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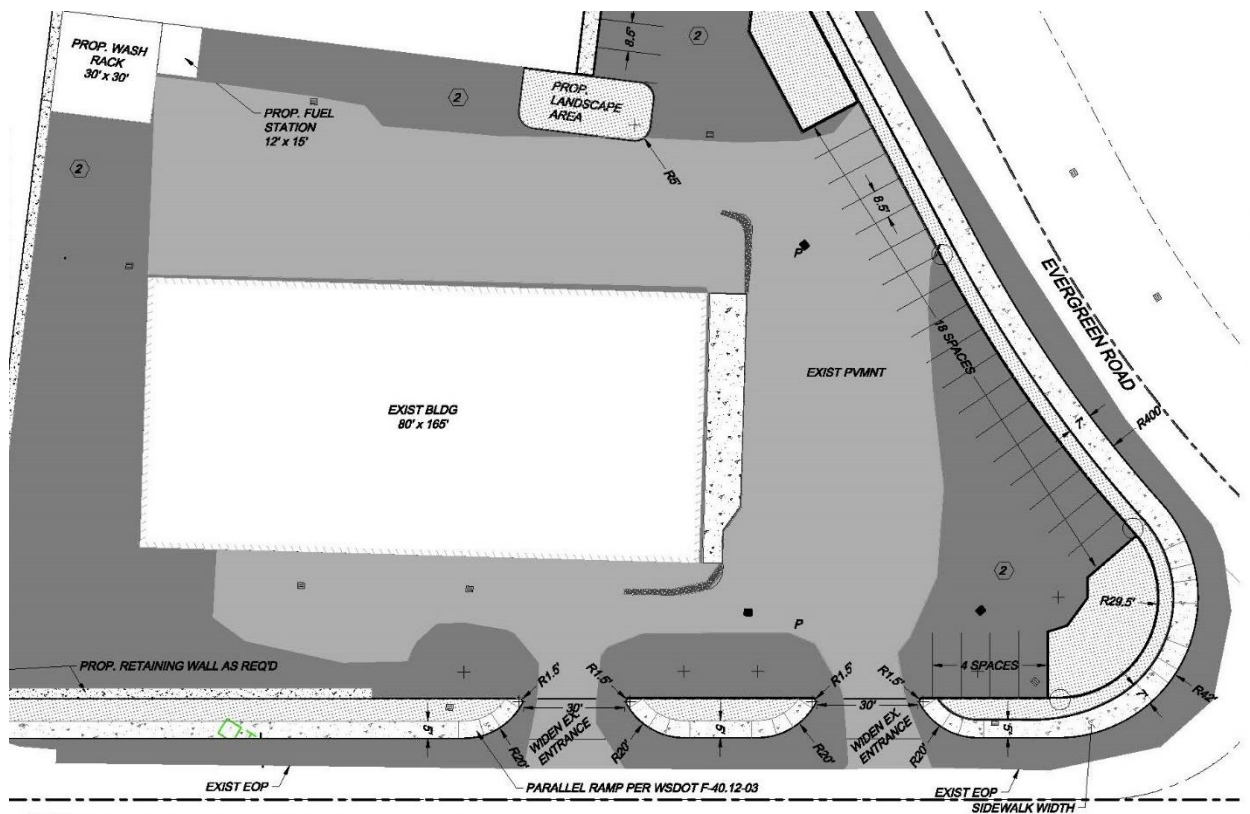
06-03-2021

2724 Black Lake Blvd. SW Suite 202
Tumwater WA 98512

Phone: 360-352-2477 Fax: 360-352-0179

Drainage Report Combined Construction Re-Development

3701 South Road
Mukilteo, WA 98275
Parcel #00441300002500



Applicant
AJ Smith
Combined Construction
3701 South Road
Mukilteo, WA 98275
425-610-4334

Owner
Smith & Sons Real Estate
3701 South Road
Mukilteo, WA 98275
425-610-4334

Engineer/Contact
Collin McMaster, PE
Vector Engineering, Inc
2724 Black Lake Blvd SW
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(360) 352-2477

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5.27.21

Stormwater Narrative

For

Combined Construction
Mukilteo, WA

Site Location:

3701 South Road
Mukilteo, WA 98275

PROJECT OVERVIEW

This project is the re-development of a 1.71 acre parcel zoned Light Industrial. This project takes place in the Picnic Point Ravine watershed and the stormwater will subsequently discharge to the Picnic Point Stream southwest of the site. The currently developed site utilizes on-site stormwater collection facilities from its impervious surfaces (including rooftops), and then discharges to the public conveyance system. After proposed re-development of the site and an increase in the impervious surface coverage, this is also the proposed method but with modifications.

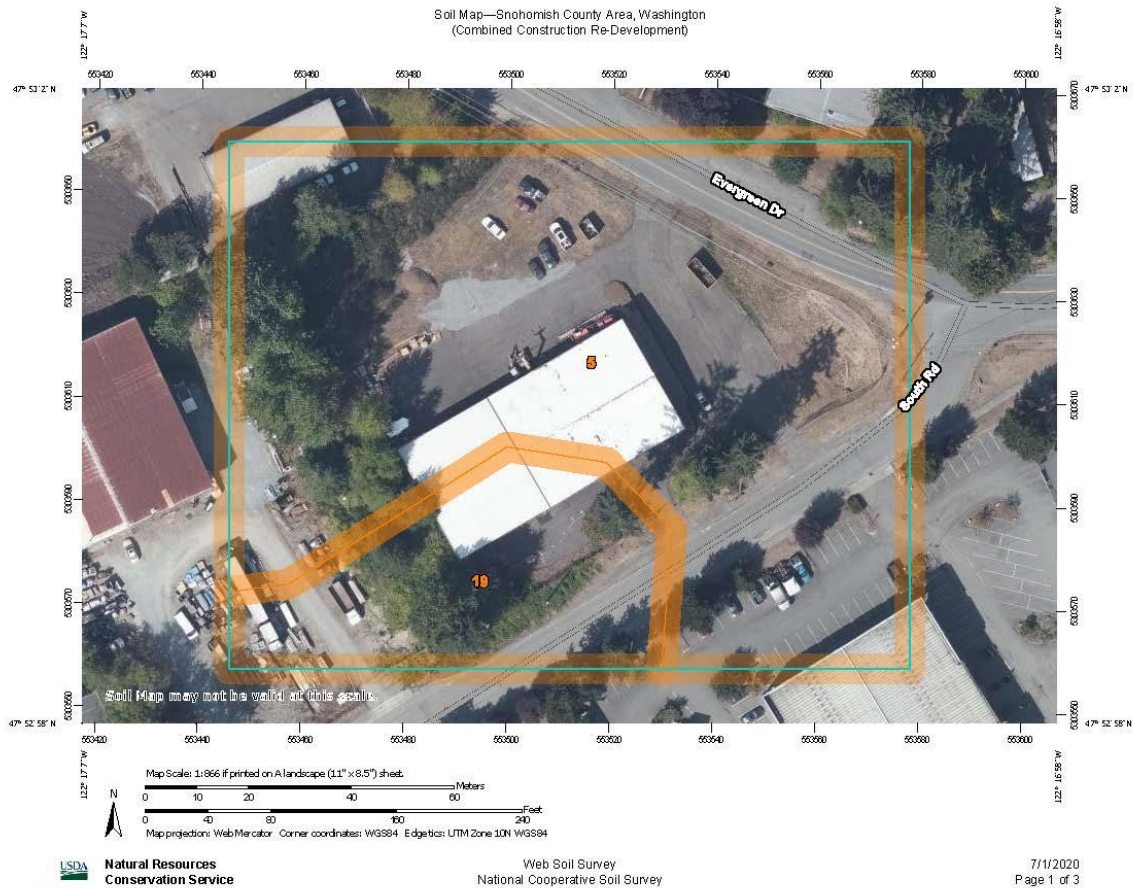
The proposed system will utilize existing and new catch basins that will collect and be treated by a Contech storm filter to meet code requirements for runoff treatment. This includes the runoff for all rooftops and impervious surfaces. The runoff will then be collected into underground chambers after being treated. These chambers are designed assuming zero infiltration, although they will be constructed with open bottoms so that infiltration may occur when site conditions allow. The remaining stormwater will be introduced into the public system for further conveyance in the same location that it currently does, at CB106 per the attached drainage plan. Flow control will be provided after the chambers, prior to entry into the public system via an approved WSDOT structure (similar to Standard Plan B-10.40-01) as shown in **Appendix C**.

Included is a vicinity map and a soils map.

Vicinity Map



Soil Map



Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
5	Alderwood-Urban land complex, 2 to 8 percent slopes	2.7	80.4%
19	Everett very gravelly sandy loam, 15 to 30 percent slopes	0.7	19.6%
Totals for Area of Interest		3.4	100.0%

A geotechnical report has been prepared by Landau Associates and is attached as **Appendix E**.

MINIMUM REQUIREMENTS

Based on Figures 2.4.1 and 2.4.2 from the Manual, this project is considered redevelopment requiring all Core Requirements 1 through 9. These requirements will be applied to all new and replaced hard surfaces.

Core Requirement #1 – Stormwater Site Plans:

- The property has had a topographic and boundary survey performed by Chehalis Valley Surveying, LLC. All plans provided are based on this survey.
- A Stormwater Control Plan is attached in **Appendix A**.

Core Requirement #2 – Construction Stormwater Pollution Prevention Plan (C-SWPPP):

A Construction Stormwater Pollution Prevention Plan is attached as a supporting document.

Core Requirement #3 – Source Control of Pollution:

This project does not fall under a specific permit requiring source control BMPs. None have been provided.

Core Requirement #4 – Preservation of Natural Drainage Systems/Outfalls:

This site does not receive any significant run-off from neighboring sites. The proposed site does not increase un-natural runoff paths, and utilizes the same offsite outfall structure as is currently in place.

Core Requirement #5 – On-Site Stormwater Management:

Per Table 2.5.1, this project imposes List #2:

Lawn and landscaped areas:

1. Post-Construction Soil Quality and Depth
 - a. Feasible, this method is selected

Roofs

1. Full Dispersion
 - a. Not Feasible, More than 65% of the site has impervious coverage
2. Bioretention
 - a. Not Feasible, Site availability not adequate
3. Downspout Dispersion
 - a. Feasible, This method most closely resembles the proposed method of dispersion via the underground chambers. In addition, stormwater will be pre-treated in a Contech media filter prior to dispersion.

Other Hard Surfaces

1. Full Dispersion
 - a. Not Feasible, More than 65% of the site has impervious coverage
2. Permeable Pavement
 - a. Not Feasible, This surface will be constantly utilized by large machinery and over-sized trucks. These machines will often be dirty, since this a

contractors office and storage facility, and will create more maintenance than is acceptable.

3. Bioretention BMPs
 - a. Not Feasible, Site availability not adequate
4. Sheet Flow Dispersion or Concentrated Flow Dispersion
 - a. Not Feasible, Site availability not adequate
5. On-Site Bioretention (Not shown in list #2)
 - a. Feasible, This method is being proposed due to the amount of proposed impervious surface and the unique site characteristics. Most of the site is impervious, thus a large area underground with the Stormtech chambers is being proposed downstream of a stand-alone treatment structure. The treated water will then be allowed to infiltrate if possible, on site, otherwise will discharge to the public system.

Core Requirement #6 - Runoff Treatment:

Runoff treatment will be supplied by a Contech Stormfilter per plan.

Core Requirement #7 - Flow Control:

Flow control is being provided by a structure in accordance with WSDOT Standard Plan B-10.40-01.

Core Requirement #8 - Wetlands Protection:

There are no wetlands within the proximity for this project.

Core Requirement #9 – Operation and Maintenance:

An Operation and Maintenance Manual is attached to this report and will be kept by the site owners for use and review by the jurisdiction.

SITE AND BASIN EXISTING CONDITION SUMMARY

The site is currently developed with a large warehouse style structure, loading dock, and paved surfacing surrounding the building. Existing stormwater catch basins are in place and transfer water to the East to an on-site stormwater pond, near the intersection of South Road and Evergreen Road. Overflow conveyance is provided to the public system via an existing catch basin near the edge of paving of South Road.

Per the Natural Resources Conservation Service (NRCS), the site is underlain with soil on site classified as Alderwood-Urban land complex, and Everett very gravelly sandy loam. The Alderwood-Urban is a hydrologic soil group B class soil.

To the northwest and southwest of the site are existing developed commercial areas. To the northeast is Evergreen Road, and to the southeast is South Road. Prior to the existing development, adjacent areas and existing topographic data would suggest that the stormwater would have moved toward the Northwest portion of the site. All of the stormwater that is currently created by the impervious surfaces, including rooftops, will be treated and routed through the treatment system prior to entering the public system in the location that it currently does.

Table 1

Existing Site	Proposed Site
Buildings 13,348 SF (0.31 Ac)	Buildings: 26,748 SF (.61 Ac)
Impervious Surface: 21,197 SF (0.49 Ac)	Impervious Surface: 40,785 SF (.94 Ac)
Other Impervious: 1,082 SF (0.02 Ac)	Other Impervious: 3,572 SF (0.08 Ac)
Pervious/undeveloped: SF (0.89 Ac)	Lawn/Tree tract: 3,383 SF (0.08 Ac)

The proposed site development would retain the existing warehouse building and add another warehouse type commercial structure. A site-use only fuel station and wash bay would also be constructed. The existing asphalt surface would be re-paved, along with additional paving for the use of parking cars and trucks, roadway access, and stormwater management facilities. On-site landscaping and full frontage improvements, in accordance with MMC 15.04.060 is also proposed on the site currently zoned as Light Industrial (LI). A quick breakdown is shown in the table above.

PERMENANT STORMWATER CONTROL PLAN

Pre-Developed Site Hydrology

Basin Area (AC)	Description
1.71	A/B Forest (Flat)

Total 1.71 Ac

Developed Site Hydrology

Basin Area	Description
0.089	A/B Lawn (Flat)
0.614	Roof Top (Flat)
0.045	Driveway (Flat)
0.026	Sidewalks (Flat)
0.936	Parking (Flat)

Total 1.71 Ac

Hydrologic Modeling

The hydrologic analysis for the project was performed using the computer-modeling program, Western Washington Hydrology Model (WWMH2012). The program effectively models predeveloped and post-developed runoff conditions using user provided basins for a given area. An infiltration rate of 0.0" per hour has been used as a Tank (fully enclosed) was used as the model to determine the conservative result. The WWHM2012 model for the project site states the current stormwater conveyance system requirements. A Stormtech chamber is proposed to store this entire amount, while also allowing any possible infiltration to be completed as the design utilizes an open bottom. Also, an oil/water separator is being proposed between the stormwater treatment chamber and the fuel station to trap fuel contaminants prior to entering the Stormtech filter along with the rest of the collected stormwater. See **Appendix C** for the WWHM report.

Flow Control

Flow control is being provided by a structure in accordance with WSDOT Standard Plan B-10.40-01. This is a Type-2 Catch Basin, with a flow restrictor outlet plate with subsequently sized orifice. This structure is also fitted with an overflow pipe, should the need arise. The calculations for the flow restrictor orifice and overflow pipe sizing are shown in **Appendix B**. This structure is being used as an overflow structure for the Stormtech Chambers, so flow control will only be provided before discharge to the public system. See **Appendix C** for the Stormtech Chambers and Flow Control Structure details.

Water Quality

Water quality is being provided by a Contech filter, that is pre-approved for use by the Washington State Department of Ecology. This project will use a Contech Stormfilter and four (4) replaceable ZPG filter cartridges. This facility will be upstream of the Stormtech Chambers, and prior to release (emergency overflow) to the public system. The details and specifications for this treatment facility are found in **Appendix C**.

Conveyance System Analysis and Design

A full conveyance system analysis and design will be provided with the final land use and site development permit submittal.

Downstream Analysis

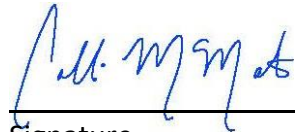
Stormwater leaves the site and connects to the public system at AssetID Catch Basin #CB06430. From this catch basin stormwater is conveyed in a 12" piped system to the southwest along South Road. It is released to an open channel ditch near the southern property corner. This open channel is gathered back in to a closed system, and continues to the southwest, where it is combined with stormwater collected from properties on the south side of South Road, and from the roadway itself. This combined stormwater collection flows via 12" pipes to its eventual outfall at Picnic Point Stream, approximately 200 yards downstream from the project site.

100-YEAR FLOOD/OVERFLOW CONDITION

The stormwater conveyance system for this project has been designed to address storm events in accordance with common industry practices. In the event of a larger storm, the system may fail. In this case, the runoff from larger events will overflow the control structure in the proposed detention vault, and flow to the northeast of the property and would be gathered within the intended system, which would ultimately discharge at the same location in Picnic Point Stream.

Certification:

"I hereby state that this Drainage and Erosion Control Plan/Construction SWPPP for Trestle Union Apartments has been prepared by me, or under my supervision, and meets the requirements of the local jurisdiction and the standard of care and expertise which is usual and customary in this community for professional engineers. I understand that the City of Mukilteo does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities prepared by me."


Signature

5.27.21
Date

Collin McMaster, P.E.
Vector Engineering, Inc.
2724 Black Lake Blvd, Ste 202
Tumwater, WA 98512
(360) 352-2477

Seal:



5.27.21

List of Appendices:

- A. Plans**
- B. Calculations**
 - a. WWHM Output**
 - b. Orifice Sizing**
- C. Details**
 - a. Chamber Details**
 - b. Flow Restrictor Structure**
 - c. Contech Stormfilter Detail**
- D. Maintenance and Operations Checklist**
- E. Geotechnical Technical Memorandum**

Appendix A

Site, Grading, and Drainage Plans

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INDEX TO SHEETS

Sheet Number	Sheet Title	Sheet Description
1	C-1	SITE & SURFACE
2	C-2	EXISTING SITE
3	C-3	SWPPP PLAN
4	C-4	GRADING PLAN
5	C-5	DRAINAGE PLAN
6	C-6	UTILITY PLAN

APPROVED FOR CONSTRUCTION

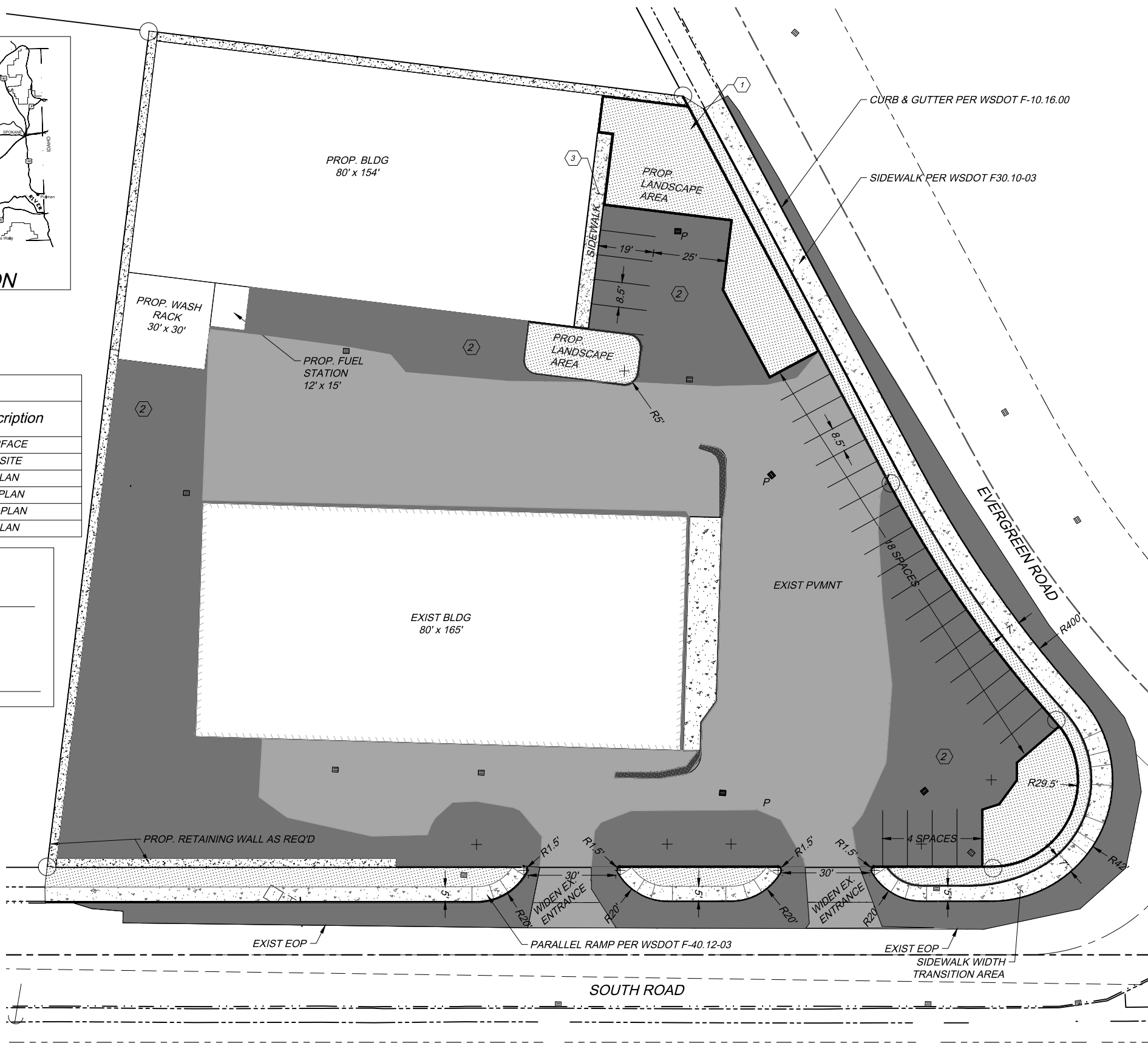
BY: _____ DATE: _____

CITY OF MUKILTEO
DIRECTOR OF PUBLIC WORKS

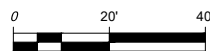
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LEGEND

EXIST	PROP	
		PAVED AREA (PROPOSED)
		CONCRETE (PROPOSED)
		EDGE PAVING
		FENCE
		CONTOUR
		PROPERTY LINE
		WATER
		SANITARY SEWER
		STORM DRAIN
		OVERHEAD PWR



A
C-1
SCALE: 1" = 40'



CALL BEFORE YOU DIG
1-800-424-5555

PROJECT INFORMATION

OWNER
SMITH & SONS REAL ESTATE LLC
PO BOX 418
MUKILTEO, WA 98275

SITE ADDRESS
3701 SOUTH RD
MUKILTEO, WA 98275

JURISDICTION
CITY OF MUKILTEO

ENGINEER
COLLIN MCMASTER, PE (54929)
VECTOR ENGINEERING, INC
2724 BLACK LAKE BLVD SW, SUITE 202
TUMWATER, WA 98512
(360) 352-2477

SITE INFORMATION

PARCEL: 00441300002500
PARCEL SIZE: 1.71 AC
LEGAL: EVERGREEN MANOR NO 2 BLK 000 D-00 - TR 25
ZONING: LI - LIGHT INDUSTRIAL

LOT 1 - 74,488 SF (1.71 AC)
CUT - 182 CY
FILL - 3155 CY
TOTAL CLEARING - 38,867 SF
TOTAL NEW & REPLACED HARD SURFACE - 66,194 SF

SOIL DATA

ALDERWOOD-URBAN LAND COMPLEX - 83%
MODERATELY WELL DRAINED
HYDROLOGIC SOIL GROUP - B

CONSTRUCTION NOTES

- 1 SEE LANDSCAPING PLAN
- 2 HEAVY PAVING SECTION
- 3 CONCRETE SIDEWALK SECTION

CONSTRUCTION SEQUENCE

THIS CONSTRUCTION SEQUENCE IS INTENDED AS A CONTRACT REQUIREMENT. THE CONTRACTOR MAY PROPOSE AN ALTERNATIVE SUBJECT TO APPROVAL BY THE ENGINEER.

1. CONSTRUCT STABILIZED CONSTRUCTION ACCESS PER TESC NOTES & DETAILS. INSTALL TEMPORARY CONSTRUCTION SIGNAGE AS REQUIRED.
2. INSTALL INITIAL PROJECT CONTROL STAKING.
3. INSTALL HIGH VISIBILITY FENCE MARKING CLEARING LIMITS. INSTALL SILT FENCE. IMPLEMENT OTHER BMP'S AS DESCRIBED ON THE PLANS AS NEEDED
4. DEMOLISH EXISTING FENCING, RELOCATE UTILITY POLES (IF REQUIRED), REMOVE EXISTING TREES AND ALL NON-NATIVE LAND COVERINGS, AND BACKFILL.
5. CLEAR AND GRUB TO CLEARING LIMITS OF ENTIRE SITE.
6. ROUGHLY GRADE SITE AS SHOWN ON GRADING PLAN.
7. INSTALL UTILITIES AND STORM DRAINAGE AS SHOWN ON UTILITY PLAN.
8. FINE GRADE BUILDING FOOTPRINT AND POUR FOUNDATION & SLAB.
9. CONSTRUCT BUILDING.
10. HOOK BUILDING UP TO ALL UTILITIES.
11. FINE GRADE REMAINING SITE AS NEEDED.
12. INSTALL CURBING, SIDEWALKS, AND ASPHALT PAVEMENT AS SHOWN ON SURFACING PLAN.
13. INSTALL PERMANENT SIGNAGE
14. INSTALL LANDSCAPING SOILS AND PLANTS AND TRAFFIC MARKING AS REQUIRED.

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DESIGNED BY: CJM		1			
DATE	NO.	REVISION	BY		

PERMIT SET



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Tumwater, WA 98512
ph: (360) 352-2477 fax: (360) 352-0179 E-mail: admin@vectorengineeringinc.com

COMBINED CONSTRUCTION SITE RE-DEVELOPMENT
3701 SOUTH ROAD
MUKILTEO, WA 98275

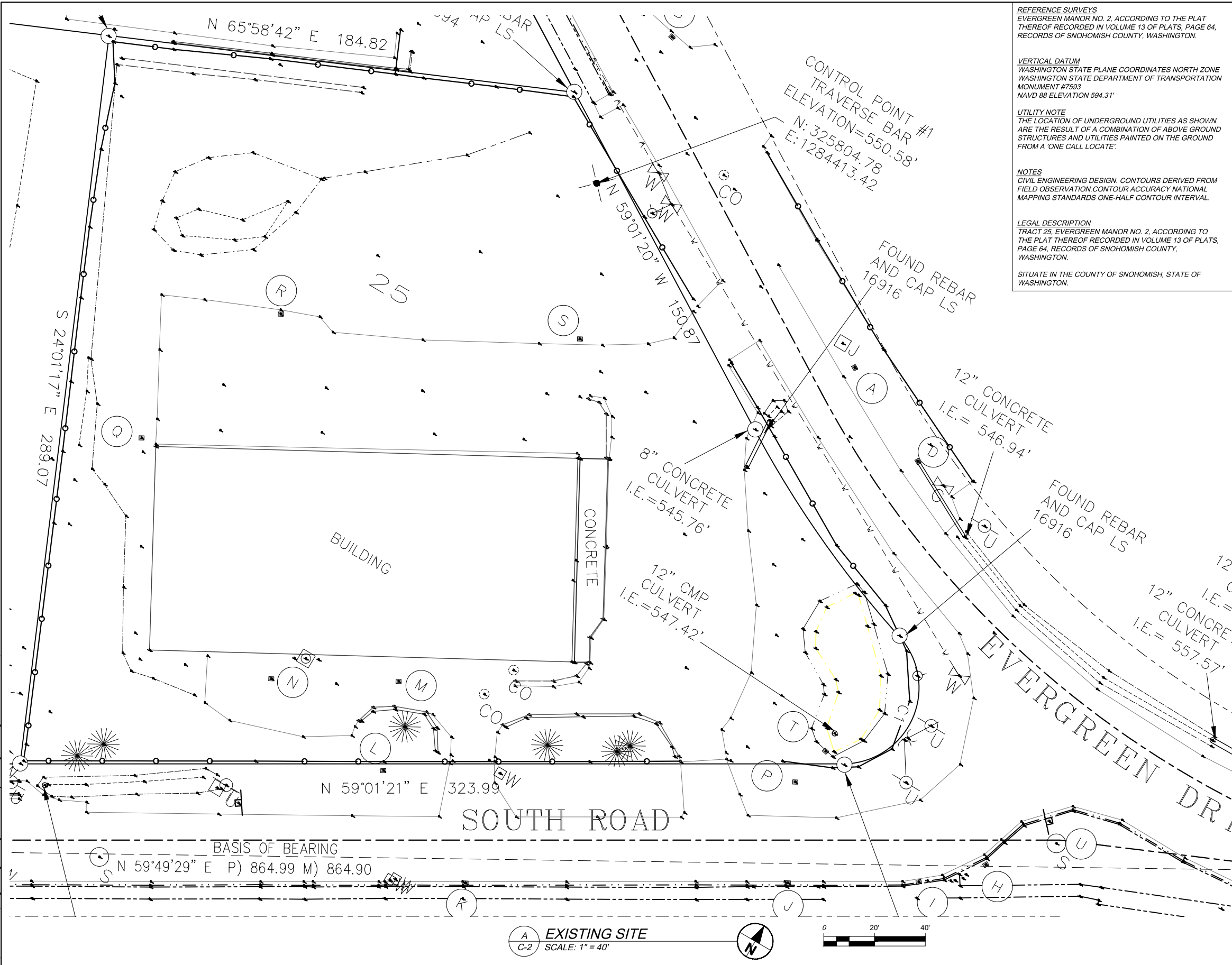
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C-1

SITE & SURFACE

SHT 1 OF 8

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REFERENCE SURVEYS
EVERGREEN MANOR NO. 2, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 13 OF PLATS, PAGE 64, RECORDS OF SNOHOMISH COUNTY, WASHINGTON.

VERTICAL DATUM
WASHINGTON STATE PLANE COORDINATES NORTH ZONE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
MONUMENT #7593
NAVD 88 ELEVATION 594.31'

UTILITY NOTE
THE LOCATION OF UNDERGROUND UTILITIES AS SHOWN ARE THE RESULT OF A COMBINATION OF ABOVE GROUND STRUCTURES AND UTILITIES PAINTED ON THE GROUND FROM A 'ONE CALL LOCATE'.

NOTES
CIVIL ENGINEERING DESIGN. CONTOURS DERIVED FROM FIELD OBSERVATION. CONTOUR ACCURACY NATIONAL MAPPING STANDARDS ONE-HALF CONTOUR INTERVAL.

LEGAL DESCRIPTION
TRACT 25, EVERGREEN MANOR NO. 2, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 13 OF PLATS, PAGE 64, RECORDS OF SNOHOMISH COUNTY, WASHINGTON.

SITUATE IN THE COUNTY OF SNOHOMISH, STATE OF WASHINGTON.

STANDARD CONSTRUCTION NOTES

- ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH CURRENT CITY OF MUKILTEO DEVELOPMENT STANDARDS; THE CURRENT EDITION OF THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION; AND THE ADOPTED EDITION OF THE WASHINGTON STATE DEPARTMENT OF ECOLOGY STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON.
- ALL WORK WITHIN THE PLAT AND CITY RIGHT-OF-WAY SHALL BE SUBJECT TO THE INSPECTION OF THE CITY.
- PRIOR TO ANY SITE CONSTRUCTION INCLUDING CLEARING/LOGGING OR GRADING, THE SITE CLEARING LIMITS SHALL BE LOCATED AND FIELD IDENTIFIED BY THE PROJECT SURVEYOR (OR PROJECT ENGINEER) AS REQUIRED BY THESE PLANS. THE PROJECT SURVEYOR'S NAME AND PHONE NUMBER IS
- THE DEVELOPER, CONTRACTOR AND PROJECT ENGINEER IS RESPONSIBLE FOR WATER QUALITY AS DETERMINED BY THE MONITORING PROGRAM ESTABLISHED BY THE PROJECT ENGINEER. THE PROJECT ENGINEER'S NAME AND PHONE NUMBER IS
- PRIOR TO ANY SITE WORK, THE CONTRACTOR SHALL CONTACT THE CITY OF MUKILTEO COMMUNITY DEVELOPMENT DEPARTMENT AT 425-263-8000 TO SCHEDULE A PRECONSTRUCTION CONFERENCE.
- ENGINEERED AS-BUILT DRAWINGS IN ACCORDANCE WITH THE CURRENT ADOPTED INTERNATIONAL BUILDING CODE SHALL BE REQUIRED PRIOR TO FINAL SITE APPROVAL.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS FOR UTILITY, ROAD, AND RIGHT-OF-WAY CONSTRUCTION. THE CONTRACTOR FOR THIS PROJECT IS:
CONTACT PERSON:
PHONE:
MOBILE:
24-HOUR EMERGENCY CONTACT AND PHONE:
- THE CONSTRUCTION STORMWATER POLLUTION PREVENTION (SWPP) FACILITIES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE APPROVED SWPPP PLANS PRIOR TO ANY GRADING OR LAND CLEARING. THESE FACILITIES MUST BE SATISFACTORILY MAINTAINED UNTIL CONSTRUCTION AND LANDSCAPING IS COMPLETED AND THE POTENTIAL FOR ON-SITE EROSION HAS PASSED. SEDIMENT LADEN WATERS SHALL NOT ENTER THE NATURAL DRAINAGE SYSTEM. A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL) OR SWPPP SUPERVISOR SHALL BE RESPONSIBLE FOR MAINTAINING THE CONSTRUCTION SWPPP FACILITIES, AS OUTLINED IN THE APPROVED SWPPP, OR AS MODIFIED FROM TIME TO TIME. CONTACT INFORMATION FOR THE CESCL (OR SWPPP SUPERVISOR) FOR THE PROJECT SHALL BE GIVEN TO THE CITY.
- NONCOMPLIANCE WITH THE REQUIREMENTS FOR EROSION CONTROLS, WATER QUALITY AND CLEARING LIMITS MAY RESULT IN REVOCATION OF PROJECT PERMITS, PLAN APPROVAL, AND BOND FORECLOSURES.
- TRENCH BACKFILL OF NEW UTILITIES AND STORM DRAINAGE FACILITIES SHALL BE COMPACTED TO 95% MAXIMUM DENSITY (MODIFIED PROCTOR) UNDER ROADWAYS AND 90% MAXIMUM DENSITY (MODIFIED PROCTOR) OFF ROADWAYS. COMPACTION SHALL BE PERFORMED IN ACCORDANCE WITH SECTIONS 7-08.3(3) AND 2-03.3(14) D OF THE WSDOT STANDARD SPECIFICATIONS.
- THE OWNER AND CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES PRIOR TO BEGINNING CONSTRUCTION. LOCATION OF UTILITIES SHOWN ON CONSTRUCTION PLANS ARE BASED ON BEST RECORDS AVAILABLE AND ARE SUBJECT TO VARIATION. FOR ASSISTANCE IN UTILITY LOCATION, CALL 811.
- PRIOR TO CONSTRUCTION THE OWNER AND/OR CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER AND THE PUBLIC WORKS DIRECTOR WHEN CONFLICTS EXIST BETWEEN THE PLANS AND FIELD CONDITIONS. CONFLICTS SHALL BE RESOLVED (INCLUDING PLAN AND PROFILE REVISIONS) AND RESUBMITTED FOR APPROVAL PRIOR TO PROCEEDING WITH CONSTRUCTION.
- THE CONTRACTOR SHALL KEEP TWO SETS OF PLANS ON SITE AT ALL TIMES FOR RECORDING AS-BUILT INFORMATION; ONE SET SHALL BE SUBMITTED TO THE PROJECT ENGINEER, AND ONE SET SHALL BE SUBMITTED TO THE CITY AT COMPLETION OF CONSTRUCTION AND PRIOR TO FINAL ACCEPTANCE OF WORK.
- A GRADING PERMIT ISSUED PURSUANT TO THE CURRENT ADOPTED INTERNATIONAL BUILDING CODE, AND APPROVAL OF THE TEMPORARY EROSION AND SEDIMENTATION CONTROL PLAN SHALL BE OBTAINED FROM THE COMMUNITY DEVELOPMENT DEPARTMENT PRIOR TO ANY ON-SITE GRADING WORK NOT EXPRESSLY EXEMPT BY THE CURRENT ADOPTED INTERNATIONAL BUILDING CODE.

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DETAILED BY: CJM		1			
DESIGNED BY: CJM	DATE	NO.	REVISION	BY	

EXISTING SITE
SCALE: 1" = 40'



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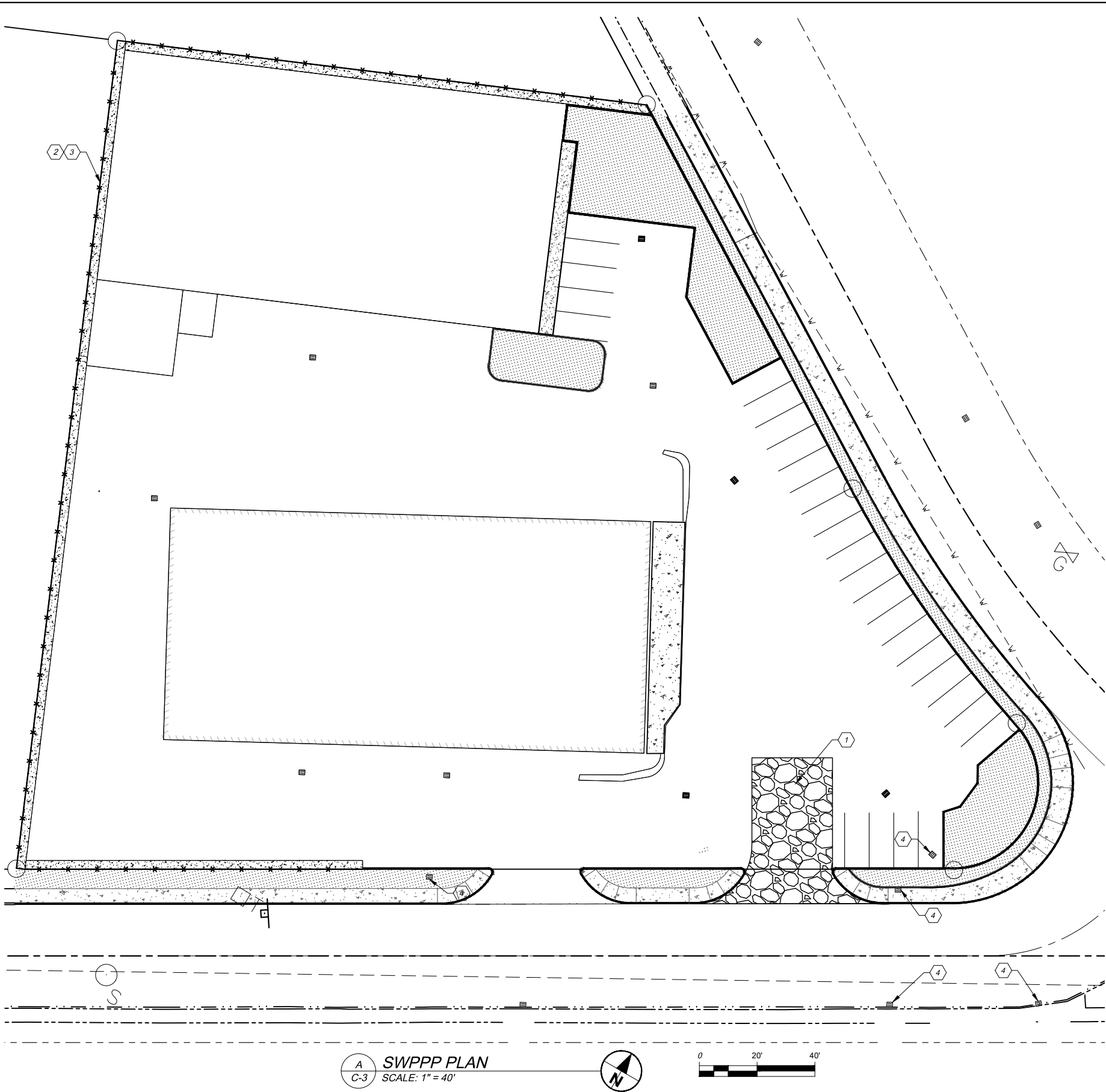
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3701 SOUTH ROAD
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C-2

EXISTING SITE

SHT 2 OF 8

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A
C-3
SWPPP PLAN
SCALE: 1" = 40'



APPROVED FOR CONSTRUCTION

BY: _____ DATE: _____

CITY OF MUKILTEO
DIRECTOR OF PUBLIC WORKS

APPROVAL EXPIRES: _____

STANDARD EROSION CONTROL NOTES

1. PRIOR TO ANY SITE WORK, INCLUDING CLEARING, LOGGING OR GRADING, THE SITE CLEARING LIMITS SHALL BE LOCATED AND FIELD IDENTIFIED BY THE PROJECT SURVEYOR (OR PROJECT ENGINEER) AS REQUIRED BY THESE THE PROJECT SURVEYOR'S NAME AND PHONE NUMBER IS _____.
2. SOILS IN MUKILTEO OFTEN CONTAIN FINER PARTICLES WHICH WILL PASS THROUGH SEDIMENT TRAPS UNTREATED AND HAVE EXTREMELY LONG SETTLING TIMES. THEREFORE, THE NEED TO CONTROL EROSION FROM THE SITE IS THE FIRST PRIORITY AND SHOULD BE EMPHASIZED.
3. THE CONSTRUCTION STORMWATER POLLUTION PREVENTION FACILITIES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE APPROVED SWPPP PRIOR TO ANY GRADING OR EXTENSIVE LAND CLEARING. AN INSPECTION BY THE CITY OF THESE FACILITIES SHALL BE ARRANGED FOR BY THE CONTRACTOR PRIOR TO ANY GRADING. THESE FACILITIES MUST BE SATISFACTORILY MAINTAINED UNTIL CONSTRUCTION AND LANDSCAPING IS COMPLETED AND THE POTENTIAL FOR ON-SITE EROSION HAS PASSED.
4. STOCKPILES ARE TO BE LOCATED IN SAFE AREAS AND ADEQUATELY PROTECTED BY TEMPORARY SEEDING AND MULCHING. HYDROSEEDING IS PREFERRED.
5. THE DEVELOPER (OR PROJECT ENGINEER) IS RESPONSIBLE FOR WATER QUALITY AS DETERMINED BY THE MONITORING PROGRAM ESTABLISHED BY THE PROJECT ENGINEER. THE PROJECT ENGINEER'S NAME AND PHONE NUMBER IS _____.
6. IF THE PROJECT WILL DISTURB MORE THAN ONE (1) ACRE OF LAND, THEN A CONSTRUCTION NPDES PERMIT IS REQUIRED AND A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL) SHALL BE ASSIGNED TO THE SITE.
CESCL'S NAME: _____
PHONE NUMBER: _____
CESCL CERTIFICATE NUMBER IS: _____
7. ALL SITE WORK MUST BE PERFORMED IN ACCORDANCE WITH THE CURRENT CITY ADOPTED INTERNATIONAL BUILDING CODE.
8. ALL EARTH WORK SHALL BE PERFORMED IN ACCORDANCE WITH CITY STANDARDS. A PRECONSTRUCTION SOILS INVESTIGATION MAY BE REQUIRED TO EVALUATE SOILS STABILITY.
9. IF CUT AND FILL SLOPES EXCEED A MAXIMUM OF TWO FEET HORIZONTAL TO ONE FOOT VERTICAL, A ROCK OR CONCRETE RETAINING WALL MAY BE REQUIRED. ALL ROCK RETAINING WALLS GREATER THAN FOUR (4) FEET IN HEIGHT ARE TO BE DESIGNED AND CERTIFIED BY A PROFESSIONAL ENGINEER EXPERIENCED IN SOIL MECHANICS.
10. THE SURFACE OF ALL SLOPES SHALL BE COMPACTED. THIS MAY BE ACCOMPLISHED BY OVER-BUILDING THE SLOPES, THEN CUTTING BACK TO FINAL GRADES; OR BY COMPACTING EACH LIFT AS THE SLOPE IS BEING CONSTRUCTED. ALL SLOPES SHALL BE COMPACTED BY THE END OF EACH WORKING DAY.
11. ALL STRUCTURAL FILLS SHALL BE COMPACTED TO A MINIMUM OF 95% MAXIMUM DENSITY IN THE UPPER 4 FEET & 90% MAXIMUM DENSITY BELOW 4 FEET AS DETERMINED BY MODIFIED PROCTOR.
12. NONCOMPLIANCE WITH THE EROSION CONTROL REQUIREMENTS, WATER QUALITY REQUIREMENTS AND CLEARING LIMITS VIOLATIONS MAY RESULT IN REVOCATION OF PROJECT PERMITS AND PLAN APPROVAL AND BOND FORECLOSURES.
13. UPON COMPLETION OF WORK, FINAL REPORTS MUST BE SUBMITTED TO THE CITY IN CONFORMANCE WITH THE CURRENT CITY ADOPTED INTERNATIONAL BUILDING CODE.
14. A WET WEATHER EROSION CONTROL PLAN MUST BE SUBMITTED TO THE CITY FOR REVIEW AND APPROVAL ON OR BEFORE SEPTEMBER 1, IF THE PROJECT IS PROPOSING TO ACTIVELY CLEAR, GRADE, OR OTHERWISE DISTURB 1,000 SQUARE FEET OR MORE OF SOIL DURING THE PERIOD BETWEEN OCTOBER 1 AND APRIL 30. OTHER THRESHOLDS FOR A WET WEATHER EROSION CONTROL PLAN INCLUDE PROJECTS THAT:
 - 14.1. HAVE AREA(S) THAT DRAIN, BY PIPE, OPEN DITCH, SHEET FLOW, OR A COMBINATION OF THESE TO A TRIBUTARY WATER, AND THE TRIBUTARY WATER IS ONE-QUARTER MILE OR LESS DOWNSTREAM; OR
 - 14.2. HAVE SLOPES STEEPER THAN 15 PERCENT ADJACENT OR ON-SITE; OR
 - 14.3. HAVE HIGH POTENTIAL FOR SEDIMENT TRANSPORT, AS DETERMINED BY THE CONSTRUCTION SITE SEDIMENT TRANSPORT POTENTIAL WORKSHEET; OR
 - 14.4. HAVE A CRITICAL AREA OR CRITICAL AREA BUFFER ON-SITE, OR WITHIN 50 FEET OF THE SITE; OR
 - 14.5. HAVE HIGH GROUNDWATER TABLE OR SPRINGS.

TEMPORARY SEEDING GENERAL NOTES

1. USE SEEDING THROUGHOUT THE PROJECT ON DISTURBED AREAS THAT HAVE REACHED FINAL GRADE OR THAT WILL REMAIN UNWORKED FOR MORE THAN 30 DAYS.
2. THE OPTIMUM SEEDING WINDOWS ARE APRIL 1 THROUGH JUNE 30 AND SEPTEMBER 1 THROUGH OCTOBER 1.
3. BETWEEN OCTOBER 1 AND MARCH 30 SEEDING REQUIRES A COVER OF MULCH WITH STRAW OR AN EROSION CONTROL BLANKET UNTIL 75 PERCENT GRASS COVER IS ESTABLISHED.
4. REVIEW ALL DISTURBED AREAS IN LATE AUGUST TO EARLY SEPTEMBER AND COMPLETE ALL SEEDING BY THE END OF SEPTEMBER.
 - 4.1. MULCH IS REQUIRED AT ALL TIMES FOR SEEDING. MULCH CAN BE APPLIED ON TOP OF THE SEED OR SIMULTANEOUSLY BY HYDROSEEDING (SEE ECOLOGY BMP C121 MULCHING FOR SPECIFICATIONS).
 - 4.2. SEED AND MULCH ALL DISTURBED AREAS NOT OTHERWISE VEGETATED AT FINAL SITE STABILIZATION.

MAINTENANCE OF SILTATION BARRIERS

1. SILTATION BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. CLOSE ATTENTION SHALL BE PAID TO THE REPAIR OF DAMAGED EROSION CONTROL ELEMENTS, ESPECIALLY END-RUNS AND SEDIMENT BUILD-UP. NECESSARY REPAIRS TO BARRIERS SHALL BE ACCOMPLISHED THE SAME DAY.
2. SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH RAINFALL. SEDIMENT DEPOSITS MUST BE REMOVED WHEN THE SEDIMENT LEVEL REACHES APPROXIMATELY ONE-HALF THE SILTATION BARRIER HEIGHT.
3. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE CHECK DAM IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM TO THE EXISTING GRADE, PREPARED AND SEEDDED.

CONSTRUCTION NOTES

- 1 BMP C105: STABILIZED CONSTRUCTION ENTRANCE
- 2 BMP C103: HIGH VISIBILITY PLASTIC FENCE
- 3 BMP C233: SILT FENCE
- 4 EXIST SIGN TO REMOVE
- 5 RELOCATE POWER VAULT. COORDINATE W/ PUD
- 6 FENCE REMOVAL/RELOCATE PER ARCHITECTURAL PLANS

LEGEND

HATCH

 STABILIZED ENTRANCE

LINES

 HIGH VISIBILITY / SILT FENCE

FILE: C-3.dwg		6			
PROJECT: 19-CC06		4			
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COMBINED CONSTRUCTION SITE RE-DEVELOPMENT
3701 SOUTH ROAD
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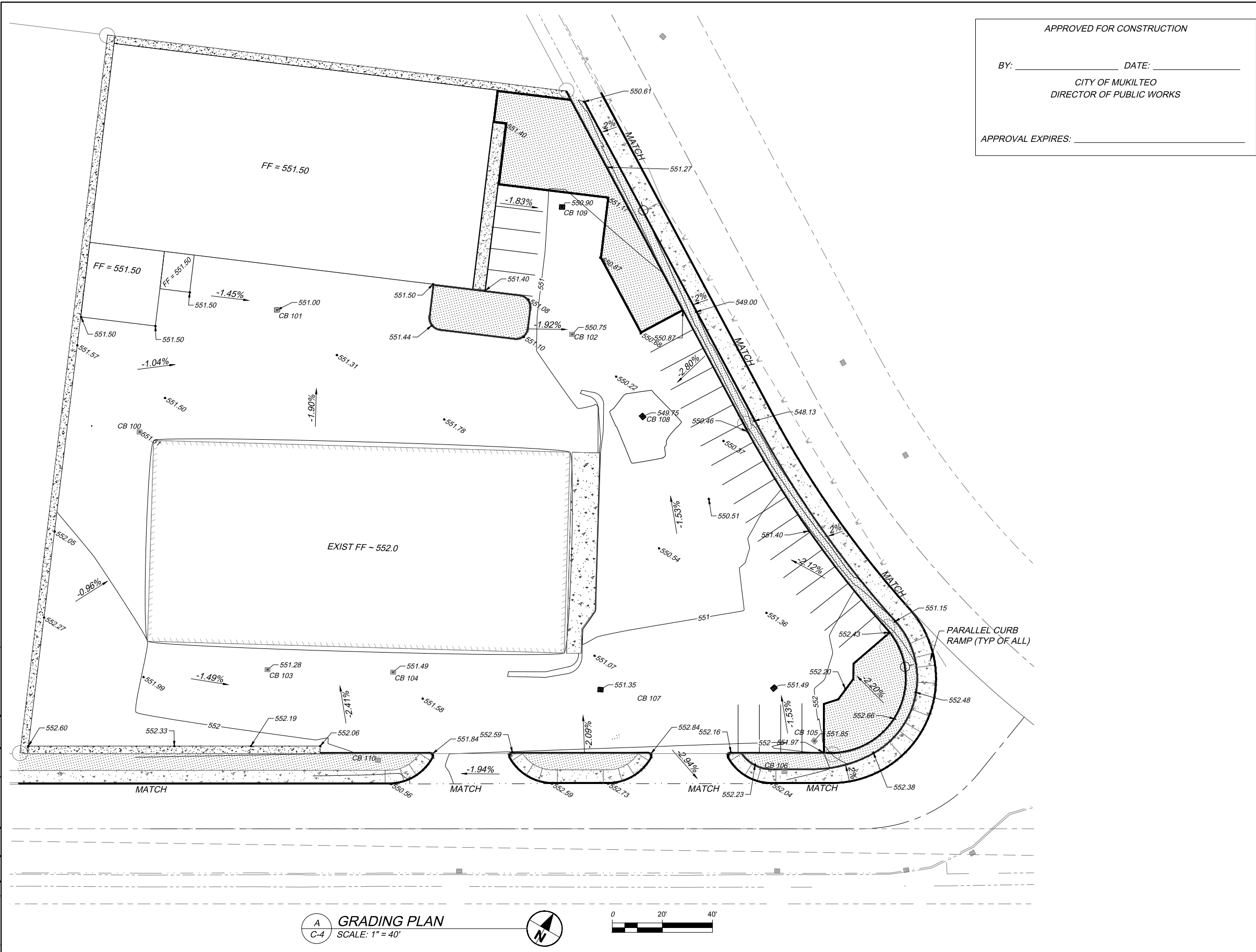
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C-3

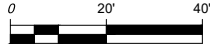
SWPPP PLAN

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A
C-4
GRADING PLAN
SCALE: 1" = 40'



LEGEND

HATCH

- PAVED AREA (PROPOSED)
- CONCRETE (PROPOSED)

LINES

EXIST PROP

- EDGE PAVING
- FENCE SEE ARCH FOR TYPE
- CONTOUR
- PROPERTY LINE
- WATER
- SANITARY SEWER
- STORM DRAIN
- OVERHEAD POWER
- BURIED POWER

SYMBOLS

EXIST PROP

- GAS METER
- GAS VALVE
- PAD MOUNTED TRANSFORMER
- POWER VAULT
- TRANSMISSION TOWER
- UTILITY POLE
- UTILITY POLE ANCHOR
- TELEPHONE RISER
- TELEPHONE VAULT
- SAN. SEWER MANHOLE
- SAN. SEWER CLEAN OUT
- WATER METER
- CHECK
- GATE/GENERAL
- FIRE HYDRANT
- CATCH BASIN

FILE: C-4.dwg		5			
PROJECT: 19-CC06		4			
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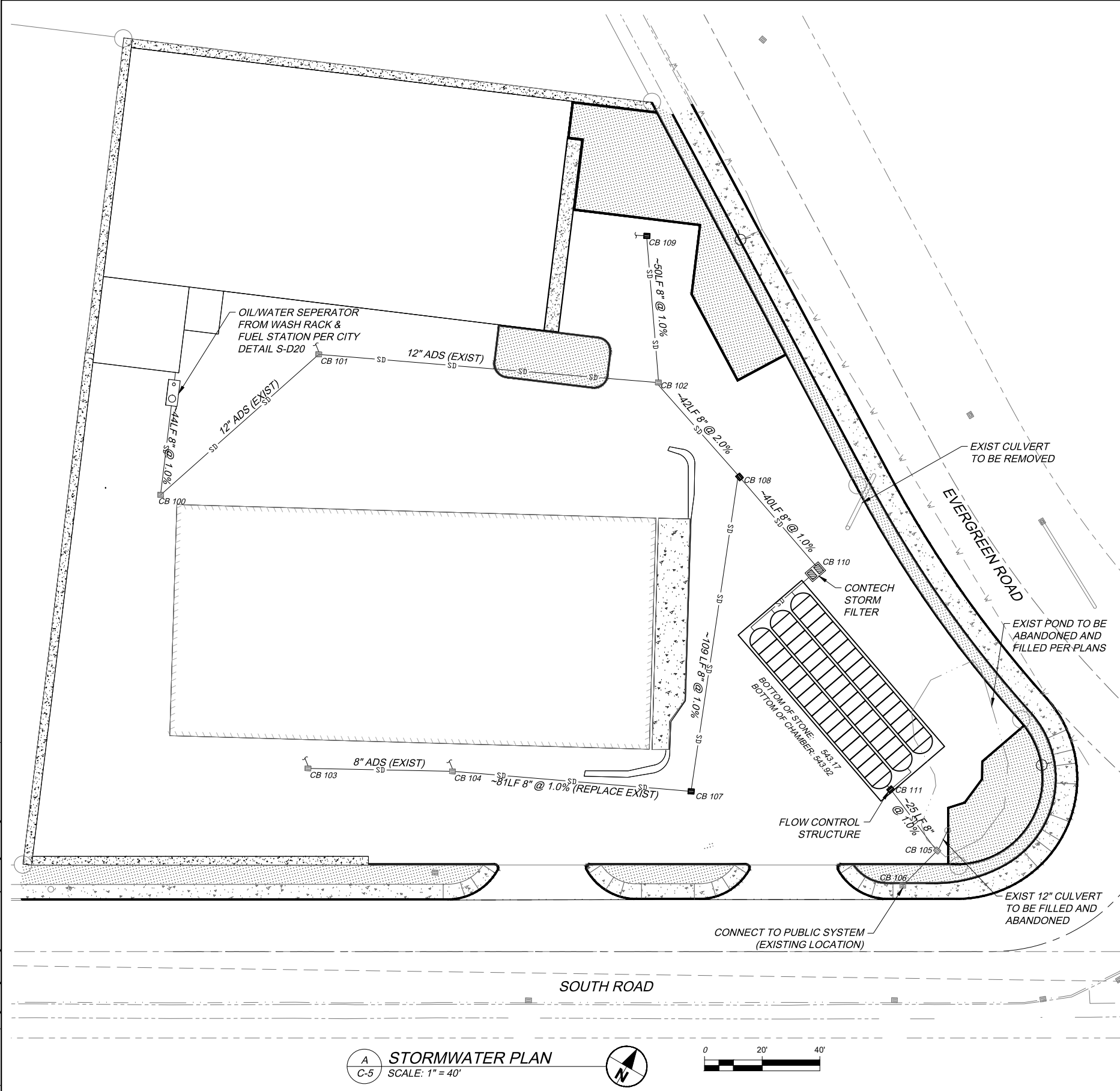
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C-4

GRADING PLAN

SHT 4 OF 8

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CATCH BASIN SCHEDULE				
CB ID	RIM	STRUCTURE	IE	NOTES
100	550.20	TYPE 1 CB W/ RECTANGULAR HERRINGBONE GRATE	549.36 12" N 549.46 8" NW (PROP)	I
101	551.00	TYPE 1 CB W/ RECTANGULAR HERRINGBONE GRATE	549.12 12" S 549.02 12" NE	I
102	550.75	TYPE 1 CB W/ RECTANGULAR HERRINGBONE GRATE	548.49 12" SW 548.9 8" NW (PROP) 548.36 8" SE (PROP)	I
103	551.28	TYPE 1 CB W/ RECTANGULAR HERRINGBONE GRATE	549.78 8 8" NE 550.08 4" NW	I
104	551.49	TYPE 1 CB W/ RECTANGULAR HERRINGBONE GRATE	548.99 8" NE 548.99 8" SW 549.09 4" NW	I
105	552.00	TYPE 1 CB W/ RECTANGULAR HERRINGBONE GRATE	546.87 12" SW 546.47 12" NW (TO BE ABANDONED) 546.37 12" NW (TO BE ABANDONED) 546.97 8" NW	INVERT 546.11 12" N ASSUME TO BE FROM CB105
106	551.88	TYPE 1 CB W/ RECTANGULAR HERRINGBONE GRATE	546.21 12" NE 546.21 12" SE 546.11 12" N	
107 PROP	551.69	TYPE 1 CB W/ RECTANGULAR SOLID LID	548.18 8" SW 547.64 8" NW	I
108 PROP	549.75	TYPE 1L CB W/ RECTANGULAR HERRINGBONE GRATE	547.1 8" NW 546.55 8" SE 546.62 8" E	I
109 PROP	550.90	TYPE 1 CB W/ RECTANGULAR HERRINGBONE GRATE	549.40 8" SE (PROP)	I
110 PROP	550.51	CONTECH STORM FILTER W/ SOLID COVER	545.35 8" NW 544.34 8" SW	I
111 PROP	551.49	TYPE 2 CB W/ FLOW RESTRICTOR & SOLID COVER	547.30 8" NW INLET 547.30 8" NE INLET 545.20 - RESTRICTOR 549.87 - EMERGENCY SPILL 547.20 8" SW OUTLET	I

LEGEND		
HATCH		
	PAVED AREA (PROPOSED)	
	CONCRETE (PROPOSED)	
LINES		
EXIST	PROP	
		EDGE PAVING
		FENCE SEE ARCH FOR TYPE
		CONTOUR
		PROPERTY LINE
		WATER
		SANITARY SEWER
		STORM DRAIN
		OVERHEAD POWER
		BURIED POWER
SYMBOLS		
EXIST	PROP	
		CATCH BASIN

- STORM DRAINAGE GENERAL NOTES**
- ALL PIPE SHALL BE PLACED ACCORDING DIVISION 7 OF THE WSDOT STANDARD SPECIFICATIONS.
 - BACKFILL SHALL BE PLACED EQUALLY ON BOTH SIDES OF THE PIPE OR PIPE-ARCH IN 6" AVERAGE DEPTH LOOSE LIFTS. MAXIMUM LIFT DEPTH SHALL NOT EXCEED 9". EACH LIFT SHALL BE THOROUGHLY COMPACTED. COMPACTED LIFTS MUST EXTEND AT LEAST ONE PIPE DIAMETER ON EACH SIDE OF THE PIPE OR TO THE SIDE OF THE TRENCH. BACKFILL OVER THE PIPE SHALL BE PERFORMED IN ACCORDANCE WITH SECTIONS 7-08.3(3) THE WSDOT STANDARD SPECIFICATIONS.
 - ALL GRATES LOCATED IN THE GUTTER FLOW LINE (INLET AND CATCH BASIN) SHALL BE DEPRESSED 0.1 FEET BELOW PAVEMENT LEVEL.
 - ALL CATCH BASINS ARE TO BE TYPE I UNLESS OTHERWISE APPROVED BY THE CITY OR DESIGNATED REPRESENTATIVE. THE USE AND INSTALLATION OF INLETS IS NOT ALLOWED.
 - THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING ALL MANHOLE, INLET AND CATCH BASIN FRAMES AND GRATES TO GRADE JUST PRIOR TO CURB INSTALLATION AND/OR PAVING.
 - ALL CATCH BASINS WITH A DEPTH OF 5 FEET OR GREATER TO THE FLOW LINE SHALL BE TYPE II CATCH BASINS.
 - VANED GRATES ARE REQUIRED ON ALL STORM STRUCTURES. ALL CATCH BASINS AND MANHOLES SHALL HAVE LOCKING LIDS. ROLLED GRATES ARE NOT APPROVED FOR USE.
 - POLYPROPYLENE SAFETY STEPS AND LADDER STEPS SHALL BE PROVIDED IN ALL MANHOLES AND SHALL BE POSITIONED CORRECTLY WITH THE BOLT AREAS ON THE RIM.
 - CATCH BASIN FRAMES AND GRATES SHALL BE OLYMPIC FOUNDRY MODEL SM60, SM52, OR SM44. LOCKING TYPE OR EQUIVALENT. MODEL SM52 SHALL BE REFERRED TO AS A "THROUGH CURB INLET" ON THE PLANS.
 - DETENTION PONDS WITH SIDE SLOPES STEEPER THAN 3:1 OR WITH A MAXIMUM WATER DEPTH GREATER THAN 3 FEET SHALL REQUIRE A VINYL COATED CHAIN LINK PERIMETER FENCE. SIDE SLOPE AVERAGING SHALL NOT BE ALLOWED. ALL INLET AND OUTFALL PIPES SHALL HAVE A TRASH RACK INSTALLED AND A MORTARED RIPRAP HEADWALL.
 - PRIOR TO SIDEWALK CONSTRUCTION, LOT DRAINAGE SYSTEMS, STUB-OUTS AND ANY BEHIND SIDEWALK DRAINS MUST BE INSTALLED AS REQUIRED. PIPE SHALL BE PVC 3034, OR SDR-35. STUB-OUTS SHALL BE MARKED WITH A 2" X 4" WITH 3 FEET VISIBLE ABOVE GRADE AND MARKED "STORM". LOCATIONS OF THESE INSTALLATIONS SHALL BE SHOWN ON THE AS-BUILT CONSTRUCTION PLANS SUBMITTED TO THE CITY.
 - STORM WATER RETENTION/DETENTION FACILITIES, STORM DRAINAGE PIPE AND CATCH BASINS SHALL BE FLUSHED AND CLEANED BY THE DEVELOPER PRIOR TO:
 - CITY OF MUKILTEO FINAL ACCEPTANCE OF THE PROJECT AND;
 - UPON COMMENCEMENT AND COMPLETION OF THE 2 YEAR WARRANTY PERIOD FOR THE STORM DRAINAGE SYSTEM. AN INVOICE DETAILING THE FLUSHING AND CLEANING SHALL BE PROVIDED TO THE CITY.
 - ALL PIPES SHALL BE INSTALLED WITH RUBBER GASKETS AS PER MANUFACTURER'S RECOMMENDATIONS.
 - CORRUGATED POLYETHYLENE PIPE (CPP):
 - ALL PIPE SHALL BE SMOOTH INTERIOR. CPP SHALL BE DOUBLE-WALLED. ALL PIPE SHALL MEET AASHTO AND ASTM SPECIFICATIONS.
 - UPON REQUEST BY THE CITY INSPECTOR, ALL PIPE RUNS SHALL PASS THE LOW PRESSURE AIR TEST REQUIREMENTS OF SECTION 7-04.3(1) E & F OF THE WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION. PIPE RUNS SHALL BE TESTED WITH PIPE LOADED AND COMPACTED TO FINISH GRADE.
 - UPON REQUEST BY THE CITY INSPECTOR, PIPE SHALL BE SUBJECT TO MANDREL TESTING (MANDREL SIZE = 90% OF NOMINAL PIPE DIAMETER).
 - PIPE SHALL BE STORED ON SITE IN SHIPPING BUNKS ON A FLAT LEVEL SURFACE. THIS REQUIREMENT WILL BE STRICTLY ENFORCED; FAILURE TO COMPLY MAY RESULT IN REJECTION OF THE PIPE AND/OR FUTURE RESTRICTION ON USE OF MATERIAL.
 - MINIMUM DEPTH OF COVER SHALL BE 2 FEET.
 - COUPLINGS SHALL BE INTEGRAL BELL AND SPIGOT OR DOUBLE BELL SEPARATE COUPLINGS. SPLIT COUPLINGS WILL NOT BE ALLOWED.
 - BACKFILL SHALL COMPLY WITH SECTION 7-08.3(3) OF THE WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION WITH THE EXCEPTION THAT THE SECOND PARAGRAPH OF SECTION 7-08.3(3) IS DELETED AND REPLACED WITH: THE MATERIAL USED FOR BACKFILLING AROUND AND TO A POINT 1 FOOT ABOVE THE TOP OF THE PIPE SHALL BE CLEAN EARTH OR SAND, FREE FROM CLAY. ANY GRAVEL OR STONES INCLUDED IN THE BACKFILL SHALL PASS THROUGH A 1 INCH SIEVE.
 - CULVERT ENDS SHALL BE BEVELED TO MATCH SIDE SLOPES. FIELD CUTTING OF CULVERT ENDS IS PERMITTED WHEN APPROVED BY THE CITY.
 - ALL FIELD CUT CULVERT PIPE SHALL BE TREATED AS REQUIRED IN THE STANDARD SPECIFICATIONS OR GENERAL SPECIAL PROVISIONS.

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BY: _____ DATE: _____

CITY OF MUKILTEO
DIRECTOR OF PUBLIC WORKS

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FILE: C-5.dwg		6			
PROJECT: 19-CC06		4			
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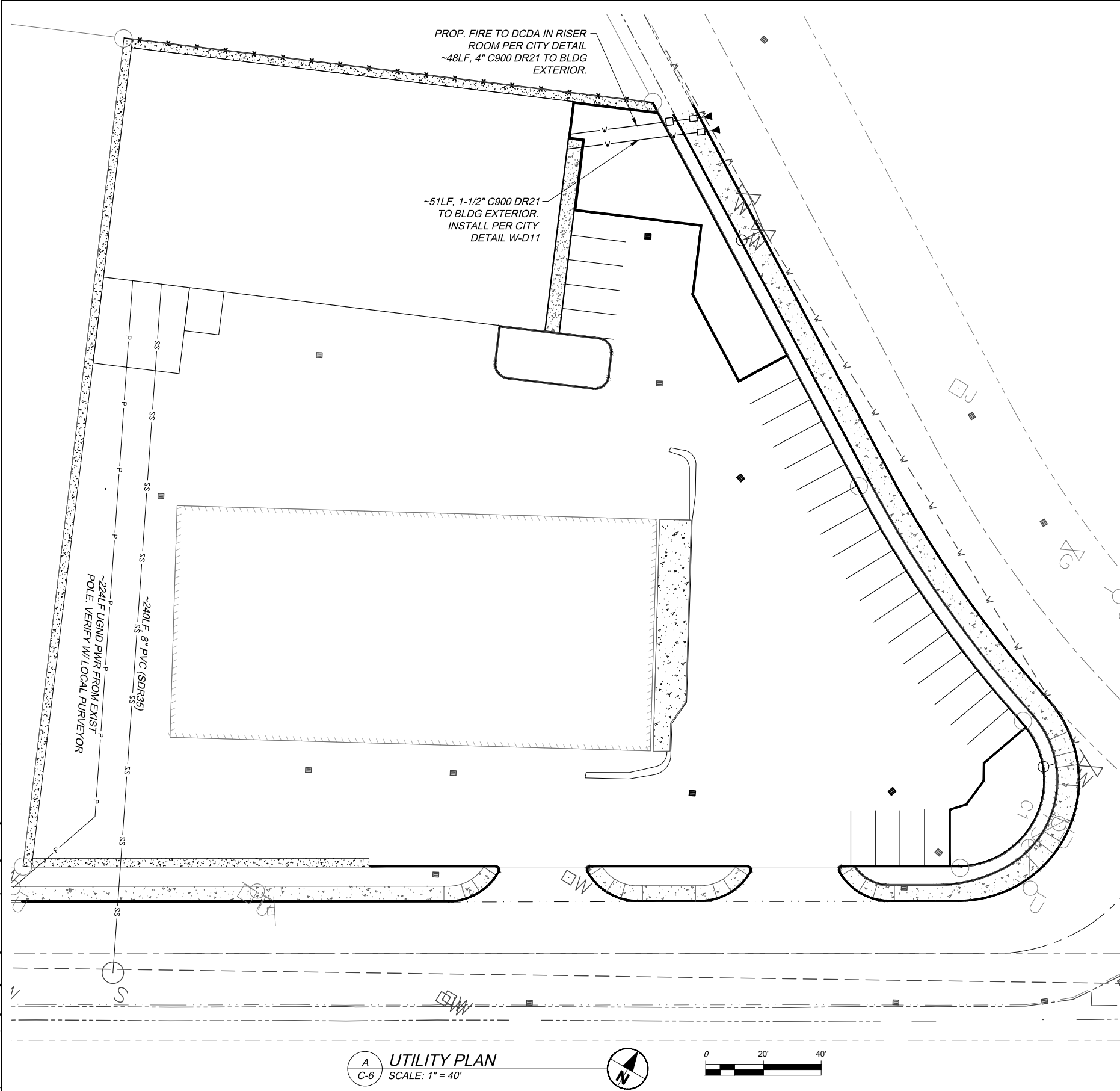
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COMBINED CONSTRUCTION SITE RE-DEVELOPMENT 3701 SOUTH ROAD MUKILTEO, WA 98275	C-5
COMBINED CONSTRUCTION 3701 SOUTH ROAD MUKILTEO, WA 98275	DRAINAGE PLAN
	SHT 5 OF 8

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A
C-6
UTILITY PLAN
SCALE: 1" = 40'



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BY: _____	DATE: _____
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APPROVAL EXPIRES: _____	

LEGEND

HATCH

- | | |
|--|-----------------------|
| | PAVED AREA (PROPOSED) |
| | CONCRETE (PROPOSED) |

LINES

- | EXIST | PROP | |
|-------|------|-------------------------|
| | | EDGE PAVING |
| | | FENCE SEE ARCH FOR TYPE |
| | | CONTOUR |
| | | PROPERTY LINE |
| | | WATER |
| | | SANITARY SEWER |
| | | STORM DRAIN |
| | | OVERHEAD POWER |
| | | BURIED POWER |

SYMBOLS

- | EXIST | PROP | |
|-------|------|-------------|
| | | CATCH BASIN |

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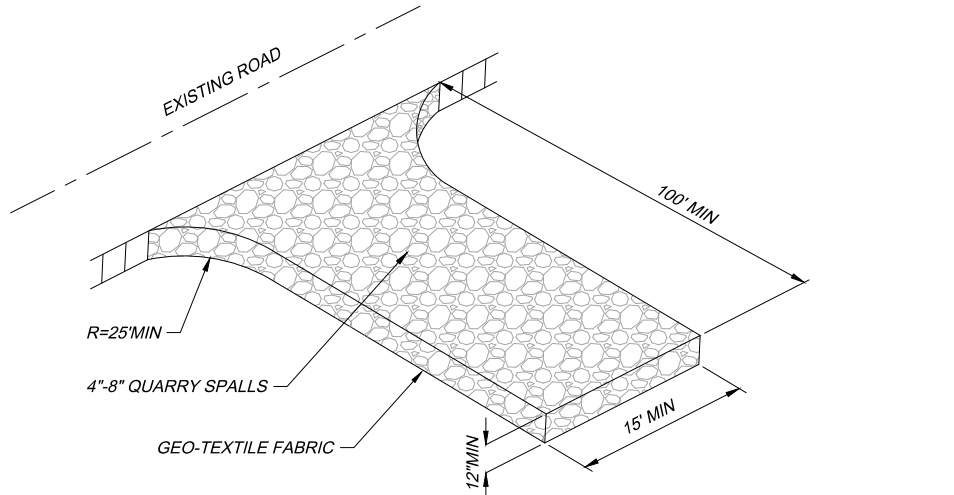
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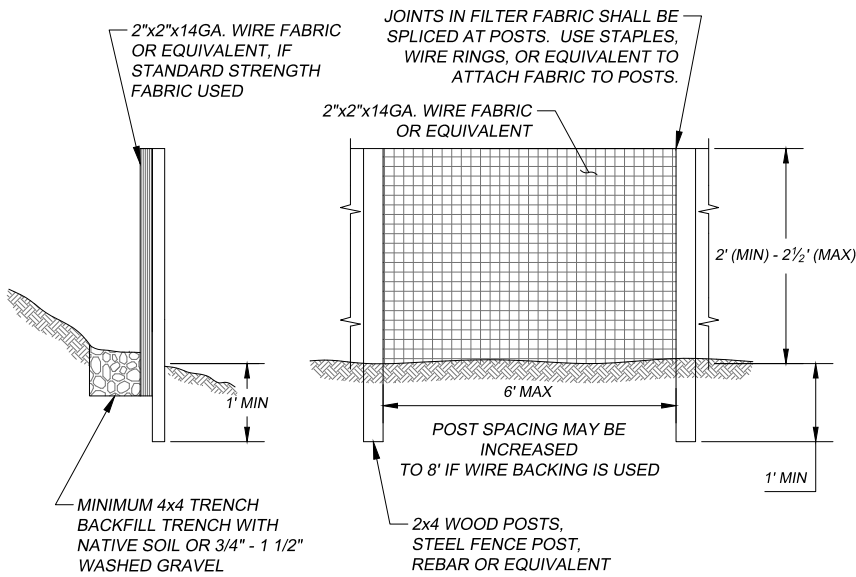
C-6
UTILITY PLAN
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- BMP C105: STABILIZED CONSTRUCTION ENTRANCE/EXIT NOTES:**
1. THE ROCK PAD SHALL BE AT LEAST 12 INCHES THICK AND 100 FEET LONG. WIDTH SHALL BE AT LEAST 15 FEET AND BE THE FULL WIDTH OF THE VEHICLE INGRESS AND EGRESS AREA. SMALLER PADS MAY BE APPROVED WHERE REQUIRED SIZE IS IMPRACTICAL.
 2. MATERIAL SHALL BE 4" TO 8" QUARRY SPALLS, A 4-INCH COURSE OF ASPHALT TREATED BASE (ATB), OR USE EXISTING PAVEMENT. DO NOT USE BROKEN/CRUSHED CONCRETE, CEMENT, OR CALCIUM CHLORIDE.
 3. A SEPARATION GEOTEXTILE SHALL BE PLACED UNDER THE SPALLS TO PREVENT FINE SEDIMENT FROM PUMPING UP INTO THE ROCK PAD. THE GEOTEXTILE SHALL MEET THE FOLLOWING STANDARDS:
 - GRAB TENSILE STRENGTH (ASTM D4751): 200 PSI MINIMUM
 - GRAB TENSILE ELONGATION (ASTM D4632): 30 PERCENT MAXIMUM
 - MULLEN BURST STRENGTH (ASTM D3786-80A): 400 PSI MINIMUM
 - AOS (ASTM D4751): 20 TO 45 (U.S. STANDARD SIEVE SIZE)
 4. FOR SINGLE-FAMILY RESIDENTIAL LOTS PAD MAY BE REDUCED IN LENGTH TO FIT SITE, TO NO LESS THAN 20 FEET LONG, AND IN DEPTH, TO 6 INCHES THICK WITH 4-INCH TO 6-INCH QUARRY SPALLS.
 5. ADDITIONAL QUARRY SPALLS SHALL BE ADDED PERIODICALLY TO MAINTAIN PROPER FUNCTION OF THE PAD.
 6. IF THE ENTRANCE IS NOT PREVENTING SEDIMENT FROM BEING TRACKED ONTO PAVEMENT, THEN ALTERNATIVE MEASURES TO KEEP THE STREETS FREE OF SEDIMENT SHALL BE USED. THIS MAY INCLUDE REPLACEMENT/CLEANING OF THE EXISTING QUARRY SPALLS, AN INCREASE IN THE DIMENSIONS OF THE ENTRANCE, OR THE INSTALLATION OF A WHEEL WASH.

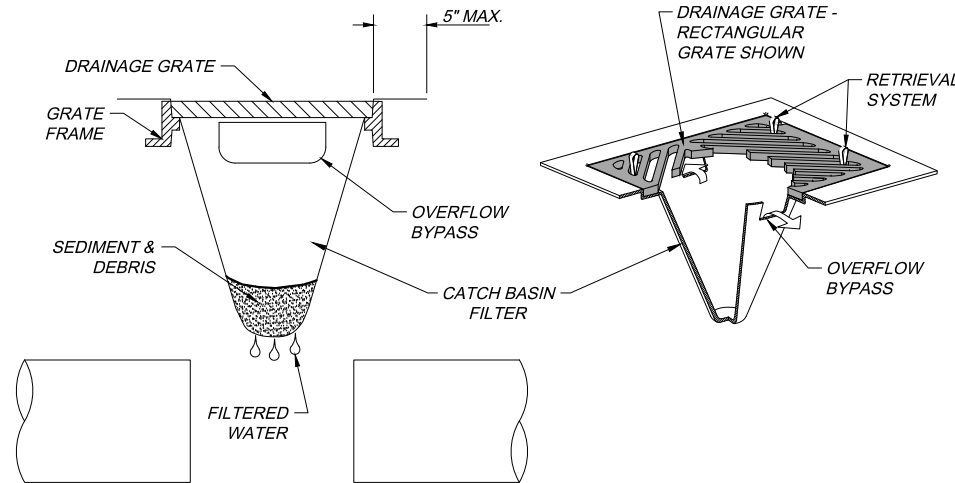
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C-7 **BMP C105: STABILIZED CONSTRUCTION ENTRANCE**
SCALE: N.T.S.



GEOTEXTILE SPECIFICATIONS	
POLYMERIC MESH AOS (ASTM D4751)	0.60 mm MAX. FOR SLIT FILM WOVEN (#30 SIEVE) 0.30 mm FOR ALL OTHER GEOTEXTILE TYPES (#50 SIEVE) 0.15 mm MIN. FOR ALL FABRIC TYPES (#100 SIEVE)
WATER PERMITTIVITY (ASTM D4491)	0.02 SEC ⁻¹
GRAB TENSILE STRENGTH (ASTM D4632)	180 LB. MIN. FOR EXTRA STRENGTH 100 LB. MIN. FOR STANDARD STRENGTH
GRAB TENSILE STRENGTH (ASTM D4632)	30% MAXIMUM
ULTRAVIOLET RESISTANCE (ASTM D4355)	70% MINIMUM

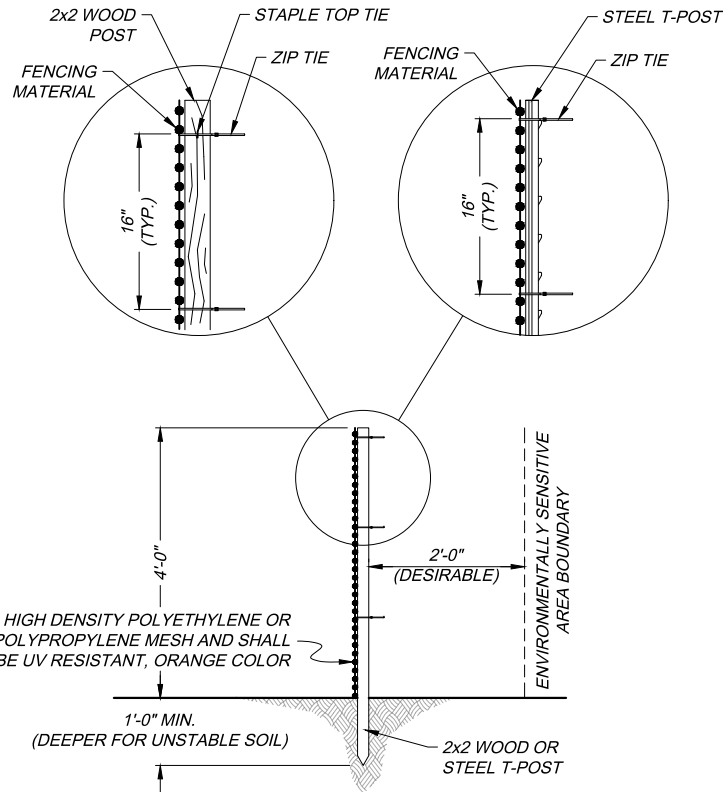
ALL GEOTEXTILE PROPERTIES LISTED ABOVE ARE MINIMUM AVERAGE ROLL VALUES

2
C-7 **BMP C233: SILT FENCE**
SCALE: N.T.S.

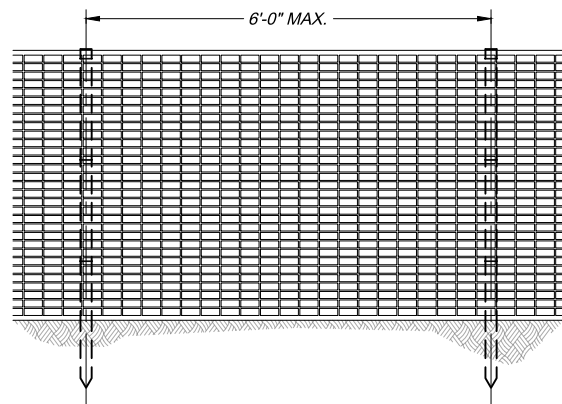


- BMP C220: INLET PROTECTION NOTES:**
1. SIZE THE CATCH BASIN FILTER (CBF) FOR THE STORM WATER STRUCTURE IT WILL SERVICE.
 2. THE CBF SHALL HAVE A BUILT-IN HIGH-FLOW RELIEF SYSTEM (OVERFLOW BYPASS).
 3. THE RETRIEVAL SYSTEM MUST ALLOW REMOVAL OF THE CBF WITHOUT SPILLING THE COLLECTED MATERIAL.
 4. PERFORM MAINTENANCE WHEN DEPTH OF ACCUMULATED SEDIMENT AND DEBRIS REACHES APPROX. 1/2 THE HEIGHT OF THE FILTER (OR LESS WHEN SO SPECIFIED BY THE MANUFACTURER).
 5. AT ALL PROPOSED CATCH BASINS, CATCH BASIN PROTECTION SHALL ABE INSTALLED IMMEDIATELY UPON CATCH BASIN INSTALLATION AND SHALL REMAIN UNTIL FINAL SITE STABILIZATION.

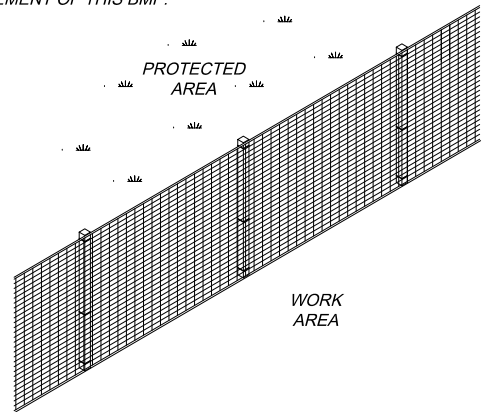
3
C-7 **BMP C220: STORM DRAIN INLET PROTECTION**
SCALE: N.T.S.



- BMP C103: HIGH VISIBILITY FENCE NOTES:**
1. FENCING COLOR SHALL BE HIGH VISIBILITY ORANGE.
 2. FENCING TENSILE STRENGTH SHALL BE 360 LB/FT (ASTM D4595).
 3. POSTS SHALL HAVE SUFFICIENT STRENGTH AND DURABILITY TO SUPPORT THE FENCE THROUGH THE LIFE OF THE PROJECT.
 4. IF APPROPRIATE, INSTALL FABRIC SILT FENCE IN ACCORDANCE WITH BMP C233 TO ACT AS HIGH VISIBILITY FENCE. EXCEPT THAT THE SILT FENCE SHALL BE AT LEAST 3 FEET HIGH AND MUST BE HIGHLY VISIBLE TO MEET THE REQUIREMENT OF THIS BMP.



4
C-7 **BMP C103: HIGH VISIBILITY FENCE**
SCALE: N.T.S.



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PROJECT: 19-CC06		4			
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C-7

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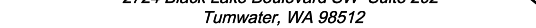
1. SITE INSPECTIONS SHALL BE CONDUCTED BY A PERSON WHO IS KNOWLEDGEABLE IN THE PRINCIPLES AND PRACTICES OF EROSION AND SEDIMENT CONTROL. FOR PROJECT SITES THAT THAT REQUIRE A CONSTRUCTION SWPPP, A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL) SHALL BE IDENTIFIED IN THE CONSTRUCTION SWPPP AND SHALL BE ON SITE OR ON CALL AT ALL TIMES.
2. APPROVAL OF THE CONSTRUCTION SWPPP DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G. SIZE AND LOCATION OF ROADS, PIPES, RESTRICTORS, CHANNELS, RETENTION/DETENTION/INFILTRATION FACILITIES, UTILITIES, ETC.).
3. THE IMPLEMENTATION OF THE CONSTRUCTION SWPPP AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE CONSTRUCTION SWPPP FACILITIES IS THE RESPONSIBILITY OF THE APPLICANT/CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION/LANDSCAPING IS ESTABLISHED.
4. THE CLEARING LIMIT BOUNDARIES SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE APPLICANT/CONTRACTOR FOR THE DURATION OF CONSTRUCTION.
5. THE CONSTRUCTION SWPPP FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT ENTER THE DRAINAGE SYSTEM, ROADWAYS, OR VIOLATE APPLICABLE STANDARDS FOR SURFACE WATER QUALITY, GROUNDWATER QUALITY, OR SEDIMENT QUALITY.
6. THE CONSTRUCTION SWPPP FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE CONSTRUCTION SWPPP FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT LEAVE THE SITE DURING THE COURSE OF CONSTRUCTION, INCLUDING CONSTRUCTION ON INDIVIDUAL LOTS.
7. THE CONSTRUCTION SWPPP FACILITIES ON ACTIVE SITES SHALL BE INSPECTED DAILY BY THE APPLICANT/CONTRACTOR. THE FACILITIES SHALL BE MAINTAINED, REPAIRED, OR AUGMENTED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTION.
8. THE CONSTRUCTION SWPPP FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AT LEAST MONTHLY AND WITHIN 48 HOURS FOLLOWING A MAJOR STORM EVENT ($\geq 1"$ RAINFALL IN 24 HOURS) BY THE APPLICANT/CONTRACTOR. THE FACILITIES SHALL BE MAINTAINED, REPAIRED, OR AUGMENTED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTION.
9. 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. AT NO TIME SHALL MORE THAN 1 FOOT OR 1/3 OF THE BMP VOLUME (WHICHEVER IS LESS) OF SEDIMENT BE ALLOWED TO ACCUMULATE WITHIN A STORM DRAIN INLET PROTECTION BMP. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEANED AS PART OF PROJECT COMPLETION AND ACCEPTANCE. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT-LADEN WATER INTO THE DOWNSYSTEM SYSTEM.
10. STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES MAY BE REQUIRED TO ENSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.
11. ROADS SHALL BE INSPECTED DAILY AND CLEANED THOROUGHLY AS NEEDED TO PROTECT DOWNSTREAM WATER RESOURCES OR STORMWATER INFRASTRUCTURE. SEDIMENT SHALL BE REMOVED FROM ROADS BY SHOVELING OR PICKUP SWEEPING AND SHALL BE TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA.
12. 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. SOILS SHALL BE STABILIZED AT THE END OF THE SHIFT BEFORE A HOLIDAY OR WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. LINEAR CONSTRUCTION ACTIVITIES, SUCH AS RIGHT-OF-WAY AND EASEMENT CLEARING, ROADWAY DEVELOPMENT, PIPELINES, AND TRENCHING FOR UTILITIES, SHALL COMPLY WITH THESE REQUIREMENTS. THESE STABILIZATION REQUIREMENTS APPLY TO ALL SOILS ON SITE, WHETHER AT FINAL GRADE OR NOT. THE CITY OF LACEY MAY DECREASE THESE TIME LIMITS IF IT CAN BE SHOWN THAT A DEVELOPMENT SITE'S EROSION OR RUNOFF POTENTIAL JUSTIFIES A DIFFERENT STANDARD.
13. CONTACT THE CITY FOR APPROVAL PRIOR TO ALL CLEARING, GRADING, AND OTHER SOIL-DISTURBING ACTIVITIES THAT OCCUR BETWEEN OCTOBER 1 AND APRIL 30. SUCH WORK SHALL ONLY BE PERMITTED IF SHOWN TO THE SATISFACTION OF THE CITY THAT THE TRANSPORT OF SEDIMENT FROM THE CONSTRUCTION SITE TO RECEIVING WATERS WILL BE PREVENTED. THE CITY MAY REQUIRE SUPPLEMENTAL SWPPP DOCUMENTATION FOR WET SEASON WORK.
14. SOIL STOCKPILES MUST BE STABILIZED AND PROTECTED FROM EROSION.
15. HANDLE AND DISPOSE OF ALL POLLUTANTS, INCLUDING WASTE MATERIALS AND DEMOLITION DEBRIS THAT OCCUR ON SITE IN A MANNER THAT DOES NOT CAUSE CONTAMINATION OF STORMWATER. WOODY DEBRIS MAY BE CHOPPED AND SPREAD ON SITE.
16. USE SPILL PREVENTION MEASURES, SUCH AS DRIP PANS, WHEN CONDUCTING MAINTENANCE AND REPAIR OF VEHICLES AND EQUIPMENT.
17. REPORT SPILLS MONDAY THROUGH FRIDAY, 7:00 A.M. TO 3:30 P.M. (360) 491-5644. AFTER HOURS, YOU CAN LEAVE A VOICEMAIL AT THE NUMBER ABOVE, OR SELECT THE OPTION TO BE CONNECTED TO THURSTON COUNTY CENTRAL DISPATCH, WHO WILL NOTIFY THE CITY'S STAND-BY SPILL RESPONSE STAFF.

1. SEED MIXTURE AND APPLICATION RATE SHALL BE:

(DESIGNER SHALL INSERT APPROPRIATE SEED MIX TABLE FROM SDM CHAPTER 5).
2. WHEN APPLIED WITH HYDROMULCH, APPLY IN TWO PHASES:
 - a. PHASE 1 – INSTALL ALL SEED AND FERTILIZER WITH 25 TO 30 PERCENT MULCH AND TACKIFIER ONTO SOIL IN THE FIRST LIFT.
 - b. PHASE 2 – INSTALL THE REST OF THE MULCH AND TACKIFIER IN THE SECOND LIFT.
3. IF FEASIBLE, SEED BETWEEN APRIL 1 AND JUNE 30 OR BETWEEN SEPTEMBER 1 AND OCTOBER 1.
4. SEED BEDS PLANTED BETWEEN JULY 1 AND AUGUST 30 SHALL BE IRRIGATED UNTIL 75 PERCENT GRASS COVER IS ESTABLISHED.
5. SEED BEDS PLANTED BETWEEN OCTOBER 1 AND MARCH 30 SHALL BE MULCHED WITH STRAW OR AN EROSION CONTROL BLANKET UNTIL 75 PERCENT GRASS COVER IS ESTABLISHED.
6. CONFIRM THE INSTALLATION OF ALL REQUIRED SURFACE WATER CONTROL MEASURES PRIOR TO SEEDING.
7. SEED BEDS SHALL BE FIRM AND ROUGH PRIOR TO SEEDING. WHERE COMPACTION IS REQUIRED FOR ENGINEERING PURPOSES, SLOPES SHALL BE TRACK WALKED BEFORE SEEDING.
8. BACKBLADING OR SMOOTHING IS PROHIBITED ON SEED BEDS STEEPER THAN 4:1.
9. IT IS RECOMMENDED THAT AREAS BEING SEEDED FOR FINAL LANDSCAPING CONDUCT SOIL TESTS TO DETERMINE THE EXACT TYPE AND QUANTITY OF FERTILIZER NEEDED. MINIMIZE USE OF FERTILIZER ADJACENT TO WATER BODIES AND WETLANDS.

1. PROTECT THE RECEIVING CHANNEL AT THE OUTLET OF A CULVERT FROM EROSION BY ROCK LINING A MINIMUM OF 6 FEET DOWNSTREAM AND EXTENDING UP THE CHANNEL SIDES A MINIMUM OF 1 FOOT ABOVE THE MAXIMUM TAILWATER ELEVATION OR 1 FOOT ABOVE THE CROWN, WHICHEVER IS HIGHER. FOR LARGE PIPES (MORE THAN 18 INCHES IN DIAMETER), OUTLET PROTECTION LINING OF THE CHANNEL SHALL BE FOUR TIMES THE DIAMETER OF THE PIPE.
2. WHERE DISCHARGE VELOCITY AT THE OUTLET IS LESS THAN 5 FEET PER SECOND (PIPE SLOPE TYPICALLY LESS THAN 10 PERCENT), USE 2- TO 8-INCH RIPRAP. MINIMUM THICKNESS IS 1 FOOT.
3. AT THE BASE OF SLOPES STEEPER THAN 10 AN ENGINEERED ENERGY DISSIPATER SHALL BE USED.
4. PLACE FILTER FABRIC OR EROSION CONTROL BLANKETS UNDER RIPRAP TO PREVENT SCOUR AND CHANNEL EROSION.
5. BANK STABILIZATION, BIOENGINEERING, AND HABITAT FEATURES MAY BE REQUIRED FOR DISTURBED AREAS.
6. ADD ROCK AS NEEDED TO MAINTAIN THE INTENDED FUNCTION.
7. REMOVE ANY ACCUMULATED SEDIMENT FROM THE ENERGY DISSIPATER.

FILE: C-8.dwg		5		
PROJECT: 19-CC06		4		
		3		
CHECKED BY: CJM		2		
DETAILED BY: CJM		1		
DESIGNED BY: CJM	DATE	NO.	REVISION	BY

The logo for Vector Engineering Inc. features the word "Vector" in a large, bold, sans-serif font. A thick, dark diagonal line crosses through the letter "V" from the top-left to the bottom-right. Below "Vector", the words "ENGINEERING INC." are written in a smaller, all-caps, sans-serif font, separated by wide spaces. A thin horizontal line runs across the page, passing behind the word "Vector". Below this line, the company's address "2724 Black Lake Boulevard SW Suite 202" and "Tumwater, WA 98512" are listed. At the bottom, the contact information "ph: (360) 352-2477 fax: (360) 352-0179 E-mail: admin@vectorengineeringinc.com" is provided. The entire logo and contact information are enclosed within a rectangular border.

COMBINED CONSTRUCTION SITE RE-DEVELOPMENT 3701 SOUTH ROAD MUKILTEO, WA 98275	C-8 ---
	SHT 8 OF 8

Appendix B

Project Calculations

WWHM2012
PROJECT REPORT

General Model Information

Project Name: WWHM
Site Name: Combined Construction
Site Address: 3701 South Road
City: Mukilteo
Report Date: 6/17/2020
Gage: Courthouse
Data Start: 1955/10/01
Data End: 2011/09/30
Timestep: Hourly
Precip Scale: 0.900
Version Date: 2018/10/10
Version: 4.2.16

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
A B, Forest, Flat 1.71

Pervious Total 1.71

Impervious Land Use acre

Impervious Total 0

Basin Total 1.71

Element Flows To:
Surface Interflow Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A B, Lawn, Flat	0.089
Pervious Total	0.089
Impervious Land Use	acre
ROOF TOPS FLAT	0.614
DRIVEWAYS FLAT	0.045
SIDEWALKS FLAT	0.026
PARKING FLAT	0.936
Impervious Total	1.621
Basin Total	1.71

Element Flows To:		
Surface	Interflow	Groundwater
Tank 1	Tank 1	

Routing Elements

Predeveloped Routing

Mitigated Routing

Tank 1

Dimensions
Depth: 3 ft.
Tank Type: Circular
Diameter: 3 ft.
Length: 30054.3835516437 ft.
Discharge Structure
Riser Height: 2 ft.
Riser Diameter: 18 in.
Notch Type: Rectangular
Notch Width: 0.010 ft.
Notch Height: 0.110 ft.
Orifice 1 Diameter: 0.079 in. Elevation: 0 ft.
Element Flows To:
Outlet 1 Outlet 2

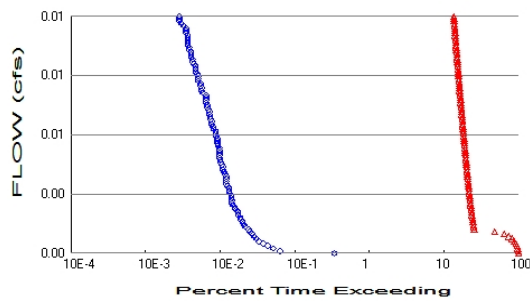
Tank Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.000	0.000	0.000	0.000
0.0333	0.433	0.009	0.000	0.000
0.0667	0.610	0.027	0.000	0.000
0.1000	0.743	0.049	0.000	0.000
0.1333	0.853	0.076	0.000	0.000
0.1667	0.948	0.106	0.000	0.000
0.2000	1.032	0.139	0.000	0.000
0.2333	1.108	0.175	0.000	0.000
0.2667	1.178	0.213	0.000	0.000
0.3000	1.241	0.253	0.000	0.000
0.3333	1.301	0.296	0.000	0.000
0.3667	1.355	0.340	0.000	0.000
0.4000	1.407	0.386	0.000	0.000
0.4333	1.455	0.434	0.000	0.000
0.4667	1.500	0.483	0.000	0.000
0.5000	1.542	0.534	0.000	0.000
0.5333	1.582	0.586	0.000	0.000
0.5667	1.620	0.639	0.000	0.000
0.6000	1.655	0.694	0.000	0.000
0.6333	1.689	0.750	0.000	0.000
0.6667	1.721	0.807	0.000	0.000
0.7000	1.750	0.864	0.000	0.000
0.7333	1.779	0.923	0.000	0.000
0.7667	1.805	0.983	0.000	0.000
0.8000	1.830	1.044	0.000	0.000
0.8333	1.854	1.105	0.000	0.000
0.8667	1.876	1.167	0.000	0.000
0.9000	1.897	1.230	0.000	0.000
0.9333	1.916	1.294	0.000	0.000
0.9667	1.934	1.358	0.000	0.000
1.0000	1.951	1.423	0.000	0.000
1.0333	1.967	1.488	0.000	0.000
1.0667	1.981	1.554	0.000	0.000
1.1000	1.994	1.620	0.000	0.000
1.1333	2.007	1.687	0.000	0.000

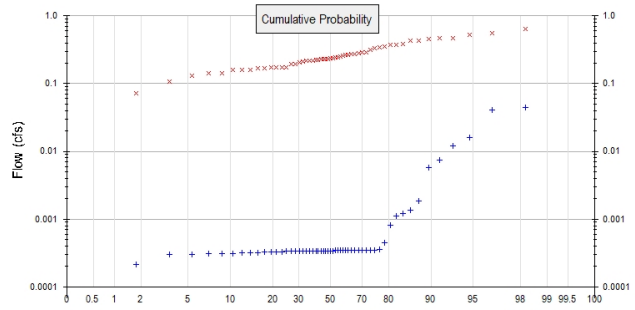
1.1667	2.018	1.754	0.000	0.000
1.2000	2.028	1.821	0.000	0.000
1.2333	2.036	1.889	0.000	0.000
1.2667	2.044	1.957	0.000	0.000
1.3000	2.051	2.025	0.000	0.000
1.3333	2.057	2.094	0.000	0.000
1.3667	2.061	2.162	0.000	0.000
1.4000	2.065	2.231	0.000	0.000
1.4333	2.067	2.300	0.000	0.000
1.4667	2.069	2.369	0.000	0.000
1.5000	2.069	2.438	0.000	0.000
1.5333	2.069	2.507	0.000	0.000
1.5667	2.067	2.576	0.000	0.000
1.6000	2.065	2.645	0.000	0.000
1.6333	2.061	2.714	0.000	0.000
1.6667	2.057	2.782	0.000	0.000
1.7000	2.051	2.851	0.000	0.000
1.7333	2.044	2.919	0.000	0.000
1.7667	2.036	2.987	0.000	0.000
1.8000	2.028	3.055	0.000	0.000
1.8333	2.018	3.122	0.000	0.000
1.8667	2.007	3.189	0.000	0.000
1.9000	1.994	3.256	0.000	0.000
1.9333	1.981	3.322	0.000	0.000
1.9667	1.967	3.388	0.000	0.000
2.0000	1.951	3.453	0.001	0.000
2.0333	1.934	3.518	0.098	0.000
2.0667	1.916	3.582	0.275	0.000
2.1000	1.897	3.646	0.503	0.000
2.1333	1.876	3.709	0.772	0.000
2.1667	1.854	3.771	1.075	0.000
2.2000	1.830	3.832	1.405	0.000
2.2333	1.805	3.893	1.757	0.000
2.2667	1.779	3.953	2.125	0.000
2.3000	1.750	4.012	2.502	0.000
2.3333	1.721	4.070	2.884	0.000
2.3667	1.689	4.126	3.262	0.000
2.4000	1.655	4.182	3.633	0.000
2.4333	1.620	4.237	3.990	0.000
2.4667	1.582	4.290	4.327	0.000
2.5000	1.542	4.342	4.640	0.000
2.5333	1.500	4.393	4.925	0.000
2.5667	1.455	4.442	5.180	0.000
2.6000	1.407	4.490	5.402	0.000
2.6333	1.355	4.536	5.593	0.000
2.6667	1.301	4.580	5.756	0.000
2.7000	1.241	4.623	5.894	0.000
2.7333	1.178	4.663	6.015	0.000
2.7667	1.108	4.701	6.206	0.000
2.8000	1.032	4.737	6.340	0.000
2.8333	0.948	4.770	6.470	0.000
2.8667	0.853	4.800	6.598	0.000
2.9000	0.743	4.827	6.724	0.000
2.9333	0.610	4.849	6.847	0.000
2.9667	0.433	4.867	6.969	0.000
3.0000	0.000	4.877	7.088	0.000
3.0333	0.000	0.000	7.205	0.000

Analysis Results

POC 1



+ Predeveloped x Mitigated



Predeveloped Landuse Totals for POC #1

Total Pervious Area: 1.71
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1

Total Pervious Area: 0.089
Total Impervious Area: 1.621

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.000472
5 year	0.001494
10 year	0.003017
25 year	0.006917
50 year	0.012365
100 year	0.021504

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.245017
5 year	0.35367
10 year	0.423138
25 year	0.507599
50 year	0.568091
100 year	0.626574

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1956	0.002	0.172
1957	0.000	0.461
1958	0.000	0.141
1959	0.000	0.240
1960	0.000	0.338
1961	0.000	0.194
1962	0.000	0.142
1963	0.000	0.426
1964	0.000	0.216
1965	0.000	0.238

1966	0.000	0.160
1967	0.000	0.289
1968	0.000	0.232
1969	0.000	0.132
1970	0.000	0.214
1971	0.000	0.262
1972	0.016	0.330
1973	0.000	0.218
1974	0.000	0.174
1975	0.000	0.174
1976	0.000	0.244
1977	0.000	0.108
1978	0.000	0.251
1979	0.000	0.242
1980	0.000	0.233
1981	0.000	0.273
1982	0.000	0.285
1983	0.000	0.381
1984	0.000	0.232
1985	0.000	0.174
1986	0.000	0.371
1987	0.001	0.350
1988	0.000	0.205
1989	0.000	0.196
1990	0.000	0.452
1991	0.045	0.548
1992	0.000	0.221
1993	0.000	0.166
1994	0.000	0.159
1995	0.000	0.426
1996	0.041	0.276
1997	0.000	0.071
1998	0.000	0.063
1999	0.001	0.266
2000	0.000	0.222
2001	0.000	0.158
2002	0.006	0.466
2003	0.000	0.230
2004	0.007	0.637
2005	0.000	0.220
2006	0.001	0.281
2007	0.012	0.368
2008	0.000	0.517
2009	0.000	0.315
2010	0.000	0.169
2011	0.001	0.259

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0449	0.6375
2	0.0408	0.5484
3	0.0162	0.5169
4	0.0120	0.4655
5	0.0075	0.4613
6	0.0058	0.4524
7	0.0019	0.4260
8	0.0013	0.4257

9	0.0012	0.3813
10	0.0011	0.3706
11	0.0008	0.3678
12	0.0005	0.3497
13	0.0004	0.3379
14	0.0003	0.3299
15	0.0003	0.3149
16	0.0003	0.2887
17	0.0003	0.2851
18	0.0003	0.2810
19	0.0003	0.2761
20	0.0003	0.2733
21	0.0003	0.2664
22	0.0003	0.2624
23	0.0003	0.2589
24	0.0003	0.2508
25	0.0003	0.2441
26	0.0003	0.2420
27	0.0003	0.2398
28	0.0003	0.2378
29	0.0003	0.2327
30	0.0003	0.2323
31	0.0003	0.2319
32	0.0003	0.2296
33	0.0003	0.2222
34	0.0003	0.2206
35	0.0003	0.2204
36	0.0003	0.2177
37	0.0003	0.2162
38	0.0003	0.2139
39	0.0003	0.2047
40	0.0003	0.1961
41	0.0003	0.1938
42	0.0003	0.1742
43	0.0003	0.1742
44	0.0003	0.1741
45	0.0003	0.1716
46	0.0003	0.1693
47	0.0003	0.1664
48	0.0003	0.1596
49	0.0003	0.1588
50	0.0003	0.1584
51	0.0003	0.1418
52	0.0003	0.1411
53	0.0003	0.1321
54	0.0003	0.1079
55	0.0002	0.0713
56	0.0002	0.0631

Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0002	1661	488982	29439	Fail
0.0004	315	486871	154562	Fail
0.0005	254	480096	189014	Fail
0.0006	213	468511	219958	Fail
0.0007	184	450986	245101	Fail
0.0008	160	427423	267139	Fail
0.0010	151	397380	263165	Fail
0.0011	140	363950	259964	Fail
0.0012	130	314910	242238	Fail
0.0013	124	234157	188836	Fail
0.0015	118	124884	105833	Fail
0.0016	106	122969	116008	Fail
0.0017	103	121546	118005	Fail
0.0018	98	120220	122673	Fail
0.0020	93	118944	127896	Fail
0.0021	91	117766	129413	Fail
0.0022	85	116539	137104	Fail
0.0023	85	115459	135834	Fail
0.0024	81	114330	141148	Fail
0.0026	77	113299	147141	Fail
0.0027	73	112268	153791	Fail
0.0028	70	111286	158980	Fail
0.0029	70	110304	157577	Fail
0.0031	69	109372	158510	Fail
0.0032	69	108488	157228	Fail
0.0033	66	107604	163036	Fail
0.0034	65	106672	164110	Fail
0.0035	65	105886	162901	Fail
0.0037	61	105052	172216	Fail
0.0038	60	104217	173695	Fail
0.0039	59	103383	175225	Fail
0.0040	59	102646	173976	Fail
0.0042	59	101861	172645	Fail
0.0043	57	101075	177324	Fail
0.0044	55	100339	182434	Fail
0.0045	53	99603	187930	Fail
0.0046	53	98916	186633	Fail
0.0048	52	98179	188805	Fail
0.0049	50	97492	194984	Fail
0.0050	49	96707	197361	Fail
0.0051	48	96068	200141	Fail
0.0053	48	95430	198812	Fail
0.0054	48	94792	197483	Fail
0.0055	48	94105	196052	Fail
0.0056	48	93467	194722	Fail
0.0057	46	92878	201908	Fail
0.0059	45	92239	204975	Fail
0.0060	45	91601	203557	Fail
0.0061	45	90914	202031	Fail
0.0062	44	90325	205284	Fail
0.0064	43	89736	208688	Fail
0.0065	43	89147	207318	Fail
0.0066	40	88558	221395	Fail
0.0067	39	88018	225687	Fail

0.0069	38	87429	230076	Fail
0.0070	38	86889	228655	Fail
0.0071	37	86349	233375	Fail
0.0072	36	85809	238358	Fail
0.0073	35	85220	243485	Fail
0.0075	35	84680	241942	Fail
0.0076	34	84140	247470	Fail
0.0077	33	83600	253333	Fail
0.0078	33	83060	251696	Fail
0.0080	32	82520	257875	Fail
0.0081	32	81980	256187	Fail
0.0082	32	81489	254653	Fail
0.0083	32	80998	253118	Fail
0.0084	29	80458	277441	Fail
0.0086	28	79967	285596	Fail
0.0087	28	79476	283842	Fail
0.0088	27	78985	292537	Fail
0.0089	27	78494	290718	Fail
0.0091	25	78003	312012	Fail
0.0092	25	77562	310248	Fail
0.0093	25	77120	308480	Fail
0.0094	24	76629	319287	Fail
0.0095	23	76187	331247	Fail
0.0097	23	75745	329326	Fail
0.0098	23	75254	327191	Fail
0.0099	22	74813	340059	Fail
0.0100	21	74371	354147	Fail
0.0102	21	73978	352276	Fail
0.0103	20	73487	367435	Fail
0.0104	20	73045	365225	Fail
0.0105	20	72653	363265	Fail
0.0106	19	72162	379800	Fail
0.0108	19	71769	377731	Fail
0.0109	18	71327	396261	Fail
0.0110	18	70934	394077	Fail
0.0111	18	70542	391900	Fail
0.0113	18	70051	389172	Fail
0.0114	18	69658	386988	Fail
0.0115	17	69265	407441	Fail
0.0116	17	68873	405135	Fail
0.0118	17	68431	402535	Fail
0.0119	16	68038	425237	Fail
0.0120	15	67744	451626	Fail
0.0121	14	67302	480728	Fail
0.0122	14	66860	477571	Fail
0.0124	14	66467	474764	Fail

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.

The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume: 0.2076 acre-feet

On-line facility target flow: 0.1512 cfs.

Adjusted for 15 min: 0.1709 cfs.

Off-line facility target flow: 0.078 cfs.

Adjusted for 15 min: 0.0882 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
Tank 1 POC	☐	259.85			☐	0.00			
Total Volume Infiltrated		259.85	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



Basin 1
1.71ac

Mitigated Schematic



Emergency Overflow Orifice Calculation

$$Q = CA \sqrt{2gh} \rightarrow h = \text{hydraulic head} = 3.78 D^2 H^{.5}$$

$g = \text{gravity } (32.2 \text{ ft/s}^2)$
 $A = \text{area of orifice}$
 $C = \text{discharge coefficient}$

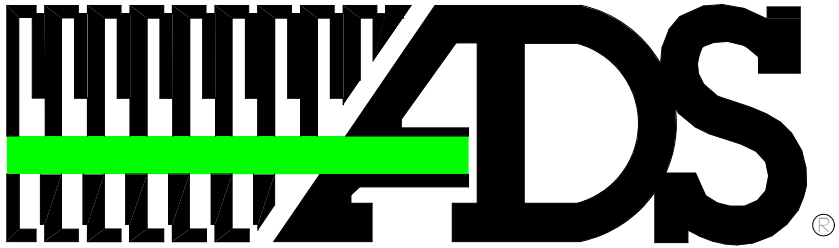
$$Q = 3.78 D^2 H^{.5} \Rightarrow Q = 3.78 D^2 (2.67)^{.5}$$

$$\begin{aligned} 2 \text{ year} &= .245 = 3.78 D^2 (1.634) \Rightarrow D = 0.199' = 2.4" \phi \\ 100 \text{ year} &= .627 = 3.78 D^2 (1.634) \Rightarrow D = .319' \text{ or } 3.8" \phi \text{ min} \\ &\text{Confirms } 4" \phi \text{ Pipe okay } \uparrow \end{aligned}$$

Appendix C

Project Details

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	



ADVANCED DRAINAGE SYSTEMS, INC.

COMBINED CONSTRUCTION

MUKILTEO, WA

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MC-4500 STORMTECH CHAMBER SPECIFICATIONS

- CHAMBERS SHALL BE STORMTECH MC-4500.
- CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101.
- CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
- THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
- CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
- 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 3".
 - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. 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.
- ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
 - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
 - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
 - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
- CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-4500 CHAMBER SYSTEM

- STORMTECH MC-4500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
- STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
- CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
 - STONESHOOTER LOCATED OFF THE CHAMBER BED.
 - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
 - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
- THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
- JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
- MAINTAIN MINIMUM 9" (230 mm) SPACING BETWEEN THE CHAMBER ROWS.
- INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 12" (300 mm) INTO CHAMBER END CAPS.
- EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
- STONE SHALL BE BROUGHT UP EVENLY AROUND CHAMBERS SO AS NOT TO DISTORT THE CHAMBER SHAPE. STONE DEPTHS SHOULD NEVER DIFFER BY MORE THAN 12" (300 mm) BETWEEN ADJACENT CHAMBER ROWS.
- STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
- THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIAL BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
- ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

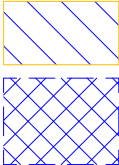
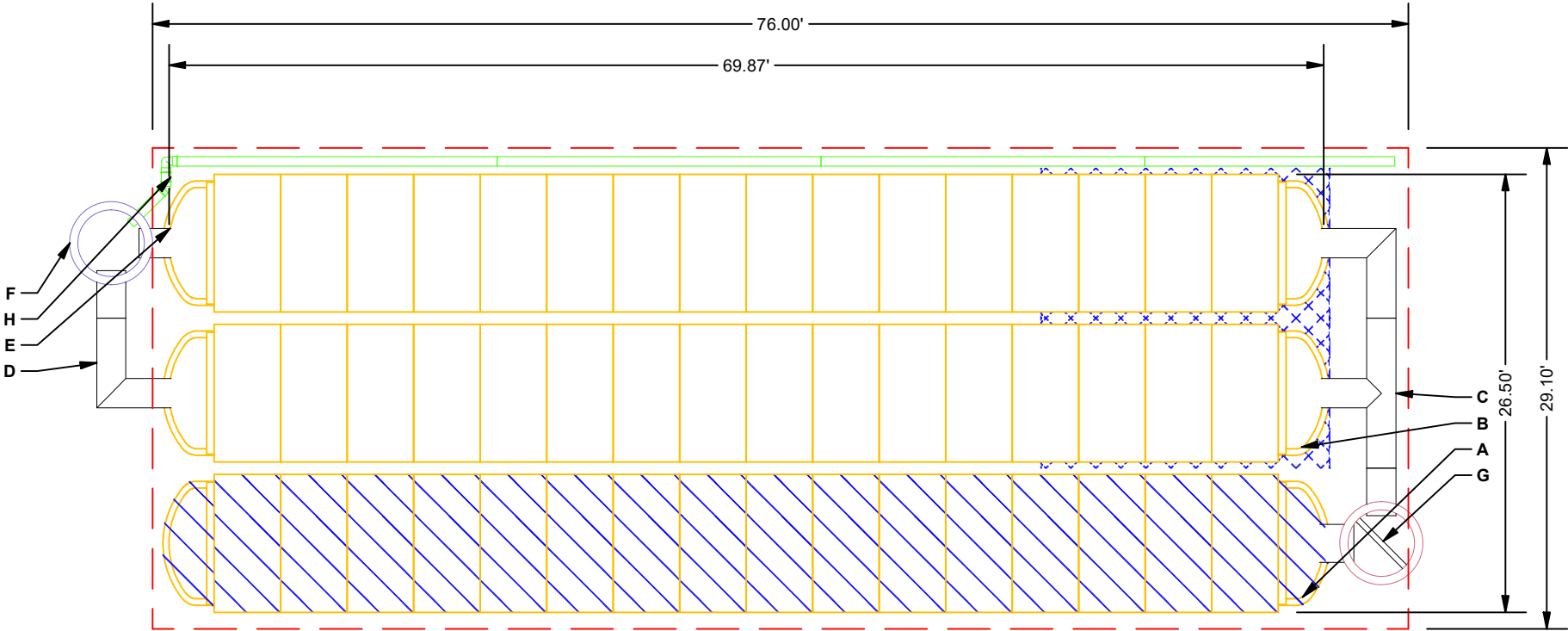
NOTES FOR CONSTRUCTION EQUIPMENT

- STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
- THE USE OF EQUIPMENT OVER MC-4500 CHAMBERS IS LIMITED:
 - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
 - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
 - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
- FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT		PROPOSED ELEVATIONS		*INVERT ABOVE BASE OF CHAMBER				
				PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
48	STORMTECH MC-4500 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	555.92	PREFABRICATED END CAP	A	24" BOTTOM PARTIAL CUT END CAP/TYP OF ALL 24" BOTTOM CONNECTIONS AND ISOLATOR ROWS	2.26"	
6	STORMTECH MC-4500 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	551.42	PREFABRICATED END CAP	B	18" BOTTOM PARTIAL CUT END CAP/TYP OF ALL 18" BOTTOM CONNECTIONS	1.97"	
12	STONE ABOVE (in)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	550.92	MANIFOLD	C	18" x 18" BOTTOM MANIFOLD, ADS N-12	1.97"	
9	STONE BELOW (in)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	550.92	MANIFOLD	D	18" x 18" BOTTOM MANIFOLD, ADS N-12	1.97"	
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	550.92	PIPE CONNECTION	E	18" BOTTOM CONNECTION	1.97"	
9181	INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	549.92	CONCRETE STRUCTURE	F	OCS (DESIGN BY ENGINEER / PROVIDED BY OTHERS)		8.0 CFS OUT
		TOP OF MC-4500 CHAMBER:	548.92	CONCRETE STRUCTURE	G	(DESIGN BY ENGINEER / PROVIDED BY OTHERS)		11.0 CFS IN
		24" ISOLATOR ROW INVERT:	544.11	W/WEIR				
		18" x 18" BOTTOM MANIFOLD INVERT:	544.08	UNDERDRAIN	H	6" ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		
2212	SYSTEM AREA (SF)	18" x 18" BOTTOM MANIFOLD INVERT:	544.08					
210.2	SYSTEM PERIMETER (ft)	18" BOTTOM CONNECTION INVERT:	544.08					
		BOTTOM OF MC-4500 CHAMBER:	543.92					
		UNDERDRAIN INVERT:	543.17					
		BOTTOM OF STONE:	543.17					



--- 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.

COMBINED CONSTRUCTION

MUKILTEO, WA

DRAWN: CM

CHECKED: N/A

DESCRIPTION

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DRW

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ADVANCED DRAINAGE SYSTEMS, INC.

10' 20'

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SHEET

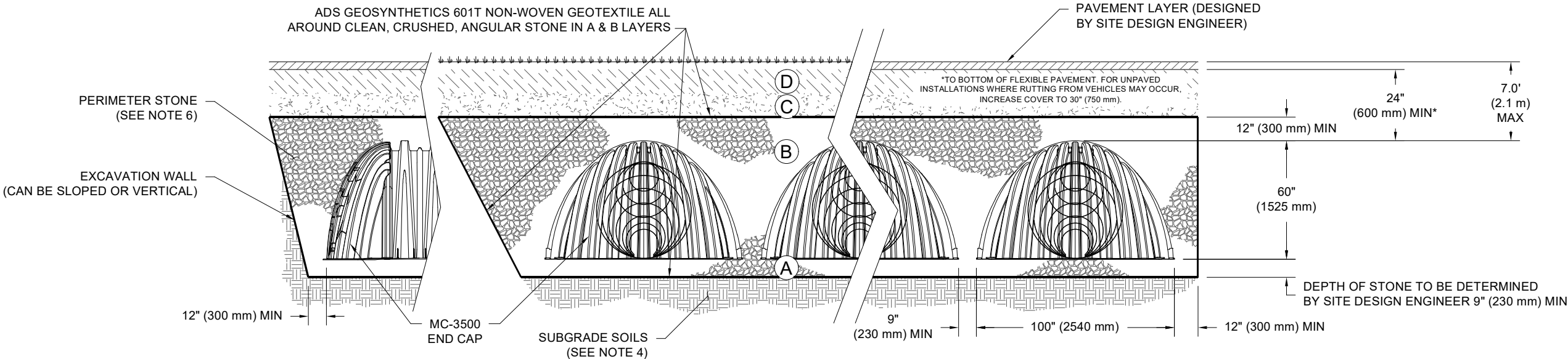
2 OF 5

ACCEPTABLE FILL MATERIALS: STORMTECH MC-4500 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 24" (600 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 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
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, 4	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, 4	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 9" (230 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 F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101
2. MC-4500 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 3".
 - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. 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.

COMBINED CONSTRUCTION

MUKILTEO, WA

DATE:

PROJECT #:

DRAWN: CM

CHECKED: N/A

DESCRIPTION

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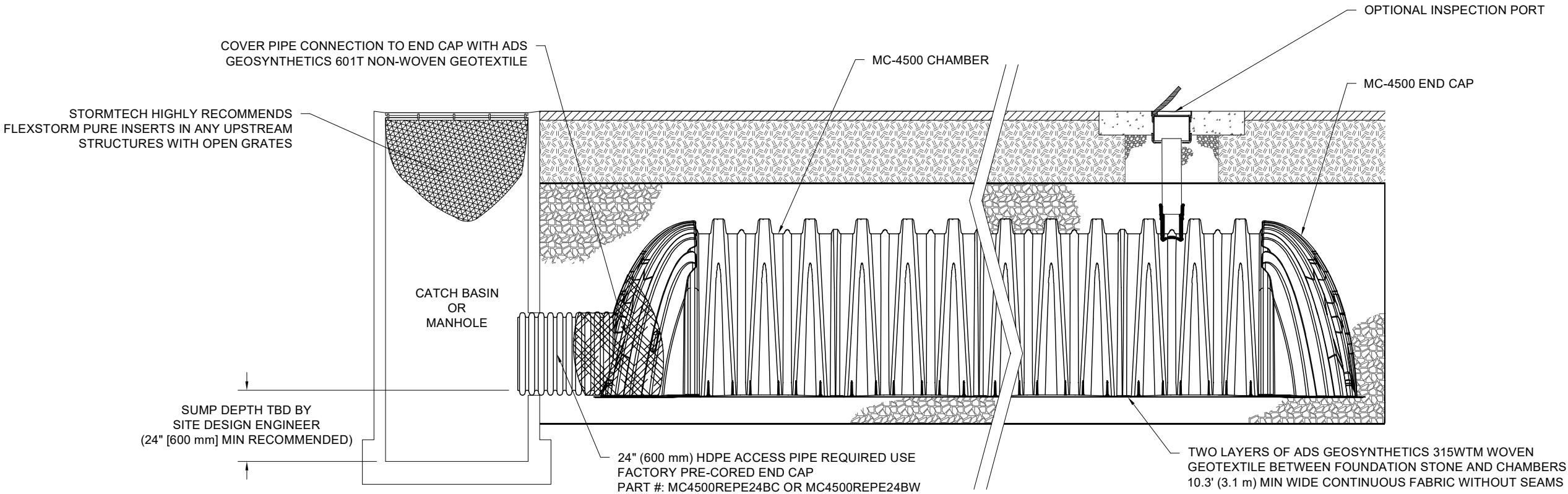
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MC-4500 ISOLATOR ROW DETAIL
NTS

INSPECTION & MAINTENANCE

- STEP 1) INSPECT ISOLATOR ROW 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 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 ROWS
 - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
 - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW 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 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

- 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.
- CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

COMBINED CONSTRUCTION		DESCRIPTION		CHK	DRW	REV
MUKILTEO, WA						
DATE:		PROJECT #:				
DRAWN: CM		CHECKED: N/A				



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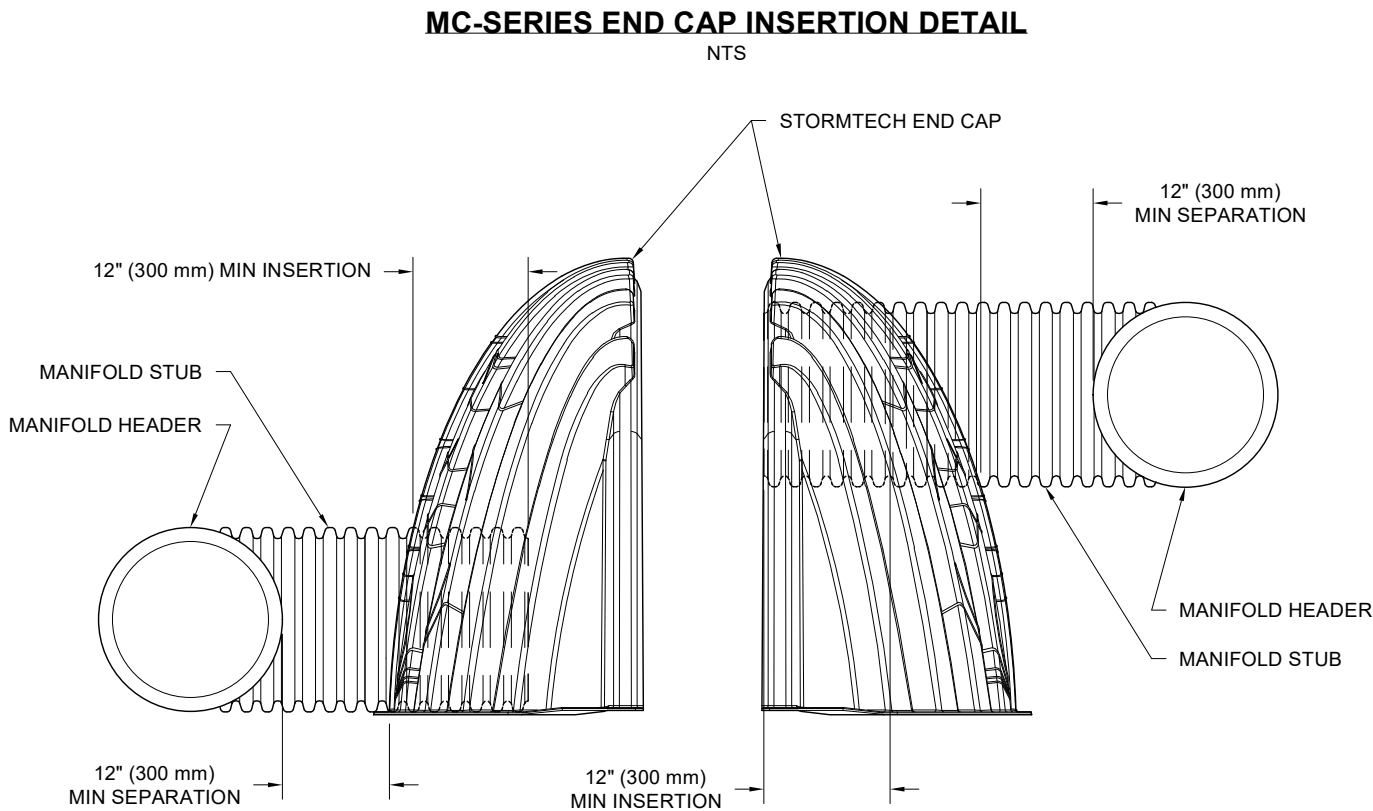
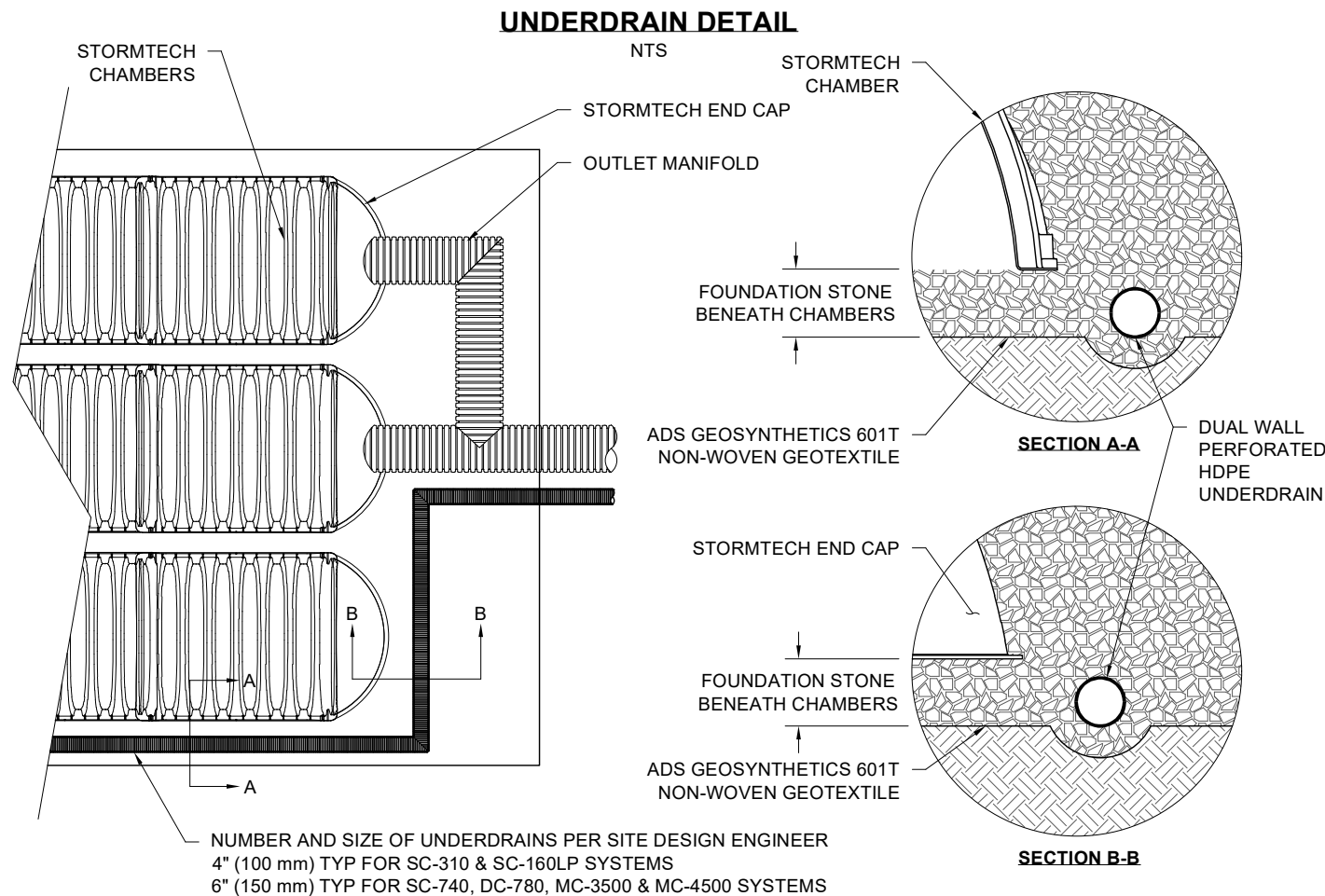


ADS
ADVANCED DRAINAGE SYSTEMS, INC.

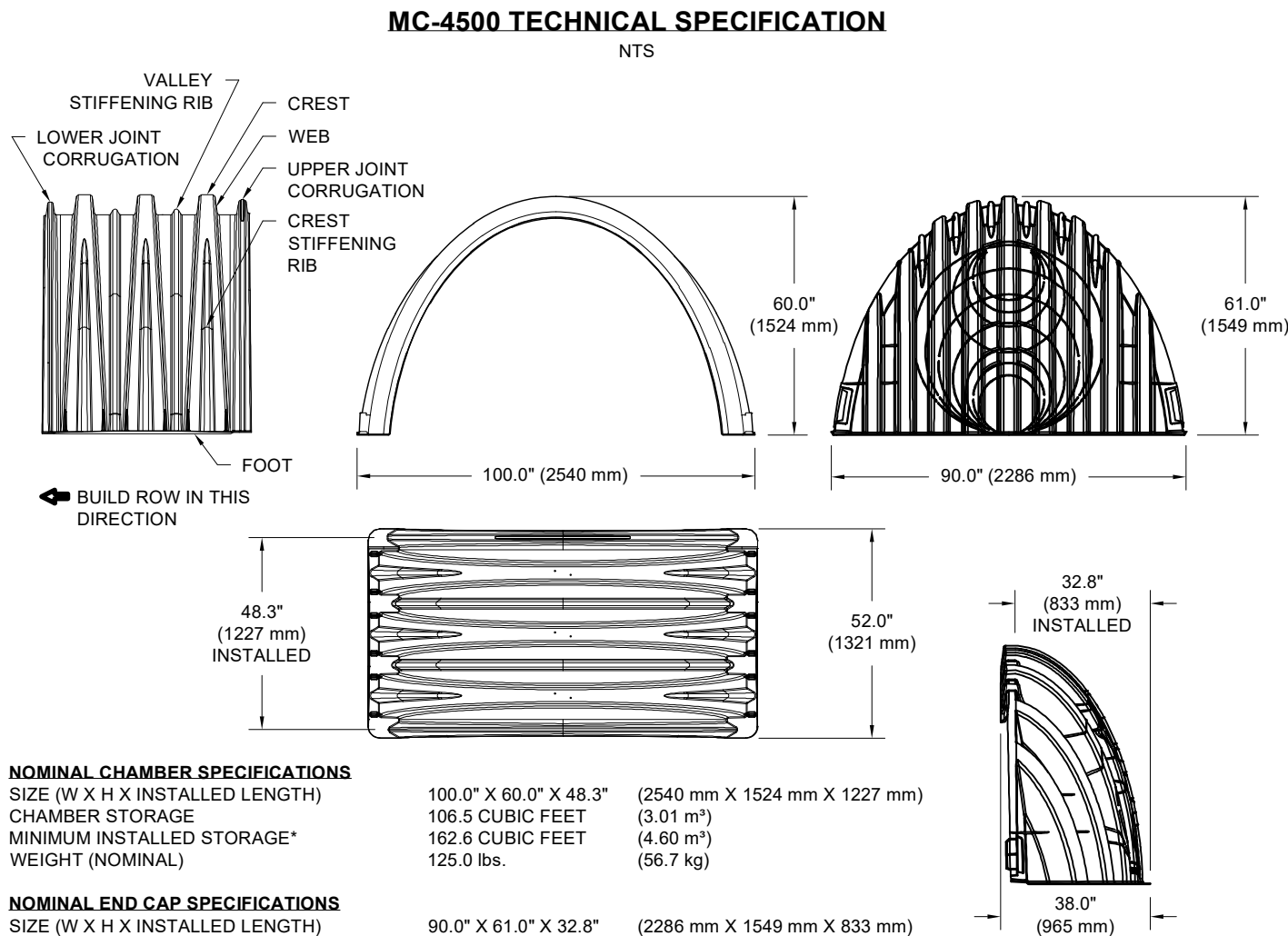
4840 TRUEMAN BLVD
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1-800-733-7473

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SHEET
4 OF 5



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 48.3"	(2540 mm X 1524 mm X 1227 mm)
CHAMBER STORAGE	106.5 CUBIC FEET	(3.01 m ³)
MINIMUM INSTALLED STORAGE*	162.6 CUBIC FEET	(4.60 m ³)
WEIGHT (NOMINAL)	125.0 lbs.	(56.7 kg)

NOMINAL END CAP SPECIFICATIONS

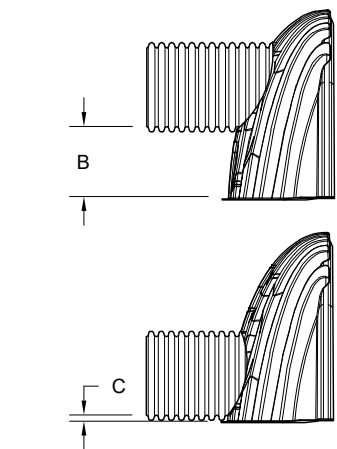
SIZE (W X H X INSTALLED LENGTH)	90.0" X 61.0" X 32.8"	(2286 mm X 1549 mm X 833 mm)
END CAP STORAGE	39.5 CUBIC FEET	(1.12 m ³)
MINIMUM INSTALLED STORAGE*	115.3 CUBIC FEET	(3.26 m ³)
WEIGHT (NOMINAL)	90 lbs.	(40.8 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC4500IEPP06T	6" (150 mm)	42.54" (1081 mm)	---
MC4500IEPP06B		---	0.86" (22 mm)
MC4500IEPP08T	8" (200 mm)	40.50" (1029 mm)	---
MC4500IEPP08B		---	1.01" (26 mm)
MC4500IEPP10T	10" (250 mm)	38.37" (975 mm)	---
MC4500IEPP10B		---	1.33" (34 mm)
MC4500IEPP12T	12" (300 mm)	35.69" (907 mm)	---
MC4500IEPP12B		---	1.55" (39 mm)
MC4500IEPP15T	15" (375 mm)	32.72" (831 mm)	---
MC4500IEPP15B		---	1.70" (43 mm)
MC4500IEPP18T	18" (450 mm)	29.36" (746 mm)	---
MC4500IEPP18TW		---	1.97" (50 mm)
MC4500IEPP18B		---	---
MC4500IEPP18BW	24" (600 mm)	23.05" (585 mm)	---
MC4500IEPP24T		---	2.26" (57 mm)
MC4500IEPP24TW		---	---
MC4500IEPP24B	30" (750 mm)	---	2.95" (75 mm)
MC4500IEPP24BW		---	3.25" (83 mm)
MC4500IEPP30BW		---	3.55" (90 mm)
MC4500IEPP36BW	36" (900 mm)	---	---
MC4500IEPP42BW	42" (1050 mm)	---	---

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PARTIAL CUT INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-4500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

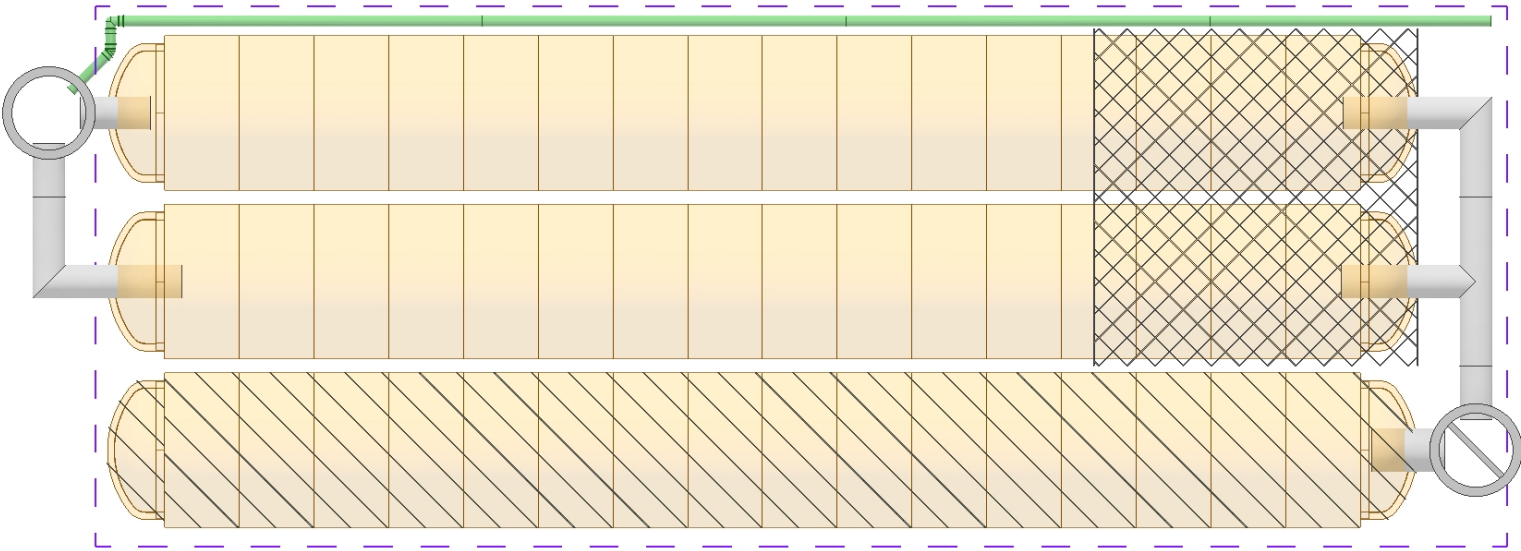
COMBINED CONSTRUCTION		DESCRIPTION		CHK	DRW	REV
MUKILTEO, WA						
DATE:		PROJECT #:				
DRAWN: CM		CHECKED: N/A				

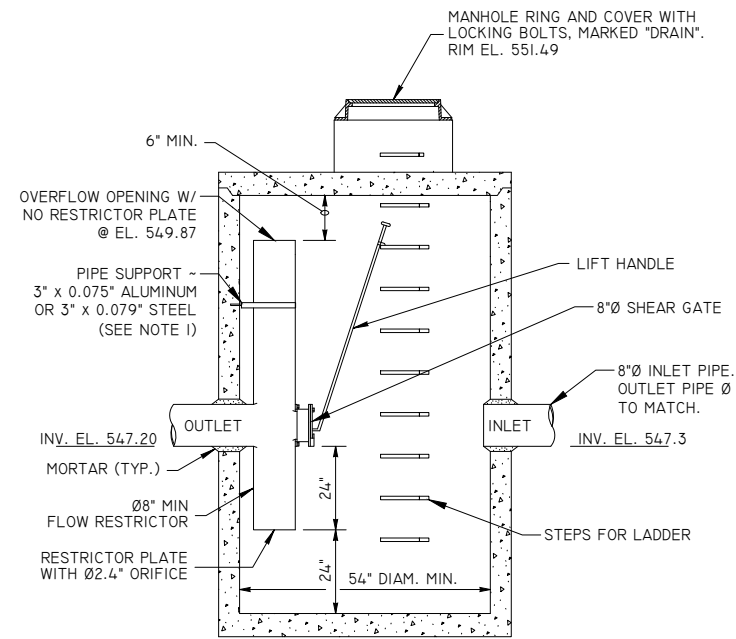
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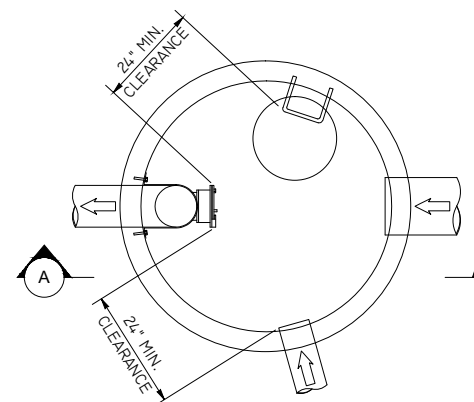
SHEET
5 OF 5

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

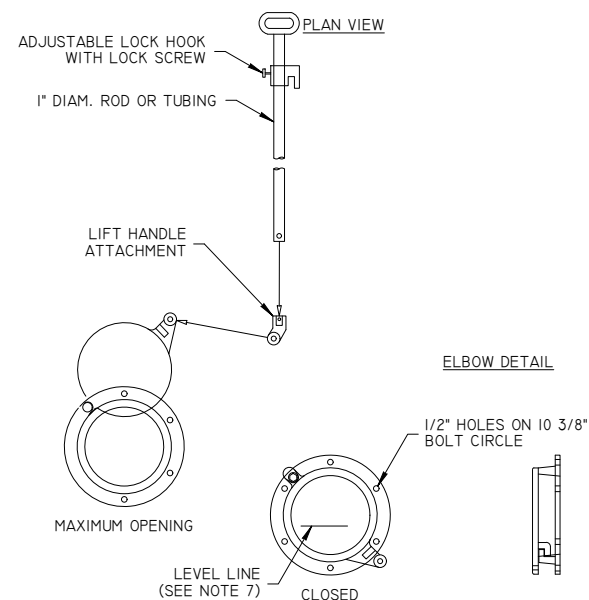




SECTION: TYPE-2 W/ FLOW RESTRICTOR
SCALE: N.T.S.



C TYPE-2 W/ FLOW RESTRICTOR
SCALE: N.T.S.



DETAIL: TYPE-2 SHEAR GATE
SCALE: N.T.S.

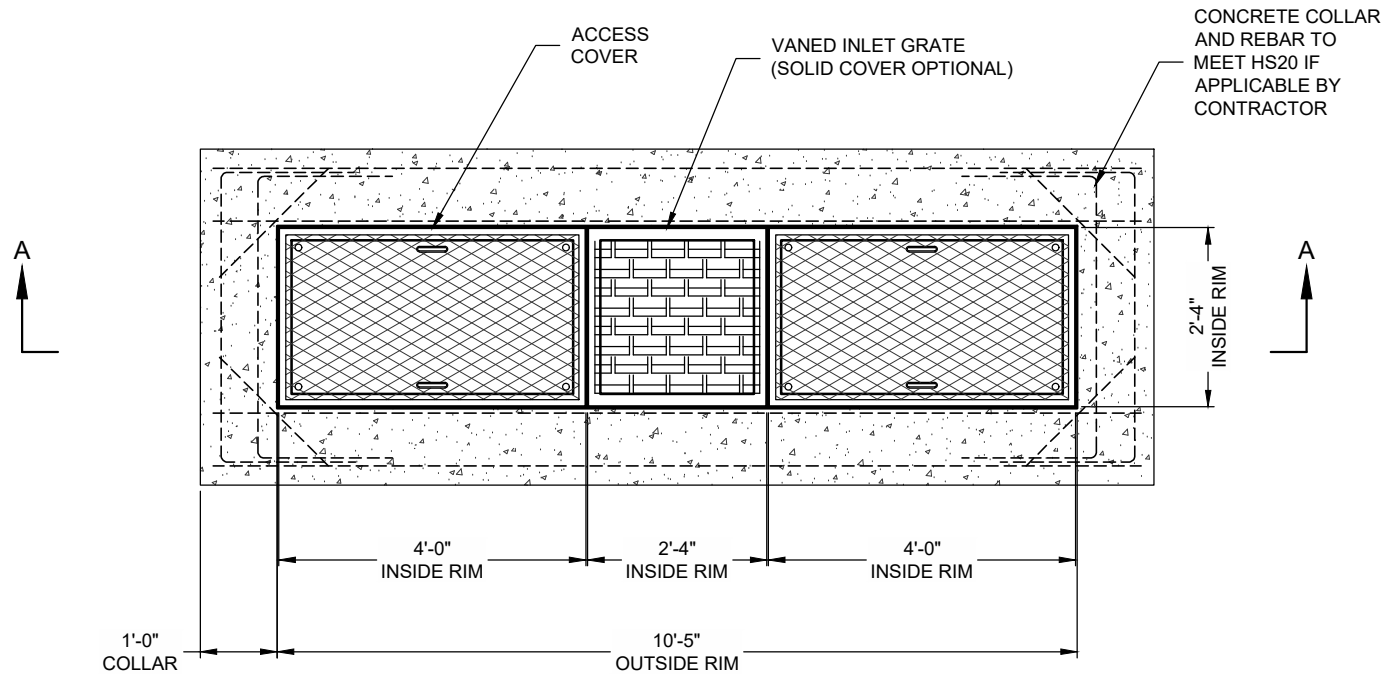
- TYPE-2 CATCH BASIN WITH FLOW RESTRICTOR NOTES**

1. THE PIPE SUPPORTS AND THE FLOW RESTRICTOR SHALL BE CONSTRUCTED OF THE SAME MATERIAL AND BE ANCHORED AT A MAXIMUM SPACING OF 36". ATTACH THE PIPE SUPPORTS TO THE MANHOLE WITH 5/8" STAINLESS STEEL EXPANSION BOLTS OR EMBED THE SUPPORTS INTO THE MANHOLE WALL 2".
2. THE VERTICAL RISER STEM OF THE FLOW RESTRICTOR SHALL BE THE SAME DIAMETER AS THE HORIZONTAL OUTLET PIPE WITH A MINIMUM DIAMETER OF 8".
3. THE FLOW RESTRICTOR SHALL BE FABRICATED FROM ONE OF THE FOLLOWING MATERIALS:

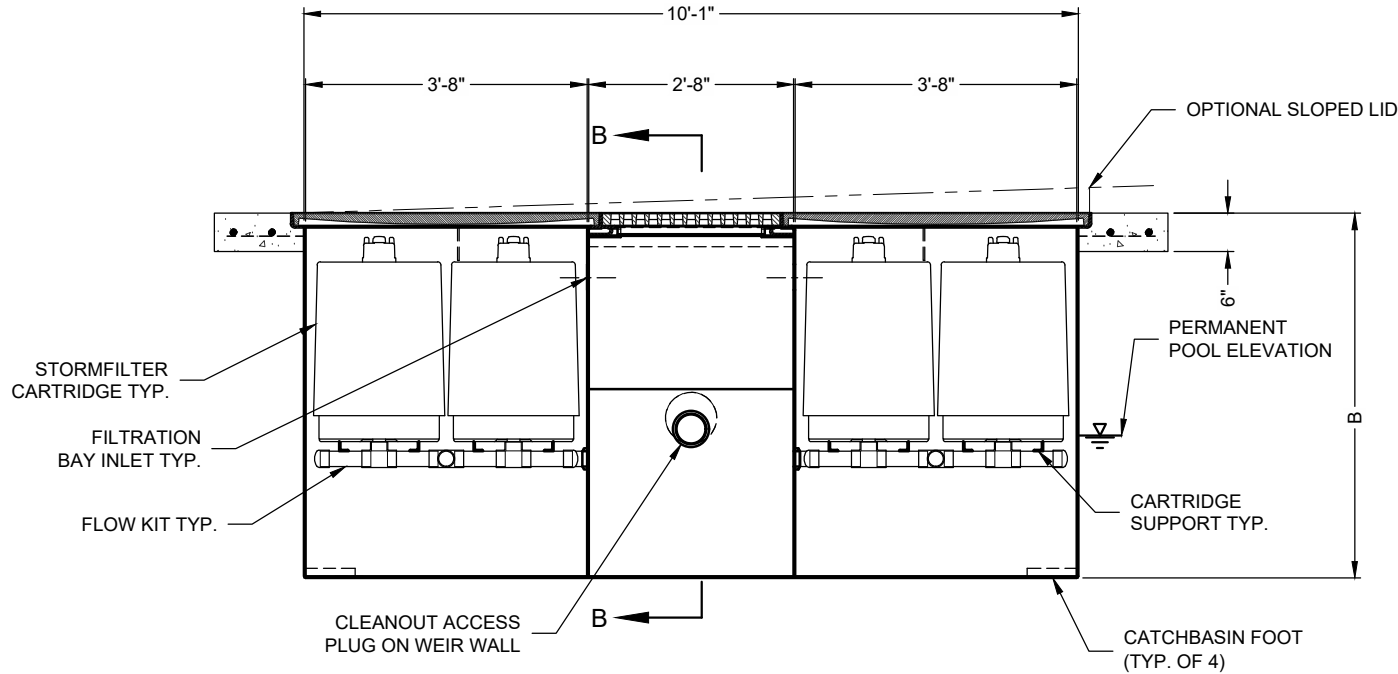
0.060" CORRUGATED ALUMINUM ALLOY DRAIN PIPE
0.064" CORRUGATED GALVANIZED STEEL DRAIN PIPE WITH TREATMENT 1
0.064" CORRUGATED ALUMINIZED STEEL DRAIN PIPE
0.060" ALUMINUM ALLOY FLAT SHEET, IN ACCORDANCE WITH ASTM B 209, 5052 H32 OR EPS
HIGH DENSITY POLYETHYLENE STORM SEWER PIPE
4. THE FRAME AND LADDER OR STEPS ARE TO BE OFFSET SO THAT: THE SHEAR GATE IS VISIBLE FROM THE TOP; THE CLIMB-DOWN SPACE IS CLEAR OF THE RISER AND GATE; THE FRAME IS CLEAR OF THE CURB.
5. THE MULTI-ORIFICE ELBOWS MAY BE LOCATED AS SHOWN, OR ALL PLACED ON ONE SIDE OF THE RISER TO ASSURE LADDER CLEARANCE. THE SIZE OF THE ELBOWS AND THEIR PLACEMENT SHALL BE SPECIFIED IN THE CONTRACT
6. RESTRICTOR PLATE WITH ORIFICE AS SPECIFIED IN THE CONTRACT. THE OPENING IS TO BE CUT ROUND AND SMOOTH.
7. THE SHEAR GATE SHALL BE MADE OF ALUMINUM ALLOY IN ACCORDANCE WITH ASTM B 26 AND ASTM B 275, DESIGNATION ZG32A; OR CAST IRON IN ACCORDANCE WITH ASTM A 48, CLASS 30B.
8. THE LIFT HANDLE SHALL BE MADE OF A SIMILAR METAL TO THE GATE (TO PREVENT GALVANIC CORROSION), IT MAY BE OF SOLID ROD OR HOLLOW TUBING, WITH ADJUSTABLE HOOK AS REQUIRED.
9. A NEOPRENE RUBBER GASKET IS REQUIRED BETWEEN THE RISER MOUNTING FLANGE AND THE GATE FLANGE.
10. INSTALL THE GATE SO THAT THE LEVEL-LINE MARK IS LEVEL WHEN THE GATE IS CLOSED.
11. THE MATING SURFACES OF THE LID AND THE BODY SHALL BE MACHINED FOR PROPER FIT.
12. ALL SHEAR GATE BOLTS SHALL BE STAINLESS STEEL.
13. THE SHEAR GATE MAXIMUM OPENING SHALL BE CONTROLLED BY LIMITED HINGE MOVEMENT, A STOP TAB, OR SOME OTHER DEVICE.
14. ALTERNATIVE SHEAR GATE DESIGNS ARE ACCEPTABLE IF MATERIAL SPECIFICATIONS ARE MET AND FLANGE BOLT PATTERN MATCHES.

FILE: Catch Basin 2_Flow Restrictor.dwg		5			#####		2724 Black Lake Boulevard SW Suite 202 Tumwater, WA 98512 ph: (360) 352-2477 fax: (360) 352-0179 E-mail: admin@vectorengineeringinc.com	####	####
PROJECT: #####		4						####	
		3						####	
CHECKED BY: #####		2						####	
DETAILED BY: #####		1						####	
DESIGNED BY: #####	DATE	NO.	REVISION	BY				SH#####	

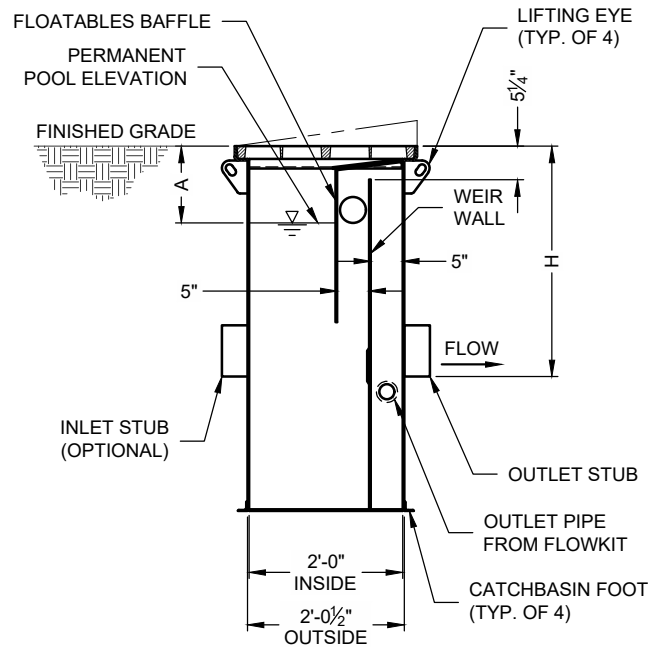
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PLAN VIEW
27" CARTRIDGES



SECTION A-A



SECTION C-C

STORMFILTER STEEL CATCHBASIN DESIGN NOTES

STORMFILTER TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE SELECTION AND THE NUMBER OF CARTRIDGES. 4 CARTRIDGE CATCHBASIN HAS A MAXIMUM OF FOUR CARTRIDGES. SYSTEM IS SHOWN WITH A 27" CARTRIDGE, AND IS ALSO AVAILABLE WITH AN 18" CARTRIDGE. STORMFILTER CATCHBASIN CONFIGURATIONS ARE AVAILABLE WITH A DRY INLET BAY FOR VECTOR CONTROL. PEAK HYDRAULIC CAPACITY PER TABLE BELOW. IF THE SITE CONDITIONS EXCEED PEAK HYDRAULIC CAPACITY, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

CARTRIDGE SELECTION

CARTRIDGE HEIGHT	27"			18"			18" DEEP		
RECOMMENDED HYDRAULIC DROP (H)	3.05'			2.3'			3.3'		
SPECIFIC FLOW RATE (gpm/sf)	2 gpm/sf	1.67* gpm/sf	1 gpm/sf	2 gpm/sf	1.67* gpm/sf	1 gpm/sf	2 gpm/sf	1.67* gpm/sf	1 gpm/sf
CARTRIDGE FLOW RATE (gpm)	22.5	18.79	11.25	15	12.53	7.5	15	12.53	7.5
PEAK HYDRAULIC CAPACITY	1.0			1.0			1.8		
INLET PERMANENT POOL LEVEL (A)	1'-0"			1'-0"			2'-0"		
OVERALL STRUCTURE HEIGHT (B)	4'-9"			3'-9"			4'-9"		

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

GENERAL NOTES

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

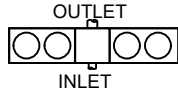
INSTALLATION NOTES

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

4-CARTRIDGE CATCHBASIN STORMFILTER DATA

STRUCTURE ID	110
WATER QUALITY FLOW RATE (cfs)	.078
PEAK FLOW RATE (<1 cfs)	.627
RETURN PERIOD OF PEAK FLOW (yrs)	100
CARTRIDGE FLOW RATE (gpm)	11.25
MEDIA TYPE (PERLITE, ZPG, PSORB)	ZPG
RIM ELEVATION	550.51

PIPE DATA:	I.E.	DIAMETER
INLET STUB	545.35	8"
OUTLET STUB	544.34	8"

CONFIGURATION


SLOPED LID	NO
SOLID COVER	YES

NOTES/SPECIAL REQUIREMENTS:

*PER ENGINEER OF RECORD

FILE: Contech Stormfilter Detail.dwg

PROJECT: #####

CHECKED BY: #####

DETAILED BY: #####

DESIGNED BY: #####

DATE

NO.

REVISION

BY

#####

#####

Vector
ENGINEERING INC.
2724 Black Lake Boulevard SW Suite 202
Tumwater, WA 98512
ph: (360) 352-2477 fax: (360) 352-0179 E-mail: admin@vectorengineeringinc.com

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Appendix D

Maintenance and Operations Package

PLACEHOLDER

The maintenance and operations package will be completed upon approval of the general stormwater scheme.