Introduction

This report has been prepared to explore alternatives and develop recommendations to address pedestrian safety and stormwater impacts along Ferry Road between Greenbush Road and US Route 7. The Town of Charlotte requested technical assistance from the Chittenden County Regional Planning Commission to address these related issues comprehensively, and develop conceptual plans and cost estimates.

Purpose and Need Statement

The purpose of this project is to simultaneously examine pedestrian safety and stormwater run-off along Ferry Road in the west Charlotte village, exploring a range of options that build on past studies as well as strategies within the Town Plan. Concerns expressed by residents and property owners regarding both of these issues prompted the study. These two issues are interrelated in that any future construction of pedestrian facilities will affect stormwater run-off. Additionally, the creation of paved parking within the road right-of-way, which can function to support village businesses and community uses, will also interrelate with both pedestrian use and stormwater run-off, and is also included in this study.

Previous Analysis

Past efforts to address these issues separately have revealed the importance of a coordinated approach. This study will build on past efforts, including but not limited to the following:

- Ferry Road Sidewalks Conceptual Alternatives and Costs (DuBois & King, 2007)
- Master Plan for Improved Mobility along Ferry Road between Greenbush Road and Route 7 (Ferry Road Sidewalks Committee, 2011)
- US Route 7 Pedestrian Crossing Study (DuBois & King, 2014)

The study will also be guided by the Charlotte Town Plan, which supports future multi-modal connections and consideration of stormwater management best practices. Several excerpts follow:

p. 108

3. Low impact development (LID) methods of stormwater management should be considered during development review, and potentially required if site circumstances warrant.

4. Stormwater management "best practices" should be applied to all development, regardless of whether a state stormwater permit is required.

p. 113

14. The Town is encouraging moderate densities and mixed uses in the two villages. This development pattern should promote the potential for pedestrian and bicycle access between homes, commercial services, and current or prospective public transportation services, including bus, rail, or other public service.

p. 114

3. The Selectboard will review the need for a Capital Budget and Program every year, which could include transportation and stormwater control facilities, as well as structures and capital equipment.

5. The Town will improve pedestrian, bicycle and auto traffic safety throughout the Town, with specific attention in the West Village on Greenbush Road and Ferry Road. In the next year, accommodations for pedestrians will be made along Ferry Road between the Library and Greenbush Road.

Existing Conditions

Ferry Road runs through Charlotte's west village and past several community buildings, including the town offices, town library, post office, fire department, daycare, senior center and two village stores before crossing Greenbush Road and proceeding downhill, across the train tracks, and out of the village, eventually terminating at a ferry crossing to New York State. Figure 1 shows a base map of the project area.

Stormwater

For some of the length of Ferry Road between Greenbush Road and US Route 7, stormwater leaves the road surface as sheet flow into vegetated roadside swales or stone-lined ditches, which offers effective and appropriate management. However, Charlotte's west village area is generally low and wet with a high water table, and there are some areas of stormwater ponding and poor drainage. Where Ferry Road slopes up to meet Greenbush Road, the road's runoff tends to be more concentrated and collects in swales along the road edge. Some of the buildings in this area are not protected from runoff by curbing or effective swales, and at least one property owner along the south side of Ferry Road has expressed a concern regarding road runoff that may be affecting her property.

The 2011 Master Plan for Mobility provided mapping and field observations on stormwater patterns as depicted in Figure 2. In addition, DuBois & King conducted two site visits and field surveys in August of 2014, with the observations and findings summarized in Figure 3. Flow conditions were also observed by town officials in November, 2014, with the assistance of the Charlotte fire department, which poured water from its tanker truck at the intersection of Ferry and Greenbush Roads. It was confirmed that a continuous 15 inch pipe runs along the south side of Ferry Road from the Greenbush intersection to the ditch east of the Town Offices driveway. There are two visible drainage inlets, but they are undersized or not properly graded so that runoff is not collected effectively. In addition, there is a private drainage pipe running south from Ferry Road between the Post Office property and the adjacent residential property to the west, which is not functioning, and may require cleaning or maintenance.

While a complete hydraulic analysis of the village stormwater system, which requires survey and modeling, is beyond the scope of this study, field observations and a review of available topography suggest that the hydraulic capacity of the 15 inch pipe is unlikely to be sufficient if all of the Ferry Road runoff were to enter the stormwater system. Therefore, it is appropriate to look for opportunities to absorb, safely divert, or store stormwater in this area.

Undersized drainage inlet (left); Pavement grading inhibits water from entering drainage inlet near Greenbush Road (right)

blocked culvert entrance adjacent to Post Office (left); Signs of erosion along southerly road edge across from and east of the Old Brick Store (right)

Gravel berm preventing sheet flow on north side of Ferry Road (left); Ponding evidence at low spot near US Route 7 on south side of Ferry Road (right)

Figure 1: Study Area Map

Figure 2: Ferry Road Drainage Patterns (from Report of the Ferry Road Sidewalks Committee, December, 2011)

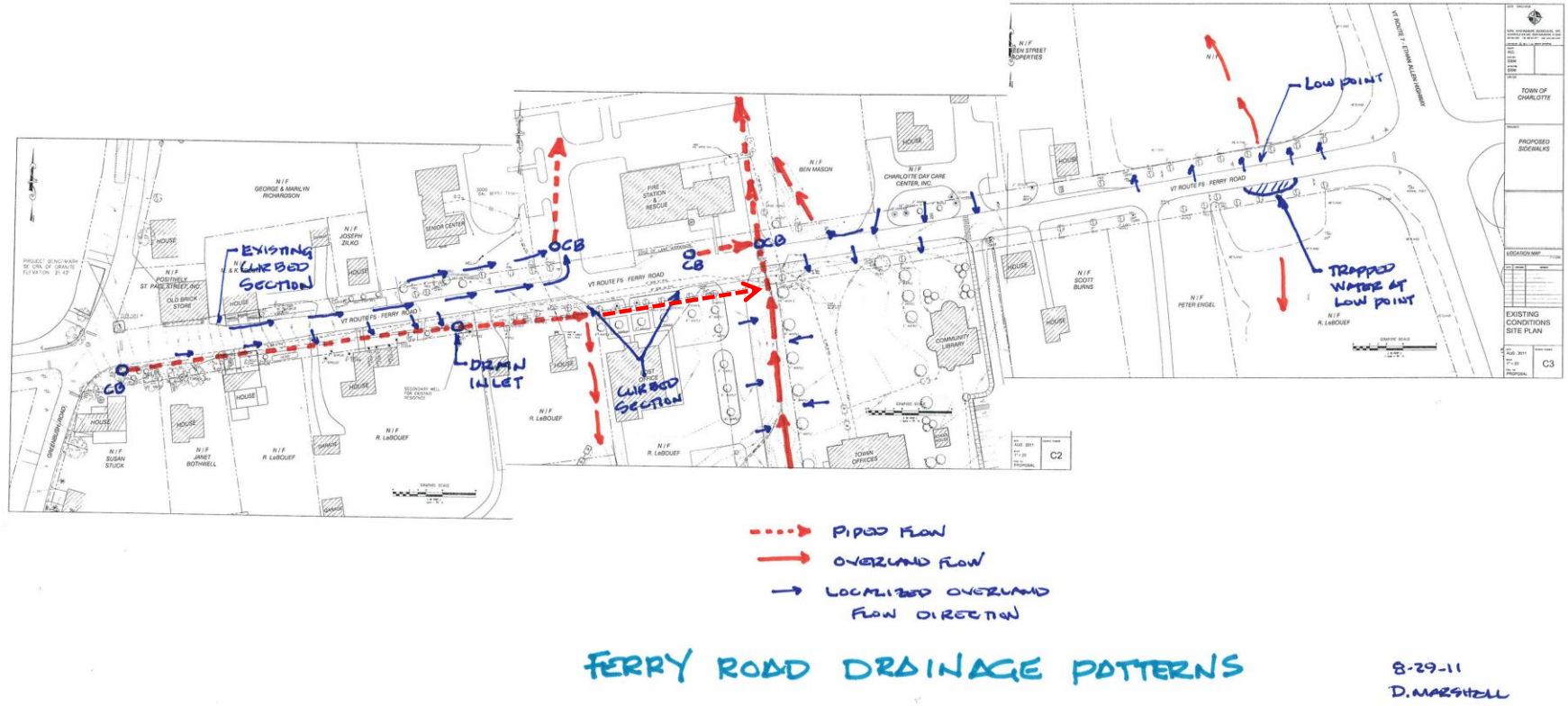
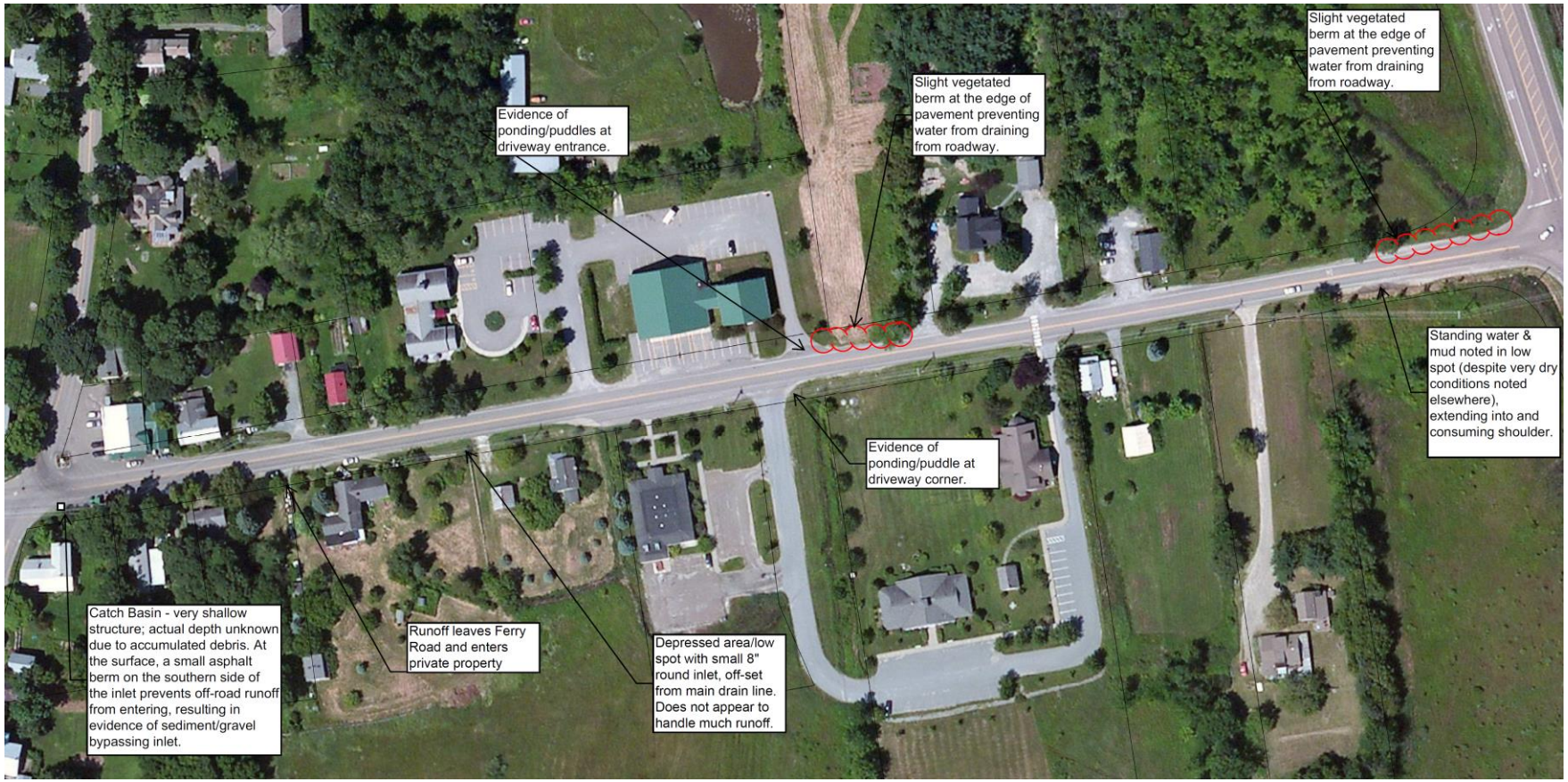


Figure 3: Stormwater Issues and Opportunities (D&K Observations, July 2014)



Traffic

The traffic volume on Ferry Road through the west village is 3,100 vehicles per day (CCRPC, 2011). This count included vehicle classification data, which showed 94% passenger cars or light trucks, 1% bicycles, and the remaining 5% medium or heavy trucks (i.e. 6 or more tires). The route is functionally classified as a major collector due to the connection to the Ferry to New York State. This designation makes it eligible for federal aid due to its regional importance and interstate connectivity. The traffic volumes are unevenly distributed throughout the day and year, with more concentrated eastbound traffic flow just after the ferry arrives.

Crash data from VTrans indicates only one crash in the past five years on ferry Road between Greenbush and US Route 7. The intersection of US 7 and Ferry is a high crash location, but all crashes are in the immediate intersection area and not along Ferry Road.

Parking

There are currently paved shoulders for on-street parking for about 5 to 6 vehicles just east of Greenbush road, and another 5 vehicles in front of the Post Office. Between these two sections of paved on-street parking, vehicles also park on the road's gravel shoulders. The town-owned right-of-way of Ferry Road is 4 rods, or 66 feet, so all on-street parking is well within the town right-of-way.

Parking on gravel shoulders may exacerbate erosion (left); on street parking by Post Office provides 4 feet buffer between cars and travel lanes (right)

Pedestrians

The Report of the Ferry Road Sidewalk Committee noted the need for facilities that are separated from traffic to allow pedestrians of all ages and abilities a safe alternative to driving to and between village destinations. This need continues today, and the lack of pedestrian facilities may discourage walking to village businesses, the Post Office, and other destinations, which increases need for parking spaces and limits the mobility of those who do not drive.

The volume of traffic on Ferry Road and its classification as a regional Major Collector further supports the need for a village sidewalk network. The Vermont Pedestrian and Bicycle Planning and Design Manual recommends sidewalks on at least one side of the street for village centers.

Alternatives

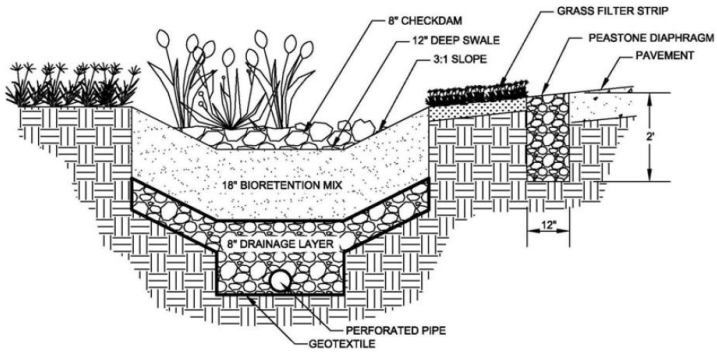
The following projects and techniques are suggested as ways to address the problems noted above. These are described in the illustrations and photos below, and shown on

Stormwater

In order to fulfill the local goals of addressing stormwater runoff onto private property and implementing best management practices (even if not required by permits), a number of possible alternatives are presented for consideration in the following sections.

A. Raingardens

There are two possible locations for a raingarden along the south side of Ferry Road, on the sloping section as it approaches Greenbush Road. The raingarden would provide several functions, including temporary storage of excess stormwater (to preserve the capacity of the potentially undersized pipe) and treatment of water that is able to pass through the soil layers before being released. The diagram below to the left shows a typical raingarden design cross section, and the photo to the right is an installation in White River Junction.



B. Curb along Ferry Road

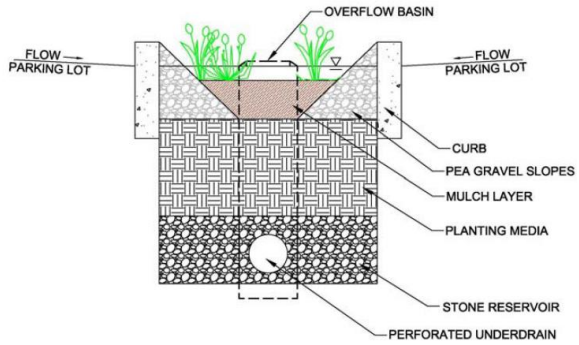
Providing continuous curbing along south side of Ferry Road between Greenbush Road and the Post Office would prevent stormwater from entering private property, although it will be important to grade the driveways so that water does not funnel into them. Granite curbing is recommended due to the potential to relocate in the future, in case other projects are contemplated that may change the desired curb location. At this time, it is recommended that the curb be installed 12 feet from the existing edge of the traveled way, to provide a 4 feet buffer for pedestrians accessing their car or walking along Ferry Road, and 8 feet for the parking space.

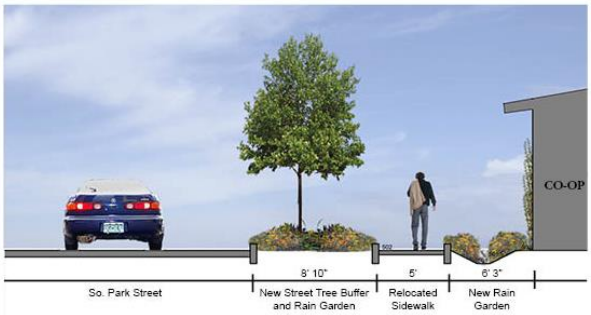
C. Replace catch basins

Catch basins should be replaced or installed in the raingarden locations; at least one additional catch basin should be replaced and regarded to allow more effective entry of stormwater into the pipe network.

D. Bioswale on Ferry Road near US 7

The low spot on Ferry Road as it approaches US Route 7 routinely ponds water. This could be addressed with a bioswale along the edge of the US 7 shoulder, with an underdrain to the wetland, which would store and treat runoff from Ferry Road before it enters the adjacent wetland. The figures below show a typical bioswale cross section (left), and an example of how a bioswale can be integrated into a future pedestrian project, if eventually a sidewalk is constructed to US 7 (right).





New Street Tree Buffer, Rain Garden and Sidewalk at Co-op

Pedestrian Facilities

Several alternatives are available for providing for pedestrian travel along Ferry Road.

A. Restripe with 10 feet lanes

A short term option would be to narrow the travel lanes on Ferry Road from the existing 11 ft width to 10 ft wide. This will increase the shoulder width on each side by 1 ft, providing a total of 3 to 4 ft for pedestrians. While this does not provide any protection of pedestrians from traffic, and may not be suitable for the full range of potential pedestrians, it is an improvement over the existing condition. The narrower lanes should also have a traffic calming effect, and reduced vehicle speeds would also increase pedestrian safety and comfort.

Dubois & King evaluated the feasibility and cost of implementing sidewalks on either side of Ferry Road between Greenbush Road and Route 7 which is documented in a report, *Ferry Road Sidewalks – Conceptual Alternatives and Costs*. The sidewalks were broken into 5 separate segments. The report determined probable costs assuming a 5 foot wide sidewalk with a 5 foot green strip. D&K determined the probable cost to range between $160,000 and $215,000, depending on what type of pavement and curbing used. The locations of each segment are summarized below and shown on Figure 4.

Segment A – South side of Ferry Road from the library access driveway to opposite the Senior Center driveway.

Segment B – South side of Ferry Road from where Segment A terminates to the general store.

Segment C – North side of Ferry Road from the west side of the senior center driveway to the general store.
Segment D – South side of Ferry Road from the east end of Segment A to connect to the town offices.

B. Sidewalk network generally as proposed in 2007 or 2011 Plan.
The Town has undertaken several studies of a potential sidewalk network in the West Village, and has sufficient plans and cost estimates to pursue federal grant funding for construction. These programs do require matching funds, and recently the Charlotte voters declined to support this in the Town budget. Both current state guidelines for providing a complete, multimodal transportation system, and Town Plan goals for additional economic activity and vitality in the village center both support revisiting the sidewalk network.

C. Gravel path or sidewalk, reduced in scope from 2007 or 2011 Study
Alternatives to the full sidewalk network as proposed in the previous studies include constructing only a portion of the proposed network; or constructing a more informal gravel path instead of a paved or concrete sidewalk. This is an option to address concerns about how a sidewalk might change the character of the west village. However, it should be noted that ongoing maintenance costs will likely be higher with a gravel path, and it will be more difficult for snow removal.

D. Corner truck apron
This is a mountable, textured or colored surface that could be used at the Greenbush/Ferry intersection on the northbound approach to promote tighter vehicular turns and reduce speeds of vehicles entering Ferry Road at the busy area near the Old Brick Store. Similar treatments could be used to promote access management at the parking areas near the Brick Store, to reinforce and differentiate where within the roadway cars and pedestrians should be in a context-sensitive and attractive way. The surface could be pervious, allowing stormwater infiltration as well. This technique has been used at the Winooski traffic circulator, as shown in the photos below.

Parking

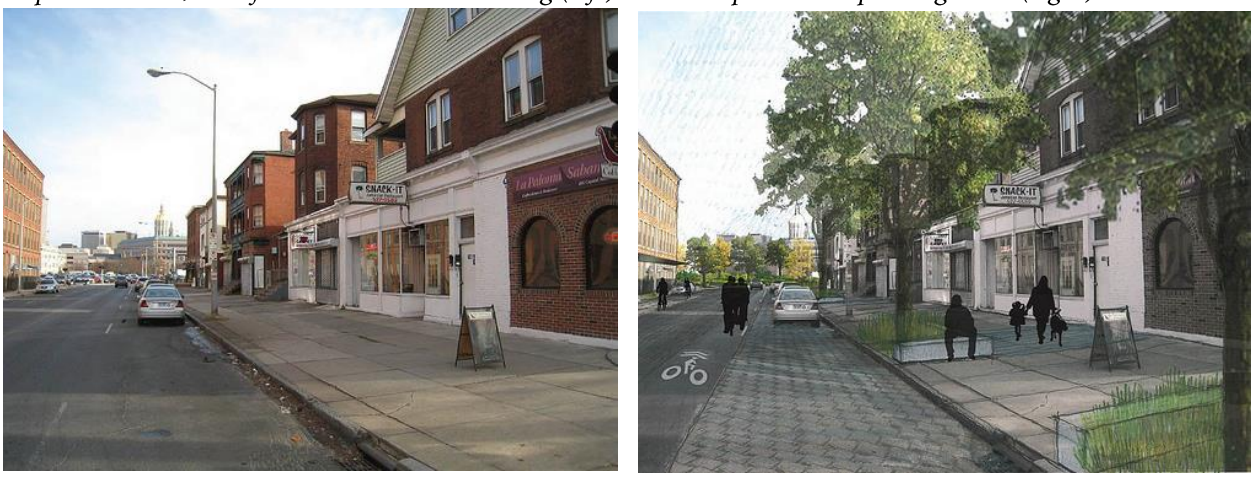
A. Provide curbed, paved on-street parking

Because curbing along the south side of Ferry Road is recommended in order to address stormwater concerns between Greenbush Road and the Post Office, and given the parking demand from the Brick Store and the goals of additional economic activity in the village center, paved on-street parking should be provided along the south side of Ferry Road. The recommended geometry is to provide a 4 foot wide buffer/"pedestrian lane" along the edge of the Ferry Road traveled way, and an 8 foot wide parallel parking lane.

There are several options for how the parking is constructed. Depending on the subsurface conditions of the shoulders on Ferry Road, it may be recommended to reconstruct the shoulders with 18 inches of a gravel base, and 6 inches of asphalt. While subsurface investigations are beyond the scope of this report, the town may elect to conduct borings to confirm if reconstruction is necessary.

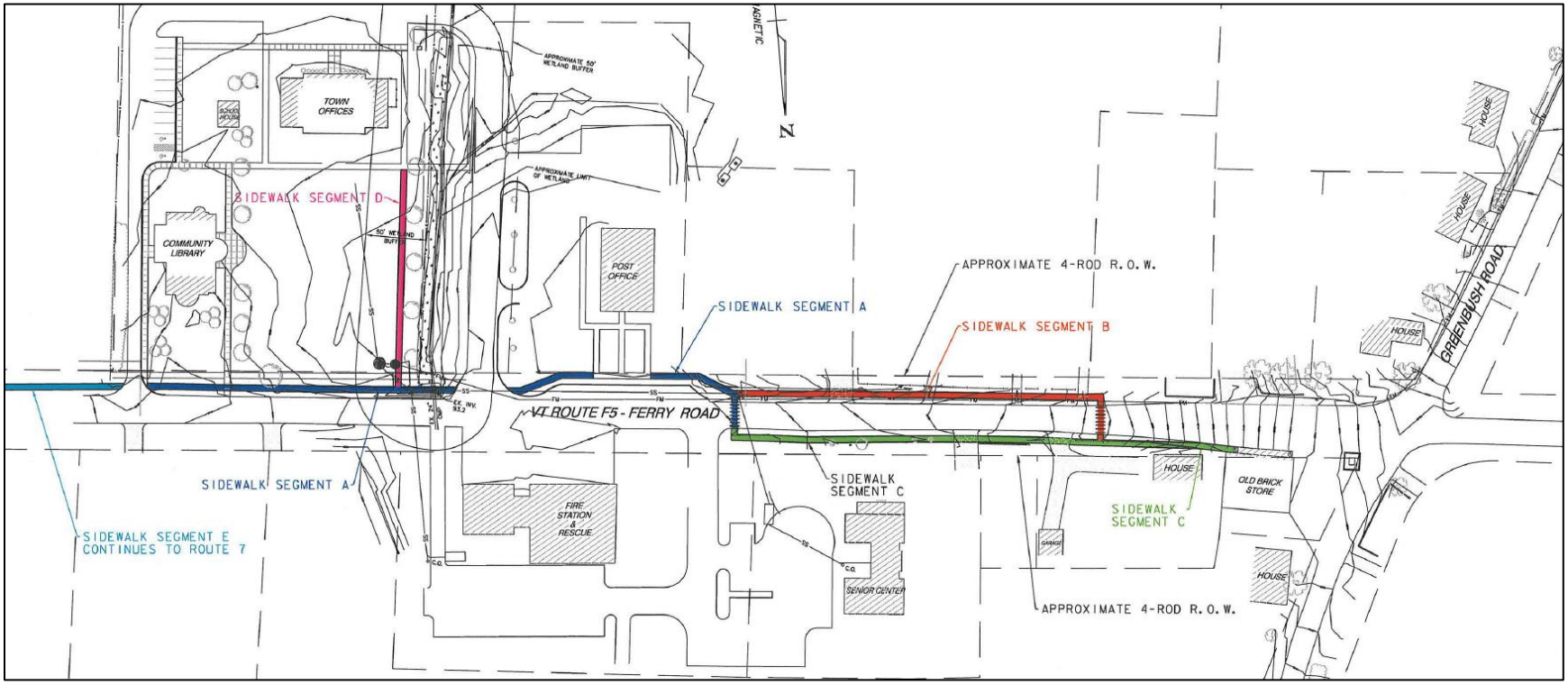
Another option to incorporate best management practices for stormwater runoff would be to use a permeable paving system such as interlocking concrete blocks or porous asphalt. Below are photo simulations of this type of application.

Capital Avenue, Hartford Connecticut: Existing (left) and with permeable parking lanes (right)



The surfaces can be very attractive, and the change in texture at the road's edge can visually narrow the road and have a traffic calming effect. However, the construction costs will be substantially higher, as will be the maintenance requirements, so the Town should carefully consider the tradeoffs of this approach to stormwater management.

Figure 4: Ferry Road Path Plan (D&K, 2007)



(Note: north is facing down in this graphic)

Figure 5: Ferry Road - Stormwater Management Alternatives

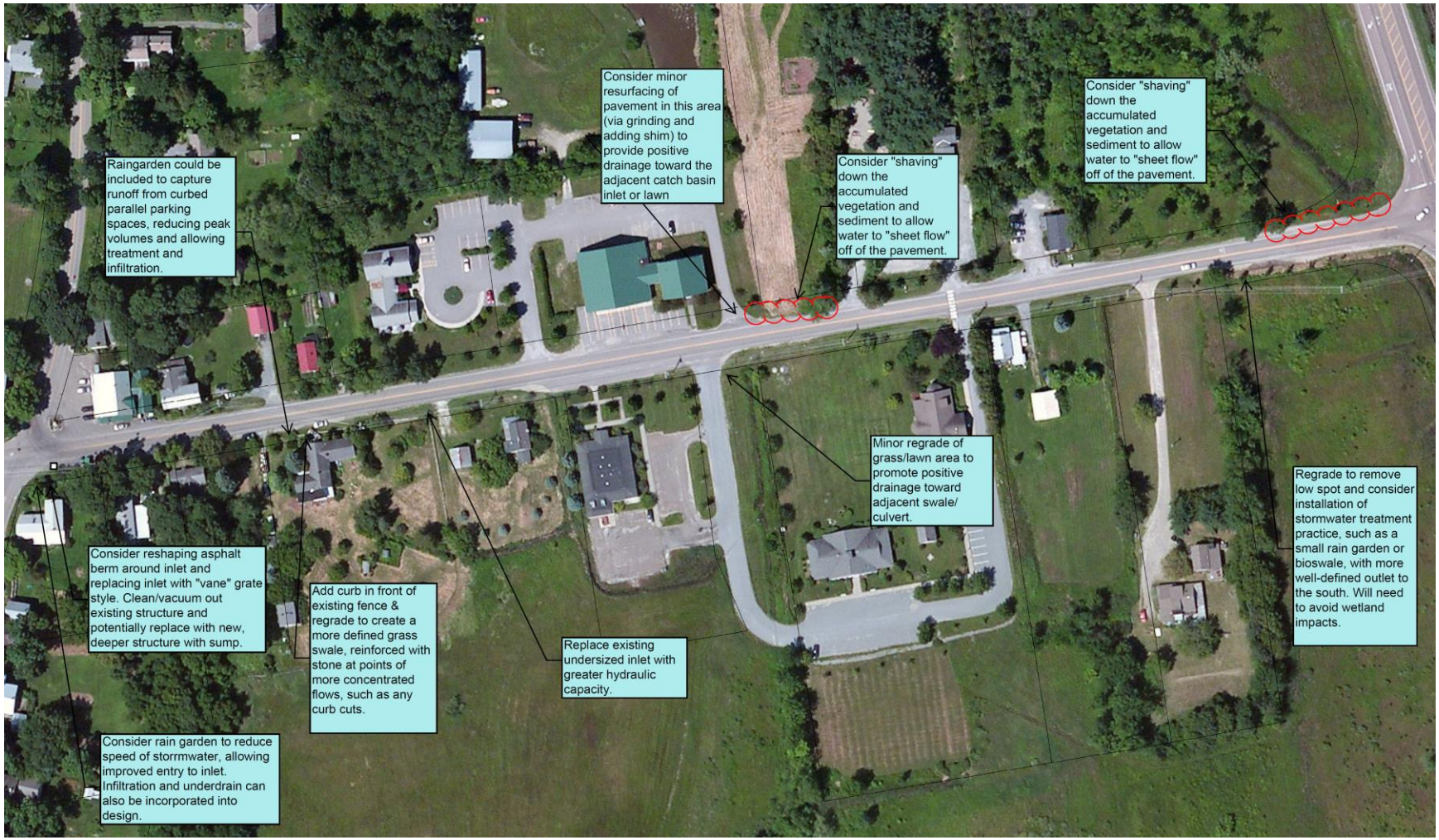


Figure 6: West End of Ferry Road – On-Street Parking, Stormwater Management & Pedestrian Path

Additional Considerations

Permitting

Potential permitting issues for several of the alternatives are summarized below. This is not an exhaustive analysis, but outlines expectations based on the concepts presented in this study.

Stormwater. The new pavement from the on-street parking will result in less than 5,000 square feet of impervious surface, so a stormwater permit is not anticipated. This will allow for a more flexible application of best management practices as compared with a design required by permit.

Wetlands. The bioswale (Stormwater project D) would be constructed within the buffer zone of a Class 2 wetland, and will therefore likely require a conditional use permit. Given the potential for improvement of water quality, the project should generally be supported by the regulatory officials.

Cultural Resources. The proposed pedestrian facilities will require a review by a qualified expert to determine if the project would result in any adverse impacts to historic or archaeological resources. This review may suggest modifications or enhancements to the design to assure it will be compatible with this historic setting.

Public and Stakeholder Outreach

A public meeting is scheduled for January 12, 2015, allowing for input and discussion on these draft recommendations.

Cost

Conceptual cost estimates for each of the parking and stormwater options are shown as follows, and should be considered preliminary estimates for planning purposes. They do not include allowances for engineering, permitting, and project management, and will be refined after obtaining input on the design.

Table 1: initial Cost Estimates for Stormwater, Pedestrian and Parking Recommendations

Project	#	Units	Unit Cost	Construction Cost
Raingardens	480	sq ft	$ 46.00	$ 22,080
Curb	500	ft	$ 30.00	$ 15,000
Catch Basins	3	ea	$ 4,500.00	$ 13,500
Bioswale	100	ft	$ 90.00	$ 9,000
Corner Truck Apron	240	sq ft	$ 40.00	$ 9,600
Paved Parking-Shoulder resurfacing				$ 32,000
Paved Parking – Shoulder reconstruction				$ 43,000
Permeable Concrete Paving blocks				$ 82,000

Costs for the pedestrian alternatives have been developed in previous 2007 D&K study, and presented below in Table 2.

Table 2: Ferry Road Sidewalk Project – Probable Construction Costs

Segment	Portland Cement Concrete	Bituminous Concrete (i.e. asphalt)	Gravel Path Option	Additional Cost For Granite Curb
A	$65,000	$58,500	$54,000	$12,500
B	$45,000	$41,500	$39,000	$13,500
C	$60,000	$54,500	$51,000	$19,000
D	$25,000	$22,500	$22,500	-
Total	$195,000	$177,000	$166,500	$45,000

The above costs should be updated to reflect 2015 estimates, which are likely to be 15% higher.

Maintenance

Several of these alternatives will have maintenance requirements. As expected with any utility, regular inspection and upkeep of stormwater treatment practices is critical to their long-term viability and effectiveness. The stormwater management practices presented within this study may involve frequent maintenance to clean and vacuum drainage inlets and pervious pavement surfaces. Plantings in rain gardens or bioswales also require weeding and occasional fertilizing or watering until they are well established and then regular upkeep of good mulch cover. Throughout the project area, roadside sand should be collected or vacuumed regularly.

Pedestrian facilities will also require maintenance, including snow removal. Current federal accessibility guidelines require any new pedestrian facility in a public right-of-way to be maintained for year round accessible travel, so snow removal should be considered a requirement. The decision of whether or not to use gravel, bituminous asphalt pavement or Portland Cement concrete should be informed by this requirement.

Recommendations

To be developed after consultation with Town of Charlotte, CCRPC and other stakeholders.