Final Report on the

Susie Wilson/Route 15 Jughandle

Prepared for:

Chittenden County MPO
and
Village of Essex Junction

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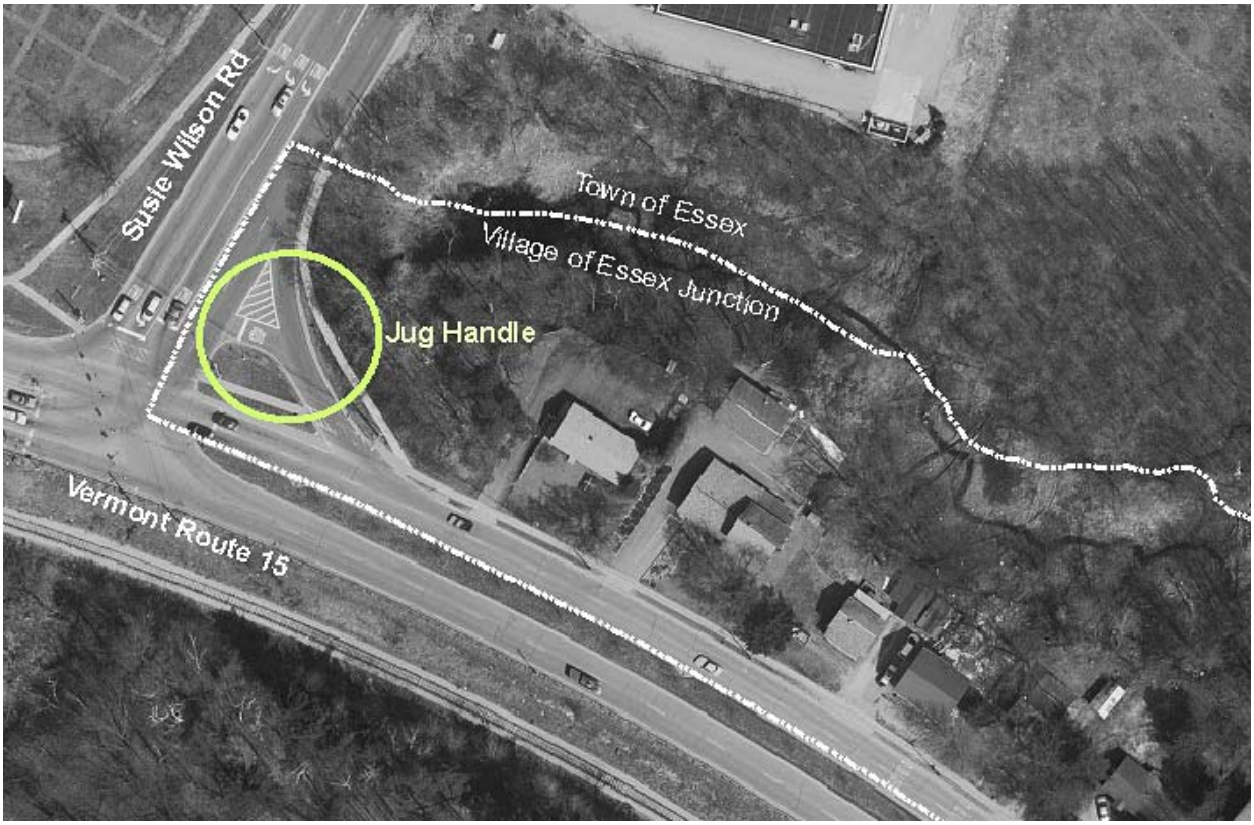
INTRODUCTION

This report evaluates the operations and safety concerns related to the westbound Route 15 jughandle lane at the Susie Wilson Road/Route 15 intersection in Essex Junction. Alternatives are proposed and evaluated that will allow for safe direction reversal for eastbound Route 15 traffic. The Village of Essex Junction initiated the study through a request to the Chittenden County Metropolitan Planning Organization's Technical Assistance program. This program provides assistance to communities on local transportation planning and engineering issues.

The jughandle allows for direction reversal for vehicles exiting residences and business on Route 15 between West Street and Susie Wilson Road, a distance of about 2,400 feet. This section of Route 15 has a median that prevents vehicles from turning left onto Route 15 eastbound. An aerial photograph of the jughandle is shown below in Figure 1. The jughandle is not a standard design. It allows no more than two vehicles to be queued here before blocking the right turn lane. In addition, the turning path does not allow vehicles to enter Susie Wilson Road before the stop bar of the traffic signal, making this turning movement awkward for drivers.

Figure 1: Route 15/Susie Wilson Road Jughandle



Study Outline

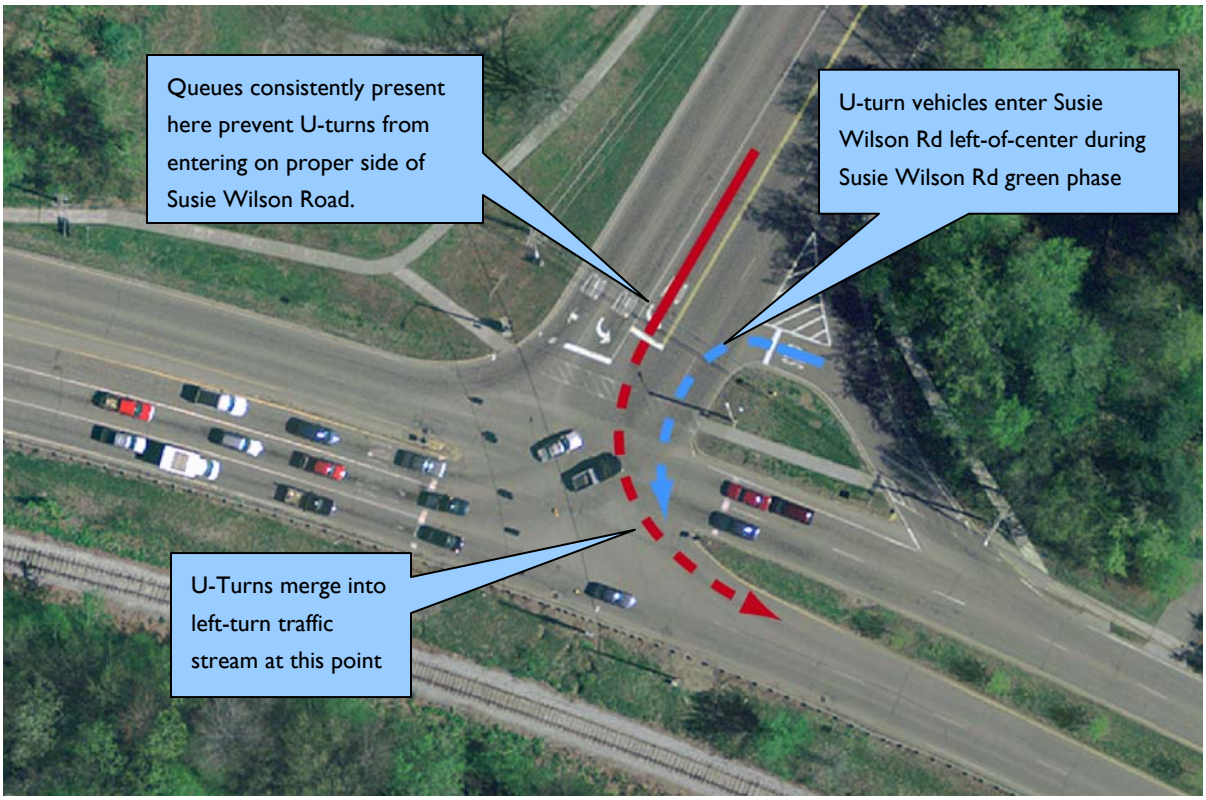
The following activities were conducted in support of this study:

- Observations of intersection operations during PM peak hour.
- Review of Intersection Traffic Counts
- Review of accident records and consultation with Essex Police Department
- Estimate of total U-turn traffic demand based on average trip generation rates
- Forecast of Future conditions based on traffic growth and land use changes.
- Develop short term and long term alternative concepts for allowing u-turns
- Assess and compare alternatives with matrix of relevant factors

Observations

Two observations and counts were conducted for this study. The intersection was observed and videotaped during the PM peak hour of March 16, 2005 from 4:00 p.m. to 5:00 p.m. During this period, ten vehicles were observed making u-turns using the jughandle. In every instance, the u-turn vehicle made the maneuver illustrated below in Figure 2, in which they entered Susie Wilson Road to the left of the center line during a green phase for Susie Wilson, and then merged or waited for a gap among the stream of left turning traffic from Susie Wilson entering Route 15 eastbound. Queues were continually present on the left turn lane on Susie Wilson, so there were no opportunities for the U-turning vehicles to enter the left turn lane properly. There was never more than one vehicle attempting a U-turn in any signal cycle, so queuing in the u-turn lane was never observed.

Figure 2: Observed Jughandle Maneuver



During the observation period, additional operational concerns were noted. In particular, long northbound queues at the Rite Aid/Ames signal on Susie Wilson Rd often extended into the lanes of Route 15 WB. This signal currently serves a relatively small amount of cross-street traffic, since the shopping center currently has high vacancy. With the redevelopment of this property, as well as new residential development proposal on the east side of Susie Wilson, the cross street traffic could grow considerably, making this queuing problem more severe. This signal's timing and phasing are tied to the Pinecrest/Susie Wilson signal, limiting options to optimize each intersection and minimize queuing.

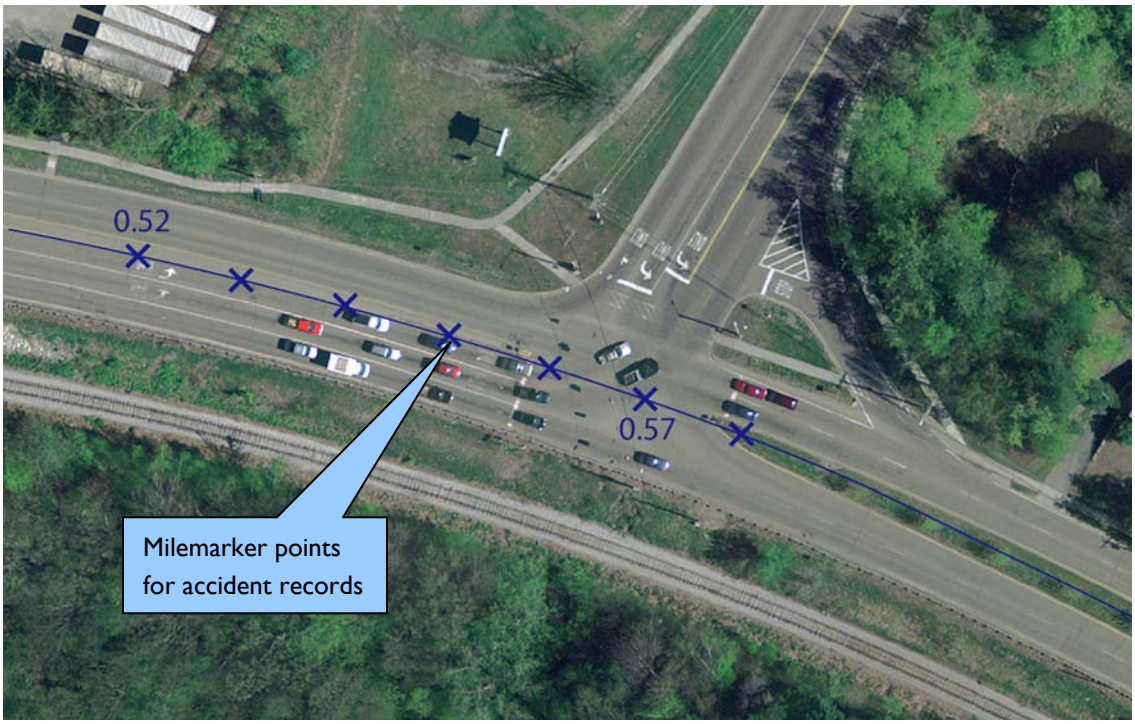
In addition, the CCMPO conducted a count of U-turns on Monday, June 13, 2005, from 7:00 a.m. to 9:30 a.m., and then from 2:00 p.m. to 6:00 p.m. This count captured school hours, which may generate different types of activity than the previous afternoon peak hour observation. The results of this count are attached to this report. A total of 55 u-turns were observed during the total 6 ½ hours of observations, or an average of 8.5 per hour. The highest hourly total was 14 per hour between 7:30 and 8:30 a.m. There were also 10 U-turns during the highest afternoon period, from 4:00 to 5:00.

Accident History

The most recent five year period of crash data for this intersection is attached to this report, from 1/1/1999 through 12/31/2003. Although the intersection was designated as a statewide "high accident location" (HAL) based on the accident rates from 1990 through 1994, the most recent available compilation of HALs for the period between 1998 and 2002 does not include the Susie Wilson Rd / VT 15 intersection. Based on a review of accident records and interviews with the Essex Police, it does not appear that the U-turn maneuver was involved in any recent accidents. The relatively slow speed of the left turning traffic allows for a relatively easy merge and gap acceptance by the u-turn vehicles. Most of the drivers making U-turns are probably familiar with the area and have adapted their driving to this idiosyncratic intersection. However, the U-turn maneuver would be difficult and potentially unsafe for those unfamiliar with this intersection.

Accident data for this portion of Route 15 and Susie Wilson Road is attached to this report. Figure 3 below shows the milemarker reference points that are reported in the accident data. Susie Wilson Road milemarkers begin at 0.0 at Route 15. The portion of Susie Wilson Road from the Ames Shopping Center entrance to Kellogg Rd was designated as a HAL in the most recent VTrans section-based compilation of crash data from 1998-2002.

Figure 3: Milemarker Reference Points for Route 15



Estimate of U-Turn Traffic Demand Volume

Trip generation rates are used to develop an estimate of the probable "demand" volume for the U-turn maneuvers at this location. Because the U-turn can be difficult during peak hours, it is likely that there fewer drivers actually making the U-turn at this location than those actually desiring to reverse direction on Route 15. Other drivers may use Pinecrest Street to get into Essex Junction, or reverse direction at an intersection along Susie Wilson Road.

An estimate of the potential daily U-turn demand has been calculated based on the following assumptions:

- Land uses on north side of Route 15 between West Street and Susie Wilson Road include approximately 14 single family and 60 multifamily residential units and 24,000 square feet of mixed commercial uses. In addition, 35 multifamily units are proposed for 235 Pearl Street are included in the future U-turn traffic estimates. While additional growth along this section of Route 15 is possible, the small parcel size along this corridor will somewhat limit growth.
- Trip generation rate assumptions are 10 trips per day per single family residential unit, 6.5 trips per day per multi-family unit, and 20 trips per day per thousand square feet general commercial (average of single tenant office, specialty retail, and light industrial). Using these trip generation rates, a total of 1292 trips per day (50% entering and 50% exiting) are estimated from this section of Route 15.
- Traffic exiting the land uses on Route 15 has destinations of 50% westbound, 50% eastbound on Route 15 (based on Lamoureux and Dickinson Traffic Impact Study for 235 Pearl Street). Therefore, the estimated u-turn volume is half of the total exiting volume, or 323 per day. This is likely a worst case scenario. Trip generation from the residential units may be lower than the ITE estimated rates, as auto ownership appears not to be high among the residents of these units. Also, with increasing development along Susie Wilson Road, and the attractiveness of using the Circ Highway rather than driving through Five Corners, the estimated 50% u-turns for exiting traffic may be high.

With these assumptions the estimate of the current U-turn traffic is 266 per day, and would increase to 323 per day if the proposed development at 235 Pearl Street is completed.

Short Term Alternatives

A range of possible short term alternatives that could be available to provide U-turn opportunities were explored with town and regional officials. By far the most promising of these was to turn right at Susie Wilson, turn right at the Rite Aid entrance, connect to Pinecrest, and then turn left on Susie Wilson and at Route 15. The proposed U-turn route is illustrated in Figure 4 on the following page.

Before this can become a viable option, however, a number of issues must be addressed. The street that accesses Rite Aid, and then connects to Pinecrest, is slated to become a town road, at which time this route could be signed for U-turns.

There is currently a proposal for a congregate care facility that will access at the corner of this new street. The site plan currently on file with the Town of Essex is attached, which does not show a clear right-of-way established between the two streets. Some type of traffic control will be needed, which ideally would not affect the ease for the U-turn traffic. Due to the oblique angle of the driveway to the congregate care facility, one option to consider is a mini-roundabout at this intersection. This would allow for a smoother flow of traffic, fewer stops for the u-turn movements, and a clear definition of traffic right-of-way. Mini-roundabouts can generally be installed within the footprint of conventional intersections, and any large vehicles may pass over the small central island, while following the priority rule for entering the intersection. The following figure shows some examples of mini-roundabouts.

An additional consideration to implement this as a short term alternative is the need for changes in the signal t twoiming and phasing of the Pinecrest and Rite Aid/Shopping Center signals. Currently, these signals operate with one timing/phasing scheme. However, some modifications to this could relieve the queuing along Susie Wilson between these two signals. The Rite Aid/Shopping Center signal currently has much lower cross-street traffic than Pinecrest, and if the signal timing plans were separated, more green time could be assigned to Susie Wilson, allowing more opportunity for Pinecrest traffic to enter and not block the intersections. Queueing could be further alleviated with the implementation of re-assigning the lane allocation at Susie Wilson/Route 15. Currently, this intersection has one exclusive right-turn lane, and two exclusive left turn lanes. An ongoing study by Lamoureux and Dickinson is determining the feasibility of reassigning the lanes to have two exclusive right turn lanes and one exclusive left turn lane, which would better match the current traffic demand. This change will require expanding the right-turn radius, and relocating a strain pole at the northwest corner of the intersection.

Figure 4: Short Term U-turn Alternative

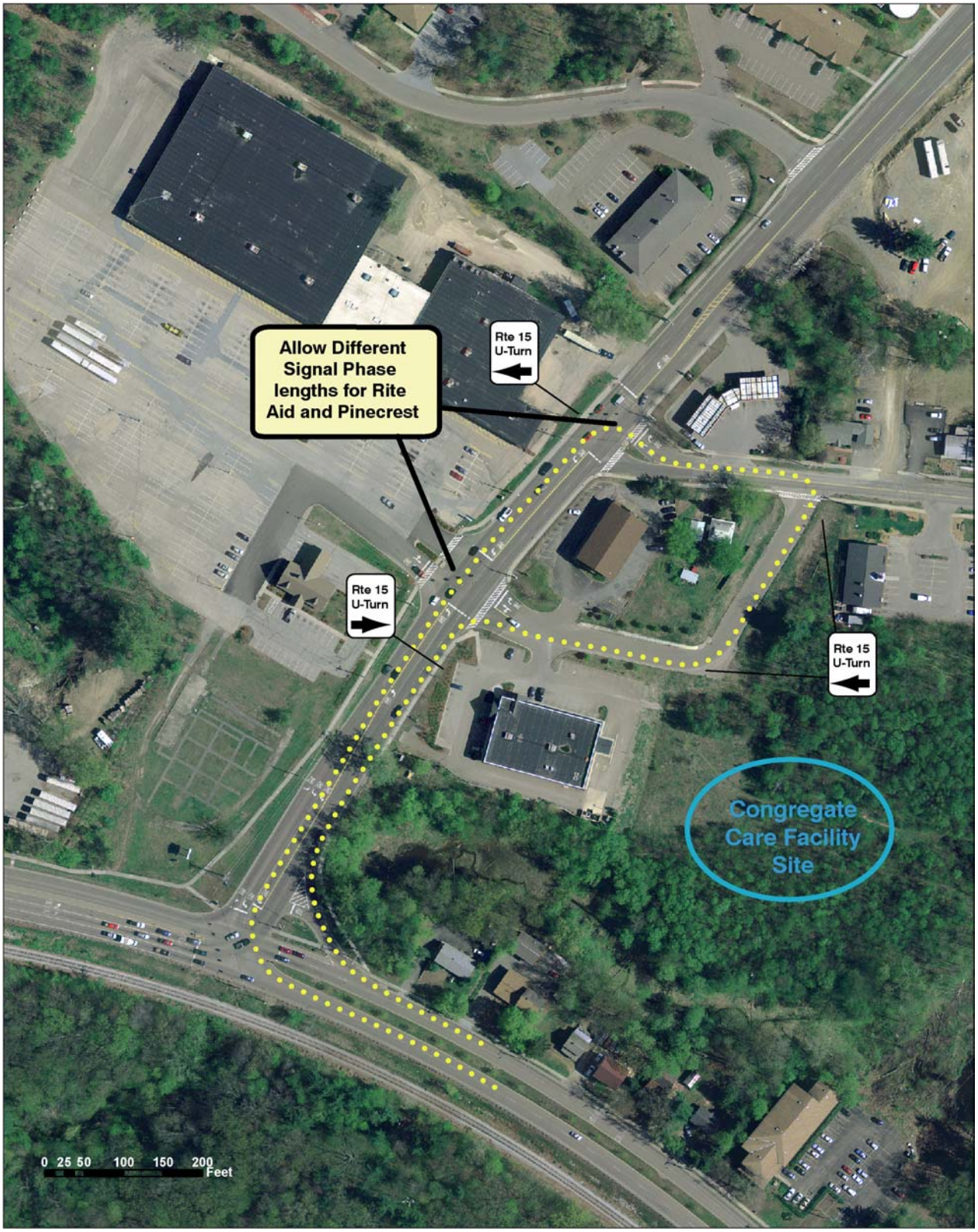
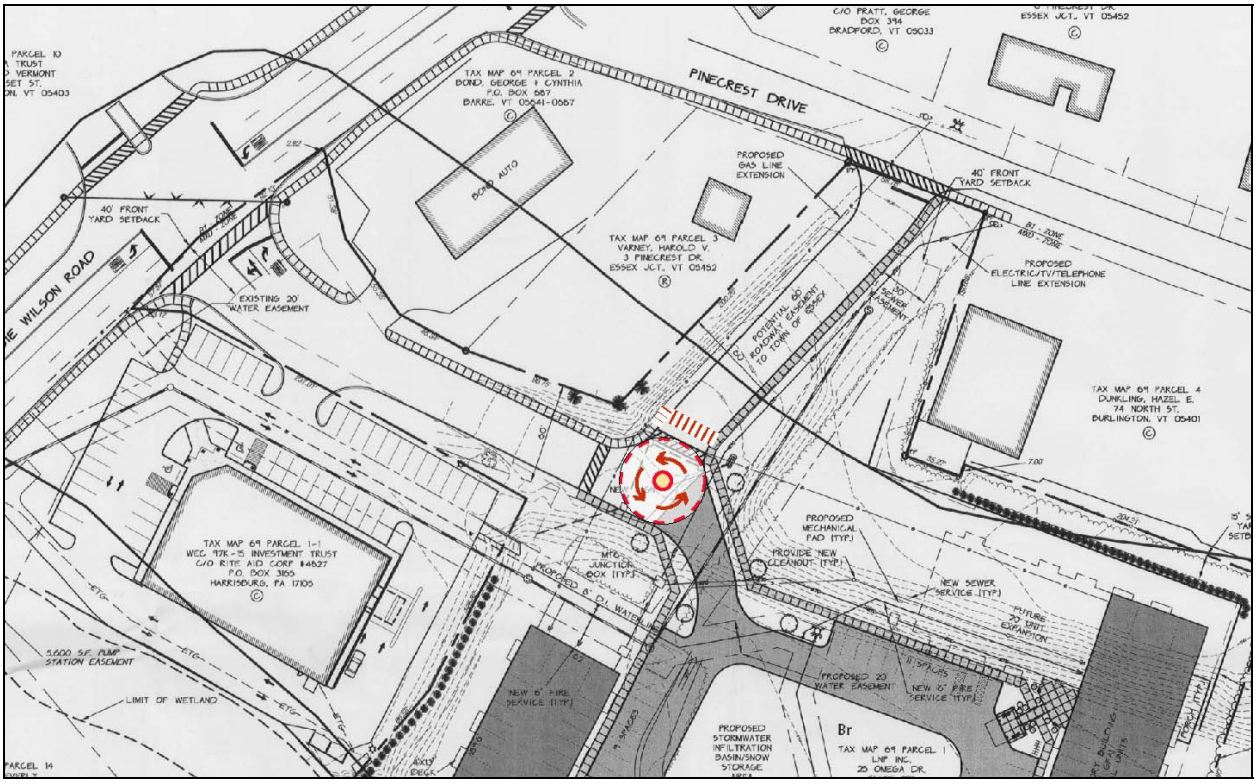


Figure 5: Examples of Mini-roundabouts

A concept for how a mini-roundabout might be implemented at the entrance to the congregate care facility is shown below.

Figure 6: Mini Roundabout concept for the Congregate Care Facility Entrance



Long Term Design Goals and Objectives

The following goals and objectives are considered in Table 1 for each long term alternative:

1) Safety-Since this intersection is a high accident location, any solution for the jughandle should improve the safety of the intersection overall.

2) Compatibility with Land Use Goals-The Susie Wilson corridor has seen a great deal of development over the past 10 years, since the construction of Route 289. This growth is likely to continue, as the Town of Essex is considering Transit Oriented Development between Route 15 and Kellogg Rd, and there are residential development proposals between Pinecrest and Route 15 currently under review.

3) Compatibility with Pedestrian and Public Transit Service- Public Transit service is planned for the corridor, so that any design proposals should allow for convenient transit stops and emphasize pedestrian safety, as transit trips are pedestrian trips at either end.

4) Ability to Accommodate Future Traffic- Upon completion of the Circumferential Highway segments A and B as planned in the CCMPO Long Range Transportation Plan, traffic volumes on Susie Wilson Road could increase. Circ Highway segments A and B are the subject of the current EIS planning and design effort. While this traffic growth could eventually be alleviated by the extension of the Circumferential Highway to Colchester, this portion of the Circ Highway is currently not programmed by VTrans. Due to funding limitations and permitting requirements, the continuation of the Circ Highway beyond Susie Wilson Rd. may be many years away, so any engineering design options for this intersection should consider the possibility of significant changes in traffic volumes and patterns that could accompany Circ segments A and B.

5) Project Cost –Planning level cost estimates are provided.

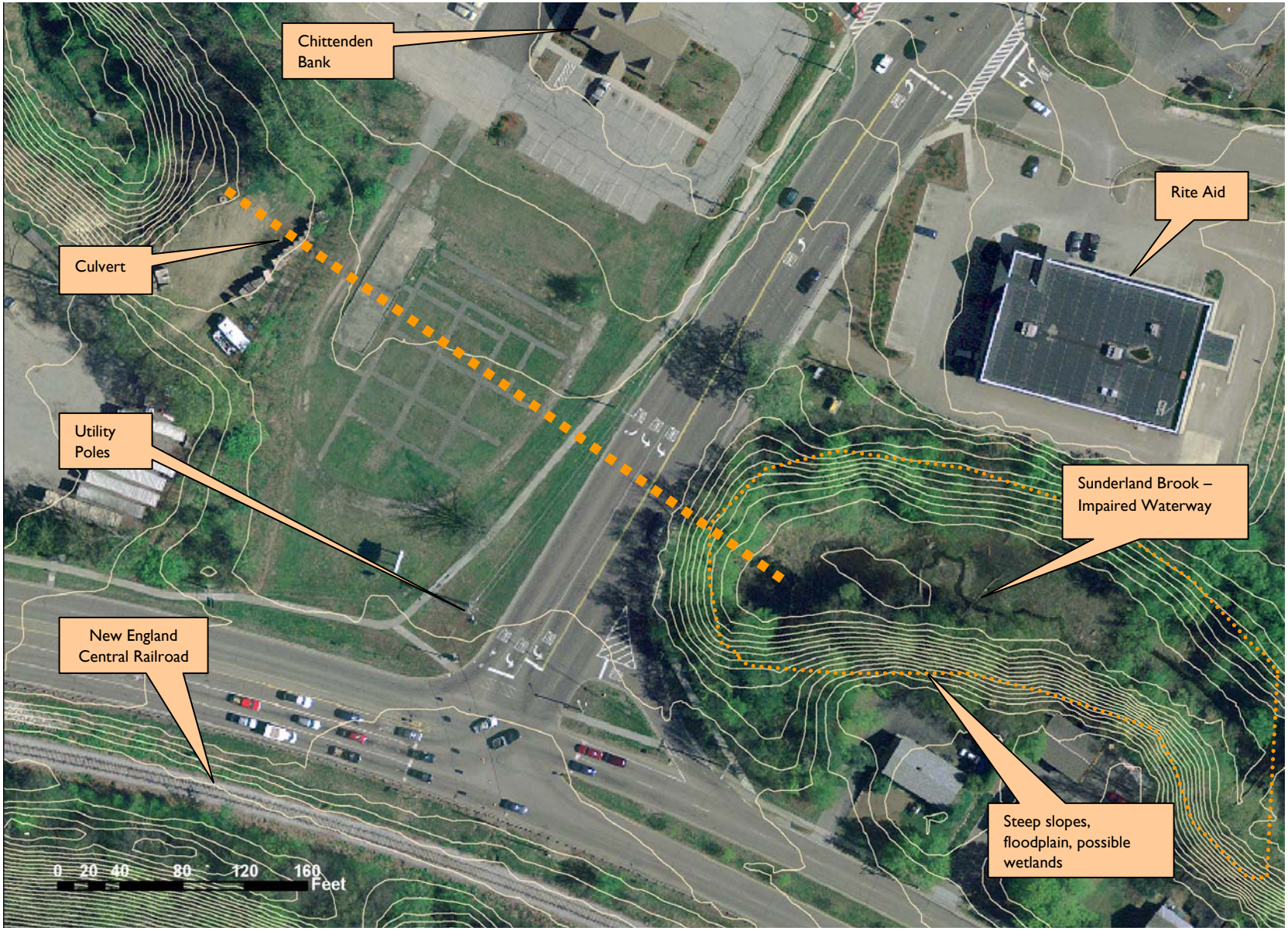
6) Environmental Impacts/Permitting-Relative degree of environmental impacts and complexity of permitting requirements will be considered. Figure 7 below shows the environmental constraints of the project area, with two foot elevation contours.

Long Term Alternatives Analysis

A wide range of alternatives, from signage changes to major construction projects, were considered in the long term alternatives analysis. Among the alternatives discussed at the project initiation were:

- Establish a signed route through Rite-Aid entrance to Pinecrest after the Town of Essex takes over this street connection.
- Provide increased width on Route 15 to allow for a U-turn at the intersection with Susie Wilson.
- Roundabout at Susie Wilson / Rte 15
- Roundabout at Shopping Center entrance on Susie Wilson Rd (just north of VT 15).
- Provide a back connection from Pearl St over to Pinecrest Rd.
- Provide for U-Turns at east entrance to Fort Ethan Allen (Ethan Allen Ave).
- Provide for a right turn into the shopping center directly from VT 15

Figure 7: Constraints at Intersection



Long Term Alternative Descriptions

The following sections describe each alternative that was developed for consideration and analysis.

A) Establish a signed route at the Rite Aid entrance to Pinecrest Dr as illustrated for the short-term recommendation in Figure 4 on page 6. While this alternative would not be as convenient to use as some of the other alternatives listed below, it is a relatively low-cost solution which would not preclude future implementation of one of the options listed below (see Figure 4).

B) New Street Connection to Pinecrest- A new street connection could be provided that would allow most of the properties along the access controlled section of Route 15 to turn right, then enter Susie Wilson at the Rite Aid intersection, and then turn left on Route 15. The location suggested would align with the connection between the Rite Aid property and Pinecrest. This alternative would be likely to require the taking of a parcel along Route 15, and would also involve crossing the creek. (see Figure 8)

C) New Street Connection to Ames Shopping Center-In this variation, a new street connection is proposed just west of the Route 15/Susie Wilson intersection (Figure 5) to align with the Chittenden Bank driveway. This would allow U-turns to exit at the current shopping center signal, and then make the left turn onto Route 15. The new street is proposed as a right-turn-in/right-turn-out. This new connector could also serve traffic generated by the proposed TOD or other redevelopment or intensification of the shopping center site. However, the entrance would generate friction for Route 15 traffic, and it is possible a right turn lane would be warranted. It appears that this new street could utilize the existing long culvert under Susie Wilson, reducing expense and impacts considerably. (Figure 8)

D) Roundabout at Route 15/Susie Wilson-Roundabouts have been successfully used in many instances to allow U-turns on corridors where medians restrict access. They allow for convenient U-turns, and would have additional benefits in this case of far greater capacity, lower delays, and reduced accidents. (see Figure 9)

E) Roundabout at Susie Wilson/Rite Aid/Shopping Center-A roundabout at this first signalized intersection would allow for convenient U-turns. In this case, further study would be needed to determine if queuing from the Route 15 intersection would frequently block this roundabout. In addition, due to the very close spacing between this intersection and the Pinecrest signal, it is suggested that both of these intersections should be roundabouts to avoid queuing problems. This concept would be far more promising if redevelopment plans for the shopping center allowed for a new main entrance to be established at the Pinecrest signal, and the Rite Aid signal could then be removed. (see Figure 9)

F) Route 15 U-turn-The possibility of providing for U-turns at the Route 15/Susie Wilson signal was evaluated. The railroad tracks do not allow sufficient room for the U-turn unless the alignment of Route 15 westbound is shifted to the north. (see Figure 10)

One alternative that was discussed at the project initiation meeting, but determined to not be feasible, is the concept of providing a parallel connection between the lots in combination with some type of connector to Pinecrest Street, allowing for both access management and access to a U-turn opportunity. The shallow depth of the lots, and steep drop off to the creek behind the lots, make this concept unlikely. Providing connections between lots would severely constrain future use of these lots.

Analysis of Alternatives

The following matrix evaluates the above six alternatives with the design goals and objectives.

Table 1: Alternatives Comparison Matrix

Alternative	Safety	Land Use	Pedestrian/Transit	Future Traffic Growth	Approximate Cost	Environmental and Property Impacts
A) Establish a signed route from the Rite Aid entrance to Pinecrest Dr..	Minor safety improvement.	Removal of jughandle could allow for additional development on north side of Pearl Street without concerns over jughandle capacity.	No improvement to intersection. Route could provide convenient turn-around for bus transit.	No improvement to capacity of Route 15/Susie Wilson	$20,000	Low: Route would be placed in exiting ROW.
B) New Street to Pinecrest	No improvement; additional access point may increase friction.	Conflicts with current proposal for a congregate care facility.	No improvement to Rte 15/SW Rd; increases local connectivity.	No improvement to capacity of Route 15/Susie Wilson	$1,200,000	High
C) New Street Connection to Ames Shopping Center	No improvement; additional access point may increase friction.	Provides increased access to shopping center and proposed TOD area.	No improvement to intersection; increases local connectivity.	No improvement to capacity of Route 15/Susie Wilson	$400,000	Low, if existing culvert can be used, and redevelopment planned with new street.
D) Roundabout at Route 15/Susie Wilson	Significant reduction in accidents likely based on experience at other signal to roundabout conversions.	Will allow for growth in corridor by increasing capacity; compatible with pedestrian oriented TOD concept.	Can be designed to provide safe pedestrian crossings, reduce speeds	Increases capacity, reduces delays	$2,200,000	Low: Mostly in ROW, culvert may need repair or replacement.
E) Roundabout at Susie Wilson /Rite Aid/ Shopping Center	Reduce accidents at this intersection; concern about combination of closely spaced signals and roundabouts. Compatible with SW Rd median concept	Will increase capacity, reduce delays, provide additional traffic capacity to future development areas	Can be designed to provide safe pedestrian crossings, reduce speeds	No improvement to capacity of Route 15/Susie Wilson	$3,600,000	Low: mostly in ROW, but impacts to Rite Aid likely.
F) Alignment shift to allow Route 15 U-turn	No improvement.	No impact or benefit to land use plans	No improvement for pedestrians.	No capacity improvement.	$1,800,000	Medium to High: may impact culvert, most of property is in ROW.

Figure 8: Alternatives A and B: New Street Connections

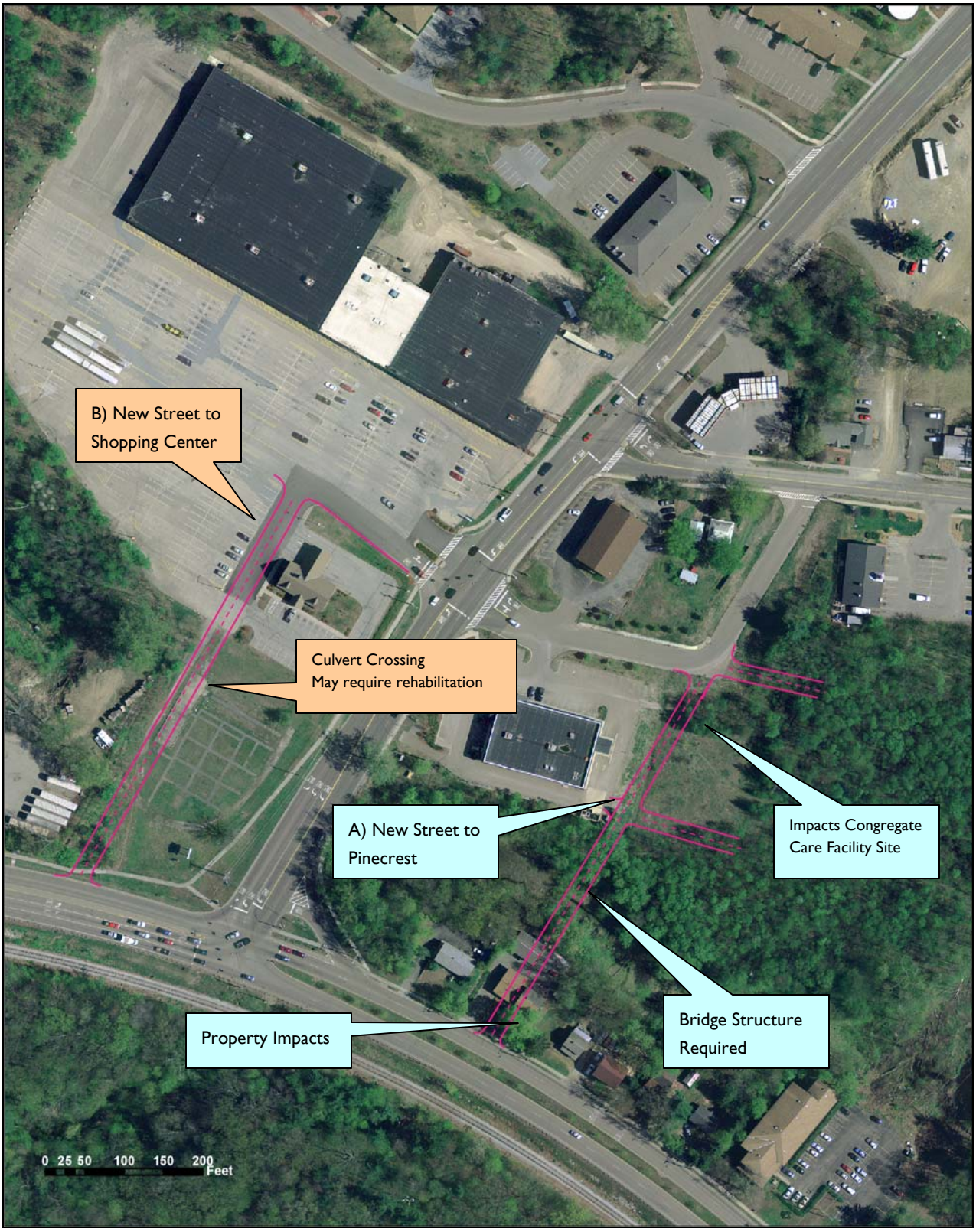


Figure 9: Roundabout Alternatives C and D

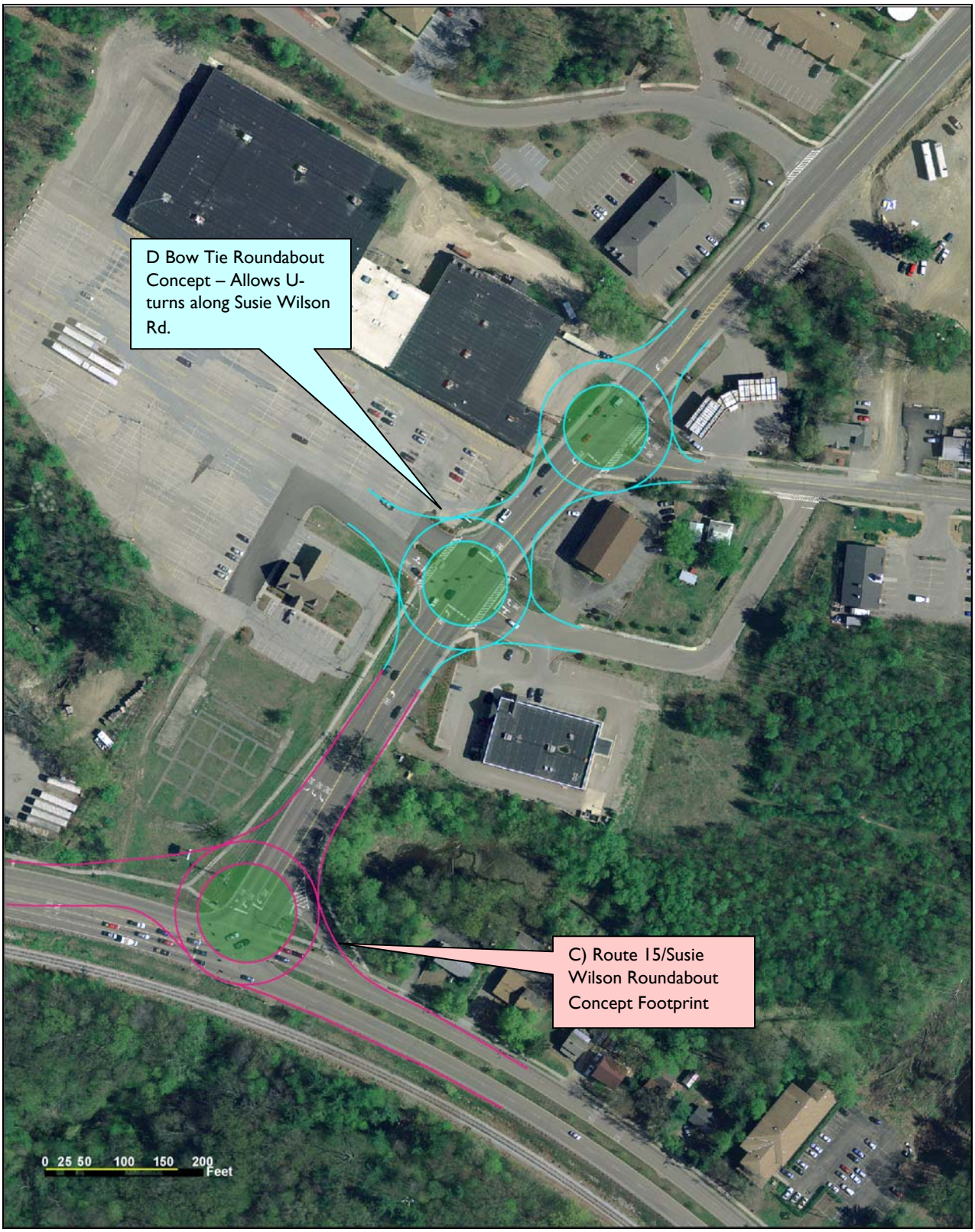
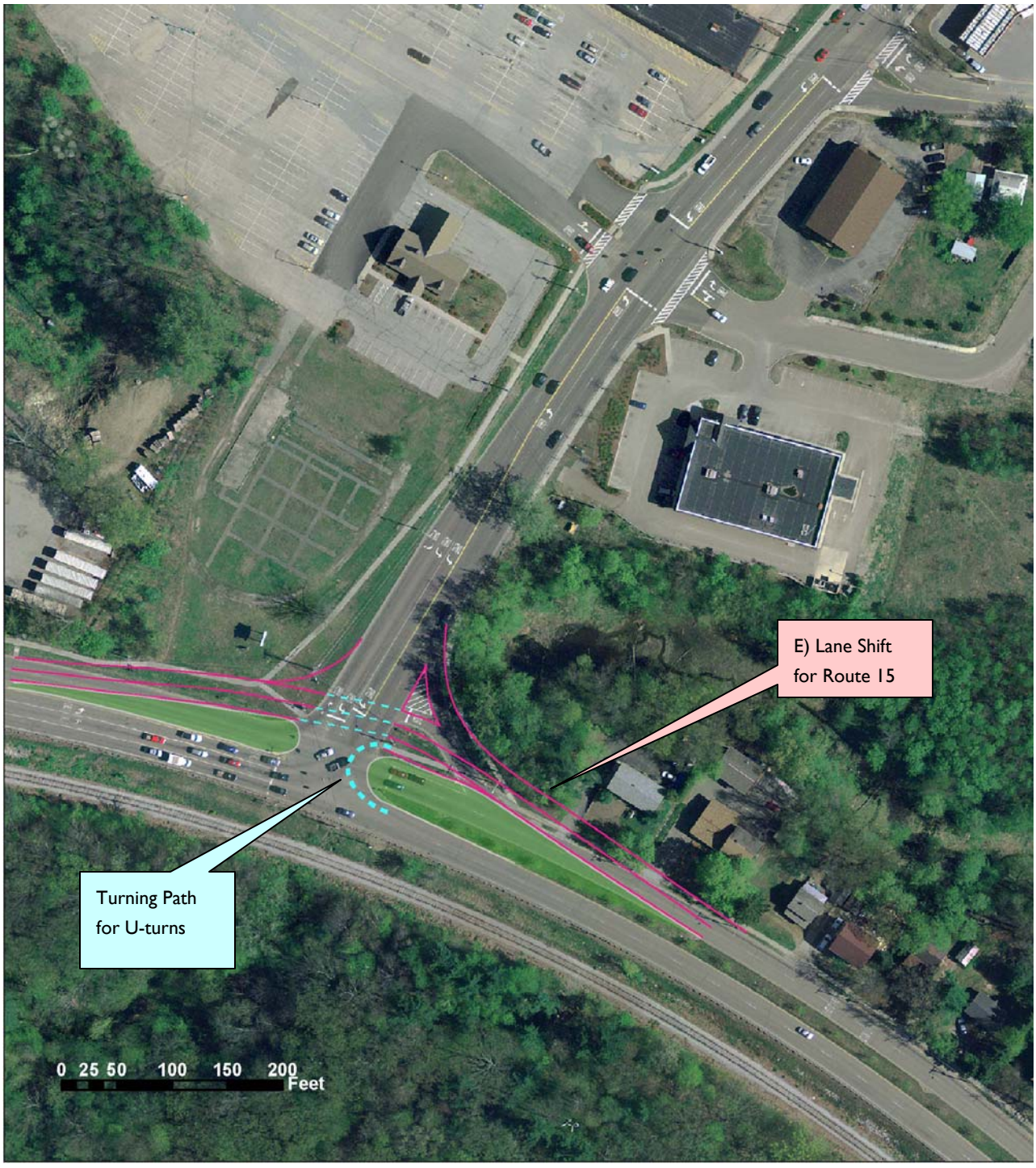


Figure 10: Alternative E: Alignment Shift/U-turn



Conclusions and Recommendations

The current jughandle configuration, combined with high traffic volumes and frequent queues in the left turn lanes of Susie Wilson Road, requires drivers to conduct potentially hazardous, non-standard maneuvers. The traffic currently must enter Susie Wilson Road left-of-center, and then attempt to merge or find gaps in the stream of left turning traffic. There have not apparently been many accidents related to the jughandle, as this maneuver is relatively infrequent, and traffic is moving at relatively slow speeds so that crashes can be avoided. However, using the jughandle during high traffic peak periods requires the unsafe maneuver due to long queues on the left turn lane of Susie Wilson Road. The jughandle should be removed and replaced with a safer alternative.

Short/Medium Term Recommendations: Designate the Rite Aid entrance to Pinecrest as the U-turn option for Route 15 traffic. This will require the following actions:

- The Rite Aid entrance and connection to Pinecrest are dedicated as Essex Town Highways.
- Signs indicating U-turns are established along the route.
- The jughandle lane is removed and seeded; the right turn lane re-striped.
- Signal timing plans should be changed for the Rite Aid/Shopping Center and Pinecrest, to allow separate, shorter green phases for Rite-Aid, which should somewhat relieve queuing on Susie Wilson Rd. between these intersections. This will be further accomplished by the proposed re-assignment of turning lanes at Route 15/Susie Wilson.
- Traffic control is established at the entrance to the Congregate Care Facility, either a mini-roundabout, or 3-way stop.

This will allow for safe u-turns for traffic entering Route 15 between West Street and Susie Wilson Road, where the existing median prevents left turns.

Long Term Recommendations: The intersection of Route 15 and Susie Wilson Road has several indications that a long term improvement study should be undertaken. This area is a focal point for growth and development for both Essex Junction and the Town of Essex. The proposed Transit Oriented Development project could bring in more growth and much more pedestrian traffic. Crash data in the vicinity of the intersection illustrates significant safety concerns. While the Circumferential Highway segments A and B might bring some relief to this intersection, the traffic projections show only a very modest decrease in traffic, which could easily be offset by growth in this area.

It is recommended that this intersection be considered for project scoping and that a modern, two lane roundabout be considered among the alternatives. This appears to offer the needed additional traffic capacity, maximum safety for vehicles and pedestrians, and serve as an attractive gateway into the rapidly growing Susie Wilson corridor. The high likelihood of continued traffic growth due to development and redevelopment of properties along Pearl St and Susie Wilson Rd, as well as the potential construction of the Circ Highway segments A and B, warrant a high priority for this intersection.