



C.3 REGULATED PROJECT WITH GREEN INFRASTRUCTURE IN THE RIGHT-OF-WAY

PROJECT EXAMPLE

June 3, 2020

James O'Connell, RWC



RWC Green Infrastructure Development Standards

08/26/2019

Adopted by Resolution on 8/26/2019

Large Development Definition:

Large Development shall be defined as a project that is any of the following: a) a subdivision of 5 or more parcels; b) a property with twenty (20) or more new dwelling units; c) a commercial property with fifty thousand (50,000) square feet of new floor area; or d) some combination of dwelling units and new square footage that would exceed the above thresholds.

RESOLUTION NO. 15796

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF REDWOOD CITY, ESTABLISHING GREEN INFRASTRUCTURE DEVELOPMENT STANDARDS FOR NEW BUILDINGS AND SUBSTANTIAL COMMERCIAL REMODELS IN ACCORDANCE WITH CITY CODE CHAPTERS 18 AND 27A

WHEREAS, Chapter 18, Article XIV of the City Code for the City of Redwood City ("City") governs the planned extension and repair of utility and street improvements upon the construction of new buildings (residential or commercial) or upon substantial commercial remodeling of existing buildings; and

WHEREAS, a recent amendment to City Code Chapter 18, Article XIV added Section 18.236.1 (Utility Improvements - Stormwater) to establish stormwater improvement requirements upon construction of new buildings (residential or commercial) or upon substantial commercial remodeling of existing buildings. These requirements are detailed in the recently amended City Code Chapter 27A, Article II; and

WHEREAS, the purpose of these recent City Code amendments is to implement the City's Green Infrastructure Plan ("GI Plan") and protect and enhance the water quality of our watercourses, water bodies, and wetlands in a manner pursuant to and consistent with the Federal Water Pollution Control Act, as amended, commonly known as the Clean Water Act (33 U.S.C. section 1251 et seq.); and

WHEREAS, being authorized to do so, the City wishes to establish design and development standards applicable to all new buildings (residential or commercial) and substantial commercial remodeling of existing buildings in accordance with its GI Plan and with the ultimate goal to protect said watercourses, water bodies, and wetlands through the implementation of green infrastructure; and

WHEREAS, on April 22, 2019, the City Council received a report from City staff and public comments from all interested parties regarding the design and development of a GI Plan for the installation of green infrastructure improvements; and

WHEREAS, on June 24, 2019, the City Council adopted the GI Plan and introduced related amendments to City Code Chapters 18 and 27A; and

WHEREAS, on August 26, 2019, the City Council adopted the amendments to City Code Chapters 18 and 27A; and

WHEREAS, the City wishes to set forth Green Infrastructure Development

ATTY/RESO 0086/CC RESO ESTABLISHING GREEN INFRASTRUCTURE DEVELOPMENT IN ACCORDANCE WITH CITY CODE CHAPTERS 18 & 27A
REV: 08-19-19 PM

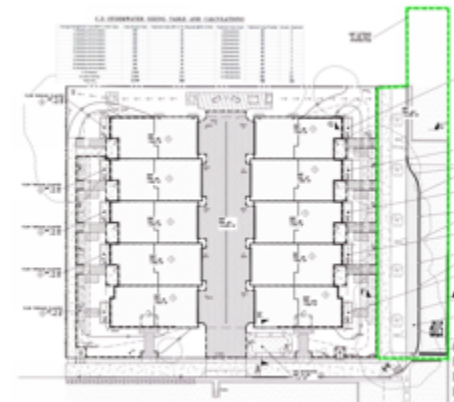
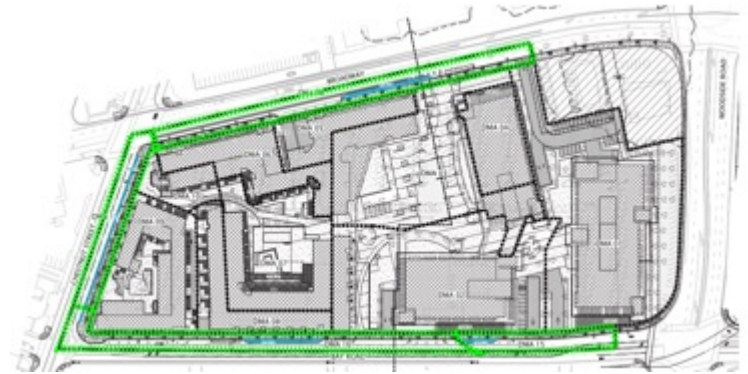
RESO. NO. 15796
MUFF NO. 802

Page 3 of 4

RWC Green Infrastructure Development Standards (Cont.)

Green Infrastructure in the Public Right-of-Way:

All Large Developments shall provide analysis for the installation of GI improvements in the right-of-way to capture and treat the runoff tributary to the project frontage. The City Engineer will review said analysis and determine whether the improvements are feasible and conform to other improvements located in the right-of-way. All GI improvements deemed feasible by the City Engineer shall be designed and constructed by the developer, and the developer and/or property owner shall enter into an agreement for the maintenance of those improvements in accordance with the same requirements for PSPPM (Permanent Stormwater Pollution Prevention Measures).



Project Example

610 Walnut St

6 Story Office Building

- 65,080 sqft
- 132 Parking Spaces with two subterranean floors
- Located in the Downtown Medical Campus (Kaiser Precise Plan)
- Approved February 10, 2019
- Currently Under Construction



Entitlement Phase

C.3 Regulated Project Review

Special Project Category A:

- Kaiser Downtown Cores District
- 0.4 acres
- No Surface Parking
- 100% Lot Coverage

Special Project Category "A"

Does the project have ALL of the following characteristics?

- ☒ Located in a municipality's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district¹⁵;
- ☒ Creates and/or replaces 0.5 acres or less of impervious surface;
- ☒ Includes no surface parking, except for incidental parking for emergency vehicle access, ADA access, and passenger or freight loading zones;
- ☒ Has at least 85% coverage of the entire site by permanent structures. The remaining 15% portion of the site may be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping and stormwater treatment.

☐ No (continue)

☒ Yes – Complete Section F.2 below

Entitlement Phase

C.3 Regulated Project Review

610 Walnut Street, Redwood City

Narrative Discussion of Low Impact Development Feasibility/Infeasibility

This report provides a narrative discussion of the feasibility or infeasibility of providing 100 percent low impact development (LID) treatment for 610 Walnut Street, which has been identified as a potential Special Project, based on Special Project criteria provided in Provision C.3.e.ii of the Municipal Regional Stormwater Permit (MRP.) This report is prepared in accordance with the requirement in MRP Provision C.3.e.vi.(2), to include in Special Projects reporting a narrative discussion of the feasibility or infeasibility of 100 percent LID treatment onsite or offsite.

1.) Feasibility/Infeasibility of Onsite LID Treatment

The project site was reviewed with regard to the feasibility and infeasibility of onsite LID treatment. The results of this review showed that it was feasible to treat 0% of the C.3.d. amount of runoff with LID treatment. The findings of this review are presented below.

a.) On-site Drainage Conditions.

The site will consist of one large drainage management area (DMA) consisting of the building roofing. Roofing will be graded such that all stormwater drainage will flow towards and into downspouts. This DMA will connect to a single non-LID treatment media filter – storm water measure, located within the building footprint. After mechanical treatment, storm water will flow directly into the existing municipal storm water system.

b.) Self-treating and Self-Retaining Areas and LID Treatment Measures.

No self-treating areas, self-retaining areas, or LID treatment measures will be implemented per building footprint infeasibility.

c.) Maximizing Flow to LID Features and Facilities.

No LID features will be provided.

d.) Constraints to Providing On-site LID.

This DMA is equivalent to the area within the property line and does not include areas outside of the building footprint. The entirety of the site's area consists of building footprint; therefore, inadequate size is available to accommodate biotreatment facilities to meet sizing requirements for the tributary area.

2.) Feasibility/Infeasibility of Off-Site LID Treatment.

This project scope includes off-site work; however, the project is exempt from LID treatment measure implementation due to an inability to provide treatment area.

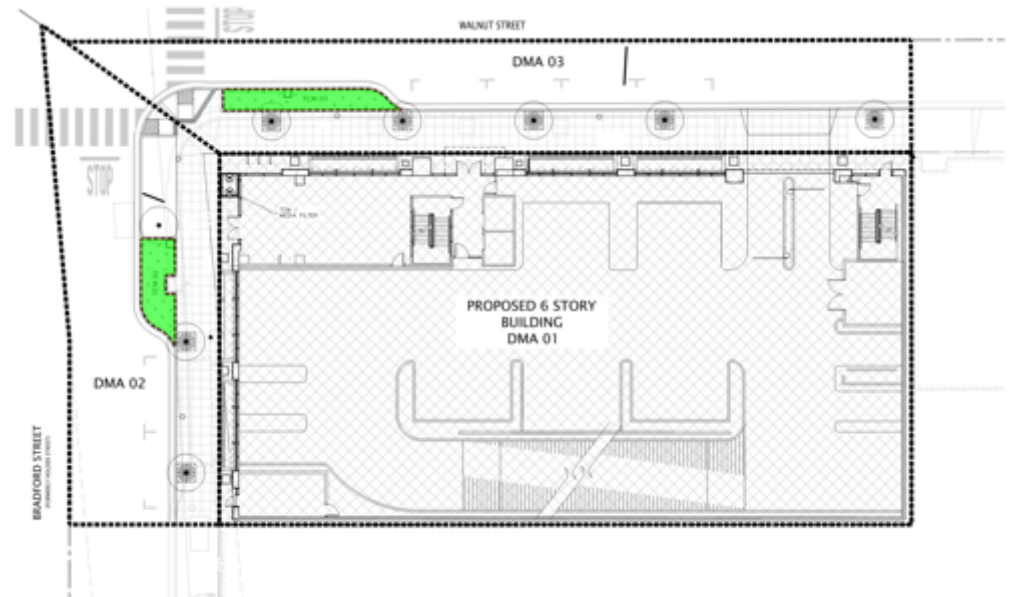
Special Project Narrative:

- No Podium level for flow-through planters.
- 100% lot coverage usually makes onsite LID nearly impossible.
- City has additional requirements for stormwater detention that is upstream from the treatment facility that also makes LID very difficult

Entitlement Phase

Original GI Design

- Included treatment of the two frontages of the property on Walnut St and Bradford St
- Included two curb extensions on a corner that needed a bulb-out for pedestrian safety
- Used 4% Sizing Criteria



OFFSITE BIOTREATMENT SUMMARY TABLE

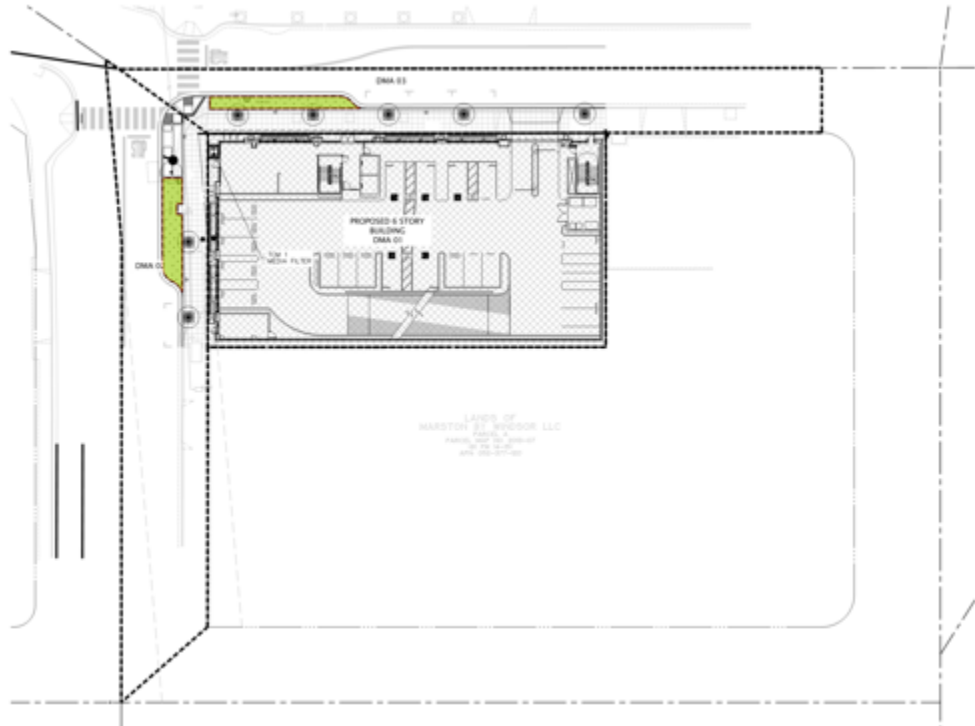
AREA	TCM	TREATMENT TYPE	TOTAL AREA (SQ. FT.)	IMPERVIOUS AREA (SQ. FT.)	TREATMENT AREA REQ. (SQ. FT.)	TREATMENT AREA PROVIDED (SQ. FT.)	PONDING DEPTH (IN.)
DMA 02	02	BIOTREATMENT POND	5,076	4,486	179	201	6
DMA 03	03	BIOTREATMENT POND	6,652	5,998	240	241	6

BIOTREATMENT SIZING BASED ON UNIFORM FLOW METHOD (4%).

Entitlement Phase

Approved GI Design

- Revised to include all of the tributary drainage area on Walnut St and Bradford St
- Still included curb extensions
- Still used 4% Sizing Criteria
- GI Improvements went from 30% of the frontage to 50% of the frontage.



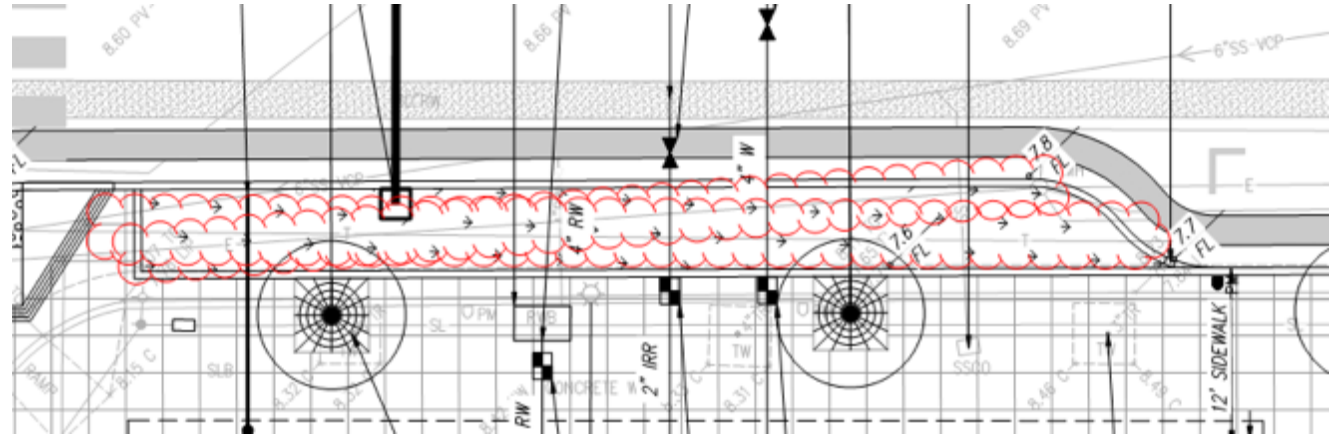
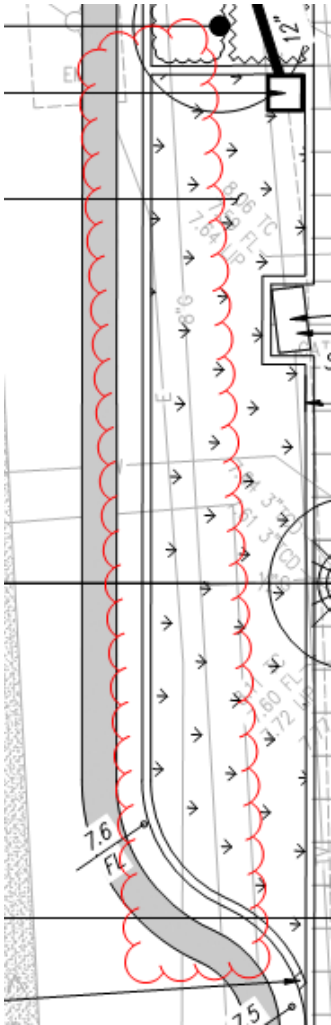
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BIOTREATMENT SIZING BASED ON UNIFORM FLOW METHOD (4%).

Entitlement Phase

Known Conflicts



- Telecommunications and Electrical line in Walnut St
 - Assumed we could wrap the lines in HDPE
- Electrical Line and Gas Main in Bradford St
 - Assumed we could wrap the electrical line in HDPE
 - Assumed the 8" gas main was deep enough to avoid the curb extension

Construction Document Phase

Utility Conflicts

- The potholing showed that the depths of the lines were more shallow than expected and could not be designed around within the curb extensions
- PG&E took exception to the conflicts with the electrical line location on Walnut St and the gas main location on Bradford St

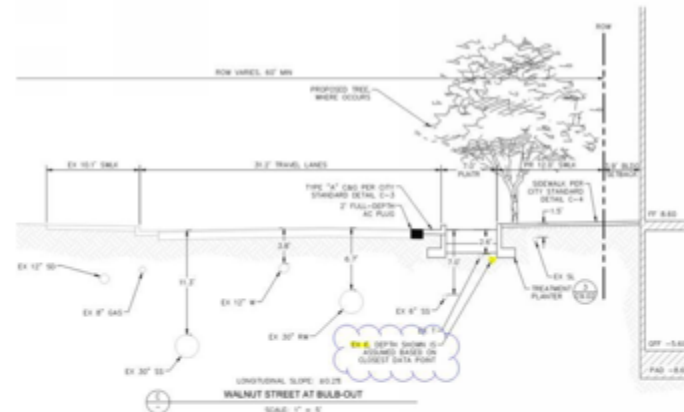
Pacific Gas and Electric Company
Service Planning Department



Mike Field
Windy Hill Property Ventures
530 Emerson Street, Ste 150
Palo Alto, CA 94301

RE: Proposed Bioswale at 610 Walnut St., Redwood City, CA,

Mike,
The proposed location of the bioswale along the Walnut Street frontage (as shown in the image below) conflicts with the existing PG&E facilities per PG&E's Joint Trench Standard S5453.

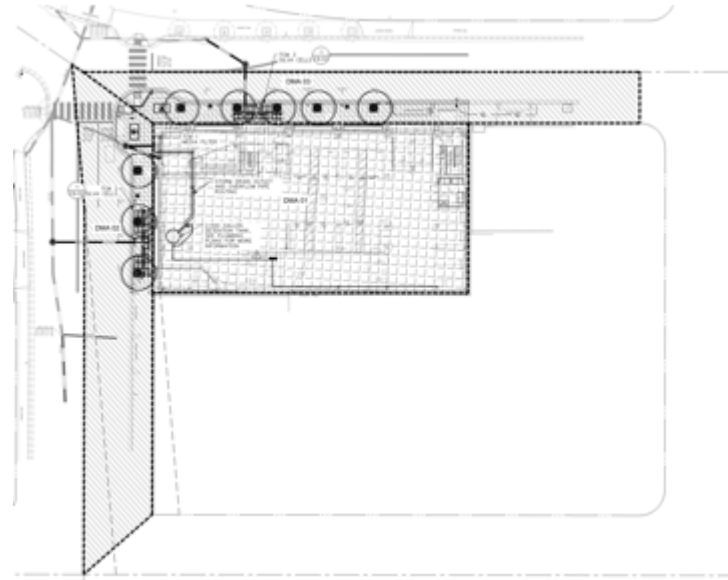


Thanks,
Paul Bueb
Industrial Power Engineer
650-598-7272

Construction Document Phase

Revised GI Design

- Silva Cells became the only viable option after the utility conflicts became unsolvable
- Required a smaller footprint than the curb extensions at about 25% of the frontage
- More Street Parking Maintained



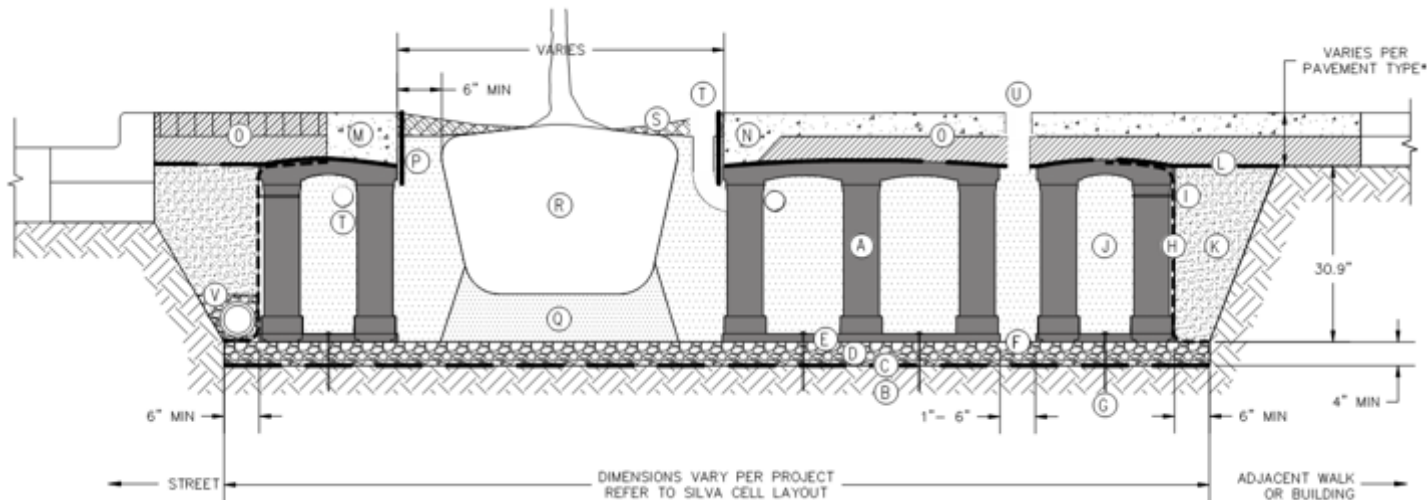
DMA SUMMARY TABLE:

DMA NAME	DRAINS TO	CONVENTIONAL SURFACES (SF)			TREATMENT REQUIRED	TREATMENT PROVIDED	TOTAL AREA (SF)
		PAVEMENT	ROOF/PODIUM	LANDSCAPE			
DMA-1	MEDIA FILTER	—	18,038	305	3 FILTERS	3 FILTERS	18,343
DMA-2	2X SILVA CELLS	10,671	—	75	21 CELLS	26 CELLS	10,746
DMA-3	2X SILVA CELLS	9,018	—	150	18 CELLS	18 CELLS	9,168
TOTAL (SF)		19,689	18,038	530	—	—	38,257

Construction Document Phase

Silva Cell Design

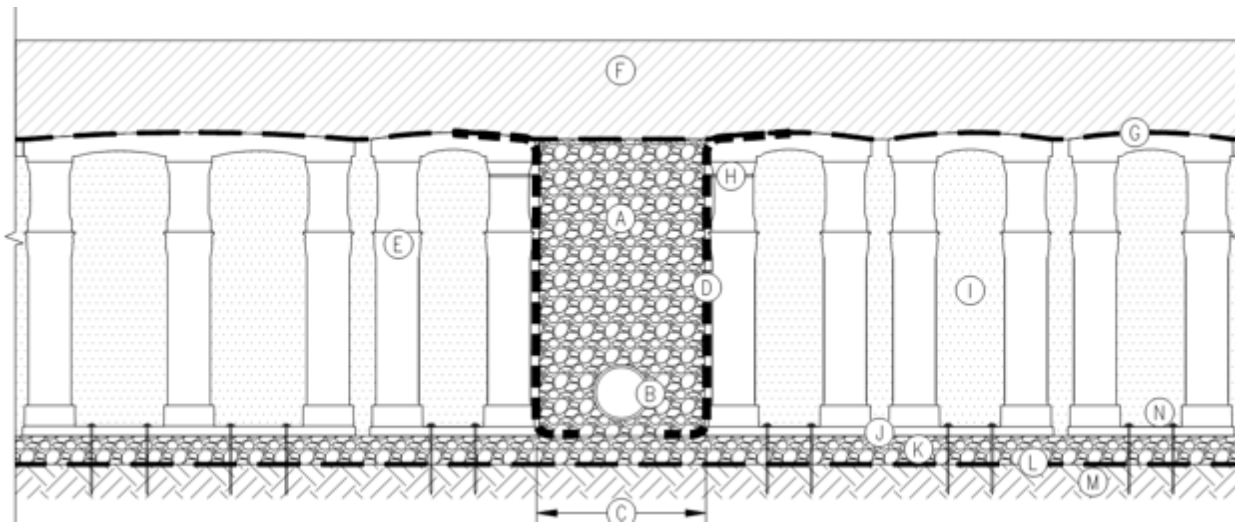
- Details provided by the manufacturer
- Designed to be used with Street Trees and within the sidewalk along the project frontage – This makes compliance with frontage improvement requirements very simple
- Not designed to bypass the hundred year storm, so additional stormwater improvements are likely required to comply with Engineering hydraulic criteria



Construction Document Phase

Silva Cell Design – Additional Considerations

- Utility crossings such as services are avoided by designing a gap in the system.
- Utility mains can be avoided by making the systems more narrow.
- Tree Species should be chosen specifically for the system. This may conflict with existing tree species lists or species that have been chosen for a specific area for aesthetic purposes. October Glory Maple is being used for this location.



STORMFILTER STEEL CATCHBASIN DESIGN NOTES

STORMFILTER TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE SELECTION AND THE NUMBER OF CARTRIDGES. 3 CARTRIDGE CATCHBASIN HAS A MAXIMUM OF THREE CARTRIDGES. SYSTEM IS SHOWN WITH A 27" CARTRIDGE, AND IS ALSO AVAILABLE WITH AN 18" CARTRIDGE. STORMFILTER CATCHBASIN CONFIGURATIONS ARE AVAILABLE WITH A DRY INLET BAY FOR VECTOR CONTROL.

PEAK HYDRAULIC CAPACITY PER TABLE BELOW. IF THE SITE CONDITIONS EXCEED PEAK HYDRAULIC CAPACITY, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

CARTRIDGE SELECTION	27"			18"			18" DEEP		
CARTRIDGE HEIGHT	3.0'	3.0'	3.0'	3.0'	3.0'	3.0'	3.0'	3.0'	3.0'
RECOMMENDED HYDRAULIC DROP (H)	2.0'	2.0'	2.0'	2.0'	2.0'	2.0'	2.0'	2.0'	2.0'
SPECIFIC FLOW RATE (gpm/sq ft)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
CARTRIDGE FLOW RATE (gpm)	22.5	22.5	22.5	15	15	15	15	15	15
PEAK HYDRAULIC CAPACITY	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
INLET PERMANENT POOL LEVEL (A)	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
OVERALL STRUCTURE HEIGHT (B)	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"

* 1.67 gpm/sq ft SPECIFIC FLOW RATE IS APPROVED WITH PHOSPHORUS[®] (PSGR) MEDIA ONLY

GENERAL NOTES

- CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
- FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE, CATCHBASIN STRUCTURE, DIMENSIONS AND HEIGHTS, PLEASE CONTACT ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechh2o.com
- STORMFILTER CATCHBASIN WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORM THIS DRAWING.
- INLET SHOULD NOT BE LOWER THAN OUTLET. INLET (IF APPLICABLE) AND OUTLET PIPING TO BE SPECIFIED BY ENGINEER / CONTRACTOR.
- MANUFACTURER TO APPLY A SURFACE BEAD WELD IN THE SHAPE OF THE LETTER "C" ABOVE THE INLET PIPE STUB ON TOP OF THE STEEL SPCS.
- STORMFILTER CATCHBASIN EQUIPPED WITH 4 INCH (APPROXIMATE) LONG STUBS FOR INLET (IF APPLICABLE) AND OUTLET. OUTLET STUB IS 8 INCHES IN DIAMETER. MAXIMUM OUTLET STUB IS 15 INCHES IN DIAMETER. CONNECTION TO COLLECTOR RISING FLEXIBLE COUPLING BY CONTRACTOR.
- STEEL STRUCTURE TO BE MANUFACTURED OF 1/4 INCH STEEL PLATE. CASTINGS SHALL MEET AASH TO MEK LOAD RATING RATING ON STRUCTURE. A CONCRETE COLLAR IS REQUIRED. WHEN REQUIRED, CONCRETE COLLAR WITH AN REINFORCEMENT BY CONTRACTOR.
- FILTER CARTRIDGES SHALL BE, MANUFACTURED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. RADIAL 8 3/4 INCHES. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST 36 SECONDS.
- SPECIFIC FLOW RATE IS EQUAL TO THE FILTER TREATMENT CAPACITY (gpm) DIVIDED BY THE FILTER CONTACT SURFACE AREA.

INSTALLATION NOTES

- BACKFILL, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND ENGINEER OF RECORD.
- CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CATCHBASIN PROVIDED.
- CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION IN

Impervious

Pervious

Total Area

Variable

C

=

Media Area

I_{wq}

=

Media Area

A

=

Media Area

Q_{req}

=

Media Area

SECTION B-B

3-CARTRIDGE CATCHBASIN STORMFILTER DATA

STRUCTURE ID	
WATER QUALITY FLOW RATE	
PEAK FLOW RATE (cfs)	
RETURN PERIOD OF PEAK	
CARTRIDGE FLOW RATE (GPM)	
MEDIA TYPE (PERLITE, ZPS)	
RIM ELEVATION	
PIPE DATA	
INLET STUB	
OUTLET STUB	
CONFIGURATION	
INLET	OUTLET
SLOPED LID	
SOLID COVER	
NOTES/SPECIAL REQUIREMENTS:	

1 Cartridge

3x12.83

CONTECH
ENGINEERED SOLUTIONS LLC

www.contechh2o.com

3025 Centre Pointe Dr., Suite 400, West Chester, OH 45380

3 CARTRIDGE CATCHBASIN STORMFILTER STANDARD DETAIL

Impervious Surface = 17,513 SF
Pervious Surface = 824 SF
Total Area = 18,337 SF

Variable	Value	Unit
C	= 0.95	Non-dimensional
I _{wq}	= 0.2	in/hr
A	= 0.42	acres
Q _{req}	= 0.080	cfs

1 Cartridge = 12.83 GPM

$$3 \times 12.83 \text{ GPM} = 0.086 \text{ CFS}$$

C.3 Sizing Criteria

Silva Cells

Silva Cell Sizing Guidelines:

Impervious Drainage Area		4% Sizing Rule		Treatment Area per Silva Cell		Silva Cells required	Trees required* (1/50)
ft ²	m ²	ft ²	m ²	ft ²	m ²	--	--
2,500	232	100	9	10	1	10	1
5,000	465	200	19	10	1	20	1
10,000	929	400	37	10	1	40	1
25,000	2,322	1,000	93	10	1	100	2
50,000	4,645	2,000	186	10	1	200	4
100,000	9,290	4,000	372	10	1	400	8

**Tree species selection based on local requirements. Sizing assumes standard 30' canopy street/plaza trees. Adjust ratio to 1/25 units if using small trees.*

Bradford Street Frontage:

$$10,671 \text{ sqft} \times .04 = 426.8 \text{ sqft}$$

$$426.8 / 2 \text{ (For Double System)} = 213.4 \text{ sqft}$$

$$213.4 \text{ sqft} / 10 \text{ sqft/cell} = 21.3$$

26 Provided

Walnut Street Frontage:

$$9,018 \text{ sqft} \times .04 = 360.7 \text{ sqft}$$

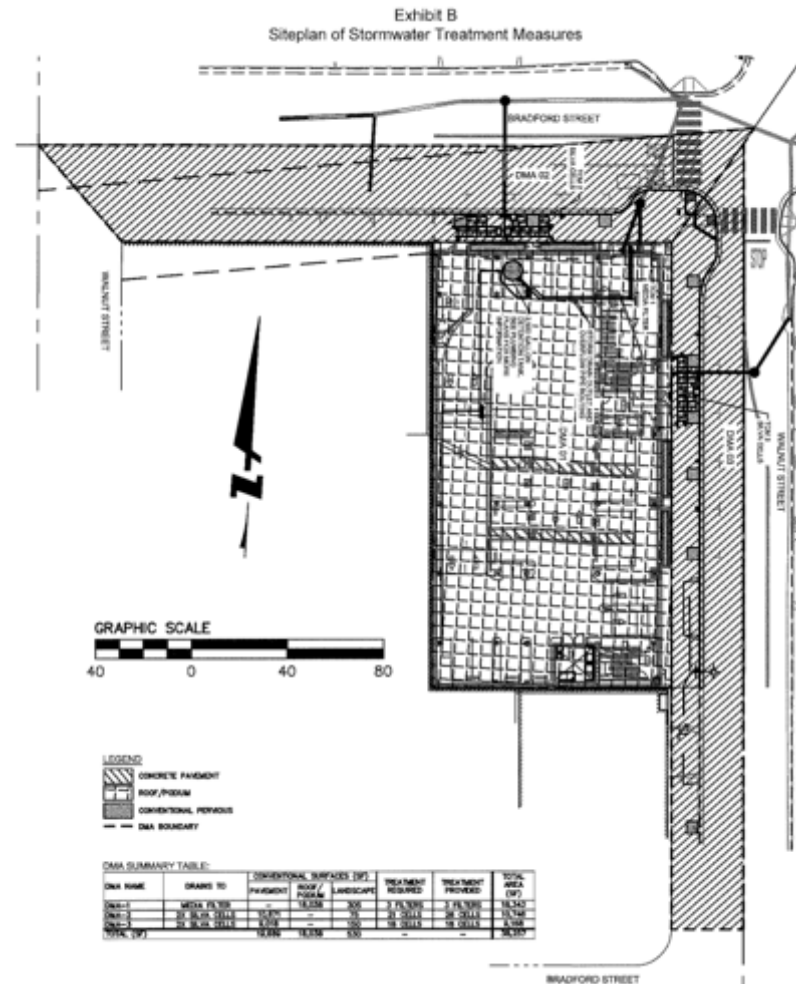
$$360.7 / 2 \text{ (For Double System)} = 180.4 \text{ sqft}$$

$$180.4 \text{ sqft} / 10 \text{ sqft/cell} = 18$$

18 Provided

O&M Requirements STMMA

- RWC GI Development Guidelines require the offsite treatment facilities to have the same requirements as a regulated project
- Both the onsite and offsite are combine as one site with one agreement
- 5th year maintenance inspection is done for both the onsite and offsite as one site limiting additional inspections





PLEASE LET US KNOW YOUR THOUGHTS