Development Review Committee is represented by the City of Chehalis:
Building and Planning | Engineering | Public Works | Fire Department | Police Department | Airport

Development Review Committee Agenda

Chehalis Building and Planning Department
June 26, 2024, at 9 A.M.
Meeting Location: Chehalis Airport Conference Room

9:00 AM AC-24-020; 1815 NW Louisiana Ave
Applicant proposes to construct a new 7,020 sq ft Discount Tire building and associated parking, drive aisles, sidewalk, utility services, stormwater management facilities, and landscaping on Lewis County Parcel 005605016002 zoned CG-General Commercial.

9:30 AM ST-24-0010; 68 13th Street SW
Site plan review for Chehalis Village Square located on Lewis County Parcel 005411013001 which is zoned CO-Commercial Office/Mixed Use. Applicant proposes to construct a new 3-story multi-use building with associated parking areas.

10:00 AM Interdepartmental staff meeting.

Join Zoom Meeting

https://us06web.zoom.us/j/83910241095?pwd=dUI1Ym0rTkt6SHZCZjkxUTRHVDBUUT09

Directions to Development Review Committee

Chehalis Airport Conference Room

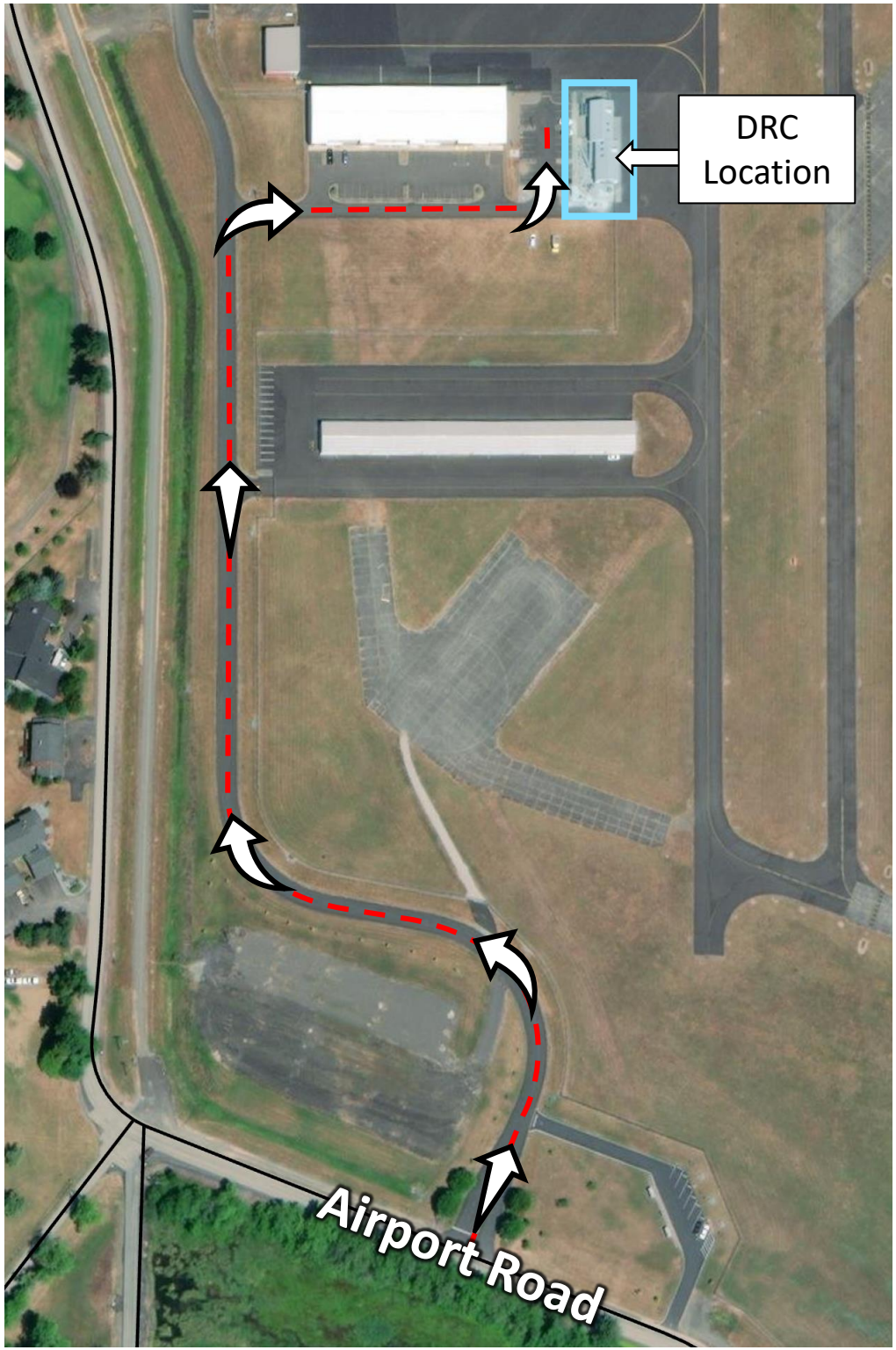
Coordinates:

(46.672787, -122.984924)

or

46° 40' 22.0332'' N

122° 59' 5.7264'' W



Form 1(5/24/2021)

CITY OF CHEHALIS
Where Heart and History Shape Our Future

Return your conference application to Community Development Department
1321 S Market Blvd. Chehalis, WA 98532
(360) 345-2229
www.ci.chehalis.wa.us email: comdev@ci.chehalis.wa.us

JOB SITE ADDRESS: 1815 NW Louisiana Ave **PARCEL #:** 005605016002

APPLICANT / CONTACT PERSON:
NAME: Willis Liu
ADDRESS: 6814 Greenwood Ave N
CITY/ST/ZIP: Seattle, WA 98103
PHONE#: (206) 212-0609
EMAIL: wliu@pacland.com

CONTRACTOR / ENGINEER / SURVEYOR:
COMPANY NAME: Pacland
CONTACT NAME: Willis Liu
ADDRESS: 6814 Greenwood Ave N, Seattle, WA 98103
PHONE #: (206) 212-0609
EMAIL: wliu@pacland.com
CONTRACTORS L&I #:

Is the property owner the same as the contact person? **Yes** [ ] **No** [X]

DETAILED PROJECT DESCRIPTION: Construction of a Discount Tire building with associated parking, utilities, storm drainage facilities, and landscaping.

Verbal comments made during discovery are not binding. Only the plan(s) submitted will be reviewed for compliance with applicable codes. By signing below, I grant permission for City of Chehalis employees to enter and remain on the property for the purpose of review and approval of this proposal and to conduct inspections related to this proposal.

Signature:	***Date:***
Willis Liu	6/14/2024
Name (print):	***Telephone #:***
Willis Liu	(206) 212-0609

Office use only	
Received by:	Date Received:
Parcel #:	
Permit #:	
Zoning:	
Flood Zone: Yes No	
Zone Classification:	

Project Description

The project site is located on an undeveloped 1.16 acre parcel located at 1815 NW Louisiana Ave in the City of Chehalis, WA. The site is located on the northeast outlot of the Home Depot development, an existing commercial retail center. The proposed development consists of the construction of a new 7,020 square foot Discount Tire building and associated parking, drive aisles, sidewalk, utility services, stormwater management facilities, and landscaping.

1815 NW Louisiana Ave

VICINITY MAP FOR 1815 NW LOUISIANA AVE
DISCOUNT TIRE
AC-24-020

SITE DATA

ZONING: CG (GENERAL COMMERCIAL)
PARCEL NO: 005605016002
TOTAL SITE AREA: 1.16 AC
PROPOSED USE: TIRE REPAIR & SALES (COMMERCIAL RETAIL)

LOT COVERAGE

IMPERVIOUS AREA: XXX AC (XX%)
PERVIOUS AREA: XXX AC (XX%)

BUILDING DATA

APPROXIMATE BUILDING AREA = 7,020 SF

PARKING DATA

PARKING REQUIRED
PARKING RATIO = 5 / 1000 SF

STANDARD STALLS	= 33 STALLS
ACCESSIBLE STALLS	= 2 STALLS
TOTAL STALLS	= 35 STALLS

PARKING PROPOSED

STANDARD STALLS	= 43 STALLS
ACCESSIBLE STALLS	= 2 STALLS
TOTAL STALLS	= 45 STALLS

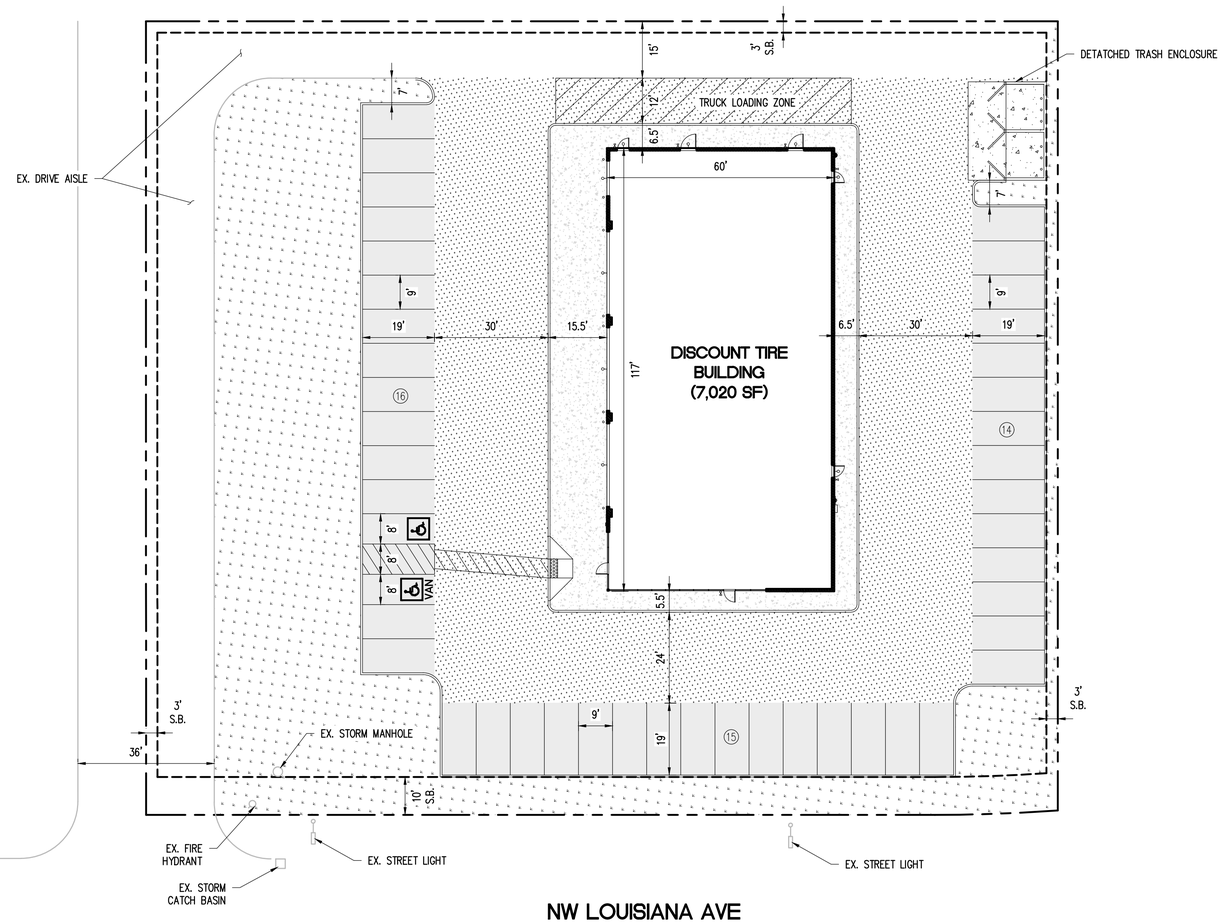
SETBACKS

PER CG (GENERAL COMMERCIAL) ZONING CODE

FRONT	=	10 FT
REAR	=	3 FT
SIDE	=	3 FT

LEGEND

- PROPERTY LINE
- HEAVY DUTY ASPHALT PAVEMENT
- STD DUTY ASPHALT PAVEMENT
- CONCRETE SIDEWALK PAVEMENT
- CONCRETE PAVEMENT
- LANDSCAPE
- CONCRETE CURB
- (#) NUMBER OF PARKING STALLS PER ROW



811 Know what's **below.** **Call** before you dig.

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

No.	Date	By	Revision Description

Designed By:	Issue Date:
MB	6/13/24 PRELIMINARY
Drawn By:	
MB	
Checked By:	Project No.:
WFF	10-393-022

PACLAND
6814 Greenwood Ave N
Seattle, WA 98103
T (206) 522-9510
www.PacLand.com

DISCOUNT TIRE
1815 NW LOUISIANA AVE
CHEHALIS, WA

SITE PLAN

C-1.0

CITY OF CHEHALIS
Where Heart and History Shape Our Future

Return your permit application to Community Development Department
1321 S Market Blvd. Chehalis, WA 98532
(360) 345-2229
www.ci.chehalis.wa.us email: comdev@ci.chehalis.wa.us

Job address: 42 & 68 SW 13th St Parcel #: 005411013001 & 005411014000

Applicant/Contact person

Name: Dan Birk - Eretz Capital LLC

Mailing address: 5171 S Spencer St

City, State, and Zip: Seattle, WA 98818

Phone #: 206.550.6295 Email: (required) dan.birk@eretzcap.com

Contractor/Engineer/Surveyor

Contact Name: Zachary Wirkkala

Company/Firm Name: RB Engineering

Mailing address: PO Box 923

City, State, and Zip: Chehalis, WA 98532

Phone #: 360.740.8919 Email: (required) zachw@rbengineers.com

Contractor's L&I #:

Project Description: (Create a project narrative on a separate page if there is not enough room to completely describe your project below.)

Project includes the construction of a new 3-story multi-use building with associated parking areas.

Current market value of proposed work: $1,500,000
(Fair market labor and materials)

Only the plan(s) submitted will be reviewed for compliance with applicable codes. By signing below, you grant permission for any City of Chehalis employee the right to access and remain on the property for the purpose of review and approval of this proposal and to conduct inspections related to this proposal.

Signature: Date: 2/29/24

Print Name: Zachary Wirkkala

Office use only

Received by: Date Received:

Parcel #:

Permit #:

Zoning:

Flood Zone: yes no Zone Classification:

Clearing, Filling or Grading Attachment

City of Chehalis
Public Works Department
2007 NE KRESKY AVE; CHEHALIS, WA 98532
(360) 748-0238 / fax (360) 748-0694

Type of Proposed Work: ☒ Filling ☒ Grading ☐ Clearing

Number of Days Required to Complete Work: TBD Number of Acres Directly Affected: 0.25

Number of Cubic Yards of Fill Involved: 335 cubic yards

Maximum Fill Height: 2 ft Maximum Excavation Depth: 2 ft

The following items are required with ***every application***:

☑ Site Plan ☑ Grading Plan

☑ Interim Erosion & Sediment Control Plan ☑ Work Schedule

Required information (Check Applicable Boxes)

Environmental Checklist	☐ YES	☒ NO	☐ N/A: _____
Final Erosion/Sediment Control Plan	☒ YES	☐ NO	☐ N/A: _____
Soil Engineering Report	☒ YES	☐ NO	☐ N/A: _____
Engineering Geology Report	☒ YES	☐ NO	☐ N/A: _____
SEPA	☐ YES	☒ NO	☐ N/A: _____
Other:	☐ YES	☐ NO	☐ N/A: _____

Other Requirements / Comments: _____

"CALL BEFORE YOU DIG" 1-800-424-5555

****State law requires 48 hours advance notice to <u>all</u> utilities prior to any excavation work****

See Chehalis Municipal Code 15.28 for complete permit requirements and conditions.

Subject to all the terms, conditions and provisions written on, printed on, or attached to this form, the applicant is hereby authorized to perform the work as described on the application and approved plans. The City of Chehalis reserves the right to alter, amend, and/or rescind this permit, or modify any conditions or requirements.

Revised: 1/25/2010

68 13th Street SW

VICINITY MAP FOR ST-24-0010
CHEHALIS VILLAGE SQUARE

GENESIS RESOURCE CONSULTING
ENVIRONMENTAL CONSULTING & LAND DEVELOPMENT
STREAM BANK PROTECTION, HABITAT RESTORATION, WETLANDS, PERMITTING, MITIGATION

ENVIRONMENTAL REVIEW REPORT

68 S.W. 13TH STREET

TAX PARCEL 005411013001 & 005411014000

CHEHALIS WASHINGTON, LEWIS COUNTY

PREPARED FOR:
Dan Birk
Eretz Capital LLC
5171 S. Spencer St
Seattle, Washington 98818

PREPARED BY:
Sarah Brummer
Genesis Resource Consulting
142 Lamprecht Rd
Winlock, Washington
98596
360-304-9903

February 10, 2024

BACKGROUND

Parcels #005411013001 & #005411014000 are located at 68 S.W. 13th Street, Chehalis Washington. Parcel #005411013001 is zero point five zero zero (0.500) acres with a use code of 65 service- professional. There is an existing medical office onsite that is two thousand eight hundred and eleven (2811) square feet. Parcel #005411014000 is zero point sixteen zero (0.160) acres with a use code of 11 single unit. This parcel has an existing single family home that is one thousand and thirty six (1036) square feet, including the existing carport and porch. The proposed development is to remove the single family residence and construct a new three (3) story building that is two thousand four hundred and fifty (2450) square feet per story, with a larger parking lot in the south western portion of both parcels.

RESOURCE CONCERNS

A site visit documents 13 Oregon White Oaks to be present through the site, most of which are located in the proposed parking lot. Oregon White Oak Woodlands are identified by Washington Department of Fish and Wildlife (WDFW) as a Priority Habitat Species. Genesis Resource Consulting (GRC) has made a site reconnaissance to determine resource concerns for the Oregon White Oak trees or other environmental issues at or adjacent to this parcel. This existing homesite was developed in 1945 and the land surrounding these parcels have been historically used for residential and business purposes.

SITE RECONNAISANCE

Genesis Resource Consulting completed a field reconnaissance of the project site on February 7th, 2024 in dry, overcast weather conditions. The soils probed within the designated hydric soil area are mapped as Lacamas Silt Loam 0-3% slopes and Scamman silty clay loam, 5-15% slopes. No secondary indicators of hydrology during the growing season were present. The site is an existing historic homesite that has been significantly disturbed. 13 Oregon White Oaks were documented on this site.

Vegetation consists of common lawn grasses and some ornamental bulbs and landscaping. Remaining vegetation consists of:
Dandelion, Common (*Taraxacum Officinale*)-FACU
Oak, Oregon White (*Quercus Garryana*)-FACU
Blackberry, Himalayan- (*Rubus Discolor Weihe & Nees*)-FACU

RESULTS AND DISCUSSION

Lewis County PATS Mapping does not indicate a wetland on the site or in the adjacent area, but does show hydric soils being present through the site. This does not impact this parcel and there are no critical area buffer requirements. The site contains significantly disturbed soils and minimal vegetation associated with the existing homesite and office buildings. Overstory vegetation of Oregon White Oak and evidence of invasive blackberry conclude the vegetation of the site does not meet wetland indicators. The site is surrounded by residential homes and businesses, with minimal vegetation and wildlife. Washington Department of Fish and Wildlife (WDFW) has listed Oregon White Oaks as a Priority Habitat/Species. WFDW has suggested recommendations on the preservation of this species. Recommendations include avoiding cutting of Oregon White Oaks if possible, unless in urbanized areas the stand is less than 1 acre. This site is under 1 acre and has a low habitat score. Because of this, there is no reasonable amount of room for habitat enhancement. Removal of the White Oaks on this site should have no adverse effects on the surrounding habitat.

SUMMARY/RECOMMENDATIONS

GRC did not find evidence of a jurisdictional wetland at this parcel location. Adjacent properties were evaluated and found to be developed residential and business building with mostly ornamental landscaping, with no obvious wetland indicators. No wetlands or stream channels were documented that may affect development of this site. According to WDFW Oregon White Oak guidelines, this site does not meet criteria for a priority Oregon White Oak woodlands due to its size and location. Due to the site location and surrounding area being developed, having minimal vegetation, and low habitat, GRC suggests that removal of any White Oaks on the parcels should be avoided if possible. GRC recommends that if any White Oaks need to be removed for development, they can be replaced by a juvenile White Oak as part of the landscape plan.

WORKS CITED

Larsen, E. M., and J. T. Morgan. 1998. Management recommendations for Washington's priority habitats: Oregon white oak woodlands. Wash. Dept. Fish and Wildl., Olympia. 37pp.

CHEHALIS VILLAGE SQUARE

TECHNICAL INFORMATION REPORT (TIR)

MARCH 2024

RB Engineering

DESIGN → PERMIT → MANAGE

Table of Contents

Project Engineer

Prepared by:	RB Engineering, Inc. (RBE) PO Box 923 Chehalis, WA 98532 (360) 740-8919 Robertb@RBEngineers.com
Contact:	Robert W. Balmelli PE
RBE Project:	23051
Prepared for:	Dan Birk 5171 S Spencer St Seattle, WA 98818 dan.birk@eretzcap.com (206) 550-6295
Reference:	2019 WSDOE Stormwater Manual

Project Engineer's Certification

"I hereby certify that this Drainage and Erosion Control Plan for **Chehalis Village Square** has been prepared by me or under my supervision and meets minimum standards the **Stormwater Management Manual for Western Washington** and normal standards of engineering practice. I hereby acknowledge and agree that the jurisdiction does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities designed by me."

Project Engineer's Stamp

SECTION 1 – PROJECT OVERVIEW

Permit Requested:	Drainage and Grading
Other Permits Required:	Building Permit Grading/Earthwork Permit
Agency Permit No.:	Pending
Site Address:	68 W 13th Street Chehalis, WA 98532
Total Site Area:	0.66 Acres
Zoning:	C-O – Commercial Office Mixed Use
WaterShed:	WRIA 23 – Upper Chehalis https://waecy.maps.arcgis.com/apps/webappviewer/index.html?id=996e6b21ae394cc3a3b63c6da0c3aa0a

Project Overall Description

The proposal is to develop the 0.66 acre parcel to include a new 3-story mixed use building consisting of general commercial and residential uses. The project also consists of constructing parking and stormwater facilities.

Proposed Flow Control Improvements

The flow control facilities proposed for this project were designed and modeled using the latest edition of the Western Washington Hydrology Manual Continuous Simulation Program. The site will utilize underground detention for the developments Threshold Discharge Areas (TDA).

Proposed Water Quality Improvements

The water quality improvements for the project site runoff consists of a manufactured treatment device for the developments Threshold Discharge Areas (TDA).

Proposed Conveyance System

The proposed conveyance systems will consist of concrete catch basins and PVC pipe in various sizes to collect and convey stormwater to the proposed water quality and flow control ponds. Roof runoff will be tightlined to nearby catch basins for discharge to the stormwater ponds. The proposed conveyance system will be sized to accommodate a minimum of the 25-year storm event.

Proposed Discharge Location

The project site will discharge runoff from the developed areas to the existing drainage system withing SW 13th Street.

Downstream Condition

The natural drainage leaving the site enters the existing drainage system within 13th street.

Onsite Soils and Geology

An onsite soils report will be completed for this project site. A copy of that report will be included in Appendix 3 of this report.

NRCS Soil Survey

RBE staff reviewed the onsite soils information provided by NRCS. Appendix 3 includes copies of the site map and soil descriptions that make up the property geology. In addition to the NRCS information,

Hydrologic Soil Group:	Lacamas Silt Loam – Class C/D Soil
	Scamman Silty Clay Loam – Class C/D Soil

Project Topography

Based on the site topography, the project site is flat.

Land Use and Ground Cover

The existing land use consists of an existing dentist facility and parking, as well as an existing single family residence.

Natural Drainage Patterns

The site does not have any natural drainage patterns.

Tributary and Discharge Points of Flow

The site does not have tributary flow.

Historical Drainage Problems

There are no known drainage problems associated with the project site.

Existing Utilities (Storm, Sewer, Water)

The existing utilities available to the site include sanitary sewer, water, gas, power and phone services.

Erosion Potential

The site has a **medium** erosion potential based on the NRCS Soil Survey. As part of the development plans a detailed Erosion Control Plan and Storm Water Pollution Prevention Plan will be prepared for use during site construction to minimize erosion and migration of sediment within and off the site. A NPDES Stormwater Construction Permit **is not** required by WSDOE for this project.

Critical Areas Onsite

The site **is not** located within any critical areas. However, white oaks have been identified onsite and require a habitat study. That study has been conducted and is included in Appendix 3 of this report.

Existing Fuel Storage Tanks

Review of the onsite parcels resulted in no evidence of existing fuel storage tanks above or below ground for this property.

Groundwater Wells

The property does not include any onsite ground water wells.

Septic Systems

No existing onsite septic system have been identified on the site.

Aquifer Recharge Area

The site **is not** located in an aquifer recharge area.

Wellhead Protection Area

The site **is not** within any wellhead protection areas.

100-Year Flood Plain

The site **is not** within any flood plains.

Section 2 – APPLICABLE MINIMUM REQUIREMENTS

Manual Exemptions

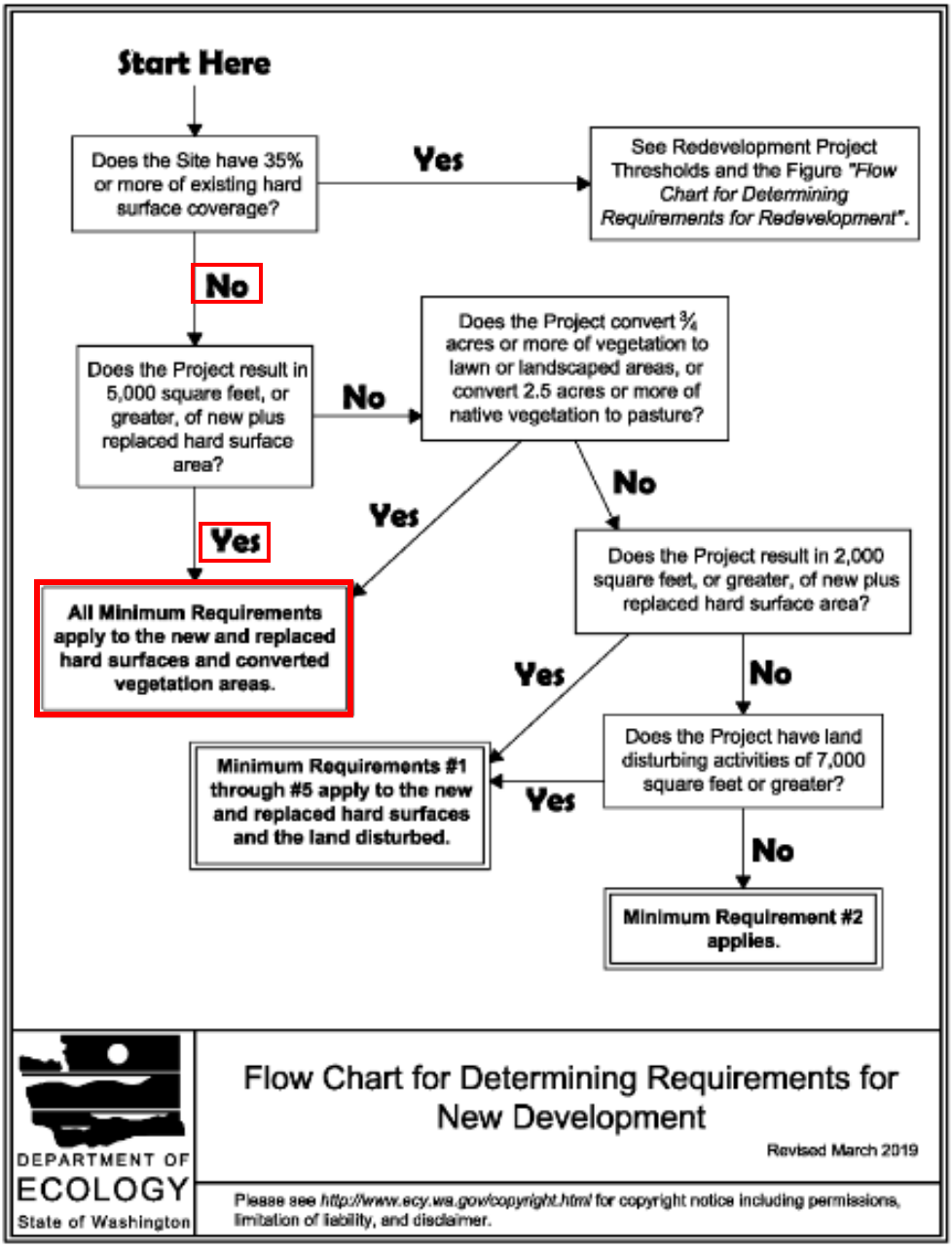
Exemptions	Applicable to Project
Forest Practices (Title 222 WAC)	No
Commercial Agriculture	No
Oil & Gas Field Activities or Operations	No
Pavement Maintenance	No
Underground Utility Projects	No

New Development and Re-Development Review

The minimum requirements for stormwater development and redevelopment sites are listed in Volume I of the 2019 SMMWW. Not all minimum requirements of this section apply to all projects. Determination of applicable minimum requirements is also based in part on Section 1-3 of the Manual. See detailed area calculations in Section 5 of this report.

Applicable Criteria	Areas
Total Site Area	0.66 AC
Existing Site Impervious Coverage	0.16 AC
New Plus Replaced Impervious Surface	0.30 AC
Vegetation Area Converted to Lawn or Landscaped Area	0.25 AC
Land Disturbing Area	0.25 AC
Percent of Existing Impervious Surface	24 %

Figure I-3.1: Flow Chart for Determining Requirements for New Development



Section 2.1 – Minimum Requirements

Based on the thresholds given in Figures 1-3.1 and/or 1-3.2 of Volume I of the Manual, the proposed project must address or comment on **Minimum Requirements #1 through #9**. These requirements as they apply to the project are discussed in more detail below.

Minimum Requirement (MR) #1 – Stormwater Site Plans:

> All projects meeting the thresholds in I-3.3 Applicability of the Minimum Requirements shall prepare a Stormwater Site Plan for local government review. Stormwater Site Plans shall use site-appropriate development principles, as required and encouraged by local development codes, to retain native vegetation and minimize impervious surfaces to the extent feasible. Stormwater Site Plans shall be prepared in accordance with III-3 Stormwater Site Plans

The proposed project will create over 5,000 square feet of new impervious surfacing, and therefore a Stormwater Site Plan complying with minimum requirements #1 through #9 is required.

MR #2 – Construction Storm Water Pollution Prevention Plan:

> All new development and redevelopment projects are responsible for preventing erosion and discharge of sediment and other pollutants into receiving waters.
>
> Projects which result in 2,000 square feet or more of new plus replaced hard surface area, or which disturb 7,000 square feet or more of land must prepare a Construction Stormwater Pollution Prevention Plan (SWPPP) as part of the Stormwater Site Plan (see I-3.4.1 MR1: Preparation of Stormwater Site Plans).
>
> Projects below those thresholds (listed above) are not required to prepare a Construction SWPPP, but must consider all of the Construction SWPPP Elements (listed below) and develop controls for all Construction SWPPP Elements that pertain to the project site.

The proposed project exceeds the thresholds of Section 2.5 and therefore a Construction Storm Water Pollution Prevention Plan is required for this project. The site **does not** disturb more than 1 acre of land and discharges to waters of the state. Therefore, a NPDES stormwater construction permit **is not** required. A SWPPP has been created as a standalone document for this project and included in Appendix 5 of this TIR.

MR #3 – Source Control of Pollution:

> All known, available and reasonable Source Control BMPs must be applied to all projects. Source Control BMPs must be selected, designed, and maintained in accordance with this Manual.

All known, available and reasonable source control BMPs shall be applied to the project to limit pollutants coming in contact with stormwater. The Source Control BMPs for this project will be incorporated into the project's Final Operation and Maintenance Plan.

MR #4 – Preservation of Natural Drainage Systems/Outfalls:

Natural drainage patterns shall be maintained, and discharges from the Project Site shall occur at the natural location, to the maximum extent practicable. The manner by which runoff is discharged from the Project site must not cause a significant adverse impact to downstream receiving waters and downgradient properties. All outfalls require energy dissipation.

Proposed stormwater discharges from the project site shall be treated and detained and then released to the original natural drainage location. The natural site drainage outfall will be maintained but will have a reduced flow due to the onsite drainage design facility.

MR #5 – On-Site Stormwater Management:

Projects shall employ Stormwater Management BMPs in accordance with the following thresholds, standards, and lists to infiltrate, disperse, and retain stormwater runoff on site to the extent feasible without causing flooding or erosion impacts.

All projects that require Minimum Requirement #5 (as detailed in I-3.3 Applicability of the Minimum Requirements) must employ Stormwater Management BMPs as detailed below. The compliance options for the project depend on the amount of improvements proposed, the locationof the project, the size of the parcel the project is on, and whether or not the project is Flow Control exempt.

Note that the site may contain multiple parcels. The designer may choose different compliance methods for different parcels, depending on the proposed design and the options for each parcel as detailed below.

Projects that Trigger Only Minimum Requirements #1 - #5
Projects that are not Flow Control exempt that trigger only Minimum Requirements #1 through #5 (per I-3.3 Applicability of the Minimum Requirements) shall either:

Use the LID BMPs from List #1 for all surfaces within each type of surface in List #1; or
Use any Flow Control BMP(s) desired to achieve the LID Performance Standard, and apply BM P T5.13: Post-Construction Soil Quality and Depth.

Projects that Trigger Minimum Requirements #1 - #9
Projects that are not Flow Control exempt that trigger Minimum Requirements #1 through #9 (per I-3.3 Applicability of the Minimum Requirements) have the compliance options shown in Table I-3.1: Minimum Requirement #5 Compliance Options for Projects Triggering Minimum Requirements #1 - #9.

Projects triggering Minimum Requirements #1 through #9, must meet the requirements in Table I-3.1.

Table I-3.1: Minimum Requirement #5 Compliance Options for Projects Triggering Minimum Requirements #1 - #9

Project Location and Parcel Size	Minimum Requirement #5 Compliance Options
Projects inside the UGA, on any size parcel	• Use the LID BMPs from List #2 for all surfaces within each type of surface in List #2; or • Use any Flow Control BMPs desired to achieve the LID Performance Standard, and apply BMP T5.13: Post-Construction Soil Quality and Depth.
Projects outside the UGA, on a parcel smaller than 5 acres	
Projects outside the UGA, on a parcel 5 acres or larger	Use any Flow Control BMPs desired to achieve the LID Performance Standard, and apply BMP T5.13: Post-Construction Soil Quality and Depth.
Note: This text refers to the Urban Growth Area (UGA) as designated under the Growth Management Act (GMA) (Chapter 36.70A RCW) of the State of Washington. If the project is located in a county that is not subject to planning under the GMA, the city limits shall be used instead.	

Flow Control Exempt Projects

Projects qualifying as Flow Control exempt in accordance with the TDA Exemption in I-3.4.7 MR7: Flow Control shall either:

- Use the LID BMPs from List #3 for all surfaces within each type of surface in List #3;

  or

- Use any Flow Control BMP(s) desired to achieve the LID Performance Standard, and apply BMP T5.13: Post-Construction Soil Quality and Depth.

If the project has multiple TDAs, all TDAs must be Flow Control exempt per the TDA Exemption in I-3.4.7 MR7: Flow Control for the project to use the options listed here.

The text in this box originates from one or more of the following Permits:
Appendix 1 of the Phase I / Phase II Municipal Stormwater Permits
Construction Stormwater General Permit

Figure I-3.3: Flow Chart for Determining MR #5 Requirements

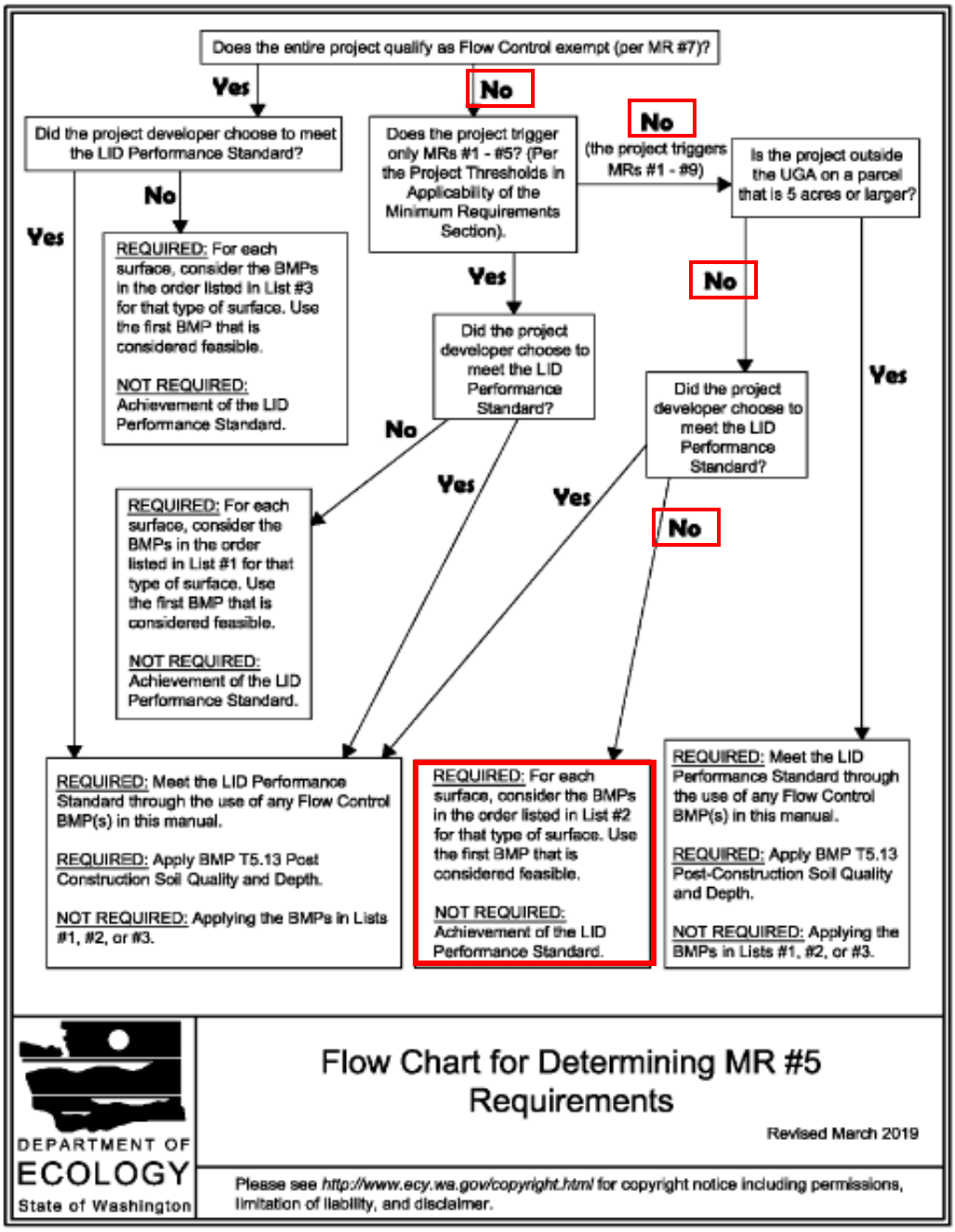


Table I-3.2: The List Approach for MR5 Compliance

List #1 (For MR #1 - #5 Projects That Are Not Flow Control Exempt)	List #2 (For MR #1 - #9 Projects That Are Not Flow Control Exempt)	List #3 (For Flow Control Exempt Projects)
Surface Type: Lawn and Landscaped Areas		
BMP T5.13: Post-Construction Soil Quality and Depth	BMP T5.13: Post-Construction Soil Quality and Depth	BMP T5.13: Post-Construction Soil Quality and Depth
Surface Type: Roofs		
1. BMP T5.30: Full Dispersion or BMP T5.10A: Downspout Full Infiltration	1. BMP T5.30: Full Dispersion or BMP T5.10A: Downspout Full Infiltration	1. BMP T5.10A: Downspout Full Infiltration
2. BMP T5.14: Rain Gardens or BMP T7.30: Bioretention	2. BMP T7.30: Bioretention	2. BMP T5.10B: Downspout Dispersion Systems
3. BMP T5.10B: Downspout Dispersion Systems	3. BMP T5.10B: Downspout Dispersion Systems	3. BMP T5.10C: Perforated Stub-out Connections
4. BMP T5.10C: Perforated Stub-out Connections	4. BMP T5.10C: Perforated Stub-out Connections	
Surface Type: Other Hard Surfaces		
1. BMP T5.30: Full Dispersion	1. BMP T5.30: Full Dispersion	BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion
2. BMP T5.15: Permeable Pavements or BMP T5.14: Rain Gardens or BMP T7.30: Bioretention	2. BMP T5.15: Permeable Pavements	
3. BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion	3. BMP T7.30: Bioretention	
	4. BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion	

Table I-3.2: The List Approach for MR5 Compliance (continued)

List #1 (For MR #1 - #5 Projects That Are Not Flow Control Exempt)	List #2 (For MR #1 - #9 Projects That Are Not Flow Control Exempt)	List #3 (For Flow Control Exempt Projects)
ing to it. 2. When the designer encounters BMP T5.15: Permeable Pavements in the List Approach, it is not a requirement to pave these surfaces. Where pavement is proposed, it must be permeable to the extent feasible unless BMP T5.30: Full Dispersion is employed.		

Low Impact Development Performance Standard:

The project **has not** chosen to utilize the LID performance standards for this project. The project will match the pre-developed durations for 50% of the 2-year peak flow up to the full 50-year flow. See MR# 6 and 7 for BMP's utilized for treatment and flow control.

List #2: Onsite Stormwater Management BMPs for Projects Triggering Minimum Requirements #1 through #9

Lawn and landscape Runoff:

Post construction soil quality BMP T5.13 will be used for disturbed landscape areas.

Roof Runoff:

Where roof downspout controls are planned, the following types must be considered in descending order of preference.

1) **Full Dispersion in accordance with BMP T5.30 in Chapter 5 of Volume V, or Downspout Full Infiltration Systems in accordance with BMP T5.10A in Section 3.1.1 in Chapter 3 of Volume III**

   Full Dispersion per BMP T5.30 is not feasible due to limited site area.

   Full Infiltration per BMP T5.10A is not feasible due to poorly drained soils.

2) **Bio-retention (See Chapter 7 of Volume V) facilities that have a minimum horizontally projected surface area below the overflow which is at least 5% of the total surface are drainage to it.**

   A Bio-Retention BMP is not feasible due to limited site area and poorly drained soils.

3) **Downspout Dispersion Systems in accordance with BMP T5.10B in Section 3.1.2 in Chapter 3 of Volume III**

   Downspout dispersion is not feasible due to limited site area.

4) **Perforated Stub-out Connections in accordance with BMP T5.10C in Section 3.1.3 in Chapter 3 of Volume III**

   Roof runoff will be connected to nearby catch basins and be conveyed to the new stormwater facility.

Other Hard Surfaces:

1) **Full Dispersion in accordance with BMP T5.30 in Chapter 5 of Volume V.**

   Full Dispersion per BMP T5.30 is not feasible due to limited site area.

2) **Permeable pavement in accordance with BMP T5.15 in chapter 5 of Volume V.**

   Permeable pavement per BMP T5.15 is not feasible due to poorly drained soils and an underdrain would be required.

3) **Bioretention BMP's (See chapter 7, Volume V of the SMMWW) that have a minimum horizontally projected surface area below the overflow which is at least 5% of the total surface area draining to it.**

   A bio-retention facility is not feasible due to limited site area and poorly drained soils.

4) **Sheet Flow Dispersion in accordance with BMP T5.12, or Concentrated Flow Dispersion in accordance with BMP T5.11 in Chapter 6 of Volume V.**

   A dispersion BMP is not feasible due to limited site area.

   Runoff from hard surfaces will be collected in catch basins and conveyed to the treatment facility before being conveyed to the underground detention system and discharged into the public stormwater conveyance system.

MR #6 – Runoff Treatment:

Projects shall employ Runoff Treatment BMPs in accordance with the following thresholds, standards, and requirements to remove pollutants from stormwater runoff.

The following require construction of stormwater treatment facilities:

1) **Projects in which the total of, pollution-generating hard surface (PGHS) is 5,000 square feet or more in a threshold discharge area of the project, or**

   The proposed project **will** develop more than 5,000 square feet of openly exposed pollution generating impervious surface and therefore meets the threshold requirements of this section. See Chapter 5.2 for selected water quality treatment method.

Determine the Receiving Waters/Pollutants of Concern Based on Offsite Analyses

Pollutants of Concern

Step 2: Oil Control Facility

This project will require oil control facility based on the analysis below.

Oil Control Determination Chart	
ADT 100 Vehicles or Greater per 1000 SF Building Area	**No**
Site Subject to Petroleum Storage or Transfer Greater than 1500 Gallons per year.	**No**
Site have Parking, Storage or maintenance of 25 or more vehicles over 25 Tons gross weight. (Trucks, Buses, Trains, Heavy Equipment)	**No**
Road Intersection with measured ADT of 25000 vehicles or more on main roadway and 15000 vehicles or more on intersection roadway.	**No**

Step 3: Is Infiltration Practicable for pollutant removal?

No

Step 4: Phosphorus Control Required

Determination Chart	
Local Government Require Phosphorus control	**No**

Step 5: Enhanced Treatment Required

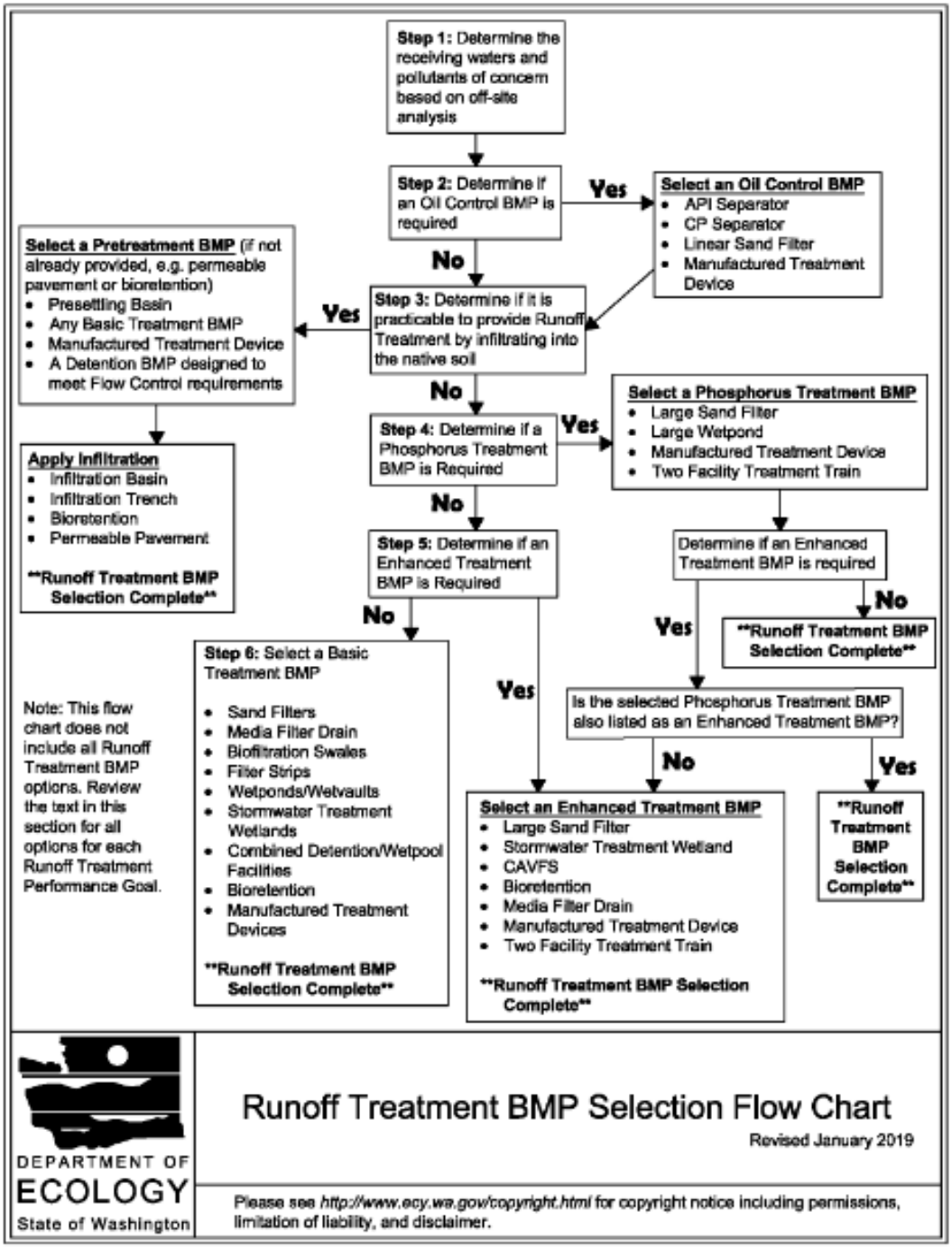
Determination Chart	
Site discharge directly to fresh waters or conveyance systems tributary to fresh waters?	**No**
Site uses infiltration strictly for flow control and the discharge is within 1.4 mile of fresh water designate for aquatic life?	**No**
Site an industrial project site?	**No**

Site a commercial project site?	**Yes**
Site a multi-family residential project site	**Yes**
UGA – Fully controlled and partially controlled limited access highways with AADT 15000 or greater	No
UGA - All other roads with and AADT of 7500 or greater.	No
Outside UGA - Roads with and AADT of 15,000 or greater unless discharging to a Strahler order Stream or large	No
Outside UGA - Road with an AADT of 30,000 or greater if discharging to a 4th Strahler order stream or larger.	No

Step 6: Select Basic/Enhanced Treatment Facility

Based on the above determinations, the treatment BMP's selected for this project were determined from figure III-1.1 on the following page.

Figure III-1.1: Runoff Treatment BMP Selection Flow Chart



Water Quality BMP's

The drainage basins delineated for this project will have openly exposed pollution generating hard surfaces. These tributary areas will be treated using the BMP technologies identified on Figure III-1.1: Runoff Treatment BMP Selection Flow Chart located on the previous page. A summary of the selected BMP's per the associated TDA is listed below.

Basin ID / TDA	BMP Used	Treatment Level
D1/TDA1	Manufactured Treatment Device	Basic

Underground Injection Control (UIC) Program

Depending on the type and size of the proposed project, different combinations of the Minimum Requirements or UIC Program regulations apply. Information on the UIC program regulations can be found at Section I-4 UIC of the Manual.

Project UIC Compliance:

This project does not use infiltration for stormwater control.

MR #7 – Flow Control:

Projects shall employ Flow Control BMPs in accordance with the following thresholds, stand ards, and requirements to reduce the impacts of stormwater runoff from hard surfaces and land cover conversions.

Flow Control is not required for TDAs that discharge directly to, or indirectly through an MS4 to a water listed in Appendix I-A of the WSDOE
Manual: Flow Control Exempt Receiving Waters, subject to all of the fol-lowing restrictions.

TDA Threshold

When assessing a TDA against the following thresholds, only consider the types of surfaces (e.g. new hard surfaces, replaced hard surfaces, converted vegetation areas) that are subject to Minimum Requirement #7, per the Project Thresholds in I-3.3 Applicability of the Minimum Requirements.

The following circumstances require achievement of the standard flow control requirement for western Washington:

Projects in which the total of effective impervious surfaces is10,000 square feet or more in a threshold discharge area, or

This project **does** create more than 10,000 square feet of effective impervious surface in its threshold discharge area.

Those impervious surfaces that are connected via sheet flow or discrete conveyance to a drain-age system. Impervious surfaces are considered ineffective if:

1. The runoff is dispersed through at least one hundred feet of native vegetation in accordance with BMP T5.30: Full Dispersion;

2. Residential roof runoff is infiltrated in accordance with BMP T5.10A: Downspout Full Infiltration; or

3. Approved continuous runoff modeling methods indicate that the entire runoff file is infiltrated

Basin ID / TDA	BMP Used	Effective Impervious Surface Area
D1/TDA1	Underground Detention	13,000 sf

Standard Flow Control Requirement
The project **will** provide flow control as outlined in Section 5.1 of this report.

MR #8 – Wetlands Protection:

Projects shall employ Stormwater Management BMPs in accordance with the following thresholds, standards, and requirements to reduce the impacts of stormwater runoff to wetlands.

There are no wetlands within the proposed project limits.

MR #9 – Operation & Maintenance:

An operation and maintenance manual that is consistent with the provisions in Volume V shall be provided for proposed Runoff Treatment and Flow Control BMPs. The party (or parties) responsible for maintenance and operation shall be identified in the operation and maintenance manual. At private facilities, a copy of the operation and maintenance manual shall be retained.

A Stormwater Maintenance Agreement and Operation and Maintenance Manual is included in Appendix 4 of this TIR.

Section 2.2 - Additional Protective Measures (APM)

Facility agreements and financial guarantees when required will be reviewed by the applicant and executed at the appropriate time determined by the reviewing agency.

APM1 - Financial Liability

Performance Bonding for this project's stormwater facility improvements will be provided if required by the jurisdiction.

APM2 – Offsite Analysis and Mitigation

The initial qualitative analysis shall extend along the flow path from the project site to the receiving water, for a distance up to one mile. If the receiving water is within one-quarter mile from the project site, the analysis shall extend within the receiving water to one-quarter mile from the project site. The analysis shall extend one-quarter mile beyond any improvements proposed as mitigation. The analysis must extend upstream form the project site to a point where there are no backwater effects created by the project, and the designer can determine all areas contributing run-on to the project. Impacts to be evaluated should include:

1. Conveyance System Capacity Problems

2. Localized Flooding

3. Erosion, including landslide hazards and erosion along streambanks and at the outfall location

4. Violations of surface water quality standards as identified in the Basin Plan or a TMDL, or violations of ground water quality standards in a wellhead protection area.

The objective of the off-site analysis report is to identify, evaluate, and determine measures to prevent off-site water quality, erosion, slope stability, and drainage impacts that may be caused or aggravated by the proposed project. "Aggravated" shall mean increasing the frequency of occurrence and /or severity of a problem.

Qualitative Analysis

The current runoff from the roof and parking lot surfaces gets collected in catch basins and is conveyed to the existing storm system within SW 13th Street. Runoff from the new development will be collected and detained before being released into the street storm system at a rate less than the pre-developed condition.

Mitigation Measures

The offsite analysis for this project **did not** yield any mitigation for this project.

Section 2.3 – Adjustments and Exceptions/Variances to the MRs

Adjustments to the Minimum Requirements may be granted prior to permit approval and construction. The jurisdiction may grant an adjustment provided that written findings of fact are prepared that address the following:

1. The adjustment provides substantially equivalent environmental protection and

2. Based on sound Engineering practices, the objectives of safety, function, environmental protection, and facility maintenance are met.

Adjustments:

No adjustments have been requested for this project.

Exceptions and Variances:

No exceptions or variances have been requested for this project.

SECTION 3 – SOURCE CONTROL BMPS

The following permanent source control BMPs that apply to all sites:

IV – 1 Source Control BMPs Applicable to All Sites:

S410 BMPs for Correcting Illicit Discharges to Storm Drains.
S453 BMPs for Formation of a Pollution Prevention Team.
S545 BMPs for Preventive Maintenance / Good Housekeeping.
S455 BMPs for Spill Prevention and Cleanup.
S457 BMPs for Inspections.
S458 BMPs for Record Keeping – Vol. IV – Page 503.

The following permanent source control BMPs will be utilized for this project and will be included in the final Operation and Maintenance Manual submitted prior to final project acceptance by the Review Agency.

IV-3 – Roads, Ditches, and Parking Lot Source Control BMP's

S410 BMPs for Correcting Illicit Discharges to Storm Drains.
S416 BMPs for Maintenance of Roadside Ditches.
S417 BMPs for Maintenance of Stormwater Drainage and Treatment Systems.
S421 BMPs for Parking and Storage of Vehicles and Equipment.
S417 BMPs for Maintenance of Stormwater Drainage and Treatment Systems.

IV-4 – Soil Erosion, Sediment Control and Landscaping

S411 BMPs for Landscaping and Lawn/Vegetation Management.
S450 BMPs for Irrigation

SECTION 4 – SITE SUITABILITY CRITERIA (SSC)

This section outlines the criteria used to help select the stormwater type of flow control and treatment facility for this project. Based on our review of the criteria below we have selected the following type of facilities for this project.

Basin ID / TDA	Flow Control	Water Quality
D1/TDA1	Detain and Release	Filtration

Infiltration SSC Review if Applicable

Infiltration is not used for stormwater control, therefore no further investigation was required.

SECTION 5 – PERMANENT STORMWATER CONTROL PLAN

Existing Site Hydrology

Existing site hydrology is based on our site investigation, field topographic survey, aerial topographic mapping and completed soils review for the subject project. The site consists of the basins outlined below.

Pre-developed Basin (P#)

The existing site consists of landscape, roof, and parking areas associated with the existing dentist and residence.

Modeled Land Use: The existing model consists of the dentist roof area, and landscaping around the existing dental building. The remainder of the site was modeled as forest.

TDA No. 1 Basin ID	Land Use Assumptions and Site Parameters				
	Land Use Cover	Slope	Acres	Hydrologic Group	Comments
P1	Forested	Flat	0.36	SAT	
	Lawn	Flat	0.23	SAT	
	Roof	Flat	0.07		
	Total		0.66		

Developed Site Hydrology (D#)

The developed site consists of existing and new roof area, as well as new parking and landscaping.

Modeled Land Use: The developed site will be modeled to match the post-developed site coverage.

TDA No. 1 Basin ID	Land Use Assumptions and Site Parameters				
	Land Use Cover	Slope	Acres	Hydrologic Group	Comments
D1	Lawn	Flat	0.25	SAT	
	Roof	Flat	0.13		
	Parking	Flat	0.28		
Total Area			0.66		

Basin Maps

A basin map is included in Appendix 1 of this report.

SECTION 5.1 – FLOW CONTROL

Flow Control System Design & Analysis

The proposed stormwater facility was designed using the latest version of the WWHM stormwater model created for WSDOE. A copy of the WWHM Data Output Report is included in Appendix 2 of this TIR.

Flow Control for TDA No. 1

Basin D1 – Underground Detention System

WWHM was used to size an ADS StormTech system to act as an underground detention facility. Below is a summary of the results.

Chamber Model	Number of Chambers	Stone Above	Stone Below	Control Structure Type
SC-740	72	8 in	6 in	Multi Orifice

Outlet Control Structure Summary

Pond Stage Storage	Height (ft)	Orifice Diameter (in)
Overflow Riser	4 ft	24 in
Orifice 2	1.8 ft	1.2 in
Orifice 1	0 ft	0.84 in

A design summary of the detention facility is included in Appendix 2 of this report.

SECTION 5.2 – WATER QUALITY DESIGN

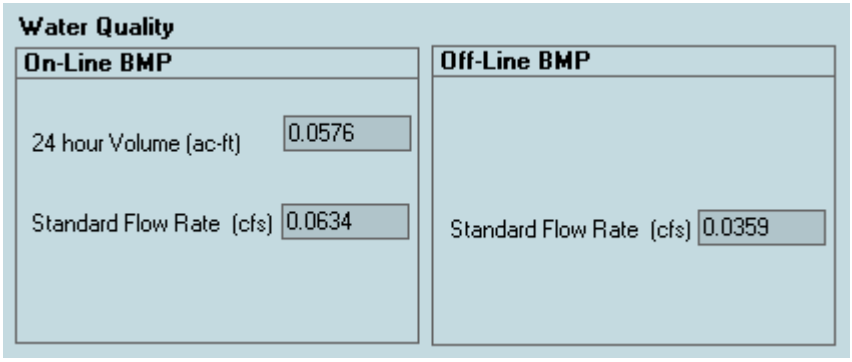
Water Quality System Design & Analysis

The drainage basins delineated for this project will have openly exposed pollution generating impervious surfaces. These tributary areas will be treated using the following treatment technologies listed under the associated drainage basins.

TDA No. 1

Basin D1 - Manufactured Treatment Device

RBE has selected this treatment method for water quality control for the new PGIS associated with the project. The WWHM model output the following requirement for water quality treatment.



A Contech Stormfilter was selected and designed to achieve these water quality requirements. The design sheet for the Stormfilter basin is included in Appendix 2 of this report.

PART 5.3 – CONVEYANCE SYSTEM DESIGN

Pipe Conveyance Design

All onsite storm conveyance systems will be sized to accommodate the 25-year storm flows. All proposed onsite storm drain pipe will vary from 8 to 24 inches in diameter and the minimum slope shall not be less than 0.3%. The minimum required pipe size at 0.3% slope to convey the 25-year event for the onsite developed area is 6-inch pipe per Field's Hydraulic Calculator.

WWHM Un-Mitigated Flow Rates for Basin D1

Listed below are the flow frequency date generated by WWHM for the developed basin D1.

Flow Frequency

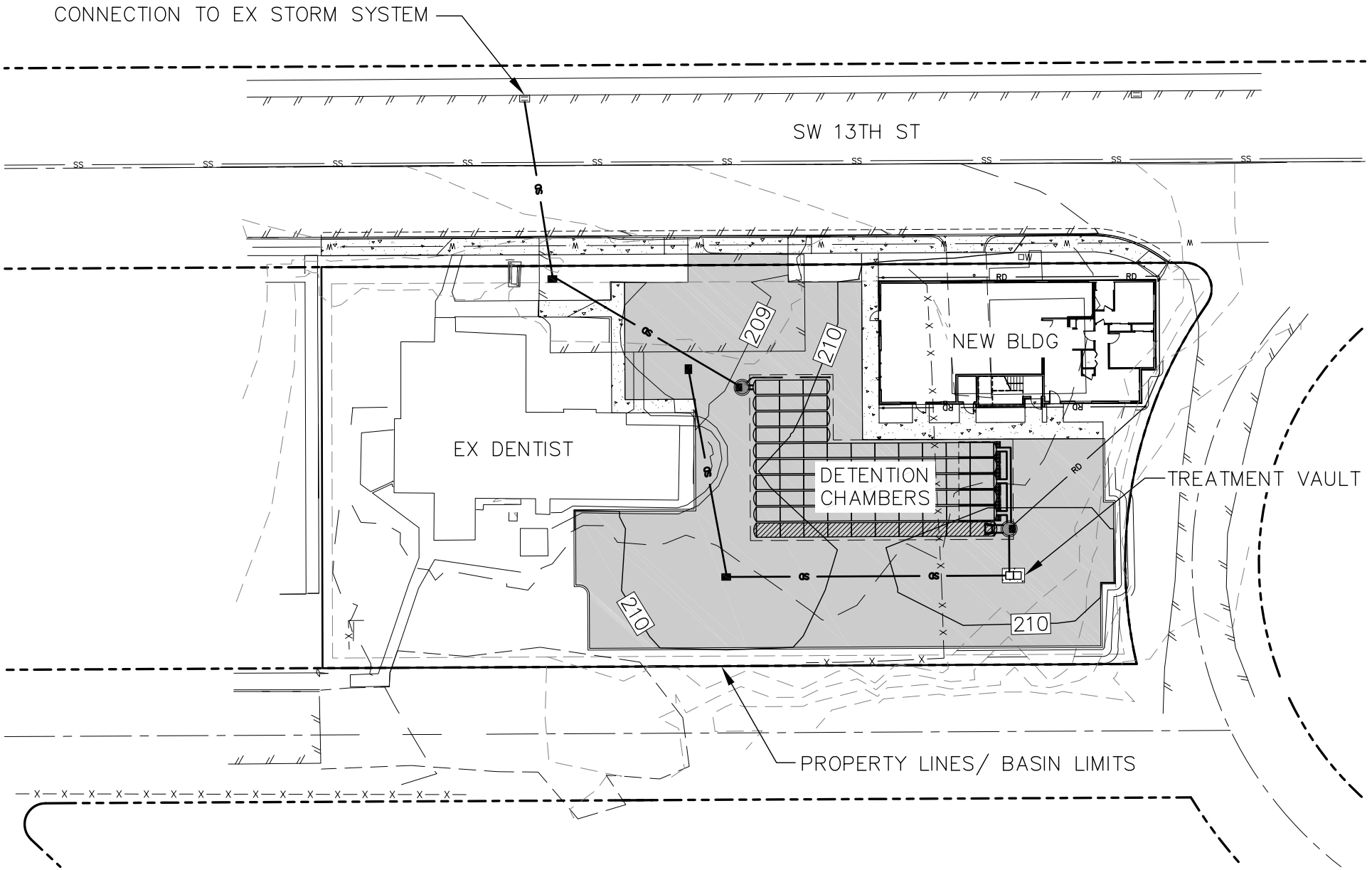
Flow(cfs)	501	701
2 Year =	0.0477	0.1444
5 Year =	0.0743	0.1838
10 Year =	0.0922	0.2091
25 Year =	0.1149	0.2405
50 Year =	0.1316	0.2635
100 Year =	0.1481	0.2863
200 Year =	0.1666	0.3110
500 Year =	0.1876	0.3379

501 – Predeveloped
701 – Unmitigated Post-Developed

APPENDIX 1 – MAP SUBMITTALS

TDA No. 1

Basin Map



RB Engineering
CIVIL ENGINEERING – LAND PLANNING – UTILITIES
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8919
FAX: (360) 740-8912

CHEHALIS VILLAGE SQUARE

BASIN MAP

JOB NUMBER 23051

DRAWING NAME 23051_BM

FIGURE 1

APPENDIX 2 – DRAINAGE DESIGN CALCULATIONS AND MODELING

TDA No. 1

Basin D1 WWHM Flow Control and Water Quality Modeling
ADS Stormtech Chambers
Contech Stormfilter

WWHM2012

PROJECT REPORT

General Model Information

WWHM2012 Project Name: 23051_WWHM

Site Name:	Cheahlis Village Square
Site Address:	13th Street
City:	Chehalis
Report Date:	2/28/2024
Gage:	Olympia
Data Start:	1955/10/01
Data End:	2008/09/30
Timestep:	15 Minute
Precip Scale:	0.800
Version Date:	2023/01/27
Version:	4.2.19

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
SAT, Forest, Flat	0.36
SAT, Lawn, Flat	0.23
Pervious Total	0.59

Impervious Land Use	acre
ROOF TOPS FLAT	0.07
Impervious Total	0.07
Basin Total	0.66

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
SAT, Lawn, Flat	0.25
Pervious Total	0.25

Impervious Land Use	acre
ROOF TOPS FLAT	0.13
PARKING FLAT	0.28
Impervious Total	0.41
Basin Total	0.66

Routing Elements
Predeveloped Routing

Mitigated Routing

StormTech 1

Chamber Model: 740
Dimensions
Max Row Length: 94
Number of Chambers: 72
Number of Endcaps: 12
Top Stone Depth: 8
Bottom Stone Depth: 6
Discharge Structure
Riser Height: 4 ft.
Riser Diameter: 24 in.
Orifice 1 Diameter: 0.840 in. Elevation:0 ft.
Orifice 2 Diameter: 1.200 in. Elevation:1.8 ft.
Element Flows To:
Outlet 1 Outlet 2

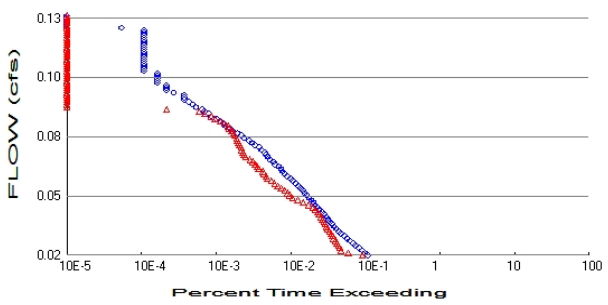
StormTech Hydraulic Table

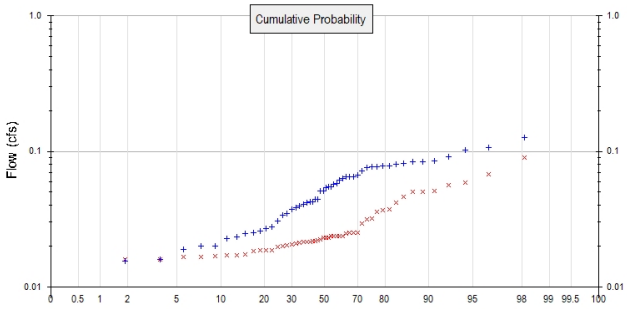
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.055	0.000	0.000	0.000
0.0833	0.055	0.001	0.005	0.000
0.1667	0.055	0.003	0.007	0.000
0.2500	0.055	0.005	0.009	0.000
0.3333	0.055	0.007	0.011	0.000
0.4167	0.055	0.009	0.012	0.000
0.5000	0.055	0.011	0.013	0.000
0.5833	0.055	0.015	0.014	0.000
0.6667	0.055	0.019	0.015	0.000
0.7500	0.055	0.023	0.016	0.000
0.8333	0.055	0.027	0.017	0.000
0.9167	0.055	0.031	0.018	0.000
1.0000	0.055	0.035	0.019	0.000
1.0833	0.055	0.039	0.019	0.000
1.1667	0.055	0.043	0.020	0.000
1.2500	0.055	0.046	0.021	0.000
1.3333	0.055	0.050	0.022	0.000
1.4167	0.055	0.054	0.022	0.000
1.5000	0.055	0.058	0.023	0.000
1.5833	0.055	0.062	0.024	0.000
1.6667	0.055	0.065	0.024	0.000
1.7500	0.055	0.069	0.025	0.000
1.8333	0.055	0.072	0.033	0.000
1.9167	0.055	0.076	0.039	0.000
2.0000	0.055	0.079	0.044	0.000
2.0833	0.055	0.083	0.048	0.000
2.1667	0.055	0.086	0.051	0.000
2.2500	0.055	0.089	0.054	0.000
2.3333	0.055	0.092	0.057	0.000
2.4167	0.055	0.095	0.060	0.000
2.5000	0.055	0.098	0.063	0.000
2.5833	0.055	0.101	0.065	0.000
2.6667	0.055	0.104	0.067	0.000
2.7500	0.055	0.106	0.069	0.000
2.8333	0.055	0.108	0.072	0.000

2.9167	0.055	0.110	0.074	0.000
3.0000	0.055	0.112	0.076	0.000
3.0833	0.055	0.114	0.077	0.000
3.1667	0.055	0.116	0.079	0.000
3.2500	0.055	0.118	0.081	0.000
3.3333	0.055	0.120	0.083	0.000
3.4167	0.055	0.122	0.085	0.000
3.5000	0.055	0.123	0.086	0.000
3.5833	0.055	0.125	0.088	0.000
3.6667	0.055	0.127	0.090	0.000

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.59
Total Impervious Area: 0.07

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.25
Total Impervious Area: 0.41

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.047708
5 year	0.074278
10 year	0.092216
25 year	0.114854
50 year	0.131561
100 year	0.148067

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.024454
5 year	0.035652
10 year	0.044692
25 year	0.05818
50 year	0.069876
100 year	0.083117

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1956	0.058	0.023
1957	0.072	0.046
1958	0.041	0.017
1959	0.023	0.021
1960	0.065	0.032
1961	0.054	0.022
1962	0.019	0.017
1963	0.085	0.037
1964	0.080	0.024
1965	0.084	0.020

1966	0.025	0.017
1967	0.051	0.024
1968	0.034	0.020
1969	0.026	0.017
1970	0.035	0.020
1971	0.044	0.025
1972	0.102	0.051
1973	0.027	0.021
1974	0.055	0.019
1975	0.039	0.018
1976	0.057	0.024
1977	0.037	0.016
1978	0.039	0.021
1979	0.077	0.021
1980	0.031	0.022
1981	0.078	0.024
1982	0.063	0.029
1983	0.042	0.025
1984	0.081	0.023
1985	0.020	0.019
1986	0.065	0.050
1987	0.127	0.042
1988	0.015	0.021
1989	0.023	0.021
1990	0.055	0.037
1991	0.078	0.068
1992	0.025	0.019
1993	0.016	0.017
1994	0.015	0.016
1995	0.043	0.024
1996	0.084	0.058
1997	0.065	0.023
1998	0.076	0.022
1999	0.062	0.025
2000	0.042	0.025
2001	0.020	0.016
2002	0.077	0.050
2003	0.028	0.017
2004	0.051	0.036
2005	0.044	0.022
2006	0.067	0.031
2007	0.091	0.057
2008	0.107	0.090

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.1273	0.0904
2	0.1073	0.0679
3	0.1021	0.0585
4	0.0909	0.0567
5	0.0852	0.0512
6	0.0843	0.0503
7	0.0836	0.0500
8	0.0810	0.0464
9	0.0805	0.0419
10	0.0783	0.0371
11	0.0782	0.0370

12	0.0771	0.0359
13	0.0771	0.0319
14	0.0763	0.0313
15	0.0716	0.0294
16	0.0665	0.0250
17	0.0650	0.0249
18	0.0647	0.0249
19	0.0645	0.0247
20	0.0632	0.0239
21	0.0615	0.0239
22	0.0583	0.0237
23	0.0575	0.0236
24	0.0551	0.0236
25	0.0549	0.0232
26	0.0540	0.0230
27	0.0510	0.0229
28	0.0508	0.0223
29	0.0442	0.0221
30	0.0441	0.0218
31	0.0426	0.0217
32	0.0424	0.0215
33	0.0416	0.0215
34	0.0409	0.0214
35	0.0394	0.0212
36	0.0385	0.0210
37	0.0371	0.0205
38	0.0347	0.0203
39	0.0339	0.0200
40	0.0308	0.0197
41	0.0276	0.0186
42	0.0268	0.0186
43	0.0260	0.0186
44	0.0249	0.0185
45	0.0248	0.0173
46	0.0235	0.0172
47	0.0228	0.0170
48	0.0199	0.0168
49	0.0199	0.0167
50	0.0189	0.0167
51	0.0158	0.0160
52	0.0155	0.0159
53	0.0153	0.0158

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0239	2000	1696	84	Pass
0.0249	1828	1096	59	Pass
0.0260	1671	882	52	Pass
0.0271	1516	838	55	Pass
0.0282	1367	809	59	Pass
0.0293	1264	774	61	Pass
0.0304	1156	740	64	Pass
0.0315	1055	701	66	Pass
0.0326	964	672	69	Pass
0.0336	884	647	73	Pass
0.0347	817	617	75	Pass
0.0358	761	587	77	Pass
0.0369	712	558	78	Pass
0.0380	664	537	80	Pass
0.0391	615	519	84	Pass
0.0402	585	495	84	Pass
0.0413	554	473	85	Pass
0.0423	526	448	85	Pass
0.0434	483	424	87	Pass
0.0445	446	395	88	Pass
0.0456	420	367	87	Pass
0.0467	395	322	81	Pass
0.0478	373	271	72	Pass
0.0489	350	231	66	Pass
0.0500	327	196	59	Pass
0.0511	306	180	58	Pass
0.0521	286	167	58	Pass
0.0532	270	154	57	Pass
0.0543	250	137	54	Pass
0.0554	234	124	52	Pass
0.0565	215	113	52	Pass
0.0576	199	102	51	Pass
0.0587	183	90	49	Pass
0.0598	166	87	52	Pass
0.0608	153	82	53	Pass
0.0619	145	79	54	Pass
0.0630	138	69	50	Pass
0.0641	129	66	51	Pass
0.0652	115	62	53	Pass
0.0663	109	58	53	Pass
0.0674	98	53	54	Pass
0.0685	91	46	50	Pass
0.0695	87	44	50	Pass
0.0706	83	42	50	Pass
0.0717	76	41	53	Pass
0.0728	71	40	56	Pass
0.0739	61	38	62	Pass
0.0750	56	37	66	Pass
0.0761	51	36	70	Pass
0.0772	44	35	79	Pass
0.0783	40	33	82	Pass
0.0793	36	32	88	Pass
0.0804	31	30	96	Pass

0.0815	28	28	100	Pass
0.0826	25	27	108	Pass
0.0837	23	24	104	Pass
0.0848	21	21	100	Pass
0.0859	19	18	94	Pass
0.0870	16	16	100	Pass
0.0880	15	13	86	Pass
0.0891	13	11	84	Pass
0.0902	12	4	33	Pass
0.0913	10	0	0	Pass
0.0924	9	0	0	Pass
0.0935	8	0	0	Pass
0.0946	7	0	0	Pass
0.0957	7	0	0	Pass
0.0967	7	0	0	Pass
0.0978	5	0	0	Pass
0.0989	4	0	0	Pass
0.1000	4	0	0	Pass
0.1011	4	0	0	Pass
0.1022	3	0	0	Pass
0.1033	3	0	0	Pass
0.1044	3	0	0	Pass
0.1055	3	0	0	Pass
0.1065	3	0	0	Pass
0.1076	2	0	0	Pass
0.1087	2	0	0	Pass
0.1098	2	0	0	Pass
0.1109	2	0	0	Pass
0.1120	2	0	0	Pass
0.1131	2	0	0	Pass
0.1142	2	0	0	Pass
0.1152	2	0	0	Pass
0.1163	2	0	0	Pass
0.1174	2	0	0	Pass
0.1185	2	0	0	Pass
0.1196	2	0	0	Pass
0.1207	2	0	0	Pass
0.1218	2	0	0	Pass
0.1229	2	0	0	Pass
0.1239	2	0	0	Pass
0.1250	2	0	0	Pass
0.1261	2	0	0	Pass
0.1272	1	0	0	Pass
0.1283	0	0	0	Pass
0.1294	0	0	0	Pass
0.1305	0	0	0	Pass
0.1316	0	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.0576 acre-feet
On-line facility target flow:	0.0634 cfs.
Adjusted for 15 min:	0.0634 cfs.
Off-line facility target flow:	0.0359 cfs.
Adjusted for 15 min:	0.0359 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
StormTech 1 POC	☐	58.82			☐	0.00			
Total Volume Infiltrated		58.82	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Failed

Model Default Modifications

Total of 0 changes have been made.

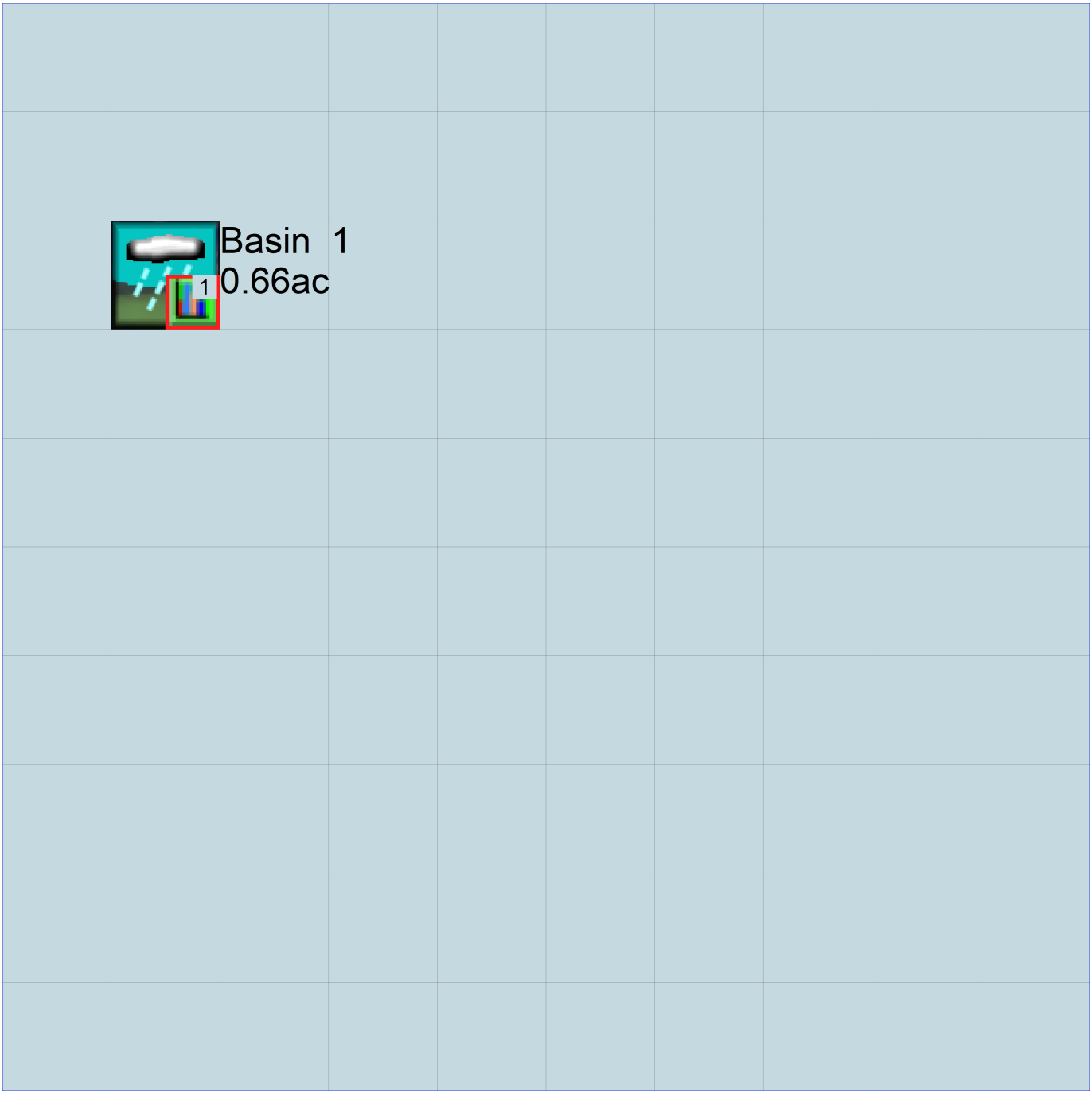
PERLND Changes

No PERLND changes have been made.

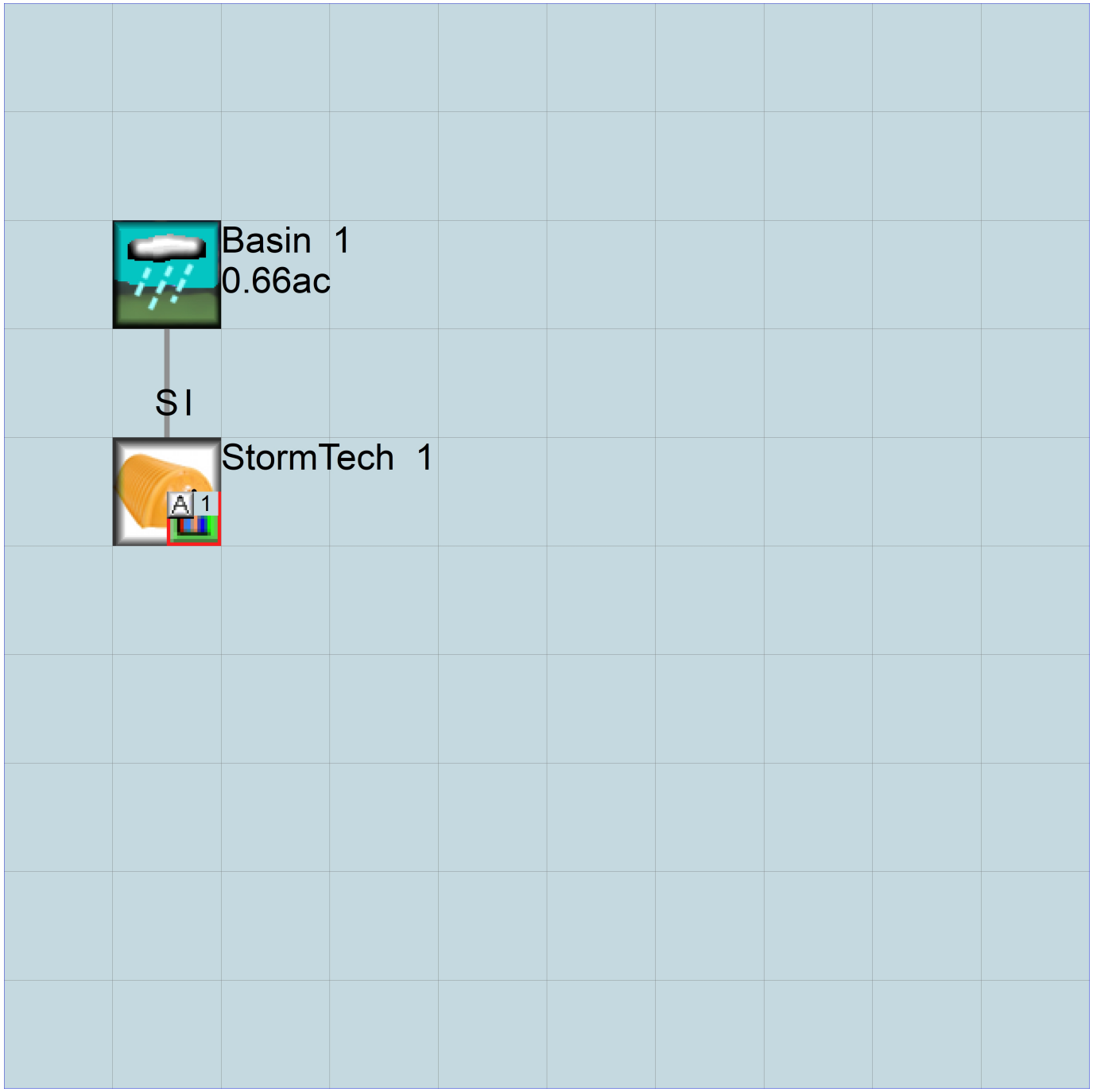
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1955 10 01        END    2008 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                             ***
WDM         26   23051_WWHM.wdm
MESSU       25   Pre23051_WWHM.MES
            27   Pre23051_WWHM.L61
            28   Pre23051_WWHM.L62
            30   POC23051_WWHM1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      19
      PERLND      25
      IMPLND       4
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                   MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                        in  out           ***
   19     SAT, Forest, Flat       1    1    1    1   27    0
   25     SAT, Lawn, Flat         1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   19         0    0    1    0    0    0    0    0    0    0    0    0
   25         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
```

```
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   19         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   25         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   19         0    0    0    0    0    0    0    0    0    0    0
   25         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   19              0         4         2       100     0.001       0.5     0.996
   25              0         4         1       100     0.001       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   19              0         0        10         2         0         0       0.7
   25              0         0        10         2         0         0      0.35
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   19            0.2         3       0.5         1       0.7       0.8
   25            0.1         3       0.5         1       0.7       0.4
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   19              0         0         0         0       4.2         1         0
   25              0         0         0         0       4.2         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    4      ROOF TOPS/FLAT         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    4         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    4         0    0    4    0    0    4    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    4         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
```

```
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    4            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    4              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    4              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  19                        0.36     COPY   501     12
PERLND  19                        0.36     COPY   501     13
PERLND  25                        0.23     COPY   501     12
PERLND  25                        0.23     COPY   501     13
IMPLND   4                        0.07     COPY   501     15

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                      in  out                               ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                 ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *      *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
```

```
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                          ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    0.8            PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.8            IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1955 10 01        END    2008 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   23051_WWHM.wdm
MESSU       25   Mit23051_WWHM.MES
            27   Mit23051_WWHM.L61
            28   Mit23051_WWHM.L62
            30   POC23051_WWHM1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      25
      IMPLND       4
      IMPLND      11
      RCHRES       1
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        StormTech  1               MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   25     SAT, Lawn, Flat         1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   25         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
```

```
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   25         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   25         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   25             0         4         1       100     0.001       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   25             0         0        10         2         0         0      0.35
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   25           0.1         3       0.5         1       0.7       0.4
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
             ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   25             0         0         0         0       4.2         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    4      ROOF TOPS/FLAT         1    1    1   27    0
   11      PARKING/FLAT           1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    4         0    0    1    0    0    0
   11         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    4         0    0    4    0    0    4    1    9
   11         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    4         0    0    0    0    0
   11         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
```

```
    4            400      0.01       0.1       0.1
   11            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    4              0         0
   11              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    4              0         0
   11              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  25                        0.25     RCHRES   1      2
PERLND  25                        0.25     RCHRES   1      3
IMPLND   4                        0.13     RCHRES   1      5
IMPLND  11                        0.28     RCHRES   1      5

******Routing******
PERLND  25                        0.25     COPY     1     12
IMPLND   4                        0.13     COPY     1     15
IMPLND  11                        0.28     COPY     1     15
PERLND  25                        0.25     COPY     1     13
RCHRES   1                           1     COPY   501     16
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                       in  out                              ***
    1     StormTech  1            1    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
```

```
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *      *  *  *  *  *         ***
    1       0  1  0  0    4  0  0  0  0       0  0  0  0  0         2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1              1      0.02       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
         *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1           0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   44    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.055875  0.000000  0.000000
  0.083333  0.055875  0.001865  0.005527
  0.166667  0.055875  0.003730  0.007817
  0.250000  0.055875  0.005602  0.009574
  0.333333  0.055875  0.007466  0.011055
  0.416667  0.055875  0.009334  0.012360
  0.500000  0.055875  0.011201  0.013539
  0.583333  0.055875  0.015255  0.014624
  0.666667  0.055875  0.019296  0.015634
  0.750000  0.055875  0.023317  0.016582
  0.833333  0.055875  0.027316  0.017479
  0.916667  0.055875  0.031292  0.018333
  1.000000  0.055875  0.035242  0.019148
  1.083333  0.055875  0.039163  0.019930
  1.166667  0.055875  0.043053  0.020682
  1.250000  0.055875  0.046909  0.021408
  1.333333  0.055875  0.050730  0.022110
  1.416667  0.055875  0.054511  0.022790
  1.500000  0.055875  0.058251  0.023451
  1.583333  0.055875  0.061953  0.024094
  1.666667  0.055875  0.065603  0.024720
  1.750000  0.055875  0.069204  0.025330
  1.833333  0.055875  0.072752  0.033061
  1.916667  0.055875  0.076243  0.039856
  2.000000  0.055875  0.079675  0.044555
  2.083333  0.055875  0.083050  0.048438
  2.166667  0.055875  0.086354  0.051847
  2.250000  0.055875  0.089561  0.054935
  2.333333  0.055875  0.092678  0.057786
  2.416667  0.055875  0.095711  0.060453
  2.500000  0.055875  0.098640  0.062969
  2.583333  0.055875  0.101445  0.065361
  2.666667  0.055875  0.104102  0.067647
  2.750000  0.055875  0.106564  0.069840
  2.833333  0.055875  0.108706  0.071953
  2.916667  0.055875  0.110730  0.073995
  3.000000  0.055875  0.112647  0.075972
  3.083333  0.055875  0.114512  0.077890
  3.166667  0.055875  0.116377  0.079756
  3.250000  0.055875  0.118249  0.081574
  3.333333  0.055875  0.120113  0.083347
  3.416667  0.055875  0.121981  0.085079
```

```
  3.500000  0.055875  0.123848  0.086772
  3.583333  0.055875  0.125716  0.088430
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    0.8            PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.8            IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   1 HYDR   RO     1 1        1      WDM   1002 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1003 STAG     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK   16


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

```
ERROR/WARNING ID:   341   6

DATE/TIME: 2007/12/ 3 12: 0

RCHRES:     1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB().  To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows.  This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS         V1         V2        VOL
44 5394.8     5476.2     5507.4
```

```
ERROR/WARNING ID:   341   5

DATE/TIME: 2007/12/ 3 12: 0

RCHRES:     1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

A          B          C      RDEP1      RDEP2  COUNT
0.0000E+00 4867.8     -6.734E+03    1.3834  1.3834E+00      2
```

```
ERROR/WARNING ID:   341   6

DATE/TIME: 2007/12/ 3 12:15

RCHRES:     1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB().  To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows.  This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS         V1         V2        VOL
44 5.3948E+03 5476.2     5530.5
```

```
ERROR/WARNING ID:   341   5

DATE/TIME: 2007/12/ 3 12:15

RCHRES:     1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated.  If extrapolation was small, no problem.
Remedy; extend ftable.  Relevant data are:

A          B          C      RDEP1      RDEP2  COUNT
0.0000E+00 4867.8     -8.115E+03    1.6670  1.6670E+00      2
```

```
ERROR/WARNING ID:   341   6

DATE/TIME: 2007/12/ 3 12:30

RCHRES:     1
```

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB(). To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows. This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS	V1	V2	VOL
44	5.3948E+03	5476.2	5543.2

ERROR/WARNING ID: 341 5

DATE/TIME: 2007/12/ 3 12:30

RCHRES: 1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated. If extrapolation was small, no problem.
Remedy; extend ftable. Relevant data are:

A	B	C	RDEP1	RDEP2	COUNT
0.0000E+00	4867.8	-8.877E+03	1.8236	1.8236	2

ERROR/WARNING ID: 341 6

DATE/TIME: 2007/12/ 3 12:45

RCHRES: 1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB(). To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows. This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS	V1	V2	VOL
44	5394.8	5476.2	5561.4

ERROR/WARNING ID: 341 5

DATE/TIME: 2007/12/ 3 12:45

RCHRES: 1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated. If extrapolation was small, no problem.
Remedy; extend ftable. Relevant data are:

A	B	C	RDEP1	RDEP2	COUNT
0.0000E+00	4867.8	-9.965E+03	2.0472	2.0472	2

ERROR/WARNING ID: 341 6

DATE/TIME: 2007/12/ 3 13: 0

RCHRES: 1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB(). To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows. This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS	V1	V2	VOL
44	5394.8	5476.2	5562.5

ERROR/WARNING ID: 341   5

DATE/TIME: 2007/12/ 3 13: 0

RCHRES: 1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated. If extrapolation was small, no problem.
Remedy; extend ftable. Relevant data are:

A	B	C	RDEP1	RDEP2	COUNT
0.0000E+00	4867.8	-1.003E+04	2.0612	2.0612E+00	2

ERROR/WARNING ID: 341   6

DATE/TIME: 2007/12/ 3 13:15

RCHRES: 1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB(). To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows. This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS	V1	V2	VOL
44	5.3948E+03	5476.2	5565.4

ERROR/WARNING ID: 341   5

DATE/TIME: 2007/12/ 3 13:15

RCHRES: 1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated. If extrapolation was small, no problem.
Remedy; extend ftable. Relevant data are:

A	B	C	RDEP1	RDEP2	COUNT
0.0000E+00	4867.8	-1.020E+04	2.0963	2.0963E+00	2

ERROR/WARNING ID: 341   6

DATE/TIME: 2007/12/ 3 13:30

RCHRES: 1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB(). To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows. This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS	V1	V2	VOL
44	5.3948E+03	5476.2	5560.5

ERROR/WARNING ID: 341   5

DATE/TIME: 2007/12/ 3 13:30

RCHRES: 1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).

Probably ftable was extrapolated. If extrapolation was small, no problem.
Remedy; extend ftable. Relevant data are:

A	B	C	RDEP1	RDEP2	COUNT
0.0000E+00	4867.8	-9.913E+03	2.0364	2.0364E+00	2

ERROR/WARNING ID: 341   6

DATE/TIME: 2007/12/ 3 13:45

RCHRES: 1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB(). To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows. This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS	V1	V2	VOL
44	5.3948E+03	5476.2	5570.0

ERROR/WARNING ID: 341   5

DATE/TIME: 2007/12/ 3 13:45

RCHRES: 1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated. If extrapolation was small, no problem.
Remedy; extend ftable. Relevant data are:

A	B	C	RDEP1	RDEP2	COUNT
0.0000E+00	4867.8	-1.048E+04	2.1532	2.1532	2

ERROR/WARNING ID: 341   6

DATE/TIME: 2007/12/ 3 14: 0

RCHRES: 1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB(). To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows. This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS	V1	V2	VOL
44	5394.8	5476.2	5572.6

ERROR/WARNING ID: 341   5

DATE/TIME: 2007/12/ 3 14: 0

RCHRES: 1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated. If extrapolation was small, no problem.
Remedy; extend ftable. Relevant data are:

A	B	C	RDEP1	RDEP2	COUNT
0.0000E+00	4867.8	-1.064E+04	2.1851	2.1851E+00	2

ERROR/WARNING ID: 341   6

DATE/TIME: 2007/12/ 3 14:15

RCHRES: 1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB(). To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows. This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS	V1	V2	VOL
44	5.3948E+03	5476.2	5557.2

ERROR/WARNING ID: 341   5

DATE/TIME: 2007/12/ 3 14:15

RCHRES: 1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated. If extrapolation was small, no problem.
Remedy; extend ftable. Relevant data are:

A	B	C	RDEP1	RDEP2	COUNT
0.0000E+00	4867.8	-9.711E+03	1.9950	1.9950E+00	2

ERROR/WARNING ID: 341   6

DATE/TIME: 2007/12/ 3 14:30

RCHRES: 1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB(). To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows. This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS	V1	V2	VOL
44	5.3948E+03	5476.2	5529.1

ERROR/WARNING ID: 341   5

DATE/TIME: 2007/12/ 3 14:30

RCHRES: 1

Calculation of relative depth, using Newton's method of successive
approximations, converged to an invalid value (not in range 0.0 to 1.0).
Probably ftable was extrapolated. If extrapolation was small, no problem.
Remedy; extend ftable. Relevant data are:

A	B	C	RDEP1	RDEP2	COUNT
0.0000E+00	4867.8	-8.031E+03	1.6498	1.6498E+00	2

ERROR/WARNING ID: 341   6

DATE/TIME: 2007/12/ 3 14:45

RCHRES: 1

The volume of water in this reach/mixed reservoir is greater than the value
in the "volume" column of the last row of RCHTAB(). To continue the
simulation the table has been extrapolated, based on information contained
in the last two rows. This will usually result in some loss of accuracy.
If depth is being calculated it will also cause an error condition.
Relevant data are:

NROWS	V1	V2	VOL
44	5.3948E+03	5476.2	5501.2

ERROR/WARNING ID: 341 5

DATE/TIME: 2007/12/ 3 14:45

RCHRES: 1

Calculation of relative depth, using Newton's method of successive approximations, converged to an invalid value (not in range 0.0 to 1.0). Probably ftable was extrapolated. If extrapolation was small, no problem. Remedy; extend ftable. Relevant data are:

A	B	C	RDEP1	RDEP2	COUNT
0.0000E+00	4867.8	-6.367E+03	1.3079	1.3079E+00	2

Disclaimer

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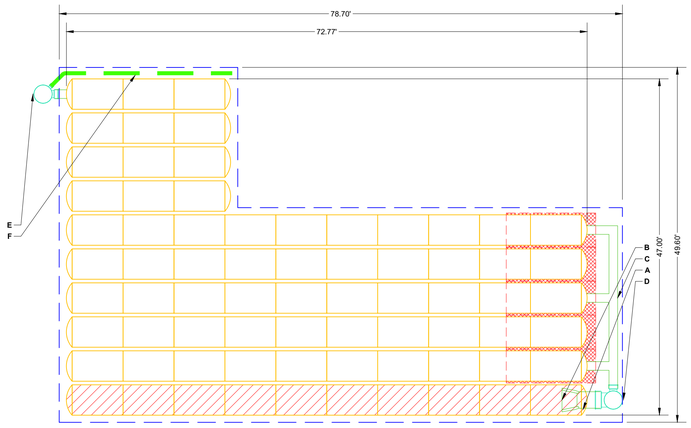
PROPOSED LAYOUT		PROPOSED ELEVATIONS:	
72	STORMTECH SC-740 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	215.50
20	STORMTECH SC-740 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	209.50
8	STONE ABOVE (in)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	209.00
6	STONE BELOW (in)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	209.00
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	209.00
6165	INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	208.17
		TOP OF SC-740 CHAMBER:	207.50
		12" x 12" TOP MANIFOLD INVERT:	206.54
		12" BOTTOM CONNECTION INVERT:	205.10
2850	SYSTEM AREA (SF)	24" ISOLATOR ROW PLUS INVERT:	205.01
256.6	SYSTEM PERIMETER (ft)	BOTTOM OF SC-740 CHAMBER:	205.00
		UNDERDRAIN INVERT:	204.50
		BOTTOM OF STONE:	204.50

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED EZ END CAP	A	24" BOTTOM PREFABRICATED EZ END CAP. PART#: SC740ECEZ / TYP OF ALL 24" BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	0.10"	
	B	INSTALL FLAMP ON 24" ACCESS PIPE / PART#: SC74024RAMP		
MANIFOLD	C	12" x 12" TOP MANIFOLD, ADS N-12	12.50"	
NYLOPLAST (INLET W/ ISO PLUS ROW)	D	30" DIAMETER (24.00" SUMP MIN)		5.7 CFS IN
NYLOPLAST (OUTLET)	E	30" DIAMETER (DESIGN BY ENGINEER)		2.0 CFS OUT
UNDERDRAIN	F	6" ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		



ISOLATOR ROW PLUS (SEE DETAIL)

PLACE MINIMUM 12.50' OF ADSPLUS125 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

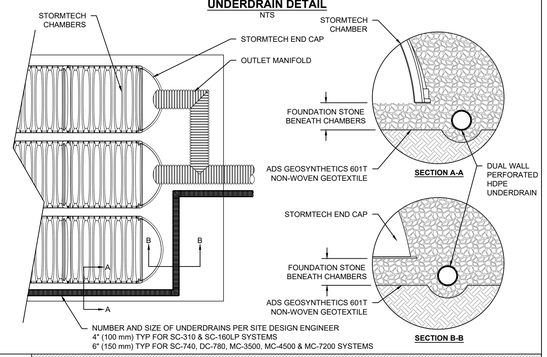
NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

SPACE INTENTIONALLY LEFT BLANK

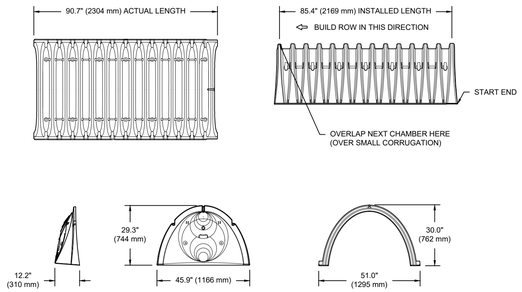
4 UNDERDRAIN DETAIL

UNDERDRAIN DETAIL
NTS



2 SC-740 TECHNICAL SPECIFICATION

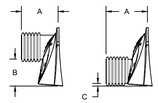
SC-740 TECHNICAL SPECIFICATION
NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS



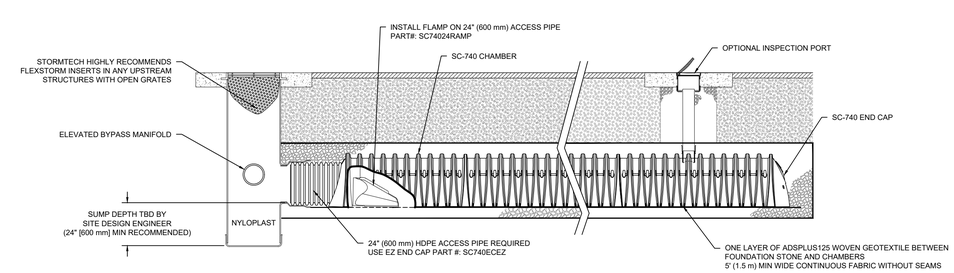
PRE-FAB STUB AT BOTTOM OF END CAP WITH FLAMP END WITH "BR"
PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE-CORED END CAPS END WITH "PC"

PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T /SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740ECEZ*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740ECEZ THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL



SC-740 ISOLATOR ROW PLUS DETAIL
NTS

3 SC-740 ISOLATOR ROW PLUS DETAIL

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

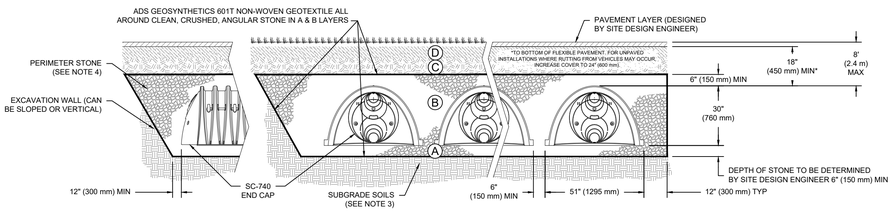
1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

SPACE INTENTIONALLY LEFT BLANK

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/% THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

1 SC-740 CROSS SECTION DETAIL

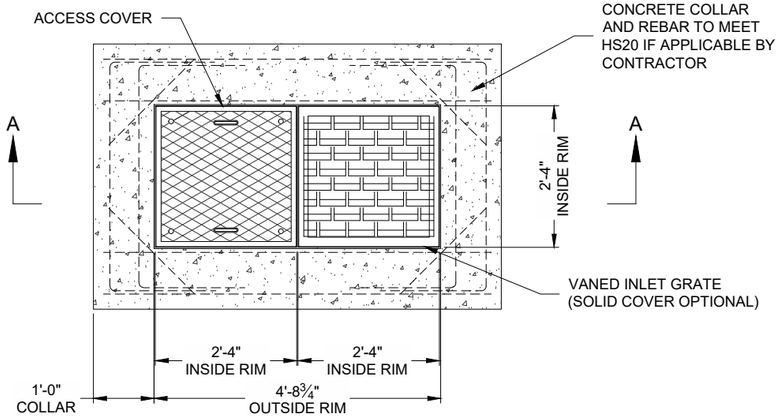
DRAWN: ZW | CHECKED: N/A | DATE: | PROJECT #: | REV: | NOT TO SCALE

23051 CHEHALIS VILLAGE SQUARE
CHEHALIS, WA, USA

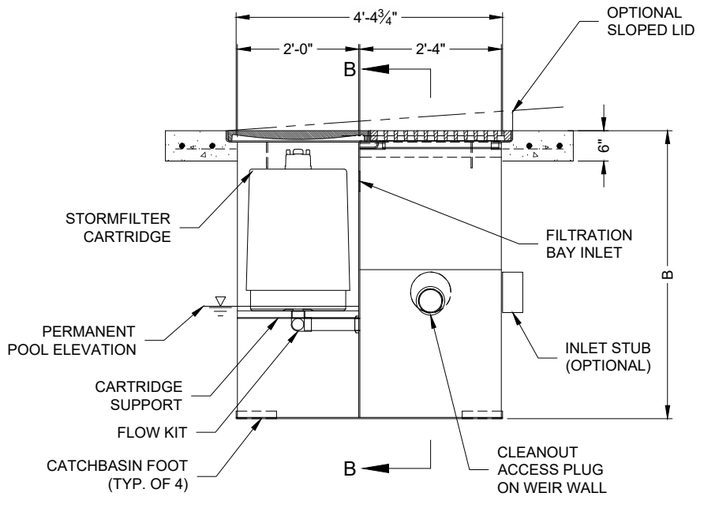
ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

StormTech® Chamber System
888-892-2694 | WWW.STORMTECH.COM

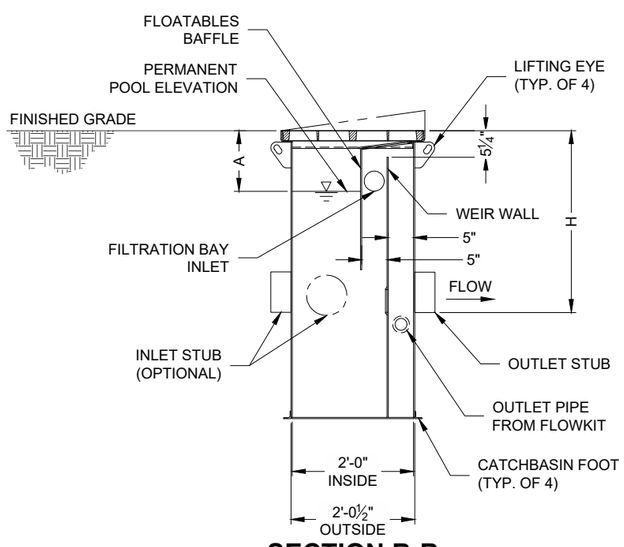
SHEET 1 OF 1



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. 1 CARTRIDGE CATCHBASIN HAS A MAXIMUM OF ONE CARTRIDGE. 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	18.79	11.25	15	12.53	7.5	15	12.53	7.5
PEAK HYDRAULIC CAPACITY	1.0			1.0			2.25		
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
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STORMFILTER CATCHBASIN STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
3. STORMFILTER CATCHBASIN WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
4. INLET SHOULD NOT BE LOWER THAN OUTLET. INLET (IF APPLICABLE) AND OUTLET PIPING TO BE SPECIFIED BY ENGINEER AND PROVIDED BY CONTRACTOR.
5. 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.
6. 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.
7. 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.
8. 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.
9. SPECIFIC FLOW RATE IS EQUAL TO THE FILTER TREATMENT CAPACITY (gpm) DIVIDED BY THE FILTER CONTACT SURFACE AREA (sq ft).

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

1-CARTRIDGE CATCHBASIN STORMFILTER DATA

STRUCTURE ID		XXX
WATER QUALITY FLOW RATE (cfs)		X.XX
PEAK FLOW RATE (<1 cfs)		X.XX
RETURN PERIOD OF PEAK FLOW (yrs)		XXX
CARTRIDGE HEIGHT (27", 18", 18" DEEP)		XX
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"
CONFIGURATION	OUTLET INLET INLET / OUTLET INLET INLET	
SLOPED LID		YES\NO
SOLID COVER		YES\NO
NOTES/SPECIAL REQUIREMENTS:		

The Stormwater Management StormFilter®

CONTECH ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-526-3999 513-645-7000 513-645-7993 FAX

1 CARTRIDGE CATCHBASIN STORMFILTER STANDARD DETAIL

APPENDIX 3 – SPECIAL REPORTS AND STUDIES

NRCS Soil Survey Data
Critical Area Report

Map Scale: 1:632 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 5 10 20 30

Feet
0 30 60 120 180

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lewis County Area, Washington
Survey Area Data: Version 22, Sep 8, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 21, 2021—Nov 22, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
118	Lacamas silt loam, 0 to 3 percent slopes	C/D	0.6	83.0%
194	Scamman silty clay loam, 5 to 15 percent slopes	C/D	0.1	17.0%
Totals for Area of Interest			**0.7**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Lewis County Area, Washington

194—Scamman silty clay loam, 5 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2hcb
Elevation: 150 to 2,000 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Scamman and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Scamman

Setting

Landform: Terraces
Parent material: Residuum from outwash and sedimentary rocks

Typical profile

H1 - 0 to 6 inches: silty clay loam
H2 - 6 to 13 inches: silty clay loam
H3 - 13 to 23 inches: silty clay loam
H4 - 23 to 60 inches: silty clay

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: C/D
Ecological site: F002XA005WA - Puget Lowlands Moist Forest
Forage suitability group: Seasonally Wet Soils (G002XV202WA)
Other vegetative classification: Seasonally Wet Soils (G002XV202WA)
Hydric soil rating: No

Minor Components

Lacamas, undrained
Percent of map unit: 5 percent
Landform: Terraces
Other vegetative classification: Wet Soils (G002XV102WA)
Hydric soil rating: Yes

Prather
Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Lewis County Area, Washington
Survey Area Data: Version 22, Sep 8, 2022

Lewis County Area, Washington

118—Lacamas silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2h8l
Elevation: 250 to 1,200 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 125 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Lacamas, drained, and similar soils: 60 percent
Lacamas, undrained, and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lacamas, Drained

Setting

Landform: Terraces, flood plains

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 17 inches: silt loam
H3 - 17 to 27 inches: silty clay
H4 - 27 to 60 inches: clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 12 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Ecological site: F001XC003OR - Mesic Aquic Forest
Forage suitability group: Seasonally Wet Soils (G002XV202WA)
Other vegetative classification: Seasonally Wet Soils (G002XV202WA)
Hydric soil rating: Yes

Description of Lacamas, Undrained

Setting

Landform: Flood plains, terraces

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 17 inches: silt loam
H3 - 17 to 27 inches: silty clay
H4 - 27 to 60 inches: clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: F001XC003OR - Mesic Aquic Forest
Forage suitability group: Wet Soils (G002XV102WA)
Other vegetative classification: Wet Soils (G002XV102WA)
Hydric soil rating: Yes

Minor Components

Klaber, undrained

Percent of map unit: 5 percent
Landform: Depressions
Other vegetative classification: Wet Soils (G002XV102WA)
Hydric soil rating: Yes

Scamman

Percent of map unit: 5 percent
Landform: Terraces
Other vegetative classification: Seasonally Wet Soils (G002XV202WA)
Hydric soil rating: No

Prather

Percent of map unit: 5 percent

Hydric soil rating: No

Data Source Information

Soil Survey Area: Lewis County Area, Washington
Survey Area Data: Version 22, Sep 8, 2022

GENESIS RESOURCE CONSULTING
ENVIRONMENTAL CONSULTING & LAND DEVELOPMENT
STREAM BANK PROTECTION, HABITAT RESTORATION, WETLANDS, PERMITTING, MITIGATION

ENVIRONMENTAL REVIEW REPORT

68 S.W. 13TH STREET

TAX PARCEL 005411013001 & 005411014000

CHEHALIS WASHINGTON, LEWIS COUNTY

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February 10, 2024

BACKGROUND

Parcels #005411013001 & #005411014000 are located at 68 S.W. 13th Street, Chehalis Washington. Parcel #005411013001 is zero point five zero zero (0.500) acres with a use code of 65 service- professional. There is an existing medical office onsite that is two thousand eight hundred and eleven (2811) square feet. Parcel #005411014000 is zero point sixteen zero (0.160) acres with a use code of 11 single unit. This parcel has an existing single family home that is one thousand and thirty six (1036) square feet, including the existing carport and porch. The proposed development is to remove the single family residence and construct a new three (3) story building that is two thousand four hundred and fifty (2450) square feet per story, with a larger parking lot in the south western portion of both parcels.

RESOURCE CONCERNS

A site visit documents 13 Oregon White Oaks to be present through the site, most of which are located in the proposed parking lot. Oregon White Oak Woodlands are identified by Washington Department of Fish and Wildlife (WDFW) as a Priority Habitat Species. Genesis Resource Consulting (GRC) has made a site reconnaissance to determine resource concerns for the Oregon White Oak trees or other environmental issues at or adjacent to this parcel. This existing homesite was developed in 1945 and the land surrounding these parcels have been historically used for residential and business purposes.

SITE RECONNAISANCE

Genesis Resource Consulting completed a field reconnaissance of the project site on February 7th, 2024 in dry, overcast weather conditions. The soils probed within the designated hydric soil area are mapped as Lacamas Silt Loam 0-3% slopes and Scamman silty clay loam, 5-15% slopes. No secondary indicators of hydrology during the growing season were present. The site is an existing historic homesite that has been significantly disturbed. 13 Oregon White Oaks were documented on this site.

Vegetation consists of common lawn grasses and some ornamental bulbs and landscaping. Remaining vegetation consists of:
Dandelion, Common (*Taraxacum Officinale*)-FACU
Oak, Oregon White (*Quercus Garryana*)-FACU
Blackberry, Himalayan- (*Rubus Discolor Weihe & Nees*)-FACU

RESULTS AND DISCUSSION

Lewis County PATS Mapping does not indicate a wetland on the site or in the adjacent area, but does show hydric soils being present through the site. This does not impact this parcel and there are no critical area buffer requirements. The site contains significantly disturbed soils and minimal vegetation associated with the existing homesite and office buildings. Overstory vegetation of Oregon White Oak and evidence of invasive blackberry conclude the vegetation of the site does not meet wetland indicators. The site is surrounded by residential homes and businesses, with minimal vegetation and wildlife. Washington Department of Fish and Wildlife (WDFW) has listed Oregon White Oaks as a Priority Habitat/Species. WFDW has suggested recommendations on the preservation of this species. Recommendations include avoiding cutting of Oregon White Oaks if possible, unless in urbanized areas the stand is less than 1 acre. This site is under 1 acre and has a low habitat score. Because of this, there is no reasonable amount of room for habitat enhancement. Removal of the White Oaks on this site should have no adverse effects on the surrounding habitat.

SUMMARY/RECOMMENDATIONS

GRC did not find evidence of a jurisdictional wetland at this parcel location. Adjacent properties were evaluated and found to be developed residential and business building with mostly ornamental landscaping, with no obvious wetland indicators. No wetlands or stream channels were documented that may affect development of this site. According to WDFW Oregon White Oak guidelines, this site does not meet criteria for a priority Oregon White Oak woodlands due to its size and location. Due to the site location and surrounding area being developed, having minimal vegetation, and low habitat, GRC suggests that removal of any White Oaks on the parcels should be avoided if possible. GRC recommends that if any White Oaks need to be removed for development, they can be replaced by a juvenile White Oak as part of the landscape plan.

WORKS CITED

Larsen, E. M., and J. T. Morgan. 1998. Management recommendations for Washington's priority habitats: Oregon white oak woodlands. Wash. Dept. Fish and Wildl., Olympia. 37pp.

APPENDIX 4 – OPERATION AND MAINTENANCE MANUAL

The following O&M Plan has been prepared for this project. Upon review and comment from the review agency, the final copy will be provided to the owners for final signatures.

APPENDIX 5 – CONSTRUCTION SWPPP

Construction Stormwater General Permit

Stormwater Pollution Prevention Plan (SWPPP)

for

Chehalis Village Square

Prepared for:

The Washington State Department of Ecology

SW Regional Office

Permittee / Owner	Developer	Operator / Contractor
Dan Birk	Pending	Pending

Certified Erosion and Sediment Control Lead (CESCL)

Name	Organization	Contact Phone Number
Pending	Pending	Pending

SWPPP Prepared By

Name	Organization	Contact Phone Number
Robert Balmelli	RB Engineering	(360) 740-8919

SWPPP Preparation Date

2.28.24

Project Construction Dates

Activity / Phase	Start Date	End Date
Pending	Pending	Pending

PROJECT OVERVIEW

WAR No. : Pending

Site Address: 68 SW 13th Street
Chehalis, WA 98532

Applicable Criteria	Areas
Total Site Area	0.66 AC
Land Disturbing Area	0.25 AC

Existing surface coverage: Roof, parking, and landscaping

Drainage Patterns: Natural drainage discharges to stormwater conveyance in SW 13th Street.

Critical Areas: No critical areas are present onsite.

Steep Slopes: Site is flat with no steep slopes.

Receiving Water Body: xxxxxxxxxxx

Known impairments for 303(d) listed or Total Maximum Daily Load (TMDL) for the receiving waterbody

Pollutant	Location	Depth	Concentration

WaterShed: WRIA 23 – Upper Chehalis
https://waecy.maps.arcgis.com/apps/webappviewer/index.html?id=996e6b21ae394cc3a3b63c6da0c3aa0a

Description of Construction Activities (example: site preparation, demolition, excavation):

Project includes constructing a new 3-story mixed use building with associated parking and stormwater facilities. Project will include typical construction activities such as excavation, filling, paving, and landscaping.

Description of Final Stabilization (example: extent of revegetation, paving, landscaping):

Project final stabilization will include installation of new impervious hard surfaces and landscaping.

CONSTRUCTION SWPPP

All new development and redevelopment shall comply with Construction SWPPP Elements #1 through #12 listed below. The suggested BMPs underlined and in **bold** are proposed for use in all phases of construction. Copies of the details for each of the recommended BMPs are included.

Element 1: Mark Clearing Limits

- Prior to beginning land disturbing activities, including clearing and grading, clearly mark all clearing limits, sensitive areas and their buffers, and trees that are to be preserved within the construction area. These shall be clearly marked, both in the field and on the plans, to prevent damage and offsite impacts.
- Plastic, metal, or stake wire fence may be used to mark the clearing limits.
- Suggested BMPs:

  BMP C101: Preserving Natural Vegetation
  BMP C102: Buffer Zones
  BMP C103: High-Visibility Fence
  BMP C233: Silt Fence

Element 2: Establish Construction Access

- Construction vehicle access and exit shall be limited to one route if possible, or two for linear projects such as roadways where one access is necessary for large equipment maneuvering.
- Access points shall be stabilized with quarry spall or crushed rock to minimize the tracking of sediment onto public roads.
- Wheel wash or tire baths should be located onsite, if applicable.
- Roads shall be cleaned thoroughly at the end of each day. Sediment shall be removed from roads by shoveling or pickup sweeping and shall be transported to a controlled sediment disposal area. Street washing will be allowed only after sediment is removed in this manner.
- Street wash wastewater shall be controlled by pumping back onsite or otherwise be prevented from discharging into systems tributary to state surface waters.
- Construction access restoration shall be equal to or better than the pre-construction condition.
- Suggested BMPs:

  BMP C105: Stabilized Construction Access
  BMP C106: Wheel Wash
  BMP C107: Construction Road/Parking Area Stabilization

Element 3: Control Flow Rates

- Properties and waterways downstream from development sites shall be protected from erosion due to increases in the volume, velocity, and peak flow rate of stormwater runoff from the project site, as required by local plan approval authority.
- Downstream analysis is necessary if changes in offsite flows could impair or alter conveyance systems, streambanks, bed sediment, or aquatic habitat.
- Where necessary to comply with Minimum Requirement #7, stormwater detention facilities shall be constructed as one of the first steps in grading. Detention facilities shall be functional prior to construction of site improvements (e.g. impervious surfaces).
- Suggested BMPs:

  BMP C203: Water Bars
  BMP C207: Check Dams
  BMP C209: Outlet Protection
  BMP C235: Wattles
  BMP C240: Sediment Trap
  BMP C241: Sediment Pond (Temporary)
  See also, V-12 Detention BMPs

Element 4: Install Sediment Controls

- The duff layer, native top soil, and natural vegetation shall be retained in an undisturbed state to the maximum extent practicable.
- Prior to leaving a construction site or prior to discharge to an infiltration facility, stormwater runoff from disturbed areas shall pass through a sediment pond or other appropriate sediment removal BMP. Runoff from fully stabilized areas may be discharged without a sediment removal BMP, but must meet the flow control performance standard of Element #3, bullet #1. Full stabilization means concrete or asphalt paving; quarry spalls used as ditch lining; or the use of rolled erosion products, a bonded fiber matrix product, or vegetative cover in a manner that will fully prevent soil erosion. The local permitting authority shall inspect and approve areas fully stabilized by means other than pavement or quarry spalls.
- BMPs intended to trap sediment on site shall be constructed as one of the first steps in grading. These BMPs shall be functional before other land disturbing activities take place.
- Earthen structures such as dams, dikes, and diversions shall be seeded and mulched according to the timing indicated in Element #5.
- BMPs intended to trap sediment on site must be located in a manner to avoid interference with the movement of juvenile salmonids attempting to enter off-channel areas or drainages, often during non-storm events, in response to rain event changes in stream elevation or wetted area.
- Suggested BMPs

  BMP C231: Brush Barrier
  BMP C232: Gravel Filter Berm

BMP C233: Silt Fence
BMP C234: Vegetated Strip
BMP C235: Wattles
BMP C240: Sediment Trap
BMP C241: Sediment Pond (Temporary)
BMP C250: Construction Stormwater Chemical Treatment
BMP C251: Construction Stormwater Filtration

Element 5: Stabilize Soils

- Exposed and unworked soils shall be stabilized by application of effective BMPs that protect the soil from the erosive forces of raindrops, flowing water, and wind.
- From October 1 through April 30, no soils shall remain exposed and unworked for more than 2 days. From May 1 to September 30, no soils shall remain exposed and unworked for more than 7 days. This stabilization requirement applies to all soils on site, whether at final grade or not. These time limits may be adjusted by the local permitting authority if it can be shown that the average time between storm events justifies a different standard.
- Soils shall be stabilized at the end of the shift before a holiday or weekend if needed based on the weather forecast.
- Applicable practices include, but are not limited to, temporary and permanent seeding, sodding, mulching, plastic covering, erosion control fabrics and matting, soil application of polyacrylamide (PAM), the early application of gravel base on areas to be paved, and dust control.
- Selected soil stabilization measures shall be appropriate for the time of year, site conditions, estimated duration of use, and the water quality impacts that stabilization agents may have on downstream waters or ground water.
- Soil stockpiles must be stabilized and protected with sediment trapping measures.
- Linear construction activities such as right-of-way and easement clearing, roadway development, pipelines, and trenching for utilities, shall be conducted to meet the soil stabilization requirement. Contractors shall install the bedding materials, roadbeds, structures, pipelines, or utilities and re-stabilize the disturbed soils so that:

– from October 1 through April 30 no soils shall remain exposed and unworked for more than 2 days and

– from May 1 to September 30, no soils shall remain exposed and unworked for more than 7 days.

- Suggested BMPs:

BMP C120: Temporary and Permanent Seeding
BMP C121: Mulching
BMP C122: Nets and Blankets
BMP C123: Plastic Covering
BMP C124: Sodding
BMP C125: Topsoiling / Composting

BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection
BMP C130: Surface Roughening
BMP C131: Gradient Terraces
BMP C140: Dust Control

Element 6: Protect Slopes

- Design, construct, and phase cut and fill slopes in a manner that will minimize erosion.
- Consider soil type and its potential for erosion.
- Reduce slope runoff velocities by reducing continuous length of slope with terracing and diversions, reduce slope steepness, and roughen slope surface.
- Divert upslope drainage and run-on waters with interceptors at top of slope. Stormwater from off site should be handled separately from stormwater generated on the site. Diversion of offsite stormwater around the site may be a viable option. Diverted flows shall be redirected to the natural drainage location at or before the property boundary.
- Contain downslope collected flows in pipes, slope drains, or protected channels. Check dams shall be used within channels that are cut down a slope.
- Provide drainage to remove ground water intersecting the slope surface of exposed soil areas.
- Excavated material shall be placed on the uphill side of trenches, consistent with safety and space considerations.
- Stabilize soils on slopes, as specified in Element #5.
- Suggested BMPs

  BMP C120: Temporary and Permanent Seeding
  BMP C121: Mulching
  BMP C122: Nets and Blankets
  BMP C123: Plastic Covering
  BMP C124: Sodding
  BMP C130: Surface Roughening
  BMP C131: Gradient Terraces
  BMP C200: Interceptor Dike and Swale
  BMP C201: Grass-Lined Channels
  BMP C203: Water Bars
  BMP C204: Pipe Slope Drains
  BMP C205: Subsurface Drains
  BMP C206: Level Spreader
  BMP C207: Check Dams
  BMP C208: Triangular Silt Dike (TSD)

Element 7: Protect Drain Inlets

- Storm drain inlets operable during construction shall be protected so that stormwater runoff does not enter the conveyance system without first being filtered or treated to remove sediment.

- Approach roads shall be kept clean. Sediment and street wash water shall not be allowed to enter storm drains without prior and adequate treatment unless treatment is provided before the storm drain discharges to waters of the state.

- Inlets should be inspected weekly at a minimum and daily during storm events. Inlet protection devices should be cleaned or removed and replaced before six inches of sediment can accumulate.

- Suggested BMPs:

  BMP C220: Inlet Protection

Element 8: Stabilize Channels and Outlets

- Temporary onsite conveyance channels shall be designed, constructed, and stabilized to prevent erosion from the expected flow velocity of a 2-year, 24-hour frequency storm for the developed condition.
- Stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent streambanks, slopes, and downstream reaches shall be provided at the outlets of all conveyance systems.
- Suggested BMPs:

  BMP C122: Nets and Blankets
  BMP C202: Riprap Channel Lining
  BMP C207: Check Dams
  BMP C209: Outlet Protection

Element 9: Control Pollutants

- All pollutants, including waste materials and demolition debris, that occur on site during construction shall be handled and disposed of in a manner that does not cause contamination of stormwater. Woody debris may be chopped and spread on site.
- Cover, containment, and protection from vandalism shall be provided for all chemicals, liquid products, petroleum products, and non-inert wastes present on the site (see Chapter 173-304 WAC for the definition of inert waste).
- Maintenance and repair of heavy equipment and vehicles involving oil changes, hydraulic system drain down, solvent and de-greasing cleaning operations, fuel tank drain down and removal, and other activities which may result in discharge or spillage of pollutants to the

ground or into stormwater runoff must be conducted using spill prevention measures, such as drip pans. Contaminated surfaces shall be cleaned immediately following any discharge or spill incident. Emergency repairs may be performed onsite using temporary plastic placed beneath and, if raining, over the vehicle.

- Wheel wash or tire bath wastewater shall be discharged to a separate onsite treatment system or to the sanitary sewer.
- Application of agricultural chemicals including fertilizers and pesticides shall be conducted in a manner and at application rate that will not result in loss of chemicals to stormwater runoff. Manufacturer recommendations for application rates and procedures shall be followed.
- BMPs shall be used to prevent or treat contamination of stormwater runoff by pH modifying sources. These sources include bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, waste streams generated from concrete grinding and sawing, exposed aggregate processes, and concrete pumping and mixer washout waters. Stormwater discharges shall not cause a violation of the water quality standard for pH in the receiving water.
- Suggested BMPs:

  BMP C151: Concrete Handling
  BMP C152: Sawcutting and Surfacing Pollution Prevention
  BMP C153: Material Delivery, Storage, and Containment
  BMP C154: Concrete Washout Area
  BMP C250: Construction Stormwater Chemical Treatment
  BMP C251: Construction Stormwater Filtration
  BMP C252: Treating and Disposing of High pH Water
  Also see, the Source Control BMPs detailed in Volume IV

Element 10: Control De-Watering

- Foundation, vault, and trench de-watering water shall be discharged into a controlled conveyance system prior to discharge to a sediment pond. Channels must be stabilized, as specified in Element #8.
- Clean, non-turbid de-watering water, such as well-point ground water, can be discharged to systems tributary to state surface waters, as specified in Element #8, provided the de-watering flow does not cause erosion or flooding of receiving waters. These clean waters should not be routed through stormwater sediment ponds.
- Highly turbid or contaminated dewatering water from construction equipment operation, clamshell digging, concrete tremie pour, or work inside a cofferdam shall be handled separately from stormwater.
- Other disposal options, depending on site constraints, may include:

1. infiltration,
2. transport off site in vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters,
3. onsite treatment using chemical treatment or other suitable treatment technologies,

4. sanitary sewer discharge with local sewer district approval, or

5. use of a sedimentation bag with outfall to a ditch or swale for small volumes of localized dewatering.

- Suggested BMPs:

  BMP C203: Water Bars
  BMP C236: Vegetative Filtration

Element 11: Maintain BMPs

- Temporary and permanent erosion and sediment control BMPs shall be maintained and repaired as needed to assure continued performance of their intended function. Maintenance and repair shall be conducted in accordance with BMPs.
- Sediment control BMPs shall be inspected weekly or after a runoff-producing storm event during the dry season and daily during the wet season. The inspection frequency for stabilized, inactive sites shall be determined by the local permitting authority based on the level of soil stability and potential for adverse environmental impacts.
- Temporary erosion and sediment control BMPs shall be removed within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed. Trapped sediment shall be removed or stabilized on site. Disturbed soil resulting from removal of BMPs or vegetation shall be permanently stabilized.

- Suggested BMPs:

  BMP C150: Materials on Hand
  BMP C160: Certified Erosion and Sediment Control Lead

Element 12: Manage the Project

- Phasing of Construction

  Development projects shall be phased where feasible in order to prevent, to the maximum extent practicable, the transport of sediment from the development site during construction. Revegetation of exposed areas and maintenance of that vegetation shall be an integral part of the clearing activities for any phase.

  Clearing and grading activities for development shall be permitted only if conducted pursuant to an approved site development plan (e.g., subdivision approval) that establishes permitted areas of clearing, grading, cutting, and filling. When establishing these permitted clearing and grading areas, consideration should be given to minimizing removal of existing trees and minimizing disturbance and compaction of native soils except as needed for building purposes. These permitted clearing and grading areas and any other areas required to preserve critical or sensitive areas, buffers, native growth protection easements, or tree retention areas as may be required by local jurisdictions, shall be delineated on the site plans and the development site.

- Seasonal Work Limitations

From October 1 through April 30, clearing, grading, and other soil disturbing activities shall only be permitted if shown to the satisfaction of the local permitting authority that the transport of sediment from the construction site to receiving waters will be prevented through a combination of the following:

1. Site conditions including existing vegetative coverage, slope, soil type, and proximity to receiving waters; and
2. Limitations on activities and the extent of disturbed areas; and
3. Proposed erosion and sediment control measures.

Based on the information provided and local weather conditions, the local permitting authority may expand or restrict the seasonal limitation on site disturbance. The local permitting authority shall take enforcement action - such as a notice of violation, administrative order, penalty, or stop-work order under the following circumstances:

- If, during the course of any construction activity or soil disturbance during the seasonal limitation period, sediment leaves the construction site causing a violation of the surface water quality standard; or
- If clearing and grading limits or erosion and sediment control measures shown in the approved plan are not maintained.

Local governments may restrict clearing and grading activities where site conditions may present a significant risk of impact to property or critical areas. Contact the local government permitting authority for information on specific site restrictions.

The following activities are exempt from the seasonal clearing and grading limitations:

1. Routine maintenance and necessary repair of erosion and sediment control BMPs,
2. Routine maintenance of public facilities or existing utility structures that do not expose the soil or result in the removal of the vegetative cover to soil, and
3. Activities where there is one hundred percent infiltration of surface water runoff within the site in approved and installed erosion and sediment control facilities.

- Coordination with Utilities and Other Contractors

  The primary project proponent shall evaluate, with input from utilities and other contractors, the stormwater management requirements for the entire project, including the utilities, when preparing the Construction SWPPP.

- Inspection and Monitoring

  All BMPs shall be inspected, maintained, and repaired as needed to assure continued performance of their intended function.

  A certified professional in erosion and sediment control shall be identified in the Construction SWPPP and shall be onsite or on-call at all times.

  Sampling and analysis of the stormwater discharges from a construction site may be necessary on a case-by-case basis to ensure compliance with standards. The local permitting authority may establish monitoring and reporting requirements when necessary.

Whenever inspection and/or monitoring reveals that the BMPs identified in the Construction SWPPP are inadequate, due to the actual discharge of or potential to discharge a significant amount of any pollutant, the SWPPP shall be modified, as appropriate, in a timely manner.

- Maintenance of the Construction SWPPP

  The Construction SWPPP shall be retained onsite or within reasonable access to the site. The Construction SWPPP shall be modified whenever there is a significant change in the design, construction, operation, or maintenance of any BMP.

- Suggested BMPs:

  BMP C150: Materials on Hand
  BMP C160: Certified Erosion and Sediment Control Lead
  BMP C162: Scheduling

Element #13: Protect Low Impact Development BMPs

Municipal Stormwater Permits Requirements

Protect all Bioretention and Rain Garden BMPs from sedimentation through installation and maintenance of erosion and sediment control BMPs on portions of the site that drain into the Bioretention and/or Rain Garden BMPs. Restore the BMP so their fully functioning condition if they accumulate sediment during construction. Re-storing the BMP must include removal of sediment and any sediment-laden Bioretention/rain garden soils, and replacing the removed soils with soils meeting the design specification.

Prevent compacting Bioretention and rain garden BMPs by excluding construction equipment and foot traffic. Protect completed lawn and landscaped areas from compaction due to construction equipment.

Control erosion and avoid introducing sediment from surrounding land uses onto permeable pavements. Do not allow muddy construction equipment on the base material or pavement. Do not allow sediment-laden runoff onto permeable pavements.

Pavements fouled with sediments or no longer passing an initial infiltration test must be cleaned using procedures from the local stormwater manual or the manufacturer's procedures.

Keep all heavy equipment off existing soils under LID facilities that have been excavated to final grade to retain the infiltration rate of the soils.

Additional Guidance

See Chapter 5: Precision Site Preparation, Construction & Inspection of LID Facilities in the

LID Technical Guidance Manual for Puget Sound (2012) for more detail on pro-tecting LID integrated management practices.

Note that the LID Technical Guidance Manual for Puget Sound (2012) is for additional informational purposes only. You must follow the guidance within this manual if there are any discrepancies between this manual and the LID Technical Guidance Manual for Puget Sound 2012).

- Suggested BMPs:

  BMP C102: Buffer Zones
  BMP C103: High-Visibility Fence
  BMP C200: Interceptor Dike and Swale
  BMP C201: Grass-Lined Channels
  BMP C207: Check Dams
  BMP C208: Triangular Silt Dike (TSD)
  BMP C231: Brush Barrier
  BMP C233: Silt Fence
  BMP C234: Vegetated Strip

Project Specific Construction BMPs

BMP C120: Temporary and Permanent Seeding
BMP C140: Dust Control
BMP C152: Sawcutting and Surfacing Pollution Prevention
BMP C153: Material Delivery, Storage, and Containment
BMP C220: Inlet Protection
BMP C233: Silt Fence

BMP C120: Temporary and Permanent Seeding

Purpose

Seeding reduces erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion.

Conditions of Use

Use seeding throughout the project on disturbed areas that have reached final grade or that will remain unworked for more than 30 days.

The optimum seeding windows for western Washington are April 1 through June 30 and September 1 through October 1.

Between July 1 and August 30 seeding requires irrigation until 75 percent grass cover is established.

Between October 1 and March 30 seeding requires a cover of mulch or an erosion control blanket until 75 percent grass cover is established.

Review all disturbed areas in late August to early September and complete all seeding by the end of September. Otherwise, vegetation will not establish itself enough to provide more than average protection.

Mulch is required at all times for seeding because it protects seeds from heat, moisture loss, and transport due to runoff. Mulch can be applied on top of the seed or simultaneously by hydroseeding. See BMP C121: Mulching for specifications.

Seed and mulch all disturbed areas not otherwise vegetated at final site stabilization. Final stabilization means the completion of all soil disturbing activities at the site and the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures (such as pavement, riprap, gabions, or geotextiles) which will prevent erosion. See BMP T5.13: Post-Construction Soil Quality and Depth.

Design and Installation Specifications

General

- Install channels intended for vegetation before starting major earthwork and hydroseed with a Bonded Fiber Matrix. For vegetated channels that will have high flows, install erosion control blankets over the top of hydroseed. Before allowing water to flow in vegetated channels, establish 75 percent vegetation cover. If vegetated channels cannot be established by seed before water flow; install sod in the channel bottom — over top of hydromulch and erosion con- trol blankets.
- Confirm the installation of all required surface water control measures to prevent seed from washing away.
- Hydroseed applications shall include a minimum of 1,500 pounds per acre of mulch with 3 percent tackifier. See BMP C121: Mulching for specifications.

- Areas that will have seeding only and not landscaping may need compost or meal-based mulch included in the hydroseed in order to establish vegetation. Re-install native topsoil on the disturbed soil surface before application. See BMP T5.13: Post-Construction Soil Quality and Depth.
- When installing seed via hydroseeding operations, only about 1/3 of the seed actually ends up in contact with the soil surface. This reduces the ability to establish a good stand of grass quickly. To overcome this, consider increasing seed quantities by up to 50 percent.
- Enhance vegetation establishment by dividing the hydromulch operation into two phases:
    - Phase 1- Install all seed and fertilizer with 25-30 percent mulch and tackifier onto soil in the first lift.
    - Phase 2- Install the rest of the mulch and tackifier over the first lift.

  Or, enhance vegetation by:
    - Installing the mulch, seed, fertilizer, and tackifier in one lift.
    - Spread or blow straw over the top of the hydromulch at a rate of 800-1000 pounds per acre.
    - Hold straw in place with a standard tackifier.

Both of these approaches will increase cost moderately but will greatly improve and enhance vegetative establishment. The increased cost may be offset by the reduced need for:

- Irrigation.
- Reapplication of mulch.
- Repair of failed slope surfaces.

This technique works with standard hydromulch (1,500 pounds per acre minimum) and Bon- ded Fiber Matrix/ Mechanically Bonded Fiber Matrix (BFM/MBFMs) (3,000 pounds per acre minimum).

- Seed may be installed by hand if:
    - Temporary and covered by straw, mulch, or topsoil.
    - Permanent in small areas (usually less than 1 acre) and covered with mulch, topsoil, or erosion blankets.
- The seed mixes listed in Table II-3.4: Temporary and Permanent Seed Mixes include recommended mixes for both temporary and permanent seeding.
- Apply these mixes, with the exception of the wet area seed mix, at a rate of 120 pounds per acre. This rate can be reduced if soil amendments or slow-release fertilizers are used. Apply the wet area seed mix at a rate of 60 pounds per acre.
- Consult the local suppliers or the local conservation district for their recommendations. The appropriate mix depends on a variety of factors, including location, exposure, soil type, slope, and expected foot traffic. Alternative seed mixes approved by the local authority may be used,

depending on the soil type and hydrology of the area.

Table II-3.4: Temporary and Permanent Seed Mixes

Common Name	Latin Name	% Weight	% Purity	% Germination
Temporary Erosion Control Seed Mix A standard mix for areas requiring a temporary vegetative cover.				
Chewings or annual blue grass	*Festuca rubra var. commutata* or *Poa anna*	40	98	90
Perennial rye	*Lolium perenne*	50	98	90
Redtop or colonial bentgrass	*Agrostis alba* or *Agrostis tenuis*	5	92	85
White dutch clover	*Trifolium repens*	5	98	90
Landscaping Seed Mix A recommended mix for landscaping seed.				
Perennial rye blend	*Lolium perenne*	70	98	90
Chewings and red fescue blend	*Festuca rubra var. commutata* or *Festuca rubra*	30	98	90
Low-Growing Turf Seed Mix A turf seed mix for dry situations where there is no need for watering. This mix requires very little maintenance.				
Dwarf tall fescue (several varieties)	*Festuca arundinacea var.*	45	98	90
Dwarf perennial rye (Barclay)	*Lolium perenne var. barclay*	30	98	90
Red fescue	*Festuca rubra*	20	98	90
Colonial bentgrass	*Agrostis tenuis*	5	98	90
Bioswale Seed Mix A seed mix for bioswales and other intermittently wet areas.				
Tall or meadow fescue	*Festuca arundinacea* or *Festuca elatior*	75-80	98	90
Seaside/Creeping bentgrass	*Agrostis palustris*	10-15	92	85

Redtop bentgrass	*Agrostis alba or Agrostis gigantea*	5-10	90	80
Wet Area Seed Mix A low-growing, relatively non-invasive seed mix appropriate for very wet areas that are not regulated wetlands. Consult Hydraulic Permit Authority (HPA) for seed mixes if applicable.				

Table II-3.4: Temporary and Permanent Seed Mixes (continued)

Common Name	Latin Name	% Weight	% Purity	% Germination
Tall or meadow fescue	*Festuca arundinacea* or *Festuca elatior*	60-70	98	90
Seaside/Creeping bentgrass	*Agrostis palustris*	10-15	98	85
Meadow foxtail	*Alepocurus pratensis*	10-15	90	80
Alsike clover	*Trifolium hybridum*	1-6	98	90
Redtop bentgrass	*Agrostis alba*	1-6	92	85
Meadow Seed Mix A recommended meadow seed mix for infrequently maintained areas or non-maintained areas where colonization by native plants is desirable. Likely applications include rural road and utility right-of-way. Seeding should take place in September or very early October in order to obtain adequate establishment prior to the winter months. Consider the appropriateness of clover, a fairly invasive species, in the mix. Amending the soil can reduce the need for clover.				
Redtop or Oregon bentgrass	*Agrostis alba* or *Agrostis oregonensis*	20	92	85
Red fescue	*Festuca rubra*	70	98	90
White dutch clover	*Trifolium repens*	10	98	90

Roughening and Rototilling

- The seedbed should be firm and rough. Roughen all soil no matter what the slope. Track walk slopes before seeding if engineering purposes require compaction. Backblading or smoothing of slopes greater than 4H:1V is not allowed if they are to be seeded.
- Restoration-based landscape practices require deeper incorporation than that provided by a simple single-pass rototilling treatment. Wherever practical, initially rip the subgrade to improve long-term permeability, infiltration, and water inflow qualities. At a minimum, permanent areas shall use soil amendments to achieve organic matter and permeability per- formance defined in engineered soil/landscape systems. For systems that are deeper than 8 inches complete the rototilling process in multiple lifts, or prepare the engineered soil system per specifications and place to achieve the specified depth.

Fertilizers

- Conducting soil tests to determine the exact type and quantity of fertilizer is recommended. This will prevent the over-application of fertilizer.
- Organic matter is the most appropriate form of fertilizer because it provides nutrients (including nitrogen, phosphorus, and potassium) in the least water-soluble form.
- In general, use 10-4-6 N-P-K (nitrogen-phosphorus-potassium) fertilizer at a rate of 90 pounds per acre. Always use slow-release fertilizers because they are more efficient and have fewer environmental impacts. Do not add fertilizer to the hydromulch machine, or agitate, more than 20 minutes before use. Too much agitation destroys the slow-release coating.
- There are numerous products available that take the place of chemical fertilizers. These include several with seaweed extracts that are beneficial to soil microbes and organisms. If 100 percent cottonseed meal is used as the mulch in hydroseed, chemical fertilizer may not be necessary. Cottonseed meal provides a good source of long-term, slow-release, available nitrogen.

Bonded Fiber Matrix and Mechanically Bonded Fiber Matrix

- On steep slopes use Bonded Fiber Matrix (BFM) or Mechanically Bonded Fiber Matrix (MBFM) products. Apply BFM/MBFM products at a minimum rate of 3,000 pounds per acre with approximately 10 percent tackifier. Achieve a minimum of 95 percent soil coverage during application. Numerous products are available commercially. Most products require 24-36 hours to cure before rainfall and cannot be installed on wet or saturated soils. Generally, products come in 40-50 pound bags and include all necessary ingredients except for seed and fertilizer.
- Install products per manufacturer's instructions.
- BFMs and MBFMs provide good alternatives to blankets in most areas requiring vegetation establishment. Advantages over blankets include:
    - BFM and MBFMs do not require surface preparation.
    - Helicopters can assist in installing BFM and MBFMs in remote areas.
    - On slopes steeper than 2.5H:1V, blanket installers may require ropes and harnesses for safety.
    - Installing BFM and MBFMs can save at least $1,000 per acre compared to blankets.

Maintenance Standards

Reseed any seeded areas that fail to establish at least 75 percent cover (100 percent cover for areas that receive sheet or concentrated flows). If reseeding is ineffective, use an alternate method such as sodding, mulching, nets, or blankets.

- Reseed and protect by mulch any areas that experience erosion after achieving adequate cover. Reseed and protect by mulch any eroded area.

- Supply seeded areas with adequate moisture, but do not water to the extent that it causes run-off.

Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C140: Dust Control

Purpose

Dust control prevents wind transport of dust from disturbed soil surfaces onto roadways, drainage ways, and surface waters.

Conditions of Use

Use dust control in areas (including roadways) subject to surface and air movement of dust where on-site or off-site impacts to roadways, drainage ways, or surface waters are likely.

Design and Installation Specifications

- Vegetate or mulch areas that will not receive vehicle traffic. In areas where planting, mulching, or paving is impractical, apply gravel or landscaping rock.
- Limit dust generation by clearing only those areas where immediate activity will take place, leaving the remaining area(s) in the original condition. Maintain the original ground cover as long as practical.
- Construct natural or artificial windbreaks or windscreens. These may be designed as enclosures for small dust sources.
- Sprinkle the site with water until the surface is wet. Repeat as needed. To prevent carryout of mud onto the street, refer to BMP C105: Stabilized Construction Access and BMP C106: Wheel Wash.
- Irrigation water can be used for dust control. Irrigation systems should be installed as a first step on sites where dust control is a concern.
- Spray exposed soil areas with a dust palliative, following the manufacturer's instructions and cautions regarding handling and application. Used oil is prohibited from use as a dust suppressant. Local governments may approve other dust palliatives such as calcium chloride or PAM.
- PAM (BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection) added to water at a rate of 0.5 pounds per 1,000 gallons of water per acre and applied from a water truck is more effective than water alone. This is due to increased infiltration of water into the soil and reduced evaporation. In addition, small soil particles are bonded together and are not as easily transported by wind. Adding PAM may reduce the quantity of water needed for dust control. Note that the application rate specified here applies to this BMP, and is not the same application rate that is specified in BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection, but the downstream protections still apply.

Refer to BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection for conditions of use. PAM shall not be directly applied to water or allowed to enter a water body.

- Contact your local Air Pollution Control Authority for guidance and training on other dust con-

trol measures. Compliance with the local Air Pollution Control Authority constitutes compliance with this BMP.

- Use vacuum street sweepers.
- Remove mud and other dirt promptly so it does not dry and then turn into dust.
- Techniques that can be used for unpaved roads and lots include:
    - Lower speed limits. High vehicle speed increases the amount of dust stirred up from unpaved roads and lots.
    - Upgrade the road surface strength by improving particle size, shape, and mineral types that make up the surface and base materials.
    - Add surface gravel to reduce the source of dust emission. Limit the amount of fine particles (those smaller than .075 mm) to 10 to 20 percent.
    - Use geotextile fabrics to increase the strength of new roads or roads undergoing reconstruction.
    - Encourage the use of alternate, paved routes, if available.
    - Apply chemical dust suppressants using the admix method, blending the product with the top few inches of surface material. Suppressants may also be applied as surface treatments.
    - Limit dust-causing work on windy days.
    - Pave unpaved permanent roads and other trafficked areas.

Maintenance Standards

Respray area as necessary to keep dust to a minimum.

BMP C152: Sawcutting and Surfacing Pollution Prevention

Purpose

Sawcutting and surfacing operations generate slurry and process water that contains fine particles and high pH (concrete cutting), both of which can violate the water quality standards in the receiving water. Concrete spillage or concrete discharge to waters of the State is prohibited. Use this BMP to minimize and eliminate process water and slurry created through sawcutting or surfacing from entering waters of the State.

Conditions of Use

Utilize these management practices anytime sawcutting or surfacing operations take place. Sawcutting and surfacing operations include, but are not limited to:

- Sawing
- Coring
- Grinding
- Roughening
- Hydro-demolition
- Bridge and road surfacing

Design and Installation Specifications

- Vacuum slurry and cuttings during cutting and surfacing operations.
- Slurry and cuttings shall not remain on permanent concrete or asphalt pavement overnight.
- Slurry and cuttings shall not drain to any natural or constructed drainage conveyance including stormwater systems. This may require temporarily blocking catch basins.
- Dispose of collected slurry and cuttings in a manner that does not violate ground water or surface water quality standards.
- Do not allow process water generated during hydro-demolition, surface roughening or similar operations to drain to any natural or constructed drainage conveyance including stormwater systems. Dispose of process water in a manner that does not violate ground water or surface water quality standards.
- Handle and dispose of cleaning waste material and demolition debris in a manner that does not cause contamination of water. Dispose of sweeping material from a pick-up sweeper at an appropriate disposal site.

Maintenance Standards

Continually monitor operations to determine whether slurry, cuttings, or process water could enter waters of the state. If inspections show that a violation of water quality standards could occur, stop operations and immediately implement preventive measures such as berms, barriers, secondary containment, and/or vacuumtrucks.

BMP C153: Material Delivery, Storage, and Containment

Purpose

Prevent, reduce, or eliminate the discharge of pollutants to the stormwater system or watercourses from material delivery and storage. Minimize the storage of hazardous materials on-site, store materials in a designated area, and install secondary containment.

Conditions of Use

Use at construction sites with delivery and storage of the following materials:

- Petroleum products such as fuel, oil and grease
- Soil stabilizers and binders (e.g., Polyacrylamide)
- Fertilizers, pesticides and herbicides
- Detergents
- Asphalt and concrete compounds
- Hazardous chemicals such as acids, lime, adhesives, paints, solvents, and curing compounds
- Any other material that may be detrimental if released to the environment

Design and Installation Specifications

- The temporary storage area should be located away from vehicular traffic, near the construction entrance(s), and away from waterways or storm drains.
- Safety Data Sheets (SDS) should be supplied for all materials stored. Chemicals should be kept in their original labeled containers.
- Hazardous material storage on-site should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- During the wet weather season (Oct 1 – April 30), consider storing materials in a covered area.
- Materials should be stored in secondary containments, such as an earthen dike, horse trough, or even a children's wading pool for non-reactive materials such as detergents, oil, grease, and paints. Small amounts of material may be secondarily contained in "bus boy" trays or concrete mixing trays.
- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and, when possible, within secondary containment.
- If drums must be kept uncovered, store them at a slight angle to reduce ponding of rainwater

on the lids to reduce corrosion. Domed plastic covers are inexpensive and snap to the top of drums, preventing water from collecting.

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be stored in approved containers and drums and shall not be overfilled. Containers and drums shall be stored in temporary secondary containment facilities.
- Temporary secondary containment facilities shall provide for a spill containment volume able to contain 10% of the total enclosed container volume of all containers, or 110% of the capacity of the largest container within its boundary, whichever is greater.
- Secondary containment facilities shall be impervious to the materials stored therein for a minimum contact time of 72 hours.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- During the wet weather season (Oct 1 – April 30), each secondary containment facility shall be covered during non-working days, prior to and during rain events.
- Keep material storage areas clean, organized and equipped with an ample supply of appropriate spill clean-up material (spill kit).
- The spill kit should include, at a minimum:
    - 1-Water Resistant Nylon Bag
    - 3-Oil Absorbent Socks 3”x 4’
    - 2-Oil Absorbent Socks 3”x 10’
    - 12-Oil Absorbent Pads 17”x19”
    - 1-Pair Splash Resistant Goggles
    - 3-Pair Nitrile Gloves
    - 10-Disposable Bags with Ties
    - Instructions

Maintenance Standards

- Secondary containment facilities shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into drums. These liquids shall be handled as hazardous waste unless testing determines them to be non-hazardous.
- Re-stock spill kit materials as needed.

BMP C220: Inlet Protection

Purpose

Inlet protection prevents coarse sediment from entering drainage systems prior to permanent stabilization of the disturbed area.

Conditions of Use

Use inlet protection at inlets that are operational before permanent stabilization of the disturbed areas that contribute runoff to the inlet. Provide protection for all storm drain inlets downslope and within 500 feet of a disturbed or construction area, unless those inlets are preceded by a sediment trapping BMP.

Also consider inlet protection for lawn and yard drains on new home construction. These small and numerous drains coupled with lack of gutters can add significant amounts of sediment into the roof drain system. If possible, delay installing lawn and yard drains until just before landscaping, or cap these drains to prevent sediment from entering the system until completion of landscaping. Provide 18-inches of sod around each finished lawn and yard drain.

Table II-3.10: Storm Drain Inlet Protection lists several options for inlet protection. All of the methods for inlet protection tend to plug and require a high frequency of maintenance. Limit contributing drainage areas for an individual inlet to one acre or less. If possible, provide emergency overflows with additional end-of-pipe treatment where stormwater ponding would cause a hazard.

Table II-3.10: Storm Drain Inlet Protection

Type of Inlet Protection	Emergency Overflow	Applicable for Paved/ Earthen Surfaces	Conditions of Use
Drop Inlet Protection			
Excavated drop inlet protection	Yes, temporary flooding may occur	Earthen	Applicable for heavy flows. Easy to maintain. Large area requirement: 30'x30'/acre
Block and gravel drop inlet protection	Yes	Paved or Earthen	Applicable for heavy concentrated flows. Will not pond.
Gravel and wire drop inlet protection	No	Paved or Earthen	Applicable for heavy concentrated flows. Will pond. Can withstand traffic.
Catch basin filters	Yes	Paved or Earthen	Frequent maintenance required.
Curb Inlet Protection			
Curb inlet protection with wooden weir	Small capacity overflow	Paved	Used for sturdy, more compact installation.
Block and gravel curb inlet protection	Yes	Paved	Sturdy, but limited filtration.
Culvert Inlet Protection			
Culvert inlet sediment trap	N/A	N/A	18 month expected life.

Design and Installation Specifications

Excavated Drop Inlet Protection

Excavated drop inlet protection consists of an excavated impoundment around the storm drain inlet. Sediment settles out of the stormwater prior to entering the storm drain. Design and installation specifications for excavated drop inlet protection include:

- Provide a depth of 1-2 ft as measured from the crest of the inlet structure.
- Slope sides of excavation should be no steeper than 2H:1V.
- Minimum volume of excavation is 35 cubic yards.
- Shape the excavation to fit the site, with the longest dimension oriented toward the longest inflow area.
- Install provisions for draining to prevent standing water.

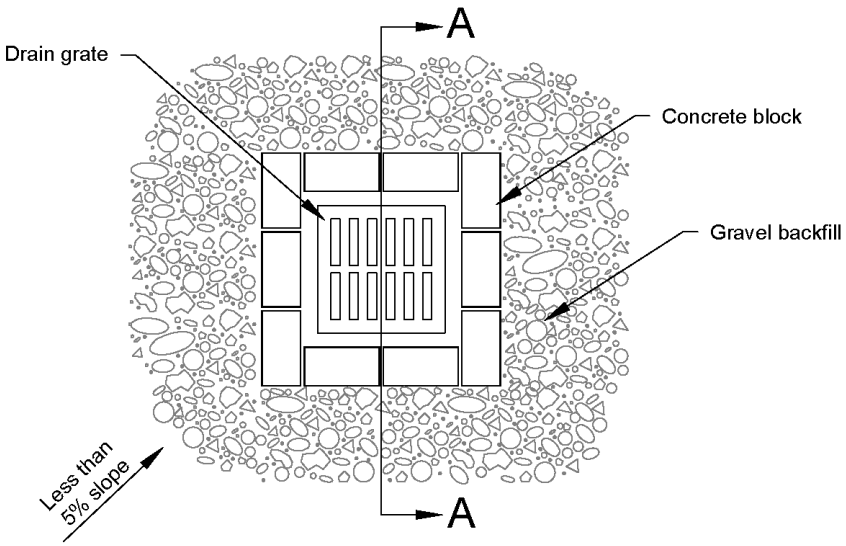
- Clear the area of all debris.
- Grade the approach to the inlet uniformly.
- Drill weep holes into the side of the inlet.
- Protect weep holes with screen wire and washed aggregate.
- Seal weep holes when removing structure and stabilizing area.
- Build a temporary dike, if necessary, to the down slope side of the structure to prevent bypass flow.

Block and Gravel Filter

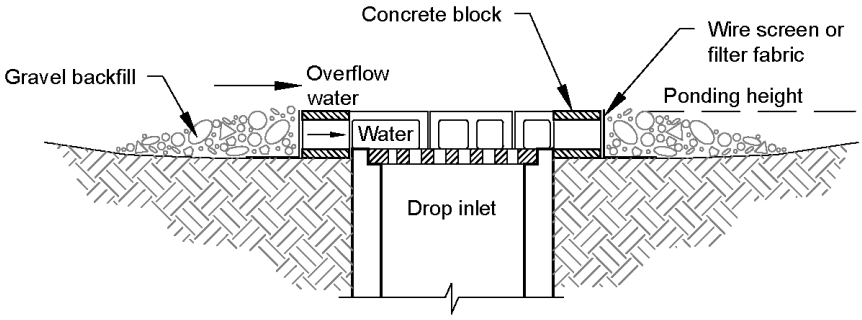
A block and gravel filter is a barrier formed around the inlet with standard concrete blocks and gravel. See Figure II-3.17: Block and Gravel Filter. Design and installation specifications for block gravel fil- ters include:

- Provide a height of 1 to 2 feet above the inlet.
- Recess the first row of blocks 2-inches into the ground for stability.
- Support subsequent courses by placing a pressure treated wood 2x4 through the block open- ing.
- Do not use mortar.
- Lay some blocks in the bottom row on their side to allow for dewatering the pool.
- Place hardware cloth or comparable wire mesh with ½-inch openings over all block openings.
- Place gravel to just below the top of blocks on slopes of 2H:1V or flatter.
- An alternative design is a gravel berm surrounding the inlet, as follows:
    - Provide a slope of 3H:1V on the upstream side of the berm.
    - Provide a slope of 2H:1V on the downstream side of the berm.
    - Provide a 1-foot wide level stone area between the gravel berm and the inlet.
    - Use stones 3 inches in diameter or larger on the upstream slope of the berm.
    - Use gravel ½- to ¾-inch at a minimum thickness of 1-foot on the downstream slope of the berm.

Figure II-3.17: Block and Gravel Filter



Plan View



Section A-A

Notes:

1. Drop inlet sediment barriers are to be used for small, nearly level drainage areas. (less than 5%)
2. Excavate a basin of sufficient size adjacent to the drop inlet.
3. The top of the structure (ponding height) must be well below the ground elevation downslope to prevent runoff from bypassing the inlet. A temporary dike may be necessary on the downslope side of the structure.

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Block and Gravel Filter

Revised June 2016

Gravel and Wire Mesh Filter

Gravel and wire mesh filters are gravel barriers placed over the top of the inlet. This method does not provide an overflow. Design and installation specifications for gravel and wire mesh filters include:

- Use a hardware cloth or comparable wire mesh with ½-inch openings.
    - Place wire mesh over the drop inlet so that the wire extends a minimum of 1-foot beyond each side of the inlet structure.
    - Overlap the strips if more than one strip of mesh is necessary.
- Place coarse aggregate over the wire mesh.
    - Provide at least a 12-inch depth of aggregate over the entire inlet opening and extend at least 18-inches on all sides.

Catch Basin Filters

Catch basin filters are designed by manufacturers for construction sites. The limited sediment storage capacity increases the amount of inspection and maintenance required, which may be daily for heavy sediment loads. To reduce maintenance requirements, combine a catch basin filter with another type of inlet protection. This type of inlet protection provides flow bypass without overflow and therefore may be a better method for inlets located along active rights-of-way. Design and installation specifications for catch basin filters include:

- Provides 5 cubic feet of storage.
- Requires dewatering provisions.
- Provides a high-flow bypass that will not clog under normal use at a construction site.
- Insert the catch basin filter in the catch basin just below the grating.

Curb Inlet Protection with Wooden Weir

Curb inlet protection with wooden weir is an option that consists of a barrier formed around a curb inlet with a wooden frame and gravel. Design and installation specifications for curb inlet protection with wooden weirs include:

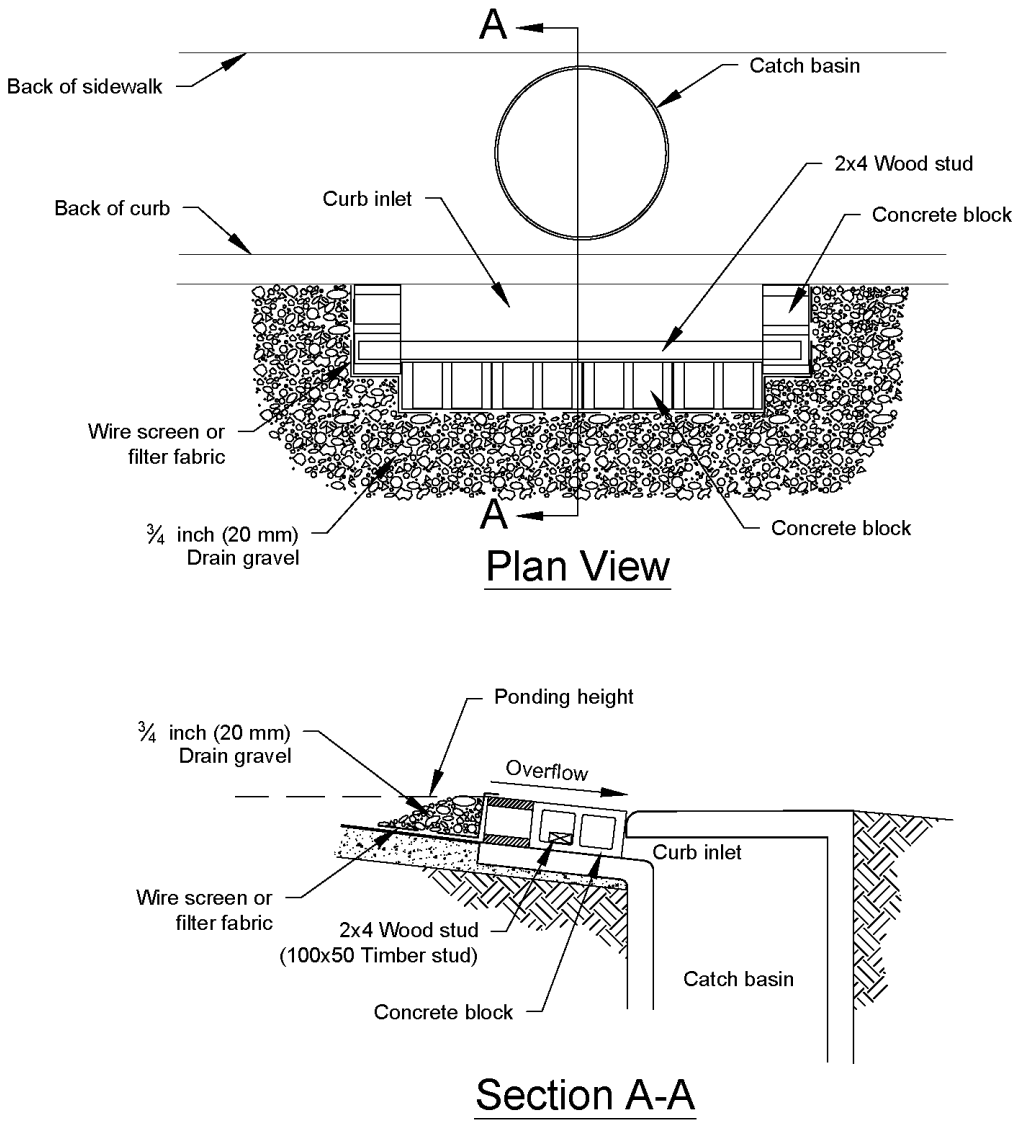
- Use wire mesh with ½-inch openings.
- Use extra strength filter cloth.
- Construct a frame.
- Attach the wire and filter fabric to the frame.
- Pile coarse washed aggregate against the wire and fabric.
- Place weight on the frame anchors.

Block and Gravel Curb Inlet Protection

Block and gravel curb inlet protection is a barrier formed around a curb inlet with concrete blocks and gravel. See Figure II-3.18: Block and Gravel Curb Inlet Protection. Design and installation specifications for block and gravel curb inlet protection include:

- Use wire mesh with ½-inch openings.
- Place two concrete blocks on their sides abutting the curb at either side of the inlet opening. These are spacer blocks.
- Place a 2x4 stud through the outer holes of each spacer block to align the front blocks.
- Place blocks on their sides across the front of the inlet and abutting the spacer blocks.
- Place wire mesh over the outside vertical face.
- Pile coarse aggregate against the wire to the top of the barrier.

Figure II-3.18: Block and Gravel Curb Inlet Protection



Notes:

1. Use block and gravel type sediment barrier when curb inlet is located in gently sloping street segment, where water can pond and allow sediment to separate from runoff.
2. Barrier shall allow for overflow from severe storm event.
3. Inspect barriers and remove sediment after each storm event. Sediment and gravel must be removed from the traveled way immediately.

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State of Washington

Block and Gravel Curb Inlet Protection

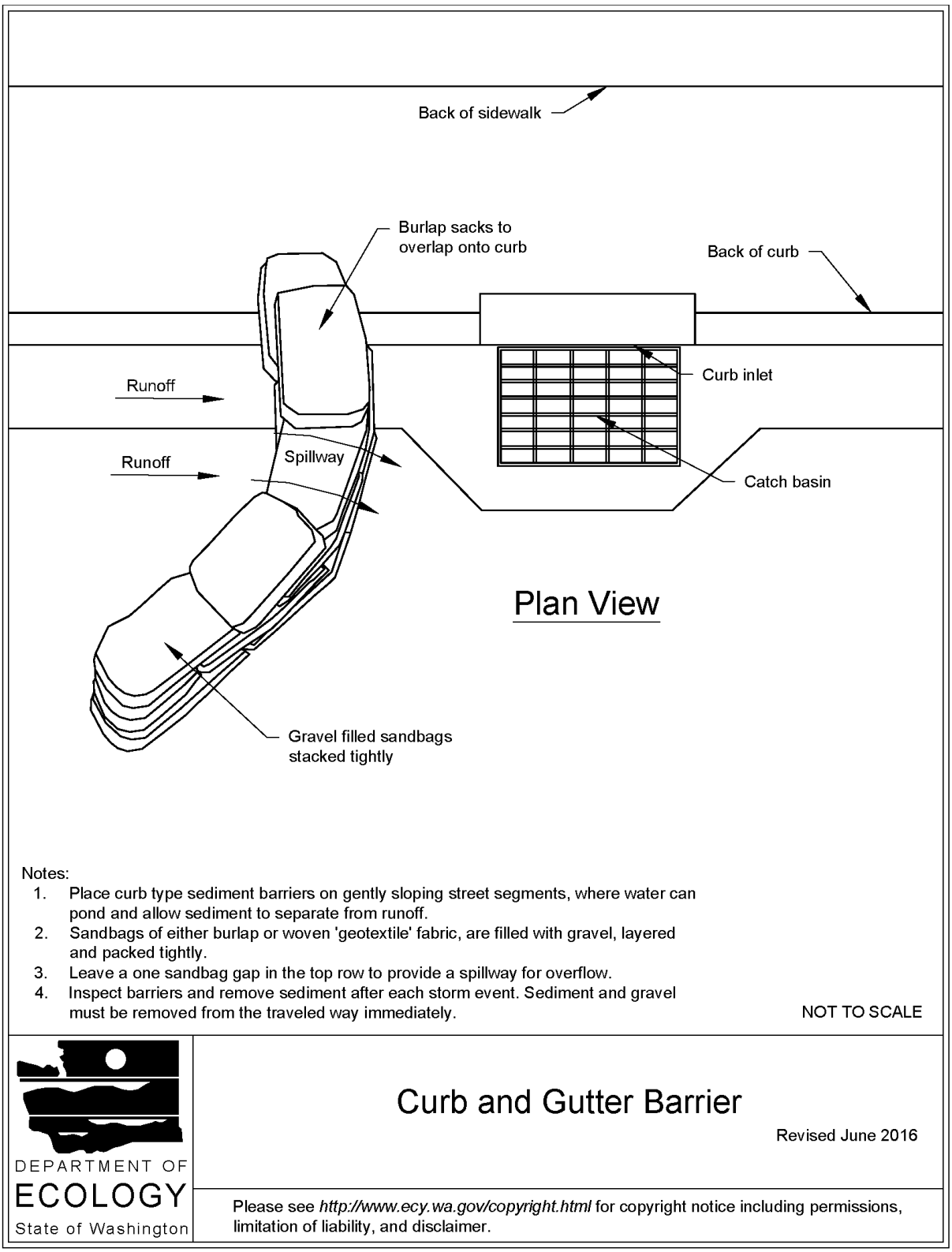
Revised June 2016

Curb and Gutter Sediment Barrier

Curb and gutter sediment barrier is a sandbag or rock berm (riprap and aggregate) 3 feet high and 3 feet wide in a horseshoe shape. See Figure II-3.19: Curb and Gutter Barrier. Design and installation specifications for curb and gutter sediment barrier include:

- Construct a horseshoe shaped berm, faced with coarse aggregate if using riprap, 3 feet high and 3 feet wide, at least 2 feet from the inlet.
- Construct a horseshoe shaped sedimentation trap on the upstream side of the berm. Size the trap to sediment trap standards for protecting a culvert inlet.

Figure II-3.19: Curb and Gutter Barrier



Maintenance Standards

- Inspect all forms of inlet protection frequently, especially after storm events. Clean and replace clogged catch basin filters. For rock and gravel filters, pull away the rocks from the inlet and clean or replace. An alternative approach would be to use the clogged rock as fill and put fresh rock around the inlet.
- Do not wash sediment into storm drains while cleaning. Spread all excavated material evenly over the surrounding land area or stockpile and stabilize as appropriate.

Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept these products, or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's website at:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C233: Silt Fence

Purpose

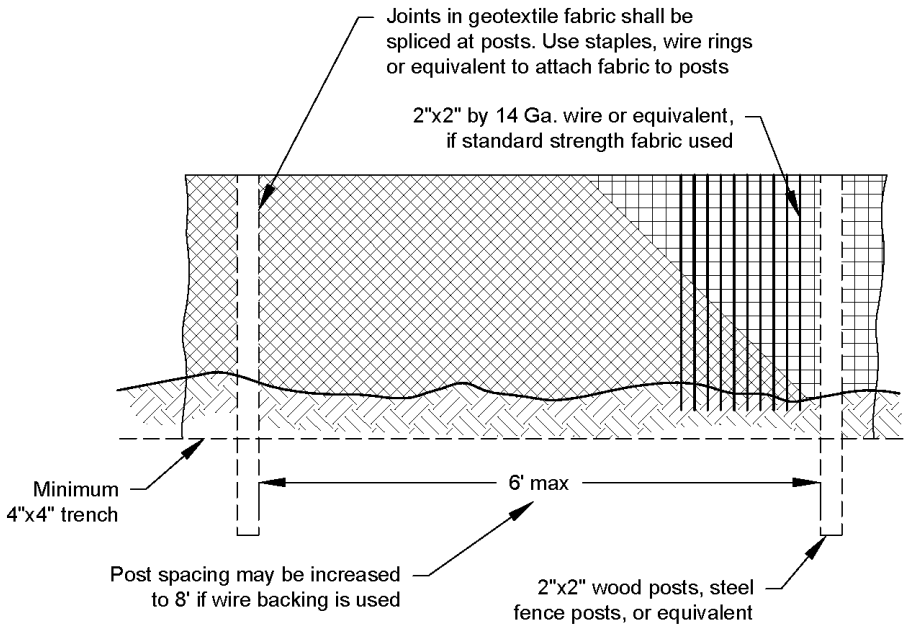
Silt fence reduces the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

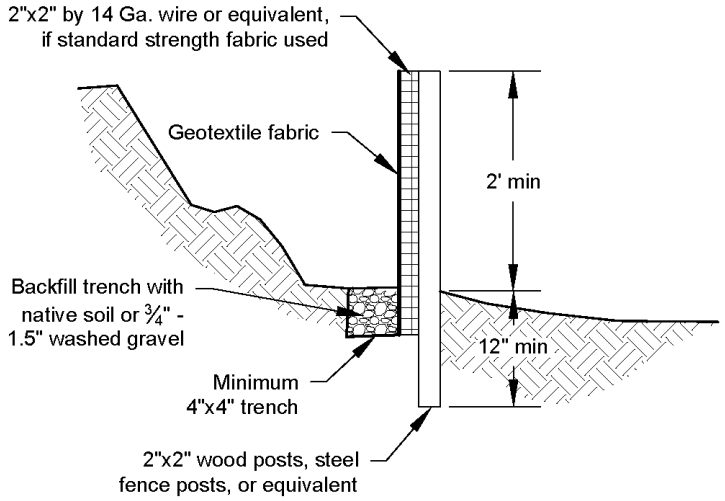
Conditions of Use

Silt fence may be used downslope of all disturbed areas.

- Silt fence shall prevent sediment carried by runoff from going beneath, through, or over the top of the silt fence, but shall allow the water to pass through the fence.
- Silt fence is not intended to treat concentrated flows, nor is it intended to treat substantial amounts of overland flow. Convey any concentrated flows through the drainage system to a sediment trapping BMP.
- Do not construct silt fences in streams or use in V-shaped ditches. Silt fences do not provide an adequate method of silt control for anything deeper than sheet or overland flow.

Figure II-3.22: Silt Fence





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State of Washington

Silt Fence

Revised July 2017

Design and Installation Specifications

- Use in combination with other construction stormwater BMPs.
- Maximum slope steepness (perpendicular to the silt fence line) 1H:1V.
- Maximum sheet or overland flow path length to the silt fence of 100 feet.
- Do not allow flows greater than 0.5 cfs.
- Use geotextile fabric that meets the following standards. All geotextile properties listed below are minimum average roll values (i.e., the test result for any sampled roll in a lot shall meet or exceed the values shown in Table II-3.11: Geotextile Fabric Standards for Silt Fence):

Table II-3.11: Geotextile Fabric Standards for Silt Fence

Geotextile Property	Minimum Average Roll Value
Polymeric Mesh AOS (ASTM D4751)	0.60 mm maximum for slit film woven (#30 sieve). 0.30 mm maximum for all other geotextile types (#50 sieve). 0.15 mm minimum for all fabric types (#100 sieve).
Water Permittivity (ASTM D4491)	0.02 sec^{-1} minimum
Grab Tensile Strength (ASTM D4632)	180 lbs. Minimum for extra strength fabric. 100 lbs minimum for standard strength fabric.
Grab Tensile Strength (ASTM D4632)	30% maximum
Ultraviolet Resistance (ASTM D4355)	70% minimum

- Support standard strength geotextiles with wire mesh, chicken wire, 2-inch x 2-inch wire, safety fence, or jute mesh to increase the strength of the geotextile. Silt fence materials are available that have synthetic mesh backing attached.
- Silt fence material shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0°F to 120°F.
- One-hundred percent biodegradable silt fence is available that is strong, long lasting, and can be left in place after the project is completed, if permitted by the local jurisdiction.
- Refer to Figure II-3.22: Silt Fence for standard silt fence details. Include the following Standard Notes for silt fence on construction plans and specifications:

    1. The Contractor shall install and maintain temporary silt fences at the locations shown in the Plans.
    2. Construct silt fences in areas of clearing, grading, or drainage prior to starting those

activities.

3. The silt fence shall have a 2-feet min. and a 2½-feet max. height above the original ground surface.

4. The geotextile fabric shall be sewn together at the point of manufacture to form fabric lengths as required. Locate all sewn seams at support posts. Alternatively, two sections of silt fence can be overlapped, provided that the overlap is long enough and that the adjacent silt fence sections are close enough together to prevent silt laden water from escaping through the fence at the overlap.

5. Attach the geotextile fabric on the up-slope side of the posts and secure with staples, wire, or in accordance with the manufacturer's recommendations. Attach the geotextile fabric to the posts in a manner that reduces the potential for tearing.

6. Support the geotextile fabric with wire or plastic mesh, dependent on the properties of the geotextile selected for use. If wire or plastic mesh is used, fasten the mesh securely to the up-slope side of the posts with the geotextile fabric up-slope of the mesh.

7. Mesh support, if used, shall consist of steel wire with a maximum mesh spacing of 2-inches, or a prefabricated polymeric mesh. The strength of the wire or polymeric mesh shall be equivalent to or greater than 180 lbs. grab tensile strength. The polymeric mesh must be as resistant to the same level of ultraviolet radiation as the geotextile fabric it supports.

8. Bury the bottom of the geotextile fabric 4-inches min. below the ground surface. Backfill and tamp soil in place over the buried portion of the geotextile fabric, so that no flow can pass beneath the silt fence and scouring cannot occur. When wire or polymeric back-up support mesh is used, the wire or polymeric mesh shall extend into the ground 3-inches min.

9. Drive or place the silt fence posts into the ground 18-inches min. A 12–inch min. depth is allowed if topsoil or other soft subgrade soil is not present and 18-inches cannot be reached. Increase fence post min. depths by 6 inches if the fence is located on slopes of 3H:1V or steeper and the slope is perpendicular to the fence. If required post depths cannot be obtained, the posts shall be adequately secured by bracing or guying to prevent overturning of the fence due to sediment loading.

10. Use wood, steel or equivalent posts. The spacing of the support posts shall be a maximum of 6-feet. Posts shall consist of either:

    - Wood with minimum dimensions of 2 inches by 2 inches by 3 feet. Wood shall be free of defects such as knots, splits, or gouges.
    - No. 6 steel rebar or larger.
    - ASTM A 120 steel pipe with a minimum diameter of 1-inch.
    - U, T, L, or C shape steel posts with a minimum weight of 1.35 lbs./ft.
    - Other steel posts having equivalent strength and bending resistance to the post sizes listed above.

11. Locate silt fences on contour as much as possible, except at the ends of the fence, where the fence shall be turned uphill such that the silt fence captures the runoff water and prevents water from flowing around the end of the fence.

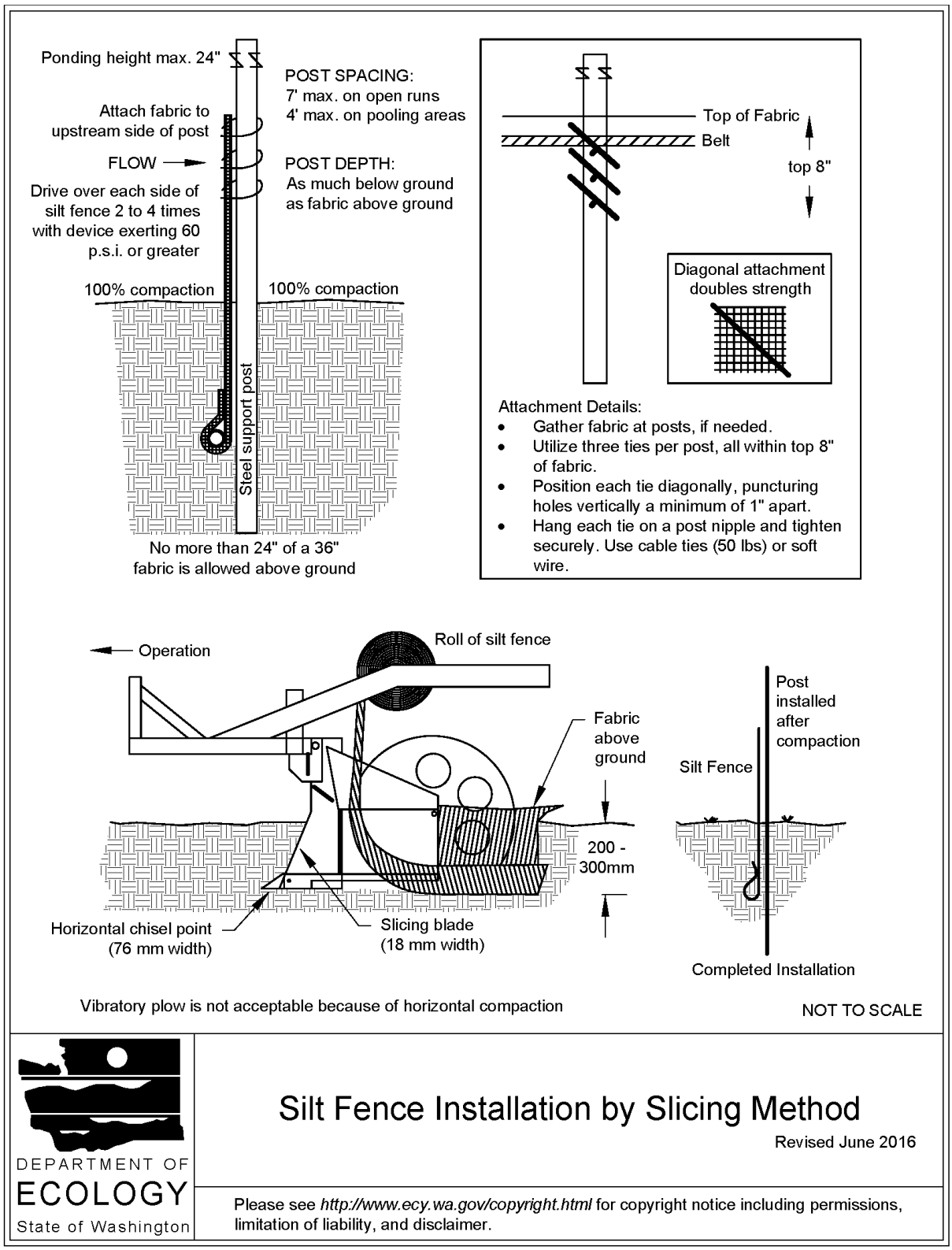
12. If the fence must cross contours, with the exception of the ends of the fence, place check dams perpendicular to the back of the fence to minimize concentrated flow and erosion. The slope of the fence line where contours must be crossed shall not be steeper than 3H:1V.

    - Check dams shall be approximately 1-foot deep at the back of the fence. Check dams shall be continued perpendicular to the fence at the same elevation until the top of the check dam intercepts the ground surface behind the fence.
    - Check dams shall consist of crushed surfacing base course, gravel backfill for walls, or shoulder ballast. Check dams shall be located every 10 feet along the fence where the fence must cross contours.

- Refer to Figure II-3.23: Silt Fence Installation by Slicing Method for slicing method details. The following are specifications for silt fence installation using the slicing method:

    1. The base of both end posts must be at least 2- to 4-inches above the top of the geo-textile fabric on the middle posts for ditch checks to drain properly. Use a hand level or string level, if necessary, to mark base points before installation.
    2. Install posts 3- to 4-feet apart in critical retention areas and 6- to 7-feet apart in standard applications.
    3. Install posts 24-inches deep on the downstream side of the silt fence, and as close as possible to the geotextile fabric, enabling posts to support the geotextile fabric from upstream water pressure.
    4. Install posts with the nipples facing away from the geotextile fabric.
    5. Attach the geotextile fabric to each post with three ties, all spaced within the top 8-inches of the fabric. Attach each tie diagonally 45 degrees through the fabric, with each puncture at least 1-inch vertically apart. Each tie should be positioned to hang on a post nipple when tightening to prevent sagging.
    6. Wrap approximately 6-inches of the geotextile fabric around the end posts and secure with 3 ties.
    7. No more than 24-inches of a 36-inch geotextile fabric is allowed above ground level.
    8. Compact the soil immediately next to the geotextile fabric with the front wheel of the tractor, skid steer, or roller exerting at least 60 pounds per square inch. Compact the upstream side first and then each side twice for a total of four trips. Check and correct the silt fence installation for any deviation before compaction. Use a flat-bladed shovel to tuck the fabric deeper into the ground if necessary.

Figure II-3.23: Silt Fence Installation by Slicing Method



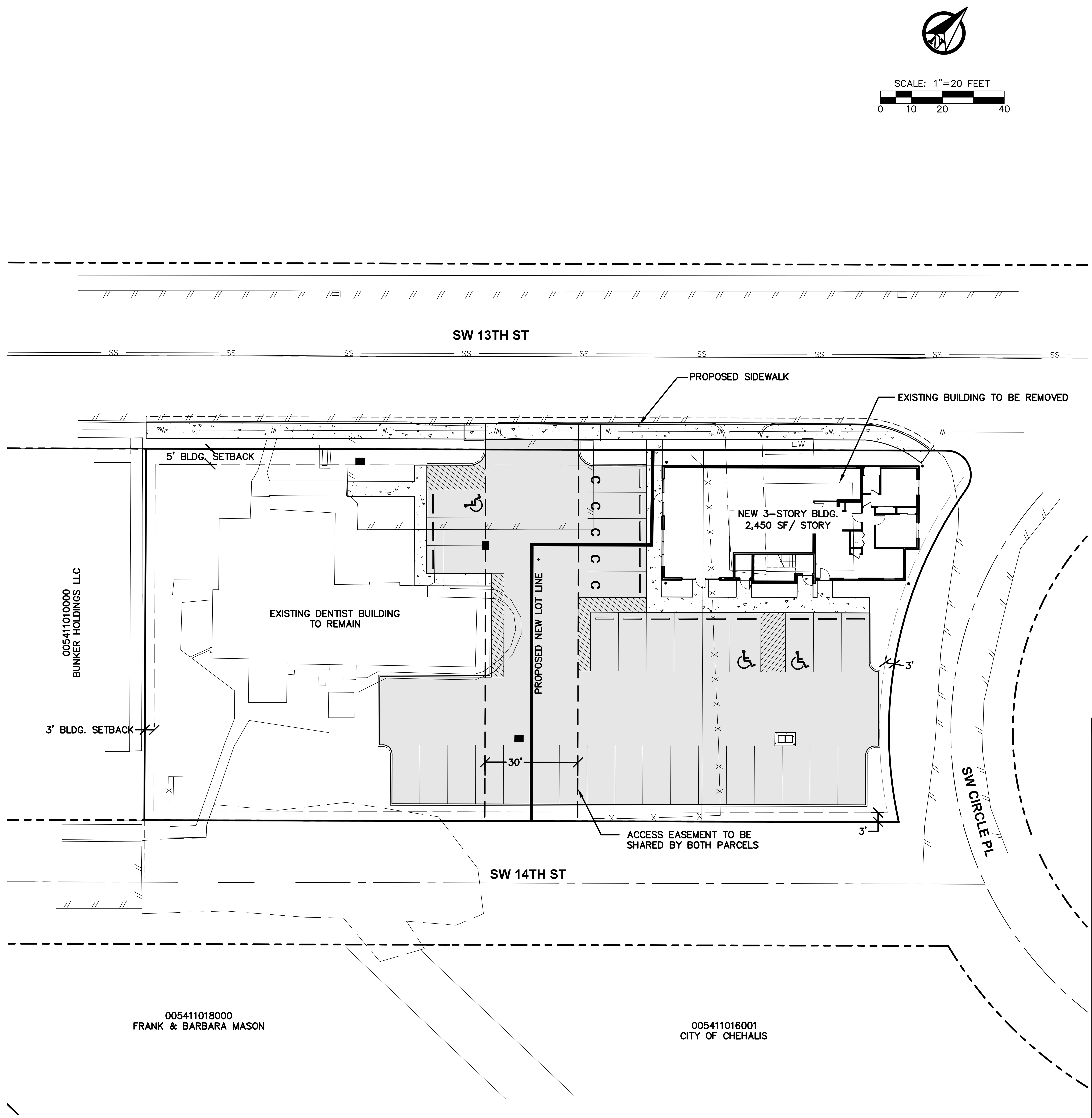
Maintenance Standards

- Repair any damage immediately.
- Intercept and convey all evident concentrated flows uphill of the silt fence to a sediment trapping BMP.
- Check the uphill side of the silt fence for signs of the fence clogging and acting as a barrier to flow and then causing channelization of flows parallel to the fence. If this occurs, replace the fence and remove the trapped sediment.
- Remove sediment deposits when the deposit reaches approximately one-third the height of the silt fence, or install a second silt fence.
- Replace geotextile fabric that has deteriorated due to ultraviolet breakdown.

APPENDIX 6 – DRAINAGE AND TESC PLANS

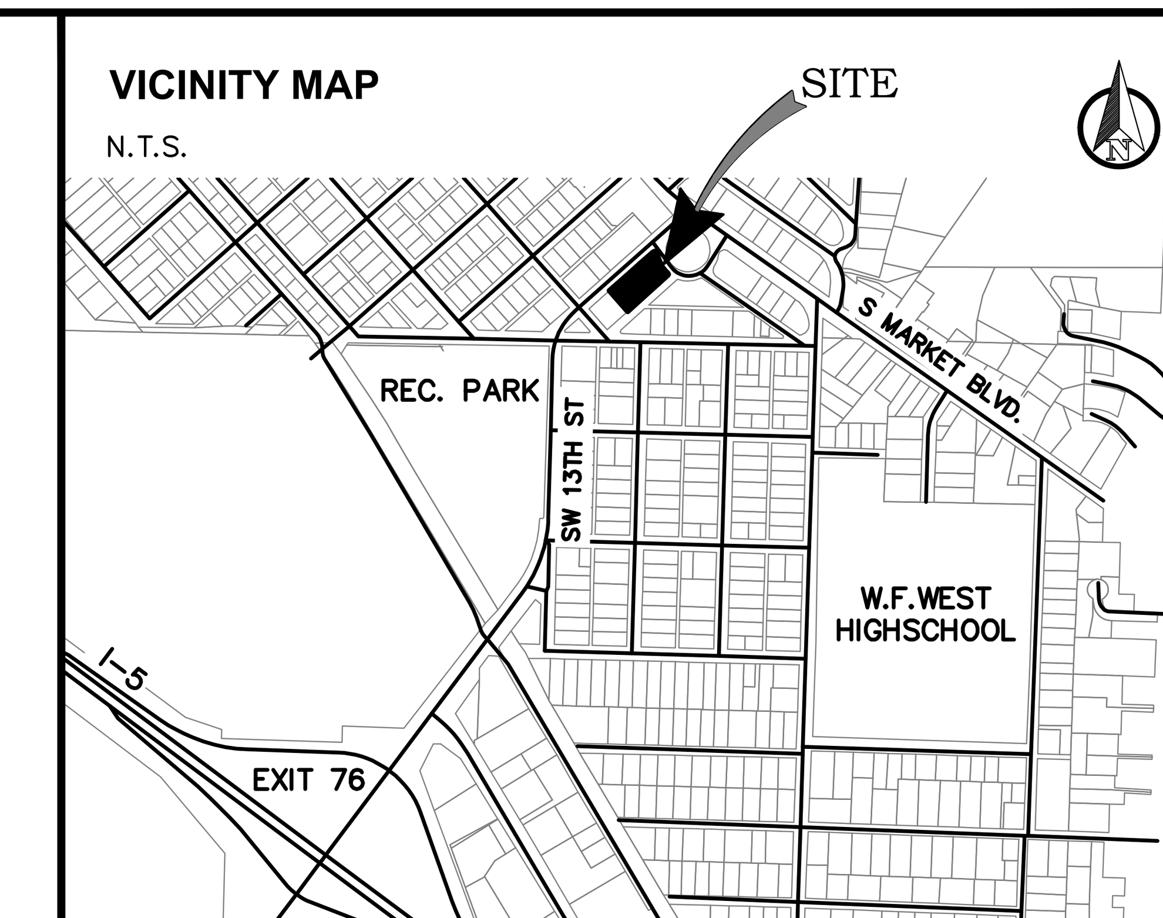
CHEHALIS VILLAGE SQUARE

SECTION 32, TOWNSHIP 14 NORTH, RANGE 02 WEST, W.M.
LEWIS COUNTY, WASHINGTON



VICINITY MAP

N.T.S.



PROJECT INFORMATION

APPLICANT:	DAN BIRK ERETZ CAPITAL LLC 5171 S SPENCER ST SEATTLE, WA 98818 (206) 550-6295 DAN.BIRK@ERETZCAP.COM
ENGINEER:	ROBERT W. BALMELLI 91 S.W. 13TH ST. P.O. BOX 923 CHEHALIS, WA. 98532-0923 (360) 740-8919 PHONE (360) 740-8912 FAX
SURVEYOR:	BLUHM & ASSOCIATES 1068 S MARKET BLVD. CHEHLAIS, WA 98532 (360) 748-1551
PARCEL NOS:	005411013001, 005411014000
SITE ADDRESS:	68 SW 13TH ST CHEHALIS, WA 98532
LAND USE APPROVAL:	PRE-APPLICATION
SEPA CHECKLIST:	YES
CRITICAL AREAS:	NO
ZONING:	C-O COMMERCIAL OFFICE/ MIXED USE
SETBACKS:	FRONT 5', BACK 0', ADJ. 3'
MAX. BLDG. HEIGHT:	35 FEET
BUILDING SIZE/USE:	2,450 SF / COMMERCIAL & RESIDENTIAL
BUILDING HEIGHT:	TBD
TOTAL SITE AREA:	0.66 ACRES
EXISTING IMPERVIOUS:	0.16 ACRES (24.2%)
NEW IMPERVIOUS:	0.27 ACRES
REPLACED IMPERVIOUS:	0.03 ACRES
NEW+REPLACED IMPERV:	0.30 ACRES (45.5%)
DISTURBED PERVIOUS:	0.25 ACRES
LANDSCAPE AREA:	0.25 ACRES
TOTAL DISTURBED AREA:	0.25 ACRES
STREET FRONTAGE:	257 LINEAR FEET
GRADING (CUT/FILL):	±188 CY CUT / ±335 CY FILL
STORMWATER REGS:	2019 SWMMWW - LIST METHOD
SOIL CLASSIFICATION	NRCS
INFILTRATION:	NO
TREATMENT:	BASIC
FLOW CONTROL:	DETENTION
NPDES STORM PERMIT:	YES
ROAD CLASSIFICATION:	PUBLIC ARTERIAL
DRIVEWAY WIDTH:	30' WIDE, MAX. ALLOWED = 30'
EXISTING PARKING:	5 STALLS
PARKING REQUIRED:	2 PER UNIT AND 5 PER 1000 SF COMMERCIAL 24 NEW + 5 EXISTING = 29 TOTAL
ADA REQUIRED:	2 STALLS
PARKING PROVIDED:	31 STD. STALLS, 2 ADA STALLS 33 TOTAL STALLS
WATER SERVICE:	CITY OF CHEHALIS (360) 748-0238
SEWER SERVICE:	CITY OF CHEHALIS (360) 748-0238
FIRE DISTRICT:	CITY OF CHEHALIS (360) 748-3394
SCHOOL DISTRICT:	CHEHALIS SCHOOL DISTRICT (360) 807-7200
POWER SERVICE:	LEWIS COUNTY PUD (800) 562-5612
GAS SERVICE:	PUGET SOUND ENERGY (888) 225-5773

SHEET INDEX

SURVEY INFORMATION

RECORD OF SURVEY DESCRIPTION

LOT 1 AND 2 OF BLOCK 7, OF HENDERSON LAND COMPANY'S FIRST ADDITION OF THE CITY OF CHEHALIS AS RECORDED IN VOL. 1 OF PLATS, PAGE 87, RECORDS OF LEWIS COUNTY, WASHINGTON.

VERTICAL DATUM

NAVD88

BASIS OF BEARING

RECORD OF SURVEY FILED UNDER VOLUME 30 OF SURVYES PAGE 161, AUDITOR'S NO. 3440275, RECORDS OF LEWIS COUNTY, WASHINGTON (C/L OF 13TH ST.)

GEOTECHNICAL NOTE

A GEOTECHNICAL REPORT WAS PREPARED BY ___________ FOR THIS PROJECT. GEOTECNICAL INFORMATION WAS NOT FIELD VERIFIED BY RB ENGINEERING

WORK IN COUNTY RIGHT-OF-WAY

CONTRACTOR TO OBTAIN RIGHT OF WAY PERMIT PRIOR TO ANY WORK WITHIN COUNTY RIGHT OF WAY. ALL WORK WITHIN COUNTY RIGHT OF WAY SHALL ADHERE TO COUNTY STANDARDS AS OUTLINED IN THE RIGHT OF WAY PERMIT.

TOPOGRAPHIC NOTE

TOPOGRAPHIC INFORMATION DEPICTED HEREON WAS PROVIDED BY ___________________________. TOPOGRAPHIC INFORMATION WAS NOT FIELD VERIFIED BY RB ENGINEERING.

REVISION

NO.	DATE	REVISION

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE: 1"=20'

CHEHALIS VILLAGE SQUARE
CHEHALIS WA.

CIVIL COVER SHEET AND SITE PLAN

ROBERT W. BALMELLI
STATE OF WASHINGTON
32107
REGISTERED PROFESSIONAL ENGINEER

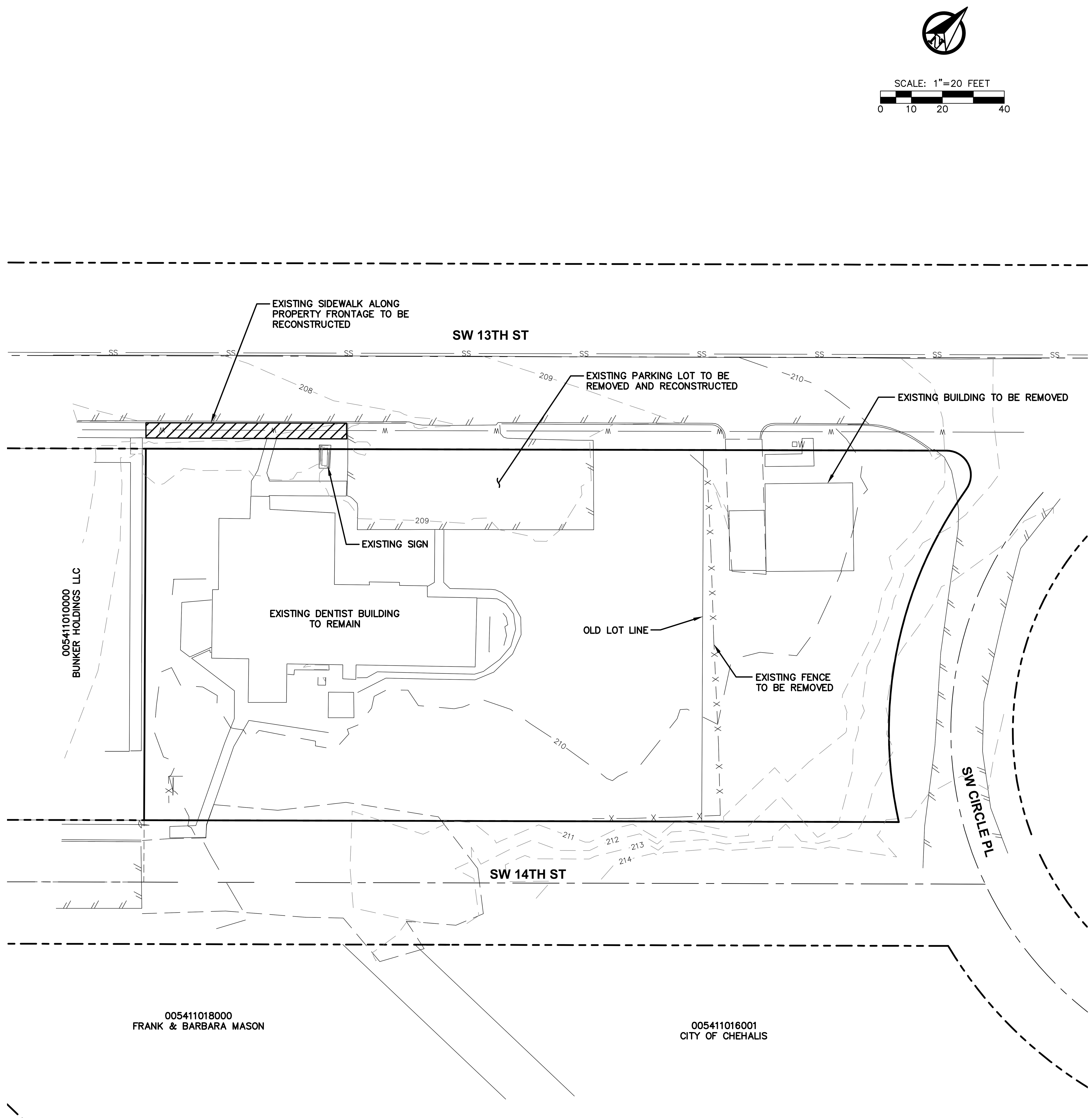
RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8919
EMAIL: CivilPros@RBEngineers.com

811 Know what's below. Call 811 before you dig.

JOB NUMBER
23051

DRAWING NAME
23051_C0.1_CVSP

C0.1



REVISION
NO. DATE

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE: 1"=20'

CHEHALIS VILLAGE SQUARE
CHEHALIS WA.

EXISTING SITE PLAN

ROBERT W. BA... REGISTERED PROFESSIONAL ENGINEER

RB Engineering
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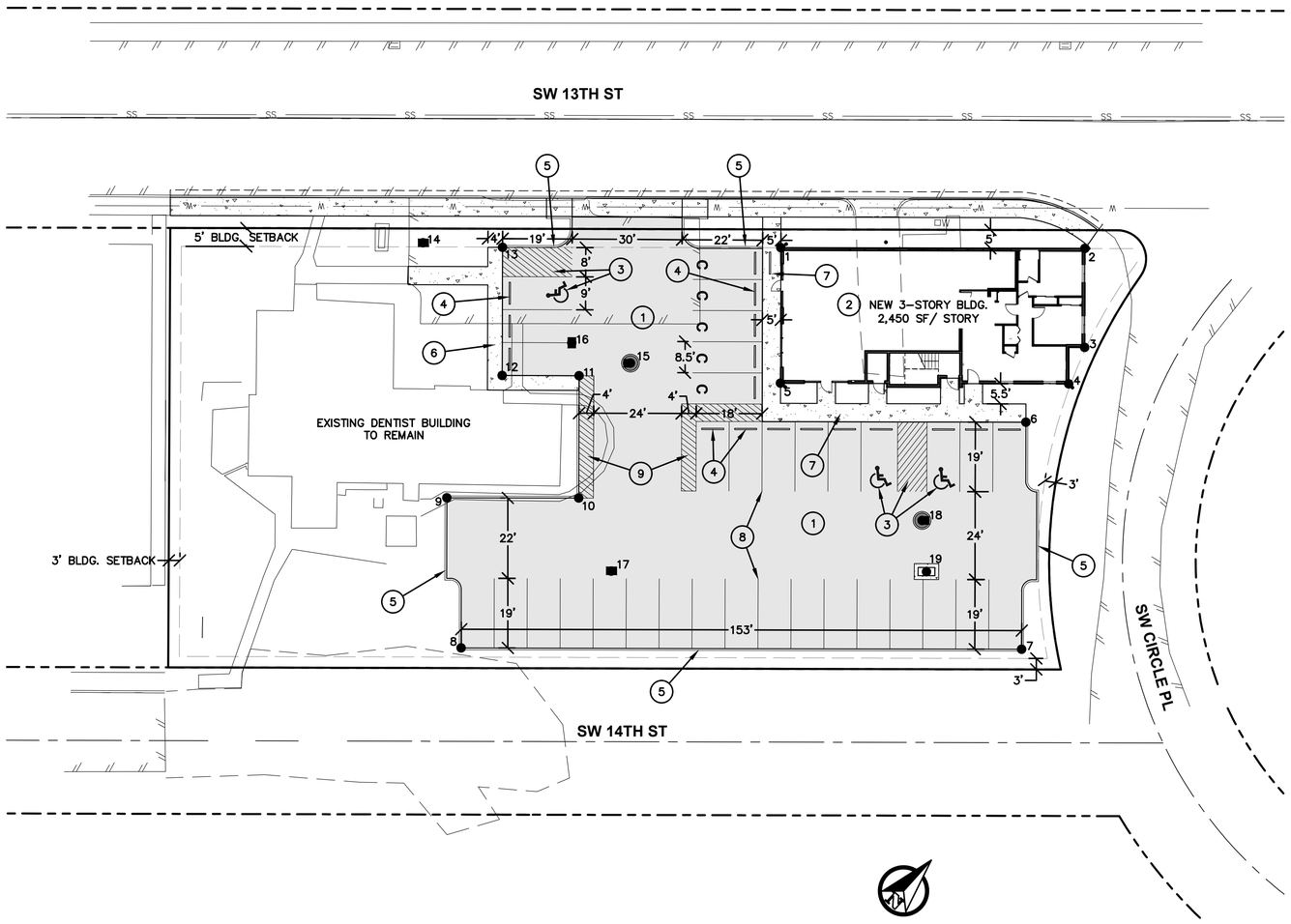
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8919
EMAIL: CraigProsse@RBEngineers.com

811 Know what's below. Call 811 before you dig.

JOB NUMBER
23051
DRAWING NAME
23051_C0.2_EXSP
C0.2
2 OF 11



SCALE: 1"=20 FEET
0 10 20 40

COORDINATE TABLE			
Point #	Description	Northing	Easting
1	BUILDING	10245.00	10781.29
2	BUILDING	10300.32	10843.16
3	BUILDING	10280.20	10861.16
4	BUILDING	10269.85	10864.60
5	BUILDING	10217.42	10805.95
6	PARKING	10254.25	10862.90
7	PARKING	10207.37	10903.48
8	PARKING	10105.38	10789.42
9	PARKING	10133.28	10759.11
10	PARKING	10157.27	10785.94
11	PARKING	10182.18	10763.69
12	PARKING	10168.19	10748.02
13	PARKING	10194.29	10724.70
14	STORM	10180.72	10707.74
15	STORM	10194.13	10771.84
16	STORM	10187.56	10756.19
17	STORM	10148.37	10805.87
18	STORM	10215.37	10859.74
19	STORM	10205.75	10869.99

ADA NOTE:

ALL NEW SIDEWALKS SHALL NOT EXCEED 2% SIDE SLOPE AND ADA PARKING STALLS AND RAMP LANDINGS SHALL NOT EXCEED 2 PERCENT SLOPE IN ALL DIRECTIONS. ALL ADA ACCESSIBLE ROUTES IDENTIFIED ON THE PLANS SHALL NOT EXCEED 5% LONGITUDINAL GRADE. ALL ADA RAMPS SHALL NOT EXCEED 8% GRADE AND 2% CROSS SLOPE. CONTRACTOR IS RESPONSIBLE TO CHECK GRADES PRIOR TO CONCRETE AND PAVING WORK. ANY GRADES EXCEEDING THE ABOVE LIMITS WILL BE REQUIRED TO BE CORRECTED AT THE SOLE EXPENSE OF THE CONTRACTOR.

STAKING AND INSPECTION NOTE:

CONTRACTOR SHALL CALL RB ENGINEERING 48 HOUR PRIOR TO POURING CONCRETE BARRIER OR CURB AND GUTTER FOR INSPECTION.

HORIZONTAL CONTROL NOTES:

1. CONSTRUCT NEW PAVED PARKING LOT PER PLAN COORDINATES AND DIMENSIONS. SEE DETAIL ON SHEET C1.2.
2. BUILDING FOUNDATION CORNERS SHALL BE STAKED BY WASHINGTON STATE LICENSED LAND SURVEYING.
3. CONSTRUCT NEW ADA PARKING STALLS AND STRIPING PER PLAN AND DETAIL ON SHEET C1.2.
4. INSTALL CONCRETE WHEEL STOPS AT PARKING STALLS SHOWN. SEE DETAIL ON SHEET C1.2.
5. CONSTRUCT NEW PARKING LOT CONCRETE EXTRUDED CURB PER DETAIL ON SHEET C1.2.
6. CONSTRUCT NEW ONSITE CONCRETE SIDEWALK FLUSH WITH PARKING LOT PER DETAIL ON SHEET C1.2.
7. CONSTRUCT NEW BUILDING PERIMETER CONCRETE SIDEWALKS PER DETAIL ON SHEET C1.2. PROVIDE CRACK CONTROL AND EXPANSION MATERIALS AT ALL BUILDING/CONCRETE CONNECTIONS.
8. STRIPE NEW PARKING LOT PARKING STALLS PER DETAIL ON SHEET C1.2,
9. STRIPE NEW WALKING PATH AS SHOWN ON PLANS.

NO. DATE REVISION

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE: 1"=20'

CHEHALIS VILLAGE SQUARE
CHEHALIS WA.

HORIZONTAL CONTROL PLAN

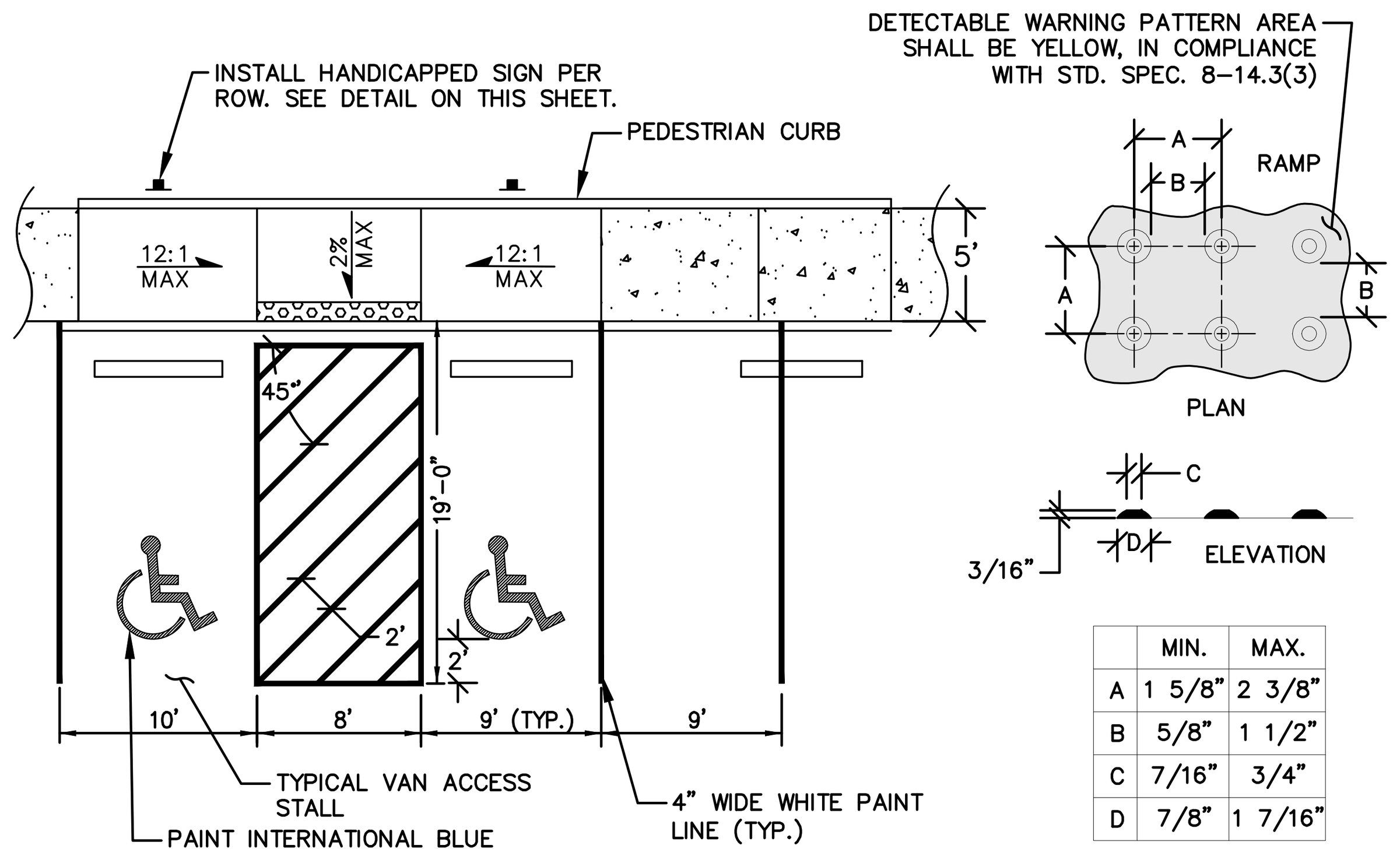
ROBERT W. BALLARD — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8919
EMAIL: CivilProject@RBengineers.com

811 Know what's below. Call 811 before you dig.

JOB NUMBER 23051
DRAWING NAME 23051_C1.1_HCPL

C1.1
3 OF 11



	MIN.	MAX.
A	1 5/8"	2 3/8"
B	5/8"	1 1/2"
C	7/16"	3/4"
D	7/8"	1 7/16"

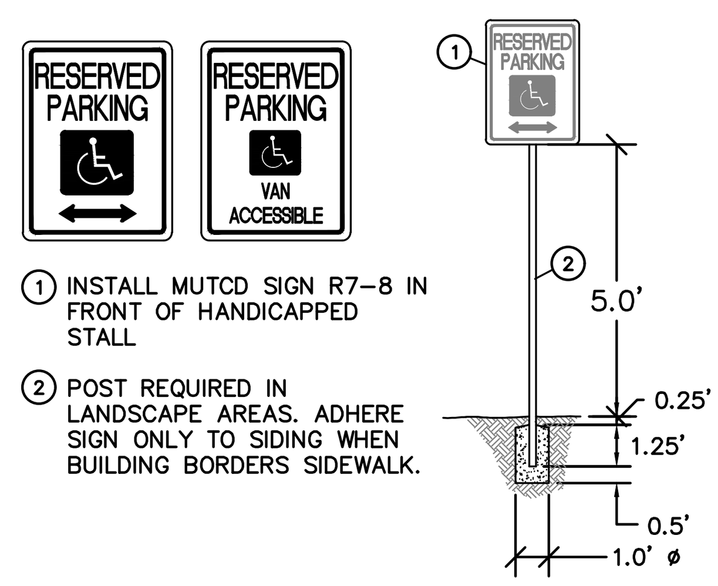
NOTES:

DETECTABLE WARNING SURFACE

1. THE DETECTABLE WARNING SURFACE (DWS) SHALL EXTEND THE FULL WIDTH OF THE CURB RAMP (EXCLUSIVE OF FLARES) OR THE LANDING.
2. THE DETECTABLE WARNING SURFACE SHALL BE PLACED AT THE BACK OF CURB, AND NEED NOT FOLLOW THE RADIUS.
3. THE ROWS OF TRUNCATED DOMES SHALL BE ALIGNED TO BE PERPENDICULAR TO GRADE BREAK AT THE BACK OF CURB.
4. THE ROWS OF TRUNCATED DOMES SHALL BE ALIGNED TO BE PARALLEL TO THE DIRECTION OF TRAVEL.
5. IF CURB AND GUTTER ARE NOT PRESENT, SUCH AS A SHARED-USE PATH CONNECTION, THE DETECTABLE WARNING SURFACE SHALL BE PLACED AT THE PAVEMENT EDGE.

SIDEWALK AND CURB RAMP

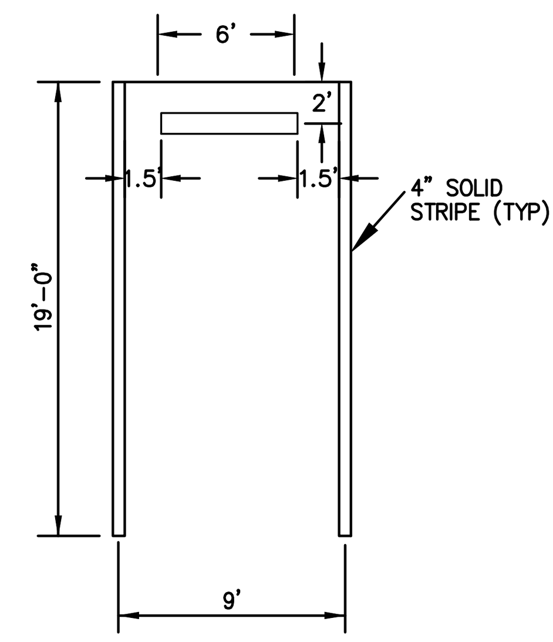
6. SEE STANDARD PLANS FOR SIDEWALK AND CURB RAMP DETAILS.
7. IF A CURB RAMP IS REQUIRED, THE LOCATION OF THE DETECTABLE WARNING SURFACE MUST BE AT THE BOTTOM OF THE RAMP AND WITHIN THE REQUIRED DISTANCE FORM THE RAIL.
8. WHEN THE GRADE BREAK BETWEEN THE CURB RAMP AND THE LANDING IS LESS THAN OR EQUAL TO 5 FT. FROM THE BACK OF CURB AT ALL POINTS, PLACE THE DETECTABLE WARNING SURFACE ON THE BOTTOM OF THE CURB RAMP.

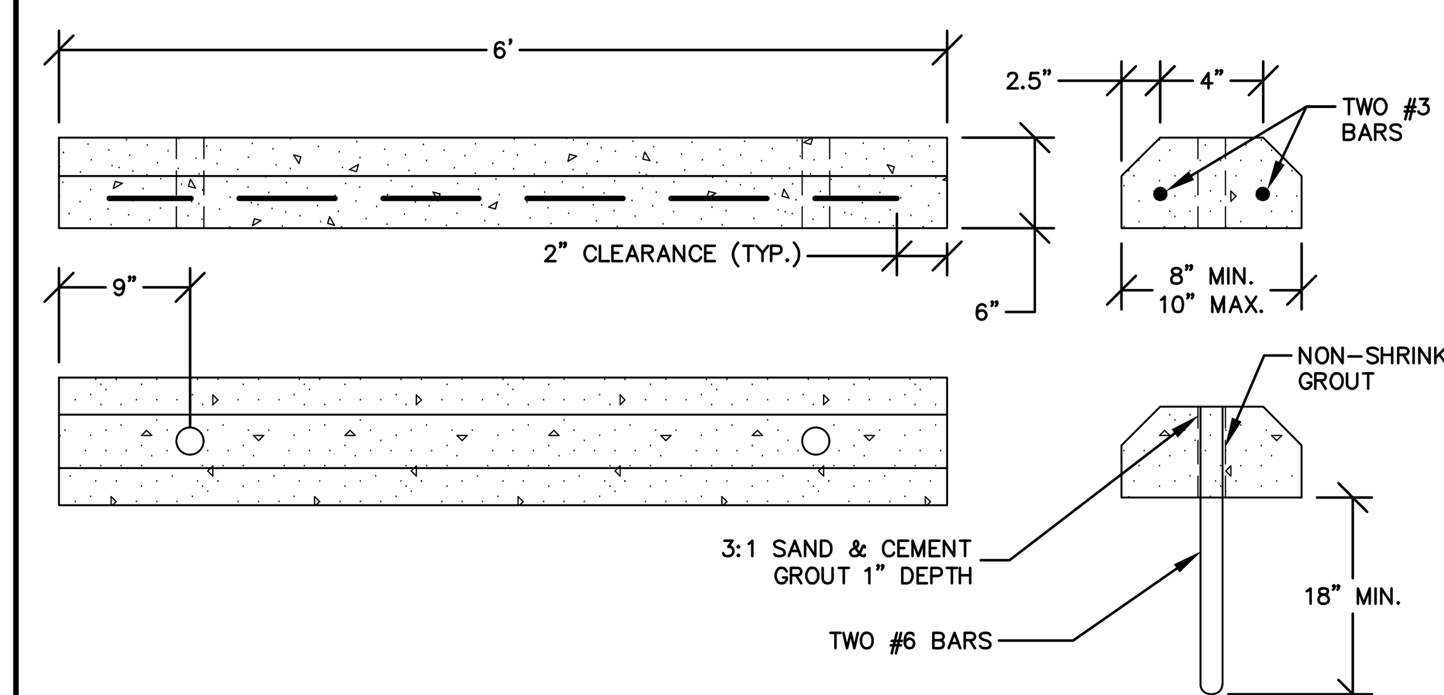


(1) INSTALL MUTCD SIGN R7-8 IN FRONT OF HANDICAPPED STALL

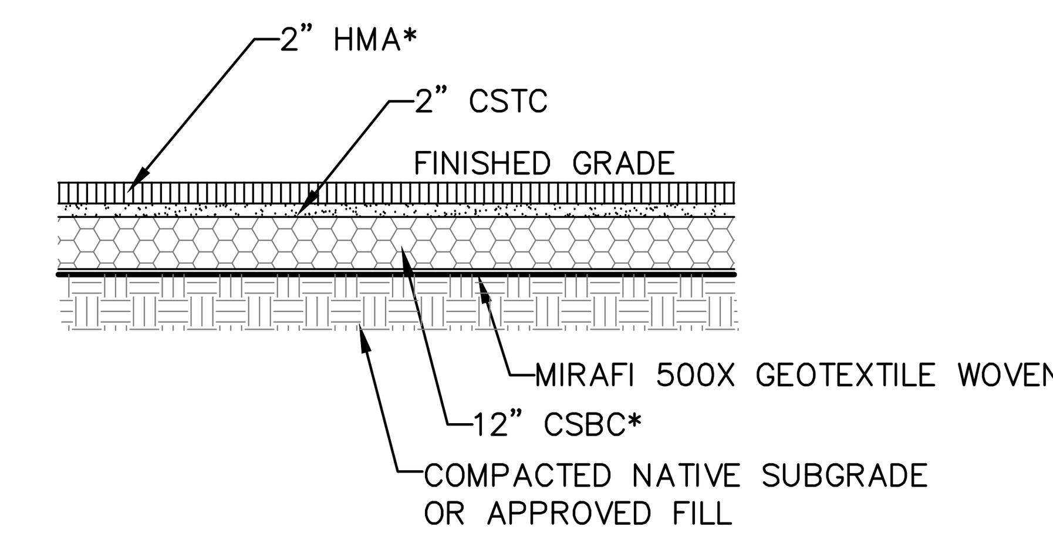
(2) POST REQUIRED IN LANDSCAPE AREAS. ADHERE SIGN ONLY TO SIDING WHEN BUILDING BORDERS SIDEWALK.

ADA STALL AND ACCESSIBILITY SIGN DETAIL
N.T.S.
RB ENGINEERING
ADD_SIGN&STALL.dwg



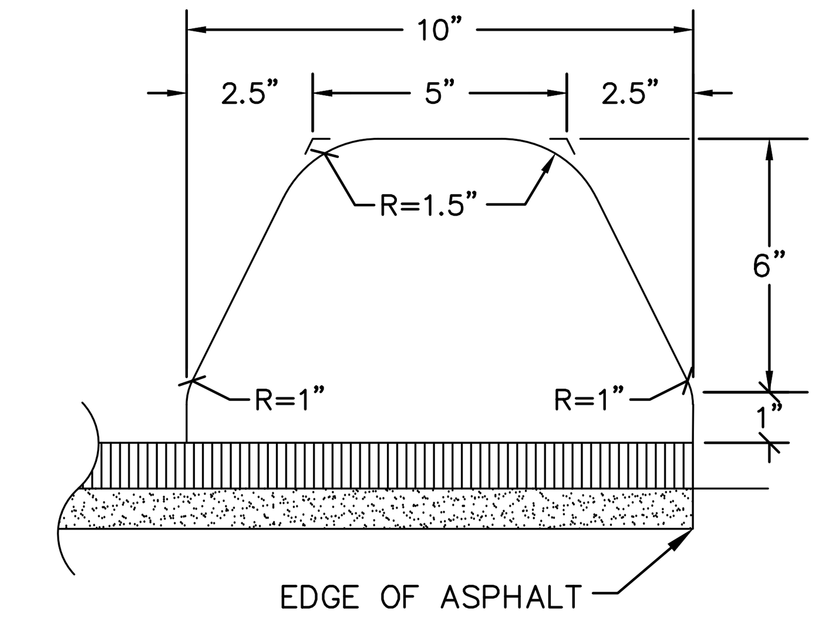


PARKING STALL & WHEEL STOP DETAIL
N.T.S.
RB ENGINEERING
PRK_ST&WH_STP.dwg

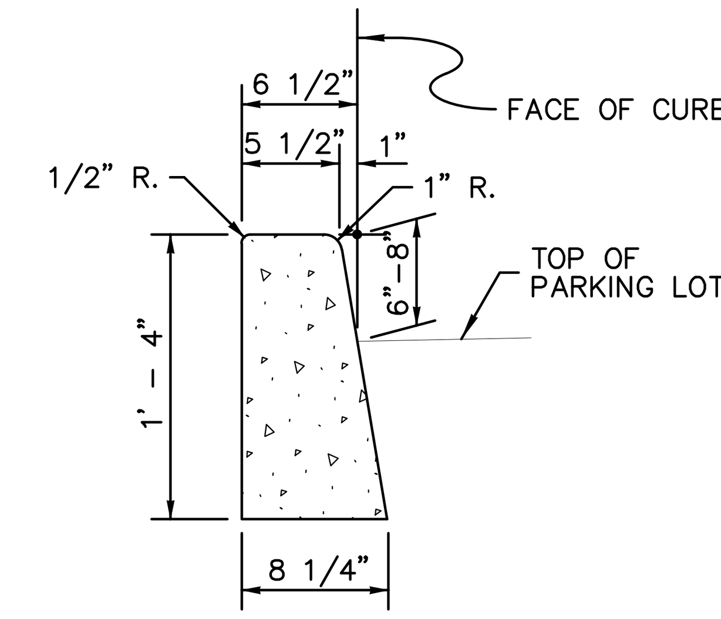


* ALL THICKNESSES ARE COMPACTED DEPTHS.

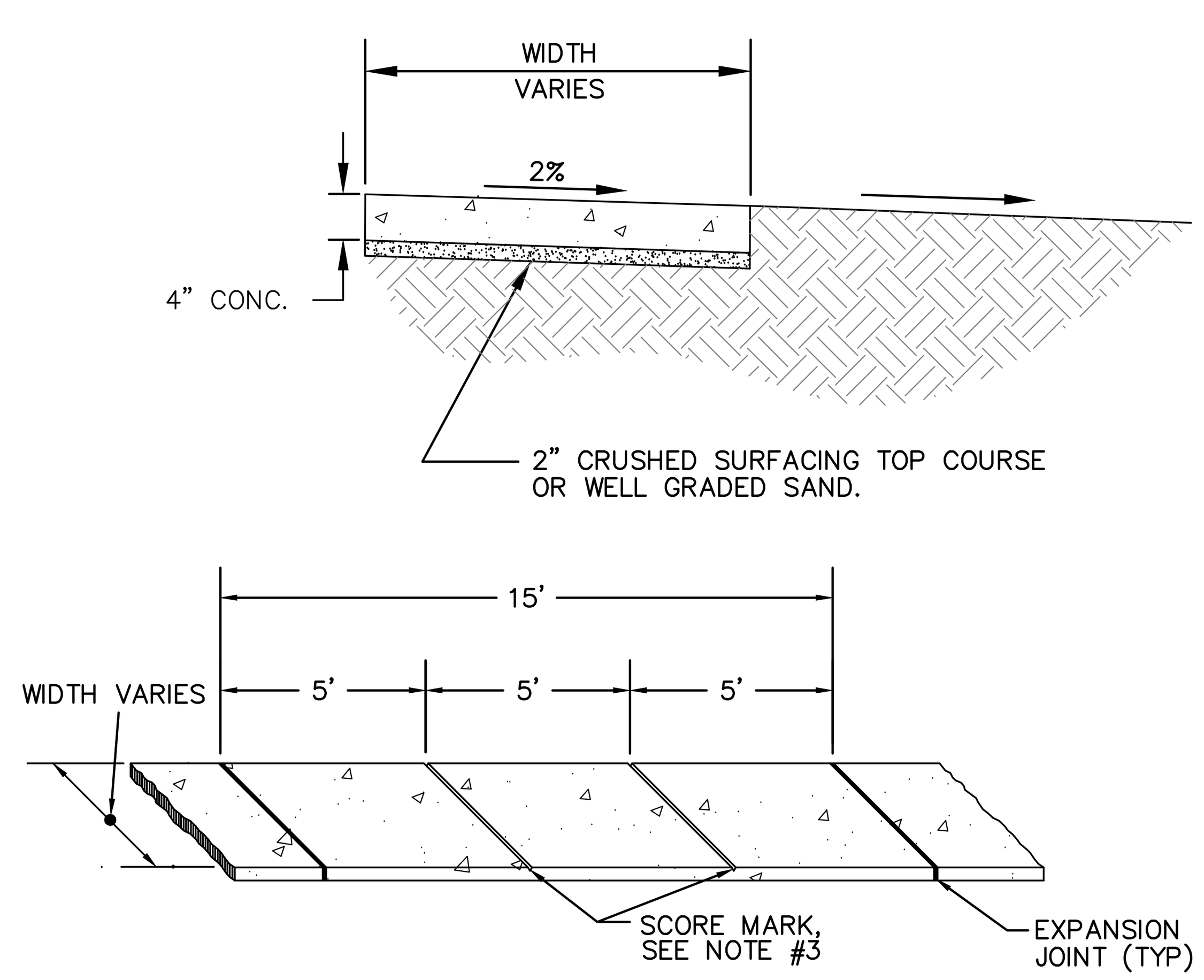
TYPICAL STRUCTURAL PAVING SECTION
N.T.S.
RB ENGINEERING
PAVING SECTION.dwg



EXTRUDED CURBING DETAIL
N.T.S.
RB ENGINEERING
EXTRUDED CURB.dwg



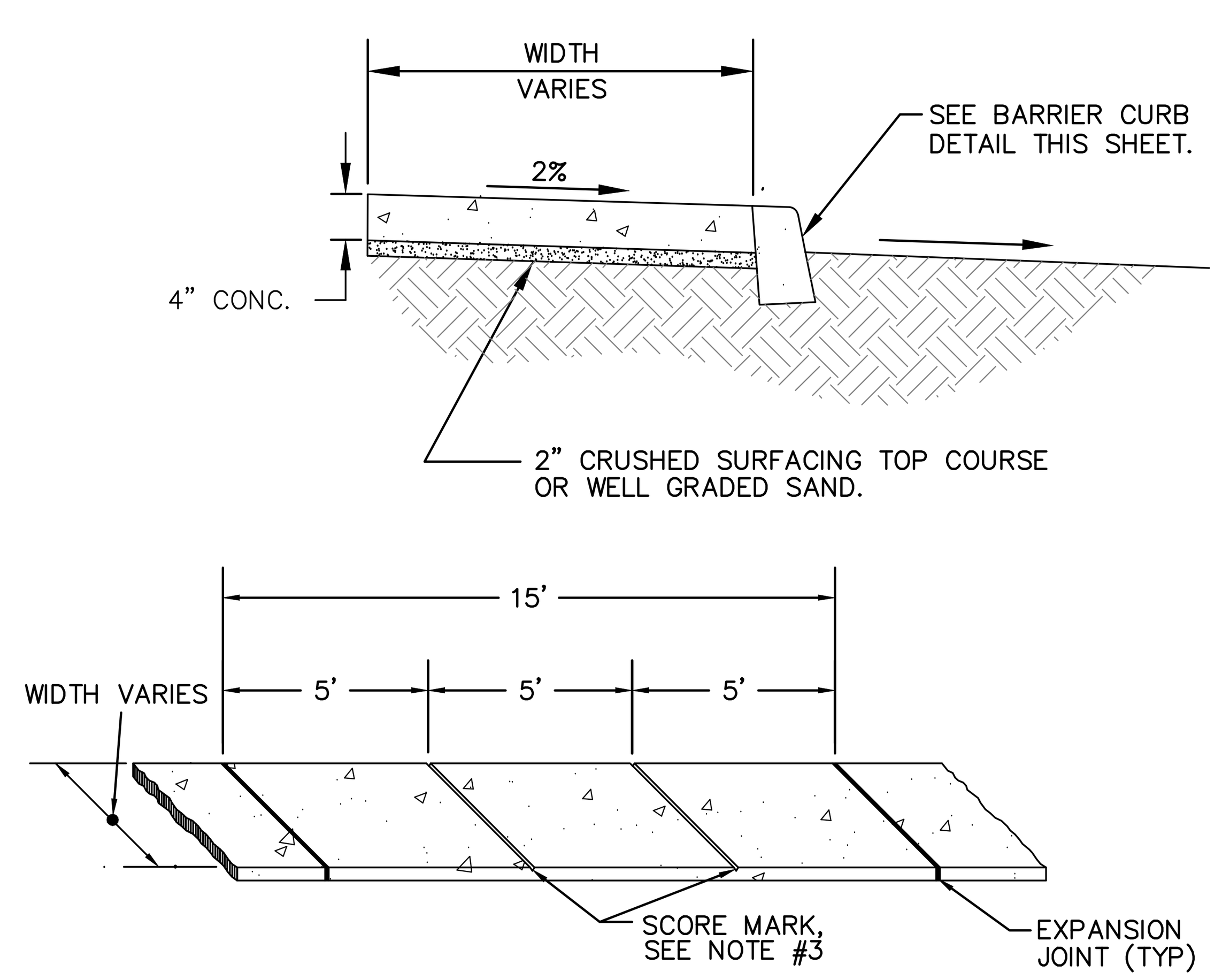
BARRIER CURB
N.T.S.
RB ENGINEERING
BARRIER_CURB.dwg



GENERAL NOTES:

1. EXPANSION JOINT MATERIAL TO BE 3/8" THICK PREMOLDED JOINT FILLER FULL THICKNESS OF CONCRETE.
2. FORM AND SUBGRADE INSPECTION REQUIRED BEFORE POURING CONCRETE.
3. SCORE MARKS SHALL BE ±1/8" WIDE BY ±1/4" DEEP. FOR SIDEWALKS OVER 8' IN WIDTH, A LONGITUDINAL SCORE MARK SHALL BE MADE ALONG CENTER OF WALK.
4. EXPANSION JOINTS SHALL BE INSTALLED IN CURB AND GUTTER AND IN SIDEWALK AT PC AND PT AT ALL CURB RETURNS. EXPANSION JOINTS SHALL BE PLACED IN SIDEWALK AT SAME LOCATIONS AS THOSE IN CURB AND GUTTER WHEN SIDEWALK IS ADJACENT TO CURB AND GUTTER, UNLESS OTHERWISE DIRECTED BY ENGINEER.

ONSITE SIDEWALK DETAIL
N.T.S.
RB ENGINEERING
ONSITE SIDEWALK.dwg



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BUILDING PERIMETER SIDEWALK DETAIL
N.T.S.
RB ENGINEERING
ONSITE SIDEWALK.dwg

REVISION
NO. DATE

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE:

CHEHALIS VILLAGE SQUARE
CHEHALIS WA.

HORIZONTAL CONTROL DETAILS

ROBERT W. BAKER, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER

RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8919
EMAIL: CallPros@RBEngineers.com

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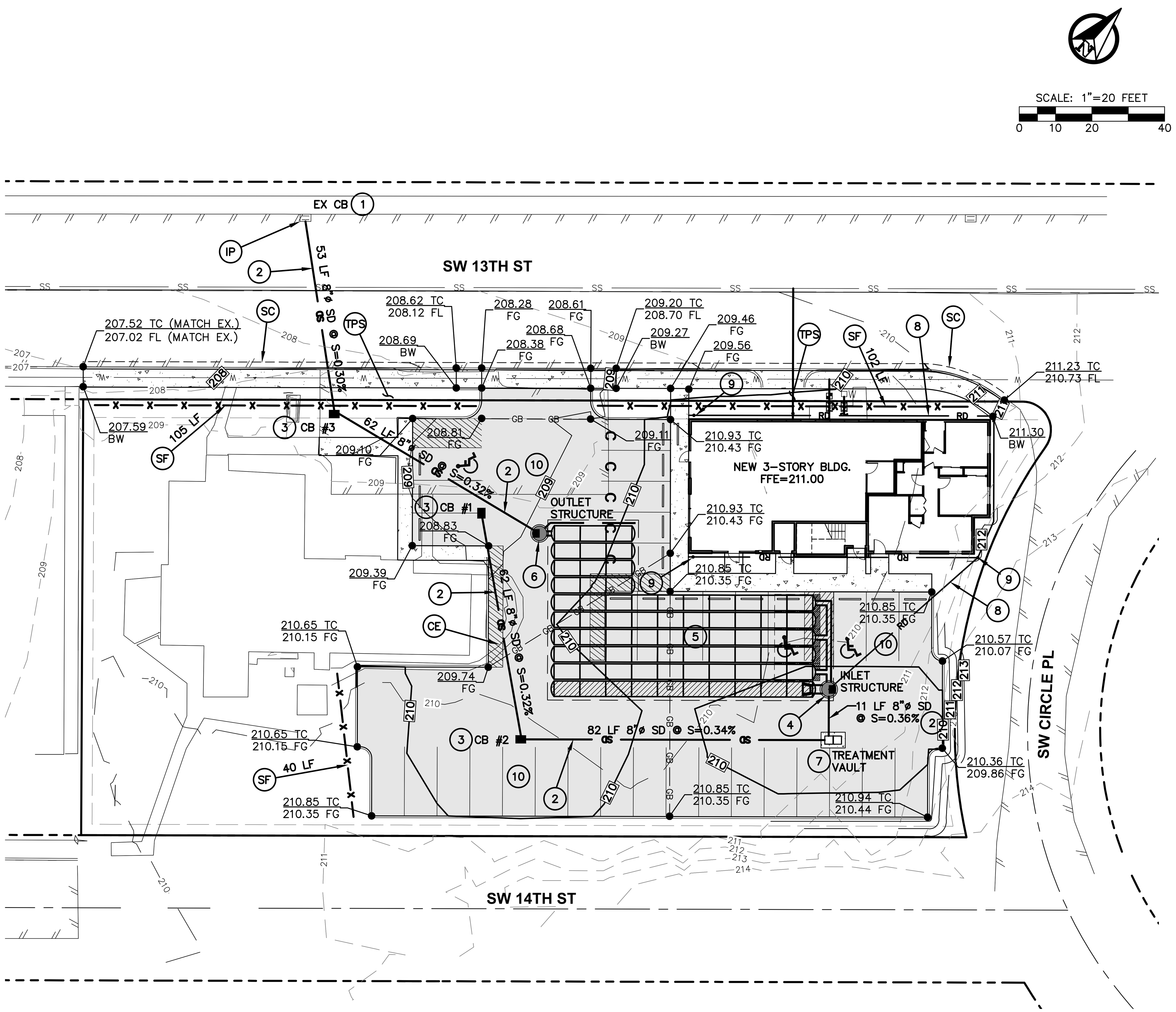
JOB NUMBER 23051
DRAWING NAME 23051_C1.2_HCDT
C1.2



WSDOE BMP LIST:

CONTRACTOR SHALL HAVE A COPY OF THE PROJECT SWPPP ONSITE AT ALL TIMES DURING CONSTRUCTION. SEE SWPPP FOR LISTED BMPS.

(TPS) TEMPORARY AND PERMANENT SEEDING – BMP C120

CONTRACTOR TO PROVIDE APPLY TEMPORARY AND PERMANENT HYDRO–SEEDING AS OUTLINED ON THE APPROVED TESC. PROVIDE SEED MIXES AT A RATE OF 120 POUNDS PER ACRE. SEED MIXES TO USE ARE PER APPLICABLE WSDOE TABLE 4.1.2 TEMPORARY EROSION CONTROL SEED, 4.1.3 LANDSCAPING SEED, 4.1.4 LOW–GROWING TURF SEED, 4.1.5 BIO–SWALE SEED, 4.1.6 WET AREA SEED AND 4.1.7 MEADOW SEED MIX. USE TYPICAL FERTILIZER OF 10–4–6 NPK AT A RATE OF 90 POUNDS PER ACRE AND MULCH PER BMP C121. ALL SLOPE AREAS SHALL BE SCARIFIED WITH TRACKED VEHICLE PERPENDICULAR TO THE SLOPE PRIOR TO SEEDING SLOPE.

(SC) SAWCUTTING AND SURFACING POLLUTION PREVENTION – BMP C152

CONTRACTOR SHALL PROTECT ALL DRAINS FROM PROCESS WATER USED FOR SAWCUTTING ASPHALT AND CONCRETE PAVEMENTS. ALL PROCESS WATER SLURRY SHALL BE COLLECTED AND REMOVED FROM THE SITE AND DISPOSE PROCESS WATER IN A MANNER THAT DOES NOT VIOLATE GROUND OR SURFACE WATER QUALITY STANDARDS.

(IP) STORM DRAIN INLET PROTECTION – BMP C220

CONTRACTOR TO PROVIDE INLET PROTECTION ON ALL NEW CATCH BASIN INLETS IMMEDIATELY AFTER INSTALLATION. ALL EXISTING CATCH BASINS WITHIN 500 FEET OF THE SITE CONSTRUCTION ENTRANCE SHALL ALSO RECEIVE INLET PROTECTION. SEE DETAIL ON APPROVED PLANS. REMOVE THE BMP'S ONCE THE SITE IS DETERMINED TO BE STABILIZED BY THE PROJECT ENGINEER.

(SF) SILT FENCING – BMP C233

CONTRACTOR SHALL INSTALL ALL SILT FENCING PER APPROVED TESC PLAN AND WSDOE FIGURE II–4.2.12. SILT FENCING ALONG THE CLEARING LIMITS SHALL BE ORANGE IN COLOR. SEE PROJECT SWPPP FOR SILT FENCING SPECIFICATIONS.

GRADING AND DRAINAGE CONSTRUCTION NOTES:

1. CONNECT TO EXISTING STORM STRUCTURE. FIELD VERIFY IE OF EXISTING PIPE PRIOR TO CONSTRUCTION START.
2. INSTALL NEW STORM PIPE PER PLAN AND REVIEW AGENCY STANDARDS. BACKFILL PIPE PER STD. DETAIL ON SHEET C3.2. MAINTAIN MINIMUM 2 FEET OF COVER OVER THE ALL STORM PIPE.
3. INSTALL NEW TYPE 1 CATCH BASINS PER PLAN AND STD. DETAIL ON SHEET C2.2.
4. INSTALL NEW TYPE 2 CATCH BASINS PER PLAN AND STD. DETAIL ON SHEET C2.2.
5. INSTALL CHAMBER SYSTEM PER PLAN AND CROSS SECTION ON SHEET C2.2.
6. INSTALL NEW TYPE 2 STORM DRAIN MANHOLE OUTLET CONTROL STRUCTURE PER DETAIL ON SHEET C2.2.
7. INSTALL NEW CONTECH 1–CARTRIDGE STEEL CATCH BASIN PER PLAN AND DETAIL ON SHEET C2.2.
8. INSTALL SDR 35 PVC ROOF DRAIN AROUND PERIMETER OF THE BUILDING. COORDINATE WITH BUILDING CONTRACTOR FOR DOWNSPOUT SIZE AND LOCATIONS.
9. INSTALL ROOF DRAIN CLEANOUTS, PER PLAN AND DETAIL ON SHEET C2.2.
10. CONSTRUCT NEW ASPHALT PARKING LOT PER DETAIL ON SHEET C1.2.

STRUCTURE TABLE

NAME	DESCRIPTION	RIM ELEV.	INLET	OUTLET
CB #1	TYPE 1	208.47		205.47
CB #2	TYPE 1	209.35	205.27	205.27
TREATMENT VAULT	STORMFILTER	209.24	204.99	204.99
INLET STRUCTURE	TYPE 2	209.73	204.95	204.95
OUTLET STRUCTURE	TYPE 2	209.18		204.09
CB #3	TYPE 1	208.31	203.89	203.89
EX CB	TYPE 1	207.75	203.75	

REVISION | NO. | DATE

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE: 1"=20'

CHEHALIS VILLAGE SQUARE
CHEHALIS WA.

GRADING, DRAINAGE, AND T.E.S.C. PLAN

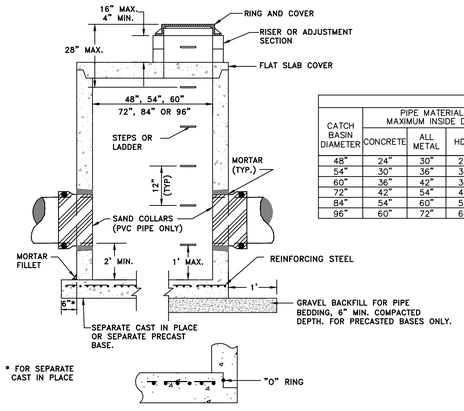
RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8919
EMAIL: CellPros@RBEngineers.com

Know what's below. Call 811 before you dig.

JOB NUMBER 23051
DRAWING NAME 23051_C2.1_GDPL

C2.1

CATCH BASIN DIAMETER	WALL THICKNESS	BASE THICKNESS	MAXIMUM KNOCKOUT SIZE	MINIMUM DISTANCE BETWEEN KNOCKOUTS	BASE REINFORCING STEEL in² /ft IN EACH DIRECTION	
					INTEGRAL	SEPARATE
48"	4"	6"	36"	8"	0.15	0.23
54"	4.5"	8"	42"	8"	0.19	0.19
60"	5"	8"	48"	8"	0.25	0.25
72"	6"	8"	60"	12"	0.24	0.35
84"	8"	12"	72"	12"	0.29	0.39
96"	8"	12"	84"	12"	0.29	0.39



PRECAST BASE JOINT DETAIL

CATCH BASIN DIAMETER	PIPE MATERIAL WITH MAXIMUM INSIDE DIAMETER			
	CONCRETE	ALL METAL	HDPE	SOLID WALL PVC
48"	24"	30"	24"	27"
54"	30"	36"	30"	27"
60"	36"	42"	36"	36"
72"	42"	54"	42"	36"
84"	54"	60"	54"	36"
96"	60"	72"	60"	36"

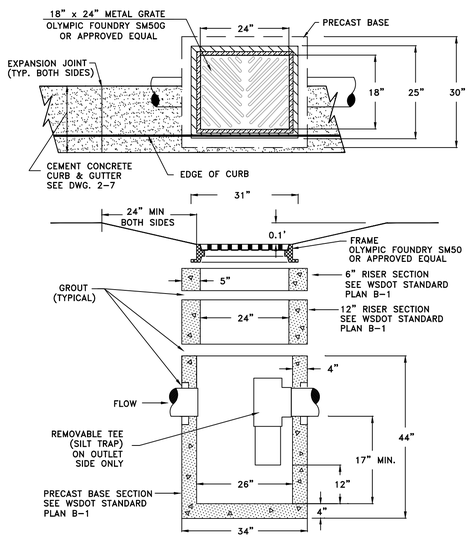
NOTES:
1. NO STEPS ARE REQUIRED WHEN THE HEIGHT IS 4' OR LESS.
2. KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MINIMUM. TO 2.5" MAXIMUM. PROVIDE A 1.5" MINIMUM GAP BETWEEN THE KNOCKOUT WALL AND THE OUTSIDE OF THE PIPE. AFTER THE PIPE IS INSTALLED, FILL THE GAP WITH JOINT MORTAR.
3. THE BOTTOM OF THE PRECAST BASIN MAY BE SLOPED TO FACILITATE CLEANING.
4. FRAME AND GRATE MAY BE INSTALLED WITH FLANGE DOWN OR CAST INTO RISER.

Drawing Not to Scale

City of Chehalis

CATCH BASIN TYPE 2

APPROVED BY	DWG. NO. 3-9
	REVISED DATE 4/14/2005
CITY ENGINEER	



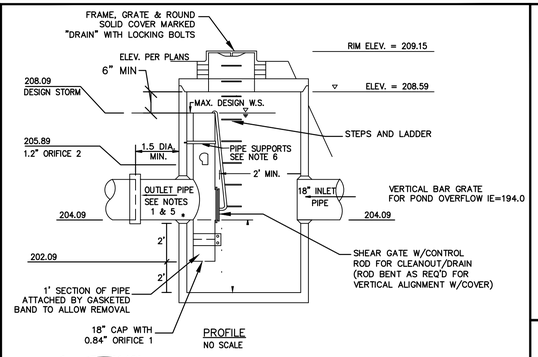
NOTES:
1. CATCH BASIN SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATIONS IN WSDOT STANDARD PLAN B-1.
2. OLYMPIC FOUNDRY GRATES SM50VG OR SM50S (OR APPROVED EQUAL), MAY BE REQUIRED WHEN CONDITIONS WARRANT, AS DETERMINED BY THE PUBLIC WORKS DIRECTOR.

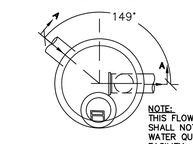
Drawing Not to Scale

City of Chehalis

CATCH BASIN WITH SILT TRAP TEE

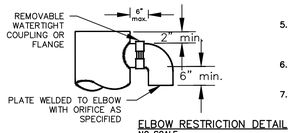
APPROVED BY	DWG. NO. 3-1
	REVISED DATE 1/02/2003
CITY ENGINEER	





NOTE: THIS FLOW RESTRICTOR SHALL NOT BE USED AS A WATER QUALITY CONTROL FACILITY.

PLAN VIEW
NO SCALE



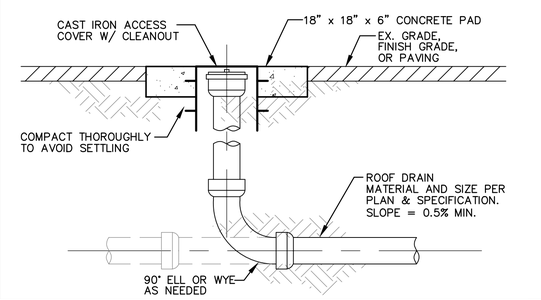
ELBOW RESTRICTION DETAIL
NO SCALE

NOTES:
1. USE A MINIMUM OF A 54" DIAMETER TYPE 2 CATCH BASIN.
2. OUTLET CAPACITY: 100-YEAR DEVELOPED PEAK FLOW.
3. METAL PARTS: CORROSION RESISTANT. NON-GALVANIZED PARTS PREFERRED. GALVANIZED PIPE PARTS TO HAVE ASPHALT TREATMENT 1.
4. FRAME AND LADDER OR STEPS OFFSET SO:
   A. CLEANOUT GATE IS VISIBLE FROM TOP.
   B. CLIMB-DOWN SPACE IS CLEAR OF RISER AND CLEANOUT GATE
   C. FRAME IS CLEAR OF CURB.
5. IF METAL OUTLET PIPE CONNECTS TO CEMENT CONCRETE PIPE: OUTLET PIPE TO HAVE SMOOTH O.D. EQUAL TO CONCRETE PIPE I.D. LESS THAN ½".
6. PROVIDE AT LEAST ONE 3"X0.90 GAUGE SUPPORT BRACKET ANCHORED TO CONCRETE WALL. (MAXIMUM 3'-0" VERTICAL SPACING)
7. LOCATE ADDITIONAL LADDER RUNGS IN STRUCTURES USED AS ACCESS TO TANKS OR VAULTS TO ALLOW ACCESS WHEN CATCH BASIN IS FILLED WITH WATER.

CONTROL STRUCTRE TYPE D - ORIFICE
N.T.S. **/ORIFICE/ORIFICE W/O OVERFLOW GRATE**

RB ENGINEERING

CTRL_STRT_C.dwg



ROOF DRAIN CLEANOUT DETAIL
N.T.S.

RB ENGINEERING

ROOF DRAIN CLEANOUT.dwg

GENERAL NOTES (STORM DRAIN CONSTRUCTION)

1. All workmanship and materials will be in accordance with the City of Chehalis Public Works Standards and the most recent copy of the State of Washington Standard Specifications for Road, Bridge and Municipal Construction (WSDOT/APWA).

2. Temporary erosion/water pollution measures will be required in accordance with the Stormwater Management Plan and Section 1-07.15 of the Standard Specifications.

3. Comply with all other permits and requirements of the City of Chehalis and/or other governing authorities or agencies.

4. A pre-construction meeting will be held with the Public Works Department prior to the start of construction.

5. All storm mains and retention/detention areas will be staked for grade and alignment by an engineering or surveying firm capable of performing such work.

6. Storm drainpipe will meet the following requirements:
   a. Plain concrete pipe conforming to the requirements of AASHTO M 86, Class 2.
   b. Reinforced concrete pipe conforming to the requirements of AASHTO M 170.
   c. PVC pipe conforming to ASTM D 3034 SDR 35 or ASTM F794 or ASTM F679 Type 1 with joints and gaskets conforming to ASTM D 3212 and ASTM F 477.
   d. Ductile iron pipe conforming to the requirements of AWWA C 151, thickness class as shown on the plans.
   e. High-density polyethylene smooth interior pipe conforming to AASHTO M252 types or AASHTO M294 type S, with a gasketed bell and spigot joints.
   f. Aluminized steel helical or spiral rib pipe in diameters of thirty (30) inches or greater, with a Manning's value of 0.020 or less.

7. Special structures, oil/water separators and outlet controls will be installed per plans and manufacturers recommendations.

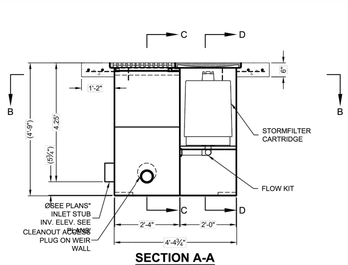
8. Provide traffic control plan(s) as required in accordance with MUTCD to the Public Works Department. Traffic control plans must be approved prior to the start of construction.

9. Call the Utilities Underground Location Center at 1-800-424-5555 a minimum of two (2) business days prior to any excavations.

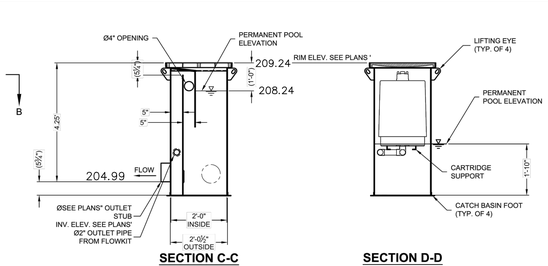
10. Where connections require "field verifications", the contractor will expose connection points and verify necessary fittings two (2) business days prior to initiating the work.

11. All storm lines and catchbasins will be high-velocity cleaned and pressure tested in accordance with Divison 7 of the Standard Specifications prior to paving. Hydrant flushing of the lines is not an acceptable cleaning method. Testing of the storm main will include television inspection at the contractor's expense. The Director of Public Works will determine whether the inspection will be performed by the city or by a representative of the contractor under the city's direction. Testing will take place after all underground utilities are installed and compaction of the roadway subgrade is completed.

12. Fill placement will not be allowed in any open channel used for storm conveyance without written approval from the Public Works Director.

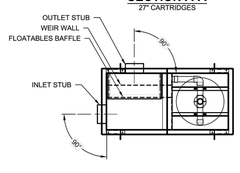


SECTION A-A
27" CARTRIDGES

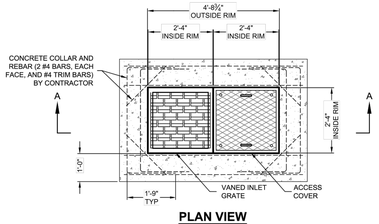


SECTION C-C

SECTION D-D



SECTION B-B



PLAN VIEW

MATERIAL LIST- PROVIDED BY CONTECH

COUNT	DESCRIPTION	INSTALLED BY
1	27", 18.79 GPM, PSORB CARTRIDGE (WHT)	CONTECH
1	FLOW KIT	CONTECH
1	NON-POWDER COATED STEEL CATCH BASIN	CONTRACTOR
1	28" x 28" VANED INLET COVER	CONTRACTOR
1	28" x 28" ACCESS COVER	CONTRACTOR

SITE DESIGN DATA

WATER QUALITY FLOW RATE	0.04 CFS
PEAK FLOW RATE	0.287 CFS
RETURN PERIOD OF PEAK FLOW	100 YRS
FILTER MEDIA TYPE	PSORB

PERFORMANCE SPECIFICATION
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 SHALL BE 1.67 GPM/SF (MAXIMUM). SPECIFIC FLOW RATE IS THE MEASURE OF THE FLOW (GPM) DIVIDED BY THE MEDIA SURFACE CONTACT AREA (SF). MEDIA VOLUMETRIC FLOW RATE SHALL BE 6 GPM/CF OF MEDIA (MAXIMUM).

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS REPRESENTATIVE, www.ContechES.com
3. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
5. STEEL STRUCTURE TO BE MANUFACTURED OF 1/4 INCH STEEL PLATE. CASTINGS SHALL MEET AASHTO HS20 LOAD RATING. FOR HS20 LOAD RATING ON STRUCTURE, CONCRETE COLLAR IS REQUIRED AND TO BE PROVIDED BY CONTRACTOR.
6. 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.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE (LIFTING CLUTCHES PROVIDED).
D. CATCHBASIN STORMFILTER EQUIPPED WITH 4 INCH (APPROXIMATE) LONG STUBS FOR INLET (IF APPLICABLE) AND OUTLET PIPING.
E. 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.CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
F. FOR H20 LOAD RATING, CONTRACTOR TO PROVIDE CONCRETE COLLAR WITH REINFORCEMENT, AS SHOWN.
G. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.

STRUCTURE WEIGHT
APPROXIMATE HEAVIEST PICK = 1,575 LBS

CONTECH
PROPOSAL
DRAWING

NO.	DATE	REVISION	BY

1 CARTRIDGE STEEL CATCHBASIN
789636-010
23051 CHEHALIS VILLAGE SQUARE
CHEHALIS, WA
SITE DESIGNATION: SFCB

CONTECH ENGINEERED SOLUTIONS LLC
11835 W. OLYMPIC BLVD, SUITE 855E
LOS ANGELES, CA 90064
(800) 338-1122
www.conteches.com

The Stormwater Management StormFilter

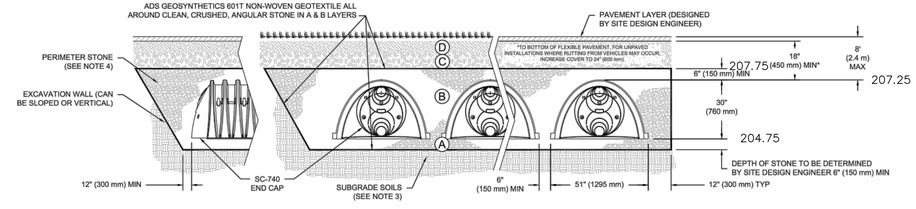
DATE: 2/5/2024

DESIGNED: AJS	DRAWN: SKJ
CHECKED: SKJ	APPROVED: SKJ
PROJECT No.: 789636	SEQUENCE No.: 010
SHEET: 1 OF 1	

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE:

CHEHALIS VILLAGE SQUARE
CHEHALIS WA.

GRADING AND DRAINAGE DETAILS

ROBERT W. BALLEW — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8819
EMAIL: CivilProjectMgr@gmail.com

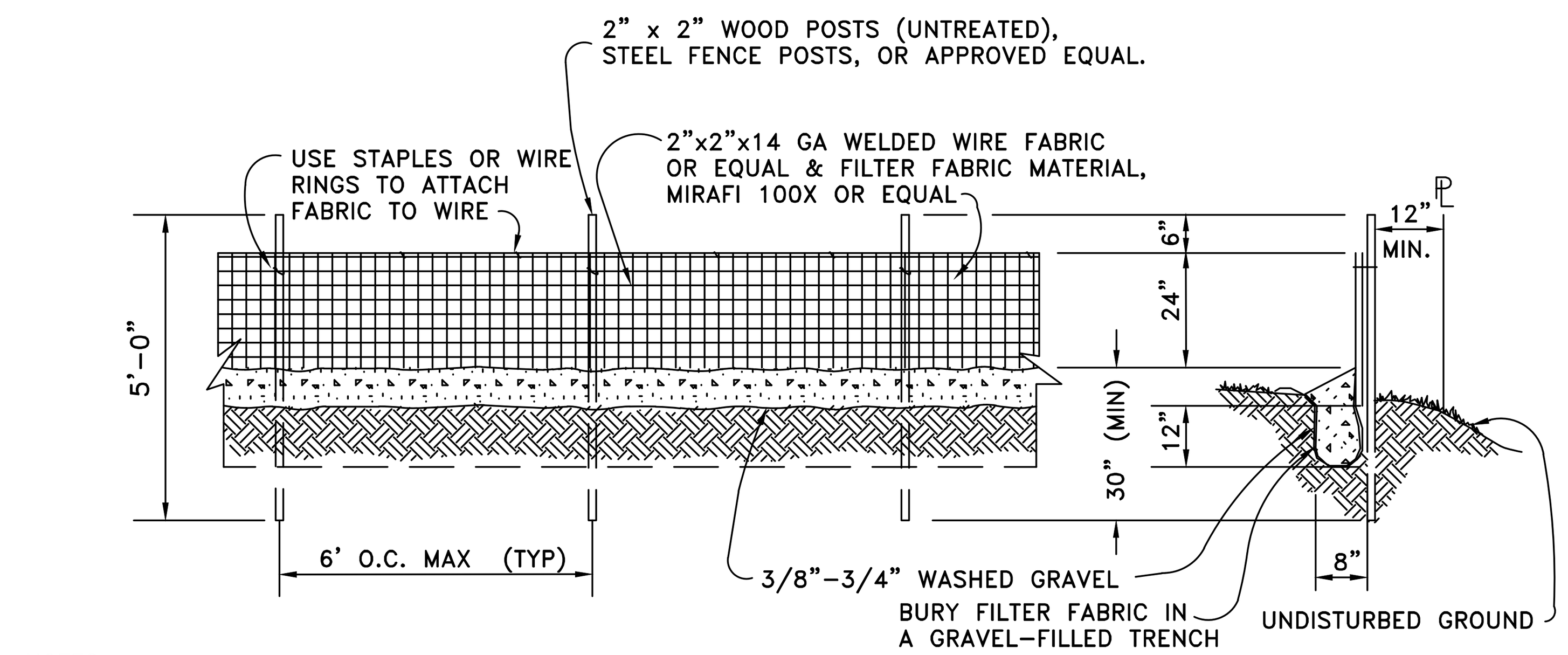
811 Know what's below. Call 811 before you dig.

JOB NUMBER 23051

DRAWING NAME 23051_C2.2_GDDT

C2.2

6 OF 11



NOTES:

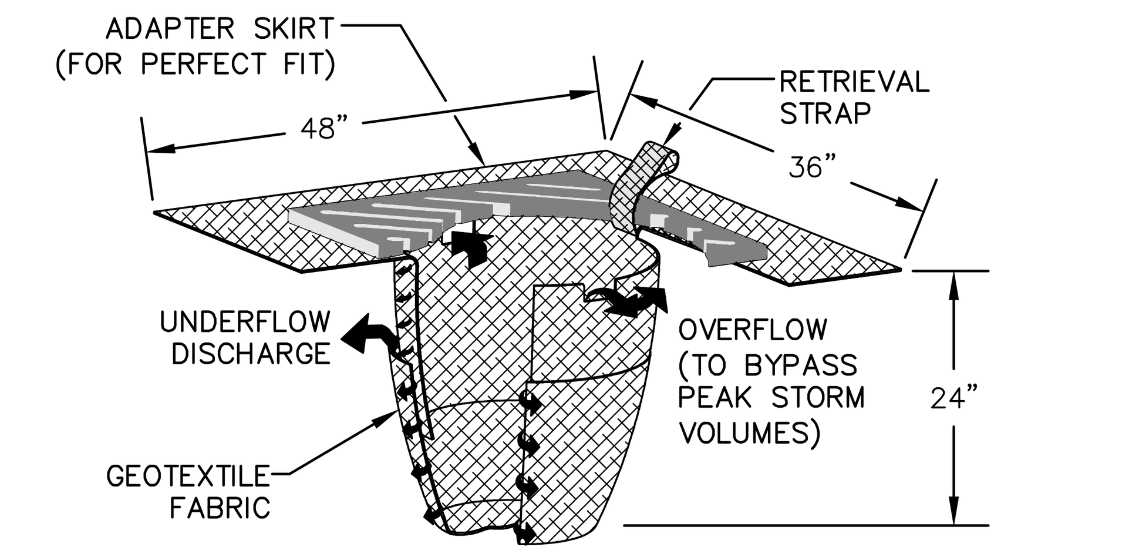
1. FILTER FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID USE OF JOINTS. WHEN JOINTS ARE NECESSARY, FILTER CLOTH SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST, WITH MINIMUM 6-INCH OVERLAP, AND SECURELY FASTENED @ BOTH ENDS.
2. A WIRE MESH SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY-DUTY WIRE STAPLES AT LEAST 1-INCH LONG, TIE WIRES, OR HOG RINGS. THE WIRE WILL EXTEND INTO THE TRENCH A MINIMUM OF 4 INCHES & SHALL NOT EXTEND MORE THAN 24 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
3. WHEN EXTRA-STRENGTH FILTER FABRIC & 4-FOOT MAXIMUM POST SPACING IS USED, THE WIRE MESH FENCE MAY BE ELIMINATED. IN SUCH CASES, THE FILTER FABRIC WILL BE STAPLED OR WIRED DIRECTLY TO THE POSTS W/ ALL OTHER PROVISIONS STILL APPLYING.
4. SILT FENCE SHALL NOT BE MOVED BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.
5. SILT FENCING SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL & AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.

DRAWING NOT TO SCALE

City of Chehalis

TEMPORARY SILT FENCE

APPROVED BY	DWG. NO. 3-4
	REVISED DATE
CITY ENGINEER	1/02/2003



CATCH BASIN INLET PROTECTION DETAIL N.T.S.	RB ENGINEERING INLET PROTECTION.dwg

TABLE 4.1
TEMPORARY EROSION CONTROL SEED MIX

	% Weight	*% Purity*	*% Germination*
Chewings OR annual blue grass *Festuca rubra var. commutata OR Poa anna*	40	98	90
Perennial rye *Lolium perenne*	50	98	90
Redtop OR colonial bentgrass *Agrostis alba OR Agrostis tenuis*	5	92	85
White dutch clover *Trifolium repens*	5	98	90

GENERAL NOTES (EROSION CONTROL)

1. EROSION CONTROL MEASURES WILL BE IN PLACE PRIOR TO THE BEGINNING OF CONSTRUCTION. A REPRESENTATIVE FROM THE CITY WILL INSPECT AND APPROVE THE EROSION CONTROL MEASURES PRIOR TO THE START OF CONSTRUCTION.

2. EROSION CONTROL MEASURES ARE NOT LIMITED TO THE ITEMS ON THIS PLAN. THE CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF ALL EROSION MEASURES, AS REQUIRED UNDER THE MOST RECENT VERSION OF THE CHEHALIS STORM WATER MANAGEMENT PLAN. CARE WILL BE TAKEN TO PREVENT MIGRATION OF SILT AND/OR POLLUTED RUNOFF TO OFF-SITE PROPERTIES.

3. THE CONTRACTOR WILL MAKE REGULAR SURVEILLANCE OF ALL EROSION CONTROL MEASURES. IN ADDITION, EROSION CONTROL WILL BE THOROUGHLY INSPECTED AFTER EACH RAINFALL EVENT. THE CONTRACTOR WILL MAKE ALL NECESSARY REPAIRS, MODIFICATIONS, AND ADDITIONS AS NECESSARY TO ENSURE THE PROPER OPERATION OF THE EROSION CONTROL MEASURES. THE CITY MAY REQUIRE MORE FREQUENT INSPECTIONS OF EROSION CONTROL MEASURES BY THE CONTRACTOR SHOULD SITE OR WEATHER CONDITIONS DICTATE.

4. DURING THE WET SEASON, NOVEMBER THROUGH MARCH, ALL DISTURBED SOILS WILL BE STABILIZED WITHIN 48 HOURS AFTER LAND DISTURBANCE ACTIVITIES HAVE CEASED. EROSION CONTROL MEASURES WILL INCLUDE, BUT ARE NOT LIMITED TO, INSTALLATION OF STRAW MATTING, JUTE MATTING, STRAW MULCH AND/OR WOOD CHIPS, AND COVERING THE AFFECTED AREA AND SPOIL PILES WITH PLASTIC SHEETING.

5. THE CONTRACTOR WILL CHECK ALL SEEDED OR SODDED AREAS REGULARLY TO ENSURE THAT THE VEGETATIVE COVER IS BEING ADEQUATELY ESTABLISHED. AREAS WILL BE REPAIRED, RESEEDED, AND FERTILIZED AS REQUIRED.

6. TRACKING OF SOIL OFF SITE WILL NOT BE ALLOWED. IF ANY SOIL IS TRACKED BEYOND THE LIMITS OF THE SITE, IT WILL BE REMOVED BEFORE THE END OF THAT WORKING DAY. TO PREVENT ADDITIONAL TRACKING, VEHICLE TIRES MUST BE SWEPT OR WASHED PRIOR TO LEAVING THE PROJECT SITE.

7. NO MORE THAN 500 LINEAL FEET (LF) OF TRENCH ON A DOWNSLOPE OF MORE THAN FIVE PERCENT WILL BE OPENED AT ONE TIME.

8. EXCAVATED MATERIAL WILL BE PLACED ON THE UPHILL SIDE OF TRENCHES.

9. EXCAVATED MATERIAL WILL NOT BE PLACED IN ESTABLISHED DRAINAGE DITCHES UNDER ANY CIRCUMSTANCES.

10. TRENCH DEWATERING DEVICES WILL BE DISCHARGED IN A MANNER THAT WILL NOT ADVERSELY AFFECT FLOWING STREAMS, DRAINAGE SYSTEMS, OR OFF-SITE PROPERTIES. AN ESTABLISHED SEDIMENT TRAP WILL BE USED AS THE RECEIVER FOR ALL TRENCH DEWATERING OPERATIONS.

11. ALL DISTURBED AREAS WILL BE SEEDED OR SODDED UPON COMPLETION OF WORK. THE CONTRACTOR WILL BE RESPONSIBLE TO ENSURE THAT COMPLETE COVERAGE OF THE DISTURBED AREAS IS PROVIDED AND THAT GROWTH OF VEGETATION IS ESTABLISHED. SEED AND SOD APPLICATIONS WILL BE CONDUCTED IN ACCORDANCE WITH THE TIMELINES NOTED IN THE MOST RECENT EDITION OF THE WSDOT STANDARD SPECIFICATIONS.

12. ALL EROSION CONTROL WILL REMAIN IN PLACE UNTIL SUCH TIME AS THE SITE IS ADEQUATELY STABILIZED. PRIOR TO REMOVAL OF EROSION CONTROL MEASURES, THE ENGINEERING DIVISION WILL BE NOTIFIED FOR FINAL INSPECTION AND APPROVAL.

REVISION | NO. | DATE

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE:

CHEHALIS VILLAGE SQUARE
CHEHALIS WA.

T.E.S.C. DETAILS

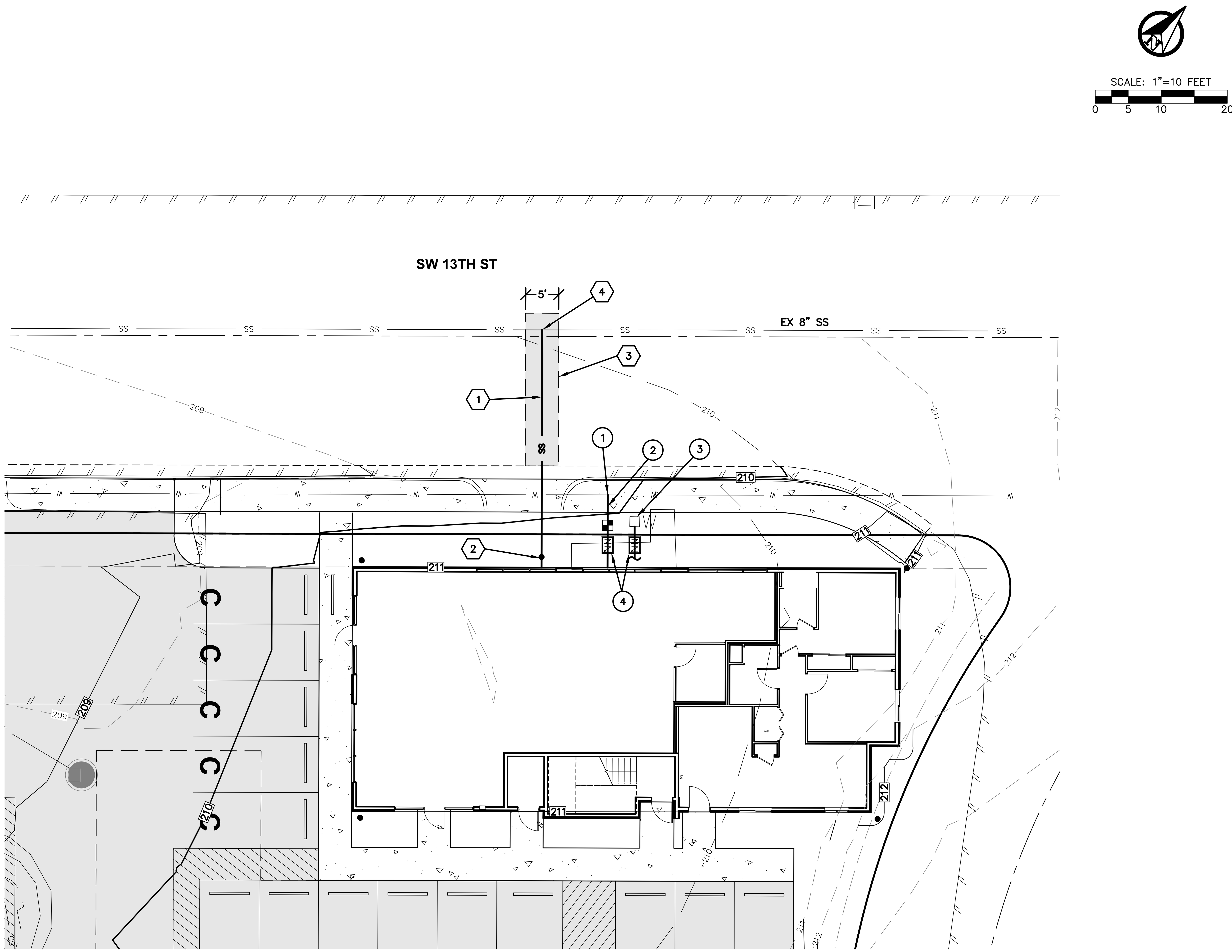
RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8919
EMAIL: CallPros@RBEngineers.com

811 Know what's below. Call 811 before you dig.

JOB NUMBER
23051

DRAWING NAME
23051_C2.3_TESCDT

C2.3



WATER CONSTRUCTION NOTES:

1. INSTALL 1.5" WATER METER TAP AND SETTER SEE STD. DETAILS ON SHEET C3.2.
2. PROVIDE NEW 1.5" POLYETHYLENE CLASS 200 SERVICE LINE TO BUILDING PER PLAN. BACKFILL TRENCH PER STD. DETAIL ON SHEET C3.2.
3. CONNECT TO EXISTING METER FOR USE AS IRRIGATION METER.
4. INSTALL 1.5" AND 1" DOUBLE CHECK VALVES PER PLAN AND DETAIL ON SHEET C3.2.

SEWER CONSTRUCTION NOTES:

1. INSTALL 75LF SDR 35 SEWER LATERAL PER PLAN. SEE STD. DETAIL ON SHEET C3.2. LATERAL IE AT BUILDING = 208.0'
2. INSTALL NEW SEWER CLEANOUT PER PLAN. SEE STD. DETAIL ON SHEET C3.2.
3. SAWCUT AND RESTORE STREET CROSSING PER STD. DETAIL ON SHEET C3.2.
4. TAP EXISTING SEWER WITH NEW 6" LATERAL.

GENERAL NOTES:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION, DIMENSION, AND DEPTH OF ALL EXISTING UTILITIES WHETHER SHOWN ON THESE PLANS OR NOT BY POTHOLE THE UTILITIES AND SURVEYING THE HORIZONTAL AND VERTICAL LOCATION PRIOR TO CONSTRUCTION. THIS SHALL INCLUDE CALLING 411. LOCATIONS OF SAID UTILITIES SHOWN ON THESE PLANS ARE BASED UPON THE UNVERIFIED PUBLIC INFORMATION AND ARE SUBJECT TO VARIATION. IF CONFLICTS SHOULD OCCUR, THE CONTRACTOR SHALL CONSULT THE DESIGN ENGINEER TO RESOLVE ALL CONFLICTS PRIOR TO PROCEEDING WITH THE CONSTRUCTION.

NO.	DATE	REVISION

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE: 1"=10'

CHEHALIS VILLAGE SQUARE
CHEHALIS WA.

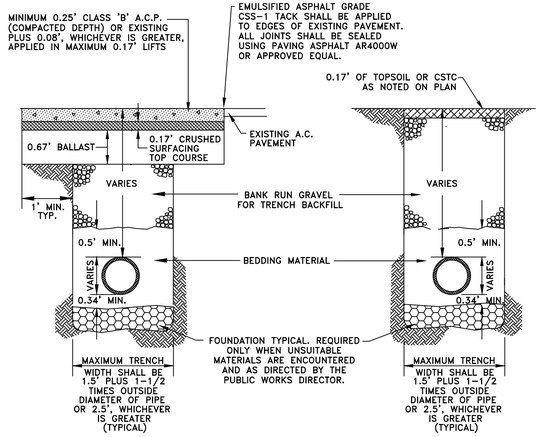
WATER AND SEWER PLAN

ROBERT W. BATEY — REGISTERED PROFESSIONAL ENGINEER

RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8919
EMAIL: CivilPros@RBEngineers.com

JOB NUMBER 23051
DRAWING NAME 23051_C3.1_WSPL

C3.1



NOTES:

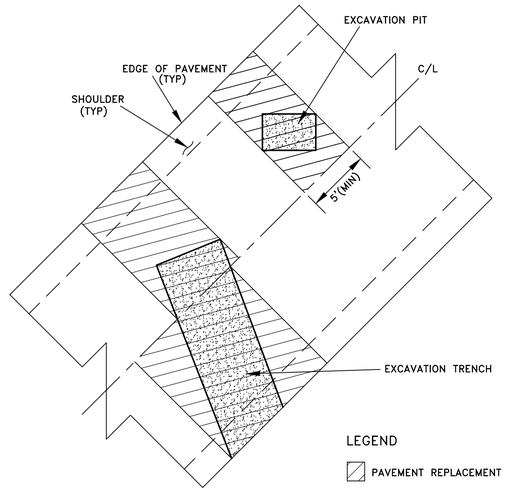
1. ALL MATERIALS EXCEPT A.C.P. AND BEDDING MATERIAL SHALL BE COMPACTED IN 6-INCH MAXIMUM LIFTS TO 95% DENSITY.
2. BEDDING SHALL CONFORM TO SECTION 9-03.16 OF STANDARD SPECIFICATIONS AS AMENDED BY CITY OF CHEHALIS STANDARDS.
3. COMPACTION: BEDDING SHALL BE COMPACTED TO 95% MAX. AS DETERMINED BY ASTM D1557. BACKFILL SHALL BE COMPACTED TO 85% IN UNPAVED AREA, AND 95% IN PAVED OR SHOULDER AREAS AS DETERMINED BY ASTM D1557.
4. ALL MATERIALS, WORKMANSHIP, AND INSTALLATION SHALL BE IN CONFORMANCE WITH THE MOST RECENT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION AS AMENDED BY CITY OF CHEHALIS PUBLIC WORKS STANDARDS.
5. KEEP TRENCH BOTTOM COMPACTED WITH UNIFORM GRADE. A BELL JOINT SHALL BE REQUIRED AT EACH JOINT FOR PROPER SUPPORT. NO TEMPORARY SUPPORTS, I.E. BLOCKS, WILL BE ALLOWED TO SUPPORT PIPE. TRENCH BOTTOM SHALL BE TO GRADE PRIOR TO PIPE INSTALLATION.

Drawing Not to Scale

City of Chehalis

TRENCH PAVEMENT RESTORATION DETAIL

APPROVED BY	DWG. NO.
	2-4
	REVISED DATE
CITY ENGINEER	1/02/2003



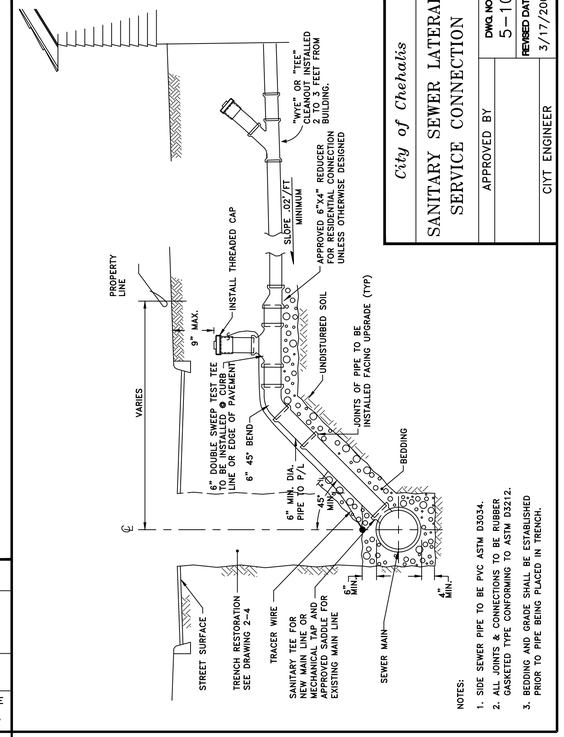
NOTE:

1. MINIMUM RESTORATION WIDTH = 5 FEET

City of Chehalis

PAVEMENT RESTORATION

APPROVED BY	DWG. NO.
	2-5
	REVISED DATE
CITY ENGINEER	1/02/2003



NOTES:

1. SIDE SEWER PIPE TO BE PVC ASTM D3034.
2. ALL JOINTS & CONNECTIONS TO BE RUBBER GASKETED TYPE CONFORMING TO ASTM D3212.
3. BEDDING AND GRADE SHALL BE ESTABLISHED PRIOR TO PIPE BEING PLACED IN TRENCH.

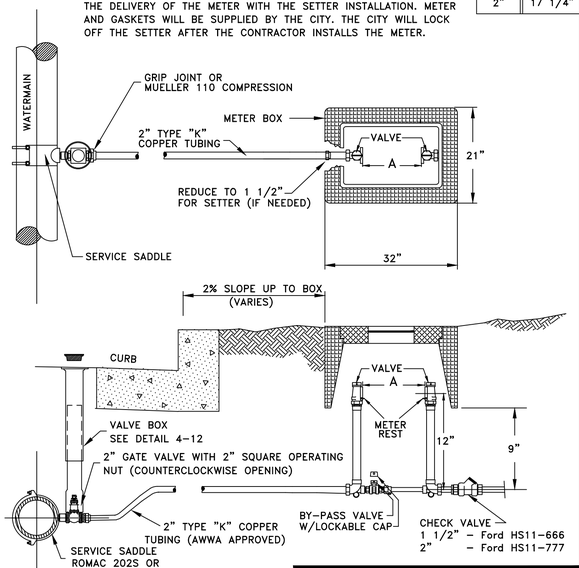
City of Chehalis

SANITARY SEWER LATERAL SERVICE CONNECTION

APPROVED BY	DWG. NO.
	5-10
	REVISED DATE
CITY ENGINEER	3/17/2009

WITH THE INSTALLATION OF 1 1/2" OR 2" METER SETTERS, THE CONTRACTOR SHALL INSTALL THE METER AT THE TIME THE SETTER IS PUT IN PLACE. THE CONTRACTOR SHALL CONTACT THE CITY 48 HOURS PRIOR TO INSTALLATION OF THE SETTER AND COORDINATE THE DELIVERY OF THE METER WITH THE SETTER INSTALLATION. METER AND GASKETS WILL BE SUPPLIED BY THE CITY. THE CITY WILL LOCK OFF THE SETTER AFTER THE CONTRACTOR INSTALLS THE METER.

SIZE	A
1 1/2"	13 1/4"
2"	17 1/4"



NOTES:

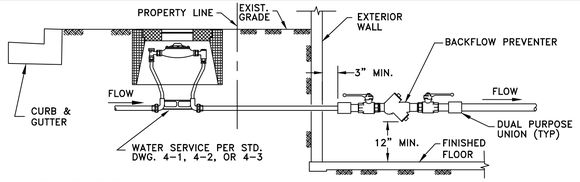
1. ALL SERVICE SADDLES SHALL HAVE RUBBER GASKET, I.P. THREADS, & STAINLESS STEEL DOUBLE STRAPS.
2. CITY STANDARD FOR COPPER SETTERS ARE:
   1 1/2" - FORD VVF76-12B-13-11-66
   2" - FORD VVF77-12B-17-11-77
3. THE CITY UTILIZES A TOUCH READ METER SYSTEM. METER LIDS FOR METER BOX INSTALLATIONS MUST BE DRILLED WITH A 2" HOLE TO ACCOMMODATE TOUCH PAD.

DRAWING NOT TO SCALE

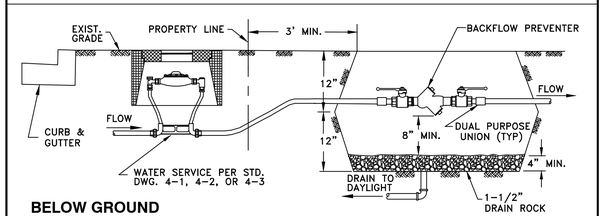
City of Chehalis

1 1/2"-2" WATER SERVICE WITH BYPASS

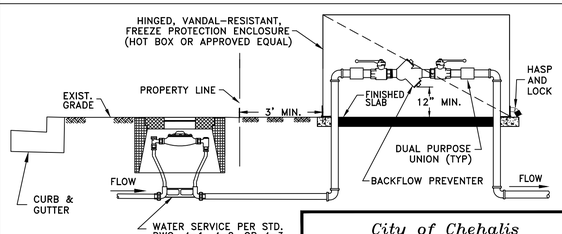
APPROVED BY	DWG. NO.
	4-3
	REVISED DATE
CITY ENGINEER	3/30/2005



IN BASEMENT



BELOW GROUND



ABOVE GROUND

NOTES:

1. BACKFLOW ASSEMBLY SHALL BE A WA. STATE D.O.H. APPROVED MODEL.
2. ALL MATERIALS TO BE BRASS OR COPPER AS APPROVED BY THE DIRECTOR OF PUBLIC WORKS.

DRAWING NOT TO SCALE

City of Chehalis

1/2"-2" DOUBLE CHECK BACKFLOW PREVENTER

APPROVED BY	DWG. NO.
	4-18
	REVISED DATE
CITY ENGINEER	1/02/2003

NO.	DATE	REVISION

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE:

CHEHALIS VILLAGE SQUARE

CHEHALIS WA.

WATER AND SEWER DETAILS AND NOTES

ROBERT W. BALLEW — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923
CHEHALIS, WA. 98532
OFF: (360) 740-8819
EMAIL: ChePlans@RBEngineers.com

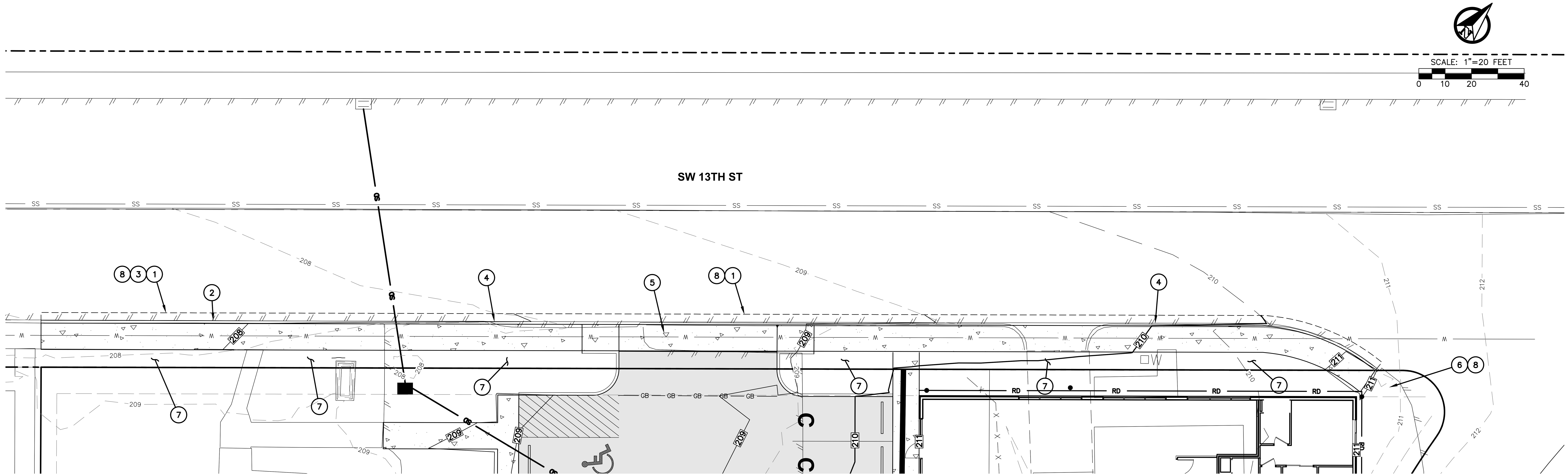
811 Know what's below. Call 811 before you dig.

JOB NUMBER 23051

DRAWING NAME 23051_C3.2_WTDT

C3.2

9 OF 11



FRONTAGE CONSTRUCTION NOTES:

1. SAWCUT 261 LF OF EXISTING ASPHALT.
2. REMOVE EXISTING CONCRETE SIDEWALK, CURB, AND GUTTER AND CONSTRUCT NEW CONCRETE SIDEWALK, CURB, AND GUTTER PER CITY STD. DETAILS ON SHEET C4.2.
3. SAWCUT ALONG EXISTING FRONT EDGE OF EXISTING CURB AND GUTTER AND REMOVE PER LIMITS SHOWN ON PLANS.
4. INSTALL NEW CONCRETE SIDEWALK, CURB, AND GUTTER PER PLAN. SEE STD. DETAIL ON SHEET C4.2.
5. CONSTRUCT NEW TYPE 1 CONCRETE DRIVEWAY PER PLAN AND DETAIL ON SHEET C4.2.
6. CONSTRUCT TEMPORARY ASPHALT ADA RAMP OFF END OF NEW CONCRETE SIDEWALK. GRADE NOT TO EXCEED 12:1 SLOPE. TRANSITION TO EXISTING ASPHALT GRADE.
7. GRADE LANDSCAPE AREA IN RIGHT OF WAY PER GRADES SHOWN. SLOPE TOWARD BACK OF SIDEWALK. HYDROSEED ALL EXPOSED SLOPES NOT COVERED IN LANDSCAPE PLAN.
8. SEAL ALL NEW ASPHALT JOINTS WITH EMULSIFIED ASPHALT.
9. CONTRACTOR SHALL CALL REVIEW AGENCY AND RB ENGINEERING AT (360) 740-8919 48 HOURS PRIOR TO POURING CONCRETE CURB AND GUTTER FOR GRADE INSPECTION OF CONCRETE CURB. FAILURE TO CALL FOR INSPECTION MAY RESULT IN CONTRACTOR REMOVING AND RE-CONSTRUCTING CONCRETE CURB AND OR SIDEWALK.

NO.	DATE	REVISION

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE: 1"=20'

CHEHALIS VILLAGE SQUARE
CHEHALIS WA.

FRONTAGE IMPROVEMENT PLAN

ROBERT W. BAXTER — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

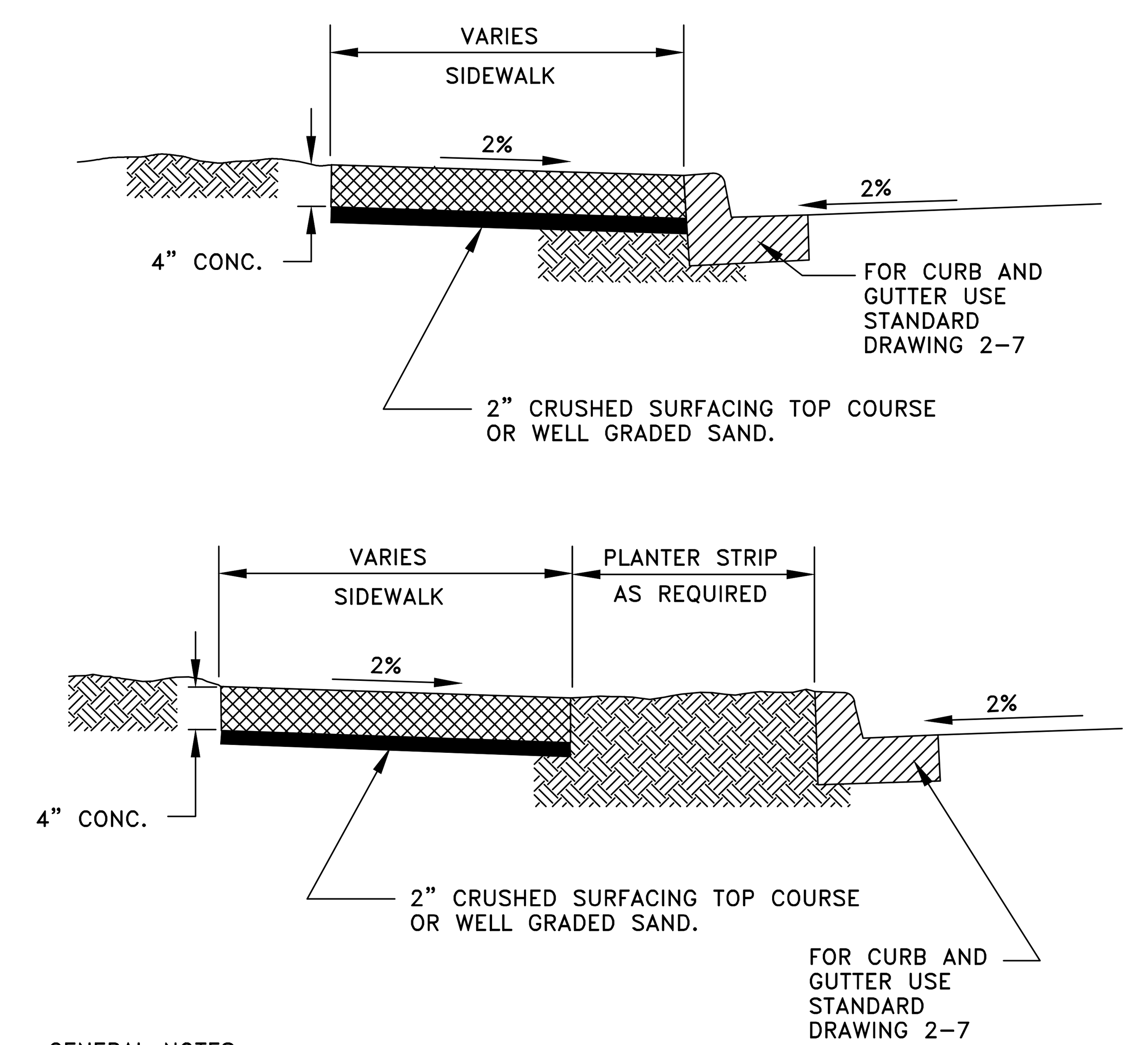
RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8919
EMAIL: CellPros@RBEngineers.com

811 Know what's below. Call 811 before you dig.

JOB NUMBER 23051

DRAWING NAME 23051_C4.1_FIPP

C4.1

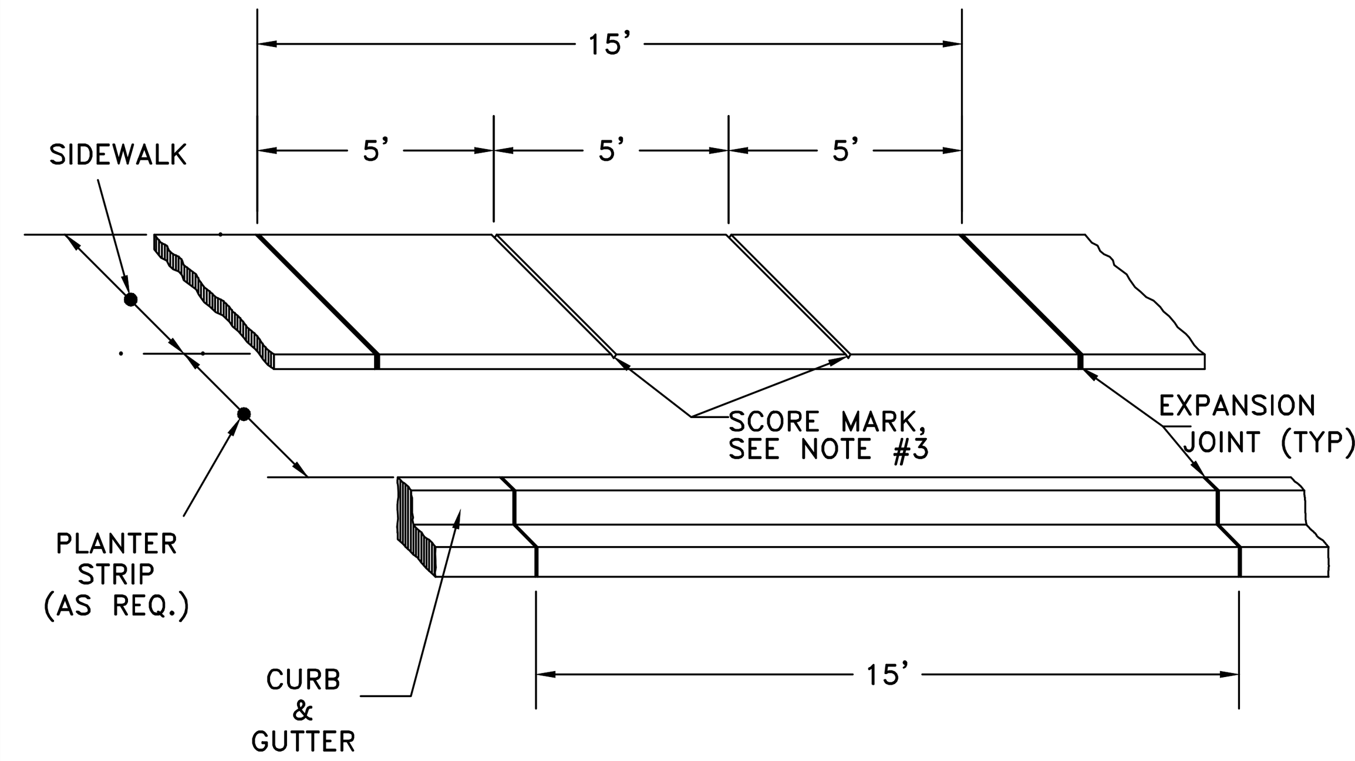


GENERAL NOTES:

1. REFER TO STANDARD DRAWING 2-10 FOR INFORMATION ON JOINTS AND SCORING.
2. SIDEWALK ACROSS CONCRETE DRIVEWAYS REQUIRE A MINIMUM DEPTH OF 6" FOR RESIDENTIAL DRIVES & 8" FOR ALL OTHER DRIVES.
3. WHEN CHECKED WITH A 10' STRAIGHTEDGE, GRADE SHALL NOT DEVIATE MORE THAN 1/8 INCH & ALIGNMENT SHALL NOT VARY MORE THAN 1/4 INCH.

Drawing Not to Scale

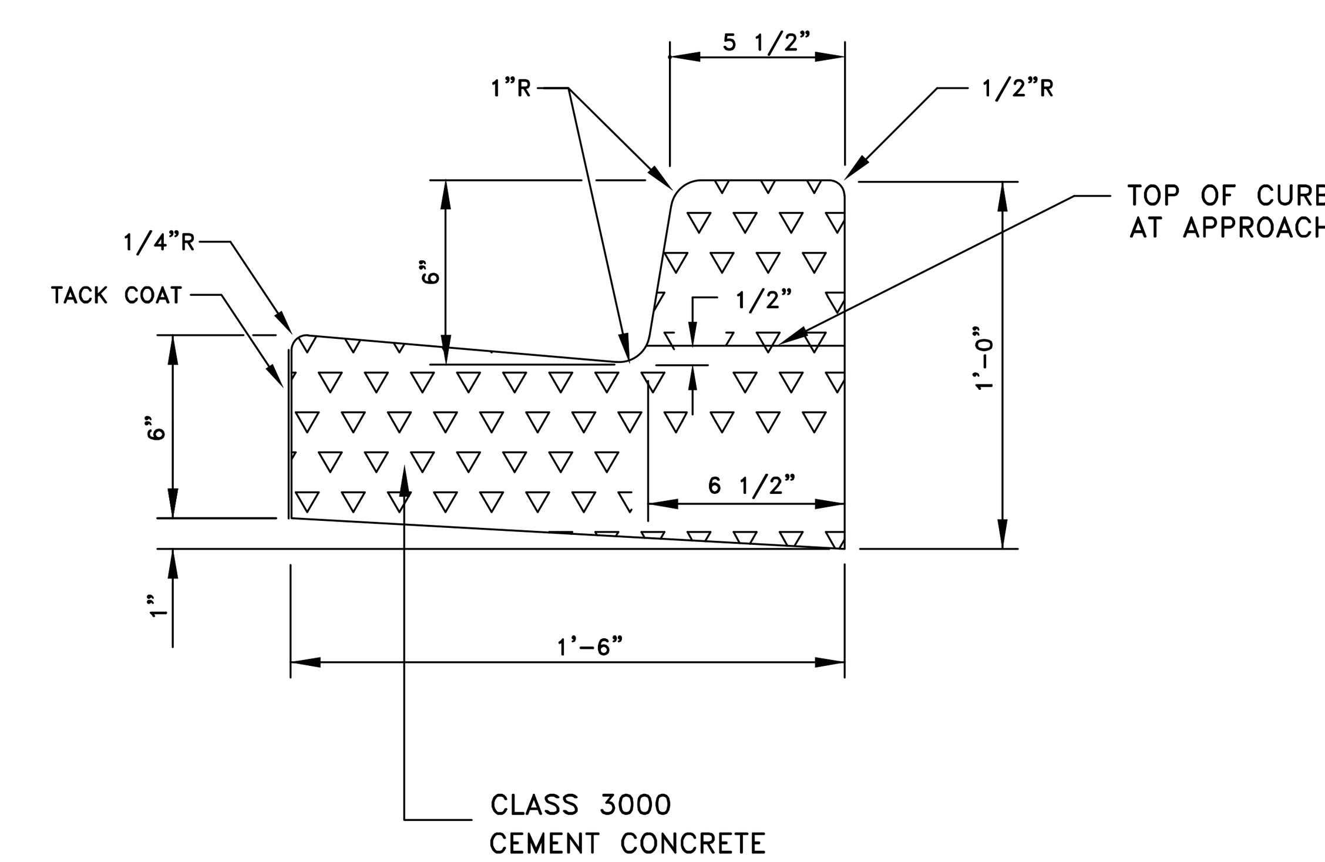
City of Chehalis	
SIDEWALK	
APPROVED BY	DWG. NO. 2-9
	REVISED DATE 1/02/2003
CITY ENGINEER	



GENERAL NOTES:

1. EXPANSION JOINT MATERIAL TO BE 3/8" THICK PREMOLDED JOINT FILLER FULL THICKNESS OF CONCRETE.
2. FORM AND SUBGRADE INSPECTION REQUIRED BEFORE POURING CONCRETE.
3. SCORE MARKS SHALL BE ±1/8" WIDE BY ±1/4" DEEP. FOR SIDEWALKS OVER 8' IN WIDTH, A LONGITUDINAL SCORE MARK SHALL BE MADE ALONG CENTER OF WALK.
4. EXPANSION JOINTS SHALL BE INSTALLED IN CURB AND GUTTER AND IN SIDEWALK AT PC AND PT AT ALL CURB RETURNS. EXPANSION JOINTS SHALL BE PLACED IN SIDEWALK AT SAME LOCATIONS AS THOSE IN CURB AND GUTTER WHEN SIDEWALK IS ADJACENT TO CURB AND GUTTER, UNLESS OTHERWISE DIRECTED BY ENGINEER.

City of Chehalis	
SIDEWALK SPACING EXPANSION JOINTS & SCORE MARKS	
APPROVED BY	DWG. NO. 2-10
	REVISED DATE 1/02/2003
CITY ENGINEER	

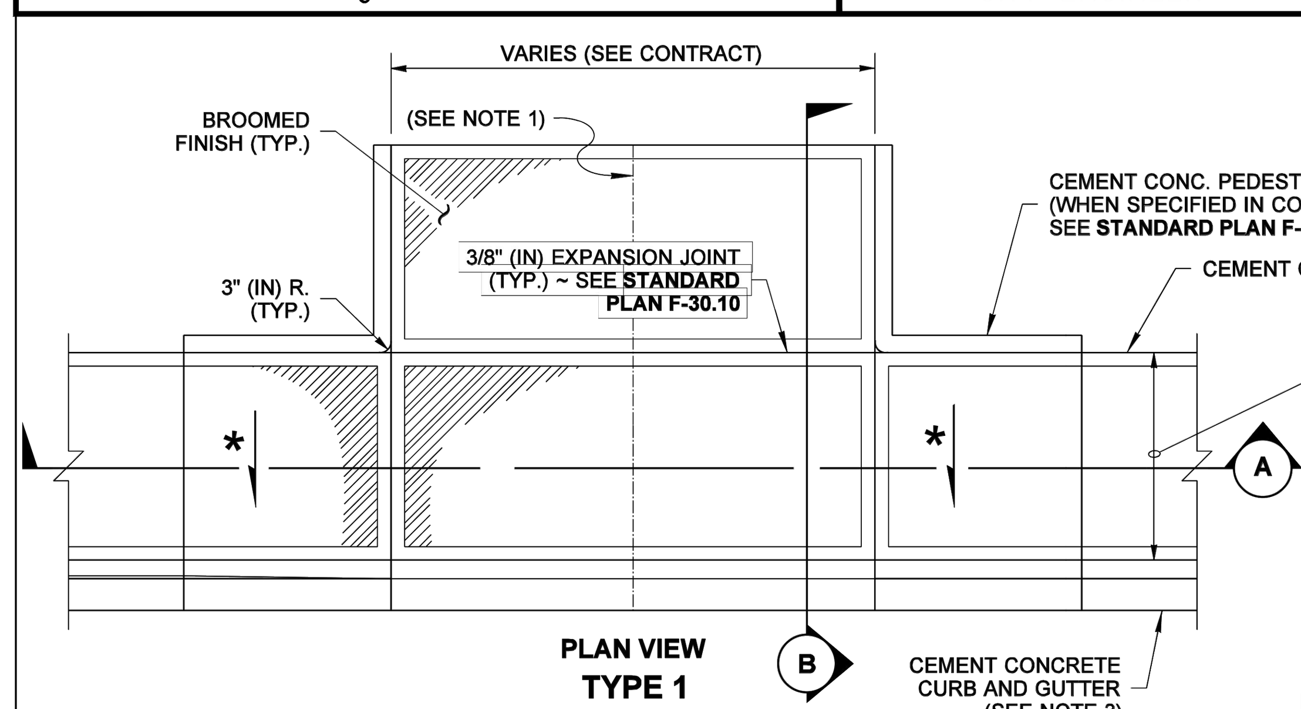


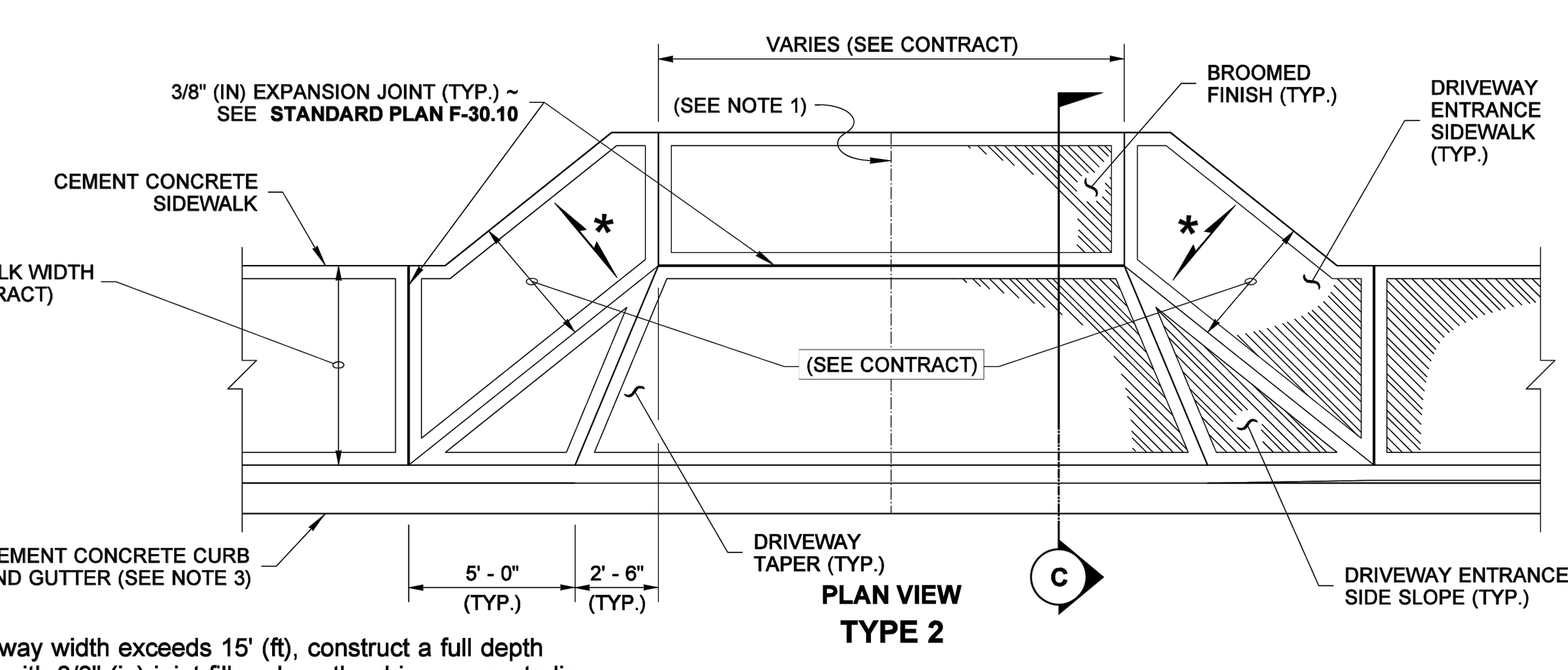
GENERAL NOTES:

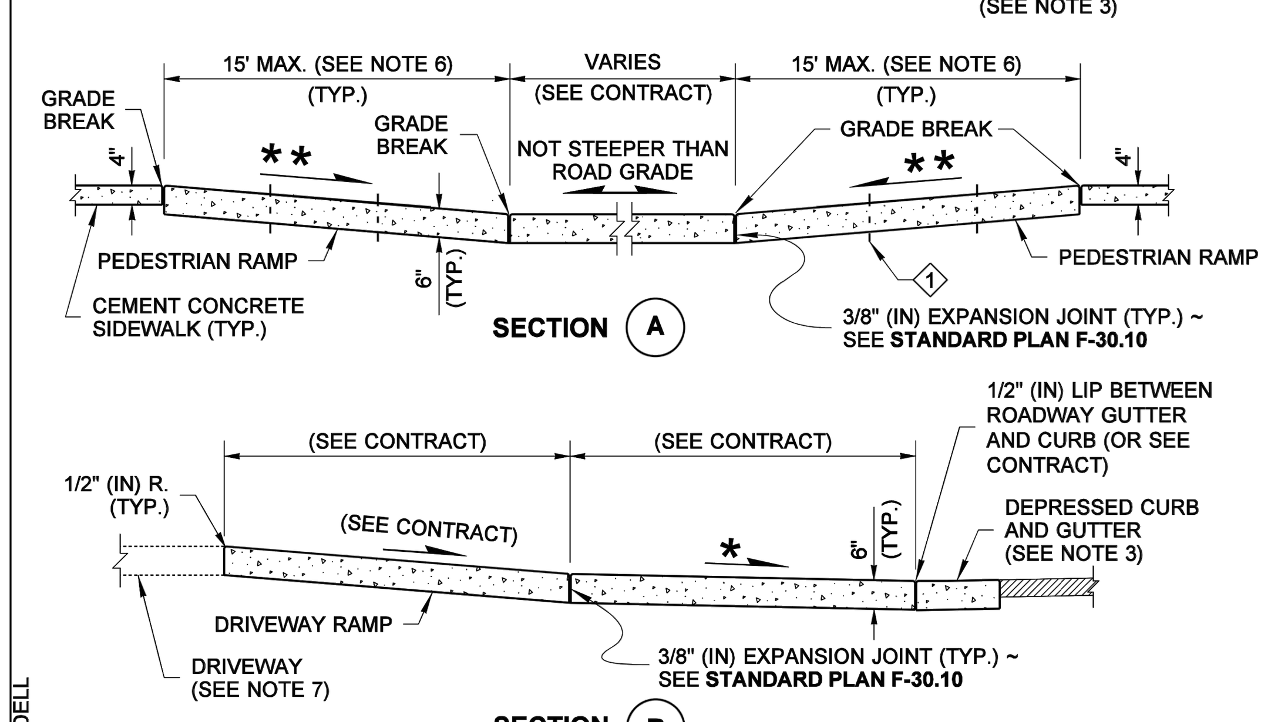
1. EXPANSION JOINT MATERIAL TO BE 3/8" THICK PREMOLDED JOINT FILLER FULL THICKNESS OF CONCRETE.
2. FORM AND SUBGRADE INSPECTION REQUIRED BEFORE POURING CONCRETE.
3. SUBGRADE AND BASE REQUIREMENTS SHALL BE THE SAME AS FOR PAVEMENT RESTORATION.

Drawing Not to Scale

City of Chehalis	
CEMENT CONCRETE CURB & GUTTER	
APPROVED BY	DWG. NO. 2-7
	REVISED DATE 1/02/2003
CITY ENGINEER	

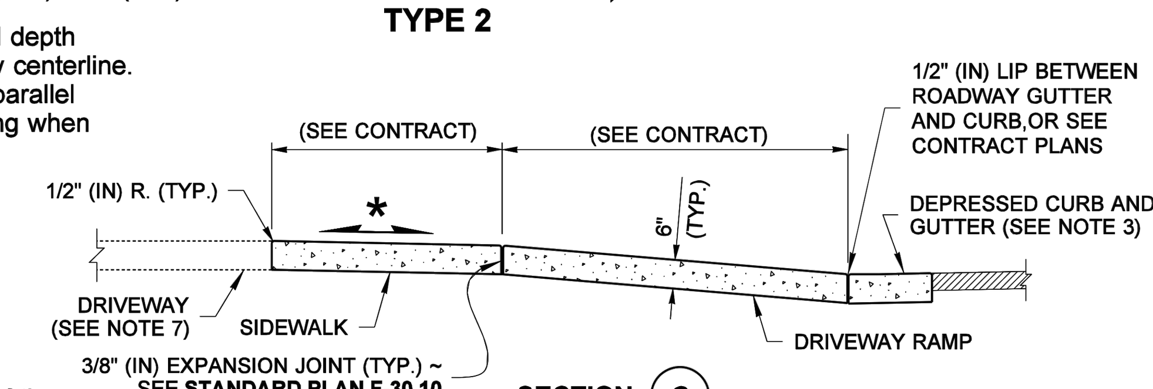






NOTES

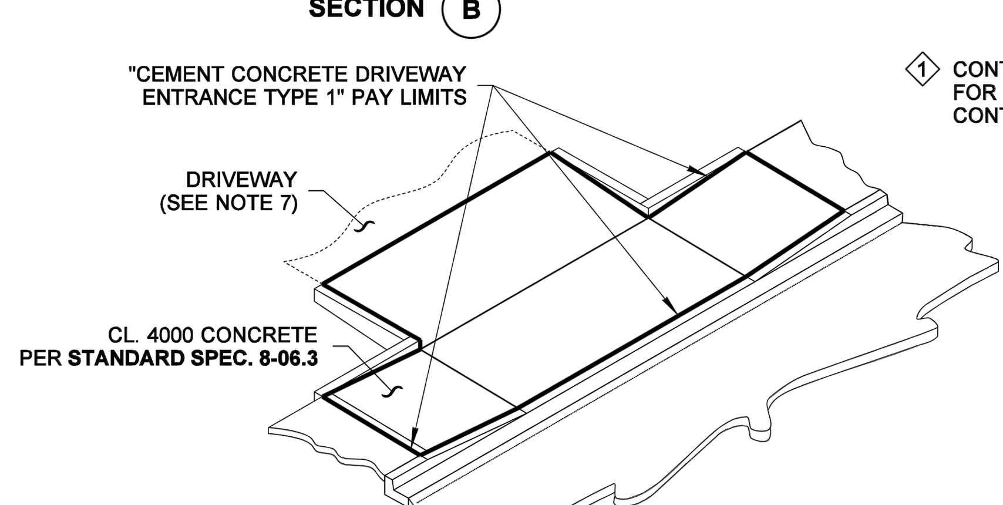
1. When the driveway width exceeds 15' (ft), construct a full depth expansion joint with 3/8" (in) joint filler along the driveway centerline. See **Standard Plan F-30.10.** Construct expansion joints parallel with the centerline as required at 15' (ft) maximum spacing when driveway widths exceed 30' (ft).
2. See **Standard Plan F-30.10** for sidewalk details.
3. Curb and Gutter shown; see the Contract Plans for the curb design specified. See **Standard Plan F-10.12** for Curb Details.
4. Avoid placing drainage structures, junction boxes or other obstructions in front of driveway entrances.
5. Where "GRADE BREAK" is called out, the entire length of the line between the two adjacent surface planes shall be flush.
6. The Pedestrian Ramp length is not required to exceed15 feet (unless otherwise shown in the Contract Plans). When applying the 15-foot max. length (measured from back of sidewalk) the running slope of the pedestrian ramp is allowed to exceed 8.3%. Use a single constant slope from bottom of ramp to top of ramp to match into the sidewalk over a horizontal distance of 15 feet.
7. Beyond limits shown. Pay item does not include driveway. See Contract Plans.



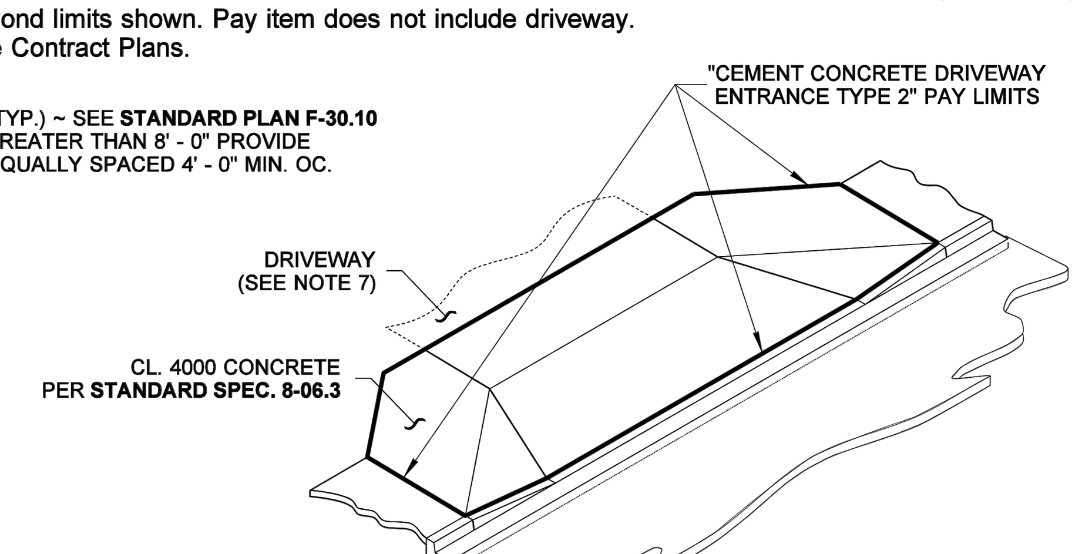
LEGEND

- SLOPE IN EITHER DIRECTION
- * 1.5% OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (2% MAX.)
- ** 7.5% OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (8.3% MAX.) (SEE NOTE 6)

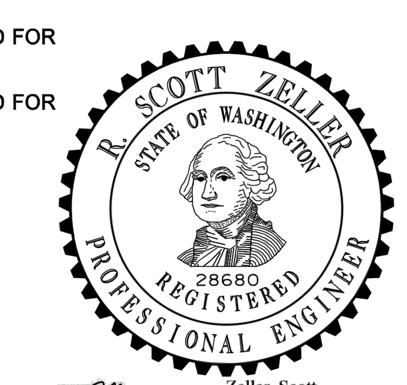
1 CONTRACTION JOINT (TYP.) ~ SEE **STANDARD PLAN F-30.10** FOR RAMP LENGTHS GREATER THAN 8' - 0" PROVIDE CONTRACTION JOINT EQUALLY SPACED 4' - 0" MIN. OC.



ISOMETRIC VIEW
TYPE 1 ~ PAY LIMITS



ISOMETRIC VIEW
TYPE 2 ~ PAY LIMITS



Zeller, Scott
Jul 12 2016 4:26 PM

CEMENT CONCRETE DRIVEWAY ENTRANCE TYPES 1, 2, 3, & 4
STANDARD PLAN F-80.10-04

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
Carpenter, Jeff
Jul 15 2016 2:27 PM
STATE DESIGN ENGINEER
Washington State Department of Transportation

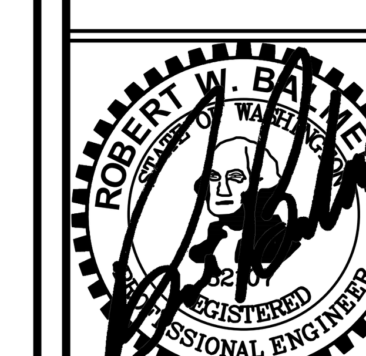
DRAWN BY: FERN LIDDELL

NO.	DATE	REVISION

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE:

CHEHALIS VILLAGE SQUARE
CHEHALIS WA.

FRONTAGE IMRPOVEMENT DETAILS



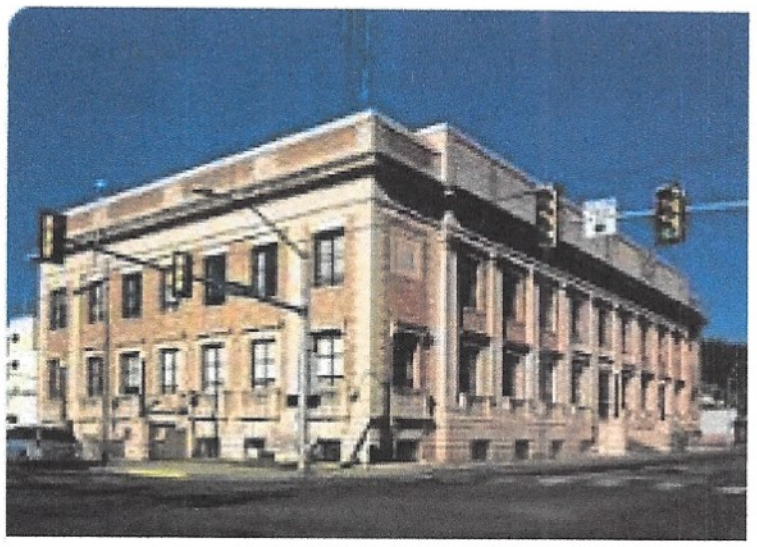
RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8919
EMAIL: CellPros@RBEngineers.com

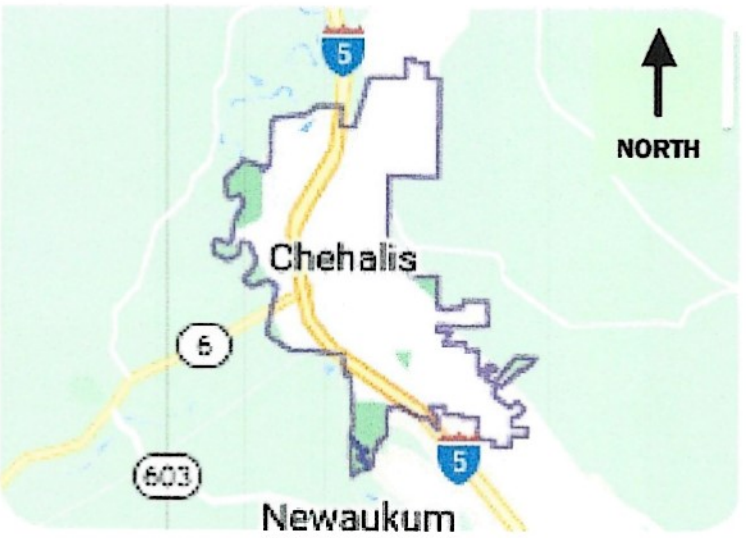
811 Know what's below. Call 811 before you dig.

JOB NUMBER 23051

DRAWING NAME 23051_C4.2_FIDT

C4.2

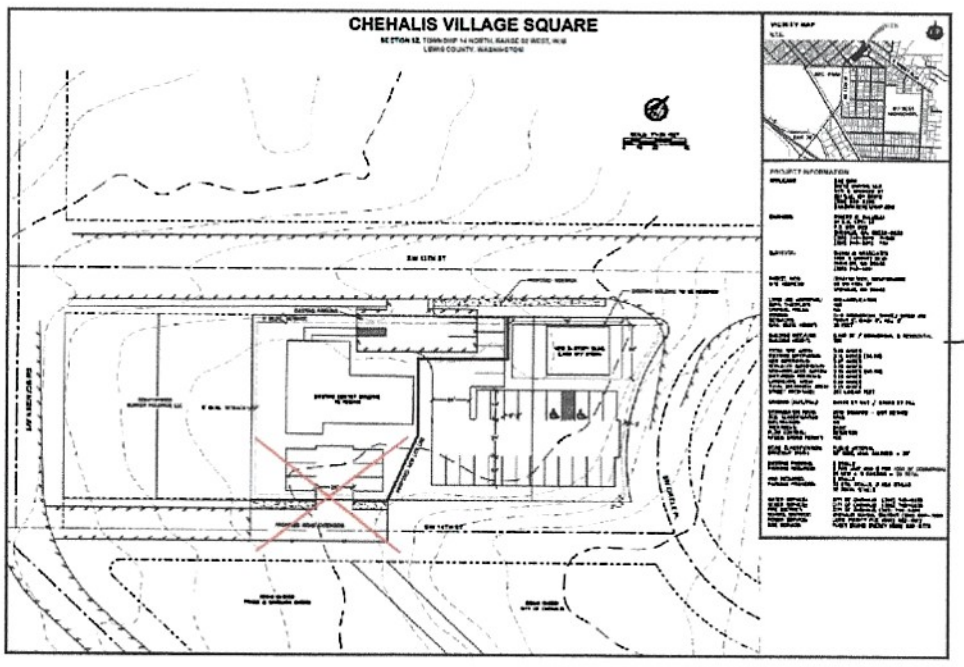


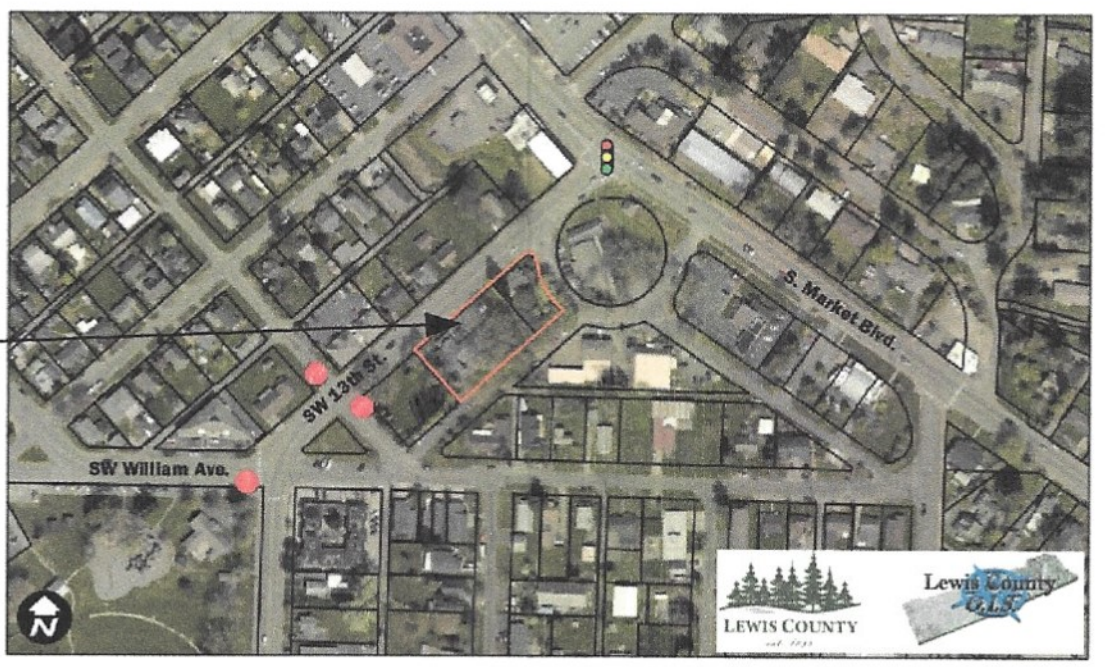


Chehalis

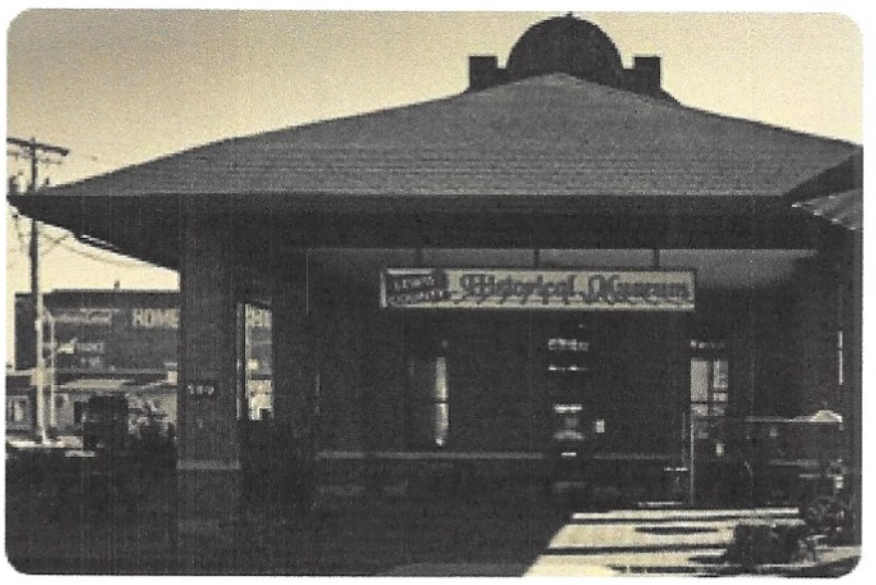
CHEHALIS VILLAGE SQUARE TRANSPORTATION MEMORANDUM

October 12, 2023





Jake Traffic Engineering, Inc.
Mark J. Jacobs, PE (OR and WA), PTOE, President
2614 39th Ave. SW – Seattle, WA 98116 – 2503
Tel. 206.762.1978 - Cell 206.799.5692
E-mail jaketraffic@comcast.net



JTE . Jake Traffic Engineering, Inc. .

Mark J. Jacobs, PE, PTOE
President
2614 39th Ave. SW – Seattle, WA 98116 – 2503
Tel. 206.762.1978 - Cell 206.799.5692
E-mail jaketraffic@comcast.net

October 12, 2023

ERETZ CAPITAL LLC
Attn: Dan Birk
5171 S. Spencer St.
Seattle, WA 98818

Re: Chehalis Village Square – Chehalis
Transportation Memorandum

Dear Mr. Birk,

I am pleased to provide this Transportation Memorandum for the proposed project located at 68 SW 13th St. to replace an existing SFDU with a three story commercial building including a 2,450 ground floor office and six apartments units in the two other floors. Access to the site would be an existing driveway on Southwest 13th Street.

This Transportation Memorandum documents the delta Traffic Generation of the proposed redevelopment. In addition, I have inspected the existing site. Below is an aerial view of the site obtained from Lewis County GIS:

Chehalis Village Square - Chehalis

The site is on two parcels #005411013001 and 005411014000. The NE lot contains a SFDU that is to be removed and the SW lot has an existing Dental Office Building that is to remain.

Attached to this letter is a Preliminary Site Plan prepared by RB Engineering I received on 10.04.2023. The plan depicts the new 3-story commercial building, the proposed new lot line, 35 shared parking stalls including two accessible, site circulation and access on SW 13th St. via the existing driveway.

Site Traffic Generation

Definitions

A vehicle trip is defined as a single or one direction vehicle movement with either the origin or destination (exiting or entering) inside the proposed development.
Traffic generated by development projects consists of the following types:

Pass-By Trips:	Trips made as intermediate stops on the way from an origin to a primary trip destination.
Diverted Link Trips:	Trips attracted from the traffic volume on a roadway within the vicinity of the generator but which require a diversion from that roadway to another roadway in order to gain access to the site.
Captured Trips:	Site trips shared by more than one land use in a multi-use development.
Primary (New) Trips:	Trips made for the specific purpose of using the services of the project.

Trip Generation

The proposed Carter Subaru Redevelopment project is projected to generate the vehicular trips during the average weekday, street traffic AM and PM peak hours as shown in Table 1. The trip generation for the project is calculated using trip rates from the Institute of Transportation Engineers (ITE) Trip Generation, 11th Edition, for Small Office Building (ITE Land Use Code 712), Multi Family Housing (ITE LUC 220) and Single Family Detached Housing for the existing use (ITE LUC 210). All site trips made by all vehicles for all purposes, including commuter, visitor, and service and delivery vehicle trips are included in the trip generation values.

TABLE 1 - VEHICULAR TRIP GENERATION
CHEHALIS VILLAGE SQUARE - CHEHALIS
TRANSPORTATION MEMORANDUM

Time Period	Size (X)	TG Rate	Enter %	Enter Trips	Exit %	Exit Trips	Total (T)	Pass-by %*	Pass-by Trips	Net Total
Proposed: Small Office Building (ITE LUC 712; 2,450 sf)										
Weekday	2,450	14.39	50%	18	50%	18	35	-	-	--
AM peak hour	2,450	1.67	82%	3	18%	1	4	-	-	--
PM peak hour	2,450	2.16	34%	2	66%	3	5	-	-	--
Proposed: Multi-Family Housing (Low-Rise) - General Urban/Suburban (ITE LUC 220; 6-units)										
Weekday	6	6.74	50%	20	50%	20	40	-	-	--
AM peak hour	6	0.4	24%	1	76%	2	2	-	-	--
PM peak hour	6	0.51	63%	2	37%	1	3	-	-	--
Existing: Single-Family Detached Housing - General Urban/Suburban (ITE LUC 210; 1 - existing unit)										
Weekday	*(1)*	*9.43*	*50%*	*(5)*	*50%*	*(5)*	*(9)*	-	-	--
AM peak hour	*(1)*	*0.7*	*26%*	*(0)*	*74%*	*(1)*	*(1)*	-	-	--
PM peak hour	*(1)*	*0.94*	*63%*	*(1)*	*37%*	*(0)*	*(1)*	-	-	--
Delta Site Traffic: Proposed - Existing										
Weekday	--	--	-	33	-	33	66	-	-	--
AM peak hour	--	--	-	4	-	2	6	-	-	--
PM peak hour	--	--	-	3	-	4	7	-	-	--

Where X = number of units or sf and T = Trips; parenthesis (xx) denote negative values
* - Pass-by rates per ITE, local Agency data and JTE, Inc. Traffic Engineering Experience, office and residential trips are typically considered new thus for analysis no pass-by to account for service/delivery type trips is taken.
Trip rates per the Institute of Transportation Engineers Trip Generation Manual 11th Edition
Note: Due to rounding some values may not add up

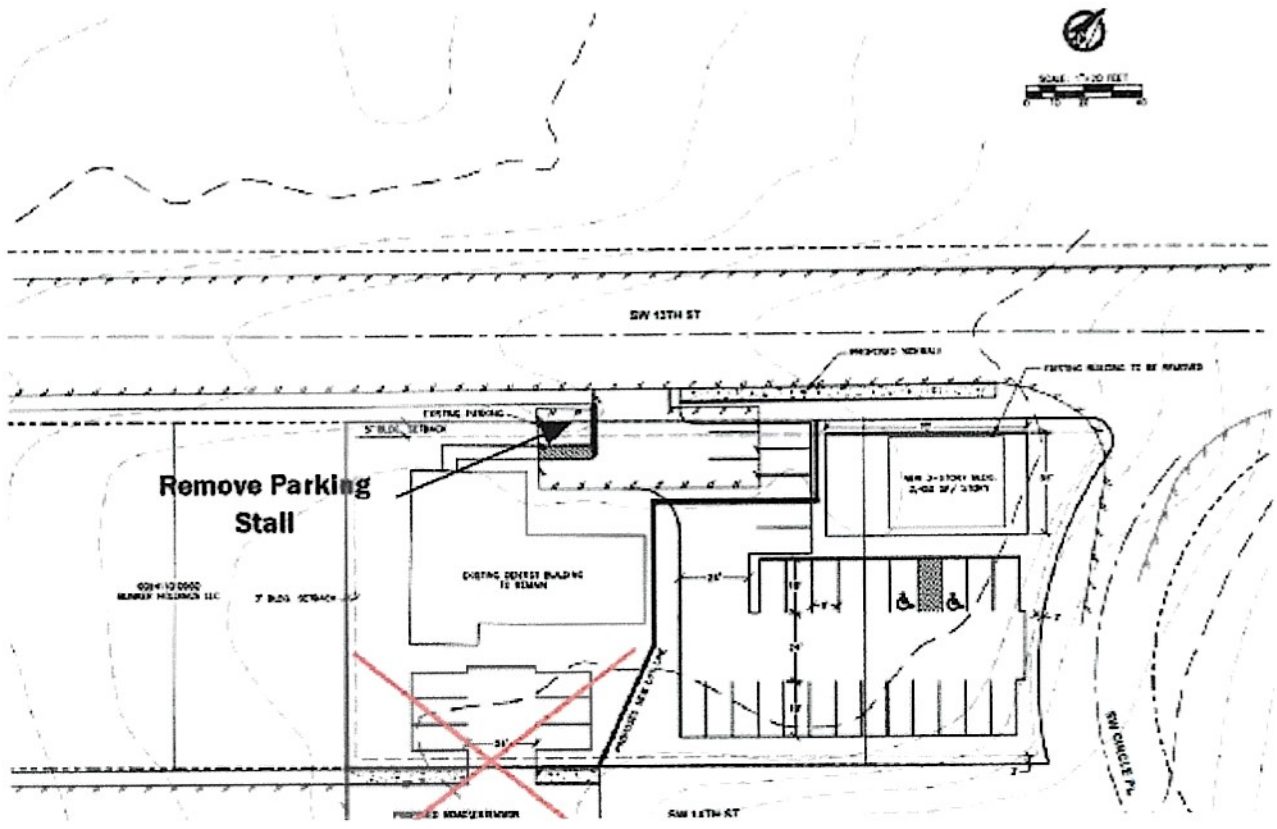
This project would generate about seven net new PM peak hour trips.

Site Access Inspection

The proposed access exists and is located about 350' southwest of the Stop Bar at S. Market Blvd. providing good intersection spacing. Below are Google Street View photographs at the existing access on SW 13th St. looking to the Southwest and Northeast, respectively

Per the Google Street View good sight lines exist in both directions, presuming no cars parked on the street encroach into the sight triangle.

The access operates and would continue to operate satisfactorily based on my Traffic Engineering Inspection. However I note that the existing parking spot located in the northwest corner at the existing access should be removed. Motorists entering/exiting this spot would add friction with motorists entering/exiting the site from and to SW 13th Street. The plan below depicts the parking stall recommended to be removed:



No change to the existing site access is proposed.

Chehalis Traffic Impact Analysis Guidelines

The City of Chehalis Municipal Code Section **12.04.330**.B notes when a TIA would be required:

> *B. When Required.*
> *1. The need for a TIA will be based on the size of the proposed development, existing street and intersection conditions, traffic volumes, accident history, community concerns, and other pertinent factors associated with the proposed project.*
> *2. A TIA will be required if a proposed development meets two or more of the following conditions:*
> *a. The proposed project generates more than 10 vehicles in the peak direction of the peak hour on the adjacent streets and intersections. This includes the summation of all turning movements that affect the peak direction of traffic.*
> *b. The proposed project generates more than 25 percent of the site-generated peak hour traffic through a signalized intersection or "critical" movement at a nonsignalized intersection.*
> *c. The proposed project is within an existing or proposed transportation benefit area. This may include transportation benefit districts (TBD), local improvement districts (LID), or local/state transportation improvement areas programmed for development reimbursements.*
> *d. The proposed project may potentially affect the implementation of the street system outlined in the transportation element of the comprehensive plan, the six-year transportation improvement program, or any other documented transportation project.*
> *e. If the original TIA was prepared more than two years before the proposed project completion dated.*
> *f. The increase in traffic volume as measured by ADT, peak hour, or peak hour of the "critical" movement is more than 10 percent.*
> *3. Even if it is determined that a TIA is not required, the director of public works or designated consultant may require the developer to have a trip generation study (TGS) conducted. TGSs will be used to forecast project-generated traffic for an established future horizon.*

Per my review of the above TIA conditions only item 2.c, I understand that the City as a whole is considered a LID, is met. The other conditions are not met; in particular the proposed redevelopment is projected to generate seven PM peak hour trips that are less than the 10 PM peak in the peak direction on the adjacent street hour trips threshold.

Agency Traffic Impact Mitigation

The City will require that the project site be constructed in conformance to City requirements.

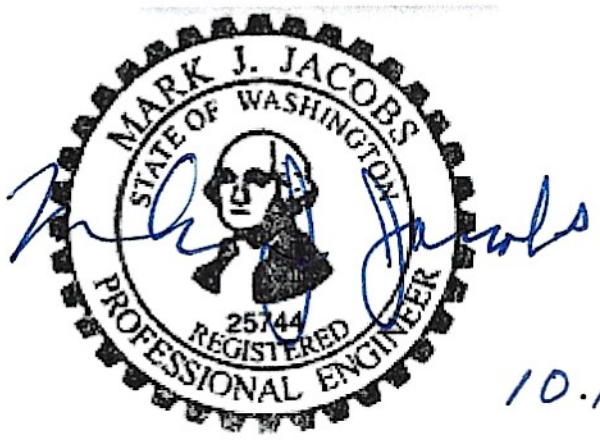
Summary

This Transportation Memorandum documents the delta Traffic Generation of the proposed redevelopment project. In addition, I inspected the existing site access and discuss the City's Traffic Impact Guidelines. Good sight lines exist at the driveway and the projected addition of seven PM peak hour trips are below the City threshold for requiring a full TIA be conducted.

Based on my analysis I recommend that Chehalis Village Square project be allowed with the following traffic impact mitigation measures.

- Construct the site in accordance with applicable City requirements.
- Remove the parking spot located in the northwest corner at the existing access.

Please contact me at 206.762.1978 or email me at jaketraffic@comcast.net if you have any questions.



Sincerely,

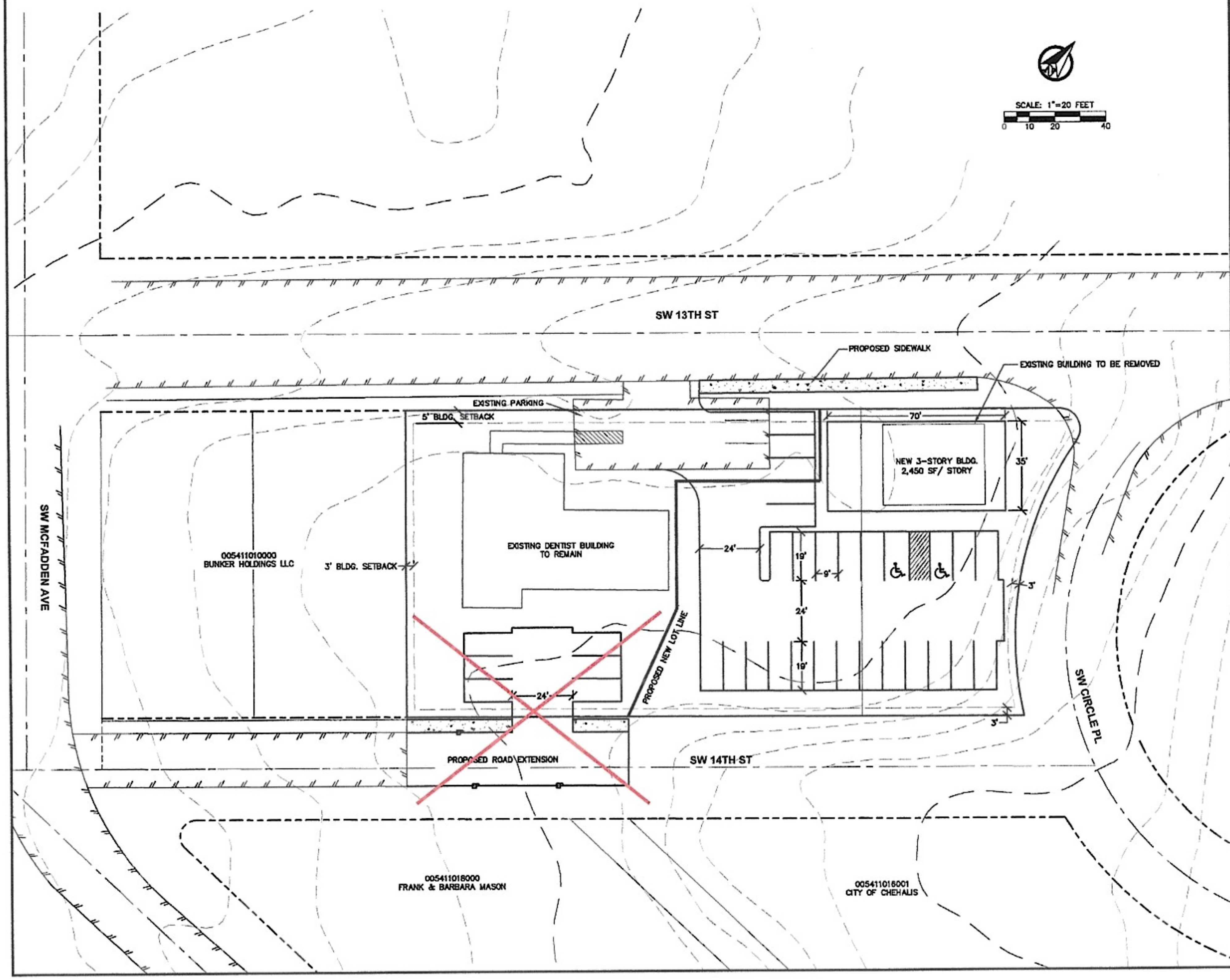
Mark J. Jacobs, PE, PTOE, President
JAKE TRAFFIC ENGINEERING, INC

10.12.2023

MJJ: mjj

CHEHALIS VILLAGE SQUARE

SECTION 32, TOWNSHIP 14 NORTH, RANGE 02 WEST, W.M.
LEWIS COUNTY, WASHINGTON



VICINITY MAP

N.T.S.

PROJECT INFORMATION

APPLICANT:	DAN BIRK ERETZ CAPITAL LLC 5171 S SPENCER ST SEATLLE, WA 98818 (206) 550-6295 DAN.BIRK@ERETZCAP.COM
ENGINEER:	ROBERT W. BALMELLI 91 S.W. 13TH ST. P.O. BOX 923 CHEHALIS, WA. 98532-0923 (360) 740-8919 PHONE (360) 740-8912 FAX
SURVEYOR:	BLUHM & ASSOCIATES 1068 S MARKET BLVD. CHEHALIS, WA 98532 (360) 748-1551
PARCEL NOS: SITE ADDRESS:	005411013001, 005411014000 68 SW 13TH ST CHEHALIS, WA 98532
LAND USE APPROVAL: SEPA CHECKLIST: CRITICAL AREAS: ZONING: SETBACKS: MAX. BLDG. HEIGHT:	PRE-APPLICATION YES NO C-O COMMERCIAL OFFICE/ MIXED USE FRONT 5', BACK 0', ADJ. 3' 35 FEET
BUILDING SIZE/USE: BUILDING HEIGHT:	2,450 SF / COMMERCIAL & RESIDENTIAL TBD
TOTAL SITE AREA: EXISTING IMPERVIOUS: NEW IMPERVIOUS: REPLACED IMPERVIOUS: NEW+REPLACED IMPERV: DISTURBED PERVIOUS: LANDSCAPE AREA: TOTAL DISTURBED AREA: STREET FRONTAGE:	0.66 ACRES 0.16 ACRES (24.2%) 0.27 ACRES 0.03 ACRES 0.30 ACRES (45.5%) 0.25 ACRES 0.25 ACRES 0.25 ACRES 257 LINEAR FEET
GRADING (CUT/FILL):	±XXXX CY CUT / ±XXXX CY FILL
STORMWATER REGS: SOIL CLASSIFICATION INFILTRATION: TREATMENT: FLOW CONTROL: NPDES STORM PERMIT:	2019 SWMMWW - LIST METHOD NRCS NO BASIC DETENTION YES
ROAD CLASSIFICATION: DRIVEWAY WIDTH:	PUBLIC ARTERIAL 30' WIDE, MAX. ALLOWED = 30'
EXISTING PARKING: PARKING REQUIRED:	5 STALLS 2 PER UNIT AND 5 PER 1000 SF COMMERCIAL 24 NEW + 5 EXISTING = 29 TOTAL
ADA REQUIRED: PARKING PROVIDED:	2 STALLS 33 STD. STALLS, 2 ADA STALLS 35 TOTAL STALLS
WATER SERVICE: SEWER SERVICE: FIRE DISTRICT: SCHOOL DISTRICT: POWER SERVICE: GAS SERVICE:	CITY OF CHEHALIS (360) 748-0238 CITY OF CHEHALIS (360) 748-0238 CITY OF CHEHALIS (360) 748-3394 CHEHALIS SCHOOL DISTRICT (360) 807-7200 LEWIS COUNTY PUD (800) 562-5612 PUGET SOUND ENERGY (888) 225-5773

NO.	DATE	REVISION

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: X/XX/XX
SCALE:

CHEHALIS VILLAGE SQUARE

CHEHALIS WA.

PRELIMINARY SITE PLAN

ROBERT W. BALMELLI

RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923 CHEHALIS, WA 98532
Off: (360) 740-8919

811 Know what's below. Call 811 before you dig.

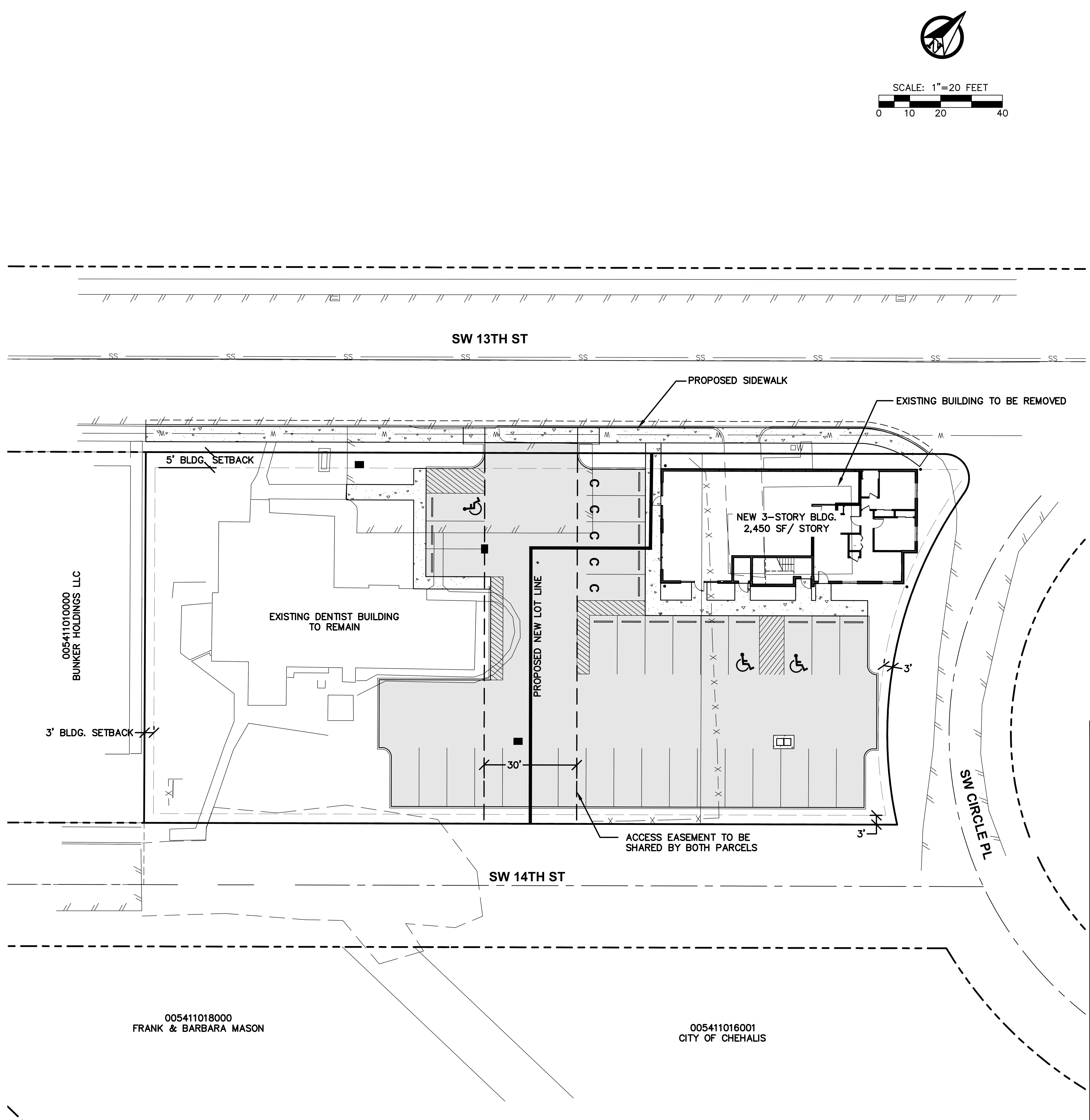
JOB NUMBER
23051

DRAWING NAME
23051_P0.1_PSP

P0.1
1 OF 1

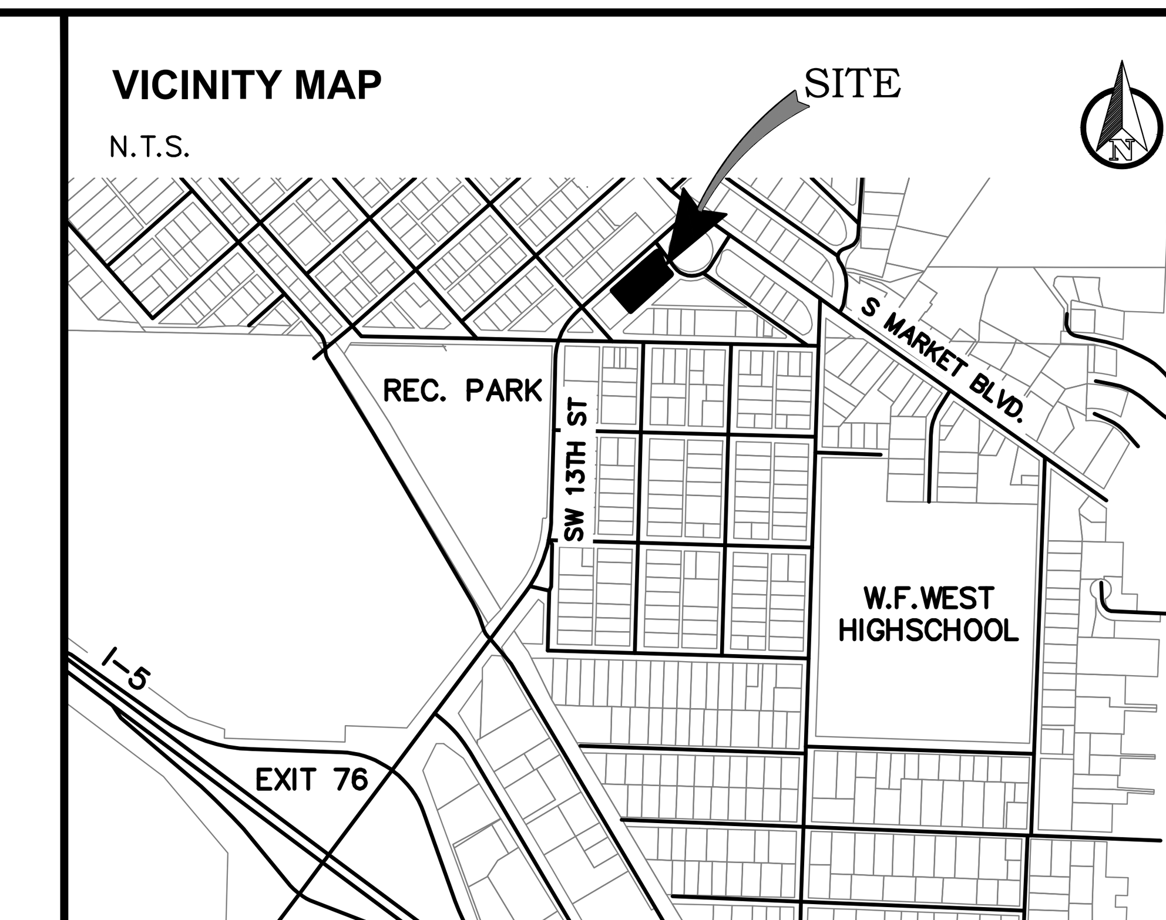
CHEHALIS VILLAGE SQUARE

SECTION 32, TOWNSHIP 14 NORTH, RANGE 02 WEST, W.M.
LEWIS COUNTY, WASHINGTON



VICINITY MAP

N.T.S.



PROJECT INFORMATION

APPLICANT:	DAN BIRK ERETZ CAPITAL LLC 5171 S SPENCER ST SEATTLE, WA 98818 (206) 550-6295 DAN.BIRK@ERETZCAP.COM
ENGINEER:	ROBERT W. BALMELLI 91 S.W. 13TH ST. P.O. BOX 923 CHEHALIS, WA. 98532-0923 (360) 740-8919 PHONE (360) 740-8912 FAX
SURVEYOR:	BLUHM & ASSOCIATES 1068 S MARKET BLVD. CHEHLAIS, WA 98532 (360) 748-1551
PARCEL NOS:	005411013001, 005411014000
SITE ADDRESS:	68 SW 13TH ST CHEHALIS, WA 98532
LAND USE APPROVAL:	PRE-APPLICATION
SEPA CHECKLIST:	YES
CRITICAL AREAS:	NO
ZONING:	C-O COMMERCIAL OFFICE/ MIXED USE
SETBACKS:	FRONT 5', BACK 0', ADJ. 3'
MAX. BLDG. HEIGHT:	35 FEET
BUILDING SIZE/USE:	2,450 SF / COMMERCIAL & RESIDENTIAL
BUILDING HEIGHT:	TBD
TOTAL SITE AREA:	0.66 ACRES
EXISTING IMPERVIOUS:	0.16 ACRES (24.2%)
NEW IMPERVIOUS:	0.27 ACRES
REPLACED IMPERVIOUS:	0.03 ACRES
NEW+REPLACED IMPERV:	0.30 ACRES (45.5%)
DISTURBED PERVIOUS:	0.25 ACRES
LANDSCAPE AREA:	0.25 ACRES
TOTAL DISTURBED AREA:	0.25 ACRES
STREET FRONTAGE:	257 LINEAR FEET
GRADING (CUT/FILL):	±188 CY CUT / ±335 CY FILL
STORMWATER REGS:	2019 SWMMWW - LIST METHOD
SOIL CLASSIFICATION	NRCS
INFILTRATION:	NO
TREATMENT:	BASIC
FLOW CONTROL:	DETENTION
NPDES STORM PERMIT:	YES
ROAD CLASSIFICATION:	PUBLIC ARTERIAL
DRIVEWAY WIDTH:	30' WIDE, MAX. ALLOWED = 30'
EXISTING PARKING:	5 STALLS
PARKING REQUIRED:	2 PER UNIT AND 5 PER 1000 SF COMMERCIAL 24 NEW + 5 EXISTING = 29 TOTAL
ADA REQUIRED:	2 STALLS
PARKING PROVIDED:	31 STD. STALLS, 2 ADA STALLS 33 TOTAL STALLS
WATER SERVICE:	CITY OF CHEHALIS (360) 748-0238
SEWER SERVICE:	CITY OF CHEHALIS (360) 748-0238
FIRE DISTRICT:	CITY OF CHEHALIS (360) 748-3394
SCHOOL DISTRICT:	CHEHALIS SCHOOL DISTRICT (360) 807-7200
POWER SERVICE:	LEWIS COUNTY PUD (800) 562-5612
GAS SERVICE:	PUGET SOUND ENERGY (888) 225-5773

SHEET INDEX

SURVEY INFORMATION

RECORD OF SURVEY DESCRIPTION

LOT 1 AND 2 OF BLOCK 7, OF HENDERSON LAND COMPANY'S FIRST ADDITION OF THE CITY OF CHEHALIS AS RECORDED IN VOL. 1 OF PLATS, PAGE 87, RECORDS OF LEWIS COUNTY, WASHINGTON.

VERTICAL DATUM

NAVD88

BASIS OF BEARING

RECORD OF SURVEY FILED UNDER VOLUME 30 OF SURVYES PAGE 161, AUDITOR'S NO. 3440275, RECORDS OF LEWIS COUNTY, WASHINGTON (C/L OF 13TH ST.)

GEOTECHNICAL NOTE

A GEOTECHNICAL REPORT WAS PREPARED BY ___________ FOR THIS PROJECT. GEOTECNICAL INFORMATION WAS NOT FIELD VERIFIED BY RB ENGINEERING

WORK IN COUNTY RIGHT-OF-WAY

CONTRACTOR TO OBTAIN RIGHT OF WAY PERMIT PRIOR TO ANY WORK WITHIN COUNTY RIGHT OF WAY. ALL WORK WITHIN COUNTY RIGHT OF WAY SHALL ADHERE TO COUNTY STANDARDS AS OUTLINED IN THE RIGHT OF WAY PERMIT.

TOPOGRAPHIC NOTE

TOPOGRAPHIC INFORMATION DEPICTED HEREON WAS PROVIDED BY ______________________________. TOPOGRAPHIC INFORMATION WAS NOT FIELD VERIFIED BY RB ENGINEERING.

REVISION

NO. DATE

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE: 1"=20'

CHEHALIS VILLAGE SQUARE
CHEHALIS WA.

CIVIL COVER SHEET AND SITE PLAN

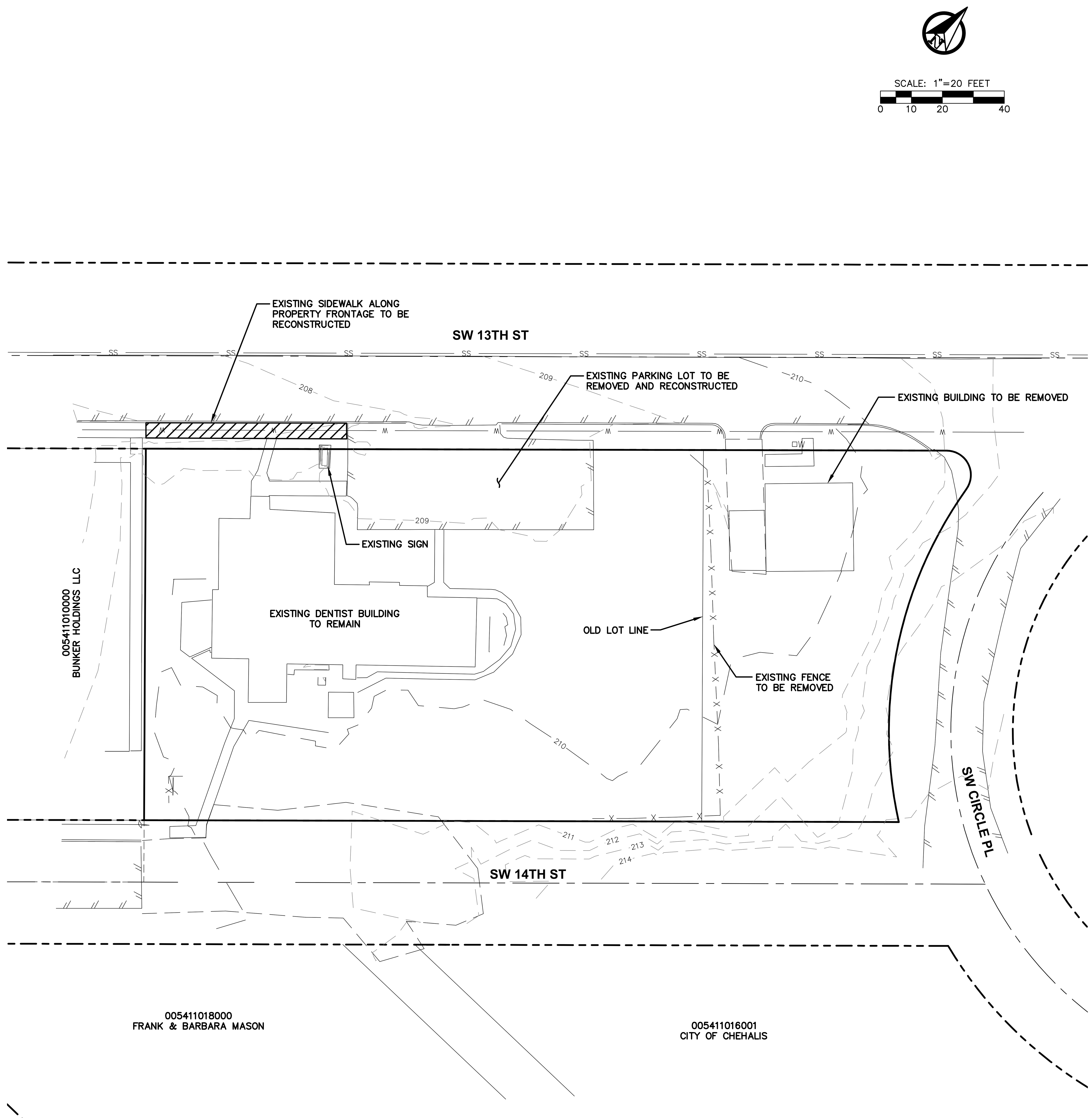
ROBERT W. BALMELLI
REGISTERED PROFESSIONAL ENGINEER

RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8919
EMAIL: CivilPros@RBEngineers.com

JOB NUMBER
23051

DRAWING NAME
23051_C0.1_CVSP

C0.1



NO.	DATE	REVISION

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE: 1"=20'

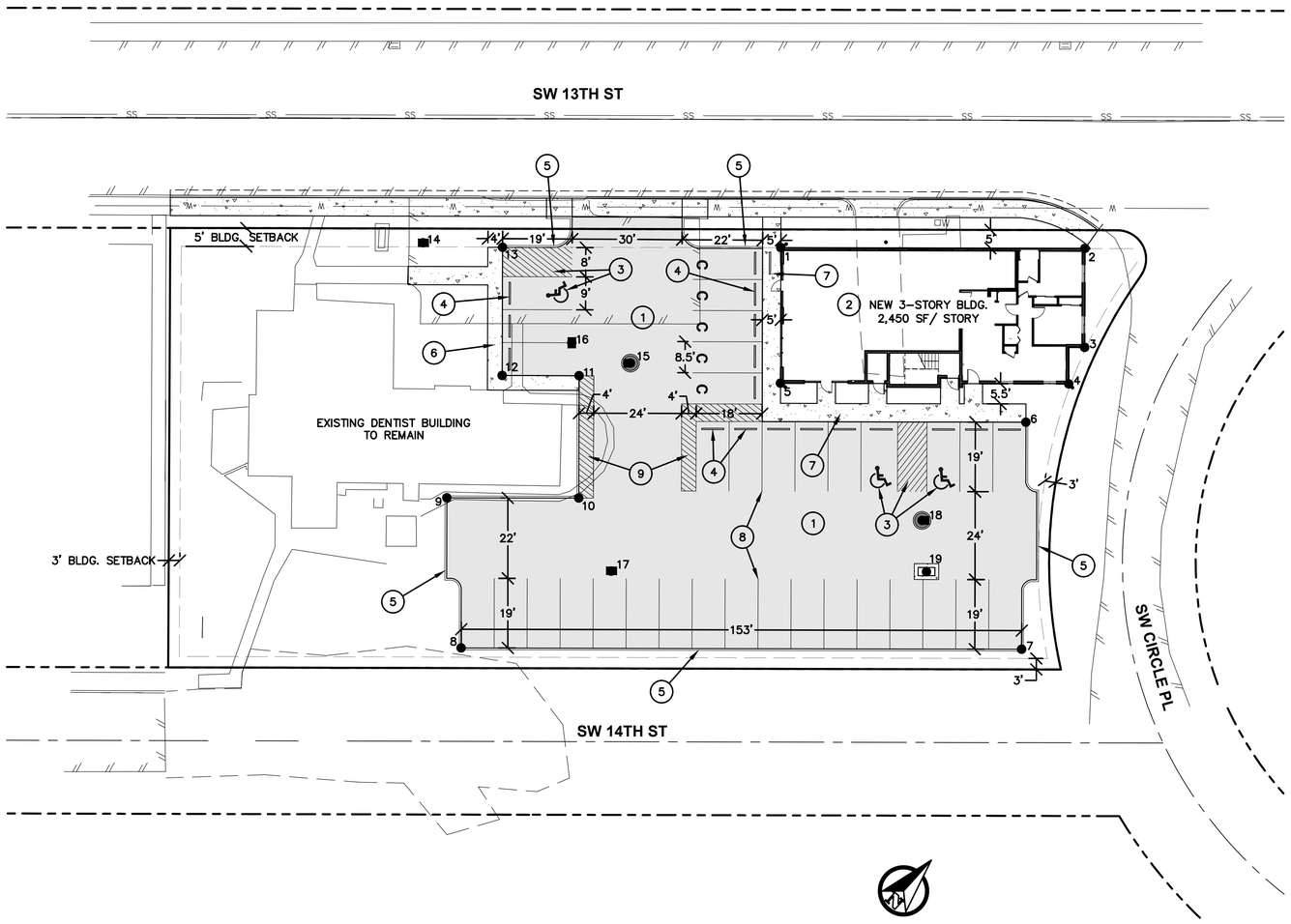
CHEHALIS VILLAGE SQUARE
CHEHALIS WA.

EXISTING SITE PLAN

ROBERT W. BA... STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER

RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8919
EMAIL: Cal@RossRBEngineers.com

JOB NUMBER 23051
DRAWING NAME 23051_C0.2_EXSP
C0.2
2 OF 11



SCALE: 1"=20 FEET
0 10 20 40

COORDINATE TABLE			
Point #	Description	Northing	Easting
1	BUILDING	10245.00	10781.29
2	BUILDING	10300.32	10843.16
3	BUILDING	10280.20	10861.16
4	BUILDING	10269.85	10864.60
5	BUILDING	10217.42	10805.95
6	PARKING	10254.25	10862.90
7	PARKING	10207.37	10903.48
8	PARKING	10105.38	10789.42
9	PARKING	10133.28	10759.11
10	PARKING	10157.27	10785.94
11	PARKING	10182.18	10763.69
12	PARKING	10168.19	10748.02
13	PARKING	10194.29	10724.70
14	STORM	10180.72	10707.74
15	STORM	10194.13	10771.84
16	STORM	10187.56	10756.19
17	STORM	10148.37	10805.87
18	STORM	10215.37	10859.74
19	STORM	10205.75	10869.99

ADA NOTE:

ALL NEW SIDEWALKS SHALL NOT EXCEED 2% SIDE SLOPE AND ADA PARKING STALLS AND RAMP LANDINGS SHALL NOT EXCEED 2 PERCENT SLOPE IN ALL DIRECTIONS. ALL ADA ACCESSIBLE ROUTES IDENTIFIED ON THE PLANS SHALL NOT EXCEED 5% LONGITUDINAL GRADE. ALL ADA RAMPS SHALL NOT EXCEED 8% GRADE AND 2% CROSS SLOPE. CONTRACTOR IS RESPONSIBLE TO CHECK GRADES PRIOR TO CONCRETE AND PAVING WORK. ANY GRADES EXCEEDING THE ABOVE LIMITS WILL BE REQUIRED TO BE CORRECTED AT THE SOLE EXPENSE OF THE CONTRACTOR.

STAKING AND INSPECTION NOTE:

CONTRACTOR SHALL CALL RB ENGINEERING 48 HOUR PRIOR TO POURING CONCRETE BARRIER OR CURB AND GUTTER FOR INSPECTION.

HORIZONTAL CONTROL NOTES:

1. CONSTRUCT NEW PAVED PARKING LOT PER PLAN COORDINATES AND DIMENSIONS. SEE DETAIL ON SHEET C1.2.
2. BUILDING FOUNDATION CORNERS SHALL BE STAKED BY WASHINGTON STATE LICENSED LAND SURVEYING.
3. CONSTRUCT NEW ADA PARKING STALLS AND STRIPING PER PLAN AND DETAIL ON SHEET C1.2.
4. INSTALL CONCRETE WHEEL STOPS AT PARKING STALLS SHOWN. SEE DETAIL ON SHEET C1.2.
5. CONSTRUCT NEW PARKING LOT CONCRETE EXTRUDED CURB PER DETAIL ON SHEET C1.2.
6. CONSTRUCT NEW ONSITE CONCRETE SIDEWALK FLUSH WITH PARKING LOT PER DETAIL ON SHEET C1.2.
7. CONSTRUCT NEW BUILDING PERIMETER CONCRETE SIDEWALKS PER DETAIL ON SHEET C1.2. PROVIDE CRACK CONTROL AND EXPANSION MATERIALS AT ALL BUILDING/CONCRETE CONNECTIONS.
8. STRIPE NEW PARKING LOT PARKING STALLS PER DETAIL ON SHEET C1.2,
9. STRIPE NEW WALKING PATH AS SHOWN ON PLANS.

NO. DATE REVISION

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE: 1"=20'

CHEHALIS VILLAGE SQUARE
CHEHALIS WA.

HORIZONTAL CONTROL PLAN

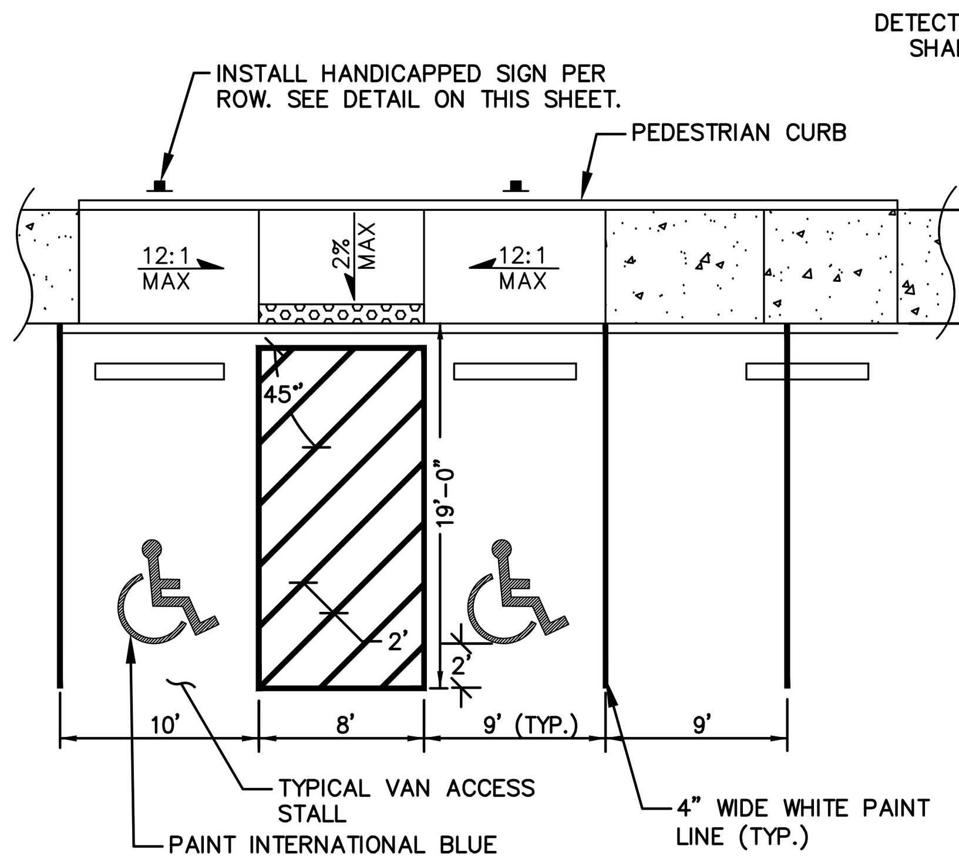
ROBERT W. BALLARD — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

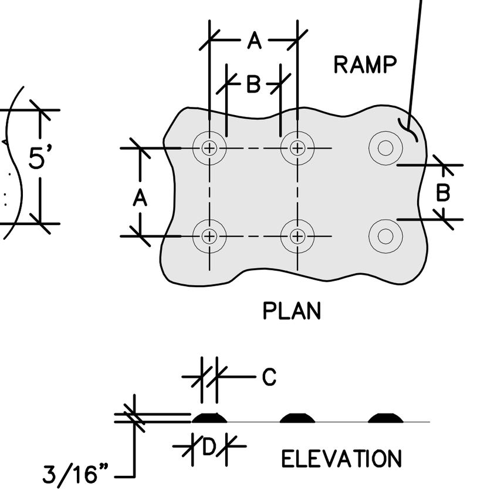
RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8919
EMAIL: CivilProject@RBengineers.com

811 Know what's below. Call 811 before you dig.

JOB NUMBER 23051
DRAWING NAME 23051_C1.1_HCPL

C1.1
3 OF 11





	MIN.	MAX.
A	1 5/8"	2 3/8"
B	5/8"	1 1/2"
C	7/16"	3/4"
D	7/8"	1 7/16"

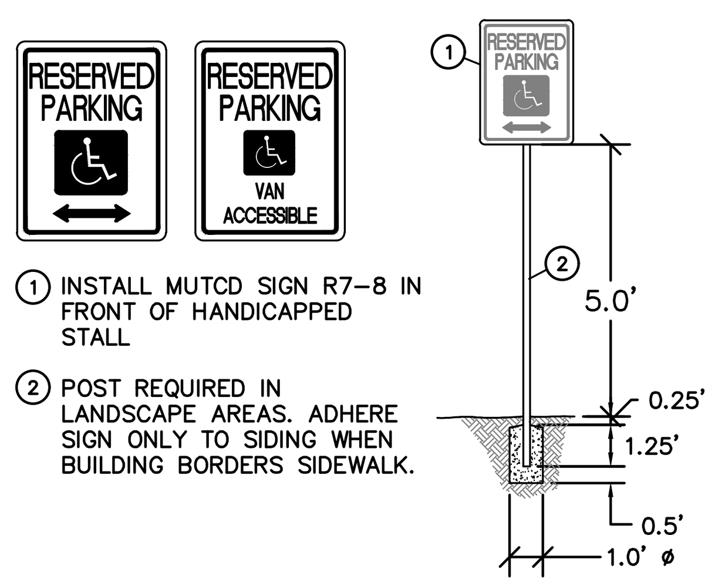
NOTES:

DETECTABLE WARNING SURFACE

1. THE DETECTABLE WARNING SURFACE (DWS) SHALL EXTEND THE FULL WIDTH OF THE CURB RAMP (EXCLUSIVE OF FLARES) OR THE LANDING.
2. THE DETECTABLE WARNING SURFACE SHALL BE PLACED AT THE BACK OF CURB, AND NEED NOT FOLLOW THE RADIUS.
3. THE ROWS OF TRUNCATED DOMES SHALL BE ALIGNED TO BE PERPENDICULAR TO GRADE BREAK AT THE BACK OF CURB.
4. THE ROWS OF TRUNCATED DOMES SHALL BE ALIGNED TO BE PARALLEL TO THE DIRECTION OF TRAVEL.
5. IF CURB AND GUTTER ARE NOT PRESENT, SUCH AS A SHARED-USE PATH CONNECTION, THE DETECTABLE WARNING SURFACE SHALL BE PLACED AT THE PAVEMENT EDGE.

SIDEWALK AND CURB RAMP

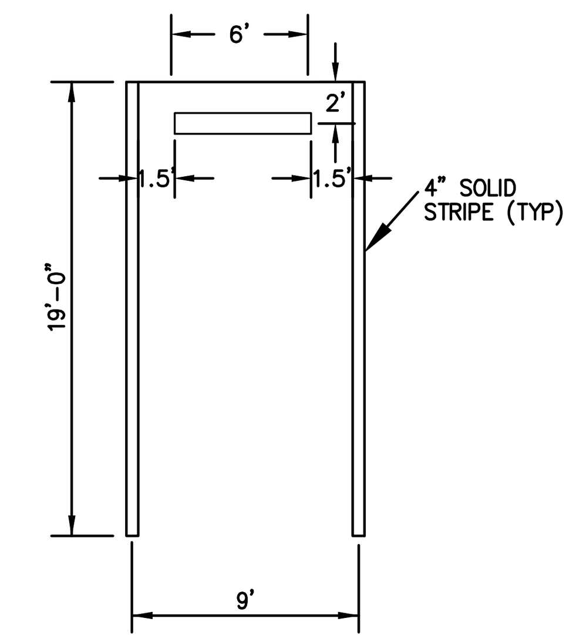
6. SEE STANDARD PLANS FOR SIDEWALK AND CURB RAMP DETAILS.
7. IF A CURB RAMP IS REQUIRED, THE LOCATION OF THE DETECTABLE WARNING SURFACE MUST BE AT THE BOTTOM OF THE RAMP AND WITHIN THE REQUIRED DISTANCE FORM THE RAIL.
8. WHEN THE GRADE BREAK BETWEEN THE CURB RAMP AND THE LANDING IS LESS THAN OR EQUAL TO 5 FT. FROM THE BACK OF CURB AT ALL POINTS, PLACE THE DETECTABLE WARNING SURFACE ON THE BOTTOM OF THE CURB RAMP.

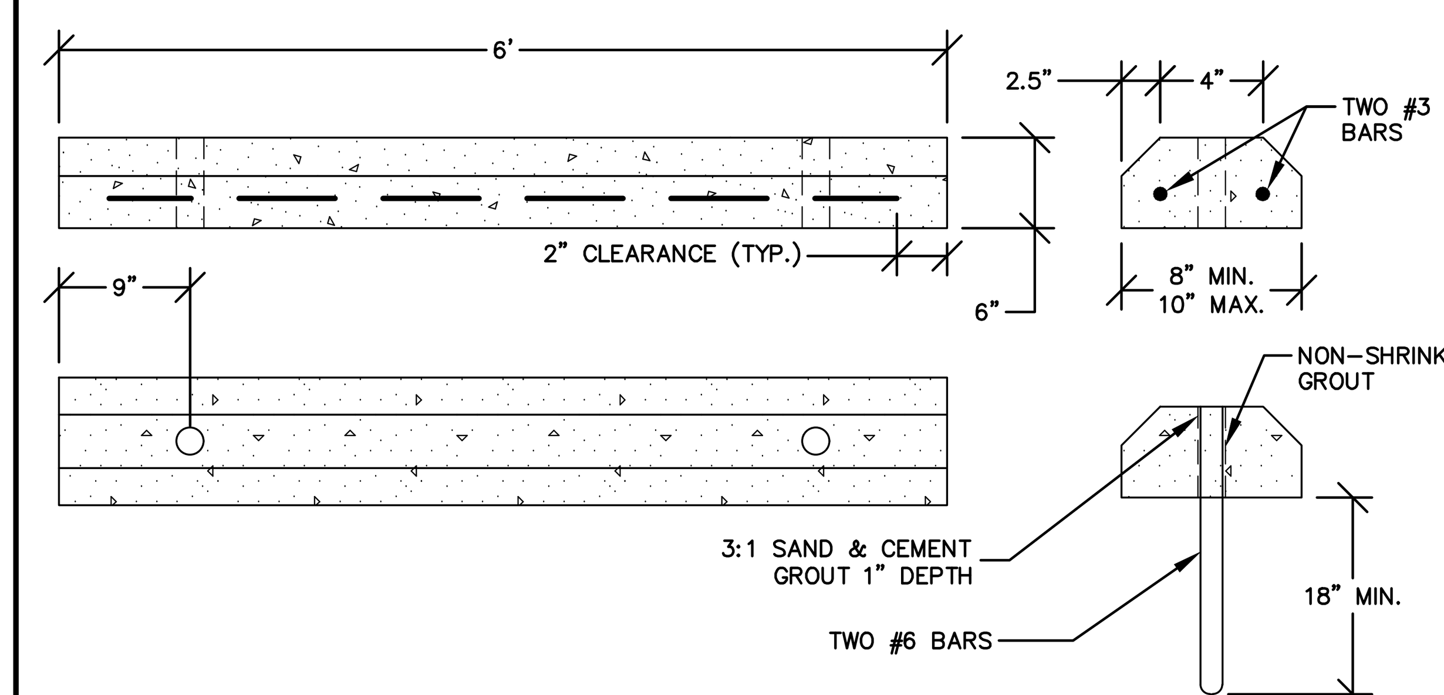


(1) INSTALL MUTCD SIGN R7-8 IN FRONT OF HANDICAPPED STALL

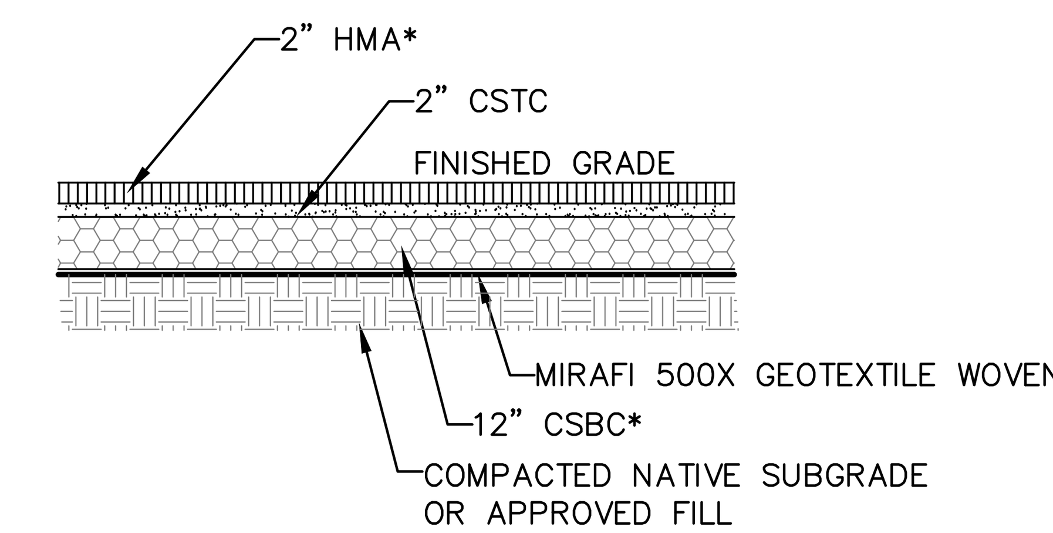
(2) POST REQUIRED IN LANDSCAPE AREAS. ADHERE SIGN ONLY TO SIDING WHEN BUILDING BORDERS SIDEWALK.

ADA STALL AND ACCESSIBILITY SIGN DETAIL
N.T.S.
RB ENGINEERING
ADD_SIGN&STALL.dwg



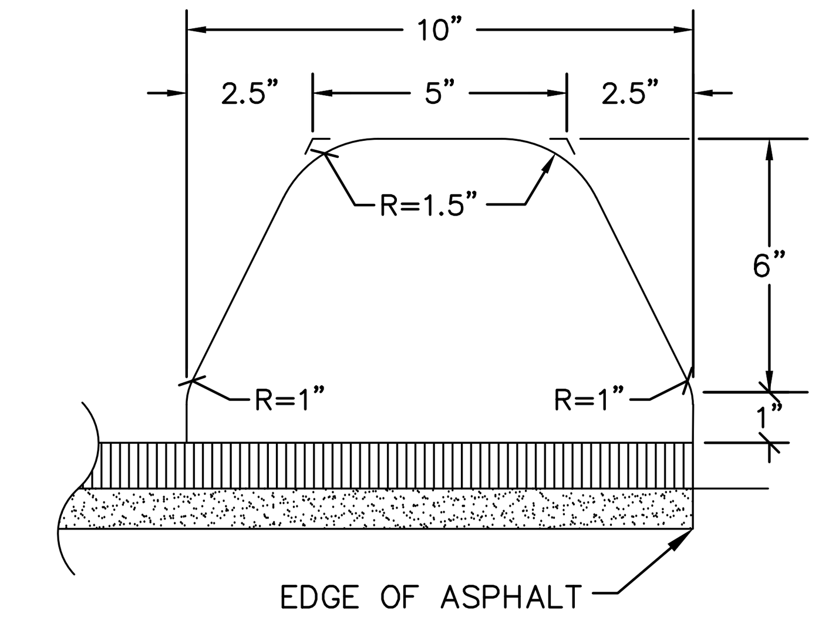


PARKING STALL & WHEEL STOP DETAIL
N.T.S.
RB ENGINEERING
PRK_ST&WH_STP.dwg

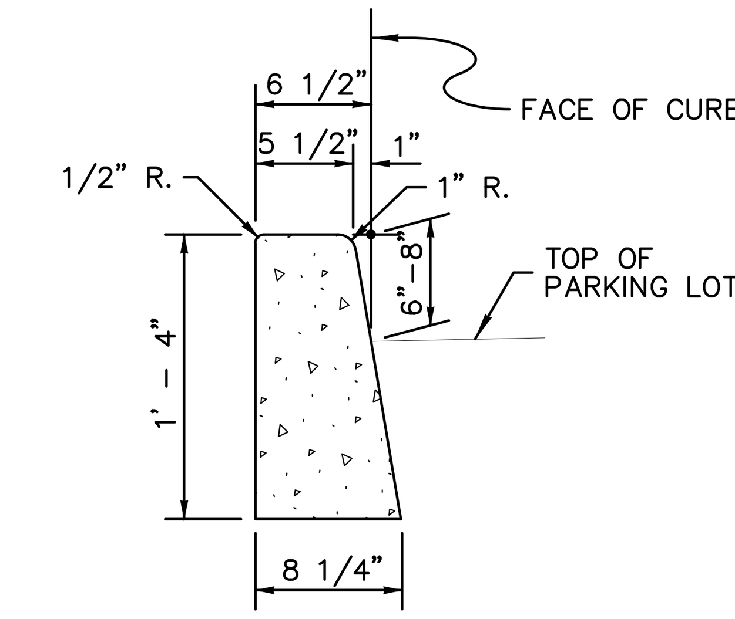


* ALL THICKNESSES ARE COMPACTED DEPTHS.

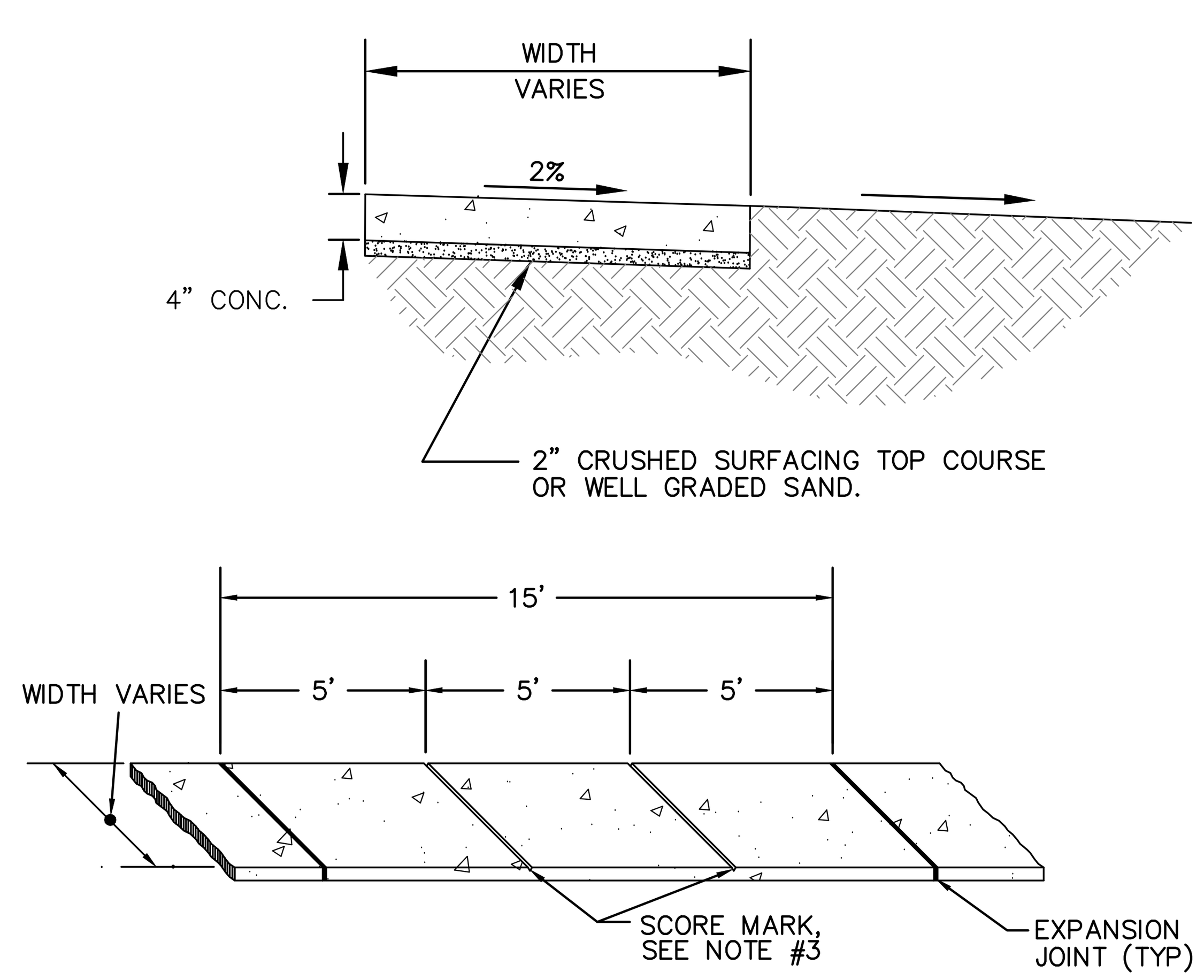
TYPICAL STRUCTURAL PAVING SECTION
N.T.S.
RB ENGINEERING
PAVING SECTION.dwg



EXTRUDED CURBING DETAIL
N.T.S.
RB ENGINEERING
EXTRUDED CURB.dwg



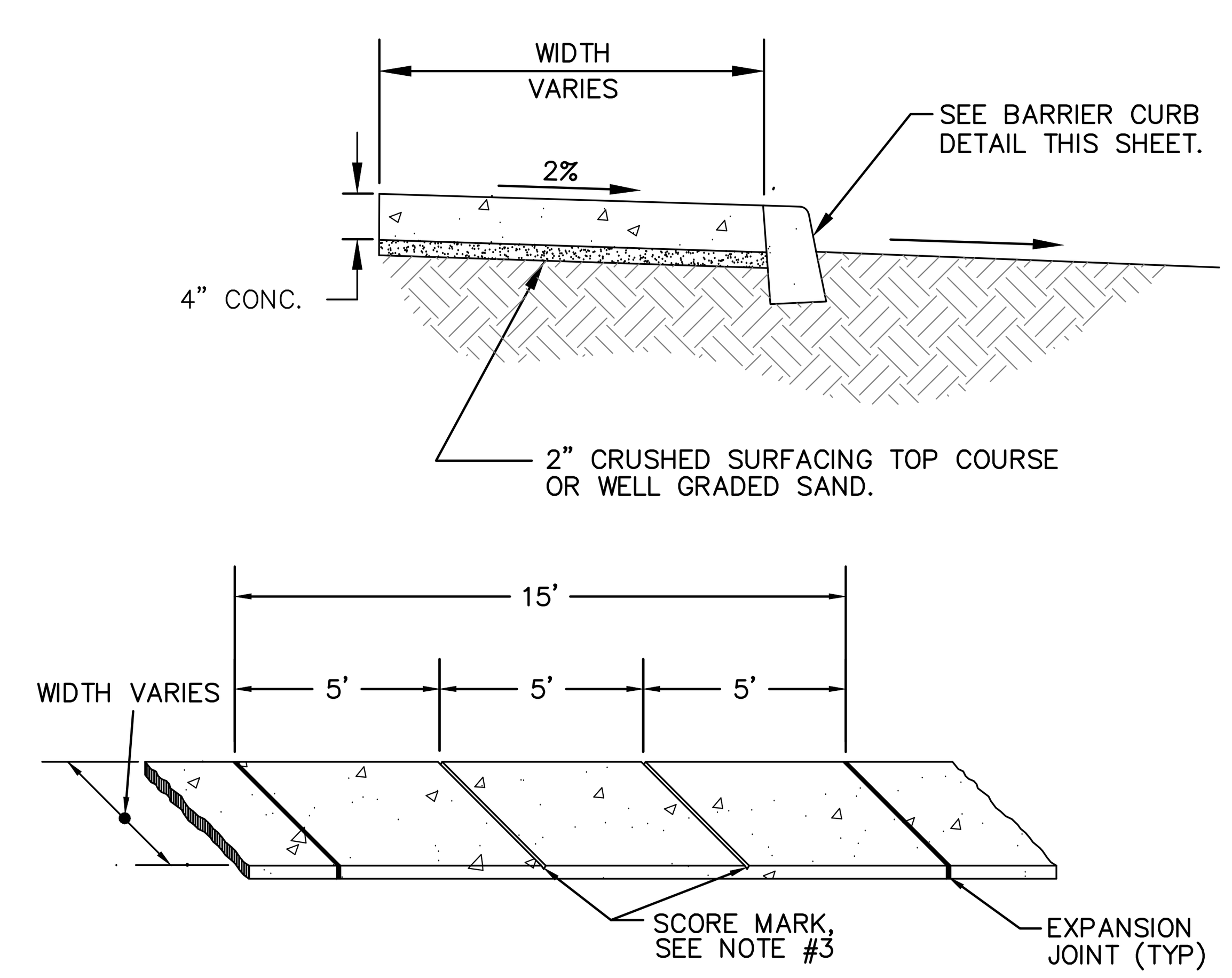
BARRIER CURB
N.T.S.
RB ENGINEERING
BARRIER_CURB.dwg



GENERAL NOTES:

1. EXPANSION JOINT MATERIAL TO BE 3/8" THICK PREMOLDED JOINT FILLER FULL THICKNESS OF CONCRETE.
2. FORM AND SUBGRADE INSPECTION REQUIRED BEFORE POURING CONCRETE.
3. SCORE MARKS SHALL BE ±1/8" WIDE BY ±1/4" DEEP. FOR SIDEWALKS OVER 8' IN WIDTH, A LONGITUDINAL SCORE MARK SHALL BE MADE ALONG CENTER OF WALK.
4. EXPANSION JOINTS SHALL BE INSTALLED IN CURB AND GUTTER AND IN SIDEWALK AT PC AND PT AT ALL CURB RETURNS. EXPANSION JOINTS SHALL BE PLACED IN SIDEWALK AT SAME LOCATIONS AS THOSE IN CURB AND GUTTER WHEN SIDEWALK IS ADJACENT TO CURB AND GUTTER, UNLESS OTHERWISE DIRECTED BY ENGINEER.

ONSITE SIDEWALK DETAIL
N.T.S.
RB ENGINEERING
ONSITE SIDEWALK.dwg



GENERAL NOTES:

1. EXPANSION JOINT MATERIAL TO BE 3/8" THICK PREMOLDED JOINT FILLER FULL THICKNESS OF CONCRETE.
2. FORM AND SUBGRADE INSPECTION REQUIRED BEFORE POURING CONCRETE.
3. SCORE MARKS SHALL BE ±1/8" WIDE BY ±1/4" DEEP. FOR SIDEWALKS OVER 8' IN WIDTH, A LONGITUDINAL SCORE MARK SHALL BE MADE ALONG CENTER OF WALK.
4. EXPANSION JOINTS SHALL BE INSTALLED IN CURB AND GUTTER AND IN SIDEWALK AT PC AND PT AT ALL CURB RETURNS. EXPANSION JOINTS SHALL BE PLACED IN SIDEWALK AT SAME LOCATIONS AS THOSE IN CURB AND GUTTER WHEN SIDEWALK IS ADJACENT TO CURB AND GUTTER, UNLESS OTHERWISE DIRECTED BY ENGINEER.

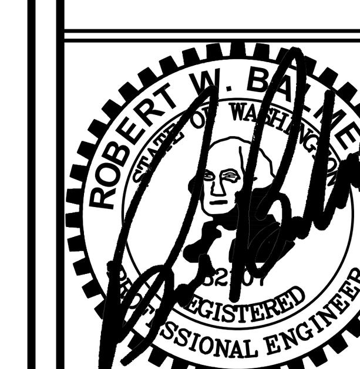
BUILDING PERIMETER SIDEWALK DETAIL
N.T.S.
RB ENGINEERING
ONSITE SIDEWALK.dwg

NO.	DATE	REVISION

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE:

CHEHALIS VILLAGE SQUARE
CHEHALIS WA.

HORIZONTAL CONTROL DETAILS

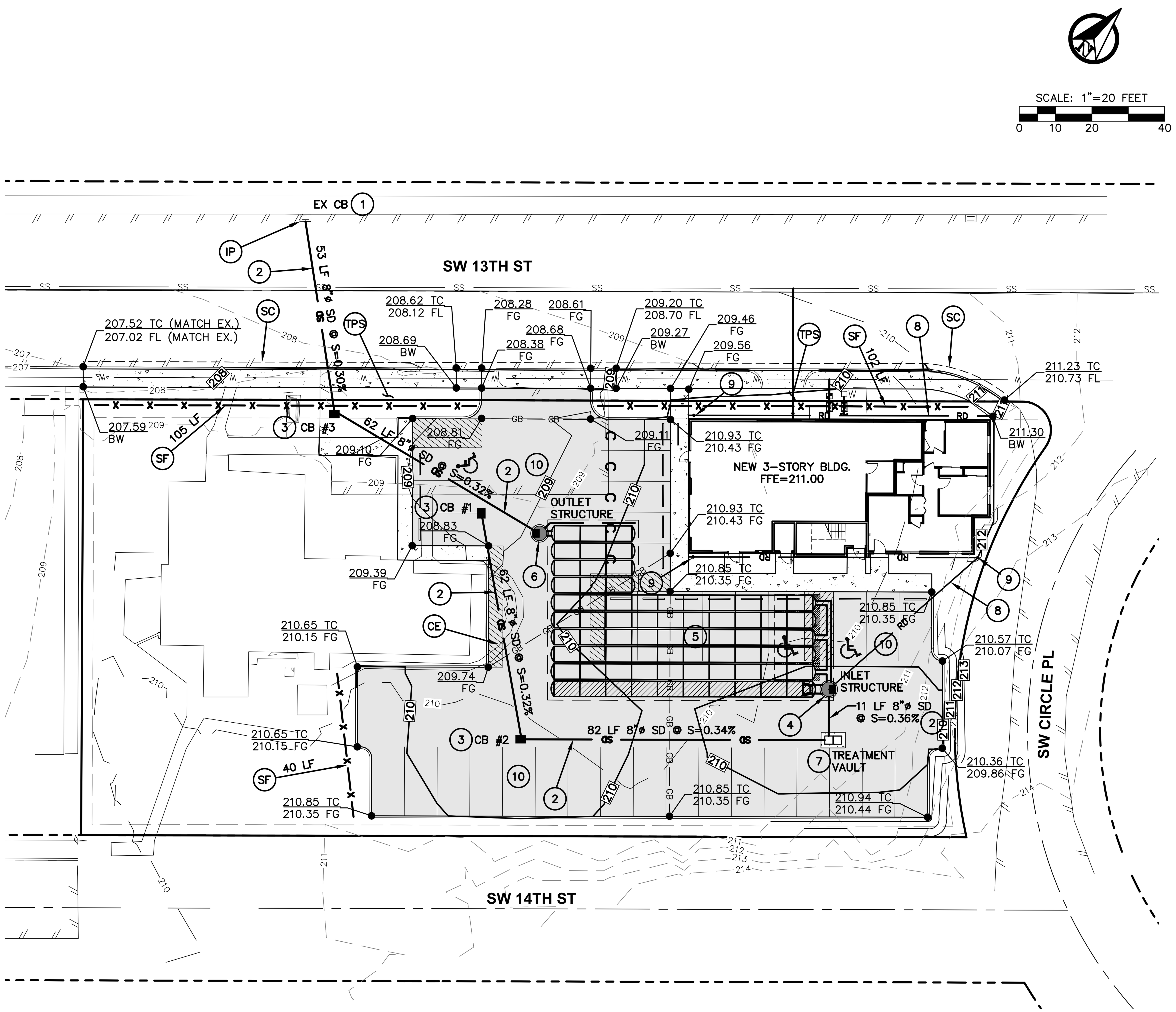


RB Engineering
DESIGN → PERMIT → MANAGE
P.O. Box 923
CHEHALIS, WA 98532
OFF: (360) 740-8919
EMAIL: CallProof@RBEngineers.com

811 Know what's below. Call 811 before you dig.

JOB NUMBER 23051
DRAWING NAME 23051_C1.2_HCDT

C1.2



STRUCTURE TABLE				
NAME	DESCRIPTION	RIM ELEV.	INLET	OUTLET
CB #1	TYPE 1	208.47		205.47
CB #2	TYPE 1	209.35	205.27	205.27
TREATMENT VAULT	STORMFILTER	209.24	204.99	204.99
INLET STRUCTURE	TYPE 2	209.73	204.95	204.95
OUTLET STRUCTURE	TYPE 2	209.18		204.09
CB #3	TYPE 1	208.31	203.89	203.89
EX CB	TYPE 1	207.75	203.75	

WSDOE BMP LIST:

CONTRACTOR SHALL HAVE A COPY OF THE PROJECT SWPPP ONSITE AT ALL TIMES DURING CONSTRUCTION. SEE SWPPP FOR LISTED BMPS.

(TPS) TEMPORARY AND PERMANENT SEEDING – BMP C120

CONTRACTOR TO PROVIDE APPLY TEMPORARY AND PERMANENT HYDRO-SEEDING AS OUTLINED ON THE APPROVED TESC. PROVIDE SEED MIXES AT A RATE OF 120 POUNDS PER ACRE. SEED MIXES TO USE ARE PER APPLICABLE WSDOE TABLE 4.1.2 TEMPORARY EROSION CONTROL SEED, 4.1.3 LANDSCAPING SEED, 4.1.4 LOW-GROWING TURF SEED, 4.1.5 BIO-SWALE SEED, 4.1.6 WET AREA SEED AND 4.1.7 MEADOW SEED MIX. USE TYPICAL FERTILIZER OF 10-4-6 NPK AT A RATE OF 90 POUNDS PER ACRE AND MULCH PER BMP C121. ALL SLOPE AREAS SHALL BE SCARIFIED WITH TRACKED VEHICLE PERPENDICULAR TO THE SLOPE PRIOR TO SEEDING SLOPE.

(SC) SAWCUTTING AND SURFACING POLLUTION PREVENTION – BMP C152

CONTRACTOR SHALL PROTECT ALL DRAINS FROM PROCESS WATER USED FOR SAWCUTTING ASPHALT AND CONCRETE PAVEMENTS. ALL PROCESS WATER SLURRY SHALL BE COLLECTED AND REMOVED FROM THE SITE AND DISPOSE PROCESS WATER IN A MANNER THAT DOES NOT VIOLATE GROUND OR SURFACE WATER QUALITY STANDARDS.

(IP) STORM DRAIN INLET PROTECTION – BMP C220

CONTRACTOR TO PROVIDE INLET PROTECTION ON ALL NEW CATCH BASIN INLETS IMMEDIATELY AFTER INSTALLATION. ALL EXISTING CATCH BASINS WITHIN 500 FEET OF THE SITE CONSTRUCTION ENTRANCE SHALL ALSO RECEIVE INLET PROTECTION. SEE DETAIL ON APPROVED PLANS. REMOVE THE BMP'S ONCE THE SITE IS DETERMINED TO BE STABILIZED BY THE PROJECT ENGINEER.

(SF) SILT FENCING – BMP C233

CONTRACTOR SHALL INSTALL ALL SILT FENCING PER APPROVED TESC PLAN AND WSDOE FIGURE II-4.2.12. SILT FENCING ALONG THE CLEARING LIMITS SHALL BE ORANGE IN COLOR. SEE PROJECT SWPPP FOR SILT FENCING SPECIFICATIONS.

GRADING AND DRAINAGE CONSTRUCTION NOTES:

1. CONNECT TO EXISTING STORM STRUCTURE. FIELD VERIFY IE OF EXISTING PIPE PRIOR TO CONSTRUCTION START.
2. INSTALL NEW STORM PIPE PER PLAN AND REVIEW AGENCY STANDARDS. BACKFILL PIPE PER STD. DETAIL ON SHEET C3.2. MAINTAIN MINIMUM 2 FEET OF COVER OVER THE ALL STORM PIPE.
3. INSTALL NEW TYPE 1 CATCH BASINS PER PLAN AND STD. DETAIL ON SHEET C2.2.
4. INSTALL NEW TYPE 2 CATCH BASINS PER PLAN AND STD. DETAIL ON SHEET C2.2.
5. INSTALL CHAMBER SYSTEM PER PLAN AND CROSS SECTION ON SHEET C2.2.
6. INSTALL NEW TYPE 2 STORM DRAIN MANHOLE OUTLET CONTROL STRUCTURE PER DETAIL ON SHEET C2.2.
7. INSTALL NEW CONTECH 1-CARTRIDGE STEEL CATCH BASIN PER PLAN AND DETAIL ON SHEET C2.2.
8. INSTALL SDR 35 PVC ROOF DRAIN AROUND PERIMETER OF THE BUILDING. COORDINATE WITH BUILDING CONTRACTOR FOR DOWNSPOUT SIZE AND LOCATIONS.
9. INSTALL ROOF DRAIN CLEANOUTS, PER PLAN AND DETAIL ON SHEET C2.2.
10. CONSTRUCT NEW ASPHALT PARKING LOT PER DETAIL ON SHEET C1.2.

REVISION | NO. | DATE

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE: 1"=20'

CHEHALIS VILLAGE SQUARE
CHEHALIS WA.

GRADING, DRAINAGE, AND T.E.S.C. PLAN

ROBERT W. BA... REGISTERED PROFESSIONAL ENGINEER

RB Engineering
DESIGN → PERMIT → MANAGE
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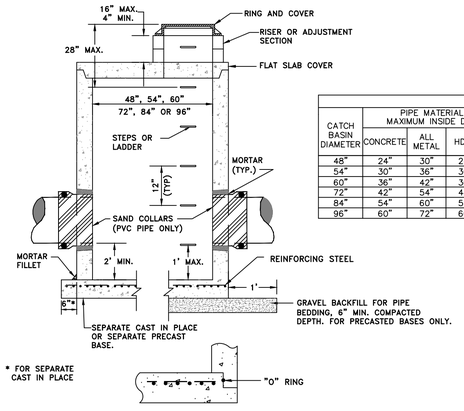
Know what's below. Call 811 before you dig.

JOB NUMBER 23051
DRAWING NAME 23051_C2.1_GDPL

C2.1

CATCH BASIN DIAMETER	WALL THICKNESS	BASE THICKNESS	MAXIMUM KNOCKOUT SIZE	MINIMUM DISTANCE BETWEEN KNOCKOUTS	BASE REINFORCING STEEL in² /ft IN EACH DIRECTION	
					INTEGRAL	SEPARATE
48"	4"	6"	36"	8"	0.15	0.23
54"	4.5"	8"	42"	8"	0.19	0.19
60"	5"	8"	48"	8"	0.25	0.25
72"	6"	8"	60"	12"	0.24	0.35
84"	8"	12"	72"	12"	0.29	0.39
96"	8"	12"	84"	12"	0.29	0.39



PRECAST BASE JOINT DETAIL

CATCH BASIN DIAMETER	PIPE MATERIAL WITH MAXIMUM INSIDE DIAMETER			
	CONCRETE	ALL METAL	HDPE	SOLID WALL PVC
48"	24"	30"	24"	27"
54"	30"	36"	30"	27"
60"	36"	42"	36"	36"
72"	42"	54"	42"	36"
84"	54"	60"	54"	36"
96"	60"	72"	60"	36"

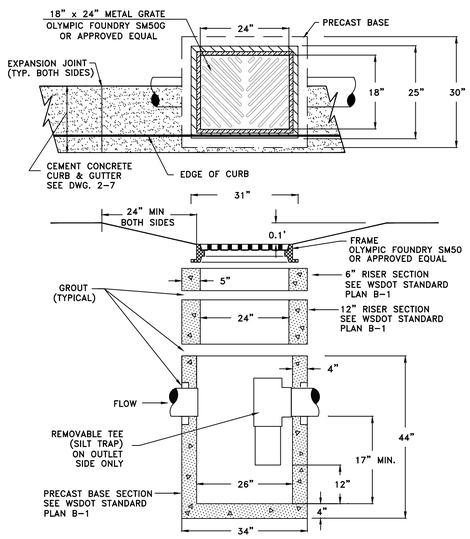
NOTES:
1. NO STEPS ARE REQUIRED WHEN THE HEIGHT IS 4' OR LESS.
2. KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MINIMUM. TO 2.5" MAXIMUM. PROVIDE A 1.5" MINIMUM GAP BETWEEN THE KNOCKOUT WALL AND THE OUTSIDE OF THE PIPE. AFTER THE PIPE IS INSTALLED, FILL THE GAP WITH JOINT MORTAR.
3. THE BOTTOM OF THE PRECAST BASIN MAY BE SLOPED TO FACILITATE CLEANING.
4. FRAME AND GRATE MAY BE INSTALLED WITH FLANGE DOWN OR CAST INTO RISER.

Drawing Not to Scale

City of Chehalis

CATCH BASIN TYPE 2

APPROVED BY	DWG. NO. 3-9
	REVISED DATE 4/14/2005
CITY ENGINEER	



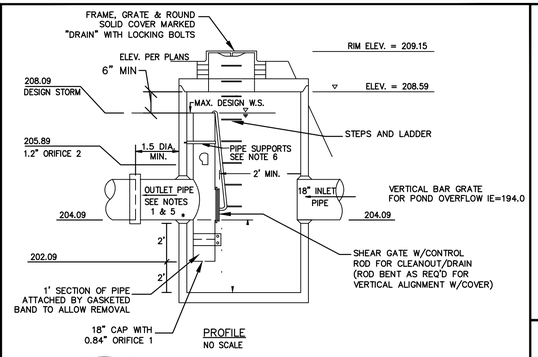
NOTES:
1. CATCH BASIN SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATIONS IN WSDOT STANDARD PLAN B-1.
2. OLYMPIC FOUNDRY GRATES SM50VG OR SM50S (OR APPROVED EQUAL), MAY BE REQUIRED WHEN CONDITIONS WARRANT, AS DETERMINED BY THE PUBLIC WORKS DIRECTOR.

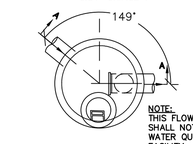
Drawing Not to Scale

City of Chehalis

CATCH BASIN WITH SILT TRAP TEE

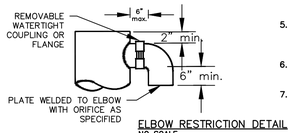
APPROVED BY	DWG. NO. 3-1
	REVISED DATE 1/02/2003
CITY ENGINEER	





NOTE: THIS FLOW RESTRICTOR SHALL NOT BE USED AS A WATER QUALITY CONTROL FACILITY.

PLAN VIEW
NO SCALE



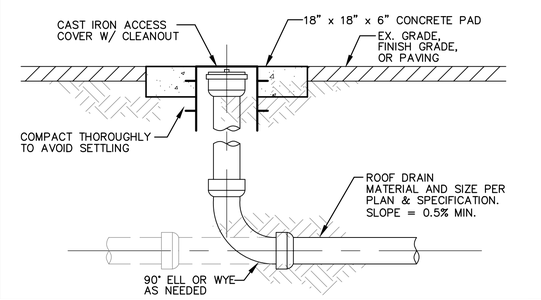
ELBOW RESTRICTION DETAIL
NO SCALE

NOTES:
1. USE A MINIMUM OF A 54" DIAMETER TYPE 2 CATCH BASIN.
2. OUTLET CAPACITY: 100-YEAR DEVELOPED PEAK FLOW.
3. METAL PARTS: CORROSION RESISTANT. NON-GALVANIZED PARTS PREFERRED. GALVANIZED PIPE PARTS TO HAVE ASPHALT TREATMENT 1.
4. FRAME AND LADDER OR STEPS OFFSET SO:
   A. CLEANOUT GATE IS VISIBLE FROM TOP.
   B. CLIMB-DOWN SPACE IS CLEAR OF RISER AND CLEANOUT GATE
   C. FRAME IS CLEAR OF CURB.
5. IF METAL OUTLET PIPE CONNECTS TO CEMENT CONCRETE PIPE: OUTLET PIPE TO HAVE SMOOTH O.D. EQUAL TO CONCRETE PIPE I.D. LESS THAN ½".
6. PROVIDE AT LEAST ONE 3"X0.90 GAUGE SUPPORT BRACKET ANCHORED TO CONCRETE WALL. (MAXIMUM 3'-0" VERTICAL SPACING)
7. LOCATE ADDITIONAL LADDER RUNGS IN STRUCTURES USED AS ACCESS TO TANKS OR VAULTS TO ALLOW ACCESS WHEN CATCH BASIN IS FILLED WITH WATER.

CONTROL STRUCTRE TYPE D - ORIFICE
N.T.S. **/ORIFICE/ORIFICE W/O OVERFLOW GRATE**

RB ENGINEERING

CTRL_STRT_C.dwg



ROOF DRAIN CLEANOUT DETAIL
N.T.S.

RB ENGINEERING

ROOF DRAIN CLEANOUT.dwg

GENERAL NOTES (STORM DRAIN CONSTRUCTION)

1. All workmanship and materials will be in accordance with the City of Chehalis Public Works Standards and the most recent copy of the State of Washington Standard Specifications for Road, Bridge and Municipal Construction (WSDOT/APWA).

2. Temporary erosion/water pollution measures will be required in accordance with the Stormwater Management Plan and Section 1-07.15 of the Standard Specifications.

3. Comply with all other permits and requirements of the City of Chehalis and/or other governing authorities or agencies.

4. A pre-construction meeting will be held with the Public Works Department prior to the start of construction.

5. All storm mains and retention/detention areas will be staked for grade and alignment by an engineering or surveying firm capable of performing such work.

6. Storm drainpipe will meet the following requirements:
   a. Plain concrete pipe conforming to the requirements of AASHTO M 86, Class 2.
   b. Reinforced concrete pipe conforming to the requirements of AASHTO M 170.
   c. PVC pipe conforming to ASTM D 3034 SDR 35 or ASTM F794 or ASTM F679 Type 1 with joints and gaskets conforming to ASTM D 3212 and ASTM F 477.
   d. Ductile iron pipe conforming to the requirements of AWWA C 151, thickness class as shown on the plans.
   e. High-density polyethylene smooth interior pipe conforming to AASHTO M252 types or AASHTO M294 type S, with a gasketed bell and spigot joints.
   f. Aluminized steel helical or spiral rib pipe in diameters of thirty (30) inches or greater, with a Manning's value of 0.020 or less.

7. Special structures, oil/water separators and outlet controls will be installed per plans and manufacturers recommendations.

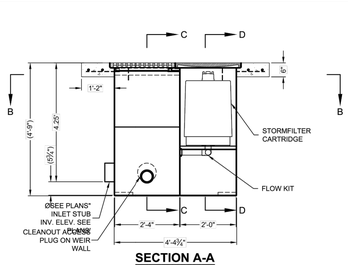
8. Provide traffic control plan(s) as required in accordance with MUTCD to the Public Works Department. Traffic control plans must be approved prior to the start of construction.

9. Call the Utilities Underground Location Center at 1-800-424-5555 a minimum of two (2) business days prior to any excavations.

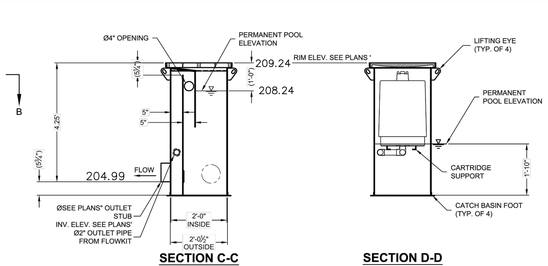
10. Where connections require "field verifications", the contractor will expose connection points and verify necessary fittings two (2) business days prior to initiating the work.

11. All storm lines and catchbasins will be high-velocity cleaned and pressure tested in accordance with Divison 7 of the Standard Specifications prior to paving. Hydrant flushing of the lines is not an acceptable cleaning method. Testing of the storm main will include television inspection at the contractor's expense. The Director of Public Works will determine whether the inspection will be performed by the city or by a representative of the contractor under the city's direction. Testing will take place after all underground utilities are installed and compaction of the roadway subgrade is completed.

12. Fill placement will not be allowed in any open channel used for storm conveyance without written approval from the Public Works Director.

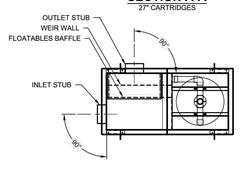


SECTION A-A
27" CARTRIDGES

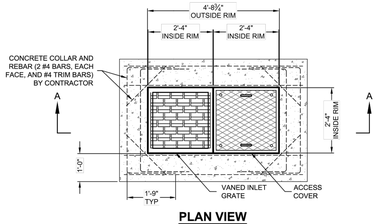


SECTION C-C

SECTION D-D



SECTION B-B



PLAN VIEW

MATERIAL LIST- PROVIDED BY CONTECH

COUNT	DESCRIPTION	INSTALLED BY
1	27", 18.79 GPM, PSORB CARTRIDGE (WHT)	CONTECH
1	FLOW KIT	CONTECH
1	NON-POWDER COATED STEEL CATCH BASIN	CONTRACTOR
1	28" x 28" VANED INLET COVER	CONTRACTOR
1	28" x 28" ACCESS COVER	CONTRACTOR

SITE DESIGN DATA

WATER QUALITY FLOW RATE	0.04 CFS
PEAK FLOW RATE	0.287 CFS
RETURN PERIOD OF PEAK FLOW	100 YRS
FILTER MEDIA TYPE	PSORB

PERFORMANCE SPECIFICATION
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 SHALL BE 1.67 GPM/SF (MAXIMUM). SPECIFIC FLOW RATE IS THE MEASURE OF THE FLOW (GPM) DIVIDED BY THE MEDIA SURFACE CONTACT AREA (SF). MEDIA VOLUMETRIC FLOW RATE SHALL BE 6 GPM/CF OF MEDIA (MAXIMUM).

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS REPRESENTATIVE, www.ContechES.com
3. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
5. STEEL STRUCTURE TO BE MANUFACTURED OF 1/4 INCH STEEL PLATE. CASTINGS SHALL MEET AASHTO HS20 LOAD RATING. FOR HS20 LOAD RATING ON STRUCTURE, CONCRETE COLLAR IS REQUIRED AND TO BE PROVIDED BY CONTRACTOR.
6. 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.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE (LIFTING CLUTCHES PROVIDED).
D. CATCHBASIN STORMFILTER EQUIPPED WITH 4 INCH (APPROXIMATE) LONG STUBS FOR INLET (IF APPLICABLE) AND OUTLET PIPING.
E. 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.CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
F. FOR H20 LOAD RATING, CONTRACTOR TO PROVIDE CONCRETE COLLAR WITH REINFORCEMENT, AS SHOWN.
G. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.

STRUCTURE WEIGHT
APPROXIMATE HEAVIEST PICK = 1,575 LBS

CONTECH
PROPOSAL
DRAWING

NO.	DATE	REVISION	BY

1 CARTRIDGE STEEL CATCHBASIN
789636-010
23051 CHEHALIS VILLAGE SQUARE
CHEHALIS, WA
SITE DESIGNATION: SFCB

CONTECH ENGINEERED SOLUTIONS LLC
11835 W. OLYMPIC BLVD, SUITE 855E
LOS ANGELES, CA 90064
(800) 338-1122
www.conteches.com

The Stormwater Management StormFilter

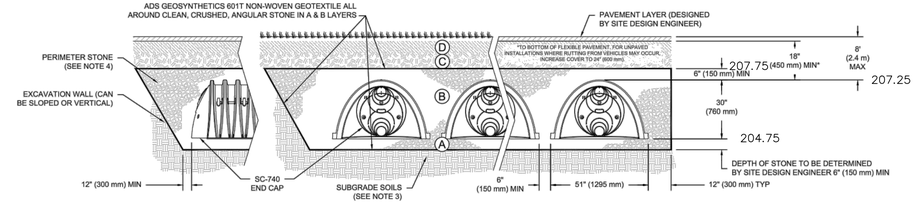
DATE: 2/5/2024

DESIGNED: AJS	DRAWN: SKJ
CHECKED: SKJ	APPROVED: SKJ
PROJECT No.: 789636	SEQUENCE No.: 010
SHEET: 1 OF 1	

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE:

CHEHALIS VILLAGE SQUARE
CHEHALIS WA.

GRADING AND DRAINAGE DETAILS

ROBERT W. BALLEW — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

RB Engineering
DESIGN → PERMIT → MANAGE
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OFF: (360) 740-8819
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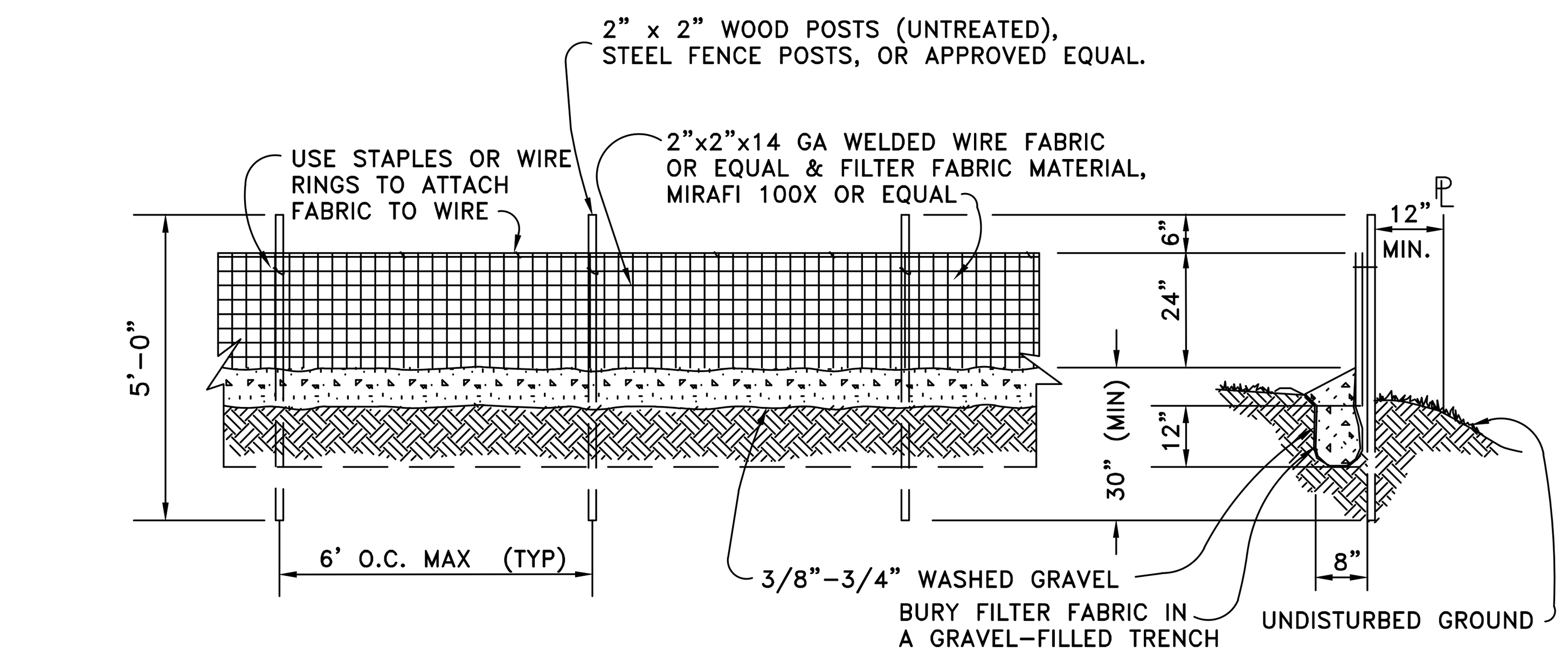
JOB NUMBER 23051

DRAWING NAME 23051_C2.2_GDDT

C2.2

6 OF 11

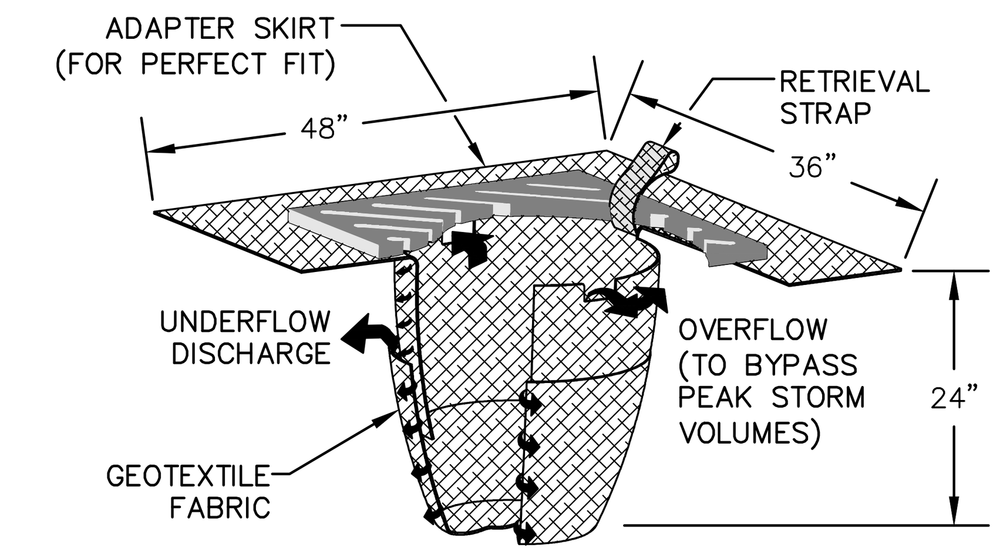


NOTES:

1. FILTER FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID USE OF JOINTS. WHEN JOINTS ARE NECESSARY, FILTER CLOTH SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST, WITH MINIMUM 6-INCH OVERLAP, AND SECURELY FASTENED @ BOTH ENDS.
2. A WIRE MESH SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY-DUTY WIRE STAPLES AT LEAST 1-INCH LONG, TIE WIRES, OR HOG RINGS. THE WIRE WILL EXTEND INTO THE TRENCH A MINIMUM OF 4 INCHES & SHALL NOT EXTEND MORE THAN 24 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
3. WHEN EXTRA-STRENGTH FILTER FABRIC & 4-FOOT MAXIMUM POST SPACING IS USED, THE WIRE MESH FENCE MAY BE ELIMINATED. IN SUCH CASES, THE FILTER FABRIC WILL BE STAPLED OR WIRED DIRECTLY TO THE POSTS W/ ALL OTHER PROVISIONS STILL APPLYING.
4. SILT FENCE SHALL NOT BE MOVED BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.
5. SILT FENCING SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL & AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.

DRAWING NOT TO SCALE

City of Chehalis	
TEMPORARY SILT FENCE	
APPROVED BY	DWG. NO. 3-4
	REVISED DATE
CITY ENGINEER	1/02/2003



(CONTRACTOR TO INSPECT AND CLEAN A MINIMUM OF EVERY TWO WEEKS.)

CATCH BASIN INLET PROTECTION DETAIL N.T.S.	RB ENGINEERING
	INLET PROTECTION.dwg

TABLE 4.1
TEMPORARY EROSION CONTROL SEED MIX

	% Weight	*% Purity*	*% Germination*
Chewings OR annual blue grass *Festuca rubra var. commutata OR Poa anna*	40	98	90
Perennial rye *Lolium perenne*	50	98	90
Redtop OR colonial bentgrass *Agrostis alba OR Agrostis tenuis*	5	92	85
White dutch clover *Trifolium repens*	5	98	90

GENERAL NOTES (EROSION CONTROL)

1. EROSION CONTROL MEASURES WILL BE IN PLACE PRIOR TO THE BEGINNING OF CONSTRUCTION. A REPRESENTATIVE FROM THE CITY WILL INSPECT AND APPROVE THE EROSION CONTROL MEASURES PRIOR TO THE START OF CONSTRUCTION.

2. EROSION CONTROL MEASURES ARE NOT LIMITED TO THE ITEMS ON THIS PLAN. THE CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF ALL EROSION MEASURES, AS REQUIRED UNDER THE MOST RECENT VERSION OF THE CHEHALIS STORM WATER MANAGEMENT PLAN. CARE WILL BE TAKEN TO PREVENT MIGRATION OF SILT AND/OR POLLUTED RUNOFF TO OFF-SITE PROPERTIES.

3. THE CONTRACTOR WILL MAKE REGULAR SURVEILLANCE OF ALL EROSION CONTROL MEASURES. IN ADDITION, EROSION CONTROL WILL BE THOROUGHLY INSPECTED AFTER EACH RAINFALL EVENT. THE CONTRACTOR WILL MAKE ALL NECESSARY REPAIRS, MODIFICATIONS, AND ADDITIONS AS NECESSARY TO ENSURE THE PROPER OPERATION OF THE EROSION CONTROL MEASURES. THE CITY MAY REQUIRE MORE FREQUENT INSPECTIONS OF EROSION CONTROL MEASURES BY THE CONTRACTOR SHOULD SITE OR WEATHER CONDITIONS DICTATE.

4. DURING THE WET SEASON, NOVEMBER THROUGH MARCH, ALL DISTURBED SOILS WILL BE STABILIZED WITHIN 48 HOURS AFTER LAND DISTURBANCE ACTIVITIES HAVE CEASED. EROSION CONTROL MEASURES WILL INCLUDE, BUT ARE NOT LIMITED TO, INSTALLATION OF STRAW MATTING, JUTE MATTING, STRAW MULCH AND/OR WOOD CHIPS, AND COVERING THE AFFECTED AREA AND SPOIL PILES WITH PLASTIC SHEETING.

5. THE CONTRACTOR WILL CHECK ALL SEEDED OR SODDED AREAS REGULARLY TO ENSURE THAT THE VEGETATIVE COVER IS BEING ADEQUATELY ESTABLISHED. AREAS WILL BE REPAIRED, RESEEDED, AND FERTILIZED AS REQUIRED.

6. TRACKING OF SOIL OFF SITE WILL NOT BE ALLOWED. IF ANY SOIL IS TRACKED BEYOND THE LIMITS OF THE SITE, IT WILL BE REMOVED BEFORE THE END OF THAT WORKING DAY. TO PREVENT ADDITIONAL TRACKING, VEHICLE TIRES MUST BE SWEPT OR WASHED PRIOR TO LEAVING THE PROJECT SITE.

7. NO MORE THAN 500 LINEAL FEET (LF) OF TRENCH ON A DOWNSLOPE OF MORE THAN FIVE PERCENT WILL BE OPENED AT ONE TIME.

8. EXCAVATED MATERIAL WILL BE PLACED ON THE UPHILL SIDE OF TRENCHES.

9. EXCAVATED MATERIAL WILL NOT BE PLACED IN ESTABLISHED DRAINAGE DITCHES UNDER ANY CIRCUMSTANCES.

10. TRENCH DEWATERING DEVICES WILL BE DISCHARGED IN A MANNER THAT WILL NOT ADVERSELY AFFECT FLOWING STREAMS, DRAINAGE SYSTEMS, OR OFF-SITE PROPERTIES. AN ESTABLISHED SEDIMENT TRAP WILL BE USED AS THE RECEIVER FOR ALL TRENCH DEWATERING OPERATIONS.

11. ALL DISTURBED AREAS WILL BE SEEDED OR SODDED UPON COMPLETION OF WORK. THE CONTRACTOR WILL BE RESPONSIBLE TO ENSURE THAT COMPLETE COVERAGE OF THE DISTURBED AREAS IS PROVIDED AND THAT GROWTH OF VEGETATION IS ESTABLISHED. SEED AND SOD APPLICATIONS WILL BE CONDUCTED IN ACCORDANCE WITH THE TIMELINES NOTED IN THE MOST RECENT EDITION OF THE WSDOT STANDARD SPECIFICATIONS.

12. ALL EROSION CONTROL WILL REMAIN IN PLACE UNTIL SUCH TIME AS THE SITE IS ADEQUATELY STABILIZED. PRIOR TO REMOVAL OF EROSION CONTROL MEASURES, THE ENGINEERING DIVISION WILL BE NOTIFIED FOR FINAL INSPECTION AND APPROVAL.

NO.	DATE	REVISION

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE:

CHEHALIS VILLAGE SQUARE
CHEHALIS WA.

T.E.S.C. DETAILS

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RB Engineering
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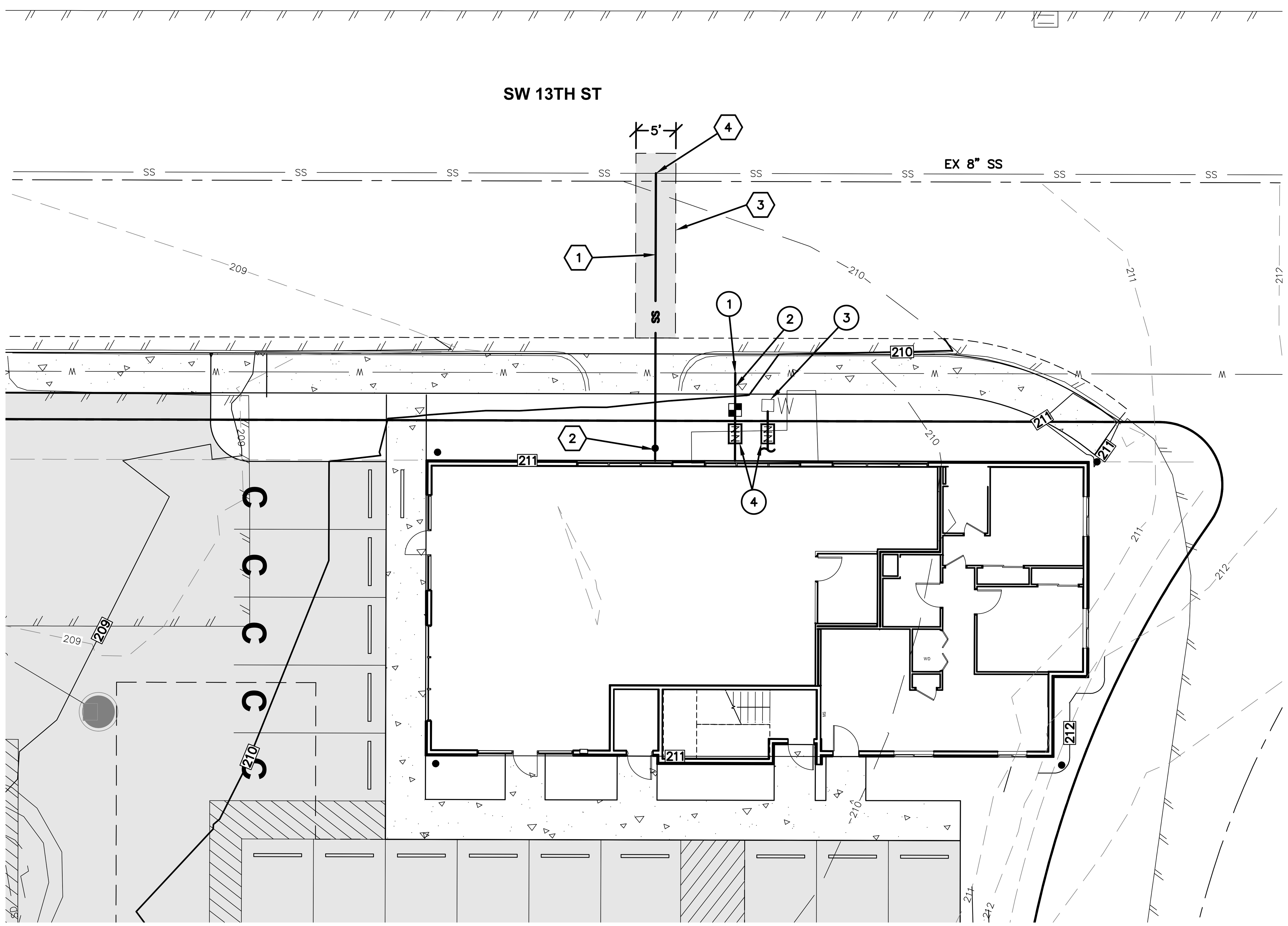
JOB NUMBER 23051
DRAWING NAME 23051_C2.3_TESCDT
C2.3



SCALE: 1"=10 FEET

0 5 10 20

WATER CONSTRUCTION NOTES:

1. INSTALL 1.5" WATER METER TAP AND SETTER SEE STD. DETAILS ON SHEET C3.2.
2. PROVIDE NEW 1.5" POLYETHYLENE CLASS 200 SERVICE LINE TO BUILDING PER PLAN. BACKFILL TRENCH PER STD. DETAIL ON SHEET C3.2.
3. CONNECT TO EXISTING METER FOR USE AS IRRIGATION METER.
4. INSTALL 1.5" AND 1" DOUBLE CHECK VALVES PER PLAN AND DETAIL ON SHEET C3.2.

SEWER CONSTRUCTION NOTES:

1. INSTALL 75LF SDR 35 SEWER LATERAL PER PLAN. SEE STD. DETAIL ON SHEET C3.2. LATERAL IE AT BUILDING = 208.0'
2. INSTALL NEW SEWER CLEANOUT PER PLAN. SEE STD. DETAIL ON SHEET C3.2.
3. SAWCUT AND RESTORE STREET CROSSING PER STD. DETAIL ON SHEET C3.2.
4. TAP EXISTING SEWER WITH NEW 6" LATERAL.

GENERAL NOTES:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION, ALIGNMENT, AND DEPTH OF ALL EXISTING UTILITIES WHETHER SHOWN ON THESE PLANS OR NOT BY POTHOLE THE UTILITIES AND SURVEYING THE HORIZONTAL AND VERTICAL LOCATION PRIOR TO CONSTRUCTION. THIS SHALL INCLUDE CALLING 411. LOCATIONS OF SAID UTILITIES SHOWN ON THESE PLANS ARE BASED UPON THE UNVERIFIED PUBLIC INFORMATION AND ARE SUBJECT TO VARIATION. IF CONFLICTS SHOULD OCCUR, THE CONTRACTOR SHALL CONSULT THE DESIGN ENGINEER TO RESOLVE ALL CONFLICTS PRIOR TO PROCEEDING WITH THE CONSTRUCTION.

NO.	DATE	REVISION

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE: 1"=10'

CHEHALIS VILLAGE SQUARE
CHEHALIS WA.

WATER AND SEWER PLAN

ROBERT W. BAXTER, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER

RB Engineering
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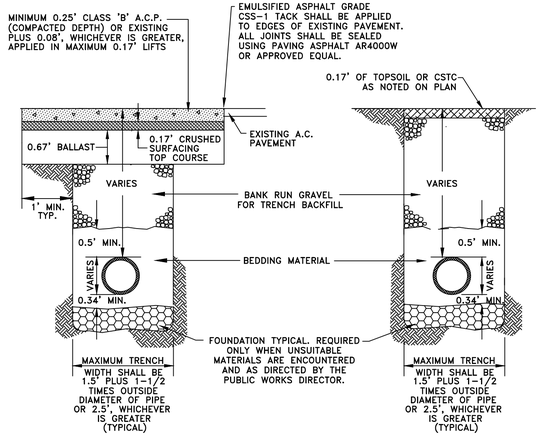
JOB NUMBER
23051

DRAWING NAME
23051_C3.1_WSPL

C3.1



NOTES:

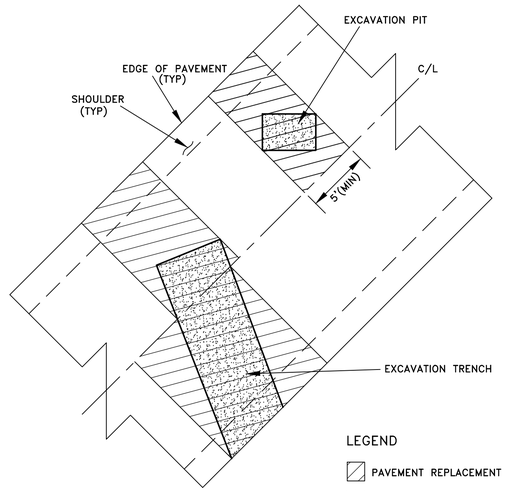
1. ALL MATERIALS EXCEPT A.C.P. AND BEDDING MATERIAL SHALL BE COMPACTED IN 6-INCH MAXIMUM LIFTS TO 95% DENSITY.
2. BEDDING SHALL CONFORM TO SECTION 9-03.16 OF STANDARD SPECIFICATIONS AS AMENDED BY CITY OF CHEHALIS STANDARDS.
3. COMPACTION: BEDDING SHALL BE COMPACTED TO 95% MAX. AS DETERMINED BY ASTM D1557. BACKFILL SHALL BE COMPACTED TO 85% IN UNPAVED AREA, AND 95% IN PAVED OR SHOULDER AREAS AS DETERMINED BY ASTM D1557.
4. ALL MATERIALS, WORKMANSHIP, AND INSTALLATION SHALL BE IN CONFORMANCE WITH THE MOST RECENT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION AS AMENDED BY CITY OF CHEHALIS PUBLIC WORKS STANDARDS.
5. KEEP TRENCH BOTTOM COMPACTED WITH UNIFORM GRADE. A BELL JOINT SHALL BE REQUIRED AT EACH JOINT FOR PROPER SUPPORT. NO TEMPORARY SUPPORTS, I.E. BLOCKS, WILL BE ALLOWED TO SUPPORT PIPE. TRENCH BOTTOM SHALL BE TO GRADE PRIOR TO PIPE INSTALLATION.

Drawing Not to Scale

City of Chehalis

TRENCH PAVEMENT RESTORATION DETAIL

APPROVED BY	DWG. NO.
	2-4
	REVISED DATE
CITY ENGINEER	1/02/2003



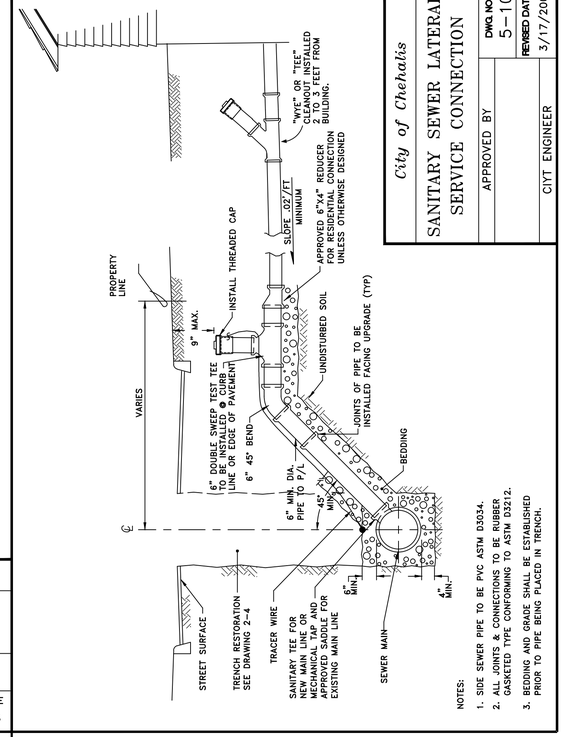
NOTE:

1. MINIMUM RESTORATION WIDTH = 5 FEET

City of Chehalis

PAVEMENT RESTORATION

APPROVED BY	DWG. NO.
	2-5
	REVISED DATE
CITY ENGINEER	1/02/2003



NOTES:

1. SIDE SEWER PIPE TO BE PVC ASTM D3034.
2. ALL JOINTS & CONNECTIONS TO BE RUBBER GASKETED TYPE CONFORMING TO ASTM D3212.
3. BEDDING AND GRADE SHALL BE ESTABLISHED PRIOR TO PIPE BEING PLACED IN TRENCH.

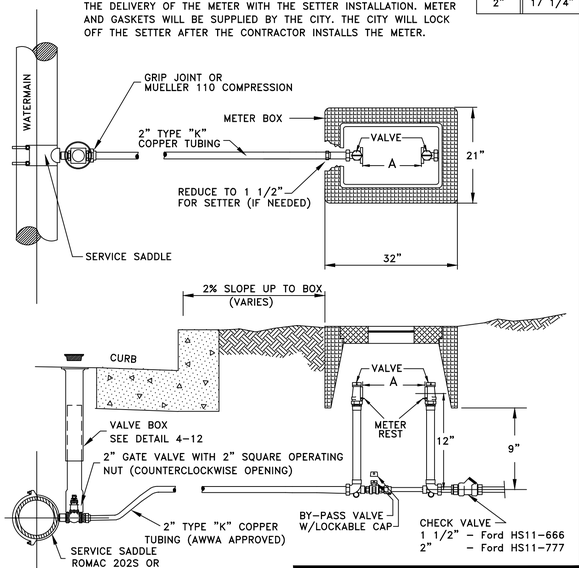
City of Chehalis

SANITARY SEWER LATERAL SERVICE CONNECTION

APPROVED BY	DWG. NO.
	5-10
	REVISED DATE
CITY ENGINEER	3/17/2009

WITH THE INSTALLATION OF 1 1/2" OR 2" METER SETTERS, THE CONTRACTOR SHALL INSTALL THE METER AT THE TIME THE SETTER IS PUT IN PLACE. THE CONTRACTOR SHALL CONTACT THE CITY 48 HOURS PRIOR TO INSTALLATION OF THE SETTER AND COORDINATE THE DELIVERY OF THE METER WITH THE SETTER INSTALLATION. METER AND GASKETS WILL BE SUPPLIED BY THE CITY. THE CITY WILL LOCK OFF THE SETTER AFTER THE CONTRACTOR INSTALLS THE METER.

SIZE	A
1 1/2"	13 1/4"
2"	17 1/4"



NOTES:

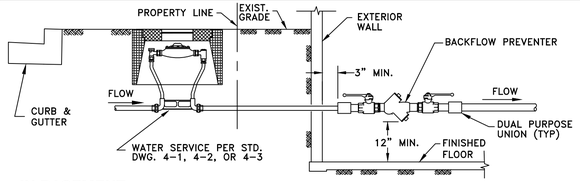
1. ALL SERVICE SADDLES SHALL HAVE RUBBER GASKET, I.P. THREADS, & STAINLESS STEEL DOUBLE STRAPS.
2. CITY STANDARD FOR COPPER SETTERS ARE:
   1 1/2" - FORD VVF76-12B-13-11-66
   2" - FORD VVF77-12B-17-11-77
3. THE CITY UTILIZES A TOUCH READ METER SYSTEM. METER LIDS FOR METER BOX INSTALLATIONS MUST BE DRILLED WITH A 2" HOLE TO ACCOMMODATE TOUCH PAD.

DRAWING NOT TO SCALE

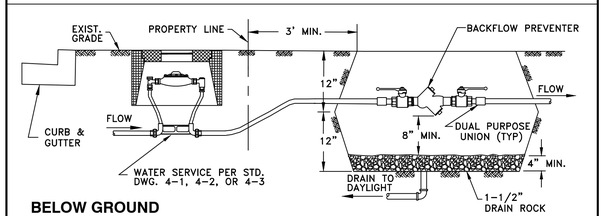
City of Chehalis

1 1/2"-2" WATER SERVICE WITH BYPASS

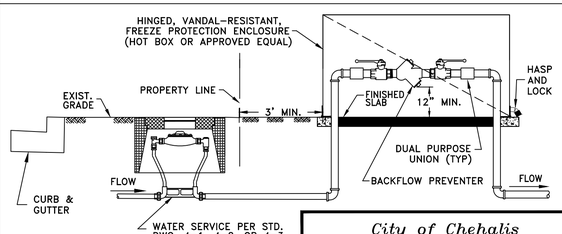
APPROVED BY	DWG. NO.
	4-3
	REVISED DATE
CITY ENGINEER	3/30/2005



IN BASEMENT



BELOW GROUND



ABOVE GROUND

NOTES:

1. BACKFLOW ASSEMBLY SHALL BE A WA. STATE D.O.H. APPROVED MODEL.
2. ALL MATERIALS TO BE BRASS OR COPPER AS APPROVED BY THE DIRECTOR OF PUBLIC WORKS.

DRAWING NOT TO SCALE

City of Chehalis

1/2"-2" DOUBLE CHECK BACKFLOW PREVENTER

APPROVED BY	DWG. NO.
	4-18
	REVISED DATE
CITY ENGINEER	1/02/2003

NO.	DATE	REVISION

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE:

CHEHALIS VILLAGE SQUARE

CHEHALIS WA.

WATER AND SEWER DETAILS AND NOTES

ROBERT W. BALLEW — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

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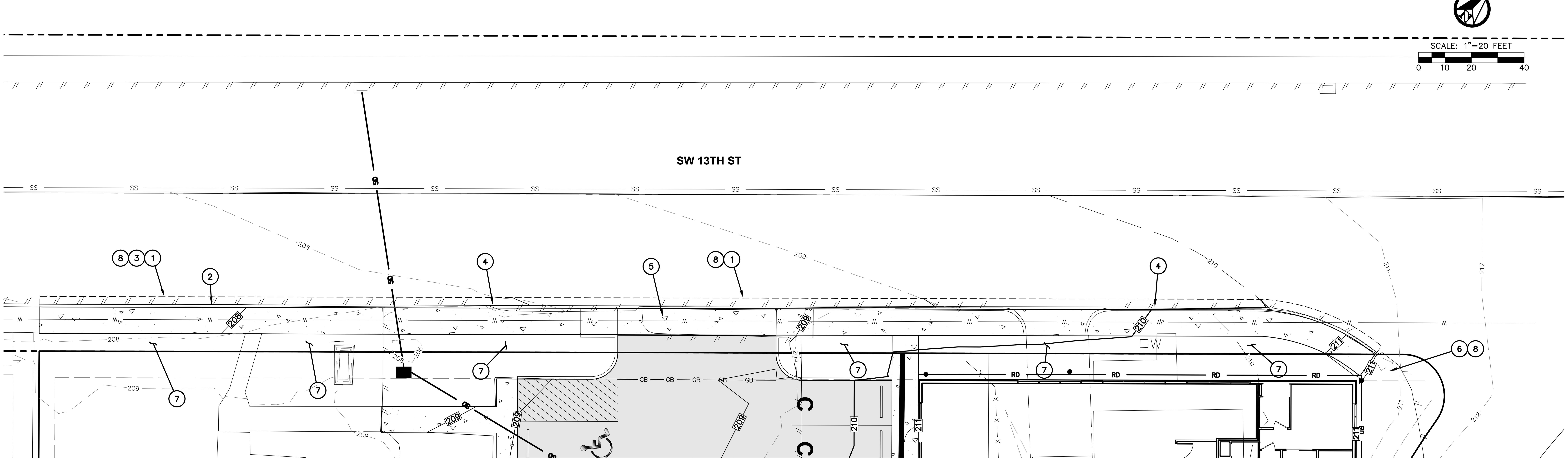
JOB NUMBER 23051

DRAWING NAME 23051_C3.2_WTDT

C3.2

9 OF 11



FRONTAGE CONSTRUCTION NOTES:

1. SAWCUT 261 LF OF EXISTING ASPHALT.
2. REMOVE EXISTING CONCRETE SIDEWALK, CURB, AND GUTTER AND CONSTRUCT NEW CONCRETE SIDEWALK, CURB, AND GUTTER PER CITY STD. DETAILS ON SHEET C4.2.
3. SAWCUT ALONG EXISTING FRONT EDGE OF EXISTING CURB AND GUTTER AND REMOVE PER LIMITS SHOWN ON PLANS.
4. INSTALL NEW CONCRETE SIDEWALK, CURB, AND GUTTER PER PLAN. SEE STD. DETAIL ON SHEET C4.2.
5. CONSTRUCT NEW TYPE 1 CONCRETE DRIVEWAY PER PLAN AND DETAIL ON SHEET C4.2.
6. CONSTRUCT TEMPORARY ASPHALT ADA RAMP OFF END OF NEW CONCRETE SIDEWALK. GRADE NOT TO EXCEED 12:1 SLOPE. TRANSITION TO EXISTING ASPHALT GRADE.
7. GRADE LANDSCAPE AREA IN RIGHT OF WAY PER GRADES SHOWN. SLOPE TOWARD BACK OF SIDEWALK. HYDROSEED ALL EXPOSED SLOPES NOT COVERED IN LANDSCAPE PLAN.
8. SEAL ALL NEW ASPHALT JOINTS WITH EMULSIFIED ASPHALT.
9. CONTRACTOR SHALL CALL REVIEW AGENCY AND RB ENGINEERING AT (360) 740–8919 48 HOURS PRIOR TO POURING CONCRETE CURB AND GUTTER FOR GRADE INSPECTION OF CONCRETE CURB. FAILURE TO CALL FOR INSPECTION MAY RESULT IN CONTRACTOR REMOVING AND RE–CONSTRUCTING CONCRETE CURB AND OR SIDEWALK.

NO. | DATE | REVISION

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE: 1"=20'

CHEHALIS VILLAGE SQUARE
CHEHALIS WA.

FRONTAGE IMPROVEMENT PLAN

ROBERT W. BAKER — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

RB Engineering
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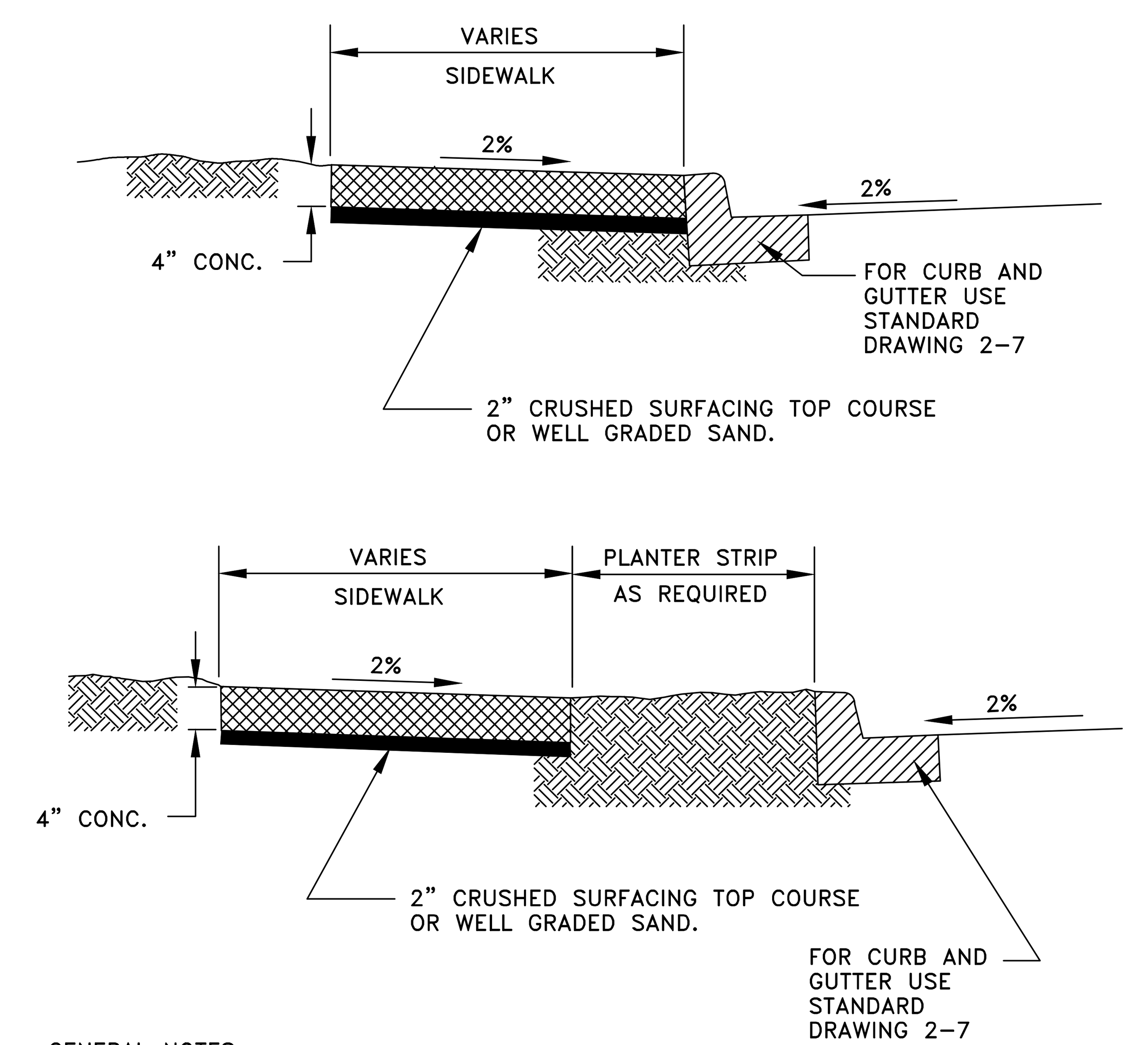
OFF: (360) 740-8919
EMAIL: CallPros@RBEngineers.com

JOB NUMBER 23051
DRAWING NAME 23051_C4.1_FIPP
C4.1

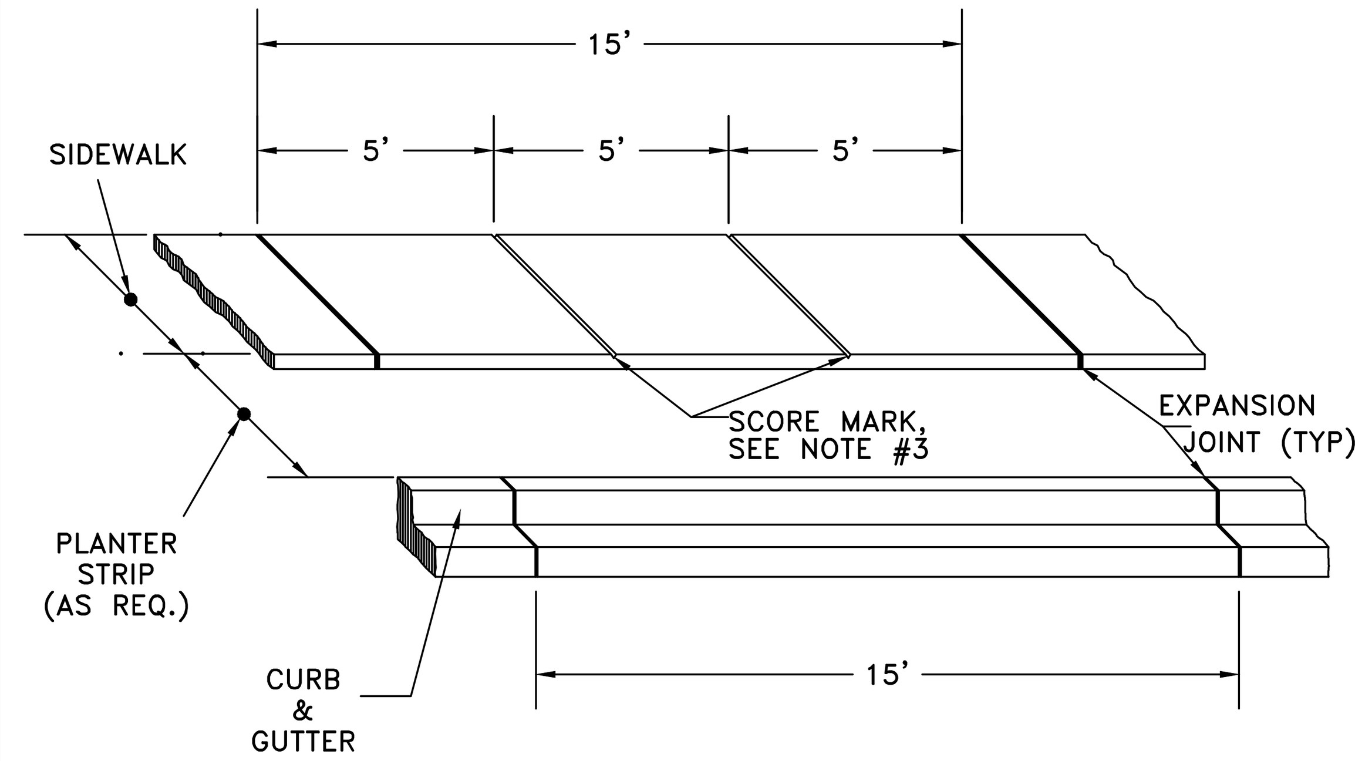


GENERAL NOTES:

1. REFER TO STANDARD DRAWING 2-10 FOR INFORMATION ON JOINTS AND SCORING.
2. SIDEWALK ACROSS CONCRETE DRIVEWAYS REQUIRE A MINIMUM DEPTH OF 6" FOR RESIDENTIAL DRIVES & 8" FOR ALL OTHER DRIVES.
3. WHEN CHECKED WITH A 10' STRAIGHTEDGE, GRADE SHALL NOT DEVIATE MORE THAN 1/8 INCH & ALIGNMENT SHALL NOT VARY MORE THAN 1/4 INCH.

Drawing Not to Scale

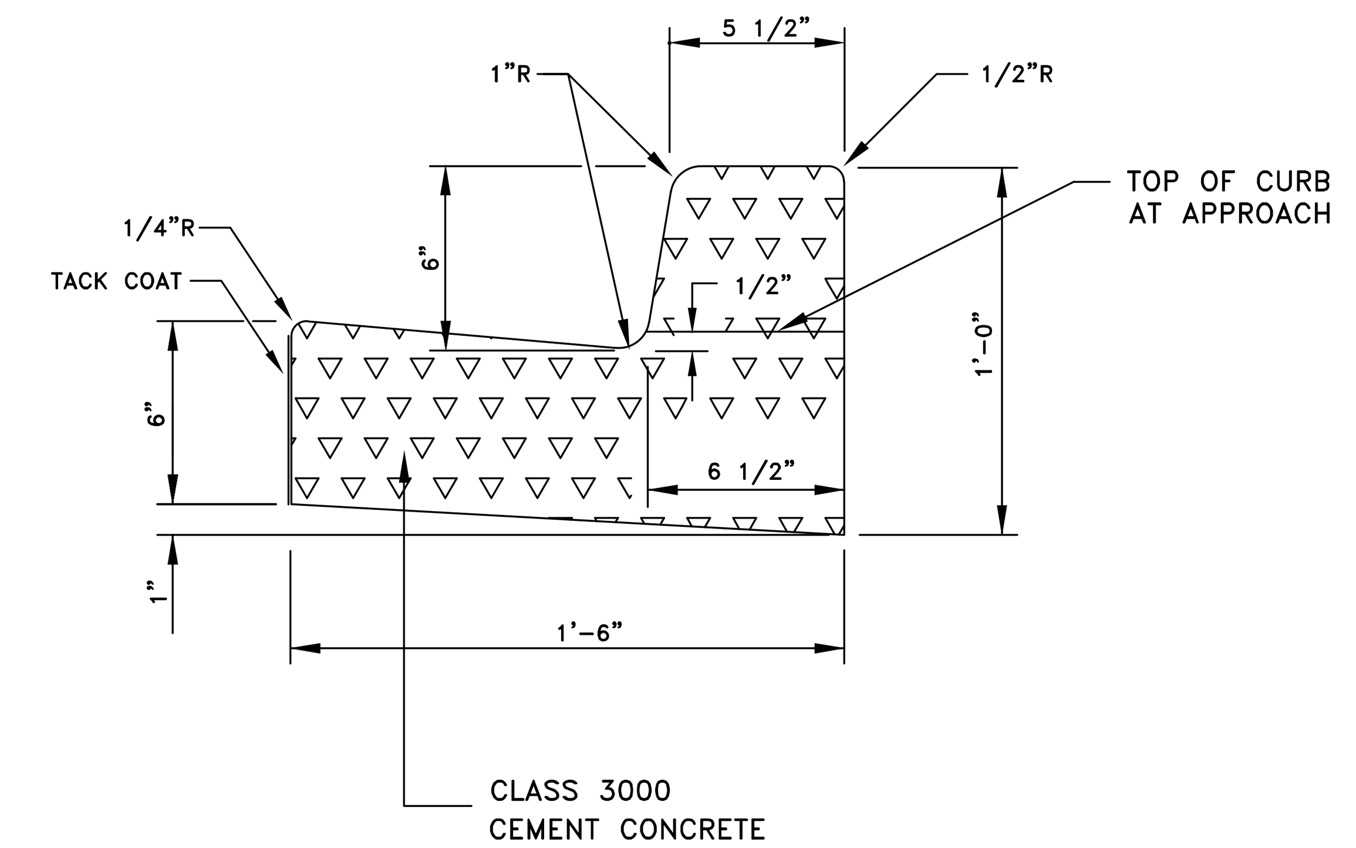
City of Chehalis	
SIDEWALK	
APPROVED BY	DWG. NO. 2-9
	REVISED DATE 1/02/2003
CITY ENGINEER	



GENERAL NOTES:

1. EXPANSION JOINT MATERIAL TO BE 3/8" THICK PREMOLDED JOINT FILLER FULL THICKNESS OF CONCRETE.
2. FORM AND SUBGRADE INSPECTION REQUIRED BEFORE POURING CONCRETE.
3. SCORE MARKS SHALL BE ±1/8" WIDE BY ±1/4" DEEP. FOR SIDEWALKS OVER 8' IN WIDTH, A LONGITUDINAL SCORE MARK SHALL BE MADE ALONG CENTER OF WALK.
4. EXPANSION JOINTS SHALL BE INSTALLED IN CURB AND GUTTER AND IN SIDEWALK AT PC AND PT AT ALL CURB RETURNS. EXPANSION JOINTS SHALL BE PLACED IN SIDEWALK AT SAME LOCATIONS AS THOSE IN CURB AND GUTTER WHEN SIDEWALK IS ADJACENT TO CURB AND GUTTER, UNLESS OTHERWISE DIRECTED BY ENGINEER.

City of Chehalis	
SIDEWALK SPACING EXPANSION JOINTS & SCORE MARKS	
APPROVED BY	DWG. NO. 2-10
	REVISED DATE 1/02/2003
CITY ENGINEER	

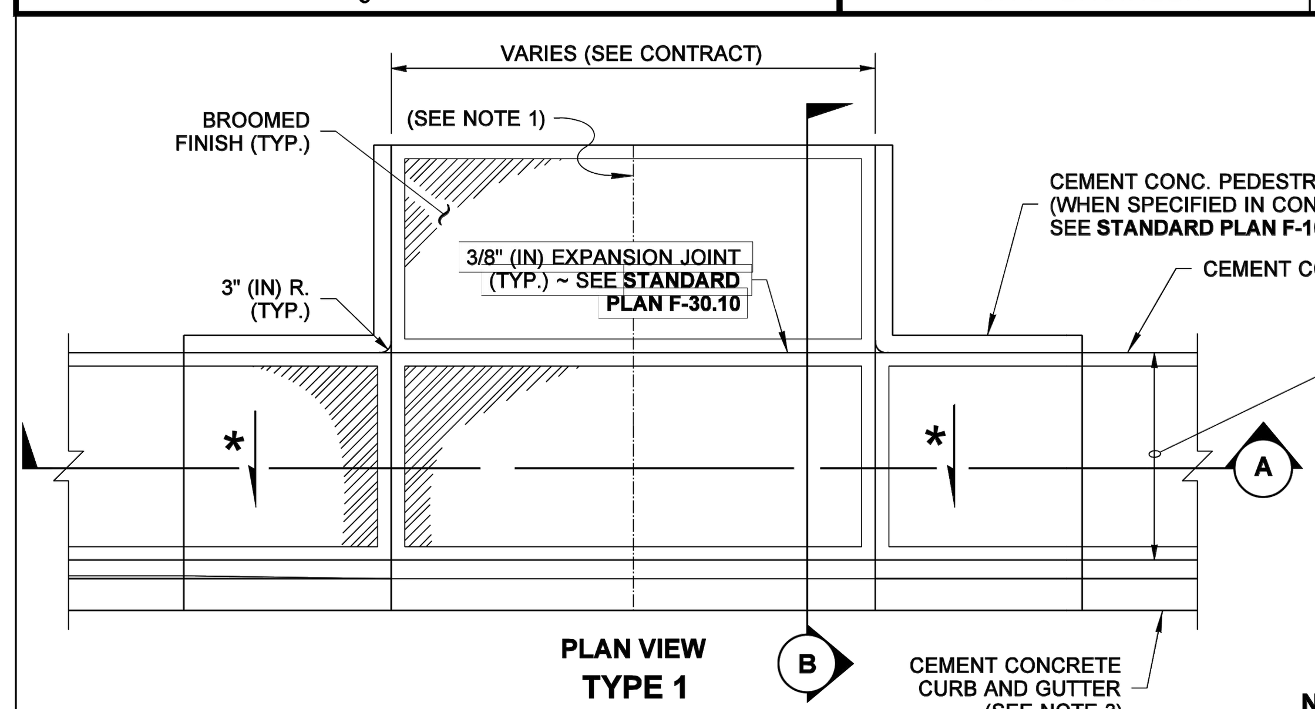


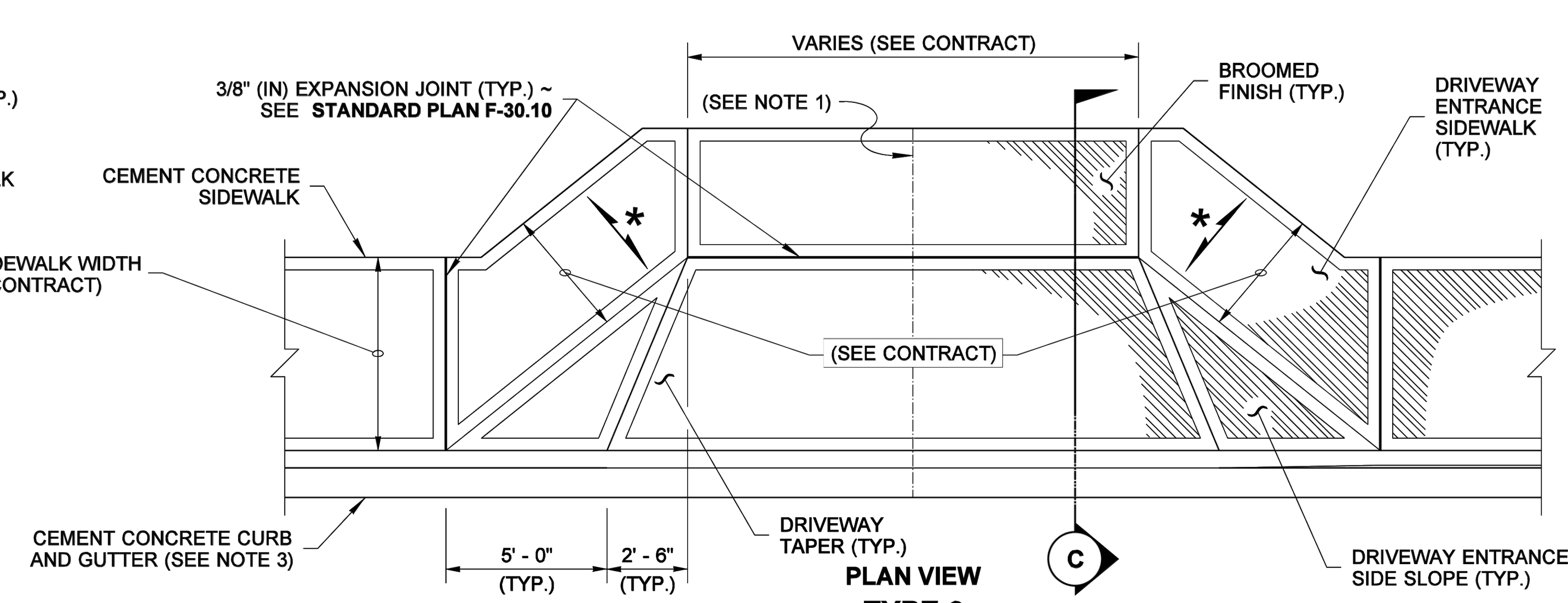
GENERAL NOTES:

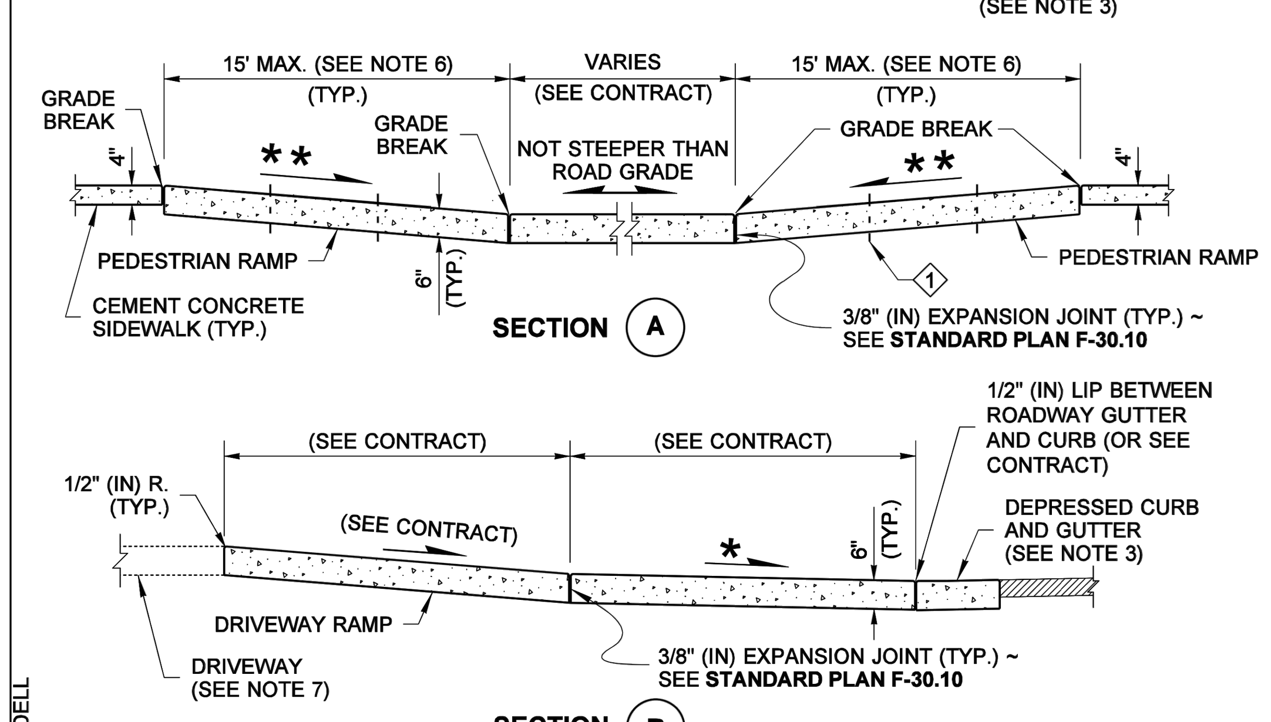
1. EXPANSION JOINT MATERIAL TO BE 3/8" THICK PREMOLDED JOINT FILLER FULL THICKNESS OF CONCRETE.
2. FORM AND SUBGRADE INSPECTION REQUIRED BEFORE POURING CONCRETE.
3. SUBGRADE AND BASE REQUIREMENTS SHALL BE THE SAME AS FOR PAVEMENT RESTORATION.

Drawing Not to Scale

City of Chehalis	
CEMENT CONCRETE CURB & GUTTER	
APPROVED BY	DWG. NO. 2-7
	REVISED DATE 1/02/2003
CITY ENGINEER	



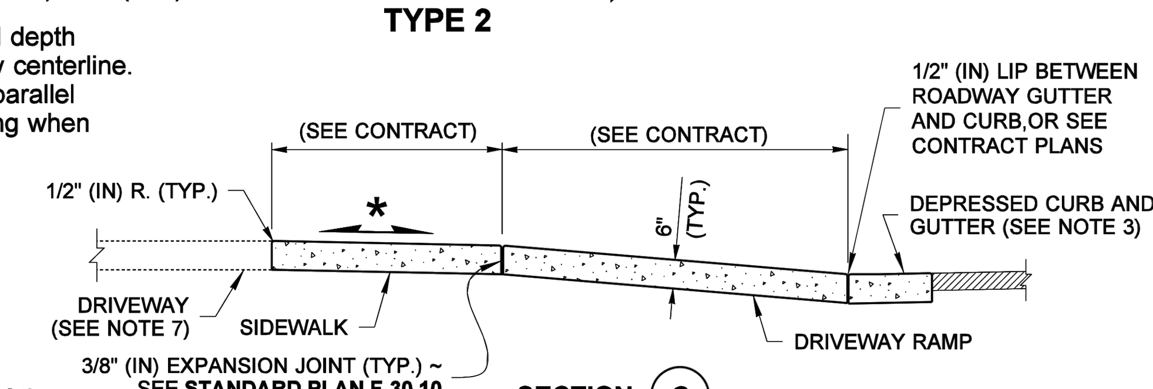




NOTES

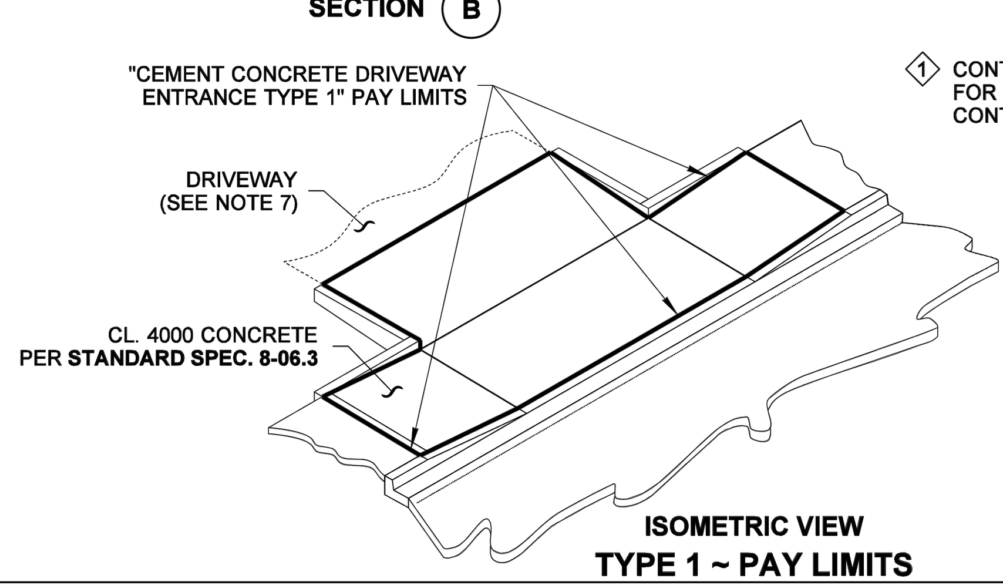
1. When the driveway width exceeds 15' (ft), construct a full depth expansion joint with 3/8" (in) joint filler along the driveway centerline. See **Standard Plan F-30.10.** Construct expansion joints parallel with the centerline as required at 15' (ft) maximum spacing when driveway widths exceed 30' (ft).
2. See **Standard Plan F-30.10** for sidewalk details.
3. Curb and Gutter shown; see the Contract Plans for the curb design specified. See **Standard Plan F-10.12** for Curb Details.
4. Avoid placing drainage structures, junction boxes or other obstructions in front of driveway entrances.
5. Where "GRADE BREAK" is called out, the entire length of the line between the two adjacent surface planes shall be flush.
6. The Pedestrian Ramp length is not required to exceed15 feet (unless otherwise shown in the Contract Plans). When applying the 15-foot max. length (measured from back of sidewalk) the running slope of the pedestrian ramp is allowed to exceed 8.3%. Use a single constant slope from bottom of ramp to top of ramp to match into the sidewalk over a horizontal distance of 15 feet.
7. Beyond limits shown. Pay item does not include driveway. See Contract Plans.

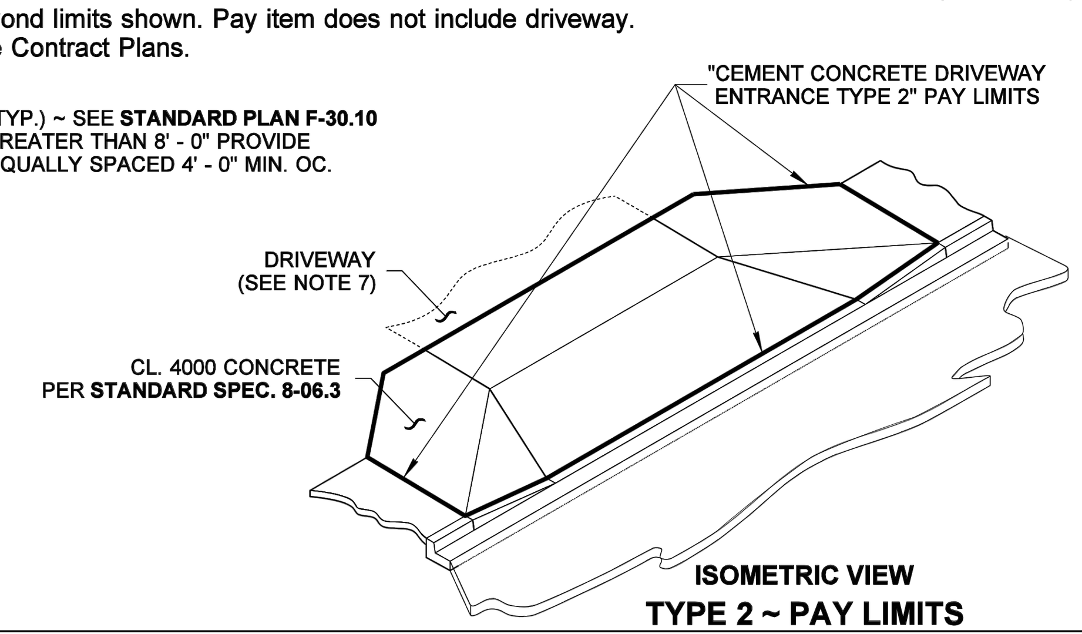
CONTRACTION JOINT (TYP.) ~ SEE **STANDARD PLAN F-30.10** FOR RAMP LENGTHS GREATER THAN 8' - 0" PROVIDE CONTRACTION JOINT EQUALLY SPACED 4' - 0" MIN. OC.



LEGEND

- SLOPE IN EITHER DIRECTION
- * 1.5% OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (2% MAX.)
- ** 7.5% OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (8.3% MAX.) (SEE NOTE 6)





R. SCOTT ZELLER
STATE OF WASHINGTON
28680
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Zeller, Scott
Jul 12 2016 4:26 PM

CEMENT CONCRETE DRIVEWAY ENTRANCE TYPES 1, 2, 3, & 4

STANDARD PLAN F-80.10-04

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Carpenter, Jeff
Jul 15 2016 2:27 PM

STATE DESIGN ENGINEER

Washington State Department of Transportation

DRAWN BY: FERN LIDDELL

NO.	DATE	REVISION

DESIGNED BY: ZRW
DRAWN BY: ZRW
CHECKED BY: RWB
DATE: 2/29/24
SCALE:

CHEHALIS VILLAGE SQUARE
CHEHALIS WA.

FRONTAGE IMRPOVEMENT DETAILS

ROBERT W. BA... STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER

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