching vehicles from the right to reduce their speed substantially.

With a posted speed limit of 40-mph on Hardin Valley Road at the proposed North Entrance, the ISD is 400 feet calculated based on Knox County's policy requiring 10 feet of sight distance per 1-mph of speed. This distance is required for a motorist to safely exit to the right (eastbound) at Hardin Valley Road. Left-turn movements will not occur at this entrance since it will have a right-in/right-out configuration while allowing left-turns in.

Visual observations of the sight distance at the proposed North Entrance were undertaken. Using a Nikon Laser Rangefinder at the proposed North Entrance location, the available sight distance was visually estimated to be greater than 999 feet to the west (limit of rangefinder). Based on visual observation, the available sight distance from the proposed North Entrance at Hardin Valley Road will be more than adequate for motorists exiting the development to the east.

Images of the existing sight distance at the proposed entrance location are labeled below with the ISD and rangefinder-measured sight distance.



View of Sight Distance on Hardin Valley Road at the Proposed North Entrance Location (Looking West)

View of Sight Distance on Hardin Valley Road at the Proposed North Entrance Location (Looking East)

- **EVALUATION OF TURN LANE THRESHOLDS**

The need for a separate right-turn lane was evaluated in the projected 2025 conditions for the proposed North Entrance on Hardin Valley Road. The evaluation did not include left turns on Hardin Valley Road since a center TWLTL is already provided to allow storage of left-turn entering vehicles.

The criteria used for this turn lane evaluation were based on Knox County's "Access Control and Driveway Design Policy". This design policy relates vehicle volume thresholds based on prevailing speeds for two-lane and four-lane roadways. The location of the proposed North Entrance on Hardin Valley Road is within a 40-mph speed zone; thus, it was evaluated based on this speed. Furthermore, the evaluation was also based on the understanding that Hardin Valley Road will be modified to include two lanes in each direction in 2025.

According to Knox County's guidelines, with a posted speed limit of 40-mph, a separate right-turn lane on Hardin Valley Road at the proposed North Entrance will be warranted based on the projected AM peak hour 2025 traffic volumes, but not in the PM peak hour. The worksheets for these evaluations are provided in Appendix I.

- **PROJECTED VEHICLE QUEUES**

A companion software program was used to assist in the calculation of the 2025 AM and PM peak hour projected vehicle queues at the studied intersections. The previously mentioned Synchro software includes SimTraffic. The Synchro portion of the software performs the macroscopic calculations for intersections, and SimTraffic performs micro-simulation and animation of vehicular traffic. The SimTraffic software was used to estimate the projected vehicle queues.

The 95th percentile vehicle queue is the recognized measurement in the traffic engineering profession as the design standard used when considering vehicle queue lengths. A 95th percentile vehicle queue length means 95% certainty that the vehicle queue will not extend beyond that point. The calculated vehicle queue results in SimTraffic were based on averaging the outcome obtained during ten traffic simulations in the software. The 95th percentile vehicle queue lengths at the intersections are shown in Table 9 for the projected 2025 conditions, and the vehicle queue worksheets from the software are in Appendix J.

TABLE 9
TURN LANE STORAGE & VEHICLE QUEUE SUMMARY -
2025 PROJECTED PEAK HOUR TRAFFIC WITH THE PROJECT

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	PROVIDED STORAGE LENGTH (ft)	SIMTRAFFIC 95th PERCENTILE QUEUE LENGTH (ft)		ADEQUATE LENGTH?
				AM PEAK HOUR	PM PEAK HOUR	
Hardin Valley Road (WB & EB) at Performing Arts Way (SB) and Greenland Way (NB)	Signalized	Eastbound Left	80	63	86	NO
		Eastbound Thru [1]	n/a	206	207	n/a
		Eastbound Right	200	28	25	✓
		Westbound Left	125	95	98	✓
		Westbound Thru [1]	n/a	230	191	n/a
		Westbound Right	125	14	17	✓
		Northbound Left	80	114	83	NO
		Northbound Thru/Right	n/a	106	84	n/a
		Southbound Left/Thru	500	17	89	✓
		Southbound Right	500	37	48	✓
Hardin Valley Road (WB & EB) at Bryant Lane (SB) and Award Winning Way (NB)	Unsignalized	Eastbound Left	TWLTL	-	-	✓
		Eastbound Thru/Right	n/a	13	5	n/a
		Westbound Left	TWLTL	34	12	✓
		Westbound Thru/Right	n/a	63	17	n/a
		Northbound Left/Thru [2]	300	218	84	✓
		Northbound Right [2]	300	-	40	✓
		Southbound Left/Thru/Right	n/a	20	-	n/a
Hardin Valley Road (WB & EB) at North Entrance (NB)	Unsignalized	Eastbound Thru/Right	n/a	10	-	n/a
		Westbound Left	TWLTL	59	58	✓
		Westbound Thru [1]	n/a	19	34	n/a
		Northbound Right [3]	50	62	62	NO
Award Winning Way (SB & NB) at Spring Bluff Way (WB)	Unsignalized	Westbound Left/Right [3]	75	45	44	✓
		Southbound Left/Thru [2]	300	-	8	✓
Greenland Way (SB & NB) at Spring Bluff Way (EB)	Unsignalized	Southbound Right [4]	100	-	-	✓
		Eastbound Left [3]	75	47	74	✓
		Eastbound Right [4]	100	6	27	✓
		Northbound Left	75	4	18	✓

Note: 95th percentile queues were calculated in SimTraffic 11 software

[1] Longest reported length in through dual lanes

[2] Distance between Hardin Valley Road and Spring Bluff Way

[3] Distance based on the available distance shown in site plan without interferring with internal aisleway vehicle movements

[4] Proposed lengths from Chick-fil-A traffic impact study

Table 9 shows considerable projected vehicle queue lengths for the northbound shared left/thru lane on Award Winning Way at Hardin Valley Road and Bryant Lane in the AM peak hour. While considerable, the reported vehicle queues on this approach are expected to be less since the calculated lengths from SimTraffic do not account for two-stage left turns. Two-stage turns are likely to occur since a TWLTL is provided in the center of Hardin Valley Road, and these maneuvers were observed during the traffic count. The Synchro software accounts for two-stage left-turn movements and calculates the northbound left-turn lane with vehicle queues of 82.5 feet in the AM peak hour and 27.5 feet in the PM peak hour. The capacity analysis worksheets in Appendix F report the results of these vehicle queues from the Synchro software.

At the signalized intersection in the 2025 peak hour conditions, two vehicle queues are projected

to extend beyond the available vehicle storage provided. The eastbound left-turn lane on Hardin Valley Road is calculated to be just marginally inadequate by 6 feet. However, the northbound left-turn lane storage on Greenland Way at the traffic signal is calculated to be inadequate in length by 34 feet.

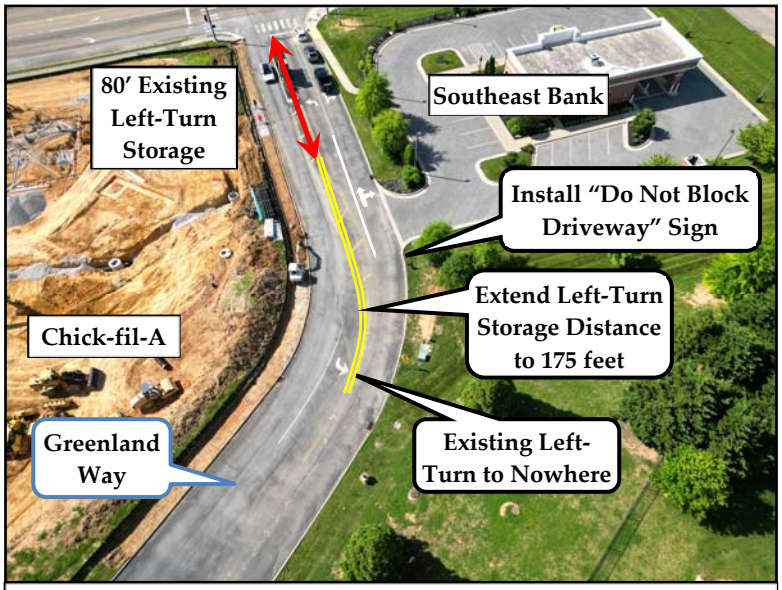
The other calculated vehicle queue result shown as marginally inadequate is the northbound approach at the proposed North Entrance at Hardin Valley Road, which is calculated to be slightly longer than the available distance shown in the site plan without interfering with the internal vehicle movements in the parking lot. However, this excess vehicle queue distance will be short in duration and will only occasionally affect vehicles traveling internally in the parking lot. The internal throat depth at this entrance is shown on the site plan as 50 feet, and the 95th percentile vehicle queue length is calculated to be 62 feet during the AM and PM peak hours.

CONCLUSIONS & RECOMMENDATIONS

The following is an overview of recommendations to minimize the transportation impacts of The Village at Hardin Valley and the Chick-fil-A restaurant on the adjacent transportation system while attempting to achieve an acceptable traffic flow and safety level.

1 **Hardin Valley Road at Performing Arts Way and Greenland Way**: The 2025 level of service calculations for this intersection with the projected trips from The Village at Hardin Valley and the Chick-fil-A restaurant resulted in very reasonable vehicle delays and LOS. These promising results were obtained due to Knox County Engineering's plan to provide additional thru lanes on Hardin Valley Road. All turn lane storage results are reasonably adequate except for the northbound left-turn lane on Greenland Way.

It is recommended that the northbound left-turn lane on Greenland Way at this intersection be extended to provide a minimum storage of 125 feet. However, due to the readily available existing unused pavement in the center of the road, providing up to 175 feet of storage on Greenland Way will fully ensure during extreme peak traffic periods that vehicles in this left-turn lane do not block northbound vehicles in the shared thru/right lane approaching Hardin Valley Road. This modification can easily be accomplished by solely re-striping Greenland Way's pavement. The bank entrance should include a "Do Not Block Driveway" sign facing northbound traffic on Greenland Way on the south side of the bank entrance to reduce the potential of vehicles blocking this entrance. Greenland Way is striped to the south of the bank entrance with a center left-turn lane to nowhere.



Greenland Way south of Hardin Valley Road

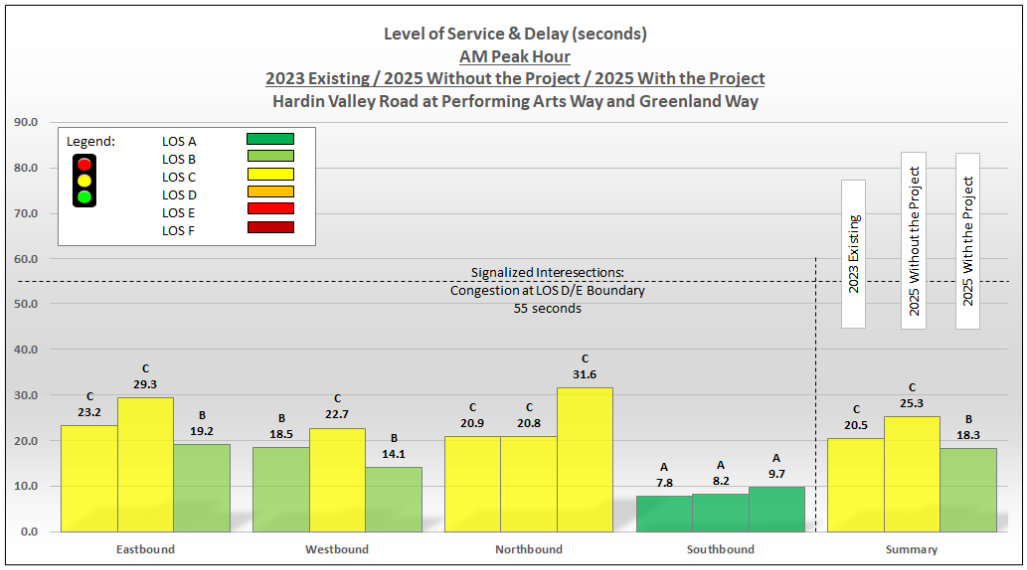
While not performed for this study, Knox County Engineering should adjust the signal timing for the AM, Mid-Day, and PM peaks to optimize traffic flows while minimizing the potential of vehicle queues spilling outside their designated storage lanes. These adjustments should occur once the lane additions are provided on Hardin Valley Road and when the Chick-fil-A restaurant and The Village at Hardin Valley all become fully operational. Fine-tuning the signal timing may be needed several times as each piece is added to the road system.

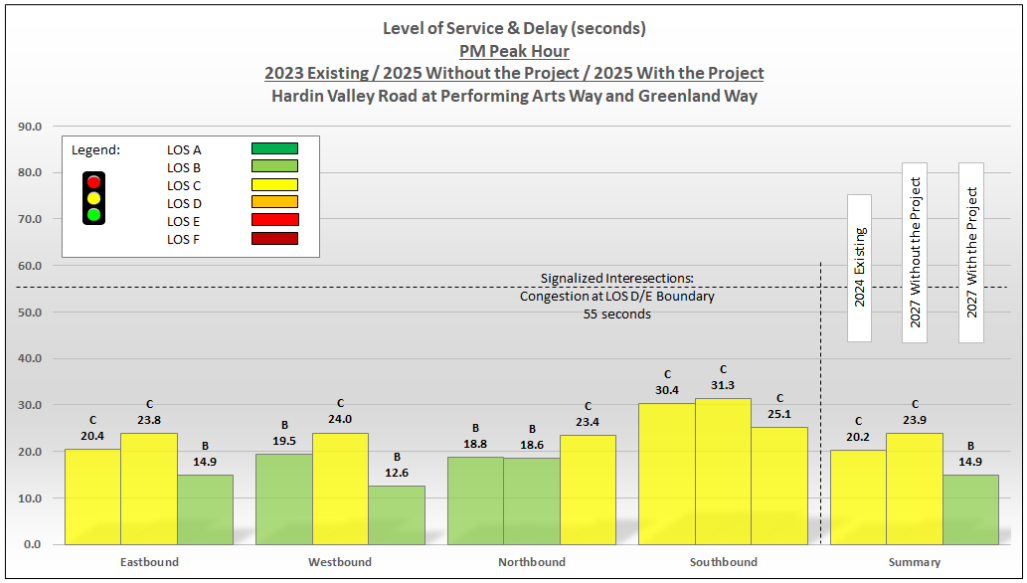
Finally, a summary of the capacity analyses for this intersection is presented in Table 10. This table provides a side-by-side summary and comparison of the intersection for the 2023 conditions, projected conditions in 2025 without the project, and the projected conditions in 2025 with the project. As seen in Table 10, the proposed lane additions by Knox County Engineering on Hardin Valley Road will significantly reduce vehicle delays in the projected 2025 conditions, even with the projected trips from the developments.

TABLE 10
INTERSECTION CAPACITY ANALYSIS SUMMARY
HARDIN VALLEY ROAD AT PERFORMING ARTS WAY AND GREENLAND WAY

APPROACH / PEAK HOUR MOVEMENT	2023 EXISTING			2025 WITHOUT THE PROJECT			2025 WITH THE PROJECT		
	LOS[a]	Delay[b]	v/c [c]	LOS[a]	Delay[b]	v/c [c]	LOS[a]	Delay[b]	v/c [c]
AM Peak									
Eastbound	C	23.2		C	29.3		B	19.2	
Westbound	B	18.5		C	22.7		B	14.1	
Northbound	C	20.9		C	20.8		C	31.6	
Southbound	A	7.8		A	8.2		A	9.7	
Summary	C	20.5	0.88	C	25.3	0.93	B	18.3	0.72
PM Peak									
Eastbound	C	20.4		C	23.8		B	14.9	
Westbound	B	19.5		C	24.0		B	12.6	
Northbound	B	18.8		B	18.6		C	23.4	
Southbound	C	30.4		C	31.3		C	25.1	
Summary	C	20.2	0.86	C	23.9	0.91	B	14.9	0.63

Note: All analyses were calculated in Synchro 11 software and reported with HCM 6th Edition methodology
[a] Level of Service , [b] Average Delay (sec/vehicle) , [c] Volume-to-Capacity Ratio





Hardin Valley Road at Bryant Lane and Award Winning Way: The 2025 projected level of service calculations for this intersection resulted in high vehicle delays and poor LOS for the northbound and southbound approaches of Award Winning Way and Bryant Lane. These approaches are projected to have these results due to the large volumes on Hardin Valley Road.

The 95th percentile vehicle queue for the northbound left-turn movement on Award Winning Way was projected to be 218 feet in the 2025 AM peak hour if motorists do not utilize the center TWLTL for two-stage left turns. This result is nearly nine passenger cars, assuming a length of 25 feet per vehicle. If motorists use this center lane as a temporary refuge when turning left to wait for a gap in westbound traffic as they currently do, the 95th percentile queue was calculated to be 82.5 feet, just over three passenger cars. Either result will be fully contained in the lane storage on Award Winning Way between Hardin Valley Road and Spring Bluff Way to the south. The distance between these two roads is 300 feet.

The driveway distribution assumptions used in the study for the northbound left-turn movement towards the west on Hardin Valley Road were purposely set lower. This strategy was done to reflect the difficulty in this movement due to the high volumes on Hardin Valley Road and the expectation that present and future motorists will recognize this difficulty and divert their travel to the east to the traffic signal to then head west on Hardin Valley Road. This distribution strategy also created a worst-case scenario for northbound left turns at the traffic signal and its effect on the amount of vehicle storage needed.

At a minimum, motorists intending to head west on Hardin Valley Road will be able to access the traffic signal to the east, which has been projected to have reasonable vehicle delays for the northbound approach and will have an appropriate, if not excessive, amount of vehicle storage.

At a minimum, however, it is recommended that the northbound lanes on Award Winning Way be defined and marked on the pavement. The width of the northbound approach of Award Winning Way at Hardin Valley Road is 24 feet, allowing two 12-foot lanes, but it is not marked as such. The approach should be delineated with a white lane line to provide a separate shared left/thru lane and an exclusive right-turn lane. The lanes should include shared white left/thru arrows and white right-turn arrows along its length.

These lane designations should be applied from Hardin Valley Road to Spring Bluff Way, approximately 300 feet in length.

Hardin Valley Road at the Proposed North Entrance: The 2025 projected level of service calculations for this intersection resulted in minimal vehicle delays and good LOS for exiting northbound and entering movements. While the delays for exiting vehicles are projected to be minimal, the vehicle queues on the exiting north approach are expected to occasionally extend past the northern internal parking lot aisleway. These vehicle queues may briefly interfere with internal vehicle movements, especially during peak periods.

3a) This entrance intersection will be constructed with a right-in/right-out configuration but allow left turns into the development from the east on Hardin Valley Road. Exiting left-turn movements to the west will not be allowed at this entrance. This entrance should be constructed with this configuration as proposed due to the limited internal vehicle storage available within the site. If allowed, the vehicle queues for a left-turn movement toward the west would quickly and easily block vehicles internally and likely spill back enough to interfere with the drive-through lane operations. It is recommended that the following be considered in the design and construction of the entrance:

i) The entering and exiting lanes should have a width and inner radius to facilitate the largest expected-sized vehicle entering and exiting at Hardin Valley Road. The layout and elements of the intersection should follow Knox County Engineering standards.

ii) The island separating the entering and exiting movements should be raised concrete and sized adequately to dissuade illegal, restricted left-turning movements to the west on Hardin Valley Road.

iii) Traffic signage with breakaway posts at this intersection should include a Stop Sign (R1-1). The Stop Sign (R1-1) should be supplemented with a 24" white stop bar on the exiting lane approaching Hardin Valley Road, a minimum of 4 feet away from the road edge. Other signs that should be posted at the entrance include a Keep Right Sign (R4-7) at the head of the island for exiting vehicles, a No Left Turn Sign (R3-2) at Hardin Valley facing the exiting lane, and a Do Not Enter Sign (R5-1) facing the exiting lane but on the outside edge of the entering lane.

3b) It is recommended that the sidewalk at the proposed North Entrance be installed with pavement markings, detectable warning surfaces, and other items to reduce the

potential turning vehicle conflicts with pedestrians. Details regarding the appropriate and desired treatments to reduce pedestrian conflicts and inappropriate vehicle movements should be discussed during the detailed design review with Knox County Engineering. The discussions should include incorporating the new entrance with the new lanes on Hardin Valley, which Knox County's project will provide.

3c) The intersection sight distance from the North Entrance at Hardin Valley Road must not be impacted by future landscaping, signage, or vegetation.

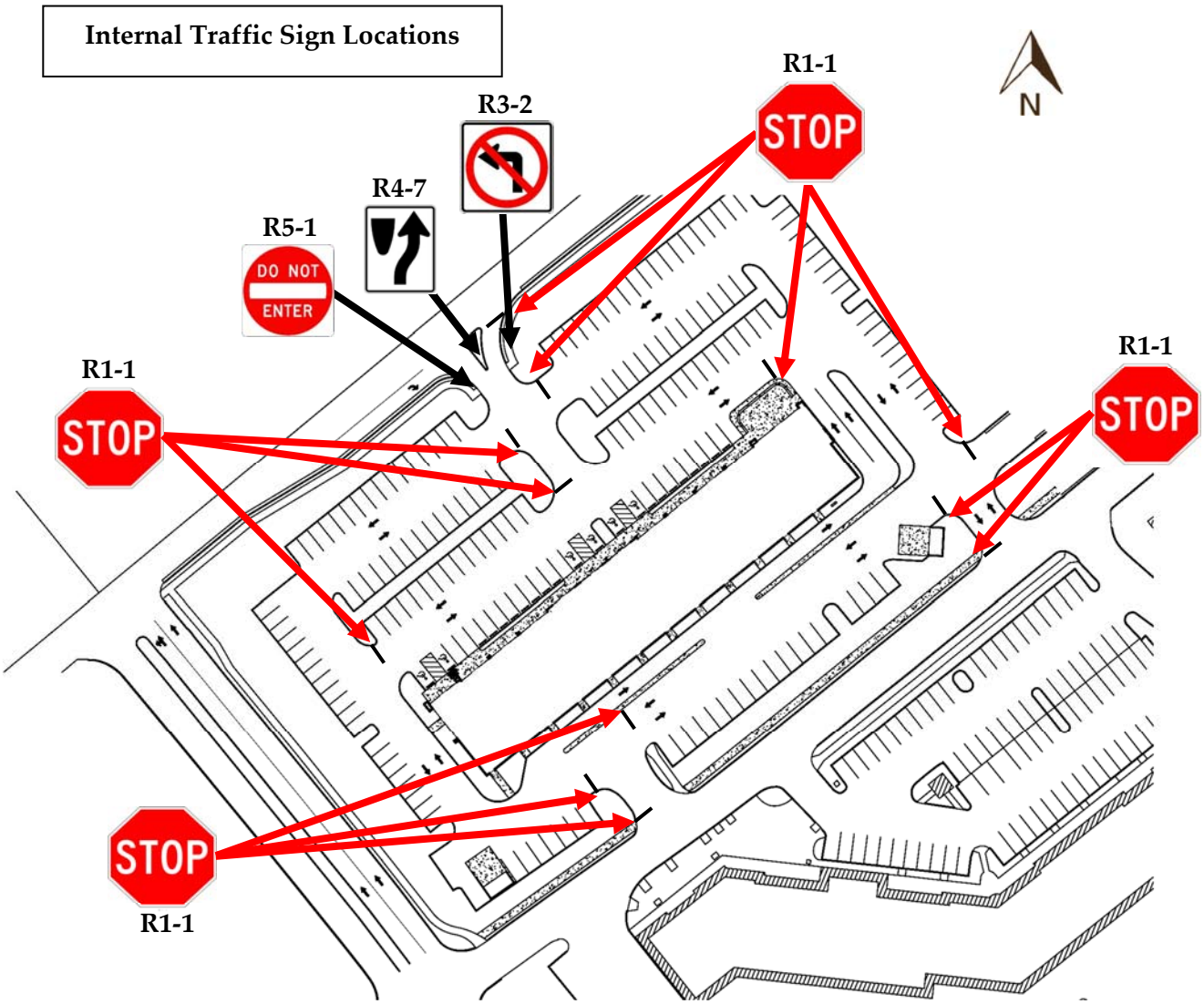
Based on the posted speed limit of 40-mph on Hardin Valley Road, the required ISD is 400 feet, looking to the west for exiting right-turning vehicles. The available sight distance was visually estimated to be greater than 999 feet to the west on Hardin Valley Road. The site designer must also verify that this distance will be available based on the final site plans.

3d) The construction of a separate eastbound right-turn lane on Hardin Valley Road for vehicles entering the proposed North Entrance is warranted based on the projected 2025 AM peak hour traffic volumes. It is not projected to be warranted in the 2025 PM peak hour.

Due to the existing site limitations along Hardin Valley Road, which include extensive underground utilities, it is recommended that the eastbound right-turn lane be designed and constructed with a minimal lane taper but with a maximum deceleration length possible within the confines of the frontage limits. The civil site designer should coordinate the design of this turn lane with Knox County, and it should include a white right-turn arrow and lane line on the pavement for this exclusive lane. As part of this eastbound right-turn lane provision, the existing sidewalk on the south side of Hardin Valley Road will need to be modified and reconstructed.

4 **<u>The Village at Hardin Valley Internal Drive/Parking Lot Aisleways:</u>** The current layout plan shows three entrance driveways with several parking lot aisleways constructed for the development, as shown in Figure 3.

4a) Stop Signs (R1-1) with 24" white stop bars are recommended to be installed at the internal locations with other signage, as shown below.



4b) Sight distance at the new internal aisleway intersections must not be impacted by new signage, parked cars, or future landscaping. With an assumed speed of 15-mph in the development, the internal intersection sight distance is 170 feet. The required stopping sight distance is 80 feet for a level road grade. The site designer should ensure that internal sight distance lengths are met.

4c) All drainage grates and covers for the commercial development must be pedestrian and bicycle safe.

4d) Internal sidewalks are proposed adjacent to the front of The Village at Hardin Valley building. Sidewalks should have appropriate ADA-compliant ramps, and the internal sidewalks are recommended to be 5 feet minimum in width to meet Knox County regulations.

4e) Internal guide signs should direct vehicular customers of the coffee/donut shop to the drive-thru lane's location. White pavement lane markings, arrows, or messages should also be considered to facilitate orderly vehicular movements.

4f) All road and intersection elements should be designed to AASHTO and Knox County specifications and guidelines to ensure proper operation.

Greenland Way at Spring Bluff Way: The prior traffic impact study for the Chick-fil-A restaurant by TWM, Inc. recommended that a 100-foot eastbound right-turn lane be constructed on Spring Bluff Way at Greenland Way and a 100-foot southbound right-turn lane be constructed on Greenland Way at Spring Bluff Way.

The findings of this current study did not indicate that an eastbound right-turn lane on Spring Bluff Way at Greenland Way would be necessary. While the findings also did not indicate a need for a southbound right-turn lane on Greenland Way at Spring Bluff Way, this current study agrees with this recommendation due to the known popularity of Chick-fil-A restaurants and the planned coffee/donut shop. A southbound right-turn lane at this intersection would ensure that entering vehicle queues from this direction will not extend back to the traffic signal on Hardin Valley Road.

APPENDIX A

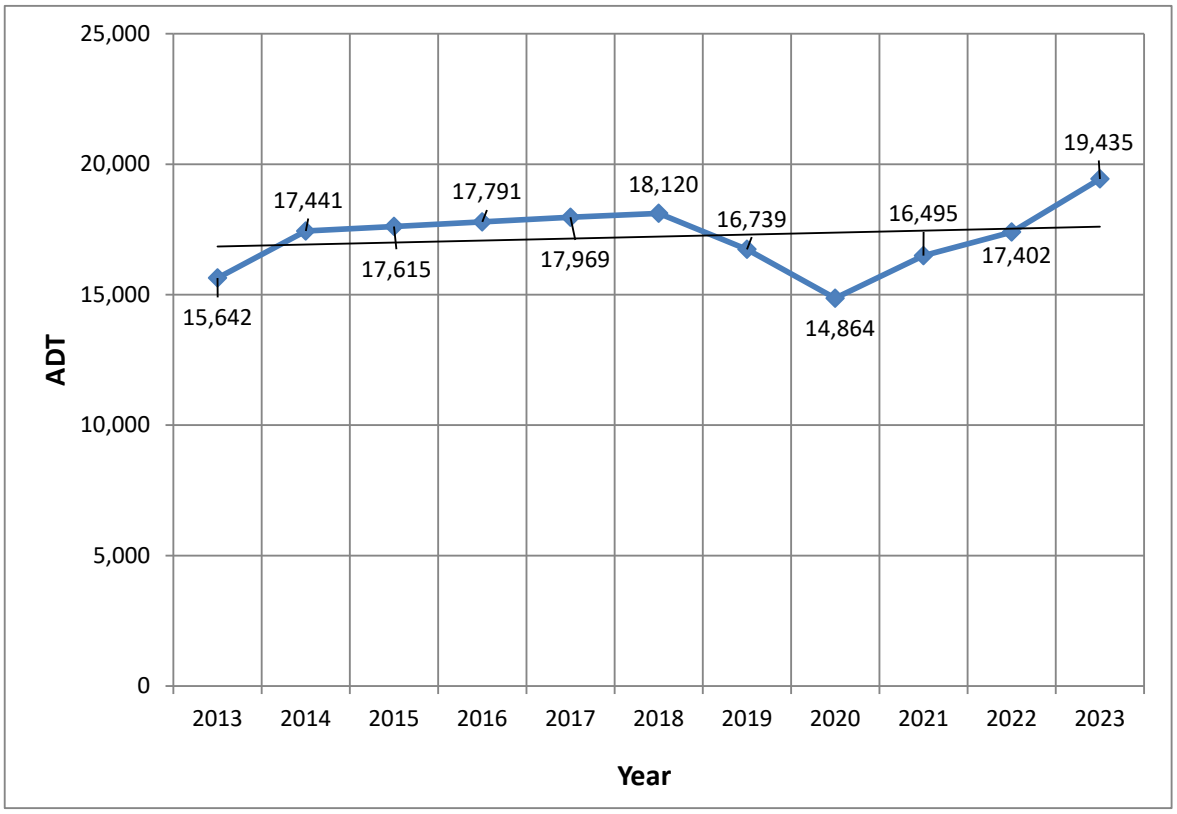
HISTORICAL TRAFFIC COUNT DATA

Historical Traffic Counts

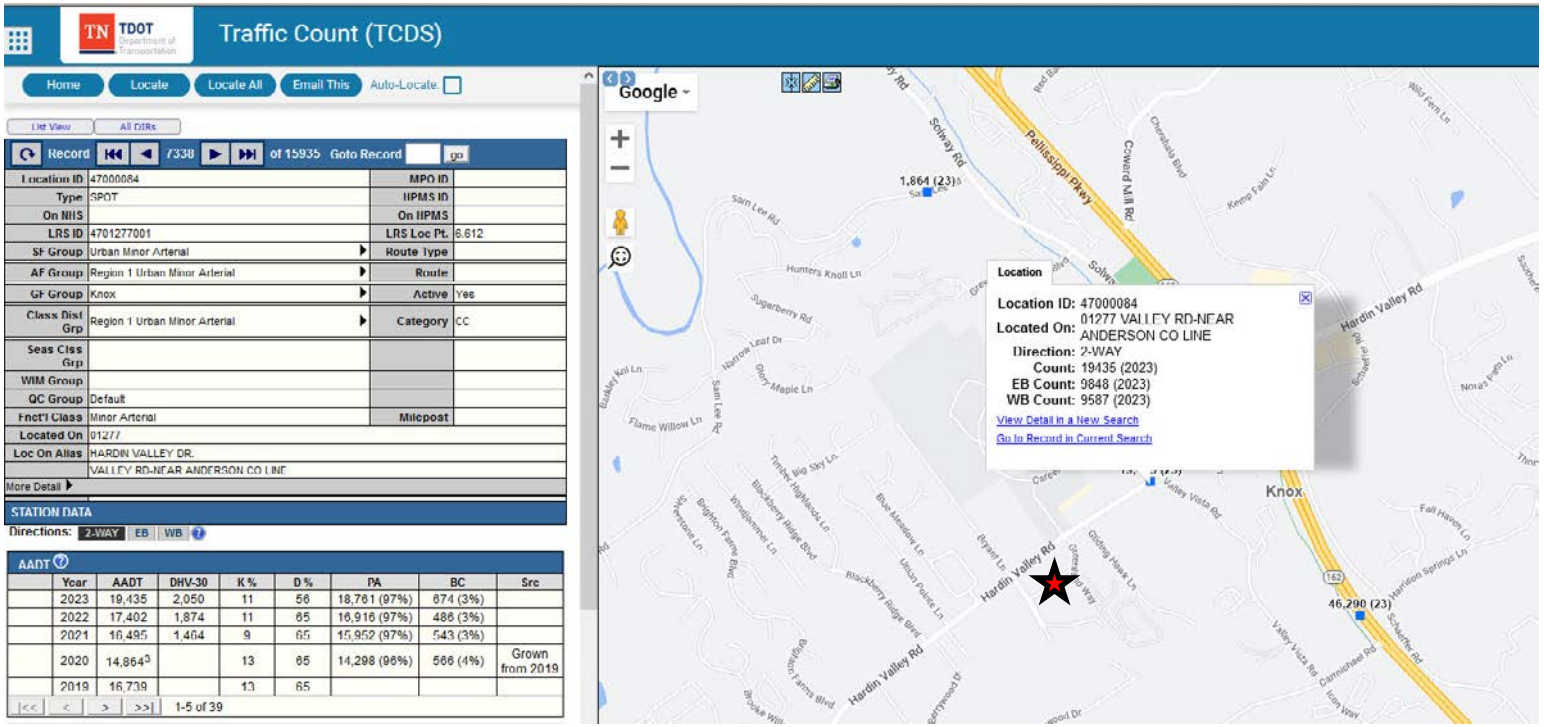
Organization: TDOT
Station ID #: 47000084
Location: Hardin Valley Road, southwest of Valley Vista Road

YEAR	AADT
2013	15,642
2014	17,441
2015	17,615
2016	17,791
2017	17,969
2018	18,120
2019	16,739
2020	14,864
2021	16,495
2022	17,402
2023	19,435

Trendline



2013 - 2023 Growth Rate = 24.2%
Average Annual Growth Rate = 2.2%

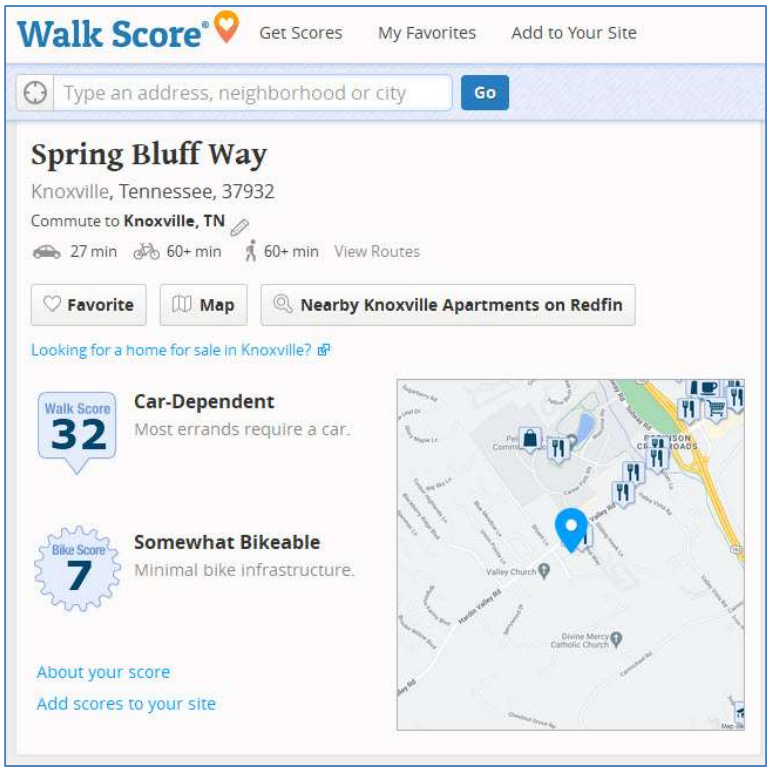

TN TDOT Department of Transportation
Traffic Count (TCDS)
Home
Locate
Locate All
Email This
Auto-Locate:
List View
All DIRs
Record 7338 of 15935 Goto Record go
Location ID 47000084
MPO ID
Type SPOT
HPMS ID
On NHS
On HPMS
LRS ID 4701277001
LRS Loc Pt. 6.612
SF Group Urban Minor Arterial
Route Type
AF Group Region 1 Urban Minor Arterial
Route
GF Group Knox
Active Yes
Class Dist Grp Region 1 Urban Minor Arterial
Category CC
Seas Clss Grp
WIM Group
QC Group Default
Fnct'l Class Minor Arterial
Milepost
Located On 01277
Loc On Alias HARDIN VALLEY DR.
VALLEY RD-NEAR ANDERSON CO LINE
More Detail
STATION DATA
Directions: 2-WAY EB WB
AADT
Year AADT DHV-30 K % D % PA BC Src
2023 19,435 2,050 11 56 18,761 (97%) 674 (3%)
2022 17,402 1,874 11 65 16,916 (97%) 486 (3%)
2021 16,495 1,464 9 65 15,952 (97%) 543 (3%)
2020 14,864[3] 13 65 14,298 (96%) 566 (4%) Grown from 2019
2019 16,739 13 65
1-5 of 39
Google
Location
Location ID: 47000084
Located On: 01277 VALLEY RD-NEAR ANDERSON CO LINE
Direction: 2-WAY
Count: 19435 (2023)
EB Count: 9848 (2023)
WB Count: 9587 (2023)
View Detail in a New Search
Go to Record in Current Search
1,864 (23)
46,290 (23)
Hardin Valley Rd
Pellissippi Pkwy
Schaad Rd
Coward Mill Rd
Knox

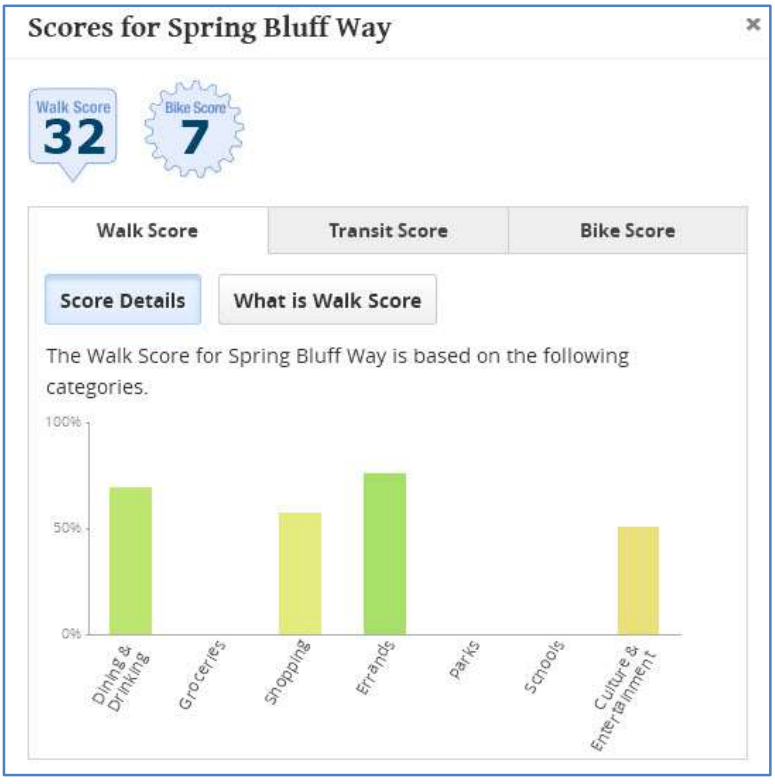
APPENDIX B

WALK SCORE

WALKSCORE

(from walkscore.com)





Scores for Spring Bluff Way

Walk Score	Transit Score	Bike Score

Transit Score measures how well a location is served by public transit based on the distance and type of nearby transit lines.

90–100	**Rider's Paradise** World-class public transportation
70–89	**Excellent Transit** Transit is convenient for most trips
50–69	**Good Transit** Many nearby public transportation options
25–49	**Some Transit** A few nearby public transportation options
0–24	**Minimal Transit** It is possible to get on a bus

Scores for Spring Bluff Way

Walk Score	Transit Score	Bike Score

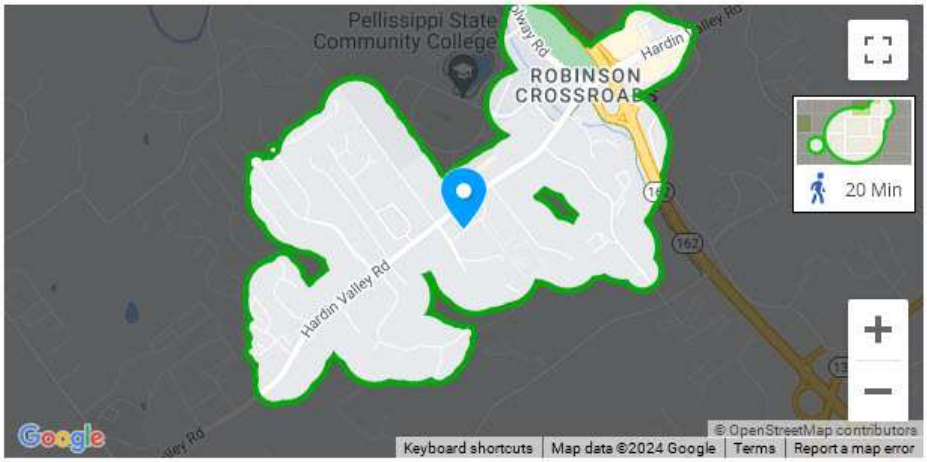
Bike Score measures whether an area is good for biking based on bike lanes and trails, hills, road connectivity, and destinations.

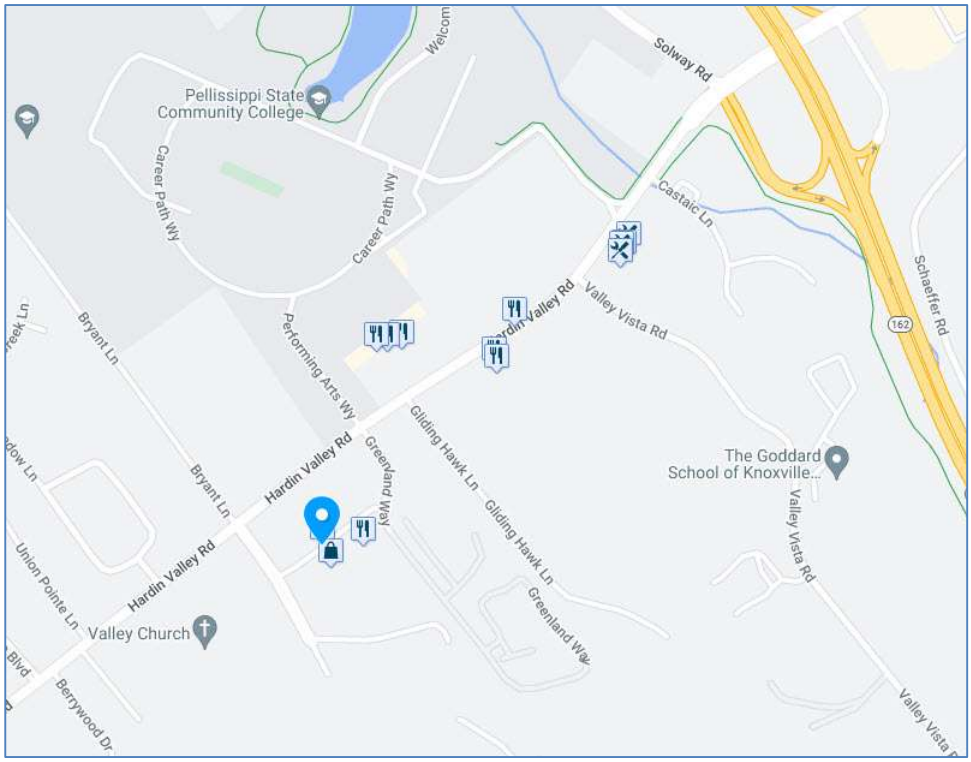
90–100	**Biker's Paradise** Daily errands can be accomplished on a bike
70–89	**Very Bikeable** Biking is convenient for most trips
50–69	**Bikeable** Some bike infrastructure
0–49	**Somewhat Bikeable** Minimal bike infrastructure

Travel Time Map

Add to your site

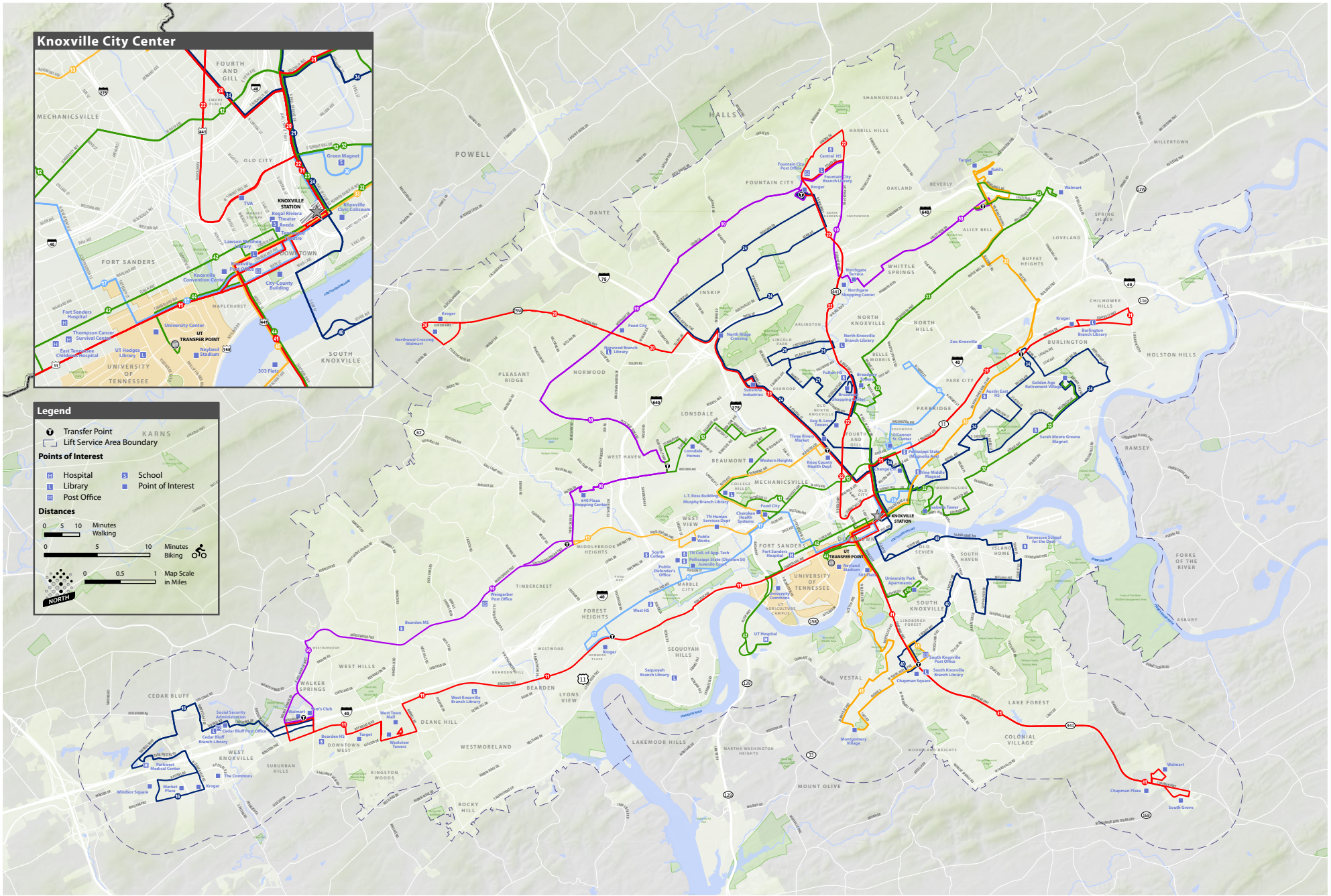
Explore how far you can travel by car, bus, bike and foot from Spring Bluff Way.

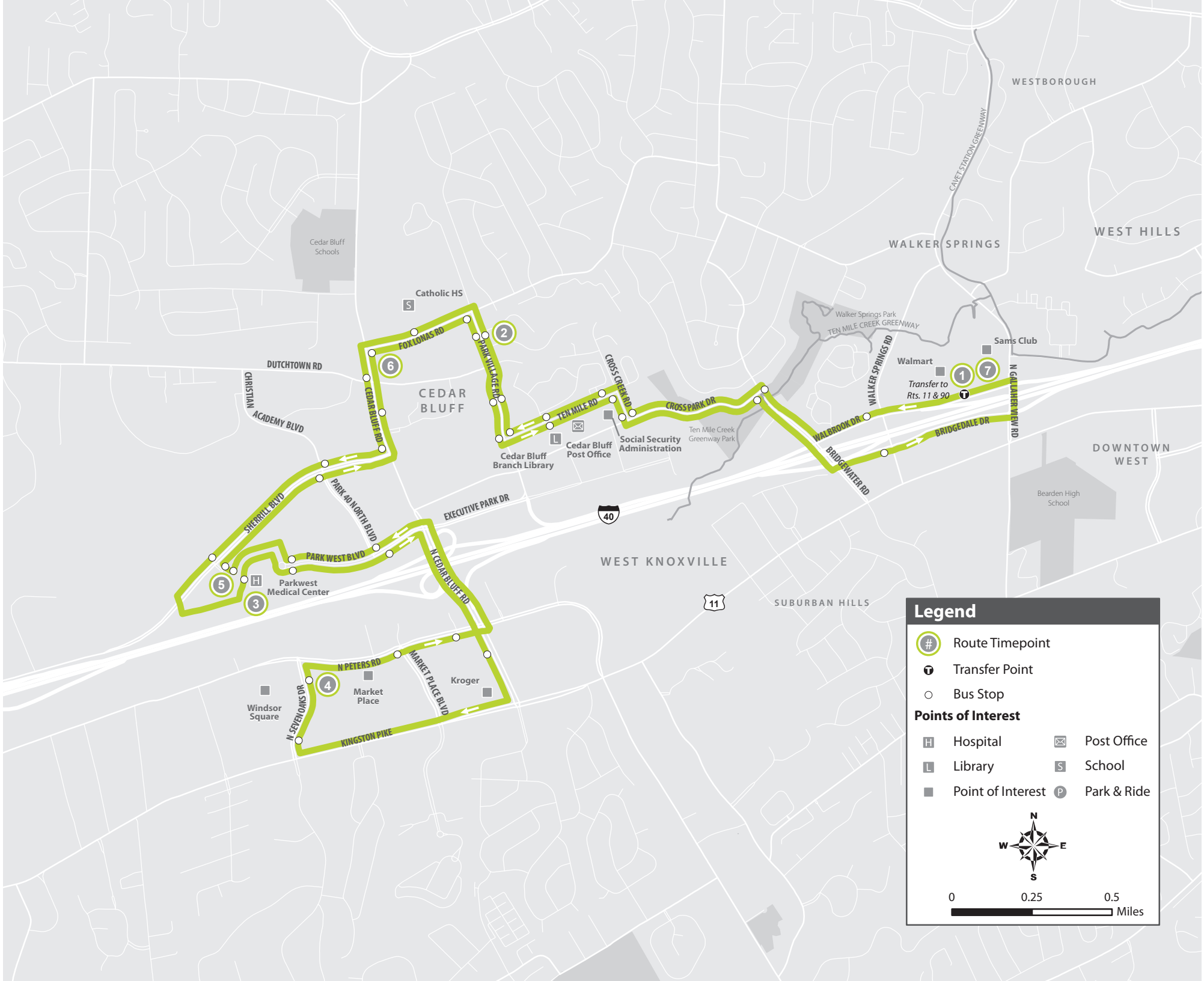




APPENDIX C

KNOXVILLE AREA TRANSIT MAP AND INFORMATION


Knoxville City Center
Legend
Transfer Point
Lift Service Area Boundary
Points of Interest
Hospital
Library
Post Office
School
Point of Interest
Distances
0 5 10 Minutes Walking
0 5 10 Minutes Biking
0 0.5 1 Map Scale in Miles
NORTH
KNOXVILLE STATION
UT TRANSFER POINT
DOWNTOWN
FORT SANDERS
UNIVERSITY OF TENNESSEE
OLD CITY
MECHANICSVILLE
FOURTH AND GILL
SOUTH KNOXVILLE
NORTH KNOXVILLE
WEST KNOXVILLE
POWELL
HALLS
KARNS


WESTBOROUGH
CAVET STATION GREENWAY
WEST HILLS
WALKER SPRINGS
Cedar Bluff Schools
Catholic HS
Walker Springs Park
TEN MILE CREEK GREENWAY
Sams Club
Walmart
Transfer to Rts. 11 & 90
WALKER SPRINGS RD
N GALLAHER VIEW RD
FOX LONAS RD
PARK VILLAGE RD
DUTCHTOWN RD
CROSS CREEK RD
CROSS PARK DR
CHRISTIAN ACADEMY BLVD
CEDAR BLUFF
CEDAR BLUFF RD
TEN MILE RD
Cedar Bluff Branch Library
Cedar Bluff Post Office
Social Security Administration
Ten Mile Creek Greenway Park
WALBROOK DR
BRIDGEDALE DR
BRIDGEWATER RD
DOWNTOWN WEST
Bearden High School
SHERRILL BLVD
PARK 40 NORTH BLVD
EXECUTIVE PARK DR
40
PARK WEST BLVD
N CEDAR BLUFF RD
Parkwest Medical Center
WEST KNOXVILLE
11
SUBURBAN HILLS
N PETERS RD
MARKET PLACE BLVD
Kroger
Market Place
Windsor Square
N SEVENOAKS DR
KINGSTON PIKE
Legend
Route Timepoint
Transfer Point
Bus Stop
Points of Interest
Hospital
Post Office
Library
School
Point of Interest
Park & Ride
N
W
E
S
0
0.25
0.5
Miles

Route 16 - Cedar Bluff: Weekdays

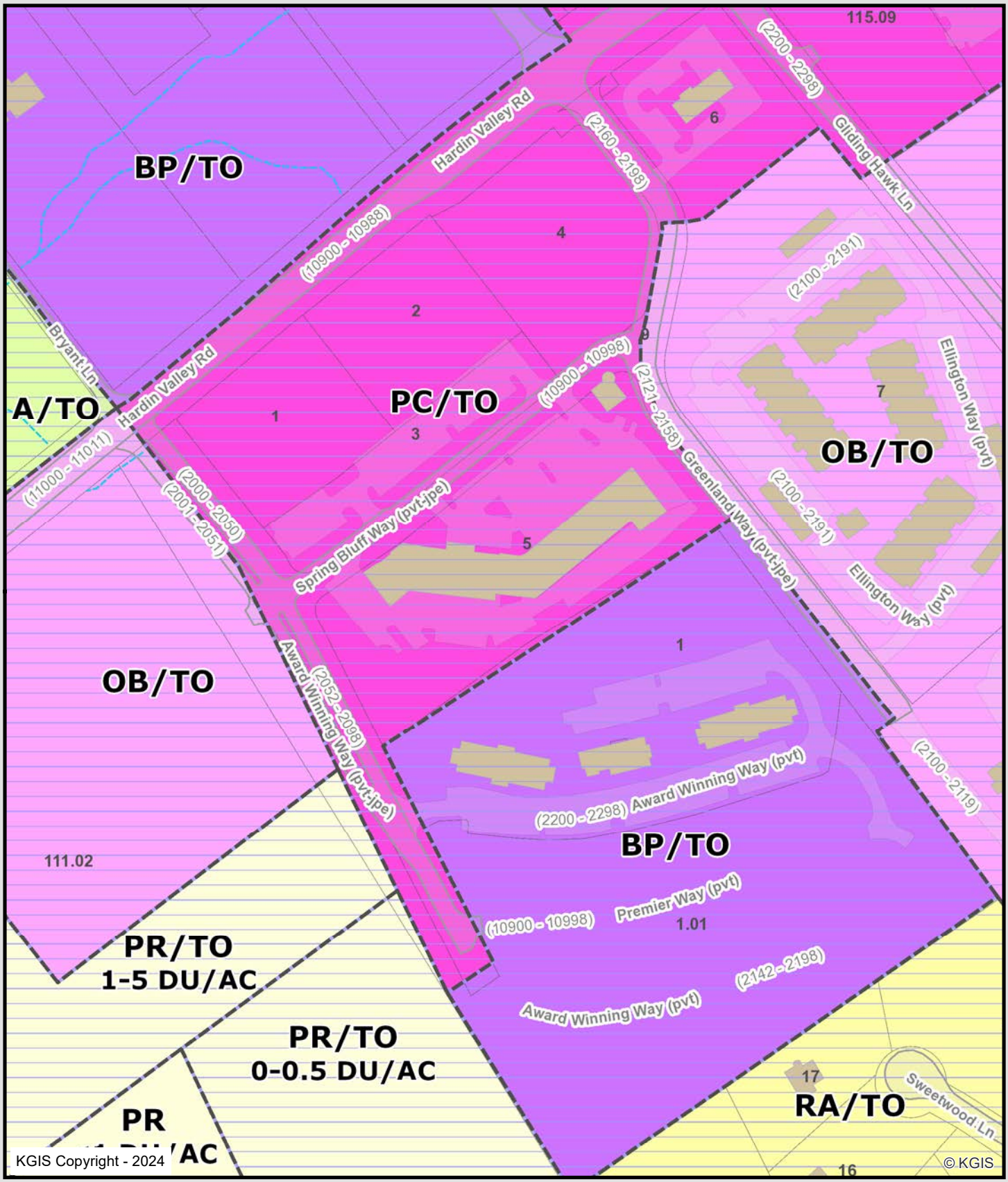
Going away from Walmart				*Going to Walmart*		
Walmart	**Park Village @ Woodpark**	**Parkwest Hospital**	**Windsor Square**	**Parkwest Hospital**	**Cedar Bluff @ Fox Lonas**	**Walmart**
1	**2**	**3**	**4**	**5**	**6**	**7**
6:15 AM	6:27 AM	6:32 AM	6:42 AM	6:50 AM	6:54 AM	7:10 AM
7:15 AM	7:27 AM	7:32 AM	7:42 AM	7:50 AM	7:54 AM	8:10 AM
8:15 AM	8:27 AM	8:32 AM	8:42 AM	8:50 AM	8:54 AM	9:10 AM
9:15 AM	9:27 AM	9:32 AM	9:42 AM	9:50 AM	9:54 AM	10:10 AM
10:15 AM	10:27 AM	10:32 AM	10:42 AM	10:50 AM	10:54 AM	11:10 AM
11:15 AM	11:27 AM	11:32 AM	11:42 AM	11:50 AM	11:54 AM	12:10 PM
12:15 PM	12:27 PM	12:32 PM	12:42 PM	12:50 PM	12:54 PM	1:10 PM
1:15 PM	1:27 PM	1:32 PM	1:42 PM	1:50 PM	1:54 PM	2:10 PM
2:15 PM	2:27 PM	2:32 PM	2:42 PM	2:50 PM	2:54 PM	3:10 PM
3:15 PM	3:27 PM	3:32 PM	3:42 PM	3:50 PM	3:54 PM	4:10 PM
4:15 PM	4:27 PM	4:32 PM	4:42 PM	4:50 PM	4:54 PM	5:10 PM
5:15 PM	5:27 PM	5:32 PM	5:42 PM	5:50 PM	5:54 PM	6:10 PM
6:15 PM	6:27 PM	6:32 PM	6:42 PM	6:50 PM	6:54 PM	7:10 PM
7:15 PM	7:27 PM	7:32 PM	7:42 PM	7:50 PM	7:54 PM	8:10 PM
8:15 PM	8:27 PM	8:32 PM	8:42 PM	8:50 PM	8:54 PM	9:10 PM
9:15 PM	9:27 PM	9:32 PM	9:42 PM	9:50 PM	9:54 PM	10:10 PM

Route 16 - Cedar Bluff: SATURDAYS

Going away from Walmart				*Going to Walmart*		
Walmart	**Park Village @ Woodpark**	**Parkwest Hospital**	**Windsor Square**	**Parkwest Hospital**	**Cedar Bluff @ Fox Lonas**	**Walmart**
1	**2**	**3**	**4**	**5**	**6**	**7**
7:15 AM	7:27 AM	7:32 AM	7:42 AM	7:50 AM	7:54 AM	8:10 AM
8:15 AM	8:27 AM	8:32 AM	8:42 AM	8:50 AM	8:54 AM	9:10 AM
9:15 AM	9:27 AM	9:32 AM	9:42 AM	9:50 AM	9:54 AM	10:10 AM
10:15 AM	10:27 AM	10:32 AM	10:42 AM	10:50 AM	10:54 AM	11:10 AM
11:15 AM	11:27 AM	11:32 AM	11:42 AM	11:50 AM	11:54 AM	12:10 PM
12:15 PM	12:27 PM	12:32 PM	12:42 PM	12:50 PM	12:54 PM	1:10 PM
1:15 PM	1:27 PM	1:32 PM	1:42 PM	1:50 PM	1:54 PM	2:10 PM
2:15 PM	2:27 PM	2:32 PM	2:42 PM	2:50 PM	2:54 PM	3:10 PM
3:15 PM	3:27 PM	3:32 PM	3:42 PM	3:50 PM	3:54 PM	4:10 PM
4:15 PM	4:27 PM	4:32 PM	4:42 PM	4:50 PM	4:54 PM	5:10 PM
5:15 PM	5:27 PM	5:32 PM	5:42 PM	5:50 PM	5:54 PM	6:10 PM
6:15 PM	6:27 PM	6:32 PM	6:42 PM	6:50 PM	6:54 PM	7:10 PM
7:15 PM	7:27 PM	7:32 PM	7:42 PM	7:50 PM	7:54 PM	8:10 PM
8:15 PM	8:27 PM	8:32 PM	8:42 PM	8:50 PM	8:54 PM	9:10 PM
9:15 PM	9:27 PM	9:32 PM	9:42 PM	9:50 PM	9:54 PM	10:10 PM

APPENDIX D

ZONING MAP



Zoning Map

5.9.24

Knoxville - Knox County - KUB Geographic Information System

Printed: 5/9/2024 at 1:37:39 PM

0 100 200 400

ft

APPENDIX E

MANUAL TRAFFIC COUNT DATA

TRAFFIC COUNT DATA

Major Street: Hardin Valley Road (WB and EB)
Minor Street: Bryant Lane (SB) and Award Winning Way (NB)
Traffic Control: Traffic Signal

5/2/2024 (Thursday)
Mostly Sunny and Warm
Conducted by: Ajax Engineering

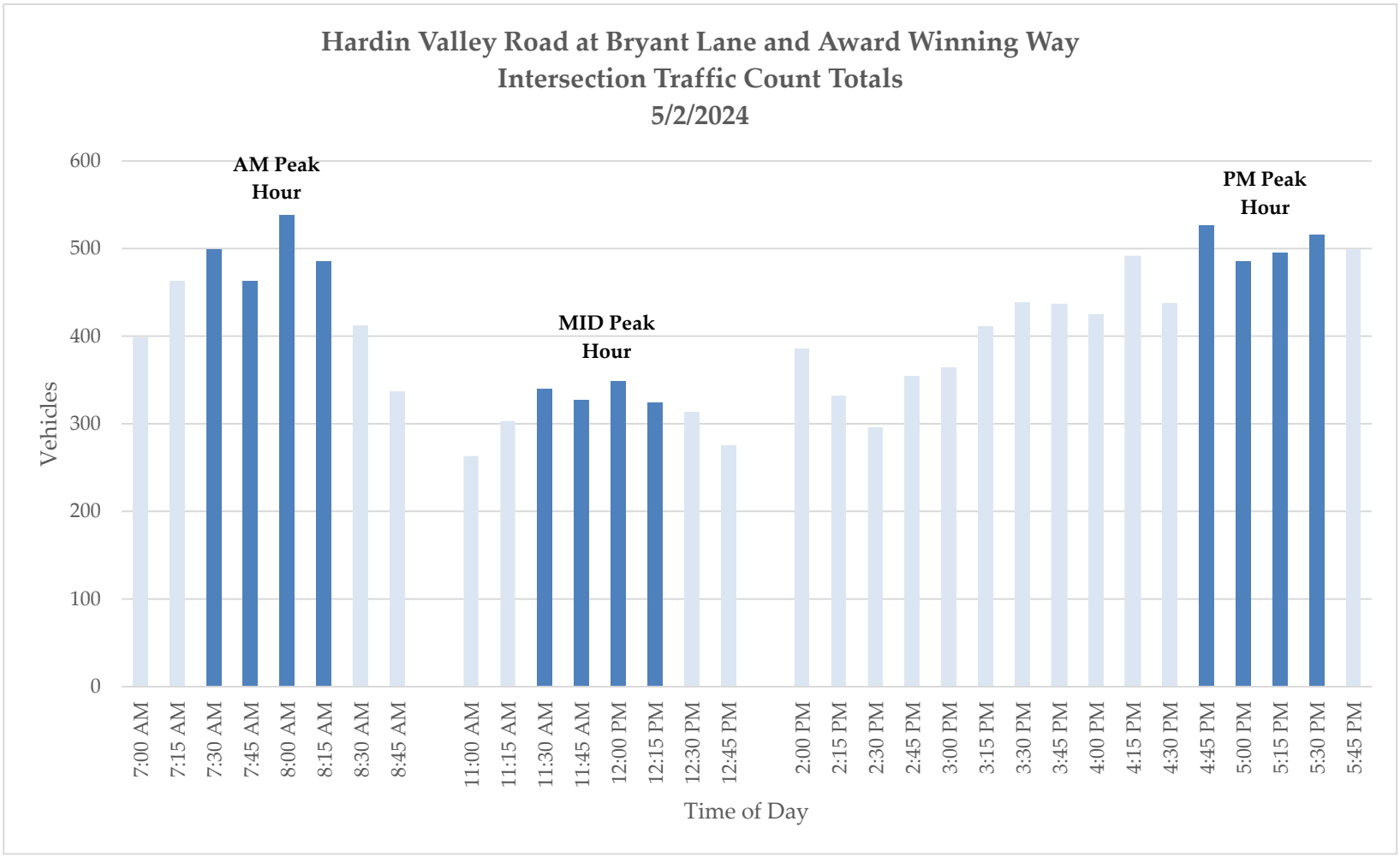
	Bryant Lane			Hardin Valley Road			Award Winning Way			Hardin Valley Road				
TIME	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND			VEHICLE	PEAK
BEGIN	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	TOTAL	HOUR
7:00 AM	0	0	0	4	185	0	0	0	0	0	205	4	398	
7:15 AM	1	0	0	2	209	0	1	0	0	0	249	1	463	
7:30 AM	2	0	1	5	219	0	0	0	0	0	268	4	499	**7:30 AM - 8:30 AM**
7:45 AM	0	0	0	5	202	0	3	0	0	0	246	7	463	
8:00 AM	0	0	1	5	305	0	1	0	1	0	221	4	538	
8:15 AM	0	0	0	3	252	0	5	0	0	0	217	8	485	
8:30 AM	0	0	1	11	126	0	1	0	0	1	266	6	412	
8:45 AM	0	0	0	4	119	0	2	0	0	0	208	4	337	
TOTAL	3	0	3	39	1617	0	13	0	1	1	1880	38	3595	
11:00 AM	0	0	0	3	105	0	3	0	4	0	146	2	263	
11:15 AM	0	0	1	2	125	2	2	0	0	0	165	6	303	
11:30 AM	0	0	1	2	126	1	3	0	5	0	196	6	340	**11:30 AM - 12:30 PM**
11:45 AM	0	0	0	5	151	1	3	0	4	0	158	5	327	
12:00 PM	0	0	0	6	165	0	3	0	6	0	166	2	348	
12:15 PM	2	0	0	4	164	1	4	0	2	0	144	3	324	
12:30 PM	1	0	1	3	138	0	3	0	7	0	156	4	313	
12:45 PM	1	0	0	7	129	0	1	0	5	0	125	7	275	
TOTAL	4	0	3	32	1103	5	22	0	33	0	1256	35	2493	
2:00 PM	1	0	0	1	177	0	4	0	3	0	199	1	386	
2:15 PM	0	0	0	1	190	0	0	0	2	0	134	5	332	
2:30 PM	1	0	0	3	154	0	1	0	2	0	133	2	296	
2:45 PM	0	0	0	3	183	0	1	0	2	0	160	5	354	
3:00 PM	0	0	0	4	195	0	2	0	6	0	156	1	364	
3:15 PM	0	0	0	2	226	1	2	0	4	0	171	5	411	
3:30 PM	0	0	0	0	201	1	2	0	2	0	231	1	438	
3:45 PM	0	0	0	4	208	0	1	0	6	0	210	7	436	
4:00 PM	0	0	1	3	222	0	0	0	1	1	191	6	425	
4:15 PM	0	0	0	2	279	1	2	0	0	0	201	6	491	
4:30 PM	1	0	0	2	256	0	1	0	2	0	173	2	437	
4:45 PM	0	0	0	2	278	0	0	0	4	0	240	2	526	**4:45 PM - 5:45 PM**
5:00 PM	0	0	0	0	259	0	2	0	10	0	209	5	485	
5:15 PM	0	0	0	0	263	0	3	0	5	0	220	4	495	
5:30 PM	0	0	0	3	282	1	2	0	4	0	219	5	516	
5:45 PM	1	0	1	2	264	0	2	0	7	0	220	2	499	
TOTAL	4	0	2	32	3637	4	25	0	60	1	3067	59	6891	

2024 AM Peak Hour **7:30 AM - 8:30 AM**

	Bryant Lane			Hardin Valley Road			Award Winning Way			Hardin Valley Road		
TIME	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND		
BEGIN	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT
7:30 AM	2	0	1	5	219	0	0	0	0	**0**	**268**	**4**
7:45 AM	0	0	0	5	202	0	3	0	0	**0**	**246**	**7**
8:00 AM	0	0	1	5	305	0	1	0	1	**0**	**221**	**4**
8:15 AM	0	0	0	3	252	0	5	0	0	**0**	**217**	**8**
TOTAL	**2**	**0**	**2**	**18**	**978**	**0**	**9**	**0**	**1**	**0**	**952**	**23**
TRUCK %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**5.2%**	**0.0%**	**11.1%**	**0.0%**	**0.0%**	**0.0%**	**3.5%**	**4.3%**
PHF $_{mvmt}$	**0.25**	**-**	**0.50**	**0.90**	**0.80**	**-**	**0.45**	**-**	**0.25**	**-**	**0.89**	**0.72**
PHF $_{app}$		**0.33**			**0.80**			**0.50**			**0.90**	
PHF $_{int}$	**0.92**											

2024 PM Peak Hour **4:45 PM - 5:45 PM**

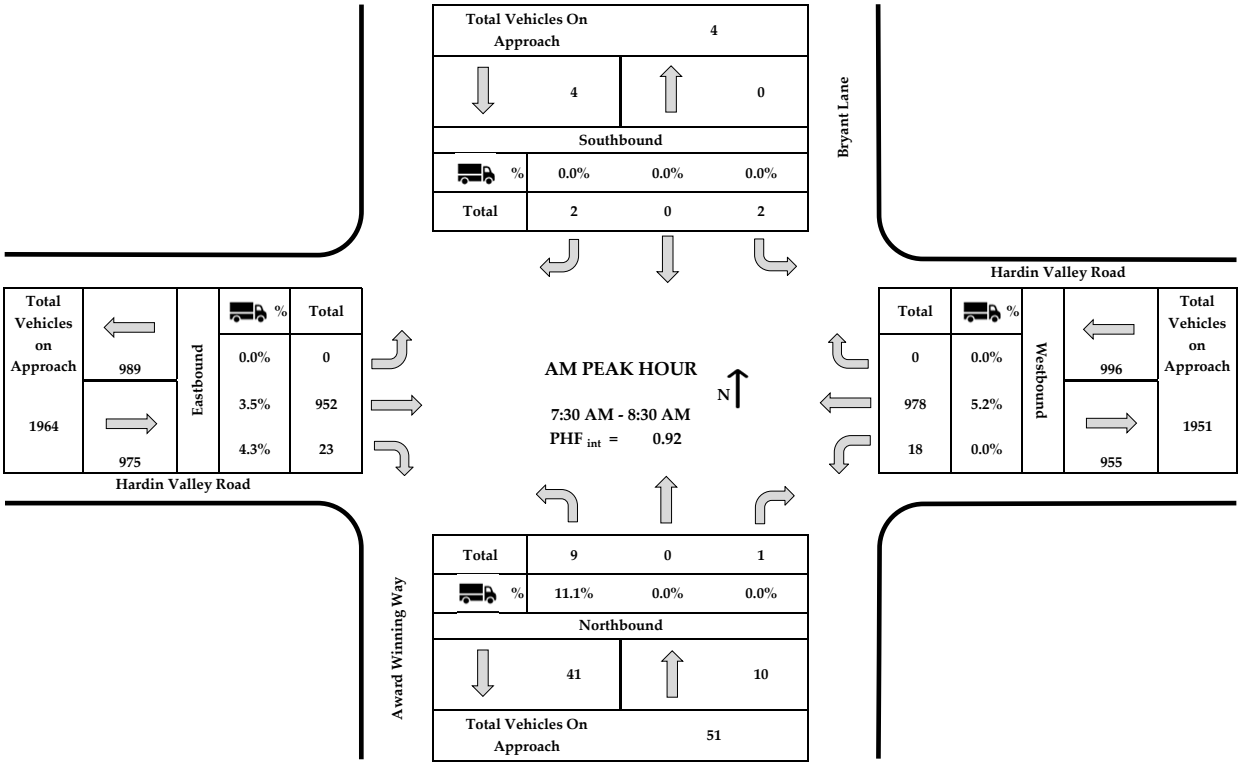
	Bryant Lane			Hardin Valley Road			Award Winning Way			Hardin Valley Road		
TIME	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND		
BEGIN	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT
4:45 PM	0	0	0	2	278	0	0	0	4	0	240	2
5:00 PM	0	0	0	0	259	0	2	0	10	0	209	5
5:15 PM	0	0	0	0	263	0	3	0	5	0	220	4
5:30 PM	0	0	0	3	282	1	2	0	4	0	219	5
TOTAL	**0**	**0**	**0**	**5**	**1082**	**1**	**7**	**0**	**23**	**0**	**888**	**16**
TRUCK %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.6%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**2.0%**	**0.0%**
PHF $_{mvmt}$	**-**	**-**	**-**	**0.42**	**0.96**	**0.25**	**0.58**	**-**	**0.58**	**-**	**0.93**	**0.80**
PHF $_{app}$		**-**			**0.95**			**0.63**			**0.93**	
PHF $_{int}$	**0.96**											

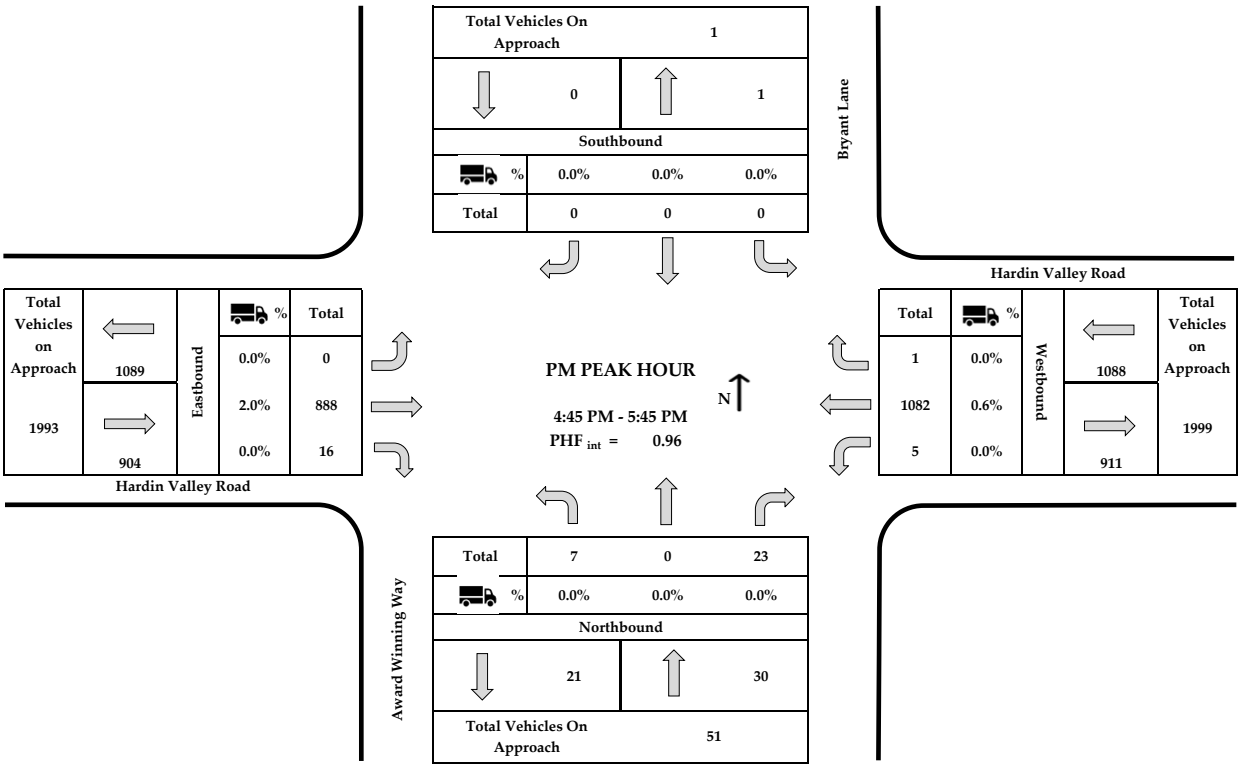

Hardin Valley Road at Bryant Lane and Award Winning Way
Intersection Traffic Count Totals
5/2/2024
AM Peak Hour
MID Peak Hour
PM Peak Hour
Vehicles
600
500
400
300
200
100
0
7:00 AM
7:15 AM
7:30 AM
7:45 AM
8:00 AM
8:15 AM
8:30 AM
8:45 AM
11:00 AM
11:15 AM
11:30 AM
11:45 AM
12:00 PM
12:15 PM
12:30 PM
12:45 PM
2:00 PM
2:15 PM
2:30 PM
2:45 PM
3:00 PM
3:15 PM
3:30 PM
3:45 PM
4:00 PM
4:15 PM
4:30 PM
4:45 PM
5:00 PM
5:15 PM
5:30 PM
5:45 PM
Time of Day

PEAK HOUR DATA

Major Street: Hardin Valley Road (WB and EB)
Minor Street: Bryant Lane (SB) and Award Winning Way (NB)
Traffic Control: Traffic Signal

5/2/2024 (Thursday)
Mostly Sunny and Warm
Conducted by: Ajax Engineering





TRAFFIC COUNT DATA

Major Street: Award Winning Way (SB and NB)
Minor Street: Spring Bluff Way (WB)
Traffic Control: Stop Sign on Minor Street

5/2/2024 (Thursday)
Mostly Sunny and Warm
Conducted by: Ajax Engineering

	Award Winning Way		Spring Bluff Way		Award Winning Way		VEHICLE
TIME	SOUTHBOUND		WESTBOUND		NORTHBOUND		TOTAL
BEGIN	LT	THRU	LT	RT	THRU	RT	
7:30 AM	4	4	0	0	0	0	8
7:45 AM	8	3	1	2	1	0	15
8:00 AM	3	4	0	2	0	0	9
8:15 AM	5	6	0	4	1	0	16
TOTAL	**20**	**17**	**1**	**8**	**2**	**0**	**48**
PHF	**0.63**	**0.71**	**0.25**	**0.50**	**0.50**	**-**	
TRUCK %	**5.0%**	**0.0%**	**0.0%**	**12.5%**	**0.0%**	**0.0%**	

	Award Winning Way		Spring Bluff Way		Award Winning Way		VEHICLE
TIME	SOUTHBOUND		WESTBOUND		NORTHBOUND		TOTAL
BEGIN	LT	THRU	LT	RT	THRU	RT	
4:45 PM	2	2	0	2	2	0	8
5:00 PM	0	5	0	1	11	1	18
5:15 PM	0	4	0	3	5	0	12
5:30 PM	3	4	0	0	7	0	14
TOTAL	**5**	**15**	**0**	**6**	**25**	**1**	**52**
PHF	**0.42**	**0.75**	**-**	**0.50**	**0.57**	**0.25**	
TRUCK %	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	

APPENDIX F

CAPACITY ANALYSES – HCM WORKSHEETS (SYNCHRO 11)

EXISTING CONDITIONS

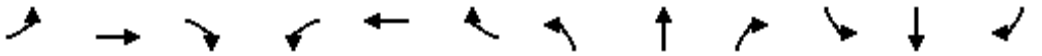
Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	994	23	20	1066	0	9	0	1	2	0	2
Future Vol, veh/h	0	994	23	20	1066	0	9	0	1	2	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	2	-	-	-2	-	-	-4	-	-	4	-
Peak Hour Factor	90	90	90	80	80	80	50	50	50	33	33	33
Heavy Vehicles, %	0	4	4	0	5	0	11	0	0	0	0	0
Mvmt Flow	0	1104	26	25	1333	0	18	0	2	6	0	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1333	0	0	1130	0	0	2503	2500	1117	2501	2513	1333
Stage 1	-	-	-	-	-	-	1117	1117	-	1383	1383	-
Stage 2	-	-	-	-	-	-	1386	1383	-	1118	1130	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.41	5.7	5.8	7.9	7.3	6.6
Critical Hdwy Stg 1	-	-	-	-	-	-	5.41	4.7	-	6.9	6.3	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.41	4.7	-	6.9	6.3	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.599	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	524	-	-	626	-	-	32	51	288	11	16	164
Stage 1	-	-	-	-	-	-	310	366	-	132	157	-
Stage 2	-	-	-	-	-	-	230	290	-	198	219	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	524	-	-	626	-	-	30	49	288	11	15	164
Mov Cap-2 Maneuver	-	-	-	-	-	-	128	166	-	73	84	-
Stage 1	-	-	-	-	-	-	310	366	-	132	151	-
Stage 2	-	-	-	-	-	-	213	278	-	197	219	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	35.7	45.4
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	128	288	524	-	-	626	-	-	101
HCM Lane V/C Ratio	0.141	0.007	-	-	-	0.04	-	-	0.12
HCM Control Delay (s)	37.7	17.6	0	-	-	11	-	-	45.4
HCM Lane LOS	E	C	A	-	-	B	-	-	E
HCM 95th %tile Q(veh)	0.5	0	0	-	-	0.1	-	-	0.4



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	967	15	47	1039	6	19	4	77	3	0	28
Future Volume (vph)	15	967	15	47	1039	6	19	4	77	3	0	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-2%			-3%			7%	
Storage Length (ft)	80		190	90		90	80		190	0		0
Storage Lanes	1		1	1		1	1		0	0		1
Taper Length (ft)	100			100			75			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.857				0.850
Flt Protected	0.950			0.950			0.950				0.950	
Satd. Flow (prot)	1778	1853	1591	1787	1828	1615	1814	1636	0	0	1725	1543
Flt Permitted	0.104			0.089			0.754				0.689	
Satd. Flow (perm)	195	1853	1591	167	1828	1615	1440	1636	0	0	1251	1543
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			83			83		100				83
Link Speed (mph)		40			40			30			20	
Link Distance (ft)		834			433			510			297	
Travel Time (s)		14.2			7.4			11.6			10.1	
Peak Hour Factor	0.88	0.88	0.88	0.92	0.92	0.92	0.77	0.77	0.77	0.65	0.65	0.65
Heavy Vehicles (%)	1%	2%	1%	2%	5%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	17	1099	17	51	1129	7	25	5	100	5	0	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	17	1099	17	51	1129	7	25	105	0	0	5	43
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		4
Detector Phase	5	2	2	1	6	6	8	8		4	4	4
Switch Phase												
Minimum Initial (s)	6.0	15.0	15.0	6.0	15.0	15.0	8.0	8.0		8.0	8.0	8.0
Minimum Split (s)	12.0	21.0	21.0	12.0	21.0	21.0	14.0	14.0		14.0	14.0	14.0
Total Split (s)	21.0	66.0	66.0	21.0	66.0	66.0	31.0	31.0		31.0	31.0	31.0
Total Split (%)	17.8%	55.9%	55.9%	17.8%	55.9%	55.9%	26.3%	26.3%		26.3%	26.3%	26.3%
Maximum Green (s)	15.0	60.0	60.0	15.0	60.0	60.0	25.0	25.0		25.0	25.0	25.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0			6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0	6.0	3.0	3.0		3.0	3.0	3.0
Minimum Gap (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	3.0		3.0	3.0	3.0
Time Before Reduce (s)	0.0	20.0	20.0	0.0	20.0	20.0	0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	10.0	10.0	0.0	10.0	10.0	0.0	0.0		0.0	0.0	0.0
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		15.0	15.0		22.0	22.0	20.0	20.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		0	0		0	0	0	0		0	0	0
Act Effct Green (s)	67.8	63.0	63.0	70.7	68.1	68.1	8.4	8.4			8.4	8.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.73	0.68	0.68	0.76	0.73	0.73	0.09	0.09			0.09	0.09
v/c Ratio	0.07	0.88	0.02	0.22	0.85	0.01	0.19	0.44			0.04	0.20
Control Delay	3.3	23.8	0.0	4.8	19.3	0.0	42.7	15.7			39.3	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay	3.3	23.8	0.0	4.8	19.3	0.0	42.7	15.7			39.3	4.1
LOS	A	C	A	A	B	A	D	B			D	A
Approach Delay		23.2			18.5			20.9			7.8	
Approach LOS		C			B			C			A	
Queue Length 50th (ft)	2	489	0	5	289	0	14	3			3	0
Queue Length 95th (ft)	6	#857	0	13	#933	0	34	35			10	0
Internal Link Dist (ft)		754			353			430			217	
Turn Bay Length (ft)	80		190	90		90	80					
Base Capacity (vph)	406	1250	1101	390	1333	1200	386	512			335	474
Starvation Cap Reductn	0	0	0	0	0	0	0	0			0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0			0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0			0	0
Reduced v/c Ratio	0.04	0.88	0.02	0.13	0.85	0.01	0.06	0.21			0.01	0.09

Intersection Summary			
Area Type:	Other		
Cycle Length: 118			
Actuated Cycle Length: 93.3			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 20.5		Intersection LOS: C	
Intersection Capacity Utilization 83.0%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 6: Greenland Way/Performing Arts Way & Hardin Valley Road

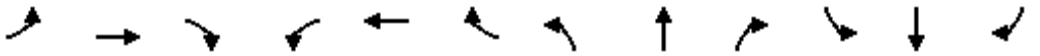
Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	903	16	5	1122	1	7	0	23	0	0	0
Future Vol, veh/h	0	903	16	5	1122	1	7	0	23	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	2	-	-	-2	-	-	-4	-	-	4	-
Peak Hour Factor	93	93	93	95	95	95	63	63	63	90	90	90
Heavy Vehicles, %	0	2	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	0	971	17	5	1181	1	11	0	37	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1182	0	0	988	0	0	2172	2172	980	2190	2180	1182
Stage 1	-	-	-	-	-	-	980	980	-	1192	1192	-
Stage 2	-	-	-	-	-	-	1192	1192	-	998	988	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.3	5.7	5.8	7.9	7.3	6.6
Critical Hdwy Stg 1	-	-	-	-	-	-	5.3	4.7	-	6.9	6.3	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.3	4.7	-	6.9	6.3	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	598	-	-	708	-	-	55	77	341	20	29	205
Stage 1	-	-	-	-	-	-	377	411	-	177	202	-
Stage 2	-	-	-	-	-	-	300	343	-	237	263	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	598	-	-	708	-	-	55	76	341	18	29	205
Mov Cap-2 Maneuver	-	-	-	-	-	-	177	204	-	95	116	-
Stage 1	-	-	-	-	-	-	377	411	-	177	201	-
Stage 2	-	-	-	-	-	-	298	341	-	212	263	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	19.1	0
HCM LOS			C	A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	177	341	598	-	-	708	-	-	-
HCM Lane V/C Ratio	0.063	0.107	-	-	-	0.007	-	-	-
HCM Control Delay (s)	26.7	16.8	0	-	-	10.1	-	-	0
HCM Lane LOS	D	C	A	-	-	B	-	-	A
HCM 95th %tile Q(veh)	0.2	0.4	0	-	-	0	-	-	-



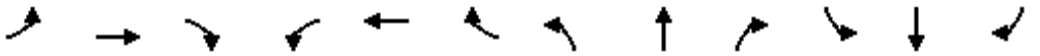
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	889	13	102	1081	22	19	2	84	36	5	28
Future Volume (vph)	24	889	13	102	1081	22	19	2	84	36	5	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-2%			-3%			7%	
Storage Length (ft)	80		190	90		90	80		190	0		0
Storage Lanes	1		1	1		1	1		0	0		1
Taper Length (ft)	100			100			75			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.853				0.850
Flt Protected	0.950			0.950			0.950				0.958	
Satd. Flow (prot)	1778	1835	1591	1787	1828	1615	1814	1629	0	0	1739	1543
Flt Permitted	0.095			0.151			0.723				0.678	
Satd. Flow (perm)	178	1835	1591	284	1828	1615	1381	1629	0	0	1231	1543
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			83			83		102				83
Link Speed (mph)		40			40			30			20	
Link Distance (ft)		834			433			510			297	
Travel Time (s)		14.2			7.4			11.6			10.1	
Peak Hour Factor	0.96	0.96	0.96	0.95	0.95	0.95	0.82	0.82	0.82	0.78	0.78	0.78
Heavy Vehicles (%)	1%	3%	1%	2%	5%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	25	926	14	107	1138	23	23	2	102	46	6	36
Shared Lane Traffic (%)												
Lane Group Flow (vph)	25	926	14	107	1138	23	23	104	0	0	52	36
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		4
Detector Phase	5	2	2	1	6	6	8	8		4	4	4
Switch Phase												
Minimum Initial (s)	6.0	15.0	15.0	6.0	15.0	15.0	8.0	8.0		8.0	8.0	8.0
Minimum Split (s)	12.0	21.0	21.0	12.0	21.0	21.0	14.0	14.0		14.0	14.0	14.0
Total Split (s)	21.0	66.0	66.0	21.0	66.0	66.0	31.0	31.0		31.0	31.0	31.0
Total Split (%)	17.8%	55.9%	55.9%	17.8%	55.9%	55.9%	26.3%	26.3%		26.3%	26.3%	26.3%
Maximum Green (s)	15.0	60.0	60.0	15.0	60.0	60.0	25.0	25.0		25.0	25.0	25.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0			6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0	6.0	3.0	3.0		3.0	3.0	3.0
Minimum Gap (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	3.0		3.0	3.0	3.0
Time Before Reduce (s)	0.0	20.0	20.0	0.0	20.0	20.0	0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	10.0	10.0	0.0	10.0	10.0	0.0	0.0		0.0	0.0	0.0
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		15.0	15.0		22.0	22.0	20.0	20.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		0	0		0	0	0	0		0	0	0
Act Effct Green (s)	66.2	60.1	60.1	72.7	69.0	69.0	9.9	9.9			9.9	9.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.69	0.63	0.63	0.76	0.72	0.72	0.10	0.10			0.10	0.10
v/c Ratio	0.11	0.80	0.01	0.32	0.86	0.02	0.16	0.40			0.41	0.15
Control Delay	4.5	21.2	0.0	5.5	21.3	0.0	42.0	13.7			50.5	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay	4.5	21.2	0.0	5.5	21.3	0.0	42.0	13.7			50.5	1.4
LOS	A	C	A	A	C	A	D	B			D	A
Approach Delay		20.4			19.5			18.8			30.4	
Approach LOS		C			B			B			C	
Queue Length 50th (ft)	3	364	0	12	319	0	13	1			30	0
Queue Length 95th (ft)	10	#770	0	28	#1019	0	34	38			59	0
Internal Link Dist (ft)		754			353			430			217	
Turn Bay Length (ft)	80		190	90		90	80					
Base Capacity (vph)	388	1157	1033	455	1319	1189	362	502			322	465
Starvation Cap Reductn	0	0	0	0	0	0	0	0			0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0			0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0			0	0
Reduced v/c Ratio	0.06	0.80	0.01	0.24	0.86	0.02	0.06	0.21			0.16	0.08

Intersection Summary			
Area Type:	Other		
Cycle Length: 118			
Actuated Cycle Length: 95.6			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 20.2		Intersection LOS: C	
Intersection Capacity Utilization 85.8%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 6: Greenland Way/Performing Arts Way & Hardin Valley Road

PROJECTED CONDITIONS WITHOUT THE PROJECT



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	1026	16	50	1102	6	20	4	82	3	0	30
Future Volume (vph)	16	1026	16	50	1102	6	20	4	82	3	0	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-2%			-3%			7%	
Storage Length (ft)	80		190	90		90	80		190	0		0
Storage Lanes	1		1	1		1	1		0	0		1
Taper Length (ft)	100			100			75			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.857				0.850
Flt Protected	0.950			0.950			0.950				0.950	
Satd. Flow (prot)	1778	1853	1591	1787	1828	1615	1814	1636	0	0	1725	1543
Flt Permitted	0.063			0.059			0.754				0.685	
Satd. Flow (perm)	118	1853	1591	111	1828	1615	1440	1636	0	0	1244	1543
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			83			83		106				83
Link Speed (mph)		40			40			30			20	
Link Distance (ft)		834			433			510			297	
Travel Time (s)		14.2			7.4			11.6			10.1	
Peak Hour Factor	0.88	0.88	0.88	0.92	0.92	0.92	0.77	0.77	0.77	0.65	0.65	0.65
Heavy Vehicles (%)	1%	2%	1%	2%	5%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	18	1166	18	54	1198	7	26	5	106	5	0	46
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	1166	18	54	1198	7	26	111	0	0	5	46
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		4
Detector Phase	5	2	2	1	6	6	8	8		4	4	4
Switch Phase												
Minimum Initial (s)	6.0	15.0	15.0	6.0	15.0	15.0	8.0	8.0		8.0	8.0	8.0
Minimum Split (s)	12.0	21.0	21.0	12.0	21.0	21.0	14.0	14.0		14.0	14.0	14.0
Total Split (s)	21.0	66.0	66.0	21.0	66.0	66.0	31.0	31.0		31.0	31.0	31.0
Total Split (%)	17.8%	55.9%	55.9%	17.8%	55.9%	55.9%	26.3%	26.3%		26.3%	26.3%	26.3%
Maximum Green (s)	15.0	60.0	60.0	15.0	60.0	60.0	25.0	25.0		25.0	25.0	25.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0			6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0	6.0	3.0	3.0		3.0	3.0	3.0
Minimum Gap (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	3.0		3.0	3.0	3.0
Time Before Reduce (s)	0.0	20.0	20.0	0.0	20.0	20.0	0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	10.0	10.0	0.0	10.0	10.0	0.0	0.0		0.0	0.0	0.0
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		15.0	15.0		22.0	22.0	20.0	20.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		0	0		0	0	0	0		0	0	0
Act Effct Green (s)	67.8	62.9	62.9	70.7	68.1	68.1	8.5	8.5			8.5	8.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.73	0.67	0.67	0.76	0.73	0.73	0.09	0.09			0.09	0.09
v/c Ratio	0.09	0.93	0.02	0.28	0.90	0.01	0.20	0.45			0.04	0.21
Control Delay	3.8	30.1	0.0	8.2	23.5	0.0	42.9	15.6			39.3	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay	3.8	30.1	0.0	8.2	23.5	0.0	42.9	15.6			39.3	4.9
LOS	A	C	A	A	C	A	D	B			D	A
Approach Delay		29.3			22.7			20.8			8.2	
Approach LOS		C			C			C			A	
Queue Length 50th (ft)	2	571	0	5	339	0	14	3			3	0
Queue Length 95th (ft)	6	#946	0	20	#1026	0	34	35			10	0
Internal Link Dist (ft)		754			353			430			217	
Turn Bay Length (ft)	80		190	90		90	80					
Base Capacity (vph)	359	1250	1100	356	1333	1200	385	515			333	474
Starvation Cap Reductn	0	0	0	0	0	0	0	0			0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0			0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0			0	0
Reduced v/c Ratio	0.05	0.93	0.02	0.15	0.90	0.01	0.07	0.22			0.02	0.10

Intersection Summary			
Area Type:	Other		
Cycle Length: 118			
Actuated Cycle Length: 93.3			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.93			
Intersection Signal Delay: 25.3		Intersection LOS: C	
Intersection Capacity Utilization 86.3%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 6: Greenland Way/Performing Arts Way & Hardin Valley Road

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1055	24	21	1131	0	10	0	1	2	0	2
Future Vol, veh/h	0	1055	24	21	1131	0	10	0	1	2	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	2	-	-	-2	-	-	-4	-	-	4	-
Peak Hour Factor	90	90	90	80	80	80	50	50	50	33	33	33
Heavy Vehicles, %	0	4	4	0	5	0	11	0	0	0	0	0
Mvmt Flow	0	1172	27	26	1414	0	20	0	2	6	0	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1414	0	0	1199	0	0	2655	2652	1186	2653	2665	1414
Stage 1	-	-	-	-	-	-	1186	1186	-	1466	1466	-
Stage 2	-	-	-	-	-	-	1469	1466	-	1187	1199	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.41	5.7	5.8	7.9	7.3	6.6
Critical Hdwy Stg 1	-	-	-	-	-	-	5.41	4.7	-	6.9	6.3	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.41	4.7	-	6.9	6.3	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.599	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	488	-	-	589	-	-	25	42	265	9	13	146
Stage 1	-	-	-	-	-	-	287	344	-	116	140	-
Stage 2	-	-	-	-	-	-	210	269	-	178	200	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	488	-	-	589	-	-	23	40	265	9	12	146
Mov Cap-2 Maneuver	-	-	-	-	-	-	115	152	-	64	74	-
Stage 1	-	-	-	-	-	-	287	344	-	116	134	-
Stage 2	-	-	-	-	-	-	192	257	-	177	200	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	40.6	51.7
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	115	265	488	-	-	589	-	-	89
HCM Lane V/C Ratio	0.174	0.008	-	-	-	0.045	-	-	0.136
HCM Control Delay (s)	42.8	18.7	0	-	-	11.4	-	-	51.7
HCM Lane LOS	E	C	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.6	0	0	-	-	0.1	-	-	0.5

Intersection	
Int Delay, s/veh	5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	9	2	0	24	21
Future Vol, veh/h	1	9	2	0	24	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	-4	-	-	-10
Peak Hour Factor	25	50	50	90	63	71
Heavy Vehicles, %	0	1	0	0	1	0
Mvmt Flow	4	18	4	0	38	30

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	110	4	0	0	4	0
Stage 1	4	-	-	-	-	-
Stage 2	106	-	-	-	-	-
Critical Hdwy	6.4	6.21	-	-	4.11	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.309	-	-	2.209	-
Pot Cap-1 Maneuver	892	1082	-	-	1624	-
Stage 1	1024	-	-	-	-	-
Stage 2	923	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	871	1082	-	-	1624	-
Mov Cap-2 Maneuver	871	-	-	-	-	-
Stage 1	1024	-	-	-	-	-
Stage 2	901	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.6	0	4.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1036	1624	-
HCM Lane V/C Ratio	-	-	0.021	0.023	-
HCM Control Delay (s)	-	-	8.6	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

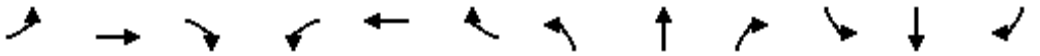
Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	37	4	7	76	20	35
Future Vol, veh/h	37	4	7	76	20	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	5	-	-	-3	-5	-
Peak Hour Factor	59	59	68	68	73	73
Heavy Vehicles, %	3	1	1	1	1	1
Mvmt Flow	63	7	10	112	27	48

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	183	51	75	0	-	0
Stage 1	51	-	-	-	-	-
Stage 2	132	-	-	-	-	-
Critical Hdwy	7.43	6.71	4.11	-	-	-
Critical Hdwy Stg 1	6.43	-	-	-	-	-
Critical Hdwy Stg 2	6.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.309	2.209	-	-	-
Pot Cap-1 Maneuver	764	1013	1531	-	-	-
Stage 1	955	-	-	-	-	-
Stage 2	860	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	759	1013	1531	-	-	-
Mov Cap-2 Maneuver	759	-	-	-	-	-
Stage 1	948	-	-	-	-	-
Stage 2	860	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.1	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1531	-	778	-	-
HCM Lane V/C Ratio	0.007	-	0.089	-	-
HCM Control Delay (s)	7.4	-	10.1	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	943	14	108	1147	23	20	2	89	38	5	30
Future Volume (vph)	25	943	14	108	1147	23	20	2	89	38	5	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-2%			-3%			7%	
Storage Length (ft)	80		190	90		90	80		190	0		0
Storage Lanes	1		1	1		1	1		0	0		1
Taper Length (ft)	100			100			75			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.853				0.850
Flt Protected	0.950			0.950			0.950				0.957	
Satd. Flow (prot)	1778	1835	1591	1787	1828	1615	1814	1629	0	0	1737	1543
Flt Permitted	0.062			0.121			0.721				0.672	
Satd. Flow (perm)	116	1835	1591	228	1828	1615	1377	1629	0	0	1220	1543
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			83			83		109				83
Link Speed (mph)		40			40			30			20	
Link Distance (ft)		834			433			510			297	
Travel Time (s)		14.2			7.4			11.6			10.1	
Peak Hour Factor	0.96	0.96	0.96	0.95	0.95	0.95	0.82	0.82	0.82	0.78	0.78	0.78
Heavy Vehicles (%)	1%	3%	1%	2%	5%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	26	982	15	114	1207	24	24	2	109	49	6	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	26	982	15	114	1207	24	24	111	0	0	55	38
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		4
Detector Phase	5	2	2	1	6	6	8	8		4	4	4
Switch Phase												
Minimum Initial (s)	6.0	15.0	15.0	6.0	15.0	15.0	8.0	8.0		8.0	8.0	8.0
Minimum Split (s)	12.0	21.0	21.0	12.0	21.0	21.0	14.0	14.0		14.0	14.0	14.0
Total Split (s)	21.0	66.0	66.0	21.0	66.0	66.0	31.0	31.0		31.0	31.0	31.0
Total Split (%)	17.8%	55.9%	55.9%	17.8%	55.9%	55.9%	26.3%	26.3%		26.3%	26.3%	26.3%
Maximum Green (s)	15.0	60.0	60.0	15.0	60.0	60.0	25.0	25.0		25.0	25.0	25.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0			6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0	6.0	3.0	3.0		3.0	3.0	3.0
Minimum Gap (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	3.0		3.0	3.0	3.0
Time Before Reduce (s)	0.0	20.0	20.0	0.0	20.0	20.0	0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	10.0	10.0	0.0	10.0	10.0	0.0	0.0		0.0	0.0	0.0
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		15.0	15.0		22.0	22.0	20.0	20.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		0	0		0	0	0	0		0	0	0
Act Effct Green (s)	67.1	61.0	61.0	74.0	70.1	70.1	10.1	10.1			10.1	10.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Actuated g/C Ratio	0.69	0.63	0.63	0.76	0.72	0.72	0.10	0.10			0.10	0.10
v/c Ratio	0.14	0.85	0.01	0.38	0.91	0.02	0.17	0.42			0.43	0.16
Control Delay	5.4	24.6	0.0	6.7	26.1	0.0	42.2	13.5			51.6	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay	5.4	24.6	0.0	6.7	26.1	0.0	42.2	13.5			51.6	1.9
LOS	A	C	A	A	C	A	D	B			D	A
Approach Delay		23.8			24.0			18.6			31.3	
Approach LOS		C			C			B			C	
Queue Length 50th (ft)	3	417	0	13	383	0	13	1			32	0
Queue Length 95th (ft)	10	#868	0	31	#1132	0	35	40			63	0
Internal Link Dist (ft)		754			353			430			217	
Turn Bay Length (ft)	80		190	90		90	80					
Base Capacity (vph)	346	1153	1031	417	1321	1190	355	501			315	460
Starvation Cap Reductn	0	0	0	0	0	0	0	0			0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0			0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0			0	0
Reduced v/c Ratio	0.08	0.85	0.01	0.27	0.91	0.02	0.07	0.22			0.17	0.08

Intersection Summary			
Area Type:	Other		
Cycle Length: 118			
Actuated Cycle Length: 97			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.91			
Intersection Signal Delay: 23.9		Intersection LOS: C	
Intersection Capacity Utilization 89.4%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 6: Greenland Way/Performing Arts Way & Hardin Valley Road

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	958	17	5	1191	1	7	0	24	0	0	0
Future Vol, veh/h	0	958	17	5	1191	1	7	0	24	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	2	-	-	-2	-	-	-4	-	-	4	-
Peak Hour Factor	93	93	93	95	95	95	63	63	63	90	90	90
Heavy Vehicles, %	0	2	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	0	1030	18	5	1254	1	11	0	38	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1255	0	0	1048	0	0	2304	2304	1039	2323	2313	1255
Stage 1	-	-	-	-	-	-	1039	1039	-	1265	1265	-
Stage 2	-	-	-	-	-	-	1265	1265	-	1058	1048	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.3	5.7	5.8	7.9	7.3	6.6
Critical Hdwy Stg 1	-	-	-	-	-	-	5.3	4.7	-	6.9	6.3	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.3	4.7	-	6.9	6.3	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	561	-	-	672	-	-	46	65	317	16	23	184
Stage 1	-	-	-	-	-	-	354	391	-	158	183	-
Stage 2	-	-	-	-	-	-	278	321	-	217	243	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	561	-	-	672	-	-	46	65	317	14	23	184
Mov Cap-2 Maneuver	-	-	-	-	-	-	162	190	-	84	104	-
Stage 1	-	-	-	-	-	-	354	391	-	158	182	-
Stage 2	-	-	-	-	-	-	276	319	-	191	243	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	20.4	0
HCM LOS			C	A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	162	317	561	-	-	672	-	-	-
HCM Lane V/C Ratio	0.069	0.12	-	-	-	0.008	-	-	-
HCM Control Delay (s)	28.9	17.9	0	-	-	10.4	-	-	0
HCM Lane LOS	D	C	A	-	-	B	-	-	A
HCM 95th %tile Q(veh)	0.2	0.4	0	-	-	0	-	-	-

Intersection	
Int Delay, s/veh	3.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	6	25	1	16	6
Future Vol, veh/h	0	6	25	1	16	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	-4	-	-	-10
Peak Hour Factor	90	50	57	25	42	75
Heavy Vehicles, %	0	1	0	0	1	0
Mvmt Flow	0	12	44	4	38	8

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	128	44	0	0	48	0
Stage 1	44	-	-	-	-	-
Stage 2	84	-	-	-	-	-
Critical Hdwy	6.4	6.21	-	-	4.11	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.309	-	-	2.209	-
Pot Cap-1 Maneuver	871	1029	-	-	1566	-
Stage 1	984	-	-	-	-	-
Stage 2	944	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	850	1029	-	-	1566	-
Mov Cap-2 Maneuver	850	-	-	-	-	-
Stage 1	984	-	-	-	-	-
Stage 2	921	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.5	0	6.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1029	1566	-
HCM Lane V/C Ratio	-	-	0.012	0.024	-
HCM Control Delay (s)	-	-	8.5	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0.1	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	64	3	4	47	70	62
Future Vol, veh/h	64	3	4	47	70	62
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	5	-	-	-3	-5	-
Peak Hour Factor	77	77	92	92	87	87
Heavy Vehicles, %	1	1	1	2	1	1
Mvmt Flow	83	4	4	51	80	71

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	175	116	151	0	-	0
Stage 1	116	-	-	-	-	-
Stage 2	59	-	-	-	-	-
Critical Hdwy	7.41	6.71	4.11	-	-	-
Critical Hdwy Stg 1	6.41	-	-	-	-	-
Critical Hdwy Stg 2	6.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.209	-	-	-
Pot Cap-1 Maneuver	778	924	1436	-	-	-
Stage 1	883	-	-	-	-	-
Stage 2	950	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	776	924	1436	-	-	-
Mov Cap-2 Maneuver	776	-	-	-	-	-
Stage 1	880	-	-	-	-	-
Stage 2	950	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.2	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1436	-	782	-	-
HCM Lane V/C Ratio	0.003	-	0.111	-	-
HCM Control Delay (s)	7.5	-	10.2	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

PROJECTED CONDITIONS WITH THE PROJECT

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	1051	46	104	1124	6	162	8	126	3	5	38
Future Volume (vph)	23	1051	46	104	1124	6	162	8	126	3	5	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	10	10	12	12	12	12	12	12
Grade (%)		1%			-2%			-3%			7%	
Storage Length (ft)	80		200	125		125	80		190	0		0
Storage Lanes	1		1	1		1	1		0	0		1
Taper Length (ft)	50			50			75			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.859				0.850
Flt Protected	0.950			0.950			0.950				0.981	
Satd. Flow (prot)	1719	3404	1538	1728	3241	1507	1814	1640	0	0	1781	1543
Flt Permitted	0.184			0.136			0.749				0.892	
Satd. Flow (perm)	333	3404	1538	247	3241	1507	1430	1640	0	0	1619	1543
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			83			83		164				83
Link Speed (mph)		40			40			30			20	
Link Distance (ft)		476			433			390			297	
Travel Time (s)		8.1			7.4			8.9			10.1	
Peak Hour Factor	0.88	0.88	0.88	0.92	0.92	0.92	0.77	0.77	0.77	0.65	0.65	0.65
Heavy Vehicles (%)	1%	2%	1%	2%	5%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	26	1194	52	113	1222	7	210	10	164	5	8	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	26	1194	52	113	1222	7	210	174	0	0	13	58
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		4
Detector Phase	5	2	2	1	6	6	8	8		4	4	4
Switch Phase												
Minimum Initial (s)	6.0	15.0	15.0	6.0	15.0	15.0	8.0	8.0		8.0	8.0	8.0
Minimum Split (s)	12.0	21.0	21.0	12.0	21.0	21.0	14.0	14.0		14.0	14.0	14.0
Total Split (s)	21.0	66.0	66.0	21.0	66.0	66.0	31.0	31.0		31.0	31.0	31.0
Total Split (%)	17.8%	55.9%	55.9%	17.8%	55.9%	55.9%	26.3%	26.3%		26.3%	26.3%	26.3%
Maximum Green (s)	15.0	60.0	60.0	15.0	60.0	60.0	25.0	25.0		25.0	25.0	25.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0			6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0	6.0	3.0	3.0		3.0	3.0	3.0
Minimum Gap (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	3.0		3.0	3.0	3.0
Time Before Reduce (s)	0.0	20.0	20.0	0.0	20.0	20.0	0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	10.0	10.0	0.0	10.0	10.0	0.0	0.0		0.0	0.0	0.0
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		15.0	15.0		22.0	22.0	20.0	20.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		0	0		0	0	0	0		0	0	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	52.2	45.7	45.7	58.8	55.7	55.7	18.6	18.6			18.6	18.6
Actuated g/C Ratio	0.57	0.50	0.50	0.65	0.61	0.61	0.20	0.20			0.20	0.20
v/c Ratio	0.09	0.70	0.06	0.39	0.62	0.01	0.72	0.37			0.04	0.15
Control Delay	7.1	20.2	1.2	10.3	14.5	0.0	50.2	9.2			32.9	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay	7.1	20.2	1.2	10.3	14.5	0.0	50.2	9.2			32.9	4.6
LOS	A	C	A	B	B	A	D	A			C	A
Approach Delay		19.2			14.1			31.6			9.7	
Approach LOS		B			B			C			A	
Queue Length 50th (ft)	5	265	0	22	183	0	111	5			6	0
Queue Length 95th (ft)	14	376	7	46	390	0	186	38			17	1
Internal Link Dist (ft)		396			353			310			217	
Turn Bay Length (ft)	80		200	125		125	80					
Base Capacity (vph)	455	2323	1076	415	2230	1063	406	583			460	498
Starvation Cap Reductn	0	0	0	0	0	0	0	0			0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0			0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0			0	0
Reduced v/c Ratio	0.06	0.51	0.05	0.27	0.55	0.01	0.52	0.30			0.03	0.12

Intersection Summary

Area Type: Other
Cycle Length: 118
Actuated Cycle Length: 90.9
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 18.3 Intersection LOS: B
Intersection Capacity Utilization 66.7% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 6: Greenland Way/Performing Arts Way & Hardin Valley Road

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1172	57	21	1241	0	32	0	1	2	0	2
Future Vol, veh/h	0	1172	57	21	1241	0	32	0	1	2	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	2	-	-	-2	-	-	-4	-	-	4	-
Peak Hour Factor	90	90	90	80	80	80	50	50	50	33	33	33
Heavy Vehicles, %	0	4	4	0	5	0	11	0	0	0	0	0
Mvmt Flow	0	1302	63	26	1551	0	64	0	2	6	0	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1551	0	0	1365	0	0	2940	2937	1334	2938	2968	1551
Stage 1	-	-	-	-	-	-	1334	1334	-	1603	1603	-
Stage 2	-	-	-	-	-	-	1606	1603	-	1335	1365	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.41	5.7	5.8	7.9	7.3	6.6
Critical Hdwy Stg 1	-	-	-	-	-	-	5.41	4.7	-	6.9	6.3	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.41	4.7	-	6.9	6.3	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.599	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	433	-	-	510	-	-	~ 17	29	220	~ 5	7	119
Stage 1	-	-	-	-	-	-	244	302	-	94	117	-
Stage 2	-	-	-	-	-	-	180	238	-	142	160	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	433	-	-	510	-	-	~ 16	28	220	~ 5	7	119
Mov Cap-2 Maneuver	-	-	-	-	-	-	96	130	-	49	59	-
Stage 1	-	-	-	-	-	-	244	302	-	94	111	-
Stage 2	-	-	-	-	-	-	162	226	-	141	160	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	95.1	68
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	96	220	433	-	-	510	-	-	69
HCM Lane V/C Ratio	0.667	0.009	-	-	-	0.051	-	-	0.176
HCM Control Delay (s)	97.4	21.5	0	-	-	12.4	-	-	68
HCM Lane LOS	F	C	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	3.3	0	0	-	-	0.2	-	-	0.6

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1043	132	62	1262	0	77
Future Vol, veh/h	1043	132	62	1262	0	77
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	1	-	-	-2	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	0	0	2	0	0
Mvmt Flow	1159	147	69	1402	0	86

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1306	0	-	653
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.1	-	-	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.2	-	-	3.3
Pot Cap-1 Maneuver	-	-	537	-	0	415
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	537	-	-	415
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	15.9
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	415	-	-	537	-
HCM Lane V/C Ratio	0.206	-	-	0.128	-
HCM Control Delay (s)	15.9	-	-	12.7	-
HCM Lane LOS	C	-	-	B	-
HCM 95th %tile Q(veh)	0.8	-	-	0.4	-

Intersection	
Int Delay, s/veh	6.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	3	31	2	3	57	21
Future Vol, veh/h	3	31	2	3	57	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	-4	-	-	-10
Peak Hour Factor	25	50	50	90	63	71
Heavy Vehicles, %	0	1	0	0	1	0
Mvmt Flow	12	62	4	3	90	30

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	214	4	0	0	7	0
Stage 1	4	-	-	-	-	-
Stage 2	210	-	-	-	-	-
Critical Hdwy	6.4	6.21	-	-	4.11	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.309	-	-	2.209	-
Pot Cap-1 Maneuver	779	1082	-	-	1620	-
Stage 1	1024	-	-	-	-	-
Stage 2	830	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	735	1082	-	-	1620	-
Mov Cap-2 Maneuver	735	-	-	-	-	-
Stage 1	1024	-	-	-	-	-
Stage 2	784	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.9	0	5.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1005	1620	-
HCM Lane V/C Ratio	-	-	0.074	0.056	-
HCM Control Delay (s)	-	-	8.9	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.2	-

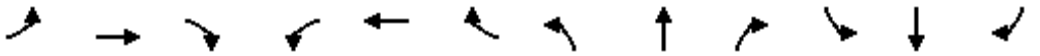
Intersection	
Int Delay, s/veh	8.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	239	14	18	75	19	125
Future Vol, veh/h	239	14	18	75	19	125
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	50	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	5	-	-	-3	5	-
Peak Hour Factor	59	59	68	68	73	73
Heavy Vehicles, %	3	1	1	1	1	1
Mvmt Flow	405	24	26	110	26	171

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	188	26	197	0	-	0
Stage 1	26	-	-	-	-	-
Stage 2	162	-	-	-	-	-
Critical Hdwy	7.43	6.71	4.11	-	-	-
Critical Hdwy Stg 1	6.43	-	-	-	-	-
Critical Hdwy Stg 2	6.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.309	2.209	-	-	-
Pot Cap-1 Maneuver	758	1049	1382	-	-	-
Stage 1	987	-	-	-	-	-
Stage 2	826	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	744	1049	1382	-	-	-
Mov Cap-2 Maneuver	744	-	-	-	-	-
Stage 1	968	-	-	-	-	-
Stage 2	826	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.1	1.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1382	-	744	1049	-	-
HCM Lane V/C Ratio	0.019	-	0.544	0.023	-	-
HCM Control Delay (s)	7.7	-	15.5	8.5	-	-
HCM Lane LOS	A	-	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	3.3	0.1	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	982	29	164	1173	23	82	9	124	38	14	40
Future Volume (vph)	35	982	29	164	1173	23	82	9	124	38	14	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	10	10	12	12	12	12	12	12
Grade (%)		1%			-2%			-3%			7%	
Storage Length (ft)	80		200	125		125	80		190	0		0
Storage Lanes	1		1	1		1	1		0	0		1
Taper Length (ft)	50			50			75			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.860				0.850
Flt Protected	0.950			0.950			0.950				0.965	
Satd. Flow (prot)	1719	3371	1538	1728	3241	1507	1814	1642	0	0	1752	1543
Flt Permitted	0.184			0.191			0.713				0.633	
Satd. Flow (perm)	333	3371	1538	347	3241	1507	1361	1642	0	0	1149	1543
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			83			83		151				83
Link Speed (mph)		40			40			30			20	
Link Distance (ft)		476			433			390			297	
Travel Time (s)		8.1			7.4			8.9			10.1	
Peak Hour Factor	0.96	0.96	0.96	0.95	0.95	0.95	0.82	0.82	0.82	0.78	0.78	0.78
Heavy Vehicles (%)	1%	3%	1%	2%	5%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	36	1023	30	173	1235	24	100	11	151	49	18	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	36	1023	30	173	1235	24	100	162	0	0	67	51
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		4
Detector Phase	5	2	2	1	6	6	8	8		4	4	4
Switch Phase												
Minimum Initial (s)	6.0	15.0	15.0	6.0	15.0	15.0	8.0	8.0		8.0	8.0	8.0
Minimum Split (s)	12.0	21.0	21.0	12.0	21.0	21.0	14.0	14.0		14.0	14.0	14.0
Total Split (s)	21.0	66.0	66.0	21.0	66.0	66.0	31.0	31.0		31.0	31.0	31.0
Total Split (%)	17.8%	55.9%	55.9%	17.8%	55.9%	55.9%	26.3%	26.3%		26.3%	26.3%	26.3%
Maximum Green (s)	15.0	60.0	60.0	15.0	60.0	60.0	25.0	25.0		25.0	25.0	25.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0			6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0	6.0	3.0	3.0		3.0	3.0	3.0
Minimum Gap (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	3.0		3.0	3.0	3.0
Time Before Reduce (s)	0.0	20.0	20.0	0.0	20.0	20.0	0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	10.0	10.0	0.0	10.0	10.0	0.0	0.0		0.0	0.0	0.0
Recall Mode	None	Min	Min	None	Min	Min	None	None		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		15.0	15.0		22.0	22.0	20.0	20.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		0	0		0	0	0	0		0	0	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	47.0	40.4	40.4	53.3	48.3	48.3	12.1	12.1			12.1	12.1
Actuated g/C Ratio	0.59	0.51	0.51	0.67	0.61	0.61	0.15	0.15			0.15	0.15
v/c Ratio	0.12	0.60	0.04	0.46	0.63	0.03	0.49	0.43			0.39	0.17
Control Delay	5.5	15.6	0.1	8.5	13.4	0.0	42.8	11.4			40.9	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay	5.5	15.6	0.1	8.5	13.4	0.0	42.8	11.4			40.9	4.3
LOS	A	B	A	A	B	A	D	B			D	A
Approach Delay		14.9			12.6			23.4			25.1	
Approach LOS		B			B			C			C	
Queue Length 50th (ft)	5	172	0	24	221	0	45	5			30	0
Queue Length 95th (ft)	15	281	0	54	343	0	101	49			70	6
Internal Link Dist (ft)		396			353			310			217	
Turn Bay Length (ft)	80		200	125		125	80					
Base Capacity (vph)	500	2627	1217	510	2526	1193	444	637			374	559
Starvation Cap Reductn	0	0	0	0	0	0	0	0			0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0			0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0			0	0
Reduced v/c Ratio	0.07	0.39	0.02	0.34	0.49	0.02	0.23	0.25			0.18	0.09

Intersection Summary			
Area Type:	Other		
Cycle Length: 118			
Actuated Cycle Length: 79.7			
Natural Cycle: 60			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 14.9		Intersection LOS: B	
Intersection Capacity Utilization 72.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 6: Greenland Way/Performing Arts Way & Hardin Valley Road

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	999	40	5	1225	1	27	0	24	0	0	0
Future Vol, veh/h	0	999	40	5	1225	1	27	0	24	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	2	-	-	-2	-	-	-4	-	-	4	-
Peak Hour Factor	93	93	93	95	95	95	63	63	63	90	90	90
Heavy Vehicles, %	0	2	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	0	1074	43	5	1289	1	43	0	38	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1290	0	0	1117	0	0	2396	2396	1096	2415	2417	1290
Stage 1	-	-	-	-	-	-	1096	1096	-	1300	1300	-
Stage 2	-	-	-	-	-	-	1300	1300	-	1115	1117	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.3	5.7	5.8	7.9	7.3	6.6
Critical Hdwy Stg 1	-	-	-	-	-	-	5.3	4.7	-	6.9	6.3	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.3	4.7	-	6.9	6.3	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	544	-	-	633	-	-	~ 40	58	296	13	19	175
Stage 1	-	-	-	-	-	-	333	372	-	150	175	-
Stage 2	-	-	-	-	-	-	267	312	-	199	222	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	544	-	-	633	-	-	~ 40	58	296	11	19	175
Mov Cap-2 Maneuver	-	-	-	-	-	-	153	181	-	77	97	-
Stage 1	-	-	-	-	-	-	333	372	-	150	174	-
Stage 2	-	-	-	-	-	-	265	310	-	173	222	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	28.7	0
HCM LOS			D	A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	153	296	544	-	-	633	-	-	-
HCM Lane V/C Ratio	0.28	0.129	-	-	-	0.008	-	-	-
HCM Control Delay (s)	37.4	19	0	-	-	10.7	-	-	0
HCM Lane LOS	E	C	A	-	-	B	-	-	A
HCM 95th %tile Q(veh)	1.1	0.4	0	-	-	0	-	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	976	47	64	1231	0	70
Future Vol, veh/h	976	47	64	1231	0	70
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	1	-	-	-2	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	0	0	2	0	0
Mvmt Flow	1084	52	71	1368	0	78

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1136	0	-	568
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.1	-	-	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.2	-	-	3.3
Pot Cap-1 Maneuver	-	-	622	-	0	471
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	622	-	-	471
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	14.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	471	-	-	622	-
HCM Lane V/C Ratio	0.165	-	-	0.114	-
HCM Control Delay (s)	14.1	-	-	11.5	-
HCM Lane LOS	B	-	-	B	-
HCM 95th %tile Q(veh)	0.6	-	-	0.4	-

Intersection	
Int Delay, s/veh	5.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	26	25	3	39	6
Future Vol, veh/h	1	26	25	3	39	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	-4	-	-	-10
Peak Hour Factor	90	50	57	25	42	75
Heavy Vehicles, %	0	1	0	0	1	0
Mvmt Flow	1	52	44	12	93	8

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	238	44	0	0	56	0
Stage 1	44	-	-	-	-	-
Stage 2	194	-	-	-	-	-
Critical Hdwy	6.4	6.21	-	-	4.11	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.309	-	-	2.209	-
Pot Cap-1 Maneuver	755	1029	-	-	1555	-
Stage 1	984	-	-	-	-	-
Stage 2	844	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	710	1029	-	-	1555	-
Mov Cap-2 Maneuver	710	-	-	-	-	-
Stage 1	984	-	-	-	-	-
Stage 2	793	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.7	0	6.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1019	1555	-
HCM Lane V/C Ratio	-	-	0.052	0.06	-
HCM Control Delay (s)	-	-	8.7	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.2	-

Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	214	19	21	46	68	144
Future Vol, veh/h	214	19	21	46	68	144
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	50	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	5	-	-	-3	5	-
Peak Hour Factor	77	77	92	92	87	87
Heavy Vehicles, %	1	1	1	2	1	1
Mvmt Flow	278	25	23	50	78	166

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	174	78	244	0	-	0
Stage 1	78	-	-	-	-	-
Stage 2	96	-	-	-	-	-
Critical Hdwy	7.41	6.71	4.11	-	-	-
Critical Hdwy Stg 1	6.41	-	-	-	-	-
Critical Hdwy Stg 2	6.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.209	-	-	-
Pot Cap-1 Maneuver	780	975	1328	-	-	-
Stage 1	927	-	-	-	-	-
Stage 2	906	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	767	975	1328	-	-	-
Mov Cap-2 Maneuver	767	-	-	-	-	-
Stage 1	911	-	-	-	-	-
Stage 2	906	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12	2.4	0
HCM LOS	B		

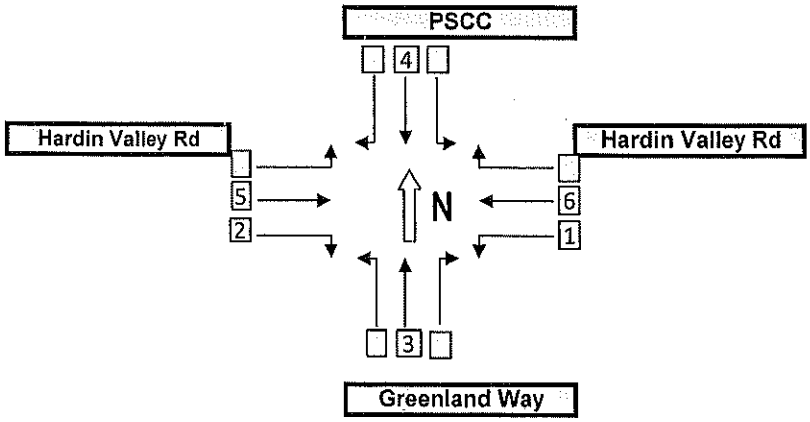
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1328	-	767	975	-	-
HCM Lane V/C Ratio	0.017	-	0.362	0.025	-	-
HCM Control Delay (s)	7.8	-	12.3	8.8	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	1.7	0.1	-	-

LOCAL CONTROLLER PROGRAMMING

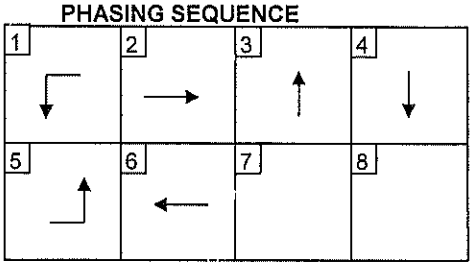
Intersection: Hardin Valley Road at Greenland Way/Pellis
Timing changed: December 2017
Controller type: Peek 3000 E

TIME BY PHASE (SEC) & FUNCTIONS

PHASE	1	2	3	4	5	6	7	8
MOVEMENTS	WBLT	EB	NB	SB	EBLT	WB		
INITIAL	6	15	8	8	6	15		
PASSAGE	3	6	3	3	3	6		
YELLOW	4	4	4	4	4	4		
RED CLEAR	2	2	2	2	2	2		
WALK		7	7	7		7		
PED CLEAR		15	20	20		22		
MAX 1	15	100	25	25	15	100		
MAX 2	15	100	25	25	15	100		
RECALL								



PHASING SEQUENCE



Date:	Initial:	Comment:
7/13/2016	JWS	See other volume-density timing parameters
12/7/2017	JWS	Changed to split phase north/south

APPENDIX G

ITE AND LOCAL TRIP GENERATION DATA

Land Use: 822
Strip Retail Plaza (<40k)

Description

A strip retail plaza is an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit. Each study site in this land use has less than 40,000 square feet of gross leasable area (GLA). Because a strip retail plaza is open-air, the GLA is the same as the gross floor area of the building.

The 40,000 square feet GFA threshold between strip retail plaza and shopping plaza (Land Use 821) was selected based on an examination of the overall shopping center/plaza database. No shopping plaza with a supermarket as its anchor is smaller than 40,000 square feet GLA.

Shopping center (>150k) (Land use 820), shopping plaza (40-150k) (Land Use 821), and factory outlet center (Land Use 823) are related uses.

Additional Data

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), California, Delaware, Florida, New Jersey, Ontario (CAN), South Dakota, Vermont, Washington, and Wisconsin.

Source Numbers

304, 358, 423, 428, 437, 507, 715, 728, 936, 960, 961, 974, 1009

Strip Retail Plaza (<40k)
(822)

Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Weekday**

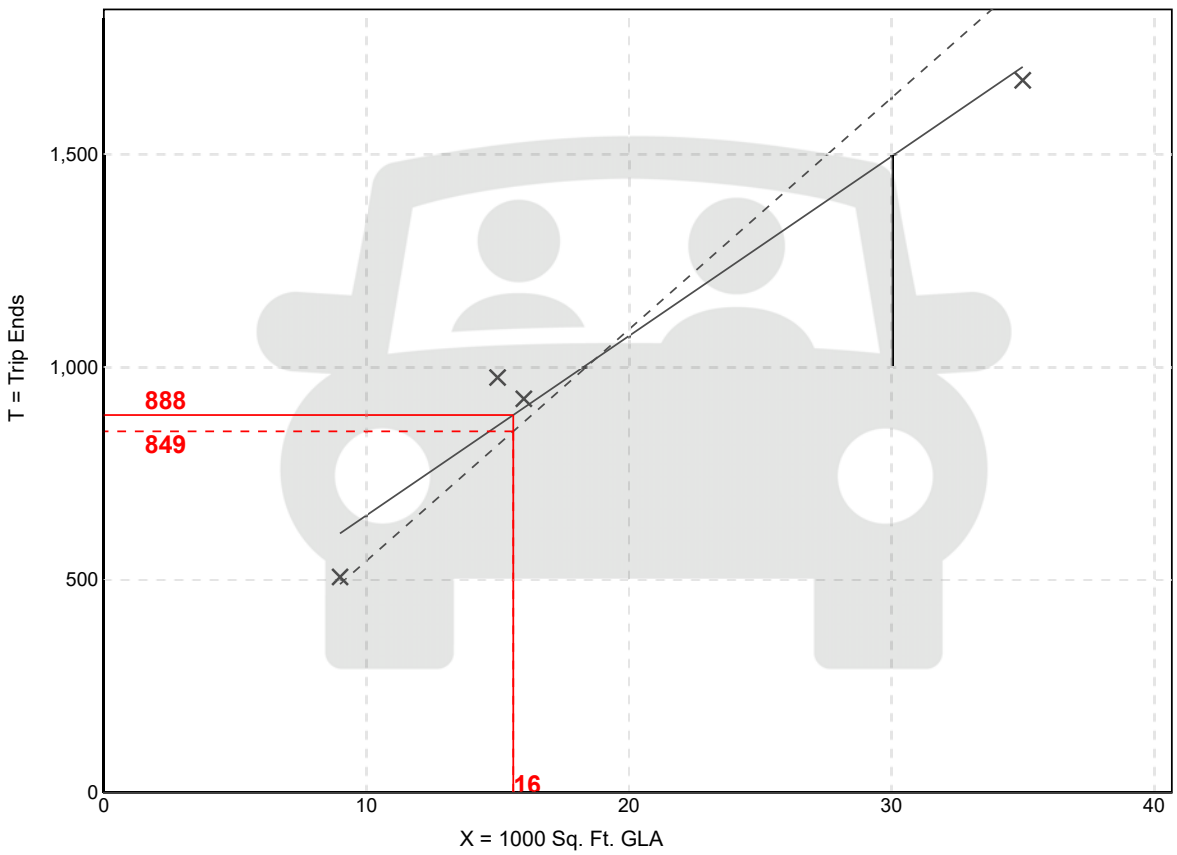
Setting/Location: **General Urban/Suburban**
Number of Studies: 4
Avg. 1000 Sq. Ft. GLA: 19
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
54.45	47.86 - 65.07	7.81

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: T = 42.20(X) + 229.68

R^2= 0.96

Strip Retail Plaza (<40k)
(822)

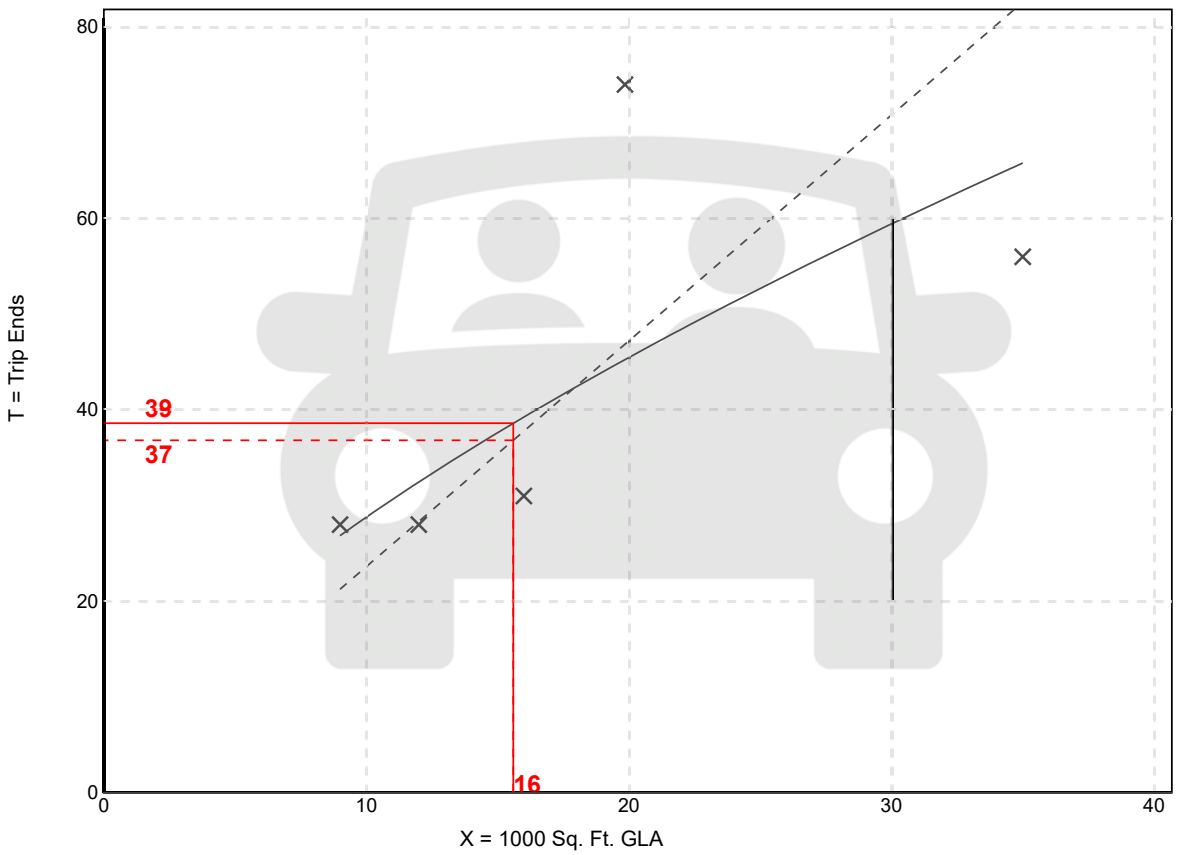
Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 5
Avg. 1000 Sq. Ft. GLA: 18
Directional Distribution: 60% entering, 40% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
2.36	1.60 - 3.73	0.94

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Ln(T) = 0.66 Ln(X) + 1.84

R^2= 0.57

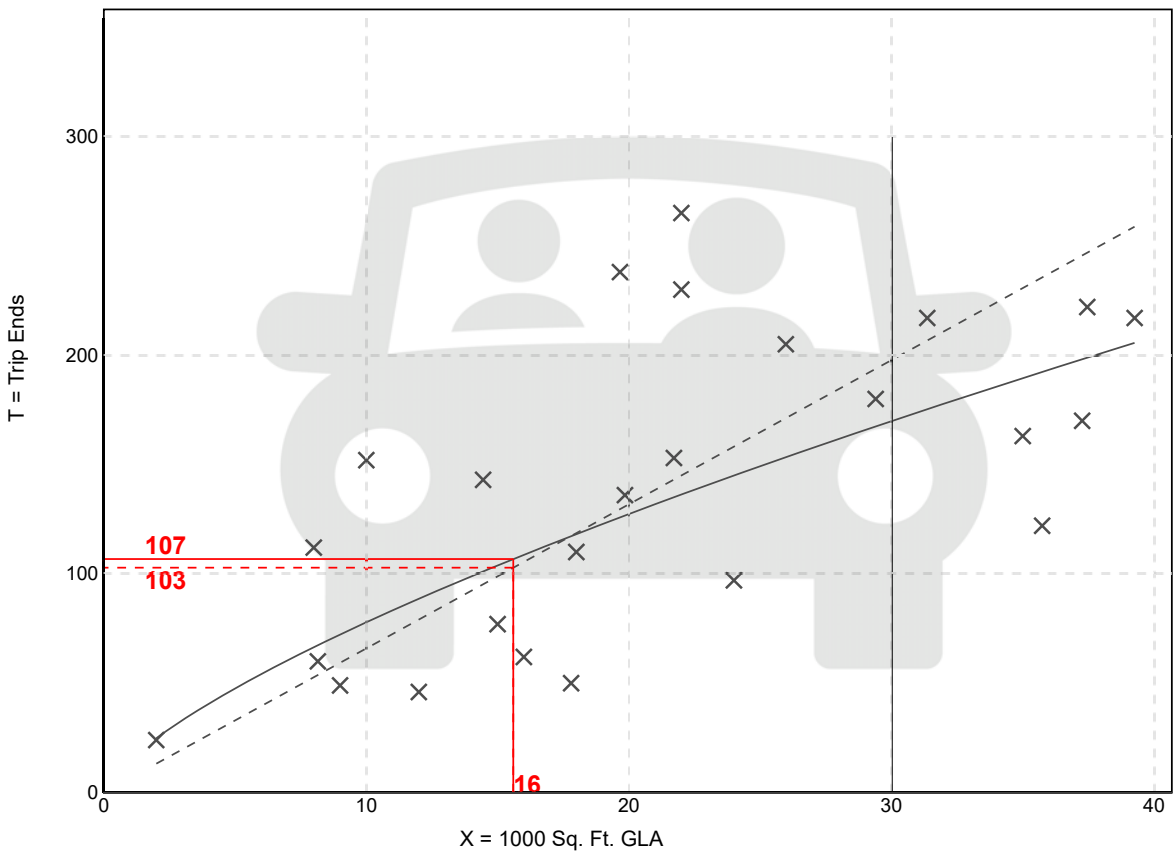
Strip Retail Plaza (<40k)
(822)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GLA**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	25
Avg. 1000 Sq. Ft. GLA:	21
Directional Distribution:	50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
6.59	2.81 - 15.20	2.94

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.71 Ln(X) + 2.72

R^2= 0.56

Land Use: 937
Coffee/Donut Shop with Drive-Through Window

Description

This land use includes any coffee and donut restaurant that has a drive-through window as well as a walk-in entrance area at which a patron can purchase and consume items. The restaurant sells freshly brewed coffee (along with coffee-related accessories) and a variety of food/drink products such as donuts, bagels, breads, muffins, cakes, sandwiches, wraps, salads, and other hot and cold beverages. The restaurant marketing and sales may emphasize coffee beverages over food (or vice versa).

A coffee/donut shop typically holds long store hours (more than 15 hours) with an early morning opening. Limited indoor seating is generally provided for patrons, but table service is not provided.

Coffee/donut shop without drive-through window (Land Use 936) and coffee/donut shop with drive-through window and no indoor seating (Land Use 938) are related uses.

Additional Data

The sites were surveyed in the 1990s, the 2000s, and the 2010s in California, Colorado, Connecticut, Illinois, Massachusetts, Minnesota, Nevada, New Hampshire, New Jersey, New York, Ontario (CAN), Pennsylvania, Quebec (CAN), Tennessee, Vermont, Washington, and Wisconsin.

Specialized Land Use Data

One study was conducted during the pandemic in 2020. Twelve sites were counted in Illinois and Missouri during the AM and PM adjacent street peak hours. The data have not been incorporated within the overall ITE trip generation database and are not reflected in the data plots for this land use. Consideration for their inclusion will be given for the 12th Edition of *Trip Generation Manual* after additional post-pandemic data are collected. Overall, the pandemic counts yielded an AM adjacent street peak weighted average rate of 84 vehicle trips per 1,000 square feet GFA, roughly equivalent to the pre-pandemic average. The PM adjacent street peak rate was 56 (roughly 40 percent higher than the pre-pandemic value). The higher PM peak rate for these coffee/donut shops conforms with anecdotal observations that with the temporary or permanent closures of many restaurants during the pandemic, the drive-through restaurants that were open did a brisk business even during their off-peak periods.

Source Numbers

594, 599, 615, 617, 618, 621, 622, 635, 639, 712, 714, 725, 726, 728, 853, 854, 892, 903, 928, 959, 979, 982, 1004, 1042, 1044

Coffee/Donut Shop with Drive-Through Window
(937)

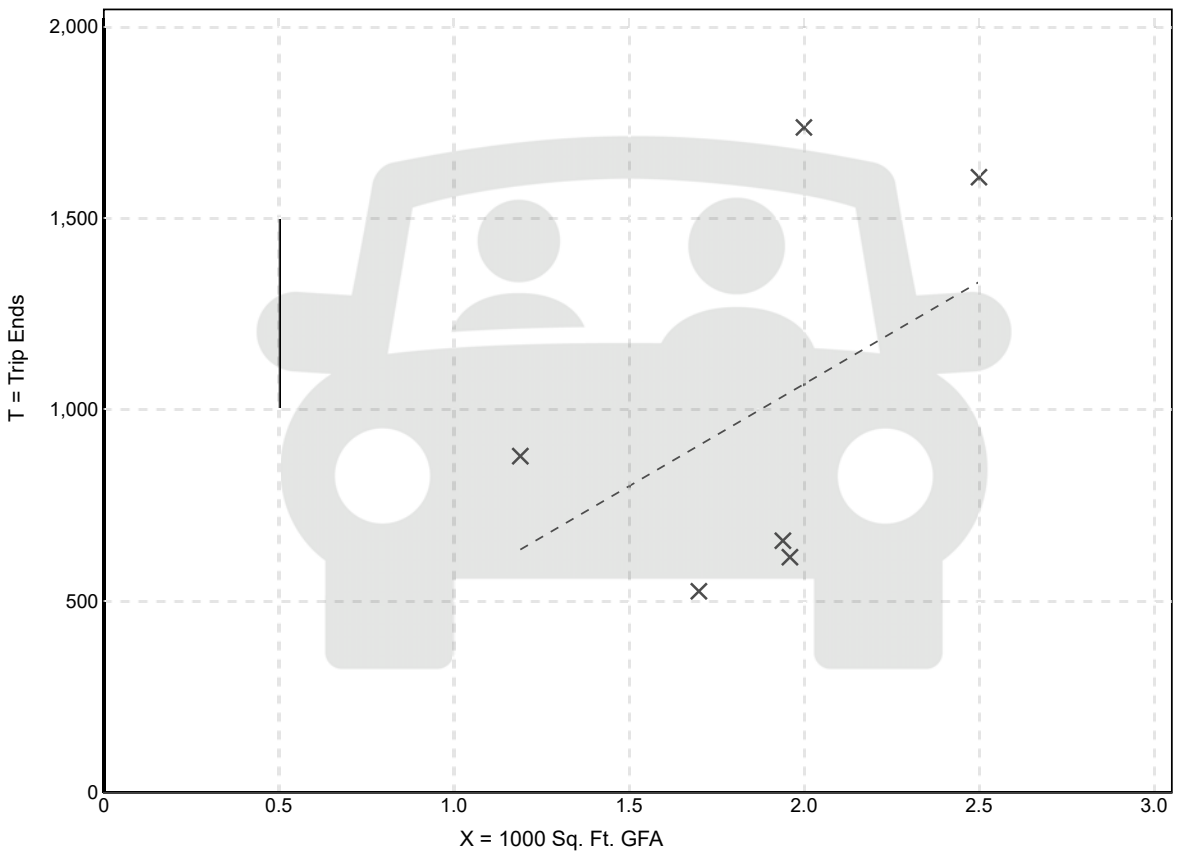
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 6
Avg. 1000 Sq. Ft. GFA: 2
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
533.57	309.41 - 869.00	243.65

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

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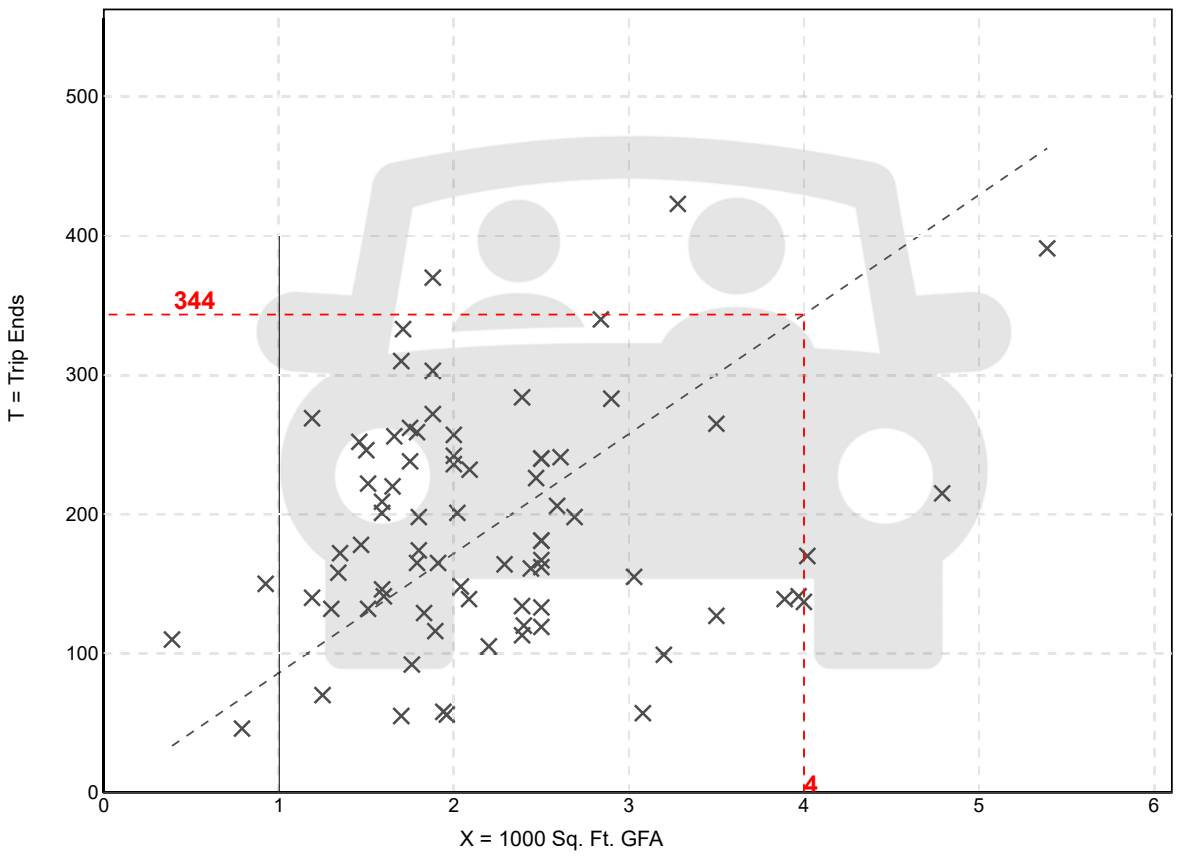
Coffee/Donut Shop with Drive-Through Window
(937)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	78
Avg. 1000 Sq. Ft. GFA:	2
Directional Distribution:	51% entering, 49% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
85.88	18.51 - 282.05	44.92

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ****

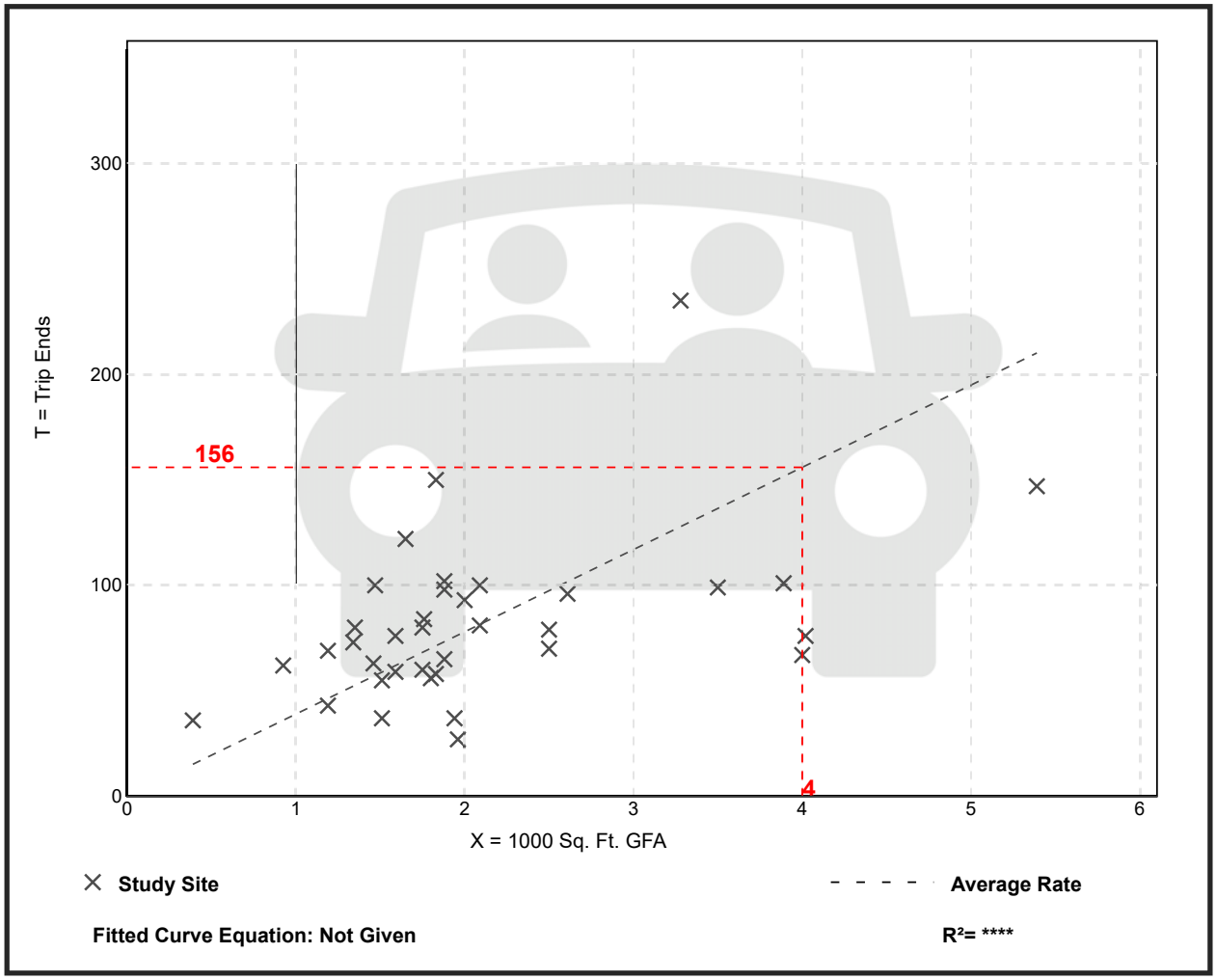
Coffee/Donut Shop with Drive-Through Window
(937)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	36
Avg. 1000 Sq. Ft. GFA:	2
Directional Distribution:	50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
38.99	13.78 - 92.31	17.79

Data Plot and Equation



APPENDIX H

OTISS PRO WORKSHEETS

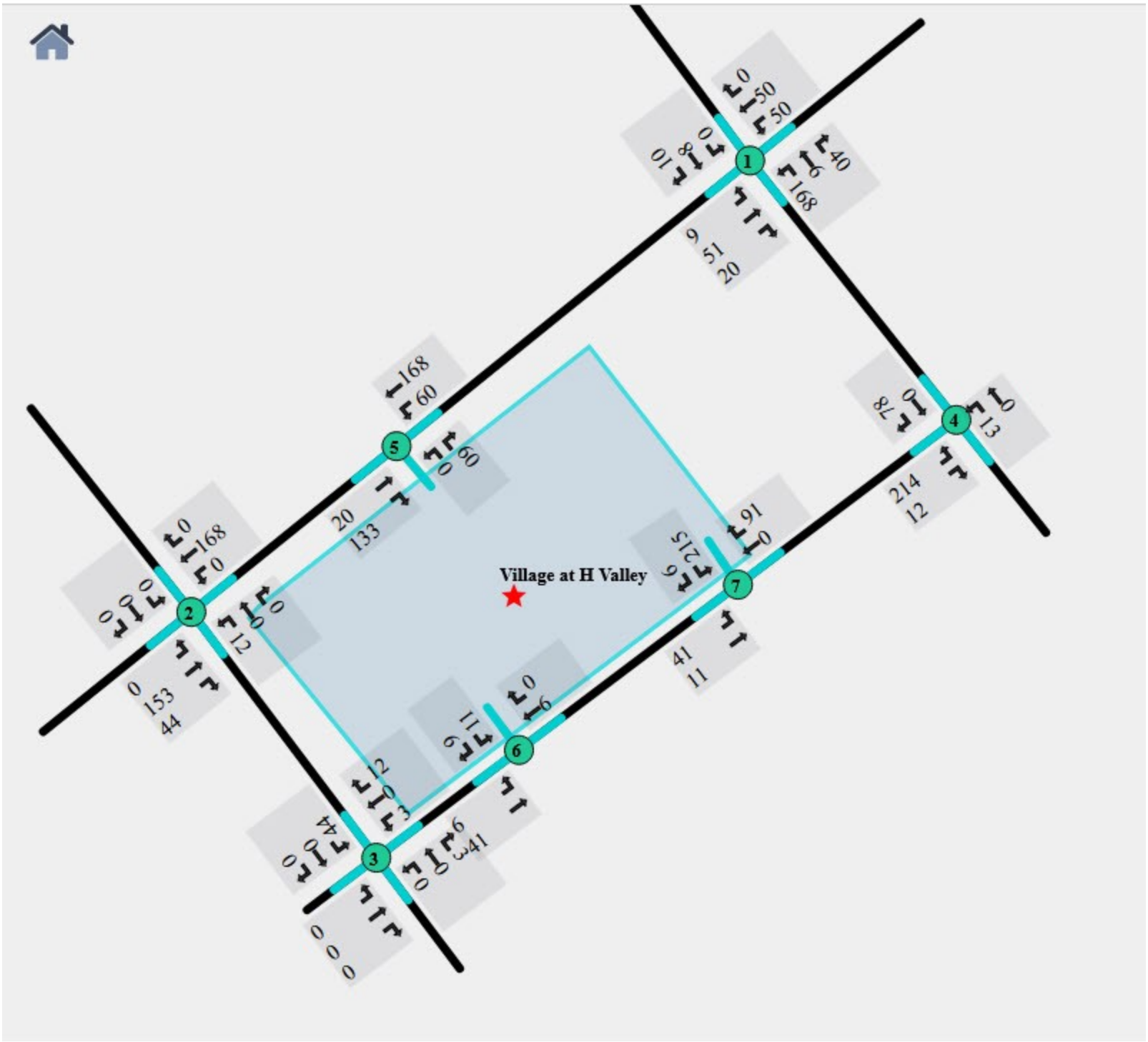
Turning Movement Volume

Trip Generation | Network Configuration | Driveway Distribution | Network Distribution | Turning Movement Volumes

Background Traffic

Turning Movement Volume

Trip Generation | Network Configuration | Driveway Distribution | Network Distribution | Turning Movement Volumes



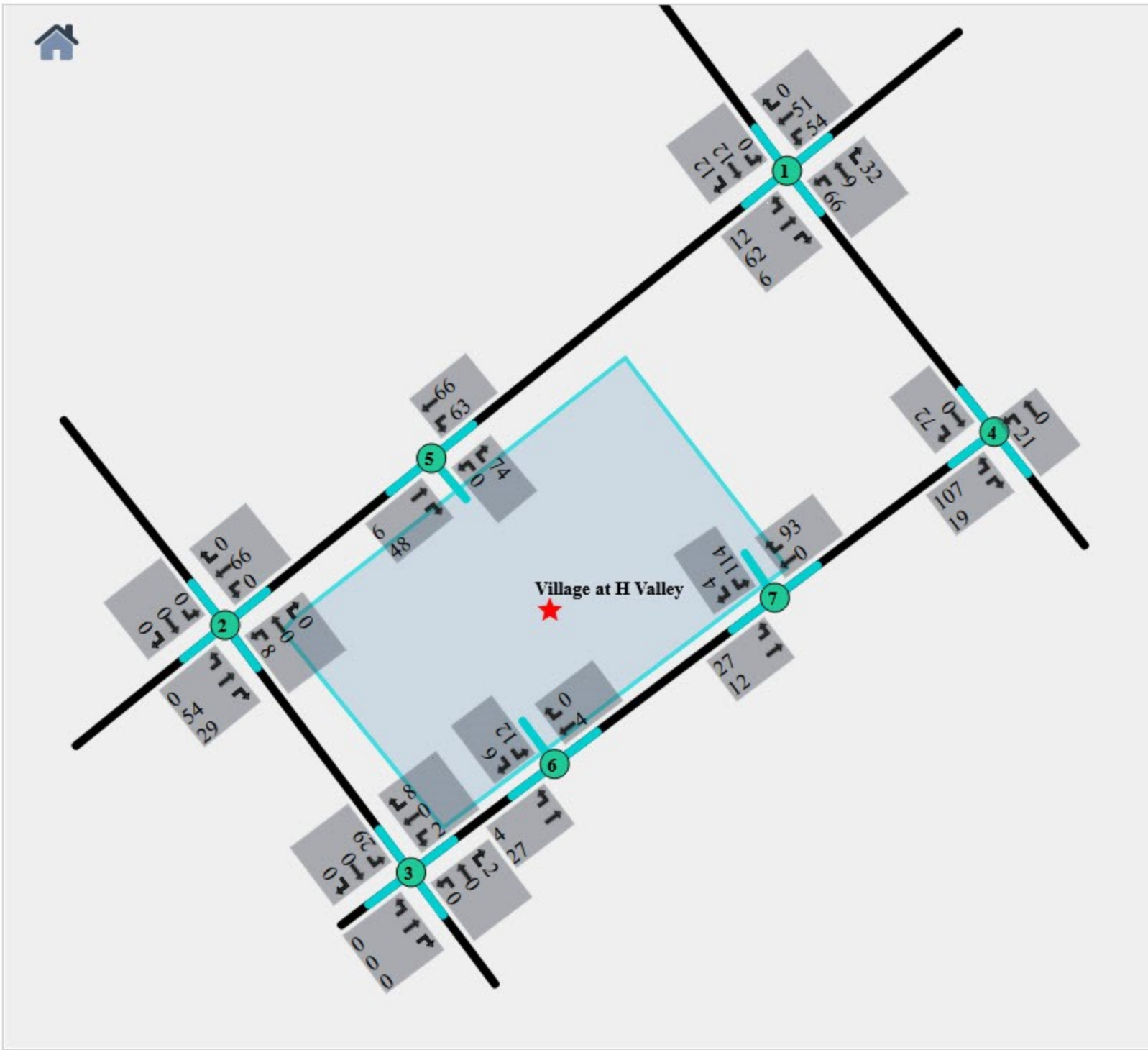
Site Generated Traffic

Turning Movement Volume

Trip Generation | Network Configuration | Driveway Distribution | Network Distribution | Turning Movement Volumes

Turning Movement Volume

Trip Generation | Network Configuration | Driveway Distribution | Network Distribution | Turning Movement Volumes



PROJECT DETAILS

Project Name:	The Village at Hardin Valley	Type of Project:	
Project No:	2409	City:	Knoxville
Country:	Knox	Built-up Area(Sq.ft):	
Analyst Name:	Robert Jacks, PE	Clients Name:	
Date:	5/17/2024	ZIP/Postal Code:	
State/Province:	**Tennessee**	No. of Scenarios:	8
Analysis Region:			

SCENARIO SUMMARY

Scenarios	Name	No. of Land Uses	Phases of Development	No. of Years to Project Traffic	User Group	Estimated New Vehicle Trips		
						Entry	Exit	Total
Scenario - 1	2025 AM Peak Hour - Revised Distribution to West	3	1	0		252	228	480

Scenario - 4

Scenario Name: 2025 AM Peak Hour - Revised Distribution to West

User Group:

Dev. phase: 1

No. of Years to Project Traffic : 0

Analyst Note: This includes pass-by trips in order to get the software to calculate them. However, the software does not correctly calculate the distribution of pass-by trips. Therefore, a copy is made of this scenario.

Warning:

VEHICLE TRIPS BEFORE REDUCTION

Land Use & Data Source	Location	IV	Size	Time Period	Method Rate/Equation	Entry Split%	Exit Split%	Total
822 - Strip Retail Plaza (<40k)	General Urban/Suburban	1000 Sq. Ft. GLA	15.6	Weekday, Peak Hour of Adjacent Street Traffic,	Best Fit (LOG)	23	15	38
Data Source: Trip Generation Manual, 11th Ed					Ln(T) =0.66Ln(X) + 1.84	60%	40%	
937 - Coffee/Donut Shop with Drive-Through	General Urban/Suburban	1000 Sq. Ft. GFA	4	Weekday, Peak Hour of Adjacent Street Traffic,	Average	175	168	343
Data Source: Trip Generation Manual, 11th Ed					85.88	51%	49%	
9007 - Chick-fil-A [Private]	General Urban/Suburban	1000 Sq. Ft. GFA	5.30	Weekday, Peak Hour of Adjacent Street Traffic,	Average	137	122	259
Data Source: Private Data Sets					48.79	53%	47%	

VEHICLE TO PERSON TRIP CONVERSION

BASELINE SITE VEHICLE CHARACTERISTICS:

Land Use	Baseline Site Vehicle Mode Share		Baseline Site Vehicle Occupancy		Baseline Site Vehicle Directional Split	
	Entry (%)	Exit (%)	Entry	Exit	Entry (%)	Exit (%)
822 - Strip Retail Plaza (<40k)	100	100	1	1	60	40
937 - Coffee/Donut Shop with Drive-Through Window	100	100	1	1	51	49
9007 - Chick-fil-A [Private]	100	100	1.00	1.00	53	47

ESTIMATED BASELINE SITE PERSON TRIPS:

Land Use	Person Trips by Vehicle		Person Trips by Other Modes		Total Baseline Site Person Trips	
	Entry	Exit	Entry	Exit	Entry	Exit
822 - Strip Retail Plaza (<40k)	23	15	0	0	23	15
	38		0		38	
937 - Coffee/Donut Shop with Drive-Through Window	175	168	0	0	175	168
	343		0		343	
9007 - Chick-fil-A [Private]	137	122	0	0	137	122
	259		0		259	

INTERNAL VEHICLE TRIP REDUCTION

LAND USE GROUP ASSIGNMENT:

Land Use	Land Use Group
822 - Strip Retail Plaza (<40k)	Retail
937 - Coffee/Donut Shop with Drive-Through Window	Resturant
9007 - Chick-fil-A [Private]	Resturant

BALANCED PERSON TRIPS:

822 - Strip Retail Plaza (<40k)						937 - Coffee/Donut Shop with Drive-Through Window		
Persons Exit	PAF	UIPTC	Unconstrained Demand	==>>> BALANCED ==>>>	Unconstrained Demand	UIPTC	PAF	Persons Entry
15	1	13	2	**2**	44	25	1	175

Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<== BALANCED <<<==	Unconstrained Demand	UIPTC	PAF	Persons Exit
23	1	4	1	**1**	24	14	1	168

822 - Strip Retail Plaza (<40k) 9007 - Chick-fil-A [Private]

Persons Exit	PAF	UIPTC	Unconstrained Demand	==>>> BALANCED ==>>>	Unconstrained Demand	UIPTC	PAF	Persons Entry
15	1	0	0	**0**	34	25	1	137
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<== BALANCED <<<==	Unconstrained Demand	UIPTC	PAF	Persons Exit
23	1	4	1	**1**	17	14	1	122

937 - Coffee/Donut Shop with Drive-Through Window 9007 - Chick-fil-A [Private]

Persons Exit	PAF	UIPTC	Unconstrained Demand	==>>> BALANCED ==>>>	Unconstrained Demand	UIPTC	PAF	Persons Entry
168	1	0	0	**0**	0	0	1	137
Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<== BALANCED <<<==	Unconstrained Demand	UIPTC	PAF	Persons Exit
175	1	0	0	**0**	0	0	1	122

INTERNAL PERSON TRIPS:

822 - Strip Retail Plaza (<40k)

Internal Person Trips From	Entry	Exit	Total
937 - Coffee/Donut Shop with Drive-Through Window	1	2	3
9007 - Chick-fil-A [Private]	1	0	1
Total Internal Person Trips	**2**	**2**	**4**

937 - Coffee/Donut Shop with Drive-Through Window

Internal Person Trips From	Entry	Exit	Total
822 - Strip Retail Plaza (<40k)	2	1	3
9007 - Chick-fil-A [Private]	0	0	0
Total Internal Person Trips	**2**	**1**	**3**

9007 - Chick-fil-A [Private]

Internal Person Trips From	Entry	Exit	Total
822 - Strip Retail Plaza (<40k)	0	1	1
937 - Coffee/Donut Shop with Drive-Through Window	0	0	0
Total Internal Person Trips	**0**	**1**	**1**

INTERNAL VEHICLE TRIPS AND CAPTURE:

822 - Strip Retail Plaza (<40k)

Total Internal Person Trips	2	2	4
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	**2**	**2**	**4**
Total External Vehicle Trips	21	13	34
Internal Vehicle Trip Capture	**9%**	**13%**	**0%**

937 - Coffee/Donut Shop with Drive-Through Window

Total Internal Person Trips	2	1	3
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-

Total Vehicle Internal Trips	**2**	**1**	**3**
Total External Vehicle Trips	173	167	340
Internal Vehicle Trip Capture	**1%**	**1%**	**0%**

9007 - Chick-fil-A [Private]

Total Internal Person Trips	0	1	1
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	**0**	**1**	**1**
Total External Vehicle Trips	137	121	258
Internal Vehicle Trip Capture	**0%**	**1%**	**0%**

PASS-BY VEHICLE TRIP REDUCTION

Land Use	External Vehicle Trips		Pass-by Vehicle Trip %		Pass-by Vehicle Trips	
	Entry	Exit	Entry (%)	Exit (%)	Entry	Exit
822 - Strip Retail Plaza (<40k)	21	13	10.00%	10.00%	2	1
937 - Coffee/Donut Shop with Drive-Through Window	173	167	25.00%	25.00%	43	42
9007 - Chick-fil-A [Private]	137	121	25.00%	25.00%	34	30

DIVERTED VEHICLE TRIP REDUCTION

Land Use	External Vehicle Trips		Diverted Vehicle Trip %		Diverted Vehicle Trips	
	Entry	Exit	Entry (%)	Exit (%)	Entry	Exit
822 - Strip Retail Plaza (<40k)	21	13	0.00%	0.00%	0	0
937 - Coffee/Donut Shop with Drive-Through Window	173	167	0.00%	0.00%	0	0
9007 - Chick-fil-A [Private]	137	121	0.00%	0.00%	0	0

EXTRA VEHICLE TRIP REDUCTION

Land Use	(External - (Pass-by + Diverted)) Vehicle Trips		Extra Vehicle Trip Reduction %		Extra Reduced Vehicle Trips	
	Entry	Exit	Entry (%)	Exit (%)	Entry	Exit
822 - Strip Retail Plaza (<40k)	19	12	0.00%	0.00%	0	0
937 - Coffee/Donut Shop with Drive-Through Window	130	125	0.00%	0.00%	0	0
9007 - Chick-fil-A [Private]	103	91	0.00%	0.00%	0	0

NEW VEHICLE TRIPS

Land Use	New Vehicle Trips		
	Entry	Exit	Total
822 - Strip Retail Plaza (<40k)	19	12	31
937 - Coffee/Donut Shop with Drive-Through Window	130	125	255
9007 - Chick-fil-A [Private]	103	91	194

RESULTS

Site Totals	Entry	Exit	Total
Vehicle Trips Before Reduction	335	305	640
Internal Vehicle Trips	4	4	8
External Vehicle Trips	331	301	632
Internal Vehicle Trip Capture	1%	1%	1%
Pass-by Vehicle Trips	79	73	152
Diverted Vehicle Trips	0	0	0

Extra Reduced Vehicle Trips	0	0	0
New Vehicle Trips	252	228	480

Project: The Village at Hardin Valley				Trip Distribution Summary
2025 AM Peak Hour - Revised Distribution to West				Report Generated by OTISS Pro
Site	Driveways	Inbound	Outbound	Total Trips
Village at H Valley	North Front Driveway	149	47	196
	SW Rear Driveway	5	16	21
	SE Rear Driveway	98	165	263

Project: The Village at Hardin Valley			Trip Assignment Summary
2025 AM Peak Hour - Revised Distribution to West			Report Generated by OTISS Pro
Assigned New Trips			
Site	**Routes**	Inbound	Outbound
Village at H Valley	From West	102	Not Defined
	To and From Pell State	8	7
	To and From East	39	40
	From SW	0	Not Defined
	To and From SE	0	0
	To and From SW	2	2
	To and From West	3	5
	To and From East	0	1
	West via East	0	8
	To and From SE	0	0
	To and From SW	1	0
	To and From West	30	4
	To and From SE	10	9
	To and From East	37	29
	West via East	15	119
	To and From Pell State	5	4

Assigned Pass-by Trips			
Site	Driveway	Turning Movement	Assigned Pass-by Trips
Village at H Valley	SW Rear Driveway	NEB-Left	1
		SWB-Right	0

SE Rear Driveway

UnAssigned trips are more than 0 for some driveways

Project: The Village at Hardin Valley
2025 AM Peak Hour - Revised Distribution to West

1:H Valley at Greenlan
Report Generated by OTISS Pro

	Peforming Arts Way			Hardin Valley Road			Hardin Valley Road			Greenland Way		
Lane Group	SEBL	SEBT	SEBR	NEBL	NEBT	NEBR	SWBL	SWBT	SWBR	NWBL	NWBT	NWBR
Configuration												
Number of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Shared?	Yes		No	No		No	No		No	No		Yes
% Growth Over 0 Years	0	0	0	0	0	0	0	0	0	0	0	0
Growth Factor	1	1	1	1	1	1	1	1	1	1	1	1
Turning Volumes												
Existing Traffic	3	0	30	16	1026	16	50	1102	6	20	4	82
Background Traffic	3	0	30	16	1026	16	50	1102	6	20	4	82
Site Generated Trips	0	5	8	7	40	15	37	39	0	127	4	30
Pass-by Trips (Non-Primary)	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips (Non-Primary)	0	0	0	0	0	0	0	0	0	0	0	0
Extra Reduced Trips (Non-Primary)	0	0	0	0	0	0	0	0	0	0	0	0
Total Non-primary Trips	0	0	0	0	0	0	0	0	0	0	0	0
Build Conditions												
Redistributed Background Traffic	3	0	30	16	1026	16	50	1102	6	20	4	82
Total Build Traffic	3	5	38	23	1066	31	87	1141	6	147	8	112

Project: The Village at Hardin Valley
2025 AM Peak Hour - Revised Distribution to West

2:Hardin at Award Win
Report Generated by OTISS Pro

	Bryant Lane			Hardin Valley Road			Hardin Valley Road			Award Winning Way		
Lane Group	SEBL	SEBT	SEBR	NEBL	NEBT	NEBR	SWBL	SWBT	SWBR	NWBL	NWBT	NWBR
Configuration												
Number of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Shared?	Yes		Yes	No		Yes	No		Yes	Yes		No
% Growth Over 0 Years	0	0	0	0	0	0	0	0	0	0	0	0
Growth Factor	1	1	1	1	1	1	1	1	1	1	1	1

Turning Volumes												
Existing Traffic	2	0	2	0	1055	24	21	1131	0	10	0	1
Background Traffic	2	0	2	0	1055	24	21	1131	0	10	0	1
Site Generated Trips	0	0	0	0	117	33	0	127	0	9	0	0
Pass-by Trips (Non-Primary)	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips (Non-Primary)	0	0	0	0	0	0	0	0	0	0	0	0
Extra Reduced Trips (Non-Primary)	0	0	0	0	0	0	0	0	0	0	0	0
Total Non-primary Trips	0	0	0	0	0	0	0	0	0	0	0	0
Build Conditions												
Redistributed Background Traffic	2	0	2	0	1055	24	21	1131	0	10	0	1
Total Build Traffic	2	0	2	0	1172	57	21	1258	0	19	0	1

Project: The Village at Hardin Valley 3:Award at S Bluff
2025 AM Peak Hour - Revised Distribution to West Report Generated by OTISS Pro

	Spring Bluff Way			Spring Bluff Way			Award Winning Way			Award Winning Way		
Lane Group	NEBL	NEBT	NEBR	SWBL	SWBT	SWBR	NWBL	NWBT	NWBR	SEBL	SEBT	SEBR
Configuration												
Number of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Shared?	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes
% Growth Over 0 Years	0	0	0	0	0	0	0	0	0	0	0	0
Growth Factor	1	1	1	1	1	1	1	1	1	1	1	1
Turning Volumes												
Existing Traffic	0	0	0	1	0	9	0	2	0	24	21	0
Background Traffic	0	0	0	1	0	9	0	2	0	24	21	0
Site Generated Trips	0	0	0	2	0	9	0	0	3	33	0	0
Pass-by Trips (Non-Primary)	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips (Non-Primary)	0	0	0	0	0	0	0	0	0	0	0	0
Extra Reduced Trips (Non-Primary)	0	0	0	0	0	0	0	0	0	0	0	0
Total Non-primary Trips	0	0	0	0	0	0	0	0	0	0	0	0

Build Conditions												
Redistributed Background Traffic	0	0	0	1	0	9	0	2	0	24	21	0
Total Build Traffic	0	0	0	3	0	18	0	2	3	57	21	0

Project: The Village at Hardin Valley
2025 AM Peak Hour - Revised Distribution to West

4:Greenland at S Bluff
Report Generated by OTISS Pro

	Spring Bluff Way		Greenland Way		Greenland Way		
Lane Group	NEBL	NEBR	NWBL	NWBT	SEBT	SEBR	
Configuration							
Number of Lanes	1	1	1	1	1	1	
Shared?	Yes		No			Yes	
% Growth Over 0 Years	0	0	0	0	0	0	
Growth Factor	1	1	1	1	1	1	
Turning Volumes							
Existing Traffic	37	4	7	76	20	35	
Background Traffic	37	4	7	76	20	35	
Site Generated Trips	161	9	10	0	0	57	
Pass-by Trips (Non-Primary)	0	0	0	0	0	0	
Diverted Trips (Non-Primary)	0	0	0	0	0	0	
Extra Reduced Trips (Non-Primary)	0	0	0	0	0	0	
Total Non-primary Trips	0	0	0	0	0	0	
Build Conditions							
Redistributed Background Traffic	37	4	7	76	20	35	
Total Build Traffic	198	13	17	76	20	92	

Project: The Village at Hardin Valley
2025 AM Peak Hour - Revised Distribution to West

5:North Entrance
Report Generated by OTISS Pro

	Hardin Valley Road		Hardin Valley Road		Street4		
Lane Group	NEBT	NEBR	SWBL	SWBT	NWBL	NWBR	
Configuration							

Number of Lanes	1	1	1	1	0	1	
Shared?		Yes	No		0		
% Growth Over 0 Years	0	0	0	0	0	0	
Growth Factor	1	1	1	1	0	1	
Turning Volumes							
Existing Traffic	1058	0	0	1152	0	0	
Background Traffic	1058	0	0	1152	0	0	
Site Generated Trips	15	102	47	127	0	47	
Pass-by Trips (Non-Primary)	-35	35	38	-38	38	35	
Diverted Trips (Non-Primary)	0	0	0	0	0	0	
Extra Reduced Trips (Non-Primary)	0	0	0	0	0	0	
Total Non-primary Trips	-35	35	38	-38	38	35	
Build Conditions							
Redistributed Background Traffic	1023	35	38	1114	0	35	
Total Build Traffic	1038	137	85	1241	0	82	

Project: The Village at Hardin Valley
2025 AM Peak Hour - Revised Distribution to West

6:SW Entrance
Report Generated by OTISS Pro

	Spring Bluff Way		Spring Bluff Way		SW Rear Driveway		
Lane Group	NEBL	NEBT	SWBT	SWBR	SEBL	SEBR	
Configuration							
Number of Lanes	1	1	1	1	1	1	
Shared?	Yes			Yes	Yes		
% Growth Over 0 Years	0	0	0	0	0	0	
Growth Factor	1	1	1	1	1	1	
Turning Volumes							
Existing Traffic	0	24	10	0	0	0	
Background Traffic	0	24	10	0	0	0	
Site Generated Trips	5	31	4	0	9	7	

Pass-by Trips (Non-Primary)	1	-1	0	0	1	0	
Diverted Trips (Non-Primary)	0	0	0	0	0	0	
Extra Reduced Trips (Non-Primary)	0	0	0	0	0	0	
Total Non-primary Trips	1	-1	0	0	1	0	
Build Conditions							
Redistributed Background Traffic	1	23	10	0	1	0	
Total Build Traffic	6	54	14	0	10	7	

Project: The Village at Hardin Valley 7:SE Entrance
2025 AM Peak Hour - Revised Distribution to West Report Generated by OTISS Pro

	Spring Bluff Way		Spring Bluff Way		CR 300		
Lane Group	NEBL	NEBT	SWBT	SWBR	SEBL	SEBR	
Configuration							
Number of Lanes	1	1	1	1	1	1	
Shared?	Yes			Yes	Yes		
% Growth Over 0 Years	0	0	0	0	0	0	
Growth Factor	1	1	1	1	1	1	
Turning Volumes							
Existing Traffic	0	41	42	0	0	0	
Background Traffic	0	41	42	0	0	0	
Site Generated Trips	31	9	0	67	161	4	
Pass-by Trips (Non-Primary)	1	-1	-1	1	1	1	
Diverted Trips (Non-Primary)	0	0	0	0	0	0	
Extra Reduced Trips (Non-Primary)	0	0	0	0	0	0	
Total Non-primary Trips	1	-1	-1	1	1	1	
Build Conditions							
Redistributed Background Traffic	1	40	41	1	1	1	
Total Build Traffic	32	49	41	68	162	5	

PROJECT DETAILS

Project Name:	The Village at Hardin Valley	Type of Project:	
Project No:	2409	City:	Knoxville
Country:	Knox	Built-up Area(Sq.ft):	
Analyst Name:	Robert Jacks, PE	Clients Name:	
Date:	5/17/2024	ZIP/Postal Code:	
State/Province:	**Tennessee**	No. of Scenarios:	8
Analysis Region:			

SCENARIO SUMMARY

Scenarios	Name	No. of Land Uses	Phases of Development	No. of Years to Project Traffic	User Group	Estimated New Vehicle Trips		
						Entry	Exit	Total
Scenario - 1	2025 PM Peak Hour - Revised Distribution to West	3	1	0		183	164	347

Scenario - 5

Scenario Name: 2025 PM Peak Hour - Revised Distribution to West

User Group:

Dev. phase: 1

No. of Years to Project Traffic : 0

Analyst Note: This includes pass-by trips in order to get the software to calculate them. However, the software does not correctly calculate the distribution of pass-by trips. Therefore, a copy is made of this scenario.

Warning:

VEHICLE TRIPS BEFORE REDUCTION

Land Use & Data Source	Location	IV	Size	Time Period	Method	Entry	Exit	Total
					Rate/Equation	Split%	Split%	
822 - Strip Retail Plaza (<40k)	General Urban/Suburban	1000 Sq. Ft. GLA	15.6	Weekday, Peak Hour of Adjacent Street Traffic,	Best Fit (LOG)	53	53	106
Data Source: Trip Generation Manual, 11th Ed					Ln(T) =0.71Ln(X) + 2.72	50%	50%	
937 - Coffee/Donut Shop with Drive-Through	General Urban/Suburban	1000 Sq. Ft. GFA	4	Weekday, Peak Hour of Adjacent Street Traffic,	Average	78	78	156
Data Source: Trip Generation Manual, 11th Ed					38.99	50%	50%	
9007 - Chick-fil-A [Private]	General Urban/Suburban	1000 Sq. Ft. GFA	5.30	Weekday, Peak Hour of Adjacent Street Traffic,	Average	115	90	205
Data Source: Private Data Sets					38.62	56%	44%	

VEHICLE TO PERSON TRIP CONVERSION

BASELINE SITE VEHICLE CHARACTERISTICS:

Land Use	Baseline Site Vehicle Mode Share		Baseline Site Vehicle Occupancy		Baseline Site Vehicle Directional Split	
	Entry (%)	Exit (%)	Entry	Exit	Entry (%)	Exit (%)
822 - Strip Retail Plaza (<40k)	100	100	1	1	50	50
937 - Coffee/Donut Shop with Drive-Through Window	100	100	1	1	50	50
9007 - Chick-fil-A [Private]	100	100	1.00	1.00	56	44

ESTIMATED BASELINE SITE PERSON TRIPS:

Land Use	Person Trips by Vehicle		Person Trips by Other Modes		Total Baseline Site Person Trips	
	Entry	Exit	Entry	Exit	Entry	Exit
822 - Strip Retail Plaza (<40k)	53	53	0	0	53	53
	106		0		106	
937 - Coffee/Donut Shop with Drive-Through Window	78	78	0	0	78	78
	156		0		156	
9007 - Chick-fil-A [Private]	115	90	0	0	115	90
	205		0		205	

INTERNAL VEHICLE TRIP REDUCTION

LAND USE GROUP ASSIGNMENT:

Land Use	Land Use Group
822 - Strip Retail Plaza (<40k)	Retail
937 - Coffee/Donut Shop with Drive-Through Window	Resturant
9007 - Chick-fil-A [Private]	Resturant

BALANCED PERSON TRIPS:

822 - Strip Retail Plaza (<40k)						937 - Coffee/Donut Shop with Drive-Through Window		
Persons Exit	PAF	UIPTC	Unconstrained Demand	==>>> BALANCED ==>>>	Unconstrained Demand	UIPTC	PAF	Persons Entry
53	1	13	7	**7**	19	25	1	78

Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<== BALANCED <<<==	Unconstrained Demand	UIPTC	PAF	Persons Exit
53	1	4	2	**2**	11	14	1	78

822 - Strip Retail Plaza (<40k) — 9007 - Chick-fil-A [Private]

Persons Exit	PAF	UIPTC	Unconstrained Demand	==>>> BALANCED ==>>>	Unconstrained Demand	UIPTC	PAF	Persons Entry
53	1	0	0	**0**	29	25	1	115

Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<== BALANCED <<<==	Unconstrained Demand	UIPTC	PAF	Persons Exit
53	1	4	2	**2**	13	14	1	90

937 - Coffee/Donut Shop with Drive-Through Window — 9007 - Chick-fil-A [Private]

Persons Exit	PAF	UIPTC	Unconstrained Demand	==>>> BALANCED ==>>>	Unconstrained Demand	UIPTC	PAF	Persons Entry
78	1	0	0	**0**	0	0	1	115

Persons Entry	PAF	UIPTC	Unconstrained Demand	<<<== BALANCED <<<==	Unconstrained Demand	UIPTC	PAF	Persons Exit
78	1	0	0	**0**	0	0	1	90

INTERNAL PERSON TRIPS:

822 - Strip Retail Plaza (<40k)

Internal Person Trips From	Entry	Exit	Total
937 - Coffee/Donut Shop with Drive-Through Window	2	7	9
9007 - Chick-fil-A [Private]	2	0	2
Total Internal Person Trips	**4**	**7**	**11**

937 - Coffee/Donut Shop with Drive-Through Window

Internal Person Trips From	Entry	Exit	Total
822 - Strip Retail Plaza (<40k)	7	2	9
9007 - Chick-fil-A [Private]	0	0	0
Total Internal Person Trips	**7**	**2**	**9**

9007 - Chick-fil-A [Private]

Internal Person Trips From	Entry	Exit	Total
822 - Strip Retail Plaza (<40k)	0	2	2
937 - Coffee/Donut Shop with Drive-Through Window	0	0	0
Total Internal Person Trips	**0**	**2**	**2**

INTERNAL VEHICLE TRIPS AND CAPTURE:

822 - Strip Retail Plaza (<40k)

Total Internal Person Trips	4	7	11
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	**4**	**7**	**11**
Total External Vehicle Trips	49	46	95
Internal Vehicle Trip Capture	**7%**	**13%**	**0%**

937 - Coffee/Donut Shop with Drive-Through Window

Total Internal Person Trips	7	2	9
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-

Total Vehicle Internal Trips	**7**	**2**	**9**
Total External Vehicle Trips	71	76	147
Internal Vehicle Trip Capture	**9%**	**3%**	**0%**

9007 - Chick-fil-A [Private]

Total Internal Person Trips	0	2	2
Vehicle Mode Share	100%	100%	-
Vehicle Occupancy	1.00	1.00	-
Total Vehicle Internal Trips	**0**	**2**	**2**
Total External Vehicle Trips	115	88	203
Internal Vehicle Trip Capture	**0%**	**2%**	**0%**

PASS-BY VEHICLE TRIP REDUCTION

Land Use	External Vehicle Trips		Pass-by Vehicle Trip %		Pass-by Vehicle Trips	
	Entry	Exit	Entry (%)	Exit (%)	Entry	Exit
822 - Strip Retail Plaza (<40k)	49	46	10.00%	10.00%	5	5
937 - Coffee/Donut Shop with Drive-Through Window	71	76	25.00%	25.00%	18	19
9007 - Chick-fil-A [Private]	115	88	25.00%	25.00%	29	22

DIVERTED VEHICLE TRIP REDUCTION

Land Use	External Vehicle Trips		Diverted Vehicle Trip %		Diverted Vehicle Trips	
	Entry	Exit	Entry (%)	Exit (%)	Entry	Exit
822 - Strip Retail Plaza (<40k)	49	46	0.00%	0.00%	0	0
937 - Coffee/Donut Shop with Drive-Through Window	71	76	0.00%	0.00%	0	0
9007 - Chick-fil-A [Private]	115	88	0.00%	0.00%	0	0

EXTRA VEHICLE TRIP REDUCTION

Land Use	(External - (Pass-by + Diverted)) Vehicle Trips		Extra Vehicle Trip Reduction %		Extra Reduced Vehicle Trips	
	Entry	Exit	Entry (%)	Exit (%)	Entry	Exit
822 - Strip Retail Plaza (<40k)	44	41	0.00%	0.00%	0	0
937 - Coffee/Donut Shop with Drive-Through Window	53	57	0.00%	0.00%	0	0
9007 - Chick-fil-A [Private]	86	66	0.00%	0.00%	0	0

NEW VEHICLE TRIPS

Land Use	New Vehicle Trips		
	Entry	Exit	Total
822 - Strip Retail Plaza (<40k)	44	41	85
937 - Coffee/Donut Shop with Drive-Through Window	53	57	110
9007 - Chick-fil-A [Private]	86	66	152

RESULTS

Site Totals	Entry	Exit	Total
Vehicle Trips Before Reduction	246	221	467
Internal Vehicle Trips	11	11	22
External Vehicle Trips	235	210	445
Internal Vehicle Trip Capture	4%	5%	5%
Pass-by Vehicle Trips	52	46	98
Diverted Vehicle Trips	0	0	0

Extra Reduced Vehicle Trips	0	0	0
New Vehicle Trips	183	164	347

Project: The Village at Hardin Valley				Trip Distribution Summary
2025 PM Peak Hour - Revised Distribution to West				Report Generated by OTISS Pro
Site	Driveways	Inbound	Outbound	Total Trips
Village at H Valley	North Front Driveway	88	60	148
	SW Rear Driveway	4	14	18
	SE Rear Driveway	91	90	181

Project: The Village at Hardin Valley			Trip Assignment Summary
2025 PM Peak Hour - Revised Distribution to West			Report Generated by OTISS Pro
Assigned New Trips			
Site	**Routes**	Inbound	Outbound
Village at H Valley	From West	37	Not Defined
	To and From Pell State	10	10
	To and From East	41	50
	From SW	0	Not Defined
	To and From SE	0	0
	To and From SW	1	1
	To and From West	3	3
	To and From East	0	2
	West via East	0	8
	To and From SE	0	0
	To and From SW	1	0
	To and From West	20	3
	To and From SE	16	15
	To and From East	41	23
	West via East	4	43
	To and From Pell State	9	6

Assigned Pass-by Trips			
Site	Driveway	Turning Movement	Assigned Pass-by Trips
Village at H Valley	North Front Driveway	NEB-Right	21
		SWB-Left	25

SE Rear Driveway

UnAssigned trips are more than 0 for some driveways

Project: The Village at Hardin Valley
2025 PM Peak Hour - Revised Distribution to West

1:H Valley at Greenlan
Report Generated by OTISS Pro

	Peforming Arts Way			Hardin Valley Road			Hardin Valley Road			Greenland Way		
Lane Group	SEBL	SEBT	SEBR	NEBL	NEBT	NEBR	SWBL	SWBT	SWBR	NWBL	NWBT	NWBR
Configuration												
Number of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Shared?	Yes		No	No		No	No		No	No		Yes
% Growth Over 0 Years	0	0	0	0	0	0	0	0	0	0	0	0
Growth Factor	1	1	1	1	1	1	1	1	1	1	1	1
Turning Volumes												
Existing Traffic	38	5	30	25	943	14	108	1147	23	20	2	89
Background Traffic	38	5	30	25	943	14	108	1147	23	20	2	89
Site Generated Trips	0	9	10	10	50	4	41	41	0	51	6	25
Pass-by Trips (Non-Primary)	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips (Non-Primary)	0	0	0	0	0	0	0	0	0	0	0	0
Extra Reduced Trips (Non-Primary)	0	0	0	0	0	0	0	0	0	0	0	0
Total Non-primary Trips	0	0	0	0	0	0	0	0	0	0	0	0
Build Conditions												
Redistributed Background Traffic	38	5	30	25	943	14	108	1147	23	20	2	89
Total Build Traffic	38	14	40	35	993	18	149	1188	23	71	8	114

Project: The Village at Hardin Valley
2025 PM Peak Hour - Revised Distribution to West

2:Hardin at Award Win
Report Generated by OTISS Pro

	Bryant Lane			Hardin Valley Road			Hardin Valley Road			Award Winning Way		
Lane Group	SEBL	SEBT	SEBR	NEBL	NEBT	NEBR	SWBL	SWBT	SWBR	NWBL	NWBT	NWBR
Configuration												
Number of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Shared?	Yes		Yes	No		Yes	No		Yes	Yes		No
% Growth Over 0 Years	0	0	0	0	0	0	0	0	0	0	0	0
Growth Factor	1	1	1	1	1	1	1	1	1	1	1	1

Turning Volumes												
Existing Traffic	0	0	0	0	958	17	5	1191	1	7	0	24
Background Traffic	0	0	0	0	958	17	5	1191	1	7	0	24
Site Generated Trips	0	0	0	0	41	23	0	51	0	6	0	0
Pass-by Trips (Non-Primary)	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips (Non-Primary)	0	0	0	0	0	0	0	0	0	0	0	0
Extra Reduced Trips (Non-Primary)	0	0	0	0	0	0	0	0	0	0	0	0
Total Non-primary Trips	0	0	0	0	0	0	0	0	0	0	0	0
Build Conditions												
Redistributed Background Traffic	0	0	0	0	958	17	5	1191	1	7	0	24
Total Build Traffic	0	0	0	0	999	40	5	1242	1	13	0	24

Project: The Village at Hardin Valley 3:Award at S Bluff
2025 PM Peak Hour - Revised Distribution to West Report Generated by OTISS Pro

	Spring Bluff Way			Spring Bluff Way			Award Winning Way			Award Winning Way		
Lane Group	NEBL	NEBT	NEBR	SWBL	SWBT	SWBR	NWBL	NWBT	NWBR	SEBL	SEBT	SEBR
Configuration												
Number of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Shared?	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes
% Growth Over 0 Years	0	0	0	0	0	0	0	0	0	0	0	0
Growth Factor	1	1	1	1	1	1	1	1	1	1	1	1
Turning Volumes												
Existing Traffic	0	0	0	0	0	6	0	25	1	16	6	0
Background Traffic	0	0	0	0	0	6	0	25	1	16	6	0
Site Generated Trips	0	0	0	1	0	6	0	0	2	23	0	0
Pass-by Trips (Non-Primary)	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips (Non-Primary)	0	0	0	0	0	0	0	0	0	0	0	0
Extra Reduced Trips (Non-Primary)	0	0	0	0	0	0	0	0	0	0	0	0
Total Non-primary Trips	0	0	0	0	0	0	0	0	0	0	0	0

Build Conditions												
Redistributed Background Traffic	0	0	0	0	0	6	0	25	1	16	6	0
Total Build Traffic	0	0	0	1	0	12	0	25	3	39	6	0

Project: The Village at Hardin Valley
2025 PM Peak Hour - Revised Distribution to West

4:Greenland at S Bluff
Report Generated by OTISS Pro

	Spring Bluff Way		Greenland Way		Greenland Way		
Lane Group	NEBL	NEBR	NWBL	NWBT	SEBT	SEBR	
Configuration							
Number of Lanes	1	1	1	1	1	1	
Shared?	Yes		No			Yes	
% Growth Over 0 Years	0	0	0	0	0	0	
Growth Factor	1	1	1	1	1	1	
Turning Volumes							
Existing Traffic	64	3	4	47	70	62	
Background Traffic	64	3	4	47	70	62	
Site Generated Trips	82	15	16	0	0	54	
Pass-by Trips (Non-Primary)	0	0	0	0	0	0	
Diverted Trips (Non-Primary)	0	0	0	0	0	0	
Extra Reduced Trips (Non-Primary)	0	0	0	0	0	0	
Total Non-primary Trips	0	0	0	0	0	0	
Build Conditions							
Redistributed Background Traffic	64	3	4	47	70	62	
Total Build Traffic	146	18	20	47	70	116	

Project: The Village at Hardin Valley
2025 PM Peak Hour - Revised Distribution to West

5:North Entrance
Report Generated by OTISS Pro

	Hardin Valley Road		Hardin Valley Road		North Front Driveway		
Lane Group	NEBT	NEBR	SWBL	SWBT	NWBL	NWBR	
Configuration							

Number of Lanes	1	1	1	1	0	1	
Shared?		Yes	No		0		
% Growth Over 0 Years	0	0	0	0	0	0	
Growth Factor	1	1	1	1	0	1	
Turning Volumes							
Existing Traffic	982	0	0	1197	0	0	
Background Traffic	982	0	0	1197	0	0	
Site Generated Trips	4	37	51	51	0	60	
Pass-by Trips (Non-Primary)	-21	21	25	-25	25	21	
Diverted Trips (Non-Primary)	0	0	0	0	0	0	
Extra Reduced Trips (Non-Primary)	0	0	0	0	0	0	
Total Non-primary Trips	-21	21	25	-25	25	21	
Build Conditions							
Redistributed Background Traffic	961	21	25	1172	0	21	
Total Build Traffic	965	58	76	1223	0	81	

	Spring Bluff Way		Spring Bluff Way		CR 600		
Lane Group	NEBL	NEBT	SWBT	SWBR	SEBL	SEBR	
Configuration							
Number of Lanes	1	1	1	1	1	1	
Shared?	Yes			Yes	Yes		
% Growth Over 0 Years	0	0	0	0	0	0	
Growth Factor	1	1	1	1	1	1	
Turning Volumes							
Existing Traffic	0	17	6	0	0	0	
Background Traffic	0	17	6	0	0	0	
Site Generated Trips	4	21	3	0	10	4	

Pass-by Trips (Non-Primary)	0	0	0	0	0	0	
Diverted Trips (Non-Primary)	0	0	0	0	0	0	
Extra Reduced Trips (Non-Primary)	0	0	0	0	0	0	
Total Non-primary Trips	0	0	0	0	0	0	
Build Conditions							
Redistributed Background Traffic	0	17	6	0	0	0	
Total Build Traffic	4	38	9	0	10	4	

Project: The Village at Hardin Valley 7:SE Entrance
2025 PM Peak Hour - Revised Distribution to West Report Generated by OTISS Pro

	Spring Bluff Way		Spring Bluff Way		CR 600		
Lane Group	NEBL	NEBT	SWBT	SWBR	SEBL	SEBR	
Configuration							
Number of Lanes	1	1	1	1	1	1	
Shared?	Yes			Yes	Yes		
% Growth Over 0 Years	0	0	0	0	0	0	
Growth Factor	1	1	1	1	1	1	
Turning Volumes							
Existing Traffic	0	67	66	0	0	0	
Background Traffic	0	67	66	0	0	0	
Site Generated Trips	21	10	0	70	87	3	
Pass-by Trips (Non-Primary)	1	-1	-2	2	1	2	
Diverted Trips (Non-Primary)	0	0	0	0	0	0	
Extra Reduced Trips (Non-Primary)	0	0	0	0	0	0	
Total Non-primary Trips	1	-1	-2	2	1	2	
Build Conditions							
Redistributed Background Traffic	1	66	64	2	1	2	
Total Build Traffic	22	76	64	72	88	5	

APPENDIX I

KNOX COUNTY TURN LANE VOLUME THRESHOLD WORKSHEETS

TABLE 5B

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

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

1043/2 * 1.05 = 547.5

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600
Fewer Than 25 25 - 49 50 - 99				Yes	Yes Yes	Yes Yes
132 100 - 149 150 - 199		Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
200 - 249 250 - 299	Yes Yes			Yes Yes	Yes Yes	Yes Yes
300 - 349 350 - 399	Yes Yes			Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499	Yes Yes			Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes Yes			Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

Hardin Valley Road at the Proposed North Entrance

2025 Projected AM EB Right Turns = 132

Right Turn Lane Warranted

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

TABLE 5B

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

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

976/2 * 1.05 = 512.4

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

47

Hardin Valley Road at the Proposed North Entrance

2025 Projected PM EB Right Turns = 47

Right Turn Lane NOT Warranted

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

APPENDIX J

SIMTRAFFIC VEHICLE QUEUE WORKSHEETS

Intersection: 3: Award Winning Way/Bryant Lane & Hardin Valley Road

Movement	EB	WB	WB	NB	SB
Directions Served	TR	L	TR	LT	LTR
Maximum Queue (ft)	8	25	47	134	14
Average Queue (ft)	2	11	12	95	4
95th Queue (ft)	13	34	63	218	20
Link Distance (ft)	397		81	292	328
Upstream Blk Time (%)			1	2	
Queuing Penalty (veh)			7	0	
Storage Bay Dist (ft)		50			
Storage Blk Time (%)		2	1		
Queuing Penalty (veh)		27	0		

Intersection: 6: Greenland Way/Performing Arts Way & Hardin Valley Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	LT	R
Maximum Queue (ft)	50	192	173	26	79	204	155	12	107	95	15	29
Average Queue (ft)	19	130	112	8	48	123	82	3	69	54	3	16
95th Queue (ft)	63	206	185	28	95	230	176	14	114	106	17	37
Link Distance (ft)		407	407			397	397			300	246	246
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	80			200	125			125	80			
Storage Blk Time (%)		17	0		0	5	2		9	2		
Queuing Penalty (veh)		4	0		0	5	0		12	3		

Intersection: 10: North Entrance & Hardin Valley Road

Movement	EB	WB	WB	WB	NB
Directions Served	TR	L	T	T	R
Maximum Queue (ft)	6	50	10	5	56
Average Queue (ft)	1	31	2	1	35
95th Queue (ft)	10	59	19	13	62
Link Distance (ft)	170		407	407	76
Upstream Blk Time (%)					1
Queuing Penalty (veh)					0
Storage Bay Dist (ft)		50			
Storage Blk Time (%)		3	0		
Queuing Penalty (veh)		18	0		

Intersection: 11: Hardin Valley Road

Movement	WB	WB
Directions Served	T	T
Maximum Queue (ft)	121	118
Average Queue (ft)	65	64
95th Queue (ft)	153	152
Link Distance (ft)	170	170
Upstream Blk Time (%)	0	0
Queuing Penalty (veh)	1	2
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 14: Award Winning Way & Spring Bluff Way

Movement	WB
Directions Served	LR
Maximum Queue (ft)	33
Average Queue (ft)	21
95th Queue (ft)	45
Link Distance (ft)	184
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 16: Greenland Way & Spring Bluff Way

Movement	EB	EB	NB
Directions Served	L	R	L
Maximum Queue (ft)	63	18	15
Average Queue (ft)	47	6	4
95th Queue (ft)	72	20	20
Link Distance (ft)	192		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		100	50
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 80

Intersection: 3: Award Winning Way/Bryant Lane & Hardin Valley Road

Movement	EB	WB	WB	NB	NB
Directions Served	TR	L	TR	LT	R
Maximum Queue (ft)	2	9	9	58	31
Average Queue (ft)	0	2	2	34	16
95th Queue (ft)	5	12	17	84	40
Link Distance (ft)	397		81	292	292
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		50			
Storage Blk Time (%)			0		
Queuing Penalty (veh)			0		

Intersection: 6: Greenland Way/Performing Arts Way & Hardin Valley Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	LT	R
Maximum Queue (ft)	63	172	180	22	88	176	123	13	76	80	78	41
Average Queue (ft)	28	122	119	6	53	107	60	4	44	49	43	24
95th Queue (ft)	86	194	207	25	98	191	131	17	83	84	89	48
Link Distance (ft)		407	407			397	397			300	246	246
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	80			200	125			125	80			
Storage Blk Time (%)	0	14	1		0	3	0		1	2		
Queuing Penalty (veh)	2	5	0		3	5	0		2	1		

Intersection: 10: North Entrance & Hardin Valley Road

Movement	WB	WB	WB	NB
Directions Served	L	T	T	R
Maximum Queue (ft)	48	18	21	53
Average Queue (ft)	29	5	4	35
95th Queue (ft)	58	34	28	62
Link Distance (ft)		407	407	76
Upstream Blk Time (%)				0
Queuing Penalty (veh)				0
Storage Bay Dist (ft)	50			
Storage Blk Time (%)	1	0		
Queuing Penalty (veh)	6	0		

Intersection: 11: Hardin Valley Road

Movement	WB	WB
Directions Served	T	T
Maximum Queue (ft)	140	134
Average Queue (ft)	68	71
95th Queue (ft)	165	168
Link Distance (ft)	170	170
Upstream Blk Time (%)	1	1
Queuing Penalty (veh)	5	4
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 14: Award Winning Way & Spring Bluff Way

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	33	3
Average Queue (ft)	18	1
95th Queue (ft)	44	8
Link Distance (ft)	184	292
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 16: Greenland Way & Spring Bluff Way

Movement	EB	EB	NB
Directions Served	L	R	L
Maximum Queue (ft)	64	18	12
Average Queue (ft)	44	10	3
95th Queue (ft)	74	27	18
Link Distance (ft)	192		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		100	50
Storage Blk Time (%)	0		
Queuing Penalty (veh)	0		

Network Summary

Network wide Queuing Penalty: 34

APPENDIX K

LETTER TO ADDRESS TIS REVIEW COMMENTS

AJAX ENGINEERING
CIVIL ENGINEERING / TRAFFIC ENGINEERING

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

June 20, 2024

PROJECT NAME: The Village at Hardin Valley (7-A-24-DP)
TO: Knoxville-Knox County Planning
SUBJECT: Response Document for The Village at Hardin Valley TIS Review Comments

Knoxville-Knox County Planning and Knox County Engineering Staff:

The following response document addresses the comments in an email from Mike Conger, PE, dated June 18, 2024. This letter is added to the end of the revised report in Appendix L.

1. **Comments from Knox County Engineering:**
   - **Proposed concrete island at Restaurant with drive-thru needs to be curbed around and eliminate access to the main driveway aisle.**
   - **Main drive aisle should line up with Chikfila.**

   Response: The site designer addressed these comments in the revised site plan, which is incorporated into the revised TIS in all figures that include the site plan.

2. **Comments from Knoxville-Knox County Planning:**
   - **There should be additional discussion in the TIS regarding internal site circulation in relation to the main Chick Fil A access and how it interacts with the coffee shop drive thru window. It is suggested that consideration be given for swapping the drive thru window to the opposite (west) side of the building which would potentially reduce conflict with the heavy traffic movements accessing Chick Fil A and also provide a more logical circulation pattern rather than the "contra-flow" situation as shown where the far-right lane is being used for eastbound rather than a more logical westbound direction. Additionally, the access to the currently shown drive-thru lane appears to be problematic from a turning radius standpoint for traffic entering the site from the Southeast entrance. There should also be an indication on the site plan of where the drive thru order board will be located and a discussion of any potential queueing issues that may need to be addressed. In summary, please evaluate the drive thru circulation pattern in order to determine the optimum orientation for the overall site layout.**

Response: An additional discussion has been included in the revised report on Pages 21-22. The drive-thru window has stayed in the same place on the east side of the building, and the order board has been identified in Figure 3. Additional recommendations are offered in the report sections under "The Village at Hardin Valley Internal Drive/Parking Lot Aisleways" related to the drive-thru lane. This includes the following: "Internal guide signs should direct vehicular customers of the coffee/donut shop to the drive-thru lane's location. White pavement lane markings, arrows, or messages should also be considered to facilitate orderly vehicular movements."

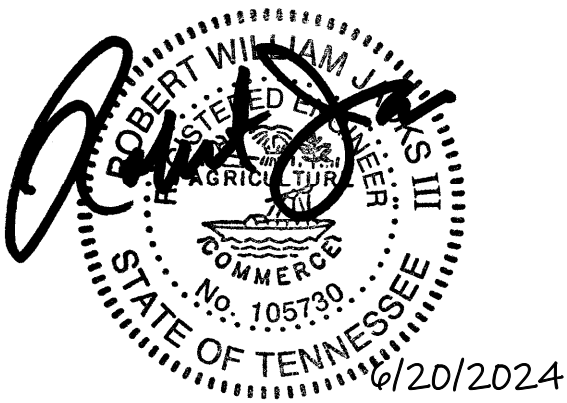
In addition to the revisions listed above, other changes in the report include the following:

- Updated Title Page
- Updated Table of Contents
- Updated Page Footers
- Added Appendix K to include this response letter

If you have any questions or further comments, don't hesitate to get in touch with me. We look forward to your approval.

Sincerely,

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



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

Development Request

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

SUBDIVISION
- ☐ Concept Plan
- ☐ Final Plat

ZONING
- ☐ Rezoning
- ☐ Plan Amendment
  - ☐ Sector Plan
  - ☐ City OYP / County Comp Plan

Urban Engineering, Inc.
Applicant Name | Affiliation

5/29/2024	**7/11/2024**	**7-A-24-DP**
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.

Chris Sharp, P.E. Urban Engineering, Inc.
Name / Company

10330 Hardin Valley Rd. Pk. Suite 201 Knoxville TN 37932
Address

865-966-1924 / chris@urban-eng.com
Phone / Email

CURRENT PROPERTY INFO

David and Tonya Hobbs OKR GP	**11707 Couch Mill Rd Knoxville TN 37932**	
Owner Name (if different)	Owner Address	Owner Phone / Email

0 SPRING BLUFF WAY
Property Address

103 M A 001, 002, 003		**3.55 acres**
Parcel ID	Part of Parcel (Y/N)?	Tract Size

West Knox Utility District	**West Knox Utility District**	
Sewer Provider	Water Provider	Septic (Y/N)

STAFF USE ONLY

Southeast side of Hardin Valley Rd, east side of Award Winning Way, northwest side of Spring Bluff Way
General Location

☐ City ☑ County	**Commission District 6** District	**PC (Planned Commercial), TO (Technology Overlay)** Zoning District	**Agriculture/Forestry/Vacant Land** Existing Land Use

Northwest County	**CMU (Corridor Mixed-use), HP (Hillside Ridgetop Protection)**	**Planned Growth Area**
Planning Sector	Land Use (City)/Place Type (County)	Growth Policy Plan Designation

DEVELOPMENT REQUEST

☑ Development Plan ☐ Planned Development ☐ Use on Review / Special Use

☐ Hillside Protection COA ☐ Residential ☑ Non-residential

Related City Permit Number(s)

Home Occupation (specify)

Other (specify) **Commercial development**

SUBDIVSION REQUEST

Related Rezoning File Number

Proposed Subdivision Name

Unit / Phase Number

Total Number of Lots Created

Additional Information

☐ Attachments / Additional Requirements

ZONING REQUEST

☐ Zoning Change

Proposed Zoning

Pending Plat File Number

☐ Plan Amendment

Proposed Plan Designation(s)

Proposed Density (units/acre)

Previous Rezoning Requests

Additional Information

STAFF USE ONLY

PLAT TYPE

☐ Staff Review ☐ Planning Commission

ATTACHMENTS

☐ Property Owners / Option Holders ☐ Variance Request

☐ Amendment Request (Comprehensive Plan)

ADDITIONAL REQUIREMENTS

☐ Use on Review / Special Use (Concept Plan)

☐ Traffic Impact Study

☐ COA Checklist (Hillside Protection)

Fee 1	Total
$1,600.00	
Fee 2	
Fee 3	

AUTHORIZATION

☐ **I declare under penalty of perjury the foregoing is true and correct: 1) He/she/it is the owner of the property, AND 2) the application and all associated materials are being submitted with his/her/its consent.**

	Urban Engineering, Inc.	**5/29/2024**
Applicant Signature	Please Print	Date

Phone / Email

	David and Tonya Hobbs OKR GP	**5/29/2024**
Property Owner Signature	Please Print	Date

Development Request

Planning
KNOXVILLE | KNOX COUNTY

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

SUBDIVISION
- ☐ Concept Plan
- ☐ Final Plat

ZONING
- ☐ Plan Amendment
  - ☐ SP ☐ PA
- ☐ Rezoning

Applicant Name	Affiliation
Urban Engineering, Inc.	Engineer

Date Filed	Meeting Date (if applicable)	File Number(s)
5/28/24	7/11/24	7-A-24-DP

CORRESPONDENCE

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

■ Applicant ☐ Property Owner ☐ Option Holder ☐ Project Surveyor ■ Engineer ☐ Architect/Landscape Architect

Name	Company
Chris Sharp	Urban Engineering, Inc.

Address	City	State	ZIP
10330 Hardin Valley Road, Suite 201	Knoxville	TN	37932

Phone	Email
(865) 966-1924	chris@urban-eng.com

CURRENT PROPERTY INFO

Property Owner Name (if different)	Property Owner Address	Property Owner Phone
OKR, G.P.	11707 Couch Mill Road (37932)	(865) 964-9254

Property Address	Parcel ID
~~0 Hardin Valley Road~~ 0 Spring Bluff Way	103MA001, 103MA002 103MA003,

Sewer Provider	Water Provider	Septic (Y/N)
WKUD	WKUD	

STAFF USE ONLY

General Location	Tract Size

☐ City ☐ County

District	Zoning District	Existing Land Use

Planning Sector	Land Use / Place Type CITY COUNTY	Growth Policy Plan Designation

DEVELOPMENT REQUEST

☐ Development Plan ☐ Use on Review / Special Use ☐ Hillside Protection COA

☐ Residential ☐ Non-Residential

Home Occupation (specify)

Other (specify)

Related City Permit Number(s)

SUBDIVISION REQUEST

Proposed Subdivision Name

Unit / Phase Number

☐ Combine Parcels ☐ Divide Parcel

Total Number of Lots Created

Related Rezoning File Number

☐ Other (specify)

☐ Attachments / Additional Requirements

ZONING REQUEST

☐ Zoning Change

Proposed Zoning

☐ Plan Amendment Change

Proposed Plan Designation(s)

Proposed Density (units/acre)

Previous Rezoning Requests

Pending Plat File Number

☐ Other (specify)

STAFF USE ONLY

PLAT TYPE

☐ Staff Review ☑ Planning Commission

ATTACHMENTS

☐ Property Owners / Option Holders ☐ Variance Request

☐ Amendment Request *(Comprehensive Plan)*

ADDITIONAL REQUIREMENTS

☐ Use on Review / Special Use *(Concept Plan)*

☐ Traffic Impact Study

☐ COA Checklist *(Hillside Protection)*

Fee 1	Total
Fee 2	
Fee 3	

AUTHORIZATION

☐ ***I declare under penalty of perjury*** *the foregoing is true and correct:*
1) *He/she/it is the owner of the property AND* ***2)*** *The application and all associated materials are being submitted with his/her/its consent*

Chris Sharp (Digitally signed by Chris Sharp Date: 2024.05.28 16:11:57 -04'00')	Urban Engineering, Inc.	5/28/24
Applicant Signature	Please Print	Date
(865) 966-1924	chris@urban-eng.com	
Phone Number	Email	
see attached		05/29/2024, SG
Property Owner Signature	Please Print	Date Paid

Planning
KNOXVILLE | KNOX COUNTY

NAMES OF ALL PROPERTY OWNERS INVOLVED OR HOLDERS OF OPTION ON SAME MUST BE LISTED BELOW:

Please print or type in black ink:

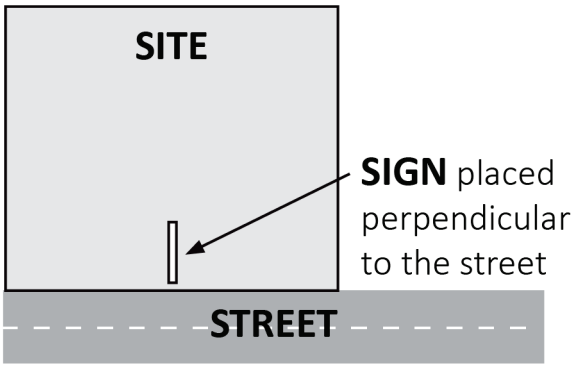
NAME	ADDRESS	CITY	STATE	ZIP	OWNER / OPTION
David Hobbs	11707 Couch Mill Rd	Knox	TN	37932	50%
Tonya Hobbs	11				50%

If more space is needed, attach additional sheets.

Sign Posting & Removal Requirement

Revised April 2021

The Administrative Rules and Procedures of the Knoxville-Knox County Planning Commission require a sign to be posted on the property for each application subject to consideration by the Planning Commission, including the following applications: rezoning, plan amendment, concept plan, use on review/special use, planned development, right-of-way closure, and name change.



The required public notice sign(s) will be provided by Planning to the applicant when an application is submitted. If an application is submitted electronically, Planning staff will post the required sign. If a replacement sign(s) is needed, the applicant is responsible for picking up the new sign(s) from Planning and will be charged $10 for each replacement.

LOCATION AND VISIBILITY

The sign must be posted on the nearest adjacent/frontage street and in a location clearly visible to vehicles traveling in either direction. If the property has more than one street frontage, the sign should be placed along the street that carries more traffic. Planning staff may recommend a preferred location for the sign to be posted at the time of application.

TIMING

The sign(s) must be posted **not less than 12 days prior to the scheduled Planning Commission public hearing** and must remain in place until the day after the meeting. In the case of a postponement, the sign can either remain in place or be removed and reposted not less than 12 days prior to the next Planning Commission meeting. The applicant is responsible for removing the sign after the application has been acted upon by the Planning Commission.

The individual below is responsible for posting and removing the sign(s) provided consistent with the above guidelines and between the dates of:

06/28/2024 and 07/12/2024

(applicant or staff to post sign) **(applicant to remove sign)**

Applicant Name: Urban Engineering, Inc

Date: 05/29/2024

File Number: 7-A-24-DP

☒ Sign posted by Staff

☐ Sign posted by Applicant