



TO:	David Ennis Craig Nicholson Affirmative Investments, Inc.	DATE:	December 29, 2022
FROM:	Keri Pyke, P.E., PTOE Christa Lucas, P.E.	HSH PROJECT NO.:	2021203.00
SUBJECT:	Southern Tier Housing Transportation Impact Review		

At the request of the Martha's Vineyard Commission (MVC), *Howard Stein Hudson (HSH)* has estimated the trip generation and assessed the transportation impacts related to the proposed Southern Tier Housing construction of 60 affordable residential units (the Project). Additionally, HSH reviewed the Transportation Action Plan (TAP) prepared for the Edgartown-Vineyard Haven Road Corridor.

The Southern Tier Residential Project will add approximately 20 – 30 vehicles to the adjacent streets during the a.m. and p.m. peak hours (5 entering and 17 exiting during the a.m. peak hour, and 19 entering and 11 exiting during the p.m. peak hour). It is anticipated that these trips will have minimal impact to the safety or operations of the area roadways. Thirty vehicles in the peak hour equates to one vehicle every two minutes, a de minimis impact.

Edgartown-Vineyard Haven Road

As described in the Edgartown-Vineyard Haven Road TAP (submitted in December 2021), Edgartown-Vineyard Haven Road is a two-way, two-lane rural minor arterial under the Town of Oak Bluffs jurisdiction. The roadway runs in a straight-line from the study limits of Barnes Road in the northwest to Jardin Mahoney's/County Road in a northwest-southeast direction. For the purposes of this report, we will refer to Edgartown-Vineyard Haven Road as an east-west roadway. This portion of roadway is approximately a mile in length. The roadway generally provides a shared-use pathway on the south side of the roadway within the study area. Pedestrian crossings are provided along the roadway at Schoolhouse Village, at the Martha's Vineyard Regional High School (MVRHS) driveway, at the Martha's Vineyard Arena, and at County Road. The pedestrian crossing at County Road provides pedestrian warning signage. Shared use paths are also provided along the west side of County Road and within the State Forest to the south of the MVRHS. The posted speed limit along Edgartown-Vineyard Haven Road is 45 miles per hour (mph) and 20 mph within the school zone limits from approximately 350 feet to the west and 780 feet to the east of the main entrance at Sanderson Avenue. The speed limit is 15 mph approaching the Edgartown-Vineyard Haven Road/Barnes Road roundabout to the west.



Data Collection

Massachusetts Department of Transportation (MassDOT) continuous count station MVC405 is located on Edgartown-Vineyard Haven Road to the east of Hidden Cove Road. Count station data indicate that the traffic is highest in July and lowest in January on Edgartown-Vineyard Haven Road. Average weekday traffic (Tuesday through Thursday) tends to be lower than average weekend traffic (Friday through Sunday). Monthly 2022 data is summarized in **Table 1**.

Table 1. Edgartown-Vineyard Haven Road Average Daily Traffic (Station MVC405)

Month	a.m. Peak Hour	p.m. Peak Hour	Average Weekday
	8- 9 am	4 – 5 pm	(Tues- Thurs)
January	655	736	8,273
February	681	742	8,495
March	685	741	8,897
April	742	796	9,852
May	844	872	11,236
June	892	939	12,500
July	933	959	13,212
August	924	955	13,140
September	832	907	11216
October	792	863	10,258
November	717	842	9,214
December	760	863	9,513
Average	787	851	10,512

Automatic Traffic Recorder (ATR) data was collected by the MVC on Edgartown-Vineyard Haven Road and Barnes Road. An ATR is a device that continuously records the number and class of vehicles on a roadway for a given period. ATR data was collected from Friday, July 1, 2022, through Wednesday, July 6, 2022, at the following locations:

- Barnes Road, north of North Line Road;
- Barnes Road, south of Pennsylvania Avenue;
- Edgartown-Vineyard Haven Road at MV Ice Arena; and
- Edgartown-Vineyard Haven Road, south of Sanborn Way.



Weekday peak volume data (Tuesday, July 5, 2022) for the roadways entering and exiting the Edgartown-Vineyard Haven Road/Barnes Road roundabout is summarized in **Table 2**.

Table 2. Edgartown-Vineyard Haven Road/Barnes Road Peak Daily Traffic

Roadway	Direction	a.m. Peak Hour	p.m. Peak Hour	Average Weekday
		8- 9 am	4 – 5 pm	(Tues- Thurs)
E-VH Road South of Sanborn Ln At MV Ice Arena	WB	522	552	7,608
	EB	609	629	7,705
	WB	429	467	6,159
	EB	393	437	5,301
Barnes Road South of Pennsylvania Ave North of North Line	SB	388	466	5,705
	NB	6	13	79
	SB	254	298	3,860
	NB	218	330	3,915

Safety

HSH compiled motor vehicle crash data from the MassDOT IMPACT portal for the most recent three-year period for which complete data are available (2018-2020). MassDOT specifies any crash records or data for the years after 2020 are subject to change or are not considered to be complete or up to date. Therefore, any crash data after 2020 has not been used for analysis purposes. Crash rates are determined based on the number of crashes per million vehicles entering an intersection. **Table 3** summarizes the crash data in the study area. The detailed crash data and crash rate worksheets are provided in the **Appendix**.



Table 3. Crash Summary

Scenario		E-VH Road	E-VH Rd at Sanderson Ave	E-VH Rd at County Rd	E-VH Rd at Ryans Way	E-VH Rd/ Barnes Rd/ Airport Rd
TOTAL		5	5	3	1	1
Year	2018	1	2	2	1	0
	2019	3	1	1	0	0
	2020	1	2	0	0	1
Severity	Property Damage Only	3	2	2	1	0
	Non-fatal Injury	1	2	1	0	0
	Not Reported	1	1	0	0	0
Type	Single Vehicle	1	1	0	1	1
	Angle	2	2	2	0	0
	Rear-End	2	1	1	0	0
	Sideswipe, same direction	0	1	0	0	0
	Head-on	0	0	0	0	0
Road Surface	Dry	5	5	2	1	1
	Wet	0	0	1	0	0
Light	Daylight	5	2	2	1	0
	Dusk	0	0	0	0	0
	Dark – Lighted Roadway	0	3	0	0	0
	Dark – Roadway not lighted	0	0	0	0	1
	Not reported	0		1	0	0
Weather	Clear	2	5	1	1	1
	Cloudy/Rain/Fog	2	0	2	0	0
	Not reported	1	0	0	0	0
Bicycle/Ped Crashes (2018-2020)		0	1	0	0	0
Crash Rate (2018 – 2020)^{1,2}		0.43	0.43	0.26	0.09	0.09
District 5 Average Crash Rates¹		0.73	0.73	0.73	0.73	0.73

Source: MassDOT, IMPACT crash data portal.

¹Crashes per million entering vehicles (MEV) based on average weekday daily volumes on EV-H Rd.

²Crash rate for most recent, complete three-year period (2018-2020).



Project Description and Overview

The Project consists of the construction of 60 affordable residential units. The site will be accessed via one driveway on Edgartown-Vineyard Haven Road. The Site driveway location provides good sight lines to Edgartown-Vineyard Haven Road and will allow for safe turns into and out of the Site. Appropriate lighting and signage at the driveway will meet all Town requirements and will improve visibility for all vehicles to maintain safety in and around the Site. The Proponent will encourage bicycle use by providing covered bicycle storage at the community building.

TRIP GENERATION

The traffic expected to be generated by the proposed Project was determined based on industry standards. The trip generation estimates were based on data published within the latest Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 11th Edition. The 11th Edition includes land uses that were not included in the 10th Edition, including affordable housing. The units associated with the Project will be affordable; to assess the range of residential trips associated with the Project, the following land use codes (LUC) were considered:

- **Land Use Code 220 – Multifamily Housing.** Low-rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have two or three floors (levels). Various configurations fit this description, including walkup apartment, mansion apartment, and stacked townhouse.
- **Land Use Code 223 – Affordable Housing.** Affordable housing includes all multifamily housing that is rented at below market rate to households that include at least one employed member. Eligibility to live in affordable housing can be a function of limited household income and/or resident age. Calculations of the number of vehicle trips use ITE's average rate per dwelling unit.

Trip generation for multifamily housing (LUC 220) was minimally higher than trip generation for affordable housing (LUC 223). For a conservative analysis, the land use with the higher number of trips, LUC 220 – Multifamily Housing, was used for this assessment.

Due to water/wastewater capacity restrictions, the units may be constructed in phases, with 45 units in the first phase and an additional 15 units when the Town adds capacity to the sewage treatment plant. The Project-generated vehicle trips associated with the first phase (45 units) and full Project (60 units) are summarized in **Table 4**. Detailed trip generation is provided in the **Appendix**.



Table 4. Project-generated Vehicle Trips

Time Period	Direction	Vehicle Trips (LUC 220)	
		45 units	60 units
Daily	In	152	202
	Out	152	202
	Total	304	404
a.m. Peak Hour	In	4	5
	Out	13	17
	Total	17	22
p.m. Peak Hour	In	14	19
	Out	8	11
	Total	22	30

PROJECT IMPACTS

Project impacts on Edgartown-Vineyard Haven Road and the Edgartown-Vineyard Haven Road/Barnes Road roundabout were assessed.

EDGARTOWN-VINEYARD HAVEN ROAD

The Project will add approximately 22 – 30 vehicles to the adjacent streets during the a.m. and p.m. peak hours (5 entering and 17 exiting during the a.m. peak hour and 19 entering and 11 exiting during the p.m. peak hour). Generally, the Project will have impacts of less than 4% to the peak hour traffic on Edgartown-Vineyard Haven Road. The 20 – 30 peak hour trips generated by the Project will be distributed to the local roadways and are not expected to have a significant impact on the operations or safety of Edgartown-Vineyard Haven Road or at the Edgartown-Vineyard Haven Road/Barnes Road roundabout. Comparisons of Project-generated vehicle trips and existing volumes on Edgartown-Vineyard Haven Road and at the Edgartown-Vineyard Haven Road/Barnes Road roundabout are summarized in **Table 5**.

Table 5. Project-generated Impacts, Edgartown-Vineyard Haven Road

Intersection ¹ /Time Period	a.m. Peak Hour			p.m. Peak Hour		
	Volume (vph)	Project Trips (vph)	% Increase	Volume (vph)	Project Trips (vph)	% Increase
Edgartown-Vineyard Haven Road						
Peak Season (July)	933	22	2%	959	30	3%
Average	787		3%	851		4%

¹ Volumes from Count Station MVC405.



The *Highway Capacity Manual* states that the “capacity of a roadway facility is the maximum reasonable hourly rate at which vehicles can be expected to transverse a point or a uniform section of lane or roadway during a given time period under prevailing roadway, traffic, and control conditions. Reasonable expectancy is that the stated capacity can be achieved repeatedly.”¹ Federal Highway Administration (FHWA) data identifies the hourly capacity of a two-lane rural roadway with a roadway speed of 45 mph and flat terrain to be 3,600 vehicles per hour (1,800 vehicles per hour in each direction) for operations at LOS B or better.² Adequate capacity exists on Edgartown-Vineyard Haven Road to accommodate of the Project-generated trips.

EDGARTOWN-VINEYARD HAVEN ROAD/BARNES ROAD ROUNDABOUT

According to the MassDOT Guidelines for the Planning and Design of Roundabouts, single-lane roundabouts have a peak hour capacity of approximately 1,800 vehicles per hour and up to 25,000 vehicles per day. Capacity of the Edgartown-Vineyard Haven Road/Barnes Road roundabout is detailed in **Table 6**.

Table 6. Roundabout Capacity

Intersection ¹ /Time Period						
	a.m. Peak Hour	Capacity	% Capacity	p.m. Peak Hour	Capacity	% Capacity
Edgartown-Vineyard Haven Road						
Peak Day	1,990	1,800	110%	1,737	1,800	97%

¹ Volumes approximated from ATR data collected by Martha’s Vineyard Commission, Tuesday, July 5, 2022.

The roundabout currently experiences approximately 23,400 vpd in the peak summer season. The daily volumes in the off season are significantly lower. The Project will add approximately 404 vpd, an approximately 1.7% increase.

¹ Highway Capacity Manual, 7th Edition. Transportation Research Board (2022).

² Simplified Highway Capacity Calculation Method for the Highway Performance Monitoring System, FHWA (October 2017).



Conclusion

The Southern Tier Residential Project will add approximately 20 – 30 vehicles to the adjacent streets during the a.m. and p.m. peak hours (5 entering and 17 exiting during the a.m. peak hour, and 19 entering and 11 exiting during the p.m. peak hour). It is anticipated that these trips will have minimal impact to the safety or operations of the area roadways. Thirty vehicles in the peak hour equates to one vehicle every two minutes, a de minimis impact.



HOWARD STEIN HUDSON

Engineers + Planners

Appendix

	Crash Number	City Town	Crash Date	Crash Seve	Light Conditions	Manner of	MassDOT	Non-Moto	Non-Moto	Non-Moto	RMV Docu	Road Surfa	Weather C
Roundabo	4843587	OAK BLUFF	4/9/2020	Non-fatal i	Dark - roadway not ligh	Single vehi	5				PR202013	Dry	Clear/Clea
Ryan	4568542	OAK BLUFF	5/26/2018	Property d	Daylight	Single vehi	5				PR201816	Dry	Clear
County	4710957	OAK BLUFF	5/2/2019	Non-fatal i	Daylight	Angle	5				PR201916	Dry	Cloudy
County	4749518	OAK BLUFF	8/13/2019	Property d	Daylight	Angle	5				PR201925	Wet	Rain
County	4874259	OAK BLUFF	8/28/2020	Property d	Not reported	Rear-end	5				PR202024	Dry	Clear
Sanderson	4568548	OAK BLUFF	5/29/2018	Non-fatal i	Dark - lighted roadway	Angle	5	P2: Walkir	P2: At inte	P2: Cyclist	PR201816	Dry	Clear
Sanderson	4622349	OAK BLUFF	9/22/2018	Property d	Dark - lighted roadway	Sideswipe,	5				PR201831	Dry	Clear/Clea
Sanderson	4711366	OAK BLUFF	5/8/2019	Property d	Daylight	Angle	5				PR201914	Dry	Clear/Clea
Sanderson	4899479	OAK BLUFF	9/8/2020	Non-fatal i	Dark - lighted roadway	Single vehi	5				PR202031	Dry	Clear/Fog,
Sanderson	4915974	OAK BLUFF	10/22/2020	Unknown	Daylight	Rear-end	5				PR202035	Dry	Clear
Roadway	4536123	OAK BLUFF	4/8/2018	Property d	Daylight	Single vehi	5				PR201812	Dry	Clear
Roadway	4665697	OAK BLUFF	1/23/2019	Not Repor	Daylight	Angle	5				PR201903	Dry	Cloudy
Roadway	4705918	OAK BLUFF	5/23/2019	Non-fatal i	Daylight	Angle	5				PW20191	Dry	Not Repor
Roadway	4710956	OAK BLUFF	5/28/2019	Property d	Daylight	Rear-end	5				PR201916	Dry	Cloudy
Roadway	4899454	OAK BLUFF	9/24/2020	Property d	Daylight	Rear-end	5				PR202031	Dry	Clear

Southern Tier Housing

Trip Generation Assessment¹ -- 45 units

HOWARD STEIN HUDSON

12-Aug-2022

Land Use	Size	Category	Directional Split	Average Trip Rate	Total Trips
Daily Peak Hour					
Multifamily Housing (Low Rise) ²	45	Total		6.740	304
	units	In	50%	3.370	152
		Out	50%	3.370	152
Affordable Housing (Income limited) ³	45	Total		4.810	216
	units	In	50%	2.405	108
		Out	50%	2.405	108
AM Peak Hour					
Multifamily Housing (Low Rise) ²	45	Total		0.370	17
	units	In	23%	0.085	4
		Out	77%	0.285	13
Affordable Housing (Income limited) ³	45	Total		0.360	17
	units	In	29%	0.104	5
		Out	71%	0.256	12
PM Peak Hour					
Multifamily Housing (Low Rise) ²	45	Total		0.510	22
	units	In	63%	0.321	14
		Out	37%	0.189	8
Affordable Housing (Income limited) ³	45	Total		0.460	20
	units	In	59%	0.271	12
		Out	41%	0.189	8

1. Based on ITE Trip Generation Handbook, 3rd Edition method

2. ITE Trip Generation Manual, 11th Edition, LUC 220 (Multifamily Housing Low-Rise (1-2 floors), average ra

3. ITE Trip Generation Manual, 11th Edition, LUC 223 (Affordable Housing --Income limited), average rate

Southern Tier Housing

Trip Generation Assessment¹ -- 60 units

HOWARD STEIN HUDSON

12-Aug-2022

Land Use	Size	Category	Directional Split	Average Trip Rate	Total Trips
Daily Peak Hour					
Multifamily Housing (Low Rise) ²	60	Total		6.740	404
	units	In	50%	3.370	202
		Out	50%	3.370	202
Affordable Housing (Income limited) ³	60	Total		4.810	288
	units	In	50%	2.405	144
		Out	50%	2.405	144
AM Peak Hour					
Multifamily Housing (Low Rise) ²	60	Total		0.370	22
	units	In	23%	0.085	5
		Out	77%	0.285	17
Affordable Housing (Income limited) ³	60	Total		0.360	21
	units	In	29%	0.104	6
		Out	71%	0.256	15
PM Peak Hour					
Multifamily Housing (Low Rise) ²	60	Total		0.510	30
	units	In	63%	0.321	19
		Out	37%	0.189	11
Affordable Housing (Income limited) ³	60	Total		0.460	27
	units	In	59%	0.271	16
		Out	41%	0.189	11

1. Based on ITE Trip Generation Handbook, 3rd Edition method

2. ITE Trip Generation Manual, 11th Edition, LUC 220 (Multifamily Housing Low-Rise (1-2 floors), average ra

3. ITE Trip Generation Manual, 11th Edition, LUC 223 (Affordable Housing --Income limited), average rate



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