Bothell Main Street Extension

Urban Elements - Design Development

FINAL

9/7/2012

BergerABAM

City of Bothell

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Overview of Conceptual Streetscape

Planning Context

The Downtown Subarea Plan vision statement strongly supports the creation of a vibrant, sustainable, and multi-modal public realm. The following elements of the vision statement allude to the creation of a centrally located public space that can accommodate all citizens of Bothell and support a range of activities:

> *"Give the community 'A Place to Go' in the heart of the City - one that is meaningful to community members, provides for daily needs as well as special events, and appeals to families and Bothell citizens of all ages."*

> *"Enhance the essential 'publicness' of downtown - its wide range of public places, civic buildings, and community services. Make downtown the welcoming place to go to meet, be at the center, and feel a sense of shared common ground in Bothell."*

The subarea plan also suggests that the revitalization of Main Street is critical for the success of the downtown:

> *"Revitalize the economic fortunes and visual character of downtown, and particularly of the City's historic Main Street."*

Finally, the subarea plan calls for the creation of streets that better accommodate all modes of travel, resulting in more environmentally responsible transportation patterns:

> *"Enhance mobility and connectivity to and through the district via automobile, transit, bicycle and pedestrian travel."*

> *"Support sustainable, environmentally responsible development."*

The proposed conceptual design for Main Street embodies all of these qualities described in the vision for the Downtown Subarea Plan within a very tight cross-section.

Design Philosophy

The design philosophy for Main Street is to create a street that supports a very high level of pedestrian activity, while still allowing vehicular access and parking. As much of the right of way as possible would be dedicated to pedestrian use without precluding the automobile.

The street would have pedestrian scaled features and amenities, decorative finishes, and support interesting activities that make it an attractive and comfortable place to linger and walk through.

The street would continue to provide vehicular access and parking, but the geometry of the travel lanes, the placement of street trees and furnishings, and the high level of pedestrian activity would keep vehicular speeds very low. Low traffic speeds would improve pedestrian safety making Main Street a comfortable place for senior citizens and families with young children and would enable pedestrians to safely cross the street at any location, which would reinforce the pedestrian emphasis of the street.

Several design elements are proposed to help facilitate all of the varying demands on this important street. The most important element is the use of "Flexible Zones" which can function as parking spaces, pedestrian seating, and/or shopping or vending space. A complementary design element is moving the street trees into this "Flexible Zone" to allow better tree growth but also to visually narrow the roads and expand the pedestrian realm and therefore slow traffic.

These characteristics will give Main Street a strong and unique identity as the heart of the downtown, which will benefit businesses and accelerate Bothell's revitalization cycle.

Design Elements

Main Street will have the following elements:

- One travel lane in each direction (with a future left turn pocket at Bothell Way NE)
- Parallel parking that can be converted to pedestrian use ("Flexible Zones")
- Flexible Zones (see Flex Zone description)
- Flush curbs
- Generous sidewalks
- Street trees located in the Flexible Zone
- Special design treatment at intersections
- Mid-block crosswalks
- Decorative lighting
- Street furnishings
- Gateway Treatment

Pedestrian oriented street in Italy

Pike Place Market in Seattle

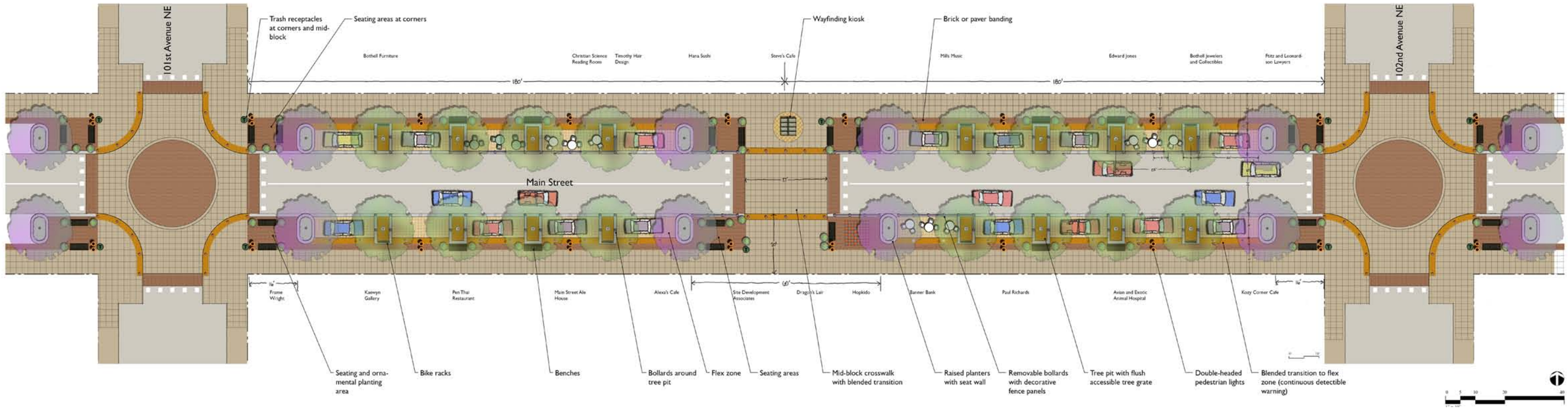
Las Ramblas in Barcelona, Spain

3rd Street Promenade in Santa Monica, CA

N. Beach Road in East Sound, Orcas Island

Lyngby, Denmark (Photo credit: www.pedbikeimages.org/Ryan Snyder)

Flexible Zones



The flexible zones will be located between the sidewalk and vehicle travel lane throughout Main Street. Further evaluation is needed between 103rd and 104th Avenues, where the block is short . This block would also receive special gateway treatment.

The flexible zones can accommodate a range of uses including cafe seating for adjacent restaurants, retail merchandise displays, street vendors, street musicians, outdoor art exhibits, additional public open space and seating, bicycle parking, parade seating or 10-foot (max) square market tents.

The flexible zones are designed as modules based on a single 22-foot long by 8-foot wide parallel parking space. Each module can be open or closed to the vehicle travel lane and designated for parking or pedestrian use respectively. Pedestrian uses could occupy one or more modules, with multiple modules forming a contiguous block.

To make the flexible zone feel like part of the sidewalk, to visually narrow the vehicle travel lanes and calm traffic, and to help define the flexible zone modules, street trees would be planted within the flexible zone between parking spaces. Tree pits will be 6 feet square and surrounded by a 24-inch wide concrete band. Removable bollards will located in the concrete band to prevent trees from getting damaged by parking vehicles. Structural soil would be used under the flexible zone and sidewalk to encourage healthy root development and extend the life of each tree as well as conserve the pavement by preventing damage like buckling caused by tree roots. Silva cells under the sidewalks are also an option.

The tree pits will have uplights to illuminate the trees at night. Electrical outlets to accommodate seasonal LED "twinkle lights" will be provided on the street lights.

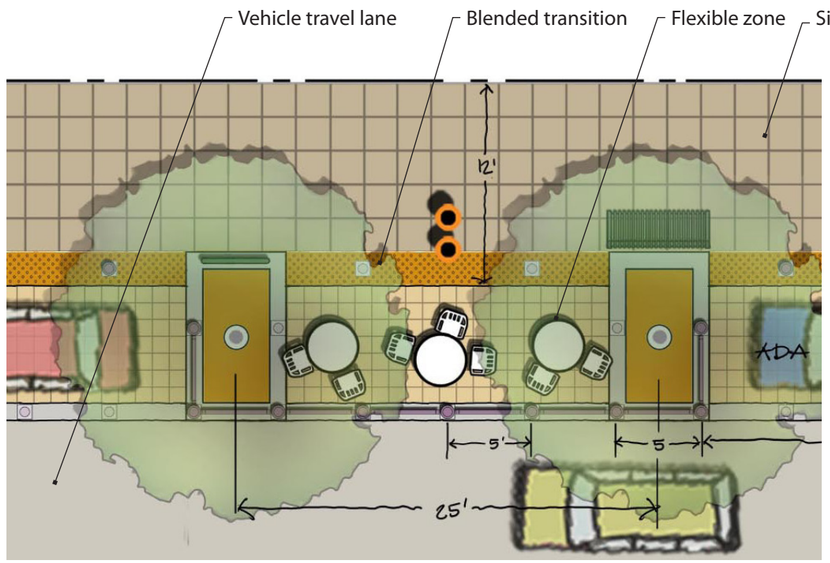
The preferred design has interlocking concrete unit pavers in the flexible zone that allow stormwater to infiltrate into the ground and air to reach the roots of the trees. The flexible zones on Main Street could use the same, or similar unit pavers proposed on the Multiway boulevard to tie the two projects together, potentially reduce the cost of the pavers, and to simplify maintenance. Even when the flexible zones are being used for parking, their materials and finishes would make the street feel more pedestrian oriented.

To physically close off a flexible zone module from the street, a partition system comprised of removable bollards and decorative fence panels will be placed along the edge of vehicle travel lane. The enclosure system will be designed to withstand a minor vehicle crash and to prevent pedestrians, particularly young children, from wandering into the vehicle travel lane while using the flexible zone. Removable bollards or planters will also be located along the blended transition to prevent parking vehicles from encroaching onto the sidewalk. When the flexible zone is in pedestrian use, these bollards can be removed and relocated to the edge and become part of the enclosure. The flexible zone enclosures could be designed by an artist and reflect the character and history of Bothell.

There are two options for maintaining and installing the enclosure system: 1) The City can store, maintain and install the enclosure system, or 2) each merchant could undertake part or all of this work as part of the lease agreement with the City. Factors to consider are: how heavy the components are, if the enclosure system has a repeating kit of parts, how the safety will inspections occur, and consistent maintenance for a safe result. The flexible zones would be available to adjacent businesses to lease on a quarterly basis. Businesses would be responsible for providing furnishings, such as cafe seating, heaters, any additional planters, as well as cleaning the area within the flexible zone. The City would establish regulations and perform design reviews of the furnishings as part of the flexible zone use agreement to ensure that the furnishings fit the character of the street.

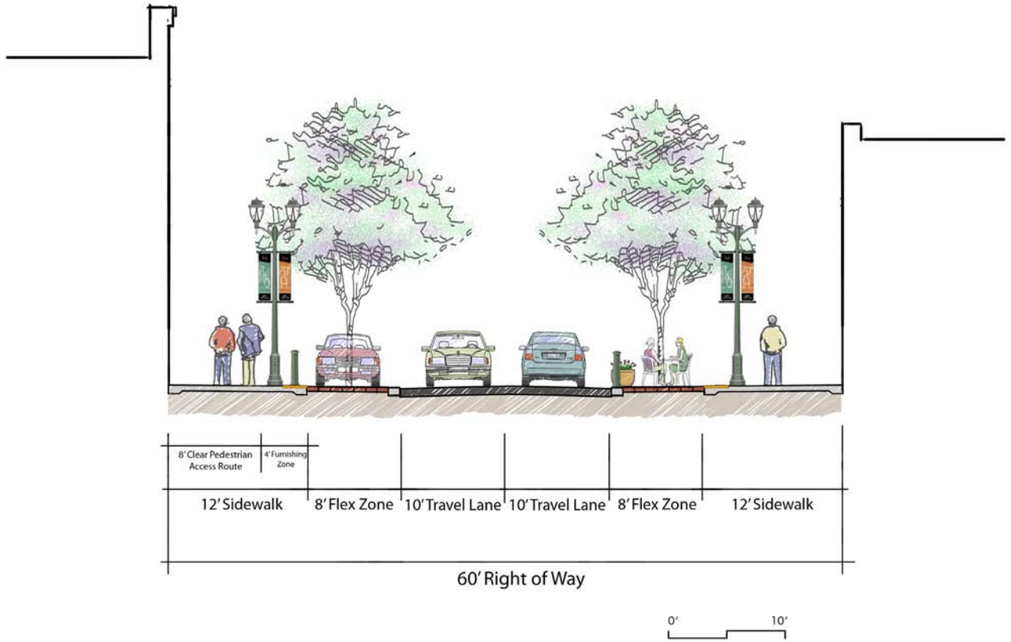
Features:

- Flex zone spaces (22' X 8') with pavers
- Flex zone enclosure system comprising removable bollards and partitions.
- Flush curb
- Street trees and ornamental shrubs planted between Flex Zone spaces
- Decorative street lighting
- Street furnishings

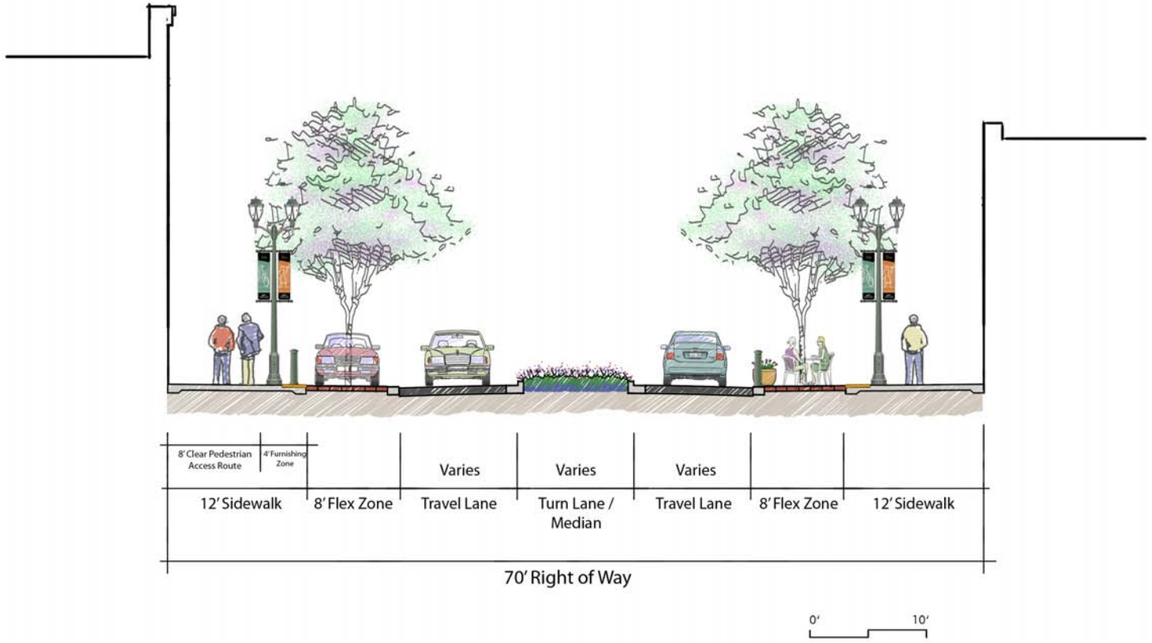


Flexible zone concept with blended transitions

Multiple flexible zone modules



Proposed cross section for the Enhancement Blocks



Proposed cross section for the Extension Block

Potential Uses

Sidewalk cafes


Performances


Seasonal street vendors


Seasonal on-street, ganged bike parking


Sidewalk cafes


Art exhibits


Festival market tents


Seasonal open space

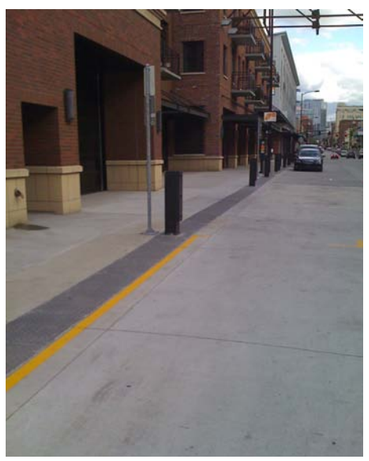

Merchandise displays


Street vendors


Seasonal open space

Comparable Flush Curb Designs

Villebois, Oregon

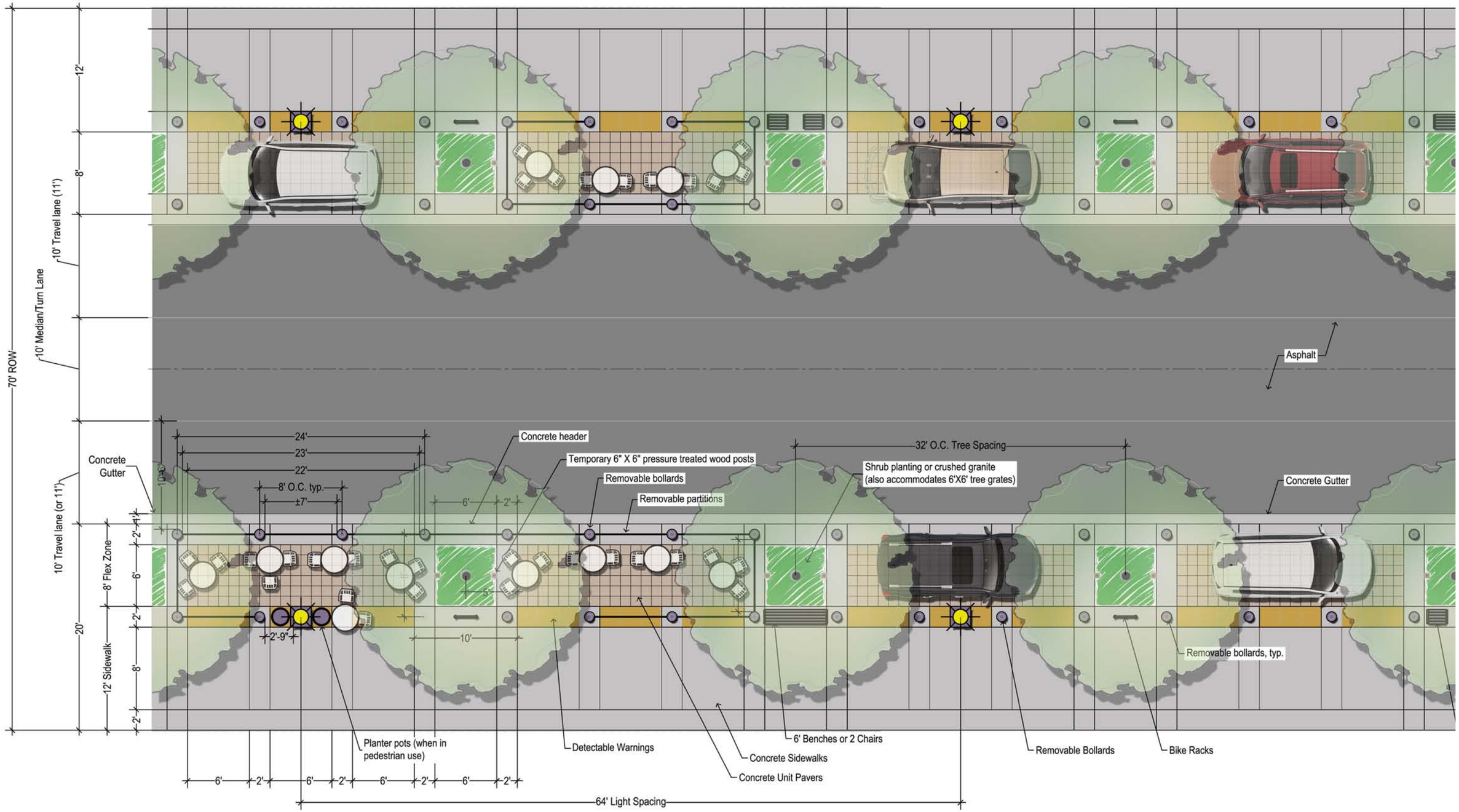


Portland, Oregon

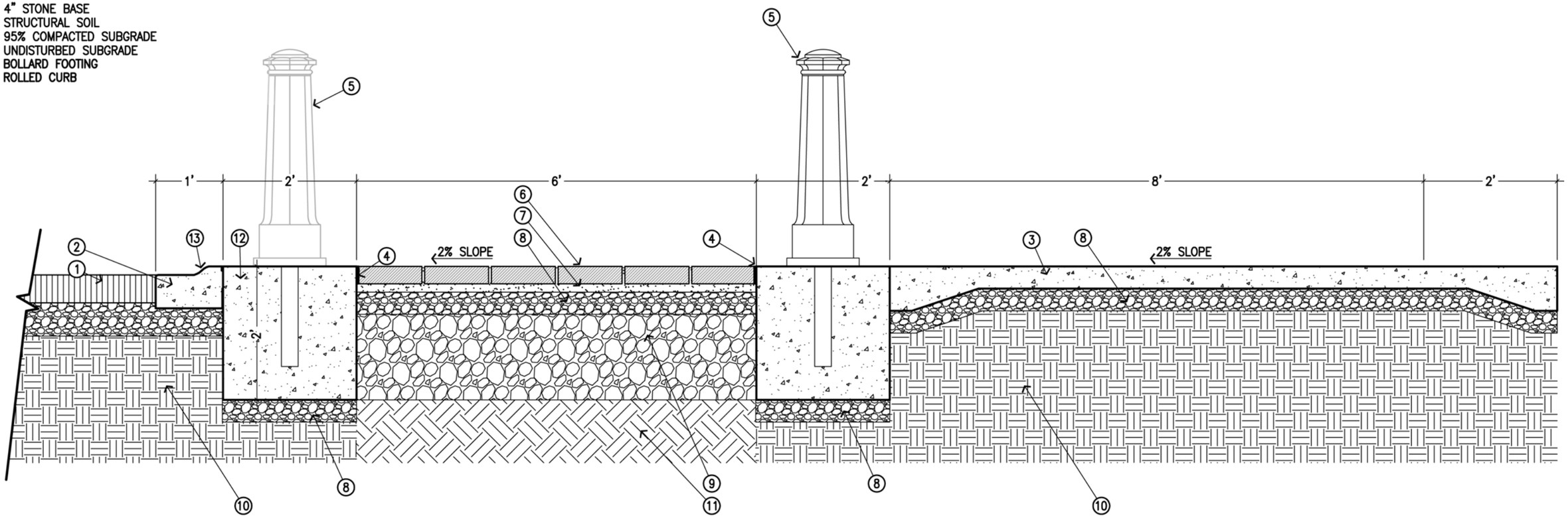
Enumclaw, Washington

San Jose, California

Prototypical Layout



1. ASPHALT PAVING, SEE CIVIL
2. INTEGRAL CURB AND GUTTER TH 2" ROLLED
3. CONCRETE SIDEWALK WITH THICKENED EDGE
4. ISOLATION JOINT, TYP.
5. REMOVABLE BOLLARDS WITH 3" PIPE AND SLEEVE
6. SAND SET 12"X12" CONCRETE UNIT PAVERS
7. SETTING BED LAYER
8. 4" STONE BASE
9. STRUCTURAL SOIL
10. 95% COMPACTED SUBGRADE
11. UNDISTURBED SUBGRADE
12. BOLLARD FOOTING
13. ROLLED CURB



Section through Flexible Zone

Flexible Zone Enclosure Design

Inspiration

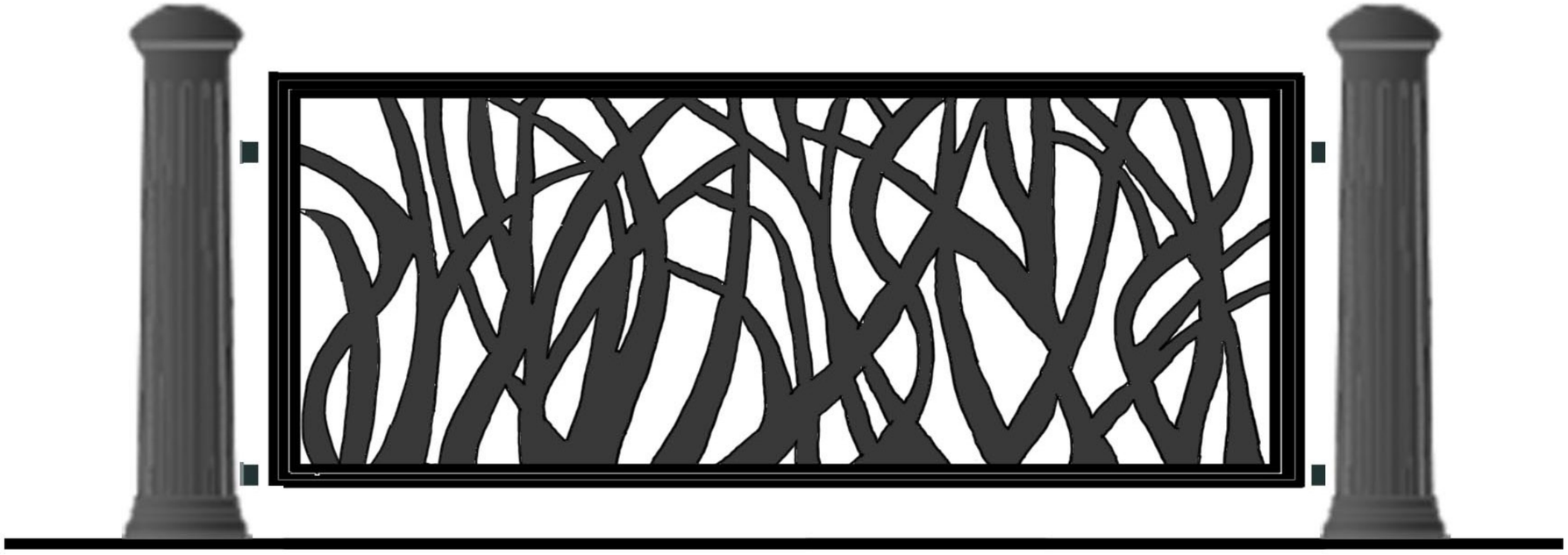






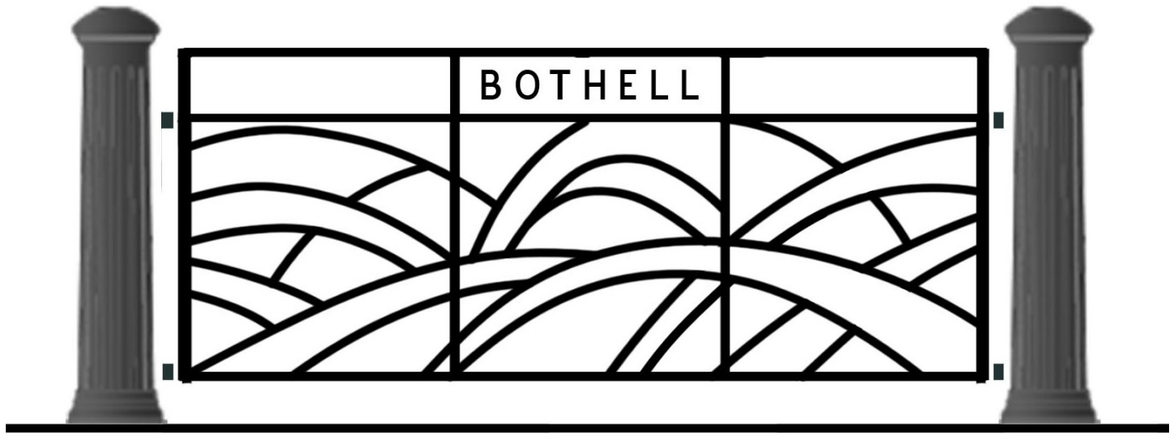


Preferred - Custom Design by Artist Based on Unified Theme with Other Downtown Elements



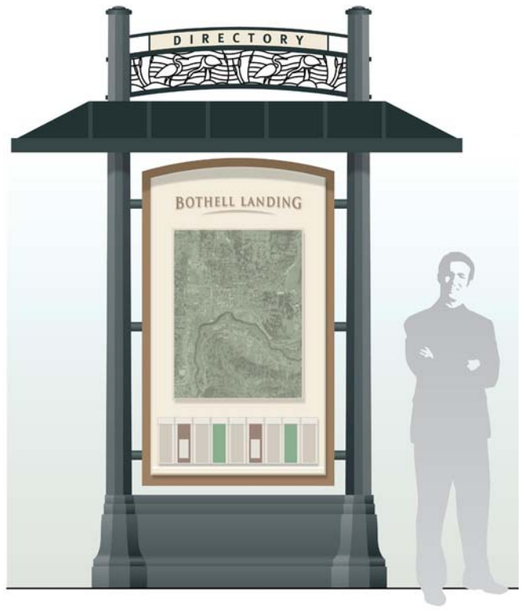
Custom Cast Iron Panels - Grasses

Preferred - Bothell Landing Design

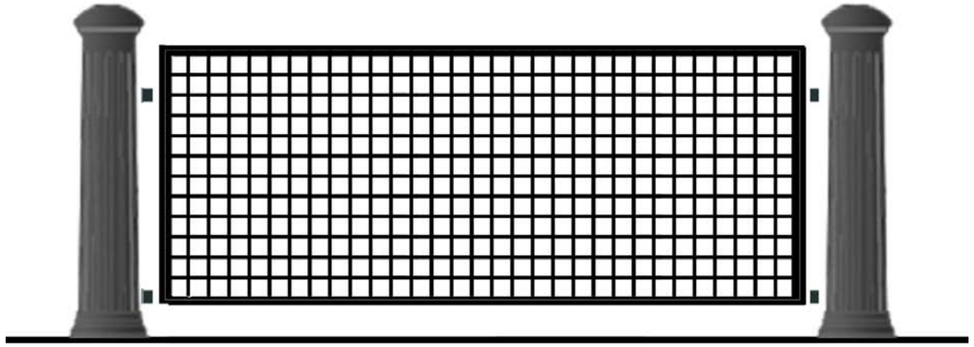


Bothell Landing - Grasses

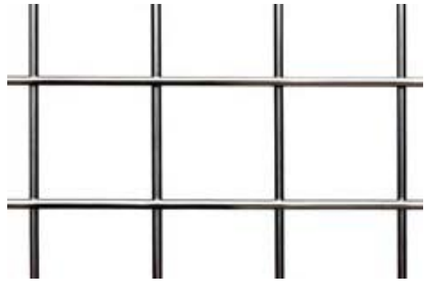
Bothell Landing - Herons

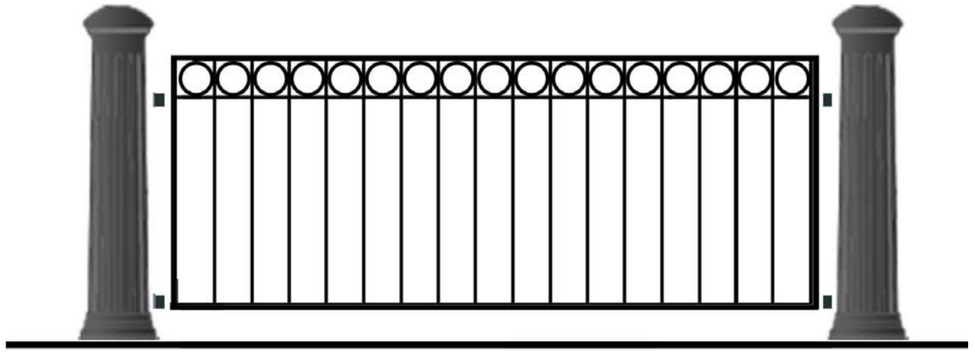


Alternates (subject to approval by engineer, City of Bothell)



4" X 4" Welded Wire Mesh



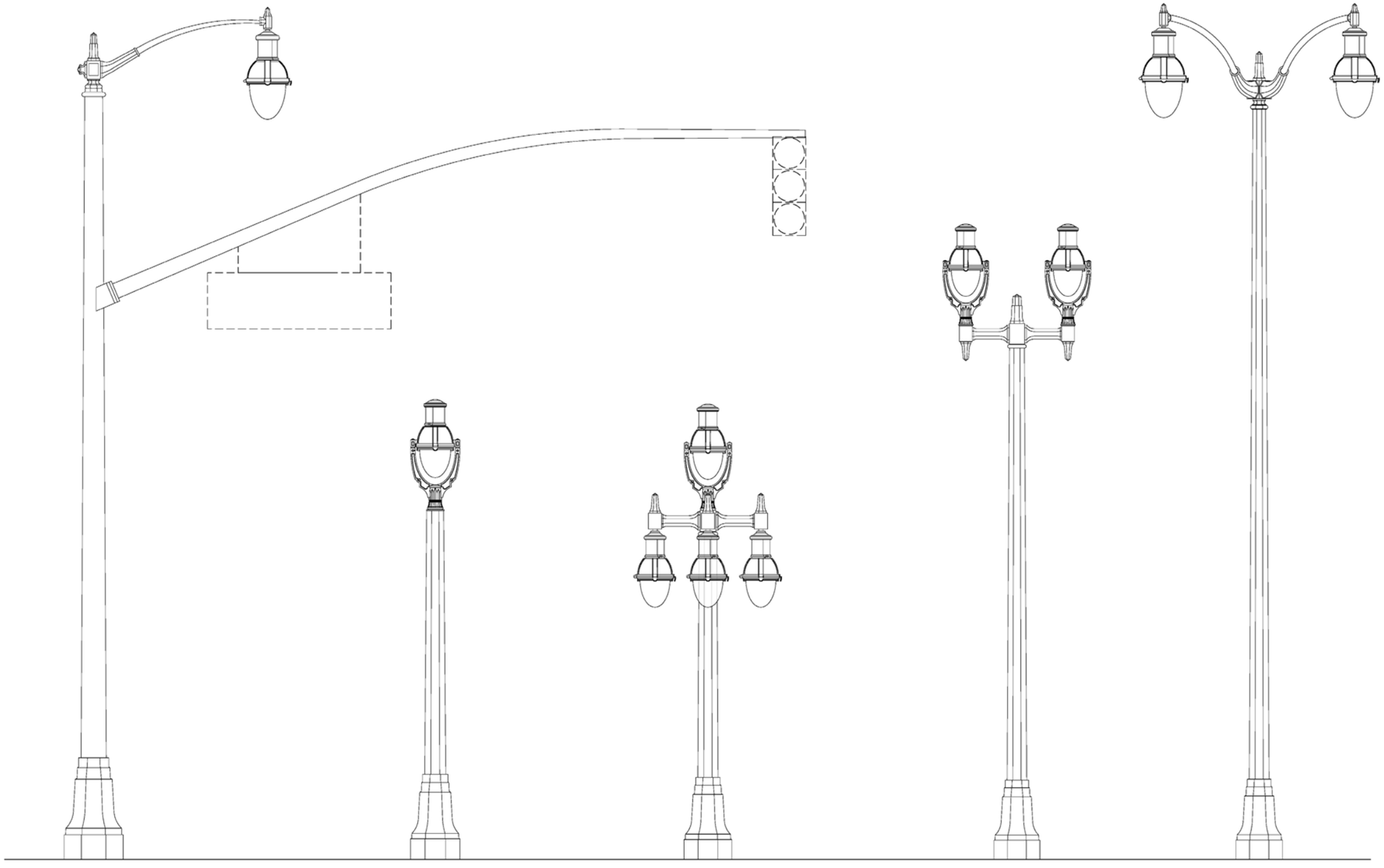


Pickets

Stretched Cloth Canvas with Business Name or "Bothell"

Lighting and Bollards

Downtown Street Lighting Collection



* See City of Bothell Design and Construction Standards and Specifications available at: www.ci.bothell.wa.us

- Click on "City Services" on the top banner, then scroll down to "Public Works" and click on the heading, then click on the link to "Design and Construction Standards" on the right side banner

- Street lighting standards are discussed in Chapter 3 (section 3-9) and the drawings are located in the 300 series.

Main Street Lighting

Street Lights

Main Street will use the same light that is being used on the Bothell Way NE project, the Lumec "Renaissance" Series luminaire. The Bothell Way NE project will have a twin-headed light on a 21' pole in the medians and a single post-top light on a 14' pole along the sidewalks. The luminaires will have an 4100k LED source.

Main Street will use a twin-headed light on a 16' pole with an LED source. The pole will be similar to the pole used on Bothell Way NE. All street light poles will also accommodate banners or hanging plants. All light poles will have a gloss black powder coated finish. The light pole and base should be slender, not overly bulky, and the base should perhaps be shorter than the current 2' 7" height. The thick pole and base specified on Bothell Way NE may give the narrower Main Street right of way a fortress-like feeling.

Tree Uplights

Tree uplights will be used at all tree wells located in flexible zones to provide a festive nighttime environment.

Seasonal Lighting

Electrical outlets will also be located at every light pole to accommodate seasonal "twinkle" lights on trees. Each light will have two outlets, with one at the top of the pole and one at the base.

Bollards

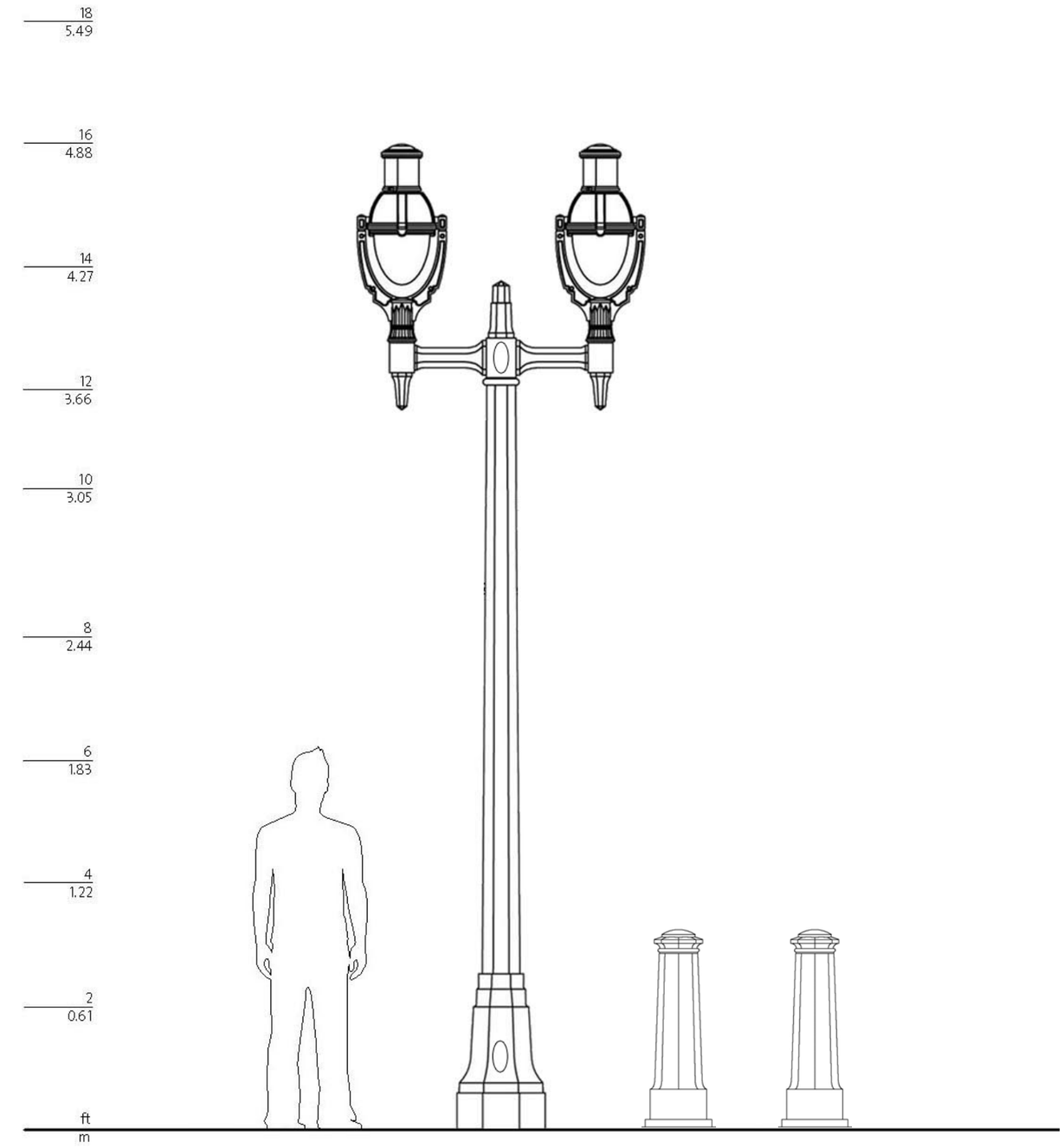
Removable bollards will be used to help protect trees and keep cars from encroaching on the sidewalk when the flexible zones are being used for parking. The same bollards will be used to close off flexible zone modules for pedestrian use. Bollards should have an historic appearance and not be too thick, imposing, or fortress-like; they should be slender to maintain the openness of the street.

Permanent lighted bollards can be used at corners and mid-block crosswalks to increase illumination of the crosswalks and provide protection for pedestrians waiting to cross.

Both the fixed and removable bollards will need to be customized to accommodate the flexible zone partitions. Brackets will need to be added to the top and base of each bollard on both sides of the bollard.

The preferred bollard style is the Antique Street Lamps "Naval Academy" Series (same as Holophane "Nautical" Series), which comes in a standard and lighted version. This bollard matches the octagonal street light poles. The standard Nautical bollard will need to be customized to accommodate the flexible zone partitions and be removable. Ideally, this customization should include making the bollard more slender so that the bollards do not create a fortress-like effect on the street.

See *Review of Barrier Standards Applicable to Flexible Parking Areas: Appendix 1*



Lumec "Renaissance" Series Street Light with Union Metal "Lodi" Pole

Antique Street Lamps "Naval Academy" Series Cast Iron Bollard (same as Holophane "Nautical" Series)

Holophane "LT Bezel Ring" in-grade LED up-light

Furnishings

The family of furnishings and their finishes for Main Street will match the furnishings selected for the Bothell Way NE project. The furnishing finish will be black powder coating.

Seating

The preferred bench is the Landscapeforms "Plainwell". the same finish as the Bothell Way NE furnishings. On Main Street, benches will be located along the sidewalk and at corners and mid-block crosswalks. A mix of 72" long benches and individual seats will be used to create variety along the street.

Landscapeforms 72" long "Plainwell" with center arm rest

Landscapeforms "Plainwell" bench

Landscapeforms "Plainwell" seat

Trash Receptacle

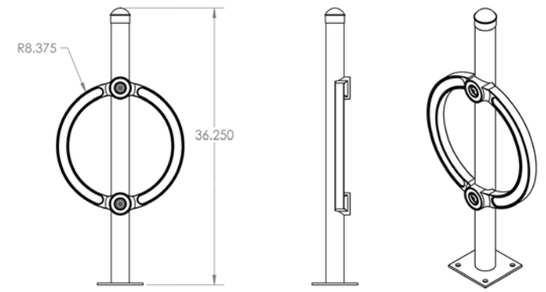
The trash receptacle for Main Street will be consistent with the trash receptacle selected for the Bothell Way NE project, the Landscape Forms "Dispatch". Trash receptacles will be located near corners and mid-block crossings within the furniture zone along the curb.

Landscape Forms "Dispatch"

Bicycle Rack

The proposed bike rack is the same rack specified on the multi-way boulevard project, the Maglin MBR202 rack. This rack accommodates two bicycles and will be located along the block at tree pits. Each block face will have 4 racks. This rack can be customized with text, such as "City of Bothell" on the loop element.

If demand for bicycle parking is high during peak cycling months, additional parking can be provided by temporarily locating ganged racks in one or more of the flexible zones. Ganged racks can be off-the-shelf or custom designed to relate to the City of Bothell and the other streetscape elements.



Maglin "MBR200 Bike Rack"

Technical Info

Trash Receptacles -- Trash Receptacles shall be Forms + Surfaces model "Dispatch", SLDIS-220, 45-gallon. Trash Receptacles shall have two (2) twenty-gallon liners for split stream use; one litter graphic and one recycling graphic on sign plate each with black vinyl graphics. Color of sign plate shall be brushed aluminum. Provide lid with an internal baffle plate to divide inserted waste materials into two streams. Receptacles shall be surface mount with standard slate texture color for receptacle base and lid.

Forms + Surfaces
30 Pine Street
Pittsburgh, PA 15223
Tel: 800-451-0410
Fax: 412-781-7840
Web: www.forms-surfaces.com

Benches -- Benches shall be Landscape Forms - Plainwell Series, color and finish shall be powder coated black.

Landscape Forms
7860 SW Laurel Street
Portland, OR 97225
Tel: 800-430-6206
Web: www.landscapeforms.com

Bike Racks -- Bike racks shall be Maglin model # MBR-200. Color and finish shall be powder coated black. Bike racks shall be direct burial installation.

Maglin Site Furniture Inc.
1875 Lawrence Street Suite 1400
Denver, CO 80202
Tel: 800-716-5506
Fax: 877-260-9393
Web: www.maglin.com

Paving Treatments

Sidewalks

The pedestrian access route for sidewalks would be paved with concrete to provide a smooth surface for pedestrians and wheelchair users. The concrete would have saw-cut scoring to create interest for pedestrians. The concrete would have a smooth finish but still have a high enough coefficient of friction to prevent slips when wet.

Sawcut concrete with smooth finish (preferred) 2' x 2'

Flexible Zones and Crosswalks

Flexible zones and crosswalks will have concrete unit pavers that shall be visually similar to 'Aqua-Bric' by Advanced Pavement Technology. Paver shall be "Ashlar"; "SunRiver Blend" color. Surface texture shall be similar to "Century finish, flat surface

SunRiver Blend (pavers in Ashlar pattern)

Aqua-Bric Specifications

The Aqua-Bric® Series

Advanced Pavement Technology presents a pedestrian-friendly, but vehicular tolerable stormwater management system featuring Aqua-Bric® permeable pavers. The smooth, flat surface created using Aqua-Bric® meets ADA standards and is a superior choice for areas with high foot traffic – even for pedestrians in high heels or wheel chairs. Ideal for roadways, parking lots, plazas and walkways, Aqua-Bric® is used by Advanced Pavement Technology to implement the environmentally sound Bio-Aquifer Storm System (BASS™).

See back side for more information.

Benefits of BASS™ with Aqua-Bric®

- Meets pedestrian slip resistance standards from the Americans with Disabilities Act (ADA) Architectural Guidelines, as well as EPA stormwater requirements
- Provides smooth surfaces with minimal openings to make walking more comfortable
- Allows for rapid removal of stormwater through void openings
- Eliminates standing water for plazas and walkways without sloping
- Maximizes design flexibility by enabling a wide range of creative patterns
- Simplifies maintenance in climates with ice and snow

Aqua-Bric® Ashlar

Dimensions:

Nom. 5" x 10" x 3⅛"

Dimensions:

Nom. 5" x 5" x 3⅛"

Dimensions:

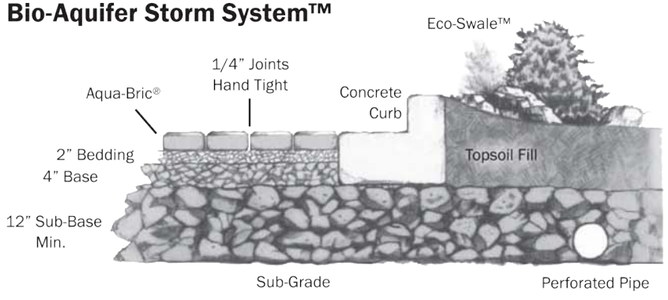
Nom. 10" x 10" x 3⅛"

When used as part of Advanced Pavement Technology's exclusive BASS™ method, these pavers allow for natural stormwater drainage and groundwater recharge, making the paved surface ecologically sound and economically smart. In fact, the BASS™ method is an acceptable post-structural Best Management Practice (BMP) used to meet the federal stormwater management requirements. Roads and parking lots created using BASS™ with these permeable pavers offer vast benefits:

- Meeting EPA stormwater requirements with a superior solution for NPDES Phase II
- Achieving significant savings and fostering ecological integrity through enhanced land planning
- Outperforming other systems in harsh climates or with freeze/thaw cycles
- Delivering maximum strength to handle heavy vehicular traffic
- Producing remarkable curb appeal and convenient maintenance access
- Providing outstanding results on a 50-year life-cycle cost analysis

Aqua-Bric®, Aqua-Loc™, Eco-Brick™ and Aqua-Bricloc® are licensed shapes, available only from Advanced Pavement Technology or selected national manufacturers. The pavers are manufactured according to ASTM C936 specifications. They can be produced in a variety of custom colors and installed using manual or mechanical methods. The new paver shapes can also be combined during installation to achieve a number of attractive patterns in an ecological pavement system.

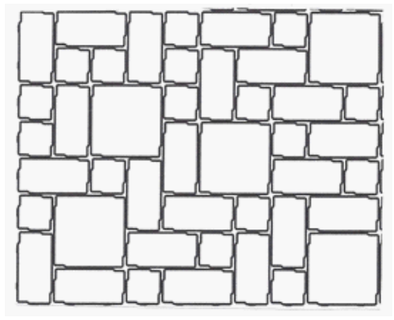
Bio-Aquifer Storm System™



Concrete Unit Paver

Concrete unit pavers shall be visually similar to 'Aqua-Bric' by Advanced Pavement Technology. Paver shall be "Ashlar"; "SunRiver Blend" color. Surface texture shall be similar to "Stone Texture".

Pavers shall meet and/or exceed the requirements set forth in ASTM C936. Pavers shall have a volume loss of less than one (1) cubic inch per eight (8) square inches, and the thickness loss shall not be more than one-eighth (1/8) inch when tested in accordance with ASTM C418.



Length or width of units shall not differ by more than ± one-sixteenth (1/16) inch from manufacturer's stated manufacturing dimension. Thickness of pavers shall not vary by more than ± one-eighth (1/8) inch from manufacturer's stated dimension.
Prior to installation, all pavers shall be visually inspected and be free from defects that can interfere with proper placing of the pavers or impair the serviceability of the pavement. Minor cracks, incidental to the usual methods of manufacture or minor chipping resulting from customary methods of handling in shipment and delivery, shall not be deemed grounds for rejection.

Paver supplier

Willamette Graystone
1150 N. E. Lafayette Ave.
McMinnville OR 97128
Cell phone 971-241-0312
gales@willamettegraystone.com
http://www.advancedpavement.com/aqua-bric.htm

Paver aluminum edge restraint shall be Curv-Rite 4000 Series, 3" high x 3" wide x 8' long.

Curv-Rite Aluminum Edging
Wayland, Michigan
(800) 366-2878
Web: www.curv-rite.com

Base

Permeable Concrete Pavers
Amended Soil Type B shall be placed over prepared Subgrade to the thickness of material indicated in the Plans. Moisten, spread and compact the Open Graded Base (No. 57) to the thickness of material indicated in the Plans. For compaction, make at least two (2) passes in the vibratory mode then at least two (2) passes in the static mode with a minimum ten (10) ton vibratory roller until there is no visible movement of the material. Do not crush aggregate with the roller. Moisten, spread and screed the Bedding Course (No. 8) to the thickness of material indicated in the Plans. The Contractor shall not subject the Bedding Course (No. 8) to any vehicular or heavy equipment traffic before paver installation begins.

Concrete Unit Pavers
CSBC and CSTC shall be placed over prepared Subgrade, and compacted to the thickness of material indicated in the Plans. Compaction shall be to 95 percent density per 2-03.3(14)D. Moisten, spread and screed the Bedding Course (No. 8) to the thickness of material indicated in the Plans.

Special attention must be given to achieve required compaction standards adjacent to edge restraints, concrete curbs, catch basins, and landscape irrigation conduits.

Bedding Course (No. 8)

Bedding Course shall meet the following requirements for grading and quality when placed in hauling vehicles for delivery to the project site, or during manufacture and placement into a temporary stockpile. The exact point of acceptance will be determined by the Engineer.

Sieve Size	Percent Passing
1/2"	100
3/8"	85 – 100
No. 4	10 – 30
No. 8	0 – 10
No. 16	0 - 5

Open Graded Base (No. 57)

Open Graded Base shall meet the following requirements for grading and quality when placed in hauling vehicles for delivery to the project site, or during manufacture and placement into a temporary stockpile. The exact point of acceptance will be determined by the Engineer.

Sieve Size	Percent Passing
1 1/2"	100
1"	95 – 100
1/2"	25-60
No. 4	0 – 10
No. 8	0 - 5

Detectable Warnings

Detectable warnings for visually impaired pedestrians must be used wherever a sidewalk crosses a vehicular way, except at unsignalized driveways. Situations where the sidewalk is flush with the street must also have detectable warnings.

Cast iron detectable warning plates are recommended for Main Street, as they fit the historic character of Bothell. While the up-front cost of cast iron is higher than plastic detectable warnings, they require less maintenance and last longer. Cast iron detectable warnings come in 3' long x 2' wide plates.

Cast Iron Detectable Warning (preferred)

Cast Iron Detectable Warning (preferred)

Cast iron detectable warnings are manufactured by a number of companies including Neenah, East Jordan Iron Works, and Iron Age Designs.

Detectable Warning Specifications

Detectable warnings shall be an integral part of the ramp and comply with section 4.29 of the ADA Accessibility Guidelines and section 705* of the 2010 ADA standards for accessible design.

Dome Size (4.29.2 and 705.1.1*)

Truncated domes in detectable warning surface shall have a base diameter of 0.9 inch (23 mm) minimum and 1.4 inches (36 mm) maximum, a top diameter of 50 percent of the base diameter minimum, to 65 percent of the base diameter maximum, and a height of 0.2 inch (5.1 mm).

Dome Spacing (4.29.2 and 705.1.2*)

Truncated domes in a detectable warning surface shall have a center-to-center spacing of 1.6 inches (41 mm) minimum and 2.4 inches (61 mm) maximum, and a base-to-base spacing of 0.65 inch (17 mm) minimum, measured between the most adjacent domes on a square grid.

Contrast (4.29.2 and 705.1.3*)

Detectable warning surfaces shall contrast visually with adjacent walking surfaces — either light-on-dark, or dark-on-light.

Materials

Cast gray iron conforming to ASTM A-48 class 30A minimum.

Tree Grates

Tree grates will not be installed in the original construction of Main Street, but may be added on a case by case basis after construction if warranted in certain locations. The design will accommodate 6' X 6' square grates.

Planting

Street Trees

Trees are one of the strongest design elements defining the character and quality of a street. Research on street trees has shown that they have many benefits, including:

- Significant "place making" value
- Traffic calming effect and crash reduction
- Air pollutant and particulate absorption
- Carbon dioxide absorption
- Stormwater quality and quantity mitigation
- Summer shade and associated energy savings
- Physical and mental health benefits
- Increase in retail sales and rental values

During the conceptual design process, the community was asked to decide whether to have a single tree species or two or more tree species along Main Street. Three options were evaluated: 1) a single tree species throughout, 2) one primary tree species along the street with an accent tree species at intersections and mid-blocks crossings, or 3) One primary tree species with two different accent species for intersections and mid-block crosswalks. Through the community process, a small majority preferred the second option. These options will be developed further during the next phase of work.

Criteria for selection of the Main Street tree species include:

- Small scale tree to fit the relatively narrow street right of way and allow sunlight to reach the sidewalk.
- Generally upright oval or pyramidal shape to fit within narrow sidewalk area and facilitate illumination of the center of the street by the streetlights.
- Branching pattern should be uniform and branches should have good clearance.
- Robust species that will thrive in an urban environment
- Native or regionally appropriate.
- Deciduous, to provide summer shade and allow winter sun.
- Relatively small leaf size to allow filtered sunlight and minimize maintenance problems (clogging storm drains, major leaf removal program).
- Open, irregular branch structure to allow views and sunlight to penetrate to surrounding buildings and serve as a counterpoint to the strong lines of existing background architecture.
- Provide interest and color in more than one season if possible (particularly spring and fall).

City of Bothell has a list of recommended tree species from which we have identified a number of candidate species for Main Street. Candidate species included:

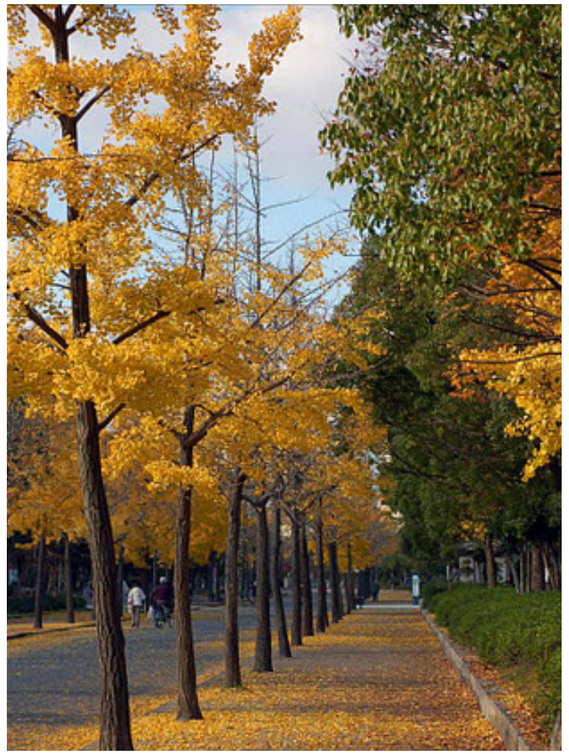
- Cercidiphyllum japonicum, Katsura tree
- Ginkgo biloba 'Autumn Gold,' Autumn Gold ginkgo
- Acer rubrum, Red maple
- Pyrus calleryana 'Aristocrat,' Ornamental pear

The preferred street trees for Main Street are the Katsura and the Ginkgo. The Ginkgo will be the primary Street Tree along the street and the Katsura will be the accent tree at the intersections and mid-block crosswalks.

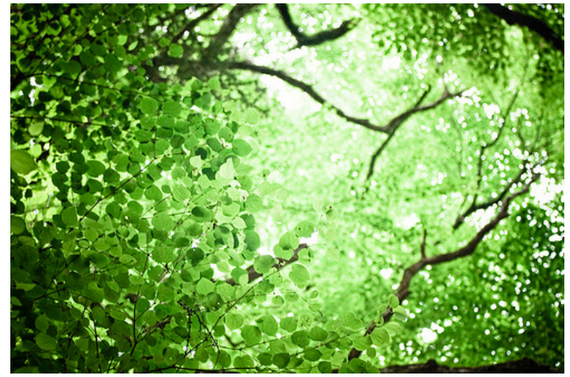
Pyrus calleryana 'Cleveland select,' Ornamental Pear

Acer rubrum 'Franksred," Red Sunset Maple

Pyrus calleryana 'Cleveland select,' Ornamental Pear



Ginkgo biloba 'Autumn Gold,' Autumn Gold Ginkgo (primary street tree)



Cercidiphyllum japonicum, Katsura Tree (intersection and mid-block accent tree)

Street Tree Soils: Option A

To improve the health and life expectancy of the street trees, structural soil is recommended adjacent to all tree pits under the flexible zones, where the concrete unit pavers will also allow some air to pass through to the soil and roots. Structural soil can be compacted to 95% of dry density to support sidewalks and other paved areas, but will allow tree roots to extend through it and under the paved areas. Structural soil mixes typically comprise about 20% clay loam soil mixed with 80% 1 to 3/4-inch angular gravel, which forms voids for the soil and roots.

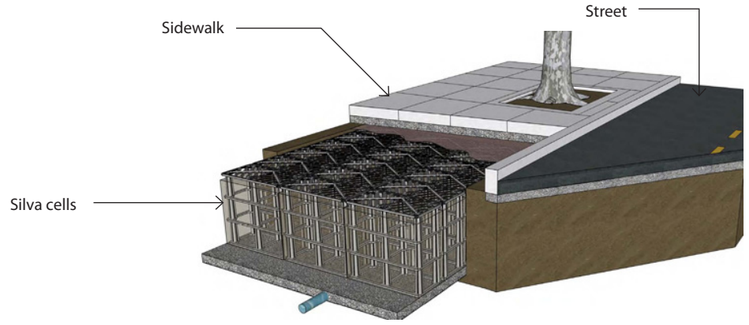
Since structural soil has 80% less soil per cubic foot than regular soil, approximately five times as much volume of structural soil should be used to provide each tree with an adequate growing medium. The structural soil zone should be at least 36" deep.

Planting soil should be used in the tree pit itself, where 95% compaction is unnecessary.

Silva Cells: Option B

"The Silva Cell is a modular suspended pavement system that uses soil volumes to support large tree growth and provide powerful on-site stormwater management through absorption, evapotranspiration, and interception." *(http://www.deeproot.com/products/silva-cell/silva-cell-overview.html)*

"Each Silva Cell is composed of a frame and a deck. Frames are 48" (1200 mm) long x 24" (600 mm) wide x 16" (400 mm) high. They can be stacked one, two, or three units high before they are topped with a deck to create a maximum containment area for lightly compacted loam soil. Silva Cells can be spread laterally as wide as necessary. Each unit is approximately 92% void space, making it easy to accommodate surrounding utilities." *(http://www.deeproot.com/products/silva-cell/silva-cell-overview.html)*



Silva Cell under sidewalk (image by: Deeproot.com)

SILVA CELL TECHNICAL SHEET

DeepRoot's new Silva Cell supports traffic loads while providing uncompacted soil volumes for large tree growth and on-site stormwater management. The modular framework provides unlimited access to healthy soil — a critical component of tree growth in urban environments — allowing them to manage storm-water, reduce heat-island effect, and improve air quality.

The modular design of the Silva Cell makes using increased quantities of native or specialized soils simple and easy, ensuring high quality soils and expanded rooting zones to grow vibrant, healthy trees with long life expectancies.

Silva Cell systems can also easily be sized to treat the water quality volume of surrounding impermeable surfaces in a typical urban setting. For example, a 1,200 cubic foot volume (34 m^3) of Silva Cells can be designed for 0% runoff from a 3,000 square foot (279 m^2) Type II rain event.

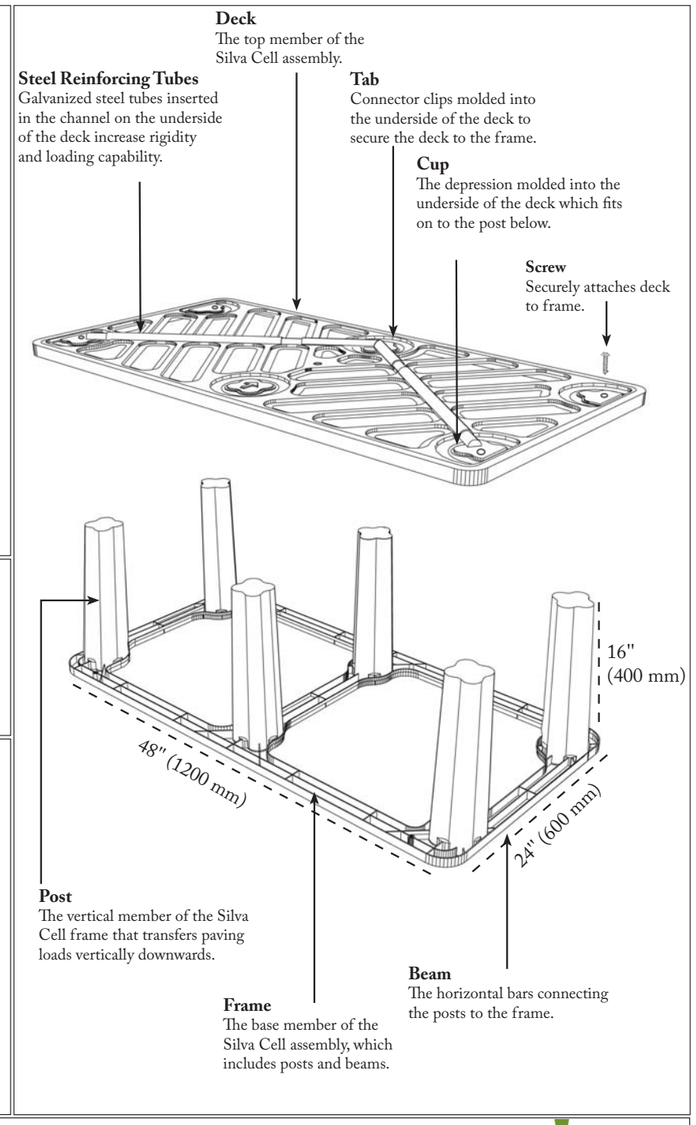
By combining on-site stormwater management with expanded rooting volumes for large, healthy trees, Silva Cells create an unparalleled opportunity to improve the environmental and aesthetic functioning of our urban spaces.

MATERIAL SPECIFICATIONS
Fiberglass reinforced, chemically-coupled, impact modified polypropylene.
Galvanized steel tubes.

FRAME DIMENSIONS
Length: 48" (1200 mm)
Width: 24" (600 mm)
Height: 16" (400 mm)

DECK DIMENSIONS
Length: 48" (1200 mm)
Width: 24" (600 mm)
Height: 2" (51.5 mm)

CAPACITY
Void capacity: approximately 92%
Soil capacity: approximately 10 ft^3 (.28 m^3)



Deep Root Partners, L.P.
530 Washington Street
San Francisco, CA 94111
Tel: 415/781-9700 Fax: 415/781-0191 www.deeproot.com

DeepRoot®

Shrub and Groundcover Planting

The sidewalk extensions at tree planters, and individual planting strips would be planted with ornamental plants or groundcovers to provide visual interest, reinforce the separation between the street and the sidewalk, and to help mitigate the impacts of traffic on pedestrians.

Design criteria for selection of ornamental planting include:

- Low maintenance.
- Hardy and able to withstand occasional foot traffic.
- Bright color, preferably in all seasons.
- Low in height (under 30") to allow drivers and pedestrians to see one another, particularly at intersections.
- Seasonal color.

Ornamental shrubs and groundcovers to be considered in the detailed design phase include:

- Cistus corbariensis, White rockrose
- Lavandula angustifolia, Lavender
- Festuca ovina 'Glauca,' Blue fescue
- Pennisetum alopecuroides, Fountain grass
- Helictotrichon sempervirens, Blue oat grass
- Rosmarinus officinalis, Rosemary
- Miscanthus sinensis, Maidenhair grass
- Calamagrostis arundinacea 'Karl Foerster', Feather reed grass
- Gaultheria shallon, Salal
- Viburnum davidii, Viburnum
- Berberis thunbergii 'Cherry Bomb', Japanese barberry
- Equisetum hyemale, Horsetail
- Arctostaphylos uva ursi, Kinnikinnick
- Cotoneaster dammeri, Bearberry cotoneaster
- Ceanothus gloriosus 'Heart's Desire", Wild lilac
- Mahonia repens, Creeping mahonia

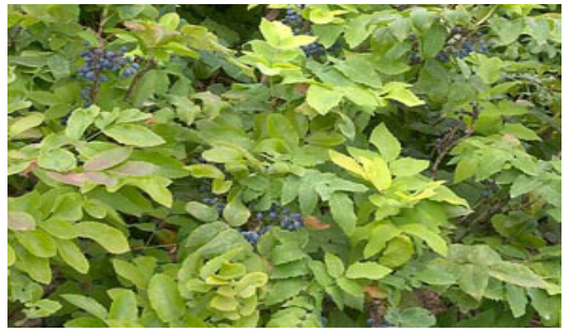
Specific plant groupings and layout will be developed during the next phase and should be coordinated with the Main Street Enhancement Project so that Main Street has a consistent appearance and identity.

Viburnum davidii, Viburnum

Berberis thunbergii, Japanese barberry

Mahonia repens, Creeping mahonia

Rosmarinus officinalis, Rosemary



Mahonia nervosa, Longleaf mahonia

Gaultheria shallon, Salal

Lavandula angustifolia, Lavender

Ceanothus gloriosus 'Heart's Desire", Wild lilac

Arctostaphylos uva ursi, Kinnikinnick

Cotoneaster dammeri, Bearberry cotoneaster

Cistus corbariensis, White rockrose

Miscanthus sinensis, Maidenhair grass

Miscanthus sinensis, Maidenhair grass

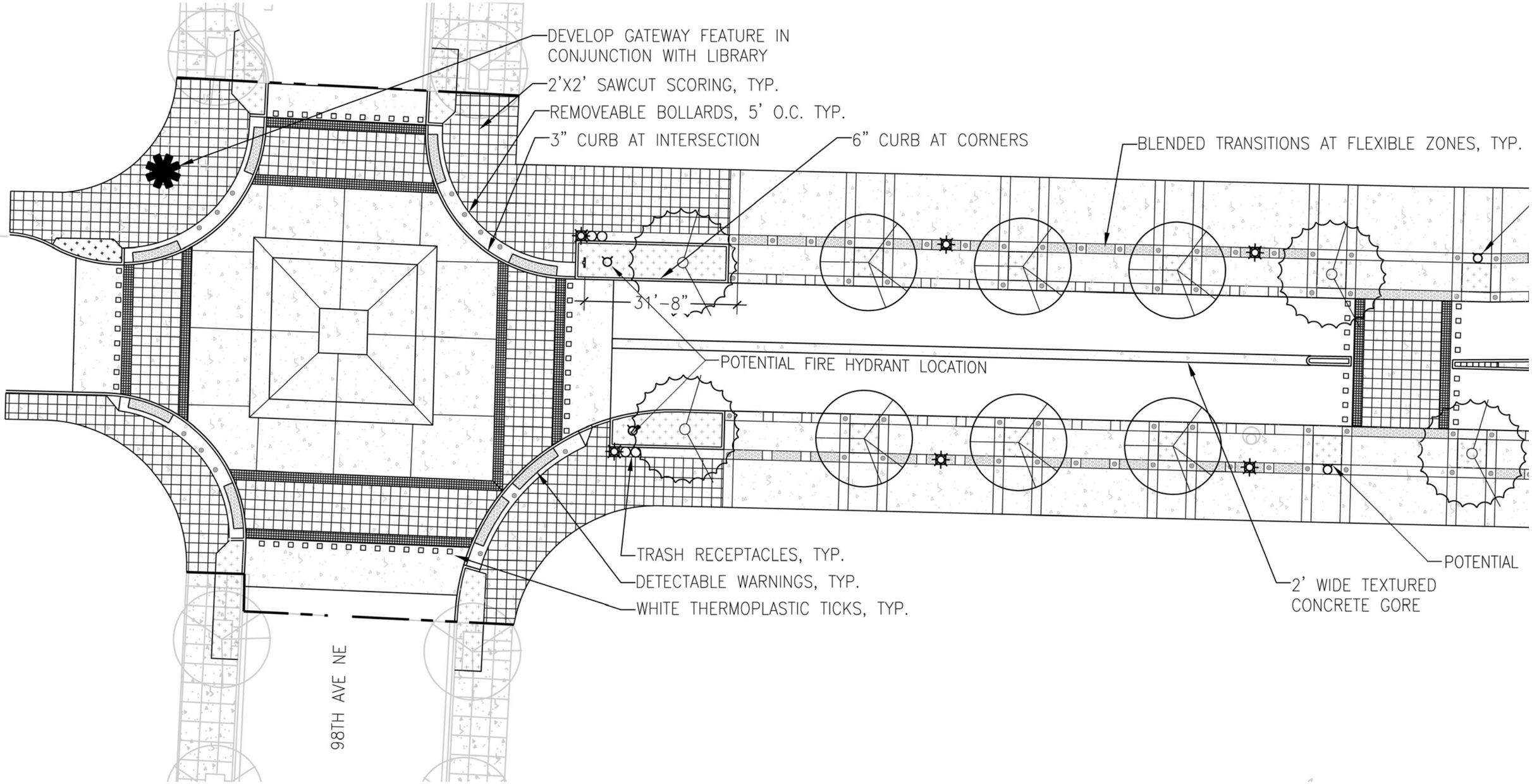
Calamagrostis arundinacea 'Karl Foerster', Feather reed grass

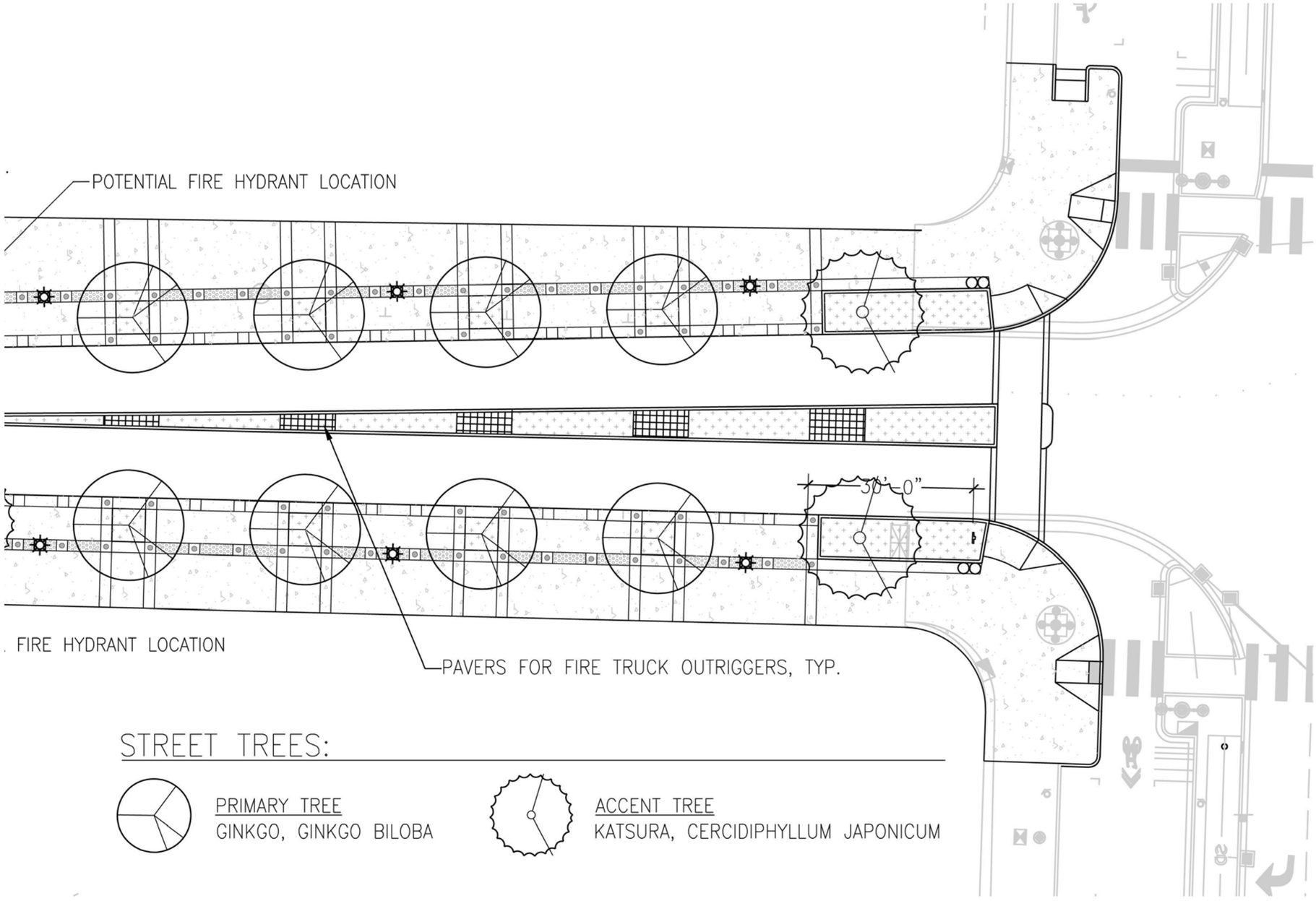
Helictotrichon sempervirens, Blue oat grass

Equisetum hyemale, Horsetail

Festuca ovina 'Glauca,' Blue fescue

Extension Block Layout





LEGEND

- SCORING PATTERN 2' x 2'
- PA — PLANTING BED
- BOLLARD
- TREE AND PLANTING AREA
- WHITE THERMOPLASTIC TICKS
- DETECTABLE WARNING STRIP
- LIGHT POLE
- STOP SIGN
- PAVERS
- RECEPTACLES
- FIRE HYDRANT
- GATEWAY FEATURE

STREET TREES:

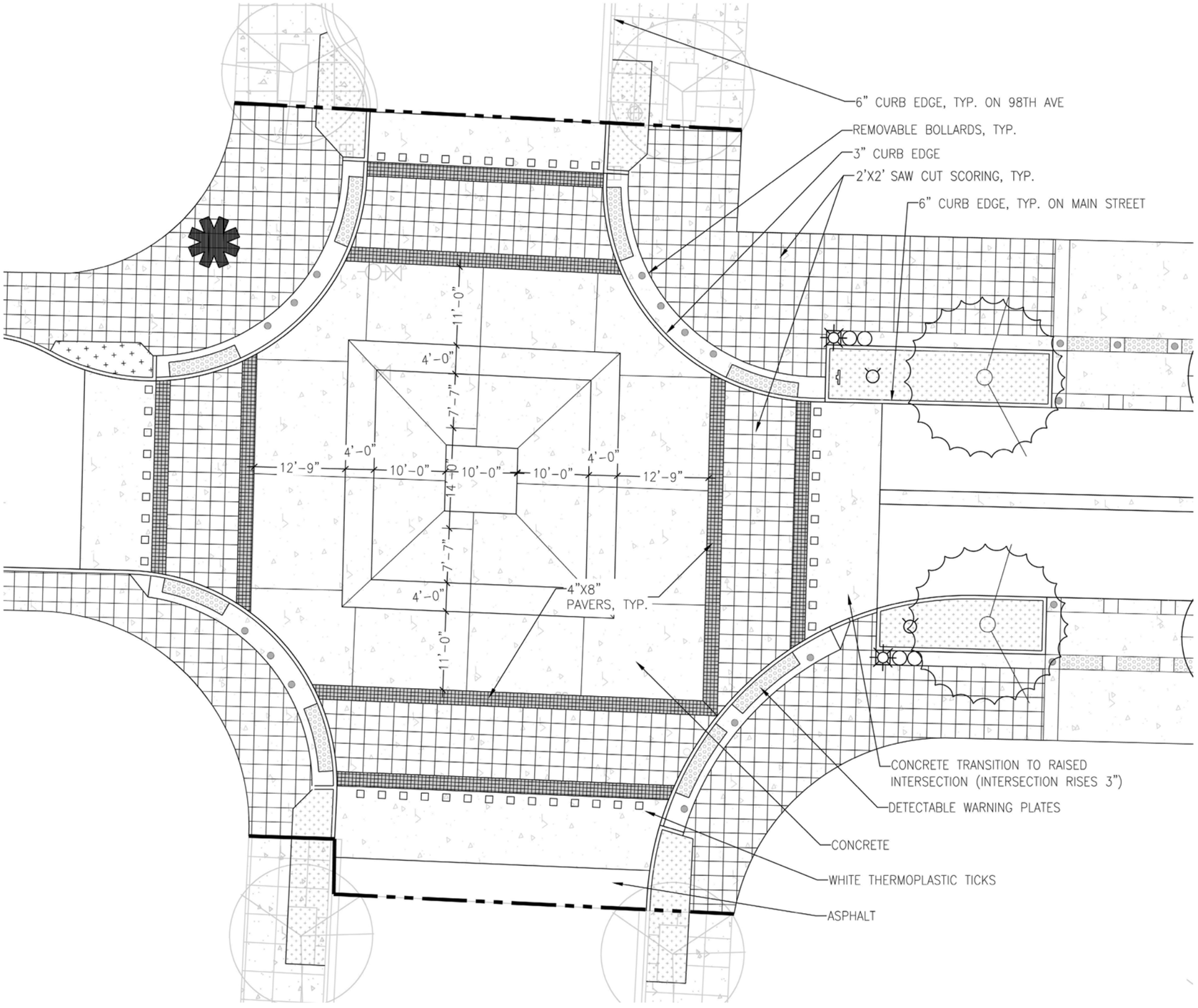
PRIMARY TREE
GINKGO, GINKGO BILOBA

ACCENT TREE
KATSURA, CERCIDIPHYLLUM JAPONICUM

NOTES:

1. ALT: REGULAR ADA RAMPS AND NO PLANTERS AT INTERSECTIONS
2. % PLANTING AREA: 7.3% (2433sf)
3. % SIDEWALK AREA: 41%
4. % PARKING AREA: 10.7%

Intersection at 98th Avenue NE



SCORING PATTERN
PA PLANTING BED
BOLLARD
TREE AND PLANTING AREA
WHITE THERMOPLASTIC TICKS
DETECTABLE WARNING STRIP
LIGHT POLE
STOP SIGN
PAVERS
RECEPTACLES
FIRE HYDRANT
GATEWAY FEATURE






Corner design examples

Preliminary Gateway Concepts

Some form of gateway treatment will be applied at both ends of Main Street. The gateway can be a traditional arched gateway over the street, a vertical sculptural element, special paving, or a unique, custom object (or objects) along the sidewalk. Development of a gateway concept should be done in collaboration with an artist or artists and the library.

Sculptural gateway elements

Traditional gateway

Custom furnishings

Ground-level gateway elements

Repeating ground-level gateway elements

Preliminary Conceptual Cost Estimate for Preferred Streetscape Elements

DRAFT

Main Street Extension

ITEM	*DESCRIPTION*	*VENDOR*	*UNIT*	*QTY*	*COST*	*SUBTOTAL*	*DIV. $*	*COMMENTS*	*SOURCE*
Sitework									
Excavate 8 inches for Sidewalk and Gravel Base						$ -			
Excavation and Haul top 18" at median						$ -			
Excavate for Structural Soil between Trees						$ -			
Haul and Place Bed in Median						$ -			
Haul, Spread and Compact Gravel Base			LS			$ 150,000			CDC
							$ 150,000		
Paving									
Concrete Sidewalk Paving	Concrete		SF	8730	$ 5	$ 43,650			Pendleton Boulevard
Flush Concrete Curb and Gutter, Headers	Concrete		SF	2760	$ 8	$ 22,080			Pendleton Boulevard
Flexible Zone Pavers	Aquabric	Advanced Pavement Technology	SF	2376.0	$ 6	$ 14,256			Pendleton Boulevard
Concrete Seat Wall at Crosswalks			FF	0.0	$ 60	$ -			
Detectable warnings	2' x 2' cast iron	Iron Age or Neenah	EA	180.0	$ 120	$ 21,600		Along flexible zones, corners and mid-block crossings	Iron Age
							$ 101,586		
Site Furnishings									
Removeable Bollards	Simple fluted custom cast iron bollard with Bothell logo and partition connections	Iron Age or others	EA	72.0	$ 1,250	$ 90,000		At flexible zones	Iron Age
Fixed Bollards	Simple fluted custom cast iron bollard with Bothell logo and partition connections	Iron Age or others	EA	60.0	$ 750	$ 45,000		At intersections, mid-block crossings and outside edge of tree pits	Iron Age
Partition Panels	Custom designed by artist to fit Bothell Landing theme	Iron Age or others	EA	25.0	$ 1,500	$ 37,500		Enough for 5 parking spaces, or 28% of the 16 total spaces	Iron Age
Benches	Landscape Forms "Plainwell", 72" long	Landscape Forms	EA	8.0	$ 1,000	$ 8,000		4 per block face	Pendleton Boulevard
Trash Receptacles	Consistent with Bothell Way NE (Landscape Forms "Scarborough" or "Plainwell")	Landscape Forms	EA	6.0	$ 1,250	$ 7,500		3 per block face	Pendleton Boulevard
Recycling Receptacles	Consistent with Bothell Way NE (Landscape Forms "Scarborough" or "Plainwell")	Landscape Forms	EA	6.0	$ 1,250	$ 7,500		3 per block face	Pendleton Boulevard
Bike Racks	Consistent with Bothell Way NE, (Maglin "MBR200" Series)	Maglin	EA	8.0	$ 250	$ 2,000		4 per block face	Pendleton Boulevard
							$ 197,500		
Lighting and Electrical									
Single-headed pedestrian lights	Lumec Series, 4100K LED source, Renaissance per Bothell Standard	Lumec	EA	0.0	$ 10,000	$ -			CDC
Double-headed pedestrian lights	Lumec Series, 4100K LED source, Renaissance per Bothell Standard	Lumec	EA	12.0	$ 12,500	$ 150,000		64' spacing, typical Pending lighting analysis at intersections	CDC
Tree Up-lights	In-ground uplights at trees (1 per tree)		EA	22.0	$ 500	$ 11,000			CDC
Receptacle at Tree Pits	In-ground locked duplex receptacle at each tree		EA	22.0	$ 50	$ 1,100			CDC
Electrical system	Conduit, transformers, pull boxes, panels, power hook-up		LS			$ 125,000			CDC
							$ 162,100		
Planting									
Trees			EA	22.0	$ 1,000	$ 22,000		3.5" caliper trees	Pendleton Boulevard
Shrubs at Tree Pits			SF	2500.0	$ 10	$ 25,000			CDC
Structural Soil			CY	150.0	$ 45	$ 6,750		At tree pits and under flexible zone	CDC
Top soil and compost			CY	30.0	$ 40	$ 1,200			CDC
							$ 54,950		
Irrigation									
Irrigated Area at Medians and Piping			SF		$ 2	$ -			CDC
Irrigated Area at Tree and Piping			SF	2500.0	$ 1.25	$ 3,125			CDC
POC, Vault, Back Flow Preventer			EA	1.0	$ 10,000	$ 10,000			CDC
							$ 13,125		
Main Street Extension Subtotal							$ 679,261		
Contingency					30%		$ 203,778		
TOTAL							**$ 883,039**		

Review of Barrier Standards Applicable to Flexible Parking Areas -- Appendix 1

At the request of the City of Bothell, BergerABAM reviewed various standards for barrier design and placement between a travelled way and outdoor pedestrian areas to be used as a guide in the design of barriers adjacent to flexible parking zones.

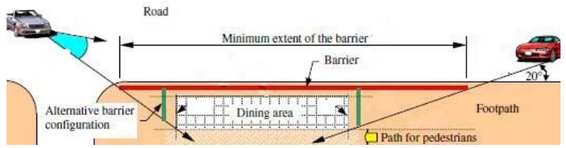
Consideration of types of barriers for outdoor seating requires evaluation of various risks. Such risks include the barrier itself, the risks involved in an event of a car accident, flying vehicle parts or flying barrier parts. Documents, such as bollard crash tests, roadside safety manuals, and urban design standards, were reviewed to provide general guidelines for creating a safe outdoor roadside dining area. This memo summarizes our interpretation of the documents.

Bollards

Various crash tests show that the bollard should be 36 inches in height with a minimum 8-inch diameter to perform as needed. They should have some type of tamper-proof locking and should be manually removable from the base or foundation. Safety will be enhanced if the bollards have reflective tape or some type of illumination (MUTCD; Bike Blogs). Any feature used in combination with the bollards, such as a fence, must not create a hazard to occupants of any vehicle or anyone in the dining area during a crash or during any time. Materials should not be used that can break apart and potentially become projectiles.

The bollards shall be certified to show that any final penetrations are less than 3 feet (ASTM F265-07; Deflection distance as specified by the Department of State Standards).

The location and arrangement of the bollards should provide a minimum 3-foot clearance distance from the edge of the dining area to the bollards. The spacing should provide a maximum 4 feet on center between the bollards (Secure USA). Most of the installation guidelines found were based on a roadside dining area separated from the travel lane by a curb, as flexible parking is a fairly new concept.



To ensure bollard or barrier satisfaction, submittals should include manufacture's specifications and installations, color and model details, and manufactured material product location of production. If bollards are selected, a site soil investigation by a registered geotechnical engineer is required for determination of allowable soil pressures for bollard foundations.

Planters as Rigid Barriers

If rigid barriers are selected, they can be disguised as planter boxes. The performance of these planter boxes shall be same as a rigid concrete barrier (ASTM F2656-07). The minimum height, weight, and sloped face should be same as a rigid traffic barrier as approved by the state. Additionally, the height of the barrier should not exceed 3.5 feet, including the plants (Outdoor Design Standards, Santa Monica). If a rigid barrier is used, the 3-foot clearance distance to the edge of the dining area may not be necessary.

Requirements for Both Bollards and Rigid Barriers

If bollards or planter boxes are used as a barrier, they shall be K4 crash tested for impacts speeds between 28 to 30 mph (DOS SD- STD – 02.01; ASTM F2656-07).

The bollards and barriers shall be Americans with Disabilities Act (ADA) compliant and generally pedestrian friendly (ADA Accessibility guidelines).

The installation of the bollard or barrier should be such that it does not create a tripping or maintenance hazard. It must not intrude in the road or dining area at any time. Barriers or bollards should be located along the curb or road so that they protect the entire dining area, including areas parallel and perpendicular to the roadside. If they are arranged on corners or curves, they should be evaluated on a case-by-case scenario. Ideally, outdoor seating areas should be 50 feet away from any alley or driveway (Collingswood Outdoor Dining Ordinance). If the dining areas are near a driveway or alley, protect the dining area and evaluate the arrangement of the bollards or barriers on a case-by-case scenario.

Recommendations

If bollards are used, to comply with the guidelines, they should be placed a maximum of 4 feet on center. The fencing used between the bollards should not be constructed of material that could shatter or splinter and potentially become projectiles. The bollards and fencing should be placed to separate the dining area from the travelled way by 3 feet.

If planters are used, the minimum height, weight, and sloped face should meet the requirements of a rigid traffic barrier. The height should not exceed 3.5 feet.

References

- King Street Outdoor Dining Design Guidelines
- Outdoor Dinning Policy – Adelaide City Council
- Lismore City Council – Outdoor Dining Policy
- Establishing Attractive Security and Pedestrian Areas in Low Manhattan - Bollards Specifications - Security - Recommendations
- Secure USA Inc. – Secure SENTRY Removable Bollard – Bollard Specifications - Bollard Manufacturing
- Delta Scientific Corp. – Bollard Specifications – Bollard Manufacturing – Bollard Testing
- MaxiForce Traffic Control Bollards – Bollard Standards
- Formex Permanent Steel Forms – Auto Testing and Crash Results
- Urban Services - Design Standards for Urban Infrastructure 11 Fences, guardrails and barriers – Australia
- Collingswood Outdoor Dining Ordinance – Amended outdoor dining regulations
- MUTCD – obstructions in travel way of a shared use path shall be marked with retro reflectorized material.)
- Stonewear force protection
- City of Santa Monica Outdoor Design Standards
- ASTM F2656-07