



## FOREST RIVER CONSERVATION AREA **TRAIL ASSESSMENT**



Produced for the Conservation Commission  
of the City of Salem, MA

February 2016

Produced by





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## ACKNOWLEDGEMENTS

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## EXECUTIVE SUMMARY

Forest River Conservation Area (FRCA) is owned by the City of Salem Conservation Commission and encompasses tree groves, salt marsh, dense woodland, and open hilltop in 97.7 acres. The site is split laterally by the Forest River and by Loring Avenue north to south, with the western portion of FRCA being the focus of this study.

Once pasture for colonists' livestock, vestiges of historic use remain in the form of stone walls and what appear to be foundations for small structures. Today the FRCA landscape is predominantly secondary hardwood forest. Forest River flows west to east through the forest into a salt marsh before reaching Salem Harbor. A 122 foot knoll, Eagle Hill, stands at the southwestern portion of the site, with the river to the north and a swampy area to the south.

Over 2.5 miles of trail wind around the site, with 70% of the trails being in fair condition. Trail conditions are affected by surface material and stability, erosion, obstacles, water, and use modes. The FRCA trails are generally stable, with some salt marsh and Eagle Hill paths eroded by foot traffic and water. Fallen limbs and loose rocks clutter many of the paths, and tree roots have been exposed in numerous places, threatening the health of the trees. Trail improvements may include erosion repair and prevention, adding soil over exposed roots, and installing water bars to stabilize trails on Eagle Hill. Additionally, if amended, the level path paralleling the salt marsh may serve as an accessible path meeting the standards of the Americans with Disabilities Act (ADA). This change would ensure that a wider range of people may enjoy the site.

Trimming vegetation back on path edges may also improve trail conditions. While FRCA is generally dense with vegetation, thorny catbrier is notably expanding around the site, and much invasive Oriental bittersweet is visible as well. This vegetation should be controlled along path edges.

Four boardwalks, or bridges, provide water crossings around FRCA. Volunteers Bridge is the largest and crosses the salt marsh. Cub Scout Bridge is the smallest and would be incorporated into the abovementioned accessible trail. All the bridges lack guardrails and do not meet building code. The framing and decking on each bridge has deteriorated, and the bridges are in need of replacement, with Cub Scout Bridge and Volunteers Bridge being priorities.

Within the past couple decades concrete wheel stops, utility poles, and aluminum signs have been placed along trails. While these items may once have served a purpose, they clutter the land today and look out-of-place. Removal is recommended.

While three interpretive signs may be found around FRCA, the site notably lacks wayfinding markers. With social paths creating numerous route options, wayfinding blazes and signage would provide helpful guidance for visitors unfamiliar with the site. Improvements to other site signage, such as the interpretive signs, the entry sign at Salem State parking lot, and a large sign at Volunteers Bridge should also be made.

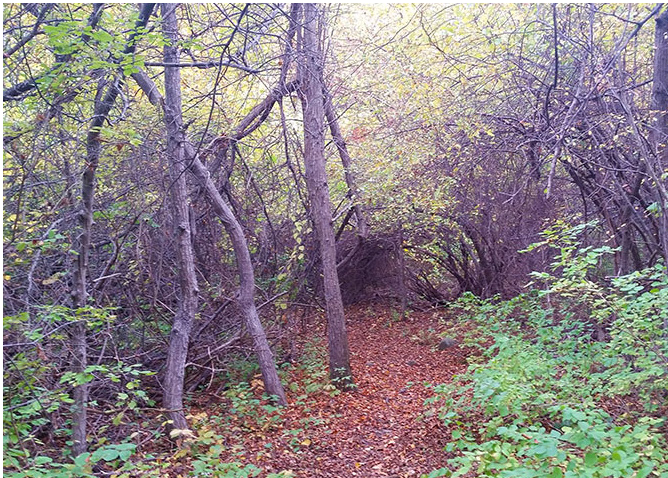
The western side of the site is bounded by MBTA commuter railroad tracks. Currently, pedestrians cross the tracks to move between FRCA and Salem Woods. Two crossing locations are located within FRCA, and new fencing is needed to close them to prevent access to the hazardous track area.

The southeastern portion of the site includes both salt marsh and woodland. Residential abutters have been dumping trash, cutting trees, and even extending their properties into Conservation Commission land. A new trail might be constructed in this area to expand recreational and educational opportunities, promote the value of FRCA, and prevent these illicit activities.



## OVERVIEW

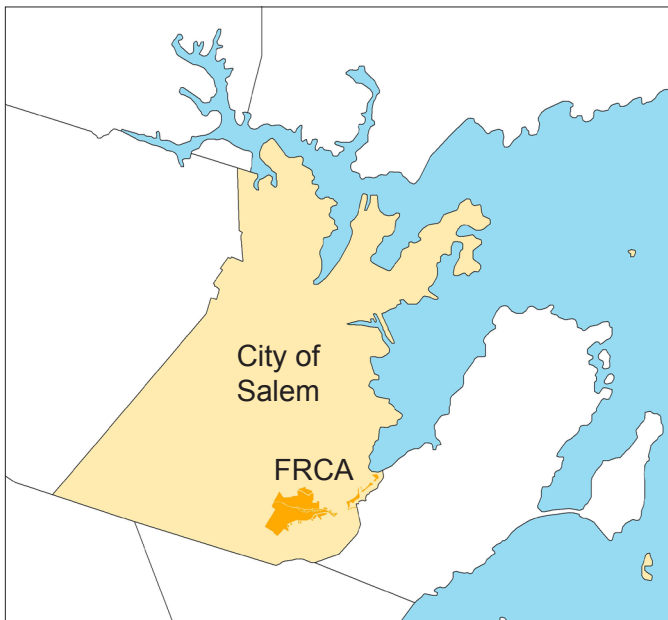
Though small in area, Forest River Conservation Area (FRCA) bestows on visitors diverse scenery — groves, salt marsh, dense woodland, and open hilltop — while providing both a quiet refuge and rich learning environment. With a healthy, regenerating forest, flowing water, and an abundance of wildlife, walkers move through an array of sights, sounds, and smells that change by season. Site trails, including social paths, cover 2.5 miles, and visitors may take advantage of varying levels of trail difficulty, from entirely level trails to steep paths on Eagle Hill.



The conditions of the FRCA trails are generally fair, with some improvements being needed to ensure good surface drainage and stability. Vegetation could be trimmed back from path edges on a number of segments. The four boardwalks on the site should be replaced. Most notably, trail blazes and signs should be added in key locations to aid visitors in wayfinding.

## Site & Surroundings

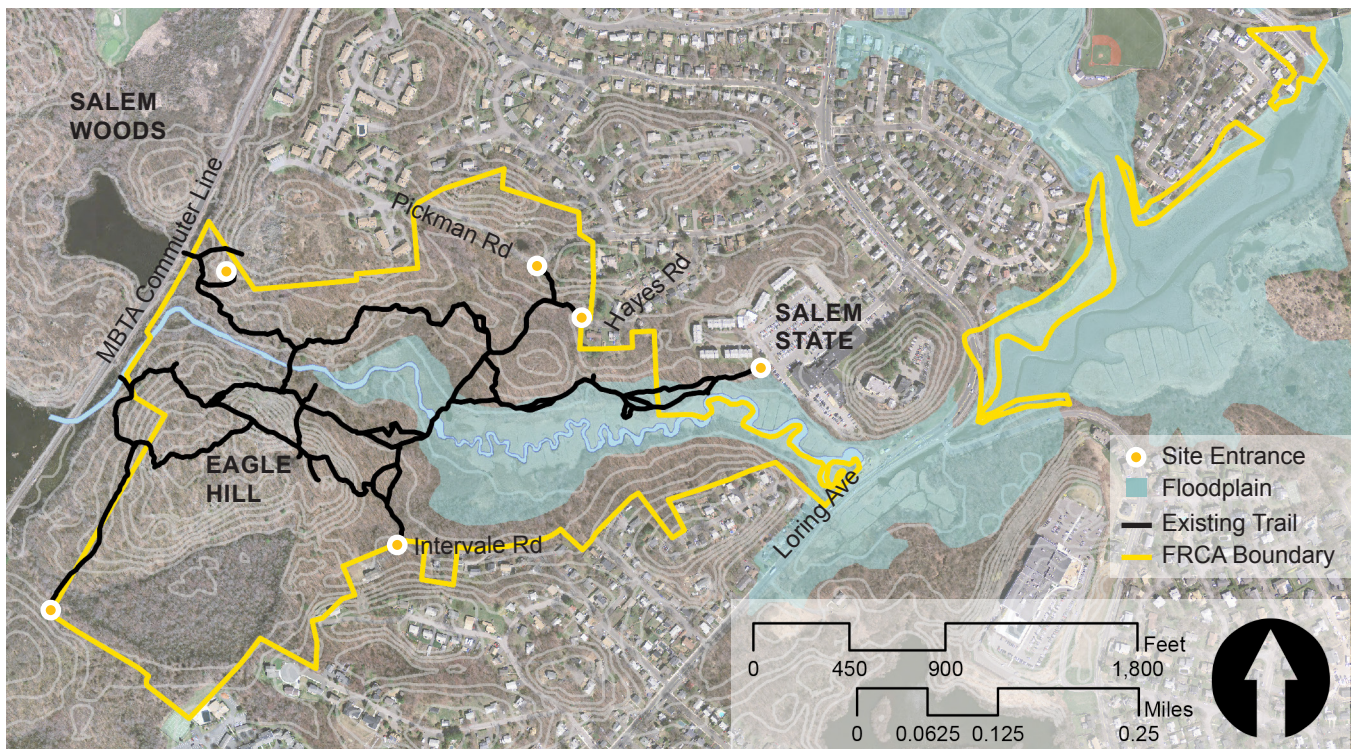
Within the City of Salem, Massachusetts, FRCA envelops 97.7 acres of salt marsh and forest land straddling Forest River as it flows east to Salem Harbor. The site is bisected by Loring Avenue, with 91 acres lying to the west of the road and the remainder to the east. This trail assessment encompassed the property to the west of the avenue where a walking loop has been long established.



Trail users' standard experiences in FRCA are characterized by a nondescript entry from the Salem State University parking lot. Users head west along a pleasant, level walk paralleling a salt marsh covered with invasive phragmites. Most of this path lies within the floodplain, and it appears users have created various social paths to avoid occasionally wet routes. Walkers may head south or north at a fork without wayfinding signs. The northern route takes visitors through

the woods over small hills, generally dense vegetation and varying heights of tree canopy, across some small rocky ledges, and past a rusted vehicle graveyard before hitting the railroad tracks at the back of the property. The southern route carries visitors over Volunteers Bridge, a large boardwalk in the salt marsh, and through the woods up Eagle Hill for a distant view of Salem's coastline.





FRCA is surrounded to the north and south by both single-family homes and multi-family units. Yards and neighborhood roads line the site. Salem State University - South Campus is located at the eastern end of the property, and Salem Woods (part of Highland Park) lies to the west of the conservation area across the MBTA commuter railroad tracks.

### Neighbory Connections

The position of FRCA near multiple residences and a university provides both recreational and educational programming opportunities for neighbors. University students can easily access the site for recreation and a quiet outdoor environment, while their professors may incorporate the natural systems of the property within their class instruction. Recently, Collins Middle School has incorporated the site into one of its outdoor learning programs, and Salem State Preschool staff have tagged certain plants within FRCA for instructional purposes. Nearby residents must also enjoy the site, as a few trails extend to neighborhood streets or across property lines to unknown destinations.

Of importance to consider is that Salem State owns both the parking and the property containing the main entry trail, main entry sign, amphitheater, and first interpretive sign. As the main entry needs some immediate improvements and continual maintenance, the Conservation Commission might consider establishing a formal agreement with Salem State as to what organization is responsible for what task. Rules for volunteers are also important to establish. Who can work on Salem State's property? What can they do there? Long-term, should the Conservation Commission try to obtain that property to prevent future development?



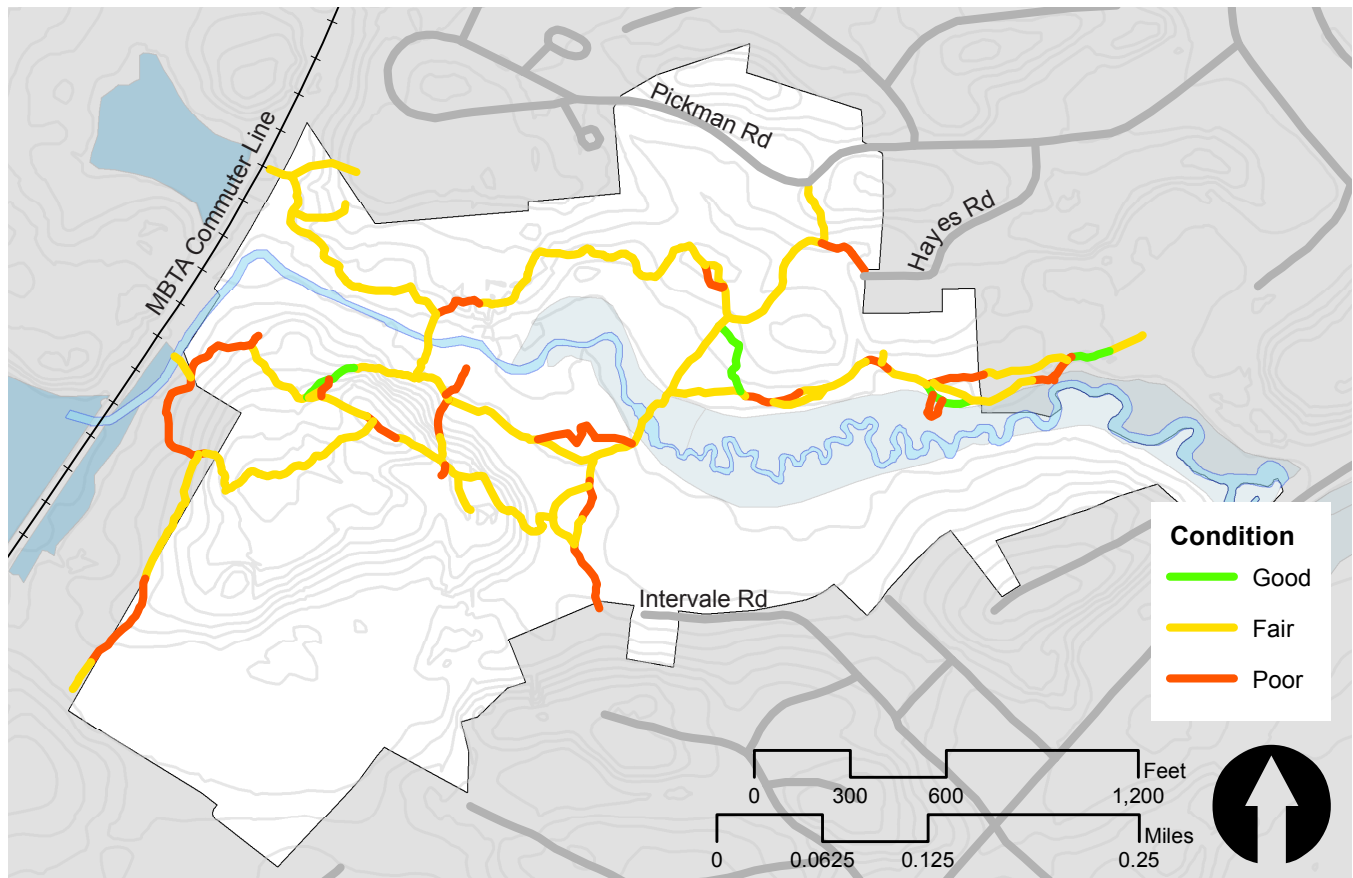
## TRAIL CONDITIONS

Except for the entrance path from Salem State, which feels more manicured due to the crushed stone surface, the FRCA trails are generally rugged in character. This ruggedness — the exposed rocks, roots, and vegetation closely hugging or overtaking path edges — made it difficult to designate trails as being in good condition. The length of trail categorized as in good condition made up just five percent (5%) of the total length assessed. However, trail segments were generally split according to overall character, vegetative communities, surface material, direction, or slope, so it should be assumed that many quite short portions of the fair-rated segments are, in fact, in plenty good condition and require no improvement.

Generally, good conditions are seen on the paths near the salt marsh where crushed stone has been laid in this area and makes a stable, attractive surface. An oddly placed concrete wheel stop does need to be removed from one of these segments, but otherwise no improvements are needed.

Seventy percent (70%) of FRCA trail length registered as being in fair condition — stable walking surfaces that may include a limited amount of obstacles such as fallen limbs, exposed tree roots, or loose rock. Some vegetation along the paths may slightly encumber walkers, and small spots along these trail segments may be wet.

The smaller number (25%) of poor condition trail segments tend to include a higher number of obstacles, including dense vegetation that users must push to move past. Longer lengths of wet area, erosion, and unstable walking surfaces may contribute to poor conditions as well.



*October 2015 Trail Conditions. Seventy percent (70%) of trails are in fair condition.*





**Good Condition**

*The concrete wheel stop should be removed, but this trail is otherwise in good condition.*



**Fair Condition**

*Loose rocks and exposed roots contribute to a fair condition rating for this trail segment.*



**Fair Condition**

*The trail edges here are quickly being overtaken by plants such as catbrier, which is thorny and spreads aggressively.*



**Poor Condition**

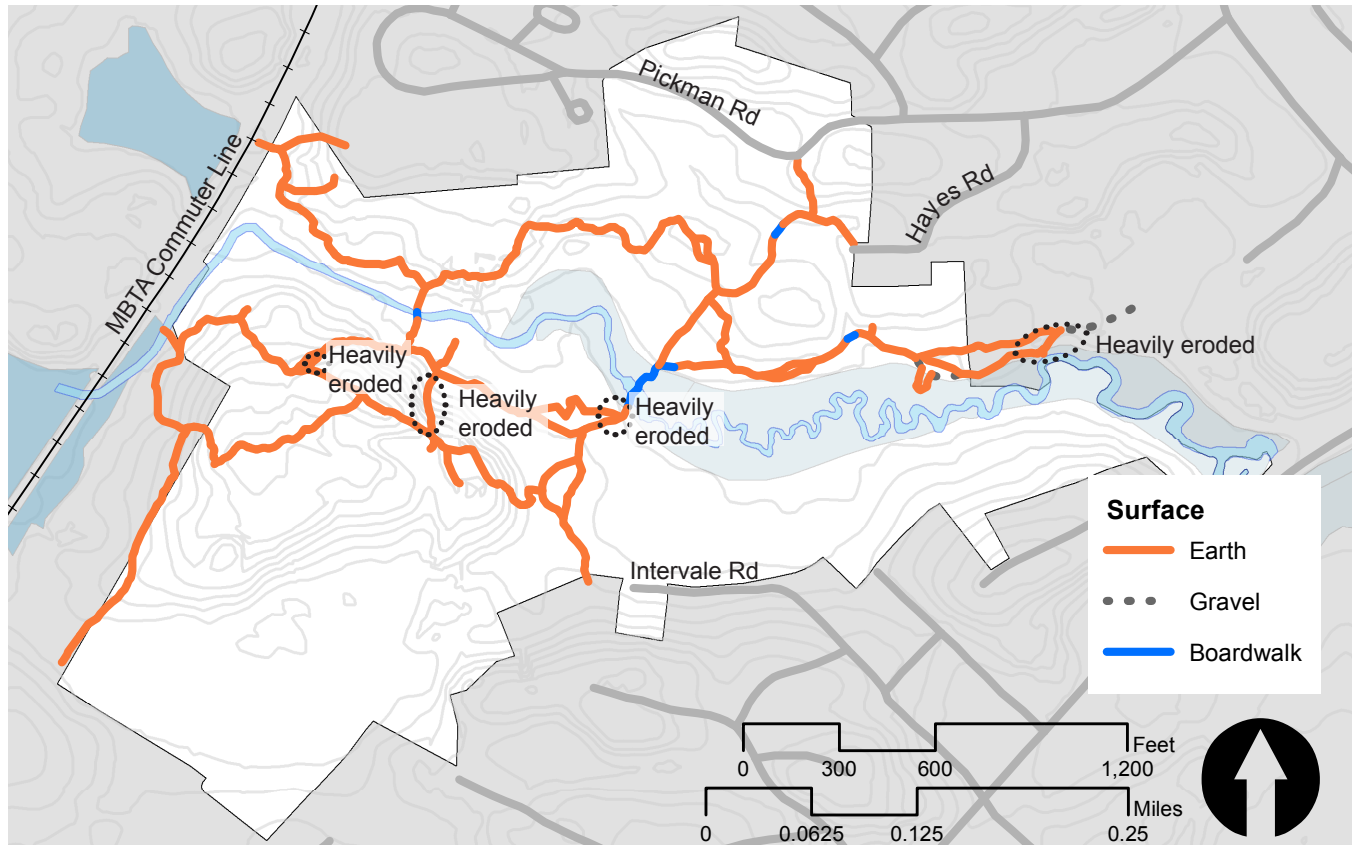
*This trail is obstructed by a fallen tree, covered in loose rocks and twigs, and shrubs are obscuring the path.*



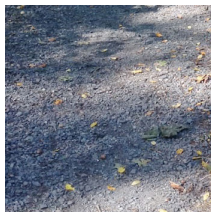
Trail conditions are important to consider in terms of both user experience and impact on forest health. The following factors influence trail conditions ratings in Forest River Conservation Area.

## Surface Material and Stability

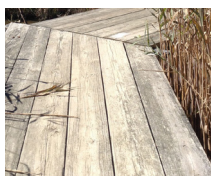
The FRCA trail surfaces may be generally categorized as earth (94.7% of trail length), crushed stone (2.9%), or wood boardwalk (2.4%).



Earth, in most cases on this site, is exposed and compacted soil. A few less traveled trails, often social paths, are covered by leaves or phragmites stalks, and some of the trail segments on Eagle Hill include a mix of compacted soil and exposed bedrock. Earth is stable where the site is level or moderately sloping. Steep slopes quickly start to erode with wear, as the slopes within FRCA are doing. Some of the earth trails are obstructed by numerous exposed tree roots or scattered small rocks.



Crushed stone surfacing is visible on the level path extending from the Salem State entrance west along the salt marsh. This material covers tree roots and provides a level, stable entry that allows people of all abilities to access the site. Some crushed stone has washed away where the path is directly adjacent to a steep slope down to the marsh, so stormwater drainage is likely the main culprit. In wetter seasons marsh flooding may also contribute to the washing away of stone and earth on portions of the trail.



Wood boardwalks make up the last broad category of surfacing. While generally a good way to make water crossings accessible, the boardwalks on this site cannot be considered ADA accessible due to loose boards and non-level entries, and they do not meet building code without guardrails. Guardrails are needed when the boardwalk is over 30" from the surface of ground, and all the FRCA boardwalks exceed that limit.





*Crushed stone trail erosion*



*Erosion on slope*

### **Erosion**

In FRCA, erosion can be seen along the slope lining the salt marsh, where the flow of water in the marsh erodes the banks and visitors propel the process forward by climbing down the slope for views. Erosion of Eagle Hill is occurring along paths as well, particularly around the steepest path on the north side of the hill. Off the south side of Volunteers Bridge, under a low tree canopy, it appears that water has heavily eroded away part of the trail.

While erosion can be both natural and man-made, it is at all times something to monitor and potentially to control. Erosion degrades growing conditions for vegetation, negatively affects aesthetics, creates unsafe walking surfaces, and, in a larger sense, determines how a site is used. An eroded hillside encourages hikers to find alternate routes, which in turn creates more erosion in different locations.

### **Obstacles**

Obstacles should be expected by regular trail users in this rugged landscape. Fallen limbs, exposed tree roots, surface rocks, and shrubby vegetation may all be considered obstacles if they in some way force visitors to alter an expected route. Obstacles do not necessarily signal poor trail conditions, but the prevalence and type of obstacles was accounted for within trail conditions ratings.

Fallen limbs are prevalent on this site and triggered fair ratings if obtrusive enough, but fallen limbs are to be expected in a forest and are often easily moved. Some larger trees have fallen, though, and visitors are forced to duck under or climb over the stems; this impacts safety and accessibility.

Tree roots are broadly exposed, and on some trail segments they are so prevalent that visitors must hop from root to root rather than walk on earth. This is negative for both people and trees. These paths cannot be considered accessible, and too many exposed roots can result in enough root damage to reduce tree health and drought tolerance.

Surface rocks interrupt the trails at various points, particularly on slopes where rocks have been exposed and loosened through use. Please note that exposed bedrock and large boulders are not considered obstacles as these far preceded the trails. Remnants of old stone walls might be considered obstacles where they cross trails that are otherwise fully accessible, but these remnants are also important landscape features and should not be removed or covered over without careful consideration.





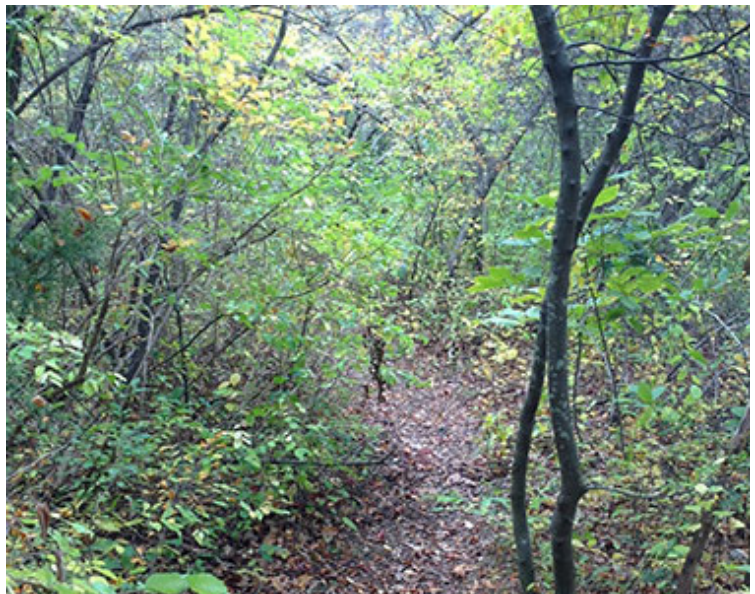
*The boulders are not obstacles, but the fallen limb, when combined with other factors, reduces the condition of the trail.*



*Many loose small rocks make this trail surface less stable under foot.*



*Multiple exposed roots and loose soil are a sign of erosion. The combination creates unstable walking surfaces.*



*Low canopy is pleasant and interesting, but too low and walkers must constantly duck and push vegetation away.*



Besides natural and historic trail obstacles, some relatively new and man-made obstacles may also be found within FRCA. At the Salem State entrance to the site, a concrete wheel stop blocks part of the path, and a utility pole has been placed at the Pickman Road entrance, presumably to prevent cyclists and motorized vehicles from entering.

### **Water**

Water on trails is a source of erosion and surface instability. A number of trail segments within FRCA are affected by water flow across paths and/or ponding on the trail surface. Near the salt marsh, an area has been covered with boards to allow walkers to cross over what must be a small pool in a rain event which was mostly dry at the time of this assessment. Other trail segments contain muddy spots to avoid. Notably, four boardwalks have been constructed to allow visitors dry passage across streams and wetlands.

### **Use Modes**

No specific use mode was noted as reducing the condition of a particular trail in FRCA, but use modes do very much affect trail conditions. A 2006 document written by an FRCA caretaker attributes much path erosion, compaction, and exposure of tree roots to mountain bikes, motorcycles, all-terrain vehicles, and snowmobiles, all of which are illegal within the property. A mountain biker was spotted on the site during this assessment, but evidence of ATVs or other large-wheeled vehicles was not found. These uses impact the health of trees, and much deadwood was spotted in some larger trees along a number of trail segments. However, the frequency at which these activities occur and impact the trees could not be determined through such a limited observation of the site.

### **Other Considerations**

#### **Trail Width**

Trail width often influences and is influenced by trail use, but at FRCA no particular trail width presages a particular trail condition. While on many recreational sites wider paths are usually more heavily traveled and often more frequently maintained, at FRCA trail conditions fluctuate on different trail widths throughout the site. It is important to note, however, that while overall widths range from 1-8 feet, the high majority of paths on this site are just 2-3 feet wide. Trail widths should be considered in terms of appropriateness for use and frequency of traffic. In general, the trails at FRCA are adequately wide for current usage, but none could be considered ADA accessible due to segments that narrow less than 3', obstacles, and lack of passing points.

#### **Social Paths**

Social paths — also called social trails, desire lines, or cow paths — are created through erosion caused by human or animal foot traffic. A guide map, presumably from the 1990s, shows a trail loop that does not match the trails seen during this assessment, suggesting that social paths have influenced the site. Without wayfinding, it is difficult to assess social paths versus what are considered the main paths. Some social paths have clearly been established, though, from private properties, along stone walls, and on the slope of Eagle Hill.

Social paths may provide desired access for users, but they also divide land into more and more disjointed sections while harming vegetation and reducing habitat. In FRCA social paths around the salt marsh and Eagle Hill are particularly prevalent, and signs of erosion and tree stress are visible.





*Utility poles lining path running to Pickman Road*



*Concrete wheel stops near the salt marsh*



*Cobblestones at eastern base of Eagle Hill*



*Car parts near railroad on northern side of river*

## **AESTHETICS**

While aesthetics did not play into trail conditions ratings, they do affect user experience. Site visitors, caretakers, local police, and, likely, past property owners, have deposited a number of items on the site which affect the appearance and of the trails. Salem State students appear to use the amphitheatre at the entrance to the site as an ashtray. Police, according to source documents, long ago affixed a number of large aluminum signs advertising fines for improper site use. Tiny pieces of broken glass glitter in the sun all over the top of Eagle Hill, where a fire pit has been made. Boards, pavers, metal pieces, even quite large piles of car parts, are all scattered around the site. Most oddly, a 30' long segment of cobblestones are laid into a more isolated segment of trail.

Though not beautiful, the cobblestones and car parts are rather interesting to discover. While rules for use should be established, the aluminum signs are forbidding, similar to "no trespassing" signs, and the quantity is unnecessary. The other debris should be removed for aesthetic appeal and safety.

Notably, concrete wheel stops, or bumper blocks, are visible in a few locations along the FRCA trails. One blocks the entry path along the salt marsh, while a couple groups have been placed off the side of the trail elsewhere near the salt marsh. More than 10 wheel stops can be found lining the slope in one location on Eagle Hill, while others appear to have fallen or been pushed downhill. According to documents provided by the City of Salem, these wheel stops were placed to prevent erosion and stabilize the Eagle Hill slope, but most appear to have been moved and, therefore, serve no purpose.



Utility poles line the trail on the northeastern portion of the site heading out to Pickman Road. The poles appear to provide a barrier to entrance for motor vehicles and to delineate the trail edge, preventing vegetation from overtaking the trail as quickly. However, vegetation is growing over the trail, and the number of poles distracts from the natural beauty of the site.

## STONE WALLS

Remnants of colonial field divisions, at least 0.5 miles of stone walls run throughout FRCA. Some lengths of wall lie parallel to trails, the walls likely having determined the route of the trails. In a few locations walls cross trails and obstruct trail surfaces to varying degrees. In some spots only small stones peak out of the trail surface. Elsewhere, wall remnants must be stepped over to continue on a route. The walls are an important feature of the site and should generally not be touched.

## SITE ENTRY

Entrances to the site are all unobtrusive in their small size and lack of formality, which may or may not be desirable depending on the goals the City has for increasing visitorship or presenting a certain appearance to potential visitors. Upon closer inspection, however, or if someone is looking for access to the site, the entrances leading directly to streets and Salem State parking lot are also somewhat cluttered with signage, overgrown vegetation, and/or wood (utility poles or firewood) lining the trails.



### *Main Entrance from Salem State Parking Lot*

Multiple trail entries provide nearby residents with access to site. The main entrance to FRCA heads west off the back of a large parking lot at Salem State. This entrance is, while not hidden, fairly nondescript. It has no dedicated parking, which according to users is not a problem. The lack of accessible parking is an issue, though. The large (~8') entry sign is hard to read and has a crooked top board. Weedy vegetation is overtaking the edges of the crushed stone path, and some dumping of brush and other materials has occurred to make the entrance look unnaturally unkempt.



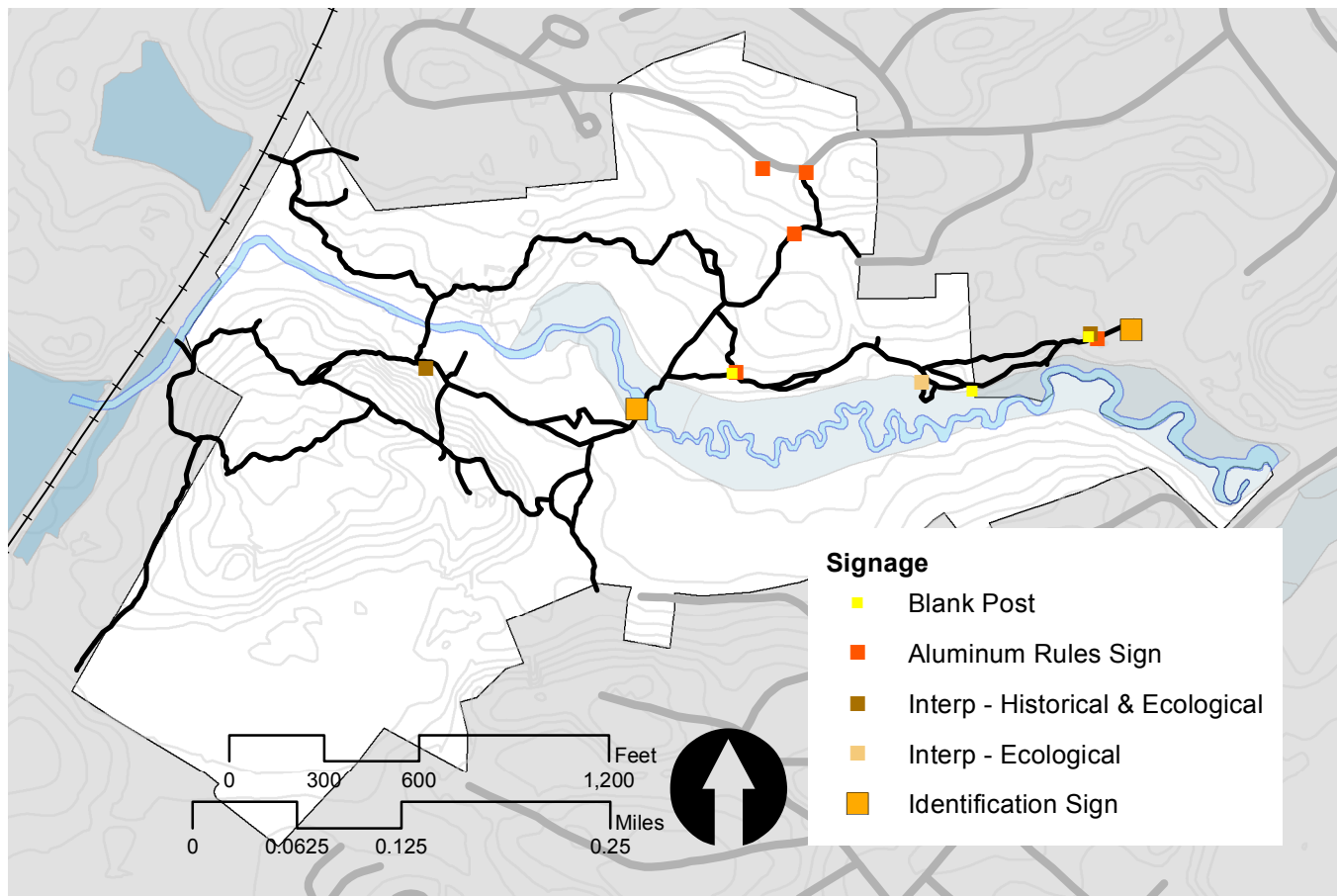
*Pickman Road Entrance with rules sign and utility pole*

### *Neighborhood Entrances*

Accessory entrances to the conservation property are found along or at the end of neighborhood streets — Hayes Road, Pickman Road, and Intervale Road. Firewood lines the path at Hayes Road. The maintainers of FRCA have blocked the path leading from Pickman Road with a utility pole, likely in an effort to restrict bike and ATV access. Two aluminum signs have also been placed at this location threatening prohibited non-pedestrian users with \$50 fines. Other entries to the site exist toward the back (west) of the property, as one trail extends north across the property line around piles of boulders, eventually reaching a paved road, while a separate trail heads up a steep hill through the woods across the southern boundary.

## SIGNAGE AND WAYFINDING

While some interpretive and rules signs are present, Forest River Conservation Area notably lacks wayfinding markers and signs. A few odd blank posts and Salem Walkways tags may once have served to this end, and trail maps are present on interpretive signage, but no blazes or wayfinding signs were identified as part of this assessment. This creates uncertainty for visitors and likely contributes to the amount of social trails seen on the property. Trail users with reduced mobility also have no way of knowing which trails are appropriate for their use. Recommendations for wayfinding and other signage have been made in the next section. Meanwhile, the condition of existing signage is noted below.



*Eagle Hill interpretive sign*

### *Interpretive*

Three graphic interpretive signs provide information on the history and ecology of Forest River Conservation Area. The signs are 6 feet high with wood frames and glass covering black and white text and graphics. The frames are sturdy but worn-looking, and one of the legs on the sign closest to Salem State is splitting. Leaves and insects have infiltrated the glass on each sign to varying extents. The signs are legible, and the graphic style fits the character of the surroundings, but the trail map is not accurate nor adequately informative.





### *Rules Signage*

Aluminum painted signs advertising \$50 fines are dotted throughout the property and located at both the Salem State and Pickman Road entrances. All clearly forbid motorized vehicles, but the bottom text has been vandalized on most every sign with white paint. One sign advertises No Hunting - No Fires, but according to a newspaper editorial other signs say No Camping - No Bikes. The effectiveness of the fine statements has not been determined as part of this assessment, and the signs lend a forbidding air to the site.



### *Salem State Entry & Volunteers Bridge Signs*

From 1997, the large (~8') entry sign at the Salem State parking lot is in disrepair. It is hard to read due to loss of paint, and the top board is misaligned. Vegetation is beginning to cover the top of the sign as well. The position of the sign is somewhat awkward as the sign faces outward and parallel to the parking lot, when it would be more legible if angled inward toward the trail. This is a minor issue only.



The Volunteers Bridge sign is hardly legible due to vegetation almost covering it and due to the wear on the sign. The sign is positioned at the southern, or far, end of the boardwalk, when it might make more sense to position a sign at the beginning, northern end of the boardwalk.



## **AMENITIES**

Few amenities exist within FRCA, which is appropriate considering the character and small size of the site. About 130 feet from the Salem State entrance Boy Scouts constructed an amphitheater of low stones which is now surrounded by weedy plants. Collins Middle School students donated a dog waste bag dispenser, which at the time of this assessment held no bags and was partially blocked by vegetation. No bike racks, benches, lighting, or trash cans are available on the site.





## BOARDWALKS

### Cub Scout Bridge

The bridge is approximately 16' long at the deck and is four feet wide. It's of timber construction. Deck elements are 10" nominal wide and 3" nominal (2+ inch full). There are three longitudinal 4"x4" stringers. It appears there are at least 3-20 penny spikes at each stringer. Some dry rot was observed in the deck planks. The deck flex under load is significant due to the lack of depth of the stringers. There are no handrails on the bridge. Due to the large deflection under load the bridge would not meet current building code standards.

### Volunteers Bridge

This bridge is framed opposite the normal framing, i.e., planks run longitudinally along the bridge structure and are supported transversely. The majority of the bridge is supported on "bents" originally comprised of 4" posts supporting a transverse post ap (4"x4" or 4"x6"). The post bents were located 4-5' on center. The ends of the bridge, close to the ground, are supported on "sleeper" logs laid right on the ground and there is fair amount of deterioration observable. The sleepers are also approximately 5 feet on-center. The main body of the bridge goes over a marsh and through some cattails.

It appears many of the original timber posts rotted and were replaced (functionally) with grout filled PVC pipes. Again significant deterioration on the decking was noted and there are several "soft spots" as one walked over the bridge. The bridge deck is 4-5' above the marsh surface and the bridge doesn't have guard rails. Bridge runs a zig zag path from one shore to the other. Similar issues with regard to deterioration and lack of guard rail. This bridge would not meet current code. The Volunteer Bridge is approximately 5'-10' wide and approximately 210 feet from first post cap to last post cap.



Text on this page provided by Childs Engineering Corporation



### **Eagle Scout Bridge**

This bridge is also framed with the decking running longitudinally. The decking is supported by 4"x4" and 4"x6" transverse members. These transverse members are supported by 2 9-10" logs spanning between the log abutments. This is sturdier construction than the Cub Scout and the Volunteer due to the heavier longitudinal structure. Decking has a bit of rot which is typical of several bridges. The abutments are a pair of logs placed transversely. The main span length is approximately 22 feet and there is some bounciness but not significant. Code issues also exist with regard to the lack of railing.



### **College Student Bridge**

Deck construction is 3"x12"s transverse. This bridge uses a couple of railroad rails or wide flange beams to span between stone and mortar abutments. The Student Bridge is 5 feet wide by approximately 20 feet long. With the exception of having no guard rails this bridge might meet current code.



## MBTA RAILROAD CROSSINGS

Site users cross from and to FRCA over the two-way MBTA commuter railroad tracks. The trains are visible from a good distance away, and the crossings, though mostly harmless, are always illegal.

Two crossing areas currently exist, with the crossing to the south being blocked only by a guardrail. Here visitors must cross a bridge made of branches. This crossing is lined at its sides by a fence in need of repair. No signage is visible here. The other crossing, to the north, includes both a guardrail and fence directly lining it, though the fence is jogged in toward the guardrail, which seems to encourage a natural funneling of users to this spot. The fence lining the guardrail has been ripped back out of place, and signage is only visible far to the sides of the crossing.



*Southern railroad crossing*



*Northern railroad crossing*

## VEGETATION

While not a relatively large property, FRCA contains some interesting vegetative communities. Along the salt marsh path exist many oaks and pignut hickories, plus goldenrod, burning bush, and buckthorn. Phragmites dominates the marsh from Volunteers Bridge eastward. The understory in the salt marsh area is less dense than in other portions of the site.

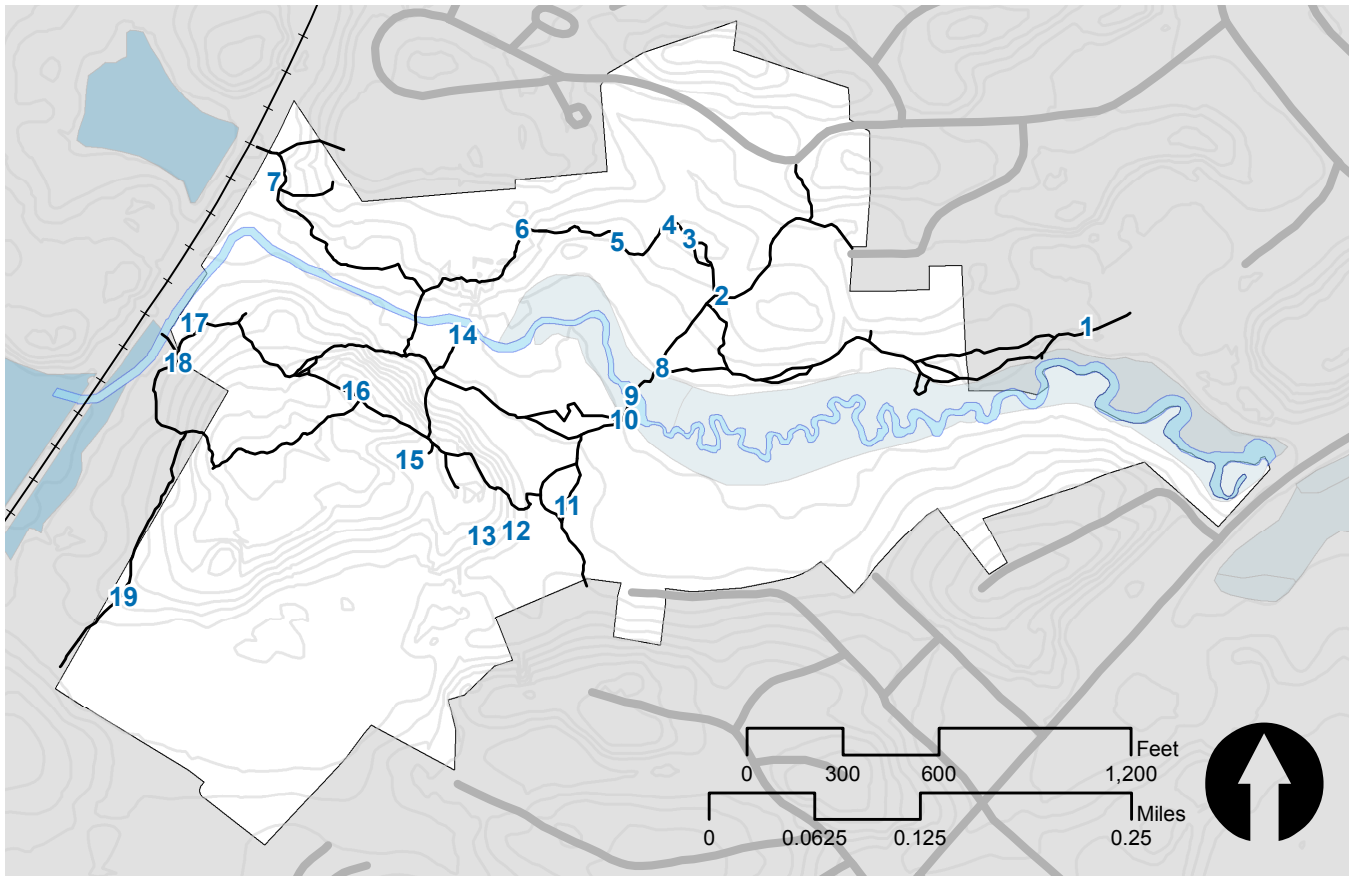
On the top of Eagle Hill, one finds red cedars, pines, amelanchier, red and white oak, sumac, and some beech. Slightly downslope toward the northeast is a noticeable grouping of princess pine, which may soon be smothered by a large mass of catbrier. Much fern is also present downslope and in different locations around the site near the salt marsh.

Notably, catbrier (also called greenbrier) is forming thickets around many locations in FRCA. Though aggressive, this is a native woody vine that provides both cover and food for all types of wildlife, from birds to rabbits, raccoons, and deer. Full eradication of this plant should not be sought. However, greenbrier can smother other vegetation and, due to its thorns, can snag clothing on trails. A management approach for catbrier appears in the Recommendations section.



## POINTS OF INTEREST

Forest River Conservation Area contains numerous assets, from views to special vegetation, and manmade features. The following map provides a reference as to the locations of various points of interest, some of which might be used for site interpretation or simply for historic record.



- |   |   |
|---|---|
| 1. Amphitheater   | 11. Cobblestone Path                        |
| 2. Small Concrete Foundations                                       | 12. Small Stone Foundation                  |
| 3. Large Clearing   | 13. Small Stone Foundation                  |
| 4. Nine-Stem Black Cherry Tree                                      | 14. Quiet Water View                        |
| 5. Vegetated Tunnel ( <i>caused by bittersweet &amp; catbrier</i> ) | 15. Certified Vernal Pool                   |
| 6. Potential Small Overlook to Develop                              | 16. Eagle Hill Summit, View to Salem Harbor |
| 7. Vehicle Graveyard  | 17. Large Oak                               |
| 8. Vegetated Tunnel   | 18. View of Large Fallen Trees Off Path     |
| 9. View Across Marsh  | 19. Large Birch                             |
| 10. Vegetated Tunnel  |   |





4. *Nine-Stem Black Cherry Tree*



5. *Small Stone Foundation*



16. *Eagle Hill Summit, View to Salem Harbor*



9. *View Across Marsh*



## POTENTIAL NEW TRAIL

No trail exists on the south side of Forest River, where adjacent residents dump trash, illegally cut trees, and extend their yards across property lines into the Conservation Area. One solution is to construct a trail in this area to increase the amount of eyes on the land.

The property as it moves north to south, evolves from phragmites dominated marsh, to successional understory, to taller canopy. Moss-covered wet spots, clearings, large fallen trees, and views of the marsh make for a varied experience. Stone walls may also be found here, and deer, coywolves, and other wildlife all traverse the site.

As configured in the map below, a new trail route would encompass 0.6 miles. To the west the trail could fork around the sides of a slope. A central branch would provide neighborhood access. As shown below the route appears to be made of many straight segments; in reality the trail would curve as needed to avoid wet areas and features to preserve.

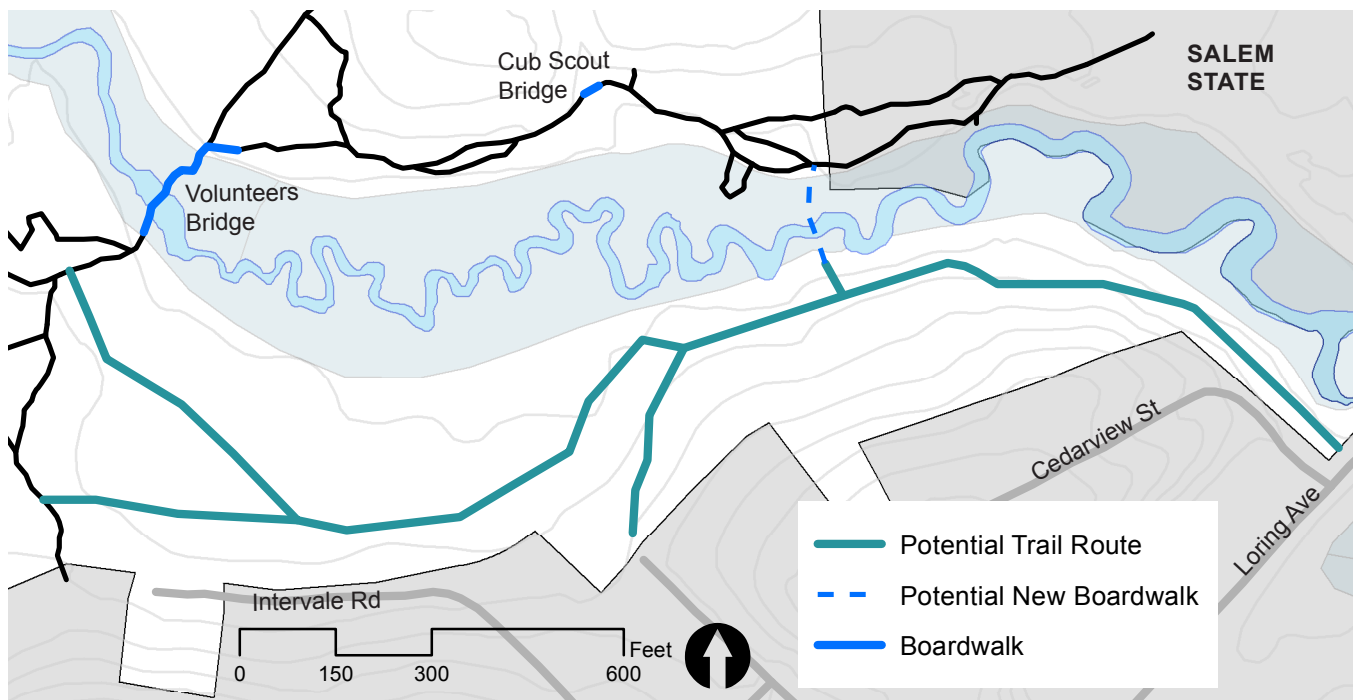
Unfortunately, the trail would end at Loring Avenue. An added boardwalk would help loop the trail back toward the Salem State parking lot, but thought should be given to how views and the marsh would be affected. In general, a new trail would give people opportunity to access and potentially disturb the marsh. Conversely, neighborhood residents may enjoy the increased recreational opportunity, and more eyes on the site make this a good option to consider.



*Dumped trash and encroachment*



*Extensive clearing would be needed*



## RECOMMENDATIONS

Forest River Conservation Area may be amended so that the user experience is enhanced while the impact on land, vegetation, and habitat is minimized. Trail conditions should be improved to clear paths of obstacles, repair and prevent erosion, stabilize surfaces, and ensure accessibility for users of all abilities where appropriate. Features of historic value, such as stone walls and foundations, should be preserved, while opportunities for interpretation and education should be encouraged and/or maintained. Clear wayfinding should be installed to aid users in navigating different loops and levels of path difficulty. Additionally, invasive species should be controlled to maintain a diverse plant community. These goals can be achieved through both minor and major improvements. Below, a number of recommendations have been detailed by work categories reflected in the cost estimate.

### Demolition / Site Preparation

#### *Remove*

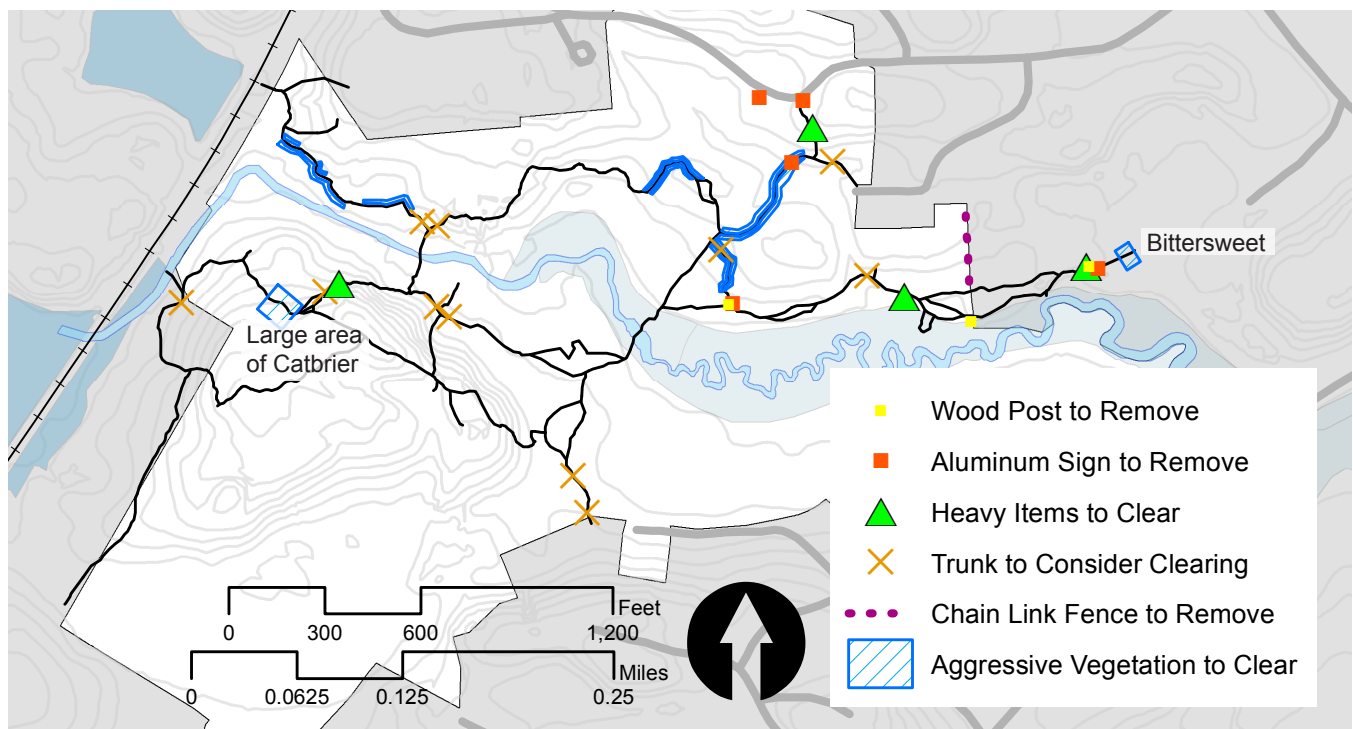
- 27 concrete wheel stops located along the salt marsh path
- 23 concrete wheel stops on the northern side of Eagle Hill
- 200 feet (estimated) of utility pole segments on the path heading north toward Pickman Road
- 5 aluminum rules signs
- 3 wood posts on the salt marsh path
- Various boards, lone pavers, other building materials and waste from around site

#### *Clean Up Amphitheater Area*

Remove cigarette butts, clear weedy or overgrown vegetation, and refill the dog waste bag station.

#### *Remove/Replace Chain Link Fence*

Consider working with Salem State to establish a less visible property boundary than the current 6' high chain link fence that stretches back toward a residence about 250 feet. Consider painting dots on trunks of trees or forming a line of boulders after removing at least the most visible length of the fence (150').





### *Discuss Rusted Vehicle Parts*

Some visitors may consider the rusted vehicle parts near the railroad tracks to be junk, but others might consider these interesting site features. Oxidized iron is not toxic, and the parts have minimal to no impact on the surrounding forest and wildlife, so removal is a matter of preference alone and is not accounted for within cost estimates.

### **Vegetation Removal**

Vegetation should be cleared around and on top of paths and in concentrated areas off of paths. This task could be done professionally but also may be completed by volunteers.

### *Cut and Clear Trail of Fallen Stems and Large Branches*

The map at left notes trunks to consider cutting and clearing off paths. We recommend cutting any fallen trees that are stuck on vegetation and hanging at all, whether overhead or even lower than waist height, as ducking under these or putting weight on top may be hazardous. Trunks fully in contact with the ground might be left strategically to prevent mountain biking, but consideration should be made in each case for whether the trunk affects walkers' footing. If the salt marsh path is made accessible, trunks should consistently be cleared off-path. In general, if a trunk is cut, efforts should be made to place the cut segment so it fits naturalistically in its surroundings.

### *Clear Trails of Small Fallen Branches*

Small fallen branches are often not noticed by walkers and can roll underfoot. While contracted labor could do a first pass, volunteers should generally be expected to move smaller fallen branches off trail to reduce these tripping hazards.

### *Cut and Remove Vegetation on Path Edges*

Vegetation should be trimmed off path edges and overhead where needed to create clear walking corridors. A maintenance team will need to walk the entire site and address the growth obscuring path edges, which is sporadic. Trimmings should be removed off-site in bags in case invasives are present.

### *Cut and Remove Aggressive Vegetation*

Oriental bittersweet appears in small areas around the site, including at the Salem State entrance. While this should be cleared, a larger task lies in the control of catbrier (smilax/greenbrier) which is not invasive but highly aggressive and present in large groups around the site. While the Conservation Commission should not expect to remove all of this vegetation, controlling the thickets most visible near paths is a decent strategy for preventing a full takeover and loss of other important natives. Maintenance teams should clear 10 feet to either side of the trails where highlighted on the plan at left plus address the large area on Eagle Hill where catbrier may outcompete princess pine. Please note that the plan covers only a fraction of the catbrier, bittersweet, and other invasives on-site.

Also consider discussing the removal or preservation of the vegetated tunnels north and south of the marsh (identified on the Points of Interest map). One has been designated for some clearing in the map at left due to the high amount of catbrier and bittersweet, but in general these tunnels might be loved by some site users, and removal may be unwanted. A fuller identification of all the vegetation making up the tunnels should be made before they are cleared.

Finally, a long-term goal may include addressing the large amount of phragmites in the salt marsh. Phragmites australis, or common reed, crowds out native vegetation, alters salinity in wetlands, increases fire potential, and forms dense thickets unsuitable for wildlife. Eradicating phragmites is a multi-year, laborious effort.

## General Site Improvements

Some additions might be made to the site to improve access and increase safety.

### *Add Chain Link Fence at Railroad Crossings*

At the southern crossing add 20 feet of fence near the guardrail. Repair 50 feet of fence frames currently without chain link. At the more northern crossing the Conservation Commission might consider constructing a 10 foot section of fence closer to the tracks and more in line with the rest of the fence at this spot to stop what seems like a funnel attracting visitors in or out. The Commission might also consider encouraging some catbrier to grow in this location.

In the future the Commission might consider more extreme possibilities for the railroad tracks, such as a bridge over the tracks to allow pedestrians and animals to cross, but such an expense is well outside the scope of what can be done to improve and protect FRCA within the next few years.

### *Install Bike Parking at Salem State Entrance*

The Conservation Commission might consider working with Salem State University to install bicycle racks in or near the Salem State parking lot at the entrance to FRCA. Make sure clear signage is posted to discourage use of bikes on trails.

### *Paint an Accessible Parking Spot Meeting the Standards of the Americans with Disabilities Act*

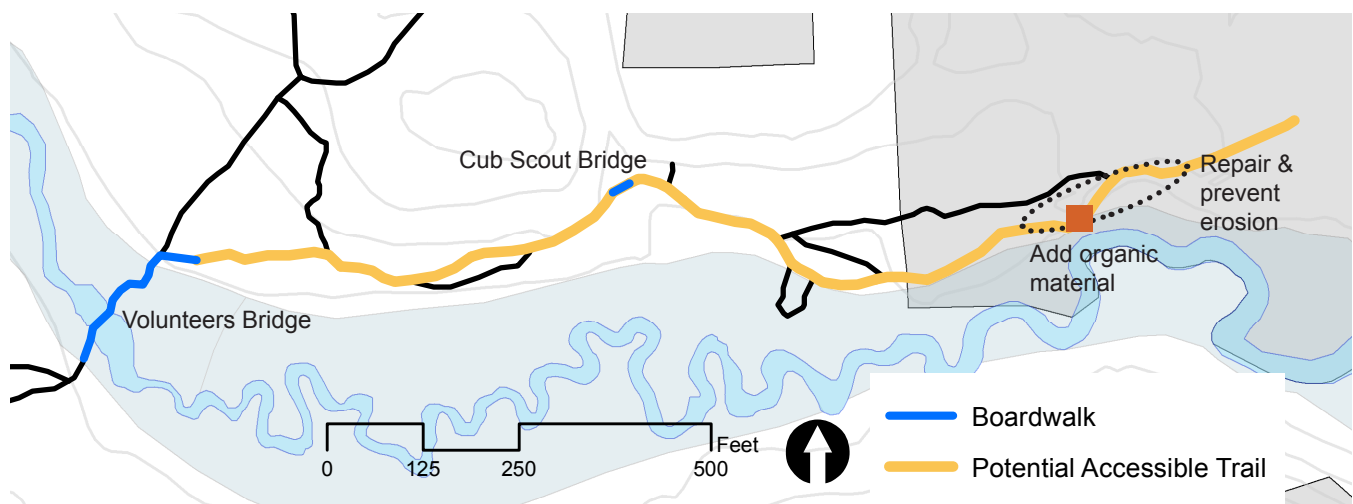
When turning the salt marsh path into an accessible trail, work with Salem State to create one or more parking spots that meet ADA standards.

## Earthwork & Trail Improvement

Trail improvements should improve walking surfaces to prevent tripping and slipping, prevent erosion of slopes, and to provide an accessible route. Specific strategies may be used for improvements to the salt marsh path and paths near or on Eagle Hill.

### *Regrade and Lay a Crushed Stone Accessible Trail*

The current salt marsh path will serve well as an accessible trail if regraded and surfaced with crushed stone throughout to the Volunteer Bridge. The 0.3 mile path is mostly level and requires only minor grade changes plus the addition of enough surface material to prevent tripping over and trampling on tree roots. In select spots widening may be necessary. As the trail is constructed erosion control methods should be used to prevent damage to the site.





### *Encourage Route Direction With Boulders and Cut Wood*

Along the salt marsh particularly pedestrians should be encouraged to stay on the most established paths. Too many small social trails are visible, and a couple of these might be cut off by placing boulders and woody material at path ends. Where erosion prevention is needed, consider placing boulders to prevent users from leaving the path and heading downslope.

### *Repair and Control Erosion With Coir*

Add organic material back to the slope in a small (6' long) location with coir. Lining the path here with boulders, wood, or planting may reduce future erosion.

### *Add Earth Over Roots North Of Eagle Hill*

Earth might be added on the well-traveled level paths south of the Forest River running to Eagle Hill. The health of the trees in this area is threatened due to extensive root exposure and trampling by pedestrians and mountain bikers. Enough material should be added that, when slightly compacted, tree roots are still covered.

### *Add Water Bars*

On Eagle Hill some trail areas are heavily eroded, threatening both trees and pedestrians. Water bars such as black locust logs might be installed in certain places on the hill, while efforts should be made to deter site users off at least once path where the hillside is falling away due to foot and likely mountain biking traffic. Erosion control might be added in this spot to prevent further erosion and put some organic material back on the site.

## **Boardwalk Improvements**

As funding allows, each of the boardwalks should be replaced with a long-lasting structure that includes a guardrail to meet building code. The Cub Scout Bridge and Volunteers Bridge are priorities. Signage, vegetation clearing, and grading at bridge entries all need to be considered as part of bridge construction projects. Educational and artistic uses/opportunities should also be contemplated in the design of each boardwalk, particularly Volunteers Bridge.

## **Signage**

Signage serves multiple purposes — interpretive, navigational, rules setting, etc. While the aluminum rules signs should be removed, other signage should be improved, replaced, or added within FRCA.

### *Salem State Entry*

The Conservation Commission could either repair the existing sign or replace it. In repairing the existing, it should be cleaned, the top board refastened, rusted washers replaced, and the letters should be repainted. Remove/replace the damaged Land and Water Conservation Fund attachment. Also consider moving the sign so it angles in toward the trail rather than toward vehicles.

Optionally, replace the existing wood sign with something more legible and which will require less maintenance over time. Different materials could be mixed for the frame and panel, but the sign should include the site name, rules, and a new map with updated trail routes.

### *Volunteers Bridge*

Currently the Volunteers Bridge sign is oddly located and repeats information stated on the Salem State entry sign. While basic repairs could be made to the sign, consider reconfiguring the Volunteers Bridge sign to make it smaller and refer only to the bridge. Place it at the northern side of the boardwalk so visitors are sure to see it. Rules do not need to be added to this sign. Optionally, remove the sign entirely or replace it with a smaller identification sign.

### *Interpretive*

The three current interpretive signs have a nice, site-appropriate aesthetic but need some repairs that will be extensive enough to require the signs be fully deconstructed. The frames need to be cleaned or even replaced, plus perhaps stained. The signs and covers need to be thoroughly cleaned.

One disadvantage to the current signage is that each panel includes a dated map that does not reflect the current trail system. The Conservation Commission might consider replacing the signs so that additional information can be added and the maps updated. Some of the same graphics could be used again if desired, and consider including mobile device triggered graphics/maps that can provide additional interpretive or navigational information. Finally, the sign nearest to the salt marsh should be moved closer to the trail to prevent people from walking 10' off path.

### *Wayfinding*

Blazes and limited navigational signage should be added to increase means of wayfinding around the site. Currently the interpretive signs contain maps, which are outdated, and no blazes exist. The future accessible trail and a loop option should be painted to provide site visitors with some way to navigate the terrain and understand what to expect. Should existing signage be replaced, new maps could better direct walkers.

### *Warning*

Signage should be added at the two railroad crossings to warn people against illegal and potentially dangerous activity. Some signage does exist along the fence today but not directly at those crossings.

### *Pickman Road Entry Sign*

Consider adding a small entry sign on Pickman Road that states the site name, rules, and provides a map. This could replace the two aluminum rules signs recommended to be removed.

### *Other*

Consider adding small signs identifying each bridge, should the originals or parts of the originals remain. This is not necessary but could be a nice way to recognize people who have previously devoted time to the site.

Finally, should an accessible parking space be added, add an identifying sign for that space as well.

## **Maintenance**

While FRCA requires little maintenance, a few tasks are necessary to complete each year to ensure site safety and accessibility. In general, the site should be inspected and repaired after significant storm events and in early spring (late March/early April) once snow has melted.

### *Vegetation*

Prune trees only when necessary to reduce hazards, such as when a large, dead branch is hanging over a trail. After storm events, clear fallen limbs, both large and small, off paths. Trim vegetation abutting edges of paths back 1-2 feet in June or July each year.

### *Invasives*

Sometime between August and November, clear catbrier, Oriental bittersweet, plus any other invasives back 10' from paths, and apply herbicide to stems. Also annually clear & herbicide the catbrier on Eagle Hill that threatens to outcompete princess pine.



### *Trail Surface*

In early spring (late March/early April), assess trail surface conditions, and repair trail tread where erosion, rutting, or poor drainage exists.

### *Boardwalks*

Assess each boardwalk annually to identify needed board and fastener repairs.

## **CONCLUSION**

Forest River Conservation Area is an excellent recreational and educational resource for the City of Salem. Trails are in decent condition, overall, but the salt marsh path and trails on Eagle Hill are starting to deteriorate due to water and use. While users may enjoy their experience of FRCA now, the site could be improved to better protect natural features and increase accessibility.

The most important improvements include adding wayfinding and creating safer boardwalk crossings. Also prioritize cleaning up the trails by removing wheel stops and utility poles, trimming vegetation back from path edges, and repairing and preventing erosion. Improve entry signage and consider creating an accessible loop on the salt marsh path so users of all abilities may enjoy FRCA.

## APPENDIX A

### Estimated Site Improvement Costs

*The following is a menu of possible improvements, where tasks might be separated into different projects.*

| ITEM  | QTY.  | UNIT | UNIT COST  | SUBTOTAL     |
|---|-------|------|------------|--------------|
| <b><u>GENERAL</u></b>                                     |       |      |            |              |
| Construction-based erosion control                        | 240   | lf   | \$10.00    | \$2,400.00   |
| Construction fencing (chain link)                         | 45    | lf   | \$10.00    | \$450.00     |
| Construction fencing (plastic)                            | 300   | lf   | \$5.00     | \$1,500.00   |
| <b><u>DEMOLITION / SITE PREPARATION</u></b>               |       |      |            |              |
| Remove & discard concrete wheel stops                     | 1     | ls   | \$1,000.00 | \$1,000.00   |
| Remove & discard wheel stops from slope                   | 1     | ls   | \$2,000.00 | \$2,000.00   |
| Remove & discard utility poles                            | 1     | ls   | \$2,500.00 | \$2,500.00   |
| Remove & discard aluminum signs                           | 5     | ea   | \$50.00    | \$250.00     |
| Remove & discard wood posts                               | 3     | ea   | \$50.00    | \$150.00     |
| Remove & discard boards, stumps, bdlg materials, & trash  | 1     | ls   | \$1,200.00 | \$1,200.00   |
| Clean up amphitheater area                                | 1     | ls   | \$200.00   | \$200.00     |
| Remove & discard chain link fence                         | 150   | lf   | \$10.00    | \$1,500.00   |
| <b><u>VEGETATION REMOVAL</u></b>                          |       |      |            |              |
| Cut & clear trail of fallen tree stems & large branches   | 1     | ls   | \$1,500.00 | \$1,500.00   |
| Clear trails of small fallen branches                     | 1     | ls   | \$800.00   | \$800.00     |
| Cut & remove vegetation on path edges                     | 1     | ls   | \$5,000.00 | \$5,000.00   |
| Cut & rem. aggressive veg. 10' off path/in select areas   | 36750 | sf   | \$1.50     | \$55,125.00  |
| <b><u>GENERAL SITE IMPROVEMENTS</u></b>                   |       |      |            |              |
| Add chain link fence at railroad crossings                | 70    | lf   | \$40.00    | \$2,800.00   |
| Install bike parking at Salem State entrance              | 1     | ls   | \$1,200.00 | \$1,200.00   |
| Paint ADA accessible parking spot                         | 1     | ls   | \$800.00   | \$800.00     |
| <b><u>EARTHWORK &amp; TRAIL IMPROVEMENT</u></b>           |       |      |            |              |
| Regrade & lay crushed stone accessible trail              | 5900  | sf   | \$4.00     | \$23,600.00  |
| Move cut wood to block paths                              | 1     | ls   | \$800.00   | \$800.00     |
| Encourage route direction with boulders                   | 30    | ea   | \$200.00   | \$6,000.00   |
| Repair & control erosion with coir near salt marsh        | 18    | lf   | \$10.00    | \$180.00     |
| Add earth over roots on level path north of Eagle Hill    | 3150  | sf   | \$5.00     | \$15,750.00  |
| Add water bars  | 30    | ea   | \$200.00   | \$6,000.00   |
| <b><u>TRAIL &amp; BOARDWALK ADDITION</u></b>              |       |      |            |              |
| Clear land of trees and understory                        | 22000 | sf   | \$0.50     | \$11,000.00  |
| Construct new trail - clear & grub, grade, 6" loam borrow | 3152  | lf   | \$10.00    | \$31,520.00  |
| Construct 5' wide boardwalk across salt marsh             | 975   | sf   | \$150.00   | \$146,250.00 |
| Construct guardrail for new boardwalk                     | 390   | lf   | \$50.00    | \$19,500.00  |



| ITEM   | QTY. | UNIT | UNIT COST  | SUBTOTAL            |
|--|------|------|------------|---------------------|
| <b><u>BOARDWALK IMPROVEMENTS</u></b>                     |      |      |            |                     |
| Replace Cub Scout Bridge                                 | 64   | sf   | \$150.00   | \$9,600.00          |
| Cub Scout Bridge guardrail                               | 32   | lf   | \$50.00    | \$1,600.00          |
| Replace Volunteer Bridge                                 | 1225 | sf   | \$150.00   | \$183,750.00        |
| Volunteer Bridge guardrail                               | 420  | lf   | \$50.00    | \$21,000.00         |
| Replace Eagle Scout Bridge                               | 220  | sf   | \$150.00   | \$33,000.00         |
| Eagle Scout Bridge guardrail                             | 88   | lf   | \$50.00    | \$4,400.00          |
| Replace College Student Bridge                           | 100  | sf   | \$150.00   | \$15,000.00         |
| College Student Bridge guardrail                         | 40   | lf   | \$50.00    | \$2,000.00          |
| <b><u>SIGNAGE</u></b>                                    |      |      |            |                     |
| <i>Salem State Entry</i> Repair & improve existing       | 1    | ls   | \$400.00   | \$400.00            |
| <i>Volunteers Bridge</i> Repair & improve existing       | 1    | ls   | \$400.00   | \$400.00            |
| <i>Interpretive</i> Clean & repair signs                 | 3    | ea   | \$500.00   | \$1,500.00          |
| <i>Wayfinding</i> Paint blazes & add minimal route signs | 1    | ls   | \$1,200.00 | \$1,200.00          |
| <i>Warning</i> Add signs directly at railroad crossings  | 2    | ea   | \$500.00   | \$1,000.00          |
| Work Priority I Subtotal                                 |      |      |            | \$615,825.00        |
| General conditions (7%)                                  |      |      |            | \$43,107.75         |
| Overhead and Profit (7%)                                 |      |      |            | \$46,125.29         |
| Escalation (2%)  |      |      |            | \$14,101.16         |
| Owner's construction contingency (10%)                   |      |      |            | \$71,915.92         |
| <b>TOTAL</b>   |      |      |            | <b>\$791,075.12</b> |

*NOTE: For any project requiring design and oversight services, add 10% to the total for that project.*

## **OPTIONS**

### **SIGNAGE**

#### **Salem State Entry**

|                                    |   |    |            |            |
|------------------------------------|---|----|------------|------------|
| Gather content and design new sign | 1 | ls | \$1,500.00 | \$1,500.00 |
| Produce & install new sign         | 1 | ls | \$3,000.00 | \$3,000.00 |

#### **Pickman Road Entry Sign**

|                                   |   |    |          |          |
|-----------------------------------|---|----|----------|----------|
| Design small wood & laminate sign | 1 | ls | \$800.00 | \$800.00 |
| Produce & install new small sign  | 1 | ls | \$800.00 | \$800.00 |

#### **Volunteers Bridge**

|                                  |   |    |          |          |
|----------------------------------|---|----|----------|----------|
| Reconfigure, repair, & move sign | 1 | ls | \$400.00 | \$400.00 |
|----------------------------------|---|----|----------|----------|

#### **Interpretive**

|                                   |   |    |            |            |
|-----------------------------------|---|----|------------|------------|
| Design new signs with updated map | 3 | ea | \$1,500.00 | \$4,500.00 |
| Produce & install new signs       | 3 | ea | \$2,500.00 | \$7,500.00 |

#### **Other**

|                            |   |    |          |          |
|----------------------------|---|----|----------|----------|
| Identify other bridges     | 3 | ea | \$150.00 | \$450.00 |
| Accessible parking signage | 1 | ea | \$300.00 | \$300.00 |