AGENDA
BOARD OF SUPERVISORS
WEDNESDAY, OCTOBER 28, 2026
6:00 PM
BOARD MEETING ROOM
107 NORTH KENT STREET, WINCHESTER, VIRGINIA 22601

1. **Call to Order**

2. **Invocation**

3. **Pledge of Allegiance**

4. **Adoption of Agenda**

5. **Citizen Comments – For agenda items that are not the subject of a Public Hearing**

6. **Consent Agenda – *Roll Call Vote***

6.A. Approval of Regular Meeting Minutes of October 14, 2026

BOS10-28-26MinutestRegMtg261014.pdf

6.B. Acceptance of Parks & Recreation Commission Report of October 13, 2026

BOS10-28-26ParksRecCommReportOctober2026.pdf

6.C. Acceptance of Public Safety Committee Report of October 15, 2026

BOS10-28-26PublicSafetyCommReportOctober20265.pdf

6.D. Acceptance of Finance Committee Report of October 21, 2026

BOS10-28-26FinanceCommReportOctober2026.pdf

6.E. Finance Committee Item: The WRAA Executive Director requests Airport Operating Fund and Airport Capital Fund supplemental appropriations in the amount of $125,000 for hangar facility roof repair. No local County funds are required. The Committee recommends approval.

SA Airport Roof Repair.pdf

Consent Agenda, *continued*

6.F. Finance Committee Item: The WRAA Executive Director requests an Airport Operating Fund supplemental appropriation of $11,000 and an Airport Capital Fund supplemental appropriation of $110,000 for security upgrades. No local County funds are required. The Committee recommends approval.

SA Airport Security Project.pdf

6.G. Finance Committee Item: The FCPS Executive Director of Finance provides the FY 2026 Year End School Board Funds Financial Report and requests the following supplemental appropriations:

- C.1.a School Capital Projects Fund carry forward appropriation of $1,962,621 for the Sherando High School HVAC capital project.
- C.1.b Textbook Fund supplemental appropriation of $189,419.60 representing interest earnings.
- C.1.c General Fund and School Capital Projects Fund supplemental appropriations of $1,065,946 representing the unobligated surplus from the FY 2026 School Operating Fund to be used for HVAC replacements and playground equipment replacements.

The committee recommends approval.

FCPS SA.pdf
FY26 School Board Funds Financial Report.pdf

6.H. Request from the Commissioner of the Revenue for Refund and Supplemental Appropriation: Shenandoah Cable Television LLC- $15,144.55

BOS10-28-26RequestForRefund.pdf

6.I. Approval to change the 2-year term expiration of Micah Jacobs on the Shawneeland Sanitary District Advisory Committee from November 9, 2028, to November 30, 2028

BOS10-28-26SSDAC-TermAdj.pdf

6.J.

Resolution of the Board of Supervisors of Frederick County Concurring With a Financing to be Undertaken by the Economic Development Authority of the Town of Woodstock, Virginia, to Benefit Shenandoah University

BOS10-28-26ConcurringIssuanceOfBondsBenefitingShenUniv_Redacted.pdf
BOS10-28-26ConcurringResolution_Issuance ofOBonds_ShenUniv.pdf

7. **Board of Supervisors Comments**

8. **County Officials**

8.A. Approval of Miller Milling Performance Agreement

BOS10-28-26MillerMillingPerfAgreement.pdf

9. **Appointments to Boards, Committees, and Commissions**

9.A. Information Item - The Board is seeking applications for:

Economic Development Authority - 2 immediate vacancies

We are particularly interested in individuals with experience in the technology sector, large -scale manufacturing, and small business. Ideal candidates will bring strong industry knowledge, an entrepreneurial mindset, and a passion for supporting economic growth and innovation in Frederick County. Members serve a four-year term.

Board of Equalization - 1 vacancy beginning 1-1-27

Members must be freeholders in the county. The primary duty of the Board of Equalization is to hear appeals of real estate reassessment in the year the reassessment takes effect while conducting its business as required by the Code of Virginia. Members serve a three-year term.

For more information or to apply online, please visit: Committee Listing and Descriptions | Frederick County (fcva.us)

10. **Committee Business** - None

11. **Public Hearings (Non Planning Issues)** - None

12. **Planning Commission Business - Public Hearings**

12.A.

Conditional Use Permit #03-26 for Winchester Gateway LLC to Establish a Data Center on 71.85 +/- Acres of M1 (Light Industrial) Zoned Property. The Property is Located at the Intersection of Apple Valley Road (Route 652) and Middle Road (Route 628) and is Bounded by Route 37 to the West and is Identified by Property Identification Number (PIN) 63-A-80I in the Back Creek Magisterial District.

BOS10-28-26_CUP03-26_Redacted.pdf

BOS10-28-26_CUP03-26_Ph1ArcheologicalSurvey.pdf

12.B.

Rezoning #04-26 for Virginia Technology Park

The Applicant has withdrawn this application; therefore, no public hearing will be conducted, and the Board will take no action on this item.

12.C. **Rezoning #08-26 for Gibson Property (Estate of Montie Wood Gibson, Jr.)** to Rezone 244.06 +/- Acres from the RA (Rural Areas) Zoning District to the M1 (Light Industrial) Zoning District with Proffers. The Property is Located at 1787 Fairfax Pike and is Generally North of Route 277 (Fairfax Pike) and West of Route 522 (Front Royal Pike) and is Identified by Property Identification Numbers (PINs) 87-3-B, 87-A-16B, and 87-A-94 in the Shawnee Magisterial District.

BOS10-28-26_REZ08-26_Redacted.pdf

BOS10-28-26_REZ08-26_TIA.pdf

13. **Planning Commission Business - Other Planning Business**

14. **Board Liaison Reports**

15. **Citizen Comments**

16. **Board of Supervisors Comments**

17. **Adjourn**

Board of Supervisors
Agenda Item Detail
Meeting Date: October 28, 2026
Agenda Section: Consent Agenda

Title: Approval of Regular Meeting Minutes of October 14, 2026

Attachments:
BOS10-28-26MinutestRegMtg261014.pdf

MINUTES
REGULAR MEETING
FREDERICK COUNTY BOARD OF SUPERVISORS
WEDNESDAY, OCTOBER 14, 2026
7:00 P.M.
BOARD ROOM, COUNTY ADMINISTRATION BUILDING
107 NORTH KENT STREET, WINCHESTER, VIRGINIA

ATTENDEES

Board of Supervisors: John F. Jewell, Chairman; Robert W. Wells, Vice Chairman; Robert T. Liero; Jason C. Aikens; Michael D. Guevremont; Albert L. Orndorff; and Gary R. Oates were present.

Staff present: Michael Bollhoefer, County Administrator; Jay E. Tibbs, Deputy County Administrator; Wyatt Pearson, Deputy County Administrator; Andrew R. Fox, County Attorney; Wendy May, Communications Director; John Bishop, Planning Director; Tyler Klein, Senior Planner; Amy Feltner, Planner I; Stacy Herbaugh, Director of Parks and Recreation; Tonya Sibert, Commissioner of the Revenue; Amanda Killen, EDA Director; and Ann W. Phillips, Deputy Clerk to the Board of Supervisors.

CALL TO ORDER

Chairman Jewell called the meeting to order at 7:00 p.m.

INVOCATION

Pastor Samuel Rogers of Hope Valley Church offered the invocation.

PLEDGE OF ALLEGIANCE

Vice Chairman Wells led the Pledge of Allegiance.

ADOPTION OF AGENDA - APPROVED

Vice Chairman Wells moved for the adoption of the draft agenda. Supervisor Guevremont seconded the motion, which carried on a voice vote.

CITIZEN COMMENTS - None

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ADOPTION OF CONSENT AGENDA – APPROVED

Vice Chairman Wells moved for the adoption of the consent agenda. Supervisor Aikens seconded the motion, which carried on the following recorded vote:

Michael D. Guevremont	**Aye**	**Robert T. Liero**	**Aye**
Albert L. Orndorff	**Aye**	**Robert W. Wells**	**Aye**
Gary R. Oates	**Aye**	**Jason C. Aikens**	**Aye**
John F. Jewell, Chairman	**Aye**		

- Approval of Minutes of Work Session & Regular Meeting of September 23, 2026 - CONSENT AGENDA APPROVAL

- Acceptance of Human Resources Committee Report of September 25, 2026 - CONSENT AGENDA APPROVAL, Appendix 1

- Human Resources Item: The Committee recommends approval of the Sheriff's Office specialty assignment stipend program at $3,000 annually for an employee's first qualifying specialty assignment and $750 annually for each additional qualifying specialty assignment. - CONSENT AGENDA APPROVAL

- Appropriation of $118,000 to the IT budget for Phase II of the BerryDunn software evaluation project – CONSENT AGENDA APPROVAL

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BOARD OF SUPERVISORS COMMENTS

Chairman Jewell introduced Amanda Killen as the new Director of the Frederick County Economic Development Authority. Ms. Killen briefly addressed the Board and provided an overview of upcoming activities.

Chairman Jewell announced that the next regular Board meeting on October 28 will begin at 6:00 p.m. instead of 7:00 p.m. in anticipation of a larger-than-usual attendance and number of public speakers.

Chairman Jewell made a statement about the Board's limited ability to request and accept proffers from developers.

COUNTY OFFICIALS - None

APPOINTMENTS TO BOARDS, COMMITTEES, AND COMMISSIONS

MICAH JACOBS REAPPOINTED TO SHAWNEELAND SANITARY DISTRICT ADVISORY COMMITTEE - APPROVED

On motion of Supervisor Orndorff, seconded by Vice Chairman Wells, Micah Jacobs was reappointed to a 2-year term expiring November 9, 2028, on the Shawneeland Sanitary District Advisory Committee.

JASON BROWN APPOINTED TO EXTENSION LEADERSHIP COUNCIL AS RED BUD DISTRICT REP. - APPROVED

On motion of Supervisor Guevremont, seconded by Supervisor Aikens, Jason Brown was appointed to a vacant 4-year term expiring October 28, 2027, as the Red Bud District Rep. on the Extension Leadership Council.

ANTHONY GELORMINE APPOINTED TO HISTORIC RESOURCES ADVISORY BOARD AS STONEWALL DISTRICT REP. - APPROVED

On motion of Supervisor Oates, seconded by Supervisor Guevremont, Anthony Gelormine was appointed to a vacant 4-year term expiring June 30, 2027, as the Stonewall District Rep. on the Historic Resources Advisory Board.

COMMITTEE BUSINESS- None

PUBLIC HEARINGS (NON PLANNING ISSUES)

ORDINANCE REGARDING THE ANNUAL DISTRIBUTION OF THE 6% TRANSIENT OCCUPANCY TAX REVENUES– APPROVED

County Administrator Michael Bollhofer said the Board had directed staff to create a policy defining the distribution of the transient occupancy tax revenues in the following manner:

1. $250,000 of the 3% General Fund portion to be set aside in a separate account to be used for a future Parks & Recreation facility.

2. $250,000 of the General Fund portion to be allocated to the Economic Development Board to be used for site readiness.

3. The full 0.75% required to be used for tourism-related projects as defined by Virginia Statutes, to be set aside in a separate account to be used for a future tourism-related facility.

He reviewed the draft proposed ordinance enacting the policy.

Chairman Jewell opened the public comment period.

No one wished to address the Board.

Chairman Jewell closed the public comment period.

Supervisor Aikens moved to adopt the Ordinance Regarding the Annual Distribution of the 6% Transient Occupancy Tax Revenues. Supervisor Guevremont seconded the motion, which carried on a recorded vote as follows:

Michael D. Guevremont	**Aye**	**Robert T. Liero**	**Aye**
Albert L. Orndorff	**Aye**	**Robert W. Wells**	**Aye**
Gary R. Oates	**Aye**	**Jason C. Aikens**	**Aye**
John F. Jewell, Chairman	**Aye**		

ORDINANCE
REGARDING THE ANNUAL DISTRIBUTION OF THE
6% TRANSIENT OCCUPANCY TAX REVENUES

WHEREAS, the Board of Supervisors approved a 6% transient occupancy tax to be distributed in the following manner: 3% to the County's General Fund; 2.25% to the Winchester-Frederick County Tourism Board; and 0.75% to be used for other qualifying tourism-related uses as allowed by the Code of Virginia; and

WHEREAS, the Frederick County Board of Supervisors directed that $250,000 of the 3% distributed to the General Fund be set aside yearly in a separate account to be used for a Parks & Recreation facility; and

WHEREAS, the Frederick County Board of Supervisors directed that $250,000 of the 3% distributed to the General Fund be set aside yearly in a separate account to be allocated to the Economic Development Authority to be used solely for site readiness; and

WHEREAS, the Frederick County Board of Supervisors directed that the 0.75% distributed for other qualifying tourism uses be set aside in a separate account to be used for a future tourism-related facility; and

WHEREAS, the Frederick County Board of Supervisors directs staff to incorporate this information in a financial policy to be included in the yearly budget book;

NOW, THEREFORE, BE IT ORDAINED by the Frederick County Board of Supervisors, that in distributing the 6% transient occupancy tax revenues:

1. $250,000 of the 3% distributed to the General Fund shall be set aside in a separate account to be used for a future Parks & Recreation Facility.

2. $250,000 of the 3% distributed to the General Fund shall be allocated to the Economic Development

Authority to be used solely for site readiness.

3. The 0.75% to be used for other tourism-related uses shall be set aside in a separate account to be used for a future tourism-related facility.

4. Staff is directed to draft a policy regarding the three preceding items and include the information in the yearly Budget Book.

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AMENDMENT TO THE 2026-2027 FISCAL YEAR BUDGET– APPROVED

Parks and Recreation Department Director Stacy Herbaugh reviewed the background and timeline leading to the development of the Old Charlestown Road Park. She explained the requested budget amendment consisting of a supplemental appropriation in the amount of $5,581,400 to develop the Old Charlestown Road Park per the signed agreement to accept a reimbursable grant from the National Park Service Land, Water, and Conservation Fund (LWCF) and the Virginia Dept. of Conservation and Recreation (DCR).

The Board briefly discussed the planned park layout.

Chairman Jewell opened the public comment period.

No one wished to address the Board.

Chairman Jewell closed the public comment period.

Supervisor Oates moved to adopt the Resolution - Fiscal Year 2026-2027 Budget Amendment Reflecting a General Fund Supplemental Appropriation in the Amount of $5,581,400. Supervisor Orndorff seconded the motion, which carried on a recorded vote as follows:

Michael D. Guevremont	**Aye**	**Robert T. Liero**	**Aye**
Albert L. Orndorff	**Aye**	**Robert W. Wells**	**Aye**
Gary R. Oates	**Aye**	**Jason C. Aikens**	**Aye**
John F. Jewell, Chairman	**Aye**		

RESOLUTION
FISCAL YEAR 2026-2027 BUDGET AMENDMENT

WHEREAS, Pursuant to Section 15.2-2507 of the Code of Virginia, 1950, as amended, the Frederick County Board of Supervisors, meeting in regular session on October 14, 2026, took the following action:

NOW, THEREFORE, BE IT RESOLVED, by the Board of Supervisors that the FY 2026-2027 Budget be Amended to Reflect:

General Fund Supplemental Appropriation in the Amount of $5,581,400. This amount reflects plans to develop the Old Charlestown Road Park per the signed agreement to accept a reimbursable grant from the National Park Service Land, Water, and Conservation Fund (LWCF) and the VA Dept. of Conservation and Recreation (DCR).

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PLANNING COMMISSION BUSINESS – PUBLIC HEARINGS

REZONING #07-26 FOR AEROGREEN SOLUTIONS (SILVERWOLFE, LLC.) – APPROVED

Supervisor Oates, as part owner of the property, recused himself from consideration of this item and left the room.

Planner Amy Feltner reviewed the request to rezone from B3 (Industrial Transition) District with proffers to M2 (Industrial General) District with proffers. She said the proposed rezoning proffers limit the permitted use on the property to "Soap and Cleaning Compound Manufacturing & General Warehouse/Storage." She reviewed the discussion at the Planning Commission and the Applicant's corresponding updates to their proposed site plan.

Marisa Whitacre, representing Greenway Engineering, discussed the planned building materials and reviewed an illustrative sketch of the proposed building.

Chairman Jewell opened the public comment period.

No one wished to address the Board.

Chairman Jewell closed the public comment period.

Vice Chairman Wells moved to approve REZONING #07-26 for Silverwolfe, LLC. (Aerogreen Solutions, LLC.) Supervisor Guevremont seconded the motion, which carried on a recorded vote as follows:

Michael D. Guevremont	**Aye**	**Robert T. Liero**	**Aye**
Albert L. Orndorff	**Aye**	**Robert W. Wells**	**Aye**
Gary R. Oates	**Recused**	**Jason C. Aikens**	**Aye**
John F. Jewell, Chairman	**Aye**		

ORDINANCE
AMENDING THE ZONING DISTRICT MAP
REZONING #07-26 FOR SILVERWOLFE, LLC.
(AEROGREEN SOLUTIONS, LLC.)

WHEREAS, REZONING #07-26 of Silverwolfe, LLC (Aerogreen Solutions, LLC) submitted to rezone 8.84+/- acres from B3 (Industrial Transition) Zoning District with proffers to M2 (Industrial General) Zoning District with proffers. The property is located at the corner of Martinsburg Pike and Woodside Road, Clear Brook and is identified by Property Identification Number 33-A-124A in the Stonewall Magisterial District; and

WHEREAS, the Frederick County Planning Commission held a public hearing on this rezoning on September 16, 2026, and recommended approval with conditions; and

WHEREAS, the Frederick County Board of Supervisors held a public hearing on October 14, 2026; and

WHEREAS, the Frederick County Board of Supervisors finds the approval of this rezoning to be in the best interest of public health, safety, and welfare, and in conformance with the Comprehensive Plan;

NOW, THEREFORE, BE IT ORDAINED by the Frederick County Board of Supervisors, that Chapter 165 of the Frederick County Code, Zoning, the Zoning District Map is amended in accordance with Rezoning #07-26 of Silverwolfe, LLC (Aerogreen Solutions, LLC) submitted to rezone 8.84+/- acres from B3 (Industrial Transition) Zoning District with proffers to the M2 (Industrial General) Zoning District with proffers dated September 28, 2026. The conditions voluntarily proffered in writing by the Applicant and the Property Owner are attached.

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Supervisor Oates returned to the meeting room.

ORDINANCE AMENDMENT TO THE FREDERICK COUNTY CODE CHAPTER 144 – SUBDIVISION ORDINANCE – MODIFICATIONS TO INCORPORATE POLICY CHANGES RECOMMENDED DURING THE PHASE I SUBDIVISION ORDINANCE UPDATE, INCLUDING WAIVERS, EXEMPTIONS, AND STORMWATER MANAGEMENT. – APPROVED

Senior Planner Tyler Klein explained the proposal to amend Chapter 144 – Subdivision Ordinance to incorporate Phase I ordinance update recommendations from the Berkley Group. He said these recommendations were identified during the Phase I Subdivision and Zoning Ordinance Update but were "policy" type changes outside of the Phase I project scope.

He continued, saying the proposed changes to Chapter 144 include implementing best practices for waivers, exemptions, and alternative use standards at the discretion of the Subdivision Administrator rather than an action of the Board of Supervisors for certain requirements contained in §144-302 (General Access; Streets, Sidewalks; Easements) and to remove an outdated requirement at the direction of Public Works contained in §144-302.13 (Environmental Features and Protections).

The Board and staff discussed standards for private roads, the possible removal of "age restricted communities" from the Zoning Ordinance, the need to study housing types, and affordable housing.

Chairman Jewell opened the public comment period.

No one wished to address the Board.

Chairman Jewell closed the public comment period.

Supervisor Aikens moved to approve the proposed Ordinance Amendment to the Frederick County Code Chapter 144 – Subdivision Ordinance – Modifications to Incorporate Policy Changes Recommended During the Phase I Subdivision Ordinance Update, Including Waivers, Exemptions, and Stormwater Management. Supervisor Oates seconded the motion, which carried on a recorded vote as follows:

Michael D. Guevremont	**Aye**	**Robert T. Liero**	**Aye**
Albert L. Orndorff	**Aye**	**Robert W. Wells**	**Aye**
Gary R. Oates	**Aye**	**Jason C. Aikens**	**Aye**
John F. Jewell, Chairman	**Aye**		

ORDINANCE
TO AMEND CHAPTER 144 - SUBDIVISION ORDINANCE

ARTICLE III
SUBDIVISION STANDARDS

WHEREAS, a proposal to amend Chapter 144 – Subdivision Ordinance to incorporate Phase I ordinance update recommendations from the Berkley Group to implement best practices for waivers, exemptions and alternative use standards at the discretion of the Subdivision Administrator to certain requirements and to remove an outdated requirement for stormwater management contained in §144-302.13; and

WHEREAS, the Board of Supervisors authorized staff to draft an ordinance amendment and hold public hearings on August 12, 2026; and

WHEREAS, the Development Review and Regulations Committee (DRRC) met and discussed this proposed amendment at its August 27, 2026, regular meeting; and

WHEREAS, the Planning Commission held a public hearing on September 16, 2026, and recommended approval of the ordinance amendment; and

WHEREAS, the Frederick County Board of Supervisors held a public hearing on this proposed ordinance amendment on October 14, 2026;

NOW, THEREFORE, BE IT ORDAINED by the Frederick County Board of Supervisors, that in the interest of public health, safety, general welfare, and good zoning practice, the amendment to Chapter 144 – Subdivision Ordinance to incorporate Phase I ordinance update recommendations is adopted.

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ORDINANCE AMENDMENT TO THE FREDERICK COUNTY CODE – CHAPTER 165 – ZONING ORDINANCE – MODIFICATIONS TO INCORPORATE POLICY CHANGES RECOMMENDED DURING THE PHASE I ZONING ORDINANCE UPDATE, INCLUDING MODIFICATIONS TO MASTER DEVELOPMENT PLAN FINAL APPROVAL, WAIVERS, AND EXEMPTIONS. - APPROVED

Senior Planner Tyler Klein explained the proposal to amend Chapter 165 - Zoning Ordinance to incorporate Phase I ordinance update recommendations from the Berkley Group. He said these recommendations were identified during the Phase I Subdivision and Zoning Ordinance Update but were

"policy" type changes outside of the Phase I project scope. He said the proposed changes to Chapter 165 include removal of the County Administrator signature requirement from Master Development Plans (§165-306.06(D)) and implementing best practices for waivers, exemptions, and alternative use standards at the discretion of the Zoning Administrator rather than an action of the Board of Supervisors for certain requirements.

Chairman Jewell opened the public comment period.

No one wished to address the Board.

Chairman Jewell closed the public comment period.

Supervisor Oates moved to approve the proposed Ordinance Amendment to the Frederick County Code – Chapter 165 – Zoning Ordinance – Modifications to Incorporate Policy Changes Recommended During the Phase I Zoning Ordinance Update, Including Modifications to Master Development Plan Final Approval, Waivers, and Exemptions. Supervisor Guevremont seconded the motion, which carried on a recorded vote as follows:

Michael D. Guevremont	**Aye**	**Robert T. Liero**	**Aye**
Albert L. Orndorff	**Aye**	**Robert W. Wells**	**Aye**
Gary R. Oates	**Aye**	**Jason C. Aikens**	**Aye**
John F. Jewell, Chairman	**Aye**		

ORDINANCE
TO AMEND CHAPTER 165, ZONING ORDINANCE

ARTICLE III
PERMITS AND APPLICATIONS
PART 306 – MASTER DEVELOPMENT PLANS

ARTICLE IV
PRIMARY ZONING DISTRICTS
PART 407 – INDUSTRIAL DISTRICTS
PART 408 – PLANNED DEVELOPMENT DISTRICTS

ARTICLE VII
ADDITIONAL REGULATIONS FOR SPECIFIC USES
PART 703 – PUBLIC/CIVIC/RECREATIONAL USE STANDARDS
PART 704 – COMMERCIAL USE STANDARDS
PART 705 – INDUSTRIAL USE STANDARDS

WHEREAS, a proposal to amend Chapter 165 – Zoning Ordinance to incorporate Phase I ordinance update recommendations from the Berkley Group to address remove County Administrator signature requirement from Master Development Plans and implement best practices for waivers, exemptions and alternative use standards at the discretion of the Zoning Administrator to certain requirements; and

WHEREAS, the Board of Supervisors authorized staff to draft an ordinance amendment and hold public hearings on August 12, 2026; and

WHEREAS, the Development Review and Regulations Committee (DRRC) met and discussed this proposed amendment at its August 27, 2026 regular meeting; and

WHEREAS, the Planning Commission held a public hearing on September 16, 2026 and recommended approval of the ordinance amendment; and

WHEREAS, the Frederick County Board of Supervisors held a public hearing on this proposed ordinance amendment on October 14, 2026;

NOW, THEREFORE, BE IT ORDAINED by the Frederick County Board of Supervisors, that in the interest of public health, safety, general welfare, and good zoning practice, the amendment to Chapter 165 to incorporate Phase I ordinance update is adopted.

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ORDINANCE AMENDMENT TO THE FREDERICK COUNTY CODE CHAPTER 165 – ZONING ORDINANCE – MODIFICATIONS TO INCORPORATE 2026 AMENDMENTS TO THE CODE OF VIRGINIA ENACTED BY THE GENERAL ASSEMBLY AND SIGNED INTO LAW BY THE GOVERNOR OF THE COMMONWEALTH OF VIRGINIA. – APPROVED

Senior Planner Tyler Klein said the amendments to the Code of Virginia enacted by the General Assembly and signed into law by the Governor should be reviewed annually, and where applicable, incorporated in the County ordinances. He said this is the best practice identified through the Zoning and Subdivision Diagnostics (2025) and the Phase I Zoning and Subdivision Ordinance Updates (2026) as recommended by the Berkley Group, and that applicable laws for 2026 to Frederick County have been reviewed by Planning staff and the County Attorney.

Chairman Jewell opened the public comment period.

Kurt Creager, Back Creek District, discussed the General Assembly's legislation allowing by-right affordable housing construction on land owned by faith-based groups. He encouraged the County to share that information with faith-based groups.

Chairman Jewell closed the public comment period.

Vice Chairman Wells moved to approve the Ordinance Amendment to the Frederick County Code Chapter 165 – Zoning Ordinance – Modifications to Incorporate 2026 Amendments to the Code of Virginia Enacted by the General Assembly and Signed into Law by the Governor of the Commonwealth of Virginia. Supervisor Oates seconded the motion, which carried on a recorded vote as follows:

Michael D. Guevremont Aye Robert T. Liero Aye

Albert L. Orndorff	**Aye**	**Robert W. Wells**	**Aye**
Gary R. Oates	**Aye**	**Jason C. Aikens**	**Aye**
John F. Jewell, Chairman	**Aye**		

ORDINANCE
TO AMEND CHAPTER 165, ZONING ORDINANCE

ARTICLE IV
PRIMARY ZONING DISTRICTS
PART 405 – RESIDENTIAL DISTRICTS

ARTICLE XI
DEFINITIONS
PART 1105 – USE TERMS

WHEREAS, a proposal to amend Chapter 165 – Zoning Ordinance to incorporate 2026 amendments to the Code of Virginia enacted by the General Assembly and signed into law by the Governor of the Commonwealth of Virginia; and

WHEREAS, amendments are necessary to §165-405.01 (RP, Residential Performance District Standards; Table IV-3) and §165-1105.02 (Use Terms) to remain fully compliant with the Code of Virginia; and

WHEREAS, the Board of Supervisors authorized staff to draft an ordinance amendment and hold public hearings on August 12, 2026; and

WHEREAS, the Development Review and Regulations Committee (DRRC) met and discussed this proposed amendment at its August 27, 2026, regular meeting; and

WHEREAS, the Planning Commission held a public hearing on September 16, 2026, and recommended approval of the ordinance amendment; and

WHEREAS, the Frederick County Board of Supervisors held a public hearing on this proposed ordinance amendment on October 14, 2026;

NOW, THEREFORE, BE IT ORDAINED by the Frederick County Board of Supervisors, that in the interest of public health, safety, general welfare, and good zoning practice, the amendments to Chapter 165 to RP, Residential District Standards (§165-405.01) and Use Terms (§165-1105.02) to remain fully compliant with the Code of Virginia is adopted.

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PLANNING COMMISSION BUSINESS - OTHER PLANNING BUSINESS - None

BOARD LIAISON REPORTS

Supervisor Liero provided an update from the Parks & Recreation Commission.

Supervisor Orndorff provided updates from the Conservation Easement Authority and the Planning Commission.

Vice Chairman Wells provided an update from the newly formed inter-jurisdictional Joint Valley Council.

CITIZEN COMMENTS

Leslie Spencer, Gainesboro District, discussed the upcoming vote on Rezoning #08-26 for Gibson Property.

BOARD OF SUPERVISORS COMMENTS - None

ADJOURN

On motion of Vice Chairman Wells, seconded by Chairman Jewell, the meeting was adjourned at 8:10 p.m.

Board of Supervisors
Agenda Item Detail
Meeting Date: October 28, 2026
Agenda Section: Consent Agenda

Title: Acceptance of Parks & Recreation Commission Report of October 13, 2026

Attachments:
BOS10-28-26ParksRecCommReportOctober2026.pdf

PARKS AND RECREATION COMMISSION REPORT to the BOARD OF SUPERVISORS
Tuesday, October 13, 2026
7:00 p.m.
107 NORTH KENT STREET, WINCHESTER, VIRGINIA

The Parks and Recreation Commission met on Tuesday, October 13, 2026. Members present were Gary Longerbeam, Vaughn Whitacre, Patrick Anderson, Michael Stottlemyer, Randy Carter, Chris Luebecke, and Charles R. Sandy, Jr. Non-voting Board of Supervisors Liaison; Mr. Robert Liero.

Members absent: Dennis Grubbs.

ITEMS REQUIRING ACTION BY BOARD OF SUPERVISORS:

1. None

ITEMS SUBMITTED FOR INFORMATION ONLY

1. Mr. Anderson made a motion to accept the FY 28 Youth Sports Partner contracts as presented, seconded by Mr. Stottlemyer carried unanimously (7-0).

2. Mr. Stottlemyer made a motion to accept the FY 28 Fees and Charges as presented, seconded by Mr. Luebcke, carried unanimously (7-0).

3. The Buildings and Grounds Committee provided an update on the Sherando Park Playground replacement progress. The Committee reviewed proposals from various vendors and directed staff to move forward with Miracle Playgrounds representative from Metro Recreation.

Cc: Randy Carter, Chairperson
Robert Liero, Liaison, Frederick County Board of Supervisors

Board of Supervisors
Agenda Item Detail
Meeting Date: October 28, 2026
Agenda Section: Consent Agenda

Title: Acceptance of Public Safety Committee Report of October 15, 2026

Attachments:
BOS10-28-26PublicSafetyCommReportOctober20265.pdf

PUBLIC SAFETY COMMITTEE REPORT to the BOARD OF SUPERVISORS
Thursday October 15, 2026
8:30 a.m.
1080 COVERSTONE DRIVE, WINCHESTER, VIRGINIA

ATTENDEES:

Committee Members Present: Chairman Bob Wells, Gary Oates, Marv Davis, Helen Lake and Rodney Snapp. Mike Guevremont and Chuck Torpy were absent.

Staff and guests present: Major Steve Hawkins, Fire & Rescue Chief Steve Majchrzak, Communications Director Ginger Whitacre, Deputy County Administrator Wyatt Pearson, County Attorney Andrew Fox, Captain Warren Gosnell and Sheriff Millholland.

ITEMS REQUIRING ACTION BY BOARD OF SUPERVISORS:

1. None

ITEMS FOR INFORMATION ONLY:

1. **Public Safety Communications Department update:**

   Director Whitacre discussed the department's many updates over the past several months, including a PSB dedicated firewall, resiliency/redundancy upgrades and interoperability with the City of Winchester. VDEM grants have been used to purchase new AI software, upgrades to the call handling system, installation of 2 new consoles and add many new dispatch programs to keep pace with technology. She mentioned that the department is currently in the hiring process and that a dedicated Communications IT professional would be beneficial in the future with all the technological changes within the department.

2. **Sheriff's Office update:**

   Sheriff Millholland updated the committee on the recent USPS check thefts, stating that the Office of the Inspector General is still looking into the cases. The BlueLine Solutions program has generated over $500,000 in funds since its inception, and speeds within the school zones are decreasing. Captain Gosnell stressed that these cameras are not license plate reader (LPR) cameras, such as Flock. Mr. Fox has been working with the Sheriff's Office on a County ordinance regulating e-bikes/scooters. Supervisor Oates requested the County post this ordinance on the website and garner feedback from the public. As with other departments, the Sheriff's Office struggles with hiring/retaining quality

personnel, and finding ways to incentivize candidates is challenging.

3. **Fire & Rescue Department update (see attached):**

Chief Majchrzak presented a rendering of Station 22. In early November, the building plans will be submitted and will then go through the RFP process for bids. At this time, 15 builders have been pre-approved. He discussed a FEMA grant that would be used for recruitment, retention and training of volunteers, and gave an update on the 2 current academies for trainees and EMTs. These programs will better position volunteer companies for success. The Chief echoed the challenges faced with staffing and finding candidates for open positions within his department.

4. **Other business:**

Marv Davis advised that the FEMA CERT team is underway and actively training. They will be drafting an organizational plan/long-term vision for this volunteer team and intend to present it to this Committee for input at a later date, and then to the Board of Supervisors as an informational item.

Respectfully submitted,

Public Safety Committee

Bob Wells
Gary Oates
Mike Guevremont
Marv Davis
Helen Lake
Chuck Torpy
Rodney Snapp

Board of Supervisors
Agenda Item Detail
Meeting Date: October 28, 2026
Agenda Section: Consent Agenda

Title: Acceptance of Finance Committee Report of October 21, 2026

Attachments:
BOS10-28-26FinanceCommReportOctober2026.pdf

REPORT AND RECOMMENDATIONS
FINANCE COMMITTEE
WEDNESDAY, OCTOBER 21, 2026
8:30 AM
FIRST FLOOR CONFERENCE ROOM
107 NORTH KENT STREET
WINCHESTER, VA 22601

ATTENDEES

Committee Members Present: Gary Oates, Chairman; Al Orndorff; Jason Aikens; Chad DeHaven; Don Priceand Angela Wiseman.

Committee Members Absent: none.

Non-Voting Liaisons Present: Tonya Sibert, Commissioner of the Revenue; and William Orndoff, Treasurer.

Staff Present: Sharon Kibler, Finance Director; Melody Ramey, Accounting Manager; Michael Bollhoefer, County Administrator; Jay Tibbs, Deputy County Administrator; Wyatt Pearson, Deputy County Administrator; Missi Neal, Budget & Risk Manager; Nick Pearson, Finance Specialist; Karen Orndorff, Purchasing Manager; Nick Sabo, WRAA Executive Director; and John Jewell, BOS Chairman.

Others Present: Kristen Anderson, FCPS Executive Director of Finance; George Hummer, FCPS Superintendent.

A. **Consent Agenda** – The following item(s) could be considered on consent if the committee chooses. No local County funds are required.

The committee recommends approval of the consent agenda.

A.1. The WRAA Executive Director requests Airport Operating Fund and Airport Capital Fund supplemental appropriations in the amount of $125,000 for hangar facility roof repair. Request has been approved by the WRAA Board of Directors. No local County funds are required.

SA Airport Roof Repair.pdf

A.2. The WRAA Executive Director requests an Airport Operating Fund supplemental appropriation of $11,000 and an Airport Capital Fund

supplemental appropriation of $110,000 for security upgrades. Request has been approved by the WRAA Board of Directors. No local County funds are required.

SA Airport Security Project.pdf

B. **Information & Discussion Items** – The following item(s) are presented for committee information and discussion. No action is required.

B.1. The Finance Director provided a report on FY 2026 General Fund revenues and expenditures, and the transfer to the County Capital Fund.

Frederick_County_FY2026_Report_v7_Final_Review.pdf

C. **Discussion & Action Items** – The following item(s) are presented to the committee for discussion and action.

C.1. The FCPS Executive Director of Finance provides the FY 2026 Year End School Board Funds Financial Report and requests the following supplemental appropriations:

- C.1.a School Capital Projects Fund carry forward appropriation of $1,962,621 for the Sherando High School HVAC capital project.

  The committee recommends approval.

- C.1.b Textbook Fund supplemental appropriation of $189,419.60 representing interest earnings.

  The committee recommends approval.

- C.1.c General Fund and School Capital Projects Fund supplemental appropriations of $1,065,946 representing the unobligated surplus from the FY 2026 School Operating Fund to be used for HVAC replacements and playground equipment replacements.

  The committee recommends approval.

FCPS SA.pdf
FY26 School Board Funds Financial Report.pdf

Finance Committee
Agenda Item Detail
Meeting Date: October 21, 2026
Agenda Section: ATTENDEES

Title: Committee Members Present: Gary Oates, Chairman; Al Orndorff; Jason Aikens; Chad DeHaven; Don Priceand Angela Wiseman.

Committee Members Absent: none.

Non-Voting Liaisons Present: Tonya Sibert, Commissioner of the Revenue; and William Orndoff, Treasurer.

Staff Present: Sharon Kibler, Finance Director; Melody Ramey, Accounting Manager; Michael Bollhoefer, County Administrator; Jay Tibbs, Deputy County Administrator; Wyatt Pearson, Deputy County Administrator; Missi Neal, Budget & Risk Manager; Nick Pearson, Finance Specialist; Karen Orndorff, Purchasing Manager; Nick Sabo, WRAA Executive Director; and John Jewell, BOS Chairman.

Others Present: Kristen Anderson, FCPS Executive Director of Finance; George Hummer, FCPS Superintendent.

Attachments:

Finance Committee
Agenda Item Detail
Meeting Date: October 21, 2026
Agenda Section: Consent Agenda

Title: The WRAA Executive Director requests Airport Operating Fund and Airport Capital Fund supplemental appropriations in the amount of $125,000 for hangar facility roof repair. Request has been approved by the WRAA Board of Directors. No local County funds are required.

Attachments:
SA Airport Roof Repair.pdf

WINCHESTER REGIONAL AIRPORT
491 AIRPORT ROAD
WINCHESTER, VIRGINIA 22602
(540) 662-5786

MEMORANDUM

To: Sharon Kibler, Frederick County Finance Director

From: Nick Sabo, Winchester Regional Airport Authority Executive Director

Date: October 9, 2026

RE: Finance Committee Agenda Item | Appropriation for Roof Repair

---

The Winchester Regional Airport Authority (WRAA) requests to appropriate funds for a building maintenance project that was not included in the FY2027 budget. The project scope includes a comprehensive repair to hangar facility that is home to several businesses. The roof is 30 years old and has had several leaks and failures. The project was approved by the WRAA Board of Directors at its October 8, 2026 regular business meeting. All project costs will be paid by WRAA funds; therefore, no County funds are required.

Expense: 4 - 085 - 081030 - 8801 - 000 - TBD, Hangar 615 Roof Repair, $125,000

Revenue: 3 - 085 - 051050 - 0003, Transfer from Airport Operating Fund, $125,000

We appreciate the support of Frederick County. Please advise if you have questions or need additional information.

Finance Committee
Agenda Item Detail
Meeting Date: October 21, 2026
Agenda Section: Consent Agenda

Title: The WRAA Executive Director requests an Airport Operating Fund supplemental appropriation of $11,000 and an Airport Capital Fund supplemental appropriation of $110,000 for security upgrades. Request has been approved by the WRAA Board of Directors. No local County funds are required.

Attachments:
SA Airport Security Project.pdf

WINCHESTER REGIONAL AIRPORT
491 AIRPORT ROAD
WINCHESTER, VIRGINIA 22602
(540) 662-5786

MEMORANDUM

To: Sharon Kibler, Frederick County Finance Director

From: Nick Sabo, Winchester Regional Airport Authority Executive Director

Date: October 9, 2026

RE: Finance Committee Agenda Item | Appropriation for Security Project

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The Winchester Regional Airport Authority (WRAA) requests to appropriate funds for a security project that was not included in the FY2027 budget. The project scope includes necessary upgrades to vehicle gates, access control systems, and cameras. The project was approved by the WRAA Board of Directors at its October 8, 2026 regular business meeting and is eligible for 90% reimbursement through a grant from the Virginia Department of Aviation (DOAV). The 10% local match will be paid by WRAA funds; therefore, no County funds are required.

Expense: 4 - 085 - 081030 - 8801 - 000 - TBD, Security Project, $110,000

Revenue: 3 - 085 - 024040 - 0012, State Reimbursement, $99,000
3 - 085 - 051050 - 0003, Transfer from Airport Operating Fund, $11,000

We appreciate the support of Frederick County. Please advise if you have questions or need additional information.

Finance Committee
Agenda Item Detail
Meeting Date: October 21, 2026
Agenda Section: Information & Discussion Items

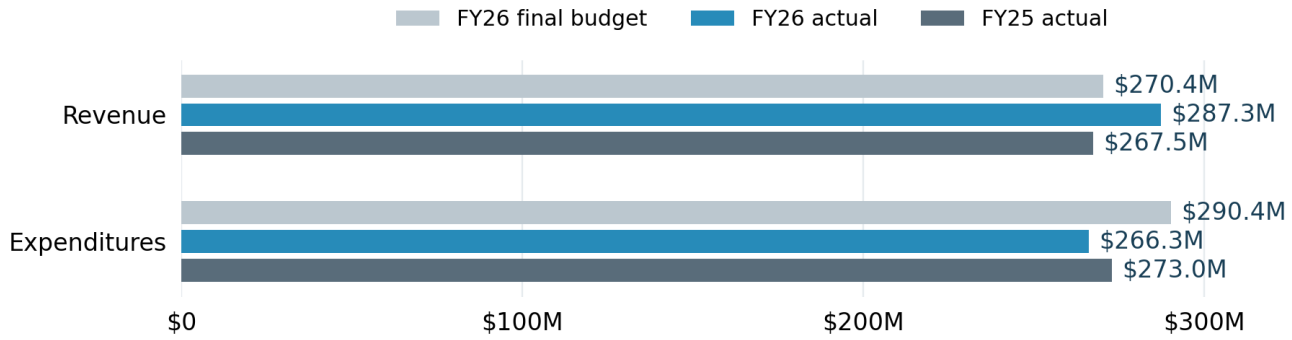
Title: The Finance Director provided a report on FY 2026 General Fund revenues and expenditures, and the transfer to the County Capital Fund.

Attachments:
Frederick_County_FY2026_Report_v7_Final_Review.pdf

Frederick County FY 2026 General Fund
Year End Report on Revenues and Expenditures

General Fund results and proposed County Capital Fund transfer

Revenue and transfers-in	Expenditures and transfers-out
$287.3 million	**$266.3 million**
$16.9 million above budget | 6.3%	**$24.1 million below budget | 8.3%**
FY25 actual $267.5 million | FY26 increase 7.4%	FY25 actual $273.0 million | FY26 decrease 2.5%



Revenue exceeded expenditures by $21.1 million

After year-end reservations for restricted receipts and carryforward funding, the net result closes to General Fund unreserved fund balance.

Proposed transfer to the County Capital Fund

$20.7 million

For future capital needs

Unreserved balance after FY26 close, carryforwards, and reappropriations	Less the amount retained under the 20% policy	Proposed Capital Fund transfer
$81.70 million	**($61.01 million)**	**$20.69 million**

The proposed transfer is based on the current unreserved balance and the FY 2027 budget, assuming approval of the pending $1,065,946 school operating reappropriation for capital. The next page shows the calculation and its effect on capital resources.

Results are substantially final and unaudited. Revenue and expenditures include transfers. Supporting detail is in the appendices.

Proposed transfer for future capital needs

$20.7 million proposed for the County Capital Fund

County policy transfers General Fund unreserved resources above 20% of the current General Fund budget to the County Capital Fund. The calculation assumes approval of the pending $1,065,946 school operating reappropriation for capital. It would leave $61.0 million in the General Fund under the policy.

How the proposed transfer is calculated

General Fund policy calculation	Amount
Unreserved balance after the pending reappropriation	$81,698,549
Amount retained under the 20% policy	($61,007,562)
Proposed transfer to the County Capital Fund	$20,690,986

The retention amount is 20% of the $305,037,813 FY 2027 General Fund budget after adding the pending $1,065,946 school operating reappropriation for capital to the current amended $303,971,867 budget. The updated unreserved balance already deducts the pending request. The transfer remains subject to its approval and final reconciliation. Appendix C provides the calculation.

What the transfer would mean for capital resources

The Capital Fund ended FY 2026 with $31.56 million. The table traces that balance through budgeted FY 2027 capital funding and subsequent allocations, then shows the proposed transfer and previously committed capital needs.

Capital Fund planning calculation	Amount
Balance at June 30, 2026	$31.56 million
Budgeted FY2027 County and school capital	($7.50 million)
CEA reserve transfer from FY2025 solar siting funds	($0.30 million)
Old Charlestown Road Park grant match	($2.79 million)
Balance after FY2027 allocations through October 15	$20.97 million
Proposed transfer from General Fund results	$20.69 million
Balance including the proposed transfer	$41.66 million
Fire Station 22 construction commitment	($8.29 million)
Radio supplement estimate	($5.00 million)
Projected balance after the listed needs	$28.37 million

The $28.37 million projection depends on the proposed transfer and includes only the commitments and estimate listed above. Station 22 construction excludes furnishings, and the radio supplement remains an estimate. The projection is a planning amount, separate from the June 30 balance.

Capital Fund activity and historical additions are in Appendix D. General Fund reserves for specific purposes are listed separately in Appendix E.

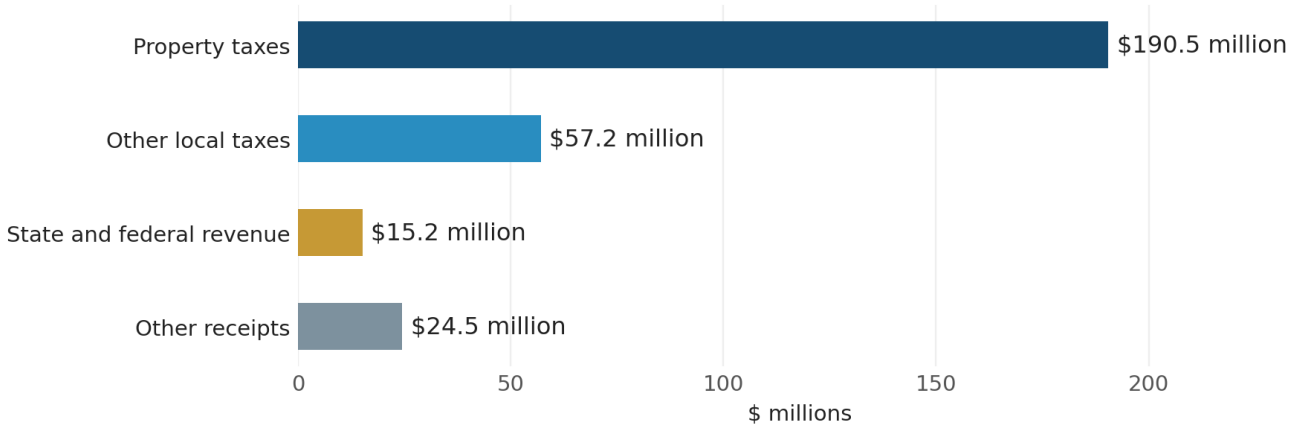
Appendix A General Fund revenue

Revenue totaled $287,347,238, exceeding the final budget by $16,932,117, or 6.3%. Receipts were 7.4% above FY 2025. Positive variances mean receipts exceeded budget.

Revenue source	FY26 final budget	FY26 actual	FY26 budget variance	FY26 receipts to reserve	FY25 actual	Change vs FY25
Property Taxes	176,225,816	190,494,298	14,268,482 8.1% above	—	172,095,041	+10.7%
Other Local Taxes	56,564,743	57,165,340	600,597 1.1% above	—	54,297,221	+5.3%
Permits, Fees & Licenses	2,808,500	2,573,534	(234,966) 8.4% below	—	2,485,674	+3.5%
Fines & Forfeitures	262,000	1,275,327	1,013,327 386.8% above	1,002,814	335,356	+280.3%
Interest, Rent & Salvage	4,389,116	4,619,870	230,754 5.3% above	—	4,535,780	+1.9%
Charges for Services	4,418,024	4,045,018	(373,006) 8.4% below	70,185	3,971,676	+1.8%
Miscellaneous	399,567	843,030	443,463 111.0% above	445,127	640,865	+31.5%
Recovered Costs	2,110,026	5,686,146	3,576,120 169.5% above	2,882,713	8,282,655	-31.3%
Transfers	5,461,271	5,461,335	64 0.0% above	—	5,672,082	-3.7%
State Revenue	17,283,297	14,690,992	(2,592,305) 15.0% below	—	14,809,703	-0.8%
Federal Revenue	492,761	492,348	(413) 0.1% below	—	366,978	+34.2%
Total	**270,415,121**	**287,347,238**	**16,932,117 6.3% above**	**4,400,839**	**267,493,031**	**+7.4%**

FY26 budget variance compares actual with budget; its percentage uses the budget. Change vs FY25 compares actuals using FY25 as the base. Receipts to reserve are already included in FY26 actual and identify amounts designated for year-end reserves. Appendix E combines receipts and other recorded reserve additions in its FY26 activity column.

Revenue by major source



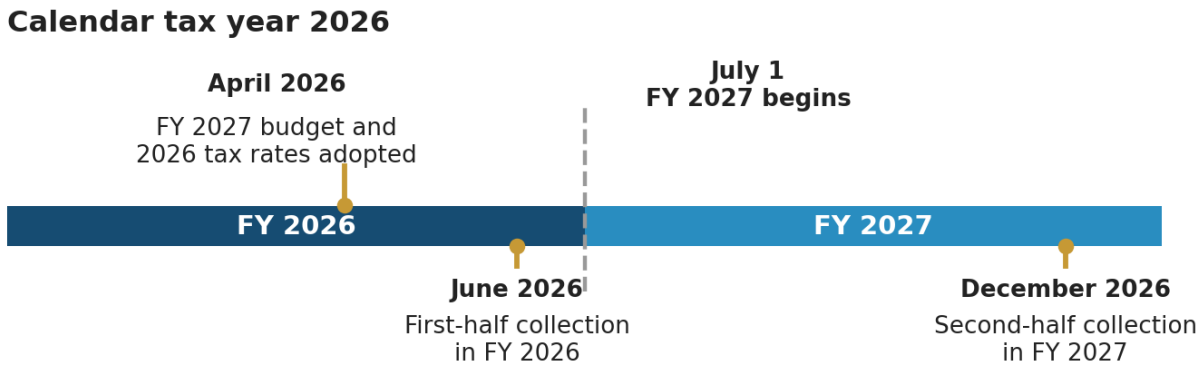
Appendix A Property tax detail

Property tax receipts were $14,268,482 above the final budget. Real estate and personal property accounted for $11,864,638 of that difference.

Property tax source	FY26 final budget	FY26 actual	FY26 budget variance	FY25 actual	Change vs FY25
Real Estate	89,655,000	97,367,380	7,712,380 8.6% above	84,854,328	+14.7%
Public Service	2,500,000	3,581,212	1,081,212 43.2% above	2,399,714	+49.2%
Personal Property	71,537,000	75,689,258	4,152,258 5.8% above	72,080,643	+5.0%
Machinery & Tools	9,533,816	9,897,344	363,528 3.8% above	9,334,083	+6.0%
Short Term Rental Tax	300,000	428,624	128,624 42.9% above	343,474	+24.8%
Penalties & Interest	2,300,000	3,093,641	793,641 34.5% above	2,727,690	+13.4%
Admn Fees - Treasurer	400,000	436,839	36,839 9.2% above	355,109	+23.0%
Total	**176,225,816**	**190,494,298**	**14,268,482 8.1% above**	**172,095,041**	**+10.7%**

Timing of the tax collections

Calendar-year 2026 rates applied to the June and December 2026 bills. June collections were received in FY 2026; December collections fall in FY 2027. The tax-rate adoption date therefore differs from the fiscal year in which some of the resulting revenue was received.



The full budget variances also reflect supplements, abatements, and collection results. The amounts above should not be treated as a forecast of additional revenue beyond the adopted FY 2027 budget.

FY26 variance compares actual with budget; variance % uses the FY26 budget. Change vs FY25 compares actuals using FY25 as the base.

Appendix A Other local taxes

Other local taxes totaled $57,165,340, exceeding the FY 2026 final budget by $600,597 (1.1%). Receipts increased $2,868,119 (5.3%) from FY 2025 actuals.

Other local tax source	FY26 final budget	FY26 actual	FY26 budget variance	FY25 actual	Change vs FY25
Sales Tax	24,134,152	23,356,127	(778,025) 3.2% below	22,916,890	+1.9%
Communications Tax	1,000,000	842,527	(157,473) 15.7% below	876,155	-3.8%
Utility Tax	4,050,000	4,275,549	225,549 5.6% above	3,891,253	+9.9%
Business License	11,240,000	11,748,624	508,624 4.5% above	11,265,112	+4.3%
Motor vehicle licenses and auto rental	2,700,000	3,491,848	791,848 29.3% above	2,795,786	+24.9%
Bank Stock & Franchise Tax	700,000	868,470	168,470 24.1% above	756,302	+14.8%
Wills & Recordation Tax	2,420,858	2,753,338	332,480 13.7% above	2,354,070	+17.0%
Meals & Lodging Tax	10,287,383	9,796,722	(490,661) 4.8% below	9,409,172	+4.1%
Street Lights/Star Fort Fees	32,350	32,135	(215) 0.7% below	32,481	-1.1%
Total	**56,564,743**	**57,165,340**	**600,597 1.1% above**	**54,297,221**	**+5.3%**

Motor vehicle license and auto rental receipts were $791,848 above budget, and business license receipts were $508,624 above budget. These increases helped offset lower-than-budget receipts from sales tax, communications tax, and meals and lodging taxes.

Budget variance compares FY26 actual with the FY26 final budget; variance % uses that budget. Change vs FY25 compares actuals using FY25 as the base.

Appendix A Revenue explanations

Property taxes include $12.7 million in state personal property tax relief payments. Other receipts in the chart include transfers, fees, charges, interest, and reimbursements. Approximately $4.4 million of FY 2026 receipts is designated for reservation for specific uses. These receipts are already included in actual revenue and in the reported cumulative reserve balances in Appendix E.

Why some receipts exceeded budget

Recovered costs included $2.88 million in proffer receipts, and miscellaneous revenue included $378,541 in opioid settlement receipts. Neither can be budgeted by the County; receipt of these funds creates a favorable revenue variance while reserving the money for its designated uses. Photo enforcement generated $1.00 million in receipts, explaining nearly all the $1.01 million fines and forfeitures variance.

State revenue

State grant receipts for Parks, the Sheriff, and emergency services were collectively $2.19 million below budget. The corresponding budgeted expenditures were not incurred, so the revenue shortfall should be considered together with those unspent appropriations.

Appendix B General Fund expenditures

Expenditures and transfers totaled $266,280,209, or 91.7% of the final budget, compared with $272,999,153 in FY 2025. The $24,149,389 difference from the FY 2026 budget includes funding for reappropriation (carryforward) into FY 2027.

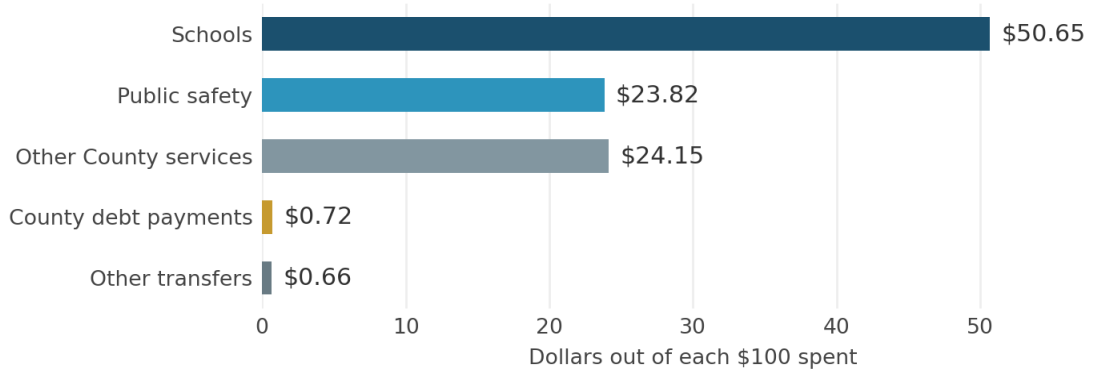
Category	FY26 budget	FY26 actual	FY26 budget variance	Carryforward	FY26 remaining budget	FY25 actual
Administration	20,788,836	19,101,802	1,687,034	47,206	1,639,828	17,779,963
Judicial	4,234,492	3,760,635	473,857	0	473,857	3,685,552
Public Safety	71,741,746	63,439,587	8,302,159	2,540,868	5,761,291	61,599,113
Public Works	10,024,174	7,094,002	2,930,172	2,036,565	893,607	7,502,689
Health & Welfare	14,640,799	12,935,066	1,705,733	0	1,705,733	12,176,335
Community College	91,983	91,983	0	0	0	68,750
Parks, Rec & Cultural	17,852,261	13,338,103	4,514,158	4,074,889	439,269	10,577,136
Community Development	8,085,687	7,974,202	111,485	4,007	107,478	3,806,819
Transfers	142,969,620	138,544,829	4,424,791	2,118,688	2,306,103	155,802,796
Total	**290,429,598**	**266,280,209**	**24,149,389**	**10,822,223**	**13,327,166**	**272,999,153**

How to read the carryforward column

The carryforward column includes $10,822,223 of funding continuing into FY 2027: $4,699,946 in County purchase orders, $1,592,810 in school purchase orders, $525,878 in approved school obligated funding, and $4,003,589 in approved carryforwards and prior-year funding. School amounts appear under Transfers; other approved funding is included in the applicable categories and departments.

Remaining budget equals the FY 2026 budget less actual expenditures and the full carryforward amount. The total is $13,327,166 after all identified continuing funding. The column is not a measure of resources available for new spending. The pending $1,065,946 school operating reappropriation for capital is excluded from carryforwards.

Where each $100 of General Fund spending went



Major reasons for the expenditure differences

The $24.15 million budget difference includes $6.56 million in salaries and benefits, $8.72 million in capital items, and $3.18 million in school operating transfers. Capital items include $4.26 million in outstanding purchase orders. Appendix B explains these differences and the funding continuing into FY 2027.

FY26 variance = budget less actual; remaining budget also deducts all listed carryforwards. FY25 actuals appear at the far right.

Appendix B Funding continuing into FY 2027

Identified continuing funding totals $10,822,223. The separate $1,065,946 request for school capital projects is pending approval and is excluded below. Amounts are rounded to whole dollars.

Continuing funding	Amount
County outstanding purchase orders	$4,699,946
School operating outstanding purchase orders	$1,592,810
School operating obligated funds	$525,878
Approved carryforwards and prior-year funding	$4,003,589
Total continuing into FY 2027	**$10,822,223**

Approved carryforwards and prior year funding

Item in the FY 2027 fund balance schedule	Amount
IT Cognos project	$3,887
IT evaluation project	$32,097
Fire Company Capital	$344,876
Forfeited asset funds	$244,372
Parks SGEMF	$40,481
HR Laserfiche project	$11,222
Maintenance projects	$20,723
Abrams Creek project	$2,351,656
CAB roof funding	$744,000
VCE VT salaries	$4,007
Sherando Park project	$67,814
Sheriff impound lot building funds	$138,454
Total approved carryforwards and prior-year funding	**$4,003,589**

Approved carryforwards and prior-year funding are included in the expenditure tables. Rounded individual items may not sum to the rounded total.

Appendix B What explains expenditure differences

The $24.15 million difference between final budget and actual spending includes ongoing commitments and restricted or designated funding.

Spending group	FY26 final budget	FY26 actual	FY26 budget variance
Capital items	14,491,856.63	5,766,859.21	8,724,997.42
Salaries and benefits	83,767,651.70	77,203,035.99	6,564,615.71
School operating transfer	115,634,347.32	112,449,713.92	3,184,633.40
All other accounts, net	76,535,742.88	70,860,599.90	5,675,142.98
Total	**290,429,598.53**	**266,280,209.02**	**24,149,389.51**

Salaries and benefits

Salaries and benefits were $6.56 million below their combined budget, or 7.8%. They explain about 27% of the overall budget-to-actual difference. The largest combined personnel differences were in Social Services ($1.68 million), the Sheriff ($1.50 million), Fire and Rescue ($0.97 million), and Public Safety Communications ($0.63 million).

Capital items and school funding

The $8.72 million capital difference includes $4.26 million in outstanding County purchase orders that carry forward to FY 2027. The $2.35 million Parks Administration improvements balance corresponds to Abrams Creek funding in the approved carryforward schedule. These are overlapping parts of the identified continuing funding, rather than additional amounts available to spend.

The Sheriff's main vehicle and equipment account had $1,165,004 in unspent appropriations, almost entirely covered by $1,165,003 in outstanding purchase orders. County Office Buildings capital accounts were $1.84 million below budget, including $1.04 million in outstanding purchase orders. These commitments explain substantial parts of the departmental budget differences.

The $3.18 million school operating transfer difference includes school purchase orders and obligated funds continuing into FY 2027, together with the separate request for school capital projects. The carryforward schedule identifies those amounts and distinguishes funding already obligated from the pending request.

Appendix B Administration and judicial services

Administration

Department	FY26 budget	FY26 actual	FY26 budget variance	Carryforward	FY26 remaining budget	FY25 actual
Board of Supervisors	489,712	457,408	32,304	0	32,304	606,848
County Administrator	1,134,434	1,030,542	103,892	0	103,892	980,512
County Attorney	566,135	473,117	93,018	0	93,018	398,634
Human Resources	1,163,308	976,566	186,742	11,222	175,520	924,208
County Communications	13,847	13,847	0	0	0	0
Independent Auditor	86,400	86,400	0	0	0	80,000
Comm of the Revenue	2,224,413	2,125,667	98,746	0	98,746	2,072,949
Reassessment	643,831	502,702	141,129	0	141,129	491,151
Treasurer	2,357,251	2,185,190	172,061	0	172,061	2,054,042
Finance	1,431,320	1,329,820	101,500	0	101,500	1,378,428
IT	3,356,997	3,077,732	279,265	35,984	243,281	3,028,283
MIS	731,097	592,973	138,124	0	138,124	686,708
Other	5,876,726	5,601,740	274,986	0	274,986	4,505,909
Electoral Board	337,114	327,013	10,101	0	10,101	247,622
Registrar	376,251	321,085	55,166	0	55,166	324,669
Total	**20,788,836**	**19,101,802**	**1,687,034**	**47,206**	**1,639,828**	**17,779,963**

Judicial services

Department	FY26 budget	FY26 actual	FY26 budget variance	Carryforward	FY26 remaining budget	FY25 actual
Circuit Court	156,368	113,926	42,442	0	42,442	94,154
General District Court	24,544	10,815	13,729	0	13,729	10,087
J&D Court	34,735	17,188	17,547	0	17,547	16,111
Clerk of Circuit Court	1,302,634	1,126,115	176,519	0	176,519	1,054,960
Law Library	12,200	22,083	(9,883)	0	(9,883)	17,541
Commonwealth Attorney	2,459,179	2,226,701	232,478	0	232,478	2,269,040
Victim Witness	244,832	243,807	1,025	0	1,025	223,659
Total	**4,234,492**	**3,760,635**	**473,857**	**0**	**473,857**	**3,685,552**

FY26 variance = budget less actual; remaining budget also deducts listed carryforwards. FY25 actuals appear at the far right for comparison.

Appendix B Public safety and public works

Public safety

Department	FY26 budget	FY26 actual	FY26 budget variance	Carryforward	FY26 remaining budget	FY25 actual
Sheriff	28,769,249	24,246,014	4,523,235	1,988,054	2,535,181	23,399,395
Volunteer Fire	2,577,475	2,189,785	387,690	343,811	43,879	1,446,699
Volunteer Rescue	430,960	430,960	0	0	0	429,216
Jail & Juvenile Detention	7,122,643	7,122,643	0	0	0	7,719,314
Juvenile Court	159,729	152,885	6,844	0	6,844	142,995
Inspections	1,993,343	1,870,273	123,070	0	123,070	1,808,704
Fire & Rescue	27,506,288	25,102,859	2,403,429	156,350	2,247,079	24,630,767
Public Safety Communications	3,182,059	2,324,168	857,891	52,653	805,238	2,022,023
Total	**71,741,746**	**63,439,587**	**8,302,159**	**2,540,868**	**5,761,291**	**61,599,113**

Public works

Department	FY26 budget	FY26 actual	FY26 budget variance	Carryforward	FY26 remaining budget	FY25 actual
Road Administration	23,500	14,403	9,097	0	9,097	20,845
Street Lights & Star Fort	32,350	31,145	1,205	0	1,205	30,426
Engineering	761,419	732,626	28,793	0	28,793	661,588
Refuse Collection	1,902,117	1,725,643	176,474	0	176,474	1,731,169
Refuse Disposal	913,908	836,450	77,458	0	77,458	701,858
Litter Control	41,762	5,791	35,971	0	35,971	6,176
Maintenance Administration	948,918	868,424	80,494	0	80,494	870,590
County Office Buildings	4,114,448	1,960,372	2,154,076	1,801,401	352,675	2,359,534
Animal Shelter	1,285,752	919,148	366,604	235,164	131,440	1,120,504
Total	**10,024,174**	**7,094,002**	**2,930,172**	**2,036,565**	**893,607**	**7,502,690**

FY26 variance = budget less actual; remaining budget also deducts listed carryforwards. FY25 actuals appear at the far right for comparison. Public Works FY25 department rows total $7,502,690; the source category control is $7,502,689. The $1 difference is due to whole-dollar source rounding.

Appendix B Other services

Health and welfare

Department	FY26 budget	FY26 actual	FY26 budget variance	Carryforward	FY26 remaining budget	FY25 actual
Local Health Department	679,091	679,091	0	0	0	507,110
Chapter 10 Board	506,265	506,265	0	0	0	482,157
Social Services	12,043,444	9,907,840	2,135,604	0	2,135,604	9,742,250
Area Agency on Aging	69,300	69,300	0	0	0	69,300
Property Tax Relief	1,342,699	1,772,570	(429,871)	0	(429,871)	1,375,518
Total	**14,640,799**	**12,935,066**	**1,705,733**	**0**	**1,705,733**	**12,176,335**

Community college

Department	FY26 budget	FY26 actual	FY26 budget variance	Carryforward	FY26 remaining budget	FY25 actual
Community College	91,983	91,983	0	0	0	68,750
Total	**91,983**	**91,983**	**0**	**0**	**0**	**68,750**

Parks recreation and cultural

Department	FY26 budget	FY26 actual	FY26 budget variance	Carryforward	FY26 remaining budget	FY25 actual
Parks & Rec Administration	3,844,938	1,478,212	2,366,726	2,392,137	(25,411)	1,456,533
Rec Centers & Playgrounds	4,638,662	4,275,293	363,369	0	363,369	4,148,023
Clearbrook Park	3,278,129	2,484,954	793,175	748,197	44,978	1,574,134
Sherando Park	4,463,209	3,472,321	990,888	934,555	56,333	1,848,140
Regional Library	1,627,323	1,627,323	0	0	0	1,550,306
Total	**17,852,261**	**13,338,103**	**4,514,158**	**4,074,889**	**439,269**	**10,577,136**

FY26 variance = budget less actual; remaining budget also deducts listed carryforwards. FY25 actuals appear at the far right for comparison.

Appendix B Community development and transfers

Community development

Department	FY26 budget	FY26 actual	FY26 budget variance	Carryforward	FY26 remaining budget	FY25 actual
Planning	1,831,544	1,745,552	85,992	0	85,992	1,629,316
EDA	5,745,601	5,745,601	0	0	0	1,706,707
Zoning Board	12,421	10,214	2,207	0	2,207	10,384
Building Appeals	561	0	561	0	561	0
NSV Regional Commission	98,852	98,852	0	0	0	95,521
Soil & Water	15,000	13,283	1,717	0	1,717	13,283
Extensions	381,708	360,700	21,008	4,007	17,001	351,608
Total	**8,085,687**	**7,974,202**	**111,485**	**4,007**	**107,478**	**3,806,819**

Transfers

Department	FY26 budget	FY26 actual	FY26 budget variance	Carryforward	FY26 remaining budget	FY25 actual
FCPS Total	138,051,450	134,866,817	3,184,633	2,118,688	1,065,945	135,678,309
County Debt Service	1,933,959	1,914,370	19,589	0	19,589	1,916,838
Transportation	0	0	0	0	0	464,789
Capital, Contingency & COLA	2,984,211	1,763,642	1,220,569	0	1,220,569	17,742,860
Total	**142,969,620**	**138,544,829**	**4,424,791**	**2,118,688**	**2,306,103**	**155,802,796**

Why transfers decreased from FY 2025

Transfers-out decreased $17,257,967 (11.1%), from $155,802,796 in FY 2025 to $138,544,829 in FY 2026. Most of the decrease came from the transfer to the Capital Fund under the 20% policy, which fell from $17.4 million recorded in FY 2025 to $2.2 million recorded in FY 2026. Those transfers arose from FY 2024 and FY 2025 results, respectively.

The proposed $20,690,986.72 transfer from FY 2026 results would be recorded in FY 2027 and is excluded from FY 2026 expenditures. Total General Fund expenditures and transfers fell $6.7 million (2.5%) from FY 2025 because the decrease in transfers-out was partly offset by $10.5 million of additional spending in the other categories.

FY26 variance = budget less actual; remaining budget also deducts listed carryforwards. FY25 actuals appear at the far right for comparison. FCPS means Frederick County Public Schools.

Appendix C Proposed capital transfer calculation

County practice applies the 20% retention calculation to the current FY 2027 General Fund budget, including approved reappropriations. The pending $1,065,946 school operating reappropriation for capital would reduce unreserved balance and increase the budget used for the policy calculation.

Budget used to calculate retention

FY 2027 budget used for policy calculation	Amount
Current General Fund budget including approved reappropriations	$303,971,867.14
Proposed school operating reappropriation for capital	$1,065,946
Budget assuming approval of the pending request	$305,037,813.14
20% retained in the General Fund	$61,007,562.63

Transfer assuming school approval

Unreserved balance calculation	Amount
Current unreserved balance including approved reappropriations	$82,764,495.35
Less pending school operating reappropriation for capital	($1,065,946.00)
Balance after the pending request per updated schedule	$81,698,549.35
Less 20% retention amount	($61,007,562.63)
Proposed transfer to County Capital Fund	$20,690,986.72

The proposed $20,690,986.72 transfer would leave $61,007,562.63 in General Fund unreserved balance. The pending $1,065,946 request increases the 20% retention requirement by $213,189.20.

The updated $81,698,549.35 balance already reflects the pending request, approved reappropriations, $4,003,588.88 in other prior funding and carryforwards, and $277,857 in refunds. These amounts are not deducted again. The pending school operating reappropriation for capital is a proposed FY 2027 action, rather than an FY 2026 expenditure.

Relationship to the annual operating result

FY 2026 revenues and transfers-in exceeded expenditures and transfers-out by $21,067,029. After year-end reservations and carryforward adjustments, the net result closes to unreserved fund balance. The proposed $20,690,986 capital transfer applies the County's 20% retention policy to the current unreserved balance, which also includes prior balances and subsequent activity.

Approved reappropriations are included in the starting figures.

Appendix D County Capital Fund activity

The Capital Fund record shows $31,563,436 at June 30, 2026, a decline of $14,229,421 during FY 2026. The entries below are recorded allocations and transfers.

FY 2026 Capital Fund activity	Amount
Beginning ledger balance, July 1, 2025	$45,792,858
FY 2025 excess General Fund transfer	$2,240,347
Interest earnings	$1,076,201
Station 22 architecture and engineering	($1,084,718)
Budgeted FY 2026 transportation allocation	($7,000,000)
Budgeted FY 2026 school capital allocation	($4,000,000)
Budgeted FY 2026 County capital allocation	($3,955,775)
Sherando park land acquisition	($1,505,476)
Ending ledger balance, June 30, 2026	$31,563,436

Activity and identified needs after year end

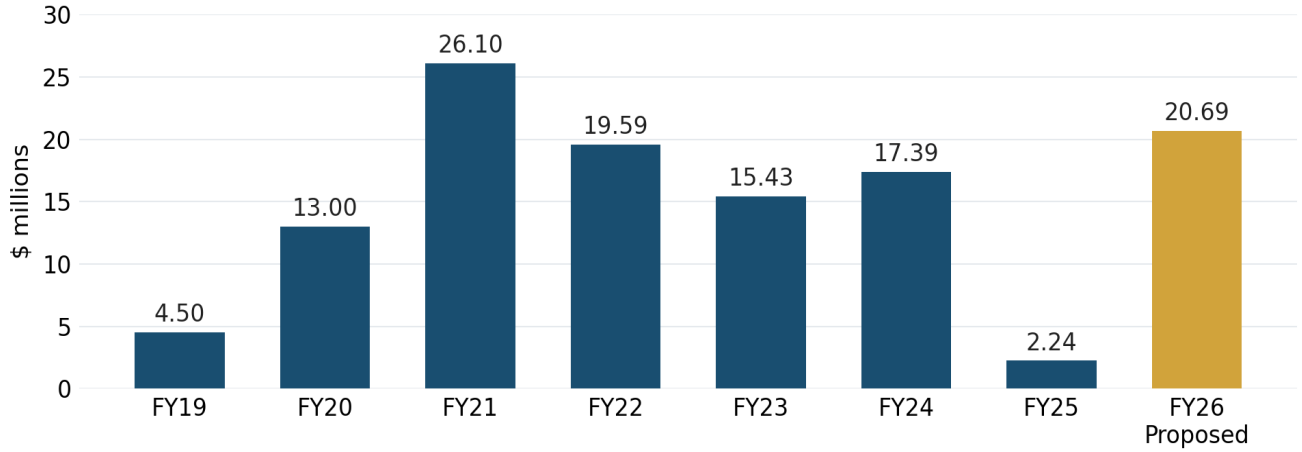
FY 2027 subsequent activity	Amount
June 30, 2026 ledger balance	$31,563,436
Budgeted FY 2027 County and school capital July 1	($7,504,366)
CEA reserve transfer from FY2025 solar siting funds September 29	($300,000)
Old Charlestown Road Park grant match October 15	($2,790,700)
Ledger balance after recorded entries	$20,968,370
Fire Station 22 construction commitment	($8,290,282)
Radio supplement estimate	($5,000,000)
Proposed transfer from the general fund	**$20,690,987**
Projected balance	**$28,369,075**

This projection is separate from the June 30 balance and excludes any unlisted commitments or future interest received.

CEA = Conservation Easement. Station 22 excludes furnishings; the radio supplement is an estimate. FY 2026 Capital Fund entries are rounded independently; their sum differs from the ending control balance by $1.

Appendix D General Fund additions to capital

Annual General Fund additions are labeled by the fiscal year that generated the excess. Transfers are recorded in the following fiscal year. The $2,240,347 addition recorded in October 2025 arose from FY 2025 results.



The FY 2026 bar shows the proposed $20,690,986.72 addition. It is not included in the June 30, 2026 Capital Fund balance. The proposal assumes approval of the school operating reappropriation for capital and final reconciliation of the General Fund policy calculation.

Appendix E General Fund designated reserves

Reported designated reserved fund balances total $17,191,673 at June 30, 2026. FY26 activity of $4,413,429 shows the listed additions and amounts returned to reserves in the year-end schedule. The ending balance is cumulative: it includes prior-year balances and FY 2026 activity, not just receipts from FY 2026. The activity and ending balances should not be added together.

Reserve	FY26 activity	Cumulative balance June 30 2026	Purpose
Conservation Easement	25	$5,005	Conservation easement purposes.
PEG Grant	—	$107,648	Capital costs of public, educational, and governmental channel facilities and networks. Code of Virginia §15.2-2108.22(3).
Parks & Rec Reserve	14,152	$55,434	Recreation assistance, park projects and improvements, and grounds maintenance under the recreation reserve arrangements.
Courthouse Fees	45,524	$695,763	Eligible courthouse, jail, and court-related facility costs. Code of Virginia §17.1-281.
Opioid Settlements	378,541	$1,408,415	Eligible opioid prevention, treatment, and remediation, including authorized program operating costs. Reference: Virginia Opioid Abatement Authority (VA OAA).
Animal Shelter Reserve	52,434	$1,491,881	Animal shelter donations reserved for their designated purposes.
Sheriff	—	$1,000	Drug Task Force.
Proffer Reserve	2,882,713	$12,180,275	Development-impact purposes specified in accepted proffer agreements, subject to Virginia law.
eSummons	37,226	$243,439	Software, hardware, and related equipment for the local electronic summons system. Code of Virginia §17.1-279.1.
Photo Traffic Enforcement	1,002,814	$1,002,813	Enforcement program expenses and eligible transportation safety uses. Code of Virginia §46.2-882.1(C).
Total	**4,413,429**	**$17,191,673**	

The audited financial statements will provide the formal fund balance classifications. A locally designated reserve is not necessarily classified as legally restricted. These balances should not be deducted again from unreserved balance if the source schedule already excludes them. Fund balance is a measure of financial resources after liabilities and differs from cash on hand.

A dash means no addition is listed.

Appendix F Reporting definitions

Definitions

Final budget means the amended FY 2026 budget. Revenue includes transfers-in to the General Fund; expenditures include transfers-out of the General Fund. The difference between them is the reported annual operating result, rather than the proposed policy transfer.

Carryforwards and reappropriations preserve funding for identified purposes in FY 2027. Budget remaining in Appendix B is reduced only by carryforwards listed in that schedule; it is not a statement of available funds.

Unreserved balance is the term used in the County's policy schedule. Formal accounting classifications will be presented in the audited financial statements.

Charts and summary figures are rounded to millions. Detailed tables use whole dollars, except where cents are material to a proposed action. Displayed component rows may differ from source totals because of rounding.

Finance Committee
Agenda Item Detail
Meeting Date: October 21, 2026
Agenda Section: Discussion & Action Items

Title: The FCPS Executive Director of Finance provides the FY 2026 Year End School Board Funds Financial Report and requests the following supplemental appropriations:

- C.1.a School Capital Projects Fund carry forward appropriation of $1,962,621 for the Sherando High School HVAC capital project.

  The committee recommends approval.

- C.1.b Textbook Fund supplemental appropriation of $189,419.60 representing interest earnings.

  The committee recommends approval.

- C.1.c General Fund and School Capital Projects Fund supplemental appropriations of $1,065,946 representing the unobligated surplus from the FY 2026 School Operating Fund to be used for HVAC replacements and playground equipment replacements.

  The committee recommends approval.

Attachments:
FCPS SA.pdf
FY26 School Board Funds Financial Report.pdf

County Finance Committee Meeting

September 16, 2026

Frederick County Public Schools

Kristen Anderson, MBA, SFO
FCPS Executive Director of Finance

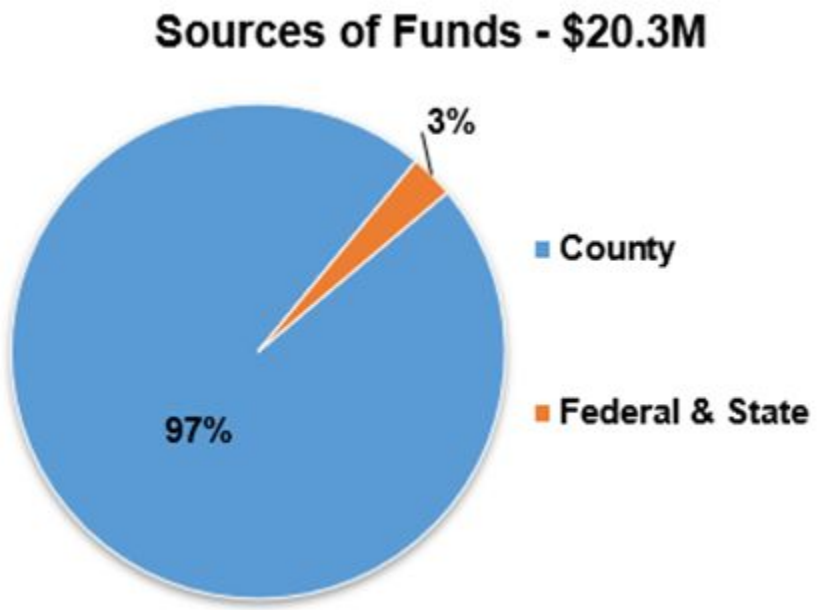
Agenda

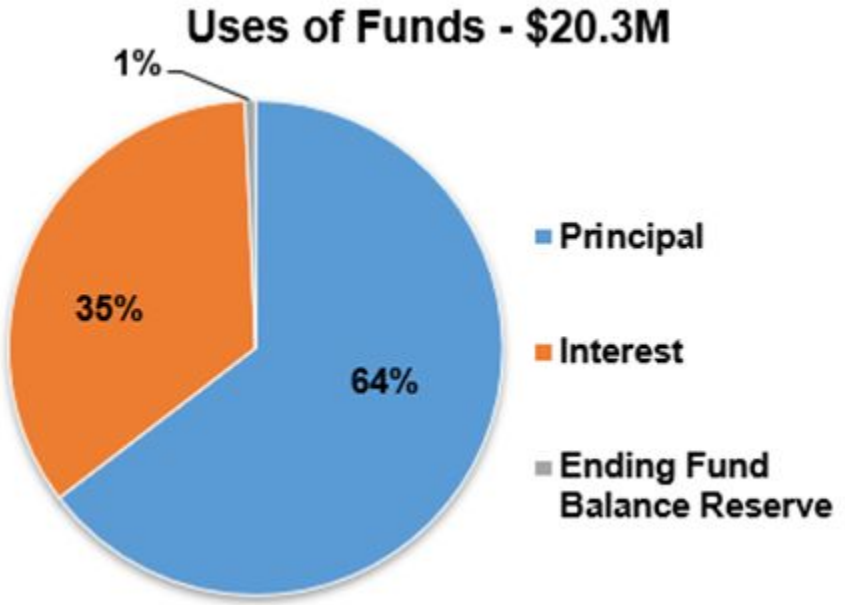
- School Debt Service Fund
- School Capital Projects Fund
  - Request for Carry Forward Supplemental Appropriation
- School Special Grants Fund
  - Request for Supplemental Appropriation
- School Operating Fund
  - Request for Supplemental Appropriation

FCPS is recommending the committee move to the full Board of Supervisors a carry forward supplemental appropriation of unencumbered FY26 School Capital Projects fund to the FY 2027 School Capital Projects Fund, a supplemental appropriation of unobligated interest earnings from the Special Grants Fund to the FY 2027 School Textbook Fund, and a supplemental appropriation of the unobligated surplus from the FY2026 School Operating Fund to the FY 2027 School Capital Projects Fund.

School Debt Service Fund

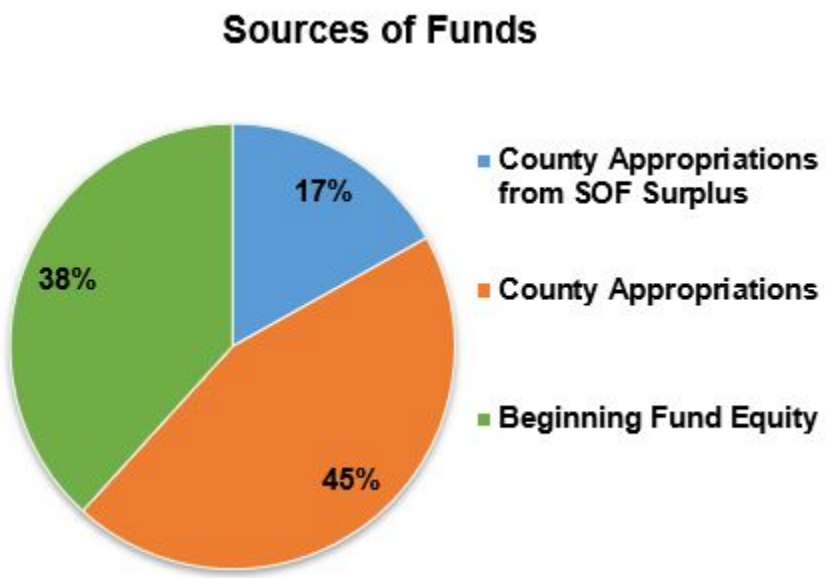
Outstanding debt at June 30, 2025	$166,775,000
New debt incurred during FY 2026	$ 35,310,000
Principal payments on existing debt during FY 2026	$(13,105,000)
Outstanding debt at June 30, 2026	$188,980,000

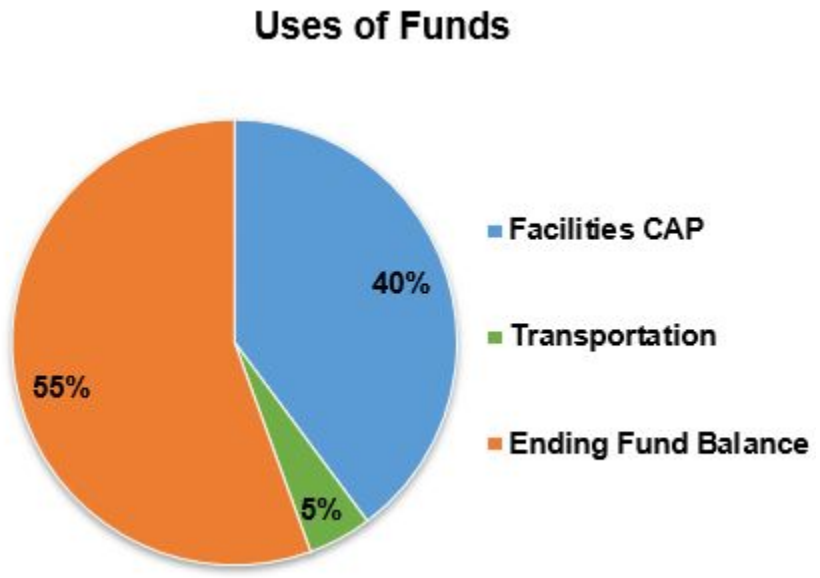




School Capital Projects Fund

Beginning Fund Balance	$ 4,261,252
Revenue Received	$ 6,815,185
Facilities projects and four buses	$(4,922,266)
Ending Fund Balance	$ 6,154,172





School Capital Projects Fund

Projects begun in FY25 and completed or in progress at 6/30/26:

- James Wood Middle School partial roof replacement*
- Bass-Hoover Elementary School HVAC chiller replacement*
- Bass-Hoover Elementary School boiler and water heater replacements*
- Stonewall Elementary School HVAC boiler unit replacements*
- Apple Pie Ridge Elementary School HVAC boiler unit replacements*
- Apple Pie Ridge Elementary School roof replacement
- Apple Pie Ridge Elementary plumbing refurbishment
- Sherando High School boiler replacement*
- Sherando High School track resurface
- Millbrook High School tennis court resurface

*In-progress at June 30, 2026

Projects begun in FY26 and completed or in progress at 6/30/26:

- Millbrook High School Fire Alarm*
- James Wood Middle School Fire Alarm*
- Millbrook High School Locker Room Heater Replacement
- Sherando High School HVAC Fresh Air Units**
- Orchard View Elementary School Cooling Tower*
- Armel Elementary School Playground Equipment Replacement
- Apple Pie Ridge Elementary School Playground Equipment Replacement
- Indian Hollow Elementary School Playground Equipment Replacement
- Bass-Hoover Elementary School HVAC Replacements*
- Dowell J. Howard School HVAC Replacements*

*In-progress at June 30, 2026
**Delayed pending re-appropriation

School Capital Projects Fund

FY27 Budget Adjustment to the School Capital Projects Fund

- SHS HVAC Fresh Air Units $1,962,621

Project is prioritized and scheduled in the Capital Asset Plan but was not encumbered by June 30, 2026. Capital Asset project costs are estimates.

Special Grants Fund

- State All In Virginia $4,163,705 revenues provided for high intensive tutoring, Virginia Literacy Act implementation, and combating chronic absenteeism.

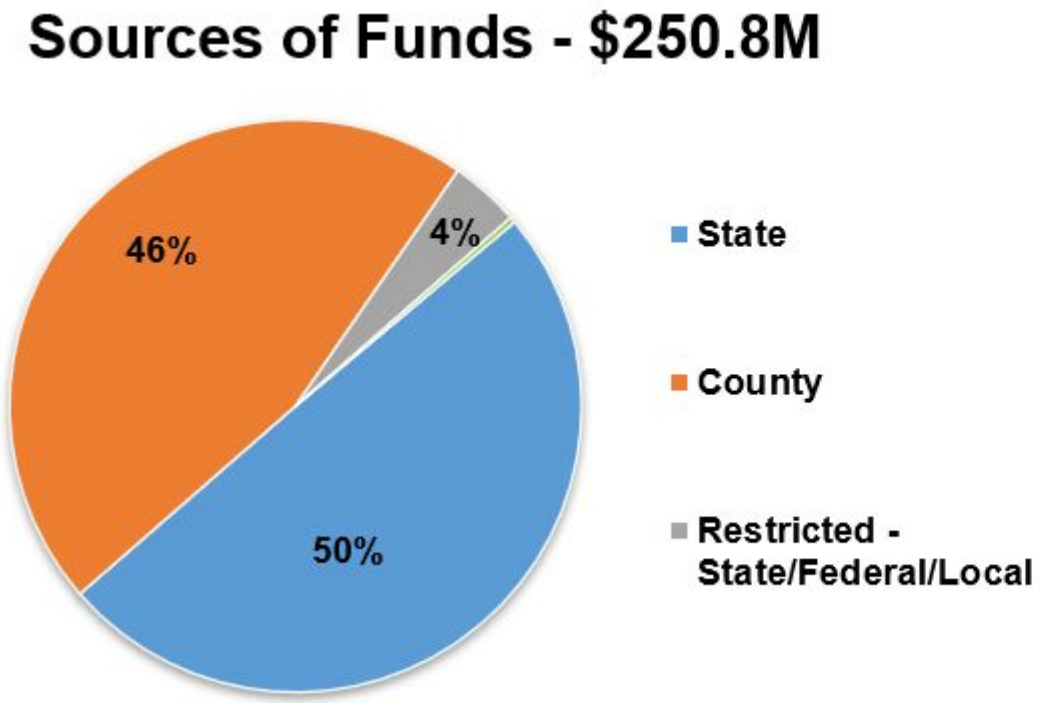
- Funds provided in 2024 to be fully utilized by June 30, 2026.

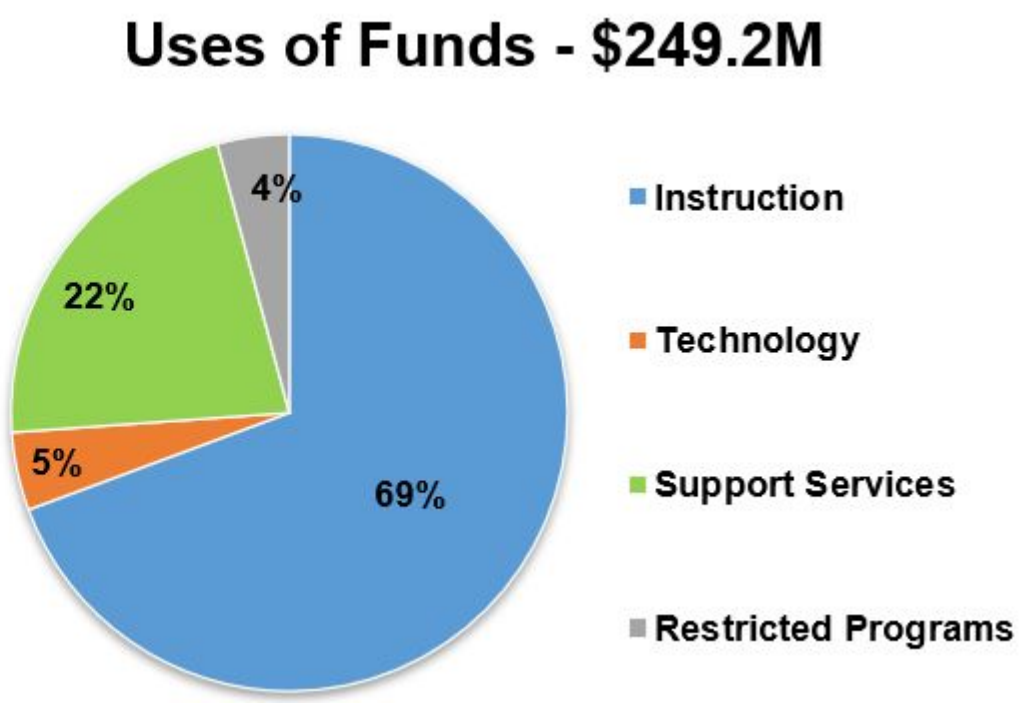
- Ending fund balance of $189,420 represents interest income earned.

FY27 Budget Adjustment to the School Textbook Fund

- **Unobligated interest earnings from the Special Grants Fund $189,419.60**

School Operating Fund





Actual revenues collected were 2.3% less than budget largely due to changes in state revenues driven by average daily membership and non-recurring grants and miscellaneous receipts.

Actual expenditures were 2.9% less than budget largely due to less than expected student enrollment, savings in departmental and school discretionary spending, and personnel vacancy savings and attrition.

School Operating Fund, cont'd.

Total Operating Fund Surplus	$1,591,824
Obligated Operating Surplus, Nonspendable	$ 324,598
Obligated Operating Surplus, Restricted	$ 201,280
Unobligated Operating Surplus (0.42% of Operating Budget)	$1,065,946

Remaining Obligated Funds

Remaining restricted grants funds of $201,280.01 are re-appropriated to FY27. Those restricted grant funds are:

- Advanced Computer Science Education Grant - $1,597.82
- Early Reading Intervention Program - $183,632.87
- Middle School Math Acceleration Grant - $642.45
- Mentor Teacher Program - $899.29
- Project Graduation Program - $14,288.48
- Virginia Star Program - $219.10

School Operating Fund, cont'd.

Key Factors Contributing to Unobligated Operating Surplus

	Budget	Actual	Variance
Sales Tax Receipts	$22,035,365	$22,385,944	$350,579
Budgetary Savings in Payroll	$199,234,761	$199,045,365	$189,396
Budgetary Savings in Schools and Departments	$50,651,519	$50,125,548	$525,971
Unobligated Surplus for FY26			**$1,065,946**

Remaining Unobligated Funds $1,065,946

FY27 Budget Adjustment to the School Capital Projects Fund

(all project costs are estimates)

- Redbud Run Elementary School HVAC $931,500
- Bass-Hoover Elementary School Playground Equipment $275,000
- Gainesboro Elementary School Playground Equipment $275,000

Projects prioritized and scheduled in the Capital Asset Plan, but not funded.

Request of Board of Supervisors

1. The School Board is requesting a carry forward supplemental appropriation of $1,962,621 to the FY 2027 School Capital Projects Fund. This amount represents unencumbered funds received during the FY 2026 for the Sherando High School HVAC Fresh Air Units capital project.

2. The School Board is requesting a supplemental appropriation of $189,419.60 to the FY 2027 School Textbook Fund. This amount represents Special Grants Fund unobligated interest earnings received during the fiscal years 2024, 2025, and 2026.

3. The School Board is requesting a supplemental appropriation of $1,065,946 to the FY 2027 School Capital Projects Fund. This amount represents the unobligated surplus from the FY 2026 School Operating Fund. If approved, the funds will be used for HVAC replacements at Redbud Run Elementary School and will support playground equipment replacements at Bass-Hoover and Gainesboro Elementary Schools.

Recap

- School Debt Service Fund
- School Capital Projects Fund
  - Request for Carry Forward Supplemental Appropriation
- School Special Grants Fund
  - Request for Supplemental Appropriation
- School Operating Fund
  - Request for Supplemental Appropriation

FCPS is recommending the committee move to the full Board of Supervisors a carry forward supplemental appropriation of unencumbered FY26 School Capital Projects fund to the FY 2027 School Capital Projects Fund, a supplemental appropriation of unobligated interest earnings from the Special Grants Fund to the FY 2027 School Textbook Fund, and a supplemental appropriation of the unobligated surplus from the FY2026 School Operating Fund to the FY 2027 School Capital Projects Fund.

YEAR-END SCHOOL BOARD FUNDS

FINANCIAL REPORTS

FISCAL YEAR 2026

1415 Amherst Street, Winchester, Virginia 22601
www.FrederickCountySchoolsVA.net / 540-662-3888

August 31, 2026

In this document are Frederick County Public Schools' year-end financial reports for fiscal year 2025-2026. As of the date of this report, the financials are undergoing an audit by an independent auditing firm hired by the Frederick County Government and Board of Supervisors. Included are the statements of operations for all funds managed by the school system.

This report summarizes the key activities within each fund. Please refer to the respective financial statement as you proceed through the text.

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Consolidated Services Fund 23

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SCHOOL OPERATING FUND

The unobligated surplus for the fiscal year 2026 school operating fund is $1,065,946, which is 0.42% of the $256,667,018 total school operating fund budget.

Operational Highlights of the Fiscal Year (and School Year) 2025-2026

- Served 14,421 students compared to a projected 14,825 student enrollment
- Focused on quality instruction, curriculum and project-based learning
- Implemented the new strategic plan – Ignite 2030
- Provided an average 4.9% salary increase for teachers
- Provided an average 5.6% salary increase for hourly employees – bus drivers, bus assistants, instructional assistants, custodians, maintenance technicians, administrative assistants, etc.
- Provided an hourly starting wage of $16.80 per hour
- Provided an average 3.4% salary increase for administrators and an average 4.4% increase for professional staff
- Purchased 11 new replacement and 10 gently-used school buses with operating funds
- Implemented the preventive maintenance schedule as prioritized in the Capital Asset Plan
- Invested in student data management, curriculum development, and professional learning
- Invested in a new Human Capital Management system for onboarding and evaluating staff

Summary Budget Statistics

1. The original (beginning) budget for the school operating fund for FY 2026 was $254,906,208.
2. Budget adjustments of $1,760,810 resulted in the adjusted budget balance of $256,667,018 and included the following:
    a. Encumbrance or undelivered commitments of $1,487,200.82
    b. Carry-forward restricted grant receipts of $273,609.50 from FY 2025

Summary Financial Statistics

1. Actual FY 2026 revenues in the school operating fund were $250,762,737, an increase of 2.3% compared to the prior year and 2.3% less than expected largely due to less than expected student enrollment.
2. Actual FY 2026 expenses and encumbrances totaled $249,170,913, an increase of 2.9% compared to the prior year and 2.9% less than budgeted largely due to less than expected student enrollment.
3. Obligations for bus and vehicle parts inventory on-hand at June 30, 2026 value at $324,598 are part of the year-end surplus and are not spendable funds.
4. Obligations for restricted programs valued at $210,280 are a part of the year-end surplus and are appropriated to FY 2027 by the Board of Supervisors FY2027 budget resolution.
5. An unobligated amount of $1,065,946 remained at year-end, or 0.42% of the operating fund budget.

The following items are key factors contributing to the school operating fund unobligated surplus after accounting for budget adjustments due to less than expected student enrollment.

	Budget	Actual	Variance
Sales tax receipts higher than expected	$22,035,365	$22,385,944	$ 350,579
Budgetary savings in payroll expenditures	$199,234,761	$199,045,365	$ 189,396
Budgetary savings in schools and departmental expenditures	$ 50,651,519	$ 50,125,548	$ 525,971
UNOBLIGATED SURPLUS FOR FY 2026			**$ 1,065,946**

The remaining portion of this section explains the financial activity and resulting variances.

UNDERSTANDING THE OPERATING FUND VARIANCES

The financial statement for the School Operating Fund is presented in a format reflecting two components of financial activity: unrestricted and restricted programs. The majority of the school division's programs and operations are funded by state and local (county) funds in the unrestricted component. While the school division must maintain minimum standards of quality with a mandated local match in most cases, the local school board allocates those funds with discretion aligned to planning goals. Therefore, the expenditures in this component are referred to as unrestricted.

The restricted program section shows the activity of grant funds received for specific use on designated programs. The budget and related financial activity align with the grant award amounts and spending period, creating budget to actual variances which could be misunderstood as local surpluses or deficits. For this reason, the format shown is designed to assist the reader with the distinction between the two.

SUMMARY OF REVENUES AND EXPENDITURES

Unrestricted revenues exceeded expenditures by $2,079,847 [line 11]. The variance for each revenue source and expenditure category is described in the following text. This amount is reduced by $488,023 in restricted program variances [line 14], resulting in the total operating fund surplus of $1,591,824 [line 15], which is reduced by $324,598 [line 16] inventory reserve and $201,280 [line 17] in carry-forward grant obligations. The bottom-line result is $1,065,946 [line 18] in unobligated surplus for FY 2026.

Unrestricted Revenues: $240,858,847 [line 6]

Local Sources [line 1]

- FCPS received $804,801 in miscellaneous local revenue, including fees and charges to students and the public, billings to other agencies, gifts and donations, rebates, refunds, and rental charges for the use of school division facilities. Funds received from these sources were less than projected by $27,413 primarily due to use of facilities.

Commonwealth [line 2]

- FCPS received $124,630,529 in state revenue, including Standards of Quality (SOQ) funds, sales tax receipts, incentive, categorical, lottery, and some miscellaneous.
- Standards of Quality revenue original budget was adjusted down due to less than expected student average daily enrollment. Remedial summer school was $352,437 less than expected due to an error in reported enrollment.
- Sales tax funding was more than the adjusted budget by $350,579.
- Lottery-funded program funding was less than budgeted by $388,396 due to less than expected student enrollment.
- Miscellaneous state funding was less than budgeted by $61,612 due to less than expected Medicaid reimbursements.

Federal Government [line 3]

- FCPS received $62,779 in unrestricted federal revenue. A small amount of funding is provided each year based on the federal land in the county and to support early childhood students receiving special education services. These funds help support FCPS's share of the early childhood program at NREP.

Local Government and Transfers [lines 4-5]

- FCPS received $115,360,738 from the County's General Fund – local government dollars. This total includes the prior year encumbrance and the current year funding support from the local governing body. County funds carried over from the prior year for restricted programs are included in the Restricted Revenues section of the financial statement.

Unrestricted Expenditures: $238,779,000 [line 10]

Instruction [line 7]

- FCPS expended $172,792,983 for costs associated with classroom instruction, student support services, library and media services, instructional support services, and school administrative offices in the areas of regular, special, vocational, and gifted education, and the other categories of instruction. Sixty-nine percent of expenditures are in this category. The positive variance of $1,594,293 is due to expenditure savings in personnel, school budgets, and instructional departments.

Instructional and Administrative Technology [line 8]

- FCPS expended $11,304,685 for costs associated with division technology – instructional, administrative, and operational categories. Five percent of all expenditures are in this category. The

positive variance of $6,330 is attributable to expenditure savings in the technology department equipment and supplies budget.

Support Services [line 9]

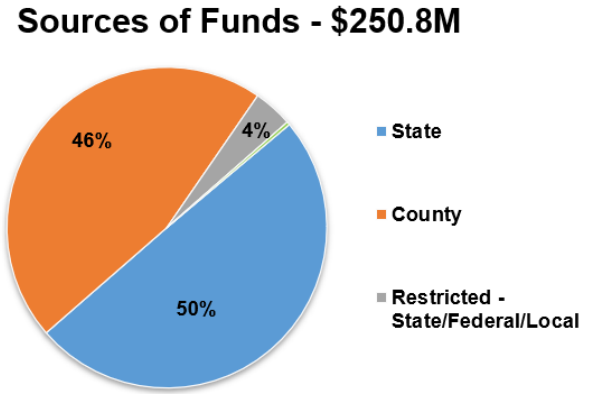
- FCPS expended $54,681,332 for costs associated with supporting the operations of the school division, including administration, student attendance and health, transporting students, and maintaining facilities. Twenty-two percent of all expenditures are in this category. The positive variance of $302,290 is due to savings in personnel and the support departmental expenditures.

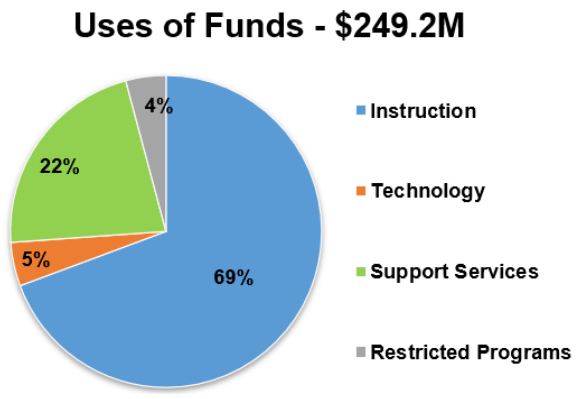
Restricted Program Revenues and Expenditures [lines 12 - 14]

Restricted Programs provide funding for specific initiatives. The majority of these revenues are based upon certain student populations or capabilities. Restricted program funding is associated with spending and reporting criteria. The vast majority of restricted revenues come from the federal government, but a few are from state, county prior year carry over funds, or miscellaneous sources. Restricted program revenues totaled $9,903,890 for FY 2026, and program expenditures totaled $10,391,913. The resulting negative balance of $488,023 represents locally required matching funds and subsidies toward certain restricted programs.

FY 2026 Operating Surplus: (Revenues Over Expenditures) $1,591,824 [line 15]

The total operating surplus for FY 2026 of $1,591,824 is reduced by the inventory value of $324,597.94 and the amount of revenue received for a special purpose, but has not yet been encumbered. These funds are obligations against the surplus funds, total $201,280.01, and include: 1) $1,597.82 for Advanced Computer Science in Education Grant, 2) $183,632.87 for Early Reading Intervention Program, 3) $642.45 for Middle School Math Acceleration Grant, 4) $899.29 for Mentor Teacher Program, 5) $14,288.48 for Project Graduation Program, and 6) $219.10 for VA Star Program. These grant funds are appropriated to the FY 2027. The unobligated surplus for FY 2026 is $1,065,946.





Frederick County Public Schools

School Operating Fund

Year Ended June 30, 2026

		[a] Actual* 2024-25	[b] Original Budget 2025-26	[c] Adjusted Budget 2025-26	[d] Actual* 2025-26	[e] Variance from Adj. Budget
SUMMARY						
	Revenue from Local/Other Sources	$ 1,789,048	$ 2,012,214	$ 1,945,582	$ 1,161,145	$ (784,437)
	Revenue from the Commonwealth	121,463,266	131,120,616	129,609,535	127,038,228	(2,571,308)
	Revenue from the Federal Government	8,865,924	7,899,841	9,477,554	6,929,017	(2,548,537)
	Revenue from Local Governing Body	113,098,756	113,873,537	115,634,347	115,634,347	-
[A]	**TOTAL REVENUES**	**$ 245,216,994**	**$ 254,906,208**	**$ 256,667,018**	**$ 250,762,737**	**$ (5,904,282)**
	Instruction	$ 164,180,768	$ 175,340,270	$ 174,387,276	$ 172,792,983	$ 1,594,293
	Instruction - Restricted Programs	12,292,228	16,573,040	15,985,105	10,391,913	5,593,192
	Technology - Instructional & Administrative	10,909,836	11,357,054	11,311,015	11,304,685	6,330
	Support Services	54,745,368	51,635,844	54,983,622	54,681,332	302,290
[B]	**TOTAL EXPENDITURES**	**$ 242,128,199**	**$ 254,906,208**	**$ 256,667,018**	**$ 249,170,913**	**$ 7,496,105**
	** Actual fiscal year expenditures includes encumbrances*					
[C]	**REVENUE OVER EXPENDITURES**	**$ 3,088,795**	**$ -**	**$ -**	**$ 1,591,824**	
[D]	Obligated Funds-Nonspendable Inventory				$ 324,598	
[E]	Obligated Funds-Special Programs	$ 273,610			$ 201,280	
[F]	**LOCAL FUNDS UNOBLIGATED AT JUNE 30**	**$ 2,815,185**			**$ 1,065,946**	
[G]	Percentage Surplus of Total Budget	1.15%			0.42%	
UNRESTRICTED REVENUES						
[1]	**Revenue from Local Sources**	**$ 895,479**	**$ 832,214**	**$ 832,214**	**$ 804,801**	**$ (27,413)**
[2]	**Revenue from Commonwealth**	**$ 119,178,208**	**$ 124,316,284**	**$ 125,077,778**	**$ 124,630,529**	**$ (447,249)**
a	Standards of Quality (SOQ)	75,435,925	78,288,058	76,992,891	76,640,454	(352,437)
b	Sales Tax	20,607,395	21,385,365	22,035,365	22,385,944	350,579
c	Incentive Accounts	5,879,868	8,442,864	8,300,011	8,300,011	-
d	Categorical	60,696	61,303	61,303	65,920	4,617
e	Lottery-Funded Programs	15,682,664	15,768,694	15,970,509	15,582,113	(388,396)
f	Miscellaneous State	1,511,659	370,000	1,717,699	1,656,087	(61,612)
[3]	**Revenue from Federal Government**	**$ 57,123**	**$ 54,841**	**$ 54,841**	**$ 62,779**	**$ 7,938**
[4]	**Transfers/ Carryover/ Prior Year Encumbrances**	**$ 3,899,414**	**$ -**	**$ 1,487,201**	**$ 1,487,201**	**$ -**
[5]	**Local Funds–Board of Supervisors**	**$ 109,026,463**	**$ 113,873,537**	**$ 113,873,537**	**$ 113,873,537**	**$ -**
[6]	**TOTAL UNRESTRICTED REVENUES**	**$ 233,056,686**	**$ 239,076,876**	**$ 241,325,571**	**$ 240,858,847**	**$ (466,724)**
UNRESTRICTED EXPENDITURES						
[7]	**Instruction**	**$ 164,180,768**	**$ 175,340,270**	**$ 174,387,276**	**$ 172,792,983**	**$ 1,594,293**
a	Regular Education	116,762,990	123,238,809	122,543,199	122,320,340	222,859
b	Special Education	33,035,052	37,195,695	37,044,753	36,157,538	887,215
c	Vocational Education	11,124,175	11,572,616	11,519,041	11,511,529	7,513
d	Gifted Education	1,127,436	1,381,936	1,289,291	965,202	324,088
e	Other Education	1,487,391	1,586,729	1,547,560	1,501,820	45,740
f	Summer School	599,157	339,590	416,643	311,336	105,307
g	Adult Education	21,847	24,000	23,418	21,847	1,570
h	Non-district Program	22,720	896	3,372	3,372	-
[8]	**Instructional & Administrative Technology**	**$ 10,909,836**	**$ 11,357,054**	**$ 11,311,015**	**$ 11,304,685**	**$ 6,330**
a	Instructional Technology	2,728,246	2,441,139	2,455,245	2,454,729	516
b	Instructional Support Technology	4,509,438	4,821,427	4,611,037	4,605,762	5,275
c	Administrative & Operations Support Technology	3,672,151	4,094,489	4,244,734	4,244,194	540
[9]	**Support Services**	**$ 54,745,368**	**$ 51,635,844**	**$ 54,983,622**	**$ 54,681,332**	**$ 302,290**
a	Administration, Attendance & Health	10,156,076	11,402,721	11,477,877	11,375,194	102,683
b	Pupil Transportation Services	14,840,332	15,487,297	15,876,036	15,708,980	167,056
c	Operation and Maintenance	21,339,822	20,388,033	22,378,122	22,373,524	4,597
d	School Nutrition Services	422	-	-	-	-
e	Facilities	6,466,268	2,289,399	3,111,372	3,083,418	27,954
f	Fund Transfers	1,942,447	2,068,395	2,140,215	2,140,215	-
[10]	**TOTAL UNRESTRICTED EXPENDITURES**	**$ 229,835,971**	**$ 238,333,168**	**$ 240,681,913**	**$ 238,779,000**	**$ 1,902,913**
[11]	**Unrestricted Revenue Over/(Under) Expense**	**$ 3,220,715**			**$ 2,079,847**	
RESTRICTED PROGRAM REVENUES						
	Revenue from Local Sources	**$ 893,569**	**$ 1,180,000**	**$ 1,113,368**	**$ 356,345**	**$ (757,023)**
a	eRate Program	25,872	30,000	25,872	25,872	-
b	Claude Moore Foundation	77,142	-	10,738	10,738	-
c	First Bank Donation	11,000	-	11,000	11,000	-
d	GMU Advanced Computer Science	8,764	-	-	-	-
e	GMU Data Science Lab Partnership	769,290	900,000	383,368	308,735	(74,633)
f	VA Star	1,500	-	-	-	-
g	Excess Appropriation	-	250,000	682,390	-	(682,390)
	Revenue from Commonwealth	**$ 2,285,059**	**$ 6,804,332**	**$ 4,531,757**	**$ 2,407,699**	**$ (2,124,059)**

Numbers may not add correctly due to rounding.

School Operating Fund
Year Ended June 30, 2026

		[a] Actual* 2024-25	[b] Original Budget 2025-26	[c] Adjusted Budget 2025-26	[d] Actual* 2025-26	[e] Variance from Adj. Budget
a	Regional Juvenile Detention Center	701,633	800,000	800,000	738,347	(61,653)
b	Special Education - In-Jail	151,037	180,000	180,000	157,420	(22,580)
c	Early Reading Intervention	528,053	535,706	512,748	512,748	-
d	SOL Algebra Readiness	203,526	206,045	206,045	211,268	5,223
e	Virginia Preschool Initiative	427,487	742,165	627,278	639,865	12,587
f	Other Special State Programs	273,322	180,416	162,891	148,051	(14,840)
g	Excess Appropriation	-	4,160,000	2,042,796	-	(2,042,796)
	Revenue from Federal Government	**$ 8,808,801**	**$ 7,845,000**	**$ 9,422,713**	**$ 6,866,237**	**$ (2,556,476)**
a	Title I, Part A	2,059,063	2,300,000	2,386,487	2,255,205	(131,282)
b	Title I, Part D	40,573	185,000	268,780	81,312	(187,468)
c	Title II, Part A Improve Teacher Quality	309,831	480,000	488,005	389,664	(98,342)
d	Title III, Part A LEP	127,164	310,000	374,689	158,363	(216,326)
e	Title IV, Part A	237,355	155,000	235,837	68,590	(167,247)
f	Title VI-B IDEA	3,571,349	3,710,000	4,089,469	3,436,620	(652,848)
g	Perkins Vocational	207,736	205,000	205,307	205,307	-
h	McKinney Vento	77,498	50,000	91,255	42,009	(49,246)
i	Coronavirus Aid Relief & Economic Security - ESSER	1,941,152	-	-	-	-
j	Coronavirus State and Local FRF	147,275	-	-	-	-
k	Literacy Grants - Farm Engage & Stds with Disabiliti	53,382	-	777,585	143,816	(633,769)
l	Other Miscellaneous Grants	-	-	85,351	85,351	-
m	School Safety and Security Grant	36,423	-	-	-	-
n	Excess Appropriation	-	450,000	419,948	-	(419,948)
	Revenue from County BOS - Prior Year Carryover	**$ 172,879**	**$ -**	**$ 273,610**	**$ 273,610**	**$ -**
a	Early Reading Intervention	-	-	26,155	26,155	-
b	GMU Data Science Lab Partnership	-	-	168,497	168,497	-
c	Project Graduation	-	-	4,796	4,796	-
d	SOL Algebra Readiness	-		23,797	23,797	-
e	Virginia Tiered Systems Support	8,797	-	4,175	4,175	-
f	VA Star	1,153	-	1,973	1,973	-
g	School-Based Health Workforce	2,291	-	-	-	-
h	Advanced Computer Science Education Grant	74,862	-	29,642	29,642	-
i	First Bank Donation	1,893	-	275	275	-
j	Chesapeake Bay Foundation	116	-	-	-	-
k	Mentor Teacher	810	-	476	476	-
l	School Safety and Security Grant	82,958	-	-	-	-
m	Title IV, Part A	-		13,823	13,823	-
[12]	**TOTAL RESTRICTED REVENUES**	**$ 12,160,308**	**$ 15,829,332**	**$ 15,341,448**	**$ 9,903,890**	**$ (5,437,558)**
	RESTRICTED PROGRAM EXPENDITURES					
a	eRate Program	25,872	30,000	25,872	25,872	-
b	Claude Moore Foundation	77,142	-	10,738	10,738	-
c	First Bank Donation	12,618	-	11,275	11,275	-
d	GMU Advanced Computer Science	6,799	-	1,965	1,837	129
e	GMU Data Science Lab School Partnership	600,793	900,000	551,865	477,232	74,633
f	VA Star	680	-	1,973	1,754	219
g	Regional Juvenile Detention Center	693,955	800,000	800,000	727,795	72,205
h	Special Education - In-Jail	151,037	180,000	180,000	157,420	22,580
i	Early Reading Intervention	501,898	915,893	719,090	719,164	(74)
j	SOL Algebra Readiness	324,170	456,396	480,193	430,250	49,943
k	Virginia Preschool Initiative	680,216	855,335	835,335	774,025	61,310
l	Other Special State Programs	456,202	180,416	177,179	160,811	16,368
m	Title I, Part A	2,059,063	2,300,000	2,386,487	2,255,205	131,282
n	Title I, Part D	40,573	185,000	268,780	81,312	187,468
o	Title II, Part A Improve Teacher Quality	309,831	480,000	488,005	389,664	98,342
p	Title III LEP	127,164	310,000	374,689	158,363	216,326
q	Title IV, Part A	223,532	155,000	249,660	82,412	167,247
r	Title VI-B	3,571,349	3,710,000	4,089,469	3,436,620	652,848
s	Perkins Vocational	207,736	205,000	205,307	205,307	-
t	Coronavirus Aid Relief & Economic Security - ESSER	1,941,152	-	-	-	-
u	Coronavirus State and Local FRF	147,275	-	-	-	-
v	McKinney Vento	77,498	50,000	91,255	42,009	49,246
w	Other Special Federal Programs	55,672	-	890,834	242,847	647,987
x	Excess Appropriation	-	4,860,000	3,145,134	-	3,145,134
[13]	**TOTAL RESTRICTED EXPENDITURES**	**$ 12,292,228**	**$ 16,573,040**	**$ 15,985,105**	**$ 10,391,913**	**$ 5,593,192**
[14]	**Restricted Revenue Over/(Under) Expense**	**$ (131,920)**			**$ (488,023)**	
[15]	**All Revenue Over/(Under) Expense**	**$ 3,088,795**			**$ 1,591,824**	
[16]	Obligated Funds-Nonspendable, Inventory				324,598	
[17]	Obligated Funds-Special Programs	273,610			201,280	
[18]	**LOCAL FUNDS UNRESTRICTED AND UNOBLIGATED AT JUNE 30**	**$ 2,815,185**			**$ 1,065,946**	

Numbers may not add correctly due to rounding.

SCHOOL NUTRITION FUND

The school nutrition program operates under the National School Lunch Program. Nine schools operated under the Community Eligibility Provision (CEP), where all meals served to participating students are free through federal reimbursements. The school nutrition fund completed FY 2026 with expenditures higher than revenues of $505,367, decreasing the fund balance.

On average, 58 percent of students participated in the lunch program daily – down from 59 percent the prior year. On average, 28 percent of students participated in the breakfast program daily – up from 27 percent the preceding year. The program received federal reimbursements on 653,464 breakfasts, 1,388,185 lunches, and 46,774 summer meal packs. The average federal reimbursement was $2.96 per meal, 6% more than the prior year. The average cost per meal was $5.31, a 6% increase.

REVENUE VARIANCES:

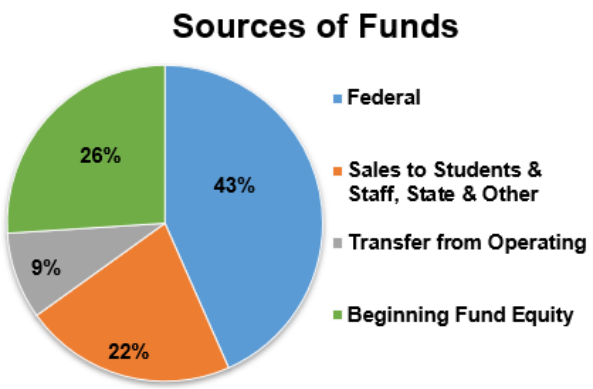
Compared to the budget, revenues were $171,876 less than expected. Primary revenue sources are sales to students and federal meal reimbursements. Lunch and breakfast sales to students were $258,554 less than anticipated due to participation patterns and less serving days due to inclement weather closures. The transfer from the School Operating Fund was $58,930 greater to fund the $500 employee bonus. All other revenue sources (interest, other sales, and receipts) were $27,748 more than the budget.

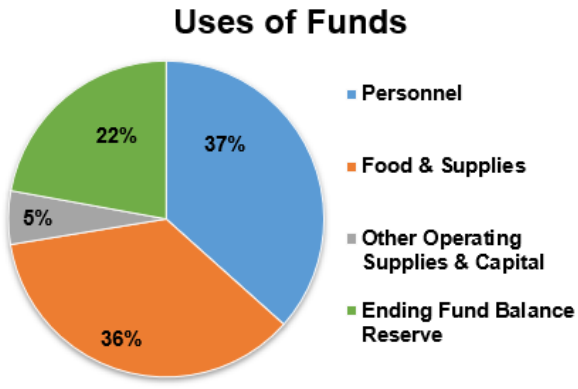
EXPENDITURE VARIANCES:

Compared to the budget, expenditures were $2,511,988 less than expected. $2,281,944 of the total expenditure variance represents the appropriation of the prior year's projected fund balance to use if needed for non-recurring operating or capital items. The other operational variances are the result:

- Labor cost was $139,339 less than anticipated due to employee turnover and vacancy savings.
- Food and supply costs were $53,823 less than budget largely due to 11 fewer serving days.
- All other expenses ended the year with a positive variance of $36,881.

The fund ended the fiscal year with $2,884,737 in fund balance. Of this amount, $145,120 is the inventory value. The residual fund balance of $2,739,617 will support the average operating expenses of about three months. Fund balance is carried forward to the next fiscal year for school nutrition operations.





Frederick County Public Schools
School Nutrition Fund
Year Ended June 30, 2026

		[a] Actual 2023-24	[b] Actual 2024-25	[c] Adjusted Budget 2025-26	[d] Actual 2025-26	[e] Variance from Adj Budget
[1]	**Beginning Balance July 1**	$ 4,762,322	$ 3,893,423	$ 2,845,479	$ 3,390,104	$ 544,625
	REVENUES:					
[2]	Interest on Bank Deposits	186,209	119,009	$ 125,000	$ 90,627	$ (34,373)
[3]	Type A Lunches	1,186,934	1,307,666	1,610,890	1,435,539	(175,351)
[4]	Breakfast Program	172,594	197,254	309,641	226,438	(83,203)
[5]	All Other Sales and Adults	719,898	705,874	750,000	724,744	(25,256)
[6]	Other Receipts	78,948	56,517	13,946	106,824	92,878
[7]	State School Food Payments	178,444	236,721	261,264	245,950	(15,314)
[8]	Federal Meals Reimbursement	5,103,055	5,133,656	5,643,738	5,653,551	9,813
[9]	Transfers From School Operating	171,028	1,000,000	1,100,000	1,158,930	58,930
[10]	**TOTAL REVENUES**	**$ 7,797,109**	**$ 8,756,698**	**$ 9,814,479**	**$ 9,642,603**	**$ (171,876)**
	Total Revenues and Beginning Balance	**$ 12,559,431**	**$ 12,650,121**	**$ 12,659,958**	**$ 13,032,707**	
	EXPENDITURES:					
[11]	Salaries	$ 2,783,613	$ 3,080,854	$ 3,410,344	$ 3,259,717	$ 150,627
[12]	Fringe Benefits	1,210,878	1,358,229	1,500,421	1,511,708	(11,288)
[13]	Contractual Services	152,479	76,634	161,764	91,494	70,271
[14]	Utilities, Travel and Misc	255,891	350,679	421,475	454,864	(33,389)
[15]	Food and Supplies	3,750,825	3,846,130	4,719,666	4,665,843	53,823
[16]	Capital Outlay	512,322	547,491	164,344	164,344	-
[17]	Planned Carryforward to Next Year	-	-	2,281,944	-	2,281,944
[18]	**TOTAL EXPENDITURES**	**$ 8,666,007**	**$ 9,260,017**	**$ 12,659,958**	**$ 10,147,970**	**$ 2,511,988**
[19]	**Revenue Over / (Under) Expenditures**	$ (868,899)	$ (503,319)	$ -	$ (505,367)	
[20]	**Ending Balance June 30**	**$ 3,893,423**	**$ 3,390,104**	**$ -**	**$ 2,884,737**	
[21]	Balance Nonspendable, Inventory	$ 149,227	$ 145,325		$ 145,120	
[22]	Committed - reserve for encumbrance	$ 489,842				
[23]	Balance Committed	$ 3,254,355	$ 3,244,780		$ 2,739,617	

Numbers may not add correctly due to rounding.

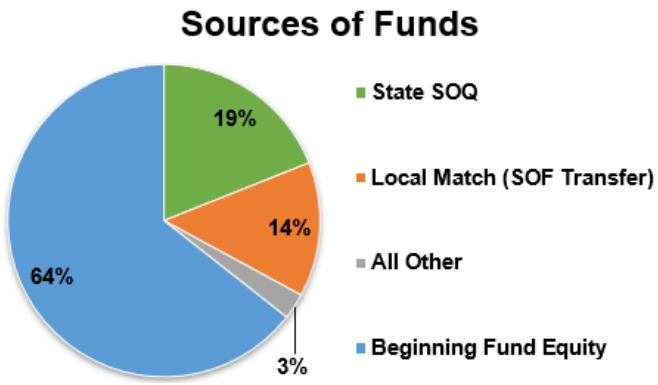
SCHOOL TEXTBOOK FUND

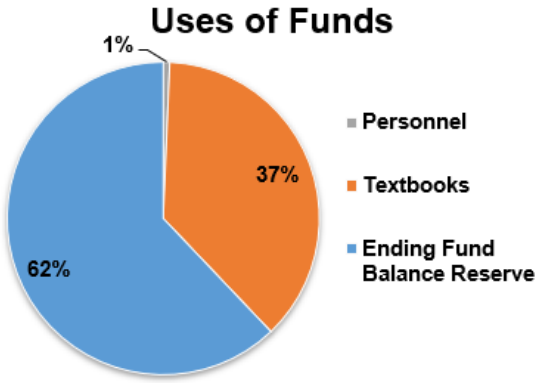
The textbook fund completed the year with expenditures in excess of revenues of $158,510, resulting in an ending fund balance of $4,314,874. The primary source of revenue for this fund comes from the Standards of Quality funding provided by the state and a local required match. The state funds require a local match equal to the composite index percentage and are provided through a transfer from the School Operating Fund.

The beginning fund balance for the School Textbook Fund was $4,473,384. Revenues plus the beginning fund balance provide for the total available funds of $6,947,113. For FY 2026, state funds of $1,318,123 plus $968,395 in local matching funds and $187,211 in miscellaneous receipts for interest earnings totaled $2,473,729 in revenue. State revenue was $46,402 less than projected due to less than expected student enrollment.

Textbook purchases replaced worn textbooks, as well as provided new math textbooks for grades K-5, secondary literacy and the social studies bridge. Textbook purchases can be either hard copy or digital formats. Total expenditures on textbooks and a part-time employee to manage the textbook inventory equaled $2,632,239 for the year.

The textbook fund balance increases and decreases over time as it supports the year-to-year disbursements driven by the timing of required textbook adoptions. The textbook fund balance is committed to the next fiscal year to support future textbook adoptions.





Frederick County Public Schools
School Textbook Fund
Year Ended June 30, 2026

		[a] Actual 2023-24	[b] Actual 2024-25	[c] Adjusted Budget 2025-26	[d] Actual 2025-26	[e] Variance from Adj Budget
[1]	**Beginning Balance July 1**	$ 1,916,893	$ 3,115,341	$ 4,272,190	$ 4,473,384	$ 201,194
	REVENUES:					
[2]	Interest on Bank Deposits	$ 132,068	$ 168,876	$ 75,000	$ 187,211	$ 112,211
[3]	Sale of Textbooks/ Lost Fees	388	0	1,000	-	(1,000)
[4]	Misc Revenue	-	-	-	-	-
[5]	State Reimbursements	1,077,654	1,331,811	1,364,525	1,318,123	(46,402)
[6]	Transfers From Other Funds	761,660	944,597	968,395	968,395	-
[7]	**TOTAL REVENUES:**	**$ 1,971,770**	**$ 2,445,284**	**$ 2,408,920**	**$ 2,473,729**	**$ 64,809**
	Total Revenues and Beginning Balance	**$ 3,888,663**	**$ 5,560,624**	**$ 6,681,110**	**$ 6,947,113**	
	EXPENDITURES:					
[8]	Salaries	$ 24,757	$ 26,635	$ 33,361	$ 33,578	$ (216)
[9]	Fringe Benefits	6,711	10,370	13,207	12,927	280
[10]	Contractual Services	-	-	-	-	-
[11]	Payments to Publishers	741,854	1,050,235	4,107,009	2,585,735	1,521,274
[12]	Planned Carryforward to Next Year	-	-	2,527,533	-	2,527,533
[13]	**TOTAL EXPENDITURES**	**$ 773,322**	**$ 1,087,240**	**$ 6,681,110**	**$ 2,632,239**	**$ 4,048,871**
[14]	**Revenues Over / (Under) Expenditures**	$ 1,198,448	$ 1,358,043	$ (4,272,190)	$ (158,510)	$ 4,113,680
[15]	**Ending Balance June 30**	**$ 3,115,341**	**$ 4,473,384**	**$ -**	**$ 4,314,874**	
[16]	Committed - reserve for encumbrance	$ 1,917	$ -		$ 514,657	
[17]	Balance Committed	$ 3,113,423	$ 4,473,384		$ 3,800,217	

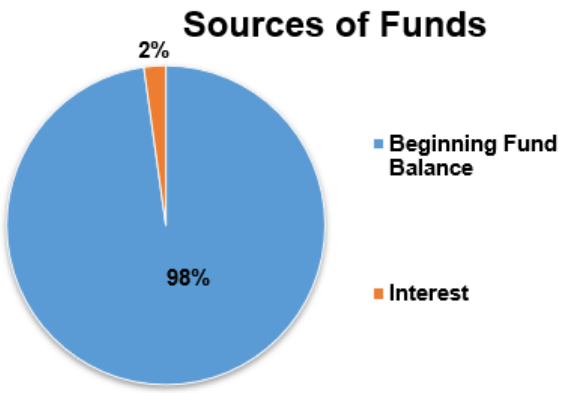
Numbers may not add correctly due to rounding.

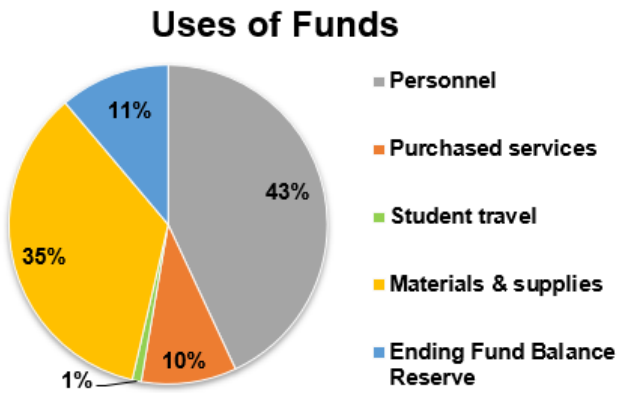
SPECIAL GRANTS FUND

The special grants fund accounts for the All In Virginia state funds to support high-dosage academic tutoring, accelerate the Virginia Literacy Act expansion, and combat student chronic absenteeism. The grant funds of $4,163,705 were received in the fiscal year 2024 to be used by June 30, 2026.

The beginning fund balance was $1,639,517. During the FY 2026, the fund received $37,082 in interest earnings and disbursed $1,487,179 for student tutoring outside the normal school hours, third-party virtual tutoring services, student transportation, and instructional materials and supplies. The fund completed the year with an ending fund balance of $189,420 reflecting interest earnings since FY2024.

The special grant fund balance of $189,420 is requested to carry-forward to the School Textbook Fund to support future textbook adoption needs.





Frederick County Public Schools
Special Grants Fund
Year Ended June 30, 2026

	[a] Grant Budget	[b] Prior Years' Receipts	[c] Actual 2025-26	[d] Cummulative Grant Receipts
[1] **Beginning Balance July 1**			$ 1,639,517	
REVENUES:				
[2] Interest Income	$ 189,420	$ 152,338	$ 37,082	$ 189,420
[3] State Revenue - All In Virginia	4,163,705	4,163,705	-	4,163,705
[4] **TOTAL REVENUES**	**$ 4,353,125**	**$ 4,316,043**	**$ 37,082**	**$ 4,353,125**

	[a] Grant Budget	[b] Prior Years' Expenditures	[c] Actual 2025-26	[d] Cummulative Grant Expenditures	[e] Outstanding Encumbrances	[f] Remaining Grant Balance
EXPENDITURES:						
[5] Salaries	$ 2,311,397	$ 1,642,848	$ 668,549	$ 2,311,397	$ -	$ -
[6] Fringe Benefits	181,619	129,306	52,313	181,619	-	-
[7] Purchased Services	658,511	496,684	161,827	658,511	-	-
[8] Student Travel	78,434	62,969	15,465	78,434	-	-
[9] Materials and Supplies	1,123,164	344,719	589,026	933,745	-	189,420
[10] **TOTAL EXPENDITURES**	**$ 4,353,125**	**$ 2,676,526**	**$ 1,487,179**	**$ 4,163,705**	**$ -**	**$ 189,420**
[11] **Ending Balance June 30**				**$ 189,420**		

Numbers may not add correctly due to rounding.

SCHOOL CAPITAL PROJECTS FUND

The school capital projects fund provides capital items too small in scope for the construction fund and not included in the school operating fund. Revenues are received from the county or a transfer of prior year surplus school operating funds. FCPS used the beginning fund balance of $4,261,252 and a $6,815,185 transfer by the county to purchase the following facilities projects and four school buses.

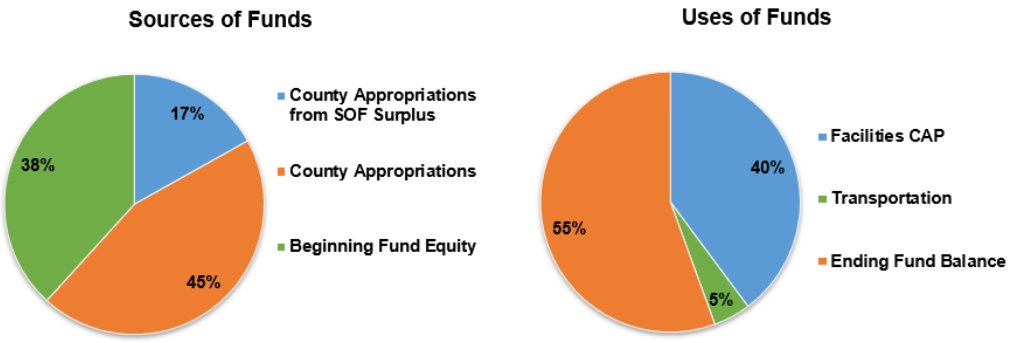
Projects begun in FY 2025 (prior year) and completed or in progress as of June 30, 2026:

- James Wood Middle School partial roof replacement *(project is in progress)*
- Bass-Hoover Elementary School HVAC chiller replacement *(project is in progress)*
- Bass-Hoover Elementary School boiler and water heater replacements *(project is in progress)*
- Stonewall Elementary School HVAC boiler unit replacements *(project is in progress)*
- Apple Pie Ridge Elementary School HVAC boiler unit replacements *(project is in progress)*
- Apple Pie Ridge Elementary School roof replacement
- Apple Pie Ridge Elementary plumbing refurbishment
- Sherando High School boiler replacement *(project is in progress*)
- Sherando High School track resurface
- Millbrook High School tennis court resurface

Projects begun in FY 2026 (current year) and complete or in progress as of June 30, 2026:

- Millbrook High School Fire Alarm *(project is in progress)*
- James Wood Middle School Fire Alarm *(project is in progress)*
- Millbrook High School Locker Room Heater Replacement
- Sherando High School HVAC Fresh Air Units *(project was delayed, in progress)*
- Orchard View Elementary School Cooling Tower *(project is in progress)*
- Armel Elementary School Playground Equipment Replacement
- Apple Pie Ridge Elementary School Playground Equipment Replacement
- Indian Hollow Elementary School Playground Equipment Replacement
- Bass-Hoover Elementary School HVAC Replacements *(project is in progress)*
- Dowell J. Howard School HVAC Replacements *(project is in progress)*

The balance of $6,154,172 will carry forward into FY27 to complete the in-progress projects listed above.



Frederick County Public Schools
School Capital Projects Fund
Year Ended June 30, 2026

		[a] Actual 2023-24	[b] Actual 2024-25	[c] Adjusted Budget 2025-26	[d] Actual 2025-26	[e] Variance from Adj Budget
[1]	**Beginning Balance July 1**	$ 3,310,246	$ 1,241,192	$ 4,338,109	$ 4,261,252	$ (76,857)
	REVENUES:					
[2]	Other Receipts	$ -	$ -	$ -	$ -	$ -
[3]	State Revenue	-	-	-	-	-
[4]	Local Funds - Frederick County	877,282	5,467,769	6,815,185	6,815,185	-
[5]	Transfers from Other Funds	-	-	-	-	-
[6]	**TOTAL REVENUES**	**$ 877,282**	**$ 5,467,769**	**$ 6,815,185**	**$ 6,815,185**	**$ -**
	Total Revenues and Beginning Balance	**$ 4,187,528**	**$ 6,708,961**	**$ 11,153,294**	**$ 11,076,437**	**$ (76,857)**
	EXPENDITURES:					
[7]	Capital Outlay	$ 2,946,336	$ 2,447,709	$ 11,153,294	$ 4,922,266	$ 6,231,029
[8]	**TOTAL EXPENDITURES**	**$ 2,946,336**	**$ 2,447,709**	**$ 11,153,294**	**$ 4,922,266**	**$ 6,231,029**
[9]	**Ending Balance June 30**	**$ 1,241,192**	**$ 4,261,252**	**$ -**	**$ 6,154,172**	
[10]	Balance Reserve for Encumbrances	$ 691,657	$ 3,338,109		$ 1,191,551	
[11]	Balance Committed	$ 549,536	$ 923,143		$ 4,962,621	

Numbers may not add correctly due to rounding.

CONSTRUCTION FUND

The active construction projects for FY 2026 were James Wood High School, the fourth high school, the Middletown Elementary expansion, and Jordan Springs Elementary expansion construction projects.

A project-to-date summary is shown below and is provided in a different format on the financial statement. The amounts shown in bold represent active project balances at year-end, which will be automatically re-appropriated in the next fiscal year to continue the project.

James Wood High School			**Fourth High School:**		
Beginning project amount	$	72,844,000.00	Beginning project amount	$	151,600,000.00
Expenditures through June 30, 2026	$	(71,593,815.51)	Expenditures through June 30, 2026	$	(6,899,122.63)
O/S Encumbrances @ June 30, 2026	$	(93,649.16)	O/S Encumbrances @ June 30, 2026	$	(2,462,749.32)
Remaining project balance	**$**	**1,156,535.33**	Remaining project balance	**$**	**142,238,128.05**
Cash received – bond proceeds	$	65,100,000.00	Cash received – bond proceeds	$	28,095,000.00
Cash received – premium proceeds	$	6,318,812.91	Cash received – premium proceeds	$	1,909,401.68
Cash received – interest earnings	$	1,581,888.76	Cash received – interest earnings	$	435,656.81
Cash transferred from other projects	$	(897,148.82)	Cash received from other projects	$	302,718.12
Cash disbursed for project	$	(70,342,676.13)	Cash disbursed for project	$	(6,441,994.42)
Accounts Payable @ June 30, 2026	$	(1,251,139.38)	Accounts Payable @ June 30, 2026	$	(457,128.21)
Cash/ A/P balance as of June 30, 2026	$	509,737.34	Cash/A/P balance @June 30, 2026	$	23,843,653.98
Jordan Springs Expansion:			**Middletown Expansion:**		
Beginning project amount	$	13,600,000.00	Beginning project amount	$	22,400,000.00
Expenditures through June 30, 2026	$	(7,466,635.00)	Expenditures through June 30, 2026	$	(1,962,204.69)
O/S Encumbrances @ June 30, 2026	$	(5,940,862.67)	O/S Encumbrances @ June 30, 2026	$	(15,488,160.24)
Remaining project balance	**$**	**192,502.33**	Remaining project balance	**$**	**4,949,635.07**
Cash received – bond proceeds	$	3,720,000.00	Cash received – bond proceeds	$	10,755,000.00
Cash received – premium proceeds	$	281,535.73	Cash received – premium proceeds	$	749,274.90
Cash received – interest earnings	$	22,279.21	Cash received – interest earnings	$	171,531.91
Cash received – proffer fund	$	7,463,418.70	Cash transferred – undesignated fund	$	-
Cash received from other projects	$	-	Cash received from other projects	$	1,343,919.41
Cash disbursed for project	$	(6,457,505.28)	Cash disbursed for project	$	(1,556,097.57)
Accounts Payable @ June 30, 2026	$	(1,009,129.72)	Accounts Payable @ June 30, 2026	$	(406,107.12)
Cash/ A/P balance as of June 30, 2026	$	4,020,598.64	Cash/ A/P balance as of June 30, 2026	$	11,057,521.53
Armel Addition:					
Beginning project amount	$	500,000.00			
Expenditures through June 30, 2026	$	(474,563.00)			
O/S Encumbrances @ June 30, 2026	$	-			
Remaining project balance	**$**	**25,437.00**			
Cash received – bond proceeds	$	-			
Cash received – premium proceeds	$	-			
Cash received – interest earnings	$	-			
Cash transferred – undesignated fund	$	-			
Cash received from other projects	$	500,000.00			
Cash disbursed for project	$	(474,563.00)			
Accounts Payable @ June 30, 2026	$	-			
Cash/ A/P balance as of June 30, 2026	$	25,437.00			

Frederick County Public Schools
Construction Funds
Year Ended June 30, 2026

	[a] Project Budget	[b] Prior Years' Receipts	[c] Actual 2025-26	[d] Cummulative Project Receipts
[1] **Beginning Balance July 1**			$ 16,495,413	
REVENUES:				
[2] Interest Income	$ -	$ 1,511,839	$ 699,517	$ 2,211,357
[3] Proceeds from Bond Sale	254,430,581	79,848,873	35,310,000	115,158,873
[4] Other Receipts	6,513,419	7,785,996	2,697,064	10,483,060
[5] Miscellaneous	-	-	-	-
[6] **TOTAL REVENUES**	**$ 260,944,000**	**$ 89,146,708**	**$ 38,706,581**	**$ 127,853,289**

	[a] Project Budget	[b] Prior Years' Expenditures	[c] Actual 2025-26	[d] Cummulative Project Expenditures	[e] Outstanding Encumbrances	[f] Remaining Project Balance
EXPENDITURES:						
[7] Armel Elementary Additions	$ 500,000	$ 474,563	$ -	$ 474,563	$ -	$ 25,437
[8] James Wood High School Renovation	72,844,000	70,052,174	1,541,642	71,593,816	93,649	$ 1,156,535
[10] Fourth High School - Design & Construction	151,600,000	1,255,254	5,643,869	6,899,123	2,462,749	$ 142,238,128
[11] Middletown Elementary Expansion	22,400,000	479,982	1,482,223	1,962,205	15,488,160	$ 4,949,635
[12] Jordan Springs Elementary Expansion	13,600,000	389,322	7,077,313	7,466,635	5,940,863	$ 192,502
[13] **TOTAL EXPENDITURES**	**$ 260,944,000**	**$ 72,651,295**	**$ 15,745,046**	**$ 88,396,341**	**$ 23,985,421**	**$ 148,562,238**
[14] **Ending Balance June 30**				**$ 39,456,948**		

Numbers may not add correctly due to rounding.

DEBT SERVICE FUND

The Debt Service Fund accounts for principal and interest payments on general obligation bonds sold through the Virginia Public School Authority to finance major school construction projects.

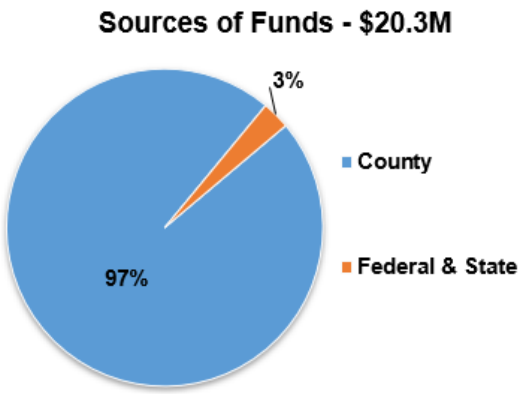
During the fiscal year, FCPS received $297,378 in refinancing credits from VPSA and $280,543 from the federal government as an interest rebate subsidy for the Qualified School Construction Bonds (QSCB) program. Additionally, $19,601,918 was received from the county. These revenue sources were used to pay the principal, interest, and administrative expenses for the 36 bond issues covering 12 construction projects amortized over 20 years.

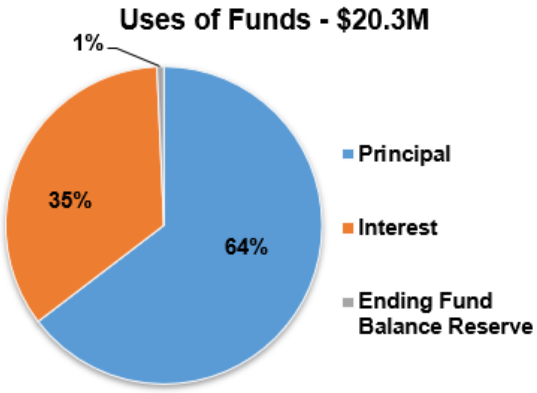
The FY 2026 principal, interest, and management fee payments totaled $20,154,099. The end-of-year fund balance is $142,325. The fund balance will carry forward to support future debt obligations.

A summary of the outstanding indebtedness is shown below.

Outstanding debt at June 30, 2025	$ 166,775,000
New debt incurred during FY 2026	$ 35,310,000 *
Principal payments on existing debt during FY 2026	$(13,105,000)
OUTSTANDING DEBT AT JUNE 30, 2026	**$ 188,980,000**

** New debt incurred includes borrowing for the fourth high school, Jordan Springs Elementary School and Middletown Elementary School construction projects.*





Frederick County Public Schools
Debt Service Fund
Year Ended June 30, 2026

		[a] Actual 2023-24	[d] Actual 2024-25	[c] Adjusted Budget 2025-26	[d] Actual 2025-26	[e] Variance from Adj Budget
[1]	**Beginning Balance July 1**	$ 31,847	$ 63,706	$ -	$ 116,586	$ 116,586
	REVENUES:					
[2]	State VPSA Credits	$ 369,331	$ 313,344	$ 270,811	$ 297,378	$ 26,567
[3]	Federal - QSCB	281,370	280,543	281,370	280,543	(828)
[4]	Local Funds - Frederick County	18,076,918	20,426,918	19,601,918	19,601,918	-
[5]	Transfers from Other Funds	226,069	-	-	-	-
[6]	**TOTAL REVENUES**	**$18,953,688**	**$21,020,805**	**$ 20,154,099**	**$ 20,179,839**	**$ 25,740**
	EXPENDITURES:					
[7]	Principal Payments	$12,450,000	$13,565,000	$ 13,105,000	$ 13,105,000	$ -
[8]	Interest Payments	6,443,345	7,374,440	7,027,664	7,027,664	-
[9]	Miscellaneous	28,484	28,485	21,435	21,435	-
[10]	**TOTAL EXPENDITURES**	**$18,921,829**	**$20,967,925**	**$ 20,154,099**	**$ 20,154,099**	**$ -**
[11]	Transfers to Other Funds	$ -	$ -	$ -	$ -	
[12]	**Ending Balance June 30**	**$ 63,706**	**$ 116,586**	**$ -**	**$ 142,325**	
[13]	Balance Assigned	$ 63,706	$ 116,586		$ 142,325	

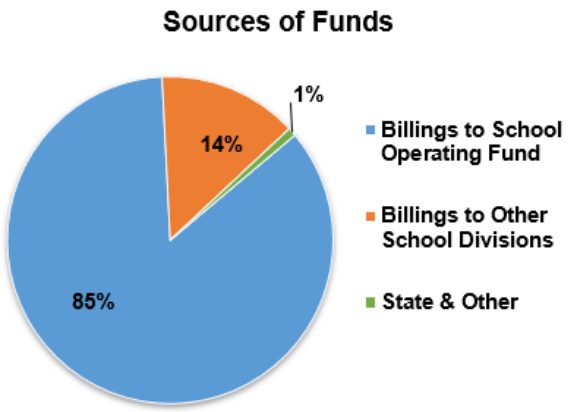
Numbers may not add correctly due to rounding.

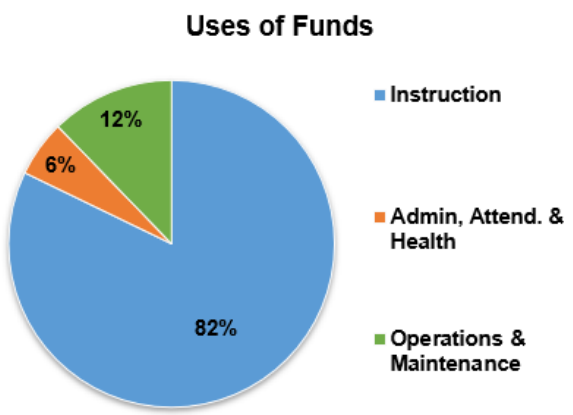
NORTHWESTERN REGIONAL EDUCATIONAL PROGRAMS (NREP) FUNDS

Frederick County Public Schools is the fiscal agent for the NREP program. The school divisions of Winchester City and Frederick and Clarke Counties fund the program along with some state dollars. The NREP program provides intense services to multiple disabled students, emotionally disabled students, autistic students, hearing-impaired students, deaf/blind students, and early childhood students with various disabilities. The program also provides outreach services to daycares and homes, as well as musical, occupational, physical, and speech therapy services. About 200 students receive services from this program, of which 85 percent are FCPS students.

Total revenues were $6,774,253 and were $381,559 less than budgeted. This amount represents a positive variance in interest earnings offset by a credit to the participating localities for the previous year's operating surplus of funds. Expenditure savings of $692,207 were realized throughout the year. The residual surplus of $357,154 is carried forward to the next school year and will be a credit to the participating localities. The residual surplus is the result of vacancy and turnover savings in personnel.

The NREP textbook fund concluded the year with a fund balance of $16,706. The fund balance is accumulated over time and is assigned to future disbursements driven by textbook adoption requirements.





Frederick County Public Schools

Northwestern Regional Educational Programs (NREP) Funds

Year Ended June 30, 2026

	[A] Actual 2023-24	[d] Actual 2024-25	[c] Adjusted Budget 2025-26	[d] Actual 2025-26	[e] Variance from Adj Budget
OPERATING FUND					
Beginning Balance at July 1	$ 408,645	$ 347,710	$ 365,000	$ 411,507	$ 46,507
REVENUES:					
[1] Interest	$ 41,477	$ 54,251	$ -	$ 29,947	$ 29,947
[2] Tuition	-	-	-	-	-
[3] Revenue from Commonwealth	26,000	26,000	26,000	26,000	-
[4] Revenue from Federal Government	-	-	-	-	-
[5] Local Funds -- Frederick County, Winchester City, and Clarke County	6,507,642	7,260,223	7,129,812	6,718,305	(411,507)
[6] **TOTAL REVENUES**	**$ 6,575,119**	**$ 7,340,474**	**$ 7,155,812**	**$ 6,774,253**	**$ (381,559)**
EXPENDITURES:					
[7] Instruction	$ 5,493,329	$ 6,036,688	$ 5,890,015	$ 5,580,466	$ 309,549
[8] Administration, Attendance & Health	411,160	431,892	380,243	379,263	980
[9] Pupil Transportation Services	1,261	-	-	-	-
[10] Operations and Maintenance	663,117	772,399	833,497	833,497	-
[11] Food Services	-	-	1,000	-	1,000
[12] Fund Transfers/Contingency	20,000	-	365,000	-	365,000
[13] Technology	47,186	35,698	51,057	35,378	15,679
[14] **TOTAL EXPENDITURES**	**$ 6,636,054**	**$ 7,276,678**	**$ 7,520,812**	**$ 6,828,605**	**$ 692,207**
[15] **Ending Balance at June 30**	**$ 347,710**	**$ 411,507**	**$ -**	**$ 357,154**	
[16] Reserve for Encumbrance	$ -	$ -		$ -	
[17] Balance Committed	$ 347,710	$ 411,507		$ 357,154	
TEXTBOOK FUND					
Beginning Balance at July 1	$ 5,485	$ 26,678	$ 20,000	$ 27,978	$ 7,978
REVENUES:					
[1] Interest	$ 1,193	$ 1,300	$ -	$ 963	$ 963
[2] Transfers from NREP Operating Fund	20,000	-	-	-	-
[3] **TOTAL REVENUES**	**$ 21,193**	**$ 1,300**	**$ -**	**$ 963**	**$ 963**
EXPENDITURES:					
[4] Payments for Textbooks	$ -	$ -	$ 20,000	$ 12,236	$ 7,765
[5] Payments for Technology Software/Devices	-	-	-	-	-
[6] **TOTAL EXPENDITURES**	**$ -**	**$ -**	**$ 20,000**	**$ 12,236**	**$ 7,765**
[7] **Ending Balance at June 30**	**$ 26,678**	**$ 27,978**	**$ -**	**$ 16,706**	
[8] Balance Committed	$ 26,678	$ 27,978		$ 16,706	

Numbers may not add correctly due to rounding.

PRIVATE PURPOSE FUNDS

The school division maintains a private-purpose endowment fund and a private-purpose income fund. The endowment fund activity includes contributions and management expenses associated with the principal or corpus. The income fund activity includes miscellaneous restricted donations, interest postings, disbursements, and fund transfers. Fund balances are brought forward each year into the next fiscal period.

The fund balance at June 30, 2026, is comprised of the following:

	Private-Purpose Endowment Balance	Private-Purpose Income Fund Balance
Armstrong Foundation Scholarship	$ 224,861	$ 138,251
Della Stine Scholarship	$ 13,465	$ 1,748
Bright Futures Program	N/A	$ 789,669
FCPS101	N/A	$ 1,748
Preschool Donations	N/A	$ 41,745
TOTAL	**$ 238,326**	**$ 973,161**

Private-Purpose Endowment Funds

- Armstrong Foundation Scholarship Fund—This fund accounts for funds provided by the Armstrong Foundation. Earnings are used to provide scholarships to deserving students of the Frederick County, Virginia schools.
- Della Stine Scholarship—This fund accounts for funds provided by a private donor. Earnings on fund assets may be used to provide a scholarship to a deserving student who attended Dowell J. Howard Learning Center.

Private-Purpose Income Fund

- The Armstrong Foundation and Della Stine Scholarship Funds are restricted for providing scholarships to students at the three Frederick County high schools. The endowed funds are used to support the respective annual scholarship when interest income is insufficient.
- Bright Futures is a non-profit organization that helps schools connect student needs with donated resources (money, supplies or time) that already exist in the community.
- FCPS101 is a community engagement program to educate community members on FCPS instructional and operational services. Private donations support this program.
- The Preschool Donation is provided to support preschool program operational expenses.

Frederick County Public Schools
Private Purpose Funds
Year Ended June 30, 2026

		[a] Private-Purpose Endowment FY24-25	[b] Private-Purpose Income FY24-25	[c] Private-Purpose Endowment FY25-26	[d] Private-Purpose Income FY25-26
[1]	**Beginning Balance July 1**	$ 238,326	$ 676,027	$ 238,326	$ 837,113
	REVENUES:				
[2]	Interest on Bank Accounts	$ -	$ 51,256	$ -	$ 31,334
[3]	Interest on Investments				
[4]	Donations and Grants		259,717		223,751
[5]	Billings to FCPS & WPS		300,000		300,000
[6]	Investment Earnings				
[7]	**TOTAL REVENUES**	**$ -**	**$ 610,973**	**$ -**	**$ 555,085**
	EXPENDITURES:				
[8]	Salaries	$ -	$ 185,726	$ -	$ 197,453
[9]	Employee Benefits	-	71,669	$ -	76,376
[10]	Scholarship Payments	-	23,500	-	19,500
[11]	Services and Other Expenses	-	14,931	-	12,701
[12]	Other Operating Supplies	-	99,920	-	113,008
[13]	Instructional Supplies	-	2,495	-	-
[14]	Technology Hardware	-	-	-	-
[15]	Capital Outlay	-	51,645	-	-
[16]	Transfers to Other Funds	-	-	-	-
[17]	**TOTAL EXPENDITURES**	**$ -**	**$ 449,886**	**$ -**	**$ 419,037**
[18]	**Ending Balance June 30**	**$ 238,326**	**$ 837,113**	**$ 238,326**	**$ 973,161**
[19]	Balance Restricted	$ 238,326	$ 837,113	$ 238,326	$ 973,161

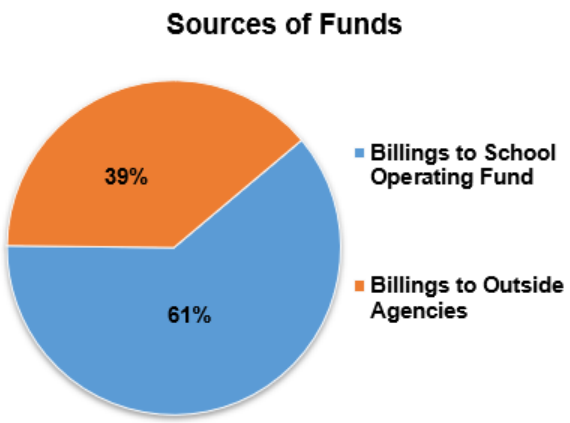
Numbers may not add correctly due to rounding.

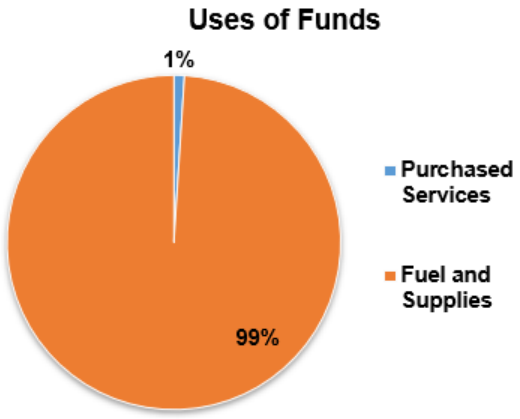
CONSOLIDATED SERVICES FUND

The consolidated services fund accounts for the transaction activity associated with vehicle fuel provided to the school division and outside agencies.

The transportation facility, located on Route 522 south, is equipped for fleet maintenance and fueling services to support the school division, some county offices and departments, and volunteer fire and rescue stations. The facility operations include vehicle repairs, tire changing, washing and fueling, and inspections. The facility is staffed by heavy-duty and light-duty mechanics. Most of the service mechanics hold Automotive Service Excellence (ASE) certifications in their respective fields. Prior to FY2026, fleet services were billed to user agencies on a cost-recovery basis. The billings included full recovery of all direct and indirect expenses associated with the service provided. Beginning in FY2026, this fund captures the purchase for and billings to the school division and outside agencies for fuel only. Vehicle labor and parts are now allocated directly to the School Operating Fund removing the billing process to the Division.

FY 2026 revenues totaled $2,007,853 and expenses totaled $2,062,605. Expenditures are more than revenues by $54,752 and are reduced from the fund balance. The ending fund balance of $950,976 includes $88,747 in fuel inventory value at fiscal year-end. The residual $862,229 in fund balance is assigned as a carried-forward to the next fiscal year to support the consolidated services operation.





Frederick County Public Schools
Consolidated Services Fund
Year Ended June 30, 2026

		[a] Actual 2023-24	[b] Actual 2024-25	[c] Adjusted Budget 2025-26	[d] Actual 2025-26	[e] Variance from Adj Budget
	Beginning Balance July 1	$ 1,046,368	$ 951,535	$ 794,330	$ 1,005,728	$ 211,398
[1]	**REVENUES:**					
[2]	Vehicle Services					
	Billings to FCPS	$ 3,382,567	$ 3,527,457	$ 1,375,600	$ 1,230,626	$ (144,974)
	Billings to Outside Agencies	739,559	677,577	830,070	777,227	(52,843)
	Other Receipts	1,578	6,036	-	-	-
	Sub-total Vehicle Services	$ 4,123,703	$ 4,211,070	$ 2,205,670	$ 2,007,853	$ (197,817)
[3]	Transfers from School Operating Fund	$ -	$ -	$ -	$ -	$ -
[4]	**TOTAL RECEIPTS**	**$ 4,123,703**	**$ 4,211,070**	**$ 2,205,670**	**$ 2,007,853**	**$ (197,817)**
	Total Receipts and Beginning Balance	**$ 5,170,071**	**$ 5,162,605**	**$ 3,000,000**	**$ 3,013,581**	
[5]	**EXPENDITURES:**					
[6]	Vehicle Services					
	Salaries	$ 976,882	$ 1,029,611	$ -	$ -	$ -
	Fringe Benefits	324,584	318,372	-	-	-
	Purchased Services	71,453	71,233	748,191	20,931	727,260
	Other Charges	53,606	56,121	-	-	-
	Materials and Supplies	2,792,010	2,657,120	2,205,670	2,041,674	163,996
	Capital Outlay	-	24,420	46,139	-	46,139
	Sub-total Vehicle Services	$ 4,218,535	$ 4,156,877	$ 3,000,000	$ 2,062,605	$ 937,395
[7]	**TOTAL EXPENDITURES**	**$ 4,218,535**	**$ 4,156,877**	**$ 3,000,000**	**$ 2,062,605**	**$ 937,395**
[8]	**Revenues Over/ (Under) Expenditures**	$ (94,832)	$ 54,193		$ (54,752)	
[9]	**Ending Balance June 30**	**$ 951,535**	**$ 1,005,728**		**$ 950,976**	
[10]	Balance Nonspendable, Inventory	$ 405,063	$ 454,493		$ 88,747	
[11]	Balance Committed - reserve for encumbrance	$ 34,477	$ -		$ -	
[12]	Balance Assigned	$ 511,995	$ 551,235		$ 862,229	

Numbers may not add correctly due to rounding.

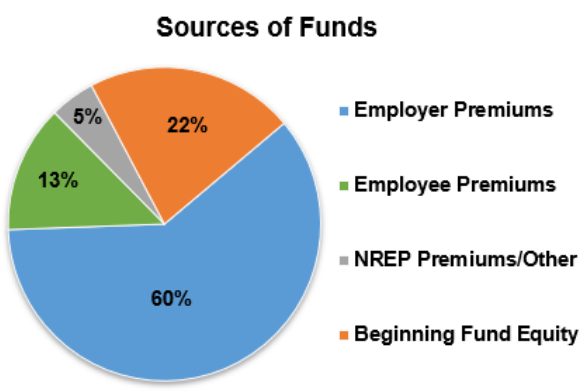
INSURANCE RESERVE FUND

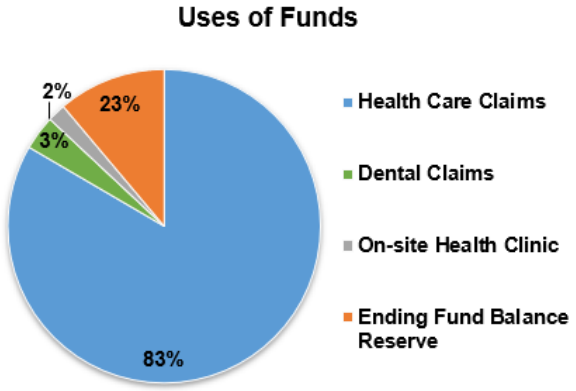
The insurance reserve fund accounts for health care benefits for participating employees. Sources of funds are medical and dental premiums received from Frederick County Public Schools and participating employees. Funds are used to pay health/dental claims and health clinic activities for participating employees. The fund balance is generated from premiums exceeding insurance carrier claims and health clinic activities. Likewise, the fund balance could decrease for claims and activities exceeding premiums collected. A range for projected claims expense and health care utilization is prepared by the insurance carrier. Premiums are set within the projected claims range and projected health clinic activities.

The health insurance program provided coverage for 1,990 FCPS employees and retirees plus their dependents. The program includes two medical plan options and one vision provided by Anthem, and one dental plan provided by Delta Dental. The two medical plan options are known as KeyCare 25 and the Health Savings Account (HSA). Participating employees and their dependents also have access to the on-site healthcare clinic in partnership with Valley Health. The health clinic is designed to improve employee access to convenient, quality healthcare services while decreasing time from the classroom and work sites.

On the financial statement, column [d] shows the current year's activity compared to the expected claim levels shown in column [c]. Medical and dental claims, Affordable Care Act, on-site health clinic activities, and other expenses for FY 2026 totaled $30,839,419, exceeding the expected level of $30,330,000. Premiums collected were lower than expected due to vacancies and changes in dependent plan participation. The insurance reserve fund fiscal year-end balance decreased by $3,636,664 to an ending balance of $3,867,596. The fund balance equates to almost two months of expected claims activity. The fund balance is assigned to support future health claims.

Column [e] provides activity projected for FY 2027. FCPS premium shares will increase by 30 percent; employee premiums will not increase. Anthem will continue to provide medical insurance and Delta Dental will provide dental insurance for participating employees and their dependents. Overall, the fund needs to support about $36.1 million in expected insurance claims and healthcare clinic activities for FY 2027. It is important to maintain a fund balance sufficient to support claims that exceed expectations.





Frederick County Public Schools
Insurance Reserve Fund
Year Ended June 30, 2026

		[a] Actual 2023-24	[b] Actual 2024-25	[c] Expected Activity 2025-26	[d] Actual 2025-26	[e] Expected Activity 2026-27	
[1]	**Beginning Balance July 1**	$ 9,563,182	$ 9,135,418	$ 7,504,260	$ 7,504,260	$ 3,867,596	[1]
	REVENUES:						
[2]	Interest on Bank Deposits	$ 660,103	$ 584,145	$ 500,000	$ 362,576	$ 250,000	[2]
[3]	Health Insurance Premiums	22,086,746	24,543,659	27,807,025	26,785,178	35,847,450	[3]
[4]	Donations/Grants/Other	10,977	5,549	500	55,000	-	[4]
[5]	**TOTAL REVENUES**	**$ 22,757,826**	**$ 25,133,353**	**$ 28,307,525**	**$ 27,202,754**	**$ 36,097,450**	[5]
	EXPENDITURES:						
[6]	Contracted Activities	$ 214,844	$ 78,700	$ 90,000	$ 79,534	$ 85,000	[6]
[7]	Taxes & Fees	8,469	9,249	10,000	10,255	11,000	[7]
[8]	Lease of Building	36,354	3,657	-	-	-	[8]
[9]	Health Clinic Services & Supplies	643,443	639,730	675,000	650,000	650,000	[9]
[10]	Health Care Claims	20,861,863	24,897,411	28,155,000	28,867,142	33,951,450	[10]
[11]	Dental Claims	1,420,616	1,135,765	1,400,000	1,232,488	1,400,000	[11]
[12]	**TOTAL EXPENDITURES**	**$ 23,185,589**	**$ 26,764,511**	**$ 30,330,000**	**$ 30,839,419**	**$ 36,097,450**	[12]
[13]	**Revenues Over/(Under) Expenditures**	$ (427,764)	$ (1,631,158)	$ (2,022,475)	$ (3,636,664)	$ -	[13]
[14]	**Ending Balance June 30**	**$ 9,135,418**	**$ 7,504,260**	**$ 5,481,785**	**$ 3,867,596**	**$ 3,867,596**	[14]

Numbers may not add correctly due to rounding.

Frederick County Public Schools

1415 Amherst Street
Winchester, Virginia 22601
540-662-3888

For more information on current budget and programs, visit www.frederickcountyschoolsva.net

Board of Supervisors
Agenda Item Detail
Meeting Date: October 28, 2026
Agenda Section: Consent Agenda

Title: Finance Committee Item: The WRAA Executive Director requests Airport Operating Fund and Airport Capital Fund supplemental appropriations in the amount of $125,000 for hangar facility roof repair. No local County funds are required. The Committee recommends approval.

Attachments:
SA Airport Roof Repair.pdf

WINCHESTER REGIONAL AIRPORT
491 AIRPORT ROAD
WINCHESTER, VIRGINIA 22602
(540) 662-5786

MEMORANDUM

To: Sharon Kibler, Frederick County Finance Director

From: Nick Sabo, Winchester Regional Airport Authority Executive Director

Date: October 9, 2026

RE: Finance Committee Agenda Item | Appropriation for Roof Repair

---

The Winchester Regional Airport Authority (WRAA) requests to appropriate funds for a building maintenance project that was not included in the FY2027 budget. The project scope includes a comprehensive repair to hangar facility that is home to several businesses. The roof is 30 years old and has had several leaks and failures. The project was approved by the WRAA Board of Directors at its October 8, 2026 regular business meeting. All project costs will be paid by WRAA funds; therefore, no County funds are required.

Expense: 4 - 085 - 081030 - 8801 - 000 - TBD, Hangar 615 Roof Repair, $125,000

Revenue: 3 - 085 - 051050 - 0003, Transfer from Airport Operating Fund, $125,000

We appreciate the support of Frederick County. Please advise if you have questions or need additional information.

Board of Supervisors
Agenda Item Detail
Meeting Date: October 28, 2026
Agenda Section: Consent Agenda

Title: Finance Committee Item: The WRAA Executive Director requests an Airport Operating Fund supplemental appropriation of $11,000 and an Airport Capital Fund supplemental appropriation of $110,000 for security upgrades. No local County funds are required. The Committee recommends approval.

Attachments:
SA Airport Security Project.pdf

WINCHESTER REGIONAL AIRPORT
491 AIRPORT ROAD
WINCHESTER, VIRGINIA 22602
(540) 662-5786

MEMORANDUM

To: Sharon Kibler, Frederick County Finance Director

From: Nick Sabo, Winchester Regional Airport Authority Executive Director

Date: October 9, 2026

RE: Finance Committee Agenda Item | Appropriation for Security Project

---

The Winchester Regional Airport Authority (WRAA) requests to appropriate funds for a security project that was not included in the FY2027 budget. The project scope includes necessary upgrades to vehicle gates, access control systems, and cameras. The project was approved by the WRAA Board of Directors at its October 8, 2026 regular business meeting and is eligible for 90% reimbursement through a grant from the Virginia Department of Aviation (DOAV). The 10% local match will be paid by WRAA funds; therefore, no County funds are required.

Expense: 4 - 085 - 081030 - 8801 - 000 - TBD, Security Project, $110,000

Revenue: 3 - 085 - 024040 - 0012, State Reimbursement, $99,000
3 - 085 - 051050 - 0003, Transfer from Airport Operating Fund, $11,000

We appreciate the support of Frederick County. Please advise if you have questions or need additional information.

Board of Supervisors
Agenda Item Detail
Meeting Date: October 28, 2026
Agenda Section: Consent Agenda

Title: Finance Committee Item: The FCPS Executive Director of Finance provides the FY 2026 Year End School Board Funds Financial Report and requests the following supplemental appropriations:

- C.1.a School Capital Projects Fund carry forward appropriation of $1,962,621 for the Sherando High School HVAC capital project.

- C.1.b Textbook Fund supplemental appropriation of $189,419.60 representing interest earnings.

- C.1.c General Fund and School Capital Projects Fund supplemental appropriations of $1,065,946 representing the unobligated surplus from the FY 2026 School Operating Fund to be used for HVAC replacements and playground equipment replacements.

The committee recommends approval.

Attachments:
FCPS SA.pdf
FY26 School Board Funds Financial Report.pdf

County Finance Committee Meeting

September 16, 2026

Frederick County Public Schools

Kristen Anderson, MBA, SFO
FCPS Executive Director of Finance

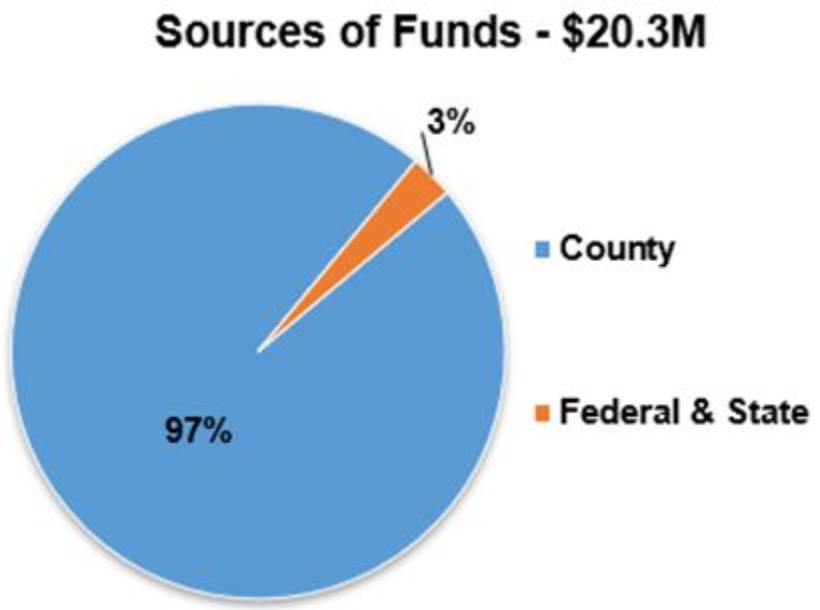
Agenda

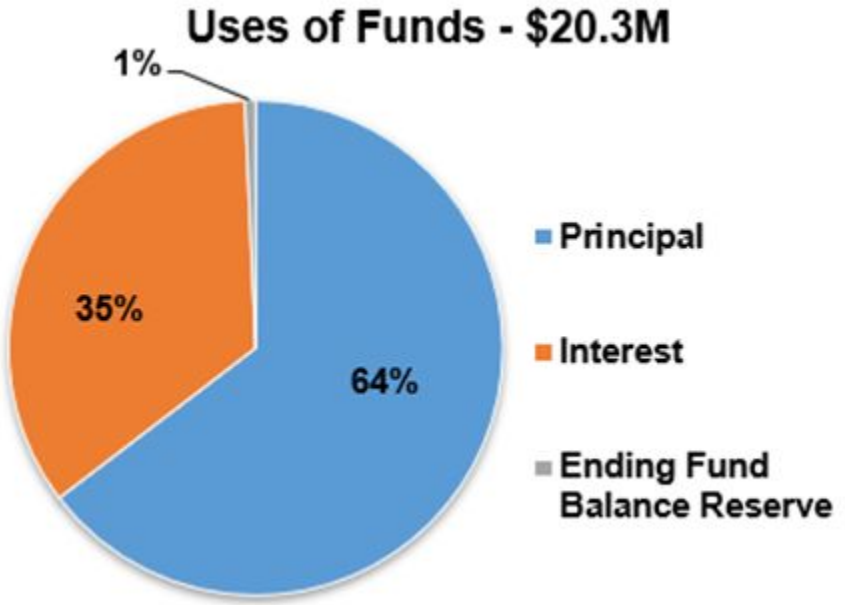
- School Debt Service Fund
- School Capital Projects Fund
  - Request for Carry Forward Supplemental Appropriation
- School Special Grants Fund
  - Request for Supplemental Appropriation
- School Operating Fund
  - Request for Supplemental Appropriation

FCPS is recommending the committee move to the full Board of Supervisors a carry forward supplemental appropriation of unencumbered FY26 School Capital Projects fund to the FY 2027 School Capital Projects Fund, a supplemental appropriation of unobligated interest earnings from the Special Grants Fund to the FY 2027 School Textbook Fund, and a supplemental appropriation of the unobligated surplus from the FY2026 School Operating Fund to the FY 2027 School Capital Projects Fund.

School Debt Service Fund

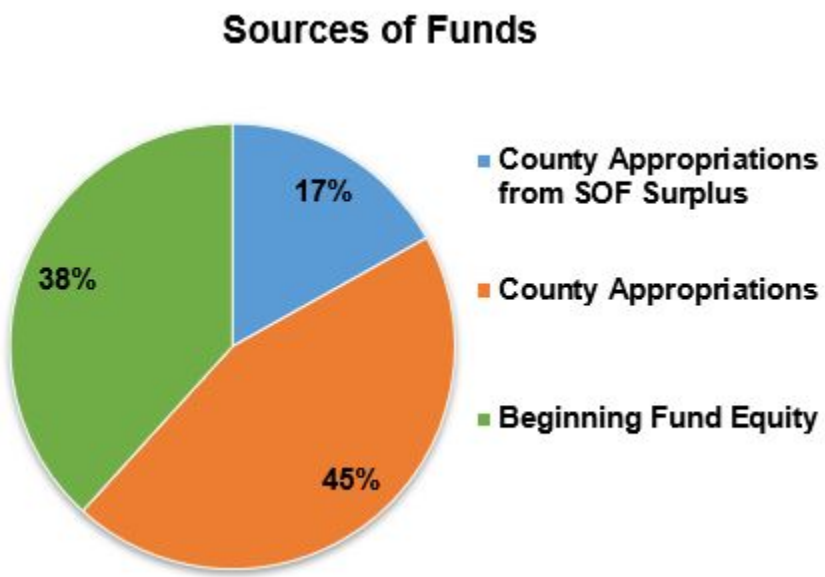
Outstanding debt at June 30, 2025	$166,775,000
New debt incurred during FY 2026	$ 35,310,000
Principal payments on existing debt during FY 2026	$(13,105,000)
Outstanding debt at June 30, 2026	$188,980,000

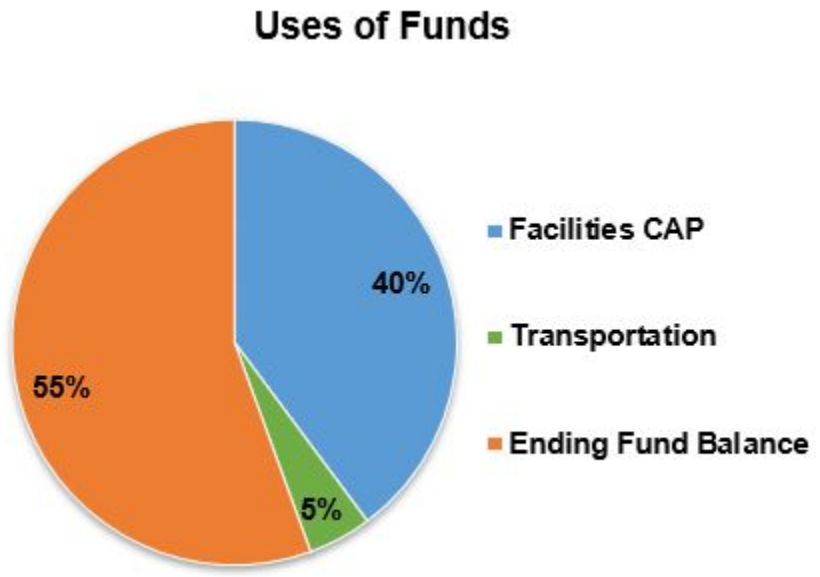




School Capital Projects Fund

Beginning Fund Balance	$ 4,261,252
Revenue Received	$ 6,815,185
Facilities projects and four buses	$(4,922,266)
Ending Fund Balance	$ 6,154,172





School Capital Projects Fund

Projects begun in FY25 and completed or in progress at 6/30/26:

- James Wood Middle School partial roof replacement*
- Bass-Hoover Elementary School HVAC chiller replacement*
- Bass-Hoover Elementary School boiler and water heater replacements*
- Stonewall Elementary School HVAC boiler unit replacements*
- Apple Pie Ridge Elementary School HVAC boiler unit replacements*
- Apple Pie Ridge Elementary School roof replacement
- Apple Pie Ridge Elementary plumbing refurbishment
- Sherando High School boiler replacement*
- Sherando High School track resurface
- Millbrook High School tennis court resurface

*In-progress at June 30, 2026

Projects begun in FY26 and completed or in progress at 6/30/26:

- Millbrook High School Fire Alarm*
- James Wood Middle School Fire Alarm*
- Millbrook High School Locker Room Heater Replacement
- Sherando High School HVAC Fresh Air Units**
- Orchard View Elementary School Cooling Tower*
- Armel Elementary School Playground Equipment Replacement
- Apple Pie Ridge Elementary School Playground Equipment Replacement
- Indian Hollow Elementary School Playground Equipment Replacement
- Bass-Hoover Elementary School HVAC Replacements*
- Dowell J. Howard School HVAC Replacements*

*In-progress at June 30, 2026
**Delayed pending re-appropriation

School Capital Projects Fund

FY27 Budget Adjustment to the School Capital Projects Fund

- SHS HVAC Fresh Air Units $1,962,621

Project is prioritized and scheduled in the Capital Asset Plan but was not encumbered by June 30, 2026. Capital Asset project costs are estimates.

Special Grants Fund

- State All In Virginia $4,163,705 revenues provided for high intensive tutoring, Virginia Literacy Act implementation, and combating chronic absenteeism.

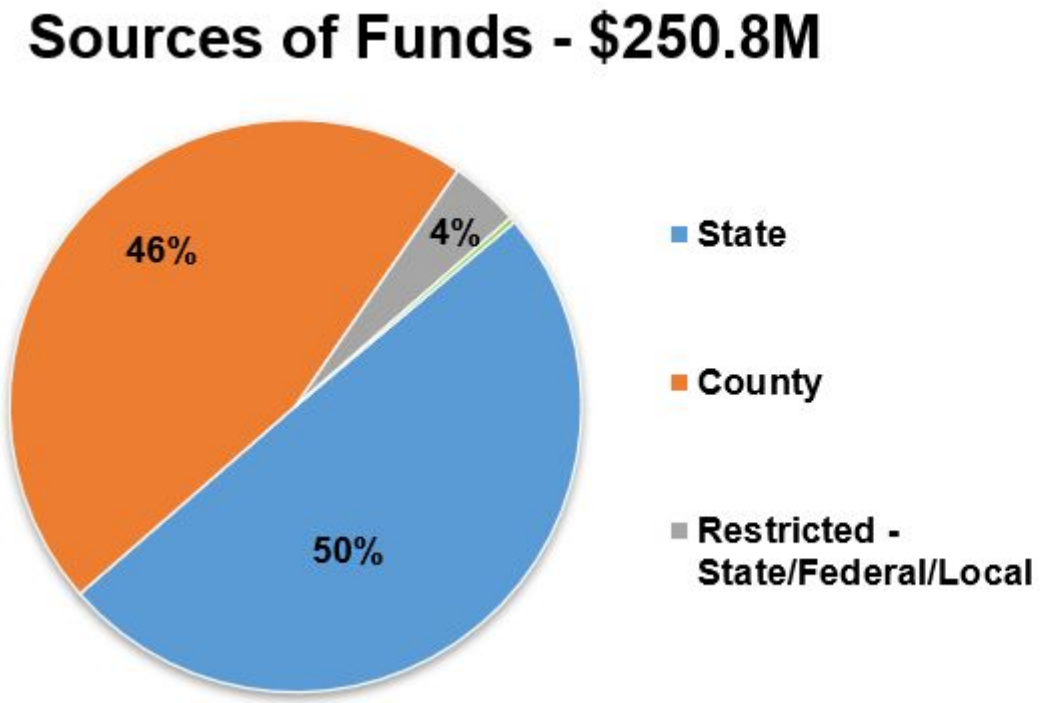
- Funds provided in 2024 to be fully utilized by June 30, 2026.

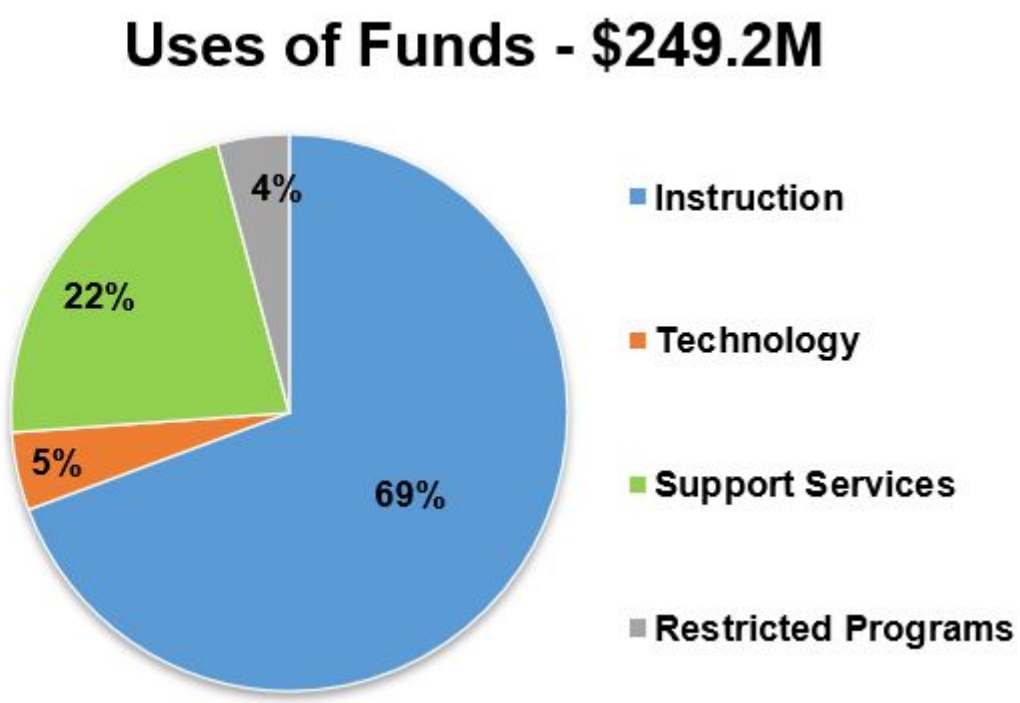
- Ending fund balance of $189,420 represents interest income earned.

FY27 Budget Adjustment to the School Textbook Fund

- **Unobligated interest earnings from the Special Grants Fund $189,419.60**

School Operating Fund





Actual revenues collected were 2.3% less than budget largely due to changes in state revenues driven by average daily membership and non-recurring grants and miscellaneous receipts.

Actual expenditures were 2.9% less than budget largely due to less than expected student enrollment, savings in departmental and school discretionary spending, and personnel vacancy savings and attrition.

School Operating Fund, cont'd.

Total Operating Fund Surplus	$1,591,824
Obligated Operating Surplus, Nonspendable	$ 324,598
Obligated Operating Surplus, Restricted	$ 201,280
Unobligated Operating Surplus (0.42% of Operating Budget)	$1,065,946

Remaining Obligated Funds

Remaining restricted grants funds of $201,280.01 are re-appropriated to FY27. Those restricted grant funds are:

- Advanced Computer Science Education Grant - $1,597.82
- Early Reading Intervention Program - $183,632.87
- Middle School Math Acceleration Grant - $642.45
- Mentor Teacher Program - $899.29
- Project Graduation Program - $14,288.48
- Virginia Star Program - $219.10

School Operating Fund, cont'd.

Key Factors Contributing to Unobligated Operating Surplus

	Budget	Actual	Variance
Sales Tax Receipts	$22,035,365	$22,385,944	$350,579
Budgetary Savings in Payroll	$199,234,761	$199,045,365	$189,396
Budgetary Savings in Schools and Departments	$50,651,519	$50,125,548	$525,971
Unobligated Surplus for FY26			**$1,065,946**

Remaining Unobligated Funds $1,065,946

FY27 Budget Adjustment to the School Capital Projects Fund

(all project costs are estimates)

- Redbud Run Elementary School HVAC $931,500
- Bass-Hoover Elementary School Playground Equipment $275,000
- Gainesboro Elementary School Playground Equipment $275,000

Projects prioritized and scheduled in the Capital Asset Plan, but not funded.

Request of Board of Supervisors

1. The School Board is requesting a carry forward supplemental appropriation of $1,962,621 to the FY 2027 School Capital Projects Fund. This amount represents unencumbered funds received during the FY 2026 for the Sherando High School HVAC Fresh Air Units capital project.

2. The School Board is requesting a supplemental appropriation of $189,419.60 to the FY 2027 School Textbook Fund. This amount represents Special Grants Fund unobligated interest earnings received during the fiscal years 2024, 2025, and 2026.

3. The School Board is requesting a supplemental appropriation of $1,065,946 to the FY 2027 School Capital Projects Fund. This amount represents the unobligated surplus from the FY 2026 School Operating Fund. If approved, the funds will be used for HVAC replacements at Redbud Run Elementary School and will support playground equipment replacements at Bass-Hoover and Gainesboro Elementary Schools.

Recap

- School Debt Service Fund
- School Capital Projects Fund
  - Request for Carry Forward Supplemental Appropriation
- School Special Grants Fund
  - Request for Supplemental Appropriation
- School Operating Fund
  - Request for Supplemental Appropriation

FCPS is recommending the committee move to the full Board of Supervisors a carry forward supplemental appropriation of unencumbered FY26 School Capital Projects fund to the FY 2027 School Capital Projects Fund, a supplemental appropriation of unobligated interest earnings from the Special Grants Fund to the FY 2027 School Textbook Fund, and a supplemental appropriation of the unobligated surplus from the FY2026 School Operating Fund to the FY 2027 School Capital Projects Fund.

YEAR-END SCHOOL BOARD FUNDS

FINANCIAL REPORTS

FISCAL YEAR 2026

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August 31, 2026

In this document are Frederick County Public Schools' year-end financial reports for fiscal year 2025-2026. As of the date of this report, the financials are undergoing an audit by an independent auditing firm hired by the Frederick County Government and Board of Supervisors. Included are the statements of operations for all funds managed by the school system.

This report summarizes the key activities within each fund. Please refer to the respective financial statement as you proceed through the text.

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SCHOOL OPERATING FUND

The unobligated surplus for the fiscal year 2026 school operating fund is $1,065,946, which is 0.42% of the $256,667,018 total school operating fund budget.

Operational Highlights of the Fiscal Year (and School Year) 2025-2026

- Served 14,421 students compared to a projected 14,825 student enrollment
- Focused on quality instruction, curriculum and project-based learning
- Implemented the new strategic plan – Ignite 2030
- Provided an average 4.9% salary increase for teachers
- Provided an average 5.6% salary increase for hourly employees – bus drivers, bus assistants, instructional assistants, custodians, maintenance technicians, administrative assistants, etc.
- Provided an hourly starting wage of $16.80 per hour
- Provided an average 3.4% salary increase for administrators and an average 4.4% increase for professional staff
- Purchased 11 new replacement and 10 gently-used school buses with operating funds
- Implemented the preventive maintenance schedule as prioritized in the Capital Asset Plan
- Invested in student data management, curriculum development, and professional learning
- Invested in a new Human Capital Management system for onboarding and evaluating staff

Summary Budget Statistics

1. The original (beginning) budget for the school operating fund for FY 2026 was $254,906,208.
2. Budget adjustments of $1,760,810 resulted in the adjusted budget balance of $256,667,018 and included the following:
    a. Encumbrance or undelivered commitments of $1,487,200.82
    b. Carry-forward restricted grant receipts of $273,609.50 from FY 2025

Summary Financial Statistics

1. Actual FY 2026 revenues in the school operating fund were $250,762,737, an increase of 2.3% compared to the prior year and 2.3% less than expected largely due to less than expected student enrollment.
2. Actual FY 2026 expenses and encumbrances totaled $249,170,913, an increase of 2.9% compared to the prior year and 2.9% less than budgeted largely due to less than expected student enrollment.
3. Obligations for bus and vehicle parts inventory on-hand at June 30, 2026 value at $324,598 are part of the year-end surplus and are not spendable funds.
4. Obligations for restricted programs valued at $210,280 are a part of the year-end surplus and are appropriated to FY 2027 by the Board of Supervisors FY2027 budget resolution.
5. An unobligated amount of $1,065,946 remained at year-end, or 0.42% of the operating fund budget.

The following items are key factors contributing to the school operating fund unobligated surplus after accounting for budget adjustments due to less than expected student enrollment.

	Budget	Actual	Variance
Sales tax receipts higher than expected	$22,035,365	$22,385,944	$ 350,579
Budgetary savings in payroll expenditures	$199,234,761	$199,045,365	$ 189,396
Budgetary savings in schools and departmental expenditures	$ 50,651,519	$ 50,125,548	$ 525,971
UNOBLIGATED SURPLUS FOR FY 2026			**$ 1,065,946**

The remaining portion of this section explains the financial activity and resulting variances.

UNDERSTANDING THE OPERATING FUND VARIANCES

The financial statement for the School Operating Fund is presented in a format reflecting two components of financial activity: unrestricted and restricted programs. The majority of the school division's programs and operations are funded by state and local (county) funds in the unrestricted component. While the school division must maintain minimum standards of quality with a mandated local match in most cases, the local school board allocates those funds with discretion aligned to planning goals. Therefore, the expenditures in this component are referred to as unrestricted.

The restricted program section shows the activity of grant funds received for specific use on designated programs. The budget and related financial activity align with the grant award amounts and spending period, creating budget to actual variances which could be misunderstood as local surpluses or deficits. For this reason, the format shown is designed to assist the reader with the distinction between the two.

SUMMARY OF REVENUES AND EXPENDITURES

Unrestricted revenues exceeded expenditures by $2,079,847 [line 11]. The variance for each revenue source and expenditure category is described in the following text. This amount is reduced by $488,023 in restricted program variances [line 14], resulting in the total operating fund surplus of $1,591,824 [line 15], which is reduced by $324,598 [line 16] inventory reserve and $201,280 [line 17] in carry-forward grant obligations. The bottom-line result is $1,065,946 [line 18] in unobligated surplus for FY 2026.

Unrestricted Revenues: $240,858,847 [line 6]

Local Sources [line 1]

- FCPS received $804,801 in miscellaneous local revenue, including fees and charges to students and the public, billings to other agencies, gifts and donations, rebates, refunds, and rental charges for the use of school division facilities. Funds received from these sources were less than projected by $27,413 primarily due to use of facilities.

Commonwealth [line 2]

- FCPS received $124,630,529 in state revenue, including Standards of Quality (SOQ) funds, sales tax receipts, incentive, categorical, lottery, and some miscellaneous.
- Standards of Quality revenue original budget was adjusted down due to less than expected student average daily enrollment. Remedial summer school was $352,437 less than expected due to an error in reported enrollment.
- Sales tax funding was more than the adjusted budget by $350,579.
- Lottery-funded program funding was less than budgeted by $388,396 due to less than expected student enrollment.
- Miscellaneous state funding was less than budgeted by $61,612 due to less than expected Medicaid reimbursements.

Federal Government [line 3]

- FCPS received $62,779 in unrestricted federal revenue. A small amount of funding is provided each year based on the federal land in the county and to support early childhood students receiving special education services. These funds help support FCPS's share of the early childhood program at NREP.

Local Government and Transfers [lines 4-5]

- FCPS received $115,360,738 from the County's General Fund – local government dollars. This total includes the prior year encumbrance and the current year funding support from the local governing body. County funds carried over from the prior year for restricted programs are included in the Restricted Revenues section of the financial statement.

Unrestricted Expenditures: $238,779,000 [line 10]

Instruction [line 7]

- FCPS expended $172,792,983 for costs associated with classroom instruction, student support services, library and media services, instructional support services, and school administrative offices in the areas of regular, special, vocational, and gifted education, and the other categories of instruction. Sixty-nine percent of expenditures are in this category. The positive variance of $1,594,293 is due to expenditure savings in personnel, school budgets, and instructional departments.

Instructional and Administrative Technology [line 8]

- FCPS expended $11,304,685 for costs associated with division technology – instructional, administrative, and operational categories. Five percent of all expenditures are in this category. The

positive variance of $6,330 is attributable to expenditure savings in the technology department equipment and supplies budget.

Support Services [line 9]

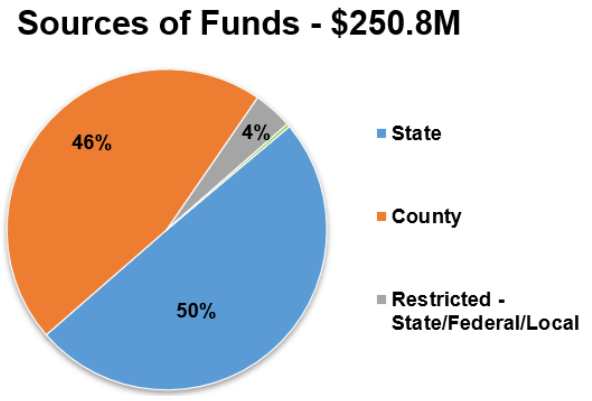
- FCPS expended $54,681,332 for costs associated with supporting the operations of the school division, including administration, student attendance and health, transporting students, and maintaining facilities. Twenty-two percent of all expenditures are in this category. The positive variance of $302,290 is due to savings in personnel and the support departmental expenditures.

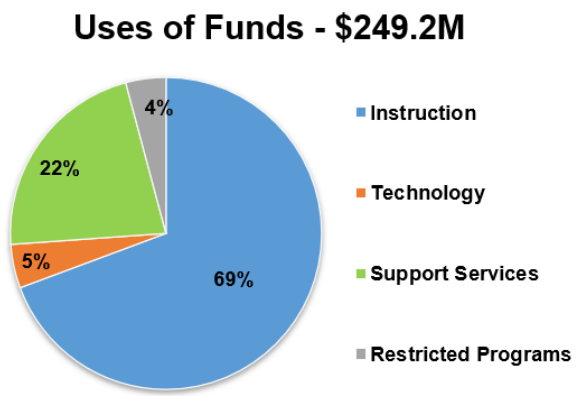
Restricted Program Revenues and Expenditures [lines 12 - 14]

Restricted Programs provide funding for specific initiatives. The majority of these revenues are based upon certain student populations or capabilities. Restricted program funding is associated with spending and reporting criteria. The vast majority of restricted revenues come from the federal government, but a few are from state, county prior year carry over funds, or miscellaneous sources. Restricted program revenues totaled $9,903,890 for FY 2026, and program expenditures totaled $10,391,913. The resulting negative balance of $488,023 represents locally required matching funds and subsidies toward certain restricted programs.

FY 2026 Operating Surplus: (Revenues Over Expenditures) $1,591,824 [line 15]

The total operating surplus for FY 2026 of $1,591,824 is reduced by the inventory value of $324,597.94 and the amount of revenue received for a special purpose, but has not yet been encumbered. These funds are obligations against the surplus funds, total $201,280.01, and include: 1) $1,597.82 for Advanced Computer Science in Education Grant, 2) $183,632.87 for Early Reading Intervention Program, 3) $642.45 for Middle School Math Acceleration Grant, 4) $899.29 for Mentor Teacher Program, 5) $14,288.48 for Project Graduation Program, and 6) $219.10 for VA Star Program. These grant funds are appropriated to the FY 2027. The unobligated surplus for FY 2026 is $1,065,946.





Frederick County Public Schools

School Operating Fund

Year Ended June 30, 2026

		[a] Actual* 2024-25	[b] Original Budget 2025-26	[c] Adjusted Budget 2025-26	[d] Actual* 2025-26	[e] Variance from Adj. Budget
SUMMARY						
	Revenue from Local/Other Sources	$ 1,789,048	$ 2,012,214	$ 1,945,582	$ 1,161,145	$ (784,437)
	Revenue from the Commonwealth	121,463,266	131,120,616	129,609,535	127,038,228	(2,571,308)
	Revenue from the Federal Government	8,865,924	7,899,841	9,477,554	6,929,017	(2,548,537)
	Revenue from Local Governing Body	113,098,756	113,873,537	115,634,347	115,634,347	-
[A]	**TOTAL REVENUES**	**$ 245,216,994**	**$ 254,906,208**	**$ 256,667,018**	**$ 250,762,737**	**$ (5,904,282)**
	Instruction	$ 164,180,768	$ 175,340,270	$ 174,387,276	$ 172,792,983	$ 1,594,293
	Instruction - Restricted Programs	12,292,228	16,573,040	15,985,105	10,391,913	5,593,192
	Technology - Instructional & Administrative	10,909,836	11,357,054	11,311,015	11,304,685	6,330
	Support Services	54,745,368	51,635,844	54,983,622	54,681,332	302,290
[B]	**TOTAL EXPENDITURES**	**$ 242,128,199**	**$ 254,906,208**	**$ 256,667,018**	**$ 249,170,913**	**$ 7,496,105**
	** Actual fiscal year expenditures includes encumbrances*					
[C]	**REVENUE OVER EXPENDITURES**	**$ 3,088,795**	**$ -**	**$ -**	**$ 1,591,824**	
[D]	Obligated Funds-Nonspendable Inventory				$ 324,598	
[E]	Obligated Funds-Special Programs	$ 273,610			$ 201,280	
[F]	**LOCAL FUNDS UNOBLIGATED AT JUNE 30**	**$ 2,815,185**			**$ 1,065,946**	
[G]	Percentage Surplus of Total Budget	1.15%			0.42%	
UNRESTRICTED REVENUES						
[1]	**Revenue from Local Sources**	**$ 895,479**	**$ 832,214**	**$ 832,214**	**$ 804,801**	**$ (27,413)**
[2]	**Revenue from Commonwealth**	**$ 119,178,208**	**$ 124,316,284**	**$ 125,077,778**	**$ 124,630,529**	**$ (447,249)**
a	Standards of Quality (SOQ)	75,435,925	78,288,058	76,992,891	76,640,454	(352,437)
b	Sales Tax	20,607,395	21,385,365	22,035,365	22,385,944	350,579
c	Incentive Accounts	5,879,868	8,442,864	8,300,011	8,300,011	-
d	Categorical	60,696	61,303	61,303	65,920	4,617
e	Lottery-Funded Programs	15,682,664	15,768,694	15,970,509	15,582,113	(388,396)
f	Miscellaneous State	1,511,659	370,000	1,717,699	1,656,087	(61,612)
[3]	**Revenue from Federal Government**	**$ 57,123**	**$ 54,841**	**$ 54,841**	**$ 62,779**	**$ 7,938**
[4]	**Transfers/ Carryover/ Prior Year Encumbrances**	**$ 3,899,414**	**$ -**	**$ 1,487,201**	**$ 1,487,201**	**$ -**
[5]	**Local Funds–Board of Supervisors**	**$ 109,026,463**	**$ 113,873,537**	**$ 113,873,537**	**$ 113,873,537**	**$ -**
[6]	**TOTAL UNRESTRICTED REVENUES**	**$ 233,056,686**	**$ 239,076,876**	**$ 241,325,571**	**$ 240,858,847**	**$ (466,724)**
UNRESTRICTED EXPENDITURES						
[7]	**Instruction**	**$ 164,180,768**	**$ 175,340,270**	**$ 174,387,276**	**$ 172,792,983**	**$ 1,594,293**
a	Regular Education	116,762,990	123,238,809	122,543,199	122,320,340	222,859
b	Special Education	33,035,052	37,195,695	37,044,753	36,157,538	887,215
c	Vocational Education	11,124,175	11,572,616	11,519,041	11,511,529	7,513
d	Gifted Education	1,127,436	1,381,936	1,289,291	965,202	324,088
e	Other Education	1,487,391	1,586,729	1,547,560	1,501,820	45,740
f	Summer School	599,157	339,590	416,643	311,336	105,307
g	Adult Education	21,847	24,000	23,418	21,847	1,570
h	Non-district Program	22,720	896	3,372	3,372	-
[8]	**Instructional & Administrative Technology**	**$ 10,909,836**	**$ 11,357,054**	**$ 11,311,015**	**$ 11,304,685**	**$ 6,330**
a	Instructional Technology	2,728,246	2,441,139	2,455,245	2,454,729	516
b	Instructional Support Technology	4,509,438	4,821,427	4,611,037	4,605,762	5,275
c	Administrative & Operations Support Technology	3,672,151	4,094,489	4,244,734	4,244,194	540
[9]	**Support Services**	**$ 54,745,368**	**$ 51,635,844**	**$ 54,983,622**	**$ 54,681,332**	**$ 302,290**
a	Administration, Attendance & Health	10,156,076	11,402,721	11,477,877	11,375,194	102,683
b	Pupil Transportation Services	14,840,332	15,487,297	15,876,036	15,708,980	167,056
c	Operation and Maintenance	21,339,822	20,388,033	22,378,122	22,373,524	4,597
d	School Nutrition Services	422	-	-	-	-
e	Facilities	6,466,268	2,289,399	3,111,372	3,083,418	27,954
f	Fund Transfers	1,942,447	2,068,395	2,140,215	2,140,215	-
[10]	**TOTAL UNRESTRICTED EXPENDITURES**	**$ 229,835,971**	**$ 238,333,168**	**$ 240,681,913**	**$ 238,779,000**	**$ 1,902,913**
[11]	**Unrestricted Revenue Over/(Under) Expense**	**$ 3,220,715**			**$ 2,079,847**	
RESTRICTED PROGRAM REVENUES						
	Revenue from Local Sources	**$ 893,569**	**$ 1,180,000**	**$ 1,113,368**	**$ 356,345**	**$ (757,023)**
a	eRate Program	25,872	30,000	25,872	25,872	-
b	Claude Moore Foundation	77,142	-	10,738	10,738	-
c	First Bank Donation	11,000	-	11,000	11,000	-
d	GMU Advanced Computer Science	8,764	-	-	-	-
e	GMU Data Science Lab Partnership	769,290	900,000	383,368	308,735	(74,633)
f	VA Star	1,500	-	-	-	-
g	Excess Appropriation	-	250,000	682,390	-	(682,390)
	Revenue from Commonwealth	**$ 2,285,059**	**$ 6,804,332**	**$ 4,531,757**	**$ 2,407,699**	**$ (2,124,059)**

Numbers may not add correctly due to rounding.

School Operating Fund
Year Ended June 30, 2026

		[a] Actual* 2024-25	[b] Original Budget 2025-26	[c] Adjusted Budget 2025-26	[d] Actual* 2025-26	[e] Variance from Adj. Budget
a	Regional Juvenile Detention Center	701,633	800,000	800,000	738,347	(61,653)
b	Special Education - In-Jail	151,037	180,000	180,000	157,420	(22,580)
c	Early Reading Intervention	528,053	535,706	512,748	512,748	-
d	SOL Algebra Readiness	203,526	206,045	206,045	211,268	5,223
e	Virginia Preschool Initiative	427,487	742,165	627,278	639,865	12,587
f	Other Special State Programs	273,322	180,416	162,891	148,051	(14,840)
g	Excess Appropriation	-	4,160,000	2,042,796	-	(2,042,796)
	Revenue from Federal Government	**$ 8,808,801**	**$ 7,845,000**	**$ 9,422,713**	**$ 6,866,237**	**$ (2,556,476)**
a	Title I, Part A	2,059,063	2,300,000	2,386,487	2,255,205	(131,282)
b	Title I, Part D	40,573	185,000	268,780	81,312	(187,468)
c	Title II, Part A Improve Teacher Quality	309,831	480,000	488,005	389,664	(98,342)
d	Title III, Part A LEP	127,164	310,000	374,689	158,363	(216,326)
e	Title IV, Part A	237,355	155,000	235,837	68,590	(167,247)
f	Title VI-B IDEA	3,571,349	3,710,000	4,089,469	3,436,620	(652,848)
g	Perkins Vocational	207,736	205,000	205,307	205,307	-
h	McKinney Vento	77,498	50,000	91,255	42,009	(49,246)
i	Coronavirus Aid Relief & Economic Security - ESSER	1,941,152	-	-	-	-
j	Coronavirus State and Local FRF	147,275	-	-	-	-
k	Literacy Grants - Farm Engage & Stds with Disabiliti	53,382	-	777,585	143,816	(633,769)
l	Other Miscellaneous Grants	-	-	85,351	85,351	-
m	School Safety and Security Grant	36,423	-	-	-	-
n	Excess Appropriation	-	450,000	419,948	-	(419,948)
	Revenue from County BOS - Prior Year Carryover	**$ 172,879**	**$ -**	**$ 273,610**	**$ 273,610**	**$ -**
a	Early Reading Intervention	-	-	26,155	26,155	-
b	GMU Data Science Lab Partnership	-	-	168,497	168,497	-
c	Project Graduation	-	-	4,796	4,796	-
d	SOL Algebra Readiness	-		23,797	23,797	-
e	Virginia Tiered Systems Support	8,797	-	4,175	4,175	-
f	VA Star	1,153	-	1,973	1,973	-
g	School-Based Health Workforce	2,291	-	-	-	-
h	Advanced Computer Science Education Grant	74,862	-	29,642	29,642	-
i	First Bank Donation	1,893	-	275	275	-
j	Chesapeake Bay Foundation	116	-	-	-	-
k	Mentor Teacher	810	-	476	476	-
l	School Safety and Security Grant	82,958	-	-	-	-
m	Title IV, Part A	-		13,823	13,823	-
[12]	**TOTAL RESTRICTED REVENUES**	**$ 12,160,308**	**$ 15,829,332**	**$ 15,341,448**	**$ 9,903,890**	**$ (5,437,558)**
	RESTRICTED PROGRAM EXPENDITURES					
a	eRate Program	25,872	30,000	25,872	25,872	-
b	Claude Moore Foundation	77,142	-	10,738	10,738	-
c	First Bank Donation	12,618	-	11,275	11,275	-
d	GMU Advanced Computer Science	6,799	-	1,965	1,837	129
e	GMU Data Science Lab School Partnership	600,793	900,000	551,865	477,232	74,633
f	VA Star	680	-	1,973	1,754	219
g	Regional Juvenile Detention Center	693,955	800,000	800,000	727,795	72,205
h	Special Education - In-Jail	151,037	180,000	180,000	157,420	22,580
i	Early Reading Intervention	501,898	915,893	719,090	719,164	(74)
j	SOL Algebra Readiness	324,170	456,396	480,193	430,250	49,943
k	Virginia Preschool Initiative	680,216	855,335	835,335	774,025	61,310
l	Other Special State Programs	456,202	180,416	177,179	160,811	16,368
m	Title I, Part A	2,059,063	2,300,000	2,386,487	2,255,205	131,282
n	Title I, Part D	40,573	185,000	268,780	81,312	187,468
o	Title II, Part A Improve Teacher Quality	309,831	480,000	488,005	389,664	98,342
p	Title III LEP	127,164	310,000	374,689	158,363	216,326
q	Title IV, Part A	223,532	155,000	249,660	82,412	167,247
r	Title VI-B	3,571,349	3,710,000	4,089,469	3,436,620	652,848
s	Perkins Vocational	207,736	205,000	205,307	205,307	-
t	Coronavirus Aid Relief & Economic Security - ESSER	1,941,152	-	-	-	-
u	Coronavirus State and Local FRF	147,275	-	-	-	-
v	McKinney Vento	77,498	50,000	91,255	42,009	49,246
w	Other Special Federal Programs	55,672	-	890,834	242,847	647,987
x	Excess Appropriation	-	4,860,000	3,145,134	-	3,145,134
[13]	**TOTAL RESTRICTED EXPENDITURES**	**$ 12,292,228**	**$ 16,573,040**	**$ 15,985,105**	**$ 10,391,913**	**$ 5,593,192**
[14]	**Restricted Revenue Over/(Under) Expense**	**$ (131,920)**			**$ (488,023)**	
[15]	**All Revenue Over/(Under) Expense**	**$ 3,088,795**			**$ 1,591,824**	
[16]	Obligated Funds-Nonspendable, Inventory				324,598	
[17]	Obligated Funds-Special Programs	273,610			201,280	
[18]	**LOCAL FUNDS UNRESTRICTED AND UNOBLIGATED AT JUNE 30**	**$ 2,815,185**			**$ 1,065,946**	

Numbers may not add correctly due to rounding.

SCHOOL NUTRITION FUND

The school nutrition program operates under the National School Lunch Program. Nine schools operated under the Community Eligibility Provision (CEP), where all meals served to participating students are free through federal reimbursements. The school nutrition fund completed FY 2026 with expenditures higher than revenues of $505,367, decreasing the fund balance.

On average, 58 percent of students participated in the lunch program daily – down from 59 percent the prior year. On average, 28 percent of students participated in the breakfast program daily – up from 27 percent the preceding year. The program received federal reimbursements on 653,464 breakfasts, 1,388,185 lunches, and 46,774 summer meal packs. The average federal reimbursement was $2.96 per meal, 6% more than the prior year. The average cost per meal was $5.31, a 6% increase.

REVENUE VARIANCES:

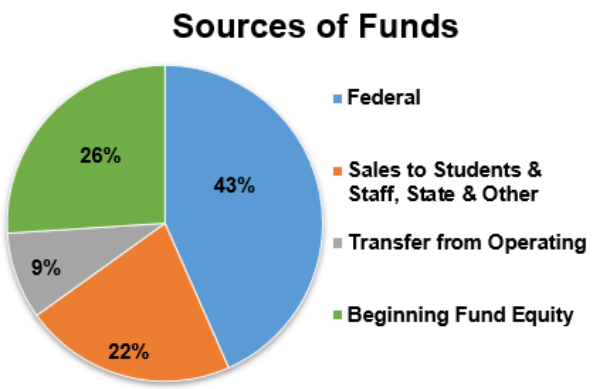
Compared to the budget, revenues were $171,876 less than expected. Primary revenue sources are sales to students and federal meal reimbursements. Lunch and breakfast sales to students were $258,554 less than anticipated due to participation patterns and less serving days due to inclement weather closures. The transfer from the School Operating Fund was $58,930 greater to fund the $500 employee bonus. All other revenue sources (interest, other sales, and receipts) were $27,748 more than the budget.

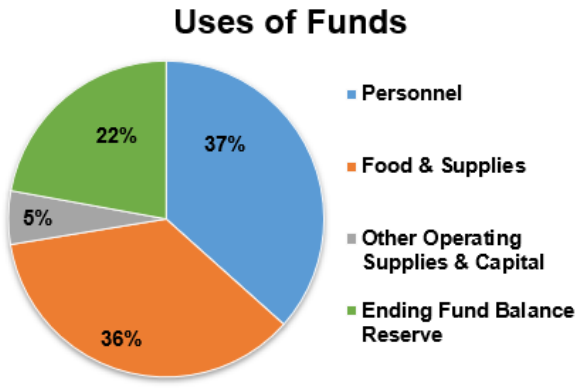
EXPENDITURE VARIANCES:

Compared to the budget, expenditures were $2,511,988 less than expected. $2,281,944 of the total expenditure variance represents the appropriation of the prior year's projected fund balance to use if needed for non-recurring operating or capital items. The other operational variances are the result:

- Labor cost was $139,339 less than anticipated due to employee turnover and vacancy savings.
- Food and supply costs were $53,823 less than budget largely due to 11 fewer serving days.
- All other expenses ended the year with a positive variance of $36,881.

The fund ended the fiscal year with $2,884,737 in fund balance. Of this amount, $145,120 is the inventory value. The residual fund balance of $2,739,617 will support the average operating expenses of about three months. Fund balance is carried forward to the next fiscal year for school nutrition operations.





Frederick County Public Schools
School Nutrition Fund
Year Ended June 30, 2026

		[a] Actual 2023-24	[b] Actual 2024-25	[c] Adjusted Budget 2025-26	[d] Actual 2025-26	[e] Variance from Adj Budget
[1]	**Beginning Balance July 1**	$ 4,762,322	$ 3,893,423	$ 2,845,479	$ 3,390,104	$ 544,625
	REVENUES:					
[2]	Interest on Bank Deposits	186,209	119,009	$ 125,000	$ 90,627	$ (34,373)
[3]	Type A Lunches	1,186,934	1,307,666	1,610,890	1,435,539	(175,351)
[4]	Breakfast Program	172,594	197,254	309,641	226,438	(83,203)
[5]	All Other Sales and Adults	719,898	705,874	750,000	724,744	(25,256)
[6]	Other Receipts	78,948	56,517	13,946	106,824	92,878
[7]	State School Food Payments	178,444	236,721	261,264	245,950	(15,314)
[8]	Federal Meals Reimbursement	5,103,055	5,133,656	5,643,738	5,653,551	9,813
[9]	Transfers From School Operating	171,028	1,000,000	1,100,000	1,158,930	58,930
[10]	**TOTAL REVENUES**	**$ 7,797,109**	**$ 8,756,698**	**$ 9,814,479**	**$ 9,642,603**	**$ (171,876)**
	Total Revenues and Beginning Balance	**$ 12,559,431**	**$ 12,650,121**	**$ 12,659,958**	**$ 13,032,707**	
	EXPENDITURES:					
[11]	Salaries	$ 2,783,613	$ 3,080,854	$ 3,410,344	$ 3,259,717	$ 150,627
[12]	Fringe Benefits	1,210,878	1,358,229	1,500,421	1,511,708	(11,288)
[13]	Contractual Services	152,479	76,634	161,764	91,494	70,271
[14]	Utilities, Travel and Misc	255,891	350,679	421,475	454,864	(33,389)
[15]	Food and Supplies	3,750,825	3,846,130	4,719,666	4,665,843	53,823
[16]	Capital Outlay	512,322	547,491	164,344	164,344	-
[17]	Planned Carryforward to Next Year	-	-	2,281,944	-	2,281,944
[18]	**TOTAL EXPENDITURES**	**$ 8,666,007**	**$ 9,260,017**	**$ 12,659,958**	**$ 10,147,970**	**$ 2,511,988**
[19]	**Revenue Over / (Under) Expenditures**	$ (868,899)	$ (503,319)	$ -	$ (505,367)	
[20]	**Ending Balance June 30**	**$ 3,893,423**	**$ 3,390,104**	**$ -**	**$ 2,884,737**	
[21]	Balance Nonspendable, Inventory	$ 149,227	$ 145,325		$ 145,120	
[22]	Committed - reserve for encumbrance	$ 489,842				
[23]	Balance Committed	$ 3,254,355	$ 3,244,780		$ 2,739,617	

Numbers may not add correctly due to rounding.

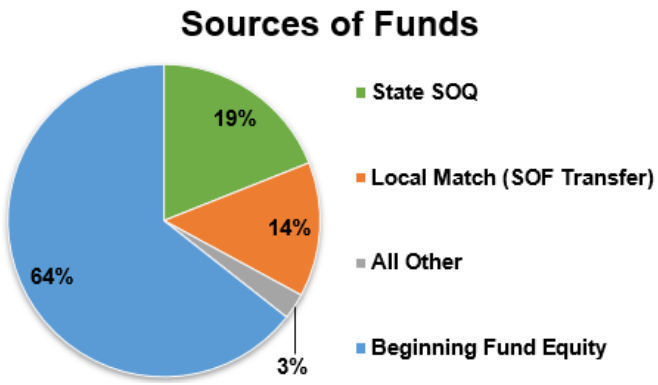
SCHOOL TEXTBOOK FUND

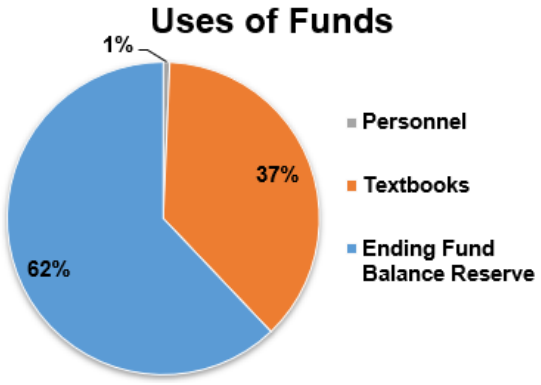
The textbook fund completed the year with expenditures in excess of revenues of $158,510, resulting in an ending fund balance of $4,314,874. The primary source of revenue for this fund comes from the Standards of Quality funding provided by the state and a local required match. The state funds require a local match equal to the composite index percentage and are provided through a transfer from the School Operating Fund.

The beginning fund balance for the School Textbook Fund was $4,473,384. Revenues plus the beginning fund balance provide for the total available funds of $6,947,113. For FY 2026, state funds of $1,318,123 plus $968,395 in local matching funds and $187,211 in miscellaneous receipts for interest earnings totaled $2,473,729 in revenue. State revenue was $46,402 less than projected due to less than expected student enrollment.

Textbook purchases replaced worn textbooks, as well as provided new math textbooks for grades K-5, secondary literacy and the social studies bridge. Textbook purchases can be either hard copy or digital formats. Total expenditures on textbooks and a part-time employee to manage the textbook inventory equaled $2,632,239 for the year.

The textbook fund balance increases and decreases over time as it supports the year-to-year disbursements driven by the timing of required textbook adoptions. The textbook fund balance is committed to the next fiscal year to support future textbook adoptions.





Frederick County Public Schools
School Textbook Fund
Year Ended June 30, 2026

		[a] Actual 2023-24	[b] Actual 2024-25	[c] Adjusted Budget 2025-26	[d] Actual 2025-26	[e] Variance from Adj Budget
[1]	**Beginning Balance July 1**	$ 1,916,893	$ 3,115,341	$ 4,272,190	$ 4,473,384	$ 201,194
	REVENUES:					
[2]	Interest on Bank Deposits	$ 132,068	$ 168,876	$ 75,000	$ 187,211	$ 112,211
[3]	Sale of Textbooks/ Lost Fees	388	0	1,000	-	(1,000)
[4]	Misc Revenue	-	-	-	-	-
[5]	State Reimbursements	1,077,654	1,331,811	1,364,525	1,318,123	(46,402)
[6]	Transfers From Other Funds	761,660	944,597	968,395	968,395	-
[7]	**TOTAL REVENUES:**	**$ 1,971,770**	**$ 2,445,284**	**$ 2,408,920**	**$ 2,473,729**	**$ 64,809**
	Total Revenues and Beginning Balance	**$ 3,888,663**	**$ 5,560,624**	**$ 6,681,110**	**$ 6,947,113**	
	EXPENDITURES:					
[8]	Salaries	$ 24,757	$ 26,635	$ 33,361	$ 33,578	$ (216)
[9]	Fringe Benefits	6,711	10,370	13,207	12,927	280
[10]	Contractual Services	-	-	-	-	-
[11]	Payments to Publishers	741,854	1,050,235	4,107,009	2,585,735	1,521,274
[12]	Planned Carryforward to Next Year	-	-	2,527,533	-	2,527,533
[13]	**TOTAL EXPENDITURES**	**$ 773,322**	**$ 1,087,240**	**$ 6,681,110**	**$ 2,632,239**	**$ 4,048,871**
[14]	**Revenues Over / (Under) Expenditures**	$ 1,198,448	$ 1,358,043	$ (4,272,190)	$ (158,510)	$ 4,113,680
[15]	**Ending Balance June 30**	**$ 3,115,341**	**$ 4,473,384**	**$ -**	**$ 4,314,874**	
[16]	Committed - reserve for encumbrance	$ 1,917	$ -		$ 514,657	
[17]	Balance Committed	$ 3,113,423	$ 4,473,384		$ 3,800,217	

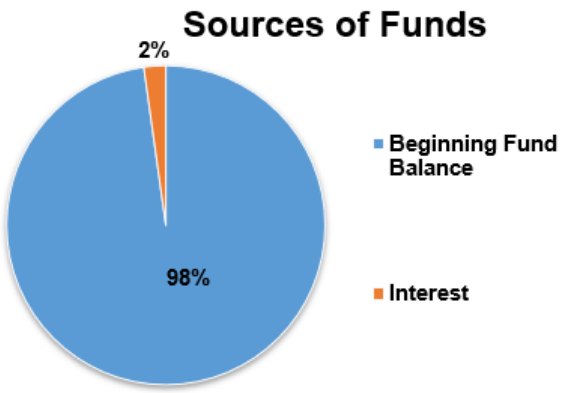
Numbers may not add correctly due to rounding.

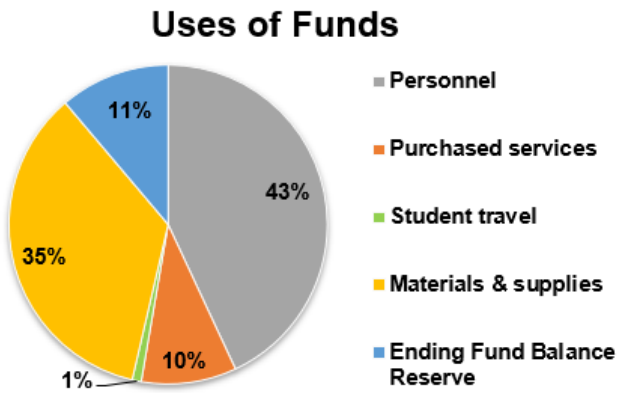
SPECIAL GRANTS FUND

The special grants fund accounts for the All In Virginia state funds to support high-dosage academic tutoring, accelerate the Virginia Literacy Act expansion, and combat student chronic absenteeism. The grant funds of $4,163,705 were received in the fiscal year 2024 to be used by June 30, 2026.

The beginning fund balance was $1,639,517. During the FY 2026, the fund received $37,082 in interest earnings and disbursed $1,487,179 for student tutoring outside the normal school hours, third-party virtual tutoring services, student transportation, and instructional materials and supplies. The fund completed the year with an ending fund balance of $189,420 reflecting interest earnings since FY2024.

The special grant fund balance of $189,420 is requested to carry-forward to the School Textbook Fund to support future textbook adoption needs.





Frederick County Public Schools
Special Grants Fund
Year Ended June 30, 2026

	[a] Grant Budget	[b] Prior Years' Receipts	[c] Actual 2025-26	[d] Cummulative Grant Receipts
[1] **Beginning Balance July 1**			$ 1,639,517	
REVENUES:				
[2] Interest Income	$ 189,420	$ 152,338	$ 37,082	$ 189,420
[3] State Revenue - All In Virginia	4,163,705	4,163,705	-	4,163,705
[4] **TOTAL REVENUES**	**$ 4,353,125**	**$ 4,316,043**	**$ 37,082**	**$ 4,353,125**

	[a] Grant Budget	[b] Prior Years' Expenditures	[c] Actual 2025-26	[d] Cummulative Grant Expenditures	[e] Outstanding Encumbrances	[f] Remaining Grant Balance
EXPENDITURES:						
[5] Salaries	$ 2,311,397	$ 1,642,848	$ 668,549	$ 2,311,397	$ -	$ -
[6] Fringe Benefits	181,619	129,306	52,313	181,619	-	-
[7] Purchased Services	658,511	496,684	161,827	658,511	-	-
[8] Student Travel	78,434	62,969	15,465	78,434	-	-
[9] Materials and Supplies	1,123,164	344,719	589,026	933,745	-	189,420
[10] **TOTAL EXPENDITURES**	**$ 4,353,125**	**$ 2,676,526**	**$ 1,487,179**	**$ 4,163,705**	**$ -**	**$ 189,420**
[11] **Ending Balance June 30**				**$ 189,420**		

Numbers may not add correctly due to rounding.

SCHOOL CAPITAL PROJECTS FUND

The school capital projects fund provides capital items too small in scope for the construction fund and not included in the school operating fund. Revenues are received from the county or a transfer of prior year surplus school operating funds. FCPS used the beginning fund balance of $4,261,252 and a $6,815,185 transfer by the county to purchase the following facilities projects and four school buses.

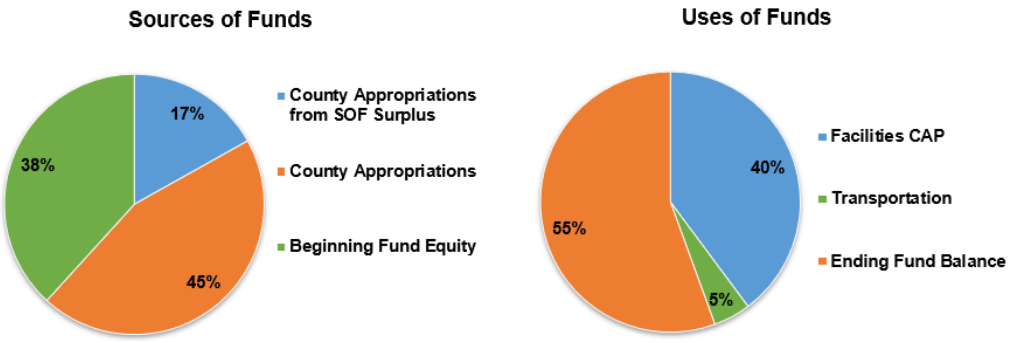
Projects begun in FY 2025 (prior year) and completed or in progress as of June 30, 2026:

- James Wood Middle School partial roof replacement *(project is in progress)*
- Bass-Hoover Elementary School HVAC chiller replacement *(project is in progress)*
- Bass-Hoover Elementary School boiler and water heater replacements *(project is in progress)*
- Stonewall Elementary School HVAC boiler unit replacements *(project is in progress)*
- Apple Pie Ridge Elementary School HVAC boiler unit replacements *(project is in progress)*
- Apple Pie Ridge Elementary School roof replacement
- Apple Pie Ridge Elementary plumbing refurbishment
- Sherando High School boiler replacement *(project is in progress*)
- Sherando High School track resurface
- Millbrook High School tennis court resurface

Projects begun in FY 2026 (current year) and complete or in progress as of June 30, 2026:

- Millbrook High School Fire Alarm *(project is in progress)*
- James Wood Middle School Fire Alarm *(project is in progress)*
- Millbrook High School Locker Room Heater Replacement
- Sherando High School HVAC Fresh Air Units *(project was delayed, in progress)*
- Orchard View Elementary School Cooling Tower *(project is in progress)*
- Armel Elementary School Playground Equipment Replacement
- Apple Pie Ridge Elementary School Playground Equipment Replacement
- Indian Hollow Elementary School Playground Equipment Replacement
- Bass-Hoover Elementary School HVAC Replacements *(project is in progress)*
- Dowell J. Howard School HVAC Replacements *(project is in progress)*

The balance of $6,154,172 will carry forward into FY27 to complete the in-progress projects listed above.



Frederick County Public Schools
School Capital Projects Fund
Year Ended June 30, 2026

		[a] Actual 2023-24	[b] Actual 2024-25	[c] Adjusted Budget 2025-26	[d] Actual 2025-26	[e] Variance from Adj Budget
[1]	**Beginning Balance July 1**	$ 3,310,246	$ 1,241,192	$ 4,338,109	$ 4,261,252	$ (76,857)
	REVENUES:					
[2]	Other Receipts	$ -	$ -	$ -	$ -	$ -
[3]	State Revenue	-	-	-	-	-
[4]	Local Funds - Frederick County	877,282	5,467,769	6,815,185	6,815,185	-
[5]	Transfers from Other Funds	-	-	-	-	-
[6]	**TOTAL REVENUES**	**$ 877,282**	**$ 5,467,769**	**$ 6,815,185**	**$ 6,815,185**	**$ -**
	Total Revenues and Beginning Balance	**$ 4,187,528**	**$ 6,708,961**	**$ 11,153,294**	**$ 11,076,437**	**$ (76,857)**
	EXPENDITURES:					
[7]	Capital Outlay	$ 2,946,336	$ 2,447,709	$ 11,153,294	$ 4,922,266	$ 6,231,029
[8]	**TOTAL EXPENDITURES**	**$ 2,946,336**	**$ 2,447,709**	**$ 11,153,294**	**$ 4,922,266**	**$ 6,231,029**
[9]	**Ending Balance June 30**	**$ 1,241,192**	**$ 4,261,252**	**$ -**	**$ 6,154,172**	
[10]	Balance Reserve for Encumbrances	$ 691,657	$ 3,338,109		$ 1,191,551	
[11]	Balance Committed	$ 549,536	$ 923,143		$ 4,962,621	

Numbers may not add correctly due to rounding.

CONSTRUCTION FUND

The active construction projects for FY 2026 were James Wood High School, the fourth high school, the Middletown Elementary expansion, and Jordan Springs Elementary expansion construction projects.

A project-to-date summary is shown below and is provided in a different format on the financial statement. The amounts shown in bold represent active project balances at year-end, which will be automatically re-appropriated in the next fiscal year to continue the project.

James Wood High School			**Fourth High School:**		
Beginning project amount	$	72,844,000.00	Beginning project amount	$	151,600,000.00
Expenditures through June 30, 2026	$	(71,593,815.51)	Expenditures through June 30, 2026	$	(6,899,122.63)
O/S Encumbrances @ June 30, 2026	$	(93,649.16)	O/S Encumbrances @ June 30, 2026	$	(2,462,749.32)
Remaining project balance	**$**	**1,156,535.33**	Remaining project balance	**$**	**142,238,128.05**
Cash received – bond proceeds	$	65,100,000.00	Cash received – bond proceeds	$	28,095,000.00
Cash received – premium proceeds	$	6,318,812.91	Cash received – premium proceeds	$	1,909,401.68
Cash received – interest earnings	$	1,581,888.76	Cash received – interest earnings	$	435,656.81
Cash transferred from other projects	$	(897,148.82)	Cash received from other projects	$	302,718.12
Cash disbursed for project	$	(70,342,676.13)	Cash disbursed for project	$	(6,441,994.42)
Accounts Payable @ June 30, 2026	$	(1,251,139.38)	Accounts Payable @ June 30, 2026	$	(457,128.21)
Cash/ A/P balance as of June 30, 2026	$	509,737.34	Cash/A/P balance @June 30, 2026	$	23,843,653.98
Jordan Springs Expansion:			**Middletown Expansion:**		
Beginning project amount	$	13,600,000.00	Beginning project amount	$	22,400,000.00
Expenditures through June 30, 2026	$	(7,466,635.00)	Expenditures through June 30, 2026	$	(1,962,204.69)
O/S Encumbrances @ June 30, 2026	$	(5,940,862.67)	O/S Encumbrances @ June 30, 2026	$	(15,488,160.24)
Remaining project balance	**$**	**192,502.33**	Remaining project balance	**$**	**4,949,635.07**
Cash received – bond proceeds	$	3,720,000.00	Cash received – bond proceeds	$	10,755,000.00
Cash received – premium proceeds	$	281,535.73	Cash received – premium proceeds	$	749,274.90
Cash received – interest earnings	$	22,279.21	Cash received – interest earnings	$	171,531.91
Cash received – proffer fund	$	7,463,418.70	Cash transferred – undesignated fund	$	-
Cash received from other projects	$	-	Cash received from other projects	$	1,343,919.41
Cash disbursed for project	$	(6,457,505.28)	Cash disbursed for project	$	(1,556,097.57)
Accounts Payable @ June 30, 2026	$	(1,009,129.72)	Accounts Payable @ June 30, 2026	$	(406,107.12)
Cash/ A/P balance as of June 30, 2026	$	4,020,598.64	Cash/ A/P balance as of June 30, 2026	$	11,057,521.53
Armel Addition:					
Beginning project amount	$	500,000.00			
Expenditures through June 30, 2026	$	(474,563.00)			
O/S Encumbrances @ June 30, 2026	$	-			
Remaining project balance	**$**	**25,437.00**			
Cash received – bond proceeds	$	-			
Cash received – premium proceeds	$	-			
Cash received – interest earnings	$	-			
Cash transferred – undesignated fund	$	-			
Cash received from other projects	$	500,000.00			
Cash disbursed for project	$	(474,563.00)			
Accounts Payable @ June 30, 2026	$	-			
Cash/ A/P balance as of June 30, 2026	$	25,437.00			

Frederick County Public Schools
Construction Funds
Year Ended June 30, 2026

	[a] Project Budget	[b] Prior Years' Receipts	[c] Actual 2025-26	[d] Cummulative Project Receipts
[1] **Beginning Balance July 1**			$ 16,495,413	
REVENUES:				
[2] Interest Income	$ -	$ 1,511,839	$ 699,517	$ 2,211,357
[3] Proceeds from Bond Sale	254,430,581	79,848,873	35,310,000	115,158,873
[4] Other Receipts	6,513,419	7,785,996	2,697,064	10,483,060
[5] Miscellaneous	-	-	-	-
[6] **TOTAL REVENUES**	**$ 260,944,000**	**$ 89,146,708**	**$ 38,706,581**	**$ 127,853,289**

	[a] Project Budget	[b] Prior Years' Expenditures	[c] Actual 2025-26	[d] Cummulative Project Expenditures	[e] Outstanding Encumbrances	[f] Remaining Project Balance
EXPENDITURES:						
[7] Armel Elementary Additions	$ 500,000	$ 474,563	$ -	$ 474,563	$ -	$ 25,437
[8] James Wood High School Renovation	72,844,000	70,052,174	1,541,642	71,593,816	93,649	$ 1,156,535
[10] Fourth High School - Design & Construction	151,600,000	1,255,254	5,643,869	6,899,123	2,462,749	$ 142,238,128
[11] Middletown Elementary Expansion	22,400,000	479,982	1,482,223	1,962,205	15,488,160	$ 4,949,635
[12] Jordan Springs Elementary Expansion	13,600,000	389,322	7,077,313	7,466,635	5,940,863	$ 192,502
[13] **TOTAL EXPENDITURES**	**$ 260,944,000**	**$ 72,651,295**	**$ 15,745,046**	**$ 88,396,341**	**$ 23,985,421**	**$ 148,562,238**
[14] **Ending Balance June 30**				**$ 39,456,948**		

Numbers may not add correctly due to rounding.

DEBT SERVICE FUND

The Debt Service Fund accounts for principal and interest payments on general obligation bonds sold through the Virginia Public School Authority to finance major school construction projects.

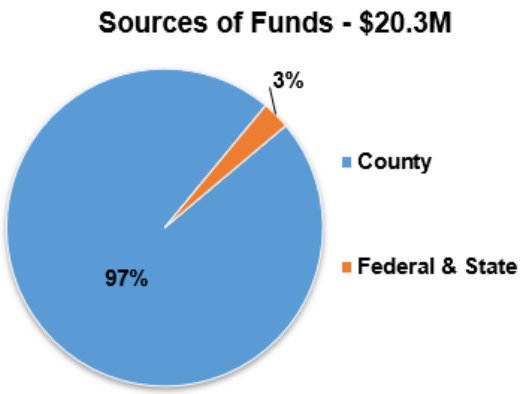
During the fiscal year, FCPS received $297,378 in refinancing credits from VPSA and $280,543 from the federal government as an interest rebate subsidy for the Qualified School Construction Bonds (QSCB) program. Additionally, $19,601,918 was received from the county. These revenue sources were used to pay the principal, interest, and administrative expenses for the 36 bond issues covering 12 construction projects amortized over 20 years.

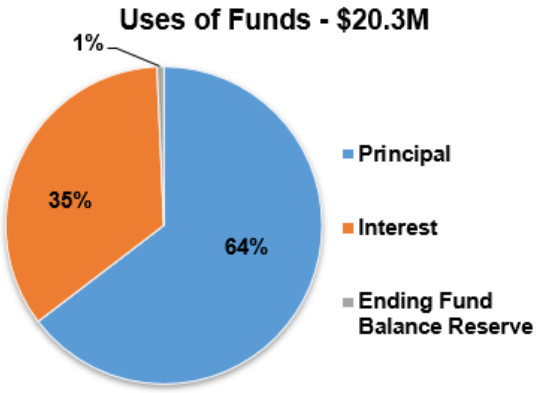
The FY 2026 principal, interest, and management fee payments totaled $20,154,099. The end-of-year fund balance is $142,325. The fund balance will carry forward to support future debt obligations.

A summary of the outstanding indebtedness is shown below.

Outstanding debt at June 30, 2025	$ 166,775,000
New debt incurred during FY 2026	$ 35,310,000 *
Principal payments on existing debt during FY 2026	$(13,105,000)
OUTSTANDING DEBT AT JUNE 30, 2026	**$ 188,980,000**

** New debt incurred includes borrowing for the fourth high school, Jordan Springs Elementary School and Middletown Elementary School construction projects.*





Frederick County Public Schools
Debt Service Fund
Year Ended June 30, 2026

		[a] Actual 2023-24	[d] Actual 2024-25	[c] Adjusted Budget 2025-26	[d] Actual 2025-26	[e] Variance from Adj Budget
[1]	**Beginning Balance July 1**	$ 31,847	$ 63,706	$ -	$ 116,586	$ 116,586
	REVENUES:					
[2]	State VPSA Credits	$ 369,331	$ 313,344	$ 270,811	$ 297,378	$ 26,567
[3]	Federal - QSCB	281,370	280,543	281,370	280,543	(828)
[4]	Local Funds - Frederick County	18,076,918	20,426,918	19,601,918	19,601,918	-
[5]	Transfers from Other Funds	226,069	-	-	-	-
[6]	**TOTAL REVENUES**	**$18,953,688**	**$21,020,805**	**$ 20,154,099**	**$ 20,179,839**	**$ 25,740**
	EXPENDITURES:					
[7]	Principal Payments	$12,450,000	$13,565,000	$ 13,105,000	$ 13,105,000	$ -
[8]	Interest Payments	6,443,345	7,374,440	7,027,664	7,027,664	-
[9]	Miscellaneous	28,484	28,485	21,435	21,435	-
[10]	**TOTAL EXPENDITURES**	**$18,921,829**	**$20,967,925**	**$ 20,154,099**	**$ 20,154,099**	**$ -**
[11]	Transfers to Other Funds	$ -	$ -	$ -	$ -	
[12]	**Ending Balance June 30**	**$ 63,706**	**$ 116,586**	**$ -**	**$ 142,325**	
[13]	Balance Assigned	$ 63,706	$ 116,586		$ 142,325	

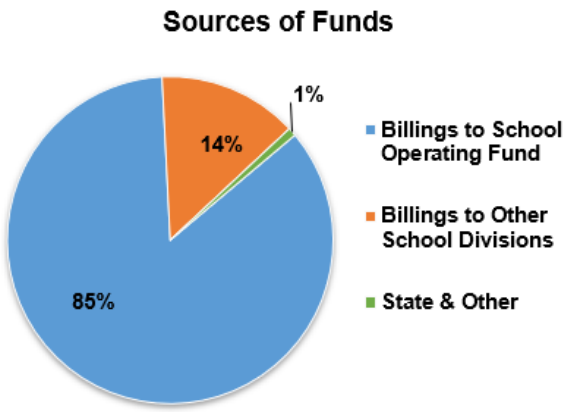
Numbers may not add correctly due to rounding.

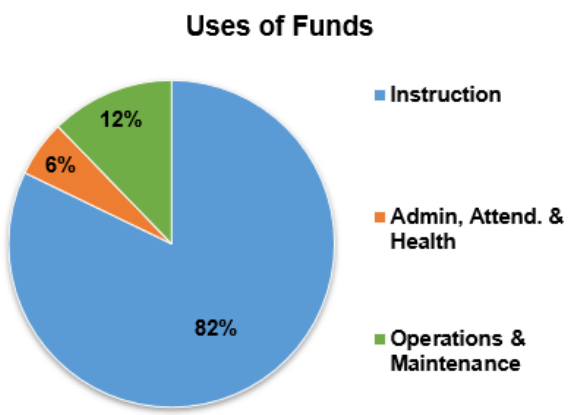
NORTHWESTERN REGIONAL EDUCATIONAL PROGRAMS (NREP) FUNDS

Frederick County Public Schools is the fiscal agent for the NREP program. The school divisions of Winchester City and Frederick and Clarke Counties fund the program along with some state dollars. The NREP program provides intense services to multiple disabled students, emotionally disabled students, autistic students, hearing-impaired students, deaf/blind students, and early childhood students with various disabilities. The program also provides outreach services to daycares and homes, as well as musical, occupational, physical, and speech therapy services. About 200 students receive services from this program, of which 85 percent are FCPS students.

Total revenues were $6,774,253 and were $381,559 less than budgeted. This amount represents a positive variance in interest earnings offset by a credit to the participating localities for the previous year's operating surplus of funds. Expenditure savings of $692,207 were realized throughout the year. The residual surplus of $357,154 is carried forward to the next school year and will be a credit to the participating localities. The residual surplus is the result of vacancy and turnover savings in personnel.

The NREP textbook fund concluded the year with a fund balance of $16,706. The fund balance is accumulated over time and is assigned to future disbursements driven by textbook adoption requirements.





Frederick County Public Schools

Northwestern Regional Educational Programs (NREP) Funds

Year Ended June 30, 2026

	[A] Actual 2023-24	[d] Actual 2024-25	[c] Adjusted Budget 2025-26	[d] Actual 2025-26	[e] Variance from Adj Budget
OPERATING FUND					
Beginning Balance at July 1	$ 408,645	$ 347,710	$ 365,000	$ 411,507	$ 46,507
REVENUES:					
[1] Interest	$ 41,477	$ 54,251	$ -	$ 29,947	$ 29,947
[2] Tuition	-	-	-	-	-
[3] Revenue from Commonwealth	26,000	26,000	26,000	26,000	-
[4] Revenue from Federal Government	-	-	-	-	-
[5] Local Funds -- Frederick County, Winchester City, and Clarke County	6,507,642	7,260,223	7,129,812	6,718,305	(411,507)
[6] **TOTAL REVENUES**	**$ 6,575,119**	**$ 7,340,474**	**$ 7,155,812**	**$ 6,774,253**	**$ (381,559)**
EXPENDITURES:					
[7] Instruction	$ 5,493,329	$ 6,036,688	$ 5,890,015	$ 5,580,466	$ 309,549
[8] Administration, Attendance & Health	411,160	431,892	380,243	379,263	980
[9] Pupil Transportation Services	1,261	-	-	-	-
[10] Operations and Maintenance	663,117	772,399	833,497	833,497	-
[11] Food Services	-	-	1,000	-	1,000
[12] Fund Transfers/Contingency	20,000	-	365,000	-	365,000
[13] Technology	47,186	35,698	51,057	35,378	15,679
[14] **TOTAL EXPENDITURES**	**$ 6,636,054**	**$ 7,276,678**	**$ 7,520,812**	**$ 6,828,605**	**$ 692,207**
[15] **Ending Balance at June 30**	**$ 347,710**	**$ 411,507**	**$ -**	**$ 357,154**	
[16] Reserve for Encumbrance	$ -	$ -		$ -	
[17] Balance Committed	$ 347,710	$ 411,507		$ 357,154	
TEXTBOOK FUND					
Beginning Balance at July 1	$ 5,485	$ 26,678	$ 20,000	$ 27,978	$ 7,978
REVENUES:					
[1] Interest	$ 1,193	$ 1,300	$ -	$ 963	$ 963
[2] Transfers from NREP Operating Fund	20,000	-	-	-	-
[3] **TOTAL REVENUES**	**$ 21,193**	**$ 1,300**	**$ -**	**$ 963**	**$ 963**
EXPENDITURES:					
[4] Payments for Textbooks	$ -	$ -	$ 20,000	$ 12,236	$ 7,765
[5] Payments for Technology Software/Devices	-	-	-	-	-
[6] **TOTAL EXPENDITURES**	**$ -**	**$ -**	**$ 20,000**	**$ 12,236**	**$ 7,765**
[7] **Ending Balance at June 30**	**$ 26,678**	**$ 27,978**	**$ -**	**$ 16,706**	
[8] Balance Committed	$ 26,678	$ 27,978		$ 16,706	

Numbers may not add correctly due to rounding.

PRIVATE PURPOSE FUNDS

The school division maintains a private-purpose endowment fund and a private-purpose income fund. The endowment fund activity includes contributions and management expenses associated with the principal or corpus. The income fund activity includes miscellaneous restricted donations, interest postings, disbursements, and fund transfers. Fund balances are brought forward each year into the next fiscal period.

The fund balance at June 30, 2026, is comprised of the following:

	Private-Purpose Endowment Balance	Private-Purpose Income Fund Balance
Armstrong Foundation Scholarship	$ 224,861	$ 138,251
Della Stine Scholarship	$ 13,465	$ 1,748
Bright Futures Program	N/A	$ 789,669
FCPS101	N/A	$ 1,748
Preschool Donations	N/A	$ 41,745
TOTAL	**$ 238,326**	**$ 973,161**

Private-Purpose Endowment Funds

- Armstrong Foundation Scholarship Fund—This fund accounts for funds provided by the Armstrong Foundation. Earnings are used to provide scholarships to deserving students of the Frederick County, Virginia schools.
- Della Stine Scholarship—This fund accounts for funds provided by a private donor. Earnings on fund assets may be used to provide a scholarship to a deserving student who attended Dowell J. Howard Learning Center.

Private-Purpose Income Fund

- The Armstrong Foundation and Della Stine Scholarship Funds are restricted for providing scholarships to students at the three Frederick County high schools. The endowed funds are used to support the respective annual scholarship when interest income is insufficient.
- Bright Futures is a non-profit organization that helps schools connect student needs with donated resources (money, supplies or time) that already exist in the community.
- FCPS101 is a community engagement program to educate community members on FCPS instructional and operational services. Private donations support this program.
- The Preschool Donation is provided to support preschool program operational expenses.

Frederick County Public Schools
Private Purpose Funds
Year Ended June 30, 2026

		[a] Private-Purpose Endowment FY24-25	[b] Private-Purpose Income FY24-25	[c] Private-Purpose Endowment FY25-26	[d] Private-Purpose Income FY25-26
[1]	**Beginning Balance July 1**	$ 238,326	$ 676,027	$ 238,326	$ 837,113
	REVENUES:				
[2]	Interest on Bank Accounts	$ -	$ 51,256	$ -	$ 31,334
[3]	Interest on Investments				
[4]	Donations and Grants		259,717		223,751
[5]	Billings to FCPS & WPS		300,000		300,000
[6]	Investment Earnings				
[7]	**TOTAL REVENUES**	**$ -**	**$ 610,973**	**$ -**	**$ 555,085**
	EXPENDITURES:				
[8]	Salaries	$ -	$ 185,726	$ -	$ 197,453
[9]	Employee Benefits	-	71,669	$ -	76,376
[10]	Scholarship Payments	-	23,500	-	19,500
[11]	Services and Other Expenses	-	14,931	-	12,701
[12]	Other Operating Supplies	-	99,920	-	113,008
[13]	Instructional Supplies	-	2,495	-	-
[14]	Technology Hardware	-	-	-	-
[15]	Capital Outlay	-	51,645	-	-
[16]	Transfers to Other Funds	-	-	-	-
[17]	**TOTAL EXPENDITURES**	**$ -**	**$ 449,886**	**$ -**	**$ 419,037**
[18]	**Ending Balance June 30**	**$ 238,326**	**$ 837,113**	**$ 238,326**	**$ 973,161**
[19]	Balance Restricted	$ 238,326	$ 837,113	$ 238,326	$ 973,161

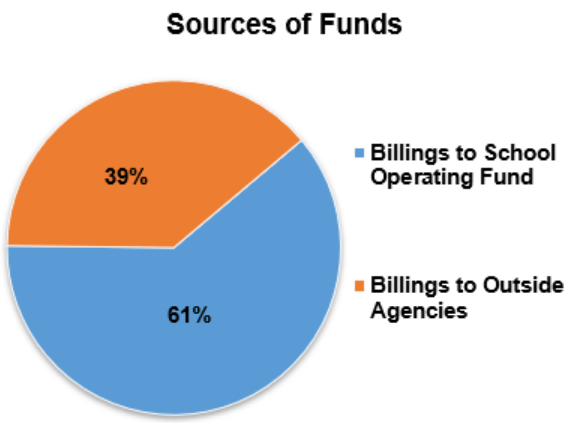
Numbers may not add correctly due to rounding.

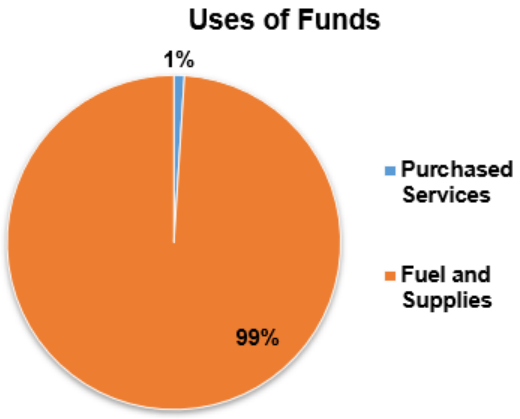
CONSOLIDATED SERVICES FUND

The consolidated services fund accounts for the transaction activity associated with vehicle fuel provided to the school division and outside agencies.

The transportation facility, located on Route 522 south, is equipped for fleet maintenance and fueling services to support the school division, some county offices and departments, and volunteer fire and rescue stations. The facility operations include vehicle repairs, tire changing, washing and fueling, and inspections. The facility is staffed by heavy-duty and light-duty mechanics. Most of the service mechanics hold Automotive Service Excellence (ASE) certifications in their respective fields. Prior to FY2026, fleet services were billed to user agencies on a cost-recovery basis. The billings included full recovery of all direct and indirect expenses associated with the service provided. Beginning in FY2026, this fund captures the purchase for and billings to the school division and outside agencies for fuel only. Vehicle labor and parts are now allocated directly to the School Operating Fund removing the billing process to the Division.

FY 2026 revenues totaled $2,007,853 and expenses totaled $2,062,605. Expenditures are more than revenues by $54,752 and are reduced from the fund balance. The ending fund balance of $950,976 includes $88,747 in fuel inventory value at fiscal year-end. The residual $862,229 in fund balance is assigned as a carried-forward to the next fiscal year to support the consolidated services operation.





Frederick County Public Schools
Consolidated Services Fund
Year Ended June 30, 2026

		[a] Actual 2023-24	[b] Actual 2024-25	[c] Adjusted Budget 2025-26	[d] Actual 2025-26	[e] Variance from Adj Budget
	Beginning Balance July 1	$ 1,046,368	$ 951,535	$ 794,330	$ 1,005,728	$ 211,398
[1]	**REVENUES:**					
[2]	Vehicle Services					
	Billings to FCPS	$ 3,382,567	$ 3,527,457	$ 1,375,600	$ 1,230,626	$ (144,974)
	Billings to Outside Agencies	739,559	677,577	830,070	777,227	(52,843)
	Other Receipts	1,578	6,036	-	-	-
	Sub-total Vehicle Services	$ 4,123,703	$ 4,211,070	$ 2,205,670	$ 2,007,853	$ (197,817)
[3]	Transfers from School Operating Fund	$ -	$ -	$ -	$ -	$ -
[4]	**TOTAL RECEIPTS**	**$ 4,123,703**	**$ 4,211,070**	**$ 2,205,670**	**$ 2,007,853**	**$ (197,817)**
	Total Receipts and Beginning Balance	**$ 5,170,071**	**$ 5,162,605**	**$ 3,000,000**	**$ 3,013,581**	
[5]	**EXPENDITURES:**					
[6]	Vehicle Services					
	Salaries	$ 976,882	$ 1,029,611	$ -	$ -	$ -
	Fringe Benefits	324,584	318,372	-	-	-
	Purchased Services	71,453	71,233	748,191	20,931	727,260
	Other Charges	53,606	56,121	-	-	-
	Materials and Supplies	2,792,010	2,657,120	2,205,670	2,041,674	163,996
	Capital Outlay	-	24,420	46,139	-	46,139
	Sub-total Vehicle Services	$ 4,218,535	$ 4,156,877	$ 3,000,000	$ 2,062,605	$ 937,395
[7]	**TOTAL EXPENDITURES**	**$ 4,218,535**	**$ 4,156,877**	**$ 3,000,000**	**$ 2,062,605**	**$ 937,395**
[8]	**Revenues Over/ (Under) Expenditures**	$ (94,832)	$ 54,193		$ (54,752)	
[9]	**Ending Balance June 30**	**$ 951,535**	**$ 1,005,728**		**$ 950,976**	
[10]	Balance Nonspendable, Inventory	$ 405,063	$ 454,493		$ 88,747	
[11]	Balance Committed - reserve for encumbrance	$ 34,477	$ -		$ -	
[12]	Balance Assigned	$ 511,995	$ 551,235		$ 862,229	

Numbers may not add correctly due to rounding.

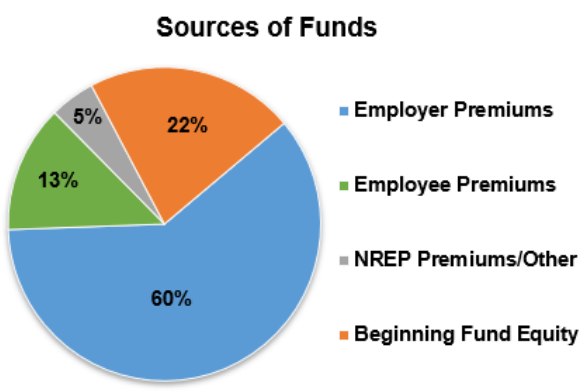
INSURANCE RESERVE FUND

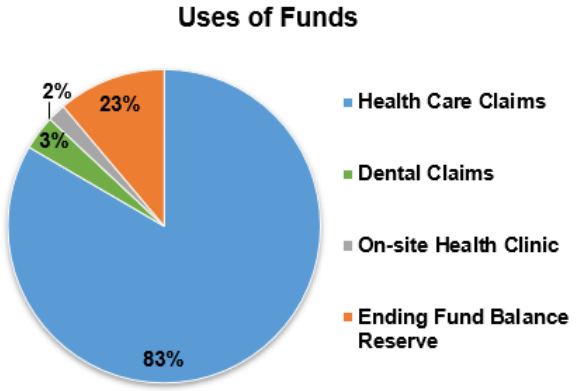
The insurance reserve fund accounts for health care benefits for participating employees. Sources of funds are medical and dental premiums received from Frederick County Public Schools and participating employees. Funds are used to pay health/dental claims and health clinic activities for participating employees. The fund balance is generated from premiums exceeding insurance carrier claims and health clinic activities. Likewise, the fund balance could decrease for claims and activities exceeding premiums collected. A range for projected claims expense and health care utilization is prepared by the insurance carrier. Premiums are set within the projected claims range and projected health clinic activities.

The health insurance program provided coverage for 1,990 FCPS employees and retirees plus their dependents. The program includes two medical plan options and one vision provided by Anthem, and one dental plan provided by Delta Dental. The two medical plan options are known as KeyCare 25 and the Health Savings Account (HSA). Participating employees and their dependents also have access to the on-site healthcare clinic in partnership with Valley Health. The health clinic is designed to improve employee access to convenient, quality healthcare services while decreasing time from the classroom and work sites.

On the financial statement, column [d] shows the current year's activity compared to the expected claim levels shown in column [c]. Medical and dental claims, Affordable Care Act, on-site health clinic activities, and other expenses for FY 2026 totaled $30,839,419, exceeding the expected level of $30,330,000. Premiums collected were lower than expected due to vacancies and changes in dependent plan participation. The insurance reserve fund fiscal year-end balance decreased by $3,636,664 to an ending balance of $3,867,596. The fund balance equates to almost two months of expected claims activity. The fund balance is assigned to support future health claims.

Column [e] provides activity projected for FY 2027. FCPS premium shares will increase by 30 percent; employee premiums will not increase. Anthem will continue to provide medical insurance and Delta Dental will provide dental insurance for participating employees and their dependents. Overall, the fund needs to support about $36.1 million in expected insurance claims and healthcare clinic activities for FY 2027. It is important to maintain a fund balance sufficient to support claims that exceed expectations.





Frederick County Public Schools
Insurance Reserve Fund
Year Ended June 30, 2026

		[a] Actual 2023-24	[b] Actual 2024-25	[c] Expected Activity 2025-26	[d] Actual 2025-26	[e] Expected Activity 2026-27	
[1]	**Beginning Balance July 1**	$ 9,563,182	$ 9,135,418	$ 7,504,260	$ 7,504,260	$ 3,867,596	[1]
	REVENUES:						
[2]	Interest on Bank Deposits	$ 660,103	$ 584,145	$ 500,000	$ 362,576	$ 250,000	[2]
[3]	Health Insurance Premiums	22,086,746	24,543,659	27,807,025	26,785,178	35,847,450	[3]
[4]	Donations/Grants/Other	10,977	5,549	500	55,000	-	[4]
[5]	**TOTAL REVENUES**	**$ 22,757,826**	**$ 25,133,353**	**$ 28,307,525**	**$ 27,202,754**	**$ 36,097,450**	[5]
	EXPENDITURES:						
[6]	Contracted Activities	$ 214,844	$ 78,700	$ 90,000	$ 79,534	$ 85,000	[6]
[7]	Taxes & Fees	8,469	9,249	10,000	10,255	11,000	[7]
[8]	Lease of Building	36,354	3,657	-	-	-	[8]
[9]	Health Clinic Services & Supplies	643,443	639,730	675,000	650,000	650,000	[9]
[10]	Health Care Claims	20,861,863	24,897,411	28,155,000	28,867,142	33,951,450	[10]
[11]	Dental Claims	1,420,616	1,135,765	1,400,000	1,232,488	1,400,000	[11]
[12]	**TOTAL EXPENDITURES**	**$ 23,185,589**	**$ 26,764,511**	**$ 30,330,000**	**$ 30,839,419**	**$ 36,097,450**	[12]
[13]	**Revenues Over/(Under) Expenditures**	$ (427,764)	$ (1,631,158)	$ (2,022,475)	$ (3,636,664)	$ -	[13]
[14]	**Ending Balance June 30**	**$ 9,135,418**	**$ 7,504,260**	**$ 5,481,785**	**$ 3,867,596**	**$ 3,867,596**	[14]

Numbers may not add correctly due to rounding.

Frederick County Public Schools

1415 Amherst Street
Winchester, Virginia 22601
540-662-3888

For more information on current budget and programs, visit www.frederickcountyschoolsva.net

Board of Supervisors
Agenda Item Detail
Meeting Date: October 28, 2026
Agenda Section: Consent Agenda

Title:

Request from the Commissioner of the Revenue for Refund and

Supplemental Appropriation: Shenandoah Cable Television LLC- $15,144.55

Attachments:
BOS10-28-26RequestForRefund.pdf

COUNTY OF FREDERICK

Andrew R. Fox
County Attorney

540/722-8383
Fax 540/667-0370
E-mail andrew.fox@fcva.us

MEMORANDUM

TO: Frederick County Board of Supervisors

CC: Michael Bollhoefer, County Administrator

FROM: Andrew R. Fox, County Attorney

DATE: October 9, 2026

RE: Commissioner of Revenue Refund Requests

Attached, for the Board's review, are requests to authorize the Treasurer to credit the following entities:

1. Shenandoah Cable Television LLC- $15,144.55

Attachments

COUNTY OF FREDERICK

Andrew R. Fox
County Attorney

540/722-8383
Fax 540/667-0370
E-mail andrew.fox@fcva.us

MEMORANDUM

TO: Frederick County Board of Supervisors

CC: Michael Bollhoefer, County Administrator

FROM: Andrew R. Fox, County Attorney

DATE: October 9, 2026

RE: Refund – Shenandoah Cable Television LLC

I am in receipt of the Commissioner's request, dated October 8, 2026, to authorize the Treasurer to refund Shenandoah Cable Television LLC $15,144.55. The State Corporation Commission (SCC) has issued its 2026 public service tax assessments. We have updated our 2026 tax assessments to reflect the SCC's revised values. As a result, a refund of $15,144.55 is due to Shenandoah Cable Television LLC.

Board approval is required in order for the Treasurer to issue this refund in compliance with Virginia State Code and Frederick County ordinance. The Commissioner's office has verified all required data, and supporting documentation is filed with the Commissioner of the Revenue.

Please also approve a supplemental appropriation for the Finance Director on this request.

Attachment

Frederick County, Virginia

OFFICE OF
COMMISSIONER OF THE REVENUE
107 North Kent Street P.O. Box 552
Winchester VA 22601Winchester VA 22604-0552
Tonya.Sibert@fcva.us or www.fcva.us/cor

October 8, 2026

To: Andrew Fox, County Attorney
Frederick County Board of Supervisors
Michael Bollhoefer, County Administrator
Sharon Kibler, Finance Director

From: Tonya C. Sibert, Commissioner of the Revenue

RE: Shenandoah Cable Television LLC

Please approve a refund of $15,144.55 to Shenandoah Cable Television LLC.

The State Corporation Commission (SCC) has issued its 2026 public service tax assessments. We have updated our 2026 tax assessments to reflect the SCC's revised values. As a result, a refund of $15,144.55 is due to Shenandoah Cable Television LLC.

To comply with the requirements for the Treasurer to issue this refund, Board action is required.

The Commissioner's Staff has verified all required data, and the paperwork is in the care of the Commissioner of the Revenue.

Please also approve a supplemental appropriation for the Finance Director on this request.

Exoneration is $15,144.55

Date: 9/24/26 Cash Register: COUNTY OF FREDERICK Time: 11:27:15

Cashier: [redacted] Total Transactions: 53

Customer Name: SHENANDOAH CABLE TELEVISION LLC Customer Transactions: 2

Options: 2=Edit 4=Delete 5=View

Opt	Dept	Trans	Ticket No.	Tax Amount	Penalty/Int	Amount Paid
_	PS2026	1	00000380001	$14,369.22-	$.00	$14,369.22-
_	PS2026	2	00000390001	$775.33-	$.00	$775.33-

Total Paid : $15,144.55

F3=Exit F14=Show Map# F15=Show Balance F18=Sort-Entered F20=Attach

Needs Board Approval

Board of Supervisors
Agenda Item Detail
Meeting Date: October 28, 2026
Agenda Section: Consent Agenda

Title: Approval to Change the 2-year term expiration of Micah Jacobs on the Shawneeland Sanitary District Advisory Committee from November 9, 2028, to November 30, 2028

Attachments:
BOS10-28-26SSDAC-TermAdj.pdf

COUNTY of FREDERICK

Office of the County Administrator

Tel: 540.665.6382
Fax: 540.667.0370

M E M O R A N D U M

To: Board of Supervisors

From: Ann W. Phillips, Deputy Clerk

Date: 10-21-2026

Re: Micah Jacobs' SSDAC Term Expiration Date Change

The Frederick County Board of Supervisors, meeting on October 14, 2026, reappointed Micah Jacobs to serve on the ShawneeLand Sanitary District Advisory Committee for a two-year term, with the new term expiring on November 9, 2028.

Supervisor Orndorff requests that Mr. Jacobs' term on the ShawneeLand Sanitary District Advisory Committee be adjusted to expire at the end of a calendar month to avoid confusion should the sitting member's term end just before a regular Committee meeting. If the Board has no objections, Mr. Jacobs's term expiration will be changed to November 30, 2028.

Board of Supervisors
Agenda Item Detail
Meeting Date: October 28, 2026
Agenda Section: Consent Agenda

Title:

Resolution of the Board of Supervisors of Frederick County Concurring With a Financing to be Undertaken by the Economic Development Authority of the Town of Woodstock, Virginia, to Benefit Shenandoah University

Attachments:
BOS10-28-26ConcurringIssuanceOfBondsBenefitingShenUniv_Redacted.pdf
BOS10-28-26ConcurringResolution_Issuance ofOBonds_ShenUniv.pdf

HUNTON

HUNTON ANDREWS KURTH LLP
RIVERFRONT PLAZA, EAST TOWER
951 EAST BYRD STREET
RICHMOND, VIRGINIA 23219-4074

TEL 804 • 788 • 8200
FAX 804 • 788 • 8218

CHRISTOPHER G. KULP
DIRECT DIAL: 804-788-8742
EMAIL: ckulp@hunton.com

FILE NO: 054410.0000012

October 13, 2026

Via Email

Mr. Jay E. Tibbs
Deputy County Administrator
Frederick County
107 North Kent Street
Winchester, Virginia 22601

Dear Jay:

In our firm's capacity as bond counsel to Shenandoah University, I wanted to follow up on our earlier email exchanges and formally request that the County Board of Supervisors place on its agenda for its October 28, 2026, meeting a resolution concurring in the issuance of bonds by the Town of Woodstock Economic Development Authority for the benefit of Shenandoah University. The University has used this same conduit issuer in many of its financings during the last 15 years.

I have attached the form of TEFRA public hearing notice that appeared in the Northern Virginian Daily newspaper on September 29, 2026, for purposes of the public hearing before the Town of Woodstock EDA on October 6, 2026, at 5:45 pm. I have also attached a draft inducement resolution that was adopted by the Town of Woodstock EDA following the public hearing.

As you are aware, state law requires that the governing body of the jurisdiction(s) in which a project is to be physically located concur in the issuance of bonds by an economic/industrial development authority from outside the jurisdiction. Hence, the University is seeking concurrence from both the Common Council of the City of Winchester and the Frederick County Board of Supervisors since the project and the University's main campus are located partly in the City and partly in the County.

I am attaching the proposed form of resolution that we have prepared for the County Board of Supervisors. I would appreciate your reviewing this draft and conveying any comments or concerns that you or others at the County may have. The Town of Woodstock EDA will not be able to issue bonds for the University until the County Board of Supervisors has adopted its concurring resolution.

On behalf of the University, thank you for your assistance with this request.

Very truly yours,

[redacted]

Christopher G. Kulp

Enclosures

CERTIFICATE OF PUBLIC HEARING

The undersigned Assistant Secretary of the Economic Development Authority of the Town of Woodstock, Virginia (the "Authority"), hereby certifies as follows:

1. A special meeting of the Authority was duly called and held at 5:45 o'clock p.m. on October 6, 2026, at the Woodstock Town Council Chambers at 135 North Main Street, Woodstock, Virginia. The meeting was open to the public, and persons of differing views were given an opportunity to be heard. At such meeting all of the members of the Authority were present or absent throughout as follows:

Name	Present	Absent
David Hutton, Chair	X	
Kara Balcerzak	X	
Travis Cooper		X
Cory Grubbs	X	
Zach Hottel	X	
Holly Steed	X	

2. The Chair announced the commencement of a public hearing on the application of Shenandoah University, notice of which was published on September 29, 2026, in the *Northern Virginia Daily* (the "Notice"). A copy of the Notice and certificate of publication of the Notice have been filed with records of the Authority and are attached hereto as Exhibit (i).

3. The individuals identified in Exhibit (ii) appeared and addressed the Authority and a reasonably detailed summary of the statements made at the public hearing is included in Exhibit (ii). The fiscal impact statement required by the Virginia Industrial Development and Revenue Bond Act is attached hereto as Exhibit (iii).

4. Attached hereto as Exhibit (iv) is a true, correct and complete copy of a resolution (the "Resolution") adopted at such meeting of the Authority by the affirmative vote of a majority of the members present at such meeting.

The Resolution constitutes all formal action taken by the Authority at such meeting relating to matters referred to in the Resolution. The Resolution has not been repealed, revoked, rescinded or amended and is in full force and effect on the date hereof.

WITNESS my hand this 6th day of October, 2026.

[redacted]

Secretary, Economic Development Authority of the Town of Woodstock, Virginia

EXHIBIT (i)

AFFIDAVIT OF PUBLIC NOTICE AND CERTIFICATE OF PUBLICATION

PROOF OF PUBLICATION

NVD Northern Virginia Daily
Woodstock Economic Development Authority | 9/29/26
Notices & Legals

I certify that the attachment hereto contains a true and accurate copy of what was published in NVD Northern Virginia Daily in consecutive issues on the following dates:

9/29/2026

Affiant further says that That said newspaper was regularly issued and circulated on those dates.

SIGNED:

Mike Gochenour
Authorized Agent

State of Virginia County of Frederick

Signed and sworn to me this 9/29/2026

[redacted]
Notary Public

My commission expires: 9/30/27

DEBORAH M. BURKE NOTARY PUBLIC REG. #184135 MY COMMISSION EXPIRES 9/30/27 COMMONWEALTH OF VIRGINIA

Customer No: 131121
Affidavit Contact Name: Alex Waszilycsak
Affidavit Contact Address:
Affidavit Batch ID: 2822
Affidavit ID: 6729

COPY OF ADVERTISEMENT

NOTICE OF PUBLIC HEARING BY THE ECONOMIC DEVELOPMENT AUTHORITY OF THE TOWN OF WOODSTOCK, VIRGINIA, ON THE PROPOSED PLAN OF FINANCE INCLUDING THE PROPOSED ISSUANCE OF REVENUE AND REFUNDING BONDS FOR THE BENEFIT OF SHENANDOAH UNIVERSITY

Notice is hereby given that the Economic Development Authority of the Town of Woodstock, Virginia (the "Authority"), will hold a public hearing on the application submitted by Shenandoah University (the "University") requesting the Authority to issue, pursuant to the Virginia Industrial Development and Revenue Bond Act, as amended (the "Act"), revenue and refunding bonds in an aggregate principal amount now estimated not to exceed $119,570,000 (the "Bonds"), in one or more series and pursuant to a common plan of finance. The University is a Virginia non-stock corporation whose principal address is 1460 University Drive, Winchester, Virginia 22601. The University's main campus (the "Main Campus") is located partly within the boundaries of the City of Winchester, Virginia (the "City"), and partly within the boundaries of the County of Frederick, Virginia (the "County"), generally (although not exclusively) in the area south of Winchester Recreation Park and the Winchester Country Club, north of E. Jubal Early Drive, Millwood Avenue and Millwood Pike, east of South Pleasant Valley Road and west of Tulane and Shockey Drives. The Main Campus also includes the Vaden Campus Commons, located at 711 Millwood Avenue in the City ("Vaden Campus Commons"). The Bonds are expected to be issued as qualified 501(c)(3) bonds as defined in Section 145 of the Internal Revenue Code of 1986, as amended.

The proceeds of the Bonds will be loaned to the University to (1) refund various obligations issued for the benefit of the University (the "Refunded Bonds"), as described below, and to (2) finance and refinance facilities to be owned and operated by the University (the "New Capital Projects"), as described below.

The Refunded Bonds are composed of the following:

(1) Educational Facilities Revenue Refunding Bond (Shenandoah University), Series 2011, issued by the Virginia College Building Authority in the principal amount of $36,455,000 to (1) refinance projects in accordance with the Educational Facilities Authority Act by effecting the refunding of (a) Educational Facilities First Mortgage Revenue Bonds (Shenandoah University Project), Series 1998 (the "1998 Bonds"), issued by the Industrial Development Authority of the City of Winchester, (b) Educational Facilities Refunding Revenue Note (Shenandoah University Project), Series 2004 (the "2004 Note"), issued by the Virginia Small Business Financing Authority, and (c) Variable Rate Demand/Fixed Rate Education Facilities Revenue Bonds (Shenandoah University Project), Series 2006 (the "2006 Bonds," and, collectively with the 1998 Bonds and the 2004 Note, the "Prior Bonds"), issued by the Virginia College Building Authority, and (2) finance certain expenses of issuing the bond and refunding the Prior Bonds. The Prior Bonds were issued to benefit the University by financing or refinancing the costs of various capital projects on the Main Campus or the University's other properties located in the City at 203 South Cameron Street (known as the Shenandoah Conservatory Arts Academy) and at 20 South Cameron Street (known as the Bowman Building). Such capital projects included, without limitation, a performing arts building, academic, administrative and dormitory buildings, library facility improvements, gymnasium space, student residential life facilities, computing technology and other equipment relating to the operations of the University, roof repairs and replacements, heating and cooling systems, chiller and pneumatic controls, working capital costs, the funding of a debt service reserve fund and the payment of costs of issuance related to such prior financings.

(2) Educational Facilities Revenue Bond (Shenandoah University), Series 2011, issued by the Industrial Development Authority of Clarke County, Virginia, the proceeds of which were used to finance the costs of (1) acquiring, constructing, renovating and equipping the East Campus Commons, located at 1017 Millwood Pike, within the boundaries of the County ("East Campus Commons"), (2) acquiring, constructing and equipping one or more capital improvements to the University facilities located on the Main Campus within the boundaries of the City, including without limitation, (a) a new residence hall of approximately 10,000 sq. ft. to 150,000 sq. ft., (b) a new health sciences building of approximately 30,000 sq. ft. to 100,000 sq. ft., (c) a new parking garage of approximately 100 to 500 parking spaces and (d) perimeter boundary and landscaping, and (3) funding certain working capital and issuance expenses incurred in connection with the issuance of the bond.

(3) Educational Facilities Revenue Bonds (Shenandoah University), Series 2012, 2013, 2015, 2016 and 2017, issued by the Economic Development Authority of the Town of Mount Jackson, Virginia, the proceeds of which were used to finance (1) the costs of the construction, improvement and equipping of the Cecil Pruitt, Jr. Health & Life Sciences Building, located on the Main Campus within the boundaries of the City, (2) the costs of the design, acquisition, construction, renovation, rehabilitation and equipping of the James R. Wilkins, Jr. Athletics & Events Center and associated parking garage, both located on the Main Campus within the boundaries of the County (the "Wilkins Center"), (3) the costs of the acquisition, construction, renovation, rehabilitation and equipping of various capital improvement projects including but not limited to (a) the Health Professions Building located at 1775 North Sector Court in the City (the "Health Professions Building"), and (b) classroom, office, laboratory, study, lounge, conference and event spaces located on the Main Campus, and (4) certain related working capital and issuance expenses incurred in connection with the issuance of the bonds.

(4) Educational Facilities Revenue Bonds (Shenandoah University), Series 2017 and 2022, issued by the Economic Development Authority of the Town of Woodstock, Virginia, the proceeds of which were used to (1) finance the acquisition, construction, renovation, rehabilitation and equipping of various capital improvement projects including but not limited to (a) the Health Professions Building, (b) Vaden Campus Commons and (c) classroom, office, laboratory, study, lounge, conference and event spaces located on the Main Campus, (2) refinance a taxable line of credit, the proceeds of which were used to provide interim financing for the renovation and equipping of East Campus Commons, and (3) finance, if and as needed, capitalized interest on the bonds, a debt service reserve fund for the bonds, costs of issuance related to the bonds, and working capital expenditures related to the capital projects.

The New Capital Projects are composed of the acquisition, construction, renovation, rehabilitation and equipping of various capital improvement projects including but not limited to: (1) a new Performance Hall and Center for the Arts, to be located on the Main Campus within the boundaries of the City, (2) expansions and upgrades to the existing Wilkins Center, and (3) a new parking garage of approximately 330 parking spaces to be located at a site to be determined. Potential sites include (a) L.P. Hill Drive located on the Main Campus within the boundaries of the City, (b) Wade Miller Drive, located on the Main Campus within the boundaries of the City, or (c) University Drive within the boundaries of the City.

As required by the Act, the Bonds will not constitute a debt or pledge of the faith and credit of the Commonwealth of Virginia (the "Commonwealth"), the Town of Woodstock, Virginia (the "Town"), the City or the County. Neither the Commonwealth nor any political subdivision thereof, including the Authority, the Town, the City and the County shall be obligated to pay the Bonds, or the interest thereon, or other costs incidental thereto, except from the revenues and monies pledged therefor, and neither the faith and credit nor the taxing power of the Commonwealth nor any political subdivision thereof will be pledged to the payment of principal of the Bonds or the interest thereon or other costs incidental thereto.

The public hearing shall be held by the Authority on behalf of itself, the Town, the City and the County, as part of the approval process with respect to the issuance of the Bonds. If, following the hearing, the Authority recommends approval of the issuance of the Bonds, a record of the public hearing will be forwarded to the Town Council of the Town of Woodstock, Virginia, the Board of Supervisors of Frederick County, Virginia, and the Common Council of the City of Winchester, Virginia, all of which must approve of, or concur in, the issuance of the Bonds.

The public hearing (which may be continued or adjourned to a later date), will be held before the Authority at 5:45 p.m. on Tuesday, October 6, 2026, in the Town Council Chambers at 135 North Main Street, Woodstock, Virginia. Residents of the Town, the County, the City, as well as any other person interested in the issuance of the Bonds or the location or nature of the New Capital Projects or the projects financed by the Refunded Bonds may attend and speak at the hearing or may send written comments before such hearing to the Authority, c/o the Secretary of the Authority, 135 North Main Street, Woodstock, Virginia 22664.

ECONOMIC DEVELOPMENT AUTHORITY OF THE TOWN OF WOODSTOCK, VIRGINIA

EXHIBIT (ii)

SUMMARY OF STATEMENTS MADE AT PUBLIC HEARING

Daniel Lauro from Botkin Rose PLC, as EDA counsel, and Christopher Kulp from Hunton Andrews Kurth LLP, as bond counsel, discussed (i) the request by Shenandoah University (the "Borrower") for a tax-exempt financing through the Authority for the refinancing of the Borrower's existing indebtedness and to finance certain capital projects set forth in the notice, (ii) the federal and state law procedural requirements, and (iii) the form of the inducement resolution to be considered by the Authority.

Marla Mooney, Chief of Staff for the Borrower, was present to answer questions.

No comments were submitted to the Authority in advance of the public hearing. No other comments were presented at the public hearing, and the public hearing was adjourned.

EXHIBIT (iii)

FISCAL IMPACT STATEMENT

EXHIBIT (iii)

FISCAL IMPACT STATEMENT

October 6, 2026
Date

Shenandoah University
(Name of Applicant)

University Academic and Athletic Facilities
(Facility)

1. Maximum amount of financing sought	$119,570,000
2. Estimated taxable value of the facility's real property to be constructed in the municipality	N/A
3. Estimated real property tax per year using present tax rates	N/A
4. Estimated personal property tax per year using present tax rates	N/A
5. Estimated merchants' capital tax per year using present tax rates	N/A
6. a. Estimated dollar value per year of goods that will be purchased from Virginia companies within the locality	$0
b. Estimated dollar value per year of goods that will be purchased from non-Virginia companies within the locality	$0
c. Estimated dollar value per year of services that will be purchased from Virginia companies within the locality	$0
d. Estimated dollar value per year of services that will be purchased from non-Virginia companies within the locality	$0
7. Estimated number of regular employees on year round basis	760
8. Average annual salary per employee	$66,075

[redacted]
Authority Chairman

Economic Development Authority of the Town of Woodstock, Virginia
Name of Authority

In completing this Fiscal Impact Statement, the Authority has relied upon representations made by the Applicant.

EXHIBIT (iv)

RESOLUTION OF THE ECONOMIC DEVELOPMENT AUTHORITY OF THE TOWN OF WOODSTOCK, VIRGINIA

RESOLUTION OF THE
ECONOMIC DEVELOPMENT AUTHORITY
OF THE TOWN OF WOODSTOCK, VIRGINIA

WHEREAS, the Economic Development Authority of the Town of Woodstock, Virginia (the "Authority"), has received a request from Shenandoah University, a non-profit, Virginia nonstock corporation (the "University"), for the Authority to issue, pursuant to the Industrial Development and Revenue Bond Act (the "Act"), revenue bonds in one or more series in an aggregate principal amount not to exceed $119,570,000 (the "Bonds") and loan the proceeds to the University to (1) refund various obligations issued for the benefit of the University (the "Refunded Bonds") that financed University facilities described on Exhibit A attached hereto (the "Refinanced Projects"), and (2) finance and refinance facilities to be owned and operated by the University (the "New Capital Projects" and together with the Refinanced Projects, the "University Projects"), as also described on Exhibit A;

WHEREAS, the University, in an appearance before the Authority by the University's representatives, has described the benefits of the financing; and

WHEREAS, a public hearing has been held as required by Section 147(f) of the Internal Revenue Code of 1986, as amended (the "Code"), and Section 15.2-4906 of the Act.

NOW, THEREFORE, BE IT RESOLVED BY THE ECONOMIC DEVELOPMENT AUTHORITY OF THE TOWN OF WOODSTOCK, VIRGINIA:

1. It is hereby found and determined that the financing and refinancing of the University Projects for the benefit of the University will be in the public interest of the Town of Woodstock, Virginia (the "Town"), and its environs, and will enable the University to provide improved educational facilities for the use of the inhabitants of the Commonwealth of Virginia (the "Commonwealth") and the Town, and will be in furtherance of the purposes of the Act.

2. The Authority hereby agrees to assist the University to finance and refinance the University Projects by undertaking the issuance of the Bonds, in one or more series, pursuant to a common plan of finance, in an aggregate principal amount not to exceed $119,570,000, upon terms and conditions to be mutually agreed upon between the Authority and the University.

3. The proceeds of the Bonds shall be loaned to the University to enable it to undertake the University Projects, pay any costs of issuance for the Bonds and, if necessary, pay capitalized interest on the Bonds during and after any construction of the New Capital Projects. The University shall agree to provide payments to the Authority sufficient to pay the principal of, premium, if any, and interest on and purchase price of, if any, the Bonds and to pay all other expenses in connection with financing and refinancing the University Projects. The Bonds shall be issued in form and pursuant to terms to be approved by the Authority, and the payment of the Bonds shall be secured by an assignment, for the benefit of the holders thereof, of the Authority's rights to payments (other than rights to fees, expenses and indemnification) under the agreement pursuant to which the proceeds of the Bonds will be loaned to the University.

4. It having been represented to the Authority that it may be necessary to proceed immediately with the construction, improvement, equipping, and development of the New Capital Projects, the Authority hereby agrees that the University may proceed with plans for the New Capital Projects, enter into contracts for construction, improvement, equipping, and development of the New Capital Projects, and take such other steps as it may deem appropriate in connection therewith, provided that nothing herein shall be deemed to authorize the University to obligate the Authority without its consent in each instance to the payment of any moneys or the performance of any acts in connection with the New Capital Projects. The Authority agrees that the University may be reimbursed from the proceeds of the Bonds for all lawful costs so incurred by it.

5. The Authority hereby agrees with the recommendation of the University that Hunton Andrews Kurth LLP be appointed as bond counsel in connection with the issuance of the Bonds, and hereby appoints such firm to supervise the proceedings and approve the issuance of the Bonds.

6. All lawful costs and expenses in connection with the financing and refinancing of the University Projects, including the fees and expenses of bond counsel, counsel for the Authority and the agent or underwriter for the sale of the Bonds, shall be paid from the proceeds of the Bonds or by the University. If for any reason the Bonds are not issued, or the Bonds are issued but it is determined that a part or all of such costs are not lawfully payable out of Bond proceeds, it is understood that all such expenses shall be paid by the University and that the Authority shall have no responsibility therefor.

7. The financing instruments shall provide for payment by the University to the Authority of an annual fee consistent with the Authority's policy for such fees by not-for-profit entities; provided, however, that the amount so paid shall not equal or exceed an amount that would cause the "yield" on the obligation of the University to the Authority or any other "acquired purpose obligation" to be "materially higher" than the yield on the Bonds, as the terms are defined in Section 148 of the Code.

8. The University shall indemnify and save harmless the Authority, its officers, directors, employees, and agents from and against all liabilities, obligations, claims, damages, penalties, fines, losses, costs, and expenses in any way connected with the University or the issuance of the Bonds.

9. The Authority hereby recommends that the Council of the Town of Woodstock approve the issuance of the Bonds in accordance with the provisions of Section 147(f) of the Code and Section 15.2-4906 of the Act. The Authority hereby recommends further that, in accordance with applicable provisions of the Code and the Act, the Common Council of the City of Winchester, Virginia, and the Board of Supervisors of Frederick County, Virginia, concur with the issuance of the Bonds.

10. The Authority hereby directs the Secretary or Assistant Secretary of the Authority to submit to the Council of the Town of Woodstock, the Common Council of the City of Winchester and the Board of Supervisors of Frederick County copies of this resolution, the University's Fiscal Impact Statement, and a summary of the public hearing held by the Authority prior to the adoption of this resolution.

11. Any action heretofore or hereafter taken by any officer of the Authority in conformity with the purposes and intent of this resolution and the issuance of the Bonds is hereby ratified, approved and confirmed.

12. This resolution shall take effect immediately upon its adoption.

Exhibit A

THE UNIVERSITY PROJECTS

The Refunded Bonds and the facilities to be refinanced are described below:

(A) Educational Facilities Revenue Refunding Bond (Shenandoah University), Series 2011, issued by the Virginia College Building Authority in the principal amount of $36,455,000 to (1) refinance projects in accordance with the Educational Facilities Authority Act by effecting the refunding of (a) Educational Facilities First Mortgage Revenue Bonds (Shenandoah University Project), Series 1998 (the "1998 Bonds"), issued by the Industrial Development Authority of the City of Winchester, (b) Educational Facilities Refunding Revenue Note (Shenandoah University Project), Series 2004 (the "2004 Note"), issued by the Virginia Small Business Financing Authority, and (c) Variable Rate Demand/Fixed Rate Education Facilities Revenue Bonds (Shenandoah University Project), Series 2006 (the "2006 Bonds," and, collectively with the 1998 Bonds and the 2004 Note, the "Prior Bonds"), issued by the Virginia College Building Authority, and (2) finance certain expenses of issuing the bond and refunding the Prior Bonds. The Prior Bonds were issued to benefit the University by financing or refinancing the costs of various capital projects on the Main Campus (as defined below) or the University's other properties located in the City of Winchester at 203 South Cameron Street (known as the Shenandoah Conservatory Arts Academy) and at 20 South Cameron Street (known as the Bowman Building). Such capital projects included, without limitation, a performing arts building, academic, administrative and dormitory buildings, library facility improvements, gymnasium space, student residential life facilities, computing technology and other equipment relating to the operations of the University, roof repairs and replacements, heating and cooling systems, chiller and pneumatic controls, working capital costs, the funding of a debt service reserve fund and the payment of costs of issuance related to such prior financings.

(B) Educational Facilities Revenue Bond (Shenandoah University), Series 2011, issued by the Industrial Development Authority of Clarke County, Virginia, the proceeds of which were used to finance the costs of (1) acquiring, constructing, renovating and equipping the East Campus Commons, located at 1017 Millwood Pike, within the boundaries of Frederick County ("East Campus Commons"), (2) acquiring, constructing and equipping one or more capital improvements to the University facilities located on the Main Campus within the boundaries of the City of Winchester, including without limitation, (a) a new residence hall of approximately 10,000 sq. ft. to 150,000 sq. ft., (b) a new health sciences building of approximately 30,000 sq. ft. to 100,000 sq. ft., (c) a new parking garage of approximately 100 to 500 parking spaces and (d) perimeter boundary and landscaping, and (3) funding certain working capital and issuance expenses incurred in connection with the issuance of the bond.

(C) Educational Facilities Revenue Bonds (Shenandoah University), Series 2012, 2013, 2015, 2016 and 2017, issued by the Economic Development Authority of the Town of Mount Jackson, Virginia, the proceeds of which were used to finance (1) the costs of the construction, improvement and equipping of the Cecil Pruitt, Jr. Health & Life Sciences Building, located on the Main Campus within the boundaries of the City of Winchester, (2) the costs of the design, acquisition, construction, renovation, rehabilitation and equipping of the James R. Wilkins, Jr. Athletics & Events Center and associated parking garage, both located on the Main Campus within

the boundaries of Frederick County (the "Wilkins Center"), (3) the costs of the acquisition, construction, renovation, rehabilitation and equipping of various capital improvement projects including but not limited to (a) the Health Professions Building located at 1775 North Sector Court in the City of Winchester (the "Health Professions Building"), and (b) classroom, office, laboratory, study, lounge, conference and event spaces located on the Main Campus, and (4) certain related working capital and issuance expenses incurred in connection with the issuance of the bonds.

(D) Educational Facilities Revenue Bonds (Shenandoah University), Series 2017 and 2022, issued by the Economic Development Authority of the Town of Woodstock, Virginia, the proceeds of which were used to (1) finance the acquisition, construction, renovation, rehabilitation and equipping of various capital improvement projects including but not limited to (a) the Health Professions Building, (b) Vaden Campus Commons and (c) classroom, office, laboratory, study, lounge, conference and event spaces located on the Main Campus, (2) refinance a taxable line of credit, the proceeds of which were used to provide interim financing for the renovation and equipping of East Campus Commons, and (3) finance, if and as needed, capitalized interest on the bonds, a debt service reserve fund for the bonds, costs of issuance related to the bonds, and working capital expenditures related to the capital projects.

The New Capital Projects are composed of the acquisition, construction, renovation, rehabilitation and equipping of various capital improvement projects including but not limited to: (1) a new Performance Hall and Center for the Arts, to be located on the Main Campus within the boundaries of the City of Winchester, (2) expansions and upgrades to the existing Wilkins Center, and (3) a new parking garage of approximately 330 parking spaces to be located at a site to be determined. Potential sites include (a) L.P. Hill Drive located on the Main Campus within the boundaries of the City of Winchester, (b) Wade Miller Drive, located on the Main Campus within the boundaries of the City of Winchester, or (c) University Drive within the boundaries of the City of Winchester.

The University's main campus (the "Main Campus") is located partly within the boundaries of the City of Winchester, Virginia, and partly within the boundaries of the County of Frederick, Virginia, generally (although not exclusively) in the area south of Winchester Recreation Park and the Winchester Country Club, north of E. Jubal Early Drive, Millwood Avenue and Millwood Pike, east of South Pleasant Valley Road and west of Tulane and Shockey Drives. The Main Campus also includes the Vaden Campus Commons, described above, which are located just south of Millwood Avenue.

CERTIFICATE

The undersigned Secretary of the Economic Development Authority of the Town of Woodstock, Virginia, hereby certifies that the foregoing is a true, correct and complete copy of a Resolution adopted by a majority of the Directors of the Authority present and voting at a meeting duly called and held on October 6, 2026, in accordance with law, at which meeting a quorum was present and acting throughout, and such Resolution has not been repealed, revoked, rescinded or amended, but is in full force and effect on the date hereof.

WITNESS my hand this 6th day of October, 2026.

[redacted]

Secretary, Economic Development Authority of the Town of Woodstock, Virginia

RESOLUTION OF THE BOARD OF SUPERVISORS OF FREDERICK COUNTY CONCURRING WITH A FINANCING TO BE UNDERTAKEN BY THE ECONOMIC DEVELOPMENT AUTHORITY OF THE TOWN OF WOODSTOCK, VIRGINIA, TO BENEFIT SHENANDOAH UNIVERSITY

WHEREAS, Shenandoah University, a not-for-profit Virginia non-stock corporation (the "University"), has applied to the Economic Development Authority of the Town of Woodstock, Virginia (the "Authority"), requesting the Authority to issue its Educational Facilities Revenue and Refunding Bonds in an aggregate principal amount not to exceed $119,570,000 (collectively, the "Bonds") to (1) refund various obligations issued for the benefit of the University (the "Refunded Bonds") that financed University facilities described on Exhibit A attached hereto (the "Refinanced Projects"), and (2) finance and refinance facilities to be owned and operated by the University (the "New Capital Projects" and together with the Refinanced Projects, the "University Projects"), as also described on Exhibit A;

WHEREAS, Section 15.2-4905 of the Code of Virginia of 1950, as amended (the "Virginia Code"), states that an industrial development authority may not finance facilities in another jurisdiction that has created its own industrial development authority "unless the governing body of such locality in which the facilities are located or are proposed to be located, concurs with the inducement resolution adopted by the authority, and shows such concurrence in a duly adopted resolution;"

WHEREAS, Section 147(f) of the Internal Revenue Code of 1986, as amended (the "Internal Revenue Code") requires that the governmental unit having jurisdiction over the area in which any facility financed with the proceeds of bonds is located approve the issuance of such bonds;

WHEREAS, Section 147(f) of the Internal Revenue Code requires that any such approval by the applicable governmental unit be given after a public hearing following reasonable public notice, which hearing may be held by the authority issuing the bonds;

WHEREAS, in accordance with the requirements of Section 147(f) of the Internal Revenue Code and Section 15.2-4906 of the Virginia Code, the Authority held on October 6, 2026, a public hearing and adopted an inducement resolution (the "Inducement Resolution"), a copy of which has been filed with the records of the Clerk of the Board of Supervisors of Frederick County, Virginia (the "County"); and

WHEREAS, the University has requested the Board of Supervisors of the County to express its concurrence with the Inducement Resolution so that a portion of the net proceeds of the Bonds may be loaned to the University to finance and refinance such University facilities located in the County that were financed by the Refunded Bonds and/or are to be financed as part of the New Capital Projects;

BE IT RESOLVED BY THE BOARD OF SUPERVISORS OF FREDERICK COUNTY, VIRGINIA:

1. The Board of Supervisors hereby approves the issuance of the Bonds by the Authority for the benefit of the University, as required by Section 147(f) of the Internal Revenue Code and Section 15.2-4906 of the Virginia Code, and concurs with the Inducement Resolution adopted by the Authority for the benefit of the University to the extent required by Section 15.2-4905 of the Virginia Code to permit the Authority to loan the proceeds of the Bonds to the University to finance and refinance such University facilities located in the County that were financed by the Refunded Bonds and/or are to be financed as part of the New Capital Projects.

2. The approval of the issuance of the Bonds does not constitute an endorsement of the Bonds or the creditworthiness of the University. As required by Section 15.2-4909 of the Virginia Code, the Bonds shall provide that the County will have no obligation to pay the Bonds or the interest thereon or other costs incident thereto.

3. All acts and doings of the officers of the County and members of the Board of Supervisors that are in conformity with the purposes and intent of this resolution shall be, and the same hereby are, in all respects approved and confirmed.

4. This Resolution shall take effect immediately.

Passed this 28th day of October 2026 by the following recorded vote:

John F. Jewell, Chairman	Jason C. Aikens
Albert L. Orndorff	Robert W. Wells
Michael D. Guevremont	Gary R. Oates
Robert T. Liero	

A COPY ATTEST

_____
Michael L. Bollhoefer
Frederick County Administrator

No.

Exhibit A

THE UNIVERSITY PROJECTS

The Refunded Bonds and the facilities to be refinanced are described below:

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Athletics & Events Center and associated parking garage, both located on the Main Campus within the boundaries of Frederick County (the "Wilkins Center"), (3) the costs of the acquisition, construction, renovation, rehabilitation and equipping of various capital improvement projects including but not limited to (a) the Health Professions Building located at 1775 North Sector Court in the City of Winchester (the "Health Professions Building"), and (b) classroom, office, laboratory, study, lounge, conference and event spaces located on the Main Campus, and (4) certain related working capital and issuance expenses incurred in connection with the issuance of the bonds.

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Board of Supervisors
Agenda Item Detail
Meeting Date: October 28, 2026
Agenda Section: County Officials

Title: Approval of Miller Milling Performance Agreement

Attachments:
BOS10-28-26MillerMillingPerfAgreement.pdf

DATE: October 28, 2026

TO: Board of Supervisors
Frederick County, Virginia

FROM: Shayla S. Rickard
Business Retention Manager

CC: Jay Tibbs
Deputy County Administrator

RE: Miller Milling Performance Agreement

Background:

At its September 14, 2026, closed session, the Frederick County Board of Supervisors discussed potential performance incentives in support of Miller Milling's planned expansion in Frederick County. The proposed expansion represents a significant investment in the County, with an anticipated capital investment of **$56,400,000**. This investment demonstrates the company's continued commitment to its Frederick County operations and presents an opportunity to support existing industry, strengthen the local economy, and maintain employment opportunities within the community.

Performance Agreement:

The proposed performance agreement would establish the terms and conditions under which Frederick County would provide a local economic development incentive grant to Miller Milling in connection with its expansion. Any incentive payments would be contingent upon the company meeting the performance requirements outlined in the agreement, which includes a required investment.

The performance agreement is intended to align the County's financial commitment with measurable economic benefits and to ensure accountability for the county's investment. The specific financial commitment by the County, along with the applicable performance measures and payment conditions, will be governed by the terms of the performance agreement.

Staff is seeking approval of the attached resolution and performance agreement,

Attachments

LOCAL ECONOMIC DEVELOPMENT INCENTIVE GRANT

PERFORMANCE AGREEMENT

This **PERFORMANCE AGREEMENT** made and entered this 7th day of October 2026 by and among the **COUNTY OF FREDERICK, VIRGINIA** (the "**Locality**"), **Miller Milling** (the "**Company**"), and the **ECONOMIC DEVELOPMENT AUTHORITY OF THE COUNTY OF FREDERICK, VIRGINIA** (the "**Authority**"), a political subdivision of the Commonwealth.

WITNESSETH:

WHEREAS, the Locality wishes to make a Local Economic Development Incentive Grant in the amount of $550,000 (the "**LEDIG**") through the Authority to the Company for the purpose of inducing the Company to expand, equip, improve, and operate its production operations located in the Locality (the "**Facility**"), thereby making a significant Capital Investment, as such capitalized terms are hereinafter defined;

WHEREAS, the Locality is willing to provide the funds to the Authority with the expectation that the Authority will provide the funds to or for the use of the Company, provided that the Company promises to meet certain criteria relating to Capital Investment;

WHEREAS, the Locality, the Authority and the Company desire to set forth their understanding and agreement as to the payout of the LEDIG, the use of the proceeds of the LEDIG, the obligations of the Company regarding Capital Investment and the repayment by the Company of all or part of the LEDIG under certain circumstances;

WHEREAS, the expansion, equipping, improvement, and operation of the Facility will entail a capital expenditure by or on behalf of the Company of approximately $56,400,000 of which approximately $43,700,000 will be invested in machinery and tools, and approximately $12,700,000 will be invested in construction to expand the Facility;

WHEREAS, the stimulation of the additional tax revenue and economic activity to be generated by the Capital Investment constitutes a valid public purpose for the expenditure of public funds and is the animating purpose for payment of LEDIG to the Company:

NOW, THEREFORE, in consideration of the foregoing, the mutual benefits, promises and undertakings of the parties to this Agreement, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties covenant and agree as follows.

Section 1. Definitions.

For the purposes of this Agreement, the following terms shall have the following definitions:

"**Capital Investment**" means a capital expenditure by or on behalf of the Company in taxable real property, taxable tangible personal property, or both, at the Facility, excluding existing real property improvements and existing personal property. The purchase or lease of furniture, fixtures, machinery and equipment, including under an operating lease, by or on behalf of the Company will qualify as Capital Investment. The Capital Investment will be calculated based upon taxable capital expenditures reported after December 31, 2023. The total expected capital expenditure of $56,400,000 is referred to in this Agreement as the "**Capital Investment.**"

"**Performance Date**" means September 30, 2029. The Performance Date shall not be subject to extension.

"**Target**" means the Company's obligations to make Capital Investments at the Facility of at least $56,400,000 as of the Performance Date.

"**Virginia Code**" means the Code of Virginia (1950, as amended).

Section 2. Target; Statutory Criteria.

(a) *Target*: The Company will expand, equip, improve, and operate the Facility in the Locality, and make Capital Investments at the Facility of at least $56,400,000 as of the Performance Date.

Section 3. Disbursement of the LEDIG; Use of Proceeds

(a) *Disbursement of the LEDIG*: As an inducement to the Company to achieve the Target at the Facility and provided that the Company is not in default under the terms of this Agreement, the Locality will disburse $550,000 of LEDIG proceeds through the Authority to the Company in two installments as follows:

(i) An installment of $200,000 will be paid by the Locality to the Authority and by the Authority to the Company after September 30, 2028, but no later than December 30, 2028.

(ii) An installment of $350,000 will be paid by the Locality to the Authority and by the Authority to the Company within sixty (60) days after the Performance Date provided that the final Progress Reports are timely filed and deemed acceptable to the Authority, in the Authority's sole and absolute discretion. The Progress Reports shall provide evidence of the achievement of the Target by the Company.

Section 4. Repayment Obligation.

(a) If the Company has met at least 90% of the Target as of the Performance Date, then and thereafter the Company is no longer obligated to repay any portion of the LEDIG. If the Company has not met at least 90% of its Target as of the Performance Date, the Company shall repay to the Authority that part of the LEDIG that is proportional to the Target for which there is

a shortfall. For example, if at the Performance Date, the Capital Investment is only $42,300,000 (reflecting achievement of 75% of the Target), the Company shall repay to the Authority 25% of the moneys allocated to the Target ($137,500 of the LEDIG). Among other things, in the event that the Company should at any time file any amended tax return indicating, among other things, that the Company did not meet the Capital Investment, the Company shall be obligated to repay all or a portion of LEDIG, according to the formula set forth herein. The Company's repayment obligation hereunder shall survive the Performance Date to the extent that the Locality subsequently receives information to the effect that the Company did not meet the Target.

(b) *Determination of Inability to Comply:* If at any time prior to the Performance Date (a "Determination Date") a material change in circumstances has occurred that causes the Company to be unable or unwilling to meet and maintain its Target by and through the Performance Date, and if the Locality or the Authority shall have promptly notified the Company of such determination and the Company has not provided reasonable reassurance that it is making commercially reasonable progress toward reaching the Target as of the Performance Date, the Company must repay to the Authority all of the proceeds of the LEDIG previously disbursed to the Company and the Authority shall be under no obligation to disburse any portion of the LEDIG that it has not already disbursed. Such material change will be based on such circumstances as a filing by, on behalf of or against the Company under the U.S. Bankruptcy Code, the liquidation of the Company, an abandonment of the Facility by the Company, appointment of a receiver, or other similar significant event that demonstrates that the Company will be unable or is unwilling to satisfy the Target for LEDIG. Upon such determination, then and in that event, the LEDIG proceeds previously disbursed to the Company will be required to be repaid as set forth in subsection 4(c).

(c) *Repayment:* In the event that the Company is obligated to repay the LEDIG, or any portion thereof, as called for under the terms of this Agreement, the Company shall pay such sums within 30 days after notification of the amount of the sums to be repaid by the Company.

Any LEDIG repayment shall be made as follows:

(i) *LEDIG:* Any LEDIG moneys repaid by the Company to the Authority hereunder shall be repaid by the Authority to the Locality within 30 days after the repayment by the Company to the Authority. In the event that the Company fails or refuses to repay any of the LEDIG moneys as called for in this Section 4, such sums shall be assessed interest at the rate of 8.00% per annum until repaid in full by the Company.

The Locality and the Authority shall use their best efforts to recover any proceeds of the LEDIG due, including judicial proceedings for any breach of this Agreement by the Company.

(d) *Attorney's Fees with Respect to Repayment*: In the event that the Company fails to comply with the repayment obligations set forth in this Section 4, the Locality and the Authority shall be entitled to recover their reasonable attorney's fees and costs incurred in connection with such default by the Company, whether or not judicial proceedings are instituted to collect such funds.

Section 5. The Company Reporting.

Commencing on September 1, 2027, and on September 1, 2028, the Company shall provide, at the Company's expense, reports on the progress of achievement of the Target ("**Progress Reports**"). Such Progress Reports shall set forth the amount of Capital Investment made as of the date of each report. Such Progress Reports also shall include an affirmative statement signed by an authorized Company Officer or Director that the information provided in the report is true and correct and certifies the status of its efforts to achieve the Target.

The Company shall provide such other reports on the progress of achievement of the Target at such other times as the Locality or the Authority may reasonably require.

The Company hereby authorizes the Locality, including the Locality's Commissioner of the Revenue and Treasurer, to provide for review by the Locality or the Authority of the Company's real estate tax, business personal property tax and machinery and tools tax information. Such information shall be marked and considered confidential and proprietary and shall be used solely for verifying satisfaction of the Capital Investment Target. If the Locality or the Authority, the Office of the Commissioner of the Revenue, or the Office of the Treasurer should require additional documentation or consents from the Company to access such information, the Company shall promptly provide, at the Company's expense, such additional documentation or consents as the Locality or the Authority may reasonably request.

In addition to the verification data described above, the Locality and the Authority may request such other documentation or audits as may reasonably be required to properly verify expenditure of the Capital Investment.

Section 6. Notices.

Formal notices and communications between the Parties shall be given either by (i) personal service, (ii) delivery by a reputable document delivery service that provides a receipt showing date and time of delivery, (iii) mailing utilizing a certified or first class mail postage prepaid service of the United States Postal Service that provides a receipt showing date and time of delivery, or (iv) delivery by facsimile or electronic mail (email) with transmittal confirmation and confirmation of delivery, addressed as noted below; provided, notices delivered by email to the Company must also be delivered by confirmed facsimile or one of the other methods specified in this Section to the copy address below. Notices and communications personally delivered or delivered by document delivery service shall be deemed effective upon receipt. Notices and communications mailed shall be deemed effective on the second business day following deposit in the United States mail. Notices and communications delivered by facsimile or email shall be deemed effective the next business day, not less than 24 hours, following the date of transmittal and confirmation of delivery to the intended recipient. Such written notices and communications shall be addressed to:

if to The Company, to:

Miller Milling
10050 Crosstown Circle, Suite 350
Eden Prairie, MN 55344
Facsimile: 612-234-1389
Email: Kyle.Shermock@millermilling.com
Attention: Kyle Shermock, SVP-Supply Chain & Corp Planning

with a copy to:

Miller Milling
10050 Crosstown Circle, Suite 350
Eden Prairie, MN 55344
Facsimile: 612-234-1389
Email: Will.Untereker@millermilling.com
Attention: William Untereker, General Counsel

if to the Locality, to:

County of Frederick, Virginia
107 North Kent Street
Winchester, Virginia 22601
Facsimile: 540-667-0370
Email: wyatt.pearson@fcva.us
Attention: Deputy County Administrator

with a copy to:

County of Frederick, Virginia
107 North Kent Street, 3rd Floor
Winchester, Virginia 22601
Facsimile: 540-667-0370
Email: andrew.fox@fcva.us
Attention: County Attorney

if to the Authority, to:

Economic Development Authority of the County of Frederick, Virginia
107 North Kent Street
Winchester, Virginia 22601
Facsimile: 540-722-0604
Email: amanda.killen@fcva.us
Attention: Executive Director

with a copy to:

County of Frederick, Virginia
107 North Kent Street, 3rd Floor
Winchester, Virginia 22601
Facsimile: 540-667-0370
Email: andrew.fox@fcva.us
Attention: County Attorney

Section 7. Miscellaneous.

(a) *Entire Agreement; Amendments*: This Agreement constitutes the entire agreement among the parties hereto as to the LEDIG and may not be amended or modified, except in writing, signed by each of the parties hereto. This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns. The Company may not assign its rights and obligations under this Agreement without the prior written consent of the Locality and the Authority.

(b) *Governing Law; Venue*: This Agreement is made, and is intended to be performed, in the Commonwealth of Virginia and shall be construed and enforced by the laws of the Commonwealth of Virginia. Jurisdiction and venue for any litigation regarding this Agreement shall lie in the Circuit Court of the County of Frederick, Virginia, and such litigation shall be brought exclusively in such court.

(c) *Counterparts*: This Agreement may be executed in one or more counterparts, each of which shall be an original, and all of which together shall be one and the same instrument.

(d) *Severability*: If any provision of this Agreement is determined to be unenforceable, invalid or illegal, then the enforceability, validity and legality of the remaining provisions will not in any way be affected or impaired, and such provision will be deemed to be restated to reflect the original intentions of the parties as nearly as possible in accordance with applicable law.

(e) *Time*: Time is of the essence as to all matters set forth in this Performance Agreement.

(f) *Attorney Fees*: Except as noted in Section 4(d) above, attorney's fees shall be paid by the party incurring such fees.

(g) *Interpretation:* Should any provision of this Agreement require judicial interpretation, it is agreed that the Court interpreting the same shall not apply the presumption that the terms of any such provision shall be more strictly construed against one party or the other by reason of the rule of construction that a document is to be construed most strictly against the party who itself or through its counsel prepared the same, it being agreed that counsel for the Locality, the Company and the Authority have participated in the preparation and review of this Agreement.

[THE REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the parties hereto have executed this Performance Agreement as of the date first written above.

COUNTY OF FREDERICK, VIRGINIA

By _____

Name: John Jewell
Title: Chair, Board of Supervisors of
the County of Frederick, Virginia
Date: _____

ECONOMIC DEVELOPMENT AUTHORITY OF THE COUNTY OF FREDERICK, VIRGINIA

By _____

Name: Bryan Fairbanks
Title: Chair, Economic Development
Authority of the County of Frederick, Virginia
Date: _____

Miller Milling

By _____
Name:
Title:
Date: _____

RESOLUTION
APPROVING PERFORMANCE AGREEMENT
MILLER MILLING

WHEREAS, MILLER MILLING has made known its intent to expand its operation by making new taxable real estate and machinery investments and to retain and create jobs; and

WHEREAS, the stimulation of the additional tax revenue and economic activity to be generated by the Capital Investment constitutes a valid public purpose for the expenditure of public funds and is the animating purpose for payment and a local economic development incentive grant to the company.

BE IT RESOLVED, that the Board of Supervisors of the County of Frederick, Virginia, does hereby approve and appropriate the payment of $550,000 in installments, as stated in the Performance Agreement, to the Economic Development Authority of Frederick County, Virginia, from Frederick County's Fund Balance to assist in expanding the operation for MILLER MILLING in Frederick County, Virginia.

BE IT FURTHER RESOLVED, that said funds are subject to an executed Performance Agreement outlining the required performance criteria.

BE IT FURTHER RESOLVED, that the Board of Supervisors of the County of Frederick, Virginia, does authorize the Chairman to execute the Performance Agreement on its behalf.

ADOPTED, this 28th day of October, 2026, on the following recorded vote:

John F. Jewell, Chairman	Jason C. Aikens
Albert L. Orndorff	Robert W. Wells
Michael D. Guevremont	Gary R. Oates
Robert T. Liero	

A COPY ATTEST

_____
Michael Bollhoefer
Frederick County Administrator

No.

Board of Supervisors
Agenda Item Detail
Meeting Date: October 28, 2026
Agenda Section: Appointments to Boards, Committees, and Commissions

Title:

Information Item - The Board is seeking applications for:

Economic Development Authority - 2 immediate vacancies

We are particularly interested in individuals with experience in the technology sector, large - scale manufacturing, and small business. Ideal candidates will bring strong industry knowledge, an entrepreneurial mindset, and a passion for supporting economic growth and innovation in Frederick County. Members serve a four-year term.

Board of Equalization - 1 vacancy beginning 1-1-27

Members must be freeholders in the county. The primary duty of the Board of Equalization is to hear appeals of real estate reassessment in the year the reassessment takes effect while conducting its business as required by the Code of Virginia. Members serve a three-year term.

For more information or to apply online, please visit: Committee Listing and Descriptions | Frederick County (fcva.us)

Attachments:

Board of Supervisors
Agenda Item Detail
Meeting Date: October 28, 2026
Agenda Section: Planning Commission Business - Public Hearings

Title:

Conditional Use Permit #03-26 for Winchester Gateway LLC to Establish a Data Center on 71.85 +/- Acres of M1 (Light Industrial) Zoned Property. The Property is Located at the Intersection of Apple Valley Road (Route 652) and Middle Road (Route 628) and is Bounded by Route 37 to the West and is Identified by Property Identification Number (PIN) 63-A-80I in the Back Creek Magisterial District.

Attachments:
BOS10-28-26_CUP03-26_Redacted.pdf
BOS10-28-26_CUP03-26_Ph1ArcheologicalSurvey.pdf

CONDITIONAL USE PERMIT #03-26
Winchester Gateway LLC (Data Center)
Staff Report for the Board of Supervisors
Prepared: October 21, 2026
Staff Contact: M. Tyler Klein, AICP, Senior Planner

Executive Summary:

Meeting Schedule	
Planning Commission: June 9, 2026 Planning Commission: September 2, 2026	Action: Work Session held Action: Recommended **Denial**
Board of Supervisors: October 28, 2026	Action: Public Hearing
Property Information	
Property Identification Number (PIN)	63-A-80I
Address	Apple Valley Road & Middle Road
Magisterial District	Back Creek
Acreage	+/- 71.85-acres
Zoning & Present Land Use	Zoning: M1 (Light Industrial) Land Use: Vacant
Adjoining Property Zoning & Present Land Use	
North: RA (Rural Areas) District	Land Use: Church/Residential/Agricultural
South: M1 (Light Industrial) District	Land Use: Warehouse/Distribution
East: RP (Residential Performance) District	Land Use: Residential (single-family detached)
West: RA/Route 37	Land Use: Vacant/Arterial Roadway
Proposed Use	
This is a request for a conditional use permit (CUP) to establish a data center campus on property zoned M1 (Light Industrial) District.	
Positives	**Concerns**
The existing zoning of the property (M1) aligns with the planned future land use contained in the current Comprehensive Plan, "industrial," as does the proposed conditional use, "data center." The proposed use is expected to result in a substantial reduction in traffic impacts to the	The facility is proposed in areas identified as "core battlefield" and listed as Second Kernstown (VA116) Core Area, the First Kernstown (VA101) Study Area, and the Second Winchester (VA107) Study Area and has the potential to impact significant historic and cultural resources and tourism in the project vicinity.

transportation network compared to the other heavy traffic uses, permitted by-right in the M1 Zoning District (for example warehousing and distribution). The noise generated by the operation of the data center facility during most hours of the day is comparable to or less than the baseline noise currently in the vicinity (62-64 dBA). Further, the noise generated is lower than the noise maximum proffered for the subject property with REZ #06-23 (65 dB(A)), and the Zoning Ordinance (70 dB(A)) maximum for data centers.	The building height and block massing, while consistent with neighboring industrial properties to the south, may have a significant impacts on area viewsheds and community health, particularly from neighboring historic resources (Kernstown Battlefield property) and single-family detached residences across Apple Valle Road. While significant electric utilities exist in the vicinity of the subject property, including existing transmission lines along Route 37, there is uncertainty based on the applicant's provided supporting documentation, that existing substations and overhead utilities are sufficient to provide the megawatts needed for data center facility operation at this location. Further, the total facility megawatts needed has not been included in the application materials.

Review Agency Comments:

Review Agency	Comment Date	Comment Summary
Historic Resources Advisory Board (HRAB)	April 20, 2026	Following their review of this application, the HRAB recommended **denial** due to impacts on the historic resources identified as "core battlefield" and listed as Second Kernstown (VA116) Core Area, the First Kernstown (VA101) Study Area, and the Second Winchester (VA107) Study Area. In addition to the recommendation of denial, the HRAB further recommended the following conditions: • To reduce visual impacts either or combined with grading and building height not to exceed 45 feet inclusive of rooftop mounted equipment; as well as building design to include neutral earthtone colors and architectural features and

		materials in accordance with National Park Service standards; • Conduct a Phase II archaeological survey on the recommended locations identified in the Phase I survey; and no ground disturbing, including utilities development, in the areas identified in the study as 44FK-1076 and 44FK-1077. *See comment letter.*
Frederick Water	February 19, 2026	Frederick Water is prepared to meet the site's maximum of 35,000 GPD demand for water and sewer. Frederick Water recommends that the Board of Supervisors include a condition on the Conditional Use Permit that limits water and sewer services for the site to a maximum of 35,000 GPD (gallons per day). *See comment letter.*
Virginia Department of Transportation (VDOT)	February 5, 2024	VDOT has no objection to the CUP proceeding at this time. The proposed use is anticipated to result in a substantial reduction in traffic impacts to the transportation network compared to the highest and best use permitted in the M1 zoning district. Any, access, frontage improvements, or other elements involving VDOT right-of-way will be subject to detailed review during the site plan and permitting phases.
FC Fire Marshal	January 27, 2026	Any and all future development shall comply with applicable sections of the Frederick County Fire Prevention Code.

FC Public Works	2025	No comments at this time. A comprehensive review of the stormwater management and erosion and sediment control will take place at time of site plan submittal.
PC Building Inspections	January 16, 2026	No comment.

Planning & Zoning:

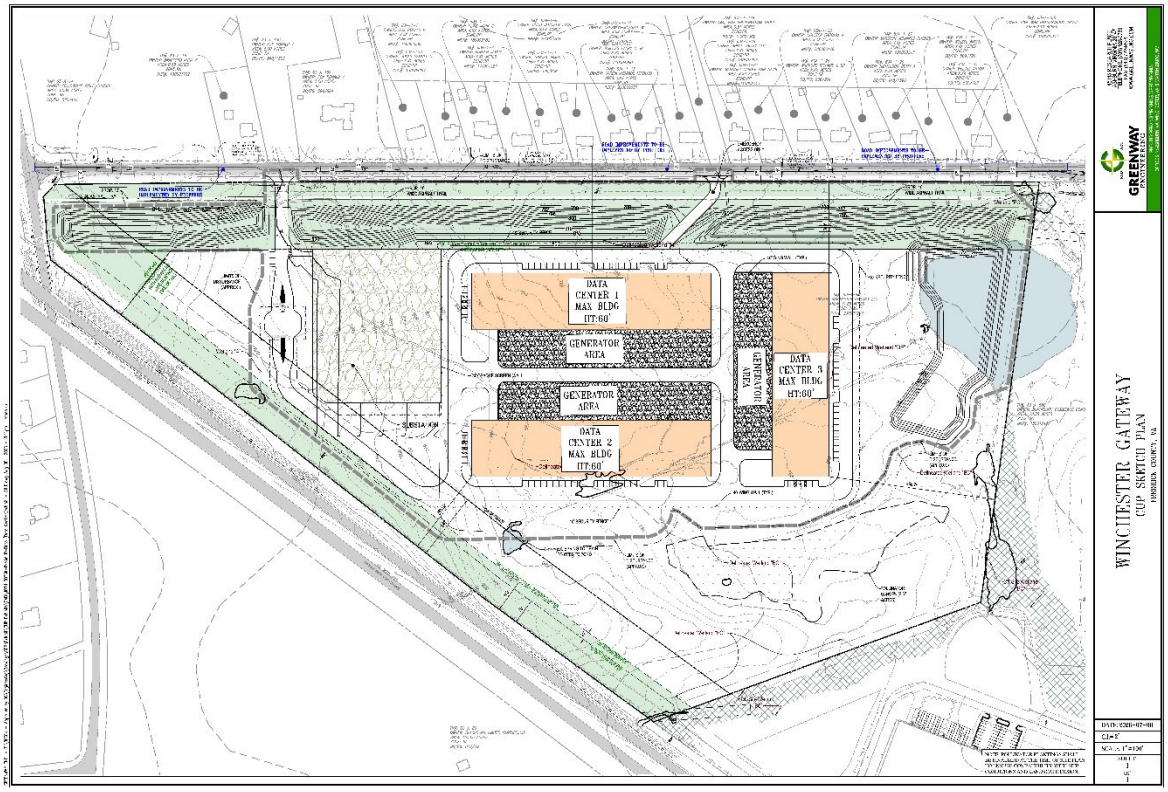
Application Proposal:

This conditional use permit (CUP) application seeks to develop a data center campus (+/- 805,000 square feet, three (3) buildings) on +/-71.85-acres of land zoned M1 (Light Industrial; REZ #06-23*). The subject property is located southwest of the intersection of Middle Road and Apple Valley Road, and immediately east of Route 37.

**Staff notes the approved rezoning (REZ #06-23, Winchester Gateway) for the subject property contemplated potential use of the site as a data center. The approved proffer statement (revised and dated April 10, 2024) included elements to mitigate the impact of a data center or other industrial use on adjoining properties. These proffered conditions included a 200-foot-wide landscape buffer, extra screening including through an earthen berm, and noise attenuation measures including a cap on the maximum dBA generated. Following approval of the rezoning, the Zoning Ordinance (Chapter 165) was amended by the Board of Supervisors in April 2025 to modify the use allowance for data centers from a "by-right use" to a "conditional use" in the M1 zoning district and provide additional regulations for data center uses. Thus, the change to the ordinance in 2025 necessitated the applicant to apply for a conditional use permit to establish a data center on property in the M1 zoning district.*

Following this CUP application acceptance by the department and the Planning Commission public hearing on September 3, 2026, the Board of Supervisors by resolution, removed data centers from the Zoning Ordinance with the expressed intent to prohibit data centers in Frederick County on September 23, 2026. Immediately following this action on the 23rd, the Board further approved a resolution to continue to consider the Winchester Gateway CUP application on or before 10/28/26.

Included with the application material is a concept sketch (revised August 7, 2026), showing the ordinance required 200-foot building setback from non-industrial properties, the general location of proposed buildings and on-site substations, stormwater management facilities, and buffers/screening. *Staff notes this is conceptual in nature, and if approved, a site plan meeting all Zoning Ordinance criteria would otherwise be required to be approved by Frederick County.*



Staff Analysis:

Certain uses in each zoning district are listed as being allowed with a conditional use permit. Because of their particular nature, such uses must be separately considered to protect the health, safety and welfare of the residents of the County and to avoid adverse impacts on surrounding properties.

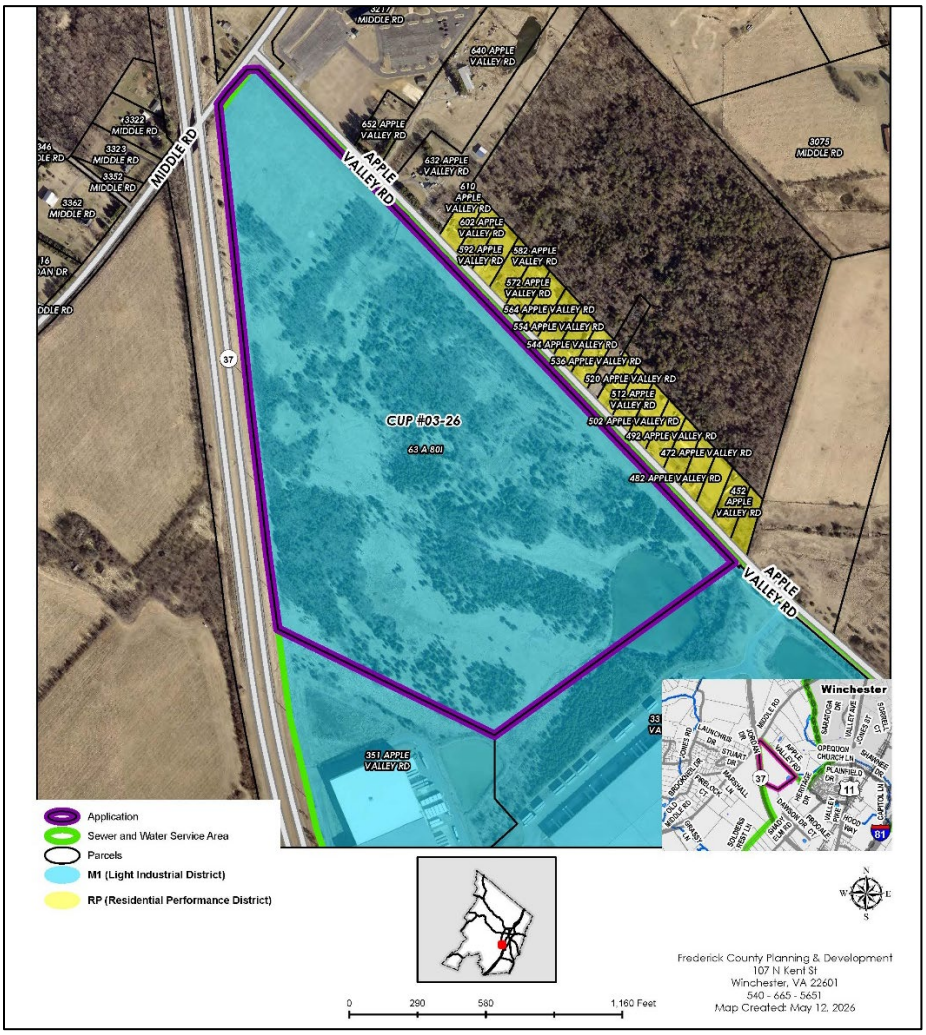
§165-304.02 of the Zoning Ordinance contains standards for Conditional Use Permits and states that the Planning Commission and Board shall consider the following standards when considering Conditional Use Permits:

A. The conditional use shall not tend to change the character and established pattern of development of the area of the proposed use.

- The existing zoning of the property is M1 (Light Industrial). To the south and southwest of the subject property, the adjoining properties are also zoned for industrial uses and include existing warehousing and distribution facilities (see map inset on the following page). The proposed data center would otherwise be *compatible* with these industrial uses.

- To the north and northeast of the subject property, the existing zoning is RA (Rural Areas) and RP (Residential Performance) and includes existing residential (small lot single-family detached uses), institutional (church) and recreation uses (Kernstown Battlefield; see map

inset below). The proposed data center could otherwise be *incompatible* with these uses if associated impacts are not properly mitigated.



B. The conditional use shall be in harmony with and shall not adversely affect the use and enjoyment of surrounding properties.

- If the proposed data center campus if not property sited, buffered, and screened, may adversely impact the adjoining properties, particularly residential uses through noise, and viewshed impacts.

- Noise generated by the facility, as noted in the applications *Environmental Noise Study*, prepared by Salas O'Brien and dated November 24, 2025, notes:

> "Normal operations are expected to produce noise levels of less than 65 dB(A) during daytime hours and 60 dB(A) during nighttime hours. While these nighttime levels exceed the ambient noise levels during the quietest hours, because they are

> steady state they will serve to mask disturbing impulsive and short spikes in noise levels caused by large trucks and emergency vehicles."

This means the noise generated by the operation of the facility, during most hours of the day, operates at or below the maximum 65 dB(A) proffered with REZ #06-23 and is comparable to the baseline noise currently in the vicinity (62-64 dB(A)). Staff would further note the proffered dBA for the site is lower than the 70 dBA maximum allowed by the County's Zoning Ordinance for industrial properties.

Following the Planning Commission work session on June 9, 2026, the applicant further evaluated if there was a significant change in the noise generated by the facility during normal operations and generator testing cycles between a proposed 60' tall structure and a staff recommended 45' tall structure. As stated in their included addendum:

> "The 60-foot building does provide slightly lower noise levels, particularly when evaluated in dB(C). This metric places greater emphasis on low-frequency sound, which tends to be more noticeable and potentially more disruptive to nearby residences."

Planning and Development staff and a 3rd party sound engineering (Trinity Consultants) also reviewed the addendum. In addition to some concerns on how the study was technically conducted, the Trinity Consultants engineer noted "the differences seem fairly minimal."

- Viewshed impacts, particularly from Kernstown Battlefield, property to the northwest owned by Shenandoah Valley Battlefields Foundation (SVBF), and residential uses across Apple Valley Road, have the potentially to negatively harm surrounding properties. However, these viewshed impacts may be mitigated through building design criteria, including reduced building heights, modulation, high quality building materials, building color, and enhanced buffering and screening.

C. The conditional use shall be in accord with the policies expressed in the Comprehensive Plan of the County and with the intent of this chapter.

- The Comprehensive Plan (adopted November 2021) and the *Kernstown Area Plan* provide guidance on the future development of the subject property. The Plan identifies the subject property with a "industrial" land use designation and as being within the limits of the sewer and water service area (SWSA). Further, the subject property is within the limits of the "Shady Elm Economic Development Area," which states:

> "The intent of the industrial designation is to further enhance the County's C/I areas and to provide focus to the County's future regional employment centers. In specific areas a mix of flexible uses, with office uses in prominent locations, is encouraged. Such areas are supported by substantial areas of C/I opportunity and provide for areas that are well designed with high-quality architecture and site

> design. It is the intent of such areas to promote a strong positive community image."

The existing zoning of the property (M1) aligns with the planned land use as does the proposed conditional use, "data center," which further aligns with area plan policies described above.

D. The conditional use shall not adversely affect the natural character and environment of the County.

- If the proposed data center campus is not property sited, buffered, and screened, the potential use, data center, may adversely impact the adjoining properties, particularly residential uses through noise and viewshed impacts.

- Noise generated by the facility, as noted in the applications *Environmental Noise Study*, prepared by Salas O'Brien and dated November 24, 2025, notes:

> "Normal operations are expected to produce noise levels of less than 65 dB(A) during daytime hours and 60 dB(A) during nighttime hours. While these nighttime levels exceed the ambient noise levels during the quietest hours, because they are steady state they will serve to mask disturbing impulsive and short spikes in noise levels caused by large trucks and emergency vehicles."

This means the noise generated by the operation of the facility, during most hours of the day, operates at or below the maximum 65 dB(A) proffered with REZ #06-23 and is comparable to the baseline noise currently in the vicinity (62-64 dBA). Staff would further note the proffered dBA for the site is lower than the 70 dBA maximum allowed by the County's Zoning Ordinance for industrial properties.

Following the Planning Commission work session on June 9, 2026, the applicant further evaluated if there was a significant change in the noise generated by the facility during normal operations and generator testing cycles between a proposed 60' tall structure and a staff recommended 45' tall structure. As stated in their included addendum:

> "The 60-foot building does provide slightly lower noise levels, particularly when evaluated in dB(C). This metric places greater emphasis on low-frequency sound, which tends to be more noticeable and potentially more disruptive to nearby residences."

Planning and Development staff and a 3rd party sound engineering (Trinity Consultants) also reviewed the addendum. In addition to some concerns on how the study was technically conducted, the Trinity Consultants engineer noted "the differences seem fairly minimal."

- Viewshed impacts, particularly from Kernstown Battlefield, property to the northwest owned by Shenandoah Valley Battlefields Foundation (SVBF), and residential uses across Apple Valley Road, have the potentially to negatively harm surrounding properties. However, these viewshed impacts may be mitigated through building design criteria, including reduced building heights, modulation, high-quality building materials, and enhanced buffering and screening.

E. The conditional use permit shall be approved only if adequate facilities, roads, safe access and drainage are provided.

- The proposed use is anticipated to result in a substantial reduction in traffic impacts to the transportation network (particularly along Apple Valley Road, Shady Elm Road, and Route 11) compared to other high-traffic generating uses permitted in the M1 zoning district (warehouse and distribution). Any access frontage improvements, or other elements involving VDOT right-of-way will be subject to detailed review during the site plan and permitting phases. Proffers approved with REZ #06-23 also stipulate widening of Apple Valley Road and installation of a multiuse trail along the subject property frontage.

- As noted in the application, it is anticipated that power serving the facility may already exist through adjoining overhead transmission utilities along Route 37 and/or overhead facilities and nearby substations may need to be upgraded to provide service. Any upgrades would be paid for by the user of the Winchester Gateway site and full slate of any necessary improvements would be evaluated at time of operation.

  However, while significant electric utilities exist in the vicinity of the subject property, including existing overhead transmission lines along Route 37, there is *uncertainty* based on the applicants provided supporting documentation (revised August 2026), that existing substations and overhead utilities in the vicinity are sufficient to provide the megawatts needed for data center facility operation at this location. There is no guarantee that the new overhead transmission lines would not be required to serve this proposed facility. Further, the total facility megawatts needed has not been included in the application materials.

- Water/sewer infrastructure serving the site would be provided by the local public utility provider, Frederick Water. The application proposes use of a closed-loop cooling system with anticipated use of 35,000 gallons per day, or less. The use of private wells or other ground water sources is not proposed as part of this application. As noted in the Frederick Water comment letter:

  > "The use of a closed-loop mechanical system will result in limited water consumption and sewer generation; this is a significant benefit for the proposed data center use and for Frederick Water service delivery. Closed-loop mechanical systems do not have seasonal changes in water consumption and would result in consistent daily water consumption and sewer generation year-round. Frederick

Water is prepared to serve the data center's maximum 35,000 GPD demand for water and sewer and a closed-loop mechanical system."

- Stormwater management facilities are outlined in the concept sketch included with the application facilities. Final stormwater management facility design would be complete during the site plan process and require conformance with applicable County codes and ordinances and review and approval by the County's Public Works staff. County policy requires all stormwater captured on site to be treated (quality) and held on site (quantity) and not to runoff onto adjoining properties and roadways.

F. The conditional use shall conform with all applicable regulations of the district in which it is located.

*** Staff notes following this CUP application acceptance by the department and the Planning Commission public hearing on September 3, 2026, the Board of Supervisors by resolution, removed data centers from the Zoning Ordinance with the expressed intent to prohibit data centers in Frederick County on September 23, 2026. Immediately following this action on the 23rd, the Board further approved a resolution to continue to consider the Winchester Gateway CUP application on or before 10/28/26 under the regulations prior to September 23, 2026.*

- The Zoning Ordinance includes district regulations for the M1 (Light Industrial) zoning district (dimensional requirements, setbacks, and height) and additional regulations for data centers contained in §165-705.01 and included below:

All data centers must meet the following requirements:

A. Prior to the approval of a rezoning application or conditional use permit the following shall be provided:
   (1) A site assessment to examine the sound profile of the data center on residential units and schools located within 500 feet of the data center property boundary in accordance with subsection E.
   (2) A site assessment evaluating the effect of the proposed facility on (i) ground and surface water resources, (ii) agricultural resources, (iii) parks, (iv) registered historic sites, and (v) forestland on the data center site or immediately contiguous land.
   (3) Details of any new or existing substations that will be used to serve the data center and (ii) the anticipated transmission voltage required to serve the data center.

B. Generator testing and cycling shall be limited to weekdays (Monday to Friday) between the hours of 8:00 a.m. to 5:00 p.m. Notwithstanding the foregoing, all noise generated by any on-site generator shall comply with County Code §165-201.12.

C. Mechanical Equipment.
   (1) Location. Ground mounted mechanical equipment shall be prohibited in the primary setback.

(2) Screening. Ground mounted and roof top mechanical equipment shall be screened from public roadways and adjoining properties on all sides.

a. Generators. All generators shall be enclosed with a manufacturer approved enclosure or located within the primary structure.

b. Other Mechanical Equipment. An opaque screen shall be provided by either the principal building, louvered wall, or equivalent screen approved by the Zoning Administrator. The maximum height of the opaque screen should correspond to the tallest piece of equipment being shielded from view.

D. Setback & Screening Requirements.

(1) Structures must be set back at least 200 feet from the common property line when adjoining land is zoned RA, RP, R4, R5 & MH1. Otherwise, the base zoning district dimensional standards shall apply.

(2) A category C full screen type buffer shall be provided around the perimeter of the property. If the adjoining property is zoned B3, TM, M1, or M2, no buffer is required.

E. Noise and Noise Monitoring.

(1) The applicant shall submit an Environmental Noise Impact Assessment prepared by a qualified full member of the Acoustical Society of America (ASA), a member of the Institute of Noise Control Engineering (INCE), or a member of the National Association of Acoustical Consultants (NCAC). The purpose of such noise impact assessment, modeled in SoundPLAN, CadnaA, or accepted equivalent, shall model anticipated noise levels as a result of facility operation and establish a baseline noise level prior to approval of a rezoning or conditional use permit.

(2) A noise study certifying noise levels shall be conducted 12-months after the issuance of the first Certificate of Occupancy (CO) and every five (5) years thereafter. Each noise study shall be submitted for review to the Zoning Administrator and/or his/her designee to assess the actual impact of the completed project.

a. The measurement of sound or noise pursuant to this section shall be as follows:

1. The measurement of sound or noise shall be made with a Type 1 or Type 2 sound level meter which meet the standards prescribed in ANSI S1.4:2014, “Specification for Sound Level Meters.” The instruments shall be maintained in calibration and good working order. A minimum of three (3) sound level readings shall be taken. The average of these readings will be used as the average sound level. If the background noise is equal to the levels set forth in this section, three (3) dB shall be subtracted out of the average sound level.

2. The slow meter response of the sound level meter shall be used to determine that the average amplitude has not exceeded the

dBA readings or the limiting noise spectra set forth in this section.

3. Unless otherwise specified, the measurement shall be taken at the property boundary on which such noise is generated.

b. Any additions, alterations, or expansion of a facility or its equipment shall require a new noise impact assessment to be submitted and approved by the Zoning Administrator.

c. If the post construction noise study exceeds the maximum noise level permitted, additional noise mitigation strategies, improvements, or operational changes shall be required.

(3) Any equipment necessary for cooling, ventilating, or otherwise operating the facility, including power generators or other power supply equipment on the Property, whether ground-mounted or roof-mounted, shall include the following noise mitigation elements:

a. Low noise emission fans.

b. Acoustic wraps for compressors and oil separators; and

c. An acoustic perimeter, which may include a perimeter around a group of individual chillers, which may be louvered or solid.

d. Other sound attenuation measures as approved by the Zoning Administrator.

The Owner shall provide documentation, in the form of technical specifications, photographs, and/or engineered plans, of the above mitigation measures contained in (2) with each building permit for a data center building on the Property and shall further provide documentation that such measures have been installed concurrently with each occupancy.

- The owner will be required to submit a site plan (§165-307) prior to the establishment of the use, certifying conformity with all Frederick County Zoning Ordinance Requirements. Site plans are reviewed by applicable County (Inspections, Public Works, Planning, Fire Marshal) and outside agencies (VDOT, Frederick Water) and require approval by the Zoning Administrator.

Recommendation:

In granting a conditional use permit, the Board of Supervisors may place appropriate conditions on the permit (§165-304.02(C)). The Board of Supervisor may impose conditions including but not limited to noise, lighting, landscaping, building height and/or hours of operations.

Should the Board of Supervisors find the use to be appropriate, staff would suggest the following conditions of approval for the CUP:

1. Historic Resources:

a. A Phase II Archeological Survey shall be performed for Site 44FK1076 (David Glass, Sr. homestead) and Site 44FK1077 identified in the *Phase I Archeological Survey of the Apple Valley Road Tract – Final Report* prepared by The Ottery Group and dated August 2023.
b. A copy of the final Phase II Archeological Survey shall be provided to the Frederick County Planning and Development prior to site plan approval
c. No land disturbing activities, including grading and/or above or below ground utilities, shall occur within the features identified in the *Phase I Archeological Survey of the Apple Valley Road Tract – Final Report* prepared by The Ottery Group and dated August 2023 as Site 44FK1076 (David Glass, Sr. homestead) and Site 44FK1077. These features shall be clearly delineated on the site plan as outside the limits of disturbance (LOD).

2. Site Access:
   a. Access to the site shall be limited to one (1) full movement entrance from Apple Valley Road (Route 652). The entrance shall not be directly across from any residential homes along Apple Valley Road as to maintain a contiguous buffer and berm along the frontage for sound attenuation and viewshed mitigation. A second entrance may be permitted for emergency vehicle access only, if required by the County's Fire Marshal and reviewed and approved at time of site plan.
   b. The location of the site entrance shall be reviewed and approved by the Virginia Department of Transportation (VDOT) as part of the site planning process.

3. Construction Management:
   a. Prior to final site plan approval for each phase of development, a Construction Mitigation Plan shall be submitted to the Department of Planning and Development for review and consideration. The Construction Mitigation Plan will address, at minimum, construction traffic control measures, including but not limited to, any mitigation measures to be implemented during weekday AM and PM peak travel hours and school bus travel times along shared construction related truck routes, including but not limited to, delivery of materials to and from the site, and other related matters the County reasonably believes is necessary for the Construction Mitigation Plan. Approval of the Construction Mitigation Plan by the Zoning Administrator must be obtained as a condition of approval of any and all site plans for each phase of development of the site.
   b. At least one public liaison shall be designated, and a toll-free phone number and email address shall be published on the Applicant's website and provided to the County's Public Information Officer (PIO) for publication on the County's website and other social media. The liaison shall act as a point of contact between citizens and construction crews and be available in person and by phone during active construction hours and must respond to any questions related to the project or the site. The liaison role will commence prior to the County's issuance of a land disturbance permit and

remain a minimum of six (6) months following the County's issuance of final certificate of occupancy for the project.

c. If requested by the County, the Applicant shall participate in a Joint Construction Traffic Reaction Team, which may include members of County Staff, the Virginia Department of Transportation, the Sheriff's Office, and the Virginia State Police to identify and expeditiously mitigate or resolve traffic issues that arise during the construction of the project. The Applicant shall assist in resolving and implementing solutions to traffic issues.

d. Pavement damage to roads, including shoulders and aprons, attributable to construction of the project, as determined by the Zoning Administrator, must be repaired by the Applicant within 120 days of notice and prior to any issuance of final certificate of occupancy for the project at the Applicant's sole expense. Should the Virginia Department of Transportation (VDOT) determine that the damage has made the road unsafe, the Applicant shall initiate the process of said repairs within forty-eight (48) hours after receiving notice from VDOT. The Applicant will diligently conduct all repairs herein a timely manner.

4. Public Utilities:
   a. Public water consumption by the subject property is limited to 35,000 gallons per day (GPD) or less.
   b. No groundwater resources, via private wells or other methods, shall be used for operation of the primary or accessory uses.
   c. Prior to site plan approval, the sanitary sewer discharge methods, shall be reviewed and approved by Frederick Water.

5. Noise & Noise Monitoring:
   a. The maximum noise generated by the operation of the data center shall not exceed 65 dB(A) & (C) during daytime hours and 60 dB(A) & (C) during nighttime hours measured in accordance with the Frederick County Zoning Ordinance §165-705.01(A)(5)(ii). Mechanical equipment (HVAC, generators, etc.) installed on the property shall be rated to produce noise that is equal to or less than the equipment studied in the *Environmental Noise Study* prepared by Salas O'Brien dated November 24, 2025.
   b. Testing of generators shall be limited to weekdays between 8:30am and 5:00pm.

6. Gound Mounted Mechanical Equipment:
   a. All backup generators used on the Property shall comply with the ambient air quality standards promulgated by the Virginia Department of Environmental Quality (DEQ) and shall be Tier IV generators permitted for emergency operation only.

7. Power Generating Facilities:

a. Power generation for the use shall be limited to back up generators in accordance with condition 6, and/or the use of solar panels.

8. Building Height, Design & Architecture:
   a. The maximum height of the principal structures, including roof-mounted mechanical equipment and parapet walls (screens), shall not exceed 45 feet.
   b. The building(s) shall include a main entrance feature, which must either project or recess from the main building plane, and/or be differentiated from the remainder of the façade by a change in building material.
   c. The design of the building façade should include fenestration of two (2) or more of the following materials comprising a minimum of 30% of the façade: concrete block, stone, brick, glass, metal, architectural precast concrete.
   d. At least two (2) neutral Earth tone or natural color palette, shall be used in the building façade.
   e. The maximum length of any exterior wall facing Apple Valley Road without modulation shall not exceed 100 feet. The minimum modulation depth is 2 feet. The minimum modulation width is 20 feet.
   f. Final building elevations and renderings shall be provided to the County for review and acceptance with the above conditions prior to issuance of the first building permit.

9. Buffers & Screening:
   a. A Category C Type full screen landscape buffer shall be installed along the property frontage with Apple Valley Road, Middle Road and Route 37. Unless otherwise modified below, the buffer area shall fulfill minimum distance and opaque screening element requirements of the Frederick County Zoning Ordinance §165-802.08.
      i. Along the property frontage with Apple Valley Road and Middle Road the buffer distance shall be a minimum of 200 feet (FT) in width and include a minimum fourteen (14) foot tall earthen berm plus an enhanced landscape screen.
      ii. The minimum plant size at time of planting for the landscape screen for all buffer areas shall be 1.5-inch caliper for deciduous trees, six (6) feet in height for evergreen trees, and 36 inches in height for evergreen shrubs.
      iii. The planting species, to be reviewed and approved at time of site plan, shall include a mix of species of which at least one (1) Virginia native variety of deciduous tree, at least one (1) Virginia native variety evergreen tree, and at least one (1) Virginia native variety of shrub.
      iv. In addition to the minimum 10-foot-wide landscape screen described above, along Apple Valley Road and Middle Road there shall be an additional double row of evergreen trees.
         1) The evergreen screen shall include at least two (2) different varieties of plantings, one (1) of which shall be a Virginia native, balled and burlapped and be a minimum of eight (8) feet in height at time of planting.

2) The additional double row of evergreen trees shall be planted within the limits of the 200' buffer. Plantings shall be spaced appropriately within the inactive portion of the buffer to allow for regular maintenance and mowing.

10. Signage:
    a. One (1) free standing monument sign is permitted from Apple Valley Road, not to exceed 50 square feet in sign area and not to exceed 12 feet in height.
    b. The base of the sign and sign face shall be of a material and color palette complementary to the building facade materials.
    c. Building/wall-mounted and electronic messaging signs are prohibited.

11. Any change in the use for which the conditional use permit was granted shall require a new conditional use permit (CUP).

Planning Commission Summary & Action from June 9, 2026, Work Session:

The Planning Commission held a work session on Tuesday June 9, 2026, to discuss the proposed conditional use permit application and to ask questions of staff and the applicants' representatives regarding the proposal. A number of concerns were raised by the Planning Commission:

- Availability of electrical infrastructure in the vicinity of the project to serve the proposed data center, including if new overhead electrical transmission lines or a new substation would be necessary;
- Viewshed impacts from new structure and infrastructure to surrounding residential and historic properties particularly Kernstown Battlefield;
- Noise impacts to surrounding residents and historic properties for daily operations and emergency generator use;
- Daily data center operations including emergency generator cycling (testing), cooling techniques and daily water usage;
- Construction hours of operation, duration and traffic impacts;
- Site layout including building design, screening, buffers, and façade materials.

The applicant in their responses noted a need to postpone the public hearing to a later date to fully consider the concerns raised by the Planning Commission and on how to proceed to best address those stated concerns. Staff noted that under the Zoning Ordinance, the Planning Commission has 90-days to provide a recommendation to the Board of Supervisors, and the latest it could go to public hearing was the regularly scheduled meeting on September 2, 2026.

No action was taken by the Planning Commission.

Planning Commission Summary & Action from September 2, 2026, Meeting:

The Planning Commission held a public hearing at their regular meeting on September 2, 2026. The primary concerns discussed were noise and viewshed impacts to surrounding residential and culturally sensitive historic properties and how the facility would be served by public utilities primarily electrical infrastructure and a desire by the Planning Commission not have additional impacts from new overhead transmission lines.

Thirty-one (31) people spoke during the public hearing, voicing opposition to the proposed data center CUP application. Concerns included building height in excess of neighboring industrial properties; incompatibility with adjoining residential, historic, and rural uses; public water availability; security, cybercrime and public safety; community health particularly impacts from mechanical and industrial noise and back-up generators air pollution; the lack of environmental studies preceding application submission to understand impacts to groundwater and karst topography; potential for diminished residential property values; potential for increased cost for utilities to rate payers; impacts to wildlife, native pollinators and water resources; viewshed impacts to Kernstown Battlefield and the real or perceived “irrevocable” damage to the community as a whole.

The Planning Commission voted unanimously to recommend **denial** of the conditional use permit.

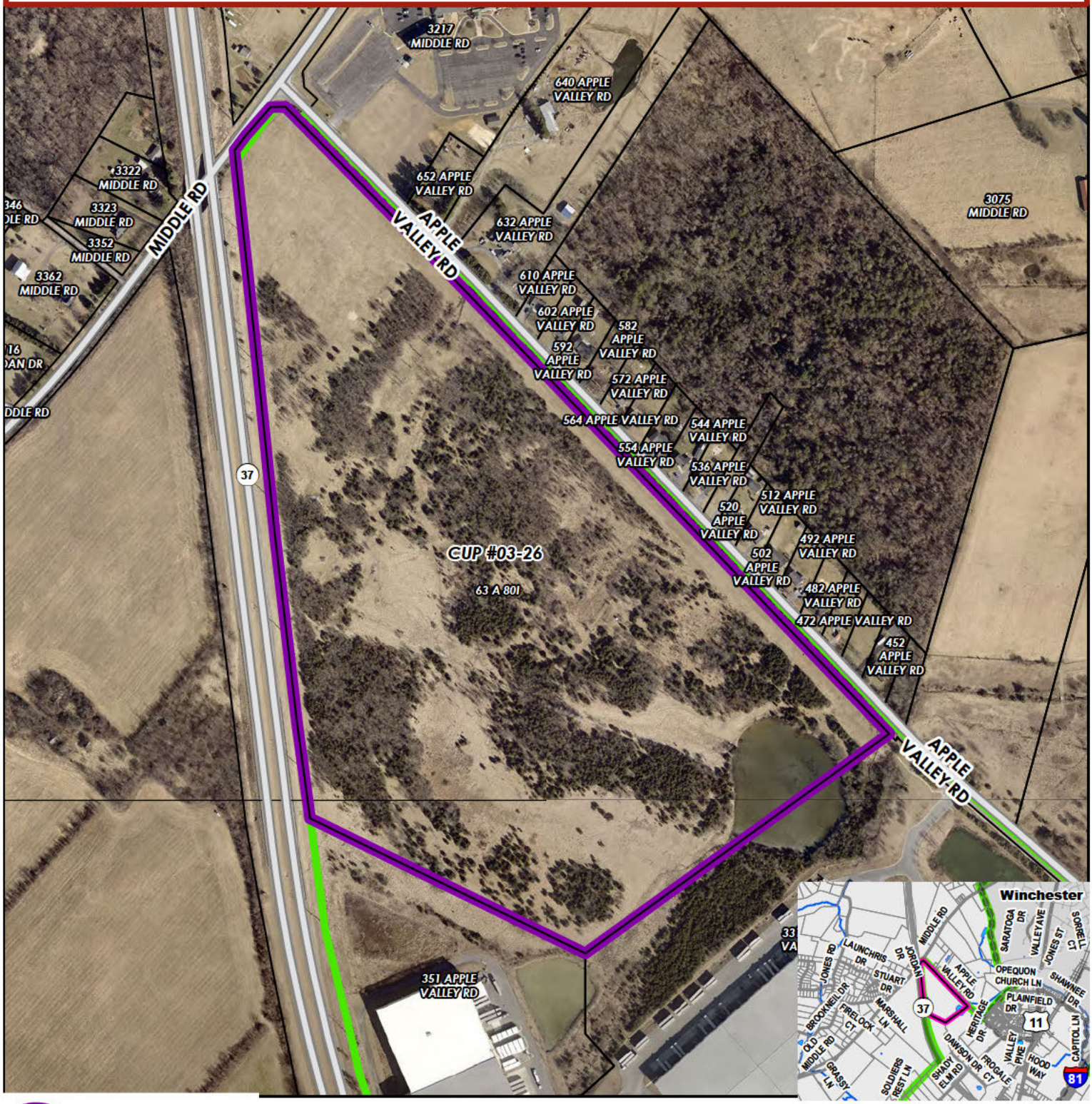
Following a public hearing, staff are seeking a decision by the Board of Supervisors on this CUP application.

CUP # 03 - 26: Winchester Gateway LLC

PIN: 63 - A - 80I

Data Center

Location Map



Application

Sewer and Water Service Area

Parcels

0 290 580 1,160 Feet

Frederick County Planning & Development
107 N Kent St
Winchester, VA 22601
540 - 665 - 5651

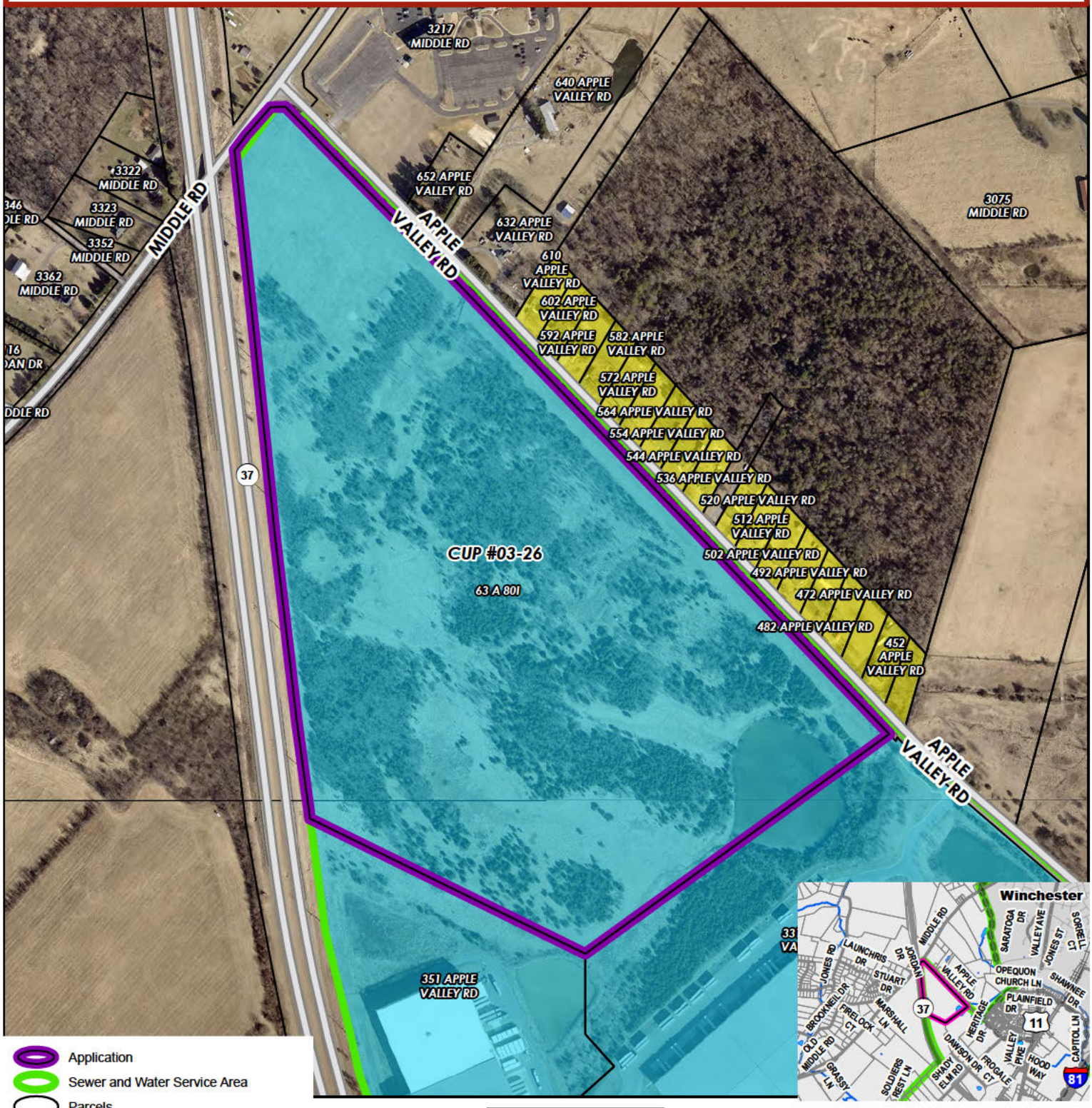
Map Created: May 12, 2026

CUP # 03 - 26: Winchester Gateway LLC

PIN: 63 - A - 80I

Data Center

Zoning Map



- Application
- Sewer and Water Service Area
- Parcels
- **M1 (Light Industrial District)**
- **RP (Residential Performance District)**

0 290 580 1,160 Feet

Frederick County Planning & Development
107 N Kent St
Winchester, VA 22601
540 - 665 - 5651

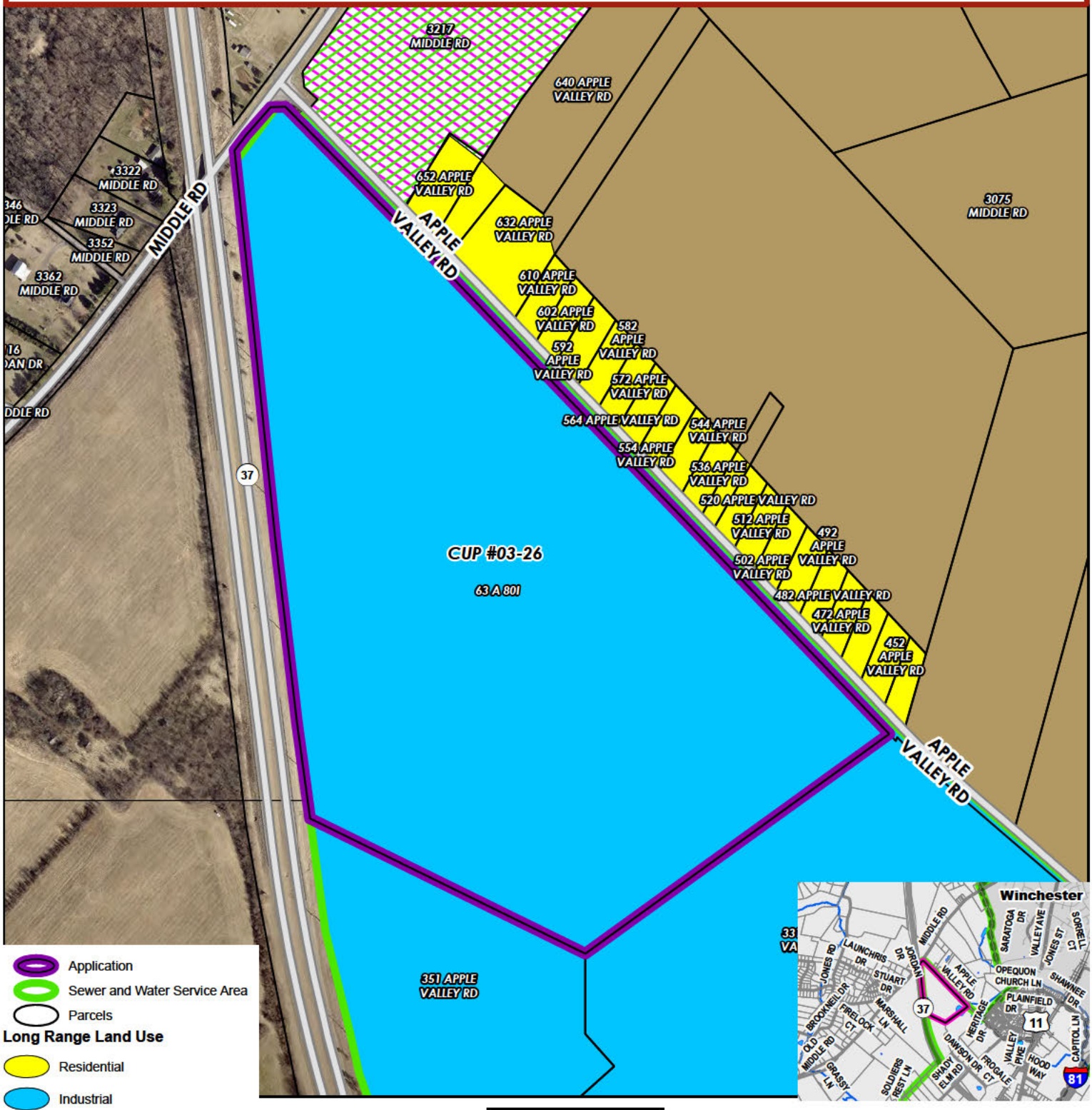
Map Created: May 12, 2026

CUP # 03 - 26: Winchester Gateway LLC

PIN: 63 - A - 80I

Data Center

Long Range Land Use Map



0 290 580 1,160 Feet

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Map Created: May 12, 2026

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August 19, 2026

Tim Stowe, Chairman
Roger L. Thomas, Vice Chairman
Betsy Brumback, Member
Jeff McKay, Member
Vaughn Whitacre, Member
Joseph Crane, Member
John Lamanna, Member
Thomas Bottorf, Member
Kevin Sneddon, Member
Charles Markert, Member
Elizabeth Kozel, Member
Justin Kerns, Member
Charles S. DeHaven, III, Member
Frederick County Planning Commission
107 N. Kent Street
Winchester, VA 22601

Re: Winchester Gateway LLC – Conditional Use Permit
Frederick County Tax Map Number 63-A-80I
Our File No. 1503.002

VIA E-MAIL

Dear Mr. Chairman and Members of the Planning Commission:

On behalf of Winchester Gateway LLC, we thank you for the opportunity to present to you at your June 9, 2026 work session the Winchester Gateway Conditional Use Permit ("CUP") application to allow for the installation of a data center campus on Parcel 63-A-80I ("Property"). During that work session, there were numerous questions asked and raised and members of the Winchester Gateway development team were pleased to appear and provide you with answers to those questions. The purpose of this letter is a follow-up to that work session presentation and to provide still additional comment and response to your questions. Please allow this letter to also serve as a supplement to the updated and revised submission, which is now in your packets and available for your consideration at the September 2, 2026 Planning Commission hearing.

First and foremost, we greatly appreciate the presentation by Staff which outlined the CUP and specific Conditions of Approval (a "Condition" or "Conditions") that have been discussed with Staff and have been offered by the Applicant. Also, the presentation by Staff was important because it provided a history of this site and the fact that it has been part of two prior approved proffered rezonings to M1, first in 2015 and then again in 2024. That history is most important because with those rezoning applications this County has not only approved the entitlement of this property to M1 as proffered, but it has now done that on two prior occasions, and the Applicant submits that maintaining consistency with these approvals for further refinement of the entitlement of this Property is important to not only this specific tract of land, but also to the surrounding areas which are also subject to the first proffered rezoning to M1.

Looking more closely at the CUP, the purpose of this process is to assure the public that any impacts that come from the specific CUP use, which in this case is data center, either do not generate additional impacts to the surrounding areas and/or, if they do, sufficient steps have been taken to mitigate those impacts. We are pleased to be able to report that with the submittal currently before you that not only are all potentially adverse impacts lessened in comparison to by right industrial (e.g., M1) as a result of the Conditions offered and the limiting of the use to a data center use, but all of those potential impacts are measurable through objective standards, which confirm in quantifiable terms such lessened or lightened impact on the surrounding community. In other words, approval of the CUP application and associated Conditions will result in an industrial development on the site that will be more compatible with and complementary to neighboring uses than would otherwise be achieved with by right M1 development.

Speaking directly to the questions raised during the hearing, I provide you with the following.

First, there was a question and discussion about the use of groundwater for the proposed data center use. As the Conditions state, there is no allowance for the drilling or installation of any wells on the Property. All of the water used by the data center will be supplied by the municipal system owned and operated by the Frederick County Sanitation Authority ("FCSA"). Furthermore, all utility improvements connected to the FCSA system will be to their specifications and will be fully inspected prior to any connection of public water or sewer and monitored thereafter.

There was much discussion about electrical service and a more general discussion about a concern that new easements will be obtained by the local electric service provider to provide electricity to this data center. In response, a Condition has been added which confirms that the electric power and any and all improvements or enhancements required to serve the initial energization of the data center buildings shall be installed within and along existing transmission easement corridors which connect to the Property and generally run along Rt. 37. There were also anecdotal discussions or concerns raised about rate payers being charged with the costs of providing electrical service upgrades for high electricity users. As this body knows, but it certainly bears repeating, the current status of the law in the Commonwealth of Virginia is that high consumers of electricity are to be solely responsible for any upgrades required to provide electrical service to their facilities. Accordingly, pursuant to the law, the operator of the Winchester Gateway site will be the party responsible for the payment of any necessary electrical service upgrades and,

therefore, the rate paying customers will not bear any portion of this expense. Interestingly, the Applicant has been advised by the local electric service provider that, in fact, there are and have been pending plans to upgrade the electrical service in the vicinity of the Winchester Gateway facility and along the easement corridor that parallels Rt. 37. Those plans have been in effect for many years and this corridor has, therefore, been targeted for upgrades long before the Winchester Gateway development was brought forward for consideration. Under the prior plans for upgrades, the rate payers would have been charged for the cost of those upgrades in the ordinary course of Shenandoah Valley Electric Cooperative's ("SVEC") mandate to continually provide and deliver adequate public service to its customers and as approved by the State Corporation Commission. With the filing of this CUP by Winchester Gateway, upon approval and as stated above, in accordance with the current State law, those upgrade charges will no longer be the responsibility of the customers/rate payers of SVEC, but instead the sole responsibility of the developer of the Winchester Gateway site, which is a demonstrable benefit to individual rate payers and the community as a whole.

There was much discussion about sound levels and concerns about the potential of elevated sounds beyond what is allowed in Frederick County's M1 district being generated by the industrial buildings onsite. Conditions have been submitted that specifically limit both A and C decibel sound levels at the Property line. Those sound levels are not only less and lower than what is allowed in the Frederick County M1 zoning ordinance but, more importantly, those sound levels of the data center equipment are lower than the sound levels that have been measured coming from and around the site currently and before any development (e.g., ambient noise levels). Winchester Gateway's certified sound engineer was present at the Planning Commission's work session and will be present at the Planning Commission's public hearing to speak further to the sound testing and modeling performed for this proposal, and how the lowered sound levels prescribed by the CUP Conditions will be confirmed and maintained during the life of the data center project. The Applicant is certainly very pleased to be able to deliver not only the sound engineer's report, but also an objective measurable standard to demonstrate that both the A and C decibel level sounds from the data center equipment will be lower if the CUP is approved.

There were further discussions and questions about the economic benefits to Frederick County as a result of the approval and development of the data center campus. Our professional financial analyst, MuniCap, has provided a detailed report reflecting the tax and employment benefits to Frederick County and has presented that report both at the current data center tax rate and also at a rate that is assumed if the Board of Supervisors votes to tax data center's personal property/machine and tool rates at the same levels as other industrial, commercial and residential users are taxed. Under either financial scenario, a data center at this site would be very beneficial to Frederick County from a positive tax generation measure and it would also provide for numerous good and well-paying jobs for Frederick County. Once again, a representative of MuniCap will be present at the Planning Commission public hearing and will be pleased to respond to any questions that may remain after you have read the MuniCap report.

There were comments about the scale and screening of the data center facility and it was pointed out that as depicted on the CUP Sketch Plan, the total square footage of the buildings planned to be constructed on the site would be approximately one-quarter of the square footage of

the buildings allowed to be constructed if built under the existing M1 zoning. Specifically, the gross floor area planned for the site totals approximately 678,720 square feet, equivalent to a floor area ratio ("FAR") of 0.22, whereas the M1 district permits a maximum FAR of 1.0, which would equate to 3,129,786 square feet of by right industrial development on the site. There was also discussion about the heights of the buildings and, as stated above, the proffered rezoning restricted the building heights to sixty (60) feet with allowance for rooftop equipment, which is consistent with the rezonings approved in 2015 and 2024. Additionally, with the 2024 rezoning, there was proffered additional levels of screening around the buildings to include the installation of a six (6) foot berm and landscaping both on and in front of the berms. With the Conditions that have been submitted for this CUP, the height of those berms have been raised to fourteen (14) feet, upon which the enhanced landscaping proffered and accepted with the 2024 M1 rezoning will be planted.

There is further in the Conditions the addition of a requirement that Earth tone/neutral paint colors be used on the exterior of the buildings and there is also a structurally integrated greenscape element which has been proposed, all to soften the visual impact of the buildings, if not in many cases to obscure them from sight completely. These revisions were made for the general public's benefit, but also with an eye towards creating a natural view scape for the immediate neighbors who are residential, a local church and also two historic battlefield preservation organizations.

There were questions and discussions about the mechanical systems used to heat and cool the data center buildings. One of Winchester Gateway's construction engineers was present at the work session and will also be present at the Planning Commission hearing to answer any follow-up questions. At the work session, he explained in great detail the heating and cooling systems that will be used for the data center building and, specifically, the closed-loop cooling system required as a Condition of the CUP, which uses a recirculating water and propylene glycol mixture. That system will be installed by professionals who are licensed to install, maintain and operate said system and will be in compliance with all local, State and Federal regulations governing same. It was interesting to point out that the propylene glycol compound used along with water is not toxic, is a food-grade substance, is a substance commonly found in lip balm or lipstick, and is very effective at assisting the operation of the heating and cooling systems. Further still, there are Conditions added to address and confirm the fact that not only will all regulations and laws governing the system be adhered to, but also that if there is a need to remove/replace any of the cooling systems or liquid in the cooling systems that it will be performed by licensed and approved professionals and in conformity with any and all FCSA standards to ensure that no contaminant or substance that could be deemed to be a contaminant is allowed to enter the FCSA sewer system or the property surrounding the data center buildings.

The existing proffers approved in 2024 already require sound dampening systems be installed for any rooftop or exterior mechanical equipment. There is also a Condition added to provide for parapet and equipment screening, that it be on the rooftop and it be installed in a manner to not only obscure from view any such equipment, but also that sound deadening material be added to it to further assist with maintaining lowered sound levels.

There were discussions about the generators proposed for the data center buildings and there are Conditions that specify the generators will only be used in instances requiring backup power and in times when electric power service from SVEC has been disrupted. Those generators are not only required under the Conditions to be Tier 4, which is the most efficient, environmentally clean and quietest units available, but also those generators have been intentionally located on the Generalized Development Plan so they are interior to the site to further ensure lesser sound generation. The height of the building at sixty (60) feet also provides an additional sound benefit to the neighbors and surrounding areas because, as the sound engineer has testified, it has the effect of lowering any sounds being emitted from the site. The entirety of the site has been most intentionally laid out and designed to improve and mitigate any viewshed and sound impacts to create a contextually compatible industrial development, all for the benefit first of the immediate neighbors, but also for the residents of the County as a whole.

Thank you for your time and attention reviewing this letter and the materials that have been submitted and supplemented for the Planning Commission hearing. The Winchester Gateway team looks forward to the opportunity to present these materials at the hearing and to respond to such additional questions and comments as may be raised. As always, and in the interim, should you have any questions, please do not hesitate to directly contact me or any of the members of the Winchester Gateway team.

Very truly yours,

[redacted]

Thomas Moore Lawson

TML:atd
cc: Winchester Gateway LLC
M. Tyler Klein, AICP, Senior Planner

Submittal Deadline	
P/C Meeting	
BOS Meeting	

APPLICATION FOR CONDITIONAL USE PERMIT
FREDERICK COUNTY, VIRGINIA

1. Property Owner(s) (please attach additional page(s) if more than two owners):

   Name: Winchester Gateway LLC

   Specific Contact Person if Other than Above: Thomas Moore Lawson, Esquire

   Address: P.O. Box 2740, Winchester, VA 22604

   Telephone: (540) 665-0050 Email: tlawson@lsplc.com

   Name: _____

   Specific Contact Person if Other than Above: _____

   Address: _____

   Telephone: _____ Email: _____

2. Other Interested Parties (such as a contract purchaser) (please attach additional page(s) if necessary):

   Name: _____

   Specific Contact Person if Other than Above: _____

   Address: _____

   Telephone: _____ Email: _____

3. Law firm, engineering firm, or other person, if any, serving as the primary contact person for this application:

   Firm Name: Thomas Moore Lawson, P.C.

   Specific Contact Person at Firm: Thomas Moore Lawson, Esquire

   Address: P.O. Box 2740, Winchester, VA 22604

Telephone: (540) 665-0050 Email: tlawson@lsplc.com

4. The property has a road frontage of 3,241.4 feet and a depth of 2,881.7 feet and consists of 71.85 acres. (Please be exact)

5. The property is owned by Winchester Gateway LLC as evidenced by deed from Blackburn Farm, LLC (previous owner) recorded in deed book no. _____ on page _____, as recorded in the records of the Clerk of the Circuit Court, County of Frederick.

Instrument No. 230001203

6. Property Identification Number(s) (P.I.N.): 63-A-80I
Magisterial District: Back Creek
Current Zoning: M1

7. Adjoining Properties:

	Zoning:	Use:
North:	RA	Residential
South:	M1	Industrial/Commercial
East:	RP/RA	Residential
West:	Route 37	

8. Conditional use(s) proposed: (**consult with the Planning Dept. before completing**):

Data Center

9. Describe, if applicable, any new buildings to-be-constructed associated with this use (attach additional documentation as necessary):

Data Center

10. The following are all of the individuals, firms, or corporations owning property adjacent to all sides (including across street from) the property where the requested use will be conducted. These people will be notified by mail of this application:

Name and Property Identification Number	Address
Name See attached	
Property #	
Name	
Property #	

Name Property #	
Name Property #	
Name Property #	
Name Property #	
Name Property #	
Name Property #	
Name Property #	
Name Property #	

10. Please attach a sketch of the property (refer to "Application Steps").

11. Please attach a written description of the proposed use (refer to "Application Steps").

I (we), the undersigned, do hereby respectfully make application and petition the governing body of Frederick County, Virginia to allow the use described in this application. I understand that the sign issued to me when this application is submitted must be placed at the front property line at least seven (7) days prior to the first public hearing and maintained so as to be visible until after the Board of Supervisors' public hearing. Your application for a Conditional Use Permit authorizes any member of the Frederick County Planning Commission, Board of Supervisors or Planning and Development Department to inspect your property where the proposed use will be conducted.

*All owners listed on the property record shall sign the application.

Signature of Applicant [redacted], Manager

Signature of Owner(s) [redacted], Manager

By: Darius E. Saeidi, Manager of Winchester Advisors LLC, Manager of WINCHESTER GATEWAY LLC

Owners' Mailing Address c/o Thomas Moore Lawson, Esquire, P.O. Box 2740, Winchester, VA 22604

Owners' Telephone No. c/o Thomas Moore Lawson, Esquire, (540) 665-0050

**A signed Power of Attorney form is required if someone is signing on the owner(s) behalf.*

ADJOINER TABLE

LABEL	PIN	OWNER NAME	OWNER NAME CONT.	ADDRESS	ADDRESS CONT.	CITY	STATE	ZIP
1	62 A 75	WILKINS ROY LANDIS JR TRUSTEE	WILKINS BETTY JEAN TRUSTEE	3210 MIDDLE RD		WINCHESTER	VA	22602
2	63 A 14	FELLOWSHIP BIBLE CHURCH		3217 MIDDLE RD		WINCHESTER	VA	22602
3	63 A 16	BRADFORD ANNA F		652 APPLE VALLEY RD		WINCHESTER	VA	22602
4	63 A 15C	FOX RONALD V	FOX PATRICIA W	632 APPLE VALLEY RD		WINCHESTER	VA	22602
5	63 A 15A	FOX RONALD V	FOX PATRICIA W	632 APPLE VALLEY RD		WINCHESTER	VA	22602
6	63A 1 1	FOX RONALD V	FOX PATRICIA W	632 APPLE VALLEY RD		WINCHESTER	VA	22602
7	63A 1 3	JONES SAMUEL C	JONES ROBIN M	602 APPLE VALLEY RD		WINCHESTER	VA	22602
8	63A 1 5	KLINE MARK C		592 APPLE VALLEY RD		WINCHESTER	VA	22602
9	63A 1 7	HUNTER JAMES	HUNTER BONNIE	582 APPLE VALLEY RD		WINCHESTER	VA	22602
10	63A 1 9	GOOD JENNIFER LYNN		572 APPLE VALLEY RD		WINCHESTER	VA	22602
11	63A 1 11	TURNER JAMES C	TURNER DEBORAH L	564 APPLE VALLEY RD		WINCHESTER	VA	22602
12	63A 1 13	PHILLIPS LARRY O JR		554 APPLE VALLEY RD		WINCHESTER	VA	22602
13	63A 1 15	GARCIA ANDRADE HIPOLITO		544 APPLE VALLEY RD		WINCHESTER	VA	22602
14	63A 1 17	CRESWELL RUSSELL W	CRESWELL ROBIN R	536 APPLE VALLEY RD		WINCHESTER	VA	22602
15	63 A 17A	CIVIL WAR PRESERVATION TRUST		1156 15TH ST NW STE 900		WASHINGTON	DC	20005
16	63A 1 19	APPLE VALLEY LLC		478 E WASHINGTON ST		STRASBURG	VA	22657
17	63A 1 21	DAVIS MARTINEZ CAROLE ANN	AGUILAR MAYA	35 ORMSKIRK AVE 913	TORONTO ON M6S1A8	CANADA		0
18	63A 1 23	HOSTLER BARBARA A		502 APPLE VALLEY RD		WINCHESTER	VA	22602
19	63A 1 25	WHITACRE RICHARD L SR	WHITACRE CHRISTINE E	492 APPLE VALLEY RD		WINCHESTER	VA	22602
20	63A 1 3 27	DIAZ SILVAS KEVIN GEOVANNI	DIAZ BENAVIDES GUILLERMO DE LA CRUZ, OLIVER MARAVILLA VILMA INES	482 APPLE VALLEY ROAD		WINCHESTER	VA	22602
21	63A 1 29	NICHOLSON BETTY A		472 APPLE VALLEY RD		WINCHESTER	VA	22602
22	63A 1 31	WELZEL ANTON	WELZEL PATRICIA D	452 APPLE VALLEY RD		WINCHESTER	VA	22602
23	63A 1 33	WELZEL ANTON	WELZEL PATRICIA D	452 APPLE VALLEY RD		WINCHESTER	VA	22602
24	63 A 17B	CIVIL WAR PRESERVATION TRUST		1156 15TH ST NW STE 900		WASHINGTON	DC	20005
25	63 A 58C	BLACKBURN COMMERCE CENTER I LC		1057 MARTINSBURG PIKE		WINCHESTER	VA	22603
26	63 A 58D	BLACKBURN COMMERCE CENTER II LC		1057 MARTINSBURG PIKE		WINCHESTER	VA	22603
27	63 A 18A	KERNSTOWN BATTLEFIELD ASSOCIATION, INC.		P.O. BOX 1327		WINCHESTER	VA	22604
28	62 A 80	WINCHESTER GATEWAY 2 LLC		15 S. KING STREET		LEESBURG	VA	20175
29	62 A 77A	FLETCHER RICHARD A		3323 MIDDLE ROAD		WINCHESTER	VA	22602
30	62 1 A	FLETCHER RICHARD A		3323 MIDDLE ROAD		WINCHESTER	VA	22602
31	62 1 B	FLETCHER EVERETT J JR	FLETCHER LUZ F	3322 MIDDLE ROAD		WINCHESTER	VA	22602
32	62 1 B1	FLETCHER EVERETT J JR	FLETCHER LUZ F	3322 MIDDLE ROAD		WINCHESTER	VA	22602

To: Frederick County Planning Commission and Staff
From: Winchester Gateway, LLC
Date: August 6, 2026
Re: Winchester Gateway Community Outreach

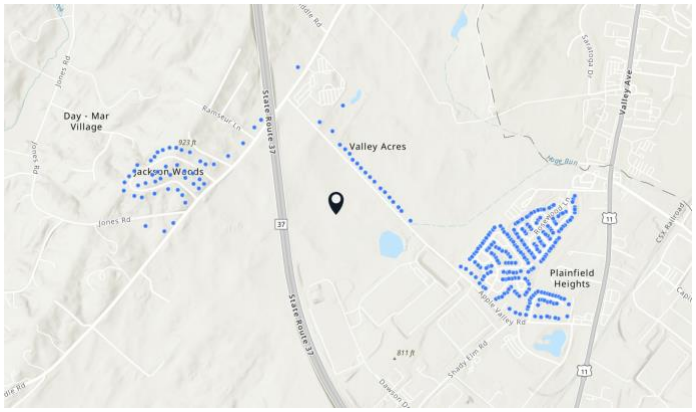
COMMUNITY MEETINGS

- Open Houses: May 11 & 12 at Orchard View Elementary School
- HOA Board Member Meeting: April 29
- Woodbrook Village neighborhood meeting: May 18
- Cottage Glen neighborhood meeting: June 11
- Cross Creek neighborhood meeting: June 16
- Bus Tour: June 24
- Fellowship Bible Church meeting: July 6

OPEN HOUSES

Winchester Gateway hosted two open houses on May 11 and May 12, 2026, at Orchard View Elementary School. Roughly 50 people attended on May 11 and 30 attended on May 12, with five to seven of those attending both nights. The meeting was set up in an open house style. Development and engineering team members were stationed around the room to explain and demonstrate seven elements of the project: the economic impacts of the project, information on noise, comparisons between by-right uses and this project, two site plants, and two renderings of the viewshed from Apple Valley Road.

Two weeks prior to the open houses, Winchester Gateway invited neighbors to attend. Postcards were sent to notify 279 neighbors on Apple Valley Road, Middle Road, the Jackson Wood neighborhood, the Cross Creek Village neighborhood, the Cottage Glen neighborhood, and the Woodbrook Village neighborhood. Postcards were also sent to Frederick County Board of Supervisors and Planning Director Wyatt Pearson.



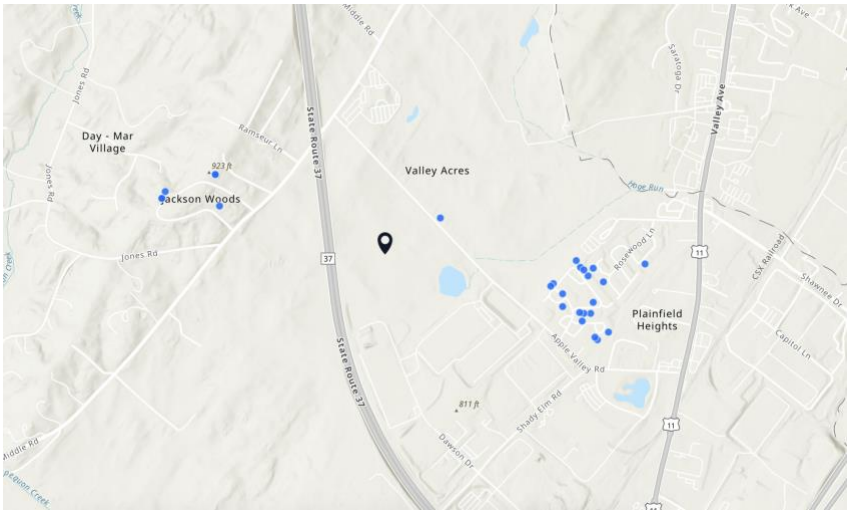
Postcard Invite Mailing Universe

CANVASSING

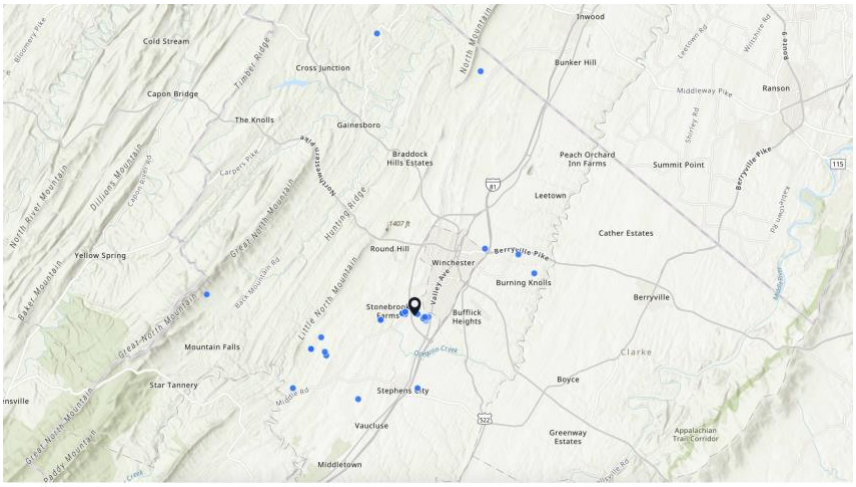
Winchester Gateway canvassed adjacent neighbors on Apple Valley, Jackson Woods, and Middle Road, hand-delivering invitations to the open houses and answering questions about the project. Winchester Gateway did three separate passes, making contact with 32 out of 78 adjacent neighbors. Eight homes were inaccessible due to “private property” signs. Winchester Gateway was unable to canvass the Cross Creek, Cottage Glen, and Woodbrook neighborhoods due to their “no solicitation” policy.

OPEN HOUSES

Attendees were asked to sign in as they entered the meeting. Forty-three attendees signed in with legible names and addresses. Below are two maps showing which neighbors, both adjacent and county-wide, attended the open houses.



Attendees, Neighbors



Attendees, All

During the open house, attendees were able to move around the room to each station and ask questions to the development team and engineers. Common concerns raised by attendees were:

- Impacts to health and safety
- Taking farmland out of production
- Increased noise
- The county's ability to regulate noise
- Property values
- Water usage
- Impacts to electricity bills
- Contaminating ground water
- Negative impacts to wells
- Chemicals used in the cooling system
- Setbacks from adjacent neighbors

Many attendees expressed frustration that this site would no longer be farmland. The development team explained that the property was already zoned for light industrial, and this use would be less impactful than other by-right uses. While some attendees were receptive of the messaging, others stated they would fight any type of development proposed for the site.

HOA MEETINGS

Due to the strict no solicitation policy of Cross Creek Village neighborhood, the Cottage Glen neighborhood, and the Woodbrook Village neighborhood, Winchester Gateway has worked closely with Abby Lisk, Community Manager at the Coventry Group, to schedule individual meetings with each of the three different HOAs. The objective of each of these meetings was to meet with adjacent neighbors and give them the opportunity to meet with the development team directly and ask any questions they may have.

On April 29, Winchester Gateway met at the Winchester County Club with the 18 board members of the three separate HOAs. The meeting was roughly two hours long. Common concerns included:

- Vibrations – most homes are on platforms within one of the neighborhoods
- Impact to air quality
- Increased noise
- Impact to historical lands
- Impact to home value
- Impacts to electricity bills
- Increase in water usage

On May 18, Winchester Gateway met with the Woodbrook Village neighborhood following their monthly HOA meeting. There were 25-30 residents present, and it did not appear there were any individuals who had previously attended the open houses. Questions were consistent with what we have heard before regarding noise, vibration, height of the buildings, and viewshed. Residents listened to the development teams' answers and seemed to be accepting them, as opposed to pushing back and being combative. Abby Lisk was in attendance and confirmed that several of her residents had visited data centers themselves and confirmed they are very quiet and appear to have no impact on the surrounding community.

Winchester Gateway met with the Cottage Glen neighborhood on June 11, the Cross Creek neighborhood on June 16, and the neighboring Fellowship Bible Church on July 6.

BUS TOUR

Winchester Gateway hosted a bus tour on July 6 to visit existing data centers in Loudoun County, VA. Winchester Gateway invited 80 neighbors on Apple Valley, Middle Road, and the Jackson Wood neighborhood via mailer. Additionally, the HOA board members from Cottage Glen, Woodbrook, and Cross Creek were invited to attend the bust tour. 14 residents said that they would attend, but only seven ultimately attended.

Residents heard from the Executive Director of Economic Development, Buddy Rizer, on the tour. Rizer highlighted the positive economic impacts of data centers while dispelling myths. He shared that Loudoun County has over 200 data centers, and they use less than 10% of the county's potable water. He also shared that data centers do not admit any type 1 emissions, and the county rarely receives noise complaints. Rizer emphasized that data centers pay for their own infrastructure upgrades, and communities with data centers experience fewer black outs and brown outs. Rizer also shared that Loudoun County receives $1.2 billion in annual revenue from data centers, which has helped lessen the tax burden on residents. Additionally, he noted that Fairfax County made the decision not to allow data centers at the same time Loudoun decided to build. Now, Fairfax is considering

raising taxes and has a $300 million budget defect, while Loudoun County has a $250 million budget surplus.

Residents were taken to see several data centers and stopped at two to hear the noise level. The first data center was a new data center with exemplar noise mitigation measures, and the second was an older data center that the county has had some issues with. Noise at the first data center was barely audible. Residents were easily able to have a conversation and hear traffic passing and birds chirping while standing directly outside of the data center. The second data center was only slightly louder, but ambient noise still exceeded the noise from the data center. Attendees noted how quiet both data centers were and were and agreed they would be less impactful than an alternative industrial use.

Winchester Gateway LLC (Applicant) – Data Center

Revised August 7, 2026

Site Assessment for Conditional Use Permit Application, Parcel 63-A-80I

Introduction and Overview

Winchester Gateway LLC respectfully requests a Conditional Use Permit (CUP) to authorize the development of a data center campus on Parcel 63-A-80I. Granting Applicant's request for a Conditional Use Permit on its Property to allow for a data center campus will have a positive impact on the community by generating economic diversity through the creation of high-paying employment opportunities and contributing to the commercial tax base within the County. The proposed development, situated in the M1 (Light Industrial) Zoning District, aligns with Frederick County's goals of fostering economic diversity and fiscal sustainability. In addition, the development proposed for the Property will decrease demands and impacts on County and community facilities such as schools, parks and libraries as residential development will not occur on the Property. The proposed development is not anticipated to negatively impact the County's public safety facilities, and the Applicant has worked closely with County stakeholders to ensure that potential impacts are addressed as part of this Application. Following the initial submission of this Application, the Applicant participated in a Planning Commission work session on June 9, 2026, has responded in writing to agency review comments, and has proposed an expanded set of Conditions of Approval (dated August 7, 2026) that memorialize the commitments described in this Site Assessment. The Planning Commission public hearing is scheduled for September 2, 2026.

Fiscal and Economic Impact

The proposed data center campus will serve as a substantial economic driver for Frederick County, characterized by a high revenue-to-expense ratio that will benefit the local tax base without burdening public services. According to the Economic Impact Analysis prepared by MuniCap, Inc., the project is projected to generate approximately $7.2 million annually in gross tax revenue for Frederick County upon full buildout and stabilization. This revenue stream is comprised primarily of Business Personal Property Tax, estimated at $4.5 million annually, and Real Property

Tax, estimated at $2.7 million annually. Over a thirty-year period, the cumulative general fund revenue contribution to the County is projected to exceed $253 million. These projections conservatively apply the County's current reduced business personal property tax rate for data center equipment; the Applicant supports application of the County's standard personal property tax rate to the Project, which would materially increase annual tax revenues to the County. Specifically, application of the standard tax rate would increase annual revenues generated by the proposed data center campus by over $9 million, depositing roughly $14.25 million in County coffers each year.

In addition to direct fiscal contributions, the proposed development will serve as a catalyst for employment. The construction phase is expected to support approximately 3,358 direct full-time equivalent (FTE) jobs, generating over $331 million in labor income. Once operational, the facility will support 115 direct permanent jobs with an average annual income of $86,000, which is consistent with the County's goals for attracting high-wage employment. Unlike residential developments, data centers do not generate new students for the school system or require significant County services, allowing the surplus tax revenue to directly fund County priorities such as education, public safety, and infrastructure.

Transportation and Traffic Impact

A primary advantage of the proposed data center campus over the previously approved industrial use is a dramatic reduction in traffic generation. A Transportation Overview indicates that the data center campus will generate significantly less traffic than the industrial park, allowed by-right for the site. Specifically, the data center proposal results in a reduction of 1,925 daily vehicle trips compared to the approved industrial use. This reduction is particularly beneficial during critical commuter windows, with projections showing 172 fewer trips during the AM peak hour (a 63% reduction) and 240 fewer trips during the PM peak hour (an 87% reduction).

Despite this reduction in traffic volume, the Applicant remains committed to the roadway improvements proffered during the prior zoning action to ensure maximum safety and efficiency. These commitments include widening Apple Valley Road to consistent cross-sections and installing a left-turn lane at the site driveway. With the significantly reduced traffic load inherent to data center operations, these improvements will provide Apple Valley Road with greater reserve

capacity than originally anticipated. In addition, as reflected in the Conditions of Approval, access to the site will be limited to one full-movement entrance from Apple Valley Road, located so that it is not directly across from any residential dwellings. The Applicant will implement a Construction Mitigation Plan approved by the County Zoning Administrator — including measures addressing peak-hour and school-bus travel times along construction truck routes, a designated public liaison with a published toll-free number and email, participation in a Joint Construction Traffic Reaction Team upon County request, and prompt repair of construction-related pavement damage.

Noise Impact and Mitigation

The Applicant has prioritized acoustical engineering to ensure the Winchester Gateway Data Center Campus not only complies with, but is projected to operate at or below, Frederick County's maximum allowable noise limits. An Environmental Noise Study prepared by Salas O'Brien (November 24, 2025, as amended in response to comments from Frederick County and its third-party noise consultant) utilized SoundPLAN modeling software to evaluate noise emissions under normal operating conditions and during generator testing scenarios.

Field measurements confirm that the existing acoustic environment in the area is heavily influenced by roadway traffic. Daytime ambient noise levels along Apple Valley Road average approximately 63–64 dB(A), while Route 37 produces levels in the range of 67–68 dB(A). The proposed facility is designed to blend into these daytime background conditions and to minimize potential intrusion during quieter nighttime periods.

The Frederick County Zoning Ordinance requires that data centers not exceed 65 dB(A) during daytime hours and 60 dB(A) during nighttime hours at the property line. The Applicant has agreed to Conditions of Approval that impose these limits at the property line and that require all installed mechanical equipment (HVAC, generators, etc.) to be rated at or below the sound levels of the equipment evaluated in the Environmental Noise Study. The Salas O'Brien modeling indicates the Project will maintain meaningful safety margins at all boundaries. Along the northern property line adjacent to Apple Valley Road, the facility is projected to reach approximately 55 dB(A) during normal operations and 56 dB(A) during generator testing. Noise levels along the remaining

property lines are projected to be lower, ranging from approximately 47 dB(A) at the northwest boundary to 54 dB(A) at the southwest boundary during normal operations.

It is also important to note that the Property is zoned M1 (Light Industrial), and under County Code, certain by-right industrial uses may generate noise levels up to 70 dB(A) at the property line. By comparison, the proposed data center campus' modeled noise levels—generally in the mid-to-high 40s through mid-50s dB(A), with higher levels during testing still below applicable thresholds—represent a substantially quieter land use than what could otherwise be developed on the site.

To achieve and maintain this strong acoustic performance, the Applicant will incorporate specific noise mitigation throughout the Project's design and equipment selection. These measures include rooftop parapet walls to block line-of-sight to rooftop equipment and reduce sound propagation, the use of low-sound fan options, acoustic wraps for compressors, high-performance mufflers on exhaust stacks, and the placement of emergency generators within sound-rated enclosures designed to minimize noise during operations. Equipment selection also specifically targets low-frequency sound: modern, smaller-diameter multi-blade fan designs shift sound energy away from the low-frequency ranges most commonly associated with the "hum" reported near other facilities, and octave-band source data for all major equipment is included in the Environmental Noise Study. At the Planning Commission's request, the Applicant's acoustical engineer can provide receiver-point octave-band breakdowns from the sound model, including the low-frequency bands of particular interest to the Commission.

The Applicant will implement strict operational protocols to further reduce potential impacts. Routine generator testing and maintenance cycling will be strictly restricted to weekdays between 8:30 a.m. and 5:00 p.m., in full alignment with County requirements. Generators will be tested on an alternating basis rather than simultaneously, limiting the number of units operating at any one time. To provide ongoing verification, the Applicant commits to the post-construction monitoring provisions of § 165-204.41, which require a certified noise study 12 months after the first certificate of occupancy, and every five years thereafter, to guarantee continued compliance.

Impacts on Surrounding Uses and Historic Sites

The Project layout has been designed to maximize compatibility with adjacent properties, including the nearby Kernstown Battlefield and residential uses along Apple Valley Road. To minimize visual impacts, the layout provides a substantial 200-foot setback from Apple Valley Road and adjacent residential zoning districts (RA, RP, and R4). Within this setback, the Applicant commits to installing a Category C full-screen buffer utilizing a minimum fourteen (14) foot tall earthen berm, an enhanced landscape screen incorporating Virginia native deciduous and evergreen species, and an additional double row of evergreen trees planted atop the berm, to visually screen the facility from neighbors. Where feasible, site grading will also be lowered relative to existing conditions to further reduce the apparent height of the buildings as viewed from Apple Valley Road.

Architectural treatments and building scale have also been tailored to the site's context. Building heights will be capped at 60 feet, consistent with the building height voluntarily proffered in the 2024 rezoning of the Property — a proffer that eliminated the otherwise-available waiver to exceed 60 feet in the M1 District — and with the heights approved for neighboring industrial properties, ensuring the scale of the structures remains compatible with the surrounding viewshed. The use of high-quality materials was part of the existing M1 proffers and will further ensure the Project enhances the existing industrial character of the immediate area. All rooftop equipment will be set back from the building edges and fully screened by parapet and screening walls constructed with sound-attenuating materials and finished in neutral Earth tone or natural colors. Building facades will incorporate wall modulation, a differentiated main entrance feature, fenestration of two or more materials comprising a minimum of 30% of the facade, and a minimum ten percent (10%) greenscape component on building surfaces fronting Apple Valley Road, to be maintained for the life of the Project. Updated architectural renderings and building elevations reflecting these commitments accompany the July 8, 2026 CUP Sketch Plan and will be provided to the County for review and acceptance prior to issuance of the first building permit.

With respect to historic resources, the Applicant has met extensively with neighbors and with representatives of the Shenandoah Valley Battlefields Foundation and the Kernstown Battlefield Association and has performed photographic viewshed analyses from multiple viewpoints surrounding the Property. As reflected in the Conditions of Approval, the Applicant will perform

a Phase II Archeological Survey for Sites 44FK1076 (David Glass, Sr. homestead) and 44FK1077 identified in the Phase I Archeological Survey of the Apple Valley Road Tract, will provide the final Phase II survey to Frederick County Planning and Development prior to site plan approval, and will clearly delineate all archeological features on the site plan, with all site work conducted in conformance with the survey's recommendations. Additionally, to facilitate pedestrian and bicycle access to historic resources in the area, the Applicant will install a 10-foot-wide asphalt trail adjoining the landscaped area along the Apple Valley Road frontage as depicted on the CUP Sketch Plan.

Power and Utilities

The Project is already served by significant utilities to include public water and sewer, natural gas and electricity. On the site there are significant 138kv power lines that connect to an existing substation immediately across Route 37 from the Winchester Gateway site. The Applicant anticipates a maximum power demand of approximately 158 megawatts (MW) to support operation of the proposed data center campus. As such, the Applicant is in the process of working with Shenandoah Valley Electric Cooperative and FirstEnergy to confirm available power to the site and also the scope of needed enhancements for the delivery of additional power to the site. The utility interconnection study process has been underway since shortly after the 2024 rezoning and is now in its second phase;. Because of the existing and installed infrastructure, the delivery of additional power to the site as the proposed data center campus develops and expands will be of no impact to adjoining properties. The additional power is already being planned to be delivered to the site and substation, and the Winchester Gateway development is a planned participant to use the power. There will be the need to build an additional substation on the Winchester Gateway site as part of the proposed data center campus.

That substation, which will be built at the sole cost of Winchester Gateway, will be installed in a manner so that it is behind the already proffered screening which was part of the approved rezoning. The project will use Tier 4 Final EPA standard or better for any backup generation on site. Consistent with the Conditions of Approval, the Applicant has committed that the electric power improvements and enhancements required to serve the initial construction of the data center buildings will be installed within the existing powerline easement corridors that connect to the Property and generally run along Route 37; no new transmission corridors across Frederick County

are proposed, needed, or anticipated to serve the Project. Under Virginia law, the costs of utility upgrades necessary to serve high-load users such as the Project are borne by those users — in this case the Applicant and any future operator of the Property — and not by other ratepayers. On-site power generation will be limited to emergency backup generators and/or solar panels; gas turbines and other primary on-site generation will not be allowed.

With respect to water usage, the facilities will utilize a closed-loop, air-cooled mechanical system. This technology will enable the facility to limit its water usage to a maximum of 35,000 gallons per day (GPD), thereby minimizing the impact on public water resources compared to traditional water-cooled facilities. The Applicant has agreed to an absolute water usage cap of 35,000 GPD for the entire Property, as reflected in the Conditions of Approval and as confirmed with the Frederick County Sanitation Authority (Frederick Water). Because the cooling system does not consume water for evaporation, ongoing water demand is modest and is highest during winter months, when outside air used for building ventilation and pressurization must be humidified. No groundwater resources, via private wells or other methods, will be used for operation of the primary or accessory uses. All water discharges into the public (Frederick County Sanitation Authority) system will be pre-treated to the extent required by a licensed third-party contractor in order to meet or exceed Frederick County Sanitation Authority's standards for public sewage. Any sewage discharge that does not meet Frederick County Sanitation Authority's standards will be collected by the aforementioned third-party contractor and disposed of in an environmentally compliant and satisfactory manner.

The closed-loop cooling system will circulate a water and propylene glycol or similar solution within welded steel and copper piping. To protect groundwater and adjoining properties, cooling-system piping within the buildings will be monitored by addressable leak-detection devices, with isolation valves permitting individual piping sections to be shut off without interrupting operations; mechanical areas will drain to in-ground sumps sized for the worst-case isolatable piping section plus a safety factor; rooftop piping will incorporate in-insulation leak-detection; and spent or removed coolant will be containerized on site and recycled or disposed of off-site by a licensed contractor rather than discharged to the sanitary sewer. All fuel storage for backup generators will be equipped with secondary containment, and the facility will maintain a Spill Prevention, Control, and Countermeasure (SPCC) plan in accordance with 40 CFR Part 112. A

Spill Prevention and Response Plan addressing both the cooling system and fuel storage will be provided to the County as part of the site plan process.

Impact on Public Parks

The Winchester Gateway site is not proximate to any existing or planned public parks. Development of a data center campus on the site will therefore have no impact on any such public facilities.

Impact on Agricultural Resources

The Winchester Gateway site is located within an area of Frederick County designated for industrial land use by the Comprehensive Plan, meaning neither the site nor immediately contiguous land are envisioned to contain or otherwise support agricultural activities. Consistent with this expectation, the site neither contains nor adjoins any active agricultural resources. As such, the development of a data center campus on the Winchester Gateway site will not impact Frederick County's agricultural base.

Impact on Forestland

Neither the Winchester Gateway site nor immediately contiguous land contains forestland resources. Development of a data center campus on the site will therefore have no impact on forestland resources.

Conclusion

The Winchester Gateway Data Center Campus represents a high-value, low-impact land use that is consistent with the Frederick County Comprehensive Plan. By granting the Conditional Use Permit, the County secures nearly $7.2 million in annual tax revenue and significant job growth while simultaneously reducing traffic congestion compared to the previously approved industrial plans. Through advanced acoustical engineering, extensive site buffering, and architectural design, the Applicant has ensured the project will remain compatible with and beneficial to the community. The Application has been refined in direct response to the Planning Commission's June 9, 2026 work session and to all agency review comments, and the accompanying Conditions of Approval

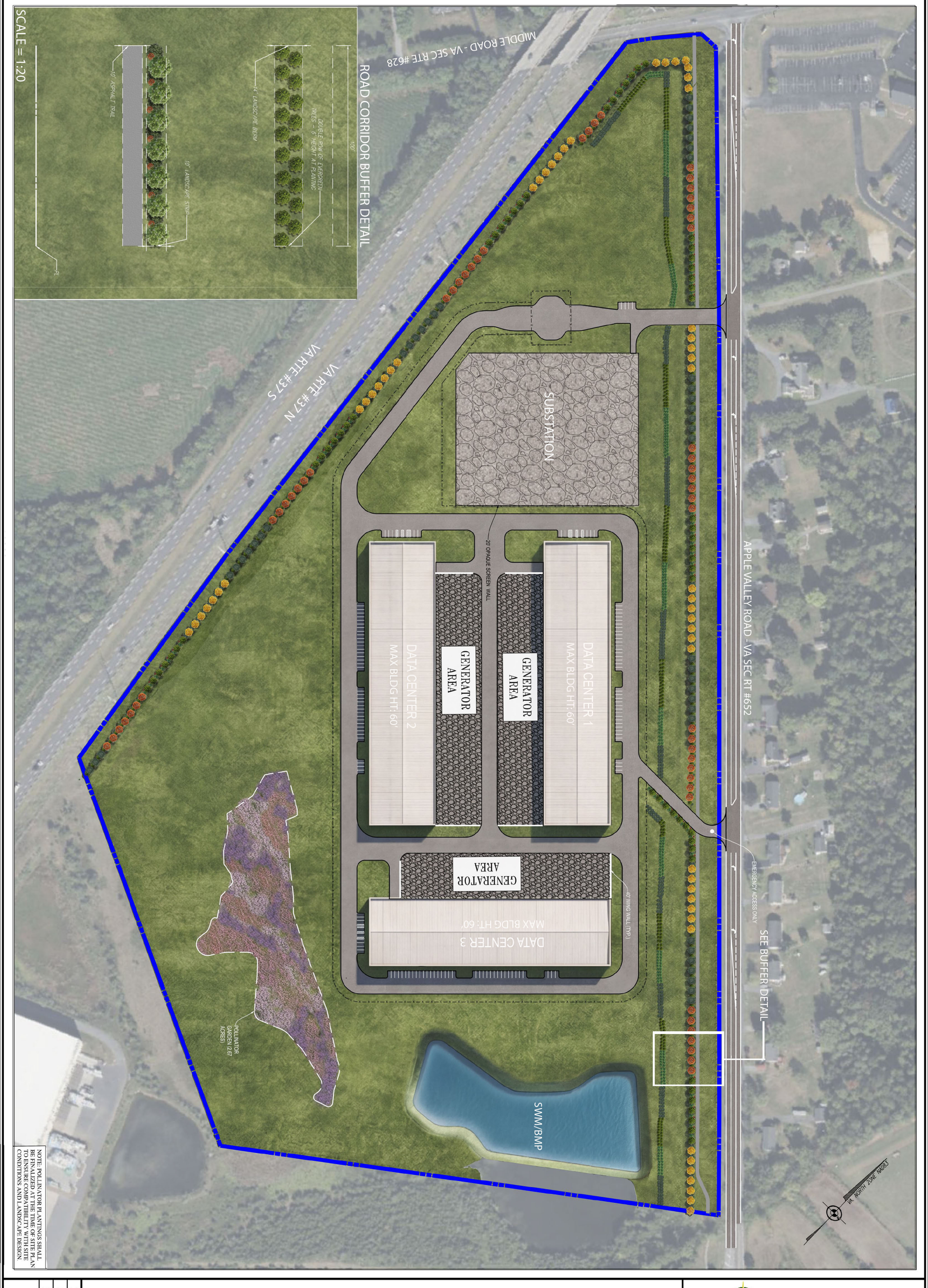
(dated August 7, 2026) memorialize enforceable commitments addressing water, power, noise, spill prevention, viewshed, and historic resources for the life of the Project.

ELECTRIC POWER AVAILABILITY

Subsequent to obtaining light industrial zoning approval for its site, the Applicant, Winchester Gateway LLC ("Winchester Gateway"), has been in discussions with the local electric provider, Shenandoah Valley Electric Cooperative ("SVEC"), and FirstEnergy to assure a delivery of sufficient power to the data center being sought for approval on the Winchester Gateway property.

The discussions with both power providers are subject to strict confidentiality, but a summary of same and, in particular, the connectivity of the Winchester Gateway site to electric power can be shared primarily for the reason that Winchester Gateway is strategically located with significant 138KV transmission electric power service already on its site. The plan for delivery of power to the Winchester Gateway site is via a connection to the existing transmission lines and easements. The aforementioned power facilities are also connected to an existing electric substation at Meadow Brook and existing power lines that connect to Meadow Brook and the Mount Storm generation facility among other connections in the electric grid.

As with the delivery of power for all industrial sites, there will need to be alterations and upgrades to the electrical system to ensure sufficient power is delivered not only to the Winchester Gateway facility, but also to assure the continued delivery of power to other FirstEnergy and SVEC customers. It is anticipated that the improvements to the electric facilities, to the extent they are not already underway and being paid for by others, will be paid by the user of the Winchester Gateway site. Further, and consistent with recently approved legislation in the Commonwealth of Virginia, it has been made more clear that the significant users of industrial power, such as data center users, will pay for the necessary upgrades to the electrical supply system in order to serve their facilities. In any event, however, given the installed power poles and lines along easements already in place that serve the Winchester Gateway site with electric power, it is expected that any and all electrical improvements will be installed along the existing electrical easements and subject to the discretion and direction of the power utilities on the existing structures. At the time of the filing of this report, there is no plan or demand being placed on Winchester Gateway to obtain supplemental or additional easements for the installation of power lines, be they above-or under-ground to serve the Winchester Gateway site.



WINCHESTER GATEWAY

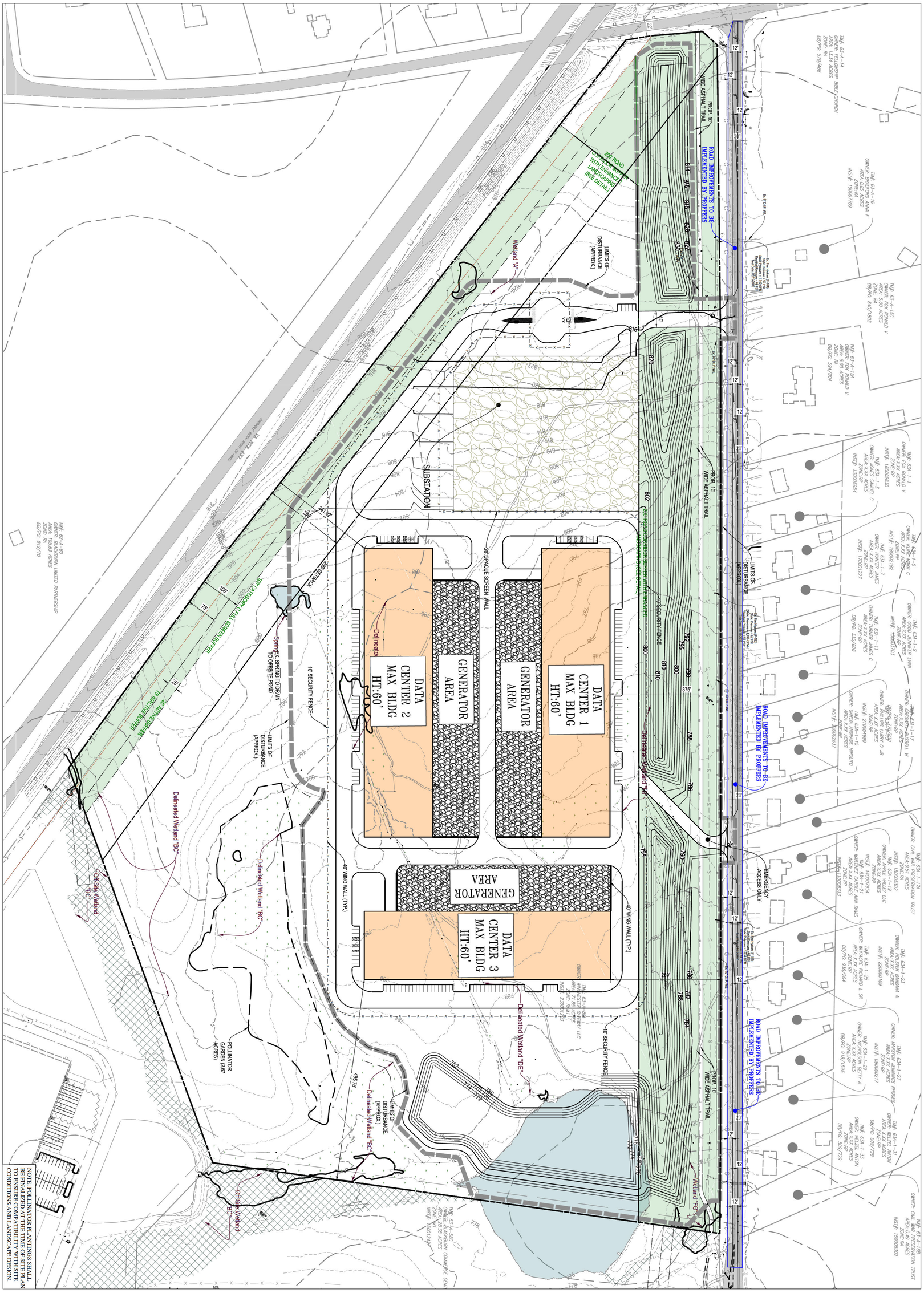
CUP SKETCH PLAN ILLUSTRATIVE RENDERING

FREDRICK COUNTY, VA

DATE: 2026-07-08
C.I.= 2'
SCALE: 1"=100'
SHEET 1 OF 1

GREENWAY ENGINEERING
FND 1971
45145 RESEARCH PLACE
ASHBURN, VIRGINIA 20147
TELEPHONE: (703) 328-0788
FAX: (540) 722-9528
WWW.GREENWAYENG.COM
PROUDLY SERVING VIRGINIA & WEST VIRGINIA
OFFICES IN: ASHBURN, VA, WINCHESTER, VA, & MARTINSBURG, WV

GREENWAY ENG. - Z:\0036K - Apple Valley DC\Engineering\Drawings\GDP\Exhibit\CUP Exhibits\CAD\JOSH 0036K-Prelim P-Base (Data Centers)exhibit - Alt.B.dwg Aug 06, 2026 - 3:11pm rcheruku



WINCHESTER GATEWAY

CUP SKETCH PLAN

FREDRICK COUNTY, VA

DATE: 2026-07-08

C.I.= 2'

SCALE: 1"=100'

SHEET 1 OF 1

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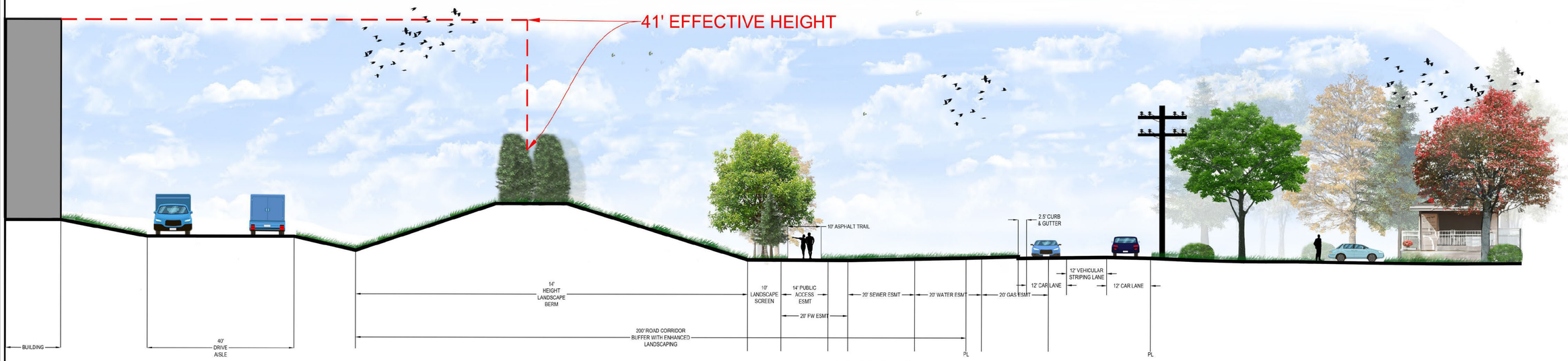

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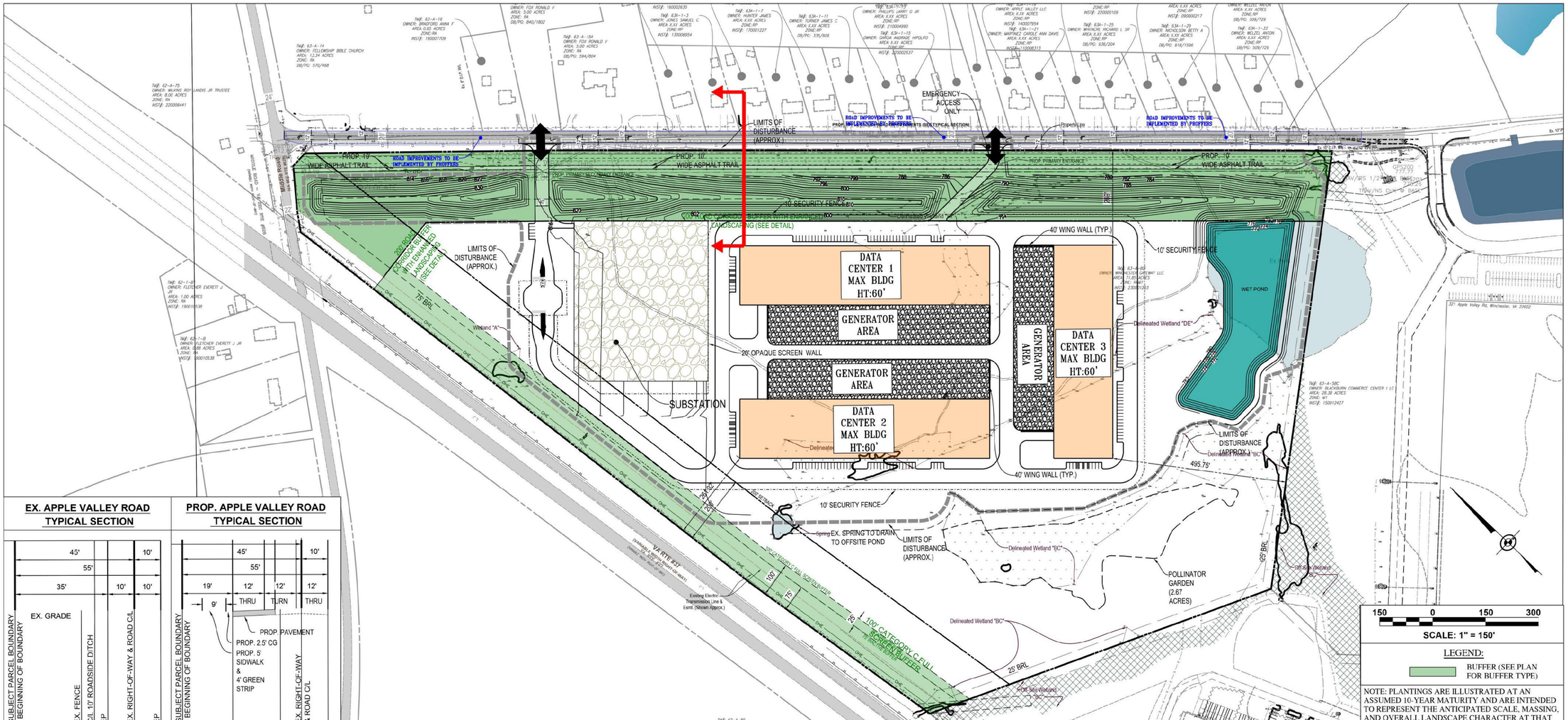


EX. APPLE VALLEY ROAD TYPICAL SECTION

PROP. APPLE VALLEY ROAD TYPICAL SECTION

151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (540) 662-4185
Fax: (540) 722-9528
www.greenwayeng.com

GREENWAY ENGINEERING

PROUDLY SERVING VIRGINIA & WEST VIRGINIA
OFFICES IN: WINCHESTER, VA & MARTINSBURG, WV

ROAD WIDENING AND ENHANCED BUFFER EXHIBIT
WINCHESTER GATEWAY

BACK CREEK MAGISTERIAL DISTRICT
FREDERICK COUNTY, VIRGINIA

DATE: JULY 08,2026

SCALE: AS SHOWN

DESIGNED BY: EJG / RLK

FILE NO. 0036E

SHEET 1 OF 1

VA. NORTH ZONE NAD83

INDEX	
01	OVERALL PLAN AND CONTEXT MAP
02	AERIAL VIEW
03	PERSPECTIVE 1
04	PERSPECTIVE 2
05	PERSPECTIVE 3
06	PERSPECTIVE 4
07	PERSPECTIVE 5
08	PERSPECTIVE 6

LEGEND

- A PERSPECTIVE 1
- B PERSPECTIVE 2
- C PERSPECTIVE 3
- D PERSPECTIVE 4
- E PERSPECTIVE 5
- F PERSPECTIVE 6

OVERALL PLAN AND CONTEXT MAP

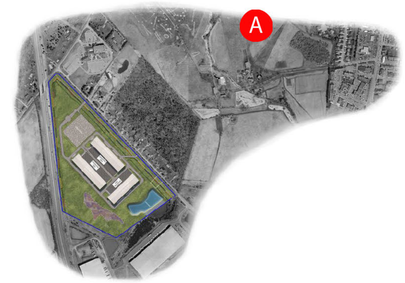
WINCHESTER GATEWAY

VIEWSHED ANALYSIS EXHIBIT
FREDRICK COUNTY, VA

FND 1971
GREENWAY ENGINEERING

SHEET 01 OF 07

KEY PLAN



LEGEND

A PERSPECTIVE 1

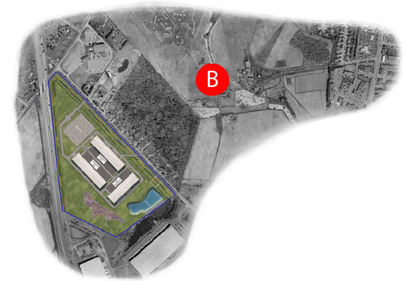
PERSPECTIVE VIEW A

WINCHESTER GATEWAY

VIEWSHED ANALYSIS EXHIBIT
FREDRICK COUNTY, VA

FND 1971
GREENWAY
ENGINEERING

KEY PLAN



LEGEND

B PERSPECTIVE 2

PERSPECTIVE VIEW B

WINCHESTER GATEWAY

VIEWSHED ANALYSIS EXHIBIT

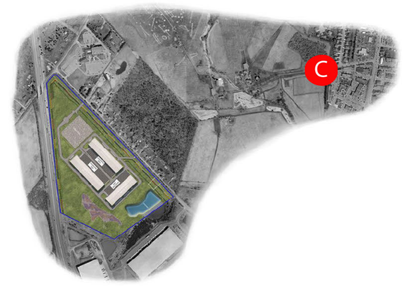
FREDRICK COUNTY, VA

FND 1971

GREENWAY ENGINEERING

SHEET 03 OF 07

KEY PLAN



LEGEND

C PERSPECTIVE 3

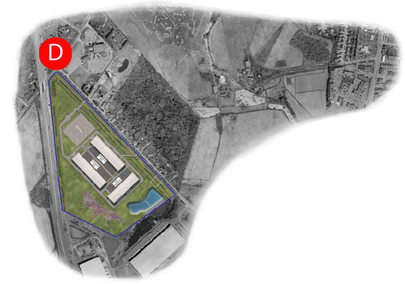
PERSPECTIVE VIEW C

WINCHESTER GATEWAY

VIEWSHED ANALYSIS EXHIBIT
FREDRICK COUNTY, VA

FND 1971
GREENWAY
ENGINEERING

KEY PLAN



LEGEND

D PERSPECTIVE 4

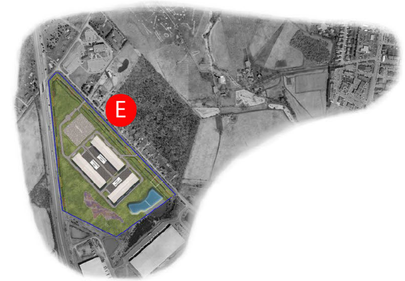
PERSPECTIVE VIEW D

WINCHESTER GATEWAY

VIEWSHED ANALYSIS EXHIBIT
FREDRICK COUNTY, VA

FND 1971
GREENWAY
ENGINEERING

KEY PLAN



LEGEND

E PERSPECTIVE 5

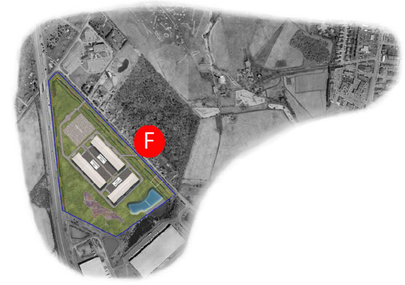
PERSPECTIVE VIEW E

WINCHESTER GATEWAY

VIEWSHED ANALYSIS EXHIBIT
FREDRICK COUNTY, VA

FND 1971
GREENWAY
ENGINEERING

KEY PLAN



LEGEND

F PERSPECTIVE 6

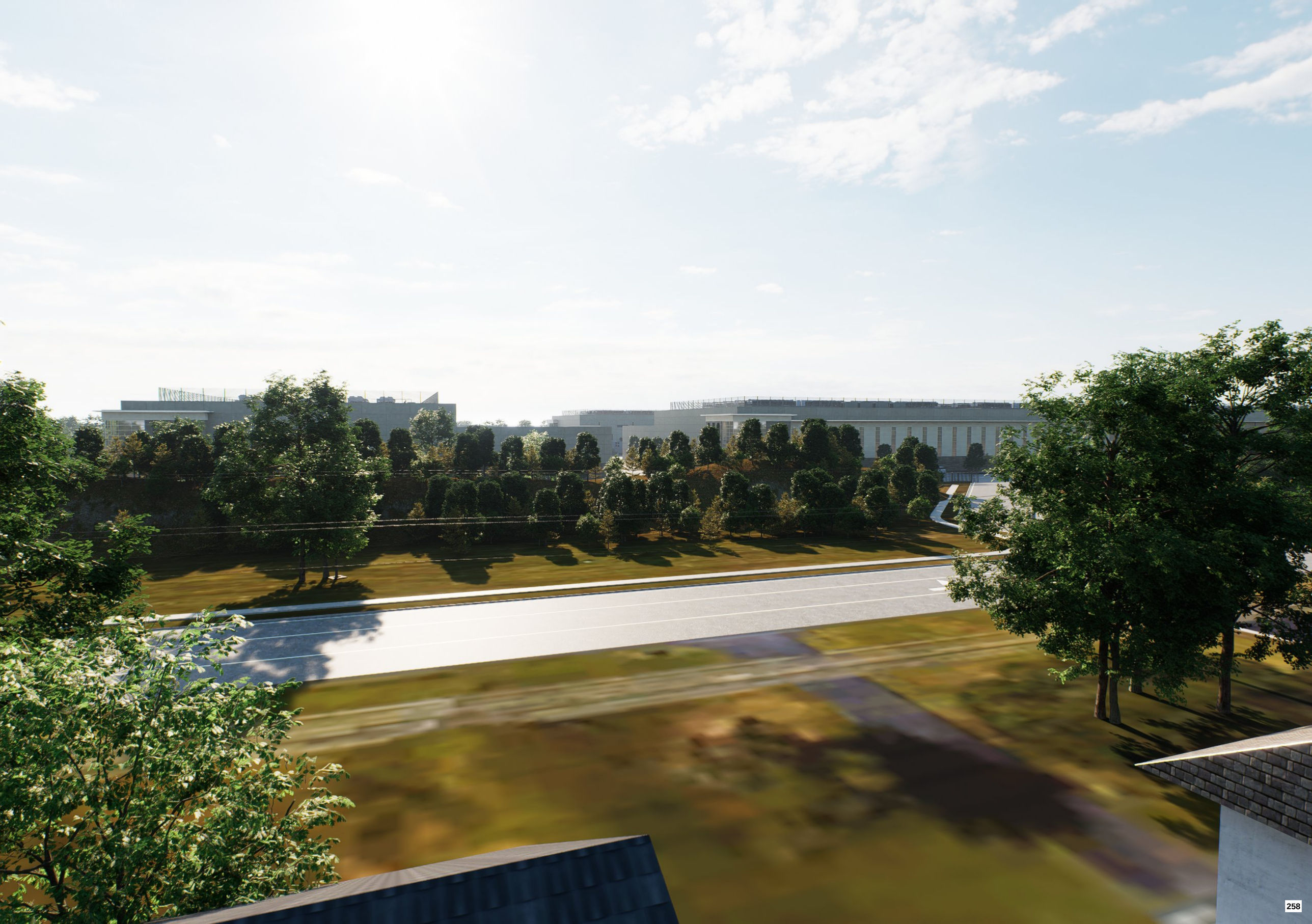
PERSPECTIVE VIEW F

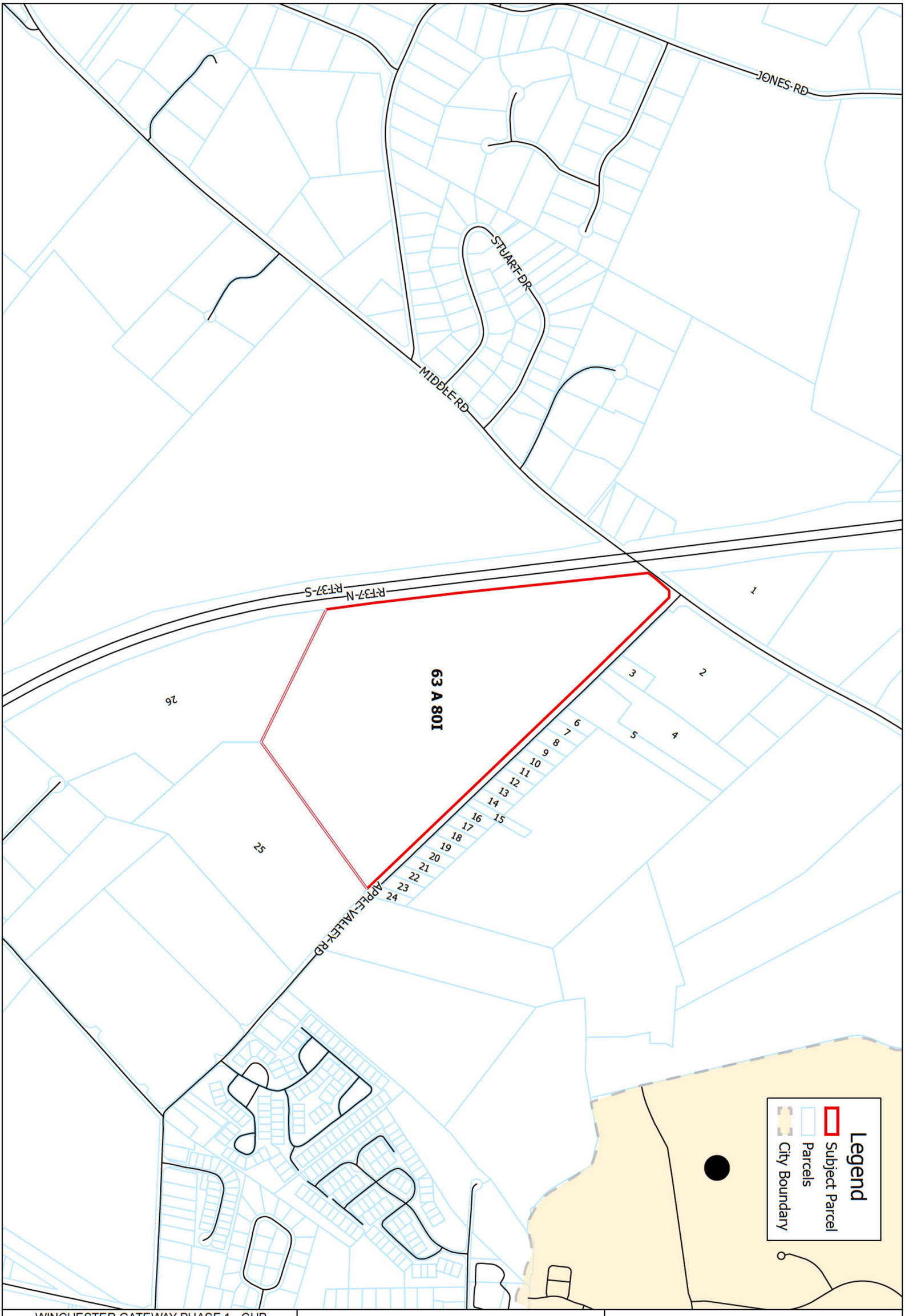
WINCHESTER GATEWAY

VIEWSHED ANALYSIS EXHIBIT
FREDRICK COUNTY, VA

FND 1971
GREENWAY
ENGINEERING

TELLURIDE





Map Data Source: Frederick County, VA GIS Department, 2025 Data.

WINCHESTER GATEWAY PHASE 1 - CUP		
ADJOINER EXHIBIT		
BACK CREEK DISTRICT		
FREDERICK COUNTY, VIRGINIA		
DATE: 06-13-2025	PROJECT ID: 0036K	DESIGNED BY: DJC
SCALE: 1"=600'		

WINCHESTER GATEWAY PHASE 1 - CUP

ADJOINER EXHIBIT

Greenway Engineering, Inc.
151 Windy Hill Lane
Winchester, VA 22602
T: 540.662.4185
F: 540.722.4185
www.GreenwayEng.com

Map Data Source: Frederick County, VA GIS Department, 2025 Data.

WINCHESTER GATEWAY PHASE 1 - CUP		
AERIAL EXHIBIT		
BACK CREEK DISTRICT		
FREDERICK COUNTY, VIRGINIA		
DATE: 06-13-2025	PROJECT ID: 0036K	DESIGNED BY: DJC
SCALE: 1"=600'		

WINCHESTER GATEWAY PHASE 1 - CIUP

AERIAL EXHIBIT

GREENWAY ENGINEERING
FND 1971

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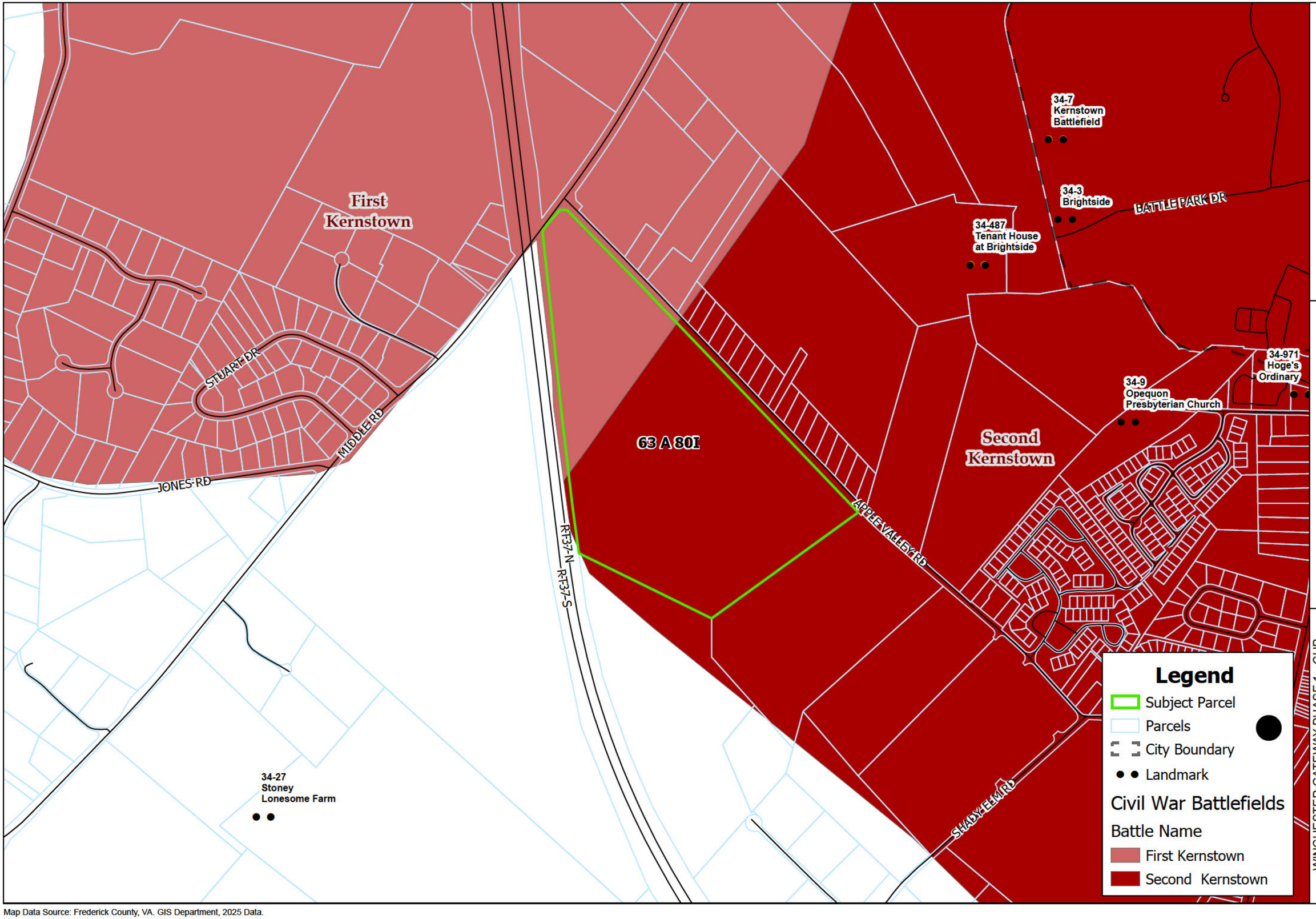

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F: 540.722.4185
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GREENWAY ENGINEERING

WINCHESTER GATEWAY PHASE 1 -CUP

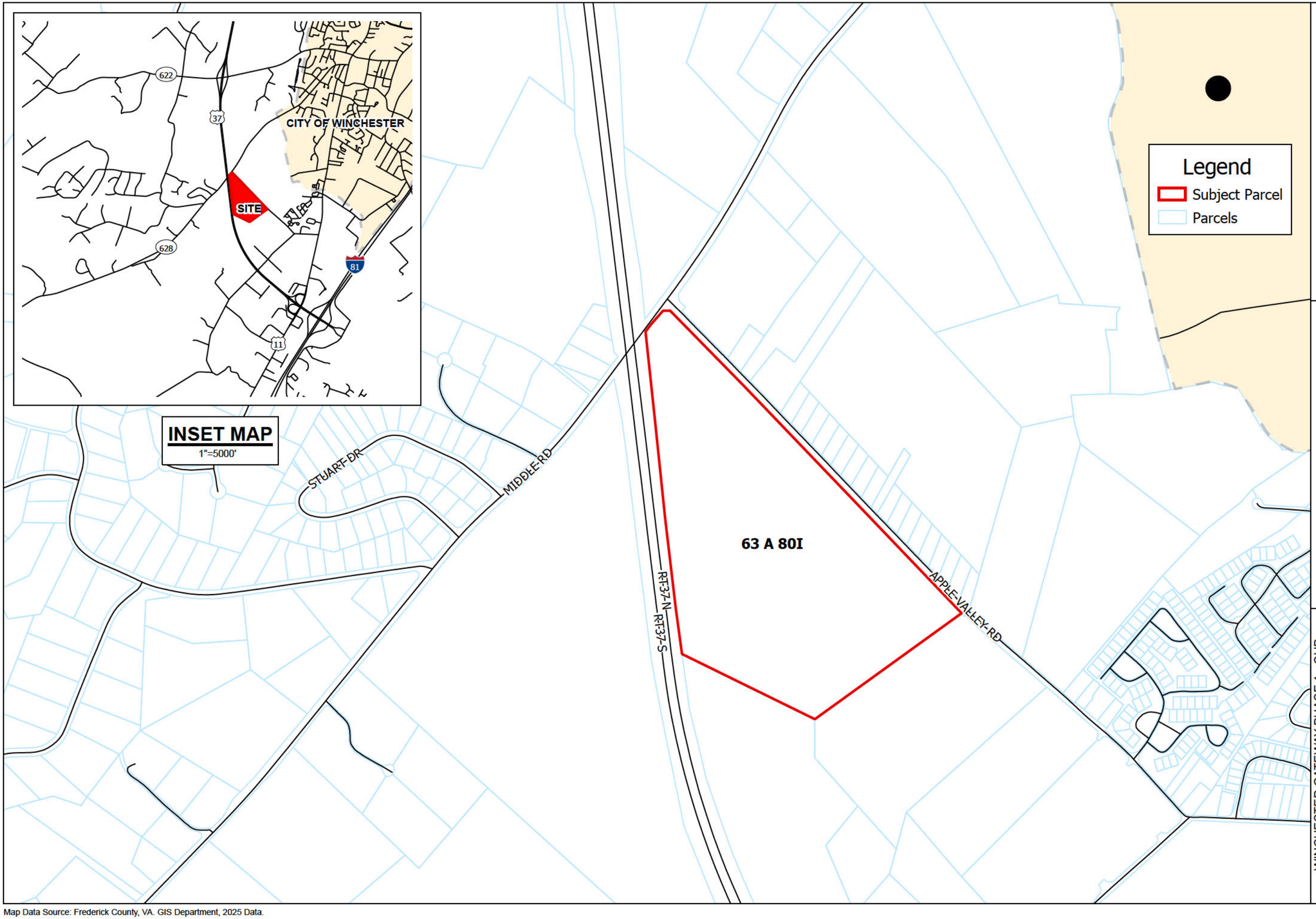
HISTORICAL EXHIBIT

BACK CREEK DISTRICT
FREDERICK COUNTY, VIRGINIA

DATE: 06-13-2025 | PROJECT ID: 0036K | DESIGNED BY: DJC
SCALE: 1"=600'

Map Data Source: Frederick County, VA. GIS Department, 2025 Data.

INSET MAP
1"=5000'



Legend
- Subject Parcel
- Parcels

Greenway Engineering, Inc.
151 Windy Hill Lane
Winchester, VA 22602
T: 540.662.4185
F: 540.722.4185
www.GreenwayEng.com

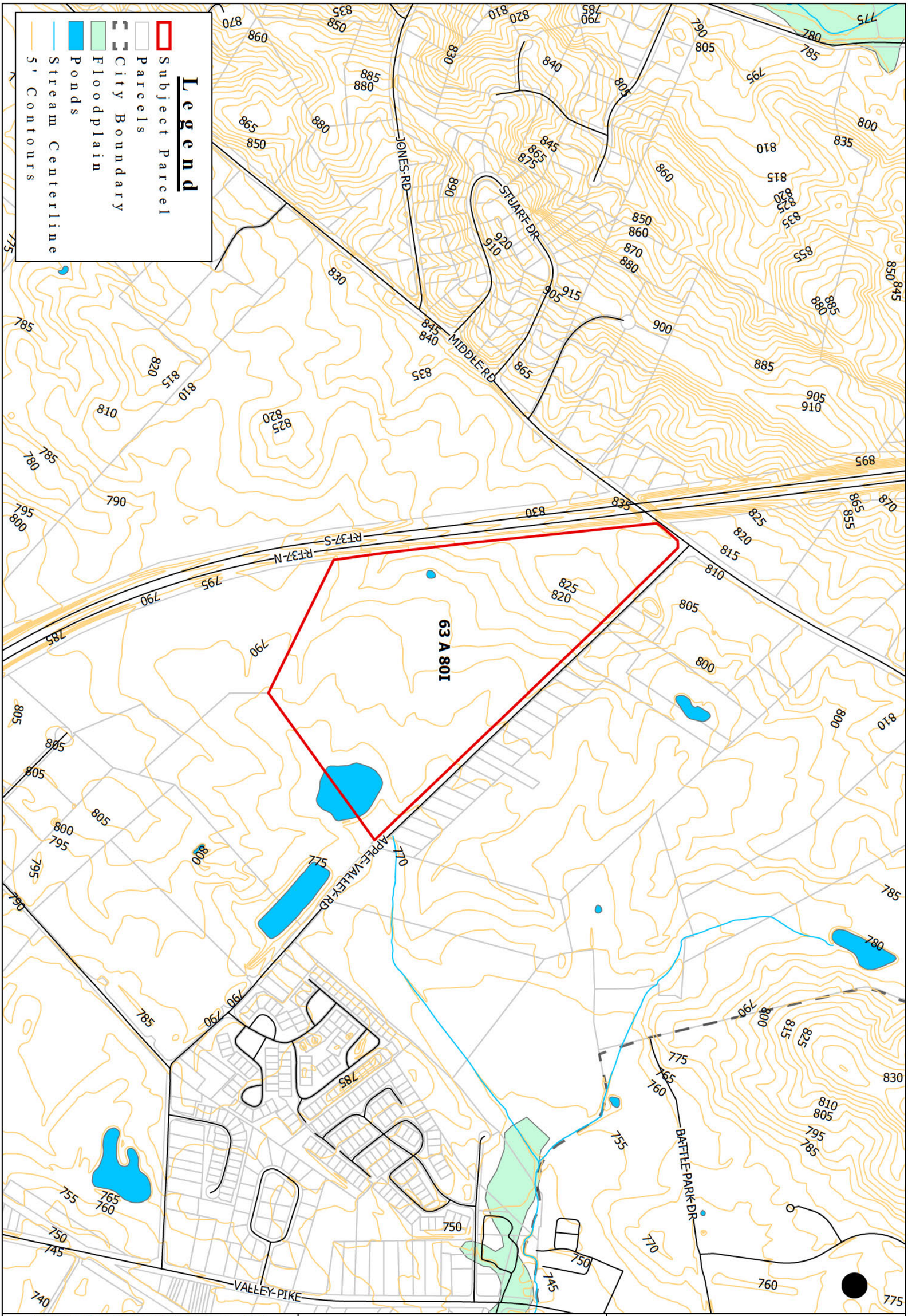
GREENWAY ENGINEERING

WINCHESTER GATEWAY PHASE 1 - CUP
LOCATION EXHIBIT

BACK CREEK DISTRICT
FREDERICK COUNTY, VIRGINIA

DATE: 06-13-2025 | PROJECT ID: 0036K | DESIGNED BY: DJC
SCALE: 1"=600'

Map Data Source: Frederick County, VA. GIS Department, 2025 Data.



Map Data Source: Frederick County, VA GIS Department, 2025 Data.

WINCHESTER GATEWAY PHASE 1 - CUP		
NATURAL FEATURES EXHIBIT		
BACK CREEK DISTRICT		
FREDERICK COUNTY, VIRGINIA		
DATE: 06-13-2025	PROJECT ID: 0036K	DESIGNED BY: DJC
SCALE: 1"=600'		

WINCHESTER GATEWAY PHASE 1 - CUP

NATURAL FEATURES EXHIBIT

Greenway Engineering, Inc.
151 Windy Hill Lane
Winchester, VA 22602
T: 540.662.4185
F: 540.722.4185
www.GreenwayEng.com

Attached please find updated slides prepared by Salas O'Brien, which demonstrate noise levels in both dB(A) and dB(C) that currently exist at the property and also after installation of the data center. Further, the slides confirm a lesser decibel reading at the property line occurs for buildings that are sixty feet in height versus forty-five feet in height. These slides not only respond to the comments/questions raised by Frederick County's sound engineer, but also demonstrate compliance with the Conditions submitted as part of the data center approval application.

Thank you.

Thomas Moore Lawson, Esquire
Thomas Moore Lawson, P.C.
Of Counsel-Williams Mullen
P.O. Box 2740
Winchester, VA 22604
Ph: 540-665-0050
Fax: 540-722-4051
Email: tlawson@lsplc.com

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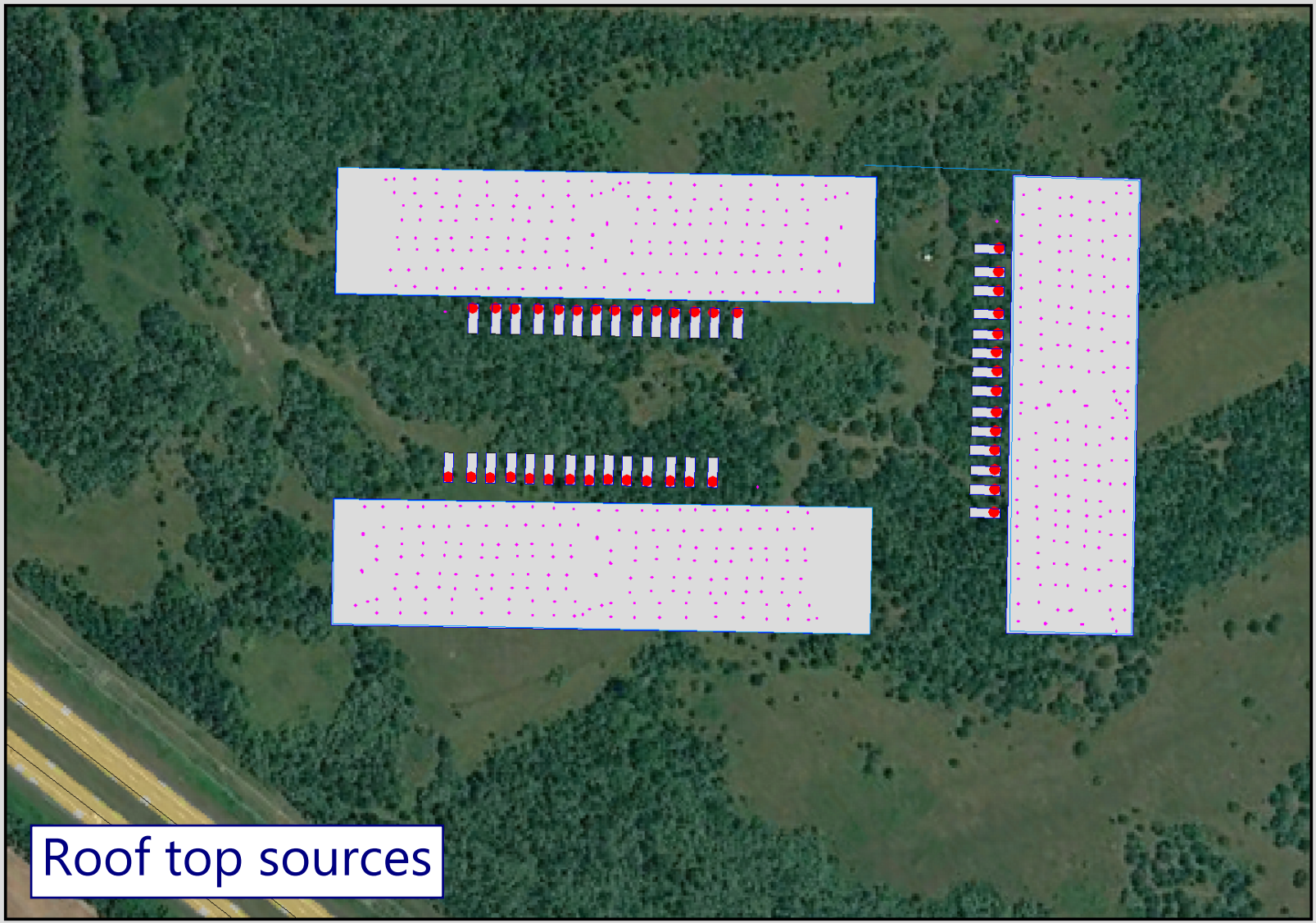
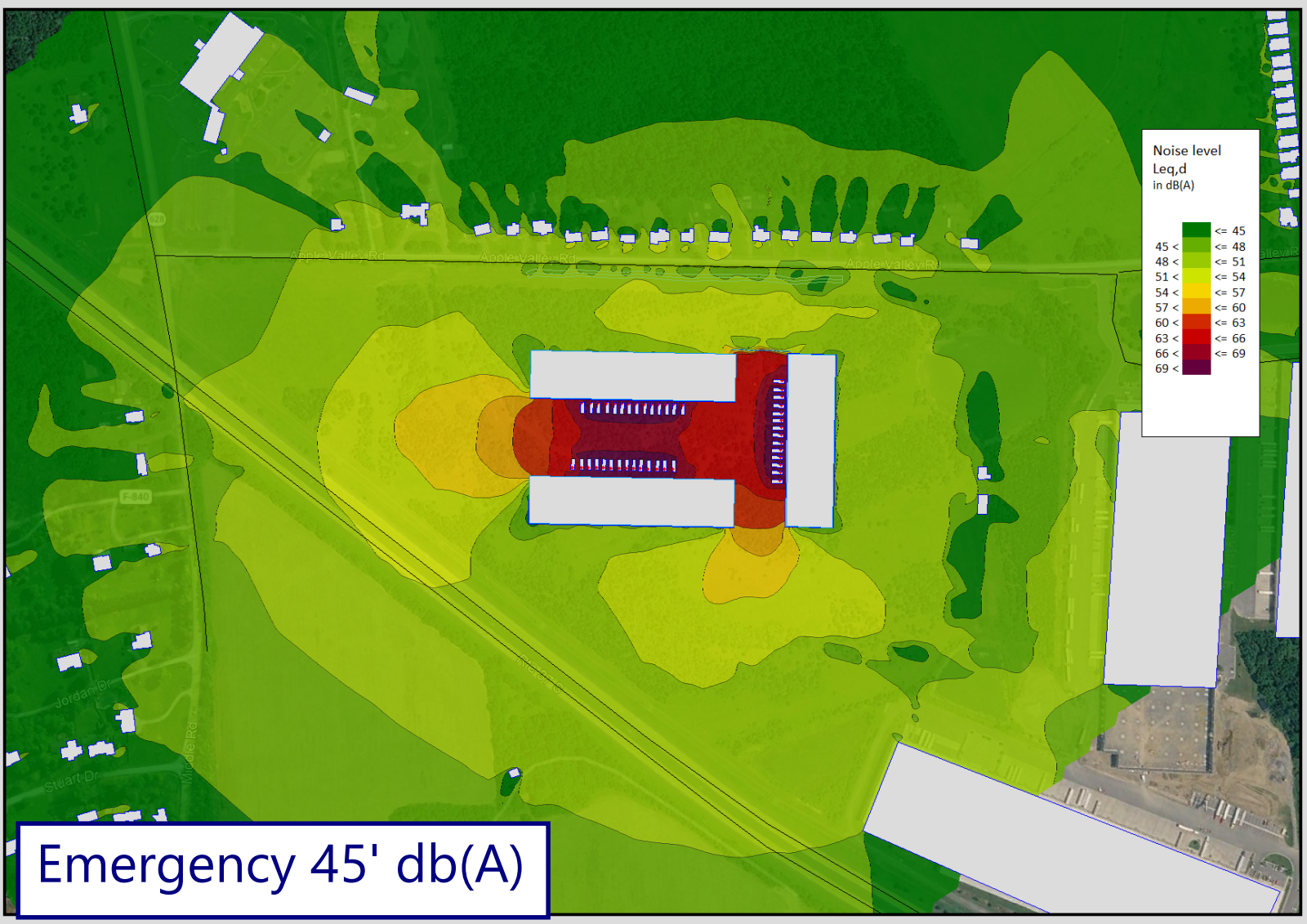
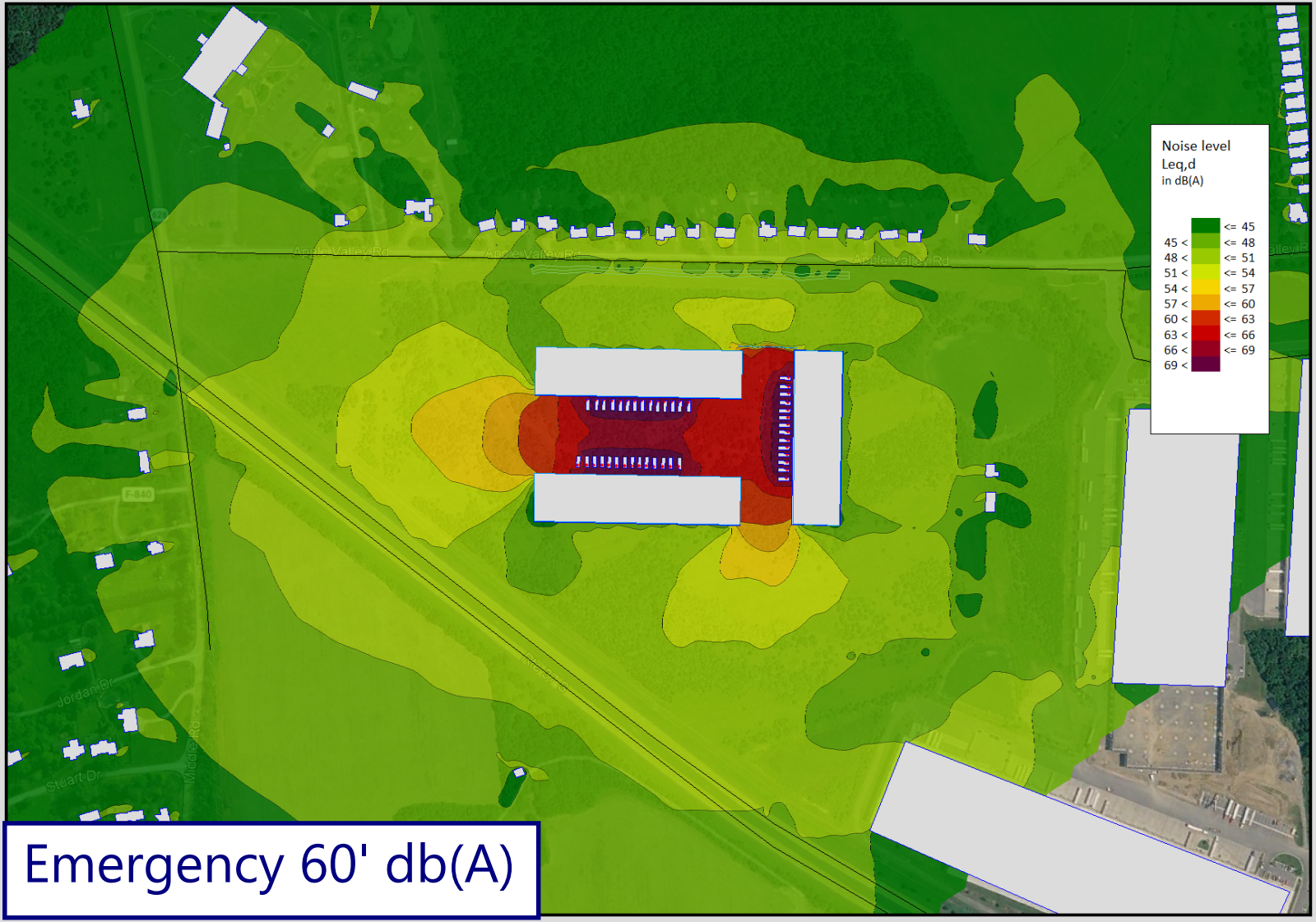
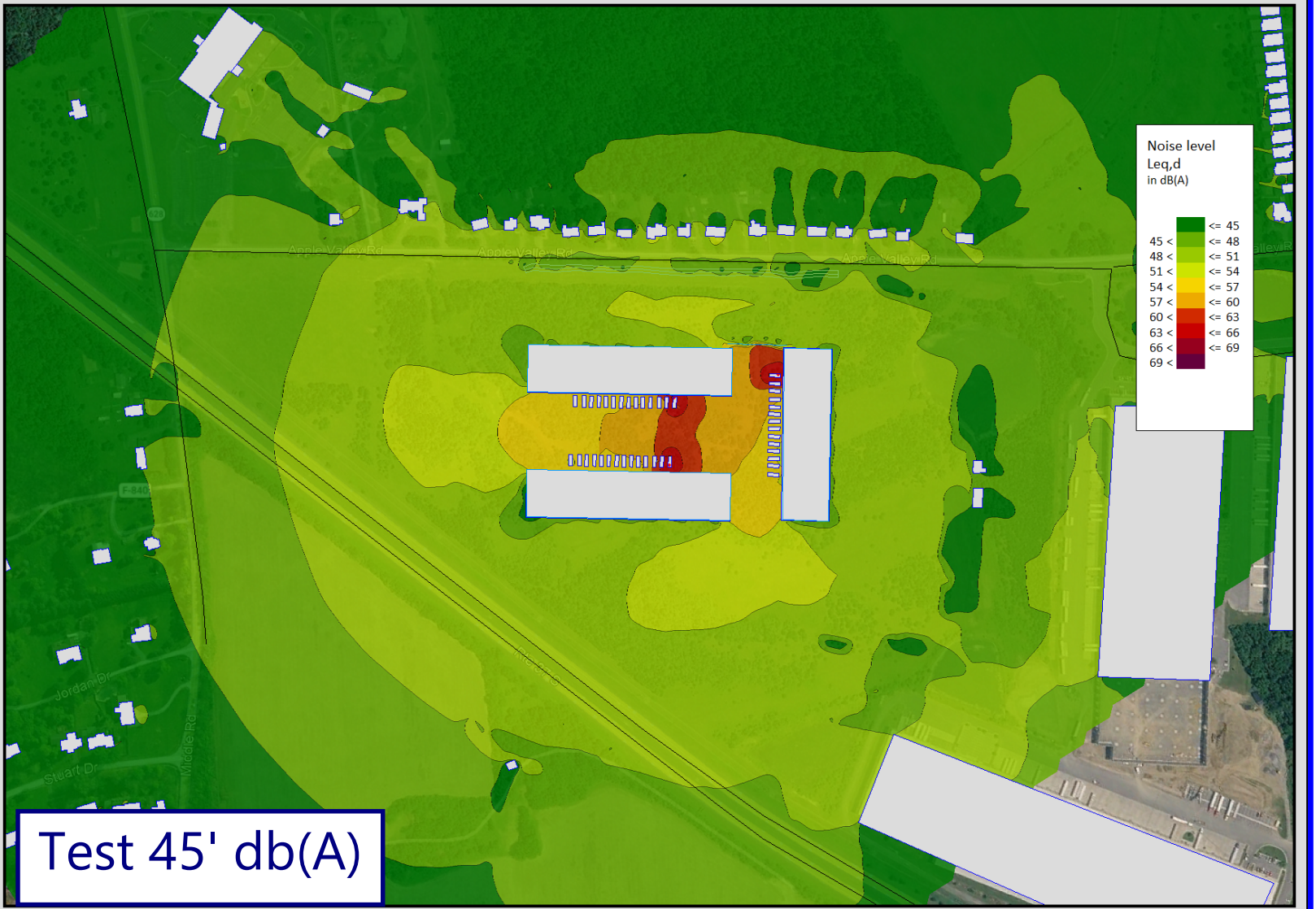

Roof top sources

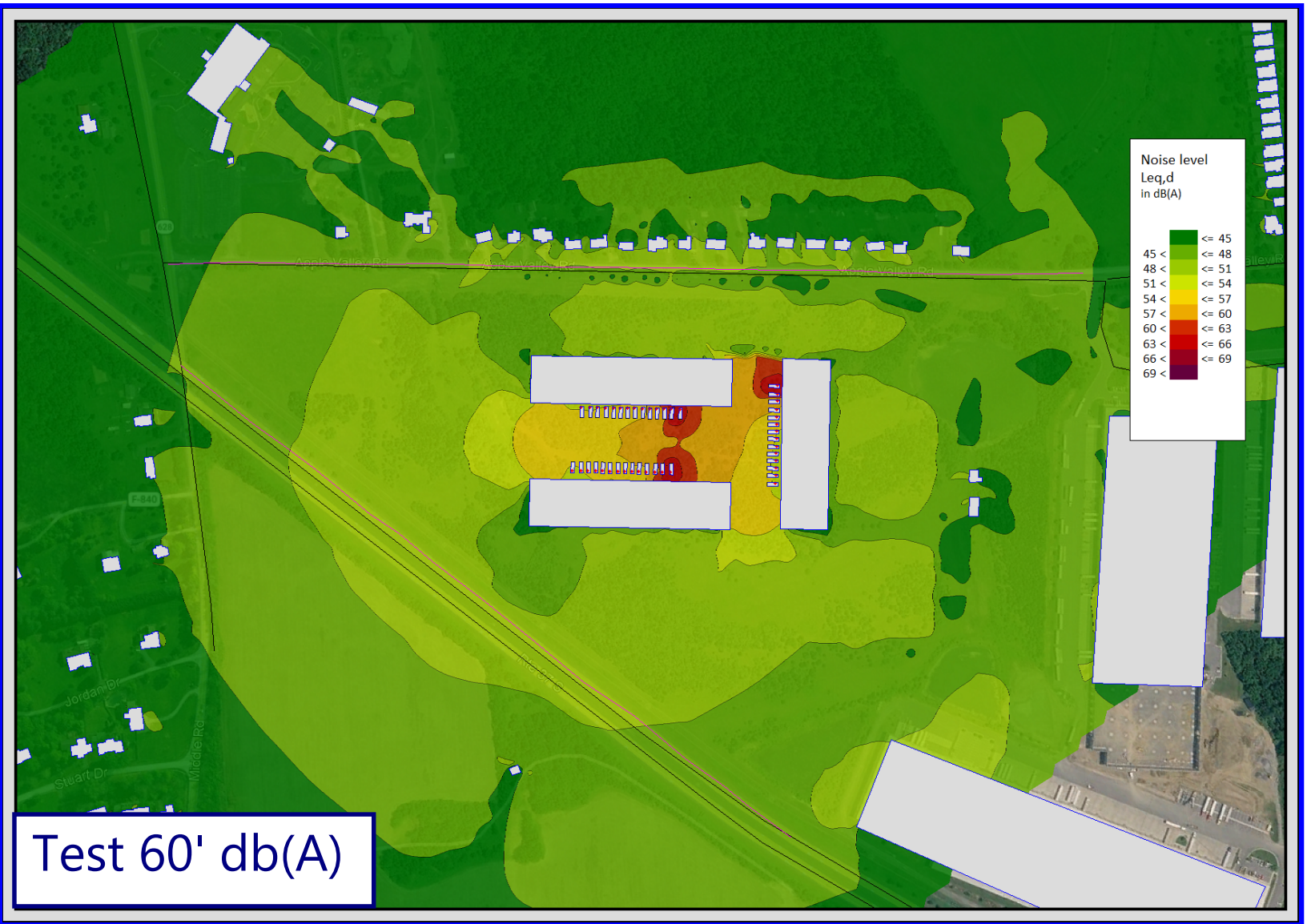


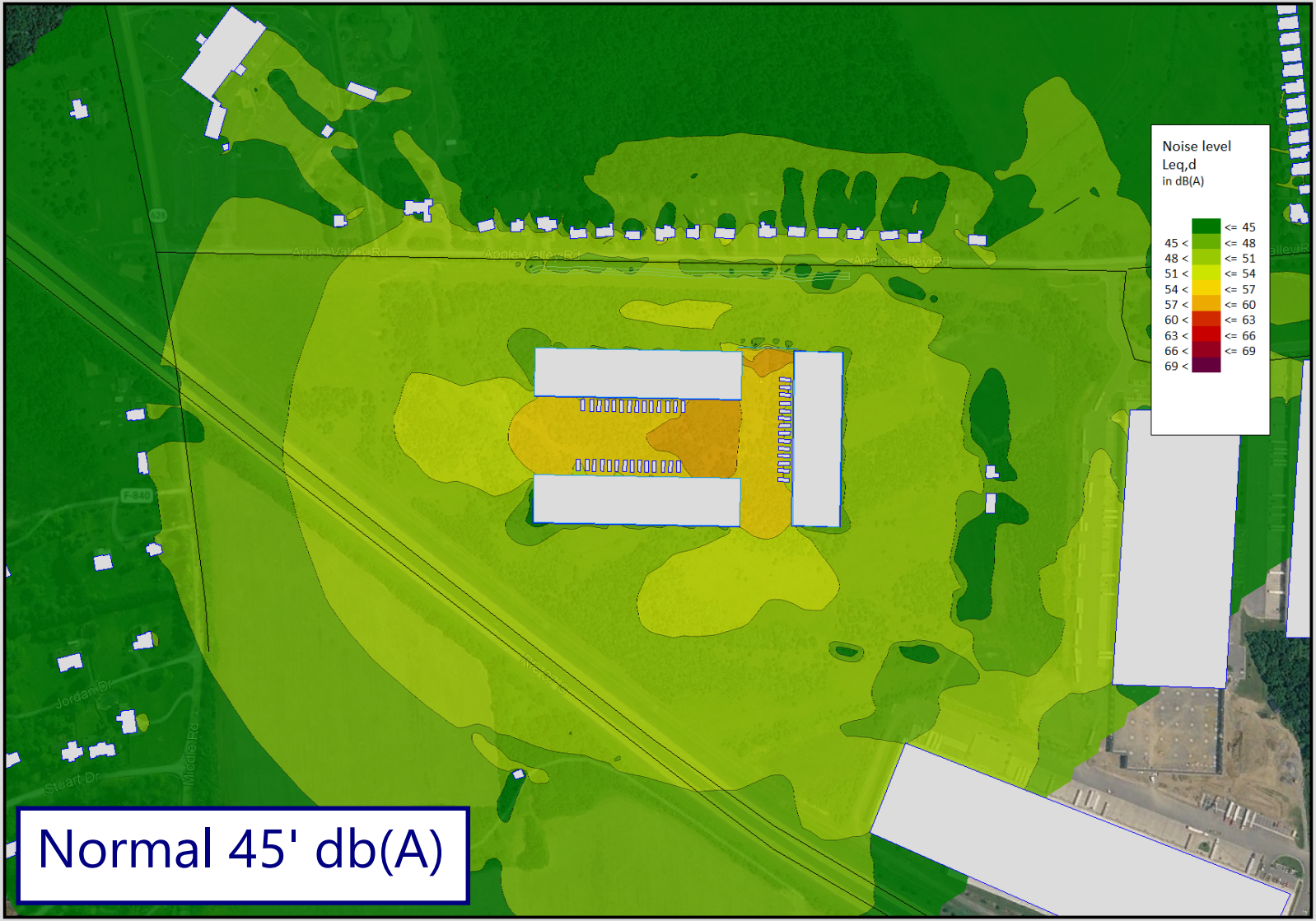
Emergency 45' db(A)

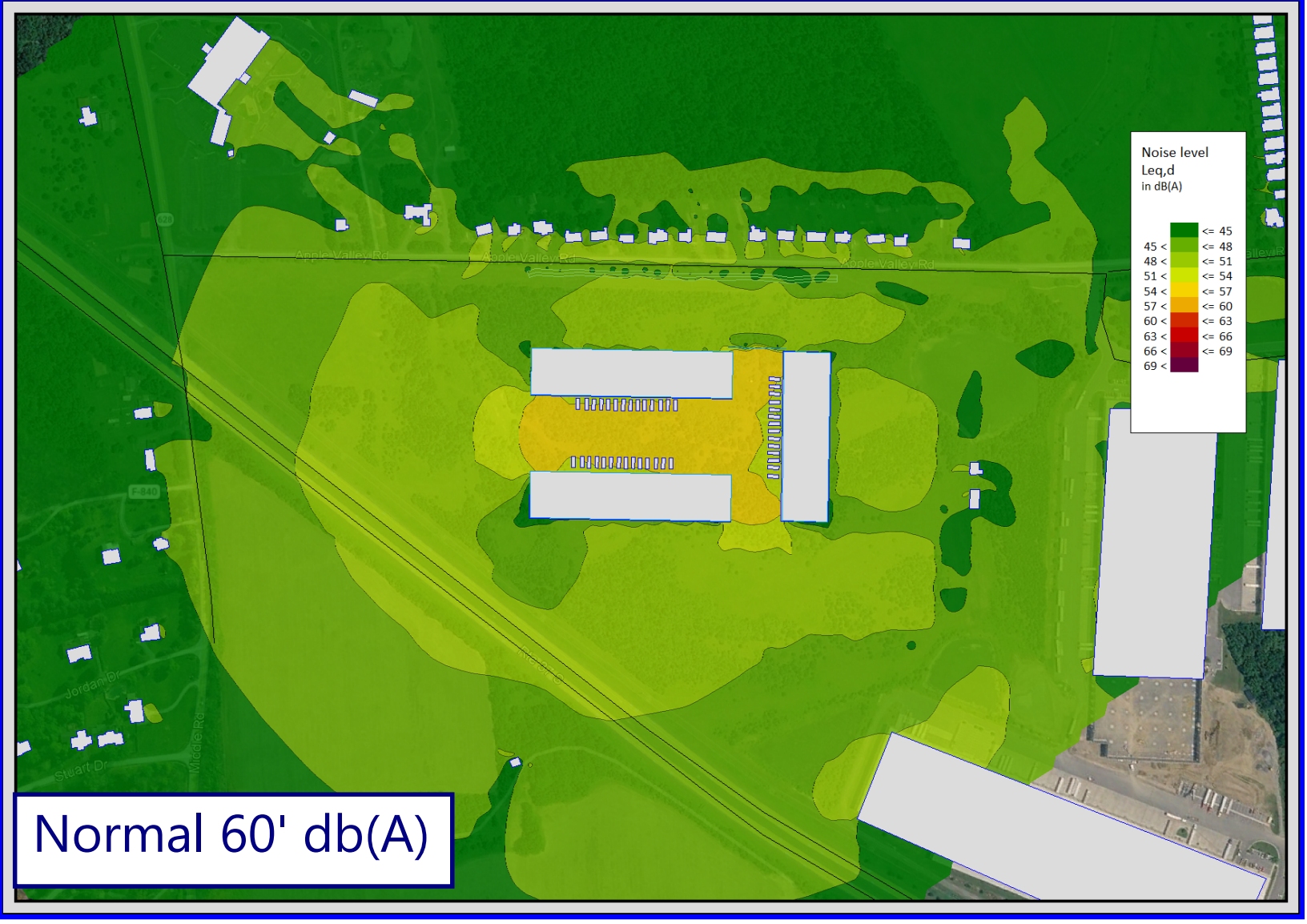


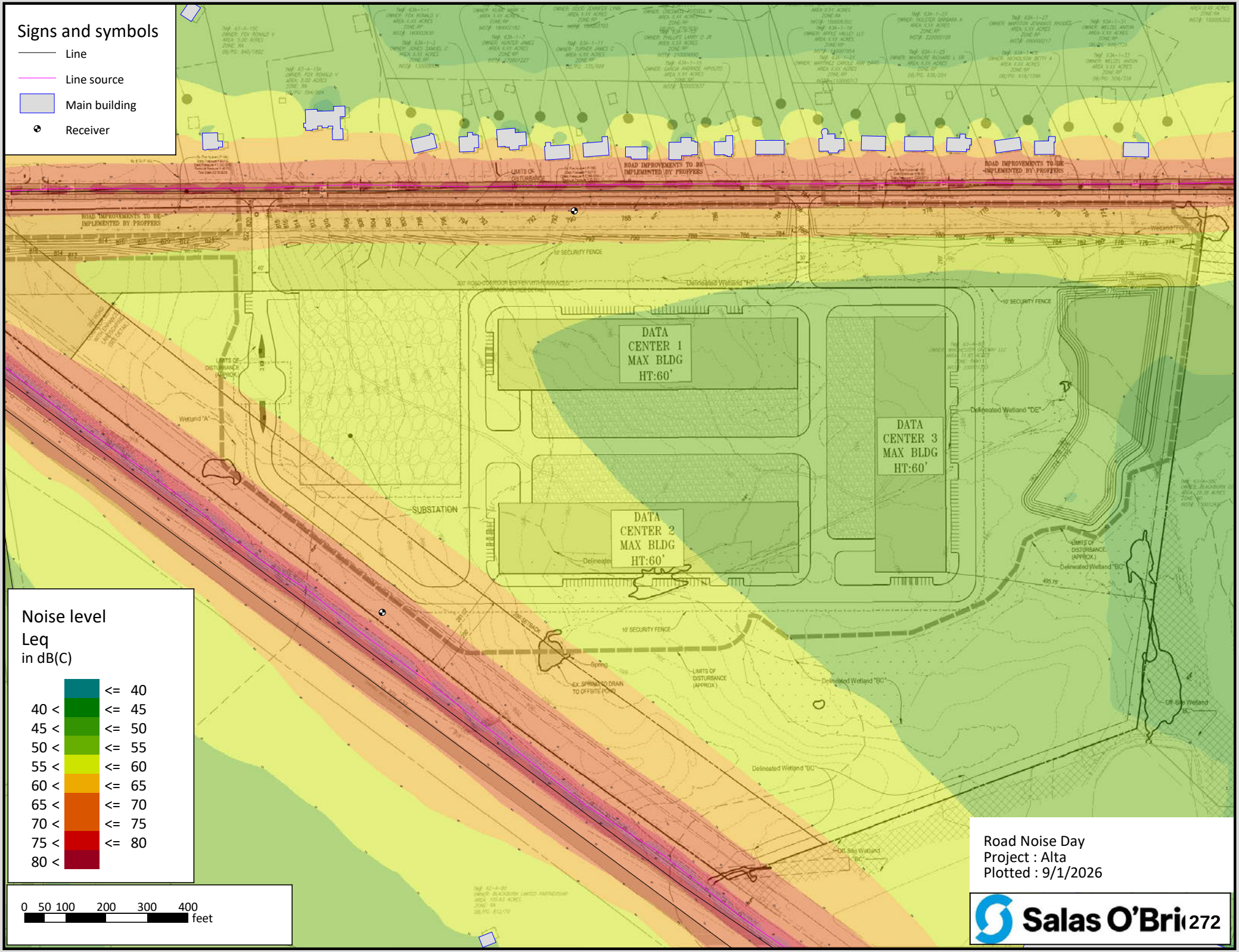
Emergency 60' db(A)


Noise level
Leq,d
in dB(A)
<= 45
45 < <= 48
48 < <= 51
51 < <= 54
54 < <= 57
57 < <= 60
60 < <= 63
63 < <= 66
66 < <= 69
69 <
Apple Valley Rd
Jordan Dr
Stuart Dr
Middle Rd
Test 45' db(A)


Noise level
Leq,d
in dB(A)
<= 45
45 < <= 48
48 < <= 51
51 < <= 54
54 < <= 57
57 < <= 60
60 < <= 63
63 < <= 66
66 < <= 69
69 <
Apple Valley Rd
Apple Valley Rd
Apple Valley Rd
F-840
Jordan Dr
Stuart Dr
Middle Rd
Test 60' db(A)

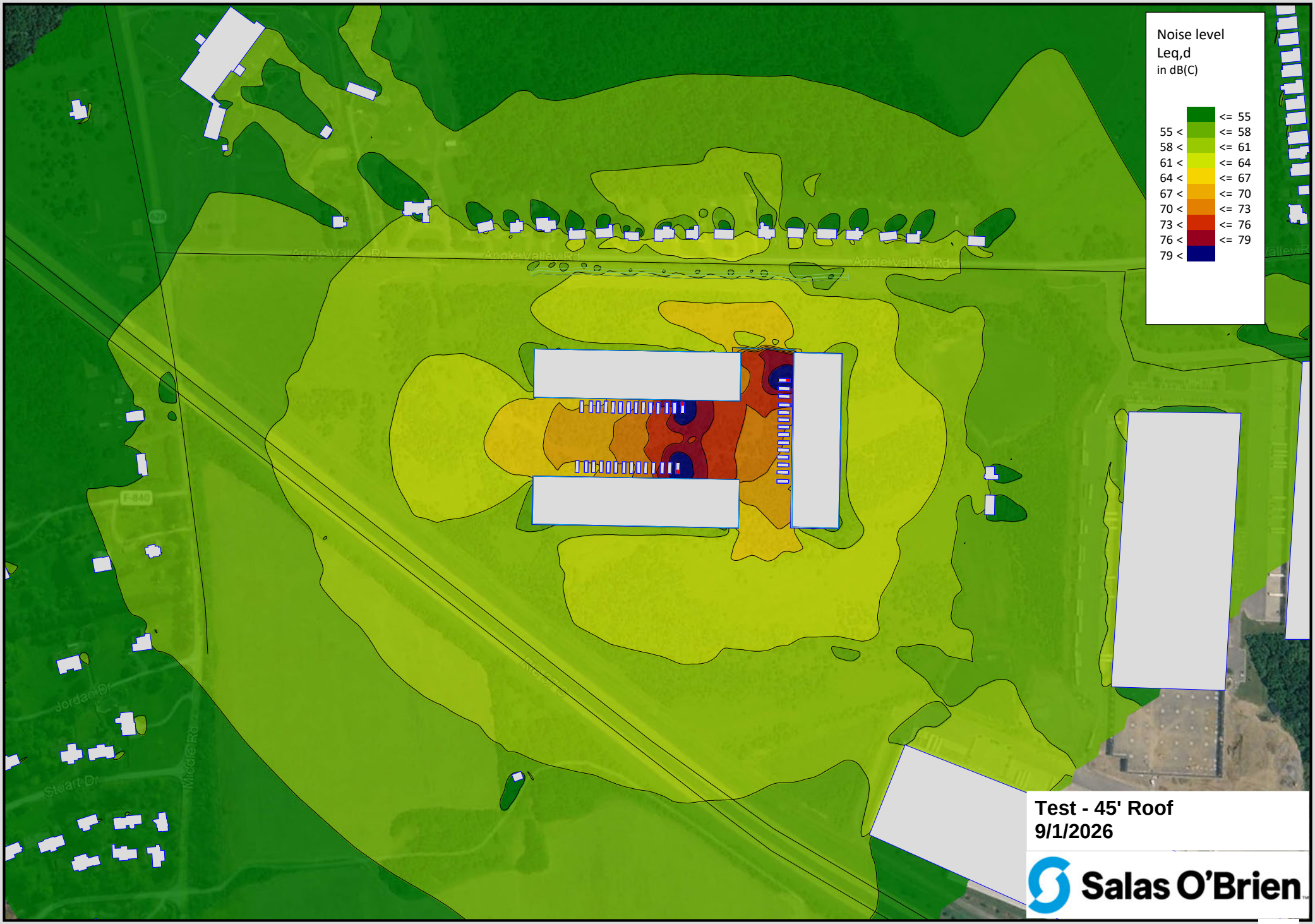

Noise level
Leq,d
in dB(A)
<= 45
45 < <= 48
48 < <= 51
51 < <= 54
54 < <= 57
57 < <= 60
60 < <= 63
63 < <= 66
66 < <= 69
69 <
Apple Valley Rd
Jordan Dr
Stuart Dr
Middle Rd
F-940
Normal 45' db(A)

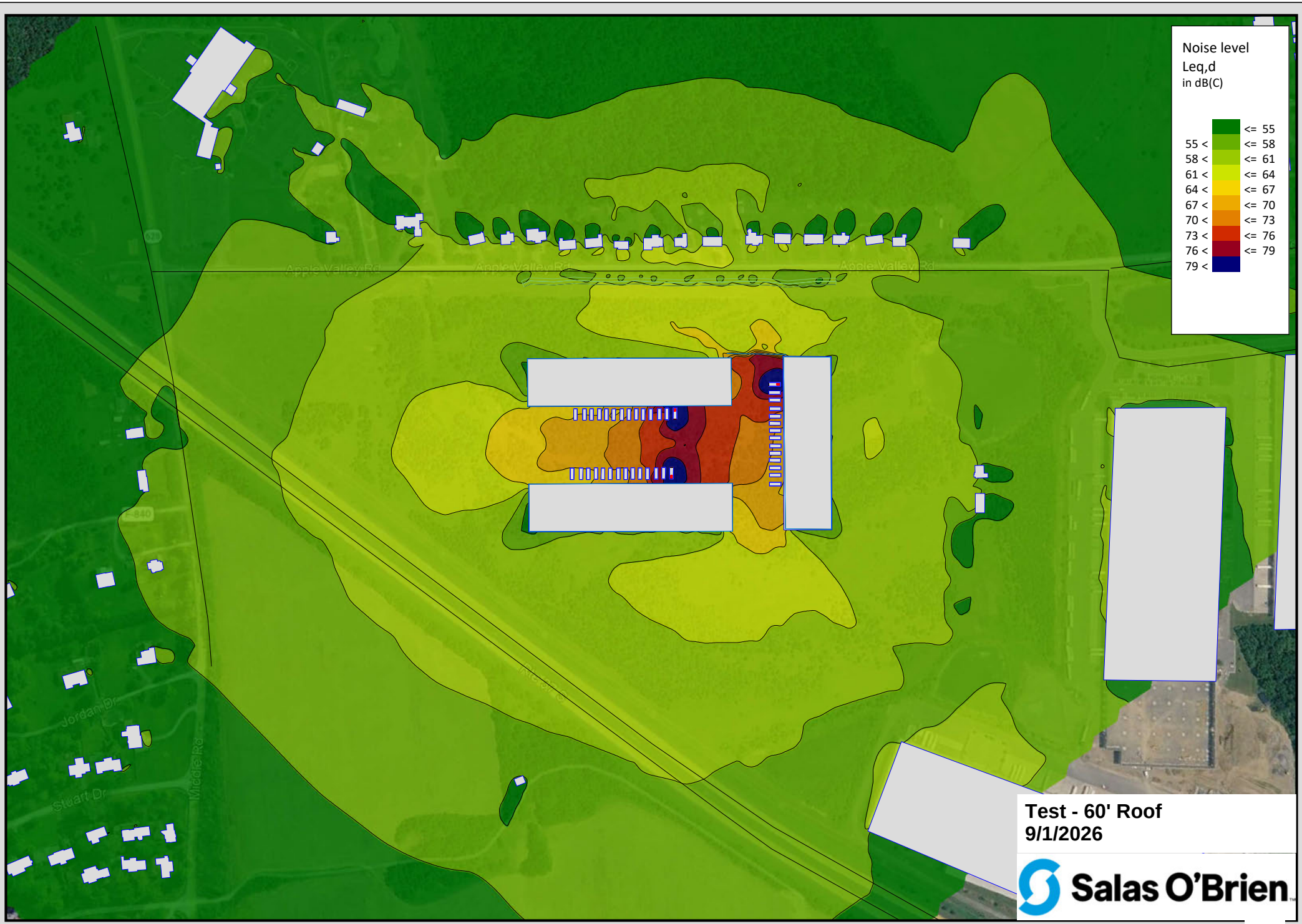

Noise level
Leq,d
in dB(A)
<= 45
45 < <= 48
48 < <= 51
51 < <= 54
54 < <= 57
57 < <= 60
60 < <= 63
63 < <= 66
66 < <= 69
69 <
Apple Valley Rd
Apple Valley Rd
Apple Valley Rd
Jordan Dr
Stuart Dr
Middle Rd
F-940
Normal 60' db(A)


Signs and symbols
Line
Line source
Main building
Receiver
DATA CENTER 1 MAX BLDG HT:60'
DATA CENTER 2 MAX BLDG HT:60'
DATA CENTER 3 MAX BLDG HT:60'
SUBSTATION
ROAD IMPROVEMENTS TO BE IMPLEMENTED BY PROFFERS
10' SECURITY FENCE
LIMITS OF DISTURBANCE (APPROX.)
Delineated Wetland "A"
Delineated Wetland "BC"
Delineated Wetland "DE"
Delineated Wetland "H"
Off-Site Wetland "BC"
Spring
EX. SPRING TO DRAIN TO OFFSITE POND
Noise level
Leq
in dB(C)
<= 40
40 < <= 45
45 < <= 50
50 < <= 55
55 < <= 60
60 < <= 65
65 < <= 70
70 < <= 75
75 < <= 80
80 <
0 50 100 200 300 400
feet
Road Noise Day
Project : Alta
Plotted : 9/1/2026
Salas O'Brien

Noise level
Leq,d
in dB(C)
<= 55
55 < <= 58
58 < <= 61
61 < <= 64
64 < <= 67
67 < <= 70
70 < <= 73
73 < <= 76
76 < <= 79
79 <
Apple Valley Rd
Jordan Dr
Stuart Dr
Middle Rd
F-840
Normal - 45' Roof
9/1/2026
Salas O'Brien

Noise level
Leq,d
in dB(C)
<= 55
55 < <= 58
58 < <= 61
61 < <= 64
64 < <= 67
67 < <= 70
70 < <= 73
73 < <= 76
76 < <= 79
79 <
Apple Valley Rd
Jordan Dr
Stuart Dr
Middle Rd
E 840
Normal - 60' Roof
9/1/2026
Salas O'Brien


Noise level
Leq,d
in dB(C)
<= 55
55 < <= 58
58 < <= 61
61 < <= 64
64 < <= 67
67 < <= 70
70 < <= 73
73 < <= 76
76 < <= 79
79 <
Apple Valley Rd
Jordan Dr
Stuart Dr
Middle Rd
Test - 45' Roof
9/1/2026
Salas O'Brien


Noise level
Leq,d
in dB(C)
<= 55
55 < <= 58
58 < <= 61
61 < <= 64
64 < <= 67
67 < <= 70
70 < <= 73
73 < <= 76
76 < <= 79
79 <
Apple Valley Rd
Apple Valley Rd
Apple Valley Rd
Jordan Dr
Stuart Dr
Middle Rd
Test - 60' Roof
9/1/2026
Salas O'Brien

Noise level
Leq,d
in dB(C)
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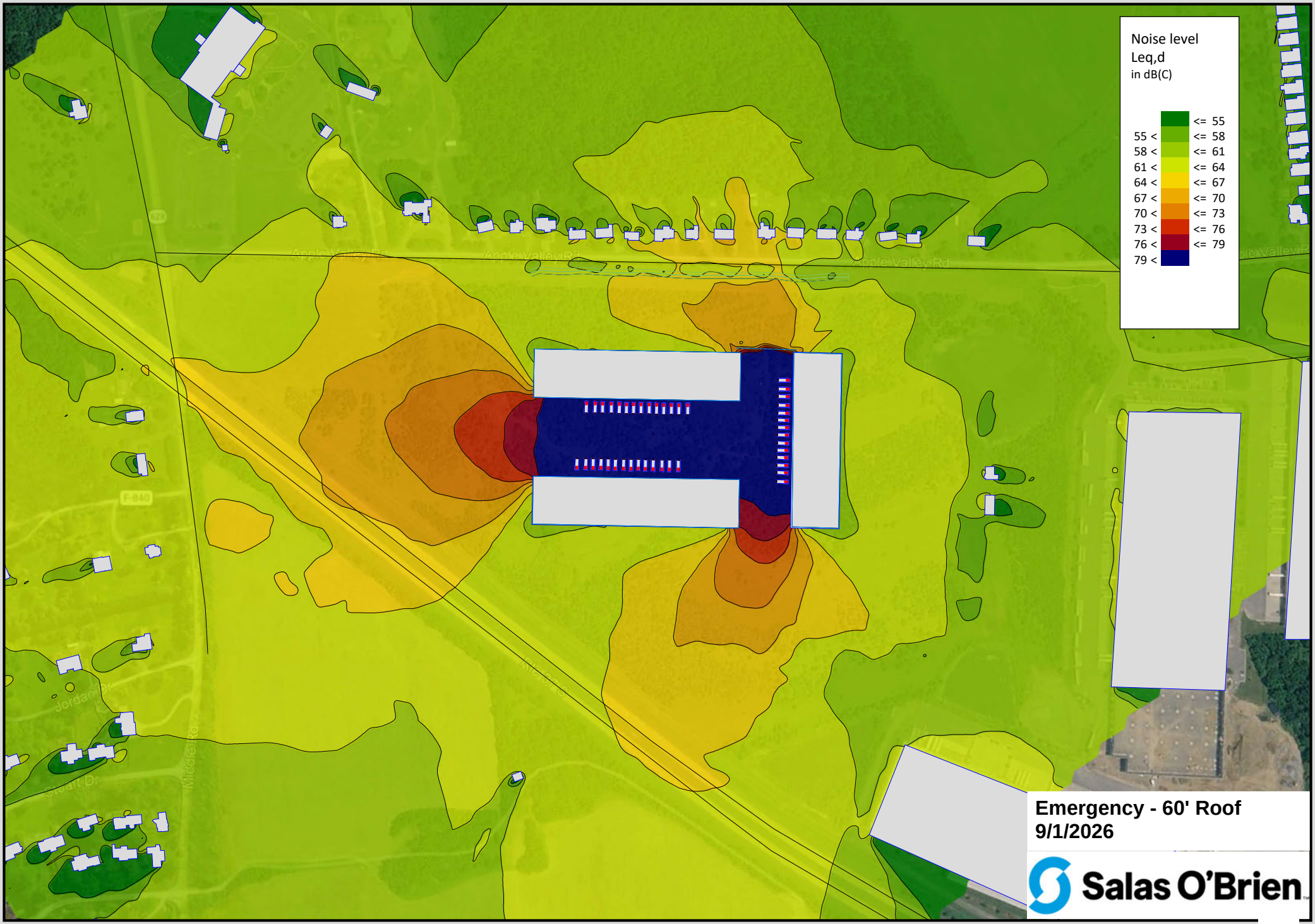
58 < <= 61
61 < <= 64
64 < <= 67
67 < <= 70
70 < <= 73
73 < <= 76
76 < <= 79
79 <
Apple Valley Rd
Jordan Dr
Middle Rd
Stuart Dr
E 840
Emergency - 45' Roof
9/1/2026
Salas O'Brien



Emergency - 60' Roof
9/1/2026

Salas O'Brien

Adjusting Building Height from 60 feet to 45 feet height – Sound Addendum

The 60-foot building does provide slightly lower noise levels, particularly when evaluated in dB(C). This metric places greater emphasis on low-frequency sound, which tends to be more noticeable and potentially more disruptive to nearby residences.

The trend is consistent across the Emergency, Test, and Normal operating scenarios in both dB(A) and dB(C) metrics, although the reduction is more pronounced in the dB(C) results.

Environmental Noise Study

Winchester Gateway Data Center- 2565-00642

INTRODUCTION

This report contains design information on environmental noise for the proposed Winchester Gateway Data Center in Frederick County, VA. This information is intended to assist Winchester Gateway LLC in meeting noise level requirements for the proposed construction set forth by Frederick County. This report does not address changes to construction that may be acoustically necessary to reduce excessive noise due to building mechanical or electrical services.

Executive Summary

Noise measurements were conducted at multiple locations surrounding the project site to document and characterize existing ambient sound levels. Results indicate a clear distinction between daytime and nighttime acoustic conditions.

Daytime noise along Apple Valley Road averaged 63–64 dB(A), dropping to about 47 dB(A) during the quietest nighttime period. Route 37 showed higher daytime levels of 67–68 dB(A), with the east side ranging 63–67 dB(A) due to nearby construction. Overall, Route 37 is 5–10 dB(A) louder than Apple Valley Road.

The frequency spectra exhibited elevated sound levels in the mid-frequency bands (500 Hz–2.5 kHz) and lower levels in the low-frequency range (50 Hz–500 Hz). Low-frequency noise presents greater mitigation challenges because attenuation at these frequencies typically requires materials with significant mass.

Overall, ambient sound levels remain steady throughout the day due to consistent traffic activity but drop during the late-night hours when traffic diminishes. With appropriate mitigation, the proposed data center operations may be minimally impactful, and possibly assist in masking disturbing short and impulsive noises caused by large trucks and sirens.

A representative model of the proposed data centers was created using SoundPlan environmental modeling software and assuming both the county specified protections (low sound fan options, mufflers, generator enclosures, etc.) and a parapet that is at least 9’ 6” above the roof level to fully block line of sight to the roof top equipment.

Normal operations are expected to produce noise levels of less than 65 dB(A) during daytime hours and 60 dB(A) during nighttime hours. While these nighttime levels exceed the ambient noise levels during the quietest hours, because they are steady state they will serve to mask disturbing impulsive and short spikes in noise levels caused by large trucks and emergency vehicles.

MEASUREMENTS

Location

Site is located on the southeast corner of Apple Valley Rd and Middle Rd in Winchester, VA 22602

Spot measurements were taken at the following times and locations:

10/22 **Afternoon** 11:47 a.m. – 2:33 p.m.: Full perimeter

10/23 **Late-night** (early morning) 3:46 a.m. – 4:26 a.m.: Along Apple Valley Rd

10/23 **Morning** 7:44 a.m.- 8:47 a.m.: Full perimeter

10/23 **Evening** 5:11 p.m. – 5:34 p.m.: Along Apple Valley Rd

10/23 **Night** 8:59 p.m. – 9:26 p.m.: Along Apple Valley Rd

A graphic showing the approximate spot check locations is included in Appendix C.

Due to safety concerns after dark, nighttime spot checks around the full perimeter were not conducted but were limited to Apple Valley Road. Apple Valley Road was prioritized because of its proximity to residential areas.

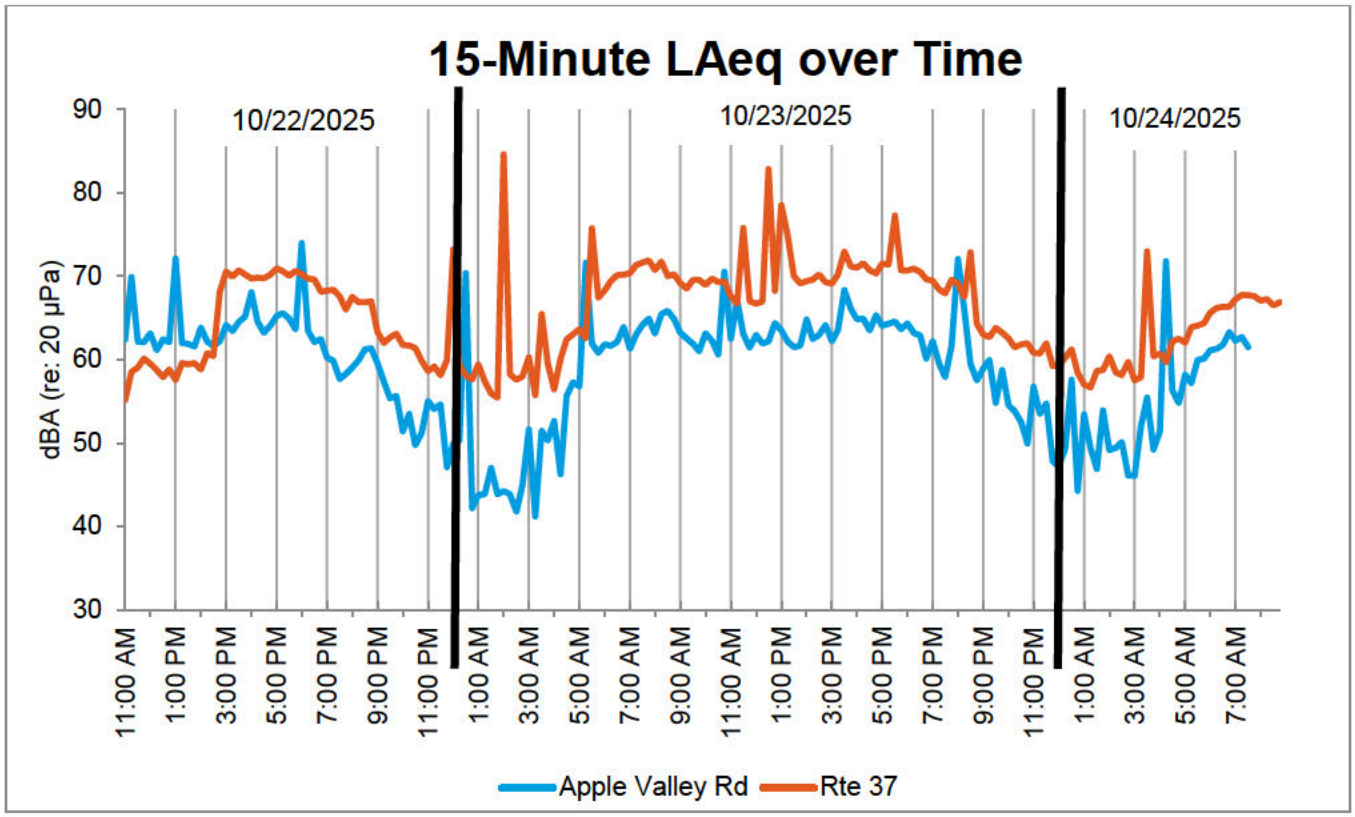
Observations

Traffic along Apple Valley Road was steady and consistent from early morning through the evening hours, contributing to stable daytime noise levels. During the late-night/early-morning periods, traffic activity decreased, resulting in lower ambient sound levels.

Active construction activity was observed on the east side of the site, characterized by frequent and pronounced hammering sounds that contributed intermittently to elevated noise levels in that area.

The surrounding land use consists primarily of single-family residences along the north side of Apple Valley Road, adjacent to the project property line. Beyond these residential areas, the surrounding environment is predominantly agricultural and industrial.

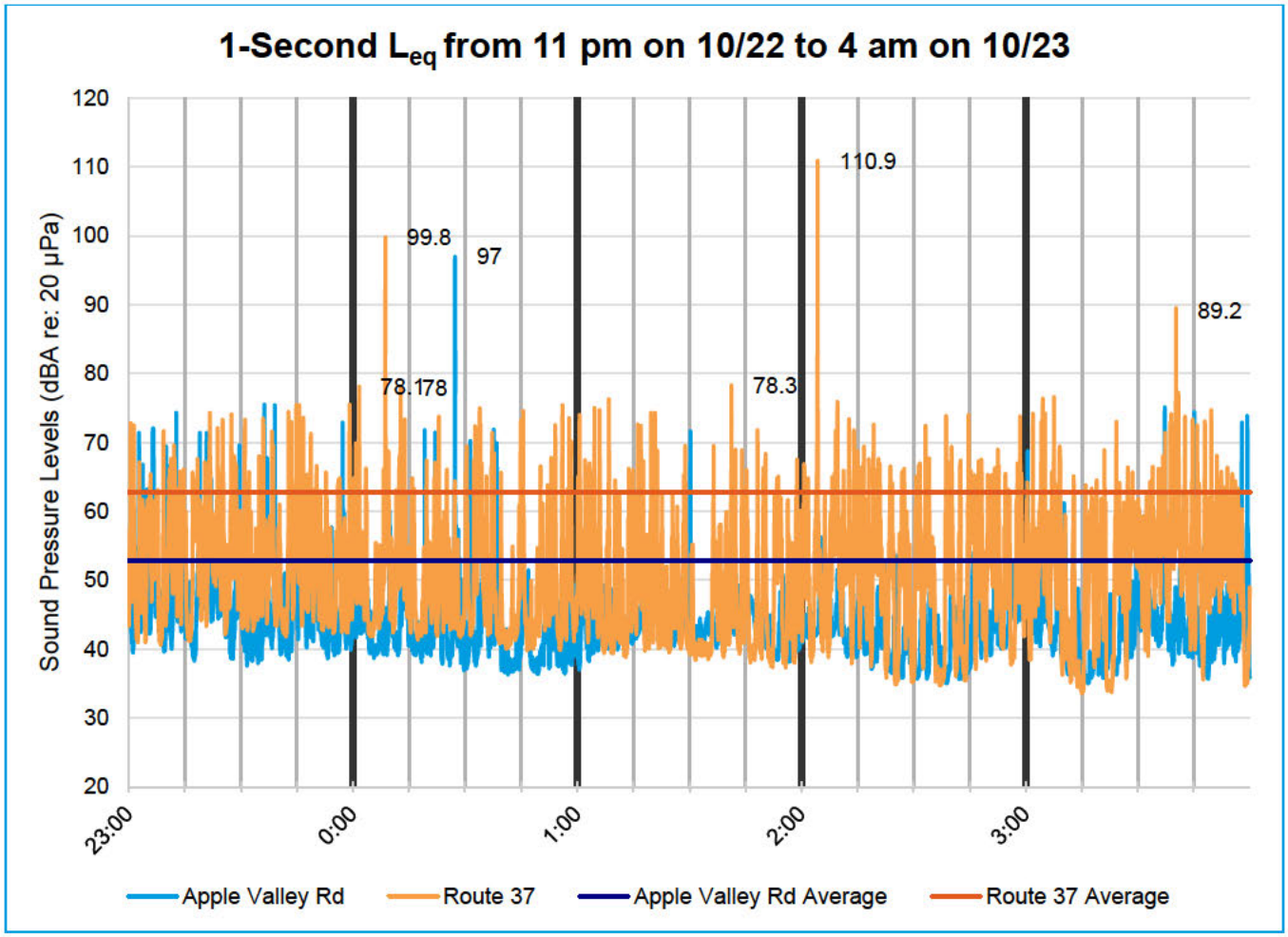
Results



Noise levels during daytime hours remained steady, decreasing between approximately 9:00 p.m. and 5:00 a.m. Several isolated spikes were observed during the late-night period, though these were not directly witnessed in the field. Such events may have resulted from emergency vehicle activity, passing heavy trucks operating overnight, or nearby wildlife.

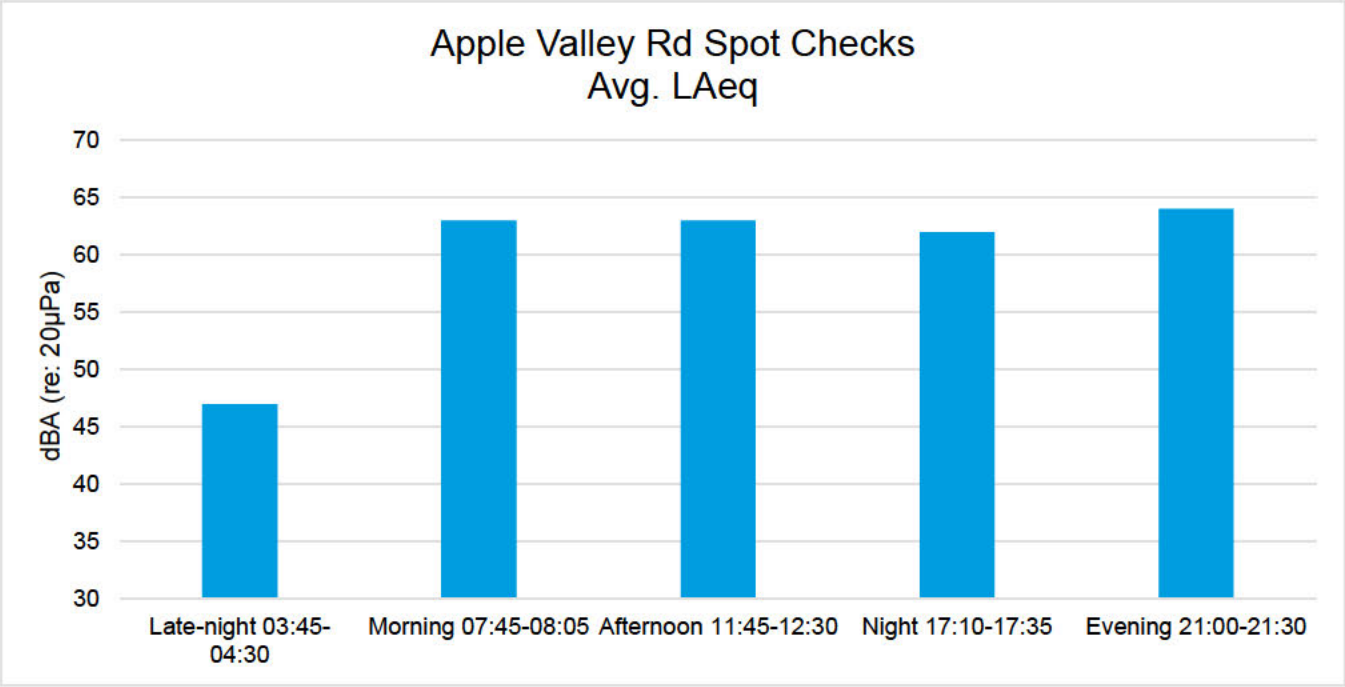
Overall, sound levels along Route 37 were 5–10 dB(A) higher than those measured along Apple Valley Road.

While the average sound level decreased noticeably between the hours of 11pm and 4am on both nights, periodic noises from ambulances, motorcycles and other vehicles along Route 37 did not change. This results in short-term noise events which rise over the noise floor by 40-60 dB(A).

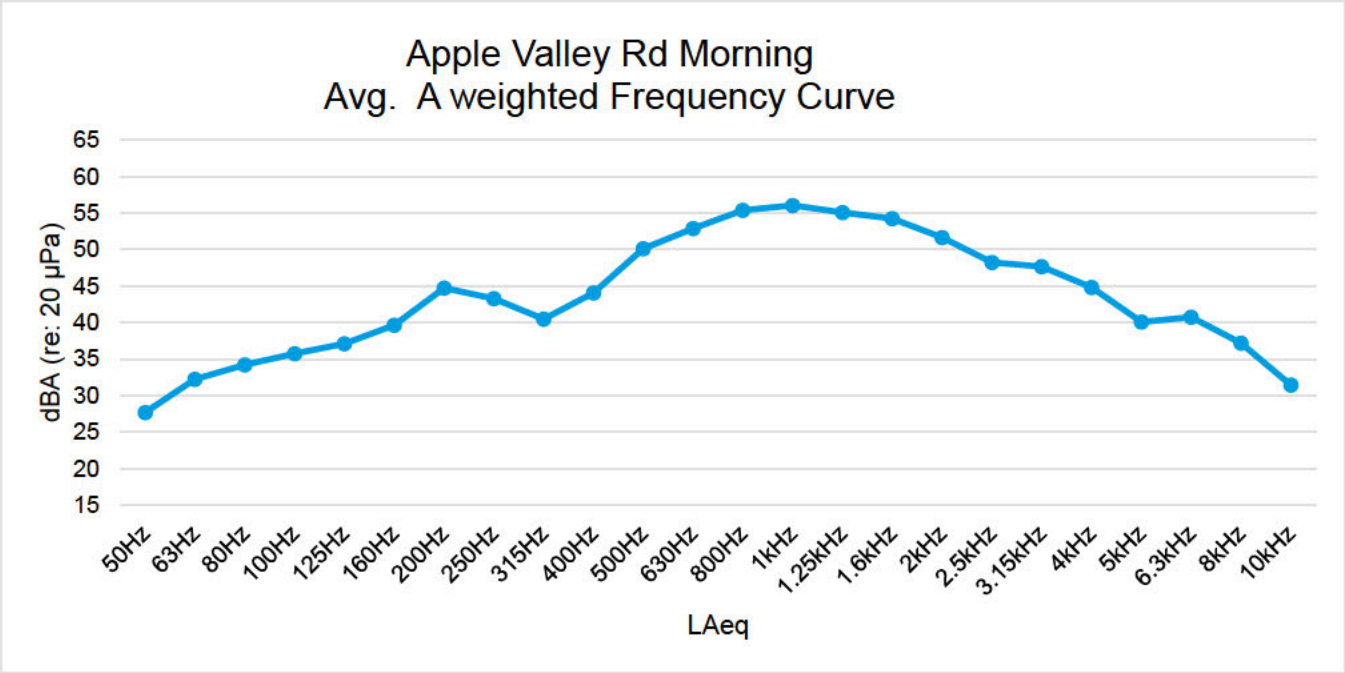


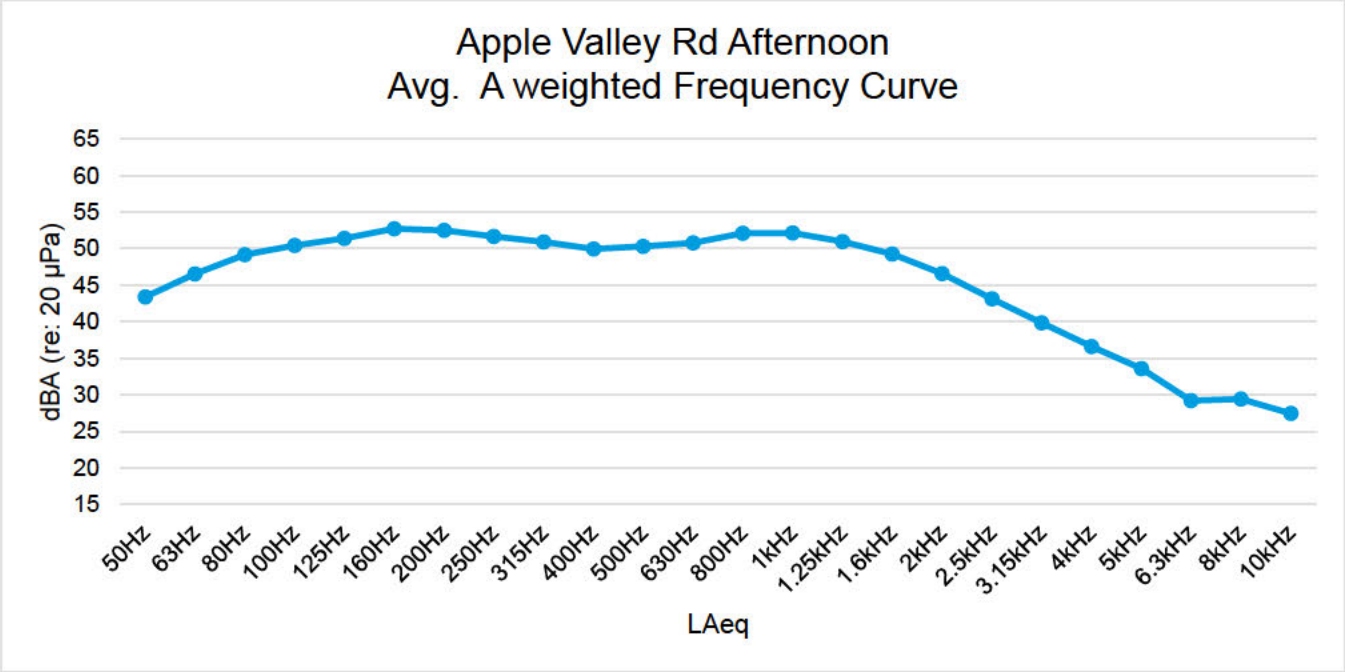
The full set of Logged 1 second L_{eq} data is included in Appendix D for reference.

Noise Levels along Apple Valley Rd.



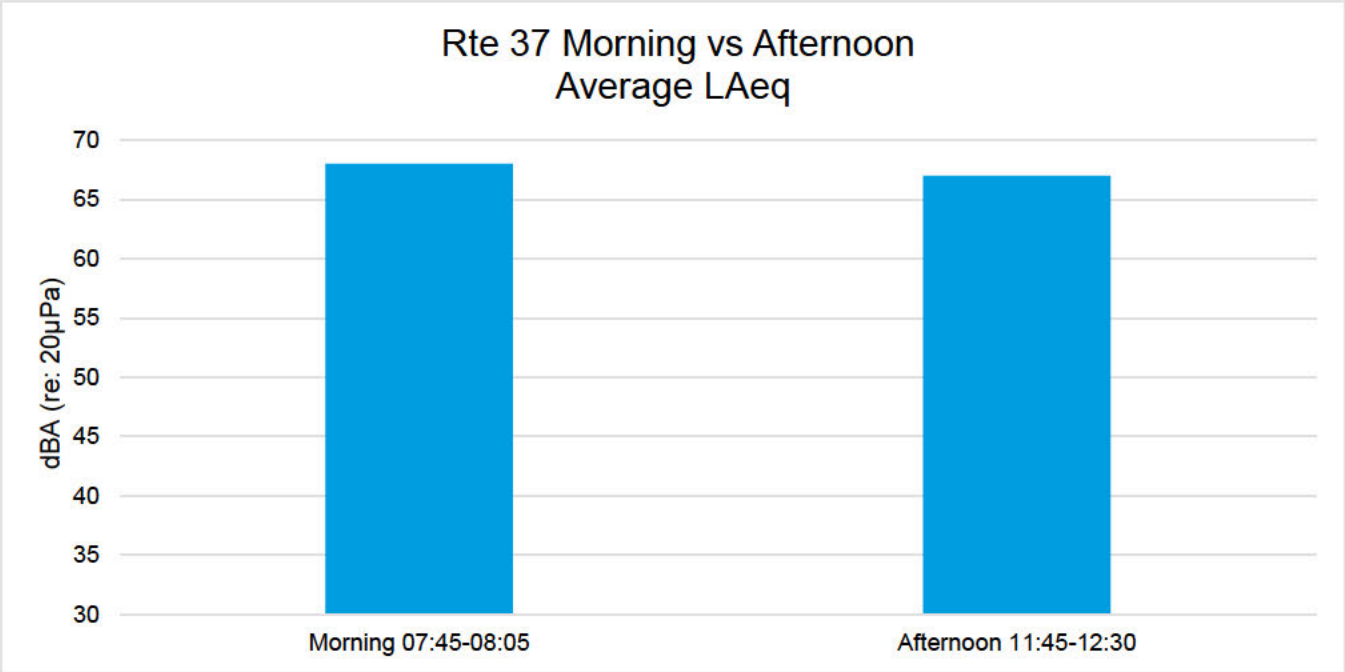
Five short-term measurements were taken along the length of plot bordering Apple Valley Road and averaged for each time frame. Daytime noise levels were consistent, ranging from 62 to 64 dB(A), while nighttime levels were approximately 15 dB(A) lower.

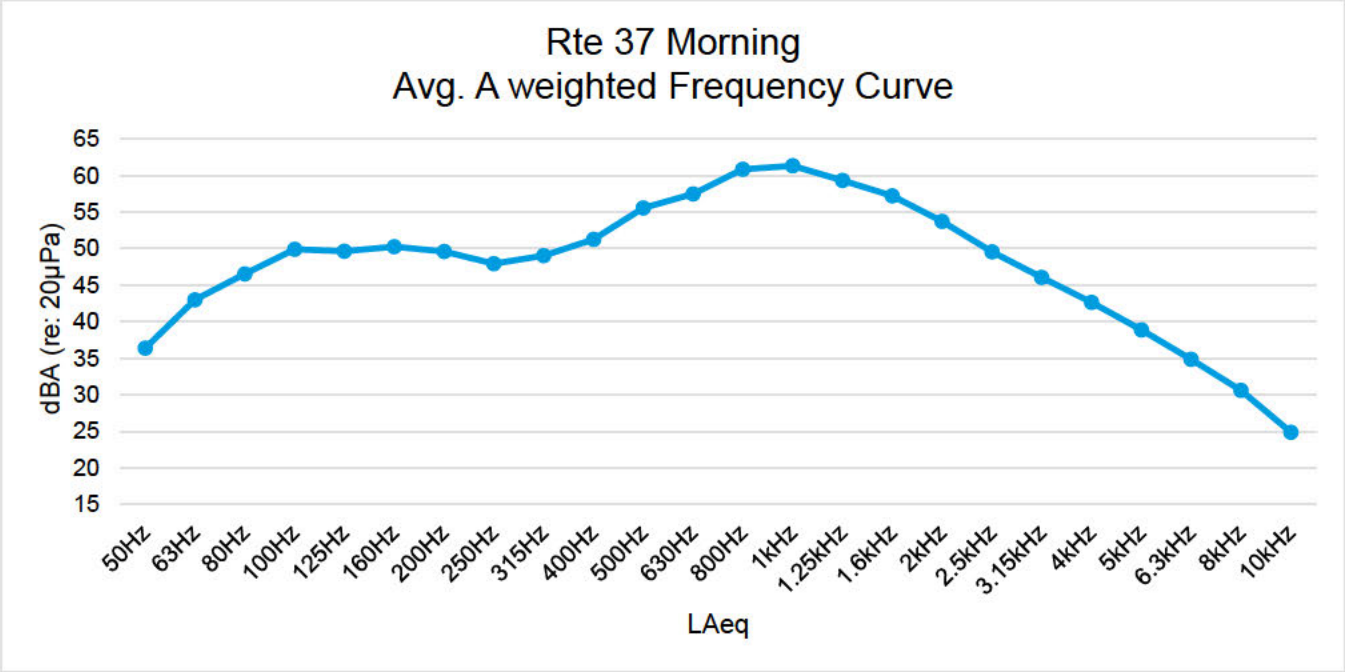


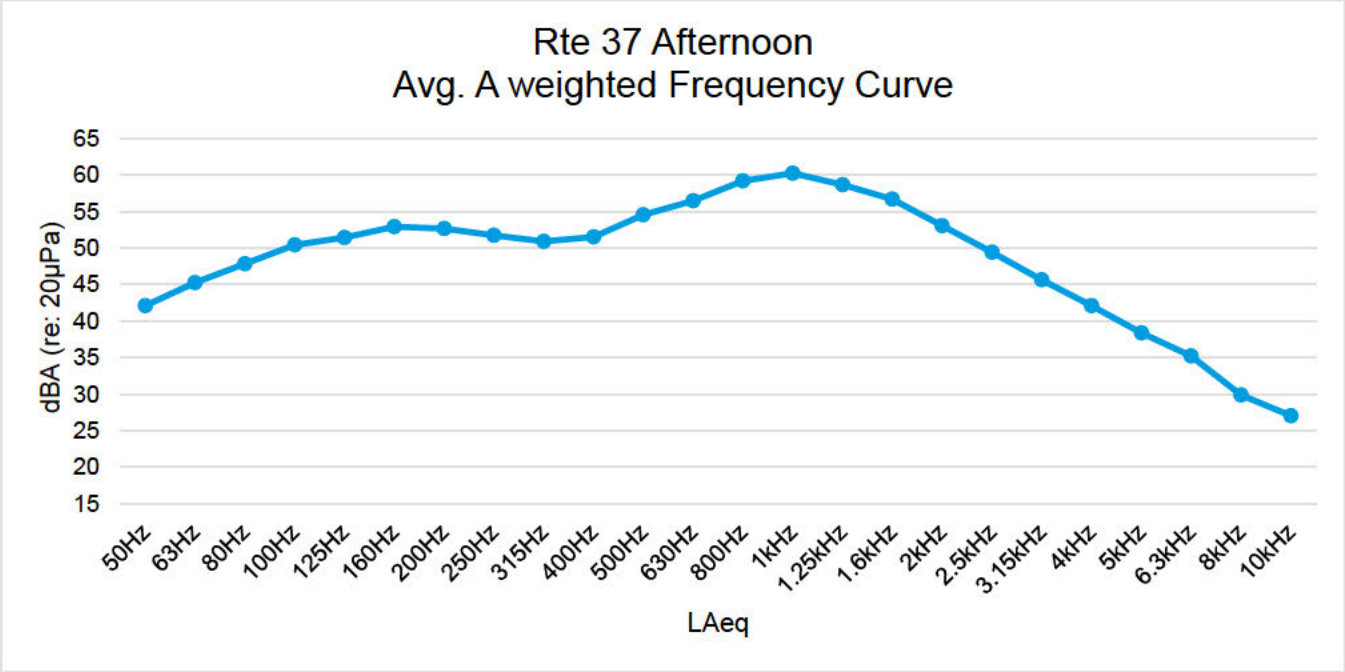


The frequency spectra were also consistent across the spot measurements. Only the afternoon measurement exhibited a noticeably different spectral profile, likely due to construction activity on the east side that was active during that period. It is noteworthy that low-frequency components (50 Hz–500 Hz) were lower in level than the mid-frequency range (500 Hz–2.5 kHz).

Noise Levels along Route 37

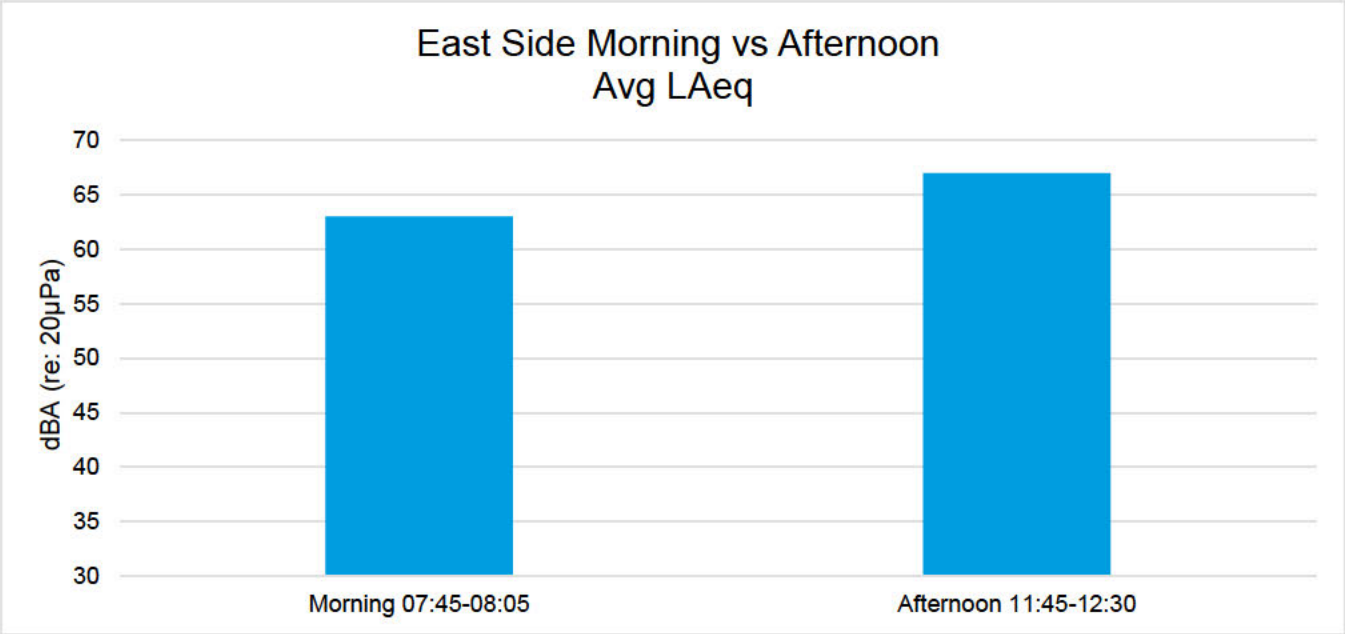




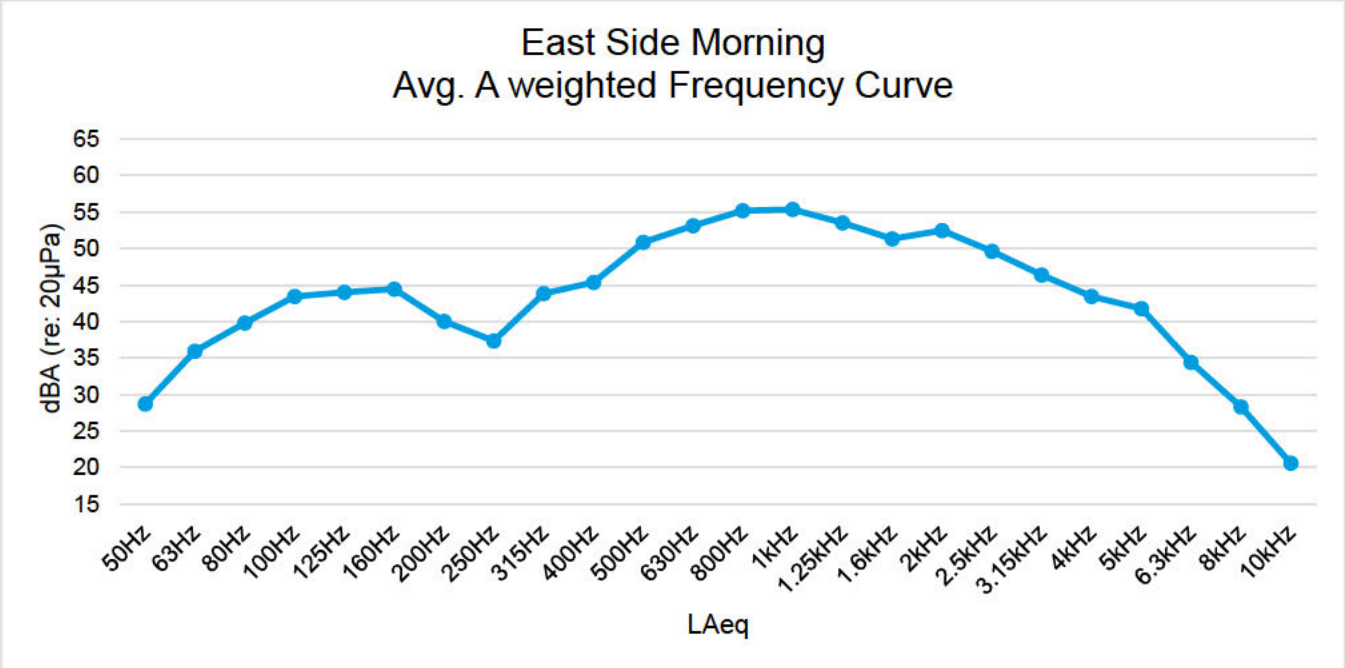


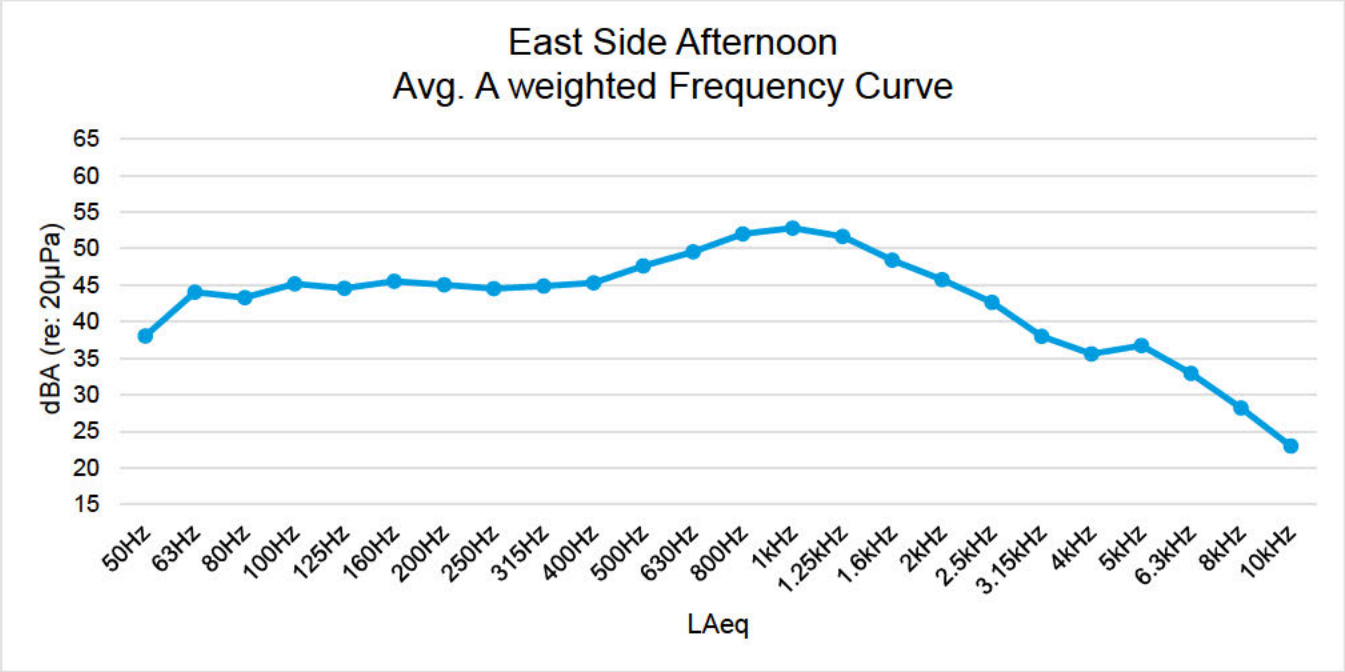
The frequency spectra along Route 37 were consistent across the morning and afternoon spot measurements. While low-frequency levels were also lower along this corridor, the difference was less pronounced than on Apple Valley Road. This is likely due to the higher volume of heavy-trailer traffic on the highway, which contributes additional low-frequency energy.

Noise Levels along East Side



The differences in levels between the morning and afternoon spot checks is more pronounced. It was observed in other measurements as well that the increased construction noise coming from the east side added to the low frequency content of the afternoon measurements. The morning measurements are more likely to be indicative of the normal sound levels in the area.





ANALYSIS

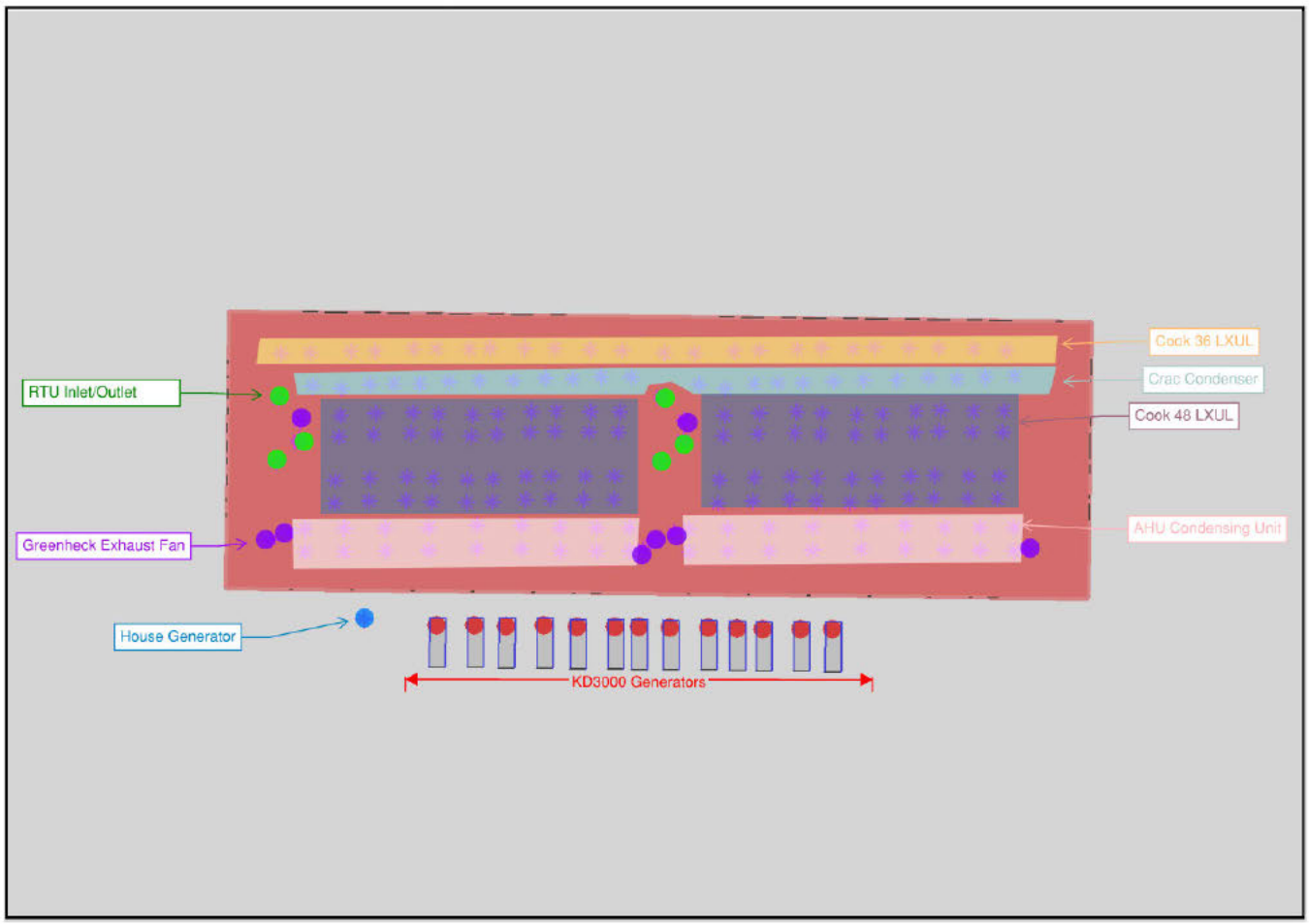
SoundPLAN Model

Salas O'Brien constructed an environmental noise model to assist in predicting the noise impact to the surrounding areas. We used both rooftop and generator equipment typical of a data center of the proposed size.

Equipment and dB values:

The sound power levels that were used in the model for each piece of equipment is listed in the table below. All data in the table is shown in dB re: 10^{-12} W.

	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Greenheck Exhaust Fan	78	77	84	74	67	66	62	59
Cook 36 LXUL	89	91	89	84	80	75	70	66
RTU-A Inlet	83	81	84	81	75	73	71	65
RTU-A Outlet	83	81	84	81	75	73	71	65
CRAC Condenser	84	94	95	93	88	85	82	78
Cook 48 LXUL	94	96	92	88	84	79	75	70
AHU Condensing Unit	62	74	83	88	88	85	81	75
House Generator	81	83	90	82	81	77	70	70
Generator KD3000	92	115	115	117	118	117	113	108



Simulations

3 simulations were ran in total, with results shown both in dB(A) (dB(A) is a frequency weighting standard that approximates human hearing at normal listening levels) as described below:

1. Normal Operating conditions. All rooftop equipment running.
2. Test conditions. All rooftop equipment running plus 1 emergency generator nearest property line
3. Emergency conditions. All rooftop equipment and generators running.

Highest dB(A) predicted at property line:

	Normal Operations	Test Conditions	Emergency Conditions
North	55	56	59
Northwest	47	47	50
Southwest	54	54	56
South	51	51	53
East	53	53	53

RECOMMENDATIONS

In addition to the requirement set by the county to install all equipment with the low sound fan options, mufflers on exhaust stacks, and generators within the sound rated enclosures, we recommend implementing a parapet that is at least 9' 6" above the roof level to fully block line of sight to the roof top equipment and help mitigate the sound level from such.

With this, and equipment that does not exceed the modeled levels, we anticipate that the data center during normal operating conditions would be noticeably quieter than the industrial limits that are currently placed on the site. With the proper selection of generator enclosures, this data center should also be able to not exceed the industrial limits even during an emergency condition where all generators are operating.

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APPENDIX A - DEFINITIONS

A-weighted Sound Level (dB(A))

A unit of sound level that measures how loud a sound is perceived by the human ear. It is a weighted measurement that adjusts the raw decibel reading to account for the fact that human hearing is less sensitive to very low and very high frequencies than it is to mid-range frequencies.

C-weighted Sound Level (dB(C))

A unit of sound level that measures how loud a sound is perceived by the human ear at higher sound levels, where hearing is relatively flatter across frequencies. It applies a gentler weighting than A-weighting, reducing the correction of low and high frequencies and providing a measurement that better represents loud or bass-rich sounds.

Leq

The equivalent continuous sound level is the sound level in decibels, having the same total sound energy as the fluctuating level measured. Leq is also known as the time-average sound level (LAT).

LAeq

The A-weighted, equivalent continuous sound level, in decibels having the same total sound energy as the fluctuating level measured.

Frequency Spectrum

A representation of sound energy distribution as a function of frequency, typically displayed in one-third-octave bands.

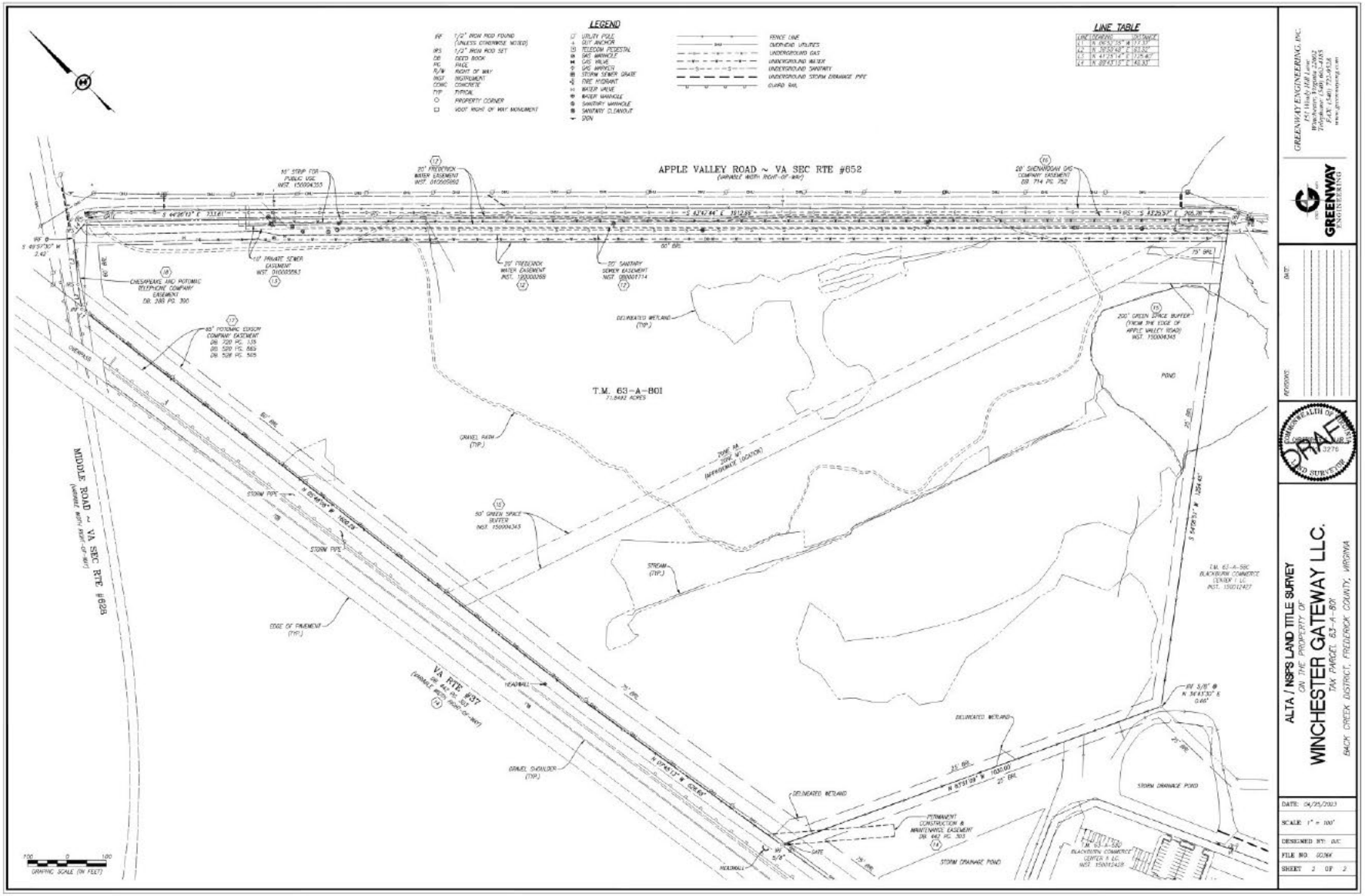
Sound Power

The total acoustic energy emitted by a source per unit time, expressed in watts. It is an inherent property of the source and does not depend on distance or environment.

Sound Pressure

The local variation in atmospheric pressure caused by a sound wave, measured in pascals (Pa). It represents the force of the sound on a surface area and is what the human ear perceives as loudness.

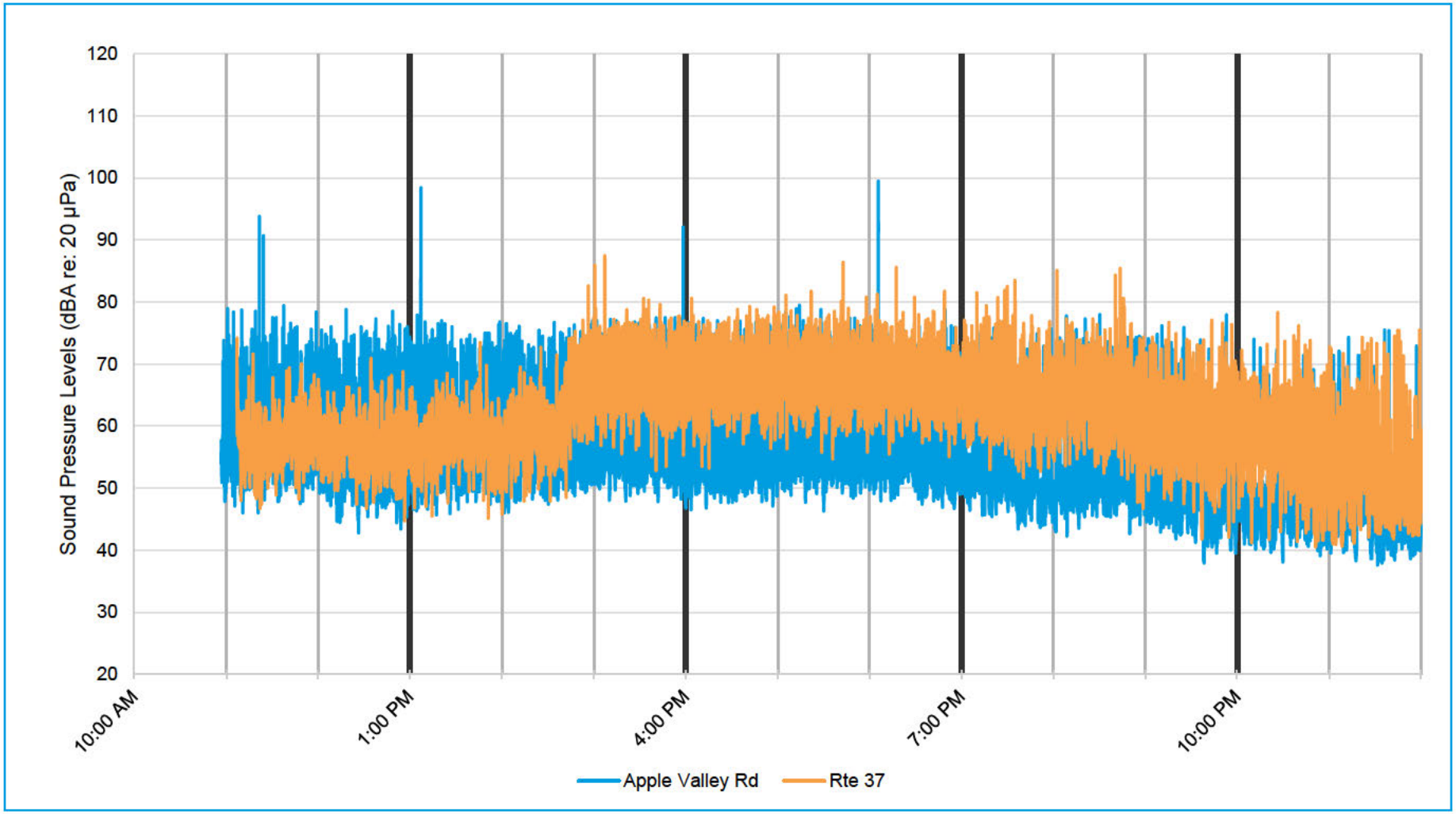
APPENDIX B– SITE PLAN



APPENDIX C– MEASUREMENT LOCATIONS

APPENDIX D

10.22.2025 Logged Data – 1 second L_{eq}



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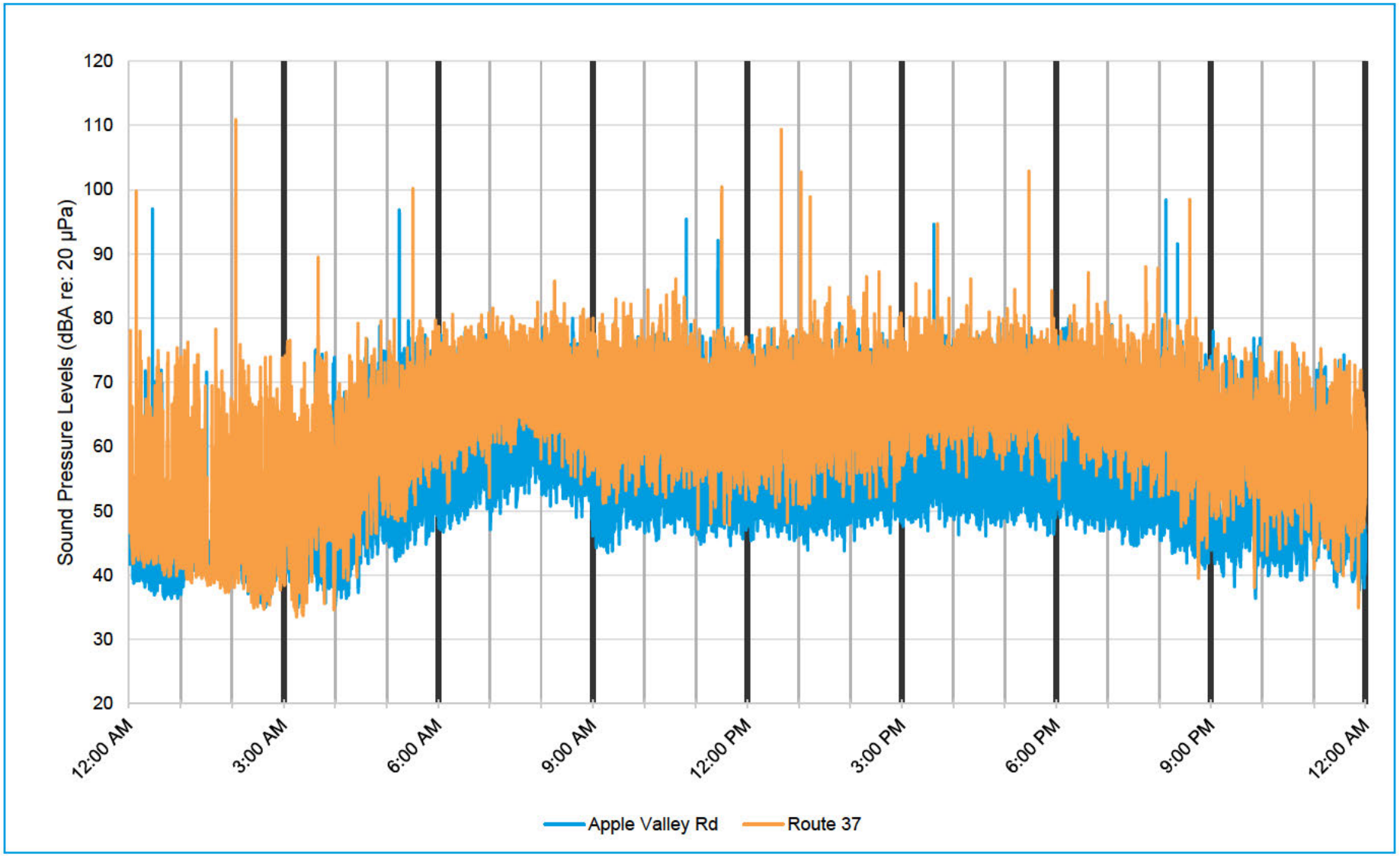
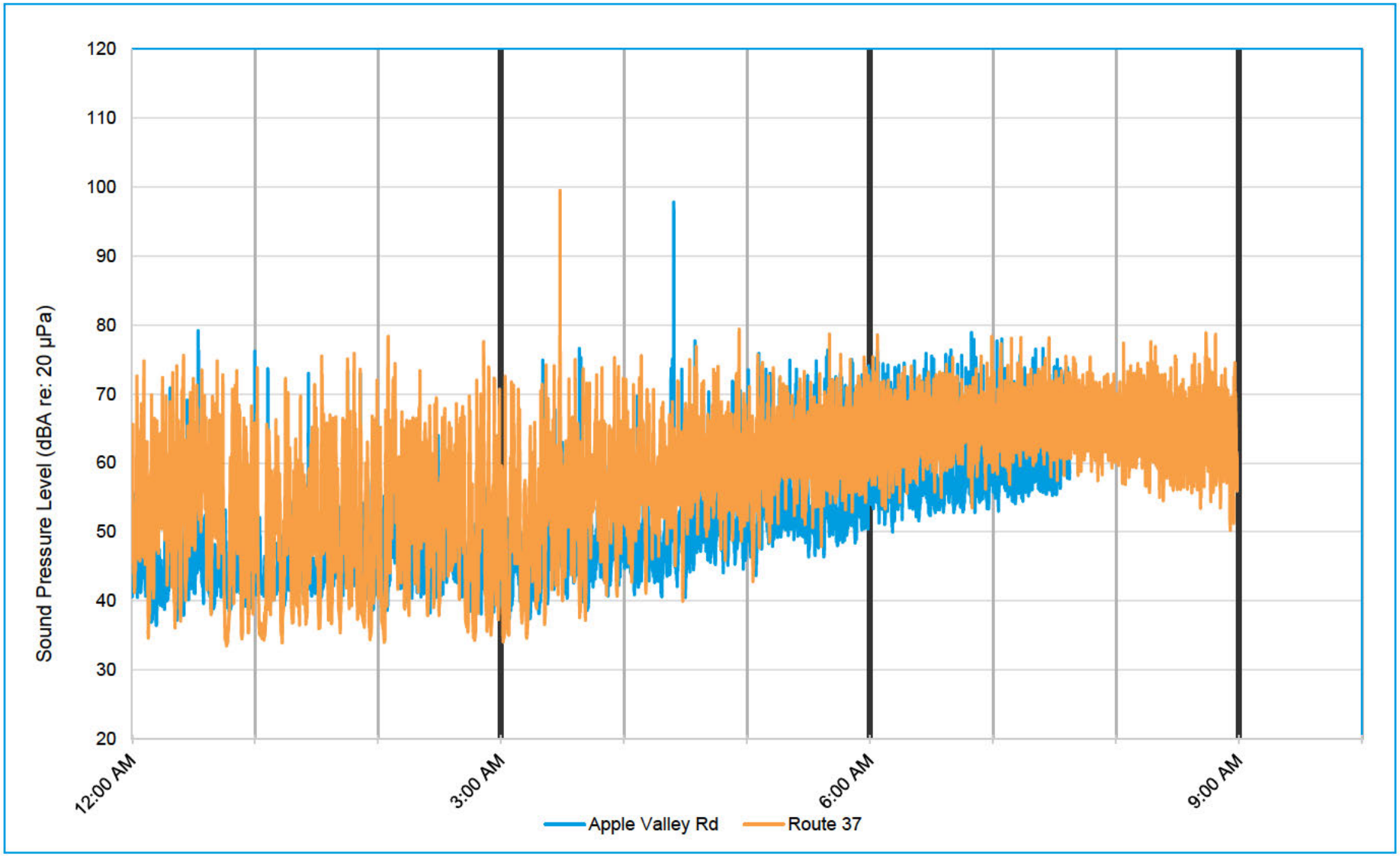
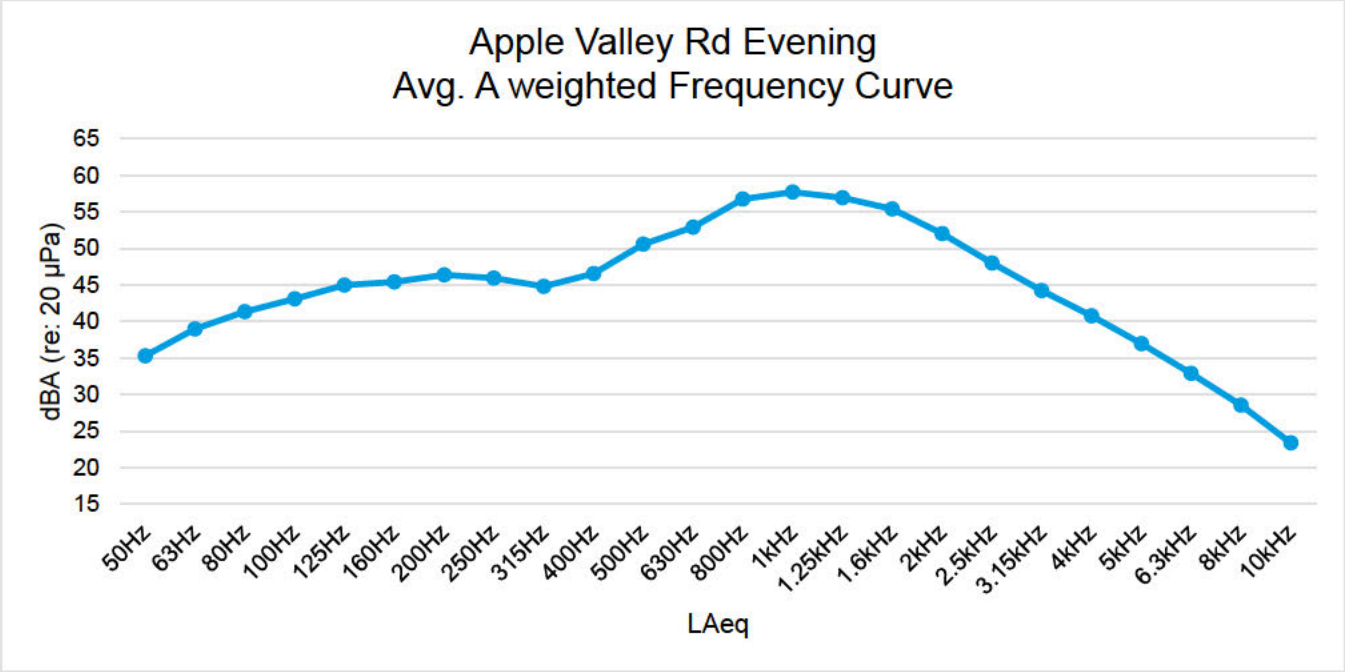
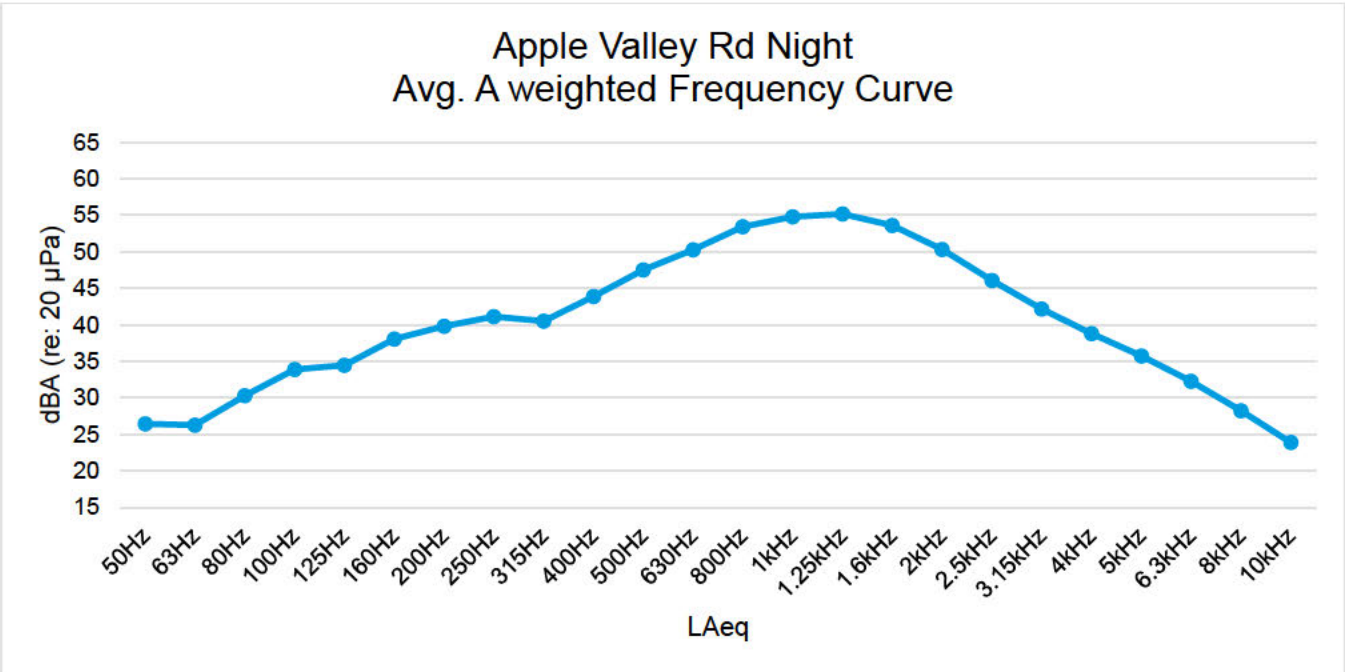


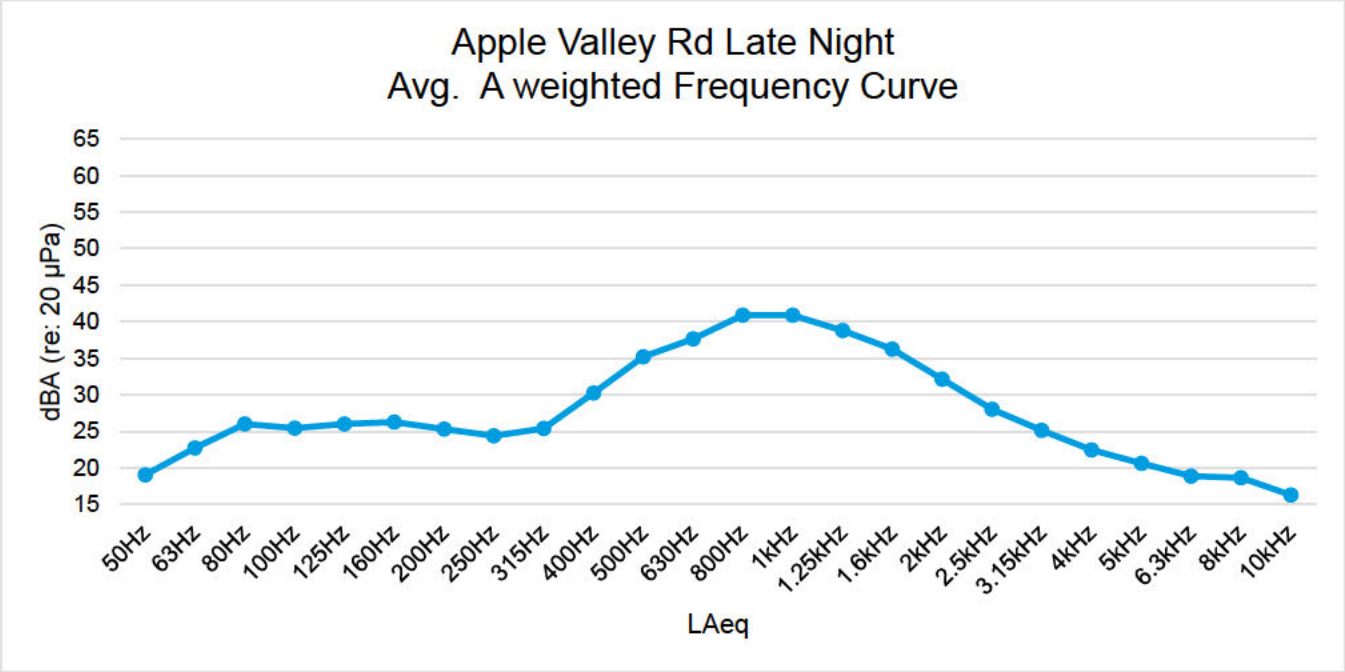
10.24.2025 Logged Data – 1 second L_{eq}



APPENDIX E– SPOT CHECK FREQUENCY DATA

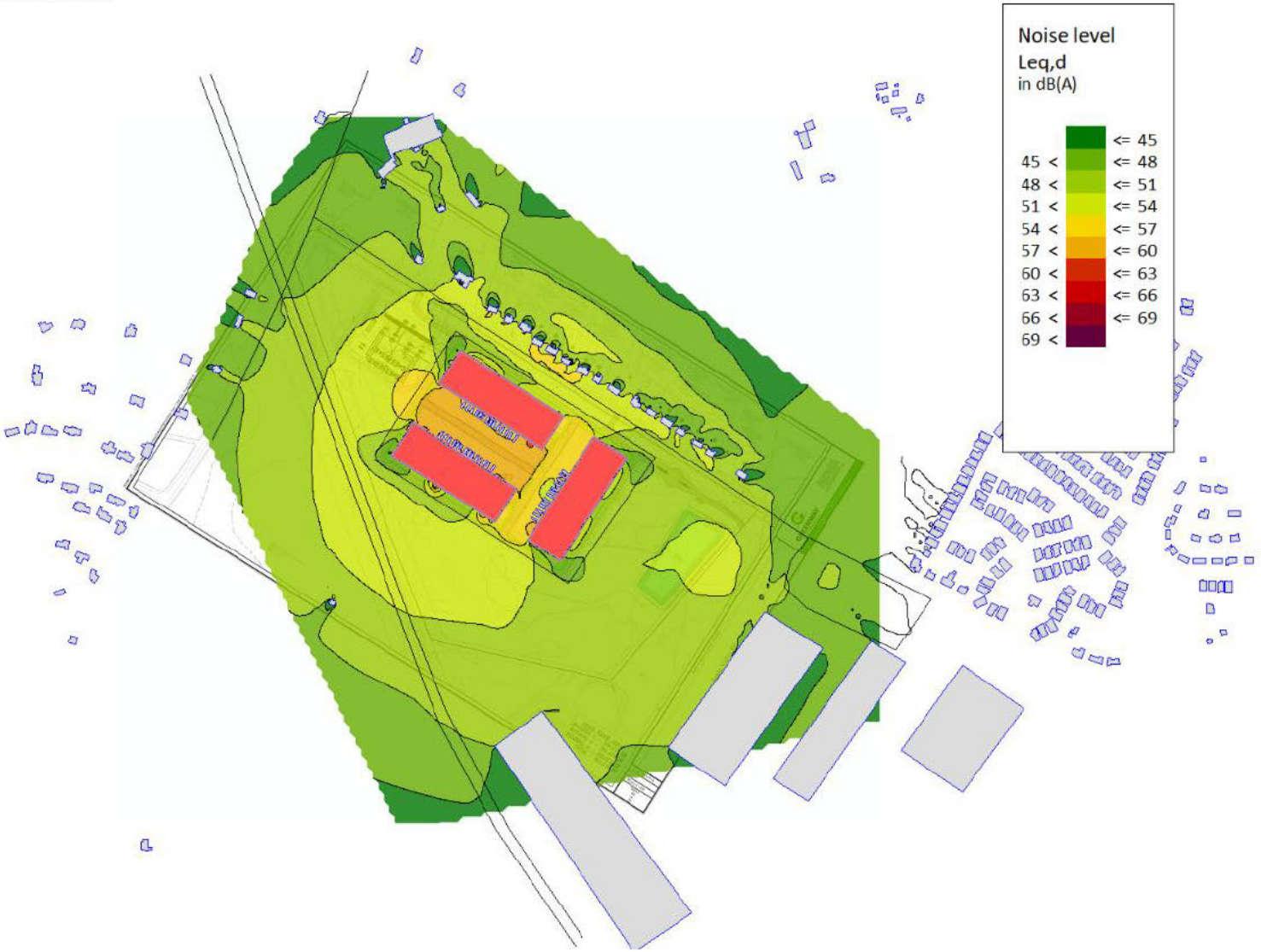




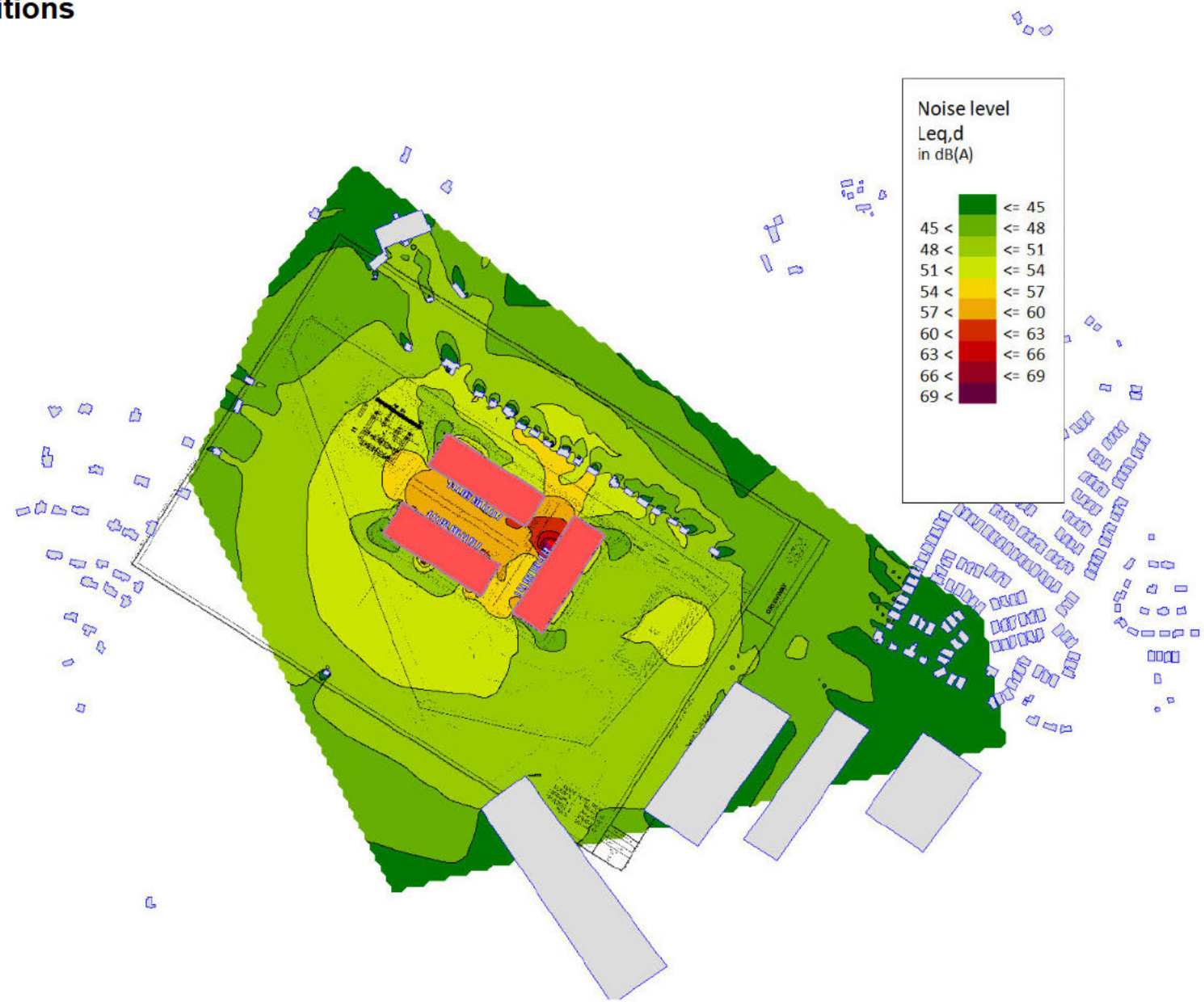

Apple Valley Rd Late Night
Avg. A weighted Frequency Curve
dBA (re: 20 µPa)
65
60
55
50
45
40
35
30
25
20
15
50HZ
63HZ
80HZ
100HZ
125HZ
160HZ
200HZ
250HZ
315HZ
400HZ
500HZ
630HZ
800HZ
1kHZ
1.25kHZ
1.6kHZ
2kHZ
2.5kHZ
3.15kHZ
4kHZ
5kHZ
6.3kHZ
8kHZ
10kHZ
LAeq

APPENDIX F – PREDICTED SOUND LEVEL MAPS

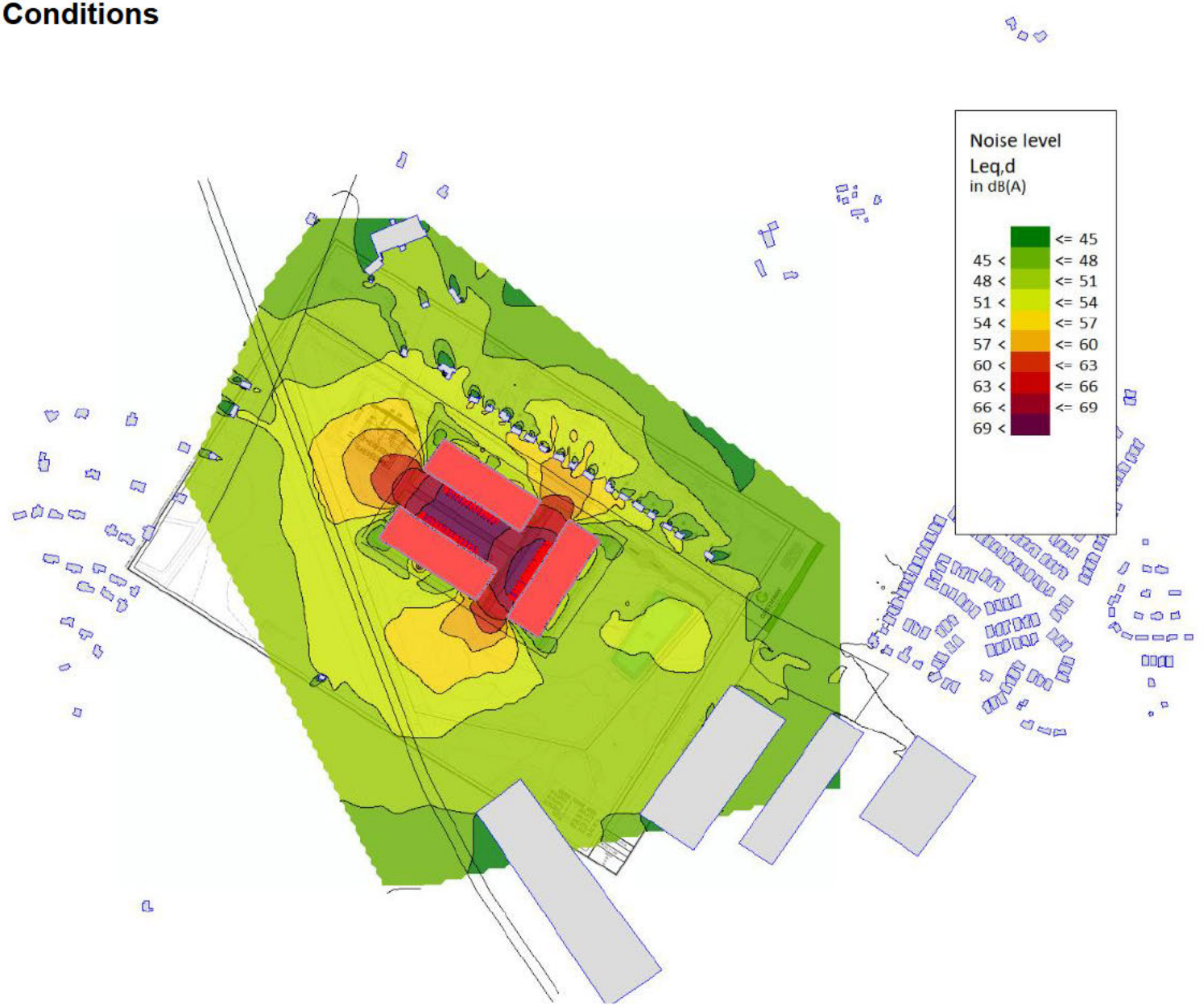
Normal Operations



Test Conditions



Emergency Conditions



Addendum

Winchester Gateway Data Center – 2565-00642

INTRODUCTION

This report is to provide supplemental information to the previous report dated November 24th, 2025 based on the comments from Cerami dated December 5th, 2025.

APPLICABLE NOISE ORDINANCE

In addition to the sound requirements set forth in the Frederick County Legislation, this project is also subject to the requirements stipulated in the Code of Ordinances for Winchester, Virginia, the applicable sections of both documents have been included in Appendix A.

As the maximum sound levels according to the Winchester Code of Ordinances are more stringent than the Frederick County limits, this project will be held to those levels, but the reporting requirements stipulated in the Frederick County Legislation.

ADDITIONAL SUPPORTING DOCUMENTATION

The Cerami report, dated December 5th, 2025, requested additional documentation including manufacturer cut sheets for mechanical source sound levels and sound attenuation levels of the mufflers or silencers used to achieve the presented levels. This is information that would be provided after the full project design has been completed, this is a preliminary study to fulfill the requirements of Part II.165.204.41-1-A of the Frederick County Legislation to show the project can feasibly achieve the requirements of the local ordinances.

As the Frederick County Legislation also includes requirements for low-noise emission fans, acoustic wraps around any compressors or oil separators, and visual screening and/or acoustic screening for all equipment, these were included in our model and the results of equipment operating without these mitigation efforts should not be up for discussion.

EXISTING CONDITIONS

The previous measurements that were completed from October 22nd-24th, 2025 included both the spot measurements and two different logging meters that were capturing data every second. Additional metrics including the hourly L_{eq}, L_{90}, L_{10}, L_{min}, and L_{max} were calculated and are included in Appendix B. Note that the 24 hour L_{eq} was not included as it would be so driven by the traffic noise that it would not provide an accurate picture of what occurs during the nighttime hours.

The quietest single hour L_{eq} that was measured along Apple Valley Road, nearest the residences, during our time on site was 45 dBA, however, during this same hour the L_{max} was measured at 56 dBA. This shows that there is still noticeable traffic over those nighttime hours that generates noticeable amounts of noise. That peak noise was likely caused by an emergency vehicle siren as that same hour had a corresponding spike at the meter along Route 37 at 111 dBA.

ADDITIONAL MODELING

Additional plots from our acoustic model that include the contribution of the existing noise sources (namely traffic noise along Route 37 and Apple Valley Road) are included in Appendix C. These plots show the different conditions either during typical daytime hours or the quietest nighttime hour.

The only combination that was not included in this is the single generator test condition with nighttime minimum levels as all maintenance testing of the generators will occur during daytime hours.

As this is a representative data center design and not a design that has been fully vetted by all engineering disciplines, it is premature to provide the representative residential point receivers. The approximate impact levels can be seen on the noise sound level maps. The intent of this report is to show the feasibility of the proposed project achieving the limits imposed by the relevant ordinances.

DISCUSSION

The sound level predictions show that there is a feasible path to meeting the noise limits imposed by both the Frederick County Legislation and the Winchester, Virginia Code of Ordinances. During daytime hours, the average noise levels at the property line are anticipated to be in the 66-69 dBA range due to the combination of existing traffic noise along Apple Valley Road and the equipment from the data center.

During the nighttime hours, while the sound levels from the data center will be below the 60 dBA limit, the activity from the data center equipment will significantly raise the L_{min}, L_{90}, L_{eq} and L_{10} and be a clear change in the existing conditions. The peak levels from sirens, motorcycles and heavy vehicles along Route 37 will be reduced because the buildings will provide some acoustic shielding.

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APPENDIX A – APPLICABLE ORDINANCES

Frederick County Legislation Part II Chapter 165 Part 204.41 for Data Center projects as of December 10th, 2025:

A. Prior to the approval of a rezoning application or conditional use permit, the following shall be provided:
(1) A site assessment to examine the sound profile of the data center on residential units and schools located within 500 feet of the data center property boundary in accordance with Subsection E.
B. Generator testing and cycling shall be limited to weekdays (Monday to Friday) between the hours of 8:00 a.m. to 5:00 p.m. Notwithstanding the foregoing, all noise generated by any on-site generator shall comply with County Code § 165-201.12. [Section 165-201.12.H Specifies a property line limit that shall not exceed 70 dBA.]
C. Mechanical equipment.
(1) Location. Ground-mounted mechanical equipment shall be prohibited in the primary setback.
(2) Screening. Ground-mounted and rooftop mechanical equipment shall be screened from public roadways and adjoining properties on all sides.
(3) Generators. All generators shall be enclosed with a manufacturer-approved enclosure or located within the primary structure.
(4) Other mechanical equipment. An opaque screen shall be provided by either the principal building, louvered wall, or equivalent screen approved by the Zoning Administrator. The maximum height of the opaque screen should correspond to the tallest piece of equipment being shielded from view.
D. Setback and screening requirements.
(1) Structures must be set back at least 200 feet from the common property line when adjoining land is zoned RA, RP, R4, R5 and MH1. Otherwise, the base zoning district dimensional standards shall apply.
(2) A category C full-screen-type buffer shall be provided around the perimeter of the property. If the adjoining property is zoned B3, TM, M1, or M2, no buffer is required.
E. Noise and noise monitoring.
(1) The applicant shall submit an Environmental Noise Impact Assessment prepared by a qualified full member of the Acoustical Society of America (ASA), a member of the Institute of Noise Control Engineering (INCE), or a member of the National Association of Acoustical Consultants (NCAC). The purpose of such noise impact assessment, modeled in SoundPLAN, CadnaA, or accepted equivalent, shall model anticipated noise levels as a result of facility operation and establish a baseline noise level prior to approval of a rezoning or conditional use permit.
(2) A noise study certifying noise levels shall be conducted 12 months after the issuance of the first certificate of occupancy (CO) and every five years thereafter. Each noise study shall be submitted for review to the Zoning Administrator and/or his/her designee to assess the actual impact of the completed project.
(a) The measurement of sound or noise pursuant to this section shall be as follows:
[1] The measurement of sound or noise shall be made with a Type 1 or Type 2 sound level meter which meet the standards prescribed in ANSI S1.4:2014, Specification for Sound Level Meters. The instruments shall be maintained in calibration and good working order. A minimum of three sound level readings shall be taken. The average of these readings will be used as the average sound level. If the background noise is equal to the levels set forth in this section, 3 dB shall be subtracted out of the average sound level.
[2] The slow meter response of the sound level meter shall be used to determine that the average amplitude has not exceeded the dBA readings or the limiting noise spectra set forth in this section.

[3] Unless otherwise specified, the measurement shall be taken at the property boundary on which such noise is generated.

(b) Any additions, alterations, or expansion of a facility or its equipment shall require a new noise impact assessment to be submitted and approved by the Zoning Administrator.

(c) If the post construction noise study exceeds the maximum noise level permitted, additional noise mitigation strategies, improvements, or operational changes shall be required.

(3) Any equipment necessary for cooling, ventilating, or otherwise operating the facility, including power generators or other power supply equipment on the property, whether ground-mounted or roof-mounted, shall include the following noise-mitigation elements:

(a) Low-noise emission fans.

(b) Acoustic wraps for compressors and oil separators.

(c) An acoustic perimeter, which may include a perimeter around a group of individual chillers, which may be louvered or solid.

(d) Other sound-attenuation measures as approved by the Zoning Administrator.

The owner shall provide documentation, in the form of technical specifications, photographs, and/or engineered plans, of the above mitigation measures contained in Subsection E(3) with each building permit for a data center building on the property and shall further provide documentation that such measures have been installed concurrently with each occupancy.

Winchester, Virginia – Code of Ordinances Chapter 17 as of December 3rd, 2025:

Sec. 17-6. - Noises prohibited—Enumeration.

The following acts shall be unlawful:

(4) To permit, operate, or cause any source of sound to create a sound level in another person's residential dwelling in excess of 65 dBA when measured inside the receiving structure at least four feet from the wall nearest the source, with doors and windows to the receiving area closed.

Sec. 17-7.1. - Maximum nighttime sound levels in residential zones.

No person shall operate or cause any source of sound in such a manner as to create a sound level in a residential zone during the hours between 10:00 p.m. and 6:00 a.m. in excess of 60 dBA when measured at the property boundary of the receiving land. The foregoing shall not be deemed to include sound generation from any bona fide agricultural activity, including noise caused by livestock.

APPENDIX B – 1-HOUR METRICS

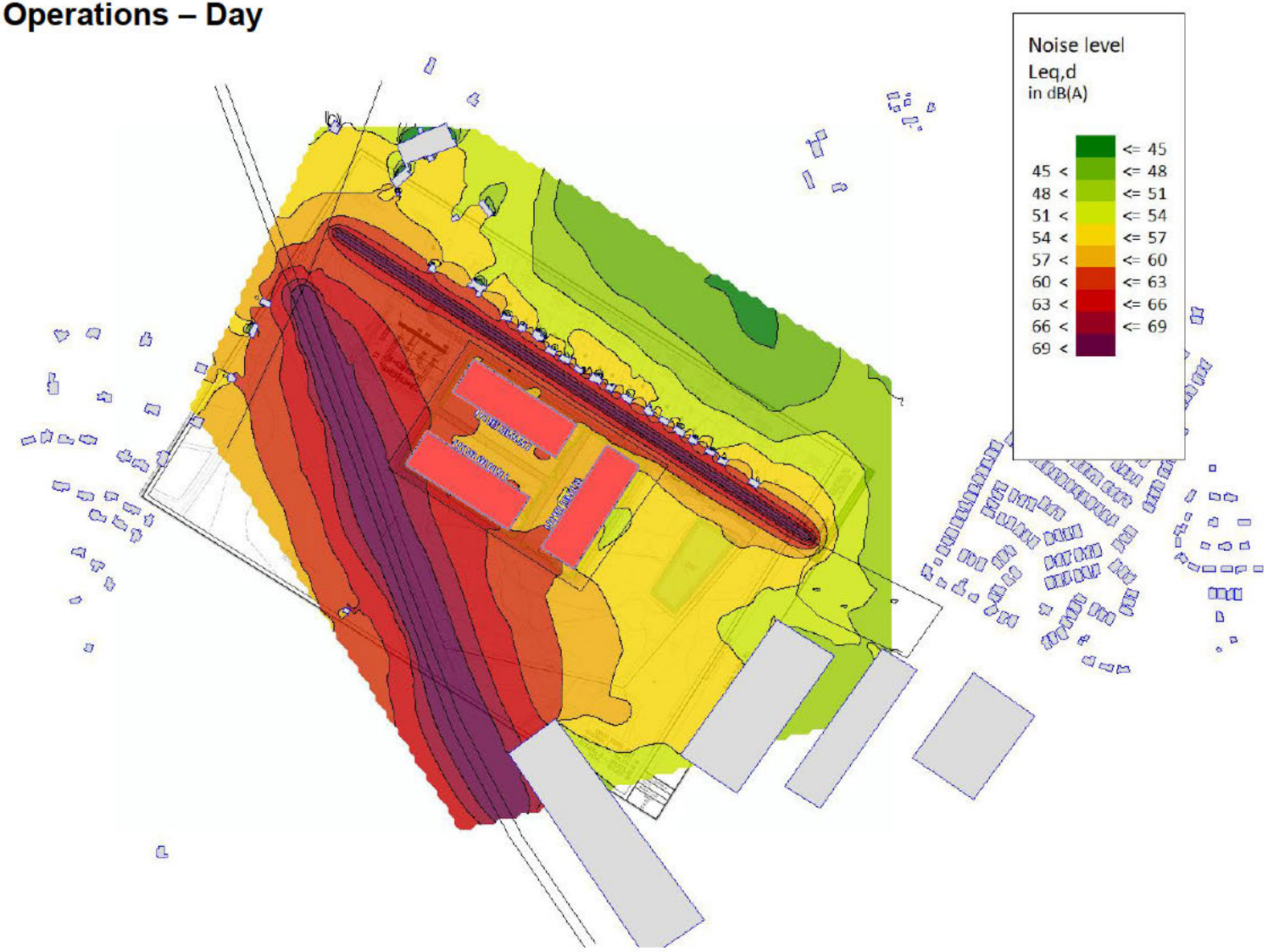
The previous measurements that were completed from October 22nd-24th, 2025 included both the spot measurements and two different logging meters that were capturing data every second. The following additional metrics were calculated based on those logged results.

Date	Hour	Apple Valley Road					Route 37				
		L_{min}	L_{90}	L_{eq}	L_{10}	L_{max}	L_{min}	L_{90}	L_{eq}	L_{10}	L_{max}
10/22/2025	11:00	46	51	66	64	94	47	53	59	62	74
	12:00	43	48	62	65	79	45	52	59	62	71
	13:00	46	50	67	63	98	45	53	59	62	74
	14:00	46	51	63	67	77	46	55	65	69	83
	15:00	47	51	66	70	92	53	63	70	73	88
	16:00	47	50	64	70	77	53	62	70	73	81
	17:00	46	51	65	70	80	55	63	70	73	86
	18:00	47	50	69	68	100	55	62	69	72	86
	19:00	43	47	59	57	76	52	58	67	71	84
	20:00	42	47	61	61	78	47	56	67	70	85
	21:00	38	43	57	56	78	42	52	63	67	77
	22:00	38	42	52	52	74	41	48	61	65	78
	23:00	38	41	54	53	76	41	44	59	62	76
10/23/2025	0:00	36	38	64	49	97	40	42	68	60	100
	1:00	37	40	45	46	72	37	40	57	59	78
	2:00	35	37	44	48	56	35	38	79	62	111
	3:00	35	37	51	50	75	34	37	62	62	90
	4:00	35	41	55	53	79	39	49	61	65	80
	5:00	42	47	67	59	97	48	55	71	70	100
	6:00	47	51	62	63	79	51	61	70	73	81
	7:00	47	53	64	68	78	58	65	71	74	83
	8:00	46	54	65	70	80	54	62	71	74	86
	9:00	44	48	62	65	79	51	59	69	72	83
	10:00	45	49	66	64	95	52	59	69	72	86
	11:00	45	49	64	65	92	47	57	71	71	101
	12:00	45	49	63	68	78	48	58	77	71	109
	13:00	44	48	62	63	79	50	58	75	73	103

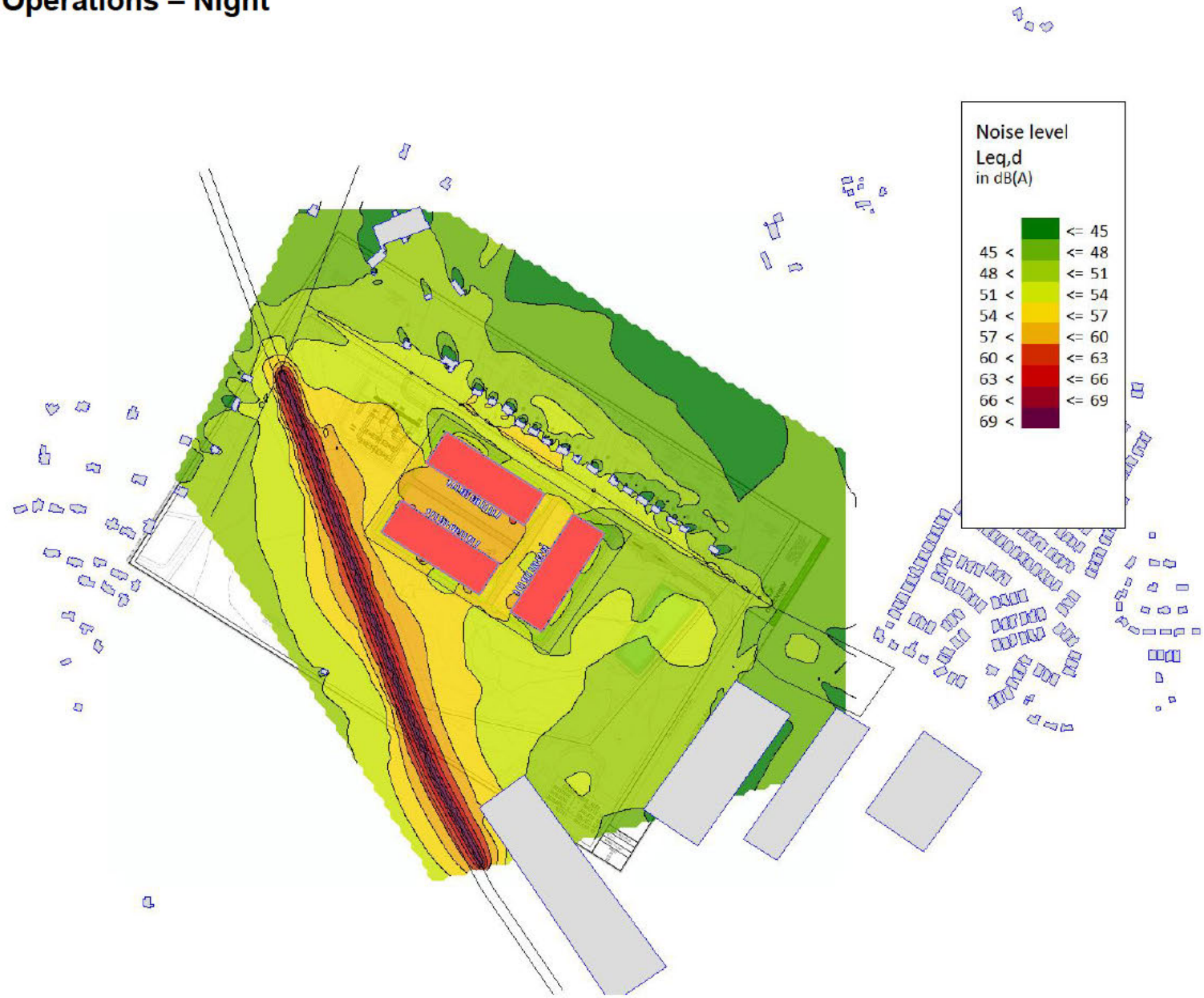
	14:00	45	50	64	69	78	51	60	70	72	87
	15:00	47	51	66	71	95	56	63	71	74	95
	16:00	46	50	65	70	79	55	64	71	74	86
	17:00	46	50	64	69	79	55	64	74	74	103
	18:00	47	50	63	66	80	52	63	70	73	87
	19:00	45	48	61	61	79	52	59	69	72	88
	20:00	41	46	67	59	98	40	54	69	71	99
	21:00	36	43	58	59	78	38	54	63	67	77
	22:00	39	43	52	52	75	43	52	62	66	76
	23:00	38	42	54	54	74	35	47	61	65	75
10/24/2025	0:00	36	40	53	51	79	34	40	60	64	76
	1:00	39	41	51	51	74	34	37	58	61	76
	2:00	38	41	49	52	64	34	39	59	62	78
	3:00	37	41	52	52	77	34	40	67	62	100
	4:00	41	45	66	55	98	40	52	61	64	79
	5:00	44	50	59	59	76	43	56	64	67	79
	6:00	50	54	62	62	79	53	60	66	69	79
	7:00	53	56	61	64	78	57	62	68	70	78
	8:00	-	-	-	-	-	50	58	67	70	79

APPENDIX C – SOUND LEVEL MAPS WITH EXISTING SOURCE CONTRIBUTIONS

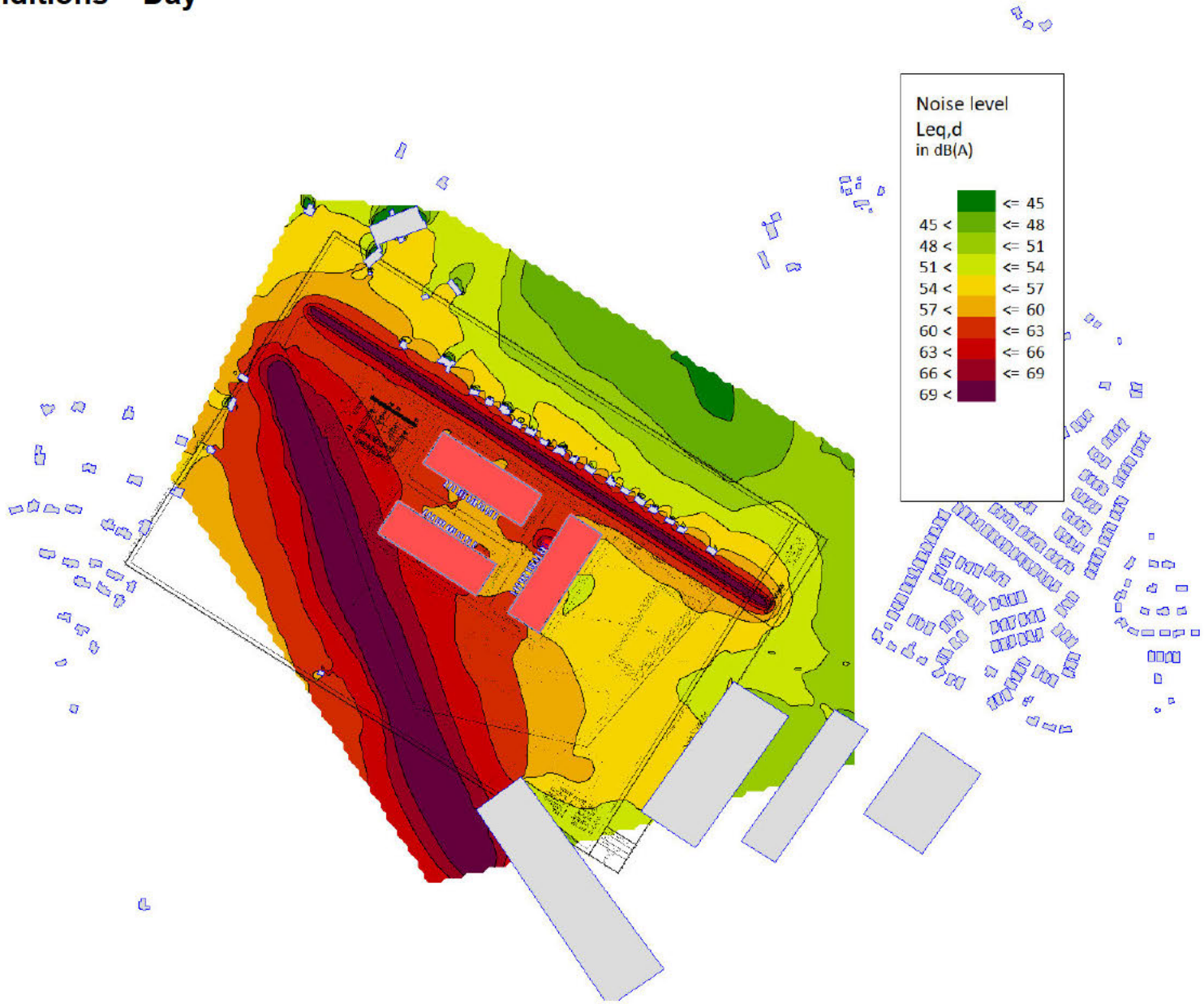
Normal Operations – Day



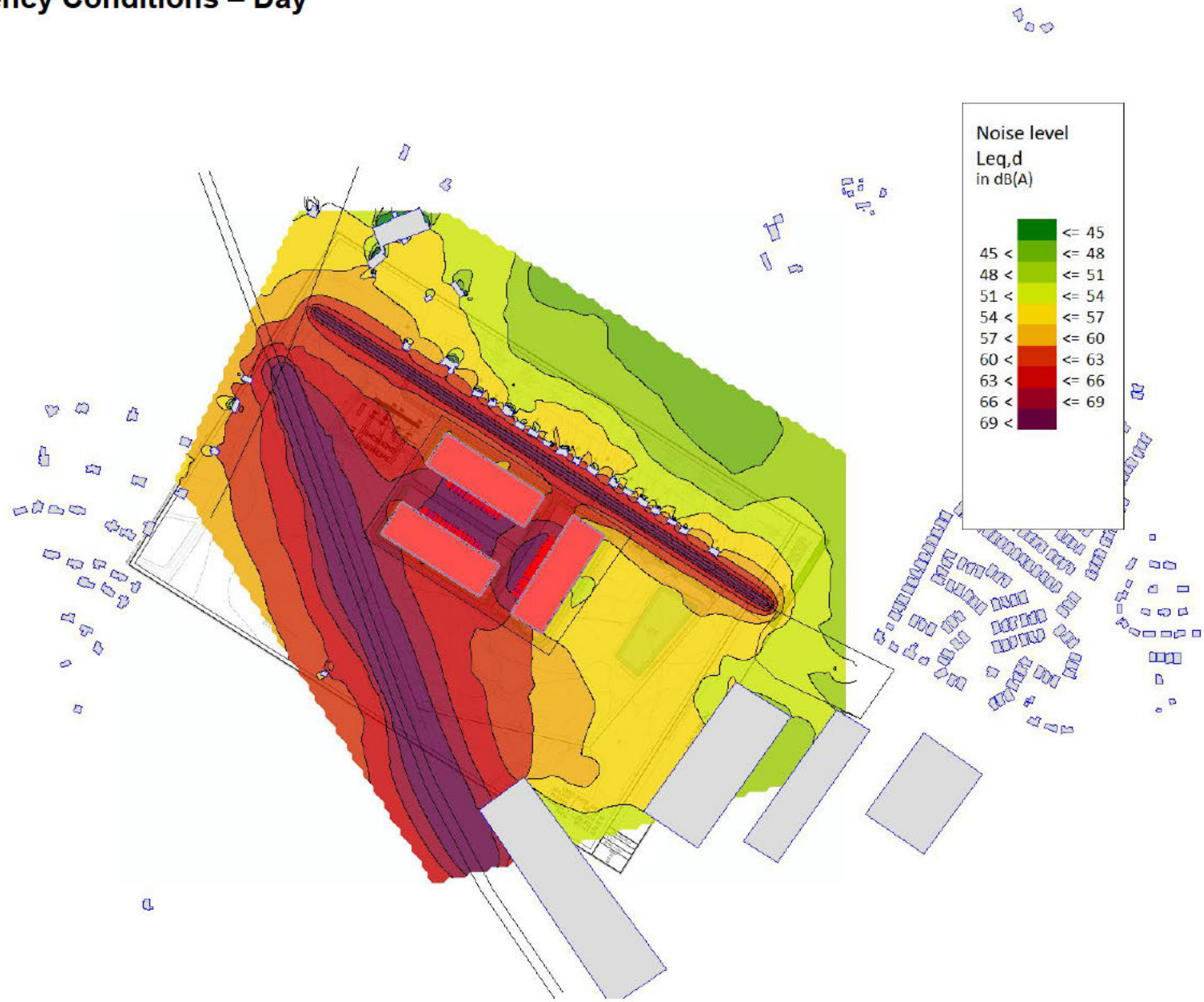
Normal Operations – Night



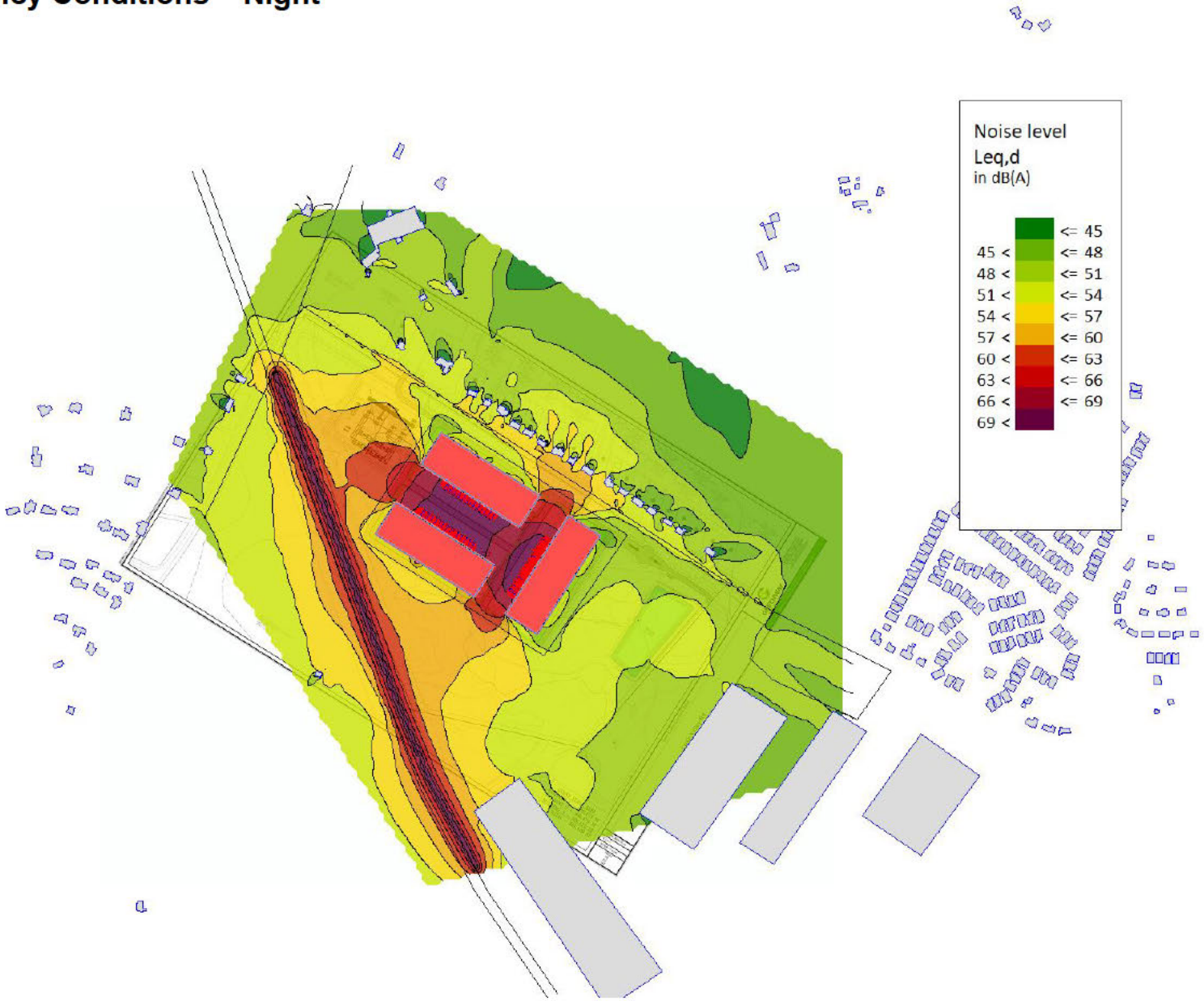
Test Conditions – Day



Emergency Conditions – Day



Emergency Conditions – Night



Addendum 2

Winchester Gateway Data Center – 2565-00642

INTRODUCTION

This report is to provide supplemental information to the previous report dated November 24th, 2025 based on the comments from Frederick County dated January 23, 2026.

METHODS AND EQUIPMENT

The spot measurements were done using a type 1 sound level meter to collect frequency data:

- SLM 1
  - Brüel and Kjær 2250 serial # 2506423
  - Mic type Brüel and Kjær 4189 serial # 2933077
  - Field calibrated

The 24 hour unattended measurements were done using type 2 sound level meters using 1 second logging:

Equipment:

- LSLM 1
  - Extech SDL600 serial # 453092
  - Field calibrated
- LSLM 2
  - Extech SDL600 serial # 453045
  - Field calibrated
- Microphone Calibrator
  - B&K 4231 serial # 2518080

MEASUREMENT LOCATIONS

Short term measurements were taken along Middle Rd see Appendix C. The measurement at the Northeast corner was in line with the other measurements along Route 37 and the measurements at the Northwest corner was in line with the other measurements along Apple Vally Rd.

These primary sources at each corner were identified to be either Route 37 and Apple Valley Rd respectively, and the sound was characterized in each of those categories.

PROPERTY LINE PREDICTIONS

Daytime noise level (dBA) at property line inclusive of existing ambient traffic levels:

	Normal Operations	Test Conditions	Emergency Conditions
North	65	66	66
Northwest	65	65	65
Southwest	70	70	70
South	54	54	56
East	65	65	65

Nighttime noise level (dBA) at property line inclusive of existing ambient traffic levels:

	Normal Operations	Test Conditions	Emergency Conditions
North	55	56	59
Northwest	47	47	50
Southwest	59	59	60
South	51	51	53
East	53	53	53

EQUIPMENT

The equipment selection indicated here is preliminary and while indicative of potential intent, will undergo substantial changes, in either (or both) quantities of equipment and equipment selections, once a mechanical engineer has completed a full design package. The cutsheets for the equipment used in this study is included on the following pages.

Significant quantities of mechanical sources of noise were placed according to the layout on page 10 of the initial report.

Contributors:

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CRAC Submittal

[redacted]

Presented to:

[redacted]

Equipment Manufacturer
AboveAir Technologies
5179 Mountville Rd
Frederick, MD 21703

Manufacturer's Representative
AirReps, LLC
3290 146th Place SE, Suite F
Bellevue, WA 98007

Date: 11/14/2024 - Rev. 1

AboveAir Technologies, LLC

5179 Mountville Road., Frederick, Maryland 21703 USA
Tel: 301-874-1130 Fax: 301-874-1131

FOR APPROVAL - EQUIPMENT SUBMITTAL

Project: [redacted]

Engineer: N/A

Contractor: [redacted]

AboveAir Rep: Air Reps, LLC

AboveAir Technologies Equipment:

Tag: CRAC-1-1,2,3,4; Qty. Four(4)

Model MCE-097D-4-ESH-AE-1D-EC-DFB-E, 27.5 Ton Nom., MC2 MissionCritical™, Split DX Evaporator, (460/3/60) w/ Qty. Four(4) **Model XPX-097D-4-00-00-00-VF-FL**, DX-Air Cooled Remote Outdoor Condenser, (460/3/60).

Tag: CRAC-1-5,6; Qty. Two(2)

Model MCE-105D-4-ESH-AE-1D-EC-DFB-E, 30.0 Ton Nom., MC2 MissionCritical™, Split DX Evaporator, (460/3/60) w/ Qty. Two(2) **Model XPX-105D-4-00-00-00-VF-FL** DX-Air Cooled Remote Outdoor Condenser, (460/3/60).

Note:
If applicable, Compressor Sound Jacket, Voltage/Phase Monitor, Hose Kit, Spare Filters, Refrigerant piping, Secondary Drain Pans, Rigging, Installation, Labor & Labor Warranty to be supplied by others.

AboveAir Technologies **Date:** November 14, 2024

Submitted by:

Submittal Comment Responses

11/14/2024 - Rev 1

1. The correct condenser nomenclature is XPX. The XP2 nomenclature in the spec is a previous model number for the same unit. AboveAir doe not have an updated spec reflecting the change. There is no effect to the equipment being provided.
2. Updated unit tags to “CRAC”.
3. Yes, all units provide 15,000 CFM of cooled air at the specified altitude.
4. There factory mounted temperature sensor in the mixed air section of the unit to meaure the temperature from the mixing box for economizer control.
5. 24V, 100VA transformers were coordinated for previouly approved sites. I discussed with Lu at Salas and he approved proceeding with 24V. Once actuator submittals are received he will confirm sufficient transformer capacity.
6. Humidifiers were revised to 30 lbs/hr capacity with no impact to cost.
7. AboveAir does not offer a labor warrany. Labor warranty will be provided by Air Reps.

Unit Tag	CRAC-1-1,2,3,4	Project	[redacted]
Evap Model, Qty (4)	MCE-097D-4-ESH-AE-1D-EC-DFB-E	Engineer	Salas O'Brien
Cond Model, Qty (4)	XPX-097D-4-00-00-00-VF-FV	Contractor	TBD
Jnit Type	27.5 Ton (Dual/Lead Digital) Nom. MC ACU w/ Split Condenser	AboveAir Rep	Air Reps (Zach Levine)
		Date	14-Nov-24

Electrical Data	**65k SCCR**
Evap Section Power	460-480/3/60
Evap Nameplate	101.5 FLA | 116.7 MCA | 125 MOP
Cond Section Power	460-480/3/60
Cond Nameplate	9.3 FLA | 11.6 MCA | 20 MOP

Design Ambient Conditions

Summer	104.6°F DB / 78.4°F WB
Winter	-2.0°F DB

Design Space/Return Conditions

Cooling	85.0°F DB / 67.0°F WB
Heating	70.0°F DB

Supply Air Fan Data

Total Airflow Rate	15,000 cfm 164' Altitude
Outdoor Airflow Rate	00 cfm OA / 0.0%
ESP / TSP	0.30 in w.g. / 1.23 in w.g.
Fan Type, Qty (3)	ECM Direct Drive BI Impeller
Motor kW / FLA (Each)	4.5 kW / 5.9 FLA
Fan Speed Control	Constant Speed

Cooling Coil Data

Gross Capacity	357.5 TMBh / 354.8 SMBh
Net Capaticty	341.1 TMBh / 338.4 SMBh
Mixed EAT	85.0°F DB / 67.0°F WB
Coil LAT	63.2°F DB / 59.4°F WB
Condensate Flow	6.8 lb/hr
Face Area / Rows / FPI	28.2 ft² / 3 / 12
Construction	Aluminum Finned, Copper Tube

Hot Gas Reheat Coil Data

Capacity	N/A
LAT (@ Max Output)	N/A
Face Area / Rows / FPI	N/A
Construction	N/A
Control	N/A

Compressor Data

Comp 1 Type	Digital Scroll
Comp 1 LRA / RLA	150.0 LRA / 23.1 RLA
Comp 2 Type	Fixed Speed Scroll
Comp 2 LRA / RLA	150.0 LRA / 23.1 RLA
Location	Evaporator Section
Refrigerant Type	R-410a

Condenser Data

Total Heat of Rej.	454.8 MBh
Coil Construction	Aluminum Finned, Copper Tube
Airflow	22,000 cfm @ 0.00 in w.g. ESP
Fan Type, Qty (2)	ECM Axial Fan
Low Ambient Control	Variable Speed Fan (-20°F)
Motor kW / FLA (each)	3.4 kW / 4.7 FLA

Dual Cool Coil Data

Gross Capacity	N/A
Net Capacity	N/A
EAT / LAT	N/A
EWT / LWT	N/A
GPM @ Ft Hd	N/A
Fluid Type	N/A
Face Area / Rows / FPI	N/A
Construction	N/A
Control Valve	N/A
Control Valve Cv	N/A

Unit Mounted Heat Data

Type	SCR Electric Heat
Capacity / FLA	30.0 kW / 37.7 FLA
Operation	Reheat/Heat
EAT / LAT	63.2°F / 69.5°F
EWT / LWT	N/A
GPM @ Ft Hd	N/A
Fluid	N/A
Face Area / Rows / FPI	N/A
Construction	Stainless Steel Elements
Control Valve	N/A
Control Valve Cv	N/A

Humidification Data

Type	Steam Canister
Steam Capacity / FLA	30 lb/hr / 12.8 FLA
Operation	Always Available

Unit Configuration & Airflow Patterns

- Downflow: Free or Ducted Top Return/Bottom Discharge
- Top Piping Connections
- Remote Free Discharge Split Condenser
- No Plenum Box
- 12" High (Adj. 11.2"-14") Field Installed Seismic Floor Stand
- Seismic Construction, Evaporator and Condenser

Refrigerant Field Connections

Indoor Unit (Qty 2 ea.)	3/4"OD Liq & 1 1/8" OD Discharge
Indoor HG Reheat	N/A
Outdoor Unit (Qty 2 ea.)	3/4"OD Liq & 1 1/8" OD Discharge
Outdoor HG Reheat	N/A

Connection Data

Condensate Drain	1/2" OD
Humidifier Supply	1/4" OD Copper
Hot Water	N/A
Dual Cool	N/A

Air Filtration Data

Filter	Qty (4) 20x25x4 & Qty (4) 16x25x4 (Merv 13)

Physical Data

Dimensions	See attached cut sheet
Evap / Cond Weight	3100 lb / 1715 lb

Coil Coatings

- Supply Air Coils - No Coatings
- Condenser Coil - No Coatings

Factory Installed Optional Accessories

- Through-Door Main Power Disconnect (Evap Section) 65k SCCR
- Condensate Pump (48' lift)
- Firestat
- Smoke Detector
- Fused Disconnect (Cond Section) 65 kA SCCR

Field Installed Optional Accessories

- Water Detector (Probe/Spot Type)
- Neoprene Vibration Isolators (Evap Section)
- Extra Filters (1 Set)

Control Type

- MC-Series Advanced Microprocessor w/ Alarms

Control Sequence

- MC-2000S RH Std DX Temp & Humidity Control

Sensors & Displays

- Unit Mtd Human Machine Interface (HMI)
- Wall Mounted Temperature & Humidity Sensor
- Duct Mounted OA Temperature Sensor
- Unit Mounted Return Air Temperature Sensor

Control Options

- BMS Card (BACnet MSTP)
- Multi-Unit Sequencing
- Airside Economizer - Dry Bulb + Enthalpy Control

Factory Warranties (Labor Not Included)

- 1 Year Limited Parts Warranty
- Extended 2 Year (Total 3 Years) Control Board and Humidifier Warranty (Parts Only)
- Extended 4 Year (Total 5 Years) Compressor Warranty

Select Standard Design Features

- Heavy Duty Gavanneal Steel Construction
- High Efficiency Scroll Compressor
- TXV with External Equilization
- High & Low Refrigerant Pressure Safety Switches
- Stainless Steel Drain Pan with Overflow Safety Switch
- Intertek (ETL) UL STD 1995 Listed/Labeled
- Factory installed and tested controls
- Each unit factory tested per UL 1995 Requirements

System Notes

1. System ships with a dry nitrogen charge.
2. Do not install refrigerant piping based upon connection sizes. Refrigerant piping runs must be sized according to piping requirements at www.aboveairioms.com.
3. Max total equivalent line length is 150 feet.
4. Include 24V, 100VA transformer to power field provided damper.

Unit Tag	CRAC 1-5, 1-6	Project	[redacted]
Evap Model, Qty (2)	MCE-105D-4-ESH-AE-1D-EC-DFB-E	Engineer	Salas O'Brien
Cond Model, Qty (2)	XPX-105D-4-00-00-00-VF-FV	Contractor	TBD
Unit Type	30.0 Ton (Dual/Lead Digital) Nom. MC ACU w/ Split Condenser	AboveAir Rep	Air Reps (Zach Levine)
		Date	14-Nov-24

Electrical Data — **65k SCCR**

Evap Section Power	460-480/3/60
Evap Nameplate	109.2 FLA | 125.3 MCA | 150 MOP
Cond Section Power	460-480/3/60
Cond Nameplate	9.3 FLA | 11.6 MCA | 20 MOP

Design Ambient Conditions

Summer	104.6°F DB / 78.4°F WB
Winter	-2.0°F DB

Design Space/Return Conditions

Cooling	85.0°F DB / 67.0°F WB
Heating	70.0°F DB

Supply Air Fan Data

Total Airflow Rate	15,000 cfm 164' Altitude
Outdoor Airflow Rate	00 cfm OA / 0.0%
ESP / TSP	0.30 in w.g. / 1.23 in w.g.
Fan Type, Qty (3)	ECM Direct Drive BI Impeller
Motor kW / FLA (Each)	4.5 kW / 5.9 FLA
Fan Speed Control	Constant Speed

Cooling Coil Data

Gross Capacity	391.9 TMBh / 390.7 SMBh
Net Capaticty	375.5 TMBh / 374.3 SMBh
Mixed EAT	85.0°F DB / 67.0°F WB
Coil LAT	61.0°F DB / 58.6°F WB
Condensate Flow	4.6 lb/hr
Face Area / Rows / FPI	28.2 ft² / 3 / 12
Construction	Aluminum Finned, Copper Tube

Hot Gas Reheat Coil Data

Capacity	N/A
LAT (@ Max Output)	N/A
Face Area / Rows / FPI	N/A
Construction	N/A
Control	N/A

Compressor Data

Comp 1 Type	Digital Scroll
Comp 1 LRA / RLA	173.0 LRA / 26.9 RLA
Comp 2 Type	Fixed Speed Scroll
Comp 2 LRA / RLA	173.0 LRA / 26.9 RLA
Location	Evaporator Section
Refrigerant Type	R-410a

Condenser Data

Total Heat of Rej.	509.8 MBh
Coil Construction	Aluminum Finned, Copper Tube
Airflow	22,000 cfm @ 0.00 in w.g. ESP
Fan Type, Qty (2)	ECM Axial Fan
Low Ambient Control	Variable Speed Fan (-20°F)
Motor kW / FLA (each)	3.4 kW / 4.7 FLA

Dual Cool Coil Data

Gross Capacity	N/A
Net Capacity	N/A
EAT / LAT	N/A
EWT / LWT	N/A
GPM @ Ft Hd	N/A
Fluid Type	N/A
Face Area / Rows / FPI	N/A
Construction	N/A
Control Valve	N/A
Control Valve Cv	N/A

Unit Mounted Heat Data

Type	SCR Electric Heat
Capacity / FLA	30.0 kW / 37.7 FLA
Operation	Reheat/Heat
EAT / LAT	61.0°F / 67.3°F
EWT / LWT	N/A
GPM @ Ft Hd	N/A
Fluid	N/A
Face Area / Rows / FPI	N/A
Construction	Stainless Steel Elements
Control Valve	N/A
Control Valve Cv	N/A

Humidification Data

Type	Steam Canister
Steam Capacity / FLA	30 lb/hr / 10.7 FLA
Operation	Always Available

Unit Configuration & Airflow Patterns

- Downflow: Free or Ducted Top Return/Bottom Discharge
- Top Piping Connections
- Remote Free Discharge Split Condenser
- No Plenum Box
- 12" High Seismic Floor Stand

Refrigerant Field Connections

Indoor Unit (Qty 2 ea.)	3/4"OD Liq & 1 1/8" OD Discharge
Indoor HG Reheat	N/A
Outdoor Unit (Qty 2 ea.)	3/4"OD Liq & 1 1/8" OD Discharge
Outdoor HG Reheat	N/A

Connection Data

Condensate Drain	1/2" OD
Humidifier Supply	1/4" OD Copper
Hot Water	N/A
Dual Cool	N/A

Air Filtration Data

Filter	Qty (4) 20x25x4 & Qty (4) 16x25x4 (Merv 13)

Physical Data

Dimensions	See attached cut sheet
Evap / Cond Weight	3120 lb / 1715 lb

Coil Coatings

- Supply Air Coils - No Coatings
- Condenser Coil - No Coatings

Factory Installed Optional Accessories

- Through-Door Main Power Disconnect (Evap Section) 65k SCCR
- Condensate Pump (48' Lift)
- Firestat
- Smoke Detector
- Fused Disconnect (Cond Section) 65 kA SCCR

Field Installed Optional Accessories

- Water Detector (Probe/Spot Type)
- Neoprene Vibration Isolators (Evap Section)
- Extra Filters (1 Set)

Control Type

- MC-Series Advanced Microprocessor w/ Alarms

Control Sequence

- MC-2000S RH Std DX Temp & Humidity Control

Sensors & Displays

- Unit Mtd Human Machine Interface (HMI)
- Wall Mounted Temperature & Humidity Sensor
- Duct Mounted OA Temperature Sensor
- Unit Mounted Return Air Temperature Sensor

Control Options

- BMS Card (BACnet MSTP)
- Multi-Unit Sequencing
- Airside Economizer - Dry Bulb + Enthalpy Control

Factory Warranties (Labor Not Included)

- 1 Year Limited Parts Warranty
- Extended 2 Year Control Board and Humidifier Warranty (Parts Only)
- 4 Year Extended Compressor Warranty

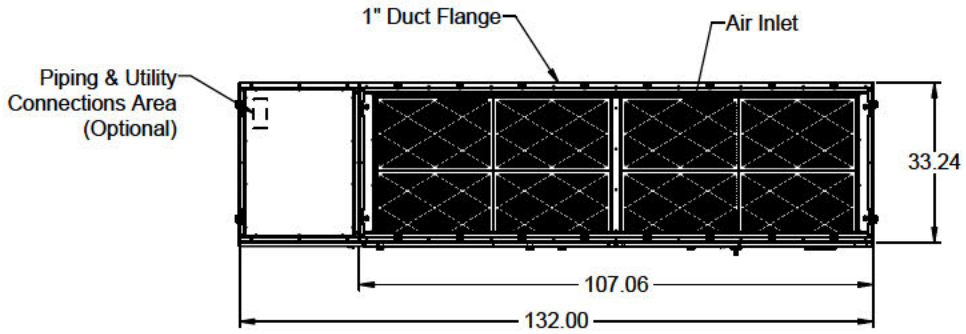
Select Standard Design Features

- Heavy Duty Gavanneal Steel Construction
- High Efficiency Scroll Compressor
- TXV with External Equilization
- High & Low Refrigerant Pressure Safety Switches
- Stainless Steel Drain Pan with Overflow Safety Switch
- Intertek (ETL) UL STD 1995 Listed/Labeled
- Factory installed and tested controls
- Each unit factory tested per UL 1995 Requirements

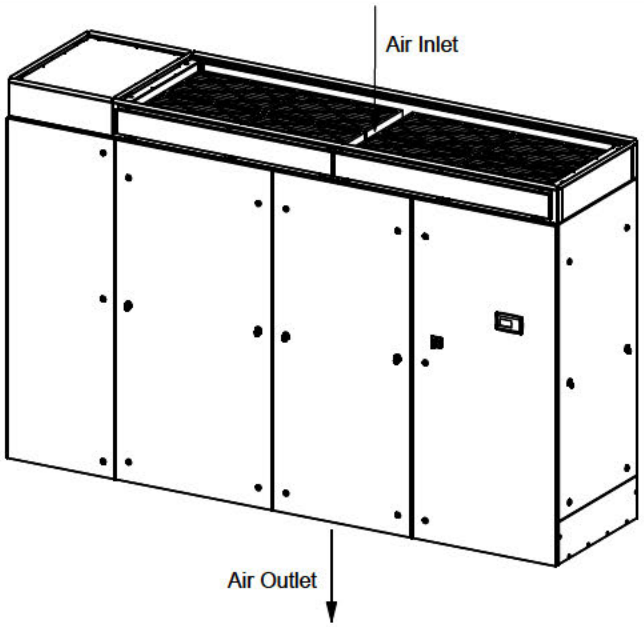
System Notes

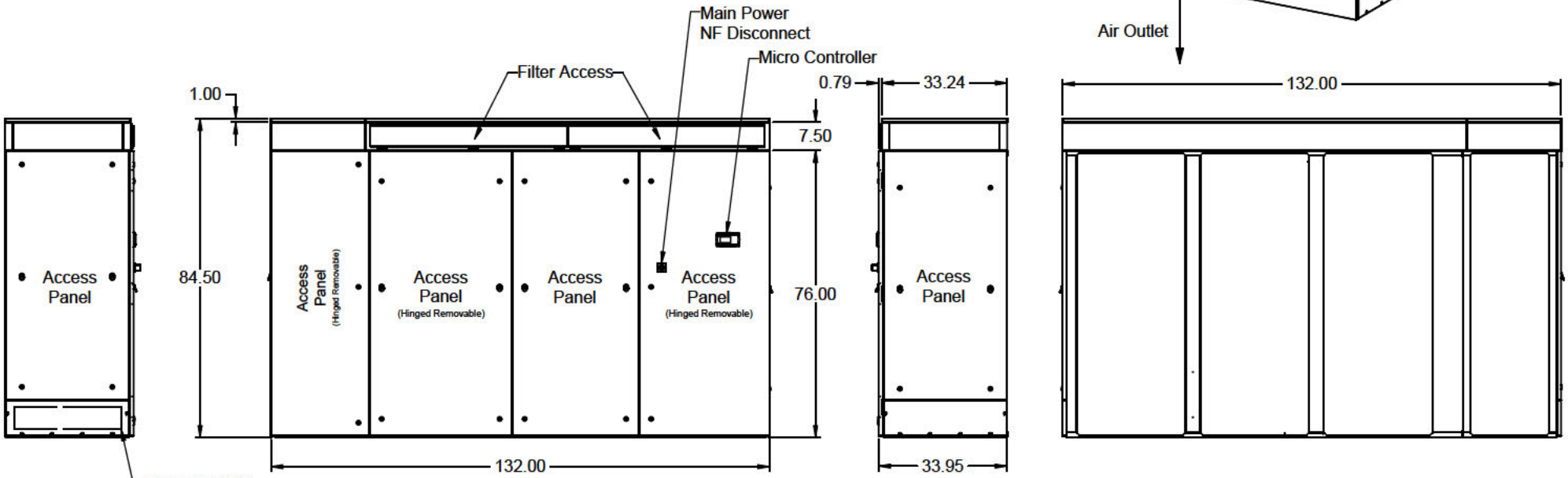
1. System ships with a dry nitrogen charge.
2. Do not install refrigerant piping based upon connection sizes. Refrigerant piping runs must be sized according to piping requirements at www.aboveairioms.com.
3. Max total equivalent line length is 150 feet.
4. Seismic construction on evaporator and condenser

5. Include 24V, 100VA transformer to power field provided damper.

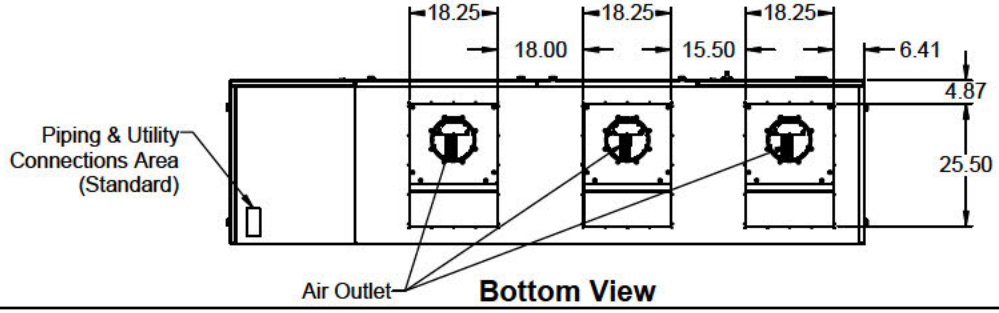


Top View



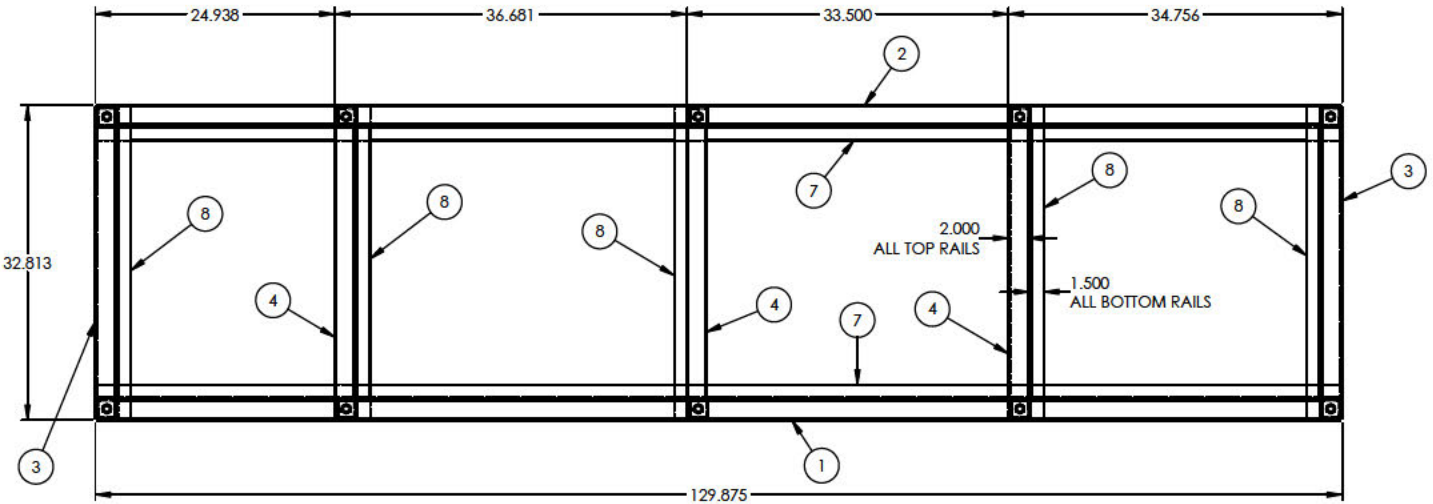


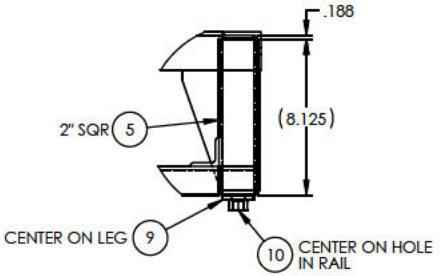
Left View **Front View** **Right View** **Rear View**



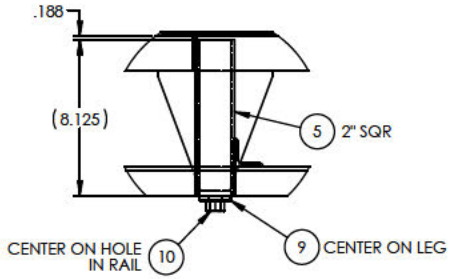
Bottom View

AboveAir TECHNOLOGIES Tel: (301) 874-1130	Dwg No. MD3413-2-V2-0001	
	Date 12/6/22	Rev B
Description **MC2-DF-E Packaged BD V2**		

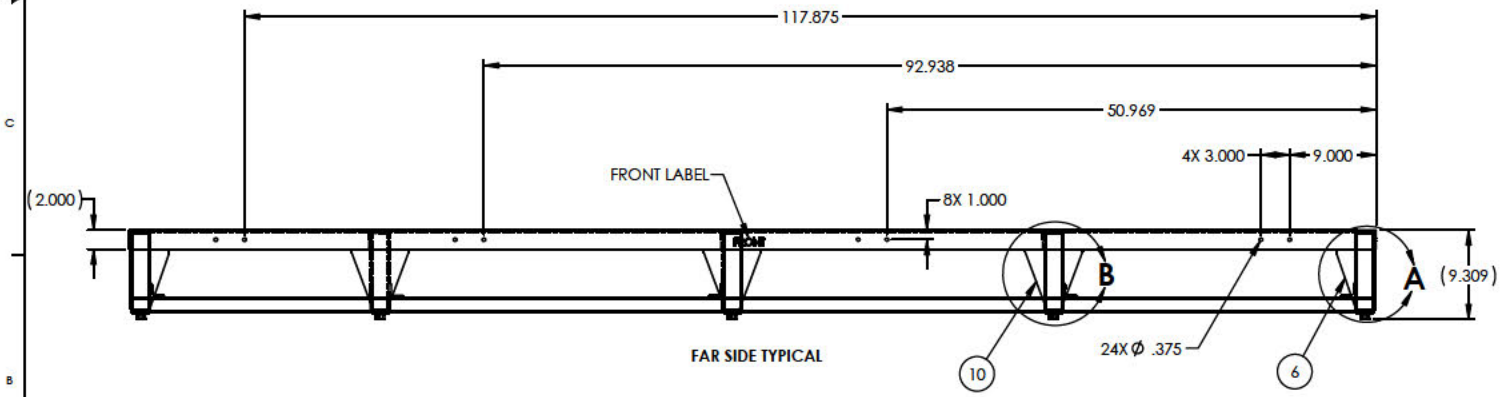




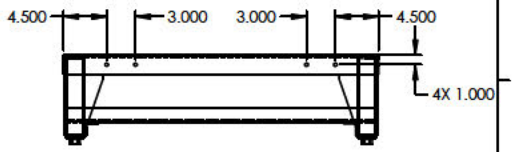
DETAIL A
SCALE 1 : 5
TYPICAL (4) CORNERS
FRONT RAIL & GUSSET HIDDEN FOR CLARITY



DETAIL B
SCALE 1 : 5
TYPICAL (6) PLACES
FRONT RAIL & GUSSET HIDDEN FOR CLARITY



FAR SIDE TYPICAL



FAR SIDE TYPICAL

NO.	PART NUMBER	DESCRIPTION	QTY.
11	HNUT 0.6250-11-D-N	Nut, Hex 5/8-11	10
10	RL40233-2	Rail, Floor Stand Gusset Side 12" - MC2-E (Seismic)	6
9	RL40231	Rail, Nut - Universal (Seismic)	10
8	RL40230-2	Rail, Floor Stand Bottom Side Frame (Seismic) - MC2-E	5
7	RL40230-3	Rail, Floor Stand Bottom Front-Rear Frame Packaged (Seismic) - MC2-E	2
6	RL40229-2	Rail, Floor Stand Gusset Corner 12" (Seismic) - MC2-E	4
5	RL40228-5	Rail, Floor Stand Leg 12" (Seismic) - MC2-E	10
4	RL40227-4	Rail, Floor Stand Frame Center (Seismic) - MC2-E	3
3	RL40227-1	Rail, Floor Stand Frame Side (Seismic) - MC2-E	2
2	RL40227-6	Rail, Floor Stand Frame Rear Packaged (Seismic) - MC2-E	1
1	RL40227-5	Rail, Floor Stand Frame Front Packaged (Seismic) - MC2-E	1

NOTES:
1. **PAINT ALL SIDES AND EDGES. COVER NUT THREADS PRIOR TO PAINTING.**

ARL1919-E-P-12
MC2-E SEISMIC PACKAGED 12"

DIMENSIONS ARE IN INCHES
TOLERANCES (UNLESS NOTED):
HOLE SIZE: ± .005
HOLE TO EDGE: ± .010
HOLE TO HOLE: ± .010
HOLE TO FOLD: ± .015
FOLD TO FOLD: ± .015
ANGULAR: ± 1°
MATERIAL

ECN NO. ECN23C002

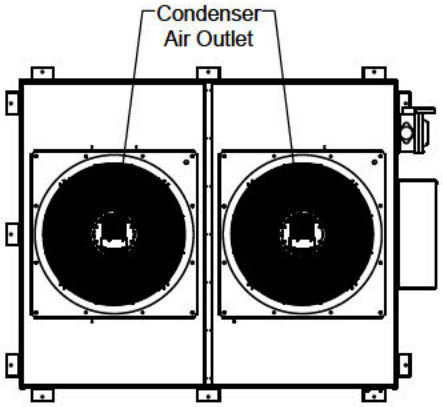
AboveAir Technologies, LLC

TITLE: Assembly, Floor Stand - MC2-E (Seismic)

	NAME	DATE
DRAWN	YATES	8/23/23
CHKR		
ENGR		
MGR		

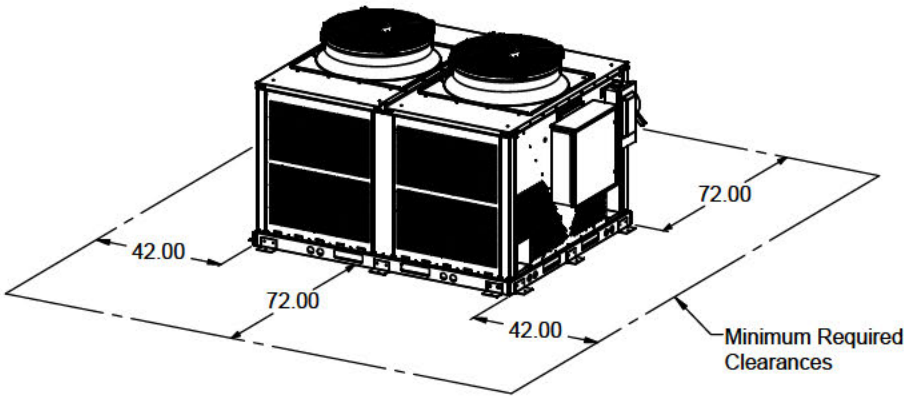
SIZE: C | DWG. NO.: ARL1919 | REV: -

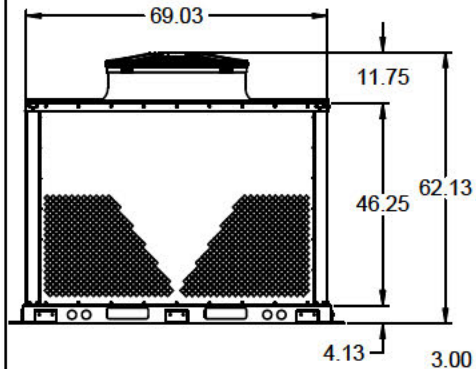
SCALE: 1:10 | SHEET 5 OF 16



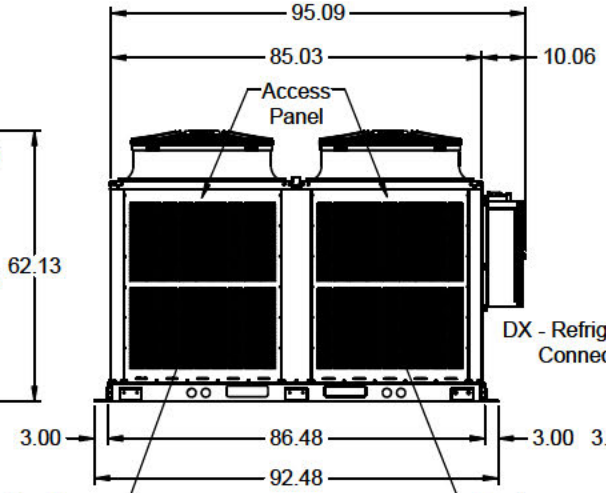
Top View

Unobstructed Vertical Clearance Required

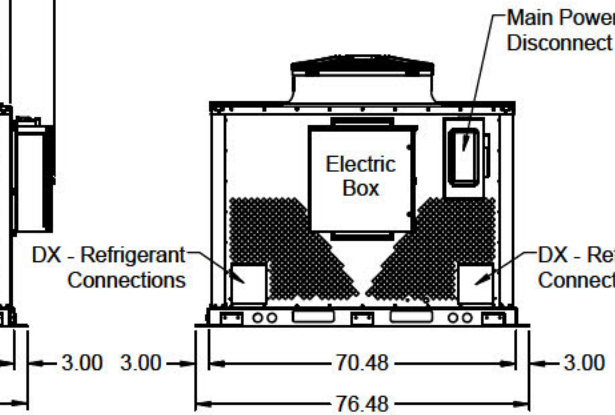




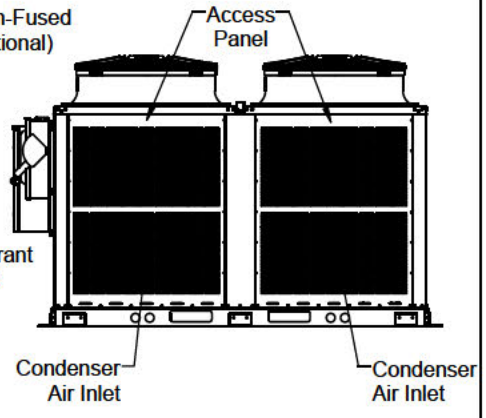
Left View



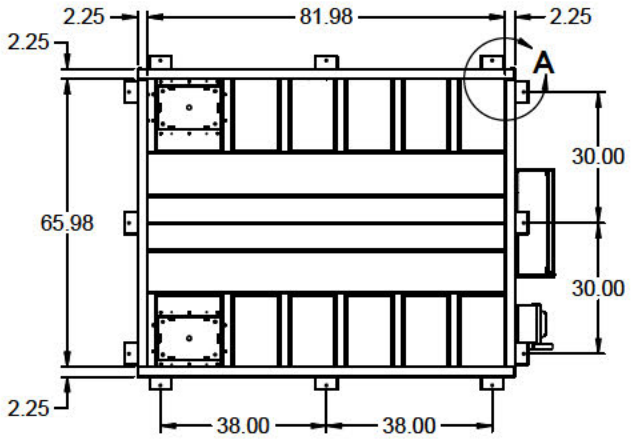
Front View



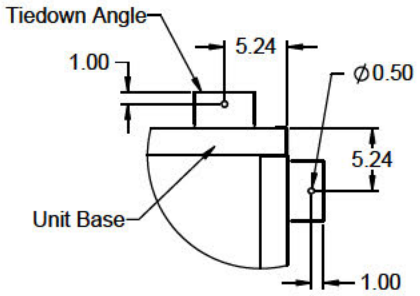
Right View



Rear View



Bottom View



DETAIL A
(6) Places
Fasten To Unit With Supplied Hardware

AboveAir TECHNOLOGIES
Tel: (301) 874-1130

Dwg No.	
MD3376-3-0001	
Date	Rev
8/21/24	B

Description

XPU-XPX 25-30T (Dual Circuit)
Twin EC Fans (Seismic)

MC-2000S RH: Temperature and Humidity Control Sequence & Installation Schematic

MC-2000S RH Temperature & Humidity Control

The MC-2000S RH control sequence provides temperature and humidity control for a single zone. The outdoor air percentage should be no greater than 20%.

Unit Operation

Unit operation is initiated when all points are in their run positions.

System Enable: The system enable is controlled at the unit's display terminal, within the system enable menu.

Remote Stop/Start: Remote stop/start NC contacts are provided on all units and ship from the factory jumpered for continuous operation.

BMS Control: The unit is provided with an optional point that may be written by a BMS to index unit operation.

Schedule Control: The unit is provided with a local schedule that may be set to operate the unit in Occupied or Unoccupied modes based on its time clock.

Fan Control

When the unit is indexed for operation and in its occupied mode, the supply fan shall be energized after a 30 second delay (adj.) to allow for optional control damper actuation. The fan shall run continuously. After an additional 15 second delay (adj.) to allow for air proving, the unit shall operate as described herein.

Set Point Control (Optional): The system is provided with direct-drive, backwards inclined ECM impellers for balancing only. Fan will maintain a constant speed setting (100% output, adj.).

System Mode

The unit provides automatic change-over between cooling, heating, dehumidification, and humidification operation. The cooling and heating set points are separated by a dead band (5°F, adj.) to minimize unit cycling and prevent simultaneous cooling and heating. The dehumidification and humidification set points are also separated by a dead band (10%RH, adj.) to prevent simultaneous dehumidification and humidification operation.

Cooling Operation

On a rise in space temperature by 1°F above the cooling set point (75°F, adj.), the unit shall energize its first compressor stage. *The first compressor shall energize at 100% and modulate to meet the space set point (digital scrolls only).* For dual circuit units, on a rise in space temperature by an additional 1°F, and a minimum delay of 3 minutes, the second compressor stage shall energize.

On a fall in space temperature, the second compressor stage (if applicable) shall de-energize. On a continued fall in space temperature, the first compressor stage shall be de-energized.

All compressors are subject to a minimum run time of 3 minutes and a minimum off time of 3 minutes to prevent short cycling.

Economizer (Air-Side Economizer, Optional)

If the outside air condition is below the economizer set point (69°F, adj.), the unit shall modulate the economizer dampers open. If the outdoor air temperature falls below 55°F (adj.), mechanical cooling shall be locked out and the dampers shall modulate to maintain 55°F into the unit.

On a fall in space temperature, the dampers shall return to their normal positions.

CO2 Damper Control (Optional): The economizer damper may also be set to respond to space CO2 level to provide demand control ventilation (<20% outdoor air). If the space CO2 level rises above the CO2 set point (700 ppm, adj.) by 50 ppm, the damper shall open to provide the unit's maximum outdoor air supply (<20%). On a fall in space CO2 level, the damper shall return to its minimum position. If both economizer and CO2 operation are required simultaneously, the damper shall open to satisfy the larger requirement.

Freecool (Water-Side Economizer, Water Cooled Only, Optional)

If the condenser water temperature is below the freecool set point (45°F, adj.), the unit shall energize its freecooling valve as its first stage of cooling in lieu of the first compressor stage. *The valve shall modulate to meet the space set point (modulating valves only).*

On a fall in space temperature, the freecool valve shall be de-energized.

On a continued rise in space temperature by 1°F and a minimum delay of 3 minutes, the freecool valve shall be de-energized and the unit shall sequence its mechanical cooling stages to meet the temperature requirement.

Dehumidification Operation
If the unit is not operating in its cooling or heating mode and on a rise in space humidity above set point (55%RH, adj.) by 1%RH, the unit shall enter its dehumidification mode. The unit shall energize its first compressor. *The first compressor shall energize at 100% and modulate to meet the space set point (digital scrolls only).*

On a fall in space humidity, the first compressor shall be de-energized.

Reheat Operation
When the unit is in its dehumidification mode, reheat is available. The hot gas reheat coil (if applicable) is the first stage of reheat. Additional heating stages (hot water, electric) may be enabled for reheat operation. Reheat stages shall energize to maintain the heating set point, as described under the Heating Operation section.

Heating Operation
On a fall in space temperature by 1°F below the heating set point (70°F, adj.), the unit shall energize its first heating stage. *The first heating stage shall modulate to meet the space set point (SCR or modulating valves only).* On a fall in space temperature by an additional 1°F, and a minimum delay of 3 minutes, the second heat stage shall energize.

On a rise in space temperature, the second heat stage (if applicable) shall de-energize. On a continued rise in space temperature, the first heat stage shall be de-energized.

Humidification Operation
If the unit is not in its cooling mode, on a fall in space humidity below the humidification set point (45%RH, adj.) by 1%RH, the humidifier shall be energized.

On a rise in space humidity, the humidifier shall be de-energized.

Head Pressure Control (Fan Cycling)
Condenser fan operation shall be controlled by a fan cycling switch. On a rise in system pressure above 275 psig, the condneser fan shall be energized. On a fall in system pressure below 210 psig, the codnenser fan shall be de-energized.

Note: not available with digital scroll compressor option.

Head Pressure Control (Air-Cooled Units, ECM or VFD)
The condenser fan motor shall ramp up gently and operate continuously while the compressors are operating. The fan shall vary its speed to maintain the head pressure set point (325 psig, adj.), as controlled by the adjustable head pressure control PID loop.

Head Pressure Control (Air-Cooled Units, p266)
The condenser fan motor shall ramp up gently and operate continuously while the compressors are operating. The p266 controller shall vary the fan speed to maintain the head pressure set point.

Head Pressure Control (Flooded Head Pressure)
The unit is provided with a flooded head pressure control valve. On a rise in condensing pressure above 275 psig, the head pressure control valve opens to allow liquid refrigerant to flow from the condenser into the receiver. On a fall in condensing pressure, the valve modulates to bypass discharge gas around the condenser; this bypass causes the pressure at the outlet of the condenser to increase and the condenser floods with liquid refrigerant.

Note: not available with digital scroll compressor option.

Head Pressure Control (Water-Cooled Units, modulating valve)
On a call for compressor operation, the compressor start shall be delayed for 60 seconds (adj.) to allow the valve to fully open. After an initial modulation delay of 90 seconds (adj.), the valve shall modulate between its minimum and maximum operating positions based on the adjustable head pressure control PID loop and head pressure set point (325 psig, adj.).

Head Pressure Control (Water-Cooled Units, mechanical valve)
The unit is provided with a direct-acting pressure-actuated water control valve. On an increase in condenser pressure, the water control valve shall modulate towards its open position. On a descrease in condenser pressure, the valve shall modulate towards its closed position.

Note: not available with digital scroll compressor option.

Unoccupied Operation
If the unit utilizes the system schedule, then during unoccupied hours the fan shall be de-energized. If the space temperature falls below the unoccupied heat set point (60°F, adj.) by 1°F or rises above the unoccupied cooling set point

(80°F, adj.) by 1°F, the fan shall energize and the unit shall operate as described herein. On satisfaction of unoccupied set point, the unit shall de-energize the fan.

System Alarms

Air Proving: A differential pressure switch or current sensing switch (optional) closes to confirm airflow prior to the activation of other mechanical components. If the switch doesn't close after an adjustable time delay or opens during unit operation, the unit shall lock-out operation and enunciate an alarm.

Dirty Filter: An adjustable differential pressure switch shall open when the pressure drop across the filter exceeds the desired pressure drop and enunciates an alarm.

Condensate Alarm: A condensate pan switch, condensate pump overflow switch (optional), and water leak detector (optional) are connected in a NC series to detect high condensate. On a high condensate condition, the circuit will open and shut down all mechanical cooling or lock-out unit operation (optional) and enunciate an alarm.

High Refrigerant Pressure: The high refrigerant pressure (>600 psig, auto-reset) switch shall open on a high pressure condition and shut down compressor operation. If the switch resets, the system will attempt to restart the compressor up to 3 times in 10 minutes. If the switch does not reset within 90 seconds or on 3 failed start attempts, the system shall lock-out compressor operation, and enunciate an alarm.

Low Refrigerant Pressure: The low refrigerant pressure (<50 psig) shall open on a low pressure condition and after a time delay (90s, adjustable), shall lock-out compressor operation and enunciate an alarm.

Life Safety: A smoke detector (optional) and firestat (optional) or remote life safety system shall open a relay and break control power to the microprocessor. Unit operation shall cease. The Life Safety Alarm may optionally be routed through the controller to enunciate an alarm and signal the BMS.

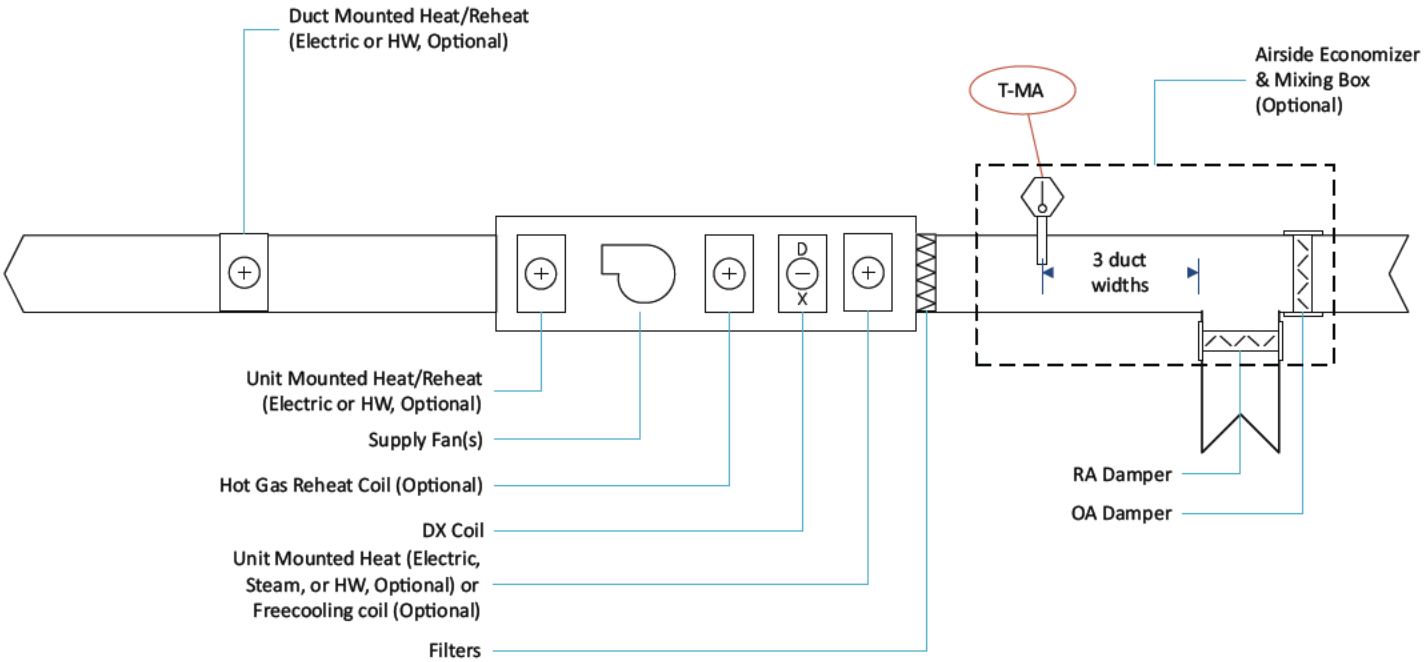
Sensor Failure: If a sensor is reading out of range for 5 minutes, the unit shall enunciate an alarm to indicate an issue with the sensor.

High and Low Limit Alarms: Adjustable high and low limit alarms are user-adjustable for sensor points.

Waterflow Switch (Optional): A differential water pressure switch is factory installed on the water lines; if the differential pressure falls below the adjustable set point, compressor operation shall be locked out.

MC-2000S RH: Temperature and Humidity Control Sequence & Installation Schematic

Sensor Installation Schematic



All sensors included with your unit must be installed prior to start-up or the unit will not operate. Sensors are typically either NTC type, 4-20mA, or 0-5 VDC.

Factory Installed Sensors

P-HEAD1(, 2) (Optional, Not Shown): The head pressure sensor(s) are factory installed on each circuit. Refer to piping diagrams for location detail.

TH-Return (MissionCritical and SpotCool Only, Not Shown): In leiu of a space mounted dry bulb temperature & humidity sensor, the sensor is factory mounted in the unit's return air section after the filters.

Display

Unit Display: All units are shipped with a display terminal and a 50 foot (standard) up to 200 foot cable for connection. The display terminal does not contain any sensors. It may be mounted in the space, mechanical room, or left in the electrical box. MissionCritical units ship with the display terminal cabinet-mounted. This terminal is required for unit operation.

Field Installed Sensors

TH-Space (Not Shown): A space mounted dry bulb temperature and humidity sensor is provided with the unit. The sensor should be mounted on an interior wall in the space away from all humidity and heat sources. Mount the sensor 60" AFF unless otherwise directed by the contract documents.

T-OA (Optional, Not Shown): An outdoor air dry bulb temperature sensor is provided when the air-side economizer option is purchased. This sensor must be installed in the outside air duct or plenum upstream of all air mixing.

T-MA (Optional): A mixed air dry bulb temperature sensor is provided when the air-side economizer option is purchased. This sensor must be installed downstream of the mixing box to control the OA and RA damper positions.

T-FC (Optional, Not Shown): A condenser water temperature sensor is provided when the freecooling option is purchased. This sensor must be mounted on the condenser water feed to the unit, upstream of any control valves so it senses the current condenser water temperature.

A-CO2 (Optional, Not Shown): If the unit is purchased with the CO2 control option option, a space or duct-mounted CO2 sensor is provided with the unit for field mounting.

MC2-DX™

MissionCritical

Vertical Floor Mounted A/C's (Dual Circuit DX)

Features & Benefits

- 21-105kW (6-30 Ton) Capacities
- DOE CCMS Compliant per AHRI Standard 1360 for Computer Room Air Conditioners
- DX Air, Water & Glycol Cooled Plus Free-Cooling Economizers
- Upflow & Downflow Air Patterns
- Fixed Speed w/ Hot Gas Bypass; Digital or 2-Spd Scroll Compressors
- Total Temp & Humidity Control
  - Free-Energy Hot Gas Reheat or Electric Reheat/Heat
  - Steam Humidifier
- 7/24/365 Low Ambient Head Pressure Control Options
- Microprocessor Controls & More!

21-105kW (6-30 Tons) "Floor Mounted Precision A/C's"

AboveAir TECHNOLOGIES

AboveAir™ MissionCritical™ vertical floor mounted precision air conditioners are the reliable environmental control solution to your precision cooling needs. Available in a wide variety of cooling methods and cabinet configurations including a full range of options, **AboveAir™** air conditioners are a step above!

- ☑ 100% Front-Access cabinet design
- ☑ Total Temperature & Humidity Control
- ☑ Up-Flow & Down-Flow air patterns
- ☑ Variety of cooling methods
- ☑ Self-contained & split systems
- ☑ Flexible options and accessories
- ☑ R410a Refrigerant
- ☑ Energy efficient operation

Contents

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Model Configurations 2
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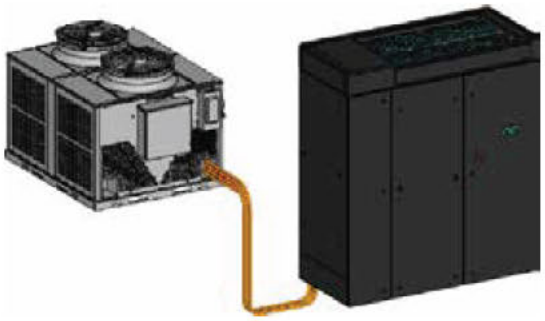
Other AboveAir Products ..... Back Cover!

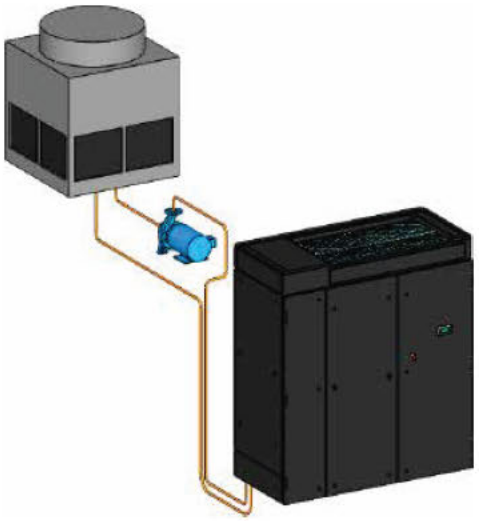
DX - Air Cooled, MCE & XPX-()

DX - Air Cooled Split with Propeller Fan, Outdoor Remote Condenser



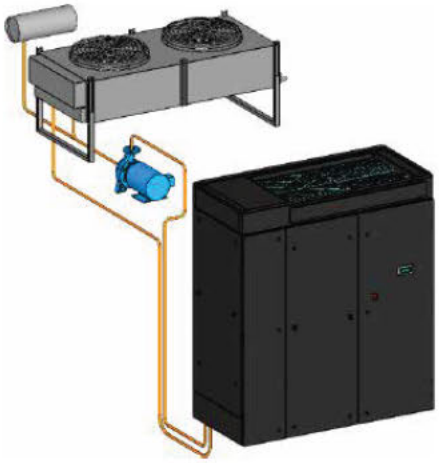
DX - Water Cooled, MCW-()

DX - Water Cooled Self-Contained (Optional Free-Cooling Economizers!)



DX - Glycol Cooled, MCG-()

DX - Glycol Cooled Self-Contained Plus Glycol Drycoolers & Pump Packages (Optional Free-Cooling Economizers!)



AboveAir™ MissionCritical™ precision A/C's are designed to meet your unique application dependent requirements. Select from a wide range of options and configurations:

21-105kW
(6-30T)
Dual Circuit DX

Up-Flow Air Pattern

Down-Flow Air Pattern

Variety of Standard & Optional Features

Standard & Optional Features:

- MC-2000, Advanced Microprocessor Controls
- Electrode Steam Canister Humidifier
- Electric Reheat/Heat or Hot Gas Reheat
- Dual Scroll Compressors (Fixed, 2-Spd or Digital)
- EC Backward-Inclined Plug Fans
- Free-Cooling Economizer Coils
- High Efficiency Air Filtration (4" Merv-8, 11 or 13)
- Low Ambient Head Pressure Control
- 2 & 3-Way 350 psig Water / Glycol Cooled Head Pressure Control Regulating Valves
- Hot Gas Bypass
- Low Entering Condenser Water/Glycol Kit
- Top or Bottom Piping Connections

Accessories:

- 2 or 3-Way Plenum Discharge Boxes
- Floor Stands & Turning Vanes
- Condensate Pumps - Factory Installed
- Main Power Electrical Disconnects
- Firestats & Smoke Detectors
- Remote Water-Leak Detectors
- Condenser Water/Glycol Flow Switches
- Compressor Sound Jackets
- Glycol Pump Packages & Drycoolers
- ... and more!

ETL LISTED CONFORMS TO UL STD 1995 CERTIFIED TO CAN/CSA STD C22.2 No. 236

Model Nomenclature

Packaged Systems & Split Evaporators

MC	E	-	070	D	-	4	-	00	ER	H	-	EC	-	00	-	UF2	-	C2	-	D3
a	b	-	c	d	-	e	-	f	g	h	-	i	-	j	-	k	-	l	-	m

a: **MC** - *MissionCritical MC2 Vertical Floor A/C*

b:
- **E** - DX, Split Evaporator (Compressor with Evaporator)
- **G** - DX, Glycol Cooled - Packaged Self-Contained
- **W** - DX, Water Cooled - Packaged Self-Contained

c: **021** = 21kW (6.0T); **028** = 28kW (8.0T); **035** = 35kW (10.0T); **042** = 42kW (12.0T); **053** = 53kW (15.0T); **063** = 63kW (18.0T); **070** = 70kW (20.0T); **088** = 88kW (25.0T); **097** = 97kW (27.5T); **105** = 105kW (30.0T)

d: **D** - Dual Circuit DX System

e:
- **1** - 208-230V / 1 Ph / 60 Hz
- **3** - 208-230V / 3 Ph / 60 Hz
- **4** - 460-480V / 3 Ph / 60 Hz
- **5** - 575V / 3 Ph / 60 Hz
- **7** - 277V / 1 Ph / 60 Hz
- **8** - 460-480V / 1 Ph / 60 Hz

f:
- **00** - No Hot Gas Reheat
- **HG** - Hot Gas Reheat (2-POS, On/Off)
- **MG** - Hot Gas Reheat (Modulating 0-10Vdc)
- **HR** - Hot Water Reheat/Heating Coil
- **SR** - Steam Reheat/Heating Coil

g:
- **00** - No Unit Mtd Electric Heat
- **EO** - Electric Heat Only, No Reheat
- **ER** - Electric Reheat/Heat

h:
- **0** - No Humidifier
- **H** - Electrode Canister Steam Humidifier

i:
- **EC** - EC = EC Plug Fan (Direct-Drive, Backward-Inclined Centrifugal Impeller, 0-10Vdc))

j:
- **00** - No Economizer
- **DC** - Dual-Cool / Alternate Water Source Coil
- **FE** - Water/Glycol Side Free-Cooling Economizer Coil

k:
- **DFB** - Down-Flow Evap Air Pattern w/ Free or Ducted Top Return & Bottom Discharge to Raised Floor
- **DFF** - Down-Flow Evap Air Pattern w/ Free or Ducted Top Return & Front Free-Discharge to Floor Level
- **UF0** - Up-Flow Evap Air Pattern w/ Front Free-Return & Top Ducted Discharge
- **UF1** - Up-Flow Evap Air Pattern w/ Front Free-Return & Top 1-Way Plenum Discharge Box
- **UF2** - Up-Flow Evap Air Pattern w/ Front Free-Return & Top 2-Way Plenum Discharge Box
- **UF3** - Up-Flow Evap Air Pattern w/ Front Free-Return & Top 3-Way Plenum Discharge Box
- **UFR** - Up-Flow Evap Air Pattern w/ Rear Ducted or Free-Return & Top Ducted Discharge

l:
- **C2** - MC2 Cabinet Size ... A2 = 21-35kW (6-10T); B2 = 42-53kW (12-15T); C2 = 63-70kW (18-20T); D2 = 88kW (25T); E2 = 97-105kW (27.5-30T)

m:
- **D1** - Dual Scroll Compressors - 1st Circuit Fixed Spd w/ Hot Gas Bypass; 2nd Circuit Fixed Spd
- **D3** - Dual Scroll Compressors - 1st Circuit Digital; 2nd Circuit Fixed Spd
- **D6** - Dual Scroll Compressors - 1st Circuit 2-Spd; 2nd Circuit Fixed Speed

Split, DX - Remote Condensers & Condensing Units

XPX	-	070	D	-	4	-	EC	-	VF	1	-	00	-	B
a	-	b	c	-	d	-	e	-	f	g	-	h	-	i

a:
- **VCX** - DX, Split Indoor Vertical Floor Mtd Remote Air Cooled Centrifugal Blower Condenser (Compr Located w/ MCE Evap)
- **XCX** - DX, Split Indoor Ceiling Mtd Remote Air Cooled Centrifugal Blower Condenser (Compr Located w/ MCE Evap)
- **XPX** - DX, Split Outdoor Mtd Remote Air Cooled Propeller Fan Condenser, (Compr Located w/ MCE Evap)

c: **021** = 21kW (6.0T); **028** = 28kW (8.0T); **035** = 35kW (10.0T); **042** = 42kW (12.0T); **053** = 53kW (15.0T); **063** = 63kW (18.0T); **070** = 70kW (20.0T); **088** = 88kW (25.0T); **097** = 97kW (27.5T); **105** = 105kW (30.0T)

d: **D** - Dual Circuit DX System

d:
- **1** - 208-230V / 1 Ph / 60 Hz
- **3** - 208-230V / 3 Ph / 60 Hz
- **4** - 460-480V / 3 Ph / 60 Hz
- **5** - 575V / 3 Ph / 60 Hz
- **7** - 277V / 1 Ph / 60 Hz
- **8** - 460-480V / 1 Ph / 60 Hz

e:
- **00** - N/A
- **AA** - Axial Fan w/ Std Motor
- **AB** - DWDI FC BD Blower w/ ODP Motor
- **EA** - Axial Fan w/ ECM
- **EC** - EC DD Backward-Inclined Impeller

f:
- **00** - Not Applicable
- **LD** - Ducted, 90 Degree / Right-Angle, In-Front / Out Left-Side
- **MI** - Ducted, Mirror-Image Same-Face Condenser Air Pattern
- **RD** - Ducted, 90 Degree / Right-Angle, In-Rear / Out Right-Side
- **SF** - Ducted, Same Face Condenser Air Pattern
- **ST** - Ducted, Straight-Thru (ZST) Condenser Air Pattern
- **VF** - Free Airflow, Vertical Discharge Air Pattern

g:
- **0** - Not Applicable
- **1** - Slab or Wrap Around Type
- **_** - Cabinet Size ... VCX-B, C, D, E or F & XCX-B, C or D

h:
- **00** - No Compressor in this section (DX Condenser Model)

i:
- **0** - No Head Pressure Control
- **A** - Low Amb Fan Cycling Head Pressure Control
- **B** - Low Amb Variable Speed Fan Head Pressure Control
- **C** - Low Amb Flooded Head Pressure Control
- **D** - Water/Glycol Regulating Valve - 2-Way, 150 psig
- **E** - Water/Glycol Regulating Valve - 2-Way, 350 psig
- **F** - Water/Glycol Regulating Valve - 3-Way, 150 psig
- **G** - Water/Glycol Regulating Valve - 3-Way, 350 psig

General

Summary

These specifications describe the requirements for a vertical floor mounted packaged (or split) precision air conditioner. The system shall be designed to control space temperature and humidity.

The air conditioning manufacturer shall design and furnish all equipment in the quantities and configurations shown on the project plans and specifications.

The system shall be provided by AboveAir Technologies in Frederick, Maryland, USA. The system shall be listed by Intertek (ETL Semko), Inc. to conform with UL Std 1995 and be certified to CAN/CSA Std C22.2 No. 236 (Control No. 3091370). The system shall be NYC MEA229-06-E and Chicago Code Approved. The system model number shall be _____.

Design Requirements

The system shall be an AboveAir Technologies MissionCritical™ brand, factory assembled and tested. The system shall be designed for indoor installation.

The system shall have a total cooling capacity of _____ BTU/H, and a sensible cooling capacity of _____ BTU/H, based on an entering air condition of _____ °F DB, and _____ °F WB, _____ % RH.

The evaporator section shall be designed for _____ Volt, _____ Phase, _____ Hertz main power supply. The remote condensing unit section (if applicable) shall be designed for _____ Volt, _____ Phase, _____ Hertz main power supply.

Submittals

Submittals shall be provided after manufacturer's receipt of a written purchase order and shall include: Detailed Performance and Electrical Data; Guide Specifications; and Dimensional Drawings.

Quality Assurance

The system shall be factory run tested prior to shipment. Testing shall include, but shall not be limited to: "HiPot" Test (2 times rated voltage plus 1000 volts, per UL 1995 testing requirements). The system shall be designed and manufactured according to world class quality standards.

Products

Standard Features

Cabinet

The cabinet chassis and access panels shall be powder-coat painted heavy gauge galvanneal steel for decor matching and corrosion resistance. Cabinet access panels shall rest in recessed pockets designed for minimum air leakage. The cabinet and access panels shall be lined with 2 lb/ft² high density sound and thermal insulation and sealed with self-extinguishing gasketing conforming to NFPA 90A and 90B.

Component Access

The unit shall be serviceable through front and side (as required) access panels with quick-release quarter-turn fasteners.

Electrical System

General:
The electrical system shall conform to National Electric Code (NEC) requirements according to UL 1995. The control circuit shall be a 24 VAC low voltage circuit.

The electrical system shall include, but not be limited to the following factory installed items: main power distribution block; grounding lug; 24 VAC control transformer; terminal connections; and motor controllers with start protection and circuit breakers for blower motors, compressors and each electric heater stage (if applicable).

Split DX Systems: (separate power)
Split systems shall require separate main power supplies to the evaporator and condensing unit sections. The evaporator and condensing unit sections shall be electrically interlocked by a field wired 24 volt control signal.

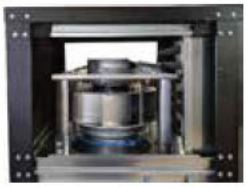
Overflow Safety Float Switch:
The system shall be provided with a factory installed float type condensate overflow safety switch. The circuit shall be designed to shut down all system water producing operations in the event of an overflow condition.

Main Power, Disconnect
(MC_ Evap Section)

The indoor evaporator section shall be provided with a factory installed main power non-fused disconnect. The disconnect shall be NEMA rated for indoor or outdoor installation as required.

Air Distribution

Evap Blower/Motor



The evaporator blower assembly shall be a backward-inclined direct-drive centrifugal impeller with variable speed EC (electronically commutated) motor. The blower shall be designed for ____ CFM @ ____ inches external static pressure (e.s.p.)

Variety of Air Patterns

Down-Flow (DF)

Down-Flow Air Pattern:

DFB: Bottom Disch Into Raised Floor

The system shall be configured for downflow evaporator air pattern with top free or ducted return and bottom discharge into raised floor. *(Refer to Floor Stand Options.)*

Air Filtration

The return air filters shall be 4 inch thick pleated and Merv-8 efficiency rated (based on ASHRAE 52.2). The filters shall be serviceable without shutting down the system.

Piping Connection Location

☑ Bottom Piping Connections

Direct Expansion Systems

DX - Evaporator Coil

The DX evaporator coil shall be constructed of copper tubes and aluminum fins. The system shall be designed for a draw-through air pattern for maximum heat transfer. Coil end-plates shall be hot dipped galvanized. The evaporator coil shall be mounted in an insulated stainless steel condensate drain pan.

Dual Scroll Compressors

Each compressor shall be the high efficiency, low sound Scroll type mounted on vibration isolators and located in a separate compartment out of the evaporator air stream to facilitate servicing while equipment is operating. Each compressor shall be complete with reversible positive oil pump, charging and service ports, internal spring isolation, and discharge gas vibration eliminator.

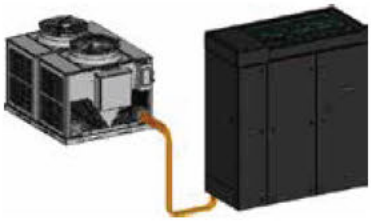
DX - Refrigeration Circuit

Each refrigeration circuit shall be pre-piped with type "L" refrigerant copper tubing. The refrigeration system shall include but not be limited to: expansion valve with external equalizer and rapid bleed-through capacity. Features shall include filter dryer, sight glass, pressure fittings and high pressure/low pressure safety cutouts.

Cooling Configurations

DX - Air Cooled Split

(Split Evap & Outdoor Remote Condenser)
MCE-( ) & XPX-( )



The system shall be a split configuration with compact indoor vertical floor mounted dx evaporator precision air conditioner with outdoor dx air cooled propeller fan remote condenser. The compressor shall be located in the indoor evaporator section. The condenser shall be sized for full heat of rejection at 95°F ambient and be capable of operation to ___ °F low ambient air temperature.

The system shall be refrigerant charged and run tested at the factory prior to shipment. The evaporator and condenser sections shall ship separately with a dry-nitrogen charge ready for field refrigerant charging.

Options

DX Air Cooled Condenser - Low Ambient Control

-20°F Ambient - Variable Spd Fan

(XP & XPU Models)*

Variable fan speed head pressure controls (*JCI P266 or Modulating EC*) shall be factory installed to allow for low ambient operation to -20°F. Compressor cold start time delay relay and crankcase heater shall be factory installed with the -20°F low ambient control feature.

CONTROL OPTIONS

MC-2000™, Advanced Temp/Humid Microprocessor Controller w/ Alarms & BMS Connection

The system shall be provided with a MC-2000™ advanced microprocessor based temperature and humidity controller with alarms.

Select Features/Benefits:

- 4x20 Character Liquid Crystal Alpha-numerical Display
- User Configurable
- Run-Time Hours
- Current Unit Mode Status
- Alarm Status
- Digital & Analog Inputs / Outputs
- Temperature Anticipation
- Remote Stop / Start Contact
- Summary Alarm Contact
- Automatic or Manual (selectable) Restart After Power Loss
- Sequential Load After Restart
- Recovery Delay
- Compressor Short Cycle Timers
- Cold Start Time Delay
- Security Password Access
- Self-Diagnostics
- Service Mode

Unit Status Display

The control system shall display current unit functions and room status (if applicable):

- Current Dry Bulb Temp Set Point
- Current Relative Humidity Set Point
- System ON/OFF
- Cooling
- Heating
- Humidifying
- Dehumidifying
- Reheating
- Actual Room DB Temperature
- Actual Room Relative Humidity

Alarm Conditions:

Alarm conditions activate an audible and visual indicator plus close a summary alarm dry contact connection. The control system shall alert to the following alarm conditions (if applicable):

- High Temperature
- Low Temperature
- High Humidity
- Low Humidity
- Sensor Failure
- Summary Failure
- Loss of Air Flow
- High Head Press
- Smoke Detection
- Firestat
- Leak Detection
- Loss of Power
- Dirty Filter
- Loss of Fluid Flow

Digital & Analog Control Inputs / Outputs:
The control system shall be capable of both digital (ON/OFF) and analog (proportional integral, PI) input and output control.

Select MC-2000 Options:

☑ Multi-Unit N+1 Sequencing

☑ BMS Communications Interface:

- ☑ BACnet over MS/TP (RS485 Serial)

Heat / Reheat Options

Electric Reheat/Heat

An electric heating system shall be factory installed to provide:

- ☑ Electric Heat Only during heat mode
- ☑ Electric Reheat to offset sensible cooling during the dehumidification mode and to provide heating during heat mode.

Heater elements shall be the low-watt density finned-tubular type. The heater shall be complete with individual heater stage starter/contactor and overheat safeties. Systems incorporating factory installed electric heaters shall require only single point power to the main unit power distribution. The electric heat shall have a capacity of _____ BTU/H and a KW rating of ___ KW, controlled in ___ stages.

Humidification Options

Steam Humidification

An electrode steam canister type humidification system shall be factory installed within the air conditioning system. The humidifier shall be complete with disposable canister, steam distributor, fill and drain valve, air gap, automatic flush cycle, manual humidity output adjustment and field installed remote wall mounted humidistat. The humidifier shall have a maximum output capacity of _____ lbs/hr.

Accessories

Floor Stand

A ____ inch nominal high (__ in to __ in adj. range) floor stand shall be factory provided for field installation. The floor stand shall have adjustable legs with vibration isolation.

Condensate Pump
(Factory Installed - Both UF & DF!)

A condensate pump shall be factory provided and installed within the indoor evaporator section *(Up-Flow & Down-Flow Air Pattern Configurations)*. The condensate pump shall be provided with dual internal float switches: one for pump operation initiation and the other for pump reservoir overflow safety.

Main Power, Non-Fused Disconnect
(Remote Condenser Section)

The remote condenser shall be factory provided with a main power non-fused disconnect for field installation. The disconnect shall be NEMA rated for indoor or outdoor installation as required.

Remote Water-Leak Detector

A remote water-leak detector shall be factory provided for field installation. The remote water-leak detector shall be wired to shut down all A/C unit water producing functions upon sensing a water leak.

Smoke Detector
(Factory Installed)

A Smoke Detector shall be factory installed in the return air stream of the unit and wired to the A/C unit electrical control panel. The Smoke Detector shall shut-down all A/C system operations upon activation.

Firestat
(Factory Installed)

A Firestat shall be factory installed in the return air stream of the unit and wired to the A/C unit electrical control panel. The Firestat shall shut-down all A/C system operations upon sensing a high return air temperature condition.

Mounting Vibration Isolators

Floor Mounted Isolators:

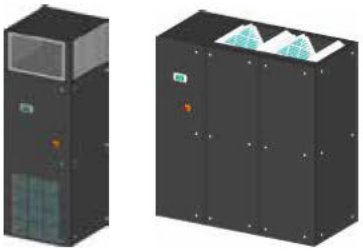
Each indoor vertical floor mounted section shall be provided with a set of quantity four vibration mounting isolators with non-skid neoprene acoustical isolation pads.

Innovative HVAC Solutions

MissionCritical Units - Precision A/C's

SC-2x4 SpotCool Ceiling Mounted A/C's
(4-11kW, 1-3 Tons)

HK Horizontal Ducted Ceiling Mounted A/C's
(4-70kW, 1-20 Tons)



MC Vertical Floor Mtd A/C's Up-Flow & Down-Flow
(4-1080kW, 1-307 Tons)

WC Wall-Cassette and FC Floor-Console Mtd A/C's
(4-18kW, 1-5 Tons)

Outdoor-Air Units - IAQ High Percent (20%-100% OA)

HK-OA Horizontal Ceiling Mtd
(1-30 Tons)

VK-OA Vertical Floor Mtd
(1-50 Tons)

Specialty Units - A/C's & Water Source Heat Pumps

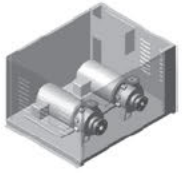
SC-2x4 SpotCool Ceiling Mtd A/C's
(4-11kW, 1-3 Tons)

HK Horizontal Packaged & Split Ceiling Mtd A/C's
(4-70kW, 1-20 Tons)

VK Vertical Packaged & Split Floor Mtd A/C's
(4-105kW, 1-30 Tons)

Remote Heat Rejection Units

Remote Air Cooled Condensers, Condensing Units & Glycol Drycoolers



Single, Dual & Triplex Glycol Pump Packages
(1/2 to 50 HP, VFD Optional)

AboveAir TECHNOLOGIES

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Email: sales@aboveair.com

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Specifications are subject to change without notice.

A25 Series Warm Air Control with Manual Reset

The A25 Series Warm Air Control with Manual Reset is designed to shut down fans, burners, dampers, etc., when the temperature of the sensed air becomes greater than the controller's setpoint.

When the sensed temperature increases to the controller's setpoint, the A25's switch will open. Manual reset is required to reclose the electrical circuit. The A25 may be used as a high limit control in the supply air duct (or plenum) where a lockout type control is desired or required by local code.

Figure 1: The A25 Series Warm Air Control with Manual Reset

Features and Benefits	
❑ **Trip-free Reset Lever**	Does not allow the reset switch to hold the contacts in a closed (on) position
❑ **Pilot Duty Electrical Rating for up to 600 Volts Maximum**	Allows direct control of high voltage motor starters
❑ **Enclosed Switch**	Protects switch contacts from dust
❑ **Rod and Tube Sensing Element**	Provides maximum response and allows for a high maximum sensing element temperature
❑ **Adjustable Duct Mounting Flange**	Controls the depth of sensor insertion into the airstream; compensates for insulation depth
❑ **Wide Temperature Range**	Allows the A25 to be used with many applications

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Part 24-7664-656, Rev. A
Code No. LIT-125118

Application Overview

A typical application for the A25 Series Warm Air Control with Manual Reset is to stop the operation of air conditioning or ventilating fans upon a temperature rise. Models A25AP and A25CP are Factory Mutual approved for use as fire protection devices.

Installation

1. Select a mounting location for the A25 in the duct (or plenum). The location must allow the sensing element to sense the average temperature in the duct.
2. Drill (or cut) a 1-3/8 in. hole in the duct at the selected mounting location (refer to Figure 2).
3. Using the flange as a template on the duct, mark the location for two 1/2 in. (13 mm) No. 10 sheet metal screws.
4. Punch (or drill) both sheet metal screw holes in the duct at the marked locations.
5. Secure the flange to the duct with two 1/2 in. (13 mm) No. 10 sheet metal screws provided.
6. Insert the sensing element and sleeve through the flange installed in Step 5 (and into the duct).
7. Secure the A25 to the flange by screwing the set screw firmly against the sleeve. Do not overtorque the set screw.

Note: Insert the sensing element as far as possible into the air stream without allowing it to contact any object inside the duct. Provide at least 5-3/4 in. (14 cm) clearance between the sensor and any other objects inside the duct.

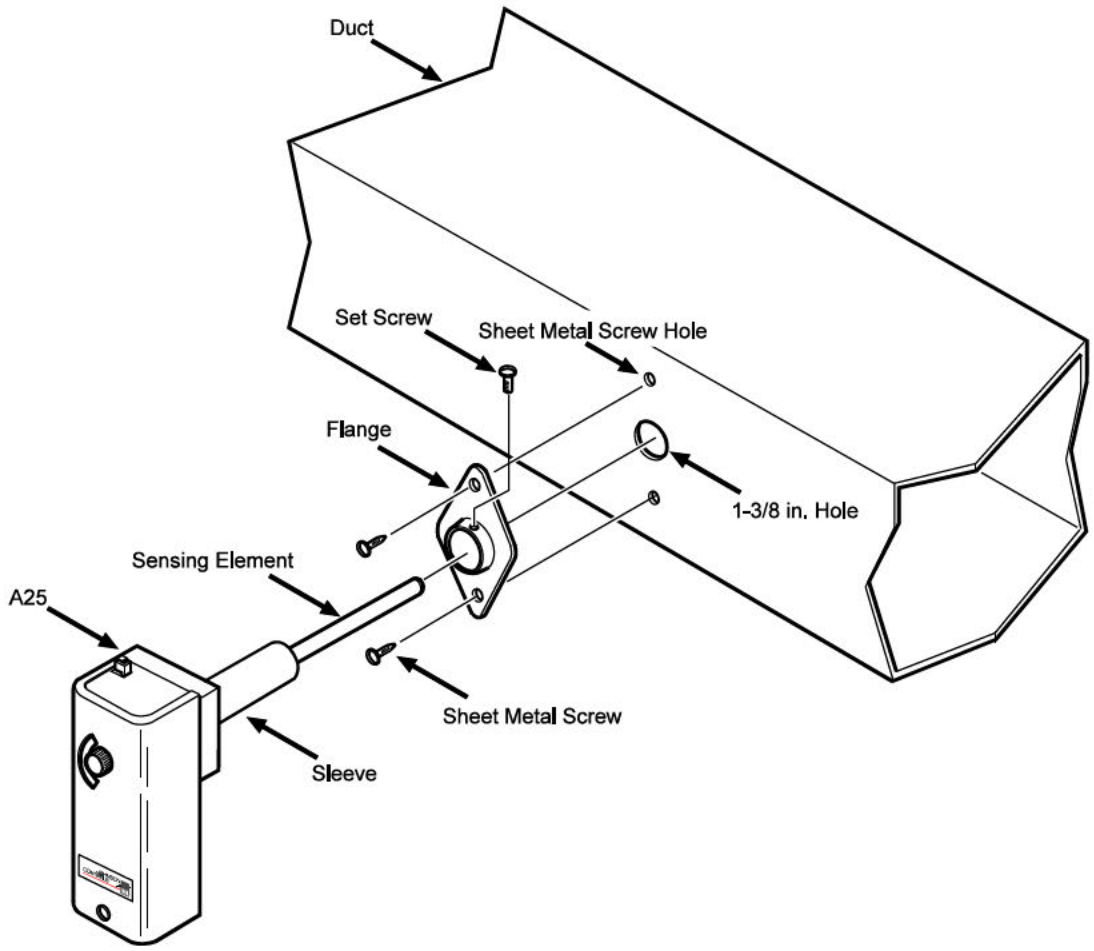


Figure 2: Installing the A25

Wiring

WARNING: **Shock hazard.** To avoid electrical shock or damage to equipment, disconnect all power before making wiring connections.

IMPORTANT: Only use the terminal screws furnished with the A25 (8-32 x 1/4 in. binder head). Use of other screws will void warranty, may damage switch terminals, and result in improper connections.

If available, follow the instructions for the unit onto which the A25 will be installed. Make all wiring connections only with copper conductors and in accordance with the National Electrical Code and local regulations. Refer to the label inside the A25's cover for the maximum electrical rating.

Models A25CN and A25CP SPDT (Single Pole Double Throw) Units

The wiring terminals on the SPDT (Single Pole Double Throw) models are color coded:

- Red is common.
- The red to yellow circuit closes on temperature increase.
- The red to blue circuit opens on temperature increase.

Refer to Figures 3 and 4 for terminal identification and typical wiring connections.

When the reset lever is pressed during normal operation, the trip free contacts are activated, the red to blue contact opens and the auxiliary red to yellow contact closes. At this point, the auxiliary system will activate.

Models A25AN and A25AP SPST (Single Pole Single Throw) Units

When the temperature increases to above the setpoint, the circuit opens. When the reset lever is pressed after the sensed temperature decreases to approximately
20F° (11C°) below the setpoint, the circuit closes.

Refer to Figures 5 and 6 for terminal identification and typical wiring connections.

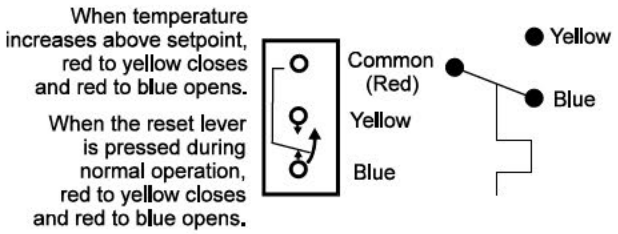


Figure 3: Terminal Identification for A25CN and A25CP SPDT Models

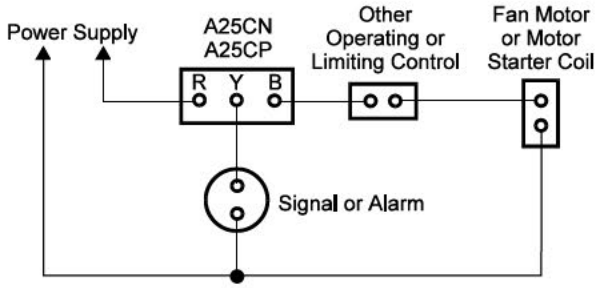


Figure 4: Typical Wiring Diagram of A25CN and A25CP SPDT Models

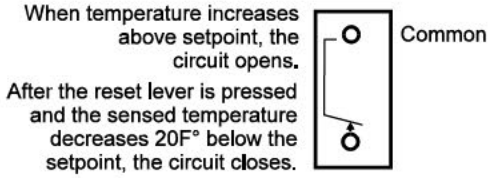


Figure 5: Terminal Identification for A25AN and A25AP SPST Models

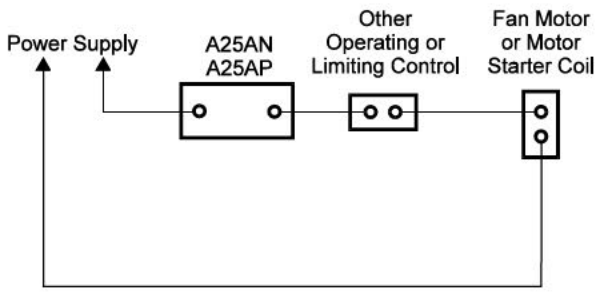


Figure 6: Typical Wiring Diagram for A25AN and A25AP SPST Models

Checkout Procedure

After installing the A25, perform the following procedures. Observe at least three complete operating cycles to verify that all components are functioning properly. If the unit fails to checkout, refer to the troubleshooting chart (Table 2). Do not attempt to make adjustments.

Return Air Applications

1. After completing the installation and wiring procedures, turn on the power to the circuit.
2. Turn the setpoint knob counterclockwise until the A25 shuts down the system.
   The A25 should lockout and the alarm or signal (if applicable) should activate.

Note: The setpoint at shutdown should equal the approximate duct air temperature.

3. Turn the setpoint knob clockwise to the desired setpoint.
   Nothing should happen.
4. Press the reset lever.
   The system should restart and the alarm or signal (if applicable) should shut off.

Supply Air Applications

1. After completing the installation and wiring procedures, turn on the power to the circuit.
2. Raise the supply air temperature to the setpoint temperature.

Note: The supply air temperature can be raised by simulating a fan failure or restricting the return air flow.

3. When the system shuts down, determine the temperature at the A25 sensing element.
   The temperature reading should closely approximate the A25's setpoint at which the system is shut down and (if applicable) the alarm or signal is activated.
4. Return the system to normal operation by re-establishing air flow or by restarting the fan.
5. Press the reset lever.
   The system should restart and the alarm or signal (if applicable) should shut off.

Operation

Models A25AN and A25CN

Setpoint Adjustment: Adjust the A25 setpoint by rotating the setpoint knob (Figure 7). The setpoint is displayed in the setpoint window.

Test Procedure:

To test (trip) the A25: Raise the temperature at the sensor above the setpoint or lower the setpoint below the ambient temperature. *The control should lockout (trip).*

To reset after test: Lower the temperature at the sensor to 20F° (11C°) below the setpoint or raise the setpoint to 20F° (11C°) above the ambient temperature. Press the reset lever. The A25 should reset (closing the circuit).

Reset Procedure: Verify that the temperature has dropped to 20F° (11C°) below setpoint. Press the reset lever to reset the A25 (closing the circuit).

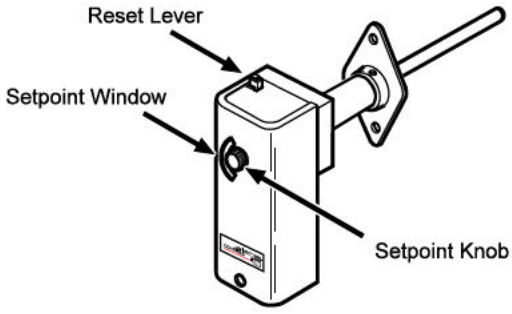


Figure 7: Models A25AN and A25CN

Models A25AP and A25CP

Setpoint Adjustment: Loosen the cover screw (Figure 8) and remove the cover. Adjust the setpoint by rotating the adjusting screw. When adjusted, re-install the cover. Tighten cover screw.

Test Procedure:

To test (trip) the A25: Raise the temperature at the sensor above the setpoint or lower the setpoint below the ambient temperature. *The control should lockout (trip).*

To reset after test: Lower the temperature at the sensor to 20F° (11C°) below the setpoint or raise the setpoint to 20F° (11C°) above the ambient temperature. Press the reset lever. The A25 should reset (closing the circuit).

Reset Procedure: Verify that the temperature has dropped 20F° (11C°) below setpoint. Press the reset lever to reset the A25 (closing the circuit).

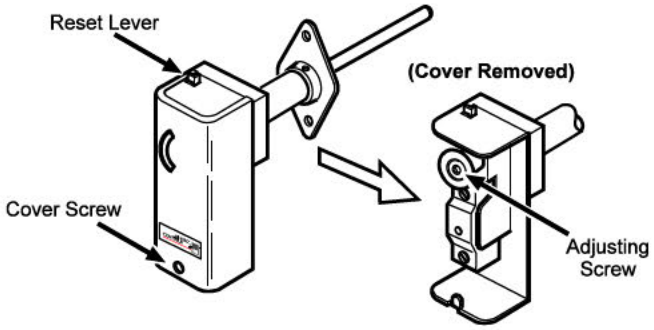


Figure 8: Models A25AP and A25CP

Dimensions

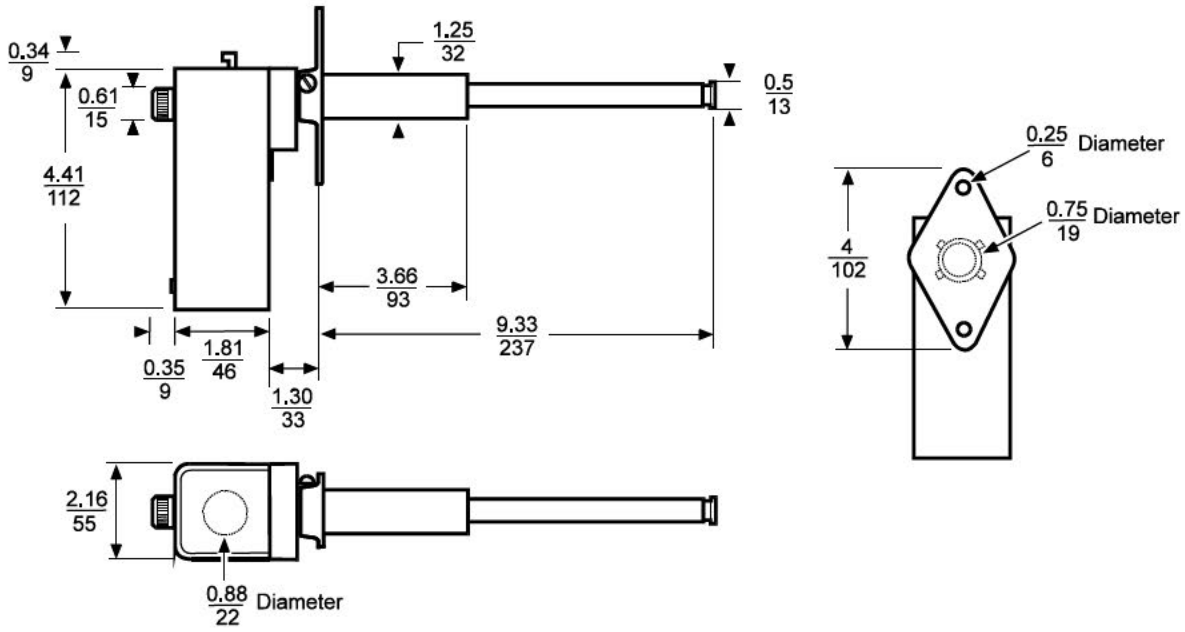


Figure 9: A25 Dimensions, in./mm

Repairs and Replacement

Do not make field repairs. For a replacement control, contact your nearest Johnson Controls representative.

Table 1: Ordering Information

Item	Product Code Number	Product Description
A25 Series Warm Air Control with Manual Reset	A25AN-1	SPST, opens on temperature rise, setpoint knob adjustment.
	A25AP-1	SPST, opens on temperature rise, concealed screwdriver adjustment, Factory Mutual approved.
	A25CN-1	SPDT, setpoint knob adjustment.
	A25CP-1	SPDT, concealed screwdriver adjustment, Factory Mutual approved.

Troubleshooting

Table 2: Troubleshooting Chart

Symptom	Problem	Solution
The A25 is not sensing properly.	The sensing element may not be extended into the airstream or the sensing element is contacting an object inside of the duct (or plenum).	Insert the sensing element as far as possible into the airstream without allowing it to contact any object inside the duct (or plenum).
The system does not operate.	Incorrect switch connections or improper wiring.	Ensure that the wiring connections follow the wiring diagrams in the *Wiring* section.
		Check connections.
	Damaged sensor.	Replace the A25.
	The A25 is tripped.	Reset the A25.
A25 does not lockout upon a temperature rise beyond the setpoint.	The A25 is defective.	Replace the A25.
The A25 does not sense the correct air temperature.	The A25 is defective.	Replace the A25.
A25 will not reset.	The temperature in the duct (or plenum) is not 20F° (11C°) below the setpoint.	Check system for overheating or fire.

Notes

Specifications

Product	A25AN-1	SPST, opens on temperature rise, setpoint knob adjustment.
	A25AP-1	SPST, opens on temperature rise, concealed screwdriver adjustment, Factory Mutual approved.
	A25CN-1	SPDT, setpoint knob adjustment.
	A25CP-1	SPDT, concealed screwdriver adjustment, Factory Mutual approved.
Range	25 to 215°F (-4 to 102°C)	

Electrical Ratings

Volts, AC	120 VAC	208 VAC	240 VAC	277 VAC
Motor FLA*	16	9.2	8	-
Motor LRA*	96	55.2	48	-
Noninductive A	16	16	16	16

Pilot Duty: 125 VA at 24/600 VAC

Ambient Temperature (Maximum)	Case	104°F (40°C)
	Element	300°F (149°C)
Conduit Opening	7/8 in. (22 mm) diameter hole for 1/2 in. conduit	
Switch	Snap-acting contacts in dust protected enclosure	
Cover Finish	Gray baked enamel	
High Limit Dial Stop	125°F	
Material	Case	0.063 in. (1.6 mm) galvanized steel
	Cover	0.025 in. (0.64 mm) cold rolled steel
Mounting	Flange for flat surface	
Reset	Positive, trip-free reset mechanism (manual reset 2 operation). Control can be reset when the temperature drops 20F° (11C°) below the dial setting.	
Sensing Element	Bi-metal rod and tube construction	
Shipping Weight	Individual pack	1.8 lb. (0.8 kg)
	Overpack of 12 units	23 lb. (10.4 kg)
Wiring Connections	Screw-type terminals	
Agency Listing	UL Recognized: File MP640, Guide MBPR CSA Certified: File LR948, Class 4813 02 Factory Mutual Approved (Models A25AP and A25CP only): Class 3545	

* FLA = Full Load Amps; LRA = Locked Rotor Amps. Values are equivalent to a 1 HP motor rating in accordance with UL353.

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

European Single Point of Contact:
JOHNSON CONTROLS
WESTENDHOF 3
45143 ESSEN
GERMANY

NA/SA Single Point of Contact:
JOHNSON CONTROLS
507 E MICHIGAN ST
MILWAUKEE WI 53202
USA

APAC Single Point of Contact:
JOHNSON CONTROLS
C/O CONTROLS PRODUCT MANAGEMENT
NO. 22 BLOCK D NEW DISTRICT
WUXI JIANGSU PROVINCE 214142
CHINA

JOHNSON CONTROLS

Controls Group
507 E. Michigan Street
P.O. Box 423
Milwaukee, WI 53201

Printed in U.S.A

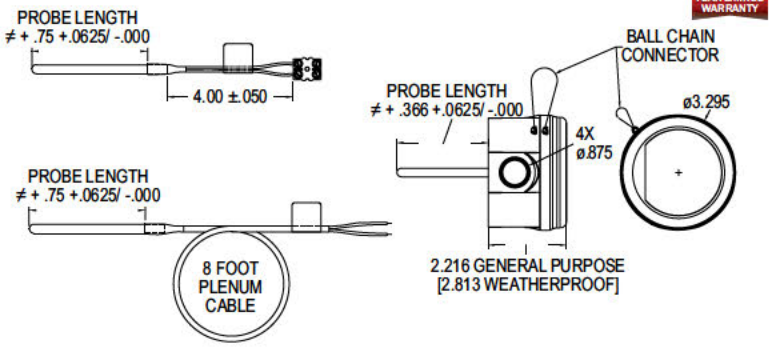
Dwyer

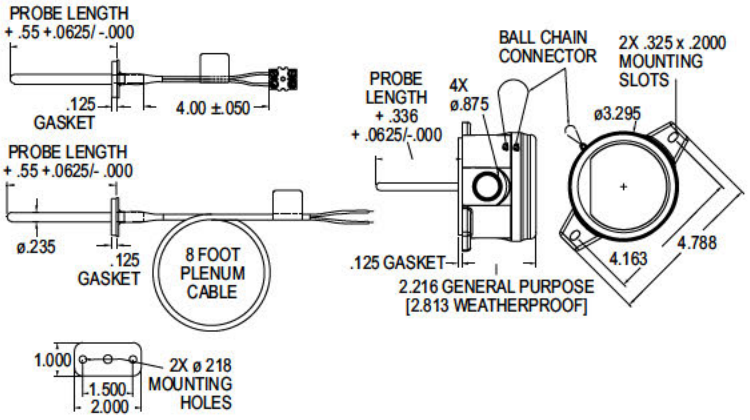
SERIES TE

DUCT AND IMMERSION BUILDING AUTOMATION TEMPERATURE SENSORS

Available up to 18″ Probe Length, Thermistor or RTD Outputs

5 YEAR LIMITED WARRANTY





VIDEO ONLINE

The **Series TE Duct and Immersion Building Automation Temperature Sensors** can be used to monitor air or water temperature throughout a building management system or an air handler unit. Duct or immersion options available with or without an enclosure.

BENEFITS/FEATURES

- Easy to mount external tab housing and flange options for duct applications
- 1/4 turn housing cover with chain to prevent dropping
- Multiple conduit knockouts for easy installation positioning
- 8´ plenum rated cable option
- Terminal connector eliminates need for wire nuts

APPLICATIONS

- Building automation
- VAV temperature sensing
- Chiller or boiler loops
- AHU monitoring

SPECIFICATIONS

Accuracy: Thermistor temperature sensor: ±0.22°C @ 25°C (±0.4°F @ 77°F); RTD temperature sensor: DIN class A: ±0.15°C @ 0°C (±0.28°F @ 32°F).
Temperature Limits: Operating: -40 to 302°F (-40 to 150°C).
Sensor Curves: See page reference ❶ below.
Cable Rating: Plenum option includes UL listed plenum cable.
Housing Material: Meets UL, 94 V-0 polycarbonate plastic.
Housing Rating: NEMA 4X (IP66) (DFW, IBW only).
Weight: 5.3 oz (150.3 g).
Compliance: Meets the technical requirements of EU Directive 2011/65/EU (RoHS II).

MODEL CHART

Example	TE	-DFN	-A	04	4	8	-00	TE-DFN-A0448-00
Series	TE							Temperature sensor
Mounting Configuration		DFN						Duct mount probe only
		DFG						Duct mount probe in general purpose housing
		DFW						Duct mount probe in NEMA 4X housing
		IBN						Immersion probe only
		IBG						Immersion probe in general purpose housing
		IBW						Immersion probe in NEMA 4X housing
Sensor Type			A					10k Ω type III thermistor
			B					10k Ω type II thermistor
			C					3k Ω thermistor
			D					Pt100 Ω RTD
			E					Pt1000 Ω RTD
			F					20k Ω thermistor
			Q					10k Ω type III with 11k Ω shunt
Probe Length				25				2.5˝
				04				4˝
				06				6˝
				08				8˝
				12				12˝
				18				18˝ (DFN/DFG only)
Probe Diameter					4			1/4˝ double encapsulated
Termination						3		4˝ leads with spade connectors
						4		4˝ leads
						7		8´ plenum rated cable with spade connectors
						8		8´ plenum rated cable
Fittings							00	None (probe only)
							12	1/2˝ NPT compression fitting
							14	1/4˝ NPT compression fitting

❶Resistance vs. Temperature Table: See page 137 (Series TE-OND/RND/OSA)

Dwyer

SERIES RHP-E/N

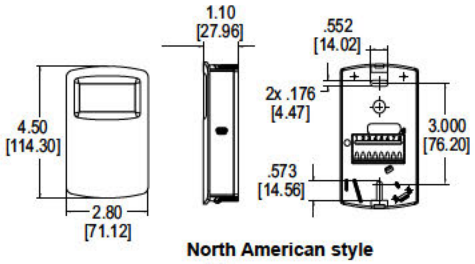
WALL MOUNT HUMIDITY/TEMPERATURE/DEW POINT TRANSMITTERS

Optional LCD Display

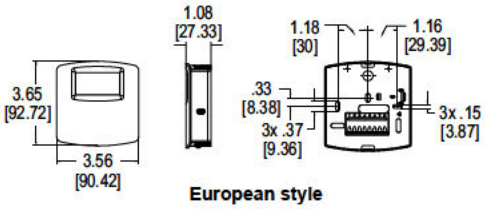
CALIBRATION SERVICES AVAILABLE

European style

North American style



North American style



European style

The **Series RHP-E/N Wall Mount Humidity/Temperature/Dew Point Transmitters** are the most versatile room transmitter on the market. The stylish housing is well vented to provide air flow across the sensor to improve measurement accuracy. The humidity and the dew point are measured using a capacitive polymer sensor. The humidity and dew point can have either a current or voltage output, while the optional temperature output can be a current, voltage, RTD or thermistor. For models with current or voltage for the temperature output, the temperature range is field selectable.

BENEFITS/FEATURES

- Reduced installation cost with combined humidity/dew point and temperature sensing
- Wide application environments from a large selection of temperature sensors and 2% and 3% accuracies
- Reduced inventory with field selectable output

APPLICATIONS

- Air economizers
- Room comfort monitoring
- Greenhouse monitoring

SPECIFICATIONS

Relative Humidity Range: 0 to 100% RH.
Temperature Range: -40 to 140°F (-40 to 60°C) for thermistor and RTD sensors. -20 to 140°F (-28.9 to 60°C) for solid state band gap temperature sensors.
Dew Point Temperature Range: -20 to 140°F (-28.9 to 60°C); 0 to 100°F (-17.8 to 37.8°C); 40 to 90°F (4.4 to 32.3°C); -4 to 140°F (-20 to 60°C) field-selectable ranges.
Accuracy: RH: Model RHP-2XXX ±2% 10 to 90% RH @ 25°C; Model RHP-3XXX ±3% 20 to 80% RH @ 25°C; Model RHP-5XXX ±5% 20 to 80% RH @ 25°C; Thermistor temperature sensor: ±0.36°F @ 77°F (±0.2°C @ 25°C); RTD temperature sensor: DIN Class B; ±0.54°F @ 32°F (±0.3°C @ 0°C); Solid state band gap temperature sensor: ±0.9°F @ 77°F (±0.5°C @ 25°C).
Hysteresis: ±0.8%.
Repeatability: ±0.1% typical.
Temperature Limits: Operating: -40 to 140°F (-40 to 60°C); Storage: -40 to 176°F (-40 to 80°C).
Compensated Temperature Range: -4 to 140°F (-20 to 60°C).
Power Requirements: 4-20 mA loop powered outputs: 10-35 VDC; 0-5/10V outputs: 15-35 VDC or 15-29 VAC.
Output Signals: 4-20 mA loop powered outputs: 4-20 mA, 2 channels for humidity/solid state temperature sensor models (loop powered on RH). Switch selectable RH/dew point. Switch selectable normal or reverse output; 0-5/10V outputs: 5 mA max., 2 channels for humidity/solid state temperature sensor models. Switch selectable 0-10 V/2-10 V or 0-5 V/1-5 V output. Switch selectable RH/dew point. Switch selectable normal or reverse output.
Solid State Band Gap Temperature Sensor Output Ranges: Switch selectable, -20 to 140°F (-28.9 to 60°C); 0 to 100°F (-17.8 to 37.8°C); 40 to 90°F (4.4 to 32.3°C); -4 to 140°F (-20 to 60°C).
Response Time: 8 s.
Electrical Connections: Screw terminal block.
Drift: <0.25% RH/year.
RH Sensor: Capacitance polymer.
Enclosure Material: Polycarbonate.
Enclosure Rating: IP20.
Display: Optional LCD; Switch selectable %RH or dew point, °F/°C.
Display Resolution: RH: 1%; Temperature: 0.1°F (0.1°C); Dew point: 1°F (1°C).
Weight: 4.4 oz (125 g).
Compliance: CE.

MODEL CHART

Example	RHP	-3	N	4	A	-LCD	RHP-3N4A-LCD
Series	RHP						Humidity/temperature dew point transmitter
Accuracy		2 3 5					2% accuracy 3% accuracy 5% accuracy
Housing			E N				European style wall mount North American style wall mount
Humidity/Dew Point Output				4			4-20 mA/0-5 VDC/0-10 VDC
Temperature Output					0 4 A B C D E F		None 4-20 mA/0-5 VDC/0-10 VDC 10K Ω @ 25°C thermistor type III 10K Ω @ 25°C thermistor type II 3K Ω @ 25°C thermistor 100 Ω RTD DIN 385 1K Ω RTD DIN 385 20K Ω @ 25°C thermistor
Options						LCD NIST	LCD display NIST traceable calibration certificate

ACCESSORIES

Model	Description
A-449	Remote LCD display allows remote indication of select Dwyer wall mount transmitters for validation or certification purposes
SCD-PS	100-240 VAC/VDC to 24 VDC power supply

A-449

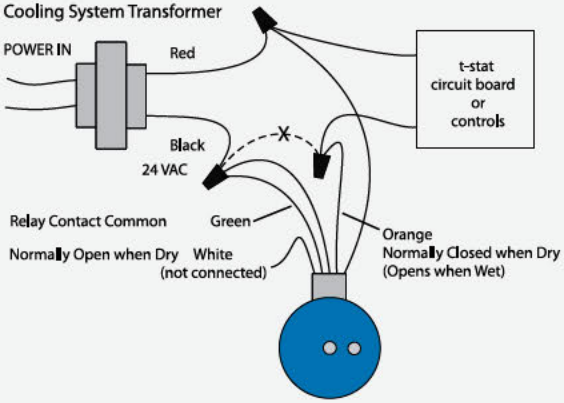
Specifications for the Wet Switch® Flood Detector

Relay:
- Isolated Contacts
- 2 Amps: NC Contact
- 2 Amps: NO Contact

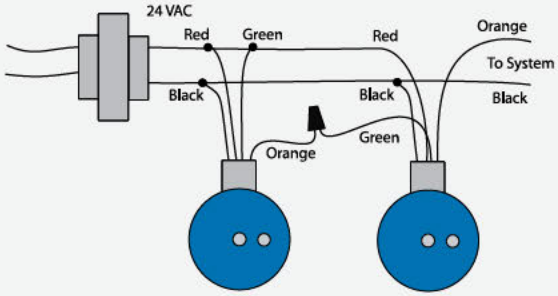
Indicators:
- Red LED : Moisture Detected
- Green LED: Power

Power Requirements:
- 18-30 VAC, 60 Hz
  20-30 VAC, 50 Hz
- 1.5 Watts Max (wet),
  <0.5 Watts (dry)

Typical Connection



Connection showing two or more Wet Switches in series



The contacts of the Wet Switch's relay may be wired to use multiple Wet Switches. The drawing above shows the contacts interrupting the 24 VAC signal when either Wet Switch® gets wet.

About DiversiTech

DiversiTech Corporation is North America's largest manufacturer of equipment pads and a leading manufacturer and supplier of components and related products for the heating, ventilating, air conditioning, and refrigeration (HVACR) industry.

Headquartered in the Atlanta, GA metropolitan area, DiversiTech manufactures a suite of products which includes a wide range of mechanical, electrical, chemical, and structural parts for HVACR and electrical systems, and swimming pool installations. The company maintains manufacturing and distribution facilities in key U.S. locations, Europe, and in the Far East. DiversiTech has enjoyed a continued history of successful growth and has acquired industry-recognized names including Devco® Enterprises, Wagner® Manufacturing, The Black Pad®, Hef-T-Pad™ and Specialty Chemical.

WET SWITCH® FLOOD DETECTOR

Download an electronic version of this brochure at:
http://media.diversitech.com/doc/DOC00015.pdf

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U.S. Patent No. 4,787,212
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LIT-FLY-WS, 6/13

DIVERSITECH

What is the Wet Switch® Flood Detector?

The Wet Switch® Flood Detector is a solid state device designed to detect the presence of condensate water overflow. Simply place the Wet Switch® Flood Detector into the secondary drain pan — a normally dry pan. If the primary drain pan fails, condensate water will overflow into the secondary drain pan. Upon sensing moisture, the Wet Switch® Flood Detector will turn the system off (typically the cause of the condensing water) to help prevent damage to carpets, walls, woodwork, ceilings, and other property.

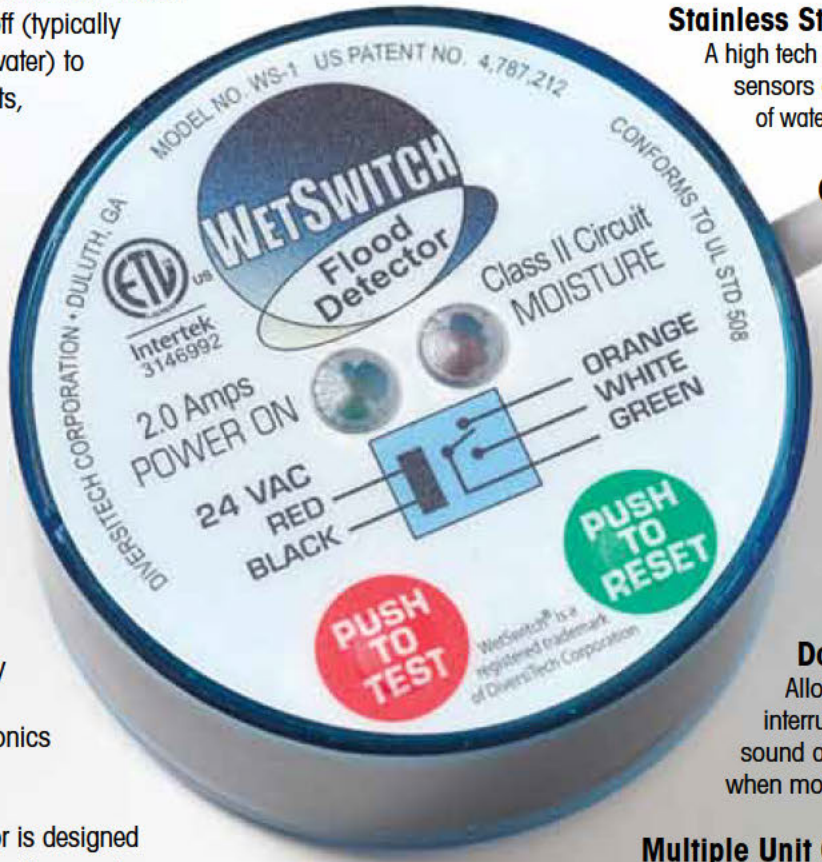
- Hydrophilic Pad
- Integral Feet
- Solid State Electronics
- Double Throw Relay
- Standard 24VAC control
- Multiple Unit Connectivity
- Stainless Steel Sensor Array
- Epoxy Encapsulated Electronics

The Wet Switch® Flood Detector is designed to interrupt the operation of cooling systems. However, it is a water activated switch and can be used in a variety of other applications.

Features and Benefits of the Wet Switch® Flood Detector

Hydrophilic Pad
A high tech polymeric fiber quickly draws water into the sensor array using proven capillary technology.

Integral Feet
Integral feet raise the hydrophilic pad and sensor array off the drain pan slightly to prevent nuisance tripping, and pan corrosion (metal pans only) from interfering with the sensor array.



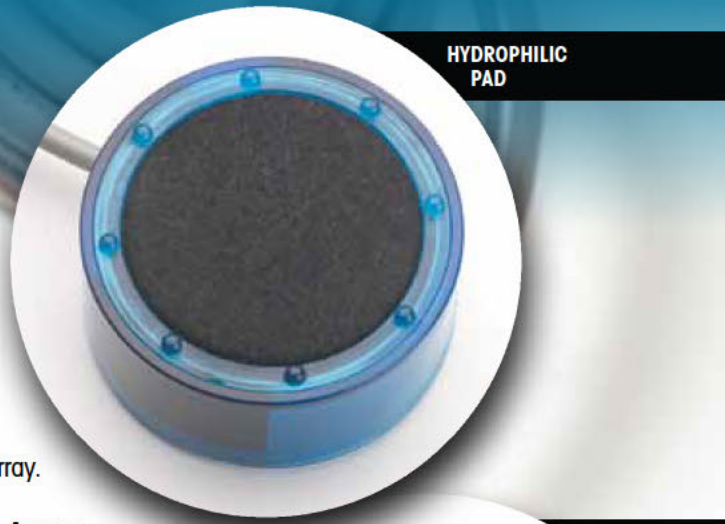
Stainless Steel Sensor Array
A high tech array of multiple stainless steel sensors detects even a minimal amount of water drawn into the hydrophilic pad.

Compact Package
The technology is packed into a 3-5/8″ diameter by 1-1/4″ high cylinder, furnished complete with 5-conductor 22AWG stranded cable, 6′ long.

Solid State Electronics
Proven electronics prevent mechanical failure in an aggressive operating environment.

Double Throw Relay
Allows for the wiring to interrupt the system and sound an alarm (by others) when moisture is detected.

Multiple Unit Connectivity
Multiple unit connectivity allows for multiple Wet Switch® Flood Detectors to be connected in series to adequately cover large drain pan areas.



RUBBER/CORK ANTI-VIBRATION PAD, 4IN. X 4IN. X 7/8IN.

Item#: **MP-4C**

The DiversiTech® MP-4C is a 4 in. x 4 in. x 7/8 in. rubber/cork anti-vibration pad designed to reduce vibration and noise emanating from refrigeration and air conditioning equipment. Rubber pads laminate to the cork center providing excellent vibration and noise reduction. Corrugated ribs on top and bottom reduce "walking" or "creep" associated with vibration. These pads are designed to withstand 50 psi.

Product Features & Benefits

- The top and bottom ribs are 90 degrees opposed to one another providing a natural resistance to "creep" or "walking" associated with vibrations
- Ideal for air conditioners, refrigeration equipment, compressors, cooling towers, presses, machines or anywhere vibration control is needed.

- Designed to withstand loads of 50 psi
- Pads can be stacked using interlocking ribs if additional vibration absorption or height is desired
- Other size options available from 2 in. x 2 in. to 18 in. x 18 in.

Specifications

Color	**Black|Brown**
Application	**Compressor|Condensers|Cooling Tower|Generator|Motor|Other|Press|Pumps**
Texture	**Corregated|Ribbed**
Size	**4x4x7/8 in.**
Indoor / Outdoor Use	**Indoor**
Durometer	**50**
PSI Rating	**50**
Ducted or Ductless	**Both Ducted and Ductless**

Order Info

UPC	**0686109670056**
Primary UoM	**Each**
Primary Depth (inches)	**4**
Primary Width (inches)	**4**
Primary Height (inches)	**0.94**
Primary Weight (lbs)	**0.37**
Quick Ship Flag	**Yes**
Order Multiple	**24**

Analog Points				
Point	Description	High Limit	Low Limit	R/W
AV0_TempSetPt	Temp set pt	95.0	40.0	Writable
AV1_TempDeadbnd	Zone Deadband	20.0	0.0	Writable
AV2_ZoneTempHiAlrm	Zone temp high alarm set pt	150.0	0.0	Writable
AV3_ZoneTempLowAlrm	Zone temp alarm low set pt	120.0	0.0	Writable
AV4_ZoneRhSetPt	Zone RH set pt	90.0	10.0	Writable
AV5_ZoneRhDeadbnd	Zone RH deadband	20.0	0.0	Writable
AV6_ZoneRhHiAlrm	Zone RH high alarm	100.0	0.0	Writable
AV7_ZoneRhLowAlrm	Zone RH low alarm set pt	100.0	0.0	Writable
AV8_WaterTempSetPt	Freecool or dual cool set point	80.0	0.0	Writable
AV9_CO2SetPt	CO2 set point	2000.0	500.0	Writable
AV10_SplyTempHiAlrm	Supply temp high alarm set pt	150.0	0.0	Writable
AV11_SplyTempLowAlrm	Supply temp low alarm set pt	150.0	0.0	Writable
AV12_StaticPSetPt	Duct static pressure set pt	20.0	0.0	Writable
AV13_SplyFanMin	Supply fan minimum set pt	100.0	30.0	Writable
AV14_SplyFanDesign	Supply fan design set point	100.0	30.0	Writable
AV15_SplyFanDehum	Supply fan dehum set back	100.0	30.0	Writable
AV16_DamperMin	Damper minimum position	100.0	0.0	Writable
AV17_DamperMax	Damper max position for CO2	100.0	0.0	Writable
AV18_AseDbSetPt	ASE dry bulb set pt	80.0	0.0	Writable
AV19_AseMixSetPt	ASE mixed air set point	80.0	0.0	Writable
AI0_StaticPress	Duct static pressure	20.0	0.0	Read Only
AI1_RetTemp	Return air temp	150.0	-50.0	Read Only
AI2_OutdoorRh	Outdoor air rh	100.0	0.0	Read Only
AI3_OutdoorTemp	Outdoor air temp	150.0	-50.0	Read Only
AI4_SplyTemp	Supply air temp	150.0	-50.0	Read Only
AI5_ZoneCO2	Zone CO2	3000.0	0.0	Read Only
AI6_ZoneRh	Zone relative hum	100.0	0.0	Read Only
AI7_ZoneTemp	Zone temp	150.0	-50.0	Read Only
AI8_WaterTemp	Free or dual cool water temp	150.0	-50.0	Read Only
AI9_Condenser	Condenser analog out	100.0	0.0	Read Only
AI10_ClgVlv	Cooling valve analog out	100.0	0.0	Read Only
AI11_Compressor	Compressor analog out	100.0	0.0	Read Only
AI12_Damper	Damper analog out	100.0	0.0	Read Only
AI13_Heater	Heater analog out	100.0	0.0	Read Only
AI14_HotGasReheat	Hot gas reheat analog out	100.0	0.0	Read Only
AI15_SplyFan	Supply fan analog out	100.0	0.0	Read Only

Binary Points				
Point	Description	-	-	R/W
BV0_AhuEn	Unit HMI enable	-	-	Writable
BV1_EnCooling	Allow cooling operation	-	-	Writable
BV2_EnDehum	Allow dehumidification operation	-	-	Writable
BV3_EnHeating	Allow heating operation	-	-	Writable
BV4_EnHum	Allow humidification operation	-	-	Writable
BV6_BMSOff	BMS point to enable/disable unit operation	-	-	Writable
BV8_AlarmReset	Reset all active alarms	-	-	Writable
BI0_AirProving	Air proving alarm	-	-	Read Only
BI1_DirtyFilter	Dirty filter alarm	-	-	Read Only
BI2_LifeSafety	Life safety alarm	-	-	Read Only
BI3_Condensate	Condensate overflow alarm	-	-	Read Only
BI4_Freezestat	Freezestat alarm	-	-	Read Only
BI5_WaterProving	Water proving alarm	-	-	Read Only
BI6_GlobalAlarm	Global alarm status	-	-	Read Only
BI7_Ckt1LowPress	Circuit 1 low refrigerant pressure alarm	-	-	Read Only
BI8_Ckt1HiPress	Circuit 1 high refrigerant pressure alarm	-	-	Read Only
BI9_Ckt2LowPress	Circuit 2 low refrigerant pressure alarm	-	-	Read Only
BI10_Ckt2HiPress	Circuit 2 high refrigerant pressure alarm	-	-	Read Only
BI11_HiZoneTemp	High zone temp alarm	-	-	Read Only
BI12_LowZoneTemp	Low zone temp alarm	-	-	Read Only
BI13_HiZoneRh	High zone RH alarm	-	-	Read Only
BI14_LowZoneRh	Low zone RH alarm	-	-	Read Only
BI15_HiSplyTemp	High supply temp alarm	-	-	Read Only
BI16_LowSplyTemp	Low supply temp alarm	-	-	Read Only
BI17_HiZoneCo2	High zone CO2	-	-	Read Only
BI18_Ckt1Comp1	Circuit 1 compressor 1 output	-	-	Read Only
BI19_Ckt1Comp2	Circuit 1 compressor 2 output	-	-	Read Only
BI20_Ckt2Comp1	Circuit 2 compressor 1	-	-	Read Only
BI21_Ckt2Comp2	Circuit 2 compressor 2 output	-	-	Read Only
BI22_ClgVlv	Cooling Valve output	-	-	Read Only
BI23_Condenser	Condenser output	-	-	Read Only
BI24_Heater1	Heater 1 output	-	-	Read Only
BI25_Heater2	Heater 2 output	-	-	Read Only
BI26_HotGasReheat	Hot gas reheat output	-	-	Read Only
BI27_Humidifier	Humidifier output	-	-	Read Only
BI28_PumpEnable	Pump enable output	-	-	Read Only
BI29_SplyFan	Supply fan output	-	-	Read Only
BI30_Damper	Damper output	-	-	Read Only
BI31_AhuOn	Current unit status	-	-	Read Only
BI32_NetOff	Unit disabled by multi-unit sequencing	-	-	Read Only
BI33_AlarmShutdown	Unit disabled by active alarms	-	-	Read Only

CRAC UNITS	INPUTS																	OUTPUTS							SOFTWARE FEATURES																					
	ANALOG									DIGITAL								DIGITAL			ANALOG				CALCULATED					ALARMS					PROGRAMS									
	TEMPERATURE	PRESSURE	RELATIVE HUMIDITY	VOLT/AMPS/ K.W.	POSITION	FLOW	SETPOINT	DP SWITCH	TEMPERATURE SWITCH	CURRENT SWITCH	SMOKE DETECTOR	ALARM	STATUS	FAULT	PHASE LOSS	SYSTEM IN MANUAL	ON - OFF (H.O.A.)	OPEN/CLOSE	ON - OFF	0 - 10 Vdc	4 - 20 ma	FLOATING POINT	OVERRIDE	KWHr/DEMAND	POSITION AS % OPN	SETPOINT	TOTALIZATION	RUNTIME	HIGH ANALOG	LOW ANALOG	BINARY	MAINTENANCE ALM	START/STOP OPT.	DEMAND LIMITING	DDC/PID CONTROL	EVENT PROGRAM	ALARM MESSAGES	TREND REPORT	DYN. COLOR GRAPHIC	DYN. TREND...
OUTSIDE AIR DAMPER																				X					X											X	X				
FILTER PRESSURE		X																											X			X				X					
COOLING COIL CONTROL VALVE																					X				X											X			X	X	
SUPPLY FAN										X							X										X	X			X		X			X	X			X	X	
SUPPLY AIR FIRE ALARM												X																									X					
SPACE RELATIVE HUMIDITY			X																							X			X					X			X	X	X	X	
SPACE TEMPERATURE	X																									X			X	X							X	X	X	X	
LEAK DETECTION ALARM												X																										X				
RETURN AIR DAMPER																					X				X	X								X		X					
RELIEF AIR DAMPER																				X					X											X	X				

COOK

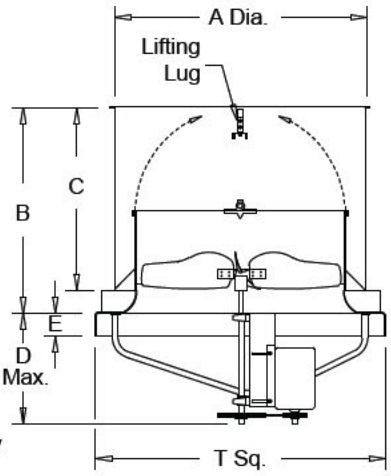
MARK: DH RELIEF
PROJECT: DC 10MW
DATE: 09/27/2024

LXUL

Low Silhouette
Upblast Exhaust Ventilator
Low Pressure X-Stream Propeller
Roof Mounted/Belt Drive

STANDARD CONSTRUCTION FEATURES:

X-Stream steel propeller - All non-galvanized steel components finished with Lorenized baked powder coat - 14 gauge spun steel Venturi/curb cap - 14 gauge steel lower drum - Minimum 18 gauge steel windband -Welded tubular steel power assembly - 2 point lifting lugs - Aluminum butterfly damper doors (20-36) - Galvanized steel butterfly dampers (42-60) - Welded curb cap corners - Adjustable pitch drives through 5 hp - Regreasable bearings in cast housing, rated at 200,000 hours average life - Propellers are statically and dynamically balanced - Corrosion resistant fasteners - Oil and heat resistant, static conducting belts - All fans factory adjusted to specified RPM



Performance (*Bhp includes 6% drive loss)

Qty	Catalog Number	Flow (CFM)	SP (in.)	Fan RPM	Power* (HP)	FEG	FEI
10	60 LXUL	44700	.250	436	6.18	67	1.14

Altitude (ft): 5312 Temperature (F): 95

Motor Information

HP	RPM	Volts/Ph/Hz	Enclosure	FLA	Mounted	VFD Rated
10	1725	460/3/60	ODP -PE	14	No	Yes

NEMA Premium® efficiency motor per MG-1 (2014) Table 12-12
FLA based on NEC (2017) Table 430.250

Sound Data Inlet Sound Power by Octave Band

1	2	3	4	5	6	7	8	LwA	dBA	Sones
93	97	95	85	82	77	74	67	90	79	33

- Distance from Sound source 5 ft

Dimensions (inches)

A Dia.	67-1/4
B	51
C	49
D Max.	28
E	3
T Sq.	72
Roof Open.	67-1/2

NOTE: Accessories may affect dimensions shown.

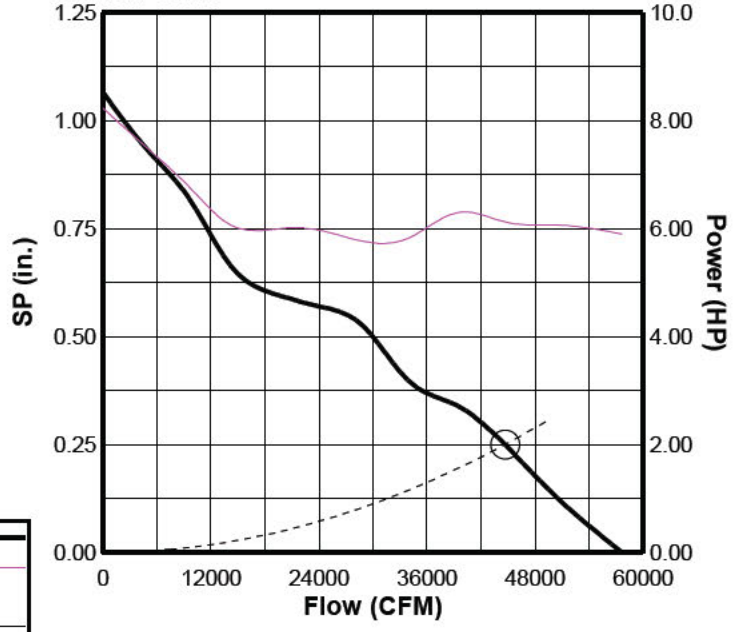
Weight(lb)***	Shipping	1781	Unit	1033

***Includes fan, motor & accessories.

Accessories:

Premium Efficiency Motor (Min. 91.7%)
DRIVES (1.5 SF) @ 436 RPM
ROOF CURB RCG 70 24H -C-T-N SL-1:12
DRIP PAN
MAGNETIC LATCHES
ANTICONDENSATE COAT
BELT TENSIONR-ROTARY

Fan Curve



Fan Curve Legend

CFM vs SP
CFM vs HP
Point of Operation
System Curve

MARK: ELEC RELIEF OPTION
PROJECT: DC 10MW
DATE: 09/27/2024

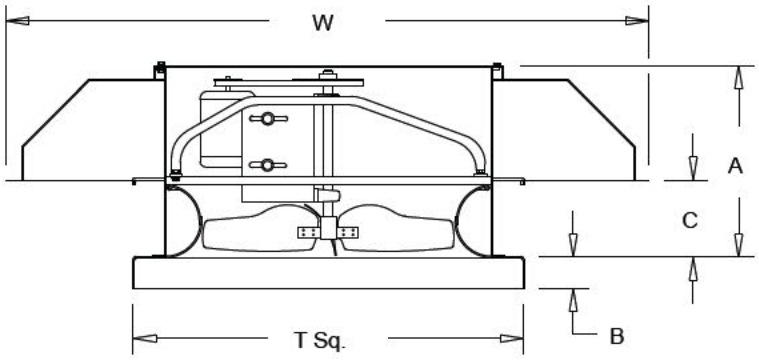
HXEL

Hooded Exhaust Ventilator
Low-Pressure Steel Propeller
Roof Mounted/Belt Drive

STANDARD CONSTRUCTION FEATURES:

X-stream steel propeller - Spun steel Venturi/curb cap - Lorenized steel lower housing - Galvanized steel hood - Birdscreen - Heavy duty steel power assembly - Welded curb cap corners - Adjustable pitch drives through 5 hp motor - Regreasable bearings in cast housing rated at 200,000 hours average life - Propellers are statically and dynamically balanced - Corrosion resistant fasteners - Oil and heat resistant, static conducting belts - All fans factory adjusted to specified RPM.

NOTE: Sizes 42-60 require field assembly of hood.



Performance (*Bhp includes 5% drive loss)

Qty	Catalog Number	Flow (CFM)	SP (in.)	Fan RPM	Power* (HP)	FEG	FEI
1	60HXEL13B	45000	.250	474	9.07	<50	0.81

Altitude (ft): 5312 Temperature (F): 70

Motor Information

HP	RPM	Volts/Ph/Hz	Enclosure	FLA	Mounted	VFD Rated
10	1725	460/3/60	ODP -PE	14	No	Yes

NEMA Premium® efficiency motor per MG-1 (2014) Table 12-12
FLA based on NEC (2017) Table 430.250

Sound Data Inlet Sound Power by Octave Band

1	2	3	4	5	6	7	8	LwA	dBA	Sones
90	92	89	86	83	81	79	73	89	77	30

- Distance from Sound source 5 ft

Accessories:

Premium Efficiency Motor (Min. 91.7%)
DRIVES (1.5 SF) @ 474 RPM
BD MOTORIZED INTAKE CTR PIVOT LA-66-24V
ROOF CURB RCG 70 24H -C-T+N SL-1:12
ENAMEL-CURB
GASKET W/NAILER-CURB
ANTICONDENSATE COAT
LIFTING LUGS - SHIPPED LOOSE
ALUMINUM HOOD
EXTENDED BASE HXB-70
BELT TENSIONR-ROTARY

Dimensions (inches)

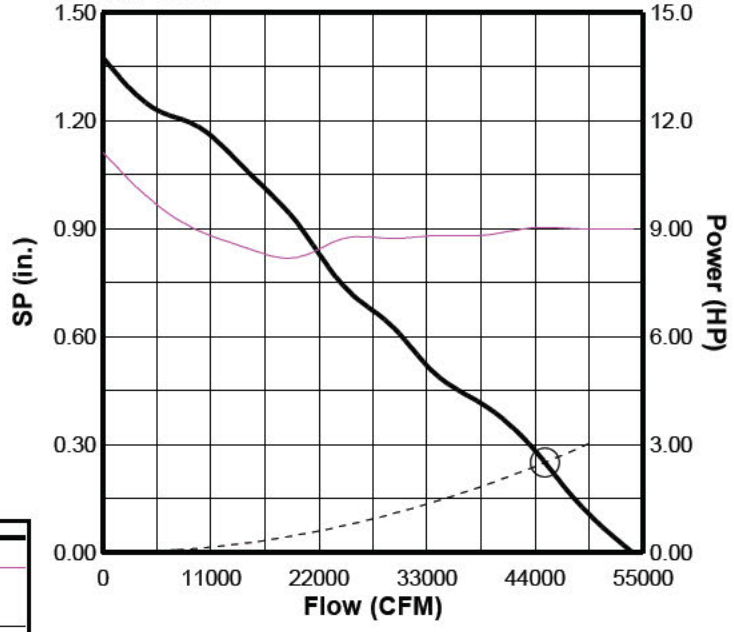
A	44-1/2
B	3
C	14-3/4
L x W	121 x 119
T Sq.	72
Base Ga.	14
Hood Ga.	18
Roof Open.Sq.*	67-1/2

NOTE: Accessories may affect dimensions shown.

Weight(lb)***	Shipping	2078	Unit	1657

*ROOF OPENING SIZE FOR CURBS SUPPLIED BY COOK ONLY.
***Includes fan, motor & accessories.

Fan Curve



Fan Curve Legend

CFM vs SP	———
CFM vs HP	———
Point of Operation	○
System Curve	———

COOK

PROJECT: DC 10MW
DATE: 09/27/2024

RCG SLOPED

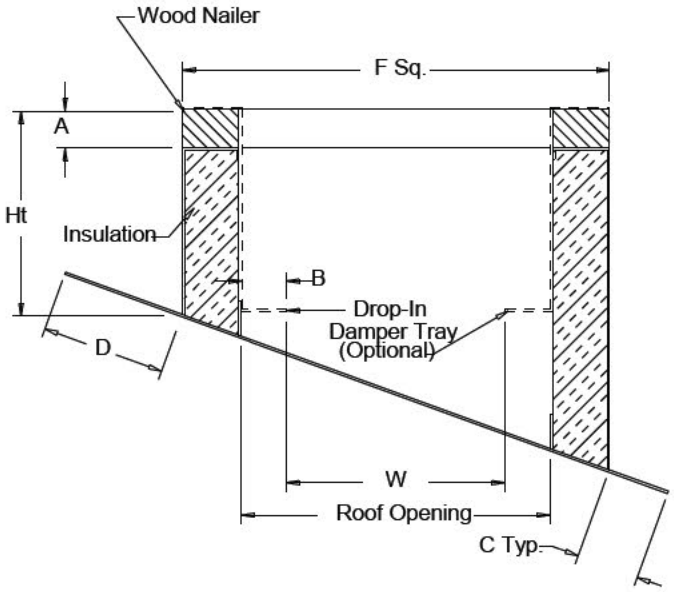
Galvanized Steel Roof Curb

STANDARD CONSTRUCTION FEATURES:

18 gauge galvanized steel - 1-1/2", 3 lbs. density thermal and acoustical insulation - Continuously welded corners - Wood nailer.

Options:(As noted below*)

1) No wood nailer (deduct 1-1/2" for actual height)
2) Drop-in damper tray.
3) Liner.
4) Gasket on wood nailer.
5) Lorenized coating.
6) Enamel coating.
7) Burglar bars.



Dimensions (inches)

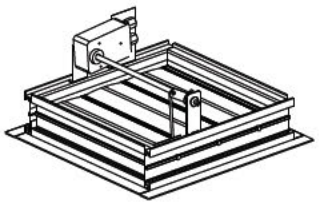
Mark	Qty	Description	Ht	Options* Rise/Run	A	B	C	D	F Sq.	W Sq.	Roof Opening
DH RELIEF	10	RCG 70	24	4; 1:12	1.5	1.875	2	6	70.5	63.75	67.5 X 67.5
ELEC RELIEF	1	RCG 70	24	4; 6; 1:12	1.5	1.875	2	6	70.5	63.75	67.5 X 67.5
ELEC RELIEF OPTION	1	RCG 70	24	4; 6; 1:12	1.5	1.875	2	6	70.5	63.75	67.5 X 67.5

COOK

PROJECT: DC 10MW
DATE: 09/27/2024

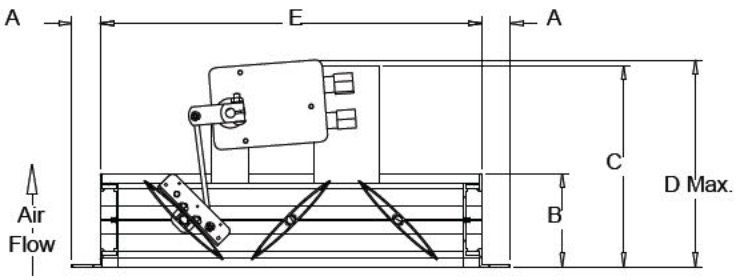
Motorized Damper

Low Leakage Class 1A Rated Aluminum



STANDARD CONSTRUCTION FEATURES:

-Frame: 5" x 1" x 6063T5 extruded hat channel with .125" minimum wall thickness.
-Blades: 6" wide, 6063T5 heavy gauge extruded aluminum, airfoil shape. Opposed blade standard.
-Seals: Synthetic polymer blade edge seals and flexible metal compressible jamb seals.
-Bearings: Molded synthetic.
-Linkage: Concealed in frame.
-Axles: 1/2" plated steel hex.
-Temperature Limits: -72 to +275 deg. Fahrenheit.
-Actuator in Airstream available in 24v, 115v, (230v and 460v with transformer). Power Open/spring Close
-MIN 13-1/2" CURB HT REQUIRED IF CURB MOUNTED.



Opposed Blade

Dimensions (inches)

Mark	Qty	Description	A	B	C	D Max	E	Num. Actuators
ELEC RELIEF OPTION	1	BDMICLA-66-24V	1-1/2	5	10-3/4	11-1/2	62-3/4	1

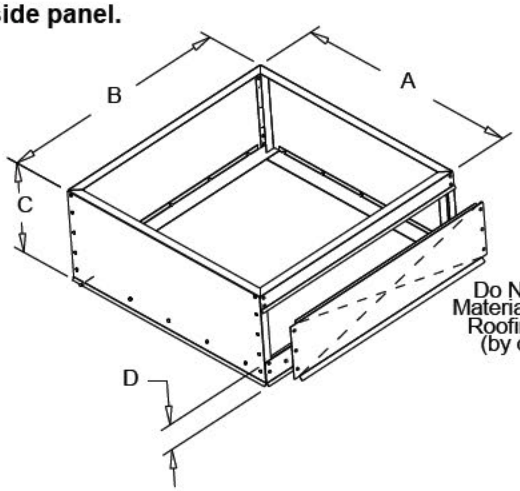
PROJECT: DC 10MW
DATE: 09/27/2024

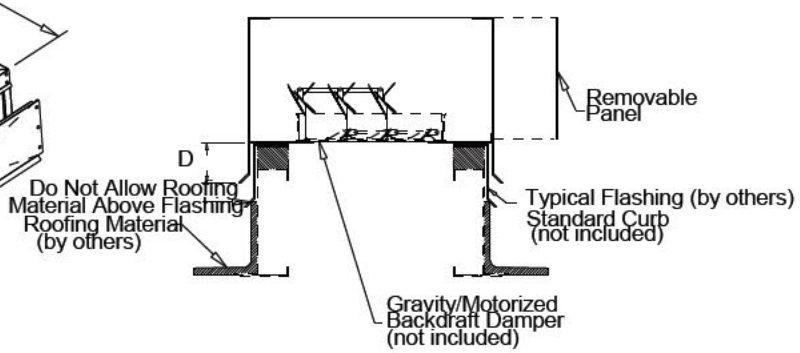
HXB

Heavy Duty Extended Base With Damper Access Door

STANDARD CONSTRUCTION FEATURES:

18 gauge galvanized steel construction -
One removable side panel.





Dimensions (inches)

Mark	Qty	Description	A	B	C	D
ELEC RELIEF OPTION	1	EXTENDED BASE HXB-70	71-9/16	71-5/8	21-19/32	2-7/16

Unit Rating

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Ecat Version: 345.0

1A	1B	1C	1D	2	3	4	5A	5B	5C	6A	6B	6C	7	8	9	10	11	12	13	14A	14B	15	16	17	18	19	20	21	22	23
R	N	-	0	0	6	-	3	-	0	-	G	6	0	C	-	1	2	A	:	A	0	0	0	-	C	L	B	-	D	B	D	-	A	G	B	-	0	0	E	A	0	A	0	-	0	0	-	0	0	0	0	0	C	0	0	B

Tag: RTU-A

Job Information

Job Name:	[redacted]
Job Number:	*Job #8*
Site Altitude:	*0 ft*
Refrigerant:	*R-410A*

Unit Information

Approx. Op./Ship Weights:	*1014 lbs / 1014 lbs (±5%)*
Ambient Temperature (DB/WB):	*95.0 °F / 65.0 °F*
Coil Filter FV / Qty:	*202.5 fpm / 4*
Supply Airflow/ESP:	*1800 SCFM / 1.30 in. w.g.*
Outside Airflow:	*550 SCFM*
Return Temperature (DB/WB):	*75.0 °F / 62.0 °F*

Static Pressure

External:	*1.30 in. w.g.*
Evaporator:	*0.10 in. w.g.*
Filters Clean:	*0.13 in. w.g.*
Dirt Allowance:	*0.35 in. w.g.*
Reheat Coil:	

Economizer:	*0.12 in. w.g.*
Heating:	*0.02 in. w.g.*
Cabinet:	*0.06 in. w.g.*
Total:	*2.08 in. w.g.*

Cooling Section

	Gross	Net
Total Capacity:	*64.1 MBH*	*61.0 MBH*
Sensible Capacity:	*57.9 MBH*	*54.8 MBH*
Latent Capacity:	*6.2 MBH*	
Mixed Air Temp (DB/WB):	*81.1 °F*	*62.9 °F*
Entering Air Temp (DB/WB):	*81.1 °F*	*62.9 °F*
Lv Air Temp (Coil) (DB/WB):	*50.9 °F*	*49.9 °F*
Lv Air Temp (Unit) (DB/WB):	*52.5 °F*	*50.6 °F*

Supply Air Fan:	*1 x RN150 @ 1.06 BHP Ea.*
SA Fan RPM / Width:	*1828 RPM / 3.360 in*
SA Fan FEI:	*1.33*
Evaporator Coil:	*8.5 ft² / 3 Rows / 14 FPI*
Evaporator Face Velocity:	*211.6 fpm*

Heating Section

Preheat Type:	*Std (No Preheat)*
Integrated Heat Capacity:	*38.3 MBH*
Primary Heat Type:	*Heat Pump*
Total Capacity:	*42.5 MBH*
OA Temp (DB/WB):	*20.0 °F / 19.0 °F*
RA Temp (DB/WB):	*75.0 °F / 62.0 °F*
Entering Air Temp (DB/WB):	*58.2 °F / 51.8 °F*
Leaving Air Temp (DB/WB):	*77.3 °F / 59.5 °F*
Input (Emergency/Aux):	*20.0 kW / 20.0 kW*
Fan Temp Rise:	*1.5 °F*
Auxiliary Heating Type:	*Electric Heat*
Heating Airflow:	*1800 SCFM*
Total Capacity:	*68.2 MBH*
Entering Air Temp (DB/WB):	*77.3 °F / 59.5 °F*
Leaving Air Temp (DB/WB):	*112.0 °F / 70.8 °F*
Electric Heat FLA:	*24*

Rating Information

Application EER @ Op. Conditions:	***10.1 BTU/h·W***
Application COP @ Op. Conditions:	***2.63 W/W***

Electrical Data

Circuit 1

Rating:	*460V/3Ø/60Hz*	*Minimum Circuit Amp:*	*46*	
Unit FLA:	*38*	*Maximum Overcurrent:*	*50*	
SCCR:	*5 KAIC*			

	Qty	HP	VAC	Phase	RPM	FLA	RLA
Compressor 1:	*1*		*460*	*3*			*8.5*
Condenser Fan:	*1*	*0.33*	*460*	*1*	*1100*	*1.6*	
Supply Fan:	*1*	*2.00*	*460*	*3*	*1760*	*3.4*	

Cabinet Sound Power Levels*

Octave Bands:	63	125	250	500	1000	2000	4000	8000
Discharge LW (dB):	*80*	*77*	*80*	*77*	*70*	*68*	*64*	*59*
Return LW (dB):	*75*	*72*	*68*	*63*	*59*	*54*	*42*	*34*

**Sound power levels are given for informational purposes only. The sound levels are not guaranteed.*

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1A 1B 1C 1D 2 3 4 5A 5B 5C 6A 6B 6C 7 8 9 10 11 12 13 14A 14B 15 16 17 18 19 20 21 22 23

RN-006-3-0-G60C-12A:A000-CLB-DBD-AGB-00EA0A0-00-00000C00B

Job Information

Job Name: [redacted] Job Number: Job #8

OA CFM: 550 SA CFM:

Performance Data Table

Outside Air		Mixed Air		Leaving Air		Heat Pump Capacity	Heat Pump Integrated Capacity	Heat Wheel Heating Capacity	Heating COP
DB °F	WB °F	DB °F	WB °F	DB °F	WB °F	MBH	MBH	MBH	W/W
62.0	56.2	71.0	60.3	110.5	72.9	77.3	77.3		3.79
57.0	51.6	69.5	59.0	105.9	71.0	71.5	71.5		3.68
52.0	47.1	68.0	57.9	101.7	69.3	66.3	66.3		3.57
47.0	42.6	66.4	56.8	97.4	67.6	61.1	61.1		3.45
42.0	38.0	64.9	55.7	93.8	66.1	57.2	57.2		3.34
37.0	33.5	63.4	54.8	86.4	63.3	53.2	45.7		2.80
32.0	28.8	61.9	53.8	83.6	62.1	49.5	43.3		2.75
27.0	24.3	60.3	52.9	80.9	60.9	46.2	40.9		2.69
22.0	19.7	58.8	52.0	78.1	59.7	43.0	38.6		2.63
17.0	15.0	57.3	51.1	75.5	58.5	40.1	36.5		2.56
12.0	10.4	55.8	50.3	72.8	57.3	37.4	34.3		2.49
7.0	5.7	54.2	49.5	70.1	56.1	34.8	32.0		2.40
2.0	0.1	52.7	48.6	*	*	*	*		*

*Invalid operation point - Compressor operating outside of operating envelope

15" STAR Plenum

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Ecat Version: 345.0

JOB INFORMATION:

Job Name:	[redacted]
Job Tag:	*RTU-A*
Date:	*3/18/2024 12:00:00 AM*

WHEEL SPECIFICATION:

Max RPM:	*2200*
Diameter x Qty:	*15 in. x 1*
CFM:	*1800*
Inertia:	*3WR²*

OPERATING CONDITIONS

Air Flow:	*1800*
Fan Energy Index (FEI):	*1.33*
Static Pressure:	*2.08 in. Wg*
Relief Dampers DP:	*0 in. Wg*
TSP:	*2.08 in. Wg*
Site Altitude	*0 ft*
TSP @ Sea Level:	*2.08 in. Wg*

MOTOR SELECTION

Rated HP / Bypass:	*2 x 1 / No*
Frame Size:	*145T*
Nominal RPM:	*1760*
VAC/PH/HZ:	*460V/3Ø/60Hz*
Enclosure Type:	*ODP*
Max Inertial Load:	*0 WR²*

FAN PERFORMANCE:

RPM:	*1828*
BHP:	*1.06*
Efficiency:	*55.68%*
Max Duct SP with Blocked Airway:	*0 in. Wg @1828 RPM*

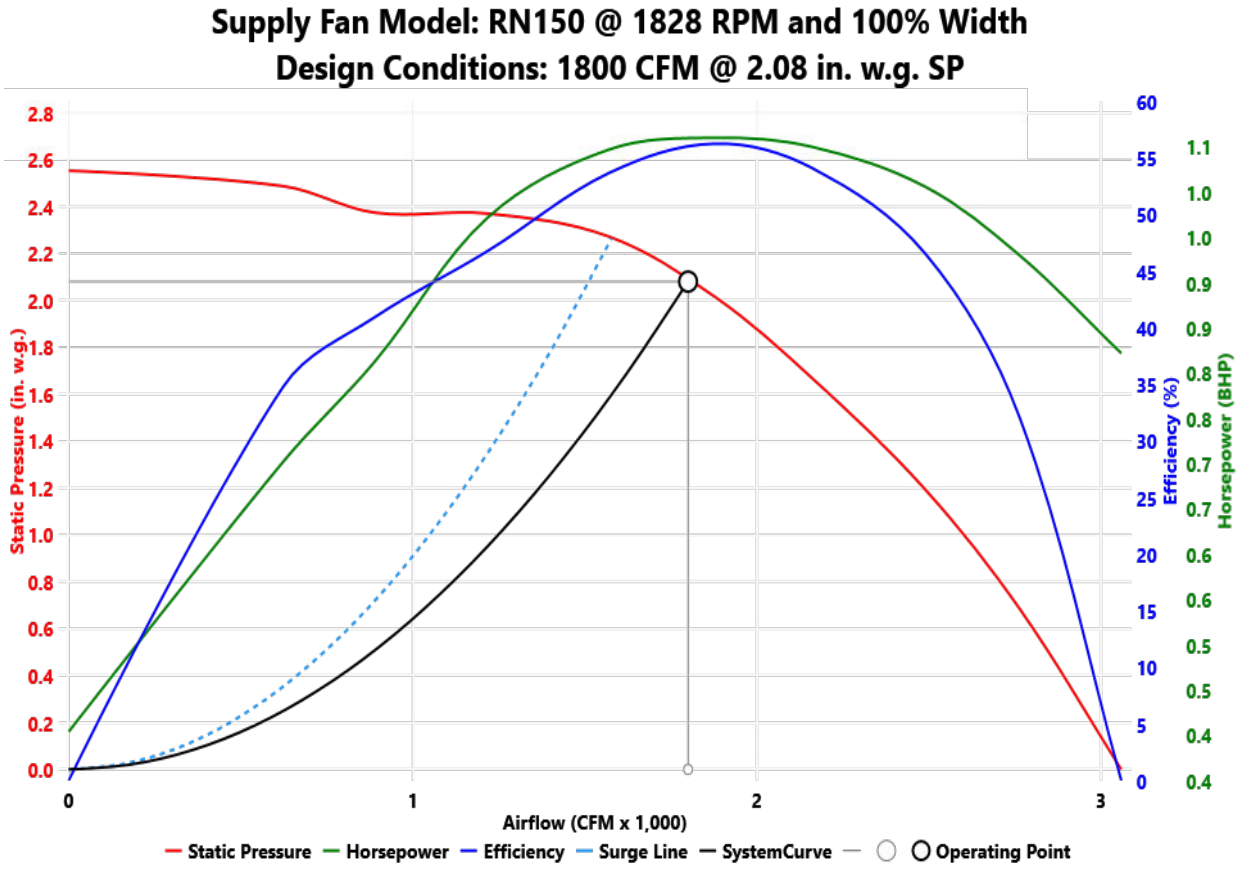
Max Duct SP with Blocked Airway:

FAN SOUND POWER (Inlet/Outlet)

Octave Band: **(Re 10^-12 watts)**

1	2	3	4	5	6	7	8
80	77	80	79	73	71	68	63
80	77	80	79	73	71	68	63

SOUND POWER A-Weighted: 63 dB



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Date Printed:3/18/2024 9:57:15 AM

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RN-006-3-0-G60C-12A:A000-CLB-DBD-AGB-00EA0A0-00-00000C00B

Tag: RTU-A

Job Name: [redacted]

Job Number: Job #8

Unit Worksheet For:

Unit Worksheet Date: 3/18/2024

	Base Option	Description
RN	Generation	Rooftop - Ninth Generation
006	Unit Size	Six
3	Voltage	460V/3φ/60Hz
0	Interior Protection	Standard
G	Refrigerant Style	R-410A Two-Step Compressor - High Efficiency
6	Unit Configuration	Alpha Class - Air-Source Heat Pump
0	Coil Coating	Standard
C	Cooling/Heat Pump Staging	2 Stage Heat Pump + 1 Stage Auxiliary Heat
1	Heating Type	Electric Heat
2	Heating Designation	Heat 2 - 20 kW
A	Heating Staging	Modulating/SCR Electric - 0-10V Control Signal

	Feature Option		Decription
A	F1A.	RA/OA Section	Economizer
0	F1B.	RA/EA Blower Configuration	Standard - None
0	F1C.	RA/EA Blower	Standard - None
0	F1D.	RA/EA Blower Motor	Standard - None
C	F2.	OA Control	Fully Modulating Actuator - Sensible Limit
L	F3.	Heat Options	20 kW - Auxiliary Heating Capacity
B	F4.	Maintenance Options	115V Convenience Outlet - Factory Wired
D	F5A.	SA Blower Configuration	1 Blower + Premium Efficiency Motor + 1 VFD
B	F5B.	SA Blower	15" Direct Drive Backward Curved Plenum
D	F5C.	SA Motor	2.0 hp - 1760 rpm
A	F6A.	Pre Filter Type	2" Pleated Pre Filter - 30% Eff
G	F6B.	Unit Filter Type	4" Pleated - 85% Eff - MERV 13
B	F6C.	Filter Options	Magnehelic Gauge
0	F7.	Refrigeration Control	Standard - Fixed 55°F Comp. Cooling Lock Out + Adjustable Comp. Heating Lock Out
0	F8.	Refrigeration Options	Standard
E	F9.	Refrigeration Accessories	ECM Condenser Fan - Head Pressure Control
A	F10.	Power Options	Non-fused Disconnect Power Switch - 100 Amps
0	F11.	Safety Options	Standard
A	F12.	Controls	Low Limit Controls
0	F13.	Special Controls	Terminal Block for Thermostat Control
0	F14A.	Outside Air Configuration	Standard - None
0	F14B.	Preheat Sizing	Standard - None
0	F15.	Glycol Percent	Water or No WSHP
0	F16.	Interior Cabinet Options	Standard - Double Wall + R-13 Foam Insulation + Stainless Steel Drain Pan
0	F17.	Exterior Cabinet Options	Standard
0	F18.	Electrical Rating	Standard - 5 KAIC
0	F19.	Code Options	Standard - ETL U.S.A. Listing
C	F20.	Crating	Shrink Wrap
0	F21.	Water-Cooled Cond.	Standard - None
0	F22.	Control Vendors	Standard
B	F23.	Type	Standard - Includes AAON Gray Paint

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Ecat Version: 345.0

1A	1B	1C	1D	2	3	4	5A	5B	5C	6A	6B	6C	7	8	9	10	11	12	13	14A	14B	15	16	17	18	19	20	21	22	23
RN	006	3	0	G60C	12A	A000	CLB	DBD	AGB	00EA0A0	00	00000C00B																		

Tag: RTU-A
Job Name: [redacted] For:
Job Number: Job #8 Date: March 18, 2024

Terminals Available/Required for Controlling the Unit

Terminals	Decription
[R]	24VAC Control Voltage
[C]	Common
[G]	Supply Fan Enable
[Y1]	Cooling Stage 1 Enable/ Heat Pump - Heating Stage 1 Enable
[O]	Reversing Valve (Cooling) Enable
[W1]	Aux Heat Stage 1 Enable
[+] & [-]	SCR Control Signal (0-10VDC)
[A1] & [A2]	Economizer Enable
[S1-] & [S2+]	Supply Fan 1 - w/ 1 VFD: Signal (0-10VDC)
	VFD frequency reference signal control point must handle a rated 20k ohm input impedance.

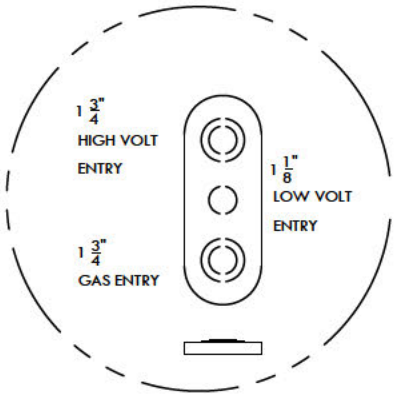
RN SERIES
A - CABINET ECONOMIZER ~ 6-10 TON

CLEARANCES

LOCATION	• UNIT SIZE • 6 - 10 TON
OUTSIDE AIR (BACK)	36*
CONTROLS SIDE (FRONT)	48
LEFT SIDE	6
RIGHT SIDE	48
TOP	UNOBSTRUCTED

*CLEARANCE IS MEASURED FROM THE END OF THE OUTSIDE AIR RAIN HOOD

NOTE: THE RNA UNIT IS NOT COMPATIBLE WITH PREVIOUS GENERATIONS OF AAON CURBS. AN ADAPTER CURB IS AVAILABLE IN ECAT.



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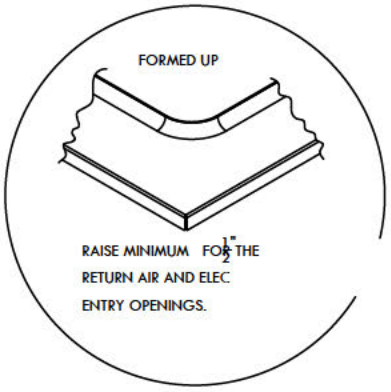

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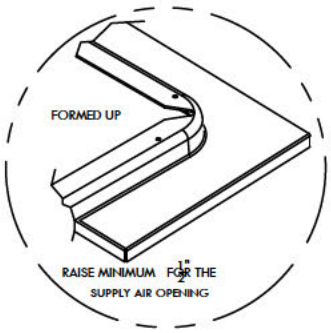

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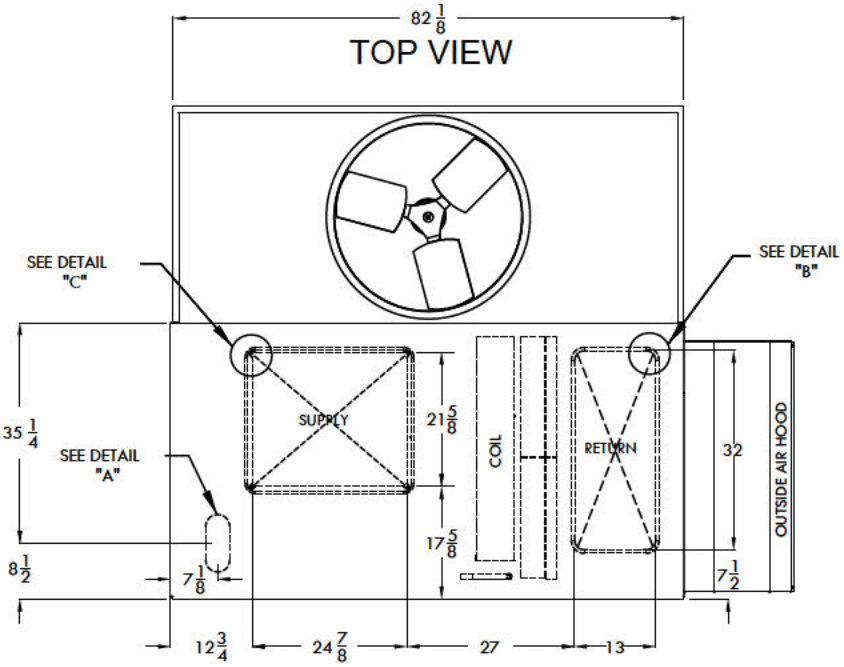
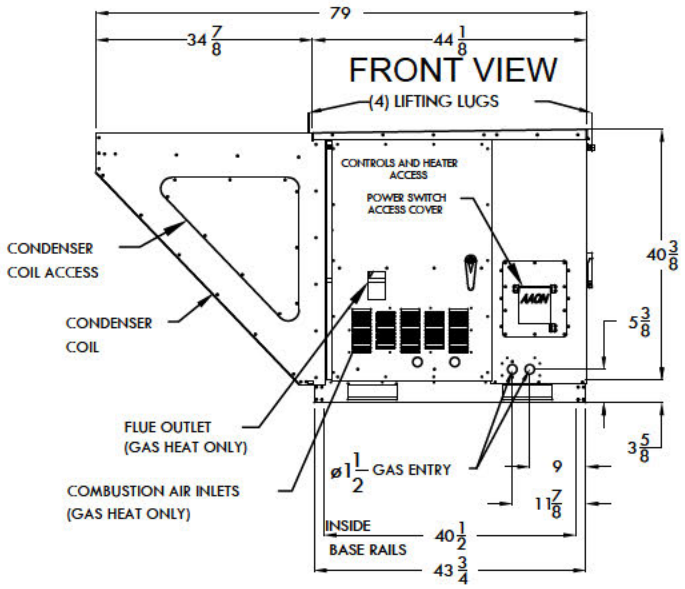
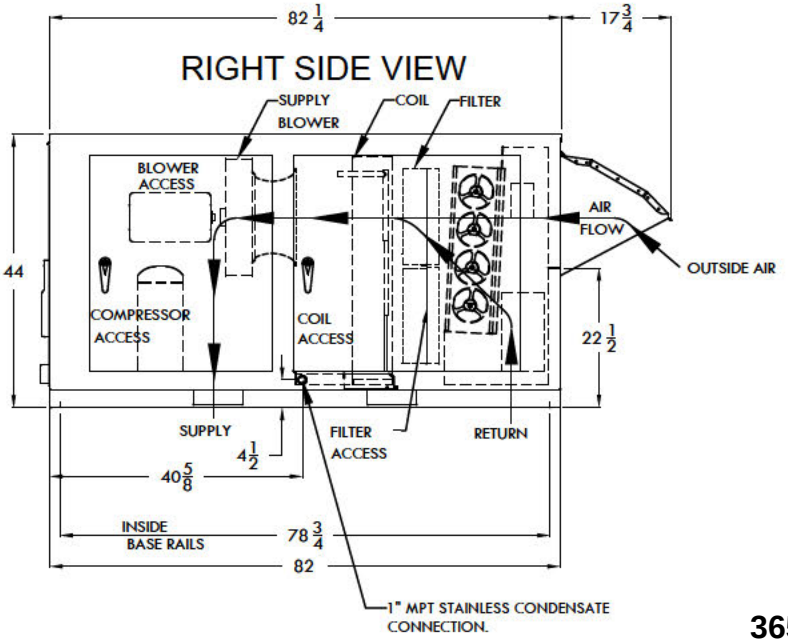




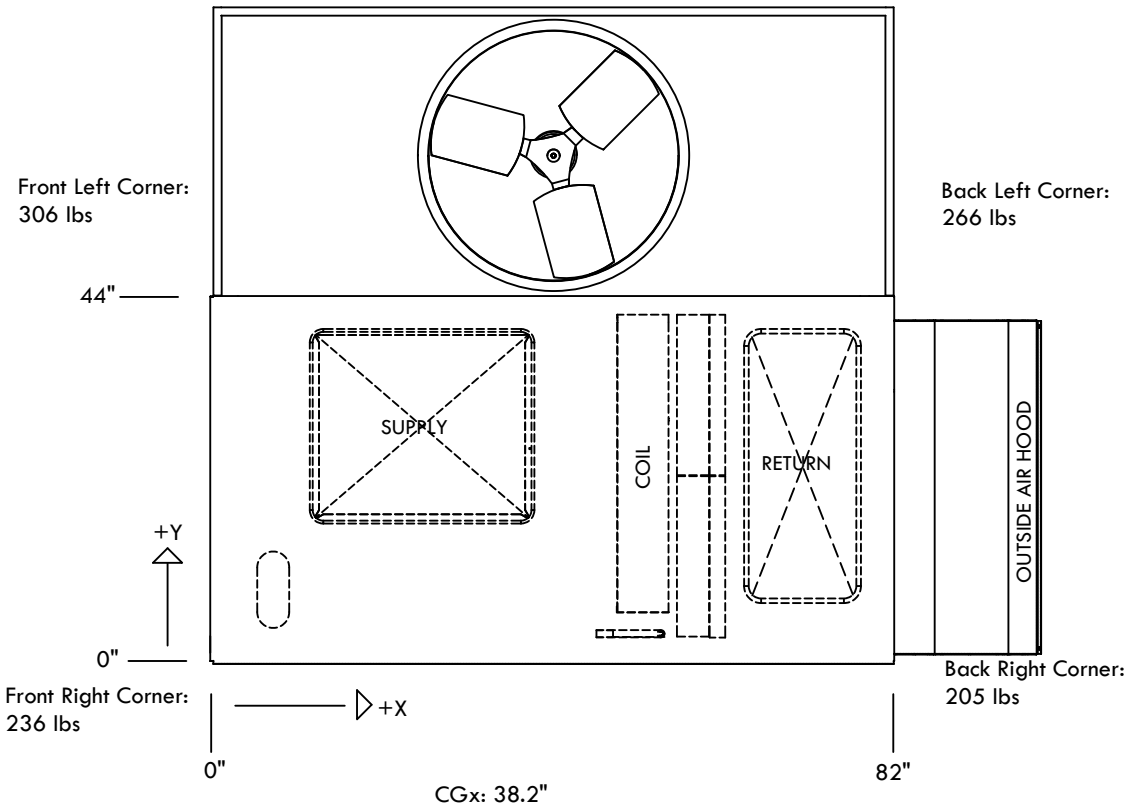


RNA-00013 REV:B 05/18/15 MLW

NOTE: ALL DIMENSIONS ARE IN INCHES

RNA CABINET
AIR COOLED CONDENSING UNIT

RN-006-3-0-G60C-12A:A000-CLB-DBD-AGB-00EA0A0-00-00000C00B



CGx: 38.2"
CGy: 24.8"

Total Weight:
1014 lbs

Disclaimer:
This weight estimate does not account for any SPAs.

COOK

MARK: RES ELEC RF	
PROJECT: DC 10MW	
DATE: 09/27/2024	

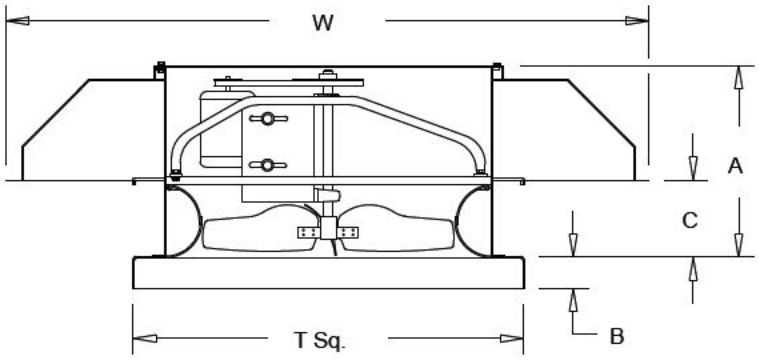
HXEL

Hooded Exhaust Ventilator
Low-Pressure Steel Propeller
Roof Mounted/Belt Drive

STANDARD CONSTRUCTION FEATURES:

X-stream steel propeller - Spun steel Venturi/curb cap - Lorenized steel lower housing - Galvanized steel hood - Birdscreen - Heavy duty steel power assembly - Welded curb cap corners - Adjustable pitch drives through 5 hp motor - Regreasable bearings in cast housing rated at 200,000 hours average life - Propellers are statically and dynamically balanced - Corrosion resistant fasteners - Oil and heat resistant, static conducting belts - All fans factory adjusted to specified RPM.

NOTE: Sizes 42-60 require field assembly of hood.



Performance (*Bhp includes 8% drive loss)

Qty	Catalog Number	Flow (CFM)	SP (inwg)	Fan RPM	Power* (HP)	FEG	FEI
1	36HXEL11B	15000	.250	685	2.26	60	1.24

Altitude (ft): 0 Temperature (F): 70

Motor Information

HP	RPM	Volts/Ph/Hz	Enclosure	FLA	Mounted	VFD Rated
5	1725	460/3/60	ODP -PE	7.6	Yes	Yes

NEMA Premium® efficiency motor per MG-1 (2014) Table 12-12
FLA based on NEC (2017) Table 430.250

Sound Data Inlet Sound Power by Octave Band

1	2	3	4	5	6	7	8	LwA	dBA	Sones
85	88	84	78	74	70	68	63	81	70	19.3

- Distance from Sound source 5 ft

Accessories:

Premium Efficiency Motor (Min. 89.5%)
DRIVES (1.5 SF) @ 685 RPM
DISCONNECT NEMA 3
ANTICONDENSATE COAT
LIFTING LUGS
EXTENDED LUBE LINES
SPARE BELT SET

Dimensions (inches)

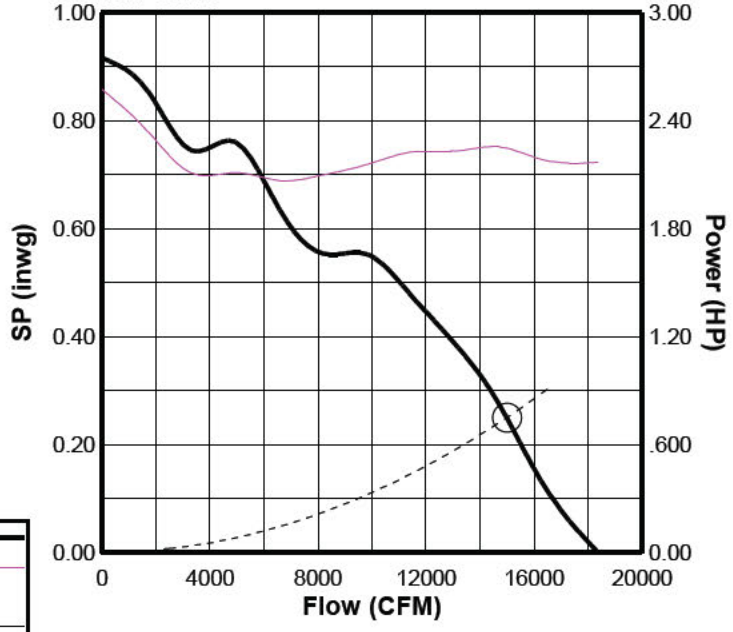
A	33
B	3
C	10
L x W	80 x 80
T Sq.	48
Base Ga.	14
Hood Ga.	18
Roof Open.Sq.*	43-1/2

NOTE: Accessories may affect dimensions shown.

Weight(lb)***	Shipping	951	Unit	688

*ROOF OPENING SIZE FOR CURBS SUPPLIED BY COOK ONLY.
***Includes fan, motor & accessories.

Fan Curve



Fan Curve Legend

CFM vs SP	
CFM vs HP	
Point of Operation	◯
System Curve	

COOK

MARK: RES ELEC RF
PROJECT: DC 10MW
DATE: 09/27/2024

HXEL

Performance (*Bhp includes 8% drive loss)

Catalog Number	Flow (CFM)	SP (inwg)	Fan RPM	Power* (HP)	FEG	FEI	OVEL (FPM)	TSPD (FPM)	SE	Temp (°F)	ALT (ft)
36HXEL11B	15000	.250	685	2.26	60	1.24	2038	6456	28%	70	0

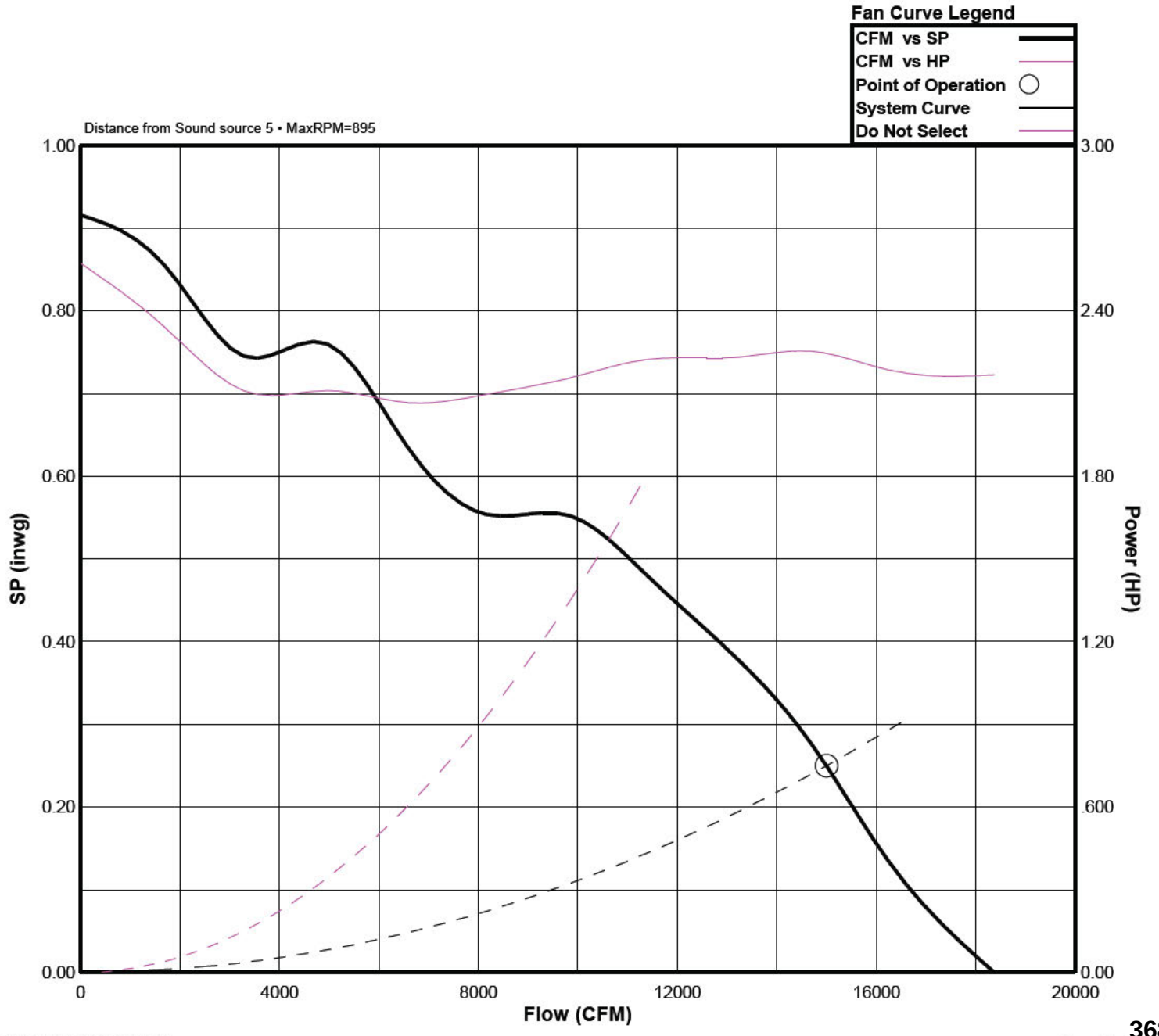
Sound Data Inlet Sound Power by Octave Band

1	2	3	4	5	6	7	8	LwA	dBA	Sones
85	88	84	78	74	70	68	63	81	70	19.3

Motor Information

HP	RPM	Volts/Ph/Hz	Enclosure	FLA	Mounted	VFD Rated
5	1725	460/3/60	ODP -PE	7.6	Yes	Yes

FLA based on NEC (2017) Table 430.250



COOK

HXEL

MARK: RES ELEC RF
PROJECT: DC 10MW
DATE: 09/27/2024

AMCA License Information

Loren Cook Company certifies that the 36HXEL11B shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program.

Performance certified is for installation type A: free inlet, free outlet. Power rating (BHP/kW) does not include transmission losses. Performance ratings do not include the effects of appurtenances (accessories). The sound ratings shown are loudness values in hemispherical sones at 5 ft. in a hemispherical free field calculated per AMCA Standard 301. Values shown are for Installation type A: free inlet hemispherical sone levels. The AMCA International licensed air and/or sound performance data has been modified for installation, appurtenances or accessories, etc. not included in the certified data. The modified performance is not AMCA licensed but is provided to aid in selection and applications of the product.

The sound power level ratings shown are in decibels, referred to 10(-12) watts calculated per AMCA Standard 301. Values shown are for inlet Lwi and LwiA sound power levels for installation type A: free inlet, free outlet. Ratings do not include the effects of duct end correction. The A-weighted sound ratings shown have been calculated per AMCA Standard 301. The dBA levels shown have been calculated for a distance of 5 ft in a hemispherical free field. The AMCA Certified Ratings Seal applies to free air sone ratings only. Octave Band, LwA and dBA levels are not AMCA International licensed.

MARK: RES ELEC RF
PROJECT: DC 10MW
DATE: 09/27/2024

Limited Warranty

Loren Cook Company warrants that your Loren Cook fan was manufactured free of defects in materials and workmanship, to the extent stated herein. For a period of one (1) year after date of shipment, we will replace any parts found to be defective without charge, except for shipping costs which will be paid by you.

This warranty is granted only to the original purchaser placing the fan in service.

This warranty is void if the fan or any part thereof has been altered or modified from its original design or has been abused, misused, damaged or is in worn condition or if the fan has been used other than for the uses described in the company manual. This warranty does not cover defects resulting from normal wear and tear.

To make a warranty claim, notify Loren Cook Company, General Offices, 2015 East Dale Street, Springfield, Missouri 65803-4637, explaining in writing, in detail, your complaint and referring to the specific model and serial numbers of your fan. Upon receipt by Loren Cook Company of your written complaint, you will be notified, within thirty (30) days of our receipt of your complaint, in writing, as to the manner in which your claim will be handled. If you are entitled to warranty relief, a warranty adjustment will be completed within sixty (60) business days of the receipt of your written complaint by Loren Cook Company.

This warranty gives only the original purchaser placing the fan in service specifically the right. You may have other legal rights which vary from state to state.

For fans provided with motors, the motor manufacturer warrants motors for a designated period stated in the manufacturer's warranty. Warranty periods vary from manufacturer to manufacturer. Should motors furnished by Loren Cook Company prove defective during the designated period, they should be returned to the nearest authorized motor service station. Loren Cook Company will not be responsible for any removal or installation costs.

TECHNICAL MEMORANDUM

To: Thomas Moore Lawson, Esq. — Thomas Moore Lawson, PC

From: Shashwat Anant, EIT; Kevin Sitzman, PE — Gorove Slade

Date: December 1, 2025

Subject: Winchester Gateway - Trip Generation Comparison Memo

Introduction

This memo presents a trip generation comparison with respect to the Winchester Gateway development, situated south of Apple Valley Road (Rte. 651/652), west of Shady Elm Road (Rte. 651), and east of VA 37 in Frederick County, Virginia. This assessment was conducted to evaluate possible changes in the proposed development program from what was previously analyzed for the site in an approved traffic impact study (TIS), titled *Traffic Impact Study – Winchester Gateway* dated July 14, 2023 for the development. As presented in this memorandum, the proposed change in development program constitutes a significant reduction in the anticipated trips generated by the site, thereby substantially reducing the previously anticipated impact.

Modification of Development Program

The Winchester Gateway development is situated on one parcel that can be identified on Frederick County Tax Maps with the following Tax PIN #: 63 A 80I. The property area is approximately 71.85 acres and is currently zoned as M1 (Light Industrial District).

In the approved TIS, the development program assumed approximately 805,000 square feet of industrial park use.

The Applicant is seeking a Conditional Use Permit (CUP) for approximately 805,000 square feet of two-story Data Center use, which generates substantially fewer vehicle trips during peak hours and across a typical weekday.

Trip Generation Comparison

In order to calculate the trips generated by the existing and proposed development, the Institute of Transportation Engineers' (ITE) Trip Generation Manual, 11th edition, the publication was utilized to determine the total number of trips going into and out of the subject study site during the weekday morning (AM) and weekday afternoon (PM) peak hours as well as the typical number of weekday daily trips associated with the development.

Table 1: Site Trip Generation: Existing Development (ITE 11: Peak Hour of the Adjacent Street)

Land Use	ITE Code	Size	Weekday						
			AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	Total
Approved Development Trips (Traffic Impact Study – Winchester Gateway dated July 14, 2023)									
Industrial Park	130	805.0 kSF of GFA	222	52	274	60	214	274	2,777

As shown in Table 1, the approved development program included in the traffic impact study would generate approximately 270 AM peak hour trips, 274 PM peak hour trips and 2,777 trips on a typical weekday.

Table 2: Site Trip Generation: Proposed Development

Land Use	Size	Weekday						
		AM Peak Hour			PM Peak Hour			Daily
		In	Out	Total	In	Out	Total	Total
Proposed Development Trips								
Data Center (AWS Study)*	805.0 kSF	40	32	72	7	17	24	604

*Notes: *Trip generation rates extracted from Data Center Trip Generation Assessment, prepared by Bowman and dated March 15, 2023.*

As shown in Table 2, the proposed development use would generate approximately 72 AM peak hour trips, 24 PM peak hour trips and 604 trips on a typical weekday.

Table 3: Comparison of Existing and Proposed Development

Land Use	ITE Code	Size	Weekday						
			AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	Total
Difference (Total Proposed Dev Trips - Total Approved Trips)			**-182**	**-20**	**-202**	**-53**	**-197**	**-250**	**-2,173**
% Reduction					**-74%**			**-91%**	**-78%**

As shown in Table 3, based on the Trip Generation Manual, the proposed development is anticipated to generate approximately 202 fewer AM peak-hour trips (a reduction of about 74%), 250 fewer PM peak-hour trips (a reduction of about 91%), and 2,173 fewer weekday daily trips (a reduction of about 78%) compared to the previously approved development scenario.

Traffic Impacts

The previously approved TIS that evaluated an 805,000 square-foot industrial park determined that no roadway improvements were needed to mitigate traffic impacts. The rezoning nevertheless included proffered roadway widening along the site frontage and related improvements along Apple Valley Road. With the Conditional Use Permit, all proffers would remain in effect.

Because the change in use represents a substantial decrease in traffic activity, the overall transportation impact is significantly lower than what was already approved. In combination with the proffered widening, the proposed CUP development will add more road capacity than traffic, resulting in a net improvement to the adjacent roadway network.

Conclusion

Given the significant trip reduction and the fact that frontage improvements were proffered with the approved rezoning of the property, despite not being required to mitigate site traffic impacts, the the proposed data center use will have even less impact to the roadway network and no additional roadway improvements would be required to support the revised development program.

MUNICAP, INC.
PUBLIC FINANCE

Winchester Gateway – Phase I
Frederick County, Virginia

Economic Impact Analysis
Scenario A – Data Center
Scenario B – Warehouse/Distribution Facility

Executive Summary

This report provides economic impact estimates to Frederick County (the "County") under two development scenarios for the Winchester Gateway – Phase I development (the "Development"). The first is a data center, which is the current plan of Winchester Gateway LLC (the "Developer"). The second is an industrial building (assumed to be a warehouse/distribution center as this is the most common type of industrial facility in the County) under M-1 zoning. The County has requested this second scenario. These include estimates of the recurring additional tax revenues that the County may receive from the Development and one-time economic impacts from construction under both scenarios. Detailed calculations related to the economic impacts are included in the appended schedules. The Developer plans to engage in future phases of substantial additional development on adjacent parcels. References to the Development in this analysis refer only to this first phase of development. This report begins with information regarding the economic benefits of data centers more generally.

Economic Benefits of Data Centers

In addition to the economic benefits described in subsequent sections that the County may receive from the prospective Development under the data center scenario, information from public sources suggests various possible economic benefits of a data center to the County. These benefits can be seen by examining both the expected growth of the industry overall and its direct effects on tax revenues.

Data centers will likely be a major growth industry in the near future and may exceed growth in other areas of commercial real estate. Data centers are the only major type of commercial real estate expected to see more construction completions in 2026 than in any of the previous five years individually throughout North America, Europe, and Asia.[1] Companies worldwide are expected to make $6.7 trillion in data center capital expenditures by 2030 to meet a near tripling of demand for data center capacity.[2] In the United States, the data center market is expected to grow 10.1% annually between 2024 and 2030.[3] Additionally, data center employment in the United States grew by more than 60% between 2016 and 2023.[4] This suggests that the impact of data center growth will be seen not just in

[1] JLL, *Global Real Estate Outlook: Six Forces Reshaping Commercial Real Estate in 2026*. https://www.jll.com/en-us/insights/market-outlook/global-real-estate, accessed December 8, 2025.
[2] McKinsey & Company, *The cost of compute: A $7 trillion race to scale data centers*, April 28 2025.
[3] Summer Street Advisors, *Data Centers and CRE: What You Need to Know. June 6, 2025.*
[4] United States Census Bureau, *Data Centers Growing Fast and Reshaping Local Economies*, January 2025.

temporary construction and technology production but in permanent employment and permanent service provision by utilities and other industries.

Northern Virginia, widely acknowledged as the data center capital of the world, provides nearby evidence of these larger trends. In Loudoun County, data centers have an average assessed value of $609 per square foot, which is around triple the value of other commercial uses.[5] In Prince William County, which has fewer data centers than Loudoun County, data centers were still responsible for 83% of business tangible (personal property) tax revenue.[6] In the state of Virginia as a whole in 2022, data centers paid $640 million in state taxes and $1 billion in local government taxes.[7]

Additionally, while this report does not directly estimate additional County expenses on services that would be provided to this prospective Development, the estimated local government revenue to expense ratios for data centers are 13-to-1 in Prince William County and 26-to-1 in Loudoun County, as compared to a ratio of 4-to-1 for manufacturing plants.[7] Moreover, since 2008, Loudoun County has decreased its real property tax rate from $1.285 to $0.805, and in fiscal year 2026, Loudoun County decreased its vehicle tax rate by $0.67. Both of these are largely due to the additional property tax revenues generated by data centers.[5]

Development

According to the Developer, the Development under the data center scenario is expected to include approximately 675,000 square feet of data center space divided over three buildings and a single power substation. The second scenario assumes the same amount of industrial square footage for consistency. **TABLE A** shows the estimated assessed values of real property and business personal property at the Development under both scenarios.

TABLE A
SCENARIO OVERVIEW

	Scenario A - Data Center	Scenario B - Industrial
GSF[(a)]	675,000	675,000
Real property		
Assessed value per GSF[(b)]	$756	$91
Total assessed value	$510,222,390	$61,152,719
Business personal property		
Assessed value per GSF[(b)]	$1,570	$0.74
Total assessed value	$1,059,673,382	$498,462

[(a)]See Schedules A-I and B-I.

[(b)]See Appendix D-1.

[5] Loudoun County Data Center FAQs. https://www.loudoun.gov/FAQ.aspx?QID=1799, accessed December 2025.
[6] Prince William County, *2024 Data Center Industry Tax Revenue Report.*
[7] Northern Virginia Technology Council, *The Impact of Data Centers on Virginia's State and Local Economies 5th Biennial Report*, April 2024.

Projection of Impacts

In estimating future economic impacts in the County, MuniCap employed a combination of accepted approaches for such forecasts.

To calculate permanent and temporary employment and economic impacts at the Development, MuniCap used IMPLAN Cloud software developed by IMPLAN Group, LLC. IMPLAN Cloud is an industry-accepted economic impact assessment software system.

For the inputs used in developing the models, MuniCap relied on a variety of sources, which are noted in the appended schedules to this narrative.

For the calculation of economic benefits, primarily those in the form of increased tax revenue, MuniCap applied the actual taxing methodology by multiplying the applicable tax rate by the estimated taxable item in question whenever possible. For instance, MuniCap estimated real property taxes by multiplying projected assessed value by the current applicable real property tax rate. Other revenues calculated in this manner include business personal property taxes and utility taxes. MuniCap estimated local sales and use tax and meals and lodging tax revenues on a per capita basis using service population (county residents plus employees that reside outside the county.)

MuniCap assumed a uniform annual increase of 2.0% in most revenue categories. For real property taxes, this was expressed as an approximately 4.0% increase biennially, as real property in the County is reassessed biennially.

The appended schedules provide specific calculations of impacts, along with the sources of the underlying assumptions.

Employment Impacts – Employment, Income, and Output

TABLE B on the following page summarizes the projected permanent employment impacts after completion of the Development under both scenarios. Direct impact jobs and income represent full-time equivalent ("FTE") positions at the Development, converting both full-time and part-time employees to the equivalent number of full-time employees. Indirect and induced impact jobs and income include full-time and part-time employees across all industries. Specifically, indirect impact jobs and income are based on the effects of purchases within the supply chain that stem from the direct industry input. Induced impact jobs and income are based on household spending of labor income of employees within the supply chain. Income includes wages, benefits, payroll taxes, and proprietor's income.

TABLE B
PERMANENT EMPLOYMENT IMPACTS

Permanent Employment Impacts	*Permanent Jobs[a]*	*Annual Income[b]*	*Income Per Employee*
Data Center:			
Direct impacts (FTEs)	115	$9,975,747	$86,457
Indirect and induced impacts	50	$2,508,629	$50,354
Industrial:			
Direct impacts (FTEs)	1,074	$82,488,572	$76,838
Indirect and induced impacts	286	$16,283,455	$56,955

[a]Direct impact jobs represent FTE jobs. Indirect and induced impact jobs represent full-time and part-time employees across all industries. See Appendices E-1 and E-2.

[b]Employee income includes wages, benefits, payroll taxes, and proprietor's income. Indirect and induced impact income represents employee income across all industries. See Appendices E-1 and E-2.

TABLE C summarizes the projected one-time employment impacts and economic impacts resulting from the construction of the Development under both scenarios. Impacts assume a one-year duration. Direct and indirect and induced impacts are shown in the same manner as in Table B.

TABLE C
CONSTRUCTION-RELATED IMPACTS

Temporary Employment Impacts	*Permanent Jobs[a]*	*Annual Income[b]*	*Income Per Employee*
Data Center:			
Direct impacts (FTEs)	3,358	$331,458,100	$98,716
Indirect and induced impacts	1,167	$76,136,228	$65,262
Industrial:			
Direct impacts (FTEs)	203	$20,019,322	$98,716
Indirect and induced impacts	70	$4,598,457	$65,262

[a]Direct impact jobs represent FTE jobs. Indirect and induced impact jobs represent full-time and part-time employees across all industries. See Appendices E-3 and E-4.

[b]Employee income includes wages, benefits, payroll taxes, and proprietor's income. Indirect and induced impact income represents employee income across all industries. See Appendices E-3 and E-4.

Economic Impacts - Revenues

TABLE D on the following page summarizes the projected annual general fund revenues to the County at stabilization of the Development under both scenarios.

TABLE D
PROJECTED REVENUES – ANNUAL

Frederick County Gross Tax Revenues - Full Buildout	*Annual (Current Dollars at Full Buildout)[a]*	
	Data Center	*Industrial*
Real property tax revenues	$2,704,179	$324,109
Business personal property tax revenues	$4,446,844	$7,268
Utility tax revenues	$99,891	$6,243
Additional tax revenues	$22,890	$212,970
Total	**$7,273,803**	**$550,590**

[a]Represents annual impacts following project stabilization, excluding appreciation and inflation.

TABLE E summarizes the projected general fund revenues to the County for thirty fiscal years, ending June 30, 2056, based on the projected Development under both scenarios, reflecting projected construction completion and appreciation and inflation.

TABLE E
PROJECTED REVENUES – CUMULATIVE THROUGH FISCAL YEAR ENDING JUNE 30, 2056

Frederick County Gross Tax Revenues - Full Buildout	*Cumulative through Fiscal Year Ending June 30, 2056[a]*	
	Data Center	*Industrial*
Real property tax revenues	$96,586,598	$11,576,389
Business personal property tax revenues	$153,724,902	$251,920
Utility tax revenues	$2,497,263	$156,065
Additional tax revenues	$793,443	$7,382,303
Total	**$253,602,205**	**$19,366,677**

[a]Represents cumulative impacts over the period shown, including appreciation and inflation.

TABLE F shows the estimated general fund revenue increase from the Development as a percentage of the County general fund budget under both scenarios.

TABLE F
PROJECTED ANNUAL INCREASE TO COUNTY REVENUES

Comparison of Projected Revenues	*Revenues*	
	Data Center	*Industrial*
Frederick County current revenues[a]	$267,811,364	$267,811,364
Proposed Development projected revenues	$7,273,803	$550,590
Overall increase in projected revenues	**2.72%**	**0.21%**

[a]Source: Frederick County, Virginia FY 2025-2026 Adopted Budget.

Limitations

Projecting economic and employment impacts is inherently imprecise, particularly when results are extrapolated over several years. Furthermore, there are different methods of projecting economic impacts, and different analysts will arrive at different conclusions. The conclusions in this study are not intended to be precise results; they are intended to represent reasonable estimates of the potential economic impacts to Frederick County from the Development.

Winchester Gateway - Phase I
Frederick County, Virginia

Economic Impact Analysis
Scenario A - Data Center
Scenario B - Industrial - Warehouse/Distribution Center

Prepared By:

MUNICAP, INC.
PUBLIC FINANCE

July 7, 2026

Winchester Gateway - Phase I
Frederick County, Virginia

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Economic Impact Analysis

Scenario A - Data Center

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A-III Projected Utility Tax Revenues
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- b. 30 Years 4

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Economic Impact Analysis

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Winchester Gateway - Phase I
Frederick County, Virginia

Summary Schedules

Winchester Gateway - Phase I
Frederick County, Virginia

Schedule S-1: Summary of Economic Impacts to Frederick County

Table 1: Summary of Economic Impacts - Annual[1]

General Fund Revenues to Frederick County	Data Center	Industrial	Schedules
Real property tax revenues	$2,704,179	$324,109	Schedules A-I and B-I
Business personal property tax revenues	$4,446,844	$7,268	Schedules A-II and B-II
Utility tax revenues	$99,891	$6,243	Schedules A-III.b and B-III.b
Additional tax revenues	$22,890	$212,970	Schedules A-IV.b and B-IV.b
Total revenues to Frederick County	$7,273,803	$550,590	

Table 2: Summary of Economic Impacts - 30 Years[2]

General Fund Revenues to Frederick County	Data Center	Industrial	Schedule
Real property tax revenues	$96,586,598	$11,576,389	Schedules A-I and B-I
Business personal property tax revenues	$153,724,902	$251,920	Schedules A-II and B-II
Utility tax revenues	$2,497,263	$156,065	Schedules A-III.b and B-III.b
Additional tax revenues	$793,443	$7,382,303	Schedules A-IV.b and B-IV.b
Total revenues to Frederick County	$253,602,205	$19,366,677	

MuniCap, Inc. *7-Jul-26*

[1]Represents annual impacts following project stabilization, excluding appreciation and inflation.

[2]Represents cumulative impacts over the period shown, including appreciation and inflation.

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Schedule S-2: Summary of Economic Impacts to Frederick County - 30 Years

Development Year Ending	Fiscal Year Ending	Scenario A - Data Center (Appendix A-V)	Scenario B - Industrial (Appendix B-V)
31-Dec-25	30-Jun-27	$0	$0
31-Dec-26	30-Jun-28	$0	$0
31-Dec-27	30-Jun-29	$0	$0
31-Dec-28	30-Jun-30	$0	$0
31-Dec-29	30-Jun-31	$3,594,147	$196,929
31-Dec-30	30-Jun-32	$6,892,610	$406,423
31-Dec-31	30-Jun-33	$9,751,560	$614,403
31-Dec-32	30-Jun-34	$8,515,013	$634,012
31-Dec-33	30-Jun-35	$7,605,589	$638,972
31-Dec-34	30-Jun-36	$7,303,014	$659,374
31-Dec-35	30-Jun-37	$7,381,149	$664,535
31-Dec-36	30-Jun-38	$8,055,355	$685,760
31-Dec-37	30-Jun-39	$8,616,434	$691,130
31-Dec-38	30-Jun-40	$9,336,700	$713,213
31-Dec-39	30-Jun-41	$9,450,074	$718,799
31-Dec-40	30-Jun-42	$9,709,867	$741,774
31-Dec-41	30-Jun-43	$9,827,821	$747,586
31-Dec-42	30-Jun-44	$10,098,110	$771,490
31-Dec-43	30-Jun-45	$10,220,829	$777,537
31-Dec-44	30-Jun-46	$10,502,038	$802,406
31-Dec-45	30-Jun-47	$10,629,715	$808,697
31-Dec-46	30-Jun-48	$10,922,285	$834,571
31-Dec-47	30-Jun-49	$11,055,120	$841,116
31-Dec-48	30-Jun-50	$11,359,509	$868,035
31-Dec-49	30-Jun-51	$11,497,712	$874,845
31-Dec-50	30-Jun-52	$11,814,398	$902,852
31-Dec-51	30-Jun-53	$11,958,184	$909,937
31-Dec-52	30-Jun-54	$12,287,664	$939,075
31-Dec-53	30-Jun-55	$12,437,259	$946,446
31-Dec-54	30-Jun-56	$12,780,050	$976,761
Total		$253,602,205	$19,366,677

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Schedule S-3: Summary of Employment Impacts

Table 1: Summary of Economic Impacts - Permanent Jobs and Income from New Development

Permanent Employment Impacts	Permanent Jobs[1]	Annual Income[2]	Income per Employee
Data center:			
Direct impacts (full-time equivalents)	115	$9,975,747	$86,457
Indirect and induced impacts	50	$2,508,629	$50,354
Industrial:			
Direct impacts (full-time equivalents)	1,074	$82,488,572	$76,838
Indirect and induced impacts	286	$16,283,455	$56,955

Table 2: Summary of Economic Impacts - Temporary Jobs and Income from Construction[3]

Temporary Employment Impacts	Temporary Jobs[1]	Annual Income[2]	Income per Employee
Data Center			
Direct impacts (full-time equivalents)	3,358	$331,458,100	$98,716
Indirect and induced impacts	1,167	$76,136,228	$65,262
Industrial			
Direct impacts (full-time equivalents)	203	$20,019,322	$98,716
Indirect and induced impacts	70	$4,598,457	$65,262

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[1]Direct impact jobs and income represent full-time equivalent employees. Indirect and induced impact jobs and income represent full-time and part-time employees across all industries. See Appendices E-1 and E-2.

[2]Income includes wages, salary, benefits, payroll taxes, and proprietor's income. See Appendices E-1 and E-2.

[3]Impacts assume a one-year duration. See Appendices E-3 and E-4.

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Schedule S-4: Summary of Proposed Development

Property Type	Estimated Completion[1]	GSF[1]	Assessed Value Per GSF[2]	Assessed Value Total
Scenario A				
Data center	2031	675,000	$756	$510,222,390
Scenario B				
Industrial	2031	675,000	$91	$61,152,719

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[1]See Schedules A-I and B-1. Represents approximate amount based on current project plan provided by the Developer. The exact size and layout of the Development is subject to change throughout the site plan approval process. Represents only Phase I development and does not include possible future development on other parcels. Industrial facility is not currently planned by Developer but included as a comparison.

[2]See Appendix D-1.

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Schedule S-5: Summary of Construction Completion

Development	Data Center[1]		Industrial[1]	
Year Ending	GSF	Cumulative	GSF	Cumulative
31-Dec-25	0	0	0	0
31-Dec-26	0	0	0	0
31-Dec-27	0	0	0	0
31-Dec-28	0	0	0	0
31-Dec-29	225,000	225,000	225,000	225,000
31-Dec-30	225,000	450,000	225,000	450,000
31-Dec-31	225,000	675,000	225,000	675,000
31-Dec-32	0	675,000	0	675,000
31-Dec-33	0	675,000	0	675,000
31-Dec-34	0	675,000	0	675,000
31-Dec-35	0	675,000	0	675,000
31-Dec-36	0	675,000	0	675,000
31-Dec-37	0	675,000	0	675,000
31-Dec-38	0	675,000	0	675,000
31-Dec-39	0	675,000	0	675,000
31-Dec-40	0	675,000	0	675,000
31-Dec-41	0	675,000	0	675,000
31-Dec-42	0	675,000	0	675,000
31-Dec-43	0	675,000	0	675,000
31-Dec-44	0	675,000	0	675,000
31-Dec-45	0	675,000	0	675,000
31-Dec-46	0	675,000	0	675,000
31-Dec-47	0	675,000	0	675,000
31-Dec-48	0	675,000	0	675,000
31-Dec-49	0	675,000	0	675,000
31-Dec-50	0	675,000	0	675,000
31-Dec-51	0	675,000	0	675,000
31-Dec-52	0	675,000	0	675,000
31-Dec-53	0	675,000	0	675,000
31-Dec-54	0	675,000	0	675,000
Total	675,000		675,000	

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[1]See Schedules A-I and B-I.

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Economic Impact Analysis - Scenario A - Data Center

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Schedule A-I: Projected Real Property Tax Revenues

Development Year Ending	Assessed As Of[1]	Final Tax Due Date[2]	Fiscal Year Ending[2]	Appreciation Factor[3]	Data Center SF	Data Center Value Per SF[4]	Data Center Total Assessed Value	County Tax Rate Per $100 A.V[5]	Projected Real Property Tax Revenues
31-Dec-25	1-Jan-26	5-Dec-26	30-Jun-27	100.0%	0	$756	$0	$0.53	$0
31-Dec-26	1-Jan-27	5-Dec-27	30-Jun-28	104.0%	0	$786	$0	$0.53	$0
31-Dec-27	1-Jan-28	5-Dec-28	30-Jun-29	104.0%	0	$786	$0	$0.53	$0
31-Dec-28	1-Jan-29	5-Dec-29	30-Jun-30	108.2%	0	$818	$0	$0.53	$0
31-Dec-29	1-Jan-30	5-Dec-30	30-Jun-31	108.2%	225,000	$818	$184,093,708	$0.53	$975,697
31-Dec-30	1-Jan-31	5-Dec-31	30-Jun-32	112.6%	450,000	$851	$383,062,188	$0.53	$2,030,230
31-Dec-31	1-Jan-32	5-Dec-32	30-Jun-33	112.6%	675,000	$851	$574,593,281	$0.53	$3,045,344
31-Dec-32	1-Jan-33	5-Dec-33	30-Jun-34	117.2%	675,000	$886	$597,806,850	$0.53	$3,168,376
31-Dec-33	1-Jan-34	5-Dec-34	30-Jun-35	117.2%	675,000	$886	$597,806,850	$0.53	$3,168,376
31-Dec-34	1-Jan-35	5-Dec-35	30-Jun-36	121.9%	675,000	$921	$621,958,247	$0.53	$3,296,379
31-Dec-35	1-Jan-36	5-Dec-36	30-Jun-37	121.9%	675,000	$921	$621,958,247	$0.53	$3,296,379
31-Dec-36	1-Jan-37	5-Dec-37	30-Jun-38	126.8%	675,000	$959	$647,085,360	$0.53	$3,429,552
31-Dec-37	1-Jan-38	5-Dec-38	30-Jun-39	126.8%	675,000	$959	$647,085,360	$0.53	$3,429,552
31-Dec-38	1-Jan-39	5-Dec-39	30-Jun-40	131.9%	675,000	$997	$673,227,608	$0.53	$3,568,106
31-Dec-39	1-Jan-40	5-Dec-40	30-Jun-41	131.9%	675,000	$997	$673,227,608	$0.53	$3,568,106
31-Dec-40	1-Jan-41	5-Dec-41	30-Jun-42	137.3%	675,000	$1,038	$700,426,004	$0.53	$3,712,258
31-Dec-41	1-Jan-42	5-Dec-42	30-Jun-43	137.3%	675,000	$1,038	$700,426,004	$0.53	$3,712,258
31-Dec-42	1-Jan-43	5-Dec-43	30-Jun-44	142.8%	675,000	$1,080	$728,723,214	$0.53	$3,862,233
31-Dec-43	1-Jan-44	5-Dec-44	30-Jun-45	142.8%	675,000	$1,080	$728,723,214	$0.53	$3,862,233
31-Dec-44	1-Jan-45	5-Dec-45	30-Jun-46	148.6%	675,000	$1,123	$758,163,632	$0.53	$4,018,267
31-Dec-45	1-Jan-46	5-Dec-46	30-Jun-47	148.6%	675,000	$1,123	$758,163,632	$0.53	$4,018,267
31-Dec-46	1-Jan-47	5-Dec-47	30-Jun-48	154.6%	675,000	$1,169	$788,793,443	$0.53	$4,180,605
31-Dec-47	1-Jan-48	5-Dec-48	30-Jun-49	154.6%	675,000	$1,169	$788,793,443	$0.53	$4,180,605
31-Dec-48	1-Jan-49	5-Dec-49	30-Jun-50	160.8%	675,000	$1,216	$820,660,698	$0.53	$4,349,502
31-Dec-49	1-Jan-50	5-Dec-50	30-Jun-51	160.8%	675,000	$1,216	$820,660,698	$0.53	$4,349,502
31-Dec-50	1-Jan-51	5-Dec-51	30-Jun-52	167.3%	675,000	$1,265	$853,815,390	$0.53	$4,525,222
31-Dec-51	1-Jan-52	5-Dec-52	30-Jun-53	167.3%	675,000	$1,265	$853,815,390	$0.53	$4,525,222
31-Dec-52	1-Jan-53	5-Dec-53	30-Jun-54	174.1%	675,000	$1,316	$888,309,532	$0.53	$4,708,041
31-Dec-53	1-Jan-54	5-Dec-54	30-Jun-55	174.1%	675,000	$1,316	$888,309,532	$0.53	$4,708,041
31-Dec-54	1-Jan-55	5-Dec-55	30-Jun-56	181.1%	675,000	$1,369	$924,197,237	$0.53	$4,898,245
Total									$96,586,598

MuniCap, Inc. *7-Jul-26*

[1]Real property is assessed for taxation as of January 1. Source: Frederick County Commissioner of Revenue.

[2]Property assessed as of January 1, 2026 will pay its final property tax payment of the year on December 5, 2026, which corresponds with fiscal year ending June 30, 2027.

[3]Assumes an annual appreciation of 2%. Property in Frederick County is reassessed every two years; as a result, the appreciation factor is set to adjust in years of the revaluation. The next reassessment values will become effective as of January 1, 2027. Source: Frederick County Commissioner of the Revenue.

[4]See Appendix D-1.

[5]Represents the tax rate as of July 2026. Source: Frederick County Commissioner of the Revenue.

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Schedule A-II: Projected Business Personal Property Tax Revenues

Development Year Ending	Assessed As Of[1]	Final Tax Due Date[2]	Fiscal Year Ending[2]	Appreciation Factor[3]	Data Center[4]		Assessed Value Before Depreciation		Depreciation Basis %[6]	Depreciated Assessed Value	Business Personal Property Tax Rate (Per $100 A.V.)[7]	Total Projected Business Personal Property Tax Revenues
					GSF	Cumulative	Per GSF[5]	Total				
31-Dec-25	1-Jan-26	5-Dec-26	30-Jun-27	100.0%	0	0	$1,570	$0	0%	$0	$1.25	$0
31-Dec-26	1-Jan-27	5-Dec-27	30-Jun-28	100.0%	0	0	$1,570	$0	0%	$0	$1.25	$0
31-Dec-27	1-Jan-28	5-Dec-28	30-Jun-29	102.0%	0	0	$1,601	$0	0%	$0	$1.25	$0
31-Dec-28	1-Jan-29	5-Dec-29	30-Jun-30	104.0%	0	0	$1,633	$0	0%	$0	$1.25	$0
31-Dec-29	1-Jan-30	5-Dec-30	30-Jun-31	106.1%	225,000	225,000	$1,666	$374,844,623	55%	$206,164,543	$1.25	$2,577,057
31-Dec-30	1-Jan-31	5-Dec-31	30-Jun-32	108.2%	225,000	450,000	$1,699	$764,683,032	50%	$382,341,516	$1.25	$4,779,269
31-Dec-31	1-Jan-32	5-Dec-32	30-Jun-33	110.4%	225,000	675,000	$1,733	$1,169,965,038	45%	$526,484,267	$1.25	$6,581,053
31-Dec-32	1-Jan-33	5-Dec-33	30-Jun-34	112.6%	0	675,000	$1,768	$1,193,364,339	35%	$417,677,519	$1.25	$5,220,969
31-Dec-33	1-Jan-34	5-Dec-34	30-Jun-35	114.9%	0	675,000	$1,803	$1,217,231,626	28%	$344,882,294	$1.25	$4,311,029
31-Dec-34	1-Jan-35	5-Dec-35	30-Jun-36	117.2%	0	675,000	$1,839	$1,241,576,258	25%	$310,394,065	$1.25	$3,879,926
31-Dec-35	1-Jan-36	5-Dec-36	30-Jun-37	119.5%	0	675,000	$1,876	$1,266,407,784	25%	$316,601,946	$1.25	$3,957,524
31-Dec-36	1-Jan-37	5-Dec-37	30-Jun-38	121.9%	0	675,000	$1,914	$1,291,735,939	28%	$359,840,726	$1.25	$4,498,009
31-Dec-37	1-Jan-38	5-Dec-38	30-Jun-39	124.3%	0	675,000	$1,952	$1,317,570,658	31%	$404,682,416	$1.25	$5,058,530
31-Dec-38	1-Jan-39	5-Dec-39	30-Jun-40	126.8%	0	675,000	$1,991	$1,343,922,071	34%	$451,173,838	$1.25	$5,639,673
31-Dec-39	1-Jan-40	5-Dec-40	30-Jun-41	129.4%	0	675,000	$2,031	$1,370,800,513	34%	$460,197,315	$1.25	$5,752,466
31-Dec-40	1-Jan-41	5-Dec-41	30-Jun-42	131.9%	0	675,000	$2,071	$1,398,216,523	34%	$469,401,261	$1.25	$5,867,516
31-Dec-41	1-Jan-42	5-Dec-42	30-Jun-43	134.6%	0	675,000	$2,113	$1,426,180,853	34%	$478,789,286	$1.25	$5,984,866
31-Dec-42	1-Jan-43	5-Dec-43	30-Jun-44	137.3%	0	675,000	$2,155	$1,454,704,470	34%	$488,365,072	$1.25	$6,104,563
31-Dec-43	1-Jan-44	5-Dec-44	30-Jun-45	140.0%	0	675,000	$2,198	$1,483,798,560	34%	$498,132,374	$1.25	$6,226,655
31-Dec-44	1-Jan-45	5-Dec-45	30-Jun-46	142.8%	0	675,000	$2,242	$1,513,474,531	34%	$508,095,021	$1.25	$6,351,188
31-Dec-45	1-Jan-46	5-Dec-46	30-Jun-47	145.7%	0	675,000	$2,287	$1,543,744,022	34%	$518,256,922	$1.25	$6,478,212
31-Dec-46	1-Jan-47	5-Dec-47	30-Jun-48	148.6%	0	675,000	$2,333	$1,574,618,902	34%	$528,622,060	$1.25	$6,607,776
31-Dec-47	1-Jan-48	5-Dec-48	30-Jun-49	151.6%	0	675,000	$2,379	$1,606,111,280	34%	$539,194,501	$1.25	$6,739,931
31-Dec-48	1-Jan-49	5-Dec-49	30-Jun-50	154.6%	0	675,000	$2,427	$1,638,233,506	34%	$549,978,391	$1.25	$6,874,730
31-Dec-49	1-Jan-50	5-Dec-50	30-Jun-51	157.7%	0	675,000	$2,476	$1,670,998,176	34%	$560,977,959	$1.25	$7,012,224
31-Dec-50	1-Jan-51	5-Dec-51	30-Jun-52	160.8%	0	675,000	$2,525	$1,704,418,139	34%	$572,197,518	$1.25	$7,152,469
31-Dec-51	1-Jan-52	5-Dec-52	30-Jun-53	164.1%	0	675,000	$2,576	$1,738,506,502	34%	$583,641,469	$1.25	$7,295,518
31-Dec-52	1-Jan-53	5-Dec-53	30-Jun-54	167.3%	0	675,000	$2,627	$1,773,276,632	34%	$595,314,298	$1.25	$7,441,429
31-Dec-53	1-Jan-54	5-Dec-54	30-Jun-55	170.7%	0	675,000	$2,680	$1,808,742,165	34%	$607,220,584	$1.25	$7,590,257
31-Dec-54	1-Jan-55	5-Dec-55	30-Jun-56	174.1%	0	675,000	$2,733	$1,844,917,008	34%	$619,364,996	$1.25	$7,742,062
Total												$153,724,902

MuniCap, Inc. *7-Jul-26*

[1]Data Center business personal property is assessed as of January 1st. Source: Frederick County Treasurer Form 762D, 2026 - Return of Tangible Personal Property for Data Centers Only.

[2]Business Personal Property assessed as of January 1, 2026 will pay its final property tax payment of the year on December 5, 2026. Source: Frederick County Treasurer. This corresponds with fiscal year ending June 30, 2027.

[3]Assumes 2% annual appreciation.

[4]See Schedule A-I.

[5]See Appendix D-1.

[6]Based on Frederick County Treasurer Form 762D, 2026 - Return of Tangible Personal Property for Data Centers Only, business personal property is depreciated and assessed at 55% of the purchase price if purchased in the previous year, and then 45%, 35%, and 25% for each preceding year, with 25% remaining until ten years prior and 15% for prior years. Analysis assumes personal property will be replaced at least every seven years, for a total average depreciation of 34%. This analysis assumes this average depreciation rate in future years to account for replacement and ongoing depreciation.

[7]Source: The Northern Virginia Daily, "Frederick County supervisors adopt special tax rate to attract lucrative data centers", September 12 2020.

Winchester Gateway - Phase I
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Schedule A-III.a: Projected Utility Tax Revenues - Annual

Table 1: Annual Electric Utility Tax Revenue - Consumption

Property Use	SF[1]	Average Annual Electric Consumption Per SF[2]	Total Annual Electric Consumption	Total Monthly Electric Consumption
		(kWh)	*(kWh)*	*(kWh)*
Data Center	675,000	92.90	62,709,525	5,225,794
Total	675,000		62,709,525	5,225,794

Table 2: Annual Electric Utility Tax Revenue - Tax Rates[3]

Property Use	Monthly Flat Rate Fee Per Consumer	Monthly Rate - First 700 kWh	Monthly Rate - Remaining kWh
Data Center	$0.30	$0.0024	$0.0015928
Total			

Table 3: Total Electric Utility Tax Revenues

Property Use	Monthly Tax Revenue - First 700 kWh	Monthly Tax Revenue - Remaining kWh	Monthly Tax Revenue - Total	Annual Tax Revenue - Total[4]
Data Center	$1.68	$8,322.53	$8,324.21	$99,890.51
Total	$1.68	$8,322.53	$8,324.21	$99,890.51

[1]See Schedule A-I.

[2]Data centers are estimated to consume roughly 1,000 kWh of electricity per square meter. Source: C&C Technology Group, Understanding Data Center Energy Consumption. This is converted into square feet.

[3]Nonresidential consumers are subject to a monthly electric utility tax of $0.30 plus a rate of $0.0024 on each of the first 700 kWh delivered monthly and $0.0015928 on the remaining kWh delivered monthly. Source: Frederick County Code of Ordinances, Ch. 155, Article VIII.

[4]Figure assumes full buildout and is expressed in current dollars.

Winchester Gateway - Phase I
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Schedule A-III.b: Projected Utility Tax Revenues - 30 Years

Development Year Ending	Fiscal Year Ending	Inflation Factor[1]	Total Projected Electricity Utility Tax Revenues
31-Dec-25	30-Jun-27	100.0%	$0
31-Dec-26	30-Jun-28	100.0%	$0
31-Dec-27	30-Jun-29	100.0%	$0
31-Dec-28	30-Jun-30	100.0%	$0
31-Dec-29	30-Jun-31	100.0%	$33,297
31-Dec-30	30-Jun-32	100.0%	$66,594
31-Dec-31	30-Jun-33	100.0%	$99,891
31-Dec-32	30-Jun-34	100.0%	$99,891
31-Dec-33	30-Jun-35	100.0%	$99,891
31-Dec-34	30-Jun-36	100.0%	$99,891
31-Dec-35	30-Jun-37	100.0%	$99,891
31-Dec-36	30-Jun-38	100.0%	$99,891
31-Dec-37	30-Jun-39	100.0%	$99,891
31-Dec-38	30-Jun-40	100.0%	$99,891
31-Dec-39	30-Jun-41	100.0%	$99,891
31-Dec-40	30-Jun-42	100.0%	$99,891
31-Dec-41	30-Jun-43	100.0%	$99,891
31-Dec-42	30-Jun-44	100.0%	$99,891
31-Dec-43	30-Jun-45	100.0%	$99,891
31-Dec-44	30-Jun-46	100.0%	$99,891
31-Dec-45	30-Jun-47	100.0%	$99,891
31-Dec-46	30-Jun-48	100.0%	$99,891
31-Dec-47	30-Jun-49	100.0%	$99,891
31-Dec-48	30-Jun-50	100.0%	$99,891
31-Dec-49	30-Jun-51	100.0%	$99,891
31-Dec-50	30-Jun-52	100.0%	$99,891
31-Dec-51	30-Jun-53	100.0%	$99,891
31-Dec-52	30-Jun-54	100.0%	$99,891
31-Dec-53	30-Jun-55	100.0%	$99,891
31-Dec-54	30-Jun-56	100.0%	$99,891
Total			$2,497,263

[1]Assumes an annual inflation rate of 0%.

Schedule A-IV.a: Projected Additional Revenues to Frederick County - Annual

Annual Revenues[1]	Current County Revenues[2]	Basis for Projecting Revenues[3]	Current County Service Factors[4]	Revenues by Factor[3] Service Population	Projected Increase in Service Factor[5]	Total Additional Revenues[6]
Real property taxes	$95,155,000	Schedule A-I	-	-	-	-
Personal property tax	$81,070,816	Schedule A-II	-	-	-	-
Local sales and use taxes	$24,134,152	service population	119,358	$202.20	79	$16,049
Communications sales tax	$1,000,000	not impacted	-	-	-	-
Utility tax - electric	$2,700,000	Schedule A-III	-	-	-	-
Utility tax - gas	$1,350,000	not impacted	-	-	-	-
Business, professional, and occupational license tax	$11,240,000	not impacted	-	-	-	-
Motor vehicle licenses	$2,700,000	not impacted	-	-	-	-
Bank stock taxes	$700,000	not impacted	-	-	-	-
Recordation taxes	$1,800,000	not impacted	-	-	-	-
Tax on wills	$25,000	not impacted	-	-	-	-
Additional tax on deeds of conveyance	$595,858	not impacted	-	-	-	-
Meals tax and lodging tax	$10,287,383	service population	119,358	$86.19	79	$6,841
Street lights/star fort fees	$32,350	not impacted	-	-	-	-
Permits, fees, and licenses[7]	$2,808,500	not impacted	-	-	-	-
Fines and forfeitures	$262,000	not impacted	-	-	-	-
Revenue from use of money & property	$4,377,545	not impacted	-	-	-	-
Charges for services	$4,418,024	not impacted	-	-	-	-
Miscellaneous	$237,800	not impacted	-	-	-	-
Recovered costs	$2,106,026	not impacted	-	-	-	-
State revenue	$10,522,303	not impacted	-	-	-	-
Shared expenses - state categorical	$5,988,830	not impacted	-	-	-	-
Federal revenues	$344,002	not impacted	-	-	-	-
Non-revenue	$3,955,775	not impacted	-	-	-	-
Total budget	$267,811,364			$288.39		$22,890

[1]Not all sources of revenues are expected to be impacted as a result of the project. Revenues shown represent general fund revenues only.

[2]Source: Frederick County, Virginia FY 2025-26 Adopted Budget. Currently proposed Fiscal Year 2027 Budget has not been officially posted as of July 2027.

[3]Method of apportioning revenues: Per service population revenues are calculated by taking current revenues and apportioning them among current service population (i.e. total permanent population and employees who do not reside in the county).

[4]Represents current statistics for the county. See Appendix A.

[5]Represents projected increase to county as a result of the proposed development. See Appendix A.

[6]Represents total increase in revenues as a result of the proposed development on an annual basis. Figures assume full buildout and are expressed in current dollars.

[7]Assumes one-time revenues from permits, fees, and licenses is offset by one-time corresponding expenditures. As a result, the line item is not impacted.

Schedule A-IV.b: Projected Additional Revenues to Frederick County - 30 Years

Development Year Ending	Fiscal Year Ending	Inflation Factor[1]	Revenues per Service Population[2]	Anticipated Service Population[3]	Total Service Population Revenues
31-Dec-25	30-Jun-27	100.0%	$288.39	0	$0
31-Dec-26	30-Jun-28	100.0%	$288.39	0	$0
31-Dec-27	30-Jun-29	102.0%	$294.16	0	$0
31-Dec-28	30-Jun-30	104.0%	$300.04	0	$0
31-Dec-29	30-Jun-31	106.1%	$306.04	26	$8,097
31-Dec-30	30-Jun-32	108.2%	$312.16	53	$16,518
31-Dec-31	30-Jun-33	110.4%	$318.40	79	$25,272
31-Dec-32	30-Jun-34	112.6%	$324.77	79	$25,778
31-Dec-33	30-Jun-35	114.9%	$331.27	79	$26,293
31-Dec-34	30-Jun-36	117.2%	$337.89	79	$26,819
31-Dec-35	30-Jun-37	119.5%	$344.65	79	$27,355
31-Dec-36	30-Jun-38	121.9%	$351.54	79	$27,903
31-Dec-37	30-Jun-39	124.3%	$358.58	79	$28,461
31-Dec-38	30-Jun-40	126.8%	$365.75	79	$29,030
31-Dec-39	30-Jun-41	129.4%	$373.06	79	$29,610
31-Dec-40	30-Jun-42	131.9%	$380.52	79	$30,203
31-Dec-41	30-Jun-43	134.6%	$388.13	79	$30,807
31-Dec-42	30-Jun-44	137.3%	$395.90	79	$31,423
31-Dec-43	30-Jun-45	140.0%	$403.81	79	$32,051
31-Dec-44	30-Jun-46	142.8%	$411.89	79	$32,692
31-Dec-45	30-Jun-47	145.7%	$420.13	79	$33,346
31-Dec-46	30-Jun-48	148.6%	$428.53	79	$34,013
31-Dec-47	30-Jun-49	151.6%	$437.10	79	$34,693
31-Dec-48	30-Jun-50	154.6%	$445.84	79	$35,387
31-Dec-49	30-Jun-51	157.7%	$454.76	79	$36,095
31-Dec-50	30-Jun-52	160.8%	$463.86	79	$36,817
31-Dec-51	30-Jun-53	164.1%	$473.13	79	$37,553
31-Dec-52	30-Jun-54	167.3%	$482.60	79	$38,304
31-Dec-53	30-Jun-55	170.7%	$492.25	79	$39,070
31-Dec-54	30-Jun-56	174.1%	$502.09	79	$39,852
Total					$793,443

MuniCap, Inc. *7-Jul-26*

[1]Assumes an annual inflation rate of 2%.

[2]See Schedule A-IV.a.

[3]See Appendix C.

Schedule A-V: Total Projected General Fund Revenues to Frederick County

Development Year Ending	Fiscal Year Ending	Real Property Tax Revenues (Schedule A-I)	Business Personal Property Tax Revenues (Schedule A-II)	Utility Tax Revenues (Schedule A-III.b)	Additional Tax Revenues (Schedule A-IV.b)	Total Tax Revenues
31-Dec-25	30-Jun-27	$0	$0	$0	$0	$0
31-Dec-26	30-Jun-28	$0	$0	$0	$0	$0
31-Dec-27	30-Jun-29	$0	$0	$0	$0	$0
31-Dec-28	30-Jun-30	$0	$0	$0	$0	$0
31-Dec-29	30-Jun-31	$975,697	$2,577,057	$33,297	$8,097	$3,594,147
31-Dec-30	30-Jun-32	$2,030,230	$4,779,269	$66,594	$16,518	$6,892,610
31-Dec-31	30-Jun-33	$3,045,344	$6,581,053	$99,891	$25,272	$9,751,560
31-Dec-32	30-Jun-34	$3,168,376	$5,220,969	$99,891	$25,778	$8,515,013
31-Dec-33	30-Jun-35	$3,168,376	$4,311,029	$99,891	$26,293	$7,605,589
31-Dec-34	30-Jun-36	$3,296,379	$3,879,926	$99,891	$26,819	$7,303,014
31-Dec-35	30-Jun-37	$3,296,379	$3,957,524	$99,891	$27,355	$7,381,149
31-Dec-36	30-Jun-38	$3,429,552	$4,498,009	$99,891	$27,903	$8,055,355
31-Dec-37	30-Jun-39	$3,429,552	$5,058,530	$99,891	$28,461	$8,616,434
31-Dec-38	30-Jun-40	$3,568,106	$5,639,673	$99,891	$29,030	$9,336,700
31-Dec-39	30-Jun-41	$3,568,106	$5,752,466	$99,891	$29,610	$9,450,074
31-Dec-40	30-Jun-42	$3,712,258	$5,867,516	$99,891	$30,203	$9,709,867
31-Dec-41	30-Jun-43	$3,712,258	$5,984,866	$99,891	$30,807	$9,827,821
31-Dec-42	30-Jun-44	$3,862,233	$6,104,563	$99,891	$31,423	$10,098,110
31-Dec-43	30-Jun-45	$3,862,233	$6,226,655	$99,891	$32,051	$10,220,829
31-Dec-44	30-Jun-46	$4,018,267	$6,351,188	$99,891	$32,692	$10,502,038
31-Dec-45	30-Jun-47	$4,018,267	$6,478,212	$99,891	$33,346	$10,629,715
31-Dec-46	30-Jun-48	$4,180,605	$6,607,776	$99,891	$34,013	$10,922,285
31-Dec-47	30-Jun-49	$4,180,605	$6,739,931	$99,891	$34,693	$11,055,120
31-Dec-48	30-Jun-50	$4,349,502	$6,874,730	$99,891	$35,387	$11,359,509
31-Dec-49	30-Jun-51	$4,349,502	$7,012,224	$99,891	$36,095	$11,497,712
31-Dec-50	30-Jun-52	$4,525,222	$7,152,469	$99,891	$36,817	$11,814,398
31-Dec-51	30-Jun-53	$4,525,222	$7,295,518	$99,891	$37,553	$11,958,184
31-Dec-52	30-Jun-54	$4,708,041	$7,441,429	$99,891	$38,304	$12,287,664
31-Dec-53	30-Jun-55	$4,708,041	$7,590,257	$99,891	$39,070	$12,437,259
31-Dec-54	30-Jun-56	$4,898,245	$7,742,062	$99,891	$39,852	$12,780,050
Total		$96,586,598	$153,724,902	$2,497,263	$793,443	$253,602,205

Winchester Gateway - Phase I
Frederick County, Virginia

Economic Impact Analysis - Scenario B - Industrial

Winchester Gateway - Phase I
Frederick County, Virginia

Schedule B-I: Projected Real Property Tax Revenues

Development Year Ending	Assessed As Of[1]	Final Tax Due Date[2]	Fiscal Year Ending[2]	Appreciation Factor[3]	Industrial SF	Industrial Value Per SF[4]	Industrial Total Assessed Value	County Tax Rate Per $100 A.V[5]	Projected Real Property Tax Revenues
31-Dec-25	1-Jan-26	5-Dec-26	30-Jun-27	100.0%	0	$91	$0	$0.53	$0
31-Dec-26	1-Jan-27	5-Dec-27	30-Jun-28	104.0%	0	$94	$0	$0.53	$0
31-Dec-27	1-Jan-28	5-Dec-28	30-Jun-29	104.0%	0	$94	$0	$0.53	$0
31-Dec-28	1-Jan-29	5-Dec-29	30-Jun-30	108.2%	0	$98	$0	$0.53	$0
31-Dec-29	1-Jan-30	5-Dec-30	30-Jun-31	108.2%	225,000	$98	$22,064,557	$0.53	$116,942
31-Dec-30	1-Jan-31	5-Dec-31	30-Jun-32	112.6%	450,000	$102	$45,911,929	$0.53	$243,333
31-Dec-31	1-Jan-32	5-Dec-32	30-Jun-33	112.6%	675,000	$102	$68,867,894	$0.53	$365,000
31-Dec-32	1-Jan-33	5-Dec-33	30-Jun-34	117.2%	675,000	$106	$71,650,157	$0.53	$379,746
31-Dec-33	1-Jan-34	5-Dec-34	30-Jun-35	117.2%	675,000	$106	$71,650,157	$0.53	$379,746
31-Dec-34	1-Jan-35	5-Dec-35	30-Jun-36	121.9%	675,000	$110	$74,544,823	$0.53	$395,088
31-Dec-35	1-Jan-36	5-Dec-36	30-Jun-37	121.9%	675,000	$110	$74,544,823	$0.53	$395,088
31-Dec-36	1-Jan-37	5-Dec-37	30-Jun-38	126.8%	675,000	$115	$77,556,434	$0.53	$411,049
31-Dec-37	1-Jan-38	5-Dec-38	30-Jun-39	126.8%	675,000	$115	$77,556,434	$0.53	$411,049
31-Dec-38	1-Jan-39	5-Dec-39	30-Jun-40	131.9%	675,000	$120	$80,689,714	$0.53	$427,655
31-Dec-39	1-Jan-40	5-Dec-40	30-Jun-41	131.9%	675,000	$120	$80,689,714	$0.53	$427,655
31-Dec-40	1-Jan-41	5-Dec-41	30-Jun-42	137.3%	675,000	$124	$83,949,578	$0.53	$444,933
31-Dec-41	1-Jan-42	5-Dec-42	30-Jun-43	137.3%	675,000	$124	$83,949,578	$0.53	$444,933
31-Dec-42	1-Jan-43	5-Dec-43	30-Jun-44	142.8%	675,000	$129	$87,341,141	$0.53	$462,908
31-Dec-43	1-Jan-44	5-Dec-44	30-Jun-45	142.8%	675,000	$129	$87,341,141	$0.53	$462,908
31-Dec-44	1-Jan-45	5-Dec-45	30-Jun-46	148.6%	675,000	$135	$90,869,723	$0.53	$481,610
31-Dec-45	1-Jan-46	5-Dec-46	30-Jun-47	148.6%	675,000	$135	$90,869,723	$0.53	$481,610
31-Dec-46	1-Jan-47	5-Dec-47	30-Jun-48	154.6%	675,000	$140	$94,540,860	$0.53	$501,067
31-Dec-47	1-Jan-48	5-Dec-48	30-Jun-49	154.6%	675,000	$140	$94,540,860	$0.53	$501,067
31-Dec-48	1-Jan-49	5-Dec-49	30-Jun-50	160.8%	675,000	$146	$98,360,311	$0.53	$521,310
31-Dec-49	1-Jan-50	5-Dec-50	30-Jun-51	160.8%	675,000	$146	$98,360,311	$0.53	$521,310
31-Dec-50	1-Jan-51	5-Dec-51	30-Jun-52	167.3%	675,000	$152	$102,334,068	$0.53	$542,371
31-Dec-51	1-Jan-52	5-Dec-52	30-Jun-53	167.3%	675,000	$152	$102,334,068	$0.53	$542,371
31-Dec-52	1-Jan-53	5-Dec-53	30-Jun-54	174.1%	675,000	$158	$106,468,364	$0.53	$564,282
31-Dec-53	1-Jan-54	5-Dec-54	30-Jun-55	174.1%	675,000	$158	$106,468,364	$0.53	$564,282
31-Dec-54	1-Jan-55	5-Dec-55	30-Jun-56	181.1%	675,000	$164	$110,769,686	$0.53	$587,079
Total									$11,576,389

MuniCap, Inc. *7-Jul-26*

[1]Real property is assessed for taxation as of January 1. Source: Frederick County Commissioner of Revenue.

[2]Property assessed as of January 1, 2026 will pay its final property tax payment of the year on December 5, 2026, which corresponds with fiscal year ending June 30, 2027.

[3]Assumes an annual appreciation of 2%. Property in Frederick County is reassessed every two years; as a result, the appreciation factor is set to adjust in years of the revaluation. The next reassessment values will become effective as of January 1, 2027. Source: Frederick County Commissioner of the Revenue.

[4]See Appendix D-1.

[5]Represents the tax rate as of July 2026. Source: Frederick County Commissioner of the Revenue.

Winchester Gateway - Phase I
Frederick County, Virginia

Schedule B-II: Projected Business Personal Property Tax Revenues

Development Year Ending	Assessed As Of[1]	Final Tax Due Date[2]	Fiscal Year Ending[2]	Appreciation Factor[3]	Industrial[4] GSF	Industrial[4] Cumulative	Assessed Value Before Depreciation Per GSF[5]	Assessed Value Before Depreciation Total	Depreciation Basis %[6]	Depreciated Assessed Value	Business Personal Property Tax Rate (Per $100 A.V.)[7]	Total Projected Business Personal Property Tax Revenues
31-Dec-25	1-Jan-26	5-Dec-26	30-Jun-27	100.0%	0	0	$0.74	$0	0%	$0	$4.86	$0
31-Dec-26	1-Jan-27	5-Dec-27	30-Jun-28	100.0%	0	0	$0.74	$0	0%	$0	$4.86	$0
31-Dec-27	1-Jan-28	5-Dec-28	30-Jun-29	102.0%	0	0	$0.75	$0	0%	$0	$4.86	$0
31-Dec-28	1-Jan-29	5-Dec-29	30-Jun-30	104.0%	0	0	$0.77	$0	0%	$0	$4.86	$0
31-Dec-29	1-Jan-30	5-Dec-30	30-Jun-31	106.1%	225,000	225,000	$0.78	$176,324	30%	$52,897	$4.86	$2,571
31-Dec-30	1-Jan-31	5-Dec-31	30-Jun-32	108.2%	225,000	450,000	$0.80	$359,701	30%	$107,910	$4.86	$5,244
31-Dec-31	1-Jan-32	5-Dec-32	30-Jun-33	110.4%	225,000	675,000	$0.82	$550,343	30%	$165,103	$4.86	$8,024
31-Dec-32	1-Jan-33	5-Dec-33	30-Jun-34	112.6%	0	675,000	$0.83	$561,350	30%	$168,405	$4.86	$8,184
31-Dec-33	1-Jan-34	5-Dec-34	30-Jun-35	114.9%	0	675,000	$0.85	$572,577	30%	$171,773	$4.86	$8,348
31-Dec-34	1-Jan-35	5-Dec-35	30-Jun-36	117.2%	0	675,000	$0.87	$584,028	30%	$175,208	$4.86	$8,515
31-Dec-35	1-Jan-36	5-Dec-36	30-Jun-37	119.5%	0	675,000	$0.88	$595,709	30%	$178,713	$4.86	$8,685
31-Dec-36	1-Jan-37	5-Dec-37	30-Jun-38	121.9%	0	675,000	$0.90	$607,623	30%	$182,287	$4.86	$8,859
31-Dec-37	1-Jan-38	5-Dec-38	30-Jun-39	124.3%	0	675,000	$0.92	$619,775	30%	$185,933	$4.86	$9,036
31-Dec-38	1-Jan-39	5-Dec-39	30-Jun-40	126.8%	0	675,000	$0.94	$632,171	30%	$189,651	$4.86	$9,217
31-Dec-39	1-Jan-40	5-Dec-40	30-Jun-41	129.4%	0	675,000	$0.96	$644,814	30%	$193,444	$4.86	$9,401
31-Dec-40	1-Jan-41	5-Dec-41	30-Jun-42	131.9%	0	675,000	$0.97	$657,710	30%	$197,313	$4.86	$9,589
31-Dec-41	1-Jan-42	5-Dec-42	30-Jun-43	134.6%	0	675,000	$0.99	$670,865	30%	$201,259	$4.86	$9,781
31-Dec-42	1-Jan-43	5-Dec-43	30-Jun-44	137.3%	0	675,000	$1.01	$684,282	30%	$205,285	$4.86	$9,977
31-Dec-43	1-Jan-44	5-Dec-44	30-Jun-45	140.0%	0	675,000	$1.03	$697,968	30%	$209,390	$4.86	$10,176
31-Dec-44	1-Jan-45	5-Dec-45	30-Jun-46	142.8%	0	675,000	$1.05	$711,927	30%	$213,578	$4.86	$10,380
31-Dec-45	1-Jan-46	5-Dec-46	30-Jun-47	145.7%	0	675,000	$1.08	$726,165	30%	$217,850	$4.86	$10,587
31-Dec-46	1-Jan-47	5-Dec-47	30-Jun-48	148.6%	0	675,000	$1.10	$740,689	30%	$222,207	$4.86	$10,799
31-Dec-47	1-Jan-48	5-Dec-48	30-Jun-49	151.6%	0	675,000	$1.12	$755,503	30%	$226,651	$4.86	$11,015
31-Dec-48	1-Jan-49	5-Dec-49	30-Jun-50	154.6%	0	675,000	$1.14	$770,613	30%	$231,184	$4.86	$11,236
31-Dec-49	1-Jan-50	5-Dec-50	30-Jun-51	157.7%	0	675,000	$1.16	$786,025	30%	$235,807	$4.86	$11,460
31-Dec-50	1-Jan-51	5-Dec-51	30-Jun-52	160.8%	0	675,000	$1.19	$801,745	30%	$240,524	$4.86	$11,689
31-Dec-51	1-Jan-52	5-Dec-52	30-Jun-53	164.1%	0	675,000	$1.21	$817,780	30%	$245,334	$4.86	$11,923
31-Dec-52	1-Jan-53	5-Dec-53	30-Jun-54	167.3%	0	675,000	$1.24	$834,136	30%	$250,241	$4.86	$12,162
31-Dec-53	1-Jan-54	5-Dec-54	30-Jun-55	170.7%	0	675,000	$1.26	$850,819	30%	$255,246	$4.86	$12,405
31-Dec-54	1-Jan-55	5-Dec-55	30-Jun-56	174.1%	0	675,000	$1.29	$867,835	30%	$260,350	$4.86	$12,653
Total												$251,920

MuniCap, Inc. *7-Jul-26*

[1]Data Center business personal property is assessed as of January 1st. Source: Frederick County Treasurer Form 762B, 2026 - Return of Tangible Personal Property - Business Equipment Only.

[2]Business Personal Property assessed as of January 1, 2026 will pay its final property tax payment of the year on December 5, 2026. Source: Frederick County Treasurer. This corresponds with fiscal year ending June 30, 2027.

[3]Assumes 2% annual appreciation.

[4]See Schedule B-I.

[5]See Appendix D-1.

[6]Based on Frederick County Treasurer Form 762B, 2026 - Return of Tangible Personal Property - Business Equipment Only, business personal property is depreciated and assessed at 30% of the purchase price.

[7]Represents the tax rate as of July 2026. Source: Frederick County Commissioner of the Revenue.

Winchester Gateway - Phase I
Frederick County, Virginia

Schedule B-III.a: Projected Utility Tax Revenues - Annual

Table 1: Annual Electric Utility Tax Revenue - Consumption

Property Use	SF[1]	Average Annual Electric Consumption Per SF[2]	Total Annual Electric Consumption	Total Monthly Electric Consumption
		(kWh)	*(kWh)*	*(kWh)*
Industrial	675,000	5.80	3,915,000	326,250
Total	675,000		3,915,000	326,250

Table 2: Annual Electric Utility Tax Revenue - Tax Rates[3]

Property Use	Monthly Flat Rate Fee Per Consumer	Monthly Rate - First 700 kWh	Monthly Rate - Remaining kWh
Industrial	$0.30	$0.0024	$0.0015928
Total			

Table 3: Total Electric Utility Tax Revenues

Property Use	Monthly Tax Revenue - First 700 kWh	Monthly Tax Revenue - Remaining kWh	Monthly Tax Revenue - Total	Annual Tax Revenue - Total[4]
Industrial	$1.68	$518.54	$520.22	$6,242.59
Total	$1.68	$518.54	$520.22	$6,242.59

[1]See Schedule B-I.

[2]Source: U.S. Energy Information Administration. 2018 Commercial Buildings Energy Consumption Survey, Table C14 Electricity Consumption and Expenditure Intensities, 2018.

[3]Nonresidential consumers are subject to a monthly electric utility tax of $0.30 plus a rate of $0.0024 on each of the first 700 kWh delivered monthly and $0.0015928 on the remaining kWh delivered monthly. Source: Frederick County Code of Ordinances, Ch. 155, Article VIII.

[4]Figure assumes full buildout and is expressed in current dollars.

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Schedule B-III.b: Projected Utility Tax Revenues - 30 Years

Development Year Ending	Fiscal Year Ending	Inflation Factor[1]	Total Projected Electricity Utility Tax Revenues
31-Dec-25	30-Jun-27	100.0%	$0
31-Dec-26	30-Jun-28	100.0%	$0
31-Dec-27	30-Jun-29	100.0%	$0
31-Dec-28	30-Jun-30	100.0%	$0
31-Dec-29	30-Jun-31	100.0%	$2,081
31-Dec-30	30-Jun-32	100.0%	$4,162
31-Dec-31	30-Jun-33	100.0%	$6,243
31-Dec-32	30-Jun-34	100.0%	$6,243
31-Dec-33	30-Jun-35	100.0%	$6,243
31-Dec-34	30-Jun-36	100.0%	$6,243
31-Dec-35	30-Jun-37	100.0%	$6,243
31-Dec-36	30-Jun-38	100.0%	$6,243
31-Dec-37	30-Jun-39	100.0%	$6,243
31-Dec-38	30-Jun-40	100.0%	$6,243
31-Dec-39	30-Jun-41	100.0%	$6,243
31-Dec-40	30-Jun-42	100.0%	$6,243
31-Dec-41	30-Jun-43	100.0%	$6,243
31-Dec-42	30-Jun-44	100.0%	$6,243
31-Dec-43	30-Jun-45	100.0%	$6,243
31-Dec-44	30-Jun-46	100.0%	$6,243
31-Dec-45	30-Jun-47	100.0%	$6,243
31-Dec-46	30-Jun-48	100.0%	$6,243
31-Dec-47	30-Jun-49	100.0%	$6,243
31-Dec-48	30-Jun-50	100.0%	$6,243
31-Dec-49	30-Jun-51	100.0%	$6,243
31-Dec-50	30-Jun-52	100.0%	$6,243
31-Dec-51	30-Jun-53	100.0%	$6,243
31-Dec-52	30-Jun-54	100.0%	$6,243
31-Dec-53	30-Jun-55	100.0%	$6,243
31-Dec-54	30-Jun-56	100.0%	$6,243
Total			$156,065

[1]Assumes an annual inflation rate of 0%.

Schedule B-IV.a: Projected Additional Revenues to Frederick County - Annual

Annual Revenues[1]	Current County Revenues[2]	Basis for Projecting Revenues[3]	Current County Service Factors[4]	Revenues by Factor[3] Service Population	Projected Increase in Service Factor[5]	Total Additional Revenues[6]
Real property taxes	$95,155,000	Schedule III	-	-	-	-
Personal property tax	$81,070,816	Schedule IV	-	-	-	-
Local sales and use taxes	$24,134,152	service population	119,358	$202.20	738	$149,321
Communications sales tax	$1,000,000	not impacted	-	-	-	-
Utility tax - electric	$2,700,000	Schedule V	-	-	-	-
Utility tax - gas	$1,350,000	not impacted	-	-	-	-
Business, professional, and occupational license tax	$11,240,000	not impacted	-	-	-	-
Motor vehicle licenses	$2,700,000	not impacted	-	-	-	-
Bank stock taxes	$700,000	not impacted	-	-	-	-
Recordation taxes	$1,800,000	not impacted	-	-	-	-
Tax on wills	$25,000	not impacted	-	-	-	-
Additional tax on deeds of conveyance	$595,858	not impacted	-	-	-	-
Meals tax and lodging tax	$10,287,383	service population	119,358	$86.19	738	$63,649
Street lights/star fort fees	$32,350	not impacted	-	-	-	-
Permits, fees, and licenses[7]	$2,808,500	not impacted	-	-	-	-
Fines and forfeitures	$262,000	not impacted	-	-	-	-
Revenue from use of money & property	$4,377,545	not impacted	-	-	-	-
Charges for services	$4,418,024	not impacted	-	-	-	-
Miscellaneous	$237,800	not impacted	-	-	-	-
Recovered costs	$2,106,026	not impacted	-	-	-	-
State revenue	$10,522,303	not impacted	-	-	-	-
Shared expenses - state categorical	$5,988,830	not impacted	-	-	-	-
Federal revenues	$344,002	not impacted	-	-	-	-
Non-revenue	$3,955,775	not impacted	-	-	-	-
Total budget	$267,811,364			$288.39		$212,970

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[1]Not all sources of revenues are expected to be impacted as a result of the project. Revenues shown represent general fund revenues only.

[2]Source: Frederick County, Virginia FY 2025-26 Adopted Budget. Currently proposed Fiscal Year 2027 Budget has not been officially posted as of July 2027.

[3]Method of apportioning revenues: Per service population revenues are calculated by taking current revenues and apportioning them among current service population (i.e. total permanent population and employees who do not reside in the county).

[4]Represents current statistics for the county. See Appendix A.

[5]Represents projected increase to county as a result of the proposed development. See Appendix A.

[6]Represents total increase in revenues as a result of the proposed development on an annual basis. Figures assume full buildout and are expressed in current dollars.

[7]Assumes one-time revenues from permits, fees, and licenses is offset by one-time corresponding expenditures. As a result, the line item is not impacted.

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Schedule B-IV.b: Projected Additional Revenues to Frederick County - 30 Years

Development Year Ending	Fiscal Year Ending	Inflation Factor[1]	Revenues per Service Population[2]	Anticipated Service Population[3]	Total Service Population Revenues
31-Dec-25	30-Jun-27	100.0%	$288.39	0	$0
31-Dec-26	30-Jun-28	100.0%	$288.39	0	$0
31-Dec-27	30-Jun-29	102.0%	$294.16	0	$0
31-Dec-28	30-Jun-30	104.0%	$300.04	0	$0
31-Dec-29	30-Jun-31	106.1%	$306.04	246	$75,335
31-Dec-30	30-Jun-32	108.2%	$312.16	492	$153,684
31-Dec-31	30-Jun-33	110.4%	$318.40	738	$235,136
31-Dec-32	30-Jun-34	112.6%	$324.77	738	$239,839
31-Dec-33	30-Jun-35	114.9%	$331.27	738	$244,636
31-Dec-34	30-Jun-36	117.2%	$337.89	738	$249,529
31-Dec-35	30-Jun-37	119.5%	$344.65	738	$254,519
31-Dec-36	30-Jun-38	121.9%	$351.54	738	$259,609
31-Dec-37	30-Jun-39	124.3%	$358.58	738	$264,802
31-Dec-38	30-Jun-40	126.8%	$365.75	738	$270,098
31-Dec-39	30-Jun-41	129.4%	$373.06	738	$275,500
31-Dec-40	30-Jun-42	131.9%	$380.52	738	$281,010
31-Dec-41	30-Jun-43	134.6%	$388.13	738	$286,630
31-Dec-42	30-Jun-44	137.3%	$395.90	738	$292,362
31-Dec-43	30-Jun-45	140.0%	$403.81	738	$298,210
31-Dec-44	30-Jun-46	142.8%	$411.89	738	$304,174
31-Dec-45	30-Jun-47	145.7%	$420.13	738	$310,257
31-Dec-46	30-Jun-48	148.6%	$428.53	738	$316,462
31-Dec-47	30-Jun-49	151.6%	$437.10	738	$322,792
31-Dec-48	30-Jun-50	154.6%	$445.84	738	$329,248
31-Dec-49	30-Jun-51	157.7%	$454.76	738	$335,833
31-Dec-50	30-Jun-52	160.8%	$463.86	738	$342,549
31-Dec-51	30-Jun-53	164.1%	$473.13	738	$349,400
31-Dec-52	30-Jun-54	167.3%	$482.60	738	$356,388
31-Dec-53	30-Jun-55	170.7%	$492.25	738	$363,516
31-Dec-54	30-Jun-56	174.1%	$502.09	738	$370,786
Total					$7,382,303

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[1]Assumes an annual inflation rate of 2%.

[2]See Schedule B-IV.a.

[3]See Appendix C.

Schedule B-V: Total Projected General Fund Revenues to Frederick County

Development Year Ending	Fiscal Year Ending	Real Property Tax Revenues (Schedule B-I)	Business Personal Property Tax Revenues (Schedule B-II)	Utility Tax Revenues (Schedule B-III.b)	Additional Tax Revenues (Schedule B-IV.b)	Total Tax Revenues
31-Dec-25	30-Jun-27	$0	$0	$0	$0	$0
31-Dec-26	30-Jun-28	$0	$0	$0	$0	$0
31-Dec-27	30-Jun-29	$0	$0	$0	$0	$0
31-Dec-28	30-Jun-30	$0	$0	$0	$0	$0
31-Dec-29	30-Jun-31	$116,942	$2,571	$2,081	$75,335	$196,929
31-Dec-30	30-Jun-32	$243,333	$5,244	$4,162	$153,684	$406,423
31-Dec-31	30-Jun-33	$365,000	$8,024	$6,243	$235,136	$614,403
31-Dec-32	30-Jun-34	$379,746	$8,184	$6,243	$239,839	$634,012
31-Dec-33	30-Jun-35	$379,746	$8,348	$6,243	$244,636	$638,972
31-Dec-34	30-Jun-36	$395,088	$8,515	$6,243	$249,529	$659,374
31-Dec-35	30-Jun-37	$395,088	$8,685	$6,243	$254,519	$664,535
31-Dec-36	30-Jun-38	$411,049	$8,859	$6,243	$259,609	$685,760
31-Dec-37	30-Jun-39	$411,049	$9,036	$6,243	$264,802	$691,130
31-Dec-38	30-Jun-40	$427,655	$9,217	$6,243	$270,098	$713,213
31-Dec-39	30-Jun-41	$427,655	$9,401	$6,243	$275,500	$718,799
31-Dec-40	30-Jun-42	$444,933	$9,589	$6,243	$281,010	$741,774
31-Dec-41	30-Jun-43	$444,933	$9,781	$6,243	$286,630	$747,586
31-Dec-42	30-Jun-44	$462,908	$9,977	$6,243	$292,362	$771,490
31-Dec-43	30-Jun-45	$462,908	$10,176	$6,243	$298,210	$777,537
31-Dec-44	30-Jun-46	$481,610	$10,380	$6,243	$304,174	$802,406
31-Dec-45	30-Jun-47	$481,610	$10,587	$6,243	$310,257	$808,697
31-Dec-46	30-Jun-48	$501,067	$10,799	$6,243	$316,462	$834,571
31-Dec-47	30-Jun-49	$501,067	$11,015	$6,243	$322,792	$841,116
31-Dec-48	30-Jun-50	$521,310	$11,236	$6,243	$329,248	$868,035
31-Dec-49	30-Jun-51	$521,310	$11,460	$6,243	$335,833	$874,845
31-Dec-50	30-Jun-52	$542,371	$11,689	$6,243	$342,549	$902,852
31-Dec-51	30-Jun-53	$542,371	$11,923	$6,243	$349,400	$909,937
31-Dec-52	30-Jun-54	$564,282	$12,162	$6,243	$356,388	$939,075
31-Dec-53	30-Jun-55	$564,282	$12,405	$6,243	$363,516	$946,446
31-Dec-54	30-Jun-56	$587,079	$12,653	$6,243	$370,786	$976,761
Total		$11,576,389	$251,920	$156,065	$7,382,303	$19,366,677

Winchester Gateway - Phase I
Frederick County, Virginia

Appendices

Winchester Gateway - Phase I
Frederick County, Virginia

Appendix A: Frederick County Allocation Factors

Frederick County permanent population[1]	98,109
Frederick County labor force[2]	30,890
Resident employees[2]	9,641
Non-resident employees[2]	21,249
Employee population equivalent	21,249
Total service population (permanent population + employee population equivalent)	119,358
Service population rates:	
Resident[3]	1.00
Employee[3]	1.00
Service population - Data Center	
Projected new employees[4]	115
Projected new employee population equivalent	115
Projected new non-resident employees[5]	79
Projected new non-resident employee population equivalent	79
Service population - Industrial	
Projected new employees[4]	1,074
Projected new employee population equivalent	1,074
Projected new non-resident employees[5]	738
Projected new non-resident employee population equivalent	738

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[1]Source: Frederick County, Virginia - Annual Comprehensive Financial Report Fiscal Year Ending June 30, 2025.

[2]Source: U.S. Census Bureau, Center for Economic Studies, LEHD (OnTheMap application, 2023 data).

[3]Employees are expected to generate revenues at the same rate as residents.

[4]See Appendix B.

[5]Represents total employees multiplied by the percentage of employees estimated to live outside Frederick County. This percentage is equivalent to non-resident employees divided by Frederick County labor force.

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Appendix B: Projected Employees

	Data Center			Industrial		
Development Year Ending	GSF[1]	Employees Per 1,000 GSF[2]	Total Employees	GSF[1]	Employees Per 1,000 GSF[3]	Total Employees
31-Dec-25	0	0.17	0	0	1.59	0
31-Dec-26	0	0.17	0	0	1.59	0
31-Dec-27	0	0.17	0	0	1.59	0
31-Dec-28	0	0.17	0	0	1.59	0
31-Dec-29	225,000	0.17	38	225,000	1.59	358
31-Dec-30	450,000	0.17	77	450,000	1.59	716
31-Dec-31	675,000	0.17	115	675,000	1.59	1,074
31-Dec-32	675,000	0.17	115	675,000	1.59	1,074
31-Dec-33	675,000	0.17	115	675,000	1.59	1,074
31-Dec-34	675,000	0.17	115	675,000	1.59	1,074
31-Dec-35	675,000	0.17	115	675,000	1.59	1,074
31-Dec-36	675,000	0.17	115	675,000	1.59	1,074
31-Dec-37	675,000	0.17	115	675,000	1.59	1,074
31-Dec-38	675,000	0.17	115	675,000	1.59	1,074
31-Dec-39	675,000	0.17	115	675,000	1.59	1,074
31-Dec-40	675,000	0.17	115	675,000	1.59	1,074
31-Dec-41	675,000	0.17	115	675,000	1.59	1,074
31-Dec-42	675,000	0.17	115	675,000	1.59	1,074
31-Dec-43	675,000	0.17	115	675,000	1.59	1,074
31-Dec-44	675,000	0.17	115	675,000	1.59	1,074
31-Dec-45	675,000	0.17	115	675,000	1.59	1,074
31-Dec-46	675,000	0.17	115	675,000	1.59	1,074
31-Dec-47	675,000	0.17	115	675,000	1.59	1,074
31-Dec-48	675,000	0.17	115	675,000	1.59	1,074
31-Dec-49	675,000	0.17	115	675,000	1.59	1,074
31-Dec-50	675,000	0.17	115	675,000	1.59	1,074
31-Dec-51	675,000	0.17	115	675,000	1.59	1,074
31-Dec-52	675,000	0.17	115	675,000	1.59	1,074
31-Dec-53	675,000	0.17	115	675,000	1.59	1,074
31-Dec-54	675,000	0.17	115	675,000	1.59	1,074

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[1]See Schedule A-I.

[2]See Appendix E-1.

[3]See Schedule B-I.

[4]See Appendix E-2.

Appendix C: Projected Service Population

	Data Center				Industrial			
	Total	Projected Employees Residing Outside County		Total	Total	Projected Employees Residing Outside County		Total
Development Year Ending	Projected Employees[1]	Percentage[2]	Employees	Service Population Increase	Projected Employees[1]	Percentage[2]	Employees	Service Population Increase
31-Dec-25	0	68.8%	0	0	0	68.8%	0	0
31-Dec-26	0	68.8%	0	0	0	68.8%	0	0
31-Dec-27	0	68.8%	0	0	0	68.8%	0	0
31-Dec-28	0	68.8%	0	0	0	68.8%	0	0
31-Dec-29	38	68.8%	26	26	358	68.8%	246	246
31-Dec-30	77	68.8%	53	53	716	68.8%	492	492
31-Dec-31	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-32	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-33	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-34	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-35	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-36	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-37	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-38	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-39	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-40	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-41	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-42	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-43	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-44	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-45	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-46	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-47	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-48	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-49	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-50	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-51	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-52	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-53	115	68.8%	79	79	1,074	68.8%	738	738
31-Dec-54	115	68.8%	79	79	1,074	68.8%	738	738

[1]See Appendix B.

[2]Represents the percentage of employees projected to reside outside of the county, as employees who are also county residents do not represent an additional impact to county service population. See Appendix A.

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Appendix D-1: Valuation - Comparison of Valuation Methods[1]

Table 1: Real Property

Development	Comparable Properties[2]	Cost Approach	
		Developer	Marshall & Swift[3]
Per GSF			
Data Center	***$756***	$1,200	$746
Industrial	***$91***	-	-

Table 2: Business Personal Property[4]

Development	Business Personal Property
Data center	
Per GSF	***$1,570***
Average assessment ratio[5]	34%
Personal business property assessed value per GSF	$527
Industrial	
Per GSF	***$0.74***
Average assessment ratio[6]	30%
Personal business property assessed value per GSF	$0.22

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[1]Valuation approach chosen for the proposed development is underlined and shown in bold and italics.

[2]See Appendix D-2.

[3]See Appendix D-3.

[4]See Appendix D-4.

[5]See Schedule A-II.

[6]See Schedule B-II.

Appendix D-2: Valuation - Projected Assessed Value of Comparable Properties

Property Name	Parcel ID[1]	Address	County	Neighborhood Code[2]	Year Built[3]	SF	Assessed Value			Per SF
							Land	Building	Total	
Data center										
Middletown Data Center	90 A 58C	8209 Valley Pike	Frederick	-	1971 / 2009	69,021	$857,300	$35,140,665	$35,997,965	$522
Ashburn Data Center Campus - Building 1	041108666000	21195 Atlantic Blvd	Loudoun	462NE-Net lease	2022	258,716	$33,633,100	$68,840,000	$102,473,100	$396
Amazon AWS IAD	043482656000	21641 Charles View Drive	Loudoun	462NE-Net lease	2020	685,682	$89,138,700	$149,858,050	$238,996,750	$349
Digital Realty Trust IAD55 Data Center	045299249000	22574 Pacific Blvd	Loudoun	462NE-Net lease	2023	258,252	$33,572,800	$68,716,520	$102,289,320	$396
Amazon AWS IAD - 22900 Platform	034385918000	22900 Platform Plz	Loudoun	462NE-Net lease	2021, 2022, 2023	976,046	$256,864,600	$259,709,550	$516,574,150	$529
Ashburn-Shellhorn Data Centers DS2	062159785000	44351 Import Plz	Loudoun	462NE-Net lease	2021, 2023	531,592	$70,977,100	$145,556,000	$216,533,100	$407
9905 Godwin - IAD53	35463	9905 Godwin Dr	Manassas City	-	2024	187,752	$45,231,500	$214,349,500	$259,581,000	$1,383
GCDC Campus Building 1	7497-46-2858	13780 University Blvd	Prince William	-	2024	482,223	$73,523,400	$922,582,500	$996,105,900	$2,066
Average										***$756***
Industrial										
McGhee Rd	43 19 67	554 McGhee Rd	Frederick	-	2026	173,720	$1,918,000	$14,867,400	$16,785,400	$97
100 Ezra Ln	43 A 152	100 Ezra Ln	Frederick	-	2022	332,436	$1,085,400	$24,835,850	$25,921,250	$78
341 Snowden Bridge Blvd	44 A 26B	341 Snowden Bridge Blvd	Frederick	-	2020	362,525	$2,640,000	$30,400,550	$33,040,550	$91
201 Prospect Dr	44 A 26D	201 Prospect Dr	Frederick	-	2020	180,800	$1,740,000	$15,125,600	$16,865,600	$93
301 Prospect Dr	44 A 26E	301 Prospect Dr	Frederick	-	2022	209,760	$1,859,000	$17,900,700	$19,759,700	$94
1251 Coverstone Dr	64 A 83E	1251 Coverstone Dr	Frederick	-	2025	#####	$6,514,400	$89,516,100	$96,030,500	$94
371 Admiral Byrd Dr - Airport Parc Building F	64 A 40J	371 Admiral Byrd Dr	Frederick	-	2024	116,580	$0	$10,189,900	$10,189,900	$87
Average										***$90.60***

MuniCap, Inc. *7-Jul-26*

[1]Parcel ID and other information provided by property search pages for the respective jurisdictions as of June and July 2026 except where noted.

[2]Net lease is assumed to represent identical ownership structure to the Development (powered shell building with single tenant that provides its own computing equipment and fixtures.) Other data centers in list are assumed to be of same type because of tenant and occupant information provided by the relevant jurisdiction or CoStar real estate database.

[3]Multiple years refer to multiple buildings on parcel or renovation.

Appendix D-3: Valuation - Projected Assessed Value- Construction Cost[1]

Occupancy	Class	Height	Stories	Rank
Data Center	Fireproof Structural Steel Frame	32'	2	5
Structure cost				
Base cost per square foot	$501.51			
Exterior walls per square foot	$56.58			
Heating & cooling per square foot	$38.98			
Estimated improved value per gross square foot based on cost	$597.07			
Land value				
Estimated land value per gross square foot[2]	$149.06			
Total estimated assessed value per gross square foot	$746.13			

MuniCap, Inc. *7-Jul-26*

[1]All cost estimates by MuniCap, Inc., using Marshall & Swift "Commercial Estimator 7" software.

[2]Based on assessed land values for comparable properties as researched by MuniCap.

Appendix D-4: Valuation - Projected Assessed Value of Business Personal Property

Table 1: Data Center Business Personal Property Value Per Square Foot - Loudoun County

Business personal property value	
Loudoun Center data center business personal property tax revenues[1]	$560,853,000
Business personal property tax rate per $100 AV[1]	$4.15
Data center business personal property assessed value	$13,514,530,120
Average depreciation[2]	30.0%
Business personal property assessed value with average depreciation	$45,048,433,735
Square feet of data centers[3]	37,175,638
Average business personal property value per square foot of data centers	$1,211.77

Table 2: Data Center Business Personal Property Value Per Square Foot - Average

	Loudoun County	Prince William County[4]	Average[5]
Average business personal property value per square foot of data center	$1,212	$1,928	$1,570

Table 3: Industrial Business Personal Property Value Per Square Foot - Average

Total personal property value from industrial locations[6]	$1,774,054
Total square footage of industrial facilities[6]	2,402,361
Personal property value per sf	$0.74

MuniCap, Inc. *7-Jul-26*

[1]Source: Loudoun County Fiscal Year 2024 Budget. (2024 budget was necessary to match square footage expressed in 2024 Fiscal Impact Committee Guidelines.)

[2]Loudoun County data center computer equipment is depreciated to 50%, 40%, 30%, 20%, and 10% over five years. Source: Loudoun County Commissioner of the Revenue.

[3]Source: Loudoun County 2024 Fiscal Impact Committee Guidelines.

[4]Represents average book value of data center equipment in county as of 2024. Source: Prince William County, 2024 Data Center Industry Tax Revenue Report.

[5]Average is used for a reasonable conservative estimate.

[6]Represents sum of total business personal property value, and total square footage, respectively, of all comparable industrial buildings shown in Appendix D-2.

Winchester Gateway - Phase I
Frederick County, Virginia

Appendix E-1: Jobs and Indirect/Induced Impacts - Data Center

	Total
Data center square feet[1]	675,000
Average square feet per data center worker[2]	5,600
Total direct data center jobs[3]	121
Full-time equivalent ("FTE") factor[4]	0.9573
Total FTE jobs	115
Total FTE jobs per 1,000 square feet	0.17
Multiplier for data center jobs[3]	1.4133
Total jobs	170
Indirect and induced jobs	50
Total direct labor income[5]	$9,975,747
Labor income to wage factor[5]	1.1267
Sub-total employee wages	$8,853,572
Average data center income per FTE -- annual	$86,457
Average data center wage per FTE -- annual	$76,732
Multiplier for data center income[3]	1.2515
Total labor income	$12,484,376
Indirect and induced income	$2,508,629
Multiplier for data center output[3]	1.3743
Total economic output	$29,640,403
Direct output	$21,567,773
Indirect and induced output	$8,072,630

MuniCap, Inc. *7-Jul-26*

[1]See Schedule I.

[2]Source: Loudoun County Virginia, 2024 Fiscal Impact Committee Guidelines.

[3]Data Center income, jobs, and output are calculated using IMPLAN software by IMPLAN Group, LLC. The software calculates labor income and the number of jobs based on industry multipliers derived from National Income and Product Accounts data published by the U.S. Bureau of Economic Analysis. This data is then indexed to local industry data compiled by the U.S. Census Bureau. For ease of interpretation, multipliers are shown to illustrate the effects of the Development in Frederick County. The multiplier for data center jobs is 1.4133, meaning that for each job at the Development, 1.4133 jobs will be created in Frederick County, including the one job at the Development. Similarly, the multiplier for data center income is 1.2515, meaning that for every $1.00 paid in income to employees at the Development, $1.2515 will be paid in Frederick County, including the $1.00 at the Development. The multiplier for data center output is 1.3743, meaning that for each dollar of data center economic activity at the Development, the economic output in Frederick County will be $1.3743, including the $1.00 at the Development.

[4]Total jobs include all full-year employees, including part-time and full-time employees. The full-time equivalent factor, provided by IMPLAN Group, LLC converts total jobs into total FTE.

[5]Total labor income includes wages and salary, benefits, payroll taxes, and proprietor's income. The employee compensation-to-wage factor, provided by IMPLAN Group, LLC converts total labor income into direct wages and salary.

Winchester Gateway - Phase I
Frederick County, Virginia

Appendix E-: Jobs and Indirect/Induced Impacts - Industrial

	Total
Industrial square feet[1]	675,000
Average square feet per industrial worker[2]	588
Total direct data center jobs[3]	1,148
Full-time equivalent ("FTE") factor[4]	0.9352
Total FTE jobs	1,074
Total FTE jobs per 1,000 square feet	1.59
Multiplier for data center jobs[3]	1.2491
Total jobs	1,434
Indirect and induced jobs	286
Total direct labor income[5]	$82,488,572
Labor income to wage factor[5]	1.1418
Sub-total employee wages	$72,243,736
Average data center income per FTE -- annual	$76,838
Average data center wage per FTE -- annual	$67,295
Multiplier for data center income[3]	1.1974
Total labor income	$98,772,027
Indirect and induced income	$16,283,455
Multiplier for data center output[3]	1.3798
Total economic output	$173,743,258
Direct output	$125,917,501
Indirect and induced output	$47,825,758

MuniCap, Inc. *7-Jul-26*

[1]See Schedule I.

[2]Source: Loudoun County Virginia, 2024 Fiscal Impact Committee Guidelines.

[2]Construction income, jobs, and output were calculated using IMPLAN software by IMPLAN Group, LLC. Multipliers are estimated and applied in the same manner as Appendix E-1.

[4]Total jobs include all full-year employees, including part-time and full-time employees. The full-time equivalent factor, provided by IMPLAN Group, LLC converts total jobs into total FTE.

[5]Total labor income includes wages and salary, benefits, payroll taxes, and proprietor's income. The employee compensation-to-wage factor, provided by IMPLAN Group, LLC converts total labor income into direct wages and salary.

Winchester Gateway - Phase I
Frederick County, Virginia

Appendix E-3: Jobs and Indirect/Induced Impacts - Temporary Construction - Data Center

	Total
Commercial construction cost[1]	$810,000,000
Total direct construction jobs[2]	3,474
Construction full-time equivalent ("FTE") factor[3]	0.9666
Total construction FTE jobs	3,358
Multiplier for construction jobs[2]	1.3358
Total jobs	4,640
Indirect and induced jobs	1,167
Total direct labor income[4]	$331,458,100
Labor income to wage factor[4]	1.1725
Sub-total employee wages	$282,695,723
Average construction income per FTE -- annual	$98,716
Average construction wage per FTE -- annual	$84,194
Multiplier for construction income[2]	1.2297
Total income	$407,594,328
Indirect and induced income	$76,136,228
Multiplier for construction output[2]	1.3417
Total economic output	$1,086,785,539
Direct output	$810,000,000
Indirect and induced output	$276,785,539

MuniCap, Inc. *7-Jul-26*

[1]Provided by Developer.

[2]Construction income, jobs, and output were calculated using IMPLAN software by IMPLAN Group, LLC. Multipliers are estimated and applied in the same manner as Appendix E-1.

[3]Total jobs include all full-year employees, including part-time and full-time employees. This factor, provided by IMPLAN Group LLC, converts total jobs into total FTE.

[4]Total labor income includes wages and salary, benefits, payroll taxes, and proprietor's income. The employee compensation-to-wage factor, provided by IMPLAN Group LLC, converts total labor income into direct wages and salary.

Winchester Gateway - Phase I
Frederick County, Virginia

Appendix E-4: Jobs and Indirect/Induced Impacts - Temporary Construction - Industrial

	Total
Commercial construction cost[1]	$48,922,175
Total direct construction jobs[2]	210
Construction full-time equivalent ("FTE") factor[3]	0.9666
Total construction FTE jobs	203
Multiplier for construction jobs[2]	1.3358
Total jobs	280
Indirect and induced jobs	70
Total direct labor income[4]	$20,019,322
Labor income to wage factor[4]	1.1725
Sub-total employee wages	$17,074,185
Average construction income per FTE -- annual	$98,716
Average construction wage per FTE -- annual	$84,194
Multiplier for construction income[2]	1.2297
Total income	$24,617,779
Indirect and induced income	$4,598,457
Multiplier for construction output[2]	1.3417
Total economic output	$65,639,398
Direct output	$48,922,175
Indirect and induced output	$16,717,223

MuniCap, Inc. *7-Jul-26*

[1]Represents 80% of estimated assessed value. See Schedule S-4.

[2]Construction income, jobs, and output were calculated using IMPLAN software by IMPLAN Group, LLC. Multipliers are estimated and applied in the same manner as Appendix E-1.

[3]Total jobs include all full-year employees, including part-time and full-time employees. This factor, provided by IMPLAN Group LLC, converts total jobs into total FTE.

[4]Total labor income includes wages and salary, benefits, payroll taxes, and proprietor's income. The employee compensation-to-wage factor, provided by IMPLAN Group LLC, converts total labor income into direct wages and salary.

COUNTY of FREDERICK

Department of Planning and Development
540/ 665-5651
Fax: 540/ 665-6395

April 20, 2026

Thomas Moore Lawson, Esquire
Winchester Gateway LLC
P.O. Box 2460
Winchester, VA 22604

RE: Request for Historic Resources Advisory Board (HRAB) Comments
Winchester Gateway Conditional Use Permit (CUP) Application
Zoning: M1 (Light Industrial) District
Property Identification Number (PIN): 63-A-80I
Magisterial District: Back Creek

Dear Mr. Lawson:

The Frederick County Historic Resources Advisory Board (HRAB) considered the above referenced CUP application during their meeting on April 17, 2026. This application seeks to construct and operate a data center on +/- 71.85-acres of property zoned M1 (Light Industrial). The property is located south and west of the intersection of Apple Valley Road (Route 652) and Middle Road (Route 628) in the Back Creek Magisterial District.

Following their review of this application, the HRAB recommended **denial** due to impacts on the historic resources identified as "core battlefield" and listed as Second Kernstown (VA116) Core Area, the First Kernstown (VA101) Study Area, and the Second Winchester (VA107) Study Area. In addition to the recommendation of denial, the HRAB further recommended the following conditions:

- to reduce visual impacts either or combined with: grading and building height not to exceed 45 feet inclusive of rooftop mounted equipment; as well as building design to include neutral earthtone colors and architectural features and materials in accordance with National Park Service standards;
- Conduct a Phase II archaeological survey on the recommended locations identified in the Phase I survey; and no ground disturbing, including utilities development, in the areas identified in the study as 44FK-1076 and 44FK-1077.

Thank you for the opportunity to provide a summary of the April 17th HRAB meeting and committee recommendation of denial with conditions. Please contact our office if you have any questions or concerns.

Sincerely,

Eric Bittner

Eric Bittner

Planner II

cc: Lucas Cooke, HRAB Chairman
M. Tyler Klein, AICP, Senior Planner
Chris Mohn, AICP, Greenway Engineering

315 Tasker Road
Stephens City, Virginia 22655

PH (540) 868-1061
Fax (540) 868-1429
www.FrederickWater.com

Eric R. Lawrence
Executive Director

February 19, 2026

Winchester Gateway LLC
c/o Thomas Moore Lawson
PO Box 2740
Winchester, VA 22604

RE: Conditional Use Permit (CUP) Application Comment
Winchester Gateway LLC
Tax Map Numbers: 63-A-80I
71.85 acres

Dear Mr. Lawson:

Thank you for the opportunity to offer review comments on the Winchester Gateway LLC Data Center Conditional Use Permit application package, revised Site Assessment dated February 13, 2026. The revised Site Assessment was received for review at Frederick Water on February 17, 2026. Frederick Water offers comments limited to the anticipated impact/effect upon Frederick Water's public water and sanitary sewer system and the demands thereon.

The application's Site Assessment statement, dated February 13, 2026, Power and Utilities section, page 5 states:

> *"With respect to water usage, the facility will utilize a closed-loop or air-cooled mechanical system. This technology will enable the facility to limit its water usage to a maximum of 35,000 gallons per day (GPD), thereby minimizing the impact on public water resources compared to traditional water-cooled facilities. That said, daily water usage will fluctuate in response to time-of-year conditions, resulting in water usage that occasionally exceeds the GDP projections, but when averaged based on annual usage, will fall within the 35,000 GDP threshold."*

Presumably, the last sentence's use of "GDP" was in error, and that it should read "GPD". Otherwise, please define GDP as intended in the narrative.

The use of a closed-loop mechanical system will result in limited water consumption and sewer generation; this is a significant benefit for the proposed data center use and for Frederick Water service delivery. Closed-loop mechanical systems do not have seasonal changes in water consumption and would result in consistent daily water consumption and sewer generation year-round. Frederick Water is prepared to serve the data center's maximum 35,000 GPD demand for water and sewer and a closed-loop mechanical system.

The use of an air-cooled mechanical system could result in seasonal changes in water consumption, potentially significant water consumption during the heat of the summer months and limited water consumption during the cooler winter months. The application's Site Assessment does acknowledge that "*daily water usage will fluctuate in response to time-of-year conditions, resulting in water usage that occasionally exceeds the GDP projections, but when averaged based on annual usage, will fall within the 35,000 GDP threshold".* This seasonal swing in water demands could generate summer demands that exceed Frederick Water's available capabilities for water and sewer treatment and delivery to and from the site. Averaging water demands over a year – as provided in the Site Assessment - is insufficient information to determine if daily water services are available to meet the proposed data center demands. **The application should clarify the expected peak daily demands for water and sewer services to determine if water and sewer services would be available to meet the seasonal high daily demands.** Compounding the evaluation of providing seasonal high (summer) and low (winter) demands for water service, the seasonal highs could necessitate Frederick Water investment to expand raw water resources and treatment capabilities that would only be used during times of high demand. The expanded peak season services would sit idle most of the year to ensure available service provisions to meet the site's peak summer demand. This significant seasonal swing in water and sewer demands causes Frederick Water to make a significant investment that will not be used nor generate revenues most of the year nor fund the investment.

Creative design solutions could be utilized by the applicant to accommodate site consumption of water flows greater than the maximum of 35,000 GPD that Frederick Water is prepared to deliver to the site. The applicant could construct on-site storage tank(s) that could be used if consumption of water is greater than 35,000 GPD. For example, a 1 MG (million gallon) storage tank would enable the site to draw down water at a greater velocity than 35,000 GPD. The tank could continue to refill at 35,000 GPD but the site could consume 100,000 GPD every few days. The ultimate tank size would need to consider the refill rate and the daily demands.

As previously shared during the rezoning for this property but worth restating: Frederick Water has multiple significantly sized water mains and sewer force mains on the property and paralleling Apple Valley Road. Each main is supplemented with numerous gate valves, air release valves, and blow-off hydrants that must be avoided and protected during site development. It is important to note that the hydrants on the 20-inch water main are under extremely high pressure and are to be only operated by Frederick Water staff. This infrastructure is captured in easements which total over 60 feet in width. There is also a parallel 20-foot gas utility easement closer to Apple Valley Road. Extra caution and Frederick Water approval must be exercised before design and excavation occurs within 100 feet of Apple Valley Road. In recognition of the extensive easements parallel to Apple Valley Road, we appreciate and support the application's 200-foot green space buffer, and the prohibition of placing earthen berms and landscape plantings atop these utility easements.

Frederick Water is prepared to meet the site's maximum of 35,000 GPD demand for water and sewer. Frederick Water recommends that the Board of Supervisors include a condition on the Conditional Use Permit that limits water and sewer services for the site to a maximum of 35,000 GPD (gallons per day). This maximum flow per day could be managed through pipe and meter sizing.

Please keep in mind that water supplies and sanitary sewer conveyance capacities change daily; with each new customer connection bring additional demand and generated flow. This letter does not guarantee system capacities to accommodate your development proposal.

Thank you for the opportunity to offer review comments.

Sincerely,

Eri
Executive Director

Cc: Winchester Gateway LLC, Property Owner
Tyler Klein, Frederick County Planning Department via e-mail

REQUEST FOR CONDITIONAL USE PERMIT (CUP) COMMENTS

Project Name: Winchester Gateway

Acreage (Disturbed Area Acreage): 71.85

PIN(s): 63-A-80I

Address (or general location):
The property is located at the intersection of Apple Valley Road and Middle Road and is bounded by Route 37 to the west.

Existing Zoning: M1

Proposed Conditional Use: Data Center

Staff Name (Email Address): M. Tyler Klein, AICP (tklein@fcva.us)

Agency Name Completing Comments (select one):

- ☐ Frederick Water
- ☑ Virginia Department of Transportation
- ☐ Winchester Regional Airport
- ☐ Virginia Department of Health
- ☐ Historic Resources Advisory Board
- ☐ Frederick County (FC) Public Schools
- ☐ FC Public Works
- ☐ FC Inspections
- ☐ FC Fire Marshal
- ☐ FC Parks & Recreation
- ☐ FC County Attorney
- ☐ Other (Specify): _____

Reviewer Name (Email Address): Ryan Spielman joseph.spielman@vdot.virginia.gov

Review Agency Comments:
**Comments that may not fit in the box should be attached to the cover sheet on agency or department letterhead.*

VDOT has no objection to the CUP proceeding at this time. The proposed use is anticipated to result in a substantial reduction in traffic impacts to the transportation network compared to the highest and best use permitted in the M1 zoning district. Any, access, frontage improvements, or other elements involving VDOT right-of-way will be subject to detailed review during the site plan and permitting phases.

Resubmission to address comments requested? Y ☐ or N ☑

Frederick County Fire and Rescue Department

Office of the Fire Marshal
1080 Coverstone Drive
Winchester, VA 22602
Phone: 540-665-6350 Fax: 540-678-4739
fmo@fcva.us

Plan Review

Conditional Use

Status: Approved with Conditions

Owner
Winchester Gateway, LLC
000 Apple Valley/Middle Road
Winchester, Virginia 22602

Other:
Thomas Moore

Printed Date: 01/27/2026

General Information

Received Date:	01/14/2026	Occupancy Type:	
Review Begin Date:	01/27/2026	Property Use:	
Review End Date:	01/27/2026	Activity Number:	I0110219
Hours:	0.5000	Review Cause:	Application

Activity Details

Project Name: Data Center

Comments:
Any and all future development shall comply with applicable sections of the Frederick County Fire Prevention Code.

[redacted]
Assistant Fire Marshal

REQUEST FOR CONDITIONAL USE PERMIT (CUP) COMMENTS

Project Name: Winchester Gateway

Acreage (Disturbed Area Acreage): 71.85

PIN(s): 63-A-80I

Address (or general location):
The property is located at the intersection of Apple Valley Road and Middle Road and is bounded by Route 37 to the west.

Existing Zoning: M1

Proposed Conditional Use: Data Center

Staff Name (Email Address): M. Tyler Klein, AICP (tklein@fcva.us)

Agency Name Completing Comments (select one):

- ☐ Frederick Water
- ☐ Virginia Department of Transportation
- ☐ Winchester Regional Airport
- ☐ Virginia Department of Health
- ☐ Historic Resources Advisory Board
- ☐ Frederick County (FC) Public Schools
- ☐ FC Public Works
- ☑ FC Inspections
- ☐ FC Fire Marshal
- ☐ FC Parks & Recreation
- ☐ FC County Attorney
- ☐ Other (Specify): _____

Reviewer Name (Email Address): 1/16/2025 John Lee. Johnathan.Lee@fcva.us

Review Agency Comments:
**Comments that may not fit in the box should be attached to the cover sheet on agency or department letterhead.*

No comment.

Resubmission to address comments requested? Y ☐ or N ☑

REQUEST FOR CONDITIONAL USE PERMIT (CUP) COMMENTS

Project Name: Winchester Gateway

Acreage (Disturbed Area Acreage): 71.85

PIN(s): 63-A-80I

Address (or general location):
The property is located at the intersection of Apple Valley Road and Middle Road and is bounded by Route 37 to the west.

Existing Zoning: M1

Proposed Conditional Use: Data Center

Staff Name (Email Address): M. Tyler Klein, AICP (tklein@fcva.us)

Agency Name Completing Comments (select one):

- ☐ Frederick Water
- ☐ Virginia Department of Transportation
- ☐ Winchester Regional Airport
- ☐ Virginia Department of Health
- ☐ Historic Resources Advisory Board
- ☐ Frederick County (FC) Public Schools
- ☑ FC Public Works
- ☐ FC Inspections
- ☐ FC Fire Marshal
- ☐ FC Parks & Recreation
- ☐ FC County Attorney
- ☐ Other (Specify): _____

Reviewer Name (Email Address): bwhitlock@fcva.us

Review Agency Comments:
**Comments that may not fit in the box should be attached to the cover sheet on agency or department letterhead.*

No comments at this time. A comprehensive review of stormwater management and erosion and sediment control will take place at the time of site plan submittal.

Resubmission to address comments requested? Y ☐ or N ☑

REQUEST FOR CONDITIONAL USE PERMIT (CUP) COMMENTS

Project Name: Winchester Gateway

Acreage (Disturbed Area Acreage): 71.85

PIN(s): 63-A-80I

Address (or general location):
The property is located at the intersection of Apple Valley Road and Middle Road and is bounded by Route 37 to the west.

Existing Zoning: M1

Proposed Conditional Use: Data Center

Staff Name (Email Address): _____

Agency Name Completing Comments (select one):

- ☐ Frederick Water
- ☐ Virginia Department of Transportation
- ☐ Winchester Regional Airport
- ☐ Virginia Department of Health
- ☐ Historic Resources Advisory Board
- ☐ Frederick County (FC) Public Schools
- ☐ FC Public Works
- ☐ FC Inspections
- ☐ FC Fire Marshal
- ☐ FC Parks & Recreation
- ☐ FC County Attorney
- ☐ Other (Specify): _____

Reviewer Name (Email Address): _____

Review Agency Comments:
**Comments that may not fit in the box should be attached to the cover sheet on agency or department letterhead.*

Resubmission to address comments requested? Y ☐ or N ☐

Frederick Home

Frederick County Virginia *Life at the Top*

Pay/Lookup Taxes

Payment Home | Personal Property | Real Estate | Dog Tags | Pay Parking Violation | Pay FOIA Charges
Other Payments | ShoppingCart(0) | Pin Options

Online Tax Receipt

Payment Type	Electronic Check
Amount Paid	$486.81
Convenience Fee	$0.00
Transaction Total	$486.81
Payment Date	05/11/2026
Transaction #	97024

You may print this page using your browser's print key. Thank you for paying online.

Dept#	Ticket#	Name	Bill Date	Amount Due	Amount Paid	Principal Balance
RE2026	476160001	WINCHESTER GATEWAY LLC	4/15/2026	$486.81	$486.81	$0.00

Back to Pay Taxes

Woodbrook Village
c/o Coventry Group
2045 Valley Ave., Ste. 100
Winchester, VA 22601

18 May 2026

County of Frederick, Virginia
Department of Planning & Development and Board of Supervisors
107 N. Kent St.
Winchester, VA 22601

Re: Winchester Gateway Conditional Use Permit Application
Parcel 63-A-801, Intersection of Apple Valley Road and Middle Road

To the Department of Planning & Development and Board of Supervisors:

We, the undersigned residents of Woodbrook Village, respectfully submit this letter opposing Winchester Gateway's Conditional Use Permit Application to locate a Data Center on Kernstown property (Parcel 63-A-801) at the intersection of Apple Valley Road and Middle Road.

While we recognize the modern need for technology and the potential financial benefits to the county, we agree with Julie Bolthouse, Director of Land Use for Piedmont Environmental Council, who opposes locating a hyper-scale Data Center where housing is already established nearby. Hyper-scale Data Centers have a well-known and recent history of negatively impacting nearby properties. Although technology has progressed, there is not yet enough empirical evidence that the proposed Data Center will be operated in a no-negative-impact manner.

Frederick Water has established a usage restriction of 35,000 GPD per 800,000 square feet of data center. While this will provide some needed protection to our vulnerable water resources, roof-top air-cooled systems will be necessary to meet that requirement. Rooftop air-cooled systems significantly increase a building's electricity consumption, often contributing to increased residential utility bills.

Additionally, *"Data Center noise impacts may extend up to 0.75-miles,"* according to Community & Environmental Defense Services (CEDS). *"A noise impact may be more likely if the data center is cooled with air and rooftop fans or if it is likely diesel generators frequently run as a backup power supply." "Low-frequency noise is most likely if a data center is air-cooled with rooftop fans."* (https://ceds.org/datacenter/)

The Frederick County Noise Ordinance (Chapter 118) doesn't specify what decibel scale (A-weighted or C-weighted) its noise limits are referencing. A-weighted decibels (dBA) miss low-frequency noise. "*Low-frequency data center noise that exceeds just one of the nine octave bands … can make life*

miserable for area residents even though dBA and dBC limits are met."
(https://ceds.org/datacenter/)

A data center proposal should not be considered for any Frederick County location until after a thorough analysis of each potential impact has been conducted by an independent third party using funds provided by the applicant-developer.

Representatives and members of our community have met with Winchester Gateway agents and we have carefully and objectively considered all available information related to this issue. There may come a time and place where welcoming a Data Center to Frederick County can be done in a responsible manner, but this is not that time and Kernstown is not that place. Once constructed, there will be no going back, leaving neighboring homeowners and residents to carry the heaviest burden imposed by that decision. Please protect our community and reject the Conditional Use Permit Application to build a Data Center in the Kernstown area of Frederick County.

Respectfully submitted,

Appendix A – Woodbrook Village Signatures

Magisterial District: Back Creek

Re: Winchester Gateway Conditional Use Permit Application

The undersigned residents (R) and property owners (O) support the attached **letter opposing** Winchester Gateway's Conditional Use Permit Application to locate a Data Center on their Kernstown property (Parcel 63-A-801) at the intersection of Apple Valley Road and Middle Road.

Printed Name	Street Address	Signature	Date	O/R
Celia Zuckerman	211 Knollwood Ct	Celia Zuckerman	5/18/26	R
Sheryl Massey	203 Rosewood Lane	Sheryl Massey	5/18/26	R-O
Becky Moler	109 Tanglewood Ln	Rebecca P Moler	5/18/26	O
Mary K Thompson	110 Ridgecrest Ct	Mary K Thompson	5/18/26	R
Carol M Leake Carol M Leake	306 Knollwood Ct	Carol M Leake	5/18/26	O+R
Claudia Reppert	304 Rosewood Ln.	Claudia J Reppert	5/18/26	O
Patricia C. Williams	304 Knollwood Ct	Patricia C. Williams	5/18/26	O+R
Richard Schoppet	115 Tanglewood	Richard A. Schoppet	11	O
Nancy Kowderville	104 Crestwood Lane	Nancy Kowderville	5/18/26	O
NANCY L. TISINGER	203 Knollwood Ct	Nancy L Tisinger	5/18/26	O
FLORA SIZEMORE	300 Rosewood Ln	Flora Sizemore	5/18/26	R
Terry Harader	100 Ridgecrest Court	Terry Harader	5/30/26	O
Kathy Wineman	113 Tanglewood Ln	Kathleen A. Wineman	5/30/26	O
Craig Wineman	113 Tanglewood Ln		5/30/26	O
Mary Margaret Barbe	200 Ridgecrest Ct	MM Barbe	5/30/26	O
WILLIAM T MASON	220 Crestwood	William T Mason	6-3-26	O
EWELL S. MOHLER	215 CRESTWOOD LN	Ewell S Mohler Jr.	6-3 26	O
Heide U. Mohler	215 Crestwood LN	Heide Ursula Mohler	6.3.26	O
GARY McDONALD	214 CRESTWOOD LN	Gary McNall	6/3/26	O
Joyce Mason	220 Crestwood Ln	Joyce Mason	6/3/26	O
Ann Brancato	206 Crestwood Ln	Brancato	6/3/26	O
SANDRA RATLIFF	204 CRESTWOOD LN	Sandra Ratliff	4/3/26	O

Appendix A – Woodbrook Village Signatures - continued

Magisterial District: Back Creek

Re: Winchester Gateway Conditional Use Permit Application

The undersigned residents (R) and property owners (O) support the attached **letter opposing** Winchester Gateway's Conditional Use Permit Application to locate a Data Center on their Kernstown property (Parcel 63-A-801) at the intersection of Apple Valley Road and Middle Road.

Printed Name	Street Address	Signature	Date	O/R
Patsy L. DeBotts	213 Knollwood Court	Patsy L. DeBotts		✓
Helen Hatfield	212 Crestwood Lane	Helen Hatfield	5/18/26	O
Linda Bock	202 Crestwood	Linda Bock	5/18/26	O
ERICK ABADIE	216 Crestwood Ln.	Erick R. Abadie	5/18/26	O
Scott Clark	[illegible]	110 Ridgecrest	5/18/26	R
Tracey Pearson	201 Rosewood LN	[illegible]	5/18/26	O
RAYMOND COUCH	105 KNOLLWOOD CT.	[illegible]	5.18.26	O
Thomas E Meehan	119 Tanglewood Ln	Thomas E Meehan	5/18/26	O
Judith Allen	103 Knollwood Ct	Judith Allen	5/18/26	O
Wilma TRADER	101 Tanglewood Ln	Wilma Trader	5/18/26	O
Christine Meehan	119 Tanglewood LN	Christine Meehan	6/03/26	O
David Creager	117 Tanglewood Ln	[illegible]	6/3/26	R
VIOLET CHARLES	Violet Charles	107 Buckwood Ln	6/3/26	O
Joanne Farrell	Joanne Farrell	106 Buckwood Ln	6/3/26	O
Gerald Ryan	104 Buckwood Ln	Gerald D. Ryan	6/3/26	O
Julianna Dyke	103 Buckwood Ln	Julianna Dyke	6/3/26	R
Helen Light	101 Buckwood	Helen Light	6/3/26	O
Gloria E. Haines	303 Knollwood Ct.	Gloria J. Haines	6/3/26	O
BETSY Lillis	308 Knollwood Ct	Betsy Lillis	6/3/26	O
ALBERT & [illegible]	309 Knollwood Ct	Albert [illegible]	6/3/26	O
PEGGY GILLICH	305 Knollwood Ct	Peggy Gillich	6/3/26	O
Carol Grabowski	103 Rosewood Ln	Carol Grabowski	06/03/26	

Appendix A – Woodbrook Village Signatures

Magisterial District: Back Creek

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The undersigned residents (R) and property owners (O) support the attached **letter opposing** Winchester Gateway's Conditional Use Permit Application to locate a Data Center on their Kernstown property (Parcel 63-A-801) at the intersection of Apple Valley Road and Middle Road.

Printed Name	Street Address	Signature	Date	O/R
JANet LOWERY	222 Crest Wood	Janet Lowery	6/3/26	O
RALPH LOWERY	222 CRest Wood	Ralph L Lowery	6/3/26	O
Lee Lowery	222 CRestwood WINCVA	Lee L Lowery	6/3/26	O
JOHN SURACK	204 CREST Wood	John W Surack	6-3/26	O
CARPE CORLEY	203 CRESTWood	Carpe Corley	6-3/26	O
CATHERINE CORLEY	203 Crestwood	Catherine Corley	6/3/26	O
Brigitte Ellis	218 Crestwood	Brigitte F Ellis	6/3/26	O
GLENN Moore	208 Crestwood	Glenn Moore	6/3/26	O
Juliette Rosenthal	200 Crestwood	Juliette Rosenthal	6/3/26	O
Rebecca A. Merrine	100 Buckwood Ln	Rebecca A Merrine	6/3/26	O
Elizabeth J. Welch	202 RidgeCrest CR	Elizabeth J. Welch	6/3/26	O
Lynn LONG	108 Ridgecrest Ct	Lynn Long	6/3/26	O
Christine Hannaford	106 Ridgecrest Ct.	Christine Hannaford	6/3/26	O
William Hannaford	106 Ridgecrest Ct		6/3/26	O
Benjamin Heavner	104 Ridgecrest Ct.	Benjamin Heavner	6/3/26	R
Felicitas Smith	102 RIDGECREST	Felicitas Smith	6/03	O
Pat Heavner	104 Ridgecrest Ct	Patricia Heavner	6/03	R
MARY Kathryn Clark	208 Rosewood Lane	Mary Kathryn Clark	6/3	O
Janice B. Mohn	302 Rosewood Ln.	Janice B. Mohn	6-3-26	O
BRIAN REPPERT	304 ROSEWOOD LN	Brian Reppert	6-3-26	O

Appendix A – Woodbrook Village Signatures

Magisterial District: Back Creek

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Printed Name	Street Address	Signature	Date	O/R
WAYNE GRABOWSKI	103 ROSEWOOD LA	Wayne Grabowski	6/3/24	
SHELVA M. JACKSON	207 ROSEWOOD LN	Shelva M. Jackson	6/3/24	O
Esperanza Rey	103 Buckwood Ln	Esperanza Rey	6/9/24	R
*√ DOYNE TEETS	101 ROSEWOOD	Doyne Teets	6/6/24	O
KENNETH SIMPSON	204 RIDGECOURT	Kenneth W Simpson	6/6/24	O
Jane Winter	101 Knollwood Ct	Jane Winter	6/8	O

*√ need wife's signature

Appendix A – Woodbrook Village Signatures

Magisterial District: Back Creek

Re: Winchester Gateway Conditional Use Permit Application

The undersigned residents (R) and property owners (O) support the attached **letter opposing** Winchester Gateway's Conditional Use Permit Application to locate a Data Center on their Kernstown property (Parcel 63-A-801) at the intersection of Apple Valley Road and Middle Road.

Printed Name	Street Address	Signature	Date	O/R
Darlene Frantz	219 Crestwood Ln	Darlene Frantz	5/4/26	O
Ina G. Walker	205 Crestwood	Ina G. Walker	6/4/26	O
Robert Kann	102 Crestwood	Robert Kann	6/4/26	O
Steve Bayliss	106 Crestwood	Steve Bayliss	6/4/26	R
Charles Courtney	112 Bridgecrest	Charles Courtney	4/26	O
Bonnie D. Lee	207 Knollwood Ct	Bonnie Lee	4-26	
Dennis LEE	207 Knolwood	Dennis Lee	4-26	O

Appendix A – Woodbrook Village Signatures - continued

Magisterial District: Back Creek

Re: Winchester Gateway Conditional Use Permit Application

The undersigned residents (R) and property owners (O) support the attached **letter opposing** Winchester Gateway's Conditional Use Permit Application to locate a Data Center on their Kernstown property (Parcel 63-A-801) at the intersection of Apple Valley Road and Middle Road.

Printed Name	Street Address	Signature	Date	O/R
SAMUEL W. LINK	207 CREST WOOD LN.	Samuel W. Link	6/3/26	
DONNA C. LINK	" "	Donna C Link	6/3/26	

KERNSTOWN BATTLEFIELD ASSOCIATION
P.O Box 1327
Winchester, Va 22604
www.kernstownbattle.org

June 15, 2026

County of Frederick
Department of Planning and Development
Attn: Mr. M. Tyler Klein, AICP; Senior Planner
107 North Kent Street, Suite 202
Winchester, Virginia 22601-5000

Dear Mr. Klein:

Reference your letter dated May 26, 2026, regarding a hearing on June 9, 2026, for a CUP Application for the Winchester Gateway LLC Data Center proposed for the Kernstown area. We did not receive your letter until after the meeting, therefore, this written response is being provided.

The Kernstown Battlefield Association (KBA), a 501(c)3, is a vitally interested party with serious concerns about proposed major changes to our neighboring properties. The proposed plans and consequent utility needs by this proposed data center would seriously jeopardize the preservation and presentation of the historic Kernstown Battlefield located on the north side of Apple Valley Road across from the proposed site of that data center.

As background for a better understanding of our concerns, the 355 historic acres owned by the KBA were first settled in 1735 as part of the first major settlement effort in the Shenandoah Valley to prevent Indian and French attacks from the Ohio Valley. During the Civil War, three battles raged across this property: 1st Kernstown, March 23, 1862; 2nd Winchester, June 13, 1863; and 2nd Kernstown, July 24, 1864. Two of these battles were launched from Barton's Woods where the data center is to be locatedf and over 3000 Americans died from these battles. The mission of the KBA is to preserve these hallowed grounds and interpret the 290 year old history of this property for the Frederick County/Winchester region and our visitors.

In the case of CUP Application #03-26, our concerns focus on several serious factors. Water availability, its usage and disposal, the noise levels, the power needs with their potential priorities, and the historic environment.

During several meetings of concerned citizens with WG LLC and with Frederick County Board of Supervisors, the water-usage subject has been at the forefront. We are advised that the daily usage by the proposed three-building complex will be 35,000 gallons per day, every day, or

1,277,500 gallons per year. That is "inbound supply" and consequently the waste quantity must be very close to the same. We've also been given conflicting water statistic usage ranging from 35,000 gallons per day to 120,000 gallons to 200,000 gallons to 300,000 gallons per day. Not sure we can believe any water usage data being provided, especially by the pro-data center group.

We've also been informed that the cooling water will be contaminated by chemical additives for computer server maintenance. What's to happen to those hundreds of thousands of gallons of no longer pure water? Hopefully they are not to be returned, uncleaned, to the ground thence into the underlying aquifer. But where will those thousands of gallons go?

But back to the origins - where will the one and a quarter million gallons be drawn from? Probably from quarries and wells. The same source, the underlying aquifer that feeds those quarries and wells, also feeds the Kernstown Battlefield's three wells and those of hundreds of our neighbors. If that common source is depleted, will all parties then have to drill new and deeper wells to find new water level sources? We are frequently advised that our area is experiencing a drought situation. Right now, we are in a severe drought. The data center's daily huge draw will exacerbate this situation. And, in an emergency, who will have priority on water usage - the area residents, including the Kernstown Battlefield, or the cooling needs of the data center(s)?

Returning to the contaminated water, what precautions are to be put into place in case of spillage? Will it just seep into the ground and eventually into our water supply? We've seen numerous instances around the country where the spilled wastes of now-closed factories are making their sites no longer usable by replacement industries creating huge hazard waste sites.

We have seen the course of events in adjacent counties and other states wherein one data center quickly breeds many more similar facilities --- a'la Loudoun, Fairfax and Prince William Counties. The same is starting here in Frederick County which will produce exponentially greater demands on that vital supply for life .... fresh water !

The KBA has deep wells on our property needed to serve not only the restrooms, museums and meeting rooms for the history-seeking visitors, but also for the property's cattle-raising operations used to financially help support our historic site. This was expensive for the KBA to have drilled, but necessary. Additional drilling to find new and deeper water sources is an unnecessary expense for us to incur.

The other resource concern is the large electrical draw to power the data centers. Again, in the event of an emergency, weather or otherwise, who will have priority for that electrical supply - your citizens on Middle Road and Apple Valley Road or the massive needs of the data centers?

Noise is another frequently-raised concern. While the claimed low-level sound emitted by a data center is no more than 35 decibels, which is below normal human tolerance, the long wave- length low tones are certainly heard by pets, animals, birds and even our older adults and young children. This noise level has been demonstrated to cause agitation in the animals, causing cattle weight loss, their inability to breed, and cause birds and pollinators to avoid the area. Persistent receipt of the 35 decibel (and up) noise can cause sleeplessness and productivity loss among humans.

The other major concern we, as a major battlefield historical area, have is the disruption of the viewshed presented to our visitors. From the many-acre theater-viewing sites atop Pritchard's Hill and from our Sandy Ridge site, the proposed excessive data center building heights will certainly obstruct the visitors' ability to see and understand the Civil War actions that took place in Kernstown. The adjacent warehouse buildings were held to a 40' height to minimize the view obstruction, but the proposed new 60' height of the data center does not even include the large pieces of equipment to be mounted on the roof tops. Again, a detriment to viewing and understanding a critical piece of U. S. and local history.

To conclude, there are multiple reasons for the KBA to recommend denial of the CUP Application. Not only for our consideration, but also for our neighbors and for the preservation of our local and national histories. Hopefully, Frederick County government takes note and takes into consideration what is really important for the health and growth of this region.

Sincerely,

[redacted]

R. Gary Sheppard
President
Kernstown Battlefield Association
Winchester, Virginia

ORDINANCE

Action:		
PLANNING COMMISSION:	June 9, 2026	Work Session Held
PLANNING COMMISSION:	September 2, 2026	Recommended Denial
BOARD OF SUPERVISORS:	October 28, 2026	Pending

CONDITIONAL USE PERMIT #03-26
WINCHESTER GATEWAY LLC

WHEREAS, **CONDITIONAL USE PERMIT APPLICATION** #03-26 for Winchester Gateway LLC submitted establish a data center on +/- 71.85-acres of M1 (Light Industrial) zoned property. The property is located at the intersection of Apple Valley Road (Route 652) and Middle Road (Route 628) and is bounded by Route 37 to the west and is identified by Property Identification Number (PIN) 63-A-80I in the Back Creek Magisterial District; and

WHEREAS, the Frederick County Planning Commission held a work session on this Conditional Use Permit on June 9, 2026, and took no action; and

WHEREAS, the Frederick County Planning Commission held a public hearing on this Conditional Use Permit on September 2, 2026, and unanimously recommended denial; and

WHEREAS, the Frederick County Board of Supervisors held a public hearing on this Conditional Use Permit during their regular meeting on October 28, 2026; and

WHEREAS, the Frederick County Board of Supervisors finds the approval of this Conditional Use Permit to be in the best interest of the public health, safety, and welfare, and in conformance with the Comprehensive Plan; and

NOW, THEREFORE, BE IT ORDAINED by the Frederick County Board of Supervisors, that in accordance with Chapter 165 of the Frederick County Code, Zoning, Conditional Use Permit 03-26 for Winchester Gateway LLC submitted establish a data center on +/- 71.85-acres of M1 (Light Industrial) zoned property and on the parcel identified with Property Identification Number 63-A-80I is approved with the following conditions:

1. <u>Historic Resources:</u>
   a. A Phase II Archeological Survey shall be performed for Site 44FK1076 (David Glass, Sr. homestead) and Site 44FK1077 identified in the *Phase I Archeological Survey of the Apple Valley Road Tract – Final Report* prepared by The Ottery Group and dated August 2023.
   b. A copy of the final Phase II Archeological Survey shall be provided to the Frederick County Planning and Development prior to site plan approval.
   c. No land disturbing activities, including grading and/or above or below ground utilities, shall occur within the features identified in the *Phase I Archeological Survey of the Apple*

Valley Road Tract – Final Report prepared by The Ottery Group and dated August 2023 as Site 44FK1076 (David Glass, Sr. homestead) and Site 44FK1077. These features shall be clearly delineated on the site plan as outside the limits of disturbance (LOD).

2. Site Access:
   a. Access to the site shall be limited to one (1) full movement entrance from Apple Valley Road (Route 652). The entrance shall not be directly across from any residential homes along Apple Valley Road as to maintain a contiguous buffer and berm along the frontage for sound attenuation and viewshed mitigation. A second entrance may be permitted for emergency vehicle access only, if required by the County's Fire Marshal and reviewed and approved at time of site plan.
   b. The location of the site entrance shall be reviewed and approved by the Virginia Department of Transportation (VDOT) as part of the site planning process.

3. Construction Management:
   a. Prior to final site plan approval for each phase of development, a Construction Mitigation Plan shall be submitted to the Department of Planning and Development for review and consideration. The Construction Mitigation Plan will address, at minimum, construction traffic control measures, including but not limited to, any mitigation measures to be implemented during weekday AM and PM peak travel hours and school bus travel times along shared construction related truck routes, including but not limited to, delivery of materials to and from the site, and other related matters the County reasonably believes is necessary for the Construction Mitigation Plan. Approval of the Construction Mitigation Plan by the Zoning Administrator must be obtained as a condition of approval of any and all site plans for each phase of development of the site.
   b. At least one public liaison shall be designated, and a toll-free phone number and email address shall be published on the Applicant's website and provided to the County's Public Information Officer (PIO) for publication on the County's website and other social media. The liaison shall act as a point of contact between citizens and construction crews and be available in person and by phone during active construction hours and must respond to any questions related to the project or the site. The liaison role will commence prior to the County's issuance of a land disturbance permit and remain a minimum of six (6) months following the County's issuance of final certificate of occupancy for the project.
   c. If requested by the County, the Applicant shall participate in a Joint Construction Traffic Reaction Team, which may include members of County Staff, the Virginia Department of Transportation, the Sheriff's Office, and the Virginia State Police to identify and expeditiously mitigate or resolve traffic issues that arise during the construction of the project. The Applicant shall assist in resolving and implementing solutions to traffic issues.
   d. Pavement damage to roads, including shoulders and aprons, attributable to construction of the project, as determined by the Zoning Administrator, must be repaired by the Applicant within 120 days of notice and prior to any issuance of final certificate of occupancy for the project at the Applicant's sole expense. Should the Virginia Department of Transportation (VDOT) determine that the damage has made the road unsafe, the Applicant shall initiate the process of said repairs within forty-eight (48) hours after receiving notice from VDOT. The Applicant will diligently conduct all repairs herein a timely manner.

4. Public Utilities:
    a. Public water consumption by the subject property is limited to 35,000 gallons per day (GPD) or less.
    b. No groundwater resources, via private wells or other methods, shall be used for operation of the primary or accessory uses.
    c. Prior to site plan approval, the sanitary sewer discharge methods, shall be reviewed and approved by Frederick Water.

5. Noise & Noise Monitoring:
    a. The maximum noise generated by the operation of the data center shall not exceed 65 dB(A) & (C) during daytime hours and 60 dB(A) & (C) during nighttime hours measured in accordance with the Frederick County Zoning Ordinance §165-705.01(A)(5)(ii). Mechanical equipment (HVAC, generators, etc.) installed on the property shall be rated to produce noise that is equal to or less than the equipment studied in the Environmental Noise Study prepared by Salas O'Brien dated November 24, 2025.
    b. Testing of generators shall be limited to weekdays between 8:30am and 5:00pm.

6. Gound Mounted Mechanical Equipment:
    a. All backup generators used on the Property shall comply with the ambient air quality standards promulgated by the Virginia Department of Environmental Quality (DEQ) and shall be Tier IV generators permitted for emergency operation only.

7. Power Generating Facilities:
    a. Power generation for the use shall be limited to back up generators in accordance with condition 6, and/or the use of solar panels.

8. Building Height, Design & Architecture:
    a. The maximum height of the principal structures, including roof-mounted mechanical equipment and parapet walls (screens), shall not exceed 45 feet.
    b. The building(s) shall include a main entrance feature, which must either project or recess from the main building plane, and/or be differentiated from the remainder of the façade by a change in building material.
    c. The design of the building façade should include fenestration of two (2) or more of the following materials comprising a minimum of 30% of the façade: concrete block, stone, brick, glass, metal, architectural precast concrete.
    d. At least two (2) neutral Earth tone or natural color palette, shall be used in the building façade.
    e. The maximum length of any exterior wall facing Apple Valley Road without modulation shall not exceed 100 feet. The minimum modulation depth is 2 feet. The minimum modulation width is 20 feet.
    f. Final building elevations and renderings shall be provided to the County for review and acceptance with the above conditions prior to issuance of the first building permit.

9. Buffers & Screening:
    a. A Category C Type full screen landscape buffer shall be installed along the property frontage with Apple Valley Road, Middle Road and Route 37. Unless otherwise modified below, the buffer area shall fulfill minimum distance and opaque screening element requirements of the Frederick County Zoning Ordinance §165-802.08.

i. Along the property frontage with Apple Valley Road and Middle Road the buffer distance shall be a minimum of 200 feet (FT) in width and include a minimum fourteen (14) foot tall earthen berm plus an enhanced landscape screen.
ii. The minimum plant size at time of planting for the landscape screen for all buffer areas shall be 1.5-inch caliper for deciduous trees, six (6) feet in height for evergreen trees, and 36 inches in height for evergreen shrubs.
iii. The planting species, to be reviewed and approved at time of site plan, shall include a mix of species of which at least one (1) Virginia native variety of deciduous tree, at least one (1) Virginia native variety evergreen tree, and at least one (1) Virginia native variety of shrub.
iv. In addition to the minimum 10-foot-wide landscape screen described above, along Apple Valley Road and Middle Road there shall be an additional double row of evergreen trees.
    1) The evergreen screen shall include at least two (2) different varieties of plantings, one (1) of which shall be a Virginia native, balled and burlapped and be a minimum of eight (8) feet in height at time of planting.
    2) The additional double row of evergreen trees shall be planted within the limits of the 200' buffer. Plantings shall be spaced appropriately within the inactive portion of the buffer to allow for regular maintenance and mowing.

10. Signage:
    a. One (1) free standing monument sign is permitted from Apple Valley Road, not to exceed 50 square feet in sign area and not to exceed 12 feet in height.
    b. The base of the sign and sign face shall be of a material and color palette complementary to the building facade materials.
    c. Building/wall-mounted and electronic messaging signs are prohibited.

11. Any change in the use for which the conditional use permit was granted shall require a new conditional use permit (CUP).

This ordinance shall be in effect on the date of adoption.

Passed this 28th, day of October 2026 by the following recorded vote:

John F. Jewell, Chairman	Jason C. Aikens
Albert L. Orndorff	Robert W. Wells
Michael D. Guevremont	Gary R. Oates
Robert T. Liero	

A COPY ATTEST

_____
Michael L. Bollhoefer
Frederick County Administrator

PHASE I ARCHEOLOGICAL SURVEY OF THE APPLE VALLEY ROAD TRACT, WINCHESTER, FREDERICK COUNTY, VIRGINIA

FINAL REPORT

Prepared For:

Winchester Gateway, LLC
15 South King St.
Leesburg, VA 20175

Prepared By:

THE OTTERY GROUP
P.O. Box 4265
Silver Spring, Maryland 20914

Jay Lunze, Karl Franz
Lyle Torp (Principal Investigator)

August 2023

Executive Summary

This report presents the findings of a Phase I archeological survey of the Apple Valley Road development tract in Winchester, Frederick County, Virginia. Winchester Gateway plans to develop two parcels of undeveloped land totaling 71.85 acres. At the time of survey, no specific land usage has been determined for the development of the parcel.

The Phase I archeological survey of the Apple Valley Road Tract was conducted as part of the due diligence prior to the pending development of the property. Depending on the development of the property that occurs, the development will likely come under review of the Historic Resources Advisory Board (HRAB), which advises the Frederick County Planning Commission on potential impacts to known historic and archeological resources, or the Virginia Department of Historic Resources (VDHR), which would be required based upon permits that may be required for development.

Archeological fieldwork for the Phase I survey consisted of the excavation of 1,580 shovel test pits across the proposed development tract. Archeological testing was conducted at 15-meter intervals, supplemented with close interval testing around clusters of positive test pits. The testing resulted in 197 positive test pits; 144 positive STPs containing chert debitage and tool fragments associated with pre-contact Native American land use and 53 positive STPs containing historic period artifacts dating from the mid-18th through 20th centuries. A total of five archeological sites were identified on the property during the Phase I survey. These were designated 44FK1076 to 44FK1080.

The Apple Valley Road Tract falls within the boundaries of the National Register-eligible Kernstown Battlefield (034-0007) which was expanded to include the project area in 2011. A metal detection survey was conducted across all areas of the APE where vegetation permitted. A total of 7 metal objects were recovered from 11 targets, with 20th and 21st century aluminum beverage cans noted but not collected. No potential military artifacts were found, although local residents described collecting Civil War material from the property in the past. No members of the local community were willing to bring in their finds for photography and cataloging.

Site 44FK1076 is a dense cluster of 18th and 19th century domestic artifacts, possibly associated with the David Glass, Sr. homestead. Glass purchased the property in 1749 and appears to have remained in the family for three generations, until approximately 1850. The site is relatively intact and does not contain later 20th century materials. A wide variety of ceramics recovered from the site suggests a long duration of habitation, and the potential for encountering intact features is high. Metal detection within the site resulted in the recovery of additional artifacts. A **Phase II investigation is recommended to establish the National Register eligibility of the site.**

Site 44FK1077 is a large moderately dense scatter of pre-contact Native American lithic artifacts with a light scatter of 18th to 19th century domestic artifacts at a springhead. The majority of the lithic artifacts recovered consist of local Beekmantown chert shatter. The site yielded one lithic tool, a nondiagnostic hafted scraper. Two fragments of unidentified pre-contact ceramic were also recovered. The pre-contact component is interpreted as a repeated use Woodland period lithic extraction site. The historic materials are likely associated with the more concentrated site 44FK1076 directly to the north of it and may represent a springhouse or other outbuilding. The ephemeral nature of the site suggests that intact cultural deposits are unlikely. **Based upon the presence of Native American tools and ceramics as well as 18th century material culture,** a **Phase II investigation is recommended to establish the National Register eligibility of the site.**

Site 44FK1078 is a low density scatter of pre-contact lithic material similar to Site 44FK1077. No tools or diagnostic artifacts were recovered from the site. The site is interpreted as a repeated use lithic extraction site. **The site is not considered to represent a significant archeological resource and no additional testing is recommended.**

Site 44FK1079 is a small scatter of pre-contact lithic material consisting of seven artifacts. No tools or diagnostic artifacts were recovered. It is likely that the site is a resource extraction site. **The site is not considered a significant archeological resource and no additional testing is recommended.**

Site 44FK1080 is a cluster of pre-contact lithic artifacts found on the north of an artificial pond and along the original spring running through the property. The site contained a moderate density of artifacts, none of which are chronologically diagnostic. The artifact assemblage is consistent with the other sites within the project area. The only anomalous artifact was a possible nutting stone, which suggests that the site may be more than a temporary resource extraction camp. **The site is not considered to meet the criteria for significance and no additional testing is recommended.**

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1.0 Introduction

The Ottery Group conducted a Phase I archeological survey of the Apple Valley Road Tract in Frederick County, Virginia. The project area comprises 71.85 acres of former agricultural land southwest of the City of Winchester. The Phase I archeological survey of the Apple Valley Road property was conducted prior to the pending development of the property. The planned development will be subject to review by the Historic Resources Advisory Board (HRAB), which advises the Frederick County Planning Commission on potential impacts to known historic and archeological resources, or the Virginia Department of Historic Resources (VDHR), which would be required based upon the need for state or federal permits for the planned development.

The Phase I archeological survey consisted of background research, field survey, artifact processing and cataloging, and report preparation. Fieldwork was conducted between June 16th and July 21, 2023. The archeological survey consisted of the excavation of 1,435 shovel test pits excavated at 15-meter intervals, with an additional 145 7.5-meter interval radial tests used to bound artifact concentrations.

Subsequent metal detector survey was conducted within all accessible areas within the project area to determine the presence of material culture associated with the National Register-eligible Kernstown Battlefield.

The methods for completing this Phase I archeological survey follow the recommended approach in the *Guidelines for Conducting Historic Resources Survey in Virginia* (VDHR 2017). The metal detector survey was conducted in accordance with the VDHR guidelines for specialized testing of military sites (VDHR 2017:45-47). All technical staff assigned to this project meet the *Secretary of the Interior's Professional Standards for Archaeology* (36 CFR 61).

The following chapters discuss the environmental and cultural conditions and backgrounds of the project area and Frederick County. The report also details the field and laboratory methods as well as the results of the archeological survey. The last chapter summarizes the survey work performed and provides a conclusion on the identified cultural resources and future research potential within the project area.

2.0 Project Area Location and Description

The Apple Valley Road Tract is situated along a corridor of shipping warehouses located at the junction of Virginia Route 37 and Interstate 81 outside of the City of Winchester, Virginia. The project area is accessible via Middle Road (Route 628) on the north and by Apple Valley Road (Route 652) on the east (Figure 2.1). Apple Valley Road continues southeast until it intersects Route 11/Main Street/Valley Pike, the primary road through the region prior to the construction of Interstate 81 and the main north-south route across the Shenandoah Valley.

The Area of Potential Effects (APE) for the planned development is drawn to include the maximum extend of impacts by potential development. Because there are no development schematics, the APE for the archeological survey includes the entire property. Archeological survey was conducted across the entirety of both parcels within the development tract.

Terrain within the project area consists of an upland ridge running through the center of the project area, with terrain gently sloping to the north-east and south-west. Outcroppings associated with the Beekmantown Group geologic unit appear across the whole of the northern half of the property, with chert nodules weathering out of the exposed bedrock. The southern half of the APE is characterized as hummocky karst topography with hydric soils bounded by small elevation rises of dryer ground.

The project area is situated within the Great Valley subprovince of the Valley and Ridge physiographic province. The Great Valley is a continuous basin that extends along the eastern edge of the Appalachian Mountains through several states. It is characterized by broad valleys, meandering streams, and rolling hills bounded by steeply sloping ridges (Bailey 1999).

The APE ranges in elevation from 839 to 781 ft. above sea level. The landscape surrounding the APE is part of the Opequon Creek drainage and is comprised of an eroded karst topography, this includes at least one disappearing stream which runs underground throughout the southernmost part of the APE before emerging to become Hoge Run to the Southeast, this drains into the Opequon Creek proper 1.5 miles south of the APE. The Opequon Creek comes closest to the APE on its western boundary being just under a mile away. As mentioned previously, a spring head drains into the disappearing stream that connects to Hoge Run along the western boundary of the APE with the low ridge making a drainage boundary. The disappearing stream reappears at the southeastern most corner of the APE and a large cattle pond has been created at this location as a catchment basin (Figure 2.1).

The United States Department of Agriculture Natural Resource Conservation Service Web Soil Survey maps four different upland soils within the project area (Figure 2.2). The soils are characterized as well-drained soils found in upland settings; ridges, interfluves, and mountain slopes (NRCS 2023). These soils belong to the Frederick-Poplimento series. The most common soil is the Oaklet silt loam, 7-15% slopes, which covers approximately 60% of the project area in its southern expanse. The other soils, the Frederick-Poplimento very rocky loam, 2-7% slopes, and Frederick-Poplimento loam, 2-7% slopes, each account for approximately 15% of the project area respectively. A small area along the northern edge of State Route 37 is comprised of soils of the Swimley silt loam, 2-7% slopes and makes up the remainder of the APE.

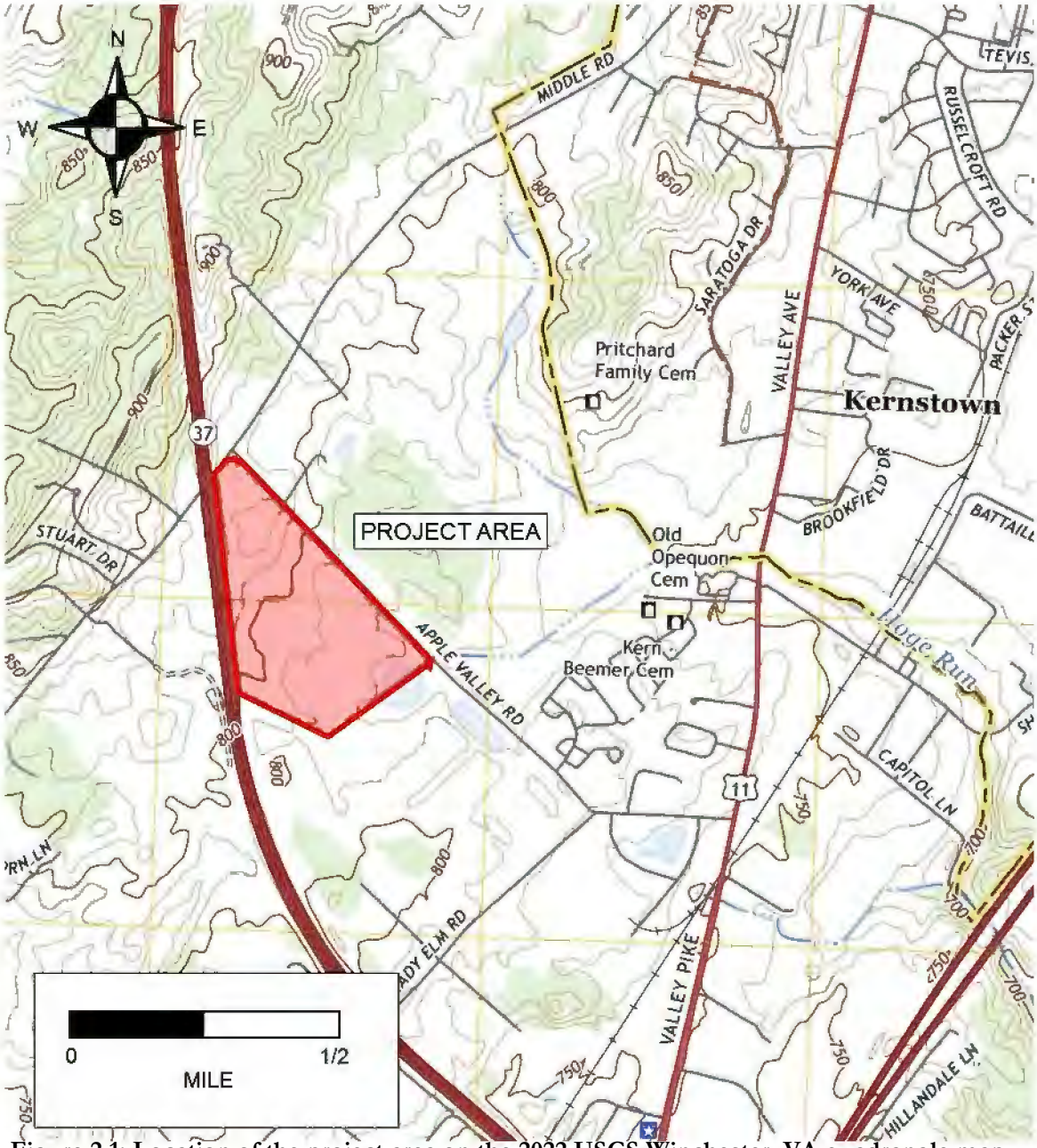

Figure 2.1: Location of the project area on the 2022 USGS Winchester, VA quadrangle map.

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
6C	Carbo-Oaklet, very rocky silt loams, 2 to 15 percent slopes	0.0	0.0%
14B	Frederick-Poplimento loams, 2 to 7 percent slopes	9.4	14.1%
16B	Frederick-Poplimento, very rocky loams, 2 to 7 percent slopes	15.4	23.1%
32B	Oaklet silt loam, 2 to 7 percent slopes	37.8	56.6%
35	Pagebrook silty clay loam	0.1	0.2%
39B	Swimley silt loam, 2 to 7 percent slopes	1.8	2.7%
W	Water	2.1	3.2%

Figure 2.2: Soils within the project area.

Figure 2.3: Terrain and vegetation in the west central portion of the project area.

Figure 2.4: Spring in the southern portion of the project area.

Figure 2.5: Filled sinkhole near the artificial pond.

Figure 2.6: Pile of demolished split rail fence at a former property boundary within the project area.

Figure 2.7: Outcropping of chert nodules within the host Beekmantown dolostone.

3.0 Environmental and Historical Background

3.1 Environmental Context

The natural environment has been an important determinant of settlement and subsistence patterns during pre-contact and historic occupations of the region. Specific environmental characteristics, such as soils and proximity to water, influenced the quantity and variety of resources available to pre-contact Native Americans (i.e., wild plants, animals, and raw lithic materials for the manufacture of stone tools). In a broader sense, climate effects the distribution of fauna, flora, and the nature and distribution of soils. Climate also influences where people travel or settle and how they exploit natural resources in their surroundings. Throughout the Middle Atlantic region, the locations and types of pre-contact sites are closely correlated with the modern biophysical environment (ca. 3,000 BP-Present) and with paleoenvironments (ca. 12,000-3,000 BP).

3.1.1 Paleo-Climate

The climate of the Middle Atlantic region underwent a series of changes following the retreat of the glaciers at the end of the Pleistocene. An understanding of climatic change is important in understanding the environmental conditions facing pre-contact Native Americans and how adaptation to these conditions shaped human settlement patterns and subsistence. Climatic episodes defined by Carbone (1976) for the Shenandoah Valley are applicable to the project area. The vegetation history of the project area may be inferred from general vegetation histories of the Middle Atlantic region that have been developed from data provided by fossilized pollen. Plant communities also influence the faunal resources that were available in the past.

The last glacial episode reached its peak at approximately 18,000 BP. The glaciation occurring at the terminal Pleistocene had profound effects upon the climate of the Middle Atlantic region. The climate during this time was cool and wet; average temperatures were several degrees lower than present (Carbone 1976). Surface runoff from the retreating glaciers and heavy precipitation resulted in numerous upland bogs and poorly drained lowlands (Custer and Wallace 1982). A relatively open forest dominated by spruce and pine was the predominant vegetative cover. Moist climatic conditions during this episode promoted the development of uplands and increased wetland areas associated with stream drainages. These vegetation communities would have provided unique sets of resources and unique resource distributions for Paleoindian and Early Archaic populations.

Between 10,000 and 8,500 BP, the effects of the ice sheet began to diminish. The primary change during this time was the rise in sea levels resulting in the slow inundation of many river valleys. The most pronounced embayment in the Middle Atlantic region occurred with the drowning of the Susquehanna River, which resulted in the formation of the Chesapeake Bay. This rise in sea level would have affected all tributaries to the Bay, including locations far away from its shores. Possible results of this rise include a cessation of stream incision, a decrease in stream competency that results in an increase in deposition throughout the drainage basin, and an increase in headwater erosion. During this time, seasonality increased and deciduous forests spread. Many Pleistocene fauna became extinct or migrated out of the region altogether.

Between 8,500 and 5,000 BP, the climate was warmer and more humid (Custer 1984), becoming increasingly warmer and drier, with the warmest and driest period from 5,000 to 4,000 BP (Carbone 1976). With increasing deciduous constituents, the resources available to Middle Archaic occupations changed. An increase in nut-bearing trees also might have resulted in an increase in small foraging animals. Anadromous fish increase in number by the end of this climatic episode.

The warmer and drier climatic conditions resulted in the draining of bogs and pocosins, which decreased the number of water sources available across the landscape.

The period between 5,000 and 3,000 BP has been interpreted as a xerothermic climate regime (Carbone 1976), which resulted in fewer lower order streams and a concentration of resources in lowlands (Custer and Wallace 1982). By the end of this climatic episode, climax forests dominated by mixed oak-hickory-pine were established composing a community similar to modern forest communities. The Late Holocene (3,000 to the present) represents essentially modern climatic conditions, although several climatic perturbations are suggested after the beginning of this period.

3.1.2 Modern Climate, Flora, and Fauna

Frederick County is located in the middle latitudes with prevailing winds generally flowing from northwest to southeast. These conditions provide for a continental climate with well-defined annual seasons. Temperatures in Frederick County vary from an average daily high temperature of 41.7 degrees Fahrenheit (°F) in January to 86.6°F in July. An average of 38.43 inches of precipitation falls over the course of a year, with highest amounts in June and July. There is an average annual snowfall of 27.8 inches (Holmes and Wagner 1987).

3.2 Pre-contact Cultural Sequence

Frederick County is located within the Mid-Atlantic culture area, which is traditionally defined as extending from the Dismal Swamp of the North Carolina/Virginia border to the Hudson estuary in New York, and from the Appalachian Mountains to the Atlantic Ocean.

There are three general pre-contact Native Americans cultural traditions recognized in the Mid-Atlantic region: Paleoindian, Archaic, and Woodland. Originally developed as cultural historical units primarily intended to classify temporal and spatial site attributes, these traditions are defined by diagnostic artifact forms and assemblages. In more recent years, this scheme has been modified to emphasize cultural adaptations to changing ecological conditions.

3.2.1 Paleoindian Period

The Paleoindian period (ca. 12,000-6,500 BP) represents human occupation and utilization of the lands representing a tundra-like environment following the retreat of the Wisconsin glaciers circa 11,000 B.C. (Dent 1995). Classical models of Paleoindian traditions propose a hunting and foraging subsistence pattern focused on extinct megafauna, pursued by highly mobile, opportunistic populations organized as bands composed of multiple family groups.

These models, largely derived from Paleoindian sites identified west of the Appalachian chain, have proved to be not directly applicable to eastern North America, where direct association between Paleoindian artifacts and extinct megafauna has not been identified. There is also material evidence to support the hypothesis that Eastern Paleoindian populations exploited of a wider range of resources, perhaps most notably the findings at the Shawnee-Minisink site along the Delaware River in the Upper Delaware Valley (McNett 1985). Thus, Paleoindian populations were mobile, frequently changing location throughout the year within a territory in order to utilize available resources. Gardner's research at the Flint Run Complex in the Shenandoah Valley in Virginia (Gardner 1974, 1977, 1979) has identified several types of sites organized around the base camp, which was the main focus of habitation by aggregate bands. Base camps tend to have heterogeneous artifact assemblages, in contrast to smaller special purpose sites that were occupied by smaller groups for shorter periods of time to make use of seasonally available resources. Base camps were tied to

quarry sites where high-quality cryptocrystalline lithic materials were extracted for stone tool manufacture (Gardner 1977, Goodyear 1979). Gardner (1974) and others (Witthoft 1953) have also proposed that upland settings were utilized as they offered a vantage point from which to observe migrating animals. Smaller camps and special use sites radiate from the base camps in varying distances.

Gardner (1974) notes that Paleoindians placed an emphasis on hunting, although it is most likely that exploitation of available floral resources were also a critical component of Paleoindian subsistence strategies. In many areas, Paleoindian sites are associated with large Pleistocene megafauna such as mammoth and mastodon, however, Gardner (1980) notes that the hunting economy probably focused on deer, elk, and possibly caribou. Diagnostic projectile point forms include (from earliest to latest) Clovis, Mid-Paleo, and Dalton-Hardaway. Although the Thunderbird site is located in nearby Warren County, no archeological sites with Paleoindian components have been recorded in Frederick County.

3.2.2 Archaic Period

The Archaic Period (8,500-3,000 BP) spans a great amount of time and substantial cultural change in the eastern United States, and is traditionally divided into three subperiods: Early, Middle, and Late. Generally, the Archaic Period refers to pre-ceramic sites associated with nomadic hunter-gatherer populations that occupied the emerging Holocene deciduous forests. This was considered distinct from the Paleoindian period that was characterized by highly mobile hunters reliant on big game for their livelihood. Warmer and drier climatic conditions at the onset of the Holocene resulted in a more varied floral and faunal resource base and resulted in cultural adaptations during the Archaic period. Settlement patterns were seasonally oriented, and groups were still semi-nomadic, with a subsistence base focused on hunting and gathering. An increase in population density appears to have resulted in both a larger number of sites and an increase in site revisitation, especially during the Late Archaic. In all probability, the geographical range of individual populations during the Archaic was smaller and more seasonally defined compared with the range of human groups during the Paleoindian period. There is evidence of increased trade between distant groups, such as the rise in the quantity in eastern sites of rhyolite quarried from the Catoctin Mountains in Maryland and Uwharrie Mountains in North Carolina.

Research over the last two decades has revealed that the transition between the Paleoindian and Early Archaic was not as great as previously thought. The transition to the Archaic appears to have been more gradual and characterized by exploitation of an increasingly broad range of local resources and decreasing mobility.

The Early Archaic sub-period (8,500-7,500 BP) is viewed as a continuation of the earlier Paleoindian lifeways, with an emphasis on the use of cryptocrystalline lithic materials for tool making. Lithic technology, however, shifted to a variety of corner-notched types, including Hardway, Palmer and Kirk, as well as bifurcate-base types such as Lecroy during the transition to the Middle Archaic period (Dent 1995). This shift in projectile point form may indicate diversification within the system of production, as economies shifted from a concentration on hunting deer and other large game to more diverse faunal exploitative patterns focused on smaller game. By the end of this sub-period, less emphasis is placed upon high-quality cryptocrystalline stone, suggesting that the settlement system based on quarry-related base camps became less important. A total of 16 sites with specified Early Archaic components have been recorded in Frederick County.

The Middle Archaic (7,500-5,000 BP) is cited as a time when hunting and gathering groups began to develop a subsistence strategy that incorporated a diverse array of seasonally available resources. This is indicated by the addition of specialized plant processing tools in Middle Archaic assemblages.

A wider variety of projectile point styles is evidenced during this time; however, the use of cryptocrystalline stone for tool production is nearly abandoned. Diagnostic artifacts include Stanley, Morrow Mountain, Guilford, and Halifax point types. Tool kits are seen as becoming increasingly diversified during this period, with many more ground- and rough-stone implements (Dent 1995). The focus of settlement is at seasonally occupied base camps located on the floodplains of major drainages where seed plants could be exploited. Hunting and limited-use sites are located in the uplands, along lower-order streams and near lithic sources, and adjacent to interior swamps and swampy floodplains of low order drainages. A total of 20 sites with specified Middle Archaic components have been recorded in Frederick County.

The Late Archaic sub-period (5,000-3,000 BP) is characterized by cultures that made efficient use of their local environments, and as a result, there is an increased degree of regional distinction that is visible in the archeological record. During this time semi-sedentary settlement systems expanded, possibly as a result of greater aridity that tethered groups to critical resources, or an increase in population that resulted in territorial circumscription. A total of 48 sites with specified Late Archaic components have been recorded in Frederick County, more than any other pre-contact time period.

Increased use of riverine and estuarine resources is evident. The development of estuaries throughout the Coastal Plain from the continued rise in sea levels resulted in the increased distribution of crabs and oysters and extensive seasonal runs of anadromous fish. Steatite bowls are introduced into the technology inventory. The majority of projectile points representative of this time period consist of side-notched and stemmed varieties, which are typically manufactured from quartz.

The Late Archaic represents the culmination of what Caldwell (1958) termed primary forest efficiency. Caldwell stressed the variety and availability of food sources in the eastern forests, and stressed that pre-contact Native American groups could move seasonally to maximize resource acquisition. Thus, in the eastern United States in general, Middle and Late Archaic groups are seen as mobile hunting and gathering peoples who exploited seasonal resources and scheduled their movements accordingly. In parts of the Middle Atlantic region, the Late Archaic period also is associated with large bivalve middens. Scattered campsites focused on major rivers appear to form a major element within the settlement pattern; short-term campsites in upland zones along small streams have also been documented.

Culturally-diagnostic artifacts for this period include the Savannah River and Susquehanna Broadspear projectile point types, which appear to be represented in different frequencies above and below the Fall Line separating the Piedmont and Coastal Plain. The presence of steatite bowls in assemblages is also a diagnostic artifact of this period.

3.2.3 Woodland Period

The Woodland period is divided into three sub-periods: Early Woodland (1,000-300 B.C.), Middle Woodland (300 B.C.-A.D. 900), and Late Woodland (A.D. 900-A.D. 1600). The Woodland period was originally defined in the 1930s by the appearance of ceramics, maize agriculture, and sedentary villages. At the time, it was believed that ceramics, food production, and sedentary village life were mutually inclusive. Research over the last few decades, however, has revealed that the transition between the Archaic and Woodland were not as great as previously thought. Witthoft (1953) has defined a Transitional Period linking the Archaic and the Woodland periods that was restricted in appellation to the cultural sequences of the northeastern and Middle Atlantic regions of the United States. Custer (1989; Custer and Wallace 1982) considers the Late Archaic through Middle Woodland as a related continuum.

The Early Woodland period represents a continuation of trends begun during the Middle and Late Archaic periods towards increased exploitation of local resources and decreased mobility. The increased productivity of coastal and estuarine resources resulted from the stabilization of sea levels; marshes developed and estuarine areas rapidly became places on the landscape in which fish, waterfowl, and shellfish could be easily exploited. Floodplains are increasingly the focus of plant harvesting. A total of 26 sites with specified Early Woodland components have been recorded in Frederick County.

Early Woodland technology included two sets of diagnostics. The first is a series of projectile points, typified by fishtail and by contracting stemmed varieties. The second set of diagnostics is ceramics. Characteristic ceramics of the period include steatite-tempered Marcey Creek and Seldon Island types, and sand-tempered Accokeek ceramics.

During the Middle Woodland (300 B.C.-A.D. 900) sub-period, villages grew in size and became more permanent. Handsman and McNett (1974:26) have suggested that there was a greater reliance on horticulture resulting from an increasing population. Diagnostic artifacts include Popes Creek ceramics that are more frequent in the Coastal Plain, and Albermarle wares which are more common in the Piedmont, as well as shell-tempered Mockley wares. A total of 19 sites with specified Middle Woodland components have been recorded in Frederick County.

Sedentism and subsistence based on food production were solidly established by the Late Woodland (A.D. 900-1,600). Large, permanent villages were located on the floodplains of major rivers. By A.D. 1,350, there is evidence of stockaded villages, suggesting extensive warfare throughout the Middle Atlantic region. Shell-tempered Townsend series ceramics are predominant in Late Woodland assemblages, while crushed-rock-tempered Potomac Creek wares are prevalent in the Inner Coastal Plain to the Fall Line zone. Triangular projectile points are typical of this period. A total of 26 sites with specified Late Woodland components have been recorded in Frederick County.

After contact with European settlers, the traditional lifeways were disrupted. European settlement rapidly led to the nearly complete elimination of Native American groups in the Middle Atlantic region. Settlement and subsistence of historic Native Americans at the time of contact were most likely a continuation of patterns observed in the Late Woodland period.

At the time of European arrival into the Chesapeake region, the Piedmont area of northern Virginia was inhabited by the Manahoacs, a tribe or confederacy of Siouan-speaking people first encountered by Captain John Smith (Haynes 1990; Barbour 1986II:175). The area around Leesburg appears to have been the center of overlapping culture groups, defined primarily by linguistic characteristics. Algonquian speaking groups occupied much of the land on both sides of the Potomac River up to the Fall Line. Jennings (1978) claims that Iroquoian speaking Susquehannocks were primarily located north of Leesburg, and similar accounts (e.g., Hudson 1976) note that Iroquoian or Siouan speaking groups probably inhabited what is now the Leesburg area. However, as European settlements began encroaching into former Indian lands, many of these original inhabitants left the area or were ravaged by diseases for which they had no resistance.

3.3 Historic Background

Prior to its establishment in 1738, Frederick County was initially part of a five million acre tract called the Northern Neck of Virginia Proprietary that was granted in 1649 to seven noblemen by King Charles II of England. The county was named after Frederick, the father of King George II, of England, or possibly after the town of Winchester, originally name Fredericktown upon its founding in 1732 (Holmes and Wagner 1987). Winchester was founded on part of 140,000 acres of land

secured by Jost Hite and Robert McKay, who settled there with 16 families that they brought with them.

The first European permanent colonial settlements in what became Frederick County began between 1725 and 1730, although the area had been visited by trappers, traders, hunters and explorers since at least the 1670s. Settlers moved into this area from neighboring colonies of Maryland and Pennsylvania, and also New Jersey, following the major Indian Path down the Shenandoah Valley. During this time, the primary motivation for settling here was the presence of fertile land which was used for growing grains and raising livestock. The terrain and lack of a reliable transportation network made the area unsuitable to the production of tobacco. The many creeks had mills built along them to transfer grain crops to flour and fruit to cider and alcohol, which were longer lasting, easier to transport to the coastal cities, and more profitable than fresh produce. The 1809 Charles Varle map of Frederick, Berkeley, Jefferson Counties shows multiple mills on Opequon Creek south of Winchester and Kernstown as well as distilleries and blacksmithing establishment to the north in Winchester (Figure 3.1).

During the 18th century there were few major roads crossing overland. The Indian Path was widened and improved and became the Great Wagon Road during the mid-18th century, spurring increased settlement. Small communities developed along the road including Winchester, Kernstown, Stevens City, Middletown, Woodstock, and Strasburg most of which were founded in the period of 1730-1770. Frederick County was organized in 1738 as a reflection of the increasing population shifts. Kernstown, which is the location of the APE was originally founded by Jost Hite who purchased forty thousand acres from John Van Meter in 1731. In 1735, Jost Hite settled large portions of this land along the upper Opequon Creek along the Great Wagon Road/ Valley Turnpike. The families who bought properties within or adjoining the APE were the Glasses, Cartmells, Woods, Vances, and Hoges all of whom purchased land from Hite from 1735 to 1742.

The area that makes up this settlement founded by the 16 families who would establish the Opequon Presbyterian Church the year of their arrival had a rich prehistory with many of the 19th historical works covering it mentioning that it had been referred to as the Shawnee Hills or Shawnee Springs, vestiges of these place names still survive on modern roads in the area today. Historical accounts also mention that ancient monuments in the form of mounds and burials were also present, as well as a substantial village just north of Winchester. Raiding parties of Delaware and Catawba were frequent in the area up until the French and Indian War. Historical accounts, especially of the Glasses, whose ancestor purchased at least 920 acres from Jost Hite in 1736 indicate that their homes were palisaded and had defensive slits cut in the shutters. Many of the second generation of the settlers of Kernstown and the Opequon Presbyterian Church would serve as militiamen and serve in various forts of the frontier, some having seen conflicts in Ireland and Germany before arriving to the frontier.

Winchester, established within 2 years of Kernstown and largest of the settlements, was important to the area during the French and Indian War. Col. James Wood who had property on the edge of the APE purchased a large area of land and laid off streets even before the town was officially recognized in 1758. Fort Loudoun in Winchester was constructed in 1756 to protect the frontier community. The fort had barrack space for 450 and was the largest of the frontier fortifications. It was besieged in 1760 during an offshoot of the French and Indian War, resulting in the surrender of English troops. Raids on Winchester and Kernstown would continue in the area until 1766. Joseph Martin's 1836 *A Comprehensive Gazetteer of Virginia and the District of Columbia* showed the population of Winchester, the closest town to Kernstown, is included as 3,620 residents with a wide variety of businesses, schools, and churches. Kernstown would contribute to Winchesters growth by providing the raw agricultural goods which would be processed as well as being an important shipping hub for the products of the many water mills along Opequon Creek.

Figure 3.1: Approximate location of the project area on the 1809 Charles Varle *Map of Frederick, Berkeley, and Jefferson Counties in the State of Virginia.*

Kernstown would be established as an official town by an act of the Virginia Assembly in 1799 and named after Adam Kern Jr. whose father had bought land just south of Winchester in 1765 along the Great Wagon Rd. Kernstown as a district stretched from Hoge's Tavern on the south at the intersection of the Great Wagon Road and the Opequon Creek to the North of the Opequon Presbyterian Church at the properties owned by the Kern family. In the early 1830's the railroad was built through the Shenandoah Valley adjacent to the original Great Wagon Road passing beside Kernstown. This infrastructure improvement allowed for the more profitable movement of processed agricultural goods from Kernstown to Winchester and external markets. For the first three generations the 16 families who came with Jost Hite intermarried and kept their lands in ever smaller divided portions amongst their families. During the early 19th century these families who had prospered in the area would use Winchester as a steppingstone to move out into the Ohio, Kentucky, and Tennessee frontiers. While many of the founding families can still be found within the boundaries of Kernstown, throughout the early 19th century and especially after the Civil War as Kernstown became more peripheral to Winchester those families began to sell their farms to people from farther afield.

Two Civil War battles were fought adjacent to the APE and both Confederate and Union Soldiers likely camped within its boundaries. These two battles at Kernstown were part of the strategic control of the Shenandoah Valley and its resources by the Confederacy as well the Union Army's attempts to disrupt this resource network at the same time protecting Maryland, Pennsylvania, and Washington D. C. from assault. As part of Maj. General Stonewall Jacksonson's early Valley Campaign he was ordered by General Johnston to prevent three separate Union forces from reinforcing McClellan's movements on Richmond. During this time 17,000 troops under his command kept 52,000 Union troops from reaching the Piedmont. Col. Turner Ashby, the Commander of the 7th Virginia Cavalry under General Jackson on skirmished with the Federal outpost on the southern edges of Winchester on March 22nd, 1862. He falsely reported to General Jackson that these troops were on the move to support over divisions in the Piedmont. With direct orders from General Johnston General Jackson's hand was forced and he moved his troops to engage the Union Army to hold them at Winchester.

General James Shields 8,000 men in their fortified positions awoke on the morning of March 23rd to see Col. Turner Ashby's cavalry return along with Confederate artillery. The Confederate forces staged their battle line roughly 700 meters northeast of the Area of Potential Effects and opened fire on General James Shields Union divisions at 9 am. Col. Ashby was unable to flank the Union forces from their entrenched positions around Pritchard's farm just northwest of Opequon Presbyterian Church on the northern edge of Kernstown. General Jackson at this time had gathered his troops and was riding north from Strasburg, arriving in the vicinity of Kernstown shortly before 3 pm. The confederates attempted to flank the Union forces at Sandy Ridge to the northeast of the project area but were pushed back by heavy artillery fire from Pritchard's farm and Union reinforcements from Winchester. Running low on ammunition, the 3,700 Confederate forces retreated from the field. The Confederate casualties numbered 740 killed while the Union army lost nearly 500 of the 7,200 troops they had committed to the battle. The First Battle of Kernstown was one of Stonewall Jackson's two major defeats, but because of the battle, the Union command chose to keep Winchester reinforced, reuiring troops that could have been otherwise used for the campaigns in the Piedmont. Figure 3.2 illustrates the position of the First Battle of Kernstown to the project area.

The entire Shenandoah Valley would be a battleground throughout the American Civil War with both Union and Confederate victories. Late in the War during 1864 Kernstown would once again be host to another battle caused by poor intelligence, this time on the Union side. The Second Battle of

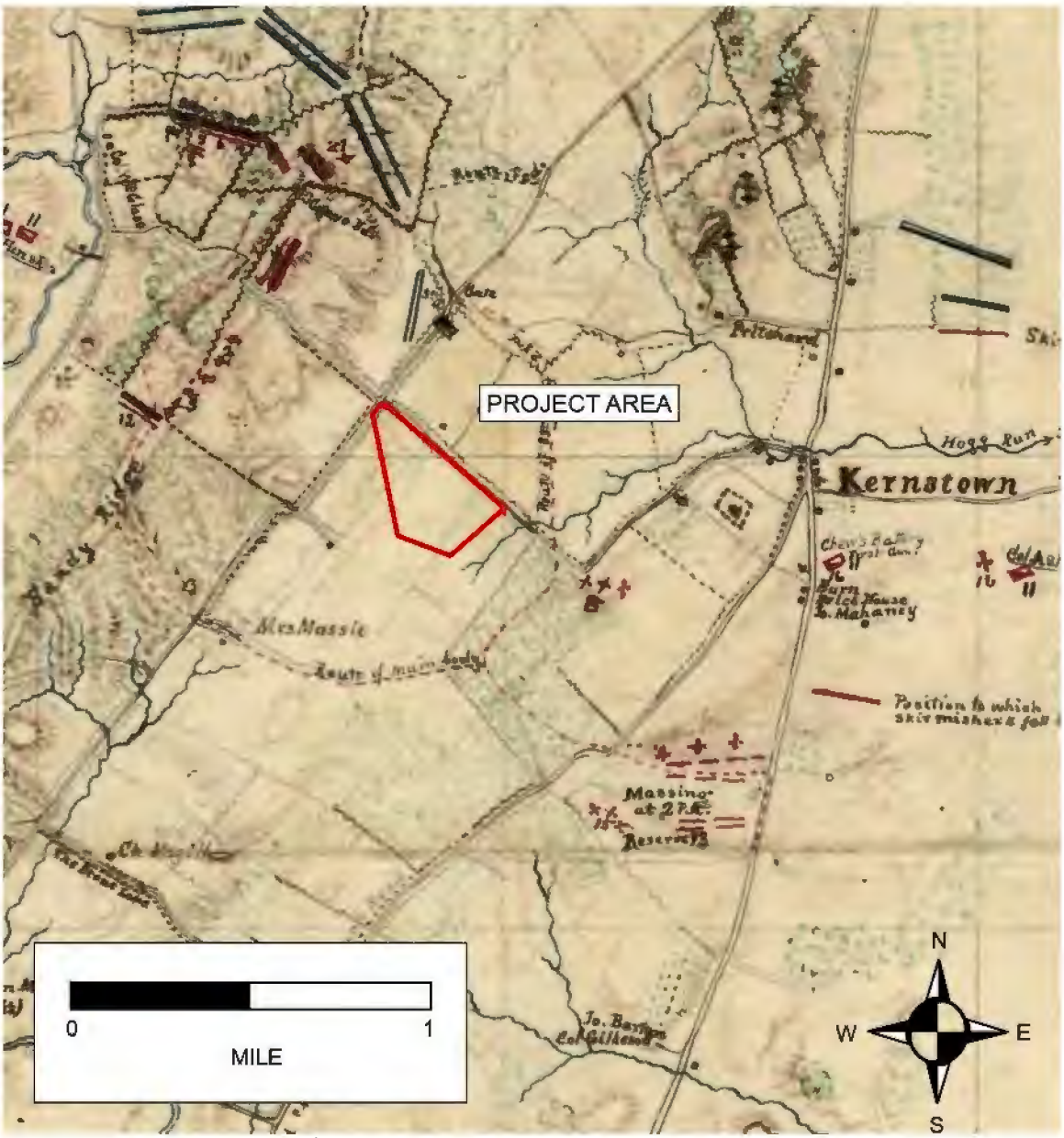

Figure 3.2: Location of the Area of Potential Effects on the Hotchkiss Map of the Battle of Kernstown, Sunday, 23 March, 1862.

Kernstown would happen late in the American Civil War after a series of defeats which resulted in the loss of valuable territory for the Confederacy. The motivations for the battle were much the same as the first, that was to keep Union troops from entering the theatre of war in the Piedmont. The commander of the overall Confederate forces in the Shenandoah Valley had fallen to General Jubal Early who had suffered a strategic defeat at the Battle of Rutherford's Farm on July 20th, 1864. The Union commander in the area General Horatio Wright after this battle assumed incorrectly that General Early and his forces would retreat out of the Shenandoah Valley and dispatched a large portion of his veteran forces from West Virginia and Virginia to support the sieges of Richmond and Petersburg. This left the bulk of Wrights forces under General George Crook with only 13,000 infantry, cavalry, and artillery men in the Shenandoah Valley. General Early learned of these events from prisoners taken during cavalry skirmishes after the Battle of Rutherford's Farm and with clear

orders from General Robert E. Lee was tasked with holding the remaining forces in the Shenandoah Valley.

Early on the morning of July 24th, 1864 General Early began marching his troops up the Valley Turnpike towards Winchester. General Early was confident his forces, which numbered 16,000 could overpower General Crook's. Col. Joseph Thoburn's held the position on Sandy Ridge and Col. James Mulligan's Artillery with new 10-pound Parrott rifles were stationed at Pritchard's Farm establishing his line of battle along the same high ground that was so successful for the Union Army during the First Battle of Kernstown. This included the digging of rough defensive works on the hill at Pritchard's Farm. Due to a lack of cavalry available, the eastern flank of General Crook's position was weakened with only a small contingent under Col. Jacob Higgins to hold the flat area east of Kernstown and the Valley Turnpike. By about 8 am on the morning of the 24th heavy skirmishing began as Confederate cavalry under Col. William Jackson assaulted Sandy Ridge much as at the beginning of the First Battle of Kernstown. The bulk of this offensive took place along Sandy Ridge and Middle Road just adjacent to the APE. This was followed up by Confederate infantry troops under Col. Stephen Ramseux assaulting Sandy Ridge moving down Middle Road and across the Northern edge of the APE. This cavalry and infantry skirmishing was held back along Sandy Ridge by Mulligan's troops.

The Confederate forces used their knowledge of the terrain around Kernstown to their advantage, using ravines and low elevation areas to covertly move troops into position along General Crook's weak east flank many of which are in the southern part of the APE. General Mulligan knowing the weakness of the line of battle at this point dispatched the 54 Pennsylvania Infantry to reinforce this part of his line. The confederate assault of was intense enough that Mulligan's infantry under Col. Thomas Harris were pushed back from their advance positions all the way back to Pritchard's Farm. At this time in the battle Col. Mulligan sent an urgent plea to General Crook for more reinforcements to shore up his weak east flank. Mulligan sent a brigade under Col. Rutherford B. Hayes and an additional artillery battery to bolster the Union defenses. At this point in the Battle General Crook left the safety of Winchester and went to the front lines to manage the offensive directly. General Crook decided to take decisive action and pushed a counter offensive. He had Thoburn, Mulligan, and Hayes leave their stable positions and advance on the larger Confederate force.

This choice would lead to the Union defeat at the Second Batlle of Kernstown. Confederate General Wharton had skillfully taken up position along Crook's weak east flank by moving his troops through the project area. Wharton's troops under General Breckinridge pushed Hayes's forces back. At the same time Ramseux's Confederate division assaulted the Union troops along Middle Road and Sandy Ridge weakened their forces there. By early afternoon the Union positions around Kernstown had been completed surrounded by the Confederate line, which by 1 pm. spread over 4 miles. The Confederate forces at this time put all their strength on the northwest and south flanks of the Union forces. The confederate forces had been bolstered by the arrival of Maj. General Robert Rodes along the Unions eastern flank along with a contingent of 12 artillery pieces under Maj. William McLaughlin. Around 3 pm the Union forces under Mulligan and Hayes attempted another advance on the Confederate positions but were pushed back by overwhelming fire from the Confederate forces to the stone walls of the Opequon Presbyterian Church. By 4 pm General Crook issued the orders for a general retreat resulting in a Confederate victory.

In the post-Civil War period, Frederick County continued much as it had prior to the war. For the first decade, population of the County remained largely unchanged, with gradual increases through the end of the 19th century.

At the end of the 19th century there was a shift from grain-livestock agriculture to an orchard-livestock agricultural model (Geier and Hofstra 1991). The transition was mostly complete by 1930. During this period, small family farming plots were commonly consolidated to enable large scale production in competition with the growing number of commercial farms. By 1958, the majority of the agricultural properties in the vicinity of the project area are orchards.

3.3.1 Tract History

The project area is situated within the historic boundaries of the town of Kernstown established as a community in 1736. The earliest maps to show detail of the vicinity of the project area, including the 1809 Varle Map do not show any structures within the project area. Later maps, including the 1862 Hotchkiss *Map of the First Battle of Kernstown,* show a road and a possible structure on the southern side of the project area. The town of Kernstown was established by 16 families who bought land either from Jost Hite, John Van Meter, or Lord Fairfax and established the Opequon Presbyterian Church in 1735. Hofstra and Geier in their 1996 work *Beyond the Great Blue Mountain: Historical Archaeology and 18th Century Settlement in Virginia West of the Blue Ridge* through careful research established the property boundaries of many of these families during the 18th century. The land ownership either within the project area or just adjacent to it during this period fell into three families: the Cartmells, Glasses, and Hoges (Figure 3.3).

Nathaniel Cartmell, known as Nathaniel Cartmell of England, was born sometime in the third quarter of the 17th century in Westmoreland England and immigrated to New Jersey with his family in 1724. Nathaniel of England apparently died before 1735 and it is one of his eldest sons and his

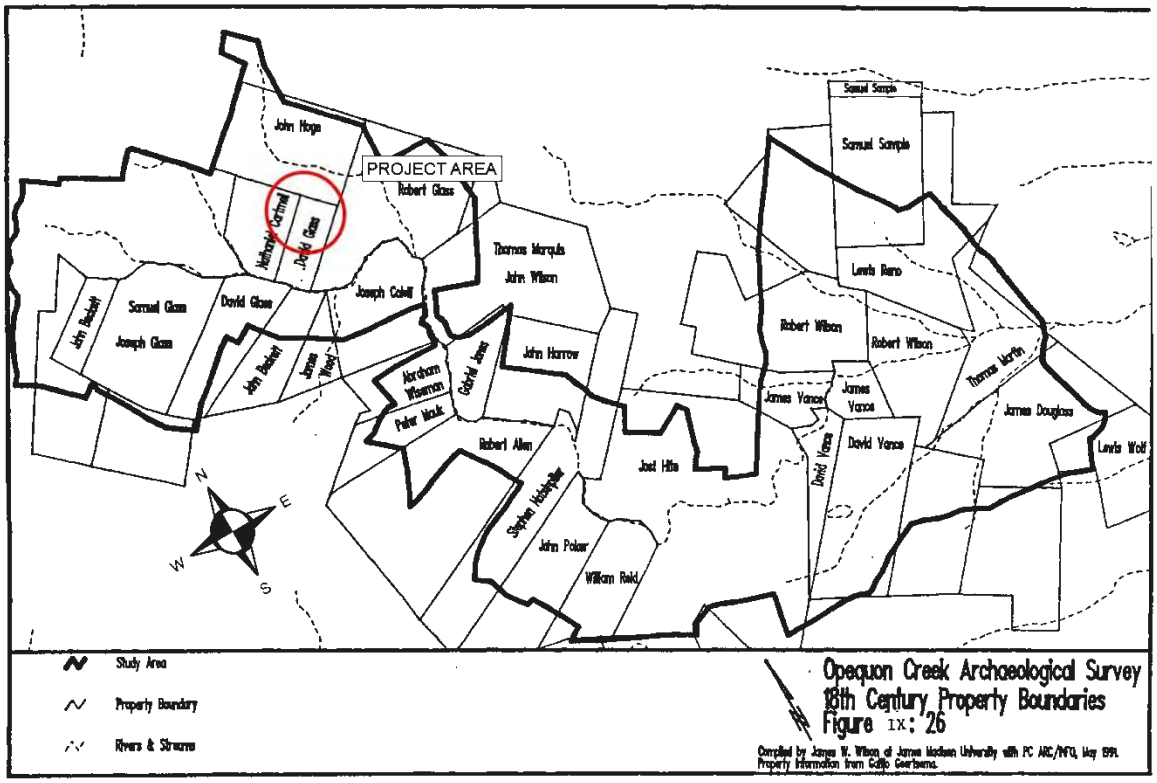

Figure 3.3: 18th century land grants which formed the basis of the project area.

widow who have appeared to have had a significant property south of the Opequon Creek. The survey of the purchase of land took almost two years to complete as the widow and her children did not arrive until 1737. The Cartmells built large estate houses on many of their properties including Homespun, Cloverdale, and Greenfield Farm. Nathaniel I also purchased other smaller tracts for his children, but there is little record of residences on those properties. Much of the Cartmell property boundaries were in dispute during the 18th century due to the family not officially leaving the parcels in wills and having land titles in their siblings or even cousins' names. The Cartmell family as a whole were farmers, millers, blacksmiths, and soldiers during both the French and Indian War and the American Revolutionary War.

The next family who may have owned portions of the center and eastern portion of the project area were the Glasses. Samuel Glass the Immigrant and his wife Mary Gamble immigrated from County Down Ireland in 1735. Samuel was born in 1660 and was already of a respectable age when arriving in the Opequon drainage in 1736. He brought with him his children and in some cases his grandchildren. There is some dispute over the amount of land he initially purchased with early accounts stating 1,600 acres and later works stating 920, this is likely due to the fact he purchased 900+ acres south of the Opequon, but also held 700 acres north of the Opequon. The land was purchased from both Jost Hite and Lord Fairfax. Prior to his death in 1767, he willed his sons several portions of his land holdings. Samuel Glass the Immigrant's three sons all have properties which were adjacent to or within the APE. Samuel Glass sold his eldest son John 250 acres from his original purchase in 1749. John never resided on this property though and may have rented it to others as he remained with his family at Beverly Manor, after his death his other properties were broken up between his 11 children. Samuel Glass sold to his son Joeseph 250 acres in 1751, much of this property was divided upon his death in 1794 by his 13 children. Robert David, another one of Samuel Glass's sons, purchased his own property to the northeast of the APE, this property was dispersed largely to his 13 children upon his death in 1797. David Glass likely owned a portion of the property that makes up the APE which he purchased from his father in 1749. His two sons inherited his estate upon his death in 1775. The Glasses married into many neighboring families including the Cartmells, Hoges, Woods, Becketts, and Vances.

William Hoge immigrated from Scotland in 1682 having been born in 1660 and met his wife Barbara Hume on that voyage. William Hoge was the son of Sir James Hoge of Scotland and his future wife was the daughter of Sir James Hume. They had both journeyed from Scotland on the Ship Caledonia to Perth Amboy New Jersey. Barbara's parents died on the voyage and William attended her for the remainder of the voyage until they were married in 1695. William was a tailor by profession but also served on the board of a trading company established by Governor Berkely. In 1688 he served a session in the House of Deputies of the New Jersey Assembly. In 1689 he moved to present day Delaware. In 1710 he purchased 1,000 acres in Chester County Pennsylvania and moved his family there until 1729. The acreage of William's estate on the branch of the Opequon Creek that still bears his name has been in dispute since historians of the 19th century. His property was "vast" compared to his neighbors. All of his children were prosperous as farmers, investors in mills, and running Hogue's Ordinary the local tavern at the intersection crossing the Opequon Creek and the Great Wagon Road/ Valley Turnpike. William Hoge's grandson John II, the son of John, would later move onto this property and establish a farm at the same time becoming Opequon Presbyterian Church's first permanent minister. This property would later be broken up and sold, with the northern portion being sold to the Pritchard family, who established Pritchard's Farm, a prominent defensive feature during the First and Second Battles of Kernstown during the Civil War.

There is a break in the land ownership records for the area of the APE during the second to third quarter of the nineteenth century. The 1885 D.J. Lake and Company *Atlas of Frederick County, Virginia* contains a map of the Shawnee District for which Kernstown is well illustrated at that time

(Figure3.4). That map shows the ownership of the property by the Fullerton family, descendants of Dr. Humphrey Fullerton who had served in the Continental Army during the American Revolutionary War. Aerial photographs from the mid-20th century show that the property remained much as it appeared in 1885, with cleared fields that are likely used for pasture (Figure 3.5). The pattern of land ownership appears to have continued into the 1970s, when Virginia Route 37 was constructed through the farm. Aerial photographs from 1982 and later show increasingly encroaching brush, likely showing the abandonment of the farmhouse on the southern site of the highway. The fields within the project area remain well maintained and actively used as pasture until 2006. Beginning in 2008, aerial photographs show scrub brush overtaking the southern fields, with only the northern field still in use until the present day.

Figure 3.4: Location of the project area on the 1885 D.J. Lake and Company *Atlas of Frederick County, Virginia.*

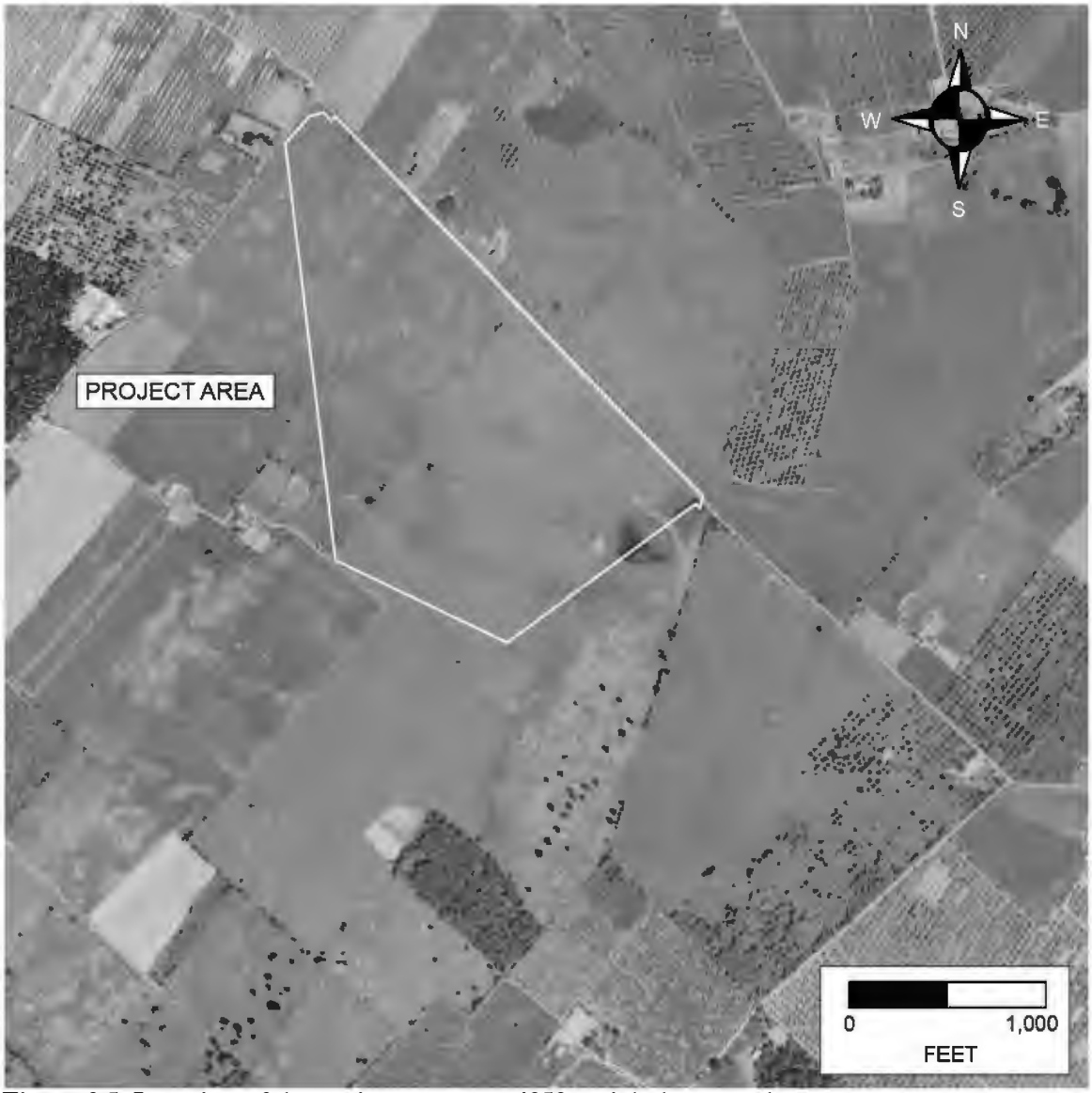

Figure 3.5: Location of the project area on a 1958 aerial photograph.

3.4 Previous Surveys

Previous archeological work in the vicinity of the project area was reviewed using the Virginia Cultural Resources Information System (VCRIS) maintained by the VDHR. The database indicates that there are no previously identified archeological sites within the APE and that the project area has not been the subject of any professional archeological investigation. Surrounding the APE is the protected National Register-eligible Kernstown Battlefield (034-0007). While numerous studies have focused on the historical and architectural history of Kernstown and its affiliated battlefield, only two large scale archaeological surveys have been conducted (Gallucci et al. 1992; Geier and Hofstra 1991). These investigations examined the Kernstown Battlefield as well as early settlement patterns along the Opequon Creek. More recent field observations of threatened site have been investigated by Robert Jolley of VDHR, but full reports on this data is presently unavailable on VCRIS.

There are a total of 22 previously identified sites within one mile of the project area (Table 3.1). The majority of the sites (n=15) date to the historic period while multi-component sites that include pre-contact Native American artifacts are uncommon (n=1). Native American sites are present within the search area (n=6) and are mostly comprised of small lithic scatters. Four of the sites are identified as Civil War encampments and or defensive positions associated with the First/Second Battles of Kernstown. The non-Civil War sites are generally farmsteads or outbuildings dating to the mid-18th through 20th century, as well as property boundaries in the form of stone walls and tree lines (witness trees). Other sites include a French and Indian War Fort and two 18th-19th century cemeteries associated with the Opequon Presbyterian Church. All of the pre-contact Native American sites in the vicinity of the project area are low density lithic scatters and most did not yield diagnostic artifacts that would allow the sites to be placed within a chronological sequence. Two of the pre-contact Native American sites had material consistent with Archaic to Early Woodland material culture.

Table 3.1: Previously recorded archeological sites within one mile of the project area.

Site Number	Description	Report Reference
44FK0025	P: Surface Lithic Scatter/ Nondiagnostic	Thunderbird Arch. Assoc. 1979
44FK0026	P: Archaic & Woodland Lithic Scatter H: Historic Ceramic Scatter	WMCAR 1980
44FK0027	P: Archaic Lithic Scatter	Thunderbird Arch. Assoc. 1979
44FK0029	H: Late 18th C. Home & Millsite	VDOT-Lyle Browning 1981
44FK0178	H: 18th or 19th Century Farm	JMU-WHITLEY 1991
44FK0181	P: Archaic & Woodland Lithic Scatter	JMU 1991
44FK0183	P: Lithic Scatter/ Nondiagnostic	JMU-WOOD 1991
44FK0188	H: 18th Century Stone Wall (Glass Family)	JMU-WOOD 1991
44FK0202	H: 18th Century Homesite (Colvill Family)	JMU-HOFSTRA 1991
44FK0228	H: Witness Tree/ Property Boundary	JMU-Opequon Arch. Survey 1991
44FK0232	H: 18th Century Stone Wall	JMU-Opequon Arch. Survey 1991
44FK0233	H: Union Defensive Earthwork	JMU-Opequon Arch. Survey 1991
44FK0266	P: Lithic Scatter/ Nondiagnostic	JMU-Opequon Arch. Survey 1991
44FK0267	P: Lithic Scatter/ Nondiagnostic	JMU-Opequon Arch. Survey 1991
44FK0272	H: Fenceline/ Union Defensive Position	JMU-Opequon Arch. Survey 1991
44FK0544	H: Union Cavalry Encampment	JRIA-JOLLEY 1998
44FK0592	H: French & Indian War Fort Colvin	DHR-JOLLEY 2002-2014
44FK0650	H: Civil War Encampment	DHR-JOLLEY 2007
44FK0651	H: Union Encampment	DHR-JOLLEY 2007
44FK0803	H: 1736 & 1790 Opequon Presbyterian Church	DHR-JOLLEY 2016
44FK1016	H: Opequon Burial Ground No. 2	DHR-JOLLEY 2020
44FK1017	H: Opequon Burial Ground No. 4	DHR-JOLLEY 2021

3.5 Above-Ground Resources

There are few surviving above-ground historic resources within half a mile of the project area. A search of VCRIS returned seven historic structures, primarily related to Kernstown Battlefield or 19th century or later domestic structures. The only standing 18th century structure within this radius is the homesite of the Wilson Family, who built this structure in around 1740. This site is known interchangeably in historical accounts as Stony Lonesome as well as the Wilson-Magill-Madagan House (034-0027). To the North of the APE is the Pritchard-Grim House (034-0003) on the property of the Hoge family was utilized by Union artillery as a high ground position during the First and Second Battles of Kernstown. Parts of this property retain ruins and foundations relating to 18th century habitation and land use.

Further to the south of the project area is the J. D. Ewing House also known as the Ewing Farm which was established during the Reconstruction Period shortly before 1880. It is a well-preserved balloon framed farmhouse with surviving outbuildings. Close to this is the Salem Methodist Church and associated cemetery established in 1913. It should be noted that the current Opequon Presbyterian Church north of the APE is of late 19th c. construction but is built close to the original footprint of the 1736 and 1790 iterations. The associated cemetery of the Opequon Presbyterian Church holds some of the earliest surviving grave markers west of the Blue Ridge Mountains. Many of these early markers were not imported but are made from locally quarried limestone, sandstone, and shale. Robert Glass son of the immigrant was listed as having mason's tools in his last will and testament. This trade would have been useful in not only building such structures as Samuel Glass's Mill on the Opequon but may have been useful in the production of these local folk funeral markers. Two additional cemeteries associated with that church and the original 16 families, and their descendants can be found within half a mile of the APE. Opequon Cemetery No. 2 was in use by the 1760's and continued to be used throughout the 19th century, and Opequon Cemetery No. 4 which appears to have been established during the last decade of the 19th century.

Farther to the south is the extant remains of Fort Colvin, a French and Indian Fort that Nathaniel Cartmell II likely served in along with his being stationed in Winchester. It is not listed in the VDHR VCRIS system as it has gone through several hands over the past 20 years including VDHR, APVA, and the French and Indian War Preservation Society before being sold back to its original owner. The remaining above ground historic assets belong to the National Register-eligible Kernstown Battlefield 034-0007 with the defensive works along Sandy Ridge, the artillery emplacement at the Pritchard-Grim Farm, and numerous stone walls/ property boundaries used as defensive positions being listed.

3.6 Typical Cultural Resources Expected in the Project Area

In general, pre-contact Native American archeological resources are most likely to be found in upland well-drained areas that are within approximately 150-meters (492 feet) of a stable, permanent water source. There have been seven sites with pre-contact Native American components encountered within one mile of the project area, several occurring on landforms similar to the project area and with a similar proximity to a water source. The project area is relatively level and includes the headwaters of Hoge Run, a minor drainage. There is a high potential that pre-contact Native American deposits are present within the project area.

A review of previous archeological surveys within one mile of the project area, and an examination of historic documents and maps, indicates that historic period archeological resources, dating from the 18th through the early 20th centuries are could be found within the project area. In general, historic period archeological sites are most typically found within 100 meters (328 feet) of a historic roadway

or navigable waterway. Historic mapping from the mid-19th century onward shows that the project area was situated in an area between the large farms that comprised the area. Research conducted by Geier and Hofstra indicate that the project area falls within tracts patented by the mid-18th century. Apple Valley Road, which abuts the project area has existed in its current layout since prior to the Civil War.

Based upon the proximity of the project area to the battlefields of First and Second Kernstown, it is not unexpected for militaria to be encountered. Apple Valley Road was used to move troops for the battles but was not directly within the area where combat occurred. VCRIS records indicate that the looting of sites of military significance by metal detectorists. Accordingly, the probability of encountering large amounts of militaria is low due to easy access to the APE along Middle and Apple Valley Roads.

4.0 Research Design and Methods

4.1 Research Design

The Ottery Group conducted the Phase I archeological survey of the Apple Valley Road Tract as part of due diligence ahead of proposed development of the property. The purpose of the archeological survey was to locate previously unrecorded archeological sites within the property and, if they exist, to preliminarily assess their research potential based on the criteria for inclusion on the National Register of Historic Places (36 CFR 60).

The project included field investigations and archival research. Archival research was conducted to locate previously identified cultural resources in the surrounding area and to guide an assessment of the potential for locating undiscovered archeological sites within the impact areas associated with the planned industrial development. Field investigations consisted of shovel test pits across the development parcel. Shovel test pits were used to systematically collect artifacts and to use the locations and quantities recovered to identify the presence and location of historic or pre-contact Native American sites.

In addition to conventional subsurface testing, a metal detector survey was completed across part of the project area due to the proximity of the battlefield of First & Second Kernstown, a Civil War battle associated with the Shenandoah Campaign of the Confederate Army during the Civil War. Metal detection surveys are considered to be the most effective tool in identifying Civil War resources and are recommended methods to enhance convention Phase I survey methods (VDHR 2017).

4.2 Archival Research

Research was conducted online using the VDHR VCRIS cultural resources database. All cultural resources within one-mile radius of the site were compiled into spreadsheets. These resources included documented historic and archeological sites. Additional research was conducted using the Library of Congress online map database, the USGS National Map Viewer, historicaerials.com, and the Frederick County GIS application.

4.3 Field Methods

The Phase I archeological survey was conducted over the period of June 16th to July 27th, 2023. Testing was conducted using a 15-meter grid that conforms to state and county standards. The grid was established using a base point at the edge of Apple Valley Road as a starting datum (N39.143671, W-78.208874), with this central datum point of N6000 E3000 due the large size of the APE as well as to differentiate it from a previous field survey. The locations of individual STPs were determined using a Suunto KB-50 optical sighting compass to determine angle and pacing to determine distance. Each STP was marked with flagging tape and measured at least 45 centimeters (cm) in diameter and was excavated in levels that approximated the existing soil conditions. Excavation of the STPs was performed based on stratigraphic layers to a depth of ten centimeters into sterile soil or to the limits of hand excavation. The STPs were offset if necessary due to obstacles such as trees, roads, or debris and based on the discretion of the excavator. One hundred percent of excavated soil was sifted through ¼-inch wire mesh screen for cultural material. Artifacts, if present, were documented and collected in labeled bags according to their horizontal and vertical provenience for further processing. Shovel test pits were excavated to culturally sterile soils unless physical obstructions prevented excavation beyond the depth of the obstruction.

The metal detection survey was accomplished using a White's Sierra Madre, Tesoro Tejón, and Whites Coinmaster 2 with factory standard detector coils. The detectors were used in "all metal" mode with low discrimination and were ground-balanced at the site at the beginning of each day of metal detecting. The instruments can detect metal artifacts within approximately one foot from the ground surface. Targets

identified during metal detection were excavated with hand tools with assistance from a hand-held pinpointer. All excavated metal artifacts were identified in the field, recorded with a bag number in an inventory and with a general identification of the artifact, mapped, and collected. Locations of all collected artifacts were recorded with hand-held GPS. Artifacts were collected in polyvinyl bags marked with complete provenience information.

Field notes recorded the vertical location of recovered cultural material, soil stratigraphy, soil colors, and soil textures onto standardized STP forms using Munsell color charts and common soil texture nomenclature. After excavation and recording, all STPs were backfilled. Additionally, digital photography was used to document unusual or exceptional landforms, materials, or cultural features, as well as to provide overview documentation of the existing conditions of the project area at the time of survey.

The locations of all tests were plotted on a proposed site plan provided by the developer. All maps, field notes, shovel test forms, catalog forms, photographs, and other project related information are on file with the Ottery Group in Silver Spring, Maryland.

4.4 Laboratory Methods

The general methodology for the processing of archeological material recovered from Phase I survey includes the cleaning, stabilization and cataloging of the artifact assemblage and associated records. In general, stable artifacts, such as ceramic, glass, and lithics were mechanically cleaned with water and dried. Heavily corroded metals were cleaned with a stiff brush to remove adhering soils and to expose diagnostic attributes. Artifact processing procedures conform to Virginia Department of Historic Resources State Collections Management Standards (VDHR 2011).

Artifacts were initially sorted into general categories based on material type and inventoried in a Microsoft Excel database based on relevant diagnostic attributes. Lithic artifacts were analyzed based on general morphology modeled after Andrefsky's (1998) typology. Debitage was categorized as either shatter, unintentional fractures resulting from lithic reduction, flakes and intentionally removed materials with morphological characteristics such as platforms and bulbs of percussion.

Historic artifacts were catalogued according to a functional analysis system modified from South's original functional groups (South 1977). In most cases, the original categories have been simplified and smaller groups have been merged into larger groups. Historic artifacts were classified using the following group designations: Domestic, Architectural, Clothing, Personal, Faunal, Floral, Fuel, Weaponry, Transportation, and Activities. Further, the artifacts were classified according to material, type, decoration, function, portion, and color. The Utilities category encompasses coal and its by-products and charcoal. A marker category also was used to identify recovered material which was determined to be modern material in the laboratory. Modern material was noted but not collected unless it occurred in situ with older cultural material.

Following analysis, artifacts were bagged in perforated, four-milliliter polypropylene bags labeled with provenience and project information and boxed in acid-free containers for long-term storage at an appropriate facility. The artifacts recovered during the survey are not considered to be candidates for conservation or permanent curation.

5.0 Results

The archeological survey of the Apple Valley Road Tract consisted of the excavation of 1,435 shovel test pits excavated at 15-meter intervals, with an additional 145 7.5-meter interval radial tests used to bound artifact concentrations within the 71.85-acre property. The purpose of the STP survey was to identify the presence of any cultural deposits within the property. Metal detection was conducted across areas where ground cover permitted, primarily in the northern portion of the project area and a central corridor extending north to south in the southern portion. The purpose of the metal detection was specifically to investigate the presence of Civil War-era artifacts associated with the 1864 Battle of Kernstown.

5.1 STP Testing

The STP grid was established using a fence corner at the northeastern corner of the project area as the datum, designated STP N6000 E3000 (Figure 5.1). The grid was set to an angle of 10 degrees west of north, following a sight line down the fence at the western property boundary. This was the longest continuous visible line and could be reestablished from multiple points to the south to avoid drift.

Terrain within the project area consisted of a relatively level upland terrace, with a central ridge running northeast-to-southwest through the project area and gently sloping northeast and southwest. In the southwestern portion of the APE a relict stream with a filled cave/ natural spring entrance was present. Outcroppings of the Beekmantown chert nodules weathering out of the exposed bedrock are present in the northern half of the project area. Evidence of quarrying for the extraction of foundation stones was evident on outcroppings in the center of the APE. The southern half of the APE can be characterized as hummocky karst topography with hydric soils bounded by small elevation rises with dryer ground and rocky and gravely soils. The southernmost regions of the APE are low lying marshland with hydric silt loam soils.

Vegetation varied across the project area, with open grassland at the northern end, multiple small open glades with borders of 1-2 meter-tall briars bounding low growing dense brush with cattle paths between the separate glades in the central portion of the property, and heavy brush in the southern end of the project area.

The soils encountered across the project area were relatively consistent. The typical soil profile consisted of a 10YR 4/4 silt loam eroded former plowzone above a 10YR 5/6 silt loam B horizon subsoil (Figure 5.2). The boundary between the plowzone and subsoil horizons is marked by a lag of gravel and cobbles comprised of angular dolostone of the Beekmantown Group. In the lower elevations of the project area proximal to the stream drainage, the soils often exhibited hydric profiles. Hydric profiles, marked by the presence of water, leached soils, and precipitated mineralization, were observed in 330 STPs. The profiles were generally shallow, with 913 STPs within the project area encountering subsoil at depths of 11-20cm below ground surface. Another 313 STPs extended to depths of between 21 and 30cm. Only 40 of the STPs encountered a soil change at deeper than 30cm.

A total of 197 STPs contained 18th-20th century and pre-contact Native American artifacts. The distribution of these positive STPs can be seen in Figure 5.1. Historic period artifacts were found in one concentrated area, with some outliers spread along the springhead to the south of the primary cluster. The bulk of the positive STPs (n=157) were concentrated in five areas. The five artifact concentrations were designated sites 44FK1076 to 44FK1080. Artifact clusters that contained only chert shatter, i.e. no flakes or other artifacts, were not designated archeological sites, as the shatter may have been inadvertently produced by plowing or animal hooves and not indicative of cultural activity.

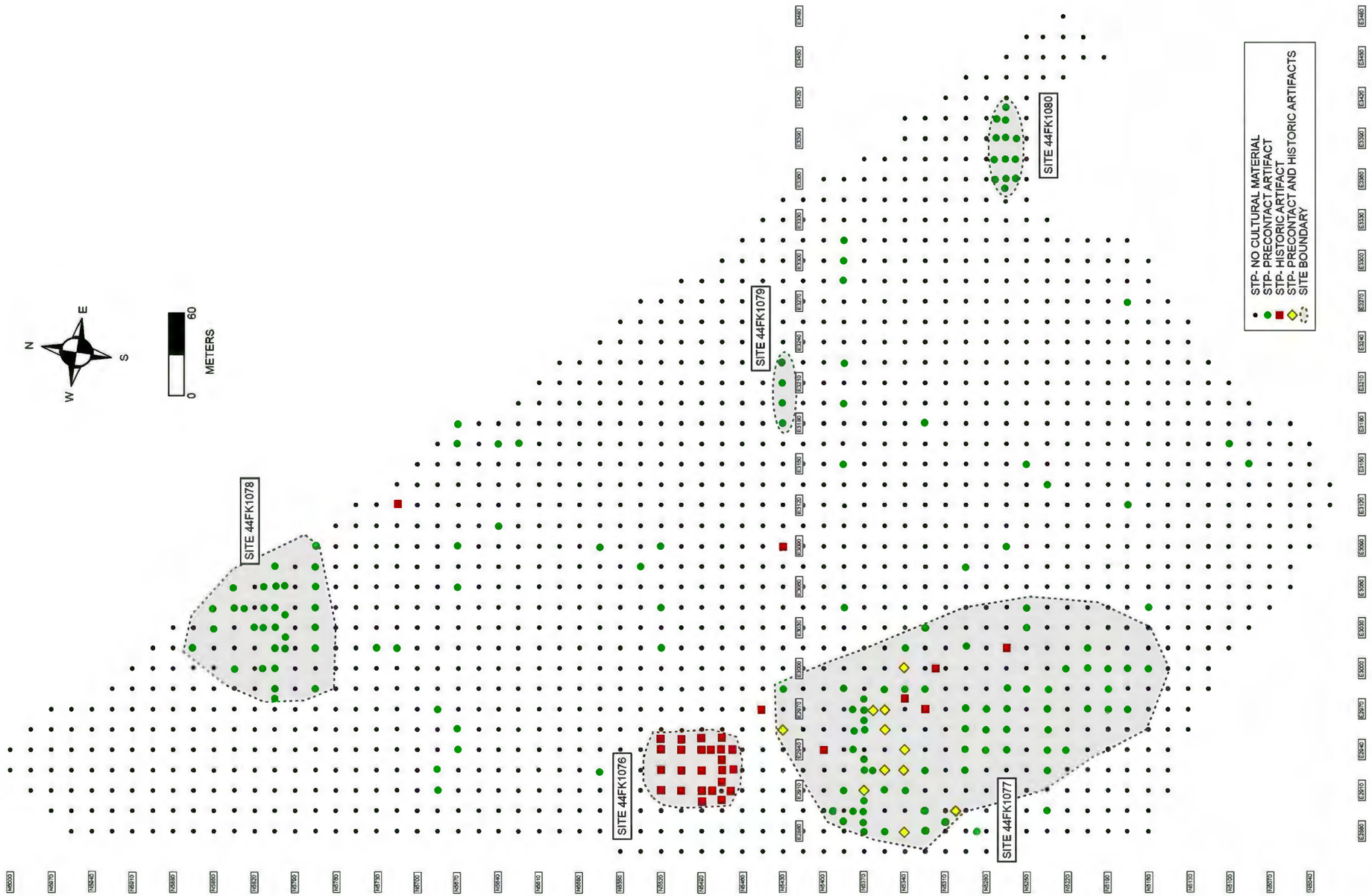

Figure 5.1: Location of Archeological Testing.

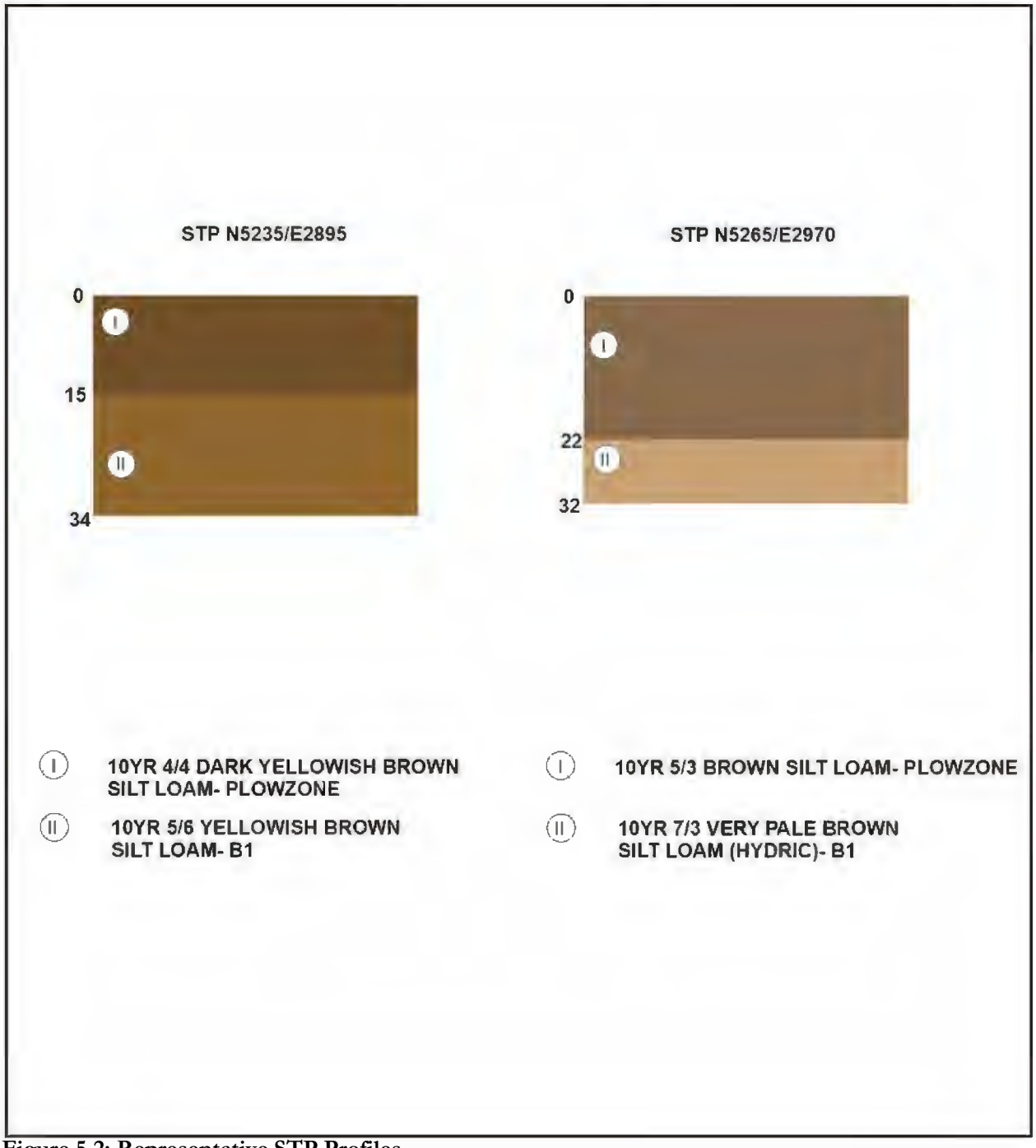

Figure 5.2: Representative STP Profiles.

Site 44FK1076 covers a roughly circular area measuring 55m-x-50m (Figure 5.1). Within this area, 23 of 29 STPs contained cultural material, including 11 baseline STPs and 12 radial STPs. A total of 204 artifacts were recovered from STP testing, with an additional 73 encountered during metal detection (Table 5.1).

The recovered material indicates a house site. A wide variety of diagnostic ceramics present shows that the period of occupation was likely between 1750 and 1830. Several artifacts recovered have a terminal use date of the end of the first quarter of the 19th century. Additional Colonial-era artifacts including blown window pane and olive green wine bottle fragments were found (Figure 5.3). Both hand-wrought and machine-cut nails were encountered, indicating that the site was being improved until after 1810. There is negligible presence of later cultural material that would indicate a continuation of occupation into the late 19th or 20th century. Only one pre-contact artifact was recovered, a secondary flake made of the local Beekmantown chert.

Site 44FK1076 may be the home of three generations of the Glass family. David Glass (1728-1775) purchased the land that includes the project area in 1749. Upon his death, it was passed to his son, David Glass II (1746- after 1789) and possibly David Glass II's son John (1831-?) after that. A fenceline with remnants of a fieldstone wall adjacent to site appears to be part of a property boundary aligning to the metes and bounds of the 1749 purchase. Little is known of this branch of the much more famous Glass family, descendants of which still live adjacent to the property today. It is thought that John Glass, the grandson, may have moved out of the Opequon Creek drainage as so many pioneers did to the Kentucky or Ohio frontiers. As John left no heirs his property may have reverted into the family or been sold in the 1850s.

Table 5.1: Artifacts recovered from Site 44FK1076.

Group	Category	Artifact	Count	Start Date	End Date
Kitchen	Ceramics				
		Creamware- Undecorated	8	1760	1810
		Pearlware- Undecorated	16	1780	1830
		Pearlware- Polychrome	3	1790	1815
		Pearlware- Feather-Edged	2	1790	1815
		Pearlware- Transfer Printed	1	1790	1815
		Redware- Lead Glazed	62	1750	1900
		Redware- Plain	63	1750	1900
		Redware- Other	3	1750	1900
		Buckley	5	1750	1790
		Astbury	1	1750	1790
		Manganese Mottled Ware	2	1750	1820
		Whiteware- Undecorated	3	1820	2000+
		Whiteware- Transfer Printed	1	1820	2000+
		Chinese Export Porcelain	2	1750	1810
		Gray Bodied Domestic Stoneware	1	1730	1930
		English Brown Stoneware	1	1750	1830
		Buff Bodied Stoneware	1	1750	1830
	Faunal				
		Oyster	3	n.a.	n.a.
		Burnt Bone/ Tooth	1	n.a.	n.a.
	Glass				
		Lead Glass Stemware	2	1750	1870
		Medicine Bottle	4	1760	1820
		Olive Vessel Glass- Free Blown	1	1750	1830

Group	Category	Artifact	Count	Start Date	End Date
Architectural					
	Ceramic				
		Brick (not wire cut)	33	1700	1880
		Mortar	10	n.a.	n.a.
	Glass				
		Window Pane (cylinder)	6	1750	1870
	Metal				
		Hand-forged Nail	16	1750	1850
		Machine-cut Nail	7	1810	1880
Activities					
	Metal	Cast iron kettle fragment	6	1760	1870
		Dowry chest/ linen chest lock plate (iron)	1	1750	1850
		Wire	1	1870	2000+
Miscellaneous					
	Lithic	Chert Secondary Flake	1	n.a.	n.a.
	TOTAL		**230**		

Figure 5.3: Selected historic period artifacts from Site 44FK1076.

Site 44FK1077 is a large multi-component site measuring 240m-x-165m (Figure 5.1). The site was much less concentrated than site 44FK1076, and included 79 positive STPs out of 182. A total of 62 baseline and 17 radial STPs contained cultural material. A total of 168 artifacts were recovered from the site, an average of 2.04 artifacts per positive STP and an overall density of 0.92 artifacts per STP within the site boundary (Tables 5.2 and 5.3). Five STPs contained only historic period artifacts while 63 contained exclusively pre-contact lithic artifacts. A total of 11 STPs contained both.

The majority of the artifacts were pre-contact Native American lithic debitage (Table 5.2). Of the 145 pre-contact artifacts present, 94 consisted of angular shatter from the locally-occurring chert. A total of 41 chert flakes were recovered, including 1 primary and 40 secondary flakes. Six fire cracked rock (FCR) indicate a potential hearth or remnant of lithic material extraction. One core was also present, also composed of local chert.

One lithic tool was recovered from Site 44FK1077. It is a broken or use-worn projectile point refashioned into a hafted scraper. The contracting stem is consistent with Late Archaic and Early Woodland point types (Figure 5.4). Two additional diagnostic artifacts were recovered from the site, both Native American ceramic fragments. One heavily carbonized small sherd is a sand-tempered ceramic with a bright orange paste, possibly Accokeek. The other is a hard fired ceramic with a micaceous paste similar to Moyaone. The pre-contact component is interpreted as a resource extraction site. With the large quantity of debitage present, it would appear that lithic extraction is the primary function, although the overall lack of primary flakes present is inconsistent with quarrying activity. The presence of the springhead makes the location favorable for a hunting camp or the harvesting of plant resources that would be found in that environment.

The historic component of Site 44FK1077 consists of 23 artifacts from 16 STPs (Table 5.3). Of these, 9 were ceramics of varieties recovered from Site 44FK1076, lead glazed redware and green feather-edged pearlware, and one was a machine-cut nail. The artifacts were found near the springhead and may represent an outbuilding associated with the domestic occupation at Site 44FK1076, possibly a springhouse. Three brick fragments and two fragments of mold-blown bottle glass may also be associated as there are no other known structures on the property. Seven artifacts, 6 fragments of barbed wire and a fence staple are associated with the current land use. One piece of 20th century floor tile is an outlier that does not fit in with the assemblage.

Table 5.2: Pre-Contact Artifacts Recovered from Site 44FK1077.

Category	Artifact	Count
Debitage	Chert shatter	94
	Chert secondary flake	41
	Chert Core	1
	Hafted Scraper	1
	Early Woodland Ceramic	1
	Late Woodland Ceramic	1
	FCR	6
TOTAL		**145**

Table 5.3: Historic Period Artifacts Recovered from Site 44FK1077.

Group	Category	Artifact	Count	Start Date	End Date
Kitchen	Ceramics				
		Pearlware- Feather-Edged	3	1790	1815
		Redware- Lead Glazed	6	1750	1900
	Glass				
		Bottle Glass- Mold Blown	2	1700	1850
Architectural					
	Ceramic				
		Brick (not wire cut)	3	1700	1880
		Floor Tile	1	1900	2000+
	Metal				
		Machine-cut Nail	1	1790	1880
Activities					
	Metal	Barbed Wire	6	1870	2000+
		Fence Staple	1	1870	2000+
	TOTAL		**230**		

Figure 5.4: Selected pre-contact artifacts from Site 44FK1077.

Site 44FK1078 is a large scatter of lithic artifacts measuring 90m-x-110m located in the northeastern part of the project area, extending off the project area into Apple Valley Road (Figure 5.1). A total of 35 positive STPs, 26 baseline STPs and 9 radial STPs together yielded 74 lithic artifacts (Table 5.4). The 2.1 artifacts per positive STP is similar to Site 44FK1077. No historic period artifacts were present. The artifact assemblage yielded high quantities of chert shatter (n=31) and secondary flakes (n-22), and two primary flakes, one chert and one quartzite. Nearly 25% of the artifacts from the site were FCR. One tested cobble was also found. None of the artifacts collected from Site 44FK1078 were temporally diagnostic. Given the presence of rock outcrops on the property, the site function is presumed to be lithic extraction.

Table 5.4: Artifacts recovered from Site 44FK1078.

Category	Artifact	Count
Debitage	Chert shatter	31
	Chert primary flake	1
	Chert secondary flake	22
	Quartzite secondary flake	1
	Tested Cobble	1
	FCR	18
TOTAL		**74**

Site 44FK1079 is the smallest of the sites encountered within the project area (Figure 5.1). It measures 15m-x-60m and consists of four consecutive positive STPs. The site yielded 7 lithic artifacts: 3 chert shatter and 4 chert secondary flakes. No temporally artifacts were recovered. No historic period artifacts were present. The site is a nondiagnostic lithic scatter.

Table 5.5: Artifacts recovered from Site 44FK1079.

Category	Artifact	Count
Debitage	Chert Shatter	3
	Chert Secondary Flake	4
TOTAL		**7**

Site 44FK1080 is a moderate sized scatter of lithic artifacts recovered from the north side of the artificial pond (Figure 5.1). The site measures 30m-x-90m and contained 13 positive STPs, including 4 baseline and 9 radial STPs. The site yielded 28 lithic artifacts: 15 chert shatter, 6 chert secondary flakes, 5 FCR, 1 tested cobble, and one potential nutting stone. No temporally diagnostic artifacts were recovered. No historic period artifacts were present. The site is interpreted as a resource procurement site. The presence of a nutting stone may indicate the processing of vegetable fibers harvested from the drainage.

Table 5.6: Artifacts recovered from Site 44FK1080.

Category	Artifact	Count
Debitage	Chert Shatter	15
	Chert Secondary Flake	6
	Nutting Stone	1
	Tested Cobble	1
	FCR	5
TOTAL		**28**

Figure 5.5: Selected pre-contact artifacts from Site 44FK1080.

5.2 Metal Detection

Following the STP survey, a systematic metal detection survey was conducted within all areas of the APE that was clear enough of vegetation to undertake this part of the survey. The metal detector survey was conducted in order to determine whether resources associated with the Battlefields of First and Second Kernstown were present within the project area. Maps of troop placement and movement during the battle (Figure 3.2) do not indicate that the project area was part of the field of war, although there appears to have been pickets along historic fence lines just to the north, including one on the property directly north of the project area and the property directly west of the project area may have been used by the Union troops (Figure 3.2). While they are effective guides to interpret general movements, battlefields are chaotic situations. The presence of artifacts is the most accurate determination of whether the battle extended into the project area. Historic accounts do mention the movement of both Confederate and Union troops across the project area.

Metal detection was conducted within the field that borders on Virginia Route 37, Middle Road, and Apple Valley Road. Historic maps indicate that the modern property lines were likely the same, as a fence line and Apple Valley Road and Middle Road are shown on the 1885 map that matches the current edge of the project area (Figure 3.4). It is likely that any battle-related activity would be encountered in this location if present within the project area as this was the closest Union picket at Sandy Ridge to the project area. Similarly, the open areas along Apple Valley Road where Confederate troops may have been mustered through were also survey.

Metal detector survey was oriented to the STP grid. Transects were examined every 15m, with a sweep 2m wide. Once the grid was completed in a north to south direction along each transect transects were run in between the preceding STP transect and the next.

Figure 5.6: Results of metal detector survey.

A total of seven targets, areas where metal objects were identified, were present, yielding 43 artifacts (Figure 5.4, Table 5.7). The collected material is indicative of farming activity through the 19th and 20th centuries, evidenced by tractor drawn plow elements and horse furniture as well as more modern mechanical parts. A cluster of beer cans was in the north field along the ridge as well as another adjacent to the springhead on the property. Tractor parts and a horse harness buckle were located adjacent to Virginia Route 37 across from the historic Fullerton farm complex. An iron harness ring and a broken 20th century cast steel plow blade were recovered at the edge of the historic homestead site in a small area that had been plowed, this is located down an access road off Apple Valley presently used by the tenant cattle rancher to move livestock. The broken plow tip was located within 25 meters of one of the numerous dolostone outcrops across the majority of the project area.

Table 5.7: Results of metal detector survey.

Northing	Easting	Description
39.14182	78.20775	Cluster of aluminum cans
39.14166	78.20789	Cluster of aluminum cans
39.14116	78.20173	Cast steel/ nondiagnostic
39.14086	78.20798	Cast steel plow part (tip broken off)
39.14028	78.20832	Iron harness ring
39.13906	78.20806	Aluminum beer can
39.13761	78.20787	Coca Cola aluminum can
39.13677	78.20714	Iron horse harness buckle (late 19th to early 20th century)
39.13675	78.20712	Steel tractor part (20th century)

No Civil War-era artifacts were encountered during the metal detector survey. The current tenant of the property, who has collected the property with a local metal detecting/relic hunting club, reported finding multiple artifacts, including a cluster of Confederate Block I and C buttons from the northern end of the property as well as numerous George II coins, George III coins, and pewter and cast copper alloy buttons from the vicinity of Site 44FK1076. In his opinion, they had "picked this place clean."

Particular care was taken in the areas that had previously yielded artifacts to ensure 100% coverage. No additional material was recovered from the area where the military artifacts were recovered. Several hits were encountered within the boundaries of Site 44FK1076 (Figure 5.4, Table 3.8). The investigation of the 11 targets resulted in the recovery of 73 artifacts, many of which were non-ferrous artifacts found while searching for the metal hits, including manganese mottled ware, Buckley ware, creamware, pearlware, and 18th century porcelain. The systematic metal detector survey in this area produced 7 cast iron 18th or early 19th century pot or kettle fragments, as well as hand-forged and early cut nails. These artifacts are represented in the artifact tables for Site 44FK1076 in Table 5.1.

Table 5.8: Metal detection results within Site 44FK1076.

Latitude	Longitude	Metal Object	Other Artifacts Collected	Date Range
39.13942	78.20866	Cast iron fragment	1 Creamware, 2 Pearlware (1 early polychrome), 2 Lead glaze redware, 4 unglazed redware.	1770-1850
39.13953	78.20865	Hand-forged nail	2 Lead glazed redware fragments	1735-1850
39.13941	78.20863	Cast iron fragment	1 Pearlware, 1 Lead glazed redware, 1 Transfer pearlware, 1 Fcr	1790-1830
39.13964	78.20865	Hand-forged nail	1 Creamware, 2 Lead glazed redware, 1 Mottled tan stoneware, 1 Late 18th c. wine	1770-1820

Latitude	Longitude	Metal Object	Other Artifacts Collected	Date Range
			glass, 2 18th c. Porcelain (lead overglaze possible English)	
39.13924	78.20824	Cast iron fragment	3 Lead glazed redware, 1 Unglazed redware	1735-1850
39.13947	78.20872	Cast iron fragment	2 Buckley redware, 1 Astbury redware, 2 Brick fragments, 2 Oyster fragments, 1 Burnt bone fragment, 2 18th Century wine bottle, 1 Creamware	1740-1850
39.13969	78.20856	Cast iron pot fragment	1 Aqua glass medicine bottle fragment	1760-1790
39.13968	78.20966	1 Early Machine-cut Nail, 1 Hand-forged nail	2 Creamware, 2 Pearlware, 2 Lead glaze mottled manganese redware, 1 Grey bodied stoneware, 3 brick fragments, 5 mortar fragments, 1 window glass fragment (thin blue), 1 Oyster shell	1740-1850
39.13969	78.20851	2 Wrought iron nails	NA	1740-1850
39.13952	78.20869	1 Hand-forged nail, 1 Cast iron kettle fragment	1 Buckley type redware, 1 Lead glazed redware, 1 Unglazed redware	1735-1850
39.13974	78. 20850	Possible 18th c. linen/ dowry chest lockplate cover	3 Unglazed redware	1735-1850

5.3 Discussion

This historic period assemblage from Site 44FK1076 has a chronological range from 1750 to 1880. No machine-made glass was recovered during any part of the survey indicating a 18th century start date to the historic occupation of the site. The bulk of the artifacts recovered have a date range from 1770 to 1830. The earliest historic artifacts could date as early as 1740 or around the time that Kernstown was established. Cast iron pots and kettles began to be manufactured just a few miles southwest of the APE after the French and Indian War. It is thought that this site represents the establishment of a farmstead shortly after the French and Indian War and was abandoned just before or after the American Civil War with no later contamination or dumping on the site. The APE shows very little evidence of agriculture in the form of wheat cultivation, but as the name of the road, Apple Valley implies this area was historically linked to orchards and grazing herding animals.

Four pre-contact Native American sites are present within the project area. The Native American artifact assemblage included 394 artifacts composed of two different materials. The project area is situated atop numerous outcrops of the Beekmantown chert. Of the 394 pre-contact Native American Artifacts 317 are chert shatter consistent with source material testing, 61 represent secondary flakes made of the local chert with only one primary flake of this material identified. The lack of primary stage debitage is likely due to the Beekmantown chert being mostly tabularly bedded in the host Beekmantown dolostone with round nodules being uncommon. Hammerstones recovered within the APE are comprised of rounded quartzite cobbles from further away in the Opequon Creek drainage and appear to be brought into the area. Flakes of quartzite were uncommon within the APE with one primary and one secondary flake recovered. Two fragments of Native American ceramic were encountered during the survey. Although one was too small to reliably identify, the color of the paste and sand inclusions in the temper suggest an Early Woodland Accokeek ceramic, while the larger hard-pasted sherd with micaceous sand in the temper is similar to the Late Woodland Moyaone ceramic. The only flaked tool recovered was a reworked projectile point fashioned into a hafted scraper. The original tool was either broken or use-worn. The contracting stem of the original tool is still intact, suggesting a Late Archaic or Early Woodland date. The interpreted function of the pre-contact

sites is the extraction of lithic material from the outcrops present within the project area or the wetland plants that would have been present in the vicinity of the drainage.

6.0 Conclusions and Recommendations

The Ottery Group conducted an archeological survey of the 71.85-acre Apple Valley Road Tract, which is planned for future development. The archeological survey was conducted by Winchester Gateway, LLC, during development planning. A total of 1,580 STPs were excavated during the archeological survey. The testing resulted in 197 positive test pits; 144 positive shovel test pits of chert debitage and tool fragments associated with pre-contact Native American land use and 53 positive test pits containing historic period artifacts dating from the mid-18th through 20th centuries. A total of five archeological sites were identified on the property during the Phase I survey. These were designated 44FK1076 to 44FK1080.

A metal detection survey was conducted within the project area due to the proximity of the National Register-eligible Kernstown Battlefield (034-0007) which was expanded to include the project area in 2011. The scope of the metal detector survey was limited due to the brushy conditions. A total of 7 metal objects were recovered from 11 targets, with 20th and 21st century aluminum beverage cans noted but not collected. No military artifacts were found, although local residents described collecting Civil War material from the property in the past.

Supplemental metal detecting conducted within the boundaries of Site 44FK1076 resulted in the recovery of 73 additional artifacts from the 18th and 19th century occupation of the site.

6.1 Recommendations

Site 44FK1076 is a dense cluster of 18th and 19th century domestic artifacts, possibly associated with the David Glass, Sr. homestead. Glass purchased the property in 1749 and appears to have remained in the family for three generations, until approximately 1850. The site is relatively intact and does not contain later 20th century materials. A wide variety of ceramics recovered from the site suggests a long duration of habitation, and the potential for encountering intact features is high. Metal detection within the site resulted in the recovery of additional artifacts. A **Phase II investigation is recommended to establish the National Register eligibility of the site.**

Site 44FK1077 is a large moderately dense scatter of pre-contact Native American lithic artifacts with a light scatter of 18th to 19th century domestic artifacts focused around a springhead. The majority of the lithic artifacts recovered consist of local Beekmantown chert shatter. The site yielded one lithic tool, a nondiagnostic hafted scraper. Two fragments of unidentified pre-contact ceramic were also recovered. The pre-contact component is interpreted as a repeated use during the Woodland period for lithic extraction. The historic materials are likely associated with the more concentrated site 44FK1076 directly to the north of it and may represent a springhouse or other outbuilding. The ephemeral nature of the site suggests that intact cultural deposits are unlikely. **Based upon the presence of Native American tools and ceramics as well as 18th century material culture,** a **Phase II investigation is recommended to establish the National Register eligibility of the site.**

Site 44FK1078 is a low density scatter of pre-contact lithic material similar to Site 44FK1077. No tools or diagnostic artifacts were recovered from the site. The site is interpreted as a lithic extraction site with a long duration or repeated use. **The site is not considered to meet the criteria as a significant archeological resource and no additional testing is recommended.**

Site 44FK1079 is a small scatter of pre-contact lithic material consisting of seven artifacts. No tools or diagnostic artifacts were recovered. If the site was not identified in proximity to sites 44FK1077 and 44FK1078, no site function would be possible due to the limited size and artifacts. It is likely that the site is a

resource extraction site. **The site is not considered to meet the National Register criteria for research potential and no additional testing is recommended.**

Site 44FK1080 is a cluster of pre-contact lithic artifacts found on the north of the cattle pond, and along the original spring running through the property. The site contained a moderate density of artifacts, none of which are chronologically diagnostic. The artifact assemblage is consistent with the other Native American sites within the project area. The only anomalous artifact was a possible nutting stone, which suggests that the site may be more than a short-term resource extraction camp. **The site is not considered to be a significant archeological resource and no additional testing is recommended.**

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Appendix A:

Artifact Catalog

STP CATALOG

Site	N	E	Radial	Description
	5085	3150		fcr/ 1 flake
	5100	3165		shatter
44FK1077	5160	3000		shatter
	5160	3045		shatter
44FK1077	5175	2970		shatter
44FK1077	5175	3000		shatter/ 1 flake
	5175	3120		1 flake
	5175	3270		1 flake
44FK1077	5190	2970		shatter
44FK1077	5190	2985		shatter
44FK1077	5190	3000		shatter/ 1 flake
44FK1077	5205	2970		shatter
44FK1077	5205	3000		shatter/ 1 flake
44FK1077	5205	3000		shatter/ 1 flake
44FK1077	5205	3015		shatter
44FK1077	5220	2940		1 flake
44FK1077	5220	3000		shatter
	5235	2895		fcr/ shatter
44FK1077	5235	2925		shatter

Site	N	E	Radial	Description
44FK1077	5235	2940		shatter/ 1 flake
44FK1077	5235	2970		shatter/ 1 flake
44FK1077	5235	2985		shatter
	5235	3135		shatter
	5235	2955a		shatter
	5235	2955b		shatter
44FK1077	5250	2985		shatter/ 1 flake
44FK1077	5250	3030		shatter
44FK1077	5250	3045		shatter
	5250	3150		1 flake
44FK1080	5257.5	3360	R	1 Fcr, 1 flint shatter, 1 flint flake
44FK1080	5257.5	3375	R	1 Thermaly altered quatrzite worked cobble
44FK1080	5257.5	3390	R	4 flint shatter
44FK1077	5265	2940		shatter
44FK1077	5265	2955		1 flake
44FK1077	5265	2970		shatter
44FK1077	5265	2985		shatter
44FK1077	5265	3015		barbed wire
	5265	3090		1 flake
44FK1080	5265	3345		hearth slag/ 1 flake
44FK1080	5265	3352.5	R	1 Fcr
44FK1080	5265	3352.5	R	3 flint shatter
44FK1080	5265	3360		cupstone/ 1 flake
44FK1080	5265	3375		fcr/ shatter
44FK1080	5265	3390		shatter
44FK1080	5265	3412.5	R	1 flint flake

Site	N	E	Radial	Description
44FK1080	5272.5	3390	R	1 flint shatter, 2 flint flakes
44FK1080	5272.5	3405	R	3 flint shatter
44FK1080	5277.5	3375	R	1 flint shatter, 2 Fcr
44FK1077	5280	2940		barded wire
44FK1077	5280	2955		shatter
44FK1077	5280	2970		shatter/ 1 flake
44FK1077	5295	2925		shatter/ 1 flake
44FK1077	5295	2940		shatter
44FK1077	5295	2955		shatter
44FK1077	5295	2970		shatter/ 1 flake
44FK1077	5295	3015		shatter/ 1 flake
	5295	3075		hammerstone/ 1 flake
44FK1077	5302.5	2895	R	1 Large iron staple, 1 chert flake
44FK1077	5310	2887.5	R	3 flint shatter
44FK1077	5317.5	3000	R	Barbed wire
44FK1077	5325	2880		1 flake
44FK1077	5325	2895		shatter/ 1 flake
44FK1077	5325	2925		1 flake/ 1 worked core
44FK1077	5325	2970		barded wire
44FK1077	5325	2985		shatter/ 1 flake
44FK1077	5325	3030		shatter
	5325	3180		shatter
44FK1077	5340	2880		1 cut nail/ shatter
44FK1077	5340	2910		1 great flake
44FK1077	5340	2925		shatter/ 1 flake
44FK1077	5340	2925		2 flakes

Site	N	E	Radial	Description
44FK1077	5340	2925		3 glazed redware/ shatter/ fcr
44FK1077	5340	2940		1 glass/ shatter/ 1 flake
44FK1077	5340	2977.5	R	Barbed wire
44FK1077	5340	3000		1 flake/ 1 glass/ barbed wire
44FK1077	5340	3015		shatter/ 1 flake
44FK1077	5355	2880		shatter
44FK1077	5355	2910		fcr/ 1 flake
44FK1077	5355	2925		shatter/ 1 flake
44FK1077	5355	2925		shatter/ 3 pearlware (green featheredge) fragments/ 1 flake
44FK1077	5355	2955		shater/ 1 redware fragment
44FK1077	5355	2970		1 lead glazed redware fragment/ 2 flakes/ shatter
44FK1077	5355	2985		1 flake
44FK1077	5362.5	2925	R	1 flint shatter, 1 flint flake
44FK1077	5362.5	2970	R	1 Lead glazed redware, 5 shatter
44FK1077	5370	2880		1 flake/ 1 prehistoric ceramic fragment
44FK1077	5370	2885		shatter
44FK1077	5370	2887.5	R	3 Fcr, 1 20th c. floor tile, 1 Flint flake
44FK1077	5370	2902.5	R	4 flint shatter
44FK1077	5370	2910		shatter/ 1 lead glazed redware fragment
44FK1077	5370	2925		shatter/ 1 flake
44FK1077	5370	2932.5	R	4 flint shatter
44FK1077	5370	2955		1 flake
44FK1077	5370	2962.5	R	4 flint shatter, 1 flint flake
44FK1077	5370	2970		shatter
44FK1077	5370	2977.5	R	9 flint shatter
44FK1077	5370	2977.5	R	4 flint shatter, 1 Stalactite, 1 flint flake

Site	N	E	Radial	Description
44FK1077	5377.5	2895	R	2 flint shatter
44FK1077	5377.5	2925	R	1 flint shatter, 1 flint flake
44FK1077	5377.5	2940	R	3 flint shatter
44FK1077	5377.5	2955	R	4 flint shatter, 1 flint flake
44FK1077	5385	2887.5	R	1 Fcr, 1 cobble
44FK1077	5385	2910		shatter
44FK1077	5385	2985		shatter/ 1 flake
	5385	3045		shatter/ 1 flake
	5385	3150		shatter
	5385	3195		shatter/ 1 flake
	5385	3225		hammerstone/ 1 flake
	5385	3285		shatter
	5385	3300		shatter/ 1 flake
	5385	3315		shatter
44FK1077	5392.5	2895	R	3 flint shatter
44FK1077	5400	2940		1 lead glazed redware fragment
44FK1077	5430	2955		3 brick fragments/ shatter
44FK1077	5430	2985		Prehistoric ceramic/ 1 flake
	5430	3090		1 aqua inkwell glass fragment
44FK1079	5430	3180		shatter/ 1 flake
44FK1079	5430	3195		shatter/ 1 flake
44FK1079	5430	3210		1 flake
44FK1079	5430	3225		shatter/ 1 flake
	5445	2970		1 creamware fragment
44FK1076	5467.5	2910	R	English saltglazed stoneware
44FK1076	5467.5	2925	R	1 Unglazed redware

Site	N	E	Radial	Description
44FK1076	5475	2902.5	R	1 Lead glazed redware, 1 unglazed redware, 1 Wrought iron nail
44FK1076	5475	2917.5	R	2 Lead glazed redware, 4 Unglazed redware, 1 Pearlware
44FK1076	5475	2925		1 pearlware fragment/ 1 pipestem fragment/ 3 lead glazed redware fragments/ 7 unglazed redware fragments/ 2 brick fragments
44FK1076	5475	2932.5	R	1 Buckley type redware, 2 Unglazed redware, 2 Pearlware (1 early polychrome), 1 Creamware
44FK1076	5475	2940		1 aqua glass fragment/ 1 glazed redware fragment/ 3 unglazed redware fragments
44FK1076	5475	2947.5	R	2 Buckley type redware, 2 Lead glazed redware, 1 unglazed redware, 1 quartz flake
44FK1076	5482.5	2910	R	1 Wrought nail, 1 Cut nail, 7 Lead glazed redware, 2 Unglazed redware, 1 mortar, 1 18th c. medicine bottle glass, 1 Pearlware
44FK1076	5482.5	2940	R	1 Lead glazed redware, 1 unglazed redware, 1 burnt bone
44FK1076	5490	2910		2 wrought nails/ 6 lead glazed redware fragments/ 2 unglazed redware fragments/ 2 pieces of pearlware/ 1 creamware fragment/ 1 cylinder window glass fragment
44FK1076	5490	2925		1 pearlware fragment/ 1 cut nail/ 3 redware fragments, animal tooth root
44FK1076	5490	2940		1 glazed redware fragment/ 1 unglazed redware fragment/ 1 creamware fragment
44FK1076	5497.5	2910	R	7 Brick, 2 Hearth slag, 3 Wrought iron nails, 1 Cut nail, 3 Pearlware (2 Green featheredge), 1 Lead glazed redware, 1 Cow tooth fragment
44FK1076	5497.5	2925	R	1 Wrought nail, 1 Cut nail, 2 burnt bone, 7 Unglazed redware, 8 Lead glazed redware (Redware rimsherd, copy of stoneware bottle), 2 Whiteware, 3 brick, 1 Late blue polychrome pearlware, 1 Cylinder window glass
44FK1076	5497.5	2940	R	2 Lead glazed redware, 3 Unglazed redware
44FK1076	5505	2910		1 wrought nail/ 3 lead glazed redware fragments/ 6 unglazed redware fragments/ 1 white ware fragment/ 2 wine glass fragments/ 2 cylinder window glass fragments/ 4 brick fragments/ 2 mortar fragments
44FK1076	5505	2925		1 transfer print fragment/ 1 pearlware fragment/ 3 unglazed redware fragments/ 1 aqua glass fragment/ 2 cut nails/ 5 brick fragments/ 1 slag/ 2 mortar fragments.
44FK1076	5505	2940		4 pearlware fragments/ 6 lead glazed redware fragments/ 7 unglazed redware fragments/ 1 cylinder window glass fragment/ 4 brick frgmnts
	5505	2997.5	R	1 Unglazed redware, 1 stalactite
44FK1076	5520	2910		2 brick frgmts.

Site	N	E	Radial	Description
44FK1076	5520	2925		brick frgmnt.
44FK1076	5520	2940		freeblown aqua bottle base fragment (1750-1800, Hume)/ 4 pieces lead glazed redware/ 1 piece bailing wire/ 1 pig tooth
	5520	3015		shatter/ 1 flake
	5520	3045		shatter
	5520	3090		shatter/ 1 flake
44FK1076	5527.5	2947.5	R	3 Flat iron fragments, 3 Lead glazed redware fragments, 3 Unglazed redware fragments
	5535	3075		shatter/ 1 flake
	5565	2925		1 flake
	5565	3090		shatter/ 1 flake
	5625	3165		shatter
	5640	3105		1 flake
	5640	3165		1 flake
	5670	2940		worked core
	5670	2950		shatter
	5670	3060		shatter
	5670	3090		shater/ 1 flake
	5670	3165		shatter
	5670	3180		shatter
	5685	2910		1 flake
	5685	2925		shatter
	5685	2970		fcr/ shatter
	5715	3015		1 flake
	5715	3180		plastic/ stoneware/ whiteware
	5730	3015		shatter/ 1 flake
44FK1078	5775	2985		fcr/ shatter

Site	N	E	Radial	Description
44FK1078	5775	3015		fcr/ shatter
44FK1078	5775	3030		fcr/ shatter
44FK1078	5775	3045		shatter/ 1 flake
44FK1078	5775	3060		fcr/ shatter
44FK1078	5775	3075		shatter
44FK1078	5775	3090		fcr/ shatter
44FK1078	5797.5	3015	R	1 flint flake
44FK1078	5797.5	3022.5	R	1 Thermaly altered worked quartzite cobble/ 2 flint shatter
44FK1078	5797.5	3037.5	R	1 flint shatter
44FK1078	5797.5	3060	R	1 flint shatter, 1 quartzite flake
44FK1078	5805	2985		shatter/ 1 flake
44FK1078	5805	2992.5	R	1 River cobble fcr
44FK1078	5805	3000		fcr/ shatter/ 1 flake
44FK1078	5805	3015		shatter/ 1 flake
44FK1078	5805	3030		fcr/ shatter/ 1 flake
44FK1078	5805	3030		fcr/ lithic collected from RW's stp on surface
44FK1078	5805	3045		fcr/ possible flakes
44FK1078	5805	3060		fcr/ 1 flake
44FK1078	5805	3075		fcr/ shatter/ 1 flake
44FK1078	5805	3090		fcr/ 1 flake
44FK1078	5812.5	3000	R	4 flint shatter, 1 flint flake
44FK1078	5812.5	3045	R	2 flint shatter, 1 quartzite cobble fcr, 3 flint flakes
44FK1078	5817.5	3030	R	2 flint shatter
44FK1078	5820	3030		shatter
44FK1078	5827.5	3045	R	1 flint cobble primary flake
44FK1078	5835	3000		fcr/ 1 flake

Site	N	E	Radial	Description
44FK1078	5835	3045		fcr/ shatter
44FK1078	5835	3060		fcr/ 1 flake
44FK1078	5835	3075		fcr/ shatter
44FK1078	5835	3090		flake
44FK1078	5850	3030		fcr/ 1 flake
44FK1078	5850	3045		fcr/ 1 flake
44FK1078	5850	3075		fcr/ 1 flake
44FK1078	5865	3015		fcr/ 1 flake

Appendix B:

Archeological Site Forms

Virginia Department of Historic Resources
Archeological Site Record

DHR ID: 44FK1176

Snapshot

Date Generated: January 29, 2024

Site Name:	Glass-Family Homestead
Site Classification:	Terrestrial, open site
Year(s):	1738, 1760, 1780, 1830, 1850, 1860
Site Type(s):	Farmstead
Other DHR ID:	
Temporary Designation:	

Site Evaluation Status

Locational Information

USGS Quad:	WINCHESTER
County/Independent City:	Frederick (County)
Physiographic Province:	Valley and Ridge
Elevation:	805 feet
Aspect:	Facing Southeast
Drainage:	Perennial
Slope:	2-8%
Acreage:	0.750
Landform:	Ridge
Ownership Status:	Private
Government Entity Name:	

Site Components

Component 1

Category:	Domestic
Site Type:	Farmstead
Cultural Affiliation:	Euro-American
Cultural Affiliation Detail:	
DHR Time Period:	Colony (c.Native) (1733 - 1788), Early National Period (1790 - 1829), Antebellum Period (1830 - 1860)
Start Year:	1738
End Year:	1860
Comments:	Site AVR-1 covers a roughly circular area measuring 30m-x-30m (Figure 3.1). Within this area, 25 of 29 STPs contained cultural material, including 16 positive STPs and 12 radial STPs. A total of 204 artifacts were recovered from STP testing, with an additional 19 encountered during controlled collection (Table 3.1). The recovered cultural material at the site. A wide variety of diagnostic ceramics present across the period of occupation at the site, ranging from [illegible] Colonial artifacts to material from the early to the end of the first quarter of the 19th century. Additional Colonial-era artifacts including glass [illegible] machine-cut nails were encountered, indicative that the site was being improved until after 1820. There is negligible presence of later cultural material that would indicate a continuation of occupation into the late 19th or 20th century. Only one pre-contact artifact was recovered, a secondary flake made of the local Stephenstown chert. Potentially associated with multiple generations of the Glass family.

Bibliographic Information

Bibliography:

Jay Dunne, Bird Franz, and Lyle Torp (2023)
Phase I Archeological Survey of the Apple Valley Road Tract, Winchester, Frederick County, Virginia. Conducted for Winchester Gateway, LLC.

Information Date:

Virginia Department of Historic Resources
Archaeological Site Record

DHR ID: 44FK1076

CRM Events

Event Type: Survey:Phase I

Project Staff/Notes:

Jay Lunze- crew chief
Lyle Torp- principal investigator
Karl Franz- archeologist

Project Review File Number: No Data

Sponsoring Organization: No Data

Organization/Company: The Ottery Group

Investigator: Lyle Torp

Survey Date: 6/16/2023

Survey Description:

Phase I archeological survey of a 71.85-acre tract conducted prior to development of the property. The property falls within the NR-eligible Kernstown Battlefield (2011 expansion). 1580 STPs were excavated at 15-meter and close intervals. Metal detection was conducted across open portions of the property. 197 positive STPs including 144 with local chert debitage. Five sites were identified during the survey.

Current Land Use	Date of Use	Comments
Pasture	7/21/2023	former pasture, overgrown, vacant since approximately 2009

Threats to Resource: Development, Erosion, Neglect

Site Conditions: Unknown Portion of Site Destroyed

Survey Strategies: Metal Detection, Subsurface Testing, Historic Map Projection

Specimens Collected: Yes

Specimens Observed, Not Collected: No

Artifacts Summary and Diagnostics:

The recovered material indicates a house site. A wide variety of diagnostic ceramics present shows that the period of occupation was likely between 1750 and 1830. Several artifacts recovered have a terminal use date of the end of the first quarter of the 19th century. Additional Colonial-era artifacts including blown window pane and olive green wine bottle fragments were found (Figure 5.3). Both hand-wrought and machine-cut nails were encountered, indicating that the site was being improved until after 1810. There is negligible presence of later cultural material that would indicate a continuation of occupation into the late 19th or 20th century. Only one pre-contact artifact was recovered, a secondary flake made of the local Beekmantown chert.

Site AV-1 may be the home of three generations of the Glass family. David Glass (1728-1775) purchased the land that includes the project area in 1749. Upon his death, it was passed to his son, David Glass II (1746- after 1789) and possibly David Glass II's son John (1831-?) after that. A fenceline with remnants of a fieldstone wall adjacent to site appears to be part of a property boundary aligning to the metes and bounds of the 1749 purchase. Little is known of this branch of the much more famous Glass family, descendants of which still live adjacent to the property today. It is thought that John Glass, the grandson, may have moved out of the Opequon Creek drainage as so many pioneers did to the Kentucky or Ohio frontiers. As John left no heirs his property may have reverted into the family or been sold in the 1850s.

Creamware- Undecorated8
Pearlware- Undecorated16
Pearlware- Polychrome3
Pearlware- Feather-Edged2
Pearlware- Transfer Printed1
Redware- Lead Glazed62
Redware- Plain63
Redware- Other3
Buckley5
Astbury1
Manganese Mottled Ware2
Whiteware- Undecorated3
Whiteware- Transfer Printed1
Chinese Export Porcelain2
Gray Bodied Domestic Stoneware1
English Brown Stoneware1
Buff Bodied Stoneware1
Lead Glass Stemware2
Medicine Bottle4
Olive Vessel Glass- Free Blown1
Brick (not wire cut)33
Mortar10
Hand-forged Nail16
Machine-cut Nail7
Window Pane (cylinder)6
Chert Secondary Flake1

Summary of Specimens Observed, Not Collected:

No Data

Archaeological site data is protected under the Archaeological Resource Protection Act (ARPA 1979).

Virginia Department of Historic Resources
Archaeological Site Record

DHR ID: 44FK1076

Current Curation Repository:	The Ottery Group, Silver Spring, MD
Permanent Curation Repository:	Artifacts to be returned to landowner
Field Notes:	Yes
Field Notes Repository:	The Ottery Group, Silver Spring, MD
Photographic Media:	Digital
Survey Reports:	Yes
Survey Report Information:	Jay Lunze, Karl Franz, and Lyle Torp (2023) Phase I Archeological Survey of the Apple Valley Road Tract, Winchester, Frederick County, Virginia
Survey Report Repository:	VCRIS
DHR Library Reference Number:	No Data
Significance Statement:	Site AV-1 is a dense cluster of 18th and 19th century domestic artifacts, possibly associated with the David Glass, Sr. homestead. Glass purchased the property in 1749 and appears to have remained in the family for three generations, until approximately 1850. The site is relatively intact and does not contain later 20th century materials. A wide variety of ceramics recovered from the site suggests a long duration of habitation, and the potential for encountering intact features is high. Metal detection within the site resulted in the recovery of additional artifacts. A Phase II investigation is recommended to establish the National Register eligibility of the site.
Surveyor's Eligibility Recommendations:	Recommended for Further Survey
Surveyor's NR Criteria Recommendations:	No Data
Surveyor's NR Criteria Considerations:	No Data

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Page: 3 of 3

Virginia Department of Historic Resources
Archaeological Site Record

DHR ID: 44FK1077

Snapshot

Date Generated: January 29, 2024

Site Name:	No Data
Site Classification:	Terrestrial, open air
Year(s):	, 3000 - 1201 B.C.E, 1200 B.C.E. - 299 C.E, 1000 - 1606, 1751 - 1789, 1790 - 1829, 1830 - 1860
Site Type(s):	Lithic procurement site, Outbuilding
Other DHR ID:	No Data
Temporary Designation:	No Data

Site Evaluation Status

Locational Information

USGS Quad:	WINCHESTER
County/Independent City:	Frederick (County)
Physiographic Province:	Valley and Ridge
Elevation:	795 feet
Aspect:	Facing Southeast
Drainage:	Potomac
Slope:	2-6%
Acreage:	5.460
Landform:	Ridge
Ownership Status:	Private
Government Entity Name:	No Data

Site Components

Component 1

Category:	Industry/Processing/Extraction
Site Type:	Lithic procurement site
Cultural Affiliation:	Native American
Cultural Affiliation Detail:	No Data
DHR Time Period:	Late Archaic Period (3000 - 1201 B.C.E), Early Woodland (1200 B.C.E - 299 C.E), Late Woodland (1000 - 1606), Pre-Contact
Start Year:	No Data
End Year:	No Data
Comments:	142 lithic artifacts shatter (94), primary flakes (1), secondary flakes (40), FCR (6), contracting stemmed point (1) possible Accokeek sherd (1) possible Moyaone sherd (1)

Component 2

Category:	Subsistence/Agriculture
Site Type:	Outbuilding
Cultural Affiliation:	Euro-American
Cultural Affiliation Detail:	No Data
DHR Time Period:	Colony to Nation (1751 - 1789), Early National Period (1790 - 1829), Antebellum Period (1830 - 1860)
Start Year:	1750
End Year:	1830
Comments:	possible springhouse associated with the domestic occupation immediately to the north. Feather-edged pearlware and lead glaze redware are similar to what was recovered from the adjacent site. Historic scatter is concentrated at a springhead. Some later material recovered (barbed wire, fence staple) is associated with the 20th century use as pasture rather than the earlier farmstead.

Archaeological site data is protected under the Archaeological Resource Protection Act (ARPA 1979).

Virginia Department of Historic Resources
Archaeological Site Record

DHR ID: 44FK1077

Bibliographic Information

Bibliography:

Jay Luuze, Karl Franz, and Lyle Torp (2023)
Phase I Archeological Survey of the Apple Valley Road Tract, Winchester, Frederick County, Virginia. Conducted for Winchester Gateway, LLC.

Informant Data:

No Data

Archaeological site data is protected under the Archaeological Resource Protection Act (ARPA 1979).

Virginia Department of Historic Resources
Archaeological Site Record

DHR ID: 44FK1077

CRM Events

Event Type: Survey:Phase I

Project Staff/Notes:

Jay Lunze- crew chief
Lyle Torp- principal investigator
Karl Franz- archeologist

Project Review File Number: No Data

Sponsoring Organization: No Data

Organization/Company: The Ottery Group

Investigator: Lyle Torp

Survey Date: 6/16/2023

Survey Description:

Phase I archeological survey of a 71.85-acre tract conducted prior to development of the property. The property falls within the NR-eligible Kernstown Battlefield (2011 expansion). 1580 STPs were excavated at 15-meter and close intervals. Metal detection was conducted across open portions of the property. 197 positive STPs including 144 with local chert debitage. Five sites were identified during the survey.

Current Land Use	Date of Use	Comments
Pasture	7/21/2023	Overgrown pasture, appears to have been last used in 2009 based on aerial photos

Threats to Resource: Development, Erosion

Site Conditions: Unknown Portion of Site Destroyed

Survey Strategies: Metal Detection, Subsurface Testing, Historic Map Projection

Specimens Collected: Yes

Specimens Observed, Not Collected: No

Artifacts Summary and Diagnostics:

A total of 168 artifacts were recovered from the site, an average of 2.04 artifacts per positive STP and an overall density of 0.92 artifacts per STP within the site boundary (Tables 5.2 and 5.3). Five STPs contained only historic period artifacts while 63 contained exclusively pre-contact lithic artifacts. A total of 11 STPs contained both.

The majority of the artifacts were pre-contact Native American lithic debitage (Table 5.2). Of the 145 pre-contact artifacts present, 94 consisted of angular shatter from the locally-occurring chert. A total of 41 chert flakes were recovered, including 1 primary and 40 secondary flakes. Six fire cracked rock (FCR) indicate a potential hearth or remnant of lithic material extraction. One core was also present, also composed of local chert.

One lithic tool was recovered from Site AV-2. It is a broken or use-worn projectile point refashioned into a hafted scraper. The contracting stem is consistent with Late Archaic and Early Woodland point types (Figure 5.4). Two additional diagnostic artifacts were recovered from the site, both Native American ceramic fragments. One heavily carbonized small sherd is a sand-tempered ceramic with a bright orange paste, possibly Accokeek. The other is a hard fired ceramic with a micaceous paste similar to Moyaone. The pre-contact component is interpreted as a resource extraction site. With the large quantity of debitage present, it would appear that lithic extraction is the primary function, although the overall lack of primary flakes present is inconsistent with quarrying activity. The presence of the springhead makes the location favorable for a hunting camp or the harvesting of plant resources that would be found in that environment.

The historic component of Site AV-2 consists of 23 artifacts from 16 STPs (Table 5.3). Of these, 9 were ceramics of varieties recovered from Site AV-1, lead glazed redware and green feather-edged pearlware, and one was a machine-cut nail. The artifacts were found near the springhead and may represent an outbuilding associated with the domestic occupation at Site AV-1, possibly a springhouse. Three brick fragments and two fragments of mold-blown bottle glass may also be associated as there are no other known structures on the property. Seven artifacts, 6 fragments of barbed wire and a fence staple are associated with the current land use. One piece of 20th century floor tile is an outlier that does not fit in with the assemblage.

Chert shatter94
Chert secondary flake41
Chert Core1
Hafted Scraper1
Early Woodland Ceramic1
Late Woodland Ceramic1
FCR6
Pearlware- Feather-Edged3
Redware- Lead Glazed6
Bottle Glass- Mold Blown2
Brick (not wire cut)3
Floor Tile1
Machine-cut Nail1
Barbed Wire6
Fence Staple1

Summary of Specimens Observed, Not Collected:

No Data

Current Curation Repository: The Ottery Group, Silver Spring, MD

Archaeological site data is protected under the Archaeological Resource Protection Act (ARPA 1979).

Virginia Department of Historic Resources
Archaeological Site Record

DHR ID: 44FK1077

Permanent Curation Repository:	Artifacts to be returned to landowner
Field Notes:	Yes
Field Notes Repository:	The Ottery Group, Silver Spring, MD
Photographic Media:	Digital
Survey Reports:	Yes
Survey Report Information:	Jay Lunze, Karl Franz, and Lyle Torp (2023) Phase I Archeological Survey of the Apple Valley Road Tract, Winchester, Frederick County, Virginia
Survey Report Repository:	VCRIS
DHR Library Reference Number:	[illegible]
Significance Statement:	Site AV-2 is a large moderately dense scatter of pre-contact Native American lithic artifacts with a light scatter of 18th to 19th century domestic artifacts focused around a springhead. The majority of the lithic artifacts recovered consist of local Beekmantown chert shatter. The site yielded one lithic tool, a nondiagnostic hafted scraper. Two fragments of unidentified pre-contact ceramic were also recovered. The pre-contact component is interpreted as a repeated use during the Woodland period for lithic extraction. The historic materials are likely associated with the more concentrated site AV-1 directly to the north of it and may represent a springhouse or other outbuilding. The ephemeral nature of the site suggests that intact cultural deposits are unlikely. Based upon the presence of Native American tools and ceramics as well as 18th century material culture, a Phase II investigation is recommended to establish the National Register eligibility of the site.
Surveyor's Eligibility Recommendations:	Recommended for Further Survey
Surveyor's NR Criteria Recommendations:	[illegible]
Surveyor's NR Criteria Considerations:	[illegible]

Archaeological site data is protected under the Archaeological Resource Protection Act (ARPA 1979).

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Virginia Department of Historic Resources
Archaeological Site Record

DHR ID: 44FK1078

Snapshot

Date Generated: January 29, 2024

Site Name:	No Data
Site Classification:	Terrestrial, open air
Year(s):	No Data
Site Type(s):	Lithic procurement site
Other DHR ID:	No Data
Temporary Designation:	No Data

Site Evaluation Status

Locational Information

USGS Quad:	WINCHESTER
County/Independent City:	Frederick (County)
Physiographic Province:	Valley and Ridge
Elevation:	820 feet
Aspect:	Facing South
Drainage:	Potomac
Slope:	2-6%
Acreage:	1.670
Landform:	Ridge
Ownership Status:	Private
Government Entity Name:	No Data

Site Components

Component 1

Category:	Industry/Processing/Extraction
Site Type:	Lithic procurement site
Cultural Affiliation:	Native American
Cultural Affiliation Detail:	No Data
DHR Time Period:	Pre-Contact
Start Year:	No Data
End Year:	No Data
Comments:	74 lithics from 35 positive STPs chert shatter (32), chert primary flake (1), chert secondary flake (22), quartzite secondary flake (1), FCR (18) no diagnostic artifacts

Bibliographic Information

Bibliography:

Jay Lunze, Karl Franz, and Lyle Torp (2023)
Phase I Archeological Survey of the Apple Valley Road Tract, Winchester, Frederick County, Virginia. Conducted for Winchester Gateway, LLC.

Informant Data:

No Data

Archaeological site data is protected under the Archaeological Resource Protection Act (ARPA 1979).

Virginia Department of Historic Resources
Archaeological Site Record

DHR ID: 44FK1078

CRM Events

Event Type: Survey:Phase I

Project Staff/Notes:

Jay Lunze- crew chief
Lyle Torp- principal investigator
Karl Franz- archeologist

Project Review File Number: No Data

Sponsoring Organization: No Data

Organization/Company: The Ottery Group

Investigator: Lyle Torp

Survey Date: 6/16/2023

Survey Description:

Phase I archeological survey of a 71.85-acre tract conducted prior to development of the property. The property falls within the NR-eligible Kernstown Battlefield (2011 expansion). 1580 STPs were excavated at 15-meter and close intervals. Metal detection was conducted across open portions of the property. 197 positive STPs including 144 with local chert debitage. Five sites were identified during the survey.

Current Land Use	Date of Use	Comments
Pasture	7/21/2023	*No Data*

Threats to Resource: Development, Erosion

Site Conditions: Unknown Portion of Site Destroyed

Survey Strategies: Metal Detection, Subsurface Testing, Historic Map Projection

Specimens Collected: Yes

Specimens Observed, Not Collected: No

Artifacts Summary and Diagnostics:

Site AV-3 is a large scatter of lithic artifacts measuring 90m-x-110m located in the northeastern part of the project area, extending off the project area into Apple Valley Road (Figure 5.1). A total of 35 positive STPs, 26 baseline STPs and 9 radial STPs together yielded 74 lithic artifacts (Table 5.4). The 2.1 artifacts per positive STP is similar to Site AV-2. No historic period artifacts were present. The artifact assemblage yielded high quantities of chert shatter (n=31) and secondary flakes (n-22), and two primary flakes, one chert and one quartzite. Nearly 25% of the artifacts from the site were FCR. One tested cobble was also found.
None of the artifacts collected from Site AV-3 were temporally diagnostic. Given the presence of rock outcrops on the property, the site function is presumed to be lithic extraction.

Chert shatter31
Chert primary flake1
Chert secondary flake22
Quartzite secondary flake1
Tested Cobble1
FCR18

Summary of Specimens Observed, Not Collected:

No Data

Current Curation Repository: The Ottery Group, Silver Spring, MD

Permanent Curation Repository: Artifacts to be returned to landowner

Field Notes: Yes

Field Notes Repository: The Ottery Group, Silver Spring, MD

Photographic Media: Digital

Survey Reports: Yes

Survey Report Information:

Jay Lunze, Karl Franz, and Lyle Torp (2023)
Phase I Archeological Survey of the Apple Valley Road Tract, Winchester, Frederick County, Virginia

Survey Report Repository: VCRIS

DHR Library Reference Number: No Data

Significance Statement: Site AV-3 is a low density scatter of pre-contact lithic material similar to Site AV-2. No tools or diagnostic artifacts were recovered from the site. The site is interpreted as a lithic extraction site with a long duration or repeated use. The site is not considered to meet the criteria as a significant archeological resource and no additional testing is recommended.

Surveyor's Eligibility Recommendations: Recommended Not Eligible

Surveyor's NR Criteria Recommendations: No Data

Surveyor's NR Criteria Considerations: No Data

Archaeological site data is protected under the Archaeological Resource Protection Act (ARPA 1979).

Page: 2 of 2

Virginia Department of Historic Resources
Archaeological Site Record

DHR ID: 44FK1079

Snapshot

Date Generated: January 29, 2024

Site Name:	No Data
Site Classification:	Terrestrial, open air
Year(s):	No Data
Site Type(s):	Lithic scatter
Other DHR ID:	No Data
Temporary Designation:	No Data

Site Evaluation Status

Locational Information

USGS Quad:	WINCHESTER
County/Independent City:	Frederick (County)
Physiographic Province:	Valley and Ridge
Elevation:	785 feet
Aspect:	Facing South
Drainage:	Potomac
Slope:	2-6%
Acreage:	0.140
Landform:	Terrace
Ownership Status:	Private
Government Entity Name:	No Data

Site Components

Component 1

Category:	Industry/Processing/Extraction
Site Type:	Lithic scatter
Cultural Affiliation:	Native American
Cultural Affiliation Detail:	No Data
DHR Time Period:	Pre-Contact
Start Year:	No Data
End Year:	No Data
Comments:	seven artifacts all from local chert recovered from 4 STPs. Artifacts consist of 4 secondary flakes and 3 shatter. Site is located at the edge of a spring.

Bibliographic Information

Bibliography:

Jay Lunze, Karl Franz, and Lyle Torp (2023)
Phase I Archeological Survey of the Apple Valley Road Tract, Winchester, Frederick County, Virginia. Conducted for Winchester Gateway, LLC

Informant Data:

No Data

Archaeological site data is protected under the Archaeological Resource Protection Act (ARPA 1979).

Virginia Department of Historic Resources
Archaeological Site Record

DHR ID: 44FK1079

CRM Events

Event Type: Survey:Phase I

Project Staff/Notes:

Jay Lunze- crew chief
Lyle Torp- principal investigator
Karl Franz- archeologist

Project Review File Number: No Data

Sponsoring Organization: No Data

Organization/Company: The Ottery Group

Investigator: Lyle Torp

Survey Date: 6/16/2023

Survey Description:

Phase I archeological survey of a 71.85-acre tract conducted prior to development of the property. The property falls within the NR-eligible Kernstown Battlefield (2011 expansion). 1580 STPs were excavated at 15-meter and close intervals. Metal detection was conducted across open portions of the property. 197 positive STPs including 144 with local chert debitage. Five sites were identified during the survey.

Current Land Use	Date of Use	Comments
Pasture	7/21/2023	overgrown pasture, last used in 2009 based on aerial photos

Threats to Resource: Development, Erosion

Site Conditions: Unknown Portion of Site Destroyed

Survey Strategies: Metal Detection, Subsurface Testing, Historic Map Projection

Specimens Collected: Yes

Specimens Observed, Not Collected: No

Artifacts Summary and Diagnostics:

Site AV-4 is the smallest of the sites encountered within the project area (Figure 5.1). It measures 15m-x-60m and consists of four consecutive positive STPs. The site yielded 7 lithic artifacts: 3 chert shatter and 4 chert secondary flakes. No temporally artifacts were recovered. No historic period artifacts were present. The site is a nondiagnostic lithic scatter.

Chert Shatter3
Chert Secondary Flake4

Summary of Specimens Observed, Not Collected:

No Data

Current Curation Repository: The Ottery Group, Silver Spring, MD

Permanent Curation Repository: artifacts to be returned to landowner

Field Notes: Yes

Field Notes Repository: The Ottery Group, Silver Spring, MD

Photographic Media: Digital

Survey Reports: Yes

Survey Report Information:

Jay Lunze, Karl Franz, and Lyle Torp (2023)
Phase I Archeological Survey of the Apple Valley Road Tract, Winchester, Frederick County, Virginia

Survey Report Repository: VCRIS

DHR Library Reference Number: No Data

Significance Statement: Site AV-4 is a small scatter of pre-contact lithic material consisting of seven artifacts. No tools or diagnostic artifacts were recovered. If the site was not identified in proximity to sites AV-2 and AV-3, no site function would be possible due to the limited size and artifacts. It is likely that the site is a resource extraction site. The site is not considered to meet the National Register criteria for research potential and no additional testing is recommended.

Surveyor's Eligibility Recommendations: Recommended Not Eligible

Surveyor's NR Criteria Recommendations: No Data

Surveyor's NR Criteria Considerations: No Data

Archaeological site data is protected under the Archaeological Resource Protection Act (ARPA 1979).

Virginia Department of Historic Resources
Archaeological Site Record

DHR ID: 44FK1080

Snapshot

Date Generated: January 29, 2024

Site Name:	No Data
Site Classification:	Terrestrial, open air
Year(s):	No Data
Site Type(s):	Other
Other DHR ID:	No Data
Temporary Designation:	No Data

Site Evaluation Status

Locational Information

USGS Quad:	WINCHESTER
County/Independent City:	Frederick (County)
Physiographic Province:	Valley and Ridge
Elevation:	780 feet
Aspect:	Facing Southeast
Drainage:	Potomac
Slope:	2-6%
Acreage:	0.190
Landform:	Terrace
Ownership Status:	Private
Government Entity Name:	No Data

Site Components

Component 1

Category:	Industry/Processing/Extraction
Site Type:	Other
Cultural Affiliation:	Native American
Cultural Affiliation Detail:	No Data
DHR Time Period:	Pre-Contact
Start Year:	No Data
End Year:	No Data
Comments:	Site AV-5 is a moderate sized scatter of lithic artifacts recovered from the north side of a dammed spring. The site measures 30m-x-90m and contained 13 positive STPs, including 4 baseline and 9 radial STPs. The site yielded 28 lithic artifacts: 15 chert shatter, 6 chert secondary flakes, 5 FCR, 1 tested cobble, and one potential nutting stone. No temporally diagnostic artifacts were recovered. No historic period artifacts were present. The site is interpreted as a resource procurement site. The presence of a nutting stone may indicate the processing of vegetable fibers harvested from the drainage.

Bibliographic Information

Bibliography:

Jay Lunze, Karl Franz, and Lyle Torp (2023)
Phase I Archeological Survey of the Appel Valley Road Tract, Winchester, Frederick County, Virginia. Conducted for Winchester Gateway, LLC.

Informant Data:

No Data

Archaeological site data is protected under the Archaeological Resource Protection Act (ARPA 1979).

Virginia Department of Historic Resources
Archaeological Site Record

DHR ID: 44FK1080

CRM Events

Event Type: Survey:Phase I

Project Staff/Notes:

Jay Lunze- crew chief
Lyle Torp- principal investigator
Karl Franz- archeologist

Project Review File Number: No Data

Sponsoring Organization: No Data

Organization/Company: The Ottery Group

Investigator: Lyle Torp

Survey Date: 6/16/2023

Survey Description:

Phase I archeological survey of a 71.85-acre tract conducted prior to development of the property. The property falls within the NR-eligible Kernstown Battlefield (2011 expansion). 1580 STPs were excavated at 15-meter and close intervals. Metal detection was conducted across open portions of the property. 197 positive STPs including 144 with local chert debitage. Five sites were identified during the survey.

Current Land Use	Date of Use	Comments
Pasture	7/21/2023	overgrown pasture last used in 2009 based on aerial photos

Threats to Resource: Development, Erosion

Site Conditions: Unknown Portion of Site Destroyed

Survey Strategies: Metal Detection, Subsurface Testing, Historic Map Projection

Specimens Collected: Yes

Specimens Observed, Not Collected: No

Artifacts Summary and Diagnostics:

Site AV-5 is a moderate sized scatter of lithic artifacts recovered from the north side of the artificial pond (Figure 5.1). The site measures 30m-x-90m and contained 13 positive STPs, including 4 baseline and 9 radial STPs. The site yielded 28 lithic artifacts: 15 chert shatter, 6 chert secondary flakes, 5 FCR, 1 tested cobble, and one potential nutting stone. No temporally diagnostic artifacts were recovered. No historic period artifacts were present. The site is interpreted as a resource procurement site. The presence of a nutting stone may indicate the processing of vegetable fibers harvested from the drainage.

Chert Shatter15
Chert Secondary Flake6
Nutting Stone1
Tested Cobble1
FCR5

Summary of Specimens Observed, Not Collected:

No Data

Current Curation Repository: The Ottery Group, Silver Spring, MD

Permanent Curation Repository: Artifacts to be returned to landowner

Field Notes: Yes

Field Notes Repository: The Ottery Group, Silver Spring, MD

Photographic Media: Digital

Survey Reports: Yes

Survey Report Information:

Jay Lunze, Karl Franz, and Lyle Torp (2023)
Phase I Archeological Survey of the Apple Valley Road Tract, Winchester, Frederick County, Virginia

Survey Report Repository: VCRIS

DHR Library Reference Number: No Data

Significance Statement: Site AV-5 is a cluster of pre-contact lithic artifacts found on the north of the cattle pond, and along the original spring running through the property. The site contained a moderate density of artifacts, none of which are chronologically diagnostic. The artifact assemblage is consistent with the other Native American sites within the project area. The only anomalous artifact was a possible nutting stone, which suggests that the site may be more than a short-term resource extraction camp. The site is not considered to be a significant archeological resource and no additional testing is recommended.

Surveyor's Eligibility Recommendations: Recommended Not Eligible

Surveyor's NR Criteria Recommendations: No Data

Surveyor's NR Criteria Considerations: No Data

Archaeological site data is protected under the Archaeological Resource Protection Act (ARPA 1979).

Appendix C:

Qualifications of Investigators

LYLE C. TORP, RPA
Managing Director

Lyle C. Torp consults on issues related to compliance with Section 106 of the National Historic Preservation Act (NHPA), directs the preparation of environmental assessments under the National Environmental Policy Act (NEPA), and performs a variety of services related to archeological and historical assessments and historic preservation planning. He has extensive experience performing all phase of cultural resource investigations, and has served as Principal Investigator on numerous compliance-related projects throughout the country. Mr. Torp is fully-qualified under the Secretary of the Interior's Standards for Archeology and Historic Preservation at 36 CFR 61, and is certified in archeology by the RPA. Mr. Torp is a past President of the Council for Maryland Archeology (CfMA), and has served two terms on the Board of Directors for the American Cultural Resources Association (ACRA). Since 1998, Mr. Torp has directed the operations of a consulting firm with a staff of cultural resource and environmental professionals. In this capacity he has augmented his prior work experience in conducting ESAs, natural resource planning, and other environmental services with a diverse professional staff serving clients throughout the United States. Lyle is an Instructor in the Cultural Heritage Resource Management (CHRM) Program at the University of Maryland.

KARL FRANZ, RA
Archeologist

Karl Franz is an Archeologist with The Ottery Group. He is certified in archeology by the RPA. He holds a bachelors degree from Saint Mary's College of Maryland (1991). Mr. Franz has been an archeologist in the Middle Atlantic region 35 years, with experience in all levels of effort at historic and pre-contact Native American sites in 20 states, with a focus in the Mid-Atlantic and Northeast Regions of the United States. He has directed archeological projects for a variety of public, private, and government clients for purposes that range from compliance-driven to academic research studies and is equally proficient in pre-contact Native American and historical period site excavation and interpretation. In addition to project management and laboratory direction duties, Mr. Franz has authored over 200 cultural resources technical reports in his career. He has been employed by the Ottery Group for the last 19 years.

JAY LUNZE, MA
Crew Chief

Jay Lunze is an Archeologist with The Ottery Group. She holds a masters degree in maritime archeology from the University of Southern Denmark (2011). Ms. Lunze has 20 years of experience in the fields of archaeology, museum studies, and heritage management. She has worked as a museum educator and docent at the Jamestown Yorktown Foundation as well as a docent and security guard at the Virginia Museum of Fine Art. Throughout this time, she contributed to the publication of the transcribed and annotated journal of George Washington's journey to Barbados. Since 2018, she has been active in CRM field archaeology in the Mid-Atlantic.

Board of Supervisors
Agenda Item Detail
Meeting Date: October 28, 2026
Agenda Section: Planning Commission Business - Public Hearings

Title:

Rezoning #04-26 for Virginia Technology Park

The Applicant has withdrawn this application; therefore, no public hearing will be conducted, and the Board will take no action on this item.

Attachments:

Board of Supervisors
Agenda Item Detail
Meeting Date: October 28, 2026
Agenda Section: Planning Commission Business - Public Hearings

Title:

Rezoning #08-26 for Gibson Property (Estate of Montie Wood Gibson, Jr.) to Rezone 244.06 +/- Acres from the RA (Rural Areas) Zoning District to the M1 (Light Industrial) Zoning District with Proffers. The Property is Located at 1787 Fairfax Pike and is Generally North of Route 277 (Fairfax Pike) and West of Route 522 (Front Royal Pike) and is Identified by Property Identification Numbers (PINs) 87-3-B, 87-A-16B, and 87-A-94 in the Shawnee Magisterial District.

Attachments:
BOS10-28-26_REZ08-26_Redacted.pdf
BOS10-28-26_REZ08-26_TIA.pdf

REZONING #08-26
Gibson Property (Estate of Montie Wood Gibson, Jr.) Staff Report for the Planning Commission
Prepared: October 23, 2026
Staff Contact: M. Tyler Klein, AICP, Senior Planner

Executive Summary:

Meeting Schedule	
Planning Commission: September 16, 2026 Planning Commission: October 7, 2026	Action: Work Session held Action: Recommended Denial
Board of Supervisors: October 28, 2026	Action: Pending
Property Information	
Property Identification Number (PIN)	87-3-B; 87-A-16B; 87-A-94
Address	1787 Fairfax Pike, White Post
Magisterial District	Shawnee
Acreage	+/- 244.06-acres
Zoning & Present Land Use	Zoning: RA (Rural Areas) Land Use: Agricultural
Proposed Zoning	M1 (Light Industrial)
Adjoining Property Zoning & Present Land Use	
North: RA (Rural Areas) District M1 (Light Industrial) District	Land Use: Agricultural/Vacant Warehouse/Distribution
South: R4 (Residential Planned Community) R5 (Residential Recreational Community) District RA (Rural Areas) District MH1 (Mobile Home Community) District	Land Use: Vacant (Madison 277) Residential (Lake Frederick) Residential Mobile Home Community (Sandy's)
East: RA (Rural Areas) District Clarke County	Land Use: Residential/Vacant/Commercial; Clarke County
West: RA (Rural Areas) District	Land Use: Residential/Vacant
Proposed Use	
This is a request to rezone three (3) parcels totaling +/- 244.06-acres from the RA (Rural Areas) Zoning District to the M1 (Light Industrial Zoning District) with proffers (revised 10/22/26) to enable industrial development.	

Positives	Concerns
The proposed zoning district, M1 (Light Industrial) is typically associated with the future land use designation for "industrial," for which significant portions of the properties are designated. The proposed rezoning generally aligns with broader Plan policy in support of opportunities for industrial development, a broad selection of employment opportunities, expanding the County's industrial base in support of a low residential tax rate and enhancing industrial development potential in vicinity of Winchester Regional Airport and Virginia Inland Port. The revised proffer statement includes architecture and site design commitments to building form, materials, color palette, reduced (varying) building heights along primary roadways and in land bay A, maximum building footprints of 80,000 SF in land bay A, prohibiting loading docks along primary roadways and enhanced buffer and screening requirements to further address Comprehensive Plan policies for "high-quality architecture and site design" a "mix of flexible uses." Transportation improvements proffered include dedication of right-of-way (ROW) for improvements to Route 277 (Fairfax Pike), future dedication of the planned collector road across the properties, and multiuse trails along primary roadways, are generally consistent with adopted Plan policy. The application also includes proffers to fully mitigate transportation impacts including regional transportation improvements (lanes) to the Double Tollgate intersection.	The proffer statement does not fully address stated concerns from the Planning Commission and/or how the proposal meets the intention of the "mixed-use industrial office" (MUIO) designation on portions of the properties along Route 277. Depending on what uses ultimately develop, the proposal may lack compatibility with the broader sub-planning areas (Lake Frederick UDA) and the rural areas of Clarke County. The proposed improvements to Routes 277/522/340 intersection (Proffer 2.8) are proposed to be installed within the existing ROW or in the event sufficient ROW does not exist they may install other such road improvements that are able to be installed within the existing ROW. This does not fully guarantee that improvements will mitigate all impacts on this key intersection and potentially leave others (VDOT or the County) responsible for such improvements, which are not currently planned, designed, or funded.

Review Agency Comments:

Review Agency	Comment Date	Comment Summary	Status
Virginia Department of Transportation (VDOT)	August 7, August 26, September 30, October 20, 2026	VDOT has reviewed the revised proffers [10/20/26] and take no exception to the proposed changes. *See comment letters.*	Fully addressed.
Frederick Water	June 12, 2026	The Impact Analysis Statement is silent on proposed water and sewer demands, and applicant responsibilities. The applications states that they – the Applicant- "understands and acknowledges the timing associated with the sanitary sewer connection and the effort required by the County to make that available". The applicant should provide proposed water and sewer demands, and clarification of the statement regarding "the effort required by the County regarding sanitary sewer". *See comment letter.*	Not fully addressed.
Clarke County	June 12, 2026	*See comment letter.*	
Historic Resources Advisory Board (HRAB)	August 24, 2026	Following their review of this application, the HRAB recommended a commemorative marker for the Battle of Double Tollgate be sited on the property, that a Phase 2 Archeological Survey be conducted (if warranted by the Phase 1 Archeological Survey) and additional documenting and preservation of the architectural features of the Funkhouser Farmhouse be completed if developing the subject property identified with 87-3-A. *See comment letter.*	Partially addressed.
Frederick County (FC) Fire Marshal	June 16, 2026	All future development shall comply with the Frederick County Fire Prevention Code and all other applicable codes.	
FC Public Works	June 2026	*See comment letter.*	

FC County Attorney	July 2026		No comments.

Planning & Zoning Staff Analysis:

Comprehensive Plan Conformance:

The Comprehensive Plan (adopted November 2021) and the *Southern Frederick Area Plan* (*SOFRED,* 2024) provide guidance on the future development of the subject properties. The Plan identifies the subject properties with a combination of "industrial" and "mixed-use industrial office" (MUIO) land use designations and as being within the limits of the sewer and water service area (SWSA). The MUIO designation is primarily along Route 277 (Fairfax Pike), intended to serve as a mixed-area and transition from residential uses (primarily Lake Frederick), south of Route 277.

> "The Route 277 Triangle Centers of Economy is designed to be a significant area of commercial and industrial opportunity that is fully supportive of the Frederick County Economic Development Authority's targeted goals and strategies. The intent of the mixed-use designation is to further enhance the County's commercial and industrial areas and to provide focus to the County's future regional employment centers. In specific areas a mix of flexible uses, with office uses in prominent locations is encouraged. Such areas are supported by substantial areas of industrial and commercial opportunity and provide for areas that are well designed with high-quality architecture and site design. It is the intent of such areas to promote a strong positive community image. Residential land uses are not envisioned in this area."

The proposed zoning district, M1 (Light Industrial) is typically associated with the future land use designation for "industrial," for which the properties are primarily designated. Further, the proposed rezoning generally *aligns* with broader Plan policy contained in Chapter 4 – Business Development in support of opportunities for industrial development, ensuring a broad selection of employment opportunities and expanding the County's industrial base in support of low residential tax rate. However, no fiscal impact study was provided in support of the rezoning request.

Contained in the area plan (SOFRED) are additional policies for potential industrial development noting for this area of the County an envisioned "mix of flexible uses" to fulfill the intention of the "mixed-use industrial office" (MUIO) designation on portions of the properties along Route 277. At a minimum, additional uses that might be noxious, unsafe, or disruptive as well as uses that generate higher traffic than what has been contemplated in the TIA should be further considered for exclusion and included in the proffer statement.

In respect to Plan conformance, including alignment with the future land use map, general policies for business development and area plan specific policies, the proposal is only partially compliant.

Further, sensitivity should be given to the broader area and how a future large assembly of industrial development may impact other sub-planning areas and the rural areas of Clarke County. Specifically, the "Lake Frederick Urban Development Area" also described in *SOFRED* is immediately to the south, which is planned for future residential and neighborhood village (Lake Frederick and more recently the Madison 277 projects). The uses ultimately to be developed on the Gibson tracts or uses to be prohibited should be carefully selected and their potential impacts (noise, odor, vibration, traffic) on surrounding properties and ensure they are fully mitigated.

At the September 16th work session and October 7th public hearing, the Planning Commission expressed a desire for the applicant to further evaluate land bay phasing with allowed and prohibited uses designated in the proffer statement. This could allow for unrestricted M1 (Light Industrial) Zoning District uses to-be-developed in the rear of the site that adjoins the existing Eastgate industrial park, and less intensive development (with smaller buildings, lower building height, limited uses) would be developed along Route 277 and Route 522 frontages.

However, some of these concerns regarding allowed and prohibited uses may be further mitigated through the proffered building form included in Proffer 1 – Site Development. The reduced size and scale of the buildings may ultimately be better suited for flex-type uses, professional offices and services, and other technical trades and services rather than large warehouses and distribution type facilities. As proffered, for frontages along Routes 277 and 522 corridors, the applicant has prohibited loading dock visibility within 250-feet of the roadways and lowered the building height to a maximum height 45-feet within 100-feet of the roadways and/or capped building heights in Land Bay A as shown on the GDP (limited to a single-story 35' tall building, or a 45' tall multistory building, and a maximum outside building footprint of 80,000 SF) to be more harmonious with existing and planned residential and agricultural uses.

Planned Transportation Improvements, Traffic Impacts and Site Access:

The Plan also identifies planned transportation improvements on the subject properties including a "new major collector" road bisecting the site and multiuse trail connecting Route 277 to Route 522. Additionally, a multiuse trail is envisioned along Route 522 and Route 277 (Fairfax Pike) and future widening to Route 277 (improved minor arterial). The collector road right-of-way (ROW) is identified on the Generalized Development Plan and dedication is included in Proffer 2.8 Pedestrian accommodations (10-foot-wide multiuse trail) along Route 277 and Route 522 are also proffered.

In this respect, the rezoning is compliant with Comprehensive Plan transportation policies.

The *Traffic Impact Study* (revised July 30, 2026) notes that the "future with development" key regional intersections studied (Warrior Drive & Fairfax Pike – Intersection #1, & Route 522 & Fairfax Pike/Lord Fairfax Highway – Intersection #3) continue to fail:

> "Two of the regional intersections have level of service or queuing deficiencies due to existing or background related traffic volumes. To mitigate site-related impacts, the following improvements are recommended: at Intersection 1, convert the eastbound and

westbound left-turn phasing from protected-only to flashing yellow arrow operation; and at Intersection 3, add an exclusive eastbound left-turn lane and a second northbound left-turn lane."

The revised proffer statement dated 10/20/26 (2.8) only partially addresses these *TIS* recommended improvements to these regional intersections, noting that improvements are subject to availability of sufficient right-of-way. **As proposed, the rezoning may not fully mitigate transportation impacts generated by development of the subject properties.**

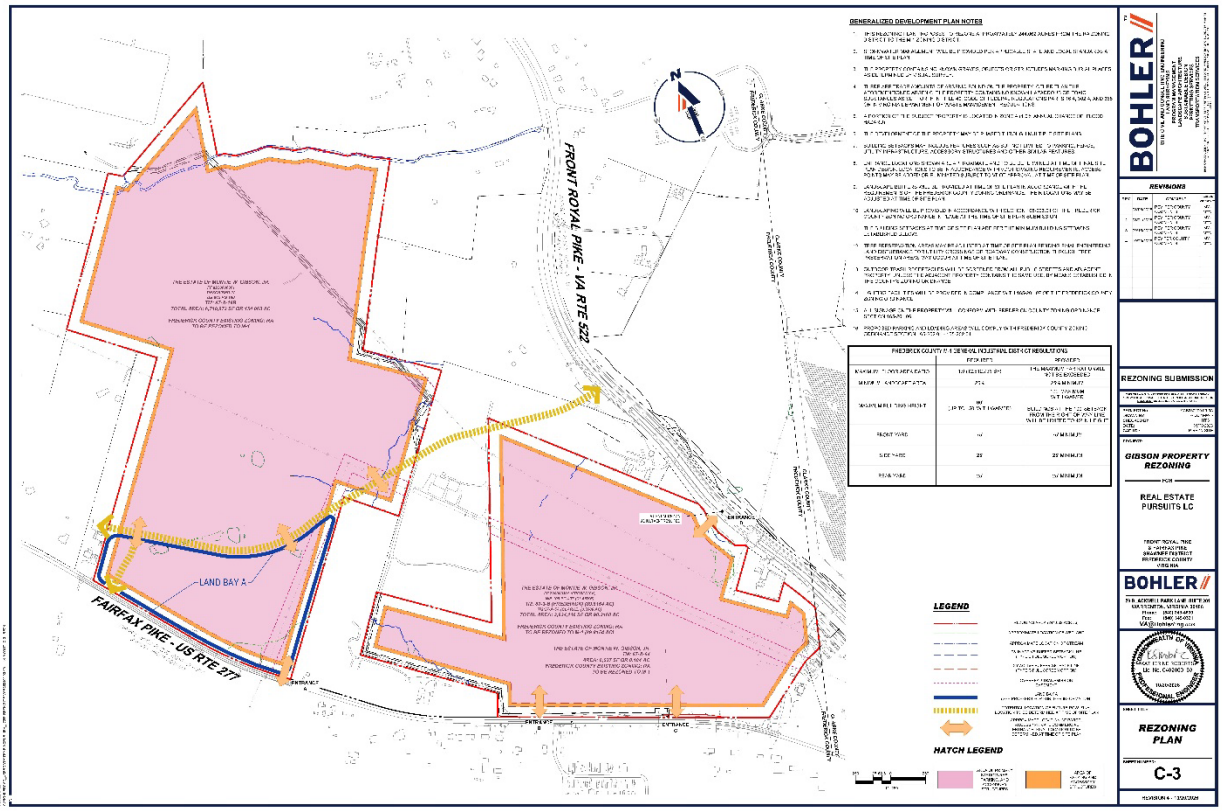
Four (4) points of site access are proposed to serve the +/-244-acres of industrial development; three (3) along Fairfax Pike, and one (1) along Front Royal Pike. The proximity of the proposed site entrance from Route 522 (Entrance D on GDP) to the intersection of Fairfax Pike/Route 522/Route 340 appears to run contrary to "access management" goals and strategies contained in the Comprehensive Plan (Chapter 5 – Transportation). The proffers (2.9) include a requirement for a signal justification report (SJR) for site access points and to install any improvements warranted before occupancy of the first building. This proffer is satisfactory to both VDOT and County staff.

Proffers Statement, Impact Analysis & Generalized Development Plan (GDP):

Proffers (Revised October 22, 2026)	**Staff Comment**
Proffer 1 – Site Development	Proffer 1.2, 1.3, 1.5, 1.6 and 1.8 has been proposed to further articulate how the proposal will implement Plan policy for "high-quality site design and architecture" and a "flexible mix of uses" including specifying a minimum of 3 architectural features or colors for buildings facing Routes 522 and 277; limiting use of EFIS to secondary structures and features; enhanced landscaping and screening including use of native species, larger plantings at time of installation and an earthen berm; reducing building heights along Route 277 and 522 and in Land Bay A; limiting total building footprint in Land Bay A to 80,000 SF; and prohibiting loading docks along primary roadways.
Proffer 2 – Transportation	Proffer 2.8 has been revised to specify that proposed improvements to the Routes 277/522/340 intersection are allowed to be installed within the existing ROW or in the event sufficient ROW does not exist they may

	enter into a reasonable agreement with Frederick County and VDOT to install other such road improvements or lane additions that are able to be installed within the existing ROW. While VDOT offered no additional comments on this revised proffer, Planning and Development staff continues to have concern that this may not fully guarantee that improvements will mitigate all impacts to this key intersection.
Proffer 3 – Water and Sewer Improvements	No comment.
Proffer 4 – Proffer Payments	No comment.
Proffer 5 – Limited Uses	The proffer statement excludes the following uses: regional detention facilities; restaurants; restaurants with drive-thru; data centers. Significant portions of the subject property fronting Route 277 are identified as "mixed-use industrial/office (MUIO)" and as stated in the plan are intended for a "mix of flexible uses" of limited intensity. Depending on what uses ultimately develop, the proposal may lack compatibility with the broader area and does not address how a future large assembly of industrial development may impact other sub-planning areas (Lake Frederick UDA) and the rural areas of Clarke County. However, some of the MUIO compatibility and allowed and prohibited uses concerns raised by the Planning Commission may be mitigated through the proffered building form included in Proffer 1 (described above) particularly along Route 277 corridor and within land bay A where the applicant has limited loading dock visibility and lowered the building heights and size to be more harmonious with existing and planned residential and agricultural uses.
Proffer 6 – Exclusion of Public Property from Proffers	No comment.

Proffer 7 – Severability	No comment.
Proffer 8 – Binding Effect	No comment.
Proffer 9 – Escalator Clause.	No comment.



The included generalized development plan (GDP, revised October 20, 2026) depicts proposed site entrances (A, B, C & D), land bay A (new), buffer areas and future collector road ROW area.

Planning Commission Summary & Action from September 16, 2026 Work Session:

The Planning Commission held a work session on September 16, 2026, to discuss the proposed application with staff and the applicant representatives. The Commission discussed the following topics:

- Transportation impacts and mitigations particularly for proposed site entrance locations (including the number of entrances & alignment), impacts to key intersections include Route 277/Route 522 and frontage improvements along Fairfax Pike;

- Concern over the inclusion of a waiver to allow for overhead utilities for all electrical infrastructure;
- Consideration of use mix, particularly along Route 277, including additional proffered allowed and prohibited uses, and concern for a data center in the future at this location if not proffered as a restricted use;
- Lack of building design, materials, modulation, height, buffers, screening and increased setbacks particularly along Route 277 and Route 522 frontages.

The applicant was further directed to consider the discussion at the work session and key areas of concern and prepare a revised application submission for the public hearing.

No action was taken by the Planning Commission.

Planning Commission Summary & Action from October 7, 2026 Public Hearing:

The Planning Commission held a public hearing on October 7, 2026. The primary discussion among the Commission focused on traffic, proffered transportation improvements, public utilities capacity and allowed/prohibited uses. Sixteen (16) speakers spoke in opposition to the proposed rezoning, citing concerns for increased traffic particularly at the Double Tollgate intersection; impacts to natural resources, residences, roadways; a lack of commitment to allowed and prohibited uses including data centers; water and sewer availability; building design; loss of rural and agricultural land; uncertainty with the feasibility of proffered transportation improvements; and need to *halt* this proposed development until after the new Comprehensive Plan is adopted (underway; anticipated adoption in fall 2027).

The Planning Commission voted 11-2 (Commissioners DeHaven & Stowe – No) to recommend **denial** of the rezoning.

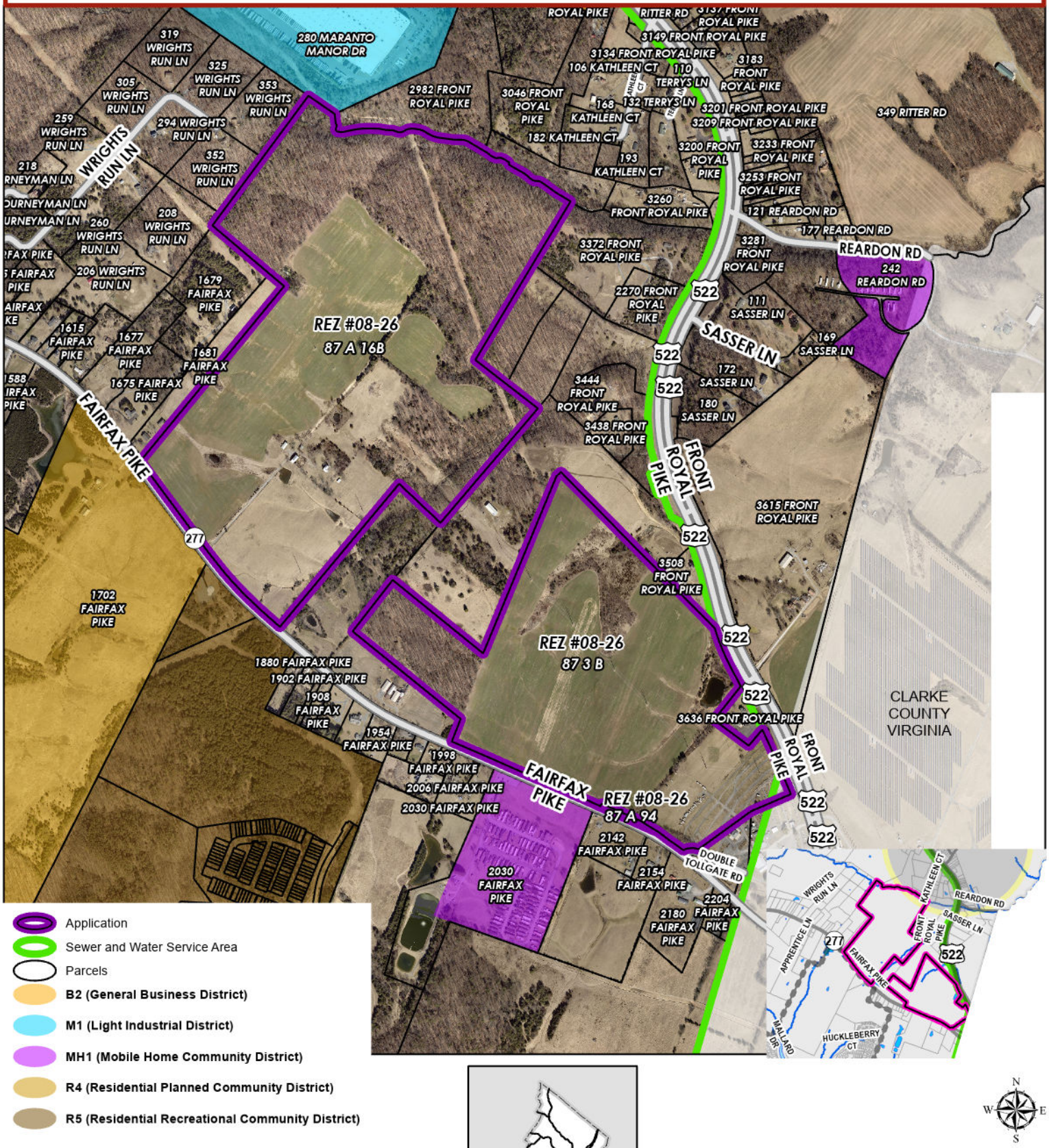
Following a public hearing, staff is seeking a decision by the Board of Supervisors on this rezoning application.

REZ # 08 - 26: Gibson Property (Estate of Monte Wood Gibson, Jr.)

PINs: 87 - 3 - B, 87 - A - 16B, 87 - A - 94

Rezoning from RA to M1

Zoning Map



- Application
- Sewer and Water Service Area
- Parcels
- **B2 (General Business District)**
- **M1 (Light Industrial District)**
- **MH1 (Mobile Home Community District)**
- **R4 (Residential Planned Community District)**
- **R5 (Residential Recreational Community District)**

0 200 400 800 1,200 1,600 2,000 2,400 Feet

Frederick County Planning & Development
107 N Kent St
Winchester, VA 22601
540 - 665 - 5651

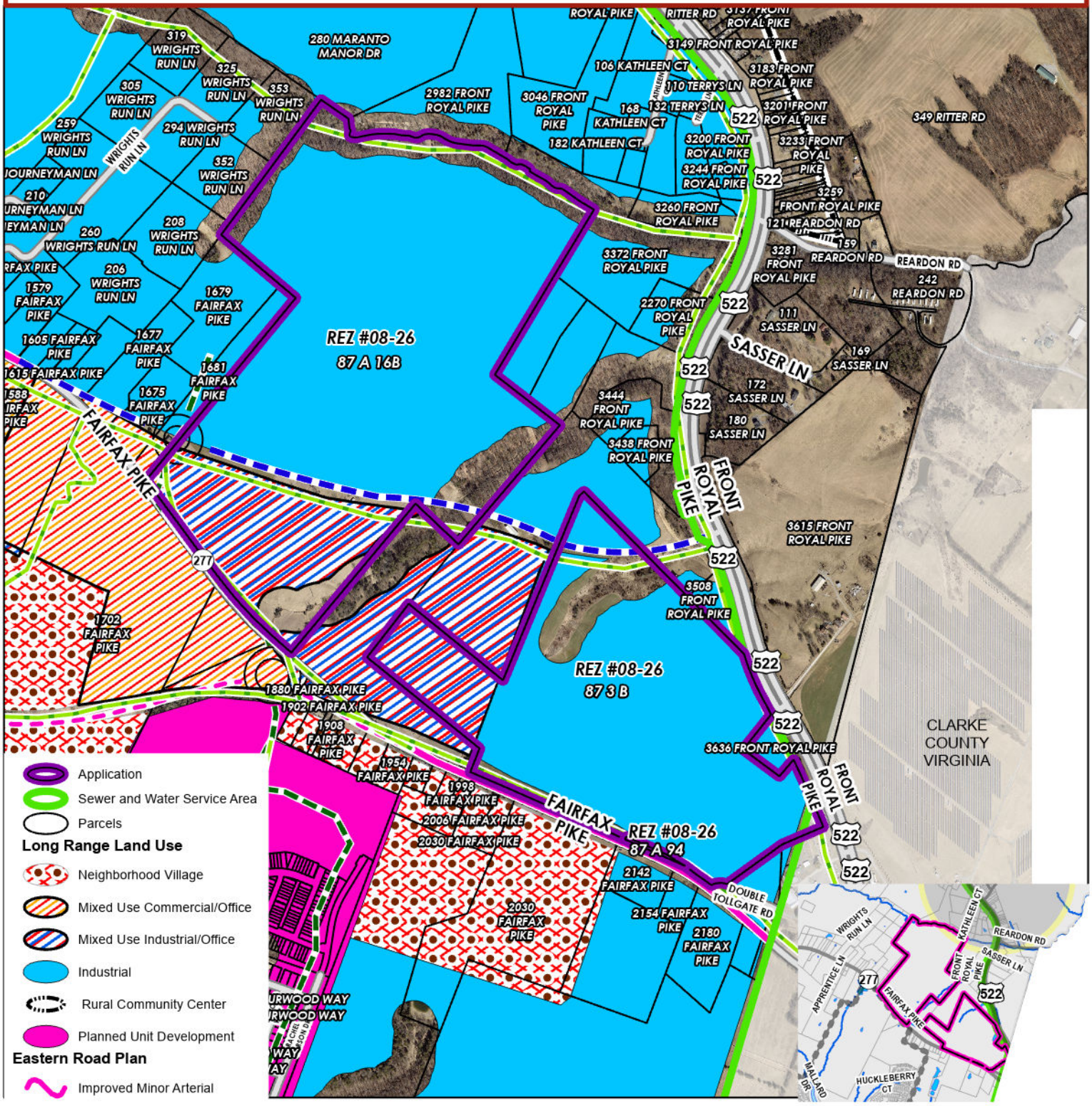
Map Created: September 1, 2026

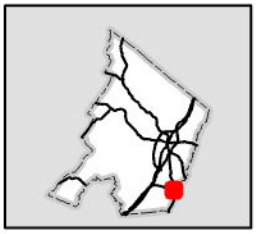
REZ # 08 - 26: Gibson Property (Estate of Monte Wood Gibson, Jr.)

PINs: 87 - 3 - B, 87 - A - 16B, 87 - A - 94

Rezoning from RA to M1

Long Range Land Use Map





0 200 400 800 1,200 1,600 2,000 2,400 Feet

Frederick County Planning & Development
107 N Kent St
Winchester, VA 22601
540 - 665 - 5651

Map Created: September 1, 2026

REZONING APPLICATION
FREDERICK COUNTY, VIRGINIA

Submittal Deadline	_____
P/C Meeting	_____
BOS Meeting	_____

1. Property Owner(s) (please attach additional page(s) if more than two owners):

Name: Estate of Montie Wood Gibson, Jr.

Specific Contact Person if Other than Above: Debra D. Davis, Administrator

Address: P.O. Box 187, White Post, VA 22663

Telephone: _____ Email: _____

Name: _____

Specific Contact Person if Other than Above: _____

Address: _____

Telephone: _____ Email: _____

2. Other Interested Parties (such as a contract purchaser) (please attach additional page(s) if necessary):

Name: Real Estate Pursuits LC

Specific Contact Person if Other than Above: Clark Tutwiler

Address: 4100 Monument Corner Drive, Suite 300, Fairfax, VA 22030

Telephone: (703) 633-2684 Email: ctutwiler@petersoncos.com

3. Law firm, engineering firm, or other person, if any, serving as the primary contact person for this application:

Firm Name: Thomas Moore Lawson, P.C.

Specific Contact Person at Firm: Thomas Moore Lawson, Esquire

Address: P.O. Box 2740, Winchester, VA 22604

Telephone: (540) 665-0050 Email: tlawson@lsplc.com

**Please note that, if a law firm, engineering firm, or other person, other than the owner of the property, will be acting on behalf of the owner and/or executing papers on behalf of the owner in connection with the rezoning, the owner will need to execute a power of attorney form granting the firm or person such authority.*

4. Project Name: Gibson Property

5. Property Information:

Property Identification Number(s):	87-3-B; 87-A-16B; 87-A-94
Total acreage of the parcel(s):	244.062 acres
Total acreage of the parcel(s) to-be-rezoned:	244.062 acres
Current zoning designation(s) and acreage(s) in each designation:	Rural Areas (244.062 acres)
Proposed zoning designation(s) and acreage(s) in each designation:	Light Industrial (M1) (244.062 acres)
Magisterial District(s):	Shawnee

Location - the property is located at (give street address(es) if assigned or otherwise exact location based on nearest road and distance from nearest intersection, using road names and route numbers):

1787 Fairfax Pike

Is this property within ½ miles of the Town of Stephens City, the Town of Middletown, the City of Winchester, Clarke County, or Shenandoah County (specify which):

Yes, Clarke County

Adjoining Properties:

	Zoning:	Use:
North:	Rural Areas, and M1	vacant, residential, and industrial
South:	Rural Areas, MH1, R4, and R5	residential, mixed use, and mobile home park
East:	Rural Areas	residential, commercial
West:	Rural Areas	residential, vacant

6. Disclosure of real parties in interest.

Virginia Code § 15.2-2289 provides that localities may by ordinance require any applicant for a zoning amendment to make complete disclosure of the equitable ownership of the real estate to be affected including, in the case of corporate ownership, the name of stockholders, officers, and directors, and in any case the names and addresses of all real parties of interest. Frederick County has, by County Code § 165-101.09, adopted such an ordinance.

For each business entity that is an owner or contract purchaser of the property, please list the name and address of each person owning an interest in, or who is an officer or director of, any entity that is an owner or contract purchaser of the property (you need not indicate the amount or extent of the ownership interest). Please note that this requirement does not apply to a corporation whose stock is traded on a national or local stock exchange and having more than 500 shareholders.

see attached

Please attach additional page(s) if necessary.

7. Signature(s):

I (we), the undersigned, do hereby respectfully make application and petition the Frederick County Board of Supervisors to amend the zoning ordinance to change the zoning map of Frederick County, Virginia. I (we) authorize Frederick County officials to enter the property for site inspection purposes.

I (we) understand that the sign issued when this application is submitted must be placed at the front property line at least seven days prior to the Planning Commission public hearing and the Board of Supervisors public hearing and maintained so as to be visible from the road right-of-way until the hearing.

I (we) hereby certify that this application and its accompanying materials are true and accurate to the best of my (our) knowledge.

Owner: [redacted] Date 5/1/2026

If signing on behalf of an entity, please state name of entity and your title:

Debra D. Davis, Administrator of the Estate of Montie Wood Gibson, Jr.

Owner: _____ Date _____

If signing on behalf of an entity, please state name of entity and your title:

_____

Other Applicant Party (if any): _____ Date _____

If signing on behalf of an entity, please state name of entity and your title:

Daniel McCahan, Manager of MVP Management, LLC,

Manager of Real Estate Pursuits LC

If additional signature lines are necessary, such as if more than two people are owners, please use additional copies of this page.

**A signed Power of Attorney form is required if someone is signing on the owner(s) behalf.*

Signatures:

I (we), the undersigned, have read the application, understand its intent, and do hereby respectfully make application to and petition the Frederick County Board of Supervisors to amend the Comprehensive Plan. Furthermore, I have the power to authorize and hereby grant permission to Frederick County officials and other authorized government agents on official business to enter the property as necessary to process this application.

I (we) hereby certify that this application and its accompanying materials are true and accurate to the best of my (our) knowledge.

Signed this _____ day of _____, _____

_____

Signature of Owner/Applicant Estate of Montie Wood Gibson, Jr., By: Debra D. Davis, Administrator

Signed this 1st day of May, 2026

_____

Signature of Owner/Applicant **Daniel McCahan, Manager of MVP Management, LLC, Manager of Real Estate Pursuits LC**

Signed this _____ day of _____, _____

_____

Signature of Owner/Applicant

If anyone other than the owner is signing, a Power of Attorney must be attached.

Rezoning Application Supplement

6. Disclosure of Real Properties in Interest.

JMP Perpetual Family Trust
4100 Monument Corner Drive, Suite 300
Fairfax, VA 22030

LEP Perpetual Trust
4100 Monument Corner Drive, Suite 300
Fairfax, VA 22030

Peterson 2020 Family Trust
4100 Monument Corner Drive, Suite 300
Fairfax, VA 22030

SBP Perpetual Trust
4100 Monument Corner Drive, Suite 300
Fairfax, VA 22030

WEP Perpetual Trust
4100 Monument Corner Drive, Suite 300
Fairfax, VA 22030

Adjoining Property Owners List

Name and Property Identification Number	Address
Joan G. Hope Property # 87-A-16A	1681 Fairfax Pike White Post, VA 22663
Karl B. Williams Property # 87-A-16D	1679 Fairfax Pike White Post, VA 22663
Justin Green Brittin and Kelly Michelle Brittin Property # 87-4-5	208 Wrights Run Lane White Post, VA 22663
Donald J. Ashley and Sue J. Ashley Property # 87-4-6	352 Wrights Run Lane White Post, VA 22663
Randy Loker and Jessie Loker Property # 87-4-11	353 Wrights Run Lane White Post, VA 22663
EIP Winchester Owner LLC Property # 76-A-53G	Attn: Home Depot Prop Tax Dept 5362 P.O. Box 105842 Atlanta, GA 30348
Brooke George and Kaleigh Wood Property # 87-A-31	10200 NE 144th Street Jones, OK 73049
Jose J. Rodriguez Property # 87-A-53	3260 Front Royal Pike Winchester, VA 22602
L F Franklin & Sons Inc. Property # 87-A-80	c/o W-L Construction & Paving P.O. Box 55038 Lexington, KY 40555
Bautista Minerva Hernandez Property # 87-A-85C and 87-A-85D	1824 26th Avenue East Bradenton, FL 34208
Madan K. Thapa, et al. Property # 87-A-86 and 87-A-87	3508 Front Royal Pike Winchester, VA 22602
Patricia McKinney Property # 87-A-96	531 N. Washington Street Falls Church, VA 22046
Larry Allen Sexton Property # 87-A-88	3636 Front Royal Pike Winchester, VA 22602

Royston Eshelman Properties Property # 87-3-B1	P.O. Box 221 White Post, VA 22663
SEJ Asset Management & Investment Co Property # 87-A-108	c/o 7-Eleven Inc One Arts Plaza 1722 Routh Street, Suite 1000 Dallas, TX 75201
Gary W. & Sharon R. McDonald Property # 87-A-90	514 Clark Road Stephens City, VA 22655
Wendi G. Simmons and Steve D. Simmons Property # 87-A-91	2154 Fairfax Pike White Post, VA 22663
Shawn Joseph Britton Property # 87-A-93	2142 Fairfax Pike White Post, VA 22663
Montie Gibson, Jr. Property # 87-3-A	P.O. Box 187 White Post, VA 22663
Sandy's MHC LLC Property # 87-A-95	c/o The Carlyle Group 9073 Nemo Street West Hollywood, CA 90069
Fairfax Pike LLC Property # 87-A-95A and 87-A-95C	225 Caldwell Lane Winchester, VA 22602
Hasnaa Ahmed Abdelnaby Property # 87-2-3A	1998 Fairfax Pike White Post, VA 22663
Van Metre Homes at Lake Frederick LLC Property # 87-A-102	9900 Main Street, Suite 500 Fairfax, VA 22031
Frederick County Sanitation Authority d/b/a Frederick Water Property # 87-A-102A	P.O. Box 1877 Winchester, VA 22604
Madison II LLC Property # 87-A-15	558 Bennys Beach Road Front Royal, VA 22630
Royston Eshelman Properties Property # 27A-A-9 (Clarke County)	P.O. Box 221 White Post, VA 22663

PROFFER STATEMENT

REZONING:	RZ# ~~————~~08-26 Rural Areas (RA) (244.062+/- acres) to Light Industrial (M1) (244.062+/- acres)
PROPERTY:	244.062 Acres +/-; Tax Map Parcels 87-3-B, 87-A-16B, and 87-A-94 (collectively, the "Property")
RECORD OWNER:	Estate of Montie Wood Gibson, Jr. ("Owner")
APPLICANT:	Real Estate Pursuits LC ("Applicant")
ORIGINAL DATE OF PROFFERS:	August 21, 2026
REVISION DATE:	September 21, 2026; September 29, 2026; October 7, 2026, October 22, 2026

The undersigned Owner and Applicant hereby proffer that the use and development of the above-referenced parcels, which are requested to be rezoned, shall be in strict conformance with the following conditions, which shall supersede all other proffers on the Property that may have been made prior hereto. In the event that the above-referenced M1 conditional rezoning is not granted as applied for by Owner and Applicant, these proffers shall be deemed withdrawn and shall be null and void. Further, these proffers are contingent upon final rezoning of the Property with "final rezoning" defined as that rezoning which is in effect on the day following the last day upon which the Frederick County Board of Supervisors' (the "Board") decision granting the rezoning may be contested in the appropriate court. If the Board's decision is contested, and the Owner and Applicant elect not to submit development plans until such contest is resolved, the term final rezoning shall include the day following entry of a final court order affirming the decision of the Board which has not been appealed, or, if appealed, the day following which the decision has been affirmed on appeal.

The headings of the proffers set forth below have been prepared for convenience or reference only and shall not control or affect the meaning or be taken as an interpretation of any provision of the proffers. The improvements proffered herein shall be provided at the time of development of that portion of the Property adjacent to or including the improvement or other proffered requirement, unless otherwise specified herein. The terms "Owner" and "Applicant" as referenced herein shall include within its meaning all future owners and successors in interest. When used in these proffers, the "Generalized Development Plan," shall refer to the plan entitled "Rezoning Plan" dated May 8, 2026 and revised through ~~September 18~~October 20, 2026 (the "GDP"), attached hereto and incorporated herein by reference as "Exhibit A," and shall include the following:

1. SITE DEVELOPMENT

1.1 Applicant shall develop the Property in substantial conformance with the GDP provided that minor modifications may be permitted during the Master Development Plan and final engineering process and as may be approved at the discretion of the Frederick County Planning Director.

1.2 The primary building material for all buildings on the Property shall be stone, wood, brick, architectural concrete masonry unit (e.g. regal stone, split face, precision ground face), precast concrete panels, site-cast/tilt up concrete panels, or metal panel of architectural grade and quality. EIFS may be used for secondary structures or architectural features. To create a varied façade, the sides of all buildings on the Property which ~~face Route 522 and/or Route 277~~front Route 522 and/or Route 277 shall contain at least three of the following features: (i) varying building heights; (ii) varying building step-backs or recesses (iii) varying fenestration; (iv) changes in material; (v) changes in pattern; (vi) changes in texture; (vii) changes in color; (viii) varying accent materials; and (ix) varying decorative reveals or scoring. The buildings shall be painted a minimum of three (3) colors.

1.3 Applicant shall install a green space buffer in the general locations shown on the GDP and eight (8) foot tall berms on the property lines of the Property adjoining Route 277, and on the property line of Tax Map 87-3-B adjoining Route 522. The minimum plant size at the time of planting for the buffers fronting on Route 277 and Route 522 shall be ~~one-half (1/~~two (2) inch caliper for deciduous trees, eight (8) feet in height for evergreen trees, and thirty-six (36) inches in height for evergreen shrubs. ~~The planting species, to be reviewed and approved at the time of site plan, shall include a mix of species of which at least one (1) Virginia native variety of deciduous tree, at least one (1) Virginia native variety evergreen tree, and at least one (1) Virginia native variety of shrub.~~At the time of site plan approval, Applicant will demonstrate that seventy percent (70%) of all required plantings will consist of native species. The remainder of the plantings will consist of non-invasive adapted species appropriate for the region and shall meet the requirements of Section 165-802.05 of the Frederick County, Virginia Zoning Ordinance. The berms shall not contain any construction trash or debris, and will contain a minimum thickness of twelve (12) inch topsoil. Landscaping shall be integrated into the slope and top of the eight (8) foot tall berms. Notwithstanding what is stated in this Section 1.3, Applicant may install six (6) foot berms on the property lines of Land Bay A adjoining Route 277.

1.4 Existing overhead power lines on the Property may be relocated and may remain overhead.

1.5 Any portions of buildings that are within one hundred (100) feet of the right-of-way for Route 277 and Route 522 shall be a maximum height of forty-five (45) feet. In the event a portion of a building is constructed within the aforementioned one hundred (100) feet, that portion of the building shall not exceed forty-five (45) feet in height and a step back roof design may be utilized for increased roof heights that extend further than one hundred (100) feet into the Property.

1.6 All buildings on the Property within two hundred fifty (250) feet of Route 277 and Route 522 shall be installed with the building fronts primarily facing Route 277 and Route 522 and said buildings shall not have loading docks along the building fronts. This restriction shall not be interpreted as not allowing an opening in said buildings for vehicles and/or trucks to access or drive through the buildings for purposes, including, but not limited to, the loading and unloading of said vehicles/trucks inside the buildings.

1.7 Applicant shall cooperate with the owner of Clarke County, Virginia Tax Map Number 27A-A-14 (the "Clarke County Property") to install signage commemorating the Battle of Double Tollgate on the Clarke County Property. The signage shall be designed and written by the Shenandoah Valley Battlefields Foundation. If the owner of the Clarke County Property does not agree to the installation of such signage on the Clarke County Property, then this Proffer shall have no further force or effect.

1.8 Single story buildings in Land Bay A shall have a maximum building height of 35'. Multistory buildings in Land Bay A shall have a maximum building height of 45'. Any building in Land Bay A shall have a maximum outside building footprint of 80,000 square feet.

2. TRANSPORTATION

2.1 Design of the roadway system shall be substantially consistent with the GDP. Access to Route 522 from Tax Map No. 87-3-B shall be achieved by one (1) point of connection in the general location shown on the GDP marked as "D". Access to Fairfax Pike from Tax Map No. 87-3-B shall be achieved by two (2) points of connection in the general locations shown on the GDP marked as "B" and "C". Access to Fairfax Pike from Tax Map No. 87-A-16B shall be achieved by one (1) point of connection in the general location shown on the GDP marked as "A". The exact location and design of proffered improvements shall be subject to reasonable adjustment upon Master Development Plan and final engineering thereof, as approved and accepted by the County and the Virginia Department of Transportation ("VDOT").

2.2 Applicant shall reserve a right-of-way along the Property frontage of Fairfax Pike to allow for the future dedication of the proposed 4-lane collector roadway as depicted on the Southern Frederick Land Use Plan Transportation with Trails Map dated November 10, 2021. Said right-of-way shall be established at a point measured 52.5' from the existing center line of Fairfax Pike. Applicant shall dedicate the reserved right-of-way to the County and/or VDOT at the time the County and/or VDOT make written request for the same.

2.3 Applicant proffers to construct a 10' wide trail for the project frontage along Fairfax Pike.

2.4 Applicant proffers to construct a 10' wide multi-use asphalt trail for the project along the western frontage of Route 522.

~~2.5~~2.5 Applicant proffers to acquire or guarantee the necessary right-of-way along Fairfax Pike for the road improvements that are required for its site entrances.

2.6 Applicant proffers to construct warranted left- and right-turn lanes at site entrances in the general location shown in the Traffic Impact Study. Applicant further proffers to construct all such entrances in the general location shown in the Traffic Impact Study of the Property; however, the exact location of all entrances shown in the Traffic Impact Study of the Property shall be designed and finalized during site plan approval.

2.~~6~~7 All public streets and roads shall be designed and constructed in accordance with the applicable VDOT subdivision street requirements and subject to review and approval by the County and shall be subject to VDOT approval.

2.~~7~~8 Provided there exists sufficient right-of-way, Applicant proffers to install an exclusive eastbound left-turn lane on Fairfax Pike at its intersection with Route 522 and a second northbound left-turn lane on Route 522 at its intersection with Fairfax Pike. Applicant proffers to make these improvements ~~the earlier of~~ when warranted and requested by VDOT ~~or before the issuance of a Certificate of Occupancy for a 1,500,000 square foot building on the Property~~. If there is not sufficient right-of-way to install the aforementioned road improvements then Applicant proffers to install such improvements that do fit within the existing right-of-way and which are directed to be installed by VDOT and Frederick County.

2.~~8~~9 In addition to the already existing site plan approval process, which includes, but is not limited to, a review and approval by VDOT and Frederick County for all such entrances connecting to the VDOT right-of-way, Applicant proffers to perform and submit a Signal Justification Report ("SJR") and to install such at grade road improvements required from the analysis of said SJR for Site Entrance A and Site Entrance D as labeled on the GDP and, under any circumstance, before the issuance of a Certificate of Occupancy for the first building on the Property.

2.~~9~~10 Applicant reserves for a future dedication of right-of-way for the Comprehensive Plan collector road connecting in the location generally depicted on the GDP. Said reservation shall remain as long as Frederick County's Comprehensive Plan calls for and depicts a collector road in the aforesaid general location. In the event the Frederick County Comprehensive Plan is amended to remove any reference to the above-referenced major collector road then the requirement for Applicant to reserve said property shall cease and expire.

3. WATER AND SEWER IMPROVEMENTS

3.1 Any improvements to the public water and sewer infrastructure serving the Property that are triggered by specific needs and uses of the development on the Property shall be installed by Applicant.

4. PROFFER PAYMENTS:

~~3~~4.1 Applicant shall make a one-time payment to Frederick County for the purposes of fire and rescue services in the amount of $0.10 per square foot of any future building constructed on the Property. Said payment shall be made on or before the issuance of the Certificate of Occupancy for said building.

~~4~~5. LIMITED USES

~~4~~5.1. Applicant proffers that the Property shall not be developed for regional criminal justice, enforcement, and detention facilities.

~~4~~5.2 Applicant proffers that the Property shall not be developed for a freestanding fast food restaurant and/or any restaurant that includes a drive-through window/food service.

~~5~~ 5.3 Applicant proffers that of the uses which are not authorized in the Light Industrial (M1) zoning district, the Property will not be developed for a data center.

6. EXCLUSION OF PUBLIC PROPERTY FROM PROFFERS

~~5~~6.1 Any portion of the Property hereafter dedicated for public street purposes (or otherwise conveyed to a public entity) shall, upon such dedication, be excluded from the terms and conditions of these Proffers and the remainder of the Property shall continue to be subject to the full force and effect of these Proffers.

~~6~~7. SEVERABILITY

~~6~~7.1 In the event any portion of these Proffers are subsequently determined to be illegal or unenforceable, the remaining Proffers shall continue in full force and effect.

~~7~~8. BINDING EFFECT

~~7~~8.1 These Proffers run with the land and shall be binding upon all heirs, executors, administrators, assigns, and successors in interest of Owner and Applicant.

~~8~~9. ESCALATOR CLAUSE

~~8~~9.1 In the event the monetary contributions set forth in these Proffers are paid to the County within twelve (12) months of the approval of this rezoning, as applied for by Applicant, said contributions shall be in the amounts as stated herein. Any monetary contributions set forth in these Proffers which are paid to the County after twelve (12) months following the approval of this rezoning shall be adjusted in accordance with the Urban Consumer Price Index ("CPI-U") published by the United States Department of Labor, such that at the time contributions are paid they shall be adjusted by the percentage change in the CPI-U from that date twelve (12) months after the approval of this rezoning to the most recently available CPI-U to the date the contributions are paid.

[remainder of page intentionally left blank]

Respectfully submitted,

_____
ESTATE OF MONTIE WOOD GIBSON, JR.
By: Debra D. Davis
Its: Administrator

STATE/COMMONWEALTH OF _____, AT LARGE
CITY/COUNTY OF _____, to-wit:

The foregoing instrument was acknowledged before me this _____ day of _____, 2026, by Debra D. Davis, Administrator of the ESTATE OF MONTIE WOOD GIBSON, JR.

_____
NOTARY PUBLIC

My commission expires: _____
Registration number: _____

REAL ESTATE PURSUITS LC
By: MVP Management, LLC
Its: Manager

_____

By: _____
Its: _____

STATE/COMMONWEALTH OF _____, AT LARGE
CITY/COUNTY OF _____, to-wit:

The foregoing instrument was acknowledged before me this _____ day of _____, 2026, by _____, _____ of MVP Management, LLC, Manager of REAL ESTATE PURSUITS LC.

_____
NOTARY PUBLIC

My commission expires: _____
Registration number: _____

PROFFER STATEMENT

REZONING:	RZ# 08-26 Rural Areas (RA) (244.062+/- acres) to Light Industrial (M1) (244.062+/- acres)
PROPERTY:	244.062 Acres +/-; Tax Map Parcels 87-3-B, 87-A-16B, and 87-A-94 (collectively, the "Property")
RECORD OWNER:	Estate of Montie Wood Gibson, Jr. ("Owner")
APPLICANT:	Real Estate Pursuits LC ("Applicant")
ORIGINAL DATE OF PROFFERS:	August 21, 2026
REVISION DATE:	September 21, 2026; September 29, 2026; October 7, 2026, October 22, 2026

The undersigned Owner and Applicant hereby proffer that the use and development of the above-referenced parcels, which are requested to be rezoned, shall be in strict conformance with the following conditions, which shall supersede all other proffers on the Property that may have been made prior hereto. In the event that the above-referenced M1 conditional rezoning is not granted as applied for by Owner and Applicant, these proffers shall be deemed withdrawn and shall be null and void. Further, these proffers are contingent upon final rezoning of the Property with "final rezoning" defined as that rezoning which is in effect on the day following the last day upon which the Frederick County Board of Supervisors' (the "Board") decision granting the rezoning may be contested in the appropriate court. If the Board's decision is contested, and the Owner and Applicant elect not to submit development plans until such contest is resolved, the term final rezoning shall include the day following entry of a final court order affirming the decision of the Board which has not been appealed, or, if appealed, the day following which the decision has been affirmed on appeal.

The headings of the proffers set forth below have been prepared for convenience or reference only and shall not control or affect the meaning or be taken as an interpretation of any provision of the proffers. The improvements proffered herein shall be provided at the time of development of that portion of the Property adjacent to or including the improvement or other proffered requirement, unless otherwise specified herein. The terms "Owner" and "Applicant" as referenced herein shall include within its meaning all future owners and successors in interest. When used in these proffers, the "Generalized Development Plan," shall refer to the plan entitled "Rezoning Plan" dated May 8, 2026 and revised through October 20, 2026 (the "GDP"), attached hereto and incorporated herein by reference as "Exhibit A," and shall include the following:

1. SITE DEVELOPMENT

1.1 Applicant shall develop the Property in substantial conformance with the GDP provided that minor modifications may be permitted during the Master Development Plan and final engineering process and as may be approved at the discretion of the Frederick County Planning Director.

1.2 The primary building material for all buildings on the Property shall be stone, wood, brick, architectural concrete masonry unit (e.g. regal stone, split face, precision ground face), precast concrete panels, site-cast/tilt up concrete panels, or metal panel of architectural grade and quality. EIFS may be used for secondary structures or architectural features. To create a varied façade, the sides of all buildings on the Property which front Route 522 and/or Route 277 shall contain at least three of the following features: (i) varying building heights; (ii) varying building step-backs or recesses (iii) varying fenestration; (iv) changes in material; (v) changes in pattern; (vi) changes in texture; (vii) changes in color; (viii) varying accent materials; and (ix) varying decorative reveals or scoring. The buildings shall be painted a minimum of three (3) colors.

1.3 Applicant shall install a green space buffer in the general locations shown on the GDP and eight (8) foot tall berms on the property lines of the Property adjoining Route 277, and on the property line of Tax Map 87-3-B adjoining Route 522. The minimum plant size at the time of planting for the buffers fronting on Route 277 and Route 522 shall be two (2) inch caliper for deciduous trees, eight (8) feet in height for evergreen trees, and thirty-six (36) inches in height for evergreen shrubs. At the time of site plan approval, Applicant will demonstrate that seventy percent (70%) of all required plantings will consist of native species. The remainder of the plantings will consist of non-invasive adapted species appropriate for the region and shall meet the requirements of Section 165-802.05 of the Frederick County, Virginia Zoning Ordinance. The berms shall not contain any construction trash or debris, and will contain a minimum thickness of twelve (12) inch topsoil. Landscaping shall be integrated into the slope and top of the eight (8) foot tall berms. Notwithstanding what is stated in this Section 1.3, Applicant may install six (6) foot berms on the property lines of Land Bay A adjoining Route 277.

1.4 Existing overhead power lines on the Property may be relocated and may remain overhead.

1.5 Any portions of buildings that are within one hundred (100) feet of the right-of-way for Route 277 and Route 522 shall be a maximum height of forty-five (45) feet. In the event a portion of a building is constructed within the aforementioned one hundred (100) feet, that portion of the building shall not exceed forty-five (45) feet in height and a step back roof design may be utilized for increased roof heights that extend further than one hundred (100) feet into the Property.

1.6 All buildings on the Property within two hundred fifty (250) feet of Route 277 and Route 522 shall be installed with the building fronts primarily facing Route 277 and Route 522 and said buildings shall not have loading docks along the building fronts. This restriction shall not be interpreted as not allowing an opening in said buildings for vehicles and/or trucks to access or drive through the buildings for purposes, including, but not limited to, the loading and unloading of said vehicles/trucks inside the buildings.

1.7 Applicant shall cooperate with the owner of Clarke County, Virginia Tax Map Number 27A-A-14 (the "Clarke County Property") to install signage commemorating the Battle of Double Tollgate on the Clarke County Property. The signage shall be designed and written by the Shenandoah Valley Battlefields Foundation. If the owner of the Clarke County Property does not agree to the installation of such signage on the Clarke County Property, then this Proffer shall have no further force or effect.

1.8 Single story buildings in Land Bay A shall have a maximum building height of 35'. Multistory buildings in Land Bay A shall have a maximum building height of 45'. Any building in Land Bay A shall have a maximum outside building footprint of 80,000 square feet.

2. TRANSPORTATION

2.1 Design of the roadway system shall be substantially consistent with the GDP. Access to Route 522 from Tax Map No. 87-3-B shall be achieved by one (1) point of connection in the general location shown on the GDP marked as "D". Access to Fairfax Pike from Tax Map No. 87-3-B shall be achieved by two (2) points of connection in the general locations shown on the GDP marked as "B" and "C". Access to Fairfax Pike from Tax Map No. 87-A-16B shall be achieved by one (1) point of connection in the general location shown on the GDP marked as "A". The exact location and design of proffered improvements shall be subject to reasonable adjustment upon Master Development Plan and final engineering thereof, as approved and accepted by the County and the Virginia Department of Transportation ("VDOT").

2.2 Applicant shall reserve a right-of-way along the Property frontage of Fairfax Pike to allow for the future dedication of the proposed 4-lane collector roadway as depicted on the Southern Frederick Land Use Plan Transportation with Trails Map dated November 10, 2021. Said right-of-way shall be established at a point measured 52.5' from the existing center line of Fairfax Pike. Applicant shall dedicate the reserved right-of-way to the County and/or VDOT at the time the County and/or VDOT make written request for the same.

2.3 Applicant proffers to construct a 10' wide trail for the project frontage along Fairfax Pike.

2.4 Applicant proffers to construct a 10' wide multi-use asphalt trail for the project along the western frontage of Route 522.

2.5 Applicant proffers to acquire or guarantee the necessary right-of-way along Fairfax Pike for the road improvements that are required for its site entrances.

2.6 Applicant proffers to construct warranted left- and right-turn lanes at site entrances in the general location shown in the Traffic Impact Study. Applicant further proffers to construct all such entrances in the general location shown in the Traffic Impact Study of the Property; however, the exact location of all entrances shown in the Traffic Impact Study of the Property shall be designed and finalized during site plan approval.

2.7 All public streets and roads shall be designed and constructed in accordance with the applicable VDOT subdivision street requirements and subject to review and approval by the County and shall be subject to VDOT approval.

2.8 Provided there exists sufficient right-of-way, Applicant proffers to install an exclusive eastbound left-turn lane on Fairfax Pike at its intersection with Route 522 and a second northbound left-turn lane on Route 522 at its intersection with Fairfax Pike. Applicant proffers to make these improvements when warranted and requested by VDOT. If there is not sufficient right-of-way to install the aforementioned road improvements then Applicant proffers to install such improvements that do fit within the existing right-of-way and which are directed to be installed by VDOT and Frederick County.

2.9 In addition to the already existing site plan approval process, which includes, but is not limited to, a review and approval by VDOT and Frederick County for all such entrances connecting to the VDOT right-of-way, Applicant proffers to perform and submit a Signal Justification Report ("SJR") and to install such at grade road improvements required from the analysis of said SJR for Site Entrance A and Site Entrance D as labeled on the GDP and, under any circumstance, before the issuance of a Certificate of Occupancy for the first building on the Property.

2.10 Applicant reserves for a future dedication of right-of-way for the Comprehensive Plan collector road connecting in the location generally depicted on the GDP. Said reservation shall remain as long as Frederick County's Comprehensive Plan calls for and depicts a collector road in the aforesaid general location. In the event the Frederick County Comprehensive Plan is amended to remove any reference to the above-referenced major collector road then the requirement for Applicant to reserve said property shall cease and expire.

3. WATER AND SEWER IMPROVEMENTS

3.1 Any improvements to the public water and sewer infrastructure serving the Property that are triggered by specific needs and uses of the development on the Property shall be installed by Applicant.

4. PROFFER PAYMENTS:

4.1 Applicant shall make a one-time payment to Frederick County for the purposes of fire and rescue services in the amount of $0.10 per square foot of any future building constructed on the Property. Said payment shall be made on or before the issuance of the Certificate of Occupancy for said building.

5. LIMITED USES

5.1. Applicant proffers that the Property shall not be developed for regional criminal justice, enforcement, and detention facilities.

5.2 Applicant proffers that the Property shall not be developed for a freestanding fast food restaurant and/or any restaurant that includes a drive-through window/food service.

5.3 Applicant proffers that of the uses which are not authorized in the Light Industrial (M1) zoning district, the Property will not be developed for a data center.

6. EXCLUSION OF PUBLIC PROPERTY FROM PROFFERS

6.1 Any portion of the Property hereafter dedicated for public street purposes (or otherwise conveyed to a public entity) shall, upon such dedication, be excluded from the terms and conditions of these Proffers and the remainder of the Property shall continue to be subject to the full force and effect of these Proffers.

7. SEVERABILITY

7.1 In the event any portion of these Proffers are subsequently determined to be illegal or unenforceable, the remaining Proffers shall continue in full force and effect.

8. BINDING EFFECT

8.1 These Proffers run with the land and shall be binding upon all heirs, executors, administrators, assigns, and successors in interest of Owner and Applicant.

9. ESCALATOR CLAUSE

9.1 In the event the monetary contributions set forth in these Proffers are paid to the County within twelve (12) months of the approval of this rezoning, as applied for by Applicant, said contributions shall be in the amounts as stated herein. Any monetary contributions set forth in these Proffers which are paid to the County after twelve (12) months following the approval of this rezoning shall be adjusted in accordance with the Urban Consumer Price Index ("CPI-U") published by the United States Department of Labor, such that at the time contributions are paid they shall be adjusted by the percentage change in the CPI-U from that date twelve (12) months after the approval of this rezoning to the most recently available CPI-U to the date the contributions are paid.

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Respectfully submitted,

_____
ESTATE OF MONTIE WOOD GIBSON, JR.
By: Debra D. Davis
Its: Administrator

STATE/COMMONWEALTH OF _____, AT LARGE
CITY/COUNTY OF _____, to-wit:

The foregoing instrument was acknowledged before me this _____ day of _____, 2026, by Debra D. Davis, Administrator of the ESTATE OF MONTIE WOOD GIBSON, JR.

_____
NOTARY PUBLIC

My commission expires: _____
Registration number: _____

REAL ESTATE PURSUITS LC
By: MVP Management, LLC
Its: Manager

_____

By: _____
Its: _____

STATE/COMMONWEALTH OF _____, AT LARGE
CITY/COUNTY OF _____, to-wit:

The foregoing instrument was acknowledged before me this _____ day of _____, 2026, by _____, _____ of MVP Management, LLC, Manager of REAL ESTATE PURSUITS LC.

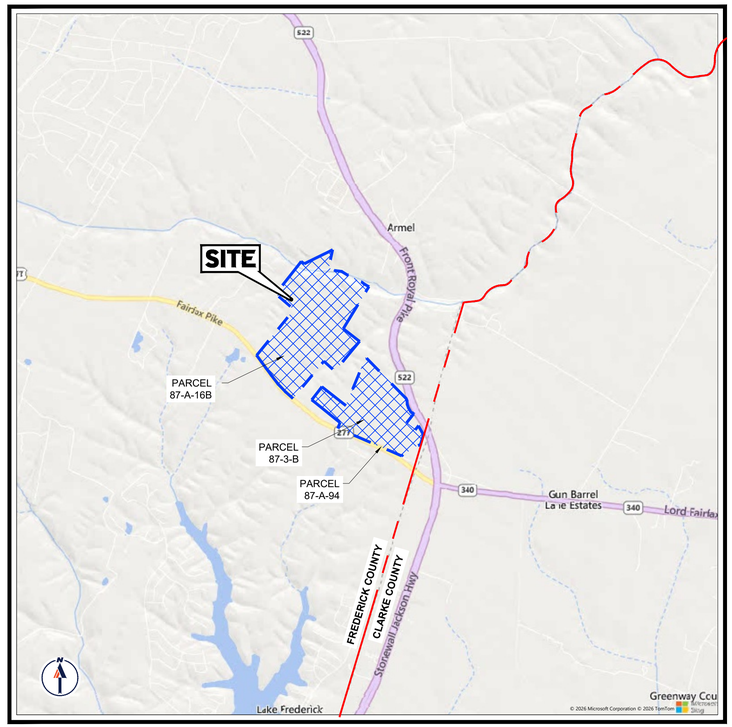
_____
NOTARY PUBLIC

My commission expires: _____
Registration number: _____

REZONING PLAN

GIBSON PROPERTY

PROPERTY ID: 87-A-16B, 87-3-B, 87-A-94
SHAWNEE DISTRICT
FREDERICK COUNTY, VIRGINIA



LOCATION MAP
SCALE: 1" = 2,000'
SOURCE: BING MAPS

Gibson Rezoning Summary					
Owner	**Tax Map**	**Existing Zoning**	**Area (SF)**	**Area (AC)**	**Proposed Zoning**
Estate of Montie W. Gibson Jr.	87-A-16B	RA	6,710,973	154.0630	M-1
Estate of Montie W. Gibson Jr.	87-3-B	RA	3,912,341	89.8154	M-1
Estate of Montie W. Gibson Jr.	87-A-94	RA	8,027	0.1840	M-1
Total	-	-	**10,631,341**	**244.062**	-

OWNER
PARCEL 87-A-16B
THE ESTATE OF MONTIE W. GIBSON JR.
PO BOX 187
WHITE POST VA, 22663

OWNER
PARCEL 87-3-B
THE ESTATE OF MONTIE W. GIBSON JR.
PO BOX 187
WHITE POST VA, 22663

OWNER
PARCEL 87-A-94
THE ESTATE OF MONTIE W. GIBSON JR.
PO BOX 187
WHITE POST VA, 22663

APPLICANT
REAL ESTATE PURSUITS LC
4100 MONUMENT CORNER DRIVE; SUITE 300
FAIRFAX, VA 22030
CONTACT: CLARK TUTWILER
703-633-2684
CTUTWILER@PETERSONCOS.COM

LAND USE ATTORNEY
THOMAS MOORE LAWSON
OF COUNSEL-WILLIAMS MULLEN
P.O. BOX 2740
WINCHESTER, VA 22604
CONTACT: THOMAS MOORE LAWSON
540-665-0050

TRANSPORTATION ENGINEER
GOROVE SLADE
4114 LEGATO ROAD; SUITE 650
FAIRFAX, VA 22033
CONTACT: KEVIN SITZMAN, P.E.
571-261-9718

CIVIL ENGINEER
BOHLER ENGINEERING
28 BLACKWELL PARK LANE, SUITE 201
WARRENTON, VA 20186
CONTACT: KATHERINE ROBERTS
703-709-9500

SHEET INDEX

SHEET TITLE	SHEET NUMBER
COVER SHEET	C-1
EXISTING CONDITIONS PLAN	C-2
REZONING PLAN	C-3

BOHLER
SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING
PROGRAM MANAGEMENT
LANDSCAPE ARCHITECTURE
SUSTAINABLE DESIGN
PERMITTING SERVICES
TRANSPORTATION SERVICES
THE DRAWINGS, DESIGN AND CONTENT OF THESE PLANS ARE PROPRIETARY AND SHALL NOT BE EXPOSED OR USED FOR ANY PURPOSE WITHOUT PRIOR WRITTEN AUTHORIZATION FROM BOHLER. ONLY APPROVED PLANS SHALL BE UTILIZED FOR CONSTRUCTION PURPOSES.
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REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY
1	08/06/2026	REV. PER COUNTY COMMENTS	MW / NTG
2	08/21/2026	REV. PER COUNTY COMMENTS	MW / NTG
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REZONING SUBMISSION

THIS DRAWING IS INTENDED FOR MUNICIPAL AND/OR AGENCY REVIEW AND APPROVAL. IT IS NOT INTENDED AS A CONSTRUCTION DOCUMENT UNLESS INDICATED OTHERWISE.

PROJECT No.:	VAB250199.00-0A
DRAWN BY:	~ EC / MW ~
CHECKED BY:	~ NTG ~
DATE:	05/08/2026
CAD I.D.:	P-REZN-CNDS

PROJECT:
GIBSON PROPERTY REZONING
FOR
REAL ESTATE PURSUITS LC
FRONT ROYAL PIKE & FAIRFAX PIKE
SHAWNEE DISTRICT
FREDERICK COUNTY
VIRGINIA

BOHLER
28 BLACKWELL PARK LANE, SUITE 201
WARRENTON, VIRGINIA 20186
Phone: (540) 349-4500
Fax: (540) 349-0321
VA@BohlerEng.com

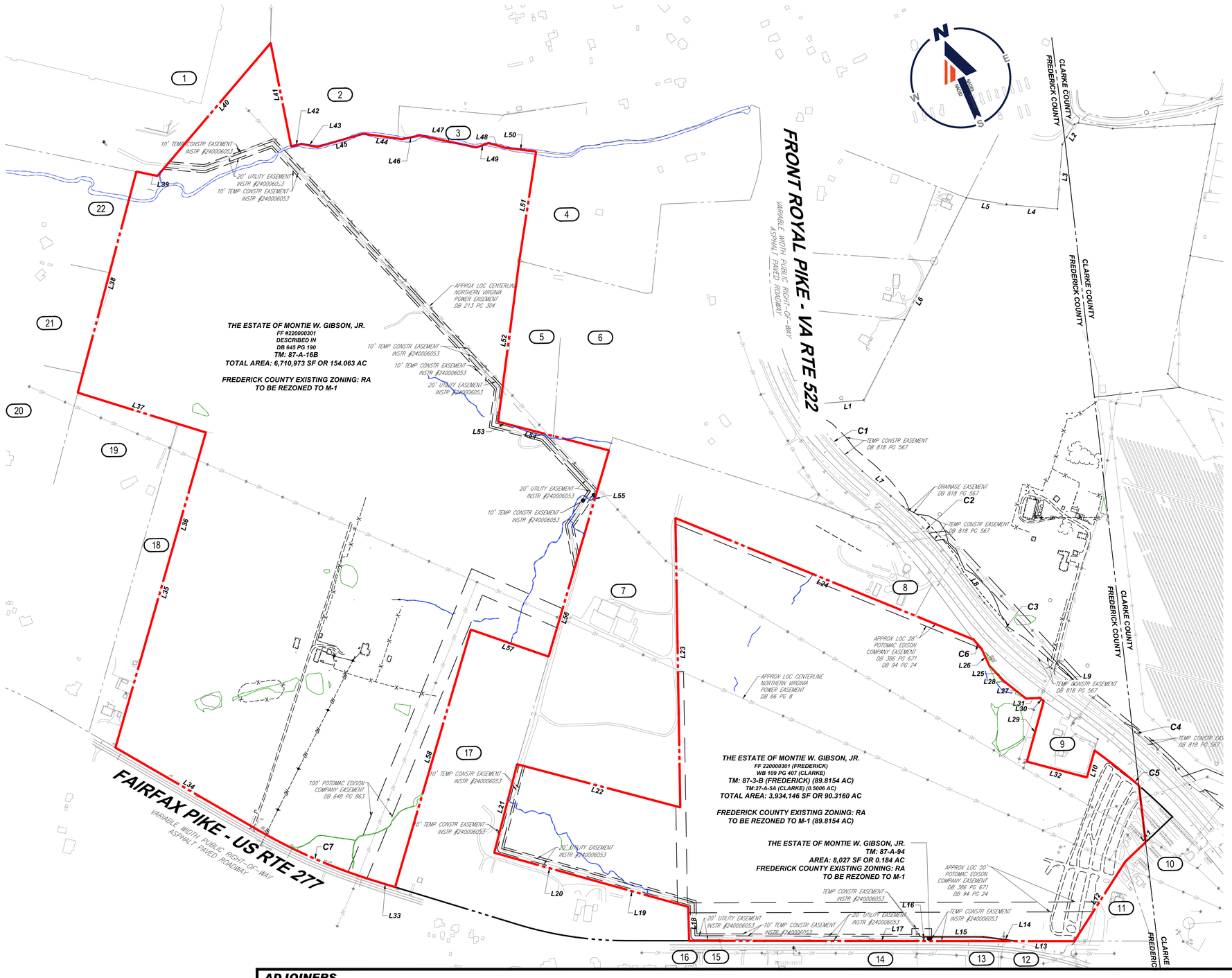
COMMONWEALTH OF VIRGINIA
KATHERINE ROBERTS
Lic. No. 0402060193
10/20/2026
PROFESSIONAL ENGINEER

SHEET TITLE:
COVER SHEET

SHEET NUMBER:
C-1

REVISION 4 - 10/20/2026

Oct 26, 2026
P:\VA\025\VAB250199.00\CAD\DRAWINGS\PLAN SETS\REZONING\P-REZN-CNDS-VAB250199.00-0A-----LAYOUT: C-1 - CNDS



LEGEND

- REZONING AREA (244.062 ACRES)
- APPROXIMATE LOCATION OF WETLAND
- APPROXIMATE LOCATION OF STREAM

CURVE TABLE

CURVE NO	RADIUS	LENGTH	CHORD BEARING	CHORD LENGTH	DELTA	TANGENT
C1	1361.85	1361.85	N16°54'23"W	414.18'	017°29'36"	209.53'
C2	2382.98	2382.98	N19°42'49"W	493.17'	011°52'44"	247.92'
C3	1555.38	1555.38	N22°30'55"W	472.74'	017°28'56"	239.15'
C4	3883.34	3883.34	N25°33'08"W	772.79'	011°25'15"	388.32'
C5	3163.05	3163.05	S26°15'03"E	515.47'	009°20'51"	258.59'
C6	1487.39	1487.39	S17°53'40"E	60.12'	002°18'58"	30.07'
C7	2835.00	2835.00	N43°09'10"W	646.78'	013°06'00"	325.51'

LINE TABLE

LINE	BEARING	DISTANCE
L1	S71°06'46"E	203.12
L2	N54°46'34"E	119.04
L3	N27°36'57"E	326.05
L4	S61°42'00"E	258.10
L5	S57°18'36"E	205.05
L6	N50°16'25"E	1143.37
L7	N25°39'11"W	188.57
L8	N13°46'27"W	226.14
L9	N31°15'23"W	137.62
L10	N39°10'07"E	141.38
L11	S69°46'24"W	327.77
L12	S56°00'02"W	476.12
L13	N66°35'33"W	1942.60
L14	S59°06'33"E	161.20
L15	S66°35'33"E	302.10
L16	N25°14'27"E	21.01
L17	N66°35'33"W	1942.60
L18	N21°55'06"E	170.77
L19	N51°03'48"W	1015.27
L20	N51°03'48"W	1015.27
L21	N37°48'35"E	460.87
L22	S51°49'53"E	850.79
L23	N22°23'58"E	1458.88
L24	S44°28'47"E	1623.52
L25	S19°55'47"E	105.83
L26	S01°18'51"E	95.32
L27	S28°19'12"E	142.77
L28	S28°19'12"E	142.77
L30	S31°21'11"E	25.12
L31	S68°51'23"E	69.13

LINE TABLE

LINE	BEARING	DISTANCE
L32	S51°50'26"E	313.12
L33	N49°42'10"W	103.76
L34	N36°36'10"W	829.10
L35	N39°21'19"E	1652.84
L36	N39°21'19"E	1652.84
L37	N49°22'54"W	676.12
L38	N38°12'09"E	1153.03
L39	S54°57'17"E	108.37
L40	N63°46'20"E	880.26
L41	S12°07'11"W	532.96
L42	S82°19'16"E	54.16
L43	S54°50'32"E	78.72
L44	S58°30'45"E	194.96
L45	S82°36'04"E	244.52
L46	S78°02'10"E	94.03
L47	S54°46'50"E	290.80
L48	S50°41'51"E	86.98
L49	S86°07'12"E	65.20
L50	S59°41'31"E	156.76
L51	S32°07'59"W	556.94
L52	S30°52'15"W	818.66
L53	S52°09'35"E	577.89
L54	S52°09'35"E	577.89
L55	S39°40'29"W	1083.27
L56	S39°40'29"W	1083.27
L57	N47°32'04"W	414.89
L58	S39°44'35"W	1353.01
L59	S87°03'46"E	76.12

250 125 62.5 0 250

1"= 250'

ADJOINERS

Label	Owner	Tax Map #	Parcel ID Number	Land Use Description	Zoning	± Size (Acres)
1	EIP WINCHESTER OWNER LLC ATTN	76/ A/ 53/ G/	41321	COMMERCIAL	M1	60.67
2	GEORGE BROOKE WOOD KALEIGH	87/ A/ 31/ /	25975	RESIDENTIAL	RA	10.03
3	RODRIGUEZ RODRIGUEZ JOSE J	87/ A/ 53/ /	25996	VACANT	RA	4.00
4	L F FRANKLIN & SONS INC C/O W-L CONSTRUCTION & PAVING	87/ A/ 80/ /	26029	RESIDENTIAL	RA	14.76
5	HERNANDEZ BAUTISTA MINERVA	87/ A/ 85D/ /	56397	VACANT	RA	5.09
6	HERNANDEZ BAUTISTA MINERVA	87/ A/ 85C/ /	56396	VACANT	RA	5.66
7	THAPA MADAN K ETALS	87/ A/ 86/ /	26036	VACANT	RA	35.00
8	THAPA MADAN K ETALS	87/ A/ 87/ /	26037	RESIDENTIAL	RA	0.59
9	SEXTON LARRY ALLEN	87/ A/ 88/ /	26038	RESIDENTIAL	RA	2.00
10	ROYSTON ESHELMAN PROPERTIES (CLARKE COUNTY)	27A/A/9	5698	COMMERCIAL	C	5.13
11	ROYSTON ESHELMAN PROPERTIES	87/ 3/ B1I /	28634	RESIDENTIAL	RA	1.84

Label	Owner	Tax Map #	Parcel ID Number	Land Use Description	Zoning	± Size (Acres)
12	SIMMONS WENDI G SIMMONS STEVE D	87/ A/ 91I /	26042	RESIDENTIAL	RA	1.39
13	BRITTON SHAWN JOSEPH	87/ A/ 93I /	26044	RESIDENTIAL	RA	3.14
14	SANDY'S MHC LLC C/O THE CARLYLE GROUP	87/ A/ 95I /	26047	COMMERCIAL	MH1	25.15
15	FAIRFAX PIKE LLC	87/ A/ 95I/ C/	37013	RESIDENTIAL	RA	2.31
16	FAIRFAX PIKE LLC	87/ A/ 95I/ A/	26046	RESIDENTIAL	RA	1.02
17	MCKINNEY PATRICIA	87/ A/ 96I/ /	26048	RESIDENTIAL	RA	20.63
18	HOPE JOAN G	87/ A/ 16I/ A/	28970	RESIDENTIAL	RA	5.63
19	WILLIAMS KARL B	87/ A/ 16I/ D/	48736	RESIDENTIAL	RA	9.18
20	BRITTIN JUSTIN GREEN	87/ 4/ 5I /	26073	RESIDENTIAL	RA	6.66
21	ASHLEY DONALD J	87/ 4/ 6I /	26074	RESIDENTIAL	RA	5.58
22	LOKER RANDY	87/ 4/ 11I /	26079	RESIDENTIAL	RA	5.15

REVISIONS

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1	08/06/2026	REV. PER COUNTY COMMENTS	MW / NTG
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REZONING SUBMISSION

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PROJECT No.: VAB250199.00-0A
DRAWN BY: ~ EC / MW ~
CHECKED BY: ~ NTG ~
DATE: 05/08/2026
CAD I.D.: P-REZN-EXST

PROJECT:

GIBSON PROPERTY REZONING

FOR

REAL ESTATE PURSUITS LC

FRONT ROYAL PIKE & FAIRFAX PIKE
SHAWNEE DISTRICT
FREDERICK COUNTY
VIRGINIA

BOHLER
28 BLACKWELL PARK LANE, SUITE 201
WARRENTON, VIRGINIA 20186
Phone: (540) 349-4500
Fax: (540) 349-0321
VA@BohlerEng.com

COMMONWEALTH OF VIRGINIA
KATHERINE ROBERTS
Lic. No. 0402060193
10/20/2026
PROFESSIONAL ENGINEER

SHEET TITLE:

EXISTING CONDITIONS

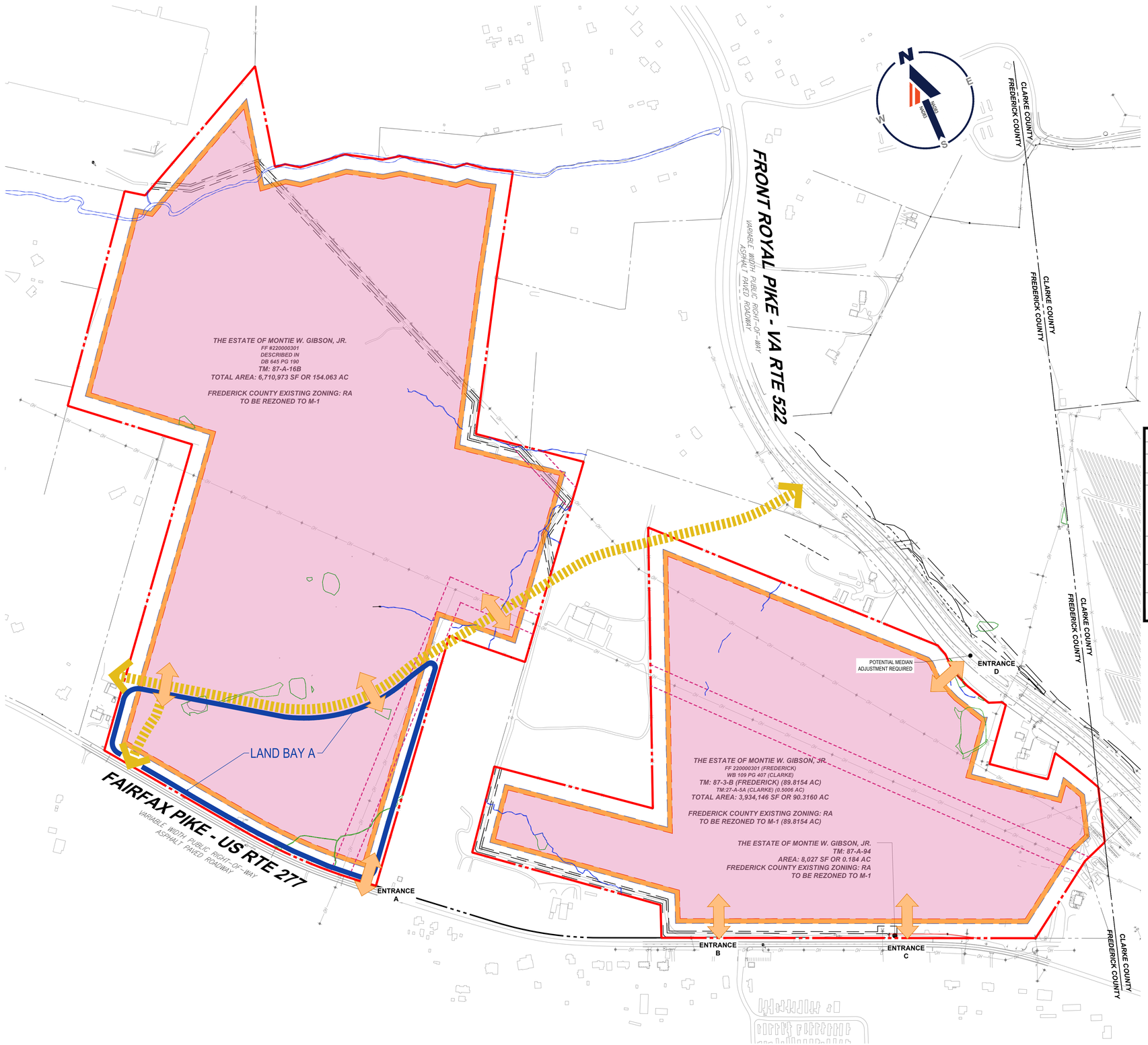
SHEET NUMBER:

C-2

REVISION 4 - 10/20/2026

THE ESTATE OF COLLEEN AND COUNTRY OF 2022 PLEASE STOCKPILE MAY AND SHALL NOT BE EXPOSED OR USED FOR ANY PURPOSE, WITHOUT PRIOR WRITTEN AUTHORIZATION FROM BOHLER. ONLY APPROVED PLANS MARKED "RELEASED FOR CONSTRUCTION" SHALL BE UTILIZED FOR CONSTRUCTION PURPOSES.
© BOHLER, PE

Oct 20, 2026
P:\VA\2025\VAB\25199.00\CAD\DRAWINGS\PLAN SETS\REZONING\P-REZN-EXST-VAB250199.00-0A-----LAYOUT: C-2 - EXST



GENERALIZED DEVELOPMENT PLAN NOTES

1. THIS REZONING PLAN PROPOSES TO REZONE APPROXIMATELY 244.062 ACRES FROM THE RA ZONING DISTRICT TO THE M-1 ZONING DISTRICT.
2. STORMWATER MANAGEMENT WILL BE PROVIDED PER APPLICABLE STATE AND LOCAL STANDARDS AT TIME OF SITE PLAN.
3. THE PROPERTY CONTAINS NO KNOWN GRAVES, OBJECTS OR STRUCTURES MARKING BURIAL PLACES AS DETERMINED BY VISUAL SURVEY.
4. THERE ARE TRACE AMOUNTS OF ARSENIC FOUND ON THE PROPERTY. OTHER THAN THE AFOREMENTIONED ARSENIC, THE PROPERTY CONTAINS NO KNOWN HAZARDOUS OR TOXIC SUBSTANCES AS SET FORTH IN TITLE 40, CODE OF FEDERAL REGULATIONS PARTS 16.4, 302.4, AND 355 OR IN VIRGINIA DEPARTMENT OF WASTE MANAGEMENT REGULATIONS.
5. A PORTION OF THE SUBJECT PROPERTY IS LOCATED IN ZONE A (1.0% ANNUAL CHANCE OF FLOOD HAZARD).
6. THE DEVELOPMENT OF THE PROPERTY MAY BE PHASED THROUGH MULTIPLE SITE PLANS.
7. BUILDING SETBACKS MAY INCLUDE FEATURES SUCH AS BUT NOT LIMITED TO PARKING, FENCE, UTILITY INFRASTRUCTURE, ACCESSORY STRUCTURES AND OTHER SIMILAR FEATURES.
8. ENTRANCE LOCATIONS SHOWN ARE APPROXIMATE AND TO BE DETERMINED AT TIME OF FINAL SITE PLAN DESIGN. LOCATIONS TO BE IN ACCORDANCE WITH VDOT SPACING REQUIREMENTS. ACCESS POINTS MAY BE ADDED OR ELIMINATED SUBJECT TO VDOT APPROVAL AT TIME OF SITE PLAN.
9. LANDSCAPE BUFFERS WILL BE PROVIDED AT TIME OF SITE PLAN IN ACCORDANCE WITH THE REQUIREMENTS OF THE FREDERICK COUNTY ZONING ORDINANCE. THEIR LOCATIONS MAY BE ADJUSTED AT TIME OF SITE PLAN.
10. LANDSCAPING WILL BE PROVIDED IN ACCORDANCE WITH SECTION 165-203.01 OF THE FREDERICK COUNTY ZONING ORDINANCE IN PLACE AT THE TIME OF SITE PLAN SUBMISSION.
11. THE BUILDING SETBACKS AT TIME OF SITE PLAN ARE PER THE MINIMUM BUILDING SETBACKS ESTABLISHED BELOW.
12. TREE PRESERVATION AREAS MAY BE ADJUSTED AT TIME OF SITE PLAN PENDING FINAL ENGINEERING. LAND DISTURBANCE FOR UTILITY CROSSINGS OR ROADWAY CONSTRUCTION THROUGH TREE PRESERVATION AREAS MAY OCCUR AT TIME OF SITE PLAN.
13. OUTDOOR TRASH RECEPTACLES WILL BE SCREENED FROM ALL PUBLIC STREETS AND ADJACENT PROPERTY, UNLESS THE ADJACENT PROPERTY CONTAINS THE SAME USE, BY MEANS ESTABLISHED IN THE COUNTY'S ZONING ORDINANCE.
14. LIGHTING FACILITIES WILL BE PROVIDED IN COMPLIANCE WITH 165-201.07 OF THE FREDERICK COUNTY ZONING ORDINANCE.
15. ALL SIGNAGE ON THE PROPERTY WILL CONFORM WITH FREDERICK COUNTY ZONING ORDINANCE SECTION 165-201.06.
16. PROPOSED PARKING AND LOADING AREAS WILL COMPLY WITH FREDERICK COUNTY ZONING ORDINANCE SECTION 165-202.01 - 165-202.04.

FREDERICK COUNTY M-1 GENERAL INDUSTRIAL DISTRICT REGULATIONS		
	REQUIRED	PROVIDED
MAXIMUM FLOOR AREA RATIO	1.0 (12,812,738 SF)	THE MAXIMUM FAR RATIO WILL NOT BE EXCEEDED
MINIMUM LANDSCAPE AREA	25%	25% MINIMUM
MAXIMUM BUILDING HEIGHT	60' (UP TO 150' WITH WAIVER)	100' MAXIMUM WITH WAIVER BUILDINGS AT THE 100' SETBACK FROM THE RIGHT-OF-WAY LINE WILL BE LIMITED TO 45' IN HEIGHT
FRONT YARD	75'	75' MINIMUM
SIDE YARD	25'	25' MINIMUM
REAR YARD	25'	25' MINIMUM

LEGEND

- REZONING AREA (244.062 ACRES)
- APPROXIMATE LOCATION OF WETLAND
- APPROXIMATE LOCATION OF STREAM
- 75' INACTIVE BUFFER SETBACK LINE (TYPE C FULL SCREEN OPTION)
- 25' ACTIVE BUFFER SETBACK LINE (TYPE C FULL SCREEN OPTION)
- OVERHEAD TRANSMISSION EASEMENT
- LAND BAY A (SEE PROFFERS FOR FURTHER INFORMATION)
- POTENTIAL LOCATION OF FUTURE ROW. FINAL LOCATION TO BE DETERMINED AT TIME OF SITE PLAN
- APPROXIMATE LOCATION OF PARCEL ACCESS / PRIVATE COMMERCIAL ENTRANCE. FINAL LOCATION TO BE DETERMINED AT TIME OF SITE PLAN

HATCH LEGEND

- AREA OF PRIMARY STRUCTURES, PARKING, AND ACCESSORY STRUCTURES
- AREA OF PARKING AND ACCESSORY STRUCTURES

BOHLER
SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING
PROGRAM MANAGEMENT
LANDSCAPE ARCHITECTURE
SUSTAINABLE ESSENTIALS
PERMITTING SERVICES
TRANSPORTATION SERVICES
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REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY
1	08/06/2026	REV. PER COUNTY COMMENTS	MW / NTG
2	08/21/2026	REV. PER COUNTY COMMENTS	MW / NTG
3	09/18/2026	REV. PER COUNTY COMMENTS	MW / NTG
4	10/20/2026	REV. PER COUNTY COMMENTS	MW / NTG

REZONING SUBMISSION

THIS DRAWING IS INTENDED FOR MUNICIPAL AND/OR AGENCY REVIEW AND APPROVAL. IT IS NOT INTENDED AS A CONSTRUCTION DOCUMENT UNLESS INDICATED OTHERWISE.

PROJECT No.:	VAB250199.00-0A
DRAWN BY:	~ EC / MW ~
CHECKED BY:	~ NTG ~
DATE:	05/08/2026
CAD I.D.:	P-REZN-SITE

PROJECT:

GIBSON PROPERTY REZONING

FOR

REAL ESTATE PURSUITS LC

FRONT ROYAL PIKE
& FAIRFAX PIKE
SHAWNEE DISTRICT
FREDERICK COUNTY
VIRGINIA

BOHLER
28 BLACKWELL PARK LANE, SUITE 201
WARRENTON, VIRGINIA 20186
Phone: (540) 349-4500
Fax: (540) 349-0321
VA@BohlerEng.com

COMMONWEALTH OF VIRGINIA
KATHERINE ROBERTS
Lic. No. 0402060193
10/20/2026
PROFESSIONAL ENGINEER

SHEET TITLE:

REZONING PLAN

SHEET NUMBER:

C-3

REVISION 4 - 10/20/2026

Oct 20, 2026
C:\BOHLER\CAD_USERDATA\TEMPACPUBLISH_4732\P-REZN-SITE\VAB250199.00-0A-----LAYOUT C-3 - REZN

GIBSON PROPERTIES

IMPACT ANALYSIS STATEMENT
August 21, 2026

GENERAL SITE INFORMATION

Location:	This is an assemblage of three parcels located near the intersection of Route 522 and Fairfax Pike.
Magisterial District:	Shawnee District
Tax Map Numbers:	87-3-B; 87-A-16B; 87-A-94
Current Zoning:	RA (244.062 acres)
Current Use:	Undeveloped
Proposed Zoning:	M1, Light Industrial District with proffers
Proposed Use:	Warehousing/Distribution Facility/Industrial Park
Total Rezoning Area:	244.062 +/- acres with proffers

INTRODUCTION

This statement has been prepared for the purpose of assessing the impact on Frederick County by the proffered rezoning of the properties identified as Tax Map Numbers 87-3-B, 87-A-16B, and 87-A-94 (collectively, the "Property") to M1 (Light Industrial District). The subject parcels are situated near the intersection of Route 522 and Fairfax Pike. Portions of the eastern boundary of Tax Map Number 87-3-B adjoin Clarke County.

The Property is currently zoned RA (Rural Areas). This application proposes to rezone the Property from RA (Rural Areas) to M1 (Light Industrial District).

Portions of the Property are currently residential and portions are vacant.

COMPREHENSIVE POLICY PLAN

Urban Development Area

The Urban Development Area (UDA) defines the general area in which residential, commercial, industrial, and institutional land use development is encouraged in the County. The Property is located outside of the UDA.

Sewer and Water Service Area

The Property is outside of the limits of the County's Urban Development Area (UDA),but is located within the limits of the Sewer and Water Service Area (SWSA).

Comprehensive Plan Conformity

The Southern Frederick Area Land Use Plan designates the Property for Industrial use. Given the Property's Comprehensive Plan designation as well as its proximity to Interstate 81, Interstate 66, Route 522, and the Virginia Inland Port, the Property is ideally situated for an industrial park use. Its proposed development pursuant to the M1 District aligns with the goals of the Frederick County Comprehensive plan, notably by promoting the County's goal of enhancing commercial/industrial areas and providing focus to the County's future regional employment centers.

USE OF SURROUNDING LAND

The properties surrounding the Property include a variety of zoning districts and uses. Properties to the north are zoned Rural Areas, and M1 and include residential uses, and the Home Depot distribution facility. Properties to the south are zoned Rural Areas, MH1, R4, and R5 and include residential uses, future mixed use developments, and a mobile home park. Properties to the east are zoned Rural Areas and include residential uses, commercial uses, and agricultural uses. Properties to the west are zoned Rural Areas and include residential and agricultural uses.

TRAFFIC

Please refer to the Traffic Impact Analysis Statement for this rezoning dated July 30, 2026 prepared by Gorove Slade.

SEWER AND WATER FACILITIES

The Sewer and Water Service Area (SWSA) defines the areas of the County to which public water and sewer services may be extended. The Property is located inside of the SWSA as defined by Frederick County Staff. Domestic water will be provided by Frederick Water, and Applicant understands and acknowledges the extension of water mains that will be required to serve this project. The water demand will vary based on industrial end user, however, +/- 60,000 – 125,000 gallons per day of water demand is anticipated. Sanitary collection and treatment will also be provided by Frederick Water, and Applicant has been working with Frederick Water to complete and review concept designs for sanitary facilities to serve the Property. The sewer demand will vary based on industrial end user, however, +/- 50,000 – 125,000 gallons per day of sanitary sewer demand is anticipated.

POPULATION

There will not be an increase in the Frederick County population as a result of this rezoning.

ADDITIONAL DEMANDS

There will be no demand on school facilities, public parks or recreational facilities, or other public facilities as a result of this rezoning. Solid waste generated by the activities on the Property will be collected in dumpster facilities and removed from the Property by commercial refuse carrier. Solid waste will be transferred to the Frederick County landfill for ultimate disposal by said carrier. The Proffers submitted with this rezoning application provide for a monetary contribution for fire and rescue services.

STORMWATER IMPACTS

Topographic relief on the Property generally follows a pattern that directs drainage towards the north of the Property. A complete stormwater management plan will be designed at the time of final engineering design. All associated stormwater quantity and quality measures will be designed in conformance with all applicable state and local regulations; therefore, site drainage and stormwater management impacts to adjoining properties and the community will be mitigated.

ENVIRONMENTAL FEATURES AND IMPACTS

There are limited wetlands and streams features on the Property. Applicant shall apply for wetlands permitting where disturbance is required for the intended development. There are no other environmental features that will constrain development of future M1 uses or such features will be managed during final engineering design in accordance with all applicable ordinances and regulations.

HISTORIC STRUCTURES

There are no historic structures or resources located on the Property.

POSITIVE NET FISCAL IMPACT

This rezoning will yield a positive net fiscal impact to the County because this rezoning will not result in any demands on the County's public schools, public parks, or other public facilities. Rather, the industrial uses will generate significant employment and revenue for the County in the form of real property taxes, business personal property taxes, utility taxes, and other taxes.

OTHER IMPACTS

Neither Owner nor Applicant anticipate any other impacts resulting from this rezoning.

Outlook

'[External]'Re: Revised Gibson Proffers

From Johnson, Joseph (VDOT) <JosephW.Johnson@vdot.virginia.gov>
Date Tue 10/20/2026 3:42 PM
To Tyler Klein <tklein@fcva.us>
Cc John Bishop <jbishop@fcva.us>

VDOT has reviewed the revised proffers and take no exception to the proposed changes.

Joseph W. Johnson, PE
Area Land Use Engineer / Edinburg Residency
Virginia Department of Transportation
14031 Old Valley Pike / Edinburg, VA 22824
Phone #540.534.3223
josephw.johnson@vdot.virginia.gov

From: Tyler Klein <tklein@fcva.us>
Sent: Tuesday, October 20, 2026 3:04 PM
To: Johnson, Joseph (VDOT) <josephw.johnson@vdot.virginia.gov>
Cc: I81 Public131 <jbishop@fcva.us>
Subject: Revised Gibson Proffers

Joe - confirming VDOT acceptance of revised proffer language? Can you let me know Wednesday AM so I can include with staff report to BOS for 10.28 public hearing? Thanks.

M. Tyler Klein, AICP
Senior Planner
Department of Planning & Development
Frederick County, Virginia
107 N. Kent Street
Winchester, VA 22601
(540)722-8248
tklein@fcva.us

Disclaimer: This correspondence is provided for informational purposes only and does not constitute a formal zoning determination or official action of Frederick County. All zoning determinations must be issued in writing by the Zoning Administrator. The Frederick County Planning and Development Department does not issue invoices directly to applicants for fees and will never request or accept payment by wire transfer.

Outlook

'[External]'Gibson Property - VDOT Response 9-30-2026

From Johnson, Joseph (VDOT) <JosephW.Johnson@vdot.virginia.gov>
Date Wed 9/30/2026 9:03 AM
To Tyler Klein <tklein@fcva.us>; John Bishop <jbishop@fcva.us>
Cc Spielman, Joseph (VDOT) <joseph.spielman@vdot.virginia.gov>

2 attachments (561 KB)
Proffers 9.29.26 RL.pdf; Proffers 9.29.26 Clean.pdf;

Tyler/John,

The latest version of the proffers for the Gibson Rezoning dated 9-26-2026 appears to address VDOT's previous comments on this application. I would offer the following notes on the provided transportation proffers:

1. Proffer 2.7 provides for the proposed off-site improvements at the intersection of Route 522/340/277 including a northbound dual-left turn lane on Route 522, westbound dual receiving lanes on Route 277, and a new dedicated eastbound left turn lane on Route 277. The language of the proffer is intended to provide some flexibility in the event that adequate right-of-way is not available to provide all of these improvements, but the use of the term "reasonable" provides a bit of uncertainty to the final scope of the improvements. I would also recommend that these improvements be completed as near to the start of the project as possible to ensure that there isn't a significant lag between site development and the installation of these transportation mitigations.

2. Proffer 2.8 provides a backstop for studying the need for signals at site entrances A and D but does not preclude VDOT from requiring these studies (and associated improvements) prior to the identified trigger as a part of the normal site plan process.

Joseph W. Johnson, PE
Area Land Use Engineer / Edinburg Residency
Virginia Department of Transportation
14031 Old Valley Pike / Edinburg, VA 22824
Phone #540.534.3223
josephw.johnson@vdot.virginia.gov

COMMONWEALTH of VIRGINIA
DEPARTMENT OF TRANSPORTATION
14031 Old Valley Pike
Edinburg, Virginia 22824

August 26, 2026

Mr. John Bishop
Frederick County Director of Planning
107 N. Kent St.
Winchester, VA 22601

Re: Gibson Property Rezoning

Dear Mr. Bishop:

This addendum serves to supplement VDOT's original comment on the Gibson Property Rezoning, dated August 7, 2026. All comments in the original letter remain in full effect except as clarified below. Additional comments are provided in response to updated proffers submitted by the applicant on August 21, 2026.

1. The updated proffers include a trigger for the required Signal Justification Report (SJR) and associated entrance improvements tied to a building square footage threshold of 2,000,000 square feet. The SJR and associated improvements should be provided once a signal is warranted based on the actual uses proposed at the time of final site plan. A 2,000,000 square foot backstop would be acceptable; however, the improvements may be required sooner depending on the intensity of the uses proposed with the final site plan.
2. The proffer to construct improvements at the intersection of Route 522 and Route 340 is insufficient to guarantee mitigation will be provided by the developer. The proffer includes a caveat that these improvements would only be provided should sufficient right-of-way exist and it appears that the existing right-of-way may not accommodate the additional of a dedicated eastbound left-turn on Route 277 as well as an additional receiving lane on Route 277 for the second northbound left turn lane on Route 522/340. It should also be noted that these improvements would likely require replacement of the existing traffic signals at this intersection. It might be beneficial for the applicant to depict these intersection improvements within the rezoning documents to provide some level of confidence that they are of a scope that can be accomplished by the developer.

Sincerely,

Joseph W. Johnson, PE
Area Land Use Engineer
Edinburg Residency
Virginia Department of Transportation

COMMONWEALTH of VIRGINIA
DEPARTMENT OF TRANSPORTATION
14031 Old Valley Pike
Edinburg, Virginia 22824

August 7, 2026

Mr. John Bishop
Frederick County Director of Planning
107 N. Kent St.
Winchester, VA 22601

Re: Gibson Property Rezoning

Dear Mr. Bishop:

The Virginia Department of Transportation (VDOT) has completed its review of the *Gibson Property Traffic Impact Study (TIS), dated July 30, 2026*, prepared in support of the rezoning request for the Gibson Property along Route 277 (Fairfax Pike) and Route 522/340. Based on our evaluation, VDOT is in general concurrence with the methodology, assumptions, and conclusions presented in the study.

As part of our review, VDOT offers the following comments and recommendations for consideration by the Planning Commission/Board of Supervisors:

1. Western Parcel Entrance Alignment Requirement – During site plan development, VDOT will expect the proposed entrance serving the western portion of the Gibson Property to be aligned with the Madison Farm entrance located directly opposite on Route 277. This corridor already faces spacing constraints, and aligning these entrances is essential to limiting the number of future major intersections or traffic signals and preserving safe, efficient traffic operations. The applicant has not demonstrated that an entrance cannot be accommodated at this location. Accordingly, VDOT will consider this alignment necessary during the site plan development and review process.
2. Right-of-Way Dedication Along Route 277 - VDOT recommends that the applicant dedicate sufficient right-of-way along the project frontage to accommodate the ultimate U4D roadway section for Route 277, as identified in the Frederick County Comprehensive Plan. Securing this right-of-way at the rezoning stage is essential to support long-term corridor improvements.
3. Lack of Transportation Mitigations in Proffer Statement - Based on the proffer statement submitted to VDOT with the application, no transportation improvements or mitigations are being offered by the applicant. The TIS demonstrates significant delays at the intersection of Route 277 and Route 522/340, particularly during peak

hours. Under future 2035 background conditions (without the project), the intersection is projected to operate at LOS F/F, with overall intersection delay at 109 sseconds in the AM and 161 seconds in the PM. With the development in 2035, intersection overall intersection delay increases to 147 seconds in the AM and 190 seconds in the PM. The TIS provides a mitigated scenario that includes an exclusive eastbound left turn lane and a second northbound left turn lane that improves overall intersection delay to 53 seconds in the AM (LOS D) and 94 seconds in the PM. Given these findings, VDOT cannot support the rezoning application without transportation mitigations that address the documented operational deficiencies.

4. Entrance Locations, Signalization, and Future Studies - All entrance locations, spacing, and configurations will be determined during the final site plan review process. No Signal Justification Reports (SJRs) have been provided with this rezoning application. The signal warrant analyses included in the TIS are preliminary and do not constitute an approved SJR. VDOT reserves the right to eliminate, relocate, or modify any entrance shown on the Generalized Development Plan (GDP) based on final engineering review, spacing requirements, and corridor operations.

While VDOT concurs with the technical findings of the July 30, 2026 TIS, the rezoning application does not currently include the transportation commitments necessary to support safe and efficient operations along Route 277 and Route 522/340. VDOT recommends that the Board of Supervisors require the applicant to address the items outlined above as conditions of rezoning approval.

Sincerely,

Joseph W. Johnson, PE
Area Land Use Engineer
Edinburg Residency
Virginia Department of Transportation

315 Tasker Road
Stephens City, Virginia 22655

PH (540) 868-1061
Fax (540) 868-1429
www.FrederickWater.com

Eric R. Lawrence
Executive Director

June 12, 2026

Thomas Moore Lawson
PO Box 2740
Winchester, Virginia 22604

RE: Rezoning Application Comment
Gibson Properties Rezoning
Tax Map Numbers: 87-3-A; 87-3-B; 87-A-16B
294.14-acres

Dear Mr. Lawson:

Thank you for the opportunity to offer review comments on the Gibson Properties rezoning application package, Impact Analysis Statement dated May 27, 2026. Frederick Water offers comments limited to the anticipated impact/effect upon Frederick Water's public water and sanitary sewer system and the demands thereon.

The project parcels 87-3-B and 87-A-16B are located within the sewer and water service area (SWSA), and therefore by county policy, Frederick Water's water and sewer services are available to access. A 12-inch water main parallels the south side of Route 277. A sanitary sewer force main was recently constructed on and in the vicinity of the project parcels; the force main was not sized to accommodate development of the subject properties and therefore may not have capacity to support this development. When the force main was being planned, designed, and constructed, the property owner did not support more intensive development and wanted to continue their agricultural interests with the potential for 4 residences. A parallel force main was designed but not constructed as projected demands for sewer service did not warrant the additional force main capacity.

Project parcel 87-3-A is not currently within the SWSA and is therefore by county policy may not access the public water and sewer. Public water and sewer facilities are not in the vicinity of parcel 87-3-A.

The application's Impact Analysis Statement dated May 27, 2026, page 2, provides the application narrative regarding water and sewer facilities:

> *"The Sewer and Water Service Area (SWSA) defines the areas of the County to which public water and sewer services may be extended. Tax Map Numbers 87-3-A and 87-3-B are located inside of the SWSA as defined by Frederick County Staff. Domestic water will be provided by Frederick Water, and Applicant understands and acknowledges the extension of water mains that will be required to serve this project. Sanitary collection and treatment will also be provided by Frederick Water, and Applicant understands and acknowledges the timing associated with the sanitary sewer connection and the effort required by the County to make that available."*

The Impact Analysis Statement is silent on proposed water and sewer demands, and applicant responsibilities. The applications states that they – the Applicant- "understands and acknowledges the timing associated with the sanitary sewer connection and the effort required by the County to make that available". The applicant should provide proposed water and sewer demands, and clarification of the statement regarding "the effort required by the County regarding sanitary sewer".

The applicant will need to ensure that adequate water and sanitary sewer conveyance and treatment system capacity is available to achieve the projected build-out of the project. It is the applicant's responsibility to fund the design, easement acquisition, and construction of the extensions of water and sewer services necessary to satisfy their proposed demands.

Sanitary sewer infrastructure is sized reflective of anticipated flows. Gravity sewer is often easier to plan for as gravity will contribute to proper flow movement, and minimal flow is less troublesome. A sanitary sewer force main warrants much more scrutiny during design as flows through the force main must be pumped, and an oversized force main with inadequate flows can result in septic conditions. Such conditions contribute to sludge buildup, reduce flow capacity, internal corrosion, cycling fatigue, and odors. Force mains should be sized reflective of known or anticipated sanitary sewer flows. As noted above, a parallel sanitary sewer force main was designed but not constructed due to the lack of projected demands of additional sanitary sewer flow.

This applicant will need to address its sanitary sewer requirements and solutions once its sanitary flow generation is more clearly known. The sewer demands and timing of when sewer demands will be realized should be considered by the applicant as they design and construct the sewer improvements necessitated by the development. If the appropriate sewer solution benefits a regional service and not solely the applicant's properties, then a partnership with other benefiting property owners and Frederick Water should be considered.

Water and sanitary sewer improvements are to be constructed in accordance with Frederick Water standards and specifications. Easements will be required to accommodate infrastructure that is dedicated to Frederick Water. Please be aware that Frederick Water is offering these review comments without the benefit or knowledge of the proposed water and sewer demands for the site.

Water supplies and sanitary sewer conveyance capacities change daily; with each new customer connection brings additional demands and generated flows. This letter does not guarantee system distribution, collection and/or treatment capacities to accommodate the development proposal.

Thank you for the opportunity to offer review comments.

Sincerely,

Eric R. Lawrence
Executive Director

The application's Impact Analysis Statement dated May 27, 2026, page 2, provides the application narrative regarding water and sewer facilities:

> *"The Sewer and Water Service Area (SWSA) defines the areas of the County to which public water and sewer services may be extended. Tax Map Numbers 87-3-A and 87-3-B are located inside of the SWSA as defined by Frederick County Staff. Domestic water will be provided by Frederick Water, and Applicant understands and acknowledges the extension of water mains that will be required to serve this project. Sanitary collection and treatment will also be provided by Frederick Water, and Applicant understands and acknowledges the timing associated with the sanitary sewer connection and the effort required by the County to make that available."*

The Impact Analysis Statement is silent on proposed water and sewer demands, and applicant responsibilities. The applications states that they – the Applicant- "understands and acknowledges the timing associated with the sanitary sewer connection and the effort required by the County to make that available". The applicant should provide proposed water and sewer demands, and clarification of the statement regarding "the effort required by the County regarding sanitary sewer".

The applicant will need to ensure that adequate water and sanitary sewer conveyance and treatment system capacity is available to achieve the projected build-out of the project. It is the applicant's responsibility to fund the design, easement acquisition, and construction of the extensions of water and sewer services necessary to satisfy their proposed demands.

Sanitary sewer infrastructure is sized reflective of anticipated flows. Gravity sewer is often easier to plan for as gravity will contribute to proper flow movement, and minimal flow is less troublesome. A sanitary sewer force main warrants much more scrutiny during design as flows through the force main must be pumped, and an oversized force main with inadequate flows can result in septic conditions. Such conditions contribute to sludge buildup, reduce flow capacity, internal corrosion, cycling fatigue, and odors. Force mains should be sized reflective of known or anticipated sanitary sewer flows. As noted above, a parallel sanitary sewer force main was designed but not constructed due to the lack of projected demands of additional sanitary sewer flow.

This applicant will need to address its sanitary sewer requirements and solutions once its sanitary flow generation is more clearly known. The sewer demands and timing of when sewer demands will be realized should be considered by the applicant as they design and construct the sewer improvements necessitated by the development. If the appropriate sewer solution benefits a regional service and not solely the applicant's properties, then a partnership with other benefiting property owners and Frederick Water should be considered.

Water and sanitary sewer improvements are to be constructed in accordance with Frederick Water standards and specifications. Easements will be required to accommodate infrastructure that is dedicated to Frederick Water. Please be aware that Frederick Water is offering these review comments without the benefit or knowledge of the proposed water and sewer demands for the site.

Water supplies and sanitary sewer conveyance capacities change daily; with each new customer connection brings additional demands and generated flows. This letter does not guarantee system distribution, collection and/or treatment capacities to accommodate the development proposal.

Thank you for the opportunity to offer review comments.

Sincerely,

Eric R. Lawrence
Executive Director

Clarke County Department of Planning
Berryville-Clarke County Government Center
101 Chalmers Court, Suite B
Berryville, VA 22611

TO: **Tyler Klein**

FROM: **Brandon Stidham, Planning Director**

RE: **Comments on Gibson property rezoning**

DATE: **June 12, 2026**

Thank you for the opportunity to comment on the Gibson property rezoning application. Clarke County Planning Department staff does not have any comments at this time, however we would like to reserve the opportunity to comment on any possible transportation impacts after we are able to review VDOT's comments on this application. VDOT staff has offered to involve us in their review process.

Please let me know if you have any questions.

COUNTY of FREDERICK

Department of Planning and Development
540/ 665-5651
Fax: 540/ 665-6395

August 24, 2026

Thomas Moore Lawson, Esquire
Winchester Gateway LLC
P.O box 2460
Winchester, VA 22604

RE: Request for Historic Resources Advisory Board (HRAB) Comments
Gibson Property (REZ) Application
Zoning: RA (Rural Area) District
Property Identification Number (PIN): 87-A-16B, 87-3-A, 87-3-B
Magisterial District: Shawnee

Dear Mr. Lawson:

The Frederick County Historic Resources Advisory Board (HRAB) considered the above referenced REZ application during their meeting on August 21, 2026. This application seeks to rezone +/- 294.14 acres from RA (Rural Areas) to M1 (Light Industrial). The properties are located between Rt. 277 and Rt. 522 in the Shawnee Magisterial District. The HRAB was advised by the Applicant that the property identified by PIN 87-3-A is intended to be removed from the application upon formal submittal

Following their review of this application, the HRAB recommended a commemorative marker for the Battle of Double Tollgate be sited on the property, that a Phase 2 Archeological Survey be conducted (if warranted by the Phase 1 Archeological Survey) and additional documenting and preservation of the architectural features of the Funkhouser Farmhouse be completed if developing the subject property identified with 87-3-A.

Thank you for the opportunity to provide a summary of the August 24th HRAB meeting. Please contact our office if you have any questions or concerns.

Sincerely,

Eric Bittner
[redacted]
Planner II

cc: Lucas Cooke, HRAB Chairman
Tyler Klein, Senior Planner

COUNTY of FREDERICK

Department of Planning and Development
540/ 665-5651
Fax: 540/ 665-6395

June 18, 2026

Thomas Moore Lawson, PC (tlawson@lsplc.com)
P.O. Box 2740
Winchester, VA 22604

RE: Proposed Rezoning Application for Gibson Property (Estate of Monte Gibson, Jr.)
Property Identification Numbers (PIN): 87-3-A, 87-3-B, & 87-A-16B

Dear Mr. Lawson:

Planning and Development staff had the opportunity to review the draft rezoning (REZ) application for the above project. This application seeks to rezone +/- 294.14-acres from the RA (Rural Areas) zoning district to the M1 (Light Industrial) zoning district with proffers. The subject property is located generally north and west of the intersection of Route 277 (Fairfax Pike) and Route 522 in the Shawnee Magisterial District. Prior to formal submission to the County, please ensure that these comments and all review agency comments are adequately addressed. At a minimum, a letter describing how each of the agencies and their comments have been addressed should be included as part of the submission.

- **Comprehensive Plan Conformance.** The Comprehensive Plan (adopted November 2021) and the *Southern Frederick Area Plan* (2024) provide guidance on the future development of the subject property. The Plan identifies the subject properties with "industrial" and "mixed-use industrial office" (MUIO) land use designations and as being within the limits of the sewer and water service area (SWSA).

  > "The Route 277 Triangle Centers of Economy is designed to be a significant area of commercial and industrial opportunity that is fully supportive of the Frederick County Economic Development Authority's targeted goals and strategies. The intent of the mixed-use designation is to further enhance the County's commercial and industrial areas and to provide focus to the County's future regional employment centers. In specific areas a mix of flexible uses, with office uses in prominent locations is encouraged. Such areas are supported by substantial areas of industrial and commercial opportunity and provide for areas that are well designed with high quality architecture and site design. It is the intent of such areas to promote a strong positive community image. Residential land uses are not envisioned in this area."

  The proposed zoning district, M1 (Light Industrial) is *typically* associated with the future land use designation for "industrial," for which the properties are partially designated.

  However, the proposal is *silent* on potential (or restricted uses) and how it would further County policy and the Economic Development Authorities targeted industries or the area plan envisioned "mix of flexible uses" and/or meets the intention of the "mixed-use industrial office" (MUIO) designation on portions of the properties along Route 277. At a

minimum, uses that might be noxious, unsafe, or disruptive as well as uses that generate higher traffic than what has been contemplated in the TIA should be considered for exclusion. Other elements of plan policy, such as "high quality architecture and site design" are absent or under-developed in the application materials. For example, EIFS (exterior insulation and finish system) specified as a primary building material in Proffer 1.2 is not typically considered "high quality." No building renderings, elevations, or conceptual layout of future buildings are provided to evaluate if policies regarding architecture and site layout are being met. **In this respect, plan conformance is only partially achieved.**

Further, sensitivity should be given to the broader area and how a future large assembly of industrial development may impact other sub-planning areas and the rural areas of Clarke County. Specifically, the Lake Frederick Urban Development Area is immediately to the south, which is planned for future residential and neighborhood village (Lake Frederick and more recently the Madison Farms projects). The uses ultimately to be developed on the Gibson properties or uses to be prohibited, should be carefully selected and their potential impacts (noise, odor, vibration, traffic) be fully mitigated. Given the surrounding area is primarily residential and agricultural, enhanced buffering and screening, lower building heights, and increased building setbacks may be appropriate mitigation measures for potential impacts and address the Plan policy for high-quality architecture and site design.

The subject property identified with PIN #87-3-A does not have a future land use designation and is outside of the limits of the SWSA. The property is otherwise planned to remain "rural." *A concurrent CPPA request for this parcel did not receive consensus for further study.*

- **Transportation & Traffic Analysis.**

    - The Plan also identifies planned transportation improvements on the subject properties including a "new major collector" road and multiuse trail connecting Route 277 to Route 522. Additionally, a multiuse trail is envisioned along Route 522 and Route 277 (Fairfax Pike) and future widening to Route 277 (improved minor arterial). While the collector road right-of-way (ROW) is proffered, the other planned transportation improvements outlined above are missing from application materials, including the GDP and proffer statement.

    - The *Traffic Impact Study* (May 8, 2026) notes that the "future with development" key regional intersections studied (Intersections #1 & #3) continue to fail, and because there is no known transportation improvements planned, "no improvements are proposed as a result of the Gibson development." This is *grossly inadequate* as it is long-standing policy in Frederick County that developments shall fully mitigate potential impacts to adjoining transportation infrastructure. Special attention should be paid to what improvements, as ultimately warranted by VDOT, could accommodate improvements to Route 522 & Fairfax Pike/Lord Fairfax Highway (Intersection #3).

    - A signal justification report (SJR), as noted in the *TIS* for Route 522 (and Site Entrances #4 & #5) and the western site entrance* on Fairfax Pike (Route 277; Site

Entrance #1), should be completed as part of the preliminary comment period, reviewed and approved by VDOT prior to acceptance of the application for public hearings. Uncertainty about the improvements necessary for a particular development and timing of when those improvements are needed raises concern for staff about the appropriateness of the proposal at this location.

**Staff notes the approved Madison 277 proffer statement (REZ #07-25) also contemplates a SJR and potential traffic signal at their site entrance on Route 277. This applicant is advised to reach out to the Madison 277 owner (Dave Madison) and coordinate on how the cost and installation of a potential signal at this location could be shared among both projects, and the trigger (timing) of such improvement.*

- **Proffer Statement.** The following comments are offered on the proffer statement dated 2026.
    - Provide a "Original Date of Proffers."
    - The proffer statement does not contemplate allowed or prohibited uses and the potential impacts to adjoining properties and roadways or mitigation measures.
    - Proffer 2 does not fully address level of service (LOS) failures, traffic impacts, and planned transportation improvements outlined in the Comprehensive Plan to adjoining roadways. Specifically, the *TIS* notes turn lanes for points-of-access to/from Route 522, and these are not expressly listed in the proffer statement.
- **Other Application Materials & Fee.** Based on the fees adopted by the Board of Supervisors, the application fee for this CUP application would be $32,207.
- **Agency Comments.** Agency comments are attached. Once the application is "complete," and the fee is paid it will also need to go to the Historic Resources Advisory Board (HRAB) prior to scheduling for public hearing.

All the above comments and reviewing agency comments should be appropriately addressed before staff can accept this application for a public hearing. **The Applicant should verify with Planning & Development staff application completeness prior to final submission.**

Please feel free to contact me with questions regarding this application.

Sincerely,

M. Tyler Klein, AICP
Senior Planner

Attachments: Agency Comment Letters

Frederick County Fire and Rescue Department

Office of the Fire Marshal
1080 Coverstone Drive
Winchester, VA 22602
Phone: 540-665-6350 Fax: 540-678-4739
fmo@fcva.us

Plan Review

Rezoning

Status: Approved

Business Name
Gibson Property
1787 Fairfax Pike
White Post, Virginia 22663

Other:
Thomas Moore Lawson. P.C.

Printed Date: 06/16/2026

General Information

Received Date:	05/20/2026	Occupancy Type:	Residential
Review Begin Date:	06/16/2026	Property Use:	
Review End Date:	06/16/2026	Activity Number:	I056080
Hours:	1.0000	Review Cause:	Application

Activity Details

Project Name: Rezoning from Rural Areas to Light Industrial (M1)

Comments:
All future development shall comply with the Frederick County Fire Prevention Code and all other applicable codes.

[redacted]

Adam Hounshell
Lieutenant/Assistant Fire Marshal

REQUEST FOR REZONING COMMENTS

Project Name: Gibson Property

Acreage: 294.14-acres

PIN(s): 87-3-A-, 87-3-B, & 87-A-16B

Address (or general location):
Generally north of Route 277 (Fairfax Pike); generally east and west of Route 522; 3615 Front Royal Pike & 1787 Fairfax Pike

Existing Zoning District: RA (Rural Areas)

Proposed Zoning District: M1 (Light Industrial)

Staff Name (Email Address): M. Tyler Klein (tklein@fcva.us)

Agency Name Completing Comments (select one):

- ☐ Frederick Water
- ☐ Virginia Department of Transportation
- ☐ Winchester Regional Airport
- ☐ Virginia Department of Health
- ☐ Historic Resources Advisory Board
- ☐ Frederick County (FC) Public Schools
- ☑ FC Public Works
- ☐ FC Inspections
- ☐ FC Fire Marshal
- ☐ FC Parks & Recreation
- ☐ FC County Attorney
- ☐ Other (Specify): _____

Reviewer Name (Email Address): jwilder@fcva.us

Review Agency Comments:
**Comments that may not fit in the box should be attached to the cover sheet on agency or department letterhead.*

A comprehensive review shall occur at the time of site plan submission.
We offer no additional comments at this time.

Resubmission to address comments requested? Y ☐ or N ☑

Gibson Property Rezoning

Agency Comment & Response Matrix

Rezoning from RA (Rural Areas) to M1 (Light Industrial) — PINs 87-3-B, 87-A-16B & 87-A-94 — 244.062 acres

Shawnee Magisterial District, Frederick County, Virginia

Frederick County Department of Planning & Development — M. Tyler Klein, AICP, Senior Planner (June 18, 2026)		
#	**Comment**	**Applicant's Response**
I. Comprehensive Plan Conformance		
1	The proposed M1 (Light Industrial) district is silent on potential or restricted uses and on how the proposal would further County policy, the Economic Development Authority's targeted industries, or the area plan's envisioned "mix of flexible uses" and "mixed-use industrial office" (MUIO) designation along Route 277. At a minimum, uses that might be noxious, unsafe, or disruptive, and uses generating higher traffic than contemplated in the TIA, should be considered for exclusion.	Applicant has revised the proffers to delete M1 by right uses of regional criminal justice, enforcement, and detention facilities, and freestanding fast food and/or any restaurant that includes a drive-through window/food service. The TIA submitted by Applicant's traffic engineer has contemplated uses as directed by and agreed with the County's traffic agency, VDOT. Accordingly, it is submitted that the TIA does accurately address traffic impact being generated by this M1 site.
2	Plan policy elements such as "high quality architecture and site design" are absent or under-developed. EIFS specified as a primary building material in Proffer 1.2 is not typically considered high quality, and no building renderings, elevations, or conceptual layouts are provided to evaluate architecture and site layout. Plan conformance is only partially achieved.	Acknowledged and will be considered during site plan process once rezoned.
3	Sensitivity should be given to how a future large industrial assembly may impact adjacent sub-planning areas and the rural areas of Clarke County. The Lake Frederick Urban Development Area (Lake Frederick and Madison Farms) is immediately to the south. Enhanced buffering and screening, lower building heights, and increased building setbacks may be appropriate mitigation for noise, odor, vibration, and traffic impacts.	Acknowledged and will be considered during site plan process once rezoned.
4	PIN 87-3-A has no future land use designation and is outside the SWSA; it is planned to remain "rural." A concurrent CPPA request for this parcel did not receive consensus for further study.	The referenced property has been removed from the rezoning application.

II. Transportation & Traffic Analysis		
5	The Plan identifies planned transportation improvements on the property, including a new major collector road and multiuse trail connecting Route 277 to Route 522, multiuse trails along Route 522 and Route 277, and future widening of Route 277. While the collector road right-of-way is proffered, the other planned improvements are missing from the application materials, including the GDP and proffer statement.	Applicant has proffered sufficient right-of-way for the dedication of a contemplated future major collector road. The right-of-way is proffered to specifications which are similar to the Madison Farms rezoning for the same potential future major collection road. The right-of-way is of sufficient width for 6 lanes along Route 522, 5' sidewalk along Route 277, and a 10' trail on west side of Route 522.
6	The Traffic Impact Study (May 8, 2026) notes that key regional intersections (#1 and #3) continue to fail and, because no transportation improvements are planned, none are proposed as a result of the Gibson development. This is grossly inadequate given long-standing County policy that developments fully mitigate impacts to adjoining transportation infrastructure. Special attention should be paid to improvements warranted at Route 522 and Fairfax Pike/Lord Fairfax Highway (Intersection #3).	Improvements to Intersections #1 and #3 are necessitated by existing and background conditions traffic. The TIA has been updated to identify the improvements needed to offset the site's impact. Specifically, at Fairfax Pike/Warrior Drive (Int. #1), left turn phasing improvements have been identified in the updated TIA to offset the site's impact to background conditions. At Fairfax Pike/Route 522 (Int. #3), an exclusive EB left turn lane and a 2nd NB left turn lane have been identified as improvements that will offset the site's impact to background conditions.
7	A Signal Justification Report (SJR) — noted in the TIS for Route 522 (Site Entrances #4 and #5) and the western site entrance on Fairfax Pike/Route 277 (Site Entrance #1) — should be completed during the preliminary comment period and reviewed and approved by VDOT prior to acceptance of the application for public hearings. The approved Madison 277 proffer (REZ #07-25) also contemplates an SJR and potential signal on Route 277; the applicant should coordinate with the Madison 277 owner (Dave Madison) on sharing the cost and installation of a potential signal and on the timing/trigger of that improvement.	The Applicant has met with and been coordinating closely with VDOT about the SJR process and timeline for this project since receiving comments. VDOT has concurred that the full SJR review and approval can be deferred to site plan review and approval, given the TIS is updated to include VJuST analysis of alternative/ innovative intersection configurations at the new proposed signalized entrance locations, Int # 6 and Int #9 (VJuST analysis). The revised TIS submission includes this

		additional analysis and includes a range of intersection configurations for recommendation, subject to a final future SJR review and approval during site plan. It should be clarified that the proposed western entrance on Rt 277 is proposed as aligned with the planned Lake Frederick entrance and no entrance is proposed across from the planned Madison Farm entrance.
III. Proffer Statement		
8	Provide an "Original Date of Proffers."	Acknowledged.
9	The proffer statement does not contemplate allowed or prohibited uses, the potential impacts to adjoining properties and roadways, or mitigation measures.	Applicant has removed allowable uses of regional criminal justice, enforcement, and detention facilities, and freestanding fast food and/or any restaurant that includes a drive-through window/food service from the Property. This is consistent with what has been recently proffered for another approved zoning to M1 in Frederick County.
10	Proffer 2 does not fully address level of service (LOS) failures, traffic impacts, and the planned transportation improvements outlined in the Comprehensive Plan for adjoining roadways. Specifically, the TIS notes turn lanes for points of access to and from Route 522 that are not expressly listed in the proffer statement.	See the responses to Comments #6 and 7 above.
IV. Other Application Materials & Fee		
11	Based on the fees adopted by the Board of Supervisors, the application fee for this application would be $32,207.	Acknowledged.
V. Agency Comments		
12	Agency comments are attached. Once the application is complete and the fee is paid, it will also need to go to the Historic Resources Advisory Board (HRAB) prior to scheduling for public hearing.	Consistent with an email dated July 2, 2026, the County confirmed it has received all required agency comments to allow this rezoning to proceed to public hearing. The Applicant appeared before HRAB on August 21, 2026 and acknowledges the comments made during the meeting.

		Further, this application is on a strict timetable in order to be compliant with the requirements for the VEDP grant which requires all grant-eligible property to be fully zoned (M1 industrial). As such, Applicant respectfully requests this matter be heard by the Frederick County Planning Commission at its hearing on September 2nd and the Board of Supervisors at its hearing on September 23rd.

Frederick Water — Eric R. Lawrence, Executive Director (June 12, 2026)		
#	**Comment**	**Applicant's Response**
I. Service Area & Availability		
1	Parcels 87-3-B and 87-A-16B are located within the Sewer and Water Service Area (SWSA), so by county policy water and sewer services are available to access. A 12-inch water main parallels the south side of Route 277. A sanitary sewer force main was recently constructed on and near the project parcels, but it was not sized to accommodate development of the subject properties and may not have capacity to support this development. A parallel force main was designed but not constructed because projected sewer demands did not warrant the additional capacity.	Sanitary sewer computations and a force main design will be completed as required to design a facility that can accommodate the proposed development. Preliminary exhibits showing a plan of approach have been circulated to Frederick Water. Further, and as stated above, this property is the subject of an active VEDP grant which, if awarded, will provide funds for infrastructure improvements related to this property. Said infrastructure includes, but is not limited to, public water and sewer improvements. If Frederick Water is noting that its existing facilities may require some upgrades, the VEDP grant award would be most timely and be put to good use to make those required improvements.
2	Parcel 87-3-A is not currently within the SWSA and by county policy may not access public water and sewer. Public water and sewer facilities are not in the vicinity of parcel 87-3-A.	The referenced property has been removed from the rezoning application.

II. Impact Analysis Statement		
3	The Impact Analysis Statement dated May 27, 2026 is silent on proposed water and sewer demands and on applicant responsibilities. The applicant should provide proposed water and sewer demands and clarify the statement regarding “the effort required by the County” for sanitary sewer.	Applicant has attached a report prepared by Bohler, which addresses anticipated water and sewer demands for this property. It should be noted these are anticipatory reports based on assumed buildout and uses. The actual consumption of water and sewer will undoubtedly change and will certainly be adjusted as actual users become known and the industrial property is developed.
III. Applicant Responsibilities		
4	The applicant must ensure adequate water and sanitary sewer conveyance and treatment system capacity is available to achieve the projected build-out of the project. It is the applicant’s responsibility to fund the design, easement acquisition, and construction of the extensions of water and sewer services necessary to satisfy the proposed demands.	The Applicant will complete sanitary and water studies and designs to demonstrate adequate water and sanitary sewer conveyance and treatment system capacity for the proposed development.
5	Sanitary sewer force mains warrant scrutiny during design; an oversized force main with inadequate flows can result in septic conditions, sludge buildup, reduced flow capacity, internal corrosion, cycling fatigue, and odors. The applicant must address its sanitary sewer requirements and solutions once its flow generation is more clearly known. If the appropriate sewer solution benefits a regional service rather than solely the applicant’s properties, a partnership with other benefiting property owners and Frederick Water should be considered.	Sanitary sewer computations and a force main design will be completed as required to design a facility that can accommodate the proposed development. Preliminary exhibits showing a plan of approach have been circulated to Frederick Water.
IV. Standards & General		
6	Water and sanitary sewer improvements are to be constructed in accordance with Frederick Water standards and specifications, and easements will be required for infrastructure dedicated to Frederick Water. These comments are offered without the benefit of the proposed water and sewer demands, and the letter does not guarantee system distribution, collection, or treatment capacity for the development.	Water and sewer improvements will be proposed and constructed in accordance with Frederick Water standards and specifications, and easements will be proposed per Frederick Water requirements.

Virginia Department of Transportation — VDOT Staunton District (June 10, 2026)		
#	**Comment**	**Applicant's Response**
TIA Review Comments (1st Submission, TIA dated May 8, 2026)		
1	The TIA conclusion indicates that the reported LOS and queuing deficiencies at the study intersections are due to existing or background traffic volumes and not the proposed site traffic. Regardless of the responsible party, the intent of the TIA is to provide future traffic conditions and the improvements necessary to mitigate unacceptable conditions. The initial submission does not meet that intent and is therefore incomplete. Revise the analysis and report to present future scenarios that mitigate the reported traffic conditions with the development.	Improvements to Intersections #1 and #3 are necessitated by existing and background conditions traffic. The TIA has been updated to identify the improvements needed to offset the site's impact. Specifically, at Fairfax Pike/Warrior Drive (Int. #1), left turn phasing improvements have been identified in the updated TIA to offset the site's impact to background conditions. At Fairfax Pike/Route 522 (Int. #3), an exclusive EB left turn lane and a 2nd NB left turn lane have been identified as improvements that will offset the site's impact to background conditions.
2	The TIA indicates overcapacity conditions in all future-year scenarios. Per TOSAM, overcapacity conditions require microsimulation to evaluate operations and report MOEs. However, if the new mitigated future scenarios (requested above) are no longer overcapacity, the currently reported future unmitigated MOEs will be acceptable.	As discussed with VDOT at the 7/13/26 meeting, with the added improvements proposed at Int. #1 and Int. #3, majority of the movements are not overcapacity, and microsimulation is not required.
3	The approved pre-scoping document indicated the westernmost site entrance on Route 277 would align as the 4th leg of the planned Madison Farm development entrance (recommended for signalization). The TIA instead shifted this entrance east to align with the future Lake Frederick entrance on Route 277, with a signal recommendation. This would add two future signals on the Route 277 corridor, which is not desirable on a Minor Arterial connecting I-81 to US 340/522 even if minimum spacing is met. What resulted in the change of the proposed entrance location?	The proposed Madison Farms and Lake Frederick entrances on Route 277 presented two potential access locations for the Gibson site's western parcel. Although the concept plan during scoping initially contemplated alignment with Madison Farm's entrance, it was subsequently determined that aligning the entrance with Lake Frederick would be preferable, as that development and entrance is further along and the proposed potential signal would provide greater benefit to the wider community including Lake Frederick residents. As noted

		in the comment, entrance spacing standards would be met.
4	The current analysis does not support the recommended future signals at study intersection 6 (site entrance 1) and study intersection 9 (site entrances 4/5). An SJR must be submitted and approved at both locations for VDOT acceptance of the TIA with these recommendations. Both recommended signal locations should also consider signal coordination in the future build year (including modeling the proposed Madison Farms signal on Route 277 if the entrance cannot be adjusted per the comment above).	Per the meetings with VDOT on 7/13/26 and 7/23/26, full SJR review and approval can be deferred to site plan review and approval, given the TIS is updated to include VJuST analysis of alternative/ innovative intersection configurations at the proposed signalized entrance locations, Int # 6 and Int #9 (VJuST analysis). The revised TIS submission includes this additional analysis and includes a range of intersection configurations for recommendation, subject to a final future SJR review and approval during site plan. As requested, under mitigated signalization scenarios, the proposed signal on Rt 277 is shown as coordinated with Madison Farm's signal in Synchro and the proposed signal on Rt 522 is shown as coordinated with the Rt 522/Rt 277 signal in Synchro.
5	Per the pre-scoping document, while the signalized intersection of US 522 and Maranto Manor Drive is not a study intersection, the signal was to be included in the Synchro modeling as an Affected Traffic Signal. Because US 522 is on the VDOT Arterial Preservation Network, this signal should be included in the modeling alongside the proposed new signal at site entrance #4 (study intersection #9) to ensure proper evaluation. Signal coordination seems likely and may extend north to the signal at Tasker Road.	The Maranto Manor Drive signal was not previously included in the Synchro model as it was confirmed with VDOT that it is currently uncoordinated. However, as discussed with VDOT on subsequent calls, it has been added to the existing and future year Synchro networks in the resubmission for thoroughness. The signal is currently uncoordinated but has been changed to coordinated between Maranto Manor Drive and Tasker Drive for all future year analysis.
6	HCM 2000 outputs are reported for the signal at US 522/340/Route 277 instead of HCM 6 due to non-NEMA phasing. Only the phase assignment in the timing plan is non-compliant; adjust it from Phase 3 to Phase 8 to make	The Intersection #3 phasing has been updated accordingly to allow HCM 6 to produce results. It is noted that HCM 6

	the intersection NEMA compliant, then update the results to HCM 6 throughout the report per TOSAM requirements.	requires manual input for RTOR reductions. The RTOR reduction was determined based on HCM 2000's methodology and has been updated for all signalized study intersections. This is noted as most intersections now show slightly improved results.
7	Update the Executive Summary and Conclusion sections to indicate the reported delay in seconds associated with each level of service, to better communicate the impacts on the listed study intersections, approaches, or movements.	As discussed with VDOT, delay in seconds has been added to all LOS F descriptions in the Executive Summary and Conclusions.

Frederick County Fire Marshal — Adam Hounshell, Lieutenant/Assistant Fire Marshal (June 16, 2026 — Status: Approved)

#	Comment	Applicant's Response
1	All future development shall comply with the Frederick County Fire Prevention Code and all other applicable codes.	Acknowledged, future development will comply with Frederick County Fire Prevention Code and other applicable codes.

Frederick County Public Works — J. Wilder (jwilder@fcva.us)

#	Comment	Applicant's Response
1	A comprehensive review shall occur at the time of site plan submission. No additional comments are offered at this time.	Acknowledged.

Clarke County Department of Planning — Brandon Stidham, Planning Director (June 12, 2026)

#	Comment	Applicant's Response
1	No comments at this time. Staff reserves the opportunity to comment on possible transportation impacts after reviewing VDOT's comments on this application. VDOT staff has offered to involve Clarke County in their review process.	Acknowledged.

Virginia Department of Transportation — VDOT Staunton District (August 7, 2026)		
#	**Comment**	**Applicant's Response**
TIA Review Comments (2nd Submission, TIA dated July 30, 2026)		
1	Western Parcel Entrance Alignment Requirement – During site plan development, VDOT will expect the proposed entrance serving the western portion of the Gibson Property to be aligned with the Madison Farm entrance located directly opposite on Route 277. This corridor already faces spacing constraints, and aligning these entrances is essential to limiting the number of future major intersections or traffic signals and preserving safe, efficient traffic operations. The applicant has not demonstrated that an entrance cannot be accommodated at this location. Accordingly, VDOT will consider this alignment necessary during the site plan development and review process.	Comment acknowledged. It is noted on the Rezoning Plan that entrance locations shown are approximate and to be determined at time of final site plan design. Locations to be in accordance with VDOT spacing requirements. Access points may be added or eliminated subject to VDOT approval at time of site plan.
2	Right-of-Way Dedication Along Route 277 - VDOT recommends that the applicant dedicate sufficient right-of-way along the project frontage to accommodate the ultimate U4D roadway section for Route 277, as identified in the Frederick County Comprehensive Plan. Securing this right-of-way at the rezoning stage is essential to support long-term corridor improvements.	Right-of-way dedication along Route 277 has been included in the proffers.
3	Lack of Transportation Mitigations in Proffer Statement - Based on the proffer statement submitted to VDOT with the application, no transportation improvements or mitigations are being offered by the applicant. The TIS demonstrates significant delays at the intersection of Route 277 and Route 522/340, particularly during peak hours. Under future 2035 background conditions (without the project), the intersection is projected to operate at LOS F/F, with overall intersection delay at 109 seconds in the AM and 161 seconds in the PM. With the development in 2035, intersection overall intersection delay increases to 147 seconds in the AM and 190 seconds in the PM. The TIS provides a mitigated scenario that includes an exclusive eastbound left turn lane and a second northbound left turn lane that improves overall intersection delay to 53 seconds in the AM (LOS D) and 94 seconds in the PM. Given these findings, VDOT cannot support the rezoning application without transportation mitigations that address the documented operational deficiencies.	Transportation mitigations at the intersection of Route 277 and Route 522/340 have been included in the proffers, subject to sufficient right-of-way.
4	Entrance Locations, Signalization, and Future Studies – All entrance locations, spacing, and configurations will be determined during the final site plan review process. No Signal Justification Reports (SJRs) have been provided with this rezoning application. The signal warrant analyses included in the TIS are preliminary and do not constitute an approved SJR. VDOT reserves the right to eliminate, relocate, or modify any entrance shown on the Generalized	Comment acknowledged. The commitment to perform and submit SJRs during site plan has been included in the proffers.

	Development Plan (GDP) based on final engineering review, spacing requirements, and corridor operations.	

****
#1975
CARL E. FRYE, ET UX
TO: :: :: ,DEED
MONTIE W. GIBSON, JR., ET UX
****

DELIVERED TO: [redacted] Robert W. Larrick Esq.

DATE 10-13-76

BOOK 460 PAGE 351

THIS DEED, made this 30th day of June, 1976, between Carl E. Frye and Anna Lee Frye, his wife, of the one part, hereinafter called the Grantors, and Montie W. Gibson, Jr., and Pearl E. Gibson, his wife, of the other part, hereinafter called the Grantees.

WITNESSETH: That for and in consideration of the sum of Ten Dollars ($10.00), cash in hand paid, and other valuable consideration receipt whereof is hereby acknowledged, the Grantors do grant and convey with General Warranty of Title unto the Grantees, jointly, as tenants by the entirety, with the common law right of survivorship, together with all rights, privileges and appurtenances thereto belonging, all that certain tract of land, containing 93 Acres, more or less, situate near Double Toll Gate, on the North side of Virginia Secondary Highway No. 277 and on the Southwest side of U. S. Highway No. 522, partly in Greenway Magisterial District, Clarke County, Virginia, and partly in Shawnee Magisterial District, Frederick County, Virginia, and more particularly described as follows:

All of that certain tract of land described as Tract "B", according to a certain deed from Katie C. Funkhouser, Widow, et als, to Charles Chamblin Funkhouser, dated February 11, 1952, of record in the Office of the Clerk of the Circuit Court of Frederick County, Virginia, in Deed Book 225, at Page 502, and in the Office of the Clerk of the Circuit Court of Clarke County, Virginia, in Deed Book 43, at Page 26, which is described as follows:

TRACT "B", located at Double Toll Gate, on the North side of Virginia Highway No. 277 and on the Southwest side of U. S. Highway No. 522, partly in Greenway District, Clarke County, Virginia, and partly in Shawnee (formerly Opequon) District, Frederick County, Virginia, and bounded and described as follows: "Beginning at (1) a post on the North side of Road No. 277 and at the Southwest corner of the Perry lot; thence with the West side of the Perry Lot N. 31 deg. E. 98 feet to (2) the point of intersection of the lines of 2 wire fences; thence with the North fence line of the Perry lot S 62-1/4 deg. E. 232 feet to (3) a post in a fence corner; thence with the east fence line of the Perry lot S. 29-1/2 deg. W. 106 feet to (4) a post at the Southeast corner of the Perry lot and in the North line of Road No. 277; thence with the North line of Road No. 277 S. 63-1/2 deg. E. 146 feet to (5) a post at the Southwest corner of the well lot on the land of C. C. Funkhouser; thence with the west fence line of the land of C. C. Funkhouser N. 47 deg. E. 406 feet to (6) a post in the Southwest fence line of U. S. Highway No. 522; thence N. 25-1/2 deg. W. 945 feet to (7) a point near the County line and at the beginning of the newly con-

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WINCHESTER, VIRGINIA

structed portion of the Highway; thence N 34 deg. W. 208 feet to (8) a post on the Southwest side of U. S. Highway No. 522 and at the Northeast corner of the Riddick lot; thence around said lot S. 45 deg W. 212 feet to (a) a post, thence N 46 deg. W. 314 feet to (B) a post; thence with the West fence line of the Riddick lot N. 45 deg. E. 320 feet to (9) the Northeast corner of a large stone post on the South side of U. S. Highway No. 522; thence with the South side of U. S. Highway No. 522 for the following 4 courses, N 26 deg. W. 97 feet to (10) 3 highway stakes where a concrete Highway marker is to be set; thence N. 24 deg. W. 100 feet to (11) a post; thence N. 18 deg. W. 206 feet to (12) a braced post; thence N. 10 deg. W. 84 feet to (13) a post in a fence corner in the Southwest property line of U. S. Highway No. 522 and corner to the Brown farm; thence leaving the Highway and with the Brown farm for the following 3 courses, N. 38-3/4 deg. W. 1610 feet to (14) a point 6 feet East of a post in a fence corner; thence S. 28 deg. W. 1462 feet to (15) a post in a fence corner at the corner of the woods; thence with the edge of the woods N 45-1/2 deg. W. 850 feet to (16) a post in a fence corner at the corner of the woods, a corner to the Brown farm in the line of the land of Cooke; thence with Cooke for the following 3 courses, S. 44-1/2 deg. W. 465 feet to (17) a post in a fence corner; thence S 44-3/4 deg. E. 1020 feet to (18) a post in a fence corner at the corner of the woods; thence S 28 deg. W. 172 feet to (19) a post at the Southeast fence corner of the land of Cooke and in the North line of Road No. 277; thence with the North line of Road No. 277 S. 61 deg. E. 2511 feet to the point of beginning, containing 102.54 acres, more or less;"

LESS: That certain parcel of land which was conveyed by Audrey F. Funkhouser, Executric of Charles C. Funkhouser, et al, to William Stuart Royston by deed bearing date of February 24, 1967, of recorded in the Office of the Clerk of the Circuit Court of Clarke County, Virginia, in Deed Book 78, at Page 33, to which said deed reference is here made, and which is described as follows: All that certain tract of land located at Double Toll Gate and situated partly in Greenway District of Clarke County, Virginia, and partly in Shawnee (formerly Opequon) District, of Frederick County, Virginia, bounded as follows: "Beginning at (1) a point on the North side of Old Road No. 277, said point being 5.9 feet South of an iron peg in a wire fence; thence with two new division lines through the land of C. C. Funkhouser N. 10 deg. 38 min. E. 429.6 feet to (2) an iron peg; thence N. 75 deg. 37 min. E. 320.0 feet to (3) an iron peg on the West side of U. S. Highway No. 522; thence with the West side of U. S. Highway No. 522 with the following three sub-chords S 11 deg. 03 min. E. 103.9 feet to (4) thence S. 11 deg. 24 min. E. 209.0 feet to (5) thence S 06 deg. 22 min. E. 438.5 feet to (6) thence S. 46 deg. 14 min. W 34.7 feet to (7) a Concrete Marker at a turn around at the end of Old Road No. 277;thence with the Highway right of way for the following two courses N 3 deg. 35 min. W. 58.8 feet to (8) a Concrete Marker; thence N. 89 deg. 21 min. W. 115.2 feet to (9), a Concrete Marker a corner to the land now or formerly Harrell; thence with said land

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for the following three courses N 29 deg. 17 min. E. 105.8 feet to (10) a post; thence N. 61 deg. 39 min. W. 232.0 feet to (11) the point of intersection of two fences; thence S 29 deg. 16 min. W. 98.7 feet to (12) a point on the Northeast side of Old Road No. 277, opposite a post corner to the land now or formerly Herrell; thence with the Northeast side of old Road No. 277 N. 60 deg. 13 min. W. 178.1 feet to the point of beginning, containing 5.13 acres, more or less, according to a plat and survey thereof made by Richard U. Goode, Certified Surveyor, under date of December 28, 1966;

and being the same realty conveyed to the Grantors by deed of J. Frederick Larrick, Trustee, dated the 30th day of June, 1976, and to be recorded in the Clerk's Office of the Circuit Court of Frederick County, Virginia, immediately preceding the recordation of this deed, and also to be recorded in the Clerk's Office of the Circuit Court of Clarke County, Virginia, immediately preceding the recordation of this deed.

This conveyance is made subject to the legally enforceable restrictive covenants, conditions, building lines and rights of way, of record, if any, affecting the aforesaid realty.

The Grantors covenant that they have the right to convey said realty to the Grantees; that the Grantees shall have quiet possession thereof, free from all encumbrances; that they have done no act to encumber said realty; and that they will execute such further assurances thereof as may be requisite.

WITNESS the following signatures and seals:

[redacted] (SEAL)

[redacted] (SEAL)

STATE OF VIRGINIA,

COUNTY OF FREDERICK, to-wit:

I, [redacted], a Notary Public in and for the State and County aforesaid, certify that Carl E. Frye and

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WINCHESTER, VIRGINIA

Anna Lee Frye, his wife, whose names are signed to the foregoing instrument, bearing date on the 30th day of June, 1976, have acknowledged the same before me in my State and County aforesaid.

Given under my hand this 30th day of June, 1976.

My commission expires 5-23-78.

[redacted]

[redacted]

VIRGINIA FREDERICK COUNTY, SS:

This instrument of writing was produced to me on the 30th day of June, 1976, at 11:27 A.M. and with certificate of acknowledgment thereto annexed was admitted to record. Tax imposed by Sec. 58-54.1 of $90.00, and 58-54 have been paid, if assessable.

[redacted] Clerk.

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WINCHESTER, VIRGINIA

#2765

BK645PG190

THIS DEED, made and dated this 21st day of April, 1987, by and between REGINALD von MOULTRI GRAFF, Single, and GLORIA GRAFF KERN and WILBUR L. KERN, her husband, hereinafter Grantors; and MONTIE W. GIBSON and PEARL E. GIBSON, husband and wife, hereinafter Grantees.

WITNESSETH: That for and in consideration of the sum of Ten Dollars ($10.00) and other good and valuable consideration, the receipt of all of which is hereby acknowledged, the Grantors do hereby grant, bargain, sell and convey with general warranty of title, unto the Grantees, jointly, as tenants by the entireties, with common law right of survivorship, it being intended that the part of the one dying should then belong to the other, his or her heirs or assigns, the following described property and appurtenances thereunto belonging:

> All that certain parcel of land in Opequon Magisterial District, Frederick County, Virginia, lying and on the northeastern boundary line of State Route 277, containing 154.049 Acres, being more particularly described on the plat and survey of Lee A. Ebert, C.L.S., dated June 21, 1984, attached hereto and by this reference incorporated herein. This is a greater portion of the land conveyed to Reginald von Moultri Graff by deed dated February 23, 1942, in Deed Book 185, at Page 89, and a portion of the land conveyed to Conrad M. Graff by deed dated April 5, 1945, recorded in the Frederick County Circuit Clerk's Office in Deed Book 192, at Page 252, which land was then devised to Reginald von Moultri Graff and Gloria Graff Kern by Will recorded in Will Book 66, at Page 162. Florence N. Graff, mother of Gloria Graff Kern and Reginald von Moultri Graff, died on October 20, 1981, thereby vesting complete title in the aforesaid properties in Reginald von Moultri Graff and Gloria Graff Kern.

Included in this conveyance are all mineral rights, EXCEPT, HOWEVER, the Grantees agree, for themselves and their heirs and assigns, as evidenced by their execution of this

BK645PG191

Deed, that they will not release or transfer any mineral rights conveyed herein until the Purchase Money Deed of Trust executed by the Grantees and payable to Reginald M. Graff and Gloria G. Kern, dated Apr. 1 21, 1987, and recorded immediately following the recordation of this Deed, is paid in full.

Reference is here made to the aforesaid instruments and the attachments and the references therein contained for a further and more particular description of the property hereby conveyed.

This conveyance is made subject to all duly recorded and enforceable restrictions, easements and rights of way.

The Grantors covenant that they have a right to convey said property to the Grantees; that they will execute such further assurances of title to said property as may be requisite; that they are seized in fee simple of the property conveyed; and that the Grantees shall have quiet possession of said property free from all encumbrances.

WITNESS the following signatures and seals:

[redacted] (SEAL)
Reginald von Mobley Graff

[redacted] (SEAL)
Gloria Graff Kern

[redacted] (SEAL)
Wilbur L. Kern

[redacted] (SEAL)
Monica W. Gibson

[redacted] (SEAL)

BK645PG192

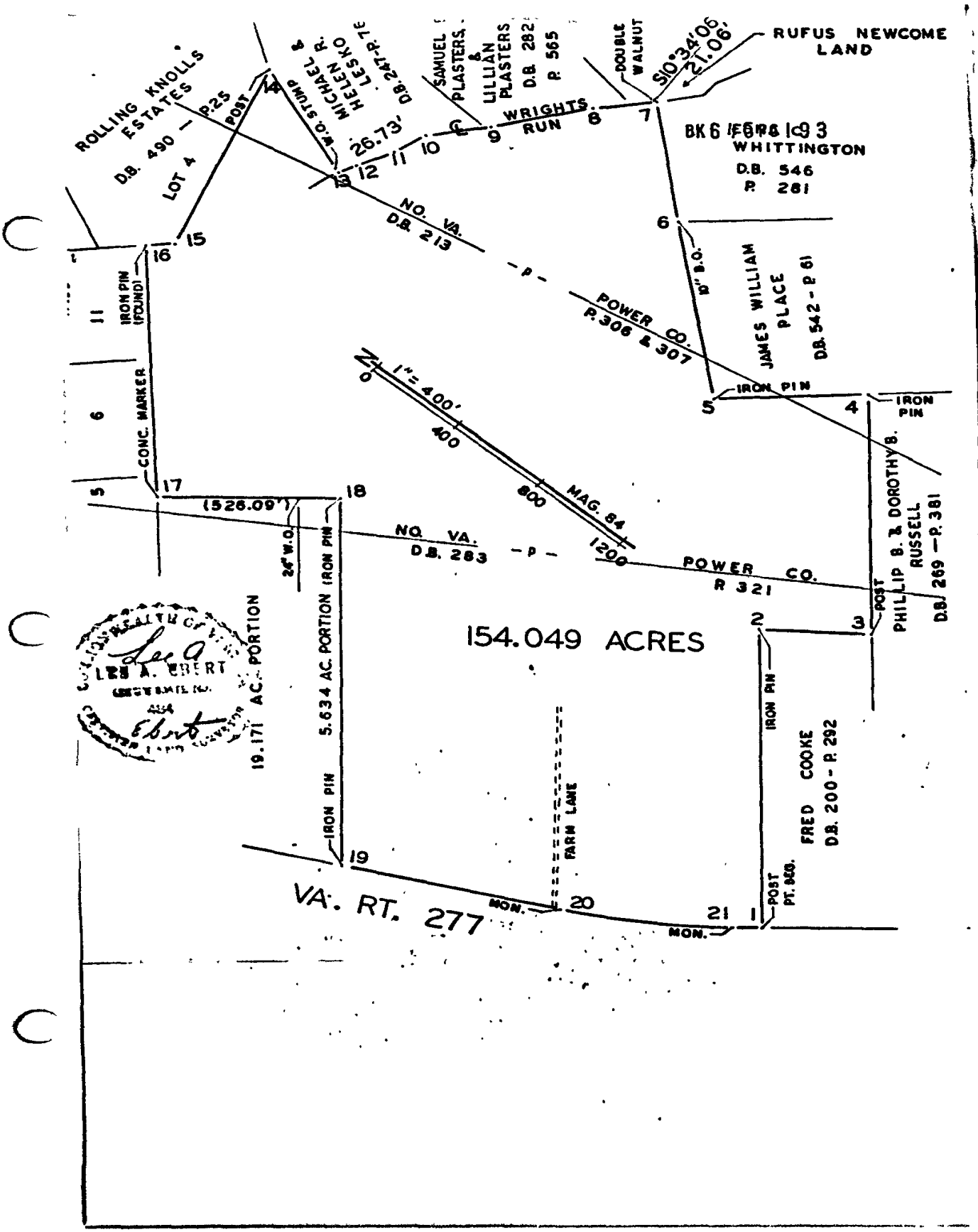
STATE OF VIRGINIA

City OF Winchester, to-wit:

The foregoing instrument was acknowledged before me this 21st day of April, 1987, by Reginald von Moultri Graff, Gloria Graff Kern, Wilbur L. Kern, Montie W. Gibson, and Pearl E. Gibson.

My Commission expires November 3, 1989.

[redacted]


RUFUS NEWCOME LAND
ROLLING KNOLLS ESTATES
D.B. 490 — P.25
LOT 4
POST
W.O. STUMP
MICHAEL & HELEN R. LESKO
D.B. 247-P.76
SAMUEL PLASTERS & LILLIAN PLASTERS
D.B. 282 P. 565
DOUBLE WALNUT
S10°34'06"
21.06'
WRIGHTS RUN
26.73'
WHITTINGTON
D.B. 546
P. 281
NO. VA.
D.B. 213
POWER CO.
P. 306 & 307
10" B.O.
JAMES WILLIAM PLACE
D.B. 542 - P. 61
IRON PIN (FOUND)
CONC. MARKER
1" = 400'
400
800
1200
MAG. 84
IRON PIN
(526.09')
24" W.O.
NO. VA.
D.B. 283
POWER CO.
R 321
PHILLIP B. & DOROTHY B. RUSSELL
D.B. 269 — P. 381
154.049 ACRES
19.171 AC. PORTION
5.634 AC. PORTION
FARM LANE
FRED COOKE
D.B. 200 - P. 292
POST PT. BEG.
VA. RT. 277
MON.
LEE A. EBERT

The Accompanying Plat is a Survey of the Graff Portion of the Land conveyed to Reginald VanMoultrie Graff by Deed date 23 February 1942 in Deed Book 185 Page 89. (ALSO NOTE: Deed to Conrad M. Graff dated 5 April 1945 in Deed Book 192 Page 252 and Conrad M. Graff will in Will Book 66 Page 162). The said Improved Land fronts the Northeastern Boundary Lines of Virginia Route 277 and lies in Opequon District, Frederick County, Virginia:

Beginning at (1), a post in the Northeastern Boundary Line of Route 277, a corner to the Cooke Land, running with the Two Following Lines of the said Land N 48° 57' 52" E - 1,353.19 ft. to (2), an iron pin; thence S 38° 18' 49" E - 414.89 ft. to (3), a post in the Northwestern Line of the Russell Land; thence with the said Line N 48° 53' 44" E - 1,083.27 ft. to (4), an iron pin in the Southwestern Line of the Place Land; thence with the Two Following Lines of the said Land N 42° 56' 20" W - 577.89 ft. to (5), an iron pin; thence N 40° 05' 30" E - 818.66 ft. to (6), a 10" black oak tree corner to the Whittington Land; thence with the Northwestern Line of the said Land N 41° 21' 14" E - 555.01 ft. to (7), a point in the Center Line of Wrights Run in the Southwestern Line of the Newcome Land - the said point being S 10° 34' 06" W - 21.06 ft. from a double walnut tree; thence with the Six Following Center Lines - Southwestern Lines of the Newcome Land, the Plasters Land and the Lesko Land - N 48° 34' 47" W - 237.86 ft. to (8); thence N 53° 45' 50" W - 388.14 ft. to (9); thence N 50° 39' 09" W - 249.17 ft. to (10); thence N 74° 05'54" W - 143.21 ft. to (11); thence N 64° 17' 08" W - 153.85 ft. to (12); thence N 67° 34' 53" W - 75.35 ft. to (13), the Southwestern Line of the said Lesko Land; thence with the Western Line of the said Land N 21° 18' 45" E - 26.73 ft. to a white oak stump, and continuing N 21° 18' 45" E - 540.32 ft., in All, to (14), a post corner to the Rolling Knolls Estates; thence with the Two Following Lines of the said Land S 72° 57' 54" W - 880.26 ft. to (15); thence N 45° 43' 40" W - 108.50 ft. to (16), an iron pin (found) corner to theSnapp Subdivision; thence with the Southeastern Line of the said Land S 47° 24' 04" W - 1,152.51 ft. to (17), a concrete marker corner to the 19.171 Acre Southwestern Portion; thence with the Northeastern Line of the said Land, and continuing with the Northeastern Line of the 5.634 Acre Portion S 40° 12' 10" E - 676.12 ft. to (18), an iron pin; thence with the Southeastern Line of the said 5.634 Acre

Portion S 48° 35' 00" W - 1,653.11 ft. BK 645 PG 185 iron pin in the Northeastern Boundary Line of Route277; thence with the Three Following Boundary Lines S 27° 24' 07" E - 829.40 ft. to (20), a concrete highway monument; thence with the Arc Line 648.19 ft. (Chord S 33° 57' 07" E - 646.78 ft. - R. 2,835.00 ft.) to (21), a concrete highway monument; thence S 40° 30' 07" E - 103.68 ft. to the beginning.

Also shown on the Plat is the Northern Virginia Power Company R/W - Deed Book 283 Page 321.

Also shown on the Plat is the Northern Virginia Power Company R/W - Deed Book 213 Pages 306 and 307.

Containing - - 154.049 Acres

Surveyed - - - June 21, 1984

COMMONWEALTH OF VIRGINIA
[redacted]
LEE A. EBERT
LICENSED SURVEYOR
[redacted]

VIRGINIA FREDERICK COUNTY, to-wit:

This instrument of writing was produced to me on the 21 day of April, 1982, at 3:27 P.M. and with certificate of acknowledgment thereto annexed was admitted to record. Tax imposed by Sec. 58-54.1 of $265.00, and 58-54 have been paid, if asse.sab

[redacted] Clr

210001397

Address: 867 Front Royal Pike
Winchester, VA 22602
Consideration: $ 1300.00
Assessed: $ 1,300.00

PG0168

DEED

THIS DEED, made and dated this 11th day of January, 2021, by and between TIMOTHY SCOTT **FRYE,** KEITH JAMES **FRYE,** and TERRY LYNN **FRYE**, being all the heirs at law of the Estate of Anna Lee Frye, parties of the first part, hereinafter called the Grantors, and MONTE **GIBSON, JR.,** party of the second part, hereinafter called the Grantee.

WITNESSETH: That for and in consideration of the sum of $10.00 cash in hand paid and other good and valuable consideration, the receipt of which is hereby acknowledged, the Grantors do hereby grant and convey, with General Warranty and English Covenants of Title, in fee simple, unto the Grantee, together with all rights, rights of way, privileges, improvements thereon and appurtenances thereto belonging, all the following described property, to-wit:

TAX ID NUMBER: 87-A-94

All that certain lot or parcel of land, containing 0.18 acres, more or less, situate on the North side of Virginia Highway No. 277, a short distance West of Double Tollgate, in the Opequon District of Frederick County, Virginia, and being more particularly describe by plat and survey of Richard Goode, dated April 28, 1966, and of record in the Office of the Clerk of the Circuit Court of Frederick County, Virginia. AND BEING the same parcel of real estate conveyed unto Carl E. Frye, by Deed dated the 26th day of October, 1970, and of record in the aforesaid Clerk's Office in Deed Book 369, ay Page 692.

Carl E. Frye died testate, and by his Last Will and Testatment dated October 19, 1994, devised this property to his wife Anna Lee Frye. Anna Lee Frye died testate and by her Last Will and Testatment dated the 8th day of April, 2002, devised this property to her three children, Terry Lynn Frye, Keith James Frye and Timothy Scott Frye, the grantors herein, in equal shares.

Reference is hereby made to the aforesaid instruments, attachments and the references therein contained, for a more particular description of the property herein

conveyed.

This conveyance is made subject to all legally enforceable restrictive covenants, easements, and rights of way of record in the aforesaid subject property.

WITNESS the following signature(s) and seal(s):

[redacted] (SEAL)
TIMOTHY SCOTT FRYE, Grantor

[redacted] (SEAL)
KEITH JAMES FRYE, Grantor

[redacted] (SEAL)
TE

COMMONWEALTH OF VIRGINIA, AT LARGE
City of Winchester, to-wit:

The foregoing Deed was acknowledged before me, MARGUERITE C. LOVELADY Notary Public in and for the aforesaid jurisdiction, by Timothy Scott Frye, this 15th day of January, 2021.

[redacted]
Notary Public

My Commission expires: 1/31/22.

Notary ID: 7010794.

MARGUERITE C. LOVELADY
NOTARY PUBLIC
REG. #7010794
MY COMMISSION EXPIRES
1/31/22
COMMONWEALTH OF VIRGINIA

COMMONWEALTH OF VIRGINIA, AT LARGE
City of Winchester, to-wit:

The foregoing Deed was acknowledged before me, [redacted] Notary Public in and for the aforesaid jurisdiction, by Keith James Frye, this 14th day of January,

(for Keith James Frye)

2021.

[redacted]
Notary Public

My Commission expires: 1/31/2020.

Notary ID: 7010794.

MARGUERITE C. LOVELADY
NOTARY PUBLIC
REG. #7010794
MY COMMISSION EXPIRES
1/31/20
COMMONWEALTH OF VIRGINIA

COMMONWEALTH OF VIRGINIA, AT LARGE
City of Winchester, to-wit:

The foregoing Deed was acknowledged before me, MARGUERITE C. LOVELADY, Notary Public in and for the aforesaid jurisdiction, by Terry Lynn Frye, this 15 day of January, 2021.

[redacted]
Notary Public

My Commission expires: 1/31/2020.

Notary ID: 7010794

MARGUERITE C. LOVELADY
NOTARY PUBLIC
REG. #7010794
MY COMMISSION EXPIRES
1/31/20
COMMONWEALTH OF VIRGINIA

This instrument was prepared by Clinton R. Ritter, Attorney at Law, 205 East Boscawen Street, Winchester, Virginia 22601, **without** the opportunity of a title examination.

VIRGINIA: FREDERICK COUNTY,SCT.
This instrument of writing was produced to me on
1.25.2021 at 12:17 p.m.
and with certificate acknowledgement thereto annexed was admitted to record. Tax imposed by Sec. 58.1-802 of
$1.50, and 58.1-801 have been paid, if assessable.

[redacted], Clerk

PG 1 / 70

Frederick Home

Frederick County Virginia *Life at the Top*

Pay/Lookup Taxes

Payment Home | Personal Property | Real Estate | Dog Tags | Pay Parking Violation | Pay FOIA Charges | Pay Planning Charges | Other Payments | ShoppingCart(0) | Pin Options

Inquiry of Real Estate

Map Number: **87 3 B** View Map Name: **GIBSON MONTIE W JR**

		Account#	Dept#	Ticket#	Seq#	Due Date	Detailed Information (Click Below)	Amount Due
ViewBill	View Back of Bill	8026068	RE2024	15187	1	6/5/2024	2024 REAL ESTATE	$0.00
ViewBill	View Back of Bill	8026068	RE2024	15187	2	12/5/2024	2024 REAL ESTATE	$0.00
ViewBill	View Back of Bill	8026068	RE2025	15575	1	6/5/2025	2025 REAL ESTATE	$0.00
ViewBill	View Back of Bill	8026068	RE2025	15575	2	12/5/2025	2025 REAL ESTATE	$0.00
ViewBill	View Back of Bill	8026068	RE2026	15536	1	6/5/2026	2026 REAL ESTATE	$0.00
		8026068	RE2026	15536	2	12/7/2026	2026 REAL ESTATE	$0.00

Total Due: $0.00

Return to Search

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Inquiry of Real Estate

Map Number: **87 A 16B** View Map Name: **GIBSON MONTIE W JR**

		Account#	Dept#	Ticket#	Seq#	Due Date	Detailed Information (Click Below)	Amount Due
ViewBill	View Back of Bill	8029952	RE2024	15185	1	6/5/2024	2024 REAL ESTATE	$0.00
ViewBill	View Back of Bill	8029952	RE2024	15185	2	12/5/2024	2024 REAL ESTATE	$0.00
ViewBill	View Back of Bill	8029952	RE2025	15573	1	6/5/2025	2025 REAL ESTATE	$0.00
ViewBill	View Back of Bill	8029952	RE2025	15573	2	12/5/2025	2025 REAL ESTATE	$0.00
ViewBill	View Back of Bill	8029952	RE2026	15534	1	6/5/2026	2026 REAL ESTATE	$0.00

(•) Show Current Charges Due ( ) Show All Charges

Total Due: $0.00

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Pay/Lookup Taxes

Payment Home | Personal Property | Real Estate | Dog Tags | Pay Parking Violation | Pay FOIA Charges | Pay Planning Charges | Other Payments | ShoppingCart(0) | Pin Options

Inquiry of Real Estate

Map Number: **87 A 94** View Map Name: **GIBSON MONTE JR**

		Account#	Dept#	Ticket#	Seq#	Due Date	Detailed Information (Click Below)	Amount Due
ViewBill	View Back of Bill	8026045	RE2024	15181	1	6/5/2024	2024 REAL ESTATE	$0.00
ViewBill	View Back of Bill	8026045	RE2024	15181	2	12/5/2024	2024 REAL ESTATE	$0.00
ViewBill	View Back of Bill	8026045	RE2025	15571	1	6/5/2025	2025 REAL ESTATE	$0.00
ViewBill	View Back of Bill	8026045	RE2025	15571	2	12/5/2025	2025 REAL ESTATE	$0.00
ViewBill	View Back of Bill	8026045	RE2026	15532	1	6/5/2026	2026 REAL ESTATE	$0.00
		8026045	RE2026	15532	2	12/7/2026	2026 REAL ESTATE	$4.77

Total Due: $4.77

Return to Search

ORDINANCE

Action:		
PLANNING COMMISSION:	September 16, 2026	Work Session Held
PLANNING COMMISSION:	October 7, 2026	Recommended Denial
BOARD OF SUPERVISORS:	October 28, 2026	Pending

AMENDING THE ZONING DISTRICT MAP
REZONING #08-26 FOR GIBSON PROPERTY (ESTATE OF MONTIE WOOD GIBSON, JR.)

WHEREAS, REZONING #08-26 for Gibson Property submitted to rezone +/- 244.06-acres from the RA (Rural Areas) Zoning District to the M1 (Light Industrial) Zoning District with proffers. The property is located at 1787 Fairfax Pike and is generally north of Route 277 (Fairfax Pike) and west of Route 522 (Front Royal Pike) and is identified by Property Identification Numbers (PINs) 87-3-B, 87-A-16B, and 87-A-94 in the Shawnee Magisterial District; and

WHEREAS, the Frederick County Planning Commission held a work session on this rezoning on September 16, 2026, and took no action; and

WHEREAS, the Frederick County Planning Commission held a public hearing on this rezoning on October 7, 2026, and recommended denial; and

WHEREAS, the Frederick County Board of Supervisors held a public hearing on October 28, 2026; and

WHEREAS, the Frederick County Board of Supervisors finds the approval of this rezoning to be in the best interest of public health, safety, and welfare, and in general conformance with the Comprehensive Plan;

NOW, THEREFORE, BE IT ORDAINED by the Frederick County Board of Supervisors, that Chapter 165 of the Frederick County Code, Zoning, the Zoning District Map is amended in accordance with Rezoning #08-26 for Gibson Property submitted to rezone +/- 244.06-acres from the RA (Rural Areas) Zoning District to the M1 (Light Industrial) Zoning District with proffers dated October 7, 2026. The conditions voluntarily proffered in writing by the Applicant and the Property Owner are attached.

This ordinance shall be in effect on the date of adoption.

Passed this 28th day of October 2026 by the following recorded vote:

John F. Jewell, Chairman

Albert L. Orndorff

Michael D. Guevremont

Gary R. Oates

Jason C. Aikens

Robert W. Wells

Robert T. Liero

A COPY ATTEST

_____

Michael Bollhoefer
Frederick County Administrator

TECHNICAL MEMORANDUM

To: John A. Bishop — Frederick County Planning and Development

From: Erin B. Steel, P.E.
Ariel Jarvis, P.E.
Pratik Neupane

Date: August 26, 2026

Subject: **Supplemental Traffic Analysis – Gibson Property (Removal of Landbay East of Rt 522)**
Frederick County, VA

Introduction

This supplemental analysis evaluates the proposed Gibson Property development in Frederick County, Virginia with the landbay east of Route 522 removed from the project. The Gibson development site is located northwest of the intersection of Route 522 and Fairfax Pike (Route 277)/Lord Fairfax Highway (Route 340). It is situated north of Fairfax Pike and west of Route 522.

This analysis supplements the previously submitted Traffic Impact Study prepared for the Gibson Property, dated July 30, 2026. Compared with the development program evaluated in the original study, the landbay east of Route 522, identified as Tax Map Parcel 87-3-A, has been removed from the proposed development. The project is now limited to Tax Map Parcels 87-A-16B and 87-3-B, which collectively comprise approximately 244.379 acres.

The revised development program proposes up to 2.6 million square feet of industrial park use, representing the same proportion of development previously proposed on the landbays retained within the application. For purposes of this supplemental analysis, only the Future with Development 2035 and Future with Development 2041 conditions will be evaluated. All other analysis scenarios and assumptions from the original Traffic Study remain applicable and are therefore unchanged for this supplemental analysis.

Figure 1 shows the site location and study intersections.

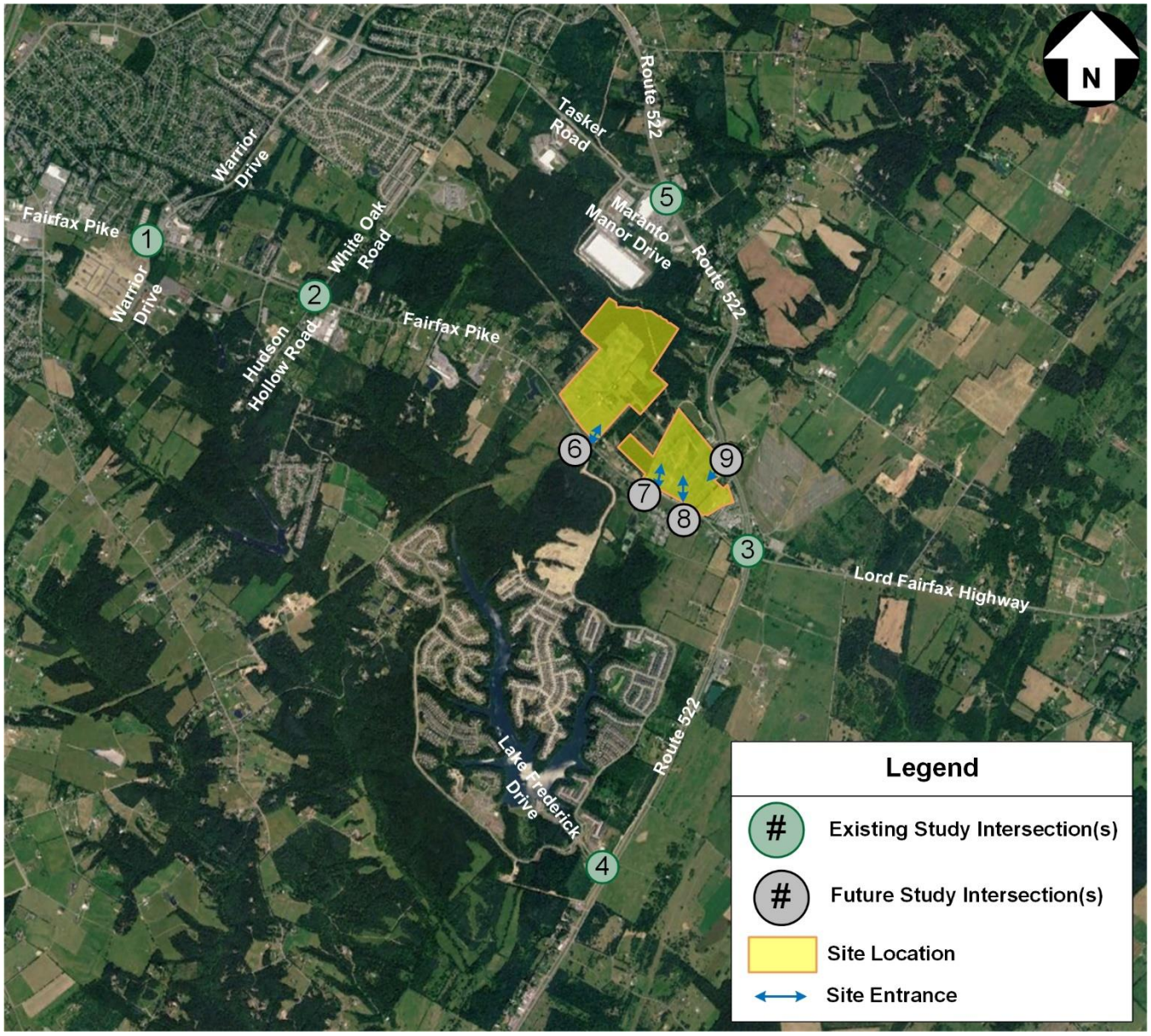

Figure 1: Site Location and Study Intersections with Removal of Eastern Landbay

Projected Site Trip Generation

In order to calculate the trips generated by the proposed development, the Institute of Transportation Engineers' (ITE) Trip Generation Manual, 12th Edition, publication was used to determine the total trips going into and out of the subject site during the AM and PM peak hours as well as the typical number of weekday daily trips. The projected trip generation for the proposed development is depicted in Table 1.

Table 1: Projected Site Trip Generation – Proposed Use (Peak Hour of the Adjacent Street; ITE 12th Ed.)

	ITE Code	Size	------ Weekday ------						
			AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	Total
Proposed Uses									
Industrial Park	130	2,600.0 kSF of GFA	377	113	490	148	382	530	6,112
Total			**377**	**113**	**490**	**148**	**382**	**530**	**6,112**

As shown in Table 1, the site is expected to generate approximately 490 trips during the AM peak hour, 530 trips during the PM peak hour, and 6,112 weekday daily trips on a typical weekday.

It should be noted that the revised development program proposes 2.6 million square feet of industrial park use, which is less than the 3.2 million square feet evaluated in the original Traffic Study. Because the revised program generates fewer site trips than the original development program, and the revised development program represents the same proportion of development on the remaining landbays, a rescoping of the study was not required.

Distribution and Assignment of Vehicular Site Traffic

The distribution and assignment of site-generated vehicular trips were based on existing traffic patterns, engineering judgment, the nature of the proposed development, and input and concurrence from Frederick County and VDOT staff during the scoping process. The directional distribution and site access assumptions are consistent with those used in the original Traffic Study. The site assignment for the peak hour trips is presented in Figure 2.

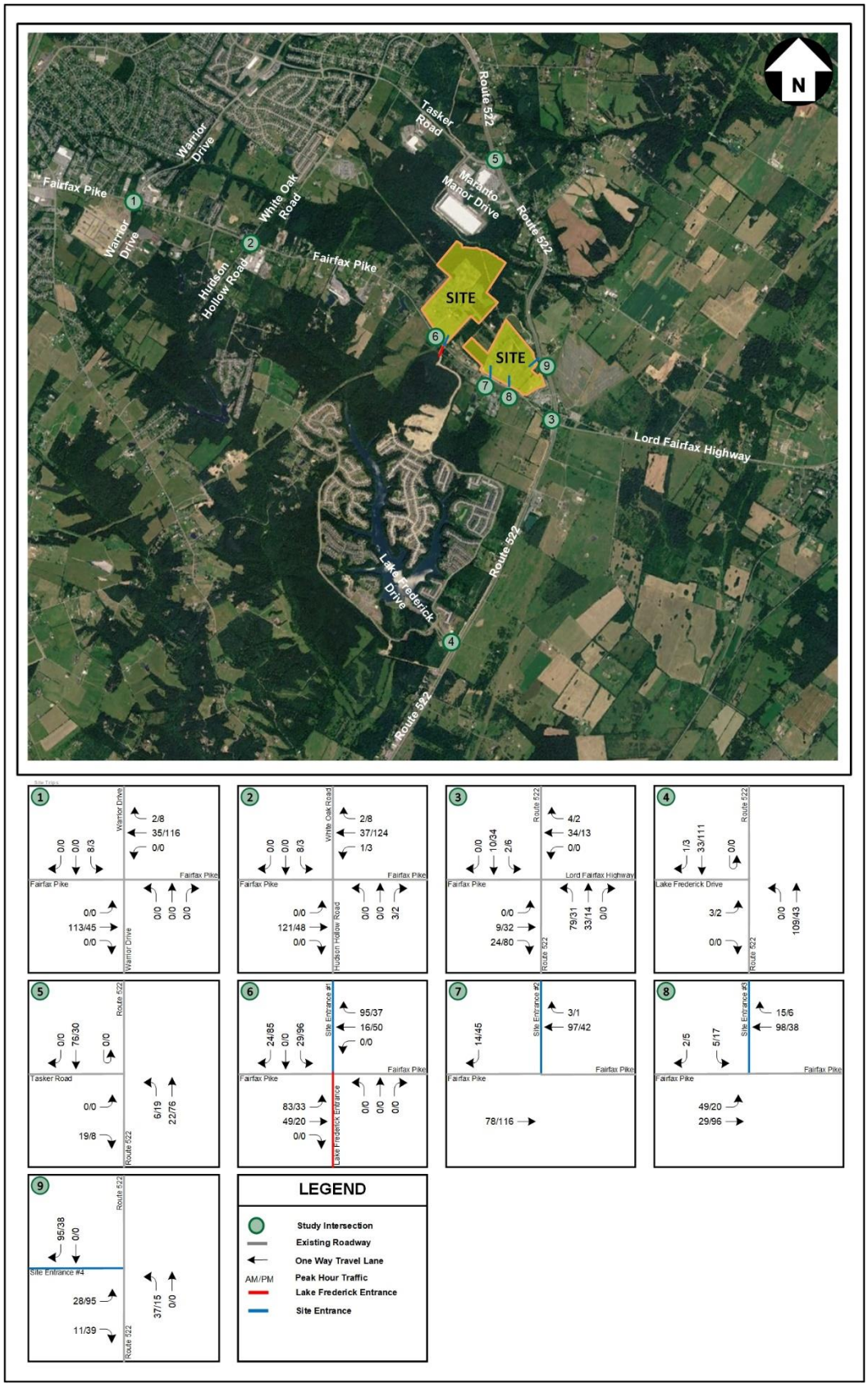

Figure 2: Site Trips Assignment

Future with Development (2035) Traffic Volumes

The future with development traffic volumes were determined by adding the assigned site generated traffic volumes (Figure 2) to the 2035 Future Conditions without Development traffic volumes presented in the original Traffic Study. The 2035 Future Conditions with Development traffic volumes are depicted in Figure 3.

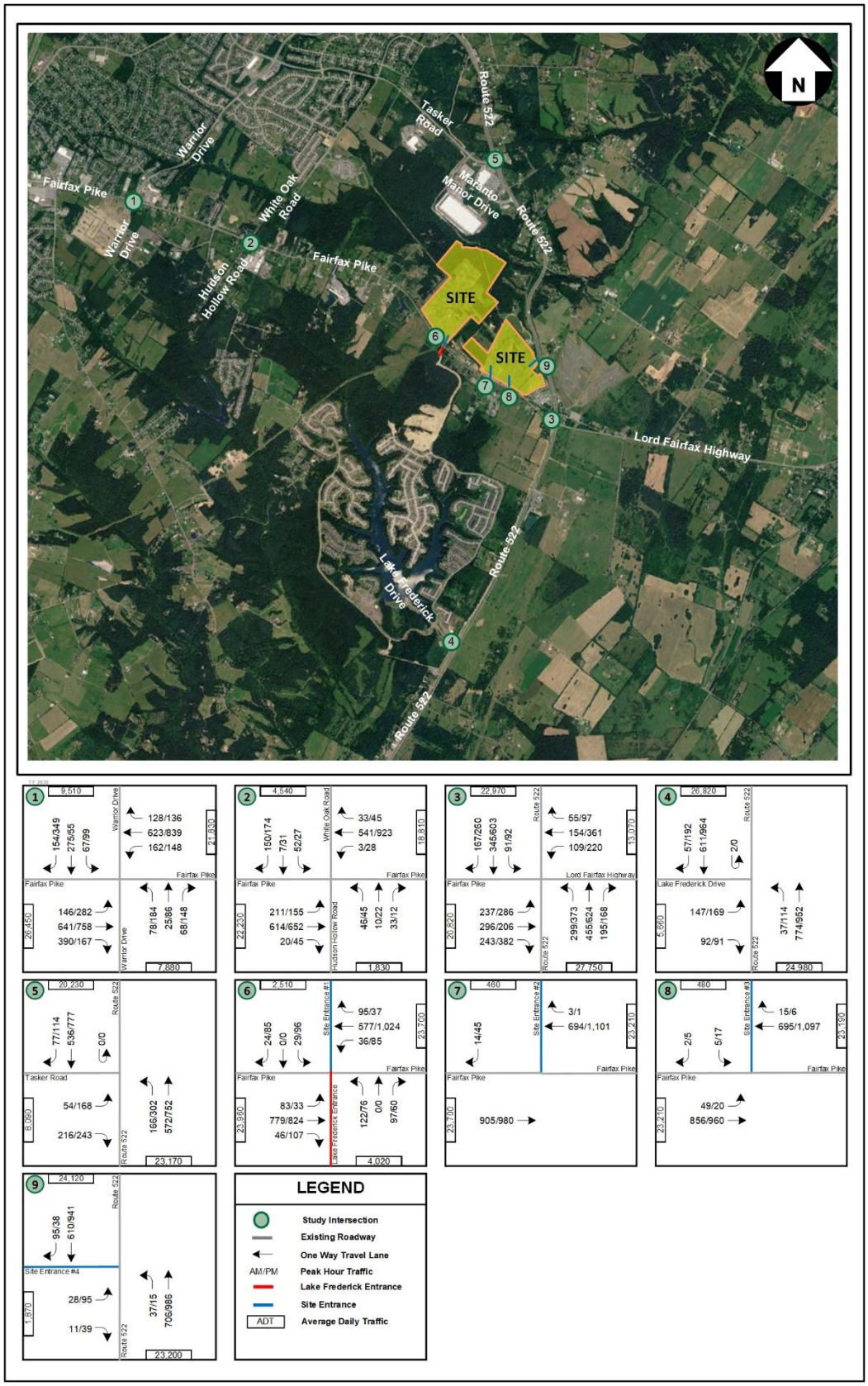

Figure 3: 2035 Future Conditions with Development – Vehicular Traffic Volumes

Future with Development (2035) Intersection Capacity and Queueing Analysis

Intersection capacity analyses were performed for the 2035 Future Conditions with Development scenario at the study area intersections during the AM and PM peak hours. Synchro, version 11, was used to analyze the study intersections with results based on the HCM 6th methodology[1] presented in the TRB's Highway Capacity Manual (HCM) and analysis guidelines provided by the County. The analysis herein includes level of service (LOS), delay, and queue length comparisons for the turning movements analyzed.

For the purposes of this analysis, the future peak hour factors (PHF) were based on the traffic counts, as applicable, and utilized on a by-intersection basis; PHF in the range of 0.92 to 1.00 were used for the future scenario, consistent with the scoping document. The heavy vehicle percentages (HV%) were the same as those used in the 2026 Existing Conditions and 2035 Future Conditions without Development scenario analyses in the original traffic study.

The planned background improvements and the site-related improvements recommended for the 2035 analysis year in the original Traffic Study dated July 30, 2026 were carried forward and incorporated into this supplemental analysis. Hence, only the mitigated results are shown in Table 2, Table 3, and Table 4.

The planned background improvements by others include:

- **Intersection 1 (Fairfax Pike and Warrior Drive):** Extension of eastbound right turn lane (VDOT SMART SCALE project).
- **Intersection 2 (Fairfax Pike and White Oak/Hudson Hallow Road):** Addition of exclusive eastbound and westbound left-turn lanes on Fairfax Pike (by Madison Farm).

The following future potential mitigations were identified under the Future with Development scenario:

- **Intersection 1 (Fairfax Pike and Warrior Drive):** Conversion from "protected only" to "flashing yellow arrow" for eastbound left-turn and westbound left-turn movements.
- **Intersection 3 (Rt 522 and Fairfax Pike/Lord Fairfax Highway):** Addition of an exclusive eastbound left-turn lane and a second northbound left-turn lane.
- **Intersection 6 (Fairfax Pike and Lake Frederick Entrance/Site Entrance #1):** Installation of a traffic signal*.
- **Intersection 9 (Rt 522 and Site Entrance #4)**: Installation of a traffic signal*.

It is noted that installation of traffic signals at Intersections 6 and 9 at site entrances are subject to VDOT review and approval through future Signal Justification Reports ("SJRs"). Preliminary signal warrant evaluations and VJuST analyses were performed as part of the original Traffic Study, dated July 30, 2026 to screen potential intersection control configurations. The ultimate configurations will be determined through the future SJRs.

The results of the intersection capacity analyses from Synchro are presented in Table 2, Table 3, and Table 4 and graphically in Figure 4. The results are expressed in LOS and delay (seconds per vehicle) for overall signalized intersections and per approach and lane group for all study intersections. The 95th percentile queue lengths were also determined from Synchro and are expressed in feet.

The detailed analysis worksheets of the 2035 Future Conditions with Development are contained in Appendix A.

[1] It should be noted that HCM 2000 methodology was used in lieu of HCM 6th if the HCM 6th methodology was not applicable. HCM 6th could not be applicable in such cases as nonstandard National Electrical Manufacturers Association (NEMA) configurations, shared lane configurations, placement of loop detectors, U-turns, etc.

Table 2: 2035 Future Conditions with Development – Intersection Capacity and Queuing Analysis Results (Part 1)

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour				PM Peak Hour			
			LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3][4]	LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3][4]
			Synchro				Synchro			
1	**Mitigation: Flashing Yellow Arrow on EBL and WBL movement Warrior Drive (N/S) & Fairfax Pike (E/W) Overall Intersection (Signalized)**		**E**	**56.3**			**D**	**54**		
	Eastbound Approach		***C***	***22.9***			***D***	***43.6***		
	Eastbound Left	260	C	21.5	3	67	F	96.9	~186	#355
	Eastbound Thru		C	28.3	565	703	C	28.3	561	#806
	Eastbound Right	500	B	12.9	165	241	A	7.9	0	57
	Westbound Approach		***C***	***25.3***			***E***	***59.1***		
	Westbound Left	270	C	22.9	61	90	C	20.8	67	#185
	Westbound Thru		C	27.2	494	#676	F	69.3	~765	#1006
	Westbound Right	575	B	12.3	0	25	B	12.7	0	26
	Northbound Approach		***D***	***51.9***			***E***	***72.9***		
	Northbound Left	190	D	52.8	56	#130	D	46.7	120	#202
	Northbound Thru/Right		D	49.7	20	#86	F	99.9	~180	#351
	Southbound Approach		***F***	***230.2***			***D***	***53.3***		
	Southbound Left	150	D	48.2	46	90	D	43.7	61	110
	Southbound Thru		F	292.5	~322	#530	D	47.7	40	83
	Southbound Right		D	46	0	55	E	57.9	185	301
2	**Hudson Hollow Road/White Oak Road & Fairfax Pike (E/W) Overall Intersection (Signalized)**		**B**	**13.9**			**B**	**19.8**		
	Eastbound Approach		***B***	***11.5***			***B***	***11.5***		
	Eastbound Left	145	B	11.4	25	68	B	17.2	16	#107
	Eastbound Thru		B	11.6	126	408	B	10.4	124	370
	Eastbound Right	90	A	5.9	0	0	A	5.6	0	7
	Westbound Approach		***B***	***15.5***			***C***	***25.5***		
	Westbound Left	125	A	7.9	0	3	A	6.9	3	11
	Westbound Thru		B	15.8	164	338	C	26.6	358	#708
	Westbound Right	155	A	8.4	0	3	A	6.7	0	7
	Northbound Approach		***C***	***21.2***			***C***	***28.3***		
	Northbound Left/Thru/Right		C	21.2	21	69	C	28.3	30	74
	Southbound Approach		***C***	***22.1***			***C***	***28.8***		
	Southbound Left/Thru/Right		C	22.1	28	102	C	28.8	27	91
3	**Mitigation: Addition of Exclusive EBL and second NBL turn lanes Route 522 (N/S) & Fairfax Pike/Lord Fairfax Highway Overall Intersection (Signalized)**		**D**	**53.2**			**F**	**90.4**		
	Eastbound Approach		***E***	***69.1***			***F***	***98.7***		
	Eastbound Left	250	E	60.3	170	#317	F	150.1	~263	#436
	Eastbound Thru		E	79.6	217	#403	E	58.1	154	#277
	Eastbound Right	230	D	37.8	0	73	D	45.1	68	#236
	Westbound Approach		***D***	***53.6***			***F***	***112.1***		
	Westbound Left	500	D	44.8	75	128	D	40.2	152	237
	Westbound Thru/Right		E	58.4	144	222	F	147.3	~421	#630
	Northbound Approach		***D***	***44.2***			***F***	***99.1***		
	Northbound Left	565	E	60.3	115	#179	F	179.8	~185	#284
	Northbound Thru		C	34.8	172	232	D	53.5	251	#372
	Northbound Right	250	C	29.2	0	41	C	33.8	0	20
	Southbound Approach		***D***	***48.5***			***D***	***49.5***		
	Southbound Left	125	E	72.2	60	#149	E	67.8	76	#152
	Southbound Thru		D	42.2	133	132	D	46.7	214	#341
	Southbound Right	480	A	0	14	50	A	0	11	110

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] ~: Volume exceeds capacity, queue is theoretically infinite.

[3] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

[4] m: 95th percentile volume and queues (reported from Synchro) are metered by upstream signal.

[5] Intersection 5 is analyzed using HCM 2000

Table 3: 2035 Future Conditions with Development – Intersection Capacity and Queuing Analysis Results (Part 2)

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour				PM Peak Hour			
			LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3][4]	LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3][4]
			Synchro				Synchro			
4	**Route 522 (N/S) & Lake Frederick Drive (E)** **Overall Intersection (Signalized)**		**B**	**17.7**			**C**	**22.2**		
	Eastbound Approach		***C***	***29.3***			***C***	***34.8***		
	Eastbound Left		C	30.8	68	153	D	38.2	104	181
	Eastbound Right		C	22.1	4	36	C	27.5	33	68
	Northbound Approach		***B***	***15.2***			***C***	***20.9***		
	Northbound Left	470	C	20.7	8	23	C	31.9	27	58
	Northbound Thru		B	14.9	111	267	B	19.6	157	244
	Southbound Approach		***B***	***17.8***			***C***	***20.4***		
	Southbound Thru		B	17.9	134	226	C	20.9	273	418
	Southbound Right	295	B	13.2	0	25	B	13.8	0	46
	Southbound U-Turn		A	0	0	3	A	0	0	0
5	**Route 522 (N/S) & Tasker Road (E)** **Overall Intersection (Signalized)**		**B**	**18.9**			**C**	**23.6**		
	Eastbound Approach		***D***	***46.9***			***D***	***45***		
	Eastbound Left		D	49.4	38	77	D	51.3	119	181
	Eastbound Right	250	D	46.3	0	39	D	40.7	0	36
	Northbound Approach		***B***	***13.8***			***B***	***18.1***		
	Northbound Left	485	D	54.9	64	96	D	53.7	119	137
	Northbound Thru		A	1.9	27	28	A	3.8	56	75
	Southbound Approach		***B***	***12.6***			***C***	***20.2***		
	Southbound Thru		B	13.4	103	162	C	21.9	205	311
	Southbound Right	315	A	6.9	0	14	A	8.7	0	20
6	**Mitigation: Install a Signal** **Lake Frederick Entrance/Gibson Site Entrance 1 & Fairfax Pike (E/W)** **Overall Intersection (Signalized)**		**A**	**7.3**			**A**	**9.8**		
	Eastbound Approach		***A***	***2.1***			***A***	***2.1***		
	Eastbound Left	150	A	4.5	8	m11	A	10	2	m6
	Eastbound Thru		A	1.9	109	119	A	1.9	134	272
	Eastbound Right	150	A	0	0	m1	A	0.1	0	m5
	Westbound Approach		***A***	***7***			***B***	***11.4***		
	Westbound Left	150	A	3.3	5	12	A	2.8	7	14
	Westbound Thru		A	7.4	182	258	B	12.3	395	#686
	Westbound Right	150	A	4.9	0	17	A	3.3	0	3
	Northbound Approach		***D***	***38.3***			***D***	***40***		
	Northbound Left		D	38.6	67	#136	D	40.1	45	#121
	Northbound Thru/Right		C	33.5	0	0	D	36.4	0	0
	Southbound Approach		***C***	***34.5***			***D***	***41.3***		
	Southbound Left	50	C	34.5	15	41	D	41.5	58	#154
	Southbound Thru/Right		C	33.3	0	0	D	36.5	0	0

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] ~: Volume exceeds capacity, queue is theoretically infinite.

[3] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

[4] m: 95th percentile volume and queues (reported from Synchro) are metered by upstream signal.

[5] Intersection 5 is analyzed using HCM 2000

Table 4: 2035 Future Conditions with Development – Intersection Capacity and Queuing Analysis Results (Part 3)

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour				PM Peak Hour			
			LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3][4]	LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3][4]
			Synchro				Synchro			
7	**Fairfax Pike (S) & Gibson Site Entrance 2 (E/W) Overall Intersection (Unsignalized)**									
	Southbound Approach		***B***	***14.2***			***D***	***25.3***		
	Southbound Right		B	14.2		2.5	D	25.3		20
8	**Fairfax Pike (S) & Gibson Site Entrance 3 (E/W) Overall Intersection (Unsignalized)**									
	Eastbound Approach									
	Eastbound Left	150	A	9.6		5	B	11.4		2.5
	Southbound Approach		***E***	***41.1***			***F***	***117.6***		
	Southbound Left		F	52		5	F	145.9		37.5
	Southbound Right	50	B	14		0	C	21.2		2.5
9	**Mitigation: Install a Signal Route 522 (N/S) & Gibson Site Entrance 4 (E) Overall Intersection (Signalized)**		**A**	**3.9**			**A**	**5.7**		
	Eastbound Approach		***C***	***32.6***			***C***	***33.7***		
	Eastbound Left		***C***	***32.6***	***9***	***28***	***C***	***33.9***	***31***	***70***
	Eastbound Right		A	0.0	0	12	C	23.6	0	22
	Northbound Approach		***A***	***0.4***			***A***	***0.1***		
	Northbound Left	300	A	4.4	0	m3	A	5.9	1	m1
	Northbound Thru		A	0.2	0	18	A	0	20	m22
	Southbound Approach		***A***	***6.6***			***A***	***8.7***		
	Southbound Thru		A	6.7	0	188	A	8.8	72	235
	Southbound Right	150	A	5.4	0	32	A	5.7	0	21

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] ~: Volume exceeds capacity, queue is theoretically infinite.

[3] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

[4] m: 95th percentile volume and queues (reported from Synchro) are metered by upstream signal.

[5] Intersection 5 is analyzed using HCM 2000

The capacity analysis results presented in Table 2, Table 3, and Table 4 indicate that the 2035 Future Conditions with Development supplemental analysis produces operational results that are similar to, or better than, those reported for the 2035 Future Conditions with Development scenario in the original Traffic Study. **Therefore, no changes to the mitigation measures recommended in the original study are proposed for the build-out year.**

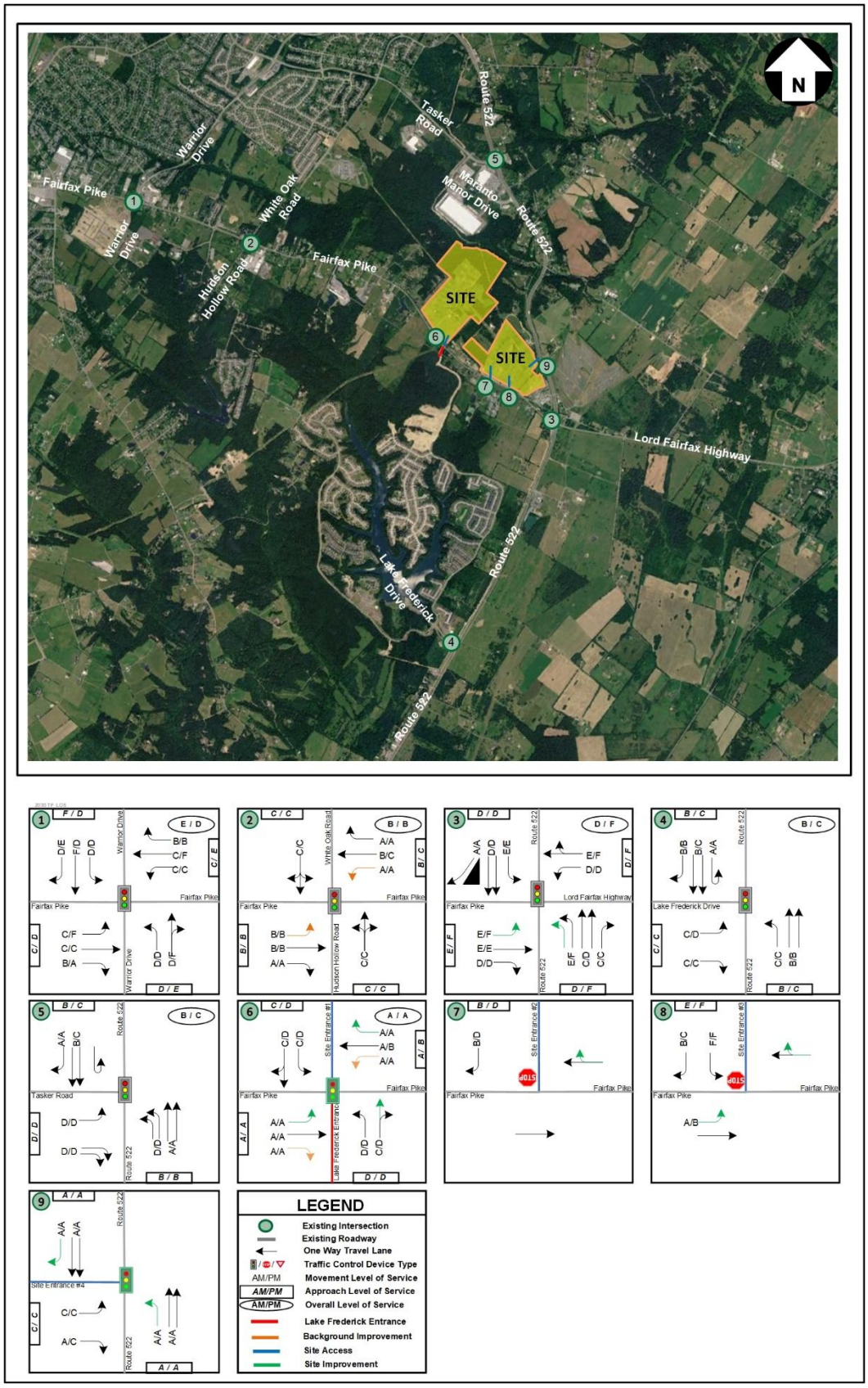

Figure 4: 2035 Future Conditions with Development (Planning Year) - Level of Service Results

Future with Development (2041) Traffic Volumes

The 2041 Future Conditions with Development traffic volumes were developed by adding the assigned site-generated traffic volumes shown in Figure 2 to the existing traffic volumes, inherent traffic growth volumes, and planned background development traffic volumes presented in the original Traffic Study. The 2041 Future Conditions with Development traffic volumes are depicted in Figure 5.

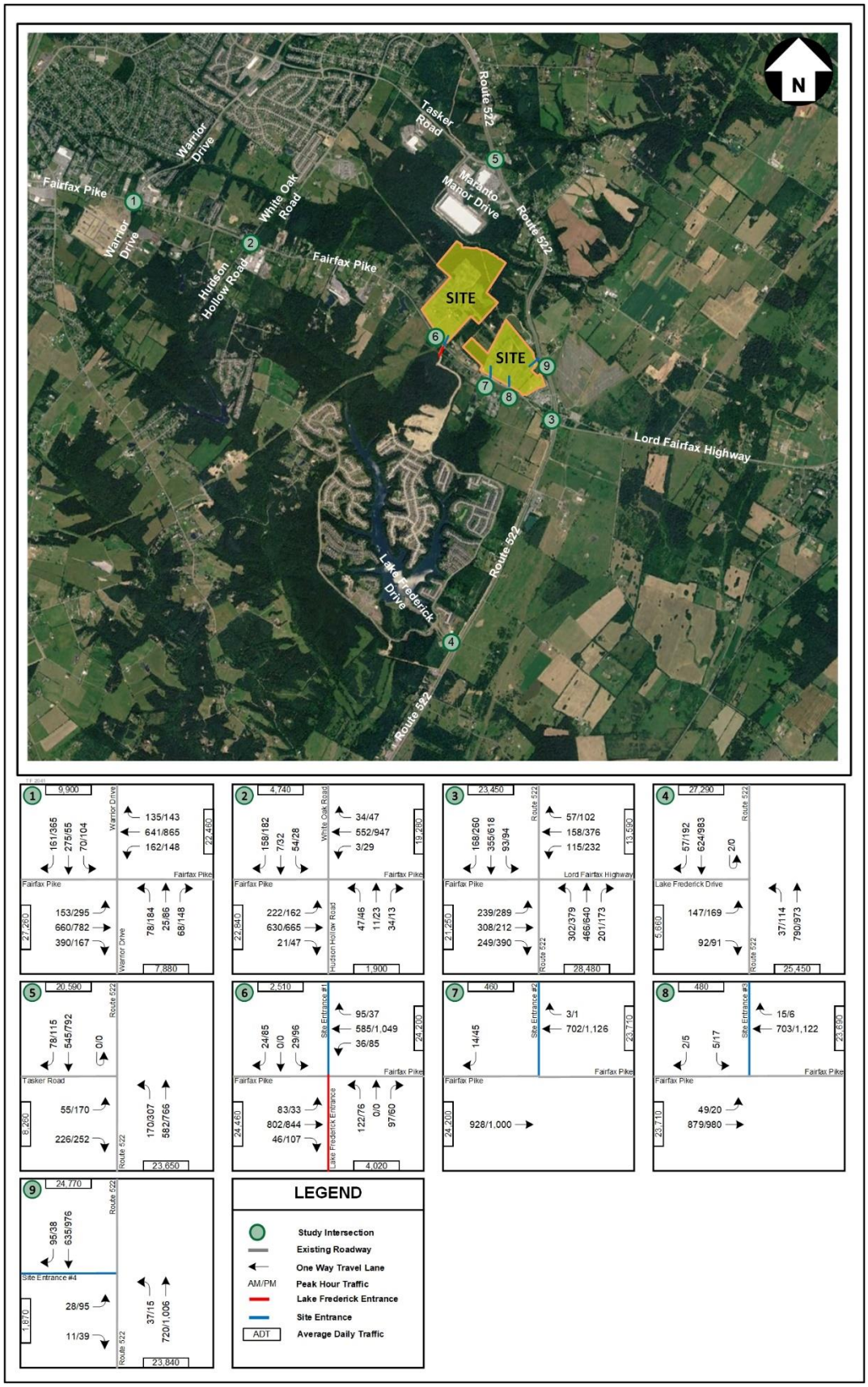

Figure 5: 2041 Future Conditions with Development (Design Year) – Vehicular Traffic Volumes

Future with Development (2041) Intersection Capacity and Queueing Analysis

Intersection capacity analyses were performed for the 2041 Future Conditions with Development scenario at the study area intersections during the AM and PM peak hours. Synchro, version 11, was used to analyze the study intersections with results based on the HCM 6th methodology presented in the TRB's Highway Capacity Manual (HCM) and analysis guidelines provided by the County. The analysis herein includes level of service (LOS), delay, and queue length comparisons for the turning movements analyzed.

For the purposes of this analysis, the future peak hour factors (PHF) were based on the traffic counts, as applicable, and utilized on a by-intersection basis; PHF in the range of 0.92 to 1.00 were used for the future scenario, consistent with the scoping document. The heavy vehicle percentages (HV%) were the same as those used in the 2026 Existing Conditions and 2035 Future Conditions without Development scenario analyses.

The planned background improvements and the site-related improvements recommended for the 2035 analysis year in the original Traffic Study were carried forward and incorporated into this supplemental analysis.

The results of the intersection capacity analyses from Synchro are presented in Table 5, Table 6, and Table 7 and graphically in Figure 6. The results are expressed in LOS and delay (seconds per vehicle) for overall signalized intersections and per approach and lane group for all study intersections. The 95th percentile queue lengths were also determined from Synchro and are expressed in feet.

The detailed analysis worksheets of the 2041 Future Conditions with Development are contained in Appendix B.

Table 5: 2041 Future Conditions with Development – Intersection Capacity and Queuing Analysis Results (Part 1)

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour				PM Peak Hour			
			LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3][4]	LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3][4]
			Synchro				Synchro			
1	**Warrior Drive (N/S) & Fairfax Pike (E/W) Overall Intersection (Signalized)**		**E**	**56.4**			**E**	**60.8**		
	Eastbound Approach		***C***	***23.7***			***D***	***48.7***		
	Eastbound Left	260	C	23	73	83	F	111	~207	#379
	Eastbound Thru		C	29.4	576	732	C	30.2	582	#845
	Eastbound Right	500	B	12.9	154	240	A	7.9	0	56
	Westbound Approach		***C***	***26.4***			***E***	***69.5***		
	Westbound Left	270	C	24.3	58	95	C	22.2	66	#183
	Westbound Thru		C	28.3	500	#769	F	81.9	~806	#1050
	Westbound Right	575	B	12.5	0	26	B	12.6	0	26
	Northbound Approach		***D***	***51.9***			***E***	***76.7***		
	Northbound Left	190	D	52.8	57	#128	D	46.8	120	#200
	Northbound Thru/Right		D	49.7	20	#87	F	107.5	~183	#351
	Southbound Approach		***F***	***228.9***			***E***	***58.5***		
	Southbound Left	150	D	48.2	49	93	D	43.8	64	115
	Southbound Thru		F	292.5	~346	#530	D	47.7	40	83
	Southbound Right		D	45.8	0	56	E	65.8	200	#345
2	**Hudson Hollow Road/White Oak Road & Fairfax Pike (E/W) Overall Intersection (Signalized)**		**B**	**14.4**			**C**	**21.8**		
	Eastbound Approach		***B***	***12.1***			***B***	***12.3***		
	Eastbound Left	145	B	12.5	27	75	B	19.8	19	#129
	Eastbound Thru		B	12.1	135	#483	B	10.8	128	390
	Eastbound Right	90	A	5.9	0	0	A	5.7	0	8
	Westbound Approach		***B***	***15.8***			***C***	***28.7***		
	Westbound Left	125	A	8.2	0	3	A	7.1	3	12
	Westbound Thru		B	16	172	355	C	30	377	#744
	Westbound Right	155	A	8.4	0	4	A	6.8	0	8
	Northbound Approach		***C***	***21.5***			***C***	***28.6***		
	Northbound Left/Thru/Right		C	21.5	23	71	C	28.6	31	#80
	Southbound Approach		***C***	***22.5***			***C***	***29.3***		
	Southbound Left/Thru/Right		C	22.5	31	107	C	29.3	30	97
3	**Route 522 (N/S) & Fairfax Pike/Lord Fairfax Highway Overall Intersection (Signalized)**		**E**	**55.2**			**F**	**96.3**		
	Eastbound Approach		***E***	***74.8***			***F***	***100.3***		
	Eastbound Left	250	E	61.1	173	#321	F	154.1	~267	#442
	Eastbound Thru		F	89.7	230	#423	E	60.4	159	#287
	Eastbound Right	230	D	37.9	0	74	D	47.8	85	#264
	Westbound Approach		***D***	***54***			***F***	***126.5***		
	Westbound Left	500	D	44.6	80	135	D	41.3	161	251
	Westbound Thru/Right		E	59.3	148	229	F	168.6	~455	#668
	Northbound Approach		***D***	***44.8***			***F***	***103.8***		
	Northbound Left	565	E	60.5	117	#181	F	188.3	~190	#290
	Northbound Thru		D	35.7	177	238	E	56.5	260	#386
	Northbound Right	250	C	29.6	0	46	C	34	0	24
	Southbound Approach		***D***	***49.3***			***D***	***52.1***		
	Southbound Left	125	E	72.7	62	#152	E	68.1	78	#155
	Southbound Thru		D	43.1	137	138	D	49.7	217	#352
	Southbound Right	480	A	0	13	44	A	0	12	109

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] ~: Volume exceeds capacity, queue is theoretically infinite.

[3] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

[4] m: 95th percentile volume and queues (reported from Synchro) are metered by upstream signal.

Table 6: 2041 Future Conditions with Development – Intersection Capacity and Queuing Analysis Results (Part 2)

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour				PM Peak Hour			
			LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3][4]	LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3][4]
			Synchro				Synchro			
4	**Route 522 (N/S) & Lake Frederick Drive (E) Overall Intersection (Signalized)**		**B**	**17.7**			**C**	**22.3**		
	Eastbound Approach		***C***	***29.4***			***D***	***35.1***		
	Eastbound Left		C	31	69	154	D	38.5	105	181
	Eastbound Right		C	22.4	5	39	C	27.8	33	68
	Northbound Approach		***B***	***15.1***			***C***	***21***		
	Northbound Left	470	C	20.9	8	23	C	32.4	27	58
	Northbound Thru		B	14.9	114	274	B	19.7	162	253
	Southbound Approach		***B***	***17.8***			***C***	***20.6***		
	Southbound Thru		B	17.9	138	232	C	21.1	282	432
	Southbound Right	295	B	13.1	0	25	B	13.7	0	46
	Southbound U-Turn		A	0	0	3	A	0	0	0
5	**Route 522 (N/S) & Tasker Road (E) Overall Intersection (Signalized)**		**B**	**19.1**			**C**	**23.7**		
	Eastbound Approach		***D***	***47***			***D***	***45.2***		
	Eastbound Left		D	49.5	39	78	D	51.8	120	184
	Eastbound Right	250	D	46.3	0	39	D	40.7	0	37
	Northbound Approach		***B***	***14***			***B***	***18.1***		
	Northbound Left	485	D	54.9	66	100	D	53.3	121	140
	Northbound Thru		A	2	27	30	A	3.9	59	77
	Southbound Approach		***B***	***12.7***			***C***	***20.4***		
	Southbound Thru		B	13.5	106	166	C	22.1	212	320
	Southbound Right	315	A	6.9	0	14	A	8.8	1	22
6	**Lake Frederick Entrance/Gibson Site Entrance 1 & Fairfax Pike (E/W) Overall Intersection (Signalized)**		**A**	**7.3**			**B**	**10.3**		
	Eastbound Approach		***A***	***2.2***			***A***	***2.2***		
	Eastbound Left	150	A	4.6	8	m11	B	10.9	2	m7
	Eastbound Thru		A	2.1	116	161	A	2.1	139	280
	Eastbound Right	150	A	0	0	m1	A	0.1	0	m6
	Westbound Approach		***A***	***7.1***			***B***	***12.3***		
	Westbound Left	150	A	3.3	5	12	A	2.8	7	14
	Westbound Thru		A	7.5	186	263	B	13.3	419	#807
	Westbound Right	150	A	4.9	0	17	A	3.3	0	3
	Northbound Approach		***D***	***38.3***			***D***	***40***		
	Northbound Left		D	38.6	67	#136	D	40.1	45	#121
	Northbound Thru/Right		C	33.5	0	0	D	36.4	0	0
	Southbound Approach		***C***	***34.5***			***D***	***41.3***		
	Southbound Left	50	C	34.5	15	41	D	41.5	58	#154
	Southbound Thru/Right		C	33.3	0	0	D	36.5	0	0

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] ~: Volume exceeds capacity, queue is theoretically infinite.

[3] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

[4] m: 95th percentile volume and queues (reported from Synchro) are metered by upstream signal.

[5] Intersection 5 is analyzed using HCM 2000.

Table 7: 2041 Future Conditions with Development – Intersection Capacity and Queuing Analysis Results (Part 3)

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour				PM Peak Hour			
			LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3][4]	LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3][4]
			Synchro				Synchro			
7	**Fairfax Pike (S) & Gibson Site Entrance 2 (E/W) Overall Intersection (Unsignalized)**									
	Southbound Approach		***B***	***14.3***			***D***	***26.2***		
	Southbound Right		B	14.3		2.5	D	26.2		20
8	**Fairfax Pike (S) & Gibson Site Entrance 3 (E/W) Overall Intersection (Unsignalized)**									
	Eastbound Approach									
	Eastbound Left	150	A	9.6		5	B	11.6		2.5
	Southbound Approach		***E***	***42.5***			***F***	***130.5***		
	Southbound Left		F	53.9		5	F	162.5		40
	Southbound Right	50	B	14		0	C	21.9		2.5
9	**Route 522 (N/S) & Gibson Site Entrance 4 (E) Overall Intersection (Signalized)**		**A**	**3.9**			**A**	**5.8**		
	Eastbound Approach		***C***	***32.6***			***C***	***33.7***		
	Eastbound Left		C	32.6	9	29	C	33.9	31	70
	Eastbound Right		A	0	0	12	C	23.6	0	22
	Northbound Approach		***A***	***0.4***			***A***	***0.1***		
	Northbound Left	300	A	4.4	0	m3	A	6	1	m1
	Northbound Thru		A	0.2	0	17	A	0	21	m22
	Southbound Approach		***A***	***6.7***			***A***	***8.9***		
	Southbound Thru		A	6.8	0	174	A	9	76	244
	Southbound Right	150	A	5.4	0	24	A	5.7	0	21

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] ~: Volume exceeds capacity, queue is theoretically infinite.

[3] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

[4] m: 95th percentile volume and queues (reported from Synchro) are metered by upstream signal.

The capacity analysis results presented in Table 5, Table 6, and Table 7 indicate that the 2041 Future Conditions with Development supplemental analysis produces operational results that are similar to, or better than, those reported for the 2041 Future Conditions with Development scenario in the original Traffic Study.

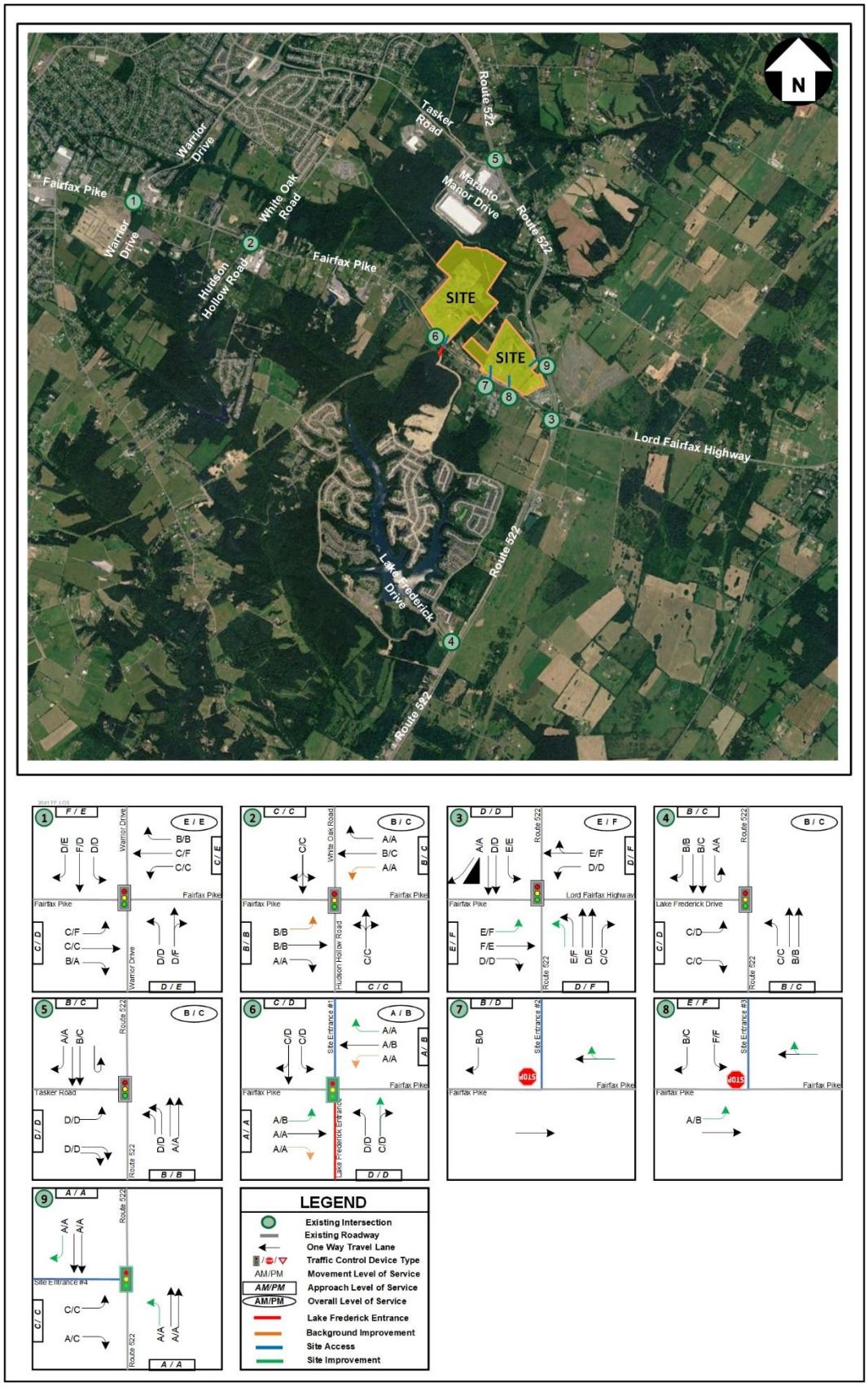

Figure 6: 2041 Future Conditions with Development (Planning Year) - Level of Service Results

Conclusion

This supplemental analysis evaluated the revised Gibson Property development program following removal of the landbay east of Route 522 (Tax Map Parcel 87-3-A). The project is now limited to Tax Map Parcels 87-A-16B and 87-3-B (approximately 244.379 acres), with development reduced proportionately from 3.2 million to 2.6 million square feet of industrial park use.

Intersection capacity and queuing analyses for both the 2035 and 2041 Future Conditions with Development scenarios show operational results similar to, or better than, those reported in the original Traffic Study. Accordingly, the mitigation measures and improvements recommended in the original study remain sufficient, and no changes are warranted as a result of the reduced development scope.

As noted in the original study, installation of traffic signals at Intersections 6 and 9 are subject to VDOT review and approval through future Signal Justification Reports (“SJRs”). Preliminary signal warrant evaluations and VJuST analyses were performed as part of the original Traffic Study to screen potential intersection control configurations. The ultimate configurations will be determined through the future SJRs.

Transportation Technical Appendix

Gibson Property- Supplemental Analysis

Frederick County, Virginia

GOROVE SLADE
Transportation Planners and Engineers

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Appendix A – 2035 Future Conditions with Development Supplemental Analysis – Capacity Analysis Worksheets

Appendix B – 2041 Future Conditions with Development Supplemental Analysis – Capacity Analysis Worksheets

A. 2035 Future Conditions with Development Supplemental Analysis – Capacity Analysis Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	159	697	424	176	677	139	85	101	73	299	167
v/c Ratio	0.60	0.85	0.48	0.67	0.88	0.16	0.62	0.44	0.22	1.04	0.36
Control Delay	23.2	42.7	13.1	25.5	45.4	2.0	58.5	25.3	37.9	116.3	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.2	42.7	13.1	25.5	45.4	2.0	58.5	25.3	37.9	116.3	7.8
Queue Length 50th (ft)	3	565	165	61	494	0	56	20	46	~322	0
Queue Length 95th (ft)	67	703	241	90	#676	25	#130	#86	90	#530	55
Internal Link Dist (ft)		593			4165			244		594	
Turn Bay Length (ft)	260		500	270		575	190		150		
Base Capacity (vph)	326	892	903	265	802	924	144	229	397	288	506
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.78	0.47	0.66	0.84	0.15	0.59	0.44	0.18	1.04	0.33

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	146	641	390	162	623	128	78	25	68	67	275	154
Future Volume (veh/h)	146	641	390	162	623	128	78	25	68	67	275	154
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	0.99		0.99	0.98		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1752	1796	1796	1722	1856	966	907	848	1870	1841	1781
Adj Flow Rate, veh/h	159	697	360	176	677	68	85	27	8	73	299	29
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	10	7	7	12	3	63	67	71	2	4	8
Cap, veh/h	312	941	956	280	906	888	140	102	30	294	204	247
Arrive On Green	0.06	0.54	0.54	0.06	0.53	0.53	0.09	0.15	0.15	0.05	0.11	0.11
Sat Flow, veh/h	1753	1752	1521	1711	1722	1537	920	670	198	1781	1841	1438
Grp Volume(v), veh/h	159	697	360	176	677	68	85	0	35	73	299	29
Grp Sat Flow(s),veh/h/ln	1753	1752	1521	1711	1722	1537	920	0	868	1781	1841	1438
Q Serve(g_s), s	5.4	39.7	15.0	6.0	39.9	2.5	10.5	0.0	4.6	4.7	14.4	2.2
Cycle Q Clear(g_c), s	5.4	39.7	15.0	6.0	39.9	2.5	10.5	0.0	4.6	4.7	14.4	2.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.23	1.00		1.00
Lane Grp Cap(c), veh/h	312	941	956	280	906	888	140	0	132	294	204	247
V/C Ratio(X)	0.51	0.74	0.38	0.63	0.75	0.08	0.61	0.00	0.26	0.25	1.47	0.12
Avail Cap(c_a), veh/h	416	941	956	308	906	888	143	0	132	402	204	247
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.56	0.56	0.56	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.2	23.1	11.7	20.9	24.0	12.2	45.8	0.0	48.7	47.7	57.8	45.8
Incr Delay (d2), s/veh	1.3	5.2	1.1	2.0	3.2	0.1	7.0	0.0	1.1	0.4	234.7	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	16.6	5.4	2.3	15.9	0.9	2.7	0.0	1.1	2.1	20.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.5	28.3	12.9	22.9	27.2	12.3	52.8	0.0	49.7	48.2	292.5	46.0
LnGrp LOS	C	C	B	C	C	B	D	A	D	D	F	D
Approach Vol, veh/h		1216			921			120			401	
Approach Delay, s/veh		22.9			25.3			51.9			230.2	
Approach LOS		C			C			D			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.3	74.2	13.1	26.4	14.9	75.7	18.5	21.0
Change Period (Y+Rc), s	* 8.7	* 5.8	6.6	6.6	* 6.8	5.8	6.6	6.6
Max Green Setting (Gmax), s	* 15	* 60	14.4	12.4	* 10	67.2	12.4	14.4
Max Q Clear Time (g_c+I1), s	7.4	41.9	6.7	6.6	8.0	41.7	12.5	16.4
Green Ext Time (p_c), s	0.2	6.1	0.1	0.0	0.1	9.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	56.3
HCM 6th LOS	E

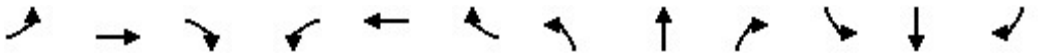
Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	229	667	22	3	588	36	97	228
v/c Ratio	0.55	0.66	0.02	0.01	0.76	0.05	0.42	0.60
Control Delay	10.7	14.5	0.1	4.3	21.9	0.5	23.9	17.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.7	14.5	0.1	4.3	21.9	0.5	23.9	17.8
Queue Length 50th (ft)	25	126	0	0	164	0	21	28
Queue Length 95th (ft)	68	408	0	3	338	3	69	102
Internal Link Dist (ft)		4165			4595		176	167
Turn Bay Length (ft)	145		90	125		155		
Base Capacity (vph)	418	1132	1026	461	1083	959	453	645
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.59	0.02	0.01	0.54	0.04	0.21	0.35

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	211	614	20	3	541	33	46	10	33	52	7	150
Future Volume (veh/h)	211	614	20	3	541	33	46	10	33	52	7	150
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1767	1752	1811	1870	1722	1737	1796	1752	1796	1826	1648	1707
Adj Flow Rate, veh/h	229	667	11	3	588	16	50	11	6	57	8	34
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	9	10	6	2	12	11	7	10	7	5	17	13
Cap, veh/h	414	943	826	333	776	663	259	51	19	193	39	67
Arrive On Green	0.09	0.54	0.54	0.00	0.45	0.45	0.14	0.14	0.14	0.14	0.14	0.14
Sat Flow, veh/h	1682	1752	1535	1781	1722	1472	1011	359	135	627	274	472
Grp Volume(v), veh/h	229	667	11	3	588	16	67	0	0	99	0	0
Grp Sat Flow(s),veh/h/ln	1682	1752	1535	1781	1722	1472	1505	0	0	1373	0	0
Q Serve(g_s), s	3.9	15.5	0.2	0.0	15.5	0.3	0.0	0.0	0.0	1.5	0.0	0.0
Cycle Q Clear(g_c), s	3.9	15.5	0.2	0.0	15.5	0.3	1.9	0.0	0.0	3.4	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.75		0.09	0.58		0.34
Lane Grp Cap(c), veh/h	414	943	826	333	776	663	330	0	0	300	0	0
V/C Ratio(X)	0.55	0.71	0.01	0.01	0.76	0.02	0.20	0.00	0.00	0.33	0.00	0.00
Avail Cap(c_a), veh/h	414	1285	1126	489	1263	1080	758	0	0	714	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	9.8	9.4	5.9	7.9	12.5	8.3	20.9	0.0	0.0	21.5	0.0	0.0
Incr Delay (d2), s/veh	1.6	2.2	0.0	0.0	3.3	0.0	0.3	0.0	0.0	0.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	4.3	0.0	0.0	4.9	0.1	0.7	0.0	0.0	1.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.4	11.6	5.9	7.9	15.8	8.4	21.2	0.0	0.0	22.1	0.0	0.0
LnGrp LOS	B	B	A	A	B	A	C	A	A	C	A	A
Approach Vol, veh/h		907			607			67			99	
Approach Delay, s/veh		11.5			15.5			21.2			22.1	
Approach LOS		B			B			C			C	

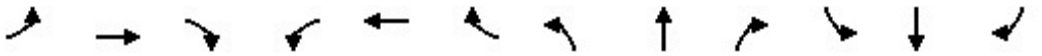
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.7	37.1		12.7	9.5	32.4		12.7				
Change Period (Y+Rc), s	4.5	7.8		4.9	4.5	7.8		4.9				
Max Green Setting (Gmax), s	5.0	40.0		25.0	5.0	40.0		25.0				
Max Q Clear Time (g_c+I1), s	2.0	17.5		3.9	5.9	17.5		5.4				
Green Ext Time (p_c), s	0.0	8.2		0.2	0.0	7.0		0.4				

Intersection Summary												
HCM 6th Ctrl Delay			13.9									
HCM 6th LOS			B									

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	258	322	264	118	227	325	495	212	99	375	182
v/c Ratio	0.76	0.86	0.53	0.46	0.77	0.76	0.65	0.41	0.68	0.65	0.43
Control Delay	57.5	65.7	9.2	46.1	57.8	58.3	43.6	5.4	77.6	40.3	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.5	65.7	9.2	46.1	57.8	58.3	43.6	5.4	77.6	40.3	7.8
Queue Length 50th (ft)	170	217	0	75	144	115	172	0	59	133	14
Queue Length 95th (ft)	#317	#403	73	128	222	#179	232	41	#150	133	52
Internal Link Dist (ft)		382			694		8434			2104	
Turn Bay Length (ft)	250		230	500		565		250	125		480
Base Capacity (vph)	338	373	494	321	362	430	764	519	152	584	431
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.86	0.53	0.37	0.63	0.76	0.65	0.41	0.65	0.64	0.42

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	237	296	243	109	154	55	299	455	195	91	345	167
Future Volume (veh/h)	237	296	243	109	154	55	299	455	195	91	345	167
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1767	1841	1663	1663	1767	1856	1722	1752	1707	1841	1618	1411
Adj Flow Rate, veh/h	258	322	36	118	167	46	325	495	36	99	375	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	9	4	16	16	9	3	12	10	13	4	19	33
Cap, veh/h	310	340	260	234	197	54	387	948	412	124	751	
Arrive On Green	0.18	0.18	0.18	0.15	0.15	0.15	0.12	0.28	0.28	0.05	0.16	0.00
Sat Flow, veh/h	1682	1841	1409	1584	1333	367	3182	3328	1447	1753	3075	1196
Grp Volume(v), veh/h	258	322	36	118	0	213	325	495	36	99	375	0
Grp Sat Flow(s),veh/h/ln	1682	1841	1409	1584	0	1701	1591	1664	1447	1753	1537	1196
Q Serve(g_s), s	16.2	19.0	2.4	7.5	0.0	13.4	11.0	13.7	2.0	6.2	12.2	0.0
Cycle Q Clear(g_c), s	16.2	19.0	2.4	7.5	0.0	13.4	11.0	13.7	2.0	6.2	12.2	0.0
Prop In Lane	1.00		1.00	1.00		0.22	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	310	340	260	234	0	252	387	948	412	124	751	
V/C Ratio(X)	0.83	0.95	0.14	0.50	0.00	0.85	0.84	0.52	0.09	0.80	0.50	
Avail Cap(c_a), veh/h	310	340	260	327	0	351	425	948	412	153	751	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.84	0.84	0.84	0.98	0.98	0.00
Uniform Delay (d), s/veh	43.2	44.3	37.5	43.1	0.0	45.6	47.3	33.0	28.8	51.6	39.9	0.0
Incr Delay (d2), s/veh	17.1	35.3	0.2	1.7	0.0	12.8	13.0	1.7	0.4	20.5	2.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.0	11.7	0.8	3.0	0.0	6.4	4.8	5.4	0.7	3.3	4.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.3	79.6	37.8	44.8	0.0	58.4	60.3	34.8	29.2	72.2	42.2	0.0
LnGrp LOS	E	E	D	D	A	E	E	C	C	E	D	
Approach Vol, veh/h		616			331			856			474	
Approach Delay, s/veh		69.1			53.6			44.2			48.5	
Approach LOS		E			D			D			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	21.7	33.6		24.6	17.2	38.0		30.2				
Change Period (Y+Rc), s	8.3	6.7		* 8.3	* 9.4	6.7		9.9				
Max Green Setting (Gmax), s	14.7	19.1		* 23	* 9.6	23.1		20.3				
Max Q Clear Time (g_c+I1), s	13.0	14.2		15.4	8.2	15.7		21.0				
Green Ext Time (p_c), s	0.4	1.2		0.9	0.0	2.3		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		53.2
HCM 6th LOS		D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Group Flow (vph)	160	100	40	841	2	664	62
v/c Ratio	0.51	0.18	0.11	0.52	0.01	0.60	0.11
Control Delay	37.1	6.4	9.6	14.2	8.0	23.2	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.1	6.4	9.6	14.2	8.0	23.2	5.7
Queue Length 50th (ft)	68	4	8	111	0	134	0
Queue Length 95th (ft)	153	36	23	267	3	226	25
Internal Link Dist (ft)	414			1077		8434	
Turn Bay Length (ft)			470		275		295
Base Capacity (vph)	623	618	623	1981	638	1695	832
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.16	0.06	0.42	0.00	0.39	0.07

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (veh/h)	147	92	37	774	2	611	57
Future Volume (veh/h)	147	92	37	774	2	611	57
Initial Q (Qb), veh	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00				1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach	No			No		No	
Adj Sat Flow, veh/h/ln	1870	1752	1589	1648		1604	1707
Adj Flow Rate, veh/h	160	35	40	841		664	17
Peak Hour Factor	0.92	0.92	0.92	0.92		0.92	0.92
Percent Heavy Veh, %	2	10	21	17		20	13
Cap, veh/h	223	246	286	1329		1060	503
Arrive On Green	0.13	0.13	0.04	0.42		0.35	0.35
Sat Flow, veh/h	1781	1485	1513	3214		3127	1447
Grp Volume(v), veh/h	160	35	40	841		664	17
Grp Sat Flow(s),veh/h/ln	1781	1485	1513	1566		1523	1447
Q Serve(g_s), s	5.3	0.0	0.0	12.9		11.1	0.5
Cycle Q Clear(g_c), s	5.3	0.0	0.0	12.9		11.1	0.5
Prop In Lane	1.00	1.00	1.00				1.00
Lane Grp Cap(c), veh/h	223	246	286	1329		1060	503
V/C Ratio(X)	0.72	0.14	0.14	0.63		0.63	0.03
Avail Cap(c_a), veh/h	730	668	721	2310		1998	949
HCM Platoon Ratio	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	25.7	21.8	20.5	13.8		16.6	13.1
Incr Delay (d2), s/veh	5.2	0.3	0.3	1.1		1.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	0.0	0.4	3.5		3.2	0.1
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	30.8	22.1	20.7	14.9		17.9	13.2
LnGrp LOS	C	C	C	B		B	B
Approach Vol, veh/h	195			881		681	
Approach Delay, s/veh	29.3			15.2		17.8	
Approach LOS	C			B		B	

Timer - Assigned Phs		2		4	5	6	
Phs Duration (G+Y+Rc), s		36.4		16.3	13.0	31.7	
Change Period (Y+Rc), s		10.5		8.7	10.5	10.5	
Max Green Setting (Gmax), s		45.0		25.0	20.0	40.0	
Max Q Clear Time (g_c+I1), s		14.9		7.3	2.0	13.1	
Green Ext Time (p_c), s		11.0		0.7	0.1	8.1	

Intersection Summary		
HCM 6th Ctrl Delay		17.7
HCM 6th LOS		B

Notes

User approved ignoring U-Turning movement.

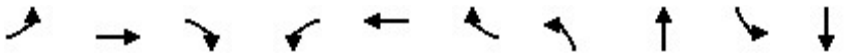
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	56	223	171	590	553	79
v/c Ratio	0.41	0.51	0.52	0.24	0.34	0.07
Control Delay	55.7	10.3	58.8	2.0	14.3	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.7	10.3	58.8	2.0	14.3	1.4
Queue Length 50th (ft)	38	0	64	27	103	0
Queue Length 95th (ft)	77	39	97	28	162	14
Internal Link Dist (ft)	446			1419	813	
Turn Bay Length (ft)		250	485			315
Base Capacity (vph)	313	720	615	2434	1634	1318
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.31	0.28	0.24	0.34	0.06

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	54	216	166	572	0	536	77
Future Volume (vph)	54	216	166	572	0	536	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Lane Util. Factor	1.00	0.88	0.97	0.95		0.95	1.00
Frt	1.00	0.85	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (prot)	1583	2733	3273	3195		2888	1583
Flt Permitted	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (perm)	1583	2733	3273	3195		2888	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	56	223	171	590	0	553	79
RTOR Reduction (vph)	0	204	0	0	0	0	27
Lane Group Flow (vph)	56	19	171	590	0	553	52
Heavy Vehicles (%)	14%	4%	7%	13%	2%	25%	2%
Turn Type	Prot	Prot	Prot	NA	Prot	NA	pm+ov
Protected Phases	7	4	1	6	5	2	7
Permitted Phases		4					2
Actuated Green, G (s)	9.6	9.6	11.1	83.8		62.2	71.8
Effective Green, g (s)	9.6	9.6	11.1	83.8		62.2	71.8
Actuated g/C Ratio	0.09	0.09	0.10	0.76		0.57	0.65
Clearance Time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Vehicle Extension (s)	3.0	3.0	3.0	3.5		3.5	3.0
Lane Grp Cap (vph)	138	238	330	2434		1633	1033
v/s Ratio Prot	c0.04	0.01	c0.05	0.18		c0.19	0.00
v/s Ratio Perm							0.03
v/c Ratio	0.41	0.08	0.52	0.24		0.34	0.05
Uniform Delay, d1	47.5	46.1	46.9	3.8		12.8	6.9
Progression Factor	1.00	1.00	1.14	0.44		1.00	1.00
Incremental Delay, d2	1.9	0.1	1.4	0.2		0.6	0.0
Delay (s)	49.4	46.3	54.9	1.9		13.4	6.9
Level of Service	D	D	D	A		B	A
Approach Delay (s)	46.9			13.8		12.6	
Approach LOS	D			B		B	

Intersection Summary			
HCM 2000 Control Delay	18.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	27.1
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

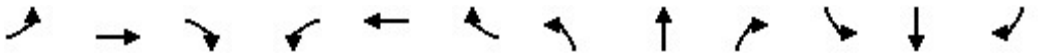
HCM 6th Edition methodology supports red clearance in the range of 0 to 6 seconds.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	90	847	50	39	627	103	133	105	32	26
v/c Ratio	0.17	0.67	0.05	0.10	0.52	0.10	0.67	0.23	0.17	0.05
Control Delay	3.1	8.3	0.2	3.9	11.1	1.8	50.7	1.2	33.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.1	8.3	0.2	3.9	11.1	1.8	50.7	1.2	33.0	0.2
Queue Length 50th (ft)	8	109	0	5	182	0	67	0	15	0
Queue Length 95th (ft)	m11	119	m1	12	258	17	#136	0	41	0
Internal Link Dist (ft)		1336			1871			292		413
Turn Bay Length (ft)	150		150	150		150			50	
Base Capacity (vph)	519	1279	1112	375	1232	1082	226	478	210	563
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.66	0.04	0.10	0.51	0.10	0.59	0.22	0.15	0.05

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	83	779	46	36	577	95	122	0	97	29	0	24
Future Volume (veh/h)	83	779	46	36	577	95	122	0	97	29	0	24
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	90	847	32	39	627	63	133	0	7	32	0	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	565	1290	1094	583	1247	1056	247	0	184	242	0	184
Arrive On Green	0.12	1.00	1.00	0.04	0.67	0.67	0.12	0.00	0.12	0.12	0.00	0.12
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1415	0	1585	1409	0	1585
Grp Volume(v), veh/h	90	847	32	39	627	63	133	0	7	32	0	2
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1415	0	1585	1409	0	1585
Q Serve(g_s), s	1.2	0.0	0.0	0.5	14.3	1.2	7.8	0.0	0.3	1.8	0.0	0.1
Cycle Q Clear(g_c), s	1.2	0.0	0.0	0.5	14.3	1.2	7.9	0.0	0.3	2.1	0.0	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	565	1290	1094	583	1247	1056	247	0	184	242	0	184
V/C Ratio(X)	0.16	0.66	0.03	0.07	0.50	0.06	0.54	0.00	0.04	0.13	0.00	0.01
Avail Cap(c_a), veh/h	567	1290	1094	625	1247	1056	308	0	252	303	0	252
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.72	0.72	0.72	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	4.4	0.0	0.0	3.3	7.1	4.9	36.8	0.0	33.4	34.3	0.0	33.3
Incr Delay (d2), s/veh	0.1	1.9	0.0	0.0	0.3	0.0	1.8	0.0	0.1	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.7	0.0	0.1	4.2	0.3	2.8	0.0	0.1	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	4.5	1.9	0.0	3.3	7.4	4.9	38.6	0.0	33.5	34.5	0.0	33.3
LnGrp LOS	A	A	A	A	A	A	D	A	C	C	A	C
Approach Vol, veh/h		969			729			140			34	
Approach Delay, s/veh		2.1			7.0			38.3			34.5	
Approach LOS		A			A			D			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.5	63.1		14.3	9.5	61.2		14.3				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.0	53.0		13.5	5.1	52.9		13.5				
Max Q Clear Time (g_c+I1), s	2.5	2.0		9.9	3.2	16.3		4.1				
Green Ext Time (p_c), s	0.0	7.1		0.1	0.0	4.4		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		7.3	
HCM 6th LOS		A	

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	905	694	3	0	14
Future Vol, veh/h	0	905	694	3	0	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	984	754	3	0	15

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	756
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	0	-	-	-	0	408
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	408
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	14.2
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	408
HCM Lane V/C Ratio	-	-	-	0.037
HCM Control Delay (s)	-	-	-	14.2
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	49	856	695	15	5	2
Future Vol, veh/h	49	856	695	15	5	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	-	0	50
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	53	930	755	16	5	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	771	0	-	0	1799	763
Stage 1	-	-	-	-	763	-
Stage 2	-	-	-	-	1036	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	844	-	-	-	88	404
Stage 1	-	-	-	-	460	-
Stage 2	-	-	-	-	342	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	844	-	-	-	82	404
Mov Cap-2 Maneuver	-	-	-	-	82	-
Stage 1	-	-	-	-	431	-
Stage 2	-	-	-	-	342	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	41.1
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	844	-	-	-	82	404
HCM Lane V/C Ratio	0.063	-	-	-	0.066	0.005
HCM Control Delay (s)	9.6	-	-	-	52	14
HCM Lane LOS	A	-	-	-	F	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.2	0

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	30	12	40	767	663	103
v/c Ratio	0.14	0.06	0.06	0.25	0.25	0.08
Control Delay	22.9	12.7	2.1	0.5	7.8	3.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.9	12.7	2.1	0.5	7.8	3.3
Queue Length 50th (ft)	9	0	0	0	0	0
Queue Length 95th (ft)	28	12	m3	18	188	32
Internal Link Dist (ft)	785			2104	3524	
Turn Bay Length (ft)			300			150
Base Capacity (vph)	209	197	631	3109	2749	1252
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.06	0.06	0.25	0.24	0.08

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	28	11	37	706	610	95
Future Volume (veh/h)	28	11	37	706	610	95
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	30	0	40	767	663	52
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	60	53	552	2711	2027	904
Arrive On Green	0.03	0.00	0.08	1.00	0.57	0.57
Sat Flow, veh/h	1781	1585	1781	3647	3647	1585
Grp Volume(v), veh/h	30	0	40	767	663	52
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1777	1777	1585
Q Serve(g_s), s	0.9	0.0	0.5	0.0	5.4	0.8
Cycle Q Clear(g_c), s	0.9	0.0	0.5	0.0	5.4	0.8
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	60	53	552	2711	2027	904
V/C Ratio(X)	0.50	0.00	0.07	0.28	0.33	0.06
Avail Cap(c_a), veh/h	178	159	663	2711	2027	904
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.67	0.67	1.00	1.00
Uniform Delay (d), s/veh	26.1	0.0	4.3	0.0	6.2	5.2
Incr Delay (d2), s/veh	6.4	0.0	0.0	0.2	0.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	0.1	0.1	1.2	1.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	32.6	0.0	4.4	0.2	6.7	5.4
LnGrp LOS	C	A	A	A	A	A
Approach Vol, veh/h	30			807	715	
Approach Delay, s/veh	32.6			0.4	6.6	
Approach LOS	C			A	A	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		48.7		6.3	10.6	38.1
Change Period (Y+Rc), s		6.7		4.5	8.3	6.7
Max Green Setting (Gmax), s		38.3		5.5	5.7	24.3
Max Q Clear Time (g_c+I1), s		2.0		2.9	2.5	7.4
Green Ext Time (p_c), s		5.0		0.0	0.0	3.7

Intersection Summary	
HCM 6th Ctrl Delay	3.9
HCM 6th LOS	A

Notes

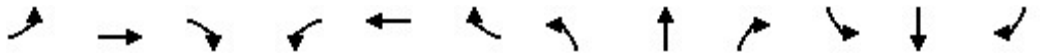
User approved volume balancing among the lanes for turning movement.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	307	824	182	161	912	148	200	254	108	60	379
v/c Ratio	1.04	0.91	0.16	0.85	1.16	0.17	0.69	1.17	0.47	0.37	0.81
Control Delay	93.5	45.9	2.8	60.4	117.2	2.2	50.6	147.3	41.6	53.4	42.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	93.5	45.9	2.8	60.4	117.2	2.2	50.6	147.3	41.6	53.4	42.1
Queue Length 50th (ft)	~186	561	0	67	~765	0	120	~180	61	40	185
Queue Length 95th (ft)	#355	#806	57	#185	#1006	26	#202	#351	110	83	301
Internal Link Dist (ft)		593			4165			244		594	
Turn Bay Length (ft)	260		500	270		575	190		150		
Base Capacity (vph)	295	902	1123	192	785	888	289	218	251	176	470
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.04	0.91	0.16	0.84	1.16	0.17	0.69	1.17	0.43	0.34	0.81

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	282	758	167	148	839	136	184	86	148	99	55	349
Future Volume (veh/h)	282	758	167	148	839	136	184	86	148	99	55	349
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	0.99		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1870	1693	1841	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	307	824	105	161	912	69	200	93	101	108	60	299
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	4	2	14	4	2	2	2	2	2	2	2
Cap, veh/h	298	1002	1012	261	847	825	299	97	105	197	177	354
Arrive On Green	0.13	0.54	0.54	0.06	0.46	0.46	0.09	0.12	0.12	0.07	0.09	0.09
Sat Flow, veh/h	1781	1841	1585	1612	1841	1552	1781	814	884	1781	1870	1560
Grp Volume(v), veh/h	307	824	105	161	912	69	200	0	194	108	60	299
Grp Sat Flow(s),veh/h/ln	1781	1841	1585	1612	1841	1552	1781	0	1698	1781	1870	1560
Q Serve(g_s), s	14.3	40.6	2.8	4.8	50.6	2.4	10.4	0.0	12.5	5.9	3.3	10.4
Cycle Q Clear(g_c), s	14.3	40.6	2.8	4.8	50.6	2.4	10.4	0.0	12.5	5.9	3.3	10.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.52	1.00		1.00
Lane Grp Cap(c), veh/h	298	1002	1012	261	847	825	299	0	202	197	177	354
V/C Ratio(X)	1.03	0.82	0.10	0.62	1.08	0.08	0.67	0.00	0.96	0.55	0.34	0.85
Avail Cap(c_a), veh/h	298	1002	1012	294	847	825	299	0	202	256	177	354
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.19	0.19	0.19	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.3	20.7	7.7	20.2	29.7	12.7	41.1	0.0	48.2	41.3	46.6	40.9
Incr Delay (d2), s/veh	60.6	7.6	0.2	0.6	39.6	0.0	5.6	0.0	51.7	2.4	1.1	17.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.8	17.6	1.0	1.8	29.6	0.9	5.4	0.0	8.2	2.8	1.6	9.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	96.9	28.3	7.9	20.8	69.3	12.7	46.7	0.0	99.9	43.7	47.7	57.9
LnGrp LOS	F	C	A	C	F	B	D	A	F	D	D	E
Approach Vol, veh/h		1236			1142			394			467	
Approach Delay, s/veh		43.6			59.1			72.9			53.3	
Approach LOS		D			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.0	56.5	14.3	19.7	13.7	65.8	17.0	17.0
Change Period (Y+Rc), s	* 8.7	* 5.8	6.6	6.6	* 6.8	5.8	6.6	6.6
Max Green Setting (Gmax), s	* 14	* 47	11.4	9.4	* 9.2	54.2	10.4	10.4
Max Q Clear Time (g_c+I1), s	16.3	52.6	7.9	14.5	6.8	42.6	12.4	12.4
Green Ext Time (p_c), s	0.0	0.0	0.1	0.0	0.1	5.9	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	54.0
HCM 6th LOS	D

Notes

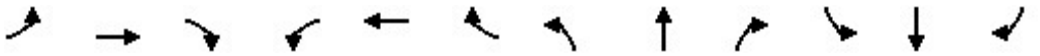
User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	158	665	46	29	942	46	80	238
v/c Ratio	0.68	0.61	0.05	0.06	0.96	0.05	0.62	0.61
Control Delay	26.1	13.2	1.0	3.8	38.6	1.1	48.2	16.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.1	13.2	1.0	3.8	38.6	1.1	48.2	16.7
Queue Length 50th (ft)	16	124	0	3	358	0	30	27
Queue Length 95th (ft)	#107	370	7	11	#708	7	74	91
Internal Link Dist (ft)		4165			4595		176	167
Turn Bay Length (ft)	145		90	125		155		
Base Capacity (vph)	232	1096	1016	486	985	898	272	654
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.61	0.05	0.06	0.96	0.05	0.29	0.36

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	155	652	45	28	923	45	45	22	12	27	31	174
Future Volume (veh/h)	155	652	45	28	923	45	45	22	12	27	31	174
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1781	1870	1841	1826	1870	1870	1752	1870	1870	1841	1870
Adj Flow Rate, veh/h	158	665	28	29	942	26	46	22	3	28	32	29
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	8	2	4	5	2	2	10	2	2	4	2
Cap, veh/h	282	1068	950	426	1024	889	186	74	8	109	90	63
Arrive On Green	0.07	0.60	0.60	0.03	0.56	0.56	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1781	1781	1585	1753	1826	1585	836	618	64	340	758	530
Grp Volume(v), veh/h	158	665	28	29	942	26	71	0	0	89	0	0
Grp Sat Flow(s),veh/h/ln	1781	1781	1585	1753	1826	1585	1519	0	0	1628	0	0
Q Serve(g_s), s	2.5	16.4	0.5	0.4	32.1	0.5	0.0	0.0	0.0	0.7	0.0	0.0
Cycle Q Clear(g_c), s	2.5	16.4	0.5	0.4	32.1	0.5	2.6	0.0	0.0	3.3	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.65		0.04	0.31		0.33
Lane Grp Cap(c), veh/h	282	1068	950	426	1024	889	267	0	0	263	0	0
V/C Ratio(X)	0.56	0.62	0.03	0.07	0.92	0.03	0.27	0.00	0.00	0.34	0.00	0.00
Avail Cap(c_a), veh/h	289	1068	950	499	1064	924	607	0	0	649	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	14.8	8.8	5.6	6.8	13.7	6.7	27.8	0.0	0.0	28.1	0.0	0.0
Incr Delay (d2), s/veh	2.3	1.6	0.0	0.1	13.0	0.0	0.5	0.0	0.0	0.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	4.8	0.1	0.1	13.1	0.1	1.0	0.0	0.0	1.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.2	10.4	5.6	6.9	26.6	6.7	28.3	0.0	0.0	28.8	0.0	0.0
LnGrp LOS	B	B	A	A	C	A	C	A	A	C	A	A
Approach Vol, veh/h		851			997			71			89	
Approach Delay, s/veh		11.5			25.5			28.3			28.8	
Approach LOS		B			C			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.6	48.9		13.1	9.3	46.3		13.1				
Change Period (Y+Rc), s	4.5	7.8		4.9	4.5	7.8		4.9				
Max Green Setting (Gmax), s	5.0	40.0		25.0	5.0	40.0		25.0				
Max Q Clear Time (g_c+I1), s	2.4	18.4		4.6	4.5	34.1		5.3				
Green Ext Time (p_c), s	0.0	8.1		0.2	0.0	4.4		0.3				

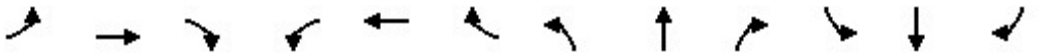
Intersection Summary												
HCM 6th Ctrl Delay			19.8									
HCM 6th LOS			B									

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	311	224	415	239	497	405	678	183	100	655	283
v/c Ratio	1.17	0.80	0.83	0.61	1.19	1.26	0.95	0.36	0.70	0.92	0.51
Control Delay	152.1	66.1	27.3	45.5	146.1	181.6	66.6	3.4	82.6	51.8	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	152.1	66.1	27.3	45.5	146.1	181.6	66.6	3.4	82.6	51.8	9.9
Queue Length 50th (ft)	~263	154	68	152	~421	~185	251	0	76	212	10
Queue Length 95th (ft)	#436	#277	#236	237	#630	#284	#372	20	#153	#341	111
Internal Link Dist (ft)		382			694		8434			2104	
Turn Bay Length (ft)	250		230	500		565		250	125		480
Base Capacity (vph)	265	281	500	390	416	321	715	514	150	715	556
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.17	0.80	0.83	0.61	1.19	1.26	0.95	0.36	0.67	0.92	0.51

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	286	206	382	220	361	97	373	624	168	92	603	260
Future Volume (veh/h)	286	206	382	220	361	97	373	624	168	92	603	260
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1811	1796	1781	1826	1796	1811	1781	1796	1826	1811	1870
Adj Flow Rate, veh/h	311	224	129	239	392	96	405	678	26	100	655	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	6	7	8	5	7	6	8	7	5	6	2
Cap, veh/h	269	285	239	396	331	81	325	767	345	123	723	
Arrive On Green	0.16	0.16	0.16	0.23	0.23	0.23	0.10	0.23	0.23	0.14	0.42	0.00
Sat Flow, veh/h	1711	1811	1522	1697	1417	347	3346	3385	1522	1739	3441	1585
Grp Volume(v), veh/h	311	224	129	239	0	488	405	678	26	100	655	0
Grp Sat Flow(s),veh/h/ln	1711	1811	1522	1697	0	1763	1673	1692	1522	1739	1721	1585
Q Serve(g_s), s	17.3	13.1	8.6	13.8	0.0	25.7	10.7	21.3	1.5	6.1	19.6	0.0
Cycle Q Clear(g_c), s	17.3	13.1	8.6	13.8	0.0	25.7	10.7	21.3	1.5	6.1	19.6	0.0
Prop In Lane	1.00		1.00	1.00		0.20	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	269	285	239	396	0	412	325	767	345	123	723	
V/C Ratio(X)	1.16	0.79	0.54	0.60	0.00	1.18	1.24	0.88	0.08	0.81	0.91	
Avail Cap(c_a), veh/h	269	285	239	396	0	412	325	767	345	152	723	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.85	0.85	0.85	0.91	0.91	0.00
Uniform Delay (d), s/veh	46.3	44.6	42.7	37.6	0.0	42.2	49.7	41.1	33.5	46.5	30.9	0.0
Incr Delay (d2), s/veh	103.7	13.6	2.4	2.6	0.0	105.1	130.1	12.3	0.4	21.5	15.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.9	6.8	3.3	5.9	0.0	22.8	10.1	9.6	0.6	3.1	7.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	150.1	58.1	45.1	40.2	0.0	147.3	179.8	53.5	33.8	68.0	46.8	0.0
LnGrp LOS	F	E	D	D	A	F	F	D	C	E	D	
Approach Vol, veh/h		664			727			1109			755	
Approach Delay, s/veh		98.7			112.1			99.1			49.6	
Approach LOS		F			F			F			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	19.0	29.8		34.0	17.2	31.6		27.2				
Change Period (Y+Rc), s	8.3	6.7		* 8.3	* 9.4	6.7		9.9				
Max Green Setting (Gmax), s	10.7	23.1		* 26	* 9.6	23.1		17.3				
Max Q Clear Time (g_c+I1), s	12.7	21.6		27.7	8.1	23.3		19.3				
Green Ext Time (p_c), s	0.0	0.7		0.0	0.0	0.0		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		90.4
HCM 6th LOS		F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	184	99	124	1035	1048	209
v/c Ratio	0.63	0.19	0.41	0.49	0.77	0.27
Control Delay	47.0	17.6	19.5	10.8	29.5	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.0	17.6	19.5	10.8	29.5	4.0
Queue Length 50th (ft)	104	33	27	157	273	0
Queue Length 95th (ft)	181	68	58	244	418	46
Internal Link Dist (ft)	414			1077	8434	
Turn Bay Length (ft)			470			295
Base Capacity (vph)	480	520	502	2091	1438	805
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.19	0.25	0.49	0.73	0.26

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (veh/h)	169	91	114	952	0	964	192
Future Volume (veh/h)	169	91	114	952	0	964	192
Initial Q (Qb), veh	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00				1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach	No			No		No	
Adj Sat Flow, veh/h/ln	1870	1722	1826	1781		1767	1870
Adj Flow Rate, veh/h	184	85	124	1035		1048	75
Peak Hour Factor	0.92	0.92	0.92	0.92		0.92	0.92
Percent Heavy Veh, %	2	12	5	8		9	2
Cap, veh/h	243	286	275	1462		1422	672
Arrive On Green	0.14	0.14	0.06	0.43		0.42	0.42
Sat Flow, veh/h	1781	1459	1739	3474		3445	1585
Grp Volume(v), veh/h	184	85	124	1035		1048	75
Grp Sat Flow(s),veh/h/ln	1781	1459	1739	1692		1678	1585
Q Serve(g_s), s	7.8	0.0	0.0	19.5		20.4	2.2
Cycle Q Clear(g_c), s	7.8	0.0	0.0	19.5		20.4	2.2
Prop In Lane	1.00	1.00	1.00				1.00
Lane Grp Cap(c), veh/h	243	286	275	1462		1422	672
V/C Ratio(X)	0.76	0.30	0.45	0.71		0.74	0.11
Avail Cap(c_a), veh/h	570	554	617	1950		1719	812
HCM Platoon Ratio	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	32.5	26.8	30.5	18.2		18.9	13.6
Incr Delay (d2), s/veh	5.7	0.7	1.4	1.5		2.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	0.1	2.1	6.5		6.9	0.7
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	38.2	27.5	31.9	19.6		20.9	13.8
LnGrp LOS	D	C	C	B		C	B
Approach Vol, veh/h	269			1159		1123	
Approach Delay, s/veh	34.8			20.9		20.4	
Approach LOS	C			C		C	

Timer - Assigned Phs		2		4	5	6	
Phs Duration (G+Y+Rc), s		44.2		19.4	15.2	43.6	
Change Period (Y+Rc), s		10.5		8.7	10.5	10.5	
Max Green Setting (Gmax), s		45.0		25.0	20.0	40.0	
Max Q Clear Time (g_c+I1), s		21.5		9.8	2.0	22.4	
Green Ext Time (p_c), s		12.2		0.9	0.3	10.7	

Intersection Summary	
HCM 6th Ctrl Delay	22.2
HCM 6th LOS	C

Notes

User approved ignoring U-Turning movement.

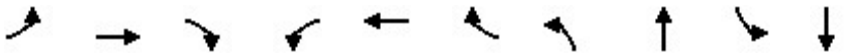
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	175	253	315	783	809	119
v/c Ratio	0.68	0.41	0.67	0.34	0.51	0.11
Control Delay	57.2	6.9	56.9	4.1	23.5	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.2	6.9	56.9	4.1	23.5	1.6
Queue Length 50th (ft)	119	0	119	57	205	0
Queue Length 95th (ft)	181	36	137	75	311	20
Internal Link Dist (ft)	446			1419	813	
Turn Bay Length (ft)		250	485			315
Base Capacity (vph)	350	755	627	2286	1571	1178
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.34	0.50	0.34	0.51	0.10

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	168	243	302	752	0	777	114
Future Volume (vph)	168	243	302	752	0	777	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Lane Util. Factor	1.00	0.88	0.97	0.95		0.95	1.00
Frt	1.00	0.85	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (prot)	1770	2787	3335	3252		3374	1583
Flt Permitted	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (perm)	1770	2787	3335	3252		3374	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.92	0.96	0.96
Adj. Flow (vph)	175	253	315	783	0	809	119
RTOR Reduction (vph)	0	216	0	0	0	0	46
Lane Group Flow (vph)	175	37	315	783	0	809	73
Heavy Vehicles (%)	2%	2%	5%	11%	2%	7%	2%
Turn Type	Prot	Prot	Prot	NA	Prot	NA	pm+ov
Protected Phases	7	4	1	6	5	2	7
Permitted Phases		4					2
Actuated Green, G (s)	16.1	16.1	15.6	77.3		51.2	67.3
Effective Green, g (s)	16.1	16.1	15.6	77.3		51.2	67.3
Actuated g/C Ratio	0.15	0.15	0.14	0.70		0.47	0.61
Clearance Time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Vehicle Extension (s)	3.0	3.0	3.0	3.5		3.5	3.0
Lane Grp Cap (vph)	259	407	472	2285		1570	968
v/s Ratio Prot	c0.10	0.01	c0.09	0.24		c0.24	0.01
v/s Ratio Perm							0.03
v/c Ratio	0.68	0.09	0.67	0.34		0.52	0.08
Uniform Delay, d1	44.5	40.6	44.7	6.4		20.7	8.7
Progression Factor	1.00	1.00	1.12	0.54		1.00	1.00
Incremental Delay, d2	6.8	0.1	3.5	0.4		1.2	0.0
Delay (s)	51.3	40.7	53.7	3.8		21.9	8.7
Level of Service	D	D	D	A		C	A
Approach Delay (s)	45.0			18.1		20.2	
Approach LOS	D			B		C	

Intersection Summary			
HCM 2000 Control Delay	23.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	27.1
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

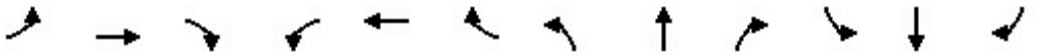
HCM 6th Edition methodology supports red clearance in the range of 0 to 6 seconds.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	36	896	116	92	1113	40	83	65	104	92
v/c Ratio	0.14	0.69	0.10	0.24	0.83	0.03	0.62	0.16	0.76	0.26
Control Delay	2.9	8.6	1.3	3.5	16.1	0.4	61.1	0.8	74.9	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.9	8.6	1.3	3.5	16.1	0.4	61.1	0.8	74.9	1.8
Queue Length 50th (ft)	2	134	0	7	395	0	45	0	58	0
Queue Length 95th (ft)	m6	272	m5	14	#686	3	#121	0	#154	0
Internal Link Dist (ft)		1336			1871			292		413
Turn Bay Length (ft)	150		150	150		150			50	
Base Capacity (vph)	249	1329	1163	382	1349	1167	133	410	136	353
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.67	0.10	0.24	0.83	0.03	0.62	0.16	0.76	0.26

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	33	824	107	85	1024	37	76	0	60	96	0	85
Future Volume (veh/h)	33	824	107	85	1024	37	76	0	60	96	0	85
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	36	896	77	92	1113	27	83	0	2	104	0	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	305	1323	1121	613	1356	1150	202	0	137	203	0	137
Arrive On Green	0.07	1.00	1.00	0.05	0.73	0.73	0.09	0.00	0.09	0.09	0.00	0.09
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1414	0	1585	1415	0	1585
Grp Volume(v), veh/h	36	896	77	92	1113	27	83	0	2	104	0	3
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1414	0	1585	1415	0	1585
Q Serve(g_s), s	0.4	0.0	0.0	1.1	35.1	0.4	5.0	0.0	0.1	6.3	0.0	0.2
Cycle Q Clear(g_c), s	0.4	0.0	0.0	1.1	35.1	0.4	5.1	0.0	0.1	6.4	0.0	0.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	305	1323	1121	613	1356	1150	202	0	137	203	0	137
V/C Ratio(X)	0.12	0.68	0.07	0.15	0.82	0.02	0.41	0.00	0.01	0.51	0.00	0.02
Avail Cap(c_a), veh/h	358	1323	1121	635	1356	1150	202	0	137	203	0	137
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.68	0.68	0.68	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.8	0.0	0.0	2.7	8.1	3.3	38.7	0.0	36.4	39.3	0.0	36.4
Incr Delay (d2), s/veh	0.1	1.9	0.1	0.1	4.1	0.0	1.3	0.0	0.0	2.2	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.7	0.0	0.2	10.1	0.1	1.8	0.0	0.0	2.3	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.0	1.9	0.1	2.8	12.3	3.3	40.1	0.0	36.4	41.5	0.0	36.5
LnGrp LOS	A	A	A	A	B	A	D	A	D	D	A	D
Approach Vol, veh/h		1009			1232			85			107	
Approach Delay, s/veh		2.1			11.4			40.0			41.3	
Approach LOS		A			B			D			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.0	66.0		12.0	7.4	67.6		12.0				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.5	60.5		7.5	5.5	60.5		7.5				
Max Q Clear Time (g_c+I1), s	3.1	2.0		7.1	2.4	37.1		8.4				
Green Ext Time (p_c), s	0.0	8.1		0.0	0.0	9.7		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		9.8	
HCM 6th LOS		A	

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	980	1101	1	0	45
Future Vol, veh/h	0	980	1101	1	0	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1065	1197	1	0	49

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1198
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	0	-	-	-	0	226
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	226
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	25.3
HCM LOS			D

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	226
HCM Lane V/C Ratio	-	-	-	0.216
HCM Control Delay (s)	-	-	-	25.3
HCM Lane LOS	-	-	-	D
HCM 95th %tile Q(veh)	-	-	-	0.8

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	960	1097	6	17	5
Future Vol, veh/h	20	960	1097	6	17	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	-	0	50
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	1043	1192	7	18	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1199	0	-	0	2283	1196
Stage 1	-	-	-	-	1196	-
Stage 2	-	-	-	-	1087	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	582	-	-	-	44	227
Stage 1	-	-	-	-	287	-
Stage 2	-	-	-	-	323	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	582	-	-	-	42	227
Mov Cap-2 Maneuver	-	-	-	-	42	-
Stage 1	-	-	-	-	276	-
Stage 2	-	-	-	-	323	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	117.6
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	582	-	-	-	42	227
HCM Lane V/C Ratio	0.037	-	-	-	0.44	0.024
HCM Control Delay (s)	11.4	-	-	-	145.9	21.2
HCM Lane LOS	B	-	-	-	F	C
HCM 95th %tile Q(veh)	0.1	-	-	-	1.5	0.1

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	103	42	16	1072	1023	41
v/c Ratio	0.42	0.16	0.04	0.42	0.43	0.04
Control Delay	26.7	9.7	1.5	0.9	8.0	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.7	9.7	1.5	0.9	8.0	4.6
Queue Length 50th (ft)	31	0	1	20	72	0
Queue Length 95th (ft)	70	22	m1	m22	235	21
Internal Link Dist (ft)	785			2104	3524	
Turn Bay Length (ft)			300			150
Base Capacity (vph)	263	271	405	2580	2365	1071
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.15	0.04	0.42	0.43	0.04

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	95	39	15	986	941	38
Future Volume (veh/h)	95	39	15	986	941	38
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	103	2	16	1072	1023	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	134	119	369	2563	1957	873
Arrive On Green	0.08	0.08	0.04	1.00	0.55	0.55
Sat Flow, veh/h	1781	1585	1781	3647	3647	1585
Grp Volume(v), veh/h	103	2	16	1072	1023	19
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1777	1777	1585
Q Serve(g_s), s	3.1	0.1	0.2	0.0	10.0	0.3
Cycle Q Clear(g_c), s	3.1	0.1	0.2	0.0	10.0	0.3
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	134	119	369	2563	1957	873
V/C Ratio(X)	0.77	0.02	0.04	0.42	0.52	0.02
Avail Cap(c_a), veh/h	243	216	496	2563	1957	873
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.09	0.09	1.00	1.00
Uniform Delay (d), s/veh	25.0	23.6	5.9	0.0	7.8	5.6
Incr Delay (d2), s/veh	9.0	0.1	0.0	0.0	1.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.1	0.0	0.0	2.3	0.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	33.9	23.6	5.9	0.0	8.8	5.7
LnGrp LOS	C	C	A	A	A	A
Approach Vol, veh/h	105			1088	1042	
Approach Delay, s/veh	33.7			0.1	8.7	
Approach LOS	C			A	A	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		46.4		8.6	9.4	37.0
Change Period (Y+Rc), s		6.7		4.5	8.3	6.7
Max Green Setting (Gmax), s		36.3		7.5	5.0	23.0
Max Q Clear Time (g_c+I1), s		2.0		5.1	2.2	12.0
Green Ext Time (p_c), s		7.8		0.0	0.0	4.7

Intersection Summary	
HCM 6th Ctrl Delay	5.7
HCM 6th LOS	A

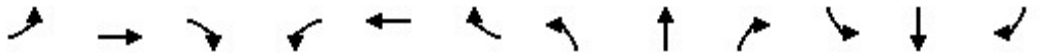
B. 2041 Future Conditions with Development Supplemental Analysis – Capacity Analysis Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	166	717	424	176	697	147	85	101	76	299	175
v/c Ratio	0.63	0.85	0.47	0.68	0.89	0.17	0.63	0.46	0.23	1.10	0.38
Control Delay	24.7	42.6	12.6	26.2	46.7	2.0	59.4	26.2	38.6	134.2	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.7	42.6	12.6	26.2	46.7	2.0	59.4	26.2	38.6	134.2	7.7
Queue Length 50th (ft)	73	576	154	58	500	0	57	20	49	~346	0
Queue Length 95th (ft)	83	732	240	95	#769	26	#128	#87	93	#530	56
Internal Link Dist (ft)		593			4165			244		594	
Turn Bay Length (ft)	260		500	270		575	190		150		
Base Capacity (vph)	319	892	913	263	803	936	144	220	386	272	500
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.80	0.46	0.67	0.87	0.16	0.59	0.46	0.20	1.10	0.35

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	153	660	390	162	641	135	78	25	68	70	275	161
Future Volume (veh/h)	153	660	390	162	641	135	78	25	68	70	275	161
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.99	0.98		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1752	1796	1796	1722	1856	966	907	848	1870	1841	1781
Adj Flow Rate, veh/h	166	717	362	176	697	73	85	27	7	76	299	29
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	10	7	7	12	3	63	67	71	2	4	8
Cap, veh/h	299	941	956	270	903	885	140	105	27	295	204	251
Arrive On Green	0.06	0.54	0.54	0.06	0.52	0.52	0.09	0.15	0.15	0.05	0.11	0.11
Sat Flow, veh/h	1753	1752	1521	1711	1722	1537	920	692	180	1781	1841	1438
Grp Volume(v), veh/h	166	717	362	176	697	73	85	0	34	76	299	29
Grp Sat Flow(s),veh/h/ln	1753	1752	1521	1711	1722	1537	920	0	872	1781	1841	1438
Q Serve(g_s), s	5.6	41.7	15.1	6.0	42.1	2.8	10.5	0.0	4.5	4.9	14.4	2.2
Cycle Q Clear(g_c), s	5.6	41.7	15.1	6.0	42.1	2.8	10.5	0.0	4.5	4.9	14.4	2.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.21	1.00		1.00
Lane Grp Cap(c), veh/h	299	941	956	270	903	885	140	0	132	295	204	251
V/C Ratio(X)	0.55	0.76	0.38	0.65	0.77	0.08	0.61	0.00	0.26	0.26	1.47	0.12
Avail Cap(c_a), veh/h	400	941	956	298	903	885	143	0	132	402	204	251
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.55	0.55	0.55	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.4	23.6	11.8	21.9	24.7	12.4	45.8	0.0	48.7	47.8	57.8	45.6
Incr Delay (d2), s/veh	1.6	5.8	1.1	2.4	3.6	0.1	7.0	0.0	1.0	0.5	234.7	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	17.5	5.4	2.4	16.9	1.0	2.7	0.0	1.0	2.2	20.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.0	29.4	12.9	24.3	28.3	12.5	52.8	0.0	49.7	48.2	292.5	45.8
LnGrp LOS	C	C	B	C	C	B	D	A	D	D	F	D
Approach Vol, veh/h		1245			946			119			404	
Approach Delay, s/veh		23.7			26.4			51.9			228.9	
Approach LOS		C			C			D			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.6	73.9	13.2	26.3	14.9	75.6	18.5	21.0
Change Period (Y+Rc), s	* 8.7	* 5.8	6.6	6.6	* 6.8	5.8	6.6	6.6
Max Green Setting (Gmax), s	* 15	* 60	14.4	12.4	* 10	67.2	12.4	14.4
Max Q Clear Time (g_c+I1), s	7.6	44.1	6.9	6.5	8.0	43.7	12.5	16.4
Green Ext Time (p_c), s	0.2	5.9	0.1	0.0	0.1	9.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	56.4
HCM 6th LOS	E

Notes

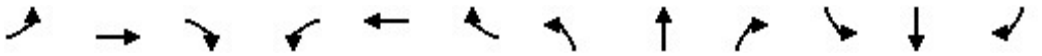
User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	241	685	23	3	600	37	100	239
v/c Ratio	0.59	0.68	0.02	0.01	0.77	0.05	0.44	0.62
Control Delay	12.3	15.3	0.0	4.7	22.5	0.6	24.8	18.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.3	15.3	0.0	4.7	22.5	0.6	24.8	18.6
Queue Length 50th (ft)	27	135	0	0	172	0	23	31
Queue Length 95th (ft)	75	#483	0	3	355	4	71	107
Internal Link Dist (ft)		4165			4595		176	167
Turn Bay Length (ft)	145		90	125		155		
Base Capacity (vph)	410	1119	1016	446	1065	943	435	638
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.61	0.02	0.01	0.56	0.04	0.23	0.37

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	222	630	21	3	552	34	47	11	34	54	7	158
Future Volume (veh/h)	222	630	21	3	552	34	47	11	34	54	7	158
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1767	1752	1811	1870	1722	1737	1796	1752	1796	1826	1648	1707
Adj Flow Rate, veh/h	241	685	12	3	600	16	51	12	7	59	8	39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	9	10	6	2	12	11	7	10	7	5	17	13
Cap, veh/h	406	948	831	321	784	670	255	54	22	188	39	73
Arrive On Green	0.09	0.54	0.54	0.00	0.46	0.46	0.14	0.14	0.14	0.14	0.14	0.14
Sat Flow, veh/h	1682	1752	1535	1781	1722	1472	988	375	151	601	268	506
Grp Volume(v), veh/h	241	685	12	3	600	16	70	0	0	106	0	0
Grp Sat Flow(s),veh/h/ln	1682	1752	1535	1781	1722	1472	1514	0	0	1374	0	0
Q Serve(g_s), s	4.2	16.4	0.2	0.0	16.2	0.3	0.0	0.0	0.0	1.7	0.0	0.0
Cycle Q Clear(g_c), s	4.2	16.4	0.2	0.0	16.2	0.3	2.0	0.0	0.0	3.8	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.73		0.10	0.56		0.37
Lane Grp Cap(c), veh/h	406	948	831	321	784	670	332	0	0	300	0	0
V/C Ratio(X)	0.59	0.72	0.01	0.01	0.77	0.02	0.21	0.00	0.00	0.35	0.00	0.00
Avail Cap(c_a), veh/h	406	1262	1105	475	1240	1060	745	0	0	700	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.1	9.6	5.9	8.2	12.6	8.3	21.2	0.0	0.0	21.8	0.0	0.0
Incr Delay (d2), s/veh	2.3	2.5	0.0	0.0	3.4	0.0	0.3	0.0	0.0	0.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	4.6	0.0	0.0	5.2	0.1	0.7	0.0	0.0	1.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.5	12.1	5.9	8.2	16.0	8.4	21.5	0.0	0.0	22.5	0.0	0.0
LnGrp LOS	B	B	A	A	B	A	C	A	A	C	A	A
Approach Vol, veh/h		938			619			70			106	
Approach Delay, s/veh		12.1			15.8			21.5			22.5	
Approach LOS		B			B			C			C	

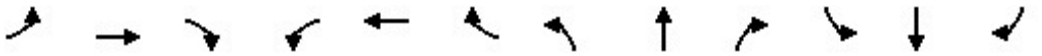
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.7	37.9		13.0	9.5	33.1		13.0				
Change Period (Y+Rc), s	4.5	7.8		4.9	4.5	7.8		4.9				
Max Green Setting (Gmax), s	5.0	40.0		25.0	5.0	40.0		25.0				
Max Q Clear Time (g_c+I1), s	2.0	18.4		4.0	6.2	18.2		5.8				
Green Ext Time (p_c), s	0.0	8.3		0.2	0.0	7.1		0.4				

Intersection Summary												
HCM 6th Ctrl Delay			14.4									
HCM 6th LOS			B									

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	260	335	271	125	234	328	507	218	101	386	183
v/c Ratio	0.74	0.86	0.53	0.48	0.78	0.79	0.69	0.43	0.70	0.70	0.43
Control Delay	55.3	65.1	9.0	46.4	58.3	60.8	45.7	6.0	77.7	42.7	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.3	65.1	9.0	46.4	58.3	60.8	45.7	6.0	77.7	42.7	7.8
Queue Length 50th (ft)	173	230	0	80	148	117	177	0	62	137	14
Queue Length 95th (ft)	#321	#423	74	135	229	#181	238	46	#153	138	44
Internal Link Dist (ft)		382			694		8434			2104	
Turn Bay Length (ft)	250		230	500		565		250	125		480
Base Capacity (vph)	351	388	509	321	362	417	737	510	151	561	423
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.86	0.53	0.39	0.65	0.79	0.69	0.43	0.67	0.69	0.43

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	239	308	249	115	158	57	302	466	201	93	355	168
Future Volume (veh/h)	239	308	249	115	158	57	302	466	201	93	355	168
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1767	1841	1663	1663	1767	1856	1722	1752	1707	1841	1618	1411
Adj Flow Rate, veh/h	260	335	39	125	172	49	328	507	33	101	386	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	9	4	16	16	9	3	12	10	13	4	19	33
Cap, veh/h	310	340	260	242	202	58	389	928	404	126	734	
Arrive On Green	0.18	0.18	0.18	0.15	0.15	0.15	0.12	0.28	0.28	0.05	0.16	0.00
Sat Flow, veh/h	1682	1841	1409	1584	1322	377	3182	3328	1447	1753	3075	1196
Grp Volume(v), veh/h	260	335	39	125	0	221	328	507	33	101	386	0
Grp Sat Flow(s),veh/h/ln	1682	1841	1409	1584	0	1699	1591	1664	1447	1753	1537	1196
Q Serve(g_s), s	16.4	20.0	2.6	8.0	0.0	13.9	11.1	14.3	1.9	6.3	12.7	0.0
Cycle Q Clear(g_c), s	16.4	20.0	2.6	8.0	0.0	13.9	11.1	14.3	1.9	6.3	12.7	0.0
Prop In Lane	1.00		1.00	1.00		0.22	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	310	340	260	242	0	259	389	928	404	126	734	
V/C Ratio(X)	0.84	0.99	0.15	0.52	0.00	0.85	0.84	0.55	0.08	0.80	0.53	
Avail Cap(c_a), veh/h	310	340	260	327	0	351	425	928	404	153	734	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.84	0.84	0.84	0.98	0.98	0.00
Uniform Delay (d), s/veh	43.3	44.7	37.6	42.9	0.0	45.4	47.2	33.7	29.3	51.6	40.5	0.0
Incr Delay (d2), s/veh	17.9	45.0	0.3	1.7	0.0	13.9	13.2	1.9	0.3	21.2	2.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.2	13.1	0.9	3.2	0.0	6.7	4.9	5.6	0.6	3.4	5.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	61.1	89.7	37.9	44.6	0.0	59.3	60.5	35.7	29.6	72.7	43.1	0.0
LnGrp LOS	E	F	D	D	A	E	E	D	C	E	D	
Approach Vol, veh/h		634			346			868			487	
Approach Delay, s/veh		74.8			54.0			44.8			49.3	
Approach LOS		E			D			D			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	21.8	32.9		25.1	17.3	37.4		30.2				
Change Period (Y+Rc), s	8.3	6.7		* 8.3	* 9.4	6.7		9.9				
Max Green Setting (Gmax), s	14.7	19.1		* 23	* 9.6	23.1		20.3				
Max Q Clear Time (g_c+I1), s	13.1	14.7		15.9	8.3	16.3		22.0				
Green Ext Time (p_c), s	0.4	1.1		0.9	0.0	2.2		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		55.2
HCM 6th LOS		E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Group Flow (vph)	160	100	40	859	2	678	62
v/c Ratio	0.51	0.18	0.11	0.53	0.01	0.60	0.11
Control Delay	37.4	7.1	9.6	14.3	8.0	23.3	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.4	7.1	9.6	14.3	8.0	23.3	5.7
Queue Length 50th (ft)	69	5	8	114	0	138	0
Queue Length 95th (ft)	154	39	23	274	3	232	25
Internal Link Dist (ft)	414			1077		8434	
Turn Bay Length (ft)			470		275		295
Base Capacity (vph)	619	613	616	1972	630	1683	826
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.16	0.06	0.44	0.00	0.40	0.08

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (veh/h)	147	92	37	790	2	624	57
Future Volume (veh/h)	147	92	37	790	2	624	57
Initial Q (Qb), veh	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00				1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach	No			No		No	
Adj Sat Flow, veh/h/ln	1870	1752	1589	1648		1604	1707
Adj Flow Rate, veh/h	160	38	40	859		678	17
Peak Hour Factor	0.92	0.92	0.92	0.92		0.92	0.92
Percent Heavy Veh, %	2	10	21	17		20	13
Cap, veh/h	223	246	284	1347		1074	510
Arrive On Green	0.13	0.13	0.04	0.43		0.35	0.35
Sat Flow, veh/h	1781	1485	1513	3214		3127	1447
Grp Volume(v), veh/h	160	38	40	859		678	17
Grp Sat Flow(s),veh/h/ln	1781	1485	1513	1566		1523	1447
Q Serve(g_s), s	5.3	0.0	0.0	13.3		11.4	0.5
Cycle Q Clear(g_c), s	5.3	0.0	0.0	13.3		11.4	0.5
Prop In Lane	1.00	1.00	1.00				1.00
Lane Grp Cap(c), veh/h	223	246	284	1347		1074	510
V/C Ratio(X)	0.72	0.15	0.14	0.64		0.63	0.03
Avail Cap(c_a), veh/h	723	662	715	2288		1979	940
HCM Platoon Ratio	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	25.9	22.0	20.7	13.8		16.6	13.1
Incr Delay (d2), s/veh	5.1	0.3	0.3	1.1		1.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	0.7	0.4	3.6		3.3	0.1
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	31.0	22.4	20.9	14.9		17.9	13.1
LnGrp LOS	C	C	C	B		B	B
Approach Vol, veh/h	198			899		695	
Approach Delay, s/veh	29.4			15.1		17.8	
Approach LOS	C			B		B	

Timer - Assigned Phs		2		4	5	6	
Phs Duration (G+Y+Rc), s		37.0		16.4	13.0	32.2	
Change Period (Y+Rc), s		10.5		8.7	10.5	10.5	
Max Green Setting (Gmax), s		45.0		25.0	20.0	40.0	
Max Q Clear Time (g_c+I1), s		15.3		7.3	2.0	13.4	
Green Ext Time (p_c), s		11.2		0.7	0.1	8.3	

Intersection Summary	
HCM 6th Ctrl Delay	17.7
HCM 6th LOS	B

Notes

User approved ignoring U-Turning movement.

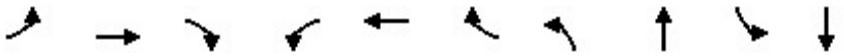
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	57	233	175	600	562	80
v/c Ratio	0.41	0.52	0.53	0.25	0.34	0.07
Control Delay	55.8	10.3	58.6	2.2	14.4	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.8	10.3	58.6	2.2	14.4	1.4
Queue Length 50th (ft)	39	0	65	28	106	0
Queue Length 95th (ft)	78	39	100	31	166	14
Internal Link Dist (ft)	446			1419	813	
Turn Bay Length (ft)		250	485			315
Base Capacity (vph)	313	728	615	2433	1629	1316
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.32	0.28	0.25	0.34	0.06

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	55	226	170	582	0	545	78
Future Volume (vph)	55	226	170	582	0	545	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Lane Util. Factor	1.00	0.88	0.97	0.95		0.95	1.00
Frt	1.00	0.85	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (prot)	1583	2733	3273	3195		2888	1583
Flt Permitted	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (perm)	1583	2733	3273	3195		2888	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	57	233	175	600	0	562	80
RTOR Reduction (vph)	0	213	0	0	0	0	28
Lane Group Flow (vph)	57	20	175	600	0	562	52
Heavy Vehicles (%)	14%	4%	7%	13%	2%	25%	2%
Turn Type	Prot	Prot	Prot	NA	Prot	NA	pm+ov
Protected Phases	7	4	1	6	5	2	7
Permitted Phases		4					2
Actuated Green, G (s)	9.6	9.6	11.2	83.8		62.1	71.7
Effective Green, g (s)	9.6	9.6	11.2	83.8		62.1	71.7
Actuated g/C Ratio	0.09	0.09	0.10	0.76		0.56	0.65
Clearance Time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Vehicle Extension (s)	3.0	3.0	3.0	3.5		3.5	3.0
Lane Grp Cap (vph)	138	238	333	2434		1630	1031
v/s Ratio Prot	c0.04	0.01	c0.05	0.19		c0.19	0.00
v/s Ratio Perm							0.03
v/c Ratio	0.41	0.09	0.53	0.25		0.34	0.05
Uniform Delay, d1	47.5	46.2	46.9	3.8		12.9	6.9
Progression Factor	1.00	1.00	1.14	0.47		1.00	1.00
Incremental Delay, d2	2.0	0.2	1.5	0.2		0.6	0.0
Delay (s)	49.5	46.3	54.8	2.0		13.5	6.9
Level of Service	D	D	D	A		B	A
Approach Delay (s)	47.0			14.0		12.7	
Approach LOS	D			B		B	

Intersection Summary			
HCM 2000 Control Delay	19.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	27.1
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

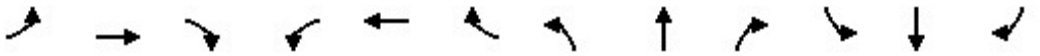
HCM 6th Edition methodology supports red clearance in the range of 0 to 6 seconds.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	90	872	50	39	636	103	133	105	32	26
v/c Ratio	0.18	0.69	0.05	0.11	0.52	0.10	0.67	0.24	0.17	0.05
Control Delay	3.1	8.5	0.2	4.0	10.9	1.7	50.7	1.2	33.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.1	8.5	0.2	4.0	10.9	1.7	50.7	1.2	33.0	0.2
Queue Length 50th (ft)	8	116	0	5	186	0	67	0	15	0
Queue Length 95th (ft)	m11	161	m1	12	263	17	#136	0	41	0
Internal Link Dist (ft)		1336			1871			292		413
Turn Bay Length (ft)	150		150	150		150			50	
Base Capacity (vph)	510	1279	1112	358	1232	1082	226	471	210	559
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.68	0.04	0.11	0.52	0.10	0.59	0.22	0.15	0.05

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	83	802	46	36	585	95	122	0	97	29	0	24
Future Volume (veh/h)	83	802	46	36	585	95	122	0	97	29	0	24
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	90	872	32	39	636	63	133	0	7	32	0	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	559	1290	1094	573	1247	1056	247	0	184	242	0	184
Arrive On Green	0.12	1.00	1.00	0.04	0.67	0.67	0.12	0.00	0.12	0.12	0.00	0.12
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1415	0	1585	1409	0	1585
Grp Volume(v), veh/h	90	872	32	39	636	63	133	0	7	32	0	2
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1415	0	1585	1409	0	1585
Q Serve(g_s), s	1.2	0.0	0.0	0.5	14.6	1.2	7.8	0.0	0.3	1.8	0.0	0.1
Cycle Q Clear(g_c), s	1.2	0.0	0.0	0.5	14.6	1.2	7.9	0.0	0.3	2.1	0.0	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	559	1290	1094	573	1247	1056	247	0	184	242	0	184
V/C Ratio(X)	0.16	0.68	0.03	0.07	0.51	0.06	0.54	0.00	0.04	0.13	0.00	0.01
Avail Cap(c_a), veh/h	561	1290	1094	615	1247	1056	308	0	252	303	0	252
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.72	0.72	0.72	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	4.5	0.0	0.0	3.3	7.2	4.9	36.8	0.0	33.4	34.3	0.0	33.3
Incr Delay (d2), s/veh	0.1	2.1	0.0	0.0	0.3	0.0	1.8	0.0	0.1	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.7	0.0	0.1	4.3	0.3	2.8	0.0	0.1	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	4.6	2.1	0.0	3.3	7.5	4.9	38.6	0.0	33.5	34.5	0.0	33.3
LnGrp LOS	A	A	A	A	A	A	D	A	C	C	A	C
Approach Vol, veh/h		994			738			140			34	
Approach Delay, s/veh		2.2			7.1			38.3			34.5	
Approach LOS		A			A			D			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.5	63.1		14.3	9.5	61.2		14.3				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.0	53.0		13.5	5.1	52.9		13.5				
Max Q Clear Time (g_c+I1), s	2.5	2.0		9.9	3.2	16.6		4.1				
Green Ext Time (p_c), s	0.0	7.5		0.1	0.0	4.5		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		7.3	
HCM 6th LOS		A	

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↱			↗
Traffic Vol, veh/h	0	928	702	3	0	14
Future Vol, veh/h	0	928	702	3	0	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1009	763	3	0	15

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	765
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	0	-	-	-	0	403
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	403
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	14.3
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	403
HCM Lane V/C Ratio	-	-	-	0.038
HCM Control Delay (s)	-	-	-	14.3
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	49	879	703	15	5	2
Future Vol, veh/h	49	879	703	15	5	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	-	0	50
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	53	955	764	16	5	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	780	0	-	0	1833	772
Stage 1	-	-	-	-	772	-
Stage 2	-	-	-	-	1061	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	837	-	-	-	84	400
Stage 1	-	-	-	-	456	-
Stage 2	-	-	-	-	333	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	837	-	-	-	79	400
Mov Cap-2 Maneuver	-	-	-	-	79	-
Stage 1	-	-	-	-	427	-
Stage 2	-	-	-	-	333	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	42.5
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	837	-	-	-	79	400
HCM Lane V/C Ratio	0.064	-	-	-	0.069	0.005
HCM Control Delay (s)	9.6	-	-	-	53.9	14
HCM Lane LOS	A	-	-	-	F	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.2	0

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	30	12	40	783	690	103
v/c Ratio	0.15	0.06	0.06	0.26	0.26	0.08
Control Delay	23.4	13.1	2.1	0.4	7.1	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.4	13.1	2.1	0.4	7.1	2.7
Queue Length 50th (ft)	9	0	0	0	0	0
Queue Length 95th (ft)	29	12	m3	17	174	24
Internal Link Dist (ft)	785			2104	3524	
Turn Bay Length (ft)			300			150
Base Capacity (vph)	202	191	621	3109	2749	1252
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.06	0.06	0.25	0.25	0.08

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	28	11	37	720	635	95
Future Volume (veh/h)	28	11	37	720	635	95
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	30	0	40	783	690	53
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	60	53	540	2711	2027	904
Arrive On Green	0.03	0.00	0.08	1.00	0.57	0.57
Sat Flow, veh/h	1781	1585	1781	3647	3647	1585
Grp Volume(v), veh/h	30	0	40	783	690	53
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1777	1777	1585
Q Serve(g_s), s	0.9	0.0	0.5	0.0	5.7	0.8
Cycle Q Clear(g_c), s	0.9	0.0	0.5	0.0	5.7	0.8
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	60	53	540	2711	2027	904
V/C Ratio(X)	0.50	0.00	0.07	0.29	0.34	0.06
Avail Cap(c_a), veh/h	178	159	650	2711	2027	904
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.64	0.64	1.00	1.00
Uniform Delay (d), s/veh	26.1	0.0	4.3	0.0	6.3	5.2
Incr Delay (d2), s/veh	6.4	0.0	0.0	0.2	0.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	0.1	0.1	1.2	1.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	32.6	0.0	4.4	0.2	6.8	5.4
LnGrp LOS	C	A	A	A	A	A
Approach Vol, veh/h	30			823	743	
Approach Delay, s/veh	32.6			0.4	6.7	
Approach LOS	C			A	A	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		48.7		6.3	10.6	38.1
Change Period (Y+Rc), s		6.7		4.5	8.3	6.7
Max Green Setting (Gmax), s		38.3		5.5	5.7	24.3
Max Q Clear Time (g_c+I1), s		2.0		2.9	2.5	7.7
Green Ext Time (p_c), s		5.2		0.0	0.0	3.8

Intersection Summary	
HCM 6th Ctrl Delay	3.9
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	321	850	182	161	940	155	200	254	113	60	397
v/c Ratio	1.09	0.94	0.16	0.83	1.20	0.18	0.69	1.18	0.49	0.37	0.84
Control Delay	107.9	50.5	2.7	58.3	131.3	2.1	50.5	151.7	42.1	53.4	46.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	107.9	50.5	2.7	58.3	131.3	2.1	50.5	151.7	42.1	53.4	46.1
Queue Length 50th (ft)	~207	582	0	66	~806	0	120	~183	64	40	200
Queue Length 95th (ft)	#379	#845	56	#183	#1050	26	#200	#351	115	83	#345
Internal Link Dist (ft)		593			4165			244		594	
Turn Bay Length (ft)	260		500	270		575	190		150		
Base Capacity (vph)	295	901	1122	193	785	891	289	216	251	176	470
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.09	0.94	0.16	0.83	1.20	0.17	0.69	1.18	0.45	0.34	0.84

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	295	782	167	148	865	143	184	86	148	104	55	365
Future Volume (veh/h)	295	782	167	148	865	143	184	86	148	104	55	365
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	0.99		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1870	1693	1841	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	321	850	104	161	940	72	200	93	101	113	60	317
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	4	2	14	4	2	2	2	2	2	2	2
Cap, veh/h	298	1002	1012	247	847	829	298	95	103	198	177	354
Arrive On Green	0.13	0.54	0.54	0.06	0.46	0.46	0.09	0.12	0.12	0.07	0.09	0.09
Sat Flow, veh/h	1781	1841	1585	1612	1841	1552	1781	814	884	1781	1870	1560
Grp Volume(v), veh/h	321	850	104	161	940	72	200	0	194	113	60	317
Grp Sat Flow(s),veh/h/ln	1781	1841	1585	1612	1841	1552	1781	0	1698	1781	1870	1560
Q Serve(g_s), s	14.3	43.0	2.8	4.8	50.6	2.5	10.4	0.0	12.5	6.2	3.3	10.4
Cycle Q Clear(g_c), s	14.3	43.0	2.8	4.8	50.6	2.5	10.4	0.0	12.5	6.2	3.3	10.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.52	1.00		1.00
Lane Grp Cap(c), veh/h	298	1002	1012	247	847	829	298	0	197	198	177	354
V/C Ratio(X)	1.08	0.85	0.10	0.65	1.11	0.09	0.67	0.00	0.98	0.57	0.34	0.90
Avail Cap(c_a), veh/h	298	1002	1012	280	847	829	298	0	197	253	177	354
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.13	0.13	0.13	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.3	21.2	7.7	21.6	29.7	12.6	41.1	0.0	48.5	41.2	46.6	41.5
Incr Delay (d2), s/veh	74.8	8.9	0.2	0.6	52.2	0.0	5.7	0.0	59.0	2.6	1.1	24.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.0	18.8	1.0	2.0	32.6	0.9	5.4	0.0	8.6	2.9	1.6	10.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	111.0	30.2	7.9	22.2	81.9	12.6	46.8	0.0	107.5	43.8	47.7	65.8
LnGrp LOS	F	C	A	C	F	B	D	A	F	D	D	E
Approach Vol, veh/h		1275			1173			394			490	
Approach Delay, s/veh		48.7			69.5			76.7			58.5	
Approach LOS		D			E			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.0	56.5	14.6	19.4	13.7	65.8	17.0	17.0
Change Period (Y+Rc), s	* 8.7	* 5.8	6.6	6.6	* 6.8	5.8	6.6	6.6
Max Green Setting (Gmax), s	* 14	* 47	11.4	9.4	* 9.2	54.2	10.4	10.4
Max Q Clear Time (g_c+I1), s	16.3	52.6	8.2	14.5	6.8	45.0	12.4	12.4
Green Ext Time (p_c), s	0.0	0.0	0.1	0.0	0.1	5.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	60.8
HCM 6th LOS	E

Notes

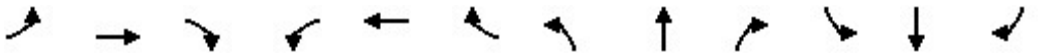
User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	165	679	48	30	966	48	83	248
v/c Ratio	0.75	0.62	0.05	0.06	0.98	0.05	0.66	0.63
Control Delay	33.9	13.8	1.1	4.0	44.6	1.2	50.6	17.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.9	13.8	1.1	4.0	44.6	1.2	50.6	17.4
Queue Length 50th (ft)	19	128	0	3	377	0	31	30
Queue Length 95th (ft)	#129	390	8	12	#744	8	#80	97
Internal Link Dist (ft)		4165			4595		176	167
Turn Bay Length (ft)	145		90	125		155		
Base Capacity (vph)	221	1092	1014	473	981	895	262	655
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.62	0.05	0.06	0.98	0.05	0.32	0.38

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	162	665	47	29	947	47	46	23	13	28	32	182
Future Volume (veh/h)	162	665	47	29	947	47	46	23	13	28	32	182
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1781	1870	1841	1826	1870	1870	1752	1870	1870	1841	1870
Adj Flow Rate, veh/h	165	679	29	30	966	27	47	23	4	29	33	35
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	8	2	4	5	2	2	10	2	2	4	2
Cap, veh/h	266	1069	951	416	1027	892	184	76	10	106	87	71
Arrive On Green	0.07	0.60	0.60	0.03	0.56	0.56	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1781	1781	1585	1753	1826	1585	822	622	83	324	715	586
Grp Volume(v), veh/h	165	679	29	30	966	27	74	0	0	97	0	0
Grp Sat Flow(s),veh/h/ln	1781	1781	1585	1753	1826	1585	1527	0	0	1625	0	0
Q Serve(g_s), s	2.6	17.2	0.5	0.4	34.2	0.5	0.0	0.0	0.0	1.0	0.0	0.0
Cycle Q Clear(g_c), s	2.6	17.2	0.5	0.4	34.2	0.5	2.8	0.0	0.0	3.7	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.64		0.05	0.30		0.36
Lane Grp Cap(c), veh/h	266	1069	951	416	1027	892	270	0	0	265	0	0
V/C Ratio(X)	0.62	0.64	0.03	0.07	0.94	0.03	0.27	0.00	0.00	0.37	0.00	0.00
Avail Cap(c_a), veh/h	272	1069	951	487	1048	910	599	0	0	638	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	15.6	9.0	5.7	7.0	14.1	6.8	28.1	0.0	0.0	28.5	0.0	0.0
Incr Delay (d2), s/veh	4.1	1.8	0.0	0.1	15.9	0.0	0.5	0.0	0.0	0.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	5.1	0.1	0.1	14.6	0.1	1.1	0.0	0.0	1.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.8	10.8	5.7	7.1	30.0	6.8	28.6	0.0	0.0	29.3	0.0	0.0
LnGrp LOS	B	B	A	A	C	A	C	A	A	C	A	A
Approach Vol, veh/h		873			1023			74			97	
Approach Delay, s/veh		12.3			28.7			28.6			29.3	
Approach LOS		B			C			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.7	49.6		13.4	9.3	47.0		13.4				
Change Period (Y+Rc), s	4.5	7.8		4.9	4.5	7.8		4.9				
Max Green Setting (Gmax), s	5.0	40.0		25.0	5.0	40.0		25.0				
Max Q Clear Time (g_c+I1), s	2.4	19.2		4.8	4.6	36.2		5.7				
Green Ext Time (p_c), s	0.0	8.2		0.3	0.0	3.0		0.4				

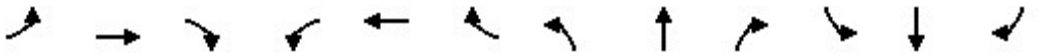
Intersection Summary			
HCM 6th Ctrl Delay		21.8	
HCM 6th LOS		C	

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	314	230	424	252	520	412	696	188	102	672	283
v/c Ratio	1.18	0.82	0.86	0.65	1.25	1.28	0.97	0.37	0.71	0.94	0.51
Control Delay	156.0	68.4	32.1	46.8	167.0	189.8	71.8	3.7	83.1	55.4	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	156.0	68.4	32.1	46.8	167.0	189.8	71.8	3.7	83.1	55.4	9.8
Queue Length 50th (ft)	~267	159	85	161	~455	~190	260	0	78	215	12
Queue Length 95th (ft)	#442	#287	#264	251	#668	#290	#386	24	#156	#351	110
Internal Link Dist (ft)		382			694		8434			2104	
Turn Bay Length (ft)	250		230	500		565		250	125		480
Base Capacity (vph)	265	281	491	390	416	321	714	514	150	715	556
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.18	0.82	0.86	0.65	1.25	1.28	0.97	0.37	0.68	0.94	0.51

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	289	212	390	232	376	102	379	640	173	94	618	260
Future Volume (veh/h)	289	212	390	232	376	102	379	640	173	94	618	260
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1811	1796	1781	1826	1796	1811	1781	1796	1826	1811	1870
Adj Flow Rate, veh/h	314	230	147	252	409	101	412	696	27	102	672	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	6	7	8	5	7	6	8	7	5	6	2
Cap, veh/h	269	285	239	396	330	82	325	763	343	125	723	
Arrive On Green	0.16	0.16	0.16	0.23	0.23	0.23	0.10	0.23	0.23	0.14	0.42	0.00
Sat Flow, veh/h	1711	1811	1522	1697	1414	349	3346	3385	1522	1739	3441	1585
Grp Volume(v), veh/h	314	230	147	252	0	510	412	696	27	102	672	0
Grp Sat Flow(s),veh/h/ln	1711	1811	1522	1697	0	1763	1673	1692	1522	1739	1721	1585
Q Serve(g_s), s	17.3	13.5	9.9	14.7	0.0	25.7	10.7	22.1	1.5	6.3	20.4	0.0
Cycle Q Clear(g_c), s	17.3	13.5	9.9	14.7	0.0	25.7	10.7	22.1	1.5	6.3	20.4	0.0
Prop In Lane	1.00		1.00	1.00		0.20	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	269	285	239	396	0	412	325	763	343	125	723	
V/C Ratio(X)	1.17	0.81	0.61	0.64	0.00	1.24	1.27	0.91	0.08	0.82	0.93	
Avail Cap(c_a), veh/h	269	285	239	396	0	412	325	763	343	152	723	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.84	0.84	0.84	0.90	0.90	0.00
Uniform Delay (d), s/veh	46.3	44.7	43.2	37.9	0.0	42.2	49.7	41.6	33.6	46.4	31.1	0.0
Incr Delay (d2), s/veh	107.8	15.7	4.6	3.3	0.0	126.4	138.7	15.0	0.4	22.0	18.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.2	7.1	4.0	6.3	0.0	25.3	10.5	10.2	0.6	3.2	7.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	154.1	60.4	47.8	41.3	0.0	168.6	188.3	56.5	34.0	68.3	49.8	0.0
LnGrp LOS	F	E	D	D	A	F	F	E	C	E	D	
Approach Vol, veh/h		691			762			1135			774	
Approach Delay, s/veh		100.3			126.5			103.8			52.3	
Approach LOS		F			F			F			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	19.0	29.8		34.0	17.3	31.5		27.2				
Change Period (Y+Rc), s	8.3	6.7		* 8.3	* 9.4	6.7		9.9				
Max Green Setting (Gmax), s	10.7	23.1		* 26	* 9.6	23.1		17.3				
Max Q Clear Time (g_c+I1), s	12.7	22.4		27.7	8.3	24.1		19.3				
Green Ext Time (p_c), s	0.0	0.3		0.0	0.0	0.0		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		96.4
HCM 6th LOS		F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	184	99	124	1058	1068	209
v/c Ratio	0.63	0.19	0.41	0.50	0.78	0.27
Control Delay	47.2	17.7	20.2	10.9	30.0	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.2	17.7	20.2	10.9	30.0	4.0
Queue Length 50th (ft)	105	33	27	162	282	0
Queue Length 95th (ft)	181	68	58	253	432	46
Internal Link Dist (ft)	414			1077	8434	
Turn Bay Length (ft)			470			295
Base Capacity (vph)	476	517	495	2098	1426	801
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.19	0.25	0.50	0.75	0.26

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (veh/h)	169	91	114	973	0	983	192
Future Volume (veh/h)	169	91	114	973	0	983	192
Initial Q (Qb), veh	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00				1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach	No			No		No	
Adj Sat Flow, veh/h/ln	1870	1722	1826	1781		1767	1870
Adj Flow Rate, veh/h	184	86	124	1058		1068	75
Peak Hour Factor	0.92	0.92	0.92	0.92		0.92	0.92
Percent Heavy Veh, %	2	12	5	8		9	2
Cap, veh/h	243	285	271	1481		1434	677
Arrive On Green	0.14	0.14	0.06	0.44		0.43	0.43
Sat Flow, veh/h	1781	1459	1739	3474		3445	1585
Grp Volume(v), veh/h	184	86	124	1058		1068	75
Grp Sat Flow(s),veh/h/ln	1781	1459	1739	1692		1678	1585
Q Serve(g_s), s	7.8	0.0	0.0	20.1		21.0	2.2
Cycle Q Clear(g_c), s	7.8	0.0	0.0	20.1		21.0	2.2
Prop In Lane	1.00	1.00	1.00				1.00
Lane Grp Cap(c), veh/h	243	285	271	1481		1434	677
V/C Ratio(X)	0.76	0.30	0.46	0.71		0.75	0.11
Avail Cap(c_a), veh/h	566	550	610	1935		1706	806
HCM Platoon Ratio	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	32.7	27.1	30.9	18.1		18.9	13.6
Incr Delay (d2), s/veh	5.8	0.7	1.4	1.5		2.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	1.9	2.2	6.7		7.1	0.7
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	38.5	27.8	32.4	19.7		21.1	13.7
LnGrp LOS	D	C	C	B		C	B
Approach Vol, veh/h	270			1182		1143	
Approach Delay, s/veh	35.1			21.0		20.6	
Approach LOS	D			C		C	

Timer - Assigned Phs		2		4	5	6	
Phs Duration (G+Y+Rc), s		44.9		19.4	15.2	44.1	
Change Period (Y+Rc), s		10.5		8.7	10.5	10.5	
Max Green Setting (Gmax), s		45.0		25.0	20.0	40.0	
Max Q Clear Time (g_c+I1), s		22.1		9.8	2.0	23.0	
Green Ext Time (p_c), s		12.3		0.9	0.3	10.6	

Intersection Summary	
HCM 6th Ctrl Delay	22.3
HCM 6th LOS	C

Notes

User approved ignoring U-Turning movement.

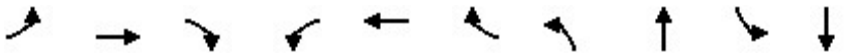
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	177	263	320	798	825	120
v/c Ratio	0.68	0.42	0.67	0.35	0.53	0.11
Control Delay	57.4	6.8	56.4	4.3	23.9	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	6.8	56.4	4.3	23.9	1.8
Queue Length 50th (ft)	120	0	121	60	212	1
Queue Length 95th (ft)	184	37	140	78	320	22
Internal Link Dist (ft)	446			1419	813	
Turn Bay Length (ft)		250	485			315
Base Capacity (vph)	350	763	627	2284	1565	1174
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.34	0.51	0.35	0.53	0.10

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	170	252	307	766	0	792	115
Future Volume (vph)	170	252	307	766	0	792	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Lane Util. Factor	1.00	0.88	0.97	0.95		0.95	1.00
Frt	1.00	0.85	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (prot)	1770	2787	3335	3252		3374	1583
Flt Permitted	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (perm)	1770	2787	3335	3252		3374	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.92	0.96	0.96
Adj. Flow (vph)	177	262	320	798	0	825	120
RTOR Reduction (vph)	0	225	0	0	0	0	45
Lane Group Flow (vph)	177	38	320	798	0	825	75
Heavy Vehicles (%)	2%	2%	5%	11%	2%	7%	2%
Turn Type	Prot	Prot	Prot	NA	Prot	NA	pm+ov
Protected Phases	7	4	1	6	5	2	7
Permitted Phases		4					2
Actuated Green, G (s)	16.1	16.1	15.7	77.3		51.1	67.2
Effective Green, g (s)	16.1	16.1	15.7	77.3		51.1	67.2
Actuated g/C Ratio	0.15	0.15	0.14	0.70		0.46	0.61
Clearance Time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Vehicle Extension (s)	3.0	3.0	3.0	3.5		3.5	3.0
Lane Grp Cap (vph)	259	407	475	2285		1567	967
v/s Ratio Prot	c0.10	0.01	c0.10	0.25		c0.24	0.01
v/s Ratio Perm							0.04
v/c Ratio	0.68	0.09	0.67	0.35		0.53	0.08
Uniform Delay, d1	44.5	40.6	44.7	6.4		20.9	8.7
Progression Factor	1.00	1.00	1.11	0.55		1.00	1.00
Incremental Delay, d2	7.3	0.1	3.7	0.4		1.3	0.0
Delay (s)	51.8	40.7	53.4	3.9		22.1	8.8
Level of Service	D	D	D	A		C	A
Approach Delay (s)	45.2			18.1		20.4	
Approach LOS	D			B		C	

Intersection Summary			
HCM 2000 Control Delay	23.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	27.1
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

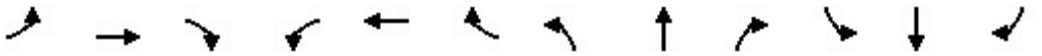
HCM 6th Edition methodology supports red clearance in the range of 0 to 6 seconds.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	36	917	116	92	1140	40	83	65	104	92
v/c Ratio	0.16	0.70	0.10	0.25	0.85	0.03	0.62	0.16	0.76	0.27
Control Delay	3.1	8.6	1.3	3.6	17.4	0.4	61.1	0.8	74.9	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.1	8.6	1.3	3.6	17.4	0.4	61.1	0.8	74.9	1.9
Queue Length 50th (ft)	2	139	0	7	419	0	45	0	58	0
Queue Length 95th (ft)	m7	280	m6	14	#807	3	#121	0	#154	0
Internal Link Dist (ft)		1336			1871			292		413
Turn Bay Length (ft)	150		150	150		150			50	
Base Capacity (vph)	231	1329	1163	368	1349	1167	133	404	136	347
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.69	0.10	0.25	0.85	0.03	0.62	0.16	0.76	0.27

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	33	844	107	85	1049	37	76	0	60	96	0	85
Future Volume (veh/h)	33	844	107	85	1049	37	76	0	60	96	0	85
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	36	917	77	92	1140	27	83	0	2	104	0	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	288	1323	1121	605	1356	1150	202	0	137	203	0	137
Arrive On Green	0.07	1.00	1.00	0.05	0.73	0.73	0.09	0.00	0.09	0.09	0.00	0.09
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1414	0	1585	1415	0	1585
Grp Volume(v), veh/h	36	917	77	92	1140	27	83	0	2	104	0	3
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1414	0	1585	1415	0	1585
Q Serve(g_s), s	0.4	0.0	0.0	1.1	37.3	0.4	5.0	0.0	0.1	6.3	0.0	0.2
Cycle Q Clear(g_c), s	0.4	0.0	0.0	1.1	37.3	0.4	5.1	0.0	0.1	6.4	0.0	0.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	288	1323	1121	605	1356	1150	202	0	137	203	0	137
V/C Ratio(X)	0.12	0.69	0.07	0.15	0.84	0.02	0.41	0.00	0.01	0.51	0.00	0.02
Avail Cap(c_a), veh/h	342	1323	1121	626	1356	1150	202	0	137	203	0	137
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.68	0.68	0.68	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.8	0.0	0.0	2.7	8.4	3.3	38.7	0.0	36.4	39.3	0.0	36.4
Incr Delay (d2), s/veh	0.1	2.1	0.1	0.1	4.9	0.0	1.3	0.0	0.0	2.2	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.8	0.0	0.2	10.9	0.1	1.8	0.0	0.0	2.3	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.9	2.1	0.1	2.8	13.3	3.3	40.1	0.0	36.4	41.5	0.0	36.5
LnGrp LOS	B	A	A	A	B	A	D	A	D	D	A	D
Approach Vol, veh/h		1030			1259			85			107	
Approach Delay, s/veh		2.2			12.3			40.0			41.3	
Approach LOS		A			B			D			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.0	66.0		12.0	7.4	67.6		12.0				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.5	60.5		7.5	5.5	60.5		7.5				
Max Q Clear Time (g_c+I1), s	3.1	2.0		7.1	2.4	39.3		8.4				
Green Ext Time (p_c), s	0.0	8.5		0.0	0.0	9.7		0.0				

Intersection Summary												
HCM 6th Ctrl Delay			10.3									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1000	1126	1	0	45
Future Vol, veh/h	0	1000	1126	1	0	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1087	1224	1	0	49

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1225
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	0	-	-	-	0	218
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	218
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	26.2
HCM LOS			D

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	218
HCM Lane V/C Ratio	-	-	-	0.224
HCM Control Delay (s)	-	-	-	26.2
HCM Lane LOS	-	-	-	D
HCM 95th %tile Q(veh)	-	-	-	0.8

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	980	1122	6	17	5
Future Vol, veh/h	20	980	1122	6	17	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	-	0	50
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	1065	1220	7	18	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1227	0	-	0	2333	1224
Stage 1	-	-	-	-	1224	-
Stage 2	-	-	-	-	1109	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	568	-	-	-	41	218
Stage 1	-	-	-	-	278	-
Stage 2	-	-	-	-	316	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	568	-	-	-	39	218
Mov Cap-2 Maneuver	-	-	-	-	39	-
Stage 1	-	-	-	-	267	-
Stage 2	-	-	-	-	316	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	130.5
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	568	-	-	-	39	218
HCM Lane V/C Ratio	0.038	-	-	-	0.474	0.025
HCM Control Delay (s)	11.6	-	-	-	162.5	21.9
HCM Lane LOS	B	-	-	-	F	C
HCM 95th %tile Q(veh)	0.1	-	-	-	1.6	0.1

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	103	42	16	1093	1061	41
v/c Ratio	0.42	0.16	0.04	0.43	0.45	0.04
Control Delay	26.7	9.7	1.5	0.9	8.2	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.7	9.7	1.5	0.9	8.2	4.6
Queue Length 50th (ft)	31	0	1	21	76	0
Queue Length 95th (ft)	70	22	m1	m22	244	21
Internal Link Dist (ft)	785			2104	3524	
Turn Bay Length (ft)			300			150
Base Capacity (vph)	263	271	389	2580	2365	1071
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.15	0.04	0.42	0.45	0.04

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	95	39	15	1006	976	38
Future Volume (veh/h)	95	39	15	1006	976	38
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	103	2	16	1093	1061	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	134	119	357	2563	1957	873
Arrive On Green	0.08	0.08	0.04	1.00	0.55	0.55
Sat Flow, veh/h	1781	1585	1781	3647	3647	1585
Grp Volume(v), veh/h	103	2	16	1093	1061	19
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1777	1777	1585
Q Serve(g_s), s	3.1	0.1	0.2	0.0	10.5	0.3
Cycle Q Clear(g_c), s	3.1	0.1	0.2	0.0	10.5	0.3
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	134	119	357	2563	1957	873
V/C Ratio(X)	0.77	0.02	0.04	0.43	0.54	0.02
Avail Cap(c_a), veh/h	243	216	484	2563	1957	873
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.09	0.09	1.00	1.00
Uniform Delay (d), s/veh	25.0	23.6	6.0	0.0	7.9	5.6
Incr Delay (d2), s/veh	9.0	0.1	0.0	0.0	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.1	0.0	0.0	2.5	0.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	33.9	23.6	6.0	0.0	9.0	5.7
LnGrp LOS	C	C	A	A	A	A
Approach Vol, veh/h	105			1109	1080	
Approach Delay, s/veh	33.7			0.1	8.9	
Approach LOS	C			A	A	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		46.4		8.6	9.4	37.0
Change Period (Y+Rc), s		6.7		4.5	8.3	6.7
Max Green Setting (Gmax), s		36.3		7.5	5.0	23.0
Max Q Clear Time (g_c+I1), s		2.0		5.1	2.2	12.5
Green Ext Time (p_c), s		8.0		0.0	0.0	4.7

Intersection Summary	
HCM 6th Ctrl Delay	5.8
HCM 6th LOS	A

Traffic Impact Study

Gibson Property

Frederick County, Virginia

May 8, 2026
Revised July 30, 2026

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Executive Summary

Purpose of Report and Study Objectives

This report presents the findings of a Traffic Impact Study (TIS) conducted for the proposed Gibson Property development (the Site / the Development / the Property). The proposed development site is situated northwest of the intersection of Route 522 and Fairfax Pike (Route 277)/Lord Fairfax Highway (Route 340), positioned north of Fairfax Pike and both east and west of Route 522 in Frederick County, Virginia. The site is identified by Tax Map #s 87-3-A, 87-3-B, and 87-A-16B and totals approximately 294.14 acres. The applicant proposes a rezoning on the entire site to M1 (Light Industrial District) and a Comprehensive Plan amendment on the parcel east of Route 522 (Tax map # 87-3-A) in order to develop up to 3,200,000 SF of industrial uses. This study evaluates all parcels under the proposed rezoning and comprehensive plan amendment.

This TIS was developed in accordance with the Virginia Department of Transportation (VDOT) and Frederick County transportation impact guidelines. The document was prepared in accordance with best professional practice and standards that assess the impact of a proposed development on the transportation system and recommends improvements to lessen or negate those impacts. Traffic operational analyses, as presented in this TIS, involves the evaluation of anticipated future roadway conditions with and without the proposed development and recommend transportation improvements to offset both the impacts of the increase in future traffic volumes and the changes in traffic operations due to the development. The analysis herein assists public officials and developers to balance interrelations between efficient traffic movements with necessary lane access.

Site Location and Study Area

The proposed development site is located northwest of the intersection of Route 522 and Fairfax Pike (Route 277)/Lord Fairfax Highway (Route 340), positioned north of Fairfax Pike and both east and west of Route 522. The site is identified by Tax Map #s 87-3-A, 87-3-B, and 87-A-16B in Frederick County, Virginia and totals approximately 294.14 acres. The vehicular study area includes five (5) existing intersections along Fairfax Pike and along Route 522.

Description of Proposed Development

The site is currently zoned RA (Rural Agricultural) with a Long Range Land Use of Industrial, Mixed Use Industrial/Office for the parcels west of Route 522 and Rural Area east of Route 522. The applicant proposes a rezoning on the entire site to M1 (Light Industrial District) and a Comprehensive Plan amendment on the parcel east of Route 522 (Tax map # 87-3-A) in order to develop up to 3,200,000 SF of industrial uses. Parcels 87-3-A and 87-A-16B are each currently occupied by one single-family detached house. This study evaluates all parcels under the proposed rezoning and comprehensive plan amendment.

The site is anticipated to include up to 3,200,000 SF of Industrial uses with a build-out year of 2035. For the purposes of the traffic study, the Industrial Park use (ITE Land Use 130) was analyzed as that is representative of a mix of industrial uses.

Access to the site will be provided via proposed entrances along Route 522 and Fairfax Pike.

Principal Findings, Conclusions, and Proposed Mitigations

Discussions regarding the study assumptions and relevant background information occurred with the Frederick County and VDOT staff during scoping discussions held on Tuesday, April 14, 2026. A copy of the signed scoping document guiding discussions is included in Appendix A.

The analysis presented in this report supports the following assumptions and findings:

- The following intersections were included for evaluation per the scoping document:
    1. Fairfax Pike at Warrior Drive
    2. Fairfax Pike at White Oak Road/Hudson Hollow Road
    3. Fairfax Pike/Lord Fairfax Highway at Route 522

4. Route 522 at Lake Frederick Drive
5. Route 522 at Tasker Road
6. Site entrances on Fairfax Pike and on Route 522

**See Supplemental Analysis summary below pertaining to the evaluation of the I-81/Fairfax Pike ramps.*

- **Existing Conditions (2026):**
  - All approaches operate at LOS D by approach except for the following:
    - **Fairfax Pike and Warrior Drive (Intersection #1):**
      - The overall intersection operates at LOS F (delay of 98.9 sec) in AM Peak
      - Northbound approach operates at LOS E in both AM and PM Peak
      - Southbound approach operates at LOS F (delay of 333.1 sec) in AM Peak
      - Eastbound left exceeds available storage length in PM peak.
      - It is noted that this intersection provides access to Sherando High School and the AM peak hour LOS deficiencies are primarily attributed to the higher volumes processed during the school peak arrival time.
- **Future without Development (2035):**
  - Future volumes were projected by applying regional growth to the regional roads and incorporation of six planned background developments including:
    - Madison 277
    - Lake Frederick (remaining build out)
    - Sherando Green
    - Fairfax Downs
    - Enclave at Tasker Residential
    - Eastgate Commercial
  - The following planned transportation improvements was incorporated in the study:
    - Construction of exclusive left turn lanes on the eastbound and westbound approaches at the intersection of Fairfax Pike and White Oak Road/Hudson Hallow Road (study Intersection #2)
    - Improvements at Route 277 (Fairfax Pike) at Warrior Drive (VDOT SMART SCALE project) to extend the eastbound right turn lane by another 200 feet with 200 foot taper
  - Under Future without Development (2035), the following intersections have approaches that operate below acceptable level of service:
    - **Warrior Drive & Fairfax Pike (Intersection #1)**
      - The overall intersection operates at LOS F (delay of 88.6 sec) in AM peak, and operates at LOS E in PM peak
      - Westbound approach operates at LOS E in the AM and PM peak

- Northbound approach operates at LOS F (delay of 99.9 sec) in PM peak
- Southbound approach operates at LOS F (delay of 312.3 sec) in AM peak
- Westbound left exceeds available storage length on both AM and PM peaks, while eastbound left and northbound left exceed available storage length in PM peak only. It is noted the eastbound and westbound lefts have protected only phasing.
- It is noted that this intersection provides access to Sherando High School as well as significant background traffic projected from Sherando Green retail and Fairfax Downs residential developments adjacent to the intersection. There are no known improvements planned as part of those developments to this intersection.

▪ **Route 522 & Fairfax Pike/Lord Fairfax Highway (Intersection #3)**

- Overall intersection operates at LOS F in the AM (delay of 108.6 sec) and PM (delay of 161.1 sec) peak hours
- Eastbound approach operates at LOS F in the AM (delay of 249.9 sec) and PM peak (delay of 293.3 sec)
- Westbound approach operates at LOS F (delay of 124.4 sec) in PM peak.
- Northbound approach operates at LOS F (delay of 174.5 sec) in PM peak
- Southbound approach operates at LOS E in PM peak
- Northbound left exceeds available storage length in PM peak, while southbound left exceeds on both AM and PM peaks.

▪ **Fairfax Pike and Lake Frederick Entrance (Intersection #6)**

- Northbound approach operates at LOS F during both the AM (delay of 89.8 sec) and PM (delay of 295.5 sec) peak hours.

- **Future with Development (2035):**
  - Under Future with Development (2035), the following intersections have approaches that operate below acceptable level of service:

▪ **Warrior Drive & Fairfax Pike (Intersection #1)**

- Overall intersection operates at LOS F (delay of 86 sec) in AM peak and LOS E in PM peak
- Westbound approach operates at LOS E in the AM peak and LOS F (delay of 91.3 sec) in the PM peak
- Northbound approach operates at LOS F (delay of 105.6 sec) in PM peak
- Southbound approach operates at LOS F (delay of 307.2 sec) in the AM peak
- Westbound left exceeds available storage length in both AM and PM peaks, while eastbound left and northbound left exceed available storage length in PM peak only. It is noted the eastbound and westbound lefts have protected only phasing.
- This intersection fails due to existing and background volumes and is not caused by the proposed development. The intersection is projected to process significant additional traffic

from nearby planned background developments of Sherando Green retail and Fairfax Downs residential. There are no known improvements planned as part of those developments to this intersection.

- **Mitigation: Left turn phasing change from "protected only" to "flashing yellow arrow" on eastbound and westbound approaches are recommended to mitigate the site impacts on this intersection and improve the delay and queuing at the intersection.** With the above improvement in place, the eastbound and westbound left turn movements have significant reduction in delay and queuing. **While the northbound approach remains at LOS F in the AM peak and the westbound approach and northbound approach operates at LOS E in the PM peak, the conditions are improved to be better than Future Conditions without Development (non-degradation).**

▪ **Route 522 & Fairfax Pike/Lord Fairfax Highway (Intersection #3)**

- Overall intersection operates at LOS F in the AM (delay of 147.2 sec) and PM peak (delay of 189.8 sec).
- Eastbound approach operates at LOS F in the AM (delay of 311.3) and PM peak (delay of 331.2 sec).
- Westbound approach operates at LOS F (delay of 139.8 sec) in the PM peak.
- Northbound approach operates at LOS F in the AM (delay of 111.7 sec) and PM peak (delay of 207.7 sec).
- Southbound approach operates at LOS F (delay of 85.9 sec) in the PM peak.
- Northbound left and eastbound right exceeds available storage length in PM peak, while southbound left exceeds available storage length in both AM and PM peaks.
- This intersection fails under background projected conditions due to regional growth and planned background development traffic.
- **Mitigation: To mitigate site-related impacts, an exclusive eastbound left-turn lane and a second northbound left-turn lane are recommended.**
- With the above recommended improvements in place, the delay and queuing are significantly improved and notably all approaches operate at LOS D in the AM peak. The post-mitigated improvements show the following:
  - Overall intersection operates at LOS D in AM peak and LOS F (delay of 94.3 sec) in PM peak.
  - Eastbound approach operates at LOS E in AM peak and LOS F (delay of 107.6 sec) in PM peak.
  - Westbound approach operates at LOS F (delay of 114.4 sec) and Northbound approach operates at LOS F (delay of 101.4 sec) in PM Peak.
  - **While some approaches operate at LOS E or F in the PM peak hour only, the delay and queuing are significantly improved with the above improvements and conditions are improved to be better than Future without Development (non-degradation).**

- **Fairfax Pike and Lake Frederick Entrance/Site Entrance #1 (Intersection #6)**
    - Northbound approach operates at LOS F during both AM (delay of 537.5 sec) and PM peak (delay of 1675.9 sec).
    - Southbound approach operates at LOS F during both AM (delay of 150.5 sec) and PM peak (delay of 1551.2 sec).
    - With a conventional traffic signal added at this location, the intersection operates at acceptable levels of service. Installation of a new traffic signal is subject to VDOT review and approval through a future Signal Justification Report ("SJR"). A preliminary signal warrant evaluation and VJuST analysis were performed as part of this study to screen potential intersection control configurations. A conventional traffic signal, thru-cut signal, roundabout, and two-way stop control were considered as possible intersection configurations. The ultimate configuration will be determined through the future SJR. It is noted that a roundabout is anticipated to require significant offsite right-of-way and was therefore not recommended for further consideration.
- **Fairfax Pike and Site Entrance #3 (Intersection #8)**
    - Southbound approach of the site access operates at LOS E in the AM peak and LOS F (delay of 130.5 sec) in the PM peak. The failing level of service is due to high through volumes on Fairfax Pike and not a result of high volumes from the entrance (17 peak hour left turn trips). The queuing for the southbound approach is 40 feet, indicating only 2 stacked vehicles. Hence, no mitigations are recommended.
- **Route 522 and Site Entrance #4 (Intersection #9)**
    - Eastbound approach and westbound approach operates at LOS E in the PM peak
    - With a conventional traffic signal added at this location, the intersection would operate at acceptable levels of service with acceptable queuing along Route 522. Installation of a new traffic signal is subject to VDOT review and approval through a future Signal Justification Report ("SJR"). A preliminary signal warrant evaluation and VJuST analysis were performed as part of this study to screen potential intersection control configurations. A conventional traffic signal, unsignalized continuous green-T, unsignalized restricted crossing U-turn (RCUT), and two-way stop control were considered as possible intersection configurations. The ultimate configuration will be determined through the future SJR. It is noted that an RCUT would result in additional U-turn traffic downstream along Route 522 including truck traffic from the proposed industrial use. It is also noted that a continuous green-T would not meet spacing and acceleration distance requirements and was therefore not recommended for further consideration.

- **The other site entrances operate at acceptable levels of service.**

- **Future with Development (Planning Year 2041):**
    - The planning year/plus 6 year analysis reveals similar results to the Future with Development 2035 analysis, and the intersections with failing level of service continuing to have approaches that fail. All of the intersections operating acceptably under 2035 continue to operate acceptably under 2041. Hence, no additional mitigations are recommended for 2041.

- ***I-81 and Exit 307 (Fairfax Pike) Ramps**
    - As scoped with County and VDOT staff, a supplemental memo was provided separately, dated May 8, 2026, providing an evaluation of the projected traffic volumes at the I-81/Fairfax Pike ramp intersections and the projected volume from this proposed site. As discussed with VDOT staff, this evaluation is separate from the Traffic Impact Study and provided for informational purposes.
- **Conclusions**
    - This traffic impact study provides an evaluation of existing, future without development and future with development conditions at five regional intersections as well as the five site entrances. Two of the regional intersections have level of service or queuing deficiencies due to existing or background related traffic volumes. To mitigate site-related impacts, the following improvements are recommended: at Intersection 1, convert the eastbound and westbound left-turn phasing from protected-only to flashing yellow arrow operation; and at Intersection 3, add an exclusive eastbound left-turn lane and a second northbound left-turn lane. Proposed improvements at the site entrances include turn lanes where warranted and a traffic signal or other innovative intersection control, subject to future SJR, at the southern entrance on Route 522 and western entrance on Fairfax Pike.

Introduction

This report presents the findings of a Traffic Impact Study (TIS) conducted for the proposed Gibson Property development (the Site / the Development / the Property), located north of Fairfax Pike (Route 277) and east and west of Route 522 in Frederick County, Virginia. The applicant proposes a rezoning on the entire site to M1 (Light Industrial District) and a Comprehensive Plan amendment on the parcel east of Route 522 in order to develop up to 3,200,000 SF of industrial uses.

The following tasks were completed as part of this study effort:

- Scoping discussions were held on Tuesday, April 14, 2026 with VDOT and County staff to discuss the parameters of this study as well as any relevant background information. A copy of the scoping document guiding discussions is included in Appendix A. **The application triggers the thresholds for a VDOT Chapter 870 study**.
- Existing conditions were observed in the field to verify roadway geometry, pedestrian and bicycle infrastructure, and traffic flow characteristics.
- Turning Movement Counts (TMCs) were collected at the study intersections along Fairfax Pike at Warrior Drive, White Oak Road/Hudson Hollow Road, and at Route 522, as well as along Route 522 at Tasker Road and Lake Frederick Drive. Counts at the intersections of Warrior Drive/Fairfax Pike and Tasker Road/Route 522 were conducted on Thursday, April 16, 2026, while counts at the other intersections were conducted on Thursday, April 9, 2026. All counts were performed during the AM peak period (6:00 AM to 9:00 AM) and PM peak period (4:00 PM to 7:00 PM) to determine peak hour traffic conditions at the study intersections.
- Future traffic conditions were estimated based on existing traffic volumes, regional growth, planned background improvements, approved developments in the area, and the proposed development plan.
- Proposed site traffic volumes were derived based on the methodology outlined in the Institute of Transportation Engineers' (ITE) Trip Generation Manual, 12th Edition, publication, and were assigned to the road network based on the agreed upon direction of approach discussed during the aforementioned scoping discussions.
- Intersection capacity and queueing analyses were performed for the identified study intersections for the 2026 Existing Conditions, 2035 Future without Development, 2035 Future with Development, and 2041 Future with Development during the weekday morning (AM), and weekday afternoon (PM) peak hours. The 2041 conditions (plus 6 years after build out) is for planning purposes only.
- Intersection capacity and queuing analyses were performed using *Synchro*, version 11, with results based on the Transportation Research Board's (TRB) Highway Capacity Manual (HCM) methodology and in following the County's guidelines. The analysis herein includes level of service (LOS), delay, and queue length comparisons for the turning movements analyzed.

Sources of data for this study include information provided by the Institute of Transportation Engineers (ITE), the Virginia Department of Transportation (VDOT), Frederick County, and the office files and field reconnaissance efforts of Gorove Slade.

Background Information: Proposed Development (Site & Nearby)

Description of the Existing Site

Site Location

The site is situated on three parcels that can be identified on the Frederick County Tax Map with the following Tax Map #s: 87-3-A, 87-3-B, and 87-A-16B. Parcels 87-3-A and 87-A-16B are each currently occupied by one single-family detached house. Access to the site will be provided via the proposed entrances along Route 522 and Fairfax Pike.

The vehicular study area includes five (5) existing intersections as well as all future entrances on Route 522 and Fairfax Pike. The geographic scope of the study area was developed based on scoping discussions with VDOT and the County and are based on the regional intersections that are most to be impacted by the proposed development based on trip generation of the proposed use and distribution of that traffic through the road network. The study area includes more intersections to the west of the site along Fairfax Pike as the proposed site distribution is higher on Fairfax Pike as compared to the other roads.

The existing study intersections are as follows:

Intersection 1: Fairfax Pike at Warrior Drive

Intersection 2: Fairfax Pike at White Oak Road/Hudson Hollow Road

Intersection 3: Fairfax Pike/Lord Fairfax Highway at Route 522

Intersection 4: Route 522 at Lake Frederick Drive

Intersection 5: Route 522 at Tasker Road

In addition, all proposed entrances on Fairfax Pike and Route 522 were included for evaluation in future with development scenarios. An aerial of the study intersections is provided in Figure 1.

An in-depth description of the roadways in the study vicinity is provided in the *Existing Roadway Network* section of this report.

The results of the analysis and the traffic impacts associated with the proposed development are presented in the *Conclusions* section of this report.

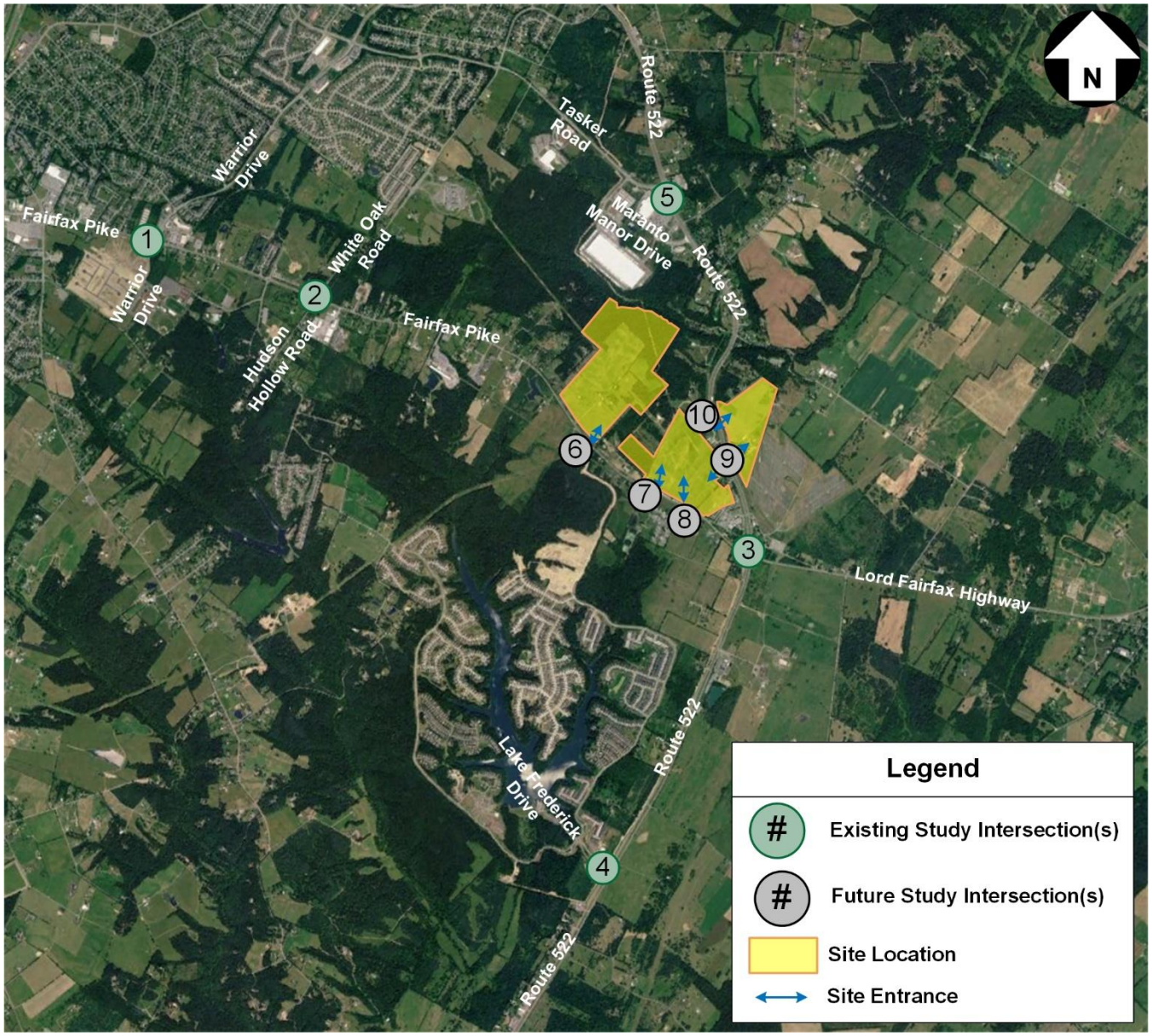

Figure 1: Study Intersections Map

Location within Jurisdiction and Region

The site is located in the southern portion of the county, generally east of I-81 and south of US Route 50. The site is bordered by Fairfax Pike to its south and Route 522 to its east and west. A regional aerial image of the Site is provided in Figure 2.

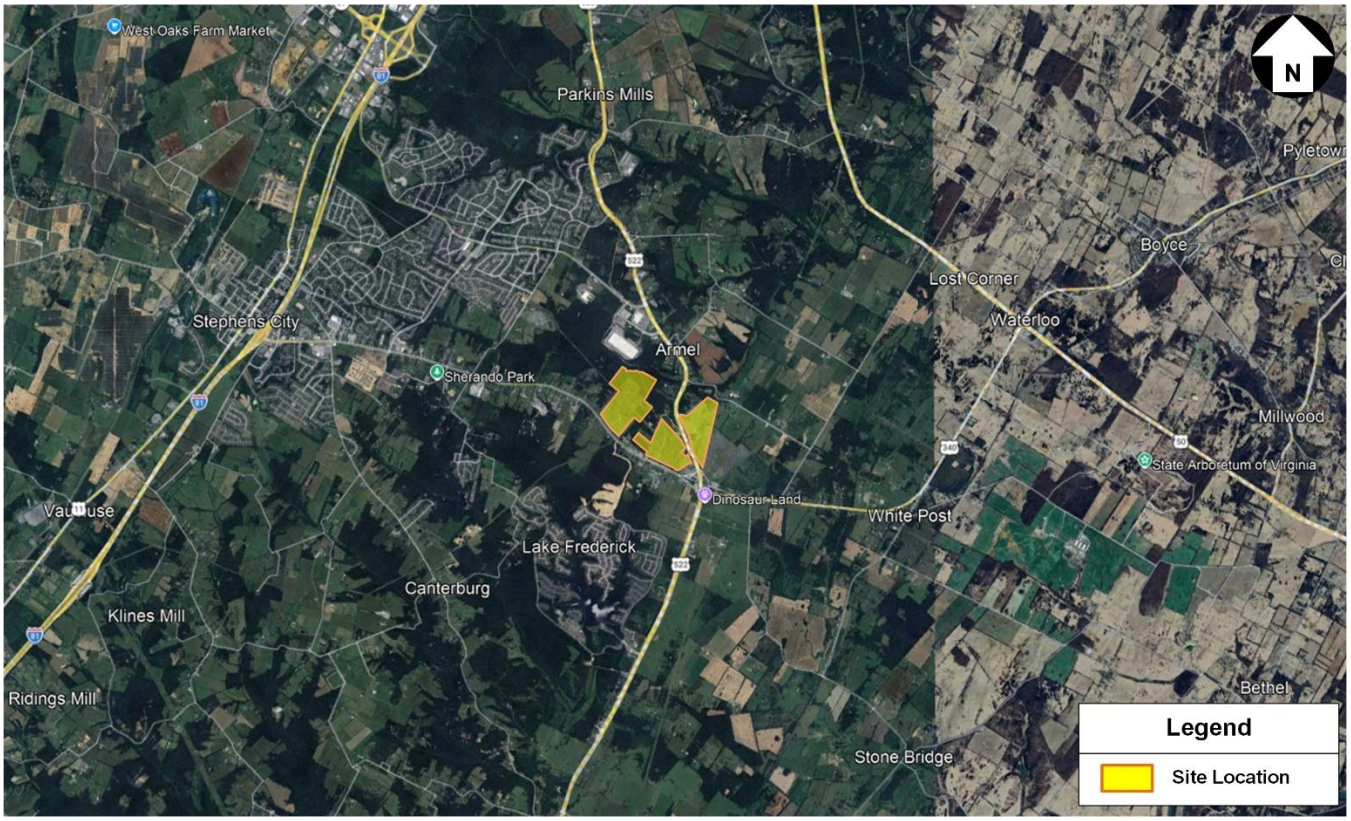

Figure 2: Regional Location

Existing Zoning and Long-Range Land-Use

The site is situated on three parcels that can be identified on the Frederick County Tax Map with the following Tax Map #s: 87-3-A, 87-3-B, and 87-A-16B. The parcels are currently zoned as RA (Rural Area District), with a Long-Range Land Use of Industrial, Mixed Use Industrial/Office for the parcels west of Route 522 and Rural Area for the parcel east of Route 522.

The existing zoning is presented in Figure 3; the Long Range Land Use Plan is presented in Figure 4.

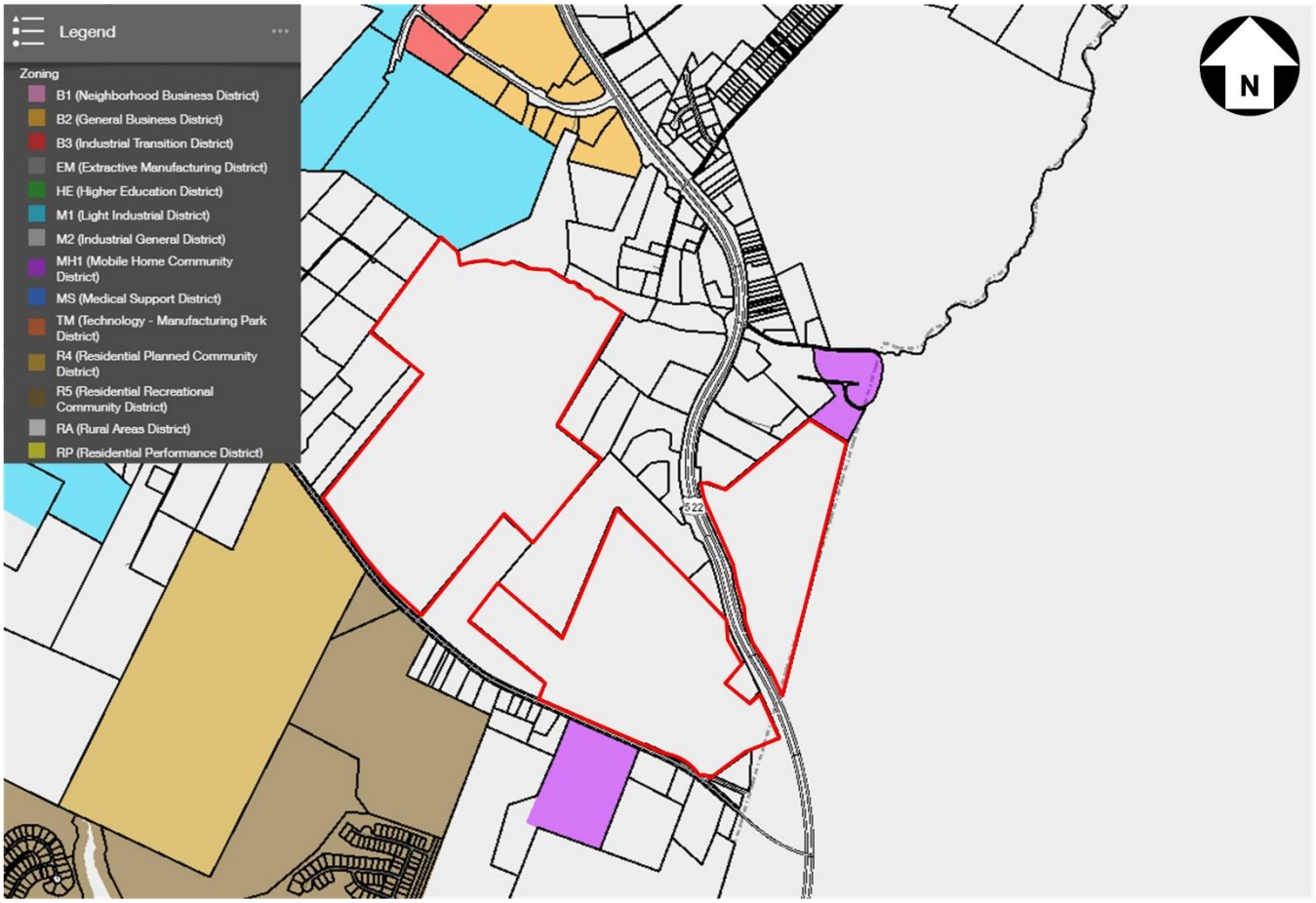

Figure 3: Frederick County Zoning Map
(Source: Frederick County GIS, https://fredcogis.fcva.us/PlanningAccessTerminal/)

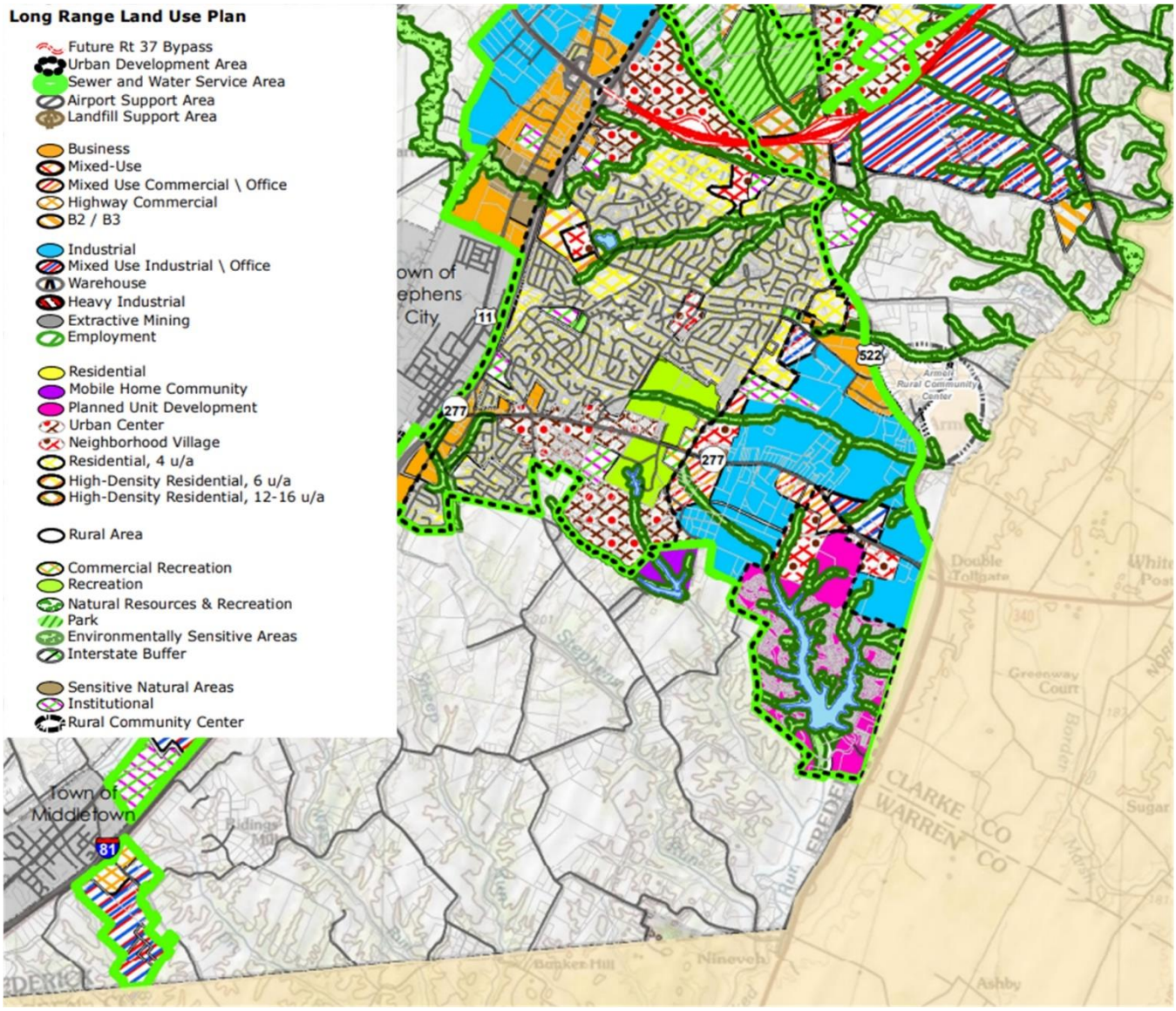

Figure 4: Eastern Frederick County Long Range Use Plan Map
(Source: https://www.fcva.us/home/showpublisheddocument/23720/638748693950870000)

Existing Roadway Network

A description of the major roadways within the immediate vicinity of the Site is summarized in Table 1.

Table 1: Summary of Existing Road Network

Roadway	RTE #	VDOT Classification	Legal/Design Speed Limit (mph)	Number of Lanes	AADT (vpd)	AADT Year	Road Segment Between		k-factor
Warrior Drive	SC-719	Minor Arterial	25	Two Lane Undivided	7,278	2024	Fairfax Pike	Centre Drive	10.59%
S.Warrior Drive	SC-720	-	25	Two Lane Undivided	990	2020	Dead End	Fairfax Pike	-
Fairfax Pike	VA-277	Minor Arterial	45	Two Lane Undivided	13,720	2024	Lexington Ct	Warrior Drive	9.75%
Hudson Hollow Road	SC-636	`-	45	Two Lane Undivided	1,700	2020	Spotswood Ct	Fairfax Pike	-
White Oak Road	VA-622	-	45	Two Lane Undivided	3,000	2023	Fairfax Pike , Rte 277	Periwinkle Pl	10.55%
Fairfax Pike	VA-277	Minor Arterial	55	Two Lane Undivided	8,698	2024	Maint Bdy Clarke Cnty/Frederick Cnty	Rte 522	8.97%
Stonewall Jackson Highway	US-522	Minor Arterial	55	Four Lane Divided	13,383	2024	Lord Fairfax Highway	Highland Corners Rd	8.54%
Lord Fairfax Highway	VA-240	Minor Arterial	55	Two Lane Undivided	8,757	2024	Stonewall Jackson Hwy	Highland Corners Rd	8.75%
Lake Frederick Drive	SC-1434	-	25	Two Way Divided	3,200	2018	Rte 340	Rte 1434	-
Stonewall Jackson Highway	US-522	Minor Arterial	55	Four Lane Divided	18,348	2024	Lake Frederick Drive	Rte Change	8.49%
Tasker Road	SC-642	Major Collector	45	Four Lane Divided	7,178	2024	Front Royal Pike	Rainville Rd	10.22%
Front Royal Pike	US-522	Minor Arterial	55	Four Lane Divided	13,167	2024	Bridgeport Ln	Tasker Rd	8.95%

Planned Future Transportation Improvements

Roadway, Bicycle, and Pedestrian Improvements

Based on the aforementioned scoping meeting following improvements are considered:

- Improvements associated with approved background developments (Madison 277)
- Improvements at Route 277 (Fairfax Pike) at Warrior Drive (VDOT SMART SCALE project)

Historical Crash Data

Crash data at the existing study intersections were obtained from the VDOT website for the most recent five years. The crash data is summarized in Table 2. The crash data extracted from VDOT website is included in Appendix C.

Table 2: Crash Data Summary (January 2021 -December 2025)

No.	Intersection	Number of Crashes	By Year					By Severity			By Crash Type			Intersection Crash Rate (Crashes/million entering vehicles)	ADT
			2021	2022	2023	2024	2025	Property Damage Only Crashes	Injury Crashes	Fatal Crashes	Rear Ends	Angle Crashes	Other Types		
1	Fairfax Pike at Warrior Drive	19	0	4	9	4	2	17	2	0	14	1	4	0.59	17585
2	Fairfax Pike at White Oak Road/Hudson Hollow Road	16	0	3	8	3	2	11	5	0	5	8	3	0.75	11665
3	Fairfax Pike/Lord Fairfax Highway at Route 522	21	4	0	7	6	4	14	7	0	10	9	2	0.44	26245
4	Route 522 at Lake Frederick Drive	18	2	4	4	4	4	12	6	0	10	4	4	0.46	21265
5	Route 522 at Tasker Road	10	1	1	2	3	3	7	3	0	9	0	1	0.37	14910

The crash data included in Table 1 shows the following:

- Fairfax Pike at Warrior Drive:
    - The intersection had a total of 19 crashes in the five-year period. The Intersection Crash Rate is 0.59 per million entering vehicles.
    - Of the total crashes, 17 of them were all property-damage only crashes while two (2) of them were injury crashes.
    - Of the total crashes, 14 was a rear end crash, one (1) was an angle crash, and four (4) were other types of crashes.
- Fairfax Pike at White Oak Road/Hudson Hollow Road:
    - The intersection had a total of 16 crashes in the five-year period. The Intersection Crash Rate is 0.75 per million entering vehicles.
    - Of the total crashes, 11 were property-damage only crashes and five (5) were injury crashes. There were no fatal crashes at the intersection.
    - Of the total crashes, five (5) were rear end crashes, eight (8) were angle crashes, and three (3) were other types of crashes.
    - It is noted that improvements are planned as part of a proffered improvement by Madison 277 to add left turn lanes along Fairfax Pike which will provide safety improvements.
- Fairfax Pike/Lord Fairfax Highway at Route 522:
    - The intersection had a total of 21 crashes in the five-year period. The Intersection Crash Rate is 0.44 per million entering vehicles.

  - Of the total crashes, 14 were property-damage only crashes and seven (7) were injury crashes. There were no fatal crashes at the intersection.
  - Of the total crashes, 10 were rear end crashes, nine (9) were angle crashes, while two (2) were other types of crashes.

- Route 522 at Lake Frederick Drive:
  - The intersection had a total of 18 crashes in the five-year period. The Intersection Crash Rate is 0.46 per million entering vehicles.
  - Of the total crashes, 12 were property-damage only crashes and six (6) were injury crashes. There were no fatal crashes at the intersection.
  - Of the total crashes, 10 were rear end crashes, four (4) were angle crashes, while four (4) were other types of crashes.
- Route 522 at Tasker Road:
  - The intersection had a total of ten (10) crashes in the five-year period. The Intersection Crash Rate is 0.37 per million entering vehicles.
  - Of the total crashes, seven (7) were property-damage only crashes and three (3) were injury crashes. There were no fatal crashes at the intersection.
  - Of the total crashes, nine (9) were rear end crashes and one of them was other types of crashes.

The crash rates shown for each intersection are calculated as crashes per one million entering vehicles (MEV), and were calculated based on the following formula:

$$Rate_{intersection} = \frac{1{,}000{,}000 * \#\ of\ Crashes}{\#\ of\ Years * 365\ \left(\frac{days}{year}\right) * ADT_{intersection}}$$

The intersection ADT is calculated as the sum of ADTs on each leg, divided by 2. ADTs are taken from the existing volumes shown in Figure 6. For crash rate calculations, ADTs are assumed to remain constant over the crash analysis years, consistent with similar traffic studies approved by the County.

It should be noted that according to the Institute of Transportation Engineers' (ITE) *Transportation Impact Analysis for Site Development*, a crash rate of 1.00/MEV or higher can be used as a threshold to identify intersections that may have an elevated crash rate due to operational, geometric, or other deficiencies.

Analysis of 2026 Existing Conditions

In order to project future traffic conditions, it was necessary to determine existing vehicular traffic volumes to utilize as a baseline. For the purposes of this report and as agreed to by VDOT and County staff, 2026 roadway conditions were to be considered as existing.

Existing Transit Services

The site is located within a 7.5-mile radius of the Winchester Regional Airport (OKV). The nearest bus stop is located near intersection of Valley Avenue and Cedar Creek Grade/Weems Lane.

Existing Traffic Volumes

In order to determine the weekday morning (AM) peak hour and weekday afternoon (PM) peak hour turning movement traffic volumes, turning movement counts (TMC) were collected at the study intersections. Counts at the intersections of Warrior Drive/Fairfax Pike and Tasker Road/Route 522 were conducted on Thursday, April 16, 2026, while counts at the remaining intersections were conducted on Thursday, April 9, 2026.

From the turning movement counts, the following system peak hours were determined.

- AM Peak Hour: 7:00 AM to 8:00 AM
- PM Peak Hour: 4:15 PM to 5:15 PM

The 2026 existing road network configuration is presented in Figure 5. The 2026 existing peak hour traffic volumes for the study intersections are illustrated in Figure 6. The published K-factors from VDOT's P4P website were used to estimate daily traffic volumes from the PM peak hour. The applied K-factors are presented in Table 1. For roadways without published values on the P4P website, a default K-factor of 10% was assumed. The existing count data is provided in Appendix B.

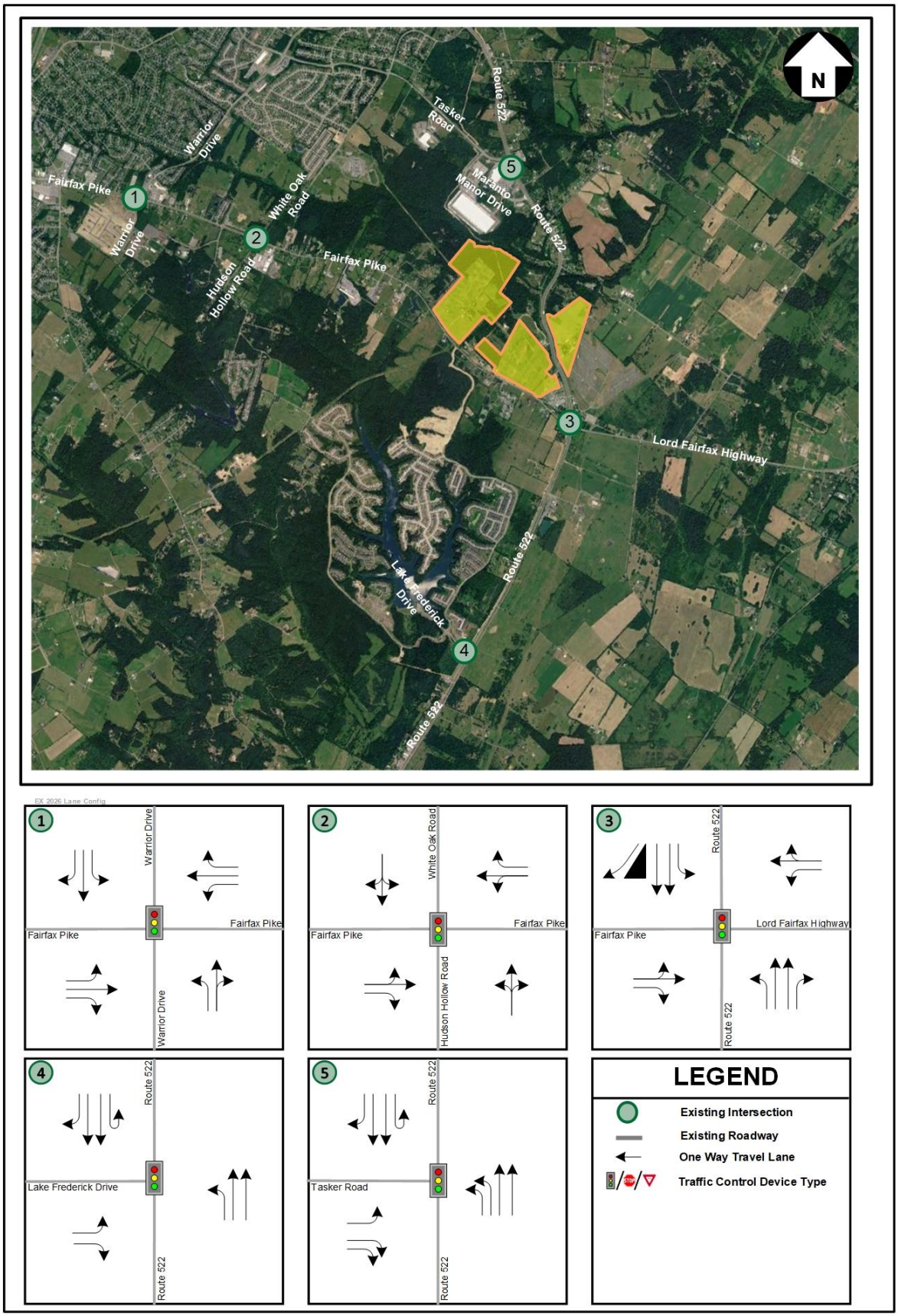

Figure 5: 2026 Existing Conditions – Roadway Network Geometric Configuration and Traffic Control Devices

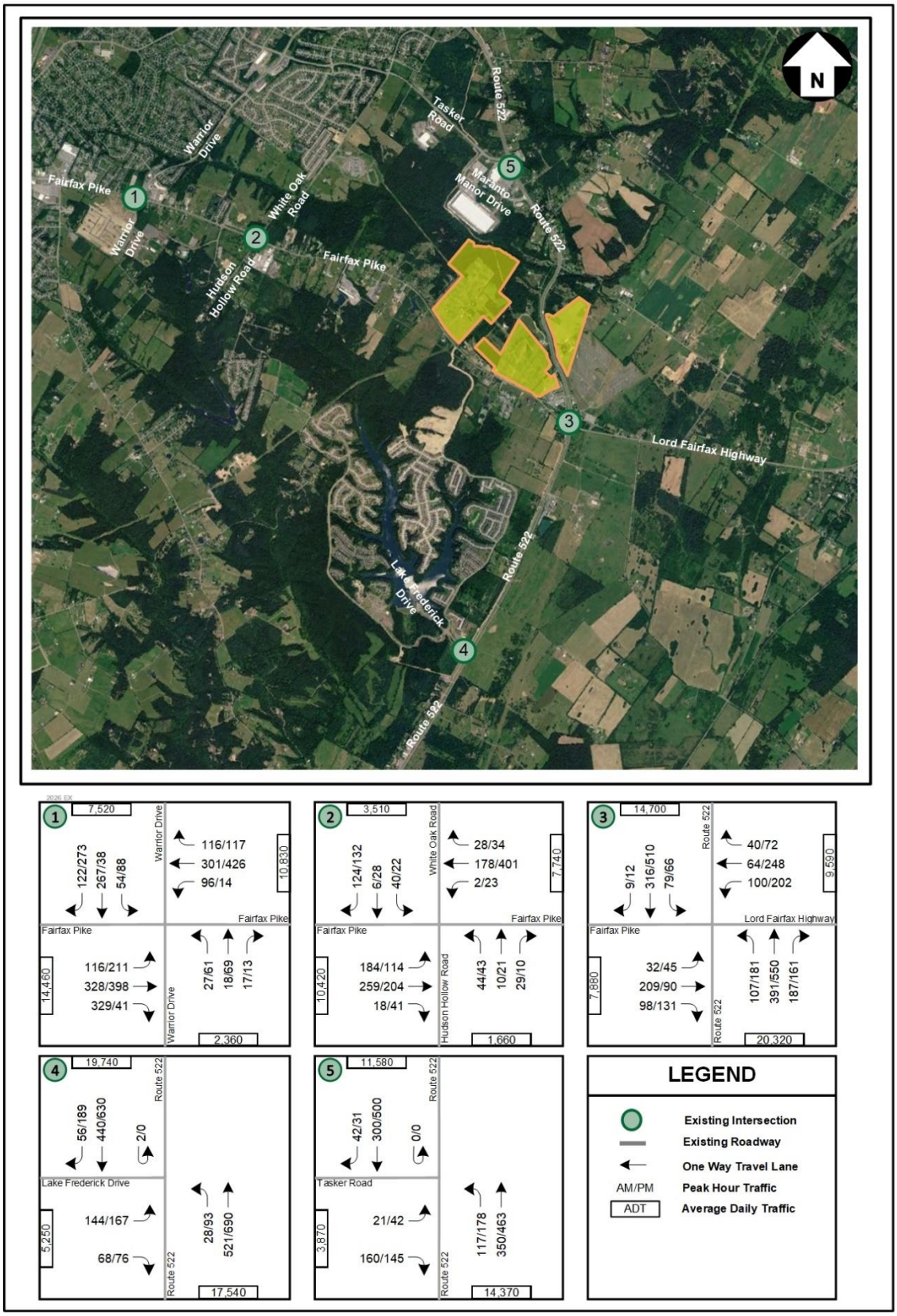

Figure 6: 2026 Existing Conditions – Vehicular Traffic Volumes

Existing Intersection Capacity and Queueing Analysis

Intersection capacity and queuing analyses were performed for the 2026 Existing Conditions scenario at the study area intersections during AM and PM peak hours. *Synchro,* version 11, was used to analyze the study intersections with results based on HCM 6th methodology[1] presented in the Transportation Research Board's (TRB) Highway Capacity Manual (HCM) and analysis guidelines provided by the County. The analysis herein includes level of service (LOS), delay, and queue lengths.

The existing signal timings for Study Intersections were obtained from the VDOT. These timings were incorporated into the *Synchro* analysis models. Existing peak hour factors observed in the field (overall intersection) were used, except where the field peak hour factor was less than 0.85, in which case a minimum value of 0.85 was applied, consistent with VDOT analysis guidelines.

Per the scoping process with County staff, it would be considered acceptable and/or desirable to achieve an approach LOS D or better for traffic operations using HCM methodology. The results of the intersection capacity analyses from *Synchro* are presented in Table 3 and graphically in Figure 7.

The 95th percentile queue lengths were also determined from *Synchro* and are expressed in feet.

The description of different LOS and delay are included in Appendix D. The detailed analysis worksheets of 2026 Existing Conditions are contained in Appendix E.

[1] It should be noted that HCM 2000 methodology was used in lieu of HCM 6th if the HCM 6th methodology was not applicable. HCM 6th could not be applicable in such cases as nonstandard National Electrical Manufacturers Association (NEMA) configurations, shared lane configurations, placement of loop detectors, U-turns, etc.

Table 3: 2026 Existing Conditions – Intersection Capacity and Queuing Analysis Results (Part 1)

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour				PM Peak Hour			
			LOS	Delay (s)	50th % Queue (ft.)	95th % Queue (ft.) [2]	LOS	Delay (s)	50th % Queue (ft.)	95th % Queue (ft.) [2]
			Synchro				Synchro			
1	**Warrior Drive (N/S) & Fairfax Pike (E/W) Overall Intersection (Signalized)**		**F**	**98.9**			**C**	**32.7**		
	Eastbound Approach		***C***	***24.4***			***C***	***32.2***		
	Eastbound Left	260	E	79.8	112	162	E	73.5	162	#288
	Eastbound Thru		B	15	285	330	B	12	181	375
	Eastbound Right	280	B	12.4	233	270	A	6.2	1	17
	Westbound Approach		***C***	***32.6***			***C***	***23.1***		
	Westbound Left	270	F	94.3	91	#189	E	58.4	11	33
	Westbound Thru		B	16.7	257	321	C	23.3	295	370
	Westbound Right	575	B	10.3	0	29	B	12.5	0	7
	Northbound Approach		***E***	***56.1***			***E***	***55.8***		
	Northbound Left	190	D	54.9	16	39	D	45.3	38	75
	Northbound Thru/Right		E	57.8	13	43	E	64.2	59	#112
	Southbound Approach		***F***	***333.1***			***D***	***44.2***		
	Southbound Left	150	D	51.5	33	64	D	46.2	56	102
	Southbound Thru		F	435.5	230	335	D	49.8	28	64
	Southbound Right		D	44.8	0	36	C	34.3	4	62
2	**Hudson Hollow Road/White Oak Road & Fairfax Pike (E/W) Overall Intersection (Signalized)**		**A**	**8.2**			**A**	**7.9**		
	Eastbound Approach		***A***	***8***			***A***	***7.1***		
	Eastbound Left/Thru		A	8	99	202	A	7.2	51	112
	Eastbound Right	90	A	4.2	0	6	A	5	0	10
	Westbound Approach		***A***	***5***			***A***	***7.1***		
	Westbound Left/Thru		A	5	28	60	A	7.2	67	133
	Westbound Right	155	A	4.3	0	8	A	5	0	10
	Northbound Approach		***B***	***14.6***			***B***	***12.3***		
	Northbound Left/Thru/Right		B	14.6	16	55	B	12.3	11	45
	Southbound Approach		***B***	***14.7***			***B***	***12.5***		
	Southbound Left/Thru/Right		B	14.7	13	63	B	12.5	9	56
3	**Route 522 (N/S) & Fairfax Pike/Lord Fairfax Highway Overall Intersection (Signalized)**		**C**	**34.1**			**D**	**45.2**		
	Eastbound Approach		***D***	***37.3***			***D***	***49.7***		
	Eastbound Left/Thru		D	37.7	152	#300	D	50	101	168
	Eastbound Right	230	C	26.3	0	0	D	39.2	0	18
	Westbound Approach		***D***	***36.5***			***D***	***46.5***		
	Westbound Left	500	D	37.9	64	124	D	35.7	140	234
	Westbound Thru/Right		C	34.9	51	109	D	53.5	233	#426
	Northbound Approach		***C***	***32.9***			***D***	***42.1***		
	Northbound Left	565	D	50.8	68	138	E	68.3	140	#298
	Northbound Thru		C	28.7	127	190	C	34.3	212	#314
	Northbound Right	250	C	24.8	0	41	C	26.9	0	23
	Southbound Approach		***C***	***32.6***			***D***	***47***		
	Southbound Left	125	D	46.3	51	110	E	58.7	49	102
	Southbound Thru		C	29.2	105	161	D	45.5	200	#306

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

Table 4: 2026 Existing Conditions – Intersection Capacity and Queuing Analysis Results (Part 2)

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour				PM Peak Hour			
			LOS	Delay (s)	50th % Queue (ft.)	95th % Queue (ft.) [2]	LOS	Delay (s)	50th % Queue (ft.)	95th % Queue (ft.) [2]
			Synchro				Synchro			
4	**Route 522 (N/S) & Lake Frederick Drive (E)**									
	Overall Intersection (Signalized)		**B**	**18.3**			**C**	**20.1**		
	Eastbound Approach		***C***	***27.4***			***C***	***31.2***		
	Eastbound Left		C	28.1	65	131	C	32.5	83	175
	Eastbound Right		B	19.5	0	23	C	21.2	3	33
	Northbound Approach		***B***	***16.2***			***B***	***18.5***		
	Northbound Left	470	B	19.2	6	19	C	23.2	21	50
	Northbound Thru		B	16	71	174	B	17.9	100	165
	Southbound Approach		***B***	***17.6***			***B***	***18.7***		
	Southbound Thru		B	17.7	95	153	B	19	144	234
	Southbound Right	295	B	13.9	0	24	B	14.9	0	44
5	**Route 522 (N/S) & Tasker Road (E)**									
	Overall Intersection (Signalized)		**B**	**14.3**			**B**	**15.8**		
	Eastbound Approach		***C***	***20.4***			***C***	***22.8***		
	Eastbound Left		C	20.6	6	24	C	23.4	14	44
	Eastbound Right	250	C	20.3	0	25	C	22.6	0	25
	Northbound Approach		***B***	***10.2***			***B***	***10.6***		
	Northbound Left	485	C	22.6	18	39	C	23	29	62
	Northbound Thru		A	6.1	26	43	A	5.9	36	61
	Southbound Approach		***B***	***16.6***			***B***	***19.7***		
	Southbound Thru		B	17.5	44	80	C	20.2	83	138
	Southbound Right	315	B	10.3	0	12	B	11.1	0	11

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

The capacity analysis results shown in Table 3 and Table 4 reveal that all intersections operate at level of service (LOS) D or better by approach under the existing (2026) conditions except the following:

- Warrior Drive & Fairfax Pike (Intersection #1)
  - The overall intersection operates at LOS F in AM Peak
  - Northbound approach operates at LOS E in both AM and PM Peak
  - Southbound approach operates at LOS F in AM Peak
  - Eastbound left exceeds available storage length in PM peak.
  - It is noted that this intersection provides access to Sherando High School and the AM peak hour LOS deficiencies are primarily attributed to the higher volumes processed during the school peak arrival time.

The Existing Conditions (2026) levels of service and lane configurations are summarized in Figure 7.

Figure 7: 2026 Existing Conditions – Level of Service Results

Analysis of 2035 Future Conditions without Development

This scenario analyzes the future without development conditions for the year 2035.

Inherent Growth

As specified in the scoping document, an annual linear growth rate of 0.5% was applied to all major movements on Route 522 and Hudson Hollow Road, while a rate of 1% was applied on Fairfax Pike, Warrior Drive, White Oak Road, and Tasker Road. The inherent regional growth volumes (for the period between 2026 and 2035) are illustrated in Figure 8.

Approved Background Development(s)

In addition to the applied inherent regional growth accommodating increased traffic demand, six (6) background development in the vicinity of the site was identified in the scoping discussions for inclusion in this study:

- Madison 277
  - 900 DU of Housing
  - 17,000 SF of Retail
  - 80,000 SF of Medical/Office Uses
- Lake Frederick (Remaining Build Out)
  - 199 DU of Single Family Detached (Age Restricted)
  - 78 DU of Single Family Detached
  - 385 DU of Single Family Attached
- Sherando Green
  - 93,900 SF of Shopping Plaza with Supermarket
- Fairfax Downs
  - 93 DU of Single Family Detached
- Enclave at Tasker Residential
  - 165 DU of Single Family Detached
  - 154 DU of Single Family Attached
- Eastgate Commercial
  - 179,000 SF of Retail

The total volume generated by background development is shown in Figure 9. Further details on each of the background developments, including trip generation, trip distribution and site location is provided in Appendix F.

Planned Transportation Improvements

The following transportation improvements were included for future 2035 conditions:

- Improvements associated with approved background developments including:
  - Construction of exclusive left turn lanes on the eastbound and westbound approaches at the intersection of Fairfax Pike and White Oak Road/Hudson Hallow Road (study Intersection #2).

- Improvements at Route 277 (Fairfax Pike) at Warrior Drive (VDOT SMART SCALE project) to extend the eastbound right turn lane by another 200 feet with 200 foot taper.

Future without Development Traffic Volumes (2035)

In order to forecast future roadway traffic volumes for the year 2035, the 2026 existing traffic volumes (Figure 6) were combined with the inherent growth traffic volumes (Figure 8) and the background development traffic assignment volume (Figure 9). The 2035 Future without Development traffic volumes are illustrated in Figure 10.

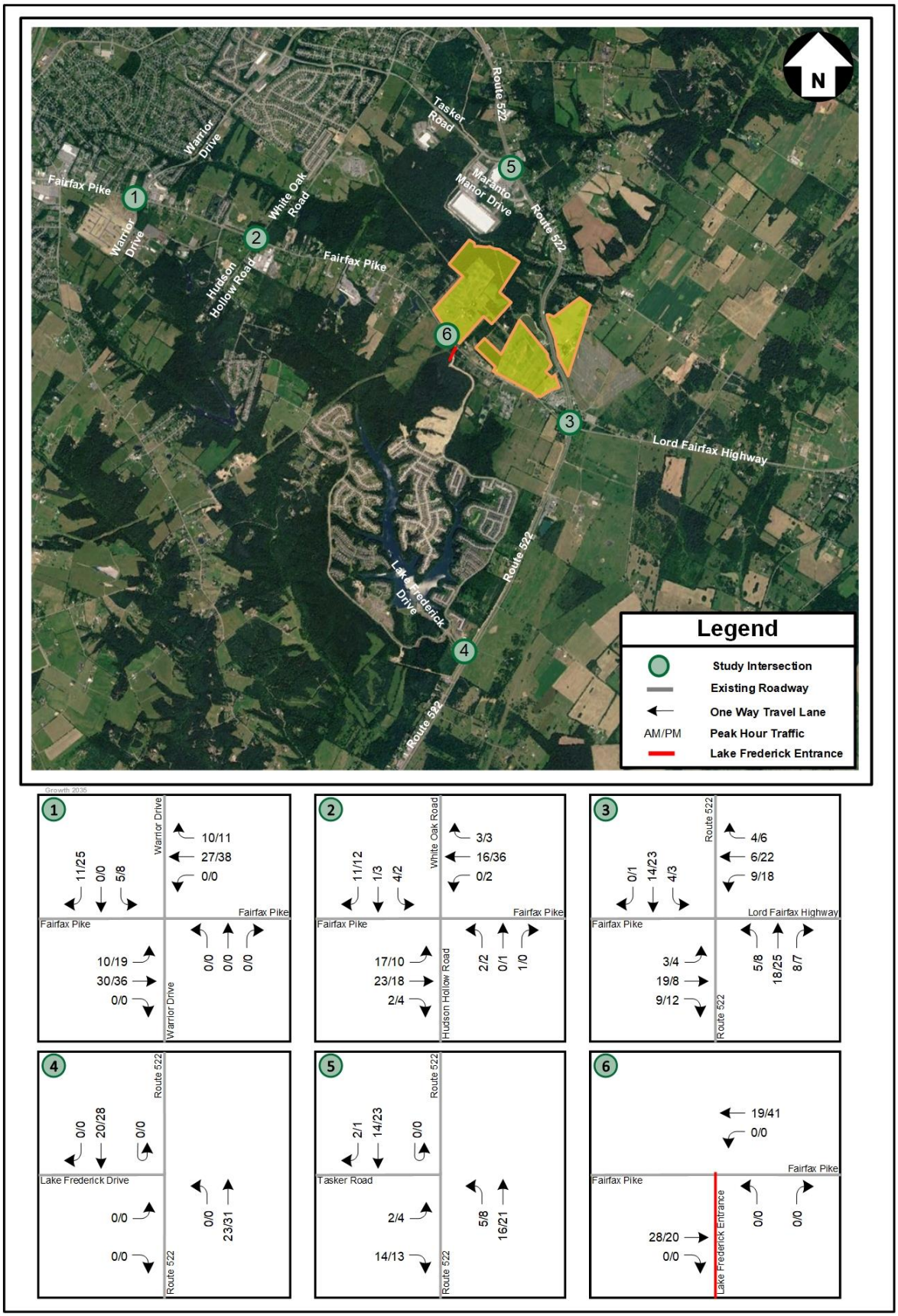

Figure 8: Projected Inherent Regional Growth Traffic Volumes (2026 to 2035)

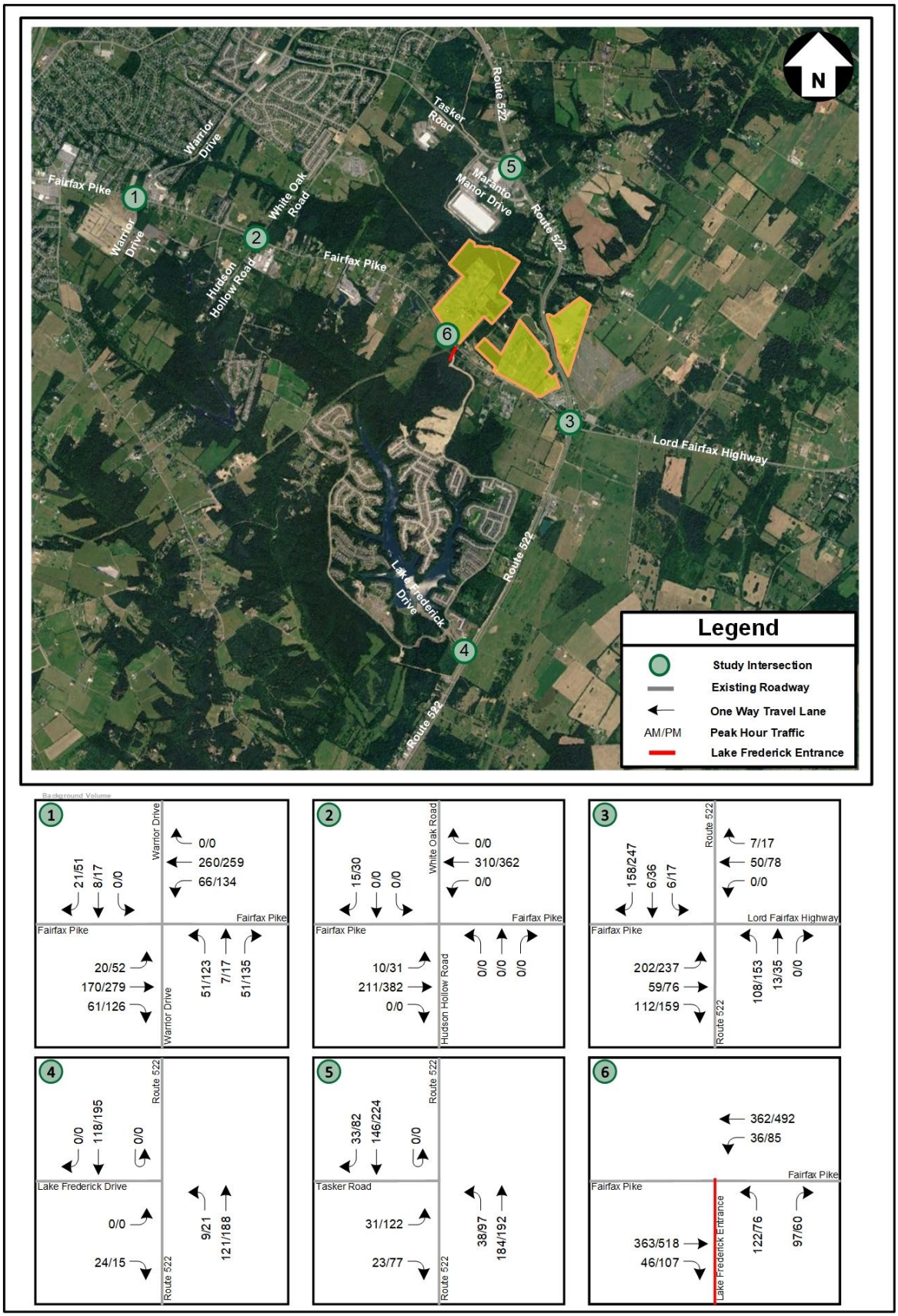

Figure 9: Total Background Development Volumes

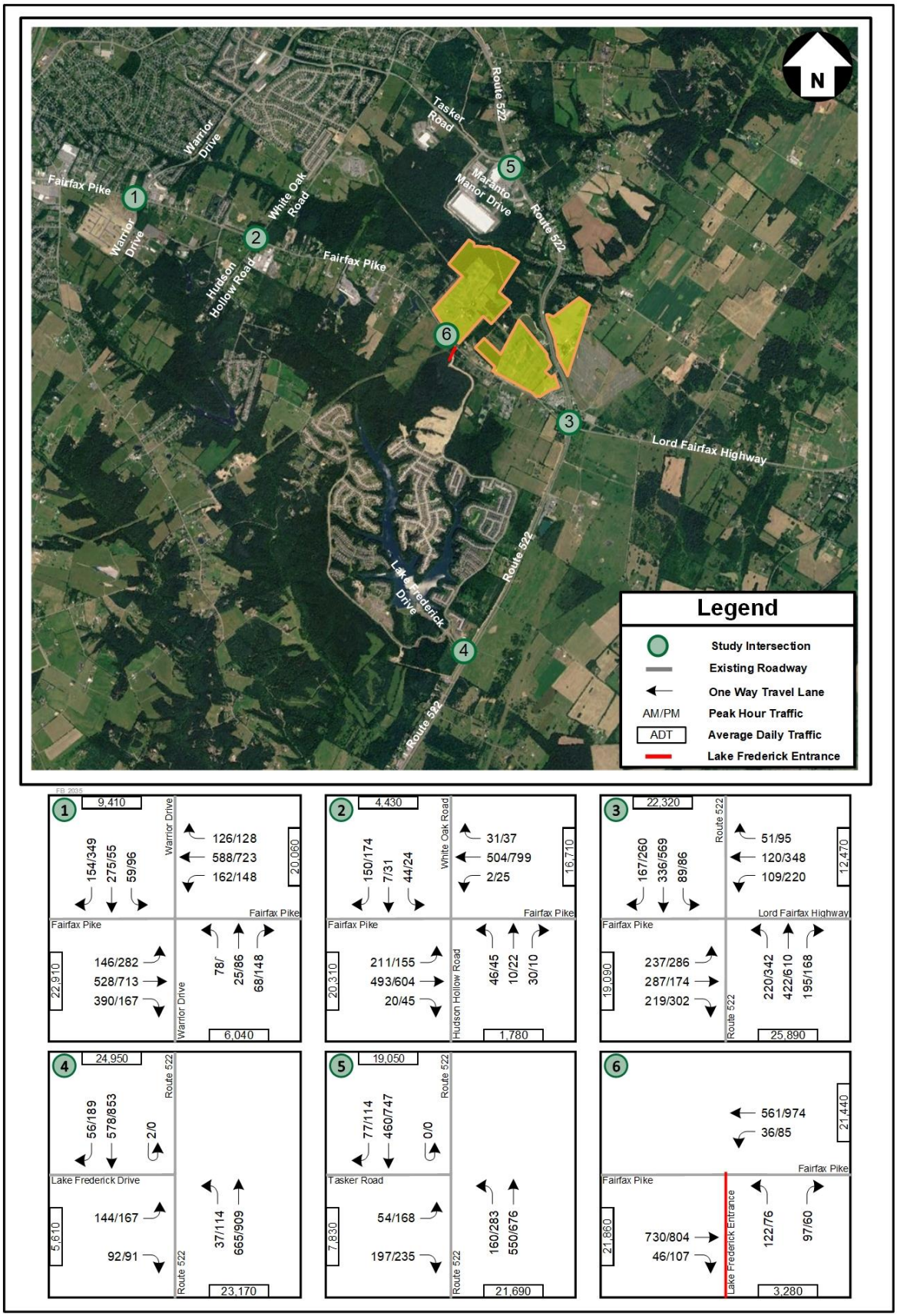

Figure 10: 2035 Future Conditions without Development – Vehicular Traffic Volumes

Future without Development Intersection Capacity and Queueing Analysis

Intersection capacity analyses were performed for the 2035 Future Conditions without Development scenario at the study area intersections during the AM and PM peak hours. *Synchro,* version 11, was used to analyze the study intersections with results based on the HCM 6th methodology[2] presented in the TRB's Highway Capacity Manual (HCM) and analysis guidelines provided by the County. The analysis herein includes level of service (LOS), delay, and queue length comparisons for the turning movements analyzed.

For the purposes of this analysis, the future peak hour factors (PHF) were based on the traffic counts, as applicable, and utilized on a by-intersection basis; PHF in the range of 0.92 to 1.00 were used for the future scenario, consistent with scoping document. The heavy vehicle percentages (HV%) were the same as those used in the 2026 Existing Conditions scenario analysis. As discussed with VDOT staff during the 1st submission review, the intersection of Rt 522 and Maranto Manor Drive was coded in the Synchro analysis given its adjacency to Intersection #5 and was coded as coordinated in all future 2035 and 2041 analysis given that it may be coordinated in the future. It is noted Maranto Manor Drive was not scoped as a study intersection.

Per the scoping process with County staff, it would be considered acceptable to achieve an approach LOS D or better for traffic operations using HCM methodology. The results of the intersection capacity analyses from *Synchro* are presented in Table 5 and Table 6 and graphically in Figure 11. The results are expressed in LOS and delay (seconds per vehicle) for overall signalized intersections and per approach and lane group for all study intersections.

The 95th percentile queue lengths were also determined from *Synchro* and are expressed in feet.

The detailed analysis worksheets of the 2035 Future Conditions without Development are contained in Appendix G.

[2] It should be noted that HCM 2000 methodology was used in lieu of HCM 6th if the HCM 6th methodology was not applicable. HCM 6th could not be applicable in such cases as nonstandard National Electrical Manufacturers Association (NEMA) configurations, shared lane configurations, placement of loop detectors, U-turns, etc.

Table 5: 2035 Future Conditions without Development – Intersection Capacity and Queuing Analysis Results (Part 1)

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour				PM Peak Hour			
			LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3]	LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3][4]
			Synchro				Synchro			
1	**Warrior Drive (N/S) & Fairfax Pike (E/W) Overall Intersection (Signalized)**		**F**	**88.6**			**E**	**59.3**		
	Eastbound Approach		***C***	***28.9***			***D***	***50.8***		
	Eastbound Left	260	F	84.9	132	#242	F	128.2	~248	#418
	Eastbound Thru		C	23.9	425	523	C	25.9	497	#691
	Eastbound Right	500	B	13.3	184	270	A	8.4	0	53
	Westbound Approach		***E***	***68.6***			***E***	***58.9***		
	Westbound Left	270	F	227.8	~192	#343	F	165.8	~140	#274
	Westbound Thru		C	30.1	471	608	D	40.6	~591	#826
	Westbound Right	575	B	14.3	0	25	B	13.3	0	11
	Northbound Approach		***D***	***53.1***			***F***	***99.9***		
	Northbound Left	190	D	53.8	56	#133	D	53	123	#216
	Northbound Thru/Right		D	51.5	20	#96	F	148.5	~186	#351
	Southbound Approach		***F***	***312.3***			***D***	***47.6***		
	Southbound Left	150	D	49.9	41	83	D	44.8	60	110
	Southbound Thru		F	398.3	~340	#555	D	49	41	84
	Southbound Right		D	42.7	0	55	D	48.2	175	287
2	**Hudson Hollow Road/White Oak Road & Fairfax Pike (E/W) Overall Intersection (Signalized)**		**B**	**12.4**			**B**	**15**		
	Eastbound Approach		***A***	***9.4***			***B***	***10.1***		
	Eastbound Left	145	A	9.9	25	62	B	12.1	16	40
	Eastbound Thru		A	9.2	90	275	A	9.8	110	320
	Eastbound Right	90	A	5.6	0	0	A	5.7	0	7
	Westbound Approach		***B***	***14.6***			***B***	***17.7***		
	Westbound Left	125	A	6.6	0	2	A	6.6	2	10
	Westbound Thru		B	14.8	147	287	B	18.3	270	#560
	Westbound Right	155	A	8.2	0	2	A	7	0	3
	Northbound Approach		***C***	***20.4***			***C***	***26***		
	Northbound Left/Thru/Right		C	20.4	20	69	C	26	30	#76
	Southbound Approach		***C***	***20.7***			***C***	***26.2***		
	Southbound Left/Thru/Right		C	20.7	17	86	C	26.2	23	85
3	**Route 522 (N/S) & Fairfax Pike/Lord Fairfax Highway Overall Intersection (Signalized)**		**F**	**108.6**			**F**	**161.1**		
	Eastbound Approach		***F***	***249.9***			***F***	***293.3***		
	Eastbound Left/Thru		F	273	~541	#837	F	343	~534	#742
	Eastbound Right	230	C	30.9	18	100	D	42.4	46	150
	Westbound Approach		***D***	***43.9***			***F***	***124.4***		
	Westbound Left	500	D	41.3	71	130	D	44.3	161	250
	Westbound Thru/Right		D	45.7	104	182	F	165	~433	#644
	Northbound Approach		***D***	***53.1***			***F***	***174.5***		
	Northbound Left	565	F	92.8	~174	#367	F	410.5	~410	#598
	Northbound Thru		C	34.1	143	214	D	48.2	251	#360
	Northbound Right	250	C	29.2	0	46	C	33.9	0	25
	Southbound Approach		***D***	***44.2***			***E***	***66.6***		
	Southbound Left	125	E	55.3	61	#139	E	72.4	67	#136
	Southbound Thru		D	41.2	116	178	E	65.7	237	#350

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] ~: Volume exceeds capacity, queue is theoretically infinite.

[3] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

[4] m: 95th percentile volume and queues (reported from Synchro) are metered by upstream signal.

Table 6: 2035 Future Conditions without Development – Intersection Capacity and Queuing Analysis Results (Part 2)

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour				PM Peak Hour			
			LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3]	LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3][4]
			Synchro				Synchro			
4	**Route 522 (N/S) & Lake Frederick Drive (E)**									
	Overall Intersection (Signalized)		**B**	**18.3**			**C**	**21**		
	Eastbound Approach		***C***	***29.2***			***C***	***33.1***		
	Eastbound Left		C	30.4	65	144	D	36.2	101	177
	Eastbound Right		C	21.3	0	31	C	25.6	27	62
	Northbound Approach		***B***	***16.2***			***B***	***19.5***		
	Northbound Left	470	C	20.2	7	23	C	28.8	27	58
	Northbound Thru		B	16	89	234	B	18.4	146	227
	Southbound Approach		***B***	***17.6***			***B***	***19.4***		
	Southbound Thru		B	17.7	123	205	B	19.8	225	349
	Southbound Right	295	B	13.3	0	25	B	14.1	0	45
	Southbound U-Turn				0	3				
5	**Route 522 (N/S) & Tasker Road (E)**									
	Overall Intersection (Signalized)		**B**	**18.9**			**C**	**24**		
	Eastbound Approach		***D***	***46.9***			***D***	***45.1***		
	Eastbound Left		D	49.4	38	77	D	51.3	119	181
	Eastbound Right	250	D	46.3	0	37	D	40.7	0	36
	Northbound Approach		***B***	***14.2***			***B***	***19.3***		
	Northbound Left	485	D	51.6	59	91	D	53.3	109	125
	Northbound Thru		A	3.3	40	62	A	5	67	94
	Southbound Approach		***B***	***11.9***			***B***	***19.4***		
	Southbound Thru		B	12.8	85	136	C	21.1	193	293
	Southbound Right	315	A	6.8	0	14	A	8.5	0	20
6	**Lake Frederick Entrance (N) & Fairfax Pike (E/W)**									
	Overall Intersection (Unsignalized)									
	Westbound Approach									
	Westbound Left	150	A	9.8		5	B	10.9		13
	Northbound Approach		***F***	***89.8***			***F***	***295.5***		
	Northbound Left		F	147.2		180.0	F	$ 514.8		203.0
	Northbound Right		C	17.7		27.5	C	17.7		18

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] ~: Volume exceeds capacity, queue is theoretically infinite.

[3] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

[4] m: 95th percentile volume and queues (reported from Synchro) are metered by upstream signal.

[5] INT 5 is analysed using HCM 2000

The capacity analysis results shown in Table 5 and Table 6 reveal that the study intersections operate at level of service (LOS) D or better by approach in Future Conditions without Development (2035) except for the following intersections:

- **Warrior Drive & Fairfax Pike** (Intersection #1)
    - The overall intersection operates at LOS F in AM peak, and operates at LOS E in PM peak
    - Westbound approach operates at LOS E in the AM and PM peak
    - Northbound approach operates at LOS F in PM peak
    - Southbound approach operates at LOS F in AM peak
    - Westbound left exceeds available storage length on both AM and PM peaks, while eastbound left and northbound left exceed available storage length in PM peak only. It is noted the eastbound and westbound left has protected only phasing.
    - It is noted that this intersection provides access to Sherando High School as well as significant background traffic projected from Sherando Green retail and Fairfax Downs residential developments adjacent to the intersection. There are no known improvements planned as part of those developments to this intersection.

- **Route 522 & Fairfax Pike/Lord Fairfax Highway** (Intersection #3)
    - Overall intersection and eastbound approach operates at LOS F in the AM and PM peak hours
    - Eastbound approach operates at LOS F in the AM and PM peak
    - Westbound approach operates at LOS F in PM peak.
    - Northbound approach operates at LOS F in PM peak
    - Southbound approach operates at LOS E in PM peak
    - Northbound left exceeds available storage length in PM peak, while southbound left exceeds on both AM and PM peaks.
    - There are no known planned improvements by others at this intersection.
- **Fairfax Pike and Lake Frederick Entrance** (Intersection #6)
    - Northbound approach operates at LOS F during both the AM and PM peak hours.

The Future Conditions without Development (2035) levels of service and lane configurations are summarized in Figure 11.

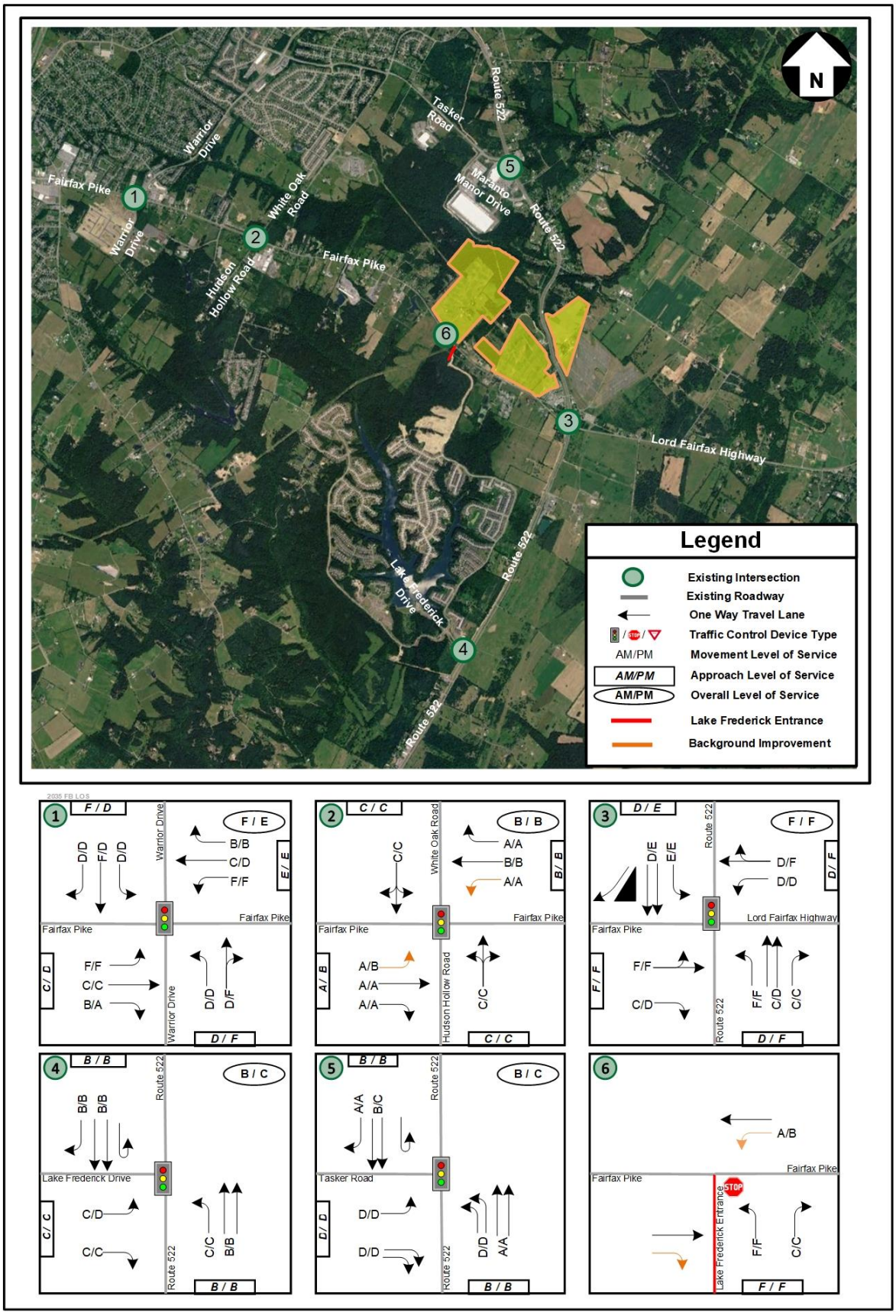

Figure 11: 2035 Future Conditions without Development – Level of Service Results

Analysis of 2035 Future Conditions with Development

For the purposes of this study, full build out is anticipated for 2035; this scenario analyzes the future with full build development conditions for the year 2035.

Site Description

The proposed development site is located northwest of the intersection of Route 522 and Fairfax Pike (Route 277)/Lord Fairfax Highway (Route 340), positioned north of Fairfax Pike and both east and west of Route 522. The site is currently zoned RA (Rural Agricultural) with a Long Range Land Use of Industrial, Mixed Use Industrial/Office for the parcels west of Route 522 and Rural Area east of Route 522. The applicant proposes a rezoning on the entire site to M1 (Light Industrial District) and a Comprehensive Plan amendment on the parcel east of Route 522 (Tax map # 87-3-A) in order to develop up to 3,200,000 SF of industrial uses. Parcels 87-3-A and 87-A-16B are each currently occupied by one single-family detached house.

The site is anticipated to include up to 3,200,000 SF of Industrial uses with a build-out year of 2035. For the purposes of the traffic study, the Industrial Park use (ITE Land Use 130) was analyzed as that is representative of a mix of industrial uses.

Proposed Site Access

Access to the site will be provided via three proposed entrances along Fairfax Pike and 3 proposed entrances along Route 522. One entrance on Fairfax Pike is proposed as a right-in/right-out only and the other two are proposed as full access. The westernmost entrance on Fairfax Pike is proposed to align with the planned entrance for Lake Frederick development. Two of the entrances on Route 522 are on opposite sides and aligned as one intersection. The entrances on Route 522 are proposed as full access with median breaks. The routing of traffic in the study also considers an interparcel connection between the two sites west of Route 522.

A conceptual Layout for the Site is illustrated in Figure 12.

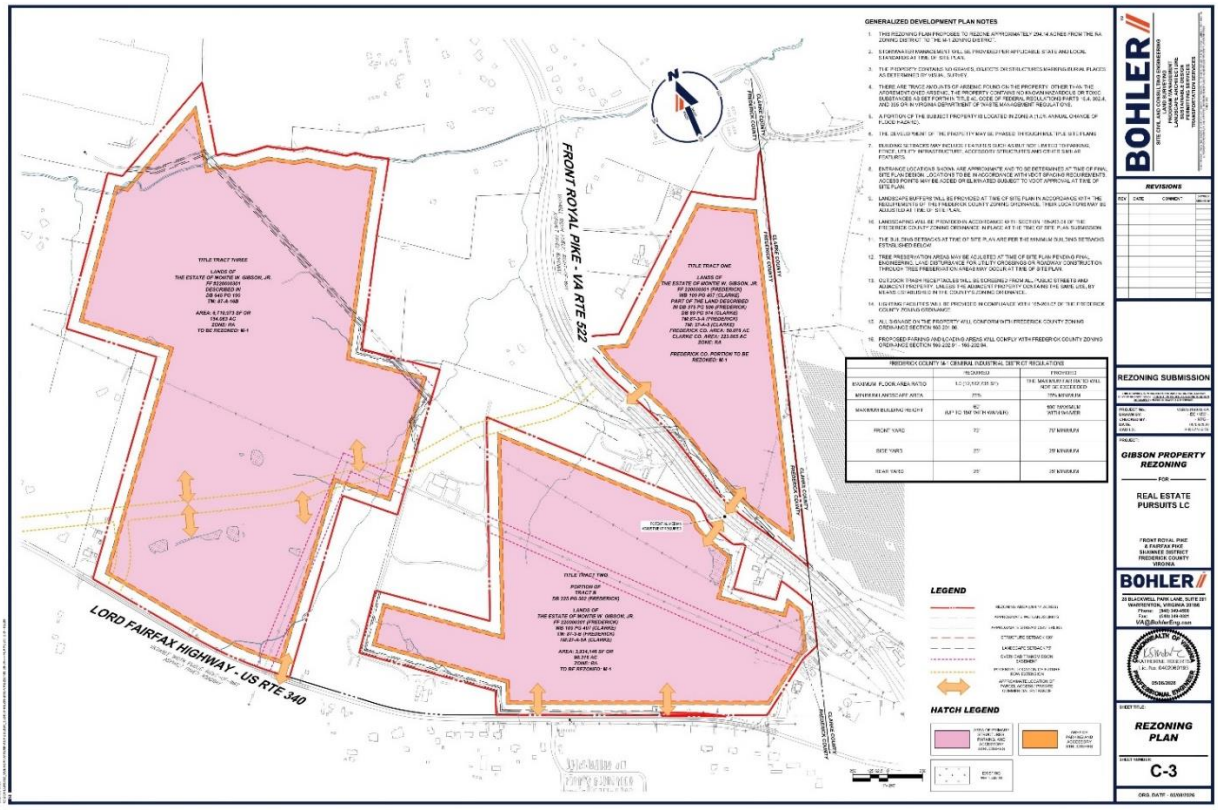

Figure 12: Rezoning Plan
For informational purposes only.

Projected Site Trip Generation

In order to calculate the trips generated by the proposed development, the Institute of Transportation Engineers' (ITE) Trip Generation Manual, 12th Edition, publication was used to determine the total trips going into and out of the subject study site during the AM and PM peak hours as well as the typical number of weekday daily trips. The projected trip generation for the proposed development is depicted in Table 7.

Table 7: Projected Site Trip Generation – Proposed Use (Peak Hour of the Adjacent Street; ITE 12th Ed.)

	ITE Code	Size	------ Weekday ------						
			AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	Total
Proposed Use									
Industrial Park	130	3,200.0 kSF of GFA	442	132	574	175	451	626	7,336
Total Proposed Trips			**442**	**132**	**574**	**175**	**451**	**626**	**7,336**

As illustrated in the Table 7, the proposed development is expected to generate approximately 574 total trips during the AM peak hour, 626 total trips during the PM peak hour, and 7,336 total weekday daily trips during a typical weekday.

Distribution and Assignment of Vehicular Site Traffic

The distribution and assignment of the vehicular site generated trips were based on the existing traffic patterns, engineering judgement, the nature of the proposed development, and with the input and agreeance from County and VDOT staff during the scoping. The site direction of approach is depicted in Figure 13. The site assignment for the peak hour trips is presented in Figure 14.

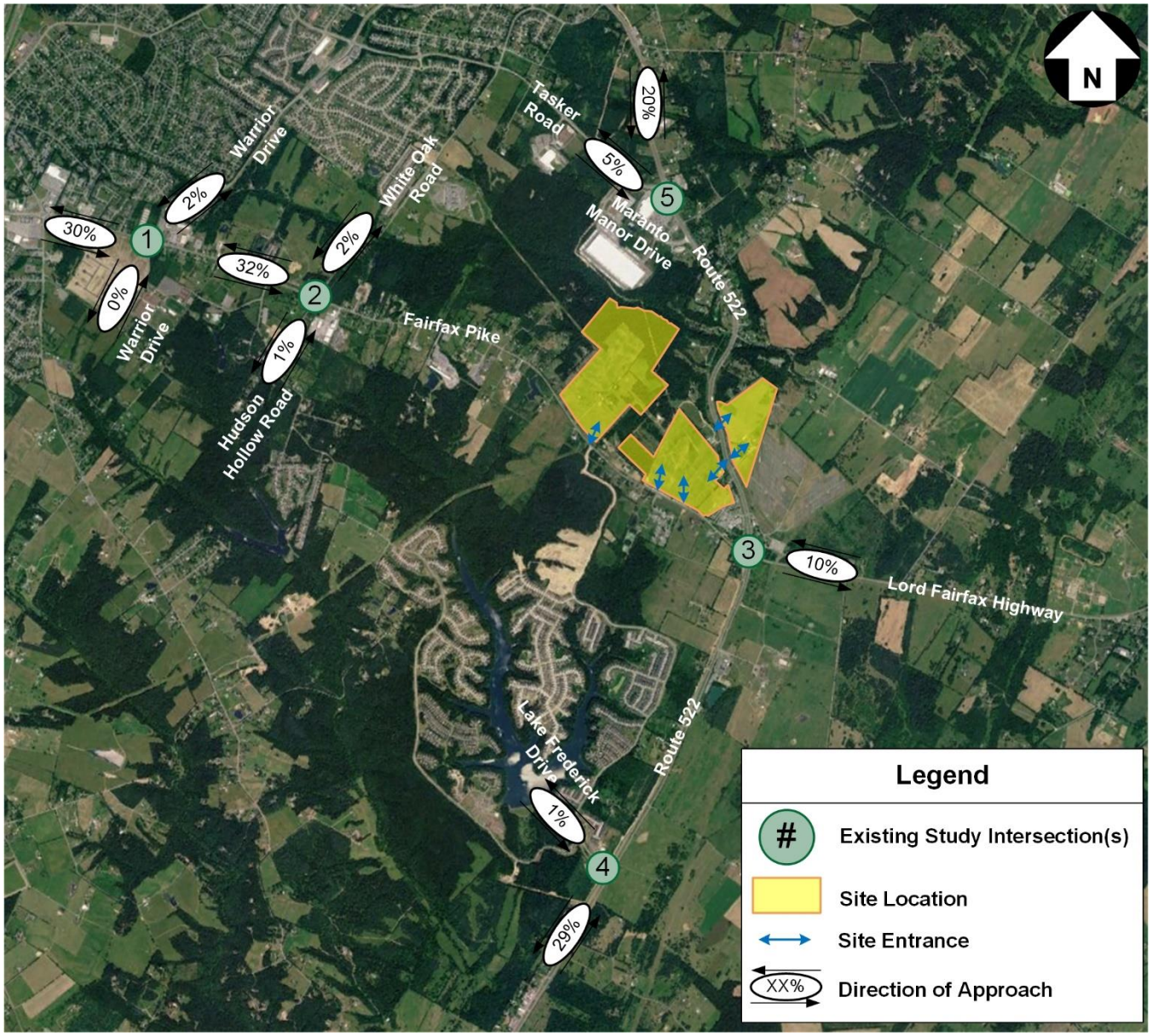

Figure 13: Global Vehicular Direction of Approach (Site Trip Distribution)

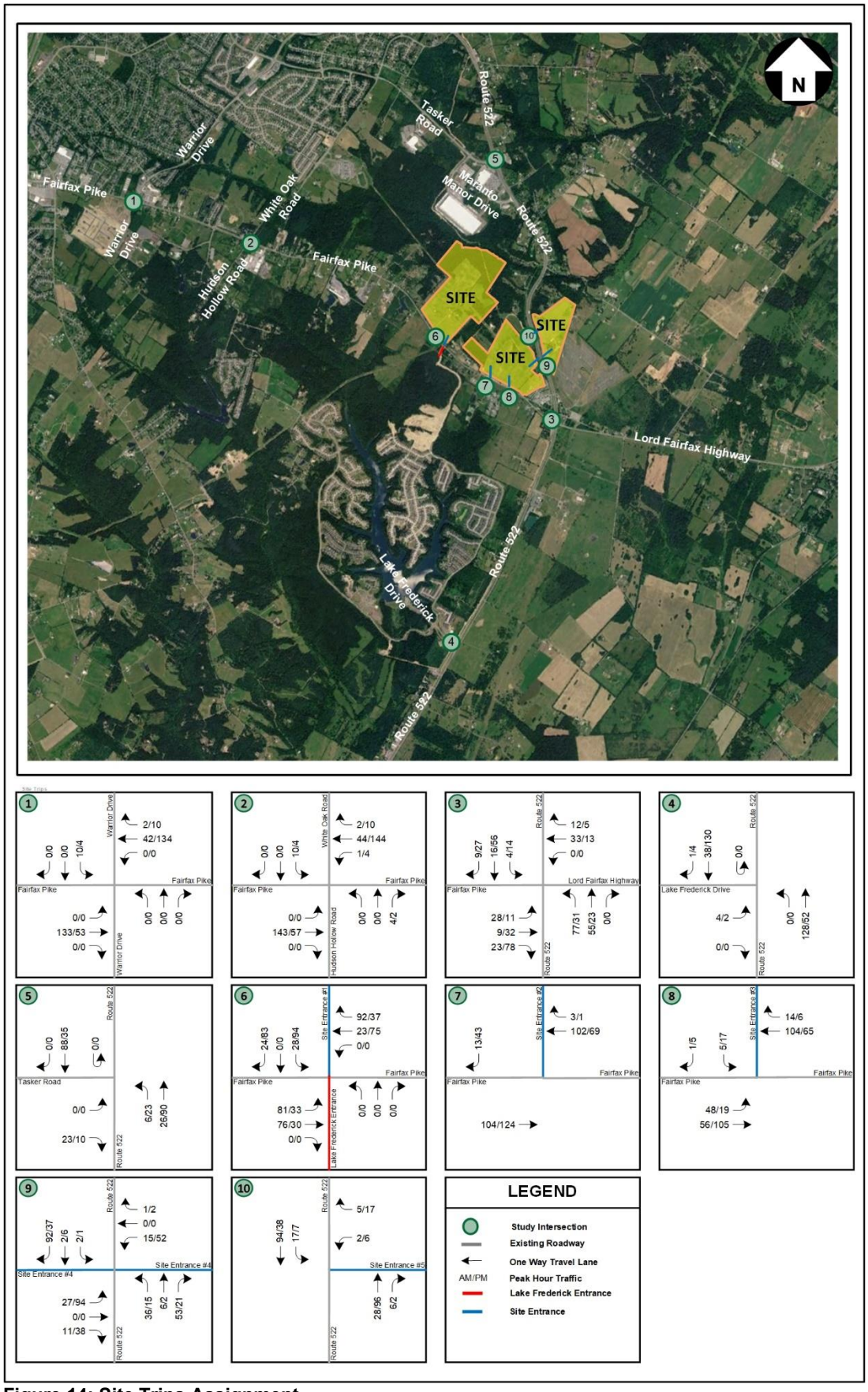

Figure 14: Site Trips Assignment

Future with Development (2035) Traffic Volumes

The future with development traffic volumes were determined by adding the assigned site generated traffic volumes (Figure 14) to the 2035 future conditions without development traffic volumes (Figure 10). The 2035 Future Conditions with Development traffic volumes are depicted in Figure 15.

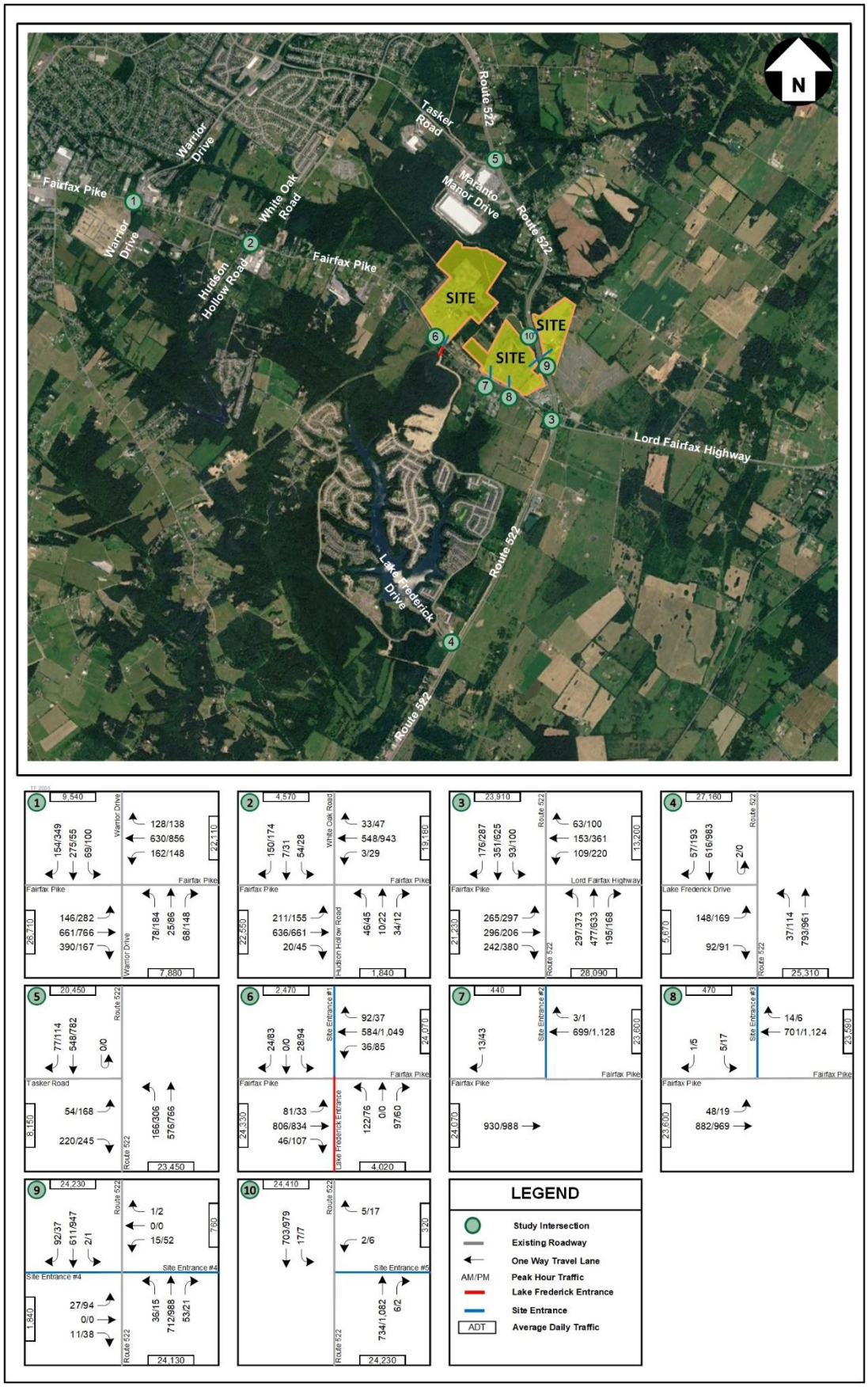

Figure 15: 2035 Future Conditions with Development – Vehicular Traffic Volumes

Future with Development Intersection Capacity and Queueing Analysis

Intersection capacity analyses were performed for the 2035 Future Conditions with Development scenario at the study area intersections during the AM and PM peak hours. *Synchro,* version 11, was used to analyze the study intersections with results based on the HCM 6th methodology[3] presented in the TRB's Highway Capacity Manual (HCM) and analysis guidelines provided by the County. The analysis herein includes level of service (LOS), delay, and queue length comparisons for the turning movements analyzed.

For the purposes of this analysis, the future peak hour factors (PHF) were based on the traffic counts, as applicable, and utilized on a by-intersection basis; PHF in the range of 0.92 to 1.00 were used for the future scenario, consistent with the scoping document. The heavy vehicle percentages (HV%) were the same as those used in the 2026 Existing Conditions and 2035 Future Conditions without Development scenario analyses.

The results of the intersection capacity analyses from *Synchro* are presented in Table 8, Table 9, Table 10 and Table 11 and graphically in Figure 16. The results are expressed in LOS and delay (seconds per vehicle) for overall signalized intersections and per approach and lane group for all study intersections.

The 95th percentile queue lengths were also determined from *Synchro* and are expressed in feet.

The detailed analysis worksheets of the 2035 Future Conditions with Development are contained in Appendix H.

[3] It should be noted that HCM 2000 methodology was used in lieu of HCM 6th if the HCM 6th methodology was not applicable. HCM 6th could not be applicable in such cases as nonstandard National Electrical Manufacturers Association (NEMA) configurations, shared lane configurations, placement of loop detectors, U-turns, etc.

Table 8: 2035 Future Conditions with Development – Intersection Capacity and Queuing Analysis Results (Part 1)

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour				PM Peak Hour			
			LOS	Delay (s) [2]	50th % Queue (ft.) [3]	95th % Queue (ft.) [4][5]	LOS	Delay (s) [2]	50th % Queue (ft.) [3]	95th % Queue (ft.) [4][5]
			Synchro				Synchro			
1	**Warrior Drive (N/S) & Fairfax Pike (E/W)**									
	Overall Intersection (Signalized)		**F**	**86**			**E**	**71.8**		
	Eastbound Approach		***C***	***31.7***			***D***	***51.9***		
	Eastbound Left	260	F	84.9	133	#241	F	128.2	~249	#420
	Eastbound Thru		C	29.8	572	726	C	29.3	561	#795
	Eastbound Right	500	B	13.3	161	260	A	8.4	0	53
	Westbound Approach		***E***	***67.7***			***F***	***91.3***		
	Westbound Left	270	F	226.1	~192	#343	F	148.1	~140	#274
	Westbound Thru		C	32.2	505	#696	F	87.1	~804	#1047
	Westbound Right	575	B	14.2	0	25	B	13.2	0	15
	Northbound Approach		***D***	***53.2***			***F***	***105.6***		
	Northbound Left	190	D	53.9	58	#128	D	53.1	123	#215
	Northbound Thru/Right		D	51.4	21	#96	F	160.1	~186	#351
	Southbound Approach		***F***	***307.2***			***D***	***48.3***		
	Southbound Left	150	D	50.1	50	94	D	44.8	63	114
	Southbound Thru		F	398.3	~371	#555	D	49	41	84
	Southbound Right		D	42.6	0	55	D	49.5	180	293
1	**Mitigation: Flashing Yellow Arrow on EBL and WBL movement** **Warrior Drive (N/S) & Fairfax Pike (E/W)**									
	Overall Intersection (Signalized)		**E**	**56.4**			**E**	**56.5**		
	Eastbound Approach		***C***	***23.6***			***D***	***43.9***		
	Eastbound Left	260	C	21.9	73	70	F	96.9	~186	#357
	Eastbound Thru		C	29.4	582	734	C	28.9	568	#820
	Eastbound Right	500	B	12.9	165	243	A	7.9	0	57
	Westbound Approach		***C***	***25.8***			***E***	***65.4***		
	Westbound Left	270	C	24.4	60	103	C	21.2	67	#185
	Westbound Thru		C	27.5	500	#733	F	77.1	~791	#1034
	Westbound Right	575	B	12.3	0	25	B	12.7	0	26
	Northbound Approach		***D***	***51.9***			***E***	***73.6***		
	Northbound Left	190	D	52.8	56	#129	D	46.7	120	#201
	Northbound Thru/Right		D	49.8	20	#86	F	101.4	~181	#351
	Southbound Approach		***F***	***229.3***			***D***	***53.3***		
	Southbound Left	150	D	48.2	47	92	D	43.7	62	111
	Southbound Thru		F	292.5	~327	#530	D	47.7	40	83
	Southbound Right		D	46	0	55	E	57.9	185	301
2	**Hudson Hollow Road/White Oak Road & Fairfax Pike (E/W)**									
	Overall Intersection (Signalized)		**B**	**14.3**			**C**	**21.2**		
	Eastbound Approach		***B***	***12***			***B***	***11.9***		
	Eastbound Left	145	B	11.7	25	70	B	18.4	16	#118
	Eastbound Thru		B	12.2	136	#488	B	10.6	127	381
	Eastbound Right	90	A	5.9	0	0	A	5.7	0	7
	Westbound Approach		***B***	***15.7***			***C***	***27.8***		
	Westbound Left	125	A	8.3	0	3	A	7	3	11
	Westbound Thru		B	16	170	351	C	29	375	#734
	Westbound Right	155	A	8.4	0	3	A	6.7	0	8
	Northbound Approach		***C***	***21.3***			***C***	***28.5***		
	Northbound Left/Thru/Right		C	21.3	21	69	C	28.5	30	74
	Southbound Approach		***C***	***22.4***			***C***	***29.2***		
	Southbound Left/Thru/Right		C	22.4	30	105	C	29.2	29	94

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] $: Delays (reported from Synchro) exceed 300 seconds in TWSC.

[3] ~: Volume exceeds capacity, queue is theoretically infinite.

[4] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

[5] m: 95th percentile volume and queues (reported from Synchro) are metered by upstream signal.

Table 9: 2035 Future Conditions with Development – Intersection Capacity and Queuing Analysis Results (Part 2)

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour				PM Peak Hour			
			LOS	Delay (s) [2]	50th % Queue (ft.) [3]	95th % Queue (ft.) [4][5]	LOS	Delay (s) [2]	50th % Queue (ft.) [3]	95th % Queue (ft.) [4][5]
			Synchro				Synchro			
3	**Route 522 (N/S) & Fairfax Pike/Lord Fairfax Highway**									
	Overall Intersection (Signalized)		**F**	**147.2**			**F**	**189.8**		
	Eastbound Approach		***F***	***311.3***			***F***	***331.2***		
	Eastbound Left/Thru		F	349.5	~647	#921	F	409	~606	#820
	Eastbound Right	230	C	33.6	35	129	D	45.7	84	#249
	Westbound Approach		***D***	***44***			***F***	***139.8***		
	Westbound Left	500	D	39.1	73	130	D	44.3	161	250
	Westbound Thru/Right		D	46.7	144	231	F	186.3	~465	#677
	Northbound Approach		***F***	***111.7***			***F***	***207.7***		
	Northbound Left	565	F	237.4	~315	#522	F	479.1	~460	#655
	Northbound Thru		D	38.5	174	248	E	55.2	263	#381
	Northbound Right	250	C	31	0	46	C	34.8	0	25
	Southbound Approach		***D***	***47.8***			***F***	***85.9***		
	Southbound Left	125	E	59.7	68	#152	E	77.1	79	#168
	Southbound Thru		D	44.7	128	191	F	87.4	~282	#403
	Southbound Right	480	A	0	0	33	A	0	0	77
3	**Mitigation: Addition of Exclusive EBL and second NBL turn lanes**									
	Route 522 (N/S) & Fairfax Pike/Lord Fairfax Highway									
	Overall Intersection (Signalized)		**D**	**52.7**			**F**	**94.3**		
	Eastbound Approach		***E***	***76.1***			***F***	***107.6***		
	Eastbound Left	250	E	76.9	195	#369	F	166.6	~280	#457
	Eastbound Thru		E	79.6	218	#403	E	58.1	154	#277
	Eastbound Right	230	D	37.8	0	73	D	45.0	67	#235
	Westbound Approach		***D***	***54.0***			***F***	***114.4***		
	Westbound Left	500	D	44.3	75	128	D	40.2	152	237
	Westbound Thru/Right		E	59.3	147	227	F	150.5	~427	#637
	Northbound Approach		***D***	***44.4***			***F***	***101.4***		
	Northbound Left	565	E	60.0	114	#177	F	179.6	~185	#284
	Northbound Thru		D	35.7	182	243	E	57.9	256	#380
	Northbound Right	250	C	29.5	0	41	C	34.3	0	20
	Southbound Approach		***D***	***35.5***			***D***	***54.1***		
	Southbound Left	125	E	69.1	61	#151	E	70.3	80	#157
	Southbound Thru		C	26.6	136	186	D	51.5	231	#370
	Southbound Right	480	A	0	25	81	A	0	24	126
4	**Route 522 (N/S) & Lake Frederick Drive (E)**									
	Overall Intersection (Signalized)		**B**	**17.7**			**C**	**22.4**		
	Eastbound Approach		***C***	***29.3***			***D***	***35.1***		
	Eastbound Left		C	30.9	69	155	D	38.5	105	181
	Eastbound Right		C	22.2	4	38	C	27.8	33	68
	Northbound Approach		***B***	***15***			***C***	***21.1***		
	Northbound Left	470	C	20.9	8	23	C	32.4	27	58
	Northbound Thru		B	14.7	115	276	B	19.8	159	248
	Southbound Approach		***B***	***17.8***			***C***	***20.6***		
	Southbound Thru		B	17.9	136	230	C	21.1	282	432
	Southbound Right	295	B	13.2	0	25	B	13.7	0	46

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] $: Delays (reported from Synchro) exceed 300 seconds in TWSC.

[3] ~: Volume exceeds capacity, queue is theoretically infinite.

[4] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

[5] m: 95th percentile volume and queues (reported from Synchro) are metered by upstream signal.

Table 10: 2035 Future Conditions with Development – Intersection Capacity and Queuing Analysis Results (Part 3)

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour				PM Peak Hour			
			LOS	Delay (s) [2]	50th % Queue (ft.) [3]	95th % Queue (ft.) [4][5]	LOS	Delay (s) [2]	50th % Queue (ft.) [3]	95th % Queue (ft.) [4][5]
			Synchro				Synchro			
5	**Route 522 (N/S) & Tasker Road (E) Overall Intersection (Signalized)**		**B**	**19.2**			**C**	**23.9**		
	Eastbound Approach		***D***	***46.9***			***D***	***45.0***		
	Eastbound Left		D	49.4	38	77	D	51.3	119	181
	Eastbound Right	-/250	D	46.3	0	39	D	40.7	0	36
	Northbound Approach		***B***	***14.4***			***B***	***18.8***		
	Northbound Left	485/485	D	52.7	61	96	D	52.3	119	139
	Northbound Thru		A	3.3	42	66	A	5.5	81	105
	Southbound Approach		***B***	***12.7***			***C***	***20.3***		
	Southbound Thru		B	13.5	106	166	C	22.0	207	315
	Southbound Right	315	A	6.9	0	14	A	8.8	1	21
6	**Lake Frederick Entrance/Gibson Site Entrance 1 & Fairfax Pike (E/W) Overall Intersection (Unsignalized)**									
	Eastbound Approach									
	Eastbound Left	150	A	9.6		7.5	B	11.5		5.0
	Westbound Approach									
	Westbound Left	150	B	10.2		5.0	B	11.1		12.5
	Northbound Approach		***F***	***$ 537.5***			***F***	***$ 1675.9***		
	Northbound Left		F	$ 949.1		350	F	$ 2984.5		285
	Northbound Thru/Right		C	19.8		32.5	C	18.4		17.5
	Southbound Approach		***F***	***150.5***			***F***	***$ 1551.2***		
	Southbound Left	50	F	268.3		75	F	$ 2896.2		340
	Southbound Thru/Right		B	13		5	D	28		40
6	**Mitigation: Install a Signal Lake Frederick Entrance/Gibson Site Entrance 1 & Fairfax Pike (E/W) Overall Intersection (Signalized)**		**A**	**7.2**			**B**	**10.3**		
	Eastbound Approach		***A***	***2.1***			***A***	***2.1***		
	Eastbound Left	150	A	4.6	8	m11	B	10.9	2	m6
	Eastbound Thru		A	2.0	117	122	A	1.9	139	275
	Eastbound Right	150	A	0.0	0	m0	A	0.1	0	m5
	Westbound Approach		***A***	***7.1***			***B***	***12.3***		
	Westbound Left	150	A	3.3	5	12	A	2.8	7	14
	Westbound Thru		A	7.5	185	263	B	13.3	419	#807
	Westbound Right	150	A	4.9	0	16	A	3.3	0	3
	Northbound Approach		***D***	***38.3***			***D***	***39.9***		
	Northbound Left		D	38.6	67	#136	D	40.0	45	#121
	Northbound Thru/Right		C	33.5	0	0	D	36.4	0	0
	Southbound Approach		***C***	***34.4***			***D***	***41.1***		
	Southbound Left	50	C	34.5	14	39	D	41.2	56	#151
	Southbound Thru/Right		C	33.3	0	0	D	36.4	0	0

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] $: Delays (reported from Synchro) exceed 300 seconds in TWSC.

[3] ~: Volume exceeds capacity, queue is theoretically infinite.

[4] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

[5] m: 95th percentile volume and queues (reported from Synchro) are metered by upstream signal.

[6] INT 5 is analysed using HCM 2000

Table 11: 2035 Future Conditions with Development – Intersection Capacity and Queuing Analysis Results (Part 4)

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour				PM Peak Hour			
			LOS	Delay (s) [2]	50th % Queue (ft.) [3]	95th % Queue (ft.) [4][5]	LOS	Delay (s) [2]	50th % Queue (ft.) [3]	95th % Queue (ft.) [4][5]
			Synchro				Synchro			
7	**Fairfax Pike (S) & Gibson Site Entrance 2 (E/W) Overall Intersection (Unsignalized)**									
	Southbound Approach		***B***	***14.2***			***D***	***26.1***		
	Southbound Right		B	14.2		2.5	D	26.1		20
8	**Fairfax Pike (S) & Gibson Site Entrance 3 (E/W) Overall Intersection (Unsignalized)**									
	Eastbound Approach									
	Eastbound Left	150	A	9.6		5.0	B	11.6		2.5
	Southbound Approach		***E***	***47.2***			***F***	***130.5***		
	Southbound Left		F	53.9		5	F	162.5		40
	Southbound Right	50	B	14		0	C	21.9		2.5
9	**Route 522 (N/S) & Gibson Site Entrance 4 (E/W) Overall Intersection (Unsignalized)**									
	Eastbound Approach		***C***	***17.1***			***E***	***40.8***		
	Eastbound Left/Thru		C	19.8		10	F	52.1		80
	Eastbound Right	50	B	10.5		2.5	B	12.8		7.5
	Westbound Approach		***C***	***20.6***			***E***	***39***		
	Westbound Left/Thru		C	21.2		5	E	40		37.5
	Westbound Right	50	B	10.9		0	B	12.4		0
	Northbound Approach									
	Northbound Left	300	A	9.5		2.5	B	10.7		2.5
	Southbound Approach									
	Southbound Left	300	A	9.5		0	B	10.7		0
9	**Mitigation: Install a Signal Route 522 (N/S) & Gibson Site Entrance 4 (E/W) Overall Intersection (Signalized)**		**A**	**4.5**			**B**	**11.9**		
	Eastbound Approach		***D***	***53.6***			***D***	***51.2***		
	Eastbound Left		D	53.6	20	49	D	51.3	69	120
	Eastbound Thru/Right		A	0.0	0	0	D	45.7	0	0
	Westbound Approach		***D***	***52.5***			***D***	***48.5***		
	Westbound Left		D	52.5	11	33	D	48.5	37	73
	Westbound Thru/Right		A	0.0	0	0	A	0	0	0
	Northbound Approach		***A***	***0.4***			***A***	***8.4***		
	Northbound Left	300	A	4.2	3	m3	A	7.0	1	m6
	Northbound Thru		A	0.2	2	m222	A	8.5	2	m292
	Northbound Right	150	A	0.0	0	m6	A	5.9	0	m0
	Southbound Approach		***A***	***6.3***			***A***	***9.6***		
	Southbound Left	300	A	4	0	m2	A	6.9	0	m1
	Southbound Thru		A	6.4	74	87	A	9.7	105	233
	Southbound Right	150	A	5.3	0	1	A	6.6	0	1
10	**Route 522 (N/S) & Gibson Site Entrance 5 (W) Overall Intersection (Unsignalized)**									
	Westbound Approach		***B***	***12.8***			***C***	***16.3***		
	Westbound Left		C	17.3		0	C	24.8		2.5
	Westbound Right	50	B	11		0	B	13.3		2.5
	Southbound Approach									
	Southbound Left	300	A	9.5		2.5	B	11.2		0

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] $: Delays (reported from Synchro) exceed 300 seconds in TWSC.

[3] ~: Volume exceeds capacity, queue is theoretically infinite.

[4] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

[5] m: 95th percentile volume and queues (reported from Synchro) are metered by upstream signal.

The capacity analysis results shown in Table 8, Table 9, Table 10 and Table 11 reveal that the study intersections operate at level of service (LOS) D or better by approach in Future Conditions with Development (2035) except for the following intersections:

- **Warrior Drive & Fairfax Pike (Intersection #1)**
  - Overall intersection operates at LOS F in AM peak and LOS E in PM peaks

- Westbound approach operates at LOS E in the AM peak and LOS F in the PM peak
- Northbound approach operates at LOS F in PM peak
- Southbound approach operates at LOS F in the AM peak
- Westbound left exceeds available storage length in both AM and PM peaks, while eastbound left and northbound left exceed available storage length in PM peak only. It is noted the westbound left has protected only phasing.
- This intersection fails due to existing and background volumes and is not caused by the proposed development. The intersection is projected to process significant additional traffic from nearby planned background developments of Sherando Green retail and Fairfax Downs residential. There are no known improvements planned as part of those developments to this intersection. However, left turn phasing changed from "protected only" to "flashing yellow arrow" on eastbound and westbound approaches are proposed to mitigate the site impacts on this intersection.
- **Mitigation: Left turn phasing change from "protected only" to "flashing yellow arrow" on eastbound and westbound approaches are recommended to mitigate the site impacts on this intersection and improve the delay and queuing at the intersection.** With the above improvement in place, the eastbound and westbound left turn movements have significant reduction in delay and queuing. **While the northbound approach remains at LOS F in the AM peak and the westbound approach and northbound approach operates at LOS E in the PM peak, the conditions are improved to be better than Future Conditions without Development (non-degradation).**

- **Route 522 & Fairfax Pike/Lord Fairfax Highway (Intersection #3)**
  - Overall intersection operates at LOS F in the AM and PM peaks.
  - Eastbound approach operates at LOS F in the AM and PM peaks.
  - Westbound approach operates at LOS F in the PM peak.
  - Northbound approach operates at LOS F in the AM and PM peaks.
  - Southbound approach operates at LOS F in the PM peak.
  - Northbound left and eastbound right exceeds available storage length in PM peak, while southbound left exceeds available storage length in both AM and PM peaks.
  - This intersection fails under background projected conditions due to regional growth and planned background development traffic.
  - **Mitigation: To mitigate site-related impacts, an exclusive eastbound left-turn lane and a second northbound left-turn lane are recommended.** For this mitigated scenario, Intersection #3 was analyzed as coordinated with Intersection #9 based on feedback from VDOT review.
  - With the above recommended improvements in place, the delay and queuing are significantly improved and notably all approaches operate at LOS D in the AM peak. The post-mitigated improvements show the following:
    - Overall intersection operates at LOS D in AM peak and LOS F in PM peak.
    - Eastbound approach operates at LOS E in AM peak and LOS F in PM peak.
    - Westbound approach operates at LOS F and Northbound approach operates at LOS F in PM Peak.
    - **While some approaches operate at LOS E or F in the PM peak hour only, the delay and queuing are significantly improved with the above improvements and conditions are improved to be better than Future without Development (non-degradation).**

- **Fairfax Pike and Lake Frederick Entrance/Site Entrance #1 (Intersection #6)**
    - Northbound Approach and Southbound Approach operates at LOS F during both AM and PM peak hours.
    - For this mitigated scenario, Intersection #6 was analyzed as coordinated with the Madison 277 entrance based on feedback from VDOT review.
    - With a conventional traffic signal added at this location, the intersection operates at acceptable levels of service. Installation of a new traffic signal is subject to VDOT review and approval through a future Signal Justification Report ("SJR"). A preliminary signal warrant evaluation and VJuST analysis were performed as part of this study to screen potential intersection control configurations. A conventional traffic signal, thru-cut signal, roundabout, and two-way stop control were considered as possible intersection configurations. The ultimate configuration will be determined through the future SJR. It is noted that a roundabout is anticipated to require significant offsite right-of-way and was therefore not recommended for further consideration.

- **Fairfax Pike and Site Entrance #3 (Intersection #8)**
    - Southbound approach of the site access operates at LOS E in the AM peak and LOS F in the PM peak. The failing level of service is due to high through volumes on Fairfax Pike and not a result of high volumes from the entrance (17 peak hour trips). The queuing for the southbound approach is 40 feet, indicating only 2 stacked vehicles. Hence, no mitigations are recommended.

- **Route 522 and Site Entrance #4 (Intersection #9)**
    - Eastbound approach and westbound approach operates at LOS E in the PM peak
    - With a conventional traffic signal added at this location, the intersection would operate at acceptable levels of service with acceptable queuing along Route 522. Installation of a new traffic signal is subject to VDOT review and approval through a future Signal Justification Report ("SJR"). A preliminary signal warrant evaluation and VJuST analysis were performed as part of this study to screen potential intersection control configurations. A conventional traffic signal, unsignalized continuous green-T, unsignalized restricted crossing U-turn (RCUT), and two-way stop control were considered as possible intersection configurations. The ultimate configuration will be determined through the future SJR. It is noted that an RCUT would result in additional U-turn traffic downstream along Route 522 including truck traffic from the proposed industrial use. It is also noted that a continuous green-T would not meet spacing and acceleration distance requirements and was therefore not recommended for further consideration.

The Future Conditions with Development (2035) levels of service and lane configurations are summarized in Figure 16.

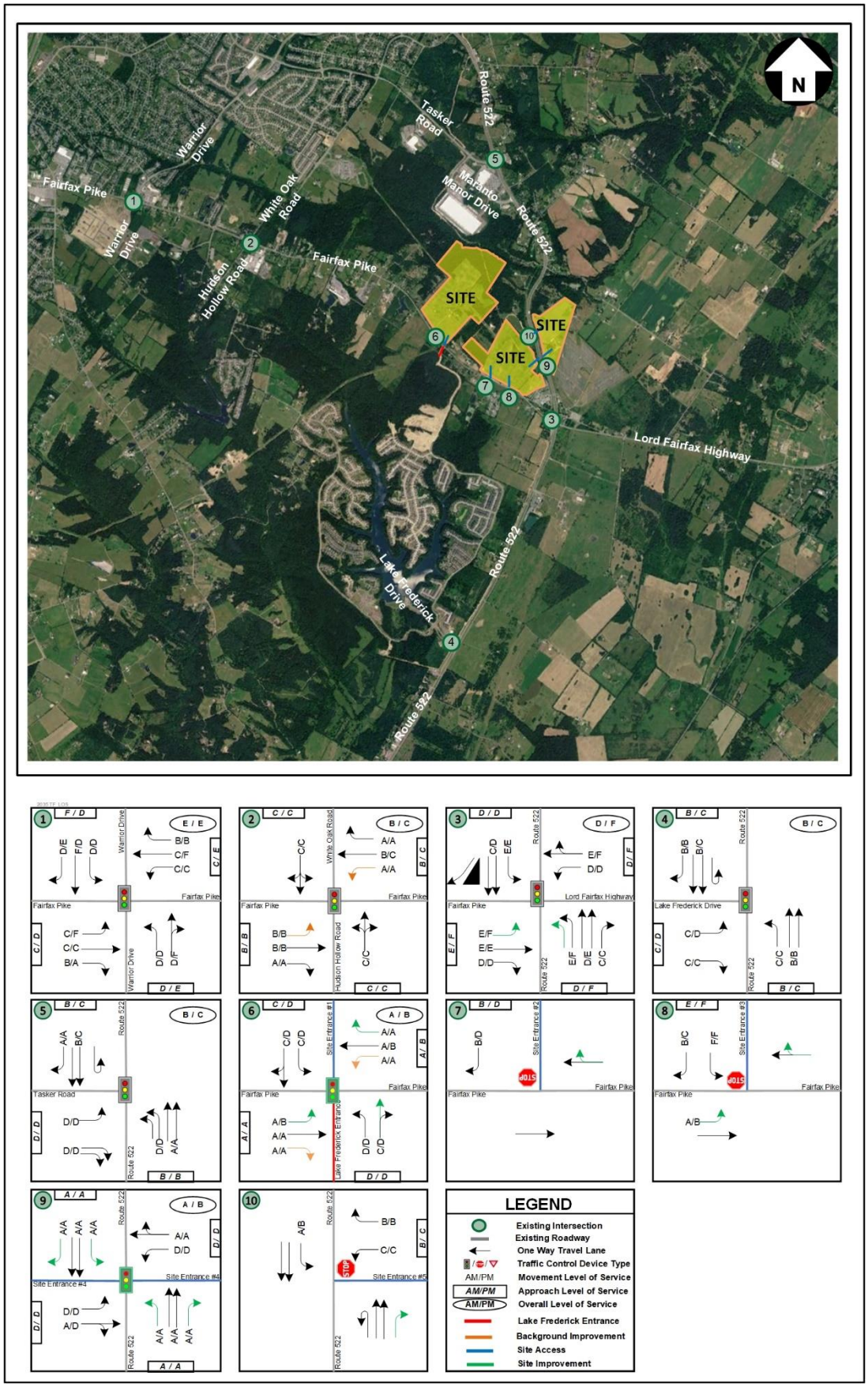

Figure 16: 2035 Future Conditions with Development - Level of Service Results

Spacing Analysis

A spacing analysis was conducted for the proposed site entrances based on VDOT's Road Design Manual (RDM) Appendix F, Table 2-2.

Appendix F focuses on access management design standards for entrances and intersections. The minimum spacing standards are specified in Table 2-2 through Table 2-4. Table 2-2 provides guidance on the minimum spacing standards for commercial accesses, intersections, and median crossovers based on roadway functional classification and design speed. Tables 2-3 and 2-4 provide guidance on minimum spacing standards for accesses near interchange areas.

Both Fairfax Pike and Route 522 are classified as Minor Arterials according to VDOT's Functional Classification, with a posted speed limit of 55 mph in the vicinity of the site.

The applicable minimum spacing standards (centerline to centerline) per Appendix F, Table 2-2 are shown in Table 12. This spacing analysis evaluates the minimum spacing standards for the proposed site entrances. A comparison of the proposed and required spacing is provided in Table 13 and illustrated in Figure 17.

Table 12: Minimum Spacing Standards for Commercial Accesses, Intersections, and Median Crossovers (RDM, Appendix F, Table 2-2)

Highway Functional Class	Design Speed (mph)	Minimum Centerline to Centerline Spacing (Feet)			
		(Type 1) Signalized Intersection	(Type 2) Unsignalized Intersection or Full Crossover	(Type 3) Full Access / Directional Crossover	(Type 4) Partial Access
Principal Arterial	≤ 30 mph	1,050	880	440	250
	35 to 45 mph	1,320	1,050	565	305
	≥ 50mph	2,640	1,320	750	495
Minor Arterial	≤ 30 mph	880	660	355	200
	35 to 45 mph	1,050	660	470	250
	≥ 50mph	1,320	1,050	555	425
Collector	≤ 30 mph	660	440	225	200
	35 to 45 mph	660	440	335	250
	≥ 50mph	1,050	660	445	360

Notes:

1. Based on the Virginia Department of Transportation's (VDOT) Road Design Manual (RDM), Appendix F Table 2-2 for Minimum Spacing Stan

2. Design speed for roadways with posted speed of 45 mph or less is at least equal to the posted speed. For roadways with a posted speed of 50 mph or higher, the design speed is at least 5 mph higher than the posted speed. Where design speed is not available, the posted speed should be used.

Table 13: Spacing Analysis Summary

Intersection(s) / Access Point(s)	Type of Traffic Control	Direction	Adjacent Intersection	Type of Traffic Control	Proposed Distance (ft.)	Minimum Spacing Required (ft.)*	Meets the Standard (Yes / No)
A. Route 522 and Sasser Lane	Partial Access	South	Route 522 and Site Entrance #5	Full Access	1,490	425	Yes
B. Route 522 and Site Entrance #5	Full Access	South	Route 522 and Site Entrance #4	Signalized	1,035	555	Yes
C. Route 522 and Site Entrance #4	Signalized	South	Route 522 and Highland Corners Road	Unsignalized	1,330	1,050	Yes
D. Route 522 and Site Entrance #4	Signalized	South	Route 522 and 3636 Entrance	Partial Access	425	425	Yes
E. Route 522 and Site Entrance #4	Signalized	South	Route 522 and Fairfax Pike/Lord Fairfax Highway	Signalized	2,375	1,320	Yes
F. Fairfax Pike and Double Tollgate Road	Full Access	West	Fairfax Pike and Site Entrance #3	Full Access	665	555	Yes
G. Fairfax Pike and Site Entrance #3	Full Access	West	Fairfax Pike and Site Entrance #2	Partial Access	930	425	Yes
H. Fairfax Pike and Site Entrance #2	Partial Access	West	Fairfax Pike and 1867 Entrance	Full Access	710	425	Yes
I. Fairfax Pike and 1867 Entrance	Full Access	West	Fairfax Pike and Site Entrance #1	Signalized	1,160	555	Yes
J. Fairfax Pike and Site Entrance #1	Signalized	West	Fairfax Pike and Madison 277 Entrance	Signalized	1,320	1,320	Yes
K. Fairfax Pike and Site Entrance #1	Signalized	East	Route 522 and Fairfax Pike/Lord Fairfax Highway	Signalized	4,850	1,320	Yes

As shown in Table 13, all proposed site entrances would meet minimum spacing standards per VDOT'S RDM Appendix F. It is noted that signalized spacing was evaluated for Intersections #6 and #9 to evaluate the highest potential category if those entrances become signalized; however, spacing for the other innovative intersection types is further discussed in the VJuST section in Appendix J.

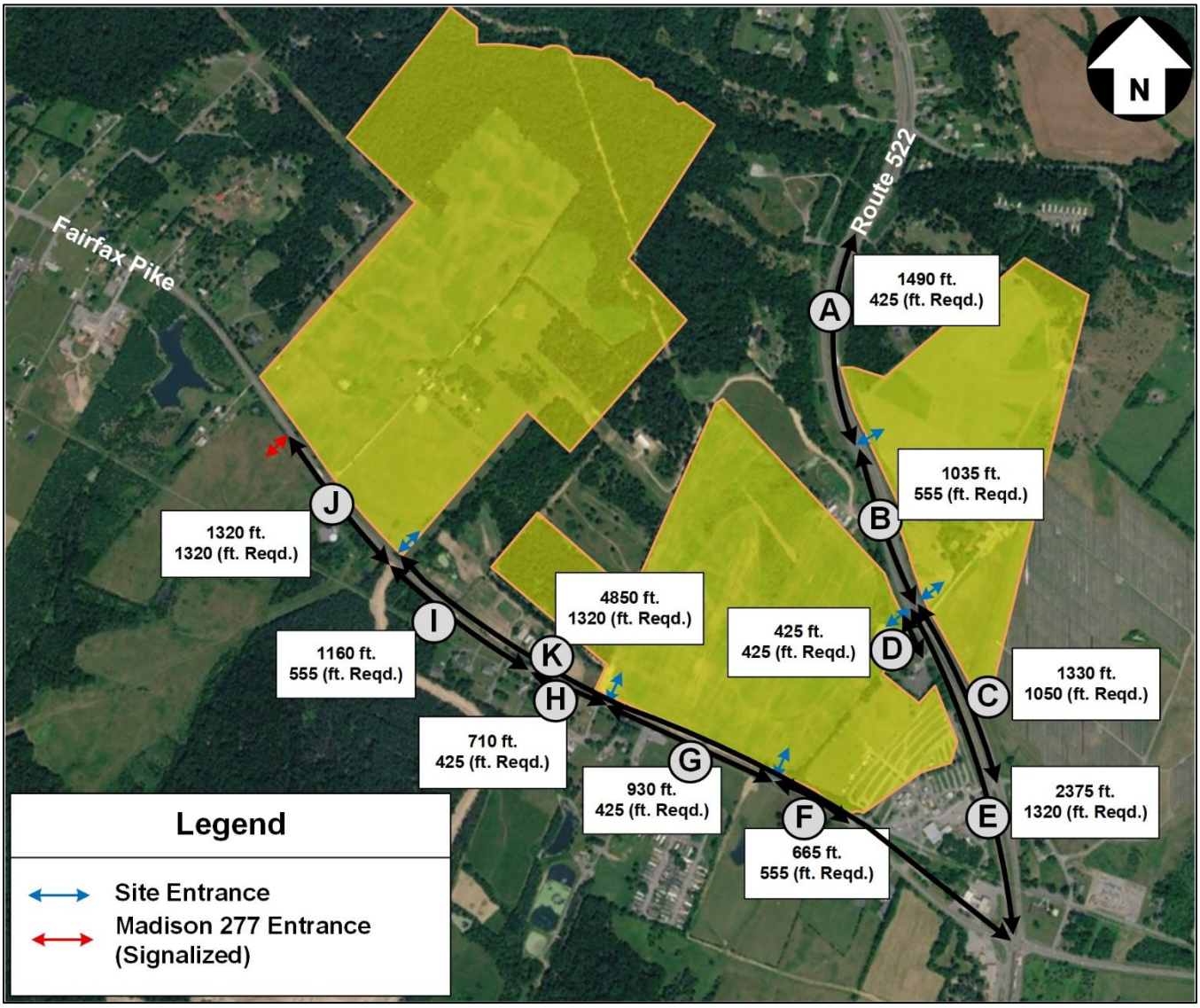

Figure 17: Spacing Analysis

Turn Lane Warrant Analysis

Left and right turn lane warrants are based on VDOT's Road Design Manual (RDM), Appendix F. In order to determine the need for exclusive left and/or right turn lanes or tapers at the site entrances, the 2035 Future Conditions with Development traffic volumes were utilized.

Warrants for right-turn storage lanes on two- and four-lane highways at intersections are based on Figure 3-26 and Figure 3-27 in Appendix F. These figures provide a graphical representation for determining the necessity of a right turn lane by comparing the total volumes of a given approach with their respective right turn volumes.

Warrants for left-turn storage lanes on two-lane highways are based on Figures 3-5 through 3-21 in Appendix F, while warrants for left-turn storage lanes on four-lane highways are based on Figure 3-3 in Appendix F. These figures provide graphical representations for determining the necessity of a left turn lane by comparing the advancing volumes of a given approach and

the respective opposing volumes with respect to the percentage of left turning vehicles of the advancing volumes and the design speed of a given roadway.

Fairfax Pike is a two-lane undivided roadway with a posted speed of 55 mph in the vicinity of the site, whereas Route 522 is a four-lane median divided roadway with a posted speed limit of 55 mph in the vicinity of the site.

A summary of the right-turn lane warrant analysis for two-lane roadways and four-lane roadways is provided in Table 14 and Table 15, respectively, and the left-turn lane warrant analysis for two-lane roadways and four-lane roadways is provided in Table 16 and Table 17, respectively.

Table 14: Right-Turn Lane Analysis for Two-Lane Roadway

Study Scenario	Approach Volume	Right Turn Volume	Minimum Right Turn Taper Threshold	Minimum Right Turn Full Lane Threshold	Treatment
Intersection 6: WBR AM Peak	712	92	20	40	Full-width Lane and Taper Required
Intersection 6: WBR PM Peak	1,171	37	20	40	Taper Required
Intersection 7: WBR AM Peak	702	3	20	40	Not Warranted
Intersection 7: WBR PM Peak	1,129	1	20	40	Not Warranted
Intersection 8: WBR AM Peak	715	14	20	40	Not Warranted
Intersection 8: WBR PM Peak	1,130	6	20	40	Not Warranted

Table 15: Right-Turn Lane Analysis for Four-Lane Roadway

Study Scenario	Approach Volume	Right Turn Volume	Minimum Right Turn Taper Threshold	Minimum Right Turn Full Lane Threshold	Treatment
Intersection 9: NBR AM Peak	801	53	16	69	Taper Required
Intersection 9: NBR PM Peak	1,024	21	10	53	Taper Required
Intersection 9: SBR AM Peak	705	92	19	75	Full-width Lane and Taper Required
Intersection 9: SBR PM Peak	985	37	10	55	Taper Required
Intersection 10: NBR AM Peak	740	6	18	73	Not Warranted
Intersection 10: NBR AM Peak	1,084	2	10	48	Not Warranted

As shown in Table 14, a full-width right turn lane and taper are warranted for the westbound right turn at Intersection 6, while no right turn lane is warranted at Intersections 7 and 8. As shown in Table 15, a taper is warranted for the northbound right turn at Intersection 9, a full-width right turn lane and taper are warranted for the southbound right turn at Intersection 9, and no right turn lane is warranted at Intersection 10. Right turn lanes will be provided at the proposed site entrances along Route 522 and where warranted on Fairfax Pike.

Table 16: Left-Turn Lane Analysis for Two-Lane Roadway

Study Scenario	Opposing Vol. (VPH)	Advancing Vol. (VPH)	Left Turn Vol. (VPH)	Left Turn %	VDOT Figure	Treatment
Intersection 6: EBL AM Peak	712	933	81	8.68%	Fig. 3-11	Full-width Lane and Taper Warranted
Intersection 6: EBL PM Peak	1,171	974	33	3.39%	Fig. 3-10	Full-width Lane and Taper Warranted
Intersection 8: EBL AM Peak	715	930	48	5.16%	Fig. 3-11	Full-width Lane and Taper Warranted
Intersection 8: EBL PM Peak	1130	988	19	1.92%	Fig. 3-10	Full-width Lane and Taper Warranted

Table 17: Left-Turn Lane Analysis for Four-Lane Roadway

Study Scenario	Median	Opposing Vol. (VPH)	Advancing Vol. (VPH)	Left Turning Vol.	Left Turn %	Treatment
Intersection 9: NBL AM Peak	Divided	705	801	36	4.5%	Full-width Turn Lane and Taper Warranted (for Undivided and Divided)
Intersection 9: NBL PM Peak	Divided	985	1,024	15	1.5%	Not Warranted
Intersection 9: SBL AM Peak	Divided	801	705	2	0.3%	Not Warranted
Intersection 9: SBL PM Peak	Divided	1,024	985	1	0.1%	Not Warranted
Intersection 10: SBL AM Peak	Divided	740	720	17	2.4%	Not Warranted
Intersection 10: SBL PM Peak	Divided	1,084	986	7	0.7%	Not Warranted

As shown in Table 16, a left turn lane is warranted for the eastbound left turns at Intersections 6 and 8. As shown in Table 17 , a left turn lane is warranted for the northbound left turn at Intersection 9, while no left turn lane is warranted at Intersections 9 and 10 for the southbound left turns. Left turn lanes will be provided at the proposed full access site entrances along Fairfax Pike. Exclusive left turn lanes are already present along Route 522 under existing conditions.

Preliminary Signal Warrant Analysis

This section presents a preliminary signal warrant analysis for the following intersection:

- Fairfax Pike and Site Entrance #1/Lake Frederick Entrance – A traffic signal is recommended as a mitigation measure in the Future with Development (2035) conditions. PM peak traffic volumes from Figure 15 were utilized for this analysis. Fairfax Pike has a posted speed limit of 55 mph.
- Route 522 and Site Entrance #4 – A traffic signal is recommended as a mitigation measure in the Future with Development (2035) conditions. PM peak traffic volumes from Figure 15 were utilized for this analysis. Route 522 has a posted speed limit of 55 mph.

This warrant analysis was conducted using Table 4C-V1: Traffic Signal Warrant Using Average Daily Traffic Estimate from the Virginia MUTCD. Table 4C-V1 from the Virginia MUTCD is shown in Table 18. The results of the preliminary signal warrant analysis are shown in Table 19.

Table 18: Traffic Signal Warrant Using Average Daily Traffic Estimate (Source: Virginia MUTCD, Table 4C-V1)

Table 4C-V1. Traffic Signal Warrant Using Average Daily Traffic Estimate

(To be used only when traffic counts are not available, such as at a future intersection)

Condition A—Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per day on major street (total of both approaches)				Vehicles per day on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	8,000	6,400	5,600	4,480	2,400	1,920	1,680	1,344
2 or more	1	9,600	7,680	6,720	5,376	2,400	1,920	1,680	1,344
2 or more	2 or more	9,600	7,680	6,720	5,376	3,200	2,560	2,240	1,792
1	2 or more	8,000	6,400	5,600	4,480	3,200	2,560	2,240	1,792

Condition B—Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per day on major street (total of both approaches)				Vehicles per day on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	12,000	9,600	8,400	6,720	1,200	960	850	680
2 or more	1	14,400	11,520	10,080	8,064	1,200	960	850	680
2 or more	2 or more	14,400	11,520	10,080	8,064	1,600	1,280	1,120	896
1	2 or more	12,000	9,600	8,400	6,720	1,600	1,280	1,120	896

[a] Basic minimum hourly volume for urban areas
[b] Used for combination of Conditions A and B after adequate consideration of other remedial measures in urban areas
[c] May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000
[d] May be used for combination of Conditions A and B after adequate consideration of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

Table 19: ADT Signal Warrant Analysis

Intersection	Scenario	Number of lanes for moving traffic on each approach		Condition	Signal Warrant Requirements		Estimated ADT		Signal Warrant Met?
		Major Street	Minor Street		Major Street (Both Directions)	Minor Street (One Direction Only)	Major Street (Both Directions)	Minor Street (One Direction Only)	
Intersection # 6: Fairfax Pike and Site Entrance #1/Lake Frederick Entrance	Future with Development (2035)	1	2 or more	70% Thresholds			23,913	2,010	YES
				Condition A	5,600	2,240			
				Condition B	8,400	1,120			
				56% Threshold					
				Condition A	4,480	1,792			
				Condition B	6,720	896			
Intersection 9: Route 522 and Site Entrance #4	Future with Development (2035)	2 or more	2 or more	70% Thresholds			22,447	1,320	YES
				Condition A	6,720	2,240			
				Condition B	10,080	1,120			
				56% Threshold					
				Condition A	5,376	1,792			
				Condition B	8,064	896			

Per the Virginia MUTCD, the following are the requirements for a traffic signal to be warranted at an intersection:

- Either Condition A or Condition B for the 70% thresholds must be satisfied or;
- Both Condition A and Condition B for the 56% thresholds must be satisfied

As shown in Table 19, the preliminary signal warrants based on the estimated ADTs for the intersection of Fairfax Pike and Site Entrance #1/Lake Frederick Entrance, and Route 522 and Site Entrance #4 are satisfied under the Future with Development (2035) conditions. Please note that this analysis is a preliminary signal warrant analysis. A future, comprehensive Signal Justification Report would need to be submitted in accordance with VDOT guidelines to determine whether other signal warrants are satisfied and if signalization is warranted. Please also refer to the VJuST section in Appendix J, which provides a screening of other innovative intersection types at these two entrance locations.

Analysis of 2041 Future Conditions with Development (Planning Year)

This scenario analyzes the future with development conditions for the planning year 2041 (plus 6 years from build out). Consistent with VDOT Chapter 870 guidelines a plus 6 year analysis provides information for regional planning purposes.

Site Description and Site Access

A description of the proposed development and the site access was provided in the earlier 2035 section of the report.

Projected Site Trip Generation

The trip generation for the site in the Planning Year conditions is consistent with the trip generation for the site in the build out year, as previously shown in Table 7.

Distribution and Assignment of Vehicular Site Traffic

The distribution and assignment of the vehicular site generated trips were based on the existing traffic patterns, engineering judgement, the nature of the proposed development, and with the input and agreeance from County and VDOT staff during the scoping. The site direction of approach was shown earlier in Figure 13. The site assignment for the peak hour trips was presented earlier in Figure 14.

Inherent Growth & Planned Background Development

As specified in the scoping document, an annual linear growth rate of 0.5% was applied to all major movements on Route 522 and Hudson Hollow Road, while a rate of 1% was applied on Fairfax Pike, Warrior Drive, White Oak Road, and Tasker Road. The inherent regional growth volumes (for the period between 2026 and 2041) are illustrated in Figure 18.

All planned background developments shown in 2035 were utilized for 2041. The total background development traffic was shown in Figure 9.

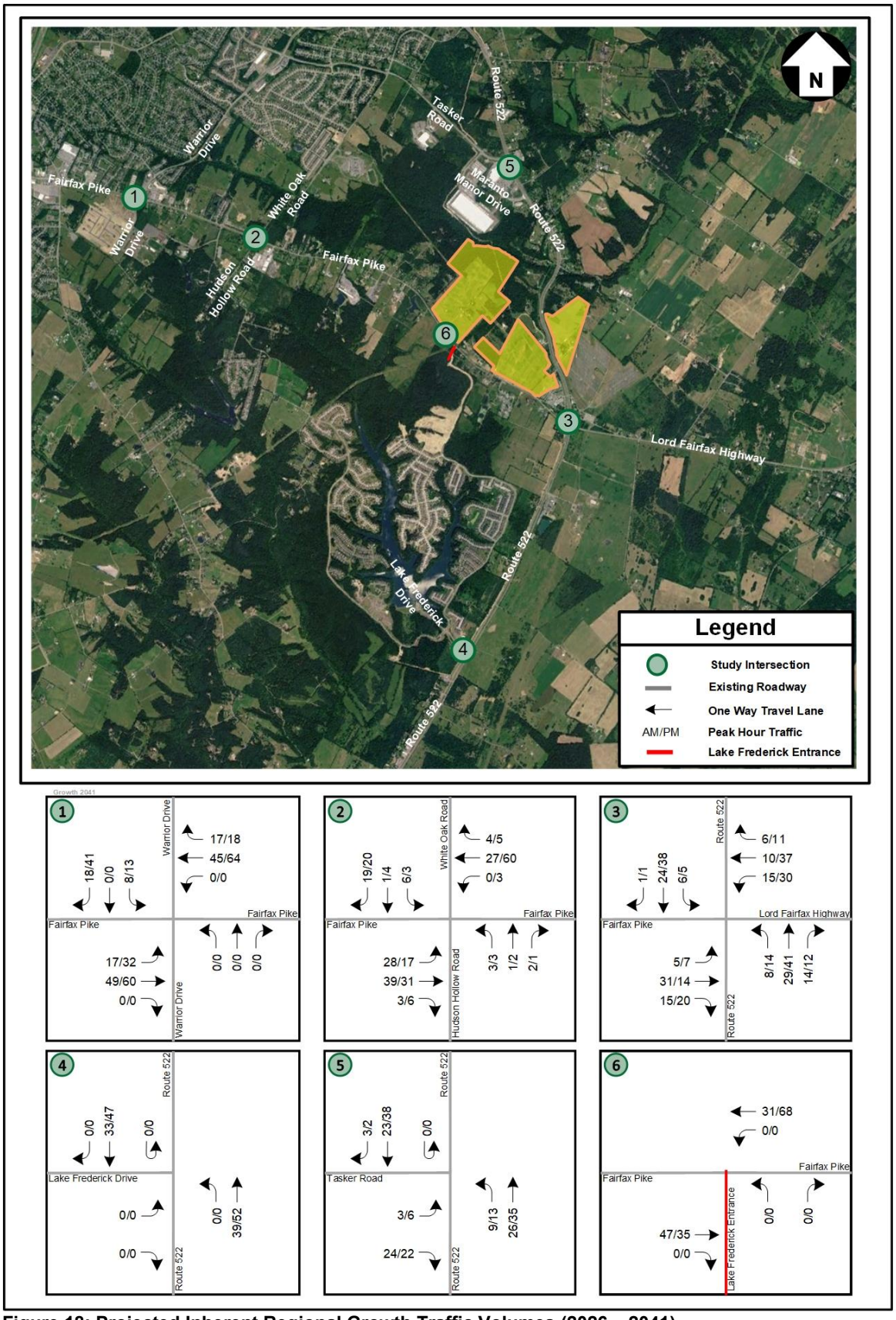

Figure 18: Projected Inherent Regional Growth Traffic Volumes (2026 – 2041)

Future with Development (2041) Traffic Volumes

The 2041 future with development traffic volumes were determined by adding the inherent growth (Figure 18) and planned background development volumes (Figure 9) as well as the assigned site generated traffic volumes (Figure 14) to the existing volumes (Figure 6). The 2041 Future Conditions with Development traffic volumes are depicted in Figure 19.

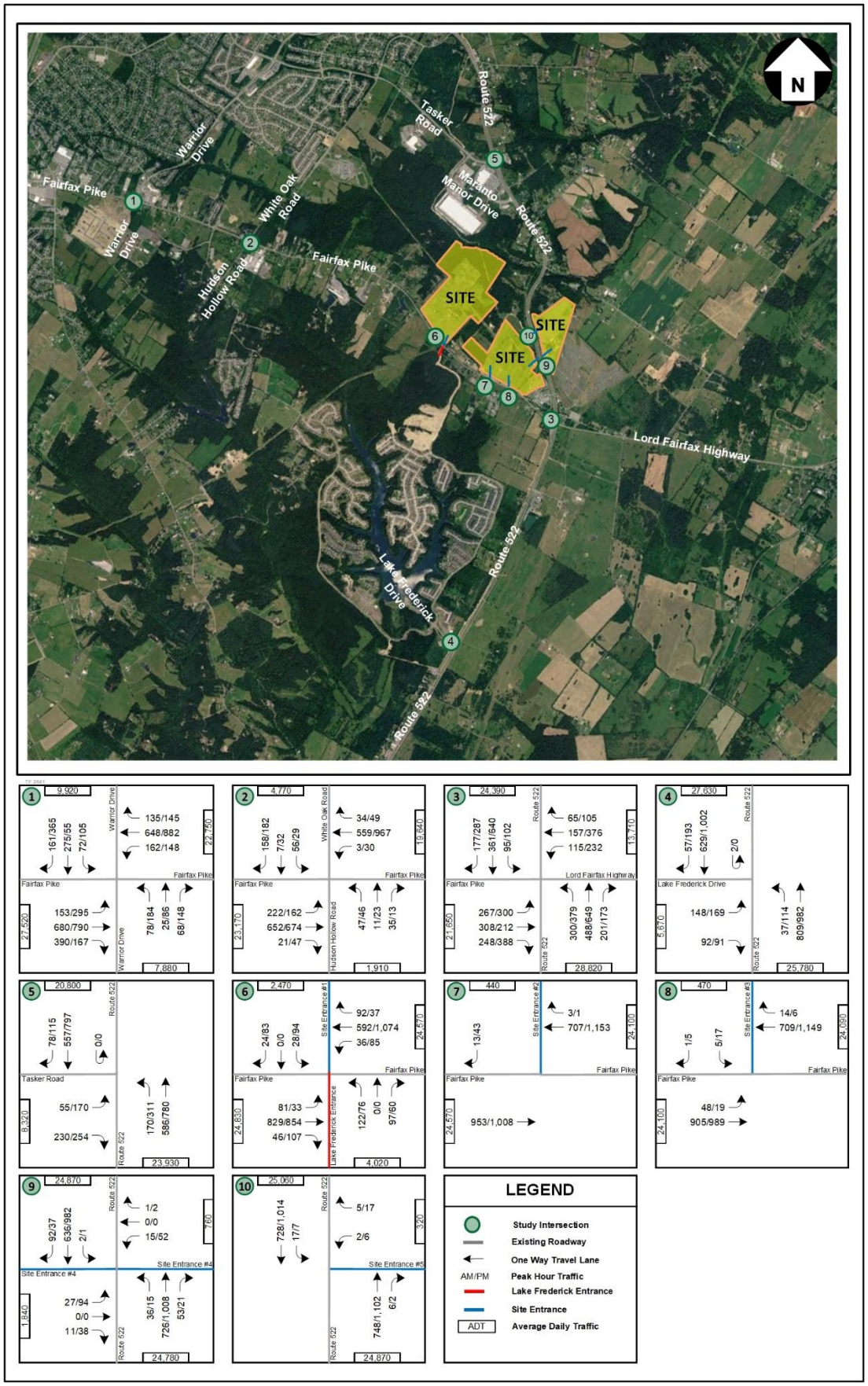

Figure 19: 2041 Future Conditions with Development (Design Year) – Vehicular Traffic Volumes

Future with Development Intersection Capacity and Queueing Analysis (2041)

Intersection capacity analyses were performed for the 2041 Future Conditions with Development scenario at the study area intersections during the AM and PM peak hours. *Synchro,* version 11, was used to analyze the study intersections with results based on the HCM 6th methodology[4] presented in the TRB's Highway Capacity Manual (HCM) and analysis guidelines provided by the County. The analysis herein includes level of service (LOS), delay, and queue length comparisons for the turning movements analyzed.

For the purposes of this analysis, the future peak hour factors (PHF) were based on the traffic counts, as applicable, and utilized on a by-intersection basis; PHF in the range of 0.92 to 1.00 were used for the future scenario, consistent with the scoping document. The heavy vehicle percentages (HV%) were the same as those used in the 2026 Existing Conditions and 2035 Future Conditions without Development scenario analyses.

The planned background and recommended due to site improvements outlined in the 2035 analysis year were carried forward for the 2041 analysis.

The results of the intersection capacity analyses from *Synchro* are presented in Table 20, Table 21, and Table 22 and graphically in Figure 20.

The 95th percentile queue lengths were also determined from *Synchro* and are expressed in feet.

The detailed analysis worksheets of the 2041 Future Conditions with Development are contained in Appendix I.

[4] It should be noted that HCM 2000 methodology was used in lieu of HCM 6th if the HCM 6th methodology was not applicable. HCM 6th could not be applicable in such cases as nonstandard National Electrical Manufacturers Association (NEMA) configurations, shared lane configurations, placement of loop detectors, U-turns, etc.

Table 20: 2041 Future Conditions with Development – Intersection Capacity and Queuing Analysis Results (Part 1)

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour				PM Peak Hour			
			LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3][4]	LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3][4]
			Synchro				Synchro			
1	**Warrior Drive (N/S) & Fairfax Pike (E/W) Overall Intersection (Signalized)**		**E**	**56.6**			**E**	**63.6**		
	Eastbound Approach		***C***	***24.6***			***D***	***49.1***		
	Eastbound Left	260	C	23.4	70	85	F	111.1	~206	#381
	Eastbound Thru		C	30.6	592	772	C	30.9	591	#860
	Eastbound Right	500	B	13	157	243	A	7.9	0	56
	Westbound Approach		***C***	***26.9***			***E***	***76.9***		
	Westbound Left	270	C	26.3	56	#110	C	22.5	66	#183
	Westbound Thru		C	28.6	494	#784	F	91	~834	#1078
	Westbound Right	575	B	12.4	0	26	B	12.6	0	26
	Northbound Approach		***D***	***52***			***E***	***77.5***		
	Northbound Left	190	D	52.9	58	#127	D	46.8	120	#200
	Northbound Thru/Right		D	49.8	21	#91	F	109.1	~183	#351
	Southbound Approach		***F***	***228***			***E***	***58.5***		
	Southbound Left	150	D	48.2	51	95	D	43.8	65	115
	Southbound Thru		F	292.5	~346	#530	D	47.7	40	83
	Southbound Right		D	45.8	0	56	E	65.8	200	#345
2	**Hudson Hollow Road/White Oak Road & Fairfax Pike (E/W) Overall Intersection (Signalized)**		**B**	**14.9**			**C**	**23.7**		
	Eastbound Approach		***B***	***12.7***			***B***	***12.8***		
	Eastbound Left	145	B	12.9	28	76	C	21.7	19	#129
	Eastbound Thru		B	12.8	147	#517	B	11	131	401
	Eastbound Right	90	A	5.9	0	0	A	5.7	0	8
	Westbound Approach		***B***	***16***			***C***	***31.9***		
	Westbound Left	125	A	8.5	0	3	A	7.2	3	12
	Westbound Thru		B	16.2	178	368	C	33.4	396	#770
	Westbound Right	155	A	8.4	0	3	A	6.8	0	8
	Northbound Approach		***C***	***21.6***			***C***	***28.8***		
	Northbound Left/Thru/Right		C	21.6	23	72	C	28.8	31	77
	Southbound Approach		***C***	***22.9***			***C***	***29.6***		
	Southbound Left/Thru/Right		C	22.9	34	111	C	29.6	32	100
3	**Route 522 (N/S) & Fairfax Pike/Lord Fairfax Highway Overall Intersection (Signalized)**		**D**	**54.8**			**F**	**100.6**		
	Eastbound Approach		***F***	***81.8***			***F***	***109.1***		
	Eastbound Left	250	E	78.4	197	#371	F	170.9	~285	#462
	Eastbound Thru		F	89.7	231	#423	E	60.4	159	#287
	Eastbound Right	230	D	37.8	0	75	D	47.5	83	#261
	Westbound Approach		***D***	***54.4***			***F***	***128.9***		
	Westbound Left	500	D	44.1	79	135	D	41.3	161	251
	Westbound Thru/Right		E	60.1	152	235	F	171.9	~460	#671
	Northbound Approach		***D***	***45***			***F***	***107***		
	Northbound Left	565	E	60.2	116	#179	F	188.3	~190	#290
	Northbound Thru		D	36.6	186	250	E	62.2	~265	#394
	Northbound Right	250	C	30	0	46	C	34.5	0	24
	Southbound Approach		***D***	***36.5***			***E***	***57.5***		
	Southbound Left	125	E	69.7	64	#155	E	70.6	81	#162
	Southbound Thru		C	27.8	140	188	E	55.5	234	#386

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] ~: Volume exceeds capacity, queue is theoretically infinite.

[3] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

[4] m: 95th percentile volume and queues (reported from Synchro) are metered by upstream signal.

Table 21: 2041 Future Conditions with Development – Intersection Capacity and Queuing Analysis Results (Part 2)

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour				PM Peak Hour			
			LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3][4]	LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3][4]
			Synchro				Synchro			
4	**Route 522 (N/S) & Lake Frederick Drive (E)**									
	Overall Intersection (Signalized)		**B**	**17.7**			**C**	**22.5**		
	Eastbound Approach		***C***	***29.4***			***D***	***35.4***		
	Eastbound Left		C	31.1	70	155	D	38.8	105	182
	Eastbound Right		C	22.5	6	41	C	28	34	69
	Northbound Approach		***B***	***15***			***C***	***21.2***		
	Northbound Left	470	C	21	8	23	C	32.9	27	58
	Northbound Thru		B	14.7	118	284	B	19.8	164	256
	Southbound Approach		***B***	***17.9***			***C***	***20.8***		
	Southbound Thru		B	18	141	232	C	21.3	290	#456
	Southbound Right	295	B	13.1	0	25	B	13.7	0	46
5	**Route 522 (N/S) & Tasker Road (E)**									
	Overall Intersection (Signalized)		**B**	**19.5**			**C**	**24.4**		
	Eastbound Approach		***D***	***46.9***			***D***	***45.2***		
	Eastbound Left		D	49.5	39	78	D	51.8	120	184
	Eastbound Right	250	D	46.3	0	39	D	40.7	0	37
	Northbound Approach		***B***	***14.9***			***B***	***19.5***		
	Northbound Left	485	D	53.8	65	99	D	50.3	122	142
	Northbound Thru		A	3.6	26	102	A	7.2	130	77
	Southbound Approach		***B***	***12.8***			***C***	***20.7***		
	Southbound Thru		B	13.6	108	170	C	22.4	214	323
	Southbound Right	315	A	6.9	0	14	A	8.9	2	23
6	**Lake Frederick Entrance/Gibson Site Entrance 1 & Fairfax Pike (E/W)**									
	Overall Intersection (Signalized)		**B**	**11.1**			**B**	**10.9**		
	Eastbound Approach		***A***	***9.4***			***A***	***2.3***		
	Eastbound Left	150	A	4.9	5	m5	B	12	2	m3
	Eastbound Thru		B	10	84	534	A	2.1	108	180
	Eastbound Right	150	A	4.2	0	m0	A	0.1	0	m4
	Westbound Approach		***A***	***7.3***			***B***	***13.5***		
	Westbound Left	150	A	7.2	5	12	A	2.8	7	14
	Westbound Thru		A	7.6	189	268	B	14.6	445	#839
	Westbound Right	150	A	4.9	0	16	A	3.3	0	3
	Northbound Approach		***D***	***38.3***			***D***	***39.9***		
	Northbound Left		D	38.6	67	#136	D	40	45	#121
	Northbound Thru/Right		C	33.5	0	0	D	36.4	0	0
	Southbound Approach		***C***	***34.4***			***D***	***41.1***		
	Southbound Left	50	C	34.5	14	39	D	41.2	56	#151
	Southbound Thru/Right		C	33.3	0	0	D	36.4	0	0

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] ~: Volume exceeds capacity, queue is theoretically infinite.

[3] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

[4] m: 95th percentile volume and queues (reported from Synchro) are metered by upstream signal.

[5] INT 5 is analysed using HCM 2000

Table 22: 2041 Future Conditions with Development – Intersection Capacity and Queuing Analysis Results (Part 3)

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour				PM Peak Hour			
			LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3][4]	LOS	Delay (s)	50th % Queue (ft.) [2]	95th % Queue (ft.) [3][4]
			Synchro				Synchro			
7	**Fairfax Pike (S) & Gibson Site Entrance 2 (E/W) Overall Intersection (Unsignalized)**									
	Southbound Approach		***B***	***14.3***			***D***	***27***		
	Southbound Right		B	14.3		2.5	D	27		20
8	**Fairfax Pike (S) & Gibson Site Entrance 3 (E/W) Overall Intersection (Unsignalized)**									
	Eastbound Approach									
	Eastbound Left	150	A	9.6		5	B	11.8		2.5
	Southbound Approach		***E***	***49.6***			***F***	***140.8***		
	Southbound Left		F	56.7		5	F	175.5		42.5
	Southbound Right	50	B	14.1		0	C	22.6		2.5
9	**Route 522 (N/S) & Gibson Site Entrance 4 (E/W) Overall Intersection (Signalized)**		**A**	**4.5**			**B**	**11.9**		
	Eastbound Approach		***D***	***53.6***			***D***	***51.2***		
	Eastbound Left		D	53.6	20	49	D	51.3	69	120
	Eastbound Thru/Right		A	0	0	0	D	45.7	0	0
	Westbound Approach		***D***	***52.5***			***D***	***48.5***		
	Westbound Left		D	52.5	11	33	D	48.5	37	73
	Westbound Thru/Right		A	0	0	0	A	0	0	0
	Northbound Approach		***A***	***0.3***			***A***	***8.5***		
	Northbound Left	300	A	4.3	3	m3	A	7.1	1	m7
	Northbound Thru		A	0.2	2	m229	A	8.5	0	m293
	Northbound Right	150	A	0	0	m6	A	5.9	0	m0
	Southbound Approach		***A***	***6.4***			***A***	***9.8***		
	Southbound Left	300	A	4	0	m2	A	7	0	m1
	Southbound Thru		A	6.5	78	92	A	9.9	111	241
	Southbound Right	150	A	5.3	0	1	A	6.6	0	0
10	**Route 522 (N/S) & Gibson Site Entrance 5 (W) Overall Intersection (Unsignalized)**									
	Westbound Approach		***B***	***13***			***C***	***16.5***		
	Westbound Left		C	17.6		0	D	25.4		2.5
	Westbound Right	50	B	11.1		0	B	13.4		2.5
	Southbound Approach			***0.2***				***0.1***		
	Southbound Left	300	A	9.6		2.5	B	11.3		0

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] ~: Volume exceeds capacity, queue is theoretically infinite.

[3] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

[4] m: 95th percentile volume and queues (reported from Synchro) are metered by upstream signal.

The capacity analysis results shown in Table 20, Table 21 and Table 22 reveal that the planning year/plus 6 year analysis reveals similar results to the Future with Development 2035 analysis, the intersections with failing level of service continuing to have approaches that fail. All of the intersections operating acceptably under 2035 continue to operate acceptably under 2041 except the following changes:

- **Warrior Drive & Fairfax Pike (Intersection #1)**
  - Southbound approach operates at LOS E in PM peak.
- **Route 522 & Fairfax Pike/Lord Fairfax Highway (Intersection #3)**
  - Southbound approach operates at LOS E in PM peak.
  - Eastbound approach operates at LOS F in AM peak.

The Future Conditions with Development (2041) levels of service and lane configurations are summarized in Figure 20.

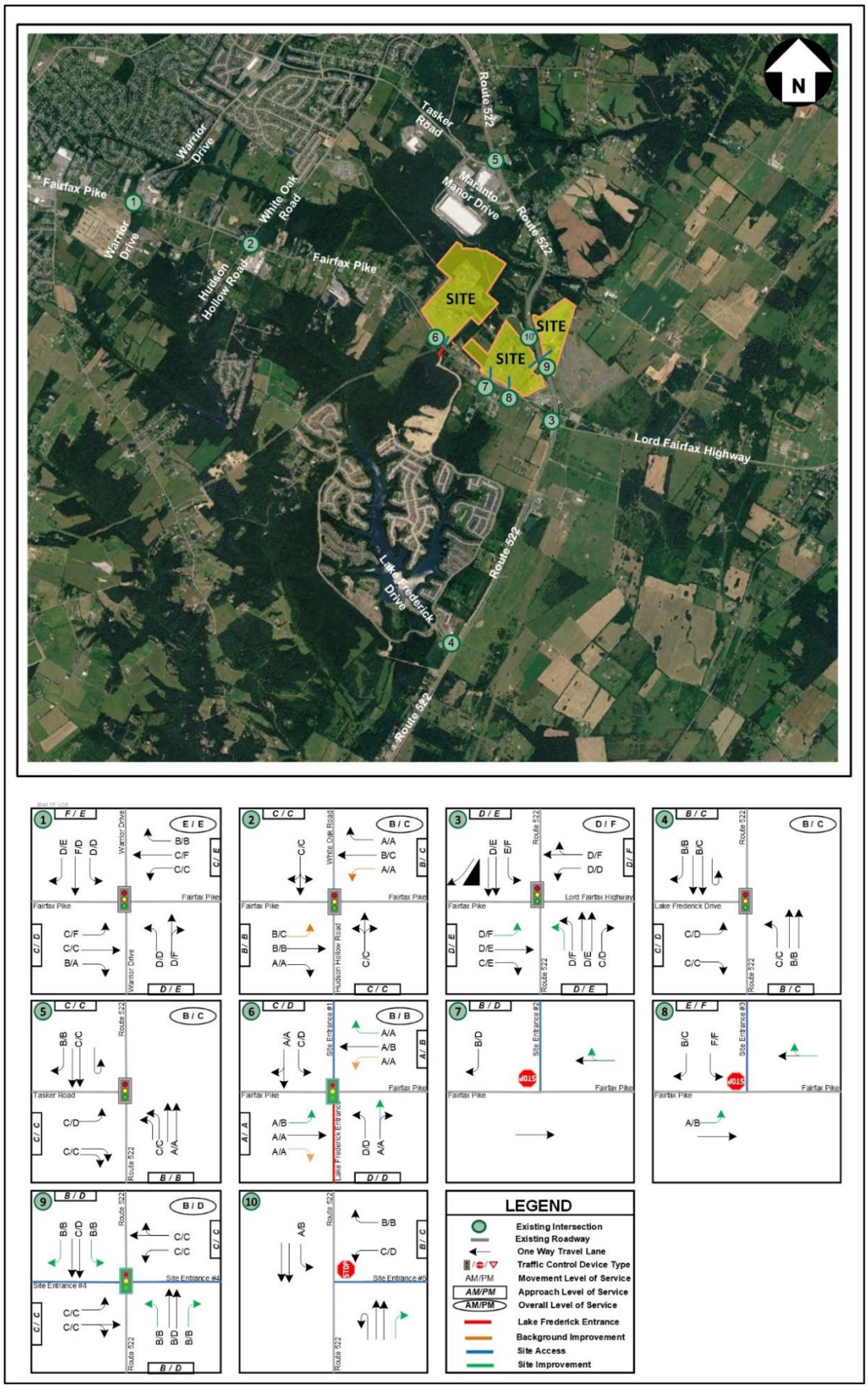

Figure 20: 2041 Future Conditions with Development (Planning Year) - Level of Service Results

Conclusion

The analysis presented in this report supports the following assumptions and findings:

- The following intersections were included for evaluation per the scoping document:
    1. Fairfax Pike at Warrior Drive
    2. Fairfax Pike at White Oak Road/Hudson Hollow Road
    3. Fairfax Pike/Lord Fairfax Highway at Route 522
    4. Route 522 at Lake Frederick Drive
    5. Route 522 at Tasker Road
    6. Site entrances on Fairfax Pike and on Route 522

    **See Supplemental Analysis summary below pertaining to the evaluation of the I-81/Fairfax Pike ramps.*

- **Existing Conditions (2026):**
    - All approaches operate at LOS D by approach except for the following:
        - **Fairfax Pike and Warrior Drive (Intersection #1):**
            - The overall intersection operates at LOS F (delay of 98.9 sec) in AM Peak
            - Northbound approach operates at LOS E in both AM and PM Peak
            - Southbound approach operates at LOS F (delay of 333.1 sec) in AM Peak
            - Eastbound left exceeds available storage length in PM peak.
            - It is noted that this intersection provides access to Sherando High School and the AM peak hour LOS deficiencies are primarily attributed to the higher volumes processed during the school peak arrival time.

- **Future without Development (2035):**
    - Future volumes were projected by applying regional growth to the regional roads and incorporation of six planned background developments including:
        - Madison 277
        - Lake Frederick (remaining build out)
        - Sherando Green
        - Fairfax Downs
        - Enclave at Tasker Residential
        - Eastgate Commercial
    - The following planned transportation improvements was incorporated in the study:
        - Construction of exclusive left turn lanes on the eastbound and westbound approaches at the intersection of Fairfax Pike and White Oak Road/Hudson Hallow Road (study Intersection #2)
        - Improvements at Route 277 (Fairfax Pike) at Warrior Drive (VDOT SMART SCALE project) to extend the eastbound right turn lane by another 200 feet with 200 foot taper

- Under Future without Development (2035), the following intersections have approaches that operate below acceptable level of service:
  - **Warrior Drive & Fairfax Pike (Intersection #1)**
    - The overall intersection operates at LOS F (delay of 88.6 sec) in AM peak, and operates at LOS E in PM peak
    - Westbound approach operates at LOS E in the AM and PM peak
    - Northbound approach operates at LOS F (delay of 99.9 sec) in PM peak
    - Southbound approach operates at LOS F (delay of 312.3 sec) in AM peak
    - Westbound left exceeds available storage length on both AM and PM peaks, while eastbound left and northbound left exceed available storage length in PM peak only. It is noted the eastbound and westbound lefts have protected only phasing.
    - It is noted that this intersection provides access to Sherando High School as well as significant background traffic projected from Sherando Green retail and Fairfax Downs residential developments adjacent to the intersection. There are no known improvements planned as part of those developments to this intersection.
  - **Route 522 & Fairfax Pike/Lord Fairfax Highway (Intersection #3)**
    - Overall intersection operates at LOS F in the AM (delay of 108.6 sec) and PM (delay of 161.1 sec) peak hours
    - Eastbound approach operates at LOS F in the AM (delay of 249.9 sec) and PM peak (delay of 293.3 sec)
    - Westbound approach operates at LOS F (delay of 124.4 sec) in PM peak.
    - Northbound approach operates at LOS F (delay of 174.5 sec) in PM peak
    - Southbound approach operates at LOS E in PM peak
    - Northbound left exceeds available storage length in PM peak, while southbound left exceeds on both AM and PM peaks.
  - **Fairfax Pike and Lake Frederick Entrance (Intersection #6)**
    - Northbound approach operates at LOS F during both the AM (delay of 89.8 sec) and PM (delay of 295.5 sec) peak hours.

- **Future with Development (2035):**
  - Under Future with Development (2035), the following intersections have approaches that operate below acceptable level of service:
    - **Warrior Drive & Fairfax Pike (Intersection #1)**
      - Overall intersection operates at LOS F (delay of 86 sec) in AM peak and LOS E in PM peak
      - Westbound approach operates at LOS E in the AM peak and LOS F (delay of 91.3 sec) in the PM peak
      - Northbound approach operates at LOS F (delay of 105.6 sec) in PM peak

- Southbound approach operates at LOS F (delay of 307.2 sec) in the AM peak
- Westbound left exceeds available storage length in both AM and PM peaks, while eastbound left and northbound left exceed available storage length in PM peak only. It is noted the eastbound and westbound lefts have protected only phasing.
- This intersection fails due to existing and background volumes and is not caused by the proposed development. The intersection is projected to process significant additional traffic from nearby planned background developments of Sherando Green retail and Fairfax Downs residential. There are no known improvements planned as part of those developments to this intersection.
- **Mitigation: Left turn phasing change from "protected only" to "flashing yellow arrow" on eastbound and westbound approaches are recommended to mitigate the site impacts on this intersection and improve the delay and queuing at the intersection.** With the above improvement in place, the eastbound and westbound left turn movements have significant reduction in delay and queuing. **While the northbound approach remains at LOS F in the AM peak and the westbound approach and northbound approach operates at LOS E in the PM peak, the conditions are improved to be better than Future Conditions without Development (non-degradation).**

▪ **<u>Route 522 & Fairfax Pike/Lord Fairfax Highway (Intersection #3)</u>**

- Overall intersection operates at LOS F in the AM (delay of 147.2 sec) and PM peak (delay of 189.8 sec).
- Eastbound approach operates at LOS F in the AM (delay of 311.3) and PM peak (delay of 331.2 sec).
- Westbound approach operates at LOS F (delay of 139.8 sec) in the PM peak.
- Northbound approach operates at LOS F in the AM (delay of 111.7 sec) and PM peak (delay of 207.7 sec).
- Southbound approach operates at LOS F (delay of 85.9 sec) in the PM peak.
- Northbound left and eastbound right exceeds available storage length in PM peak, while southbound left exceeds available storage length in both AM and PM peaks.
- This intersection fails under background projected conditions due to regional growth and planned background development traffic.
- **Mitigation: To mitigate site-related impacts, an exclusive eastbound left-turn lane and a second northbound left-turn lane are recommended.**
- With the above recommended improvements in place, the delay and queuing are significantly improved and notably all approaches operate at LOS D in the AM peak. The post-mitigated improvements show the following:
    - Overall intersection operates at LOS D in AM peak and LOS F (delay of 94.3 sec) in PM peak.
    - Eastbound approach operates at LOS E in AM peak and LOS F (delay of 107.6 sec) in PM peak.

- Westbound approach operates at LOS F (delay of 114.4 sec) and Northbound approach operates at LOS F (delay of 101.4 sec) in PM Peak.
- **While some approaches operate at LOS E or F in the PM peak hour only, the delay and queuing are significantly improved with the above improvements and conditions are improved to be better than Future without Development (non-degradation).**

▪ **Fairfax Pike and Lake Frederick Entrance/Site Entrance #1 (Intersection #6)**

- Northbound approach operates at LOS F during both AM (delay of 537.5 sec) and PM peak (delay of 1675.9 sec).
- Southbound approach operates at LOS F during both AM (delay of 150.5 sec) and PM peak (delay of 1551.2 sec).
- With a conventional traffic signal added at this location, the intersection operates at acceptable levels of service. Installation of a new traffic signal is subject to VDOT review and approval through a future Signal Justification Report ("SJR"). A preliminary signal warrant evaluation and VJuST analysis were performed as part of this study to screen potential intersection control configurations. A conventional traffic signal, thru-cut signal, roundabout, and two-way stop control were considered as possible intersection configurations. The ultimate configuration will be determined through the future SJR. It is noted that a roundabout is anticipated to require significant offsite right-of-way and was therefore not recommended for further consideration.

▪ **Fairfax Pike and Site Entrance #3 (Intersection #8)**

- Southbound approach of the site access operates at LOS E in the AM peak and LOS F (delay of 130.5 sec) in the PM peak. The failing level of service is due to high through volumes on Fairfax Pike and not a result of high volumes from the entrance (17 peak hour left turn trips). The queuing for the southbound approach is 40 feet, indicating only 2 stacked vehicles. Hence, no mitigations are recommended.

▪ **Route 522 and Site Entrance #4 (Intersection #9)**

- Eastbound approach and westbound approach operates at LOS E in the PM peak
- With a conventional traffic signal added at this location, the intersection would operate at acceptable levels of service with acceptable queuing along Route 522. Installation of a new traffic signal is subject to VDOT review and approval through a future Signal Justification Report ("SJR"). A preliminary signal warrant evaluation and VJuST analysis were performed as part of this study to screen potential intersection control configurations. A conventional traffic signal, unsignalized continuous green-T, unsignalized restricted crossing U-turn (RCUT), and two-way stop control were considered as possible intersection configurations. The ultimate configuration will be determined through the future SJR. It is noted that an RCUT would result in additional U-turn traffic downstream along Route 522 including truck traffic from the proposed industrial use. It is also noted that a continuous green-T would not meet spacing and acceleration distance requirements and was therefore not recommended for further consideration.

- **The other site entrances operate at acceptable levels of service.**

- **Future with Development (Planning Year 2041):**
    - The planning year/plus 6 year analysis reveals similar results to the Future with Development 2035 analysis, and the intersections with failing level of service continuing to have approaches that fail. All of the intersections operating acceptably under 2035 continue to operate acceptably under 2041. Hence, no additional mitigations are recommended for 2041.
- ***I-81 and Exit 307 (Fairfax Pike) Ramps**
    - As scoped with County and VDOT staff, a supplemental memo was provided separately, dated May 8, 2026, providing an evaluation of the projected traffic volumes at the I-81/Fairfax Pike ramp intersections and the projected volume from this proposed site. As discussed with VDOT staff, this evaluation is separate from the Traffic Impact Study and provided for informational purposes.
- **Conclusions**
    - This traffic impact study provides an evaluation of existing, future without development and future with development conditions at five regional intersections as well as the five site entrances. Two of the regional intersections have level of service or queuing deficiencies due to existing or background related traffic volumes. To mitigate site-related impacts, the following improvements are recommended: at Intersection 1, convert the eastbound and westbound left-turn phasing from protected-only to flashing yellow arrow operation; and at Intersection 3, add an exclusive eastbound left-turn lane and a second northbound left-turn lane. Proposed improvements at the site entrances include turn lanes where warranted and a traffic signal or other innovative intersection control, subject to future SJR, at the southern entrance on Route 522 and western entrance on Fairfax Pike.

Transportation Technical Appendix

Gibson Property

Frederick County, Virginia

GOROVE SLADE
Transportation Planners and Engineers

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A. Scoping Guidance

THIS IS A CHAPTER 870 STUDY

VDOT Virginia Department of Transportation	PRE-SCOPE OF WORK MEETING FORM Information on the Project Traffic Impact Analysis Base Assumptions

The applicant is responsible for entering the relevant information and submitting the form to VDOT and the locality no less than three (3) business days prior to the meeting. If a form is not received by this deadline, the scope of work meeting may be postponed.

Contact Information			
Consultant Name: Tele: E-mail:	Erin Steel, PE, Gorove Slade 703-787-9595 esteel@goroveslade.com		
Developer/Owner Name: Tele: E-mail:	Clark Tutwiler, Peterson Companies 703-633-2684 Ctutwiler@Petersoncos.com		
Project Information			
Project Name:	Gibson Property	Locality/County:	Frederick County
Project Location: (Attach regional and site specific location map)	The proposed development site is located northwest of the intersection of Route 522 and Fairfax Pike (Route 277)/Lord Fairfax Highway (Route 340), positioned north of Fairfax Pike and both east and west of Route 522. The site is identified by Tax Map #s 87-3-A, 87-3-B, and 87-A-16B in Frederick County, Virginia and totals approximately 283.32 acres.		
Submission Type	Comp Plan ☒	REZ/CUP ☒	Site Plan ☐ / Subd Plat ☐
Project Description: (Including details on the land use, acreage, phasing, access location, etc. Attach additional sheet if necessary)	The site is situated on three parcels that can be identified on the Frederick County Tax Map with the following Tax Map #s: 87-3-A, 87-3-B, and 87-A-16B. The property totals approximately 283.32 acres with a Long Range Land Use of Industrial, Mixed Use Industrial/Office, and Rural Area. The site is currently zoned as Rural Areas District (RA). The site is anticipated to include up to 3.2 million SF of Industrial uses with a build-out year of 2032. For the purposes of the TIA, the Industrial Park use (ITE Land Use 130) will be analyzed. Parcels 87-3-A and 87-A-16B are each currently occupied by one single-family detached house. Access to the site will be provided via the proposed entrances along Route 522 and Fairfax Pike.		
Proposed Use(s): (Check all that apply; attach additional pages as necessary)	Residential ☐ / Commercial ☐ / Mixed Use ☐ / Other ☒ **Other Use(s)** ITE LU Code(s): 130 Square Ft or Other Variable: 3.2 million SF		
Total Peak Hour Trip Projection:	Less than 100 ☐ / 100 – 499 ☐ / 500 – 999 ☒ / 1,000 or more ☐		

Traffic Impact Analysis Assumptions					
Study Period	Existing Year: 2026		Build-out Year: 2035		Design Year: 2041
Study Area Boundaries (Attach map)	North: Tasker Road			South: Lake Frederick Drive	
	West: Warrior Drive			East: Route 522	
External Factors That Could Affect Project (Planned road improvements, other nearby developments)	New road connecting Route 522 and Fairfax Pike as shown on Eastern Frederick County Road Plan (not funded – assumed to be constructed after the horizon year).				
Consistency With Comprehensive Plan (Land use, transportation plan)	The proposed development west of Route 522 is consistent with the Eastern Frederick Land Use Plan. A Comprehensive Plan Amendment is required for the parcel east of Route 522.				
Available Traffic Data (Historical, forecasts)	VDOT Historical AADT Data				
Trip Distribution **(Please refer to attached Figure 2)**	Road Name: Lord Fairfax Highway (to/from the East) – 10%			Road Name: Fairfax Pike (to/from the West) – 35%	
	Road Name: Route 522 (to/from the North) – 25%			Road Name: Route 522 (to/from the South) – 30%	
Annual Vehicle Trip Growth Rate: (See Note 4)	0.5% (linear growth) on Route 522 and Hudson Hollow Road 1% (linear growth) on Fairfax Pike, Warrior Drive, White Oak Road, and Tasker Road	Peak Period for Study (check all that apply)		☒ AM ☒ PM ☐ SAT	
		Peak Hour of the Adj. (to be used in study)		AM: 574/ PM: 626 / Daily: 7,336	
Study Intersections and/or Road Segments (Attach additional sheets as necessary) **(Please refer to attached Figure 1)**	1.	Fairfax Pike at Warrior Drive		6.	All site entrances on Route 522 and Fairfax Pike
	2.	Fairfax Pike at White Oak Road/Hudson Hollow Road		7.	
	3.	Fairfax Pike/Lord Fairfax Highway at Route 522		8.	
	4.	Route 522 at Lake Frederick Drive		9.	
	5.	Route 522 at Tasker Road		10.	
Trip Adjustment Factors	Internal allowance Reduction: ☐ Yes ☒ No			Pass-by allowance Reduction: ☐ Yes ☒ No	
Software Methodology	☒ Synchro ☐ HCS (v.2000/+) ☐ SIDRA ☐ CORSIM ☐ Other				

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

Traffic Signal Proposed or Affected (Analysis software to be used, progression speed, cycle length)	Existing traffic signals that could be affected: 1. Fairfax Pike at Warrior Drive 2. Fairfax Pike at White Oak Road/Hudson Hollow Road 3. Fairfax Pike/Lord Fairfax Highway at Route 522 4. Route 522 at Lake Frederick Drive 5. Route 522 at Tasker Road 6. Route 522 at Maranto Manor Drive (Synchro network only) Analysis Software: Synchro Version 11 Results: HCM 6 Methodology (See Note 9) Queue Lengths to be Reported: 95th Percentile
Improvement(s) Assumed or to be Considered	• Improvements associated with approved background developments • Improvements at Route 277 (Fairfax Pike) at Warrior Drive (VDOT SMART SCALE project)
Background Traffic Studies Considered	• Madison Farms • Lake Frederick (Remaining Units) • Sherando Green • Fairfax Downs (Remaining Units) • Enclave at Tasker – Residential • Eastgate
Plan Submission	☐ Master Development Plan (MDP) ☒ Generalized Development Plan (GDP) ☐ Preliminary/Sketch Plan ☐ Other Plan type (Final Site, Subd. Plan)
Additional Issues to be Addressed	☒ Queuing analysis ☐ Actuation/Coordination ☐ Weaving analysis ☐ Merge analysis ☐ Bike/Ped Accommodations ☒ Intersection(s) ☐ TDM Measures ☐ Other (_____)

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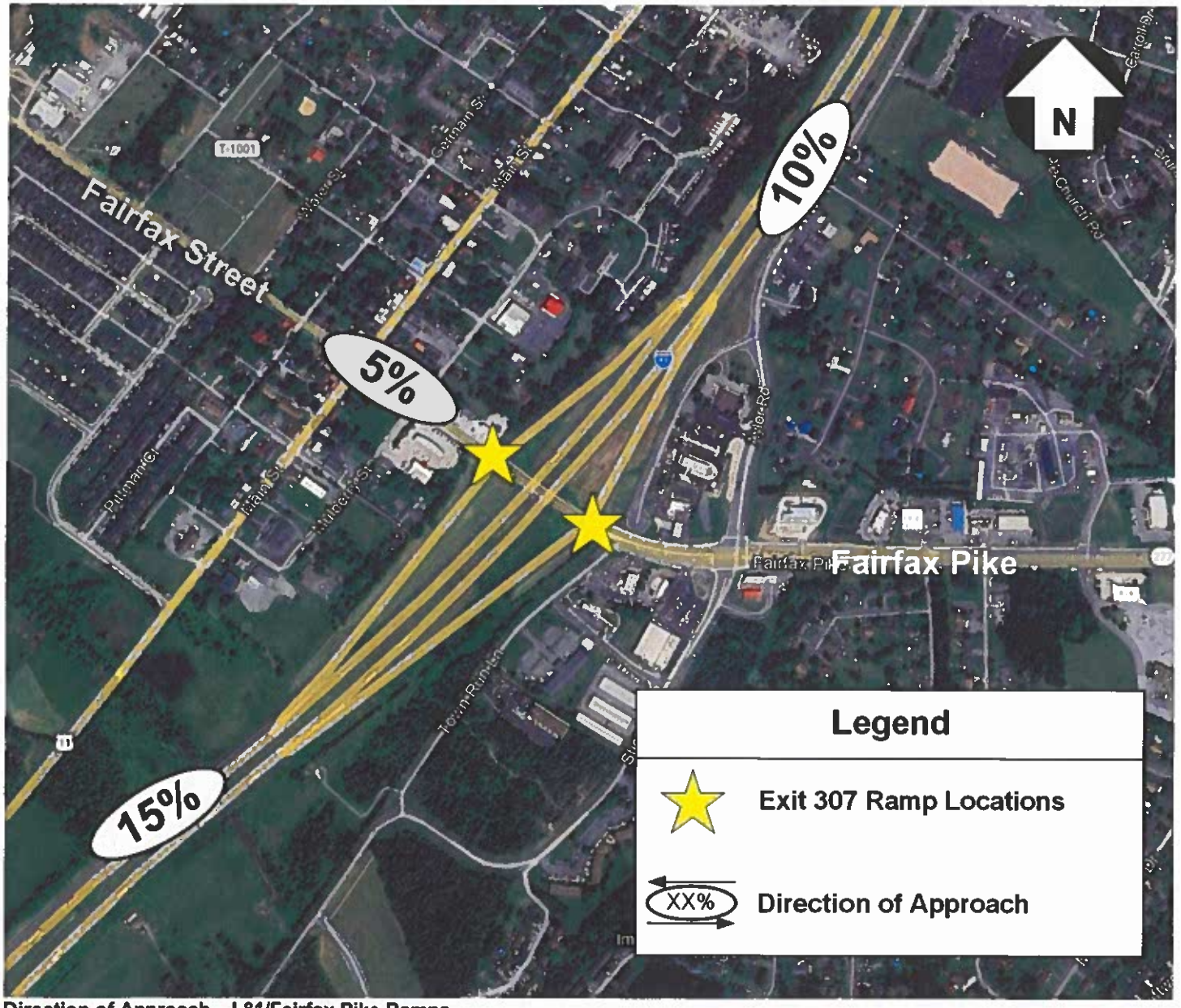
NOTES on ASSUMPTIONS:

1. Synchro files/signal timings will be obtained from VDOT.
2. The scenarios to be included in the study are 2026 Existing Conditions, 2035 Future without Development, 2035 Future with Development, 2041 Future without Development, and 2041 Future with Development. The study will analyze AM and PM peak hours for all above scenarios. The 2041 conditions will be for planning purposes only.
3. Existing turning movement counts will be collected at the study intersections.
4. A regional growth rate of 0.5% (linear growth) will be applied to the existing volumes of all major movements on Route 522 and Hudson Hollow Road, while a 1% (linear growth) will be applied to all major movements on Fairfax Pike, Warrior Drive, White Oak Road, and Tasker Road. The growth volumes will be balanced along the road network where appropriate.
5. Existing peak hour factors will be based on the traffic counts and utilized on a by-intersection basis. Peak hours factors by intersection in the range of 0.85 to 1.00 will be used for existing scenario. Peak hour factors of 0.92 will be used for all future scenarios if the existing peak hour factor by intersection is less than 0.92, and for all new intersections.
6. Heavy vehicle percentages (HV%) will be based on existing counts. For any new intersection and at site entrances, the HV% will be based on a default *Synchro* value of 2.0% per movement on new approaches.
7. For any approach, a level of service (LOS) D or better would be considered as acceptable/desirable for traffic operations. Will show intersection, approach, and movement LOS.
8. 95th percentile queue lengths will be provided in addition to the capacity analyses. The queue lengths will be determined from *Synchro 11*.
9. HCM 6 methodology will be utilized in the capacity analyses where applicable; HCM 2000 methodology will be utilized if HCM 6 methodology is not applicable.
10. The direction of approach for primary site trips will be based on Figure 2.
11. Preliminary access management, turn lanes, and preliminary signal warrants will be assessed at the proposed site entrances, where appropriate. If a traffic signal is proposed at a site entrance, a Signal Justification Report (SJR) will be prepared and submitted to VDOT for approval as a separate document from the TIA. It is noted Route 522 is on the Arterial Preservation Network.
12. A narrative will be provided in the TIA explaining how the study intersections and directions of approach were determined.

13. A supplemental memorandum for the I-81/Fairfax Pike ramps (Exit 307) will be provided with the TIA submission for informational purposes. The memorandum will summarize existing traffic counts and projected growth based on VDOT's Pipeline Study ST-23-08 for the 2054 design year. It will also outline the study's recommendations and evaluate the proposed Gibson development's share of future interchange growth identified in that study. The direction of approach for Gibson site trips at the ramps will be based on the figure below.



Direction of Approach – I-81/Fairfax Pike Ramps

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

SIGNED: Erin B. Steel DATE: 04/28/2026
Applicant or Consultant

PRINT NAME: Erin Steel, PE
Applicant or Consultant

SIGNED: J Ryan Spielman DATE: 5-6-2026
VDOT Representative

PRINT NAME: J. Ryan Spielman
VDOT Representative

SIGNED: JOHN A. BISHOP DATE: 05/06/2026
Local Government Representative

PRINT NAME: John A. Bishop
Local Government Representative

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

Table 1: Historic Growth (Based on VDOT P4P Traffic Data)

Road Segment	From:	To:	Published VDOT AADT						Growth Rate				
			2019	2020	2021	2022	2023	2024	2019-2024	2020-2024	2021-2024	2022-2024	2023-2024
Fairfax Pike	Apprentice Lane	Double Tollgate Road	8,538	8,950	9,664	8,950	8,661	8,698	0.4%	-0.7%	-3.4%	-1.4%	0.4%
Lord Fairfax Highway	Double Tollgate Road	Featherbed Road	8,274	7,582	8,037	8,037	8,155	8,757	1.1%	3.7%	2.9%	4.4%	7.4%
Route 522	Lord Fairfax Highway	Highland Comers Road	13,479	15,485	16,720	15,485	13,325	13,383	-0.1%	-3.6%	-7.2%	-7.0%	0.4%

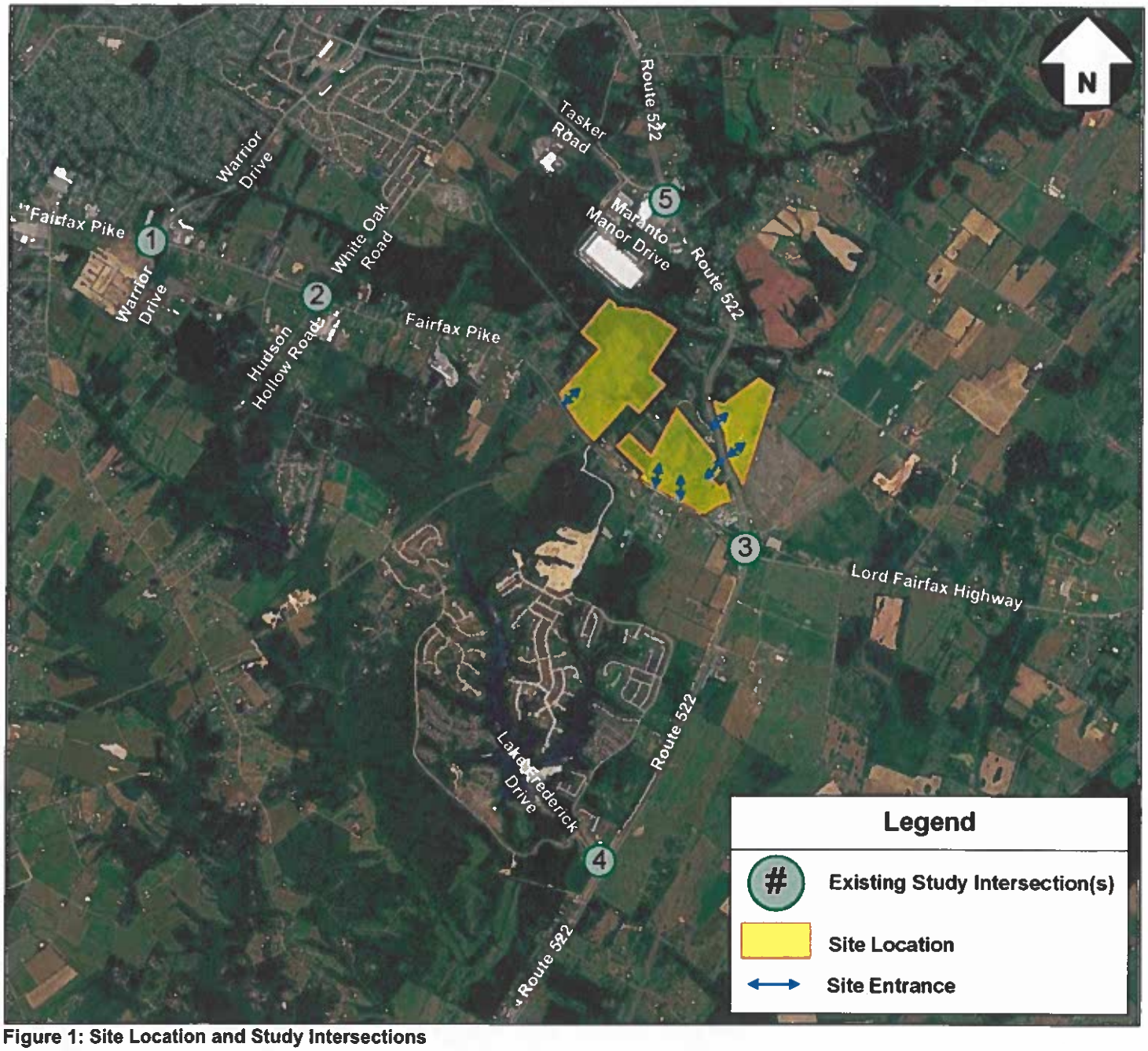


Figure 1: Site Location and Study Intersections

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

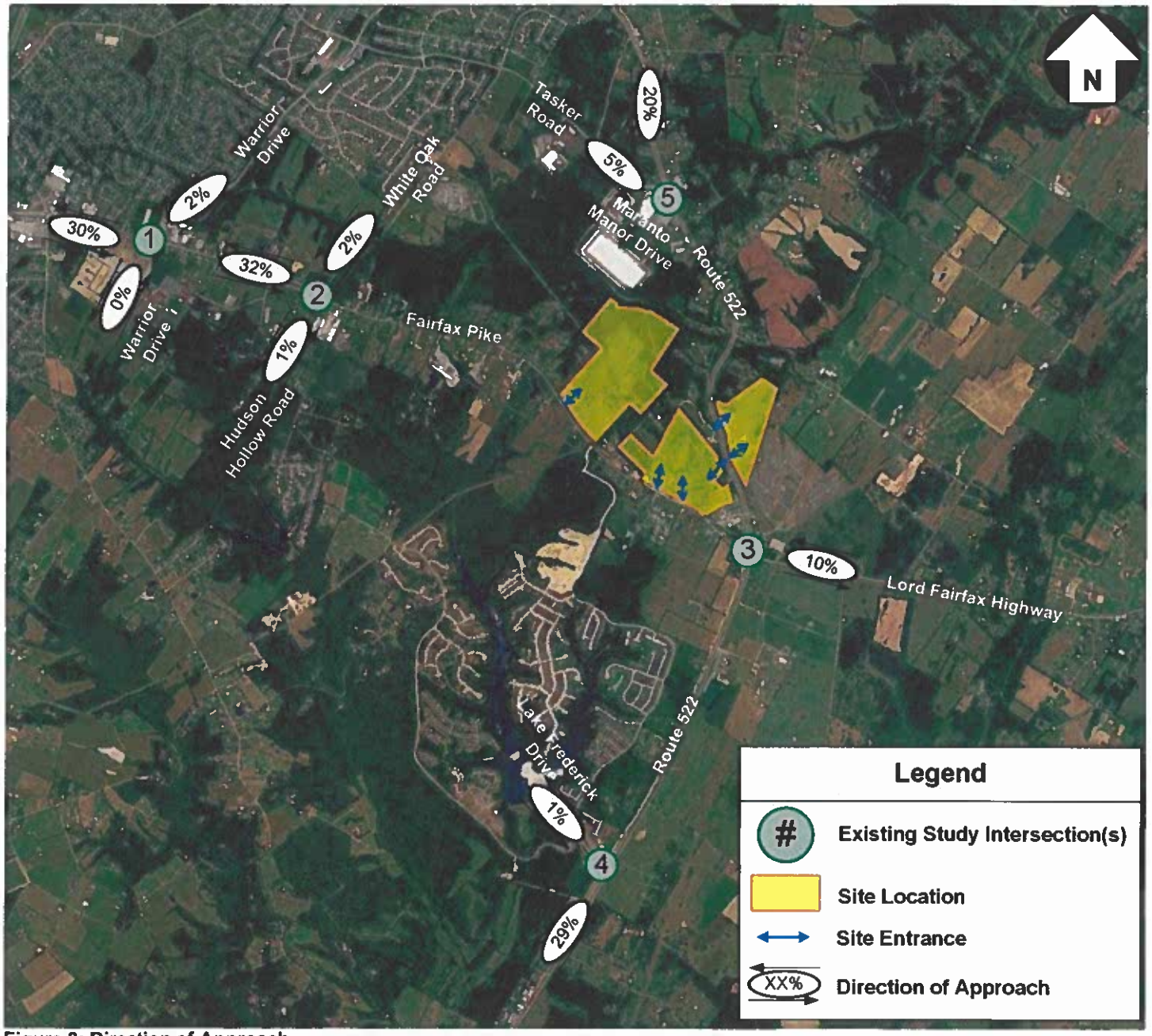


Figure 2: Direction of Approach

Table 2: ITE 12th Edition Trip Generation – Peak Hour of the Adjacent Street

	ITE Code	Size	Weekday AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily Total
Proposed Uses									
Industrial Park	130	3,200.0 kSF of GFA	442	132	574	175	451	626	7,336
Total			**442**	**132**	**574**	**175**	**451**	**626**	**7,336**

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

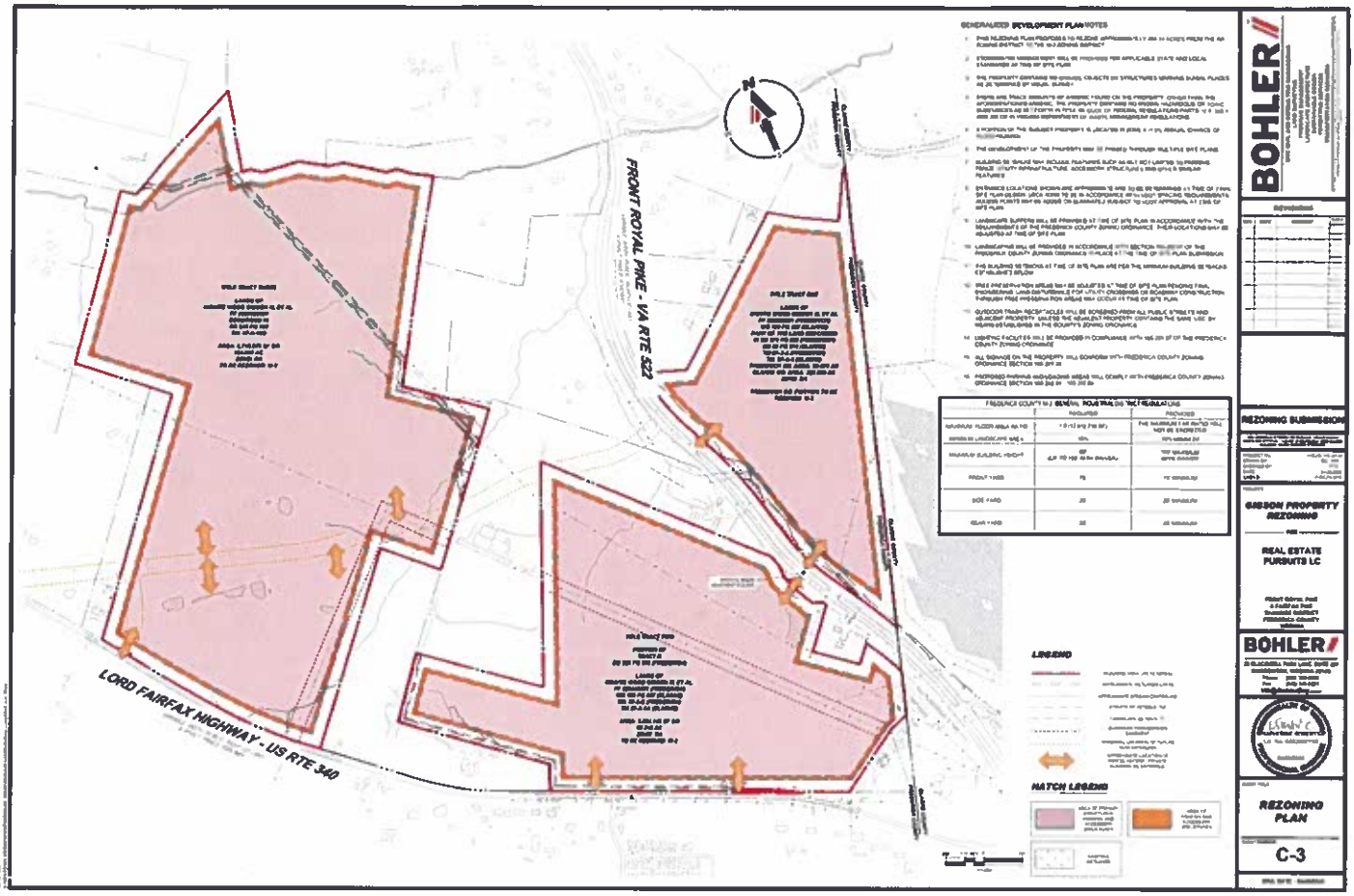


Figure 3: Rezoning Plan (For Information Purpose Only)

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

B. Turning Movement Counts Data

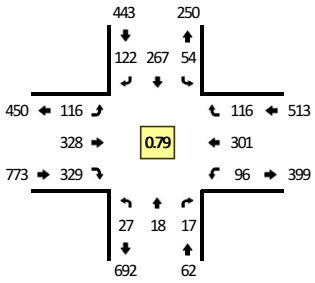
Type of peak hour being reported: User-Defined

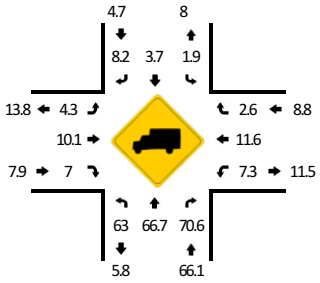
Method for determining peak hour: Total Entering Volume

LOCATION: Warrior Dr -- Fairfax Pike
CITY/STATE: Stephens City, VA

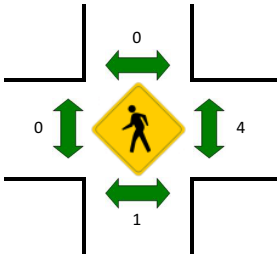
QC JOB #: 17563801
DATE: Thu, Apr 16 2026

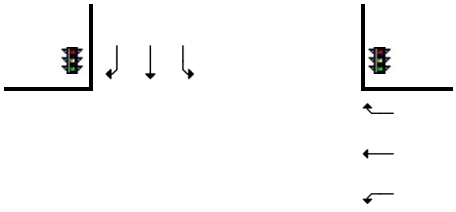
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

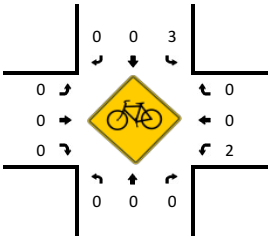


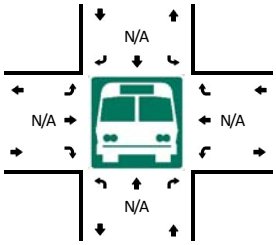


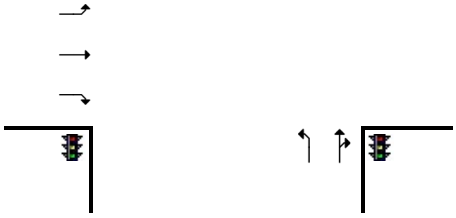
TRUE DATA TO IMPROVE MOBILITY

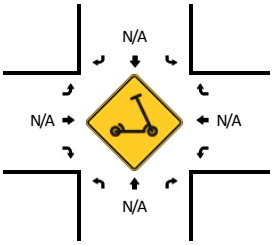












15-Min Count Period Beginning At	Warrior Dr (Northbound)				Warrior Dr (Southbound)				Fairfax Pike (Eastbound)				Fairfax Pike (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	0	1	1	0	16	2	17	0	11	48	1	0	0	18	7	0	122	
6:15 AM	0	1	0	0	12	4	17	0	9	64	4	0	0	28	3	0	142	
6:30 AM	1	1	0	0	14	8	16	0	14	63	5	0	0	32	6	0	160	
6:45 AM	3	4	0	0	23	25	26	0	23	60	16	0	4	25	6	0	215	639
7:00 AM	12	6	2	0	15	30	27	0	20	76	46	0	10	43	10	0	297	814
7:15 AM	11	6	10	0	14	77	34	0	22	62	102	0	21	49	34	0	442	1114
7:30 AM	2	4	3	0	11	108	31	0	18	101	121	0	46	88	32	0	565	1519
7:45 AM	2	2	2	0	14	52	30	0	56	89	60	0	19	121	40	0	487	1791
8:00 AM	9	1	0	0	14	5	43	0	31	61	13	0	0	59	10	0	246	1740
8:15 AM	4	1	3	0	16	3	32	0	25	71	11	0	0	50	6	0	222	1520
8:30 AM	3	1	1	0	19	3	32	0	32	77	6	0	0	47	12	0	233	1188
8:45 AM	2	2	0	0	13	2	51	0	42	58	4	0	0	63	8	0	245	946

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	8	16	12	0	44	432	124	0	72	404	484	0	184	352	128	0	2260
Heavy Trucks	8	12	8		4	8	8		8	32	8		4	32	4		136
Buses																	
Pedestrians		4				0				0				8			12
Bicycles	0	0	0		8	0	0		0	0	0		4	0	0		12
Scooters																	

Comments:

Report generated on 4/20/2026 11:07 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

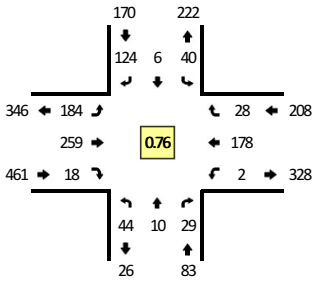
Type of peak hour being reported: User-Defined

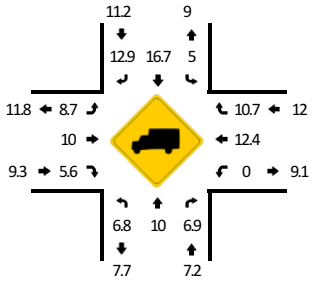
Method for determining peak hour: Total Entering Volume

LOCATION: White Oak Rd/Hudson Hollow Rd -- Fairfax Pike
CITY/STATE: Frederick, VA

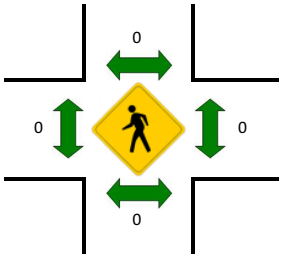
QC JOB #: 17547901
DATE: Thu, Apr 9 2026

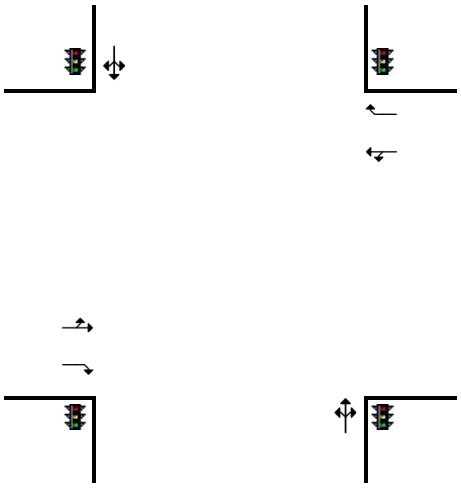
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

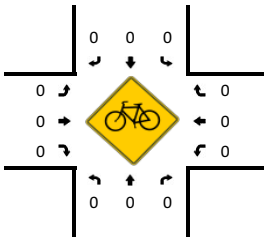


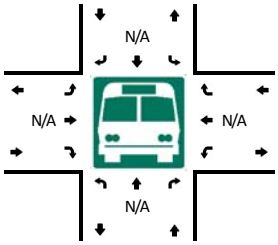


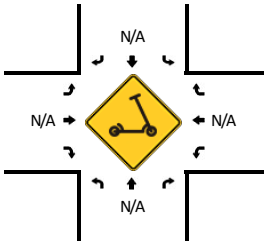
TRUE DATA TO IMPROVE MOBILITY











15-Min Count Period Beginning At	White Oak Rd/Hudson Hollow Rd (Northbound)				White Oak Rd/Hudson Hollow Rd (Southbound)				Fairfax Pike (Eastbound)				Fairfax Pike (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	1	2	10	0	3	3	0	0	5	61	1	0	0	6	1	0	93	
6:15 AM	8	4	2	0	5	1	3	0	6	63	1	0	0	19	2	0	114	
6:30 AM	7	3	13	0	3	1	2	0	4	67	1	0	1	28	1	0	131	
6:45 AM	7	4	7	0	7	0	2	0	14	60	3	0	1	29	0	0	134	472
7:00 AM	5	4	4	0	3	1	9	0	22	62	0	0	0	35	1	0	146	525
7:15 AM	11	1	13	0	9	0	10	0	43	70	0	0	0	46	6	0	209	620
7:30 AM	15	1	7	0	17	3	63	0	75	59	9	0	1	41	13	0	304	793
7:45 AM	13	4	5	0	11	2	42	0	44	68	9	0	1	56	8	0	263	922
8:00 AM	6	2	2	0	1	4	11	0	11	64	3	0	1	39	0	0	144	920
8:15 AM	14	4	8	0	4	2	7	0	12	50	4	0	0	38	3	0	146	857
8:30 AM	6	4	6	0	4	3	9	0	10	53	4	0	1	49	6	0	155	708
8:45 AM	11	3	4	0	3	3	6	0	13	57	7	0	1	45	2	0	155	600

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	60	4	28	0	68	12	252	0	300	236	36	0	4	164	52	0	1216
Heavy Trucks	0	0	4		0	4	24		32	36	4		0	16	8		128
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

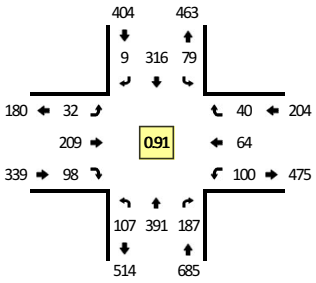
Report generated on 4/20/2026 11:03 AM

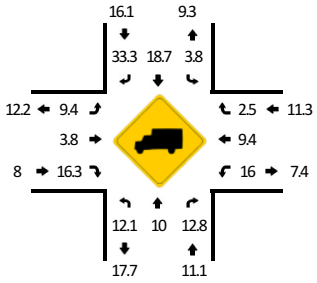
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

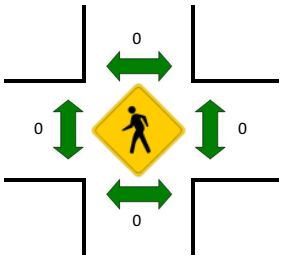
LOCATION: Rt 522 -- Fairfax Pike/Lord Fairfax Hwy | **QC JOB #:** 17547903
CITY/STATE: Clarke, VA | **DATE:** Thu, Apr 9 2026

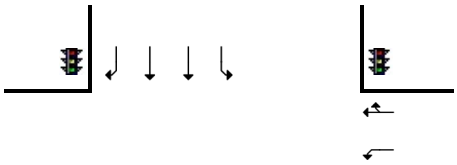
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

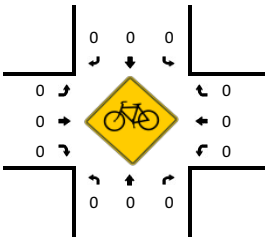


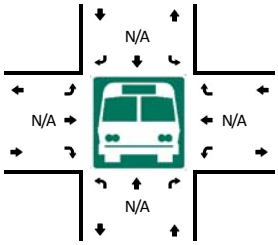


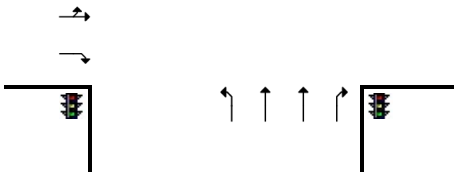
TRUE DATA TO IMPROVE MOBILITY

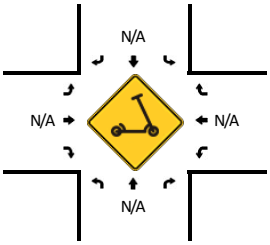












15-Min Count Period Beginning At	Rt 522 (Northbound)				Rt 522 (Southbound)				Fairfax Pike/Lord Fairfax Hwy (Eastbound)				Fairfax Pike/Lord Fairfax Hwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	7	53	29	0	22	59	2	0	1	44	22	0	10	2	5	0	256	
6:15 AM	7	49	26	0	19	77	1	0	3	52	30	0	11	9	1	0	285	
6:30 AM	15	54	39	0	14	91	1	0	6	67	30	0	18	13	6	0	354	
6:45 AM	13	76	27	0	19	80	1	0	3	56	22	0	21	18	8	0	344	1239
7:00 AM	24	88	56	0	18	89	3	0	10	53	15	0	11	9	7	0	383	1366
7:15 AM	21	82	42	0	22	76	1	0	7	57	23	0	24	21	7	0	383	1464
7:30 AM	27	122	49	0	19	73	3	0	12	55	30	0	33	16	9	0	448	1558
7:45 AM	35	99	40	0	20	78	2	0	3	44	30	0	32	18	17	0	418	1632
8:00 AM	11	77	48	0	15	86	1	0	5	39	31	0	30	20	14	0	377	1626
8:15 AM	22	84	30	0	24	84	3	0	6	38	34	0	41	24	7	0	397	1640
8:30 AM	23	107	34	0	18	72	0	0	7	43	22	0	30	21	10	0	387	1579
8:45 AM	27	97	39	0	14	77	2	1	4	27	32	0	23	19	11	0	373	1534

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	108	488	196	0	76	292	12	0	48	220	120	0	132	64	36	0	1792
Heavy Trucks	16	40	20		4	44	4		4	20	16		20	4	4		196
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 4/20/2026 11:03 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

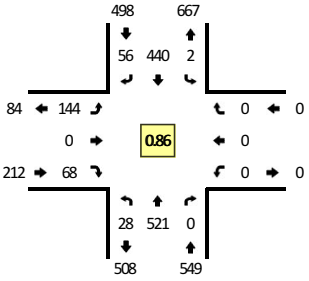
Type of peak hour being reported: User-Defined

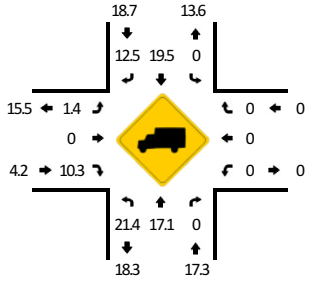
Method for determining peak hour: Total Entering Volume

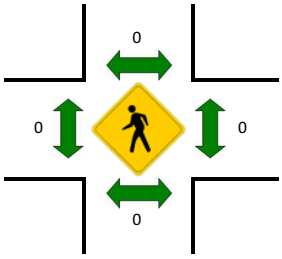
LOCATION: Rt 522 -- Lord Frederick Dr
CITY/STATE: Clarke, VA

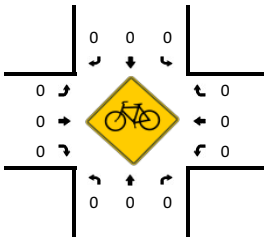
QC JOB #: 17547907
DATE: Thu, Apr 9 2026

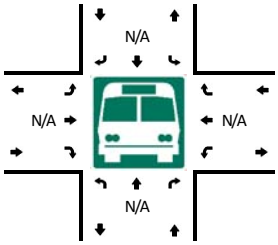
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

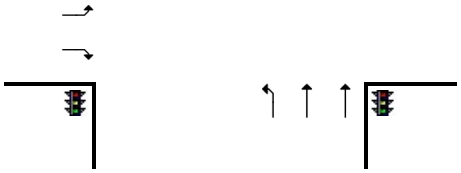


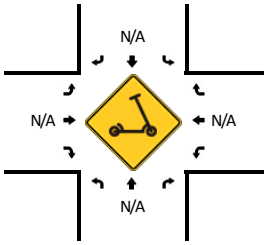












15-Min Count Period Beginning At	Rt 522 (Northbound)				Rt 522 (Southbound)				Lord Frederick Dr (Eastbound)				Lord Frederick Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	2	79	0	0	0	74	3	1	10	0	7	0	0	0	0	0	176	
6:15 AM	1	78	0	0	0	120	2	0	17	0	16	0	0	0	0	0	234	
6:30 AM	5	90	0	0	0	117	6	0	15	0	16	0	0	0	0	0	249	
6:45 AM	9	117	0	0	0	116	13	0	15	0	21	0	0	0	0	0	291	950
7:00 AM	4	124	0	0	0	91	17	1	22	0	14	0	0	0	0	0	273	1047
7:15 AM	6	124	0	0	0	113	9	0	32	0	19	0	0	0	0	0	303	1116
7:30 AM	7	158	0	0	0	121	9	0	49	0	21	0	0	0	0	0	365	1232
7:45 AM	11	115	0	0	0	115	21	1	41	0	14	0	0	0	0	0	318	1259
8:00 AM	11	117	0	1	0	112	32	0	23	0	13	0	0	0	0	0	309	1295
8:15 AM	20	111	0	0	0	125	30	0	29	0	17	0	0	0	0	0	332	1324
8:30 AM	18	99	0	0	0	106	20	0	60	0	12	0	0	0	0	0	315	1274
8:45 AM	12	104	0	0	0	116	25	0	43	0	25	0	0	0	0	0	325	1281

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	28	632	0	0	0	484	36	0	196	0	84	0	0	0	0	0	1460
Heavy Trucks	4	108	0		0	64	0		0	0	8		0	0	0		184
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 4/20/2026 11:03 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

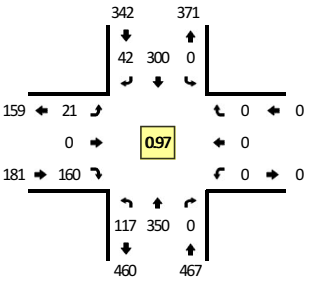
Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

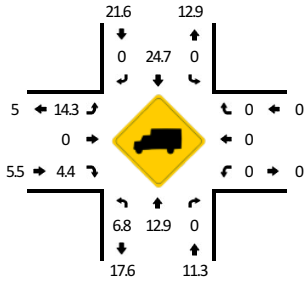
LOCATION: Rt. 522 -- Tasker Rd
CITY/STATE: Stephens City, VA

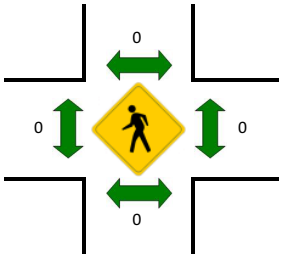
QC JOB #: 17563803
DATE: Thu, Apr 16 2026

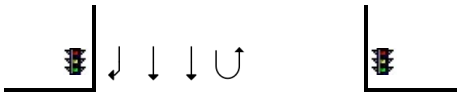
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

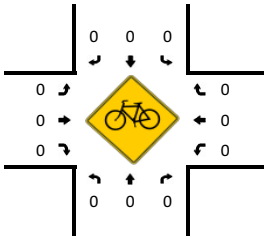


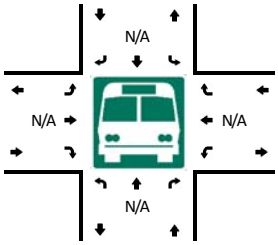
TRUE DATA TO IMPROVE MOBILITY

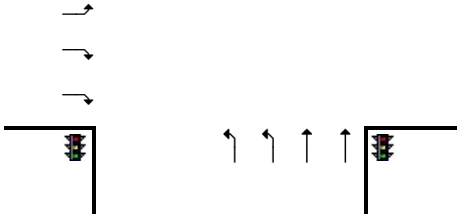


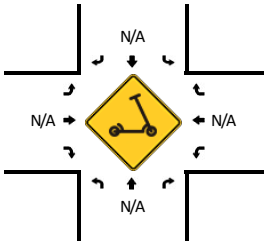












15-Min Count Period Beginning At	Rt. 522 (Northbound)				Rt. 522 (Southbound)				Tasker Rd (Eastbound)				Tasker Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:00 AM	17	40	0	0	0	58	7	0	2	0	40	0	0	0	0	0	164	
6:15 AM	14	53	0	0	0	84	5	0	2	0	34	0	0	0	0	0	192	
6:30 AM	16	64	0	0	0	67	12	0	2	0	42	0	0	0	0	0	203	
6:45 AM	20	68	0	0	0	72	10	0	3	0	29	0	0	0	0	0	202	761
7:00 AM	28	77	0	0	0	78	11	0	4	0	47	0	0	0	0	0	245	842
7:15 AM	24	87	0	0	0	84	13	0	4	0	38	0	0	0	0	0	250	900
7:30 AM	34	96	0	0	0	60	9	0	4	0	37	0	0	0	0	0	240	937
7:45 AM	31	90	0	0	0	78	9	0	9	0	38	0	0	0	0	0	255	990
8:00 AM	34	73	0	0	0	59	7	0	6	0	31	0	0	0	0	0	210	955
8:15 AM	32	58	0	0	0	61	5	0	8	0	26	0	0	0	0	0	190	895
8:30 AM	34	109	0	0	0	63	11	0	3	0	38	0	0	0	0	0	258	913
8:45 AM	22	99	0	0	0	68	9	0	5	0	30	0	0	0	0	0	233	891

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	124	360	0	0	0	312	36	0	36	0	152	0	0	0	0	0	1020
Heavy Trucks	8	56	0		0	72	0		4	0	16		0	0	0		156
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 4/20/2026 11:07 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

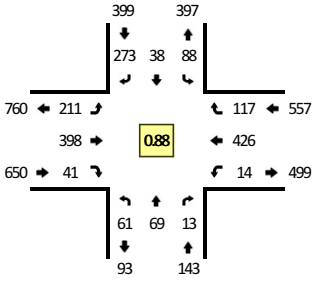
Type of peak hour being reported: User-Defined

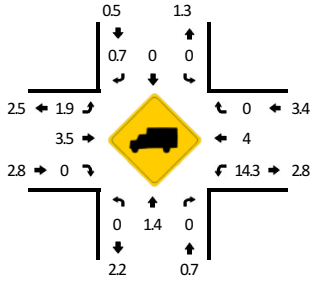
Method for determining peak hour: Total Entering Volume

LOCATION: Warrior Dr -- Fairfax Pike
CITY/STATE: Stephens City, VA

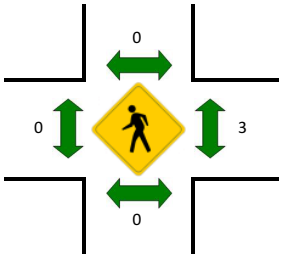
QC JOB #: 17563802
DATE: Thu, Apr 16 2026

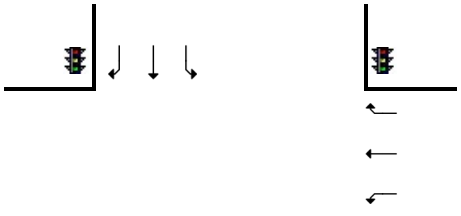
Peak-Hour: 4:15 PM -- 5:15 PM
Peak 15-Min: 5:00 PM -- 5:15 PM

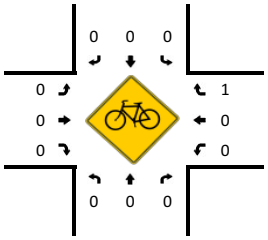


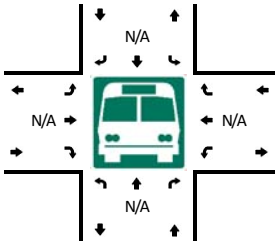


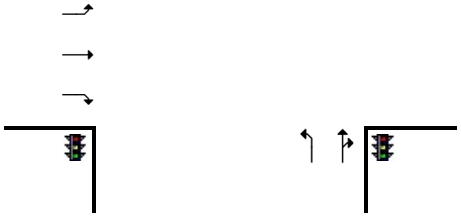
TRUE DATA TO IMPROVE MOBILITY

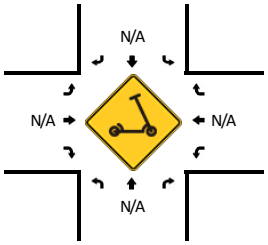












15-Min Count Period Beginning At	Warrior Dr (Northbound)				Warrior Dr (Southbound)				Fairfax Pike (Eastbound)				Fairfax Pike (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	9	9	3	0	13	9	77	0	44	98	3	0	9	102	24	0	400	
4:15 PM	13	19	3	0	16	9	60	0	57	108	8	0	2	102	22	0	419	
4:30 PM	16	16	1	0	14	9	67	0	36	93	13	0	6	123	25	0	419	
4:45 PM	12	10	3	0	26	10	61	0	53	100	12	0	4	94	30	0	415	1653
5:00 PM	20	24	6	0	32	10	85	0	65	97	8	0	2	107	40	0	496	1749
5:15 PM	8	4	2	0	26	7	77	0	44	91	9	0	4	99	27	0	398	1728
5:30 PM	2	2	2	0	25	10	58	0	52	101	20	0	0	66	31	0	369	1678
5:45 PM	1	1	0	0	24	12	60	0	55	96	28	0	3	96	27	0	403	1666
6:00 PM	8	10	2	0	29	12	53	0	53	70	12	0	6	81	38	0	374	1544
6:15 PM	11	8	2	0	32	1	68	0	55	74	1	0	2	85	32	0	371	1517
6:30 PM	1	1	0	0	20	4	57	0	41	69	0	0	2	86	25	0	306	1454
6:45 PM	4	1	1	0	18	2	55	0	38	55	1	0	0	86	31	0	292	1343

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	80	96	24	0	128	40	340	0	260	388	32	0	8	428	160	0	1984
Heavy Trucks	0	0	0		0	0	0		0	8	0		0	12	0		20
Buses																	
Pedestrians		0				0				0				4			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	4		4
Scooters																	

Comments:

Report generated on 4/20/2026 11:14 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

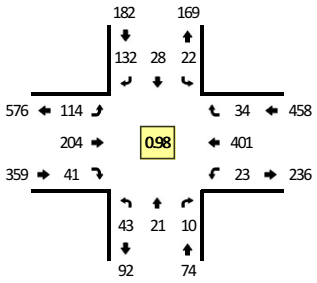
Type of peak hour being reported: User-Defined

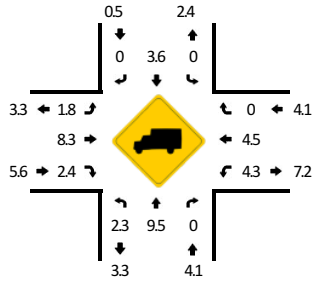
Method for determining peak hour: Total Entering Volume

LOCATION: White Oak Rd/Hudson Hollow Rd -- Fairfax Pike
CITY/STATE: Frederick, VA

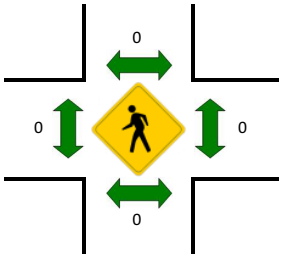
QC JOB #: 17547902
DATE: Thu, Apr 9 2026

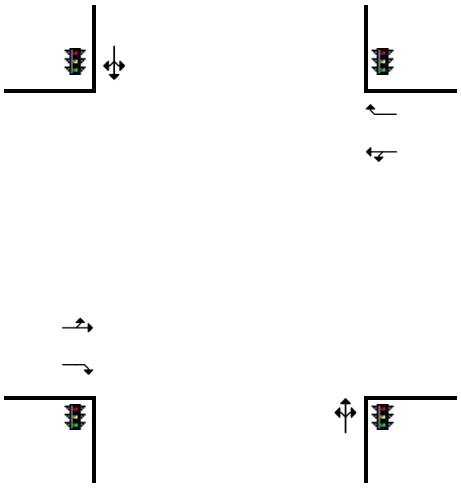
Peak-Hour: 4:15 PM -- 5:15 PM
Peak 15-Min: 4:15 PM -- 4:30 PM

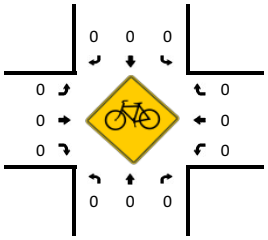


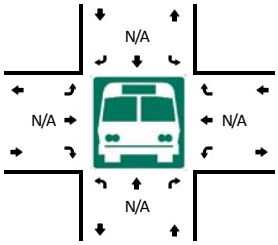


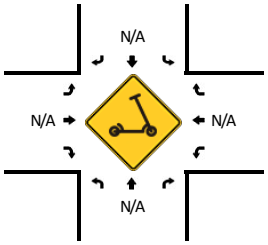
TRUE DATA TO IMPROVE MOBILITY











15-Min Count Period Beginning At	White Oak Rd/Hudson Hollow Rd (Northbound)				White Oak Rd/Hudson Hollow Rd (Southbound)				Fairfax Pike (Eastbound)				Fairfax Pike (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	10	7	0	0	6	8	23	0	24	53	12	0	7	106	15	0	271	
4:15 PM	16	8	6	0	7	11	23	0	31	49	11	0	3	97	12	0	274	
4:30 PM	8	4	1	0	5	6	51	0	27	61	6	0	6	83	12	0	270	
4:45 PM	7	4	2	0	7	5	21	0	35	48	7	0	5	118	6	0	265	1080
5:00 PM	12	5	1	0	3	6	37	0	21	46	17	0	9	103	4	0	264	1073
5:15 PM	10	4	2	0	5	6	20	0	22	50	9	0	8	102	7	0	245	1044
5:30 PM	6	8	2	0	5	13	20	0	13	55	11	0	6	116	3	0	258	1032
5:45 PM	9	6	2	0	4	10	23	0	20	43	12	0	2	88	6	0	225	992
6:00 PM	8	3	3	0	2	6	15	0	24	46	11	0	6	86	5	0	215	943
6:15 PM	10	2	0	0	3	7	17	0	22	43	5	0	6	76	8	0	199	897
6:30 PM	8	2	2	0	3	7	23	0	21	46	6	0	2	63	6	0	189	828
6:45 PM	5	1	1	0	3	6	21	0	15	42	12	0	2	61	3	0	172	775

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	64	32	24	0	28	44	92	0	124	196	44	0	12	388	48	0	1096
Heavy Trucks	0	4	0		0	0	0		4	28	4		4	24	0		68
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 4/20/2026 11:05 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

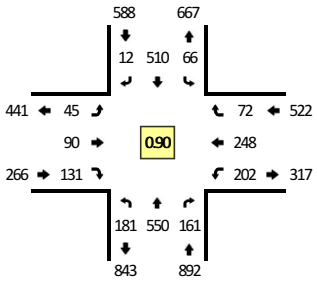
Type of peak hour being reported: User-Defined

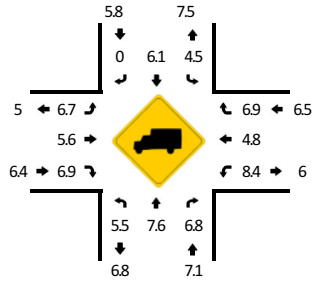
Method for determining peak hour: Total Entering Volume

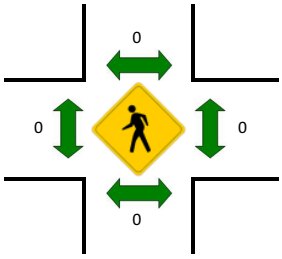
LOCATION: Rt 522 -- Fairfax Pike/Lord Fairfax Hwy
CITY/STATE: Clarke, VA

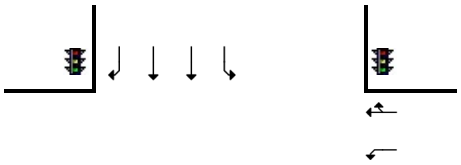
QC JOB #: 17547904
DATE: Thu, Apr 9 2026

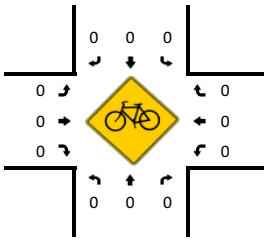
Peak-Hour: 4:15 PM -- 5:15 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

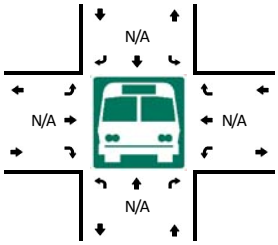


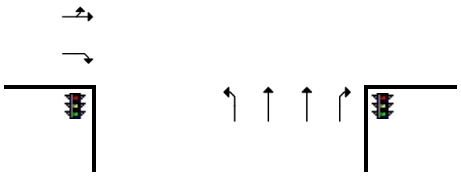


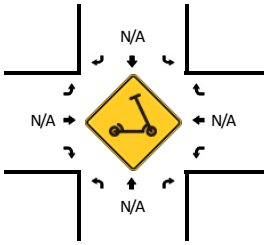












TRUE DATA TO IMPROVE MOBILITY

15-Min Count Period Beginning At	Rt 522 (Northbound)				Rt 522 (Southbound)				Fairfax Pike/Lord Fairfax Hwy (Eastbound)				Fairfax Pike/Lord Fairfax Hwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	40	118	38	2	13	118	3	0	12	20	33	0	61	62	17	0	537	
4:15 PM	45	168	46	0	16	126	0	0	15	16	25	0	53	63	16	0	589	
4:30 PM	44	164	46	0	18	130	6	0	13	30	41	0	58	59	18	0	627	
4:45 PM	43	115	36	0	15	116	3	0	12	23	32	0	48	61	15	0	519	2272
5:00 PM	49	103	33	0	17	138	3	0	5	21	33	0	43	65	23	0	533	2268
5:15 PM	36	112	42	0	13	121	2	0	10	16	35	0	44	71	25	0	527	2206
5:30 PM	47	117	32	0	14	115	3	1	11	19	28	0	31	75	19	0	512	2091
5:45 PM	27	111	39	0	17	108	1	0	8	26	32	0	53	65	17	0	504	2076
6:00 PM	33	117	33	0	16	73	2	0	11	20	19	0	43	57	12	0	436	1979
6:15 PM	32	83	15	0	9	76	5	0	4	21	21	0	34	47	20	0	367	1819
6:30 PM	25	76	19	0	4	65	0	0	9	13	17	0	27	42	18	0	315	1622
6:45 PM	23	66	17	0	8	80	4	0	8	27	17	0	32	41	13	0	336	1454

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	176	656	184	0	72	520	24	0	52	120	164	0	232	236	72	0	2508
Heavy Trucks	8	48	0		0	48	0		0	8	16		24	12	4		168
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 4/20/2026 11:05 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

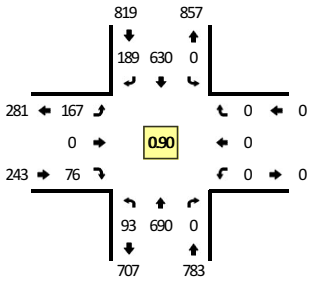
Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

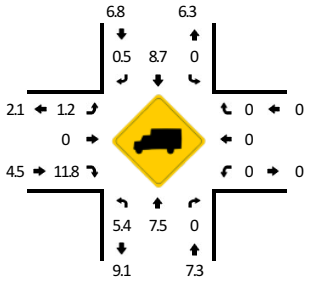
LOCATION: Rt 522 -- Lord Frederick Dr
CITY/STATE: Clarke, VA

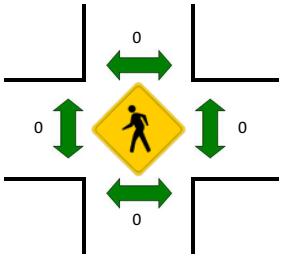
QC JOB #: 17547908
DATE: Thu, Apr 9 2026

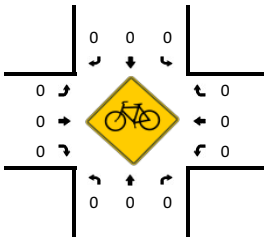
Peak-Hour: 4:15 PM -- 5:15 PM
Peak 15-Min: 4:15 PM -- 4:30 PM

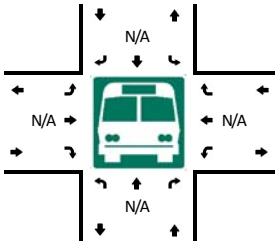


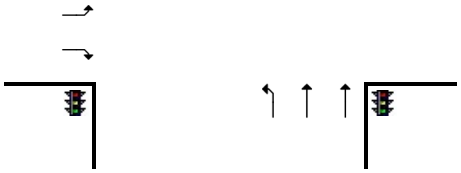
TRUE DATA TO IMPROVE MOBILITY

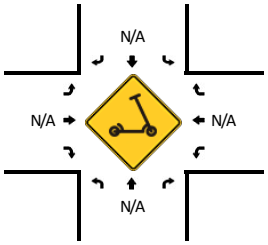












15-Min Count Period Beginning At	Rt 522 (Northbound)				Rt 522 (Southbound)				Lord Frederick Dr (Eastbound)				Lord Frederick Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	22	161	0	1	0	168	46	0	43	0	16	0	0	0	0	0	457	
4:15 PM	33	203	0	1	0	160	43	0	54	0	20	0	0	0	0	0	514	
4:30 PM	20	189	0	0	0	180	38	0	57	0	25	0	0	0	0	0	509	
4:45 PM	21	152	0	0	0	138	57	0	36	0	14	0	0	0	0	0	418	1898
5:00 PM	18	146	0	0	0	152	51	0	20	0	17	0	0	0	0	0	404	1845
5:15 PM	26	174	0	0	0	145	51	0	28	0	18	0	0	0	0	0	442	1773
5:30 PM	22	157	0	0	0	134	40	1	22	0	11	0	0	0	0	0	387	1651
5:45 PM	34	152	0	0	0	142	46	0	20	0	14	0	0	0	0	0	408	1641
6:00 PM	28	157	0	0	0	99	41	0	22	0	19	0	0	0	0	0	366	1603
6:15 PM	18	112	0	0	0	96	40	0	17	0	14	0	0	0	0	0	297	1458
6:30 PM	12	101	0	0	0	82	27	1	23	0	15	0	0	0	0	0	261	1332
6:45 PM	14	85	0	0	0	96	26	0	18	0	6	0	0	0	0	0	245	1169

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	132	812	0	4	0	640	172	0	216	0	80	0	0	0	0	0	2056
Heavy Trucks	8	60	0		0	60	4		0	0	8		0	0	0		140
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 4/20/2026 11:05 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

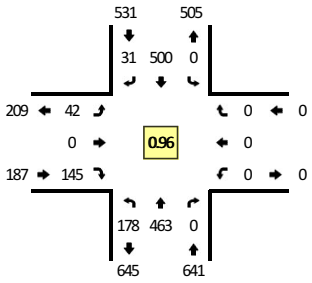
Type of peak hour being reported: User-Defined

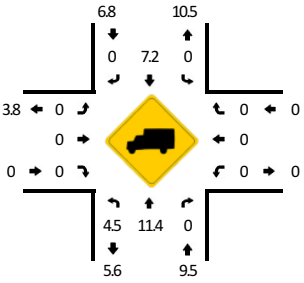
Method for determining peak hour: Total Entering Volume

LOCATION: Rt. 522 -- Tasker Rd
CITY/STATE: Stephens City, VA

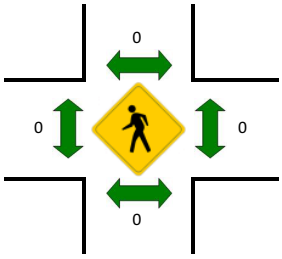
QC JOB #: 17563804
DATE: Thu, Apr 16 2026

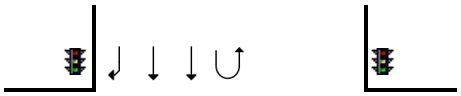
Peak-Hour: 4:15 PM -- 5:15 PM
Peak 15-Min: 5:00 PM -- 5:15 PM

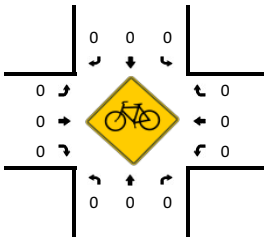


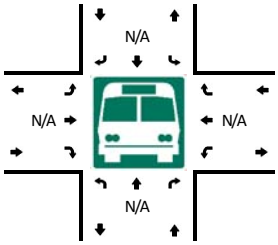


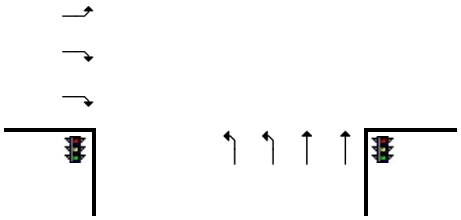
TRUE DATA TO IMPROVE MOBILITY

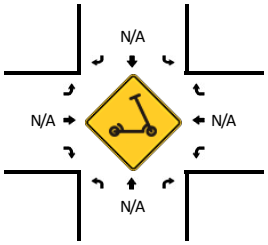












15-Min Count Period Beginning At	Rt. 522 (Northbound)				Rt. 522 (Southbound)				Tasker Rd (Eastbound)				Tasker Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	48	107	0	0	0	152	7	0	10	0	39	0	0	0	0	0	363	
4:15 PM	44	126	0	0	0	113	8	0	14	0	40	0	0	0	0	0	345	
4:30 PM	51	120	0	0	0	123	10	0	8	0	32	0	0	0	0	0	344	
4:45 PM	46	103	0	0	0	111	7	0	13	0	35	0	0	0	0	0	315	1367
5:00 PM	37	114	0	0	0	153	6	0	7	0	38	0	0	0	0	0	355	1359
5:15 PM	48	132	0	0	0	112	7	0	2	0	29	0	0	0	0	0	330	1344
5:30 PM	35	101	0	0	0	95	6	0	9	0	30	0	0	0	0	0	276	1276
5:45 PM	50	112	0	0	0	72	1	0	9	0	16	0	0	0	0	0	260	1221
6:00 PM	33	91	0	0	0	89	10	0	5	0	25	0	0	0	0	0	253	1119
6:15 PM	42	83	0	0	0	78	4	0	8	0	25	0	0	0	0	0	240	1029
6:30 PM	31	90	0	0	0	66	6	0	4	0	23	0	0	0	0	0	220	973
6:45 PM	29	59	0	0	0	95	3	0	1	0	17	0	0	0	0	0	204	917

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	148	456	0	0	0	612	24	0	28	0	152	0	0	0	0	0	1420
Heavy Trucks	16	48	0		0	48	0		0	0	0		0	0	0		112
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 4/20/2026 11:14 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

C. Crash Data

Crash Data in Study Intersection 1 (January 2021 to December 2025)									
Document Number	Date	Crash Severity	Collsion Type	Pedestrain Injury	Persons Injured	Fatalities	Work Zone Related	Adverse Weather Conditions	Distracted Driver
221825080	6/29/2022	O	1. Rear End	0	0	0		no	no
222145169	8/2/2022	O	2. Angle	0	0	0		no	no
223475140	12/13/2022	O	1. Rear End	0	0	0		no	no
222845560	10/9/2022	B	3. Head On	0	2	0		no	no
231955279	7/14/2023	O	1. Rear End	0	0	0		no	no
233415045	12/5/2023	O	1. Rear End	0	0	0		no	no
231325168	5/12/2023	O	1. Rear End	0	0	0		no	no
230365120	1/27/2023	O	1. Rear End	0	0	0		no	no
233395100	12/1/2023	O	1. Rear End	0	0	0		no	no
233405205	12/6/2023	O	1. Rear End	0	0	0		no	no
230695135	3/10/2023	O	1. Rear End	0	0	0		yes	no
231455194	5/23/2023	O	4. Sideswipe - Same Direction	0	0	0		no	no
233315291	11/26/2023	O	1. Rear End	0	0	0		no	no
240545361	2/22/2024	A	3. Head On	0	2	0		no	no
241545251	5/30/2024	O	1. Rear End	0	0	0		no	no
240985124	4/7/2024	O	9. Fixed Object - Off Road	0	0	0		no	no
242855190	10/11/2024	O	1. Rear End	0	0	0		no	no
250285256	1/27/2025	O	1. Rear End	0	0	0		no	no
250855169	3/25/2025	O	1. Rear End	0	0	0		no	no

Crash Data in Study Intersection 2 (January 2021 to December 2025)									
Document Number	Date	Crash Severity	Collsion Type	Pedestrain Injury	Persons Injured	Fatalities	Work Zone Related	Adverse Weather Conditions	Distracted Driver
223215223	11/16/2022	O	1. Rear End	0	0	0		no	no
222475116	9/4/2022	O	2. Angle	0	0	0		no	no
223225052	11/14/2022	O	3. Head On	0	0	0		no	no
232335200	8/21/2023	B	1. Rear End	0	2	0		no	no
233125428	11/6/2023	O	1. Rear End	0	0	0		no	no
232485093	9/5/2023	O	1. Rear End	0	0	0		no	no
231845225	7/2/2023	O	2. Angle	0	0	0		no	no
232935291	10/20/2023	O	2. Angle	0	0	0		no	no
233115282	11/6/2023	O	2. Angle	0	0	0		no	no
233045284	10/28/2023	B	2. Angle	0	1	0		no	no
232365149	8/24/2023	B	1. Rear End	0	1	0		no	no
240775228	3/17/2024	B	3. Head On	0	3	0		no	no
242835358	10/8/2024	B	2. Angle	0	1	0		no	no
241515407	5/30/2024	O	2. Angle	0	0	0		no	no
250860012	3/26/2025	O	3. Head On	0	0	0		no	no
253070286	11/3/2025	O	2. Angle	0	0	0		no	no

Crash Data in Study Intersection 3 (January 2021 to December 2025)

Document Number	Date	Crash Severity	Collsion Type	Pedestrain Injury	Persons Injured	Fatalities	Work Zone Related	Adverse Weather Conditions	Distracted Driver
212235307	8/11/2021	O	1. Rear End	0	0	0		yes	no
210355031	2/2/2021	B	2. Angle	0	1	0		no	no
212075395	7/25/2021	B	1. Rear End	0	1	0		no	no
211345201	5/12/2021	O	1. Rear End	0	0	0		no	no
233355285	12/1/2023	O	1. Rear End	0	0	0		yes	no
233215300	11/14/2023	O	1. Rear End	0	0	0		no	no
231765352	6/25/2023	O	1. Rear End	0	0	0		no	no
232715131	9/26/2023	O	9. Fixed Object - Off Road	0	0	0		yes	no
232885079	10/14/2023	O	2. Angle	0	0	0		yes	no
232265413	8/14/2023	O	1. Rear End	0	0	0		yes	no
231925274	7/9/2023	O	1. Rear End	0	0	0		no	no
240785254	3/18/2024	O	2. Angle	0	0	0		no	no
242985375	10/23/2024	B	2. Angle	0	2	0		no	no
240635093	3/2/2024	O	2. Angle	0	0	0		no	no
240615069	2/28/2024	O	2. Angle	0	0	0		yes	no
242575270	8/27/2024	B	2. Angle	0	2	0		no	no
243065425	10/31/2024	B	1. Rear End	0	1	0		no	no
250785000	3/17/2025	O	2. Angle	0	0	0		no	no
251470178	5/27/2025	B	2. Angle	0	1	0		yes	no
251660159	6/15/2025	A	3. Head On	0	2	0		yes	no
252650082	9/20/2025	O	1. Rear End	0	0	0		no	no

Crash Data in Study Intersection 4 (January 2021 to December 2025)

Document Number	Date	Crash Severity	Collsion Type	Pedestrain Injury	Persons Injured	Fatalities	Work Zone Related	Adverse Weather Conditions	Distracted Driver
210415208	2/8/2021	O	1. Rear End	0	0	0		no	no
211025207	4/9/2021	B	1. Rear End	0	1	0		no	no
220565169	2/24/2022	O	1. Rear End	0	0	0		yes	no
222725236	9/29/2022	O	2. Angle	0	0	0		no	no
223195357	11/15/2022	O	1. Rear End	0	0	0		yes	no
222035303	7/21/2022	A	10. Deer	0	1	0		no	no
232505117	9/6/2023	B	2. Angle	0	2	0		no	no
231855238	7/3/2023	B	2. Angle	0	1	0		yes	no
232845209	10/11/2023	O	2. Angle	0	0	0		no	no
231315138	5/1/2023	O	1. Rear End	0	0	0		no	no
242495578	9/5/2024	O	1. Rear End	0	0	0		no	no
242145186	7/30/2024	O	1. Rear End	0	0	0		yes	no
241765241	6/24/2024	O	15. Backed Into	0	0	0		no	no
240405235	2/9/2024	O	1. Rear End	0	0	0		no	no
250325061	1/28/2025	B	1. Rear End	0	2	0		no	no
250355183	2/4/2025	O	1. Rear End	0	0	0		no	no
251415080	4/9/2025	O	9. Fixed Object - Off Road	0	0	0		no	no
253115229	11/6/2025	C	10. Deer	0	1	0		no	no

Crash Data in Study Intersection 5 (January 2021 to December 2025)

Document Number	Date	Crash Severity	Collsion Type	Pedestrain Injury	Persons Injured	Fatalities	Work Zone Related	Adverse Weather Conditions	Distracted Driver
212125117	7/31/2021	O	1. Rear End	0	0	0		no	no
223085231	11/1/2022	B	1. Rear End	0	1	0		no	no
230345053	2/2/2023	O	1. Rear End	0	0	0		no	no
231535244	6/2/2023	O	10. Deer	0	0	0		no	no
240875266	3/27/2024	C	1. Rear End	0	2	0		yes	no
241485084	5/25/2024	O	1. Rear End	0	0	0		no	no
243015337	10/16/2024	O	1. Rear End	0	0	0		no	no
251900129	7/9/2025	O	1. Rear End	0	0	0		no	no
252810102	10/6/2025	O	1. Rear End	0	0	0		no	no
253210131	11/14/2025	C	1. Rear End	0	1	0		no	no

D. Level of Service Definitions

TECHNICAL MEMORANDUM

Subject: Level of Service Definitions

Introduction

The purpose of this memorandum is to define the level of service (LOS) metric that commonly used as a measure of effectiveness (MOE) for traffic operations.

All capacity analyses are based on the procedures specified by the Transportation Research Board's (TRB) Highway Capacity Manual (HCM), which is currently on its sixth edition. Level of service ranges from A to F. A brief description of each level of service for signalized and unsignalized intersections is provided below.

Signalized Intersections

Level of service is based upon the traffic volume present in each lane on the roadway, the capacity of each lane at the intersection and the delay associated with each directional movement. The levels of service for signalized intersections are defined below:

- **Level of Service A** describes operations with very low average delay per vehicle, i.e., less than 10.0 seconds. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop. Short signal cycle lengths may also contribute to low delay.
- **Level of Service B** describes operations with average delay in the range of 10.1 to 20.0 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.
- **Level of Service C** describes operations with delay in the range of 20.1 to 35.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level although many still pass through the intersection without stopping. This is generally considered the lower end of the range of the acceptable level of service in rural areas.
- **Level of Service D** describes operations with delay in the range of 35.1 to 55.0 seconds per vehicle. At LOS D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, and/or high traffic volumes as compared to the roadway capacity. Many vehicles are required to stop and the number of vehicles that do not have to stop declines. Individual signal cycle failures, where all waiting vehicles do not clear the intersection during a single green time, are noticeable. This is generally considered the lower end of the range of the acceptable level of service in urban areas.
- **Level of Service E** describes operations with delay in the range of 55.1 to 80.0 seconds per vehicle. These higher delay values generally indicate poor progression, long cycle lengths, and high traffic volumes. Individual cycle failures are frequent occurrences. LOS E has been set as the limit of acceptable conditions.
- **Level of Service F** describes operations with average delay in excess of 80.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with over-saturation, i.e., when traffic arrives at a flow rate that exceeds the capacity of the intersection. It may also occur at high volumes with many individual cycle failures. Poor progression and long cycle lengths may also contribute to such delays.

Unsignalized Intersections

At an unsignalized intersection, the major street through traffic and right-turns are assumed to operate unimpeded and therefore receive no level of service rating. The level of service for the minor street and the major street left-turn traffic is dependent on the volume and capacity of the available lanes, and, the number and frequency of acceptable gaps in the major street traffic to make a conflicting turn. The level of service grade is provided for each conflicting movement at an unsignalized intersection and is based on the total average delay experienced by each vehicle. The delay includes the time it takes a vehicle to move from the back of a queue through the intersection.

The unsignalized intersection level of service analysis does not account for variations in driver behavior or the effects of nearby traffic signals. Therefore, the results from this analysis usually indicate worse levels of service than may be experienced in the field. The unsignalized intersection level of service descriptions are provided below:

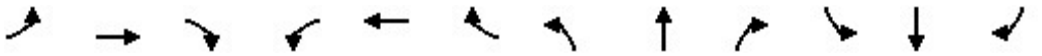
- **Level of Service A** describes operations where there is very little to no conflicting traffic for a minor side street movement, i.e., an average total delay of less than 10.0 seconds per vehicle.
- **Level of Service B** describes operations with average total delay in the range of 10.1 to 15.0 seconds per vehicle.
- **Level of Service C** describes operations with average total delay in the range of 15.1 to 25.0 second per vehicle.
- **Level of Service D** describes operations with average total delay in the range of 25.1 to 35.0 seconds per vehicle.
- **Level of Service E** describes operations with average total delay in the range of 35.1 to 50.0 seconds per vehicle.
- **Level of Service F** describes operations with average total delay of 50 seconds per vehicle. LOS F exists when there are insufficient gaps of suitable size to allow a side street demand to cross safely through or enter a major street traffic stream. This level of service is generally evident from extremely long total delays experienced by side street traffic and by queuing on the minor approaches. It is important to note that LOS F may not always result in long queues but may result in adjustments to normal driver behavior.

E. 2026 Existing Conditions – Capacity Analysis Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	136	386	387	113	354	136	32	41	64	314	144
v/c Ratio	0.71	0.69	0.62	0.67	0.70	0.15	0.18	0.21	0.11	0.56	0.21
Control Delay	69.7	39.1	26.7	75.3	47.6	3.5	31.6	26.3	25.6	44.9	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	69.7	39.1	26.7	75.3	47.6	3.5	31.6	26.3	25.6	44.9	4.6
Queue Length 50th (ft)	112	285	233	91	257	0	16	13	33	230	0
Queue Length 95th (ft)	162	330	270	#189	321	29	39	43	64	335	36
Internal Link Dist (ft)		496			4165			244		340	
Turn Bay Length (ft)	260		280	270		575	190		150		
Base Capacity (vph)	212	919	663	169	812	908	209	215	605	562	692
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.42	0.58	0.67	0.44	0.15	0.15	0.19	0.11	0.56	0.21

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	116	328	329	96	301	116	27	18	17	54	267	122
Future Volume (veh/h)	116	328	329	96	301	116	27	18	17	54	267	122
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		1.00	0.98		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1752	1796	1796	1722	1856	966	907	848	1870	1841	1781
Adj Flow Rate, veh/h	136	386	322	113	354	60	32	21	0	64	314	49
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	4	10	7	7	12	3	63	67	71	2	4	8
Cap, veh/h	161	1035	955	134	969	942	89	76	0	226	176	275
Arrive On Green	0.09	0.59	0.59	0.08	0.56	0.56	0.04	0.08	0.00	0.05	0.10	0.10
Sat Flow, veh/h	1753	1752	1521	1711	1722	1538	920	907	0	1781	1841	1431
Grp Volume(v), veh/h	136	386	322	113	354	60	32	21	0	64	314	49
Grp Sat Flow(s),veh/h/ln	1753	1752	1521	1711	1722	1538	920	907	0	1781	1841	1431
Q Serve(g_s), s	9.9	15.0	13.0	8.5	14.7	2.1	4.1	2.8	0.0	4.2	12.4	3.7
Cycle Q Clear(g_c), s	9.9	15.0	13.0	8.5	14.7	2.1	4.1	2.8	0.0	4.2	12.4	3.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	161	1035	955	134	969	942	89	76	0	226	176	275
V/C Ratio(X)	0.85	0.37	0.34	0.84	0.37	0.06	0.36	0.28	0.00	0.28	1.79	0.18
Avail Cap(c_a), veh/h	206	1035	955	134	969	942	143	87	0	310	176	275
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.98	0.98	0.98	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.1	14.0	11.4	59.1	15.6	10.2	52.5	55.9	0.0	50.8	58.8	44.5
Incr Delay (d2), s/veh	21.7	1.0	1.0	35.2	1.0	0.1	2.4	1.9	0.0	0.7	376.7	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	5.8	4.7	4.9	5.7	0.7	1.0	0.7	0.0	1.9	24.2	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	79.8	15.0	12.4	94.3	16.7	10.3	54.9	57.8	0.0	51.5	435.5	44.8
LnGrp LOS	E	B	B	F	B	B	D	E	A	D	F	D
Approach Vol, veh/h		844			527			53			427	
Approach Delay, s/veh		24.4			32.6			56.1			333.1	
Approach LOS		C			C			E			F	

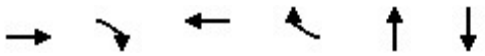
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.6	79.0	12.9	17.5	17.0	82.6	11.4	19.0
Change Period (Y+Rc), s	* 8.7	* 5.8	6.6	6.6	* 6.8	5.8	6.6	6.6
Max Green Setting (Gmax), s	* 15	* 62	12.4	12.4	* 10	69.2	12.4	12.4
Max Q Clear Time (g_c+I1), s	11.9	16.7	6.2	4.8	10.5	17.0	6.1	14.4
Green Ext Time (p_c), s	0.1	3.5	0.1	0.0	0.0	5.7	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	98.9
HCM 6th LOS	F

Notes

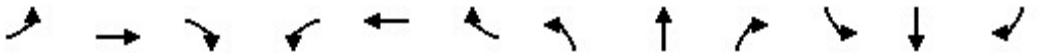
User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	521	21	211	33	98	200
v/c Ratio	0.73	0.03	0.23	0.04	0.33	0.49
Control Delay	15.9	2.2	6.9	2.4	17.7	12.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.9	2.2	6.9	2.4	17.7	12.2
Queue Length 50th (ft)	99	0	28	0	16	13
Queue Length 95th (ft)	202	6	60	8	55	63
Internal Link Dist (ft)	4165		4595		176	167
Turn Bay Length (ft)		90		155		
Base Capacity (vph)	1056	1210	1334	1156	653	756
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.02	0.16	0.03	0.15	0.26

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	184	259	18	2	178	28	44	10	29	40	6	124
Future Volume (veh/h)	184	259	18	2	178	28	44	10	29	40	6	124
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1767	1752	1811	1870	1722	1737	1796	1752	1796	1826	1648	1707
Adj Flow Rate, veh/h	216	305	9	2	209	15	52	12	2	47	7	11
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	9	10	6	2	12	11	7	10	7	5	17	13
Cap, veh/h	402	469	801	100	897	768	309	55	6	278	43	31
Arrive On Green	0.52	0.52	0.52	0.52	0.52	0.52	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	504	899	1535	3	1718	1472	1009	414	44	820	321	232
Grp Volume(v), veh/h	521	0	9	211	0	15	66	0	0	65	0	0
Grp Sat Flow(s),veh/h/ln	1404	0	1535	1720	0	1472	1468	0	0	1373	0	0
Q Serve(g_s), s	7.9	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.0
Cycle Q Clear(g_c), s	10.3	0.0	0.1	2.5	0.0	0.2	1.3	0.0	0.0	1.4	0.0	0.0
Prop In Lane	0.41		1.00	0.01		1.00	0.79		0.03	0.72		0.17
Lane Grp Cap(c), veh/h	871	0	801	997	0	768	370	0	0	351	0	0
V/C Ratio(X)	0.60	0.00	0.01	0.21	0.00	0.02	0.18	0.00	0.00	0.19	0.00	0.00
Avail Cap(c_a), veh/h	1657	0	1666	1960	0	1598	1120	0	0	1057	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	6.6	0.0	4.2	4.8	0.0	4.3	14.4	0.0	0.0	14.4	0.0	0.0
Incr Delay (d2), s/veh	1.4	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	0.0	0.4	0.0	0.0	0.4	0.0	0.0	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.0	0.0	4.2	5.0	0.0	4.3	14.6	0.0	0.0	14.7	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B	A	A	B	A	A
Approach Vol, veh/h		530			226			66			65	
Approach Delay, s/veh		8.0			5.0			14.6			14.7	
Approach LOS		A			A			B			B	

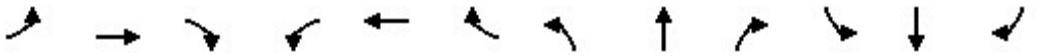
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		27.0		9.8		27.0		9.8				
Change Period (Y+Rc), s		7.8		4.9		7.8		4.9				
Max Green Setting (Gmax), s		40.0		25.0		40.0		25.0				
Max Q Clear Time (g_c+I1), s		12.3		3.3		4.5		3.4				
Green Ext Time (p_c), s		6.9		0.2		2.4		0.2				

Intersection Summary												
HCM 6th Ctrl Delay			8.2									
HCM 6th LOS			A									

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	265	108	110	114	118	430	205	87	347	10
v/c Ratio	0.77	0.25	0.54	0.47	0.55	0.51	0.38	0.53	0.61	0.02
Control Delay	53.6	1.4	50.3	37.7	50.7	35.4	5.0	55.6	41.2	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.6	1.4	50.3	37.7	50.7	35.4	5.0	55.6	41.2	0.1
Queue Length 50th (ft)	152	0	64	51	68	127	0	51	105	0
Queue Length 95th (ft)	#300	0	124	109	138	190	41	110	161	0
Internal Link Dist (ft)	3900			694		8434			5712	
Turn Bay Length (ft)		230	500		565		250	125		480
Base Capacity (vph)	387	459	417	468	242	941	577	186	716	466
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.24	0.26	0.24	0.49	0.46	0.36	0.47	0.48	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	32	209	98	100	64	40	107	391	187	79	316	9
Future Volume (veh/h)	32	209	98	100	64	40	107	391	187	79	316	9
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1767	1841	1663	1663	1767	1856	1722	1752	1707	1841	1618	1411
Adj Flow Rate, veh/h	35	230	11	110	70	20	118	430	36	87	347	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	9	4	16	16	9	3	12	10	13	4	19	33
Cap, veh/h	42	279	248	163	136	39	151	698	304	112	602	
Arrive On Green	0.18	0.18	0.18	0.10	0.10	0.10	0.09	0.21	0.21	0.06	0.20	0.00
Sat Flow, veh/h	242	1587	1409	1584	1321	377	1640	3328	1447	1753	3075	1196
Grp Volume(v), veh/h	265	0	11	110	0	90	118	430	36	87	347	0
Grp Sat Flow(s),veh/h/ln	1829	0	1409	1584	0	1699	1640	1664	1447	1753	1537	1196
Q Serve(g_s), s	10.7	0.0	0.5	5.1	0.0	3.8	5.4	9.0	1.5	3.7	7.8	0.0
Cycle Q Clear(g_c), s	10.7	0.0	0.5	5.1	0.0	3.8	5.4	9.0	1.5	3.7	7.8	0.0
Prop In Lane	0.13		1.00	1.00		0.22	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	321	0	248	163	0	175	151	698	304	112	602	
V/C Ratio(X)	0.82	0.00	0.04	0.67	0.00	0.51	0.78	0.62	0.12	0.78	0.58	
Avail Cap(c_a), veh/h	477	0	368	517	0	554	300	1082	470	229	883	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	30.4	0.0	26.2	33.1	0.0	32.5	34.0	27.5	24.5	35.3	27.9	0.0
Incr Delay (d2), s/veh	7.3	0.0	0.1	4.8	0.0	2.3	16.8	1.3	0.2	11.0	1.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	0.0	0.2	2.1	0.0	1.6	2.6	3.3	0.5	1.8	2.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.7	0.0	26.3	37.9	0.0	34.9	50.8	28.7	24.8	46.3	29.2	0.0
LnGrp LOS	D	A	C	D	A	C	D	C	C	D	C	
Approach Vol, veh/h		276			200			584			434	
Approach Delay, s/veh		37.3			36.5			32.9			32.6	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.4	21.7		16.2	14.3	22.8		23.4				
Change Period (Y+Rc), s	8.3	6.7		* 8.3	* 9.4	6.7		9.9				
Max Green Setting (Gmax), s	14.0	22.0		* 25	* 10	24.9		20.0				
Max Q Clear Time (g_c+I1), s	7.4	9.8		7.1	5.7	11.0		12.7				
Green Ext Time (p_c), s	0.3	2.0		0.7	0.1	2.9		0.8				

Intersection Summary		
HCM 6th Ctrl Delay		34.1
HCM 6th LOS		C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Group Flow (vph)	167	79	33	606	2	512	65
v/c Ratio	0.51	0.14	0.08	0.41	0.00	0.51	0.13
Control Delay	33.0	4.6	9.8	13.8	8.5	22.4	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.0	4.6	9.8	13.8	8.5	22.4	6.2
Queue Length 50th (ft)	65	0	6	71	0	95	0
Queue Length 95th (ft)	131	23	19	174	3	153	24
Internal Link Dist (ft)	414			1077		8434	
Turn Bay Length (ft)			470		275		295
Base Capacity (vph)	671	643	690	2105	727	1824	892
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.12	0.05	0.29	0.00	0.28	0.07

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (veh/h)	144	68	28	521	2	440	56
Future Volume (veh/h)	144	68	28	521	2	440	56
Initial Q (Qb), veh	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00				1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach	No			No		No	
Adj Sat Flow, veh/h/ln	1870	1752	1589	1648		1604	1707
Adj Flow Rate, veh/h	167	16	33	606		512	12
Peak Hour Factor	0.86	0.86	0.86	0.86		0.86	0.86
Percent Heavy Veh, %	2	10	21	17		20	13
Cap, veh/h	230	245	298	1055		894	424
Arrive On Green	0.13	0.13	0.04	0.34		0.29	0.29
Sat Flow, veh/h	1781	1485	1513	3214		3127	1447
Grp Volume(v), veh/h	167	16	33	606		512	12
Grp Sat Flow(s),veh/h/ln	1781	1485	1513	1566		1523	1447
Q Serve(g_s), s	4.9	0.0	0.0	8.7		7.8	0.3
Cycle Q Clear(g_c), s	4.9	0.0	0.0	8.7		7.8	0.3
Prop In Lane	1.00	1.00	1.00				1.00
Lane Grp Cap(c), veh/h	230	245	298	1055		894	424
V/C Ratio(X)	0.73	0.07	0.11	0.57		0.57	0.03
Avail Cap(c_a), veh/h	812	730	795	2569		2222	1055
HCM Platoon Ratio	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	22.9	19.3	19.0	14.9		16.5	13.8
Incr Delay (d2), s/veh	5.2	0.1	0.2	1.1		1.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	0.0	0.3	2.4		2.2	0.1
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	28.1	19.5	19.2	16.0		17.7	13.9
LnGrp LOS	C	B	B	B		B	B
Approach Vol, veh/h	183			639		524	
Approach Delay, s/veh	27.4			16.2		17.6	
Approach LOS	C			B		B	

Timer - Assigned Phs		2		4	5	6	
Phs Duration (G+Y+Rc), s		29.0		15.8	12.5	26.6	
Change Period (Y+Rc), s		10.5		8.7	10.5	10.5	
Max Green Setting (Gmax), s		45.0		25.0	20.0	40.0	
Max Q Clear Time (g_c+I1), s		10.7		6.9	2.0	9.8	
Green Ext Time (p_c), s		7.8		0.6	0.1	6.3	

Intersection Summary			
HCM 6th Ctrl Delay		18.3	
HCM 6th LOS		B	

Notes

User approved ignoring U-Turning movement.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	22	165	121	361	309	43
v/c Ratio	0.10	0.31	0.24	0.21	0.41	0.05
Control Delay	23.0	6.8	22.5	6.3	19.7	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.0	6.8	22.5	6.3	19.7	3.2
Queue Length 50th (ft)	6	0	18	26	44	0
Queue Length 95th (ft)	24	25	39	43	80	12
Internal Link Dist (ft)	446			1419	813	
Turn Bay Length (ft)		250	485			315
Base Capacity (vph)	625	1179	1292	2815	2277	1231
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.14	0.09	0.13	0.14	0.03

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	21	160	117	350	0	300	42
Future Volume (vph)	21	160	117	350	0	300	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Lane Util. Factor	1.00	0.88	0.97	0.95		0.95	1.00
Frt	1.00	0.85	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (prot)	1583	2733	3273	3195		2888	1583
Flt Permitted	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (perm)	1583	2733	3273	3195		2888	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.92	0.97	0.97
Adj. Flow (vph)	22	165	121	361	0	309	43
RTOR Reduction (vph)	0	143	0	0	0	0	26
Lane Group Flow (vph)	22	22	121	361	0	309	17
Heavy Vehicles (%)	14%	4%	7%	13%	2%	25%	2%
Turn Type	Prot	Prot	Prot	NA	Prot	NA	pm+ov
Protected Phases	7	4	1	6	5	2	7
Permitted Phases		4					2
Actuated Green, G (s)	7.3	7.3	6.0	29.9		13.4	20.7
Effective Green, g (s)	7.3	7.3	6.0	29.9		13.4	20.7
Actuated g/C Ratio	0.14	0.14	0.11	0.56		0.25	0.38
Clearance Time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Vehicle Extension (s)	3.0	3.0	3.0	3.5		3.5	3.0
Lane Grp Cap (vph)	214	370	365	1775		719	609
v/s Ratio Prot	c0.01	0.01	0.04	c0.11		c0.11	0.00
v/s Ratio Perm							0.01
v/c Ratio	0.10	0.06	0.33	0.20		0.43	0.03
Uniform Delay, d1	20.4	20.3	22.0	6.0		17.0	10.3
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	0.1	0.5	0.1		0.5	0.0
Delay (s)	20.6	20.3	22.6	6.1		17.5	10.3
Level of Service	C	C	C	A		B	B
Approach Delay (s)	20.4			10.2		16.6	
Approach LOS	C			B		B	

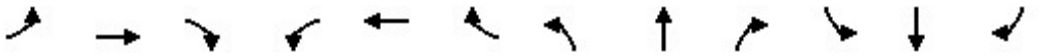
Intersection Summary			
HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	53.8	Sum of lost time (s)	27.1
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM 6th Edition methodology supports red clearance in the range of 0 to 6 seconds.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	240	452	47	16	484	133	69	93	100	43	310
v/c Ratio	0.83	0.40	0.04	0.15	0.61	0.15	0.26	0.57	0.41	0.25	0.48
Control Delay	62.3	16.3	2.3	51.5	30.3	0.8	35.5	58.0	41.1	49.6	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.3	16.3	2.3	51.5	30.3	0.8	35.5	58.0	41.1	49.6	6.3
Queue Length 50th (ft)	162	181	1	11	295	0	38	59	56	28	4
Queue Length 95th (ft)	#288	375	17	33	370	7	75	#112	102	64	62
Internal Link Dist (ft)		496			4165			244		340	
Turn Bay Length (ft)	260		280	270		575	190		150		
Base Capacity (vph)	298	1146	1289	132	838	897	277	174	252	186	648
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.39	0.04	0.12	0.58	0.15	0.25	0.53	0.40	0.23	0.48

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	211	398	41	14	426	117	61	69	13	88	38	273
Future Volume (veh/h)	211	398	41	14	426	117	61	69	13	88	38	273
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	0.98		0.98	0.99		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1870	1693	1841	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	240	452	29	16	484	59	69	78	8	100	43	45
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	4	2	14	4	2	2	2	2	2	2	2
Cap, veh/h	269	1127	1059	40	863	834	230	102	10	205	136	352
Arrive On Green	0.15	0.61	0.61	0.02	0.47	0.47	0.06	0.06	0.06	0.07	0.07	0.07
Sat Flow, veh/h	1781	1841	1585	1612	1841	1552	1781	1664	171	1781	1870	1552
Grp Volume(v), veh/h	240	452	29	16	484	59	69	0	86	100	43	45
Grp Sat Flow(s),veh/h/ln	1781	1841	1585	1612	1841	1552	1781	0	1835	1781	1870	1552
Q Serve(g_s), s	14.5	13.9	0.7	1.1	20.8	2.0	3.9	0.0	5.1	5.7	2.4	2.6
Cycle Q Clear(g_c), s	14.5	13.9	0.7	1.1	20.8	2.0	3.9	0.0	5.1	5.7	2.4	2.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.09	1.00		1.00
Lane Grp Cap(c), veh/h	269	1127	1059	40	863	834	230	0	113	205	136	352
V/C Ratio(X)	0.89	0.40	0.03	0.40	0.56	0.07	0.30	0.00	0.76	0.49	0.32	0.13
Avail Cap(c_a), veh/h	280	1127	1059	135	863	834	283	0	157	237	160	372
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.85	0.85	0.85	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.8	10.9	6.2	52.9	21.0	12.3	44.6	0.0	50.8	44.4	48.4	34.2
Incr Delay (d2), s/veh	27.6	1.1	0.0	5.5	2.2	0.1	0.7	0.0	13.4	1.8	1.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.3	5.3	0.2	0.5	8.9	0.7	1.8	0.0	2.8	2.6	1.2	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	73.5	12.0	6.2	58.4	23.3	12.5	45.3	0.0	64.2	46.2	49.8	34.3
LnGrp LOS	E	B	A	E	C	B	D	A	E	D	D	C
Approach Vol, veh/h		721			559			155			188	
Approach Delay, s/veh		32.2			23.1			55.8			44.2	
Approach LOS		C			C			E			D	

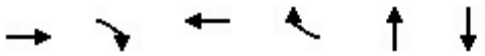
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.3	57.4	14.0	13.4	9.5	73.2	12.7	14.6
Change Period (Y+Rc), s	* 8.7	* 5.8	6.6	6.6	* 6.8	5.8	6.6	6.6
Max Green Setting (Gmax), s	* 17	* 46	9.4	9.4	* 9.2	56.2	9.4	9.4
Max Q Clear Time (g_c+I1), s	16.5	22.8	7.7	7.1	3.1	15.9	5.9	4.6
Green Ext Time (p_c), s	0.1	4.4	0.0	0.1	0.0	4.4	0.0	0.1

Intersection Summary	
HCM 6th Ctrl Delay	32.7
HCM 6th LOS	C

Notes

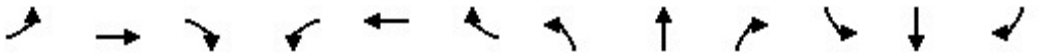
User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	324	42	432	35	75	186
v/c Ratio	0.53	0.05	0.51	0.04	0.22	0.39
Control Delay	12.0	2.7	10.6	2.8	14.9	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.0	2.7	10.6	2.8	14.9	8.6
Queue Length 50th (ft)	51	0	67	0	11	9
Queue Length 95th (ft)	112	10	133	10	45	56
Internal Link Dist (ft)	4165		4595		176	167
Turn Bay Length (ft)		90		155		
Base Capacity (vph)	1127	1406	1551	1405	815	959
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.03	0.28	0.02	0.09	0.19

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	114	204	41	23	401	34	43	21	10	22	28	132
Future Volume (veh/h)	114	204	41	23	401	34	43	21	10	22	28	132
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1781	1870	1841	1826	1870	1870	1752	1870	1870	1841	1870
Adj Flow Rate, veh/h	116	208	20	23	409	17	44	21	2	22	29	30
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	8	2	4	5	2	2	10	2	2	4	2
Cap, veh/h	285	432	722	132	805	722	301	108	7	184	119	96
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	300	948	1585	36	1767	1585	755	677	44	281	749	605
Grp Volume(v), veh/h	324	0	20	432	0	17	67	0	0	81	0	0
Grp Sat Flow(s),veh/h/ln	1248	0	1585	1803	0	1585	1477	0	0	1634	0	0
Q Serve(g_s), s	1.4	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	7.0	0.0	0.2	5.6	0.0	0.2	1.1	0.0	0.0	1.4	0.0	0.0
Prop In Lane	0.36		1.00	0.05		1.00	0.66		0.03	0.27		0.37
Lane Grp Cap(c), veh/h	717	0	722	937	0	722	416	0	0	399	0	0
V/C Ratio(X)	0.45	0.00	0.03	0.46	0.00	0.02	0.16	0.00	0.00	0.20	0.00	0.00
Avail Cap(c_a), veh/h	1727	0	1925	2278	0	1925	1248	0	0	1350	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	6.3	0.0	4.9	6.4	0.0	4.9	12.1	0.0	0.0	12.2	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.0	0.0	0.8	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.0	0.0	1.0	0.0	0.0	0.3	0.0	0.0	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.2	0.0	5.0	7.2	0.0	5.0	12.3	0.0	0.0	12.5	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B	A	A	B	A	A
Approach Vol, veh/h		344			449			67			81	
Approach Delay, s/veh		7.1			7.1			12.3			12.5	
Approach LOS		A			A			B			B	

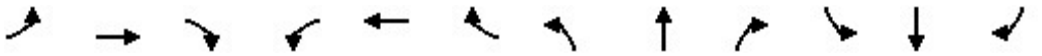
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		22.8		10.1		22.8		10.1				
Change Period (Y+Rc), s		7.8		4.9		7.8		4.9				
Max Green Setting (Gmax), s		40.0		25.0		40.0		25.0				
Max Q Clear Time (g_c+I1), s		9.0		3.1		7.6		3.4				
Green Ext Time (p_c), s		4.3		0.2		5.5		0.3				

Intersection Summary												
HCM 6th Ctrl Delay			7.9									
HCM 6th LOS			A									

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	150	146	224	356	201	611	179	73	567	13
v/c Ratio	0.64	0.39	0.60	0.89	0.90	0.68	0.31	0.52	0.84	0.03
Control Delay	56.9	4.6	45.7	65.3	86.4	42.1	3.0	61.9	54.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.9	4.6	45.7	65.3	86.4	42.1	3.0	61.9	54.3	0.1
Queue Length 50th (ft)	101	0	140	233	140	212	0	49	200	0
Queue Length 95th (ft)	168	18	234	#426	#298	#314	23	102	#306	0
Internal Link Dist (ft)	3900			694		8434			5712	
Turn Bay Length (ft)		230	500		565		250	125		480
Base Capacity (vph)	330	449	393	418	224	903	579	161	705	513
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.33	0.57	0.85	0.90	0.68	0.31	0.45	0.80	0.03

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	90	131	202	248	72	181	550	161	66	510	12
Future Volume (veh/h)	45	90	131	202	248	72	181	550	161	66	510	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1811	1796	1781	1826	1796	1811	1781	1796	1826	1811	1870
Adj Flow Rate, veh/h	50	100	5	224	276	70	201	611	33	73	567	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	7	6	7	8	5	7	6	8	7	5	6	2
Cap, veh/h	63	126	161	377	312	79	233	902	406	93	676	
Arrive On Green	0.11	0.11	0.11	0.22	0.22	0.22	0.14	0.27	0.27	0.05	0.20	0.00
Sat Flow, veh/h	594	1188	1522	1697	1405	356	1725	3385	1522	1739	3441	1585
Grp Volume(v), veh/h	150	0	5	224	0	346	201	611	33	73	567	0
Grp Sat Flow(s),veh/h/ln	1781	0	1522	1697	0	1762	1725	1692	1522	1739	1721	1585
Q Serve(g_s), s	8.0	0.0	0.3	11.5	0.0	18.5	11.1	15.8	1.6	4.0	15.5	0.0
Cycle Q Clear(g_c), s	8.0	0.0	0.3	11.5	0.0	18.5	11.1	15.8	1.6	4.0	15.5	0.0
Prop In Lane	0.33		1.00	1.00		0.20	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	189	0	161	377	0	392	233	902	406	93	676	
V/C Ratio(X)	0.80	0.00	0.03	0.59	0.00	0.88	0.86	0.68	0.08	0.78	0.84	
Avail Cap(c_a), veh/h	365	0	312	435	0	451	248	902	406	178	776	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	42.6	0.0	39.1	34.0	0.0	36.7	41.3	32.0	26.8	45.6	37.7	0.0
Incr Delay (d2), s/veh	7.4	0.0	0.1	1.7	0.0	16.8	27.0	2.3	0.1	13.1	7.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	0.0	0.1	4.7	0.0	9.5	6.2	6.2	0.5	2.0	6.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.0	0.0	39.2	35.7	0.0	53.5	68.3	34.3	26.9	58.7	45.5	0.0
LnGrp LOS	D	A	D	D	A	D	E	C	C	E	D	
Approach Vol, veh/h		155			570			845			640	
Approach Delay, s/veh		49.7			46.5			42.1			47.0	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	21.5	25.9		30.0	14.6	32.7		20.2				
Change Period (Y+Rc), s	8.3	6.7		* 8.3	* 9.4	6.7		9.9				
Max Green Setting (Gmax), s	14.0	22.0		* 25	* 10	24.9		20.0				
Max Q Clear Time (g_c+I1), s	13.1	17.5		20.5	6.0	17.8		10.0				
Green Ext Time (p_c), s	0.1	1.7		1.1	0.0	2.7		0.5				

Intersection Summary		
HCM 6th Ctrl Delay		45.2
HCM 6th LOS		D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	186	84	103	767	700	210
v/c Ratio	0.58	0.14	0.28	0.40	0.61	0.31
Control Delay	39.2	6.4	12.4	10.4	24.2	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.2	6.4	12.4	10.4	24.2	4.2
Queue Length 50th (ft)	83	3	21	100	144	0
Queue Length 95th (ft)	175	33	50	165	234	44
Internal Link Dist (ft)	414			1077	8434	
Turn Bay Length (ft)			470			295
Base Capacity (vph)	565	598	657	2065	1694	912
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.14	0.16	0.37	0.41	0.23

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (veh/h)	167	76	93	690	0	630	189
Future Volume (veh/h)	167	76	93	690	0	630	189
Initial Q (Qb), veh	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00				1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach	No			No		No	
Adj Sat Flow, veh/h/ln	1870	1722	1826	1781		1767	1870
Adj Flow Rate, veh/h	186	24	103	767		700	59
Peak Hour Factor	0.90	0.90	0.90	0.90		0.90	0.90
Percent Heavy Veh, %	2	12	5	8		9	2
Cap, veh/h	247	297	338	1245		1144	540
Arrive On Green	0.14	0.14	0.06	0.37		0.34	0.34
Sat Flow, veh/h	1781	1459	1739	3474		3445	1585
Grp Volume(v), veh/h	186	24	103	767		700	59
Grp Sat Flow(s),veh/h/ln	1781	1459	1739	1692		1678	1585
Q Serve(g_s), s	6.5	0.0	0.0	12.1		11.3	1.7
Cycle Q Clear(g_c), s	6.5	0.0	0.0	12.1		11.3	1.7
Prop In Lane	1.00	1.00	1.00				1.00
Lane Grp Cap(c), veh/h	247	297	338	1245		1144	540
V/C Ratio(X)	0.75	0.08	0.30	0.62		0.61	0.11
Avail Cap(c_a), veh/h	683	655	759	2338		2061	973
HCM Platoon Ratio	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	27.0	21.0	22.6	16.8		17.9	14.7
Incr Delay (d2), s/veh	5.5	0.1	0.6	1.1		1.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	0.4	1.3	3.9		3.7	0.5
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	32.5	21.2	23.2	17.9		19.0	14.9
LnGrp LOS	C	C	C	B		B	B
Approach Vol, veh/h	210			870		759	
Approach Delay, s/veh	31.2			18.5		18.7	
Approach LOS	C			B		B	

Timer - Assigned Phs		2		4	5	6	
Phs Duration (G+Y+Rc), s		34.5		17.7	14.7	32.7	
Change Period (Y+Rc), s		10.5		8.7	10.5	10.5	
Max Green Setting (Gmax), s		45.0		25.0	20.0	40.0	
Max Q Clear Time (g_c+I1), s		14.1		8.5	2.0	13.3	
Green Ext Time (p_c), s		9.9		0.7	0.3	8.9	

Intersection Summary	
HCM 6th Ctrl Delay	20.1
HCM 6th LOS	C

Notes

User approved ignoring U-Turning movement.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	44	151	185	482	521	32
v/c Ratio	0.19	0.31	0.37	0.25	0.60	0.04
Control Delay	27.2	7.4	25.7	6.2	22.5	3.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.2	7.4	25.7	6.2	22.5	3.3
Queue Length 50th (ft)	14	0	29	36	83	0
Queue Length 95th (ft)	44	25	62	61	138	11
Internal Link Dist (ft)	446			1419	813	
Turn Bay Length (ft)		250	485			315
Base Capacity (vph)	604	1050	1138	2569	2303	1136
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.14	0.16	0.19	0.23	0.03

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	42	145	178	463	0	500	31
Future Volume (vph)	42	145	178	463	0	500	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Lane Util. Factor	1.00	0.88	0.97	0.95		0.95	1.00
Frt	1.00	0.85	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (prot)	1770	2787	3335	3252		3374	1583
Flt Permitted	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (perm)	1770	2787	3335	3252		3374	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.92	0.96	0.96
Adj. Flow (vph)	44	151	185	482	0	521	32
RTOR Reduction (vph)	0	132	0	0	0	0	20
Lane Group Flow (vph)	44	19	185	482	0	521	12
Heavy Vehicles (%)	2%	2%	5%	11%	2%	7%	2%
Turn Type	Prot	Prot	Prot	NA	Prot	NA	pm+ov
Protected Phases	7	4	1	6	5	2	7
Permitted Phases		4					2
Actuated Green, G (s)	7.6	7.6	8.9	34.8		15.4	23.0
Effective Green, g (s)	7.6	7.6	8.9	34.8		15.4	23.0
Actuated g/C Ratio	0.13	0.13	0.15	0.59		0.26	0.39
Clearance Time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Vehicle Extension (s)	3.0	3.0	3.0	3.5		3.5	3.0
Lane Grp Cap (vph)	228	359	503	1918		880	617
v/s Ratio Prot	c0.02	0.01	0.06	c0.15		c0.15	0.00
v/s Ratio Perm							0.01
v/c Ratio	0.19	0.05	0.37	0.25		0.59	0.02
Uniform Delay, d1	23.0	22.5	22.5	5.8		19.1	11.1
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.4	0.1	0.5	0.1		1.1	0.0
Delay (s)	23.4	22.6	23.0	5.9		20.2	11.1
Level of Service	C	C	C	A		C	B
Approach Delay (s)	22.8			10.6		19.7	
Approach LOS	C			B		B	

Intersection Summary			
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	59.0	Sum of lost time (s)	27.1
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM 6th Edition methodology supports red clearance in the range of 0 to 6 seconds.

F. Background Information

Enclave at Tasker Residential and Eastgate Commercial

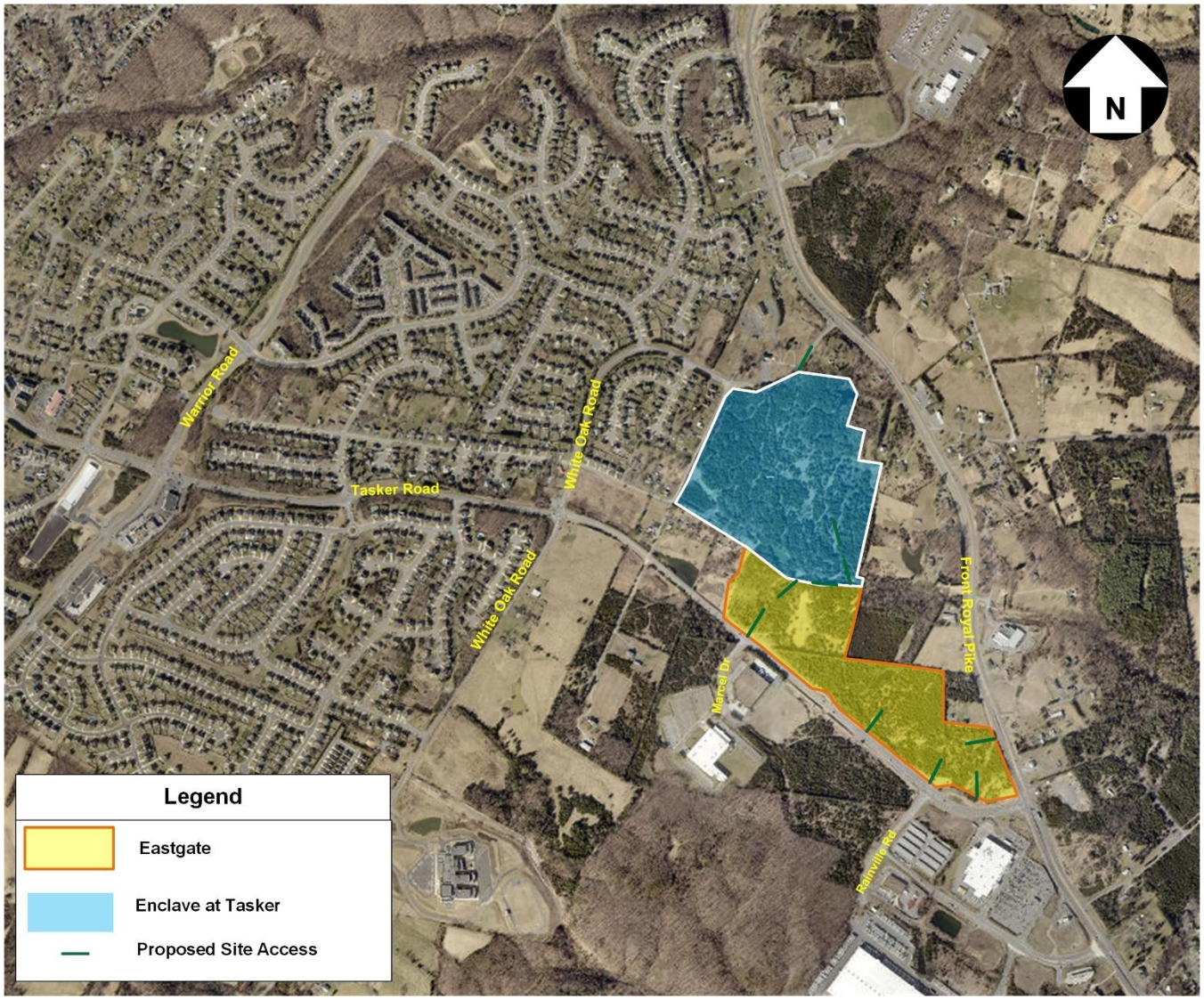


Figure 1: Enclave at Tasker Residential and Eastgate Commercial Locations

Table 1: Trip Generation of Enclave at Tasker Residential Development

Land Use	ITE Code	Size	Units	------ Weekday ------						
				AM Peak Hour			*PM Peak Hour*			*Weekday*
				In	Out	Total	In	Out	Total	Total
Single Family Detached	210	165	DU	31	85	116	95	58	153	1,597
Single Family Attached	215	154	DU	19	57	76	46	34	80	1,009
Subtotal		**319**	**DU**	**50**	**142**	**192**	**141**	**92**	**233**	**2,606**

Note: ITE Trip Generation Manual, 12th Edition is used for site trip generation.

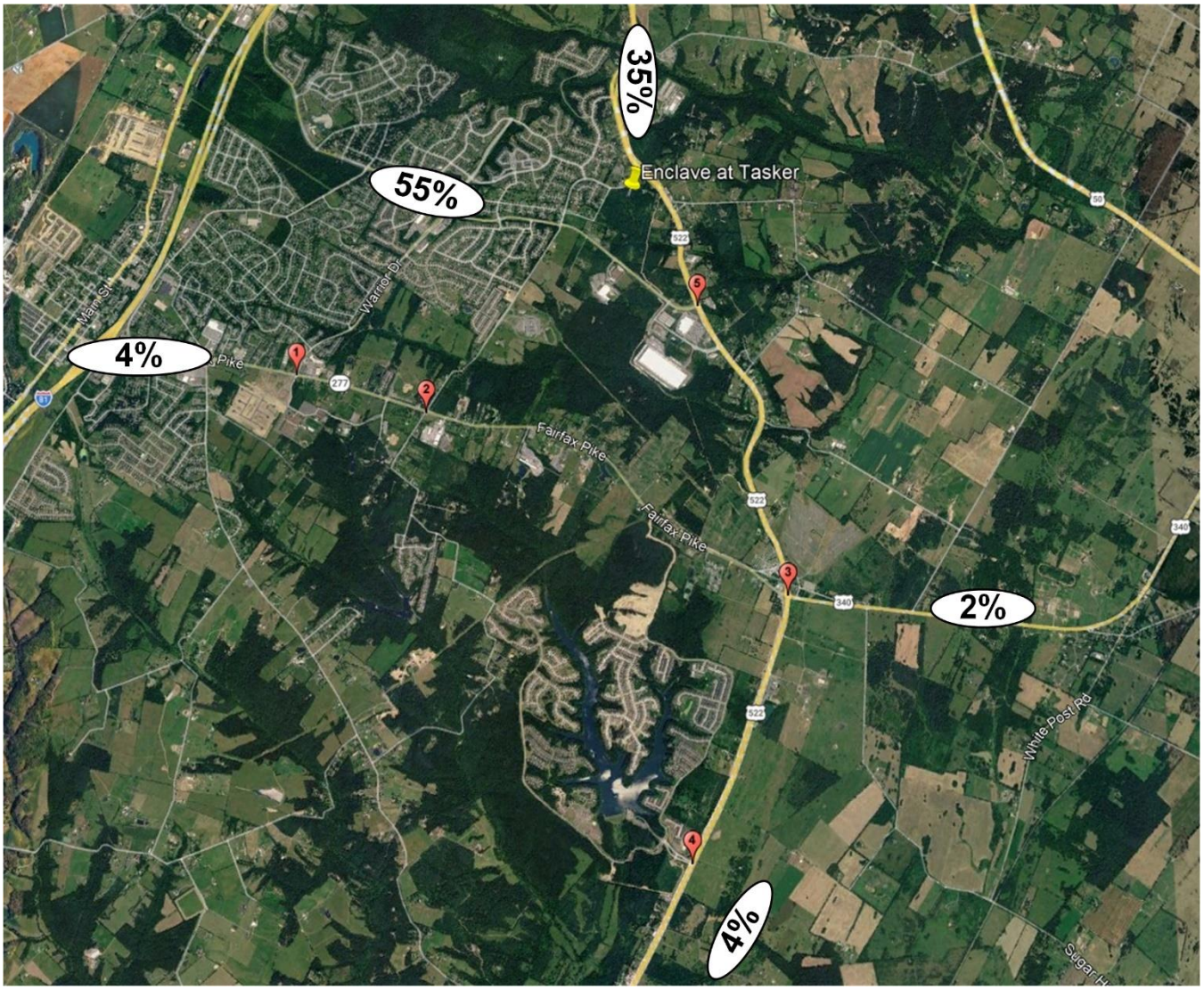


Figure 2: Enclave at Tasker Direction of Approach

Note: The distribution of traffic is based on engineering judgment. Due to the presence of multiple access points for the Enclave at Tasker development, not all trips generated by this development are expected to pass through the study intersection.

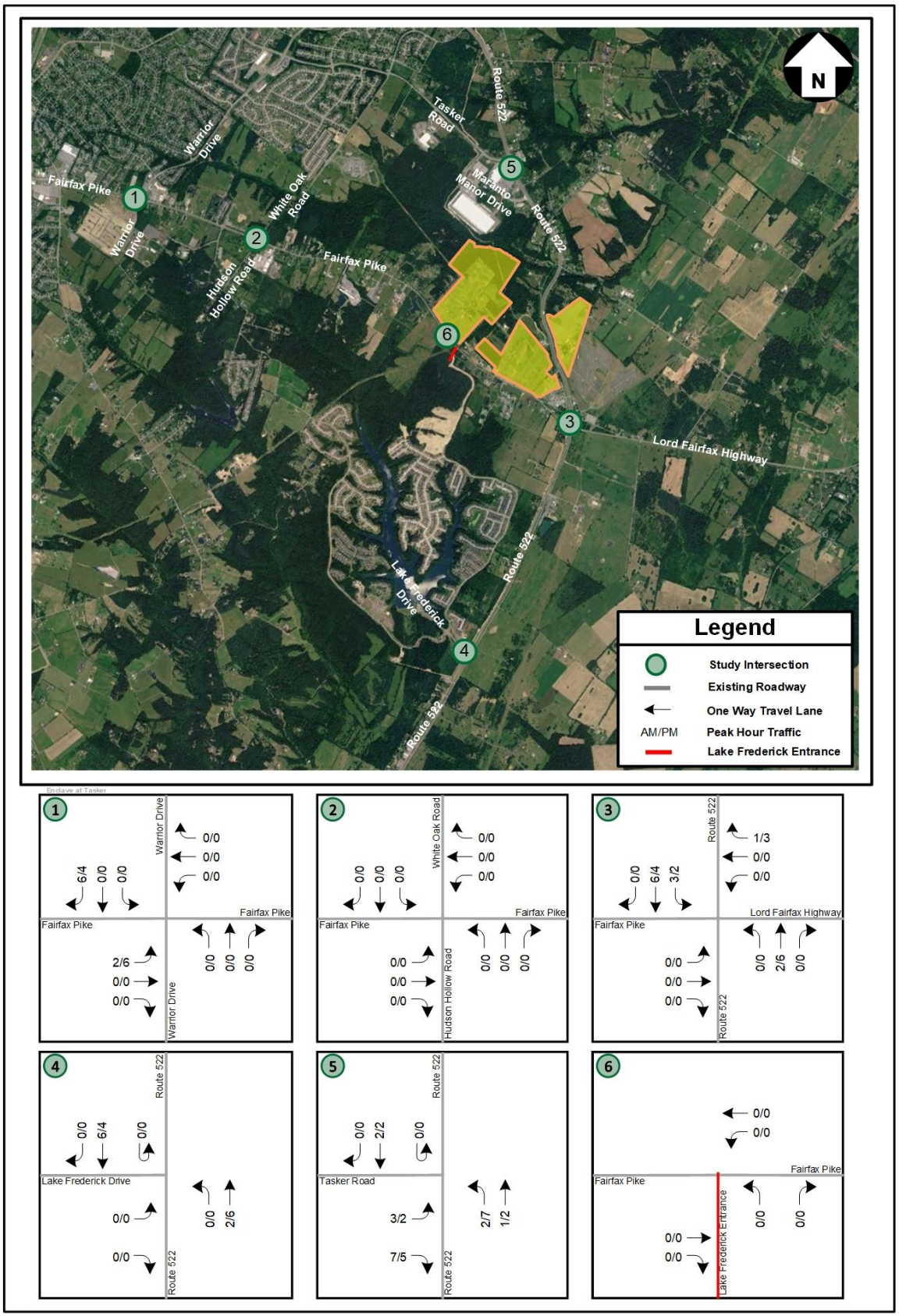


Figure 3: Enclave at Tasker Trips Assignment

Table 2: Trip Generation of Eastgate Development

Land Use	ITE Code	Size	Units	------ Weekday ------						
				AM Peak Hour			*PM Peak Hour*			*Weekday*
				In	Out	Total	In	Out	Total	Total
Retail (>150 K)	820	179	KSF	150	92	242	381	395	776	6,514
Pass-by Reductions -Retail (AM/PM/WKDY)				*-38*	*-23*	*-61*	*-95*	*-99*	*-194*	-1,889
Site Trips with Reduction		**179**	**KSF**	**113**	**69**	**182**	**286**	**296**	**582**	**4,625**

Note: ITE Trip Generation Manual, 12th Edition is used for site trip generation. Pass-by rates for Shopping Plaza with Supermarket use were based on ITE Land Use Code (LUC) 820. Since ITE does not provide pass-by rates for the AM or PM for LUC 820, both were assumed to be 25% percent, while 29% Is used for the Weekday.

Figure 4: Eastgate Direction of Approach

Note: The distribution of traffic is based on engineering judgment. Due to the presence of multiple access points for Eastgate development, not all trips generated by this development are expected to pass through the study intersection.

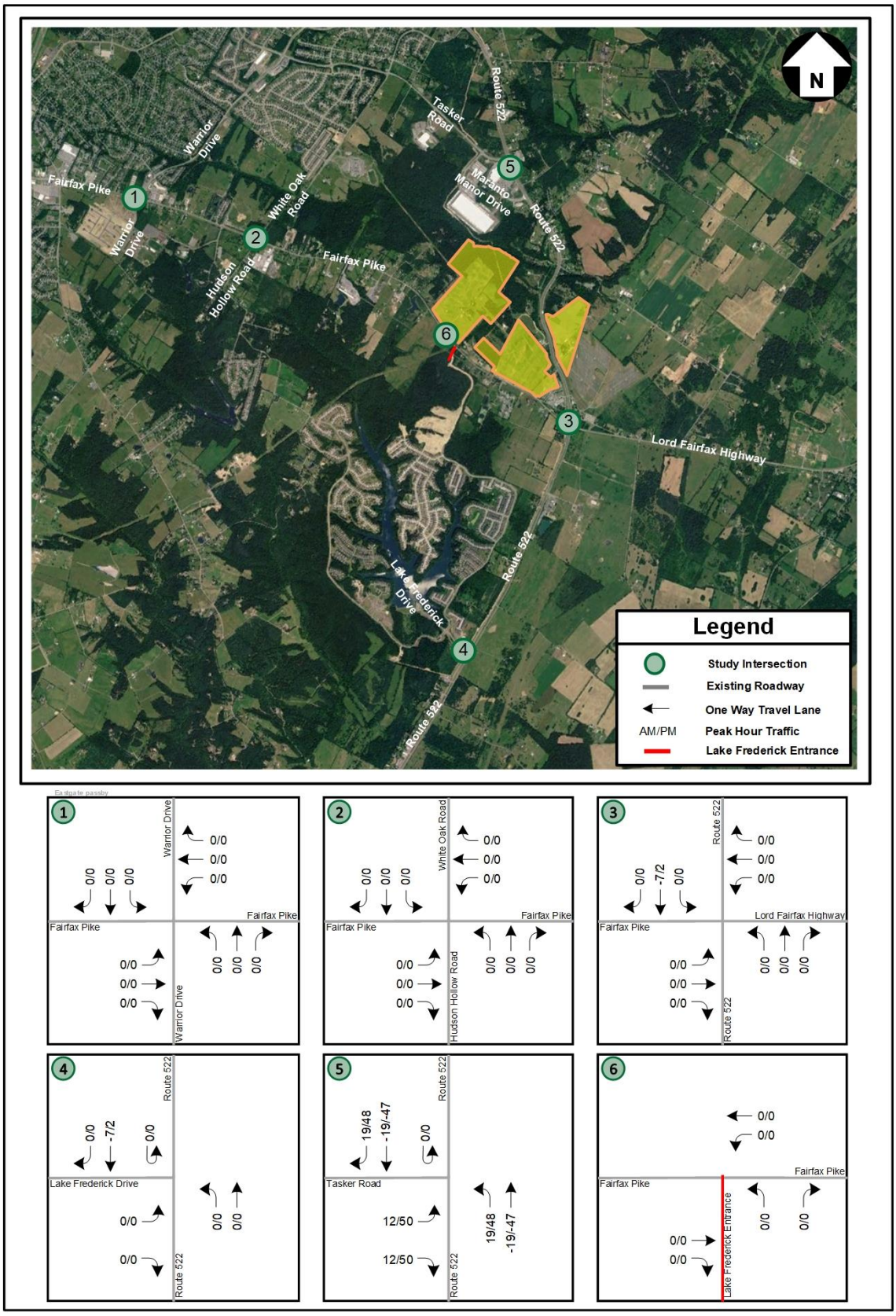


Figure 5: Eastgate Pass-by Trips Assignment

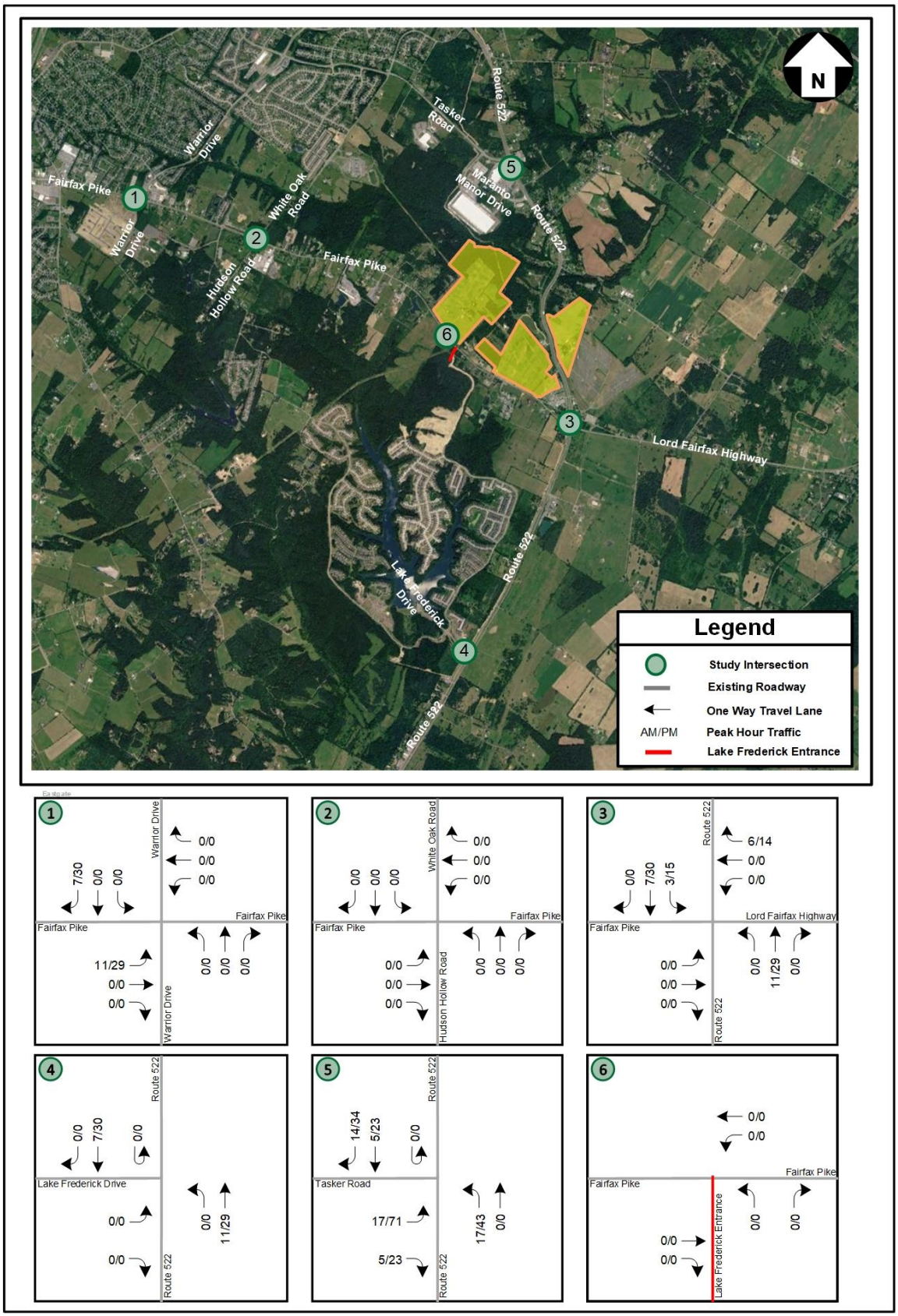


Figure 6: Eastgate Site Trips Assignment

Sherando Green

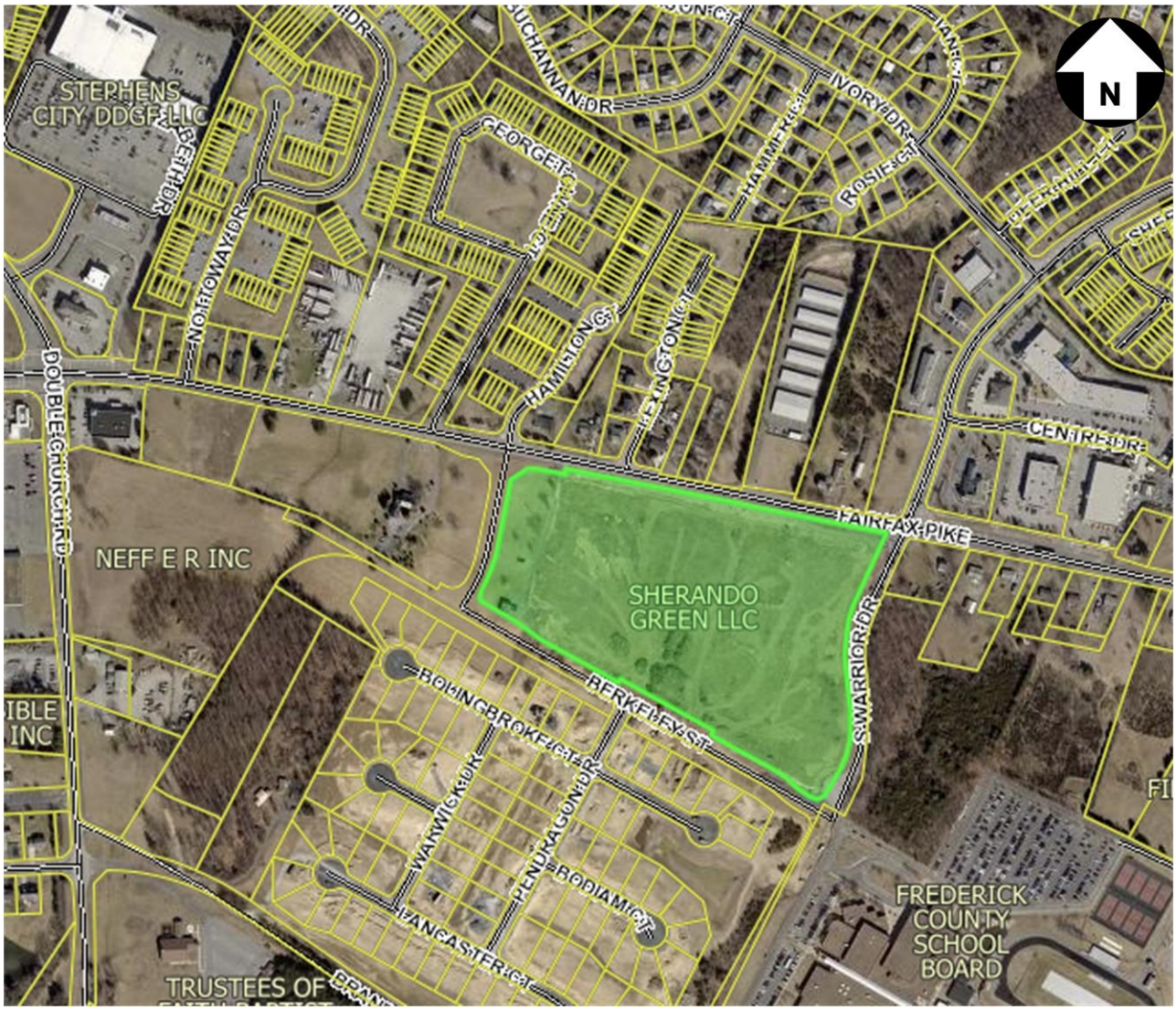


Figure 7: Sherando Green Location

Table 3: Trips Generation of Sherando Green

Land Use	ITE Code	Size	Units	------ Weekday ------						
				AM Peak Hour			*PM Peak Hour*			*Weekday*
				In	Out	Total	In	Out	Total	Total
Shopping Plaza with Supermarket	821	93.9 KSF		199	133	332	395	411	806	10,128
Pass-by Reductions -Retail (AM/PM/WKDY)				*-50*	*-33*	*-83*	*-99*	*-103*	*-202*	-2,937
Site Trips with Reduction		**93.9 KSF**		**149**	**100**	**249**	**296**	**308**	**605**	**7,191**

Note: ITE Trip Generation Manual, 12th Edition is used for site trip generation. Pass-by rates for Shopping Plaza with Supermarket use were based on ITE Land Use Code (LUC) 821. Since ITE does not provide pass-by rates for the AM or PM for LUC 821, both were assumed to be 25% percent, while 29% Is used for the Weekday.

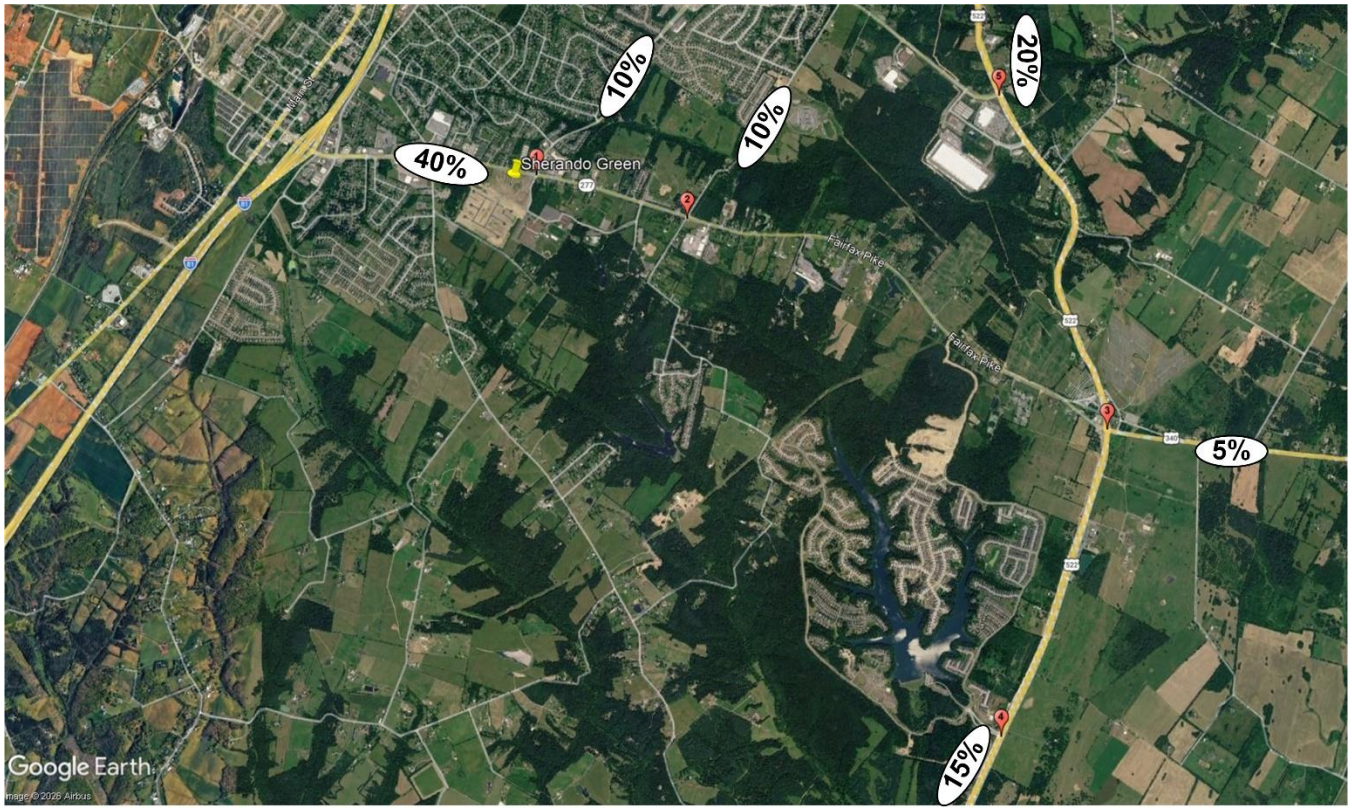


Figure 8: Sherando Green Direction of Approach
Note: As no traffic study was conducted for Sherando Green, the directional distribution assumptions were based on existing travel patterns, surrounding land uses, and engineering judgment.

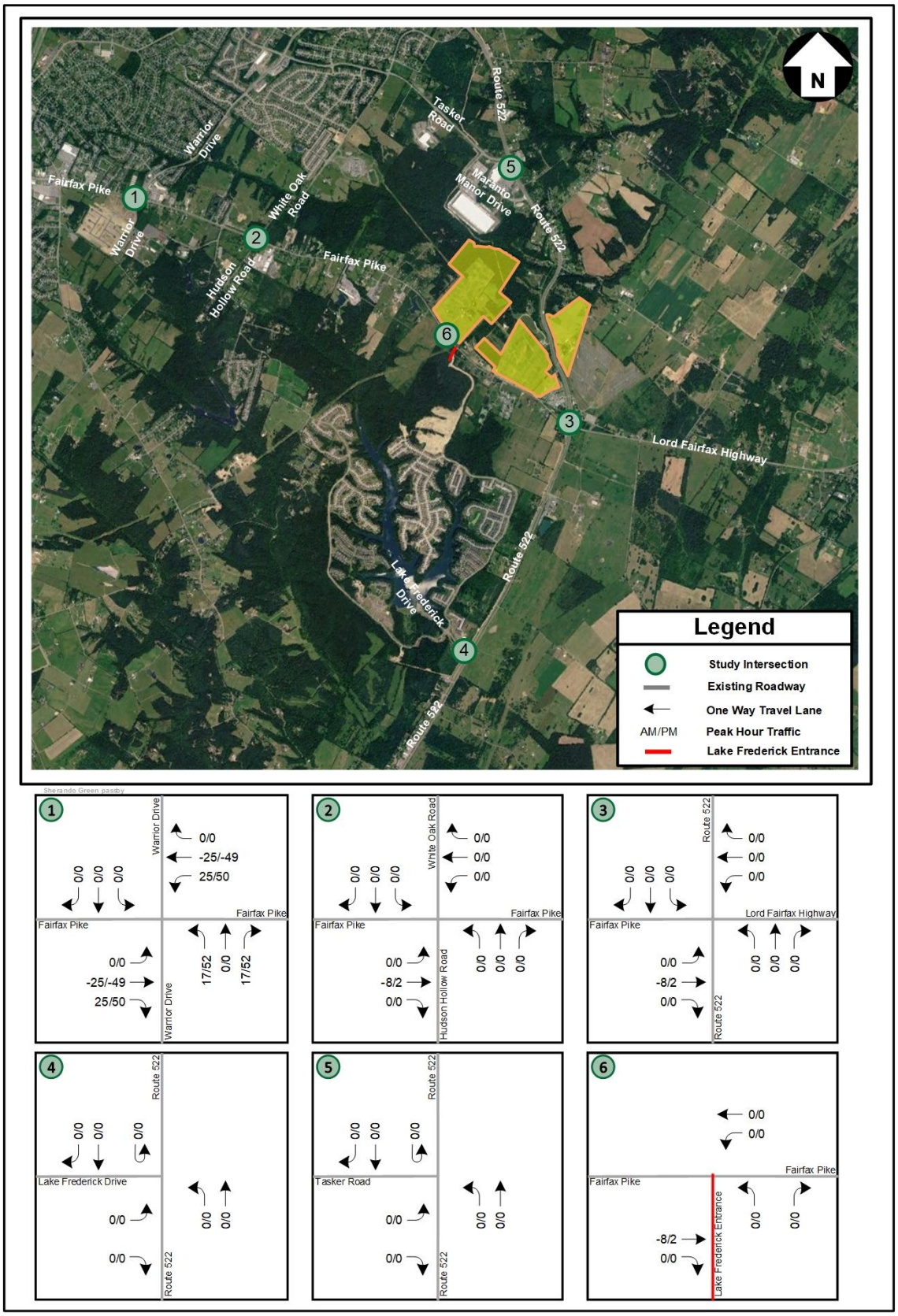


Figure 9: Sherando Green Pass-by Trips

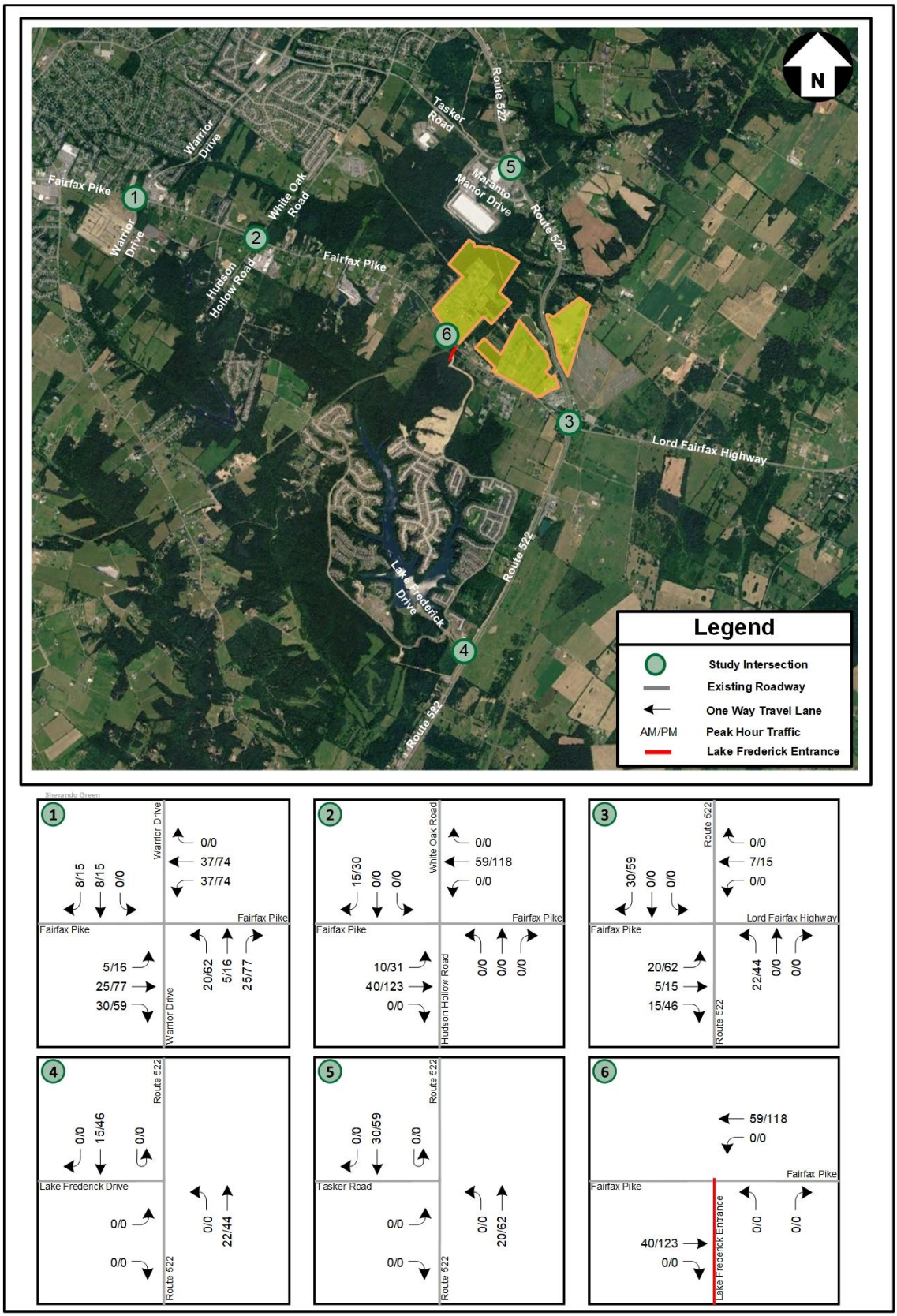


Figure 10: Sherando Green Site Trips Assignment

Fairfax Downs

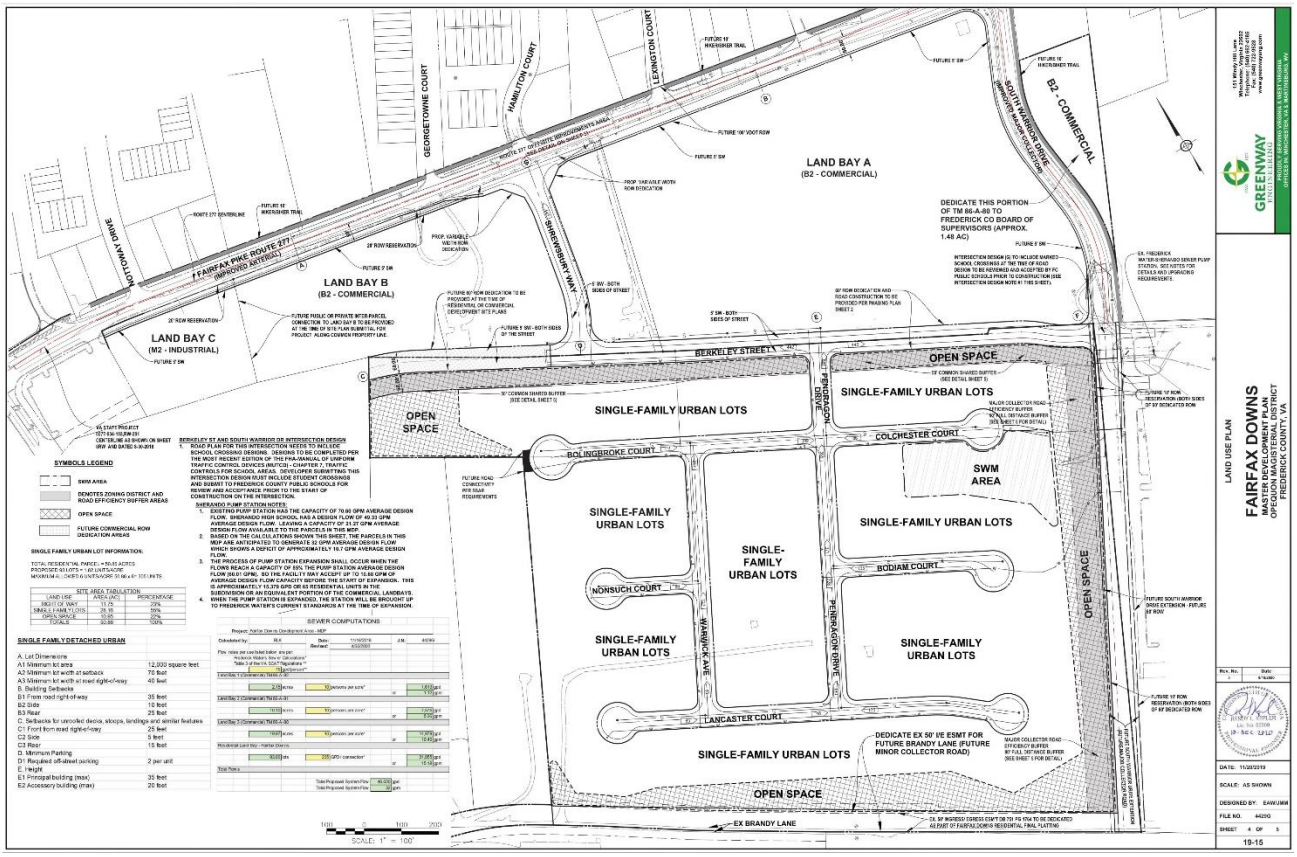


Figure 11: Fairfax Downs Land Use Plan

Table 4: Trips Generation by Fairfax Downs

Land Use	ITE Code	Size	Units	------ Weekday ------						
				AM Peak Hour			*PM Peak Hour*			*Weekday*
				In	Out	Total	In	Out	Total	Total
Single Family Urban Lots										
Single Family Detached	210		93 DU	18	50	68	56	34	90	1,016
Subtotal			**93 DU**	**18**	**50**	**68**	**56**	**34**	**90**	**1,016**

Note: ITE Trip Generation Manual, 12th Edition is used for site trip generation. The number of units were referenced from the approved Master Development Plan.

Figure 12: Fairfax Downs Direction of Approach
Note: As no traffic study was conducted for Sherando Green, the directional distribution assumptions were based on existing travel patterns, surrounding land uses, and engineering judgment.

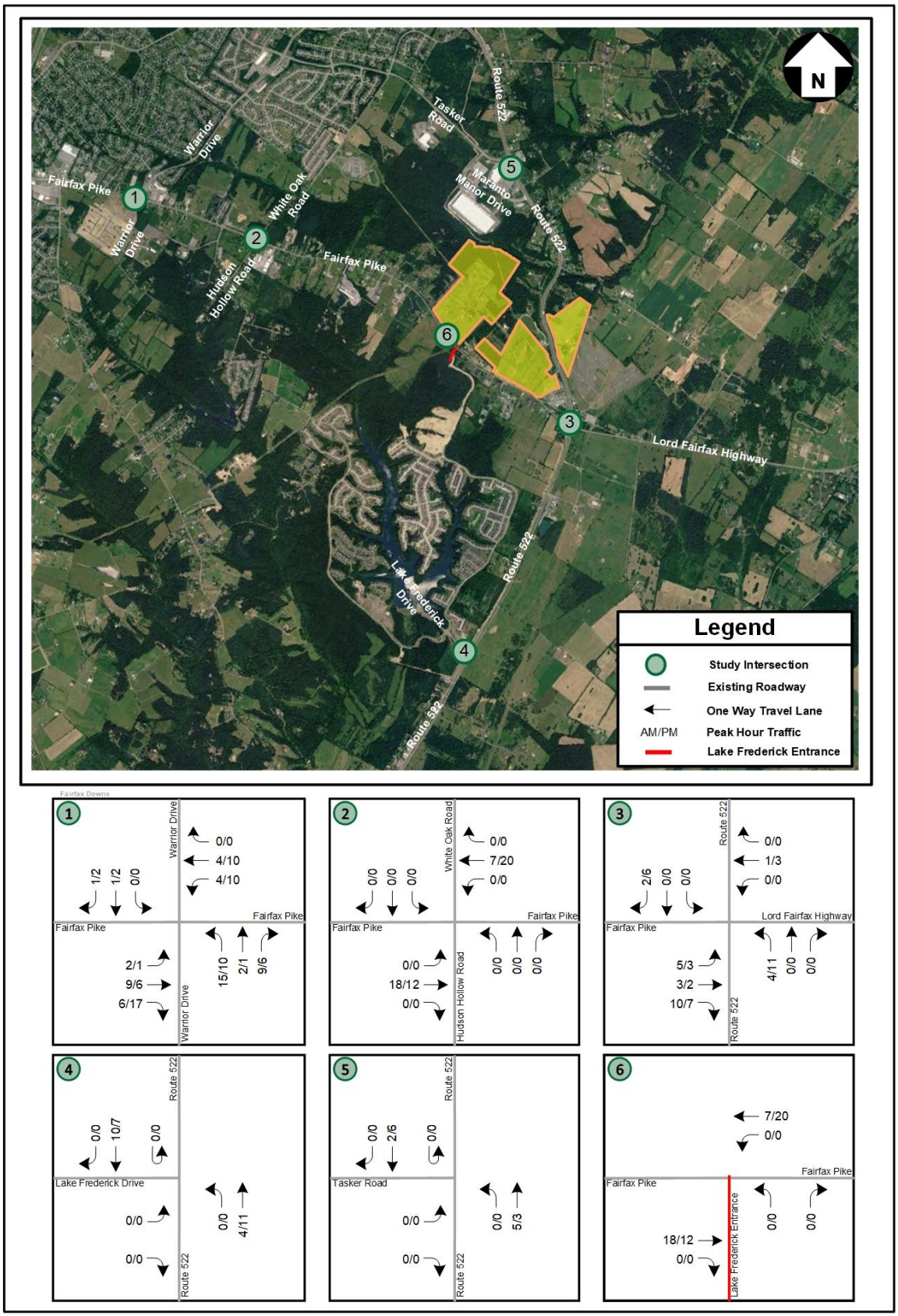


Figure 13: Fairfax Downs Site Trips Assignment

Lake Frederick (remaining build out)

Figure 14: Lake Frederick Master Development Plan

LOT PHASING TABULATIONS

	PROPOSED SINGLE FAMILY DETACHED	PROPOSED SINGLE FAMILY ATTACHED	EXISTING LOTS	TOTAL
PHASE IA (AGE RESTRICTED)	0	0	197	197
PHASE IB	0	25	140	165
PHASE IIA (AGE RESTRICTED)	0	0	79	79
PHASE IIB	0	0	178	178
PHASE III	0	0	193	193
PHASE IV (AGE RESTRICTED)	0	0	203	203
PHASE V (AGE RESTRICTED)	0	0	145	145
PHASE VI A (AGE RESTRICTED)	109	0	0	109
PHASE VI B	0	185	0	185
PHASE VII A (AGE RESTRICTED)	90	0	0	90
PHASE VII B	0	200	0	200
PHASE VIII (AGE RESTRICTED)	128	0	94	222
PHASE IX (AGE RESTRICTED)	119	0	45	164
TOTAL	446	410	1274	2130

Figure 15: Lake Frederick Lot Phasing Tabulations

Table 5: Lake Frederick Site Trips Generation

Land Use	ITE Code	Size	Units	------ Weekday ------						
				AM Peak Hour			*PM Peak Hour*			*Weekday*
				In	Out	Total	In	Out	Total	Total
Single Family Detached (Age Restricted)	251	199	DU	22	42	64	46	30	76	1,038
Single Family Attached	215	385	DU	53	159	212	121	91	212	2,529
Delta										
Single Family Detached	210	78	DU	16	42	58	47	30	77	895
Subtotal		**662**	**DU**	**91**	**243**	**334**	**214**	**151**	**365**	**4,462**

Notes: ITE Trip Generation Manual, 12th Edition is used for site trip generation. The vacant area shown on Google Satellite imagery corresponds to Phases VIA, VIB, VIIA, and VIIB.

Figure 16: Lake Frederick Direction of Approach

Note: The direction of approach (DOA) was referenced from the memorandum titled "Lake Frederick Development – Fairfax Pike Site Access Evaluation." All trips traveling from the south to the northbound direction are assumed to use the existing entrance on Route 522, while all other trips are assumed to use the proposed new driveway on Fairfax Pike.

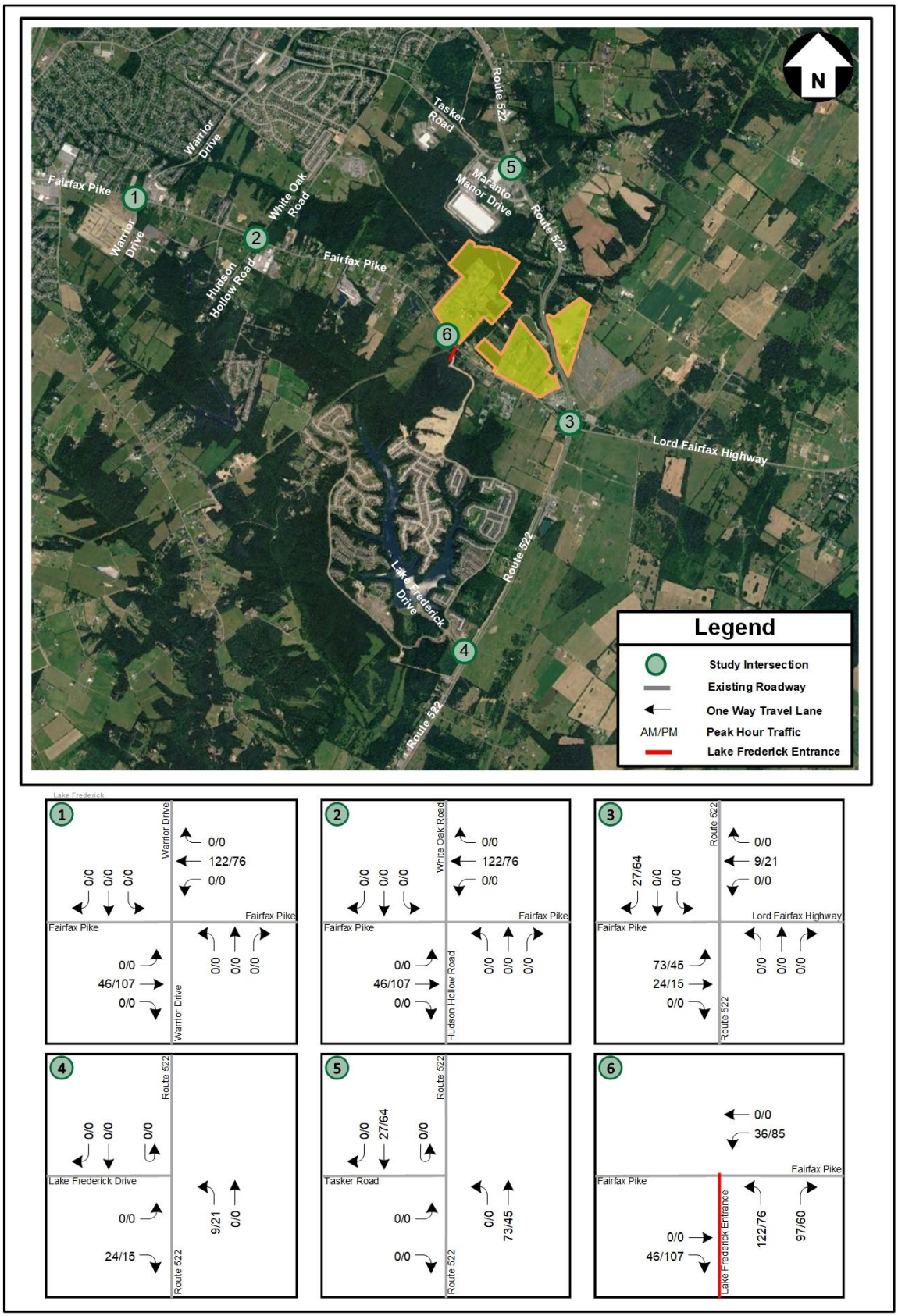


Figure 17: Lake Frederick Site Trips Assignment

Site Generated Traffic Distributions and Assignments

Trip distributions for the proposed development are based on recent traffic counts, the surrounding road network, local knowledge and engineering judgement and are consistent with the approved scoping document. The following trip distributions were assumed for the proposed development's site trips.

	Distribution
To/From the North on US Route 522:	30%
To/From the South on US Route 522	25%
To/From the East on US Route 340:	10%
To/From the West on Fairfax Pike (Route 277):	35%
Total:	100%

The peak hour vehicle trips shown in Table 5-1 were assigned to the public roadway network according to the directional distribution described above. Pass-by site trips are shown on Figure 5-1 and the new site generated trips are shown on Figure 5-2.

Table 5-1
Site Trip Generation

Land Use	ITE LUC	Size	Units	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Development Program										
Land Bay 1										
Residential Uses:										
Multifamily Housing (Low-Rise)	220	120	DU	14	46	60	45	27	72	845
Senior Adult Housing - Multifamily	252	150	DU	10	19	29	21	17	38	458
Sub-total Land Bay 1 Residential (270 units):				***24***	***65***	***89***	***66***	***44***	***110***	***1,303***
Commercial Uses:										
Fast-Food Restaurant with Drive-Through Window	934	4,000	SF	91	87	178	69	63	132	1,870
Pass-By Reduction (50% Weekday AM Peak & 55% Weekday PM Peak)				*(46)*	*(44)*	*(89)*	*(38)*	*(35)*	*(73)*	*(935)*
			Subtotal:	46	44	89	31	29	59	935
Coffee/Donut Shop with Drive-Through Window	937	5,000	SF	219	210	429	97	97	195	2,668
Pass-By Reduction[2] (90% Weekday AM Peak & 98% Weekday PM Peak)				*(197)*	*(189)*	*(386)*	*(96)*	*(96)*	*(191)*	*(2,401)*
			Subtotal:	22	21	43	2	2	4	267
Strip Retail Plaza (<40K)	822	8,000	SF	11	8	19	33	33	66	567
Free-Standing Emergency Room	650	10,000	SF	6	6	11	7	8	15	249
Clinic	630	10,000	SF	22	5	28	11	26	37	393
Clinic (Family Medicine)	630	20,000	SF	45	10	55	22	52	74	752
Medical-Dental Office Building (Stand-Alone) (Outpatient Medical Facility)	720	20,000	SF	45	12	57	23	55	78	751
Medical-Dental Office Building (Stand-Alone)	720	20,000	SF	45	12	57	23	55	78	751
Sub-total Land Bay 1 Commercial (90,500 sf):				***241***	***117***	***358***	***152***	***260***	***412***	***4,667***
Total Land Bay 1 Residential and Commercial Subtotal:				***265***	***182***	***447***	***218***	***304***	***522***	***5,970***

Table 5-1 (continued)
Site Trip Generation

Land Use	ITE LUC	Size	Units	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Land Bay 2										
Senior Adult Housing - Multifamily	252	360	DU	24	45	69	50	40	90	1,065
Land Bay 2 Residential Subtotal:				***24***	***45***	***69***	***50***	***40***	***90***	***1,065***
Land Bay 3										
Single-Family Detached Housing	210	120	DU	22	66	88	74	44	118	1,193
Single-Family Attached Housing	215	150	DU	18	54	72	51	35	86	1,093
Land Bay 3 Residential Subtotal:				***40***	***120***	***160***	***125***	***79***	***204***	***2,286***
Land Bay 4										
Open Space Only										
Net New Trips				**329**	**348**	**677**	**393**	**423**	**816**	**9,321**

Notes:
Trip Generation based on the Institute of Transportation Engineers' (ITE) Trip Generation Manual, 11th Edition.
Coffee Shop Pass-by reduction was based on ITE LUC 938, Coffee/Donut Shop with Drive-Through Window and No Indoor Seating.

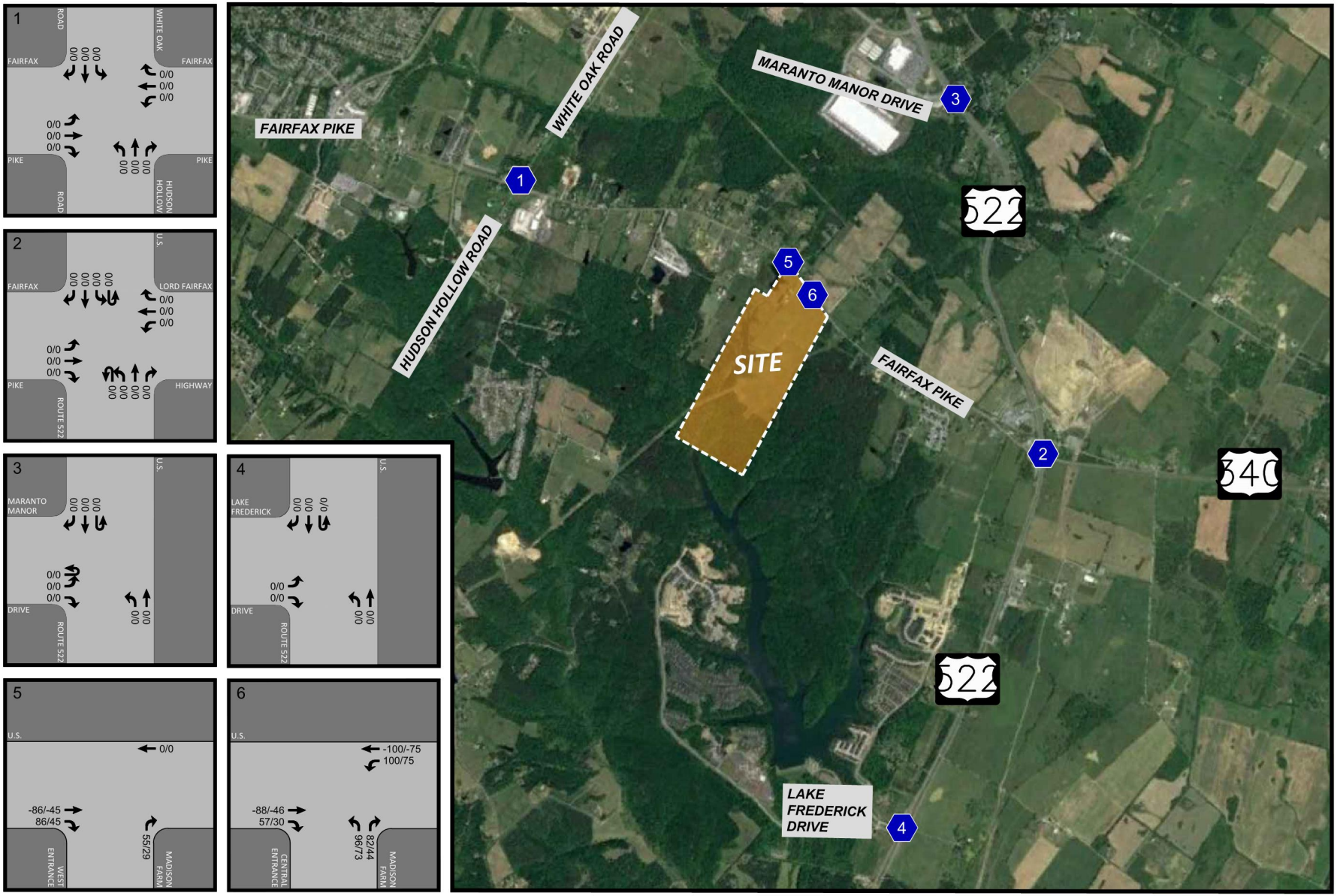


Figure 5-1
Pass-By Site Trips

AM PEAK HOUR
PM PEAK HOUR
000 / 000

NORTH
Madison Farms 277
Frederick County, VA

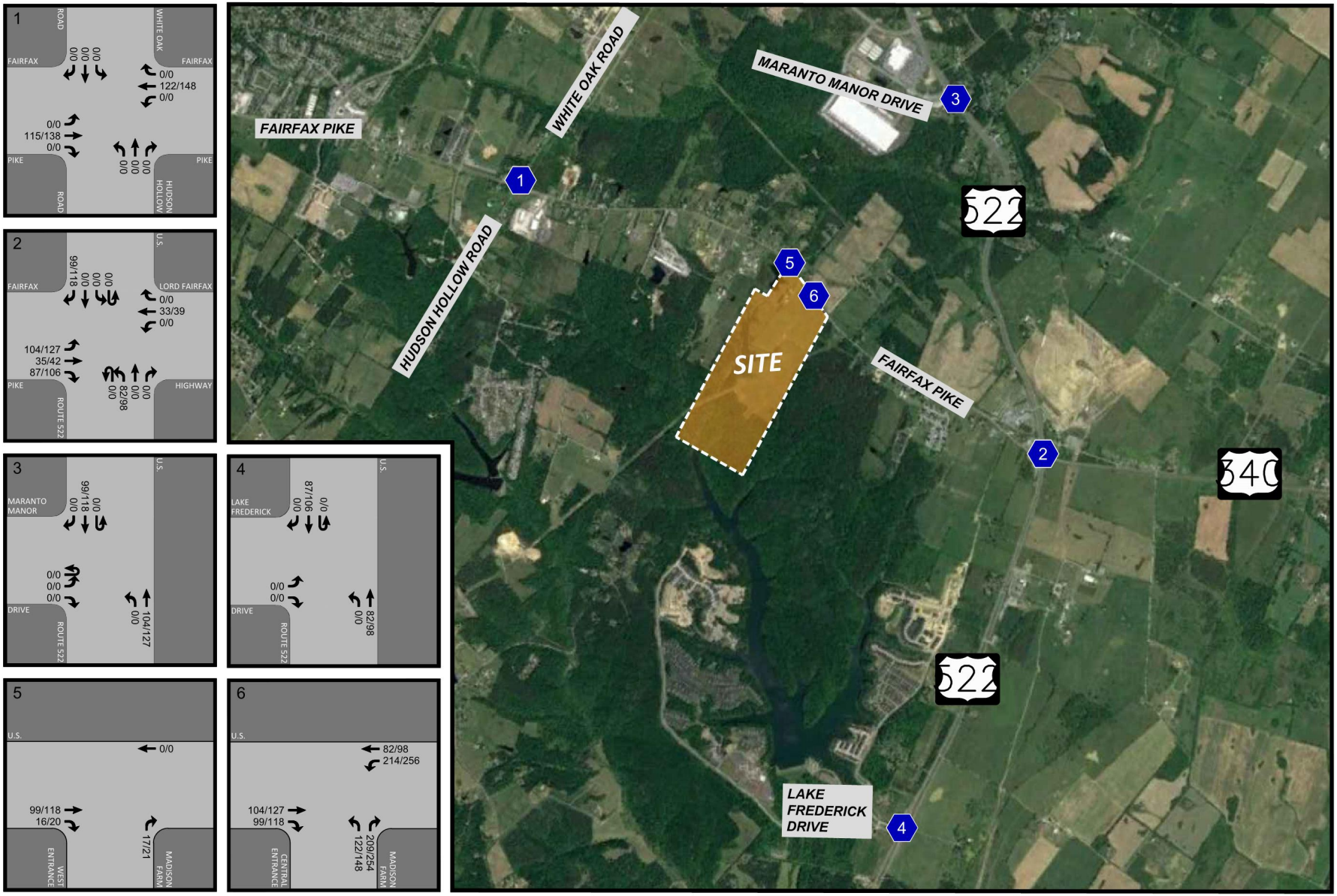


Figure 5-2
SIte Generated Trips

AM PEAK HOUR
PM PEAK HOUR
000 / 000

NORTH
Madison Farms 277
Frederick County, VA

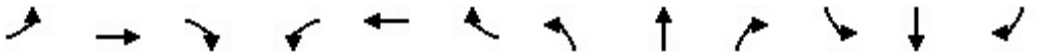
G. 2035 Future Conditions without Development – Capacity Analysis Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	159	574	424	176	639	137	85	101	64	299	167
v/c Ratio	0.82	0.69	0.48	1.33	0.87	0.16	0.62	0.44	0.20	1.09	0.34
Control Delay	82.9	33.1	15.1	237.3	46.9	2.1	58.5	25.6	38.8	130.8	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	82.9	33.1	15.1	237.3	46.9	2.1	58.5	25.6	38.8	130.8	7.4
Queue Length 50th (ft)	132	425	184	~192	471	0	56	20	41	~340	0
Queue Length 95th (ft)	#242	523	270	#343	608	25	#133	#96	83	#555	55
Internal Link Dist (ft)		496			4165			244		594	
Turn Bay Length (ft)	260		500	270		575	190		150		
Base Capacity (vph)	204	919	888	132	812	868	146	228	360	275	496
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.62	0.48	1.33	0.79	0.16	0.58	0.44	0.18	1.09	0.34

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	146	528	390	162	588	126	78	25	68	59	275	154
Future Volume (veh/h)	146	528	390	162	588	126	78	25	68	59	275	154
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.99	0.98		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1752	1796	1796	1722	1856	966	907	848	1870	1841	1781
Adj Flow Rate, veh/h	159	574	384	176	639	63	85	27	8	64	299	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	10	7	7	12	3	63	67	71	2	4	8
Cap, veh/h	184	937	955	134	851	836	141	93	28	270	176	295
Arrive On Green	0.10	0.54	0.54	0.08	0.49	0.49	0.09	0.14	0.14	0.05	0.10	0.10
Sat Flow, veh/h	1753	1752	1521	1711	1722	1537	920	670	198	1781	1841	1431
Grp Volume(v), veh/h	159	574	384	176	639	63	85	0	35	64	299	33
Grp Sat Flow(s),veh/h/ln	1753	1752	1521	1711	1722	1537	920	0	868	1781	1841	1431
Q Serve(g_s), s	11.6	29.5	16.3	10.2	38.8	2.5	10.6	0.0	4.7	4.1	12.4	2.5
Cycle Q Clear(g_c), s	11.6	29.5	16.3	10.2	38.8	2.5	10.6	0.0	4.7	4.1	12.4	2.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.23	1.00		1.00
Lane Grp Cap(c), veh/h	184	937	955	134	851	836	141	0	121	270	176	295
V/C Ratio(X)	0.87	0.61	0.40	1.31	0.75	0.08	0.60	0.00	0.29	0.24	1.70	0.11
Avail Cap(c_a), veh/h	206	937	955	134	851	836	143	0	121	354	176	295
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.59	0.59	0.59	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.3	20.9	12.1	59.9	26.4	14.2	46.9	0.0	50.2	49.4	58.8	42.6
Incr Delay (d2), s/veh	27.7	3.0	1.3	167.9	3.6	0.1	6.8	0.0	1.3	0.4	339.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.4	12.1	5.9	10.6	15.8	0.9	2.7	0.0	1.1	1.9	22.4	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	84.9	23.9	13.3	227.8	30.1	14.3	53.8	0.0	51.5	49.9	398.3	42.7
LnGrp LOS	F	C	B	F	C	B	D	A	D	D	F	D
Approach Vol, veh/h		1117			878			120			396	
Approach Delay, s/veh		28.9			68.6			53.1			312.3	
Approach LOS		C			E			D			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	22.3	70.0	12.9	24.7	17.0	75.4	18.6	19.0
Change Period (Y+Rc), s	* 8.7	* 5.8	6.6	6.6	* 6.8	5.8	6.6	6.6
Max Green Setting (Gmax), s	* 15	* 62	12.4	12.4	* 10	69.2	12.4	12.4
Max Q Clear Time (g_c+I1), s	13.6	40.8	6.1	6.7	12.2	31.5	12.6	14.4
Green Ext Time (p_c), s	0.1	6.0	0.1	0.0	0.0	8.7	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	88.6
HCM 6th LOS	F

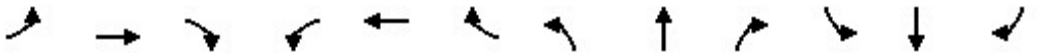
Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	229	536	22	2	548	34	94	219
v/c Ratio	0.52	0.54	0.02	0.00	0.74	0.05	0.41	0.55
Control Delay	9.4	11.5	0.1	4.0	20.9	0.4	23.8	14.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.4	11.5	0.1	4.0	20.9	0.4	23.8	14.3
Queue Length 50th (ft)	25	90	0	0	147	0	20	17
Queue Length 95th (ft)	62	275	0	2	287	2	69	86
Internal Link Dist (ft)		4165			4595		176	167
Turn Bay Length (ft)	145		90	125		155		
Base Capacity (vph)	443	1170	1059	566	1143	1007	475	686
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.46	0.02	0.00	0.48	0.03	0.20	0.32

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	211	493	20	2	504	31	46	10	30	44	7	150
Future Volume (veh/h)	211	493	20	2	504	31	46	10	30	44	7	150
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1767	1752	1811	1870	1722	1737	1796	1752	1796	1826	1648	1707
Adj Flow Rate, veh/h	229	536	11	2	548	14	50	11	6	48	8	17
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	9	10	6	2	12	11	7	10	7	5	17	13
Cap, veh/h	445	930	815	426	749	640	247	48	17	212	40	41
Arrive On Green	0.10	0.53	0.53	0.00	0.44	0.44	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	1682	1752	1535	1781	1722	1472	973	378	133	746	315	322
Grp Volume(v), veh/h	229	536	11	2	548	14	67	0	0	73	0	0
Grp Sat Flow(s),veh/h/ln	1682	1752	1535	1781	1722	1472	1484	0	0	1383	0	0
Q Serve(g_s), s	3.7	10.5	0.2	0.0	13.4	0.3	0.0	0.0	0.0	0.4	0.0	0.0
Cycle Q Clear(g_c), s	3.7	10.5	0.2	0.0	13.4	0.3	1.8	0.0	0.0	2.2	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.75		0.09	0.66		0.23
Lane Grp Cap(c), veh/h	445	930	815	426	749	640	312	0	0	293	0	0
V/C Ratio(X)	0.51	0.58	0.01	0.00	0.73	0.02	0.21	0.00	0.00	0.25	0.00	0.00
Avail Cap(c_a), veh/h	445	1383	1212	597	1360	1162	815	0	0	771	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.8	8.0	5.6	6.6	11.9	8.2	20.1	0.0	0.0	20.3	0.0	0.0
Incr Delay (d2), s/veh	1.0	1.2	0.0	0.0	3.0	0.0	0.3	0.0	0.0	0.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	2.6	0.0	0.0	4.1	0.1	0.6	0.0	0.0	0.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.9	9.2	5.6	6.6	14.8	8.2	20.4	0.0	0.0	20.7	0.0	0.0
LnGrp LOS	A	A	A	A	B	A	C	A	A	C	A	A
Approach Vol, veh/h		776			564			67			73	
Approach Delay, s/veh		9.4			14.6			20.4			20.7	
Approach LOS		A			B			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.6	34.7		11.3	9.5	29.8		11.3				
Change Period (Y+Rc), s	4.5	7.8		4.9	4.5	7.8		4.9				
Max Green Setting (Gmax), s	5.0	40.0		25.0	5.0	40.0		25.0				
Max Q Clear Time (g_c+I1), s	2.0	12.5		3.8	5.7	15.4		4.2				
Green Ext Time (p_c), s	0.0	6.7		0.2	0.0	6.7		0.3				

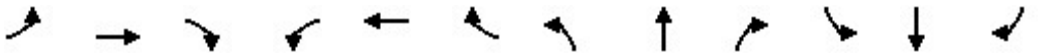
Intersection Summary												
HCM 6th Ctrl Delay			12.4									
HCM 6th LOS			B									

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	570	238	118	185	239	459	212	97	365	182
v/c Ratio	1.65	0.54	0.50	0.68	1.07	0.64	0.43	0.61	0.66	0.44
Control Delay	334.0	13.7	47.3	50.4	124.5	41.3	6.2	63.6	45.3	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	334.0	13.7	47.3	50.4	124.5	41.3	6.2	63.6	45.3	5.3
Queue Length 50th (ft)	~541	18	71	104	~174	143	0	61	116	0
Queue Length 95th (ft)	#837	100	130	182	#367	214	46	#139	178	25
Internal Link Dist (ft)	1857			694		8434			5712	
Turn Bay Length (ft)		230	500		565		250	125		480
Base Capacity (vph)	346	439	385	431	223	808	529	171	660	448
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.65	0.54	0.31	0.43	1.07	0.57	0.40	0.57	0.55	0.41

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	237	287	219	109	120	51	220	422	195	89	336	167
Future Volume (veh/h)	237	287	219	109	120	51	220	422	195	89	336	167
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1767	1841	1663	1663	1767	1856	1722	1752	1707	1841	1618	1411
Adj Flow Rate, veh/h	258	312	60	118	130	40	239	459	33	97	365	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	9	4	16	16	9	3	12	10	13	4	19	33
Cap, veh/h	173	209	299	204	167	51	243	751	326	123	489	
Arrive On Green	0.21	0.21	0.21	0.13	0.13	0.13	0.15	0.23	0.23	0.07	0.16	0.00
Sat Flow, veh/h	815	985	1409	1584	1296	399	1640	3328	1447	1753	3075	1196
Grp Volume(v), veh/h	570	0	60	118	0	170	239	459	33	97	365	0
Grp Sat Flow(s),veh/h/ln	1800	0	1409	1584	0	1695	1640	1664	1447	1753	1537	1196
Q Serve(g_s), s	20.0	0.0	3.3	6.6	0.0	9.2	13.7	11.7	1.7	5.1	10.7	0.0
Cycle Q Clear(g_c), s	20.0	0.0	3.3	6.6	0.0	9.2	13.7	11.7	1.7	5.1	10.7	0.0
Prop In Lane	0.45		1.00	1.00		0.24	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	382	0	299	204	0	218	243	751	326	123	489	
V/C Ratio(X)	1.49	0.00	0.20	0.58	0.00	0.78	0.98	0.61	0.10	0.79	0.75	
Avail Cap(c_a), veh/h	382	0	299	420	0	449	243	878	382	186	717	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	37.2	0.0	30.6	38.7	0.0	39.8	40.1	32.8	29.0	43.2	37.9	0.0
Incr Delay (d2), s/veh	235.8	0.0	0.3	2.6	0.0	5.9	52.8	1.3	0.2	12.1	3.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	33.4	0.0	1.1	2.6	0.0	4.0	8.7	4.5	0.6	2.5	4.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	273.0	0.0	30.9	41.3	0.0	45.7	92.8	34.1	29.2	55.3	41.2	0.0
LnGrp LOS	F	A	C	D	A	D	F	C	C	E	D	
Approach Vol, veh/h		630			288			731			462	
Approach Delay, s/veh		249.9			43.9			53.1			44.2	
Approach LOS		F			D			D			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	22.3	21.7		20.5	16.0	28.0		29.9				
Change Period (Y+Rc), s	8.3	6.7		* 8.3	* 9.4	6.7		9.9				
Max Green Setting (Gmax), s	14.0	22.0		* 25	* 10	24.9		20.0				
Max Q Clear Time (g_c+I1), s	15.7	12.7		11.2	7.1	13.7		22.0				
Green Ext Time (p_c), s	0.0	1.8		1.0	0.0	2.8		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		108.6
HCM 6th LOS		F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Group Flow (vph)	157	100	40	723	2	628	61
v/c Ratio	0.50	0.18	0.11	0.46	0.00	0.57	0.11
Control Delay	35.6	4.9	9.6	14.2	8.0	22.5	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.6	4.9	9.6	14.2	8.0	22.5	5.7
Queue Length 50th (ft)	65	0	7	89	0	123	0
Queue Length 95th (ft)	144	31	23	234	3	205	25
Internal Link Dist (ft)	414			1077		8434	
Turn Bay Length (ft)			470		275		295
Base Capacity (vph)	637	630	644	2008	673	1733	849
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.16	0.06	0.36	0.00	0.36	0.07

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (veh/h)	144	92	37	665	2	578	56
Future Volume (veh/h)	144	92	37	665	2	578	56
Initial Q (Qb), veh	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00				1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach	No			No		No	
Adj Sat Flow, veh/h/ln	1870	1752	1589	1648		1604	1707
Adj Flow Rate, veh/h	157	24	40	723		628	16
Peak Hour Factor	0.92	0.92	0.92	0.92		0.92	0.92
Percent Heavy Veh, %	2	10	21	17		20	13
Cap, veh/h	218	242	292	1185		1024	486
Arrive On Green	0.12	0.12	0.04	0.38		0.34	0.34
Sat Flow, veh/h	1781	1485	1513	3214		3127	1447
Grp Volume(v), veh/h	157	24	40	723		628	16
Grp Sat Flow(s),veh/h/ln	1781	1485	1513	1566		1523	1447
Q Serve(g_s), s	5.0	0.0	0.0	11.1		10.2	0.4
Cycle Q Clear(g_c), s	5.0	0.0	0.0	11.1		10.2	0.4
Prop In Lane	1.00	1.00	1.00				1.00
Lane Grp Cap(c), veh/h	218	242	292	1185		1024	486
V/C Ratio(X)	0.72	0.10	0.14	0.61		0.61	0.03
Avail Cap(c_a), veh/h	751	686	741	2377		2056	976
HCM Platoon Ratio	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	25.1	21.1	19.9	14.9		16.5	13.2
Incr Delay (d2), s/veh	5.4	0.2	0.3	1.1		1.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.4	0.4	3.1		2.9	0.1
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	30.4	21.3	20.2	16.0		17.7	13.3
LnGrp LOS	C	C	C	B		B	B
Approach Vol, veh/h	181			763		644	
Approach Delay, s/veh	29.2			16.2		17.6	
Approach LOS	C			B		B	

Timer - Assigned Phs		2		4	5	6	
Phs Duration (G+Y+Rc), s		32.9		15.9	12.9	30.4	
Change Period (Y+Rc), s		10.5		8.7	10.5	10.5	
Max Green Setting (Gmax), s		45.0		25.0	20.0	40.0	
Max Q Clear Time (g_c+I1), s		13.1		7.0	2.0	12.2	
Green Ext Time (p_c), s		9.4		0.6	0.1	7.7	

Intersection Summary		
HCM 6th Ctrl Delay		18.3
HCM 6th LOS		B

Notes

User approved ignoring U-Turning movement.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	56	203	165	567	474	79
v/c Ratio	0.41	0.48	0.51	0.23	0.29	0.07
Control Delay	55.7	10.4	55.5	3.4	13.6	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.7	10.4	55.5	3.4	13.6	1.4
Queue Length 50th (ft)	38	0	59	40	85	0
Queue Length 95th (ft)	77	37	91	62	136	14
Internal Link Dist (ft)	446			1419	813	
Turn Bay Length (ft)		250	485			315
Base Capacity (vph)	313	704	615	2434	1638	1320
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.29	0.27	0.23	0.29	0.06

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	54	197	160	550	0	460	77
Future Volume (vph)	54	197	160	550	0	460	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Lane Util. Factor	1.00	0.88	0.97	0.95		0.95	1.00
Frt	1.00	0.85	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (prot)	1583	2733	3273	3195		2888	1583
Flt Permitted	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (perm)	1583	2733	3273	3195		2888	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.92	0.97	0.97
Adj. Flow (vph)	56	203	165	567	0	474	79
RTOR Reduction (vph)	0	185	0	0	0	0	27
Lane Group Flow (vph)	56	18	165	567	0	474	52
Heavy Vehicles (%)	14%	4%	7%	13%	2%	25%	2%
Turn Type	Prot	Prot	Prot	NA	Prot	NA	pm+ov
Protected Phases	7	4	1	6	5	2	7
Permitted Phases		4					2
Actuated Green, G (s)	9.6	9.6	10.9	83.8		62.4	72.0
Effective Green, g (s)	9.6	9.6	10.9	83.8		62.4	72.0
Actuated g/C Ratio	0.09	0.09	0.10	0.76		0.57	0.65
Clearance Time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Vehicle Extension (s)	3.0	3.0	3.0	3.5		3.5	3.0
Lane Grp Cap (vph)	138	238	324	2434		1638	1036
v/s Ratio Prot	c0.04	0.01	c0.05	0.18		c0.16	0.00
v/s Ratio Perm							0.03
v/c Ratio	0.41	0.07	0.51	0.23		0.29	0.05
Uniform Delay, d1	47.5	46.1	47.0	3.8		12.3	6.8
Progression Factor	1.00	1.00	1.07	0.80		1.00	1.00
Incremental Delay, d2	1.9	0.1	1.3	0.2		0.4	0.0
Delay (s)	49.4	46.3	51.6	3.3		12.8	6.8
Level of Service	D	D	D	A		B	A
Approach Delay (s)	46.9			14.2		11.9	
Approach LOS	D			B		B	

Intersection Summary			
HCM 2000 Control Delay	18.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	27.1
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM 6th Edition methodology supports red clearance in the range of 0 to 6 seconds.

Intersection	
Int Delay, s/veh	12.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	730	46	36	561	122	97
Future Vol, veh/h	730	46	36	561	122	97
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	150	150	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	793	50	39	610	133	105

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	843	0	1481	793
Stage 1	-	-	-	-	793	-
Stage 2	-	-	-	-	688	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	793	-	138	389
Stage 1	-	-	-	-	446	-
Stage 2	-	-	-	-	499	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	793	-	~ 131	389
Mov Cap-2 Maneuver	-	-	-	-	~ 131	-
Stage 1	-	-	-	-	446	-
Stage 2	-	-	-	-	475	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	89.8
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	131	389	-	-	793	-
HCM Lane V/C Ratio	1.012	0.271	-	-	0.049	-
HCM Control Delay (s)	147.2	17.7	-	-	9.8	-
HCM Lane LOS	F	C	-	-	A	-
HCM 95th %tile Q(veh)	7.2	1.1	-	-	0.2	-

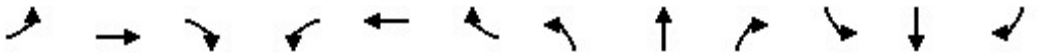
Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	307	775	182	161	786	139	200	254	104	60	379
v/c Ratio	1.10	0.83	0.16	1.22	1.02	0.16	0.76	1.24	0.50	0.40	0.75
Control Delay	126.2	36.0	2.8	192.3	70.7	1.0	58.4	174.1	44.3	55.9	35.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	126.2	36.0	2.8	192.3	70.7	1.0	58.4	174.1	44.3	55.9	35.9
Queue Length 50th (ft)	~248	497	0	~140	~591	0	123	~186	60	41	175
Queue Length 95th (ft)	#418	#691	53	#274	#826	11	#216	#351	110	84	287
Internal Link Dist (ft)		496			4165			244		594	
Turn Bay Length (ft)	260		500	270		575	190		150		
Base Capacity (vph)	278	933	1132	132	769	870	264	205	218	159	505
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.10	0.83	0.16	1.22	1.02	0.16	0.76	1.24	0.48	0.38	0.75

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	282	713	167	148	723	128	184	86	148	96	55	349
Future Volume (veh/h)	282	713	167	148	723	128	184	86	148	96	55	349
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	0.99		0.99	0.99		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1870	1693	1841	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	307	775	106	161	786	62	200	93	100	104	60	295
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	4	2	14	4	2	2	2	2	2	2	2
Cap, veh/h	280	997	994	135	830	808	274	84	90	187	160	382
Arrive On Green	0.16	0.54	0.54	0.08	0.45	0.45	0.09	0.10	0.10	0.07	0.09	0.09
Sat Flow, veh/h	1781	1841	1585	1612	1841	1552	1781	818	879	1781	1870	1557
Grp Volume(v), veh/h	307	775	106	161	786	62	200	0	193	104	60	295
Grp Sat Flow(s),veh/h/ln	1781	1841	1585	1612	1841	1552	1781	0	1697	1781	1870	1557
Q Serve(g_s), s	17.3	36.7	2.9	9.2	45.0	2.2	9.4	0.0	11.3	5.8	3.3	9.4
Cycle Q Clear(g_c), s	17.3	36.7	2.9	9.2	45.0	2.2	9.4	0.0	11.3	5.8	3.3	9.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.52	1.00		1.00
Lane Grp Cap(c), veh/h	280	997	994	135	830	808	274	0	175	187	160	382
V/C Ratio(X)	1.10	0.78	0.11	1.19	0.95	0.08	0.73	0.00	1.11	0.56	0.38	0.77
Avail Cap(c_a), veh/h	280	997	994	135	830	808	274	0	175	218	160	382
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.45	0.45	0.45	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.3	19.9	8.2	50.4	28.9	13.3	43.4	0.0	49.3	42.3	47.5	38.9
Incr Delay (d2), s/veh	81.8	5.9	0.2	115.4	11.7	0.1	9.5	0.0	99.2	2.6	1.5	9.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.7	15.6	1.0	7.9	20.8	0.8	1.5	0.0	9.6	2.7	1.6	8.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	128.2	25.9	8.4	165.8	40.6	13.3	53.0	0.0	148.5	44.8	49.0	48.2
LnGrp LOS	F	C	A	F	D	B	D	A	F	D	D	D
Approach Vol, veh/h		1188			1009			393			459	
Approach Delay, s/veh		50.8			58.9			99.9			47.6	
Approach LOS		D			E			F			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	26.0	55.5	14.1	17.9	16.0	65.5	16.0	16.0
Change Period (Y+Rc), s	* 8.7	* 5.8	6.6	6.6	* 6.8	5.8	6.6	6.6
Max Green Setting (Gmax), s	* 17	* 46	9.4	9.4	* 9.2	56.2	9.4	9.4
Max Q Clear Time (g_c+I1), s	19.3	47.0	7.8	13.3	11.2	38.7	11.4	11.4
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	7.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	59.3
HCM 6th LOS	E

Notes

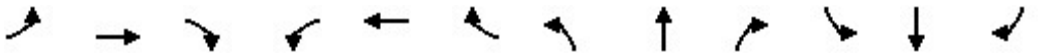
User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	158	616	46	26	815	38	78	234
v/c Ratio	0.48	0.56	0.05	0.05	0.83	0.04	0.63	0.60
Control Delay	8.7	12.1	1.0	3.6	23.7	0.6	49.3	15.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.7	12.1	1.0	3.6	23.7	0.6	49.3	15.4
Queue Length 50th (ft)	16	110	0	2	270	0	30	23
Queue Length 95th (ft)	40	320	7	10	#560	3	#76	85
Internal Link Dist (ft)		4165			4595		176	167
Turn Bay Length (ft)	145		90	125		155		
Base Capacity (vph)	331	1096	1016	526	993	904	270	664
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.56	0.05	0.05	0.82	0.04	0.29	0.35

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	155	604	45	25	799	37	45	22	10	24	31	174
Future Volume (veh/h)	155	604	45	25	799	37	45	22	10	24	31	174
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1781	1870	1841	1826	1870	1870	1752	1870	1870	1841	1870
Adj Flow Rate, veh/h	158	616	28	26	815	21	46	22	2	24	32	23
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	8	2	4	5	2	2	10	2	2	4	2
Cap, veh/h	350	1032	918	441	975	846	194	75	5	112	101	57
Arrive On Green	0.07	0.58	0.58	0.03	0.53	0.53	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1781	1781	1585	1753	1826	1585	832	630	43	318	847	479
Grp Volume(v), veh/h	158	616	28	26	815	21	70	0	0	79	0	0
Grp Sat Flow(s),veh/h/ln	1781	1781	1585	1753	1826	1585	1505	0	0	1644	0	0
Q Serve(g_s), s	2.4	14.0	0.5	0.4	23.7	0.4	0.0	0.0	0.0	0.1	0.0	0.0
Cycle Q Clear(g_c), s	2.4	14.0	0.5	0.4	23.7	0.4	2.4	0.0	0.0	2.6	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.66		0.03	0.30		0.29
Lane Grp Cap(c), veh/h	350	1032	918	441	975	846	274	0	0	270	0	0
V/C Ratio(X)	0.45	0.60	0.03	0.06	0.84	0.02	0.26	0.00	0.00	0.29	0.00	0.00
Avail Cap(c_a), veh/h	359	1131	1006	529	1159	1006	660	0	0	712	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.2	8.5	5.7	6.5	12.4	6.9	25.5	0.0	0.0	25.6	0.0	0.0
Incr Delay (d2), s/veh	0.9	1.3	0.0	0.1	5.9	0.0	0.5	0.0	0.0	0.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	4.0	0.1	0.1	8.4	0.1	0.9	0.0	0.0	1.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.1	9.8	5.7	6.6	18.3	7.0	26.0	0.0	0.0	26.2	0.0	0.0
LnGrp LOS	B	A	A	A	B	A	C	A	A	C	A	A
Approach Vol, veh/h		802			862			70			79	
Approach Delay, s/veh		10.1			17.7			26.0			26.2	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.3	44.3		12.4	9.2	41.4		12.4				
Change Period (Y+Rc), s	4.5	7.8		4.9	4.5	7.8		4.9				
Max Green Setting (Gmax), s	5.0	40.0		25.0	5.0	40.0		25.0				
Max Q Clear Time (g_c+I1), s	2.4	16.0		4.4	4.4	25.7		4.6				
Green Ext Time (p_c), s	0.0	7.8		0.2	0.0	7.9		0.3				

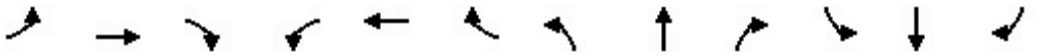
Intersection Summary												
HCM 6th Ctrl Delay			15.0									
HCM 6th LOS			B									

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	500	328	239	481	372	663	183	93	618	283
v/c Ratio	1.66	0.69	0.65	1.23	1.79	0.89	0.35	0.66	0.94	0.53
Control Delay	340.9	19.3	50.3	163.2	403.9	58.6	3.7	72.7	69.4	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	340.9	19.3	50.3	163.2	403.9	58.6	3.7	72.7	69.4	8.6
Queue Length 50th (ft)	~534	46	161	~433	~410	251	0	67	237	0
Queue Length 95th (ft)	#742	150	250	#644	#598	#360	25	#136	#350	73
Internal Link Dist (ft)	1857			694		8434			5712	
Turn Bay Length (ft)		230	500		565		250	125		480
Base Capacity (vph)	302	475	365	390	208	745	519	150	656	533
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.66	0.69	0.65	1.23	1.79	0.89	0.35	0.62	0.94	0.53

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	286	174	302	220	348	95	342	610	168	86	569	260
Future Volume (veh/h)	286	174	302	220	348	95	342	610	168	86	569	260
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1811	1796	1781	1826	1796	1811	1781	1796	1826	1811	1870
Adj Flow Rate, veh/h	311	189	99	239	378	93	372	663	29	93	618	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	6	7	8	5	7	6	8	7	5	6	2
Cap, veh/h	191	116	267	371	310	76	211	808	363	116	663	
Arrive On Green	0.18	0.18	0.18	0.22	0.22	0.22	0.12	0.24	0.24	0.07	0.19	0.00
Sat Flow, veh/h	1093	664	1522	1697	1415	348	1725	3385	1522	1739	3441	1585
Grp Volume(v), veh/h	500	0	99	239	0	471	372	663	29	93	618	0
Grp Sat Flow(s),veh/h/ln	1756	0	1522	1697	0	1763	1725	1692	1522	1739	1721	1585
Q Serve(g_s), s	20.0	0.0	6.6	14.6	0.0	25.0	14.0	21.2	1.7	6.0	20.2	0.0
Cycle Q Clear(g_c), s	20.0	0.0	6.6	14.6	0.0	25.0	14.0	21.2	1.7	6.0	20.2	0.0
Prop In Lane	0.62		1.00	1.00		0.20	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	308	0	267	371	0	386	211	808	363	116	663	
V/C Ratio(X)	1.63	0.00	0.37	0.64	0.00	1.22	1.76	0.82	0.08	0.80	0.93	
Avail Cap(c_a), veh/h	308	0	267	371	0	386	211	808	363	152	663	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	47.1	0.0	41.6	40.5	0.0	44.6	50.1	41.1	33.7	52.5	45.4	0.0
Incr Delay (d2), s/veh	295.9	0.0	0.9	3.8	0.0	120.4	360.4	7.0	0.1	19.8	20.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	33.8	0.0	2.5	6.4	0.0	23.5	26.9	9.1	0.6	3.2	10.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	343.0	0.0	42.4	44.3	0.0	165.0	410.5	48.2	33.9	72.4	65.7	0.0
LnGrp LOS	F	A	D	D	A	F	F	D	C	E	E	
Approach Vol, veh/h		599			710			1064			711	
Approach Delay, s/veh		293.3			124.4			174.5			66.6	
Approach LOS		F			F			F			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	22.3	28.7		33.3	17.0	34.0		29.9				
Change Period (Y+Rc), s	8.3	6.7		* 8.3	* 9.4	6.7		9.9				
Max Green Setting (Gmax), s	14.0	22.0		* 25	* 10	24.9		20.0				
Max Q Clear Time (g_c+I1), s	16.0	22.2		27.0	8.0	23.2		22.0				
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	0.9		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		161.1
HCM 6th LOS		F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	182	99	124	988	927	205
v/c Ratio	0.61	0.18	0.37	0.48	0.72	0.28
Control Delay	45.0	15.3	16.0	10.7	27.2	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.0	15.3	16.0	10.7	27.2	4.1
Queue Length 50th (ft)	101	27	27	146	225	0
Queue Length 95th (ft)	177	62	58	227	349	45
Internal Link Dist (ft)	414			1077	8434	
Turn Bay Length (ft)			470			295
Base Capacity (vph)	503	540	550	2080	1507	832
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.18	0.23	0.47	0.62	0.25

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (veh/h)	167	91	114	909	0	853	189
Future Volume (veh/h)	167	91	114	909	0	853	189
Initial Q (Qb), veh	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00				1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach	No			No		No	
Adj Sat Flow, veh/h/ln	1870	1722	1826	1781		1767	1870
Adj Flow Rate, veh/h	182	75	124	988		927	70
Peak Hour Factor	0.92	0.92	0.92	0.92		0.92	0.92
Percent Heavy Veh, %	2	12	5	8		9	2
Cap, veh/h	243	290	300	1447		1343	634
Arrive On Green	0.14	0.14	0.06	0.43		0.40	0.40
Sat Flow, veh/h	1781	1459	1739	3474		3445	1585
Grp Volume(v), veh/h	182	75	124	988		927	70
Grp Sat Flow(s),veh/h/ln	1781	1459	1739	1692		1678	1585
Q Serve(g_s), s	7.3	0.0	0.0	17.5		16.9	2.1
Cycle Q Clear(g_c), s	7.3	0.0	0.0	17.5		16.9	2.1
Prop In Lane	1.00	1.00	1.00				1.00
Lane Grp Cap(c), veh/h	243	290	300	1447		1343	634
V/C Ratio(X)	0.75	0.26	0.41	0.68		0.69	0.11
Avail Cap(c_a), veh/h	602	584	661	2058		1814	856
HCM Platoon Ratio	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	30.7	25.1	27.7	17.1		18.4	13.9
Incr Delay (d2), s/veh	5.5	0.6	1.1	1.2		1.4	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	0.0	2.0	5.7		5.6	0.6
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	36.2	25.6	28.8	18.4		19.8	14.1
LnGrp LOS	D	C	C	B		B	B
Approach Vol, veh/h	257			1112		997	
Approach Delay, s/veh	33.1			19.5		19.4	
Approach LOS	C			B		B	

Timer - Assigned Phs		2		4	5	6	
Phs Duration (G+Y+Rc), s		42.1		18.8	15.1	40.1	
Change Period (Y+Rc), s		10.5		8.7	10.5	10.5	
Max Green Setting (Gmax), s		45.0		25.0	20.0	40.0	
Max Q Clear Time (g_c+I1), s		19.5		9.3	2.0	18.9	
Green Ext Time (p_c), s		12.2		0.9	0.3	10.7	

Intersection Summary		
HCM 6th Ctrl Delay		21.0
HCM 6th LOS		C

Notes

User approved ignoring U-Turning movement.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	175	245	295	704	778	119
v/c Ratio	0.68	0.40	0.65	0.31	0.49	0.11
Control Delay	57.1	6.9	56.7	5.4	22.7	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.1	6.9	56.7	5.4	22.7	1.6
Queue Length 50th (ft)	119	0	109	67	193	0
Queue Length 95th (ft)	181	36	125	94	293	20
Internal Link Dist (ft)	446			1419	813	
Turn Bay Length (ft)		250	485			315
Base Capacity (vph)	350	749	627	2285	1590	1187
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.33	0.47	0.31	0.49	0.10

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	168	235	283	676	0	747	114
Future Volume (vph)	168	235	283	676	0	747	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Lane Util. Factor	1.00	0.88	0.97	0.95		0.95	1.00
Frt	1.00	0.85	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (prot)	1770	2787	3335	3252		3374	1583
Flt Permitted	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (perm)	1770	2787	3335	3252		3374	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.92	0.96	0.96
Adj. Flow (vph)	175	245	295	704	0	778	119
RTOR Reduction (vph)	0	209	0	0	0	0	46
Lane Group Flow (vph)	175	36	295	704	0	778	73
Heavy Vehicles (%)	2%	2%	5%	11%	2%	7%	2%
Turn Type	Prot	Prot	Prot	NA	Prot	NA	pm+ov
Protected Phases	7	4	1	6	5	2	7
Permitted Phases		4					2
Actuated Green, G (s)	16.1	16.1	15.0	77.3		51.8	67.9
Effective Green, g (s)	16.1	16.1	15.0	77.3		51.8	67.9
Actuated g/C Ratio	0.15	0.15	0.14	0.70		0.47	0.62
Clearance Time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Vehicle Extension (s)	3.0	3.0	3.0	3.5		3.5	3.0
Lane Grp Cap (vph)	259	407	454	2285		1588	977
v/s Ratio Prot	c0.10	0.01	c0.09	0.22		c0.23	0.01
v/s Ratio Perm							0.04
v/c Ratio	0.68	0.09	0.65	0.31		0.49	0.08
Uniform Delay, d1	44.5	40.6	45.0	6.2		20.0	8.4
Progression Factor	1.00	1.00	1.11	0.75		1.00	1.00
Incremental Delay, d2	6.8	0.1	3.2	0.3		1.1	0.0
Delay (s)	51.3	40.7	53.3	5.0		21.1	8.5
Level of Service	D	D	D	A		C	A
Approach Delay (s)	45.1			19.3		19.4	
Approach LOS	D			B		B	

Intersection Summary			
HCM 2000 Control Delay	24.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	27.1
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM 6th Edition methodology supports red clearance in the range of 0 to 6 seconds.

Intersection	
Int Delay, s/veh	19.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	804	107	85	974	76	60
Future Vol, veh/h	804	107	85	974	76	60
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	150	150	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	874	116	92	1059	83	65

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	990	0	2117	874
Stage 1	-	-	-	-	874	-
Stage 2	-	-	-	-	1243	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	698	-	~ 56	349
Stage 1	-	-	-	-	408	-
Stage 2	-	-	-	-	272	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	698	-	~ 49	349
Mov Cap-2 Maneuver	-	-	-	-	~ 49	-
Stage 1	-	-	-	-	408	-
Stage 2	-	-	-	-	236	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	295.5
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	49	349	-	-	698	-
HCM Lane V/C Ratio	1.686	0.187	-	-	0.132	-
HCM Control Delay (s)	$ 514.8	17.7	-	-	10.9	-
HCM Lane LOS	F	C	-	-	B	-
HCM 95th %tile Q(veh)	8.1	0.7	-	-	0.5	-

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

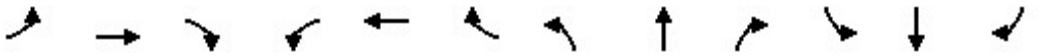
H. 2035 Future Conditions with Development – Capacity Analysis Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	159	718	424	176	685	139	85	101	75	299	167
v/c Ratio	0.82	0.83	0.47	1.33	0.90	0.16	0.63	0.49	0.25	1.22	0.36
Control Delay	83.6	39.7	13.7	237.3	48.2	2.1	61.0	27.7	40.5	175.7	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.6	39.7	13.7	237.3	48.2	2.1	61.0	27.7	40.5	175.7	7.7
Queue Length 50th (ft)	133	572	161	~192	505	0	58	21	50	~371	0
Queue Length 95th (ft)	#241	726	260	#343	#696	25	#128	#96	94	#555	55
Internal Link Dist (ft)		648			4165			244		594	
Turn Bay Length (ft)	260		500	270		575	190		150		
Base Capacity (vph)	204	919	910	132	812	895	143	208	340	245	476
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.78	0.47	1.33	0.84	0.16	0.59	0.49	0.22	1.22	0.35

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	146	661	390	162	630	128	78	25	68	69	275	154
Future Volume (veh/h)	146	661	390	162	630	128	78	25	68	69	275	154
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	0.99		0.99	0.98		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1752	1796	1796	1722	1856	966	907	848	1870	1841	1781
Adj Flow Rate, veh/h	159	718	385	176	685	67	85	27	6	75	299	30
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	10	7	7	12	3	63	67	71	2	4	8
Cap, veh/h	184	937	955	134	851	838	141	99	22	274	176	295
Arrive On Green	0.10	0.53	0.53	0.08	0.49	0.49	0.09	0.14	0.14	0.05	0.10	0.10
Sat Flow, veh/h	1753	1752	1521	1711	1722	1537	920	716	159	1781	1841	1431
Grp Volume(v), veh/h	159	718	385	176	685	67	85	0	33	75	299	30
Grp Sat Flow(s),veh/h/ln	1753	1752	1521	1711	1722	1537	920	0	876	1781	1841	1431
Q Serve(g_s), s	11.6	42.0	16.4	10.2	43.4	2.7	10.6	0.0	4.4	4.9	12.4	2.2
Cycle Q Clear(g_c), s	11.6	42.0	16.4	10.2	43.4	2.7	10.6	0.0	4.4	4.9	12.4	2.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.18	1.00		1.00
Lane Grp Cap(c), veh/h	184	937	955	134	851	838	141	0	121	274	176	295
V/C Ratio(X)	0.87	0.77	0.40	1.31	0.81	0.08	0.60	0.00	0.27	0.27	1.70	0.10
Avail Cap(c_a), veh/h	206	937	955	134	851	838	143	0	121	354	176	295
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.55	0.55	0.55	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.3	23.8	12.1	59.9	27.6	14.1	47.1	0.0	50.2	49.5	58.8	42.5
Incr Delay (d2), s/veh	27.7	6.0	1.3	166.2	4.6	0.1	6.8	0.0	1.2	0.5	339.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.4	17.7	5.9	10.5	17.8	1.0	2.7	0.0	1.0	2.2	22.4	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	84.9	29.8	13.3	226.1	32.2	14.2	53.9	0.0	51.4	50.1	398.3	42.6
LnGrp LOS	F	C	B	F	C	B	D	A	D	D	F	D
Approach Vol, veh/h		1262			928			118			404	
Approach Delay, s/veh		31.7			67.7			53.2			307.2	
Approach LOS		C			E			D			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	22.3	70.0	13.1	24.5	17.0	75.3	18.7	19.0
Change Period (Y+Rc), s	* 8.7	* 5.8	6.6	6.6	* 6.8	5.8	6.6	6.6
Max Green Setting (Gmax), s	* 15	* 62	12.4	12.4	* 10	69.2	12.4	12.4
Max Q Clear Time (g_c+I1), s	13.6	45.4	6.9	6.4	12.2	44.0	12.6	14.4
Green Ext Time (p_c), s	0.1	5.9	0.1	0.0	0.0	9.7	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	86.0
HCM 6th LOS	F

Notes

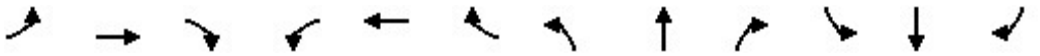
User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	229	691	22	3	596	36	98	230
v/c Ratio	0.55	0.68	0.02	0.01	0.77	0.05	0.42	0.61
Control Delay	11.1	15.5	0.1	4.3	22.3	0.5	23.7	18.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.1	15.5	0.1	4.3	22.3	0.5	23.7	18.6
Queue Length 50th (ft)	25	136	0	0	170	0	21	30
Queue Length 95th (ft)	70	#488	0	3	351	3	69	105
Internal Link Dist (ft)		4165			4595		176	167
Turn Bay Length (ft)	145		90	125		155		
Base Capacity (vph)	413	1123	1019	442	1071	948	449	636
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.62	0.02	0.01	0.56	0.04	0.22	0.36

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	211	636	20	3	548	33	46	10	34	54	7	150
Future Volume (veh/h)	211	636	20	3	548	33	46	10	34	54	7	150
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1767	1752	1811	1870	1722	1737	1796	1752	1796	1826	1648	1707
Adj Flow Rate, veh/h	229	691	11	3	596	16	50	11	5	59	8	38
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	9	10	6	2	12	11	7	10	7	5	17	13
Cap, veh/h	408	946	829	316	781	668	265	52	17	190	39	72
Arrive On Green	0.09	0.54	0.54	0.00	0.45	0.45	0.14	0.14	0.14	0.14	0.14	0.14
Sat Flow, veh/h	1682	1752	1535	1781	1722	1472	1040	356	114	608	268	496
Grp Volume(v), veh/h	229	691	11	3	596	16	66	0	0	105	0	0
Grp Sat Flow(s),veh/h/ln	1682	1752	1535	1781	1722	1472	1510	0	0	1371	0	0
Q Serve(g_s), s	4.0	16.6	0.2	0.0	16.0	0.3	0.0	0.0	0.0	1.8	0.0	0.0
Cycle Q Clear(g_c), s	4.0	16.6	0.2	0.0	16.0	0.3	1.9	0.0	0.0	3.7	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.76		0.08	0.56		0.36
Lane Grp Cap(c), veh/h	408	946	829	316	781	668	333	0	0	300	0	0
V/C Ratio(X)	0.56	0.73	0.01	0.01	0.76	0.02	0.20	0.00	0.00	0.35	0.00	0.00
Avail Cap(c_a), veh/h	408	1268	1111	470	1246	1065	748	0	0	704	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.0	9.7	5.9	8.2	12.6	8.3	21.0	0.0	0.0	21.7	0.0	0.0
Incr Delay (d2), s/veh	1.7	2.6	0.0	0.0	3.3	0.0	0.3	0.0	0.0	0.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	4.7	0.0	0.0	5.1	0.1	0.7	0.0	0.0	1.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.7	12.2	5.9	8.3	16.0	8.4	21.3	0.0	0.0	22.4	0.0	0.0
LnGrp LOS	B	B	A	A	B	A	C	A	A	C	A	A
Approach Vol, veh/h		931			615			66			105	
Approach Delay, s/veh		12.0			15.7			21.3			22.4	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.7	37.6		12.9	9.5	32.9		12.9				
Change Period (Y+Rc), s	4.5	7.8		4.9	4.5	7.8		4.9				
Max Green Setting (Gmax), s	5.0	40.0		25.0	5.0	40.0		25.0				
Max Q Clear Time (g_c+I1), s	2.0	18.6		3.9	6.0	18.0		5.7				
Green Ext Time (p_c), s	0.0	8.4		0.2	0.0	7.1		0.4				

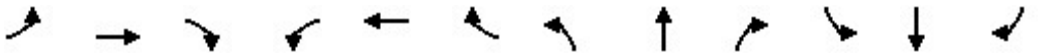
Intersection Summary												
HCM 6th Ctrl Delay			14.3									
HCM 6th LOS			B									

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	610	263	118	234	323	518	212	101	382	191
v/c Ratio	1.84	0.61	0.44	0.76	1.50	0.72	0.43	0.65	0.68	0.46
Control Delay	415.8	17.8	44.2	54.6	283.8	45.5	6.3	68.5	47.4	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	415.8	17.8	44.2	54.6	283.8	45.5	6.3	68.5	47.4	5.9
Queue Length 50th (ft)	~647	35	73	144	~315	174	0	68	128	0
Queue Length 95th (ft)	#921	129	130	231	#522	248	46	#152	191	33
Internal Link Dist (ft)	1857			694		8434			2104	
Turn Bay Length (ft)		230	500		565		250	125		480
Base Capacity (vph)	332	430	370	416	215	778	518	165	636	440
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.84	0.61	0.32	0.56	1.50	0.67	0.41	0.61	0.60	0.43

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	265	296	242	109	153	63	297	477	195	93	351	176
Future Volume (veh/h)	265	296	242	109	153	63	297	477	195	93	351	176
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1767	1841	1663	1663	1767	1856	1722	1752	1707	1841	1618	1411
Adj Flow Rate, veh/h	288	322	84	118	166	53	323	518	33	101	382	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	9	4	16	16	9	3	12	10	13	4	19	33
Cap, veh/h	173	194	287	249	201	64	234	722	314	127	486	
Arrive On Green	0.20	0.20	0.20	0.16	0.16	0.16	0.14	0.22	0.22	0.07	0.16	0.00
Sat Flow, veh/h	849	949	1409	1584	1283	410	1640	3328	1447	1753	3075	1196
Grp Volume(v), veh/h	610	0	84	118	0	219	323	518	33	101	382	0
Grp Sat Flow(s),veh/h/ln	1798	0	1409	1584	0	1693	1640	1664	1447	1753	1537	1196
Q Serve(g_s), s	20.0	0.0	4.9	6.7	0.0	12.3	14.0	14.2	1.8	5.6	11.7	0.0
Cycle Q Clear(g_c), s	20.0	0.0	4.9	6.7	0.0	12.3	14.0	14.2	1.8	5.6	11.7	0.0
Prop In Lane	0.47		1.00	1.00		0.24	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	367	0	287	249	0	266	234	722	314	127	486	
V/C Ratio(X)	1.66	0.00	0.29	0.47	0.00	0.82	1.38	0.72	0.11	0.79	0.79	
Avail Cap(c_a), veh/h	367	0	287	404	0	431	234	845	367	179	690	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	39.0	0.0	33.1	37.7	0.0	40.0	42.0	35.6	30.8	44.8	39.7	0.0
Incr Delay (d2), s/veh	310.4	0.0	0.6	1.4	0.0	6.7	195.3	2.9	0.2	14.9	5.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	40.1	0.0	1.7	2.6	0.0	5.4	18.0	5.6	0.6	2.8	4.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	349.5	0.0	33.6	39.1	0.0	46.7	237.4	38.5	31.0	59.7	44.7	0.0
LnGrp LOS	F	A	C	D	A	D	F	D	C	E	D	
Approach Vol, veh/h		694			337			874			483	
Approach Delay, s/veh		311.3			44.0			111.7			47.8	
Approach LOS		F			D			F			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	22.3	22.2		23.7	16.5	28.0		29.9				
Change Period (Y+Rc), s	8.3	6.7		* 8.3	* 9.4	6.7		9.9				
Max Green Setting (Gmax), s	14.0	22.0		* 25	* 10	24.9		20.0				
Max Q Clear Time (g_c+I1), s	16.0	13.7		14.3	7.6	16.2		22.0				
Green Ext Time (p_c), s	0.0	1.8		1.1	0.0	2.7		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		147.2
HCM 6th LOS		F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Group Flow (vph)	161	100	40	862	2	670	62
v/c Ratio	0.51	0.18	0.11	0.54	0.01	0.60	0.11
Control Delay	37.3	6.6	9.6	14.4	8.0	23.3	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.3	6.6	9.6	14.4	8.0	23.3	5.8
Queue Length 50th (ft)	69	4	8	115	0	136	0
Queue Length 95th (ft)	155	38	23	276	3	230	25
Internal Link Dist (ft)	414			1077		8434	
Turn Bay Length (ft)			470		275		295
Base Capacity (vph)	621	616	620	1977	631	1690	830
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.16	0.06	0.44	0.00	0.40	0.07

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (veh/h)	148	92	37	793	2	616	57
Future Volume (veh/h)	148	92	37	793	2	616	57
Initial Q (Qb), veh	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00				1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach	No			No		No	
Adj Sat Flow, veh/h/ln	1870	1752	1589	1648		1604	1707
Adj Flow Rate, veh/h	161	36	40	862		670	17
Peak Hour Factor	0.92	0.92	0.92	0.92		0.92	0.92
Percent Heavy Veh, %	2	10	21	17		20	13
Cap, veh/h	224	246	285	1354		1065	506
Arrive On Green	0.13	0.13	0.04	0.43		0.35	0.35
Sat Flow, veh/h	1781	1485	1513	3214		3127	1447
Grp Volume(v), veh/h	161	36	40	862		670	17
Grp Sat Flow(s),veh/h/ln	1781	1485	1513	1566		1523	1447
Q Serve(g_s), s	5.3	0.0	0.0	13.2		11.2	0.5
Cycle Q Clear(g_c), s	5.3	0.0	0.0	13.2		11.2	0.5
Prop In Lane	1.00	1.00	1.00				1.00
Lane Grp Cap(c), veh/h	224	246	285	1354		1065	506
V/C Ratio(X)	0.72	0.15	0.14	0.64		0.63	0.03
Avail Cap(c_a), veh/h	726	665	718	2298		1988	944
HCM Platoon Ratio	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	25.8	21.9	20.6	13.6		16.6	13.1
Incr Delay (d2), s/veh	5.2	0.3	0.3	1.1		1.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	0.0	0.4	3.6		3.2	0.1
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	30.9	22.2	20.9	14.7		17.9	13.2
LnGrp LOS	C	C	C	B		B	B
Approach Vol, veh/h	197			902		687	
Approach Delay, s/veh	29.3			15.0		17.8	
Approach LOS	C			B		B	

Timer - Assigned Phs		2		4	5	6	
Phs Duration (G+Y+Rc), s		37.0		16.4	13.0	31.9	
Change Period (Y+Rc), s		10.5		8.7	10.5	10.5	
Max Green Setting (Gmax), s		45.0		25.0	20.0	40.0	
Max Q Clear Time (g_c+I1), s		15.2		7.3	2.0	13.2	
Green Ext Time (p_c), s		11.3		0.7	0.1	8.2	

Intersection Summary	
HCM 6th Ctrl Delay	17.7
HCM 6th LOS	B

Notes

User approved ignoring U-Turning movement.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	56	227	171	594	565	79
v/c Ratio	0.41	0.51	0.52	0.24	0.35	0.07
Control Delay	55.7	10.3	56.6	3.5	14.4	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.7	10.3	56.6	3.5	14.4	1.4
Queue Length 50th (ft)	38	0	61	42	106	0
Queue Length 95th (ft)	77	39	96	66	166	14
Internal Link Dist (ft)	446			1419	813	
Turn Bay Length (ft)		250	485			315
Base Capacity (vph)	313	723	615	2434	1634	1318
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.31	0.28	0.24	0.35	0.06

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	54	220	166	576	0	548	77
Future Volume (vph)	54	220	166	576	0	548	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Lane Util. Factor	1.00	0.88	0.97	0.95		0.95	1.00
Frt	1.00	0.85	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (prot)	1583	2733	3273	3195		2888	1583
Flt Permitted	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (perm)	1583	2733	3273	3195		2888	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	56	227	171	594	0	565	79
RTOR Reduction (vph)	0	207	0	0	0	0	27
Lane Group Flow (vph)	56	20	171	594	0	565	52
Heavy Vehicles (%)	14%	4%	7%	13%	2%	25%	2%
Turn Type	Prot	Prot	Prot	NA	Prot	NA	pm+ov
Protected Phases	7	4	1	6	5	2	7
Permitted Phases		4					2
Actuated Green, G (s)	9.6	9.6	11.1	83.8		62.2	71.8
Effective Green, g (s)	9.6	9.6	11.1	83.8		62.2	71.8
Actuated g/C Ratio	0.09	0.09	0.10	0.76		0.57	0.65
Clearance Time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Vehicle Extension (s)	3.0	3.0	3.0	3.5		3.5	3.0
Lane Grp Cap (vph)	138	238	330	2434		1633	1033
v/s Ratio Prot	c0.04	0.01	c0.05	0.19		c0.20	0.00
v/s Ratio Perm							0.03
v/c Ratio	0.41	0.08	0.52	0.24		0.35	0.05
Uniform Delay, d1	47.5	46.2	46.9	3.8		12.9	6.9
Progression Factor	1.00	1.00	1.09	0.81		1.00	1.00
Incremental Delay, d2	1.9	0.2	1.4	0.2		0.6	0.0
Delay (s)	49.4	46.3	52.7	3.3		13.5	6.9
Level of Service	D	D	D	A		B	A
Approach Delay (s)	46.9			14.4		12.7	
Approach LOS	D			B		B	

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	27.1
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM 6th Edition methodology supports red clearance in the range of 0 to 6 seconds.

Intersection	
Int Delay, s/veh	66.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	81	806	46	36	584	92	122	0	97	28	0	24
Future Vol, veh/h	81	806	46	36	584	92	122	0	97	28	0	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	150	150	-	150	0	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	88	876	50	39	635	100	133	0	105	30	0	26

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	735	0	0	926	0	0	1828	1865	876	1843	1815	635
Stage 1	-	-	-	-	-	-	1052	1052	-	713	713	-
Stage 2	-	-	-	-	-	-	776	813	-	1130	1102	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	870	-	-	738	-	-	~ 59	73	348	58	78	478
Stage 1	-	-	-	-	-	-	274	303	-	423	435	-
Stage 2	-	-	-	-	-	-	390	392	-	248	287	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	870	-	-	738	-	-	~ 49	62	348	36	66	478
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 49	62	-	36	66	-
Stage 1	-	-	-	-	-	-	246	272	-	380	412	-
Stage 2	-	-	-	-	-	-	349	371	-	155	258	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	0.5	$ 537.5	150.5
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	49	348	870	-	-	738	-	-	36	478
HCM Lane V/C Ratio	2.706	0.303	0.101	-	-	0.053	-	-	0.845	0.055
HCM Control Delay (s)	$ 949.1	19.8	9.6	-	-	10.2	-	-	268.3	13
HCM Lane LOS	F	C	A	-	-	B	-	-	F	B
HCM 95th %tile Q(veh)	14	1.3	0.3	-	-	0.2	-	-	3	0.2

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

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↱			↗
Traffic Vol, veh/h	0	930	699	3	0	13
Future Vol, veh/h	0	930	699	3	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1011	760	3	0	14

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	762
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	0	-	-	-	0	405
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	405
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	14.2
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	405
HCM Lane V/C Ratio	-	-	-	0.035
HCM Control Delay (s)	-	-	-	14.2
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	48	882	701	14	5	1
Future Vol, veh/h	48	882	701	14	5	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	-	0	50
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	52	959	762	15	5	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	777	0	-	0	1833	770
Stage 1	-	-	-	-	770	-
Stage 2	-	-	-	-	1063	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	839	-	-	-	84	401
Stage 1	-	-	-	-	457	-
Stage 2	-	-	-	-	332	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	839	-	-	-	79	401
Mov Cap-2 Maneuver	-	-	-	-	79	-
Stage 1	-	-	-	-	429	-
Stage 2	-	-	-	-	332	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	47.2
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	839	-	-	-	79	401
HCM Lane V/C Ratio	0.062	-	-	-	0.069	0.003
HCM Control Delay (s)	9.6	-	-	-	53.9	14
HCM Lane LOS	A	-	-	-	F	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.2	0

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	27	0	11	15	0	1	36	712	53	2	611	92
Future Vol, veh/h	27	0	11	15	0	1	36	712	53	2	611	92
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	50	-	-	50	300	-	150	300	-	150
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	29	0	12	16	0	1	39	774	58	2	664	100

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1133	1578	332	1188	1620	387	764	0	0	832	0	0
Stage 1	668	668	-	852	852	-	-	-	-	-	-	-
Stage 2	465	910	-	336	768	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	158	108	664	144	102	611	845	-	-	796	-	-
Stage 1	414	455	-	321	374	-	-	-	-	-	-	-
Stage 2	547	352	-	652	409	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	152	103	664	136	97	611	845	-	-	796	-	-
Mov Cap-2 Maneuver	272	221	-	238	210	-	-	-	-	-	-	-
Stage 1	395	454	-	306	357	-	-	-	-	-	-	-
Stage 2	521	336	-	639	408	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.1	20.6	0.4	0
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	845	-	-	272	664	238	611	796	-	-
HCM Lane V/C Ratio	0.046	-	-	0.108	0.018	0.069	0.002	0.003	-	-
HCM Control Delay (s)	9.5	-	-	19.8	10.5	21.2	10.9	9.5	-	-
HCM Lane LOS	A	-	-	C	B	C	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	0.1	0.2	0	0	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	2	5	734	6	17	703
Future Vol, veh/h	2	5	734	6	17	703
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	50	-	150	300	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	5	798	7	18	764

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1216	399	0	0	805	0
Stage 1	798	-	-	-	-	-
Stage 2	418	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	173	601	-	-	815	-
Stage 1	404	-	-	-	-	-
Stage 2	632	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	169	601	-	-	815	-
Mov Cap-2 Maneuver	295	-	-	-	-	-
Stage 1	404	-	-	-	-	-
Stage 2	618	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.8	0	0.2
HCM LOS	B		

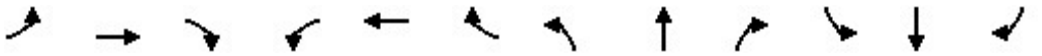
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	295	601	815	-
HCM Lane V/C Ratio	-	-	0.007	0.009	0.023	-
HCM Control Delay (s)	-	-	17.3	11	9.5	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0	0	0.1	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	307	833	182	161	930	150	200	254	109	60	379
v/c Ratio	1.10	0.89	0.16	1.22	1.21	0.17	0.76	1.25	0.51	0.40	0.76
Control Delay	126.4	41.7	2.7	192.3	136.6	1.2	58.3	177.4	45.1	55.9	37.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	126.4	41.7	2.7	192.3	136.6	1.2	58.3	177.4	45.1	55.9	37.1
Queue Length 50th (ft)	~249	561	0	~140	~804	0	123	~186	63	41	180
Queue Length 95th (ft)	#420	#795	53	#274	#1047	15	#215	#351	114	84	293
Internal Link Dist (ft)		648			4165			244		594	
Turn Bay Length (ft)	260		500	270		575	190		150		
Base Capacity (vph)	278	933	1132	132	769	870	264	204	218	159	501
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.10	0.89	0.16	1.22	1.21	0.17	0.76	1.25	0.50	0.38	0.76

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	282	766	167	148	856	138	184	86	148	100	55	349
Future Volume (veh/h)	282	766	167	148	856	138	184	86	148	100	55	349
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	0.99		0.99	0.99		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1870	1693	1841	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	307	833	106	161	930	67	200	93	100	109	60	301
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	4	2	14	4	2	2	2	2	2	2	2
Cap, veh/h	280	997	994	135	830	812	273	82	88	192	160	382
Arrive On Green	0.16	0.54	0.54	0.08	0.45	0.45	0.09	0.10	0.10	0.07	0.09	0.09
Sat Flow, veh/h	1781	1841	1585	1612	1841	1552	1781	817	879	1781	1870	1557
Grp Volume(v), veh/h	307	833	106	161	930	67	200	0	193	109	60	301
Grp Sat Flow(s),veh/h/ln	1781	1841	1585	1612	1841	1552	1781	0	1696	1781	1870	1557
Q Serve(g_s), s	17.3	41.7	2.9	9.2	49.6	2.4	9.4	0.0	11.0	6.0	3.3	9.4
Cycle Q Clear(g_c), s	17.3	41.7	2.9	9.2	49.6	2.4	9.4	0.0	11.0	6.0	3.3	9.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.52	1.00		1.00
Lane Grp Cap(c), veh/h	280	997	994	135	830	812	273	0	170	192	160	382
V/C Ratio(X)	1.10	0.84	0.11	1.19	1.12	0.08	0.73	0.00	1.14	0.57	0.38	0.79
Avail Cap(c_a), veh/h	280	997	994	135	830	812	273	0	170	218	160	382
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.14	0.14	0.14	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.3	21.1	8.2	50.4	30.2	13.1	43.4	0.0	49.5	42.1	47.5	39.1
Incr Delay (d2), s/veh	81.8	8.2	0.2	97.7	56.9	0.0	9.6	0.0	110.6	2.7	1.5	10.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.7	18.1	1.0	7.2	33.1	0.8	1.5	0.0	9.9	2.8	1.6	8.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	128.2	29.3	8.4	148.1	87.1	13.2	53.1	0.0	160.1	44.8	49.0	49.5
LnGrp LOS	F	C	A	F	F	B	D	A	F	D	D	D
Approach Vol, veh/h		1246			1158			393			470	
Approach Delay, s/veh		51.9			91.3			105.6			48.3	
Approach LOS		D			F			F			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	26.0	55.5	14.4	17.6	16.0	65.5	16.0	16.0
Change Period (Y+Rc), s	* 8.7	* 5.8	6.6	6.6	* 6.8	5.8	6.6	6.6
Max Green Setting (Gmax), s	* 17	* 46	9.4	9.4	* 9.2	56.2	9.4	9.4
Max Q Clear Time (g_c+I1), s	19.3	51.6	8.0	13.0	11.2	43.7	11.4	11.4
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	6.3	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	71.8
HCM 6th LOS	E

Notes

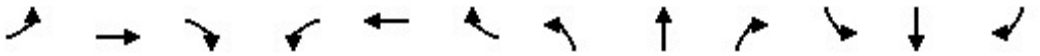
User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	158	674	46	30	962	48	80	239
v/c Ratio	0.71	0.62	0.05	0.06	0.98	0.05	0.62	0.62
Control Delay	30.4	13.5	1.0	3.9	43.1	1.2	47.2	17.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.4	13.5	1.0	3.9	43.1	1.2	47.2	17.1
Queue Length 50th (ft)	16	127	0	3	375	0	30	29
Queue Length 95th (ft)	#118	381	7	11	#734	8	74	94
Internal Link Dist (ft)		4165			4595		176	167
Turn Bay Length (ft)	145		90	125		155		
Base Capacity (vph)	222	1094	1015	479	983	896	272	652
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.62	0.05	0.06	0.98	0.05	0.29	0.37

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	155	661	45	29	943	47	45	22	12	28	31	174
Future Volume (veh/h)	155	661	45	29	943	47	45	22	12	28	31	174
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1781	1870	1841	1826	1870	1870	1752	1870	1870	1841	1870
Adj Flow Rate, veh/h	158	674	28	30	962	27	46	22	3	29	32	31
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	8	2	4	5	2	2	10	2	2	4	2
Cap, veh/h	270	1070	952	421	1029	893	186	74	8	109	88	66
Arrive On Green	0.07	0.60	0.60	0.03	0.56	0.56	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1781	1781	1585	1753	1826	1585	840	617	64	343	735	547
Grp Volume(v), veh/h	158	674	28	30	962	27	71	0	0	92	0	0
Grp Sat Flow(s),veh/h/ln	1781	1781	1585	1753	1826	1585	1522	0	0	1625	0	0
Q Serve(g_s), s	2.5	16.9	0.5	0.4	33.7	0.5	0.0	0.0	0.0	0.9	0.0	0.0
Cycle Q Clear(g_c), s	2.5	16.9	0.5	0.4	33.7	0.5	2.6	0.0	0.0	3.5	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.65		0.04	0.32		0.34
Lane Grp Cap(c), veh/h	270	1070	952	421	1029	893	268	0	0	263	0	0
V/C Ratio(X)	0.58	0.63	0.03	0.07	0.94	0.03	0.27	0.00	0.00	0.35	0.00	0.00
Avail Cap(c_a), veh/h	276	1070	952	492	1054	915	602	0	0	642	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	15.4	8.9	5.6	6.9	14.0	6.7	28.0	0.0	0.0	28.4	0.0	0.0
Incr Delay (d2), s/veh	3.0	1.7	0.0	0.1	15.1	0.0	0.5	0.0	0.0	0.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	5.0	0.1	0.1	14.1	0.1	1.0	0.0	0.0	1.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.4	10.6	5.7	7.0	29.0	6.7	28.5	0.0	0.0	29.2	0.0	0.0
LnGrp LOS	B	B	A	A	C	A	C	A	A	C	A	A
Approach Vol, veh/h		860			1019			71			92	
Approach Delay, s/veh		11.9			27.8			28.5			29.2	
Approach LOS		B			C			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.7	49.4		13.2	9.3	46.8		13.2				
Change Period (Y+Rc), s	4.5	7.8		4.9	4.5	7.8		4.9				
Max Green Setting (Gmax), s	5.0	40.0		25.0	5.0	40.0		25.0				
Max Q Clear Time (g_c+I1), s	2.4	18.9		4.6	4.5	35.7		5.5				
Green Ext Time (p_c), s	0.0	8.2		0.2	0.0	3.3		0.4				

Intersection Summary												
HCM 6th Ctrl Delay			21.2									
HCM 6th LOS			C									

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	547	413	239	501	405	688	183	109	679	312
v/c Ratio	1.81	0.82	0.65	1.28	1.95	0.93	0.35	0.75	1.04	0.56
Control Delay	404.5	27.5	50.3	183.0	471.5	64.3	3.7	81.8	89.8	8.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	404.5	27.5	50.3	183.0	471.5	64.3	3.7	81.8	89.8	8.7
Queue Length 50th (ft)	~606	84	161	~465	~460	263	0	79	~282	0
Queue Length 95th (ft)	#820	#249	250	#677	#655	#381	25	#168	#403	77
Internal Link Dist (ft)	1857			694		8434			2104	
Turn Bay Length (ft)		230	500		565		250	125		480
Base Capacity (vph)	303	506	365	390	208	739	516	150	656	556
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.81	0.82	0.65	1.28	1.95	0.93	0.35	0.73	1.04	0.56

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
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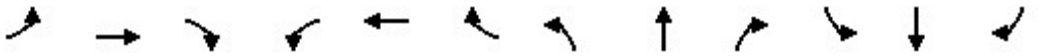
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	297	206	380	220	361	100	373	633	168	100	625	287
Future Volume (veh/h)	297	206	380	220	361	100	373	633	168	100	625	287
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1811	1796	1781	1826	1796	1811	1781	1796	1826	1811	1870
Adj Flow Rate, veh/h	323	224	149	239	392	99	405	688	29	109	679	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	6	7	8	5	7	6	8	7	5	6	2
Cap, veh/h	182	126	267	371	308	78	211	774	348	134	663	
Arrive On Green	0.18	0.18	0.18	0.22	0.22	0.22	0.12	0.23	0.23	0.08	0.19	0.00
Sat Flow, veh/h	1039	720	1522	1697	1407	355	1725	3385	1522	1739	3441	1585
Grp Volume(v), veh/h	547	0	149	239	0	491	405	688	29	109	679	0
Grp Sat Flow(s),veh/h/ln	1759	0	1522	1697	0	1762	1725	1692	1522	1739	1721	1585
Q Serve(g_s), s	20.0	0.0	10.2	14.6	0.0	25.0	14.0	22.5	1.7	7.0	22.0	0.0
Cycle Q Clear(g_c), s	20.0	0.0	10.2	14.6	0.0	25.0	14.0	22.5	1.7	7.0	22.0	0.0
Prop In Lane	0.59		1.00	1.00		0.20	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	308	0	267	371	0	386	211	774	348	134	663	
V/C Ratio(X)	1.78	0.00	0.56	0.64	0.00	1.27	1.92	0.89	0.08	0.81	1.02	
Avail Cap(c_a), veh/h	308	0	267	371	0	386	211	774	348	152	663	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	47.1	0.0	43.1	40.5	0.0	44.6	50.1	42.6	34.6	51.9	46.1	0.0
Incr Delay (d2), s/veh	361.9	0.0	2.6	3.8	0.0	141.7	429.0	12.6	0.1	25.2	41.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	39.5	0.0	4.0	6.4	0.0	25.8	30.9	10.2	0.6	3.9	12.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	409.0	0.0	45.7	44.3	0.0	186.3	479.1	55.2	34.8	77.1	87.4	0.0
LnGrp LOS	F	A	D	D	A	F	F	E	C	E	F	
Approach Vol, veh/h		696			730			1122			788	
Approach Delay, s/veh		331.2			139.8			207.7			85.9	
Approach LOS		F			F			F			F	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	22.3	28.7		33.3	18.2	32.8		29.9				
Change Period (Y+Rc), s	8.3	6.7		* 8.3	* 9.4	6.7		9.9				
Max Green Setting (Gmax), s	14.0	22.0		* 25	* 10	24.9		20.0				
Max Q Clear Time (g_c+I1), s	16.0	24.0		27.0	9.0	24.5		22.0				
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	0.2		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		189.8
HCM 6th LOS		F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	184	99	124	1045	1068	210
v/c Ratio	0.63	0.19	0.41	0.50	0.78	0.27
Control Delay	47.2	17.7	20.2	10.8	30.0	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.2	17.7	20.2	10.8	30.0	4.0
Queue Length 50th (ft)	105	33	27	159	282	0
Queue Length 95th (ft)	181	68	58	248	432	46
Internal Link Dist (ft)	414			1077	8434	
Turn Bay Length (ft)			470			295
Base Capacity (vph)	476	517	495	2098	1426	801
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.19	0.25	0.50	0.75	0.26

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (veh/h)	169	91	114	961	0	983	193
Future Volume (veh/h)	169	91	114	961	0	983	193
Initial Q (Qb), veh	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00				1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach	No			No		No	
Adj Sat Flow, veh/h/ln	1870	1722	1826	1781		1767	1870
Adj Flow Rate, veh/h	184	86	124	1045		1068	76
Peak Hour Factor	0.92	0.92	0.92	0.92		0.92	0.92
Percent Heavy Veh, %	2	12	5	8		9	2
Cap, veh/h	243	285	271	1467		1434	677
Arrive On Green	0.14	0.14	0.06	0.43		0.43	0.43
Sat Flow, veh/h	1781	1459	1739	3474		3445	1585
Grp Volume(v), veh/h	184	86	124	1045		1068	76
Grp Sat Flow(s),veh/h/ln	1781	1459	1739	1692		1678	1585
Q Serve(g_s), s	7.8	0.0	0.0	19.9		21.0	2.3
Cycle Q Clear(g_c), s	7.8	0.0	0.0	19.9		21.0	2.3
Prop In Lane	1.00	1.00	1.00				1.00
Lane Grp Cap(c), veh/h	243	285	271	1467		1434	677
V/C Ratio(X)	0.76	0.30	0.46	0.71		0.74	0.11
Avail Cap(c_a), veh/h	566	550	610	1935		1706	806
HCM Platoon Ratio	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	32.7	27.1	30.9	18.3		18.9	13.6
Incr Delay (d2), s/veh	5.8	0.7	1.4	1.5		2.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	0.1	2.2	6.6		7.1	0.7
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	38.5	27.8	32.4	19.8		21.1	13.7
LnGrp LOS	D	C	C	B		C	B
Approach Vol, veh/h	270			1169		1144	
Approach Delay, s/veh	35.1			21.1		20.6	
Approach LOS	D			C		C	

Timer - Assigned Phs		2		4	5	6	
Phs Duration (G+Y+Rc), s		44.6		19.4	15.2	44.1	
Change Period (Y+Rc), s		10.5		8.7	10.5	10.5	
Max Green Setting (Gmax), s		45.0		25.0	20.0	40.0	
Max Q Clear Time (g_c+I1), s		21.9		9.8	2.0	23.0	
Green Ext Time (p_c), s		12.2		0.9	0.3	10.6	

Intersection Summary	
HCM 6th Ctrl Delay	22.4
HCM 6th LOS	C

Notes

User approved ignoring U-Turning movement.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	175	255	319	798	815	119
v/c Ratio	0.68	0.41	0.67	0.35	0.52	0.11
Control Delay	57.2	6.8	55.4	5.9	23.7	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.2	6.8	55.4	5.9	23.7	1.7
Queue Length 50th (ft)	119	0	119	81	207	1
Queue Length 95th (ft)	181	36	139	105	315	21
Internal Link Dist (ft)	446			1419	813	
Turn Bay Length (ft)		250	485			315
Base Capacity (vph)	350	756	627	2286	1568	1176
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.34	0.51	0.35	0.52	0.10

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	168	245	306	766	0	782	114
Future Volume (vph)	168	245	306	766	0	782	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Lane Util. Factor	1.00	0.88	0.97	0.95		0.95	1.00
Frt	1.00	0.85	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (prot)	1770	2787	3335	3252		3374	1583
Flt Permitted	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (perm)	1770	2787	3335	3252		3374	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.92	0.96	0.96
Adj. Flow (vph)	175	255	319	798	0	815	119
RTOR Reduction (vph)	0	218	0	0	0	0	45
Lane Group Flow (vph)	175	37	319	798	0	815	74
Heavy Vehicles (%)	2%	2%	5%	11%	2%	7%	2%
Turn Type	Prot	Prot	Prot	NA	Prot	NA	pm+ov
Protected Phases	7	4	1	6	5	2	7
Permitted Phases		4					2
Actuated Green, G (s)	16.1	16.1	15.7	77.3		51.1	67.2
Effective Green, g (s)	16.1	16.1	15.7	77.3		51.1	67.2
Actuated g/C Ratio	0.15	0.15	0.14	0.70		0.46	0.61
Clearance Time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Vehicle Extension (s)	3.0	3.0	3.0	3.5		3.5	3.0
Lane Grp Cap (vph)	259	407	475	2285		1567	967
v/s Ratio Prot	c0.10	0.01	c0.10	0.25		c0.24	0.01
v/s Ratio Perm							0.04
v/c Ratio	0.68	0.09	0.67	0.35		0.52	0.08
Uniform Delay, d1	44.5	40.6	44.7	6.4		20.8	8.7
Progression Factor	1.00	1.00	1.09	0.78		1.00	1.00
Incremental Delay, d2	6.8	0.1	3.7	0.4		1.2	0.0
Delay (s)	51.3	40.7	52.3	5.5		22.0	8.8
Level of Service	D	D	D	A		C	A
Approach Delay (s)	45.0			18.8		20.3	
Approach LOS	D			B		C	

Intersection Summary			
HCM 2000 Control Delay	23.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	27.1
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM 6th Edition methodology supports red clearance in the range of 0 to 6 seconds.

Intersection	
Int Delay, s/veh	205

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	33	834	107	85	1049	37	76	0	60	94	0	83
Future Vol, veh/h	33	834	107	85	1049	37	76	0	60	94	0	83
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	150	150	-	150	0	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	36	907	116	92	1140	40	83	0	65	102	0	90

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1180	0	0	1023	0	0	2368	2343	907	2394	2419	1140
Stage 1	-	-	-	-	-	-	979	979	-	1324	1324	-
Stage 2	-	-	-	-	-	-	1389	1364	-	1070	1095	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	592	-	-	679	-	-	~ 24	36	334	~ 23	32	245
Stage 1	-	-	-	-	-	-	301	328	-	192	225	-
Stage 2	-	-	-	-	-	-	176	215	-	268	290	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	592	-	-	679	-	-	~ 13	29	334	~ 16	26	245
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 13	29	-	~ 16	26	-
Stage 1	-	-	-	-	-	-	283	308	-	180	195	-
Stage 2	-	-	-	-	-	-	96	186	-	203	272	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.8	$ 1675.9	$ 1551.2
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	13	334	592	-	-	679	-	-	16	245
HCM Lane V/C Ratio	6.355	0.195	0.061	-	-	0.136	-	-	6.386	0.368
HCM Control Delay (s)	$ 2984.5	18.4	11.5	-	-	11.1	-	-	$ 2896.2	28
HCM Lane LOS	F	C	B	-	-	B	-	-	F	D
HCM 95th %tile Q(veh)	11.4	0.7	0.2	-	-	0.5	-	-	13.6	1.6

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

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	988	1128	1	0	43
Future Vol, veh/h	0	988	1128	1	0	43
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1074	1226	1	0	47

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1227
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	0	-	-	-	0	217
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	217
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	26.1
HCM LOS			D

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	217
HCM Lane V/C Ratio	-	-	-	0.215
HCM Control Delay (s)	-	-	-	26.1
HCM Lane LOS	-	-	-	D
HCM 95th %tile Q(veh)	-	-	-	0.8

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	19	969	1124	6	17	5
Future Vol, veh/h	19	969	1124	6	17	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	-	0	50
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	21	1053	1222	7	18	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1229	0	-	0	2321	1226
Stage 1	-	-	-	-	1226	-
Stage 2	-	-	-	-	1095	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	567	-	-	-	41	218
Stage 1	-	-	-	-	277	-
Stage 2	-	-	-	-	321	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	567	-	-	-	39	218
Mov Cap-2 Maneuver	-	-	-	-	39	-
Stage 1	-	-	-	-	267	-
Stage 2	-	-	-	-	321	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	130.5
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	567	-	-	-	39	218
HCM Lane V/C Ratio	0.036	-	-	-	0.474	0.025
HCM Control Delay (s)	11.6	-	-	-	162.5	21.9
HCM Lane LOS	B	-	-	-	F	C
HCM 95th %tile Q(veh)	0.1	-	-	-	1.6	0.1

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	94	0	38	52	0	2	15	988	21	1	947	37
Future Vol, veh/h	94	0	38	52	0	2	15	988	21	1	947	37
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	50	-	-	50	300	-	150	300	-	150
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	102	0	41	57	0	2	16	1074	23	1	1029	40

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1600	2160	515	1623	2177	537	1069	0	0	1097	0	0
Stage 1	1031	1031	-	1106	1106	-	-	-	-	-	-	-
Stage 2	569	1129	-	517	1071	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	~ 71	47	505	68	46	488	648	-	-	632	-	-
Stage 1	249	309	-	224	284	-	-	-	-	-	-	-
Stage 2	474	277	-	509	295	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 69	46	505	61	45	488	648	-	-	632	-	-
Mov Cap-2 Maneuver	173	152	-	158	147	-	-	-	-	-	-	-
Stage 1	243	308	-	218	277	-	-	-	-	-	-	-
Stage 2	460	270	-	467	294	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	40.8	39	0.2	0
HCM LOS	E	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	648	-	-	173	505	158	488	632	-	-
HCM Lane V/C Ratio	0.025	-	-	0.591	0.082	0.358	0.004	0.002	-	-
HCM Control Delay (s)	10.7	-	-	52.1	12.8	40	12.4	10.7	-	-
HCM Lane LOS	B	-	-	F	B	E	B	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	3.2	0.3	1.5	0	0	-	-

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

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	6	17	1082	2	7	979
Future Vol, veh/h	6	17	1082	2	7	979
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	50	-	150	300	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	18	1176	2	8	1064

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1724	588	0	0	1178	0
Stage 1	1176	-	-	-	-	-
Stage 2	548	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	80	452	-	-	589	-
Stage 1	255	-	-	-	-	-
Stage 2	543	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	79	452	-	-	589	-
Mov Cap-2 Maneuver	188	-	-	-	-	-
Stage 1	255	-	-	-	-	-
Stage 2	535	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.3	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	188	452	589	-
HCM Lane V/C Ratio	-	-	0.035	0.041	0.013	-
HCM Control Delay (s)	-	-	24.8	13.3	11.2	-
HCM Lane LOS	-	-	C	B	B	-
HCM 95th %tile Q(veh)	-	-	0.1	0.1	0	-

2035 Future Conditions with Development – Capacity Analysis Worksheets with Mitigation

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	159	718	424	176	685	139	85	101	75	299	167
v/c Ratio	0.60	0.87	0.47	0.70	0.88	0.16	0.62	0.45	0.23	1.06	0.37
Control Delay	23.4	44.2	13.1	28.6	45.8	2.0	58.7	25.6	38.1	122.6	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.4	44.2	13.1	28.6	45.8	2.0	58.7	25.6	38.1	122.6	7.8
Queue Length 50th (ft)	73	582	165	60	500	0	56	20	47	~327	0
Queue Length 95th (ft)	70	734	243	103	#733	25	#129	#86	92	#530	55
Internal Link Dist (ft)		593			4165			244		594	
Turn Bay Length (ft)	260		500	270		575	190		150		
Base Capacity (vph)	323	892	904	255	802	928	144	226	393	282	502
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.80	0.47	0.69	0.85	0.15	0.59	0.45	0.19	1.06	0.33

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	146	661	390	162	630	128	78	25	68	69	275	154
Future Volume (veh/h)	146	661	390	162	630	128	78	25	68	69	275	154
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	0.99		0.99	0.98		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1752	1796	1796	1722	1856	966	907	848	1870	1841	1781
Adj Flow Rate, veh/h	159	718	363	176	685	68	85	27	8	75	299	29
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	10	7	7	12	3	63	67	71	2	4	8
Cap, veh/h	307	941	956	270	906	888	140	102	30	294	204	247
Arrive On Green	0.06	0.54	0.54	0.06	0.53	0.53	0.09	0.15	0.15	0.05	0.11	0.11
Sat Flow, veh/h	1753	1752	1521	1711	1722	1537	920	670	198	1781	1841	1438
Grp Volume(v), veh/h	159	718	363	176	685	68	85	0	35	75	299	29
Grp Sat Flow(s),veh/h/ln	1753	1752	1521	1711	1722	1537	920	0	868	1781	1841	1438
Q Serve(g_s), s	5.4	41.8	15.1	6.0	40.7	2.5	10.5	0.0	4.6	4.8	14.4	2.2
Cycle Q Clear(g_c), s	5.4	41.8	15.1	6.0	40.7	2.5	10.5	0.0	4.6	4.8	14.4	2.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.23	1.00		1.00
Lane Grp Cap(c), veh/h	307	941	956	270	906	888	140	0	132	294	204	247
V/C Ratio(X)	0.52	0.76	0.38	0.65	0.76	0.08	0.61	0.00	0.27	0.25	1.47	0.12
Avail Cap(c_a), veh/h	411	941	956	298	906	888	143	0	132	402	204	247
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.55	0.55	0.55	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.6	23.6	11.8	22.0	24.2	12.2	45.8	0.0	48.7	47.8	57.8	45.8
Incr Delay (d2), s/veh	1.4	5.8	1.1	2.4	3.3	0.1	7.0	0.0	1.1	0.5	234.7	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	17.5	5.4	2.4	16.2	0.9	2.7	0.0	1.1	2.2	20.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.9	29.4	12.9	24.4	27.5	12.3	52.8	0.0	49.8	48.2	292.5	46.0
LnGrp LOS	C	C	B	C	C	B	D	A	D	D	F	D
Approach Vol, veh/h		1240			929			120			403	
Approach Delay, s/veh		23.6			25.8			51.9			229.3	
Approach LOS		C			C			D			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.3	74.2	13.1	26.4	14.9	75.6	18.5	21.0
Change Period (Y+Rc), s	* 8.7	* 5.8	6.6	6.6	* 6.8	5.8	6.6	6.6
Max Green Setting (Gmax), s	* 15	* 60	14.4	12.4	* 10	67.2	12.4	14.4
Max Q Clear Time (g_c+I1), s	7.4	42.7	6.8	6.6	8.0	43.8	12.5	16.4
Green Ext Time (p_c), s	0.2	6.0	0.1	0.0	0.1	9.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	56.4
HCM 6th LOS	E

Notes

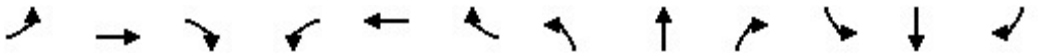
User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	288	322	263	118	234	323	518	212	101	382	191
v/c Ratio	0.85	0.86	0.53	0.45	0.78	0.77	0.69	0.41	0.69	0.66	0.45
Control Delay	66.3	65.8	9.2	45.7	58.0	59.4	45.0	5.4	73.5	37.2	11.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.3	65.8	9.2	45.7	58.0	59.4	45.0	5.4	73.5	37.2	11.3
Queue Length 50th (ft)	195	218	0	75	147	114	182	0	61	136	25
Queue Length 95th (ft)	#369	#403	73	128	227	#177	243	41	#151	186	81
Internal Link Dist (ft)		382			694		8434			2104	
Turn Bay Length (ft)	250		230	500		565		250	125		480
Base Capacity (vph)	338	373	494	321	363	422	761	518	153	583	430
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.86	0.53	0.37	0.64	0.77	0.68	0.41	0.66	0.66	0.44

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	265	296	242	109	153	63	297	477	195	93	351	176
Future Volume (veh/h)	265	296	242	109	153	63	297	477	195	93	351	176
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1767	1841	1663	1663	1767	1856	1722	1752	1707	1841	1618	1411
Adj Flow Rate, veh/h	288	322	36	118	166	53	323	518	35	101	382	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	9	4	16	16	9	3	12	10	13	4	19	33
Cap, veh/h	310	340	260	241	195	62	385	935	406	124	740	
Arrive On Green	0.18	0.18	0.18	0.15	0.15	0.15	0.12	0.28	0.28	0.14	0.48	0.00
Sat Flow, veh/h	1682	1841	1409	1584	1283	410	3182	3328	1447	1753	3075	1196
Grp Volume(v), veh/h	288	322	36	118	0	219	323	518	35	101	382	0
Grp Sat Flow(s),veh/h/ln	1682	1841	1409	1584	0	1693	1591	1664	1447	1753	1537	1196
Q Serve(g_s), s	18.5	19.0	2.4	7.5	0.0	13.9	10.9	14.6	2.0	6.1	9.4	0.0
Cycle Q Clear(g_c), s	18.5	19.0	2.4	7.5	0.0	13.9	10.9	14.6	2.0	6.1	9.4	0.0
Prop In Lane	1.00		1.00	1.00		0.24	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	310	340	260	241	0	257	385	935	406	124	740	
V/C Ratio(X)	0.93	0.95	0.14	0.49	0.00	0.85	0.84	0.55	0.09	0.81	0.52	
Avail Cap(c_a), veh/h	310	340	260	327	0	349	425	935	406	153	740	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.83	0.83	0.83	0.98	0.98	0.00
Uniform Delay (d), s/veh	44.1	44.3	37.5	42.7	0.0	45.4	47.3	33.7	29.1	46.5	24.1	0.0
Incr Delay (d2), s/veh	32.8	35.3	0.2	1.5	0.0	13.8	12.7	2.0	0.3	22.7	2.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.3	11.7	0.8	3.0	0.0	6.7	4.8	5.8	0.7	3.2	3.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	76.9	79.6	37.8	44.3	0.0	59.3	60.0	35.7	29.5	69.1	26.6	0.0
LnGrp LOS	E	E	D	D	A	E	E	D	C	E	C	
Approach Vol, veh/h		646			337			876			483	
Approach Delay, s/veh		76.1			54.0			44.4			35.5	
Approach LOS		E			D			D			D	

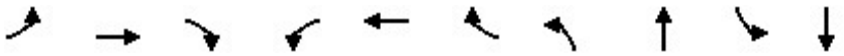
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	21.6	33.2		25.0	17.2	37.6		30.2				
Change Period (Y+Rc), s	8.3	6.7		* 8.3	* 9.4	6.7		9.9				
Max Green Setting (Gmax), s	14.7	19.1		* 23	* 9.6	23.1		20.3				
Max Q Clear Time (g_c+I1), s	12.9	11.4		15.9	8.1	16.6		21.0				
Green Ext Time (p_c), s	0.4	1.7		0.8	0.0	2.2		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		52.7	
HCM 6th LOS		D	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

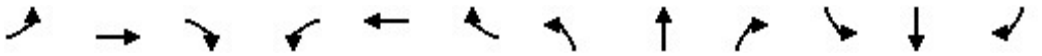
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	88	876	50	39	635	100	133	105	30	26
v/c Ratio	0.17	0.69	0.05	0.11	0.52	0.09	0.67	0.24	0.16	0.05
Control Delay	3.0	8.2	0.2	4.0	10.8	1.7	50.7	1.2	32.8	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.0	8.2	0.2	4.0	10.8	1.7	50.7	1.2	32.8	0.2
Queue Length 50th (ft)	8	117	0	5	185	0	67	0	14	0
Queue Length 95th (ft)	m11	122	m0	12	263	16	#136	0	39	0
Internal Link Dist (ft)		1336			1871			292		413
Turn Bay Length (ft)	150		150	150		150			50	
Base Capacity (vph)	510	1279	1112	355	1232	1080	226	470	210	560
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.68	0.04	0.11	0.52	0.09	0.59	0.22	0.14	0.05

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	81	806	46	36	584	92	122	0	97	28	0	24
Future Volume (veh/h)	81	806	46	36	584	92	122	0	97	28	0	24
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	88	876	32	39	635	61	133	0	7	30	0	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	560	1291	1094	572	1247	1057	247	0	184	242	0	184
Arrive On Green	0.12	1.00	1.00	0.04	0.67	0.67	0.12	0.00	0.12	0.12	0.00	0.12
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1415	0	1585	1409	0	1585
Grp Volume(v), veh/h	88	876	32	39	635	61	133	0	7	30	0	2
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1415	0	1585	1409	0	1585
Q Serve(g_s), s	1.2	0.0	0.0	0.5	14.6	1.1	7.8	0.0	0.3	1.6	0.0	0.1
Cycle Q Clear(g_c), s	1.2	0.0	0.0	0.5	14.6	1.1	7.9	0.0	0.3	2.0	0.0	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	560	1291	1094	572	1247	1057	247	0	184	242	0	184
V/C Ratio(X)	0.16	0.68	0.03	0.07	0.51	0.06	0.54	0.00	0.04	0.12	0.00	0.01
Avail Cap(c_a), veh/h	562	1291	1094	613	1247	1057	308	0	252	303	0	252
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.68	0.68	0.68	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	4.5	0.0	0.0	3.3	7.2	4.9	36.8	0.0	33.4	34.3	0.0	33.3
Incr Delay (d2), s/veh	0.1	2.0	0.0	0.0	0.3	0.0	1.8	0.0	0.1	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.7	0.0	0.1	4.3	0.3	2.8	0.0	0.1	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	4.6	2.0	0.0	3.3	7.5	4.9	38.6	0.0	33.5	34.5	0.0	33.3
LnGrp LOS	A	A	A	A	A	A	D	A	C	C	A	C
Approach Vol, veh/h		996			735			140			32	
Approach Delay, s/veh		2.1			7.1			38.3			34.4	
Approach LOS		A			A			D			C	

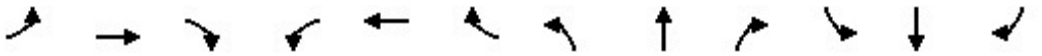
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.5	63.1		14.3	9.5	61.2		14.3				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.0	53.0		13.5	5.1	52.9		13.5				
Max Q Clear Time (g_c+I1), s	2.5	2.0		9.9	3.2	16.6		4.0				
Green Ext Time (p_c), s	0.0	7.5		0.1	0.0	4.5		0.0				

Intersection Summary												
HCM 6th Ctrl Delay			7.2									
HCM 6th LOS			A									

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	29	12	16	1	39	774	58	2	664	100
v/c Ratio	0.29	0.03	0.15	0.00	0.06	0.26	0.04	0.00	0.24	0.08
Control Delay	55.1	0.2	49.3	0.0	1.8	2.7	1.1	4.0	5.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.1	0.2	49.3	0.0	1.8	2.7	1.1	4.0	5.5	0.1
Queue Length 50th (ft)	20	0	11	0	3	2	0	0	74	0
Queue Length 95th (ft)	49	0	33	0	m3	m222	m6	m2	87	1
Internal Link Dist (ft)		785		554		2104			1225	
Turn Bay Length (ft)					300		150	300		150
Base Capacity (vph)	296	571	306	555	664	2934	1340	609	2738	1261
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.02	0.05	0.00	0.06	0.26	0.04	0.00	0.24	0.08

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	0	11	15	0	1	36	712	53	2	611	92
Future Volume (veh/h)	27	0	11	15	0	1	36	712	53	2	611	92
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	29	0	0	16	0	0	39	774	40	2	664	65
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	114	64	0	114	64	0	579	2587	1154	559	2484	1108
Arrive On Green	0.03	0.00	0.00	0.03	0.00	0.00	0.06	1.00	1.00	0.00	0.70	0.70
Sat Flow, veh/h	1418	1870	0	1418	1870	0	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	29	0	0	16	0	0	39	774	40	2	664	65
Grp Sat Flow(s),veh/h/ln	1418	1870	0	1418	1870	0	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	2.2	0.0	0.0	1.2	0.0	0.0	0.7	0.0	0.0	0.0	7.6	1.4
Cycle Q Clear(g_c), s	2.2	0.0	0.0	1.2	0.0	0.0	0.7	0.0	0.0	0.0	7.6	1.4
Prop In Lane	1.00		0.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	114	64	0	114	64	0	579	2587	1154	559	2484	1108
V/C Ratio(X)	0.26	0.00	0.00	0.14	0.00	0.00	0.07	0.30	0.03	0.00	0.27	0.06
Avail Cap(c_a), veh/h	363	393	0	376	410	0	680	2587	1154	695	2484	1108
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	0.59	0.59	0.59	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.4	0.0	0.0	51.9	0.0	0.0	4.2	0.0	0.0	4.0	6.1	5.2
Incr Delay (d2), s/veh	1.2	0.0	0.0	0.6	0.0	0.0	0.0	0.2	0.0	0.0	0.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	0.0	0.5	0.0	0.0	0.2	0.1	0.0	0.0	2.2	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.6	0.0	0.0	52.5	0.0	0.0	4.2	0.2	0.0	4.0	6.4	5.3
LnGrp LOS	D	A	A	D	A	A	A	A	A	A	A	A
Approach Vol, veh/h		29			16			853			731	
Approach Delay, s/veh		53.6			52.5			0.4			6.3	
Approach LOS		D			D			A			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.6	86.8		14.6	11.8	83.6		14.6				
Change Period (Y+Rc), s	8.3	6.7		10.9	8.3	6.7		* 11				
Max Green Setting (Gmax), s	8.7	52.3		23.1	9.7	51.3		* 24				
Max Q Clear Time (g_c+I1), s	2.0	2.0		4.2	2.7	9.6		3.2				
Green Ext Time (p_c), s	0.0	5.4		0.0	0.0	4.5		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		4.5
HCM 6th LOS		A

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	307	833	182	161	930	150	200	254	109	60	379
v/c Ratio	1.04	0.92	0.16	0.84	1.18	0.17	0.69	1.17	0.47	0.37	0.81
Control Delay	93.5	47.5	2.8	59.8	126.2	2.2	50.5	148.9	41.6	53.4	42.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	93.5	47.5	2.8	59.8	126.2	2.2	50.5	148.9	41.6	53.4	42.1
Queue Length 50th (ft)	~186	568	0	67	~791	0	120	~181	62	40	185
Queue Length 95th (ft)	#357	#820	57	#185	#1034	26	#201	#351	111	83	301
Internal Link Dist (ft)		593			4165			244		594	
Turn Bay Length (ft)	260		500	270		575	190		150		
Base Capacity (vph)	295	901	1122	192	785	889	289	217	251	176	470
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.04	0.92	0.16	0.84	1.18	0.17	0.69	1.17	0.43	0.34	0.81

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	282	766	167	148	856	138	184	86	148	100	55	349
Future Volume (veh/h)	282	766	167	148	856	138	184	86	148	100	55	349
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	0.99		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1870	1693	1841	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	307	833	105	161	930	70	200	93	101	109	60	299
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	4	2	14	4	2	2	2	2	2	2	2
Cap, veh/h	298	1002	1012	256	847	826	299	96	105	197	177	354
Arrive On Green	0.13	0.54	0.54	0.06	0.46	0.46	0.09	0.12	0.12	0.07	0.09	0.09
Sat Flow, veh/h	1781	1841	1585	1612	1841	1552	1781	814	884	1781	1870	1560
Grp Volume(v), veh/h	307	833	105	161	930	70	200	0	194	109	60	299
Grp Sat Flow(s),veh/h/ln	1781	1841	1585	1612	1841	1552	1781	0	1698	1781	1870	1560
Q Serve(g_s), s	14.3	41.5	2.8	4.8	50.6	2.4	10.4	0.0	12.5	6.0	3.3	10.4
Cycle Q Clear(g_c), s	14.3	41.5	2.8	4.8	50.6	2.4	10.4	0.0	12.5	6.0	3.3	10.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.52	1.00		1.00
Lane Grp Cap(c), veh/h	298	1002	1012	256	847	826	299	0	201	197	177	354
V/C Ratio(X)	1.03	0.83	0.10	0.63	1.10	0.08	0.67	0.00	0.96	0.55	0.34	0.85
Avail Cap(c_a), veh/h	298	1002	1012	289	847	826	299	0	201	256	177	354
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.14	0.14	0.14	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.3	20.9	7.7	20.7	29.7	12.7	41.1	0.0	48.3	41.3	46.6	40.9
Incr Delay (d2), s/veh	60.6	8.0	0.2	0.5	47.4	0.0	5.6	0.0	53.1	2.4	1.1	17.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.8	18.0	1.0	1.9	31.4	0.9	5.4	0.0	8.3	2.8	1.6	9.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	96.9	28.9	7.9	21.2	77.1	12.7	46.7	0.0	101.4	43.7	47.7	57.9
LnGrp LOS	F	C	A	C	F	B	D	A	F	D	D	E
Approach Vol, veh/h		1245			1161			394			468	
Approach Delay, s/veh		43.9			65.4			73.6			53.3	
Approach LOS		D			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.0	56.5	14.4	19.6	13.7	65.8	17.0	17.0
Change Period (Y+Rc), s	* 8.7	* 5.8	6.6	6.6	* 6.8	5.8	6.6	6.6
Max Green Setting (Gmax), s	* 14	* 47	11.4	9.4	* 9.2	54.2	10.4	10.4
Max Q Clear Time (g_c+I1), s	16.3	52.6	8.0	14.5	6.8	43.5	12.4	12.4
Green Ext Time (p_c), s	0.0	0.0	0.1	0.0	0.1	5.7	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	56.5
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.

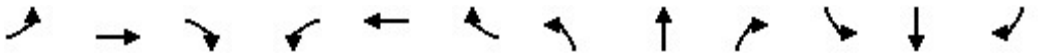
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	323	224	413	239	501	405	688	183	109	679	312
v/c Ratio	1.22	0.80	0.83	0.61	1.20	1.26	0.97	0.36	0.75	0.95	0.54
Control Delay	168.0	66.1	27.1	45.5	149.6	181.6	70.2	3.4	85.3	59.6	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	168.0	66.1	27.1	45.5	149.6	181.6	70.2	3.4	85.3	59.6	10.2
Queue Length 50th (ft)	~280	154	67	152	~427	~185	256	0	80	231	24
Queue Length 95th (ft)	#457	#277	#235	237	#637	#284	#380	20	#157	#370	126
Internal Link Dist (ft)		382			694		8434			2104	
Turn Bay Length (ft)	250		230	500		565		250	125		480
Base Capacity (vph)	265	281	499	390	416	321	712	513	150	715	578
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.22	0.80	0.83	0.61	1.20	1.26	0.97	0.36	0.73	0.95	0.54

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	297	206	380	220	361	100	373	633	168	100	625	287
Future Volume (veh/h)	297	206	380	220	361	100	373	633	168	100	625	287
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1811	1796	1781	1826	1796	1811	1781	1796	1826	1811	1870
Adj Flow Rate, veh/h	323	224	128	239	392	99	405	688	26	109	679	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	6	7	8	5	7	6	8	7	5	6	2
Cap, veh/h	269	285	239	396	329	83	325	748	336	133	723	
Arrive On Green	0.16	0.16	0.16	0.23	0.23	0.23	0.10	0.22	0.22	0.15	0.42	0.00
Sat Flow, veh/h	1711	1811	1522	1697	1407	355	3346	3385	1522	1739	3441	1585
Grp Volume(v), veh/h	323	224	128	239	0	491	405	688	26	109	679	0
Grp Sat Flow(s),veh/h/ln	1711	1811	1522	1697	0	1762	1673	1692	1522	1739	1721	1585
Q Serve(g_s), s	17.3	13.1	8.5	13.8	0.0	25.7	10.7	21.9	1.5	6.7	20.8	0.0
Cycle Q Clear(g_c), s	17.3	13.1	8.5	13.8	0.0	25.7	10.7	21.9	1.5	6.7	20.8	0.0
Prop In Lane	1.00		1.00	1.00		0.20	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	269	285	239	396	0	412	325	748	336	133	723	
V/C Ratio(X)	1.20	0.79	0.53	0.60	0.00	1.19	1.24	0.92	0.08	0.82	0.94	
Avail Cap(c_a), veh/h	269	285	239	396	0	412	325	748	336	152	723	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.84	0.84	0.84	0.91	0.91	0.00
Uniform Delay (d), s/veh	46.3	44.6	42.6	37.6	0.0	42.2	49.7	41.9	34.0	45.9	31.2	0.0
Incr Delay (d2), s/veh	120.3	13.6	2.3	2.6	0.0	108.4	129.9	16.0	0.4	24.4	20.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.1	6.8	3.3	5.9	0.0	23.2	10.1	10.2	0.6	3.5	7.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	166.6	58.1	45.0	40.2	0.0	150.5	179.6	57.9	34.3	70.3	51.5	0.0
LnGrp LOS	F	E	D	D	A	F	F	E	C	E	D	
Approach Vol, veh/h		675			730			1119			788	
Approach Delay, s/veh		107.6			114.4			101.4			54.1	
Approach LOS		F			F			F			D	

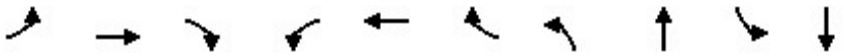
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	19.0	29.8		34.0	17.8	31.0		27.2				
Change Period (Y+Rc), s	8.3	6.7		* 8.3	* 9.4	6.7		9.9				
Max Green Setting (Gmax), s	10.7	23.1		* 26	* 9.6	23.1		17.3				
Max Q Clear Time (g_c+I1), s	12.7	22.8		27.7	8.7	23.9		19.3				
Green Ext Time (p_c), s	0.0	0.2		0.0	0.0	0.0		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		94.3
HCM 6th LOS		F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	36	907	116	92	1140	40	83	65	102	90
v/c Ratio	0.15	0.69	0.10	0.24	0.84	0.03	0.63	0.16	0.76	0.26
Control Delay	3.1	8.8	1.3	3.5	17.2	0.4	61.5	0.8	74.6	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.1	8.8	1.3	3.5	17.2	0.4	61.5	0.8	74.6	1.8
Queue Length 50th (ft)	2	139	0	7	419	0	45	0	56	0
Queue Length 95th (ft)	m6	275	m5	14	#807	3	#121	0	#151	0
Internal Link Dist (ft)		1336			1871			292		413
Turn Bay Length (ft)	150		150	150		150			50	
Base Capacity (vph)	233	1330	1164	378	1352	1169	132	405	135	345
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.68	0.10	0.24	0.84	0.03	0.63	0.16	0.76	0.26

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	33	834	107	85	1049	37	76	0	60	94	0	83
Future Volume (veh/h)	33	834	107	85	1049	37	76	0	60	94	0	83
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	36	907	77	92	1140	27	83	0	2	102	0	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	288	1323	1121	609	1356	1150	203	0	137	203	0	137
Arrive On Green	0.07	1.00	1.00	0.05	0.73	0.73	0.09	0.00	0.09	0.09	0.00	0.09
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1415	0	1585	1415	0	1585
Grp Volume(v), veh/h	36	907	77	92	1140	27	83	0	2	102	0	2
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1415	0	1585	1415	0	1585
Q Serve(g_s), s	0.4	0.0	0.0	1.1	37.3	0.4	5.0	0.0	0.1	6.2	0.0	0.1
Cycle Q Clear(g_c), s	0.4	0.0	0.0	1.1	37.3	0.4	5.1	0.0	0.1	6.3	0.0	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	288	1323	1121	609	1356	1150	203	0	137	203	0	137
V/C Ratio(X)	0.12	0.69	0.07	0.15	0.84	0.02	0.41	0.00	0.01	0.50	0.00	0.01
Avail Cap(c_a), veh/h	342	1323	1121	630	1356	1150	203	0	137	203	0	137
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.66	0.66	0.66	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.8	0.0	0.0	2.7	8.4	3.3	38.7	0.0	36.4	39.2	0.0	36.4
Incr Delay (d2), s/veh	0.1	1.9	0.1	0.1	4.9	0.0	1.3	0.0	0.0	1.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.7	0.0	0.2	10.9	0.1	1.8	0.0	0.0	2.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.9	1.9	0.1	2.8	13.3	3.3	40.0	0.0	36.4	41.2	0.0	36.4
LnGrp LOS	B	A	A	A	B	A	D	A	D	D	A	D
Approach Vol, veh/h		1020			1259			85			104	
Approach Delay, s/veh		2.1			12.3			39.9			41.1	
Approach LOS		A			B			D			D	

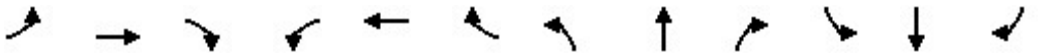
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.0	66.0		12.0	7.4	67.6		12.0				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.5	60.5		7.5	5.5	60.5		7.5				
Max Q Clear Time (g_c+I1), s	3.1	2.0		7.1	2.4	39.3		8.3				
Green Ext Time (p_c), s	0.0	8.3		0.0	0.0	9.7		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		10.3	
HCM 6th LOS		B	

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	102	41	57	2	16	1074	23	1	1029	40
v/c Ratio	0.60	0.11	0.32	0.01	0.04	0.44	0.02	0.00	0.44	0.04
Control Delay	59.7	0.6	46.8	0.0	5.9	9.5	0.2	9.0	9.1	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.7	0.6	46.8	0.0	5.9	9.5	0.2	9.0	9.1	0.1
Queue Length 50th (ft)	69	0	37	0	1	2	0	0	105	0
Queue Length 95th (ft)	120	0	73	0	m6	m292	m0	m1	233	1
Internal Link Dist (ft)		785		554		2104			1225	
Turn Bay Length (ft)					300		150	300		150
Base Capacity (vph)	296	495	297	505	416	2456	1148	394	2359	1109
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.08	0.19	0.00	0.04	0.44	0.02	0.00	0.44	0.04

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	94	0	38	52	0	2	15	988	21	1	947	37
Future Volume (veh/h)	94	0	38	52	0	2	15	988	21	1	947	37
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	102	0	2	57	0	0	16	1074	14	1	1029	24
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	193	0	142	191	168	0	380	2393	1067	347	2335	1042
Arrive On Green	0.09	0.00	0.09	0.09	0.00	0.00	0.02	0.67	0.67	0.00	0.66	0.66
Sat Flow, veh/h	1418	0	1585	1415	1870	0	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	102	0	2	57	0	0	16	1074	14	1	1029	24
Grp Sat Flow(s),veh/h/ln	1418	0	1585	1415	1870	0	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	7.8	0.0	0.1	4.2	0.0	0.0	0.3	15.6	0.3	0.0	15.4	0.6
Cycle Q Clear(g_c), s	7.8	0.0	0.1	4.3	0.0	0.0	0.3	15.6	0.3	0.0	15.4	0.6
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	193	0	142	191	168	0	380	2393	1067	347	2335	1042
V/C Ratio(X)	0.53	0.00	0.01	0.30	0.00	0.00	0.04	0.45	0.01	0.00	0.44	0.02
Avail Cap(c_a), veh/h	363	0	333	374	410	0	506	2393	1067	486	2335	1042
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	0.09	0.09	0.09	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.1	0.0	45.6	47.6	0.0	0.0	7.0	8.4	5.9	6.9	9.1	6.6
Incr Delay (d2), s/veh	2.2	0.0	0.0	0.9	0.0	0.0	0.0	0.1	0.0	0.0	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	0.0	0.1	1.5	0.0	0.0	0.1	4.6	0.1	0.0	4.9	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.3	0.0	45.7	48.5	0.0	0.0	7.0	8.5	5.9	6.9	9.7	6.6
LnGrp LOS	D	A	D	D	A	A	A	A	A	A	A	A
Approach Vol, veh/h		104			57			1104			1054	
Approach Delay, s/veh		51.2			48.5			8.4			9.6	
Approach LOS		D			D			A			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.5	80.8		20.8	10.2	79.0		20.8				
Change Period (Y+Rc), s	8.3	6.7		10.9	8.3	6.7		* 11				
Max Green Setting (Gmax), s	8.7	52.3		23.1	9.7	51.3		* 24				
Max Q Clear Time (g_c+I1), s	2.0	17.6		9.8	2.3	17.4		6.3				
Green Ext Time (p_c), s	0.0	7.9		0.2	0.0	7.5		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		11.9
HCM 6th LOS		B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

I. 2041 Future Conditions with Development – Capacity Analysis Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	166	739	424	176	704	147	85	101	78	299	175
v/c Ratio	0.63	0.87	0.47	0.70	0.89	0.16	0.64	0.47	0.24	1.12	0.38
Control Delay	24.6	44.1	12.8	29.1	46.4	2.0	60.9	26.7	39.0	139.3	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.6	44.1	12.8	29.1	46.4	2.0	60.9	26.7	39.0	139.3	7.7
Queue Length 50th (ft)	70	592	157	56	494	0	58	21	51	~346	0
Queue Length 95th (ft)	85	772	243	#110	#784	26	#127	#91	95	#530	56
Internal Link Dist (ft)		593			4165			244		594	
Turn Bay Length (ft)	260		500	270		575	190		150		
Base Capacity (vph)	320	892	912	253	807	942	141	215	383	268	498
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.83	0.46	0.70	0.87	0.16	0.60	0.47	0.20	1.12	0.35

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	153	680	390	162	648	135	78	25	68	72	275	161
Future Volume (veh/h)	153	680	390	162	648	135	78	25	68	72	275	161
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	0.99		0.99	0.98		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1752	1796	1796	1722	1856	966	907	848	1870	1841	1781
Adj Flow Rate, veh/h	166	739	366	176	704	74	85	27	7	78	299	29
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	10	7	7	12	3	63	67	71	2	4	8
Cap, veh/h	295	941	956	259	903	886	140	105	27	296	204	251
Arrive On Green	0.06	0.54	0.54	0.06	0.52	0.52	0.09	0.15	0.15	0.05	0.11	0.11
Sat Flow, veh/h	1753	1752	1521	1711	1722	1537	920	692	180	1781	1841	1438
Grp Volume(v), veh/h	166	739	366	176	704	74	85	0	34	78	299	29
Grp Sat Flow(s),veh/h/ln	1753	1752	1521	1711	1722	1537	920	0	872	1781	1841	1438
Q Serve(g_s), s	5.6	43.9	15.3	6.0	42.8	2.8	10.5	0.0	4.5	5.0	14.4	2.2
Cycle Q Clear(g_c), s	5.6	43.9	15.3	6.0	42.8	2.8	10.5	0.0	4.5	5.0	14.4	2.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.21	1.00		1.00
Lane Grp Cap(c), veh/h	295	941	956	259	903	886	140	0	132	296	204	251
V/C Ratio(X)	0.56	0.79	0.38	0.68	0.78	0.08	0.61	0.00	0.26	0.26	1.47	0.12
Avail Cap(c_a), veh/h	395	941	956	287	903	886	143	0	132	402	204	251
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.54	0.54	0.54	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.7	24.1	11.8	23.2	24.9	12.3	45.9	0.0	48.7	47.7	57.8	45.6
Incr Delay (d2), s/veh	1.7	6.5	1.2	3.1	3.7	0.1	7.0	0.0	1.0	0.5	234.7	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	18.5	5.5	2.6	17.2	1.0	2.7	0.0	1.0	2.3	20.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.4	30.6	13.0	26.3	28.6	12.4	52.9	0.0	49.8	48.2	292.5	45.8
LnGrp LOS	C	C	B	C	C	B	D	A	D	D	F	D
Approach Vol, veh/h		1271			954			119			406	
Approach Delay, s/veh		24.6			26.9			52.0			228.0	
Approach LOS		C			C			D			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.6	73.9	13.2	26.3	14.9	75.6	18.5	21.0
Change Period (Y+Rc), s	* 8.7	* 5.8	6.6	6.6	* 6.8	5.8	6.6	6.6
Max Green Setting (Gmax), s	* 15	* 60	14.4	12.4	* 10	67.2	12.4	14.4
Max Q Clear Time (g_c+I1), s	7.6	44.8	7.0	6.5	8.0	45.9	12.5	16.4
Green Ext Time (p_c), s	0.2	5.9	0.1	0.0	0.1	9.1	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	56.6
HCM 6th LOS	E

Notes

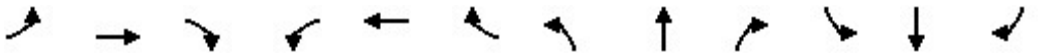
User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	241	709	23	3	608	37	101	241
v/c Ratio	0.60	0.70	0.02	0.01	0.77	0.05	0.43	0.63
Control Delay	12.8	16.3	0.0	4.7	22.9	0.6	24.5	19.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.8	16.3	0.0	4.7	22.9	0.6	24.5	19.5
Queue Length 50th (ft)	28	147	0	0	178	0	23	34
Queue Length 95th (ft)	76	#517	0	3	368	3	72	111
Internal Link Dist (ft)		4165			4595		176	167
Turn Bay Length (ft)	145		90	125		155		
Base Capacity (vph)	404	1113	1010	426	1052	933	434	628
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.64	0.02	0.01	0.58	0.04	0.23	0.38

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	222	652	21	3	559	34	47	11	35	56	7	158
Future Volume (veh/h)	222	652	21	3	559	34	47	11	35	56	7	158
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1767	1752	1811	1870	1722	1737	1796	1752	1796	1826	1648	1707
Adj Flow Rate, veh/h	241	709	12	3	608	16	51	12	6	61	8	44
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	9	10	6	2	12	11	7	10	7	5	17	13
Cap, veh/h	400	951	833	305	789	675	261	55	19	184	38	79
Arrive On Green	0.09	0.54	0.54	0.00	0.46	0.46	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	1682	1752	1535	1781	1722	1472	1016	373	132	581	257	534
Grp Volume(v), veh/h	241	709	12	3	608	16	69	0	0	113	0	0
Grp Sat Flow(s),veh/h/ln	1682	1752	1535	1781	1722	1472	1521	0	0	1373	0	0
Q Serve(g_s), s	4.3	17.5	0.2	0.0	16.6	0.3	0.0	0.0	0.0	2.1	0.0	0.0
Cycle Q Clear(g_c), s	4.3	17.5	0.2	0.0	16.6	0.3	2.0	0.0	0.0	4.1	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.74		0.09	0.54		0.39
Lane Grp Cap(c), veh/h	400	951	833	305	789	675	335	0	0	301	0	0
V/C Ratio(X)	0.60	0.75	0.01	0.01	0.77	0.02	0.21	0.00	0.00	0.38	0.00	0.00
Avail Cap(c_a), veh/h	400	1245	1091	456	1224	1046	736	0	0	691	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.3	9.9	5.9	8.5	12.8	8.3	21.3	0.0	0.0	22.1	0.0	0.0
Incr Delay (d2), s/veh	2.5	2.9	0.0	0.0	3.4	0.0	0.3	0.0	0.0	0.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	5.1	0.0	0.0	5.4	0.1	0.7	0.0	0.0	1.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.9	12.8	5.9	8.5	16.2	8.4	21.6	0.0	0.0	22.9	0.0	0.0
LnGrp LOS	B	B	A	A	B	A	C	A	A	C	A	A
Approach Vol, veh/h		962			627			69			113	
Approach Delay, s/veh		12.7			16.0			21.6			22.9	
Approach LOS		B			B			C			C	

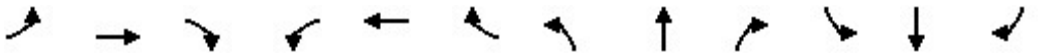
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.7	38.4		13.2	9.5	33.6		13.2				
Change Period (Y+Rc), s	4.5	7.8		4.9	4.5	7.8		4.9				
Max Green Setting (Gmax), s	5.0	40.0		25.0	5.0	40.0		25.0				
Max Q Clear Time (g_c+I1), s	2.0	19.5		4.0	6.3	18.6		6.1				
Green Ext Time (p_c), s	0.0	8.4		0.2	0.0	7.2		0.5				

Intersection Summary												
HCM 6th Ctrl Delay			14.9									
HCM 6th LOS			B									

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	290	335	270	125	242	326	530	218	103	392	192
v/c Ratio	0.84	0.88	0.54	0.47	0.79	0.79	0.72	0.43	0.71	0.70	0.45
Control Delay	65.1	68.1	9.1	45.9	58.7	60.6	46.6	6.0	74.5	38.5	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.1	68.1	9.1	45.9	58.7	60.6	46.6	6.0	74.5	38.5	11.4
Queue Length 50th (ft)	197	231	0	79	152	116	186	0	64	140	26
Queue Length 95th (ft)	#371	#423	75	135	235	#179	250	46	#155	188	79
Internal Link Dist (ft)		382			694		8434			2104	
Turn Bay Length (ft)	250		230	500		565		250	125		480
Base Capacity (vph)	344	380	503	321	363	417	734	508	151	560	423
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.84	0.88	0.54	0.39	0.67	0.78	0.72	0.43	0.68	0.70	0.45

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	267	308	248	115	157	65	300	488	201	95	361	177
Future Volume (veh/h)	267	308	248	115	157	65	300	488	201	95	361	177
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1767	1841	1663	1663	1767	1856	1722	1752	1707	1841	1618	1411
Adj Flow Rate, veh/h	290	335	37	125	171	56	326	530	34	103	392	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	9	4	16	16	9	3	12	10	13	4	19	33
Cap, veh/h	310	340	260	248	200	65	388	915	398	126	723	
Arrive On Green	0.18	0.18	0.18	0.16	0.16	0.16	0.12	0.27	0.27	0.14	0.47	0.00
Sat Flow, veh/h	1682	1841	1409	1584	1274	417	3182	3328	1447	1753	3075	1196
Grp Volume(v), veh/h	290	335	37	125	0	227	326	530	34	103	392	0
Grp Sat Flow(s),veh/h/ln	1682	1841	1409	1584	0	1692	1591	1664	1447	1753	1537	1196
Q Serve(g_s), s	18.7	20.0	2.4	8.0	0.0	14.4	11.0	15.1	1.9	6.3	10.0	0.0
Cycle Q Clear(g_c), s	18.7	20.0	2.4	8.0	0.0	14.4	11.0	15.1	1.9	6.3	10.0	0.0
Prop In Lane	1.00		1.00	1.00		0.25	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	310	340	260	248	0	265	388	915	398	126	723	
V/C Ratio(X)	0.93	0.99	0.14	0.50	0.00	0.86	0.84	0.58	0.09	0.81	0.54	
Avail Cap(c_a), veh/h	310	340	260	327	0	349	425	915	398	153	723	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.83	0.83	0.83	0.98	0.98	0.00
Uniform Delay (d), s/veh	44.2	44.7	37.6	42.5	0.0	45.2	47.3	34.4	29.6	46.4	24.9	0.0
Incr Delay (d2), s/veh	34.2	45.0	0.2	1.6	0.0	14.9	12.9	2.2	0.4	23.3	2.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.5	13.1	0.8	3.2	0.0	7.0	4.8	6.0	0.7	3.3	3.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	78.4	89.7	37.8	44.1	0.0	60.1	60.2	36.6	30.0	69.7	27.8	0.0
LnGrp LOS	E	F	D	D	A	E	E	D	C	E	C	
Approach Vol, veh/h		662			352			890			495	
Approach Delay, s/veh		81.8			54.4			45.0			36.5	
Approach LOS		F			D			D			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	21.7	32.6		25.5	17.3	36.9		30.2				
Change Period (Y+Rc), s	8.3	6.7		* 8.3	* 9.4	6.7		9.9				
Max Green Setting (Gmax), s	14.7	19.1		* 23	* 9.6	23.1		20.3				
Max Q Clear Time (g_c+I1), s	13.0	12.0		16.4	8.3	17.1		22.0				
Green Ext Time (p_c), s	0.4	1.6		0.8	0.0	2.1		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		54.8	
HCM 6th LOS		D	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Group Flow (vph)	161	100	40	879	2	684	62
v/c Ratio	0.51	0.18	0.11	0.54	0.01	0.60	0.11
Control Delay	37.8	7.4	9.6	14.5	8.0	23.1	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.8	7.4	9.6	14.5	8.0	23.1	5.6
Queue Length 50th (ft)	70	6	8	118	0	141	0
Queue Length 95th (ft)	155	41	23	284	3	232	25
Internal Link Dist (ft)	414			1077		8434	
Turn Bay Length (ft)			470		275		295
Base Capacity (vph)	613	609	616	1964	620	1667	819
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.16	0.06	0.45	0.00	0.41	0.08

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (veh/h)	148	92	37	809	2	629	57
Future Volume (veh/h)	148	92	37	809	2	629	57
Initial Q (Qb), veh	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00				1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach	No			No		No	
Adj Sat Flow, veh/h/ln	1870	1752	1589	1648		1604	1707
Adj Flow Rate, veh/h	161	39	40	879		684	17
Peak Hour Factor	0.92	0.92	0.92	0.92		0.92	0.92
Percent Heavy Veh, %	2	10	21	17		20	13
Cap, veh/h	224	246	283	1370		1079	512
Arrive On Green	0.13	0.13	0.04	0.44		0.35	0.35
Sat Flow, veh/h	1781	1485	1513	3214		3127	1447
Grp Volume(v), veh/h	161	39	40	879		684	17
Grp Sat Flow(s),veh/h/ln	1781	1485	1513	1566		1523	1447
Q Serve(g_s), s	5.4	0.0	0.0	13.6		11.6	0.5
Cycle Q Clear(g_c), s	5.4	0.0	0.0	13.6		11.6	0.5
Prop In Lane	1.00	1.00	1.00				1.00
Lane Grp Cap(c), veh/h	224	246	283	1370		1079	512
V/C Ratio(X)	0.72	0.16	0.14	0.64		0.63	0.03
Avail Cap(c_a), veh/h	720	659	711	2277		1969	935
HCM Platoon Ratio	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	26.0	22.1	20.8	13.6		16.6	13.1
Incr Delay (d2), s/veh	5.1	0.4	0.3	1.1		1.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	0.7	0.4	3.7		3.3	0.1
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	31.1	22.5	21.0	14.7		18.0	13.1
LnGrp LOS	C	C	C	B		B	B
Approach Vol, veh/h	200			919		701	
Approach Delay, s/veh	29.4			15.0		17.9	
Approach LOS	C			B		B	

Timer - Assigned Phs		2		4	5	6	
Phs Duration (G+Y+Rc), s		37.6		16.5	13.0	32.4	
Change Period (Y+Rc), s		10.5		8.7	10.5	10.5	
Max Green Setting (Gmax), s		45.0		25.0	20.0	40.0	
Max Q Clear Time (g_c+I1), s		15.6		7.4	2.0	13.6	
Green Ext Time (p_c), s		11.5		0.7	0.1	8.3	

Intersection Summary	
HCM 6th Ctrl Delay	17.7
HCM 6th LOS	B

Notes

User approved ignoring U-Turning movement.

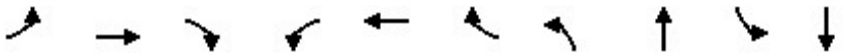
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	57	237	175	604	574	80
v/c Ratio	0.41	0.52	0.53	0.25	0.35	0.07
Control Delay	55.8	10.2	57.6	3.8	14.5	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.8	10.2	57.6	3.8	14.5	1.4
Queue Length 50th (ft)	39	0	65	26	108	0
Queue Length 95th (ft)	78	39	99	102	170	14
Internal Link Dist (ft)	446			1419	813	
Turn Bay Length (ft)		250	485			315
Base Capacity (vph)	313	731	615	2433	1629	1316
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.32	0.28	0.25	0.35	0.06

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	55	230	170	586	0	557	78
Future Volume (vph)	55	230	170	586	0	557	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Lane Util. Factor	1.00	0.88	0.97	0.95		0.95	1.00
Frt	1.00	0.85	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (prot)	1583	2733	3273	3195		2888	1583
Flt Permitted	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (perm)	1583	2733	3273	3195		2888	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	57	237	175	604	0	574	80
RTOR Reduction (vph)	0	216	0	0	0	0	28
Lane Group Flow (vph)	57	21	175	604	0	574	52
Heavy Vehicles (%)	14%	4%	7%	13%	2%	25%	2%
Turn Type	Prot	Prot	Prot	NA	Prot	NA	pm+ov
Protected Phases	7	4	1	6	5	2	7
Permitted Phases		4					2
Actuated Green, G (s)	9.6	9.6	11.2	83.8		62.1	71.7
Effective Green, g (s)	9.6	9.6	11.2	83.8		62.1	71.7
Actuated g/C Ratio	0.09	0.09	0.10	0.76		0.56	0.65
Clearance Time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Vehicle Extension (s)	3.0	3.0	3.0	3.5		3.5	3.0
Lane Grp Cap (vph)	138	238	333	2434		1630	1031
v/s Ratio Prot	c0.04	0.01	c0.05	0.19		c0.20	0.00
v/s Ratio Perm							0.03
v/c Ratio	0.41	0.09	0.53	0.25		0.35	0.05
Uniform Delay, d1	47.5	46.2	46.9	3.8		13.0	6.9
Progression Factor	1.00	1.00	1.11	0.87		1.00	1.00
Incremental Delay, d2	2.0	0.2	1.5	0.2		0.6	0.0
Delay (s)	49.5	46.3	53.8	3.6		13.6	6.9
Level of Service	D	D	D	A		B	A
Approach Delay (s)	46.9			14.9		12.8	
Approach LOS	D			B		B	

Intersection Summary			
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	27.1
Intersection Capacity Utilization	49.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

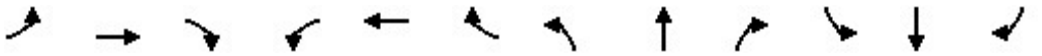
HCM 6th Edition methodology supports red clearance in the range of 0 to 6 seconds.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	88	901	50	39	643	100	133	105	30	26
v/c Ratio	0.17	0.71	0.05	0.11	0.52	0.09	0.69	0.24	0.17	0.05
Control Delay	2.0	8.2	0.2	3.8	10.5	1.7	53.6	1.4	33.6	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	8.2	0.2	3.8	10.5	1.7	53.6	1.4	33.6	0.2
Queue Length 50th (ft)	5	84	0	5	189	0	67	0	14	0
Queue Length 95th (ft)	m5	534	m0	12	268	16	#136	0	39	0
Internal Link Dist (ft)		737			2471			292		413
Turn Bay Length (ft)	150		150	150		150			50	
Base Capacity (vph)	512	1279	1112	345	1232	1080	218	455	203	549
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.70	0.04	0.11	0.52	0.09	0.61	0.23	0.15	0.05

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	81	829	46	36	592	92	122	0	97	28	0	24
Future Volume (veh/h)	81	829	46	36	592	92	122	0	97	28	0	24
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	88	901	32	39	643	62	133	0	7	30	0	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	555	1291	1094	389	1247	1057	247	0	184	242	0	184
Arrive On Green	0.06	0.69	0.69	0.04	0.67	0.67	0.12	0.00	0.12	0.12	0.00	0.12
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1415	0	1585	1409	0	1585
Grp Volume(v), veh/h	88	901	32	39	643	62	133	0	7	30	0	2
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1415	0	1585	1409	0	1585
Q Serve(g_s), s	1.2	24.5	0.5	0.5	14.8	1.2	7.8	0.0	0.3	1.6	0.0	0.1
Cycle Q Clear(g_c), s	1.2	24.5	0.5	0.5	14.8	1.2	7.9	0.0	0.3	2.0	0.0	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	555	1291	1094	389	1247	1057	247	0	184	242	0	184
V/C Ratio(X)	0.16	0.70	0.03	0.10	0.52	0.06	0.54	0.00	0.04	0.12	0.00	0.01
Avail Cap(c_a), veh/h	557	1291	1094	431	1247	1057	308	0	252	303	0	252
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.68	0.68	0.68	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	4.8	7.9	4.2	7.1	7.2	4.9	36.8	0.0	33.4	34.3	0.0	33.3
Incr Delay (d2), s/veh	0.1	2.2	0.0	0.1	0.4	0.0	1.8	0.0	0.1	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	7.3	0.1	0.1	4.4	0.3	2.8	0.0	0.1	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	4.9	10.0	4.2	7.2	7.6	4.9	38.6	0.0	33.5	34.5	0.0	33.3
LnGrp LOS	A	B	A	A	A	A	D	A	C	C	A	C
Approach Vol, veh/h		1021			744			140			32	
Approach Delay, s/veh		9.4			7.3			38.3			34.4	
Approach LOS		A			A			D			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.5	63.1		14.3	9.5	61.2		14.3				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.0	53.0		13.5	5.1	52.9		13.5				
Max Q Clear Time (g_c+I1), s	2.5	26.5		9.9	3.2	16.8		4.0				
Green Ext Time (p_c), s	0.0	7.1		0.1	0.0	4.6		0.0				

Intersection Summary												
HCM 6th Ctrl Delay			11.1									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	953	707	3	0	13
Future Vol, veh/h	0	953	707	3	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1036	768	3	0	14

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	770
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	0	-	-	-	0	401
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	401
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	14.3
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	401
HCM Lane V/C Ratio	-	-	-	0.035
HCM Control Delay (s)	-	-	-	14.3
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	48	905	709	14	5	1
Future Vol, veh/h	48	905	709	14	5	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	-	0	50
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	52	984	771	15	5	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	786	0	-	0	1867	779
Stage 1	-	-	-	-	779	-
Stage 2	-	-	-	-	1088	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	833	-	-	-	80	396
Stage 1	-	-	-	-	452	-
Stage 2	-	-	-	-	323	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	833	-	-	-	75	396
Mov Cap-2 Maneuver	-	-	-	-	75	-
Stage 1	-	-	-	-	424	-
Stage 2	-	-	-	-	323	-

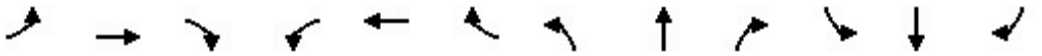
Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	49.6
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	833	-	-	-	75	396
HCM Lane V/C Ratio	0.063	-	-	-	0.072	0.003
HCM Control Delay (s)	9.6	-	-	-	56.7	14.1
HCM Lane LOS	A	-	-	-	F	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.2	0

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	29	12	16	1	39	789	58	2	691	100
v/c Ratio	0.29	0.03	0.15	0.00	0.07	0.27	0.04	0.00	0.25	0.08
Control Delay	55.1	0.2	49.3	0.0	1.8	2.8	1.2	4.0	5.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.1	0.2	49.3	0.0	1.8	2.8	1.2	4.0	5.6	0.1
Queue Length 50th (ft)	20	0	11	0	3	2	0	0	78	0
Queue Length 95th (ft)	49	0	33	0	m3	m229	m6	m2	92	1
Internal Link Dist (ft)		785		554		2104			1225	
Turn Bay Length (ft)					300		150	300		150
Base Capacity (vph)	296	562	306	551	647	2934	1340	598	2738	1261
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.02	0.05	0.00	0.06	0.27	0.04	0.00	0.25	0.08

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	0	11	15	0	1	36	726	53	2	636	92
Future Volume (veh/h)	27	0	11	15	0	1	36	726	53	2	636	92
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	29	0	0	16	0	0	39	789	40	2	691	65
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	114	64	0	114	64	0	565	2587	1154	552	2484	1108
Arrive On Green	0.03	0.00	0.00	0.03	0.00	0.00	0.06	1.00	1.00	0.00	0.70	0.70
Sat Flow, veh/h	1418	1870	0	1418	1870	0	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	29	0	0	16	0	0	39	789	40	2	691	65
Grp Sat Flow(s),veh/h/ln	1418	1870	0	1418	1870	0	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	2.2	0.0	0.0	1.2	0.0	0.0	0.7	0.0	0.0	0.0	8.0	1.4
Cycle Q Clear(g_c), s	2.2	0.0	0.0	1.2	0.0	0.0	0.7	0.0	0.0	0.0	8.0	1.4
Prop In Lane	1.00		0.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	114	64	0	114	64	0	565	2587	1154	552	2484	1108
V/C Ratio(X)	0.26	0.00	0.00	0.14	0.00	0.00	0.07	0.31	0.03	0.00	0.28	0.06
Avail Cap(c_a), veh/h	363	393	0	376	410	0	666	2587	1154	688	2484	1108
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	0.56	0.56	0.56	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.4	0.0	0.0	51.9	0.0	0.0	4.2	0.0	0.0	4.0	6.2	5.2
Incr Delay (d2), s/veh	1.2	0.0	0.0	0.6	0.0	0.0	0.0	0.2	0.0	0.0	0.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	0.0	0.5	0.0	0.0	0.2	0.1	0.0	0.0	2.3	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.6	0.0	0.0	52.5	0.0	0.0	4.3	0.2	0.0	4.0	6.5	5.3
LnGrp LOS	D	A	A	D	A	A	A	A	A	A	A	A
Approach Vol, veh/h		29			16			868			758	
Approach Delay, s/veh		53.6			52.5			0.3			6.4	
Approach LOS		D			D			A			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.6	86.8		14.6	11.8	83.6		14.6				
Change Period (Y+Rc), s	8.3	6.7		10.9	8.3	6.7		* 11				
Max Green Setting (Gmax), s	8.7	52.3		23.1	9.7	51.3		* 24				
Max Q Clear Time (g_c+I1), s	2.0	2.0		4.2	2.7	10.0		3.2				
Green Ext Time (p_c), s	0.0	5.5		0.0	0.0	4.7		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		4.5
HCM 6th LOS		A

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	2	5	748	6	17	728
Future Vol, veh/h	2	5	748	6	17	728
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	50	-	150	300	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	5	813	7	18	791

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1245	407	0	0	820	0
Stage 1	813	-	-	-	-	-
Stage 2	432	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	166	593	-	-	805	-
Stage 1	396	-	-	-	-	-
Stage 2	622	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	162	593	-	-	805	-
Mov Cap-2 Maneuver	288	-	-	-	-	-
Stage 1	396	-	-	-	-	-
Stage 2	608	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	288	593	805	-
HCM Lane V/C Ratio	-	-	0.008	0.009	0.023	-
HCM Control Delay (s)	-	-	17.6	11.1	9.6	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0	0	0.1	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	321	859	182	161	959	158	200	254	114	60	397
v/c Ratio	1.09	0.95	0.16	0.83	1.22	0.18	0.69	1.18	0.49	0.37	0.84
Control Delay	107.9	52.2	2.7	58.3	141.1	2.1	50.5	152.5	42.2	53.4	46.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	107.9	52.2	2.7	58.3	141.1	2.1	50.5	152.5	42.2	53.4	46.1
Queue Length 50th (ft)	~206	591	0	66	~834	0	120	~183	65	40	200
Queue Length 95th (ft)	#381	#860	56	#183	#1078	26	#200	#351	115	83	#345
Internal Link Dist (ft)		593			4165			244		594	
Turn Bay Length (ft)	260		500	270		575	190		150		
Base Capacity (vph)	295	901	1122	193	785	893	289	215	251	176	470
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.09	0.95	0.16	0.83	1.22	0.18	0.69	1.18	0.45	0.34	0.84

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	295	790	167	148	882	145	184	86	148	105	55	365
Future Volume (veh/h)	295	790	167	148	882	145	184	86	148	105	55	365
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	0.99		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1841	1870	1693	1841	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	321	859	104	161	959	74	200	93	101	114	60	317
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	4	2	14	4	2	2	2	2	2	2	2
Cap, veh/h	298	1002	1012	243	847	830	298	94	102	198	177	354
Arrive On Green	0.13	0.54	0.54	0.06	0.46	0.46	0.09	0.12	0.12	0.07	0.09	0.09
Sat Flow, veh/h	1781	1841	1585	1612	1841	1552	1781	814	884	1781	1870	1560
Grp Volume(v), veh/h	321	859	104	161	959	74	200	0	194	114	60	317
Grp Sat Flow(s),veh/h/ln	1781	1841	1585	1612	1841	1552	1781	0	1698	1781	1870	1560
Q Serve(g_s), s	14.3	43.9	2.8	4.8	50.6	2.6	10.4	0.0	12.6	6.3	3.3	10.4
Cycle Q Clear(g_c), s	14.3	43.9	2.8	4.8	50.6	2.6	10.4	0.0	12.6	6.3	3.3	10.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.52	1.00		1.00
Lane Grp Cap(c), veh/h	298	1002	1012	243	847	830	298	0	196	198	177	354
V/C Ratio(X)	1.08	0.86	0.10	0.66	1.13	0.09	0.67	0.00	0.99	0.58	0.34	0.90
Avail Cap(c_a), veh/h	298	1002	1012	276	847	830	298	0	196	252	177	354
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.09	0.09	0.09	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.3	21.4	7.7	22.0	29.7	12.6	41.1	0.0	48.6	41.2	46.6	41.5
Incr Delay (d2), s/veh	74.8	9.4	0.2	0.5	61.3	0.0	5.7	0.0	60.5	2.6	1.1	24.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.0	19.3	1.0	2.0	34.7	0.9	5.4	0.0	8.6	2.9	1.6	10.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	111.1	30.9	7.9	22.5	91.0	12.6	46.8	0.0	109.1	43.8	47.7	65.8
LnGrp LOS	F	C	A	C	F	B	D	A	F	D	D	E
Approach Vol, veh/h		1284			1194			394			491	
Approach Delay, s/veh		49.1			76.9			77.5			58.5	
Approach LOS		D			E			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.0	56.5	14.7	19.3	13.7	65.8	17.0	17.0
Change Period (Y+Rc), s	* 8.7	* 5.8	6.6	6.6	* 6.8	5.8	6.6	6.6
Max Green Setting (Gmax), s	* 14	* 47	11.4	9.4	* 9.2	54.2	10.4	10.4
Max Q Clear Time (g_c+I1), s	16.3	52.6	8.3	14.6	6.8	45.9	12.4	12.4
Green Ext Time (p_c), s	0.0	0.0	0.1	0.0	0.1	4.8	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	63.6
HCM 6th LOS	E

Notes

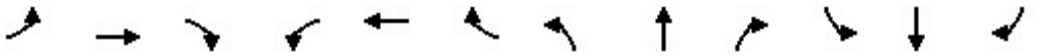
User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	165	688	48	31	987	50	83	249
v/c Ratio	0.75	0.63	0.05	0.07	1.01	0.06	0.65	0.63
Control Delay	34.0	14.1	1.2	4.0	50.2	1.3	49.6	17.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.0	14.1	1.2	4.0	50.2	1.3	49.6	17.9
Queue Length 50th (ft)	19	131	0	3	396	0	31	32
Queue Length 95th (ft)	#129	401	8	12	#770	8	77	100
Internal Link Dist (ft)		4165			4595		176	167
Turn Bay Length (ft)	145		90	125		155		
Base Capacity (vph)	221	1092	1013	465	980	894	264	652
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.63	0.05	0.07	1.01	0.06	0.31	0.38

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	162	674	47	30	967	49	46	23	13	29	32	182
Future Volume (veh/h)	162	674	47	30	967	49	46	23	13	29	32	182
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1781	1870	1841	1826	1870	1870	1752	1870	1870	1841	1870
Adj Flow Rate, veh/h	165	688	29	31	987	28	47	23	4	30	33	38
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	8	2	4	5	2	2	10	2	2	4	2
Cap, veh/h	253	1069	952	411	1030	894	185	76	10	106	84	75
Arrive On Green	0.07	0.60	0.60	0.03	0.56	0.56	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1781	1781	1585	1753	1826	1585	827	621	83	323	688	610
Grp Volume(v), veh/h	165	688	29	31	987	28	74	0	0	101	0	0
Grp Sat Flow(s),veh/h/ln	1781	1781	1585	1753	1826	1585	1531	0	0	1621	0	0
Q Serve(g_s), s	2.6	17.7	0.5	0.5	36.0	0.6	0.0	0.0	0.0	1.2	0.0	0.0
Cycle Q Clear(g_c), s	2.6	17.7	0.5	0.5	36.0	0.6	2.8	0.0	0.0	3.9	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.64		0.05	0.30		0.38
Lane Grp Cap(c), veh/h	253	1069	952	411	1030	894	271	0	0	265	0	0
V/C Ratio(X)	0.65	0.64	0.03	0.08	0.96	0.03	0.27	0.00	0.00	0.38	0.00	0.00
Avail Cap(c_a), veh/h	258	1069	952	479	1040	903	594	0	0	632	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	16.1	9.1	5.7	7.1	14.5	6.8	28.3	0.0	0.0	28.7	0.0	0.0
Incr Delay (d2), s/veh	5.6	1.9	0.0	0.1	18.8	0.0	0.5	0.0	0.0	0.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	5.3	0.1	0.1	16.0	0.1	1.1	0.0	0.0	1.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.7	11.0	5.7	7.2	33.4	6.8	28.8	0.0	0.0	29.6	0.0	0.0
LnGrp LOS	C	B	A	A	C	A	C	A	A	C	A	A
Approach Vol, veh/h		882			1046			74			101	
Approach Delay, s/veh		12.8			31.9			28.8			29.6	
Approach LOS		B			C			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.8	50.0		13.5	9.3	47.4		13.5				
Change Period (Y+Rc), s	4.5	7.8		4.9	4.5	7.8		4.9				
Max Green Setting (Gmax), s	5.0	40.0		25.0	5.0	40.0		25.0				
Max Q Clear Time (g_c+I1), s	2.5	19.7		4.8	4.6	38.0		5.9				
Green Ext Time (p_c), s	0.0	8.2		0.3	0.0	1.6		0.4				

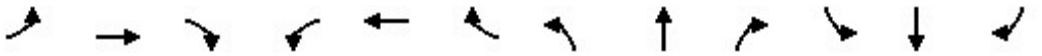
Intersection Summary												
HCM 6th Ctrl Delay			23.7									
HCM 6th LOS			C									

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	326	230	422	252	523	412	705	188	111	696	312
v/c Ratio	1.23	0.82	0.86	0.65	1.26	1.28	0.99	0.37	0.76	0.97	0.54
Control Delay	172.1	68.4	31.6	46.8	169.8	189.8	75.9	3.7	86.2	64.0	10.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	172.1	68.4	31.6	46.8	169.8	189.8	75.9	3.7	86.2	64.0	10.1
Queue Length 50th (ft)	~285	159	83	161	~460	~190	~265	0	81	234	25
Queue Length 95th (ft)	#462	#287	#261	251	#671	#290	#394	24	#162	#386	99
Internal Link Dist (ft)		382			694		8434			2104	
Turn Bay Length (ft)	250		230	500		565		250	125		480
Base Capacity (vph)	265	281	491	390	416	321	710	512	150	715	578
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.23	0.82	0.86	0.65	1.26	1.28	0.99	0.37	0.74	0.97	0.54

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	300	212	388	232	376	105	379	649	173	102	640	287
Future Volume (veh/h)	300	212	388	232	376	105	379	649	173	102	640	287
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1811	1796	1781	1826	1796	1811	1781	1796	1826	1811	1870
Adj Flow Rate, veh/h	326	230	145	252	409	104	412	705	27	111	696	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	6	7	8	5	7	6	8	7	5	6	2
Cap, veh/h	269	285	239	396	328	83	325	744	335	135	723	
Arrive On Green	0.16	0.16	0.16	0.23	0.23	0.23	0.10	0.22	0.22	0.15	0.42	0.00
Sat Flow, veh/h	1711	1811	1522	1697	1404	357	3346	3385	1522	1739	3441	1585
Grp Volume(v), veh/h	326	230	145	252	0	513	412	705	27	111	696	0
Grp Sat Flow(s),veh/h/ln	1711	1811	1522	1697	0	1762	1673	1692	1522	1739	1721	1585
Q Serve(g_s), s	17.3	13.5	9.8	14.7	0.0	25.7	10.7	22.6	1.5	6.8	21.7	0.0
Cycle Q Clear(g_c), s	17.3	13.5	9.8	14.7	0.0	25.7	10.7	22.6	1.5	6.8	21.7	0.0
Prop In Lane	1.00		1.00	1.00		0.20	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	269	285	239	396	0	412	325	744	335	135	723	
V/C Ratio(X)	1.21	0.81	0.61	0.64	0.00	1.25	1.27	0.95	0.08	0.82	0.96	
Avail Cap(c_a), veh/h	269	285	239	396	0	412	325	744	335	152	723	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.84	0.84	0.84	0.90	0.90	0.00
Uniform Delay (d), s/veh	46.3	44.7	43.2	37.9	0.0	42.2	49.7	42.3	34.1	45.8	31.5	0.0
Incr Delay (d2), s/veh	124.5	15.7	4.3	3.3	0.0	129.8	138.7	19.9	0.4	24.8	24.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.5	7.1	3.9	6.3	0.0	25.6	10.5	10.9	0.6	3.5	8.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	170.9	60.4	47.5	41.3	0.0	171.9	188.3	62.2	34.5	70.6	55.5	0.0
LnGrp LOS	F	E	D	D	A	F	F	E	C	E	E	
Approach Vol, veh/h		701			765			1144			807	
Approach Delay, s/veh		109.1			128.9			107.0			57.5	
Approach LOS		F			F			F			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	19.0	29.8		34.0	17.9	30.9		27.2				
Change Period (Y+Rc), s	8.3	6.7		* 8.3	* 9.4	6.7		9.9				
Max Green Setting (Gmax), s	10.7	23.1		* 26	* 9.6	23.1		17.3				
Max Q Clear Time (g_c+I1), s	12.7	23.7		27.7	8.8	24.6		19.3				
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	0.0		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		100.6
HCM 6th LOS		F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	184	99	124	1067	1089	210
v/c Ratio	0.63	0.19	0.42	0.51	0.80	0.27
Control Delay	47.5	18.0	21.0	10.9	30.6	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.5	18.0	21.0	10.9	30.6	4.0
Queue Length 50th (ft)	105	34	27	164	290	0
Queue Length 95th (ft)	182	69	58	256	#456	46
Internal Link Dist (ft)	414			1077	8434	
Turn Bay Length (ft)			470			295
Base Capacity (vph)	473	514	488	2104	1419	798
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.19	0.25	0.51	0.77	0.26

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (veh/h)	169	91	114	982	0	1002	193
Future Volume (veh/h)	169	91	114	982	0	1002	193
Initial Q (Qb), veh	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00				1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00		1.00	1.00
Work Zone On Approach	No			No		No	
Adj Sat Flow, veh/h/ln	1870	1722	1826	1781		1767	1870
Adj Flow Rate, veh/h	184	87	124	1067		1089	76
Peak Hour Factor	0.92	0.92	0.92	0.92		0.92	0.92
Percent Heavy Veh, %	2	12	5	8		9	2
Cap, veh/h	242	285	267	1484		1445	682
Arrive On Green	0.14	0.14	0.06	0.44		0.43	0.43
Sat Flow, veh/h	1781	1459	1739	3474		3445	1585
Grp Volume(v), veh/h	184	87	124	1067		1089	76
Grp Sat Flow(s),veh/h/ln	1781	1459	1739	1692		1678	1585
Q Serve(g_s), s	7.9	0.0	0.0	20.5		21.7	2.3
Cycle Q Clear(g_c), s	7.9	0.0	0.0	20.5		21.7	2.3
Prop In Lane	1.00	1.00	1.00				1.00
Lane Grp Cap(c), veh/h	242	285	267	1484		1445	682
V/C Ratio(X)	0.76	0.31	0.46	0.72		0.75	0.11
Avail Cap(c_a), veh/h	562	546	603	1921		1693	800
HCM Platoon Ratio	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00		1.00	1.00
Uniform Delay (d), s/veh	33.0	27.3	31.4	18.3		19.0	13.5
Incr Delay (d2), s/veh	5.8	0.7	1.5	1.6		2.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	2.0	2.2	6.9		7.3	0.7
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	38.8	28.0	32.9	19.8		21.3	13.7
LnGrp LOS	D	C	C	B		C	B
Approach Vol, veh/h	271			1191		1165	
Approach Delay, s/veh	35.4			21.2		20.8	
Approach LOS	D			C		C	

Timer - Assigned Phs		2		4	5	6	
Phs Duration (G+Y+Rc), s		45.3		19.5	15.2	44.6	
Change Period (Y+Rc), s		10.5		8.7	10.5	10.5	
Max Green Setting (Gmax), s		45.0		25.0	20.0	40.0	
Max Q Clear Time (g_c+I1), s		22.5		9.9	2.0	23.7	
Green Ext Time (p_c), s		12.3		0.9	0.3	10.4	

Intersection Summary		
HCM 6th Ctrl Delay		22.5
HCM 6th LOS		C

Notes

User approved ignoring U-Turning movement.

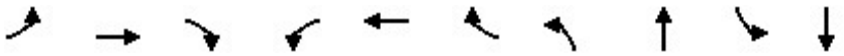
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	177	265	324	813	830	120
v/c Ratio	0.68	0.42	0.67	0.36	0.53	0.11
Control Delay	57.4	6.8	53.6	7.8	24.1	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	6.8	53.6	7.8	24.1	1.9
Queue Length 50th (ft)	120	0	122	130	214	2
Queue Length 95th (ft)	184	37	142	77	323	23
Internal Link Dist (ft)	446			1419	813	
Turn Bay Length (ft)		250	485			315
Base Capacity (vph)	350	764	627	2284	1560	1172
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.35	0.52	0.36	0.53	0.10

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	170	254	311	780	0	797	115
Future Volume (vph)	170	254	311	780	0	797	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Lane Util. Factor	1.00	0.88	0.97	0.95		0.95	1.00
Frt	1.00	0.85	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (prot)	1770	2787	3335	3252		3374	1583
Flt Permitted	0.95	1.00	0.95	1.00		1.00	1.00
Satd. Flow (perm)	1770	2787	3335	3252		3374	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.92	0.96	0.96
Adj. Flow (vph)	177	265	324	812	0	830	120
RTOR Reduction (vph)	0	226	0	0	0	0	44
Lane Group Flow (vph)	177	39	324	813	0	830	76
Heavy Vehicles (%)	2%	2%	5%	11%	2%	7%	2%
Turn Type	Prot	Prot	Prot	NA	Prot	NA	pm+ov
Protected Phases	7	4	1	6	5	2	7
Permitted Phases		4					2
Actuated Green, G (s)	16.1	16.1	15.9	77.3		50.9	67.0
Effective Green, g (s)	16.1	16.1	15.9	77.3		50.9	67.0
Actuated g/C Ratio	0.15	0.15	0.14	0.70		0.46	0.61
Clearance Time (s)	10.2	10.2	10.3	6.4		6.6	10.2
Vehicle Extension (s)	3.0	3.0	3.0	3.5		3.5	3.0
Lane Grp Cap (vph)	259	407	482	2285		1561	964
v/s Ratio Prot	c0.10	0.01	c0.10	0.25		c0.25	0.01
v/s Ratio Perm							0.04
v/c Ratio	0.68	0.10	0.67	0.36		0.53	0.08
Uniform Delay, d1	44.5	40.6	44.6	6.5		21.1	8.8
Progression Factor	1.00	1.00	1.05	1.04		1.00	1.00
Incremental Delay, d2	7.3	0.1	3.7	0.4		1.3	0.0
Delay (s)	51.8	40.7	50.3	7.2		22.4	8.9
Level of Service	D	D	D	A		C	A
Approach Delay (s)	45.2			19.5		20.7	
Approach LOS	D			B		C	

Intersection Summary			
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	27.1
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

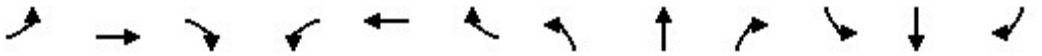
HCM 6th Edition methodology supports red clearance in the range of 0 to 6 seconds.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	36	928	116	92	1167	40	83	65	102	90
v/c Ratio	0.17	0.71	0.10	0.25	0.86	0.03	0.63	0.16	0.76	0.26
Control Delay	2.5	6.7	0.7	3.7	18.7	0.4	61.5	0.9	74.6	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.5	6.7	0.7	3.7	18.7	0.4	61.5	0.9	74.6	1.9
Queue Length 50th (ft)	2	108	0	7	445	0	45	0	56	0
Queue Length 95th (ft)	m3	180	m4	14	#839	3	#121	0	#151	0
Internal Link Dist (ft)		737			2471			292		413
Turn Bay Length (ft)	150		150	150		150			50	
Base Capacity (vph)	213	1330	1164	363	1352	1169	132	398	135	340
Starvation Cap Reductn	0	7	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.70	0.10	0.25	0.86	0.03	0.63	0.16	0.76	0.26

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	33	854	107	85	1074	37	76	0	60	94	0	83
Future Volume (veh/h)	33	854	107	85	1074	37	76	0	60	94	0	83
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	36	928	77	92	1167	27	83	0	2	102	0	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	272	1323	1121	600	1356	1150	203	0	137	203	0	137
Arrive On Green	0.07	1.00	1.00	0.05	0.73	0.73	0.09	0.00	0.09	0.09	0.00	0.09
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1415	0	1585	1415	0	1585
Grp Volume(v), veh/h	36	928	77	92	1167	27	83	0	2	102	0	2
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1415	0	1585	1415	0	1585
Q Serve(g_s), s	0.4	0.0	0.0	1.1	39.7	0.4	5.0	0.0	0.1	6.2	0.0	0.1
Cycle Q Clear(g_c), s	0.4	0.0	0.0	1.1	39.7	0.4	5.1	0.0	0.1	6.3	0.0	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	272	1323	1121	600	1356	1150	203	0	137	203	0	137
V/C Ratio(X)	0.13	0.70	0.07	0.15	0.86	0.02	0.41	0.00	0.01	0.50	0.00	0.01
Avail Cap(c_a), veh/h	325	1323	1121	622	1356	1150	203	0	137	203	0	137
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.66	0.66	0.66	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.9	0.0	0.0	2.7	8.7	3.3	38.7	0.0	36.4	39.2	0.0	36.4
Incr Delay (d2), s/veh	0.1	2.1	0.1	0.1	5.8	0.0	1.3	0.0	0.0	1.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.8	0.0	0.2	11.8	0.1	1.8	0.0	0.0	2.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.0	2.1	0.1	2.8	14.6	3.3	40.0	0.0	36.4	41.2	0.0	36.4
LnGrp LOS	B	A	A	A	B	A	D	A	D	D	A	D
Approach Vol, veh/h		1041			1286			85			104	
Approach Delay, s/veh		2.3			13.5			39.9			41.1	
Approach LOS		A			B			D			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.0	66.0		12.0	7.4	67.6		12.0				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.5	60.5		7.5	5.5	60.5		7.5				
Max Q Clear Time (g_c+I1), s	3.1	2.0		7.1	2.4	41.7		8.3				
Green Ext Time (p_c), s	0.0	8.7		0.0	0.0	9.4		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		10.9	
HCM 6th LOS		B	

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1008	1153	1	0	43
Future Vol, veh/h	0	1008	1153	1	0	43
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1096	1253	1	0	47

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1254
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	0	-	-	-	0	210
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	210
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	27
HCM LOS			D

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	210
HCM Lane V/C Ratio	-	-	-	0.223
HCM Control Delay (s)	-	-	-	27
HCM Lane LOS	-	-	-	D
HCM 95th %tile Q(veh)	-	-	-	0.8

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	19	989	1149	6	17	5
Future Vol, veh/h	19	989	1149	6	17	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	-	0	50
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	21	1075	1249	7	18	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1256	0	-	0	2370	1253
Stage 1	-	-	-	-	1253	-
Stage 2	-	-	-	-	1117	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	554	-	-	-	38	210
Stage 1	-	-	-	-	269	-
Stage 2	-	-	-	-	313	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	554	-	-	-	37	210
Mov Cap-2 Maneuver	-	-	-	-	37	-
Stage 1	-	-	-	-	259	-
Stage 2	-	-	-	-	313	-

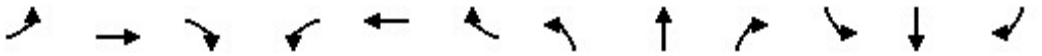
Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	140.8
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	554	-	-	-	37	210
HCM Lane V/C Ratio	0.037	-	-	-	0.499	0.026
HCM Control Delay (s)	11.8	-	-	-	175.5	22.6
HCM Lane LOS	B	-	-	-	F	C
HCM 95th %tile Q(veh)	0.1	-	-	-	1.7	0.1

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	102	41	57	2	16	1096	23	1	1067	40
v/c Ratio	0.60	0.11	0.32	0.01	0.05	0.45	0.02	0.00	0.45	0.04
Control Delay	59.7	0.6	46.8	0.0	6.3	9.9	0.2	8.0	9.1	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.7	0.6	46.8	0.0	6.3	9.9	0.2	8.0	9.1	0.1
Queue Length 50th (ft)	69	0	37	0	1	0	0	0	111	0
Queue Length 95th (ft)	120	0	73	0	m7	m293	m0	m1	241	0
Internal Link Dist (ft)		785		554		2104			1225	
Turn Bay Length (ft)					300		150	300		150
Base Capacity (vph)	296	491	297	503	401	2456	1148	386	2359	1109
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.08	0.19	0.00	0.04	0.45	0.02	0.00	0.45	0.04

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	94	0	38	52	0	2	15	1008	21	1	982	37
Future Volume (veh/h)	94	0	38	52	0	2	15	1008	21	1	982	37
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	102	0	2	57	0	0	16	1096	14	1	1067	24
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	193	0	142	191	168	0	366	2393	1067	339	2335	1042
Arrive On Green	0.09	0.00	0.09	0.09	0.00	0.00	0.02	0.67	0.67	0.00	0.66	0.66
Sat Flow, veh/h	1418	0	1585	1415	1870	0	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	102	0	2	57	0	0	16	1096	14	1	1067	24
Grp Sat Flow(s),veh/h/ln	1418	0	1585	1415	1870	0	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	7.8	0.0	0.1	4.2	0.0	0.0	0.3	16.0	0.3	0.0	16.2	0.6
Cycle Q Clear(g_c), s	7.8	0.0	0.1	4.3	0.0	0.0	0.3	16.0	0.3	0.0	16.2	0.6
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	193	0	142	191	168	0	366	2393	1067	339	2335	1042
V/C Ratio(X)	0.53	0.00	0.01	0.30	0.00	0.00	0.04	0.46	0.01	0.00	0.46	0.02
Avail Cap(c_a), veh/h	363	0	333	374	410	0	492	2393	1067	478	2335	1042
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	0.09	0.09	0.09	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.1	0.0	45.6	47.6	0.0	0.0	7.1	8.5	5.9	7.0	9.2	6.6
Incr Delay (d2), s/veh	2.2	0.0	0.0	0.9	0.0	0.0	0.0	0.1	0.0	0.0	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	0.0	0.1	1.5	0.0	0.0	0.1	4.8	0.1	0.0	5.1	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.3	0.0	45.7	48.5	0.0	0.0	7.1	8.5	5.9	7.0	9.9	6.6
LnGrp LOS	D	A	D	D	A	A	A	A	A	A	A	A
Approach Vol, veh/h		104			57			1126			1092	
Approach Delay, s/veh		51.2			48.5			8.5			9.8	
Approach LOS		D			D			A			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.5	80.8		20.8	10.2	79.0		20.8				
Change Period (Y+Rc), s	8.3	6.7		10.9	8.3	6.7		* 11				
Max Green Setting (Gmax), s	8.7	52.3		23.1	9.7	51.3		* 24				
Max Q Clear Time (g_c+I1), s	2.0	18.0		9.8	2.3	18.2		6.3				
Green Ext Time (p_c), s	0.0	8.1		0.2	0.0	7.8		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		11.9
HCM 6th LOS		B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	6	17	1102	2	7	1014
Future Vol, veh/h	6	17	1102	2	7	1014
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	50	-	150	300	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	18	1198	2	8	1102

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1765	599	0	0	1200	0
Stage 1	1198	-	-	-	-	-
Stage 2	567	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	75	445	-	-	577	-
Stage 1	249	-	-	-	-	-
Stage 2	531	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	74	445	-	-	577	-
Mov Cap-2 Maneuver	183	-	-	-	-	-
Stage 1	249	-	-	-	-	-
Stage 2	524	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.5	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	183	445	577	-
HCM Lane V/C Ratio	-	-	0.036	0.042	0.013	-
HCM Control Delay (s)	-	-	25.4	13.4	11.3	-
HCM Lane LOS	-	-	D	B	B	-
HCM 95th %tile Q(veh)	-	-	0.1	0.1	0	-

J. VJuST

Preliminary VJuST Analysis – Intersections #6 and #9

The VDOT Junction Screening Tool (VJuST) was utilized to consider and screen innovative intersection configurations that address mobility and safety issues. This analysis is based on the Future with Development (2035) traffic volumes. As shown in Table 1, Fairfax Pike and Site Entrance #1/Lake Frederick Entrance (Intersection #6) was evaluated for a conventional traffic signal, thru-cut signal, roundabout (single lane and hybrid), and two-way stop control. As shown in Table 6, configurations considered for Route 522 and Site Entrance #4 (Intersection #9) included a conventional traffic signal, unsignalized Continuous Green-T, unsignalized Restricted Crossing U-Turn (RCUT), and two-way stop control.

Table 2, Table 3, Table 4, and Table 5 show the results for Intersection #6 and Table 7 and Table 8 show the results for Intersection #9.

Table 1: VJuST Possible Configurations for Intersection #6

VDOT Junction Screening Tool				
Possible Configurations				
Indicate with a "Y" or "N" if each intersection or interchange configuration should or should not be considered. Use the information links for guidance. Then, click the "Show/Hide Configurations button" to hide the worksheets for the configurations that will not be considered.				
#	**Intersections**	**Information**	**Consider?**	**Justification**
	Signalized Intersections			
1	Conventional	-	Y	
2	Bowtie	Link	N	Right-of-way restrictions identified
3	Center Turn Overpass	Link	N	Not feasible for roadway facility type
4	Continuous Green-T	Link	N	Not feasible for roadway facility type
5	Echelon	Link	N	Not feasible for roadway facility type
6	Full Displaced Left Turn	Link	N	Not feasible for roadway facility type
7	Median U-Turn	Link	N	Not feasible for roadway facility type
8	Partial Displaced Left Turn	Link	N	Not feasible for roadway facility type
9	Partial Median U-Turn	Link	N	Not feasible for roadway facility type
10	Quadrant Roadway N-E	Link	N	Right-of-way restrictions identified
11	Quadrant Roadway N-W	Link	N	Right-of-way restrictions identified
12	Quadrant Roadway S-E	Link	N	Right-of-way restrictions identified
13	Quadrant Roadway S-W	Link	N	Right-of-way restrictions identified
14	Restricted Crossing U-Turn	Link	N	Not feasible for roadway facility type
15	Single Loop	Link	N	Right-of-way restrictions identified
16	Split Intersection	Link	N	Right-of-way restrictions identified
17	Thru-Cut	Link	Y	
	Unsignalized Intersections			
18	50 Mini Roundabout	Link	N	Not feasible for roadway facility type
19	75 Mini Roundabout	Link	N	Not feasible for roadway facility type
20	Roundabout	Link	Y	
21	Two-Way Stop Control	-	Y	
#	**Interchanges**	**Information**	**Consider?**	**Justification**
22	Traditional Diamond	Link	N	Not feasible for roadway facility type
23	Contraflow Left	Link	N	Not feasible for roadway facility type
24	Displaced Left Turn	Link	N	Not feasible for roadway facility type
25	Diverging Diamond	Link	N	Not feasible for roadway facility type
26	Double Roundabout	Link	N	Not feasible for roadway facility type
27	Michigan Urban Diamond	Link	N	Not feasible for roadway facility type
28	Partial Cloverleaf	Link	N	Not feasible for roadway facility type
29	Single Point	Link	N	Not feasible for roadway facility type
30	Single Roundabout	Link	N	Not feasible for roadway facility type

Table 2: VJuST Intersection #6 Results (AM Peak Hour)

Intersection Results						
		Congestion	Pedestrian	Safety	Planning Level Costs	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	Planning Level Cost Category	
Conventional	-	0.67		48	$$	
Thru-Cut	-	0.65		28	$$	
Roundabout	-	0.78		8	$$	
Two-Way Stop Control	-	1.91		48	$	

Table 3: VJusT Intersection #6 Results for Hybrid Roundabout (AM Peak Hour)

Intersection Results						
		Congestion	Pedestrian	Safety	Planning Level Costs	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	Planning Level Cost Category	
Roundabout	-	0.39		8	$$	

Table 4: VJuST Intersection #6 Results (PM Peak Hour)

Intersection Results						
		Congestion	Pedestrian	Safety	Planning Level Costs	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	Planning Level Cost Category	
Conventional	-	0.83		48	$$	
Thru-Cut	-	0.80		28	$$	
Roundabout	-	1.00		8	$$	
Two-Way Stop Control	-	4.02		48	$	

Table 5: VJuST Intersection #6 Results for Hybrid Roundabout (PM Peak Hour)

Intersection Results						
		Congestion	Pedestrian	Safety	Planning Level Costs	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	Planning Level Cost Category	
Roundabout	-	0.50		8	$$	

Table 6: VJuST Possible Configurations for Intersection #9

VDOT Junction Screening Tool				
Possible Configurations				
Indicate with a "Y" or "N" if each intersection or interchange configuration should or should not be considered. Use the information links for guidance. Then, click the "Show/Hide Configurations button" to hide the worksheets for the configurations that will not be considered.				
#	Intersections	Information	Consider?	Justification
	Signalized Intersections			
1	Conventional	-	Y	
2	Bowtie	Link	N	Unable to accommodate magnitude of traffic volumes
3	Center Turn Overpass	Link	N	Not feasible for roadway facility type
4	Continuous Green-T	Link	Y	
5	Echelon	Link	N	Right-of-way restrictions identified
6	Full Displaced Left Turn	Link	N	Right-of-way restrictions identified
7	Median U-Turn	Link	N	Unable to accommodate traffic patterns
8	Partial Displaced Left Turn	Link	N	Unable to accommodate traffic patterns
9	Partial Median U-Turn	Link	N	Unable to accommodate traffic patterns
10	Quadrant Roadway N-E	Link	N	Right-of-way restrictions identified
11	Quadrant Roadway N-W	Link	N	Right-of-way restrictions identified
12	Quadrant Roadway S-E	Link	N	Right-of-way restrictions identified
13	Quadrant Roadway S-W	Link	N	Right-of-way restrictions identified
14	Restricted Crossing U-Turn	Link	Y	
15	Single Loop	Link	N	Right-of-way restrictions identified
16	Split Intersection	Link	N	Right-of-way restrictions identified
17	Thru-Cut	Link	N	
	Unsignalized Intersections			
18	50 Mini Roundabout	Link	N	Not feasible for roadway facility type
19	75 Mini Roundabout	Link	N	Not feasible for roadway facility type
20	Roundabout	Link	N	
21	Two-Way Stop Control	-	Y	
#	Interchanges	Information	Consider?	Justification
22	Traditional Diamond	Link	N	Not feasible for roadway facility type
23	Contraflow Left	Link	N	Not feasible for roadway facility type
24	Displaced Left Turn	Link	N	Not feasible for roadway facility type
25	Diverging Diamond	Link	N	Not feasible for roadway facility type
26	Double Roundabout	Link	N	Insufficient intersection spacing
27	Michigan Urban Diamond	Link	N	Not feasible for roadway facility type
28	Partial Cloverleaf	Link	N	Not feasible for roadway facility type
29	Single Point	Link	N	Not feasible for roadway facility type
30	Single Roundabout	Link	N	Not feasible for roadway facility type

Table 7: VJuST Intersection #9 Results (AM Peak Hour)

Intersection Results						
		Congestion	Pedestrian	Safety	Planning Level Costs	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	Planning Level Cost Category	
Conventional	-	0.27		48	$$	
Continuous Green-T	-	0.27	-	12*	$$	
Restricted Crossing U-Turn	-	0.22		20	$$	
Two-Way Stop Control	-	0.20		48	$	

Table 8: VJuST Intersection #9 Results (PM Peak Hour)

Intersection Results						
		Congestion	Pedestrian	Safety	Planning Level Costs	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	Planning Level Cost Category	
Conventional	-	0.40		48	$$	
Continuous Green-T	-	0.39	-	12*	$$	
Restricted Crossing U-Turn	-	0.28		20	$$	
Two-Way Stop Control	-	0.47		48	$	

Two-Way Stop Control

Intersection capacity analysis was performed using Synchro 11 based on the Highway Capacity Manual (HCM) 6th methodology. Analysis was performed for the AM and PM peak hours under the Future with Development Conditions (2035) assuming two-way stop control. Figure 15 of traffic study shows the peak hour volumes for the study intersections. A peak hour factor of 0.92 was used, consistent with VDOT analysis guidelines, for the future study intersections. The uniform PHF by intersection was used, consistent with TOSAM guidelines. The results of the intersection capacity analysis with two-way stop control are summarized in Table 9.

Table 9: Two-Way Stop Control Intersection Capacity Analysis (2035)

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour			PM Peak Hour		
			LOS	Delay (s) [2]	95th % Queue (ft.) [4][5]	LOS	Delay (s) [2]	95th % Queue (ft.) [4][5]
			Synchro			Synchro		
6	**Lake Frederick Entrance/Gibson Site Entrance 1 & Fairfax Pike (E/W) Overall Intersection (Unsignalized)**							
	Eastbound Approach							
	Eastbound Left	150	A	9.6	7.5	B	11.5	5.0
	Westbound Approach							
	Westbound Left	150	B	10.2	5.0	B	11.1	12.5
	Northbound Approach		***F***	***$ 537.5***		***F***	***$ 1675.9***	
	Northbound Left		F	$ 949.1	350	F	$ 2984.5	285
	Northbound Thru/Right		C	19.8	32.5	C	18.4	17.5
	Southbound Approach		***F***	***150.5***		***F***	***$ 1551.2***	
	Southbound Left	50	F	268.3	75	F	$ 2896.2	340
	Southbound Thru/Right		B	13	5	D	28	40
9	**Route 522 (N/S) & Gibson Site Entrance 4 (E/W) Overall Intersection (Unsignalized)**							
	Eastbound Approach		***C***	***17.1***		***E***	***40.8***	
	Eastbound Left/Thru		C	19.8	10	F	52.1	80
	Eastbound Right	50	B	10.5	2.5	B	12.8	7.5
	Westbound Approach		***C***	***20.6***		***E***	***39***	
	Westbound Left/Thru		C	21.2	5	E	40	37.5
	Westbound Right	50	B	10.9	0	B	12.4	0
	Northbound Approach							
	Northbound Left	300	A	9.5	2.5	B	10.7	2.5
	Southbound Approach							
	Southbound Left	300	A	9.5	0	B	10.7	0

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] $: Delays (reported from Synchro) exceed 300 seconds in TWSC.

[3] ~: Volume exceeds capacity, queue is theoretically infinite.

[4] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

[5] m: 95th percentile volume and queues (reported from Synchro) are metered by upstream signal.

As shown in Table 9 , at Intersection #6, the two-way stop control configuration results in LOS F during both the AM and PM peak hours for the northbound and southbound approaches. At Intersection #9, this configuration operates at LOS E during the PM peak hour for the eastbound and westbound approaches. **With the proposed development program, two-way stop control is not recommended at Intersection #6 due to the unacceptable levels of service during both peak hours. Lower density levels or lower trip uses would be necessary for two-way stop control to be further considered at Intersection #6. Two-way stop control may be further considered for Intersection #9, as its performance is only slightly below acceptable levels during one peak hour.**

Conventional Signal

Intersection capacity analysis was performed using Synchro 11 based on the Highway Capacity Manual (HCM) 6th methodology. Analysis was performed for the AM and PM peak hours under the Future with Development Conditions (2035) considering a full-color, full-movement traffic signal. Figure 15 of the traffic study shows the peak hour volumes for the study intersections. A peak hour factor of 0.92 was used, consistent with VDOT analysis guidelines, for the future study intersections. The uniform PHF by intersection was used, consistent with TOSAM guidelines. The results of the intersection capacity analysis with a conventional signal are shown in Table 10.

Table 10: Conventional Signal Intersection Capacity Analysis (2035)

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour				PM Peak Hour			
			LOS	Delay (s) [2]	50th % Queue (ft.) [3]	95th % Queue (ft.) [4][5]	LOS	Delay (s) [2]	50th % Queue (ft.) [3]	95th % Queue (ft.) [4][5]
			Synchro				Synchro			
6	**Mitigation: Install a Signal Lake Frederick Entrance/Gibson Site Entrance 1 & Fairfax Pike (E/W)**									
	Overall Intersection (Signalized)		**A**	**7.2**			**B**	**10.3**		
	Eastbound Approach		***A***	***2.1***			***A***	***2.1***		
	Eastbound Left	150	A	4.6	8	m11	B	10.9	2	m6
	Eastbound Thru		A	2.0	117	122	A	1.9	139	275
	Eastbound Right	150	A	0.0	0	m0	A	0.1	0	m5
	Westbound Approach		***A***	***7.1***			***B***	***12.3***		
	Westbound Left	150	A	3.3	5	12	A	2.8	7	14
	Westbound Thru		A	7.5	185	263	B	13.3	419	#807
	Westbound Right	150	A	4.9	0	16	A	3.3	0	3
	Northbound Approach		***D***	***38.3***			***D***	***39.9***		
	Northbound Left		D	38.6	67	#136	D	40.0	45	#121
	Northbound Thru/Right		C	33.5	0	0	D	36.4	0	0
	Southbound Approach		***C***	***34.4***			***D***	***41.1***		
	Southbound Left	50	C	34.5	14	39	D	41.2	56	#151
	Southbound Thru/Right		C	33.3	0	0	D	36.4	0	0
9	**Mitigation: Install a Signal Route 522 (N/S) & Gibson Site Entrance 4 (E/W)**									
	Overall Intersection (Signalized)		**A**	**4.5**			**B**	**11.9**		
	Eastbound Approach		***D***	***53.6***			***D***	***51.2***		
	Eastbound Left		D	53.6	20	49	D	51.3	69	120
	Eastbound Thru/Right		A	0.0	0	0	D	45.7	0	0
	Westbound Approach		***D***	***52.5***			***D***	***48.5***		
	Westbound Left		D	52.5	11	33	D	48.5	37	73
	Westbound Thru/Right		A	0.0	0	0	A	0	0	0
	Northbound Approach		***A***	***0.4***			***A***	***8.4***		
	Northbound Left	300	A	4.2	3	m3	A	7.0	1	m6
	Northbound Thru		A	0.2	2	m222	A	8.5	2	m292
	Northbound Right	150	A	0.0	0	m6	A	5.9	0	m0
	Southbound Approach		***A***	***6.3***			***A***	***9.6***		
	Southbound Left	300	A	4	0	m2	A	6.9	0	m1
	Southbound Thru		A	6.4	74	87	A	9.7	105	233
	Southbound Right	150	A	5.3	0	1	A	6.6	0	1

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

[2] $: Delays (reported from Synchro) exceed 300 seconds in TWSC.

[3] ~: Volume exceeds capacity, queue is theoretically infinite.

[4] #: 95th percentile queues (reported from Synchro) exceed capacity; actual queues may be longer. Queues shown are based on the maximum after two cycles.

[5] m: 95th percentile volume and queues (reported from Synchro) are metered by upstream signal.

As shown in Table 11, with a conventional signal, both intersections operate at acceptable levels of service during both peak hours. Additionally, the queues for the turning movements are anticipated to be accommodated within the proposed storage lanes. **Since the intersections operate acceptably with the conventional signal, this configuration is recommended for further consideration at both intersections.**

Restricted Crossing U-Turn (RCUT)

An RCUT alternative was evaluated only for Intersection #9, as insufficient right-of-way and lack of a median preclude this configuration at Intersection #6. Under this configuration, left-turn movements from the eastbound and westbound approaches at Intersection #9 are rerouted as right turns followed by U-turns at Intersection #10 and at the intersection of Route 522 and Highland Corners Road, respectively.

Intersection capacity analysis was performed using Synchro 11 based on the Highway Capacity Manual (HCM) 6th methodology. Analysis was performed for the AM and PM peak hours under the Future with Development Conditions (2035) assuming an RCUT. Figure 1 shows the peak hour volumes for the study intersections. A peak hour factor of 0.92 was used, consistent with VDOT analysis guidelines, for the future study intersections. The uniform PHF by intersection was used, consistent with TOSAM guidelines. The results of the intersection capacity analysis with an RCUT are shown in Table 11.

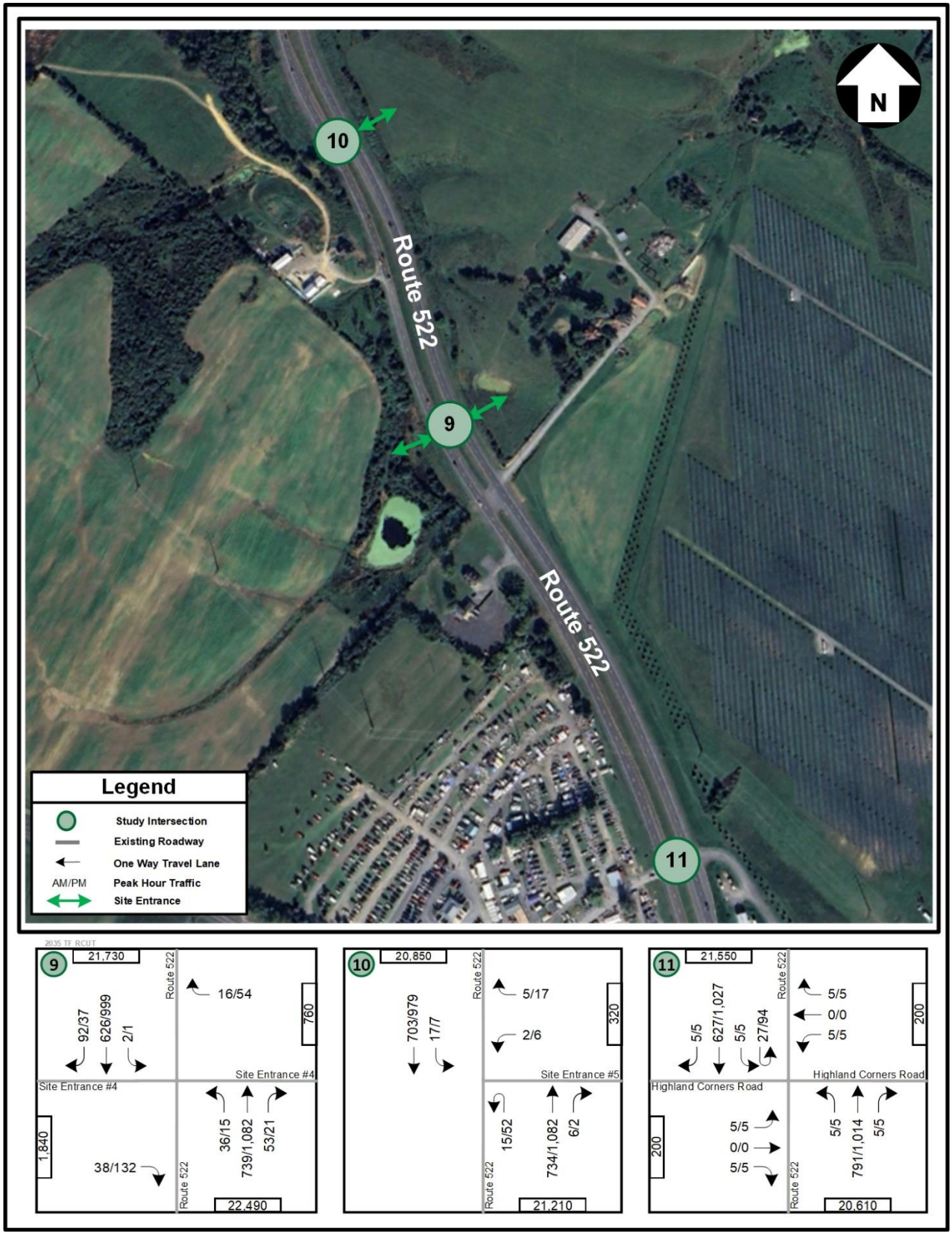


Figure 1: Future with Development Conditions (2035) Peak Hour Volume

Note: Traffic volumes for Highland Corners Road at Route 522 were not collected. Given that it is a low-volume roadway, an estimated 5 vehicles for each movement have been assumed to use this approach for VJuST screening purposes.

Table 11: RCUT Capacity Analysis (2035) Intersection #9

No.	Intersection (Movement)	Effective Storage Length (ft.) [1]	AM Peak Hour			PM Peak Hour		
			LOS	Delay (s)	95th % Queue (ft.)	LOS	Delay (s)	95th % Queue (ft.)
			Synchro			Synchro		
9	**Route 522 (N/S) & Gibson Site Entrance 4 (E/W) Overall Intersection (Unsignalized)**							
	Eastbound Approach		***B***	***10.9***		***C***	***15.5***	
	Eastbound Thru		A	0		A	0	
	Eastbound Right	50	B	10.9	5	C	15.5	30
	Westbound Approach		***B***	***11.2***		***B***	***14.2***	
	Westbound Thru		A	0		A	0	
	Westbound Right	50	B	11.2	2.5	B	14.2	10
	Northbound Approach			***0.4***			***0.1***	
	Northbound Left	300	A	9.5	2.5	B	11.0	2.5
	Southbound Approach			***0***			***0***	
	Southbound Left	300	A	9.7	0	B	11.2	0
10	**Route 522 (N/S) & Gibson Site Entrance 5 (W) Overall Intersection (Unsignalized)**							
	Westbound Approach		***B***	***13***		***C***	***18.3***	
	Westbound Left		C	18.1	0	D	32.4	2.5
	Westbound Right	50	B	11	0	B	13.3	2.5
	Northbound Approach							
	Northbound U-Turn		B	12.9	2.5	C	19.6	17.5
	Southbound Approach							
	Southbound Left	300	A	9.5	2.5	B	11.2	0
11	**Route 522 (N/S) & Highland Corner Road Overall Intersection (Unsignalized)**							
	Eastbound Approach		***C***	***15.1***		***D***	***26***	
	Eastbound Left/Thru/Right		C	15.1	2.5	D	26	5
	Westbound Approach		***C***	***16.5***		***D***	***25.8***	
	Westbound Left/Thru/Right		C	16.5	2.5	D	25.8	5
	Northbound Approach							
	Northbound Left	285	A	9.0	0.0	B	10.9	0
	Southbound Approach							
	Southbound U-Turn/Left	260	B	14	7.5	C	24.6	40

NOTES:

[1] Effective storage length is based on the storage length plus one-half of the taper length per TOSAM guidelines.

As shown in Table 11, with an RCUT configuration, the intersection operates at acceptable levels of service during both peak hours. Additionally, the queues for the turning movements are anticipated to be accommodated within the proposed storage lanes. **Since the intersection operates acceptably with the RCUT, this configuration is recommended for further consideration at Intersection #9.**

Continuous Green-T

A Continuous Green-T configuration was evaluated for Intersections #9 and #10. For evaluation purposes, the east leg of Intersection #9 was assumed to be removed, and the intersection was analyzed as operating with only the west leg serving as the site entrance.

This configuration is not recommended due to spacing constraints. According to the AASHTO Green Book (Chapter 10), approximately 1,900 feet of acceleration lane would be required along Route 522. As shown in Figure 2 , the acceleration lane for Intersection #10 would extend beyond Intersection #9, while the acceleration lane for Intersection #9 would extend beyond

Intersection #10. **Therefore, due to these conflicting spacing and functional requirements, this configuration is not recommended for further consideration.**

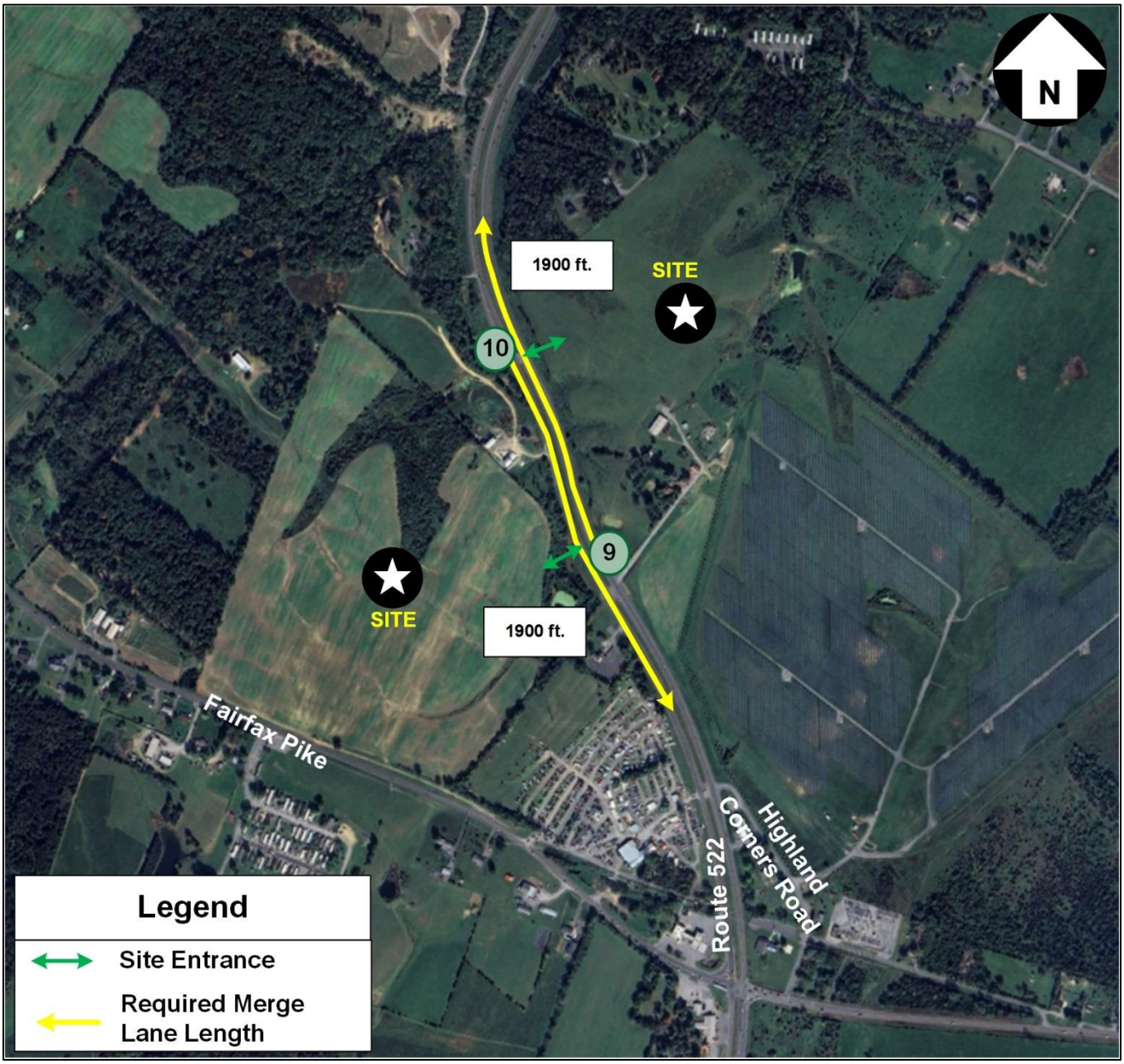


Figure 2: Continuous Green-T Merge Lane Spacing Evaluation

Thru-Cut Signal

A Thru-Cut configuration was evaluated for Intersection #6; however, it is noted there are identified right-of-way constraints. In this context, the minor street movements at the site entrance and Lake Frederick entrance would be restricted to right and left turns only, while the mainline traffic would continue like a conventional intersection. With fewer traffic signal phases, a thru-cut can be more operationally efficient compared to a conventional traffic signal. Implementation of this configuration would require the addition of channelized traffic islands, which may not be able to be accommodated within the available right-of-way. On the north side of the intersection, the proposed Gibson site entrance is in close proximity to the property line, limiting any potential widening. The south side of the intersection serves the Lake Frederick development and is not controlled by the Applicant. As a

result, the geometric requirements for a Thru-Cut configuration cannot be feasibly achieved at Intersection #6 without acquiring offsite right-of-way. Because the right-of-way constraints are considered less significant compared to a roundabout, a Thru-Cut may be further considered for Intersection #6.

Roundabout

A roundabout configuration was evaluated for Intersection #6; however, it is not recommended for further consideration due to significant right-of-way constraints. Both a single-lane configuration and a hybrid configuration with two lanes on Fairfax Pike were screened as part of the analysis. Implementation of a roundabout would require significant space to accommodate the inscribed circle diameter, central island, splitter islands, and appropriate entry and exit geometry. Although the intersection spacing requirements for a roundabout are anticipated to be met, the roundabout footprint cannot be accommodated within the available right-of-way. On the north side of the intersection, the proposed Gibson site entrance is in close proximity to the property line, limiting opportunities for expansion. The south side of the intersection serves the Lake Frederick development and is not controlled by the Applicant. As a result, the required footprint for a roundabout cannot be feasibly achieved at Intersection #6 without acquiring significant and costly offsite right-of-way as shown in Figure 3, therefore it is not recommended for further consideration.

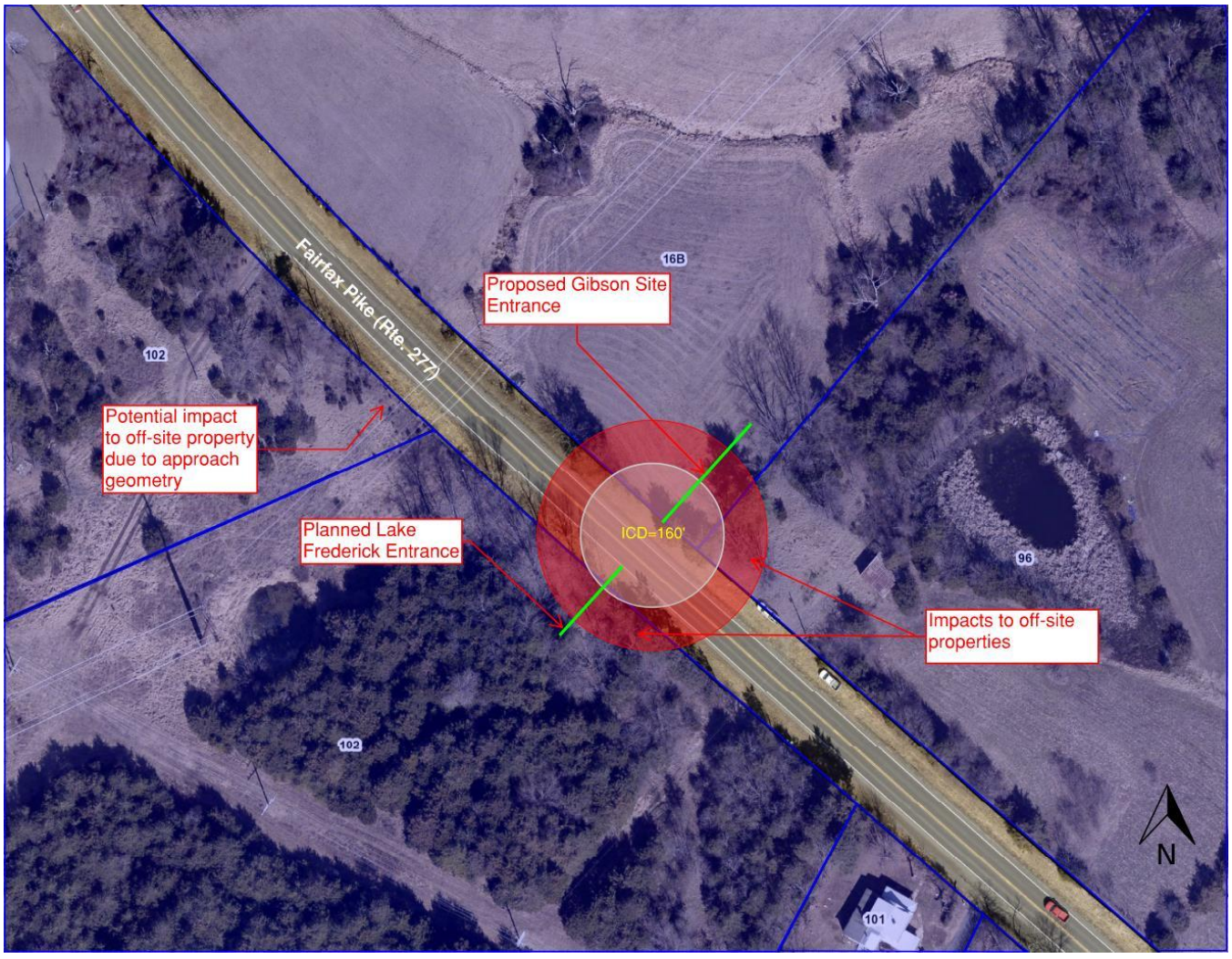


Figure 3: Impacts of installing Roundabout

VJuST Findings Summary

Intersection of Fairfax Pike and Site Entrance #1/Lake Frederick Entrance (Intersection #6):

Two-Way Stop Control (TWSC) operates at a significantly higher volume-to-capacity (v/c) ratio than the other alternatives during both peak hours. However, depending on the ultimate development program and density, the v/c ratio could potentially be lower. In the AM peak hour, the v/c ratios are 0.67 for the conventional signal, 0.65 for the Thru-Cut, 0.78 for the single-lane roundabout, 1.91 for TWSC, and 0.39 for the hybrid roundabout with 2 lanes on EB-WB direction. Similarly, in the PM peak hour, the v/c ratios are 0.83 for the conventional signal, 0.80 for the Thru-Cut, 1.0 for the single-lane roundabout, 4.02 for TWSC, and 0.50 for the hybrid roundabout. While the conventional signal, thru-cut, and hybrid roundabout all have a lower v/c, the hybrid roundabout would have significantly higher cost and significantly offsite right-of-way impacts, and was therefore removed from the recommended alternatives.

The VJuST results for Intersection #6 are presented in Table 2, Table 3, Table 4 and Table 5. The following intersection types are recommended for further consideration:

- Conventional Signalized Intersection
- Thru-Cut Signal
- Two-Way Stop Control (under lower density levels or lower trip uses)

Intersection of Route 522 and Site Entrance #4 (Intersection #9):

The conventional signal and Continuous Green-T operate at a slightly higher v/c ratio than the other alternatives during the AM peak hour, with v/c ratios of 0.27 for the conventional signal, 0.27 for the Continuous Green-T, 0.22 for the RCUT, and 0.20 for TWSC. In contrast, during the PM peak hour, the TWSC operates at the highest v/c ratio among the alternatives, with v/c ratios of 0.40 for the conventional signal, 0.39 for the Continuous Green-T, 0.28 for the RCUT, and 0.47 for TWSC.

The VJuST results for Intersection #9 are presented in Table 7 and Table 8. The following intersection types are recommended for further consideration:

- Conventional Signalized Intersection
- Restricted Crossing U-Turn (RCUT)
- Two-Way Stop Control

This VJuST analysis was performed as part of this study to screen other potential intersection control types. However, a comprehensive Signal Justification Report will be prepared during the site plan development process to determine the appropriate intersection configuration for each intersection.

VJuST Analysis for Intersection of Fairfax Pike and Site Entrance#1 (AM Peak)

VDOT Junction Screening Tool

Input Worksheet

Project Title:	*Gibson Property*
E-W Facility:	*Fairfax Pike*
N-S Facility:	*Site Entrance 1*
Date:	*July 8, 2026*

Traffic Volume Demand

Direction	Volume (veh/hr)			Truck Percent (%)
	U-Turn / Left	Through	Right	
Eastbound	81	806	46	8.00%
Westbound	36	584	92	12.20%
Northbound	122	0	97	2.00%
Southbound	28	0	24	2.00%
Adjustment Factor	0.80 / 0.95		0.85	
Suggested	**U - 0.8** / **L - 0.95**		**0.85**	
Truck to PCE Factor		**Suggested = 2.00**		2.00
Critical Lane Volume		1600		

Equivalent Passenger Car Volume

	Volume (pc/hr)			
	U-Turn / Left	Through	Right	Approach
Eastbound	87	870	50	1007
Westbound	40	655	103	798
Northbound	124	0	99	223
Southbound	29	0	24	53

Notes:

Left-turn Adjustment Factor	*Conversion of left-turning vehicles to equivalent through vehicles*
Right-turn Adjustment Factor	*Conversion of right-turning vehicles to equivalent through vehicles*
U-turn Adjustment Factor	*Conversion of U-turning vehicles to equivalent through vehicles*
Truck to PCE Factor	*1 truck = X Passenger Car Equivalents*
Critical Lane Volume Sum Limit	*Saturation value for critical lane volume sum at an intersection*

VDOT Junction Screening Tool

Possible Configurations

Indicate with a "Y" or "N" if each intersection or interchange configuration should or should not be considered. Use the information links for guidance. Then, click the "Show/Hide Configurations button" to hide the worksheets for the configurations that will not be considered.

#	Intersections	Information	Consider?	Justification
	Signalized Intersections			
1	Conventional	-	Y	
2	Bowtie	Link	N	Right-of-way restrictions identified
3	Center Turn Overpass	Link	N	Not feasible for roadway facility type
4	Continuous Green-T	Link	N	Not feasible for roadway facility type
5	Echelon	Link	N	Not feasible for roadway facility type
6	Full Displaced Left Turn	Link	N	Not feasible for roadway facility type
7	Median U-Turn	Link	N	Not feasible for roadway facility type
8	Partial Displaced Left Turn	Link	N	Not feasible for roadway facility type
9	Partial Median U-Turn	Link	N	Not feasible for roadway facility type
10	Quadrant Roadway N-E	Link	N	Right-of-way restrictions identified
11	Quadrant Roadway N-W	Link	N	Right-of-way restrictions identified
12	Quadrant Roadway S-E	Link	N	Right-of-way restrictions identified
13	Quadrant Roadway S-W	Link	N	Right-of-way restrictions identified
14	Restricted Crossing U-Turn	Link	N	Not feasible for roadway facility type
15	Single Loop	Link	N	Right-of-way restrictions identified
16	Split Intersection	Link	N	Right-of-way restrictions identified
17	Thru-Cut	Link	Y	
	Unsignalized Intersections			
18	50 Mini Roundabout	Link	N	Not feasible for roadway facility type
19	75 Mini Roundabout	Link	N	Not feasible for roadway facility type
20	Roundabout	Link	Y	
21	Two-Way Stop Control	-	Y	
#	**Interchanges**	**Information**	**Consider?**	**Justification**
22	Traditional Diamond	Link	N	Not feasible for roadway facility type
23	Contraflow Left	Link	N	Not feasible for roadway facility type
24	Displaced Left Turn	Link	N	Not feasible for roadway facility type
25	Diverging Diamond	Link	N	Not feasible for roadway facility type
26	Double Roundabout	Link	N	Not feasible for roadway facility type
27	Michigan Urban Diamond	Link	N	Not feasible for roadway facility type
28	Partial Cloverleaf	Link	N	Not feasible for roadway facility type
29	Single Point	Link	N	Not feasible for roadway facility type
30	Single Roundabout	Link	N	Not feasible for roadway facility type

VDOT Junction Screening Tool

Directional Questions and Base Lane Configurations

Before entering a base number of through lanes for each direction, answer all applicable directional question for each intersection or interchange configuration selected for consideration. Navigate to the lane configuration worksheet for example diagrams, if provided.

Intersections	Question	Direction
Bowtie	N/A	N/A
Continuous Green-T	N/A	N/A
Echelon	N/A	N/A
Median U-Turn	N/A	N/A
Partial Displaced Left Turn	N/A	N/A
Partial Median U-Turn	N/A	N/A
Restricted Crossing U-Turn	N/A	N/A
Single Loop	N/A	N/A
Split Intersection	N/A	N/A
Thru-Cut	Select the roadway where through traffic is permitted from the drop-down list. See example diagrams.	EB-WB
Interchanges	**Question**	**Direction**
All	N/A	N/A

Base Number of Through Lanes

Enter a base number of through lanes for each direction. The number of through lanes entered will populate on each non-roundabout lane configuration worksheet. This tool also allows the user to enter the number of through lanes on the lane configuration worksheets directly. This base number may be overwritten on individual lane configuration worksheets. Turn lanes, shared lanes, and channelized lanes must still be entered in each lane configuration worksheet.

Eastbound	1
Westbound	1
Northbound	1
Southbound	1

VDOT Junction Screening Tool

Results Worksheet

VJuST
VDOT Junction Screening Tool

General Information	
Project Title:	Gibson Property
EW Facility:	Fairfax Pike
NS Facility:	Site Entrance 1
Date:	July 8, 2026

Volumes (veh/hr)	U-Turn / Left	Through		Right
Eastbound	81	806	81	46
Westbound	36	584	81	92
Northbound	122	0	81	97
Southbound	28	0	81	24

General Instructions: All intersection and interchange configurations have a default assumption of one exclusive lane per movement. No results shall be interpreted until the user has verified the lane configurations on each worksheet.

Intersection Results

Type	Dir	Maximum V/C (Congestion)	Accommodation Compared to Conventional (Pedestrian)	Weighted Total Conflict Points (Safety)	Planning Level Cost Category (Planning Level Costs)	Notes
Conventional	-	0.67		48	$$	
Thru-Cut	-	0.65		28	$$	
Roundabout	-	0.78		8	$$	
Two-Way Stop Control	-	1.91		48	$	

*The continuous green-T is the only three-legged innovative intersection in this tool. To compare the continuous green-T to other innovative intersections, conflicts corresponding with the fourth leg must be removed. This has been done for the conventional intersection. Conflict point diagrams for three-legged and four-legged conventional intersections have been provided on the conventional intersection worksheet for reference.

Interchange Results						
		Congestion	Pedestrian	Safety	Planning Level Costs	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Traditional Diamond	Weighted Total Conflict Points	Planning Level Cost Category	

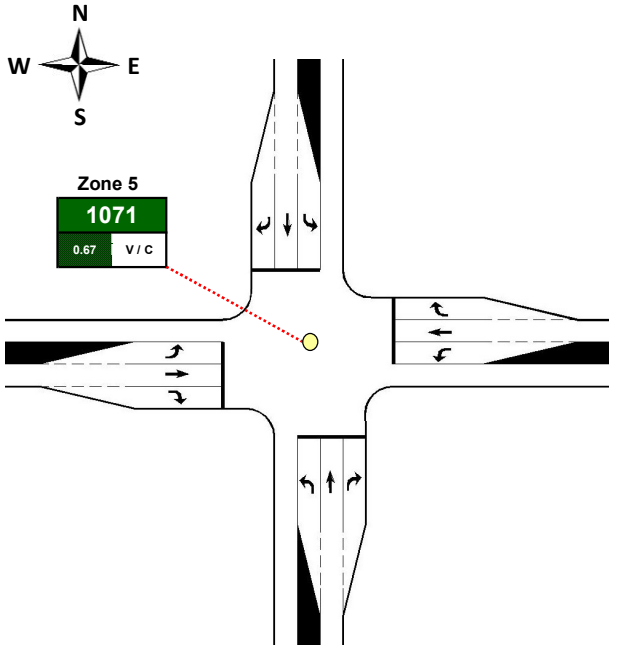
Information	
Congestion	The maximum v/c ratio represents the worst v/c of all zones that make up an intersection.
Pedestrian	Compares the potential of each design to accommodate pedestrians based on safety, wayfinding, and delay. Potential is qualitatively defined as better (+), similar (blank cell), or worse (-) than a conventional intersection or traditional diamond interchange.
Safety	Weighted Total = (2 x Crossing Conflicts) + Merging Conflicts + Diverging Conflicts
Planning Level Costs	Cost category estimates for each intersection/interchange alternative. Some alternatives have choices that affect the resulting cost category (e.g. requirement of a new bridge) that can be configured on the individual input worksheets.

Conventional

DESIGN AND RESULTS

Project Name:	Gibson Property
EW Facility:	Fairfax Pike
NS Facility:	Site Entrance 1
Date:	July 8, 2026

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:	0.67		

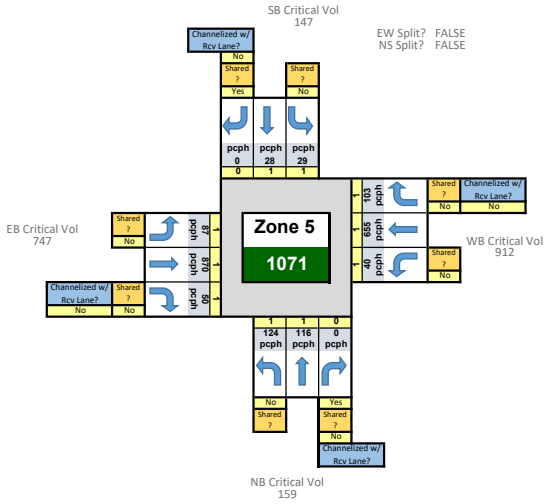


Note: This diagram does not reflect the actual lane configuration of the intersection

Conventional

DATA INPUT AND CONFIGURATION

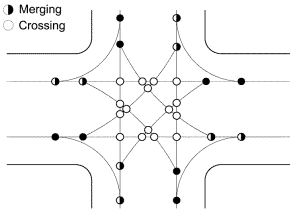
Enter the lane configurations in the yellow cells.



Back to Results

Safety - Conflict Point Diagram

● Diverging
◑ Merging
○ Crossing



Conflict Type	Count
Crossing	16
Merging	8
Diverging	8
Total	**32**

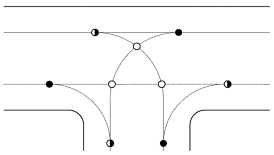
Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

48

Safety - Conflict Point Diagram (Three Legs)

● Diverging
◑ Merging
○ Crossing



Conflict Type	Count
Crossing	3
Merging	3
Diverging	3
Total	**9**

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

12

Planning Level Cost

$ $ $ $ $ **2**

- Are new lanes and/or pavement needed? **Yes**
- Cost category 1 if no new pavement needed, else cost cateogry 2.
- Assumes existing two-way stop contol or all-way stop control

Thru-Cut

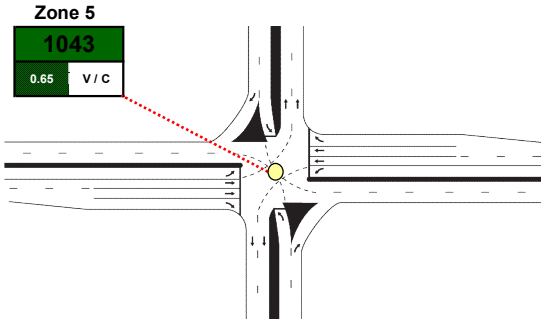
DESIGN AND RESULTS

Project Name:	Gibson Property
EW Facility:	Fairfax Pike
NS Facility:	Site Entrance 1
Date:	July 8, 2026

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:	0.65		

N W E S

North arrow directions will appear once the directional question has been answered on the Input Worksheet.

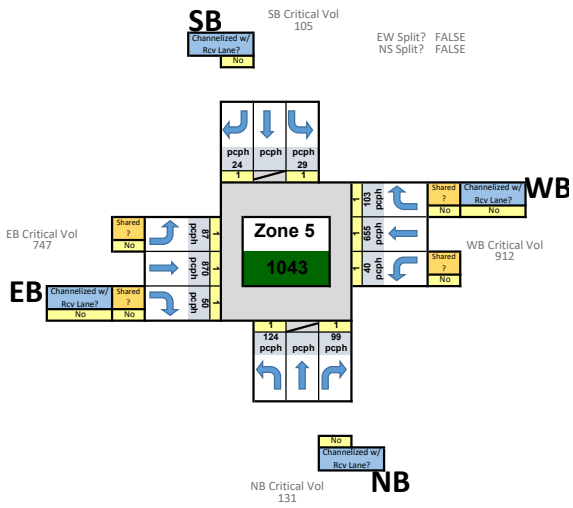


Note: This diagram does not reflect the actual lane configuration of the intersection

Thru-Cut

DATA INPUT AND CONFIGURATION

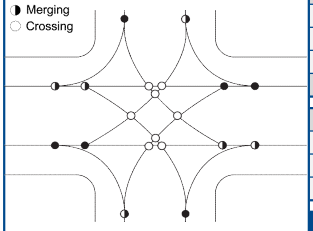
Enter the lane configurations in the yellow cells.



Back to Results

Safety - Conflict Point Diagram

● Diverging
◑ Merging
○ Crossing



Conflict Type	Count
Crossing	8
Merging	6
Diverging	6
Total	20

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

28

Assumptions

- Minor street through traffic does not need to re-enter the intersection from the major street to complete the desired movement. There are no u-turn crossover intersections on the major street.
- The original through volumes were split evenly to left-turns and right-turns.

Planning Level Cost

$ $ $ $ $ **2**

- Cost Category 2
- Assumes conversion from conventional signal.

Guidance

A thru-cut is a signalized intersection form best suited for location at which minor street through volumes are relatively low but overall minor street volumes are high enough to warrant a signal. Thru-Cuts are generally appropriate when the through volume on each minor street leg is less than 100 vehicles (per leg) in peak hour, but may be appropriate with minor street through volumes if the major street through volume is very high. This will often occur at locations where land uses served by each of the minor street legs are likely to generate only a small number of trips between them. VDOT envisions thru-cuts to predominantly be used as relatively low-cost improvements and not include the implementation of u-turn crossovers to facilitate minor street through movements. Thru-cuts will generally be implemented in locations where the surrounding road and/or driveway network already supports alternative routes for minor street through-movement trips. The following are additional design considerations for thru-cuts:

- The vehicular signal phasing does not accommodate a pedestrian crossing of the major street. A pedestrian phase--likely pedestrian only--is needed for designs including a major street pedestrian crossing. If the pedestrian phase is frequently actuated, then the operational benefit of the thru-cut will be diminished.

- Channelization is needed on the minor street to 1) align both left-turn movements so they can operate concurrently and 2) physically prevent through movements. This is similar to the channelization at an off-ramp at a single-point diamond interchange. Channelization may require some minor widening in the immediate vicinity of the intersection.

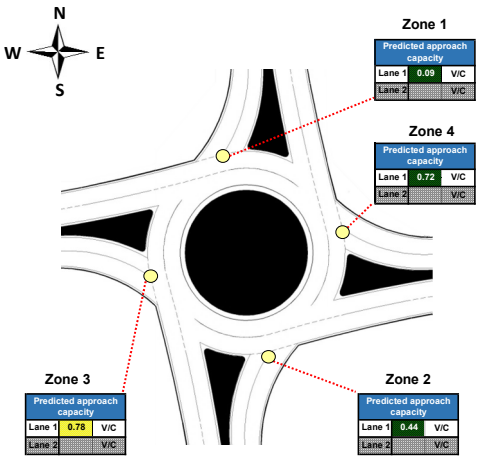
- Minor street right turns will generally be yield-controlled but could be signalized or stop-controlled.

The benefits of an unsignalized thru-cut are limited. The design would encourage concurrent minor street left turns and two-stage left turns with a stop in the median, which are not necessarily desirable. Additionally, minor street left-turn movements would still have conflict points with both directions of the major street.

Roundabout

DESIGN AND RESULTS

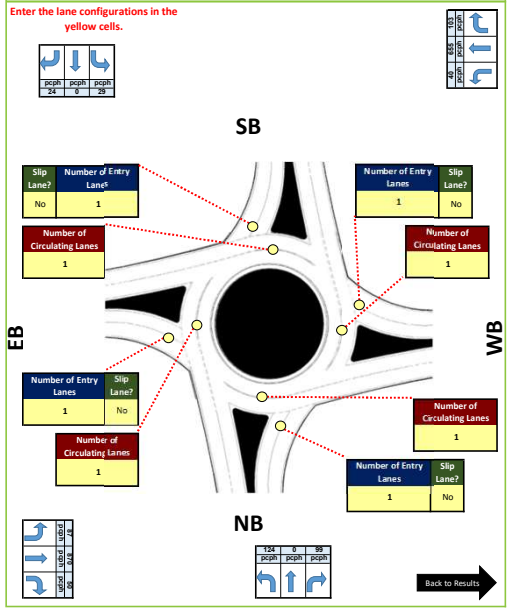
		Critical Lane Volume Sum			
Project Name:	Gibson Property	< 1200	1200 - 1399	1400 - 1599	≥ 1600
EW Facility:	Fairfax Pike				
NS Facility:	Site Entrance 1	VOLUME / CAPACITY RATIO:	0.78		
Date:	July 8, 2026				



Roundabout

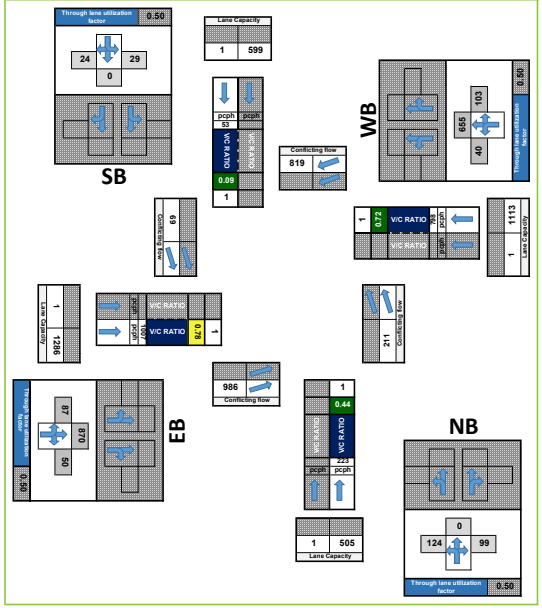
DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Roundabout

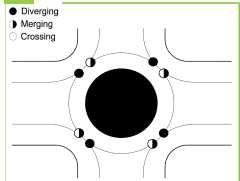
CAPACITY CALCULATIONS



EQUATION: A x exp(-B x Q)

Number of Entry Lanes	Number of Circulating Lanes	Lane	A	B
1	1	-	1380	0.00102
1	2	-	1420	0.00085
2	1	Left	1420	0.00091
2	1	Right	1420	0.00091
2	2	Left	1350	0.00092
2	2	Right	1420	0.00085

Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	0
Merging	4
Diverging	4
Total	8

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points: 8

Assumptions

- The number of circulating lanes in one quadrant is assumed to be equal to the number of exiting lanes in the next quadrant.
- The roundabout is limited to a maximum of two entry lanes and two circulating lanes.
- All left-turning vehicles are assumed to stay in the innermost lane until exiting the roundabout.
- This worksheet does not use the CLV methodology. The calculations are based on the *HCM 6th Edition* .

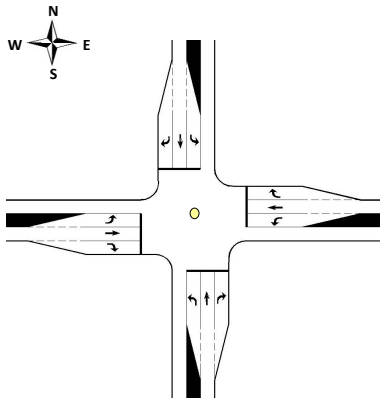
Planning Level Cost $ $ $ $ $ 2

- Cost Category 2
- Assumes conversion from two-way stop control or all-way stop control.

Two-Way Stop Control (TWSC)

DESIGN AND RESULTS

		Critical Lane Volume Sum			
Project Name:	Gibson Property	< 1200	1200 - 1399	1400 - 1599	≥ 1600
EW Facility:	Fairfax Pike				
NS Facility:	Site Entrance 1	VOLUME / CAPACITY RATIO:			1.91
Date:	July 8, 2026				



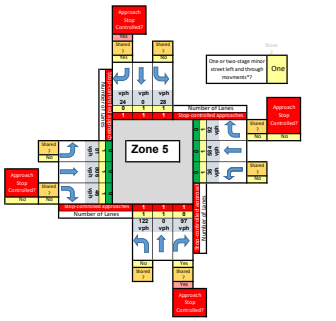
Note: This diagram does not reflect the actual lane configuration of the intersection

Two-Way Stop Control (TWSC)

DATA INPUT AND CONFIGURATION

Step 1: Identify which approaches are stop-controlled by selecting "Yes" from the drop-down box.

Step 2: Enter the lane configurations in the yellow cells.



Two-Way Stop Control (TWSC)

HCM 6 CALCULATIONS

Priority	MVMT	Rank
1	EBL	2
2	EBT	1
3	EBR	1
4	WBL	2
5	WBT	1
6	WBR	1
7	NBL	4
8	NBT	3
9	NBR	2
10	SBL	4
11	SBT	3
12	SBR	2

MAJOR	MINOR
EB	NB
WB	SB

Major street lanes	2
NB Shared?	FALSE
SB Shared?	FALSE

Priority	Rank	Flow Rates	Lanes	Shared?	Stop controlled?	Track %
1	2	81	1	No		0.08
4	2	36	1	No		0.122
7	4	122	1	No	Yes	0.02
8	3	0	1		Yes	0.02
9	2	97	0	Yes	Yes	0.02
10	4	28	1	No	Yes	0.02
11	3	0	1		Yes	0.02
12	2	24	0	Yes	Yes	0.02
2	1	806	1			0.08
3	1	46	1	No	No	0.08
5	1	584	1			0.122
6	1	92	1	No	No	0.122

Conflicting Flows		Critical Headways		Follow-Up Headways	
$v_{c,1}$	676.00	$t_{c,1}$	4.18	$t_{f,1}$	2.27
$v_{c,2}$	852.00	$t_{c,2}$	6.22	$t_{f,2}$	2.31
$v_{c,3}$	1683.00	$t_{c,3}$	7.12	$t_{f,3}$	3.52
$v_{c,4}$	1716.00	$t_{c,4}$	6.52	$t_{f,4}$	4.02
$v_{c,5}$	806.00	$t_{c,5}$	6.22	$t_{f,5}$	3.32
$v_{c,6}$	1695.50	$t_{c,6}$	7.12	$t_{f,6}$	3.52
$v_{c,7}$	1670.00	$t_{c,7}$	6.52	$t_{f,7}$	4.02
$v_{c,8}$	584.00	$t_{c,8}$	6.22	$t_{f,8}$	3.32
$v_{c,9}$	968.00	$t_{c,9}$	6.12		
$v_{c,10}$	714.00	$t_{c,10}$	6.12		
$v_{c,11}$	968.00	$t_{c,11}$	5.52		
$v_{c,12}$	748.00	$t_{c,12}$	5.52		
$v_{c,13}$	656.00	$t_{c,13}$	6.12		
$v_{c,14}$	1038.50	$t_{c,14}$	6.12		
$v_{c,15}$	656.00	$t_{c,15}$	5.52		
$v_{c,16}$	1014.00	$t_{c,16}$	5.52		

α	0.91

Assumption: One storage space in median (p_{sp} = 1) for two-stage turns

Saturation Flow Rates	
Through	1900
Right	1900

Potential Capacities		Movement Capacities		Shared Movement Capacities		Movement Capacities		Movement V/C		Intersection V/C
$c_{p,1}$	887.90	$c_{m,1}$	887.90			1	887.90	1	0.09	1.91
$c_{p,2}$	744.88	$c_{m,2}$	744.88			2	1800.00	2	0.45	
$c_{p,3}$	74.88	$c_{m,3}$	63.97			3	1600.00	3	0.09	
$c_{p,4}$	89.95	$c_{m,4}$	77.79	0		4	744.88	4	0.05	
$c_{p,5}$	381.95	$c_{m,5}$	381.95	1	381.95	5	1800.00	5	0.32	
$c_{p,6}$	73.26	$c_{m,6}$	68.99	0		6	1500.00	6	0.06	
$c_{p,7}$	96.02	$c_{m,7}$	83.04	1	511.52	7	61.97	7	1.91	
$c_{p,8}$	511.52	$c_{m,8}$	511.52	1		8-9	381.95	8-9	0.25	
						---	---	---	---	V/C Not Reported for Any Movements?
						10	48.99	10	0.57	
						11-12	511.52	11-12	0.05	No

Two-Stage Potential Capacities		Two-Stage Movement Capacities		Single-Stage Movement Capacities	
$c_{c,1,1}$	305.26	$c_{m,1,1}$	277.41	$c_{m,1}$	63.97
$c_{c,1,2}$	422.28	$c_{m,1,2}$	383.91	$c_{m,2}$	77.79
$c_{c,2,1}$	332.18	$c_{m,2,1}$	301.87	$c_{m,3}$	48.99
$c_{p,1,1}$	439.69	$c_{m,1,1}$	399.41	$c_{m,4}$	83.04
$c_{p,1,2}$	454.44	$c_{m,1,2}$	412.47		
$c_{p,2,1}$	276.36	$c_{m,2,1}$	188.72		
$c_{p,2,2}$	462.55	$c_{m,2,2}$	430.81		
$c_{p,4,1}$	336.13	$c_{m,4,1}$	287.29		

$v_{c,1}$	0.90	$c_{c,1}$	161.11
$v_{c,2}$	0.93	$c_{c,2}$	176.92
$v_{c,3}$	1.70	$c_{c,3}$	139.26
$p_{c,2}$	2.17	$c_{c,4}$	180.46

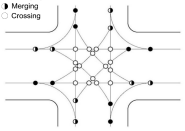
Mvmt 1, excl left	$\beta_{c,1}$	0.91	
Mvmt 4, excl left	$\beta_{c,4}$	0.95	
Mvmt 1, shared left	$\beta^*_{c,1}$	0.83	$\beta_{c,1,a}$ 1.00
Mvmt 4, shared left	$\beta^*_{c,4}$	0.93	$\beta_{c,4,a}$ 1.00
Mvmt 7, 4-leg	$\beta^*_{c,7}$	0.865	$\beta^*_{c,7}$ 0.90
Mvmt 10, 4-leg	$\beta^*_{c,10}$	0.865	$\beta^*_{c,10}$ 0.90
	$\beta_{c,1,2}$	0.45	
	$\beta_{c,4,2}$	0.32	

One Stage	$f_{c,1}$	0.86	
	$f_{c,2}$	0.86	
	$f_{c,3}$	0.00	
	$f_{c,4}$	0.00	
Two Stage	$f_{c,1}$	0.91	$f_{c,1,a}$ 0.95
	$f_{c,2}$	0.95	$f_{c,2,a}$ 0.95
	$f_{c,3}$	0.91	$f_{c,3,a}$ 0.91
	$f_{c,4}$	0.95	$f_{c,4,a}$ 0.68

	$p_{c,1,a}$	0.75	$p_{c,1,2,a}$ 1.00
	$p_{c,2,a}$	0.95	$p_{c,2,2,a}$ 1.00
	$f_{c,1,a}$	0.95	
	$f_{c,2,a}$	0.87	

Safety - Conflict Point Diagram

- Diverging
- Merging
- Crossing



Conflict Type	Count
Crossing	16
Merging	8
Diverging	8
Total	32

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points
48

Assumptions

- This worksheet does not use the CLV methodology. The calculations are based on the *HCM, 6th Edition*. The calculations are based on vehicles per hour.

Planning Level Cost

$ $ $ $ **1**

- Cost Category 1
- Assumes no intersection, but cost of new road is not included

VDOT Junction Screening Tool

Results Worksheet

VJuST
VDOT Junction Screening Tool

General Information	
Project Title:	Gibson Property
EW Facility:	Fairfax Pike
NS Facility:	Site Entrance 1
Date:	July 8, 2026

Volumes (veh/hr)	U-Turn / Left	Through		Right
Eastbound	81	806	81	46
Westbound	36	584	81	92
Northbound	122	0	81	97
Southbound	28	0	81	24

General Instructions: All intersection and interchange configurations have a default assumption of one exclusive lane per movement. No results shall be interpreted until the user has verified the lane configurations on each worksheet.

Intersection Results

Congestion | Pedestrian | Safety | Planning Level Costs | Notes

Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	Planning Level Cost Category	
Roundabout	-	0.39		8	$$	

*The continuous green-T is the only three-legged innovative intersection in this tool. To compare the continuous green-T to other innovative intersections, conflicts corresponding with the fourth leg must be removed. This has been done for the conventional intersection. Conflict point diagrams for three-legged and four-legged conventional intersections have been provided on the conventional intersection worksheet for reference.

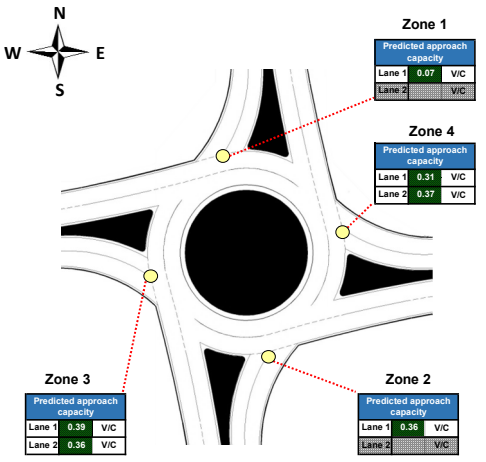
Interchange Results						
		Congestion	Pedestrian	Safety	Planning Level Costs	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Traditional Diamond	Weighted Total Conflict Points	Planning Level Cost Category	

Information	
Congestion	The maximum v/c ratio represents the worst v/c of all zones that make up an intersection.
Pedestrian	Compares the potential of each design to accommodate pedestrians based on safety, wayfinding, and delay. Potential is qualitatively defined as better (+), similar (blank cell), or worse (-) than a conventional intersection or traditional diamond interchange.
Safety	Weighted Total = (2 x Crossing Conflicts) + Merging Conflicts + Diverging Conflicts
Planning Level Costs	Cost category estimates for each intersection/interchange alternative. Some alternatives have choices that affect the resulting cost category (e.g. requirement of a new bridge) that can be configured on the individual input worksheets.

Roundabout

DESIGN AND RESULTS

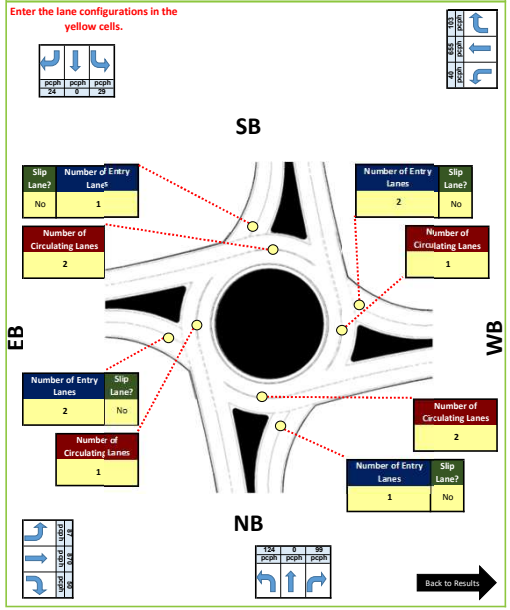
Project Name:	Gibson Property	Critical Lane Volume Sum			
EW Facility:	Fairfax Pike	< 1200	1200 - 1399	1400 - 1599	≥ 1600
NS Facility:	Site Entrance 1	VOLUME / CAPACITY RATIO:	0.39		
Date:	July 8, 2026				



Roundabout

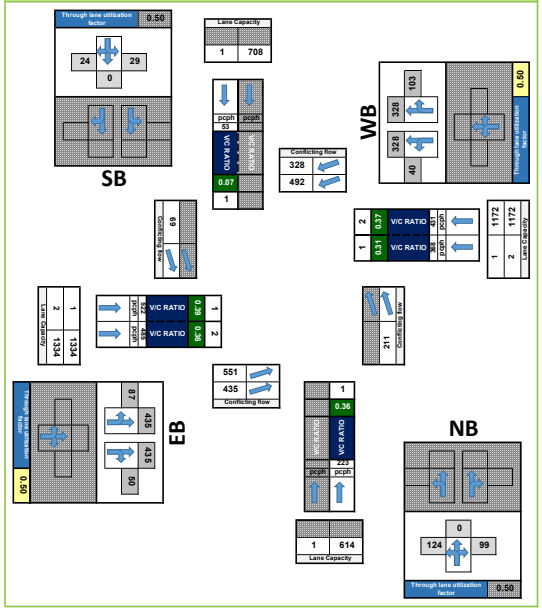
DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Roundabout

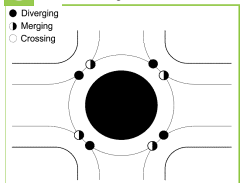
CAPACITY CALCULATIONS



EQUATION: A x exp(-B x Q)

Number of Entry Lanes	Number of Circulating Lanes	Lane	A	B
1	1	-	1380	0.00102
1	2	-	1420	0.00085
2	1	Left	1420	0.00091
2	1	Right	1420	0.00091
2	2	Left	1350	0.00092
2	2	Right	1420	0.00085

Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	0
Merging	4
Diverging	4
Total	8

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points: 8

Assumptions

- The number of circulating lanes in one quadrant is assumed to be equal to the number of exiting lanes in the next quadrant.
- The roundabout is limited to a maximum of two entry lanes and two circulating lanes.
- All left-turning vehicles are assumed to stay in the innermost lane until exiting the roundabout.
- This worksheet does not use the CLV methodology. The calculations are based on the *HCM 6th Edition* .

Planning Level Cost $ $ $ $ 2

- Cost Category 2
- Assumes conversion from two-way stop control or all-way stop control.

VJuST Analysis for Intersection of Fairfax Pike and Site Entrance#1 (PM Peak)

VDOT Junction Screening Tool

Input Worksheet

Project Title:	*Gibson Property*
E-W Facility:	*Fairfax Pike*
N-S Facility:	*Site Entrance 1*
Date:	*July 8, 2026*

Traffic Volume Demand

Direction	Volume (veh/hr)			Truck Percent (%)
	U-Turn / Left	Through	Right	
Eastbound	33	834	107	6.40%
Westbound	85	1049	37	5.00%
Northbound	76	0	60	2.00%
Southbound	94	0	83	2.00%
Adjustment Factor	0.80 / 0.95		0.85	
Suggested	**U - 0.8 / L - 0.95**		**0.85**	
Truck to PCE Factor		**Suggested = 2.00**		2.00
Critical Lane Volume		1600		

Equivalent Passenger Car Volume

	Volume (pc/hr)			
	U-Turn / Left	Through	Right	Approach
Eastbound	35	887	114	1036
Westbound	89	1101	39	1229
Northbound	78	0	61	139
Southbound	96	0	85	181

Notes:

Left-turn Adjustment Factor	*Conversion of left-turning vehicles to equivalent through vehicles*
Right-turn Adjustment Factor	*Conversion of right-turning vehicles to equivalent through vehicles*
U-turn Adjustment Factor	*Conversion of U-turning vehicles to equivalent through vehicles*
Truck to PCE Factor	*1 truck = X Passenger Car Equivalents*
Critical Lane Volume Sum Limit	*Saturation value for critical lane volume sum at an intersection*

VDOT Junction Screening Tool

Possible Configurations

Indicate with a "Y" or "N" if each intersection or interchange configuration should or should not be considered. Use the information links for guidance. Then, click the "Show/Hide Configurations button" to hide the worksheets for the configurations that will not be considered.

#	Intersections	Information	Consider?	Justification
	Signalized Intersections			
1	Conventional	-	Y	
2	Bowtie	Link	N	Right-of-way restrictions identified
3	Center Turn Overpass	Link	N	Not feasible for roadway facility type
4	Continuous Green-T	Link	N	Not feasible for roadway facility type
5	Echelon	Link	N	Not feasible for roadway facility type
6	Full Displaced Left Turn	Link	N	Not feasible for roadway facility type
7	Median U-Turn	Link	N	Not feasible for roadway facility type
8	Partial Displaced Left Turn	Link	N	Not feasible for roadway facility type
9	Partial Median U-Turn	Link	N	Not feasible for roadway facility type
10	Quadrant Roadway N-E	Link	N	Right-of-way restrictions identified
11	Quadrant Roadway N-W	Link	N	Right-of-way restrictions identified
12	Quadrant Roadway S-E	Link	N	Right-of-way restrictions identified
13	Quadrant Roadway S-W	Link	N	Right-of-way restrictions identified
14	Restricted Crossing U-Turn	Link	N	Not feasible for roadway facility type
15	Single Loop	Link	N	Right-of-way restrictions identified
16	Split Intersection	Link	N	Right-of-way restrictions identified
17	Thru-Cut	Link	Y	
	Unsignalized Intersections			
18	50 Mini Roundabout	Link	N	Not feasible for roadway facility type
19	75 Mini Roundabout	Link	N	Not feasible for roadway facility type
20	Roundabout	Link	Y	
21	Two-Way Stop Control	-	Y	
#	Interchanges	Information	Consider?	Justification
22	Traditional Diamond	Link	N	Not feasible for roadway facility type
23	Contraflow Left	Link	N	Not feasible for roadway facility type
24	Displaced Left Turn	Link	N	Not feasible for roadway facility type
25	Diverging Diamond	Link	N	Not feasible for roadway facility type
26	Double Roundabout	Link	N	Not feasible for roadway facility type
27	Michigan Urban Diamond	Link	N	Not feasible for roadway facility type
28	Partial Cloverleaf	Link	N	Not feasible for roadway facility type
29	Single Point	Link	N	Not feasible for roadway facility type
30	Single Roundabout	Link	N	Not feasible for roadway facility type

VDOT Junction Screening Tool

Directional Questions and Base Lane Configurations

Before entering a base number of through lanes for each direction, answer all applicable directional question for each intersection or interchange configuration selected for consideration. Navigate to the lane configuration worksheet for example diagrams, if provided.

Intersections	Question	Direction
Bowtie	N/A	N/A
Continuous Green-T	N/A	N/A
Echelon	N/A	N/A
Median U-Turn	N/A	N/A
Partial Displaced Left Turn	N/A	N/A
Partial Median U-Turn	N/A	N/A
Restricted Crossing U-Turn	N/A	N/A
Single Loop	N/A	N/A
Split Intersection	N/A	N/A
Thru-Cut	Select the roadway where through traffic is permitted from the drop-down list. See example diagrams.	EB-WB
Interchanges	**Question**	**Direction**
All	N/A	N/A

Base Number of Through Lanes

Enter a base number of through lanes for each direction. The number of through lanes entered will populate on each non-roundabout lane configuration worksheet. This tool also allows the user to enter the number of through lanes on the lane configuration worksheets directly. This base number may be overwritten on individual lane configuration worksheets. Turn lanes, shared lanes, and channelized lanes must still be entered in each lane configuration worksheet.

Eastbound	1
Westbound	1
Northbound	1
Southbound	1

VDOT Junction Screening Tool

Results Worksheet

VJuST
VDOT Junction Screening Tool

General Information	
Project Title:	Gibson Property
EW Facility:	Fairfax Pike
NS Facility:	Site Entrance 1
Date:	July 8, 2026

Volumes (veh/hr)	U-Turn / Left	Through		Right
Eastbound	33	834	33	107
Westbound	85	1049	33	37
Northbound	76	0	33	60
Southbound	94	0	33	83

General Instructions: All intersection and interchange configurations have a default assumption of one exclusive lane per movement. No results shall be interpreted until the user has verified the lane configurations on each worksheet.

Intersection Results

Type	Dir	Maximum V/C (Congestion)	Accommodation Compared to Conventional (Pedestrian)	Weighted Total Conflict Points (Safety)	Planning Level Cost Category (Planning Level Costs)	Notes
Conventional	-	0.83		48	$$	
Thru-Cut	-	0.80		28	$$	
Roundabout	-	1.00		8	$$	
Two-Way Stop Control	-	4.02		48	$	

*The continuous green-T is the only three-legged innovative intersection in this tool. To compare the continuous green-T to other innovative intersections, conflicts corresponding with the fourth leg must be removed. This has been done for the conventional intersection. Conflict point diagrams for three-legged and four-legged conventional intersections have been provided on the conventional intersection worksheet for reference.

Interchange Results						
		Congestion	Pedestrian	Safety	Planning Level Costs	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Traditional Diamond	Weighted Total Conflict Points	Planning Level Cost Category	

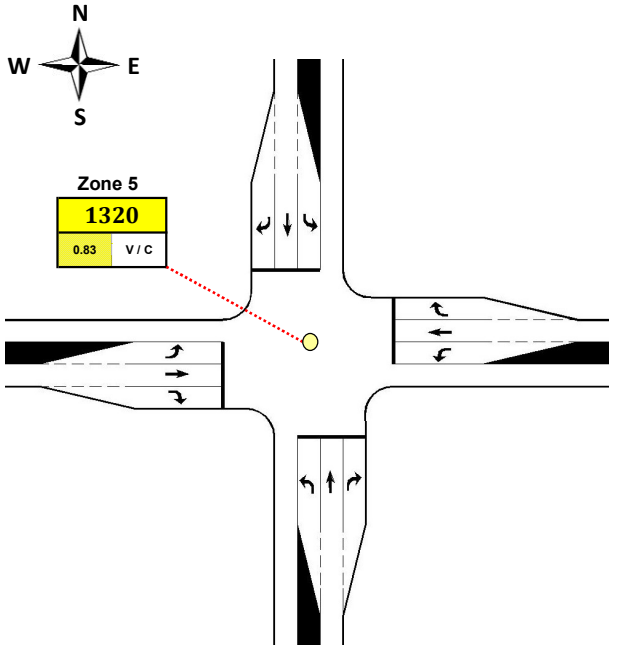
Information	
Congestion	The maximum v/c ratio represents the worst v/c of all zones that make up an intersection.
Pedestrian	Compares the potential of each design to accommodate pedestrians based on safety, wayfinding, and delay. Potential is qualitatively defined as better (+), similar (blank cell), or worse (-) than a conventional intersection or traditional diamond interchange.
Safety	Weighted Total = (2 x Crossing Conflicts) + Merging Conflicts + Diverging Conflicts
Planning Level Costs	Cost category estimates for each intersection/interchange alternative. Some alternatives have choices that affect the resulting cost category (e.g. requirement of a new bridge) that can be configured on the individual input worksheets.

Conventional

DESIGN AND RESULTS

Project Name:	Gibson Property
EW Facility:	Fairfax Pike
NS Facility:	Site Entrance 1
Date:	July 8, 2026

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:		0.83	

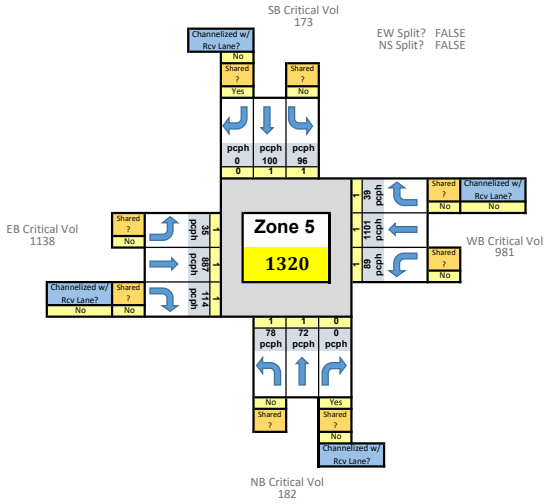


Note: This diagram does not reflect the actual lane configuration of the intersection

Conventional

DATA INPUT AND CONFIGURATION

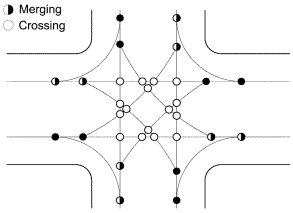
Enter the lane configurations in the yellow cells.



Back to Results

Safety - Conflict Point Diagram

● Diverging
◑ Merging
○ Crossing



Conflict Type	Count
Crossing	16
Merging	8
Diverging	8
Total	**32**

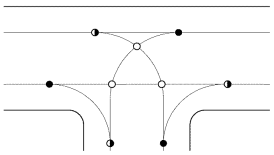
Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

48

Safety - Conflict Point Diagram (Three Legs)

● Diverging
◑ Merging
○ Crossing



Conflict Type	Count
Crossing	3
Merging	3
Diverging	3
Total	**9**

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

12

Planning Level Cost

$ $ $ $ $ **2**

- Are new lanes and/or pavement needed? **Yes**
- Cost category 1 if no new pavement needed, else cost cateogry 2.
- Assumes existing two-way stop contol or all-way stop control

Thru-Cut

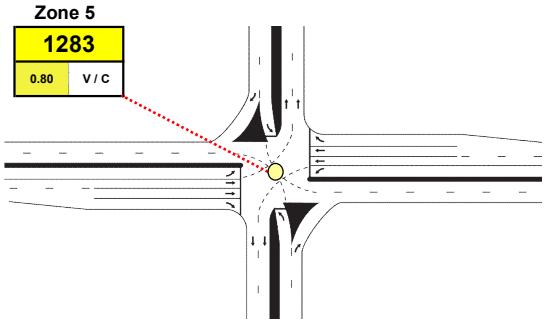
DESIGN AND RESULTS

Project Name:	Gibson Property
EW Facility:	Fairfax Pike
NS Facility:	Site Entrance 1
Date:	July 8, 2026

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:		0.80	

N W E S

North arrow directions will appear once the directional question has been answered on the Input Worksheet.

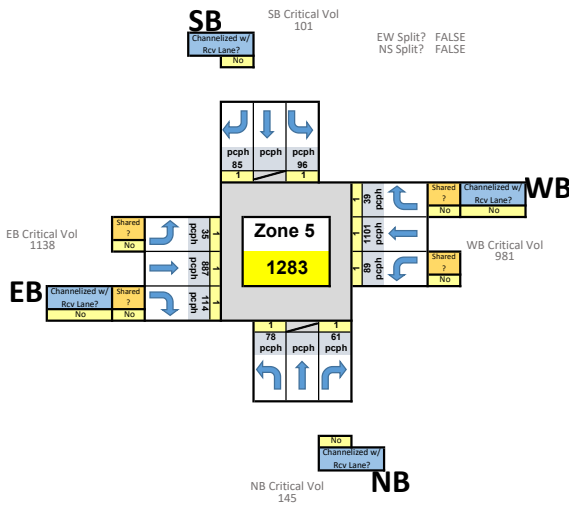


Note: This diagram does not reflect the actual lane configuration of the intersection

Thru-Cut

DATA INPUT AND CONFIGURATION

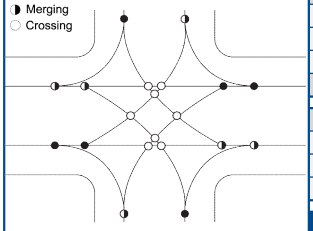
Enter the lane configurations in the yellow cells.



Back to Results

Safety - Conflict Point Diagram

● Diverging
◑ Merging
○ Crossing



Conflict Type	Count
Crossing	8
Merging	6
Diverging	6
Total	**20**

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

28

Assumptions

- Minor street through traffic does not need to re-enter the intersection from the major street to complete the desired movement. There are no u-turn crossover intersections on the major street.
- The original through volumes were split evenly to left-turns and right-turns.

Planning Level Cost

$ $ $ $ $ **2**

- Cost Category 2
- Assumes conversion from conventional signal.

Guidance

A thru-cut is a signalized intersection form best suited for location at which minor street through volumes are relatively low but overall minor street volumes are high enough to warrant a signal. Thru-Cuts are generally appropriate when the through volume on each minor street leg is less than 100 vehicles (per leg) in peak hour, but may be appropriate with minor street through volumes if the major street through volume is very high. This will often occur at locations where land uses served by each of the minor street legs are likely to generate only a small number of trips between them. VDOT envisions thru-cuts to predominantly be used as relatively low-cost improvements and not include the implementation of u-turn crossovers to facilitate minor street through movements. Thru-cuts will generally be implemented in locations where the surrounding road and/or driveway network already supports alternative routes for minor street through-movement trips. The following are additional design considerations for thru-cuts:

- The vehicular signal phasing does not accommodate a pedestrian crossing of the major street. A pedestrian phase--likely pedestrian only--is needed for designs including a major street pedestrian crossing. If the pedestrian phase is frequently actuated, then the operational benefit of the thru-cut will be diminished.

- Channelization is needed on the minor street to 1) align both left-turn movements so they can operate concurrently and 2) physically prevent through movements. This is similar to the channelization at an off-ramp at a single-point diamond interchange. Channelization may require some minor widening in the immediate vicinity of the intersection.

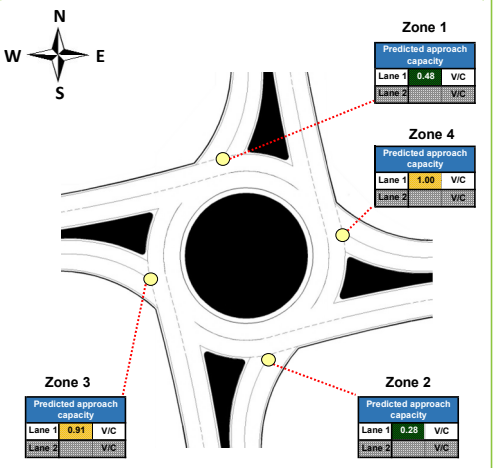
- Minor street right turns will generally be yield-controlled but could be signalized or stop-controlled.

The benefits of an unsignalized thru-cut are limited. The design would encourage concurrent minor street left turns and two-stage left turns with a stop in the median, which are not necessarily desirable. Additionally, minor street left-turn movements would still have conflict points with both directions of the major street.

Roundabout

DESIGN AND RESULTS

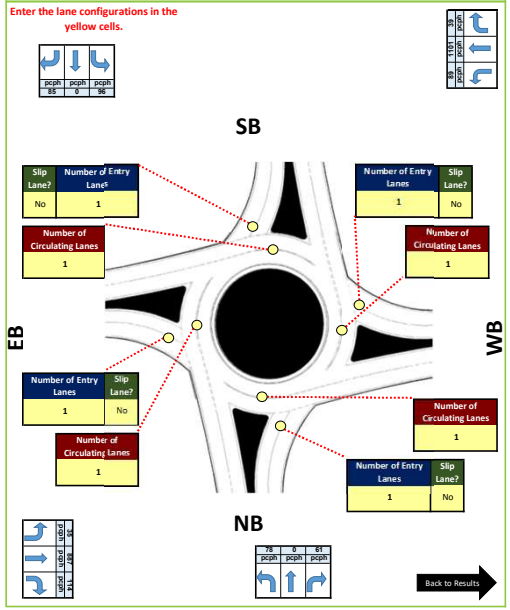
Project Name:	Gibson Property	Critical Lane Volume Sum			
EW Facility:	Fairfax Pike	< 1200	1200 - 1399	1400 - 1599	≥ 1600
NS Facility:	Site Entrance 1	VOLUME / CAPACITY RATIO:	1.00		
Date:	July 8, 2026				



Roundabout

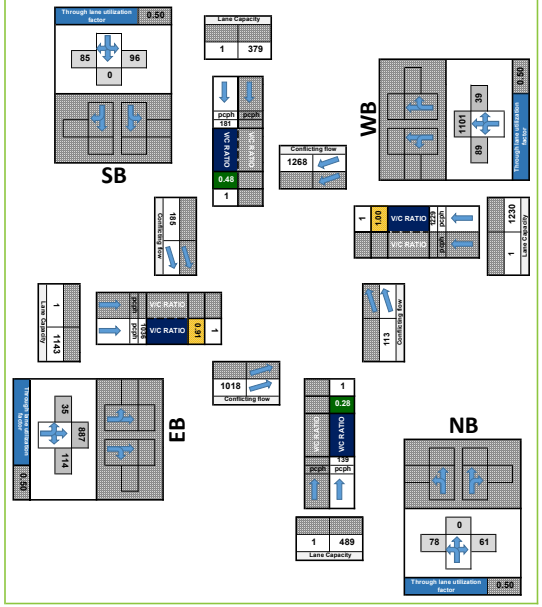
DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Roundabout

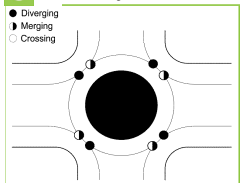
CAPACITY CALCULATIONS



EQUATION: A x exp(-B x Q)

Number of Entry Lanes	Number of Circulating Lanes	Lane	A	B
1	1	-	1380	0.00102
1	2	-	1420	0.00085
2	1	Left	1420	0.00091
2	1	Right	1420	0.00091
2	2	Left	1350	0.00092
2	2	Right	1420	0.00085

Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	0
Merging	4
Diverging	4
Total	8

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

8

Assumptions

- The number of circulating lanes in one quadrant is assumed to be equal to the number of exiting lanes in the next quadrant.
- The roundabout is limited to a maximum of two entry lanes and two circulating lanes.
- All left-turning vehicles are assumed to stay in the innermost lane until exiting the roundabout.
- This worksheet does not use the CLV methodology. The calculations are based on the *HCM 6th Edition* .

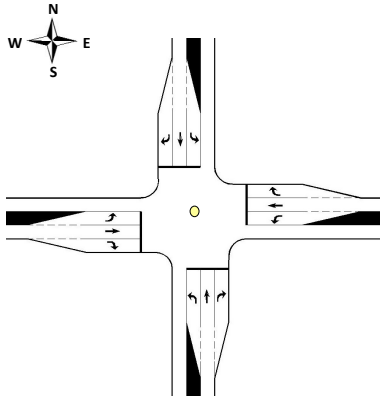
Planning Level Cost $ $ $ $ $ 2

- Cost Category 2
- Assumes conversion from two-way stop control or all-way stop control.

Two-Way Stop Control (TWSC)

DESIGN AND RESULTS

		Critical Lane Volume Sum			
Project Name:	Gibson Property	< 1200	1200 - 1399	1400 - 1599	≥ 1600
EW Facility:	Fairfax Pike				
NS Facility:	Site Entrance 1	VOLUME / CAPACITY RATIO:			4.02
Date:	July 8, 2026				



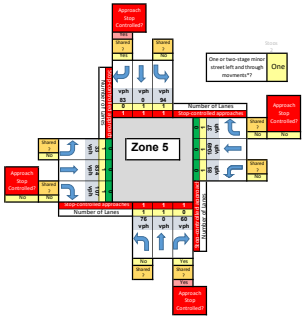
Note: This diagram does not reflect the actual lane configuration of the intersection

Two-Way Stop Control (TWSC)

DATA INPUT AND CONFIGURATION

Step 1: Identify which approaches are stop-controlled by selecting "Yes" from the drop-down box.

Step 2: Enter the lane configurations in the yellow cells.



Two-Way Stop Control (TWSC)

HCM 6 CALCULATIONS

Priority	MVMT	Rank
1	EBL	2
2	EBT	1
3	EBR	1
4	WBL	2
5	WBT	1
6	WBR	1
7	NBL	4
8	NBT	3
9	NBR	2
10	SBL	4
11	SBT	3
12	SBR	2

MAJOR	MINOR
EB	NB
WB	SB

Major street lanes	2
NB Shared?	FALSE
SB Shared?	FALSE

Priority	Rank	Flow Rates	Lanes	Shared?	Stop controlled?	Truck %
1	2	33	1	No		0.064
4	2	85	1	No		0.05
7	4	76	1	No	Yes	0.02
8	3	0	1		Yes	0.02
9	2	60	0	Yes	Yes	0.02
10	4	94	1	No	Yes	0.02
11	3	0	1		Yes	0.02
12	2	83	0	Yes	Yes	0.02
–	–	–	–	–	–	–
2	1	834	1			0.064
3	1	107	1	No	No	0.064
5	1	1049	1			0.05
6	1	37	1	No	No	0.05

Conflicting Flows		Critical Headways		Follow-Up Headways	
$v_{c,1}$	1086.00	$t_{c,1}$	4.16	$t_{f,1}$	2.26
$v_{c,2}$	941.00	$t_{c,2}$	4.15	$t_{f,2}$	2.25
$v_{c,3}$	2179.00	$t_{c,3}$	7.12	$t_{f,3}$	3.52
$v_{c,4}$	2156.00	$t_{c,4}$	6.52	$t_{f,4}$	4.02
$v_{c,5}$	834.00	$t_{c,5}$	6.22	$t_{f,5}$	3.32
$v_{c,6}$	2202.50	$t_{c,6}$	7.12	$t_{f,6}$	3.52
$v_{c,7}$	2216.00	$t_{c,7}$	6.52	$t_{f,7}$	4.02
$v_{c,8}$	1049.00	$t_{c,8}$	6.22	$t_{f,8}$	3.32
–	–	–	–	–	–
$v_{c,9}$	900.00	$t_{c,9}$	6.12		
$v_{c,10}$	1279.00	$t_{c,10}$	6.12		
$v_{c,11}$	900.00	$t_{c,11}$	5.52		
$v_{c,12}$	1256.00	$t_{c,12}$	5.52		
$v_{c,13}$	1219.00	$t_{c,13}$	6.12		
$v_{c,14}$	983.50	$t_{c,14}$	6.12		
$v_{c,15}$	1219.00	$t_{c,15}$	5.52		
$v_{c,16}$	1007.00	$t_{c,16}$	5.52		

α	0.91

*Assumption: One storage space in median ($p_{sm,1}$ = 1) for two-stage turns

Saturation Flow Rates	
Through	1900
Right	1900

Potential Capacities		Movement Capacities		Shared Movement Capacities		Movement Capacities		Movement V/C		Intersection V/C
$c_{p,1}$	626.10	$c_{m,1}$	626.10			1	626.10	1	0.05	4.02
$c_{p,2}$	716.46	$c_{m,2}$	716.46			2	1800.00	2	0.46	
$c_{p,3}$	33.14	$c_{m,3}$	33.11	0		3	1600.00	3	0.07	
$c_{p,4}$	47.74	$c_{m,4}$	39.86	1	368.04	4	716.46	4	0.12	
$c_{p,5}$	368.04	$c_{m,5}$	368.04	1		5	1800.00	5	0.58	
$c_{p,6}$	31.97	$c_{m,6}$	23.37	0		6	1500.00	6	0.02	
$c_{p,7}$	43.10	$c_{m,7}$	35.98	1	276.35	7	20.31	7	0.74	
$c_{p,8}$	276.35	$c_{m,8}$	276.35	1		8-9	368.04	8-9	0.16	
						–	–	–	–	
						10	23.37	10	0.02	
						11-12	276.35	11-12	0.30	
						–	–	–	–	

Two-Stage Potential Capacities		Two-Stage Movement Capacities		Single-Stage Movement Capacities	
$c_{c,1,1}$	333.18	$c_{t,1,1}$	315.57	$c_{s,1,1}$	20.31
$c_{c,1,2}$	203.91	$c_{t,1,2}$	125.68	$c_{s,1,2}$	28.86
$c_{c,2,2}$	357.36	$c_{t,2,2}$	338.43	$c_{s,2,2}$	23.37
$c_{pt,1,1}$	242.93	$c_{mt,1,1}$	214.02	$c_{ss,2}$	35.98
$c_{pt,1,2}$	220.45	$c_{mt,1,2}$	194.30		
$c_{pt,2,1}$	199.23	$c_{mt,2,1}$	237.24		
$c_{pt,2,2}$	252.50	$c_{mt,2,2}$	222.91		
$c_{pt,3,2}$	338.50	$c_{mt,3,2}$	301.78		

$v_{c,1}$	4.68	$c_{c,1}$	71.59
$v_{c,2}$	2.13	$c_{c,2}$	123.87
$v_{c,3}$	1.33	$c_{c,3}$	88.40
$p_{t,2}$	1.03	$c_{c,4}$	116.73

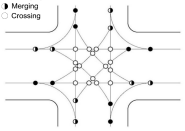
Mvmt 1, excl left		$p_{t,1}$	0.95
Mvmt 4, excl left		$p_{t,4}$	0.88
Mvmt 1, shared left		$p^*_{t,1}$	0.90
Mvmt 4, shared left		$p^*_{t,4}$	0.72
Mvmt 7, 4-leg		$p^*_{t,7}$	0.835
Mvmt 10, 4-leg		$p^*_{t,10}$	0.835

		$p_{t,1,2}$	0.46
		$p_{t,2,2}$	0.58
One Stage		$f_{c,1}$	0.83
		$f_{c,2}$	0.83
		$f_{c,3}$	0.00
		$f_{c,4}$	0.00
Two Stage		$f_{c,1}$	0.91
		$f_{c,2}$	0.88
		$f_{c,3}$	0.91
		$f_{c,4}$	0.88

$p_{t,1,1}$	1.00	$p_{ss,1,1}$	0.84
$p_{t,2,1}$	1.00	$p_{ss,2,1}$	0.70
$p^*_{t,7}$	0.87	$f_{c,1}$	0.61
$p^*_{t,10}$	0.87	$f_{c,2}$	0.71
$f_{c,1,1}$	0.88	$p_{ss,1,2}$	1.00
$f_{c,2,1}$	0.95	$p_{ss,2,2}$	1.00
$f_{c,1,2}$	0.62		
$f_{c,2,2}$	0.79		

Safety - Conflict Point Diagram

● Diverging
◗ Merging
○ Crossing



Conflict Type	Count
Crossing	16
Merging	8
Diverging	8
Total	**32**

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

48

Assumptions

- This worksheet does not use the CLV methodology. The calculations are based on the *HCM, 6th Edition*. The calculations are based on vehicles per hour.

Planning Level Cost

$ $ $ $ **1**

- Cost Category 1
- Assumes no intersection, but cost of new road is not included

Hybrid Roundabout

VDOT Junction Screening Tool

Results Worksheet

VJuST
VDOT Junction Screening Tool

General Information	
Project Title:	Gibson Property
EW Facility:	Fairfax Pike
NS Facility:	Site Entrance 1
Date:	July 8, 2026

Volumes (veh/hr)	U-Turn / Left	Through		Right
Eastbound	33	834	33	107
Westbound	85	1049	33	37
Northbound	76	0	33	60
Southbound	94	0	33	83

General Instructions: All intersection and interchange configurations have a default assumption of one exclusive lane per movement. No results shall be interpreted until the user has verified the lane configurations on each worksheet.

Intersection Results

Type	Dir	Maximum V/C (Congestion)	Accommodation Compared to Conventional (Pedestrian)	Weighted Total Conflict Points (Safety)	Planning Level Cost Category (Planning Level Costs)	Notes
Roundabout	-	0.50		8	$$	

*The continuous green-T is the only three-legged innovative intersection in this tool. To compare the continuous green-T to other innovative intersections, conflicts corresponding with the fourth leg must be removed. This has been done for the conventional intersection. Conflict point diagrams for three-legged and four-legged conventional intersections have been provided on the conventional intersection worksheet for reference.

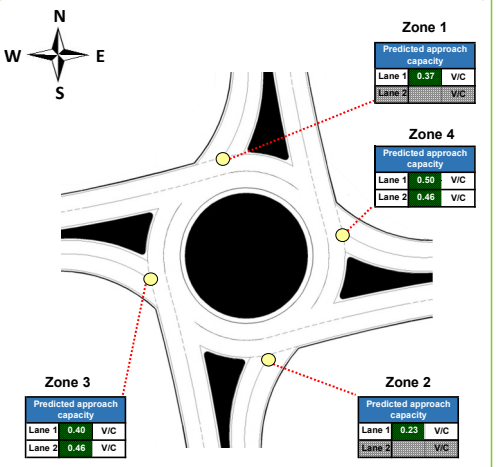
Interchange Results						
		Congestion	Pedestrian	Safety	Planning Level Costs	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Traditional Diamond	Weighted Total Conflict Points	Planning Level Cost Category	

Information	
Congestion	The maximum v/c ratio represents the worst v/c of all zones that make up an intersection.
Pedestrian	Compares the potential of each design to accommodate pedestrians based on safety, wayfinding, and delay. Potential is qualitatively defined as better (+), similar (blank cell), or worse (-) than a conventional intersection or traditional diamond interchange.
Safety	Weighted Total = (2 x Crossing Conflicts) + Merging Conflicts + Diverging Conflicts
Planning Level Costs	Cost category estimates for each intersection/interchange alternative. Some alternatives have choices that affect the resulting cost category (e.g. requirement of a new bridge) that can be configured on the individual input worksheets.

Roundabout

DESIGN AND RESULTS

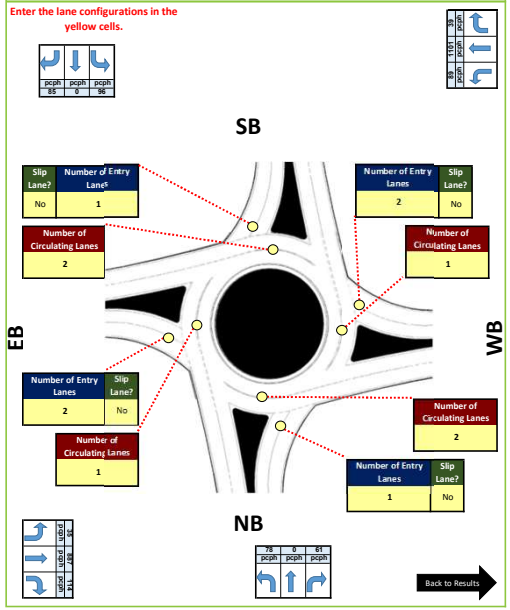
		Critical Lane Volume Sum			
Project Name:	Gibson Property	< 1200	1200 - 1399	1400 - 1599	≥ 1600
EW Facility:	Fairfax Pike				
NS Facility:	Site Entrance 1	VOLUME / CAPACITY RATIO:	0.50		
Date:	July 8, 2026				



Roundabout

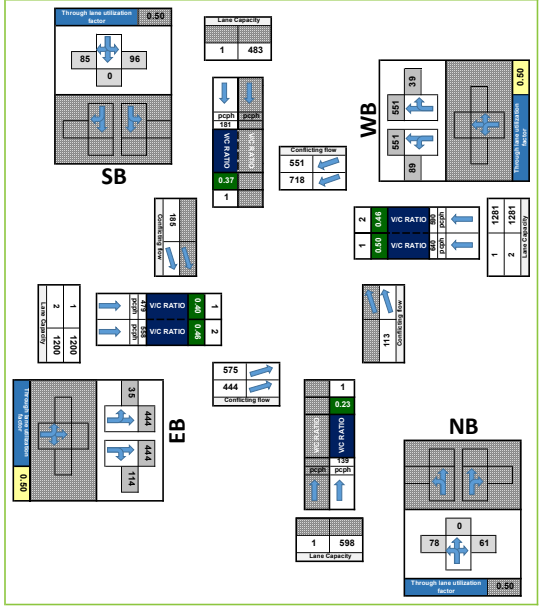
DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Roundabout

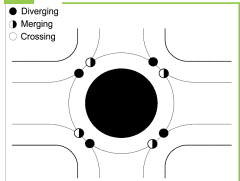
CAPACITY CALCULATIONS



EQUATION: A x exp(-B x Q)

Number of Entry Lanes	Number of Circulating Lanes	Lane	A	B
1	1	-	1380	0.00102
1	2	-	1420	0.00085
2	1	Left	1420	0.00091
2	1	Right	1420	0.00091
2	2	Left	1350	0.00092
2	2	Right	1420	0.00085

Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	0
Merging	4
Diverging	4
Total	8

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points: 8

Assumptions

- The number of circulating lanes in one quadrant is assumed to be equal to the number of exiting lanes in the next quadrant.
- The roundabout is limited to a maximum of two entry lanes and two circulating lanes.
- All left-turning vehicles are assumed to stay in the innermost lane until exiting the roundabout.
- This worksheet does not use the CLV methodology. The calculations are based on the *HCM 6th Edition* .

Planning Level Cost $ $ $ $ $ 2

- Cost Category 2
- Assumes conversion from two-way stop control or all-way stop control.

VJuST Analysis for Intersection of Route 522 and Site Entrance#4 (AM Peak)

VDOT Junction Screening Tool

Input Worksheet

Project Title:	*Gibson Property*
E-W Facility:	*Site Entrance 4*
N-S Facility:	*Rte. 522*
Date:	*July 10, 2026*

Traffic Volume Demand

Direction	Volume (veh/hr)			Truck Percent (%)
	U-Turn / Left	Through	Right	
Eastbound	27	0	11	2.00%
Westbound	15	0	1	2.00%
Northbound	36	712	53	9.30%
Southbound	2	611	92	16.10%
Adjustment Factor	0.80 / 0.95		0.85	
Suggested	**U - 0.8** / **L - 0.95**		**0.85**	
Truck to PCE Factor		**Suggested = 2.00**		2.00
Critical Lane Volume		1600		

Equivalent Passenger Car Volume

	Volume (pc/hr)			
	U-Turn / Left	Through	Right	Approach
Eastbound	28	0	11	39
Westbound	15	0	1	16
Northbound	39	778	58	875
Southbound	2	709	107	818

Notes:

Left-turn Adjustment Factor	*Conversion of left-turning vehicles to equivalent through vehicles*
Right-turn Adjustment Factor	*Conversion of right-turning vehicles to equivalent through vehicles*
U-turn Adjustment Factor	*Conversion of U-turning vehicles to equivalent through vehicles*
Truck to PCE Factor	*1 truck = X Passenger Car Equivalents*
Critical Lane Volume Sum Limit	*Saturation value for critical lane volume sum at an intersection*

VDOT Junction Screening Tool

Possible Configurations

Indicate with a "Y" or "N" if each intersection or interchange configuration should or should not be considered. Use the information links for guidance. Then, click the "Show/Hide Configurations button" to hide the worksheets for the configurations that will not be considered.

#	Intersections	Information	Consider?	Justification
	Signalized Intersections			
1	Conventional	-	Y	
2	Bowtie	Link	N	Unable to accommodate magnitude of traffic volumes
3	Center Turn Overpass	Link	N	Not feasible for roadway facility type
4	Continuous Green-T	Link	Y	
5	Echelon	Link	N	Right-of-way restrictions identified
6	Full Displaced Left Turn	Link	N	Right-of-way restrictions identified
7	Median U-Turn	Link	N	Unable to accommodate traffic patterns
8	Partial Displaced Left Turn	Link	N	Unable to accommodate traffic patterns
9	Partial Median U-Turn	Link	N	Unable to accommodate traffic patterns
10	Quadrant Roadway N-E	Link	N	Right-of-way restrictions identified
11	Quadrant Roadway N-W	Link	N	Right-of-way restrictions identified
12	Quadrant Roadway S-E	Link	N	Right-of-way restrictions identified
13	Quadrant Roadway S-W	Link	N	Right-of-way restrictions identified
14	Restricted Crossing U-Turn	Link	Y	
15	Single Loop	Link	N	Right-of-way restrictions identified
16	Split Intersection	Link	N	Right-of-way restrictions identified
17	Thru-Cut	Link	N	
	Unsignalized Intersections			
18	50 Mini Roundabout	Link	N	Not feasible for roadway facility type
19	75 Mini Roundabout	Link	N	Not feasible for roadway facility type
20	Roundabout	Link	N	
21	Two-Way Stop Control	-	Y	
#	**Interchanges**	**Information**	**Consider?**	**Justification**
22	Traditional Diamond	Link	N	Not feasible for roadway facility type
23	Contraflow Left	Link	N	Not feasible for roadway facility type
24	Displaced Left Turn	Link	N	Not feasible for roadway facility type
25	Diverging Diamond	Link	N	Not feasible for roadway facility type
26	Double Roundabout	Link	N	Insufficient intersection spacing
27	Michigan Urban Diamond	Link	N	Not feasible for roadway facility type
28	Partial Cloverleaf	Link	N	Not feasible for roadway facility type
29	Single Point	Link	N	Not feasible for roadway facility type
30	Single Roundabout	Link	N	Not feasible for roadway facility type

VDOT Junction Screening Tool

Directional Questions and Base Lane Configurations

Before entering a base number of through lanes for each direction, answer all applicable directional question for each intersection or interchange configuration selected for consideration. Navigate to the lane configuration worksheet for example diagrams, if provided.

Intersections	Question	Direction
Bowtie	N/A	N/A
Continuous Green-T	Select the direction associated with the "stem" of the T-intersection from the drop-down list. See example diagrams.	EB
Echelon	N/A	N/A
Median U-Turn	N/A	N/A
Partial Displaced Left Turn	N/A	N/A
Partial Median U-Turn	N/A	N/A
Restricted Crossing U-Turn	Select the roadway with the U-turns from the drop-down list.	NB-SB
Single Loop	N/A	N/A
Split Intersection	N/A	N/A
Thru-Cut	N/A	N/A
Interchanges	**Question**	**Direction**
All	N/A	N/A

Base Number of Through Lanes

Enter a base number of through lanes for each direction. The number of through lanes entered will populate on each non-roundabout lane configuration worksheet. This tool also allows the user to enter the number of through lanes on the lane configuration worksheets directly. This base number may be overwritten on individual lane configuration worksheets. Turn lanes, shared lanes, and channelized lanes must still be entered in each lane configuration worksheet.

Eastbound	1
Westbound	1
Northbound	2
Southbound	2

VDOT Junction Screening Tool

Results Worksheet

VJuST
VDOT Junction Screening Tool

General Information	
Project Title:	Gibson Property
EW Facility:	Site Entrance 4
NS Facility:	Rte. 522
Date:	July 10, 2026

Volumes (veh/hr)	U-Turn / Left	Through		Right
Eastbound	27	0	27	11
Westbound	15	0	27	1
Northbound	36	712	27	53
Southbound	2	611	27	92

General Instructions: All intersection and interchange configurations have a default assumption of one exclusive lane per movement. No results shall be interpreted until the user has verified the lane configurations on each worksheet.

Intersection Results

Type	Dir	Maximum V/C (Congestion)	Accommodation Compared to Conventional (Pedestrian)	Weighted Total Conflict Points (Safety)	Planning Level Cost Category (Planning Level Costs)	Notes
Conventional	-	0.27		48	$$	
Continuous Green-T	-	0.27	-	12*	$$	
Restricted Crossing U-Turn	-	0.22		20	$$	
Two-Way Stop Control	-	0.20		48	$	

*The continuous green-T is the only three-legged innovative intersection in this tool. To compare the continuous green-T to other innovative intersections, conflicts corresponding with the fourth leg must be removed. This has been done for the conventional intersection. Conflict point diagrams for three-legged and four-legged conventional intersections have been provided on the conventional intersection worksheet for reference.

Interchange Results						
		Congestion	Pedestrian	Safety	Planning Level Costs	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Traditional Diamond	Weighted Total Conflict Points	Planning Level Cost Category	

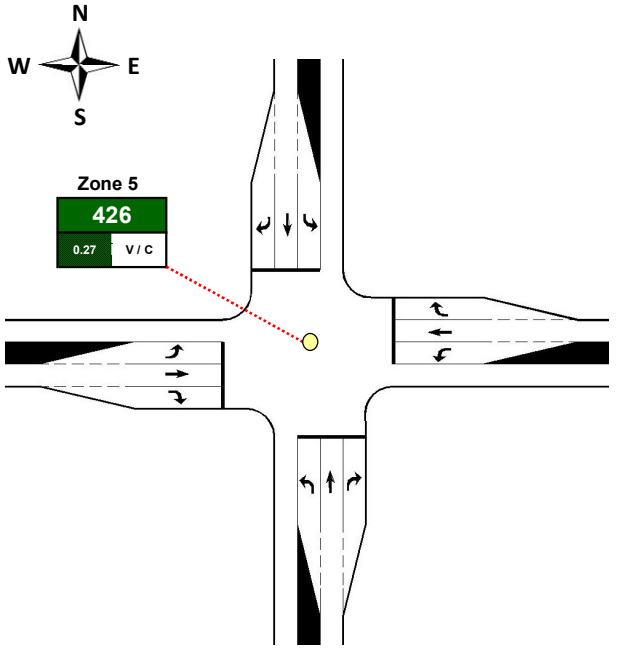
Information	
Congestion	The maximum v/c ratio represents the worst v/c of all zones that make up an intersection.
Pedestrian	Compares the potential of each design to accommodate pedestrians based on safety, wayfinding, and delay. Potential is qualitatively defined as better (+), similar (blank cell), or worse (-) than a conventional intersection or traditional diamond interchange.
Safety	Weighted Total = (2 x Crossing Conflicts) + Merging Conflicts + Diverging Conflicts
Planning Level Costs	Cost category estimates for each intersection/interchange alternative. Some alternatives have choices that affect the resulting cost category (e.g. requirement of a new bridge) that can be configured on the individual input worksheets.

Conventional

DESIGN AND RESULTS

Project Name:	Gibson Property
EW Facility:	Site Entrance 4
NS Facility:	Rte. 522
Date:	July 10, 2026

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:		0.27	

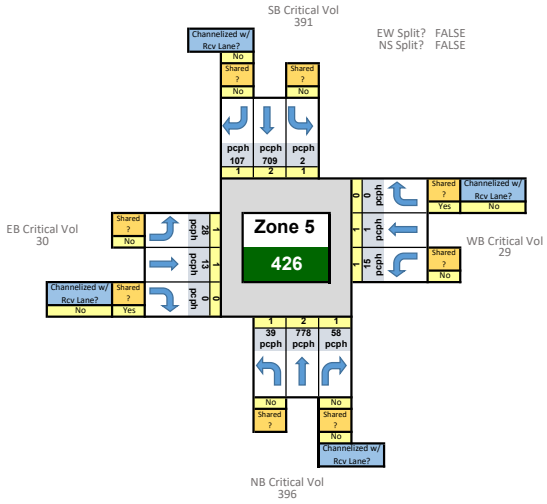


Note: This diagram does not reflect the actual lane configuration of the intersection

Conventional

DATA INPUT AND CONFIGURATION

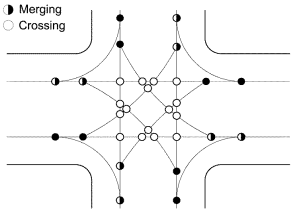
Enter the lane configurations in the yellow cells.



Back to Results

Safety - Conflict Point Diagram

● Diverging
◑ Merging
○ Crossing



Conflict Type	Count
Crossing	16
Merging	8
Diverging	8
Total	**32**

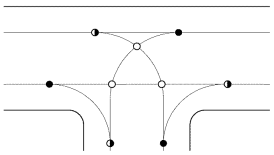
Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

48

Safety - Conflict Point Diagram (Three Legs)

● Diverging
◑ Merging
○ Crossing



Conflict Type	Count
Crossing	3
Merging	3
Diverging	3
Total	**9**

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

12

Planning Level Cost

$ $ $ $ $ **2**

- Are new lanes and/or pavement needed? **Yes**
- Cost category 1 if no new pavement needed, else cost cateogry 2.
- Assumes existing two-way stop contol or all-way stop control

Continuous Green-T Intersection

DESIGN AND RESULTS

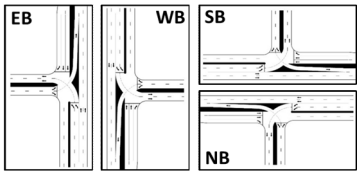
Project Name:	Gibson Property
EW Facility:	Site Entrance 4
NS Facility:	Rte. 522
Date:	July 10, 2026

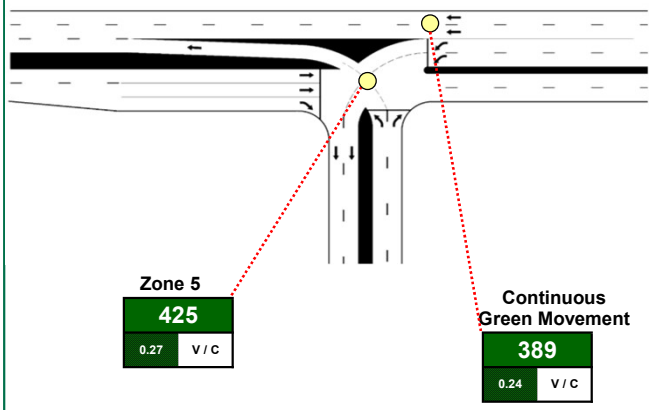
Critical Lane Volume Sum

< 1200	1200 - 1399	1400 - 1599	≥ 1600

VOLUME / CAPACITY RATIO: **0.27**

North arrow directions will appear once the directional question has been answered on the **Input Worksheet**.



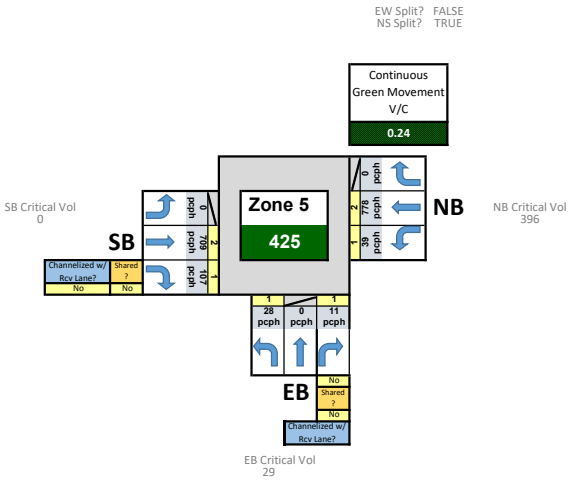


Note: This diagram does not reflect the actual lane configuration of the intersection

Continuous Green-T Intersection

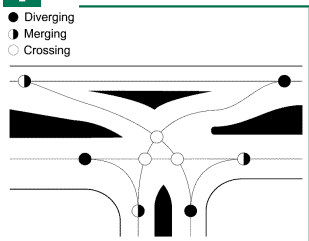
DATA INPUT AND CONFIGURATION

Step 1: Enter the lane configurations in the yellow cells.



Back to Results

Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	3
Merging	3
Diverging	3
Total	**9**

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

12

Planning Level Cost

$ $ $ $ $ **2**

- Cost Category 2
- Assumes conversion from conventional signal.

Restricted Crossing U-Turn (RCUT) Intersection

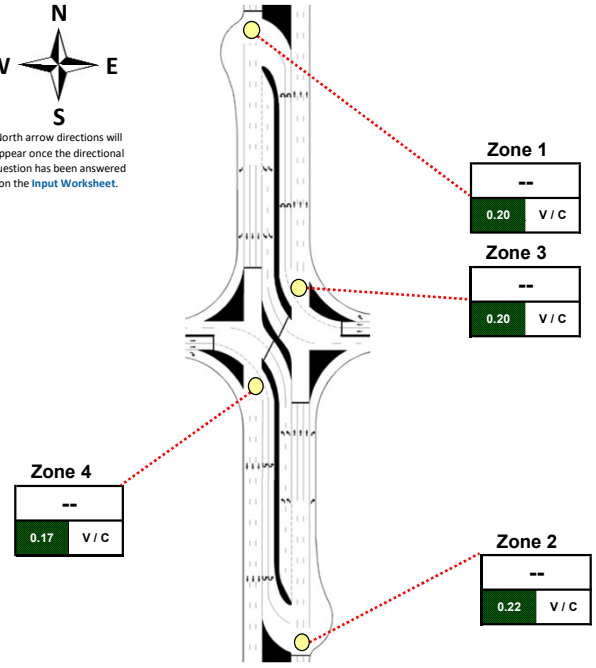
DESIGN AND RESULTS

Project Name:	Gibson Property
EW Facility:	Site Entrance 4
NS Facility:	Rte. 522
Date:	July 10, 2026

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:	0.22		

N W E S

North arrow directions will appear once the directional question has been answered on the **Input Worksheet**.

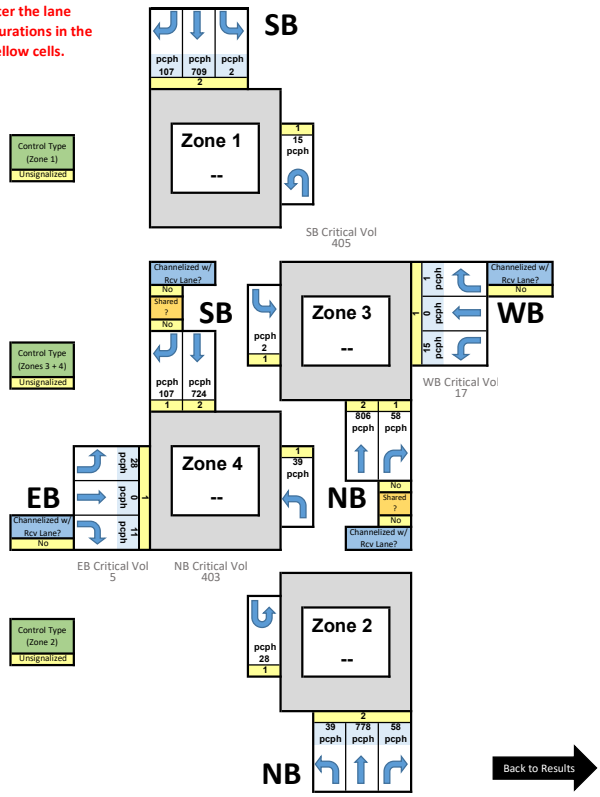


Note: This diagram does not reflect the actual lane configuration of the intersection

Restricted Crossing U-Turn (RCUT) Intersection

DATA INPUT AND CONFIGURATION

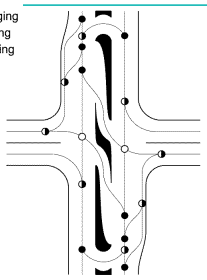
Enter the lane configurations in the yellow cells.



Back to Results

Safety - Conflict Point Diagram

● Diverging
◑ Merging
○ Crossing



Conflict Type	Count
Crossing	2
Merging	8
Diverging	8
Total	**18**

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

20

Assumptions

- This worksheet uses the CLV methodology for calculations at signalized zones. These calculations are based on passenger cars per hour.
- This worksheet uses the *HCM, 6th Edition* methodology for calculations at unsignalized zones. These calculations are based on vehicles per hour.

Planning Level Cost

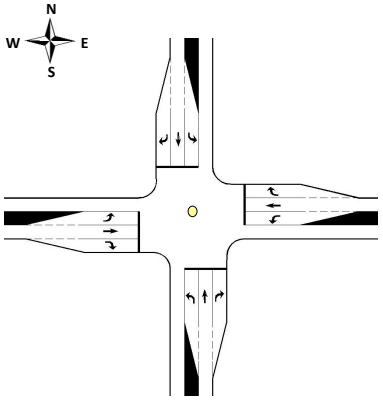
$ $ $ $ $ **2**

- Cost Category 3
- Assumes conversion from conventional signal.

Two-Way Stop Control (TWSC)

DESIGN AND RESULTS

		Critical Lane Volume Sum			
Project Name:	Gibson Property	< 1200	1200 - 1399	1400 - 1599	≥ 1600
EW Facility:	Site Entrance 4				
NS Facility:	Rte. 522	VOLUME / CAPACITY RATIO:	0.20		
Date:	July 10, 2026				



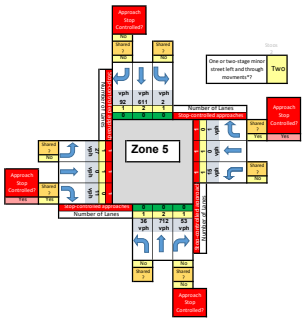
Note: This diagram does not reflect the actual lane configuration of the intersection

Two-Way Stop Control (TWSC)

DATA INPUT AND CONFIGURATION

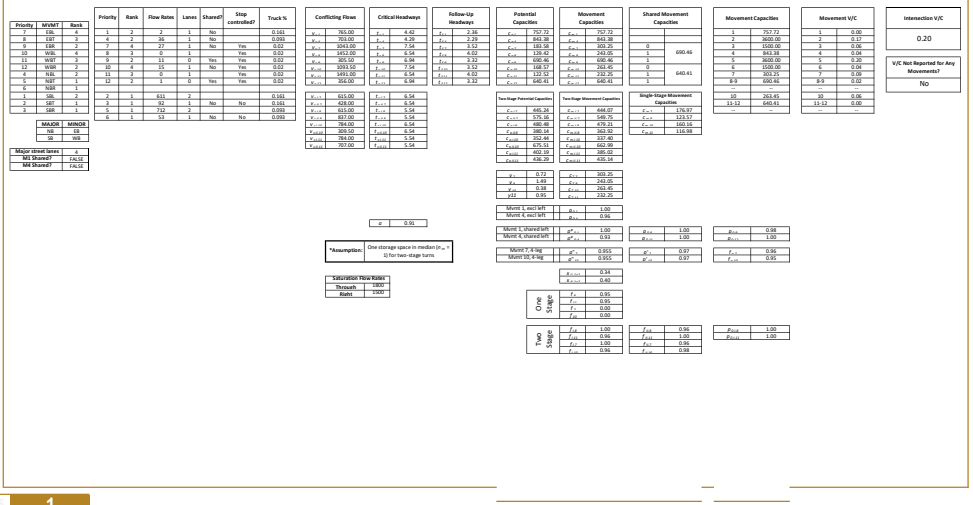
Step 1: Identify which approaches are stop-controlled by selecting "Yes" from the drop-down box.

Step 2: Enter the lane configurations in the yellow cells.



Two-Way Stop Control (TWSC)

HCM 6 CALCULATIONS



Major street lanes	4
MI Shared?	FALSE
MI Shared?	FALSE

Priority	MVMT	Rank
7	EBL	4
8	EBT	3
9	EBR	2
10	WBL	4
11	WBT	3
12	WBR	2
4	NBL	2
5	NBT	1
6	NBR	1
1	SBL	2
2	SBT	1
3	SBR	1

MAJOR	MINOR
NB	EB
SB	WB

Priority	Rank	Flow Rates	Lanes	Shared?	Stop controlled?	Track %
1	2	2	1	No		0.161
4	2	36	1	No		0.093
7	4	27	1	No	Yes	0.02
8	3	0	1		Yes	0.02
9	2	11	0	Yes	Yes	0.02
10	4	15	1	No	Yes	0.02
11	3	0	1		Yes	0.02
12	2	1	0	Yes	Yes	0.02
2	1	611	2			0.161
3	1	32	1	No	No	0.161
5	1	712	2			0.093
6	1	53	1	No	No	0.093

Conflicting Flows		Critical Headways		Follow-Up Headways	
$v_{c,1}$	765.00	$t_{c,1}$	4.42	$t_{f,1}$	2.36
$v_{c,2}$	703.00	$t_{c,2}$	6.39	$t_{f,2}$	2.29
$v_{c,3}$	1043.00	$t_{c,3}$	7.54	$t_{f,3}$	3.52
$v_{c,4}$	1452.00	$t_{c,4}$	6.54	$t_{f,4}$	4.02
$v_{c,5}$	305.50	$t_{c,5}$	6.94	$t_{f,5}$	3.32
$v_{c,6}$	1093.50	$t_{c,6}$	7.54	$t_{f,6}$	3.52
$v_{c,7}$	1491.00	$t_{c,7}$	6.54	$t_{f,7}$	4.02
$v_{c,8}$	356.00	$t_{c,8}$	6.94	$t_{f,8}$	3.32
$v_{c,9}$	615.00	$t_{c,9}$	6.54		
$v_{c,10}$	628.00	$t_{c,10}$	6.54		
$v_{c,11}$	615.00	$t_{c,11}$	5.54		
$v_{c,12}$	837.00	$t_{c,12}$	5.54		
$v_{c,13}$	784.00	$t_{c,13}$	6.54		
$v_{c,14}$	309.00	$t_{c,14}$	6.54		
$v_{c,15}$	784.00	$t_{c,15}$	5.54		
$v_{c,16}$	707.00	$t_{c,16}$	5.54		

Potential Capacities		Movement Capacities		Shared Movement Capacities			Movement Capacities		Movement V/C		Intersection V/C
$c_{p,1}$	757.72	$c_{m,1}$	757.72				1	757.72	1	0.00	0.20
$c_{p,2}$	843.38	$c_{m,2}$	843.38				2	3600.00	2	0.17	
$c_{p,3}$	183.58	$c_{m,3}$	169.35	0			3	1500.00	3	0.06	V/C Not Reported for Any Movements?
$c_{p,4}$	139.42	$c_{m,4}$	243.05	1	690.46		4	843.38	4	0.04	
$c_{p,5}$	690.46	$c_{m,5}$	690.46	1			5	3600.00	5	0.20	No
$c_{p,6}$	168.57	$c_{m,6}$	243.45	0			6	1500.00	6	0.04	
$c_{p,7}$	132.52	$c_{m,7}$	232.35	1	640.41		7	303.35	7	0.09	
$c_{p,8}$	640.41	$c_{m,8}$	640.41	1			8-9	690.46	8-9	0.02	
							---	---	---	---	
							10	263.45	10	0.06	
							11-12	640.41	11-12	0.00	
							---	---	---	---	

Two-Stage Potential Capacities		Two-Stage Movement Capacities		Single-Stage Movement Capacities	
$c_{c,1,1}$	445.26	$c_{m,1,1}$	444.07	$c_{m,1,}$	176.97
$c_{c,1,2}$	575.16	$c_{m,1,2}$	548.75	$c_{m,2,}$	123.57
$c_{c,2,2}$	480.48	$c_{m,2,2}$	475.21	$c_{m,7,}$	160.16
$c_{c,3,3}$	380.14	$c_{m,3,3}$	360.92	$c_{m,8}$	116.98
$c_{c,4,4}$	352.46	$c_{m,4,4}$	337.40		
$c_{c,5,5}$	675.31	$c_{m,5,5}$	662.99		
$c_{c,6,6}$	402.59	$c_{m,6,6}$	385.02		
$c_{c,4,3,3}$	436.29	$c_{m,4,3,3}$	426.14		

$v_{c,1}$	0.72	$c_{c,1}$	269.26
$v_{c,2}$	1.43	$c_{c,2}$	248.85
$v_{c,3}$	0.88	$c_{c,3}$	262.45
$p_{c,2}$	0.93	$c_{c,3,3}$	232.25

Mvmt 1, excl left		$p_{m,1}$	1.00
Mvmt 4, excl left		$p_{m,4}$	0.96
Mvmt 1, shared left		$p^*_{m,1}$	1.00
Mvmt 4, shared left		$p^*_{m,4}$	0.93
Mvmt 7, 4-leg		$p^*_{m,7}$	0.955
Mvmt 10, 4-leg		$p^*_{m,10}$	0.955
		$p_{m,7,3}$	0.94
		$p_{m,10,3}$	0.40

One Stage	$f_{c,}$	0.95	
	$f_{c,}$	0.95	
	$f_{c,}$	0.00	
	$f_{c,8}$	0.00	
Two Stage	$f_{c,1}$	1.00	
	$f_{c,2}$	0.96	
	$f_{c,3}$	1.00	
	$f_{c,4}$	0.96	

	$f_{c,1}$	1.00	
	$f_{c,2}$	1.00	
	$f_{c,3}$	0.96	
	$f_{c,4}$	0.88	

	$p_{c,1,1}$	1.00	
	$p_{c,2,2}$	1.00	
	$p_{c,3,3}$	1.00	

	$f_{c,}$	0.96	
	$f_{c,}$	0.95	

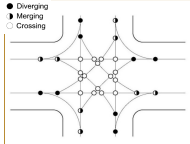
	$p_{c,1,1}$	1.00	
	$p_{c,2,2}$	1.00	

α	0.91

*Assumption:	One storage space in median ($p_{c,x}$ = 1) for two-stage turns

Saturation Flow Rates	
Through	1900
Right	1900

Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	16
Merging	8
Diverging	8
Total	32

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

48

Assumptions

- This worksheet does not use the CLV methodology. The calculations are based on the *HCM, 6th Edition*. The calculations are based on vehicles per hour.

Planning Level Cost

$ $ $ $ **1**

- Cost Category 1
- Assumes no intersection, but cost of new road is not included

VJuST Analysis for Intersection of Route 522 and Site Entrance#4 (PM Peak)

VDOT Junction Screening Tool

Input Worksheet

Project Title:	*Gibson Property*
E-W Facility:	*Site Entrance 4*
N-S Facility:	*Rte. 522*
Date:	*July 10, 2026*

Traffic Volume Demand

Direction	Volume (veh/hr)			Truck Percent (%)
	U-Turn / Left	Through	Right	
Eastbound	94	0	38	2.00%
Westbound	52	0	2	2.00%
Northbound	15	988	21	7.50%
Southbound	1	947	37	5.80%
Adjustment Factor	0.80 / 0.95		0.85	
Suggested	**U - 0.8** / **L - 0.95**		**0.85**	
Truck to PCE Factor		**Suggested = 2.00**		2.00
Critical Lane Volume		1600		

Equivalent Passenger Car Volume

	Volume (pc/hr)			
	U-Turn / Left	Through	Right	Approach
Eastbound	96	0	39	135
Westbound	53	0	2	55
Northbound	16	1062	23	1101
Southbound	1	1002	39	1042

Notes:

Left-turn Adjustment Factor	*Conversion of left-turning vehicles to equivalent through vehicles*
Right-turn Adjustment Factor	*Conversion of right-turning vehicles to equivalent through vehicles*
U-turn Adjustment Factor	*Conversion of U-turning vehicles to equivalent through vehicles*
Truck to PCE Factor	*1 truck = X Passenger Car Equivalents*
Critical Lane Volume Sum Limit	*Saturation value for critical lane volume sum at an intersection*

VDOT Junction Screening Tool

Possible Configurations

Indicate with a "Y" or "N" if each intersection or interchange configuration should or should not be considered. Use the information links for guidance. Then, click the "Show/Hide Configurations button" to hide the worksheets for the configurations that will not be considered.

#	Intersections	Information	Consider?	Justification
	Signalized Intersections			
1	Conventional	-	Y	
2	Bowtie	Link	N	Unable to accommodate magnitude of traffic volumes
3	Center Turn Overpass	Link	N	Not feasible for roadway facility type
4	Continuous Green-T	Link	Y	
5	Echelon	Link	N	Right-of-way restrictions identified
6	Full Displaced Left Turn	Link	N	Right-of-way restrictions identified
7	Median U-Turn	Link	N	Unable to accommodate traffic patterns
8	Partial Displaced Left Turn	Link	N	Unable to accommodate traffic patterns
9	Partial Median U-Turn	Link	N	Unable to accommodate traffic patterns
10	Quadrant Roadway N-E	Link	N	Right-of-way restrictions identified
11	Quadrant Roadway N-W	Link	N	Right-of-way restrictions identified
12	Quadrant Roadway S-E	Link	N	Right-of-way restrictions identified
13	Quadrant Roadway S-W	Link	N	Right-of-way restrictions identified
14	Restricted Crossing U-Turn	Link	Y	
15	Single Loop	Link	N	Right-of-way restrictions identified
16	Split Intersection	Link	N	Right-of-way restrictions identified
17	Thru-Cut	Link	N	
	Unsignalized Intersections			
18	50 Mini Roundabout	Link	N	Not feasible for roadway facility type
19	75 Mini Roundabout	Link	N	Not feasible for roadway facility type
20	Roundabout	Link	N	
21	Two-Way Stop Control	-	Y	
#	**Interchanges**	**Information**	**Consider?**	**Justification**
22	Traditional Diamond	Link	N	Not feasible for roadway facility type
23	Contraflow Left	Link	N	Not feasible for roadway facility type
24	Displaced Left Turn	Link	N	Not feasible for roadway facility type
25	Diverging Diamond	Link	N	Not feasible for roadway facility type
26	Double Roundabout	Link	N	Insufficient intersection spacing
27	Michigan Urban Diamond	Link	N	Not feasible for roadway facility type
28	Partial Cloverleaf	Link	N	Not feasible for roadway facility type
29	Single Point	Link	N	Not feasible for roadway facility type
30	Single Roundabout	Link	N	Not feasible for roadway facility type

VDOT Junction Screening Tool

Directional Questions and Base Lane Configurations

Before entering a base number of through lanes for each direction, answer all applicable directional question for each intersection or interchange configuration selected for consideration. Navigate to the lane configuration worksheet for example diagrams, if provided.

Intersections	Question	Direction
Bowtie	N/A	N/A
Continuous Green-T	Select the direction associated with the "stem" of the T-intersection from the drop-down list. See example diagrams.	EB
Echelon	N/A	N/A
Median U-Turn	N/A	N/A
Partial Displaced Left Turn	N/A	N/A
Partial Median U-Turn	N/A	N/A
Restricted Crossing U-Turn	Select the roadway with the U-turns from the drop-down list.	NB-SB
Single Loop	N/A	N/A
Split Intersection	N/A	N/A
Thru-Cut	N/A	N/A
Interchanges	**Question**	**Direction**
All	N/A	N/A

Base Number of Through Lanes

Enter a base number of through lanes for each direction. The number of through lanes entered will populate on each non-roundabout lane configuration worksheet. This tool also allows the user to enter the number of through lanes on the lane configuration worksheets directly. This base number may be overwritten on individual lane configuration worksheets. Turn lanes, shared lanes, and channelized lanes must still be entered in each lane configuration worksheet.

Eastbound	1
Westbound	1
Northbound	2
Southbound	2

VDOT Junction Screening Tool

Results Worksheet

VJuST
VDOT Junction Screening Tool

General Information	
Project Title:	Gibson Property
EW Facility:	Site Entrance 4
NS Facility:	Rte. 522
Date:	July 10, 2026

Volumes (veh/hr)	U-Turn / Left	Through		Right
Eastbound	94	0	94	38
Westbound	52	0	94	2
Northbound	15	988	94	21
Southbound	1	947	94	37

General Instructions: All intersection and interchange configurations have a default assumption of one exclusive lane per movement. No results shall be interpreted until the user has verified the lane configurations on each worksheet.

Intersection Results

Congestion | Pedestrian | Safety | Planning Level Costs | Notes

Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	Planning Level Cost Category	
Conventional	-	0.40		48	$$	
Continuous Green-T	-	0.39	-	12*	$$	
Restricted Crossing U-Turn	-	0.28		20	$$	
Two-Way Stop Control	-	0.47		48	$	

*The continuous green-T is the only three-legged innovative intersection in this tool. To compare the continuous green-T to other innovative intersections, conflicts corresponding with the fourth leg must be removed. This has been done for the conventional intersection. Conflict point diagrams for three-legged and four-legged conventional intersections have been provided on the conventional intersection worksheet for reference.

Interchange Results						
		Congestion	Pedestrian	Safety	Planning Level Costs	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Traditional Diamond	Weighted Total Conflict Points	Planning Level Cost Category	

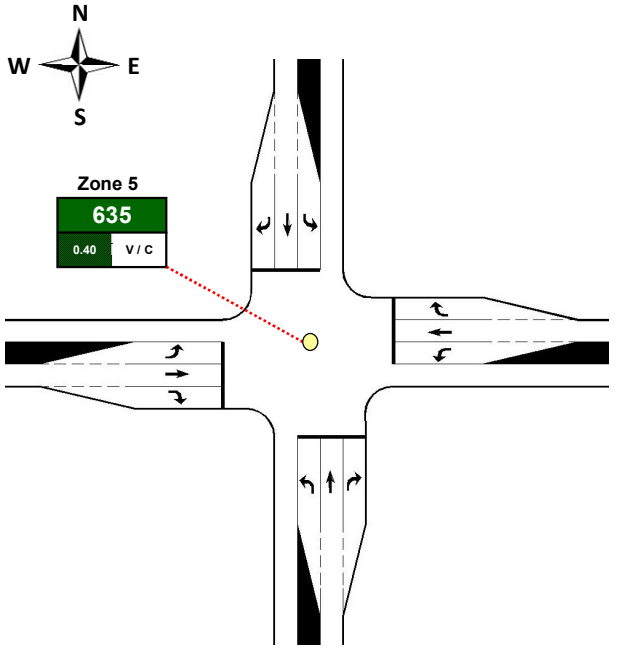
Information	
Congestion	The maximum v/c ratio represents the worst v/c of all zones that make up an intersection.
Pedestrian	Compares the potential of each design to accommodate pedestrians based on safety, wayfinding, and delay. Potential is qualitatively defined as better (+), similar (blank cell), or worse (-) than a conventional intersection or traditional diamond interchange.
Safety	Weighted Total = (2 x Crossing Conflicts) + Merging Conflicts + Diverging Conflicts
Planning Level Costs	Cost category estimates for each intersection/interchange alternative. Some alternatives have choices that affect the resulting cost category (e.g. requirement of a new bridge) that can be configured on the individual input worksheets.

Conventional

DESIGN AND RESULTS

Project Name:	Gibson Property
EW Facility:	Site Entrance 4
NS Facility:	Rte. 522
Date:	July 10, 2026

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:	0.40		

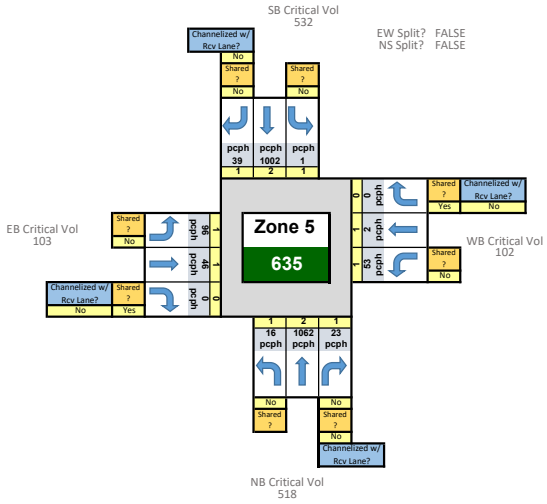


Note: This diagram does not reflect the actual lane configuration of the intersection

Conventional

DATA INPUT AND CONFIGURATION

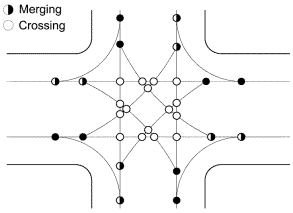
Enter the lane configurations in the yellow cells.



Back to Results

Safety - Conflict Point Diagram

● Diverging
◑ Merging
○ Crossing



Conflict Type	Count
Crossing	16
Merging	8
Diverging	8
Total	32

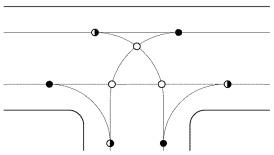
Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

48

Safety - Conflict Point Diagram (Three Legs)

● Diverging
◑ Merging
○ Crossing



Conflict Type	Count
Crossing	3
Merging	3
Diverging	3
Total	9

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

12

Planning Level Cost

$ $ $ $ $ **2**

- Are new lanes and/or pavement needed? **Yes**
- Cost category 1 if no new pavement needed, else cost cateogry 2.
- Assumes existing two-way stop contol or all-way stop control

Continuous Green-T Intersection

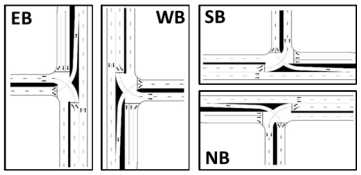
DESIGN AND RESULTS

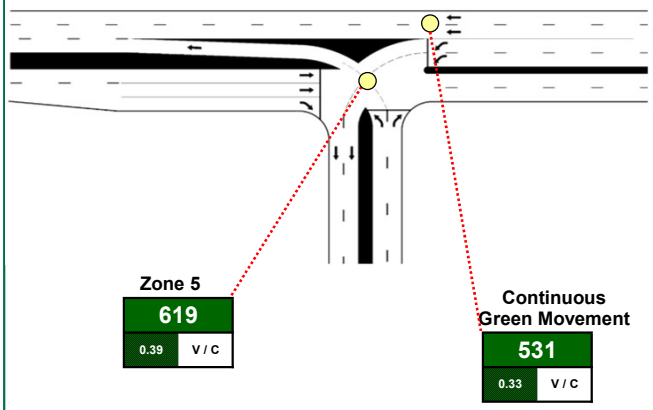
Project Name:	Gibson Property
EW Facility:	Site Entrance 4
NS Facility:	Rte. 522
Date:	July 10, 2026

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:	0.39		

E N S W

North arrow directions will appear once the directional question has been answered on the **Input Worksheet**.



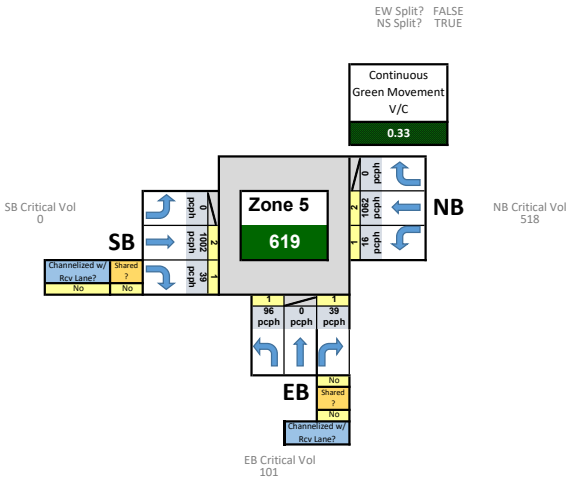


Note: This diagram does not reflect the actual lane configuration of the intersection

Continuous Green-T Intersection

DATA INPUT AND CONFIGURATION

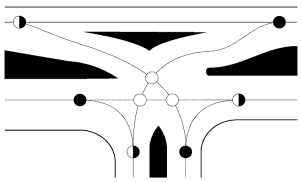
Step 1: Enter the lane configurations in the yellow cells.



Back to Results

Safety - Conflict Point Diagram

Diverging
Merging
Crossing



Conflict Type	Count
Crossing	3
Merging	3
Diverging	3
Total	**9**

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

12

Planning Level Cost

$ $ $ $ $ **2**

- Cost Category 2
- Assumes conversion from conventional signal.

Restricted Crossing U-Turn (RCUT) Intersection

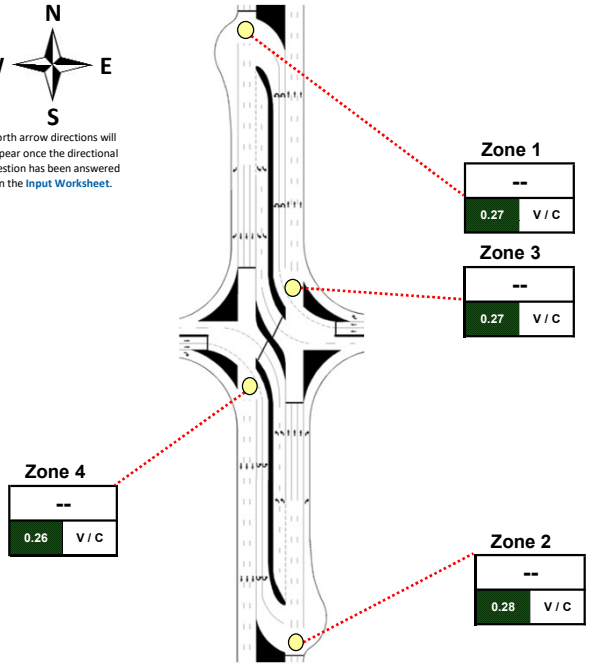
DESIGN AND RESULTS

Project Name:	Gibson Property
EW Facility:	Site Entrance 4
NS Facility:	Rte. 522
Date:	July 10, 2026

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:	0.28		

N W E S

North arrow directions will appear once the directional question has been answered on the **Input Worksheet**.

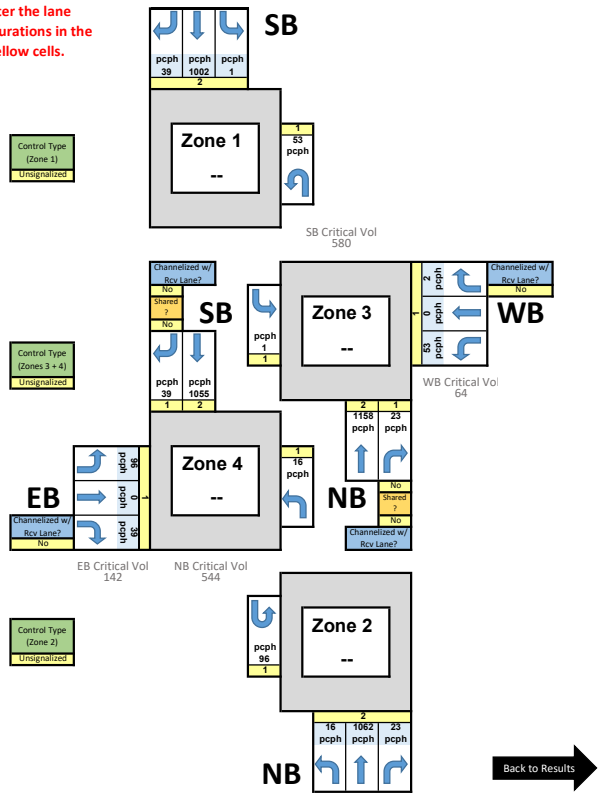


Note: This diagram does not reflect the actual lane configuration of the intersection

Restricted Crossing U-Turn (RCUT) Intersection

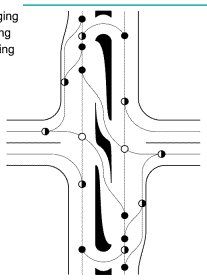
DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Safety - Conflict Point Diagram

Diverging
Merging
Crossing



Conflict Type	Count
Crossing	2
Merging	8
Diverging	8
Total	18

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

20

Assumptions

- This worksheet uses the CLV methodology for calculations at signalized zones. These calculations are based on passenger cars per hour.
- This worksheet uses the *HCM, 6th Edition* methodology for calculations at unsignalized zones. These calculations are based on vehicles per hour.

Planning Level Cost

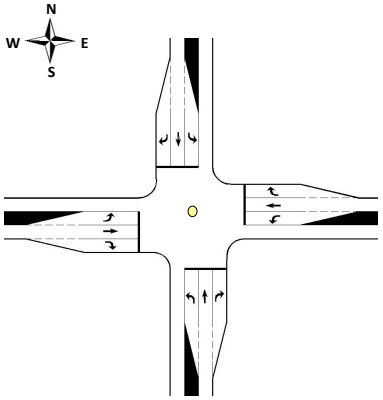
$ $ $ $ $ **2**

- Cost Category 3
- Assumes conversion from conventional signal.

Two-Way Stop Control (TWSC)

DESIGN AND RESULTS

		Critical Lane Volume Sum			
Project Name:	Gibson Property	< 1200	1200 - 1399	1400 - 1599	≥ 1600
EW Facility:	Site Entrance 4				
NS Facility:	Rte. 522	VOLUME / CAPACITY RATIO:	0.47		
Date:	July 10, 2026				



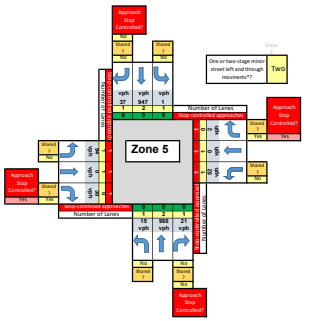
Note: This diagram does not reflect the actual lane configuration of the intersection

Two-Way Stop Control (TWSC)

DATA INPUT AND CONFIGURATION

Step 1: Identify which approaches are stop-controlled by selecting "Yes" from the drop-down box.

Step 2: Enter the lane configurations in the yellow cells.



Two-Way Stop Control (TWSC)

HCM 6 CALCULATIONS

Priority	MVMT	Rank
7	EBL	4
8	EBT	3
9	EBR	2
10	WBL	4
11	WBT	3
12	WBR	2
4	NBL	2
5	NBT	1
6	NBR	1
1	SBL	2
2	SBT	1
3	SBR	1

MAJOR	MINOR
NB	EB
SB	WB

Major street lanes	4
NB Shared?	FALSE
SB Shared?	FALSE

Priority	Rank	Flow Rates	Lanes	Shared?	Stop controlled?	Truck %
1	2	1	1	No		0.058
4	2	15	1	No		0.075
7	4	94	1	No	Yes	0.02
8	3	0	1		Yes	0.02
9	2	38	0	Yes	Yes	0.02
10	4	52	1	No	Yes	0.02
11	3	0	1		Yes	0.02
12	2	2	0	Yes	Yes	0.02
2	1	947	2			0.058
3	1	37	1	No	No	0.058
5	1	988	2			0.075
6	1	21	1	No	No	0.075

Conflicting Flows		Critical Headways		Follow-Up Headways	
$v_{c,1}$	1009.00	$t_{c,1}$	4.22	$t_{f,1}$	2.26
$v_{c,2}$	984.00	$t_{c,2}$	6.25	$t_{f,2}$	2.28
$v_{c,3}$	1473.00	$t_{c,3}$	7.54	$t_{f,3}$	3.52
$v_{c,4}$	1988.00	$t_{c,4}$	6.54	$t_{f,4}$	4.02
$v_{c,5}$	473.50	$t_{c,5}$	6.94	$t_{f,5}$	3.32
$v_{c,6}$	1493.50	$t_{c,6}$	7.54	$t_{f,6}$	3.52
$v_{c,7}$	2004.00	$t_{c,7}$	6.54	$t_{f,7}$	4.02
$v_{c,8}$	494.00	$t_{c,8}$	6.94	$t_{f,8}$	3.32
$v_{c,9}$	949.00	$t_{c,9}$	6.54		
$v_{c,10}$	524.00	$t_{c,10}$	6.54		
$v_{c,11}$	949.00	$t_{c,11}$	5.54		
$v_{c,12}$	1018.00	$t_{c,12}$	5.54		
$v_{c,CV}$	1018.00	$t_{c,CV}$	6.54		
$v_{pt,1}$	475.50	$t_{c,pt1}$	6.54		
$v_{pt,2}$	1018.00	$t_{c,pt2}$	5.54		
$v_{pt,CV}$	986.00	$t_{c,pt,CV}$	5.54		

Potential Capacities		Movement Capacities		Shared Movement Capacities		Movement Capacities		Movement V/C	
$c_{p,1}$	660.08	$c_{m,1}$	660.08			1	660.08	1	0.00
$c_{p,2}$	665.07	$c_{m,2}$	665.07			2	3600.00	2	0.26
$c_{p,3}$	88.26	$c_{m,3}$	198.97	0		3	1500.00	3	0.02
$c_{p,4}$	60.24	$c_{m,4}$	170.99	1	537.18	4	665.07	4	0.02
$c_{p,5}$	537.18	$c_{m,5}$	537.18	1		5	3600.00	5	0.27
$c_{p,6}$	85.20	$c_{m,6}$	180.72	0		6	1500.00	6	0.01
$c_{p,7}$	58.86	$c_{m,7}$	166.40	1	520.90	7	198.97	7	0.47
$c_{p,8}$	520.90	$c_{m,8}$	520.90	1		8-9	537.18	8-9	0.07
						---	---	---	---
						10	180.72	10	0.29
						11-12	520.90	11-12	0.00
						---	---	---	---

Intersection V/C
0.47

V/C Not Reported for Any Movements?
No

Two-Stage Potential Capacities		Two-Stage Movement Capacities		Single-Stage Movement Capacities	
$c_{c,1,1}$	279.55	$c_{m,1,1}$	279.55	$c_{m,7}$	86.31
$c_{c,1,2}$	104.50	$c_{m,1,2}$	491.22	$c_{m,8}$	58.79
$c_{c,2,1}$	337.16	$c_{m,2,1}$	336.63	$c_{m,9}$	77.72
$c_{pt,1,1}$	185.86	$c_{m,pt,1,1}$	298.96	$c_{m,10}$	57.44
$c_{pt,1,2}$	254.07	$c_{m,pt,1,2}$	248.34		
$c_{pt,2,1}$	539.09	$c_{m,pt,2,1}$	500.59		
$c_{pt,2,2}$	312.55	$c_{m,pt,2,2}$	305.86		
$c_{pt,CV,1}$	322.94	$c_{m,pt,CV,1}$	319.45		

$v_{c,1}$	0.48	$c_{m,1}$	198.07
$v_{c,2}$	1.55	$c_{m,2}$	170.99
$v_{c,3}$	0.43	$c_{m,3}$	180.72
p_{CV}	0.93	$c_{m,4}$	166.40

Mvmt 1, excl left		$p_{m,1}$	1.00
Mvmt 4, excl left		$p_{m,4}$	0.98
Mvmt 1, shared left		$p^*_{m,1}$	1.00
Mvmt 4, shared left		$p^*_{m,4}$	0.95
Mvmt 7, 4-leg		$p^*_{m,7}$	0.976
Mvmt 10, 4-leg		$p^*_{m,10}$	0.976

		$p_{m,7}$	1.00
		$p_{m,8}$	1.00
		$p^*_{m,7}$	0.98
		$p^*_{m,10}$	0.98

		$p_{m,9}$	0.93
		$p_{m,10}$	1.00
		$f_{c,7}$	0.98
		$f_{c,10}$	0.91

	$p_{m,13}$	0.53	
	$p_{m,14}$	0.55	
One Stage	$f_{c,1}$	0.98	
	$f_{c,2}$	0.98	
	$f_{c,3}$	0.00	
	$f_{pt,1}$	0.00	
Two Stage	$f_{c,1,1}$	1.00	
	$f_{c,1,2}$	0.98	
	$f_{c,2,1}$	1.00	
	$f_{c,2,2}$	0.98	

		$f_{c,1,1}$	0.98
		$f_{c,1,2}$	1.00
		$f_{c,2,1}$	0.97
		$f_{c,2,2}$	0.93

		$p_{m,1,1}$	1.00
		$p_{m,2,1}$	1.00

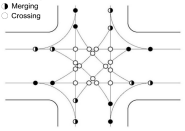
α	0.91

***Assumption:** One storage space in median ($p_{m,3}$ = 1) for two-stage turns

Saturation Flow Rates	
Through	1900
Right	1900

Safety - Conflict Point Diagram

- Diverging
- Merging
- Crossing



Conflict Type	Count
Crossing	16
Merging	8
Diverging	8
Total	32

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points
48

Assumptions

- This worksheet does not use the CLV methodology. The calculations are based on the *HCM, 6th Edition*. The calculations are based on vehicles per hour.

Planning Level Cost

$ $ $ $ 1

- Cost Category 1
- Assumes no intersection, but cost of new road is not included

RCUT Analysis - Synchro Report

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	38	0	0	16	36	739	53	2	626	92
Future Vol, veh/h	0	0	38	0	0	16	36	739	53	2	626	92
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	300	-	150	300	-	150
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	41	0	0	17	39	803	58	2	680	100

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	340	-	-	402	780	0	0	861	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	0	0	656	0	0	598	833	-	-	776	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	656	-	-	598	833	-	-	776	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.9	11.2	0.4	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	833	-	-	656	598	776	-	-
HCM Lane V/C Ratio	0.047	-	-	0.063	0.029	0.003	-	-
HCM Control Delay (s)	9.5	-	-	10.9	11.2	9.7	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.2	0.1	0	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Vol, veh/h	2	5	15	734	6	17	703
Future Vol, veh/h	2	5	15	734	6	17	703
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	-	None	-	None
Storage Length	0	50	310	-	150	300	-
Veh in Median Storage, #	1	-	-	0	-	-	0
Grade, %	0	-	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	2	5	16	798	7	18	764

Major/Minor	Minor1		Major1			Major2	
Conflicting Flow All	1248	399	764	0	0	805	0
Stage 1	830	-	-	-	-	-	-
Stage 2	418	-	-	-	-	-	-
Critical Hdwy	6.84	6.94	6.44	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.52	-	-	2.22	-
Pot Cap-1 Maneuver	165	601	470	-	-	815	-
Stage 1	388	-	-	-	-	-	-
Stage 2	632	-	-	-	-	-	-
Platoon blocked, %				-	-		-
Mov Cap-1 Maneuver	156	601	470	-	-	815	-
Mov Cap-2 Maneuver	276	-	-	-	-	-	-
Stage 1	375	-	-	-	-	-	-
Stage 2	618	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13	0.3	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBU	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	470	-	-	276	601	815	-
HCM Lane V/C Ratio	0.035	-	-	0.008	0.009	0.023	-
HCM Control Delay (s)	12.9	-	-	18.1	11	9.5	-
HCM Lane LOS	B	-	-	C	B	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	0	0.1	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	5	0	5	5	0	5	5	791	5	27	5	627	5
Future Vol, veh/h	5	0	5	5	0	5	5	791	5	27	5	627	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	-	285	-	150	-	260	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	0	5	5	0	5	5	860	5	29	5	682	5

Major/Minor	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	1193	1628	344	1279	1625	430	687	0	0	860	865	0	0
Stage 1	753	753	-	870	870	-	-	-	-	-	-	-	-
Stage 2	440	875	-	409	755	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	6.44	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.52	2.22	-	-
Pot Cap-1 Maneuver	142	101	652	123	101	573	903	-	-	408	774	-	-
Stage 1	368	416	-	313	367	-	-	-	-	-	-	-	-
Stage 2	566	365	-	590	415	-	-	-	-	-	-	-	-
Platoon blocked, %								-	-			-	-
Mov Cap-1 Maneuver	131	92	652	114	92	573	903	-	-	437	437	-	-
Mov Cap-2 Maneuver	254	203	-	226	211	-	-	-	-	-	-	-	-
Stage 1	366	383	-	311	365	-	-	-	-	-	-	-	-
Stage 2	558	363	-	538	382	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.1	16.5	0.1	0.7
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	903	-	-	366	324	437	-	-
HCM Lane V/C Ratio	0.006	-	-	0.03	0.034	0.08	-	-
HCM Control Delay (s)	9	-	-	15.1	16.5	14	-	-
HCM Lane LOS	A	-	-	C	C	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0.3	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	132	0	0	54	15	1082	21	1	999	37
Future Vol, veh/h	0	0	132	0	0	54	15	1082	21	1	999	37
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	300	-	150	300	-	150
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	143	0	0	59	16	1176	23	1	1086	40

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	543	-	-	588	1126	0	0	1199	0	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	0	0	484	0	0	452	616	-	-	578	-	-
Stage 1	0	0	-	0	0	-	-	-	-	-	-	-
Stage 2	0	0	-	0	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	484	-	-	452	616	-	-	578	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.5	14.2	0.1	0
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	616	-	-	484	452	578	-	-
HCM Lane V/C Ratio	0.026	-	-	0.296	0.13	0.002	-	-
HCM Control Delay (s)	11	-	-	15.5	14.2	11.2	-	-
HCM Lane LOS	B	-	-	C	B	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	1.2	0.4	0	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Vol, veh/h	6	17	52	1082	2	7	979
Future Vol, veh/h	6	17	52	1082	2	7	979
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free	Free
RT Channelized	-	None	-	-	None	-	None
Storage Length	0	50	310	-	150	300	-
Veh in Median Storage, #	1	-	-	0	-	-	0
Grade, %	0	-	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	7	18	57	1176	2	8	1064

Major/Minor	Minor1		Major1			Major2	
Conflicting Flow All	1838	588	1064	0	0	1178	0
Stage 1	1290	-	-	-	-	-	-
Stage 2	548	-	-	-	-	-	-
Critical Hdwy	6.84	6.94	6.44	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.52	-	-	2.22	-
Pot Cap-1 Maneuver	67	452	302	-	-	589	-
Stage 1	222	-	-	-	-	-	-
Stage 2	543	-	-	-	-	-	-
Platoon blocked, %				-	-		-
Mov Cap-1 Maneuver	54	452	302	-	-	589	-
Mov Cap-2 Maneuver	138	-	-	-	-	-	-
Stage 1	180	-	-	-	-	-	-
Stage 2	535	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.3	0.9	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBU	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	302	-	-	138	452	589	-
HCM Lane V/C Ratio	0.187	-	-	0.047	0.041	0.013	-
HCM Control Delay (s)	19.6	-	-	32.4	13.3	11.2	-
HCM Lane LOS	C	-	-	D	B	B	-
HCM 95th %tile Q(veh)	0.7	-	-	0.1	0.1	0	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	5	0	5	5	0	5	5	1014	5	94	5	1027	5
Future Vol, veh/h	5	0	5	5	0	5	5	1014	5	94	5	1027	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	-	285	-	150	-	260	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	0	5	5	0	5	5	1102	5	102	5	1116	5

Major/Minor	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	1894	2450	561	1884	2447	551	1121	0	0	1102	1107	0	0
Stage 1	1333	1333	-	1112	1112	-	-	-	-	-	-	-	-
Stage 2	561	1117	-	772	1335	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	6.44	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.52	2.22	-	-
Pot Cap-1 Maneuver	43	31	471	43	31	478	619	-	-	285	626	-	-
Stage 1	162	221	-	223	282	-	-	-	-	-	-	-	-
Stage 2	480	281	-	358	221	-	-	-	-	-	-	-	-
Platoon blocked, %								-	-			-	-
Mov Cap-1 Maneuver	30	19	471	30	19	478	619	-	-	290	290	-	-
Mov Cap-2 Maneuver	113	79	-	114	90	-	-	-	-	-	-	-	-
Stage 1	161	139	-	221	280	-	-	-	-	-	-	-	-
Stage 2	471	279	-	222	139	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	26	25.8	0.1	2.1
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	619	-	-	182	184	290	-	-
HCM Lane V/C Ratio	0.009	-	-	0.06	0.059	0.371	-	-
HCM Control Delay (s)	10.9	-	-	26	25.8	24.6	-	-
HCM Lane LOS	B	-	-	D	D	C	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.2	1.6	-	-

K. Turn Lane Warrant Tables and Graphics

Left Turn Lane Warrant Assessment

Two-Lane Highways

Based on AASHTO / VDOT RDM Appendix F

Background:

Warrants for left-turn storage lanes on two-lane highways at unsignalized intersections are based on Figure 3-4 to Figure 3-21 in Appendix F of the Virginia Department of Transportation's (VDOT) ***Road Design Manual*** (RDM). The figures provide a graphical representation for determining the necessity of a left turn lane by comparing the advancing volumes of a given approach and the respective opposing volumes and are differentiated by design speed and percent left turning volume.

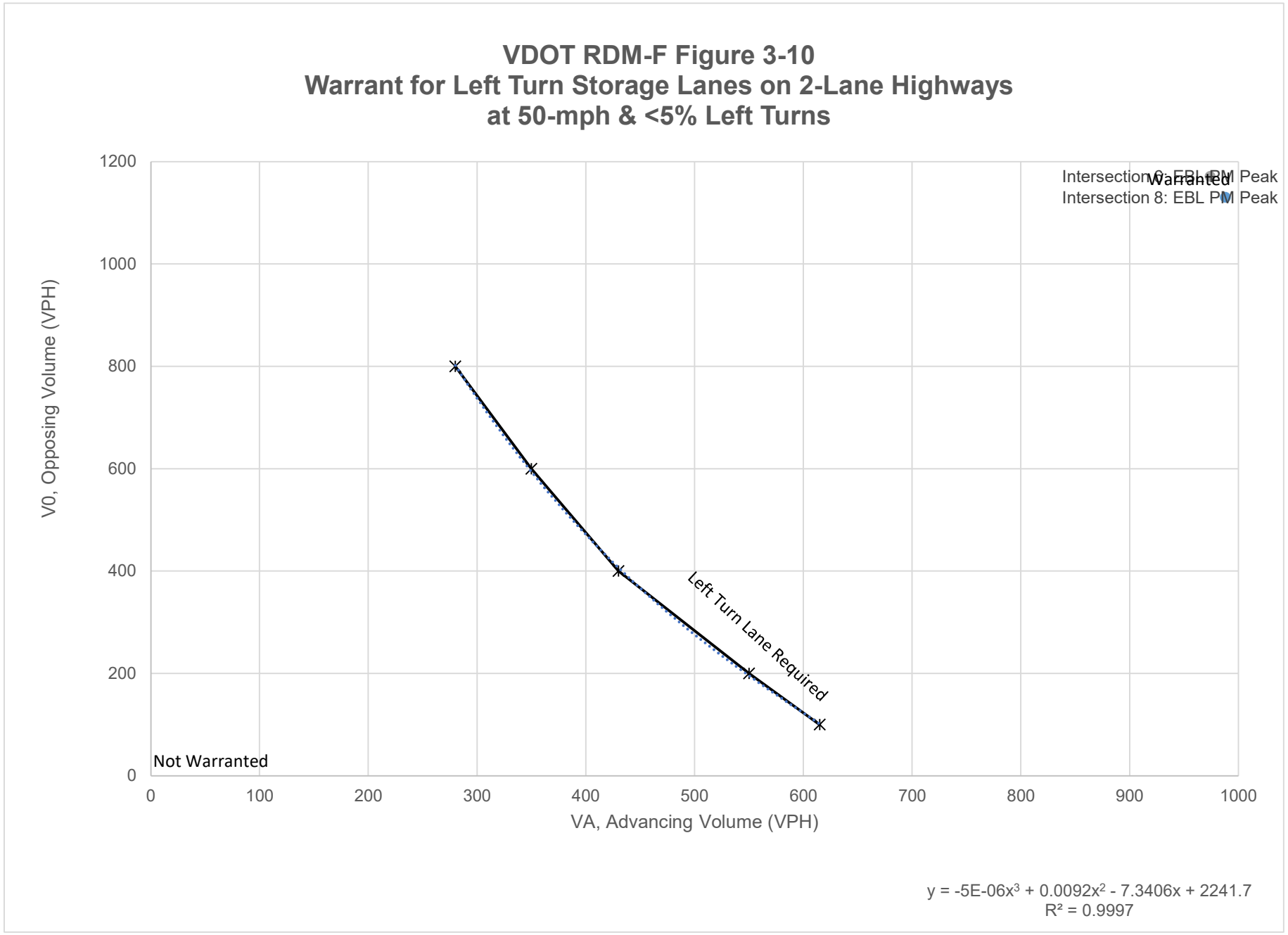
Project Information:

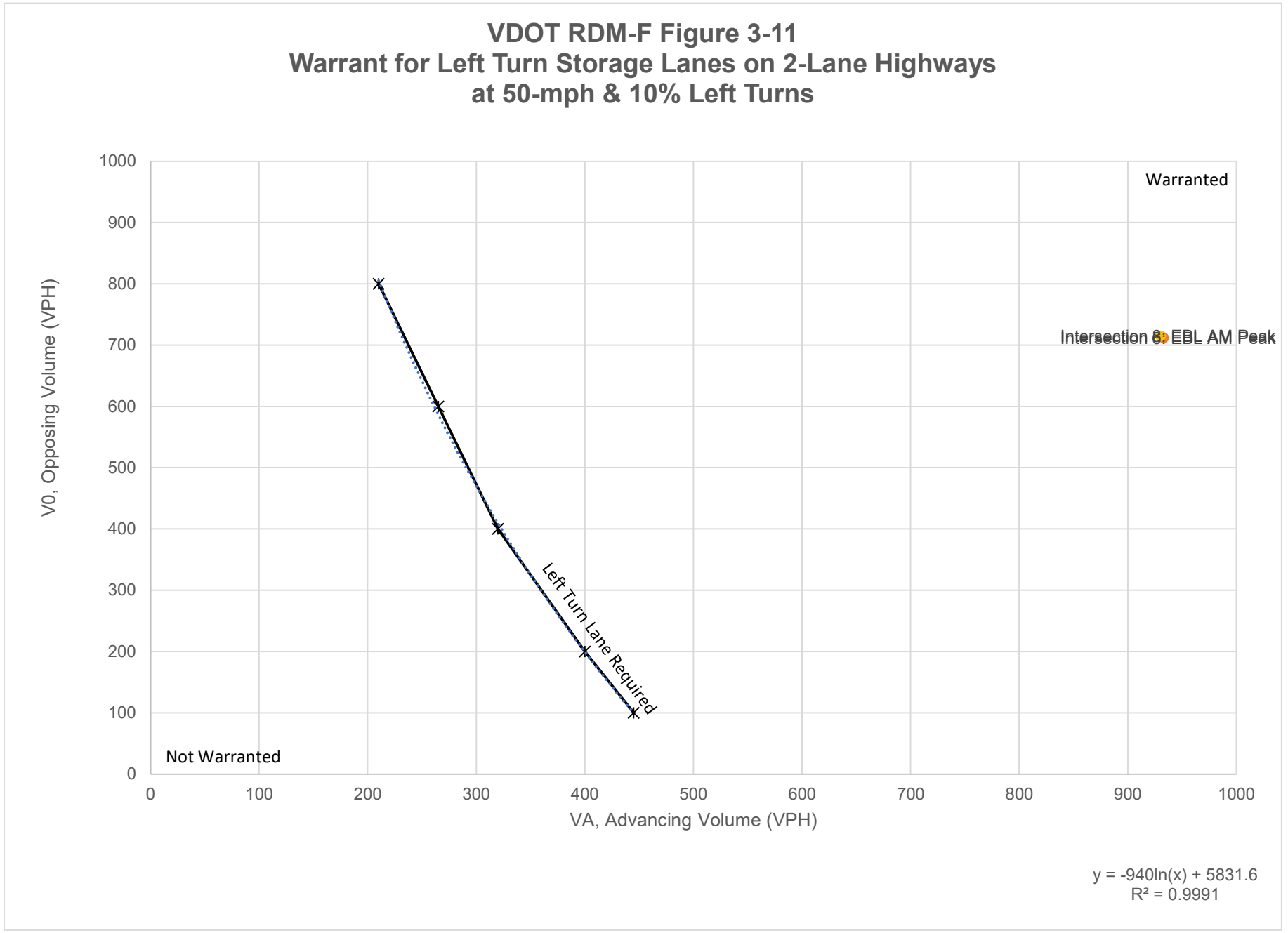
Project:	Gibson Property TIA
Project ID:	
Intersection(s) and Movement(s):	Intersection 6: Madison Site Entrance/Gibson Site Entrance 1 (N/S) & Fairfax Pike (E/W) Intersection 8: Fairfax Pike (S) & Gibson Site Entrance 3 (E/W)
Scenario:	2035 Future Conditions with Development
Analysis:	Gorove Slade

Design Speed (mph):	**50**	**(40, 50, or 60?)**

Assessment Summary:

Input				VDOT Calculated Thesholds			
Study Scenario	**Opposing Vol. (VPH)**	**Advancing Vol. (VPH)**	**Left Turn Vol. (VPH)**	**Left Turn %**	**Minimum Opposing Threshold (VPH)**	**VDOT RDM F Figure**	**Treatment**
Intersection 6: EBL AM Peak	712	933	81	8.68%	0	Fig. 3-11	Full-width Lane and Taper Warranted
Intersection 6: EBL PM Peak	1,171	974	33	3.39%	0	Fig. 3-10	Full-width Lane and Taper Warranted
Intersection 8: EBL AM Peak	715	930	48	5.16%	0	Fig. 3-11	Full-width Lane and Taper Warranted
Intersection 8: EBL PM Peak	1,130	988	19	1.92%	0	Fig. 3-10	Full-width Lane and Taper Warranted


VDOT RDM-F Figure 3-10
Warrant for Left Turn Storage Lanes on 2-Lane Highways
at 50-mph & <5% Left Turns
V0, Opposing Volume (VPH)
VA, Advancing Volume (VPH)
0
200
400
600
800
1000
1200
0
100
200
300
400
500
600
700
800
900
1000
Intersection 8: EBL PM Peak
Warranted
Left Turn Lane Required
Not Warranted
y = -5E-06x³ + 0.0092x² - 7.3406x + 2241.7
R² = 0.9997


VDOT RDM-F Figure 3-11
Warrant for Left Turn Storage Lanes on 2-Lane Highways
at 50-mph & 10% Left Turns
V0, Opposing Volume (VPH)
VA, Advancing Volume (VPH)
Warranted
Not Warranted
Left Turn Lane Required
Intersection 8: EBL AM Peak
y = -940ln(x) + 5831.6
R² = 0.9991
0
100
200
300
400
500
600
700
800
900
1000

Left Turn Lane Warrant Assessment

Four-Lane Highways

Background:

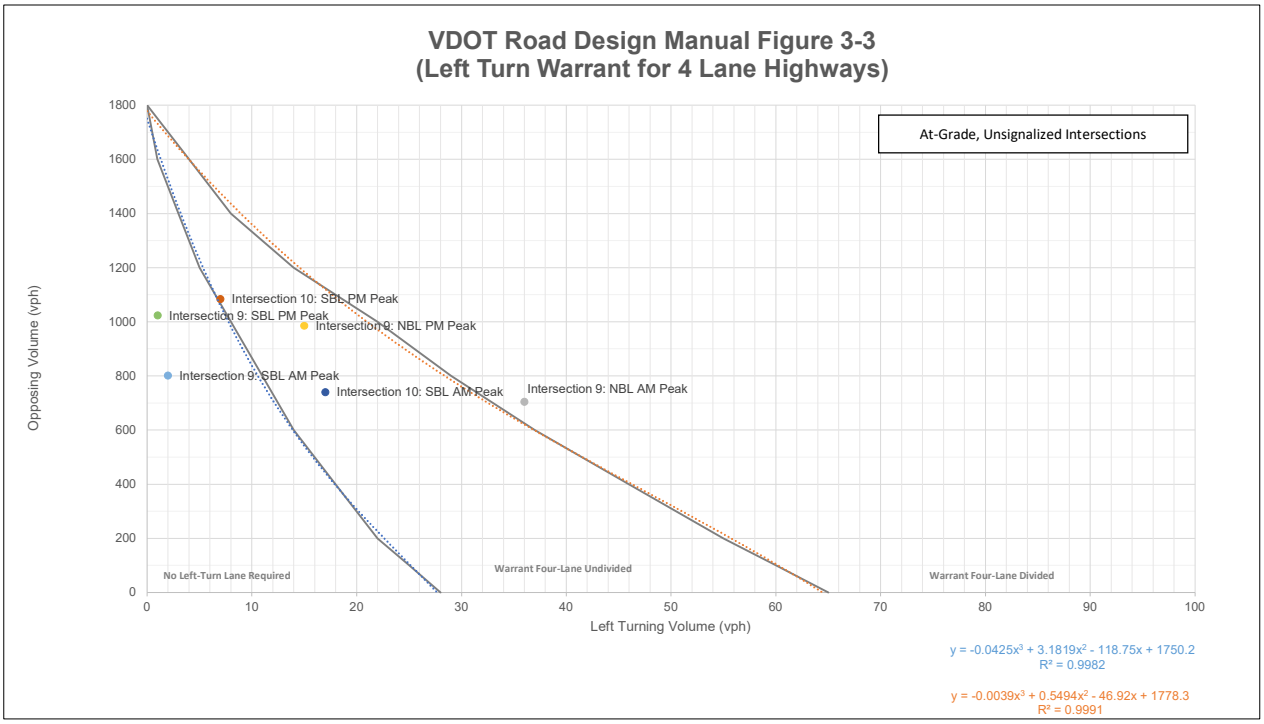
Warrants for left-turn storage lanes on four-lane highways at unsignalized intersections are based on Figure 3-3 in Appendix F of the Virginia Department of Transportation's (VDOT) ***Road Design Manual*** (RDM). The figure provides a graphical representation for determining the necessity of a left turn lane for divided and undivided roadway conditions by comparing the left turning volumes of a given approach and the respective opposing traffic volume.

Project Information:

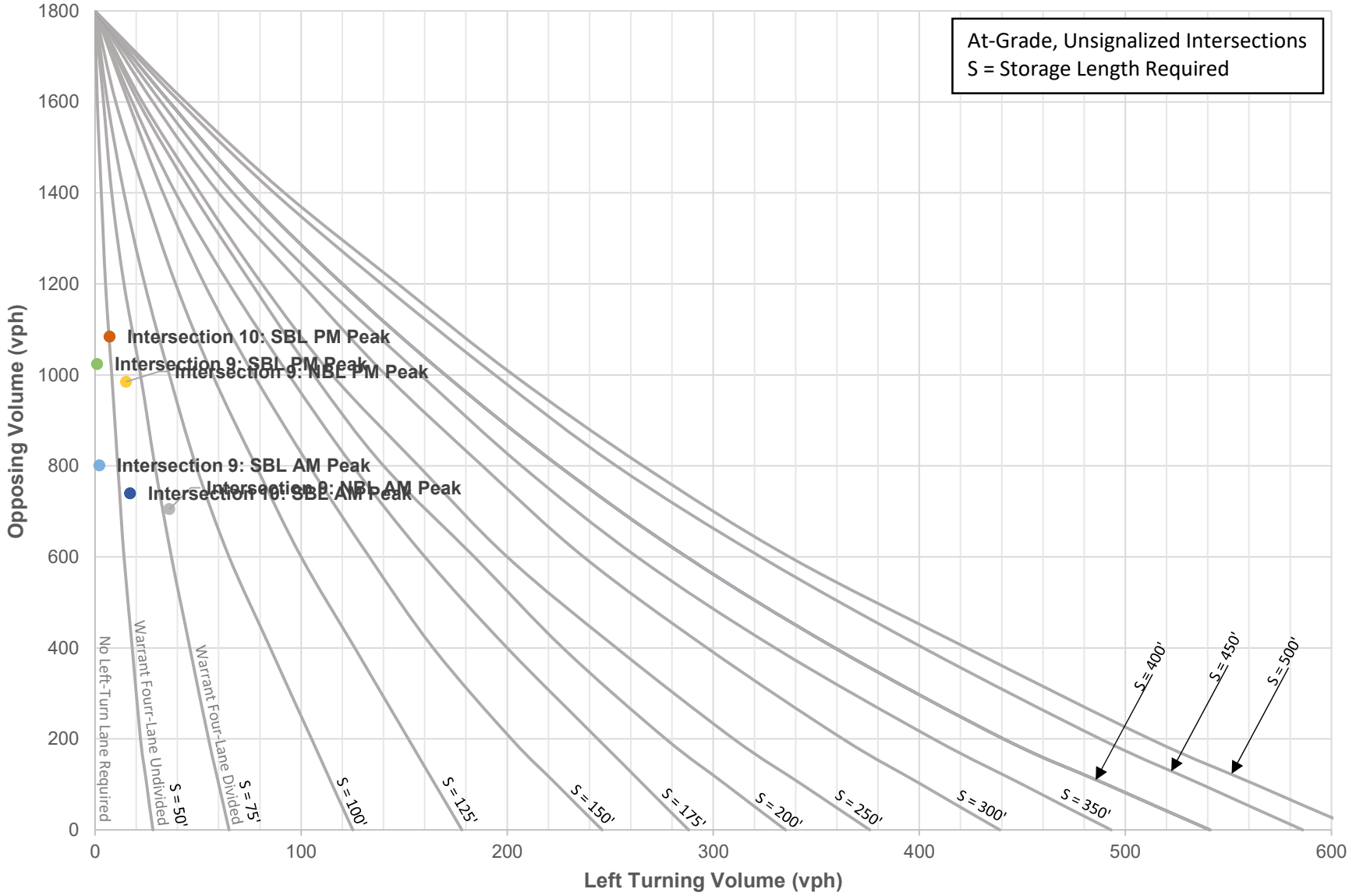
Project:	Gibson Property TIA
Project ID:	
Intersection(s) and Movement(s):	Intersection 9: Route 522 (N/S) & Gibson Site Entrance 4/Gibson Site Entrance 5 (E/W)
	Intersection 10: Route 522 (N/S) & Gibson Site Entrance 6 (W)
Scenario:	2035 Total Future
Analysis:	Gorove Slade

Assessment Summary:

Input					Result	
Study Scenario	**Median**	**Opposing Vol. (VPH)**	**Advancing Vol. (VPH)**	**Left Turning Vol. (VPH)**	**Left Turn %**	**Treatment**
Intersection 9: NBL AM Peak	Divided	705	801	36	4.5%	Full-width Turn Lane and Taper Warranted (for Undivided and Divided)
Intersection 9: NBL PM Peak	Divided	985	1,024	15	1.5%	Not Warranted
Intersection 9: SBL AM Peak	Divided	801	705	2	0.3%	Not Warranted
Intersection 9: SBL PM Peak	Divided	1,024	985	1	0.1%	Not Warranted
Intersection 10: SBL AM Peak	Divided	740	720	17	2.4%	Not Warranted
Intersection 10: SBL PM Peak	Divided	1,084	986	7	0.7%	Not Warranted



VDOT Road Design Manual Figure 3-3
(Left Turn Warrant for 4 Lane Highways)



Right Turn Lane Warrant Assessment

Two-Lane Highways

Based on NCHRP Report 279 / VDOT RDM Appendix F
"Intersection Channelization Guide"

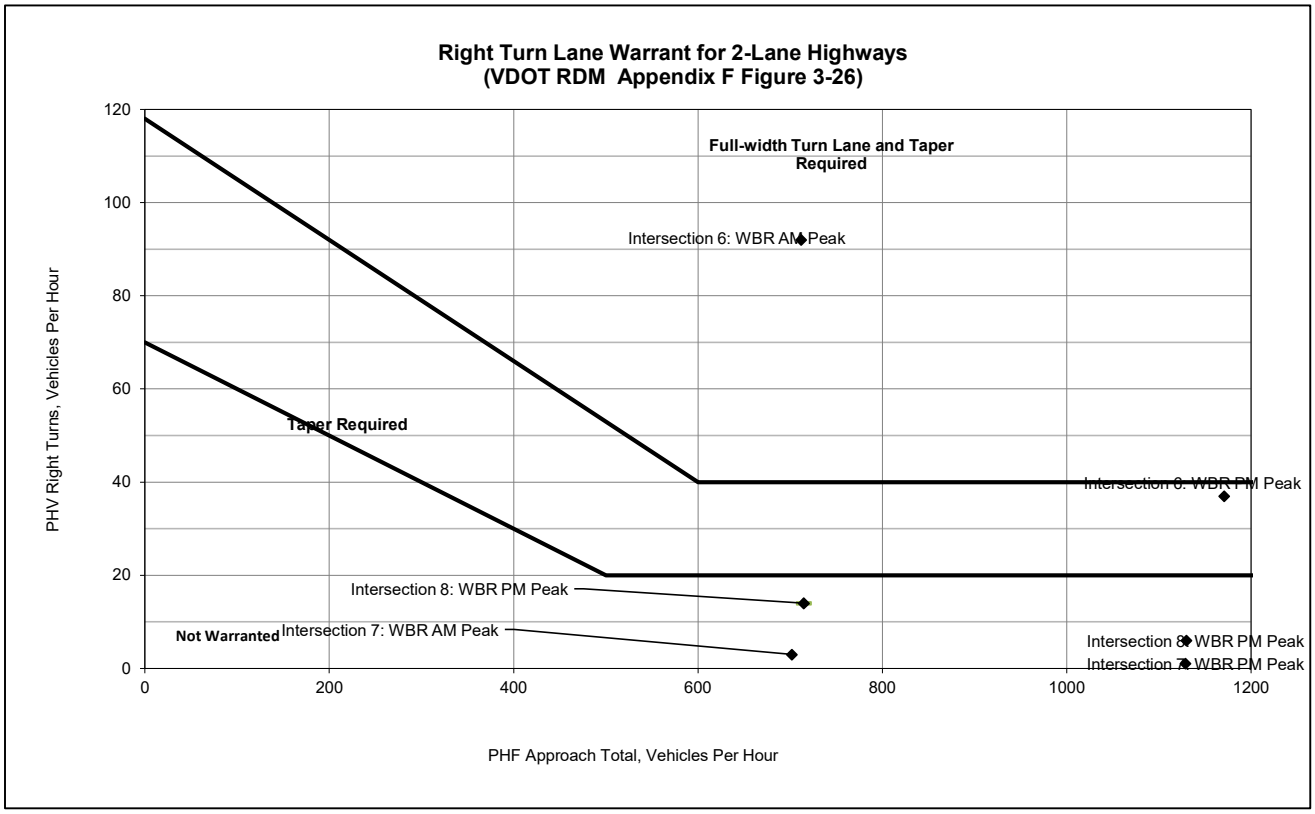
Background:

Warrants for right-turn storage lanes on two-lane highways at unsignalized intersections are based on Figure 3-26 in Appendix F of the Virginia Department of Transportation's (VDOT) ***Road Design Manual*** (RDM). This figure provides a graphical representation for determining the necessity of a right turn lane and / or taper by comparing the total volumes of a given approach with their respective right turn volumes.

Project Information:

Project:	Gibson Property TIA
Project ID:	
Intersection(s) and Movement(s):	Intersection 6: Madison Site Entrance/Gibson Site Entrance 1 (N/S) & Fairfax Pike (E/W)
	Intersection 7: Fairfax Pike (S) & Gibson Site Entrance 2 (E/W)
	Intersection 8: Fairfax Pike (S) & Gibson Site Entrance 3 (E/W)
Scenario:	2035 Total Future
Analyst:	Gorove Slade

Study Scenario	Approach Volume	Right Turn Volume	Minimum Right Turn Taper Threshold	Minimum Right Turn Full Lane Threshold	Treatment
Intersection 6: WBR AM Peak	712	92	20	40	Full-width Lane and Taper Required
Intersection 6: WBR PM Peak	1,171	37	20	40	Taper Required
Intersection 7: WBR AM Peak	702	3	20	40	Not Warranted
Intersection 7: WBR PM Peak	1,129	1	20	40	Not Warranted
Intersection 8: WBR AM Peak	715	14	20	40	Not Warranted
Intersection 8: WBR PM Peak	1,130	6	20	40	Not Warranted



Right Turn Lane Warrant Assessment

Four-Lane Highways

Based on NCHRP Report 279 / VDOT RDM Appendix F
"Intersection Channelization Guide"

Background:

Warrants for right-turn storage lanes on four-lane highways at unsignalized intersections are based on Figure 3-27 in Appendix F of the Virginia Department of Transportation's (VDOT) ***Road Design Manual*** (RDM). This figure provides a graphical representation for determining the necessity of a right turn lane and / or taper by comparing the total volumes of a given approach with their respective right turn volumes.

Project Information:

Project:	
Project ID:	
Intersection(s) and Movement(s):	Intersection 9: Route 522 (N/S) & Gibson Site Entrance 4/Gibson Site Entrance 5 (E/W)
	Intersection 10: Route 522 (N/S) & Gibson Site Entrance 6 (W)
Scenario:	2035 Total Future
Analyst:	Gorove Slade

Study Scenario	Approach Volume	Right Turn Volume	Minimum Right Turn Taper Threshold	Minimum Right Turn Full Lane Threshold	Treatment
Intersection 9: NBR AM Peak	801	53	16	69	Taper Required
Intersection 9: NBR PM Peak	1,024	21	10	53	Taper Required
Intersection 9: SBR AM Peak	705	92	19	75	Full-width Lane and Taper Required
Intersection 9: SBR PM Peak	985	37	10	55	Taper Required
Intersection 10: NBR AM Peak	740	6	18	73	Not Warranted
Intersection 10: NBR AM Peak	1,084	2	10	48	Not Warranted