

4.0 Intersection Alternatives

4.1 Design Criteria

Based on pertinent standards and references, applicable design criteria are tabulated below. These references include:

- ◆ Vermont State Standard for the Design of Transportation Construction, Reconstruction and Rehabilitation on Freeways, Roads and Streets (VSS)
- ◆ A Policy on Geometric Design of Highways and Streets (AASHTO)

Parameter	VT 15	Sand Hill Road	Reference
Functional Classification	Urban Principal Arterial	Urban Collector	
AADT (2006)	12,000 vpd	3,500 vpd	
Design Vehicle	WB-62	WB-62	
Posted Speed	35 mph	30 mph	
Design Speed	40 mph	35 mph	
Stopping Sight Distance	300 ft.	225 ft.	VSS Sect. 3.4.1; 5.4.1
Corner Sight Distance	440 ft.	385 ft.	VSS Sect. 3.4.2; 5.4.2
Travel Lane Width			
Minimum	10 ft.	9 ft.	VSS Sect. 3.5; 5.5
Existing	11 ft.	11 ft.	
Proposed	11 ft.	10 ft.	
Shoulder Width			
Existing	4 ft.	1 ft.	
Minimum w/ Bicycles	4 ft.	2 ft.	VSS Sect. 3.14
Minimum w/o Bicycles	2 ft.	2 ft.	VSS Sect. 3.5
Proposed	4 ft.	2 ft.	
Clear Zone			
With Vertical Curb	1.5 ft.	1.5 ft.	VSS Sect. 3.9; 5.9
Without Vertical Curb	14-16 ft.	12-14 ft.	VSS Sect. 3.9; 5.9
Horizontal Alignment			
@ e _{max} = 0.04	573 ft.	430 ft.	AASHTO, Table III-8
@ sensitive resources (DS-10 mph)	302 ft.	215 ft.	AASHTO, Table III-8
@ intersection approach (DS-15 mph)	225 ft.	130 ft.	AASHTO, Table III-8 & III-7

Table 3: Intersection Design Criteria.

4.2 Alternatives

Based on existing issues and conditions and the analysis of traffic conditions, the project committee developed and evaluated three alternatives. These are:

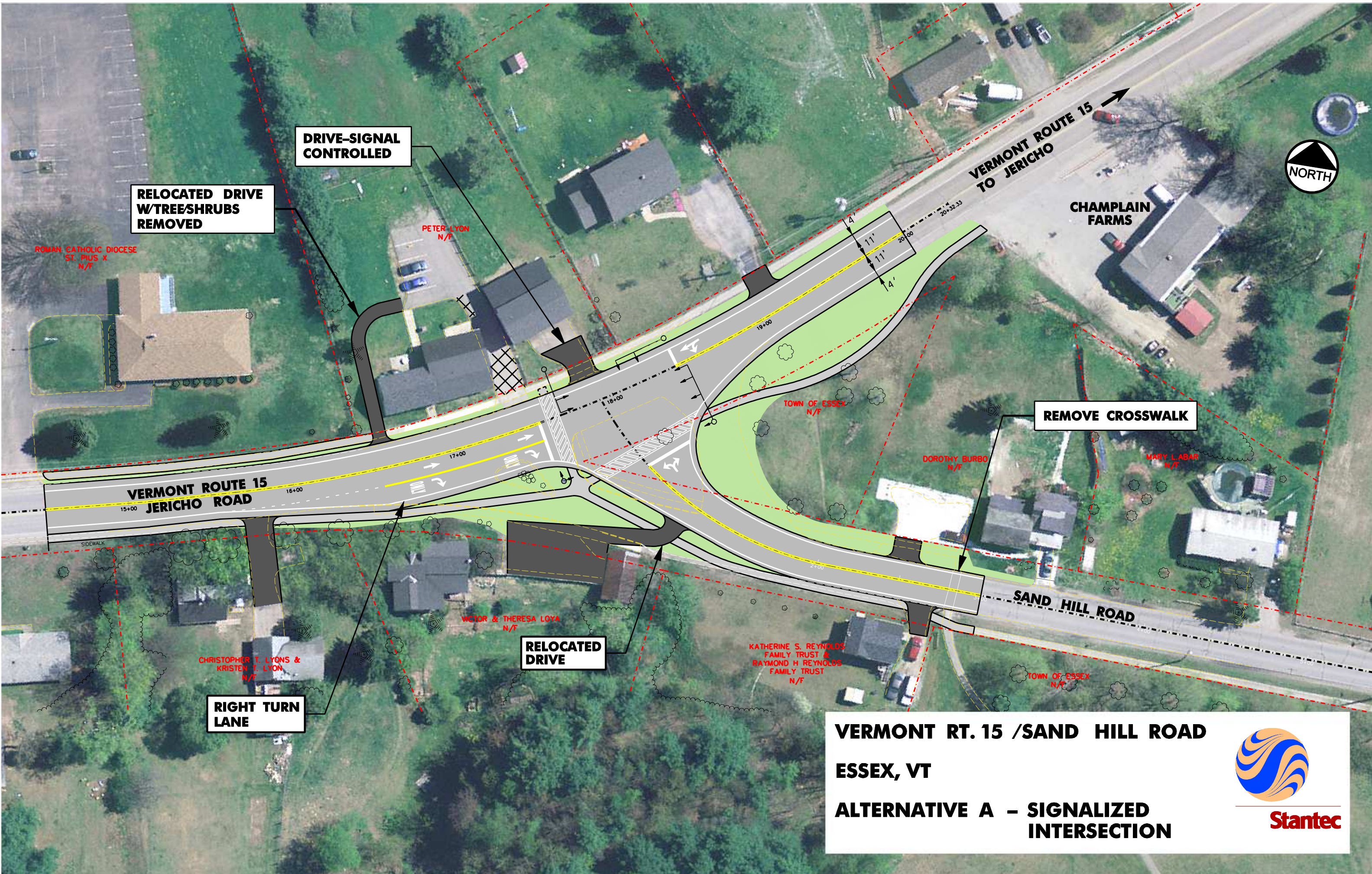
- Alternative A – Signalized Intersection (skewed)
- Alternative B – Signalized Intersection
- Alternative C – Roundabout

4.2.1 Alternative A – Signalized / Skewed Intersection

This alternative includes revising the existing geometry of the Sand Hill approach, adding a right turn lane on the VT Route 15 west approach, and installing a signal. The proposed geometry replaces the two-leg Sand Hill Road approach with a single two-lane approach intersecting VT Route 15 at a slight skew. This geometry attempts to minimize impacts to adjacent properties and drives.

Alternative A includes the following features and impacts:

- Adds a traffic signal including a protected pedestrian phase. Resulting 2018 PM DHV overall LOS is B with up to a 400 foot vehicle queue on VT 15 west approach and 200-foot queue on Sand Hill Road approach.
- Provides a protected pedestrian crossing on VT Route 15 west approach and the Sand Hill Road approach and removes the existing mid-block crossing on Sand Hill Road and maintains 4-foot shoulders on VT Route 15 for bicyclists.
- Maintains existing geometry of VT Route 15, except adds a right turn lane on VT Route 15 west approach to facilitate reducing delays and to provide an indication to Sand Hill Road traffic of VT Route 15 right turning vehicles.
- Requires moving existing sidewalk approximately 5 feet southward at the Chris/Kristen Lyon property at Station 16+00 rt. This steepens existing drive and places back of sidewalk at the existing trees.
- Provides signal control for the existing Peter Lyon Drive, opposite Sand Hill Road.
- Requires relocating two drives – Lyon and Loya properties. The Loya drive is within 50 feet of the intersection. A consolidation of drives on the north side, similar to the consolidation shown with Alternative B is an option.
- Requires removing existing large tree in the center of Sand Hill Road split approach.



**RELOCATED DRIVE
W/TREESHRUBS
REMOVED**

**DRIVE-SIGNAL
CONTROLLED**

REMOVE CROSSWALK

**RELOCATED
DRIVE**

**RIGHT TURN
LANE**

**VERMONT RT. 15 / SAND HILL ROAD
ESSEX, VT
ALTERNATIVE A – SIGNALIZED
INTERSECTION**

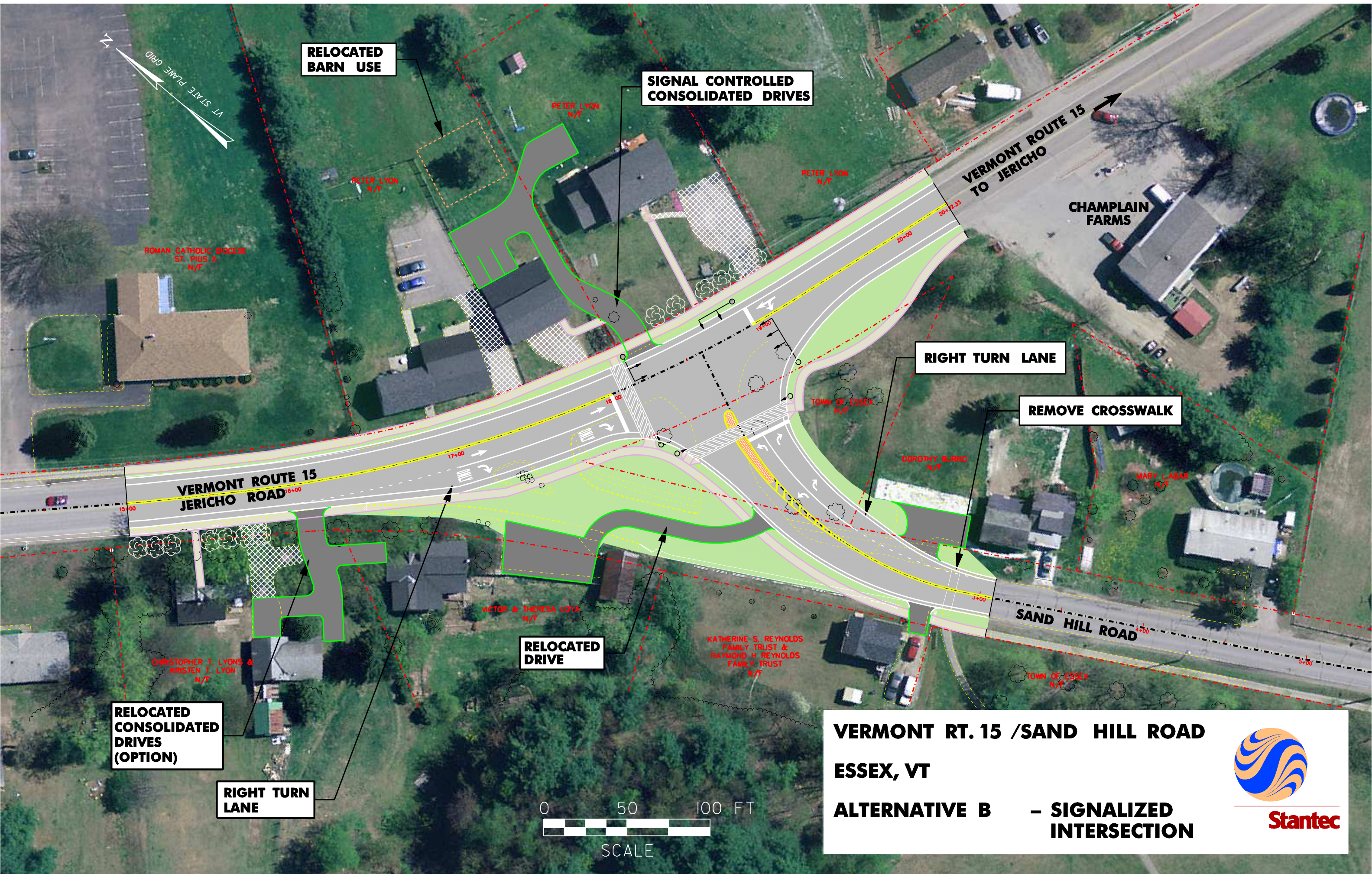


4.2.2 Alternative B – Signal / T-intersection

This alternative is similar to Alternative A. The proposed Sand Hill Road approach does intersect VT Route 15 more perpendicular and more easterly. It positions the Sand Hill Road approach along the same alignment as the existing eastern leg of the split Sand Hill Road approach.

Alternative B includes the following features and impacts.

- Adds a traffic signal including a protected pedestrian crossing phase. Resulting intersection overall LOS is B with traffic queues similar to Alternative A.
- Provides a protected pedestrian crossing on VT Route 15 west approach and Sand Hill Road approach and removes mid-block crossing on Sand Hill Road.
- Maintains existing geometry of VT Route 15 except provides a right turn lane at the VT Route 15 west approach. A 4-foot shoulder on VT Route 15 for bicyclists is proposed.
- Maintains the sidewalk location close to existing at the Chris/Kristen Lyon property.
- Provides a channelization island and two-lane approach (left and right turn lanes) on the Sand Hill Road approach, as suggested by town staff.
- Provides the relocation and/or consolidation of drives. Through discussions with the Lyons family, owners of the three properties on the north side of VT Route 15, a consolidation of three drives to one is proposed. This consolidation minimizes accesses on VT Route 15 and the consolidated drives are signal-controlled at the intersection. One benefit of the signal control is it enhances safety egress since the existing corner sight distances are restricted to less than the 445 feet desired. This consolidation effects the current barn operations of the center Lyons building. It is proposed the barn operations be replaced with a new structure beyond the proposed drive and parking area. Abandoned portions of the drive would be topsoiled and grassed. Shrubs would be included to block Sand Hill Road traffic headlights.
- Proposes to relocate the Loya Drive approximately 100 feet from the intersection. One option is to consolidate this drive with the Lyons Drive at Station 16+00 and create a new shared drive as shown as an option on the Alternative B plan. This may require additional discussions and coordination with property owners.
- Has greater impact on Burbo drive / property and requires minor adjustments to existing drive.
- Requires removing five existing large trees on town property, adjacent to the intersection.



RELOCATED BARN USE

SIGNAL CONTROLLED CONSOLIDATED DRIVES

RIGHT TURN LANE

REMOVE CROSSWALK

RELOCATED DRIVE

RELOCATED CONSOLIDATED DRIVES (OPTION)

RIGHT TURN LANE



VERMONT RT. 15 / SAND HILL ROAD
ESSEX, VT
ALTERNATIVE B – SIGNALIZED INTERSECTION



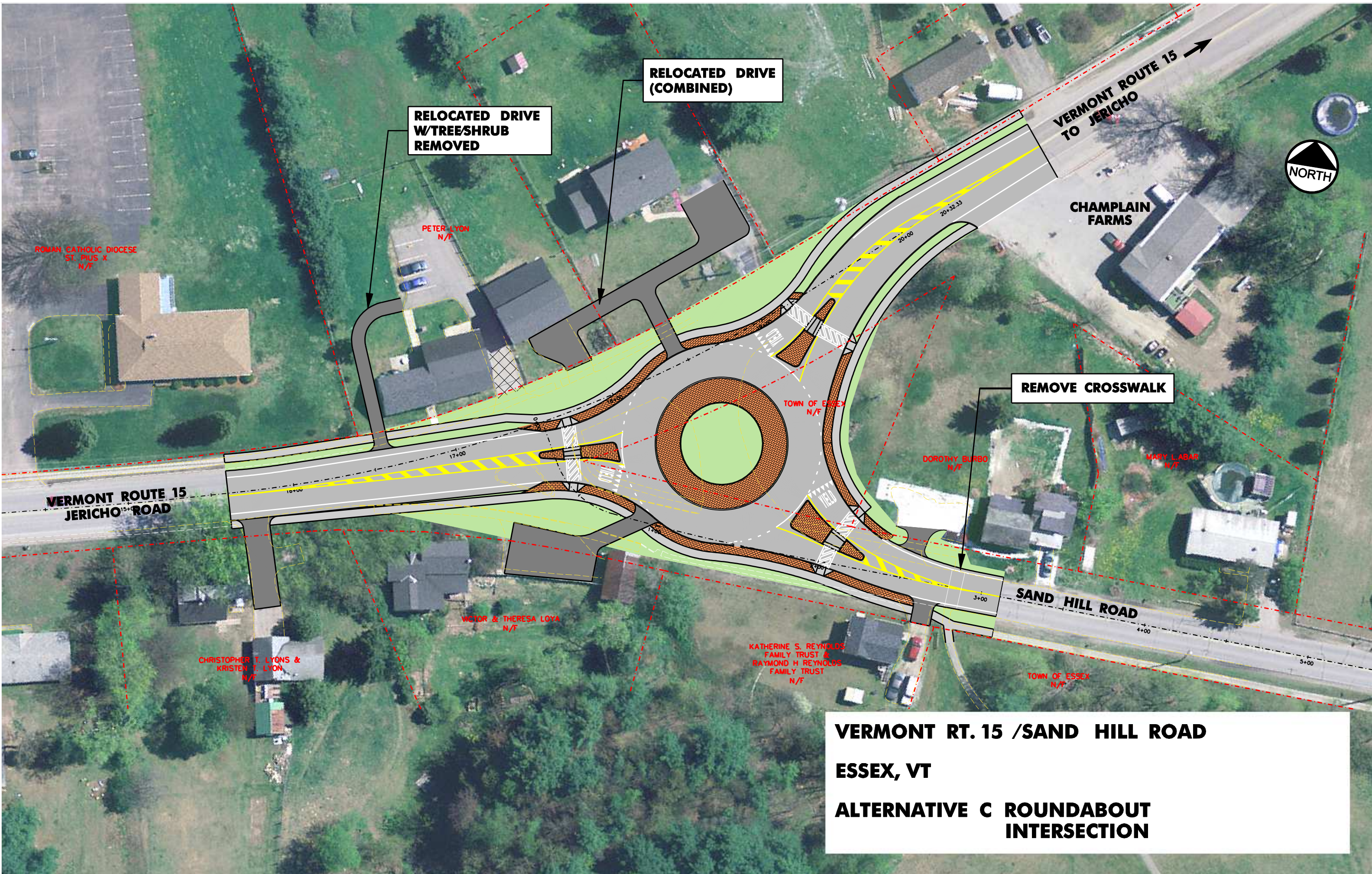
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4.2.3 Alternative C – Roundabout

The existing intersection geometry and the adjacent town property, facilitate accommodating the geometry of a single lane roundabout without significant adjacent property owner impacts. As with the signalized intersection alternatives, accommodating the existing drives is a challenge. Five drives are proposed to be relocated, realigned, or consolidated so as they either enter the roundabout directly or are beyond the proposed splitter islands.

This alternative includes the following features and impacts:

- Adds a single lane roundabout with an overall LOS B and vehicle queues of 250 feet.
- Has potential of roundabout operation being blocked in AM periods by queued traffic from VT 15 / VT 128 intersection.
- Provides a 20-mph design speed, and approach splitter islands contributing to pedestrian safety due to slower speeds, shorter crossings and looking in one direction at a time. Relies on traffic yielding to pedestrians.
- Provides a gateway treatment through landscaped center and splitter islands and curved approach geometry.
- Requires consolidating two P. Lyon's drives and providing access within roundabout.
- Requires relocating P. Lyons drive at Sta. 17+50 If approximately 100' west.
- Requires relocating Loya drive with access within roundabout.
- Has some impact at Burbo property and drive.
- Removes approximately seven large trees on town property adjacent to the existing intersection.
- Complicates snow removal process, but eliminates need to maintain a signal.



**RELOCATED DRIVE
(COMBINED)**

**RELOCATED DRIVE
W/TREESHURUB
REMOVED**

**VERMONT ROUTE 15
TO JERICO** →



**CHAMPLAIN
FARMS**

ROMAN CATHOLIC DIOCESE
ST. PIUS X
N/F

PETER LYON
N/F

REMOVE CROSSWALK

TOWN OF ESSEX
N/F

**VERMONT ROUTE 15
JERICO ROAD**

DOROTHY BURBO
N/F

MARY LABAR
N/F

VICTOR & THERESA LOYA
N/F

SAND HILL ROAD

CHRISTOPHER T. LYONS &
KRISTEN T. LYON
N/F

KATHERINE S. REYNOLDS
FAMILY TRUST &
RAYMOND H. REYNOLDS
FAMILY TRUST
N/F

TOWN OF ESSEX
N/F

VERMONT RT. 15 / SAND HILL ROAD

ESSEX, VT

**ALTERNATIVE C ROUNDABOUT
INTERSECTION**

<i>Alternative Evaluation Matrix</i>			
ITEM	Alternative A Signal/Skewed Intersection	Alternative B Signal / T- Intersection	Alternative C Roundabout
Project Costs			
Construction Costs (estimated)	\$600,000	\$650,000	\$900,000
Preliminary Engineering (20%)	120,000	130,000	180,000
Project Management (10%)	60,000	65,000	90,000
ROW Costs (estimated)	50,000	100,000	100,000
Construction Engineering (15%)	90,000	100,000	135,000
TOTAL PROJECT COSTS	\$920,000	\$1,045,000	\$1,405,000
Performance			
Overall LOS	B	B	B
Critical Approach	West	West	West
LOS	C	C	N/A
Approach Queue	400 ft.	400 ft.	250 ft.
Maintenance			
Signal	Yes	Yes	None
Snow Removal	Some	Some	More difficult
Safety			
Design speed	40	40	20
Sight distance (corner)			
Min.	440	440	220
Provided	±450	±500	±300
Accident severity	Some	Some	Less
Pedestrian crossings	Protected	Protected	Yielding vehicles
Bicycles	Similar	Similar	Less
Impacts			
Environmental	Minimal	Minimal	Minimal
Adjacent properties	1 (C. Lyon)	1 (Burbo)	2 (Burbo and Town)
Driveways relocated	2	4	4
Existing trees (town property)	1	5	7
Utilities	Some	Some	More
Permits			
ACT 250	No	No	No
NEPA	CE	CE	CE
401 Water quality	No	No	No
404 COE	No	No	No
WD – ANR Wetlands	No	No	No
Stream alteration	No	No	No
Stormwater Discharge	Possible	Possible	Yes
Archaeology – Phase IB	No	No	No
Section 106 / Historic	No	No	No
NEPDES	CGP	CGP	CGP

Table 4: Alternative Evaluation Matrix

4.3 *Public Meetings / Participation*

The public participation process included a Local Concerns Meeting, discussions with adjacent property owners, and an Alternative Presentation Meeting. The issues and concerns raised at the Local Concerns Meeting are discussed in Section 2.1 and considered in the development and evaluation of alternatives.

On February 5, 2007, an Alternatives Presentation was provided at a regularly scheduled Selectboard meeting. Notes for this meeting are included in Appendix A. There was no support for Alternative C – Roundabout. Some attendees and the Town staff indicated Alternative B – Signalized Intersection was the preferred alternative. One property owner expressed a concern with the relocated drive on the north side, bisecting her existing lawn and pointed out a school bus stops at the intersection. Subsequent property owner discussions included various drive options and the Alternative B plan was updated to reflect these discussions. More detail on this is provided in the “Preferred Alternative Section” below.

Using the revised Alternative B plan, town staff presented their preferred alternative to the Selectboard on May 7, 2007. They agreed with the selection of Alternative B – Signal / T-intersection as the preferred alternative.

4.4 *Preferred Alternative*

The preferred alternative is Alternative B – Signalized Intersection. During the design development there are some important features discussed. One feature is this alternative should include signal timing and phasing coordination with the adjacent signal at VT 15/VT 128 intersection to facilitate traffic progression on VT 15.

One challenge of this project is the number of drives in close proximity to the intersection. To address this, the Town worked with the Lyons family, who owns three properties on the north side and one property on the south side. Numerous options were discussed. The result is a consolidation of drives and directing drives to the intersection or offsetting them further from the intersection. One impact of the consolidation is the effected use of a barn on the north side. To initiate this effect, a replacement structure is proposed. See Alternative B plan for the resulting drive concepts.

During the scoping process it was pointed out the Champlain Farms just east of the intersection has plans to construct a connecting drive to Sand Hill Road. One concern expressed with a connecting road is the potential for cut-through traffic avoiding the intersection. Alternative B will provide a reduced delay and queue on the Sand Hill Road approach and will better facilitate Sand Hill Road traffic to enter VT 15. This alternative includes a dedicated right turn lane on the Sand Hill Road approach. It is anticipated these improvements will encourage turning vehicles to use the intersection, not to cut through the Champlain Farms. In the instance, through traffic is an issue, the Champlain Farms design may include features or techniques to discourage this. Potential features include a circuitous alignment or speed tables.