LRI

LANDTECH RESOURCES, INC.

Community Impact Study

For

SUP-19-0020
Forest Heights Master Plan, Proffer Amendment, and Rezoning

James City County, Virginia

Preparation Date:

September 25, 2019

Revised Date:

October 24, 2019

LRI Project No. 17-268

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Project Overview and Existing Conditions

Project Site Information

Project/Site Name: Forest Heights Master Plan, Proffer Amendment. And Rezoning

Project Street/Location: 6015 Richmond Road

City/County: Williamsburg **State:** Virginia **ZIP Code:** 23188

Municipality: James City County

Map #: 32220100081

Private / Public / Federal / State: Private

Residential / Commercial / Industrial / Other (specify): Residential/Commercial

County (or City) Site Plan Number (if applicable): Z-19-0012 / Z-0001-2011 / SUP-19-0020

Total Site Area: 47.1 Acres

i) Project Narrative and Description

In 2011 the Forest Heights Master plan was approved by the James City County Board of supervisors. The project consisted of rezoning 47.1 Acres to Mixed Use (MU) as well as the realignment and new construction of Forest Heights Road, Benefit Lane, and Neighbors Drive. To the north west of Forest Heights Road the previously submitted Traffic Study in the Community Impact Study dated July 14, 2011 and received by the county in August of 2011 proposed the development of a Salvation Army, 12 Single Family Detached Homes, 24 Townhome Units and 26 Apartments. Select pages from the previously submitted Community Impact Study have been provided in Appendix E. Those improvements were never developed triggering this master plan and proffer amendment for any new development on the 11.4 Ac. lot owned by the Salvation Army.
The master plan and proffer amendment focuses only on the proposed development at 6015 Richmond Road which consists of 11.4 Ac. out of the entire 47.1 Ac in the original master plan. The proposed development consists of the construction of a new road to connect to both the front and end of Forest Heights Road, 12 Multi-Family buildings consisting of 46 units, and a 50-unit Senior Independent Living Facility. The multi-family units will have three parking lots available for additional parking above the driveway and garage parking. All 46 multi-family units will meet the requirements for the James City County Housing Opportunities Policy. At least of four (4) dwelling units will be offered to households earning 30%-60% of Area Mean Income. At least of four (4) dwelling units will be offered to households earning 60%-80% of Area Mean Income. All remaining dwelling units will be offered to households earning 30%-120% of Area Mean Income. The 50 units within the Senior Independent Living Facility will be proffered as affordable housing and will be targeted at the income range of 30%-60% of Area Median Income.

ii) Analysis of Existing Public Facilities and Services

a) Using the James City County Fiscal Impact Analysis Worksheet it is expected that the proposed development would generate 7.82 students. The estimate was determined by only using the multifamily line item as the senior living apartments will be proffered as age-restricted, thus not generating any schoolchildren. In the draft copy of the Williamsburg James City County School Board 2020 capital improvement project budget there are multiple school expansions proposed. The budget proposes the construction of a new elementary school along with the expansion of the three existing high schools. In the fall of 2018 WJCC opened a new middle school to help with the growing James City County community. The already in place improvements as well as the proposed will alleviate any burden of new students created by this development.

School	School Children*
Norge Elementary	+/- 3
Hornsby Middle School	+/- 2
Warhill High School	+/- 3

	Total: 8

- Numbers are rounded up

b) The proposed development will be served by an existing James City Service Authority 12" water main located along Richmond Road and be connected to an existing JCSA 8" waterline stubbed out at the end of Forest Heights Road. The demand from the new development will generate an additional 29,760 gallons per day. This equates to 20.67 gpm average demand, 35.13 gpm max. day demand, and 82.67 gpm peak hour demand. Water demand calculations have been provided in Appendix A.

c) Wastewater generated by the proposed development will be tied into an existing 12" sewer lateral and flow to an existing JCSA Lift Station (6-2). From the lift station the waste water is pumped through an existing 8" force main to an existing 24" HRSD force main located in the Richmond Road median. An additional 29,760 gallons per day of wastewater will be generated and flow into JCSA Lift Station 6-2. The peak flow from the improvements will be 71.35 GPM. Through an initial meeting with JCSA it was determined that Lift Station 6-2 will have the adequate capacity to service the additional flow. Wastewater generation calculations have been provided in Appendix B.

d) The project site is in a very central location within James City County that allows for multiple fire stations to be in proximity as well as Sentara Williamsburg Regional Medical Center. James City County currently has 5 fire stations that cover both emergency medical services and fire protection. JCC station #4 is located the closest on Olde Towne Road and is approximately 2.1 mi. from the development. The county also has a mutual aid agreement with York County and the City of Williamsburg. With station #4 having a response time of 4 minutes and three other stations within a 10-minute response time there is adequate county EMS protection for the development.

e) Dominion Power provides electrical service for this area of James City County. All new utilities will be placed underground per JCC requirements.

f) Solid waste pickup will be provided by private contracts by each individual home. The senior living facility will have a separate contract for solid waste pickup. Solid waste haulers will work to ensure waste is picked up and disposed of in accordance with local health standards.

g) Per the James City County Recreational Facility Development Guidelines the entire master planned area of 47.1 Acres was recommended to have the following amenities:
   - 1 Sport Court or Pool
   - 1 Field
   - 1 pocket park at a minimum of 0.3 Acres.
   - 1 Playground
   - 8' wide trail that is a minimum of 0.4 miles long.

   Based on the available 11.4 Acre area of this proposed Master Plan Amendment the following items have been provided. One pocket park to include a 2,500 S.F. playground, and 0.14 miles of an 8' wide multi use path. There is also additional common area that will remain open to allow for gathering areas. In lieu of the construction of a Sport Court or Pool and Field, due to the size of the site, cash proffers have been offered.

h) Per section 24-273.9 of the James City County Zoning Ordinance there will be 1 Ac. of open space provided on the 11.4 Ac. parcel. The requirement will be met through a pocket park at 0.3 Ac., Open Space and Common area totaling 0.55 Ac., 50' Perimeter Buffer totaling 0.45 Acres and the 8' wide multiuse path at 0.08 Ac.. These areas will be spread throughout the development to allow for space between the different residential area.

iii) Analysis of Stormwater Management

Stormwater for the site will be treated with three onsite stormwater management facilities. The square footage for these facilities was determined by VRRM compliance spreadsheet and provided in Appendix C. Final stormwater layout and design will be provided with submittal of site plan documents.

iv) Environmental Constraints Analysis

(1) Hydraulic Features:

(a) Location of all bodies of water such as streams, ponds, lakes, impoundments, rivers:
- The centerline of the existing stream is shown on the master plan.

(b) Name of watershed in which the project is located:
- The project is located in the Powhatan Creek and Lower James River watersheds

(c) Approximate location of tidal and non-tidal wetlands (e.g. sinkholes, wetland, springs, seeps, etc);
- Approximate edge of wetlands are shown on the master plan

(d) Approximate location of perennial and intermittent streams;
- Perennial and intermittent streams exist along the northern, western, and southern boundaries of the property per AES community impact study completed July 14, 2011

(e) Description of receiving steams:
- The site will flow into a flat bottom at the western part of the site. This channel flows into the Longhill Swamp and ultimately the Powhatan Creek.

(f) Floodplain:
- The floodplain has been shown on the master plan per FEMA community panel #51095C0128D 12/16/2015

(2) Physical Features

(a) Approximate location of steep slopes greater than 25 percent:
- 0.2 Ac. of steep slopes exist on site.

(b) Soil types:
- The different soil types located on the site are shown on sheet 2 of the master plan.

(c) Soils erodibility based on the County Soils survey:

- A table is provided on sheet 2 of the master plan and includes the soils erodibility factor

(d) Area of forest, woodland cover and wildlife corridors:
- The entire 11.4 Ac. site is wooded.

(e) Pre-development topography based on County GIS
- County contours are provided on sheet 2 of the master plan for 6015 Richmond Road

(3) Prohibited or Restricted Development Areas:

(a) Location of required buffers and existing conservation easements:
- 100' and 50' buffers as well as existing natural open space easements are show on the master plan

(b) Sites with known populations of rare, threatened or endangered species of plants or animals per studies done in accordance with the Natural Resource Policy
- Per the Community Impact Study completed by AES consulting Engineers on July 14, 2011 there is not a concern of the development impacting any rare, threatened or endangered species.

(c) Location of trees to be preserved in accordance with the Chesapeake Bay Preservation Ordinance
- No clearing will be done in the RPA besides what is required to outfall stormwater at the toe of slope as well as tie into the existing 12" JCSA gravity sewer line.

(d) Preliminary location of Resources Protection Areas and legal wetlands:
- RPA as well as the edge of wetlands is shown on the proposed master plan.

(4) Existing and Proposed Changes to the Site:

(a) The nature of existing and approved but not yet built development on the site:
- The site was previously approved for a Salvation Army, 12 Single Family homes, 24 Townhome Units and 26 Apartments. The site remains wooded and undisturbed as none of those improvements or their infrastructure was installed.

(b) Location of Surrounding properties and neighborhoods:
- The property is surrounded by Richmond Rd. to the north east, single family lots to the south and north, as well as Scotts Pond and Villages at Westminster Homeowners common area to the south and west.

(c) Proposed limit of disturbance and a disturbance area estimate:
- The proposed limits of disturbance for the 11.4 Ac. parcel will be roughly 9.9 Ac.

(d) Calculation of existing and proposed pervious and impervious areas
- The existing lot is wooded which roughly 1.5 Ac. will remain wooded, 5.1 Ac. will be managed turf, and 4.39 Ac. will be impervious cover.

(e) If used, description of Better Site Design or Low Impact Development techniques (e.g. pervious pavement, walks, infiltration areas, etc.):

- The proposed stormwater management facilities are bioretention ponds that will infiltrate stormwater and treat the pollutant loads.

(f) Description of how disturbance is being minimized, indigenous vegetation is being preserved, and impervious cover is being reduced:

- Impervious cover was reduced to the minimum amount to allow for development as well as connectivity within the development. Open areas and landscape areas will be utilized to divide the different proposed improvements.

v) Traffic Impact Analysis (Provided by DRW Consultants, LLC)

Attached in Appendix D is the traffic impact study completed by DRW Consultants, LLC. The study shows that the original traffic impacts from this section of the Master Plan, and what is proposed in this Master Plan Amendment are equal or less. Both AM peak hour and daily trips are below what was previously planned, and PM peak hour trips remain the same. The previous traffic study required a right turn taper and no improvements to the median in Route 60. Though there was no requirement for improvement in the median, the work was still completed. With this amendment not increasing any trips to the site as well as the additional work being completed in the median, no additional traffic improvements are proposed.

Appendix A

Water Demand Calculations

Forest Heights Master Plan Amendement
James City County, Virginia
Water Demand
LRI Job #17-268
9/25/2019

Existing Water Generation

Improvement	Use	Flow Rate	Flow Duration (hrs)	#Units	Avg. Daily Flow (gpd)	Avg. Demand (gpm)	Max Day (pf=1.7) Demand (gpm)	Peak Hr (pf=4.0) Demand (gpm)
Ex. Single Family	Residential	310 (GPD/Unit)	24	61 Lots	18,910	13.13	22.32	52.52

Total Daily Demand = 18,910 GPD

Average Demand = 13.13 GPM

Maximum Day Demand = 22.32 GPM

Peak Hour Demand = 52.52 GPM

Proposed Water Generation

Improvement	Use	Flow Rate	Flow Duration (hrs)	#Units	Avg. Daily Flow (gpd)	Avg. Demand (gpm)	Max Day (pf=1.7) Demand (gpm)	Peak Hr (pf=4.0) Demand (gpm)
Multi-Family	Residential	310 (GPD/Unit)	24	46	14,260	9.90	16.83	39.61
Senior Living Facility	Apartments	310 (GPD/Unit)	24	50	15,500	10.76	18.30	43.06
Ex. Single Family	Residential	310 (GPD/Unit)	24	61 Lots	18,910	13.13	22.32	52.52

Total Daily Demand = 48,670 GPD

Average Demand = 33.80 GPM

Maximum Day Demand = 57.45 GPM

Peak Hour Demand = 135.19 GPM

Addotional Demands Created by Project

Daily **29,760 GPD**
Average **20.67 GPM**
Max Day **35.13 GPM**
Peak Hr. **82.67 GPM**

Appendix B

Wastewater Generation Calculations

LRI LANDTECH RESOURCES, INC

Forest Heights Master Plan Amendement
James City County, Virginia
Wastewater Generation
LRI Job #17-268
9/25/2019

Existing Wastewater Generation

Improvement	Use	Flow Rate	Flow Duration (hrs)	#Units	Avg. Daily Flow (gpd)	Avg. Flow (gpm)	Peak Factor	Peak Flow (gpm)
Ex. Single Family	Residential	310 (GPD/Unit)	24	61 Lots	18,910	13.13	2.5	32.83

Total Daily Flow = 18,910 GPD

Total Peak Flow = 34.43 GPM

Total Avg. Daily Flow (ADF) = 13.13 GPM

Minimum Flow (ADF / 2)= 6.57 GPM

Proposed Wastewater Generation

Improvement	Use	Flow Rate	Flow Duration (hrs)	#Units	Avg. Daily Flow (gpd)	Avg. Flow (gpm)	Peak Factor	Peak Flow (gpm)
Multi-Family	Residential	310 (GPD/Unit)	24	46	14,260	9.9	2.5	24.75
Senior Living Facility	Apartments	310 (GPD/Unit)	24	50	15,500	10.76	2.5	26.91
Ex. Single Family	Residential	310 (GPD/Unit)	24	61 Lots	18,910	13.13	2.5	32.83

Total Daily Flow = 48,670 GPD

Total Avg. Daily Flow (ADF) = 33.79 GPM

Total Peak Flow = 84.48 GPM

Minimum Flow (ADF / 2)= 42.24 GPM

Addotional Flows Created by Project

Daily Flow - 29,760 GPD

Peak Flow - 71.35 GPM

Appendix C

VRRM Spreadsheets

Drainage Area A

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv
Forest/Open Space (acres)					0.00	0.00
Managed Turf (acres)		2.37	1.05	1.76	5.18	0.22
Impervious Cover (acres)		2.10	0.88	1.41	4.39	0.95
				Total	9.57	

CLEAR BMP AREAS

Total Phosphorus Available for Removal in D.A. A (lb/yr)	12.12
Post Development Treatment Volume in D.A. A (ft^3)	19,295

Stormwater Best Management Practices (RR = Runoff Reduction)

--Select from dropdown lists--

Practice	Runoff Reduction Credit (%)	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	Volume from Upstream Practice (ft^3)	Runoff Reduction (ft^3)	Remaining Runoff Volume (ft^3)	Total BMP Treatment Volume (ft^3)	Phosphorus Removal Efficiency (%)	Phosphorus Load from Upstream Practices (lb)	Untreated Phosphorus Load to Practice (lb)	Phosphorus Removed By Practice (lb)	Remaining Phosphorus Load (lb)	Downstream Practice to be Employed
1. Vegetated Roof (RR)													
1.a. Vegetated Roof #1 (Spec #5)	45				0	0	0	0		0.00	0.00	0.00	
1.b. Vegetated Roof #2 (Spec #5)	60				0	0	0	0		0.00	0.00	0.00	
2. Rooftop Disconnection (RR)													
2.a. Simple Disconnection to A/B Soils (Spec #1)	50			0	0	0	0	0	0.00	0.00	0.00	0.00	
2.b. Simple Disconnection to C/D Soils (Spec #1)	25			0	0	0	0	0	0.00	0.00	0.00	0.00	
2.c. To Soil Amended Filter Path as per specifications (existing C/D soils) (Spec #4)	50			0	0	0	0	0	0.00	0.00	0.00	0.00	
2.d. To Dry Well or French Drain #1, Micro-Infilration #1 (Spec #8)	50			0	0	0	0	25	0.00	0.00	0.00	0.00	
2.e. To Dry Well or French Drain #2, Micro-Infiltration #2 (Spec #8)	90			0	0	0	0	25	0.00	0.00	0.00	0.00	
2.f. To Rain Garden #1, Micro-Bioretention #1 (Spec #9)	40			0	0	0	0	25	0.00	0.00	0.00	0.00	
2.g. To Rain Garden #2, Micro-Bioretention #2 (Spec #9)	80			0	0	0	0	50	0.00	0.00	0.00	0.00	
2.h. To Rainwater Harvesting (Spec #6)	0			0	0	0	0	0	0.00	0.00	0.00	0.00	
2.i. To Stormwater Planter, Urban Bioretention (Spec #9, Appendix A)	40			0	0	0	0	25	0.00	0.00	0.00	0.00	
3. Permeable Pavement (RR)													
3.a. Permeable Pavement #1 (Spec #7)	45			0	0	0	0	25	0.00	0.00	0.00	0.00	
3.b. Permeable Pavement #2 (Spec #7)	75				0	0	0	25		0.00	0.00	0.00	
4. Grass Channel (RR)													
4.a. Grass Channel A/B Soils (Spec #3)	20			0	0	0	0	15	0.00	0.00	0.00	0.00	
4.b. Grass Channel C/D Soils (Spec #3)	10			0	0	0	0	15	0.00	0.00	0.00	0.00	
4.c. Grass Channel with Compost Amended Soils as per specs (see Spec #4)	30			0	0	0	0	15	0.00	0.00	0.00	0.00	
5. Dry Swale (RR)													
5.a. Dry Swale #1 (Spec #10)	40			0	0	0	0	20	0.00	0.00	0.00	0.00	
5.b. Dry Swale #2 (Spec #10)	60			0	0	0	0	40	0.00	0.00	0.00	0.00	
6. Bioretention (RR)													
6.a. Bioretention #1 or Micro-Bioretention #1 or Urban Bioretention (Spec #9)	40			0	0	0	0	25	0.00	0.00	0.00	0.00	

Practice	Nitrogen Removal Efficiency (%)	Nitrogen Load from Upstream Practices (lbs)	Untreated Nitrogen Load to Practice (lbs)	Nitrogen Removed By Practice (lbs)	Remaining Nitrogen Load (lbs)
1. Vegetated Roof (RR)					
1.a. Vegetated Roof #1 (Spec #5)	0		0.00	0.00	0.00
1.b. Vegetated Roof #2 (Spec #5)	0		0.00	0.00	0.00
2. Rooftop Disconnection (RR)					
2.a. Simple Disconnection to A/B Soils (Spec #1)	0	0.00	0.00	0.00	0.00
2.b. Simple Disconnection to C/D Soils (Spec #1)	0	0.00	0.00	0.00	0.00
2.c. To Soil Amended Filter Path as per specifications (existing C/D soils) (Spec #4)	0	0.00	0.00	0.00	0.00
2.d. To Dry Well or French Drain #1, Micro-Infilration #1 (Spec #8)	15	0.00	0.00	0.00	0.00
2.e. To Dry Well or French Drain #2, Micro-Infiltration #2 (Spec #8)	15	0.00	0.00	0.00	0.00
2.f. To Rain Garden #1, Micro-Bioretention #1 (Spec #9)	40	0.00	0.00	0.00	0.00
2.g. To Rain Garden #2, Micro-Bioretention #2 (Spec #9)	60	0.00	0.00	0.00	0.00
2.h. To Rainwater Harvesting (Spec #6)	0	0.00	0.00	0.00	0.00
2.i. To Stormwater Planter, Urban Bioretention (Spec #9, Appendix A)	40	0.00	0.00	0.00	0.00
3. Permeable Pavement (RR)					
3.a. Permeable Pavement #1 (Spec #7)	25	0.00	0.00	0.00	0.00
3.b. Permeable Pavement #2 (Spec #7)	25		0.00	0.00	0.00
4. Grass Channel (RR)					
4.a. Grass Channel A/B Soils (Spec #3)	20	0.00	0.00	0.00	0.00
4.b. Grass Channel C/D Soils (Spec #3)	20	0.00	0.00	0.00	0.00
4.c. Grass Channel with Compost Amended Soils as per specs (see Spec #4)	20	0.00	0.00	0.00	0.00
5. Dry Swale (RR)					
5.a. Dry Swale #1 (Spec #10)	25	0.00	0.00	0.00	0.00
5.b. Dry Swale #2 (Spec #10)	35	0.00	0.00	0.00	0.00
6. Bioretention (RR)					
6.a. Bioretention #1 or Micro-Bioretention #1 or Urban Bioretention (Spec #9)	40	0.00	0.00	0.00	0.00

6.b. Bioretention #2 or Micro-Bioretention #2 (Spec #9)	80	5.18	4.39	0	15,436	3,859	19,295	50	0.00	12.11	10.90	1.21	

60	0.00	86.63	79.70	6.93

7. Infiltration (RR)												
7.a. Infiltration #1 (Spec #8)	50			0	0	0	0	25	0.00	0.00	0.00	0.00	
7.b. Infiltration #2 (Spec #8)	90			0	0	0	0	25	0.00	0.00	0.00	0.00	

7. Infiltration (RR)				
15	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00

8. Extended Detention Pond (RR)												
8.a. ED #1 (Spec #15)	0			0	0	0	0	15	0.00	0.00	0.00	0.00	
8.b. ED #2 (Spec #15)	15			0	0	0	0	15	0.00	0.00	0.00	0.00	

8. Extended Detention Pond (RR)				
10	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00

9. Sheetflow to Filter/Open Space (RR)												
9.a. Sheetflow to Conservation Area, A/B Soils (Spec #2)	75			0	0	0	0	0	0.00	0.00	0.00	0.00	
9.b. Sheetflow to Conservation Area, C/D Soils (Spec #2)	50			0	0	0	0	0	0.00	0.00	0.00	0.00	
9.c. Sheetflow to Vegetated Filter Strip, A Soils or Compost Amended B/C/D Soils (Spec #2 & #4)	50			0	0	0	0	0	0.00	0.00	0.00	0.00	

9. Sheetflow to Filter/Open Space (RR)				
0	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00

TOTAL IMPERVIOUS COVER TREATED (ac)	4.39	AREA CHECK: OK.
TOTAL MANAGED TURF AREA TREATED (ac)	5.18	AREA CHECK: OK.
TOTAL RUNOFF REDUCTION IN D.A. A (ft^3)	15,436	

TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. A (lb/yr)	12.12
TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	10.90
TOTAL PHOSPHORUS REMAINING AFTER APPLYING RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	1.22

SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS

TOTAL RUNOFF REDUCTION IN D.A. A (ft^3)	15,436
NITROGEN REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	79.70

SEE WATER QUALITY COMPLIANCE TAB FOR SITE CALCULATIONS (Information Only)

10. Wet Swale (no RR)												
10.a. Wet Swale #1 (Spec #11)	0			0	0	0	0	20	0.00	0.00	0.00	0.00	
10.b. Wet Swale #2 (Spec #11)	0			0	0	0	0	40	0.00	0.00	0.00	0.00	

10. Wet Swale (Coastal Plain) (no RR)				
25	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00

11. Filtering Practices (no RR)												
11.a.Filtering Practice #1 (Spec #12)	0			0	0	0	0	60	0.00	0.00	0.00	0.00	
11.b. Filtering Practice #2 (Spec #12)	0			0	0	0	0	65	0.00	0.00	0.00	0.00	

11. Filtering Practices (no RR)				
30	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00

12. Constructed Wetland (no RR)												
12.a.Constructed Wetland #1 (Spec #13)	0			0	0	0	0	50	0.00	0.00	0.00	0.00	
12.b. Constructed Wetland #2 (Spec #13)	0			0	0	0	0	75	0.00	0.00	0.00	0.00	

12. Constructed Wetland (no RR)				
25	0.00	0.00	0.00	0.00
55	0.00	0.00	0.00	0.00

13. Wet Ponds (no RR)												
13.a. Wet Pond #1 (Spec #14)	0			0	0	0	0	50	0.00	0.00	0.00	0.00	
13.b. Wet Pond #1 (Coastal Plain) (Spec #14)	0			0	0	0	0	45	0.00	0.00	0.00	0.00	
13.c. Wet Pond #2 (Spec #14)	0			0	0	0	0	75	0.00	0.00	0.00	0.00	
13.d. Wet Pond #2 (Coastal Plain) (Spec #14)	0			0	0	0	0	65	0.00	0.00	0.00	0.00	

13. Wet Ponds (no RR)				
30	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00

14. Manufactured Treatment Devices (no RR)													
14.a. Manufactured Treatment Device-Hydrodynamic	0			0	0	0	0	20	0.00	0.00	0.00	0.00	
14.b. Manufactured Treatment Device-Filtering	0			0	0	0	0	20	0.00	0.00	0.00	0.00	
14.c. Manufactured Treatment Device-Generic	0			0	0	0	0	20	0.00	0.00	0.00	0.00	

14. Manufactured BMP (no RR)				
0	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00

TOTAL IMPERVIOUS COVER TREATED (ac)	4.39	AREA CHECK: OK.
TOTAL MANAGED TURF AREA TREATED (ac)	5.18	AREA CHECK: OK.
TOTAL PHOSPHORUS REMOVAL REQUIRED ON SITE (lb/yr)	8.20	
TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. A (lb/yr)	12.12	
TOTAL PHOSPHORUS REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	0.00	
TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	10.90	
TOTAL PHOSPHORUS LOAD REDUCTION ACHIEVED IN D.A. A (lb/yr)	10.90	
TOTAL PHOSPHORUS REMAINING AFTER APPLYING BMP LOAD REDUCTIONS IN D.A. A (lb/yr)	1.22	

SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS

NITROGEN REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	79.70
NITROGEN REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	0.00
TOTAL NITROGEN REMOVED IN D.A. A (lb/yr)	79.70

Appendix D

Traffic Impact Study

DRW Consultants, LLC
Traffic Impact Studies
Development Access
Condemnation Damages

TO: Chase Grogg
FROM: Dexter Williams
SUBJECT: Trip Generation Comparison For Blocks 4, 5, 6, 7 Of Forest Heights
DATE: September 24, 2019

Enclosed Exhibit B shows the areas involved with this trip generation analysis:

1. Existing Master Plan Blocks 4, 6, and 7 are outlined in red.
2. Existing Master Plan Block 5 is outlined in blue.
3. Proposed development area is outlined in green.
4. Remaining area of Blocks 4, 5, 6 and 7 outlined in grey.

Enclosed Exhibit A shows trip generation for Blocks 4, 5, 6 and 7 of Forest Heights as follows:

- Table 1: Proposed Development Trip Generation (green boundary). 46 multi-family low rise units, 50 units senior adult attached.
- Table 2: Remainder Blocks 4, 5, 6, and 7 Trip Generation (grey boundary). 10 residenitial units.
- Table 3: Total Blocks 4, 5, 6, 7 Trip Generation With Proposed Development. Total of Tables 1 and 2.
- Table 4: AES Blocks 4, 5, 6, and 7 Original Trip Generation. Provided by you from original Forest Heights development plan.

Proposed development peak hour traffic is is substantially less than the original trip generation for both peak hours and for daily traffic.

2319 Latham Place
Midlothian, VA 23113
phone 804-794-7312
fax 804-379-3810

		LAND USE	SQ.FT., OTHER UNITS	WEEKDAY TRIP GENERATION						
				AM PEAK HOUR			PM PEAK HOUR			
VALUE	LAND USE	CODE		Enter	Exit	Total	Enter	Exit	Total	DAILY
TABLE 1: Proposed Development Trip Generation										
eq.-adj. st.	Sr. Adult Attached	252	50 units	3	6	9	8	6	14	175
eq.-adj. st.	Multifamily Low Rise	220	46 units	5	18	23	19	11	30	307
			Total	8	24	32	27	17	44	482
TABLE 2: Remainder Blocks 4, 5, 6, 7 Trip Generation										
rate-adj. st.	Single-Family	210	10 units	2	5	7	6	4	10	94
TABLE 3: Total Blocks 4, 5, 6, 7 Trip Generation With Proposed Development										
				10	29	39	33	21	54	576
TABLE 4: AES Blocks 4, 5, 6 and 7 Original Trip Generation										
4	Salvation Army		30,000 sq. ft.			49			49	686
5	Future SF Detached		12 lots			9			12	115
6	Future Townhomes		24 units			11			12	145
7	Future Sal Va Army Apts		26 apts			13			16	175
						82			89	1121

Trip generation rates from Trip Generation Manual, 10th Edition (TGM10) by the Institute of Transportation Engineers (ITE)

FOREST HEIGHTS TRIP GENERATION COMPARISON
09-24-19

DRW Consultants, LLC
804-794-7312

Exhibit A

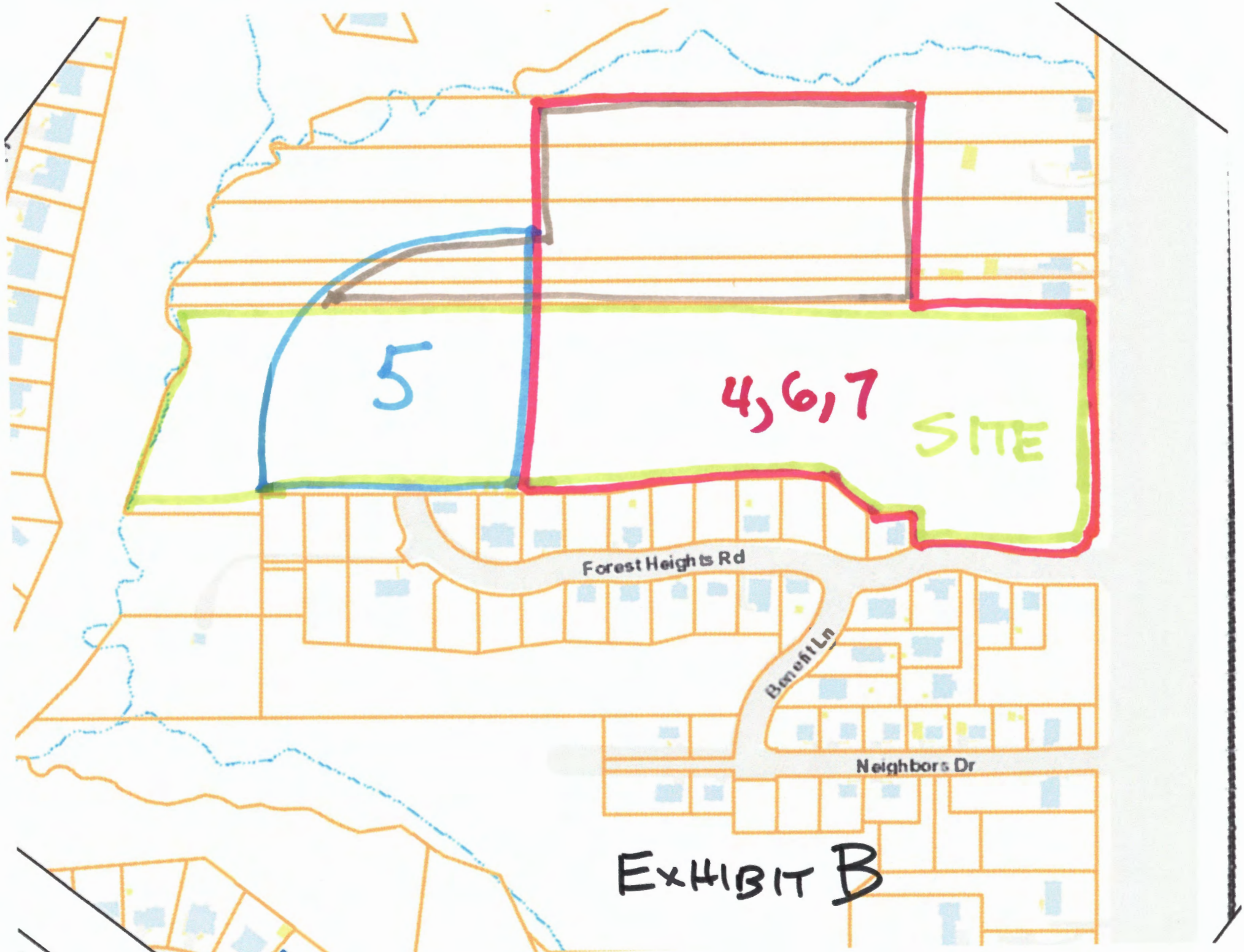


EXHIBIT B

Appendix D

Traffic Study From Original Master Plan Submission

Community Impact Study

Rezoning of

Forest Heights Road / Neighbors Drive / Richmond Road Areas

for

James City County
Department of Community Services
Office of Housing and Community Development

April 1, 2011
Revised July 14, 2011

Prepared By

AES
CONSULTING ENGINEERS

5248 Olde Towne Road, Suite 1
Williamsburg, VA 23188
Ph: (757) 253-0040 Fax: (757) 220-8994
http://www.aesva.com

Forest Heights Road / Neighbors Drive

James City County, Virginia

Traffic Analysis for Rezoning

AES Project No. W10119-E-03

2/25/2011 by: ABS

Revised: March 22, 2011

No.	Generator	Landuse	Units	PM Pk VPH	AM Pk VPH	Avg VPD
1	Neighbors Dr.	210	21 Lots	21	16	201
2	Neighbors Cross-Thru	210	3 Lots	3	2	29
3	Forest Heights Rd	210	31 Lots	31	23	297
4	Salvation Army	495	30 KSF	49	49	686
5	Future SF Detached Lots	210	12 Lots	12	9	115
6	Future Townhomes	230	24 Units	12	11	141
7	Future Salvation Army Apts	220	26 Apts	16	13	175
8	Ex. Richmond Rd Homes	210	6 Lots	6	5	57

Minimum Condition (includes Nos. 1, 2, 3, 4, 8 above)

Total Peak PM Trips:	110	VPH
Total Peak AM Trips:	95	VPH
Total Daily Trips:	1,270	VPD

Maximum Condition (includes Nos. 1, 2, 3, 4, 6, 7, 8 above)

			Additional Trips (over Ex.)	
Total Peak PM Trips:	138	VPH	76	VPH
Total Peak AM Trips:	119	VPH	73	VPH
Total Daily Trips:	1,586	VPD	1,002	VPD

Determine which peak hour controls entry movements (for turn lane analysis)

No.	Generator	PM Pk VPD	PM Enter	AM Pk VPH	AM Enter	
1	Neighbors Dr.	21	13	16	4	
2	Neighbors Cross-Thru	3	2	2	1	
3	Forest Heights Rd	31	20	23	6	
4	Salvation Army	49	14	49	30	
5	Future SF Detached Lots	12	8	9	2	
6	Future Townhomes	12	8	11	2	
7	Future Salvation Army Apts	16	10	13	3	
8	Ex. Richmond Rd Homes	0	0	0	0	<- Have separate entry from Rt 60

Minimum Condition (includes Nos. 1, 2, 3, 4, 8 above)

Total Peak PM Entry Trips:	49	VPH	
Total Peak AM Entry Trips:	41	VPH	=> PM Entry Trips Control

Maximum Condition (includes Nos. 1, 2, 3, 4, 6, 7, 8 above)

Total Peak PM Trips:	67	VPH	
Total Peak AM Trips:	46	VPH	=> PM Entry Trips Control

Forest Heights Road / Neighbors Drive

James City County, Virginia

Traffic Analysis for Rezoning

AES Project No. W10119-E-03

2/25/2011 by: ABS

Revised: March 22, 2011

Calculate total peak turn lane motions:

Minimum Condition

No.	Generator	Total Entering	Left Turn Entering	% RT Neighbors*	RT Enter Neighbors	RT Enter Forest Heights
1	Neighbors Dr.	13	7	100%	7	0
2	Neighbors Cross-Thru	2	1	50%	1	1
3	Forest Heights Rd	20	10	0%	0	10
4	Salvation Army	14	7	0%	0	7
	Total	49	25		8	18

Total Entry is assumed to be split 50/50 from East 60 and West 60
Left Turn Entering = 50% of Total from Williamsburg
% RT Neighbors = Percentage of entry trips from Lightfoot that turns into Neighbors Dr; others turn at Forest Heights

Approach Traffic:

PHVapp = AADT x K x Dir. Factor = 590 VPH
USE DRW Peak Hr Counts = 931 VPH

Warrants:

LT = 25 VPH
Vo = 931 VPH

Per Fig 3-3 of VDOT Road Design Manual

Does not meet warrant for left turn lane for 4-lane divided highway BUT CLOSE

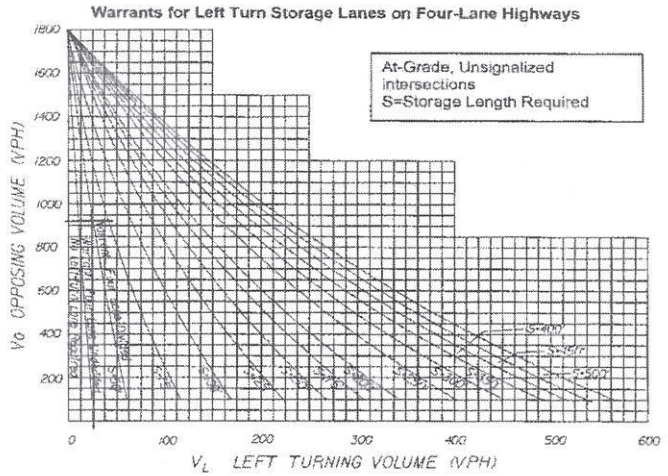


FIGURE 3-3 WARRANTS FOR LEFT TURN STORAGE LANES ON FOUR-LANE HIGHWAYS

Figure 3-3 was derived from Highway Research Report No. 211.

Forest Heights Road / Neighbors Drive

James City County, Virginia

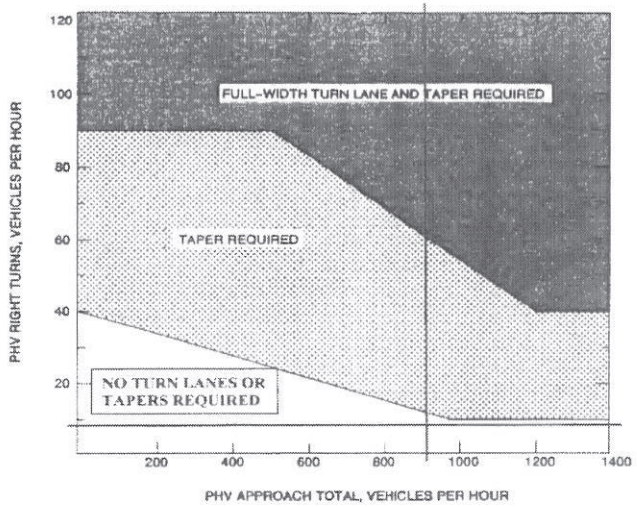
Traffic Analysis for Rezoning

AES Project No. W10119-E-03

2/25/2011 by: ABS

Revised: March 22, 2011

Neighbors Drive



Appropriate Radius required at all Intersections and Entrances (Commercial or Private).

LEGEND

PHV- - Peak Hour Volume (also Design Hourly Volume equivalent)

Adjustment for Right Turns

If PHV is not known use formula: PHV = ADT x K x D

K = the percent of AADT occurring in the peak hour
D = the percent of traffic in the peak direction of flow

Note: An average of 11% for K x D will suffice.

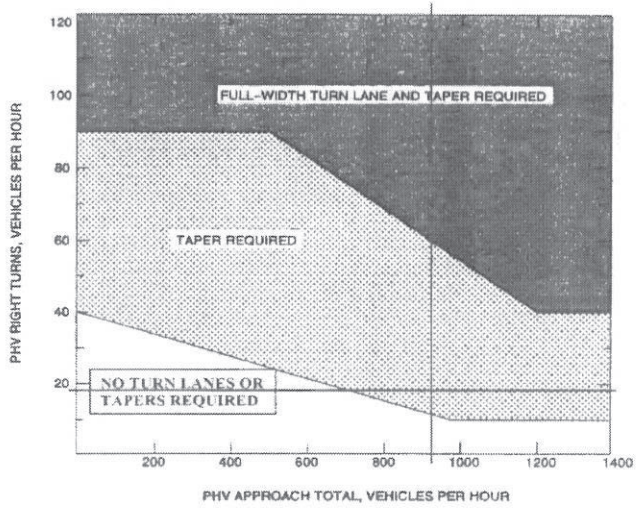
FIGURE 3-27 GUIDELINES FOR RIGHT TURN TREATMENT (4-LANE HIGHWAY)

RT = 8 VPH
PHV = 931 VPH

Per Fig 3-27 of VDOT Road Design Manual

Does not meet warrant for right turn lane or taper

Forest Heights Road



Appropriate Radius required at all Intersections and Entrances (Commercial or Private).

LEGEND

PHV- - Peak Hour Volume (also Design Hourly Volume equivalent)

Adjustment for Right Turns

If PHV is not known use formula: PHV = ADT x K x D

K = the percent of AADT occurring in the peak hour
D = the percent of traffic in the peak direction of flow

Note: An average of 11% for K x D will suffice.

FIGURE 3-27 GUIDELINES FOR RIGHT TURN TREATMENT (4-LANE HIGHWAY)

RT = 18 VPH
PHV = 931 VPH

Per Fig 3-27 of VDOT Road Design Manual

Meets warrant for right taper

Forest Heights Road / Neighbors Drive

James City County, Virginia

Traffic Analysis for Rezoning

AES Project No. W10119-E-03

2/25/2011 by: ABS

Revised: March 22, 2011

Maximum Condition

No.	Generator	Total Entering	Left Turn Entering	% RT Neighbors*	RT Enter Neighbors	RT Enter Forest Heights
1	Neighbors Dr.	13	7	100%	7	0
2	Neighbors Cross-Thru	2	1	50%	1	1
3	Forest Heights Rd	20	10	0%	0	10
4	Salvation Army	14	7	0%	0	7
6	Future Townhomes	8	4	0%	0	4
7	Future Salvation Army Apts	10	5	0%	0	5
	Total	67	34		8	27

Total Entry is assumed to be split 50/50 from East 60 and West 60
Left Turn Entering = 50% of Total from Williamsburg
% RT Neighbors = Percentage of entry trips from Lightfoot that turns into Neighbors Dr; others turn at Forest Heights

Approach Traffic:

PHVapp = AADT x K x Dir. Factor = 590 VPH
USE DRW Peak Hr Counts = 931 VPH

Warrants:

LT = 34 VPH
Vo = 931 VPH

Per Fig 3-3 of VDOT Road Design Manual

Meets warrant for left turn lane with 50' Storage for 4-lane divided highway

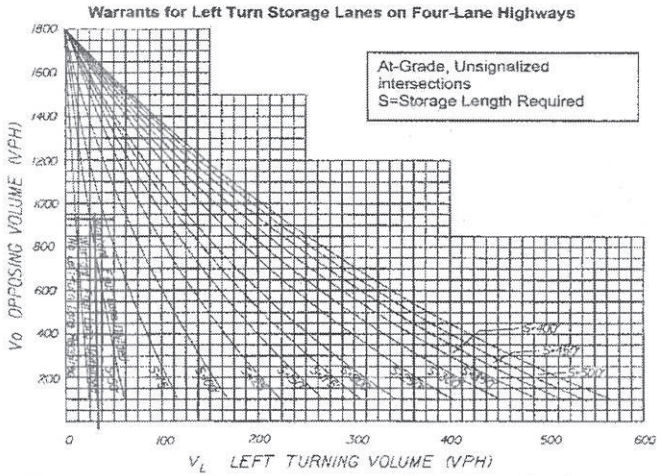


FIGURE 3-3 WARRANTS FOR LEFT TURN STORAGE LANES ON FOUR-LANE HIGHWAYS

Figure 3-3 was derived from Highway Research Report No. 211.