

## ***2.0 PROJECT DESCRIPTION***

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### **2.1 PROJECT SITE**

Trinity Hamilton Canal Limited Partnership (THCLP) (“the proponent”) is proposing to redevelop approximately 13 acres of underutilized and vacant property located in the Jackson/Appleton/Middlesex Streets Area (JAM), known as the Hamilton Canal District. The site centers around the confluence of three canals; the Hamilton, Merrimack, and Pawtucket Canals, and is bounded by the Lowell National Historic Park Visitor Center to the north, Middlesex Street and Jackson Street to the south, Dutton Street to the west, and Revere Street to the east. See Figure 2-1, Locus Plan.

The site is adjacent to the heart of Lowell’s downtown and is surrounded by the system of canals that distinguish the City. It includes lands that are divided into three sections by the Pawtucket and Hamilton Canals. Approximately 6 acres of vacant land is located north of the Pawtucket Canal including 2.2 acres of land owned by the National Park Service adjacent to the southern edge of the Merrimack Canal. Approximately 6.5 acres of land is located between the Pawtucket and Hamilton Canals and is surrounded by canals, historic mill buildings, and the Swamp Locks area. The area south of the Hamilton Canal includes approximately 0.7 acres of land located at the corner of Jackson and Revere Streets. In addition, the project includes 2.2 acres of land owned by the National Park Service adjacent to the southern edge of the Merrimack Canal. Figure 2-2, Illustrative Master Plan and Figure 2-3, Existing Parcel Map delineate the above parcels.

### **2.2 PROJECT DESCRIPTION**

The proposed Hamilton Canal project is a mixed-use, transit-oriented development with the goal of bringing new life to 13 acres of blighted land adjacent to Downtown and the Dutton Street gateway to Lowell.

Within the project site, there are several ownership entities which include the City of Lowell, the Lowell National Historic Park (LNHP), and the Commonwealth of Massachusetts (Division of Capital Asset Management) and (Division of Conservation and Recreation), Boott Hydropower, and the Proprietors of the Locks and Canals. The proponent has been working with each entity to create the most vibrant, efficient, publicly accessible project design for the site. As shown in Figure 2-3, Existing Parcel Map, the City of Lowell will be conveying parcels to the Division of Capital Asset Management (DCAM) for the Trial Court and to the proponent for the proposed development. The City of Lowell will be retaining ownership of streets, bridges, and rights of way connecting the project parcels. It is anticipated that the National Park Service (NPS) will convey or lease the current parking lot areas to the proponent as well. Creation of a street network and pedestrian routes will

involve use of some portions of DCR property. This area is outlined in more detail in Section 3.5, Compliance with EEA Article 97 Policy.

The proposed project is organized into parcels, each with distinct characteristics. The overall project program calls for approximately 767,000 gross square feet (gsf) of housing (623 units), 54,800 gsf of retail space, 424,000 of commercial space, 32,000 of theater space, and 627,000 gsf of parking. The proponent has also developed an alternative plan for Parcel 10. Should the building not be marketable as office space, the alternative program is for 50 units of housing. A detailed description of each parcel can be found below in Table 2.1, Program Summary. Following the summary table is a project overview. Also refer to Figure 2-4, Proposed Parcel Map and Figure 2-5, Aerial View of Site.

Table 2.1: Project Summary

| Parcel # | Parcel Area            | Use                        | Building Footprint (sf) | Height (stories) | Avg. Height of Floor (ft) | Total Area (sf) |
|----------|------------------------|----------------------------|-------------------------|------------------|---------------------------|-----------------|
| P-1      | 22,300                 | Office                     | 17,900                  | 5                | 12                        | 89,500          |
|          |                        | Retail                     | 8,000                   | 1                | 16                        | 8,000           |
|          |                        | Parking below grade        | 17,900                  | 2                |                           | 35,800          |
|          | <b>Building Height</b> |                            |                         |                  | <b>76</b>                 | <b>133,300</b>  |
| P-2      | 28,100                 | Housing (75 Units)         | 18,000                  | 5                | 11                        | 90,000          |
|          |                        | Retail                     | 6,000                   | 1                | 16                        | 6,000           |
|          |                        | Parking below grade        | 17,000                  | 2                |                           | 34,000          |
|          | <b>Building Height</b> |                            |                         |                  | <b>71</b>                 | <b>130,000</b>  |
| P-3      | 11,400                 | Point Park                 |                         |                  |                           |                 |
| P-4      | 27,950                 | Housing (169 Units)        | 16,000                  | 8-14             | 11                        | 204,000         |
|          |                        | Retail                     | 5,000                   | 1                | 16                        | 5,000           |
|          |                        | Surface Parking            |                         |                  |                           |                 |
|          |                        | Parking below grade        | 33,000                  | 2                |                           | 66,000          |
|          | <b>Building Height</b> |                            |                         |                  | <b>104-181</b>            | <b>275,000</b>  |
| P-5      | 22,350                 | 450 Seat Theater           | 16,000                  | 2                | 32                        | 32,000          |
|          |                        | <b>Building Height</b>     |                         |                  |                           | <b>64</b>       |
| P-6      | 15,734                 | Live/Work Lofts (40 Units) | 10,730                  | 4                | 13                        | 51,015          |
|          |                        | Gallery                    | 2,500                   | 1                | 13                        | 2,566           |
|          |                        | <b>Building Height</b>     |                         |                  |                           | <b>52</b>       |
| P-7      | 60,694                 | Housing (90 Units)         | 29,367                  | 4.5              | 13                        | 156,326         |
|          |                        | <b>Building Height</b>     |                         |                  |                           | <b>52-65</b>    |
| P-8      | 32,086                 | Housing (62 Units)         | 15,000                  | 5                | 62                        | 75,000          |
|          |                        | Lofts (11 Units)           | 6,210                   | 2                | 11                        | 12,420          |
|          |                        |                            |                         |                  |                           |                 |
|          |                        | Parking below grade        | 15,000                  | 1                |                           | 41,850          |
|          | <b>Building Height</b> |                            |                         |                  | <b>73</b>                 | <b>129,270</b>  |
| P-9      | 23,850                 | Housing (63 Units)         | 15,100                  | 5                | 11                        | 75,500          |
|          |                        | Lofts (14 Units)           | 8,000                   | 2                |                           | 16,000          |
|          |                        |                            |                         |                  |                           |                 |

| Parcel #     | Parcel Area            | Use                 | Building Footprint (sf) | Height (stories) | Avg. Height of Floor (ft) | Total Area (sf)   |
|--------------|------------------------|---------------------|-------------------------|------------------|---------------------------|-------------------|
|              |                        | Parking below grade | 15,100                  | 1                |                           | 15,100            |
|              | <b>Building Height</b> |                     |                         |                  | <b>55</b>                 | <b>106,600</b>    |
| <b>P-10</b>  | 15,000                 | Office              | 12,150                  | 5                | 12                        | 51,300            |
|              |                        | Parking below grade | 8,800                   | 1                |                           | 8,800             |
|              | <b>Building Height</b> |                     |                         |                  | <b>60</b>                 | <b>60,100</b>     |
| <b>P-11</b>  | 21,269                 | Housing (58 Units)  | 14,000                  | 5                | 11                        | 70,000            |
|              |                        | Lofts (10 Units)    | 5,325                   | 2                |                           | 10,650            |
|              | <b>Building Height</b> |                     |                         |                  | <b>55</b>                 | <b>80,650</b>     |
| <b>P-12</b>  | 7,703                  | Park Square         |                         |                  |                           |                   |
| <b>P-13</b>  | 7,082                  | Park Square         |                         |                  |                           |                   |
| <b>P-14</b>  | 65,300                 | Parking above grade | 52,000                  | 7                | 9                         | 364,000           |
|              |                        | Retail              |                         | 1                | 18                        | 14,000            |
|              | <b>Building Height</b> |                     |                         |                  | <b>58</b>                 | <b>378,000</b>    |
| <b>P-15</b>  | 48,780                 | Parking below grade | 35,500                  | 1                |                           | 35,500            |
|              |                        | Office              | 27,611                  | 4.5              | 12                        | 124,450           |
|              |                        | Retail              | 14,800                  | 1                | 16                        | 14,800            |
|              | <b>Building Height</b> |                     |                         |                  | <b>64</b>                 | <b>174,550</b>    |
| <b>P-16</b>  | 45,234                 | Office              | 24,000                  | 4.5              | 12                        | 108,000           |
|              |                        | Retail              | 7,000                   | 1                | 18                        | 7,000             |
|              |                        | Parking below grade | 26,000                  | 1                |                           | 26,000            |
|              | <b>Building Height</b> |                     |                         |                  | <b>64</b>                 | <b>141,000</b>    |
| <b>P-17</b>  | 9,750                  | Office              | 6,500                   | 1                | 16                        | 6,500             |
|              |                        | Surface Parking     |                         | 1                |                           |                   |
|              | <b>Building Height</b> |                     |                         |                  | <b>24</b>                 | <b>6,500</b>      |
|              | <b>Parcel Area</b>     |                     |                         |                  |                           | <b>Floor Area</b> |
| <b>Total</b> | <b>460,293</b>         |                     |                         |                  |                           | <b>1,862,845</b>  |

**Parcel 1** – At the southern entry to the site, a new six-story contemporary office building will benefit from its location next to the new Lowell Trial Court – the Trial Court will occupy a large parcel at the west end of Jackson Street close to the Lord Overpass and will be situated next to Parcel 1. Although not part of the overall

Hamilton Canal District Project, the Trial Court will be developed by DCAM as a comprehensive justice center containing sixteen courtrooms and is adjacent to the project site. A large number of people will work and travel through this complex every day. The office building proposed for Parcel 1 will leverage its proximity to the Court with retail businesses at ground-level and offices on upper floors for legal firms and other companies related to the judicial process. The site will be linked to the new residential and mixed-use areas in the remainder of the development. The building conveniently benefits from easy access to public transportation as well as its proximity to the new public garage on Jackson Street. Site development may include two levels of underground parking and access off of the reconfigured Jackson Street, Street B.

**Parcels 2 & 4 – Signature high-rise housing is envisioned that will overlook the canal junction and offer a highly visible entry to downtown from the Lowell Connector.**

Figure 2-6, View Looking from Park Square to Signature Building, illustrates a view towards the signature high-rise from the northern portion of the site, looking past the new Park Square. Since the early rendering was completed, detailed discussions with the LHNP have resulted in conceptual design changes to this signature high-rise including reducing the height of the main mass to fourteen stories, slightly rotating the footprint alignment to the south to create a greater set-back from the historic Swamp Locks structures, and stepping the building massing down toward the east. These changes are reflected in Figure 2-5, Aerial View of Site. Aligning with the Revere Street extension, Street C, onto the island, is a pair of buildings that will offer retail space along the street, facing the new trolley line extension. Parking is envisioned below grade, spanning the width of the island and entered off the cul-de-sac which serves as a drop-off for residents. Housing sits above the retail space, extending from eight to fourteen stories, creating a clearly contemporary tower element at this highly visible site. Parcel 2 extends along the Hamilton Canal edge, leading to the new Point Park, and an overlook of the nexus of the canals. Parcel 4 sits back from the canal lock at the Swamp Locks, providing ample space for servicing the canal and NPS canal boat tours that originate in this area.

**Parcels 3 – A new public park with views of the Hamilton, Merrimack, and Upper and Lower Pawtucket Canals** will create over 11,500 sf of open space.

**Parcel 5 – A new 450- seat theater/entertainment venue at the entry to the island creates an arts focus for the development.** Parcel 5 is being studied as the site of a new arts complex, including a theater. This entertainment venue is desired to create a synergy with the artist housing and gallery developed on Parcels 6 and 7 as part of Phase One, and create a rich cultural attraction at the heart of the island. A sketch image of the proposed development is shown as Figure 2-7, Sketch of Parcel 5. If this use proves not to be feasible, Parcel 5 will be used for additional housing on the island, in the alternative program.

**Parcels 6 & 7 – In Phase One, new loft style and live/work housing engages a contemporary mill yard interpretation to create a community core at the central “island.”** – With water on three sides, this island area has outstanding potential and value for residential use. Phase One of the development on parcels 6 and 7 involves the rehabilitation of the Appleton Mills complex into approximately 130 artists live/sell, affordable, rental units, ranging in size from 500 to 1,400 sf. The north side of the rehabilitated mill buildings will define a contemporary interpretation of a mill yard bisected by a primary pedestrian route from Jackson Street across the Hamilton Canal, through an existing opening in the Appleton Mill Building. Parking for the development will be in the City’s new Early Garage on Jackson Street. See Figure 2-8, View of Exterior Appleton Mills.

**Parcels 8 and 9 will allow for future residential development.** This development is illustrated in Figure 2-9, looking from the Swamp Locks Bridge at the new Pawtucket Canal Bridge (B3). The Appleton Mill remnants along the southern wall of the Lower Pawtucket Canal are shown on the right hand side of the sketch, and the new building is set back behind them. The six-story buildings (five-stories above street grade) are configured to sit behind the masonry remnants of the Appleton Mill complex along the Lower Pawtucket Canal. They will define a linear deck along the canal, an amenity for new townhouses on the lower levels of the structures. Figure 2-10, View of Appleton Mills over Remnant Wall to Parcel 17 and Swamp Locks, illustrates the kinds of views that will be available from the private housing terraces above the remnant walls. Above the two-story height of the remnant walls, a double-loaded corridor building with housing units facing both the canal and the Mill Yard is envisioned. Elevations of the buildings will reflect the simple grid of punched openings suggested in the historic remnants. Just beyond this complex, the new vehicular bridge (B3) will connect to the northern parcel of the site, intersecting through the remnant wall, and engaging new visual and physical connections throughout the District.

**Parcel 10 – the historic Freudenberg Building will be adaptively used for commercial businesses.** This 60,000 square foot, six-story building will be renovated to reveal its simple concrete frame as part of the Phase One development. An existing two-story addition will be removed to reveal the original building; concrete block infill panels will be removed so that broad frames of glass can be inserted into the concrete frame and suggest the original historic industrial character of the building. The sixth floor of the building, currently enclosed by a windowless metal-panel system, will be reconstructed and set back from the predominant building facades to incorporate a rooftop terrace at the upper level. The building is expected to be used for a commercial office tenant, although in alternative Program B, it could be renovated for 50 housing units.

**Parcel 11 – New contemporary housing will arch along the curved edge of the Lower Pawtucket Canal** and highlight a broad pedestrian “canal walk” along the northern edge of the canal. Figure 2-9 illustrates the view of this new building along the Lower Pawtucket Canal from the Swamp Locks Bridge. Note that the renovated Freudenberg Building is on the right in the sketch. Housing units will define the edge this canal walk and enliven it with front entry stoops, and possibly, with ground floor small business or live/work spaces for artists. The northern façade will provide a backdrop for a new district park, “Park Square.” The building, while similar to the six-story scale of historic mill buildings formerly in the district, will be designed in a contemporary fashion and highlighted by the entry and circulation tower on a new District park. South of the canal walk, an existing concrete deck over the canal will be removed to expose the full width of the canal. The building will take full advantage of its southern exposure, providing shading that both reflects light into spaces in the cold winter months and shades sun from windows in hot summer months.

**Parcels 12 & 13 – A new district park, Park Square, connects views from around the site** and will allow an inviting, open plaza that can support community arts and cultural events (such as a venue for portions of the Lowell Folk Festival events in summer months). The open park also allows views into the street-level retail shops and provides on-street, easy short-term parking for the retail patrons. Figure 2-11, Sketch of Park Square at Dutton Street, illustrates the view of the Park Square with the surrounding new commercial and ground level retail uses.

**Parcel 14 – A new 980-car Parking Garage will support the commercial uses in the District and replace the 166 existing NPS surface lot spaces.** The structure is envisioned to reflect the scale and massing of the historic mill buildings in the area, and will have a regular rhythm of “window” openings above retail space along the two streets that it fronts on. An interior ramp, hidden from street view, will connect the parking levels avoiding long sloping public facades. After Canal Place II residents voiced significant concerns about the parking structure, the proposed massing and details were substantially altered. The eastern wall facing these residents was reduced by two stories to a maximum of 40 feet high and a setback of 58 feet is required before the western portion of the structure can rise to a maximum of 60 feet high. The wall facing east will be solid to eliminate headlight glare and vehicle noises, but these walls will also be covered with living plants as green walls. There will a green roof over the eastern portion of the garage. In addition, a proposed walkway along the eastern façade, next to the tailrace canal was eliminated to avoid potential noise impacts. See Figure 2-12, Proposed Parking Plan.

**Parcels 15, 16 and 17** – New large scale office building targeted for significant commercial uses are grouped at a new site entry extension of Broadway Street (Street F). These new uses create activity and build market support for the development and

for downtown. Figure 2-6, View Looking from Park Square to Signature Building, illustrates their character of masonry with large glass openings. The extension of Broadway Street into the site will be transformed into an urban street, framed by the new anchor uses. Two new six-story commercial buildings will reclaim the National Park Service parking area, engaging this open site into the development (the existing large parking lot does not present an inviting entry to the site). Scaled to match the adjacent mill building heights, these buildings will likely house retail shops along their first floor and bring activity onto the broad pedestrian sidewalks. Additionally, these buildings may be linked by an overhead bridge reminiscent of the historic overhead bridges across the City of Lowell. The bridge will allow for a single tenant to occupy the two buildings. Parcel 17, sited at the edge of this site and overlooking views of the dramatic Swamp Locks waterfall, will be reserved for a unique commercial use. Figure 2-10 illustrates a view from the Appleton Mills rooftop deck overlooking the Lower Pawtucket Canal towards this structure on Parcel 17.

### 2.2.1 PUBLIC REALM

The opportunities to enhance the public realm include a series of new pedestrian-oriented streets and a number of new parks. These streets and parks are illustrated in an open space diagram shown in Figure 2-13, Open Spaces in Master Plan:

**Park Square (Parcels 12 & 13)** – At the center of the site’s northern section, Park Square will consist of two open spaces on either side of the new Street F. The landscaped park (Parcel 13) to the north could accommodate a vertical sculpture located at the apex of the triangle visible from the bridge crossing of the Lower Pawtucket Canal, a sculptural fountain in the widest part of the park, and benches under shade trees set in the lawn along the eastern. Together these parks will create a pedestrian core for the northern area of the District and provide attractive views from surrounding buildings and from the primary site roadways. The Residential Plaza (Parcel 12) will create a public fore-court in front of the new residential building on Parcel 11.

**Point Park (Parcel 3)** – Located at the western tip of the island just above Swamp Locks Falls, Point Park is envisioned as a public park with panoramic views of the junction of the Hamilton, Merrimack, and Upper and Lower Pawtucket Canals. Pedestrian access to the park will be via new Street D through a paved courtyard flanked by retail uses and housing units. The path will be wide enough to allow police car access for security. The Park will encourage both strolling and sitting in sun or shade with benches oriented for capturing the views. The tip of the point and northern edge bordering Swamp Locks will be preserved as existing lawn and stone remnants. The Park will be lit by pedestrian scale lights, and the canal wall edged with an ornamental barrier rail.

**The Mill Yard (located between Parcels 7 & 8)** –The Mill Yard is located on the island framed by proposed residential housing along three sides of the open space. Accessible pedestrian access to the open space is from three directions; from the south, the entrance is at grade over a renovated pedestrian bridge over Hamilton Canal through an existing gateway at the historic Appleton Mills; from the west, primary pedestrian access is via the sidewalk of the new street; and from the north across new Bridge B-3. The open space is the highlight of views from the street where cars and pedestrians turn north to meet the Lower Pawtucket Bridge.

The Mill Yard has two characteristics; semi-private green residential buffer zones and more open public paved plazas, organized around public access from the south and interpretive elements that trace some of the previous industrial structure that previously occupied the site.

**Swamp Locks Falls Courtyard (at waterside of Parcel 17)** – The Swamp Locks and the National Park Service boat landing will be reclaimed as the “heart” of the development. A new linear canal park will be created on the northern side of the Lower Pawtucket Canal and take advantage of the southern sun that will shine along this area throughout the day. A paved courtyard for outdoor seating and viewing of the falls is shown at the northern corner of Swamp Locks Falls where the Merrimack Canal drops to the Lower Pawtucket Canal. Railings along the canal edge, outdoor lighting, and some minimal landscaping will fill out this tip of land.

**Streetscape and Trolley Way** – Street trees and night sky cutoff street lights are proposed along all of the new streets. Trees are shown at 32.5 feet on center and paired street lights at 65.0 feet on center. The typical width from new building façade to granite street curb with street trees is 12 feet. A five-foot wide tree-way of mulched tree pit and permeable brick pavers sand set is proposed along the back edge of the curb to provide maximum root growing space for street trees. The tree pits may have a slightly raised brick or concrete edge to minimize salt intrusion into the root systems nearest the trunks. Tree grates are not proposed. Tree species tolerant of urban conditions approved by the City are proposed. Parallel parking along the street is shown with nubbins at intersections and crosswalks for pedestrian safety and traffic calming. The sidewalks are proposed as scored concrete with broom finish. The trolley way is shown as 14-foot wide clear. Catenary poles for trolley electric supply will be coordinated with the street lights along the trolley way. A pedestrian connection to downtown at the northeastern tip of the site is shown along the new Street G on axis with the existing NPS building archway, as well as along the Lower Pawtucket canal spur running north-south at the eastern side of the site. See Figure 2-14, Pedestrian Circulation Within the Site and Figure 2-15, Pedestrian Connections to Outside of the Site.

**Canal Walks** – Three canal walks will be developed as illustrated in Figures 2-13, Open Spaces in the Master Plan Figure and 2-14, Pedestrian Circulation within the Site.

**Hamilton Canal Walk:** The trees, canal railings, and post top lights are shown as designed by the NPS along the southern side of Hamilton Canal west to Revere Street. New shade trees, post top lights, and a Canal Walk with a barrier railing along the canal edge are proposed on the south side of Hamilton Canal west of Revere Street bordering the new Street B connection to Thorndike Street and adjacent to the proposed District Courthouse.

**Lower Pawtucket Canal Walk:** The north side of this canal which faces south, will include a canal walk, pedestrian lighting set back from the canal edge, lighting under the bridge, and a canal railing along the Canal wall. Visitors will have opportunities for viewing the canal from benches at the back of the Canal Walk and under the new vehicular bridge (B3). Accessible ramps and exterior stairs will be provided down to the Canal Walk from the west and the east of a new curved residential building bordering the canal on Parcel 11.

**Merrimack Canal Walk:** A Canal Walk, with shade trees is shown along the far northern edge of the site on the south side of the Merrimack Canal. These walkways connect to the National Park Service walkways that run along Dutton to Market and Merrimack Streets to downtown.

## 2.3 BRIDGE OVERVIEW

As shown on Figure 2-16, Master Plan of Bridges, the external access to the parcels within the project is currently provided by two means. The Broadway Bridge (B-7) provides access to the North Island from Dutton Street and the Revere Street Bridge (B-1) connects the South Island. Internal access between the parcels is provided by the Swamp Locks Falls Bridge (B-2). In addition, there are four other crossings, which are currently closed because they are severely deteriorated. They are the Railroad Bridge (B-1A) adjacent to the Revere Street Bridge, the Cotton Loading Bridge off Jackson Street (B-4), the 217 Jackson Street entrance Bridge (The Carriage Bridge) (B-5), and the overhead structure over Jackson Street (B-6). There is also a new bridge (B-3) planned to create an internal circulation roadway connecting the North and South parcels.

Each of these crossings will play various roles in the master plan and will require design criteria to respond to those roles. A list of the bridges can be found below, followed by a detail description of each bridge.

B-1 – Revere Street Extension Bridge (Street C) will be replaced and will provide vehicular, pedestrian, and trolley access.

B-1A – Portions of the Railroad Bridge will retained as historic remnants.

B-1B – A temporary bridge will be installed to provide construction vehicle access during Phase One as the current bridge will not support heavy loaded construction vehicles. The bridge will be removed when Bridge B-1 is complete.

B-2 – The Swamp Locks Falls Bridge will serve as a trolley and pedestrian crossing. An additional requirement of this structure is that the freeboard, clearance between the high water elevation within the lock chamber and the bottom of the bridge superstructure, be increased by as much as 1.5 feet to provide additional headroom for the canal boat tours.

B-3 – The Proposed Bridge will service vehicles and pedestrians crossing the Hamilton Canal from Jackson Street.

B-4 – The Pedestrian Bridge will be replaced with a new, Americans with Disabilities Act (ADA) compliant bridge into the west end of the Appleton Mills.

B-5 – The Carriage Bridge connects the center of the Appleton Mills buildings to each other. The bridge will be rehabilitated and converted to a pedestrian-only structure.

B-6 – The Overhead Historic Bridge over Jackson Street will be restored as an un-used historic remnant.

B-7 – The Broadway Street Bridge provides access across the Merrimack Canal to the North Island and the bridge will provide expanded vehicular access using the existing structure. Sidewalks will be constructed as independent wings on the east and west sides of the existing bridge.

B-8 – The Thorndike Street/Dutton Street/ and Fletcher Street/Jackson Street Extension Bridge crosses the Pawtucket Canal. This bridge structure will be expanded to provide vehicular access connecting all four streets with a redesigned intersection and providing pedestrian sidewalks on the east and west sides.

The MOA with MHC contemplates the potential restoration of the previously existing overhead bridge across Jackson Street, at the Appleton Mills, should the funding and permitting be obtained by the City and LNHP.

## 2.3.1 BRIDGE DESCRIPTIONS

### **B-1 REVERE STREET EXTENSION BRIDGE**

*Span:* Single Span

*Type:* Riveted steel built-up plate arch girders with concrete deck

*Foundation:* Canal Walls

*Operation:* In Use

*Proposed Use:* Trolley/Vehicular/Pedestrian Bridge

*Existing Conditions:*

- Approximately 22 ft wide x 55 feet long
- The steel beams and girders appear to be rusted and corrosion is present.
- The steel beams and girders appear to be deteriorating in some locations.
- Reinforcement bars are exposed and concrete spalling is noticeable beneath the bridge.
- The canal walls provide the support of the concrete stub abutments. The existing foundation system does not appear to provide sufficient foundation support for the intended future use of the bridge.

### **INTENDED REUSE**

This crossing is intended to serve as the major access to the southern portion of the site, carrying pedestrians, a trolley way, and two-lanes of vehicular traffic. This will require the demolition of the existing structure including the selective removal of the granite wall block walls of the canal to construct a new foundation system that meets current AASHTO and AREMA criteria. The face of the abutment will be in line with the current canal wall and will be placed with colored concrete and possibly a form façade liner to blend with the appearance of the current canal wall. Utility bays will be located within the bridge structure and the bottom of the superstructure will maintain the current clearance envelope of the existing structure to assure compliance with Federal Energy Regulation Commission current approvals.

### **DESIGN APPROACH**

#### **SUPERSTRUCTURE:**

- Replacement and widening of this crossing from an existing two-lane cross section with built-up plate arch girders, transverse floor beam, and concrete deck to a two-lane vehicular crossing (22 ft), a trolley way (14 ft) and two pedestrian sidewalks (6 ft).
- The proposed replacement superstructure is a single, clear span, prefabricated steel bow shaped arch truss bridge. The arch shape geometry of the pony trusses is intended to mimic the arch of the existing built up girders.
- New replacement structure will be galvanized, high strength steel to insure long term durability and limited maintenance requirements.

- Sidewalk facilities will be outboard of the pony trusses and supported by fixed-end cantilevered girder supports and bear on new foundations and the end of the span.

#### **INDEPENDENT FOUNDATION SYSTEM ALTERNATIVE I:**

- Proposed roadway profiles are intended to maintain the existing clearance envelopes over the high water level of the canal and blend the new roadway grades into the existing to minimize impacts to the canal walls. Bottom elevation of the new superstructure will provide clearance over the canal, similar to that provided today.
- New foundation systems will be constructed beyond the base width of the existing canal walls, currently estimated at 10 ft in width. During the geotechnical program, probes will be advanced to determine the safe distance to construct the deep foundations.

#### **INTEGRATED FOUNDATION SYSTEM ALTERNATIVE 2:**

- Alternative 2 is similar to that used in previous reconstructions and new crossings such as the Broadway Street Bridge, B-7, reconstructed in 1987 by MassHighway.
- Removal of the full height canal walls will extend to a horizontal limit of approximately 6 ft beyond the proposed bridge width.
- A new soil supported, cast-in-place, reinforced, concrete foundation system will be constructed with color concrete to blend with the adjacent stone canal walls. The addition of form liner will be reviewed with the Lowell Historic Board.
- A bentonite waterproof seal will be placed between the new concrete abutment and the abutting replaced canal stones to provide a watertight seal between the interfaces.

#### **B-1A- RAILROAD BRIDGE**

*Span: Single Span*

*Type: Riveted steel built-up plate arch girder with no deck, skewed*

*Foundation: Canal walls*

*Operation: Closed*

*Proposed Use: Historic remnant*

*Existing Conditions:*

- Approximately 24 ft wide x 68 ft long
- Surface corrosion and some deterioration appear to be present in all members.
- Material properties are unknown.
- Canal walls appear to be in fair to good condition. See Figure 2-21, Bridge Photographs I.

**INTENDED REUSE**

Under the master plan the eastern side of this structure will be removed to allow for the widening of Bridge B-1. Ultimately, the western girder will be preserved as a historic remnant.

**B-1B TEMPORARY BRIDGE**

*Span:* Single Span  
*Type:* Prefabricated pony truss  
*Foundation:* Temporary foundation system (set back from canal walls)  
*Operation:* Construction access  
*Proposed Use:* Removed after Bridge B1-Revere Street Bridge is constructed.  
*Existing Conditions:* N/A

**DESIGN APPROACH**

A new temporary crossing may be constructed on an independent support system located behind the walls of the canal. The crossing location is approximately 20 ft east of the Revere Street Bridge crossing within a 32-ft easement. Upon completion of geotechnical investigations, a determination will be made if a more economical concrete spread footing and foundation wall can be used in place of a drilled shaft foundation without adverse effects on the canal wall. A temporary structure such as a Bailey bridge or an inverse bridge will be leased and placed on the foundation system until such time as permanent crossing can be constructed. A typical drill shaft stiff foundation will be put in place which will assure no lateral pressures will be placed on the existing canal walls in the area.

An alternative temporary crossing method may use concrete box culverts along the base of the entire canal width to maintain flow down the canal. The box culverts would have surrounding stone in-fill with MSE walls on top to provide construction travel. This approach will require detailed discussions with Enel and FERC.

**B-2 SWAMP LOCKS BRIDGE**

*Span:* Four span  
*Type:* Concrete deck and steel stringers, jack arch construction  
*Foundation:* Canal wall (north side), concrete piers, and a concrete abutment (south side)  
*Operation:* In-Use  
*Proposed Use:* Trolley/Pedestrian Bridge  
*Existing Conditions:*

- Approximately 42 ft wide x 140 ft long
- The concrete beams were not visible during inspection.
- The concrete piers need detailed evaluation.

- The canal wall appears to have significant section loss and concrete is deteriorating and spalling.
- The independent concrete abutment (south abutment) appears to be in fair conditions, but if reused, repairs would be required. See Figure 2-21, Bridge Photographs I.

### **INTENDED REUSE**

This bridge is currently operating with load restrictions and a construction type typical of the early 1900s. As stated in March 31, 2000 report by Kimball Chase prepared for previous owners Freudenberg Nonwovens, the 33-ft wide bridge crossing is about 115 ft in total span. The five span structure has separate spans of 25 ft, 30 ft, 18 ft, 12 ft, and 30 ft. The construction type appears to be a “jack-arch” method with steel beams entirely encased in concrete except for exposed bottom flanges, providing some composite action. Two concrete piers and one ashlar granite bin wall provide immediate support from abutments on the north and south side which are a combination of granite block, patched field stones, blocks, and concrete caps. The findings of this report eight years ago indicated that “the structure is in very poor conditions and requires immediate repair or replacement...” Based on the recommendations in this report, a repair contract was prepared in November 2001 to take corrective measure to address the immediate issue of spalling concrete falling into the canal and jeopardizing the safety of boat traffic below. This contract however, did not address the structural carrying capacity which remains substantially less than HS25 vehicular loading and without provisions for any seismic retrofit.

The intended use of the structure in the master plan is to provide pedestrian sidewalks and a trolley way within a 30-ft ROW. The monolithic bridge deck must be completely removed and reconstructed. The substructure system must be evaluated to determine the feasibility of reuse versus removal and reconstruction of a new substructure system to meet current statutory requirements. Utility bays should be provided within the new structure to carry water, sewer, natural gas, communication and electrical lines in separate bays. Many of these utilities are currently carried by the existing bridge structure.

The current clearance over the canal high water elevation varies with the profile of the existing structure and the navigable waterway through the locks. It has been suggested that the current vertical clearance be increased by 1.5 ft to better accommodate canal boat clearance. This will require building a new pier and abutment caps to increase the clearance, if new substructures are not employed.

## **DESIGN APPROACH**

### **SUPERSTRUCTURE:**

- The replacement of this crossing will change the structure from an existing two-lane cross section to a trolley way (14 ft) and two pedestrian walkways (6 ft each).
- The proposed replacement superstructure is a continuous multiple span steel girder with composite concrete deck bridge. This structure type will mimic the existing and provide the shallowest structure depth to aide in increasing the vertical clearance envelopes.
- The new replacement structure will be galvanized, high strength steel to insure long term durability. See Figure 2-17, Swamp Locks Bridge B-2 Over Pawtucket Canal.

### **SUBSTRUCTURE:**

- The proposed roadway profiles are intended to maintain the existing clearance envelopes over the high water level of the canal and increase 1.5 ft over the lock chamber.
- A field inspection of the existing substructures will be performed to determine their geometry, properties, and condition. Based on this information, a structural model and analysis will be performed to determine the feasibility of their reuse.
- New foundation system will be constructed if it is determined that the existing substructures cannot be rehabilitated and upgraded to current trolley and seismic loads.

## **B-3 PROPOSED BRIDGE**

*Span: Proposed single span*

*Type: Proposed pony steel truss with concrete decking*

*Foundation: Proposed independent foundation system set back from the existing canal walls*

*Operation: N/A*

*Proposed Use: Vehicular/Pedestrian Bridge*

*Existing Conditions: N/A*

## **INTENDED REUSE**

This proposed bridge structure will be constructed above grade with high foundation walls set back from the canal walls in order to maintain and restore the double barrel raceway as well as the proposed Hamilton Canal Walk. This raised bridge structure will be used as a pedestrian and vehicular access way over the Lower Pawtucket Canal. Existing free standing historic walls will remain abutting the new bridge crossing.

## **DESIGN APPROACH**

### **SUPERSTRUCTURE:**

- The proposed crossing will be a two-lane vehicular crossing (22 ft), and have two pedestrian walkways (6 ft each).
- The proposed superstructure is a single, clear span, prefabricated steel bow-shaped arch truss bridge.
- The new structure will be galvanized, high strength steel to insure long term durability and limited maintenance requirements.
- Sidewalk facilities may be outboard of the pony trusses and supported by fixed-end cantilevered girder supports and bear on new foundations at the end of the span. See Figure 2-18, Proposed Bridge Over Pawtucket Canal.

### **INDEPENDENT FOUNDATION SYSTEM:**

- The proposed roadway profiles show the elevations to be higher than the canal wall elevation, which allows the proposed structure to have a minimum loft height above the canal walls without affecting the proposed roadway profile.
- New foundation systems will be constructed beyond the base width of the existing canal walls, currently estimated at 20 ft in width on the north side, and 10 ft in width on the south side. During the geotechnical program, probes will be advanced to determine a safe distance to construct deep foundations.
- The bridge elevation graphically represents the proposed raised superstructure span, outboard foundations, and increase effect of the roadway profile.

## **B-4 PEDESTRIAN BRIDGE**

*Span: Single Span*

*Type: Steel deck trusses with timber deck and concrete topping*

*Foundation: Concrete abutment on top of canal wall (south side) and existing building (north side)*

*Operation: Closed*

*Proposed Use: Pedestrian Bridge*

*Existing Conditions:*

- Approximately 10 ft wide x 55 ft long
- The steel floor beams and trusses appear to be rusted, as well as the diagonal tie rods.
- The timber plank decking appears to be rotted and the concrete topping has several cracks and is missing in some areas.
- The concrete abutment on the top of the canal wall appears to be in good condition, along with the canal wall, showing no signs of stress cracks or deterioration.

**INTENDED REUSE**

The existing crossing previously served as a loading dock to the Appleton Mills and is proposed to be replaced as an ADA compliant pedestrian connection.

**DESIGN APPROACH****SUPERSTRUCTURE:**

- The bridge will be replaced with a new, ADA compliant, steel truss bridge.

**FOUNDATION:**

- Foundation details will be provided to insure the long term performance and durability of the existing systems.

**B-5 CARRIAGE BRIDGE**

*Span: Single Span*

*Type: Steel girder with concrete deck: braces to support sidewalk*

*Foundation: Canal wall (south side) and existing building (north side)*

*Operation: Closed*

*Proposed Use: Pedestrian Bridge*

***Existing Conditions:***

- Approximately 10 ft wide x 55 ft long
- The steel beams and girders display significant rust.
- Reinforcement bars are exposed and concrete spalling is noticeable beneath the bridge.
- The steel braces to support the sidewalk appear to be rusted and deteriorating in some locations.
- The timber decking for the sidewalk appears to be missing in some locations.

**INTENDED REUSE**

This existing crossing previously served as a vehicular and pedestrian connection to the Appleton Mills. The intended reuse will be to convert and rehabilitate the structure as a pedestrian connection. This will require a detailed inspection of the existing framing and the supporting foundation systems. Material sampling will be performed to determine the steel properties. The design intention is to maintain the overall characteristics of the bridge and rehabilitate it for its pedestrian use.

**DESIGN APPROACH****SUPERSTRUCTURE:**

- An in-depth field investigation and material sampling program will be performed to conduct a structural analysis for current pedestrian live load criteria.

- The overall geometry of the bridge truss alignment and profile will be maintained.
- New approach ramps and railing systems will be developed to meet current ADA requirements.
- Structural design and details of the deck replacement system will be provided to meet gravity loads and accessibility criteria.

**FOUNDATION:**

- The conversion of the structure from a vehicular bridge to a pedestrian crossing will reduce the loadings on the supports. A field inspection will be performed to determine the structural condition of the supports.
- Foundation restoration details will be provided to insure the long term performance and durability of the existing systems.

**B-6 OVERHEAD PEDESTRIAN BRIDGE**

*Span: Single Span*

*Type: Steel girders and floor beams with concrete deck supported by steel columns.*

*Foundation: N/A*

*Operation: Closed*

*Proposed Use: Aesthetic Restoration (no access)*

*Existing Conditions:*

- Approximately 10 ft wide x 110 ft long
- The steel columns appear to be rusted.
- Concrete spalling is noticeable beneath the bridge.

**INTENDED REUSE**

The existing pedestrian bridge is a historic connection between the Jackson Street mill buildings and the Appleton Mill buildings. The structure will be preserved for historic purposes, but will not have any active use. A condition survey and inspection will be performed to record the structural condition. Restoration design and details will be developed to maintain its integrity and aesthetic character.

**B-7 BROADWAY STREET BRIDGE**

*Span: Single span*

*Type: Pre-stressed concrete box beams and concrete deck*

*Foundation: Reinforced concrete abutments*

*Operation: In-use*

*Proposed Use: Vehicular/Pedestrian Bridge*

*Existing Conditions:*

- Approximately 45 ft by 60 ft long

- The pre-stressed concrete box beams appear to be in good condition (visibility limited to outside beams).
- The concrete deck appears to be in good condition and does not seem to be cracking on the surface.
- The concrete abutments appear to be in good condition, and seem to be a viable foundation compared to the canal walls.

### **INTENDED REUSE**

The Broadway Street Bridge was constructed by the Massachusetts Highway Department (MHD) in 1985 and appears to be in good structural condition without any load rating limitations. During the initial phases, the most recent MHD inspection report will be reviewed in conjunction with a full depth field investigation and evaluation. The current cross section will be redefined to provide three lanes of travel, with two exiting and one entering. The current pedestrian walkway will be removed to accommodate the proposed travel lane widths and turning radii. New pedestrian sidewalks will be constructed independent of the existing structure. Clearance over the canal for the sidewalk structures will maintain the existing vertical clearance envelope.

### **DESIGN APPROACH**

#### **SUPERSTRUCTURE:**

- New, independent, single span, prefabricated pony trusses will provide the support for the sidewalk facilities on either side of the existing bridge.
- A new structure will be galvanized, high strength steel to insure long-term durability and limited maintenance requirements. See Figure 2-19, Broadway Street Bridge B-7 Over Merrimack Canal.

#### **SUBSTRUCTURE:**

- Given that the loads are pedestrian only, detailed evaluations will be conducted to confirm that the superstructure can bear on existing canal walls.

Since the filing of the DEIR, the proponent has met with NPS regarding the proposed additional sidewalks for the Broadway Street Bridge. NPS made it clear that the sidewalks should be more visually integrated with the existing bridge. As a result of that feedback, the proponent has prepared revisions and will be discussing them with NPS during the week of April 6, 2009.

### **B-8 THORNDIKE ST./DUTTON ST. AND FLETCHER ST./JACKSON STREET EXTENSION BRIDGE**

|                    |  |
|--------------------|--|
| <i>Span:</i>       | <i>Continuous multi-span</i>                   |
| <i>Type:</i>       | <i>Steel girders and a concrete deck</i>       |
| <i>Foundation:</i> | <i>Reinforced concrete abutments and piers</i> |
| <i>Operation:</i>  | <i>In-use</i>                                  |

*Proposed use: Maintain use*

*Existing Conditions:*

- Approximately 100 ft wide x 200 ft long
- The steel beams appear to be in good condition and show no signs of rusting.
- The concrete piers and abutments appear to be in good condition and show no signs of cracking.
- The intersection is currently located at the Route 3A Bridge crossing of the Pawtucket Canal. This crossing was reconstructed by Mass Highway in 1986.
- The current bridge ratings list the Dutton Street Bridge as functionally obsolete.

### **INTENDED REUSE**

Full build volumes will require that this intersection be improved to align with the Jackson Street Extension and provide additional capacity through widening. The intent is to add to the current bridge system by constructing a separate joint between the two decks to allow for a uniform riding surface. New center piers and abutments will be required to accomplish the creation of an expanded new intersection. The proposed structure will parallel the outside of the existing structure, and the abutting girders will resemble a parallelogram. New deck will only be configured for proposed travel lanes minimizing the shadow area on the canal. The girders that expand past the configured decking will need to be provided for substructure installment.

### **DESIGN APPROACH**

#### **SUPERSTRUCTURE:**

- The proposed superstructure widening will be independent of the existing superstructure. The geometry will be refined during final determination of the transportation study and roadway improvements.
- A multi-span, continuous steel girder system with a reinforced composite concrete deck will be utilized for structure type.
- Vertical and horizontal clearance envelopes will be maintained to match the existing clearances. See Figure 2-20, Conceptual Intersection Improvement Thorndike St./Dutton St. & Fletcher St./Jackson St.

## 2.4 PUBLIC AND COMMUNITY BENEFITS

The City of Lowell and the Northern Middlesex region will realize the following significant benefits from this project:

### **CANAL REVITALIZATION AND PUBLIC ACCESS**

- The project will revitalize approximately 13 acres of underutilized land located in the Hamilton Canal District directly adjacent to Downtown Lowell into a mixed-used development featuring housing, office space, restaurants, retail, and other commercial uses, such as an art gallery.
- The project will enliven the canals as the central component of the project and will provide new public access along the water, enhancing the public realm.

### **TRANSPORTATION**

- The project's proximity to the Gallagher Transportation Terminal will support and enhance use of public transportation.
- The proposed expansion of the trolley car system will augment transportation within the District, attracting more visitors to the area and enhance connections to the rest of the City.
- New canal crossings will ease and enhance pedestrian and vehicular access.
- New, safe, and attractive pedestrian walkways will help to enliven street-level activity and encourage visitors and residents to utilize the District.

### **HOUSING**

- The project will generate up to 700 units of market rate and affordable housing units, including artist live/work units; all of which will create a critical mass of residents to make the District more than a 9am-5pm district.

### **REVENUES**

- The project will increase state and local tax revenues by adding new infrastructure (residential and commercial), attracting new businesses, and servicing new customers.
- Property values in the neighborhood will be improved.
- The project will invest between \$500 and \$800 million in total development costs.

### **JOB CREATION**

- Contributing to the area's economy, the project will create construction phase employment opportunities and approximately 400 permanent full time jobs.
- The project will create up to 425,000 sf of commercial space and up to 54,000 sf of retail space.

## **ENVIRONMENT**

- The project is an adaptive redevelopment of a large, underutilized area of the City of Lowell.
- The project will be designed and constructed to incorporate many elements of green building design, specifically in compliance with the Leadership in Energy and Environmental Design Neighborhood Development (LEED ND) criteria of the U.S. Green Building Council (USGBC).
- Stormwater controls will reduce pollution and runoff into the canals.
- The project program is a transit-oriented development and is designed to take full advantage of the Gallagher Transportation Terminal and proposed trolley system expansion.
- The project will create shared parking in the District through on-street parking, underground parking, a new 980-car garage, and the use of the adjacent Early Parking Garage.