



GERBER

ARCHITECT

LLC.

CARR SUBARU

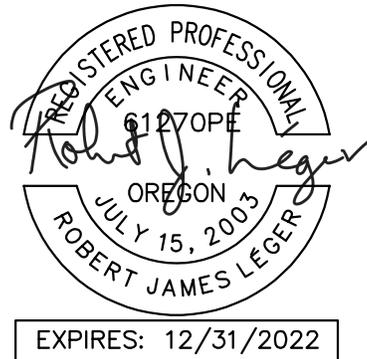
AUTOMOBILE SALES AND SERVICE BUILDING ADDITIONS & RENOVATIONS

CIVIL STORMWATER REPORT

Received
Planning Division
11/05/2021

Stormwater Calculations For Land Use Documents

Carr Subaru
11635 SW Canyon Road
Beaverton, Oregon 97005



DCI Job Number 18032-0008

August 4, 2021



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 - Swale
- C. Stormwater Facility Details
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 - Request for HA Fee-In-Lieu per CWS Code
 - HA Exhibit 1
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- E. Operations and Maintenance Manual



Existing Conditions

The Carr Subaru site is located at 11635 SW Canyon Road in Beaverton. The site currently is in use for sales and service of vehicles. The entire property area (the two tax lots) is 175,906 sf (4.04 acres) and is fully developed at this time.

The site is comprised of two tax lots with numbers 1S110CD00600 and 1S110CD00301. There are four buildings onsite, and the remainder of the site is mostly paved area for car sales and staging. The north portion of the parcel contains a natural area/creek and accounts for most of the onsite pervious area.

Approximately 30,000 sf of existing impervious area will be disturbed/redeveloped and replaced with building additions, pavement, and new landscaping.

Stormwater Management

The site is a Redevelopment site, and activities exceed 1,000 sf and would trigger water quality upgrades for the redeveloped impervious areas. However, as the full site has stormwater treatment facilities that meet current codes (installed between 2011 and 2016), additional water quality treatment or upgrades would be redundant and are not proposed.

Approximately 30,000 sf of existing impervious area will be disturbed/redeveloped and replaced with building additions, pavement and landscaping. For this site, the post-development site impervious area will be less than the pre-development area.

Approximately 2,808 sf of impervious area will be removed and converted to landscaped areas.

The northerly portion of the site drains to a two-cartridge StormFilter catch basin, sized per CWS requirements. Approximately 31,620 sf of paved lot area drains to this filter catch basin, which produces a Q_{wQ} of 0.066 cfs. The StormFilter catch basin uses two standard cartridges, with treatment capacity for 0.067 cfs / 32,160 sf of impervious area. See attached calculations. The Sales building expansion of 2,978 sf exceeds the treatment capacity of the StormFilter catch basin unit, but this 2,978 sf area is offset by the minor capacity remaining in the StormFilter catch basin (540 sf) and the 2,808 sf of new landscaped area provided onsite (converted from existing impervious area).

The southern portion of the site is collected and discharged to a water quality sediment manhole that discharges to a 3,000 sf, 145' long LIDA compliant vegetated swale along the western property line, designed per CWS requirements. This swale was completed with the Hall Creek Enhancement Project and discharges to Hall Creek. A recent field



visit showed the swale to be in excellent condition (100% aerial coverage with many varieties of vegetation).

See the attached calculations regarding the swale design. As constructed, the swale meets Section 4.09.4 of the CWS D&CS for Vegetated Swales. Please note, these calculations represent the bottom 2' wide flow path of the channel. The facility is much larger than this, and has capacity for treatment beyond the existing Carr Subaru site.

Hydromodification Assessment:

Risk Level: Low
Development Class: Developed Area
Project Size Category: Medium

Category 2

Retrofit of the site for additional detention or more recently adopted hydromodification requirements is impracticable, and risky. **We request that deficient stormwater control requirements be satisfied via Fee-In-Lieu for the proposed project.** Below are contributing factors:

- Site topography does not support effective retrofit of onsite detention controls.
- Site contamination has been documented onsite – See Environmental section below. Disturbance to contaminated soils should be minimized or treated per environmental recommendations. The installation of underground detention facilities is a higher risk of exposing contaminated areas than maintaining water quality facilities only, as the site is currently doing.
- High groundwater exists.
- The proposed project creates an overall reduction of onsite impervious areas through the conversion of existing paved areas to landscaping.

In addition, the proposed development is likely to have a negligible impact and on-site implementation of a hydromodification approach will result in little or no benefit to the Receiving Reach. We believe that the site qualifies for an Infill Exemption per Section 4.03.7.a.5. **Please see Attachment D for our review of Hydromodification Approach (HA) options from CWS Table 4-3 and our Request for Hydromodification Approach Fee-In-Lieu per CWS Code including and HA Exhibits 1 & 2.**

New or relocated stormwater catch basins will meet Oregon Plumbing Codes with regards to trap and sump depths to maximize heavy sediment and trash removal.



Hall Creek has a 100-year flood elevation associated with it at 182.9 NAVD88, and all building expansion areas proposed are at least 3' above the flood elevation. The new trash enclosure is outside of, and above, the floodplain. No fill below the flood plain is necessary for the proposed development.

Environmental

A Limited Subsurface Investigation Report has been prepared by GeoDesign, Inc. in July 2018. Contaminants were not detected in soil or soil gas at concentrations that pose unacceptable risk to future construction workers, excavation workers, or commercial occupants of the site. Cadmium and/or lead was detected in some shallow soil samples at concentrations exceeding DEQ CFSLs. Notes have been added to the plans directing the contractor(s) to handle and dispose of excavated materials in accordance with the guidelines listed in the Report. In June 2010, GeoDesign prepared a site-specific Soil Management Plan for the site improvements made in 2011 / 2012. The same SMP shall be followed for the proposed site improvements.

Operation and Maintenance

The property owner(s) is responsible for maintaining the existing stormwater management systems in accordance with the existing operation and maintenance (O&M) requirements. Owners are required to check their stormwater systems regularly to determine maintenance needs.

Temporary Erosion and Sediment Control (TESC)

The site soil is susceptible to erosion; therefore, control measures should be carefully planned and in place before construction begins. A temporary erosion and sediment control (TESC) plan has been developed to control erosion and contain sediment-laden water on-site. The TESC plan will address practices, methodologies, and requirements for erosion control, as is required by the City of Beaverton and Clean Water Services. The TESC plan will be developed during the design process and will be followed during construction. This plan is intended to result in the establishment of Best Management Practices (BMPs) to be implemented and followed during construction to prevent erosion of exposed soils, as well as prevent sediment from leaving the project site. Adjacent properties and pipe storm drain systems must be protected from sediment deposits, as well as increases in volume, velocity, and peak flow rates of stormwater runoff from the project site. Erosion control measures may include the use of temporary sediment basins, filter fabric silt fences, construction entrance, catch basin inserts, straw bales, gravel check dams, temporary detention and settling basins, and so on. However, due to the limited scope of work, extensive erosion and sediment



controls are not anticipated to be needed. Silt fencing or wattles will be installed along the down gradient limits of work.

The contractor is responsible for ensuring the use of proper erosion control and shall maintain such measures throughout construction, until all pertinent permanent erosion control measures (i.e. paved surfaces) have been established. Maintenance shall include daily inspections and repair of the silt fencing/wattles. The contractor shall also inspect all erosion control measures following each storm water event during construction or until the permanent measures are established.

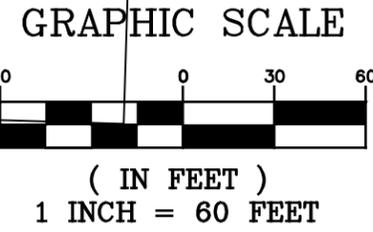
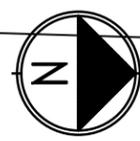
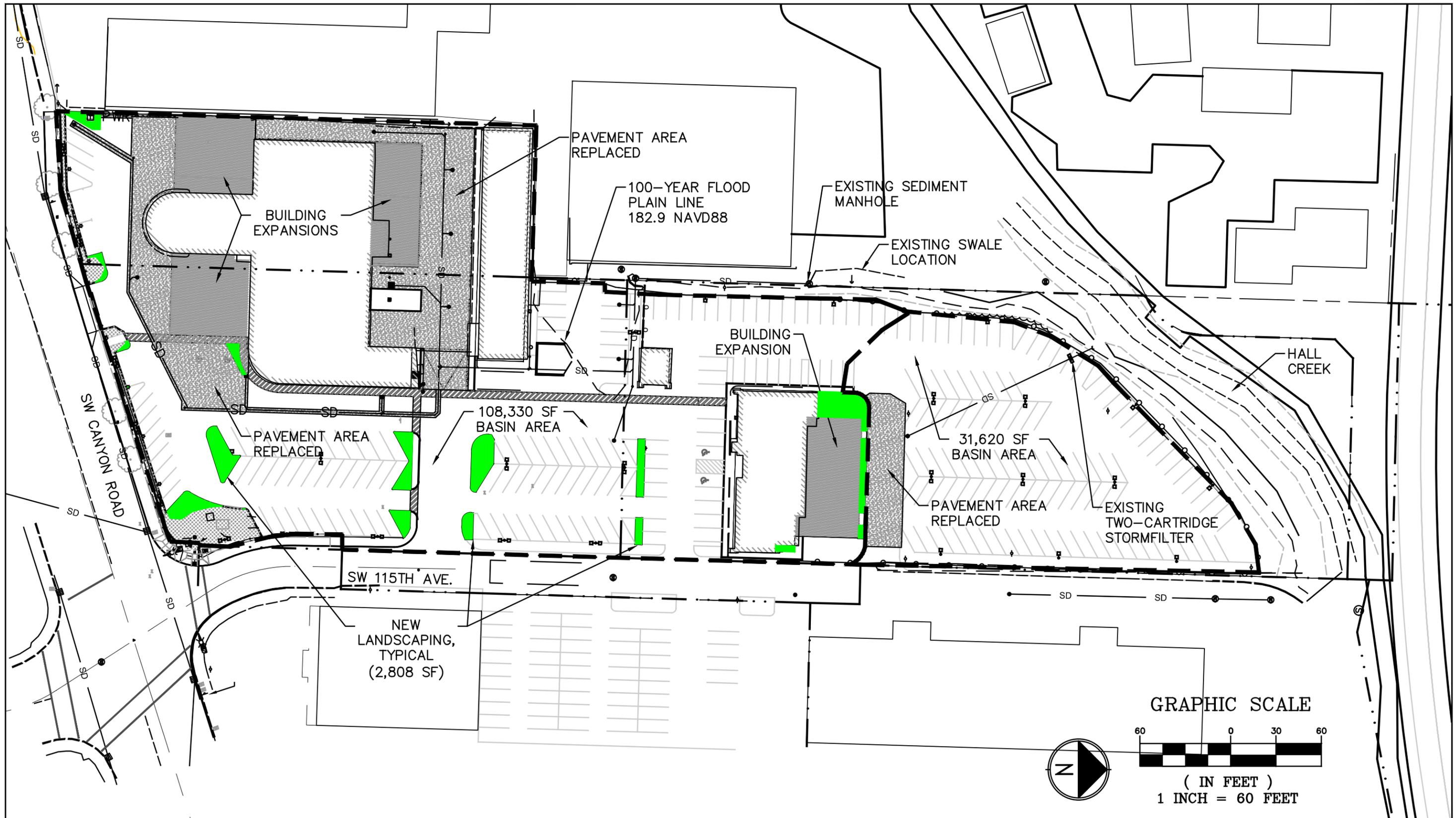
Periodically, the temporary erosion control measures must be cleaned of debris and siltation. The contractor shall dispose of the materials so as not to damage any reclaimed areas or create other erosion problem areas. Upon direction by the City of Beaverton, Clean Water Services, owner, or the engineer, the contractor may also be required to clean the roadway of siltation or other debris that may occur along or at the site entrance.



Attachment A

Overall Site Plans

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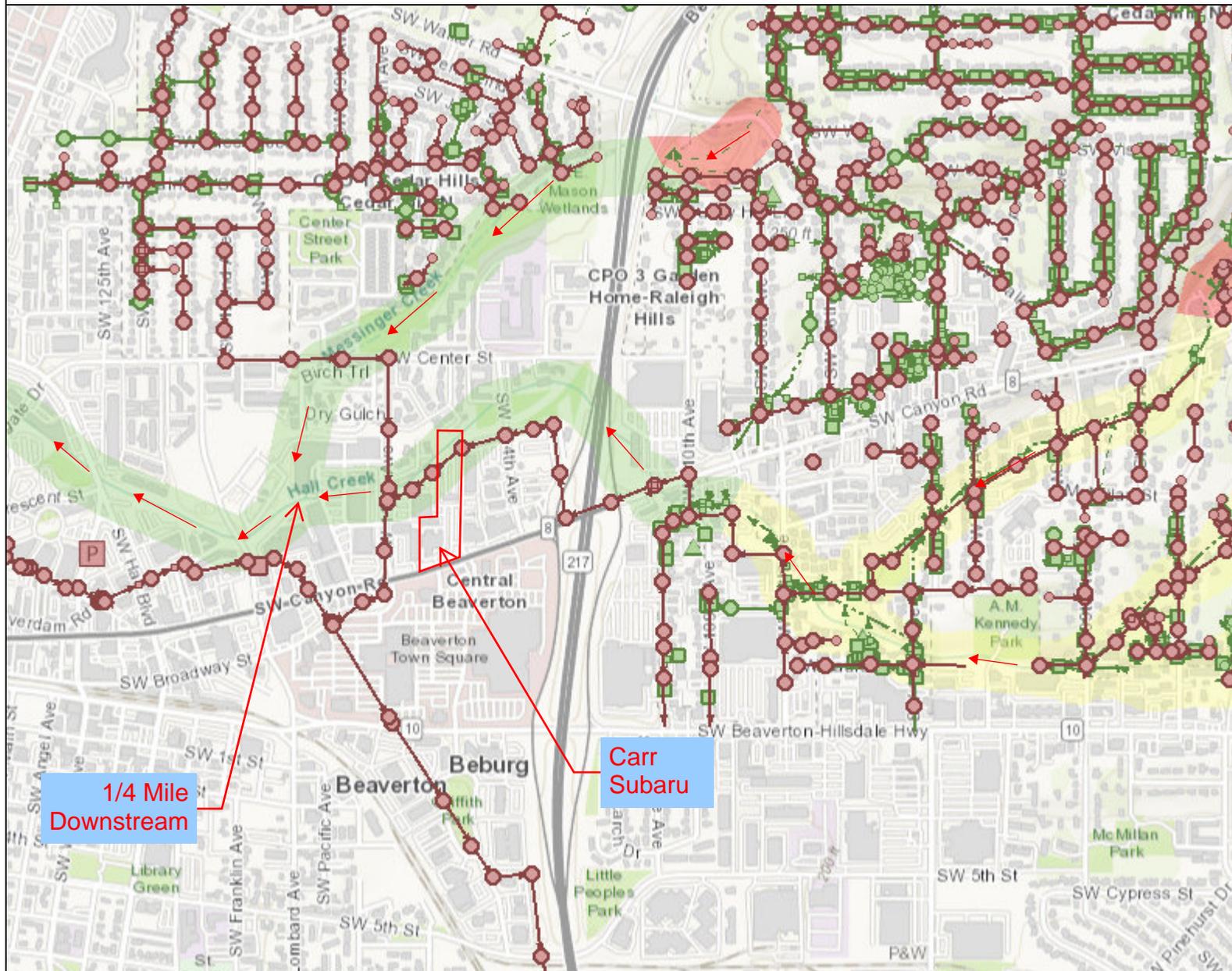


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PROJECT TITLE: CARR SUBARU	PROJECT NO.: 18032-0008
SHEET DESCRIPTION: STORMWATER EXHIBIT	DATE: 07/28/2021
	BY: KLE
	SHEET NO.:

Clean Water Services -- Sewer Map



Legend

- Cleanout
- Fitting
- ⊕ Valve
- Manhole
- Inlet
- △ Pond
- Vault
- ☆ Treatment Plant
- Ⓟ Pump Station
- Gravity Line
- Pressure Line
- Open Channel
- Virtual Flow
- ⏏ Pond Outline
- ▭ CWS Boundary
- ▭ County Boundary
- ▭ Urban Growth Boundary

- ✕ Abandoned
- CWS Sani
- CWS Storm
- Partner Sani
- Partner Storm



Disclaimer: This product and its associated data is for informational purposes only and was derived from several databases. It was not prepared for, and is not suitable for legal, engineering or surveying purposes. Users of this information should review or consult the primary data and information sources to ensure accuracy. Clean Water Services cannot accept any responsibility for errors, omissions or positional accuracy. There are no warranties for this product. Mainline and service lateral locations are depicted using best available information but must be field verified and located before digging. Service laterals are marked in the field as "Unlocatable underground facilities" as defined in OAR 952-001-0010 (20). Easement data is not currently completed District-wide and should be used for general reference only. All sanitary or storm sewer data, with the exception of sanitary lines 24" and larger located within the city limits of Beaverton, Cornelius, Forest Grove, Hillsboro, Lake Oswego, Portland, Sherwood, Tigard or Tualatin, need to be verified by contacting the individual city. Notification of any errors would be appreciated. Clean Water Services, Development Services, 2550 SW Hillsboro Highway, Hillsboro OR 97123, (503) 681-5100.



Attachment B

Stormwater Facility Calculations



Job Name: Carr Subaru

Job No.: 18032-0008

Date: 19-Apr-21

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Water Quality Calculations

Based on *the CWS December 2019 Design and Construction Standards*

Treat Using Contech StormFilter Catch Basin Units: Each Cartridge Treats **15 gpm (0.033 cfs)**

SF CB 1	31,620	sf of Impervious Surface Area
Water Quality Volume (V_{wq}):		
$V_{wq} = \text{Impervious Area} \cdot 0.36''$		
$V_{wq} =$	31,620	sf \cdot 0.36 in \cdot 1/12 ft/in
$V_{wq} =$	949	cf
Water Quality Flowrate (Q_{wq}):		
$Q_{wq} = V_{wq} / \text{Time}$	Time =	4 hours
$Q_{wq} =$	0.066	cfs $<$ 0.067 cfs
<u>Use Two Cartridge Catch Basin Unit(s)</u>		

Water Quality Requirements Met



Job Name: Carr Subaru

Job No.: 18032-0008

Date: 19-Apr-21

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Water Quality Calculations

Based on *the CWS December 2019 Design and Construction Standards*

Swale	108,330	sf of Impervious Surface Area
Water Quality Volume (V_{wq}):		
$V_{wq} = \text{Impervious Area} \cdot 0.36''$		
$V_{wq} =$	108,330 sf	$\cdot 0.36$ in $\cdot 1/12$ ft/in
$V_{wq} = 3,250$ cf		
Water Quality Flowrate (Q_{wq}):		
$Q_{wq} = V_{wq} / \text{Time}$	Time =	4 hours
$Q_{wq} = 0.226$ cfs		

A 60" diameter WQ Sediment MH is upstream of the Vegetated Swale. It has a 3.2' sump, providing pre-treatment up to 3.2 cfs for the 25-year storm event. The Q25 from the Carr site is 2.54 cfs, meeting the pre-treatment requirements for the Sediment Manhole.

Existing Swale Design:

Swale Bottom Width:	2.0'	= 2.0'
Channel Slope:	1.25%	> 0.5%
Side Slopes:	4H:1V	
Length:	145'	> 100
Q_{wq} :	0.23 cfs	
Manning's Value:	0.24	

Results:

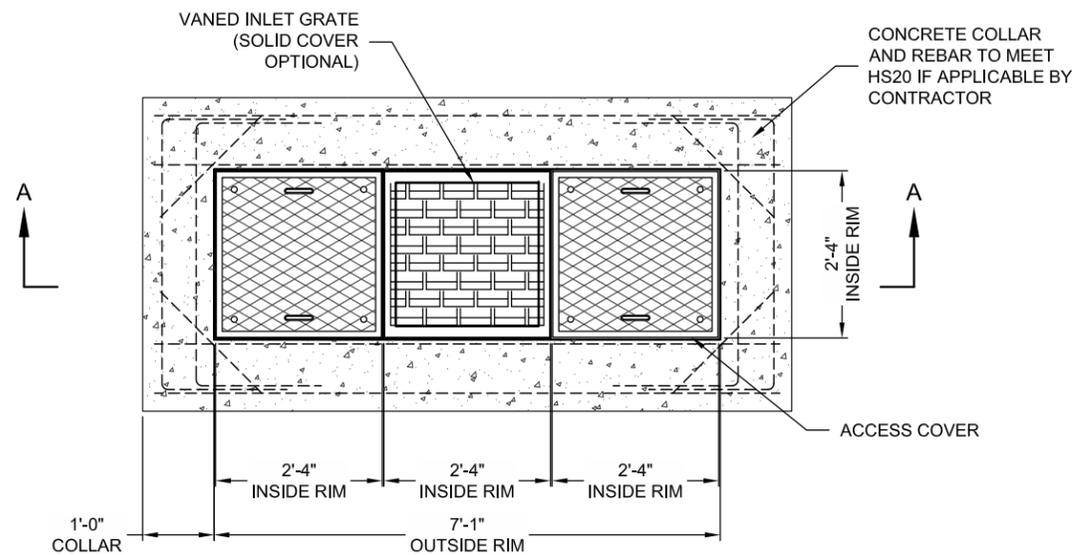
WQ Water Depth:	0.31'	< 0.5'
Velocity V_{wq} :	0.254 ft/s	
Flow Top Width:	3.85'	
Residence Time:	570 s / 9.5 min.	> 9.0
Peak Flow Q_{25} :	2.54 cfs	
Peak Velocity V_{25} :	0.497 ft/s	< 2.0'

Water Quality Requirements Met

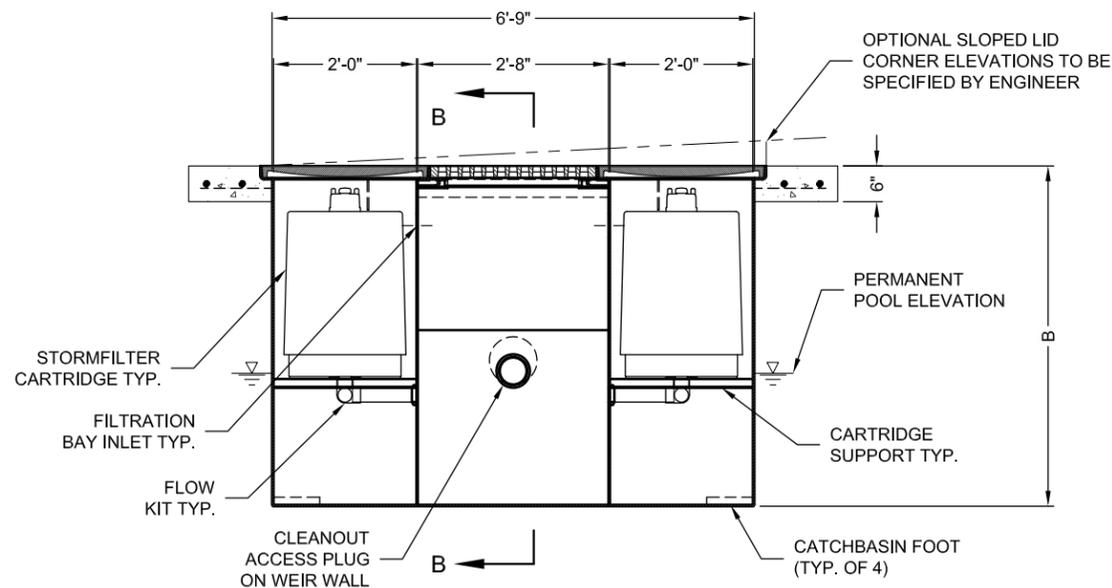


Attachment C

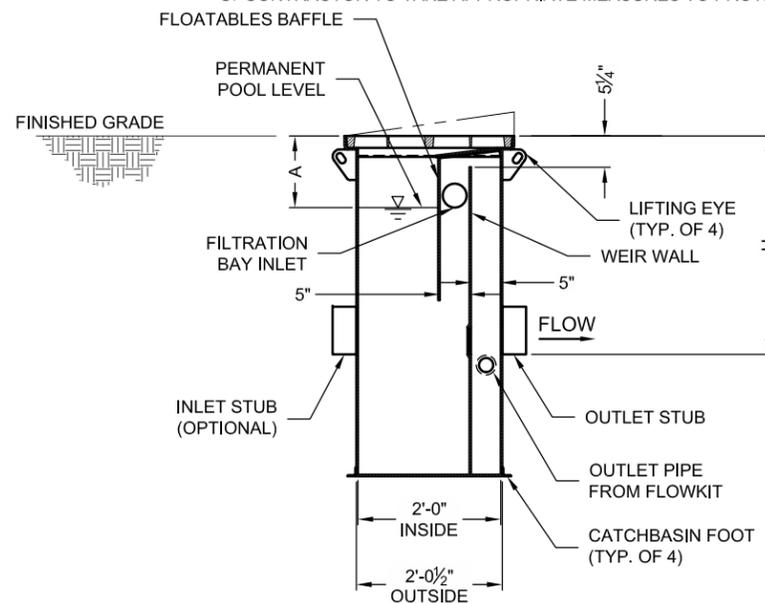
Stormwater Facility Details



PLAN VIEW



SECTION A-A



SECTION B-B

STORMFILTER STEEL CATCHBASIN DESIGN NOTES

STORMFILTER TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE SELECTION AND THE NUMBER OF CARTRIDGES. 2 CARTRIDGE CATCHBASIN HAS A MAXIMUM OF TWO 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

CARTRIDGE HEIGHT	27"			18"			18" DEEP		
RECOMMENDED HYDRAULIC DROP (H)	3.05'			2.3'			3.3'		
SPECIFIC FLOW RATE (gpm/sf)	2 gpm/sf	1.67* gpm/sf	1 gpm/sf	2 gpm/sf	1.67* gpm/sf	1 gpm/sf	2 gpm/sf	1.67* gpm/sf	1 gpm/sf
CARTRIDGE FLOW RATE (gpm)	22.5	18.75	11.25	15	12.53	7.5	15	12.53	7.5
PEAK HYDRAULIC CAPACITY	1.0			1.0			1.8		
INLET PERMANENT POOL LEVEL (A)	1'-0"			1'-0"			2'-0"		
OVERALL STRUCTURE HEIGHT (B)	4'-9"			3'-9"			4'-9"		

* 1.67 gpm/sf SPECIFIC FLOW RATE IS APPROVED WITH PHOSPHOSORB® (PSORB) MEDIA ONLY

GENERAL NOTES

- CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
- FOR SITE SPECIFIC DRAWINGS WITH DETAILED STORMFILTER CATCHBASIN STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. WWW.CONTECHES.COM
- STORMFILTER CATCHBASIN WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
- INLET SHOULD NOT BE LOWER THAN OUTLET. INLET (IF APPLICABLE) AND OUTLET PIPING TO BE SPECIFIED BY ENGINEER AND PROVIDED BY CONTRACTOR.
- MANUFACTURER TO APPLY A SURFACE BEAD WELD IN THE SHAPE OF THE LETTER "O" ABOVE THE OUTLET PIPE STUB ON THE EXTERIOR SURFACE OF THE STEEL SFCB.
- STORMFILTER CATCHBASIN EQUIPPED WITH 4 INCH (APPROXIMATE) LONG STUBS FOR INLET (IF APPLICABLE) AND OUTLET PIPING. STANDARD OUTLET STUB IS 8 INCHES IN DIAMETER. MAXIMUM OUTLET STUB IS 15 INCHES IN DIAMETER. CONNECTION TO COLLECTION PIPING CAN BE MADE USING FLEXIBLE COUPLING BY CONTRACTOR.
- STEEL STRUCTURE TO BE MANUFACTURED OF 1/4 INCH STEEL PLATE. CASTINGS SHALL MEET AASHTO M306 LOAD RATING. TO MEET HS20 LOAD RATING ON STRUCTURE, A CONCRETE COLLAR IS REQUIRED. WHEN REQUIRED, CONCRETE COLLAR WITH #4 REINFORCING BARS TO BE PROVIDED BY CONTRACTOR.
- FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. RADIAL MEDIA DEPTH SHALL BE 7-INCHES. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST 38 SECONDS.
- SPECIFIC FLOW RATE IS EQUAL TO THE FILTER TREATMENT CAPACITY (gpm) DIVIDED BY THE FILTER CONTACT SURFACE AREA (sq ft).

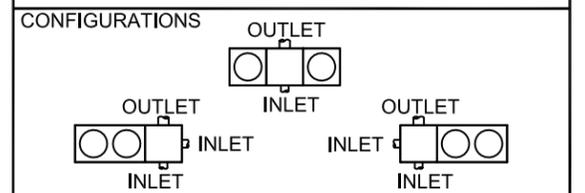
INSTALLATION NOTES

- ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
- CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CATCHBASIN (LIFTING CLUTCHES PROVIDED).
- CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.

2-CARTRIDGE DEEP CATCHBASIN STORMFILTER DATA

STRUCTURE ID	XXX
WATER QUALITY FLOW RATE (cfs)	X.XX
PEAK FLOW RATE (<1.8 cfs)	X.XX
RETURN PERIOD OF PEAK FLOW (yrs)	XXX
CARTRIDGE FLOW RATE (gpm)	XX
MEDIA TYPE (PERLITE, ZPG, PSORB)	XXXXX
RIM ELEVATION	XXX.XX'

PIPE DATA:	I.E.	DIAMETER
INLET STUB	XXX.XX'	XX"
OUTLET STUB	XXX.XX'	XX"



SLOPED LID	YES/NO
SOLID COVER	YES/NO

NOTES/SPECIAL REQUIREMENTS:

Index of Sheets	
Sheet Number	Sheet Title
000	TITLE SHEET
001	LEGEND & ABBREVIATIONS
002	NOTES
100	EXISTING CONDITIONS PLAN
101	DEMO AND EROSION CONTROL PLAN
200	SITE AND STORM DRAINAGE PLAN
201	SITE AND STORM DRAINAGE PLAN
202	SHARED USE PLAN & PROFILE
203	SHARED USE PLAN & PROFILE
204	STONE GRAVITY WALL DETAILS
300	OVERALL GRADING PLAN
301	DETAILED GRADING PLANS
302	DETAILED GRADING PLANS
303	DETAILED GRADING PLANS
304	DETAILED GRADING PLANS
305	DETAILED GRADING PLANS
400	ALP CONVEYANCE DITCH AND RAIN GARDEN PLAN & PROFILE
401	CARR CONVEYANCE DITCH PLAN & PROFILE
500	WETLAND IMPACT PLAN
600	DETAIL SHEET
601	DETAIL SHEET
602	DETAIL SHEET
603	DETAIL SHEET
604	DETAIL SHEET
605	DETAIL SHEET
606	DETAIL SHEET
LP-000	PLANTING LEGEND, DETAILS & NOTES
LP-100	PLANTING PLAN
LP-101	PLANTING PLAN
LP-102	PLANTING PLAN
LP-103	PLANTING PLAN
LP-104	PLANTING PLAN
LI-000	IRRIGATION DETAILS AND NOTES
LI-200	IRRIGATION PLAN
LI-201	IRRIGATION PLAN
LI-202	IRRIGATION PLAN
LI-203	IRRIGATION PLAN
LI-204	IRRIGATION PLAN

UTILITY STATEMENT:

THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED, ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

UTILITY ACCURACY STATEMENT:

DUE TO THE HAZARDOUS NATURE AND APPLICABLE OSHA REQUIREMENTS REGARDING CONFINED SPACES, IT IS CARDNO WRG POLICY TO NOT SEND OUR FIELD STAFF INTO UTILITY MANHOLES TO RETRIEVE DEPTH AND SIZE INFORMATION. THEREFORE, ANY ELEVATION INFORMATION SHOWN HEREON IS SUBJECT TO AN UNCERTAINTY IN ACCURACY OF PLUS OR MINUS 0.2" OR GREATER (DEPENDING ON DEPTH, SIZE, FLOW, AND CONSTRUCTION OF MANHOLE). PIPE SIZES ARE ALSO SUBJECT TO AN UNCERTAINTY OF SIX INCHES OR MORE (DEPENDING ON DEPTH, SIZE, FLOW, AND CONSTRUCTION OF MANHOLE). IF A HIGHER ACCURACY IS NEEDED, THEN ADDITIONAL TIME, EQUIPMENT, AND PERSONNEL WILL BE REQUIRED TO GO INTO THE MANHOLE AND RETRIEVE THIS INFORMATION.

C.O.B CONSTRUCTION PACKAGE CITY OF BEAVERTON

PLANS FOR PROPOSED PROJECT

MAP RECORD AB # 2017-013

Date: 05/01/2017 | QS: 3418

Project # CIP 3320

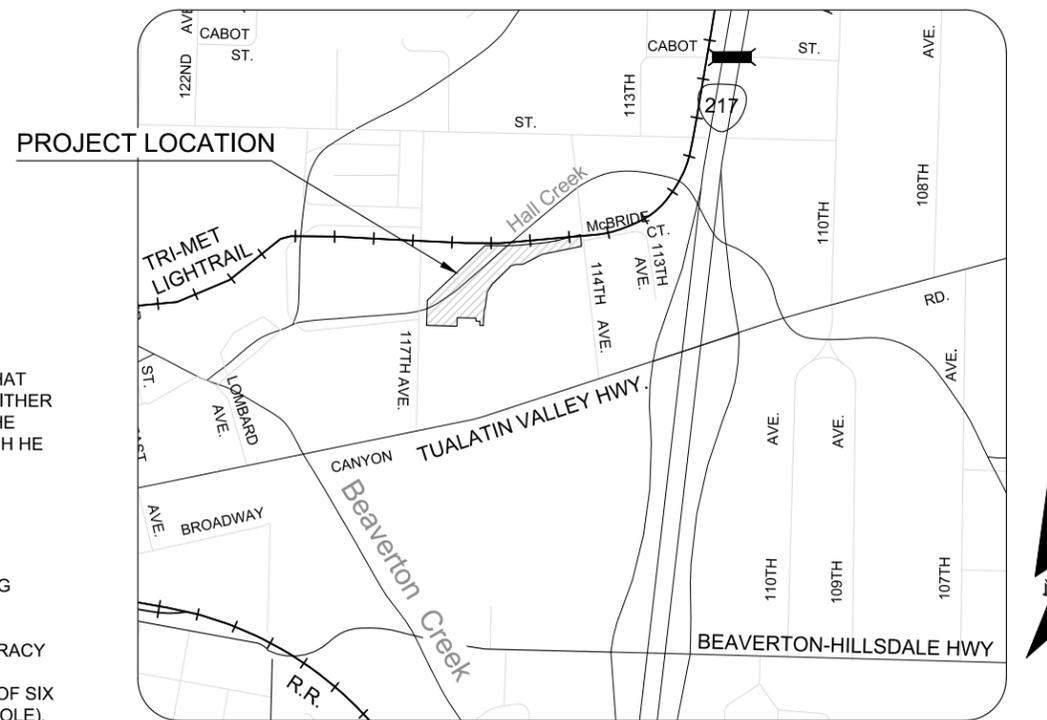
Hall Creek Enhancement Project



GRADING, PAVING, DRAINAGE,
CHANNEL ENHANCEMENTS AND STRUCTURES

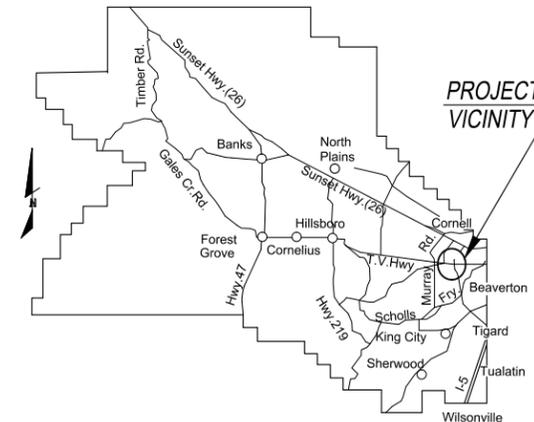
HALL CREEK ENHANCEMENT PROJECT BEAVERTON, OREGON

July 2015



VICINITY MAP

NOT TO SCALE



WASHINGTON COUNTY, OREGON

RECORD DRAWING

08/25/2016
THIS RECORD DRAWING HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY THE GENERAL CONTRACTOR. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE AND REPRESENT ACTUAL IMPROVEMENTS CONSTRUCTED, A POST-CONSTRUCTION TOPOGRAPHIC SURVEY OF THE IMPROVEMENTS WAS NOT CONDUCTED. PARTIES RELYING ON THIS RECORD DOCUMENT ARE ADVISED TO OBTAIN INDEPENDENT VERIFICATION.

**OREGON UTILITY
NOTIFICATION CENTER
1-800-332-2344**



UTILITY CONTACTS:

- CITY OF BEAVERTON: (503) 526-2220
- PM - DEBBIE MARTISAK (503) 350-4084
- ENGINEERING - JIM BRINK (503) 526-2450
- SANITARY SEWER - KEVIN AZAR
- STORM SEWER - MEL SCHULZ
- WATER DEPT. - DAVID WINSHIP
- TUALATIN VALLEY WATER DISTRICT:
KEVIN SCHMELTZER (503) 848-3041
- CLEAN WATER SERVICES: (503) 547-8180
- SANITARY SEWER - SCOTT WOODBURY
- AT&T: DAN MCGEOGH (425) 896-9830
- NW NATURAL GAS: ANDREW YOUNG (503) 226-4211 X 2980
- PGE: TRENT LUTZ (503) 672-5465
- FRONTIER: ANDREW MULICK (503) 526-3544
- COMCAST: MARGARET PORTER (503) 372-1383
- MCI: BRAD LANDIS (425) 201-0901
- LEVEL3: SETH DWYER SETH.DWYER@LEVEL3.COM

BASIS OF BEARINGS:

HORIZONTAL AND VERTICAL DATUM ARE PER CITY OF BEAVERTON CONTROL POINTS, RECEIVED ON 11/2/2012.

ELEVATION DATUM AND BENCHMARK

ELEVATION DATUM: CITY OF BEAVERTON
BENCHMARK: TOP OF "PK" NAIL
LOCATION: IN ROADWAY NEAR EAST CURB LINE ON SW 117ST AVE AT NORTH ENTRANCE TO ASSISTANCE LEAGUE OF PORTLAND PARKING LOT.
ELEVATION: 176.78 FEET



CITY OF BEAVERTON
ECONOMIC & CAPITAL DEVELOPMENT
Engineering Division

4755 S.W. Griffith Drive
P.O. Box 4755
Beaverton, Or 97076
Ph: 503-526-2269
Fx: 503-350-4052

REVISIONS / RELEASES

NO. DATE DESCRIPTION



**HALL CREEK
ENHANCEMENT
PROJECT**
C.O.B CONSTRUCTION
PACKAGE

TITLE SHEET

DESIGNED BY: ND, JB
DRAWN BY: ND
CHECKED BY: CJ
APPROVED BY: CJ
PROJECT NO: 2120173
DATE: 07/07/2014



PORTLAND
5415 SW WESTGATE DR, STE 100, PORTLAND, OR 97221
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www.cardno.com

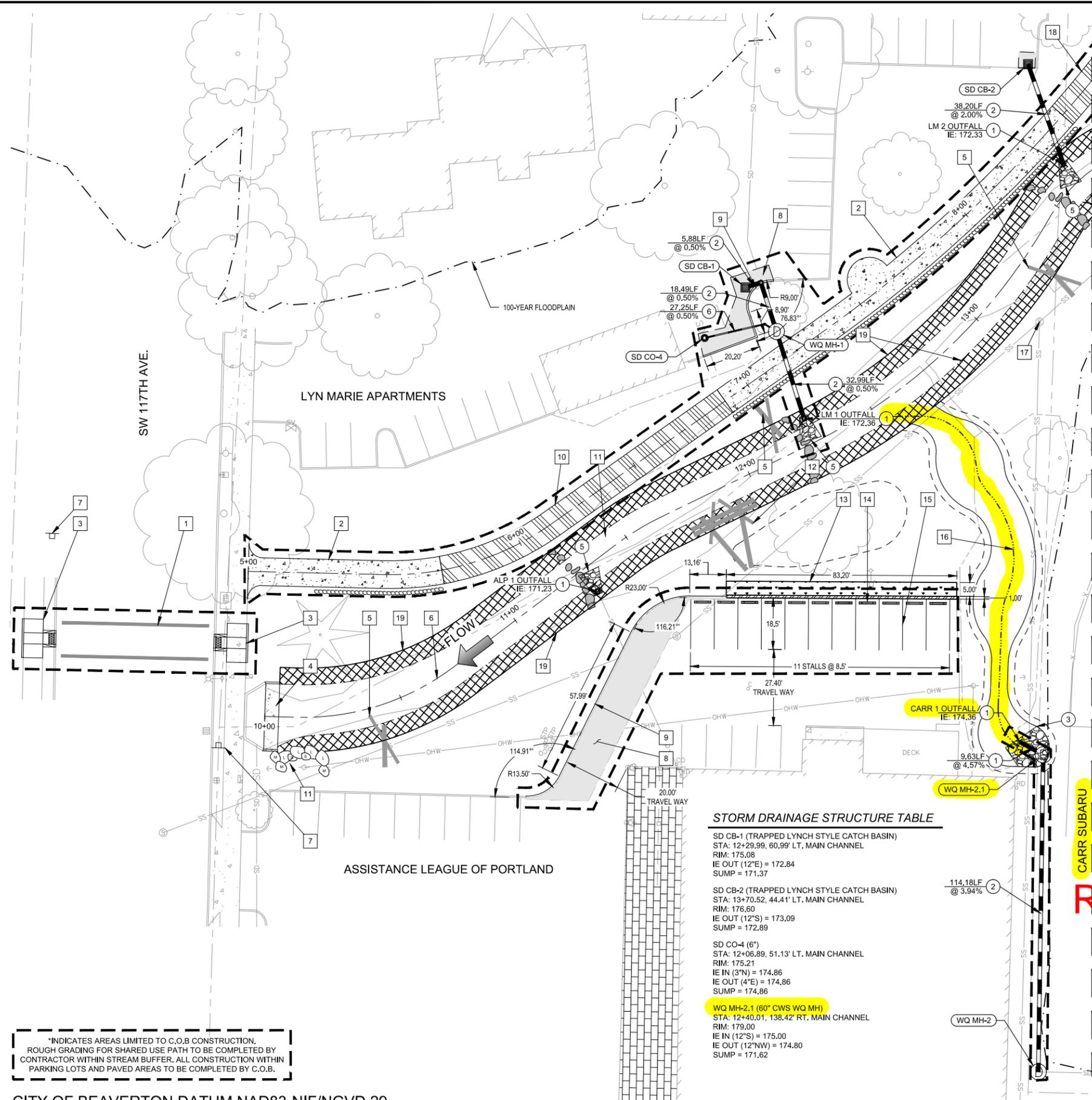
000

OF 41

CITY OF BEAVERTON DATUM NAD83-NIF/NGVD 29

THIS DRAWING IS FULL SIZE WHEN 22" X 34" OR IS REDUCED TO HALF SCALE WHEN 11" X 17"

w:\21201730\civil\cd\0173-cd-title - 9/15/2016 3:13:33 PM



- ### CONSTRUCTION NOTES
- 1 CONSTRUCT MIDBLOCK CROSSING (BY C.O.B.)
 - 2 CONSTRUCT PERVIOUS CONCRETE SHARED USE PATH PER DETAIL ON SHEET 600 AND 603. SEE SHEETS 202 AND 203 FOR PATH PLAN AND PROFILE.
 - 3 CONSTRUCT RETROFIT MIDBLOCK SIDEWALK RAMP WITH PLANTER STRIP. SEE DETAILED GRADING ON SHEET C301. SEE CITY DETAIL ON SHEET 600.
 - 4 CONCRETE APRON EXTENSION FOR FUTURE CITY OF BEAVERTON TRASH RACK REPLACEMENT. EXTEND 2' BEYOND SIDES OF EXISTING WINGWALL. SEE DETAIL SHEET 603.
 - 5 CONSTRUCT LWD STRUCTURE TYPE 1 PER DETAIL ON SHEET 606. ENSURE 2' MIN CLEARANCE FROM EDGE OF ANY SANITARY OR STORM SEWER PIPE.
 - 6 CONSTRUCT PROPOSED HALL CREEK CHANNEL. SEE MAIN CHANNEL TYPICAL SECTION ON SHEET 300. SEE DETAILED GRADING SHEETS 301-305.
 - 7 INSTALL ADVANCED PEDESTRIAN CROSSING SIGN W11-2 PER MID-BLOCK PEDESTRIAN CROSSING DETAIL ON SHEET 600.
 - 8 INSTALL ASPHALT CONCRETE PAVEMENT. SEE DETAIL ON SHEET 603.
 - 9 CONSTRUCT TYPE 'A' CURB PER CITY OF BEAVERTON DETAIL ON SHEET 600. FOR DETAILED GRADING SEE SHEETS 301-305.
 - 10 CONSTRUCT RAISED BOARDWALK PATH WITHOUT HANDRAIL PER DETAIL ON SHEET 604.
 - 11 CONSTRUCT GRADE CONTROL STRUCTURE PER DETAIL ON SHEET 606.
 - 12 CONSTRUCT LWD STRUCTURE TYPE 2 PER DETAIL ON SHEET 606. ENSURE 2' MIN CLEARANCE FROM EDGE OF ANY SANITARY OR STORM SEWER PIPE.
 - 13 CONSTRUCT VEGETATED FILTER STRIP PER CWS DETAIL ON SHEET 601.
 - 14 INSTALL CONCRETE WHEEL STOP PER DETAIL ON SHEET 603.
 - 15 INSTALL 4" WHITE PAINTED STRIPING. PROVIDE 2 COATS OF PAINT FOR ALL PARKING LOT STRIPING. SEE SHEET 603 FOR STALL DIMENSIONS AND DETAILS.
 - 16 CONSTRUCT VEGETATED CONVEYANCE DITCH WITH RAIN GARDEN SEE CONVEYANCE DITCH AND RAIN GARDEN PLAN AND PROFILE SHEET 400. SEE DETAILS ON SHEET 603 FOR MORE INFORMATION. SHEET PLANTING PLANS FOR ADDITIONAL PLANTING INFORMATION.
 - 17 PROTECT AND PRESERVE EXISTING 48" SANITARY MANHOLE. MAINTAIN APPROXIMATELY 2.09' OF EXPOSURE FROM CONE AND LID TO FINISHED GRADE.
 - 18 CONSTRUCT RAISED BOARDWALK PATH WITH HANDRAIL PER DETAIL ON SHEET 604. SEE SHEETS 202 AND 203 FOR PATH PLAN AND PROFILE.
 - 19 INSTALL SEMI-PERMANENT TYPE 2 COIR MAT PER CWS. SEE DETAILED GRADING PLAN FOR LIMITS.

- ### STORM DRAINAGE NOTES
- 1 DAYLIGHT OUTFALL TO FINISH GRADE.
 - 2 INSTALL 12" CONCRETE STORM DRAIN PIPE AT LENGTH AND SLOPE PER PLAN.
 - 3 INSTALL RIP RAP OUTFALL PROTECTION. CLASS 50 RIP RAP 1.5" THICK x 7" WIDE x 8" LONG. PLACE RIP RAP TO ENCOURAGE FLOW TO DITCH FLOWLINE.
 - 5 INSTALL GRANITE BOULDER OUTFALL PROTECTION. 1.5" THICK x 7" WIDE x 8" LONG TO CONSIST OF 50% SMALL AND 50% MEDIUM ROUNDED GRANITE BOULDERS MATCHING GRADE CONTROL STRUCTURES. TO BE PLACED IN A MANNER NOT TO IMPEDE LOW FLOW OF CHANNEL.
 - 6 INSTALL 4" HDPE STORM DRAIN PIPE AT LENGTH AND SLOPE PER PLAN.

STORM DRAINAGE STRUCTURE TABLE

Structure	Station	Length	Rim	IE In	IE Out	Sump
WQ MH-1 (60" CWS WQ MH)	12+33.23, 41.74' LT. MAIN CHANNEL		177.54	172.72	174.73	170.16
WQ MH-2 (60" CWS WQ MH)	11+99.86, 239.22' RT. MAIN CHANNEL		183.50			177.00

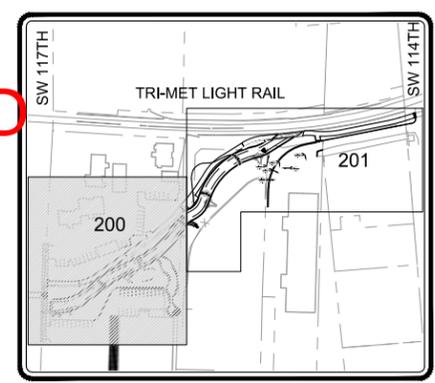
STORM DRAINAGE STRUCTURE TABLE

SD CB-1 (TRAPPED LYNCH STYLE CATCH BASIN)	STA: 12+29.99, 60.99' LT. MAIN CHANNEL	RIM: 175.08	IE OUT (12"E) = 172.84	SUMP = 171.37	
SD CB-2 (TRAPPED LYNCH STYLE CATCH BASIN)	STA: 13+70.52, 44.41' LT. MAIN CHANNEL	RIM: 176.60	IE OUT (12"S) = 173.09	SUMP = 172.89	
SD CO-4 (6")	STA: 12+06.89, 51.13' LT. MAIN CHANNEL	RIM: 175.21	IE IN (3"N) = 174.86	IE OUT (4"E) = 174.86	SUMP = 174.86
WQ MH-2.1 (60" CWS WQ MH)	STA: 12+40.01, 138.42' RT. MAIN CHANNEL	RIM: 179.00	IE IN (12"S) = 175.00	IE OUT (12"NW) = 174.80	SUMP = 171.62

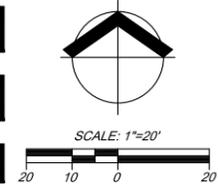
RECORD DRAWING

08/25/2016

THIS RECORD DRAWING HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY THE GENERAL CONTRACTOR. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE AND REPRESENT ACTUAL IMPROVEMENTS CONSTRUCTED, A POST-CONSTRUCTION TOPOGRAPHIC SURVEY OF THE IMPROVEMENTS WAS NOT CONDUCTED. PARTIES RELYING ON THIS RECORD DOCUMENT ARE ADVISED TO OBTAIN INDEPENDENT VERIFICATION.



REDUCED SCALE



*INDICATES AREAS LIMITED TO C.O.B. CONSTRUCTION. ROUGH GRADING FOR SHARED USE PATH TO BE COMPLETED BY CONTRACTOR WITHIN STREAM BUFFER. ALL CONSTRUCTION WITHIN PARKING LOTS AND PAVED AREAS TO BE COMPLETED BY C.O.B.

CITY OF BEAVERTON DATUM NAD83-NIF/NGVD 29

THIS DRAWING IS FULL SIZE WHEN 22" X 34" OR IS REDUCED TO HALF SCALE WHEN 11" X 17"

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CITY OF BEAVERTON
ECONOMIC & CAPITAL DEVELOPMENT
Engineering Division

4755 S.W. Griffith Drive
P.O. Box 4755
Beaverton, Or 97076
Ph: 503-526-2269
Fx: 503-350-4052

REVISIONS / RELEASES
NO. DATE DESCRIPTION



HALL CREEK ENHANCEMENT PROJECT
C.O.B CONSTRUCTION PACKAGE

SITE AND STORM DRAINAGE PLAN

DESIGNED BY: ND, JB
DRAWN BY: ND
CHECKED BY: CJ
APPROVED BY: CJ
PROJECT NO: 2120173
DATE: 07/07/2014



200

GENERAL GRADING NOTES

1. WITHIN THE PROTECTED ROOT ZONE OF EACH TREE, GRADE CHANGE OR CUT AND FILL, SHALL NOT BE PERMITTED EXCEPT WHERE HAND EXCAVATION IS APPROVED WITH THE SUBMITTAL OF AN ARBORIST'S REPORT, AS PART OF APPLICATION APPROVAL.
2. USE 10' TRANSITION ZONE TO TIE THE PROPOSED PATH CROSS SECTION IN WITH AS-BUILT BOARDWALK CORNER ELEVATIONS.



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REVISIONS / RELEASES
 NO. DATE DESCRIPTION



HALL CREEK ENHANCEMENT PROJECT
C.O.B CONSTRUCTION PACKAGE

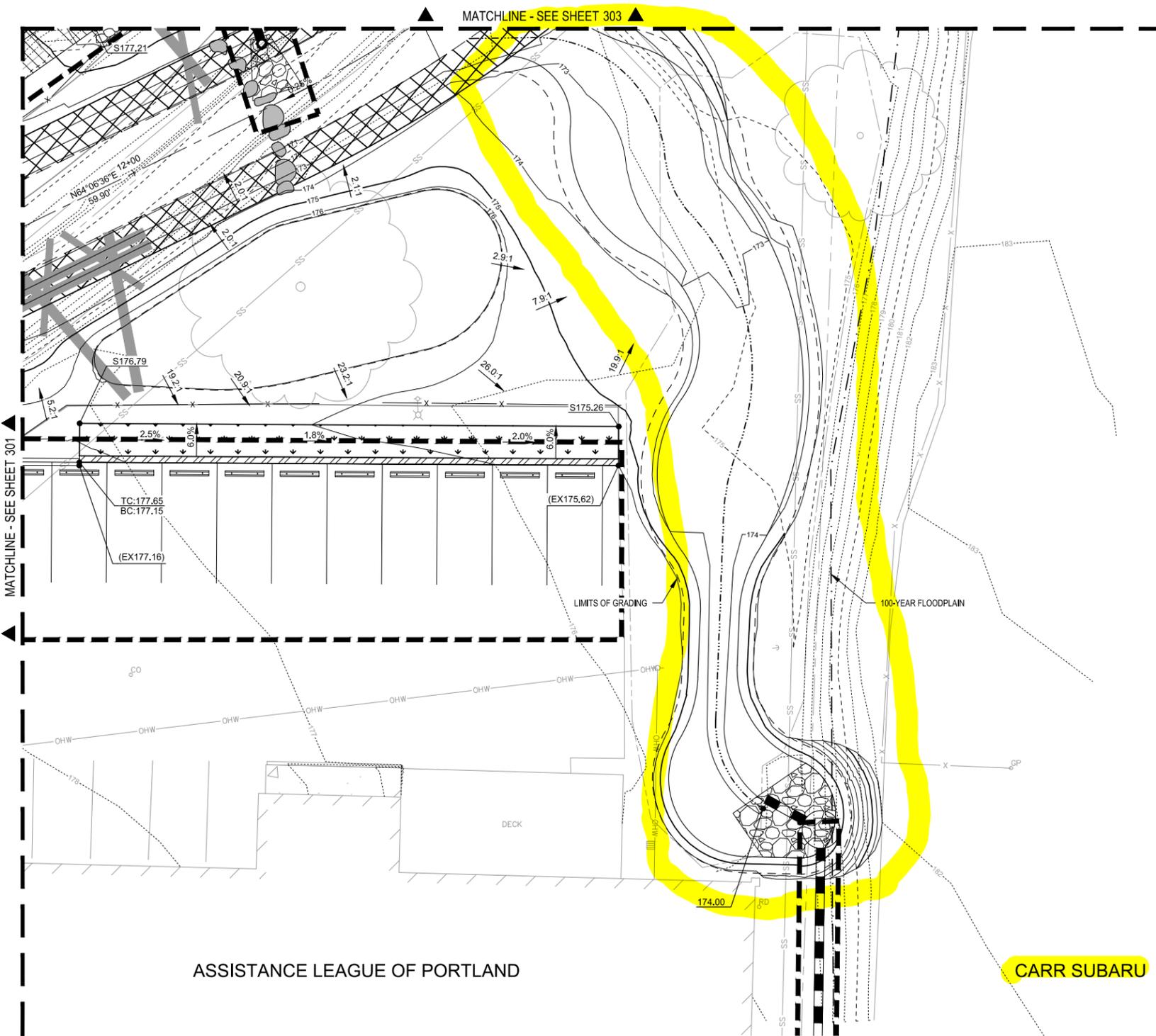
DETAILED GRADING PLANS

DESIGNED BY: ND, JB
 DRAWN BY: ND
 CHECKED BY: CJ
 APPROVED BY: CJ
 PROJECT NO: 2120173
 DATE: 07/07/2014



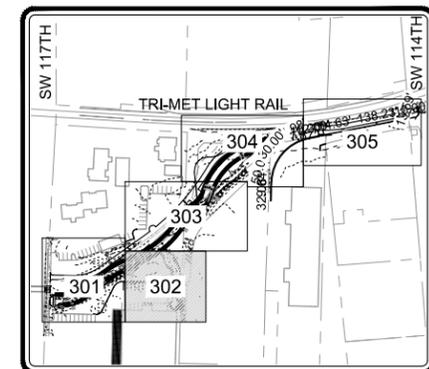
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OF 41



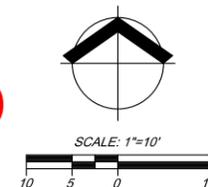
RECORD DRAWING
 08/25/2016

THIS RECORD DRAWING HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY THE GENERAL CONTRACTOR. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE AND REPRESENT ACTUAL IMPROVEMENTS CONSTRUCTED, A POST-CONSTRUCTION TOPOGRAPHIC SURVEY OF THE IMPROVEMENTS WAS NOT CONDUCTED. PARTIES RELYING ON THE RECORD DOCUMENT ARE ADVISED TO OBTAIN INDEPENDENT VERIFICATION.



SHEET LOCATION

REDUCED SCALE



*INDICATES AREAS LIMITED TO C.O.B CONSTRUCTION. ROUGH GRADING FOR SHARED USE PATH TO BE COMPLETED BY CONTRACTOR WITHIN STREAM BUFFER. ALL CONSTRUCTION WITHIN PARKING LOTS AND PAVED AREAS TO BE COMPLETED BY C.O.B.

CITY OF BEAVERTON DATUM NAD83-NIF/NGVD 29

THIS DRAWING IS FULL SIZE WHEN 22" X 34" OR IS REDUCED TO HALF SCALE WHEN 11" X 17"



Attachment D

Hydromodification Approach Review
& Fee-In-Lieu Request

Stormwater Options for Hydromodification Approach (HA) from CWS Table 4-3:

- Water Quality Manhole (Pretreatment only):
 - *While not a hydromodification approach, Pretreatment is required prior to stormwater management approaches for runoff from impervious surfaces.*
 - *The northerly portion of the site is collected in trapped and sumped catch basins prior to treatment in the StormFilter catch basin. **These basins meet the pretreatment requirement.***
 - *The southerly portion of the site **is routed through a water quality manhole** prior to discharge to the existing vegetated swale for treatment.*
- Detention Pond:
 - *The most logical location onsite to install a detention pond that would intercept the “southerly” portion of the existing stormwater system is at the low point prior to exiting the site (behind the “Existing Maintenance Bays” building).*
 - *Installation of a pond here that would preclude floodwater from entering it would create fill in the floodplain which we could not offset without impacting the existing vegetated corridor and disturbing the Hall Creek Stream & Riparian Zone.*
 - *Installation of a detention pond here would create backwater in the upstream system during any detention events. This is not a design we like to recommend.*
 - *Installing a detention pond at other locations onsite would require extensive rework of site utilities. A lift station for stormwater is likely required in order to reach the existing outfall point to the vegetated swale. Not only is this risky, but it would also consume electricity every time it rains.*
- Underground Detention:
 - *An underground detention system will have the same or similar challenges to a Detention Pond (fill in floodplain, upstream backwater, possible lift station).*
 - *Low levels of contamination exist onsite making extensive excavation a risk to workers and the environment.*
 - *Static groundwater is anticipated to be in the 5’ – 7’ BGS range, with seasonal fluctuations with negative consequences.*
 - *A PVC lined underground detention system may need dewatering to install, risking contaminating of groundwater from the exposed soils. High groundwater may have negative effects over time on a flexible liner.*
 - *A concrete basin could mitigate groundwater issues, but may need additional natural resources (concrete anchoring or ballast).*
- Extended Dry Basin:
 - *Same challenges as a Detention Pond – see above.*

- 
- 
- Constructed Water Quality Wetland
 - *Incorrectly noted in Table 4-3 as a HA approach / does not apply.*
 - *Similar challenges as ponds.*
 - Structural Infiltration Planter
 - *Infiltration is the best way to address HA, but we will not design an infiltration system at this site due to:*
 - *Native silts with over 80% fines measured,*
 - *Extensive undocumented fill,*
 - *Soil contamination.*
 - *Flow-through planters can provide detention benefits but are not listed on the table. However, retrofitting flow-through planters to meet the site needs is unlikely to be feasible as it would require dropping the site outlets into the Riparian Zone by at least 2.5' (depth from soil surface to IE of underdrain).*
 - Non-Structural Infiltration Planter (Rain Garden)
 - *Same issues as structural infiltration planters.*
 - Street-Side Planter
 - *Same issues as structural infiltration planters.*
 - *No appropriate locations onsite.*
 - Green Roofs
 - *New roof areas will not assist HA in a meaningful way for the added cost to the structures.*
 - Porous Pavement
 - *Not recommended due to poor soils (high fines, undocumented fill) and soil contamination.*
 - *Porous pavement in the areas of pavement rework would not provide a meaningful HA benefit.*
 - *Porous pavement not recommended for a car sales and service site.*
 - Stormwater Tree
 - *Current landscaping plans indicate approximately 40 new 2" caliper trees being planted in areas that will benefit HA (near pavement areas), but will not be a significant impact toward the ~140,000 sf of impervious area onsite.*
 - Structural Soils
 - *Same issues as porous pavement and structural infiltration planters.*

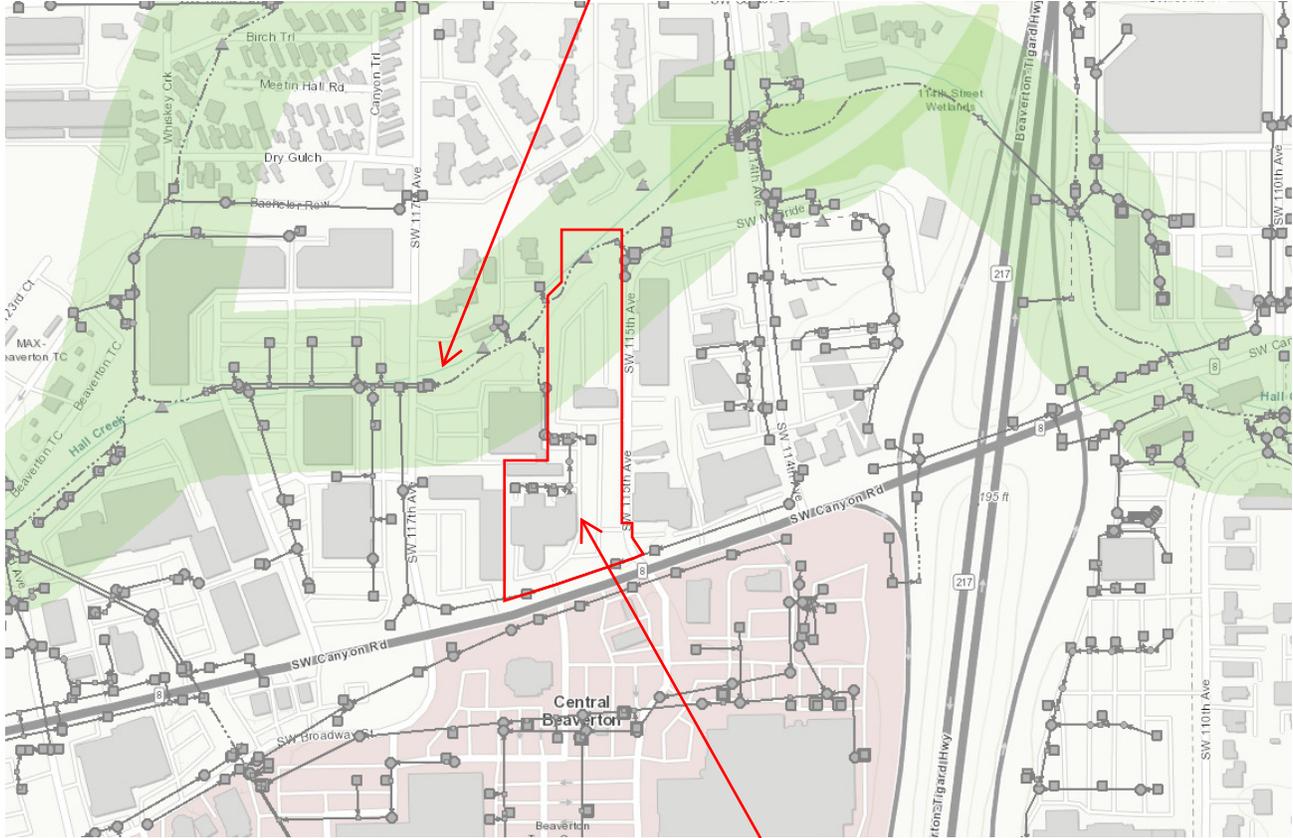


Request for Hydromodification Approach Fee-In-Lieu per CWS Code:

The owner requests to pay a Fee-In-Lieu of construction or implementation of a Hydromodification Approach (HA) as a result of meeting conditions outlined in Section 4.03.7.a. Applicable subsections are noted below:

3. Effective implementation of a HA is impracticable due to topography, soils, high ground water, and site contamination.
 - *There are no good areas onsite to install HA stormwater controls (as outlined above with the Stormwater Options for Hydromodification Approach from CWS Table 4-3).*
5. Implementation of HA at the proposed development is likely to have a negligible impact and on-site implementation of a hydromodification approach will result in little or no benefit to the Receiving Reach as outlined above. This site meets the following characteristics for an Infill Exemption, meeting all of the following factors:
 - A) The Receiving Reach is Low or Moderate risk.
 - *This section of Hall Creek is mapped as Low Risk. See HA Exhibit 1*
 - B) The Size of the impervious surface area created and/or modified by the project is moderate to small. A project's impervious surface is moderate to small when the proposed new and/or impervious surface created by the development is 25,000 sf or less.
 - *The project will not add impervious surface to the watershed, and will actually reduce the actual impervious area with the redevelopment through the conversion of existing paved areas to landscaping.*
 - C) The discharge from the site is small compared with the total tributary drainage flow in the receiving stream. A project's discharge will be considered small when the additional flow from the proposed development is less than 10 percent of the total tributary drainage flow at the Point of Discharge.
 - *Looking at HA Exhibit 2, the 4.0 acre site is well below 10% of the area contributing to Hall Creek. Additional flow (when analyzed under the 2019 CWS pre-development land use Curve Numbers) will be well below 10% of the total tributary drainage flow at the Point of Discharge by default. No further analysis performed.*
 - D) The project is located in a drainage basin with a high level of existing development tributary to the downstream end of the Receiving Reach.
 - *The drainage basin has a high level of existing development and appears that there is 10% or less of the basin area that has not been developed or is otherwise protected from or unlikely to be further developed.*

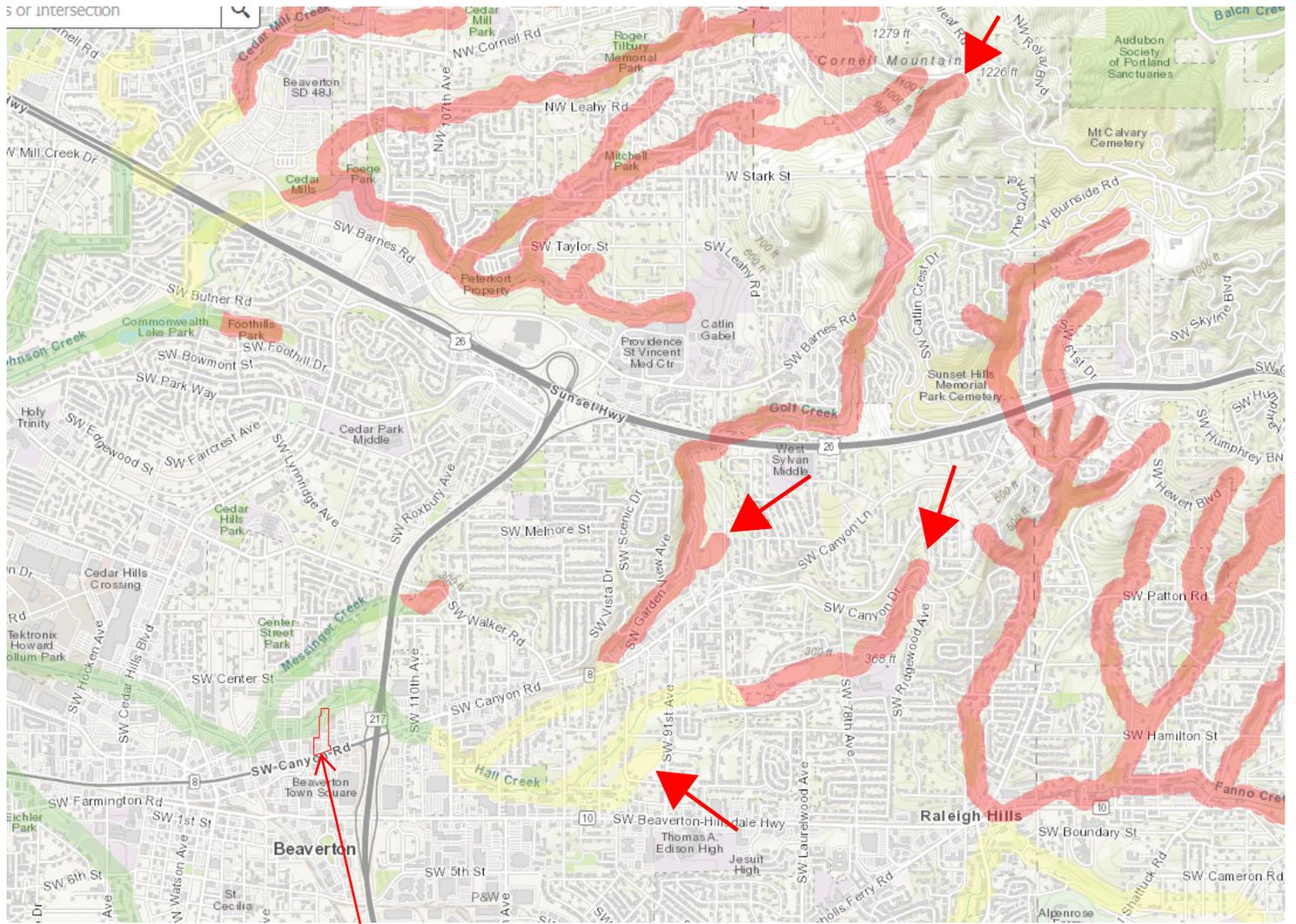
HALL CREEK
LOW HYDROMOD RISK LEVEL



N.T.S.

CARR SUBARU SITE

HA EXHIBIT 1



CARR SUBARU SITE
4.0 ACRES
 $Q_{25} \leq 4.8$ CFS

LEGEND:
STREAMS THAT CONTRIBUTE TO HALL CREEK AT THE CARR SUBARU SITE.

NOTES:
UPSTREAM BASIN IS HEAVILY DEVELOPED.

CARR SUBARU SITE IS FULLY DEVELOPED AND EXISTING DISCHARGES ARE WELL BELOW 10% OF THE TOTAL TRIBUTARY DRAINAGE FLOW AT THE POINT OF DISCHARGE.

NO FURTHER ANALYSIS PERFORMED.

HA EXHIBIT 2



Attachment E

Operations and Maintenance Manual

StormFilter Inspection and Maintenance Procedures



Maintenance Guidelines

The primary purpose of the Stormwater Management StormFilter® is to filter and prevent pollutants from entering our waterways. Like any effective filtration system, periodically these pollutants must be removed to restore the StormFilter to its full efficiency and effectiveness.

Maintenance requirements and frequency are dependent on the pollutant load characteristics of each site. Maintenance activities may be required in the event of a chemical spill or due to excessive sediment loading from site erosion or extreme storms. It is a good practice to inspect the system after major storm events.

Maintenance Procedures

Although there are many effective maintenance options, we believe the following procedure to be efficient, using common equipment and existing maintenance protocols. The following two-step procedure is recommended::

1. Inspection

- Inspection of the vault interior to determine the need for maintenance.

2. Maintenance

- Cartridge replacement
- Sediment removal

Inspection and Maintenance Timing

At least one scheduled inspection should take place per year with maintenance following as warranted.

First, an inspection should be done before the winter season. During the inspection the need for maintenance should be determined and, if disposal during maintenance will be required, samples of the accumulated sediments and media should be obtained.

Second, if warranted, a maintenance (replacement of the filter cartridges and removal of accumulated sediments) should be performed during periods of dry weather.

In addition to these two activities, it is important to check the condition of the StormFilter unit after major storms for potential damage caused by high flows and for high sediment accumulation that may be caused by localized erosion in the drainage area. It may be necessary to adjust the inspection/maintenance schedule depending on the actual operating conditions encountered by the system. In general, inspection activities can be conducted at any time, and maintenance should occur, if warranted, during dryer months in late summer to early fall.

Maintenance Frequency

The primary factor for determining frequency of maintenance for the StormFilter is sediment loading.

A properly functioning system will remove solids from water by trapping particulates in the porous structure of the filter media inside the cartridges. The flow through the system will naturally decrease as more and more particulates are trapped. Eventually the flow through the cartridges will be low enough to require replacement. It may be possible to extend the usable span of the cartridges by removing sediment from upstream trapping devices on a routine as-needed basis, in order to prevent material from being re-suspended and discharged to the StormFilter treatment system.

The average maintenance lifecycle is approximately 1-5 years. Site conditions greatly influence maintenance requirements. StormFilter units located in areas with erosion or active construction may need to be inspected and maintained more often than those with fully stabilized surface conditions.

Regulatory requirements or a chemical spill can shift maintenance timing as well. The maintenance frequency may be adjusted as additional monitoring information becomes available during the inspection program. Areas that develop known problems should be inspected more frequently than areas that demonstrate no problems, particularly after major storms. Ultimately, inspection and maintenance activities should be scheduled based on the historic records and characteristics of an individual StormFilter system or site. It is recommended that the site owner develop a database to properly manage StormFilter inspection and maintenance programs..





Inspection Procedures

The primary goal of an inspection is to assess the condition of the cartridges relative to the level of visual sediment loading as it relates to decreased treatment capacity. It may be desirable to conduct this inspection during a storm to observe the relative flow through the filter cartridges. If the submerged cartridges are severely plugged, then typically large amounts of sediments will be present and very little flow will be discharged from the drainage pipes. If this is the case, then maintenance is warranted and the cartridges need to be replaced.

Warning: In the case of a spill, the worker should abort inspection activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct an inspection:

Important: Inspection should be performed by a person who is familiar with the operation and configuration of the StormFilter treatment unit and the unit's role, relative to detention or retention facilities onsite.

1. If applicable, set up safety equipment to protect and notify surrounding vehicle and pedestrian traffic.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the access portals to the vault and allow the system vent.
4. Without entering the vault, visually inspect the inside of the unit, and note accumulations of liquids and solids.
5. Be sure to record the level of sediment build-up on the floor of the vault, in the forebay, and on top of the cartridges. If flow is occurring, note the flow of water per drainage pipe. Record all observations. Digital pictures are valuable for historical documentation.
6. Close and fasten the access portals.
7. Remove safety equipment.
8. If appropriate, make notes about the local drainage area relative to ongoing construction, erosion problems, or high loading of other materials to the system.
9. Discuss conditions that suggest maintenance and make decision as to whether or not maintenance is needed.

Maintenance Decision Tree

The need for maintenance is typically based on results of the inspection. The following Maintenance Decision Tree should be used as a general guide. (Other factors, such as Regulatory Requirements, may need to be considered).

Please note Stormwater Management StormFilter devices installed downstream of, or integrated within, a stormwater storage facility typically have different operational parameters (i.e. draindown time). In these cases, the inspector must understand the relationship between the retention/detention facility and the treatment system by evaluating site specific civil engineering plans, or contacting the engineer of record, and make adjustments to the below guidance as necessary. Sediment deposition depths and patterns within the StormFilter are likely to be quite different compared to systems without upstream storage and therefore shouldn't be used exclusively to evaluate a need for maintenance.

1. Sediment loading on the vault floor.
 - a. If $>4''$ of accumulated sediment, maintenance is required.
2. Sediment loading on top of the cartridge.
 - a. If $>1/4''$ of accumulation, maintenance is required.
3. Submerged cartridges.
 - a. If $>4''$ of static water above cartridge bottom for more than 24 hours after end of rain event, maintenance is required. (Catch basins have standing water in the cartridge bay.)
4. Plugged media.
 - a. While not required in all cases, inspection of the media within the cartridge may provide valuable additional information.
 - b. If pore space between media granules is absent, maintenance is required.
5. Bypass condition.
 - a. If inspection is conducted during an average rain fall event and StormFilter remains in bypass condition (water over the internal outlet baffle wall or submerged cartridges), maintenance is required.
6. Hazardous material release.
 - a. If hazardous material release (automotive fluids or other) is reported, maintenance is required.
7. Pronounced scum line.
 - a. If pronounced scum line (say $\geq 1/4''$ thick) is present above top cap, maintenance is required.

Maintenance

Depending on the configuration of the particular system, maintenance personnel will be required to enter the vault to perform the maintenance.

Important: If vault entry is required, OSHA rules for confined space entry must be followed.

Filter cartridge replacement should occur during dry weather. It may be necessary to plug the filter inlet pipe if base flows is occurring.

Replacement cartridges can be delivered to the site or customers facility. Information concerning how to obtain the replacement cartridges is available from Contech Engineered Solutions.

Warning: In the case of a spill, the maintenance personnel should abort maintenance activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct cartridge replacement and sediment removal maintenance:

1. If applicable, set up safety equipment to protect maintenance personnel and pedestrians from site hazards.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the doors (access portals) to the vault and allow the system to vent.
4. Without entering the vault, give the inside of the unit, including components, a general condition inspection.
5. Make notes about the external and internal condition of the vault. Give particular attention to recording the level of sediment build-up on the floor of the vault, in the forebay, and on top of the internal components.
6. Using appropriate equipment offload the replacement cartridges (up to 150 lbs. each) and set aside.
7. Remove used cartridges from the vault using one of the following methods:

Method 1:

- A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.

Using appropriate hoisting equipment, attach a cable from the boom, crane, or tripod to the loose cartridge. Contact Contech Engineered Solutions for suggested attachment devices.

- B. Remove the used cartridges (up to 250 lbs. each) from the vault.



Important: Care must be used to avoid damaging the cartridges during removal and installation. The cost of repairing components damaged during maintenance will be the responsibility of the owner.

- C. Set the used cartridge aside or load onto the hauling truck.
- D. Continue steps a through c until all cartridges have been removed.

Method 2:

- A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.
- B. Unscrew the cartridge cap.
- C. Remove the cartridge hood and float.
- D. At location under structure access, tip the cartridge on its side.
- E. Empty the cartridge onto the vault floor. Reassemble the empty cartridge.
- F. Set the empty, used cartridge aside or load onto the hauling truck.
- G. Continue steps a through e until all cartridges have been removed.

8. Remove accumulated sediment from the floor of the vault and from the forebay. This can most effectively be accomplished by use of a vacuum truck.
9. Once the sediments are removed, assess the condition of the vault and the condition of the connectors.
10. Using the vacuum truck boom, crane, or tripod, lower and install the new cartridges. Once again, take care not to damage connections.
11. Close and fasten the door.
12. Remove safety equipment.
13. Finally, dispose of the accumulated materials in accordance with applicable regulations. Make arrangements to return the used **empty** cartridges to Contech Engineered Solutions.

Related Maintenance Activities - Performed on an as-needed basis

StormFilter units are often just one of many structures in a more comprehensive stormwater drainage and treatment system.

In order for maintenance of the StormFilter to be successful, it is imperative that all other components be properly maintained. The maintenance/repair of upstream facilities should be carried out prior to StormFilter maintenance activities.

In addition to considering upstream facilities, it is also important to correct any problems identified in the drainage area. Drainage area concerns may include: erosion problems, heavy oil loading, and discharges of inappropriate materials.

Material Disposal

The accumulated sediment found in stormwater treatment and conveyance systems must be handled and disposed of in accordance with regulatory protocols. It is possible for sediments to contain measurable concentrations of heavy metals and organic chemicals (such as pesticides and petroleum products). Areas with the greatest potential for high pollutant loading include industrial areas and heavily traveled roads.

Sediments and water must be disposed of in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. This typically requires coordination with a local landfill for solid waste disposal. For liquid waste disposal a number of options are available including a municipal vacuum truck decant facility, local waste water treatment plant or on-site treatment and discharge.



Inspection Report

Date: _____ Personnel: _____

Location: _____ System Size: _____ Months in Service: _____

System Type: Vault Cast-In-Place Linear Catch Basin Manhole Other: _____

Sediment Thickness in Forebay: _____ Date: _____

Sediment Depth on Vault Floor: _____

Sediment Depth on Cartridge Top(s): _____

Structural Damage: _____

Estimated Flow from Drainage Pipes (if available): _____

Cartridges Submerged: Yes No Depth of Standing Water: _____

StormFilter Maintenance Activities (check off if done and give description)

Trash and Debris Removal: _____

Minor Structural Repairs: _____

Drainage Area Report _____

Excessive Oil Loading: Yes No Source: _____

Sediment Accumulation on Pavement: Yes No Source: _____

Erosion of Landscaped Areas: Yes No Source: _____

Items Needing Further Work: _____

Owners should contact the local public works department and inquire about how the department disposes of their street waste residuals.

Other Comments:

Review the condition reports from the previous inspection visits.

StormFilter Maintenance Report

Date: _____ Personnel: _____

Location: _____ System Size: _____

System Type: Vault Cast-In-Place Linear Catch Basin Manhole Other: _____

List Safety Procedures and Equipment Used: _____

System Observations

Months in Service: _____

Oil in Forebay (if present): Yes No

Sediment Depth in Forebay (if present): _____

Sediment Depth on Vault Floor: _____

Sediment Depth on Cartridge Top(s): _____

Structural Damage: _____

Drainage Area Report

Excessive Oil Loading: Yes No Source: _____

Sediment Accumulation on Pavement: Yes No Source: _____

Erosion of Landscaped Areas: Yes No Source: _____

StormFilter Cartridge Replacement Maintenance Activities

Remove Trash and Debris: Yes No Details: _____

Replace Cartridges: Yes No Details: _____

Sediment Removed: Yes No Details: _____

Quantity of Sediment Removed (estimate?): _____

Minor Structural Repairs: Yes No Details: _____

Residuals (debris, sediment) Disposal Methods: _____

Notes:



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Support

- Drawings and specifications are available at www.conteches.com.
- Site-specific design support is available from our engineers.

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CONSTRUCTION

1. Water Quality Facility shall be over-excavated and filled to final grade with 12-inch amended topsoil. Topsoil amendments shall be garden compost, not conventional fertilizer amendments.
2. A biodegradable Erosion Control Matting shall be placed over the topsoil throughout the swale cross section, fabric shall be held in place in accordance with the manufacturer's installation requirements. Anchor spacing shall be based on 3 fps flow over the fabric.
 - a. Treatment area - high-density jute matting (Geojute Plus or other approved equal)
 - b. All other areas - low-density jute matting (EconoJute or other approved equal)
3. Plant materials shall be placed in accordance with the plan and plant table as shown on approved plans.
4. The water quality facility treatment area plantings can be deemed "substantially complete" once active green growth has occurred to an average growth of 3" and plant density is an average of approx. 6 plants (minimum 1-inch plugs or equivalent) per square foot.
5. The facility shall be deemed acceptable to begin the maintenance period when plant growth and density matches the engineer's design as shown on the approved plans and all other requirements have been met. The engineer must certify the facility to be functional, in accordance with the approved plan design to begin the two-year maintenance period.

MAINTENANCE

5. The permittee is responsible for the maintenance of this facility for a minimum of two years following construction and acceptance of this facility per Chapter 2.
6. Irrigation is to be provided per separate irrigation plan as approved.

Note: Irrigation needs are to be met using a temporary irrigation system with a timer during the dry season. Systems should be winterized during the wet season to assure longevity and guard against damage from freezing temperatures. Water source shall be as shown on the approved plans.
7. Engineer or Owner's Representative is required to perform Monitoring and Maintenance of the Site and provide Documentation as required in Appendix A, 2.5 of the Design and Construction Standards. The Approved Plans shall include a Maintenance Schedule per Appendix A, 2.6.e of the Design and Construction Standards.
8. The facility shall be re-excavated and planted if siltation greater than 3 inches in depth occurs within the two-year maintenance period.