

Date: April 6, 2022
To: Joe Laster
From: Corey Mack, PE
Subject: Laster Development, Hinesburg: Transportation Assessment

WCG has reviewed the Laster Development site plan for the proposed subdivision and development of eight single family homes in Hinesburg, Vermont. This memo estimates the projected vehicle traffic generation expected from the project, documents the existing sight distances at the proposed drive location, and addresses the transportation related planning standards in the Hinesburg Subdivision Regulations (HSR Section 5.1.6).

Background

The Laster Development is a proposed subdivision of approximately 102 acres for eight single family homes with dedicated open space off Mechanicsville Road, approximately 1500 feet south of CVU Road in [Hinesburg, VT](#). The proposed site plan is illustrated in Figure 1.

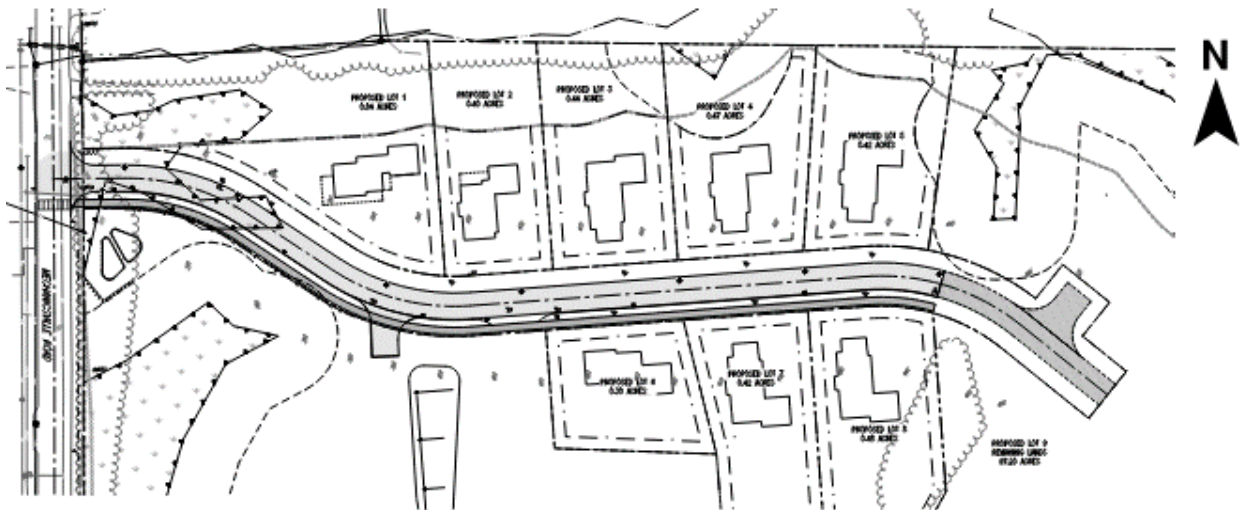


FIGURE 1: SITE PLAN (ENGINEERING VENTURES, 3/18/22)

The site proposes access from a single new roadway from Mechanicsville Road with no outlet. Mechanicsville Road is a Class 2 Town Highway (TH-2) classified as a Major Collector (MJC S0209). Mechanicsville Road has one lane in each direction with no marked shoulder or fog line, for a total roadway width of 28 feet. A curb and 5-foot sidewalk is adjacent to the west side of the road. VTrans automatic traffic recorder (ATR) site D363 just north of the project site recorded an average annual daily traffic (AADT) volume of 3,398 vehicles per day (vpd), with a design hour volume (DHV) of 507 vehicles per hour (vph) over six days of observation in July 2017. The speed limit of Mechanicsville Road is 35 mph at the proposed site drive, reducing to 30 mph approximately 700 feet to the south.

The site driveway is 22-feet wide and includes a hammerhead vehicle turnaround at the end of the roadway. The site proposes a pedestrian walkway on the south side of the proposed development driveway.

Estimated Trip Generation

Trip generation refers to the number of vehicle trips originating at or destined for a particular land use development. Data from the Institute of Transportation Engineers (ITE) can be applied to estimate trip generation associated with the former and proposed land uses. WCG consulted the ITE Trip Generation Manual, 11th Edition to estimate base vehicle trips. Base vehicle trips are the total estimated vehicle trips prior to any reductions associated with internal capture, pass-by, or transportation demand management (TDM) features.

ITE Land Use Code (LUC) 210: Single-Family Detached Housing is reflective of the proposed project. The ITE Trip Generation Manual describes the land use as:

“A single-family detached housing site includes any single-family detached home on an individual lot.”

The estimated AM peak hour, PM peak hour, and daily base vehicle trip generation is documented in Table 1 for LUC 210 Single-Family Detached Housing.

TABLE 1: ESTIMATED BASE VEHICLE TRIP GENERATION OF THE PROPOSED PROJECT

Laster Development				AM Peak Hour			PM Peak Hour			Daily
Description	ITE LUC	Size	Unit	Total	Enter	Exit	Total	Enter	Exit	Total
Single Family Detached	210	8	DU	7	2	5	9	6	3	99

The VTrans Traffic Impact Study Guidelines¹ state:

Generally, a traffic impact study should be considered when the proposed development generates 75 or more peak hour trips directly accessing the State Highway System.

The estimated base vehicle trip generation of the development is less than the 75-trip peak hour threshold typically employed by VTrans for further transportation analysis. Given the small amount of trip generation, the proposed project is not likely to result in any significant change in existing traffic operations.

¹ VTrans Traffic Impact Study Guidelines, Revised April 2019
<https://vtrans.vermont.gov/planning/development-review-services>

Sight Distance Review

As defined in the 2018 publication *A Policy on Geometric Design of Highways and Streets*, from the American Association of State Highway and Transportation Officials (AASHTO), sight distance is the “the length of roadway ahead that is visible to the driver.”² Sight distances of sufficient length are necessary at all points along a roadway to ensure vehicles can safely stop or avoid colliding with potential obstructions or other vehicles on the roadway.

Standard practice in assessing intersection safety and operations involves measuring two separate sight distances – **stopping sight distance** and **intersection sight distance**.

Stopping sight distance (SSD) is the visible distance along a roadway between an advancing motorist and a potential obstacle in the roadway. It is measured from a point representing the approaching driver’s eye and a point representing an obstacle in the roadway.³ Stopping sight distances of adequate length are needed along all roadways, both at and away from intersections, so that drivers travelling at design speeds can react to potential obstacles and safely brake to avoid collisions. Design minimum stopping sight distances are calculated based on factors such as design speed, response times, and grades as reported in the *2018 Policy on Geometric Design of Highways and Streets*.⁴

Intersection sight distance (ISD) is the distance available along the major road travelled way corresponding with the maximum visibility between an advancing motorist on the major road and an entering motorist on an intersecting minor road. It is measured between a point representing the advancing driver’s eye above the major road and a point representing the entering driver’s eye above the intersecting road.⁵

The *2018 Policy on Geometric Design of Highways and Streets* states that the available intersection sight distance should be at least equal to the required stopping sight distance along the major road.

² American Association of State Highway and Transportation Officials, *A Policy on Geometric Design of Highways and Streets*, Seventh Edition (Washington D.C.: American Association of State Highway and Transportation Officials, 2018). Page 3-2.

³ As noted in the *2018 Policy on Geometric Design of Highways and Streets* (page 3-15), the height of the driver’s eye is assumed to be 3.5’ above the road surface and the height of a potential obstacle is 2.0’ above the road surface.

⁴ American Association of State Highway and Transportation Officials, *A Policy on Geometric Design of Highways and Streets*, Seventh Edition (Washington D.C.: American Association of State Highway and Transportation Officials, 2018). Page 3-5 to 3-6.

⁵ As noted in the *2018 Policy on Geometric Design of Highways and Streets* (page 3-16), the height of the driver’s eye of the approaching vehicle is assumed to be 3.5’ above the road surface of the major road and the height of the driver’s eye of the entering vehicle is assumed to be 3.5’ above the minor road surface. The decision point offset from the travel way varies with sight conditions (page 9-38); typically the decision point is 15-feet from the travel way.

“Sight distance is also provided at intersections to allow the drivers of stopped vehicles a sufficient view of the intersecting highway to decide when to enter the intersecting highway or to cross it. If the available sight distance for an entering or crossing vehicle is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient sight distance to anticipate and avoid collisions.”

However, when possible, it is desirable to have intersection sight distances that exceed the design minimum stopping sight distances to offer improved operations, such that major road traffic need not decelerate to accommodate entering traffic.

“However, in some cases a major-road vehicle may need to stop or slow to accommodate the maneuver by a minor road vehicle. To enhance traffic operations, intersection sight distances that exceed stopping sight distances are desirable along the major road.”

Based on the 35-mph speed limit and relatively level grade of Mechanicsville Road adjacent to the project site, the design minimum intersection sight distance for turning traffic is 335 feet to the left and 390 feet to the right. The design minimum stopping sight distance is 250 feet.

We reviewed sight distances at the proposed site access entrance. Intersection sight distance measurements were reviewed from the edge of the brush line, approximately 4-feet from the edge of pavement. No obstructions were noted that would limit the sight distance from a decision point 15-feet from the edge of travel way. The intersection sight distance views to the left and right at the proposed new intersection are shown in the following figures, and the measured intersection and stopping sight distances are presented in the accompanying table.



FIGURE 2: DRIVER'S PERSPECTIVE NEAR THE EDGE OF TRAVEL WAY AT THE PROPOSED NEW SITE DRIVEWAY LOCATION ALONG MECHANICSVILLE ROAD TO THE SOUTH (LEFT) AND NORTH (RIGHT).

TABLE 2: MEASURED SSD AND ISD AT PROPOSED NEW SITE DRIVEWAY

	<i>Stopping Sight Distance</i>		<i>Intersection Sight Distance</i>	
	Northbound	Southbound	Left (to south)	Right (to north)
<i>Required Minimum</i>	250'	250'	250'	250'
<i>Design Target</i>	-	-	335'	390'
<i>Measured</i>	420'	>500'	>500'	>500'

Proposed Mechanicsville Road Crosswalk

The proposed project has illustrated a crosswalk across Mechanicsville Road on the south side of the proposed driveway location. This proposed crosswalk layout would be considered a crosswalk across an uncontrolled approach to an unsignalized intersection. The VTrans Guidelines for Pedestrian Crossing Treatments⁶ includes several crosswalk warranting criteria to consider when installing a crosswalk:

2.4.1 Criteria for installation:

A crosswalk should not be installed at an intersection on a roadway approach that is not regulated by a traffic signal, a stop sign, or a yield sign unless all of the following criteria are met (unless supported by other factors using engineering judgment:)

- 1. The speed limit is 40 mph or less. **Met - speed limit is 35 mph***
- 2. There are 20 or more pedestrians using the crossing per hour during the highest pedestrian volume hour (elementary school age and elderly pedestrians count as 2 each). **Not evaluated - no pedestrian data available***
- 3. The AADT (annual average daily traffic) for the roadway (both directions combined) exceeds 3000 vehicles per day. **Met - 2019 AADT is 3,398 vpd in 2017***
- 4. There is a sidewalk or adequate shoulder for use by pedestrians. The determination of adequate shoulder should be based upon an assessment of traffic volumes, adjacent land use patterns and other site specific conditions. The shoulder shall be a minimum of three feet wide, and a maximum of six feet wide (in order to minimize potential conflicts with parking activities.) **Met - existing sidewalk on Mechanicsville Road, proposed walkway along south side of site driveway***

⁶ VTrans Guidelines for Pedestrian Crossing Treatments – August 2019

5. There is not another crosswalk across the same roadway within 200 feet of the intersection. **Met** - nearest crosswalk is approximately 2,000 feet south of the proposed driveway location.

6. Adequate sight distance (equal to or exceeding the stopping sight distance for the posted speed) is available in both directions. At a minimum, a driver must be able to see either the crosswalk or the pedestrian warning sign. It is recommended that sight distance be measured from the driver's perspective to the outer edges of the traveled lanes, to ensure that an approaching driver can see a pedestrian at any point on the crosswalk within the traveled way. **Met** - stopping sight distances exceed required design minimums.

The VTrans crosswalk guidance further states “not all situations can be adequately addressed in this guideline; therefore engineering judgment must be used at all times.”

The pedestrian volume warrant guidance cannot be evaluated, but all other warranting criteria guidance is met. If a crosswalk is pursued, we recommend installing a W11-2 “PEDESTRIAN” advance warning signs approximately 200 feet in advance of the proposed driveway walkway in both directions, with W11-2 and W16-7P downward pointing arrow plaque at the crosswalk in both directions.

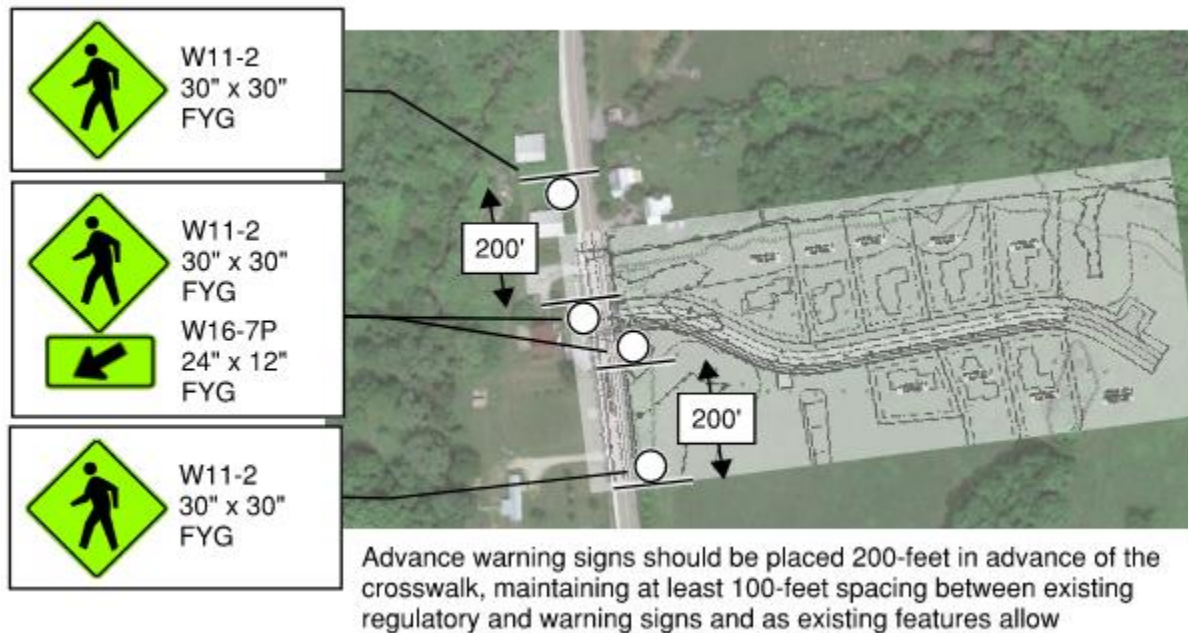


FIGURE 3: RECOMENDED SIGN PLACEMENT FOR CROSSWALK INSTALLATION

Crash History Review

WCG reviewed the most recent high crash location (HCL) report prepared by VTrans using 2012-2016 crash data. According to the HCL report, there are no HCLs at the proposed project driveway on Mechanicsville Road. The nearest HCL is a roadway segment beginning at the CVU Road & Mechanicsville Road intersection and continuing for 0.3 miles along Richmond Road, approximately 1/4 mile north of the proposed project driveway (Figure 4).

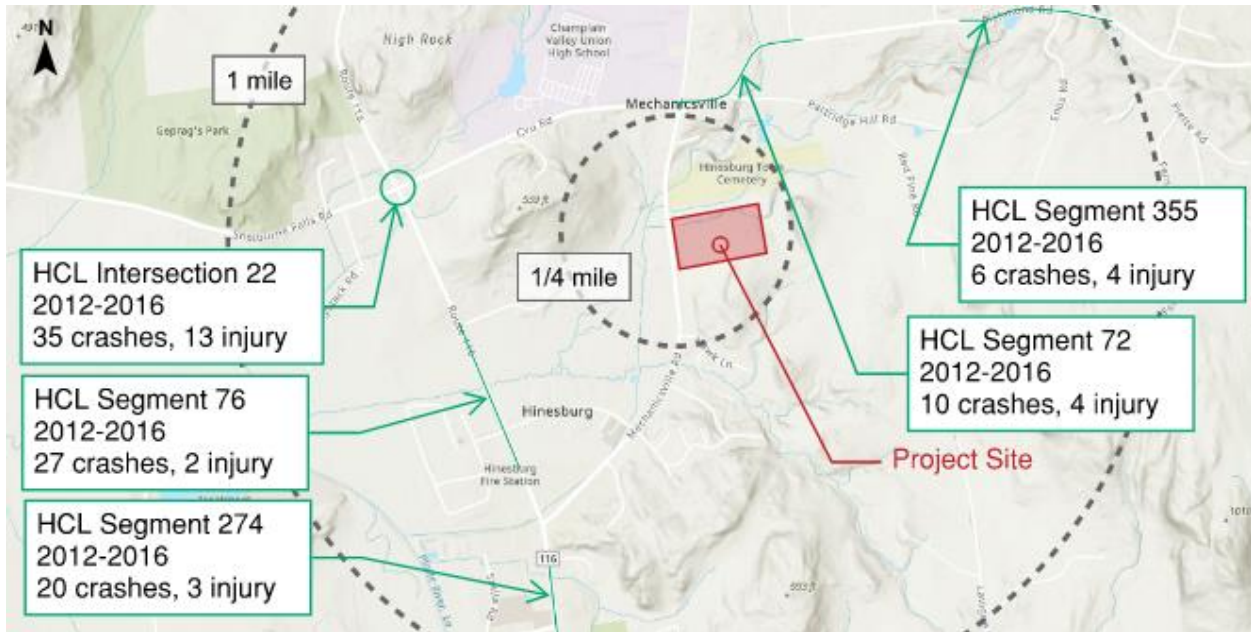


FIGURE 4: NEARBY STATE-DESIGNATED HIGH CRASH LOCATIONS USING CRASH DATA FROM 2012-2016

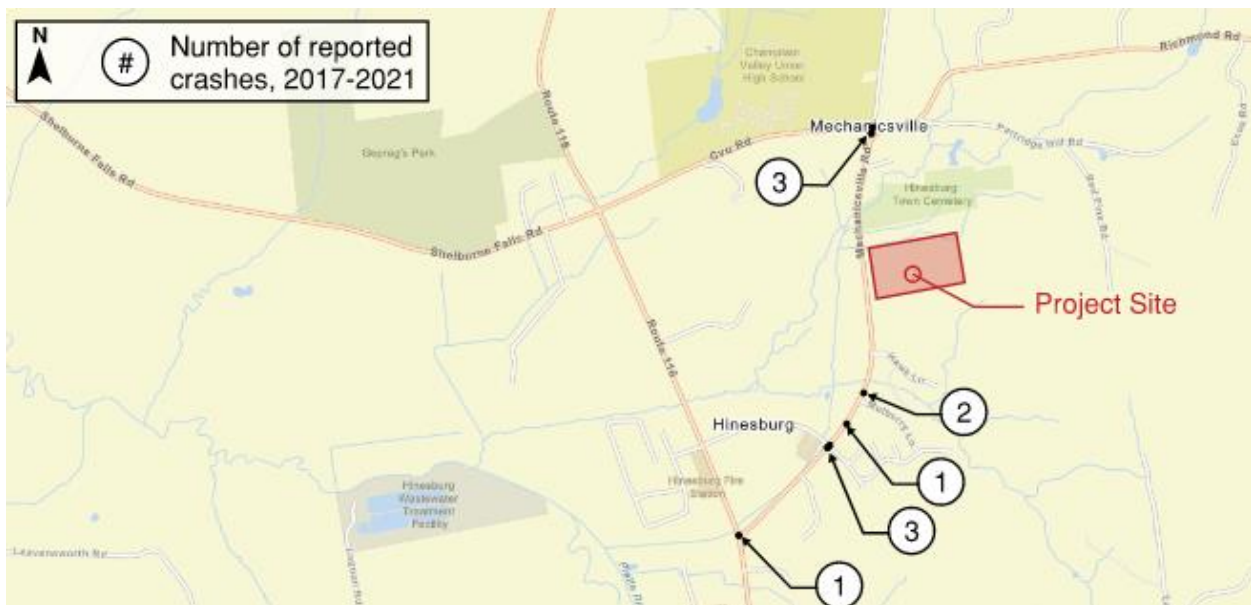


FIGURE 5: REPORTED CRASHES ALONG MECHANICSVILLE ROAD FROM 1/1/2017 THROUGH 12/31/2021

Figure 5 illustrates the nine reported crashes along Mechanicsville Road / Town Highway 2 / MJC S0209 between January 1, 2017 through December 31, 2021. No crashes were reported within 1,000 feet of the proposed site driveway.

As there is no pattern of crashes and the site distances exceed required minimums, the project is not anticipated to cause or exacerbate unsafe conditions.

Hinesburg Subdivision Regulations

The Hinesburg Subdivision Regulations⁷, section 5.1.6 states:

“5.1.6 Transportation - Whether the proposal contains adequate provision for transportation including vehicular and pedestrian traffic in terms of safety, convenience, access to points of destination and attractiveness.

- (1) Whether the proposed development will cause unreasonable highway congestion or unsafe conditions with respect to the use of roads and highways in the Town.*
- (2) Whether the layout and/or extension of any roads provides for appropriate access to the project and possible future projects as determined necessary by the Development Review Board. The Development Review Board shall consider the long term road network as it relates to existing, proposed, and potential roads and development in the Town, safety, emergency vehicle access, aesthetics, and any other impacts identified in the course of the review of the project.”*

As discussed in this transportation assessment:

- The proposed project is not expected to generate a significant amount of traffic. The eight single family homes are expected to generate fewer than 10 trips in the peak hours. The typical threshold for traffic analysis used by VTrans is 75 trips in the PM peak hour. This project is not expected to impact roadway capacity or result in any unreasonable congestion.
- The project is not located within a state-designated high crash location, and no pattern of crashes along Mechanicsville Road is evident. Sight distances at the proposed driveway location exceeds required design minimum standards. The project is not anticipated to cause or exacerbate unsafe conditions.
- The site is accessed by a single 22-foot wide roadway with no outlet serving the eight proposed residences. There is a hammerhead vehicle turnaround located at the furthest extent of the site driveway. The site access drive includes a pedestrian walkway along the south side of the roadway and marked crosswalk across Mechanicsville Road.

⁷ <https://www.hinesburg.org/planning-zoning/pages/zoning-and-subdivision-regulations>, as amended 7/12/2018