

PSTA SITE STORMWATER MANAGEMENT CONCEPT PLAN REPORT #285681

Submitted for:

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PROFESSIONAL CERTIFICATION

"I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 50010, Expiration Date: 7/09/22."

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Executive Summary

This report presents the concept storm water management plan for the PSTA Site project in Montgomery County, Maryland. The PSTA project site is bound by Great Seneca Highway (MD-119) to the east, Key West Avenue (MD-28) to the north, the Shady Grove Medical Village to the northwest, and the Shady Grove Life Sciences Center to the south. The project proposes redevelopment of the Montgomery County Public Safety Training Academy campus, the absorption of portions of adjacent properties for the implementation of the master plan road Medical Center Drive, and public improvements within offsite county and state public right-of-way's bordering the site. The new development will include mixed use of single-family dwellings, commercial multifamily buildings, public roads, private alleys, and civic green areas. Offsite improvements in the county and state right-of-ways include intersection entrances of the master plan road Medical Center Drive as well as a new separated bikeway and sidepath running parallel to each roadway respectively. The PSTA project site consolidates five existing pieces of land into one overall site for stormwater management analysis (hereby referred to as "the Site") in the proposed condition. Three of these pieces of land make up the site in the existing condition, totaling at 1,944,513 ft². The other two pieces of land are parts of adjacent properties that will be acquiesced by the county for the Medical Center Drive public right-of-way. The total of these five pieces of land is 1,976,095 ft², and this is the total that is considered to make up the Site for the purposes of computing the site's stormwater management target requirements. Additionally, improvements are proposed offsite in the county right-of-way for Great Seneca Highway and the state right-of-way for Key West Avenue, for which the limits of disturbance are 44,418 ft² and 29,476 ft² respectively. Please see sheet 2A for more on the land pieces, their legal descriptions, and square footage.

This stormwater management plan has been prepared in accordance with the MDE 2007 Stormwater Management Regulations and applicable Montgomery County, Maryland COMCOR codes. This plan and report introduce the proposed redevelopment and the intended implementation of ESD and structural practices to provide all quality and quantity control requirements for this project. The Site meets the definition of redevelopment as defined by Montgomery County Code Section 19.21, whereby this project exceeds or equals 5,000 square feet of land disturbance; and will be performed on a site where the existing land use is commercial, industrial, institutional, or multifamily residential and existing imperviousness is greater than 40 percent. In the existing condition, there is 812,850 ft² of impervious area within the 1,944,513 ft² existing site, or 41.80%. For redevelopment, the applicant may use alternative stormwater management measures to satisfy the requirements of the project if it is shown that impervious area reduction and environmental site design (ESD) have been implemented to the maximum extent practicable (MEP), but the site targets have still not been met. Alternative stormwater management measures include on-site structural best management practices, off-site structural best management practices, or a combination of impervious area reduction, ESD implementation, and onsite or offsite structural best management practices within the limit of disturbance.

(Executive summary continues on next page)

The Site's environmental site design volume (ESD_v) is partially provided through the use of micro-bioretenion facilities, bio-swales, and sheet flow to conservation area for a total 38,542 ft³ of treatment provided. The full Site ESD_v target of 156,670 ft³ will not be met with ESD alone, despite ESD to the MEP. Underground structural systems are proposed to treat the remaining required volume of 118,128 ft³ not able to be treated in ESD measures, in order to reach the overall Site's targets. The structural practices proposed include systems comprised of standard pre-cast flow splitters, corrugated metal pipe (CMP) detention units, and "jellyfish" filter cartridge treatment devices or approved equivalent. Through the combination of ESD facility and structural facility treatment, all stormwater management requirements have been met for the Site. A total of 160,418 ft³ of treatment has been provided.

Offsite public right-of-way improvements have been partitioned from the Site and will receive their own stormwater management analysis. Improvements and the associated stormwater treatment for the offsite state right-of-way will be coordinated with Maryland State Highway and are not a part of this stormwater management plan. Improvements for the offsite county right-of-way will require 3,078 ft³ of ESD_v treatment. At the time of concept design, Rodgers does not believe ESD solutions will be practicable within the limits of offsite county right-of-way. Per correspondence between Rodgers and DPS on 06/18/2021, Rodgers agrees to continue to explore permeable pavement as the primary treatment solution for the offsite county improvements with geotechnical engineering input at the Site Development Stormwater Management stage. If permeable pavement and other ESD options are determined impracticable, Rodgers will provide treatment within the limits of the Site as necessary to meet the 159,748 ft³ combined total of the Site and the offsite county right-of-way ESD_v targets. The concept currently proposes 160,418 ft³ of treatment total in the event that this outcome should occur, and so both outcomes remain viable to meet the overall stormwater management requirements.

Executive Summary Table

ESD_v Required for the Site	156,670 ft³
ESD_v Required for the offsite county right-of-way improvements	3,078 ft³
Combined ESD_v Required	159,748 ft³
ESD_v through ESD Provided	38,542 ft³
Structural Treatment Required	118,128 ft³
Structural Treatment Provided	121,876 ft³
Surplus Treatment Volume	670 ft³
Total ESD_v Provided	160,418 ft³

Stormwater Management Narrative

Property Information & Existing Conditions:

The PSTA project site consists of five existing pieces of land that will be combined into one. These pieces of land are a part of Parcel D (L. 16172 F. 270), a part of Parcel A (L. 16172 F. 223), P850 (L. 3862 F. 776), P925 (L. 3862 F. 772), and a part of Parcel V (Tax ID#03210078 FR43 NO66). The total of these five pieces of land is 1,976,095 ft² (please see sheet 2A for an existing condition base map). Work is also proposed in the offsite county right-of-way for Great Seneca Highway, for which the limits of development are 44,418 ft². Improvements are also proposed in the offsite state right-of-way for Key West Avenue, for which the limits of development are 29,476 ft². These offsite state right-of-way improvements and the associated stormwater treatment will be coordinated with Maryland State Highway Administration.

Soils for the Site and the offsite improvement areas are Hydrologic Soil Group 'C' & 'D', with the exception of 0.1% of the Site classified as B soils. See appendix A for USGS soil reports for the Site and the offsite county right-of-way improvements. Shallow bedrock exists in many areas throughout the site; please see the GTA Subsurface Exploration Plan located in the documents folder as well as sheet 2 for infiltration rates and bedrock depths.

Per the approved NRI/FSD (approval dated May 29, 2019), the Site is within the Upper Muddy Branch sub-watershed of the Lower Potomac Direct Watershed, Class I-P, and is not within a Special Protection Area (SPA). There is no FEMA mapped floodplain on or within 100' of the Site. There are perennial streams, intermittent streams, and areas of stream valley buffer present on the Site. Wetlands were observed on site during a field study performed by Rodgers Consulting in December 2018. There were no steep slopes found on site. The majority of the site drains to the northeast corner of the site towards an existing tributary. This tributary then leaves the limits of the Site via two 84" RCP pipes forming a culvert running underneath Key West Avenue. A small portion of the site drains to the west of the property towards a drainage swale that ends at the property line of the site and Shady Grove Medical village. A floodplain delineation study (FLDSTUDY-286994) has been applied for and is under review for the floodplain in the northeast corner of the site. The results of this study conclude the existing culvert is sufficient to handle the Site's outflow in both the existing and proposed condition.

The Site comprises of safety training facilities, expansive surface lots, existing stormwater management facilities/structures, and pad sites where buildings have been demolished in the existing condition. Rodgers Consulting has identified eight existing SWFAC stormwater management assets on the Site providing some level quality treatment and quantity control as required by stormwater regulations imposed in 2005. These facilities consist of dry ponds, bay savers, sand filters, flow splitters, and wet ponds. Additionally, there are five more existing SWFAC stormwater management assets on Parcel V to the south of the Site constructed at a similar time, providing some level of quality and quantity treatment for Parcel V drainage. The facilities include a stormceptor, flow splitters, and a sand filter. These parcel V facilities have been confirmed to be unimpacted by the Site's redevelopment and are outside of the Site's limits-of-disturbance.

All existing facilities previously mentioned eventually drain into the twin 84" RCP pipe culvert running underneath Key West Avenue. This water daylights on the other side of the road and flows via a small creek into SWFAC asset #11575, an extended detention wet pond.

Rodgers has reached out to DPS' Record Request under Information Request #437610 regarding existing facilities on the Site, but DPS was not able to locate any information regarding this project. Rodgers has also reached out to DEP and was provided an As Built for I.F.B. #5504510285 as the only result; it has been included in the supporting drawings folder for this submittal. Rodgers utilized this As Built in order to draft in existing storm drain information for a 42" line located on the Site (see sheet 2A). After review of this As Built and based on existing site grades, features, and storm drain information, Rodgers believes the Site's existing SWFAC facilities treat exclusively onsite water and are not regional facilities with one notable exception. SWFAC asset #23608, an existing wet pond, appears to provide some amount of quantity control for water picked up on parcel V south of the Site. Water draining in parcel V is partitioned via flow splitters to receive quality treatment via a stormceptor and a sand filter located within the limits of parcel V. However, some quantity overflow travels from one of these flow splitters to SWFAC asset #23608. Rodgers approximates the drainage area into this flow splitter to be at most 3 acres.

Rodgers is confident after reviewing the existing SWFAC facilities on the Site that the removal of said facilities will not impact the stormwater quality treatment requirements for Parcel V. Rodgers is also confident the removal the quantity control provided via SWFAC asset #23608 for parcel V will be acceptable for the following reasons:

1. Rodgers has verified the capacity of the twin 84" RCP culvert running under Key West Avenue in proposed condition where SWFAC asset #23608 is no longer controlling for any quantity of water. The culvert has been analyzed via TR-55 (see appendix B) as well as via HEC-RAS for the floodplain delineation study (FLDSTUDY-286994).
2. The stability of the tributary in the proposed condition will be preserved through non-erosive discharge of proposed Site storm drain, ensured by standard riprap protection as described in the 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control.
3. The results of the floodplain delineation study FLDSTUDY-286994, currently under review with MCDPS, substantiate a point of water surface elevation convergence prior to SWFAC asset #11575 in the stream flowing into it (please see FPDS-05 supporting drawings from the most recent submittal to DPS). Because the WSEL converges prior to, the extended detention wet pond is functionally not impacted.

Rodgers will continue to investigate through additional field survey recon and relevant existing plan inquiries. However, at this time it is Rodger's conclusion that the removal of the eight SWFAC assets as shown on sheet 2A is acceptable. Facilities will be removed during construction, and stormwater management will be transitioned from the existing facilities to the new proposed ESD / CMP systems during the sediment control phase of development.

Environmental Site Design:

In accordance with MDE 2007 Stormwater Management Regulations, ESD facilities will be required to treat an ESD_v based on the identification of a target P_E for the site multiplied across the project's limit of disturbance.

Site Constraints:

There are several significant site limitations that constrain or reduce the practicability of ESD practices. A majority of ESD options are eliminated by poor site soil infiltration and shallow bedrock. A geotechnical exploration conducted by Geo-Technology Associates found a majority of infiltration tests resulted in augur failure due to shallow bedrock (see sheet 2 of the plan for boring locations, infiltration rates, and bedrock depths). Infiltration tests where bedrock was not encountered yielded infiltration rates which failed to meet the necessary MDE thresholds for a majority of ESD options. Please see the geotechnical report produced by GTA included with this submittal for further details. The Project is further limited by feasible facility locations including: two existing WSSC water lines; two major 60" gas line and its associate buffer; significant green space lost to atypically large roadway sections for Medical Center Drive; Key West Avenue, and Blackwell Road dedicated to right-of-way where no ESD is permissible as mandated by Montgomery County; expansive pedestrian / bike paths; green space lost to the future CCT station per the county master plan.

The following is an evaluation of each ESD option for the Site.

Alternative Surfaces –

- a. *Green Roofs – Green roofs are not feasible for the residential development proposed due to the construction types of residential buildings. Multifamily buildings are wood frame and gable roofed and will not support green roof loads.*
- b. *Permeable Pavements – Soil types found on site are entirely hydrologic soil group 'C' and 'D'; there is significant presence of rocky soils / shallow bedrock as well. Site soil conditions do not provide the infiltration necessary to make permeable pavements a practicable solution. The majority of boring calculated infiltration rates varied between 0 and 0.4 in/hr., with the exception of GTA-1, GTA-3, and GTA-5. However, GTA-1 boring encountered bedrock 3 feet from existing grade, GTA-3 is located where a building is being proposed, and GTA-5 is located where a civic green area is being proposed. Permeable Pavements are not a feasible solution for the overall site, however permeable pavements will be explored as the primary solution for the offsite county right-of-way with further geotechnical input at the site development stormwater management stage.*
- c. *Reinforced Turf – Ideal areas for reinforced turf are not available to utilize on this site. There are no emergency access roads or occasionally used parking areas on this site. Some fire access surfaces are proposed with this layout, but they will need to bear loads too great for reinforced turf.*

Nonstructural Practices –

- a. Disconnection of Rooftop Runoff – Rooftop disconnection is not practicable due to site grading and green space available. There is an area of tree save towards the center of the Site's western edge. Existing grades exceed the 5% maximum allowable for rooftop disconnect however, so this practice cannot be counted.*
- b. Disconnection of Non-Rooftop Runoff - Non-rooftop disconnection is not practicable due to site grading and lack of green space available for applicable areas.*
- c. Sheetflow to Conservation Areas –Sheetflow to conservation area is proposed in the multifamily section of the site where it is most applicable.*

Micro-Scale Practices –

- a. Rainwater Harvesting (Cisterns and Rain Barrels) – Rainwater harvesting barrels are not practicable in the proposed conditions. Residential units will be high density and it will be more necessary to treat roofs with micro bioretention or structural practices in order to hit the site's overall target.*
- b. Submerged Gravel Wetlands – Submerged gravel wetlands are not practicable given the soil conditions and lack of applicable space found on site.*
- c. Landscape Infiltration – Soil types found on site are entirely hydrologic soil group 'C' and 'D'; there is significant presence of rocky soils as well. Site soil conditions do not provide the infiltration necessary to make landscape infiltration a practicable solution.*
- d. Infiltration Berms – Soil types found on site are entirely hydrologic soil group 'C' and 'D'; there is significant presence of rocky soils as well. Site soil conditions do not provide the infiltration necessary to make infiltration berms a practicable solution*
- e. Dry Wells – Rooftop runoff is more effectively treated through micro-bioretention facilities and structural facilities in order to meet the site's overall target, therefore dry wells are not a practicable solution for the site.*
- f. Micro-Bioretention – Micro-bioretention facilities are proposed as much as possible where practicable on site.*
- g. Rain Gardens – Micro-bioretention is being proposed in all places where rain gardens would be appropriate, therefore rain gardens are not a practicable solution for the site.*
- h. Swales – Soil types found on site are entirely hydrologic soil group 'C' and 'D'; there is significant presence of rocky soils as well. Site soil and grading conditions do not provide the infiltration necessary to make grass swales a practicable solution. Bio-swales are however located in the multifamily surface lot area.*
- i. Enhanced Filters – Enhanced filters to be considered for implementation where soil conditions beneath micro-bioretention are most feasible. Exact placement and depth to be determined at site development stage.*

ESD to the MEP:

ESD_V is provided through the use of micro-bioretenention, bio-swale facilities, and sheetflow to conservation area to the maximum extent practicable. The Site was determined to have a target P_E of 1.80 in and treatment volume target (ESD_V) of 156,670 ft³, and offsite improvements in the county right-of-way were also determined to have a target P_E of 1.80 and a treatment volume target of 3,078 ft³ (see Appendix A for full stormwater management target computations for both the Site and the offsite county right-of-way improvements). This yields an overall target P_E of 1.80 in and treatment volume target (ESD_V) of 159,748 ft³. The ESD practices proposed on the Site will provide 0.434 in. of treatment, or 38,542 ft³ of ESD_V. Please see Appendix A for the ESD_V design summary table.

Structural Practice Requirements Summary:

Due to site constraints outlined in the previous sections, structural design practices will be required to provide volume to be treated beyond what is treated through ESD_V to the MEP. Structural practices include a system comprised of standard pre-cast flow splitters, corrugated metal pipe (CMP) detention units, and “jellyfish” filter cartridge treatment devices or another approved equivalent (please see sheet 9 of the plan for details).

A total of 156,670 ft³ of ESD_V is required in total for the Site, but only 38,542 ft³ of treatment is provided through ESD to the MEP. Thus, 118,128 ft³ of structural treatment volume will be required to meet the site’s total requirement of 156,670 ft³.

Project Summary:

Structural practices have been placed throughout the Project to ensure 121,876 ft³ of runoff is stored and treated. Thus, an overall treatment volume of 160,418 ft³ is achieved and the Site’s stormwater treatment target of 156,670 ft³ is met. The concept currently proposes 160,418 ft³ of treatment total in the event that no viable ESD solutions for offsite county right-of-way improvements.

Appendix A – Stormwater Management Computations:

Table 5.3 Rainfall Targets/Runoff Curve Number Reductions used for ESD

Hydrologic Soil Group A										
%I	RCN*	P _E = 1"	1.2"	1.4"	1.6"	1.8"	2.0"	2.2"	2.4"	2.6"
0%	40									
5%	43									
10%	46									
15%	48	38								
20%	51	40	38	38						
25%	54	41	40	39						
30%	57	42	41	39	38					
35%	60	44	42	40	39					
40%	61	44	42	40	39					
45%	66	48	46	41	40					
50%	69	51	48	42	41	38				
55%	72	54	50	42	41	39				
60%	74	57	52	44	42	40	38			
65%	77	61	55	47	44	42	40			
70%	80	66	61	55	50	45	40			
75%	84	71	67	62	56	48	40	38		
80%	86	73	70	65	60	52	44	40		
85%	89	77	74	70	65	58	49	42	38	
90%	92	81	78	74	70	65	58	48	42	38
95%	95	85	82	78	75	70	65	57	50	39
100%	98	89	86	83	80	76	72	66	59	40

Hydrologic Soil Group B										
%I	RCN*	P _E = 1"	1.2"	1.4"	1.6"	1.8"	2.0"	2.2"	2.4"	2.6"
0%	61									
5%	63									
10%	65									
15%	67	55								
20%	68	60	55	55						
25%	70	64	61	58						
30%	72	65	62	59	55					
35%	74	66	63	60	56					
40%	75	66	63	60	56					
45%	78	68	66	62	58					
50%	80	70	67	64	60					
55%	81	71	68	65	61	55				
60%	83	73	70	67	63	58				
65%	85	75	72	69	65	60	55			
70%	87	77	74	71	67	62	57			
75%	89	79	76	73	69	65	59			
80%	91	81	78	75	71	66	61			
85%	92	82	79	76	72	67	62	55		
90%	94	84	81	78	74	70	65	59	55	
95%	96	87	84	81	77	73	69	63	57	
100%	98	89	86	83	80	76	72	66	59	55

Cp_v Addressed (RCN = Woods in Good Condition)

RCN Applied to Cp_v Calculations

Table 5.3 Runoff Curve Number Reductions used for Environmental Site Design (continued)

Hydrologic Soil Group C										
%I	RCN*	P _E = 1"	1.2"	1.4"	1.6"	1.8"	2.0"	2.2"	2.4"	2.6"
0%	74									
5%	75									
10%	76									
15%	78									
20%	79	70								
25%	80	72	70	70						
30%	81	73	72	71						
35%	82	74	73	72	70					
40%	84	77	75	73	71					
45%	85	78	76	74	71					
50%	86	78	76	74	71					
55%	86	78	76	74	71	70				
60%	88	80	78	76	73	71				
65%	90	82	80	77	75	72				
70%	91	82	80	78	75	72				
75%	92	83	81	79	75	72				
80%	93	84	82	79	76	72				
85%	94	85	82	79	76	72				
90%	95	86	83	80	77	73	70			
95%	97	88	85	82	79	75	71			
100%	98	89	86	83	80	76	72	70		

Hydrologic Soil Group D										
%I	RCN*	P _E = 1"	1.2"	1.4"	1.6"	1.8"	2.0"	2.2"	2.4"	2.6"
0%	80									
5%	81									
10%	82									
15%	83									
20%	84	77								
25%	85	78								
30%	85	78	77	77						
35%	86	79	78	78						
40%	87	82	81	79	77					
45%	88	82	81	79	78					
50%	89	83	82	80	78					
55%	90	84	82	80	78					
60%	91	85	83	81	78					
65%	92	85	83	81	78					
70%	93	86	84	81	78					
75%	94	86	84	81	78					
80%	94	86	84	82	79					
85%	95	86	84	82	79					
90%	96	87	84	82	79	77				
95%	97	88	85	82	80	78				
100%	98	89	86	83	80	78	77			

 Cp_v Addressed (RCN = Woods in Good Condition)

 RCN Applied to Cp_v Calculations

The Site Stormwater Management Requirements Concept Computations:

PE Determination based on Site Area:

Total Site Area = 45.32 acres (1,976,095 ft²)

Proposed Impervious Area = 24.36 acres (1,061,281 ft²)

Impervious Percentage (Site) = 53.76% -> 54%

Site Soil Conditions:

HSG A = 0 acres

HSG B = 0.041 acres | Site is 0.1% B | P_E = 1.8 in.

HSG C = 32.86 acres | Site is 79.9% C | P_E = 1.8 in.

HSG D = 8.23 acres | Site is 20.0% D | P_E = 1.8 in.

Therefore **P_E = 1.80 in**

Target Runoff Curve Number Determination:

RCN HSG A = 40

RCN HSG B = 58 | Site is 0.1% B

RCN HSG C = 70 | Site is 79.9% C

RCN HSG D = 77 | Site is 20.0% D

Therefore **RCN = 71**

ESD_v Determination Based on LOD Area:

LOD Area = 41.13 acres (1,791,538 ft²)

Impervious Area within LOD = 24.34 acres (1,061,281 ft²)

Impervious Percentage (LOD) = 59.239%


RV = 0.05+0.009*(59.26%) = 0.583

Target ESD_v for full PE treatment = $\frac{(1.80)*(0.583)(1,791,538)}{12} = 156,670 \text{ ft}^3$

Custom Soil Resource Report







MAP LEGEND

Area of Interest (AOI)









 Area of Interest (AOI)

Soils

Soil Rating Polygons





 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines


 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points






 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available

Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

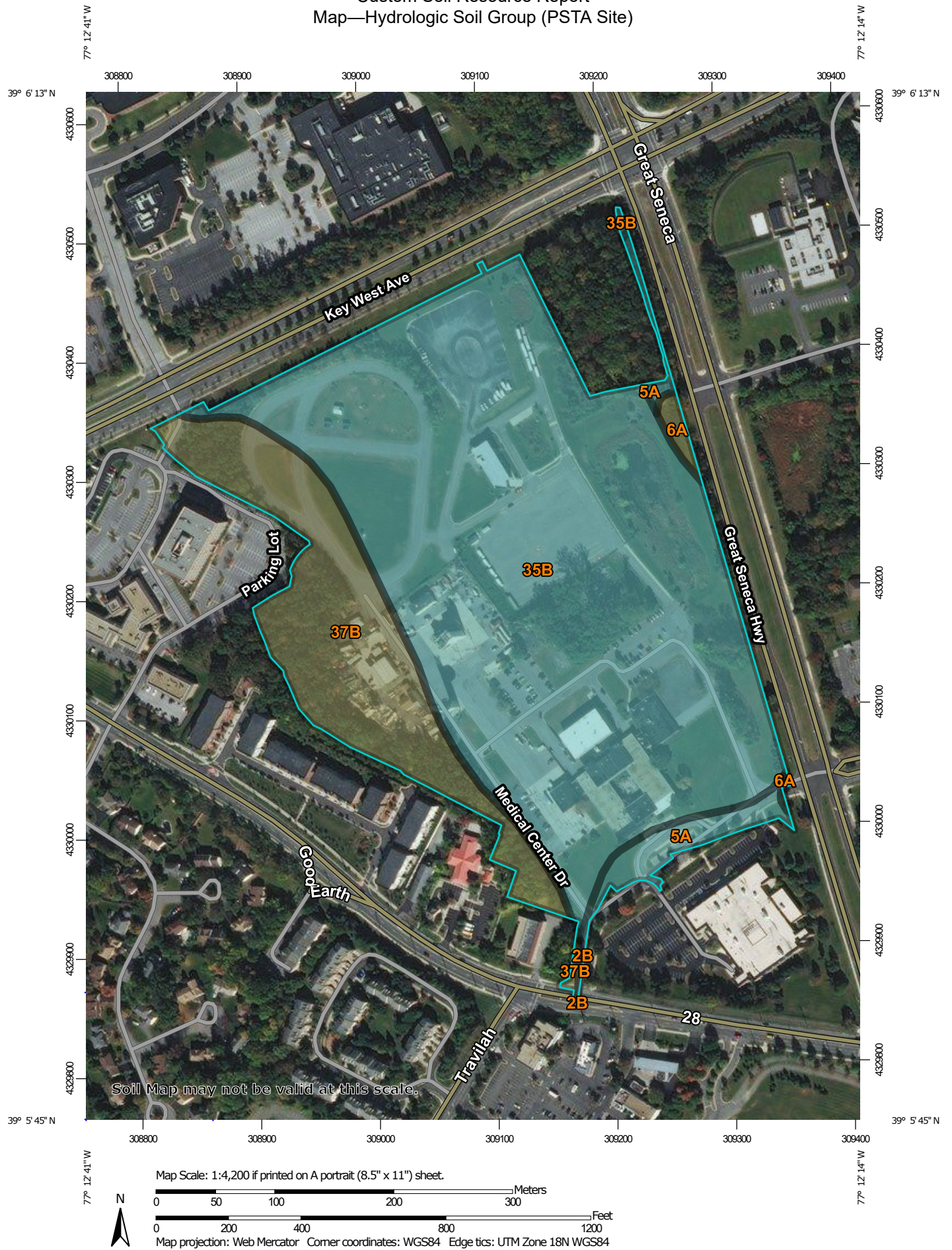
Soil Survey Area: Montgomery County, Maryland
Survey Area Data: Version 16, Jun 12, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 3, 2015—Feb 22, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Custom Soil Resource Report Map—Hydrologic Soil Group (PSTA Site)



Table—Hydrologic Soil Group (PSTA Site)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
2B	Glenelg silt loam, 3 to 8 percent slopes	B	0.0	0.1%
5A	Glenville silt loam, 0 to 3 percent slopes	C	1.3	3.3%
6A	Baile silt loam, 0 to 3 percent slopes	C/D	0.3	0.7%
35B	Chrome and Conowingo soils, 3 to 8 percent slopes	C	31.5	76.6%
37B	Travilah silt loam, 3 to 8 percent slopes	C/D	8.0	19.3%
Totals for Area of Interest			41.1	100.0%

Rating Options—Hydrologic Soil Group (PSTA Site)*Aggregation Method: Dominant Condition*

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie. The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

Component Percent Cutoff: None Specified

Offsite County Right-of-Way Stormwater Management Requirements Computations:

PE Determination based on Site Area:

Total Site Area = 1.02 acres (44,418 ft²)

Proposed Impervious Area = 0.47 acres (20,314 ft²)

Impervious Percentage (Site) = 45.73% -> 45%

Site Soil Conditions:

HSG A = 0 acres

HSG B = 0 acres

HSG C = 0.75 acres | Site is 73.5% C | P_E = 1.8 in.

HSG D = 0.27 acres | Site is 26.5% D | P_E = 1.8 in.

Therefore **P_E = 1.80 in**

Target Runoff Curve Number Determination:

RCN HSG A = 40

RCN HSG B = 58

RCN HSG C = 70 | Site is 73.5% C

RCN HSG D = 77 | Site is 26.5% D

Therefore **RCN = 72**

ESD_v Determination Based on LOD Area:

LOD Area = 1.02 acres (44,418 ft²)

Impervious Area within LOD = 0.47 acres (20,314 ft²)

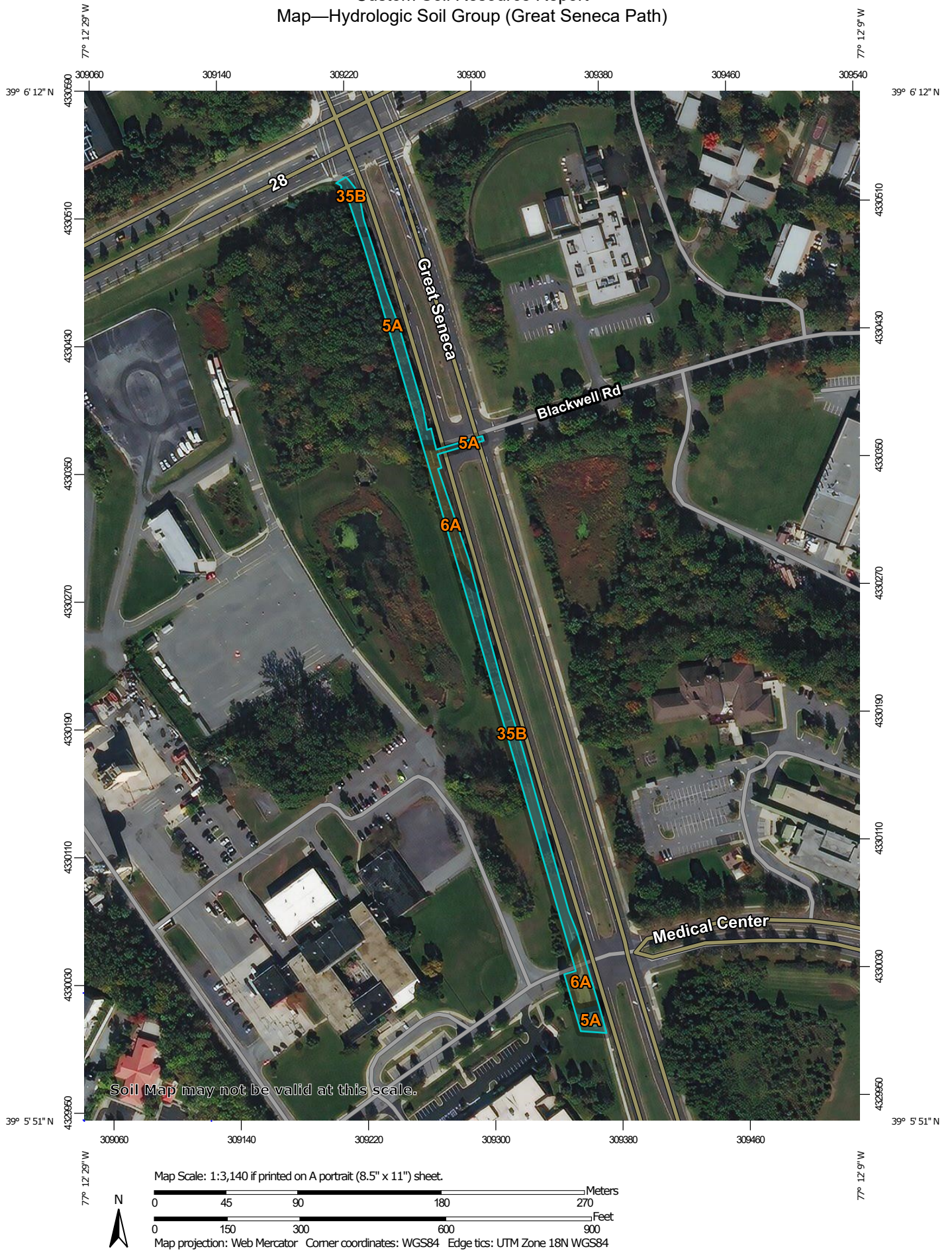
Impervious Percentage (LOD) = 45.734%

RV = 0.05+0.009*(45.734%) = 0.462

Target ESD_v for full PE treatment = $\frac{(1.80)*(0.462)(44,418)}{12} = 3,078 \text{ ft}^3$

Custom Soil Resource Report

Map—Hydrologic Soil Group (Great Seneca Path)



Table—Hydrologic Soil Group (Great Seneca Path)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
5A	Glenville silt loam, 0 to 3 percent slopes	C	0.3	28.6%
6A	Baile silt loam, 0 to 3 percent slopes	C/D	0.3	26.5%
35B	Chrome and Conowingo soils, 3 to 8 percent slopes	C	0.5	44.9%
Totals for Area of Interest			1.0	100.0%

Rating Options—Hydrologic Soil Group (Great Seneca Path)*Aggregation Method: Dominant Condition*

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie. The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

STORMWATER MANAGEMENT SUMMARY					
FACILITY #	DRAINAGE AREA [SF]	IMPERV. AREA [SF]	% IMPERVIOUS	ESD _v @ 2.6" [cf]	Creditted Volume [cf]
BS-3	9301	6653	72%	1,390	1,078
BS-4	8985	5829	65%	1,226	1,120
BS-5	9047	6237	69%	1,313	1,120
BS-6	9087	6289	69%	1,319	1,120
BS-7	7867	4721	60%	1,006	895
MBR 8	17437	13169	76%	2,758	2,758
MBR 9	7356	4867	66%	1,036	1,036
MBR 10	19759	16062	81%	3,339	3,339
MBR 11	12759	7236	57%	1,548	1,548
MBR 12	8290	4326	52%	934	934
MBR 13	17426	10785	62%	2,303	2,303
MBR 14	16679	9089	54%	1,951	1,951
MBR 15	19220	10291	54%	2,207	2,207
MBR 16	17568	4125	23%	990	990
MBR 17	12862	3426	27%	808	808
MBR 18	13306	5171	39%	1,153	1,153
MBR 19	19857	8431	42%	1,850	1,850
MBR 20	6765	4795	71%	1,011	490
MBR 21	7871	6050	77%	1,262	490
MBR 22	6765	5323	79%	1,114	490
MBR 23	6765	5056	75%	1,055	490
MBR 24	7427	5416	73%	1,143	490
MBR 25	16708	4639	28%	1,086	491
MBR 26	4432	2212	50%	480	492
MBR 27	5211	2966	57%	632	493
MBR 28	11170	6848	61%	1,452	494
BB 30	2299	2031	88%	423	495
BB 31	2274	2007	88%	414	496
BB 32	1886	1618	86%	335	497
BB 33	2001	1734	87%	360	498
BB 34	2526	2258	89%	465	499
BB 35	3196	2927	92%	602	500
BB 36	1994	1726	87%	359	501
BB 37	1922	1654	86%	341	502
BB 38	1859	1591	86%	330	503
BB 39	2022	1752	87%	364	504
BB 40	3306	2848	86%	595	505
BB 41	5357	4872	91%	1,010	506
Sheetflow to Conservation	13765	13765	100%	2,833	508
ESD Total				44,800	38,542
CMP-1	27601	23422	85%		4888.32
CMP-2	24998	16376	66%		3477.74
CMP-3	38157	26686	70%		5651.33
CMP-4	41525	31606	76%		6622.48
CMP-5	31565	24955	79%		5227.61
CMP-7	32947	13278	40%		6371.15
CMP-6	43531	30186	69%		2950.25
CMP-8	30789	26130	85%		5500.05
CMP-9	38982	29440	76%		5523.80
CMP-10	22722	10082	44%		2218.65
CMP-11	26747	14488	54%		3121.96
CMP-12	43360	19317	45%		4247.43
CMP-13	42495	22416	53%		4849.83
CMP-15	28735	20588	72%		4339.32
CMP-16	22824	18129	79%		3793.18
CMP-17	24294	15530	64%		3326.16
CMP-18	37504	11719	31%		2701.77
CMP-19	29425	24190	82%		5046.18
CMP-20	35506	30176	85%		6283.19
CMP-21	30853	20068	65%		4252.54
CMP-22	21044	16091	76%		3387.62
CMP-23	43309	35933	83%		7500.55
CMP-24	43360	23423	54%		5057.57
CMP-25	43480	26315	61%		5645.05
CMP-26	36629	29075	79%		6083.40
CMP-27	35656	17528	49%		3809.08
Structural Total					121,876
ESD _v Required for the Site				156,670	
ESD _v Required for the Offsite County Right-of-Way Improvements				3,078	
Combined ESD _v (If Required)				159,748	
ESD _v through ESD Provided				38,542	
Structural Treatment Required				118,128	
Structural Treatment Provided				121,876	
Surplus Treatment Volume				670	
Total ESD _v Provided				160,418	

Drainage Area ESD _v Summary Table												MBR Facility Design Parameters			
Drainage Area / Facilities	DA [ft ²]	Impv. Area [ft ²]	Impv %	Rv	ESD _v @ 1" [ft ³]	ESD _v @ 2.6" [ft ³]	Ponding Area [ft ²]	Media Area [ft ²]	ESD _v Treated [ft ³]	P _E Provided [in.]	ESD _v Provided [ft ³]	Media Depth [ft]	Media Treatment (V1) [ft ³]	Ponding Depth [ft]	Ponding Treatment (V2) [ft ³]
BS-3	9,301	6,653	72%	0.69	535	1,390	0	770	1,078	2.02	1,078	3.5	1078	0	0
BS-4	8,985	5,829	65%	0.63	472	1,226	0	800	1,120	2.37	1,120	3.5	1120	0	0
BS-5	9,047	6,237	69%	0.67	505	1,313	0	800	1,120	2.22	1,120	3.5	1120	0	0
BS-6	9,087	6,289	69%	0.67	507	1,319	0	800	1,120	2.21	1,120	3.5	1120	0	0
BS-7	7,867	4,721	60%	0.59	387	1,006	0	639	895	2.31	895	3.5	894.6	0	0
MBR 8	17,437	13,169	76%	0.73	1,061	2,758	1,352	937	2,831	2.60	2,758	4.5	1686.6	1	1145
MBR 9	7,356	4,867	66%	0.65	398	1,036	829	618	1,227	2.60	1,036	3.5	865.2	0.5	362
MBR 10	19,759	16,062	81%	0.78	1,284	3,339	1,607	1,452	3,378	2.60	3,339	4.5	2613.6	0.5	765
MBR 11	12,759	7,236	57%	0.56	595	1,548	844	677	1,599	2.60	1,548	4.5	1218.6	0.5	380
MBR 12	8,290	4,326	52%	0.52	359	934	854	637.0	1,010	2.60	934	2.5	637	0.5	373
MBR 13	17,426	10,785	62%	0.61	886	2,303	1344	1114	2,397	2.60	2,303	4	1782.4	0.5	615
MBR 14	16,679	9,089	54%	0.54	751	1,951	1,234	979	2,120	2.60	1,951	4	1566.4	0.5	553
MBR 15	19,220	10,291	54%	0.53	849	2,207	1631	1406	2,446	2.60	2,207	3	1687.2	0.5	759
MBR 16	17,568	4,125	23%	0.26	381	990	940	747	1,169	2.60	990	2.5	747	0.5	422
MBR 17	12,862	3,426	27%	0.29	311	808	608	460	819	2.60	808	3	552	0.5	267
MBR 18	13,306	5,171	39%	0.40	444	1,153	688	538	1,275	2.60	1,153	4.5	968.4	0.5	307
MBR 19	19,857	8,431	42%	0.43	712	1,850	1469	1130	2,006	2.60	1,850	3	1356	0.5	650
MBR 20	6,765	4,795	71%	0.69	389	1,011	175	175	490	1.26	490	4.5	315	1	175
MBR 21	7,871	6,050	77%	0.74	485	1,262	175	175	490	1.01	490	4.5	315	1	175
MBR 22	6,765	5,323	79%	0.76	428	1,114	175	175	490	1.14	490	4.5	315	1	175
MBR 23	6,765	5,056	75%	0.72	406	1,055	175	175	490	1.21	490	4.5	315	1	175
MBR 24	7,427	5,416	73%	0.71	439	1,143	175	175	490	1.12	490	4.5	315	1	175
MBR 25	16,708	4,639	28%	0.30	418	1,086	366	262	629	1.50	629	4.5	471.6	0.5	157
MBR 26	4,432	2,212	50%	0.50	185	480	767	602	944	2.60	480	2.5	602	0.5	342
MBR 27	5,211	2,966	57%	0.56	243	632	671	470	755	2.60	632	2.5	470	0.5	285
MBR 28	11,170	6,848	61%	0.60	559	1,452	1068	869	1,875	2.60	1,452	4	1390.4	0.5	484
BB 30	2,299	2,031	88%	0.85	163	423	216	216	432	2.60	423	2.5	216	1	216
BB 31	2,274	2,007	88%	0.84	159	414	216	216	475	2.60	414	3	259.2	1	216
BB 32	1,886	1,618	86%	0.82	129	335	216	216	432	2.60	335	2.5	216	1	216
BB 33	2,001	1,734	87%	0.83	138	360	216	216	432	2.60	360	2.5	216	1	216
BB 34	2,526	2,258	89%	0.85	179	465	240	240	480	2.60	465	2.5	240	1	240
BB 35	3,196	2,927	92%	0.87	232	602	240	240	672	2.60	602	4.5	432	1	240
BB 36	1,994	1,726	87%	0.83	138	359	250	250	500	2.60	359	2.5	250	1	250
BB 37	1,922	1,654	86%	0.82	131	341	250	250	500	2.60	341	2.5	250	1	250
BB 38	1,859	1,591	86%	0.82	127	330	250	250	500	2.60	330	2.5	250	1	250
BB 39	2,022	1,752	87%	0.83	140	364	250	250	500	2.60	364	2.5	250	1	250
BB 40	3,306	2,848	86%	0.83	229	595	433	433	866	2.60	595	2.5	433	1	433
BB 41	5,357	4,872	91%	0.87	388	1,010	433	433	1,039	2.60	1,010	3.5	606.2	1	433
Sheetflow to Conservation	13,765	13,765	100%	0.95	1,090	2,833	--	--	1,090	1.00	1,090	Min. Width 100'		P _E (in.) 1"	
Summary	Sum ESD _v Required	159,748	Sum ESD _v Available		17,231	44,800	Sum ESD _v via ESD		42,180	Sum ESD _v Provided	38,542	Sum P _E Required	1.8	Sum P _E Provided	0.434

D r a i n a g e A r e a	SBMP #	CMP-1	CMP-2	CMP-3	CMP-4	CMP-5	CMP-6	CMP-7	CMP-8	CMP-9	CMP-10	CMP-11	CMP-12	CMP-13	CMP-15	CMP-16	CMP-17	CMP-18	CMP-19	CMP-20	CMP-21	CMP-22	CMP-23	CMP-24	CMP-25	CMP-26	CMP-27
	DA (sf)	27601	24998	38157	41525	31565	43531	32947	30789	38982	22722	26747	43360	42495	28735	22824	24294	37504	29425	35506	30853	21044	43309	43360	43480	36629	35656
	DA (ac.)	0.63	0.57	0.88	0.95	0.72	1.00	0.76	0.71	0.89	0.52	0.61	1.00	0.98	0.66	0.52	0.56	0.86	0.68	0.82	0.71	0.48	0.99	1.00	1.00	0.84	0.82
	Impv (sf)	23422	16376	26686	31606	24955	30186	13278	26130	29440	10082	14488	19317	22416	20588	18129	15530	11719	24190	30176	20068	16091	35933	23423	26315	29075	17528
	Impv (ac.)	0.54	0.38	0.61	0.73	0.57	0.69	0.30	0.60	0.68	0.23	0.33	0.44	0.51	0.47	0.42	0.36	0.27	0.56	0.69	0.46	0.37	0.82	0.54	0.60	0.67	0.40
	Impv %	84.9%	65.5%	69.9%	76.1%	79.1%	69.3%	40.3%	84.9%	75.5%	44.4%	54.2%	44.6%	52.7%	71.6%	79.4%	63.9%	31.2%	82.2%	85.0%	65.0%	76.5%	83.0%	54.0%	60.5%	79.4%	49.2%
	Impv. RCN	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98
	Perv. RCN	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61
	Composite RCN	93	86	87	90	91	87	76	93	89	78	82	78	81	88	91	85	73	92	93	86	90	92	81	84	91	80
	C Factor	0.80	0.68	0.70	0.74	0.76	0.70	0.51	0.80	0.74	0.54	0.60	0.54	0.59	0.72	0.77	0.67	0.45	0.78	0.80	0.67	0.75	0.79	0.60	0.64	0.77	0.57
Time of Concentration (min)	9	9	9	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Time of Concentration (hour)	0.15	0.15	0.15	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	
Volume Available	4866.30	3464.13	5617.14	6613.02	5208.18	6357.86	2946.14	5428.90	6163.11	2212.15	3114.92	4236.55	4831.48	4325.96	3782.42	3291.54	2691.50	5035.82	6268.97	4247.50	3365.72	7476.12	5037.22	5602.46	6066.44	3804.23	
S D F	Surface	437	435	438	444.5	444	451	447.5	468.5	469.5	466.5	466.25	466.3	467.5	460.7	456.3	451	472.5	443.5	443	447.5	452.7	452.9	450.5	456.9	454.4	455.5
	Inv	433.5	431.5	434.5	441	439.5	446.5	443	465	466	462	461.75	461.8	463	457.2	452.8	446.5	468	440	439.5	444	449.2	449.4	446	452.4	449.9	452
	Pipe Length	92	15	9	20	8	109	15	70	34	95	11	104	167	16	12	25	60	29	95	237	280	278	116	12	80	
	Pipe Diameter	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	2	1.25	1.25	1.25	1.25	1.25	2	2	2	2	1.25	1.25	1.25	1.25
	Surface @ FS	436.25	435.5	437.75	443	444.25	447.75	447.75	468.5	469.5	466	466	466	466	467	460.7	456.1	450.5	472	442.5	439	448	453	452	448	457	455
Invert into FS	432.2	431.3	433.65	438	440	443.5	442.8	465.5	464.5	461	461	459.7	461.1	455.7	451.1	445.5	467.3	438	434.5	442.4	445.8	445.60	443	452	449	449.5	
I o w e r p i t t e	Overflow Pipe Invert	432.10	431.20	433.55	437.90	439.90	443.40	442.70	465.40	464.40	460.90	460.90	459.60	461.00	455.60	451.00	445.40	467.20	437.90	434.40	442.30	445.70	445.50	442.90	451.90	448.90	449.40
	Overflow Pipe Diameter [in.]	15	15	15	15	15	18	15	15	15	15	15	15	24	15	15	15	15	15	15	24	24	24	15	15	15	15
	SBMP / Overflow Gap [ft.]	-0.15	-0.45	-0.35	-0.25	-0.35	-0.35	-0.25	-0.35	-0.35	-0.45	-0.45	-0.45	-0.45	-0.15	-0.45	-0.35	-0.45	-0.45	-0.35	-0.45	-0.45	-0.25	-0.35	-0.35	-0.35	-0.45
	SBMP Pipe Invert	431.00	430.40	432.65	436.90	439.00	442.50	441.70	464.50	463.50	460.10	460.10	458.80	460.20	454.50	450.20	444.50	466.40	437.10	433.50	441.50	444.90	444.50	442.00	451.00	448.00	448.60
O r i f i c e	SBMP Pipe Diameter [in.]	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
	SBMP Pipe C _c	431.63	431.03	433.28	437.53	439.63	443.13	442.33	465.13	464.13	460.73	460.73	459.43	460.83	455.13	450.83	445.13	467.03	437.73	434.13	442.13	445.53	445.13	442.63	451.63	448.63	449.23
T R - S	Target Rainfall P	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
	R _v	0.81	0.64	0.68	0.74	0.76	0.67	0.41	0.81	0.73	0.45	0.54	0.45	0.52	0.69	0.76	0.63	0.33	0.79	0.81	0.64	0.74	0.80	0.54	0.59	0.76	0.49
	Qa	2.12	1.66	1.77	1.91	1.98	1.75	1.07	2.12	1.90	1.17	1.40	1.17	1.36	1.81	1.99	1.63	0.86	2.05	2.12	1.65	1.92	2.07	1.39	1.55	1.99	1.28
	CN	95.57	90.53	91.77	93.41	94.16	91.61	82.02	95.57	93.26	83.59	87.03	83.66	86.56	92.24	94.25	90.07	78.15	94.93	95.60	90.39	93.50	95.12	86.98	89.05	94.24	85.33
	Ia	0.09	0.21	0.18	0.14	0.12	0.18	0.44	0.09	0.14	0.39	0.30	0.39	0.31	0.17	0.12	0.22	0.56	0.11	0.09	0.21	0.14	0.10	0.30	0.25	0.12	0.34
	Ia/P	0.04	0.08	0.07	0.05	0.05	0.07	0.17	0.04	0.06	0.15	0.11	0.15	0.12	0.06	0.05	0.08	0.22	0.04	0.04	0.08	0.05	0.04	0.12	0.09	0.05	0.13
	qu	1010	1010	1010	1010	1010	1010	853	1010	1010	886	970	888	958	1010	1010	1010	778	1010	1010	1010	1010	1010	9			

Appendix B - Project Downstream Conveyance Considerations:

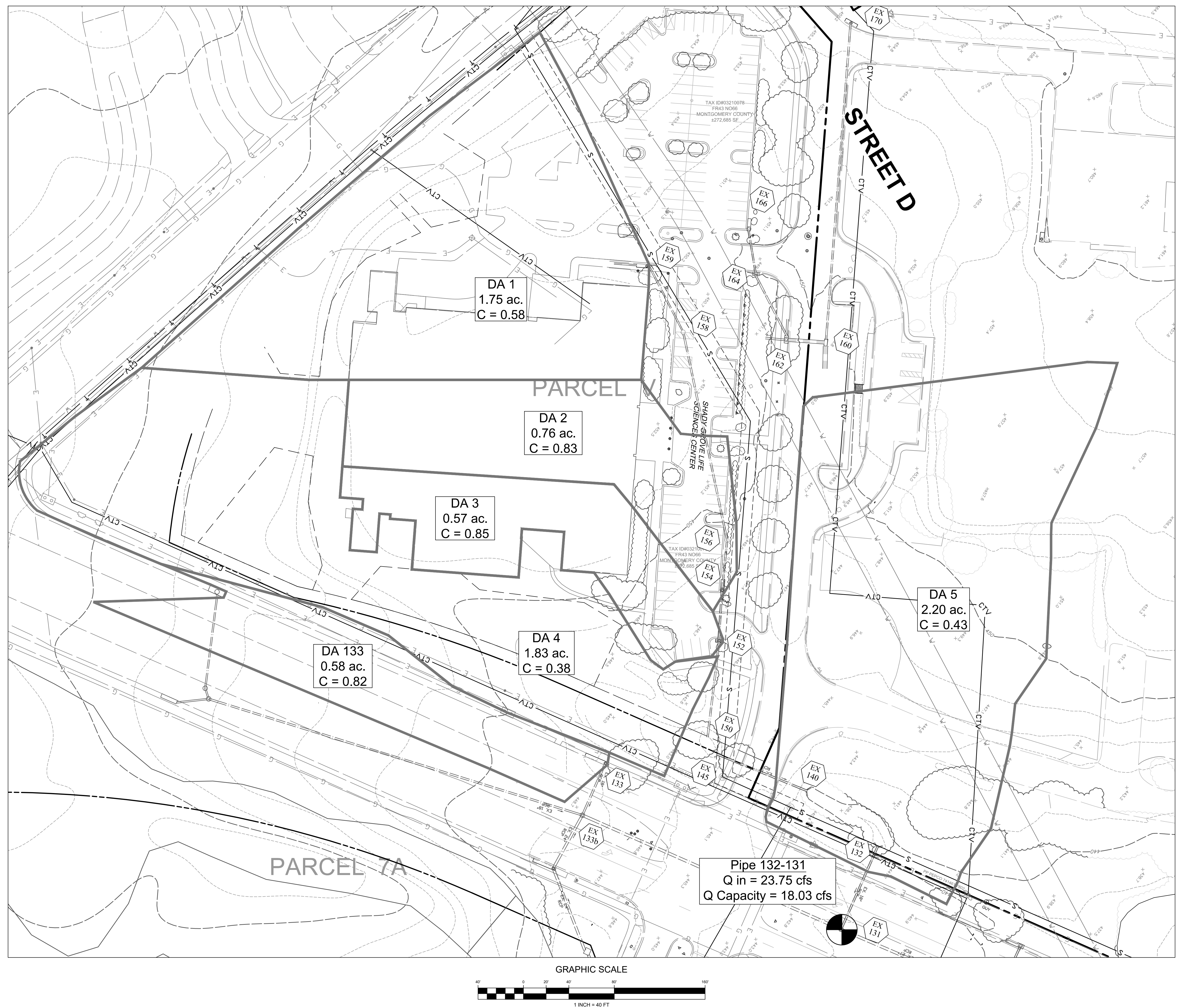
An analysis was conducted on the existing receiving culvert found on site. Two 84" culverts run south to north at the northeastern corner of the site underneath Key West Avenue. Key West Avenue is an urban major highway and therefore analysis regarding safe conveyance of the 50-year storm was conducted on the existing 84" culverts.

Methodology from the United States Department of Agriculture's Technical Release 55 (TR-55) was utilized to estimate total runoff the existing receiving culvert in the existing and final design condition. The total drainage area to the existing receiving culvert was determined to be approximately 148.15 acres, of which approximately 75% was estimated to be impervious area in the existing condition and 80% was estimated to be impervious area in the final design condition. Assuming all non-impervious area was open space in good conditions and given a C to D HSG ratio of 4:1, the RCN was found to be 92 in the existing condition and 93 in the final design condition. 25 minutes was used as a time of concentration in both the existing and final design condition, total runoff to the existing receiving culvert was determined.

Existing Culvert Computations Summary							
	ft²	ac.					
Total Drainage Area	6453490	148.15					
Existing	%	ac.	C Type	D Type	RCN	Tc	Q
Estimated Green Space	24.87%	36.84	29.47	7.37	92	25	760.09
Estimated Impervious	75.13%	111.31	89.05	22.26		0.42	
Final	%	ac.	C Type	D Type	RCN	Tc	Q
Estimated Green Space	20.16%	29.87	23.90	5.97	93	25	769.05
Estimated Impervious	79.84%	118.28	94.62	23.66		0.42	











The Hydraflow Express extension was used in AutoCAD to analyze the impact to the existing culvert. In the final design condition, H_w/D is equal to 1.23 and there is 3.7 feet of freeboard. All Maryland State Highway culvert design criteria have been met by the existing receiving culvert in the final design condition.

For further analysis of the culvert conveyance, please see the floodplain delineation study FLDSTUDY-286994. Rodgers acknowledges DPS does not review or approve but included for reference.

[illegible]

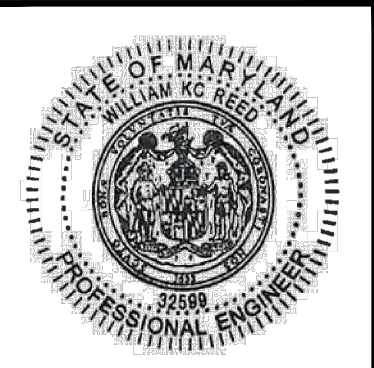
Existing @ Ex 132				
DA	Area [sf]	Area [ac.]	Impv. (%)	C
1	76081	1.75	46%	0.58
2	33084	0.76	89%	0.83
3	24968	0.57	92%	0.85
4	79794	1.83	14%	0.38
5	95928	2.20	22%	0.43
Total	309855	7.11		0.53
Existing @ 133				
133	25214	0.58	87%	0.82
Total	25214	0.58		

LEGEND

	SITE LIMITS
	DRAINAGE AREA
	PROPOSED PUBLIC STORM DRAIN
	EXISTING STORM DRAIN
	EXISTING GAS MAIN
	EXISTING CONTOURS
	PROPOSED CONTOURS
	LIMIT OF DISTURBANCE
	OFFSITE TIE-IN STUDY POINT
	TO BE REMOVED

PROFESSIONAL CERTIFICATION

"I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 32599, Expiration Date: 1/22/22."

[illegible]

APPLICANT:
THE ELMS AT PSTA, LLC

ATTN: KATHRYN KUBIT
1355 BEVERLY ROAD, SUITE 240
MCLEAN, VA 22101
PHONE: (703) 734-9730
EMAIL: kkubit@elmstreetdev.com

OWNER:
MONTGOMERY COUNTY

EOB 101 MONROE STREET
ROCKVILLE, MD 20850

PARCEL 850, L.4047 F.003, PARCEL 925, L.3862 F. 772 AND PART A, L.16172 F.223
ELECTION DISTRICT No. 9
MONTGOMERY COUNTY, MARYLAND

RODGERS
CONSULTING

19847 Century Boulevard, Suite 200, Germantown, Maryland 20876
Ph: 301.948.4700 Fax: 301.948.6256 www.rodgers.com

	BY	DATE
BASE DATA		
DESIGNED		
DRAWN		
REVIEWED		

RODGER'S CONTACT:

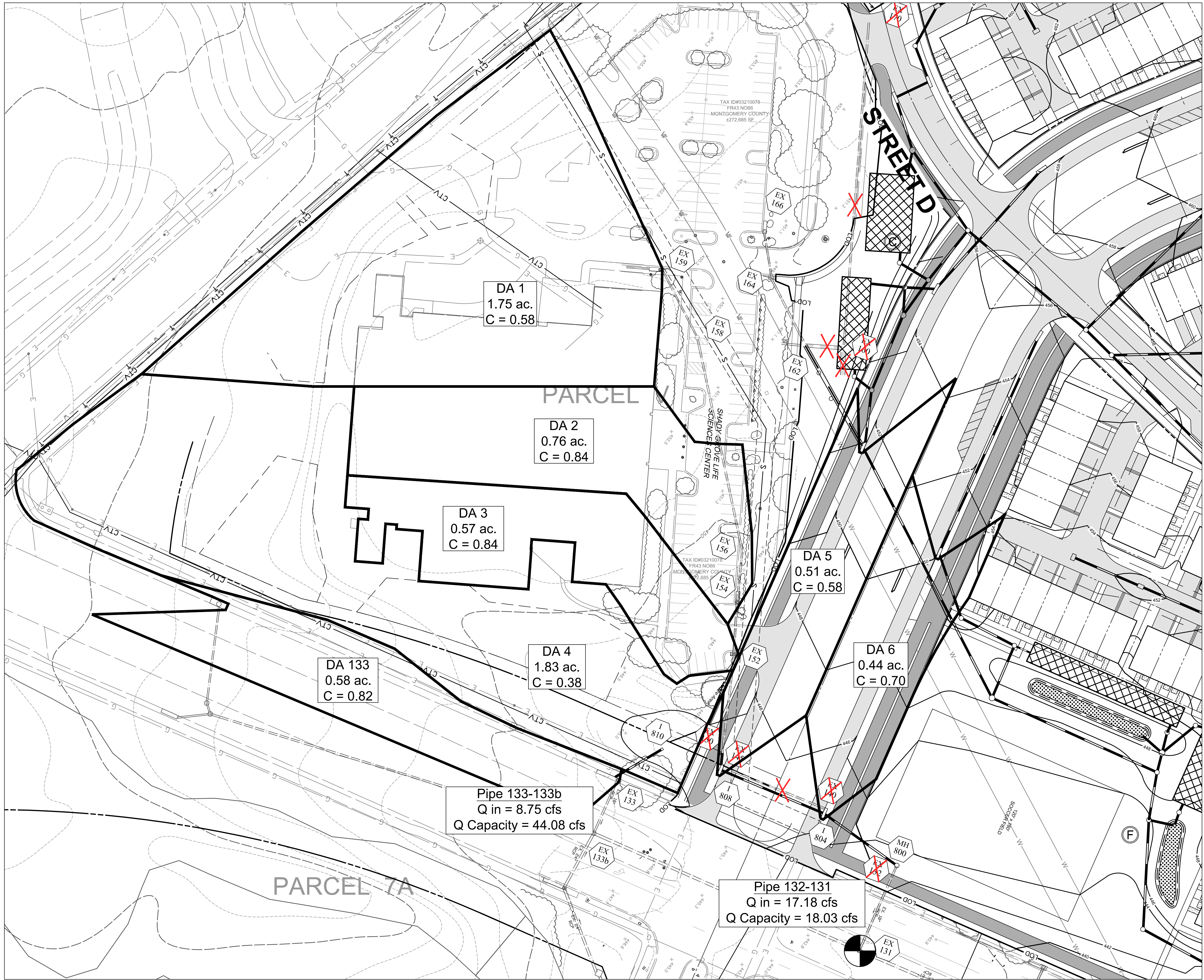
RELEASE FOR ☐

BY: _____ DATE: _____

**OFFSITE STORM DRAIN
EXISTING TIE IN CONDITION**

SCALE:	1" = 100'
JOB No.	1302A
DATE:	MAR., 2021
SHEET No.	1 OF 1

From Structure	To Structure	Drainage Area (Ac.)	Runoff Coeff. C	CA (Incr.)	Accum. Area (Ac.)	Accum. CA (Incr.)	T _c (min.)	Rainfall Intensity (In./hr.)	Runoff Q (ft ³ /s)	Minimum Slope	Friction Velocity (ft./s)	Dia. In.	Pipe Material	Manning's N	Invert Elevations (ft.)		Slope (%)	Length (ft.)	Full Flow Capacity (ft ³ /s)	Full Flow Velocity (ft./s)	Partial Flow Velocity (ft./s)	Capacity Used %	Flow Time (min.)
800	131	4.03	0.68	2.74	4.03	2.74	8.00	6.28	17.18	2.659	9.72	18	CL IV RCP	0.013	438.13	433.87	2.94%	77	18.03	10.21	11.60	95.27%	0.13
810	133	1.83	0.42	0.77	1.83	0.77	5.00	7.07	5.44	0.705	4.43	15	CL IV RCP	0.013	442.00	441.50	1.06%	47	6.67	5.44	6.06	81.49%	0.14
133	133b	0.58	0.81	0.47	2.41	1.24	5.14	7.07	8.75	0.149	2.79	24	CL IV RCP	0.013	441.41	439.67	3.78%	46	44.08	14.04	10.95	19.86%	0.05



Proposed @ Ex 132				
DA	Area [sf]	Area [ac.]	Impv. (%)	C
1	76081	1.75	46%	0.58
2	33084	0.76	89%	0.83
3	24968	0.57	92%	0.85
5	22212	0.51	47%	0.58
6	19267	0.44	67%	0.70
Total	175612	4.03		0.68
Proposed @ 810				
4	79794	1.83	14%	0.38
Total	79794	1.83		
Existing @ 133				
133	25214	0.58	87%	0.82
Total	25214	0.58		

LEGEND

- SITE LIMITS
- DRAINAGE AREA
- PROPOSED PUBLIC STORM DRAIN
- EXISTING STORM DRAIN
- EXISTING GAS MAIN
- EXISTING CONTOURS
- PROPOSED CONTOURS
- LIMIT OF DISTURBANCE
- OFFSITE TIE-IN STUDY POINT
- TO BE REMOVED

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REVISION	DATE	REVISION	DATE	REVISION	DATE

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1355 BEVERLY ROAD, SUITE 240
MCLEAN, VA 22101
PHONE: (703) 734-9730
EMAIL: kkubit@elmsstreetdev.com

OWNER:
MONTGOMERY COUNTY

EOB 101 MONROE STREET
ROCKVILLE, MD 20850

PSTA SITE

PARCEL 850, L.4047 F.003, PARCEL 925, L.3862 F. 772 AND PART A, L.16172 F.223
ELECTION DISTRICT No. 9
MONTGOMERY COUNTY, MARYLAND

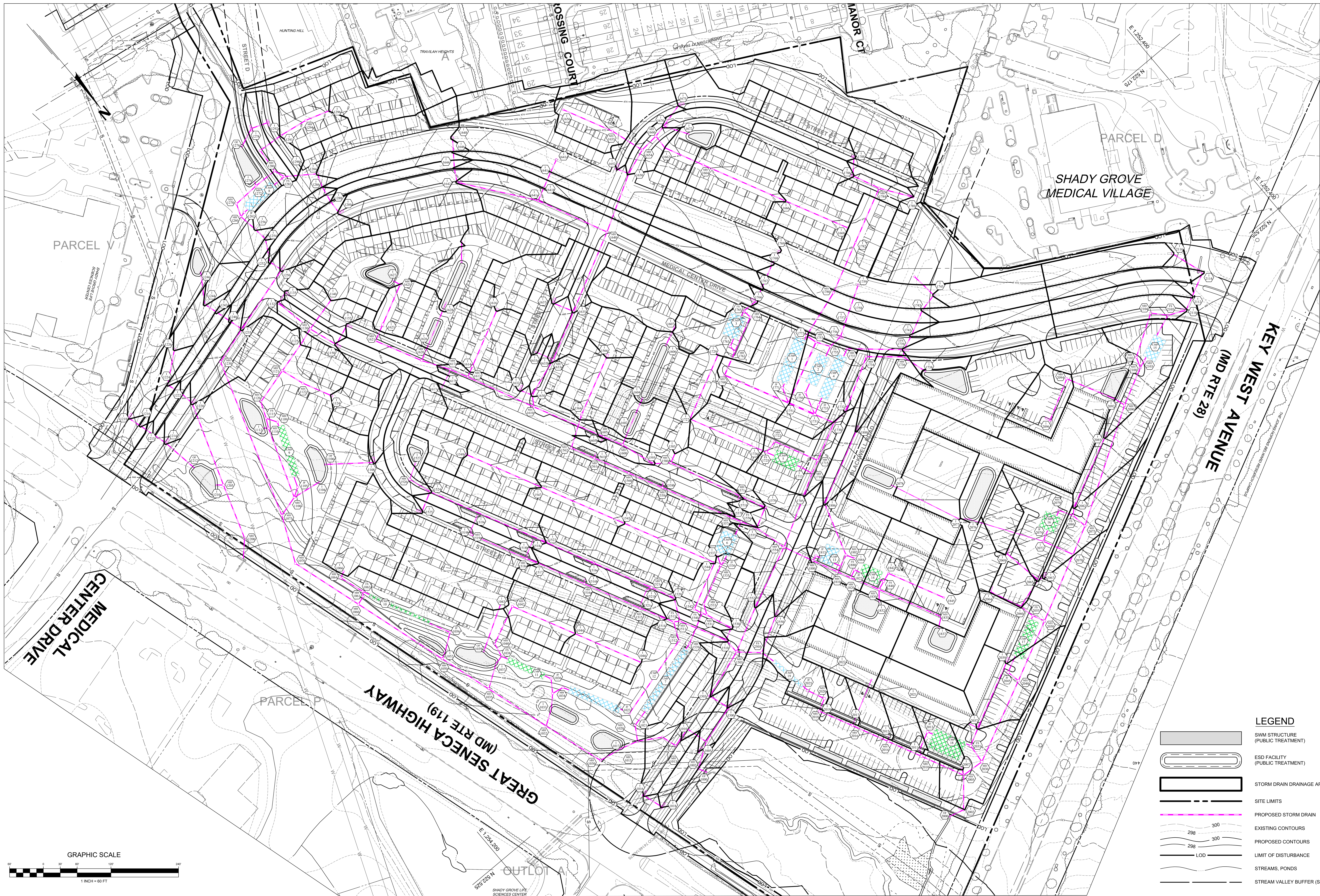
RODGERS CONSULTING

19847 Century Boulevard, Suite 200, Germantown, Maryland 20874
Ph: 301.948.4700 Fx: 301.948.6256 www.rodgers.com

BASE DATA	BY	DATE
DESIGNED		
DRAWN		
REVIEWED		
RODGERS CONTACT:		
RELEASE FOR <input type="checkbox"/>		
BY: _____	DATE: _____	

OFFSITE STORM DRAIN TIE-IN PROPOSED CONDITION

SCALE: 1" = 100'
JOB No. 1302A
DATE: MAR., 2021
SHEET No. 1 of 1



N:\MD_Montgomery\PSTA\ElmsAtPSTA\Storm Drain Analysis\Map Layout.dwg, Jan 23, 2020, 11:08am

REVISION	DATE	REVISION	DATE	REVISION	DATE

APPLICANT:
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BASE DATA	BY	DATE
DESIGNED		
DRAWN		
REVIEWED		
RODGERS CONTACT:		
RELEASE FOR <input type="checkbox"/>		
BY: _____	DATE: _____	

STORM DRAIN LAYOUT OVERALL

SCALE: 1" = 100'

JOB No. 0643T

DATE: JAN., 2020

SHEET No. 1 of 1

From: [Tallerico, Laura M.](#)
To: [MCP-Chair](#)
Cc: [Scars, Barbara A.](#); [Kate Kubit](#); [Graham, Tamika](#)
Subject: PSTA Site: Preliminary Plan No. 120200100 - Item 7 on Planning Board Agenda of July 22, 2021 - Request of Applicant to Include Materials into the Record (Email 5/5)
Date: Tuesday, July 20, 2021 4:44:11 PM
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)
[image004.png](#)
[image005.png](#)
[13-FDA-120200100-001.pdf](#)
[Eliminating MedCtr access 06.04.2021.pdf](#)

[EXTERNAL EMAIL] Exercise caution when opening attachments, clicking links, or responding.

This is the fifth of five emails transmitting those documents the Applicant wishes to submit into the record for Preliminary Plan No. 120200100 - Item 7 on Planning Board Agenda of July 22, 2021.

Laura M. Tallerico

11 N. Washington Street | Suite 700 | Rockville, MD 20850-4229
D: +1 301.517.4833 | O: +1 301.762.1600 | F: +1 301.517.4833



For COVID-19 information and resources, please visit our [Coronavirus Task Force page](#).

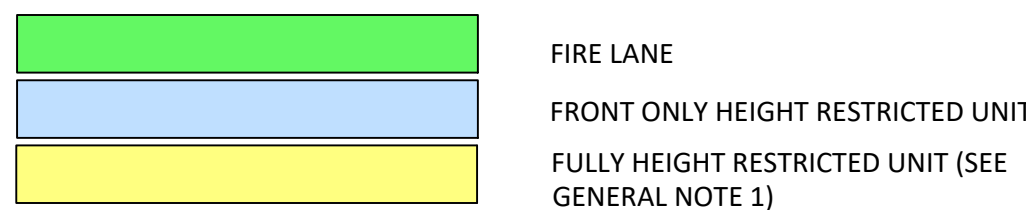
Confidentiality Notice:

This e-mail, including any attachment(s), is intended for receipt and use by the intended addressee(s), and may contain confidential and privileged information. If you are not an intended recipient of this e-mail, you are hereby notified that any unauthorized use or distribution of this e-mail is strictly prohibited, and requested to delete this communication and its attachment(s) without making any copies thereof and to contact the sender of this e-mail immediately. Nothing contained in the body and/or header of this e-mail is intended as a signature or intended to bind the addressor or any person represented by the addressor to the terms of any agreement that may be the subject of this e-mail or its attachment(s), except where such intent is expressly indicated.

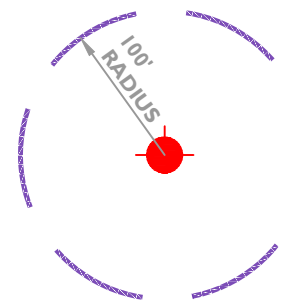
Any federal tax advice provided in this communication is not intended or written by the author to be used, and cannot be used by the recipient, for the purpose of avoiding penalties which may be imposed on the recipient by the IRS. Please contact the author if you would like to receive written advice in a format which complies with IRS rules and may be relied upon to avoid penalties.

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LEGEND



FIRE LANE
FRONT ONLY HEIGHT RESTRICTED UNIT
FULLY HEIGHT RESTRICTED UNIT (SEE GENERAL NOTE 1)



PROPOSED FIRE HYDRANT



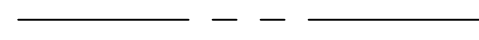
PROPOSED FIRE DEPARTMENT CONNECTION



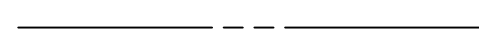
HOSE PULL



MAIN DOOR LOCATION



SITE LIMITS



PUBLIC STREET RIGHT OF WAY



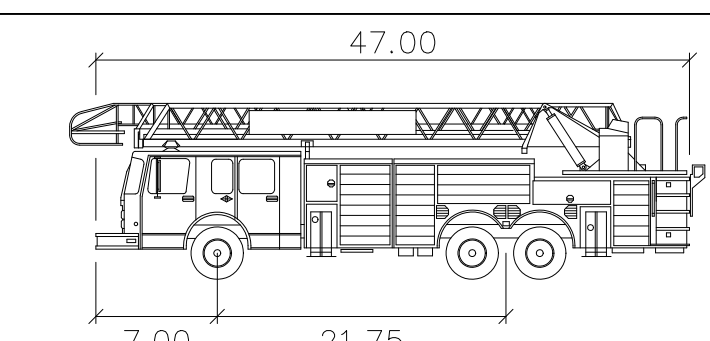
LOT LINES



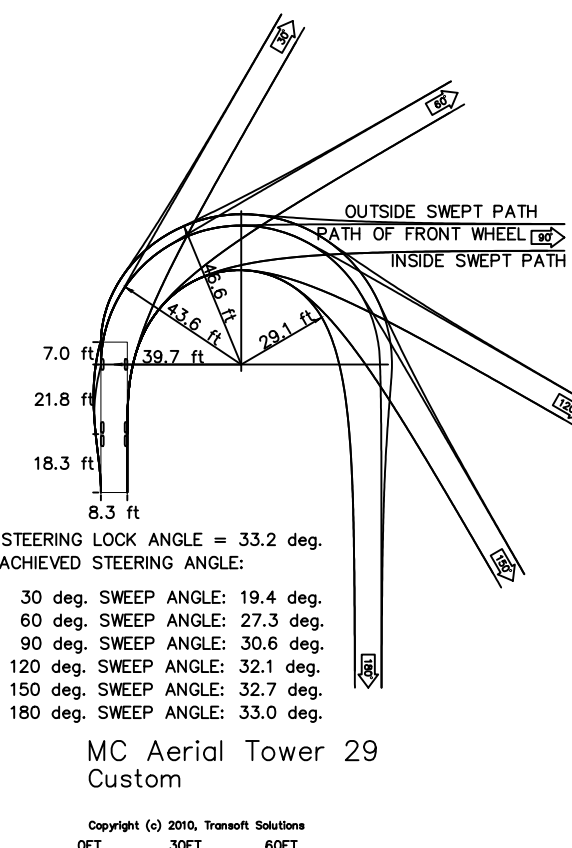
PROPOSED SIDEWALKS, PATHS, TRAILS



SWM/ESD

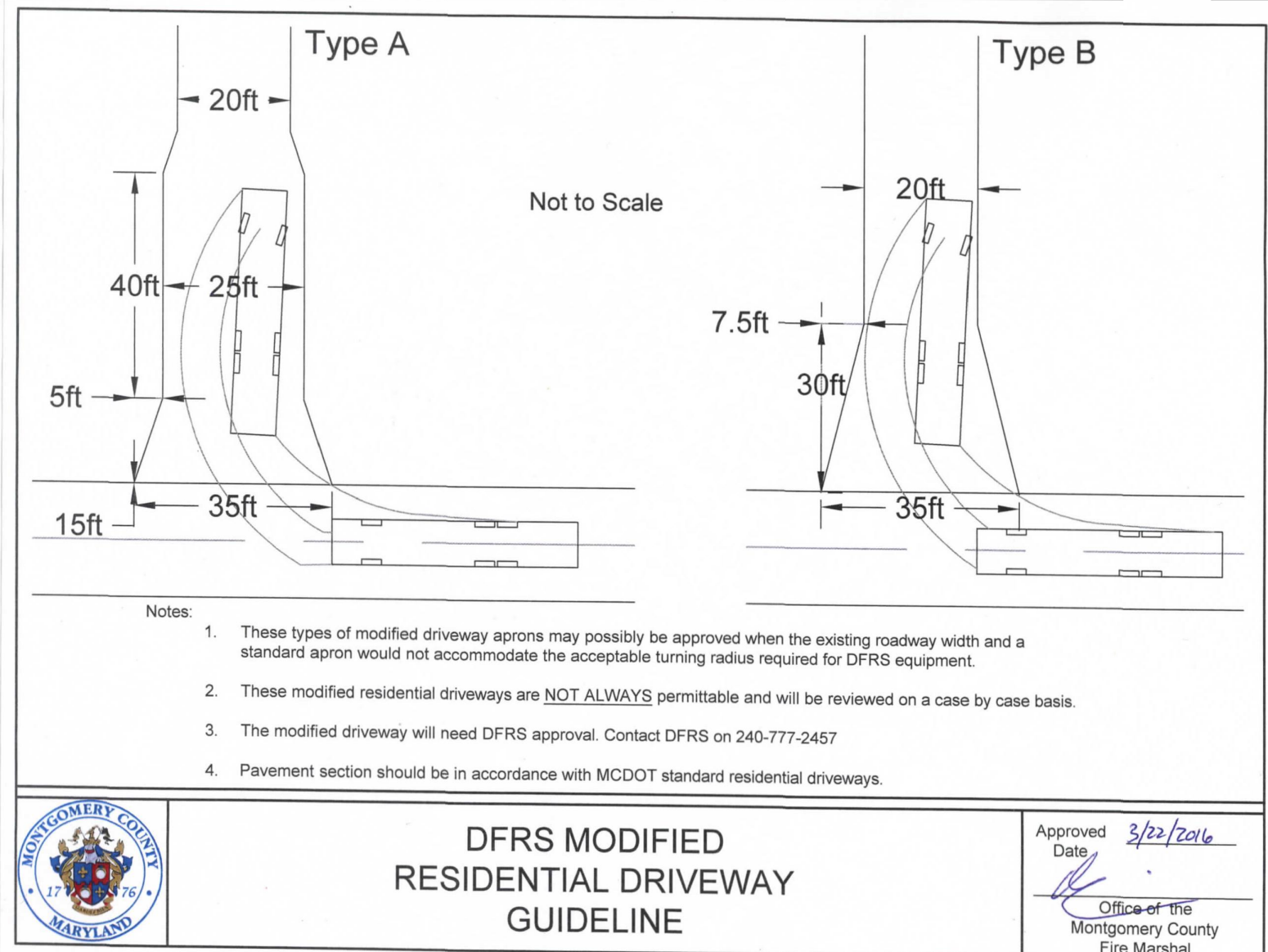
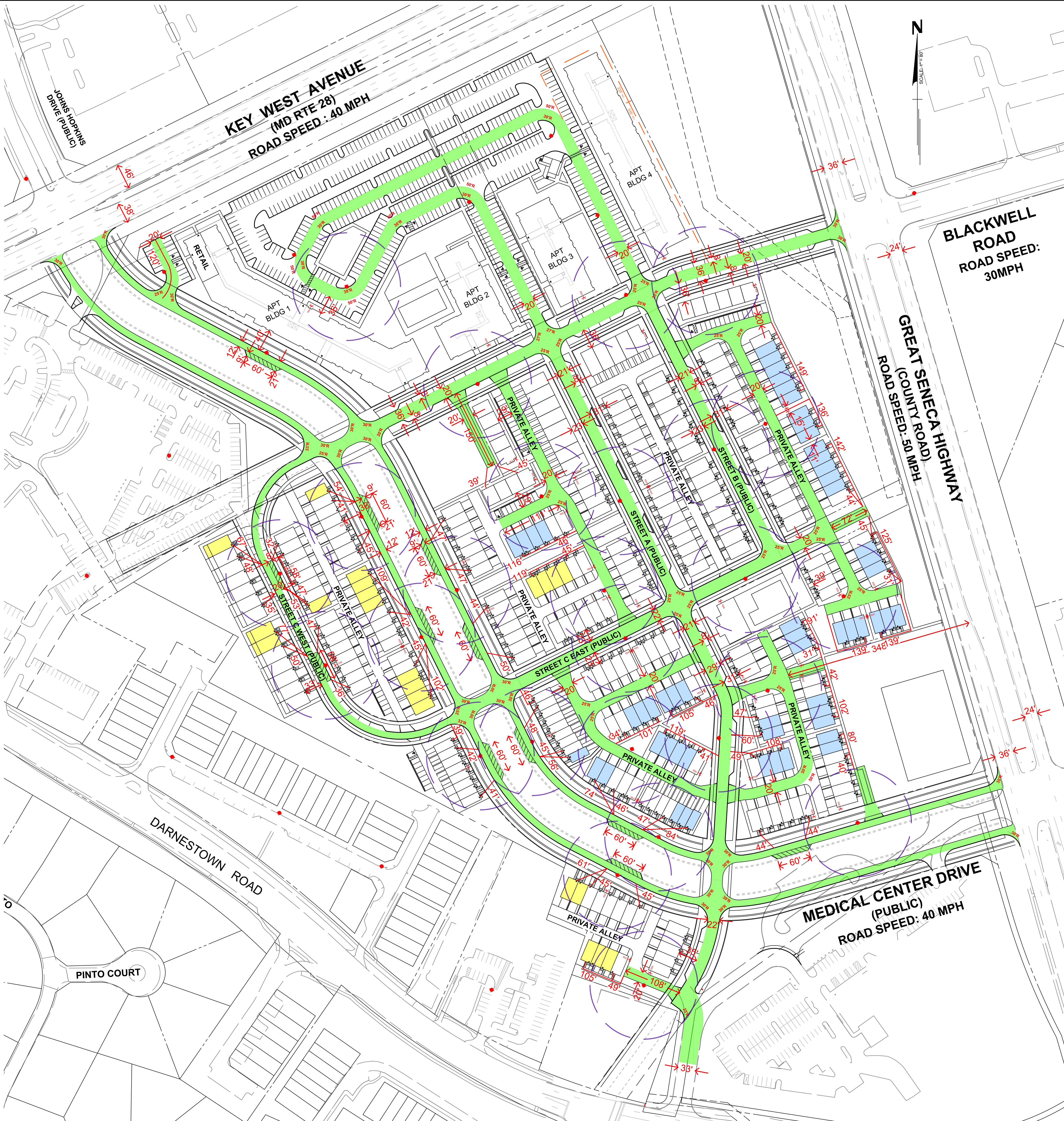
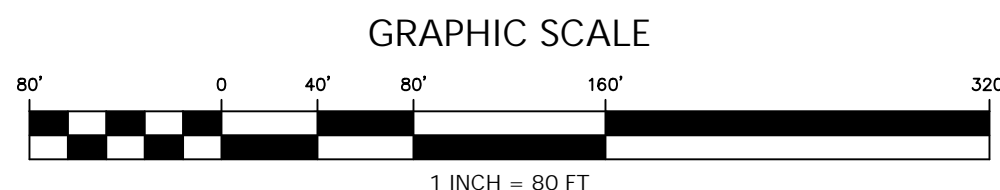


MC Aerial Tower 29
Width : 8.25
Track : 8.25
Lock to Lock Time : 6.0
Steering Angle : 33.2



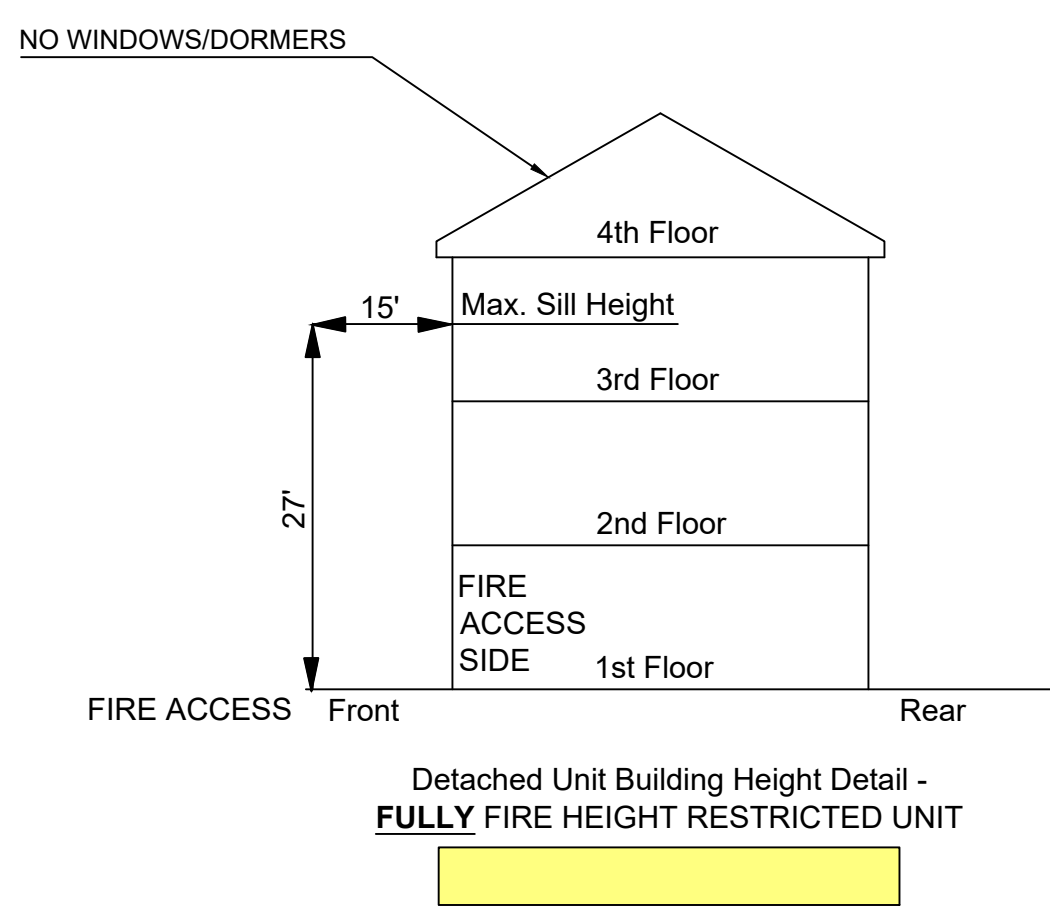
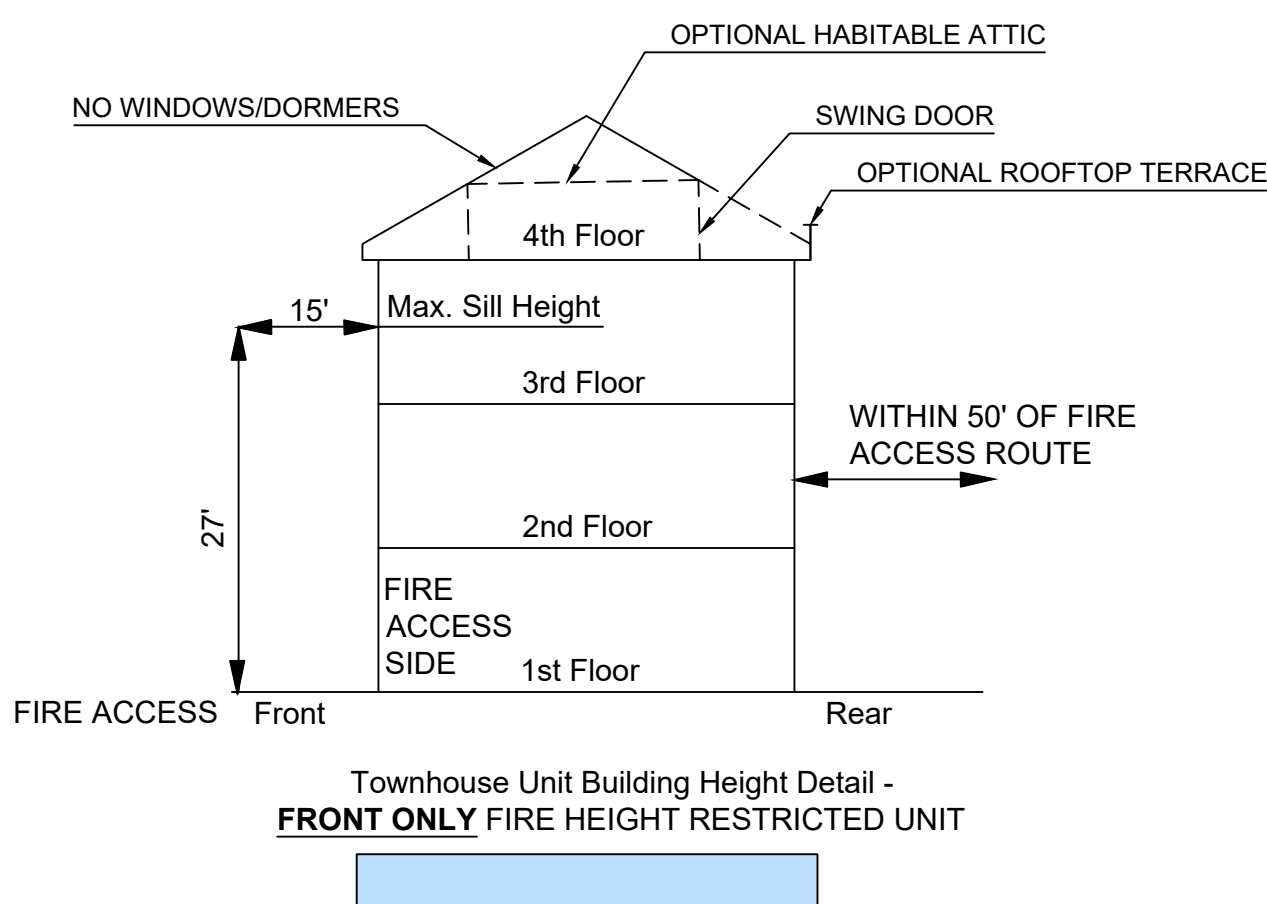
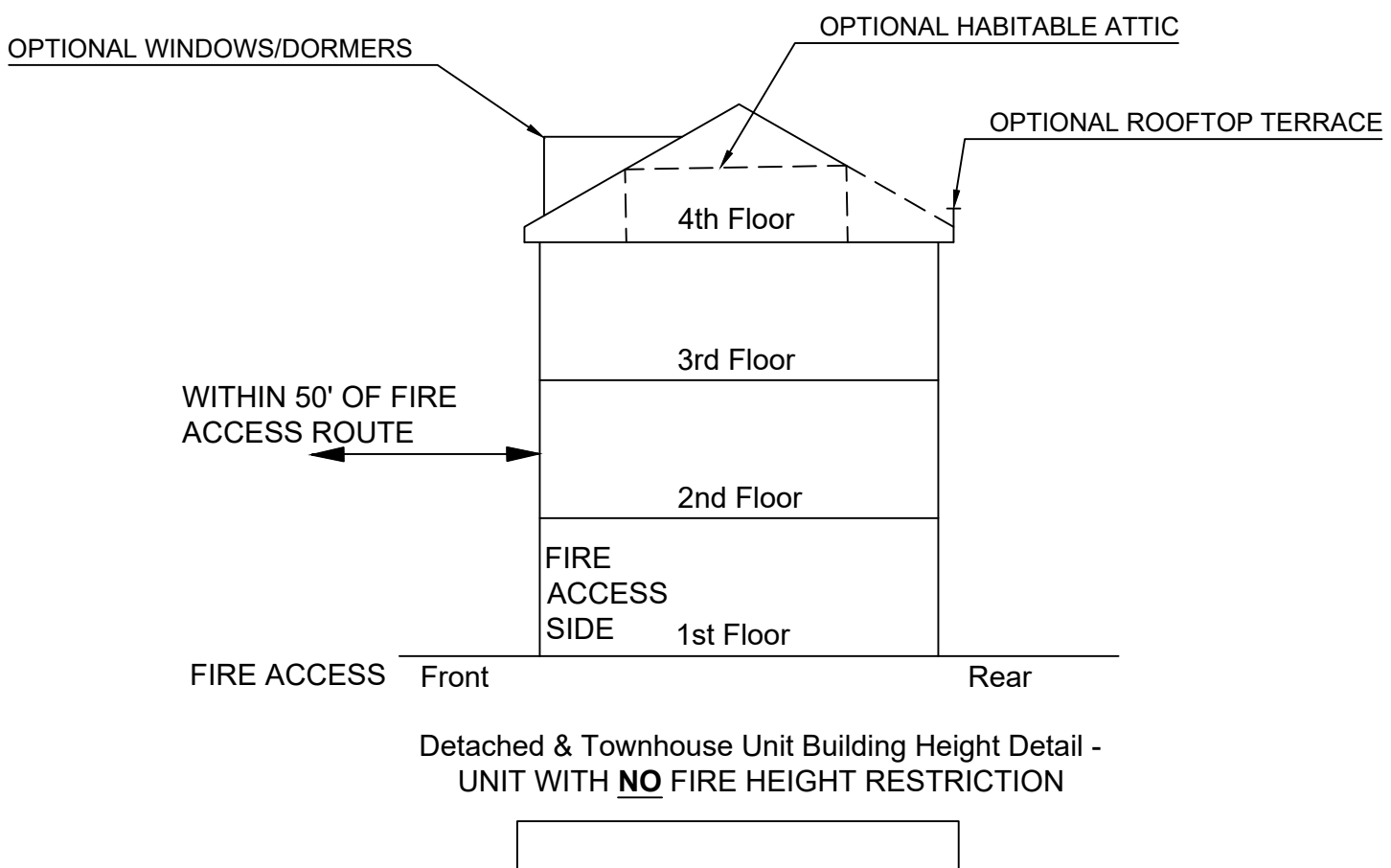
GENERAL NOTES:

- ONE AND TWO-FAMILY DWELLINGS OF THREE (3) STORIES (27' TO HIGHEST SILL, INCLUDING FALSE DORMERS) OR LESS MUST PROVIDE ACCESS TO THE OCCUPIED INTERIOR THROUGH A MAIN, SIDE-HINGE DOOR WITHIN 150 FEET OF A FIRE DEPARTMENT ACCESS ROUTE. FOR UNITS OF THREE (3) STORIES OR MORE, ACCESS MUST BE WITHIN FIFTY (50) FEET OF ACCESS ROUTE.
- ALL ALLEYS DESIGNATED AS A FIRE LANE SHALL PROVIDE 20' MINIMUM CLEAR WIDTH.
- EMERGENCY TRUCK: TYPE AT-29.
- ALL PARALLEL PARKING SPACES ARE 8' WIDE.
- ALL FIRE DEPARTMENT CONNECTIONS (FDC'S) CONFIRMED TO BE WITHIN 50' OF FIRE ACCESS ROUTE.
- FIRE DEPARTMENT CONNECTIONS (FDC'S) TO BE COORDINATED AT BUILDING PERMIT. SHOWN FOR GRAPHICAL PURPOSES ONLY.
- FIRE HYDRANTS INTENDED TO SERVE FDC'S ARE SHOWN WITH 100' RADIUS.
- SEE STATEMENT OF PERFORMANCE BASED DESIGN FOR ADDITIONAL INFORMATION.



DFRS MODIFIED
RESIDENTIAL DRIVEWAY
GUIDELINE

- ALL ENTRANCES



NOTE: HEIGHT RESTRICTION DETAILS PROVIDE ILLUSTRATIONS FOR MCFRS PRESCRIPTIVE CODE, NOT SPECIFIC UNIT TYPES.

PROFESSIONAL CERTIFICATION

"I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 32599, Expiration Date: 1/22/22."



REVISION	DATE	REVISION	DATE	REVISION	DATE

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PSTA SITE

PARCEL 850, L.4047 F.003, PARCEL 925, L.3862 F. 772 AND PART A, L.16172 F.223

ELECTION DISTRICT No. 9
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BASE DATA	BY	DATE
DESIGNED		
DRAWN		
REVIEWED		
RODGERS CONTACT:		
RELEASE FOR <input type="checkbox"/>		
BY: _____ DATE: _____		

FIRE ACCESS PLAN

SCALE:
1" = 80'
JOB No.
0643T
DATE:
MAR. 2021
SHEET No.
1 OF 1

Memo

Impact of Not Having Access on Medical Center Dr

Results of Intersections Capacity Analysis (CLV)

	Total Traffic (w/ Medical Ctr Dr Access)	Total Traffic (No Medical Ctr Dr Access)
Morning Peak Hour		
2. Key West Ave & Johns Hopkins Dr	824	813
4. Key West Ave & Great Seneca Hwy	1289	1293
<i>With Improvement (3rd SB LTL)</i>	<i>1257</i>	<i>1267</i>
5. Great Seneca Hwy & Blackwell Rd	675	693
6. Great Seneca Hwy & Medical Center Dr	681	708
Evening Peak Hour		
2. Key West Ave & Johns Hopkins Dr	1245	1251
4. Key West Ave & Great Seneca Hwy	1524	1524
<i>With Improvement (3rd SB LTL)</i>	<i>1491</i>	<i>1491</i>
5. Great Seneca Hwy & Blackwell Rd	807	819
6. Great Seneca Hwy & Medical Center Dr	739	739

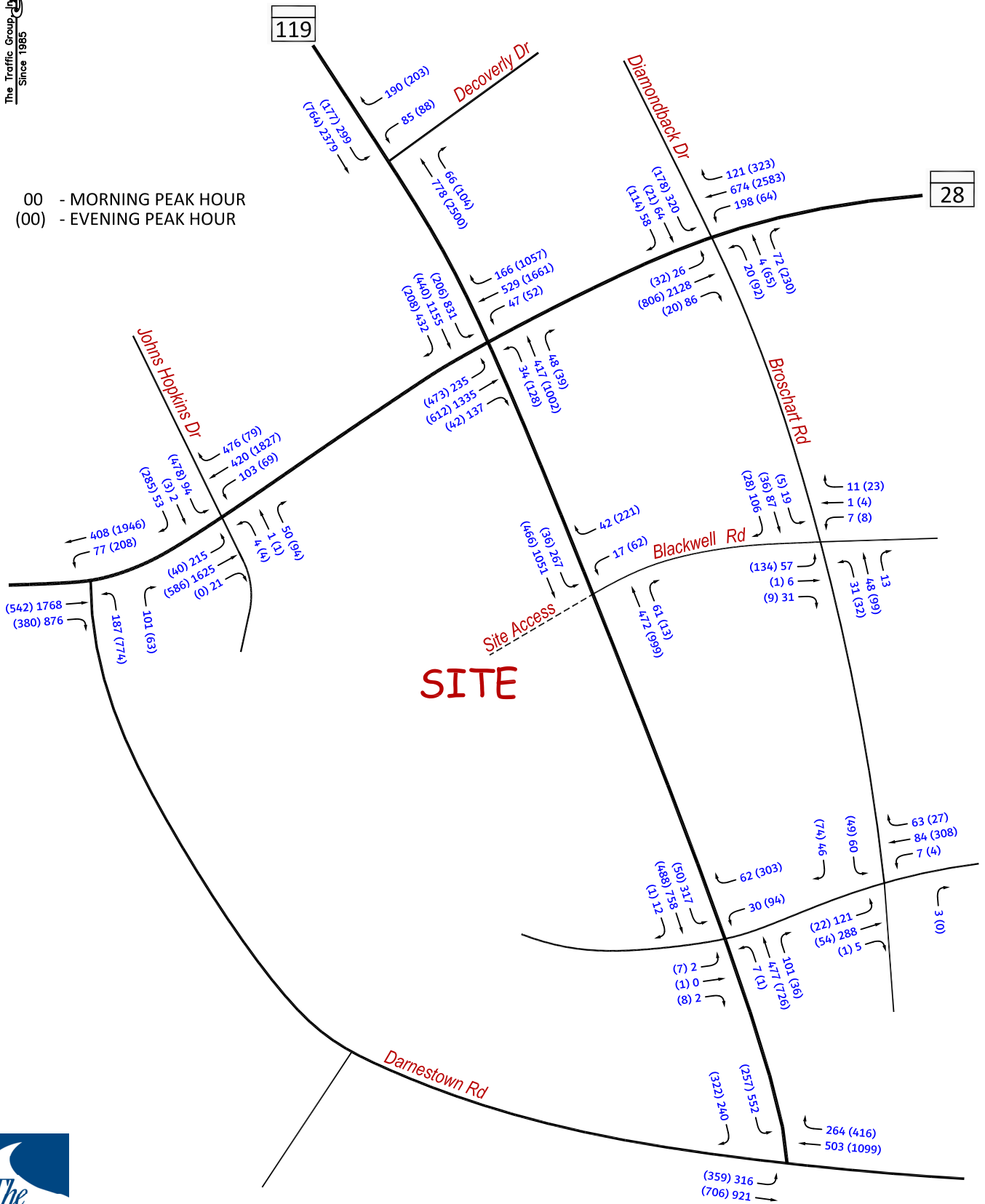
Results of Intersections Capacity Analysis (HCM)

			Total Traffic (w/ Medical Ctr Dr Access)	Total Traffic (No Medical Ctr Dr Access)
Morning Peak Hour Traffic	Control Type	HCM Standard	Delay (sec.)	
2. Key West Ave & Johns Hopkins Dr	Stop Sign	55	357.3	332.4
<i>With Improvement</i>	<i>Signal</i>	<i>55</i>	<i>5.9</i>	<i>5.5</i>
4. Key West Ave & Great Seneca Hwy	Signal	55	44.9	45.5
<i>With Improvement (SB 3rd LTL)</i>	<i>Signal</i>	<i>55</i>	<i>42.7</i>	<i>43.2</i>
5. Great Seneca Hwy & Blackwell Rd	Stop Sign	55	43.6	62.2
<i>With Improvement</i>	<i>Signal</i>	<i>55</i>	----	29.3
6. Great Seneca Hwy & Medical Ctr Dr	Stop Sign	55	6.9	7.0
Evening Peak Hour Traffic	Control Type	HCM Standard	Delay (sec.)	
2. Key West Ave & Johns Hopkins Dr	Stop Sign	55	1218.6	1167.6
<i>With Improvement</i>	<i>Signal</i>	<i>55</i>	<i>26.8</i>	<i>26.7</i>
4. Key West Ave & Great Seneca Hwy	Signal	55	54.2	54.1
<i>With Improvement (SB 3rd LTL)</i>	<i>Signal</i>	<i>55</i>	<i>46.0</i>	<i>46.1</i>
5. Great Seneca Hwy & Blackwell Rd	Stop Sign	55	11.7	14.4
<i>With Improvement</i>	<i>Signal</i>	<i>55</i>	----	28.2
6. Great Seneca Hwy & Medical Ctr Dr	Stop Sign	55	11.0	10.9

Note: 1. Results are based on HCM 6 Reports from HCS 7.

BACKGROUND PEAK HOUR TRAFFIC VOLUMES

00 - MORNING PEAK HOUR
(00) - EVENING PEAK HOUR



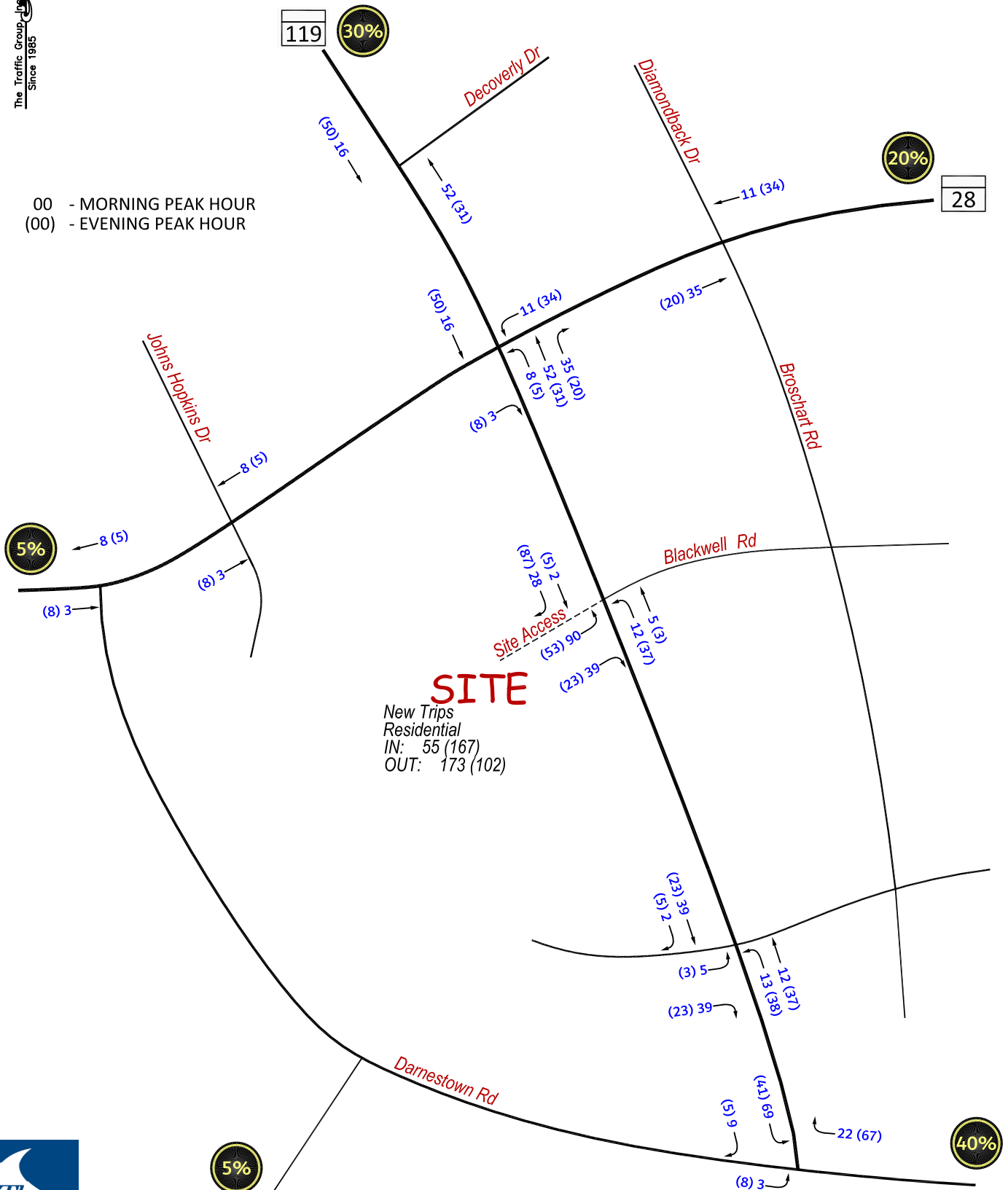
SITE



NOT TO SCALE

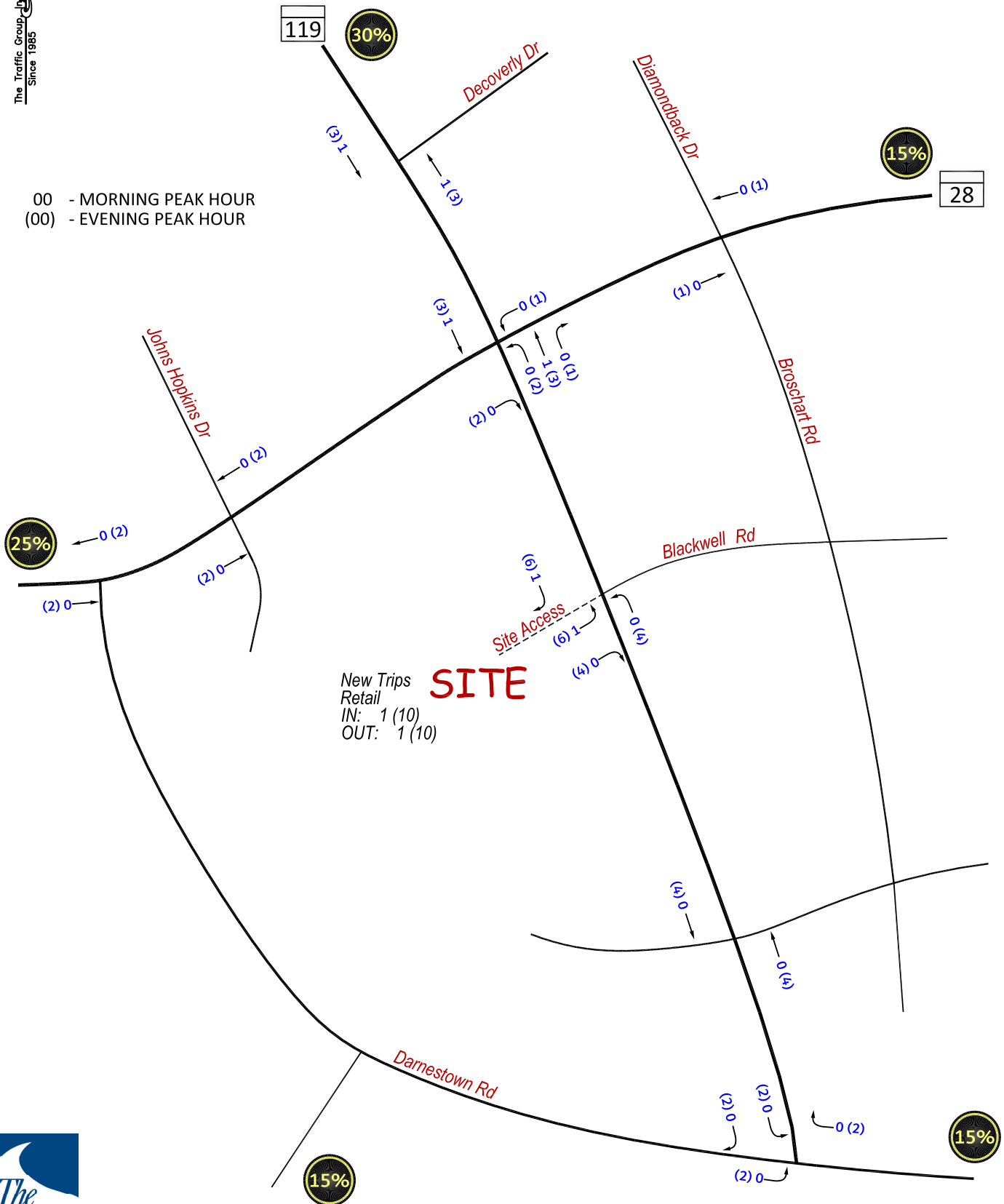
NEW TRIP ASSIGNMENT FOR SUBJECT SITE (RESIDENTIAL)

00 - MORNING PEAK HOUR
(00) - EVENING PEAK HOUR



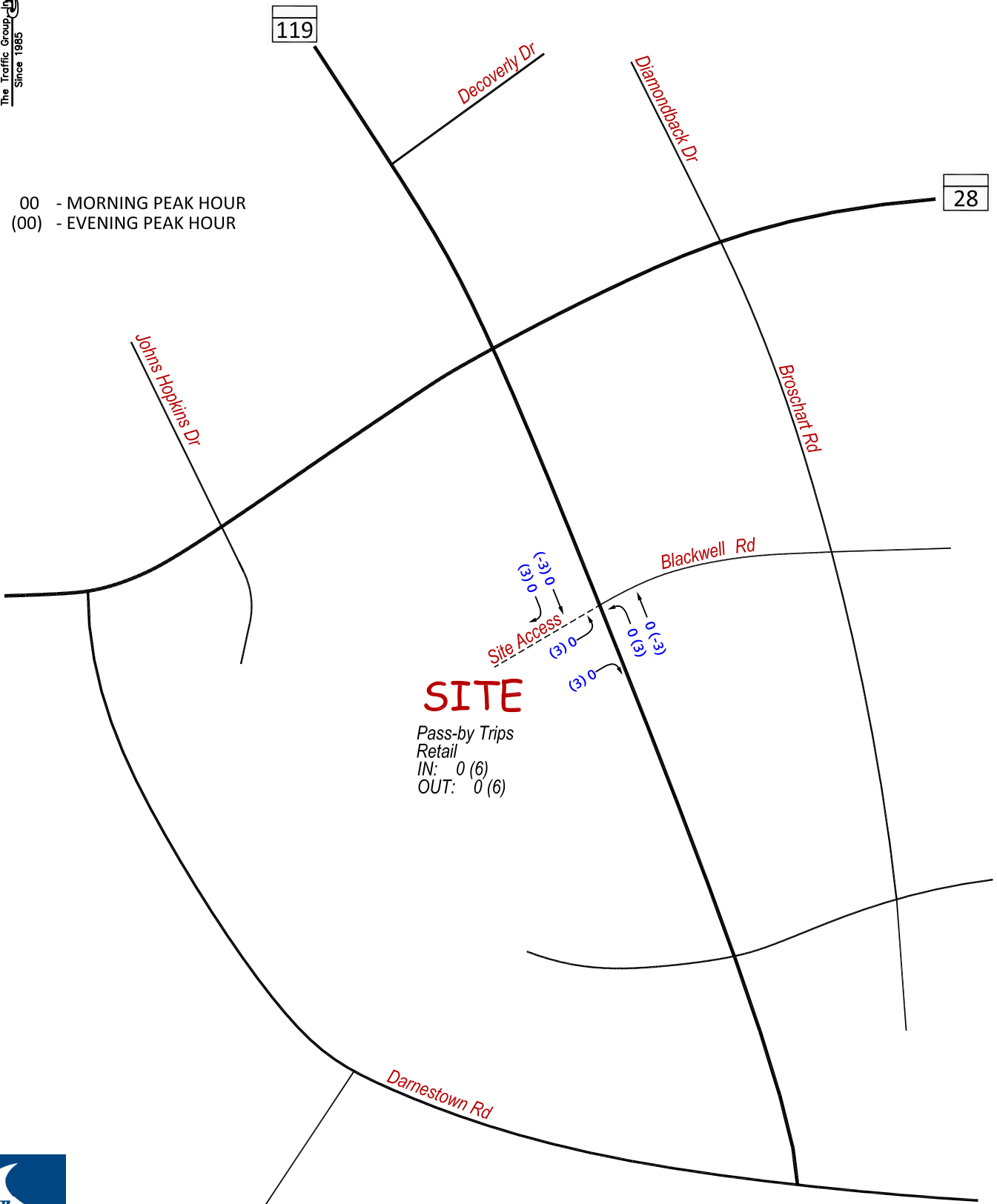
NEW TRIP ASSIGNMENT FOR SUBJECT SITE (RETAIL)

00 - MORNING PEAK HOUR
(00) - EVENING PEAK HOUR



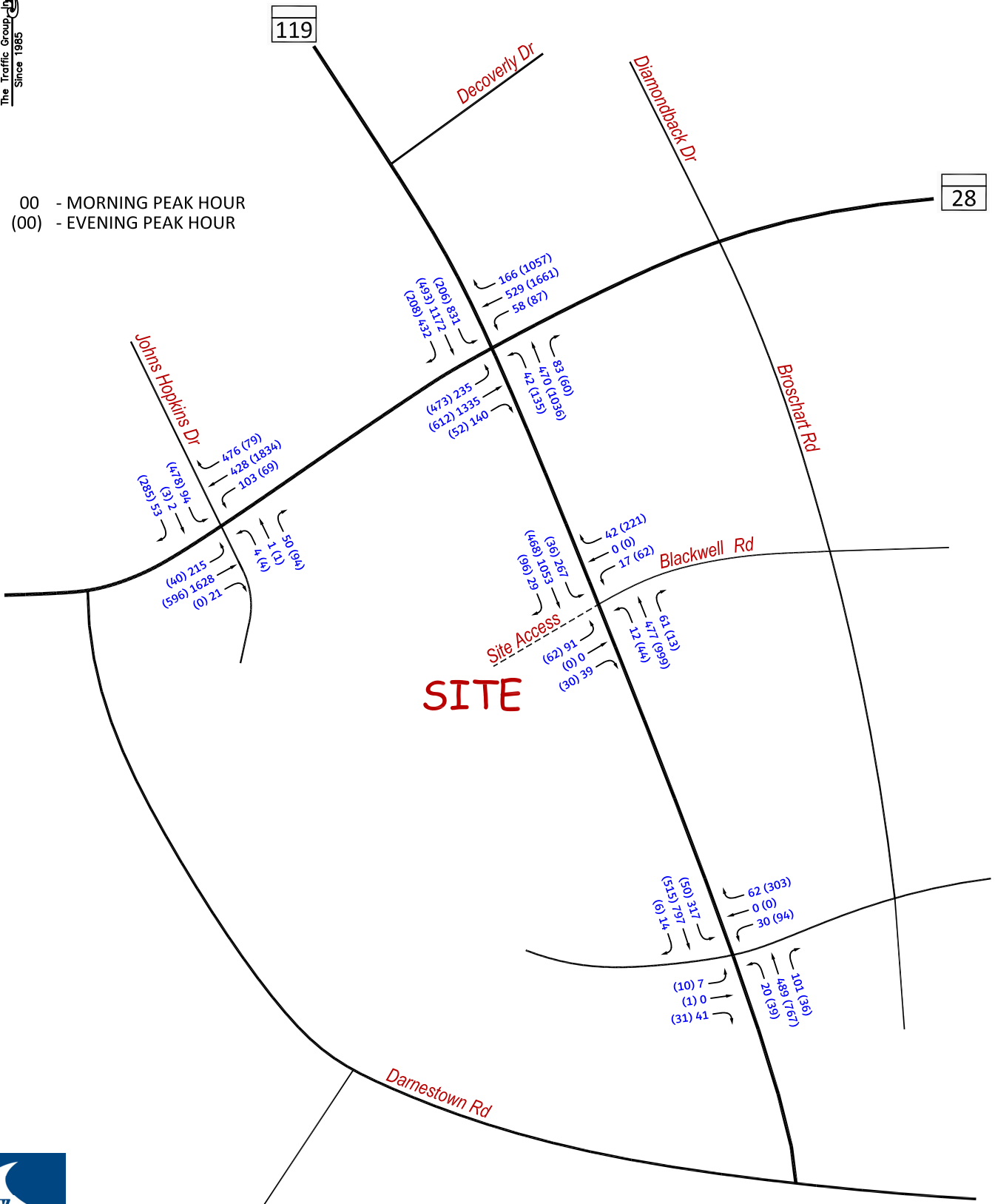
PASS-BY TRIP ASSIGNMENT FOR SUBJECT SITE (RETAIL)

00 - MORNING PEAK HOUR
(00) - EVENING PEAK HOUR



TOTAL PEAK HOUR TRAFFIC VOLUMES

00 - MORNING PEAK HOUR
(00) - EVENING PEAK HOUR



CRITICAL LANE VOLUME (CLV) METHODOLOGY for Montgomery County

E/W Road: Key West Avenue

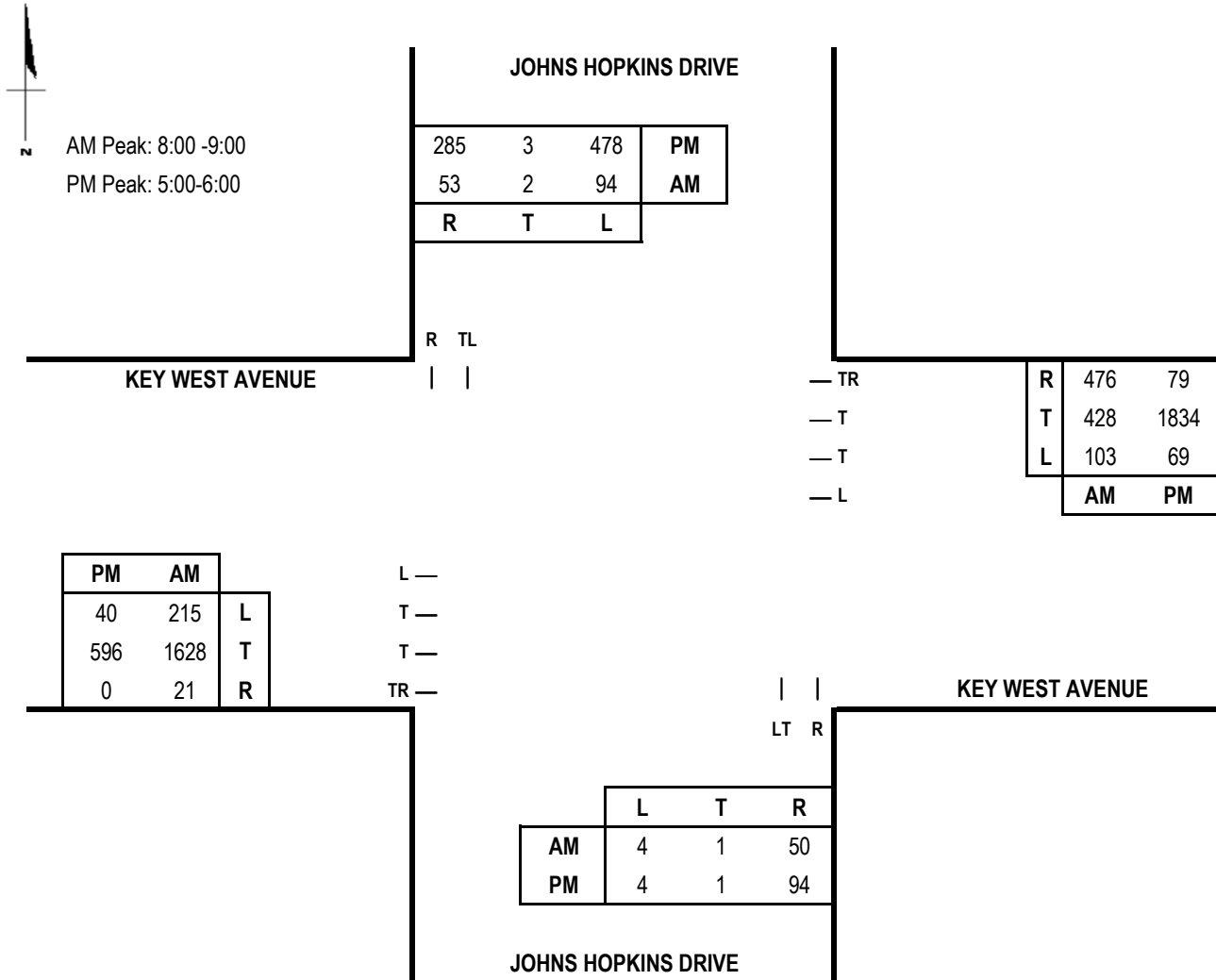
Date of Count: 3/5/2019

N/S Road: Johns Hopkins Drive

Day of Count: Tuesday

Conditions: Total Traffic

Analyst: Shulin Li



Capacity Analysis

Morning Peak Hour							
Dir	Thru Volumes			+ Opposing Lefts			AM
	VOL	x LUF	= Total	VOL	x LUF	= Total	CLV
NB	5	1.00	5	94	1.00	94	100
SB	96	1.00	96	4	1.00	4	
EB	1649	0.37	610	103	1.00	103	713
WB	904	0.37	334	215	1.00	215	
CLV TOTAL=							813

Evening Peak Hour							
Dir	Thru Volumes			+ Opposing Lefts			PM
	VOL	x LUF	= Total	VOL	x LUF	= Total	CLV
NB	25	1.00	25	478	1.00	478	503
SB	481	1.00	481	4	1.00	4	
EB	596	0.37	221	69	1.00	69	748
WB	1913	0.37	708	40	1.00	40	
CLV TOTAL=							1,251

CRITICAL LANE VOLUME (CLV) METHODOLOGY for Montgomery County

E/W Road: Key West Avenue

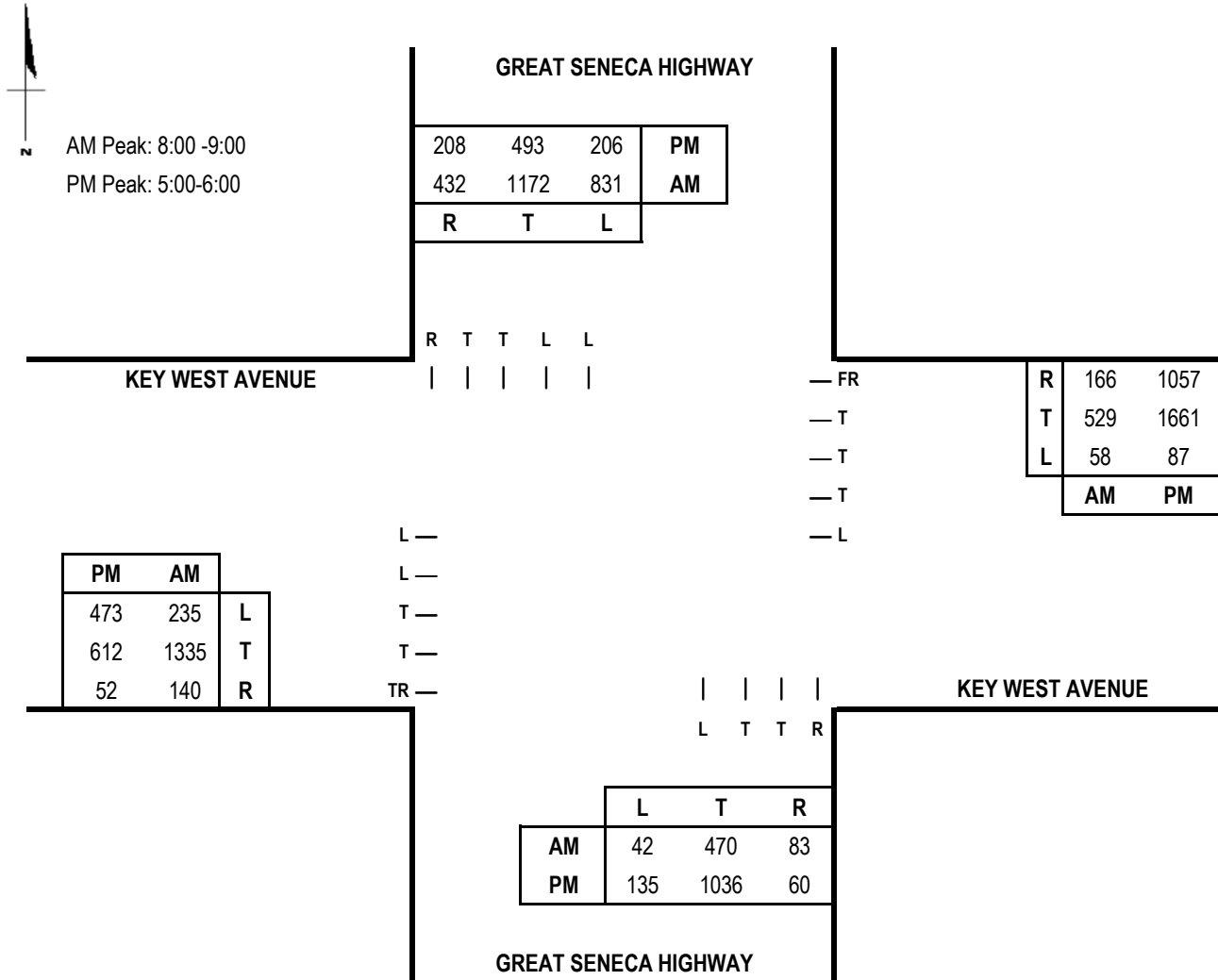
Date of Count: 3/5/2019

N/S Road: Great Seneca Highway

Day of Count: Tuesday

Conditions: Total Traffic

Analyst: Shulin Li



Capacity Analysis

Morning Peak Hour						
Dir	Thru Volumes			+ Opposing Lefts		
	VOL	x LUF	= Total	VOL	x LUF	= Total
NB	470	0.53	249	831	0.53	440
SB	1172	0.53	621	42	1.00	42
EB	1475	0.37	546	58	1.00	58
WB	529	0.37	196	235	0.53	125
CLV TOTAL=						1,293

Evening Peak Hour						
Dir	Thru Volumes			+ Opposing Lefts		
	VOL	x LUF	= Total	VOL	x LUF	= Total
NB	1036	0.53	549	206	0.53	109
SB	493	0.53	261	135	1.00	135
EB	664	0.37	246	87	1.00	87
WB	1661	0.37	615	473	0.53	251
CLV TOTAL=						1,524

CRITICAL LANE VOLUME (CLV) METHODOLOGY

for Montgomery County

E/W Road: Key West Avenue

Date of Count: 3/5/2019

N/S Road: Great Seneca Highway

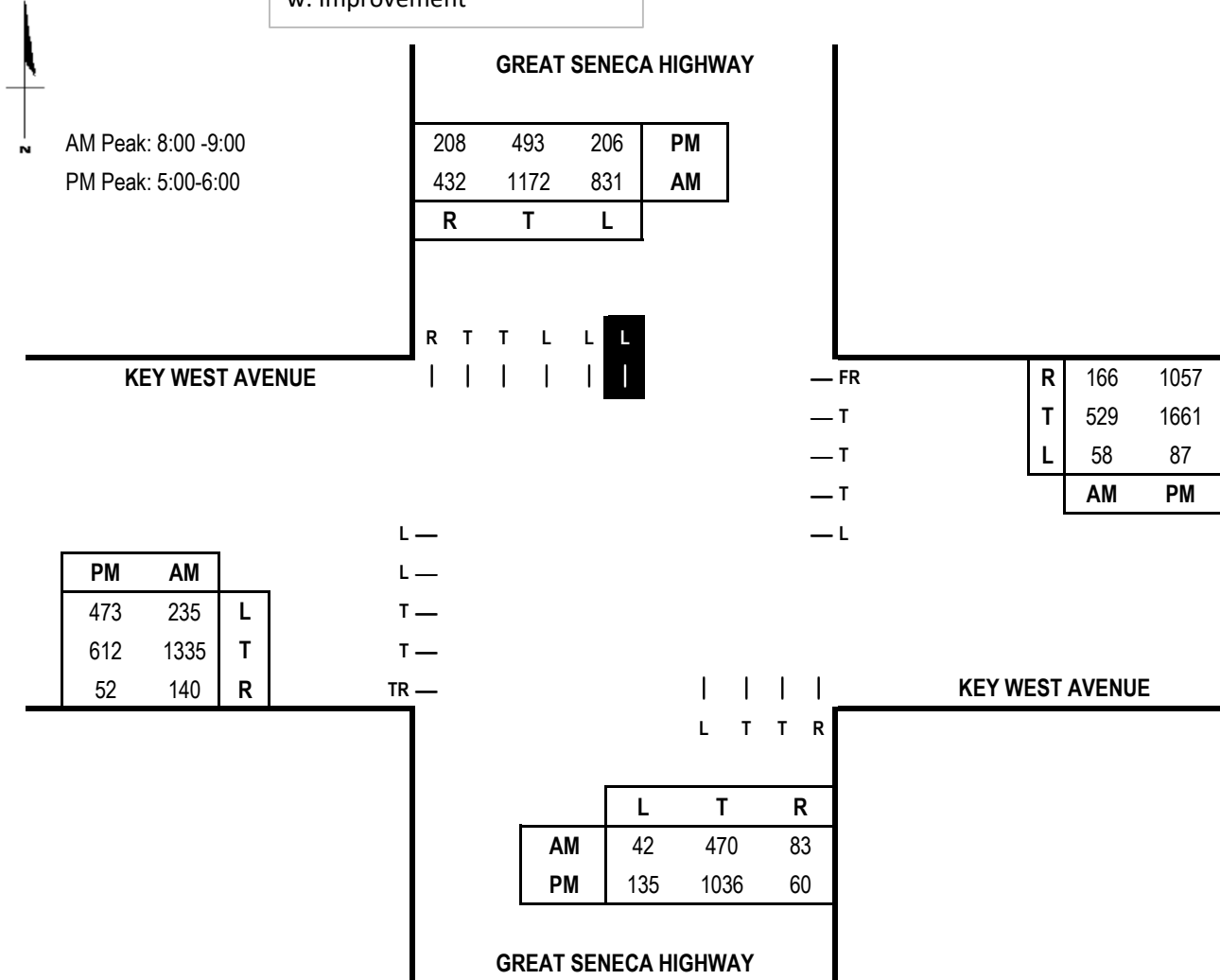
Day of Count: Tuesday

Conditions: Total Traffic

Analyst: Shulin Li



w. Improvement



Capacity Analysis

Morning Peak Hour							
Dir	Thru Volumes			+ Opposing Lefts			AM
	VOL	x LUF	= Total	VOL	x LUF	= Total	CLV
NB	470	0.53	249	831	0.37	307	663
SB	1172	0.53	621	42	1.00	42	
EB	1475	0.37	546	58	1.00	58	604
WB	529	0.37	196	235	0.53	125	
CLV TOTAL=							1,267

Evening Peak Hour							
Dir	Thru Volumes			+ Opposing Lefts			PM
	VOL	x LUF	= Total	VOL	x LUF	= Total	CLV
NB	1036	0.53	549	206	0.37	76	625
SB	493	0.53	261	135	1.00	135	
EB	664	0.37	246	87	1.00	87	866
WB	1661	0.37	615	473	0.53	251	
CLV TOTAL=							1,491

CRITICAL LANE VOLUME (CLV) METHODOLOGY for Montgomery County

E/W Road: Blackwell Road/Site Access

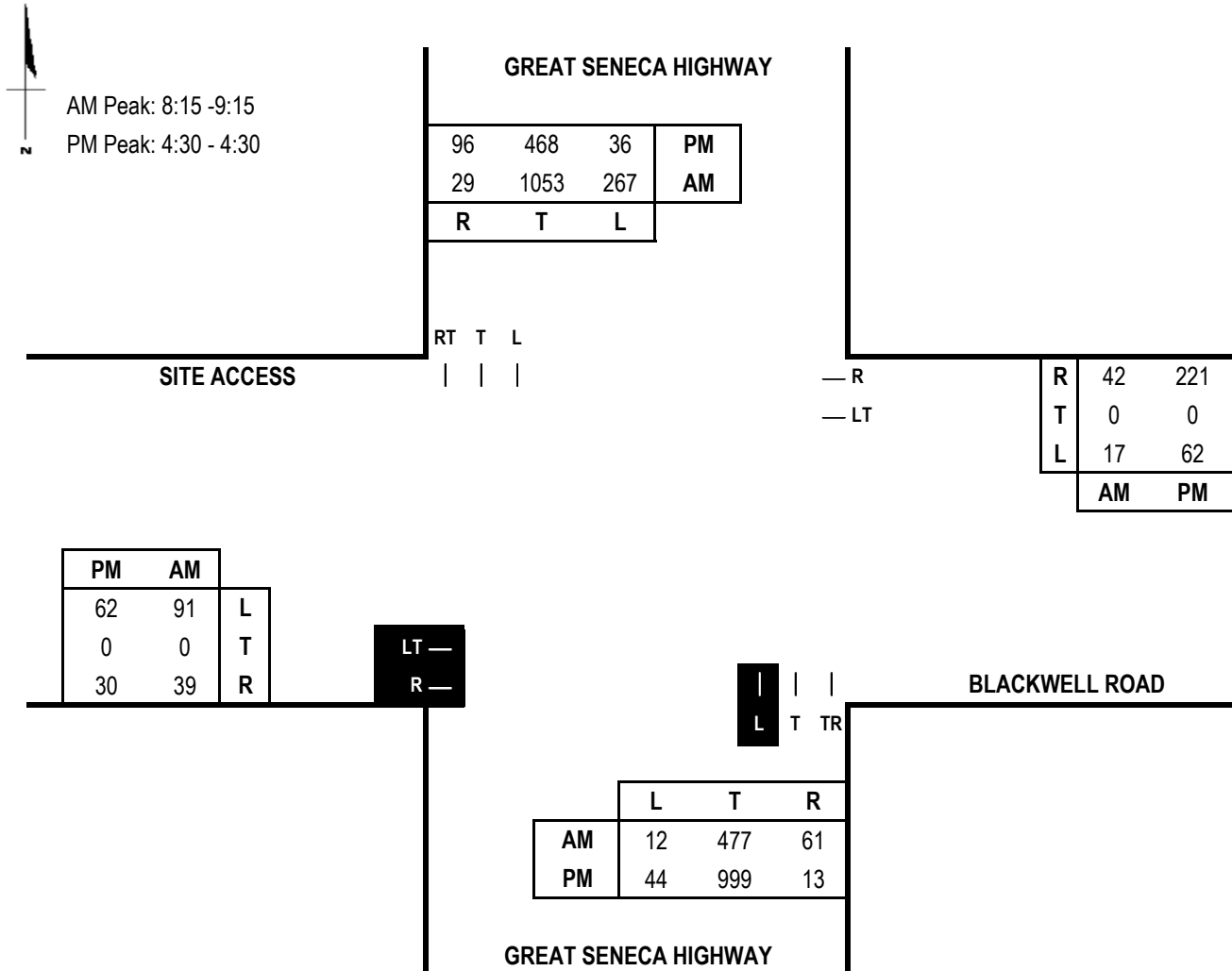
Date of Count: 3/5/2019

N/S Road: Great Seneca Highway

Day of Count: Tuesday

Conditions: Total Traffic

Analyst: Shulin Li



Capacity Analysis

Morning Peak Hour							
Dir	Thru Volumes			+ Opposing Lefts			AM
	VOL	x LUF	= Total	VOL	x LUF	= Total	CLV
NB	538	0.53	285	267	1.00	267	585
SB	1082	0.53	573	12	1.00	12	
EB	91	1.00	91	17	1.00	17	108
WB	17	1.00	17	91	1.00	91	
CLV TOTAL=							693

Evening Peak Hour							
Dir	Thru Volumes			+ Opposing Lefts			PM
	VOL	x LUF	= Total	VOL	x LUF	= Total	CLV
NB	1012	0.53	536	36	1.00	36	572
SB	564	0.53	299	44	1.00	44	
EB	62	1.00	62	62	1.00	62	247
WB	185	1.00	185	62	1.00	62	
CLV TOTAL=							819

CRITICAL LANE VOLUME (CLV) METHODOLOGY

for Montgomery County

E/W Road: Medical Center Drive

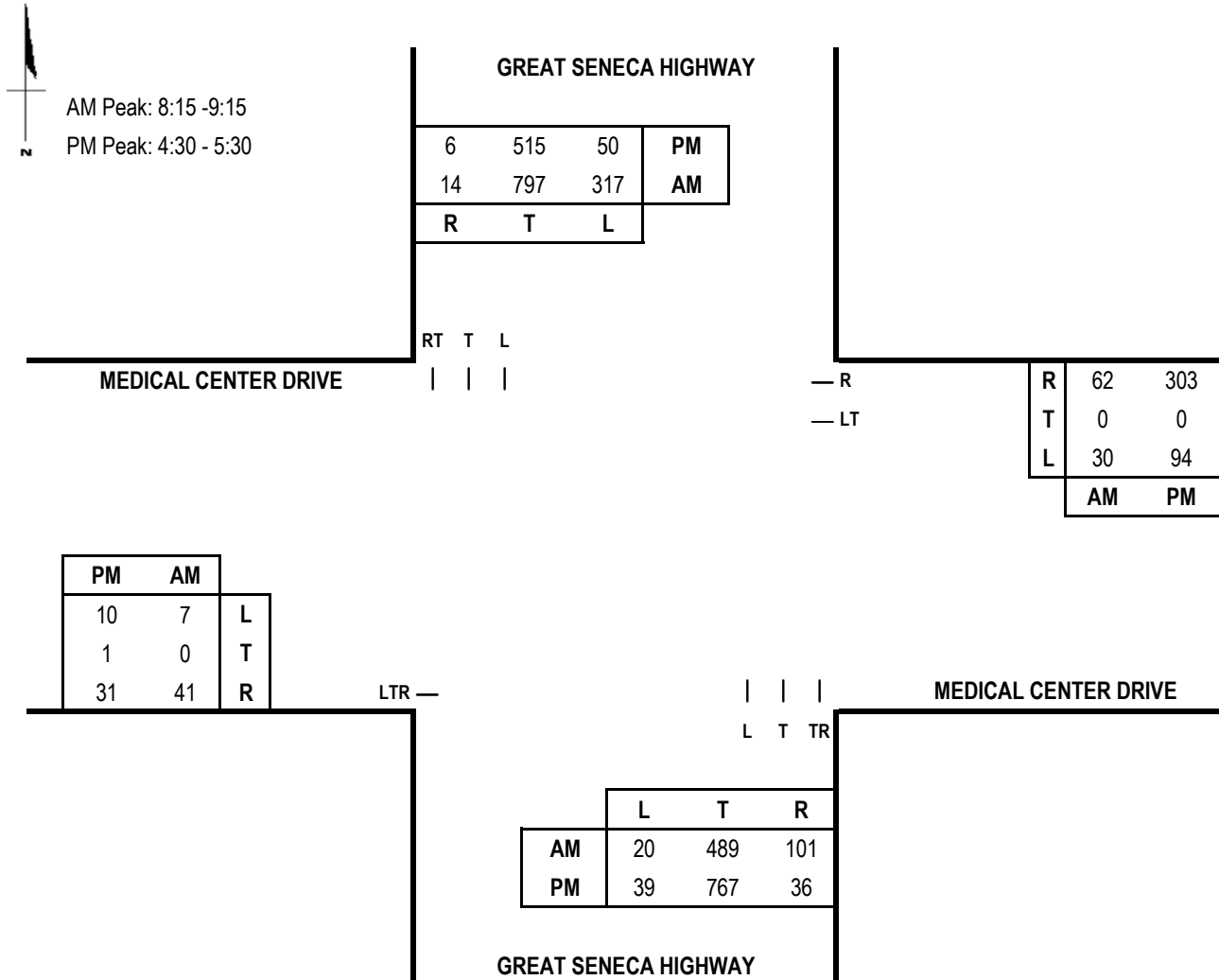
Date of Count: 3/5/2019

N/S Road: Great Seneca Highway

Day of Count: Tuesday

Conditions: Total Traffic

Analyst: Shulin Li



Capacity Analysis

Morning Peak Hour							
Dir	Thru Volumes			+ Opposing Lefts			AM
	VOL	x LUF	= Total	VOL	x LUF	= Total	CLV
NB	590	0.53	313	317	1.00	317	630
SB	811	0.53	430	20	1.00	20	
EB	48	1.00	48	30	1.00	30	78
WB	30	1.00	30	7	1.00	7	
CLV TOTAL=							708

Evening Peak Hour							
Dir	Thru Volumes			+ Opposing Lefts			PM
	VOL	x LUF	= Total	VOL	x LUF	= Total	CLV
NB	803	0.53	426	50	1.00	50	476
SB	521	0.53	276	39	1.00	39	
EB	42	1.00	42	94	1.00	94	263
WB	253	1.00	253	10	1.00	10	
CLV TOTAL=							739

HCS7 Two-Way Stop-Control Report

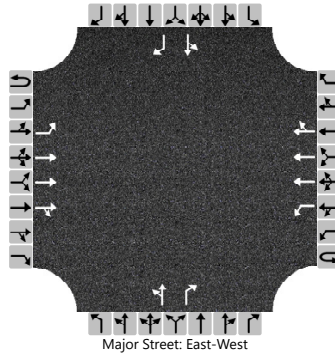
General Information

Analyst	sli
Agency/Co.	TTG, Inc.
Date Performed	11/1/2019
Analysis Year	2019
Time Analyzed	Total AM
Intersection Orientation	East-West
Project Description	PSTA

Site Information

Intersection	2. MD 28 & Johns Hopkins
Jurisdiction	Montgomery, MD
East/West Street	MD 28
North/South Street	Johns Hopkins Dr
Peak Hour Factor	0.97
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	3	0	0	1	3	0		0	1	1		0	1	1
Configuration		L	T	TR		L	T	TR		LT		R		LT		R
Volume (veh/h)	0	215	1628	21	0	103	428	476		4	1	50		94	2	53
Percent Heavy Vehicles (%)	3	3			3	3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized									No				No			
Median Type Storage	Left + Thru								1							

Critical and Follow-up Headways

Base Critical Headway (sec)		5.3				5.3				6.4	6.5	7.1		6.4	6.5	7.1
Critical Headway (sec)		5.36				5.36				6.46	6.56	7.16		6.46	6.56	7.16
Base Follow-Up Headway (sec)		3.1				3.1				3.8	4.0	3.9		3.8	4.0	3.9
Follow-Up Headway (sec)		3.13				3.13				3.83	4.03	3.93		3.83	4.03	3.93

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		222				106				5		52		99		55
Capacity, c (veh/h)		419				175						259				463
v/c Ratio		0.53				0.61						0.20				0.12
95% Queue Length, Q ₉₅ (veh)		3.0				3.3						0.7				0.4
Control Delay (s/veh)		22.8				52.9						22.3				13.8
Level of Service (LOS)		C				F						C				B
Approach Delay (s/veh)	2.6				5.4											
Approach LOS																

HCS7 Two-Way Stop-Control Report

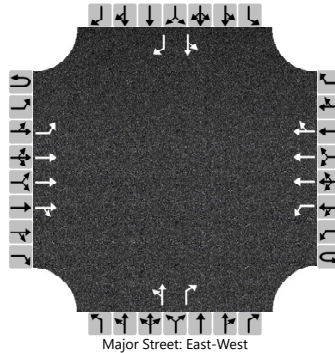
General Information

Analyst	sli
Agency/Co.	TTG, Inc.
Date Performed	11/1/2019
Analysis Year	2019
Time Analyzed	Total PM
Intersection Orientation	East-West
Project Description	PSTA

Site Information

Intersection	2. MD 28 & Johns Hopkins
Jurisdiction	Montgomery, MD
East/West Street	MD 28
North/South Street	Johns Hopkins Dr
Peak Hour Factor	0.97
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	3	0	0	1	3	0		0	1	1		0	1	1
Configuration		L	T	TR		L	T	TR		LT		R		LT		R
Volume (veh/h)	0	40	596	0	0	69	1834	79		4	1	94		478	3	285
Percent Heavy Vehicles (%)	3	3			3	3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized									No				No			
Median Type Storage	Left + Thru								1							

Critical and Follow-up Headways

Base Critical Headway (sec)		5.3				5.3				6.4	6.5	7.1		6.4	6.5	7.1
Critical Headway (sec)		5.36				5.36				6.46	6.56	7.16		6.46	6.56	7.16
Base Follow-Up Headway (sec)		3.1				3.1				3.8	4.0	3.9		3.8	4.0	3.9
Follow-Up Headway (sec)		3.13				3.13				3.83	4.03	3.93		3.83	4.03	3.93

Delay, Queue Length, and Level of Service

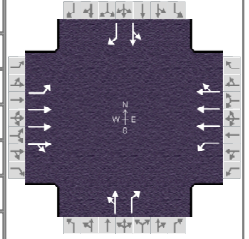
Flow Rate, v (veh/h)		41				71				5		97		496		294
Capacity, c (veh/h)		128				595						585		27		210
v/c Ratio		0.32				0.12						0.17		18.55		1.40
95% Queue Length, Q ₉₅ (veh)		1.3				0.4						0.6		61.7		16.9
Control Delay (s/veh)		46.1				11.9						12.4		8179.3		247.9
Level of Service (LOS)		E				B						B		F		F
Approach Delay (s/veh)	2.9				0.4								5228.3			
Approach LOS													F			

HCS7 Signalized Intersection Results Summary

General Information

Agency	TTG, Inc.		
Analyst	QT	Analysis Date	Nov 4, 2019
Jurisdiction	Montgomery, MD	Time Period	Total AM
Urban Street	MD 28	Analysis Year	2019
Intersection	2. MD 28 & Medical Ctr Dr	File Name	2TA-Imp.xus
Project Description	PSTA		

Intersection Information



Demand Information

Approach Movement	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	215	1628	21	103	428	476	4	1	50	94	2	53

Signal Information

Cycle, s	150.0	Reference Phase	2	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div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Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	4.0	1.1	4.0		7.0		7.0
Phase Duration, s	13.4	119.5	10.5	116.6		20.0		20.0
Change Period, ($Y+R_c$), s	6.0	6.5	6.0	6.5		7.0		7.0
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.3		4.3
Queue Clearance Time (g_s), s	6.7		4.3			6.6		12.3
Green Extension Time (g_e), s	0.8	0.0	0.3	0.0		0.7		0.7
Phase Call Probability	1.00		0.99			1.00		1.00
Max Out Probability	0.00		0.00			0.00		0.00

Movement Group Results

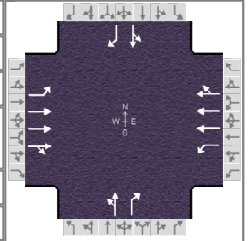
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	222	1136	564	106	441	491		5	52		99	55
Adjusted Saturation Flow Rate (s), veh/h/ln	1767	1856	1843	1767	1856			1490	1572		1412	1572
Queue Service Time (g_s), s	4.7	0.0	0.7	2.3	0.5			0.0	4.6		9.9	4.9
Cycle Queue Clearance Time (g_c), s	4.7	0.0	0.7	2.3	0.5			0.4	4.6		10.3	4.9
Green Ratio (g/C)	0.78	0.75	0.75	0.76	0.73			0.09	0.09		0.09	0.09
Capacity (c), veh/h	501	2795	1388	311	2723			172	136		170	136
Volume-to-Capacity Ratio (X)	0.443	0.406	0.406	0.341	0.162			0.030	0.378		0.582	0.401
Back of Queue (Q), ft/ln (95 th percentile)	69.6	7	21	36.1	8.7			8.5	89.2		179	94.9
Back of Queue (Q), veh/ln (95 th percentile)	2.7	0.3	0.8	1.4	0.3			0.3	3.5		7.0	3.7
Queue Storage Ratio (RQ) (95 th percentile)	0.21	0.00	0.00	0.11	0.00			0.00	0.59		0.00	0.32
Uniform Delay (d_1), s/veh	5.8	0.0	0.2	4.4	0.4			62.7	64.7		67.3	64.8
Incremental Delay (d_2), s/veh	0.5	0.4	0.8	0.6	0.1			0.1	1.7		3.1	1.9
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	0.0
Control Delay (d), s/veh	6.3	0.4	1.0	5.1	0.6	0.0		62.8	66.4		70.4	66.7
Level of Service (LOS)	A	A	A	A	A	A		E	E		E	E
Approach Delay, s/veh / LOS	1.2		A	0.8		A	66.1		E	69.1		E
Intersection Delay, s/veh / LOS	5.5						A					

Multimodal Results

	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.04		B	2.28		B	3.23		C	3.13		C
Bicycle LOS Score / LOS	1.54		B	1.06		A	0.58		A	0.74		A

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	TTG, Inc.			Duration, h	0.250
Analyst	QT	Analysis Date	Nov 4, 2019	Area Type	Other
Jurisdiction	Montgomery, MD	Time Period	Total PM w. Improvement	PHF	0.97
Urban Street	MD 28	Analysis Year	2019	Analysis Period	1> 7:00
Intersection	2. MD 28 & Medical Ctr Dr	File Name	2TP-Imp.xus		
Project Description	PSTA				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	40	596	0	69	1834	79	4	1	94	478	3	285

Signal Information											
Cycle, s	150.0	Reference Phase	2								
Offset, s	0	Reference Point	End								
Uncoordinated	No	Simult. Gap E/W	On								
Force Mode	Fixed	Simult. Gap N/S	On								

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	4.0	1.1	4.0		7.0		7.0
Phase Duration, s	9.3	68.8	11.2	70.7		70.0		70.0
Change Period, ($Y+R_c$), s	6.0	6.5	6.0	6.5		7.0		7.0
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0		4.2		4.2
Queue Clearance Time (g_s), s	4.0		5.5			7.7		49.3
Green Extension Time (g_e), s	0.1	0.0	0.1	0.0		3.7		3.0
Phase Call Probability	0.82		0.95			1.00		1.00
Max Out Probability	0.00		0.06			0.00		0.12

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	41	614	0	71	1323	649		5	97		496	253
Adjusted Saturation Flow Rate (s), veh/h/ln	1767	1856	1839	1767	1856			1477	1572		1407	1572
Queue Service Time (g_s), s	2.0	8.7	0.0	3.5	43.8			0.0	5.7		47.1	16.6
Cycle Queue Clearance Time (g_c), s	2.0	8.7	0.0	3.5	43.8			0.2	5.7		47.3	16.6
Green Ratio (g/C)	0.44	0.42	0.41	0.45	0.43			0.42	0.42		0.42	0.42
Capacity (c), veh/h	113	2310		396	1587			664	660		639	660
Volume-to-Capacity Ratio (X)	0.365	0.266	0.000	0.180	0.834			0.008	0.147		0.776	0.382
Back of Queue (Q), ft/ln (95 th percentile)	41.9	168.1	0	67.8	641.8			5.2	105.2		629.2	280.4
Back of Queue (Q), veh/ln (95 th percentile)	1.6	6.6	0.0	2.6	25.1			0.2	4.1		24.6	11.0
Queue Storage Ratio (RQ) (95 th percentile)	0.13	0.00	0.00	0.21	0.00			0.00	0.70		0.00	0.93
Uniform Delay (d_1), s/veh	32.5	21.5		23.9	27.9			25.3	26.9		39.0	30.1
Incremental Delay (d_2), s/veh	1.9	0.3	0.0	0.2	5.3			0.0	0.5		9.0	1.7
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0			0.0	0.0		0.0	0.0
Control Delay (d), s/veh	34.5	21.8		24.1	33.1	0.0		25.3	27.4		47.9	31.7
Level of Service (LOS)	C	C		C	C	A		C	C		D	C
Approach Delay, s/veh / LOS	22.6	C		22.3	C			27.3	C		42.5	D
Intersection Delay, s/veh / LOS	26.7						C					

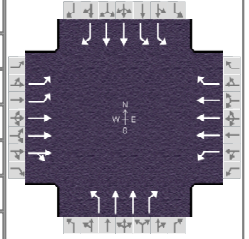
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.04	B	2.03	B	3.37	C	3.22	C
Bicycle LOS Score / LOS	0.85	A	1.61	B	0.66	A	1.72	B

HCS7 Signalized Intersection Results Summary

General Information

Agency	TTG, Inc.		
Analyst	QT	Analysis Date	Nov 4, 2019
Jurisdiction	Montgomery, MD	Time Period	Total AM
Urban Street	MD 28	Analysis Year	2019
Intersection	4. MD 28 & MD 119	File Name	4TA.xus
Project Description	PSTA		

Intersection Information



Demand Information

Approach Movement	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	235	1335	140	58	529	166	42	470	83	831	1172	432

Signal Information

Cycle, s	150.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	6.6	0.5	49.2	4.8	30.5	26.9		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	4.5	4.0	0.0	5.0		
				Red	2.0	2.0	2.0	2.0	0.0	2.0		

Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	19.1	62.2	12.6	55.7	10.8	33.9	41.4	64.4
Change Period, ($Y+R_c$), s	6.0	6.5	6.0	6.5	6.0	7.0	0.0	7.0
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0	4.0	3.9	4.0	3.9
Queue Clearance Time (g_s), s	12.5		7.1		5.7	21.4	38.6	49.0
Green Extension Time (g_e), s	0.6	0.0	0.1	0.0	0.1	5.5	2.7	6.8
Phase Call Probability	1.00		0.92		0.84	1.00	1.00	1.00
Max Out Probability	0.05		0.01		0.00	0.74	0.24	0.61

Movement Group Results

Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	245	1042	495	60	551	173	44	490	86	866	1221	325
Adjusted Saturation Flow Rate (s), veh/h/ln	1716	1856	1762	1767	1685		1767	1766	1572	1716	1766	1572
Queue Service Time (g_s), s	10.5	34.0	34.9	5.1	10.8		3.7	19.4	7.2	36.6	47.0	24.1
Cycle Queue Clearance Time (g_c), s	10.5	34.0	34.9	5.1	10.8		3.7	19.4	7.2	36.6	47.0	24.1
Green Ratio (g/C)	0.09	0.37	0.37	0.04	0.33		0.03	0.18	0.18	0.28	0.38	0.38
Capacity (c), veh/h	300	1378	654	77	1657		57	633	282	946	1353	602
Volume-to-Capacity Ratio (X)	0.817	0.756	0.756	0.781	0.333		0.772	0.773	0.307	0.915	0.902	0.540
Back of Queue (Q), ft/ln (95 th percentile)	209.6	521.5	545.3	120.5	195.2		89.7	338	130.4	598.2	666.2	360.2
Back of Queue (Q), veh/ln (95 th percentile)	8.2	20.4	21.3	4.7	7.6		3.5	13.2	5.1	23.4	26.0	14.1
Queue Storage Ratio (RQ) (95 th percentile)	0.84	0.00	0.00	0.40	0.00		0.36	0.00	0.52	1.33	0.00	0.90
Uniform Delay (d_1), s/veh	67.3	32.4	35.0	71.0	31.4		72.0	54.2	53.5	52.6	34.2	36.0
Incremental Delay (d_2), s/veh	5.4	3.5	7.1	15.4	0.5		19.5	4.9	0.6	10.7	8.1	0.8
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	72.7	35.9	42.1	86.4	32.0	0.0	91.5	59.1	54.1	63.3	42.3	36.8
Level of Service (LOS)	E	D	D	F	C	A	F	E	D	E	D	D
Approach Delay, s/veh / LOS	42.7	D		29.1	C		60.7	E		49.1	D	
Intersection Delay, s/veh / LOS	45.5						D					

Multimodal Results

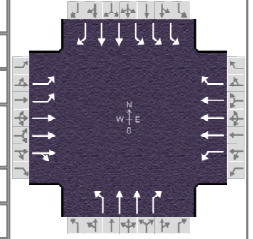
	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	3.04	C		3.45	C		3.33	C		3.27	C	
Bicycle LOS Score / LOS	1.47	A		0.92	A		1.00	A		2.48	B	

HCS7 Signalized Intersection Results Summary

General Information

Agency	TTG, Inc.		
Analyst	QT	Analysis Date	Nov 4, 2019
Jurisdiction	Montgomery, MD	Time Period	Total AM w. Improvement
Urban Street	MD 28	Analysis Year	2019
Intersection	4. MD 28 & MD 119	File Name	4TA-Imp.xus
Project Description	PSTA		

































Intersection Information



Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	235	1335	140	58	529	166	42	470	83	831	1172	432

Signal Information

Cycle, s	150.0	Reference Phase	2															
Offset, s	0	Reference Point	End	Green	6.6	0.7	56.0	4.8	19.2	37.2								
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.0	0.0	4.5	4.0	0.0	5.0								
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0	2.0	2.0	0.0	2.0								

Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	13.3	63.2	12.6	62.5	10.8	44.2	30.0	63.4
Change Period, (Y+R _c), s	0.0	6.5	6.0	6.5	6.0	7.0	0.0	7.0
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0	4.0	3.9	4.0	3.9
Queue Clearance Time (g _s), s	12.5		7.1		5.7	19.1	26.2	49.9
Green Extension Time (g _e), s	0.8	0.0	0.1	0.0	0.1	10.2	3.8	6.4
Phase Call Probability	1.00		0.92		0.84	1.00	1.00	1.00
Max Out Probability	0.00		0.00		0.00	0.29	0.01	0.65

Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	245	1042	495	60	551	173	44	490	86	866	1221	325
Adjusted Saturation Flow Rate (s), veh/h/ln	1716	1856	1762	1767	1685		1767	1766	1572	1716	1766	1572
Queue Service Time (g _s), s	10.5	33.4	34.4	5.1	9.6		3.7	17.1	6.6	24.2	47.9	24.4
Cycle Queue Clearance Time (g _c), s	10.5	33.4	34.4	5.1	9.6		3.7	17.1	6.6	24.2	47.9	24.4
Green Ratio (g/C)	0.09	0.38	0.38	0.04	0.37		0.03	0.25	0.25	0.20	0.38	0.38
Capacity (c), veh/h	304	1404	666	77	1887		57	875	390	1031	1328	591
Volume-to-Capacity Ratio (X)	0.804	0.742	0.742	0.780	0.292		0.772	0.559	0.222	0.840	0.919	0.550
Back of Queue (Q), ft/ln (95 th percentile)	207.8	509.5	534	120.4	172.3		89.7	288.2	117.5	403.8	687	364.4
Back of Queue (Q), veh/ln (95 th percentile)	8.1	19.9	20.9	4.7	6.7		3.5	11.3	4.6	15.8	26.8	14.2
Queue Storage Ratio (RQ) (95 th percentile)	0.83	0.00	0.00	0.40	0.00		0.36	0.00	0.47	0.90	0.00	0.91
Uniform Delay (d ₁), s/veh	67.1	31.4	34.0	71.0	26.0		72.0	43.5	44.9	57.7	35.3	36.8
Incremental Delay (d ₂), s/veh	4.4	3.2	6.6	15.3	0.4		19.5	0.6	0.3	2.3	9.6	0.9
Initial Queue Delay (d ₃), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	71.5	34.6	40.6	86.3	26.4	0.0	91.5	44.1	45.2	59.9	44.9	37.7
Level of Service (LOS)	E	C	D	F	C	A	F	D	D	E	D	D
Approach Delay, s/veh / LOS	41.3		D	25.2		C	47.6		D	49.3		D
Intersection Delay, s/veh / LOS	43.2						D					

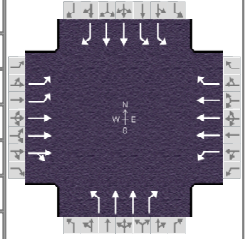
Multimodal Results

	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	3.04		C	3.53		D	3.33		C	3.27		C
Bicycle LOS Score / LOS	1.47		A	0.92		A	1.00		A	2.48		B

HCS7 Signalized Intersection Results Summary

General Information

Agency	TTG, Inc.		
Analyst	QT	Analysis Date	Nov 4, 2019
Jurisdiction	Montgomery, MD	Time Period	Total PM
Urban Street	MD 28	Analysis Year	2019
Intersection	4. MD 28 & MD 119	File Name	4TP.xus
Project Description	PSTA		



Demand Information

Approach Movement	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	473	612	52	87	1661	1057	135	1036	60	206	493	208

Signal Information

Cycle, s	150.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	9.6	0.5	55.5	11.9	2.1	39.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	4.5	0.0	4.0	5.0		
				Red	2.0	2.0	2.0	0.0	2.0	2.0		

Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	22.0	68.4	15.6	62.0	20.0	54.1	11.9	46.0
Change Period, ($Y+R_c$), s	6.0	6.5	6.0	6.5	6.0	7.0	0.0	7.0
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0	4.0	3.9	4.0	3.9
Queue Clearance Time (g_s), s	18.1		9.7		13.9	47.8	11.3	20.0
Green Extension Time (g_e), s	0.0	0.0	0.1	0.0	0.1	0.0	0.6	8.2
Phase Call Probability	1.00		0.98		1.00	1.00	1.00	1.00
Max Out Probability	1.00		0.10		0.89	1.00	0.00	0.26

Movement Group Results

Approach Movement	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	498	471	228	92	1748	1113	142	1091	63	217	519	219
Adjusted Saturation Flow Rate (s), veh/h/ln	1716	1856	1779	1767	1685		1767	1766	1572	1716	1766	1572
Queue Service Time (g_s), s	16.1	10.3	11.1	7.7	48.8		11.9	45.8	4.3	9.3	17.9	18.0
Cycle Queue Clearance Time (g_c), s	16.1	10.3	11.1	7.7	48.8		11.9	45.8	4.3	9.3	17.9	18.0
Green Ratio (g/C)	0.11	0.41	0.41	0.06	0.37		0.09	0.31	0.31	0.08	0.26	0.26
Capacity (c), veh/h	368	1533	735	113	1868		165	1109	493	273	919	409
Volume-to-Capacity Ratio (X)	1.354	0.307	0.311	0.813	0.936		0.862	0.984	0.128	0.795	0.565	0.535
Back of Queue (Q), ft/ln (95 th percentile)	642.6	197.4	208.9	141.7	594.3		238.4	681.1	75.7	193.4	298.5	291.4
Back of Queue (Q), veh/ln (95 th percentile)	25.1	7.7	8.2	5.5	23.2		9.3	26.6	3.0	7.6	11.7	11.4
Queue Storage Ratio (RQ) (95 th percentile)	2.57	0.00	0.00	0.47	0.00		0.95	0.00	0.30	0.43	0.00	0.73
Uniform Delay (d_1), s/veh	67.0	22.1	23.9	69.3	36.4		67.1	43.2	36.8	67.8	42.1	47.7
Incremental Delay (d_2), s/veh	176.1	0.5	1.1	5.4	4.6		17.1	18.1	0.1	5.2	0.8	1.4
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	243.1	22.6	25.0	74.7	41.0	0.0	84.1	61.4	36.9	73.1	42.9	49.1
Level of Service (LOS)	F	C	C	E	D	A	F	E	D	E	D	D
Approach Delay, s/veh / LOS	114.8		F	26.6		C	62.7		E	51.2		D
Intersection Delay, s/veh / LOS	54.1						D					

Multimodal Results

	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	3.01		C	3.31		C	3.46		C	3.36		C
Bicycle LOS Score / LOS	1.15		A	2.11		B	1.56		B	1.28		A

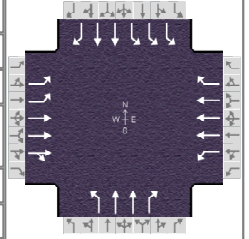
HCS7 Signalized Intersection Results Summary

General Information

Agency	TTG, Inc.		
Analyst	QT	Analysis Date	Nov 4, 2019
Jurisdiction	Montgomery, MD	Time Period	Total PM w. Improvement
Urban Street	MD 28	Analysis Year	2019
Intersection	4. MD 28 & MD 119	File Name	4TP-Imp.xus
Project Description	PSTA		

Intersection Information







































Duration, h	0.250
Area Type	Other
PHF	0.95
Analysis Period	1> 7:00



Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	473	612	52	87	1661	1057	135	1036	60	206	493	208

Signal Information

Cycle, s	150.0	Reference Phase	2															
Offset, s	0	Reference Point	End	Green	9.6	8.2	53.7	8.8	5.2	39.0								
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.0	0.0	4.5	4.0	0.0	5.0								
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0	2.0	2.0	0.0	2.0								

Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	23.8	68.4	15.6	60.2	20.0	51.2	14.8	46.0
Change Period, (Y+R _c), s	0.0	6.5	6.0	6.5	6.0	7.0	6.0	7.0
Max Allow Headway (MAH), s	4.1	0.0	4.1	0.0	4.0	3.9	4.0	3.9
Queue Clearance Time (g _s), s	23.4		9.7		13.9	46.2	8.2	20.0
Green Extension Time (g _e), s	0.4	0.0	0.1	0.0	0.1	0.0	0.6	8.2
Phase Call Probability	1.00		0.98		1.00	1.00	1.00	1.00
Max Out Probability	1.00		0.00		0.89	1.00	0.01	0.26

Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	498	471	228	92	1748	1113	142	1091	63	217	519	219
Adjusted Saturation Flow Rate (s), veh/h/ln	1716	1856	1779	1767	1685		1767	1766	1572	1716	1766	1572
Queue Service Time (g _s), s	21.4	10.3	11.1	7.7	50.3		11.9	44.2	4.4	6.2	17.9	18.0
Cycle Queue Clearance Time (g _c), s	21.4	10.3	11.1	7.7	50.3		11.9	44.2	4.4	6.2	17.9	18.0
Green Ratio (g/C)	0.16	0.41	0.41	0.06	0.36		0.09	0.29	0.29	0.06	0.26	0.26
Capacity (c), veh/h	545	1532	734	113	1810		165	1042	464	301	919	409
Volume-to-Capacity Ratio (X)	0.914	0.307	0.311	0.810	0.966		0.862	1.047	0.136	0.721	0.565	0.535
Back of Queue (Q), ft/ln (95 th percentile)	408.6	197.4	209	141.6	626.2		238.4	763.3	78	127.5	298.5	291.4
Back of Queue (Q), veh/ln (95 th percentile)	16.0	7.7	8.2	5.5	24.5		9.3	29.8	3.0	5.0	11.7	11.4
Queue Storage Ratio (RQ) (95 th percentile)	1.63	0.00	0.00	0.47	0.00		0.95	0.00	0.31	0.28	0.00	0.73
Uniform Delay (d ₁), s/veh	62.1	22.1	23.9	69.3	38.3		67.1	45.5	38.9	69.4	42.1	47.7
Incremental Delay (d ₂), s/veh	18.7	0.5	1.1	5.2	7.3		17.1	36.0	0.1	3.3	0.8	1.4
Initial Queue Delay (d ₃), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	80.8	22.6	25.0	74.6	45.6	0.0	84.1	81.5	38.9	72.7	42.9	49.1
Level of Service (LOS)	F	C	C	E	D	A	F	F	D	E	D	D
Approach Delay, s/veh / LOS	47.3		D	29.3		C	79.7		E	51.1		D
Intersection Delay, s/veh / LOS	46.1						D					

Multimodal Results

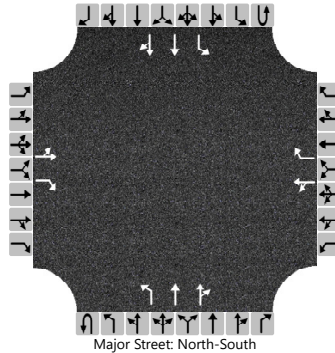
	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	3.01		C	3.38		C	3.46		C	3.36		C
Bicycle LOS Score / LOS	1.15		A	2.11		B	1.56		B	1.28		A

HCS7 Two-Way Stop-Control Report

General Information

Analyst	sli	Intersection	5. MD 119 & Blackwell Rd
Agency/Co.	TTG, Inc.	Jurisdiction	Montgomery, MD
Date Performed	11/1/2019	East/West Street	MD 119
Analysis Year	2019	North/South Street	Blackwell Rd / Site Acc
Time Analyzed	Total AM	Peak Hour Factor	0.96
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	PSTA		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	1		0	1	1	0	1	2	0	0	1	2	0
Configuration		LT		R		LT		R		L	T	TR		L	T	TR
Volume (veh/h)		91	0	39		17	0	42	0	12	477	61	0	267	1053	29
Percent Heavy Vehicles (%)		3	3	3		3	3	3	3	3			3	3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				No											
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.5	6.5	6.9		7.5	6.5	6.9		4.1				4.1		
Critical Headway (sec)		7.56	6.56	6.96		7.56	6.56	6.96		4.16				4.16		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

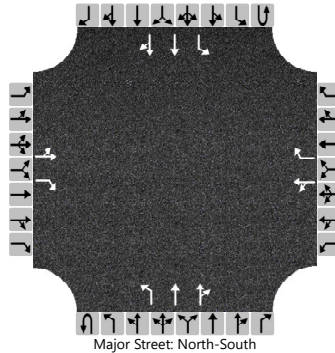
Flow Rate, v (veh/h)		95		41		18		44		13				278		
Capacity, c (veh/h)		28		467		45		714		610				1000		
v/c Ratio		3.38		0.09		0.40		0.06		0.02				0.28		
95% Queue Length, Q ₉₅ (veh)		11.4		0.3		1.4		0.2		0.1				1.1		
Control Delay (s/veh)		1361.2		13.4		130.5		10.4		11.0				10.0		
Level of Service (LOS)		F		B		F		B		B				A		
Approach Delay (s/veh)	956.9				45.0				0.2				2.0			
Approach LOS	F				E											

HCS7 Two-Way Stop-Control Report

General Information

Analyst	sli	Intersection	5. MD 119 & Blackwell Rd
Agency/Co.	TTG, Inc.	Jurisdiction	Montgomery, MD
Date Performed	11/1/2019	East/West Street	MD 119
Analysis Year	2019	North/South Street	Blackwell Rd
Time Analyzed	Total PM	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	PSTA		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	1		0	1	1	0	1	2	0	0	1	2	0
Configuration		LT		R		LT		R		L	T	TR		L	T	TR
Volume (veh/h)		62	0	30		62	0	221	0	44	999	13	0	36	468	96
Percent Heavy Vehicles (%)		3	3	3		3	3	3	3	3			3	3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				No											
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.5	6.5	6.9		7.5	6.5	6.9		4.1				4.1		
Critical Headway (sec)		7.56	6.56	6.96		7.56	6.56	6.96		4.16				4.16		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

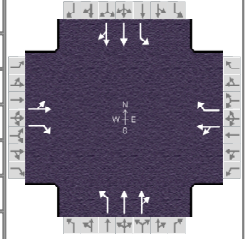
Flow Rate, v (veh/h)		65		32		65		233		46				38		
Capacity, c (veh/h)		63		696		77		489		972				644		
v/c Ratio		1.03		0.05		0.85		0.48		0.05				0.06		
95% Queue Length, Q ₉₅ (veh)		5.1		0.1		4.3		2.5		0.1				0.2		
Control Delay (s/veh)		232.2		10.4		156.1		18.9		8.9				10.9		
Level of Service (LOS)		F		B		F		C		A				B		
Approach Delay (s/veh)	159.8				48.9				0.4				0.7			
Approach LOS	F				E											

HCS7 Signalized Intersection Results Summary

General Information

Agency	TTG, Inc.		
Analyst	QT	Analysis Date	Nov 4, 2019
Jurisdiction	Montgomery, MD	Time Period	Total AM w. Imp.
Urban Street	MD 28	Analysis Year	2019
Intersection	5. MD 119 & Blackwell...	File Name	5TA-Imp.xus
Project Description	PSTA		

Intersection Information



Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	91	0	39	17	0	42	12	477	61	267	1053	29

Signal Information

Cycle, s	120.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	58.6	3.4	7.1	34.9	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	4.0	0.0	0.0		
				Red	2.0	1.0	0.0	1.0	0.0	0.0		

Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6	3	8	7	4
Case Number		7.0		7.0	1.1	4.0	1.1	4.0
Phase Duration, s		64.6		64.6	8.4	39.9	15.6	47.0
Change Period, ($Y+R_c$), s		6.0		6.0	5.0	5.0	0.0	5.0
Max Allow Headway (MAH), s		0.0		0.0	4.0	3.9	4.0	3.9
Queue Clearance Time (g_s), s					2.6	16.6	14.6	35.0
Green Extension Time (g_e), s		0.0		0.0	0.0	7.3	0.9	7.0
Phase Call Probability					0.34	1.00	1.00	1.00
Max Out Probability					0.00	0.02	0.00	0.07

Movement Group Results

Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h		95	41		18	44	13	285	276	278	566	561
Adjusted Saturation Flow Rate (s), veh/h/ln		1406	1572		1406		1767	1856	1782	1767	1856	1838
Queue Service Time (g_s), s		3.7	1.6		0.0		0.6	14.2	14.6	12.6	32.9	33.0
Cycle Queue Clearance Time (g_c), s		4.4	1.6		0.8		0.6	14.2	14.6	12.6	32.9	33.0
Green Ratio (g/C)		0.49	0.49		0.49		0.32	0.29	0.29	0.44	0.35	0.35
Capacity (c), veh/h		746	767		746		139	540	518	431	650	644
Volume-to-Capacity Ratio (X)		0.127	0.053		0.024		0.090	0.528	0.532	0.645	0.871	0.871
Back of Queue (Q), ft/ln (95 th percentile)		67.3	27.5		11.9		11.4	241.7	243.6	186.2	412.2	413.3
Back of Queue (Q), veh/ln (95 th percentile)		2.6	1.1		0.5		0.4	9.4	9.5	7.3	16.1	16.1
Queue Storage Ratio (RQ) (95 th percentile)		0.00	0.00		0.00		0.00	0.00	0.00	0.85	0.00	0.00
Uniform Delay (d_1), s/veh		16.9	16.1		15.9		31.3	30.4	31.6	24.3	29.5	29.9
Incremental Delay (d_2), s/veh		0.3	0.1		0.1		0.2	0.7	0.8	0.6	2.2	2.2
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh		17.2	16.3		16.0	0.0	31.6	31.1	32.4	24.9	31.7	32.1
Level of Service (LOS)		B	B		B	A	C	C	C	C	C	C
Approach Delay, s/veh / LOS	16.9	B		4.6	A		31.7	C		30.5	C	
Intersection Delay, s/veh / LOS	29.3						C					

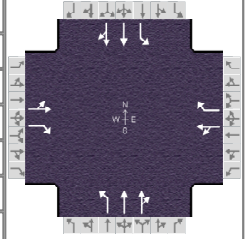
Multimodal Results

	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.88	C		2.90	C		2.16	B		2.05	B	
Bicycle LOS Score / LOS	0.71	A		0.59	A		0.96	A		1.65	B	

HCS7 Signalized Intersection Results Summary

General Information

Agency	TTG, Inc.			Intersection Information	
Analyst	QT	Analysis Date	Nov 4, 2019	Duration, h	0.250
Jurisdiction	Montgomery, MD	Time Period	Total PM w. Imp.	Area Type	Other
Urban Street	MD 28	Analysis Year	2019	PHF	0.95
Intersection	5. MD 119 & Blackwell...	File Name	5TP-Imp.xus	Analysis Period	1> 7:00
Project Description	PSTA				



Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	62	0	30	62	0	221	44	999	13	36	468	96

Signal Information

Cycle, s	120.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	No	Simult. Gap E/W	On	Green	61.8	7.2	0.7	34.4	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	0.0	4.0	4.0	0.0	0.0		
				Red	2.0	0.0	1.0	1.0	0.0	0.0		

Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6	3	8	7	4
Case Number		7.0		7.0	1.1	4.0	1.1	4.0
Phase Duration, s		67.8		67.8	12.9	45.1	7.2	39.4
Change Period, ($Y+R_c$), s		6.0		6.0	5.0	5.0	0.0	5.0
Max Allow Headway (MAH), s		0.0		0.0	4.0	3.9	4.0	3.9
Queue Clearance Time (g_s), s					4.0	33.1	3.7	18.2
Green Extension Time (g_e), s		0.0		0.0	0.1	6.9	0.1	7.1
Phase Call Probability					0.79	1.00	0.72	1.00
Max Out Probability					0.00	0.05	0.00	0.02

Movement Group Results

Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h		65	32		65	233	46	534	531	38	305	289
Adjusted Saturation Flow Rate (s), veh/h/ln		1406	1572		1406		1767	1856	1847	1767	1856	1746
Queue Service Time (g_s), s		0.0	1.2		0.0		2.0	31.1	31.1	1.7	15.6	16.2
Cycle Queue Clearance Time (g_c), s		2.8	1.2		2.8		2.0	31.1	31.1	1.7	15.6	16.2
Green Ratio (g/C)		0.51	0.51		0.51		0.37	0.33	0.33	0.35	0.29	0.29
Capacity (c), veh/h		784	809		784		299	619	616	196	531	500
Volume-to-Capacity Ratio (X)		0.083	0.039		0.083		0.155	0.862	0.862	0.193	0.573	0.578
Back of Queue (Q), ft/ln (95 th percentile)		42.4	19.9		42.6		38.4	429.9	430.1	33.1	254.3	256.7
Back of Queue (Q), veh/ln (95 th percentile)		1.7	0.8		1.7		1.5	16.8	16.8	1.3	9.9	10.0
Queue Storage Ratio (RQ) (95 th percentile)		0.00	0.00		0.00		0.00	0.00	0.00	0.15	0.00	0.00
Uniform Delay (d_1), s/veh		14.8	14.4		14.8		26.0	30.8	31.0	29.6	31.3	33.2
Incremental Delay (d_2), s/veh		0.2	0.1		0.2		0.2	2.9	2.9	0.4	0.8	0.8
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh		15.0	14.5		15.0	0.0	26.2	33.7	33.9	30.0	32.1	34.0
Level of Service (LOS)		B	B		B	A	C	C	C	C	C	C
Approach Delay, s/veh / LOS	14.8	B		3.3	A		33.5	C		32.8	C	
Intersection Delay, s/veh / LOS	28.2						C					

Multimodal Results

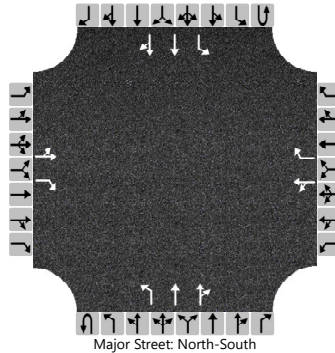
	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.87	C		2.89	C		2.13	B		2.08	B	
Bicycle LOS Score / LOS	0.65	A		0.98	A		1.40	A		1.01	A	

HCS7 Two-Way Stop-Control Report

General Information

Analyst	QT	Intersection	6. MD 119 & Medical Ctr
Agency/Co.	TTG, Inc.	Jurisdiction	Montgomery, MD
Date Performed	11/1/2019	East/West Street	MD 119
Analysis Year	2019	North/South Street	Medical Center Dr
Time Analyzed	Total AM	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	PSTA		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	1		0	1	1	0	1	2	0	0	1	2	0
Configuration		LT		R		LT		R		L	T	TR		L	T	TR
Volume (veh/h)		7	0	41		30	0	62	0	20	489	101	0	317	797	14
Percent Heavy Vehicles (%)		3	3	3		3	3	3	3	3			3	3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				No											
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.5	6.5	6.9		7.5	6.5	6.9		4.1				4.1		
Critical Headway (sec)		7.56	6.56	6.96		7.56	6.56	6.96		4.16				4.16		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

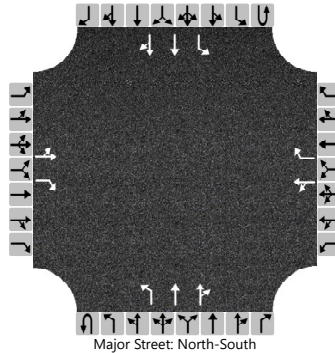
Flow Rate, v (veh/h)		7		43		32		65		21				334		
Capacity, c (veh/h)		31		573		39		682		775				949		
v/c Ratio		0.24		0.08		0.81		0.10		0.03				0.35		
95% Queue Length, Q ₉₅ (veh)		0.7		0.2		3.0		0.3		0.1				1.6		
Control Delay (s/veh)		152.8		11.8		241.7		10.8		9.8				10.8		
Level of Service (LOS)		F		B		F		B		A				B		
Approach Delay (s/veh)	32.4				86.1				0.3				3.0			
Approach LOS	D				F											

HCS7 Two-Way Stop-Control Report

General Information

Analyst	sli	Intersection	6. MD 119 & Medical Ctr
Agency/Co.	TTG, Inc.	Jurisdiction	Montgomery, MD
Date Performed	11/1/2019	East/West Street	MD 119
Analysis Year	2019	North/South Street	Medical Center Dr
Time Analyzed	Total PM	Peak Hour Factor	0.96
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	PSTA		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	1		0	1	1	0	1	2	0	0	1	2	0
Configuration		LT		R		LT		R		L	T	TR		L	T	TR
Volume (veh/h)		10	1	31		94	0	303	0	39	767	36	0	50	515	6
Percent Heavy Vehicles (%)		3	3	3		3	3	3	3	3			3	3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				No											
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.5	6.5	6.9		7.5	6.5	6.9		4.1				4.1		
Critical Headway (sec)		7.56	6.56	6.96		7.56	6.56	6.96		4.16				4.16		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		11		32		98		316		41				52		
Capacity, c (veh/h)		69		723		108		581		1015				787		
v/c Ratio		0.17		0.04		0.91		0.54		0.04				0.07		
95% Queue Length, Q ₉₅ (veh)		0.6		0.1		5.5		3.3		0.1				0.2		
Control Delay (s/veh)		67.6		10.2		136.6		18.3		8.7				9.9		
Level of Service (LOS)		F		B		F		C		A				A		
Approach Delay (s/veh)	25.2				46.3				0.4				0.9			
Approach LOS	D				E											

From: [Sears, Barbara A.](#)
To: [MCP-Chair](#)
Cc: [Sanders, Carrie](#); [Folden, Matthew](#); [Graham, Tamika](#); [Mills, Matthew](#); [David Flanagan](#); [dmflanagan@elmstreetdev.com](#); [jclarke@elmstreetdev.com](#); [Kate Kubit](#); [wguckert@trafficgroup.com](#); [gcook@trafficgroup.com](#); [Gary Unterberg](#); [Randall Rentfro](#); [Sears, Barbara A.](#); [Tellerico, Laura M.](#)
Subject: PSTA Site: Preliminary Plan No. 120200100 – Item 7 on Planning Board Agenda of July 22, 2021 – Letter from Applicant for Inclusion into the Record
Date: Wednesday, July 21, 2021 1:28:41 PM
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)
[image004.png](#)
[image005.png](#)
[Utr to Plan, Rd., re Medical Center Dr.pdf](#)
[Exhibit A.pdf](#)
[Exhibit B.pdf](#)
[Exhibit C.pdf](#)

[EXTERNAL EMAIL] Exercise caution when opening attachments, clicking links, or responding.

Dear Chairman Anderson and Members of the Planning Board:

On behalf of the Applicant in the above-referenced Preliminary Plan, we wish to submit the attached letter regarding Medical Center Drive for your review and inclusion in the record of the Planning Board hearing. The Preliminary Plan is scheduled for hearing on July 22, 2021 as Item 7.

Thank you for your attention to this matter.

Barbara Sears

Barbara A. Sears

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July 21, 2021

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Mr. Casey Anderson, Chair
and Members of the Montgomery County Planning Board
2425 Reddie Drive, 14th Floor
Wheaton, MD 20902

Re: Preliminary Plan No. 120200100 ("Preliminary Plan") – Medical Center Drive

Dear Chair Anderson and Planning Board Commissioners:

On behalf of our client, The Elms at PSTA, LLC, Applicant for approval of the Preliminary Plan ("Applicant"), the purpose of this letter is to request that the Planning Board ("Planning Board") modify staff recommended Conditions 3 and 47(c) with regard to the construction of Medical Center Drive. Applicant requests that the modified cross-section reflect the dedication of a 150-foot right-of-way ("ROW") with the construction of two lanes (in lieu of four) and the pedestrian, bicycle, sidewalk and other streetscape improvements called for by the *2010 approved and adopted Great Seneca Sciences Corridor Master Plan* ("GSSC Master Plan"), and 2018 Bicycle Master Plan as shown below. The dedicated ROW and two-lane construction would permit the future construction of two additional travel lanes and the Corridor Cities Transitway ("CCT") by others if needed.

I. Background

For additional background of the Medical Center Drive ROW issue, please see pages 1–4 of our April 22, 2021 letter to Rebecca Torma of the Montgomery County Department of Transportation ("April Letter"), and the Traffic Analysis attached as an exhibit to the April Letter prepared by The Traffic Group and dated April 20, 2021 ("Traffic Analysis"). The April Letter and Traffic Analysis are attached as Exhibit "A". In brief, the Preliminary Plan comprises approximately 45 acres of land zoned CR-1.0 C-0.5, R-1.0, H-150 located at 9710 Great Seneca Highway and is known as the former Public Safety Training Academy Site ("Property"). The Applicant proposes to redevelop the Property with a total of 630 units (276 townhouses, 56 2-over-2 condominiums and 298 multi-family, 30% of all units will be Moderately Priced Dwelling Units) and 1,740

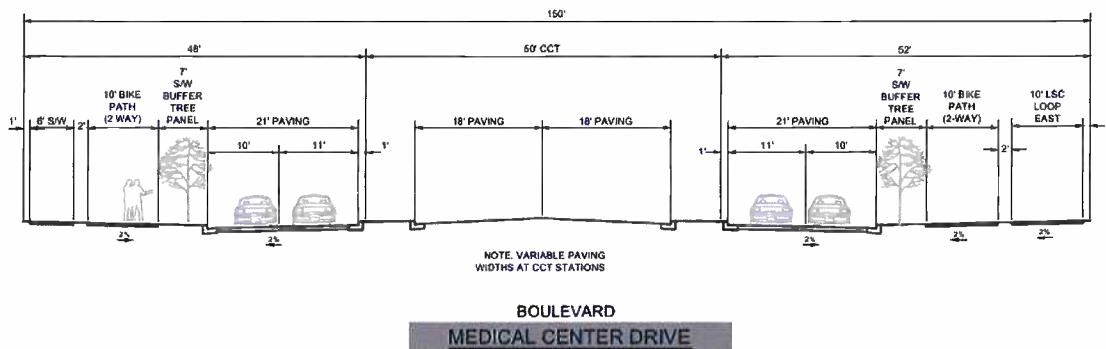
Mr. Casey Anderson, Chair, and
 Members of the Montgomery County Planning Board
 July 21, 2021
 Page 2

square feet of retail using the standard method of development and providing less than 0.5 FAR ("Project"). The GSSC Master Plan anticipated the possibility of redevelopment of the Property at potentially three times the density of 1.5 FAR with 1.0 residential and 0.5 commercial. (GSSC Master Plan, p. 40).

II. Medical Center Drive Cross-Sections

A. Master Plan Cross-Section

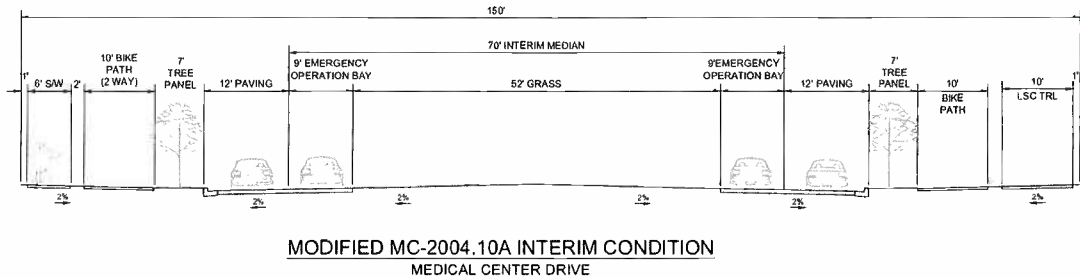
The GSSC Master Plan at page 84 designates Medical Center Drive from Key West Avenue to Key West Avenue as an arterial roadway with a 100-150-foot ROW (A-261d). The larger width ROW is applicable to areas where the CCT may be constructed in the future to allow for a 50-foot median. Rodgers Consulting, the Project engineers and land planners, provided the below illustration of the "Master Plan Cross-Section" based on Standard Cross-Section MC 2004.10A for a divided arterial road, the Bicycle Master Plan and the GSSC Master Plan inclusive of the area for the CCT and pedestrian/bicycle features such as the LSC Loop.



B) Proposed Interim Cross-Section

The Applicant proposes to construct a modified interim cross section (the "Interim Condition") as follows:

Mr. Casey Anderson, Chair, and
Members of the Montgomery County Planning Board
July 21, 2021
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This Interim Condition includes (i) dedication of 150 feet of ROW to accommodate the future CCT if constructed, (ii) construction of two travel lanes (one lane in each direction), and (iii) all pedestrian, bicycle and streetscape elements called for in the Master Plan Cross-Section. Accordingly, the Interim Condition allows for the construction of the CCT and two additional travel lanes, if needed in the future.

III. The Construction of Four Lanes of Medical Center Drive by the Applicant Lacks an Essential Nexus and Rough Proportionality to the Need Created by the Project

As demonstrated by the Traffic Analysis, the traffic generated by the proposed 630 dwelling units and 1,740 square feet of retail, including background traffic, does not support the construction of Medical Center Drive as a four-lane road. According to the Traffic Analysis, as updated by the attached Exhibit "B" also prepared by The Traffic Group, if Medical Center Drive is constructed as a four-lane road with the Project, only 21% of the four-lane capacity would be utilized by site-generated and background traffic. Further, traffic projected to have access to Medical Center Drive from the Project would utilize approximately 1.8% of the capacity based on average daily traffic, approximately 2.5% of the capacity in the morning peak hour, and approximately 2.4% in the evening peak hour. In sum, the Project does not generate sufficient traffic to justify construction of Medical Center Drive as a four-lane road.

Because the Project will not generate sufficient traffic to require the construction of four travel lanes for Medical Center Drive, requiring the Applicant to not only dedicate 7.3 acres or 16.3% of the total site area for only the Medical Center Drive ROW and construct extensive bicycle, pedestrian, and streetscape improvements, but also construct four lanes, is disproportionate to the burden the Project creates and hence bears no reasonable relationship to the need created by the Project. In support of this point, the

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Applicant is only utilizing 2.5% of the four-lane configuration but is being required to pay for 100% of the cost of the road.¹

Based on MCDOT's letter dated July 8, 2021 (pages 3–4) regarding the Preliminary Plan PSTA Site and the Staff Report (pages 38–39), MCDOT and Technical Staff contend that construction of Medical Center Drive as a four-lane road is required pursuant to Section 49-33(f) of the County Code: "The construction of half roads or any road of less than the width provided in this Article is prohibited." MCDOT and Technical Staff further state as justification for their four-lane requirement that Applicant "owns both sides of the Road" and "If the Applicant does not construct both sides of the road, no other property owner will construct the road." These claims are unpersuasive and contrary to applicable law. Initially, it is irrelevant whether the Applicant owns both sides of the road (please note that the Applicant does not own both sides of the entire length of Medical Center Drive) or that the MCDOT and Technical Staff believe no one else will build the additional two lanes. This too is an incorrect assumption because (i) adjacent properties can add lanes when they redevelop; and (ii) since this is a Master Plan Road, these additional two lanes are eligible for funding from impact fees generated by future development projects in the area. Furthermore, Section 49-40(b)(5) allows for waivers of any requirement of Article 3 of the County Code (entitled, "Road Construction and Design Code") which includes Section 49-33(f), to construct "both roadways of a dual road." Moreover, Section 49-33(f) must be read consistent with and cannot defeat applicable constitutional considerations as provided in the Maryland and Federal Constitution and case law interpreting same.

To pass legal scrutiny, an exaction, such as the requirement to construct a public road, must: (1) have an essential nexus with a legitimate public purpose; and (2) be "roughly proportional" to the impact on public services created by a development project. *Koontz v. St. Johns River Water Mgmt. Dist.*, 570 U.S. 595 (2013); *Dolan v. City of Tigard*, 512 U.S. 374, 385, 391 (1994). Even if one accepts the premise that construction of Medical Center Drive as a four-lane road serves a legitimate public purpose, requiring the Applicant to construct the Master Plan Cross-Section which represents 100% of the

¹ Please note that, because the County requires that 30% of all units in the Project must be MPDUs, the Project is exempt from the payment of impact taxes. This exemption is intended to help offset the cost of the large number of MPDUs being constructed. Normally, the construction of a roadway like Medical Center Drive that creates additional capacity for the larger network would be eligible for impact tax credits to offset the cost of the road. This credit allowance demonstrates the legislative acknowledgment the developer should not bear the cost for the creation of a general public benefit and should, therefore, be reimbursed for incurring such a cost. No such reimbursement is available to the Applicant.

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total cost of the road but utilizes only 2.5% of the capacity lacks proportionality to the Project's impact on the road.

Specifically, as noted above, courts have held that requirements such as the requirement to construct public road improvements such as Medical Center Drive must have "an essential nexus and rough proportionality to the effects of the proposed new use of the specific property at issue." *Koontz*, 570 U.S. at 613. The Project, even when including projected future background traffic, does not generate sufficient traffic to require the construction of four travel lanes for Medical Center Drive. In view of these findings, to require the construction of four lanes would fall squarely within the Supreme Court's stated concern in *Koontz v. St. Johns River Water Mgmt. Dist.* regarding the **"... risk that the government may use its substantial power and discretion in land-use permitting to pursue governmental ends that lack an essential nexus and rough proportionality to the effects of the proposed new use of the specific property at issue, thereby diminishing without justification the value of the property"**. *Id.* (emphasis added). It is plain from the very limited impact the Project has on Medical Center Drive as a four-lane road and MCDOT's assertions regarding their concern regarding who else the government can get to build the four lanes that the requirement to construct all four lanes is a misuse of the County's "substantial power and discretion in land use permitting to pursue governmental ends which fail the tests of an essential nexus and rough proportionality." Therefore, despite MCDOT's and Technical Staff's assertions regarding Section 49-33(f), the requirement to construct all four lanes may not be lawfully imposed by the Board.

Although the contentions of MCDOT and Technical Staff fail Constitutional scrutiny as discussed above, we note that Medical Center Drive does not constitute a "half road" or a "road of less than the width provided" as contended by MCDOT. The Interim Condition includes two travel lanes (one in each direction), and all pedestrian, bicycle, sidewalk and other streetscape improvements called for by the GSSC Master Plan and Bicycle Master Plan. Furthermore, the Applicant proposes to dedicate the full 150 feet of ROW as recommended for Medical Center Drive in the GSSC Master Plan.

Finally, based on the Traffic Analysis, the need for four lanes on Medical Center Drive will most likely never occur. The density proposed for the Property is significantly less than what is anticipated for the Property in the GSSC Master Plan. The Traffic Group's study indicates that the traffic generated by the Project, as well as all projected background traffic, will not necessitate the construction of Medical Center Drive as a four-lane road. The Traffic Group also confirms that non-site-related traffic will utilize existing more convenient routes along Great Seneca Highway, Key West Avenue, and Darnestown Road (see Exhibit "C" attached). As such, even if the additional two lanes

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Members of the Montgomery County Planning Board
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are not constructed by the County or others, no traffic congestion issue on Medical Center Drive will arise.

IV. Planning Board Authority

The Planning Board need not accept MCDOT's determination that Medical Center Drive must be constructed as a four-lane road. Not only does the constitutional lens through which Section 49-33(f) must be viewed defeat the four-lane requirement, but the Subdivision Regulations (Chapter 50 of the County Code) require the Planning Board make findings regarding the design of roads proposed under a Preliminary Plan. Pursuant to Section 50.4.2.D of the Subdivision Regulations (Chapter 50 of the County Code), the Planning Board must find that "the location and design of roads is appropriate for the subdivision" (Section 50.4.2.D.1) and that "the preliminary plan substantially conforms to the master plan." (Section 50.4.2.D.2) Pursuant to these provisions, with respect to Medical Center Drive, the Planning Board must make an independent determination that: (1) the design of Medical Center Drive is appropriate for the Project; and (2) the design of Medical Center Drive is in substantial conformance with the Master Plan for the Project for the reasons discussed above.

Further, the Planning Board cannot abdicate this authority to MCDOT. Recently the Court of Special Appeals, in an unreported opinion involving a matter before the Board, explained that it is an error for the Planning Board to state that it cannot "second guess" these agencies with respect to findings the Planning Board itself is required to make. *Concerned Citizens of Cloverly v. Montgomery County Planning Board, et. al.*, 2019 WL 1220935. Therefore, although the case is unreported and cannot be used in court as precedent, it provides guidance to the Planning Board regarding the Planning Board's role to determining whether the Applicant's proposal to construct the Interim Condition is appropriate.

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V. Conclusion

In conclusion, the Applicant respectfully requests that the Planning Board allow the Applicant to construct the Interim Condition and modify proposed Staff Conditions 3 and 47(c) to reflect this modification. We look forward to discussing our request with the Planning Board at the July 22, 2021 hearing and answering any questions you may have.

Very truly yours,



Barbara A. Sears



Laura M. Tallerico

Enclosures

cc: Carrie Sanders
Matt Folden
Tamika Graham
Matt Mills, Esq.
David Flanagan
Douglas Flanagan
John Clarke
Kate Kubit
Wes Guckert
Glenn Cook
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April 22, 2021

Ms. Rebecca Torma
Montgomery County Department of Transportation
101 Monroe Street, 10th Floor
Rockville, Maryland 20850

Re: Preliminary Plan No. 120200100 ("Preliminary Plan") – Medical Center Drive –
Justification for Construction of Two Travel Lanes as Interim Condition

Dear Ms. Torma:

On behalf of our client, The Elms at PSTA, LLC, Applicant for approval of the Preliminary Plan ("Applicant"), the purpose of this letter is to provide justification for the construction by Applicant of Medical Center Drive with two rather than four travel lanes in a dedicated 150-foot right-of-way ("ROW"). Construction would also include related pedestrian, bicycle, sidewalk and other streetscape improvements called for by the *2010 approved and adopted Great Seneca Sciences Corridor Master Plan* ("GSSC Master Plan"). The dedicated ROW would permit future construction of two additional travel lanes and the Corridor Cities Transitway ("CCT") by others.

Property and Project

The property that is the subject of the Preliminary Plan comprises approximately 45 acres located at 9710 Great Seneca Highway and is known as the former Public Safety Training Academy site ("Property"). Montgomery County owns the Property and has entered into a contract of sale with the Applicant ("Contract"). The Property is zoned CR-1.0 C-0.5 R-1.0 H-150. The Preliminary Plan proposes a total of 630 units (276 townhouses, 56 2-over-2 condominiums and 298 multi-family) and 2,607 square feet of retail using the standard method of development and providing less than 0.5 FAR ("Project"). Thirty percent (30%) of the units, or 189 units, will be MPDUs as required by Montgomery County in the Contract. The density proposed by the Project, including the unit number and mix and use of the standard method of development, is acceptable to Montgomery County and complies with the Contract and requirements of the GSSC Master Plan.

As explained in more detail below, construction of Medical Center Drive with two travel lanes as proposed by Applicant is appropriate because: 1) the Preliminary Plan proposes significantly less density than originally contemplated for the Property by the GSSC Master Plan which was based on the use of the optional method of the CR zone at 1.0 FAR; 2) an analysis of the traffic volumes projected to be generated by the Project and other background development on the projected capacity of Medical Center Drive demonstrates that the Project will have minimal impact and two travel lanes would easily accommodate the projected volumes; and 3) the cost of construction of the full four lanes is disproportionate to the demand created by the Project and constitutes an unreasonable and unlawful exaction.

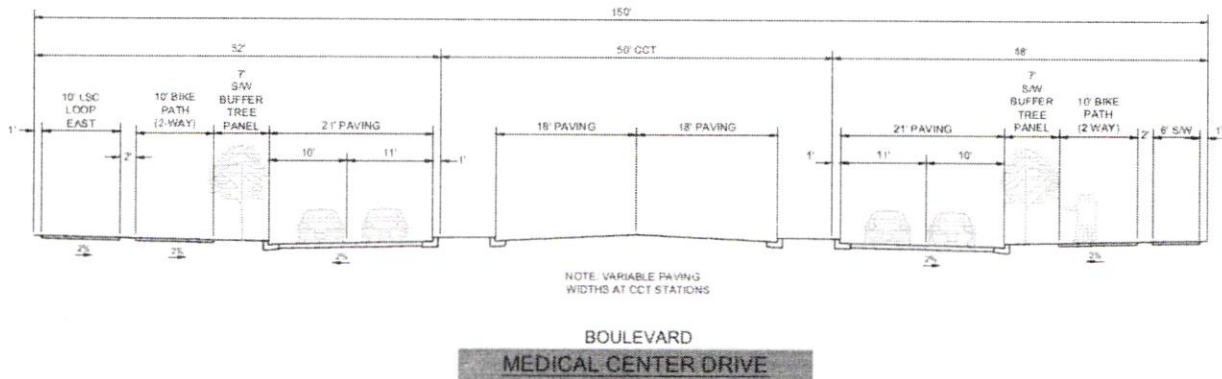
Proposed Dedication and Construction of Medical Center Drive

The GSSC Master Plan recommends that Medical Center Drive be constructed as a modification to the Montgomery County Standard 2004.10A for a Suburban Divided Arterial with four travel lanes, to include a 50-foot median for the future CCT, and several enhanced pedestrian, bicycle and streetscape improvements within a 150-foot ROW. Although Applicant has proposed to dedicate the full 150-foot ROW to accommodate the ultimate four travel lanes and the CCT, if built, and to construct the enhanced improvements, it has requested a design modification to accommodate the Bicycle Master Plan requirements and CCT right-of-way, as well as to construct two rather than four travel lanes as part of the Preliminary Plan.

Specifically, the Master Plan Cross-Section includes: two 10-foot inner travel lanes, two 11-foot outer travel lanes, 50-foot median for the CCT, two 10-foot bike lanes, the 10-foot LSC Loop Trail, a 6-foot sidewalk, and two 7-foot tree panels in a 150-foot ROW. (See GSSC Master Plan pp.84–85,¹ 88–90,² 2018 Bicycle Master Plan pp. 302–03) The Master Plan Cross-Section is depicted below:

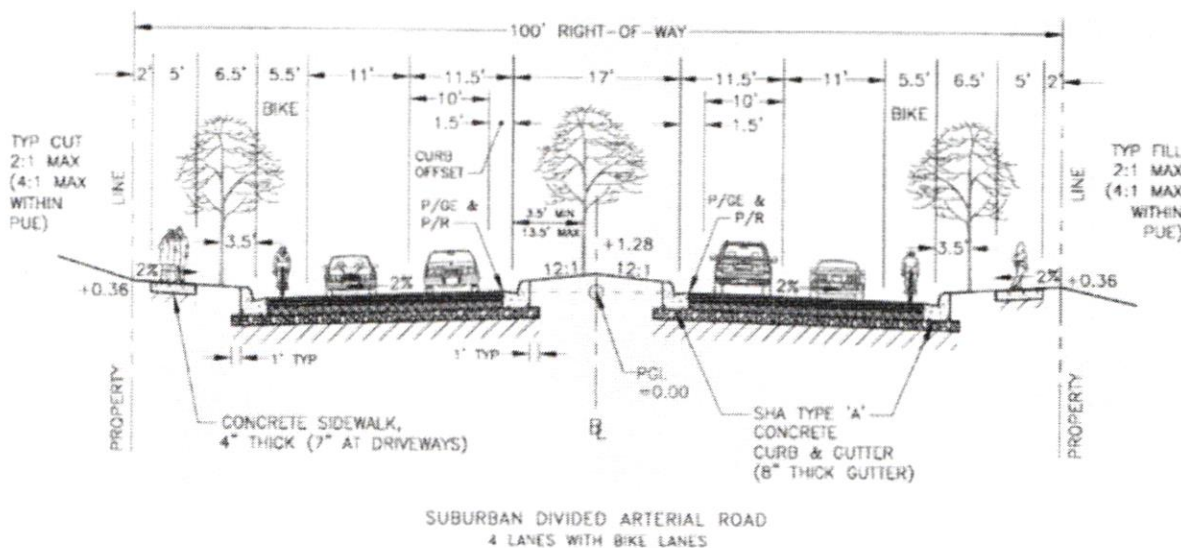
¹ See A-261d (Medical Center Drive).

² At pages 88–90, the GSSC Master Plan calls for: 1) SP-66, a shared use path along the length of the CCT including along Medical Center Drive; and 2) LB-1, the LSC Loop Trail, “3.5-mile recreational path connecting major destinations in the LSC districts. Portions coterminous with SP-66, the CCT shared use path.” The LSC Loop Trail runs along Medical Center Drive coterminous with SP-66.



Master Plan Cross-Section

As noted, the Master Plan Cross-Section is a modification of the Suburban Divided Arterial Road, Four Lanes with Bike Lanes (“Standard 2004.10A”) shown below:

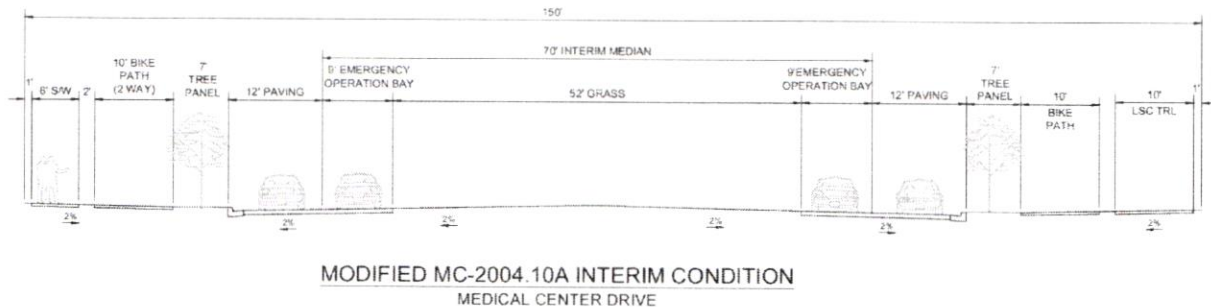


Standard MC-2004.10A

Standard 2004.10A requires only 100 feet of ROW, a 17-foot median, and 5-foot and 5.5-foot bike paths. (GSSC Master Plan pp. 84–85.) Additionally, both the GSSC Master Plan and the 2018 Bicycle Master Plan recommend additional improvements within the Medical Center Drive ROW as summarized above which further modify Standard 2004.10A. These modifications result in the Master Plan Cross-Section shown above.

The Applicant, through Rodgers Consulting, has requested a design exception to Standard 2004.10A to accommodate the GSSC Master Plan and 2018 Bicycle Master Plan recommendations

for Medical Center Drive, by letter dated March 23, 2021 to William Whelan (“Modification Letter”). Applicant’s requested modification to Standard 2004.10A is illustrated in the following cross-section called “Modified Interim Condition” (“Modification”):



Applicant proposes to dedicate the full 150 feet of ROW to public use for Medical Center Drive. This dedication consists of approximately 7.3 acres, which represents approximately 17% of the Property, and will accommodate the Master Plan Cross-Section, shown above, including four travel lanes and the CCT. The Applicant proposes to construct the Interim Condition. The Interim Condition, also depicted above, includes construction of all elements called for in the Master Plan Cross-Section with the exception of two of the four travel lanes and the CCT. Specifically, the Interim Condition will include two 12-foot travel lanes (two as 9-foot emergency operation bays), two 10-foot bike lanes, the 10-foot LSC Loop Trail, a 6-foot sidewalk, two 7-foot tree panels, and a 70-foot interim median.

Proposed Density and Impact of Anticipated Traffic Volumes on Medical Center Drive

Circumstances regarding potentially high levels of anticipated density for the PSTA Site under the CR optional method have failed to materialize since the GSSC Master Plan was adopted nearly eleven years ago. The GSSC Master Plan anticipated the demand for a dense commercial/residential development with a potential yield of 2,000 dwelling units and supporting retail and services. (GSSC Master Plan, p. 38). Market factors have never supported the high levels of multifamily residential development reflected in the density assumptions or related levels of retail and service uses on the Property. The Project proposal of 630 dwelling units using the standard method of development with the unit mix proposed and very limited new retail is compliant with GSSC Master Plan zoning and represents the acceptable density feasible for the Property under realistic market circumstances.

This density level does not support the construction of Medical Center Drive with four travel lanes as demonstrated by the attached April 20, 2021, transportation analysis prepared by The Traffic Group regarding the impact of projected traffic volumes from the Project and background approvals on the projected capacity of Medical Center Drive (“Analysis”). A copy of the Analysis is attached as Exhibit “A”. As part of the Analysis, The Traffic Group reviewed existing traffic volumes which would be impacted by the construction of Medical Center Drive in

addition to approved background traffic. As a four-lane divided roadway, Medical Center Drive would be expected to have a capacity of 4,200 vehicles per hour, or 1,050 per lane. Based on background traffic, the projected hourly traffic volume that would be anticipated along Medical Center Drive would be approximately 670 vehicles during the morning peak and 576 during the evening peak. When applicable directional volumes were considered, only 24% of the capacity southbound and 17% northbound would be utilized based on four lanes.

In view of their analysis, The Traffic Group found that:

“... the future anticipated volumes along Medical Center Drive could clearly be accommodated by one thru lane of traffic in each direction operating at a maximum of 48% of capacity in the southbound direction and 34% of capacity in the northbound direction. The addition of the traffic projected to have access to Medical Center Drive from the PSTA Site would utilize 2.5% of the capacity in the morning and approximately 2.4% in the evening.”
(pp. 1-2)

Thus, considering all projected volumes (background and PSTA), The Traffic Group concluded that “Medical Center Drive would be more than capable of handling the projected volumes which would still only represent a maximum of 48% of the capacity with one lane of traffic along Medical Center Drive in each direction during the highest peak hour.” (p. 2)

The Cost of Construction of the Full Four Lanes is Disproportionate to the Demand Created by the Project and Constitutes an Unreasonable and Unlawful Exaction

Given that the Project will not generate sufficient traffic to require the construction of four travel lanes for Medical Center Drive, requiring the Applicant to construct four lanes is disproportionate to the burden the Project creates and hence bears no reasonable relationship to the need created by the Project. Courts have held that requirements such as the requirement to construct public road improvements like Medical Center Drive must have “an essential nexus and rough proportionality to the effects of the proposed new use of the specific property at issue.” *Koontz v. St. Johns River Water Mgmt. Dist.*, 570 U.S. 595 (2013). Otherwise stated, to pass legal muster, an exaction must: (1) have an essential nexus with a legitimate public purpose; and (2) be “roughly proportional” to the impact on public services created by a development project. *Dolan v. City of Tigard*, 512 U.S. 374, 385, 391 (1994). Even if one accepts that construction of Medical Center Drive as a four lane road serves a legitimate public purpose, requiring the Applicant to construct the Master Plan Cross-Section at a cost that Applicant’s consultants have determined to be in excess of several million dollars, lacks proportionality to the Project’s impact on the road.

Such an exaction falls squarely within the Supreme Court’s stated concern in *Koontz v. St. Johns River Water Mgmt. Dist.* regarding the “...risk that the government may use its substantial power and discretion in land-use permitting to pursue governmental ends that lack an essential

nexus and rough proportionality to the effects of the proposed new use of the specific property at issue, thereby diminishing without justification the value of the property". *Id.* at 597. As plain from the very limited impact the Project has on Medical Center Drive as a four-lane divided arterial road, the requirement to construct all four lanes does not bear sufficient proportionality to the demands created by the proposed development. We further note that, because the County requires that 30% of the units must be MPDUs, there is no offset from an impact tax credit for the cost of constructing the road.

As discussed above, Applicant proposes to dedicate over 7.3 acres of the approximately 44-acre Property to public use for Medical Center Drive. This ROW is approximately 50 feet larger in width than a typical divided arterial road with four lanes in order to permit the uncertain future construction of the CCT. The Project does not depend or rely on the CCT for adequacy. Additionally, the CCT is not funded and has no known timeline for funding or construction. It is, therefore, Applicant's position that the dedication of ROW over 100 feet is unreasonable. However, in an effort to resolve the continued objection of MCDOT to reducing the ROW from 150 feet, Applicant has agreed to dedicate the 150 feet requested. To require the construction of four lanes of the road is unacceptable to Applicant for the reasons stated above. Applicant, therefore, requests that the Modification for Medical Center Drive be approved.

Thank you for your time and consideration. Please do not hesitate to contact us should you have any questions or need any further information.

Very truly yours,

Barbara A. Sears /KDM

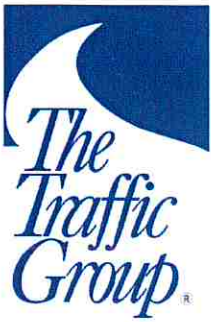
Barbara A. Sears

Laura M. Tallerico /KDM

Laura M. Tallerico

Enclosure

cc: Brenda Pardo
Carrie Sanders
Tamika Graham
John Clarke
David Flanagan
Doug Flanagan
Kate Kubit
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FIELD OFFICE LOCATIONS

Arkansas
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Maryland
New York
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Ohio
South Carolina
Texas
Utah
Virginia
West Virginia

EXHIBIT A

April 20, 2021

The ELMS at PSTA, LLC
c/o Elm Steet Development
1355 Beverly Road, Suite 420
McLean, Virginia 22101

Attn: Kathryn L. Kubit

RE: Medical Center Drive
PSTA Site
Montgomery County, Maryland
Our Job No.: 2019-0201

Dear Ms. Kubit:

As requested, The Traffic Group, Inc. has had an opportunity to review the anticipated capacity for the segment of Medical Center Drive, which is shown on the Master Plan to extend from MD 28 (Key West Avenue) to the north to MD 119 (Great Seneca Highway) to the south. The subject roadway was originally planned to be a four-lane divided arterial roadway with a posted speed limit of 25 MPH. Based on data contained in the Highway Capacity Manual, a four-lane divided roadway with a posted speed limit of 25 MPH would be expected to have a capacity of 1,050 vehicles per hour per lane for a total of 4,200 vehicles for all four lanes per hour.

Although The Traffic Group does not have access to the model originally developed for the design of Medical Center Drive, we have reviewed the existing traffic volumes which would be impacted by the construction of Medical Center Drive in addition to the anticipated development to occur in this area that has been approved but not yet constructed. This traffic is referred to as the background traffic. There is other development in this area that would be anticipated to utilize Medical Center Drive if the property is to be developed in the future.

Medical Center Drive is essentially a parallel roadway for Darnestown Road between MD 128 (Key West Avenue) to the north and MD 119 (Great Seneca Highway) to the south. Based on the background traffic that was utilized in the Traffic Impact Analysis prepared for the PSTA Site, the projected hourly traffic volumes that would be anticipated along Medical Center Drive would be approximately 670 vehicles during the morning peak hour and approximately 576 vehicles during the evening peak hour. Based on the directional volumes, it would be anticipated that the southbound traffic projected along Medical Center Drive would be 24% of the capacity of this roadway if it was constructed as a four-lane divided roadway. The highest northbound volume would represent approximately 17% of the capacity available for a four-lane roadway. Based on this information, it is clear that the future anticipated volumes along Medical Center Drive could clearly be accommodated by one thru lane of traffic in each direction operating at a maximum of 48% of capacity in the southbound direction and 34% of capacity in the northbound direction. The addition of the traffic projected to

have access to Medical Center Drive from the PSTA Site would utilize 2.5% of the capacity in the morning and approximately 2.4% in the evening.

Based on the above calculations, it is clear that with the projected traffic volumes for the background traffic conditions represented in the Traffic Impact Analysis prepared for the PSTA Site as well as the traffic projected to be generated by the PSTA Site, Medical Center Drive would be more than capable of handling the projected volumes which would still only represent a maximum of 48% of the capacity with one lane of traffic along Medical Center Drive in each direction during the highest peak hour.

Furthermore, the traffic projected to be generated by the PSTA Site would only utilize a maximum of 2.5% of the available capacity in each direction of a four-lane roadway along Medical Center Drive based on the traffic projections contained in the Revised Traffic Impact Analysis.

Therefore, it is clear from this analysis, as it relates to the capacity of Medical Center Drive and its ability to accommodate the projected traffic volumes in this area, that Medical Center Drive would be more than adequate to handle the projected demand if constructed as a two-lane roadway versus the four-lane roadway reflected in the Master Plan.

If you have any questions, please do not hesitate to contact me.

Sincerely,



Glenn E. Cook
Senior Vice President

GEC:amr/smb

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Impact of Future Traffic On Medical Center Drive

- **Site generated traffic** contributes only **2.5%** of traffic to Medical Center Drive.
- Total traffic includes projected background and site generated traffic.
- Total traffic will utilize only **21%** of **four lane** capacity.
- Total traffic will utilize only **41%** of **two-lane** capacity.
- **Only two lanes** are supported by total traffic.

