
Appendix H: Traffic Impact Study

Traffic Impact Study

Manassas Regional Airport
Proposed Part 139
Certification and Terminal
Redevelopment Project
Environmental Assessment



Swans Engineering
PLLC

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2026



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1. Introduction

Manassas Regional Airport (HEF or “Airport”) is in northern Virginia within the City of Manassas (“City”) and Prince William County. The Airport is owned by the City of Manassas and is operated and managed by the Manassas Regional Airport Commission. HEF is a general aviation (GA) airport and serves a variety of GA operations including single-engine light aircraft used for training and corporate jet aircraft. The Airport previously provided commercial service between 1971 and 1986 but does not currently have scheduled commercial airline operations and is not certified under Federal Aviation Regulation (FAR) Part 139. As part of a Franchise Agreement, AFCO Avports Management (Avports) is working to reestablish commercial airline operations at the Airport.

This report was developed to supplement the Programmatic Environmental Assessment (PEA), which is being prepared pursuant to the National Environmental Policy Act (NEPA). This is part of the requirements for the Federal Aviation Administration’s (FAA) issuance of Part 139 certification¹ and changes to the HEF Airport Layout Plan (ALP) in support of activities related to the re-establishment of commercial airline operations.

The FAA, the Airport, and Avports identified two alternatives to be completed and evaluated by the PEA. Alternative #1 includes three projects that would not generate traffic. Alternative #2 (“Build” or “Proposed Action”), has 16 projects, including a Terminal Building Expansion, Terminal Parking Lot Rehabilitation and Expansion, and Economy Parking Lot Construction. This Traffic Impact Study evaluates the potential traffic impacts that the Proposed Action could have on the surrounding traffic network. The report describes existing traffic operations in the vicinity of the Airport, establishes trip generation rates related to the Proposed Action, assigns the trips throughout the roadway network, and analyzes and evaluates Existing (2024), No Build (2027, 2036, and 2041), Construction (2027) and Build (2036 and 2041) operations. An analysis of 2027 Construction conditions for Alternative #1 is also provided.

2. Study Area

The roadway network surrounding HEF primarily serves to connect the Airport, Virginia Railway Express (VRE) Broad Run Train Station and local businesses to the greater roadway network. The existing Study Area consists of intersections that have the potential to be impacted by the Proposed Action.

The Traffic Study Area is defined by Virginia Department of Transportation (VDOT) as “within 2,000 feet of site and any roadway on which 10% or more of the new vehicle trips generated by the proposal are distributed – not to exceed two miles” for projects that have 500 to 999 site generated peak hour trips². **Section 4** discusses trip generation rates developed for the Proposed Action and assigned throughout the

¹ Under 14 CFR Part 139, the FAA issues Airport Operating Certificates to allow airport operators to serve air carrier passenger operations.

² Virginia Department of Transportation. (2022, August). Updated Administrative Guidelines for the Traffic Impact Analysis Regulations. Richmond, Virginia.

traffic network. The following nine intersections were selected for analysis based on their location and the percent of trips that are expected to travel through them:

1. Prince William Parkway and Clover Hill Rd (signalized)
2. Harry J. Parrish Blvd and Clover Hill Rd (unsignalized)
3. Harry J. Parrish Blvd and Wakeman Dr (unsignalized)
4. Wakeman Dr and the Frontage Rd Exit (unsignalized driveway)
5. Wakeman Dr and the Frontage Rd Entrance (unsignalized driveway)
6. Wakeman Dr and the Employee Lot (unsignalized driveway)
7. Wakeman Dr and Observation Rd (unsignalized)
8. Observation Rd and Piper Ln (unsignalized)
9. Gateway Blvd and Carolina Dr (unsignalized)

These intersections are presented in **Figure 2-1**.

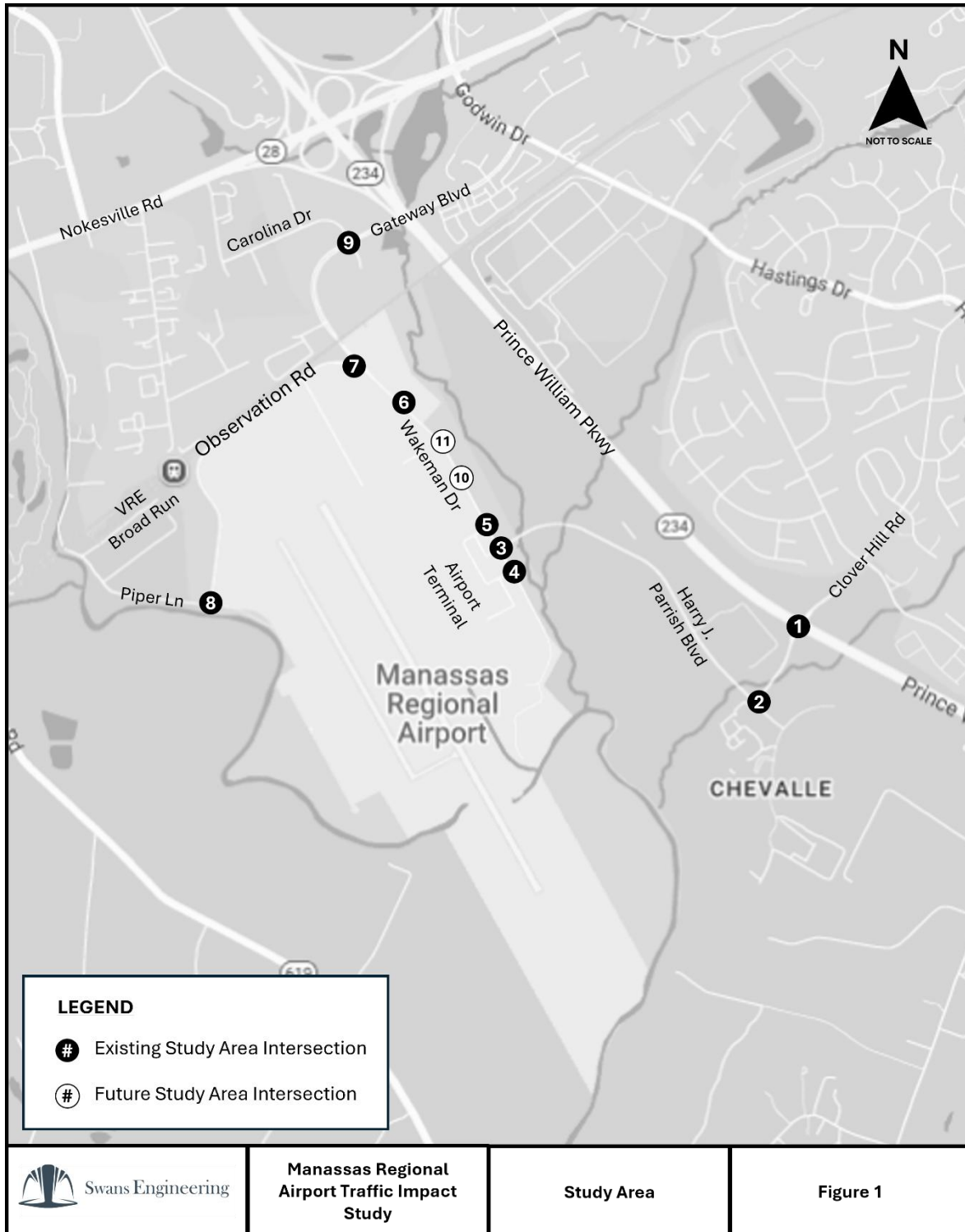


Figure 2-1: Study Area

3. Methodology

The Traffic Impact Study methodology consists of evaluating Existing conditions, future conditions without the Proposed Action (No Build), Construction conditions, and future conditions with the Proposed Action (Build). The results were compared to assess the potential impacts that the Proposed Action may have on the surrounding transportation network.

3.1. Scenarios

The following scenarios were considered in the Traffic Impact Study.

3.1.1. Existing: 2024

The Existing conditions scenario consists of analysis of the existing traffic volumes on nine Study Area intersections identified and discussed in **Section 2** for the base year of 2024, which is also the year traffic data was collected.

3.1.2. No Build: 2027, 2036, 2041

The No Build scenario considers the future Study Area without the Proposed Action. The Airport would not have commercial airline operations and would continue as-is with General Aviation operations only and no additional improvements to the Airport. It assumes a background traffic growth rate and the addition of traffic from local projects that would be constructed between the Existing and No Build years. It also includes any planned roadway improvements within the Study Area that would be constructed and operational between the Existing and No Build years.

3.1.3. Build Construction: 2027

The Build Construction scenario assesses future traffic operation during the peak year of construction. It includes the No Build scenario, plus the addition of incremental traffic generated by the Proposed Action in 2027, any Proposed Action roadway improvements that would be constructed by 2027, and traffic expected to be generated by construction activity. Construction impacts vary daily and are temporary in nature. However, construction operations are analyzed to understand the extent to which they have the potential to impact the surrounding roadway network.

3.1.4. Build: 2036 and 2041

The Build scenarios represent the future conditions with the Proposed Action (construction of all 16 Projects and commercial airline operations at the Airport) during the design year (2036) and five years after (2041)³. This includes the No Build scenario for each year plus the traffic expected to be generated by the Proposed Action.

3.1.1. Alternative #1 Construction: 2027

The Alternative #1 Construction scenario assesses future traffic operation during the peak year of construction for Alternative #1. It includes the No Build scenario, Proposed Action roadway improvements

³ Federal Aviation Administration, Forecast Review and Approval Instructions, August 12, 2024, pg. 3, https://www.faa.gov/airports/planning_capacity/Forecasts-Approval-Instructions

that would be constructed by 2027, and traffic expected to be generated by construction activity. Construction impacts vary daily and are temporary in nature. However, construction operations are analyzed to understand the extent to which they have the potential to impact the surrounding roadway network.

3.2. Analysis

Each scenario was analyzed for traffic operations during a typical weekday AM, weekday PM, and Saturday peak hour. These hours were selected based on a blend of existing peak traffic times and expected flight schedules that would generate the highest combined volumes on the roadway and therefore have the potential to experience the greatest impacts due to the Proposed Action. No Build conditions were compared to Build conditions of the same year to determine the potential impacts due to the Proposed Action.

The Study Area intersections were analyzed using Synchro 12, an industry-standard traffic analysis software that uses Highway Capacity Manual (HCM) methodologies and reports measures of effectiveness such as Level of Service (LOS), delay, volume-to-capacity ratios, and queue lengths. Evaluation criteria for the Study Area intersections include delay at the intersection and expected queue lengths. Intersection delay is measured through Level of Service (LOS) which expresses the quality of traffic flow based on the average amount of delay a driver would typically experience passing through the intersection. LOS ranges from A to F with A indicating little to no congestion or delay and F indicating a failing movement or intersection with severe congestion and delays. Delay thresholds for LOS (Table 3-1) are set by the Highway Capacity Manual⁴ and were established based on a variety of factors that represent quality of service from the driver's perspective. The thresholds differ between signalized and unsignalized intersections due to differences between, and tolerance for, driver discomfort and frustration at a signalized versus unsignalized intersection. LOS from A to D are generally considered acceptable for urban or suburban areas. All approaches are evaluated for LOS at signalized intersections. For unsignalized intersections, only the stop- or yield-controlled approaches are evaluated for LOS.

Table 3-1: LOS Criteria for Signalized and Unsignalized Intersections

LOS	Signalized Intersection Delay (seconds/vehicle)	Unsignalized Intersection Delay (seconds/vehicle)
A	≤ 10.0	≤ 10.0
B	> 10.0 - 20.0	> 10.0 - 15.0
C	> 20.0 - 35.0	> 15.0 - 25.0
D	> 35.0 - 55.0	> 25.0 - 35.0
E	> 55.0 - 80.0	> 35.0 - 50.0
F	> 80.0	> 50.0

Queue lengths are also considered when evaluating existing and proposed transportation networks. 95th percentile queues are used for evaluation and are calculated in the traffic modeling software to determine maximum queue length that can be expected with 95th percentile volumes. These queue lengths are used to determine whether traffic can be accommodated in available existing and proposed lane lengths at intersections.

⁴ Highway Capacity Manual 7th Edition: A Guide for Multimodal Mobility Analysis, Washington, DC: The National Academies Press, 2022.

4. Proposed Action

The Proposed Action, which would bring commercial airline operations to the Airport, consists of 16 PEA Projects with Build years spanning from 2026 through 2036, presented in **Table 4-1**.

Table 4-1: HEF PEA Projects

PEA Project Number	PEA Project Name	Construction Year Start-End
1	Terminal Building Expansion (north, south, and west)	2026-2026
2	West Ramp GA Tie-Down Relocation	2026-2026
3	East Ramp Strengthening, Reconfiguration, and Rehabilitation	2026-2028
4	Terminal Parking Lot Rehabilitation and Expansion	2026-2026
5	Economy Parking Lot Construction	2026-2026
6	Bridge Rehabilitation - Runway 16L/34R and Taxiway Bravo	2026-2027
7	Construction of a new SRE Building	2027-2028
8	Taxiway Bravo Widening	2027-2028
9	Runway 16L/34R Reconstruction and Strengthening	2027-2029
10	Taxiway Echo Fillet Widening	2027-2029
11	Taxiway Bravo Reconstruction and Strengthening (south of the bridge)	2029-2030
12	Construction of a new East Ramp Taxiway	2032-2034
13	Runway 16L/34R Widening	2033-2033
14	Construction of an Aircraft Deicing Pad and Apron Expansion between Taxiways Delta and Echo	2033-2034
15	Construction of new Expanded East Ramp and Taxilane between Taxiways Delta and Echo	2033-2036
16	Construction of new ARFF Facility	2035-2036

Project #4 and Project #5 would make modifications to the roadways and parking at the Airport (**Figure 4-1**). There is an existing ground-level terminal parking lot immediately east of the existing terminal building. The parking lot is a large rectangle divided into four quadrants. Currently, only the northwest quadrant is paved, and it has 119 striped parking spaces.

In order to accommodate expected parking demand associated with the addition of commercial airline operations at the Airport, Project #4, the Terminal Parking Lot Rehabilitation and Expansion, involves:

- paving and striping the remaining three grass covered quadrants,
- creating landscaped islands that would delimit the end of parking slot sets; and
- reconfiguring the parking slot arrangements within the existing paved lot.

Upon completion of the parking lot improvements, access to the parking lot would be provided at the north Frontage Rd Entrance off Wakeman Drive (Dr) which would be converted from two-way to one-way, and in the existing center aisle entrance west of the Harry J. Parrish Blvd and Wakeman Dr intersection. Egress would occur at the south end of the Frontage Rd and also in the central aisle. At completion, the expanded

parking lot would contain approximately 529 slotted spaces, including 11 ADA accessible parking locations.

Project #5, the Economy Parking Lot Construction, would be constructed in a currently undeveloped area of the Airport between Wakeman Dr (west), Cannon Branch (east), Harry J. Parrish Blvd (south), and the Airport Fuel Farm (north). The proposed parking lot would accommodate 647 parking spaces and a shuttle bus station. Access to the Economy Parking Lot would be via two driveways on the east side of Wakeman Dr.

It is anticipated that both Project #4 and Project #5 would be completed in 2026, in conjunction with Project #1, the Terminal Building Expansion.

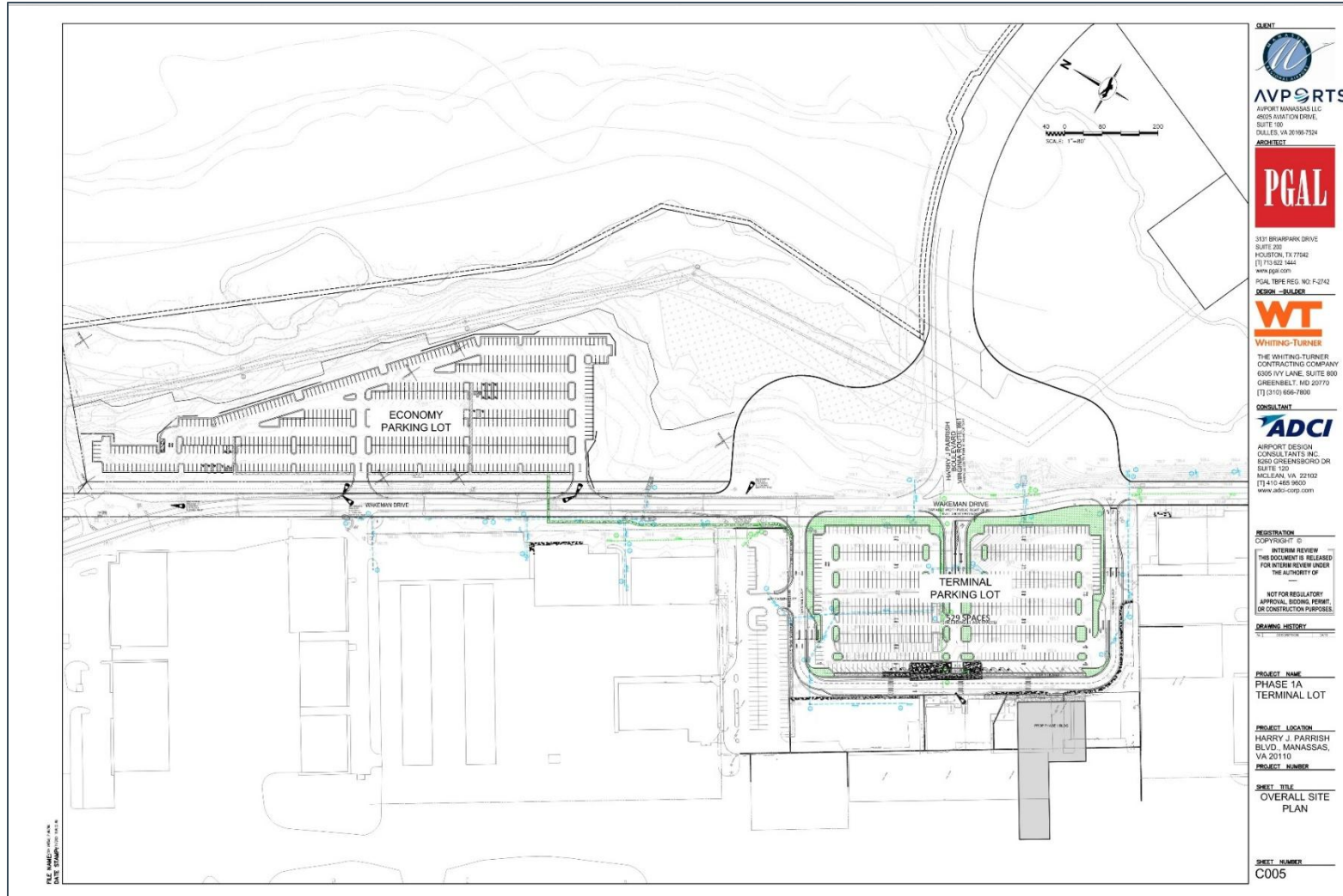


Figure 4-1: Project #4 - Terminal Parking Lot Rehabilitation and Expansion and Project #5 - Economy Parking Lot Construction

An additional Build Alternative (Alternative #1) is also being considered as part of the PEA. This Alternative would assume that there would be no scheduled commercial service or Part 139 certification projects; only General Aviation operations would continue at the Airport. This Alternative would be the equivalent of the No Build Alternative plus Project #7 (Construction of SRE Building), Project #8 (Taxiway Bravo Widening), and Project #12 (Construction of a new East Ramp Taxiway). The three projects are related to Airport infrastructure and would not result in additional flights or vehicular trips. This Alternative, therefore, would not generate additional traffic beyond what is anticipated under No Build conditions, and the transportation network would operate the same as No Build conditions. It is therefore not considered further in this Traffic Impact Study.

4.1. Trip Generation

Trips anticipated to be generated by the Proposed Action include both flight passenger trips and employee trips.

4.1.1. Airport Passenger Trips

Passenger trips were estimated using anticipated flight schedules developed by Flare Consulting and various travel demand factors, in consultation with Avports, from the Tweed New Haven Airport (HVN) NEPA Final Environmental Assessment Runway 02-20 Extension and Terminal Expansion Program (“HVN EA”) which was approved by the FAA in 2023. The New Haven Airport is also operated by Avports, is located in a similar environment, and is anticipated to have similar ultra-low-carrier operations when compared to HEF. The Flare Consulting Forecast projects departing and arriving flights for HEF from 2025 through 2051 and is provided in **Appendix A**. It also develops a Design Day Flight Schedule (DDFS). The DDFS is the number of passengers (arrivals and departures) expected to occur at an airport during a typical busy day of the year — not the busiest day experienced by the airport, but a realistic average day during the peak month of any given year. It is used to simulate how the airport’s facilities (runways, taxiways, terminal gates, parking, roads, etc.) would perform under expected operational demand.

The forecast assumes there would be 15 arriving and 15 departing flights daily in 2027, 26 arriving and 26 departing flights daily in 2036 and 29 arriving and 29 departing flights in 2041. It is expected that the commercial aircraft at HEF would hold 109 to 200 passengers.

Travel demand factors used in the analysis are provided in **Table 4-2**. Based on consultation with Flare, the assumed average capacity of each aircraft (load factor) is 85 percent. This coincides with the load factor used in the HVN EA as well. The number of passengers per vehicle were assumed to be 1.8, similar to the HVN EA⁵. Modal split was also obtained from HVN EA; 28 percent of travelers would be dropped-off/picked up, 26 percent would use a taxi or ride share service, 26 percent would use a rental car, and 19

⁵ McFarland Johnson. (2023, December). Tweed New Haven Airport NEPA Final Environmental Assessment Runway 02-20 Extension and Terminal Expansion Program. New Haven, CT. Retrieved from [https://afcoavports-my.sharepoint.com/personal/fsurriel_avports_com/_layouts/15/onedrive.aspx?id=%2Fpersonal%2Ffsurriel%5Favports%5Fcom%2FDocuments%2FWebsite%20Documents%2FEA%20documents%2FHVN%5FFinal%5FEA%5FCh1%2D6%5FFAA%2Epdf&parent=%2Fpersonal%2Ffsurriel%](https://afcoavports-my.sharepoint.com/personal/fsurriel_avports_com/_layouts/15/onedrive.aspx?id=%2Fpersonal%2Ffsurriel%5Favports%5Fcom%2FDocuments%2FWebsite%20Documents%2FEA%20documents%2FHVN%5FFinal%5FEA%5FCh1%2D6%5FFAA%2Epdf&parent=%2Fpersonal%2Ffsurriel%2F)

percent would park at the Airport⁶. Drop-off/pick-up and taxi/ride share trips resulted in two trips per passenger group, one in and one out of the Airport. It was conservatively assumed that taxis and ride share vehicles would either arrive or leave with passengers, but would not carry passengers for both trips. Rental car trips and park trips would be only one trip, either in or out of the Airport.

Table 4-2: Travel Demand Factors

Factor	Value
Load Factor ¹	85%
Passenger Occupancy ²	1.8 passengers per vehicle
Modal Split²	
Drop-off/Pick-up	28%
Taxi/Ride Share	26%
Rental Car	26%
Park at Airport	19%

Source:

1. Flare Consulting Forecast (Version 15)
2. HVN EA

Arrival and departure times were based on the HVN EA. It was assumed that passengers would arrive at HEF between one hour 45 minutes and 30 minutes before their plane departed from the Airport (**Table 4-3**). Passengers would depart from the Airport 15 minutes to one hour after their plane arrived (**Table 4-4**).

Table 4-3: Passenger Arrival Times

Passenger Arrival Time (Minutes Before Plane Departs)	Percent of Total Arrivals	Cumulative Percent of Arrivals
105	5%	5%
90	10%	15%
75	30%	45%
60	30%	75%
45	20%	95%
30	5%	100%

Source: HVN EA

Table 4-4: Passenger Departure Times

Passenger Departure Time (Minutes After Plane Arrives)	Percent of Total Departures	Cumulative Percent of Departures
15	20%	20%
30	60%	80%
45	10%	90%
60	10%	100%

Source: HVN EA

⁶ Ibid.

24-hour volume profiles were developed based on the above factors to provide total daily Airport passenger vehicle trips in 15-minute increments for the DDFS in 2027, 2036, and 2041 (**Figure 4-2, Figure 4-3, and Figure 4-4**). A breakdown of those 15-minute increments by mode and direction (“in” or “out” of the Airport) are provided in **Appendix B**. It is estimated that there are 3,594 daily passenger trips in 2027, 5,298 in 2036, and 6,754 in 2041.

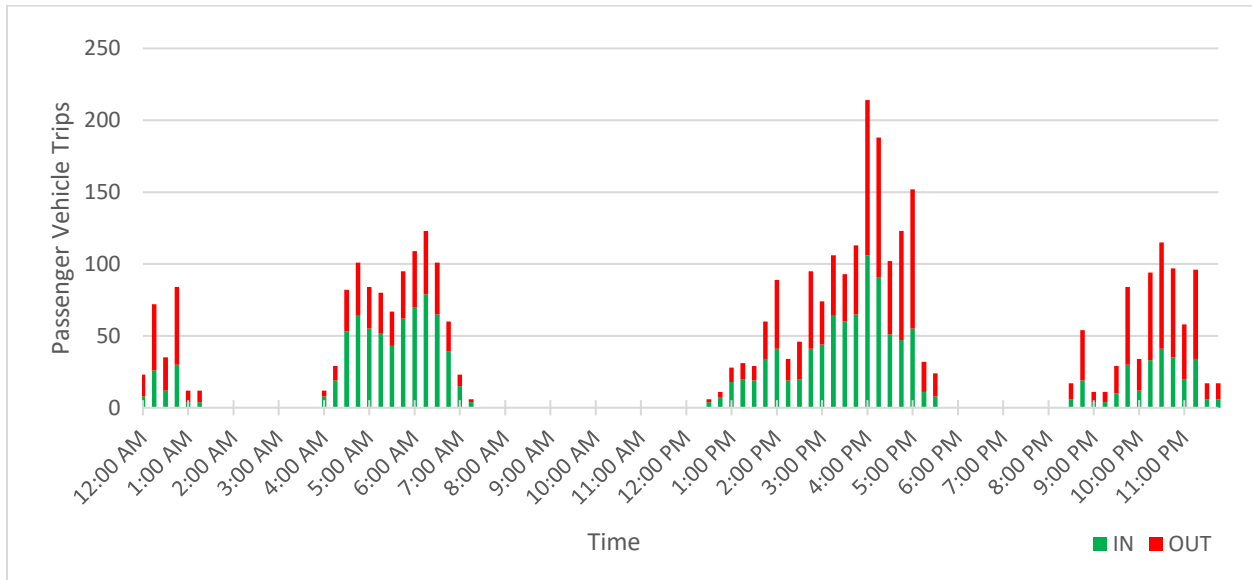


Figure 4-2: 2027 15-Minute Airport Passenger Build Vehicle Increments

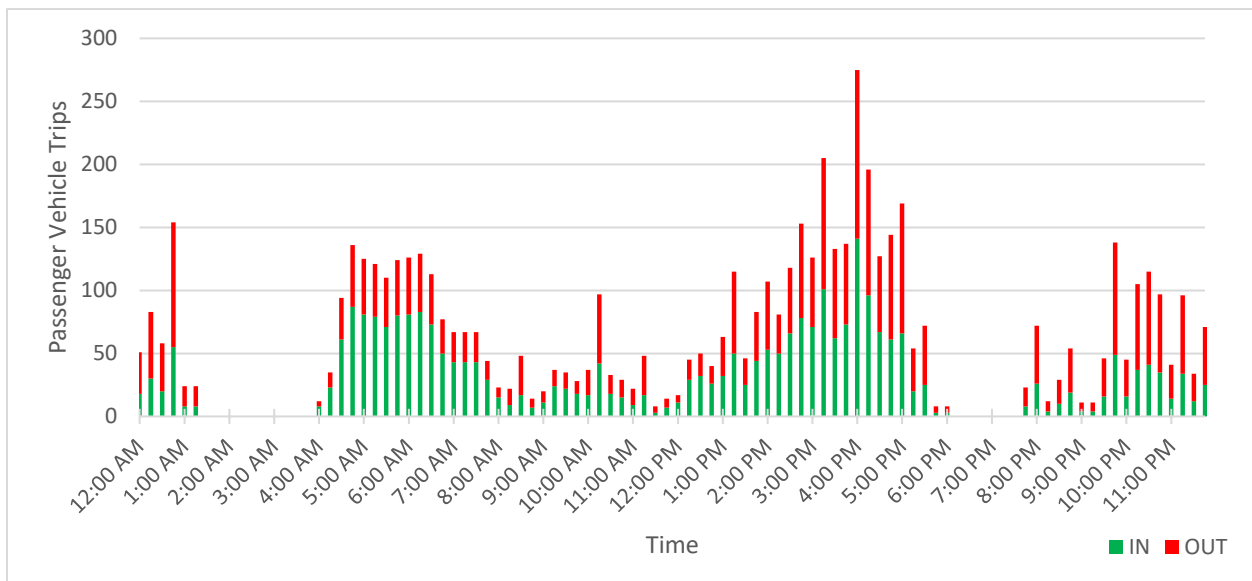


Figure 4-3: 2036 15-Minute Airport Passenger Build Vehicle Increments

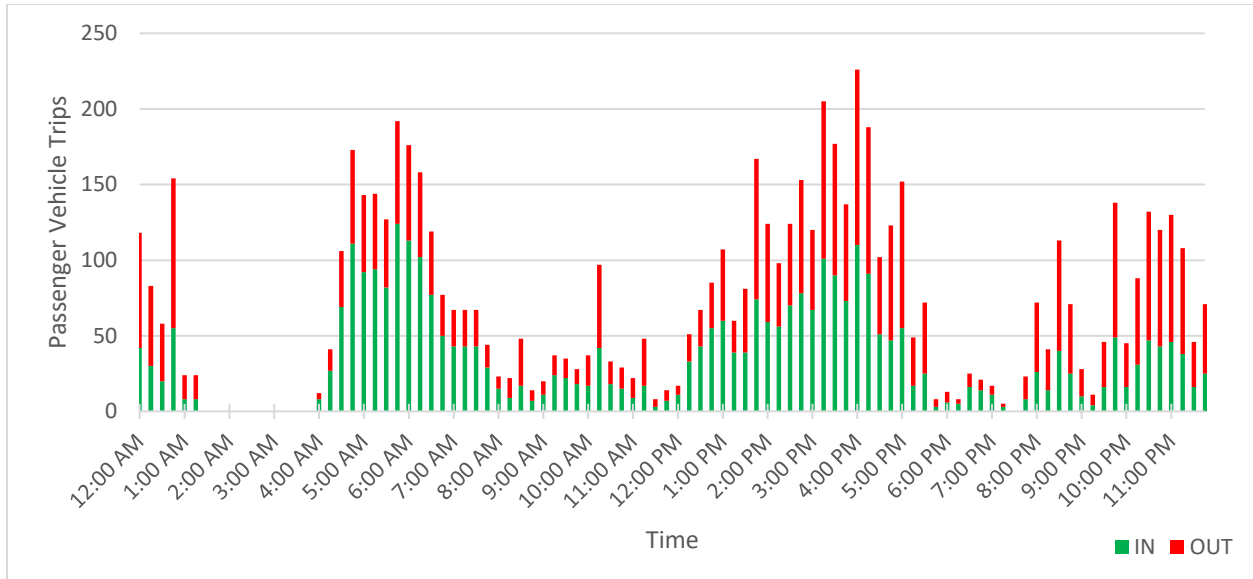


Figure 4-4: 2041 15-Minute Airport Passenger Build Vehicle Increments

The number of parked vehicles per day was estimated based on the modal split trip generation calculations (Table 4-5).

Table 4-5: Daily Parked Airport Visitors

Build Year	Daily Parked Airport Visitors
2027	220
2036	362
2041	413

4.1.2. Airport Employee Trips

Employee trips to and from the Airport under the Build condition would consist of Airline, Airport Transportation Security Administration (TSA), concession, and Avports employees. The number of employees and their shifts were developed based on the HVN EA. **Table 4-6**, **Table 4-7**, and **Table 4-8** present the expected number of daily employees and their shifts in 2027, 2036, and 2041.

Table 4-6: 2027 Airport Employees

Employee Types	Total Employees	Employee Numbers	Employee Shifts
Avports	75	38	4:00 AM – 2:00 PM
		37	2:00 PM – 12:00 AM
Airline	350	175	4:00 AM – 2:00 PM
		175	2:00 PM – 12:00 AM
TSA Staff	40	14	4:00 AM – 12:00 PM
		13	8:00 AM – 4:00 PM
		13	12:15 PM - 8:15 PM
Car Rental, Concessions, Retail	21	11	5:00 AM – 1:00 PM
		10	12:00 PM – 9:00 PM
Notes:			
1. New Haven assumes 28 flights per day under Build conditions. In the HVN EA, employee numbers, other than Car Rental, Concessions, Retail, remain constant between No Build and Build Conditions.			
2. HEF uses HVN EA assumptions for 2027, 2036, and 2041 for Avports, Airline and TSA Staff.			
3. Car Rentals, Concessions and Retail employee numbers were adjusted proportionally based on amount of flights in the HVN EA compared to HEF. HVN EA assumes 28 flights in and out. HEF assumes 15 (2027), 26 (2036), and 29 (2041).			

Table 4-7: 2036 Airport Employees

Employee Types	Total Employees	Employee Numbers	Employee Shifts
Avports	75	38	4:00 AM – 2:00 PM
		37	2:00 PM – 12:00 AM
Airline	350	175	4:00 AM – 2:00 PM
		175	2:00 PM – 12:00 AM
TSA Staff	40	14	4:00 AM – 12:00 PM
		13	8:00 AM – 4:00 PM
		13	12:15 PM - 8:15 PM
Car Rental, Concessions, Retail	37	19	5:00 AM – 1:00 PM
		18	12:00 PM – 9:00 PM
Notes:			
Notes:			
1. New Haven assumes 28 flights per day under Build conditions. In the HVN EA, employee numbers, other than Car Rental, Concessions, Retail, remain constant between No Build and Build Conditions.			
2. HEF uses HVN EA assumptions for 2027, 2036, and 2041 for Avports, Airline and TSA Staff.			
3. Car Rentals, Concessions and Retail employee numbers were adjusted proportionally based on amount of flights in the HVN EA compared to HEF. HVN EA assumes 28 flights in and out. HEF assumes 15 (2027), 26 (2036), and 29 (2041).			

Table 4-8: 2041 Airport Employees

Employee Types	Total Employees	Employee Numbers	Employee Shifts
Avports	75	38	4:00 AM – 2:00 PM
		37	2:00 PM – 12:00 AM
Airline	350	175	4:00 AM – 2:00 PM
		175	2:00 PM – 12:00 AM
TSA Staff	40	14	4:00 AM – 12:00 PM
		13	8:00 AM – 4:00 PM
		13	12:15 PM - 8:15 PM
Car Rental, Concessions, Retail	41	21	5:00 AM – 1:00 PM
		20	12:00 PM – 9:00 PM

Notes:

1. New Haven assumes 28 flights per day under Build conditions. In the HVN EA, employee numbers, other than Car Rental, Concessions, Retail, remain constant between No Build and Build Conditions.
2. HEF uses HVN EA assumptions for 2027, 2036, and 2041 for Avports, Airline and TSA Staff.
3. Car Rentals, Concessions and Retail employee numbers were adjusted proportionally based on amount of flights in the HVN EA compared to HEF. HVN EA assumes 28 flights in and out. HEF assumes 15 (2027), 26 (2036), and 29 (2041).

It was assumed that employees would travel individually in vehicles. Arrival and departure times for Airport employees were also developed based on the HVN EA and are presented in **Table 4-9** and **Table 4-10**, respectively.

Table 4-9: Airport Employee Arrival Time

Arrival Before Shift Starts (minutes)	Percent	Cumulative Percent
60-45	40%	40%
45-30	40%	80%
30-15	20%	100%

Source: HVN EA

Table 4-10: Airport Employee Departure Time

Departure After Shift Ends (minutes)	Percent	Cumulative Percent
15-30	20%	20%
30-45	40%	60%
45-60	40%	100%

Source: HVN EA

This data was used to develop 15-minute trip increments for daily employee trips, shown in **Figure 4-5**, **Figure 4-6**, and **Figure 4-7**, for 2027, 2036, and 2041, respectively. Daily 15-minute employee increments for each year are provided in **Appendix C**.

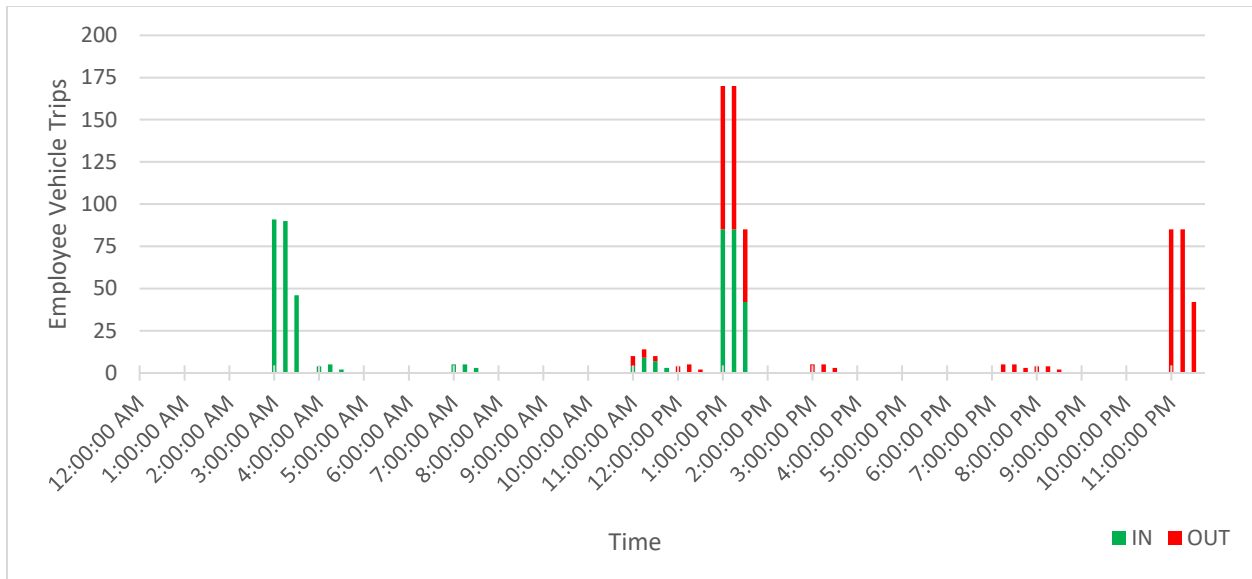


Figure 4-5: 2027 15-Minute Airport Employee Build Vehicle Increments

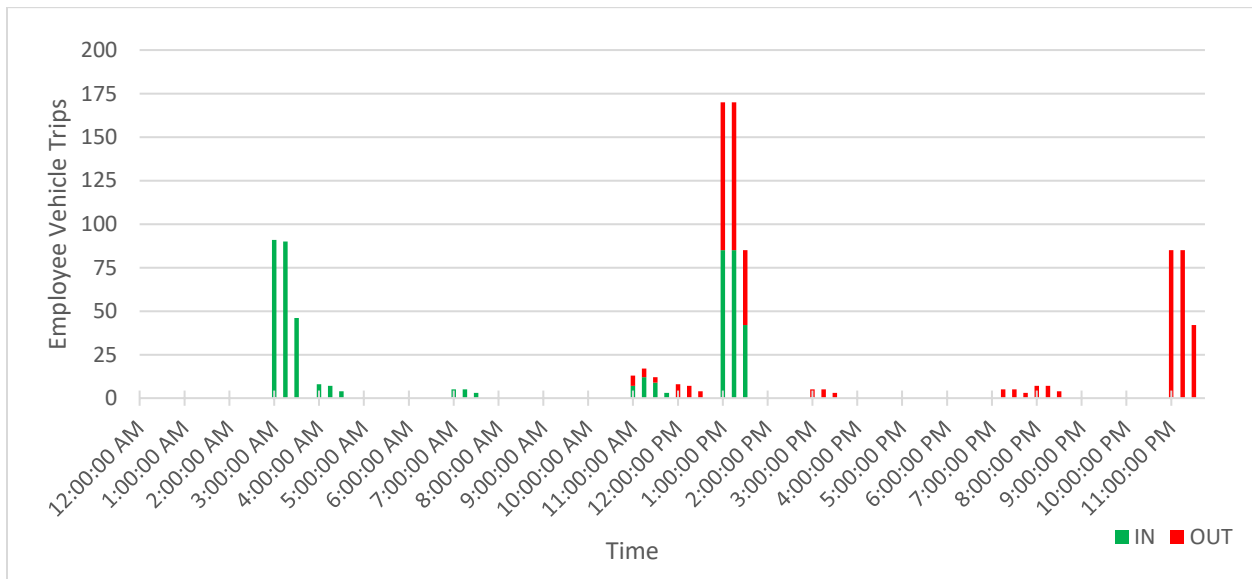


Figure 4-6: 2036 15-Minute Airport Employee Build Vehicle Increments

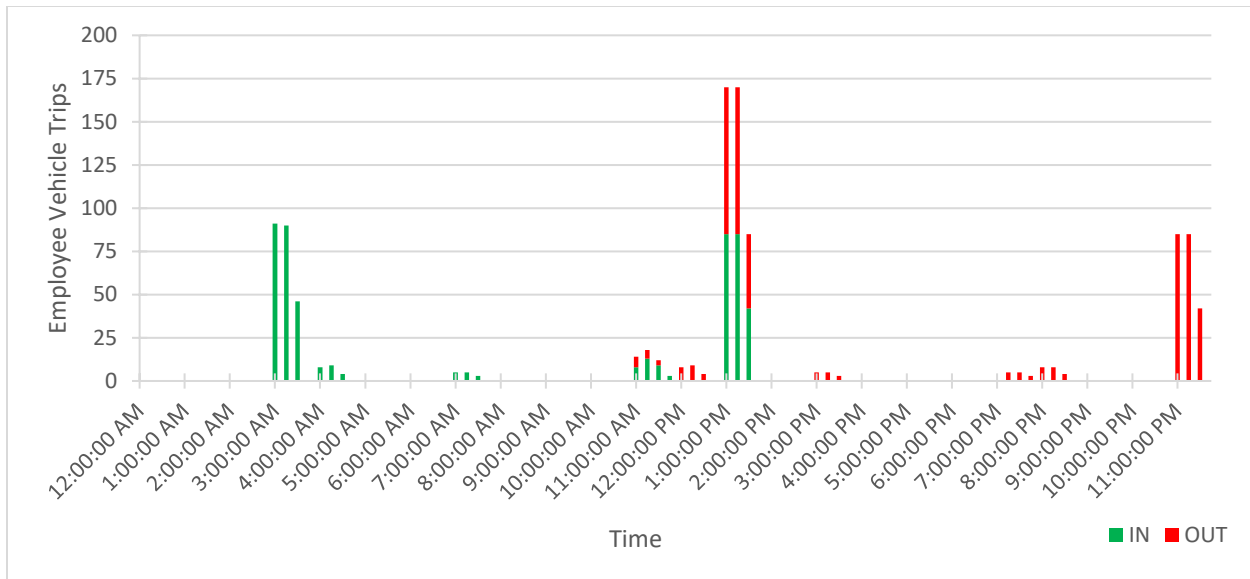


Figure 4-7: 2041 15-Minute Airport Employee Build Vehicle Increments

4.1.3. Build Construction Trips

Peak construction is expected to occur in 2027. Trips are expected to be generated by construction workers and single unit short-haul and combination short-haul trucks. The highest daily volume is estimated to reach 416 round trips per day, with 374 worker round trips (374 “ins” and 374 “outs”), and 42 truck round trips (42 “ins” and 42 “outs”). It is anticipated that both daytime and nighttime work would occur. It was assumed that 75 percent of workers would work the day shift, arriving before their 7:00 AM shift in the morning and leaving at the end of their shift after 3:00 PM, with 75 percent of truck trips and construction material deliveries spread throughout an eight-hour day. The remaining 25 percent would work an overnight shift (10:00 PM to 6:00 AM) to perform construction airside while the airport is closed. For the purpose of this analysis it was assumed that worker trips leaving the overnight shift would overlap with workers trips arriving for the day shift.

4.1.4. Total Build Trips

The above trips were combined into 24-hour daily profiles for each Build scenario (2036 and 2041) and Construction (2027). The combined trips included employees entering and leaving the airport before and after their shifts, construction workers (for 2027 Build analysis), shuttles to and from the new economy lot, and customers, who would park, rent vehicles, take taxis or other ride share vehicles, or would be dropped off or picked up at the Airport. Total trips expected to be generated by the Proposed Action are presented in **Figure 4-8**, **Figure 4-9**, and **Figure 4-10** for 2027, 2036, and 2041, respectively. Detailed 15-minute increments, broken down by mode and “ins” and “outs” are provided in **Appendix D**.

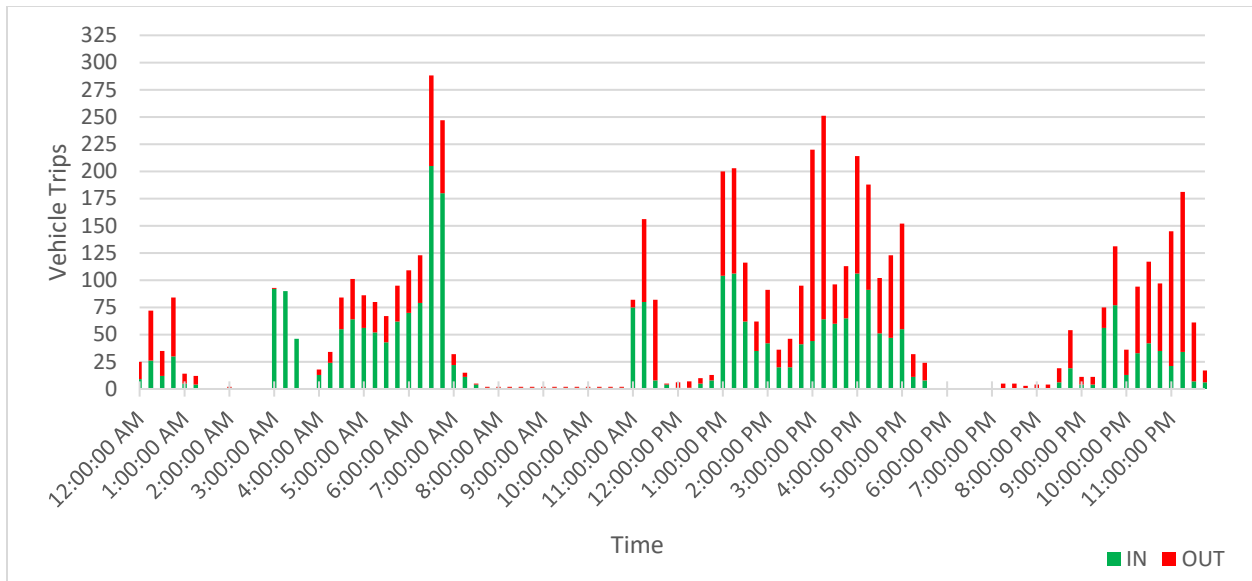


Figure 4-8: 2027 15-Minute Total Airport Plus Construction Build Vehicle Increments

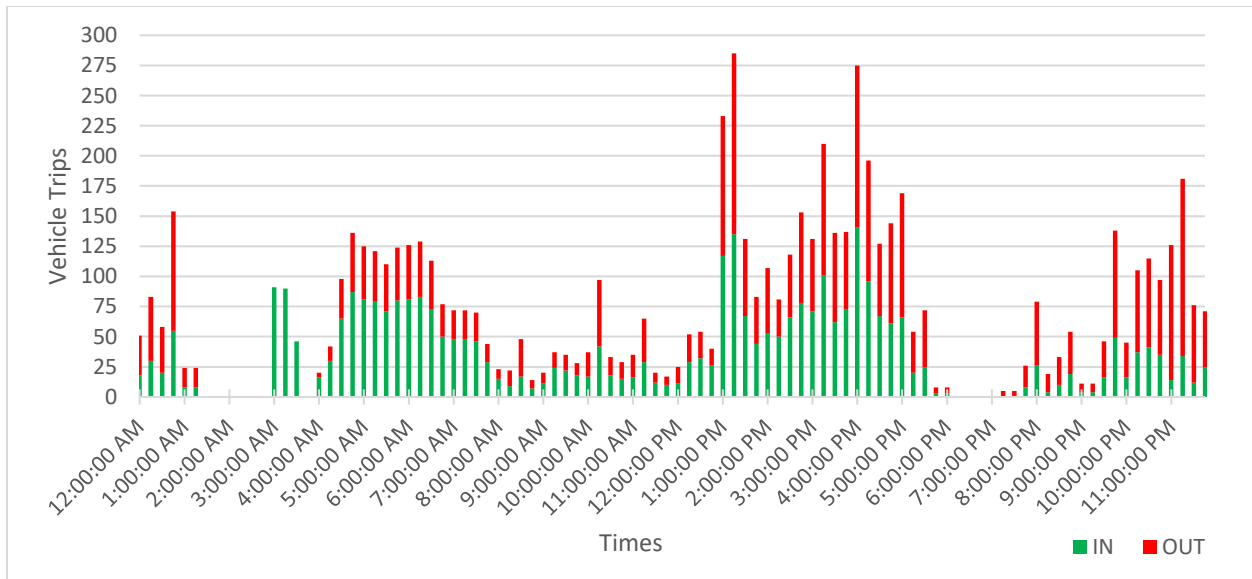


Figure 4-9: 2036 15-Minute Total Airport Build Vehicle Increments

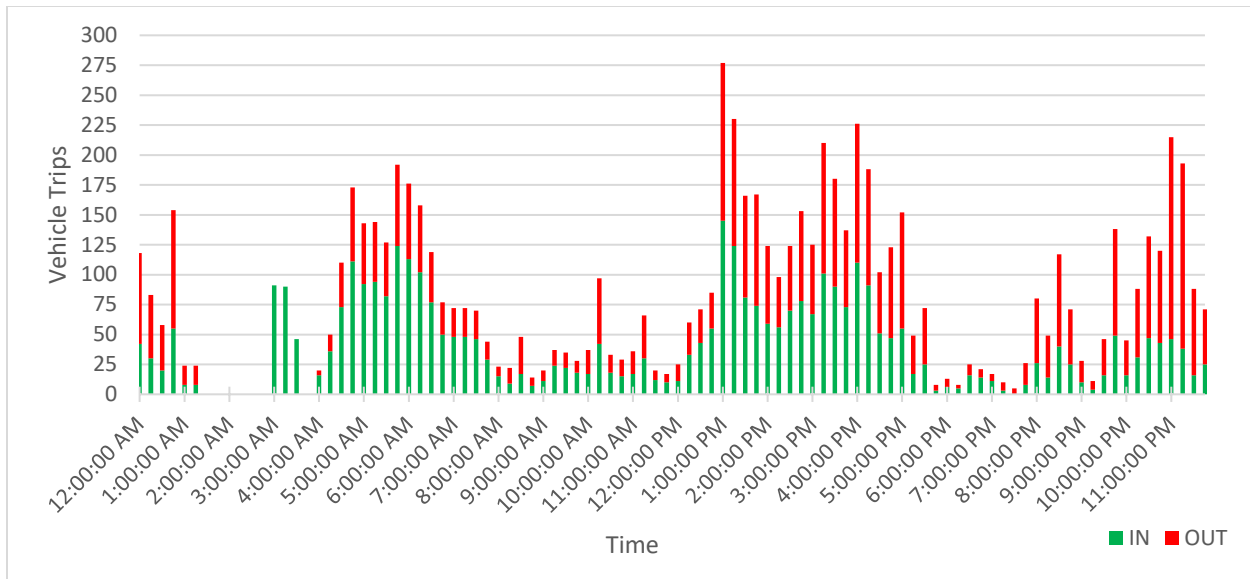


Figure 4-10: 2041 15-Minute Total Airport Build Vehicle Increments

The volume profiles were compared to existing volumes to determine expected peak hours of expected traffic. This resulted in the analysis of a weekday morning peak, weekday late afternoon peak, and a Saturday midday peak. **Table 4-11, Table 4-12, and Table 4-13** provide total peak hour trips for 2027, 2036, and 2041, respectively, that would be generated by the Airport. Weekday AM peak hour trips would be 208 in 2027, 342 in 2036, and 348 in 2041. Weekday PM peak hour trips would be 542 in 2027, 766 in 2036, and 761 in 2041. A slight decrease in total Proposed Action increments would occur between 2036 and 2041 in the Weekday PM peak hour due to projected changes in flight schedules. Saturday Midday peak hour trips would be 740 in 2036, and 8 in 2041. 2027 was analyzed for Construction conditions only and therefore, Saturday Midday trips related to the Proposed Action were not developed.

Table 4-11: 2027 Proposed Action Trip Generation

Trip Type	Weekday AM (6:30 - 7:30 AM)		Weekday PM (3:15 - 4:15 PM)	
	In	Out	In	Out
Employees	10	0	0	8
Parking Shuttle	4	4	4	4
Visitors Parked	24	0	48	20
Visitors Using Rental Vehicles	32	0	62	26
Visitors Dropped Off or Picked Up	35	35	97	97
Visitors using Taxi or Ride Share	32	32	88	88
Construction Workers Parked	281	93	0	281
Construction Trucks	4	4	4	4
Total Ins and Outs	422	168	303	528
Peak Hour Total Build Increments	590		831	

Table 4-12: 2036 Proposed Action Trip Generation

Trip Type	Weekday AM (6:30 - 7:30 AM)		Weekday PM (3:15 - 4:15 PM)		Saturday Midday (1:00 – 2:00 PM)	
	In	Out	In	Out	In	Out
Employees	10	0	0	8	212	213
Parking Shuttle	4	4	4	4	4	4
Visitors Parked	39	0	49	47	19	20
Visitors Using Rental Vehicles	55	0	64	62	24	28
Visitors Dropped Off or Picked Up	60	60	138	138	56	56
Visitors using Taxi or Ride Share	55	55	126	126	52	52
Total Ins and Outs	223	119	381	385	367	373
Peak Hour Total Build Increments	342		766		740	

Table 4-13: 2041 Proposed Action Trip Generation

Trip Type	Weekday AM (6:30 - 7:30 AM)		Weekday PM (3:15 - 4:15 PM)		Saturday Midday (1:00 – 2:00 PM)	
	In	Out	In	Out	In	Out
Employees	10	0	0	8	212	213
Parking Shuttle	4	4	4	4	4	4
Visitors Parked	40	0	49	47	29	24
Visitors Using Rental Vehicles	56	0	63	62	37	33
Visitors Dropped Off or Picked Up	61	61	137	137	76	76
Visitors using Taxi or Ride Share	56	56	125	125	70	70
Totals	227	121	378	383	428	420
Peak Hour Total Build Increments	348		761*		848	
Note: *A slight decrease in total Proposed Action increments occurred between 2036 and 2041 in the Weekday PM peak hour due to projected changes in flight schedules.						

4.2. Trip Assignments

Vehicle increments were assigned throughout the network via direct and logical routes based on a combination of catchment area populations, origin-destination employment statistics, and existing travel routes.

Flare Consulting assumed a 45-mile catchment area around the Airport to determine the Airport passenger market that HEF could capture. Populations were obtained from the American Community Survey for 2022 and analyzed for locations within a 45-mile radius of the Airport. These populations were then assigned to the Airport via direct and logical routes to determine the routes Airport passengers would take to and from the Airport. **Table 4-14** presents the assignment percentages for airline passengers.

Drop-offs/pick-ups as well as Taxi/ride-share would occur at the frontage. Rentals are also assumed to be located on the Frontage Rd⁷. Parking trips were assigned 75 percent to the Terminal Parking Lot and 25

⁷ It is anticipated that a rental company desk and phone would be available for passengers to request a rental car. There are no separate rental car facilities included in the current plans.

percent to the Economy Parking Lot. Shuttle trips would circulate between the Economy Parking Lot and the Terminal Parking Lot. Assignment percentage maps are provided in **Appendix E**.

Table 4-14: Passenger Assignment Percentages Along Main Routes

Route	Percent Population Assigned
Southbound Prince William Parkway	54%
Northbound Prince William Parkway	38%
Eastbound Nokesville Rd	5%
Southbound Godwin Dr	2%
Westbound Clover Hill Rd	1%

Airport employee and construction trips were developed using the Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics, from the US Census for the years 2019 and 2021, based on work within Manassas, Virginia. Employee home location percentages were then assigned to the Airport via direct and logical routes to determine the routes employees and construction workers would take to and from the Airport. **Table 4-15** presents the assignment percentages for employees and construction workers.

Employees would continue to park at the existing lot north of the Fuel Farm. It was assumed that construction workers in 2027 would park in the Economy Parking Lot. Assignment percentage maps are provided in the **Appendix E**.

Table 4-15: Employee Assignment Percentages Along Main Routes

Route	Percent Population Assigned
Eastbound Nokesville Rd	30%
Northbound Prince William Parkway	25%
Southbound Prince William Parkway	24%
Westbound Clover Hill Rd	15%
Southbound Godwin Dr	6%

5. Existing (2024)

The Existing (2024) transportation network was evaluated, including understanding the Study Area roadways and intersections, pedestrian and bicycle access, traffic operations, and parking.

5.1. Data Collection and Peak Hour Selection

Data was collected for the Study Area intersections, including turning movement counts (TMCs), automated traffic recorders (ATRs), and physical inventories. ATRs were collected from March 9, 2024 through March 17, 2024. TMCs were collected on Thursday March 14, 2024 and Saturday March 16, 2024. Raw data tables are provided in **Appendix F**. Three peak hours were selected to be analyzed: 6:30-7:30 AM on a typical weekday, 3:15-4:15 PM on a typical weekday, and 1:00 – 2:00 PM on a typical Saturday. These hours were determined based on a blend of existing peak traffic times and trips expected to be generated by the Proposed Action that would generate the highest combined volumes on the roadway and

therefore have the potential to experience the greatest impacts due to the Proposed Action. Volume maps showing peak hour traffic volumes at the Study Area intersections are provided in **Appendix G**.

5.2. Existing Conditions

The Study Area intersections and surrounding roadways can be found in **Figure 2-1**. A description of the roadways leading to and within the Study Area is provided below. The Airport is accessed through a network of roadways, beginning with regional access principally via Prince William Parkway (Route 234) which is classified as an “Other Freeway and Expressway”. Prince William Parkway has two lanes in each direction in the vicinity of the Study Area and runs north-south to the east of the Airport and is posted with a 55 mile per hour (mph) speed limit. It connects and provides regional access to and from I-66 to the north and I-95 to the south. From Prince William Parkway, drivers access the Airport via an actuated signalized intersection to Clover Hill Road (Rd) and then Harry J. Parrish Boulevard (Blvd) (posted 35 mph), both are a “Local Collector” surrounded by primarily industrial uses. Clover Hill Rd is two lanes in each direction with no parking on either side. Harry J. Parrish Blvd is two lanes in each direction with occasional right turn lanes and no parking. It terminates at Wakeman Dr and the Airport entrance. This route provides the primary access to the Airport.

Secondary access to the Airport is available via Route 28, or Nokesville Rd, which runs east-west to the north of the Study Area. From Nokesville Rd, drivers access the Airport via Piper Lane (Ln), and less commonly, Pennsylvania Avenue (Ave) or Godwin Dr. Piper Ln is a 25 mph “Minor Collector” with no parking, surrounded primarily by industrial businesses that provides access to the VRE Broad Run Train Station and to Observation Rd. Observation Rd runs along the western and northern portion of the Airport. It is one lane in each direction with no parking and is surrounded by airport and industrial uses.

Tertiary access to the Airport is via Gateway Blvd, which is a “Minor Collector,” posted at 35 mph, and has two lanes in each direction, without parking. It provides access to the intersection of Observation Rd and Wakeman Dr.

Observation Rd and Wakeman Dr are 35 mph, two-lane (one in each direction) “Local” roadways with no parking that circle the west, north and east sides of the Airport; there is no southern access to or roadway around HEF. Wakeman Dr runs north-south along the east side of the Airport terminates at Gateway Blvd just north of the intersection with Observation Rd. Observation Rd runs west from the intersection with Wakeman Dr around the northwest corner of the Airport and south along the west side. It terminates at facilities on the southwest side of the Airport. Both roadways provide access to Airport facilities, with Observation Rd also providing access to the Broad Run VRE Station. All intersections surrounding the Airport are unsignalized.

At the time of existing data collection, the intersection of Piper Ln with Observation Rd was in the process of being relocated due to flooding concerns. Under non-construction conditions, Piper Ln ran free-flow north-south. Observation Rd intersected Piper Ln at a T-intersection and was stop controlled. Under existing construction conditions, the south leg of Piper Ln was closed and all Piper Ln traffic was directed to Observation Rd. A temporary intersection was constructed on Observation Rd to the northeast of the

intersection with Piper Ln to provide access to Airport facilities to the south. For the purposes of this study, existing conditions were analyzed with this temporary construction intersection.

Traffic volumes on the roadways immediately surrounding the airport tend to be low, with peak volume at approximately 225 vehicles per hour (vph) or less on weekdays and approximately 100 vph or less on weekends. These roadway volumes are almost entirely driven by Airport traffic and are therefore subject to peaks in Airport activity. Roadways further from the Airport that carry other local or regional traffic are higher volume and are subject to regional travel patterns and peaks. For example, Prince William Parkway, carries over 3,500 vph during the weekday PM peak hour.

5.2.1. Existing Traffic Operations

Existing peak hour LOS results for the Study Area intersections, by lane group, approach, and overall intersection during the peak hours are provided in **Appendix H**. Existing 95th percentile queues are also provided in **Appendix H**. Synchro result reports are provided in **Appendix I**.

All unsignalized intersections within the Study Area currently operate at an overall LOS A and queuing is minimal. All unsignalized approaches and movements operate at LOS B or better. The signalized intersection of Prince William Parkway and Clover Hill Rd operates at overall LOS C during all peak hours. The eastbound and westbound approaches operate at LOS F and E, respectively in the AM, and LOS E in the PM. All other approaches operate at acceptable LOS during all peak hours. 95th percentile queues are accommodated within existing available storage lengths.

Table 5-1: Existing Peak Hour Levels of Service

Intersection Number	Intersection	Peak Hour LOS		
		Weekday AM	Weekday PM	Saturday MIDDAY
1	Prince William Parkway at Clover Hill Road (Signalized)	C	C	C
2	Harry J. Parrish Blvd at Clover Hill Rd (Unsignalized)	A	A	A
3	Harry J. Parrish Blvd at Wakeman Dr (Unsignalized)	A	A	A
4	Wakeman Dr at Frontage Rd Exit (Unsignalized)	A	A	A
5	Wakeman Dr at Frontage Rd Entrance (Unsignalized)	A	A	A
6	Wakeman Dr at Employee Lot (Unsignalized)	A	A	A
7	Wakeman Dr at Observation Rd (Unsignalized)	A	A	A
8	Piper Ln at Observation Rd (Unsignalized)	A	A	A
9	Gateway Blvd at Carolina Dr (Unsignalized)	A	A	A

5.2.2. Pedestrian, Bicycle, and Transit Access

There is no pedestrian access to the Airport, and the immediate surrounding roadways do not have pedestrian facilities. Gateway Blvd is the only Study Area roadway with sidewalks.

Bicycle access is available near the Airport. There are shared use paths along Nokesville Rd, to Godwin Dr, and Gateway Blvd. Wakeman Dr is signed as a bicycle route with shared vehicle/bicycle lanes. Bicycle Warning signs are posted on Harry J. Parrish Blvd.

The nearest transit access to the Airport is the Broad Run VRE Train Station to the northeast of the Airport. The nearest bus service is operated by OmniRide and provides connections between Downtown Manassas and eastern Prince William County, Tysons Corner, Manassas Park, the Northern Virginia Community College and destinations toward Washington D.C. There is no nearby bus service that runs to the Airport or the Broad Run VRE Train Station.

5.2.3. Parking

There is an existing free surface parking lot with 119 spaces at the Terminal Arrivals and Departures Parking Lot in front of the existing Terminal at the intersection of Harry J. Parrish Blvd and Wakeman Dr. Individual buildings, hangars, and tenants also have limited private parking within their lease areas. Free parking (236 spaces) is also provided on the west side of Wakeman Dr, north of the Fuel Farm. This lot is primarily used for Airport employees, and the businesses and Fixed Base Operators (FBOs) along Wakeman Dr.

6. No Build (2027, 2036, 2041)

Under the No Build condition, the Proposed Action would not be constructed or operated, and the Airport would continue to operate as it does with only General Aviation.

No Build pedestrian, transit, and bicycle access, as well as parking is expected to remain similar to existing conditions. A shared-use path is proposed along Prince William Parkway, Clover Hill Rd and Harry J. Parrish Blvd, however, it is currently unfunded.

6.1. Background Growth Rates

The Airport is anticipated to continue to operate as it currently does, with no expansions or improvements to the Airport beyond normal maintenance activities, and growth of existing aviation operations at typical background rates (expected to be 1.34 percent per year according to the *Manassas Regional Airport Master Plan Update*⁸ Table 2-22). Prince William County provided a traffic background growth rate of two percent per year⁹ which was applied to existing volumes for each No Build year. The traffic volumes within the Study Area are almost exclusively due to Airport traffic, and local industry to a lesser extent (other than the Prince William Parkway and Clover Hill Rd intersection which carries regional traffic). Because the anticipated growth rate for the Airport without commercial airline operations is less than the two percent background traffic growth rate, it was assumed that background Airport growth is accounted for within the two percent background traffic growth rate.

⁸ The Master Plan forecast was approved by the FAA for use in the HEF Master Plan on August 12, 2024.

⁹ Email from Kevin Wrauch, AICP (Prince William County) to Erica Swansen, PE PTOE (Swans Engineering, PLLC), RE: Traffic Study Coordination with Prince William County- Manassas Regional Airport (HEF), Proposed Part 139 Certification and Terminal Redevelopment Environmental Assessment Project, June 4, 2025

6.2. No Build Projects

Trip increments for background No Build projects were also added to the No Build condition. Prince William County provided two proposed projects on Harry J. Parrish Blvd to be included in No Build conditions¹⁰:

10. 1,718,823 SF Data Center
1. 340,500 SF Data Center

Proposed traffic increment maps were provided for Project #1 and added to the No Build volumes. No Build Project #2 did not have an associated traffic study; proposed trips were estimated using the Institute of Transportation Engineers Trip Generation Manual (11th Edition), Land Use Code 160 – Data Center and assigned through the traffic network using the same routing assumptions as Project #1. Volume Maps showing the No Build increments from the two projects are presented in **Appendix G** for the weekday AM and PM peak hours. It was assumed that Saturday midday increments would be minimal and would fall within the typical background growth rate.

6.3. Roadway Improvements

As discussed above, the intersection of Piper Ln with Observation Rd was in the process of being relocated. It is anticipated that the new intersection between Piper Ln and Observation Rd will be completed prior to 2027 and the new configuration was therefore included in No Build conditions. The configuration is similar to pre-construction conditions, with a stop-controlled Observation Rd meeting free-flowing Piper Ln at a T-intersection. This intersection will be located further south along Piper Ln. This configuration was included in the 2027, 2036, and 2041 No Build analysis.

Planning and design for a diverging diamond interchange (DDI) in place of the current Prince William Parkway and Clover Hill Road intersection is currently underway. Prince William County has indicated that they anticipate the build year to be 2030¹¹. The DDI was therefore included in the 2036 and 2041 No Build analyses. Because a design had not been finalized at the time of this report, assumptions were made regarding the layout and signal operations of the DDI based on existing and future traffic growth, to estimate operations of the updated intersection under No Build conditions. The Prince William Parkway and Clover Hill Rd intersection was expected to remain the same as existing conditions for the 2027 No Build analyses.

6.4. No Build Analysis

Volume maps for the No Build conditions on a weekday AM and weekday PM peak hours for 2027, 2036, and 2041, and Saturday midday peak hour for 2036 and 2041 are presented in Appendix G. 2027 No Build conditions were only modeled to compare to 2027 Construction conditions. Because peak construction activity is associated with employee shifts, construction conditions were not analyzed for the Saturday midday peak hour.

¹⁰ Email from Kevin Wrauch, AICP (Prince William County) to Erica Swansen, PE PTOE (Swans Engineering, PLLC), RE: Traffic Study Coordination with Prince William County- Manassas Regional Airport (HEF), Proposed Part 139 Certification and Terminal Redevelopment Environmental Assessment Project, August 22, 2025

¹¹ Email from Mekdes Tabor (Prince William County) to Erica Swansen, PE PTOE (Swans Engineering, PLLC), RE: Manassas Airport - follow up 8/19, August 19, 2025 and Email from Richard Windish PE, PMP to Erica Swansen, PE PTOE (Swans Engineering, PLLC, RE: Manassas Airport - DDI 10-15, October 15, 2025

As shown in **Table 6-1**, **Table 6-2**, and **Table 6-3**, all unsignalized intersections within the Study Area are expected to operate at acceptable LOS A. All approaches and movements are expected to operate at LOS B or better. 95th percentile queues are expected to increase by less than one vehicle, compared to Existing conditions.

In 2027, the Prince William Parkway at Clover Hill Rd would operate at overall LOS C during the weekday AM peak hour and LOS D during the weekday PM peak hour. The eastbound and westbound approaches would operate at LOS E and the northbound and southbound approaches would operate at LOS C or D. 95th percentile queues would be greater than existing queues, however they would all be accommodated within existing storage lengths.

As described above, the Prince William Parkway at Clover Hill Rd intersection would be converted to a DDI in 2030. The signalized and unsignalized intersections and approaches of the DDI operate at LOS B or better and all queues are less than two vehicles.

Table 6-1: No Build - 2027 Intersection Peak Hour Levels of Service

Intersection Number	Intersection	Peak Hour Intersection LOS	
		Weekday AM	Weekday PM
1	Prince William Parkway at Clover Hill Rd (signalized)	C	D
2	Harry J. Parrish Blvd at Clover Hill Rd (unsignalized)	A	A
3	Harry J. Parrish Blvd at Wakeman Dr (unsignalized)	A	A
4	Wakeman Dr at Frontage Rd Exit (unsignalized)	A	A
5	Wakeman Dr at Frontage Rd Entrance (unsignalized)	A	A
6	Wakeman Dr at Employee Lot (unsignalized)	A	A
7	Wakeman Dr at Observation Rd (unsignalized)	A	A
8	Piper Ln at Observation Rd (unsignalized)	A	A
9	Gateway Blvd at Carolina Dr (unsignalized)	A	A

Table 6-2: No Build - 2036 Intersection Peak Hour Levels of Service

Intersection Number	Intersection	Peak Hour Intersection LOS		
		Weekday AM	Weekday PM	Saturday Midday
1a	New: Prince William Parkway at Clover Hill Rd East (signalized)	B	A	A
1b	New: Prince William Parkway at Clover Hill Rd West (signalized)	B	B	B
1c	New: NB Prince William Parkway Merge from DDI (unsignalized)	A	A	A
1d	New: SB Prince William Parkway Merge from DDI (unsignalized)	A	A	A
2	Harry J. Parrish Blvd at Clover Hill Rd (unsignalized)	A	A	A
3	Harry J. Parrish Blvd at Wakeman Dr (unsignalized)	A	A	A
4	Wakeman Dr at Frontage Rd Exit (unsignalized)	A	A	A
5	Wakeman Dr at Frontage Rd Entrance (unsignalized)	A	A	A
6	Wakeman Dr at Employee Lot (unsignalized)	A	A	A
7	Wakeman Dr at Observation Rd (unsignalized)	A	A	A
8	Piper Ln at Observation Rd (unsignalized)	A	A	A
9	Gateway Blvd at Carolina Dr (unsignalized)	A	A	A

Table 6-3: No Build - 2041 Intersection Peak Hour Levels of Service

Intersection Number	Intersection	Peak Hour Intersection LOS		
		Weekday AM	Weekday PM	Saturday Midday
1a	New: Prince William Parkway at Clover Hill Rd East (signalized)	B	A	B
1b	New: Prince William Parkway at Clover Hill Rd West (signalized)	B	B	B
1c	New: NB Prince William Parkway Merge from DDI (unsignalized)	A	A	A
1d	New: SB Prince William Parkway Merge from DDI (unsignalized)	A	A	A
2	Harry J. Parrish Blvd at Clover Hill Rd (unsignalized)	A	A	A
3	Harry J. Parrish Blvd at Wakeman Dr (unsignalized)	A	A	A
4	Wakeman Dr at Frontage Rd Exit (unsignalized)	A	A	A
5	Wakeman Dr at Frontage Rd Entrance (unsignalized)	A	A	A
6	Wakeman Dr at Employee Lot (unsignalized)	A	A	A
7	Wakeman Dr at Observation Rd (unsignalized)	A	A	A
8	Piper Ln at Observation Rd (unsignalized)	A	A	A
9	Gateway Blvd at Carolina Dr (unsignalized)	A	A	A

As discussed above, pedestrian, bicycle, and transit access is not expected to change significantly between Existing and No Build conditions. There are no expected impacts to parking in the No Build conditions, with all parking being able to be accommodated in existing on-airport lots.

7. Build Construction (2027)

Construction activities related to the Proposed Action would temporarily impact local traffic operations due to truck and construction worker trips to and from the Airport. These projected trips were evaluated for their short-term effects to determine the potential for impacts to the existing roadway network.

The 2027 total trip increments include construction trips plus Airport passenger and employee trips. 2027 Construction analysis includes 2027 No Build volumes, 2027 Construction trips, plus expected trips generated by commercial airline operations in 2027. Calculation of trips generated by construction and commercial airline operations are discussed in detail in **Section 4.1**. A discussion of the trip assignments throughout the roadway network is provided in **Section 4.2**.

It is anticipated that Project #s 1, 2, 4, and 5 (see **Table 4-1**) would be completed prior to 2027, and therefore roadway improvements associated with these projects were applied to the Construction analyses. As discussed earlier and presented in **Figure 4-1**, these included updating the frontage access to a one-way “in” entrance, expanding parking at the Terminal Parking Lot to all three quadrants, and constructing the Economy Parking Lot.

During construction, all unsignalized intersections would operate at acceptable LOS B or better, as shown in **Table 7-1**, and all movements would operate at acceptable LOS C or better. 95th percentile queues would be expected to increase from 2027 No Build conditions by less than one vehicle at all unsignalized intersections except the southeastbound approach of Harry J. Parrish Blvd at Clover Hill Rd which would increase by six vehicles¹² to 188 ft and the westbound approach of Harry J. Parrish Blvd at Wakeman Dr which would increase by three vehicles to 80 ft during the weekday PM peak hour. All unsignalized intersection queues would be accommodated within existing storage lengths.

Table 7-1: Construction - 2027 Intersection Peak Hour Levels of Service

Intersection Number	Intersection	Peak Hour Intersection LOS	
		Weekday AM	Weekday PM
1	Prince William Parkway at Clover Hill Rd (signalized)	D	F
2	Harry J. Parrish Blvd at Clover Hill Rd (unsignalized)	A	B
3	Harry J. Parrish Blvd at Wakeman Dr (unsignalized)	A	A
4	Wakeman Dr at Frontage Rd Exit (unsignalized)	A	A
5	Wakeman Dr at Frontage Rd Entrance (unsignalized)	A	A
6	Wakeman Dr at Employee Lot (unsignalized)	A	A
7	Wakeman Dr at Observation Rd (unsignalized)	A	A
8	Piper Ln at Observation Rd (unsignalized)	A	A
9	Gateway Blvd at Carolina Dr (unsignalized)	A	A

Operation of the signalized intersection of Prince William Parkway and Clover Hill Road would be impacted under Construction conditions, though, any impacts would be temporary in nature. The overall

¹² 25 feet per vehicle is assumed for queue lengths

intersection would operate at acceptable LOS D during the weekday AM peak hour. The eastbound approach would operate at LOS F and the westbound approach would continue to operate at LOS E, similar to 2027 No Build conditions. The AM peak hour 95th percentile queue for the northbound left would exceed existing available storage. With signal timing adjustments during the AM peak hour including modifications to the cycle length and phase lengths, the intersection would remain LOS D, the eastbound and westbound approaches would improve to LOS E and LOS D, respectively, the northbound and southbound approaches would operate at acceptable LOS D, and the 95th percentile queue lengths for all turns would be accommodated within existing available storage.

The overall PM peak hour LOS would degrade to an LOS F, the northbound approach would operate at acceptable LOS D, and the eastbound, westbound and southbound approaches would operate at LOS F. There would be especially high delays for the eastbound and westbound through movements. However, all 95th percentile queues would be accommodated within existing available storage space. With signal timing adjustments during the PM peak hour including modifications to the cycle length and phase lengths, the intersection would remain LOS F. The eastbound approach would operate at LOS F, the westbound approach would operate at LOS D, the northbound approach would operate at LOS E, and the southbound approach would operate at LOS F. The high delays that the eastbound and westbound would have experienced would be distributed through other movements. The 95th percentile queue lengths for all turns would be accommodated within existing available storage.

Maintenance and Protection of Traffic Plans would be developed during the Design phase to help control, minimize or mitigate any potential disruptions to the traveling public during construction. It is expected that traffic operations would be monitored and any signal timing modifications implemented would be coordinated with the construction schedule to minimize impacts to the traveling public.

8. Build (2036 and 2041)

The Proposed Action would bring commercial service to the Airport through FAR Part 139 certification and the 16 proposed PEA Projects as discussed previously and presented in **Table 4-1**. Of these projects, Project #4 the Terminal Parking Lot Rehabilitation and Expansion, and Project #5, the Economy Parking Lot Construction, in conjunction with Project #1 the Terminal Building Expansion, would make modifications to the roadways and parking at the Airport. Roadway improvements associated with these projects are anticipated to be completed by 2026 and were therefore included in the 2036 and 2041 Build analyses.

The Build analysis includes changes to travel demand (build increments related to commercial airline operations), roadway geometry, traffic patterns, and Terminal Building Access as a result of the Proposed Action.

8.1. Geometric Modifications

Roadway modification would occur as a result of the Proposed Action. Project #4 would modify access to the Proposed Terminal Building and Terminal Parking lot. Access to the parking lot would be provided at the north Frontage Rd Entrance off Wakeman Dr which would be converted from two-way to one-way counterclockwise. Access would also be provided in the existing center aisle entrance at the Harry J. Parrish

Bldv and Wakeman Dr intersection. Egress from the parking lot would occur at the south end of Frontage Rd and also in the central aisle (**Figure 4-1**).

There would also be a new Economy Parking Lot built on the west side of Wakeman Dr, to the north of the intersection with Harry J. Parrish Blvd. This lot would have two, two-way, two-lane (one in each direction) driveways along Wakeman Dr. These intersections would be stop-controlled at the driveways and free-flow on Wakeman Dr (**Figure 4-1**). For analysis purposes, it is expected that there would be a shuttle that runs from the Economy Lot to the Terminal Frontage with a round trip every 15 minutes.

8.2. Traffic Operations

The Proposed Action would result in a change in traffic demand and travel patterns to the Airport. The Proposed Action has been analyzed for the 2036 full build year, as well as for 2041, the build year plus five years. The results of the traffic analysis for these scenarios are provided below.

The Proposed Action analysis consists of expected traffic generated by the Airport in 2036 and 2041 to the No Build conditions for 2036 and 2041, plus the geometric changes described above. As discussed previously, projected vehicle trips for the Airport were generated based on projected flight schedules plus employee trips. Vehicles were assigned to Study Area intersections via direct and logical routes to the Airport; Airport visitor origins and destinations were based on population within the catchment area used by the Flare Consulting Forecast, and employee/construction trips were based on employee origin and destination data from the Census Bureau.

LOS results for intersections under Proposed Action conditions in 2036 and 2041 are provided in **Table 8-1** and **Table 8-2**. All signalized and unsignalized intersections are expected to operate at overall LOS B or better during the 2036 and 2041 Proposed Action peak hours. Individual movements and approaches would operate at acceptable LOS C or better. Some 95th percentile queues would increase from No Build conditions, however all queues would be less than approximately four vehicles and would be accommodated within available storage.

Table 8-1: Proposed Action - 2036 Peak Hour Levels of Service

Intersection Number	Intersection	Peak Hour Intersection LOS		
		Weekday AM	Weekday PM	Saturday Midday
1a	Prince William Parkway at Clover Hill Rd East (signalized)	B	B	A
1b	Prince William Parkway at Clover Hill Rd West (signalized)	B	B	B
1c	NB Prince William Parkway Merge from DDI (unsignalized)	A	A	A
1d	SB Prince William Parkway Merge from DDI (unsignalized)	A	A	A
2	Harry J. Parrish Blvd at Clover Hill Rd (unsignalized)	A	B	A
3	Harry J. Parrish Blvd at Wakeman Dr (unsignalized)	A	A	A
4	Wakeman Dr at Frontage Rd Exit (unsignalized)	A	A	A
5	Wakeman Dr at Frontage Rd Entrance (unsignalized)	A	A	A

6	Wakeman Dr at Employee Lot (unsignalized)	A	A	A
7	Wakeman Dr at Observation Rd (unsignalized)	A	A	A
8	Piper Ln at Observation Rd (unsignalized)	A	A	A
9	Gateway Blvd at Carolina Dr (unsignalized)	A	A	A
10	New: Wakeman Dr at Economy Lot South Driveway (unsignalized)	A	A	A
11	New: Wakeman Dr at Economy Lot North Driveway (unsignalized)	A	A	A

Table 8-2: Proposed Action - 2041 Peak Hour Levels of Service

Intersection Number	Intersection	Peak Hour Intersection LOS		
		Weekday AM	Weekday PM	Saturday Midday
1a	Prince William Parkway at Clover Hill Rd East (signalized)	B	B	B
1b	Prince William Parkway at Clover Hill Rd West (signalized)	B	B	B
1c	NB Prince William Parkway Merge from DDI (unsignalized)	A	A	A
1d	SB Prince William Parkway Merge from DDI (unsignalized)	A	A	A
2	Harry J. Parrish Blvd at Clover Hill Rd (unsignalized)	A	B	A
3	Harry J. Parrish Blvd at Wakeman Dr (unsignalized)	A	A	A
4	Wakeman Dr at Frontage Rd Exit (unsignalized)	A	A	A
5	Wakeman Dr at Frontage Rd Entrance (unsignalized)	A	A	A
6	Wakeman Dr at Employee Lot (unsignalized)	A	A	A
7	Wakeman Dr at Observation Rd (unsignalized)	A	A	A
8	Piper Ln at Observation Rd (unsignalized)	A	A	A
9	Gateway Blvd at Carolina Dr (unsignalized)	A	A	A
10	New: Wakeman Dr at Economy Lot South Driveway (unsignalized)	A	A	A
11	New: Wakeman Dr at Economy Lot North Driveway (unsignalized)	A	A	A

8.1. Parking Improvements

The Proposed Action would add additional parking to the Airport property via Project #4, the Terminal Parking Lot Rehabilitation and Expansion and Project #5, the Economy Parking Lot Construction (**Figure 4-1**).

Project #4, would convert the three existing grass quadrants in the main Terminal Parking Lot to parking, expanding available spaces from 119 spaces in the northwest quadrant to a total of 529 spaces, including 11 ADA accessible parking spaces across all four quadrants. Project #5 would construct an economy parking lot along Wakeman Dr. This lot would have 647 parking spaces and a shuttle bus station. Shuttle service would likely be provided for this lot, and for the purposes of this analysis, it is expected to complete one round trip every 15 minutes between the economy lot and the main terminal frontage. Combined, there would be 1,176 parking spaces available for visitors parking at the airport, enough spaces to accommodate approximately three days of projected parked vehicles. The employee lot would remain the same as existing with 236 spaces. It is expected that all employee parking would be accommodated on Airport property. All

parking needs are expected to be accommodated by on-Airport parking, and there are therefore no significant impacts associated with projected parking.

9. Alternative #1 Construction (2027)

Construction activities due to Alternative #1 would temporarily impact local traffic operations due to truck and construction worker trips to and from the Airport. These projected trips were evaluated for their short-term effects to determine the potential for impacts to the existing roadway network.

2027 Construction analysis includes 2027 No Build volumes and 2027 Construction trips.

9.1. Alternative #1 Construction Trips and Assignments

Peak construction is expected to occur in 2027. Trips are expected to be generated by construction workers and single unit short-haul and combination short-haul trucks. The highest daily volume is estimated to reach 96 round trips per day, with 92 worker round trips (92 “ins” and 92 “outs”), and 4 truck round trips (4 “ins” and 4 “outs”). It is anticipated that both daytime and nighttime work would occur. It was assumed that 75 percent of workers would work the day shift, arriving before their 7:00 AM shift in the morning and leaving at the end of their shift after 3:00 PM, with 75 percent of truck trips and construction material deliveries spread throughout an eight-hour day. The remaining 25 percent would work an overnight shift (10:00 PM to 6:00 AM) to perform construction airside while the airport is closed. For the purpose of this analysis it was assumed that worker trips leaving the overnight shift would overlap with workers trips arriving for the day shift. Construction trips were assigned following the same methodology outlined in **Section 4.2**. It is assumed that construction workers would park in the employee parking lot.

9.2. Alternative #1 Construction Analysis

During construction, all unsignalized intersections would operate at acceptable LOS A, as shown in **Table 9-1**, and all movements would operate at acceptable LOS B or better. 95th percentile queues would be expected to increase from 2027 No Build conditions by less than one vehicle at all unsignalized intersections. All unsignalized intersection queues would be accommodated within existing storage lengths

Table 9-1: Construction - 2027 Intersection Peak Hour Levels of Service

Intersection Number	Intersection	Peak Hour Intersection LOS	
		Weekday AM	Weekday PM
1	Prince William Parkway at Clover Hill Rd (signalized)	D	D
2	Harry J. Parrish Blvd at Clover Hill Rd (unsignalized)	A	A
3	Harry J. Parrish Blvd at Wakeman Dr (unsignalized)	A	A
4	Wakeman Dr at Frontage Rd Exit (unsignalized)	A	A
5	Wakeman Dr at Frontage Rd Entrance (unsignalized)	A	A
6	Wakeman Dr at Employee Lot (unsignalized)	A	A
7	Wakeman Dr at Observation Rd (unsignalized)	A	A
8	Piper Ln at Observation Rd (unsignalized)	A	A
9	Gateway Blvd at Carolina Dr (unsignalized)	A	A

The overall intersection LOS for the signalized intersection of Prince William Parkway and Clover Hill Road would operate at acceptable LOS D during the weekday AM and PM peak hour. The eastbound and westbound approaches would continue to operate at LOS E. The northbound and southbound approaches would continue to operate at LOS C during the AM peak hour. During the PM peak hour, the northbound approach would continue to operate at LOS C. The southbound approach would degrade from LOS D to LOS E. Queues would increase from No Build to construction, however, all 95th percentile queues would be accommodated within existing available storage space.

Maintenance and Protection of Traffic Plans would be developed during the Design phase to help control, minimize or mitigate any potential disruptions to the traveling public during construction. It is expected that traffic operations would be monitored and any signal timing modifications implemented would be coordinated with the construction schedule to minimize impacts to the traveling public.

10. Conclusion

A Traffic Impact Study was performed to determine the impacts of the Proposed Action, 16 Projects at HEF, including a Terminal Building Expansion, Terminal Parking Lot Rehabilitation and Expansion, and Economy Parking Lot Construction, to establish commercial airline operations and obtain Part 139 certification.

This Traffic Impact Study evaluated the potential traffic impacts that the Proposed Action could have on the surrounding traffic network. The report described Existing traffic operations in the vicinity of the Airport, established trip generation rates related to the Proposed Action, assigned the trips throughout the roadway network, and analyzed and evaluated Existing (2024), No Build (2027, 2036, and 2041), Construction (2027) and Build (2036 and 2041) operations. The Proposed Action would not have a significant impact on traffic operations within the Study Area.

During the peak of construction in 2027 of the Proposed Action, unsignalized intersections in the Study Area would not be impacted. The intersection of Prince William Parkway at Clover Hill Rd would experience impacts, however, those impacts would be temporary.

During the AM peak hour the intersection would operate at acceptable LOS D, however the eastbound approach would operate at LOS F, the westbound approach would operate at LOS E and the 95th percentile queue for the northbound left turn would exceed existing available storage. With signal timing adjustments during the AM peak hour, the intersection would remain LOS D, the eastbound and westbound approaches would improve to LOS E and LOS D, respectively, the northbound and southbound approaches would operate at acceptable LOS D, and the 95th percentile queue lengths for all turns would be accommodated within existing available storage.

During the PM peak period, overall LOS would degrade to a LOS F but all 95th percentile queues would be accommodated within existing available lane storage. With signal timing modifications, LOS would improve and queue lengths would remain within existing available storage lengths. Maintenance and Protection of Traffic Plans would be developed during the Design phase to help control, minimize or

mitigate any potential disruptions to the traveling public during construction. Traffic operations would be monitored and any signal timing modifications implemented would be coordinated with the construction schedule to minimize impacts to the traveling public.

Construction analysis was also performed for Alternative #1. Unsignalized intersections in the Study Area would not be impacted during 2027 Alternative #1 construction. Overall LOS for the intersection of Prince William Parkway at Clover Hill Rd would remain LOS D, however the southbound approach would degrade from LOS D to LOS E between No Build and construction. All 95th percentile queues would be accommodated within existing available lane storage. Maintenance and Protection of Traffic Plans would be developed during the Design phase to help control, minimize or mitigate any potential disruptions to the traveling public during construction. Traffic operations would be monitored and any modifications implemented would be coordinated with the construction schedule to minimize impacts to the traveling public.