

# Tri-Town Shuttles (TTS) Scheduling Review

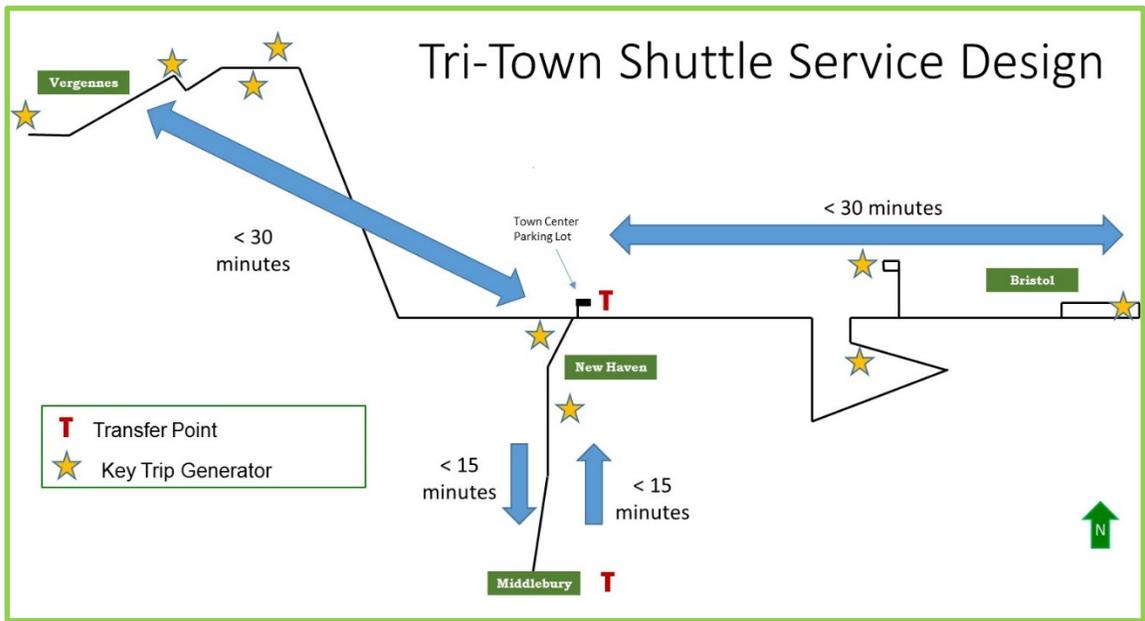
## May 20, 2013

### 1 Service Design

The present Bristol and Vergennes service is well-conceived using a trunk-and-branch structure and integrated timetables along the common segment forming the trunk between downtown Middlebury and New Haven Center. Two branch alignments extend from New Haven east to Bristol and west to Vergennes. This design is intended to supply an even 30-minute frequency to the trunk portion and a 60-minute frequency to each of the branches. Additionally, two timed-transfer points are supported in downtown Middlebury and New Haven Center.

Two buses are deployed in weekday service; one on each route running within a 60-minute schedule cycle beginning and ending at Merchant's Row in Middlebury. The current cycle is comprised almost entirely of running time with only minimal provision for recovery time between successive trips. Both the printed timetables issued to ACTR customers and Driver's Log sheets used by drivers indicate the same times for successive southbound arrivals and northbound departures at Merchant's Row in Middlebury. This practice leaves little tolerance for variations in running times from day to day, and limited capacity to recover time once a bus falls behind schedule.

TTS transfer integrity in Middlebury and New Haven is mathematically dependent on maintaining trunk segment running times under 15 minutes in each direction, and maintaining branch running times under 30 minutes in both directions. As illustrated in the figure below, this time symmetry enables the Bristol bus that departs from Middlebury at the top of each hour and returns from Bristol generally during the half-hour to arrive in New Haven at 45 minutes past the hour. Meanwhile, the Vergennes bus that departs from Middlebury on the half-hour also arrives in New



Haven at 45 minutes past the hour. A second meeting occurs at 15 minutes past the hour, giving passengers an opportunity every 30 minutes to travel between Bristol and Vergennes directly without triangulating via Middlebury.

## **2 Current Conditions**

As directed by ACTR, OpTrans LLC conducted an on-site analysis of current TTS service delivery activities on May 7-9, 2013, focusing on operating safety, schedule performance, and overall customer and employee satisfaction with the functionality of the transit services provided. Observations and conclusions drawn are based primarily on data obtained from ACTR's new SEON onboard surveillance system, and supplemented by ride-along observations aboard key afternoon trips that were reportedly running late on a chronic basis.

The data supports the conclusion that the existing 60-minute schedule cycle realistically cannot be attained by either the Bristol or Vergennes routes in their present route configurations. Using randomly selected days and trips from the April - May 2013 operating period, it is estimated that afternoon round trips commonly require 65 - 75 minutes to run the Vergennes route, and 60 - 70 minutes to run the Bristol route. Additionally, the absence of recovery time scheduled between trips permits accumulation of lateness across successive trips, such that by 4:30 pm or 5:00 pm schedule integrity has broken down entirely with departures from Middlebury potentially occurring 20 – 30 minutes behind schedule.

Although morning schedules are more likely to operate within the 60-minute cycle than afternoon trips, nevertheless there is insufficient recovery time between trips to allow for routine variations in running times that must be accommodated for effective transit operations. Generally the transit industry practices attainment of a 95% reliability target when service frequencies are in the 30-60 minute range. Optimally, a 60-minute cycle should contain up to 53 minutes of round trip running time, allowing at least seven (7) minutes of recovery time.<sup>1</sup> This is applied to the overall service day or to a driver shift, although it would be expected that less recovery might be allocated to selected peak trips when operating conditions require more running time. However, scheduled recovery time of less than three (3) minutes per trip should be avoided.

Loss of schedule integrity has a serious impact on the timed transfers occurring in Middlebury and New Haven. Actual running times observed between Merchant's Row in Middlebury and the New Haven Town Center varied from 13 - 19 minutes, and commonly took 15 - 16 minutes. This points to the inability of the buses to meet consistently in New Haven even if all other aspects of the current schedules were functioning properly. Coupled with the problems already noted, it becomes apparent that late morning and afternoon buses seldom arrive at the Town Library at the same time.

## **3 Routing and Scheduling Adjustments**

Incremental changes to the current routes represent one part of the immediate term recommendations intended to resolve or mitigate TTS schedule reliability issues. Aggregated running time savings of up to 12 minutes per cycle for the Vergennes route, and seven (7) minutes

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<sup>1</sup> Based on transit industry scheduling best practice to provide recovery time equivalent to 10%-15% of round trip running time as allowance for lift-assisted boardings, riders with bicycles, traffic delay, and driver preparation.

per cycle for the Bristol route are desired to restore the integrity of the 60-minute schedule cycle and support attainment of a 95% or better on-time performance record. The following changes should be considered:

### 3.1 Relocate New Haven Transfer Point to South of Main Street

The existing transfer point in the parking lot behind the Town Library on North Street requires out-of-direction travel time and mileage for both routes, and particularly affects the Vergennes route. Relocation of the transfer point to Town Hill Road south of Main Street (VT 17) is recommended as a prerequisite to discontinuing service to the Library bus stop and simplifying the routes in New Haven Center. Ideally, the transfer point would be near the Village Green Market, which is a destination for ACTR customers. This action would enable ACTR to maintain the transfer connection in New Haven while increasing the likelihood that the buses would meet as intended, and also run closer to schedule elsewhere along the routes.

Moving the transfer point south of Main Street would allow the routes to be trimmed by 0.8 mile and an estimated seven (7) minutes per cycle on the Vergennes branch, and 0.4 mile and an estimated three (3) minutes per cycle trip on the Bristol branch. Discontinuation of service to the Library stop would reduce unnecessary bus traffic on North Street amounting to 80 buses per day at present, or 104 buses per day if ACTR decides to add midday service to the Bristol and Vergennes timetables as planned later in the year.

### 3.2 Adjust Service Level on Hewitt Drive and Lover's Lane in Bristol

Currently nine of 10 daily Bristol round trips operate on Route 116, Hewitt Drive and Lover's Lane in both directions. Ridership data indicates that passengers boarding along this segment are strongly oriented toward morning travel into Middlebury, and afternoon travel returning from Middlebury. Reverse flow ridership is sporadic and does not indicate regular or frequent use by any ACTR customers.

It is recommended that ACTR discontinue reverse direction operation and instead serve the Hewitt Drive-Lover's Lane segment in one direction only per cycle. The five morning trips and the first afternoon trip should cover this segment in the westbound direction (i.e., toward Middlebury). Generally, the five afternoon trips should cover this segment in the eastbound direction (i.e., returning from Middlebury). This action would trim the Bristol route by 1.8 miles and an estimated four (4) minutes per cycle.

### 3.3 Adjust Mt. Abraham High School Trip

Afternoon service from Mt. Abraham High School should be suspended for the summer and reevaluated for the Fall 2013 academic year. Ridership data shows that last summer the 2:35 pm southbound trip generated 10 boardings at Mt. Abe during the month of July 2012, including six on July 27 and two each on July 9 and July 11. There was no ridership activity on 18 of 21 operating days in the month. During August 2012, there were two total boardings on a single day and no ridership activity on 22 of 23 operating days in the month.

The rationale for service to Mt. Abe High School should be reconsidered in context of the need for service. It is noted that the PM dismissal bell time occurs at 2:42 pm, while ACTR departs at 2:35 pm. This means that students who want to ride ACTR must secure permission to leave school prior to the dismissal bell. Moreover, the bus operates to the high school when leaving

rather than entering Bristol, which limits the potential to serve students who travel less than a mile and are ineligible for yellow school bus service. It is understood that the Bristol – Vergennes connection represents a significant ridership opportunity for TTS at Mt. Abe High School; however, additional sources should be developed to generate more student riders at bell times.

### 3.4 Discontinue Selected Goodrich Trips

Currently ACTR operates six daily trips to the Goodrich facility west of downtown Vergennes, including the first three morning trips arriving at 5:57 am, 6:57 am and 7:57 am; and the last three afternoon/evening trips departing at 4:01 pm, 5:01 pm and 6:01 pm.

Morning ridership data indicates regular use of the 6:57 am trip, light daily use of the 7:57 am trip, and virtually no passenger activity on the 5:57 am trip. In the afternoon, there is regular use of the 4:01 pm trip, light daily use of the 5:01 pm trip, and sporadic use of the 6:01 pm trip.

It is recommended that ACTR discontinue the current 5:57 am and 6:01 pm trips operating west of downtown Vergennes to Goodrich via Main, Basin and Canal Streets. This action would trim the Vergennes route by 2.1 miles and an estimated six (6) minutes per cycle on the trips departing from Middlebury at 5:30 am and 5:30 pm.

It is noted that the first morning trip in the Vergennes schedule (departing Middlebury at 5:30 am) currently is the least productive in the TTS daily timetable. Average ridership during all of FY 2012 was one passenger per round trip. More recently, the average increased to 2.1 passengers per trip during the month of April 2013. Total daily boardings ranged from a high of four passengers (2 days) to a low of zero boardings (3 days). More frequently there were either three passengers (7 days) or two passengers (6 days) riding. Most passengers rode the southbound portion of the trip; boarding at Shaw's (0.7 passenger), and at the Post Office stop (0.4 passenger). One customer rode the northbound trip from Merchant's Row in Middlebury to the State Offices on Exchange Street on 11 of 22 days in April 2013 (0.5 passenger). Less than seven percent of the April monthly ridership was attributable to any stops west of downtown Vergennes, including Goodrich, Canal/Basin and High/McDonough. Given low ridership, ACTR should consider reallocating Vergennes service from the early morning to partially fill in the current three-hour gap in service between 9:30 am and 1:30 pm.

### 3.5 Discontinue Deviation Service to High Street and MacDonough Drive

Currently ACTR offers service north of Main Street to the Vergennes Wellness Center and other destinations along High Street and MacDonough Drive when requested by customers. Ridership data indicates that service requests are infrequent; for example, one pickup and one drop-off during the month of April 2013; no activity during the month of March 2013. Given its limited use, the High Street/Macdonough Drive deviation is not currently a key contributor to schedule delay; nevertheless, it is recommended that ACTR discontinue offering this service to customers in consideration of existing schedule reliability concerns.

### 3.6 Relocate Shaw's Plaza Bus Stop to Aubuchon Hardware

Currently the Vergennes bus enters the Shaw's Plaza parking lot via the Monkton Road entrance driveway and circulates to the front door of Shaw's Market via a counter-clockwise loop passing the building that houses the Aubuchon Hardware and Kinnney Drug stores and looping around the eastern perimeter of the parking lot to position the bus door at the curbside bus stop in front

of the west-facing entrance to Shaw's Market. After servicing the bus stop, the bus returns to the exit roadway via the south perimeter driveway that parallels the sidewalk between Shaw's and Kinney Drug. Bus circulation within the plaza the parking lot is slowed for safety reasons. It is estimated that off-street circulation from Monkton Road consumes about two minutes in the westbound direction, and up to 2.5 minutes in the eastbound direction, or 4.5 minutes per cycle.

It is recommended that ACTR relocate the bus stop from the Shaw's Market to a point approximately 400 feet east across the parking lot along the curb in front of the Aubuchon Hardware and Kinney Drug stores. This would substantially reduce bus circulation within the plaza to a tighter counter-clockwise loop through the parking area situated immediately south of the stores. Incremental savings of up to three (3) minutes per cycle likely would be realized by this action. Two-way operation on Monkton Road is recommended at all times when the stores in Shaw's Plaza are open for business.

#### **4 Fixed Route Deviation Service Policy**

ACTR operating personnel widely acknowledge that fixed route deviations have become a serious impediment to schedule reliability as customer requests for deviations have increased sharply in recent months. However, specific recommendations for immediate change are limited by the lack of data concerning the present use of deviations by route, time of day, and destination. It is recommended that ACTR collect and compile an accurate data base of deviations requested and fulfilled for a minimum period as the basis for a comprehensive review of the existing deviation policy.

Meanwhile, consideration of selected reduction of deviation destinations could help to incrementally relieve pressure on current schedules of both the TTS and MSB routes. Examples of deviations that could be eliminated immediately include:

- No midday deviation service to Exchange Street area to be provided by MSB buses when TTS is not operating (11:00 am – 1:30 pm).
- No northbound operation of the South Loop through the Courtyard Hotel and Rite Aid parking lots.

#### **5 Operating Procedures and Practices**

Communications and other operating functions have a significant influence on running speeds of ACTR buses. ACTR should review and refine current procedures and practices that slow down revenue vehicle operations and cause delay-producing events. The following changes should be considered:

##### 5.1 Prioritize Call Traffic

Certain types of messages should be discontinued during periods of peak communications, strictly controlled at other times. The use of categories and prioritization of call types is recommended, along with a priority structure to moderate the number of controls during peak periods. An eight-level priority structure is offered as an example:

1. Emergency calls about accidents, incidents, vehicle malfunctions, road closures and other events affecting safety and security.

2. Dispatch overrides issued to resolve an urgent customer or operational concern.
3. Incoming calls from Drivers running more than 10 minutes behind schedule at three consecutive bus stops along a route; also “back-on-schedule” calls when applicable.
4. Fulfillment/confirmation of bona fide route deviations committed by Dispatch to ACTR customers.
5. Transfer alert/reminder calls initiated by customers and relayed by either Dispatch or Drivers.
6. Boarding alert/reminder calls initiated by customers waiting at posted and request-only bus stops along regularly serviced fixed-route segments.
7. Bus location requests initiated by customers and relayed by Dispatch.
8. Administrative or personal messages non-essential to vehicle operations in real time.

### 5.2 Reduce Duration of Calls

ACTR dispatchers and drivers should be encouraged through training to practice mobile communications etiquette that results in clear messages in the shortest possible time. Callers should stay on point and minimize the number of words required to convey questions, answers and other comments directly. The use of common language and standard phrasing in short forms is suggested: e.g., “*Where are you?*”, “*I am at Merchant’s Row*”. ACTR should align its communications protocols with those of the Middlebury Police and other first-responder agencies in the event of a future emergency requiring ACTR’s participation in a coordinated response.

### 5.3 Written Guidance on Mobile Communications for Front-line Employees

ACTR should closely monitor prevailing cell phone call volumes and patterns as the basis for better managing mobile communications. This analysis should be followed by issuance of procedural guidance in the form of concise written documents (e.g. bulletins) to dispatchers, drivers and administrative personnel supporting supplemental telephone information and reservations when needed. Procedural guidance should clearly establish the valid purposes for mobile communications and indicate methods and practices consistent with transit industry best practices tapered to ACTR’s particular requirements.

### 5.4 Optimize Functionality of Existing Cell Phones

Both during onboard travel and earlier meetings with dispatchers, it was observed that ACTR may not be making full use of the capabilities of existing cell phones. For example, ACTR dispatchers dial the full number each time they initiate a call to a driver rather than programming the phone numbers in the speed-dial function. Additionally, the flip-phones used by ACTR drivers could be set to answer the call automatically when the phone is opened without separately pressing the send/call button. ACTR should consult with its phone system vendor concerning available features on existing phones to optimize their utility to current operations.

### 5.5 Transition to Hands-free Cell Phones

The cell phones that ACTR uses are hand-held flip-phones that require the use of both hands to initiate or receive a call. Most ACTR drivers observed followed the established practice of pulling the bus out of traffic or stopping entirely before handling the cell phone. This practice adds delay at unpredictable intervals, causing schedule variability that cannot be accommodated within

existing schedules. It is recommended that ACTR convert to using hands-free cell phone technology as soon as possible.

## **6 Physical Improvements**

### **6.1 Vehicle Queuing at Merchant's Row**

The physical constraints at Merchant's Row impose operational difficulties that potentially impact schedule performance. Of particular concern is that a bus must be positioned correctly within a vaguely delineated zone to safely and expeditiously board and alight customers who require the wheelchair lift. The zone is forward of the passenger shelter approaching the crosswalk, but is limited by parking spaces, a lamppost, planter strip and uneven curb height approaching the crosswalk. Failure to position the bus correctly on the first attempt can add significantly to the time required to accommodate lift-assisted boardings and alightings. ACTR should provide better delineation of the lift deployment zone at the Merchant's Row bus stop, using pavement markings and signposts to guide ACTR drivers using several different bus models with distinct lift configurations.