UBC Social Ecological Economic Development Studies (SEEDS) Sustainability Program

Student Research Report

Green Corridor Phase Two: Rain Garden

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University of British Columbia

LARC 580B

Themes: Biodiversity, Community, Land

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DIRECTED STUDY – LARC580B

RAIN GARDEN

PROJECT COMPLETED BY AYISHAH CHUI, LISA NG, AND MAUREEN SAVAGE
SUPERVISING PROFESSOR CYNTHIA GIRLING
IN COLLABORATION WITH UBC SEEDS, CAMPUS COMMUNITY AND PLANNING
CONSULTANT DARYL TYACKE OF ETA LANDSCAPE ARCHITECTURE

DESCRIPTION

The planning and implementation of a Green Corridor at UBC could bring numerous benefits to the campus. From the first phase of this SEEDS directed study (LARC 581B, completed May 2017), we have identified and demonstrated how the following benefits could be brought by a green corridor/infrastructure at UBC at a planning scale: stormwater cleansing, reduction of stormwater discharge quantity, enhancement of sense of place, relinking of fragmented wildlife habitats, incorporation with the neighbouring Pacific Spirit Regional Park (PSRP), improvement of stream health, improvement of air quality, moderation of microclimate, reduction of greenhouses gases, and rainwater harvesting opportunities. Due to time constraints, we were not able to explore past the conceptual design within the first phase of the directed study. Having met with UBC's community and planning members, we would like to explore a smaller scale demonstration at a more detailed level.

In this second phase of the Green Corridor directed study, we would like to demonstrate further the feasibility and benefits of a small scale intervention at UBC. Having met with SEEDS and community and planning members this fall, we have determined a site within the original framework of the previous green corridor directed study. The site falls within an ongoing project with campus planning staff and consultants; therefore, this directed study will work in collaboration and supervision of the hired consultant, Daryl Tyacke of eta, in addition to our advisor, Cynthia Girling. It has been established that the site is located northeast of the UBC Faculty of Pharmaceutical Sciences building and is to be developed into a shade-tolerant rain garden.

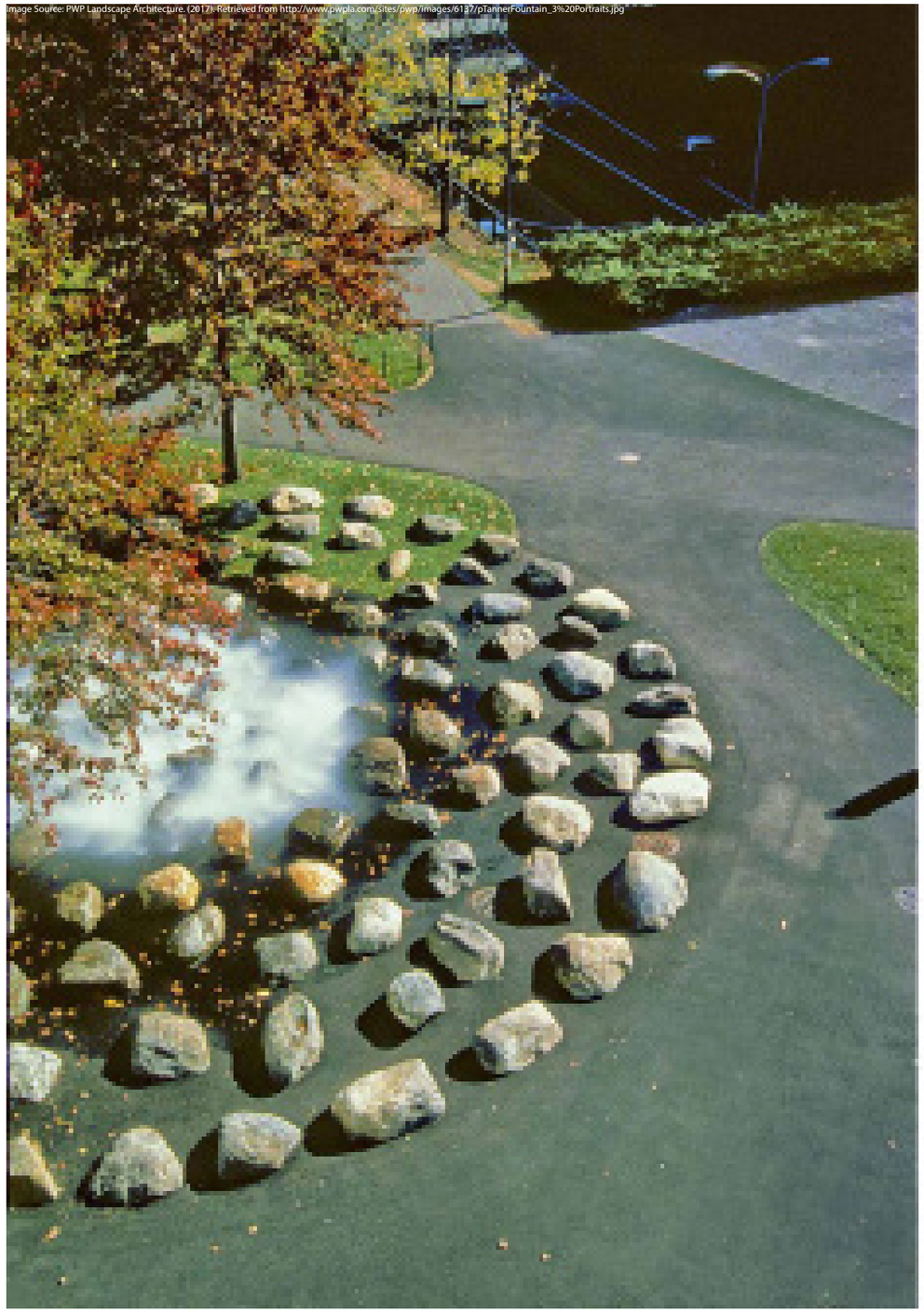
EXECUTIVE SUMMARY

Our project is a continuation of phase one of a SEEDS directed study we completed in May 2017. In that study we identified how a green corridor/ infrastructure could bring benefits to UBC in the form of stormwater cleansing, improvement of stream health and air quality, relinking of wildlife habitats, and an enhanced sense of place, among many others. Following the completion of that directed study project, and a meeting with SEEDS and community and campus planning members in fall 2017, we identified a site, located at Westbrook Mall and Agronomy Rd, north east of the Pharmaceutical Sciences building. This phase of the project will further demonstrate the benefits of a small scale intervention at UBC. Westbrook Mall is currently undergoing revitalization, and our site falls within the project area. As a result, Daryl Tyacke of eta, the hired consultant provided critical feedback, in addition to our faculty advisor, Cynthia Girling for supervising on this project.

Our design solution was developed into a shade tolerant rain garden. We proposed two potential concepts, inspired by precedent research on Tanner Fountain at Cambridge, Massachusetts, and the Capitol Hill Water Quality Project in Seattle, Washington. Circular forms, strong bands of planting, and use of stone are common elements throughout. Our final concept was based on Concept 2, which was the preferred concept after meetings with Cynthia and Daryl. Design elements include circular arrangements of rocks at the high and low points to signify where water enters and exits the raingarden. Bands of shade-tolerant grasses give texture and visual interest throughout the seasons.

Design challenges included selecting plants that were shade and drought tolerant. Another challenge we encountered upon meeting with the campus arborist was to work with the recommended root zones of the existing oak trees, which constrained how far we could extend the raingarden.

PRECEDENT RESEARCH



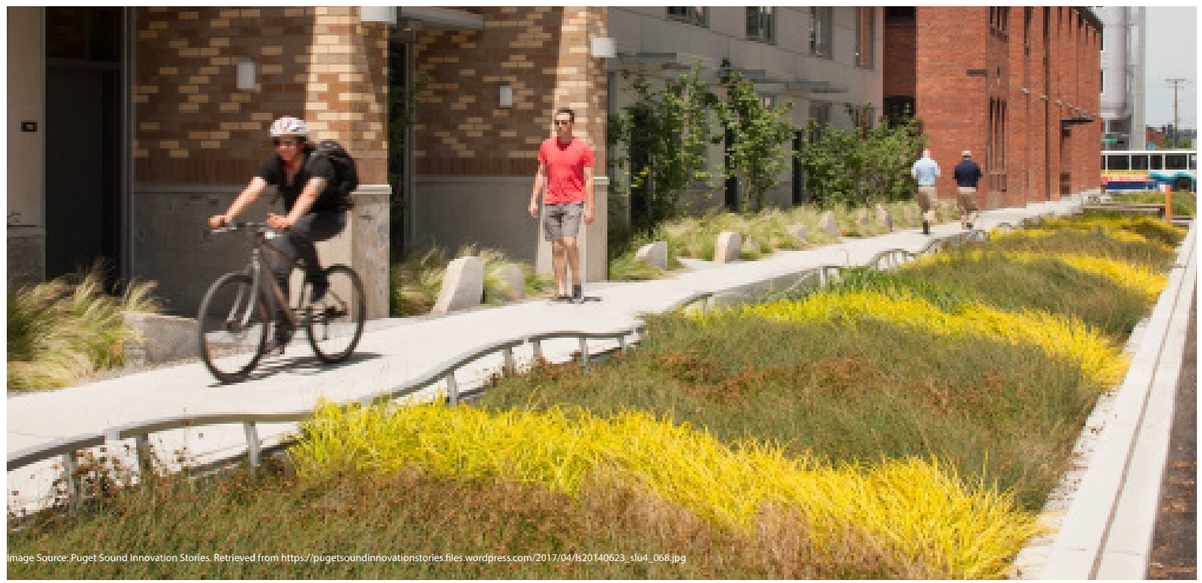
Tanner Fountain
PWP Landscape Architecture
Cambridge, Massachusetts

Tanner Fountain consists of 159 granite boulders which had been sourced from regional farms.

The circular form adopted from this concept was to juxtapose against the existing architectural form. The overall UBC campus has been dictated by institutional buildings, forcing many landscapes to conform to a linear format (eg. Main Mall). Rather than follow suit, the main design elements for this raingarden will contrast with more curvilinear forms.

The boulders used at Tanner Fountain provides a new way for people to move around this space, via a natural seating component. For our rain garden design, we can design this to a smaller scale to provide a new way for rainwater to move, creating an improved visual and audio experience.

PRECEDENT RESEARCH



Capitol Hill Water Quality Project
Runberg Architecture Group
Seattle, Washington

The Capitol Hill Water Quality Project is a regional urban rainwater management project in Seattle. The first phrase of this project was completed in 2013 (EPA, 2017). This project involves redesigning four wide and connected bio-filtration swales along urban street. Plants are selected for the swales to facilitate water cleaning (Seattle Public Utilities, 2012). In the conceptual design stage, multiple planting layouts were proposed in this project, including "Movement Concept", "Tapestry Concept", "Curvy Concept", and "Linear Concept" (Seattle Design Commission, 2011). In addition to the swales, a large underground tank, pre-treatment facility for separating solid waste, and new storm pipes are also installed (Seattle Public Utilities, 2012). When this project is completed, 190 million gallons of urban stormwater will be slowed down and cleansed every year (EPA, 2017).

Setting	Regional Scale Urban Street Project
Drainage Area	1760383 meter sq. (435 acres)
Project Area	338.6 meter sq.
Project Timeline	On Going
	Source: Seattle Public Utilities, 2012

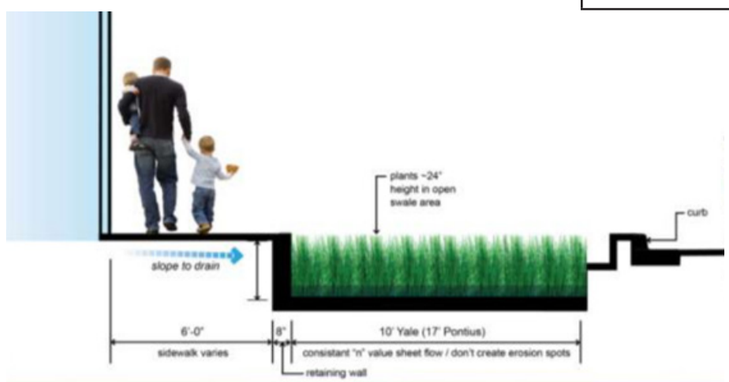


Image Source: (Seattle Design Commission, 15). Retrieved from http://www.seattle.gov/dpd/AppDocs/GroupMeetings/DCPresentation1Swale-on-YaleAgendaID3179.pdf

Planting Palette

Carex laxiculmis 'Hobb'
Bunny Blue Sedge

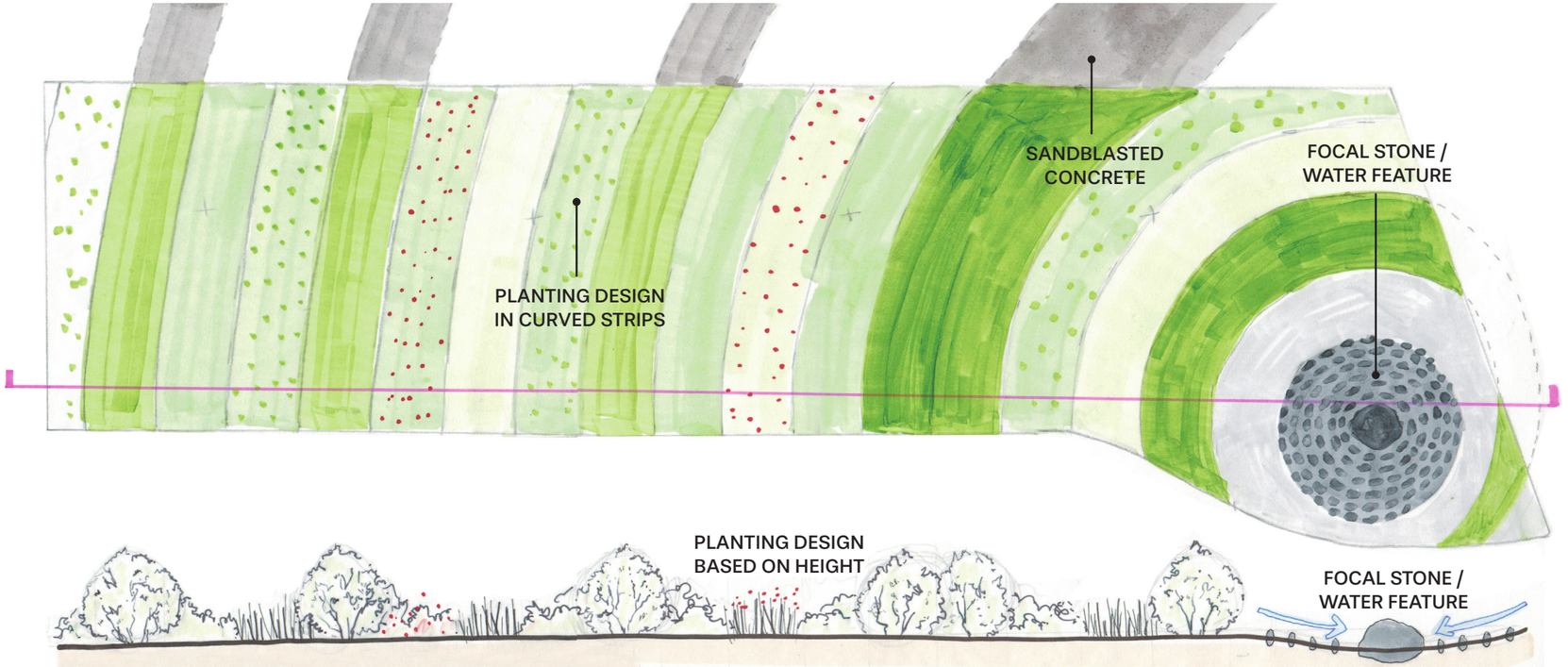
Carex dolichostachya 'Gold Fountains'
Gold Fountain Sedge

Carex oshimensis 'Evergold'
Variegated Japanese Sedge

Juncus patens 'Elk Blue'
California Blue Rush

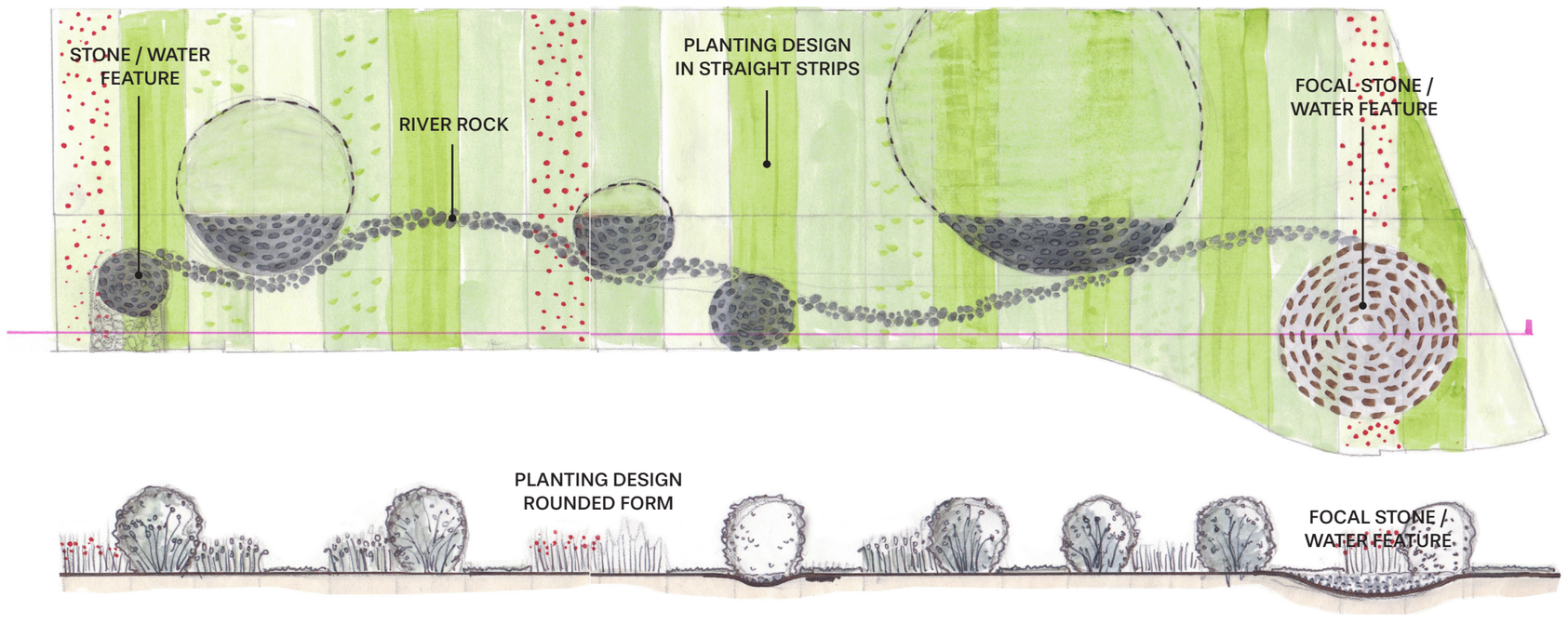
PROPOSED SITE

INITIAL CONCEPTS



Concept 1 - Ripple

Inspired by the Tanner Fountain, this concept proposes a concave terminus stone feature at the raingarden's low point. Plantings are designed to form linear bands, radiating from the terminus stone feature. By assigning plants with varying height to each band, an interesting waveform elevation of the design would be created. This waveform does not only simulate waves created by raindrops, but also provide formal interest to the design even during autumn, when the raingarden could be covered by leaves fallen from the oak trees on site. To make the design more relatable to its surroundings, sandblasted bands are also proposed on the adjacent concrete sidewalk.



Concept 2 - Bubbles

This concept proposes multiple circular features throughout the raingarden, with a curve of pebble stones linking all the circles. These circular features are either made of stone (as in concept 1), or a mixed of stone and planting materials if part of the circle lays outside of the raingarden. Inspired by the Capitol Hill Water Quality Project, plantings with distinct foliage colours are designed to form straight linear bands perpendicular to the road.

FINAL CONCEPT

Our final concept was arrived at after developing 2 conceptual designs:

DESIGN ELEMENTS

Small rocks are arranged to create two circular forms located at either end of the raingarden, signifying where the water will enter and exit the garden (as in concept 2). A meandering “stream” of pebbles connects these two circular features, and provides a channel to make visible the flow of the rainwater as it makes its way to the low point of the garden. Interspersed throughout the swathes of grasses are large boulders that draw the eye and provide a counterpoint to the softness of the planting.

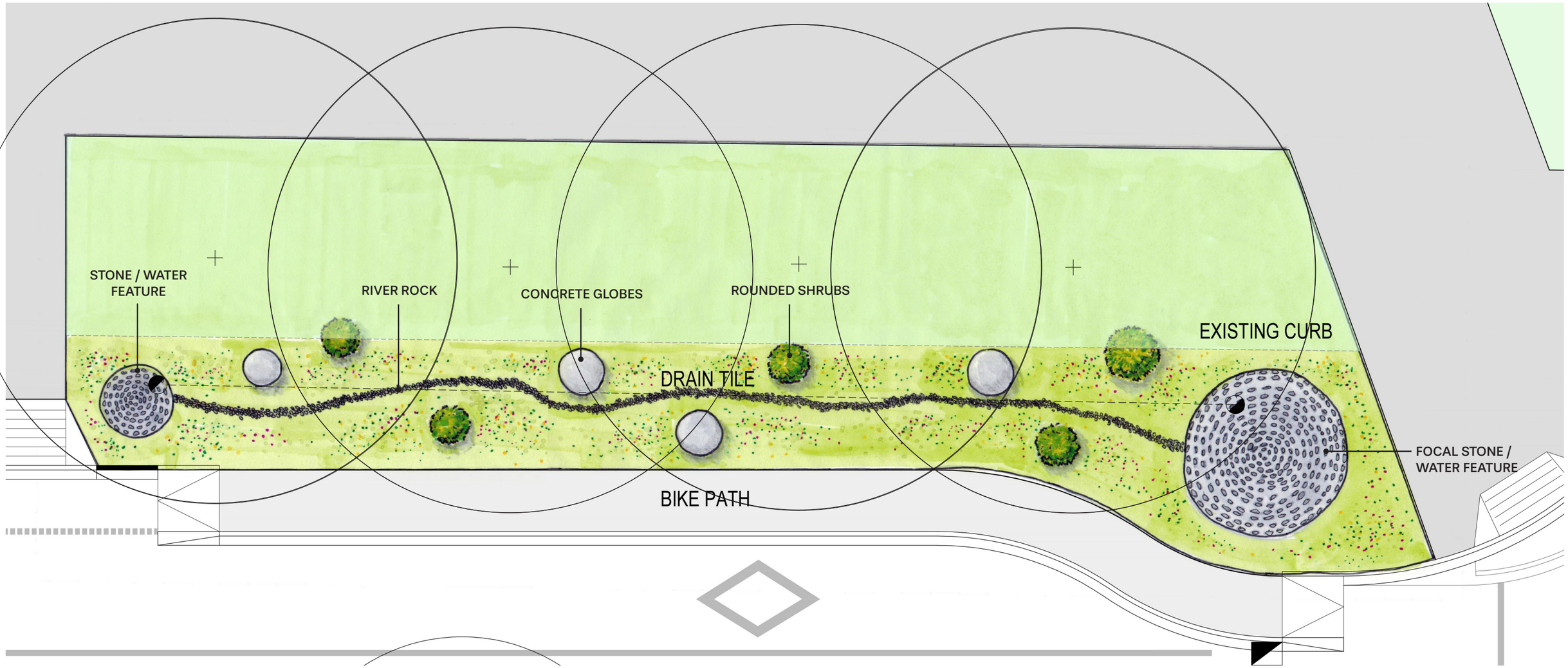
CHALLENGES

Our site is shaded most of the day, so this limited our planting choices to plants that are shade and drought/flooding tolerant. We selected a palette of plants that change colour seasonally.

The root zone of the four large oak trees also provided a constraint on how far we could extend the rain garden, according to our meeting with the campus arborist, which we were informed that the existing oak trees are likely to have their root zone in the area between the existing curb and the sidewalk.

Our final concept was arrived at after concept 2 was selected through meetings with both Cynthia and Daryl Tyacke. A further meeting with the campus arborist and Dean Gregory, UBC campus landscape architect, lead us to understand that the existing grassy lawn currently surrounding the oak trees should remain. Following that meeting, we modified concept 2 so that our planting did not extend onto the grassy area as it did before. In this report, we are providing options for both straight planting bandings and curved plantings bands.

FINAL CONCEPT



PLANTING PALETTE

SUMMER

WINTER

Salix purpurea ‘Nana‘
dwarf willow

Height: 1.0 - 1.5m
(could be clipped and kept to 0.3 - 1.0m)
Spread: 1.0 - 1.5m
(could be clipped and kept to 0.3 - 1.0m)

Description: A medium shrub with characteristic purplish shoots and narrow leaves. Catkins are produced along shoots in spring before leave emerges.

Attracts: Birds, butterflies

Seasonal Interest: Deciduous; Fall Colour

Carex oshimensis ‘Evergold’
variegated Japanese Sedge

Height: 0.20 - 0.30m
Spread: 0.30 - 0.45m

Description: A low maintenance perennial grass often found in wet soil. This plant has a crumping form and a characteristic creamy white strip along the center of the dark green leave. This plant produces brown bloom in May.

Tolerates: Full shade

Seasonal Interest: Evergreen

Carex dolichostachya ‘Kaga-nishiki’GOLD FOUNTAINS
Gold Fountain sedge

Height: 0.15 - 0.30m
Spread: 0.30 - 0.45m

Description: A low maintenance perennial grass often found in wet soil. This plant has fine textured bright green leaves with yellow edges. This plant produces brown bloom in May.

Tolerates: Full shade, wet soil, erosion

Seasonal Interest: Evergreen

Carex laxiculmis ‘Hobb’ BUNNY BLUE
Bunny Blue sedge

Height: 0.15 - 0.30m
Spread: 0.15 - 0.30m

Description: A low maintenance perennial plant often found in wet soil. This is a creeping plant with characteristic blue-green leaves. This plant produces white bloom in May and June.

Tolerates: Full shade, wet soil

Trifolium repens var. Pipolina.
Micro-Clover

Height: 0.02 - 0.08m

Description: A lawn grass alternative that is drought tolerant. This ground cover remains green in winter and is less prone to European Chafer Beetle infestation.

Tolerates: Drought, Foot Traffic

Seasonal Interest: Evergreen

MATERIAL PALETTE

Concrete Globe

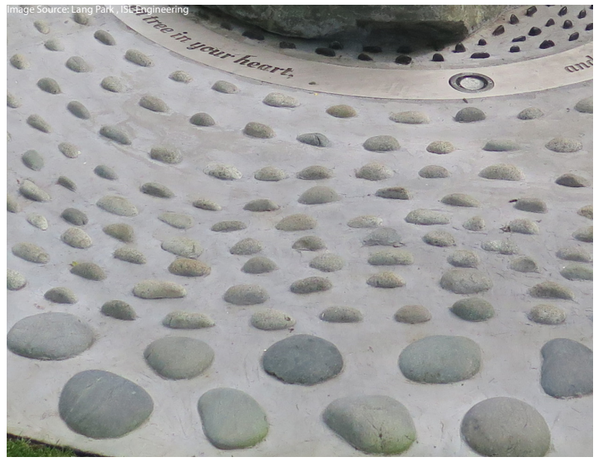
Dimension: Approx. 1.0m x 1.0m

Description: These concrete globes serve as focal point of the design.

River Rocks

Dimension: 4″ to 8″

Description: River rocks of various sizes. These loose stones are placed at the base of the rain garden.



Pebbles Casted in Concrete

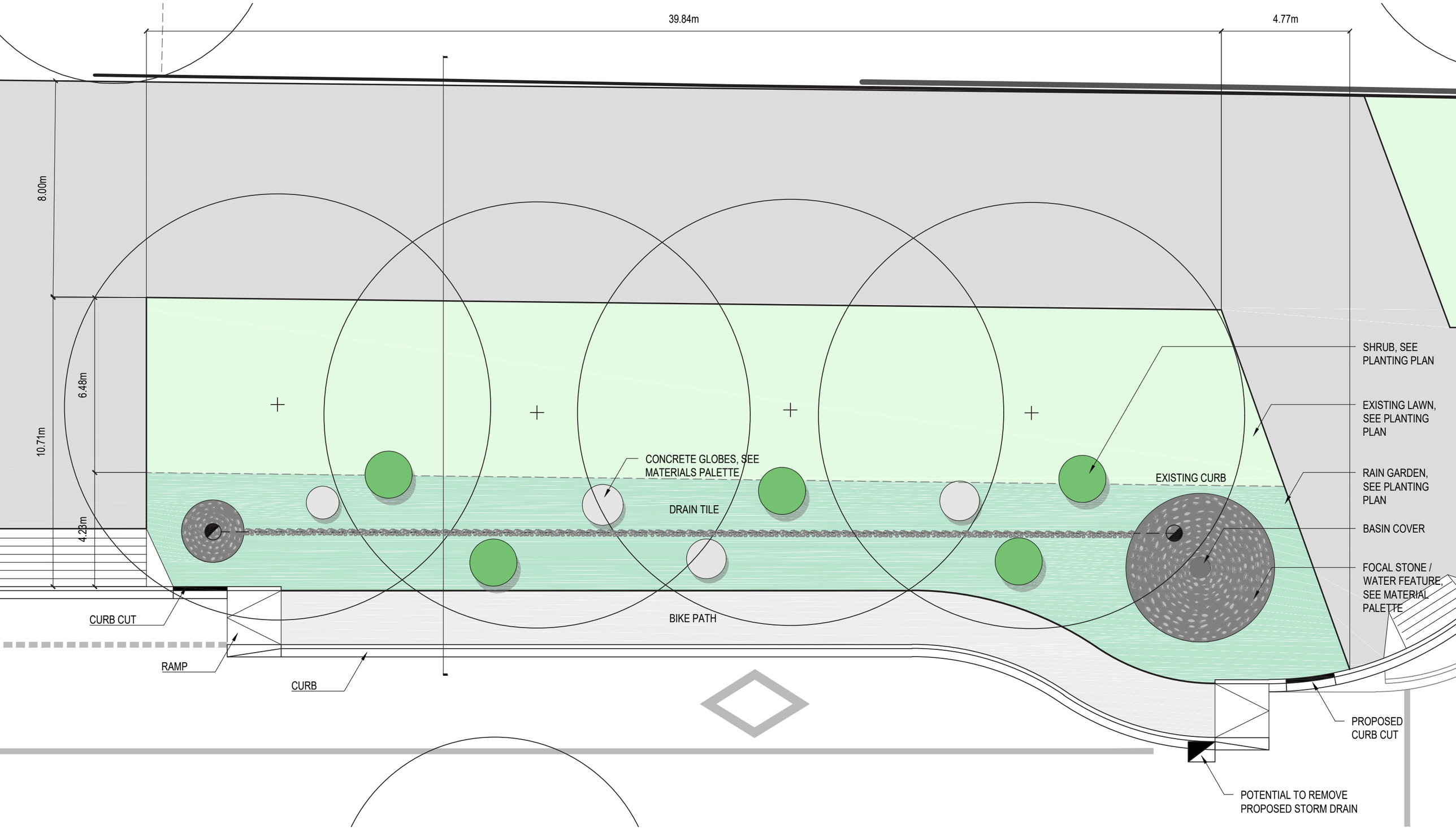
Dimension: 2″ to 3″

Description: Stones of similar size. These stones are cased in concrete at the two terminus feature of the design.

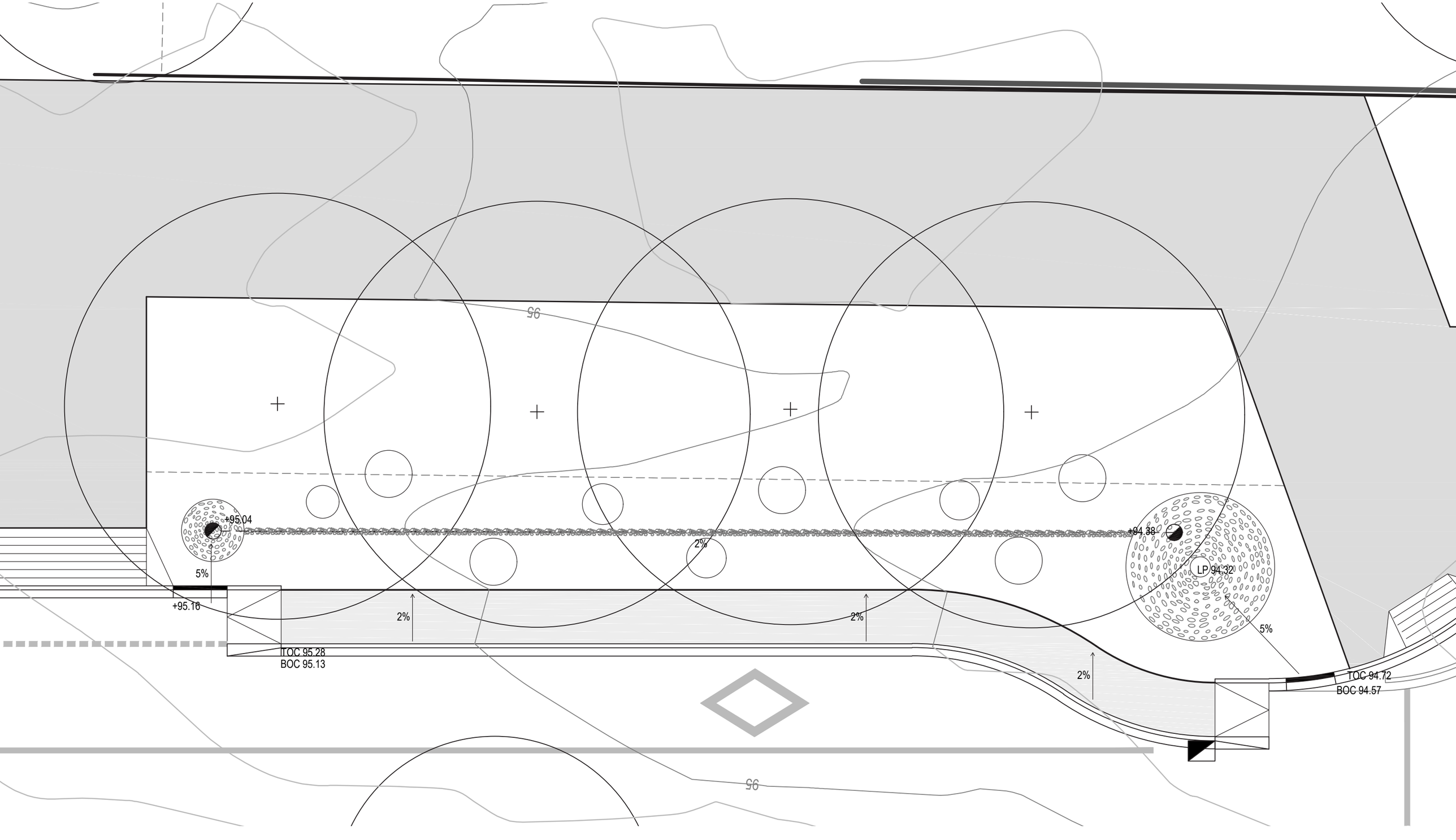
Sandblasted Concrete

Description: Sandblasting concrete surfaces of existing pedestrian pathway. Contrast of sandblasted bands and non-sandblasted bands allows the pedestrian pathway to match with planting design.

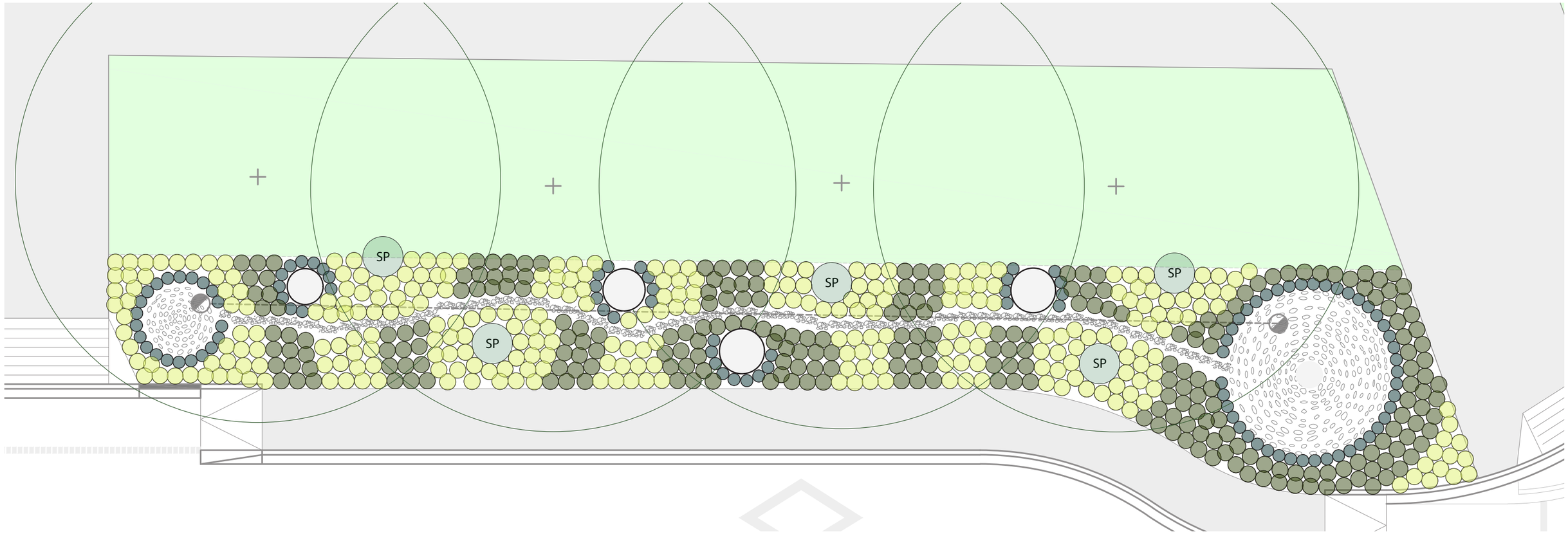
SCHEMATIC DESIGN 1:125



PRELIMINARY GRADING 1:125



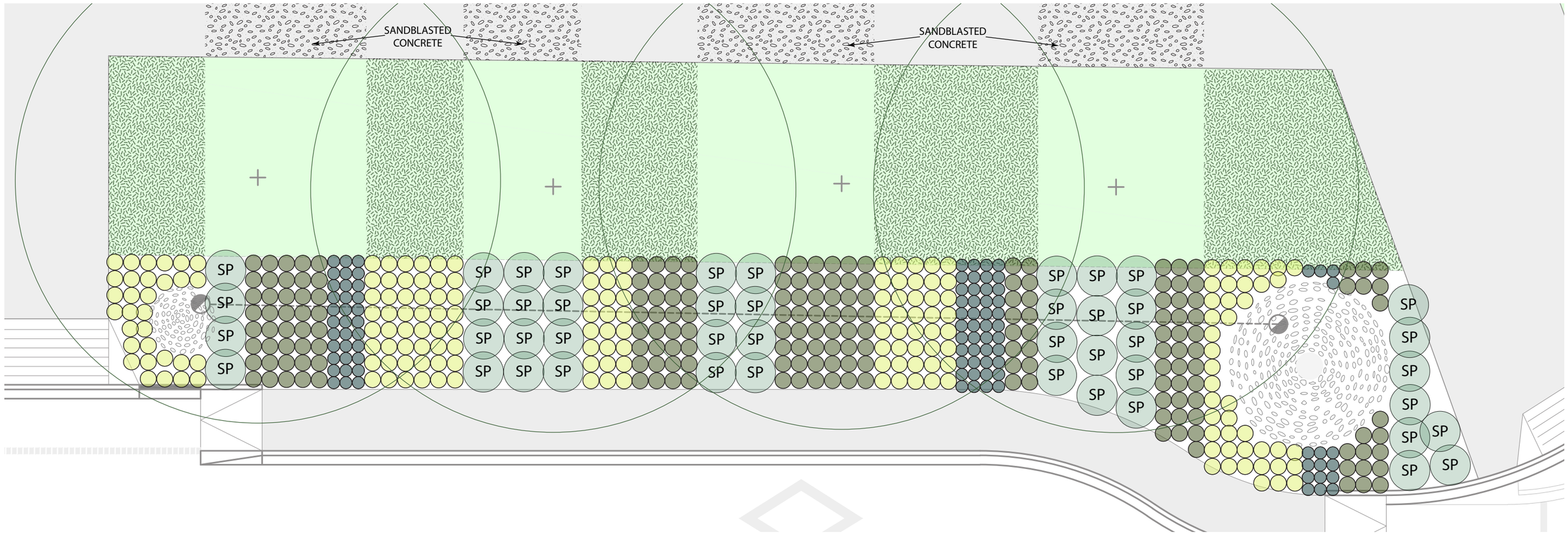
PLANTING PLAN A (Curvy Bands) 1:125



PLANTING SCHEDULE

SYMBOL	TYPE	CODE	BONTANICAL NAME	COMMON NAME	POT SIZE	QUANTITY AS ILLUSTRATED
	Shrub	SP	Salix purpurea 'Nana'	dwarf willow	#2	5
	Herbaceous	CO	Carex oshimensis 'Evergold'	variegated Japanese Sedge	#1	291
	Herbaceous	CD	Carex dolichostachya 'Kaganishiki'GOLD FOUNTAINS	Gold Fountain sedge	#1	254
	Herbaceous	CL	Carex laxiculmis 'Hobb' BUNNY BLUE	Bunny Blue sedge	#1	103

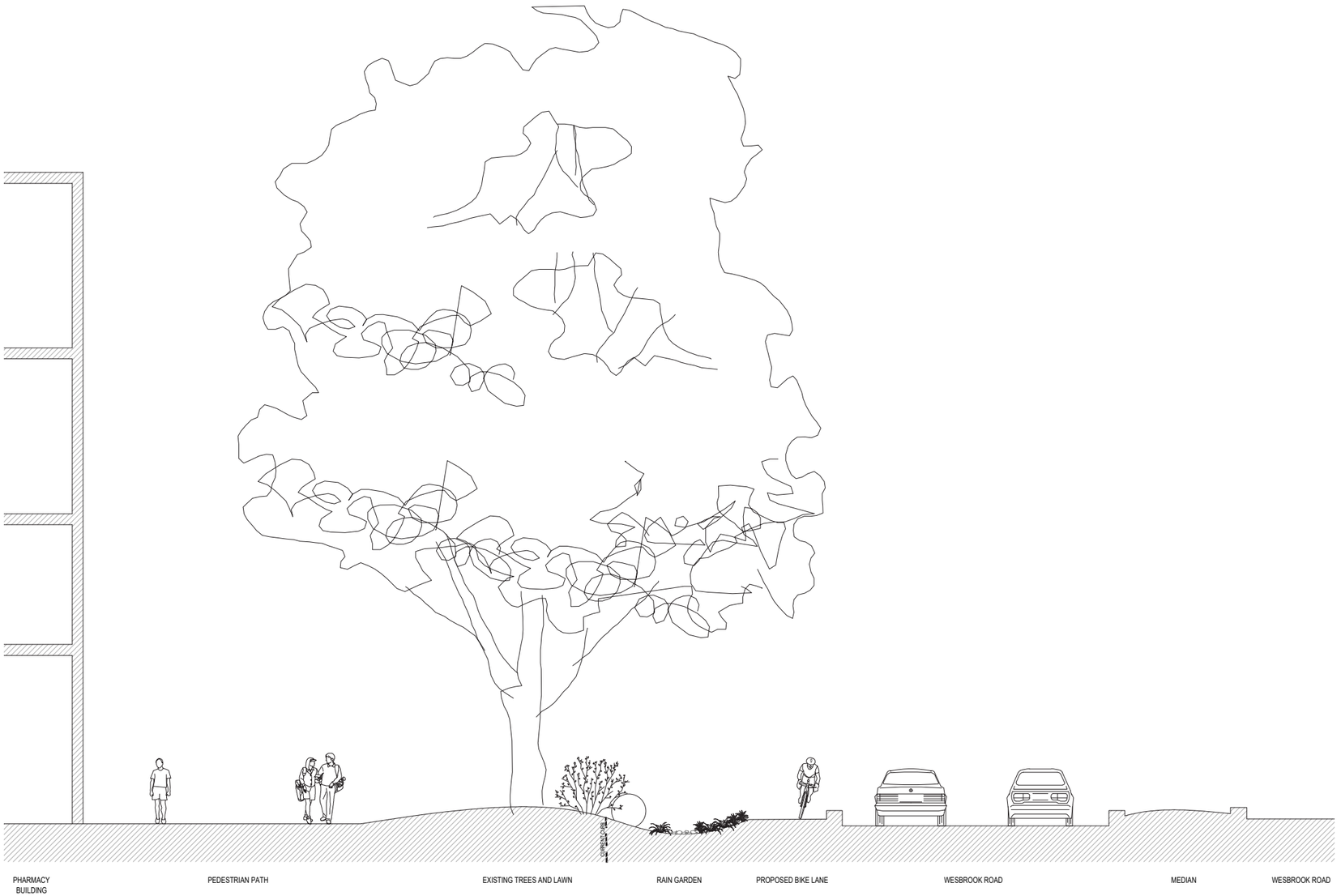
PLANTING PLAN B (Bands) 1:125



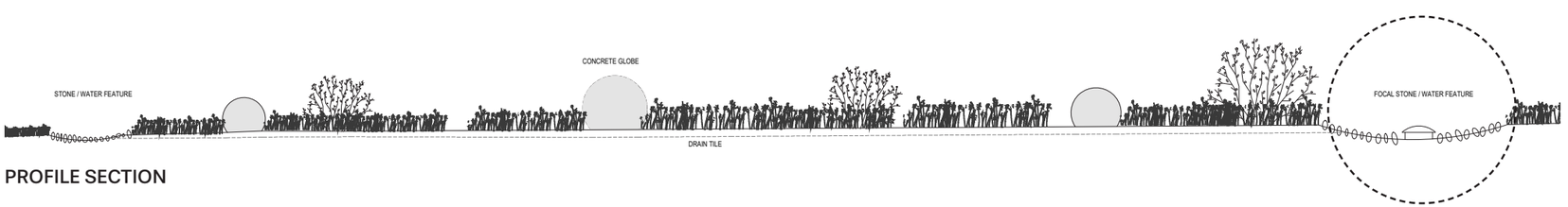
PLANTING SCHEDULE

SYMBOL	TYPE	CODE	BONTANICAL NAME	COMMON NAME	POT SIZE	QUANTITY AS ILLUSTRATED
	Shrub	SP	Salix purpurea 'Nana'	dwarf willow	#2	37
	Herbaceous	CO	Carex oshimensis 'Evergold'	variegated Japanese Sedge	#1	204
	Herbaceous	CD	Carex dolichostachya 'Kaganishiki'GOLD FOUNTAINS	Gold Fountain sedge	#1	189
	Herbaceous	CL	Carex laxiculmis 'Hobb' BUNNY BLUE	Bunny Blue sedge	#1	120
	Herbaceous	TR	Trifolium repens var. Pipolina.	micro-clover	seeds	covers 135 sq. m

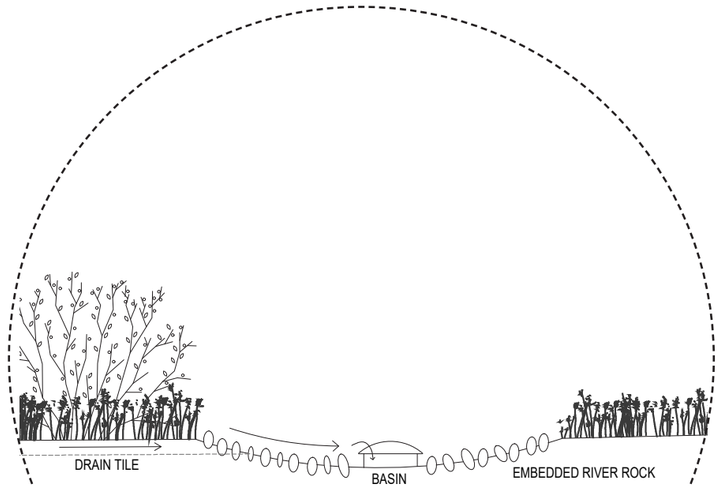
SECTION



CROSS SECTION



PROFILE SECTION



DRAINAGE DETAIL

REFERENCE LIST

The following publication/website would serve as valuable resources for this project:

City of Portland. (2017). Environmental Services – Green Infrastructure. Retrieved from https://www.portlandoregon.gov/bes/34598

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These were the resources that we have already explored through the first phase of this directed study that will likely have contributions to the second phase:

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Li, DY, and WC Sullivan. "Impact of Views to School Landscapes on Recovery from Stress and Mental Fatigue." Landscape and Urban Planning 148 (2016): 149-58. Web.

Minnesota Pollution Control Agency. "Heritage Park - an urban retrofit." 2016, https://stormwater.pca.state.mn.us/index.php/Heritage_Park_-_an_urban_retrofit. Web. 2 Nov 2016.

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