

Hamilton Canal District Form-Based Code Subdivisions Section



City of Lowell, MA

January 30, 2009

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Appendix A:
Subdivision Standards for the Hamilton Canal District Form-Based Code

A1. Purpose

These subdivision standards shall apply within the Hamilton Canal District (HCD) as identified on the Zoning Map for the City of Lowell. The purpose of these subdivision standards is to provide for development of streets and Open Spaces in a manner consistent with the goals of the HCD Master Plan dated September 2008 and complement the zoning regulations of the Hamilton Canal District Form-Based Code (HCD-FBC) established in Section 10.1 of the Zoning Ordinance.

A2. Standards

Within the Hamilton Canal District, these standards shall apply to subdivisions that are reviewed and approved by the Lowell Planning Board. No other provisions of the City of Lowell Subdivision of Land Standards shall apply within the HCD unless otherwise specifically referenced herein.

Capitalized terms used in this Appendix are defined in the definition section of these Subdivision Standards, in Section 10.3.2 of the Zoning Ordinance and in the Section 2 of the Zoning Ordinance. Where there are inconsistencies between definitions of these capitalized terms, the definitions provided in Section 10.3.2 of the Zoning Ordinance shall have precedence.

A3. Application Review and Requirements

1. Process

Subdivisions within the Hamilton Canal District shall require preliminary and definitive approval, subject to the provisions of G.L. c. 41, s. 81K-81GG. Plans shall be filed and reviewed subject to the following application review requirements.

2. Preliminary Plan - Purpose

The purpose of the Preliminary Plan is to acquaint the Planning Board with the intentions of the applicant, and to allow for an informal discussion of the plan. This procedure allows recommended changes to be conveniently incorporated into the Preliminary Plan prior to the development of the definitive plan. It is required for a nonresidential subdivision of land by G.L. c. 41, s. 81S, and therefore required within the Hamilton Canal District.

A Preliminary Plan of a subdivision within the Hamilton Canal District shall be submitted by the applicant, pursuant to G.L. c. 41, s. 81S, to the Planning Board for discussion and approval, modification, or disapproval by the Planning Board. Applicants wishing to submit a Preliminary Plan of a subdivision for approval shall make application on the appropriate application form, as adopted by the Planning

Board, and file one (1) copy of the application and Preliminary Plan with the City Clerk, and eight (8) copies of the application and the Preliminary Plan with the Planning Board. The Preliminary Plan shall not be deemed to have been submitted to the Planning Board until all required material, including the fee, has been delivered to the Planning Board, and all forms and documents are completed in accordance with these Subdivision Standards.

The submission of a Preliminary Plan for examination by the Planning Board shall not be deemed the submission of a Definitive Plan of a subdivision of land for approval by the Planning Board under G.L. c.41, s.81U.

3. Preliminary Plan - Submittal

The Preliminary Plan shall be at a scale of one inch equals forty (40) feet. The plan shall be clearly designated as "Preliminary Plan." The Preliminary Plan shall contain the following:

1. The subdivision name, boundaries, north point, date and scale.
2. Name and address of record owner, applicant, and engineer or surveyor.
3. Names of all abutters, as determined from the most recent City tax list.
4. Lines of existing and proposed streets, ways, easements and common or public areas within the subdivision.
5. The boundary lines of proposed lots with areas and dimensions indicated.
6. A list of any waivers from these Subdivision Standards requested by the applicant.

4. Preliminary Plan - Review

The Planning Board shall submit copies of the Preliminary Plan to the Planning Department, Board of Health, Conservation Commission, Fire Department, Police Department, City Engineers, Transportation Engineer, Wastewater Utility, Water Utility, and Commissioner of Public Works/Tree Warden for their review and comment. Replies shall be made to the Planning Board within fourteen (14) days.

5. Preliminary Plan – Action

The Planning Board shall, in conformance with G.L. c.41, s. 81S, approve such Preliminary Plan with or without modifications, or disapprove such Preliminary Plan with reasons stated therefor in writing, and shall notify the City Clerk of its action within forty five (45) days of the date of the submittal of the application, unless otherwise extended.

In case of disapproval, the Planning Board shall advise the applicant of the specific reasons for which the plan is disapproved, thus enabling the applicant to resubmit the plan, provided the plan is corrected to comply with the requirements of the Planning Board and with the HDC-FBC.

Approval of a Preliminary Plan, with or without modifications, does not constitute approval of a subdivision under G.L. c.41 s.81U. The action or decision of the Planning Board as to such Preliminary Plan shall not prejudice its action or decision

as to the Definitive Plan.

The Planning Board shall notify the City Clerk in writing of its decision on a Preliminary Plan in accordance with G.L. c.41, s.81S, as amended.

6. Definitive Plan - Purpose

The purposes of the Definitive Plan for a subdivision within the Hamilton Canal District shall be as set forth in G.L. c. 41, ss. 81M and 81Q.

7. Definitive Plan - Application

An application for approval of a Definitive Plan within the Hamilton Canal District, or for any aspect thereof or modification thereto, shall be made on the appropriate application form, as adopted by the Planning Board, one copy to be filed with the City Clerk and one copy of said application form together with fifteen (15) copies of the proposed Definitive Plan to be filed with the Planning Board, two (2) of which may be reduced to a smaller format. The applicant shall also file required submittals as set forth below. The Definitive Plan shall not be deemed to have been submitted to the Planning Board until all required material, including the fee, has been delivered to the Planning Board, and all forms and documents are completed in accordance with these Subdivision Standards.

The applicant shall file by delivery or by registered mail written notice with the City Clerk, pursuant to G.L. c.41, s.81T, stating that a Definitive Plan has been submitted to the Planning Board with the date of submission thereof, accompanied by a copy of the application form.

The applicant shall file one (1) copy of the Definitive Plan and one (1) copy of the application form with the Board of Health.

8. Definitive Plan - Submittal

The Definitive Plan shall be prepared by a professional engineer and land surveyor and shall be clearly and legibly drawn. The Definitive Plan shall bear the appropriate stamp and signature of the professional engineer and land surveyor who prepared the Plan. All surveying shall conform to the requirements of the Land Court, Class A, as set forth in the manual of said court, as may from time to time be changed. The plan shall be at a scale of one (1) inch equals forty (40) feet. Plan sheets shall be twenty-four (24) inches wide and thirty-six (36) inches long with one inch border, except on the left side where the border shall be two and one-quarter (2 1/4) inches. If multiple sheets are required, all such sheets shall bear the stamp of the engineer, they shall be numbered in the lower right hand corner, and they shall be accompanied by an index sheet showing the entire subdivision. The index sheet shall contain a key plan at one (1) inch equals one hundred (100) feet or as approved by the Planning Board, indicating the location of each sheet.

The Definitive Plan shall contain the following:

1. Name of subdivision, date, scale, name of record owner, applicant, engineer,

- surveyor, north point, bench marks. A title block shall appear on each page.
2. Provide adequate space above the title block for required Planning Board approval stamps.
 3. Names of all abutters, including those separated from the subdivision by only a street, as they appear on the most recent tax list, and approximate intersecting boundary lines of the abutting lands.
 4. Lines of existing and proposed streets, ways, lots, easements, and public or common areas within the subdivision.
 5. Location of all permanent monuments as defined in "Design Standards and Required Improvements," properly identified as to whether existing or proposed.
 6. Location, names and present widths of streets bounding, approaching, or abutting the subdivision, with existing water, electrical, and telephone lines.
 7. Location of existing roadways and driveways opposite or adjacent to the site.
 8. Location of major site features, such as existing stone walls, fences, buildings, large trees, rock ridges and outcropping, bodies of water, natural waterways, and the limits of all wetlands, water bodies, and flood plains within and adjacent to the subdivision.
 9. Proposed location and preliminary proposed design of water mains, sewer lines, and sewer pump stations. Per section A7.2, changes are subject to review by the wastewater department. Per section A7.2, definitive construction plans for pump stations shall be reviewed and approved by the wastewater department using standardized equipment and controls identified by the wastewater department.
 10. Profile plans of proposed streets drawn as follows:
 - a. A horizontal scale of one (1) inch equals forty (40) feet.
 - b. A vertical scale of one inch (1") equals four feet (4').
 - c. Existing center line in fine solid black line.
 - d. Existing right side line in fine dotted black line.
 - e. Existing left, side line in fine dashed black line.
 11. The names and addresses of all abutters and property owners within 300 feet of the Definitive Plan area as they appear in the most recent City tax list shall also be filed with the Planning Board.
 12. A complete list of any waivers requested from these Subdivision Standards.

9. Definitive Plan - Review

Before approval, approval with modification, or disapproval of a Definitive Plan is granted, a public hearing shall be held by the Planning Board. Notice of such hearing shall be given in accordance with the provisions of G.L. c.41, s.81T. A copy of said notice shall be mailed to the applicant and to all owners of land submitted on the Certified List of Abutters. Notice of the time and place of the public hearing and of the subject matter, sufficient for identification, shall be given by the Planning Board by advertisement in a newspaper of general circulation in the City, once in each of two successive weeks, the first publication being not less than fourteen (14) days before the date of said hearing.

The Planning Board shall submit copies of the Definitive Plan to the Planning Department, Board of Health, Conservation Commission, Fire Department, Police Department, City Engineers, Transportation Engineer, Wastewater Utility, Water Utility, and Commissioner of Public Works for their review and comment. Replies shall be made to the Planning Board within fourteen (14) days.

The Board of Health shall, within forty-five (45) days after filing of the plan, report to the Planning Board in writing and shall make specific findings as to which, if any, of the proposed lots shown on such plan cannot be used for building sites without injury to the public health, or is unsuitable because of drainage conditions. The Board of Health shall make specific findings and state reasons therefor in such report, and, where possible, shall make recommendations for the adjustment thereof.

10. Definitive Plan – Action

After the close of the public hearing, the Planning Board in due course shall approve, modify and approve, or disapprove the Definitive Plan submitted. Criteria for action by the Planning Board shall be the following:

1. Completeness and technical adequacy of all submissions;
2. Conformity with these standards, and the HCD-FBC;

The action of the Planning Board with respect to any Definitive Plan shall be by vote, copies of which shall be filed with the City Clerk and sent by registered mail to the applicant. If the Planning Board modifies or disapproves such plan, it shall state in its vote the reasons for such modification or disapproval.

11. Definitive Plan – Waiver of Technical Compliance

The Planning Board may grant specific waivers from the technical standards of Section A7-1 of this Appendix A, if the Planning Board determines that such a waiver will not deviate from the intent of this Appendix A, the Hamilton Canal District Master Plan, and the HCD-FBC. Specific waivers shall be identified in the application for a Definitive Plan approval and identified and specifically approved within the Planning Board's written approval of the definitive plan.

12. City Engineer Review

Any Definitive Plan for a subdivision within the Hamilton Canal District that is approved by the Planning Board shall establish a condition that the plan requires review and approval by the City Engineer relative to the items indicated in Section A7-2 of these standards.

A4. Open Space Application Review Requirements

Open Space within the Hamilton Canal District may not be constructed until a Definitive Certificate of Consistency is issued by the HCDRG. Before construction commences on an Open Space Parcel, the applicant shall submit an application to the Building Commissioner following the process of Section 10.3.5(7) of the Zoning Ordinance. The HCDRG review shall be based solely upon consistency with the HCD-FBC including this Appendix A, and a Certificate of Consistency shall be issued in accordance with Section 10.3.5(8) of the Zoning Ordinance. A Certificate of Consistency for Open Space shall lapse if construction does not begin within 24 months. Extensions for good cause may be granted by the HCDRG.

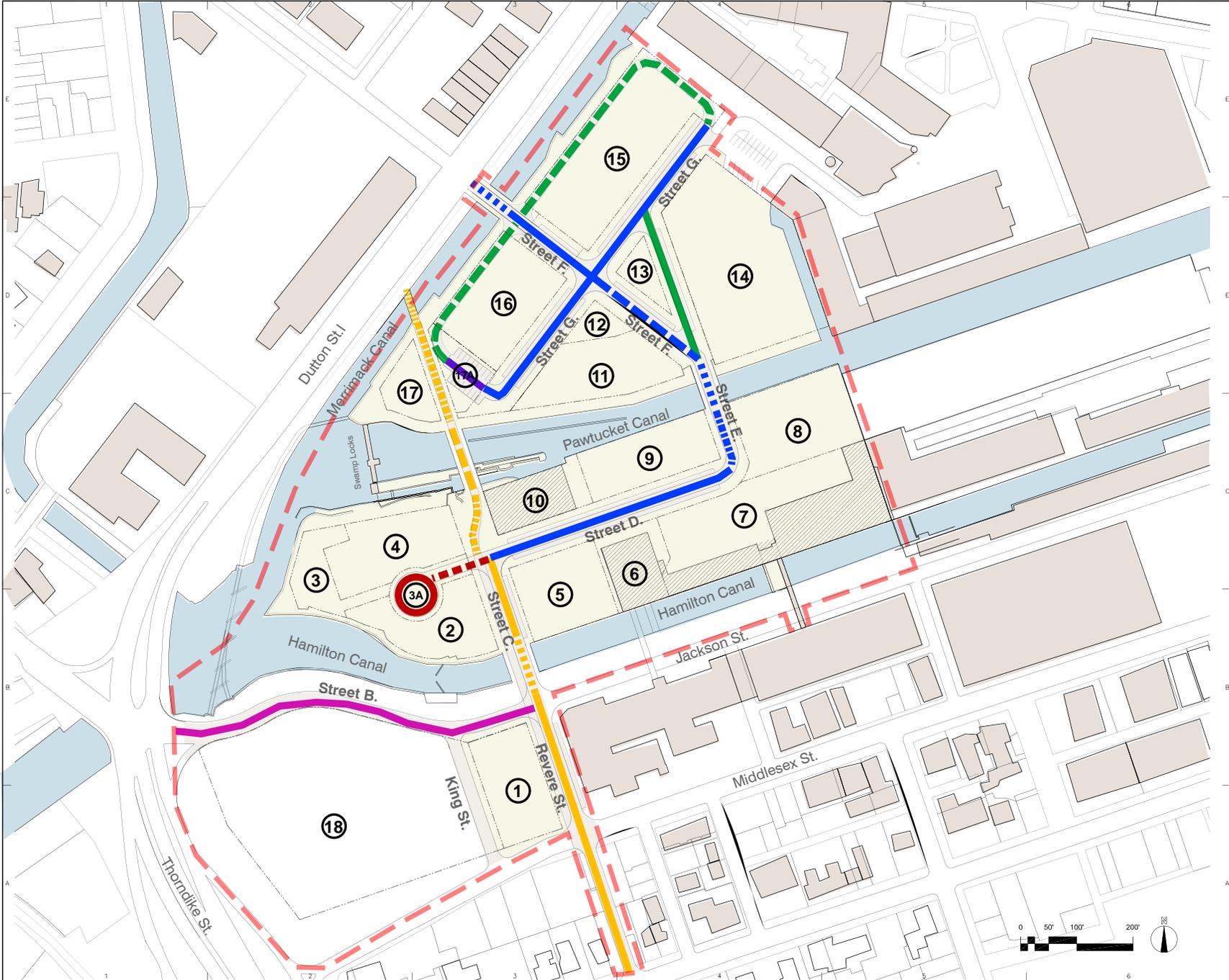
A5. Street Standards: Regulating Plan, Standards & Specifications

A5-1. Street Standards Regulating Plan

The following page is the Street Standards Regulating Plan. It is to be used as an index for the street standards in Section A5-2.

HAMILTON CANAL DISTRICT

Lowell, MA



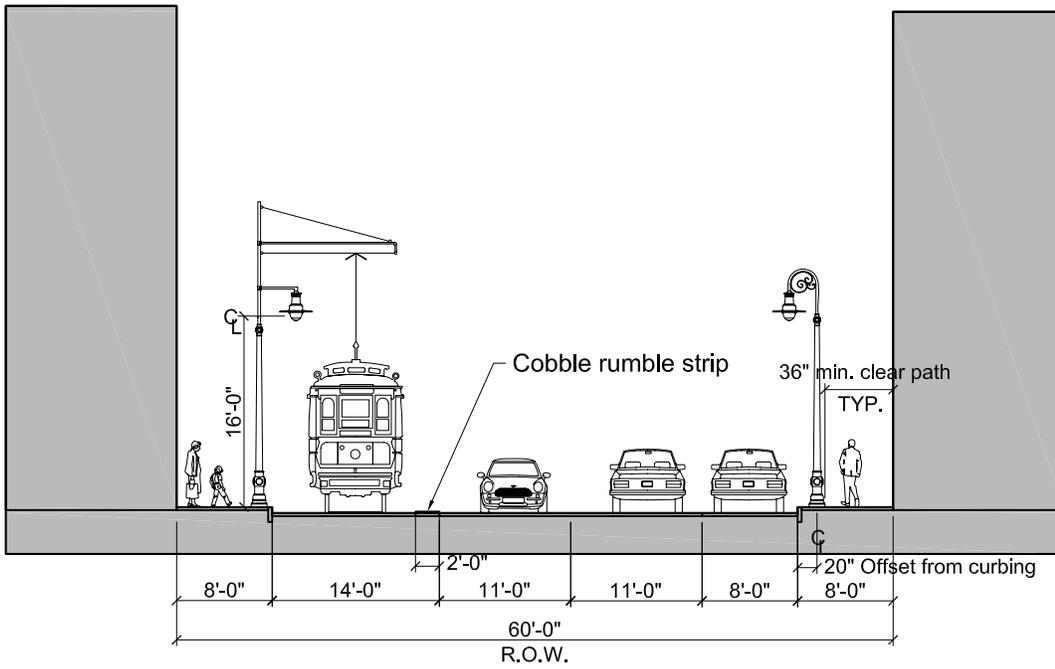
- Street Type 1A:
- Street Type 1B:
- Street Type 1C:
- Street Type 1D:
- Street Type 1E:
- Street Type 2A:
- Street Type 2B:
- Street Type 2C:
- Street Type 2D:
- Street Type 3A:
- Street Type 3B:
- Street Type 4A:
- Street Type 4B:
- Street Type 5:
- Street Type 6:

Street Standards Regulating Plan

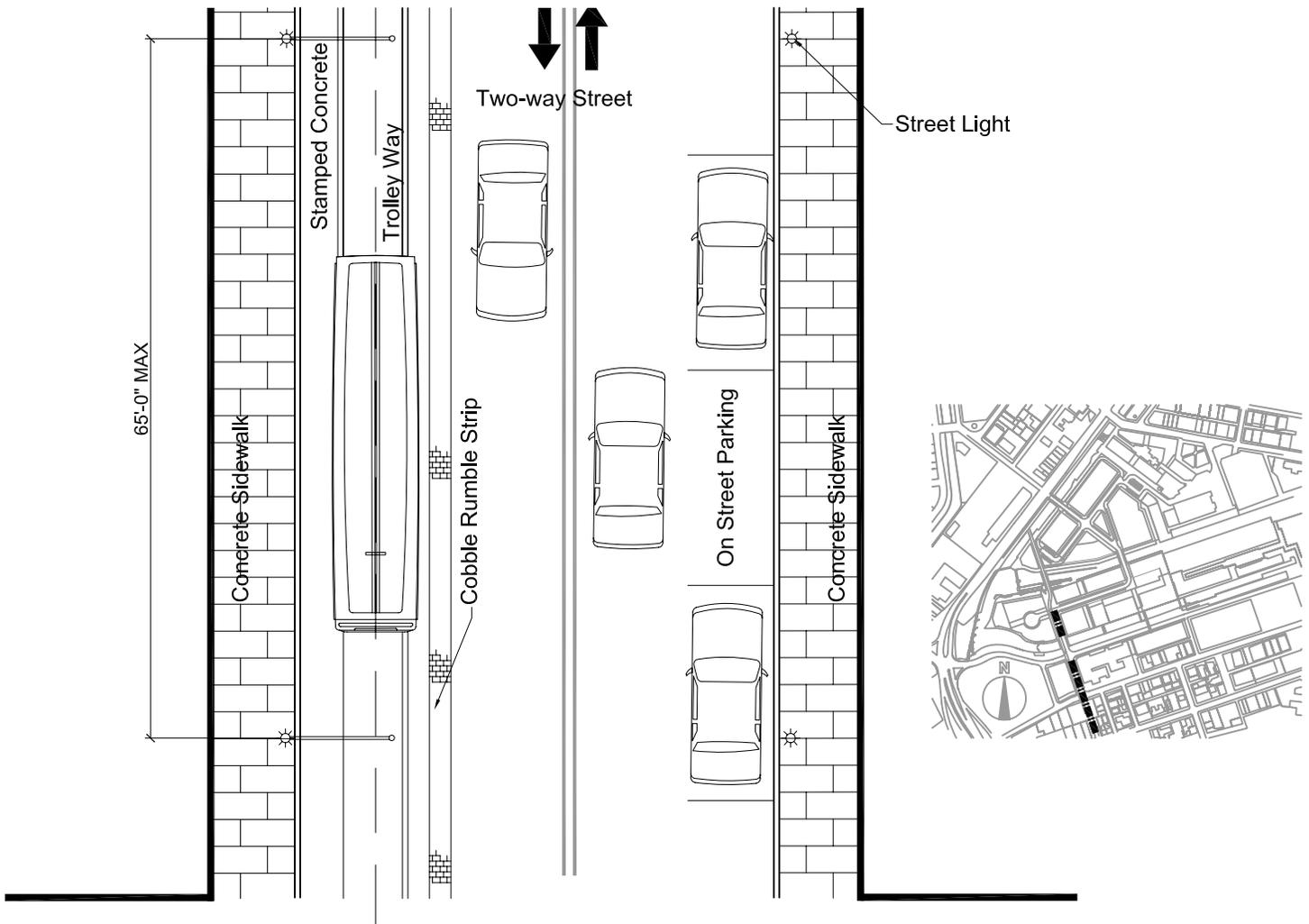
A5-2. Street Standards

Street standards are illustrated graphically on the following pages, as indexed in the Regulating Plan. Street standards vary at intersections, where the intersection standard will be used as the basis for design. Street standards may vary where curbcuts are allowed and installed for driveways into structured parking and/or Loading/Service areas are required, subject to the provisions of the HCD-FBC.

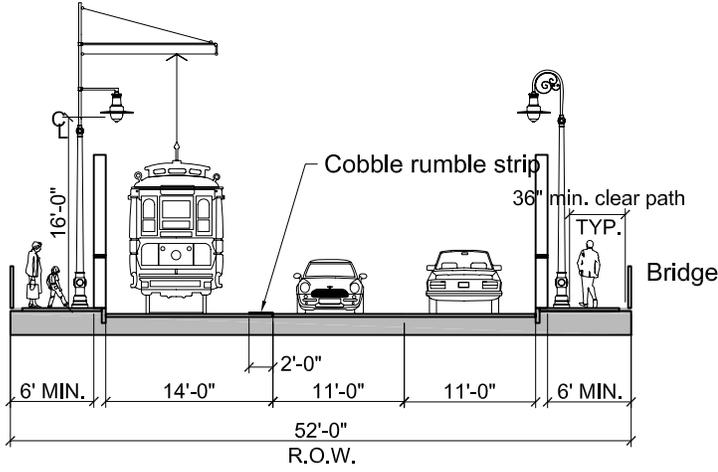
Requirements in these illustrations may be waived by the Planning Board where stormwater Best Management Practices and/or Low Impact Design elements identified in section A7-3 require deviation from the requirements of street standards.



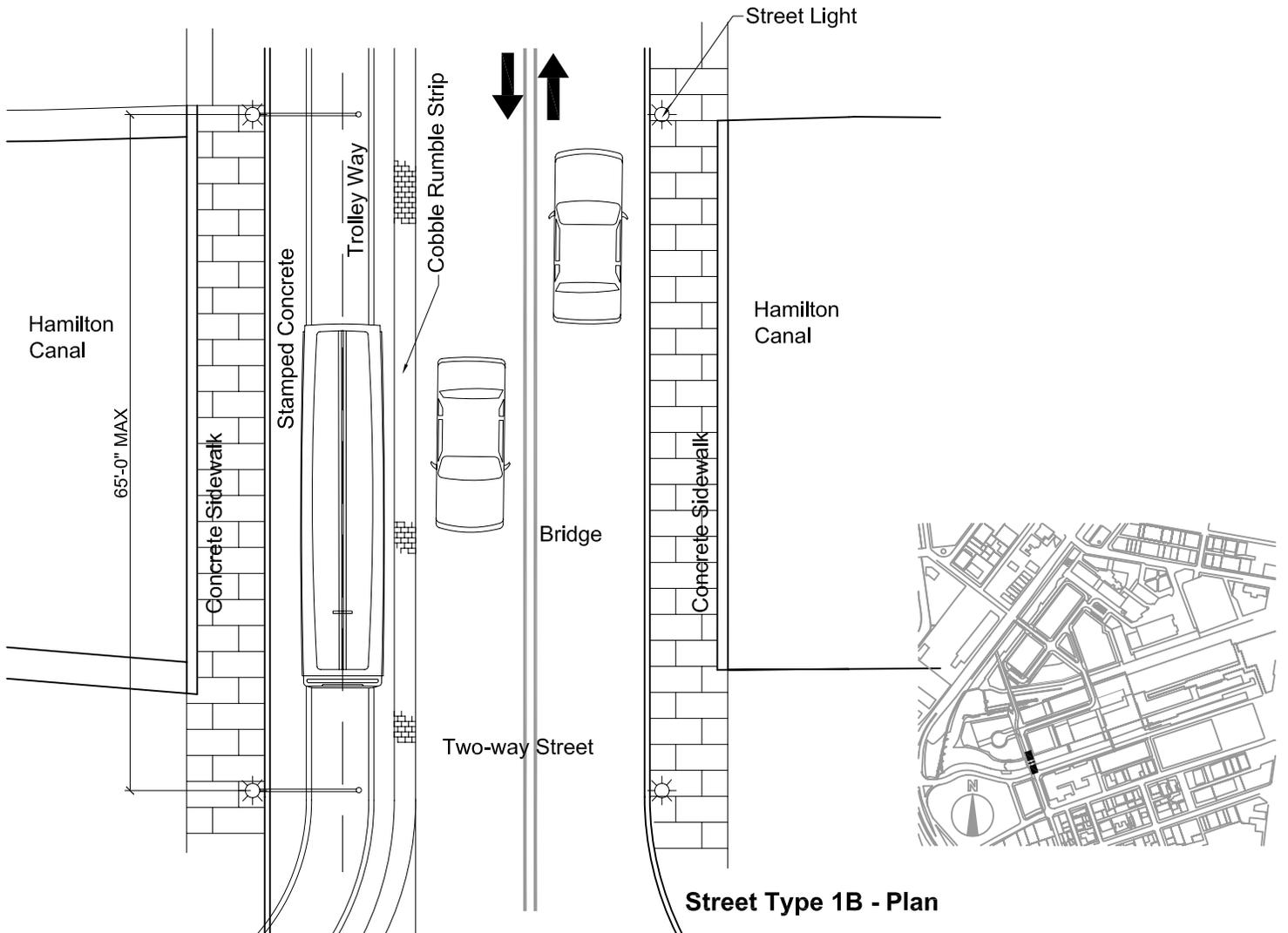
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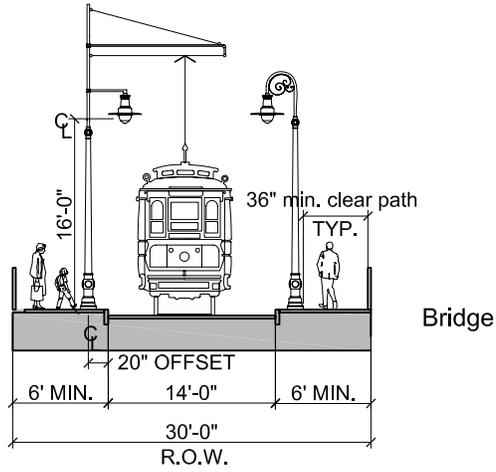


Street Type 1A - Plan

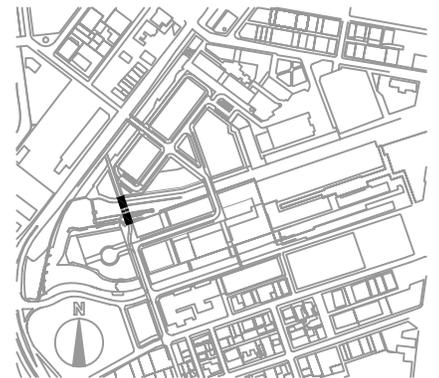
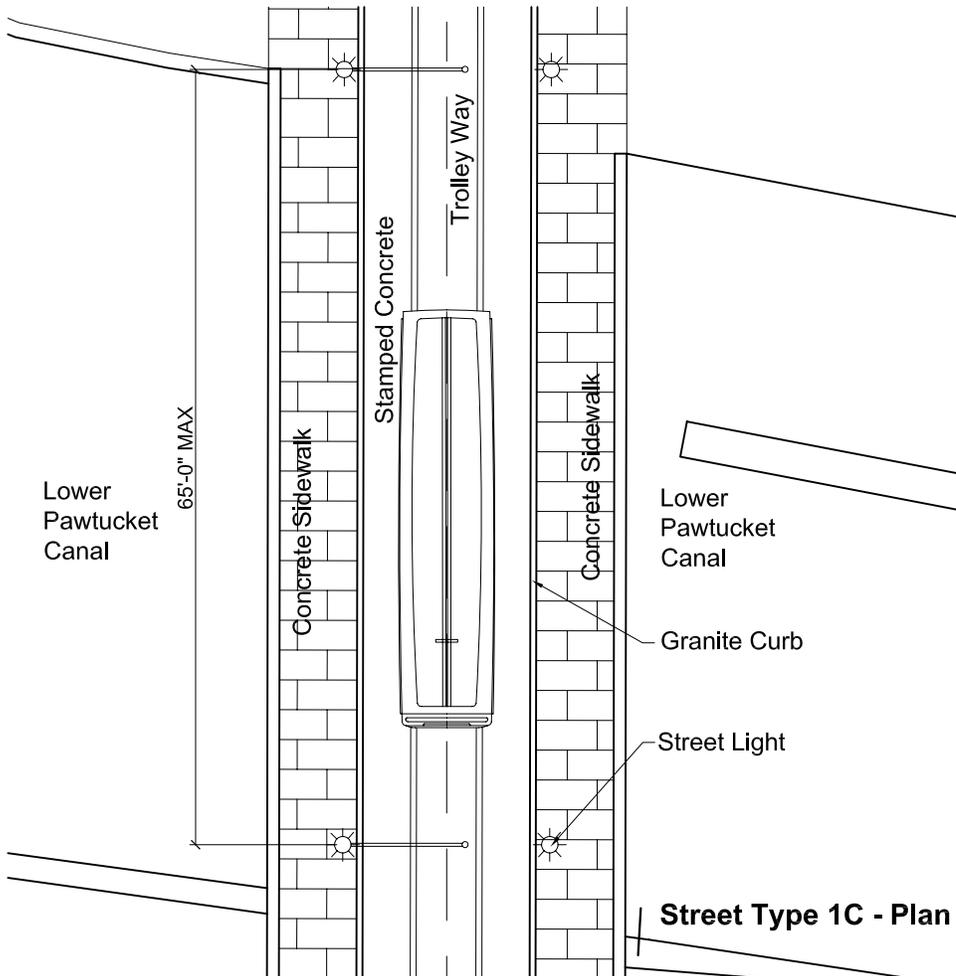


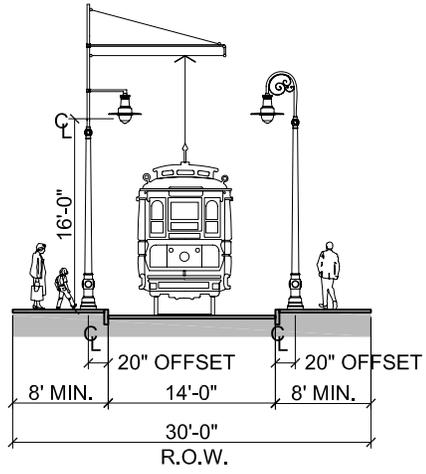
Street Type 1B - Section



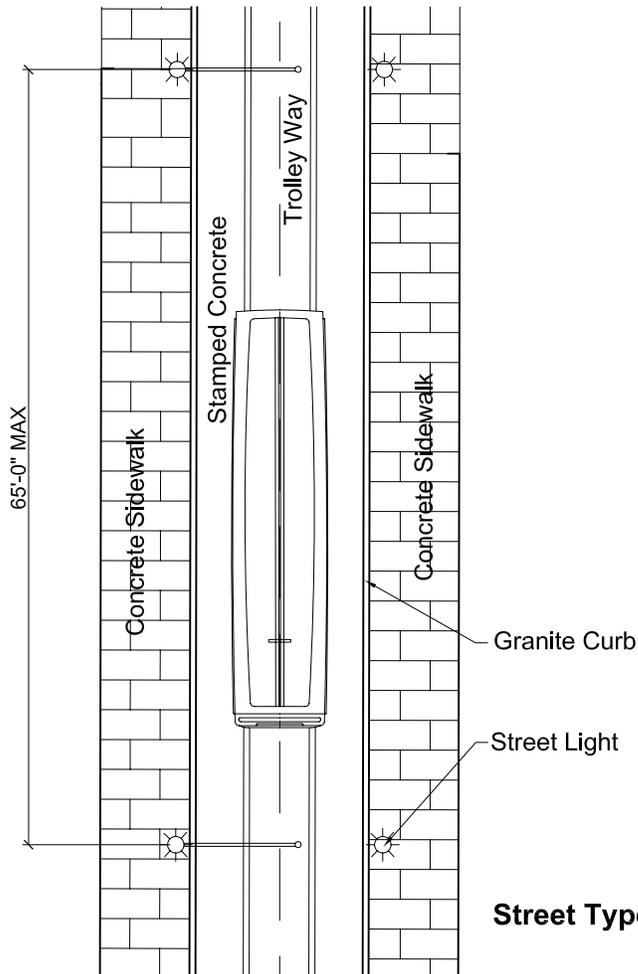


Street Type 1C - Section

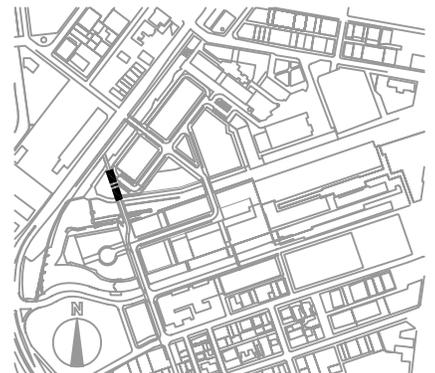


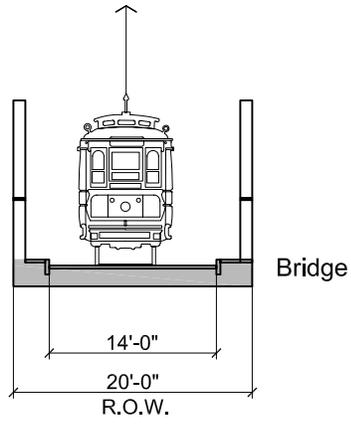


Street Type 1D - Section

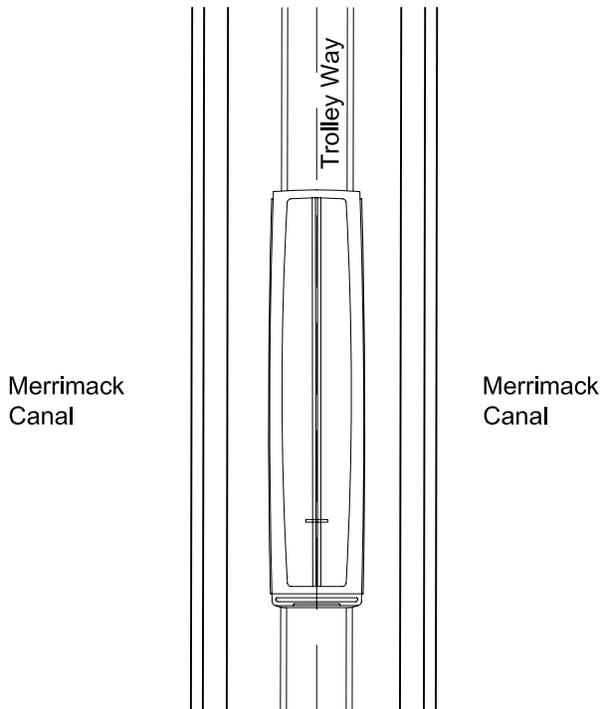


Street Type 1D - Plan

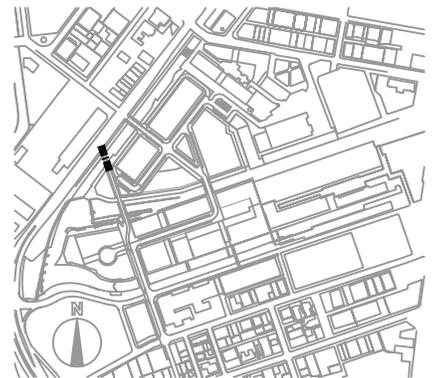


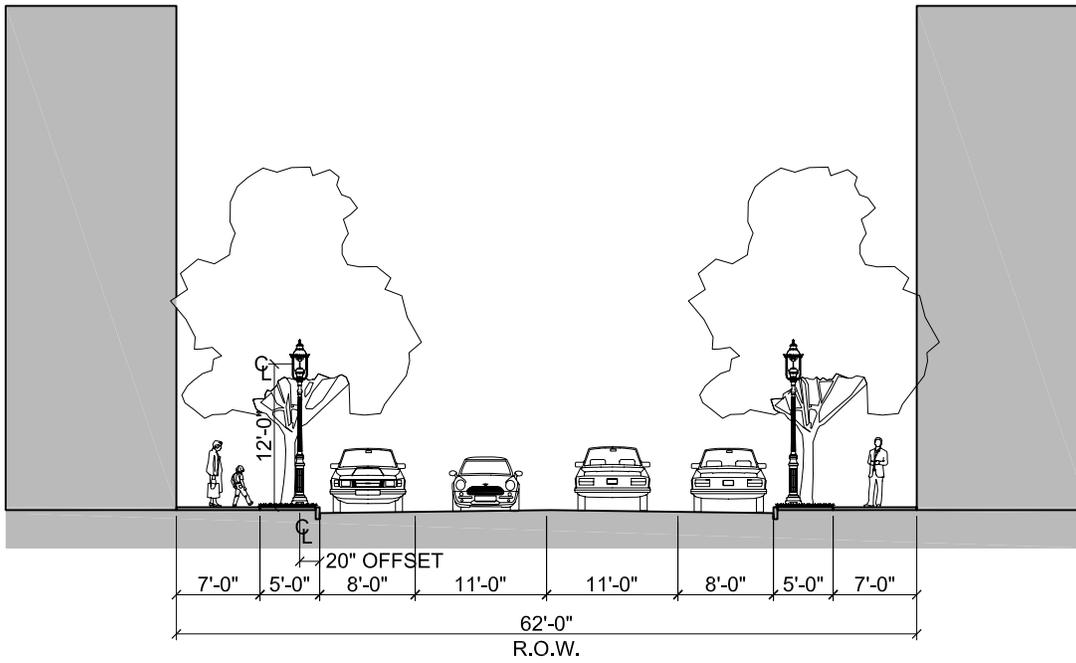


Street Type 1E - Section

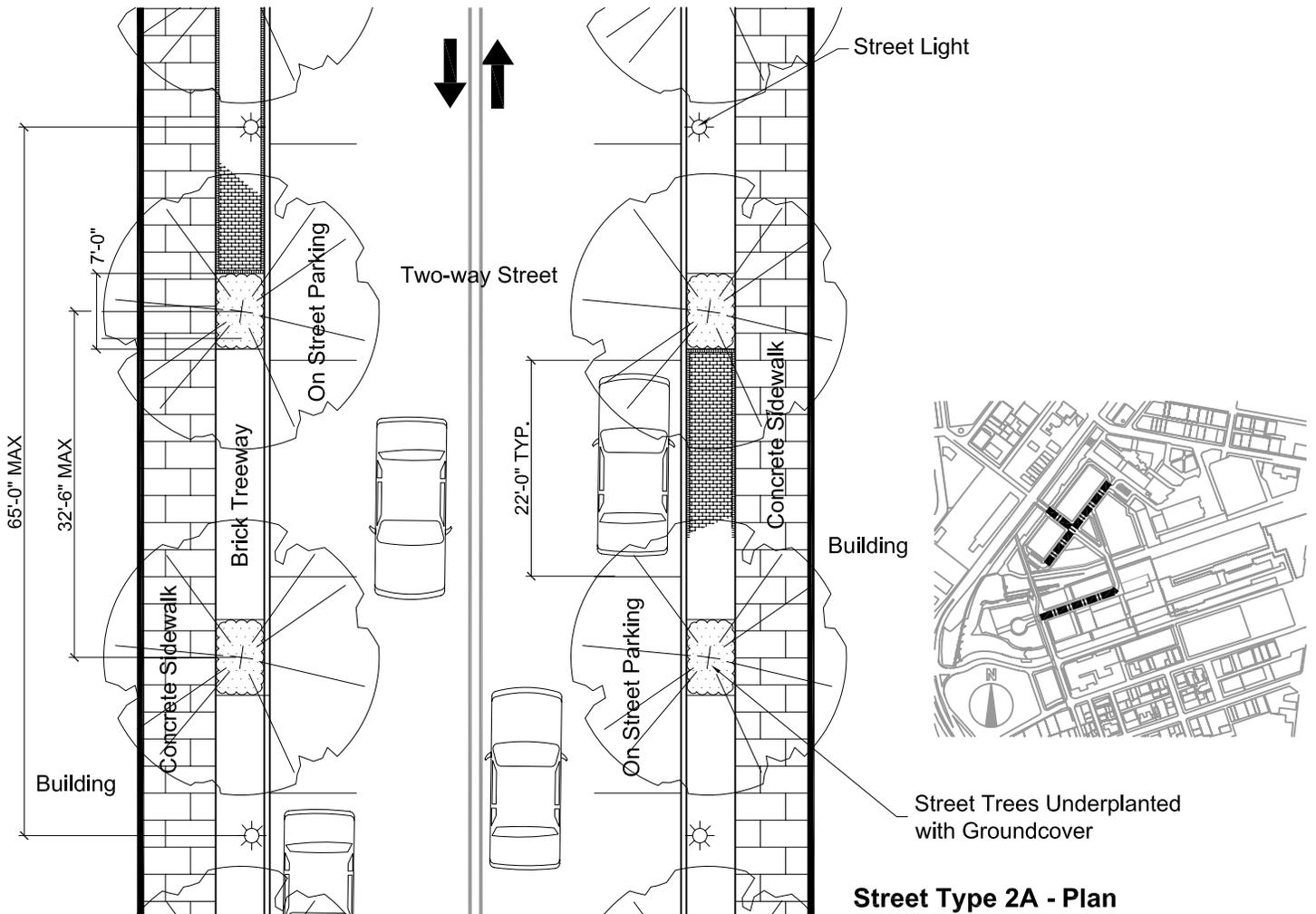


Street Type 1E - Plan

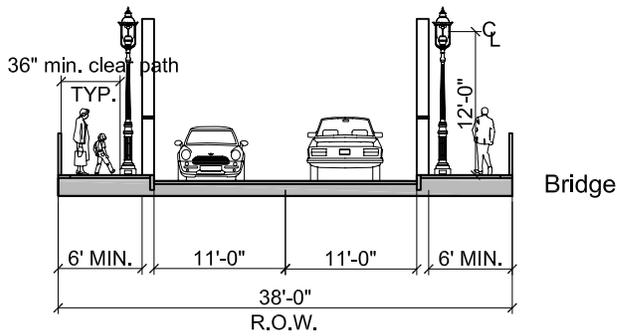




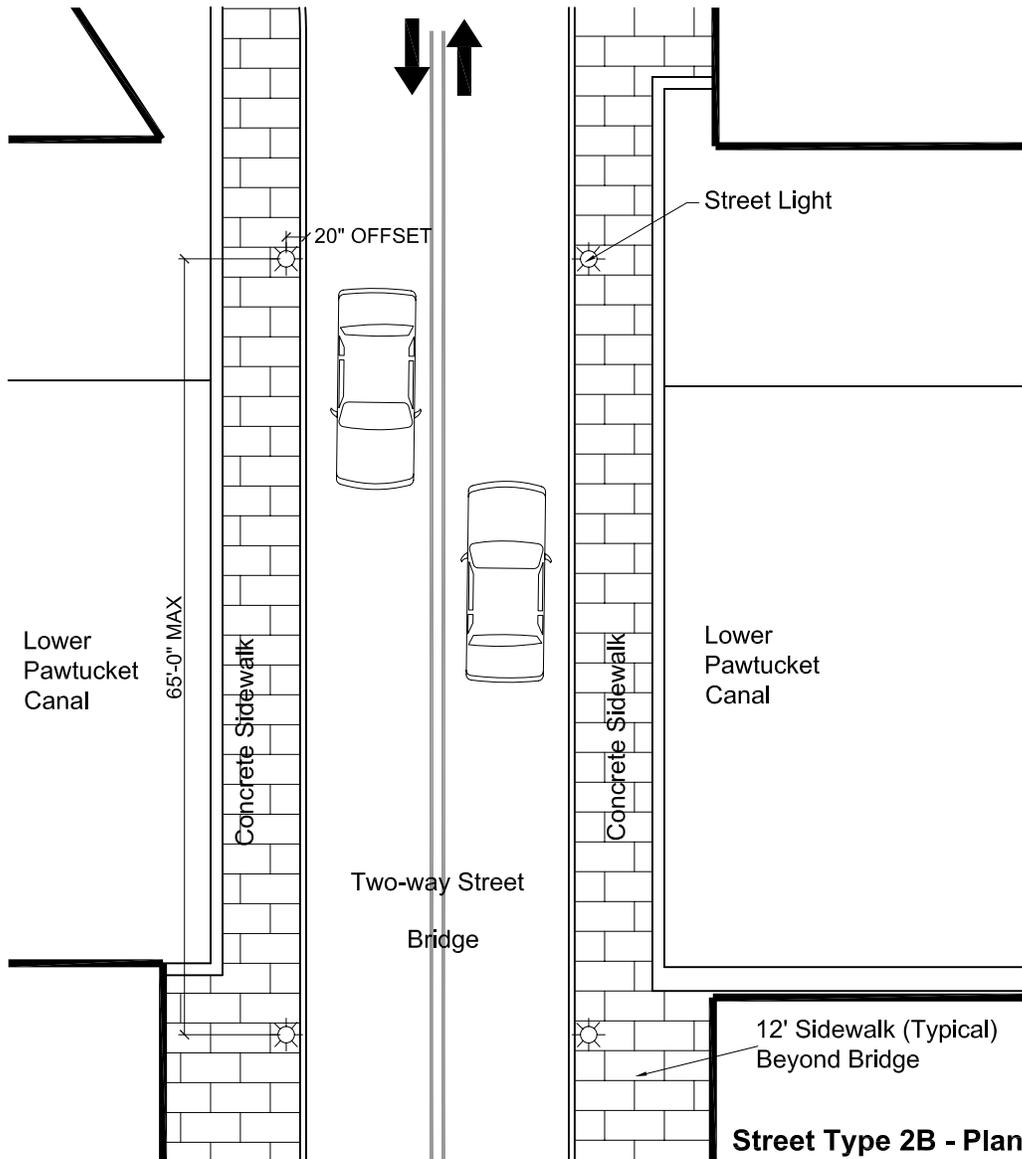
Street Type 2A - Section



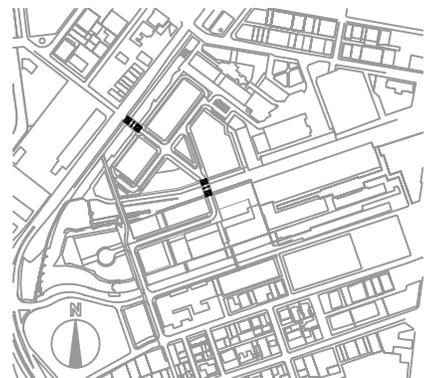
Street Type 2A - Plan

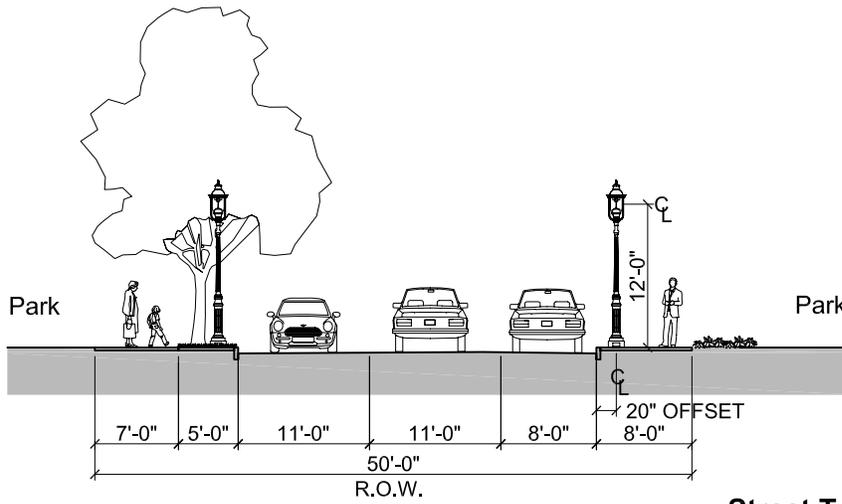


Street Type 2B - Section

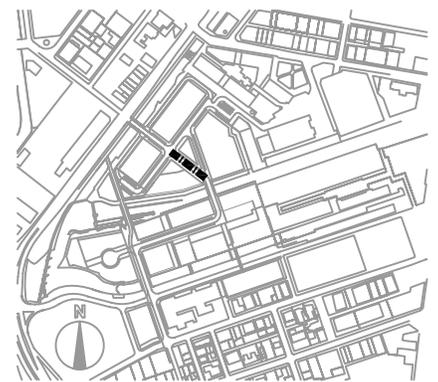
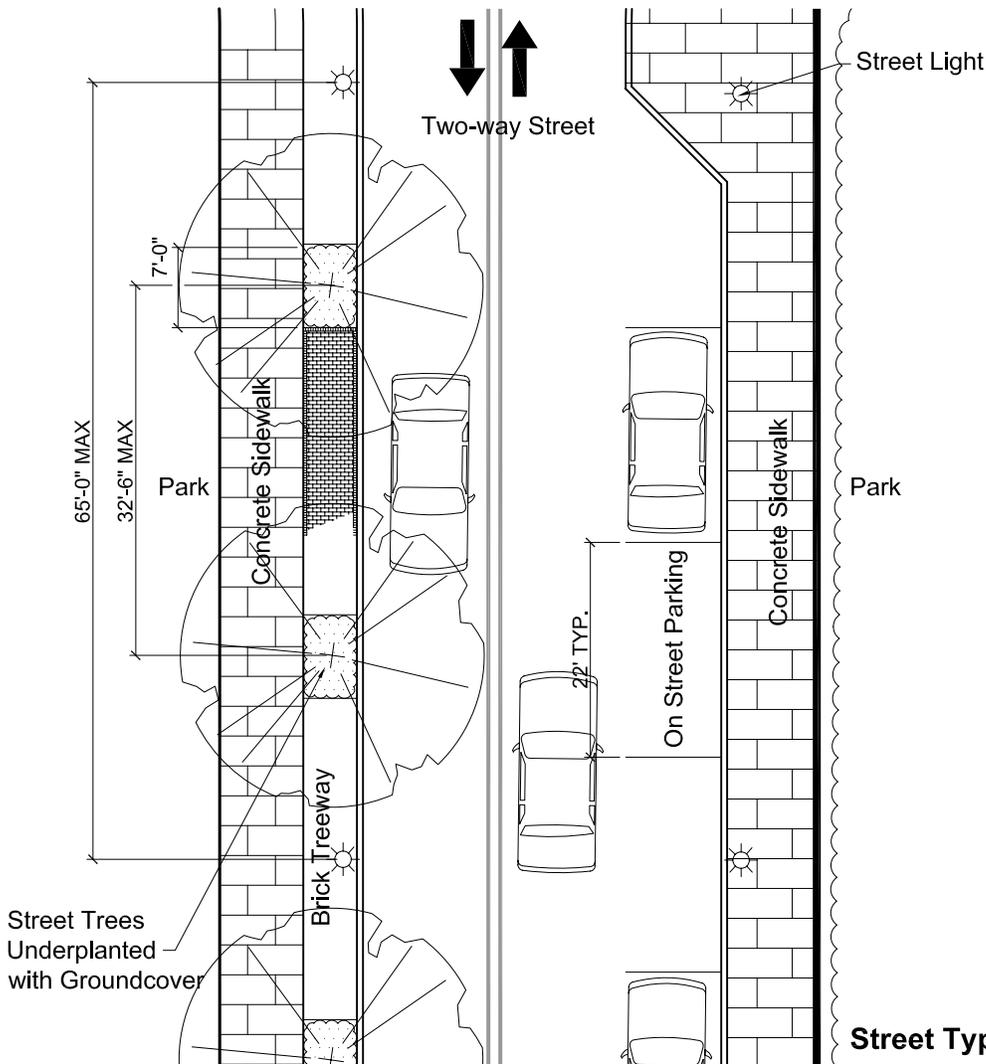


Street Type 2B - Plan

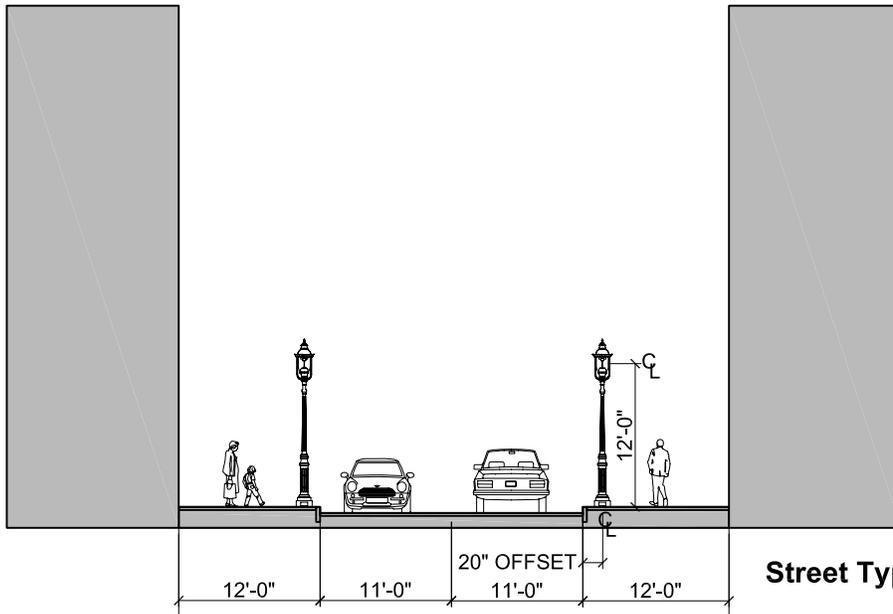




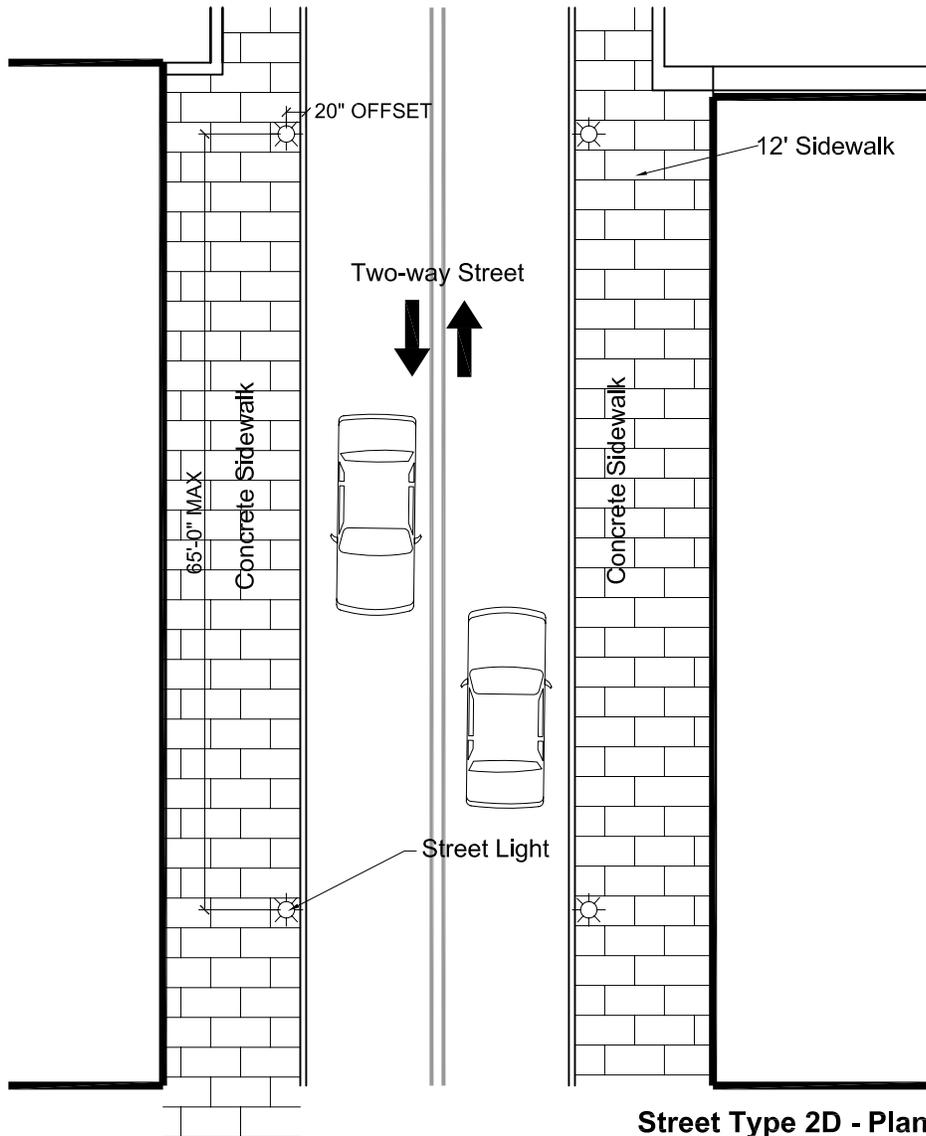
Street Type 2C - Section



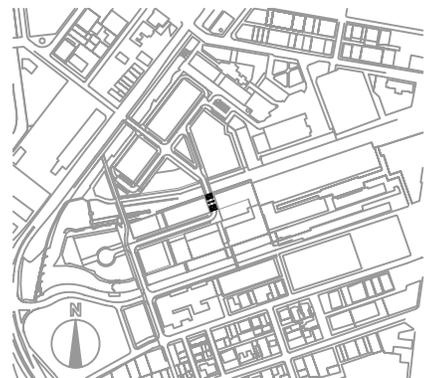
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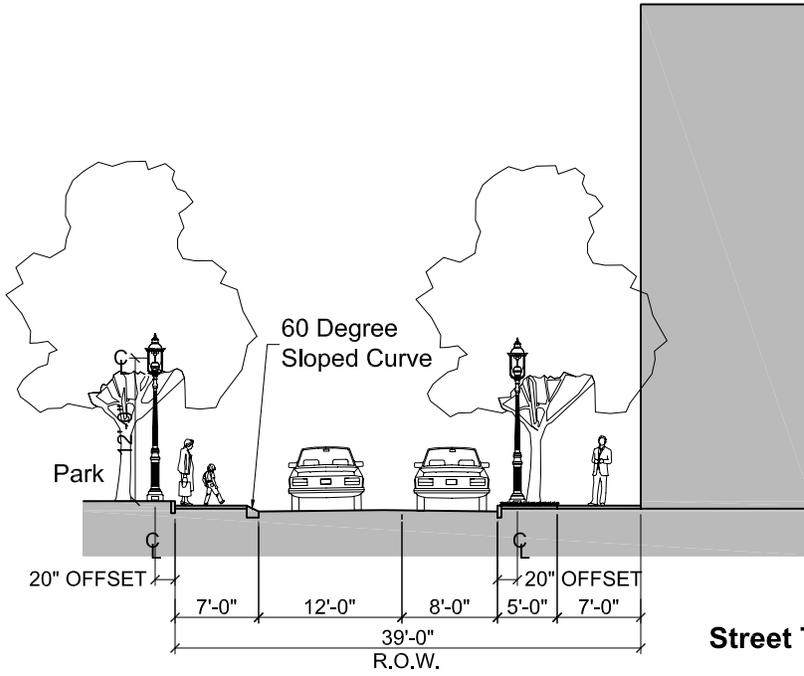


Street Type 2D - Section

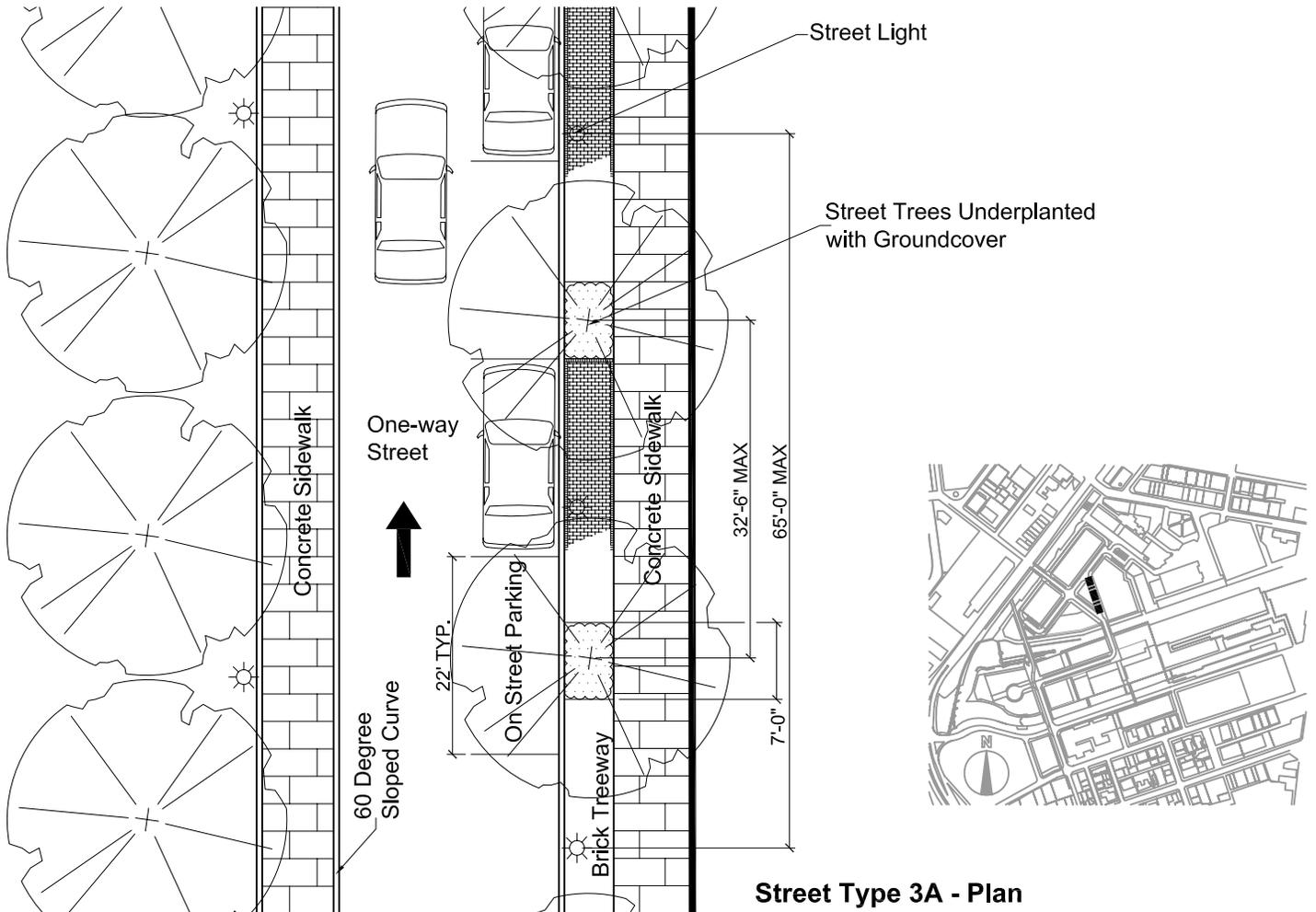


Street Type 2D - Plan





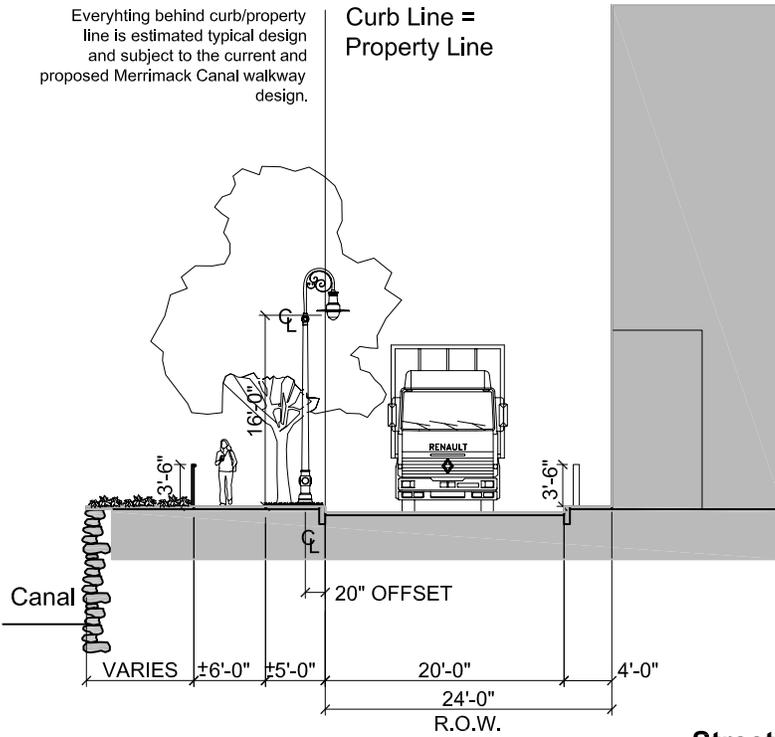
Street Type 3A - Section



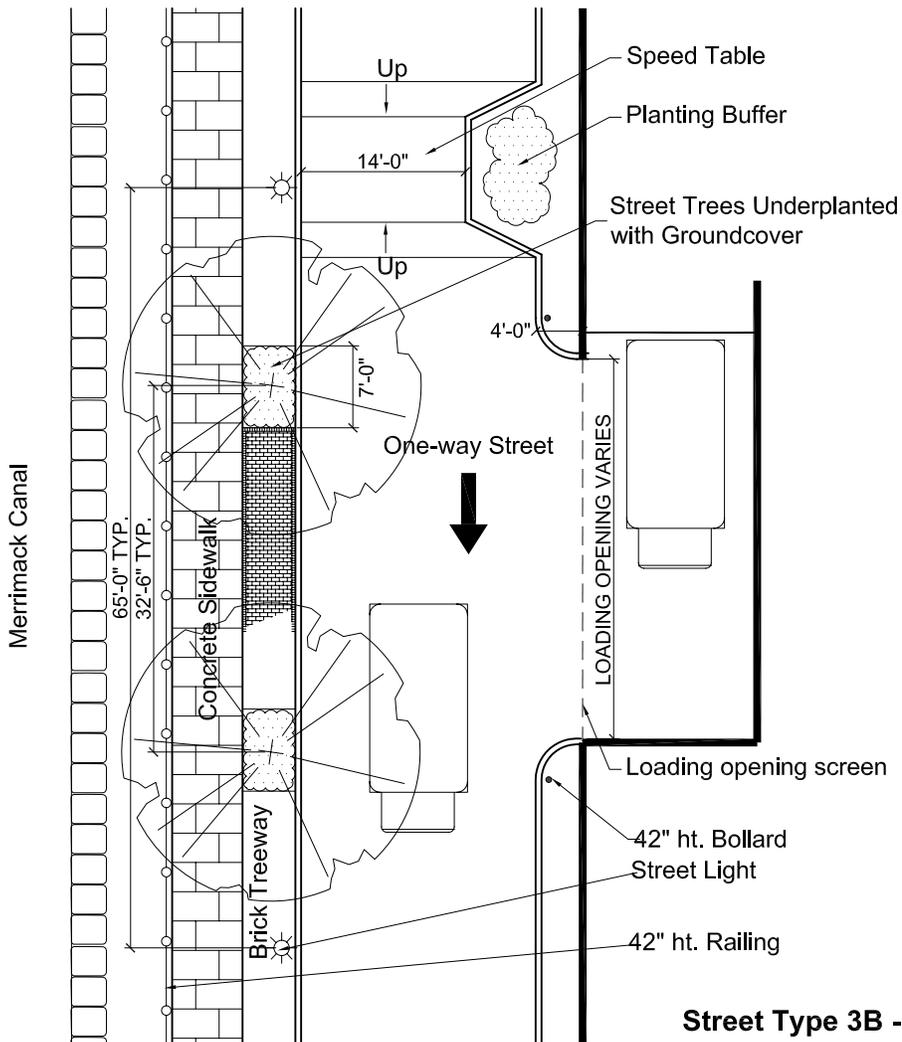
Street Type 3A - Plan

Everything behind curb/property line is estimated typical design and subject to the current and proposed Merrimack Canal walkway design.

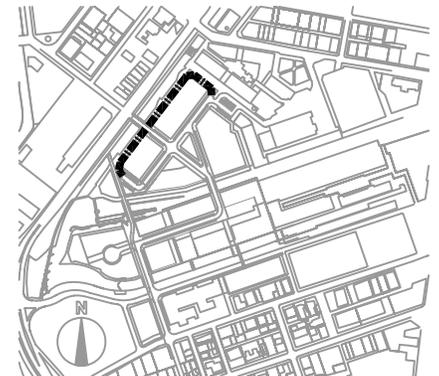
Curb Line = Property Line

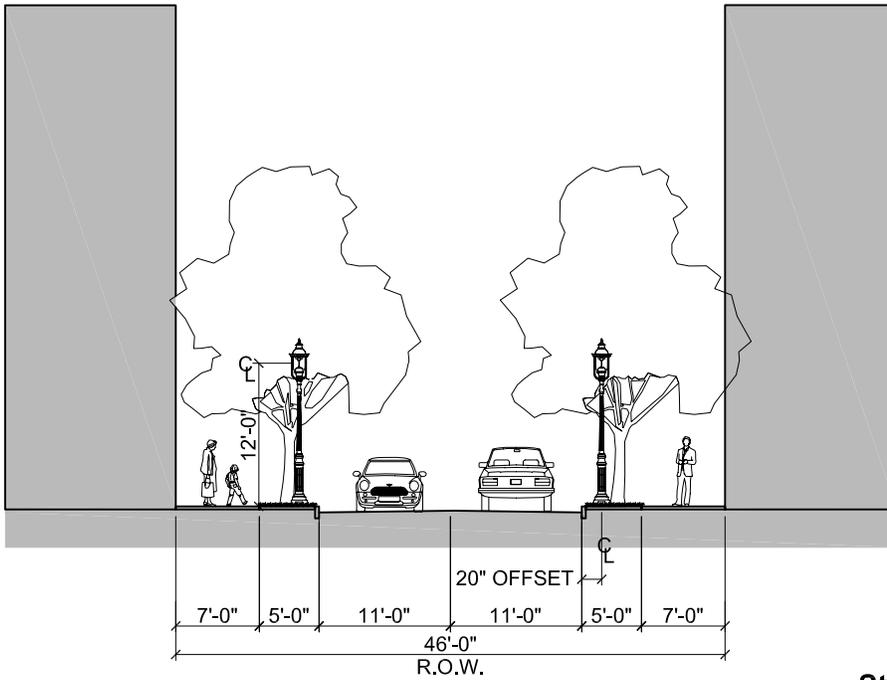


Street Type 3B - Section

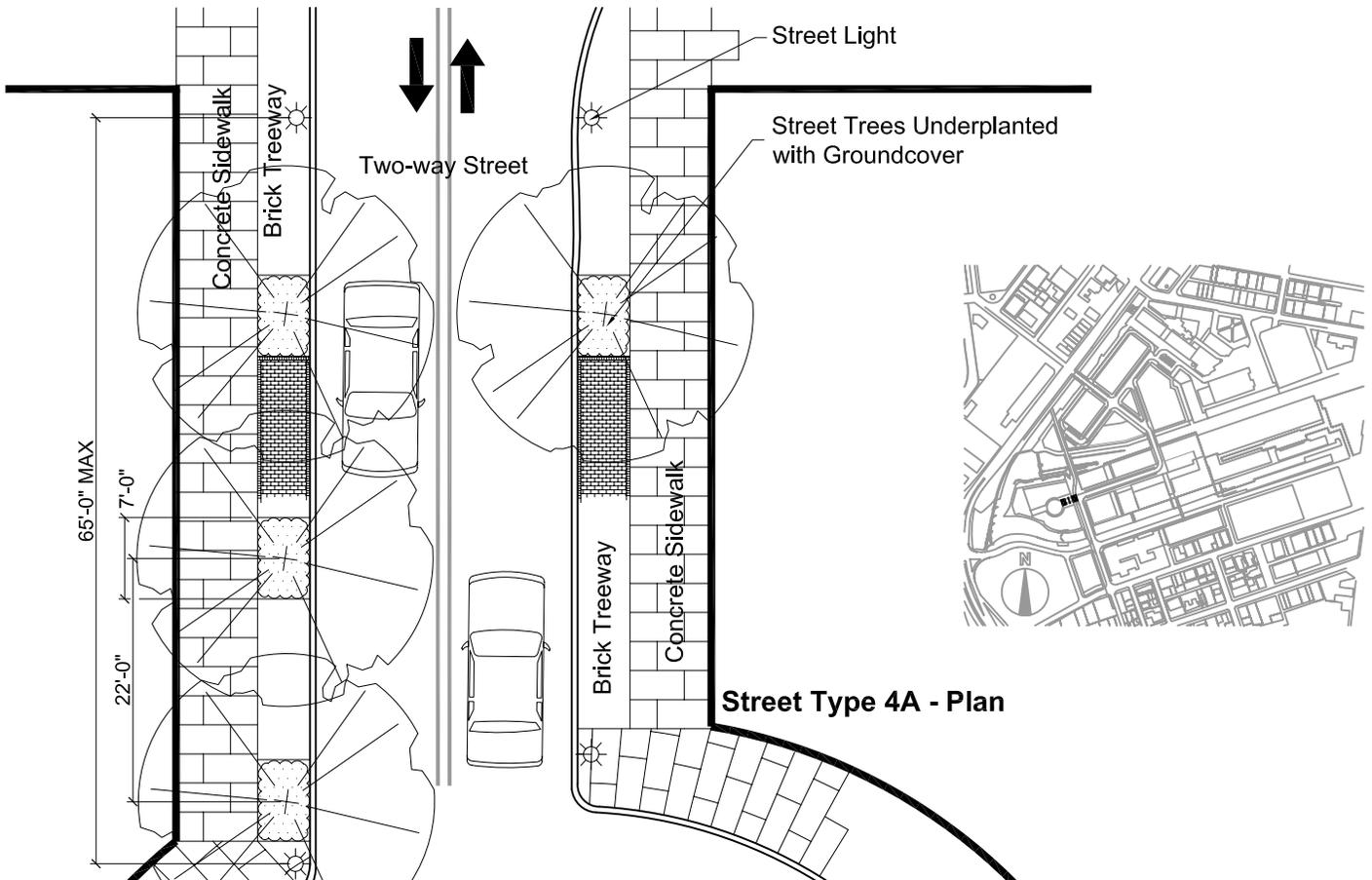


Street Type 3B - Plan

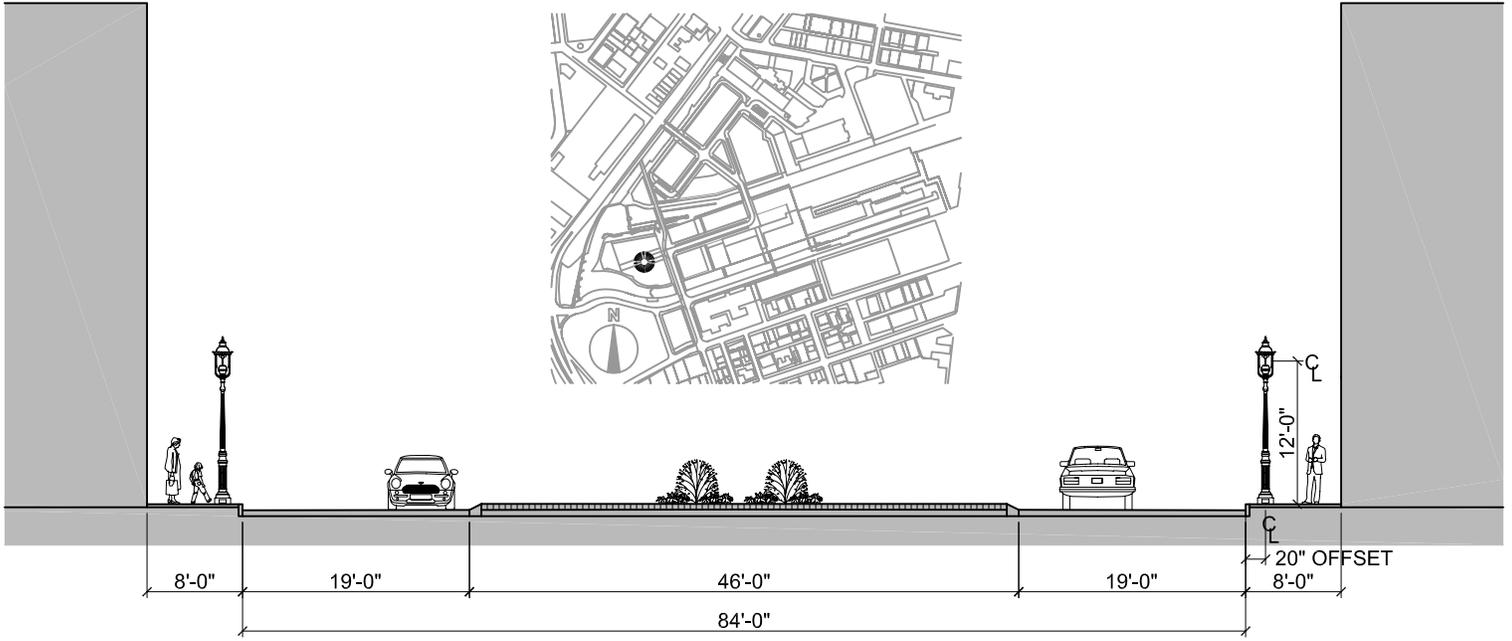




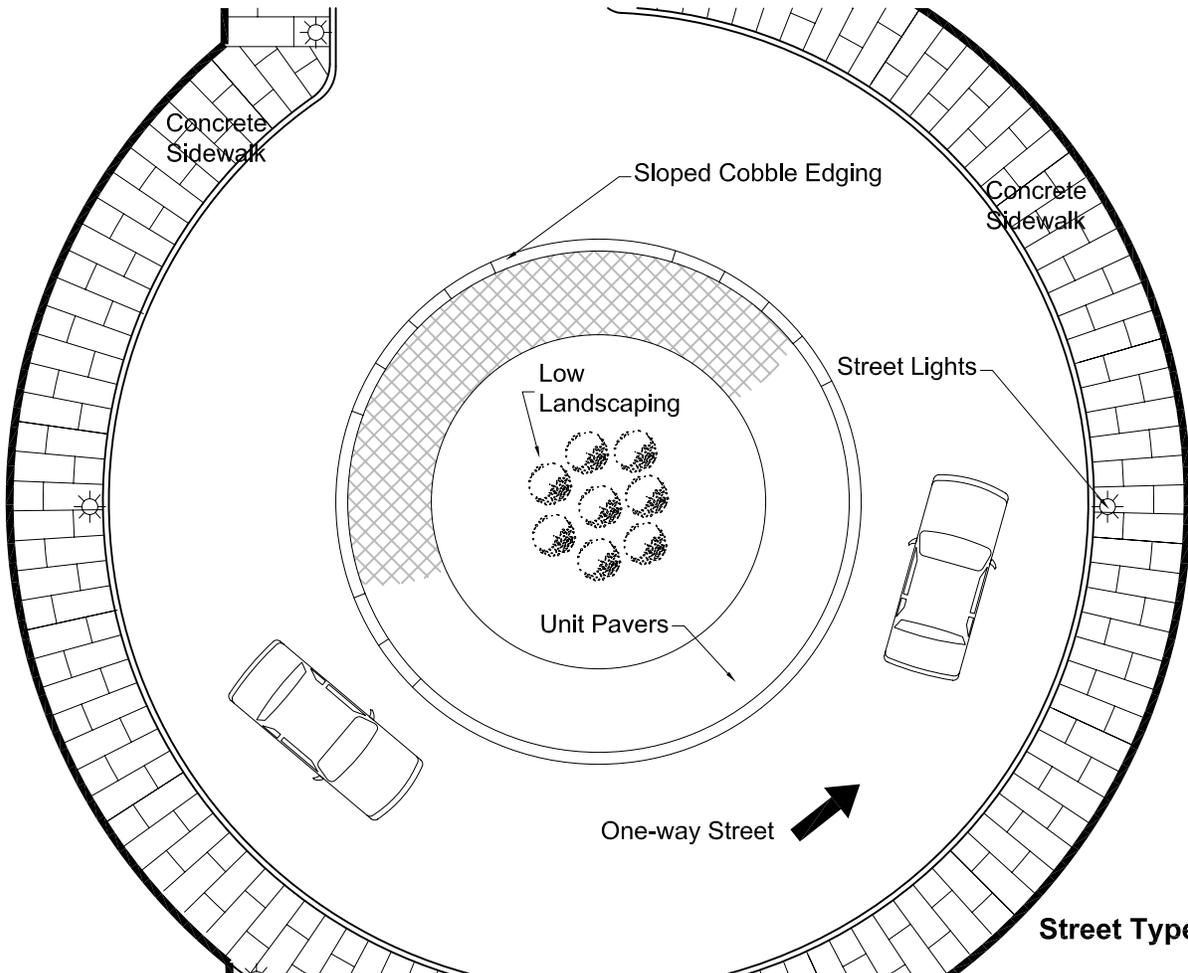
Street Type 4A - Section



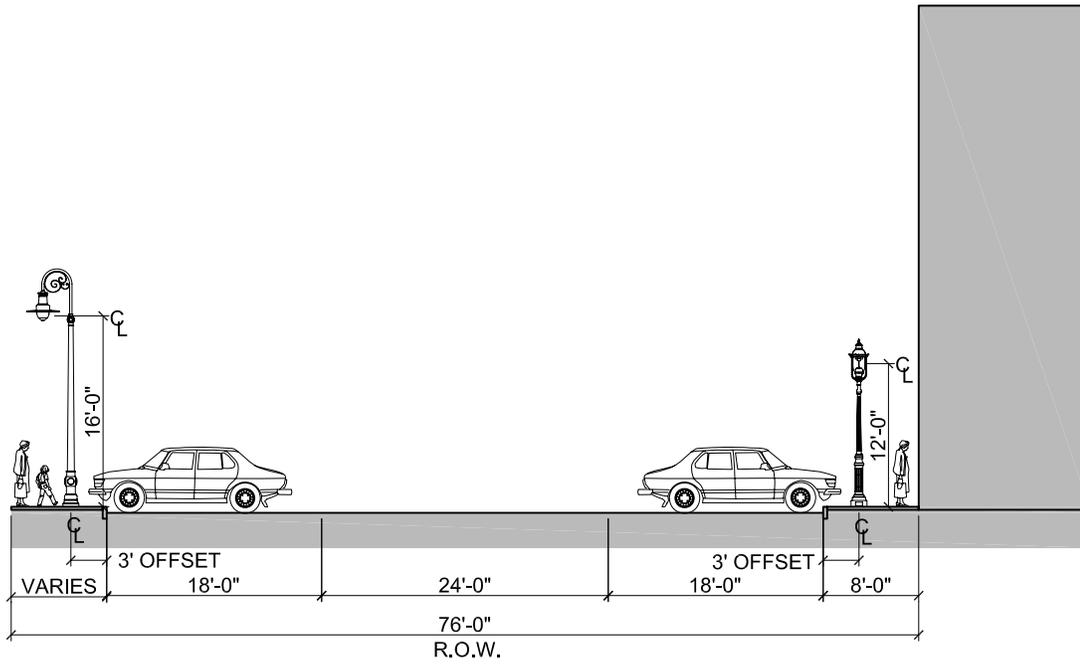
Street Type 4A - Plan



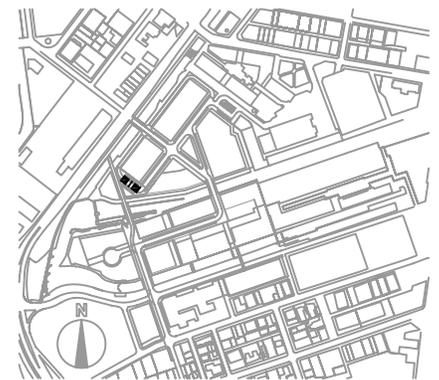
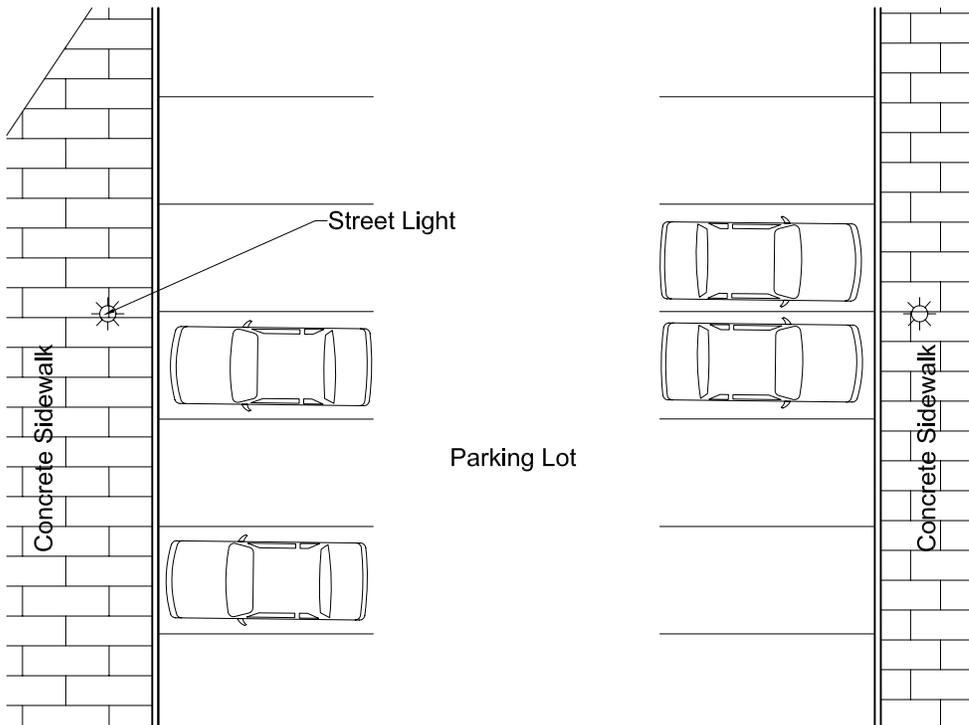
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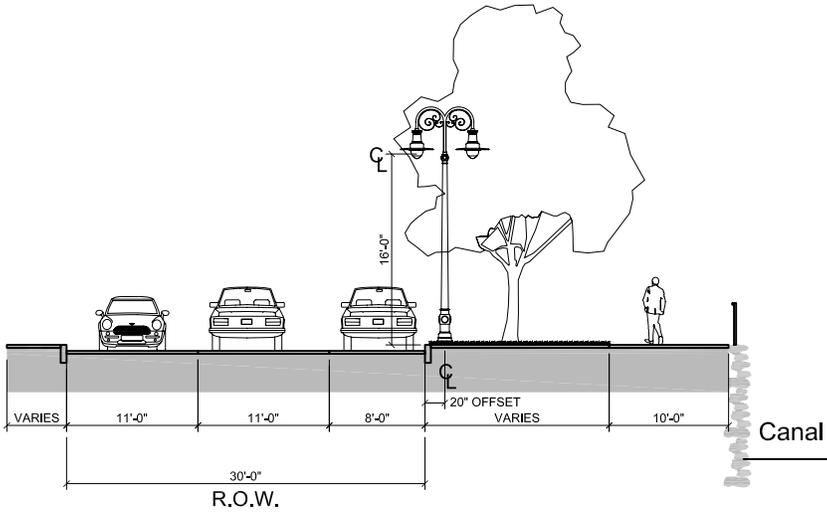
Street Type 4B - Plan



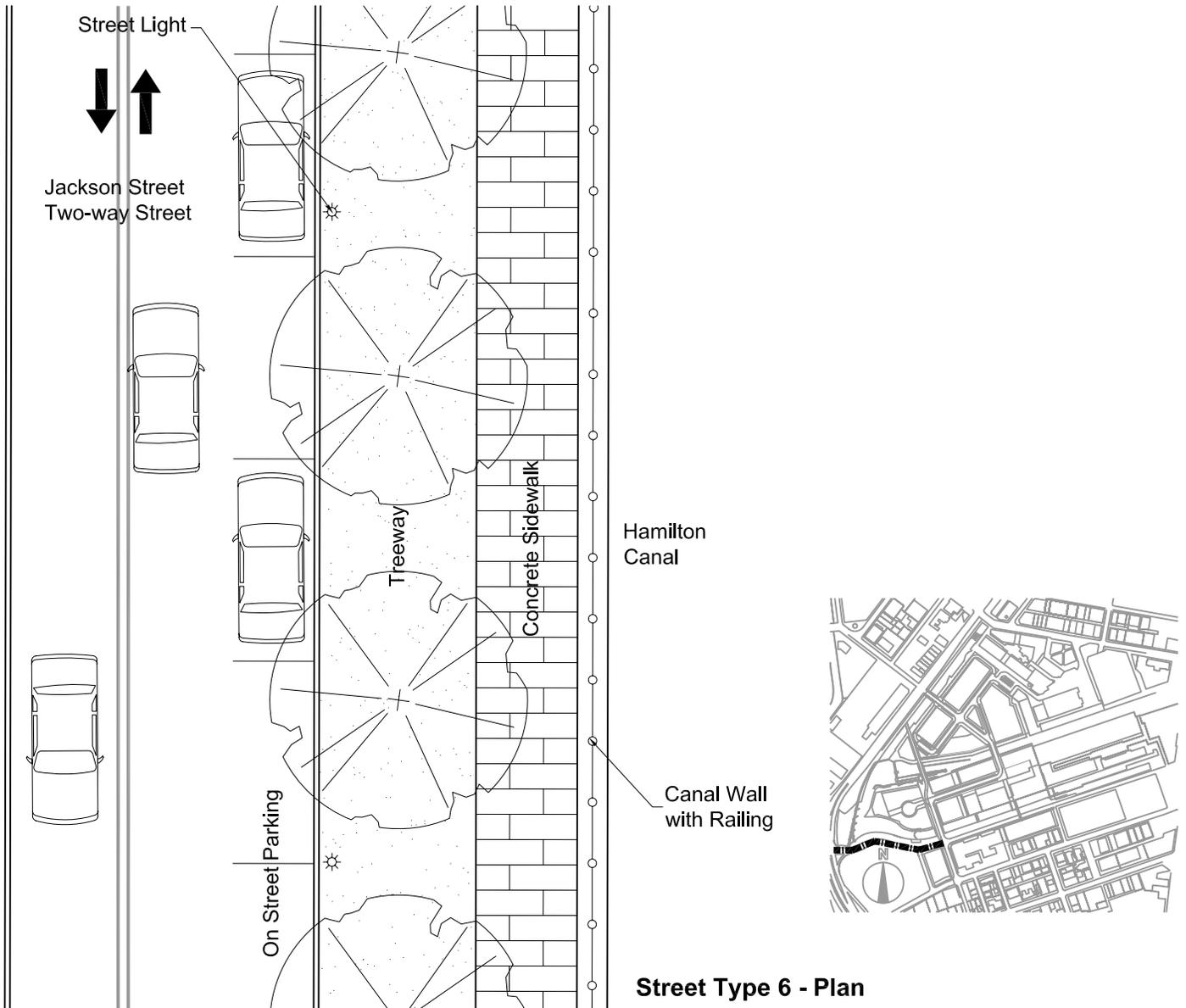
Street Type 5 - Section



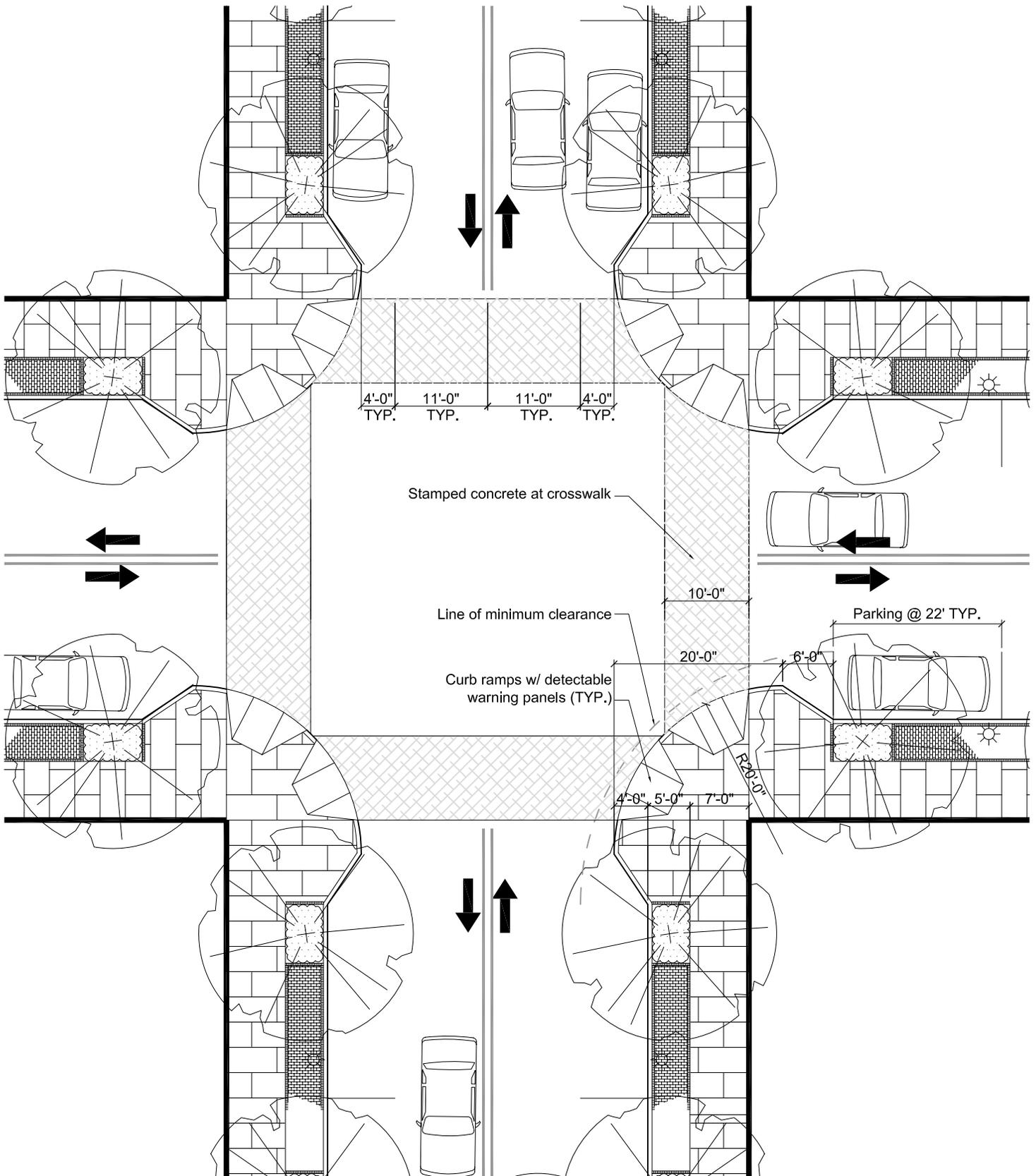
Street Type 5 - Plan



Street Type 6 - Section



Street Type 6 - Plan



A5-3. Specifications for Street Standards

1. General

- a. Construction of sidewalks, Treeways and street lights may be phased as Development Parcels are built. All public way improvements from the back of the curb to the building façade shall be in place at the time of building occupancy, weather permitting. If weather does not allow for planting at the time of occupancy, a waiver from this provision may be granted by the Planning Board subject to the appropriate performance security.
- b. Covenant and bond requirements within the Subdivision Standards shall not be required for streets and curb work undertaken by the City of Lowell in accordance with the HCD Master Plan and the HCD-FBC. The Planning Board may require a bond for streets and curb work undertaken by the applicant that is not completed before the occupancy permit is to be issued for an adjacent building.
- c. Parallel parking spaces along the street shall be set back from crosswalks and intersections by a minimum of 6 feet.
- d. Where a street indicated on the Regulating Plan has a width between Parcel boundaries that is greater than the cross section on the street standard, portions of land not otherwise regulated shall be used for additional width of sidewalks and/or Treeways.
- e. Street types 1B and 2B are on bridges over Canals. A decorative pedestrian railing shall be located on the outside of the sidewalk. Between the sidewalk and the street shall be a structural truss, non-structural truss or vehicular guardrail. Lighting on bridges may be incorporated into the railing, truss or guardrail.

2. Street Trees

- a. Street trees shall be planted as shown on the street type standards. Where necessary, spacing exceptions may be made to accommodate curb cuts, fire hydrants, and other infrastructure elements.
- b. Street trees shall be a minimum of 3-1/2" caliper at planting.
- c. Street trees shall be pruned to allow 8 foot clearance for pedestrians.
- d. Street trees are to be selected from the following species list
 - a. Ginkgo biloba, Maidenhair Tree (male only)
 - b. Gleditsia triacanthos inermis, Honeylocust
 - c. Acer rubrum 'Red Sunset', Red Sunset Red Maple
 - d. Platanus acerifolia, London planetree
 - e. Sophora japonica, Japanese scholar / pagoda tree
 - f. Liriodendron tulipifera, Tulip tree
 - g. Maackia amurensis, Amur maackia
 - h. Tilia x euchlora 'Redmond', Redmond Linden
 - i. Tilia tomentosa, Silver Linden
 - j. Ulmus parviflora 'Allee', Allee Chinese Elm
 - k. Zelkova serrata 'Green Vase', Green Vase Zelkova (or 'Village Green')
- e. To establish variety, street segments with more than four trees shall include at least two types of trees listed above, and street segments with more than eight trees shall include at least three types of trees listed above.
- f. Street trees shall be planted in mulched pits with a minimum size of 5 feet by 4.5 feet. Where brick is used, the Treeway shall have open jointed, sand set bricks between trees. Clean sand backfill is required under unit

pavers to a minimum 18-inch depth between tree pits to encourage root growth.

- g. Tree pits shall not use grates.

3. Sidewalks and Treeways

- a. Sidewalks, Treeways and curbs are to be constructed as identified on the street type standards.
- b. Sidewalks shall be scored concrete. No asphalt sidewalks shall be allowed.
- c. Where bricks are identified on the street standards within Treeways, bricks may be substituted with masonry pavers.

4. Street Furniture

- a. Street Furniture, such as bike racks, trash bins, newspaper boxes, transit shelters, and seating, shall be incorporated into the streetscape design. Such elements shall be placed within the Treeway area where one is available
- b. Street Furniture shall not reduce a clear sidewalk to less than 3 feet.
- c. Street Furniture elements shall be durable, cost effective, and easy to maintain.
- d. Bike racks shall be provided within the district in Treeways or other Open Space areas at locations no more than 700 feet from the primary entrance to any building within the HCD.
- e. Street name signs shall be white lettering on a black background. (standard heights and size, etc.).

5. Street Lights and Utilities

- a. Street lights shall be located approximately at the midpoint between two trees, as applicable.
- b. Street lights shall be paired on either side of the street
- c. Light standards shall match the replica light fixture existing on Merrimack Street, (the Victorian Boulevard Luminaire by Penn Globe set on Hancock steel poles by Spring City), unless otherwise specified and/or approved by the Lowell Historic Board. Single and double luminaires may be utilized for specific locations and streets.
- d. Post top lights are to be designed to allow for seasonal rotation of flowers in hanging pots mounted on post top lights along sidewalk.
- e. Catenary poles for trolley electric supply will be coordinated with the street lights along the trolley way. Luminaires may be mounted on these poles in addition to individual street lights. The trolley way lights may vary from the street light design, to reflect the goose neck standard that exists elsewhere along the trolley ways in Lowell.
- f. All electrical and traffic control equipment within the HCD, including but not limited to utility boxes, traffic control equipment, mastarms and signal heads shall be black.

6. Exceptions at Curb Cuts

- a. Where necessary, spacing exceptions may be made to accommodate curb cuts, fire hydrants, and other infrastructure elements. Such exceptions must not deviate from the street standard any more than is necessary to accommodate the required curb cut, fire hydrant or infrastructure element.

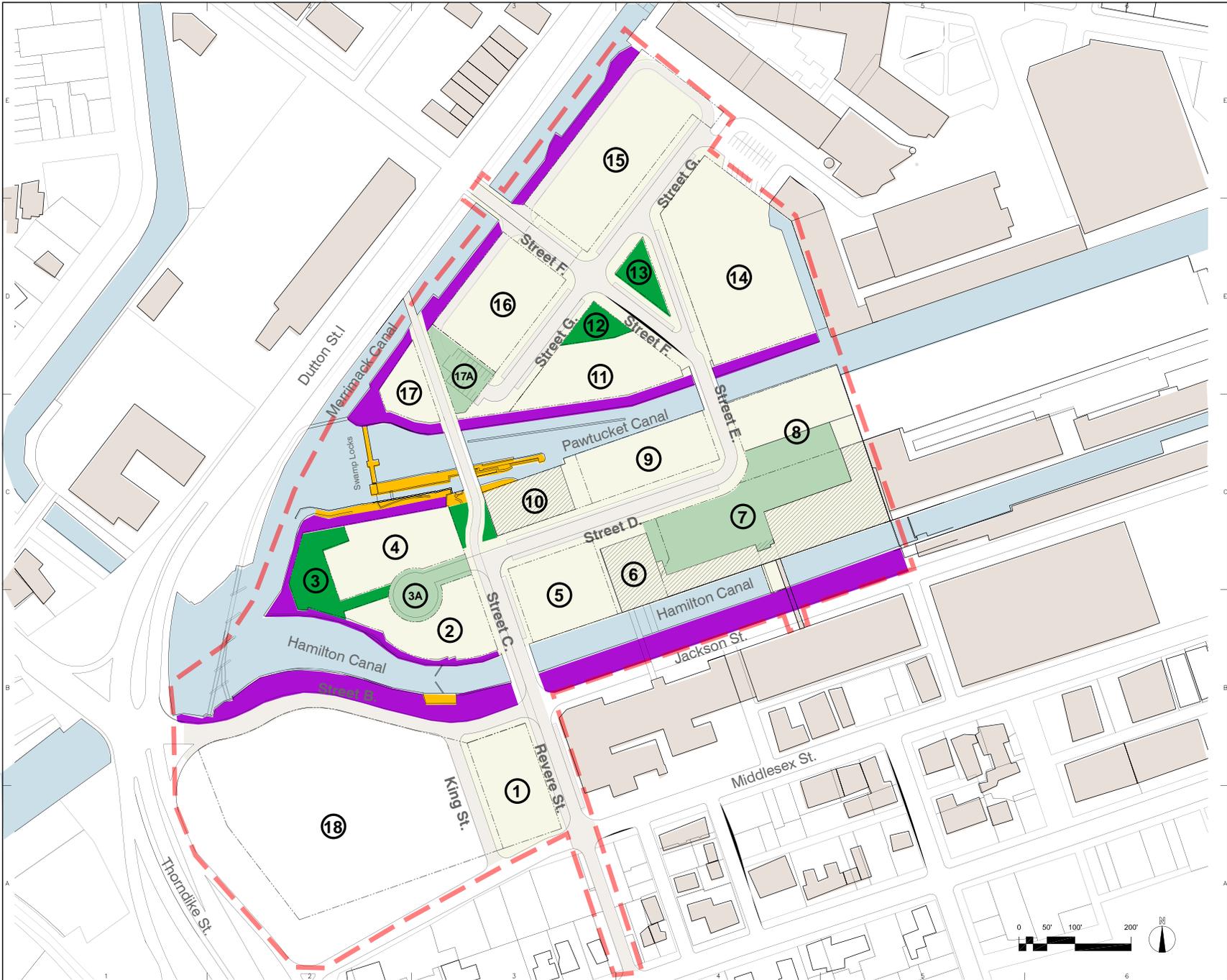
A6. Open Space Standards: Regulating Plan, Standards and Specifications

A6-1. Open Space Standards Regulating Plan

The following page is the Open Space Standards Regulating Plan. It is to be used as an index for the Open Space standards in Section A6-2.

HAMILTON CANAL DISTRICT

Lowell, MA



Open Space Standards Regulating Plan

A6-2. Public and Private Open Space Standards

The Hamilton Canal District Master Plan includes Parcels reserved for public and private Open Spaces located to facilitate and enhance the pedestrian's movement into and through the District, to provide access to Canal edges and Historic resources such as the Swamp Locks, falls and gates, and to provide locations for people to gather throughout the District. All such Open Spaces are intended to contribute to a high quality urban environment for the benefit of residents, businesses and employees, and visitors. Some of these Open Spaces are private with public rights for access and passage, some are private and provide buffer zones for ground floor residential units, some are public walkways on State Department of Conservation and Recreation land, and others are public parks to be owned by the City of Lowell.

The Open Space Regulatory Plan identifies all of these various Open Spaces while the individual Open Space descriptions below provide more detail as to the design intent for each space. In addition all Open Spaces shall be subject to the specifications established in Section A6-3.

1. Public Open Space

Site Description

Located at the western tip of the southern island just south of Swamp Locks Falls, Point Park will be a public park designed to take maximum advantage of wide-open, panoramic views of the junction of the Hamilton, Merrimack, and Upper & Lower Pawtucket Canals. Pedestrian access to the park is made available from the new "Street C" through a paved and landscaped courtyard. Pedestrians may also gain access to the open space from canal walks along the northern edge of the Hamilton Canal and the southern edge of the Pawtucket Canal.

Site Requirements

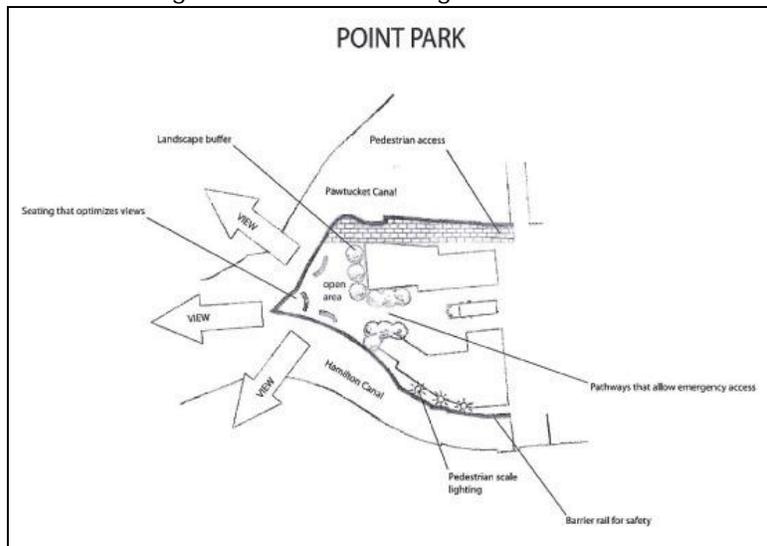
1. The pedestrian access along the northern edge shall allow access close enough to the locks chambers and gates providing a good view while not interfering with the NPS staff operations of this equipment.
2. The northern Hamilton Canal wall from the west side of the new Revere Street bridge (B-1) to the tip of the point shall be edged with an appropriate barrier rail. The barrier rail will proceed northerly from the tip of the point to the northwest corner of the Park where it will turn east along the northern edge of the Park and Parcel 4 separating them from the NPS's working areas around the boat ramp and the lock chambers.
3. The park shall be lit by pedestrian scale lights that shall foster a sense of security without lighting areas beyond the park.
4. The park pathway extending from "Street D" shall be wide enough to allow vehicle access for emergencies.
5. The park shall provide seating oriented for capturing views of canals and historic structures.
6. The ground floors of the buildings on Parcels 2 and 4 shall be buffered from the activity of the park.

Site Guidelines

The park should encourage strolling along the canal edges and offer view-oriented seating areas as well as seating areas off of the primary paths. Lighting should be employed along all formal pathways leading to the waterfront to act as a wayfinding tool to the waterfront and provide a safe walking environment during dusk and evening.

Paved areas, lawns and plantings ought to reinforce the open quality of the space allowing for flexible informal programming. Stone remnants located at the tip of the point and along the northern edge bordering the Swamp Locks may be incorporated into landscape and/or structural elements within the open space. Planting design should reflect landscape that would be typical along historic Lowell canals as shade trees in lawn with more hearty ornamental plantings in appropriate locations against the new building facades and entries.

The view corridor east from the Park down New Street D into the Mill Yard and vice versa should be reinforced by the park layout and planting design. To amplify the visual connection the designer may consider incorporating a sculptural or water element that reinforces the "D Street" axis, providing a strong visual connection to the park, a gateway landscape element, and gathering marker.



Site Description

Park Square will consist of two public parks on either side of "Street F" into the District. Together, these parks are intended to open up the center of the HCD and define the edges of the two primary streets in this area: "Street F" leading to the new bridge across the Lower Pawtucket Canal, and "Street G" leading from the Market Mills archway to the Swamp Locks. These parks will serve as a critical center of activity within the HCD, and should allow for flexible formal and informal programming.

Site Requirements

Parcel 13

1. The park shall be open to pedestrians from all three sides and offer a substantial amount of hardscaped plaza and seating along with deciduous shade trees.
2. Street trees and street lights along the narrow roadway to the east of the park (Street E) shall be provided within the park itself (at the back of the sidewalk) to maintain a clear sidewalk area for possible emergency access along this narrow street
3. Options for seating in shall be provided on benches, planters, and other landscape elements.
4. The park shall include a combination of shade and ornamental trees, and pedestrian scaled lighting in walkways and seating areas.

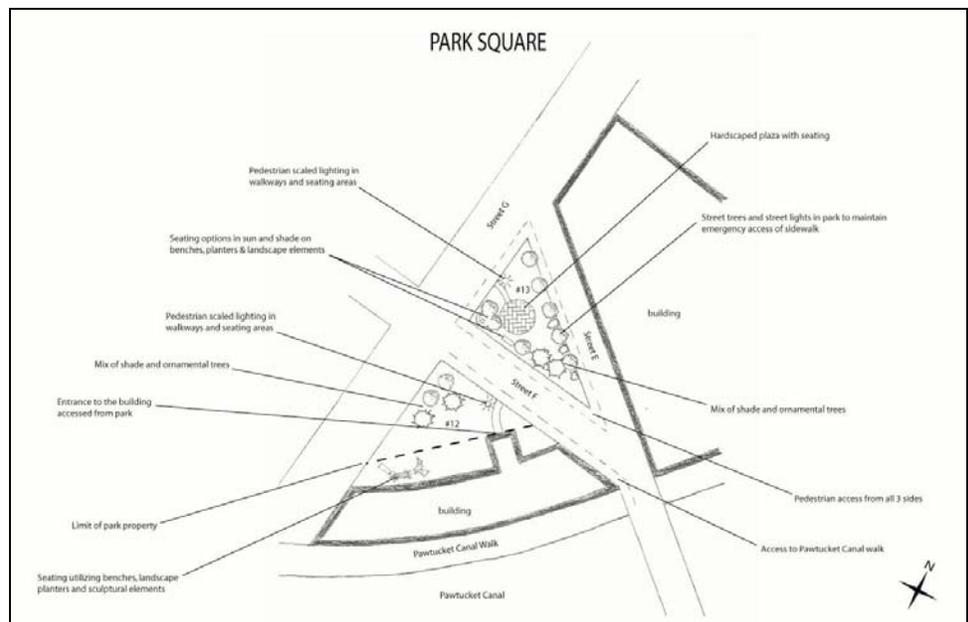
Parcel 12

1. A ramp or stairway follows the east façade of the building on Parcel 11 to provide access to the Pawtucket Canal walk.
2. The entry to the building on Site 11 shall be accessed from this park.
3. The park shall provide seating utilizing a variety of landscape elements such as benches, landscape planters, and sculptural pieces.
4. The park shall include a combination of shade and ornamental trees, and pedestrian scaled lighting in walkways and seating areas.

Site Guidelines

The southern end of Parcel 13, at the apex of the triangle, offers an opportunity for a landmark vertical landscape element. The designer may include an art installation or water element located in the central space serving as a focal feature attracting users to the center.

Openings for pedestrians along the two streets ought to be limited by a fence, screening wall, or other landscape devices allowing the public to view into the site while channeling access to the main pedestrian path and creating an opportunity to view the site from multiple perspectives. Location of openings should be located so as to discourage cut through traffic in the private landscape space on parcel 11 and encourage a sense of passive refuge.



Site Description

Two small triangular open spaces located south of the trolley bridge spanning the Pawtucket Canal at the swamp locks are defined by the trolley ROW as it re-aligns itself to the west side of "Street C". One open space is located west of "Street C" adjacent to building parcel 4 and the Swamp Locks, the other is located across the street adjacent to building 10.

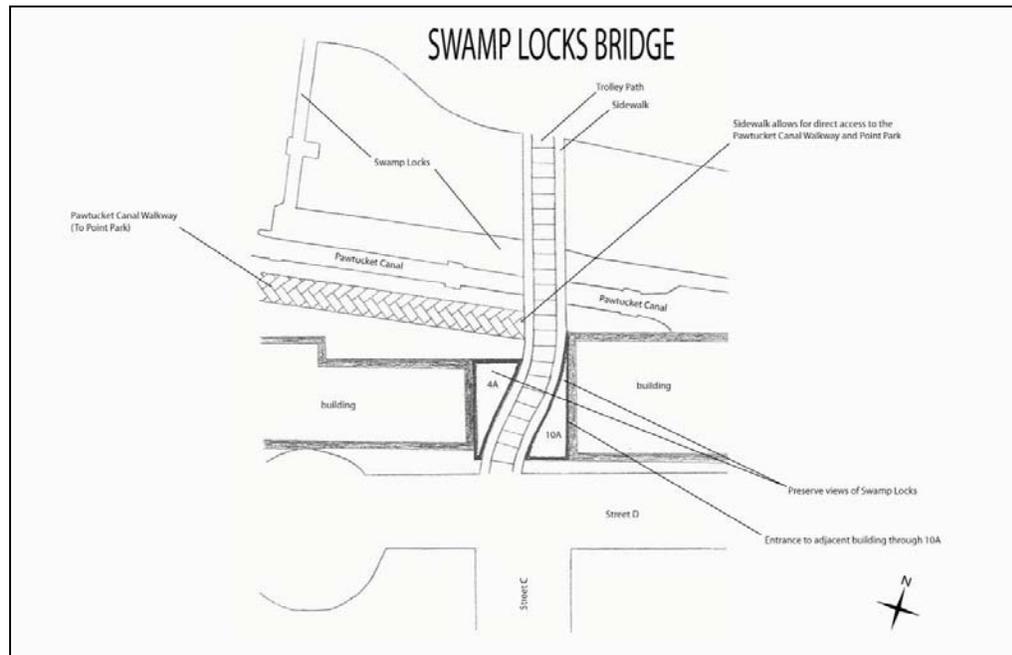
Site Requirements

1. The sidewalk located on the western side of "Street C" shall extend north through the open space located at parcel 4A providing a direct connection with the walkway leading to Point Park along the Pawtucket Canal.
2. At the junction of the sidewalk and Pawtucket Canal walkway, the north end of the open space shall be developed to facilitate viewing of the lock chambers and gates.
3. The eastern sidewalk of Street C shall extend north through the opens space at parcel 10A with the sidewalk on the new trolley bridge.
4. If necessary, access, including pedestrian walkways, to an entry to the building on Parcel 10 shall be provided from Parcel 10A.

Site Guidelines

These open spaces present a good opportunity for a central trolley stop servicing the HCD, providing a strong physical connection to the district, and historic resources contained within. If a trolley stop is incorporated into parcel 4A and/or 10A open space, seating and amenities should be provided accommodating trolley riders as well as pedestrians who may want to sit and relax. This compact space has the potential for creating significant pedestrian interaction as visitors make their way from the visitors center to the Swamp Locks interact with trolley riders disembarking and boarding trolleys as well as pedestrians in the district. The designer may consider providing space facilitating such interactions, which may include such elements as a small pavilion or space for street vendors.

Although the trolley line bisects each open space they should be conceived as a single space and share landscape elements to tie them together. Both of these open spaces should be primarily hardscaped with minimal, low plantings.



2. Private Open Space

Site Description

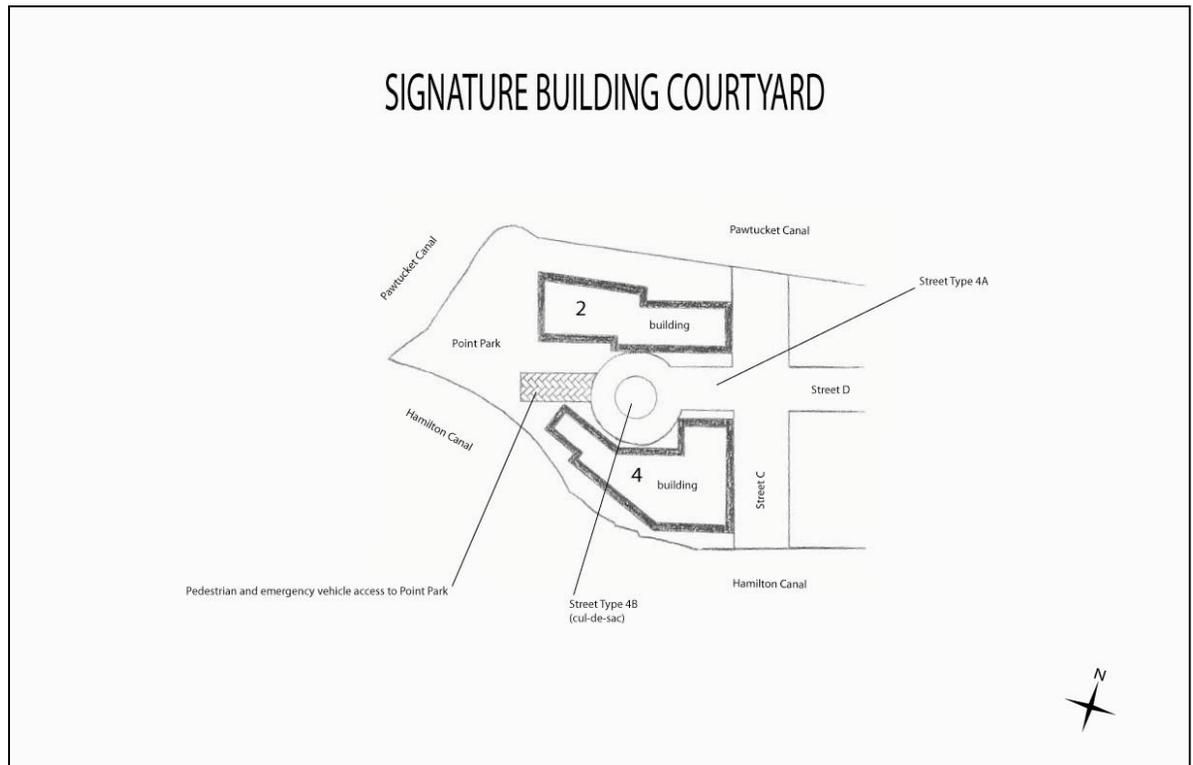
The Signature Building Courtyard includes the semi-private space that includes the extension of "Street D" into development Parcels 2 & 4 and includes the landscaped cul-de-sac terminus of the street. Pedestrian through connection to Point Park is accommodated via a walkway from the cul-de-sac on axis with "Street D"

Site Requirements

1. Site requirements should refer to the Street Form Standards for street types 4A (Street D extension), and type 4B (Cul-de-sac).
2. Through connection for emergency vehicles to Point Park should be accommodated through the space.

Site Guidelines

Although this space provides primary vehicular access for residents in buildings located on Parcels 2 and 4, landscaping elements should be used in such a way to invite the public to walk through the space to reach Point Park.



Site Description

The Mill Yard is located on the eastern end of the southern island in the area framed on three sides by the existing Appleton Mill buildings and new buildings proposed for Parcel 8. Pedestrian access to the Mill Yard should be developed from two directions. From the north and west, pedestrian access is via the sidewalk of the new streets. From the south, entry shall be provided at grade across a renovated pedestrian bridge (B-5) over the Hamilton Canal via an existing passage-way through the Appleton Mills to the junction of new streets D and E will be over private land with a public right of travel. The north-south pedestrian path running from "Street E" through the Appleton Mill complex via the renovated bridge will divide the Mill Yard into two separate spaces, each exhibiting different characteristics.

Site Requirements

1. Both open space parcels shall primarily be hardscape.
2. Vehicular access should be accommodated for loading docks, parking garage and drop-off areas.
3. The western half (parcel 7A) should encourage public access to the live/sell units on the ground floor of the Appleton Mill and to the common gallery space at the northeast corner of the Parcel 6 portion of the Appleton Mill.
4. The eastern half of the open space (parcel 8A) shall provide landscape elements that provide a greater buffer between the public and the ground floor uses of these buildings.
5. Both open space areas shall provide shade trees in order to provide a more comfortable pedestrian scaled environment.
6. The park shall be lit by pedestrian scale lights and should be selected to foster a sense of security without over-lighting.

Site Guidelines

Parcel 7A will provide a more open inclusive space, inviting the public to interact with the live/sell units on the ground floor of the Appleton Mill and with the common gallery space at the northeast corner of the Parcel 6 portion of the Appleton Mill. The Designer may consider this space as a plaza with seating providing additional visual interest to pedestrians and further attracting patrons to the live/sell units.

Parcel 8A should be semi-public open space providing a greater sense of enclosure and be programmed towards passive recreational activities. The designer may consider utilizing a central unifying element (fountain, public art, or something similar) to draw interest into the space.

Site Description

The surface parking area will include private open space southwest of building parcel 16. Although the space primarily functions as parking area, the space acts as a transition from “Street G”, canal walkways, and the trolley bridge.

Site Requirements

1. For site requirements refer to Street Form Standards for street types 5.
2. Landscaping should be utilized to soften the aesthetic impact of the parking field on adjacent buildings, and public spaces.

Site Guidelines

Landscaping located at the southwestern corner of the space should be used to provide visual continuity from the axis formed along “Street G” to the trolley bridge, and views of the swamp locks. Landscaping should be provided to create a visual buffer between the surface parking areas and public ways, and mitigate negative aesthetic impacts from surrounding buildings.

3. Public Canal Walks and Park Resources

Site Description

This canal walk extends along the southern side of the Hamilton Canal from Marston Street at the eastern end of the Appleton Mills building on Parcel 7 to Dutton Street along the extension of Jackson Street.

Site Requirements

- 1.This canal walk shall accommodate several important north/south connections. These connections include the re-development of the historic railroad trestle across the Upper Pawtucket Canal, Revere Street bridge (B-1), the replacement bridge (B-4), the renovated Carriage Bridge (B-5) providing the significant pedestrian access through the Appleton Mill passageway and the Mill Yard to the new bridge (B-3) across the Lower Pawtucket Canal the north side of the HCD.
- 2.Final design shall be co-coordinated with the final design for any parking proposed for the north side of Jackson Street between Revere and Marston Streets.

Site Guidelines

Trees, canal walk, canal railings and post top lights are shown as designed by the National Park Service along the southern side of Hamilton Canal west to Revere Street. New shade trees, post top lights, and a canal walk with barrier railing along the canal edge are proposed on the south side of Hamilton Canal west of Revere Street bordering the new Jackson Street Extension to Thorndike Street, adjacent to the proposed District Courthouse. The majority of the canal walk along Hamilton Canal will be based on NPS design drawings.

Site Description

This canal walk follows the northern side of the Lower Pawtucket Canal from the eastern end of the HCD west to the Swamp Locks Courtyard where it meets the Merrimack Canal Walk.

Site Requirements

- 1.Collaboration with NPS is required to address design of pedestrian scale lighting, the canal guardrail, the underpass at bridge B-3, and the accessible ramps required to transition up to the Swamp Locks Courtyard.
- 2.Pedestrian scale lighting shall be utilized throughout the walkway with ceiling mounted or bollard lighting at underpasses at Bridge B-3 to provide a safe and comfortable environment for pedestrians.

Site Guidelines

Lower Pawtucket canal is the central canal walk within the HCD offering exciting views of the remains of the "industrial canyon", the Lower Pawtucket Locks, the Swamp Locks Falls, and the two new bridges spanning the Lower Pawtucket (B-2 & B-3). Landscape elements should be chosen carefully to help preserve the "canyon" affect.

Site Description

This is an existing canal walk that extends along the southern edge of the Merrimack Canal from Market Mills to the Swamp Locks Courtyard.

Site Requirements

- 1.This canal walk shall accommodate several connections, including intersections at Broadway Street and a proposed trolley bridge. Landscape treatment at these intersections shall ensure a safe and convenient crossing for pedestrians.
- 2.Landscape elements including seating, barrier fence, paving, shade tree and other vegetation shall conform to the existing pedestrian way developed by the National Park Service extending along the Canal leading to Merrimack Street.

Site Guidelines

A canal walk, post top lights, and shade trees are 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. Modifications and improvements will need to be designed in response to the development proposals for Parcels 15, 16, & 17

Site Description

The Swamp Locks Falls Courtyard is an existing open space located at the western end of the walkway along the southern side of the Merrimack Canal between building parcel 17.

Site Requirements

- 1.The courtyard shall continue to provide critical access to the NPS canal boat docks.
- 2.The courtyard should be primarily hardscape, utilizing shade trees to provide comfort for pedestrians.

Site Guidelines

The courtyard is an important node in the open space network as it provides one of the best views of the swamp locks and is located at the convergence of canal walkways. The designer may consider providing a flexible seating area and space for the provision of refreshments to allow the public to take advantage of the views. Furthermore the space may be designed to accommodate flexible programs such as street performers, and other impromptu events.

Depending on the building use located on parcel 17, the designer may consider landscape treatments that blur the line between exterior and interior (such as a pavilion or a canopy of shade trees) as this building is likely to provide an open and transparent entrance in order to take advantage of the views of the swamp locks.

Site Description

The Open Space parcels identified as “National Park Resources” are owned and operated by the National Park Service.

Site Requirements & Guidelines

Site requirements and guidelines are as established by the National Park Service.

A6-3. Specifications for Open Space Standards

1. General

All parks, whether public or private, shall have accessible paved areas and walkways, shade trees and lawns, and a variety of seating and night time lighting. The parks shall be designed to be beautiful, safe, accessible, and maintainable, as well as following sustainable design principles. It is expected that some automatically controlled irrigation will be provided to the plantings and turf. Controls shall include the latest technologies to minimize impact on the use of the park, minimize watering during times of extreme sunlight, and eliminate watering during periods of rainfall.

Species selected for parks and Open Space shall be selected from species demonstrating insect and disease resistance, cold hardiness to Zone 4, resistance to snow and wind breakage, with multi-season interest as applicable, with medium to low maintenance requirements. Native species that tolerate the expected conditions shall be selected over non-natives, as applicable. Some non-natives (also selections of native species) are included in this list.

2. Planting List

The parks shall include plant species selected from the following species list:

- Deciduous Shade and Evergreen Trees
 - *Acer rubrum* 'Red Sunset', Red Sunset Red Maple
 - *Betula nigra* 'Heritage', Heritage Birch
 - *Picea glauca*, White Spruce
 - *Picea omorika*, Serbian Spruce
 - *Pinus cembra*, Swiss Stone Pine
 - *Pinus nigra*, Austrian Pine
 - *Platanus acerifolia* 'Bloodgood', Bloodgood London Plane Tree
 - *Quercus bicolor*, Swamp White Oak
 - *Quercus palustris*, Pin Oak
 - *Quercus rubra*, Red Oak
 - *Cecidiphyllum japonicum*, Katsura Tree
 - *Salix alba* 'Niobi', Golden Weeping Willow
 - *Thuja plicata*, Western Arborvitae
 - *Tilia tomentosa*, Silver Linden
- Small Ornamental Trees
 - *Acer ginnala*, Amur Maple
 - *Amelanchier canadensis*, Shadbush
 - *Amelanchier laevis*, Allegheny Serviceberry
 - *Cornus alternifolia*, Pagoda Dogwood
 - *Cornus kousa*, Korean Dogwood
 - *Cornus mas*, Cornelian Cherry
 - *Hamamelis* 'Arnold Promise', Arnold Promise Witchazel
 - *Hamamelis* 'Jelena', Jelena Witchazel
 - *Hibiscus syriacus* 'Diana', Diana Rose of Sharon
 - *Malus floribunda*, Japanese Crabapple
 - *Malus* 'Snowdrift', Snowdrift Crabapple
 - *Malus* 'Indian Magic', Indian Magic Crabapple
 - *Viburnum prunifolium*, Blackhaw Viburnum
- Deciduous and Evergreen Shrubs and Vines
 - *Aescelus parviflora*, Bottlebrush Buckeye

- Clematis paniculata, Sweet Autumn Clematis Vine
- Clethra alnifolia 'Hummingbird', Hummingbird Summersweet
- Cornus sericea, Red Twig Dogwood
- Cotoneaster apiculatus, Cranberry Cotoneaster
- Fothergilla gardenia, Dwarf Fothergilla
- Hydrangea anomala petiolaris, Climbing Hydrangea Vine
- Hydrangea arborescens 'Annabell', Annabell Hydrangea
- Hydrangea paniculata 'Grandiflora', Pee Gee Hydrangea
- Malus sargentii, Sargent Crabapple
- Parthenocissus quinquefolia, Virginia Creeper Vine
- Rhododendron catawbiense 'Alba', White Catawba Rhododendron
- Rhododendron mucronulatum 'Cornell Pink', Cornell Pink Korean Rhododendron
- Rhododendron 'Delaware Valley White', Delaware Valley White Rhododendron
- Rosa 'Knockout', Knockout Shrub Rose
- Syringa 'Miss Kim', Miss Kim Lilac
- Syringa x meyeri 'Paliban, Dwarf Korean Lilac
- Viburnum carlesii, Koreanspice Viburnum
- Viburnum dentatum 'Blue Muffin', Blue Muffin Arrowwood Viburnum
- Ilex crenata 'Hetzzi', Hetz Holly
- Ilex glabra 'Compacta', Compact Inkberry
- Ilex verticillata 'Winter Red', Winter Red Winterberry
- Groundcovers
 - Dennstaedtia punctilobula, Hay Scented Fern
 - Euonymus fortunei 'Coloratus', Purple Leaf Wintercreeper
 - Hedera helix 'Baltica', Baltic Ivy
 - Juniperus var. sargentii viridis, Green Sargent Juniper
 - Microbiota decussata, Russian Cypress
 - Vinca minor, Myrtle
- Turf Grass
 - Blended mixture of improved cultivars of Blue Grass, Perennial Rye, and turf-type Chewings Fescue, selected for insect and disease resistance, color, and drought tolerance.
- Seasonal Display
- Perennials
 - Aster x 'Frikharti', Dwarf Aster
 - Dicentra spectabilis, Bleeding Heart
 - Echinacea 'Kim's Knee High', Kim's Knee High Echinacea
 - Geranium sanguineum, Cranesbill
 - Hemerocallis 'Happy Returns', Happy Returns Daylily
 - Hemerocallis 'Rosy Returns', Rosy Returns Daylily
 - Hosta 'Honeybells', Honeybells Hosta
 - Iris sibirica, Siberian Iris
 - Paeony latifolia 'Festiva Maxima', Festiva Maxima Peony
 - Phlox paniculata 'David', David Garden Phlox
 - Rudbeckia fulgida 'Goldstrum', Goldstrum Black Eyed Susan
 - Salvia x superba 'Maninacht', Violet Sage
 - Sedum x 'Autumn Joy', Autumn Joy Sedum
 - Sedum x 'Brilliant', Brilliant Sedum
 - Aquilegia canadensis, Native Columbine
- Spring Bulbs
 - Crocus, species, Giant Crocus

- Narcissus 'King Alfred', King Alfred Daffodil
- Narcissus 'Mount Hood', Mount Hood Daffodil
- Scilla sibirica, Squill
- Annual Flowers

A7. Technical Requirements

A7-1. Required Items

The applicant shall observe all design standards for land subdivision as hereinafter provided. These standards shall be considered minimum standards and shall not be varied or waived, except by explicit permission of the Planning Board in the Definitive Subdivision approval decision.

1. Streets and Sidewalks

Except as otherwise specified in A6-3, streets and sidewalks should meet the following standards:

- a. Basic standards:
 - Pavement Thickness: 1 1/2 inch finish course
 - Binder Course: 3 1/2 inch binder course
 - Base Course: 12 inch processed gravel or reclaimed paving base course conforming to M1.03.0 Type C standard from the Massachusetts Standards Specifications for Highways and Bridges.
- b. Sidewalk construction material: All sidewalks shall be scored concrete, with 4 inch cement concrete at 3,000 psi, above a six inch dense graded crushed stone base.
- c. Crosswalks shall be stamped concrete with a pattern to resemble bricks, with an adequate base as determined by the City Engineer.
- d. Trolleyway shall include stamped concrete and include adequate base as determined by the City Engineer
- e. All pavement markings shall be thermoplastic and conform to the standards of the Manual on Uniform Traffic Control Devices (MUTCD).
- f. No curb-cut shall be greater in width than 28 feet measured along the curb line.
- g. All curbs shall be VA-4 vertical granite.

2. Utilities

- General
 - Utility easements shall be provided where necessary.
- Electrical, Telephone and Gas
 - All electrical, telephone, and other utility wires shall be placed underground.
 - The design and location of the electrical power distribution system shall be as directed and approved by the local electric utility company.
 - The design and location of gas pipes shall be coordinated with the local gas utility company. The applicant shall consult the telephone company, television cable company and other applicable utilities

- relative to the installation of communication services.
- Electrical, telephone, gas and other utilities shall be located as shown on the Typical Cross Section in the Definitive Plan. Upon completion of the subdivision, the applicant will be required to submit to the City Engineer a final plan showing electric, telephone, cable and other utilities as constructed.
- Water
 - Applicant shall establish that adequate water infrastructure shall be capable of serving the full build-out.
 - Each 500 linear feet of roadway shall include at least one fire hydrant. Hydrants shall be located according to the standards of the National Fire Prevention Association (NFPA).
 - All water mains shall be a minimum of 8 inches in diameter. Water lines shall be at least 5 and no more than 7 feet below grade to prevent freezing.
 - Water pipes and related equipment, such as hydrants and mains shut-off valves, shall be sized and constructed to serve all lots on each street in the subdivision in conformity with specifications of the City Engineer.
- Sewer
 - Sewer pipes along Canal walls or within existing Canal right-of-ways may not be used to provide sewer service within the Hamilton Canal District, and shall be discontinued from use and removed if feasible.
 - Sewer connections within the district shall not use existing pipes within the Hamilton Canal District boundary.

3. Drainage

- a. A complete storm drainage system, designed to the satisfaction of the City Engineer, shall, before the start of construction, be laid out and of sufficient size as to permit unimpeded flow of all natural waterways, to provide adequate drainage of all portions of the street system so that water does not accumulate thereon, to intercept storm water runoff from the adjacent lots of the subdivision, and to prevent adverse impacts due to stormwater discharges from the subdivision. Preliminary stormwater system design shall be complete for the definitive subdivision review.
- b. Stormwater shall be recharged on the site to the maximum extent practicable. Where stormwater cannot be infiltrated into the ground, water collected by the drainage system should be detained on site and treated by stormwater quality management systems before discharge.
- c. Drainage design shall be consistent with the Massachusetts Department of Environmental Protection Stormwater Management Policy, Phase II, the federal NPDES Stormwater Permit program, and all other local guidelines and ordinances governing the disposal of stormwater. The City Engineer shall instruct the applicant as to the standards for calculating drainage system capacity as each portion of the project is approved by the City Engineer before construction.
- d. After full construction of the subdivision, including all buildings, paved areas, and new landscaping, peak stormwater flows at the boundaries of the development shall not exceed peak flows prior to development measured in the same locations, based on the two, ten and hundred-year, twenty-four hour design storms. After full construction of the subdivision, including all buildings, paved areas, and new landscaping, total peak stormwater flow at

the boundaries of the development shall be less than total peak flow prior to development, based on the two, ten and hundred-year, twenty-four hour design storms. Stormwater volumes shall also be controlled so that if they exceed the volume prior to development at the same location based upon the two-, ten- and hundred-year, twenty-four hour design storm there will be no increased negative impact to properties outside of the Hamilton Canal District.

- e. Drainage from the Hamilton Canal District shall not be connected to the municipal sewer/drain combined system.
- f. Storm drains shall be of the type approved by the Lowell Regional Wastewater Utility.
- g. Catch basins shall be constructed at all low points or sag curves in the roadway, at intervals of not more than three hundred and fifty (350) feet on continuous grades of the roadway, and at or near the corners of the roadway at intersection streets. Each catch basin shall connect directly to a manhole. Additional catch basins may be required based on the capacity of inlet grates to pass anticipated design flows.
- h. Manholes shall be located at all changes in direction, either horizontally or vertically, of a drain line or at the intersection of two (2) or more drain lines, or so located so that no drain line of a length greater than three hundred fifty (350) feet would exist without either a catch basin or a manhole.
- i. All pipe conveyance systems, excluding outlet structures, shall be designed with a minimum of twelve (12) inches in diameter. The minimum pitch of storm drains shall be 0.5 percent.
- j. In cases where underground drainage is required in connection with the erection of buildings or the use of any lot, such underground lines may be connected to the storm drains in the proposed streets within the Hamilton Canal District.
- k. Upon completion of the entire Hamilton Canal District, a total of 30% of roof drainage within the HCD Zoning Districts shall allow for rainwater to be captured and treated with a Rooftop Rainwater Retention Facility (Green Roof) Additional roof drainage must be treated before discharge.
- l. The City shall not be responsible for maintaining drainage systems on private lots within the Hamilton Canal District.
- m. The applicant will be required to submit to the City Engineer a final plan showing the drainage system as constructed.

A7-2. Engineering Requirements

The following items are to be addressed by the City Engineer before construction of a section of street in the Hamilton Canal District. The City Engineer will be required to review additional detailed development documents before construction. The following items shall be addressed to the satisfaction of the City Engineer:

- Grades
- Crown height
- ADA sidewalk curbcut requirements
- Crosswalk base course material and thickness
- Removal of existing material (clearing and grubbing)
- Time of year for suitable construction
- Post-construction clean up
- Installation of granite monuments and bounds
- Street signs

- Storm drain and catch basin standards
- Meeting state stormwater standards
- Final size, location and standards for installation of sewer lines, water lines, underground electrical lines, and other utilities
- Specifications for types of equipment for sewer pump stations (built to city specs)
- Specifications for other utility equipment including but not limited to water gates, hydrants, manholes, catch basins and pipe materials.
- Traffic calming elements not otherwise specified
- Street light types
- Street names (proposed by the applicant before construction of the street)

Standards not otherwise specified within the HCD-FBC shall be required to meet the standards for streets established by the Massachusetts Highway Department. Traffic calming elements are allowed to be included in final engineering plans for public ways with the approval of the City's traffic engineer. Standards for traffic calming not otherwise specified within the HCD-FBC shall be required to meet the standards established in the City of Lowell's Traffic Calming Policy, if the policy has been formally adopted by the City of Lowell at the time of submission of these final engineering plans.

A7-3. Stormwater Regulations and Low Impact Development

In mixed-use infill development, some best management practices (BMPs) for stormwater management differ from suburban practices. Compact development creates fewer pollutants by reducing expansive lawns and parking lots. However, because less land is available for stormwater treatment, excess stormwater may be infiltrated or detained in subsurface basins, used for plantings in green roofs, or sent, treated, into the Canal system. This subsection allows the use of a variety of BMPs and Low Impact Development practices to meet stormwater management standards. Where contradictory to the designs shown in the street standards, these methods may replace the landscape elements shown in the street standards, with the approval of the City Engineer:

1. Use of green swales within the Treeways
2. Use of pervious concrete pavement
3. Use of pavers within the parking spaces on the street instead of asphalt
4. Use of roof drain watering to support street trees
5. Use of alternative tree-pit designs to allow tree watering with stormwater

A8. Severability

If any provision of this Appendix A is found to be invalid by a court of competent jurisdiction, the remainder of Appendix A shall not be affected but shall remain in full force. The invalidity of any provision of this Appendix A shall not affect the validity of the remainder of the City of Lowell Subdivision of Land Standards.