



**Salisbury Intersection Study:
Lake Dunmore Road / Upper Plains Road /
West Shore Road Intersection
Town of Salisbury, Vermont**

**ACRPC TAC Meeting
September 16 @ 6:30 pm**



- Project Overview
- Project Meetings
- Background Research
- Existing Conditions
- Multi-Way Stop Evaluations
- Project Findings
- Technical Memorandum

**Salisbury Intersection Study:
Route 53 (Lake Dunmore Road) / Upper Plains
Road / West Shore Road Intersection**

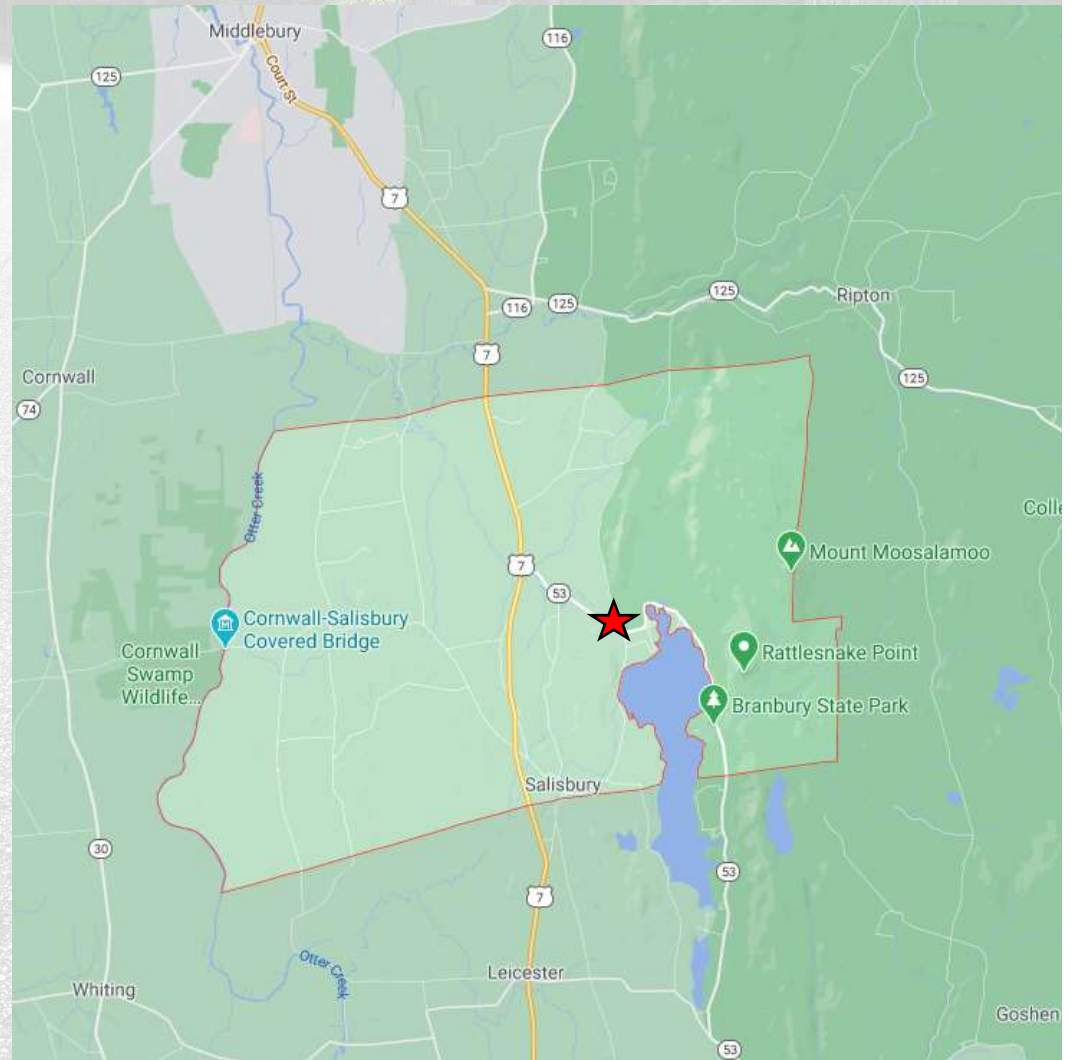
**Addison County Regional Planning Commission
Transportation Advisory Committee Meeting,
September 16, 2020**

Salisbury Intersection Study - Project Findings

ACRPC TAC Meeting – September 16, 2020

- **Project Overview**
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Project Location: Route 53 (Lake Dunmore Road) / Upper Plains Road / West Shore Road. Salisbury, VT



Salisbury Intersection Study

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Project Overview:

Review intersection as it relates to the stop-control type of the intersection.

Project Funding:

ACRPC Transportation Planning Initiative (TPI) grant

Project Background:

Similar review of the intersection was conducted by VTrans in 2018. Sheriff's department also reviewed the intersection in 2018. Public interest on both sides of the stop-control opinion: some are in favor of maintaining the intersection as a two-way stop and others are in favor of changing to an all-way stop control.

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Kick-Off Meeting:

June 26, 2020

Discuss project objectives, assumptions, scope of work, schedule, relevant information, etc.

Steering Committee Meeting:

August 28, 2020

Discuss evaluations and findings.

ACRPC TAC Meeting:

September 16, 2020

Provide project synopsis to ACRPC TAC.

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2018 VTrans intersection review:

- 2015 traffic volumes do not meet warrants for a multi-way stop. They are quite low and favor Lake Dunmore Rd with higher volumes compared to the other approaches. Crash data does not appear to meet warrants.
- Vehicles on Upper Plains Rd stopped at the intersection looking right have very limited corner sight distance. This could be increased by working with the property owner to cut vegetation between their building face and the edge of roadway.
- Under “Option” in MUTCD Section 2B.07, due to limited sight lines, this condition does allow for the installation of a multi-way stop intersection.
- If a 4-way stop is installed, habitual users may have a difficult time adjusting to the change.

2018 Sheriff’s Department review:

- Indicated that due to the line of sight a 4-way stop would be appropriate.

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Crash Data review



- Graphic shows 2015-2019 crash data reported on the VTrans Public Crash Data Query Tool.
- Anecdotal input from the Town of near-crashes.
- Approaches to intersection are Town jurisdiction.

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Salisbury Intersection Study

ACRPC TAC Meeting – September 16, 2020

Methodology: Manual on Uniform Traffic Control Devices (MUTCD) Section 2B.07, Multi-Way Stop Applications

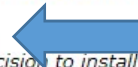
Section 2B.07 Multi-Way Stop Applications

Support:

01 Multi-way stop control can be useful as a safety measure at intersections if certain traffic conditions exist. Safety concerns associated with multi-way stops include pedestrians, bicyclists, and all road users expecting other road users to stop. Multi-way stop control is used where the volume of traffic on the intersecting roads is approximately equal.

02 The restrictions on the use of STOP signs described in [Section 2B.04](#) also apply to multi-way stop applications.

Guidance:



03 *The decision to install multi-way stop control should be based on an engineering study.*

04 *The following criteria should be considered in the engineering study for a multi-way STOP sign installation:*

- A. *Where traffic control signals are justified the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.*
- B. *Five or more reported crashes in a 12-month period that are susceptible to correction by a multi-way stop installation. Such crashes include right-turn and left-turn collisions as well as right-angle collisions.*
- C. *Minimum volumes:*
 - 1. *The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day; and*
 - 2. *The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour; but*
 - 3. *If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the values provided in Items 1 and 2.*
- D. *Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.*

Option:

05 Other criteria that may be considered in an engineering study include:

- A. The need to control left-turn conflicts;
- B. The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes;
- C. *Locations where a road user, after stopping, cannot see conflicting traffic and is not able to negotiate the intersection unless conflicting cross traffic is also required to stop; and*
- D. An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multi-way stop control would improve traffic operational characteristics of the intersection.

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MUTCD SECTION 2B.07 CRITERIA	FINDINGS
CRITERIA A: Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.	A signal warrant analysis was not conducted.
CRITERIA B: Five or more reported crashes in a 12-month period that are susceptible to correction by a multi-way stop installation. Such crashes include right-turn and left-turn collisions as well as right-angle collisions.	There are no reported crashes on the VTrans Crash Tool Query online tool at the intersection. Anecdotally, the Town has indicated that there have been crashes in vicinity of the project area, but we have no known data available to support or deny this.
CRITERIA C: Minimum Volumes: 1. The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles / hour for any 8 hours of an average day; and; 2. The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 sec./veh. during the highest hour; but 3. If the 85-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum vehicular warrants are 70 percent of the values provided in items 1 and 2.	<p>This criteria is not met.</p> <p>The maximum hourly total for both major street approaches was 162 vehicles per hour (3-4pm).</p> <p>This criteria is not met.</p> <p>The maximum hourly total for both minor street approaches was 62 vehicles per hour (3-4pm). Ped/bike volumes were negligible during the 2015 count.</p> <p>No known speed study data is available. However, even if the major-street traffic exceeded 40mph, the criteria in #1 and #2 at 70% would not be met.</p>
CRITERIA D: Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.	This criteria is not met.

MUTCD Section 2B.07 Multi-Way Stop
Application criteria are not met.



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Methodology: Manual on Uniform Traffic Control Devices (MUTCD) Section 2B.07, Multi-Way Stop Applications

Section 2B.07 Multi-Way Stop Applications

Support:

01 Multi-way stop control can be useful as a safety measure at intersections if certain traffic conditions exist. Safety concerns associated with multi-way stops include pedestrians, bicyclists, and all road users expecting other road users to stop. Multi-way stop control is used where the volume of traffic on the intersecting roads is approximately equal.

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 - 3. *If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the values provided in Items 1 and 2.*
- D. *Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.*

Option:

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- A. *The need to control left-turn conflicts;*
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Sight Distance Review: Intersection Sight distance on Minor Approaches

Road	looking left			looking right			Notes Regarding Sight Distance Limitations
	Measured Sight Distance	Speed *	ISD Criteria*	Measured Sight Distance	Speed *	ISD Criteria*	
A. Upper Plains Rd (southbound)	<u>looking towards B</u> > 600'	30 mph	335'	<u>looking towards D</u>			ISD is not met looking right. ISD is estimated to be 190' if vegetation is cut back.
				25 mph (advanced advisory sign)	280'		
				30 mph (speed limit)	335'		
C. West Shore Rd (northbound)	<u>looking towards D</u> 362'	25 mph (advanced advisory sign)	280'	365'	<u>looking towards B</u>		
		30 mph (speed limit)	335'		30 mph	335'	

* based on vehicle speed of adjacent road



If ISD is not met, it is preferable that the available sight distance meets the criteria for stopping sight distance (SSD). SSD criteria for 25mph = 155' and 200' for 30mph.

DuBois & King inc.

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Sight Distance Review:

Stopping Sight distance on Major Approaches

Road	Speed Limit	Stopping Sight Distance Criteria *	looking left		looking right	
			Looking towards	Measured Sight Distance	Looking towards	Measured Sight Distance
B. Lake Dunmore Rd (westbound)	30	200' assuming 0% approach grade	C	> 600'	A	> 600'
D. Lake Dunmore Rd (eastbound)	25 (advanced speed advisory sign)	158' assuming downgrade 3% 165' assuming downgrade 6%	A	205'	C	355'
	30 (speed limit)	205' assuming downgrade 3% 215' assuming downgrade 6%				

* SSD criteria based on speed limit of major approach and approximate road grade. AASHTO "Green Book" Table 3-2 includes grades of 3%, 6%, and 9%.



SSD criteria being met is borderline, depending on actual road grade (which was not measured).

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Sight Distance Review:

Intersection Sight distance on Major Approaches
(*applicable if changed to a 4-way stop*)

Road	looking left			looking right			Notes Regarding Sight Distance Limitations
	Measured Sight Distance	Speed *	ISD Criteria*	Measured Sight Distance	Speed *	ISD Criteria*	
B. Lake Dunmore Rd (westbound)	<u>looking towards C</u> 338'	30 mph	335'	<u>looking towards A</u> 142'	35 mph	390'	ISD is not met looking right. ISD estimated to be 625' with hedges clearing. See Photo 2.
D. Lake Dunmore Rd (eastbound)	<u>looking towards A</u> 312'	35 mph	390'	<u>looking towards C</u> 220'	30 mph	335'	ISD is not met for both. ISD estimated to be >390' looking left with vegetation clearing (see Photo 3) and approx. 380' looking right with tree/vegetation clearing (see Photo 4).

* based on vehicle speed of adjacent road

Current ISD criteria is not met but can be met with vegetation cutting.



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Sight Distance Review:

Vegetation clearing opportunities to improve sight distance for major approaches



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Project Findings:

- MUTCD Section 2B.07 Multi-Way Stop Criteria not met.
- Additional criteria that can be considered include line of sight.
- If the Town would like to pursue changing the intersection control to a 4-way intersection, they can pursue this based on sight line limitations.

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Recommendations:

- At a minimum, it is recommended that vegetation clearing be completed on the northwest quadrant of the intersection to improve sight lines. There is the potential that the house on this corner impedes intersection sight distance on Upper Plains Road to meet criteria. It is likely that sight distance would meet the criteria for stopping sight distance with vegetation clearing.
- While the major approaches do not have to stop at the intersection, additional vegetation clearing on the northeast (hedges) and southwest (trees/brush) quadrants are recommended to maximize sight lines across the intersection as a whole.
- If the Town would like to pursue a 4-way stop, it is recommended that the Town have a speed study conducted just west of the intersection to get a better understanding of actual vehicle speeds.
- It is recommended the Town update signage to meet MUTCD standards.

Salisbury Intersection Study - Project Findings

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Technical Memorandum



25 Union Street
Brandon, VT 05733
(802) 465-8390 (office)
(800) 783-7101 (fax)

TECHNICAL MEMORANDUM **(DRAFT)** (226483)

Date: September 8, 2020
To: Mike Winslow, Transportation Planner, Addison County Regional Planning Commission
Cc: Paul Vaczy, Town of Salisbury Selectboard Chair
From: Jenny Austin, P.E.
Subject: Salisbury Intersection Study Technical Memorandum

The engineering services of DuBois & King, Inc. (D&K) were retained to study the intersection of Lake Dunmore Road (Route 53) and Upper Plains Road / West Shore Road in Salisbury, Vermont as it relates to evaluating whether a four-way stop control of the intersection is warranted. Currently, vehicles on the minor approaches of the intersection (Upper Plains Road and West Shore Road) have a stop control and the major approaches, Lake Dunmore Road (Route 53), do not have to stop at the intersection.

The impetus of the intersection's control type discussion at the Town level began, to our knowledge, in the timeframe of 2018 – 2019. As stated in the grant application for this project, the intersection was reviewed in 2018 by the Addison County Sheriff's Department and Vermont Agency of Transportation. The grant application indicates that the Sheriff's Department had indicated that due to the line of sight a four-way stop would be appropriate. The VTTRANS review indicated that the traffic and crash data do not appear to meet MUTCD Section 2B.07 Multi-Way Stop Application criteria. However, conditions in the intersection would allow for the installation of a multi-way stop intersection due to line of sight limitations. As indicated by the Town, there have been petitions for both requesting a four-way stop from the Addison County Regional Planning Commission (ACRPC) to complete this study to assist the Town with making a decision as to whether to keep the two-way stop control or change to a four-way stop control.

1. Background Review

2018 Addison County Sheriff's Department Review

The grant application submitted to the ACRPC from the Town indicates that in 2018 the Addison County Sheriff's Department reviewed the intersection and indicated that due to the line of sight a four-way stop would be appropriate. Based on input at the Kick-Off Meeting, the Town has checked with the

States Prison Hollow
Road and Monkton
Ridge Road
Intersection Study

ACRPC Transportation
Advisory Committee
(TAC) Meeting
October 16, 2019 @
6:30 pm

Jenny Austin, P.E.
DuBois & King, Inc.
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Mike Winslow
Addison County Regional Planning
Commission
mwinslow@acrpc.org

