Designing Green Infrastructure: Lawrence Rail Corridor

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Designing Green Infrastructure: Lawrence Rail Trail

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in partial fulfillment of the requirements for the
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Disclaimer

Abstract

The Manchester Lawrence Rail Trail conversion project is a rail-to-trail conversion that aims to convert the abandoned Lawrence portion of the rail corridor into a greenway. This greenway will bring recreational space, transportation opportunities, economic benefits and community identity to the local communities. Through site visiting, interviews with local activists, geographical information system analysis and other research, the project team completed a detailed information booklet which includes site analysis, trail design recommendations and cost estimates. The purpose of this booklet is to help local government and community groups plan and implement this rail trail conversion.

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Introduction & Goals

Project Team:

As a team of third year, engineering students from Worcester Polytechnic Institute, we have worked with Groundwork Lawrence, the Methuen Rail Trail Alliance, and the Senior Planner from the City of Danvers to analyze current conditions of the Manchester and Lawrence Rail Corridor and to make recommendations to transform it into a greenway.

Project Goal:

The goal of this project to help stakeholders in Lawrence envision how an underutilized rail corridor in the city can be transformed into a multi-use greenway.

Figure 1: Author's rendition of the potential Lawrence Rail Trail

Background

The Manchester-Lawrence Rail Trail is a rails-to-trails conversion project in Lawrence, Massachusetts. The 2.5 mile long abandoned rail corridor lies on the western side of the city and runs along residential neighborhoods, industrial areas, sports fields, and many other community fixtures. A number of roads cut across the corridor, and much of it is overgrown. After heavy rains, water collects at low points along the tracks. The corridor in its current condition does not serve the community and creates a barrier between neighborhoods.

This project is a first step in what is likely to be a long process to convert the abandoned corridor into a greenway: a public amenity with open space, recreation opportunities, and urban art. The greenway is part of a larger vision. It would connect to existing trails in Lawrence such as the Spicket River Greenway and the Riverwalk so that residents of Lawrence would have miles of linear park to enjoy. The trail could also connect to the Methuen Rail Trail and to a regional network of rail trails into New Hampshire.

This report documents in detail the current conditions of the corridor and adjacent land uses, and we make recommendations to improve the conditions of the corridor.

A Brief History of the Rail Line

Lawrence was established in 1847, when Abbott Lawrence, a wealthy merchant and congressman and the Essex Company, a group of Boston industrialists, purchased land from neighboring towns on the northern shore of the Merrimack River. They sought to use the Merrimack River to power textile mills. Lawrence and the Essex Company designed the layout of the city; the mills were mostly located on the northern bank of the river with the necessary infrastructure to support them, such as streets, housing, and schools in the surrounding area. Streets were designed in a grid around the mills. Housing, along with other key amenities for the workers, was located close to the mills. This plan helped the mills run as efficiently as possible because everything the workers and factories needed was very close and easily accessible. Bringing raw material to the mills and shipping out finished textiles was important to the textile mills. However, construction of the Great Stone Dam to power mills and factories made boat passage difficult so the Manchester Lawrence railroad was opened in August 1849.[1] The rail line was a part of the Boston and Maine Railroad Western division.[2] The rail network enabled the mills to ship products to all parts of New England, as well as the rest of the United States. By World War I Lawrence had become the largest manufacturer of woolen textiles in the world.[3]

The rail line was crucial to Lawrence's development through the 19th and 20th century. The corridor separated the neighborhood where most of the mill workers lived from the western, industrial section of the city. It also ran alongside many of the city's major industrial areas. Freight trains carrying cargo into and out of Lawrence ran the rail line multiple times a day. Partly due to its industrial strength Lawrence experienced a period of growth in both population and geographical area.

As shown by Figure 2, from 1850 to 1940 the city almost doubled in area and the population grew from just over 8,000 residents to almost 100,000 in 1940. The time before World War II represented the peak of Lawrence's industrial might. After the war, textiles made from synthetic materials became prominent and much of New England's textile production was moved to the southern states or overseas. At this time Lawrence began to de-industrialize, factories were closing and former mill employees moved out of the city. The city lost almost 20,000 manufacturing jobs and the population dropped to almost 63,000 residents by the 1960's.

Since many industries were leaving the area, the demand for rail transport decreased, causing the B and M corporation (the owner and operator of the rail) to decrease service.[4] The rail also suffered from lack of passenger service, causing passenger service to be cut in 1953.[5] Due to continued decrease in service B and M sold the line to Guilford Transportation Industries, which was eventually purchased by PanAm railways, in the 1980's. After the acquisition, PanAm continued to cut service to stations. This coincided with much of the rail line becoming abandoned and by June 2001 service past Methuen was ended. Currently PanAm has operating rights up to Haverhill Street, although the line has essentially been abandoned.

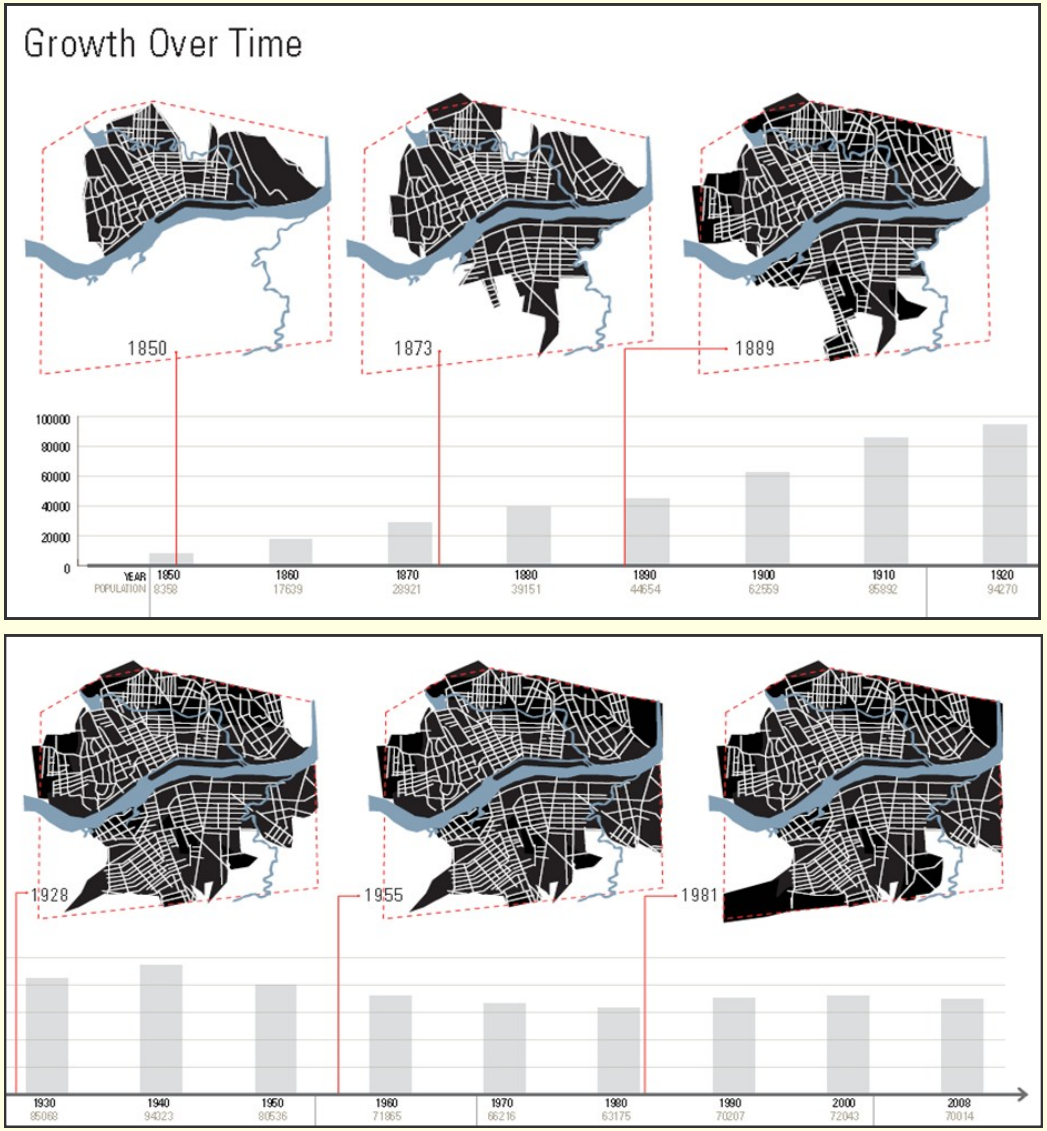

Figure 2: Growth of Lawrence, 1850-1981

A Snap shot of Lawrence:

According to the 2010 U.S. Census Bureau, the population of Lawrence has grown over the past decade to total 76,377 residents. In part this growth has stemmed from an influx of immigrants. The Hispanic population of the city comprises 73.8% of the population, far surpassing the state average of 9.6%. The neighborhoods along the corridor have a high proportion of Hispanic residents, as shown in Figure 3.

The percentage of household living below the poverty line in Lawrence is 26.5%, compared to 10.5% in Massachusetts. Figure 4 shows the percentage of households by census block group below the poverty line. The darker green indicates a greater concentration of poverty. This map shows the areas around the corridor have higher concentrations of poverty compared to the rest of the city.

In recent years, unemployment in Lawrence has risen sharply. Since 2000 unemployment has more than doubled, reaching 14.4%, more than twice the state unemployment rate of 6.4%. Despite a stagnant economy, however, people have continued to immigrate to the city. This has led to a continued high population density of 11,028 people per square mile compared to the population density in Massachusetts at 839 people per square mile. [7]

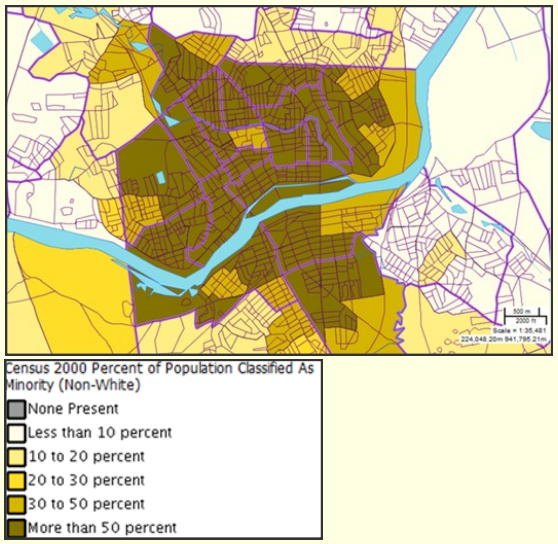

Figure 3: Map showing the percentage of Lawrence residents classified as a minority.

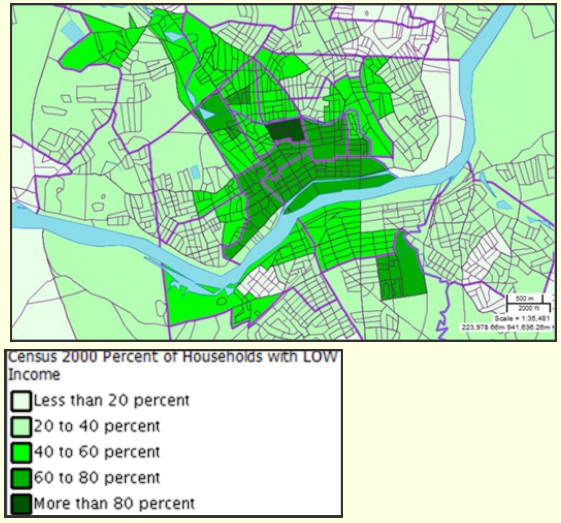

Figure 4: Map showing percentage of homes with income below 25,000 dollars/year.

Lawrence has the lowest household median income in the state at $31,457, compared to $64,081 in Massachusetts.[8]

In addition to high rates of unemployment and poverty, an alarming 46.6% of Lawrence's children are considered 'overweight' or 'obese' based on BMI evaluations.[9] Considering the population density, unemployment, and high obesity levels, transforming the rail corridor into a greenway could have significant benefits for the community as a whole.

Year	Unemployment Rate of Lawrence, MA
1990	8.8%
2000	5.6%
2002	12.3%
2012	14.4%

Table 1: Unemployment rate comparison [10]

Rails to Trails Initiatives

In recent years, converting abandoned rail lines to trails has become popular in the United States. In the past 50 years communities across the country have converted thousands of miles of abandoned rail corridors into multi use trails. According to a Methuen Rail Trail advocate, there are currently over 982 miles of trails in the New England region alone, which have been converted to multi -use public paths for biking, walking, skating, and other activities.

These conversions have resulted in a variety of benefits for the various communities.

Multiple Recreation Opportunities: The addition of a rail trail will provide opportunities for healthier living. Walking, jogging, bicycling simply to enjoy the scenery along the trail will help people become more active. These rail corridors have passageways that can connect to sports fields and courts to encourage children and community members to use the trail to engage in sporting activities.

Healthy Living: Table 2 below shows American obesity rates from 1963 to 2004 in children ages 2-19. As can be seen from the table, over the past forty years the obesity rates for American children in general has increased three-fold for toddlers and four-fold for children and teenagers. This trend has many causes, but a lack of exercise and activity by American youth is widely believed to be one of the most significant.[11]

With the obesity rates of Massachusetts above 20%, a rail trail could encourage Lawrence residents to exercise and take part in outdoor acitivities.[12]

Connecting People and Communities: Rail -trails serve as transportation corridors for local residents between neighborhoods and workplaces. In addition linking the rail trail to recreation venues and open space can encourage residents to socialize and enjoy their natural surroundings.

Environmental Protection: Rail trails can help improve environmental quality. For example rail trails can provide habitat for plants and animals as well as filter urban storm-water runoff. Rail trails can serve as an alternative, non-motorized form of transportation and thus reduce air pollution from vehicle traffic

Economic Renewal and Growth: It has been shown that trail users spend more money on products and services in the vicinity of the trail, compared to before the addition of the trail. Instead of spending money on gasoline for cars, trail users will spend money on the trail which benefits local businesses. Trails also benefit hotels, restaurants, local businesses because visitors come to see the amenities of the trail and of course ride along the trail.

Age (years)[1]	1963-65 1966-70[2]	1971-74	1976-80	1988-94	1999-2000	2001-02	2003-04
2-5	-	5%	5%	7.2%	10.3%	10.6%	13.9%
6-11	4.2%	4%	6.5%	11.3%	15.1%	16.3%	18.8%
12-19	4.6%	6.1%	5%	10.5%	14.8%	16.7%	17.4%

Table 2: Obesity Rates in American Children Ages 2-19 [13]

Challenges

There are many difficulties to successfully implementing a rail trail; listed below are the general challenges that other rail trail initiatives have experienced while designing and installing their respective trails.

Rail Acquisition: Often it is initially unclear as to who owns the rail corridor and therefore it can take a significant amount of time and effort to establish ownership and then work with them to acquire the rights to build on the corridor.[14]

Community Outreach: Despite the inherent benefits of rail trails, often there are pockets of resistance inside the community or areas surrounding the proposed rail trail. Community members oppose the trails for a variety of reasons such as liability, crime and an increase in pedestrians near their property which fuels fears of trespassing and vandalism.[15]

Funding: It is difficult to establish an average cost of a rail trail, but the Department of Transportation has come up with an average cost for rails to trails projects as an estimated $237,185.33 per mile.[16] This suggests the conversion of the rail to a trail in Lawrence could cost upwards of $500,000. Groundwork Lawrence has received a grant from the MSGA (Massachusetts Smart Growth Alliance) called the Great Neighborhoods, for development of a multi-use path on the Lawrence rail corridor. However, if the project can be shown to truly benefit a community, additional funding is available from local and federal government in various funds spanning from Federal Transportation Enhancements, Safe Routes to Schools funds, to federal funds for Brownfields or Community Development Block Grant which have all been used in similar development projects.[17]

Maintenance: Once the trails have been started, they require management to be finished in an efficient and timely manner. Once finished, they still need to be effectively managed so that they remain in good condition and can serve their communities efficiently. There are many online resources that management can utilize to learn how other trails have been run.[18]

Location of the Rail Corridor

Lawrence, MA

Figure 5: Overview of Massachusetts [19]

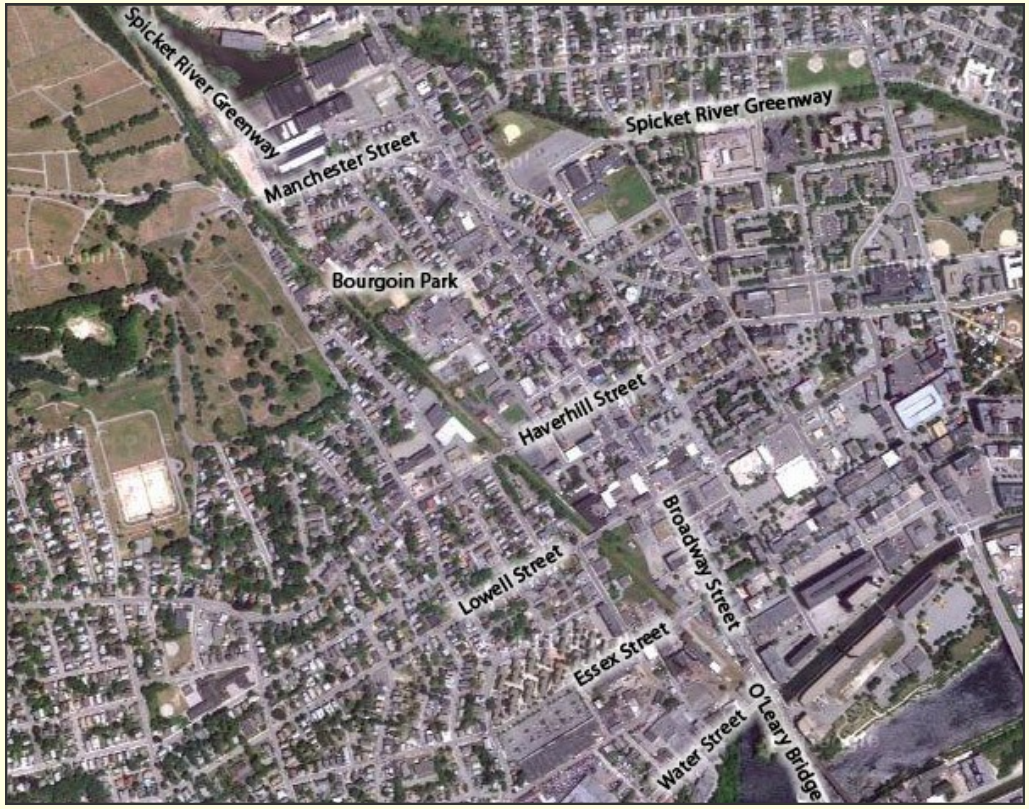

Figure 6: Birds-Eye View of Lawrence, MA

Current Conditions of the Rail Corridor

Figure 7: Segments 1 & 2 shown respectively along with specific characteristics pertaining to both

Figure 8: Segments 3 & 4 shown respectively along with specific characteristics pertaining to both

When the corridor begins at the Merrimack River, it is characterized by an urban setting with many street crossings but little vegetation. As the corridor continues to the north it becomes more rustic, ending in a wooded area near the Spicket River Greenway. These changing conditions present many trail design opportunities. To create a robust site analysis, we have divided the corridor into four segments, each with it's own unique conditions and characteristics.

Segment Map of the Lawrence Rail Corridor

Figure 9: Overview of the City of Lawrence with Corridor Highlighted and Segments established

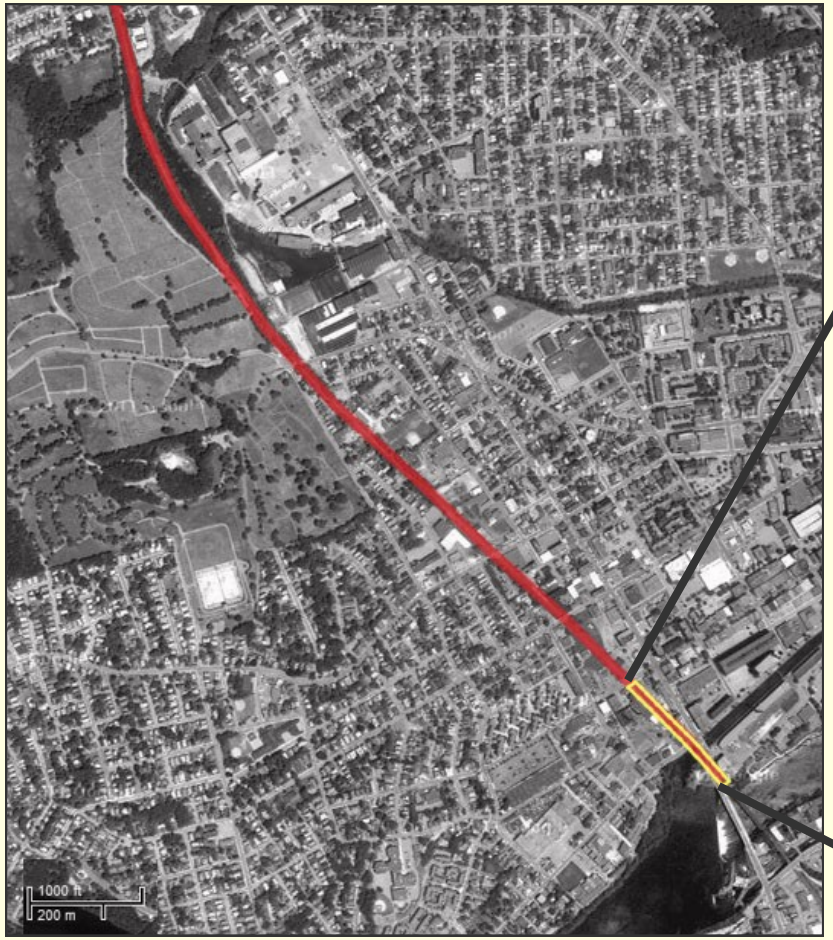

Figure 10: Segment 1 shown along the Rail Corridor

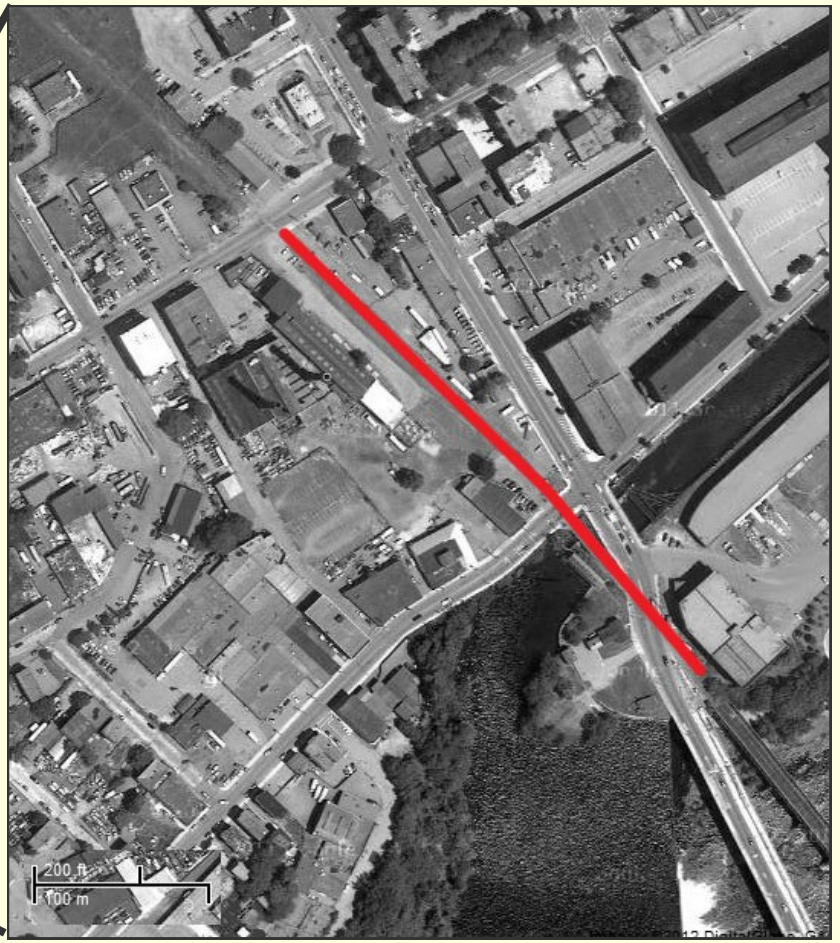

Figure 11: Bird's Eye View of Segment 1

Segment 1 of the Rail Corridor: O'Leary Bridge to Essex Street

This segment begins at the Merrimack River, where there are sweeping views of the great Stone Dam and the smaller canals. It continues north for 0.2 miles and concludes at the Essex Street intersection.

Land Use from O'Leary Bridge to Essex Street

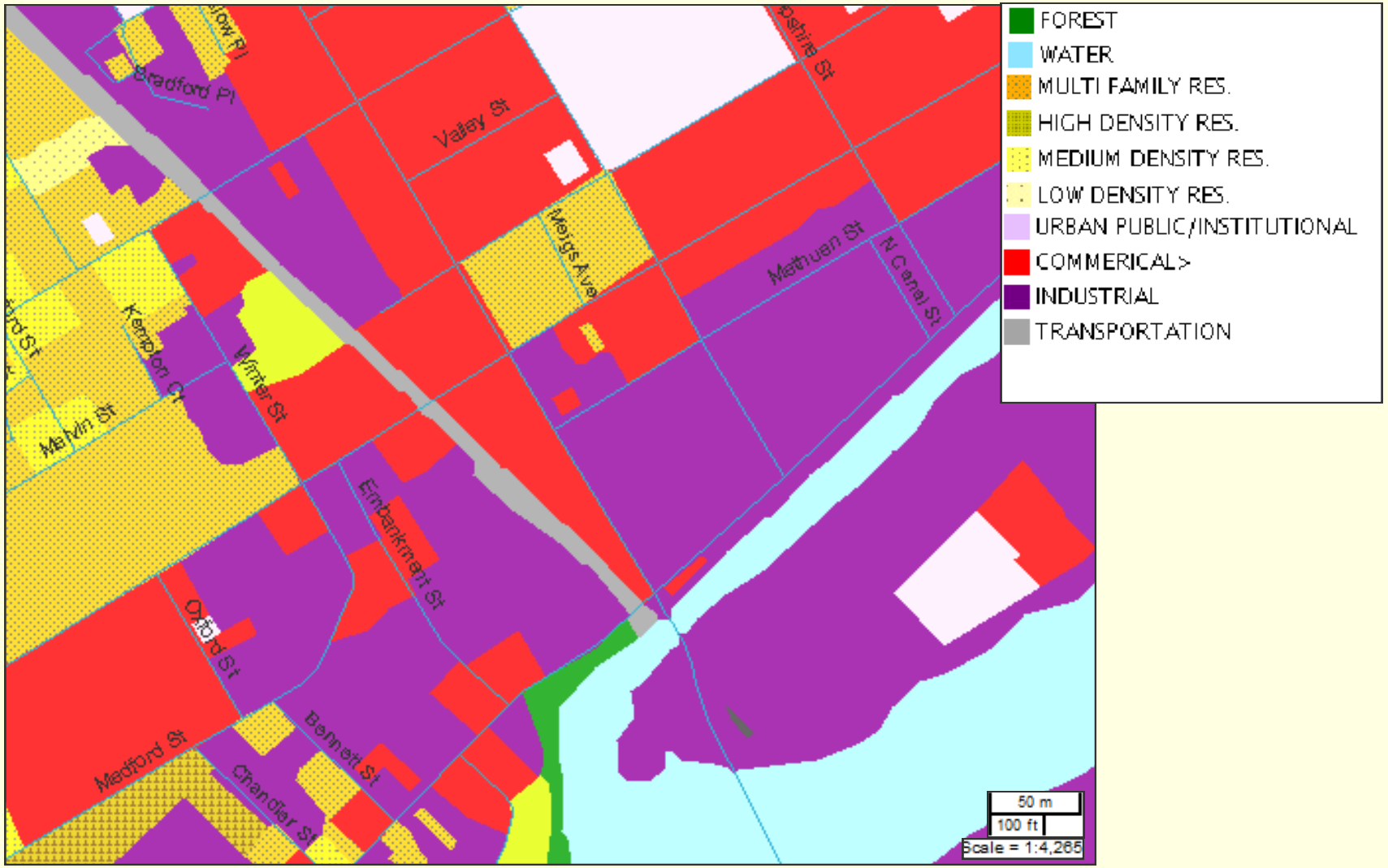

Figure 12: Land Use of Segment 1 from O'Leary Bridge to Essex Street

This map shows the land use in Segment 1. Much of the land along the corridor is used for industrial or commercial purposes.

Historic Views

1. Figure 13: O'Leary Bridge and Great Stone Dam

2. Figure 14: Unused Rail Structure over the North Canal

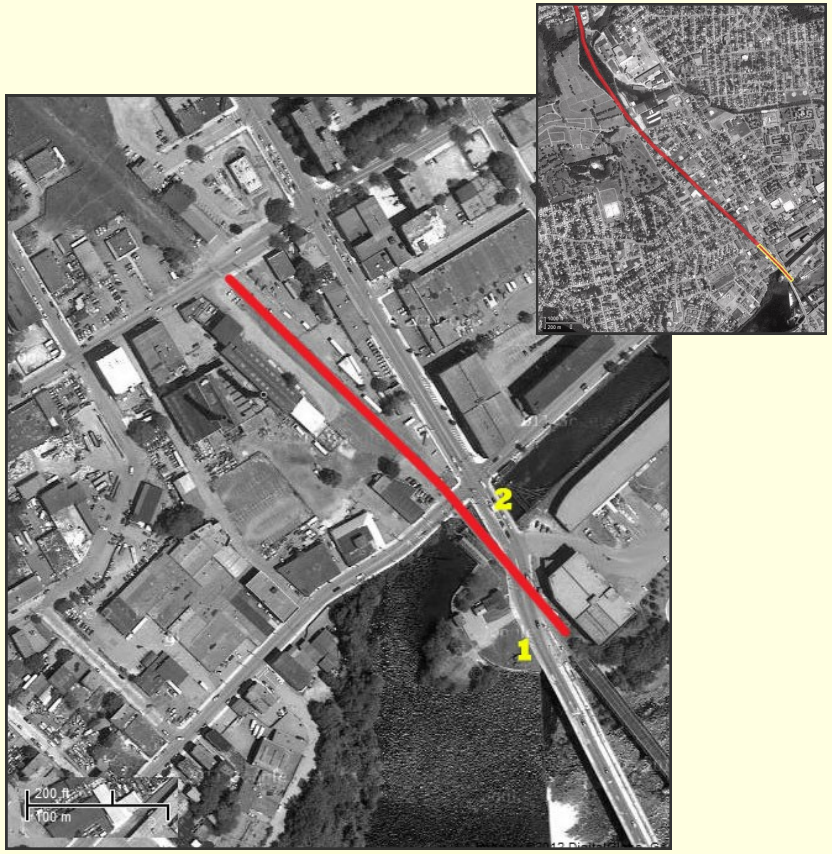

Figure 15: Scenic Views Along the Rail Corridor

This segment contains many areas that are of great historical significance to Lawrence. The Great Stone Dam, shown in Figure 13, powered the mills that helped build the city. Here there are also views of the historic mill district, shown in Figure 14.

Recommendation: Historical Signage

The Merrimack River and historic buildings provide scenic views at the beginning of the trail. This can serve as an attraction as well as a scenic resting area for users coming from the north. Installing benches or picnic tables at the location marked in Figure 16 will create an amenity for all users.

Signage explaining the historic significance of the dam and mills will help inform users of the history of the area while welcoming users to the trail.

Figure 16: Scenic View Location Along the Rail Corridor

Recommendation: Green Design Ideas

Figure 17: Flametech Steel Company.

Figure 18: Wooden Fence with Flowers [20]

Figure 19: Woodbine spreading in the fall [21]

Part of Segment 1 runs along an inactive steel company, Flametech Steels. The façade is not well maintained. A simple chain link fence with vines and flowers incorporated would prevent trail users from trespassing onto Flametech's property, while also improving trail aesthetic. A great native vine that would be beautiful in all seasons is Woodbine, or Virginia Creeper. This vine is green during the spring and summer then turns red, as seen in Figure 18, during the fall and winter months. This can maintain a natural aesthetic year-round.

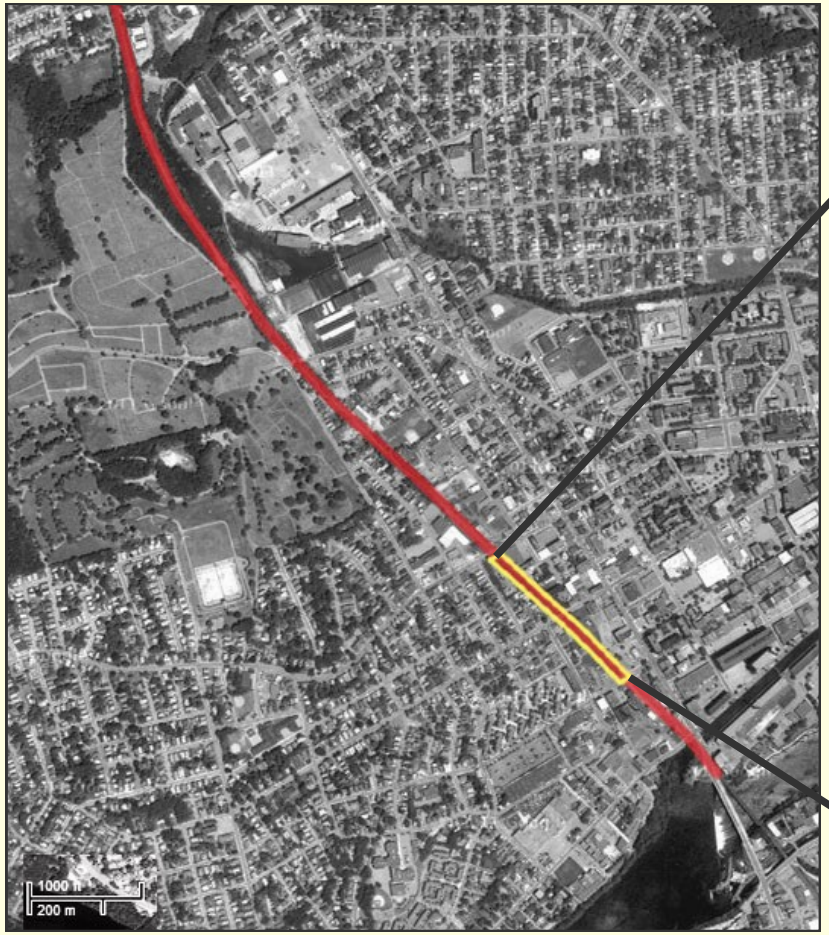

Figure 20: Segment 2 shown along the Rail Corridor

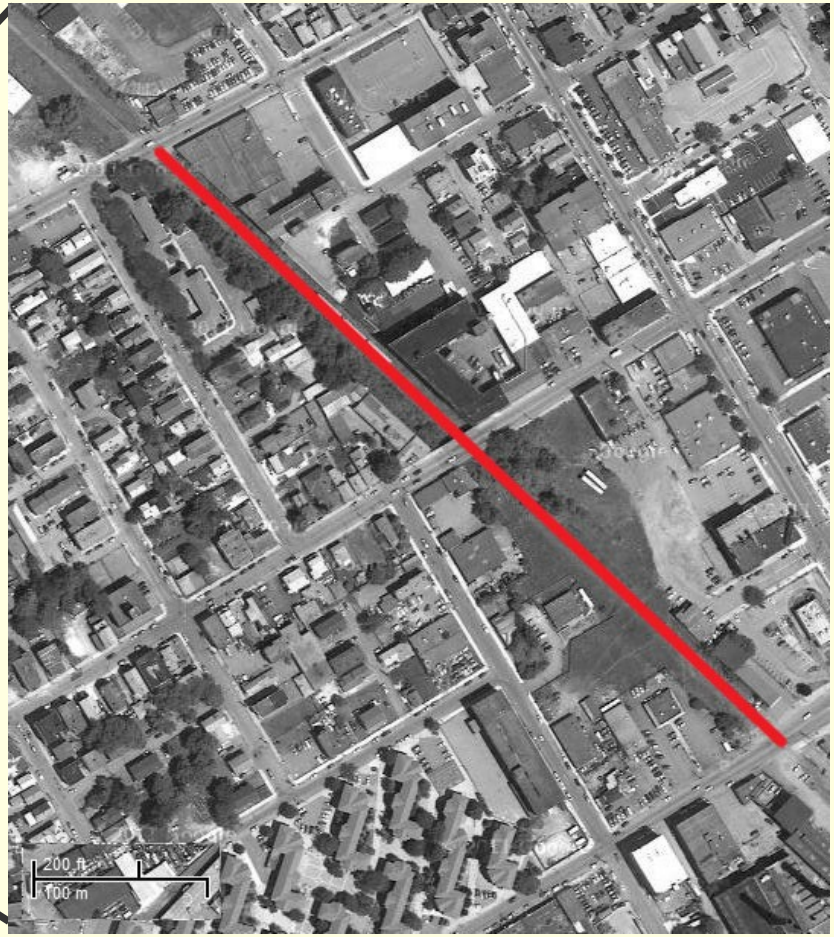

Figure 21: Bird's Eye View of Segment 2

Segment 2 of the Rail Corridor: Essex Street to Haverhill Street

Beginning at Essex Street this segment continues north for 0.4 miles to Haverhill Street. At the start of this segment, a large open space parcel offers potential for recreation. As the trail continues north, we encountered a lengthy wet spot that could be transformed into a rain garden to channel stormwater. Approaching Haverhill Street we found areas that can be used for urban art.

Land Use From Essex Street to Haverhill Street

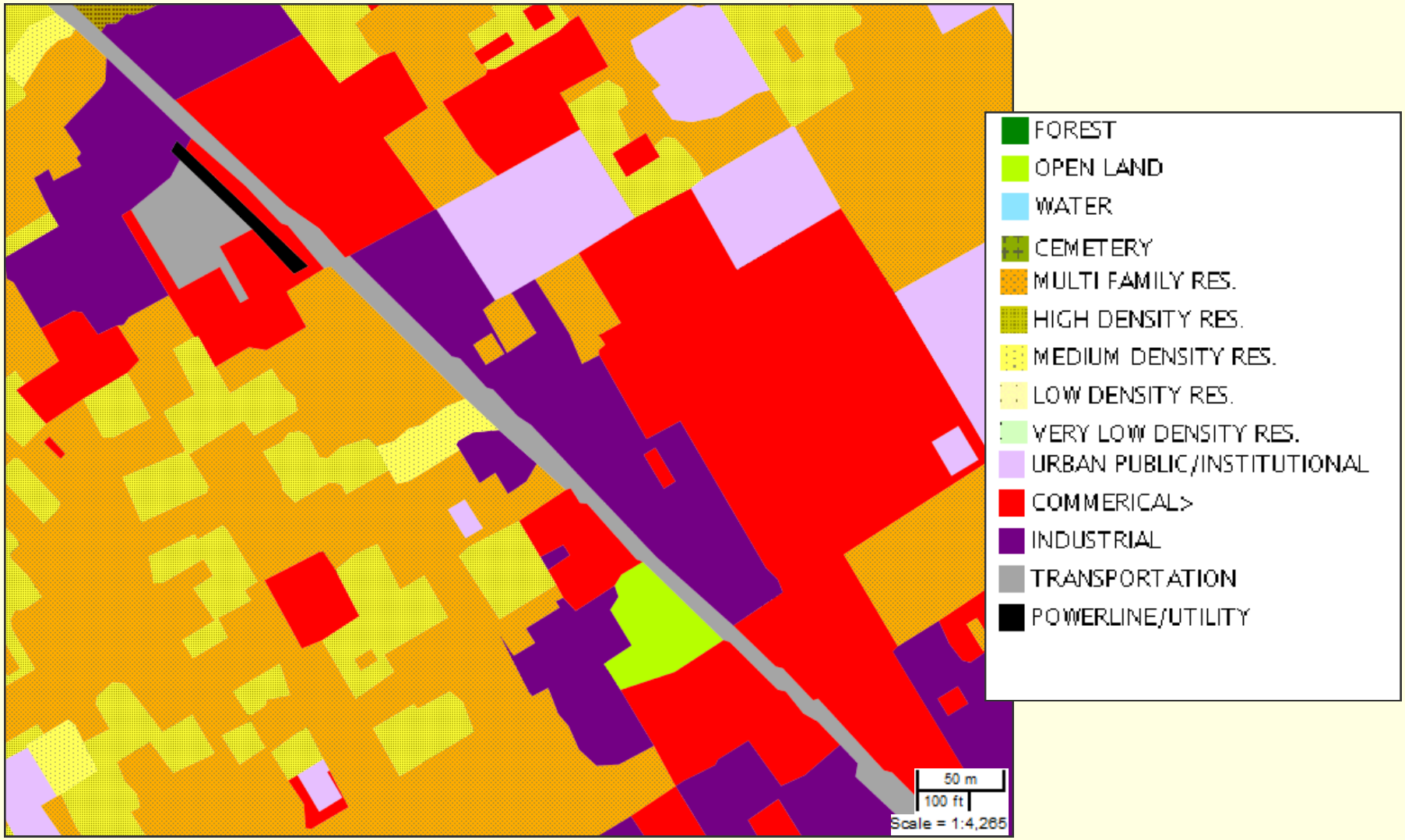

Figure 22: Land Use of Segment 2 from Essex Street to Haverhill Street

As this map shows the area around the corridor is still used for mostly industrial and commercial purposes. Unlike segment one this segment has more residential areas, especially on the western edge of the corridor.

Open Space

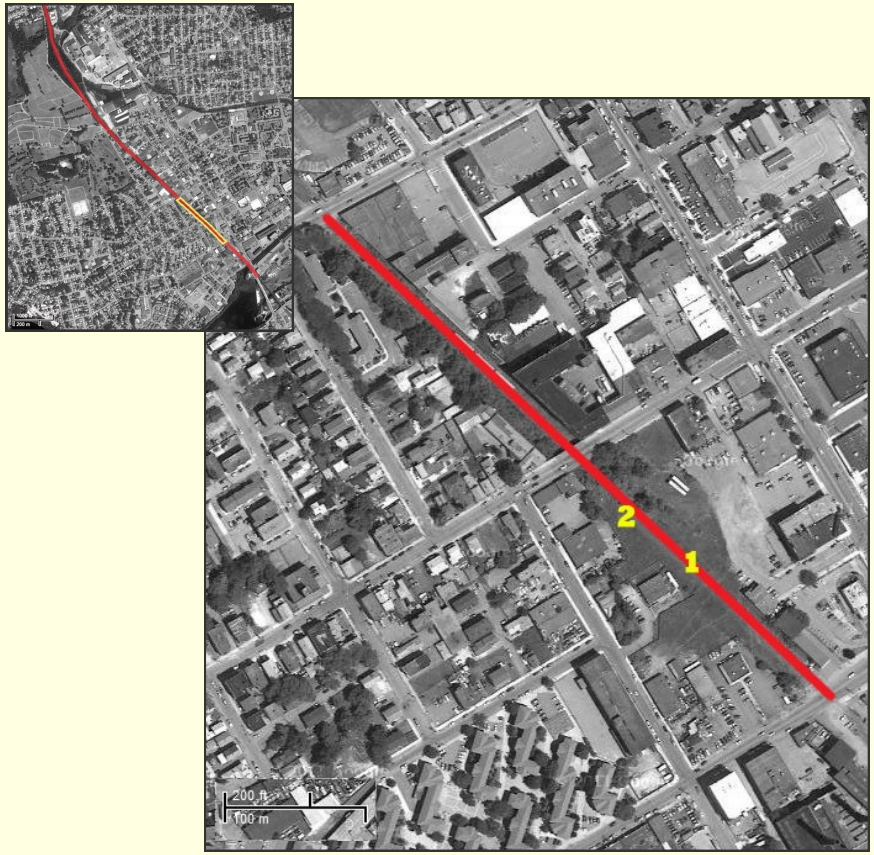

Figure 23: Open Space Along the Rail Corridor

The open space of this segment is between Essex Street and the Lowell Street overpass. The space is currently overgrown and bordered by a variety of properties, ranging from homes to commercial properties.

1. Figure 24: A view for the open space, looking South.

2. Figure 25: View from the same location as above, looking North.

Open Space Recommendations

Figure 26: Dog Park [22]

Figure 27: A recreational area Basketball Court [23]

Many rail-to-trails do not have the luxury of a large open field in the middle of the corridor. The open field is large enough for many recreational uses. One option that may be very beneficial to the area would be a basketball court. According to discussion with a Groundwork Lawrence associate, there was interest in a basketball court in this area of Lawrence. This will present a low maintenance recreational area for the community. Along with the possibility of a court, picnic tables, benches, water fountains, and trash cans may be installed in this area to augment its attractiveness to users. This area also has the potential for a dog park. This can be a simple fenced off area for dogs to run around off a leash. Similarly to a basketball court, this can be very low maintenance recreation area.

Encouraging Urban Art

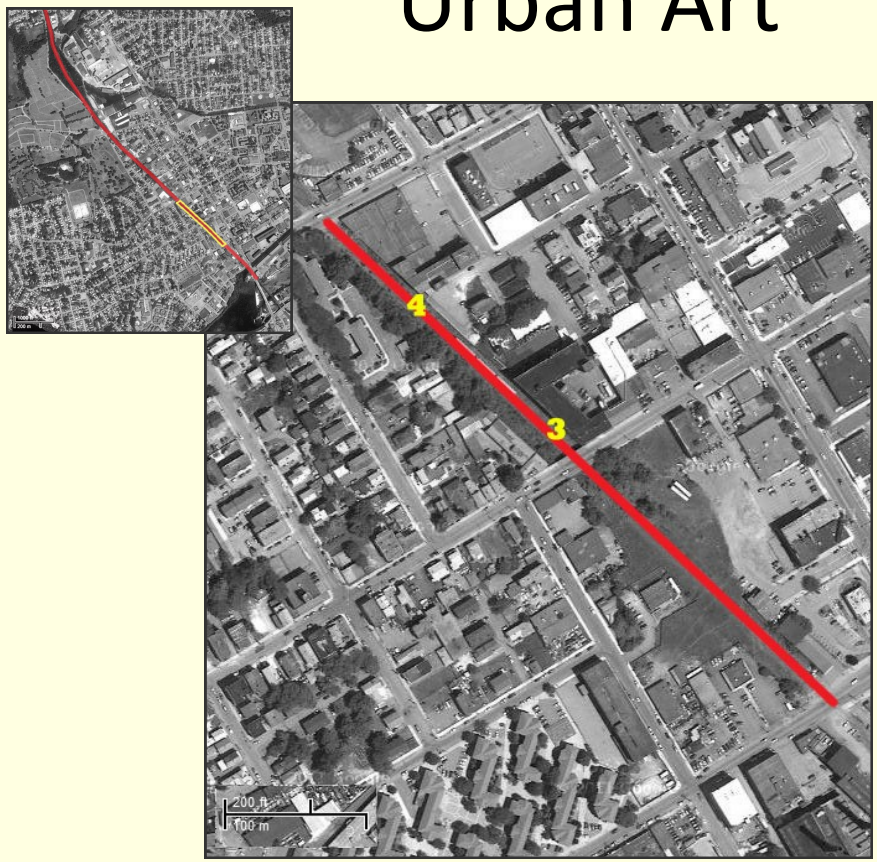

Figure 28: Open Space Along the Rail Corridor

Many of the properties adjacent to this segment have large concrete and brick walls on the trail. Using these spaces to encourage urban art could transform these eyesores into public amenities.

3. Figure 29: The Eastern Packaging Company

4. Figure 30: A brick and concrete wall along the northern part of the segment.

Urban Art Recommendations—Green Graffiti

Figure 31: Spray Painted Advertisement Mural, Hayward California [24]

Figure 32: Moss Art [25]

Graffiti, when artistically done, can be visually appealing. Creating space in this segment of the trail for organized artistic expression is a simple way to beautify the trail and give it an identity.

The city of Hayward California has created a Mural Art Program for its artistic citizens to help beautify the city. The initiative has created many interesting and tasteful murals throughout the city. Some are even advertisements, as seen to the left, therefore creating a method of sponsorship.

Graffiti and other types of urban art can be created using living plant matter, like moss, that can grow on vertical surfaces like walls.

How it works:

1. Gather a large clump of moss.
2. Wash the moss to get rid of soil content.
3. Break the moss into small pieces and place into blender.
4. Add 2 cups of buttermilk, 2 cups of water and ½ tsp. of sugar.
5. Blend until a yogurt-like consistency is achieved.
6. Using a paint brush, apply mixture to wall or surface.
7. Mist every few days for best results [26]

The Drainage Problem

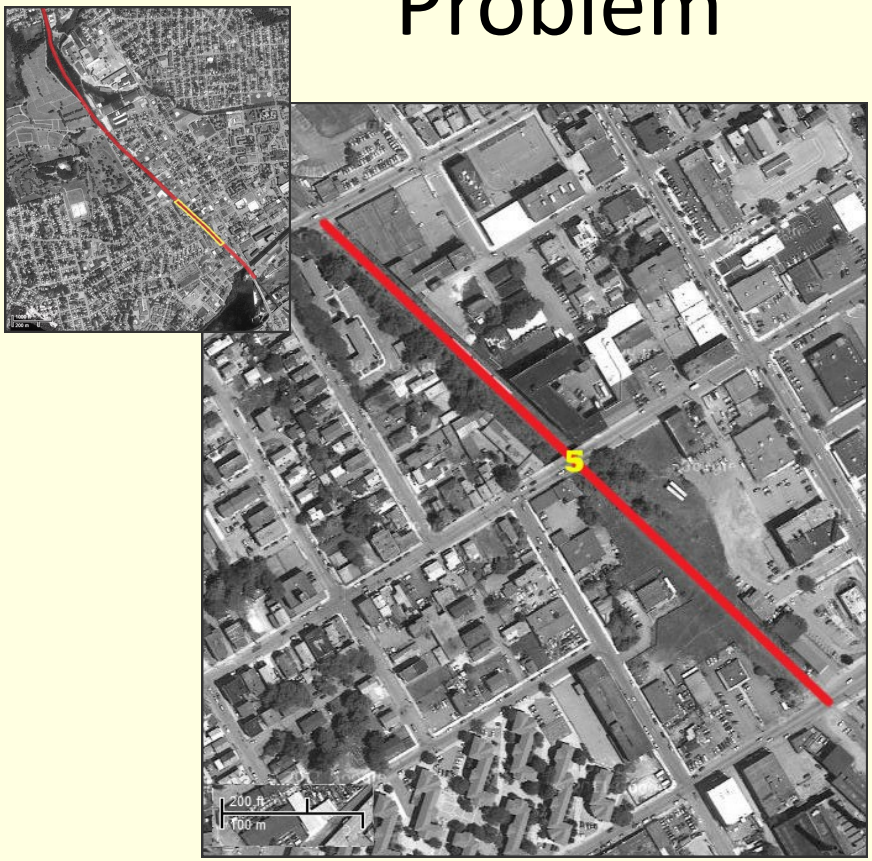

Figure 33: Drainage Problem Along the Rail Corridor

5. Figure 34: The drainage issues underneath the Lowell Street overpass

The trail under the Lowell Street Bridge collects water and poorly drains. As seen in this picture only the top of the metal rail lines break the surface.

Drainage Recommendations—Rain Garden

Figure 35: Flooding North of the Lowell Street Bridge

Figure 36: An example of a typical rain garden [27]

A rain garden could be very beneficial here. Rain gardens can be described as a flowerbed of plants that thrive in a wet environment located where water tends to flood. The soil of the garden is mixed with porous planting material all sitting above drains in order to carry clean water away from the garden. Different plants that bloom in different seasons would create a beautiful and yet practical garden for users of the trail to enjoy.

Shown in Figure 35 is the trail just before the Lowell St. overpass. This area is lower than the surrounding land and as a result collects water. The trail is almost completely submerged for roughly 30 yards on either side of the overpass.

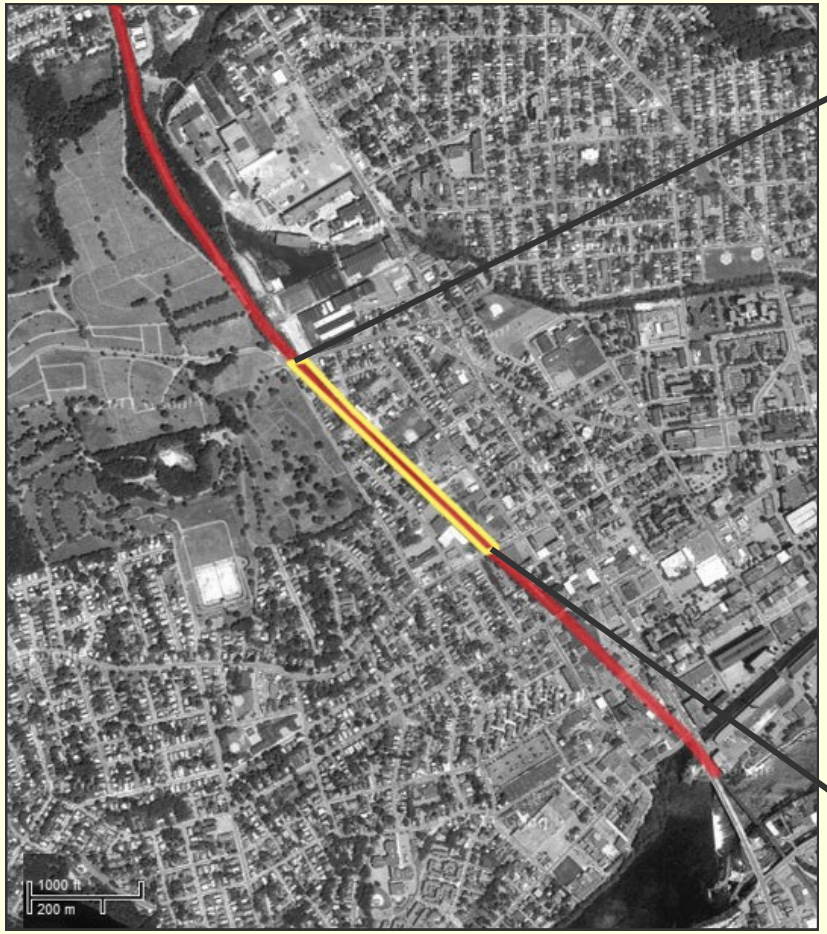

Figure 37: Segment 3 shown along the Rail Corridor

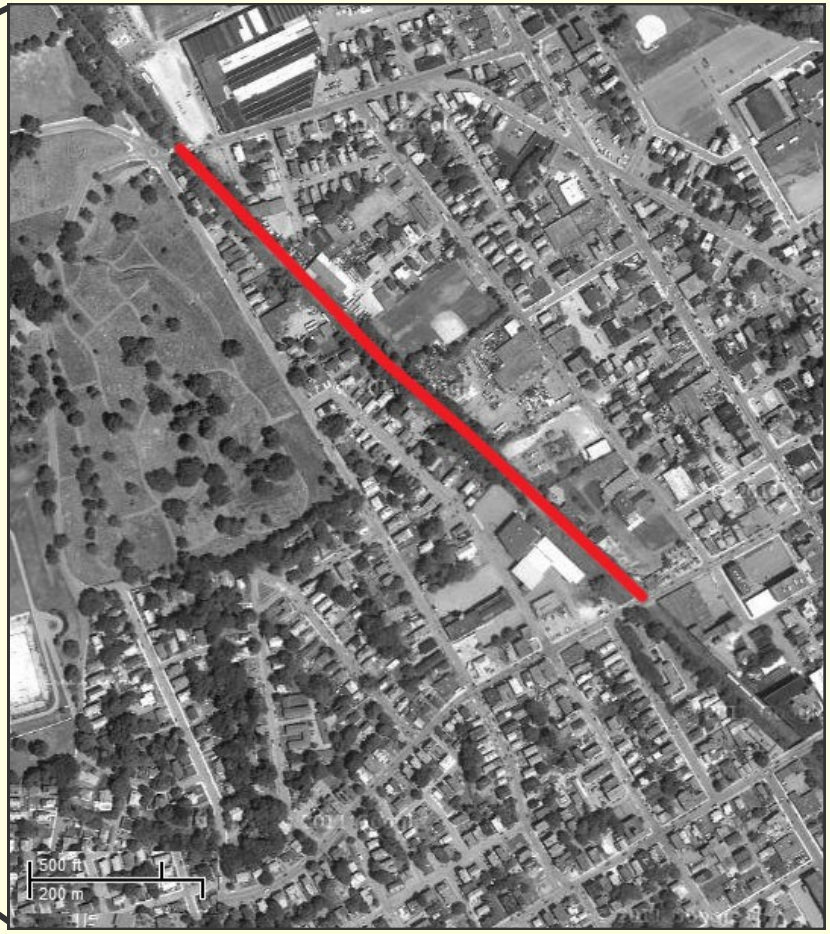

Figure 38: Bird's Eye View of Segment 3

Segment 3 of the Rail Corridor: Haverhill Street to Manchester Street

The longest of the segments, Segment 3 stretches for 0.6 miles from Haverhill Street to Manchester Street. As this segment progresses north it becomes more rural. We found considerable litter and garbage scattered along this segment of the corridor.

Land Use from Haverhill Street to Manchester Street

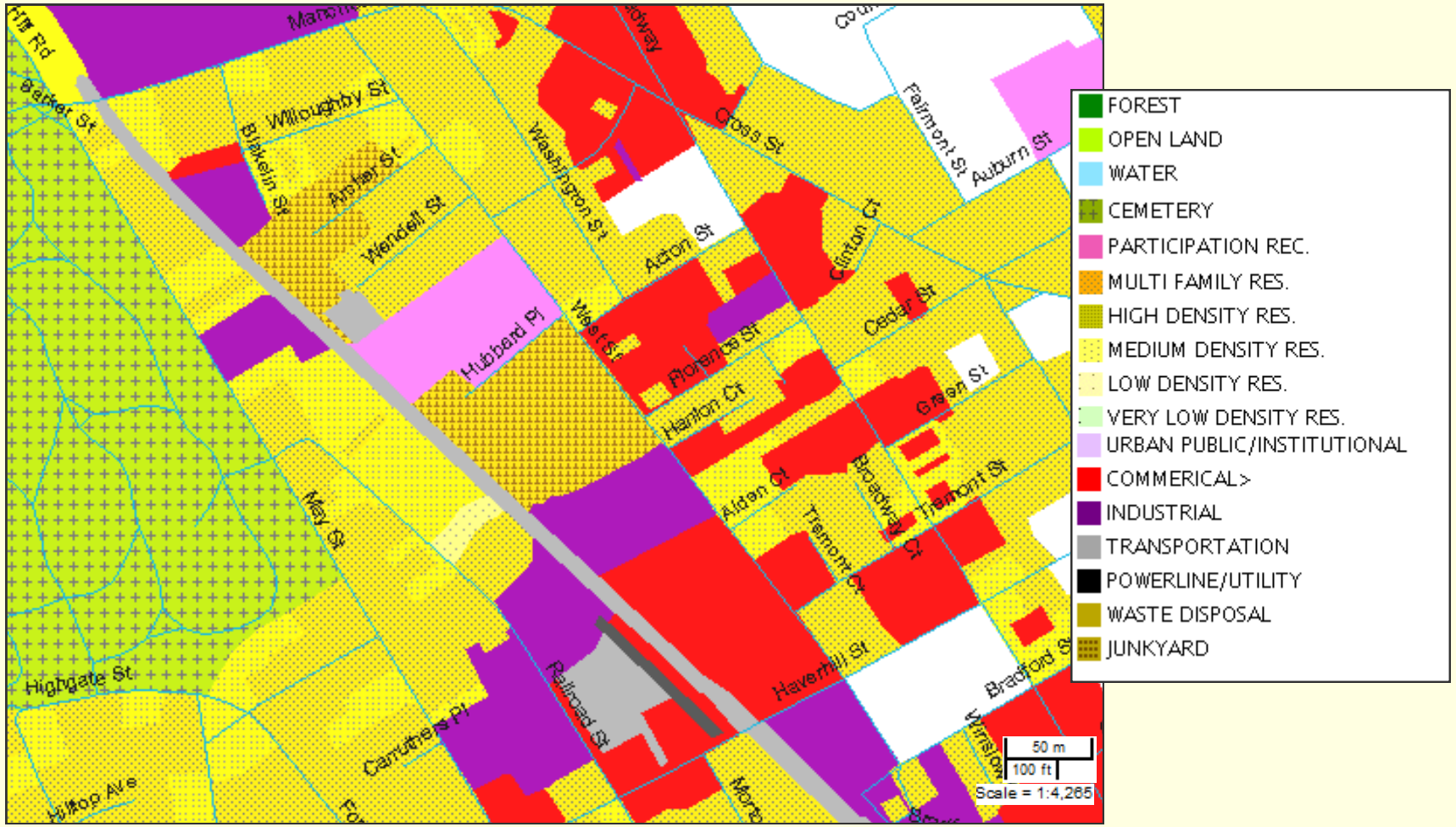

Figure 39: Land Use of Segment 3 from Haverhill Street to Manchester Street

Compared to the previous segments this stretch of the corridor is almost exclusively residential.

Adjacent Properties

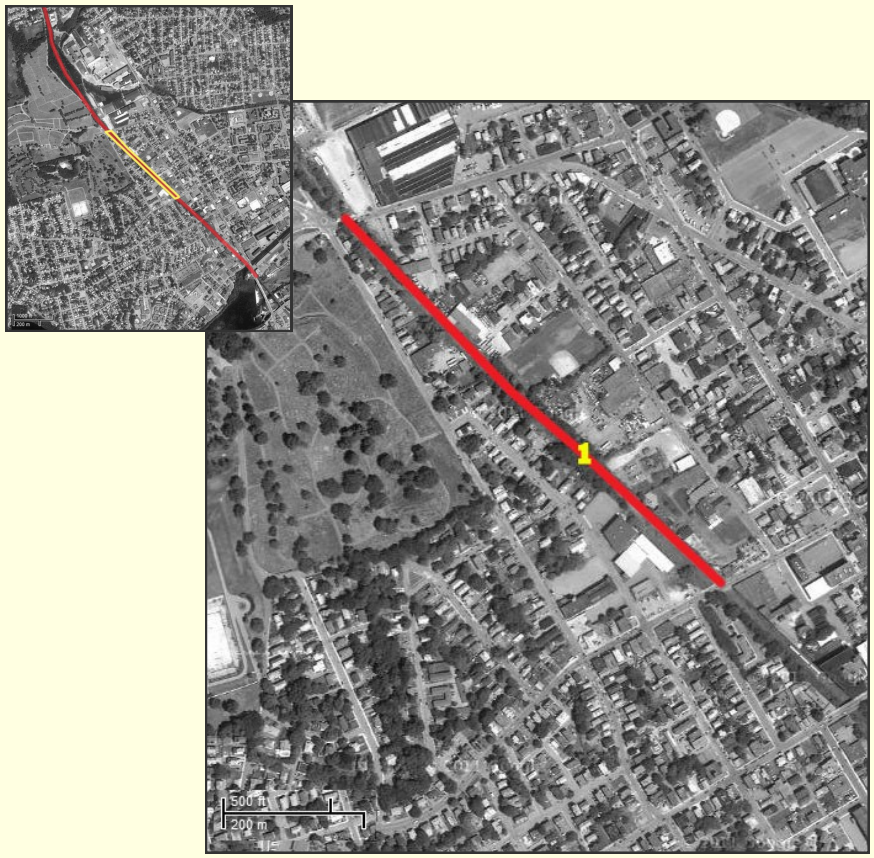

Figure 40: Adjacent Properties Along the Rail Corridor

The adjacent properties in this segment have a wide range of uses. Single and multi-family housing is located on the west side of the corridor and community businesses and a school located to the east.

1. Figure 41: Multifamily residential housing on the West side of the trail.

Figure 42: On the East side, at the same location, is a school.

Adjacent Properties

2. Figure 43: Bourgoin Park

3. Figure 44: A power transmission facility

Figure 45: More Adjacent Properties Along the Rail Corridor

Along with the residential and commercial properties, there are areas that require attention for recreation and safety purposes. This corridor runs adjacent to Bourgoin Park that has a large soccer field and is very popular among community members. Access between the two recreational spaces would benefit the community greatly. Inadvertent access to the power transmission facility next to the corridor would need to be addressed.

Adjacent Property Recommendations

Bourgoin Park presents a very unique opportunity to bring users to the trail. People already access the corridor via the park and an official connection would legitimize passing between the trail and park. Throughout the last segment of the rail corridor at Manchester Street is a grocery store called La Fruteria. This location can provide an area for users to purchase snacks or drinks while on the trail.

Figure 46: Example of residential area adjacent to a trail [28]

Figure 47: La Fruteria

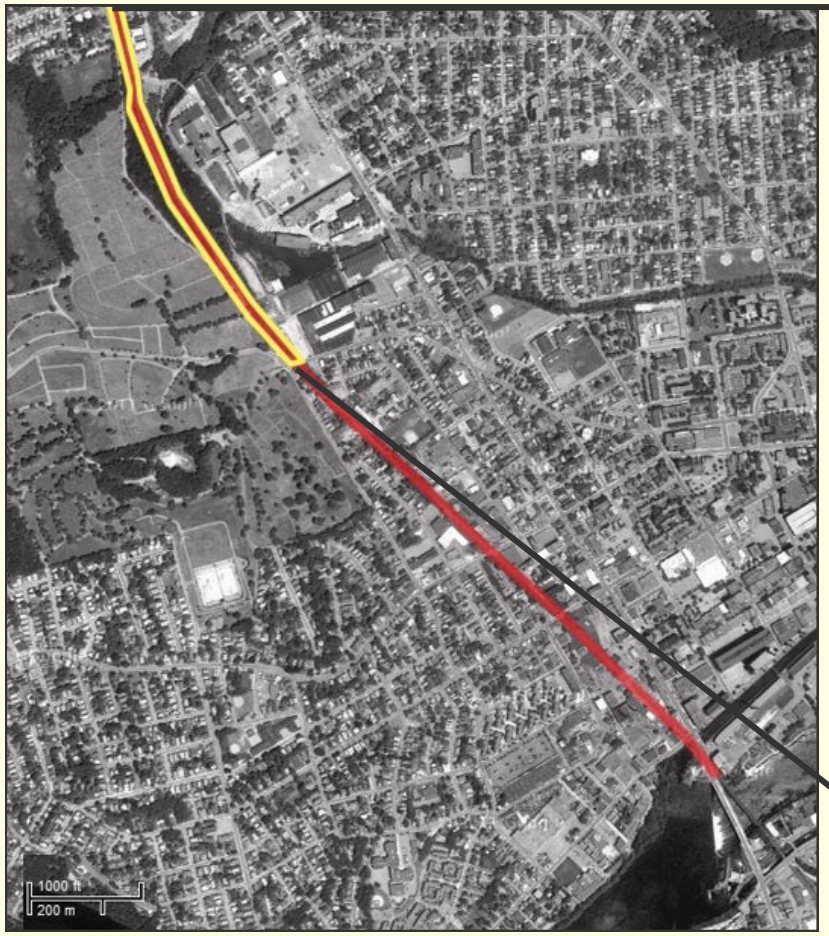

Figure 48: Segment 4 shown along the Rail Corridor

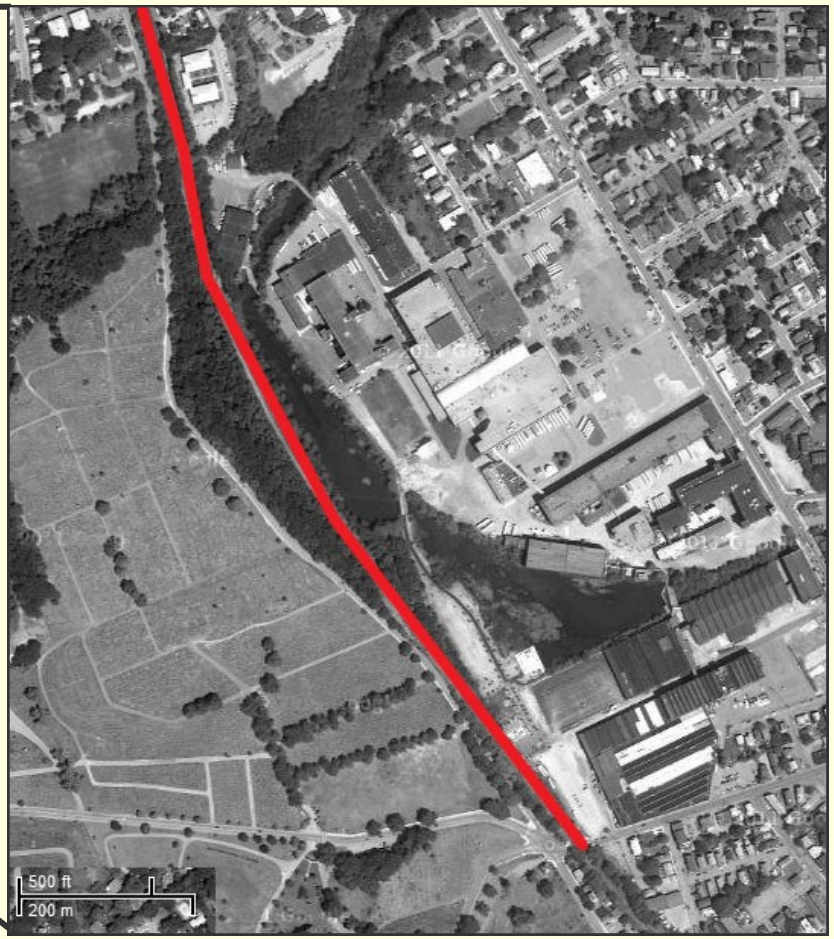

Figure 49: Bird's Eye View of Segment 4

Segment 4 of the Rail Corridor: Manchester Street to Spicket River Greenway

Segment 4 spans 0.3 miles beginning at Manchester Street and ending at the Spicket River Greenway. It is the northern most segment of the rail corridor. The vegetation and natural scenery creates a rustic feel to the segment. This segment will connect to the Spicket River Greenways and the Methuen Rail Trail .

Land Use from Manchester Street to the Spicket River Greenway

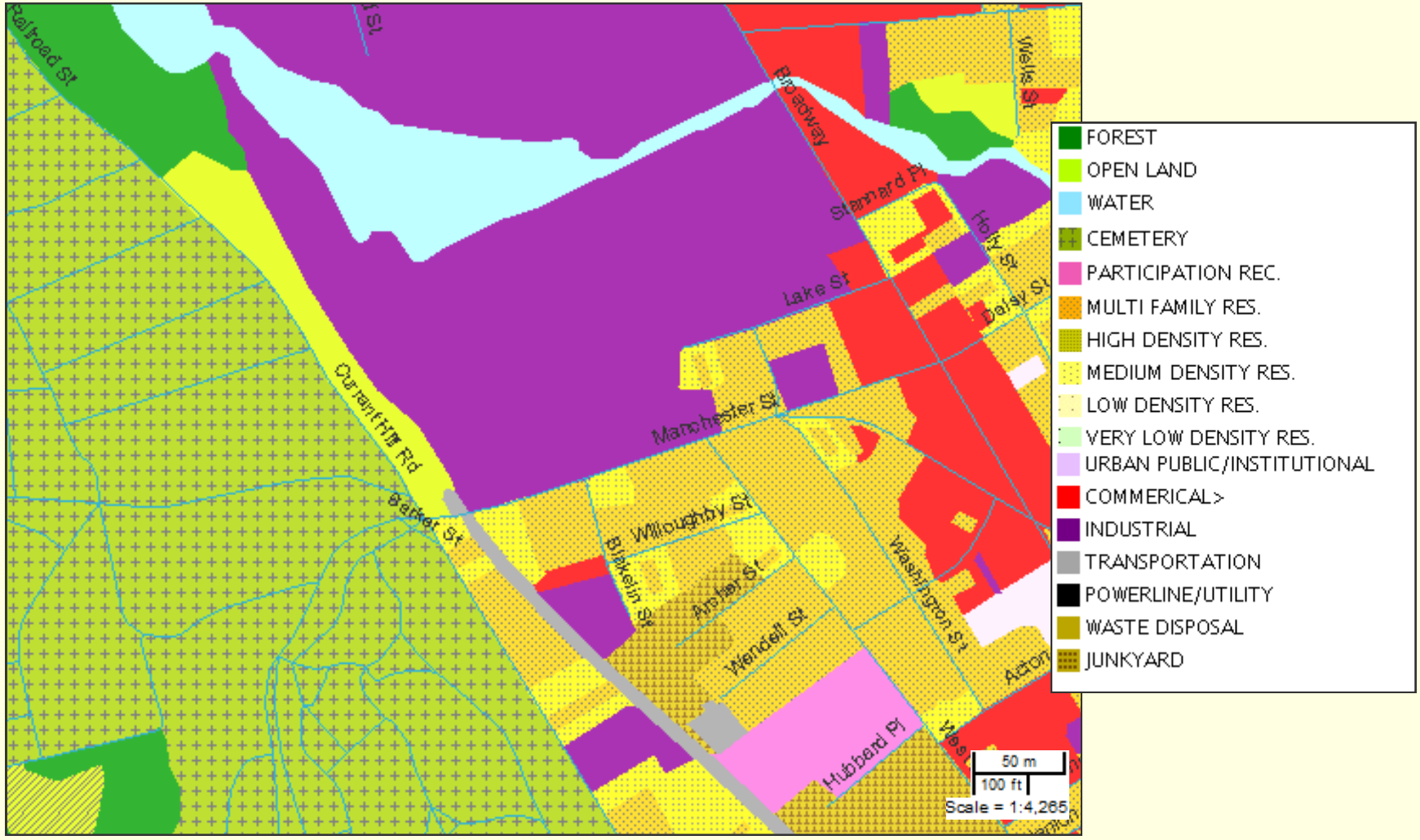

Figure 50: Land Use of Segment 4 from Manchester Street to the Spicket River Greenway

The map shows the segment is adjacent to a cemetery, industrial and residential areas.

Rustic Scenery

1. Figure 51: Abandonment along this segment .

2. Figure 52: The corridor already has a path worn into it

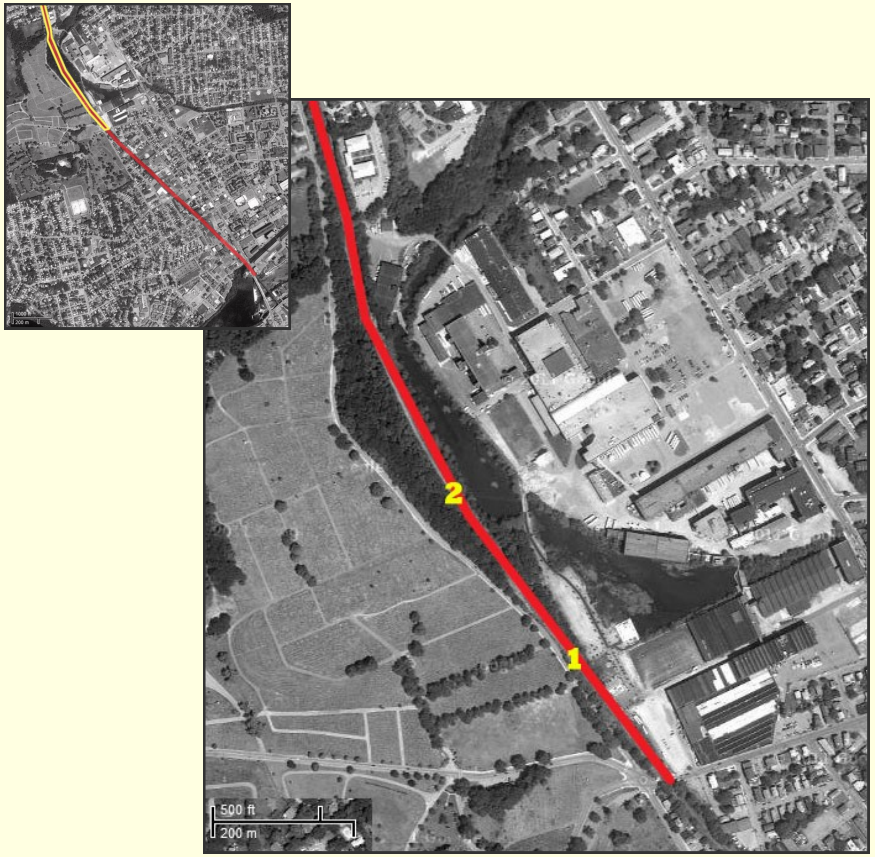

Figure 53: Open Space Along the Rail Corridor

The rails are almost completely covered by vegetation. There is, however, a small path worn through the brush.

.

Rustic Scenery Recommendations

The tree cover and vegetation on this segment of the corridor is attractive and should be pruned to maintain shade and its rustic character. Once this has been completed, the segment will need to be graded and surfaced in a manner similar to the other segments. The most probable surface of the trail will be crushed gravel at a width of about 7 feet to allow for two way traffic.

Figure 54: A segment Along the Tauern Bike Path where rustic appeal was maintained [29]

Figure 55: A segment along the Elroy-Sparta bike trail where rustic appeal was maintained [30]

3. Figure 56: Park at the end of the Spicket River Greenway and Segment 4

4. Figure 57: The parking lot of La Fruteria, at the southern end of Segment 4

Trail Connections

Figure 58: Open Space Along the Rail Corridor

At this point, the trail will join the Spicket River Greenway, and create opportunities for users to follow that Greenway to other parts of the city. In addition this trail would also connect to the Methuen Rail Trail which would vastly extend the reach of the trail to New Hampshire .

Trail Connection Recommendations

One of the key assets of Segment 4 are possible connections to the Methuen Greenway and the Spicket River Greenway. The Spicket River Greenway terminates at a park in which the fence is directly adjacent to the Lawrence Rail Corridor. The removal of the fence and ability to pass between the two will encourage patrons of either to utilize both. The Methuen Rail Trail is directly connected to where Segment 4 of the Lawrence Rail Corridor ends. The opportunity to create one continuous trail could create a smooth transition from one trail to the next. Signage may be used in order to show the point of transition. The connect to the Spicket River Greenway and Methuen Rail Trail, will ultimately connect the Lawrence Rail Trail giving patrons access to a larger trail network that includes to many other trails in the Northeast.[31]

Another possible connection is the Lawrence Rail Trail to the Riverwalk at the other end of Lawrence. The connection at this end would make travelling along the network of trails one continuous loop around Lawrence and back to the Methuen Rail Trail.

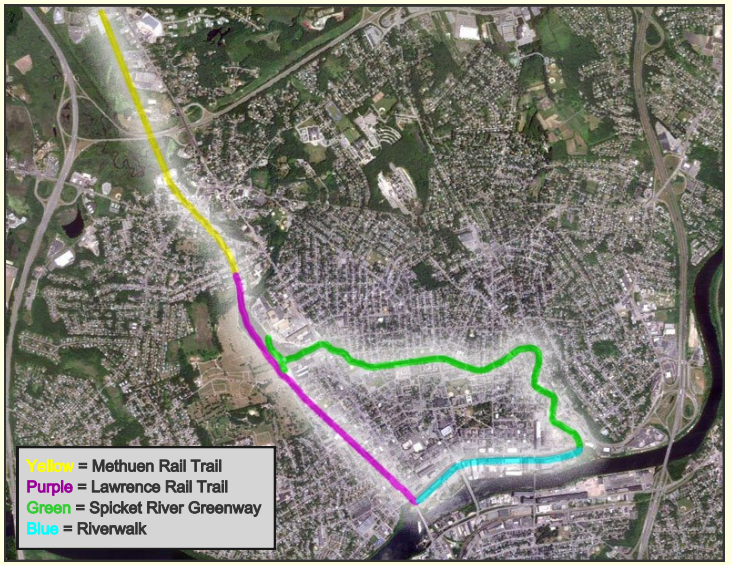

Figure 59: Map of future connections of all the local trails

Figure 60: The park near the Spicket River Greenway ends, it could be an excellent space for patrons of both trails to utilize.

Core Concerns on the Corridor

Figure 61: Straight View of Rail Corridor

Figure 62: Garbage collected along the Rail Corridor

This next section discusses what the team has defined as trail-long themes. These themes are issues and considerations that apply to the trail as a whole as opposed to problems that are localized in only a small section of the corridor. GIS maps will be used to show and explain some conditions of the trail.

Brownfield Locations

The map to the right shows the locations of brownfields along the trail. Brownfields are former industrial or commercial properties where reuse is complicated by real or perceived contamination. According to the Merrimack Valley Planning Commission, the brownfields along the corridor were sources of contamination that included oil and coal deposits arsenic, and herbicides that have been used to control the vegetation to the sides of the corridor.

Blue sites are open sites meaning they have been cleaned up and can be used for other purposes such as recreational parks or greenways. Yellow sites are closed; this means the cleanup of the sites may be required by the current or future users of the properties. Red sites are closed sites with Activity and Use limitations (AUL). Generally AUL sites prohibit activities that would allow contact with the soil in the area covered by the AUL, and requires the existence of a health and safety plan that would be used if any excavation occurs on the property.

Of the eight sites, only one site is an AUL site, located on 85 Manchester St. The site is contaminated with arsenic, benzo fluoranthene and lead. For future action at this site, project leaders must contact Mass Department of Environment. The other seven sites are mostly without limitation and should not concern the greenway project.

Red: Closed Sites with Use Limitations

Blue: Open Sites

Yellow: Closed Sites

Figure 63: Brownfields along Manchester & Lawrence Corridor

Impervious Surface and Topography

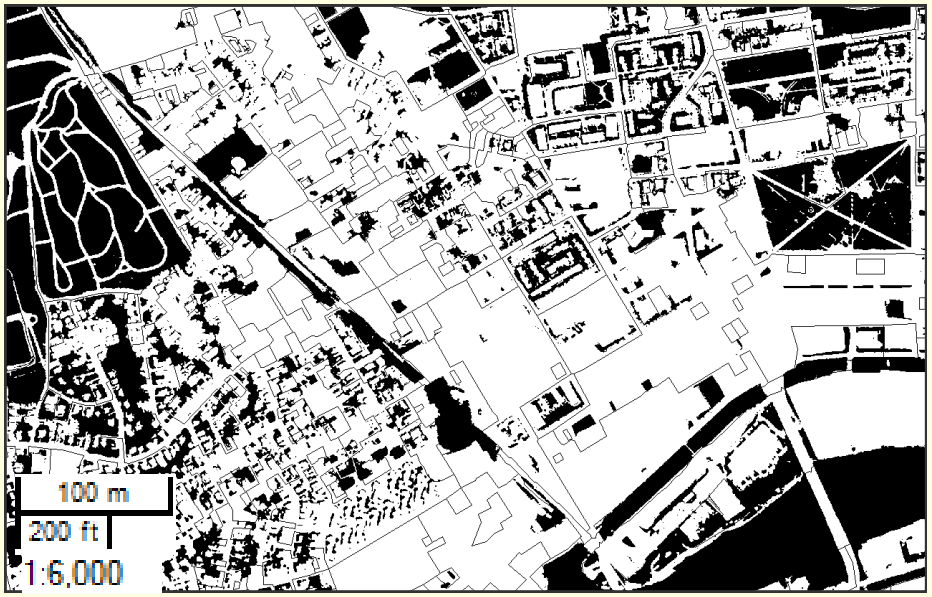

Figure 64: Impervious Surface of Lawrence, MA

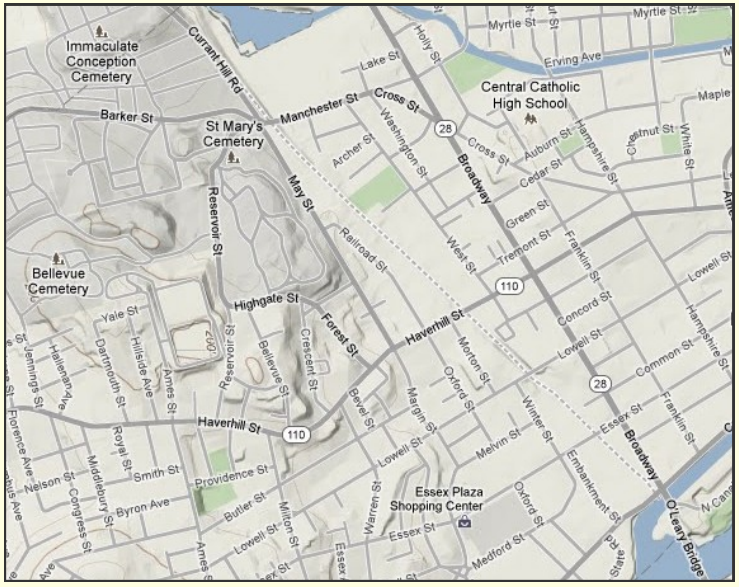

Figure 65: Topography Data of Lawrence, MA

The maps to the left show impervious surface and topography along the corridor. The white area represents pavement. The black shows unpaved areas. This suggests that the green space along the corridor should be preserved for the residents of the community.

The topography map shows that the trail has a lower altitude than its surroundings. This has partly resulted in the drainage problem along the trail. For the above reasons, it is important to assess the drainage system there before trail construction.

Schools

The map to the right shows the locations of schools in the center of the city. The trail could potentially provide outdoor learning activities to the students.

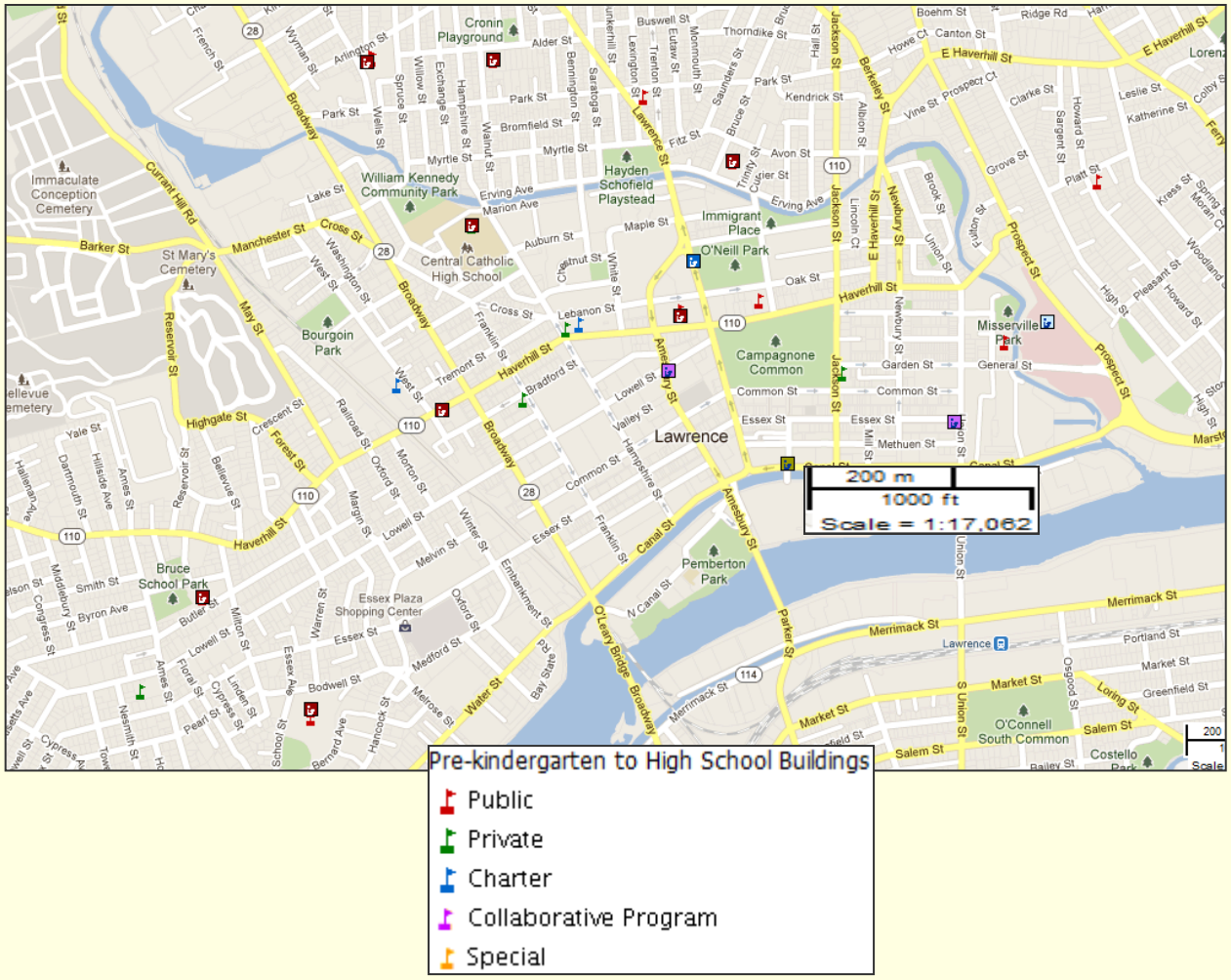

Figure 66: Schools in Lawrence, MA

Bridge Safety Concerns near Broadway Street

1. Figure 67: Rail Bridge adjacent to the O'Leary Bridge

2. Figure 68: Rail Bridge Crossing the North Canal

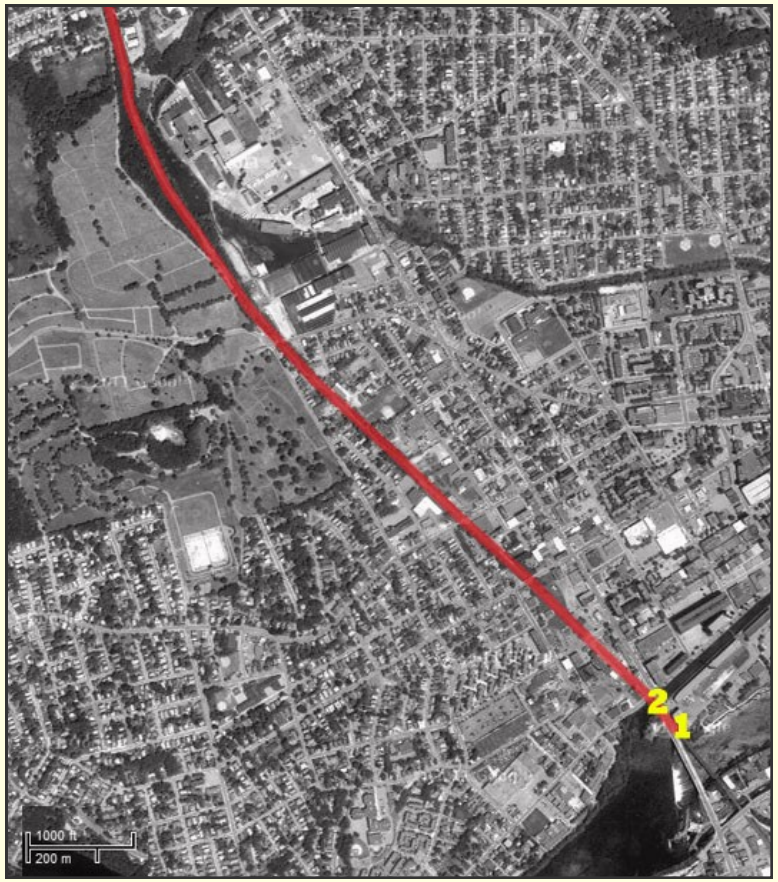

Figure 69: Bridge Safety along Rail Corridor

Although the space between the ties of the bridges in figures 67 and 68 may be large, the wood of the ties seems to be in good condition and not rotting. The functionality of the bridges and their railings however, will need to be tested by professional engineers.

Safety Concerns on the Manchester St. Bridge

Figure 70: Bridge Safety along the Rail Corridor

This bridge presents significant safety hazards. The railings end abruptly. The rail ties have large gaps between ties and some of the ties are beginning to rot .

3. Figure 71: Manchester Street Bridge ends abruptly at both sides of the overpass

4. Figure 72: Gaps between ties on the Manchester Street Bridge

Bridge Safety Recommendations

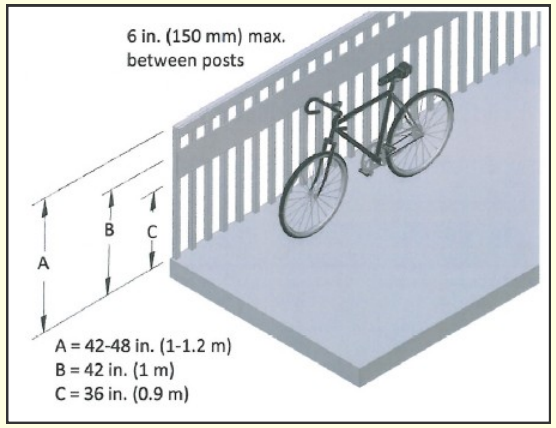

Figure 73: Dimensions of specifications for riding a bicycle [32]

Figure 74: A Bridge along the Bizz Johnson Trail in California [33]

The bridges needs to be transformed from rail-use bridges into pedestrian-use bridges. This means that the bridge needs a surface with no gaps. One way to alleviate this issue is to put decking over the current rail ties. The Danvers Rail Trail has used diagonal decking in order for users on wheels to more easily us it.

Other important requirements include the following.

1. The bridge needs to be able to support at least 12500 pounds as a multi-use bridge.

2. The bridge decking should be durable and non –slip for the purpose of bicycling.

3. The width of the bridge should match the width of the trail.

4. The bridge approach of the trail should be wider than the trail to accommodate the possible congestion. [34]

Garbage Removal

Figure 75: Garbage Removal Locations along the Rail Corridor

Garbage and litter is in scattered along the trail. The adjacent packaging company has littered small plastic pellets around the area.

5. Figure 76: Small Plastic pellets scattered along the segment

6. Figure 77: Thick Brush along the Northern end of the Corridor

Garbage Removal

7. Figure 78: Large piles of garbage located on the West Side of Rail Corridor

8. Figure 79: Large Wooden Structure that will need to be identified and removed

Figure 80: Garbage Removal Locations along the Corridor

The third segment has the most significant issue with piles of trash along the trail. Its both unsightly and potentially a health hazard.

Garbage Removal Recommendations

The removal of garbage along the trail will be a significant task, but with the help of community volunteers this can be accomplished. There are different methods to create community service projects.

According to an interview with officials from the Methuen River trail, local residents are usually willing to participate in the clean-up of their trail. According to a Danvers Trail advocate, the Danvers Trail was cleaned up with many volunteers from the Kiwanis group and a donated truck to haul away the trash. [35]

Figure 81: Volunteers along the Danvers Rail Trail removing trash . [36]

Trail Vegetation

9. Figure 82: Thick Tree Cover and tall Grass and Bushes

10. Figure 83: Overgrown Shrubbery encroaching on the Rail Trail

Figure 84: Overgrown Vegetation along the Rail Corridor

Many parts of the trail are overgrown; there are large trees along the sides of the trail and their seedlings have taken root and started growing right into the rails. Lower growing shrubbery and grasses have also grown unchecked since the abandonment of the corridor and will need to be removed to properly surface the trail.

Maintaining a rustic feel

One of the major attractions but also concerns is an abundance of vegetation on the trail. While the trees lining the corridor can be used for shade with little maintenance, the low lying shrubbery should only be trimmed if it is hinders access along the trail.

Figure 85: A Contractor along the Danvers Rail Trail are removing overgrown vegetation [37]

Navigating Intersections

Figure 86: Intersection along Washington & Old Dominion Rail Trail [38]

The rail corridor crosses four major roads with significant traffic flows. When examining crossings there are three general types: midblock, adjacent path and complex. Midblock crossing involves "a trail crossing a roadway or a railroad when there are no other intersections". The adjacent path crossing involves a trail crossing a roadway where there are existing intersections. All other undefined crossings belong to complex crossings. Each type of crossing presents its own set of challenges.

It is critical to understand these risks so that they can be properly mitigated using signage and other visual aids on the trail and on the streets to warn trail users that there is an impending intersection as well as warn motorists that they will soon be passing a multi-use trail that crosses the street.

This crossing on the Washington & Old Dominion trail, in Figure 86, is located along South Four Mile Run Drive, Virginia, is classified as an adjacent path crossing and uses nonstandard dashed striping.

Broadway Street Intersection

The Broadway Street-O'Leary Bridge intersection is a complex crossing. The awkward angled path makes it difficult to be seen as a pedestrian. In order to reduce crossing distance it would be ideal to create a path directly across the street instead of along the rail tracks. While there is an existing traffic light at the crossing, additional signage and perhaps a mirror, would add to public safety.

Figure 88: The intersection of Broadway Street

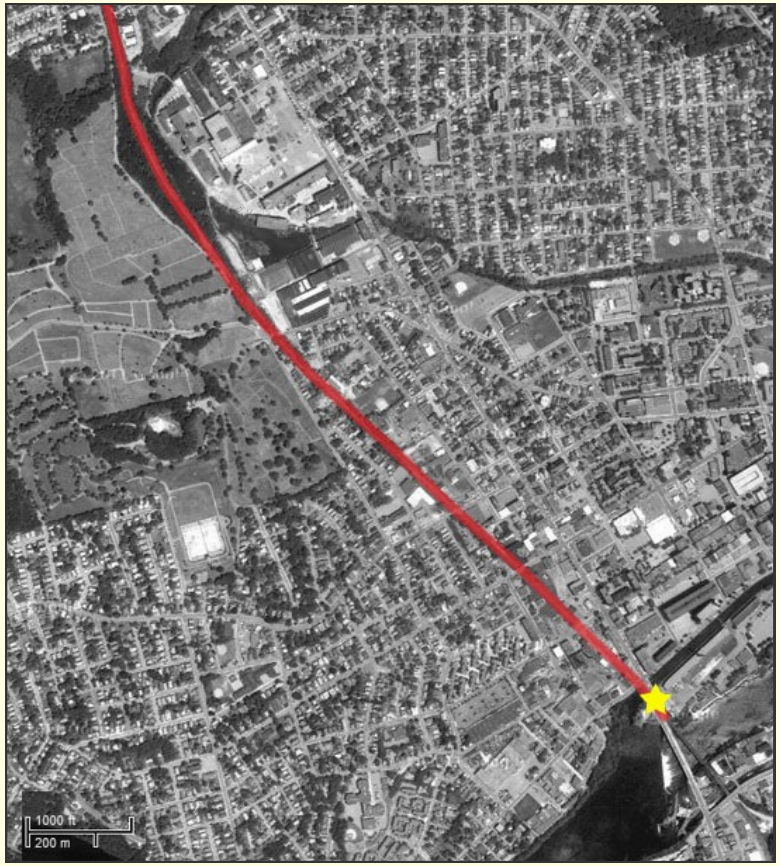

Figure 87: Rail lines cross into the street with no warning

Figure 89: Broadway Street & Rail Corridor Intersection

Water Street Intersection

Figure 90: Stop lights Exist at Intersection Broadway & Water Street

Figure 91: An existing railroad crossing system

The Water Street intersection is an adjacent path type of crossing since there is a traffic light and existing railroad crossing lights. While railroad signage alerts motorists it is not sufficient for a pedestrian path. The railroad tracks cross the street at a right angle, decreasing the amount of time pedestrians would be on the street. As can be seen from the figures, the intersection is quite large and busy.

Figure 92: Water Street & Rail Corridor Intersection

Essex Street Intersection

The Essex Street intersection is a mid block type crossing. Traffic at the Essex crossing is heavy and there are driveways in the vicinity, impeding visibility.

Figure 93: Essex Street & Rail Corridor Intersection

Figure 94: Residential apartments and commercial and retail businesses.

Figure 95: Flame-Tech Steels on Essex Street borders Rail Corridor

Haverhill Street Intersection

Figure 96: Residential Building on West side of Haverhill Street

The intersection divides Segment 2 and 3. Though the intersection is not as large or busy as those to the south, this intersection could potentially be dangerous because there are no traffic signals or warning signs to prepare drivers for crossing traffic.

Figure 97: Retail Area on East side of Haverhill Street

Figure 98: Haverhill Street & Rail Corridor Intersection

Intersection Recommendation

Intersections are a critical component of the trails. Safety is particularly important when it comes to trail building. Each type of crossings has its unique design strategy. But generally speaking the methods to improve crossing safety includes

1.Reduce exposure and crossing distance by making a crosswalk the shortest distance possible. For example the crossing area should be perpendicular to the road as it is in Figure 101.

2.Increase mutual awareness and visibility by presenting signs at crosswalks as shown in Figures 99 and 100.

3.Manage traffic speed and flow by incorporating flashing flights and proper signage for drivers to use caution while driving in the area.

In conclusion all the intersections will require easy to understand signage, for both preparation and stoppage on both the drivers ' and the patrons ' paths; along with road painted path lines as seen in the photo. Adding large diagonal strips along the pedestrian path does not cost any more, however it creates more attention to the crosswalk.[34] This attention helps create a more aware and therefore safer intersection. Signs should be installed far enough from crossing so that users moving at higher speeds are able to react before reaching the crossing.

Figure 99: Bike-Path approaching an intersection [39]

Figure 100: Harwich Bike-Path approaching an intersection [40]

Figure 101: Cape Cod trail approaching an intersection [41]

Trail Access Points

Figure 102: A map of the Metropolitan Branch Trail, with multiple access points shown as points where the red lines branch off from the trail [42]

There are several other ways to gain access to the trail besides entering the trail at intersections. The team divided these access points into four categories; Recreational, Parking Lots, Residential and Commercial. These locations are possible future access points because they are already connected to the trail. Currently there are no formal access points to the trail other than street intersections. Because the access points have yet to be developed, many of them are difficult to find or navigate or are have large amounts of refuse piled around them. For the above reasons, the team suggests converting these unofficial access points into official ones that can be taken advantage of by trail users.

Recreational Access Points

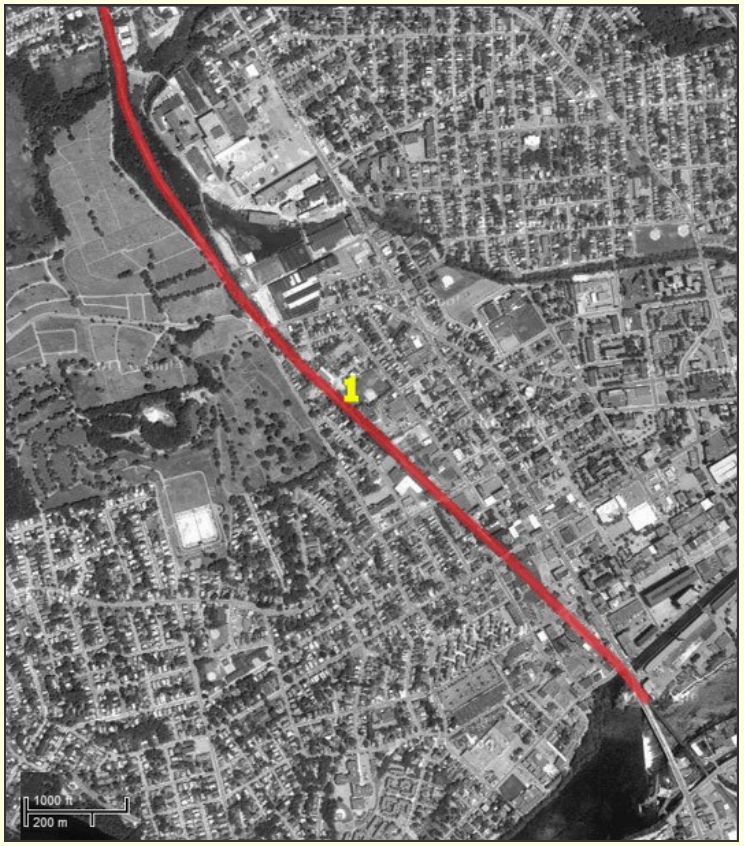

Figure 103: Recreational Access Point Along Rail Corridor

Easy access to recreational fields are key components of the trail. Bourgoin Park will benefit from the trail because it is already highly popular locally, but users from other areas will be able to use the trail to access it. Both the field and corridor are currently municipal properties.

1. Figure 104: An opening in the fencing for access to Bourgoin Park.

Figure 105: Soccer fields at Bourgoin Park

Recreational Access Points

2. Figure 106: The Spicket River Greenway on the other side of the fence terminates

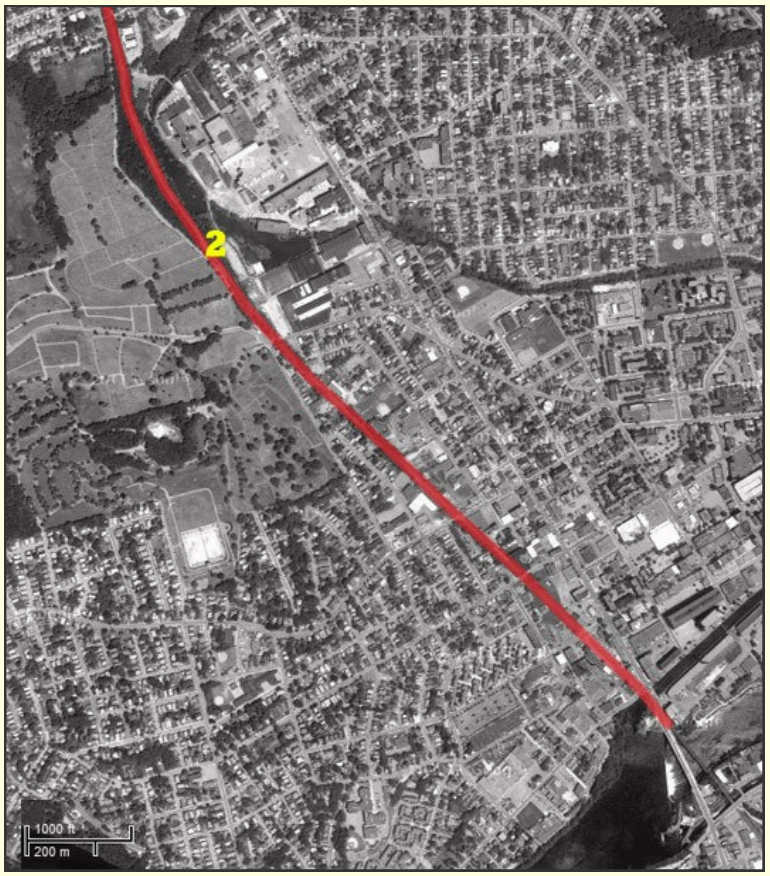

Figure 107: Recreational Access Point Along Corridor

The integration of the Spicket River Greenway, the Lawrence Rail Corridor, and the Riverwalk, is crucial to creating a path that encircles the industrial downtown of Lawrence. At this point the trail will also connect to the Methuen Rail Trail, allowing residents of New Hampshire to utilize the trail. This access point can be viewed as a connection between not only neighborhoods within Lawrence, but with communities in Massachusetts and New Hampshire.

Parking Lot Access Points

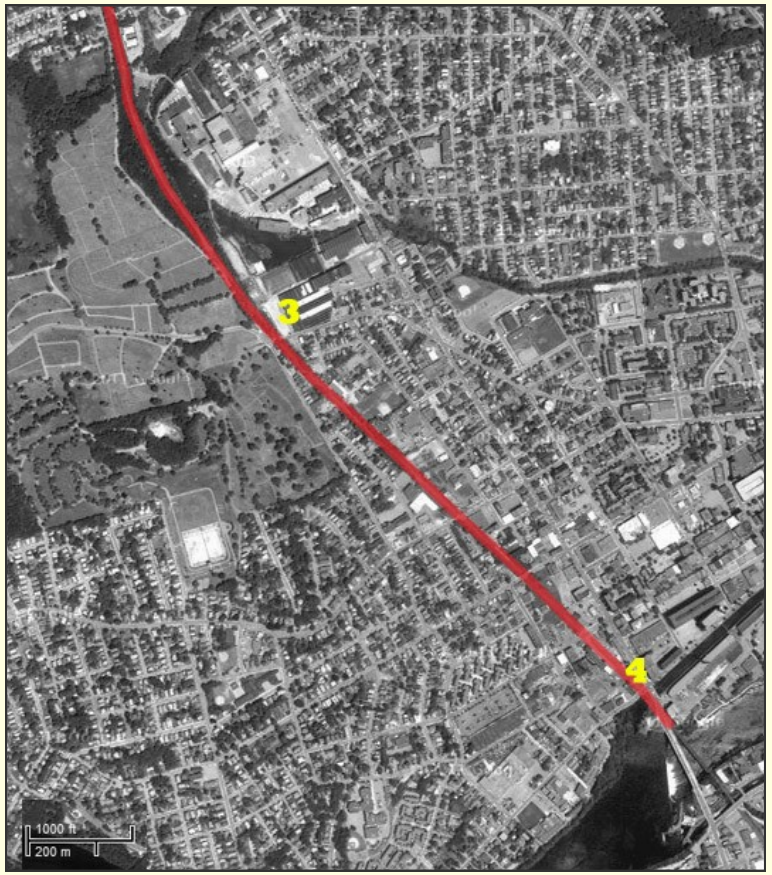

Figure 108: Parking Lot Access Points Along Corridor

Parking lots are excellent access points because they conveniently provide somewhere for patrons to park.

Residents will likely be able to walk to access the trail, however users from further away will likely drive to the trail and need somewhere to park their car.

3. Figure 109: Parking Lot of La Fruteria

4. Figure 110: The Parking Lot at the Canal-Broadway Intersection

Revitalizing the Corridor

Figure 111 : Manchester Park, part of Spicket River Greenway [4]

The vision for this trail is for an attractive addition to the Lawrence community that encourages community integration and healthy living choices. It will be a trail that includes many amenities such as well as connecting the Spicket River Greenway, the Lawrence Riverwalk and the Methuen Rail Trail.

Revitalizing the corridor involves many key design considerations. For example, designing suitable intersections and crossings will make the trail not only easier to use and more accessible, but it will also make the trail safer. Another important consideration is open space. The picture on the left, of Manchester Park, shows a successful design for open space that allows many different trail users to enjoy the area. While these are very important, there are other considerations that are crucial to designing a successful trail. These include rain gardens to help with drainage problems and the removal of waste from the trail. All of these design considerations, along with others are discussed in the following section. These considerations will aim to create a trail that is an attractive amenity to the city of Lawrence that all residents can enjoy safely.

Trail Features

This map shows the possible locations of trail amenities. The descriptions and reasoning for location are in the following pages and throughout the cost estimations of each of them.

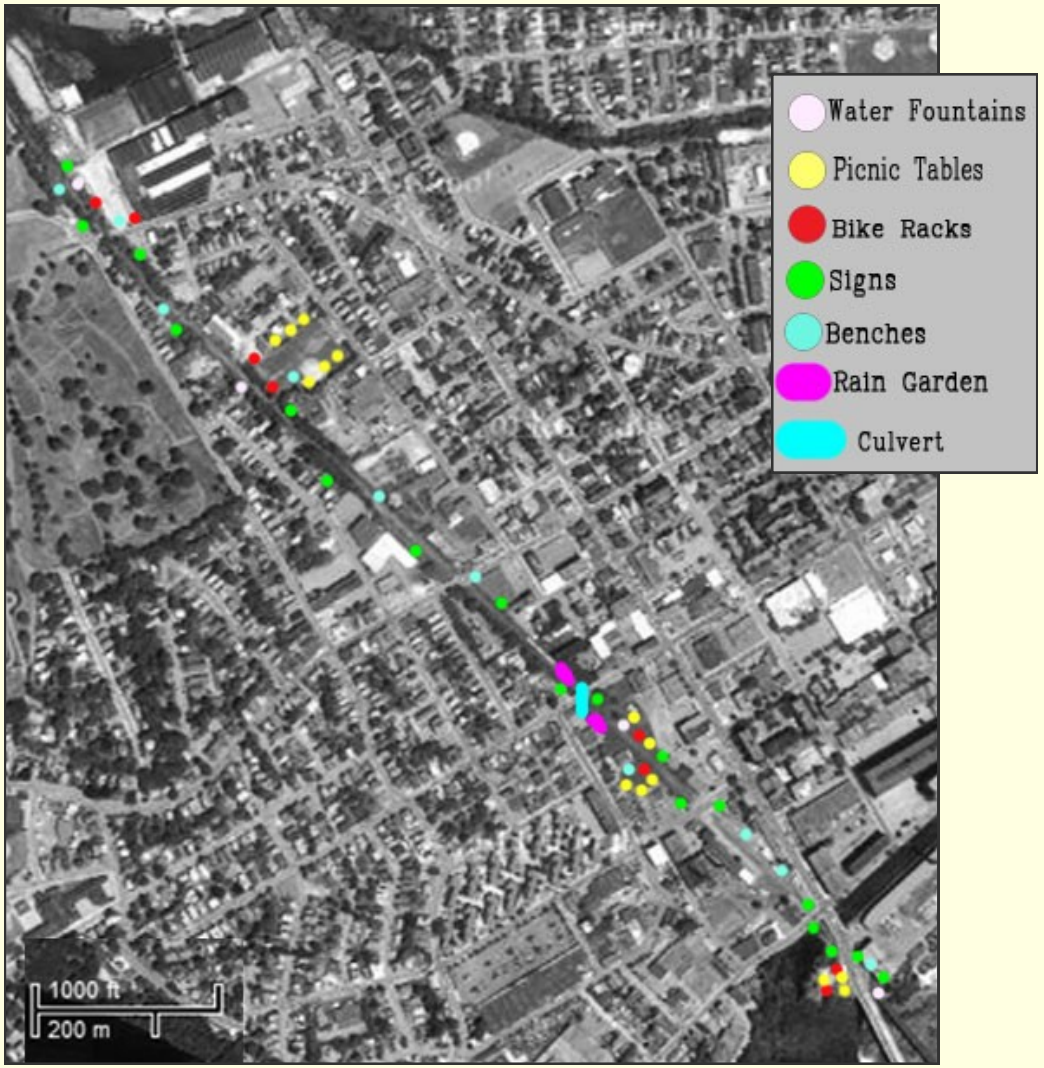

Figure 112: Amenity Placement Map

Rain Gardens

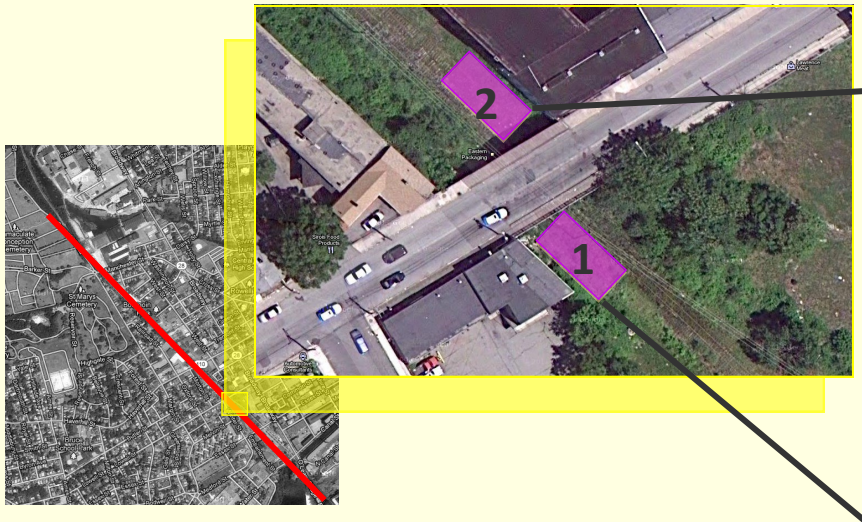

Figure 113: Rain Garden Placement Map

Figure 114: Rain Garden 2 will be on the North side of the Lowell Street Bridge.

Figure 115: Rain Garden 1 will be on the South side of the Lowell Street Bridge.

Within 20 feets on the Manchester Street Bridge, there were approximately six inches of standing water. To address this issue, we suggest constructing a one foot deep rain garden. The rain garden will need to be eight feet wide and fifteen feet long to sufficiently keep the areas surrounding the gardens dry of standing water. Since there is water on both sides of the bridge, we suggest building a rain garden on either side of the bridge. The purple shapes in the picture above show an approximate placement of two gardens. The pictures to the right show the current condition of the proposed location for the gardens.

Rain Garden Design

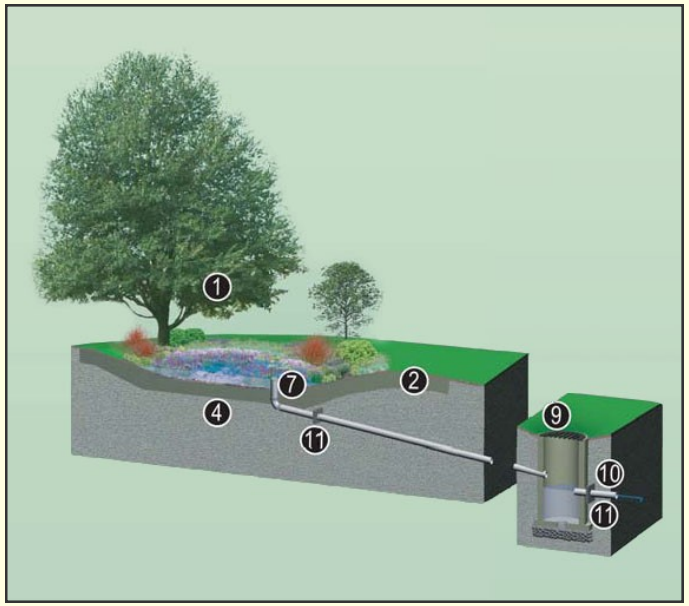

Figure 116: Diagram of Under-drained Rain Garden [44]

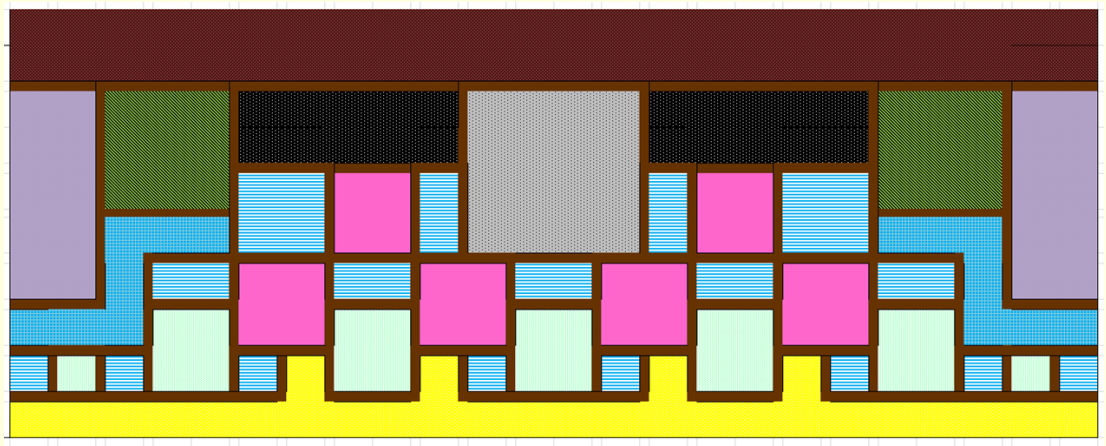

Figure 117: Rain Garden 1 Preliminary Layout

1 Tree, Shrub, Groundcover plants.

2 Planting material , minimum depth 1.5 feet.

4 Subsoil, broken up/ loosened.

7 Standpipe for water overflow.

9 Second overflow inlet at basin.

10 Outflow Pipe to Storm Drain or other water system.

11 Trench dams at Utility crossings.

	one box is 1 square foot		
	Winterberry - Winter (10ft)		Bog Rosemary - Summer
	Buttonbush - Summer (6ft)		Turtle Head - Summer (2ft)
	Black Chokeberry - Fall (6 ft)		Blue Flag - Late Spring (2ft)
	Interrupted Fern - Spring (3ft)		Sensitive Fern - Spring (1 ft)
	Rhodora - Spring (3ft)		Marsh Marigold - Spring

Table 3: Rain Garden Layout Legend

Table 4: Rain Garden Flower Choices

	Plant	Classification Name	Full/ Partial Sunlight or Shade	Wet/Average or Dry	Height	Bloom Season
	Interrupted Fern	*Osmunda Caytoniana*	F-S	W-D	3ft	SPRING
	Rhodora	*Rhododendron Canadense*	F-P	W-A	3ft	SPRING
	Marsh Marigold	*Caltha Palustris*	F-P	W-A	12"	SPRING
	Lady Fern	*Athyrium Filix-Femina*	P-S	W-A	18"	SPRING
	Labrador Tea	*Ledum Groenlandicum*	F-P	W-A	3ft	LATE SPRING
	Blue Flag	*Iris Versicolor*	F-P	W-A	2ft	LATE SPRING
	Bog Rosemary	*Andromeda Polifolia*	F-P	W	1'	SUMMER
	Buttonbush	*Cephalanthus Occidentalis*	F	W	6ft	SUMMER
	Turtlehead	*Chelone Glabra*	P-S	W-A	24"	SUMMER
	Black Chokeberry	*Aronia Melanocarpa*	F-P	W-A	6ft	FALL
	Winterberry	*Ilex Verticillata*	F-P	W-A	10ft	WINTER

Basketball Court Recommendation

A basketball or multi-use court could promote healthy lifestyles. With improved accessibility, it could provide a healthy place for the community to assemble and enjoy the outdoors.

We recommend the basketball court be located on the open field in segment two since it would be convenient for community members and trail users alike to access it.

Figure 118: Basketball Court in Residential Area [45]

Figure 119: Basketball Court in a Miami Public Park [46]

Recommendation Summary 1

Safety of Intersections

Signage must be placed on the trail to inform trail users that there is an upcoming intersection. These signs must be highly visible placed far enough from the intersection so that bicyclists have enough time to slow down.

Signage must also be used on the roads to indicate to car traffic that there is an upcoming pedestrian crossing and to proceed with caution.

Mechanical systems may also be needed to control traffic flow. These can be devices such as stoplights or gates that stop traffic and allow trail users to cross

The distance of the crossing path must also be kept to a minimum, to shorten crossing time.

Safety of Bridges

In order to increase safety the bridge over Manchester Street will need railing sufficient enough to protect trail users from falling from the bridge. Signs warning trail users that the bridge is coming will make users safer. Diagonal decking will make the surface non-slip while also preventing bike wheels from getting stuck.

The bridge must also be inspected by a structural engineer to determine the structural integrity of the bridge and to ensure that it can safely sustain trail traffic.

Based on recommendations from the engineer the bridge will be repaired so that it can safely sustain trail users.

Existing and Potential Historic Views

Signs discussing the historic significance of the corridor can be placed along the trail.

To improve upon the natural beauty of the trail natural Installing benches and picnic tables will allow users to stop and enjoy the scenery of the trail.

Figure 120: Signage for Safety of Intersections [47]

Figure 121: Safety of Bridges include verifying bridge structure [48]

Figure 122: Existing and Potential Scenic View [49]

Recommendation Summary 2

Open Space Usage

- Segment 2 offers excellent recreational opportunities due to a large open field located adjacent to it.
- The field has enough space for both basketball courts and a dog park.
- A water fountain, picnic tables, benches and other such amenities will enhance the above features as well.
- Greater detail on the aforementioned features and amenities can be found on pages 18 and 61.

Urban Art

- The tasteful application of modern art styles will make the trail stand out from others in the area.
- Urban art can include styles such as murals, spray paint graffiti and moss graffiti.
- Children and staff from local schools could do such paintings which would be an excellent project and field trip as well as beautifying the area.
- More information on urban art can be found on page 20

Drainage Problem

- The area under the Lowell Street Bridge is experiencing very poor drainage; most of the trail in that area is submerged.
- The application of one or more Rain Gardens could potentially solve the drainage problem here.
- Rain Gardens are low-maintenance, easily created and would increase the attractiveness of the trail while mitigating water levels.
- Refer to pages 22 and 58-60 for a longer discussion of drainage and Rain Gardens.

Garbage Removal

- Garbage along the trail is a major concern for the team.
- Community members such as schools or Scout troops could aid in the garbage removal process to give them community service hours.
- Further information can be found on page 41.

Figure 123: Open Space Usage— Dog Park [50]

Figure 124: Boy Scoot troops help with Garbage Removal [51]

Recommendation Summary 3

Greenery

- A concern is the overgrown vegetation, especially in Segments 3 and 4.
- Both bushes and trees have steadily encroached on the trail from years of abandonment.
- Small saplings, bushes, accumulated brush and other vegetation will have to be cleared for users to enjoy the trail unhindered by plant matter.
- The abundance of plant life in the area, however does provide those segments with an earthy, rustic feel.
- More info is listed on page 45

Adjacent Properties

- There are many different types of adjacent property along the corridor, each with unique challenges that must be handled.
- By working with the school along the trail, students can become involved in the revitalization of the corridor.

Trail Connection

- The connection with the Spicket River Greenway and Methuen Rail Trail can connect this trail to other parts of Lawrence as well as communities as far as New Hampshire.
- Working with the advocates from those trail groups can help make a better rail trail.

Access Points

- Properly utilizing these will provide more convenient access to the trail.
- There will be four categories to define them, Recreational, Parking Lot, Residential and Commercial.
- Officially integrating these access points into the trail will also allow users to access certain areas of the community more easily than travelling by road.
- Pages 52-55 discuss this topic in greater detail.

Figure 125: Volunteers are help trimming trees and shrubs [52]

Figure 126: The Rail Trail is connected to a pathway to a local neighborhood [53]

Estimated Cost of Rail Trail Conversion

Our cost estimate does not take into account the cost of land acquisition, labor costs to install the items or and trail maintenance.

The total cost of this trail has been estimated taking the following into consideration: two miles of crushed stone, seven bike racks, fifteen picnic tables, seventeen signs, one culvert, ten benches, four water fountains, two hundred and twenty five feet of swale, ten thousand five hundred and sixty feet of grading/ herbicide treatment and removal of six thousand rail ties. With these components in mind, we estimate the rail to trail conversation trail will cost $358,400.

A breakdown of this value is shown in Table 5 to the right and justification of these costs can be found in the following pages.

Item	How Many	Cost of Item	Total Cost
Trash Recepticles	12	$305 per recepticle	$3,660.00
Benches	10	$1000 per bench	$10,000.00
Drinking Fountains	4	$3500 per fountain	$14,000.00
Picnic Tables	15	$430 per table	$6,450.00
Bike Racks	7	$230 per rack	$1,610.00
Signage	17	$250 per sign	$4,250.00
Crushed Gravel Surface	2 miles	$100,000 per mile	$200,000.00
Swale	225 feet	$6.50 per foot	$1,462.50
Culvert	1	$1000 per culvert	$1,000.00
Grading/Herbicide Treatments	10,560 feet	$5.30 per foot	$55,968.00
Rail and Tie Removal	6,000	$10 per tie	$60,000.00
Total Estimated Cost			$358,400.50

Table 5: Cost of Implimentation Estimation Table

Figure 127: The Ashuwillticook Rail Trail shown includes all the elements of a Rail Trail [54]

Cost of Rail and Tie Removal

The first and most important step to converting the corridor is to remove the rails and ties. Rail tie removal and processing, due to their status as hazardous waste, costs roughly $10 per tie. Regulations for railroads in the Maine/ Massachusetts area say that there are typically three thousand ties per mile, thus we have roughly six thousand ties to deal with. Non-profit companies like Iron Horse Preservation have the ability to remove the rail lines and ties, free of cost to the inquirer due to their ability to sell the metals the recover and use it to properly dispose of the wood ties. However without the help of such a company, it will cost around $60,000 to remove and process the ties.

Iron Horse is an organization that removes rails from abandoned rail corridors and sell the rails as scrap and properly dispose of the ties.

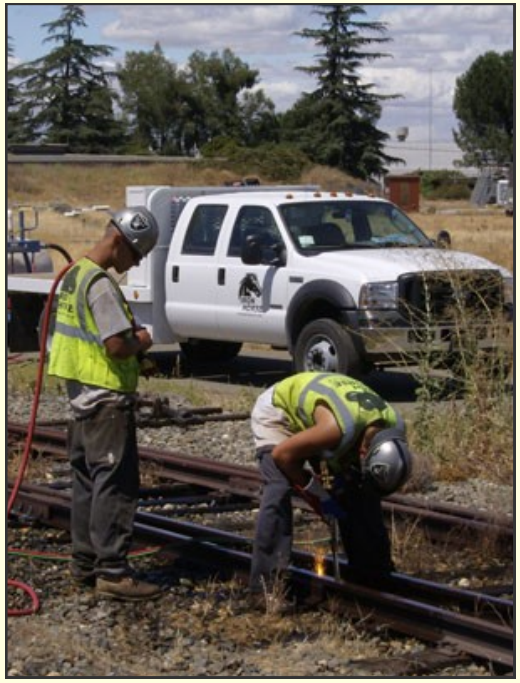

Figure 128: Removal process,
Iron Horse Preservation Society [55]

Figure 129: Final product of tie removal [56]

Rain Garden Costs

There is only the one wet section in Segment 2, in which a rain garden is the suggested solution. A will be necessary to allow proper drainage of water with or without the implementation of rain gardens. A single culvert costs around $1000. However, if there is no rain gardens in Segment 2, a swale would be necessary to maintain the standing water that is currently spanning a distance of around 225 feet. The cost for this possible necessity is roughly $6.50 per foot; in our case the total installation cost would be $1462.50.

Grading and herbicide treatment could cost around $5.30 per foot applied, thus with a two mile trail we have 10,560 feet requiring application for a total cost of $55,968.00.

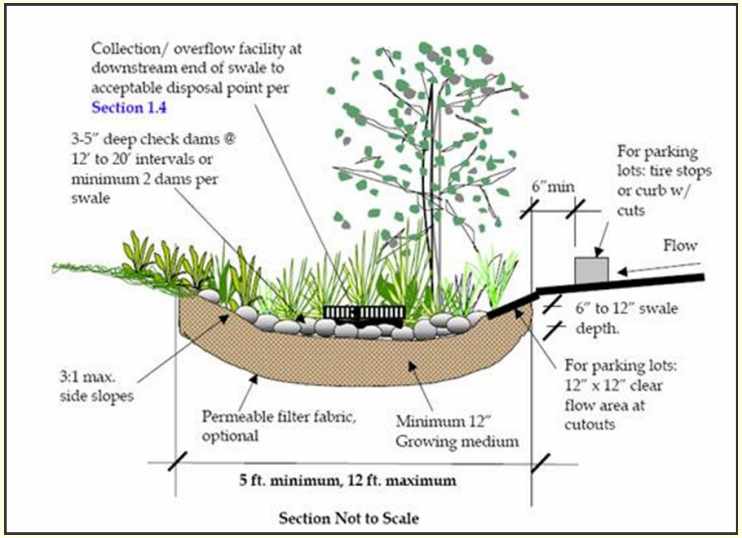

Figure 130: Diagram of a Rain Garden [57]

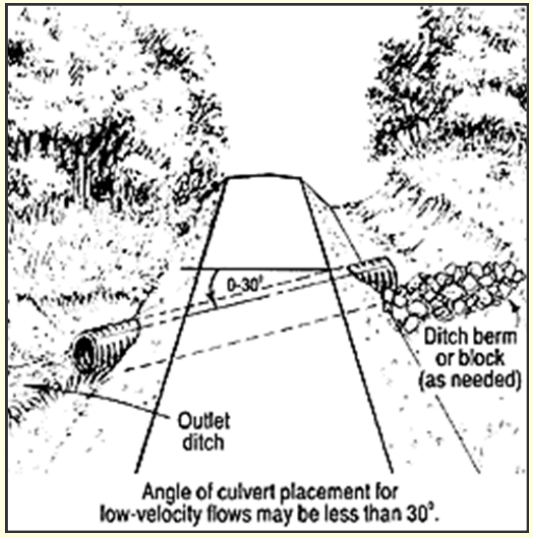

Figure 131: Diagram of culvert placement [58]

Rail Surfacing Costs

Once the rail ties have been removed and the other necessary preparatory work has been done, a path surface must be chosen. Our research has shown crushed gravel or stone is the ideal surface because it is dense enough to allow cyclists to ride along it easily, and it is also soft enough for joggers, walkers and equestrians to use regularly. According to the Rails-to-Trails website, two miles of crushed stone is estimated to cost $200,000.

Figure 132: Close—Up of Crushed Gravel [59]

Figure 133: Crushed gravel being used on a current rail trail. [60]

Signage Costs

We estimated that seventeen informational signs will be necessary for the trail. Signs will be placed at the trail's crossings, indicating that it is a road/bridge crossing and advising patrons to dismount their bikes and carefully cross. Signs will also provide users with information about which road they are crossing and how far away the next road will be. Each sign is $250, thus the total cost of signs will be $4250.

An interview with an advocate for the Danvers Rail Trail, provided information regarding their method of acquiring signage. When Iron Horse Preservation removed the rails and ties, they provided the money for proper signage along the trail. [61]

Figure 134: An informational sign such as this one warns cyclists that there is an impending pedestrian crossing so that they can safely decelerate.

Figure 135: Typical sign near or on a bike path or rail trail that informs users that cyclists utilize the path. [62]

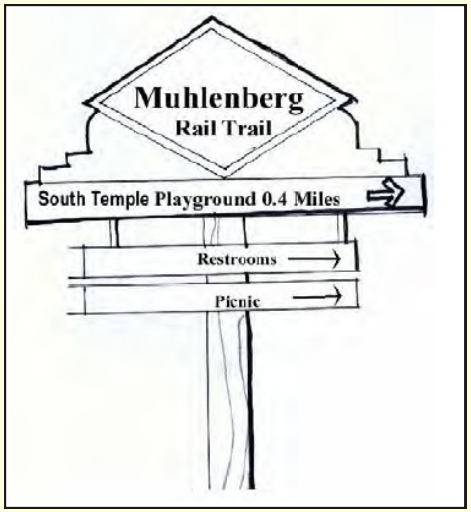

Figure 136: A sketch of a directional sign proposed for the Muhlenberg Rail Trail in Virginia, giving trail users a sense of direction, allowing them to successfully navigate the trail. [63]

Amenity Costs: Bike Racks and Picnic Tables

Bike racks are priced at $230 each, thus seven will cost $1610.

Segment 1: 2 racks, near O ' Leary Bridge
Segment 2: 1 rack; in the open field
Segment 3: 2 racks, at the entrance to Bourgion Park
Segment 4: 2 racks, at the connection to the Methuen Rail Trail and Spicket River Greenway

These four locations are judged to be the places with the highest numbers of people mounting and dismounting their bicycles, thus needing a place to store their bicycles while they pursue an alternative activity.

Picnic tables are $430 apiece and thus the total cost for 15 tables will be $6450.

Segment 1: 5 tables at the entrance to the trail

Segment 2: 4 tables in the open space

Segment 3: 6 tables at Bourgion Park

Segment 4: Picnic tables already exist in the area between where our trail and the Spicket River Greenway terminates, no tables necessary.

These three places are locations for people to dismount from their bikes, eat and relax.

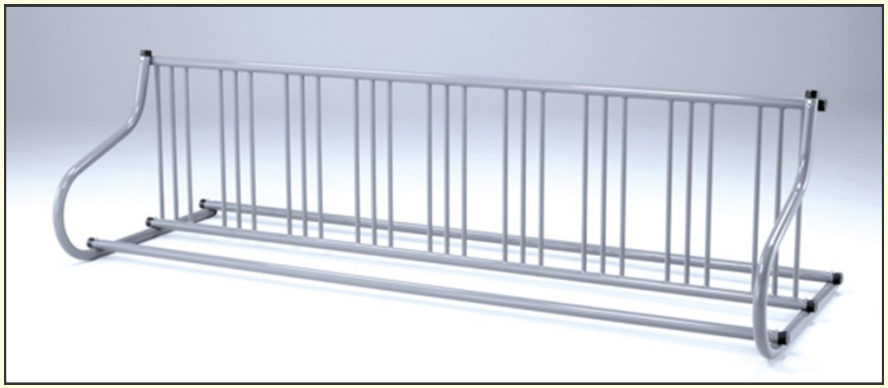

Figure 137: Potential Bike Rack along Rail Trail [64]

Figure 138: Picnic table in the Park [65]

Amenity Costs: Benches and Water Fountains

It is estimated that ten benches at $1000 each will be necessary for a total cost of $10,000. The trail is two miles long or about ten thousand feet long and thus ten benches would be used at a distance of 1000 ft. apart from each other. In this way, benches could be located at every major amenity and access point on the trail. Having one every thousand feet will give the trail a sense of continuity.

We assume that there would be a need for water fountains at four points along the trail: the beginning of the trail, the basketball court, Bourgion Park, and the at the connection with the Spicket River Greenway. A water fountain costs around $3500 so four would cost $14,000, disregarding the cost of connecting the fountains to pre-existing infrastructure.

Figure 139: Potential benches along the Rail trail [66]

Figure 140: Water Fountains along the Rail Trail [67]

Amenity Costs: Trash Receptacles

With there being 10 benches mentioned previously, twelve trash receptacles would be required for the Lawrence Rail Trail. Placing one trash receptacle 20 feet from each bench and one extra at both Bourgoin Park and near the potential basketball court would create convenience for patrons along with encouraging use of them. The distance of 20 feet is to keep the convenience of having a receptacle near, while keeping the potential bugs and smells away from the patrons when they are enjoying the other amenities. These twelve trash receptacles cost around $305 each on average, would cost $3660 in total.[68]

Figure 141: Examples of trash receptacles to place along trail [69]

Concluding Thoughts

This report examined current conditions of the Lawrence rail corridor. We also have made a series of recommendations to stimulate interest in converting the rail corridor into a multi-use trail.

We worked collectively with the team sponsor, Groundwork Lawrence, and conducted interviews of city officials in Lawrence and neighboring cities.

To help us understand best practices, we did extensive research on rail-to-trail conversion projects in other parts of the country and hope the wealth of examples in this report can help create a new amenity in Lawrence.

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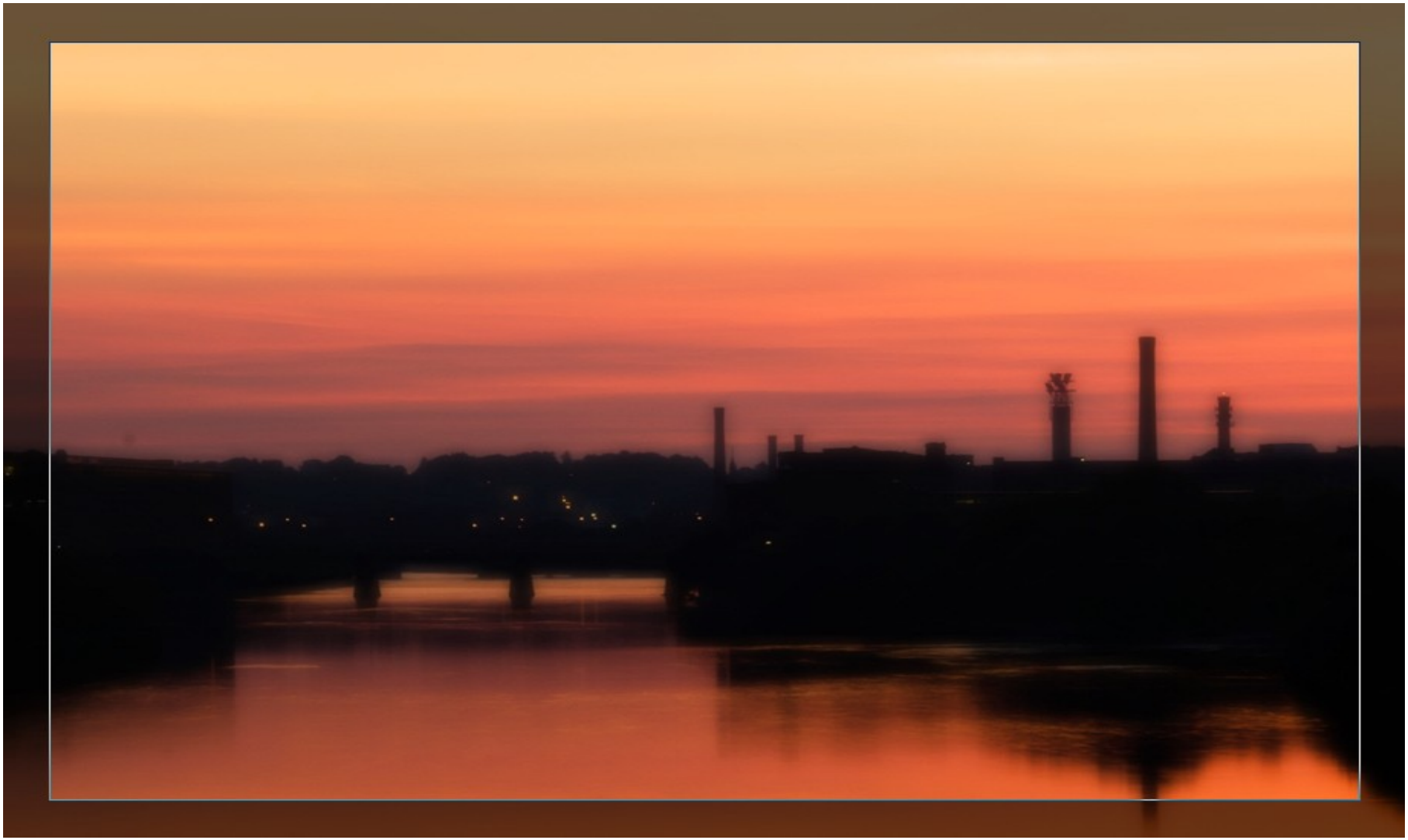

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