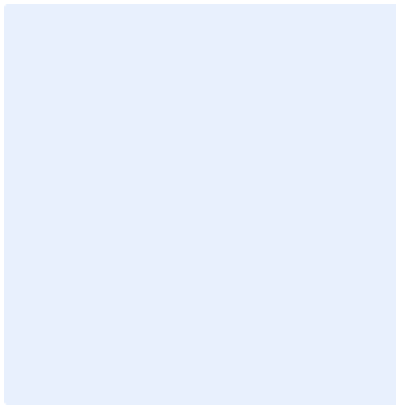


# OPERATION & MAINTENANCE MANUAL

**Filterra**

**Manual prepared: December 2018**

**DFI No. D00829**



**Figure 1: DFI No. D00829**

## 1. Identification

Drainage Facility ID (DFI): D00829  
Facility Type:  
Construction Drawings: V-File Numbers – None, City Plans  
Location: District: 4  
Highway No.: 91  
Mile Post: 83.98, left side

## 2. Manual Purpose

The purpose of this manual is to outline inspection needs and summarize maintenance actions for planted water quality catch basins.

## 3. Facility Location

The location map below details the facility location. The highway, mile posts, side streets, access location, and stormwater flow directions are noted on the map.

Facility location type: Curb and Gutter (travel lane)

Flow direction:



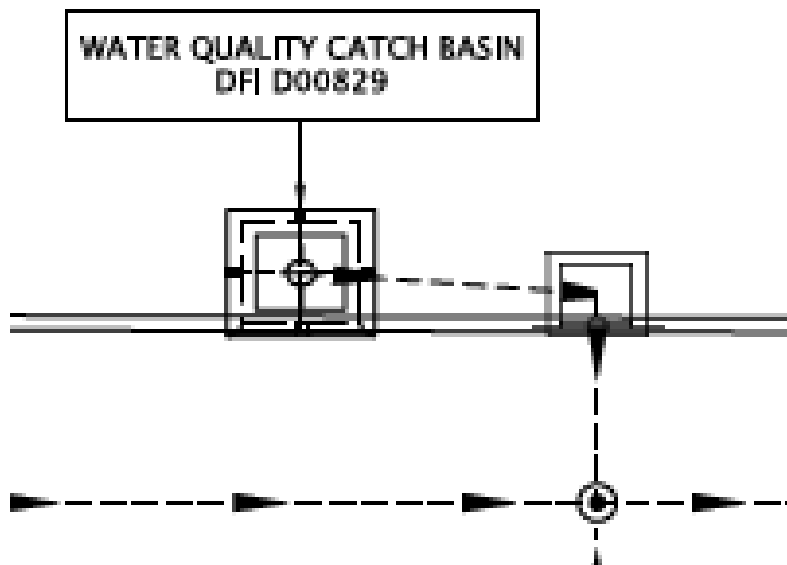
Figure 2: Facility Location Map

#### 4. Facility Summary

The length and width of the WQ Catch Basin is based on the dimensions of the inside of the treatment cell.

The length and width of the WQ Catch Basin is:

Length (Feet)	Width (Feet)	Designation Number <sup>1</sup>
4	4	FT0404



---

#### **Site Specific Information:**

<sup>1</sup> The Filterra and MWS designation number is associated with the dimensions of this type of proprietary structure. See appendix C of the Standard Operation Manual for Water Quality Catch Basins to view the Configuration Details for additional information.

## 5. Facility Access

Maintenance access to the facility: Curb and gutter (travel lane)

**Lane Closure Needed**

Water quality catch basins do not typically have access roads/access pads, nor are they gated, as they are located in urban areas alongside sidewalks and curbs. Use caution when accessing these facilities as there may be pedestrians or cyclists in the vicinity.

## 6. Operational Components / Maintenance Items

### Classification and Standard Operational (Op) Plan:

This facility is classified as a:

<input checked="" type="checkbox"/> <b>Filterra (Op Plan A)</b>	<input type="checkbox"/> <b>WQ Planter (Op Plan B)</b>	<input type="checkbox"/> <b>MWS (Op Plan C)</b>
A Filterra is a single chamber treatment cell that utilizes filter media, a plant, and a perforated underdrain.	A WQ Planter is a single chamber treatment cell that utilizes plants, filter media, and a perforated underdrain. The auxiliary outlet is located inside of the treatment cell.	A <u>Modular Wetland System</u> is a three chamber treatment cell that utilizes plants, filter media, filter media cartridges, and a perforated underdrain network.
<b>A standard operational plan illustrates the general facility footprint configuration and explains the purpose of each facility component. Operational plans (A and B) are provided in the Standard Operation Manual.</b>		

See Appendix A for the site specific operational plan.

### Operational Components

The facility components table (**Table 1**) has been provided to highlight the applicable components for this facility. The component is in use when the box contains an “x” (e.g.  ).

The Standard Operation Manual for Water Quality Catch Basins (implemented April 2018) outlines facility operation, typical footprint configuration, and component definitions and details. A link to the manual is attached to the feature marker in TransGIS. <https://gis.odot.state.or.us/TransGIS/>

## Maintenance Items

Operational components marked in **Table 1** should be inspected and maintained according to Section 7. Each facility component is defined and detailed in the Standard Operation Manual using the associated ID number indicated below.

Table 1: Facility Components		ID #
<b>Facility Inlet</b>		
Inlet Grate	<input type="checkbox"/>	<b>C1</b>
Curb Inlet	<input checked="" type="checkbox"/>	<b>C2</b>
Sidewalk Chute	<input checked="" type="checkbox"/>	<b>C3</b>
Bypass Inlet	<input checked="" type="checkbox"/>	<b>C4</b>
<b>Treatment</b>		
Plantings (Tree or Shrub)	<input checked="" type="checkbox"/>	<b>C5</b>
Filter Media	<input checked="" type="checkbox"/>	<b>C6</b>
Filter Media Cartridge	<input type="checkbox"/>	<b>C7</b>
<b>Outfall Type</b>		
Waterbody (Creek/Lake/Ocean)	<input type="checkbox"/> <b>C</b>	<b>C8</b>
	<input type="checkbox"/> <b>L</b>	
	<input type="checkbox"/> <b>O</b>	
Ditch	<input type="checkbox"/>	<b>C9</b>
Storm Drain System	<input checked="" type="checkbox"/>	<b>C10</b>

## 7. Maintenance

### Maintenance Frequency/Maintain Records

- Inspect per manufacturer requirements. Preferably prior to the rainy season.
- Clean and maintain as necessary. Refer to Activity 125 in the Maintenance Guide for conditions when maintenance is needed.
- Keep a record of inspections, maintenance, and repairs.

### Maintenance Guide/Maintenance Actions

Proprietary Water Quality Catch Basins have an operation and maintenance manual provided by the manufacturer. See Appendix C of the Standard Operational Manual for Water Quality Catch Basins. These manuals provided guidelines on maintenance procedures for the facilities. A link to the manual is attached to the feature marker in TransGIS. <https://gis.odot.state.or.us/TransGIS/>

The Maintenance Guide outlines the standard maintenance actions for water quality facilities under Activity 125.

There are standard maintenance tables for standard ODOT designs. The maintenance tables describe the maintenance component, the defect or problem, the condition when maintenance is needed, and the recommended maintenance to correct the problem. Use the following tables to maintain ODOT Water Quality Catch Basins:

- Table 1 (General Maintenance): Contains general maintenance and inspection guidelines that are applicable to all ODOT water quality facilities

The ODOT Maintenance Guide can be viewed at the following website:

<http://www.oregon.gov/ODOT/HWY/OOM/pages/mguide.aspx>

## **8. Waste Material Handling**

Material removed from the facility is defined as waste by the Department of Environmental Quality (DEQ). Refer to the road waste section of the ODOT Maintenance Yard Environmental Management System (EMS) Policy and Procedures Manual for disposal options:

<http://www.oregon.gov/ODOT/HWY/OOM/pages/ems.aspx>

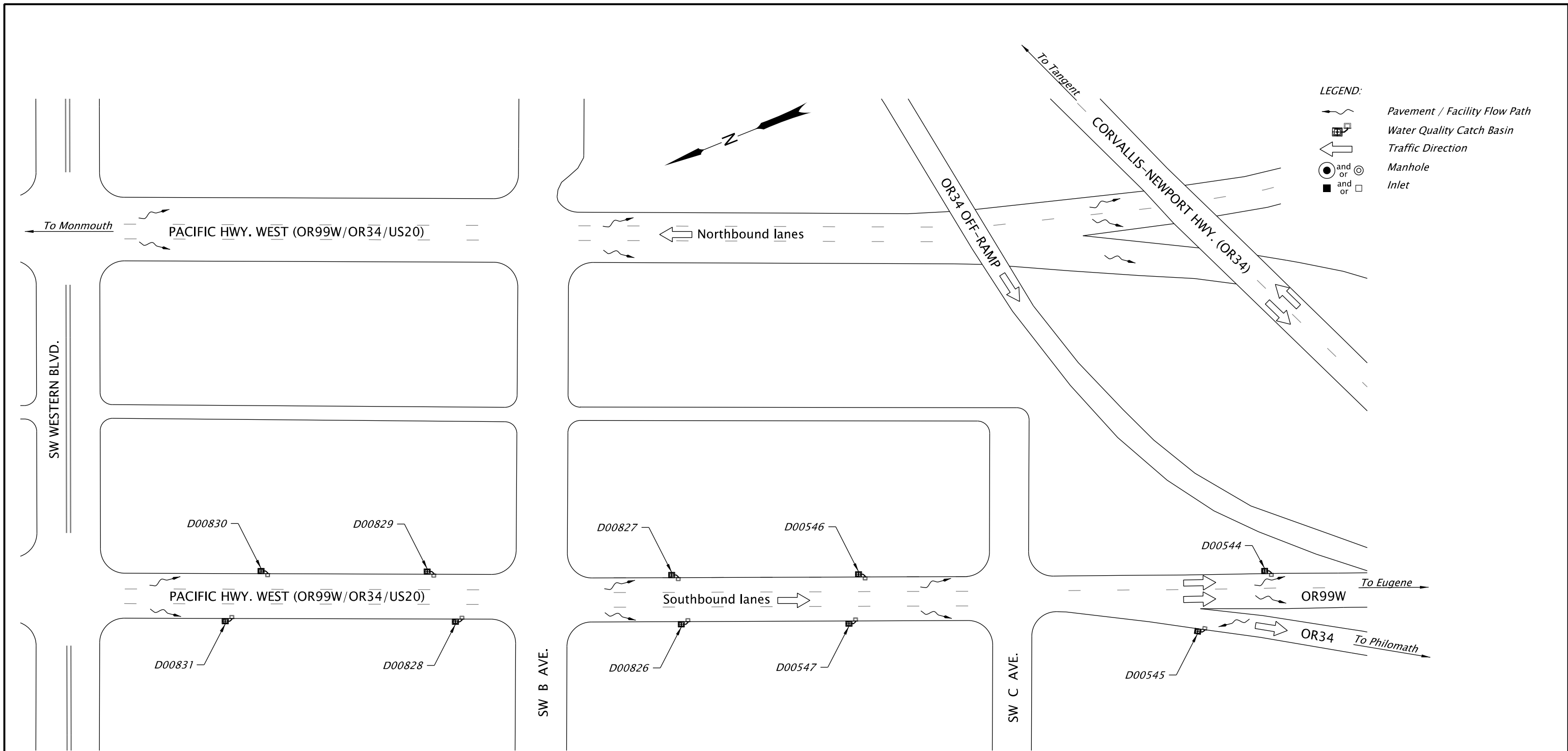
Contact any of the following for more detailed information about management of waste materials found on site:

ODOT Clean Water Unit	(503) 986-3008
ODOT Statewide Hazmat Coordinator	(503) 667-7442
ODOT Region 1 Hazmat Coordinator	(503) 731-8290
ODOT Region 2 Hazmat Coordinator	(503) 986-2647
ODOT Region 3 Hazmat Coordinator	(541) 957-3594
ODOT Region 4 Hazmat Coordinator	(541) 388-6186
ODOT Region 5 Hazmat Coordinator	(541) 963-1590
ODEQ Northwest Region Office	(503) 229-5263

## **Appendix A – Site Specific Operational Plan**

### **Contents:**

**Operational Plan: DFI D00829**



PLAN  
N.T.S.



OREGON DEPARTMENT OF TRANSPORTATION

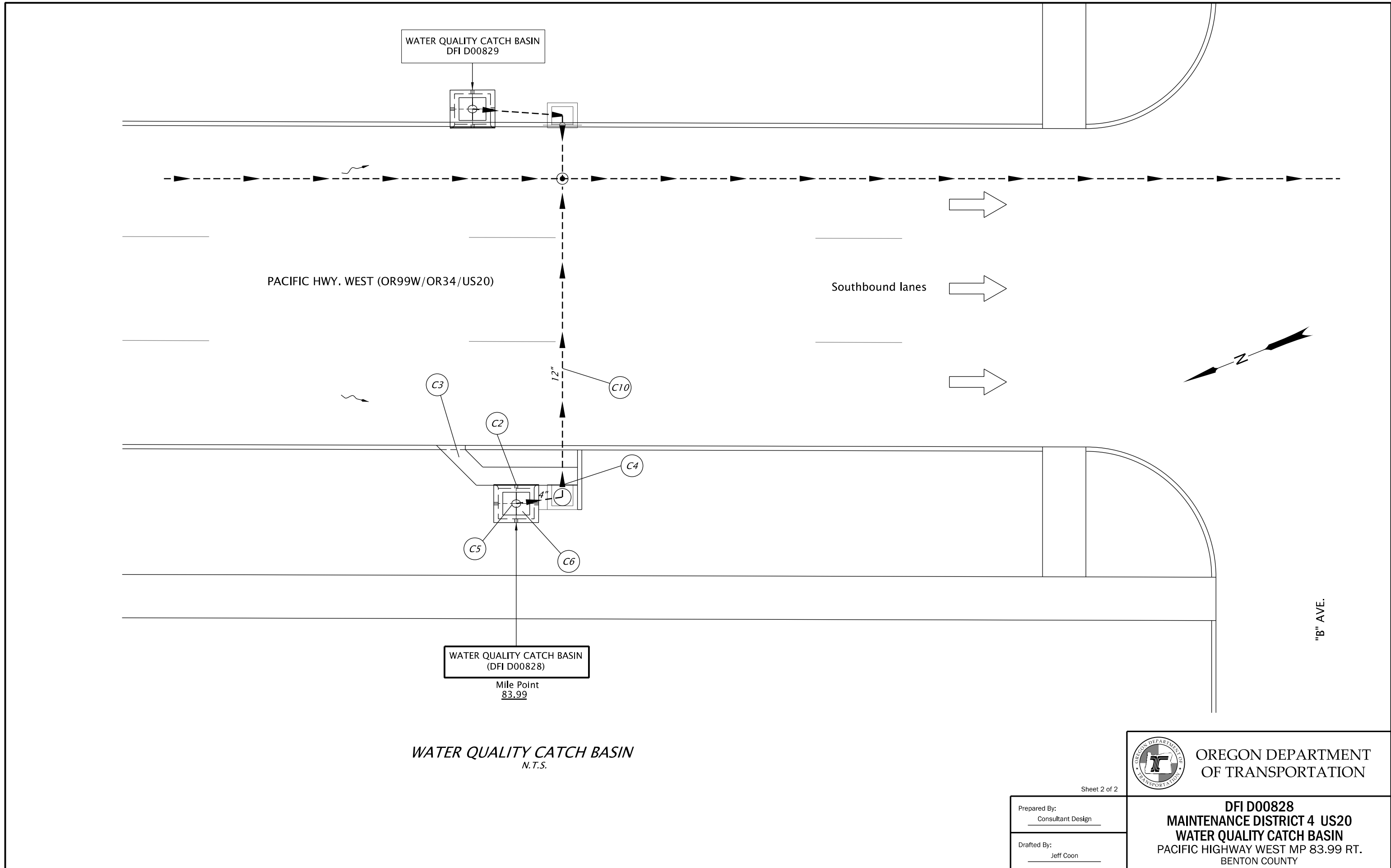
Sheet 1 of 2

Prepared By:  
Consultant Design

Drafted By:  
Jeff Coon

**OR99W: SW WESTERN BLVD. - SW C AVE.**  
**MAINTENANCE DISTRICT 4 US20**  
**WATER QUALITY CATCH BASIN**  
 PACIFIC HIGHWAY WEST  
 BENTON COUNTY





**WATER QUALITY CATCH BASIN**  
N.T.S.

WATER QUALITY CATCH BASIN  
(DFI D00828)

Mile Point  
83.99



OREGON DEPARTMENT  
OF TRANSPORTATION

Sheet 2 of 2

Prepared By:  
Consultant Design

Drafted By:  
Jeff Coon

**DFI D00828**  
**MAINTENANCE DISTRICT 4 US20**  
**WATER QUALITY CATCH BASIN**  
PACIFIC HIGHWAY WEST MP 83.99 RT.  
BENTON COUNTY

## **Appendix B – Project Contract Plans**

### **Contents:**

**Site Specific Subset of Project Contract Plan xxV-xxx**

**GENERAL NOTES**

1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF CORVALLIS STANDARD CONSTRUCTION SPECIFICATIONS LATEST EDITION, AND AS PROVIDED ON THESE PLANS AND THE CONTRACT DOCUMENTS.
2. LOCATIONS OF EXISTING UTILITIES ARE APPROXIMATE, BASED ON AVAILABLE INFORMATION AND ARE NOT GUARANTEED TO BE COMPLETE AND ACCURATE. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL MAKE ALL NECESSARY ARRANGEMENTS AND COMPLY WITH REQUIREMENTS AND SPECIFICATIONS OF THE RESPECTIVE UTILITIES WHERE IT IS NECESSARY TO CUT, MOVE, RELOCATE OR RECONNECT ANY EXISTING UTILITY.
3. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING LOCATIONS AND VERIFICATION OF ACTIVE SERVICE LATERALS. THE CONTRACTOR SHALL MAINTAIN ACTIVE SERVICE FLOWS AT ALL TIMES.
4. THE CONTRACTOR SHALL PROTECT ALL EXISTING STRUCTURES AND IMPROVEMENTS DURING CONSTRUCTION.
5. TREES AND SHRUBS THAT REQUIRE PRUNING SHALL BE PRUNED BY A LICENSED TREE SURGEON AT THE APPROVAL AND DIRECTION OF THE ENGINEER.
6. ALL LANDSCAPING DISTURBED OR DAMAGED DURING CONSTRUCTION SHALL BE REPLACED IN KIND AT THE CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE PROPERTY OWNER.
7. CONTRACTOR SHALL MAINTAIN ACCESS TO ALL PROPERTIES AT ALL TIMES.
8. ANY SEWER LATERAL WORK WITHIN 5 FEET OF A BUILDING SHALL BE PERFORMED BY A LICENSED JOURNEYPERMAN PLUMBER. BUILDING PERMITS ARE REQUIRED FOR SEWER LATERAL CONSTRUCTION OUTSIDE THE CITY EASEMENT.
9. CONTRACTOR SHALL SUBMIT A TRAFFIC CONTROL PLAN PER THE OREGON TEMPORARY TRAFFIC CONTROL HANDBOOK FOR APPROVAL BY THE CITY PRIOR TO ANY WORK WITHIN THE PUBLIC ROW. TRAFFIC CONTROL SHALL BE IN PLACE AT ALL TIMES DURING CONSTRUCTION.
10. ALL WORK SHALL BE PERFORMED IN COMPLIANCE WITH APPLICABLE OSHA REGULATIONS.
11. ALL SPOILS FROM EXCAVATION OUTSIDE THE PUBLIC ROW SHALL BE PLACED ON PLYWOOD, 1/4" THICK MIN., TO PROTECT EXISTING LAWNS AND IMPROVEMENTS.
12. PEDESTRIAN/BICYCLE ACCESS SHALL BE MAINTAINED AROUND WORK AREA AT ALL TIMES.
13. ALL OPEN EXCAVATION SHALL BE BACK FILLED OR COVERED OVERNIGHT. CUTS IN ROADWAY SURFACES SHALL BE STEEL PLATED AND RAMPED WITH AC ALONG EDGES. CUTS OUTSIDE ROADWAYS SHALL BE COVERED WITH SUBSTANTIAL PLYWOOD SHEETS CAPABLE OF PROTECTING HUMANS OR ANIMALS FROM FALLING IN AND SHALL BE COMPLETELY SURROUNDED BY 4' (MINIMUM) ORANGE CONSTRUCTION FENCE.
14. AT THE END OF EACH WORKING DAY THE CONTRACTOR SHALL INSTALL TEMPORARY FENCING AT ALL LOCATIONS WHERE FENCING HAS BEEN REMOVED.

**ATTENTION:**

OREGON LAW REQUIRES YOU FOLLOW RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THESE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH 952-001-0090. YOU MAY OBTAIN COPIES OF THESE RULES BY CALLING THE CENTER. (NOTE: THE TELEPHONE NUMBER FOR THE OREGON UTILITY NOTIFICATION CENTER IS (503)392-1987, OR DIAL 811.

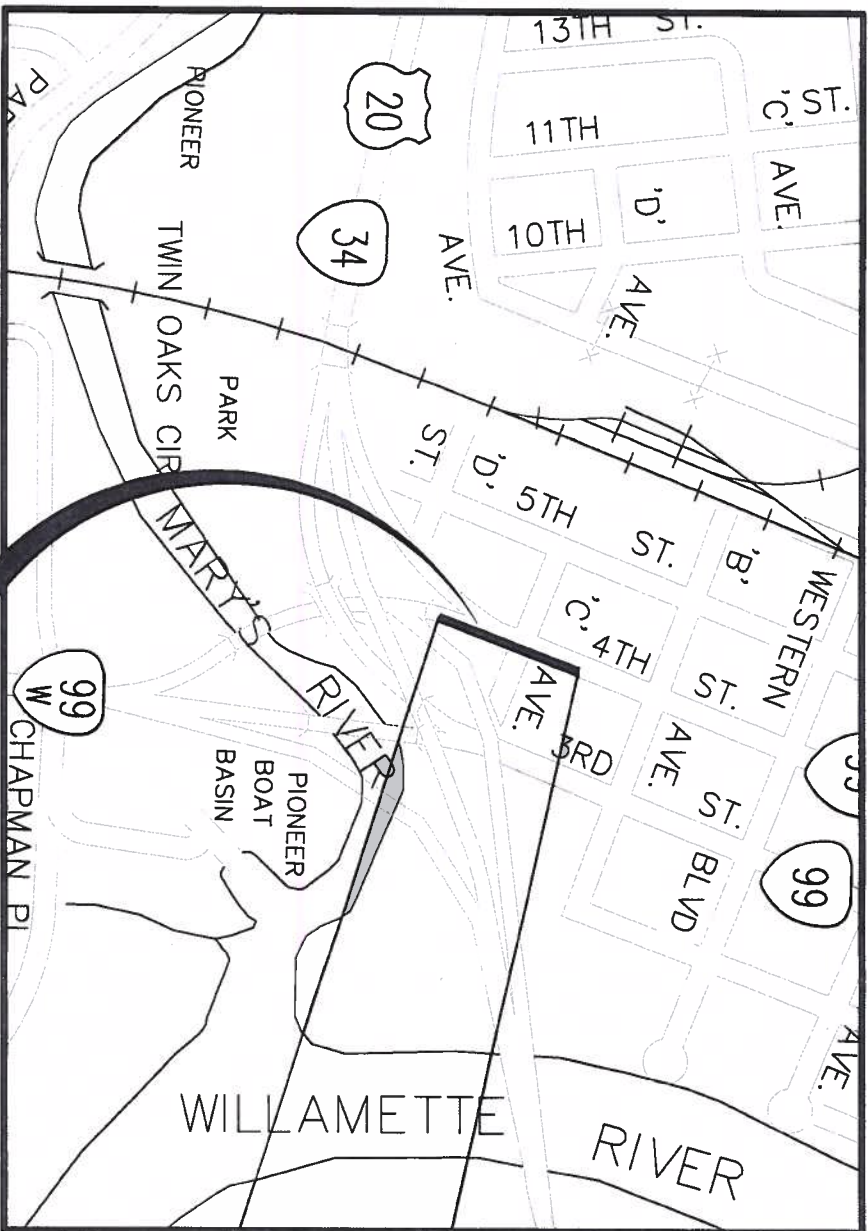
# STORM WATER RETROFIT 4TH STREET

## PROJECT NO. 652414

**SHEET INDEX**

SHEET 1	COVER SHEET
SHEET 2	4TH STREET PIPE PLAN
SHEET 3	DETAILS
SHEET 4	DETAILS
TC-1	TRAFFIC CONTROL PLAN
TC-2	TRAFFIC CONTROL PLAN
TC-3	TRAFFIC CONTROL PLAN

THIS RECORD DRAWING HAS BEEN PREPARED BASED UPON INFORMATION FURNISHED BY OTHERS. CITY OF CORVALLIS IS RELYING UPON THE ACCURACY AND COMPLETENESS OF THE INFORMATION FURNISHED BUT ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THIS RECORD DRAWING OR FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO IT AS A RESULT. THOSE USING THIS RECORD DOCUMENT ARE ADVISED TO OBTAIN INDEPENDENT VERIFICATION OF ITS ACCURACY BEFORE APPLYING IT FOR ANY PURPOSE.

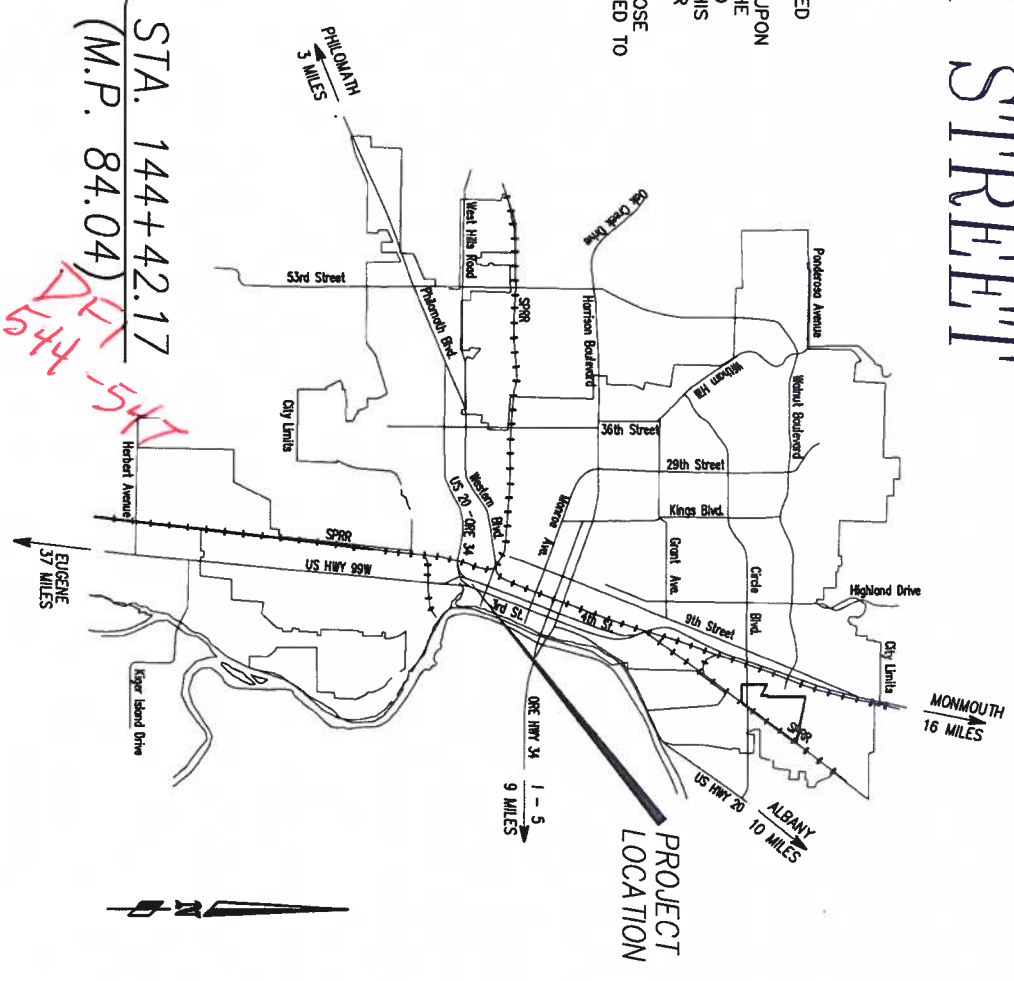


VICINITY MAP  
NOT TO SCALE

PROJECT LOCATION  
4TH AND 3RD STREET

**LEGEND**

EXISTING	PROPOSED
Waterline	Gutter Inlet Catch Basin
Sanitary Sewer	Curb Inlet Catch Basin
Storm Drain	Water Valve
Gas Line	Fire Hydrant
Underground Power	Water Meter
Underground Telephone	Utility Meter
Underground TV Cable	Utility Pedestal
Fence	Cleanout
Curb	Street Sign
Storm Drain Manhole	Bench Mark/BSM
Sanitary Sewer Manhole	Utility Pole with Down Guy
	Curb and Gutter
	Storm Drain
	Saw Cut
	Storm Drain Manhole
	Curb Inlet
	Filterbox Unit
	Grand Limits



LOCATION MAP  
NOT TO SCALE

STA. 144+42.17  
(M.P. 84.04)

STA. 148+45.17  
(M.P. 84.12)

**RECORD DRAWING**  
DATE: 7/12/12

**ABBREVIATIONS**

AC	ASPHALT CONCRETE	(N)	NORTH
AGG	AGGREGATE	N/S	NOT TO SCALE
APPROX	APPROXIMATE	PCC	PORTLAND CEMENT CONCRETE
BLVD	BOULEVARD	PH	PHONE
CI	CAST IRON	(S)	SOUTH
CONC	CONCRETE	S	SLOPE
COOP	CORPORATION	SS	SANITARY SEWER
DA	DIAMETER	SD	STORM DRAIN
(E)	EAST	SF	SQUARE FEET
ELEV	ELEVATION	SIT	SHEET
EX	EXISTING	ST	STREET
FH	FIRE HYDRANT	STA	STATION
FT	FEET	STD	STANDARD
E	INVERT ELEVATION	STL	STEEL
LF	LINEAL FEET	TBD	TO BE DETERMINED
MAX	MAXIMUM	TEMP	TEMPORARY
MH	MANHOLE	TV	TELEVISION
MIN	MINIMUM	TYP	TYPICAL
W/	WITH	(W)	WEST

<p>CITY OF CORVALLIS Public Works Department</p>	<p>STORM WATER RETRO FIT 4TH STREET PROJECT NUMBER 652414 COVER</p>												
	<p>DATE: 7/12/12</p>												
<p>1 of 4</p>	<p>REGISTERED PROFESSIONAL ENGINEER CORVALLIS, OREGON JESSE B. TACKMIN</p>												
<p>REVISIONS</p> <table border="1"> <thead> <tr> <th>NO.</th> <th>DATE</th> <th>DESCRIPTION OF REVISION</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>6/17/11</td> <td>7% PLAN SET</td> </tr> <tr> <td>2</td> <td>9/15/11</td> <td>00% PLAN SET</td> </tr> <tr> <td>5</td> <td>7/12/12</td> <td>AS-BUILT</td> </tr> </tbody> </table>	NO.	DATE	DESCRIPTION OF REVISION	1	6/17/11	7% PLAN SET	2	9/15/11	00% PLAN SET	5	7/12/12	AS-BUILT	<p>ATTENTION: Oregon law requires you follow rules adopted by the Oregon Utility Notification Center. These rules are set forth by OAR 952-001-0010 through 952-001-0090. You may obtain copies of the rules by calling the center. (Note: the telephone number for the Oregon Utility Notification Center is (503) 392-1987.)</p>
NO.	DATE	DESCRIPTION OF REVISION											
1	6/17/11	7% PLAN SET											
2	9/15/11	00% PLAN SET											
5	7/12/12	AS-BUILT											

**CITY OF CORVALLIS**  
Public Works Department

**STORM WATER RETRO FIT  
4TH STREET  
PIPE LAYOUT**

PROJECT NUMBER 652414



NO. DATE DESCRIPTION OF REVISION

1 6/17/11 79 X PLAN REVIEW

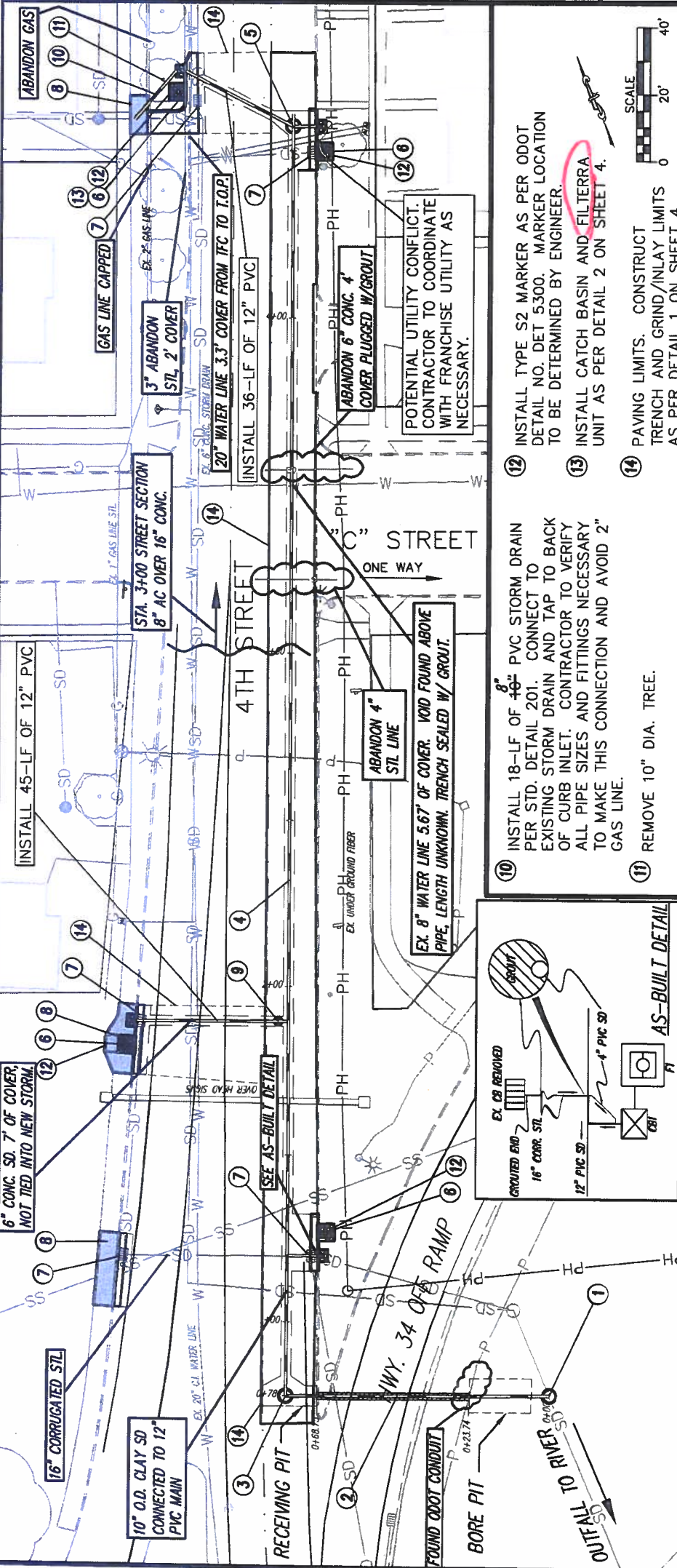
2 9/19/11 100X PLAN REVIEW

3 7/12/12 AS SHOWN

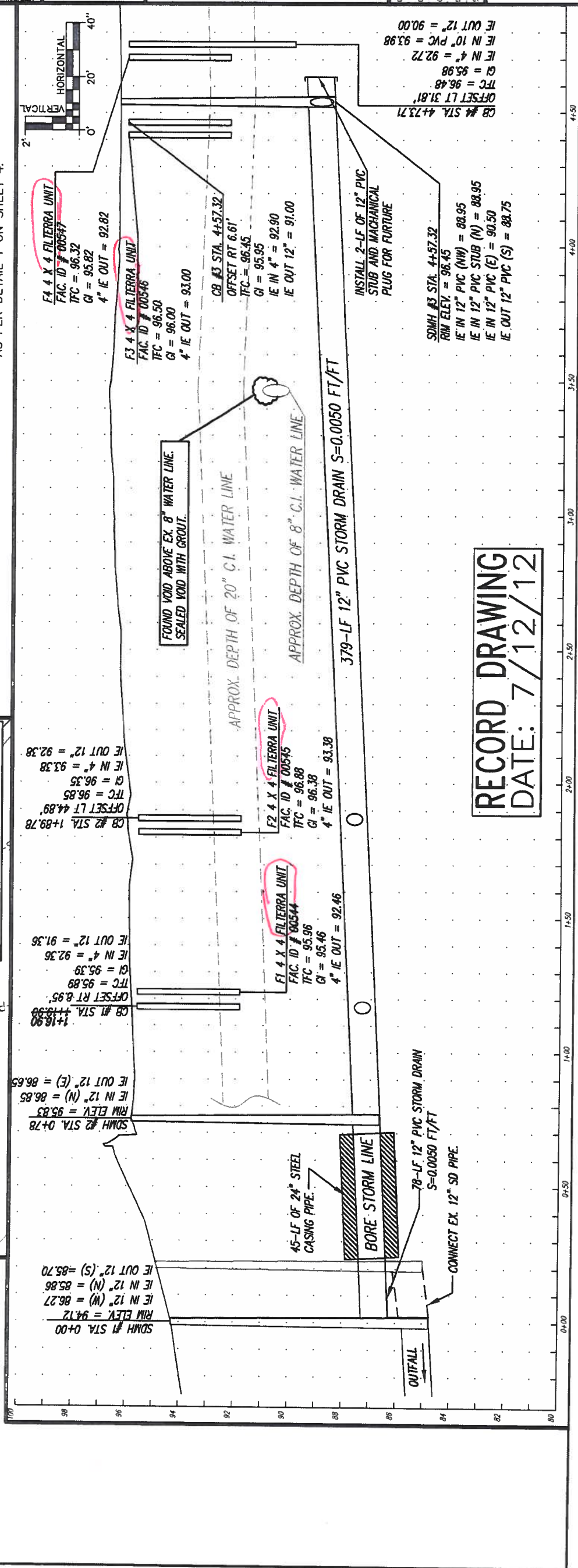
DESIGNED: J. F. YOUNG  
DRAWN: S. BOD  
CHECKED: J. F. YOUNG

SCALE: AS SHOWN

Sheet No. **2 of 4**



- 1 STA. 0+00 INSTALL NEW MANHOLE #1 PER STD. DETAIL 203B. CONSTRUCT POURED IN PLACE BASE. REMOVE 12" CORRUGATED PIPE AS REQUIRED.
- 2 DIRECTIONAL BORE APPROX. 45-LF OF 24" STEEL CASING PIPE WITH 78-LF OF 12" PVC STORM DRAIN PIPE USING NYLON SPACERS IN CASING. CAP ENDS WITH RUBBER BOOTS AND FILL ANNULAR SPACE AS SPECIFIED.
- 3 STA. 0+78 INSTALL NEW MANHOLE #2 PER STD. DETAIL 203.
- 4 INSTALL 379-LF OF 12" PVC STORM DRAIN PER STD. DETAIL
- 5 STA. 4+57.32 INSTALL NEW MANHOLE #3 PER STD. DETAIL 203.
- 6 INSTALL CATCH BASIN PER STD. DETAIL 209. INSTALL 4'X4' FILTERRA UNIT AS PER DETAILS ON SHEET 3. CONTRACTOR TO PICK UP AT ODOT YARD.
- 7 REMOVE EXISTING GUTTER INLET. INSTALL STANDARD CURB AND GUTTER PER STD. DETAIL 103 AS DIRECTED BY ENGINEER.
- 8 INSTALL STANDARD SIDEWALK PER STD. DETAIL 106.
- 9 INSTALL 4" CLEAN OUT FOR MAINTENANCE ACCESS.



**RECORD DRAWING**  
DATE: 7/12/12

**ATTENTION:**  
Oregon law requires you follow Utility Notification Center (UNC) rules and not both in OAR 852-001-0010 through OAR 852-001-0016. The rule by which you follow is the rule by which the telephone number for the Oregon Utility Notification Center is (800) 332-2344.

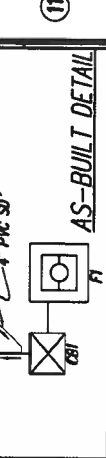
12 INSTALL TYPE S2 MARKER AS PER ODOT DETAIL NO. DET 5300. MARKER LOCATION TO BE DETERMINED BY ENGINEER.

13 INSTALL CATCH BASIN AND FILTERRA UNIT AS PER DETAIL 2 ON SHEET 4.

14 PAVING LIMITS. CONSTRUCT TRENCH AND GRIND/INLAY LIMITS AS PER DETAIL 1 ON SHEET 4.

10 INSTALL 18-LF OF 8" PVC STORM DRAIN PER STD. DETAIL 201. CONNECT TO EXISTING STORM DRAIN AND TAP TO BACK OF CURB INLET. CONTRACTOR TO VERIFY ALL PIPE SIZES AND FITTINGS NECESSARY TO MAKE THIS CONNECTION AND AVOID 2" GAS LINE.

11 REMOVE 10" DIA. TREE.



10" O.D. CLAY SD CONNECTED TO 12" PVC MAIN

15" CORRUGATED STL

6" CONC. SD. 7' OF COVER, NOT TIED INTO NEW STORM

3" ABANDON STL. 2' COVER

20" WATER LINE 3.3' COVER FROM IFC TO I.O.P.

INSTALL 36-LF OF 12" PVC

ABANDON 6" CONC. 4' COVER PLUGGED W/GROUT.

POTENTIAL UTILITY CONFLICT. CONTRACTOR TO COORDINATE WITH FRANCHISE UTILITY AS NECESSARY.

INSTALL 45-LF OF 12" PVC

STA. 3+00 STREET SECTION 8" AC OVER 16" CONC.

4TH STREET

ONE WAY

ABANDON 4" STL LINE

EX. 8" WATER LINE 5.67' OF COVER. VOID FOUND ABOVE PIPE. LENGTH UNKNOWN. TRENCH SEALED W/ GROUT.

RECEIVING PIT

BORE PIT

FOUND ODOT CONDUIT

OUTFALL TO RIVER

WY. 34 OFF RAMP

SEE AS-BUILT DETAIL

EX. CB REMOVED

GRAVELLED END

16" CONC. STL

12" PVC SD

4" PVC SD

AS-BUILT DETAIL

SCALE 0 20' 40'

HORIZONTAL 0 20' 40'

VERTICAL 0 2' 4'

CB #1 STA. 1+18.90  
RIM ELEV. = 94.12  
IE IN 12" (W) = 86.27  
IE IN 12" (N) = 85.86  
IE OUT 12" (S) = 85.70

SDMH #2 STA. 0+78  
RIM ELEV. = 93.83  
IE IN 12" (N) = 86.85  
IE OUT 12" (E) = 86.65

CB #2 STA. 1+89.78  
OFFSET LT 44.89  
TFC = 96.85  
GI = 96.35  
IE IN 4" = 93.38  
IE OUT 12" = 92.38

F1 4 X 4 FILTERRA UNIT  
FAC ID # 80544  
TFC = 95.96  
GI = 95.46  
4" IE OUT = 92.46

F2 4 X 4 FILTERRA UNIT  
FAC ID # 80545  
TFC = 96.88  
GI = 96.38  
4" IE OUT = 93.38

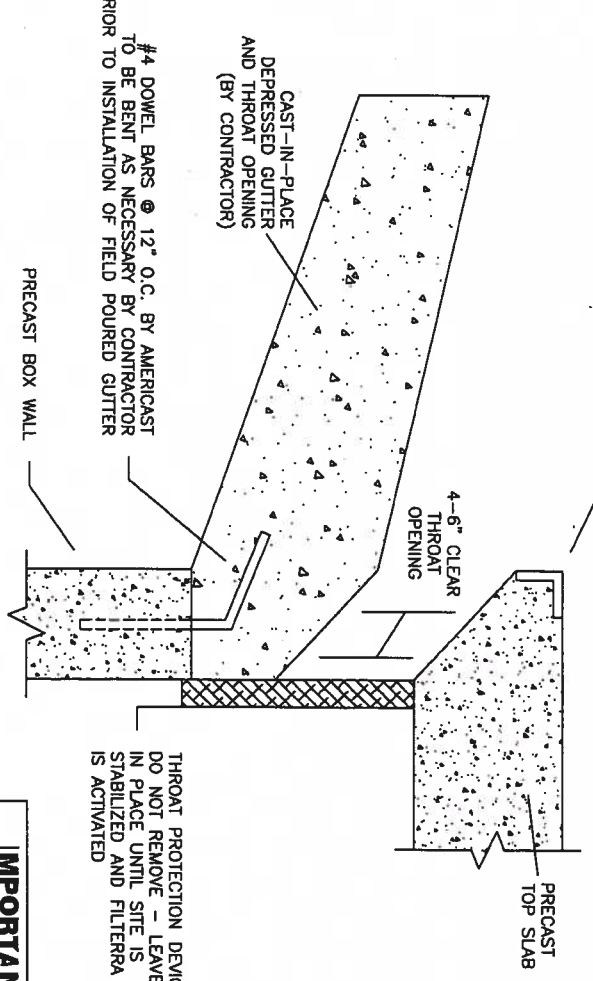
F3 4 X 4 FILTERRA UNIT  
FAC ID # 80546  
TFC = 96.50  
GI = 96.00  
4" IE OUT = 93.00

CB #3 STA. 4+57.32  
OFFSET RT 6.61  
TFC = 96.45  
GI = 95.95  
IE IN 4" = 92.80  
IE OUT 12" = 91.00

SDMH #3 STA. 4+57.32  
RIM ELEV. = 96.45  
IE IN 12" PVC (NW) = 88.95  
IE IN 12" PVC STUB (N) = 88.95  
IE IN 12" PVC (E) = 90.50  
IE OUT 12" PVC (S) = 88.75

CB #4 STA. 4+73.71  
OFFSET LT 31.81  
TFC = 96.48  
GI = 95.98  
IE IN 4" = 92.72  
IE IN 10" PVC = 93.98  
IE OUT 12" = 90.00

STANDARD 90° NOSING  
(OTHER NOSING AVAILABLE  
UPON REQUEST)



#4 DOWEL BARS @ 12" O.C. BY AMERICAST TO BE BENT AS NECESSARY BY CONTRACTOR PRIOR TO INSTALLATION OF FIELD POURED GUTTER

THROAT PROTECTION DEVICE DO NOT REMOVE - LEAVE IN PLACE UNTIL SITE IS STABILIZED AND FILTERRA IS ACTIVATED

**SECTION VIEW  
STANDARD FILTERRA THROAT OPENING**

**IMPORTANT**  
FILTERRA FLOWLINE MUST BE AT A HIGHER ELEVATION THAN BYPASS FLOWLINE (DROP INLET OR OTHER)

MODIFICATIONS OF DRAWINGS ARE ONLY PERMITTED BY WRITTEN AUTHORIZATION FROM FILTERRA

DRAWING AVAILABLE IN TIF FILE FORMAT.

**AMERICAST**  
Copyright © 2007 by Americast

**FILTERRA® THROAT OPENING AND GUTTER OR FAUNE DETAIL**

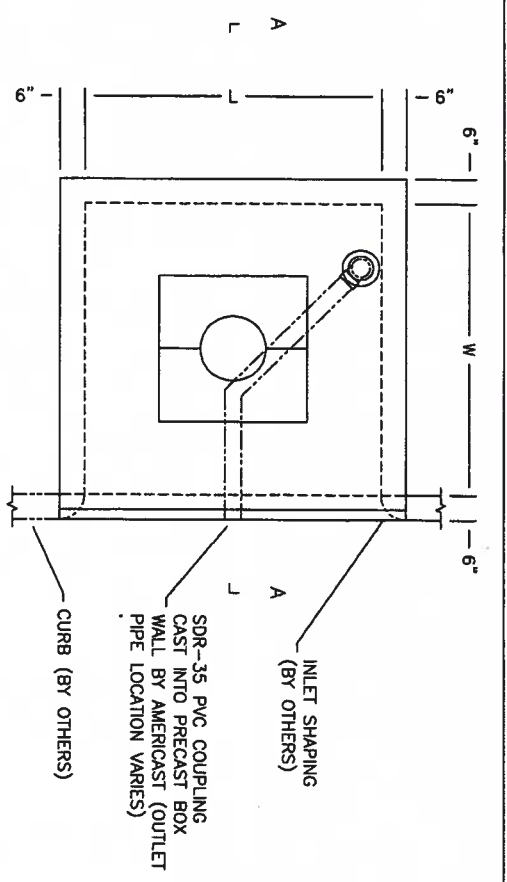
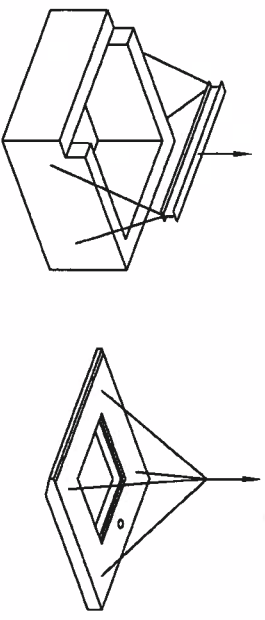
filterra  
US PAT. 6,277,274 AND 6,589,321

DATE: 02-26-09 DWG: CGT-5

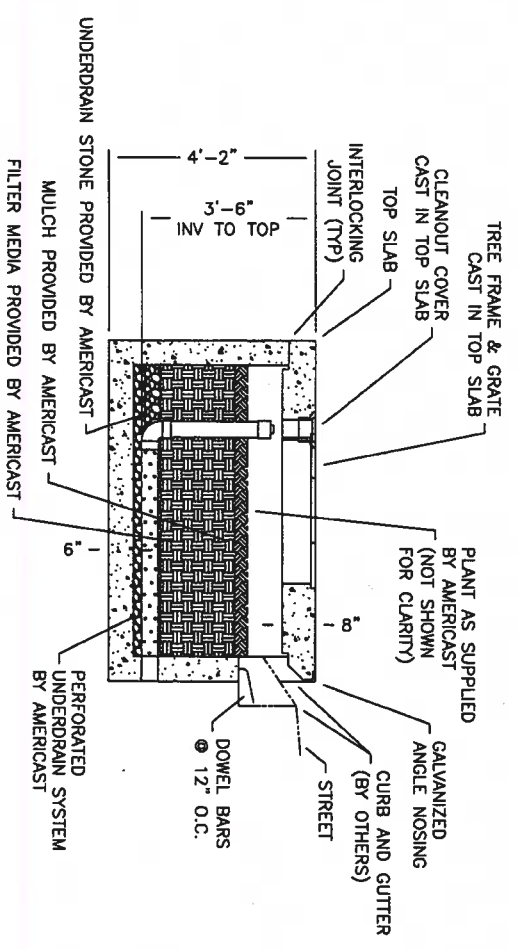
**Americast Filterra Weights and Lifting Details**

WESTERN ZONE

4'-0" Throat	Top Only		Box + Media		Spreader Bar	
	Pounds	Tons	Pounds	Tons	Min	Max
4x4	1,808	0.90	9,180	4.59	5.00 ft	7.50 ft



**PLAN VIEW**



**SECTION A-A**

DESIGNATION	L	W	TREE GRATE QTY & SIZE	OUTLET PIPE
4 x 4	4'-0"	4'-0"	(1) 3x3	4" SDR-35 PVC
6 x 6	6'-0"	6'-0"	(1) 3x3	4" SDR-35 PVC

MODIFICATIONS OF DRAWINGS ARE ONLY PERMITTED BY WRITTEN AUTHORIZATION FROM FILTERRA

DRAWING AVAILABLE IN TIF FILE FORMAT.

**AMERICAST**  
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**PRECAST FILTERRA® UNIT STANDARD CONFIGURATION WESTERN ZONE**

filterra  
US PAT. 6,277,274 AND 6,589,321

DATE: 03-17-09 DWG: WZ FTST-3

**RECORD DRAWING**  
DATE: 7/12/12



**CITY OF CORVALLIS**  
Public Works Department

**STORM WATER RETRO FIT  
4TH STREET  
PROJECT NUMBER 652414  
DETAILS**

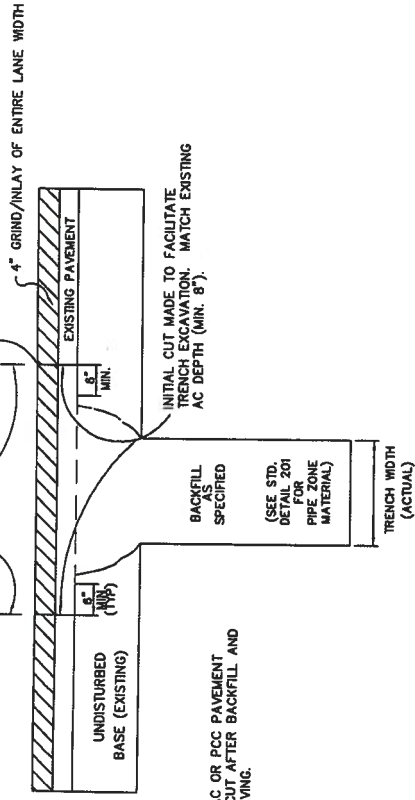
**ATTENTION:**  
Oregon law requires you follow rules adopted by the Oregon Utility Modification Center. These rules are set forth in OAR 852-001-0010 through OAR 852-001-0090. You may obtain copies of the rules by calling the center.  
Note: the telephone number for the Oregon Utility Modification Center is (800) 332-2344

NO.	DATE	DESCRIPTION OF REVISION	BY
1	6/17/11	75% PLAN REVIEW	SP
2	9/15/11	100% PLAN REVIEW	SP
3	7/12/12	AS-BUILT	SP

DESIGNER:	L. NORDEN
DRAWN:	S. ROOP
CHECKED:	L. NORDEN
DATE:	AS SHOWN
SCALE:	Sheet No.

PAY LIMITS: MAXIMUM TRENCH WIDTH ALLOWED PER STANDARDS, PLUS TWO (2) FEET. TRENCH SHALL BE TEMPORARILY PATCHED BACK AT THE END OF WORK SHIFT WITH MHMAC (1" MIN.).

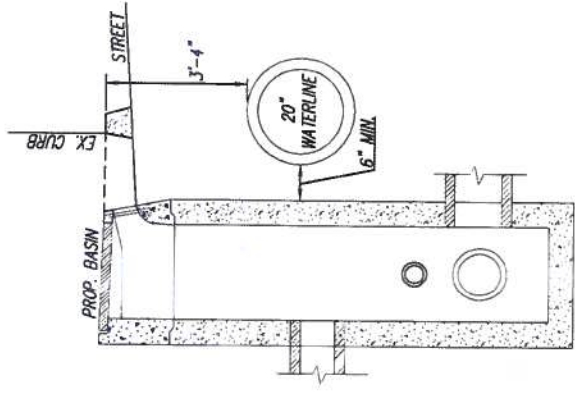
FINAL SAW CUT. BACK-SOPE ALL CUT EDGES AND SAW CUT WITH TACK (A.C. PATCH ONLY) (TYPICAL)



NOTES:

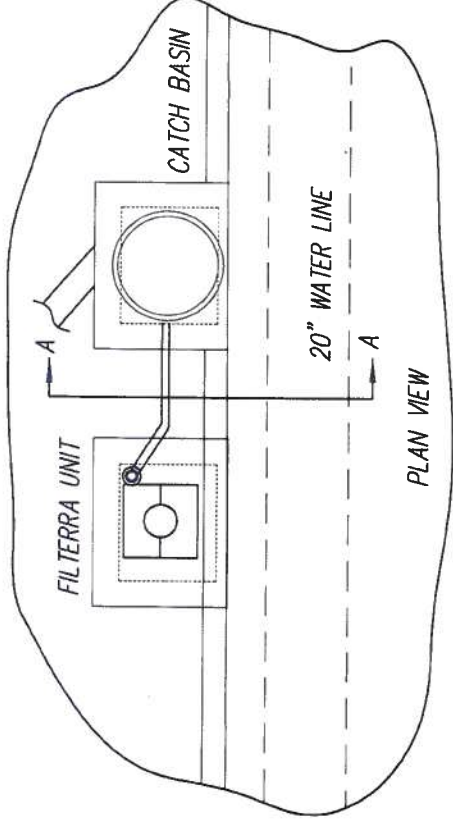
- 1) ALL EXISTING AC OR PCC PAVEMENT SHALL BE SAWCUT AFTER BACKFILL AND PRIOR TO REPAVING.

**1**  
4  
NTS  
TRENCH PATCH DETAIL



SECTION A - A

**2**  
4  
NTS  
BASIN LAYOUT FOR WATER LINE CONFLICT



PLAN VIEW

**RECORD DRAWING**  
**DATE: 7/12/12**

**CITY OF CORVALLIS**  
Public Works Department

**STORM WATER RETRO FIT**  
**4TH STREET**  
**PROJECT NUMBER 652414**  
**DETAILS**

ATTORNEY: Oregon law requires you follow rules adopted by the Oregon Utility Notification Center. These rules are set forth in OAR 853-001-0010 through OAR 853-001-0020. You may obtain copies of the rules by calling the center. (Note: the telephone number for Center is (800) 332-2344)



NO	DATE	DESCRIPTION OF REVISION	BY
1	6/17/11	75% PLAN REVIEW	AS
2	9/15/11	100% PLAN REVIEW	AS
3	7/12/12	AS-BUILT'S	AS

DESIGNED: J. JACKSON  
DRAWN: S. BOOP  
CHECKED: J. JACKSON  
DATE: AS SHOWN  
SCALE: AS SHOWN

Sheet No.

4 of 4

**GENERAL NOTES**

1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF CORVALLIS STANDARD CONSTRUCTION SPECIFICATIONS LATEST EDITION, AND AS PROVIDED ON THESE PLANS AND THE CONTRACT DOCUMENTS.
2. LOCATIONS OF EXISTING UTILITIES ARE APPROXIMATE, BASED ON AVAILABLE INFORMATION AND ARE NOT GUARANTEED TO BE COMPLETE AND ACCURATE. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL MAKE ALL NECESSARY ARRANGEMENTS AND COMPLY WITH REQUIREMENTS AND SPECIFICATIONS OF THE RESPECTIVE UTILITIES WHERE IT IS NECESSARY TO CUT, MOVE, RELOCATE OR RECONNECT ANY EXISTING UTILITY.
3. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING LOCATIONS AND VERIFICATION OF ACTIVE SERVICE LATERALS. THE CONTRACTOR SHALL MAINTAIN ACTIVE SERVICE FLOWS AT ALL TIMES.
4. THE CONTRACTOR SHALL PROTECT ALL EXISTING STRUCTURES AND IMPROVEMENTS DURING CONSTRUCTION.
5. TREES AND SHRUBS THAT REQUIRE PRUNING SHALL BE PRUNED BY A LICENSED TREE SURGEON AT THE APPROVAL AND DIRECTION OF THE ENGINEER.
6. ALL LANDSCAPING DISTURBED OR DAMAGED DURING CONSTRUCTION SHALL BE REPLACED IN KIND AT THE CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE PROPERTY OWNER.
7. CONTRACTOR SHALL MAINTAIN ACCESS TO ALL PROPERTIES AT ALL TIMES.
8. ANY SEWER LATERAL WORK WITHIN 5 FEET OF A BUILDING SHALL BE PERFORMED BY A LICENSED JOURNEYPERMAN PLUMBER. BUILDING PERMITS ARE REQUIRED FOR SEWER LATERAL CONSTRUCTION OUTSIDE THE CITY EASEMENT.
9. CONTRACTOR SHALL SUBMIT A TRAFFIC CONTROL PLAN PER THE OREGON TEMPORARY TRAFFIC CONTROL HANDBOOK FOR APPROVAL BY THE CITY PRIOR TO ANY WORK WITHIN THE PUBLIC ROW. TRAFFIC CONTROL SHALL BE IN PLACE AT ALL TIMES DURING CONSTRUCTION.
10. ALL WORK SHALL BE PERFORMED IN COMPLIANCE WITH APPLICABLE OSHA REGULATIONS.
11. ALL SPOILS FROM EXCAVATION OUTSIDE THE PUBLIC ROW SHALL BE PLACED ON PLYWOOD, 1/4" THICK MIN., TO PROTECT EXISTING LAWNS AND IMPROVEMENTS.
12. PEDESTRIAN/BICYCLE ACCESS SHALL BE MAINTAINED AROUND WORK AREA AT ALL TIMES.
13. ALL OPEN EXCAVATION SHALL BE BACK FILLED OR COVERED OVERNIGHT. CUTS IN ROADWAY SURFACES SHALL BE STEEL PLATED AND RAMPED WITH AG ALONG EDGES. CUTS OUTSIDE ROADWAYS SHALL BE COVERED WITH SUBSTANTIAL PLYWOOD SHEETS CAPABLE OF PROTECTING HUMANS OR ANIMALS FROM FALLING IN AND SHALL BE COMPLETELY SURROUNDED BY 4' (MINIMUM) ORANGE CONSTRUCTION FENCE.
14. AT THE END OF EACH WORKING DAY THE CONTRACTOR SHALL INSTALL TEMPORARY FENCING AT ALL LOCATIONS WHERE FENCING HAS BEEN REMOVED.

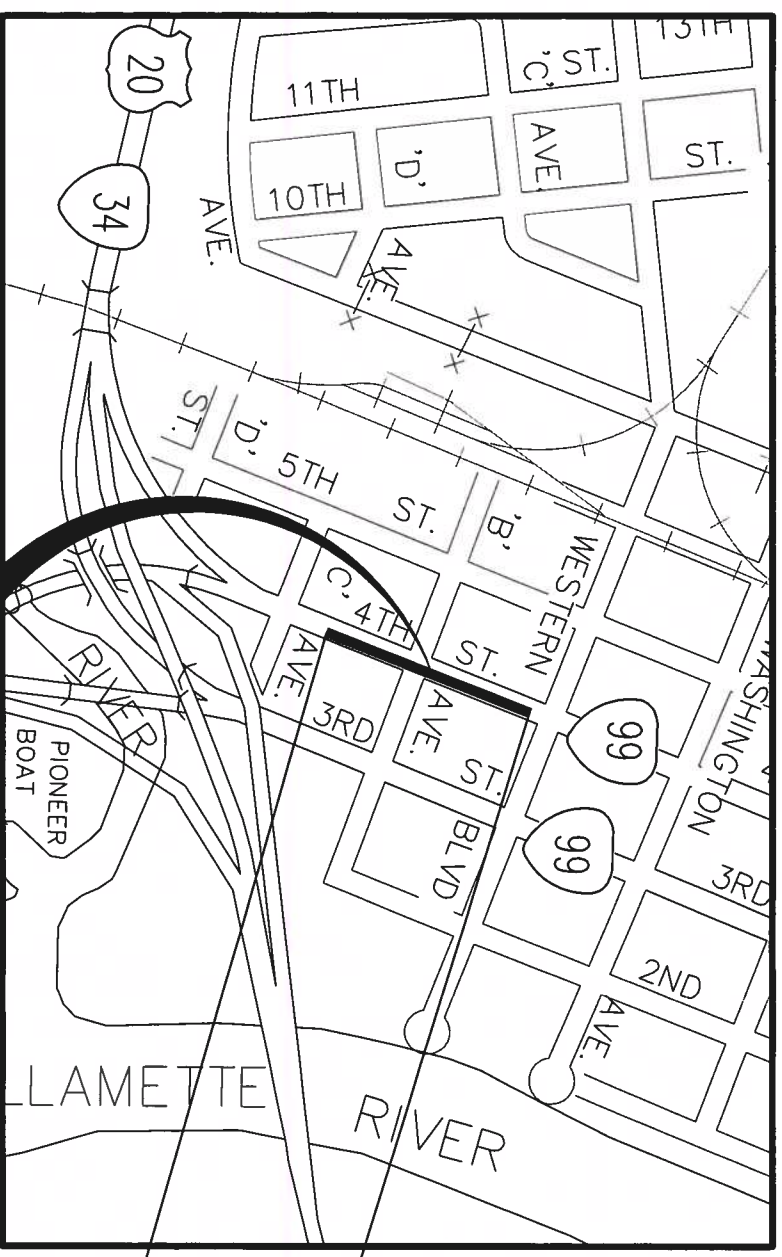
**ATTENTION:**  
**OREGON LAW REQUIRES YOU FOLLOW RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH 952-001-0090. YOU MAY OBTAIN COPIES OF THE RULES BY CALLING THE CENTER. (NOTE: THE TELEPHONE NUMBER FOR THE OREGON UTILITY NOTIFICATION CENTER IS (503)232-1987, OR DIAL 811.**

# STORM DRAIN HWY. 99W PHASE I (CORVALLIS) SEC., HIGHWAY 99W PROJECT NO. 653430

**SHEET INDEX**

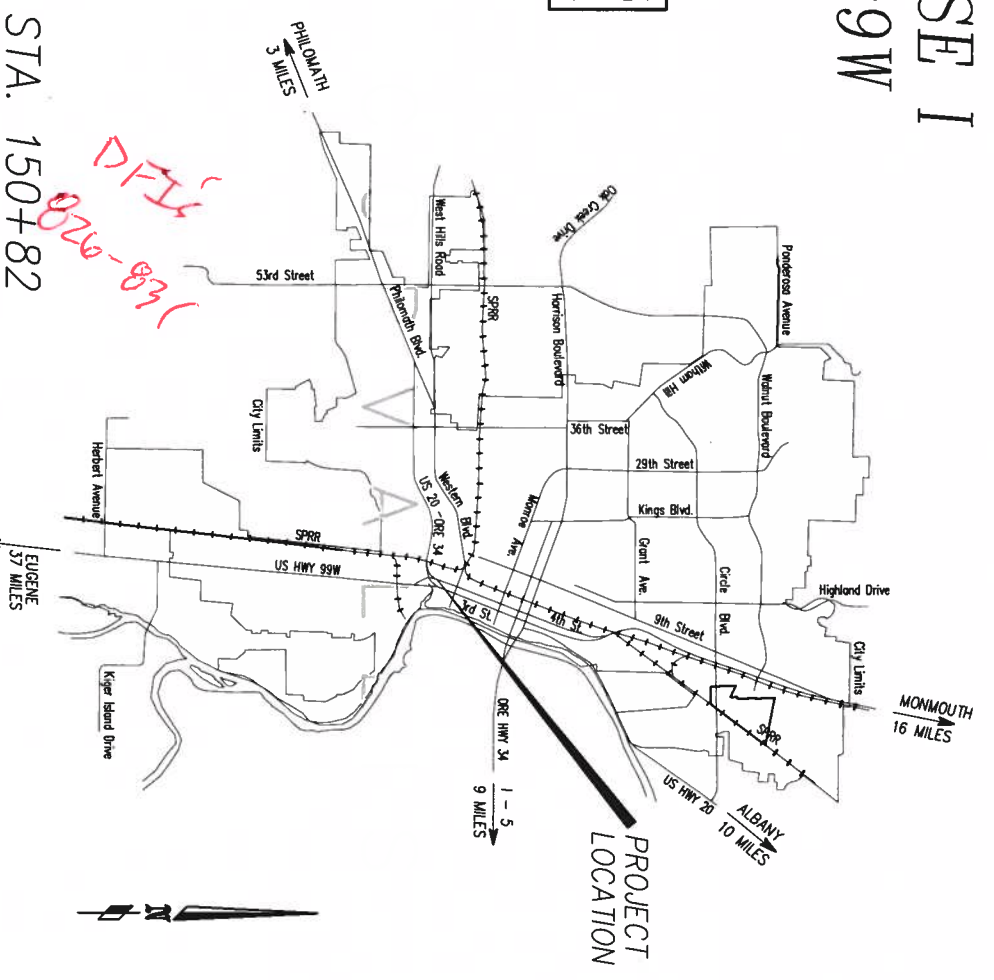
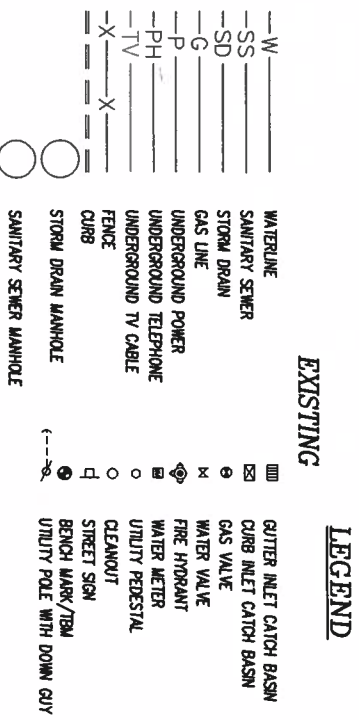
SHEET 1	COVER SHEET
SHEET 2	STORM DRAIN LAYOUT
SHEET 3	STORM DRAIN LAYOUT
SHEET 4	FILTERRA INSTALL DETAIL
SHEET 5	FILTERRA APRON EXHIBITS
SHEET 6	GRIND/INLAY PLAN
SHEET TC-1	TRAFFIC CONTROL PLAN
SHEET TC-2	TRAFFIC CONTROL PLAN
SHEET TC-3	TRAFFIC CONTROL PLAN

**RECORD DRAWING**  
 DATE: 12/18/13



**VICINITY MAP**  
 NOT TO SCALE

**PROJECT LOCATION**  
 4TH STREET FROM "C" STREET TO WESTERN BLVD.



**LOCATION MAP**  
 NOT TO SCALE

STA. 142+42  
 (M.P. 84.04)

STA. 150+82  
 (M.P. 83.92)

**ABBREVIATIONS**

AC	ASPHALT CONCRETE	LF	LINEAL FEET	ST	STREET
AGG	AGGREGATE	LT	LEFT	STA	STATION
APPROX	APPROXIMATE	MAX	MAXIMUM	STD	STANDARD
BCR	BETON CURB RETURN	MH	MANHOLE	STL	STEEL
C.A.B.	CRUSHED AGGREGATE BASE	MIN	MINIMUM	S/W	SIDEWALK
CB	CATCH BASIN	(N)	NORTH	SY	SQUARE YARD
CR	CAST IRON	NO.	NUMBER	TBD	TO BE DETERMINED
CONC	CONCRETE	N/S	NOT TO SCALE	TEMP	TEMPORARY
C.T.B.	CEMENT TREATED BASE	OC	ON CENTER	TV	TELEVISION
DIA	DIAMETER	PCC	PORTLAND CEMENT CONCRETE	TYP	TYPICAL
(E)	EAST	PH	PHONE	(N)	NORTH
ECR	END CURB RETURN	QTY	QUANTITY	W	WIDTH
ELEV	ELEVATION	RT	RIGHT	W/	WITH
EX	EXISTING	(S)	SOUTH		
FH	FIRE HYDRANT	S	SLOPE		
F.O.C.	FACE OF CURB	SS	SANITARY SEWER		
FT	FEET	SD	STORM DRAIN		
HP	HIGH POINT	SF	SQUARE FEET		
IE	INVERT ELEVATION	SHT	SHEET		



**ATTENTION:**  
 Oregon law requires you follow rules adopted by the Oregon Utility Notification Center. Those rules are set forth in OAR 952-001-0010 through 952-001-0090. You may obtain copies of the rules by calling the center. (Note: the telephone number for the Oregon Utility Notification Center is (503) 232-5198.)

**STORM DRAIN HWY.99W PHASE I**

**PROJECT NUMBER 653430**

**COVER**

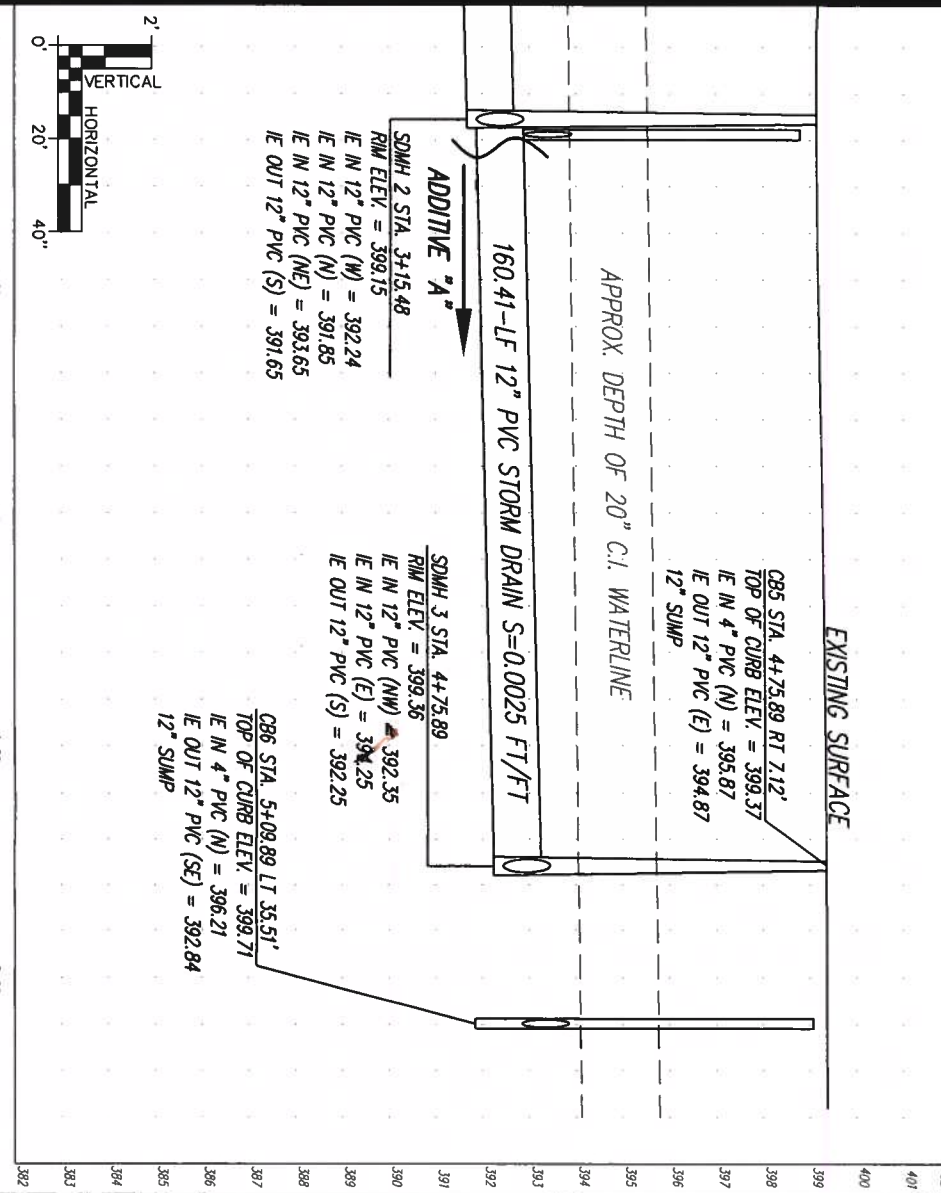
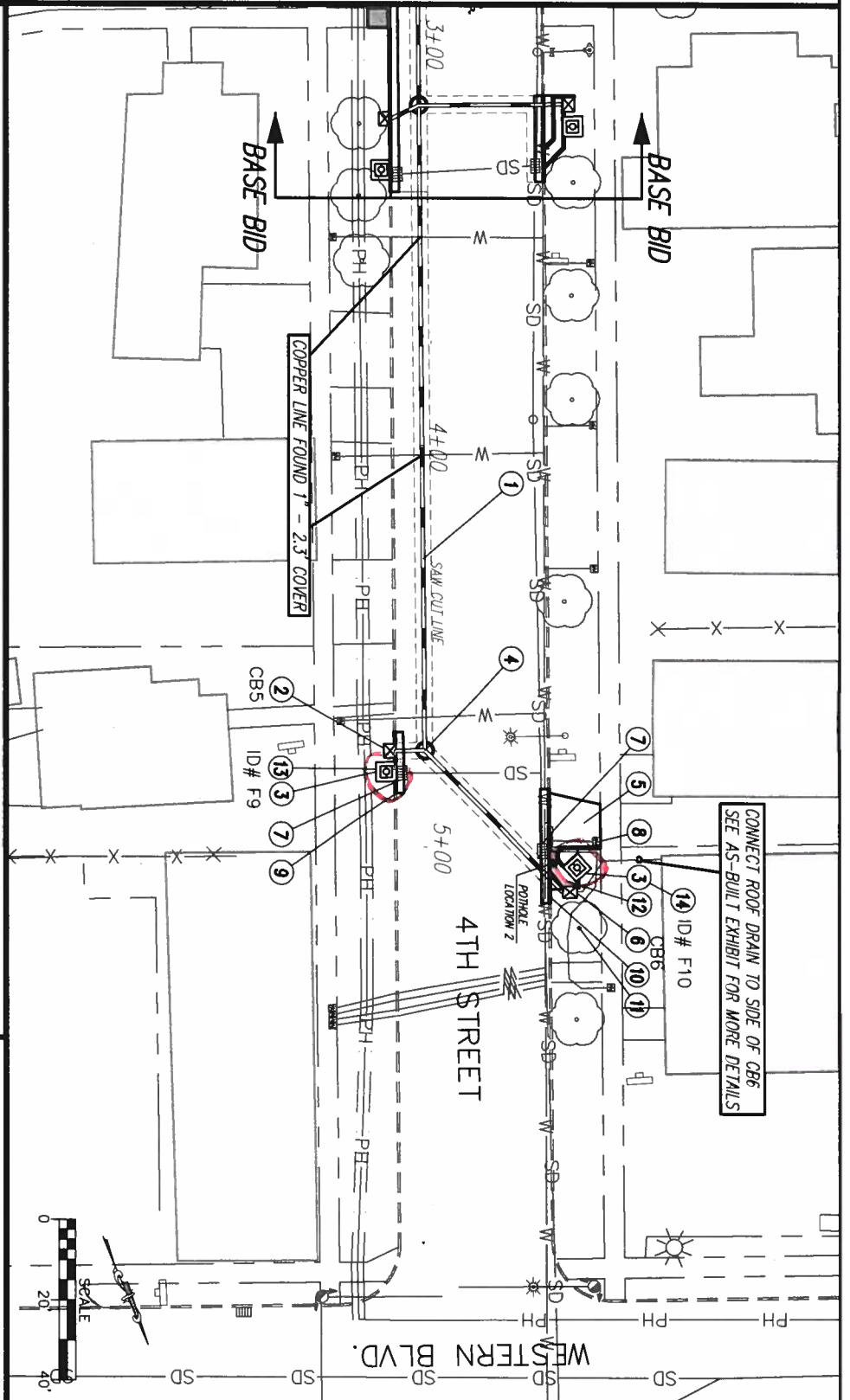
**CORVALLIS**  
 PUBLIC WORKS  
 DEPARTMENT





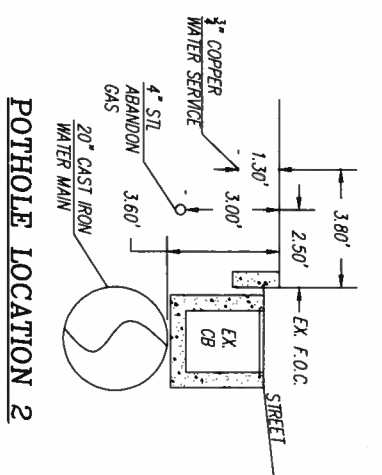
- 1 INSTALL 160.41-LF OF 12" PVC STORM PIPE. S= 0.0025 FT/FT.
- 2 STA. 4+75.89 INSTALL CB5 PER STD. DETAIL 209. INSTALL APPROX. 7-LF OF 12" PVC PIPE FROM CB5 TO MH3, S= 0.0871 FT/FT.
- 3 INSTALL FILTERRA UNIT AS PER DETAIL ON SHEET 4. INSTALL 4" PVC PIPE TO ACCOMPANYING CATCH BASIN.
- 4 STA. 4+75.89 INSTALL STORM DRAIN MANHOLE #3 AS PER STD. DETAIL 203.
- 5 REMOVE APPROX. 16.95-SY OF EXISTING DRIVEWAY AND INSTALL 8" PCC DRIVEWAY PER STD. DETAIL 108.
- 6 STA. 5+09.89 INSTALL CB6 PER STD. DETAIL 209. INSTALL APPROX. 49-LF OF 12" PVC PIPE FROM CB6 TO MH3, S= 0.0100 FT/FT. SEE "POTHOLE LOCATION 2" ON THIS SHEET FOR EX. 20" WATER LINE LOCATION.
- 7 REMOVE EXISTING GUTTER INLET. PLUG AND ABANDON IN PLACE EXISTING STORM PIPE ENCOUNTERED DURING REMOVAL AS APPROVED BY THE ENGINEER.
- 8 EXISTING 3/4" COPPER WATER SERVICE. CITY CREWS WILL HOT TAP NEW SERVICE. CONTRACTOR RESPONSIBLE FOR ALL TRAFFIC CONTROL, EQUIPMENT TO EXPOSE THE LINE, SHORING IF NECESSARY, BACKFILLING AND COMPACTION. CONTRACTOR SHALL NOTIFY ENGINEER 1 WEEK PRIOR TO WORK BEING DONE FOR SCHEDULING.
- 9 INSTALL 16-LF OF CURB AND GUTTER AS PER STD. DETAIL 103.
- 10 INSTALL 30-LF OF CURB AND GUTTER AS PER STD. DETAIL 103.
- 11 PROTECT EXISTING TREE.
- 12 INSTALL 3.77-SY OF 8" DEPTH CONCRETE APRON. SEE EXHIBIT C ON SH. 5.
- 13 INSTALL TYPE S2 MARKER AS PER ODOT DETAIL NO. DET 5300. MARKER LOCATION TO BE DETERMINED BY ENGINEER.

EXISTING STREET SECTION IS 8" AC OVER 16" OF CTB. SEE DETAIL ON SHEET 6.



CONNECT ROOF DRAIN TO SIDE OF CB6  
SEE AS-BUILT EXHIBIT FOR MORE DETAILS

**RECORD DRAWING**  
DATE: 12/18/13



**STORM DRAIN HWY.99W PHASE I**  
**ADDITIVE "A"**  
**PROJECT NUMBER 653430**  
**STORM DRAIN LAYOUT**

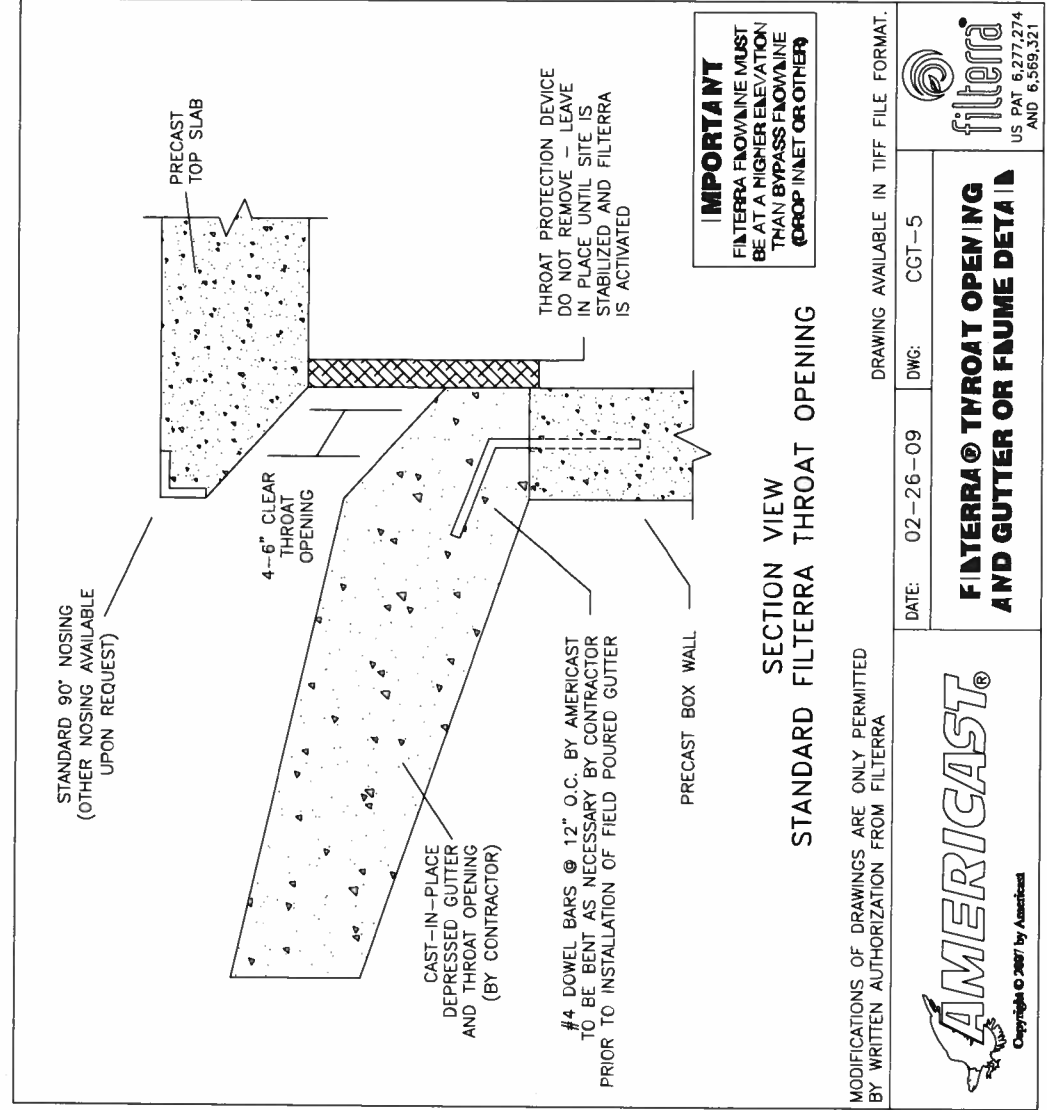
ATTENTION: Oregon law requires you follow rules adopted by the Oregon Utility Notification Center. Those rules are set forth in OAR 852-001-0010 through OAR 852-001-0090. You may obtain copies of the rules by calling the center. (Note: the telephone number for the Oregon Utility Notification Center is (800) 332-2344)

REGISTERED PROFESSIONAL ENGINEER  
OSMA B. TACHIBANA  
OREGON

NO.	DATE	DESCRIPTION OF REVISION
1	12/11/12	50% PLAN REVIEW
2	4/10/13	75% PLAN REVIEW
3	6/14/13	100% PLAN REVIEW
4	12/18/13	AS BUILT

DESIGNED	J. TACHIBANA
DRAWN	S. SPOON
CHECKED	J. TACHIBANA
DATE	AS SHOWN
SCALE	AS SHOWN
SHEET No.	

3 of 6

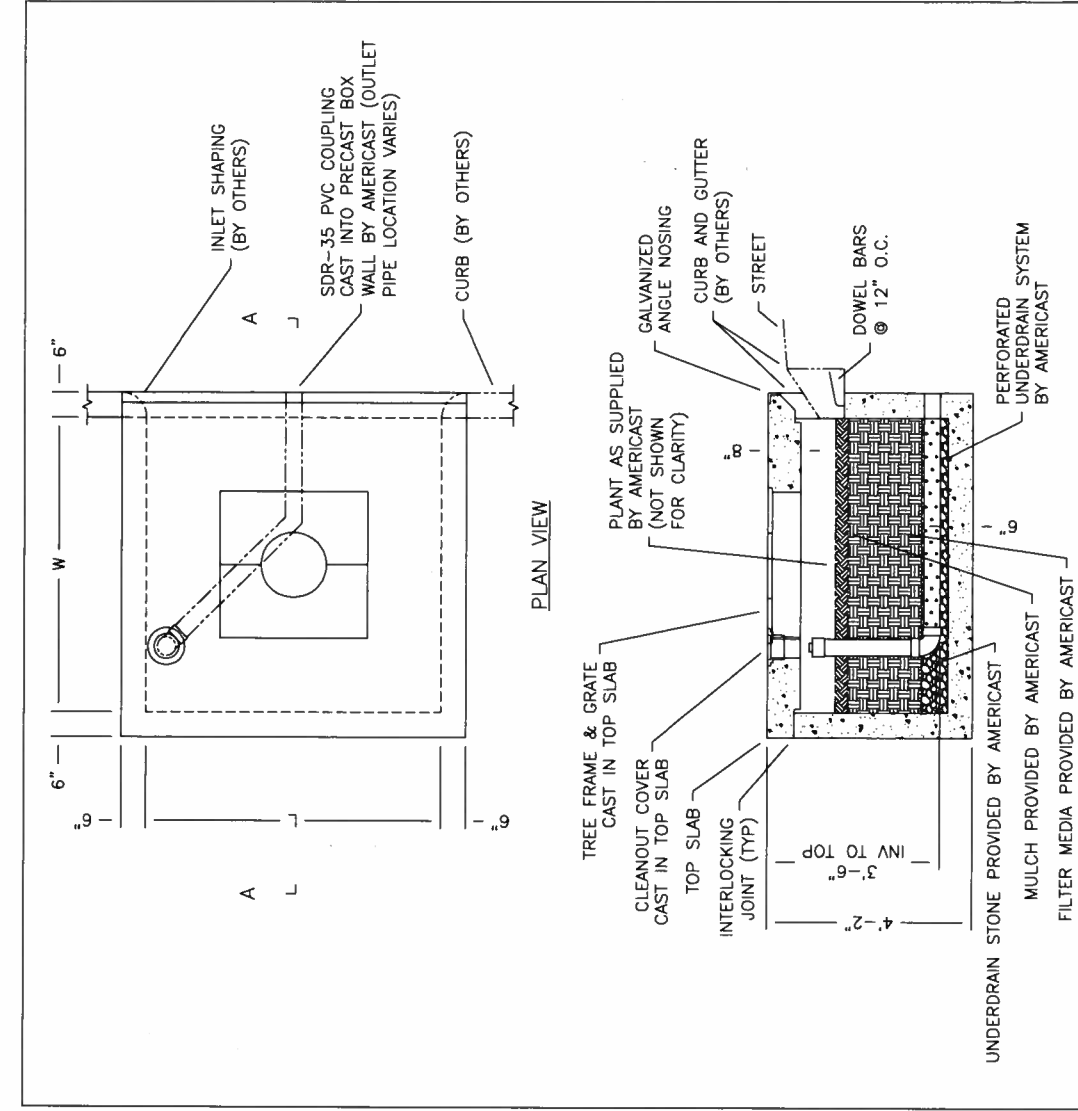


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**filterra®**  
US PAT. 6,277,274 AND 6,569,321

DATE: 02-26-09 DWG: CGT-5  
**filterra® THROAT OPENING AND GUTTER OR FRAME DETAIL**

MODIFICATIONS OF DRAWINGS ARE ONLY PERMITTED BY WRITTEN AUTHORIZATION FROM FILTERRA. DRAWING AVAILABLE IN TIFF FILE FORMAT.



DESIGNATION	L	W	TREE GRATE QTY & SIZE	OUTLET PIPE
4 x 4	4'-0"	4'-0"	(1) 3x3	4" SDR-35 PVC
6 x 6	6'-0"	6'-0"	(1) 3x3	4" SDR-35 PVC

AMERICAST®  
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filterra®  
US PAT. 6,277,274 AND 6,569,321

DATE: 03-17-09 DWG: WZ FTST-3  
**filterra® PRECAST FILTERRA® UNIT STANDARD CONFIGURATION WESTERN ZONE**

**STORM DRAIN HWY. 99W PHASE I**  
**BASE BID**  
**PROJECT NUMBER 653430**  
**filterra® UNIT INSTALL DETAIL**

**CITY OF CORVALLIS**  
**Public Works Department**

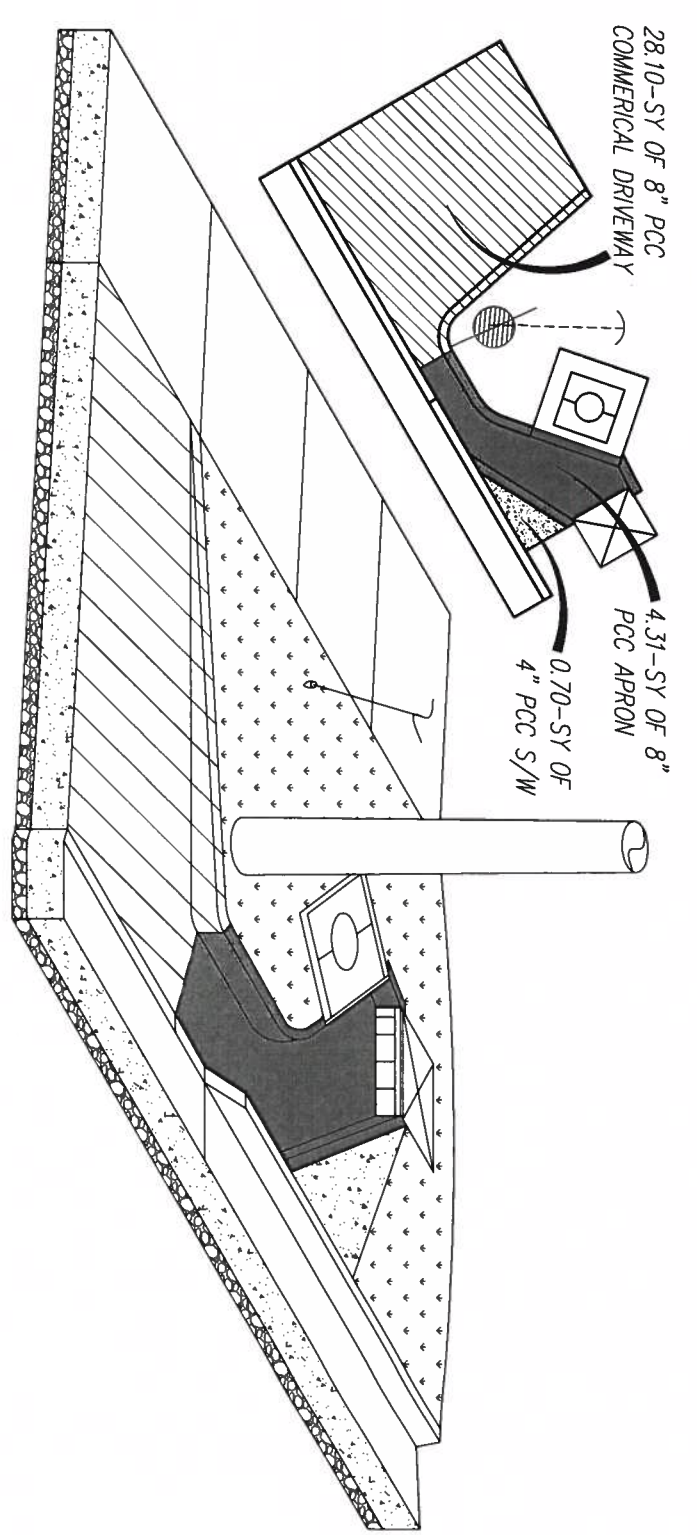
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filterra®  
US PAT. 6,277,274 AND 6,569,321

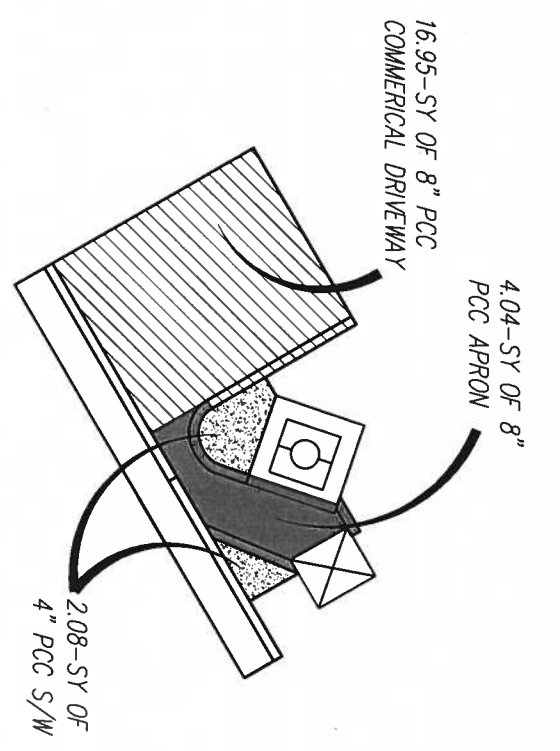


NO.	DATE	DESCRIPTION
1	12/17/12	FOR PLAN REVIEW
2	4/16/13	FOR PLAN REVIEW
3	6/17/13	FOR PLAN REVIEW
4	6/17/13	FOR PLAN REVIEW
5	12/18/13	FOR PLAN REVIEW

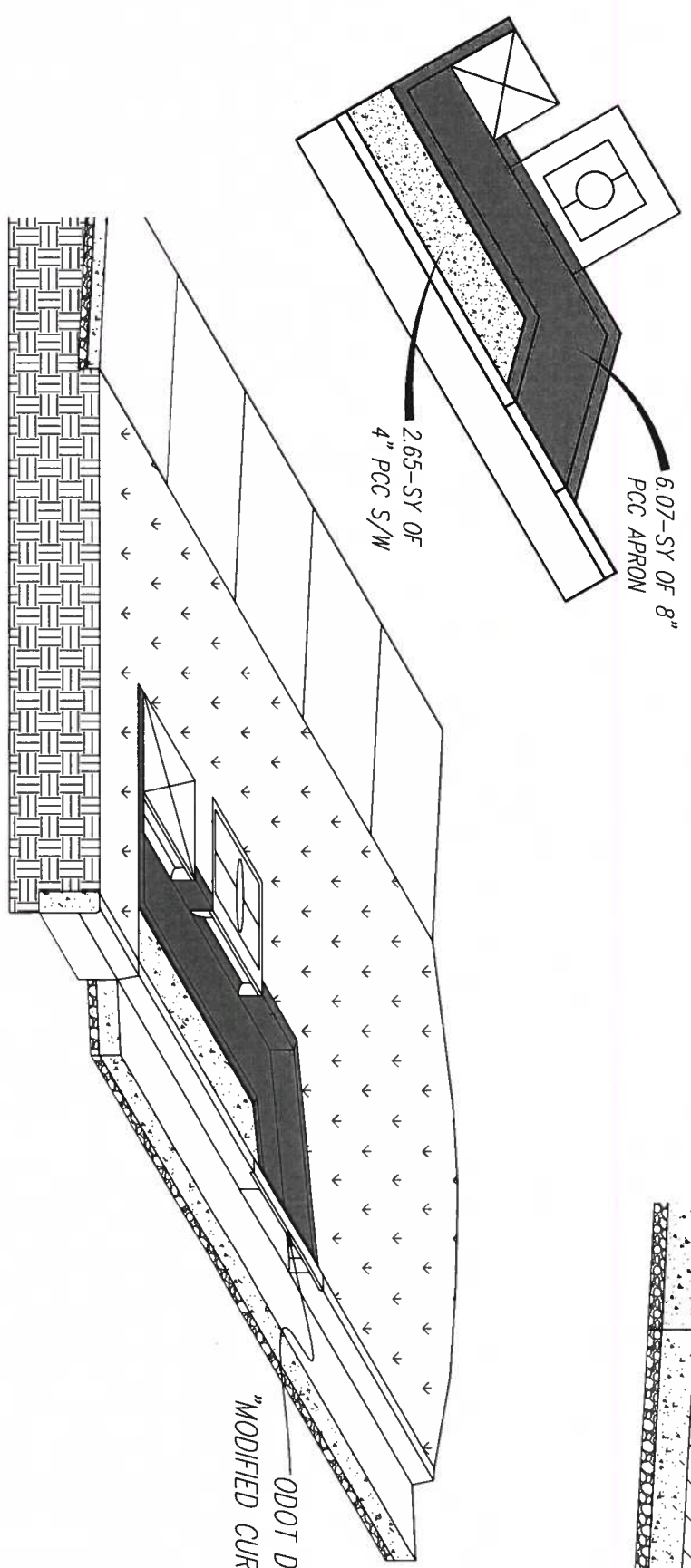
**RECORD DRAWING**  
**DATE: 12/18/13**



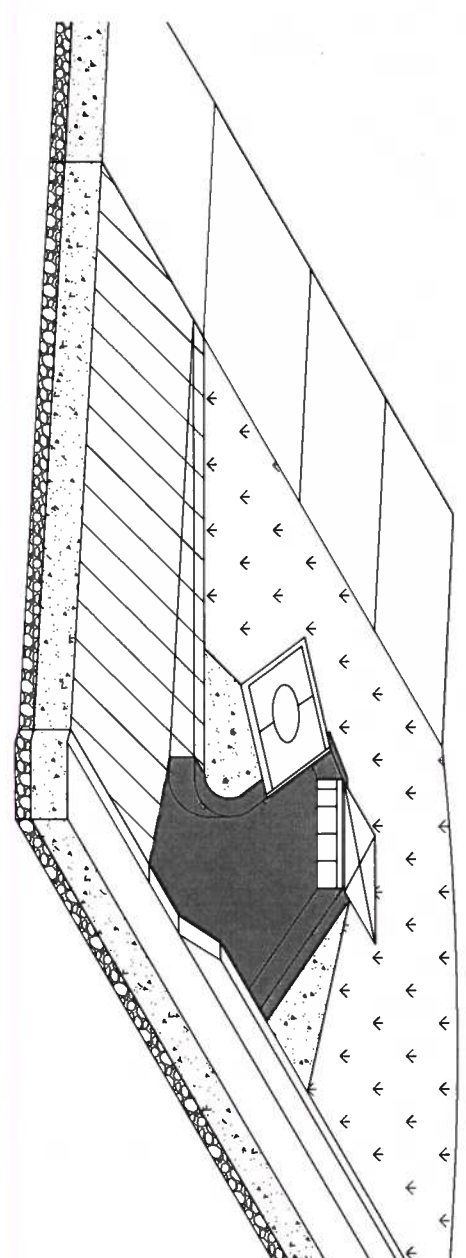
**Exhibit A**  
Base Bid



**Exhibit C**  
Additive "A"



**Exhibit B**  
Base Bid



**RECORD DRAWING**  
DATE: 12/18/13

**CITY OF CORVALLIS**  
Public Works Department

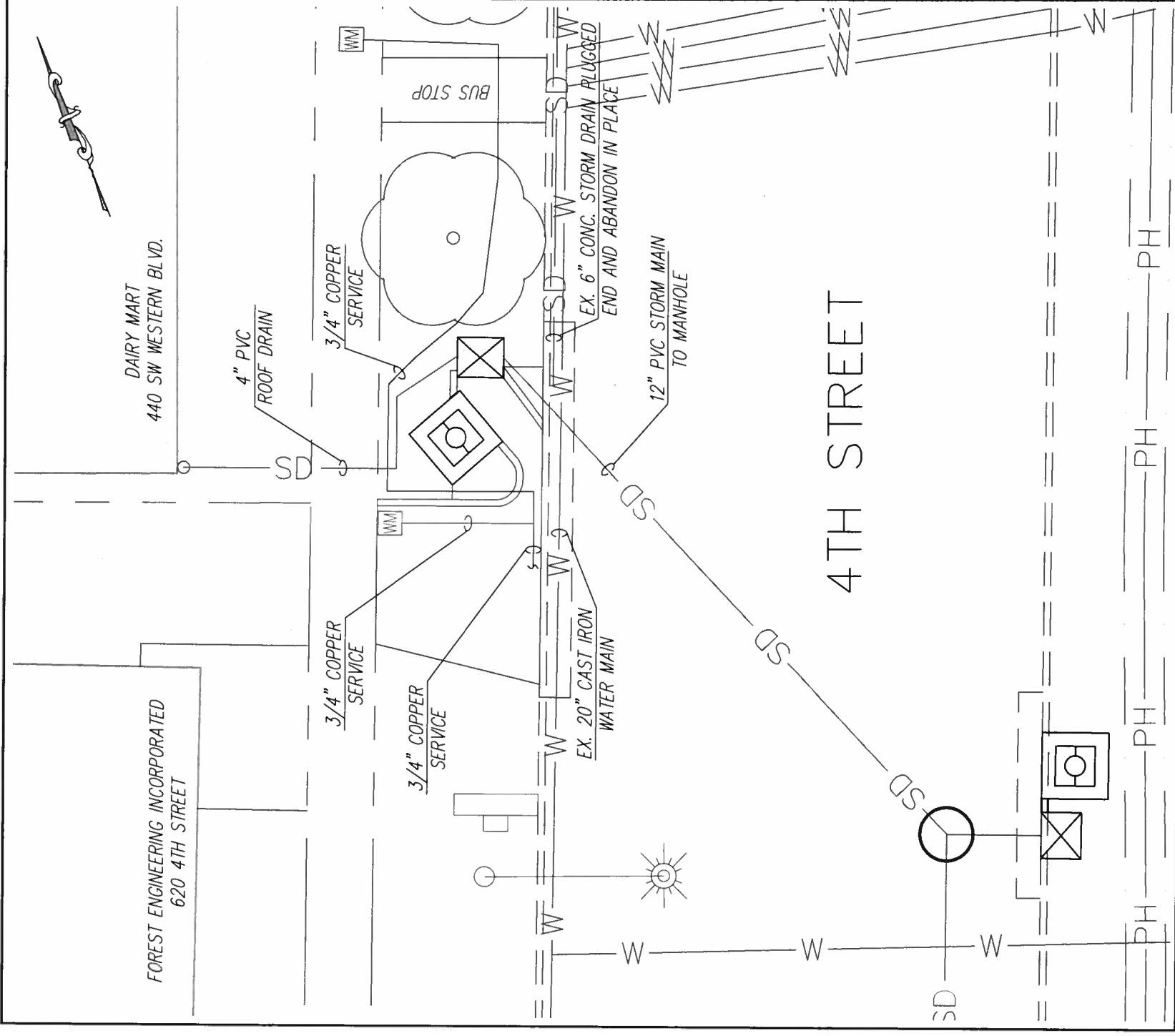
**STORM DRAIN HWY.99W PHASE I**  
**BASE BID**  
**PROJECT NUMBER 653430**  
**FILTERRA UNIT LAYOUT**

**ATTENTION:**  
Oregon law requires you follow rules adopted by the Oregon Utility Notification Center. Those rules are set forth in OAR 552-001-0010 through OAR 552-001-0090. You may obtain copies of the rules by calling the center.  
*(Note: the telephone number for the Oregon Utility Notification Center is (800) 332-2344)*

REGISTERED PROFESSIONAL ENGINEER  
OREGON  
NORMA B. TACHINI

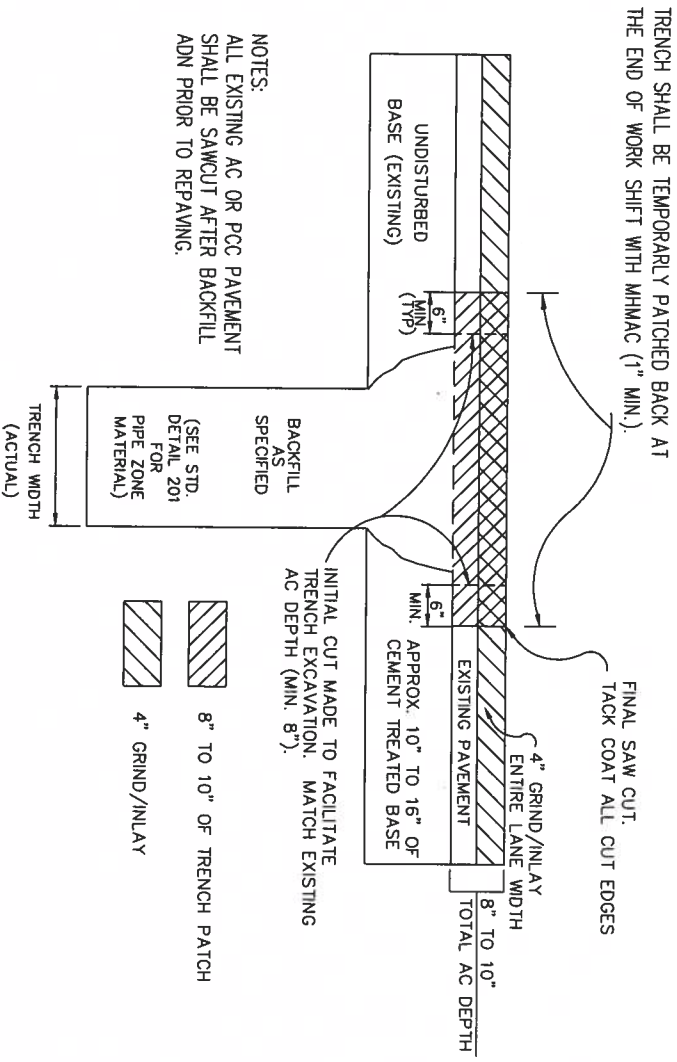
NO.	DATE	DESCRIPTION OF REVISION	BY
1	12/11/12	60x PLAN REVIEW	SP
2	4/16/13	9x9 PLAN REVIEW	SP
3	6/19/13	LOCAL PLAN REVIEW	SP
4	11/18/13	REBUILT	SP

5 of 6



DESIGNED J. TACCHINI	<p><b>CITY OF CORVALLIS</b> Public Works Department As Built Exhibit</p>
DRAWN S. BOND	
CHECKED J. TACCHINI	
DATE 12/18/15	
SCALE: 1" = 10'	

- GENERAL NOTES:**
1. STRIPING DONE BY OTHERS. TEMPORARY "STICK AND STOMPS" MARKERS TO BE INSTALLED BY CONTRACTOR.
  2. GRIND LIMITS ARE APPROXIMATE AND WILL BE DETERMINED BY THE ENGINEER. CONTRACTOR WILL BE RESPONSIBLE FOR ALL DAMAGE DUE TO CONSTRUCTION ACTIVITIES OUTSIDE OF WORK ZONE.



- 8" TO 10" OF TRENCH PATCH
- 4" GRIND/INLAY

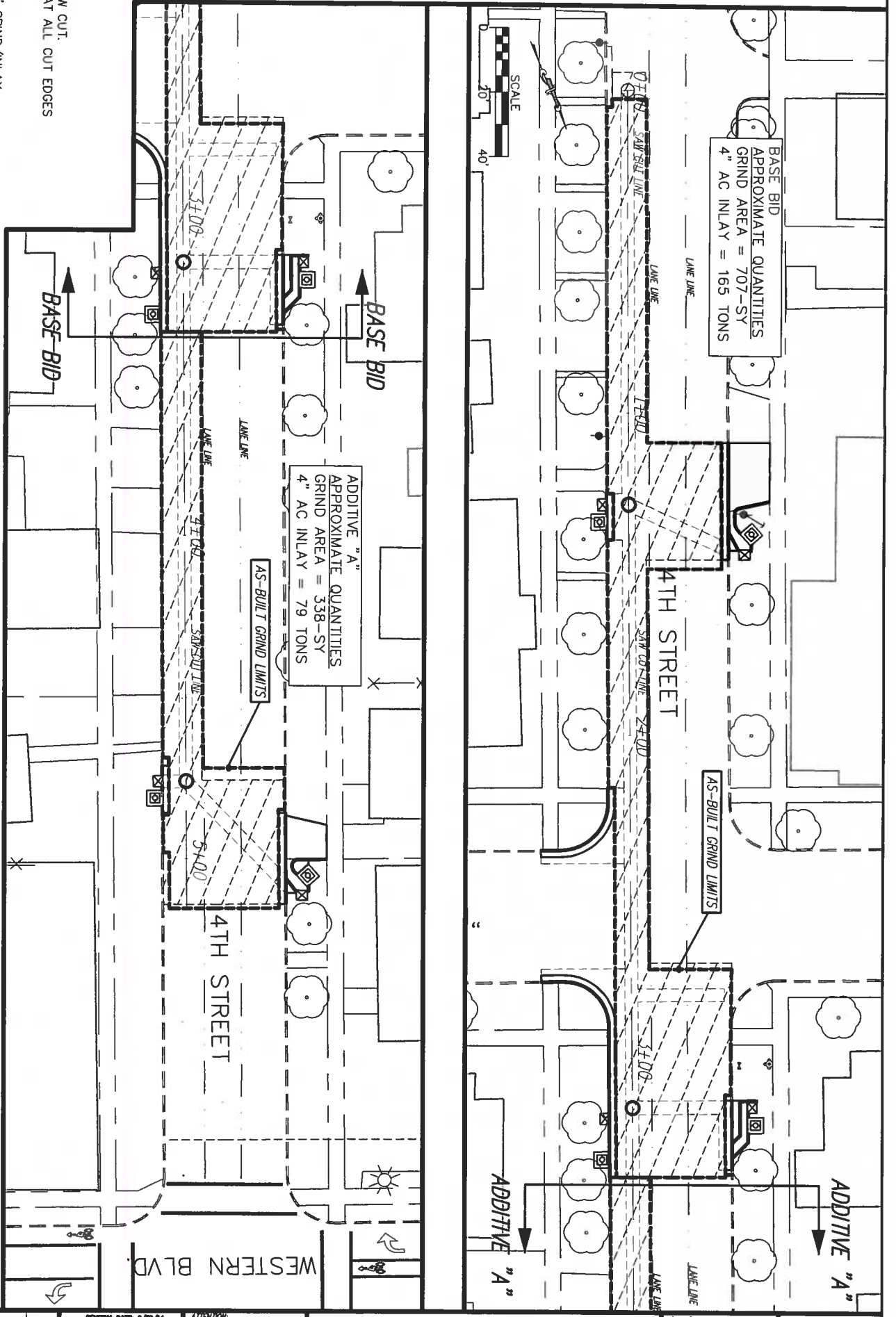
NOTES:  
ALL EXISTING AC OR PCC PAVEMENT SHALL BE SAWCUT AFTER BACKFILL AND PRIOR TO REPAVING.  
(SEE STD. DETAIL 201 FOR PIPE ZONE MATERIAL)

TRENCH SHALL BE TEMPORARILY PATCHED BACK AT THE END OF WORK SHIFT WITH MHMAC (1" MIN.).

FINAL SAW CUT, TACK COAT ALL CUT EDGES

INITIAL CUT MADE TO FACILITATE TRENCH EXCAVATION. MATCH EXISTING AC DEPTH (MIN. 8").

TRENCH PATCH/GRIND DETAIL



**RECORD DRAWING**  
DATE: 12/18/13



**CITY OF CORVALLIS**  
Public Works Department

**STORM DRAIN HWY.99W PHASE I**  
**BASE BID AND ADDITIVE "A"**  
PROJECT NUMBER 653430  
GRIND/INLAY PLAN

**ATTENTION:**  
Oregon law requires you follow rules adopted by the Oregon Utility Notification Center. Those rules are set forth in OAR 852-001-0010 through OAR 852-001-0090. You may obtain copies of the rules by calling the center.  
(Note: the telephone number for the Oregon Utility Notification Center is (800) 332-2344)



NO.	DATE	DESCRIPTION OF REVISION	BY
1	12/17/12	SGA PLANNED	JP
2	4/1/13	9x2 PL W/REVIEW	JP
3	6/14/13	10x2 PL W/REVIEW	JP
4	11/14/13	15 PULL	JP

# Filterterra Owner's Manual



**filterterra**<sup>®</sup>  
Bioretention Systems

**C NTECH**<sup>®</sup>  
ENGINEERED SOLUTIONS



## Table of Contents

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Appendix 2 – Planting Requirements for Filtererra Systems.....	13

### Enclosed

Local Area Filtererra Plant List



# Introduction

Thank you for your purchase of the Filterra® Bioretention System. Filterra is a specially engineered stormwater treatment system incorporating high performance biofiltration media to remove pollutants from stormwater runoff. The system’s biota (vegetation and soil microorganisms) then further breakdown and absorb captured pollutants. All components of the system work together to provide a sustainable long-term solution for treating stormwater runoff.

The Filterra system has been delivered to you with protection in place to resist intrusion of construction related sediment which can contaminate the biofiltration media and result in inadequate system performance. These protection devices are intended as a best practice and cannot fully prevent contamination. It is the purchaser’s responsibility to provide adequate measures to prevent construction related runoff from entering the Filterra system.

Included with your purchase is Activation of the Filterra system by the manufacturer as well as a 1-year warranty from delivery of the system and 1-year of routine maintenance (mulch replacement, debris removal, and pruning of vegetation) up to twice during the first year after activation.

## Design and Installation

Each project presents different scopes for the use of Filterra systems. Information and help may be provided to the design engineer during the planning process. Correct Filterra box sizing (by rainfall region) is essential to predict pollutant removal rates for a given area. The engineer shall submit calculations for approval by the local jurisdiction. The contractor is responsible for the correct installation of Filterra units as shown in approved plans. A comprehensive installation manual is available at [www.ContechES.com](http://www.ContechES.com).

## Activation Overview

Activation of the Filterra system is a procedure completed by the manufacturer to place the system into working condition. This involves the following items:

- Removal of construction runoff protection devices
- Planting of the system’s vegetation
- Placement of pretreatment mulch layer using mulch certified for use in Filterra systems.

Activation MUST be provided by the manufacturer to ensure proper site conditions are met for Activation, proper installation of the vegetation, and use of pretreatment mulch certified for use in Filterra systems.





## Minimum Requirements

The minimum requirements for Filterra Activation are as follows:

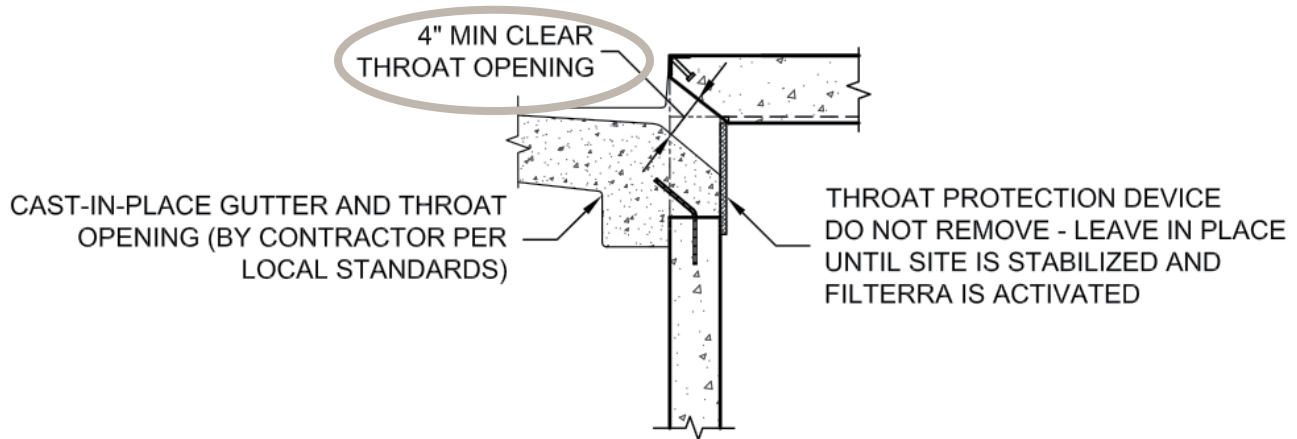
1. The site landscaping must be fully stabilized, i.e. full landscaping installed and some grass cover (not just straw and seed) is required to reduce sediment transport. Construction debris and materials should be removed from surrounding area.



2. Final paving must be completed. Final paving ensures that paving materials will not enter and contaminate the Filterra system during the paving process, and that the plant will receive runoff from the drainage area, assisting with plant survival for the Filterra system.



3. Filterra throat opening should be at least 4" in order to ensure adequate capacity for inflow and debris.



An Activation Checklist is included on page 12 to ensure proper conditions are met for Contech to perform the Activation services. A charge of \$500.00 will be invoiced for each Activation visit requested by Customer where Contech determines that the site does not meet the conditions required for Activation.

## Filterra Plant Selection Overview

A Plant List has been enclosed with this packet highlighting recommended plants for Filterra systems in your area. Keep in mind that plants are subject to availability due to seasonality and required minimum size for the Filterra system. Plants installed in the Filterra system are container plants (max 15 gallon) from nursery stock and will be immature in height and spread at Activation.

It is the responsibility of the owner to provide adequate irrigation when necessary to the plant of the Filterra system.

The "Planting Requirements for Filterra Systems" document is included as an appendix and discusses proper selection and care of the plants within Filterra systems.

## Warranty Overview

Refer to the Contech Engineered Solutions LLC Stormwater Treatment System LIMITED WARRANTY for further information. The following conditions may void the Filterra system's warranty and waive the manufacturer provided Activation and Maintenance services:

- Unauthorized activation or performance of any of the items listed in the activation overview
- Any tampering, modifications or damage to the Filterra system or runoff protection devices
- Removal of any Filterra system components
- Failure to prevent construction related runoff from entering the Filterra system
- Failure to properly store and protect any Filterra components (including media and underdrain stone) that may be shipped separately from the vault

## Routine Maintenance Guidelines

With proper routine maintenance, the biofiltration media within the Filterra system should last as long as traditional bioretention media. Routine maintenance is included by the manufacturer on all Filterra systems for the first year after activation. This includes a maximum of 2 visits to remove debris, replace pretreatment mulch, and prune the vegetation. More information is provided in the Operations and Maintenance Guidelines. Some Filterra systems also contain pretreatment or outlet bays. Depending on site pollutant loading, these bays may require periodic removal of debris, however this is not included in the first year of maintenance, and would likely not be required within the first year of operation.

These services, as well as routine maintenance outside of the included first year, can be provided by certified maintenance providers listed on the Contech website. Training can also be provided to other stormwater maintenance or landscape providers.



## Why Maintain?

All stormwater treatment systems require maintenance for effective operation. This necessity is often incorporated in your property's permitting process as a legally binding BMP maintenance agreement. Other reasons to maintain are:

- Avoiding legal challenges from your jurisdiction's maintenance enforcement program.
- Prolonging the expected lifespan of your Filterra media.
- Avoiding more costly media replacement.
- Helping reduce pollutant loads leaving your property.

Simple maintenance of the Filterra is required to continue effective pollutant removal from stormwater runoff before discharge into downstream waters. This procedure will also extend the longevity of the living biofilter system. The unit will recycle and accumulate pollutants within the biomass, but is also subjected to other materials entering the inlet. This may include trash, silt and leaves etc. which will be contained above the mulch layer. Too much silt may inhibit the Filterra's flow rate, which is the reason for site stabilization before activation. Regular replacement of the mulch stops accumulation of such sediment.

## When to Maintain?

Contech includes a 1-year maintenance plan with each system purchase. Annual included maintenance consists of a maximum of two (2) scheduled visits. Additional maintenance may be necessary depending on sediment and trash loading (by Owner or at additional cost). The start of the maintenance plan begins when the system is activated.

Maintenance visits are scheduled seasonally; the spring visit aims to clean up after winter loads including salts and sands while the fall visit helps the system by removing excessive leaf litter.

It has been found that in regions which receive between 30-50 inches of annual rainfall, (2) two visits are generally required; regions with less rainfall often only require (1) one visit per annum. Varying land uses can affect maintenance frequency; e.g. some fast food restaurants require more frequent trash removal. Contributing drainage areas which are subject to new development wherein the recommended erosion and sediment control measures have not been implemented may require additional maintenance visits.

Some sites may be subjected to extreme sediment or trash loads, requiring more frequent maintenance visits. This is the reason for detailed notes of maintenance actions per unit, helping the Supplier and Owner predict future maintenance frequencies, reflecting individual site conditions.

Owners must promptly notify the (maintenance) Supplier of any damage to the plant(s), which constitute(s) an integral part of the bioretention technology. Owners should also advise other landscape or maintenance contractors to leave all maintenance to the Supplier (i.e. no pruning or fertilizing) during the first year.



## Exclusion of Services

Clean up due to major contamination such as oils, chemicals, toxic spills, etc. will result in additional costs and are not covered under the Supplier maintenance contract. Should a major contamination event occur the Owner must block off the outlet pipe of the Filterra (where the cleaned runoff drains to, such as drop inlet) and block off the throat of the Filterra. The Supplier should be informed immediately.

## Maintenance Visit Summary

Each maintenance visit consists of the following simple tasks (detailed instructions below).

1. Inspection of Filterra and surrounding area
2. Removal of tree grate and erosion control stones
3. Removal of debris, trash and mulch
4. Mulch replacement
5. Plant health evaluation and pruning or replacement as necessary
6. Clean area around Filterra
7. Complete paperwork

## Maintenance Tools, Safety Equipment and Supplies

Ideal tools include: camera, bucket, shovel, broom, pruners, hoe/rake, and tape measure. Appropriate Personal Protective Equipment (PPE) should be used in accordance with local or company procedures. This may include impervious gloves where the type of trash is unknown, high visibility clothing and barricades when working in close proximity to traffic and also safety hats and shoes. A T-Bar or crowbar should be used for moving the tree grates (up to 170 lbs ea.). Most visits require minor trash removal and a full replacement of mulch. See below for actual number of bagged mulch that is required in each media bay size. Mulch should be a double shredded, hardwood variety. Some visits may require additional Filterra engineered soil media available from the Supplier.

Box Length	Box Width	Filter Surface Area (ft <sup>2</sup> )	Volume at 3" (ft <sup>3</sup> )	# of 2 ft <sup>3</sup> Mulch Bags
4	4	4	4	2
6	4	6	6	3
8	4	8	8	4
6	6	9	9	5
8	6	12	12	6
10	6	15	15	8
12	6	18	18	9
13	7	23	23	12

# Maintenance Visit Procedure

Keep sufficient documentation of maintenance actions to predict location specific maintenance frequencies and needs. An example Maintenance Report is included in this manual.



## 1. Inspection of Filterra and surrounding area

- Record individual unit before maintenance with photograph (numbered). Record on Maintenance Report (see example in this document) the following:

Record on Maintenance Report the following:

Standing Water	yes		no
Damage to Box Structure	yes		no
Damage to Grate	yes		no
Is Bypass Clear	yes		no

If yes answered to any of these observations, record with close-up photograph (numbered).



## 2. Removal of tree grate and erosion control stones

- Remove cast iron grates for access into Filterra box.
- Dig out silt (if any) and mulch and remove trash & foreign items.

## 3. Removal of debris, trash and mulch

Record on Maintenance Report the following:

Silt/Clay	yes		no
Cups/ Bags	yes		no
Leaves	yes		no
Buckets Removed	_____		



- After removal of mulch and debris, measure distance from the top of the Filterra engineered media soil to the top of the top slab. Compare the measured distance to the distance shown on the approved Contract Drawings for the system. Add Filterra media (not top soil or other) to bring media up as needed to distance indicated on drawings.

Record on Maintenance Report the following:

Distance to Top of Top Slab (inches)	_____
Inches of Media Added	_____



#### 4. Mulch replacement

- Add double shredded mulch evenly across the entire unit to a depth of 3".
- Refer to Filterra Mulch Specifications for information on acceptable sources.
- Ensure correct repositioning of erosion control stones by the Filterra inlet to allow for entry of trash during a storm event.
- Replace Filterra grates correctly using appropriate lifting or moving tools, taking care not to damage the plant.

#### 5. Plant health evaluation and pruning or replacement as necessary

- Examine the plant's health and replace if necessary.
- Prune as necessary to encourage growth in the correct directions



Record on Maintenance Report the following:

Height above Grate	_____	(ft)
Width at Widest Point	_____	(ft)
Health	healthy   unhealthy	
Damage to Plant	yes   no	
Plant Replaced	yes   no	



#### 6. Clean area around Filterra

- Clean area around unit and remove all refuse to be disposed of appropriately.



#### 7. Complete paperwork

- Deliver Maintenance Report and photographs to appropriate location (normally Contech during maintenance contract period).
- Some jurisdictions may require submission of maintenance reports in accordance with approvals. It is the responsibility of the Owner to comply with local regulations.

# Maintenance Checklist

Drainage System Failure	Problem	Conditions to Check	Condition that Should Exist	Actions
Inlet	Excessive sediment or trash accumulation.	Accumulated sediments or trash impair free flow of water into Filterra.	Inlet should be free of obstructions allowing free distributed flow of water into Filterra.	Sediments and/or trash should be removed.
Mulch Cover	Trash and floatable debris accumulation.	Excessive trash and/or debris accumulation.	Minimal trash or other debris on mulch cover.	Trash and debris should be removed and mulch cover raked level. Ensure bark nugget mulch is not used.
Mulch Cover	"Ponding" of water on mulch cover.	"Ponding" in unit could be indicative of clogging due to excessive fine sediment accumulation or spill of petroleum oils.	Stormwater should drain freely and evenly through mulch cover.	Recommend contact manufacturer and replace mulch as a minimum.
Vegetation	Plants not growing or in poor condition.	Soil/mulch too wet, evidence of spill. Incorrect plant selection. Pest infestation. Vandalism to plants.	Plants should be healthy and pest free.	Contact manufacturer for advice.
Vegetation	Plant growth excessive.	Plants should be appropriate to the species and location of Filterra.		Trim/prune plants in accordance with typical landscaping and safety needs.
Structure	Structure has visible cracks.	Cracks wider than 1/2 inch or evidence of soil particles entering the structure through the cracks.		Vault should be repaired.

Maintenance is ideally to be performed twice annually.

## Filterra Inspection & Maintenance Log

Filterra System Size/Model: \_\_\_\_\_ Location: \_\_\_\_\_

Date	Mulch & Debris Removed	Depth of Mulch Added	Mulch Brand	Height of Vegetation Above Grate	Vegetation Species	Issues with System	Comments
1/1/17	5 – 5 gal Buckets	3"	Lowe's Premium Brown Mulch	4'	Galaxy Magnolia	- Standing water in downstream structure	- Removed blockage in downstream structure

# Appendix 1 – Filterra® Activation Checklist



Project Name: \_\_\_\_\_ Company: \_\_\_\_\_

Site Contact Name: \_\_\_\_\_ Site Contact Phone/Email: \_\_\_\_\_

Site Owner/End User Name: \_\_\_\_\_ Site Owner/End User Phone/Email: \_\_\_\_\_

Preferred Activation Date: \_\_\_\_\_ (provide 2 weeks minimum from date this form is submitted)

Site Designation	System Size	Final Pavement / Top Coat Complete	Landscaping Complete / Grass Emerging	Construction materials / Piles / Debris Removed	Throat Opening Measures 4" Min. Height	Plant Species Requested
		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Attach additional sheets as necessary.

**NOTE:** A charge of \$500.00 will be invoiced for each Activation visit requested by Customer where Contech determines that the site does not meet the conditions required for Activation. ONLY Contech authorized representatives can perform Activation of Filterra systems; unauthorized Activations will void the system warranty and waive manufacturer supplied Activation and 1st Year Maintenance.

Signature \_\_\_\_\_

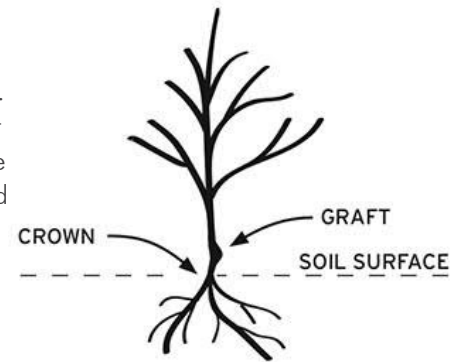
Date \_\_\_\_\_



# Appendix 2 – Planting Requirements for Filterra® Systems

## Plant Material Selection

- Select plant(s) as specified in the engineering plans and specifications.
- Select plant(s) with full root development but not to the point where root bound.
- Use local nursery container plants only. Ball and burlapped plants are not permitted.
- For precast Filterra systems with a tree grate, plant(s) must not have scaffold limbs at least 14 inches from the crown due to spacing between the top of the mulch and the tree grate. Lower branches can be pruned away provided there are sufficient scaffold branches for tree or shrub development.
- For precast Filterra systems with a tree grate, at the time of installation, it is required that plant(s) must be at least 6" above the tree grate opening at installation for all Filterra configurations. This DOES NOT apply to Full Grate Cover designs.
- Plant(s) shall not have a mature height greater than 25 feet.
- For standard 21" media depth, a 7 – 15 gallon container size shall be used. Media less than 21" (Filterra boxes only) will require smaller container plants.
- For precast Filterra systems, plant(s) should have a single trunk at installation, and pruning may be necessary at activation and maintenance for some of the faster growing species, or species known to produce basal sprouts.



## Plant Installation

- During transport protect the plant leaves from wind and excessive jostling.
- Prior to removing the plant(s) from the container, ensure the soil moisture is sufficient to maintain the integrity of the root ball. If needed, pre-wet the container plant.
- Cut away any roots which are growing out of the container drain holes. Plants with excessive root growth from the drain holes should be rejected.
- Plant(s) should be carefully removed from the pot by gently pounding on the sides of the container with the fist to loosen root ball. Then carefully slide out. Do not lift plant(s) by trunk as this can break roots and cause soil to fall off. Extract the root ball in a horizontal position and support it to prevent it from breaking apart. Alternatively the pot can be cut away to minimize root ball disturbance.
- Remove any excess soil from above the root flare after removing plant(s) from container.
- Excavate a hole with a diameter 4" greater than the root ball, gently place the plant(s).
- If plant(s) have any circling roots from being pot bound, gently tease them loose without breaking them.
- If root ball has a root mat on the bottom, it should be shaved off with a knife just above the mat line.
- Plant the tree/shrub/grass with the top of the root ball 1" above surrounding media to allow for settling.
- All plants should have the main stem centered in the tree grate (where applicable) upon completion of installation.
- With all trees/shrubs, remove dead, diseased, crossed/rubbing, sharply crotched branches or branches growing excessively long or in wrong direction compared to majority of branches.
- To prevent transplant shock (especially if planting takes place in the hot season), it may be necessary to prune some of the foliage to compensate for reduced root uptake capacity. This is accomplished by pruning away some of the smaller secondary branches or a main scaffold branch if there are too many. Too much foliage relative to the root ball can dehydrate and damage the plant.
- Plant staking may be required.

## Mulch Installation

- Only mulch that has been meeting Contech Engineered Solutions' mulch specifications can be used in the Filterra system.
- Mulch must be applied to a depth of 3" evenly over the surface of the media.

## Irrigation Requirements

- Each Filterra system must receive adequate irrigation to ensure survival of the living system during periods of drier weather.
- Irrigation sources include rainfall runoff from downspouts and/or gutter flow, applied water through the tree grate or in some cases from an irrigation system with emitters installed during construction.
- At Activation: Apply about one (cool climates) to two (warm climates) gallons of water per inch of trunk diameter over the root ball.
- During Establishment: In common with all plants, each Filterra plant will require more frequent watering during the establishment period. One inch of applied water per week for the first three months is recommended for cooler climates (2 to 3 inches for warmer climates). If the system is receiving rainfall runoff from the drainage area, then irrigation may not be needed. Inspection of the soil moisture content can be evaluated by gently brushing aside the mulch layer and feeling the soil. Be sure to replace the mulch when the assessment is complete. Irrigate as needed\*\*.
- Established Plants: Established plants have fully developed root systems and can access the entire water column in the media. Therefore irrigation is less frequent but requires more applied water when performed. For a mature system assume 3.5 inches of available water within the media matrix. Irrigation demand can be estimated as 1" of irrigation demand per week. Therefore if dry periods exceed 3 weeks, irrigation may be required. It is also important to recognize that plants which are exposed to windy areas and reflected heat from paved surfaces may need more frequent irrigation. Long term care should develop a history which is more site specific.

\*\* Five gallons per square yard approximates 1 inch of water Therefore for a 6' by 6' Filterra approximately 20-60 gallons of water is needed. To ensure even distribution of water it needs to be evenly sprinkled over the entire surface of the filter bed, with special attention to make sure the root ball is completely wetted. NOTE: if needed, measure the time it takes to fill a five gallon bucket to estimate the applied water flow rate then calculate the time needed to irrigate the Filterra. For example, if the flow rate of the sprinkler is 5 gallons/minute then it would take 12 minutes to irrigate a 6' by 6' filter.







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