

# CONTOUR

ENGINEERING • LLC

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## CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

### FOR OVERLOOK APARTMENTS PHASE 2 PORT ORCHARD, WASHINGTON

FEBRUARY 2020

**Prepared For:**  
OLAA, LLC  
15234 SE 366<sup>th</sup> Place  
Auburn, WA 98092

**Prepared By:**  
Kyle Rose, P.E., Design Engineer

**Approved By:**  
Jeremy Haug, P.E., Project Engineer

**Project # 16-300**

*I hereby state that this Construction Stormwater Pollution Prevention Plan for **Overlook Apartments Phase 2** has been prepared by me or under my supervision and meets the standard of care and expertise that is usual and customary in this community of professional engineers. I understand that City of Port Orchard does not and will not assume liability for the sufficiency, suitability or performance of drainage facilities prepared by Contour Engineering LLC. This analysis is based on data and records either supplied to, or obtained by, Contour Engineering, LLC. These documents are referenced within the text of the analysis. The analysis has been prepared utilizing procedures and practices within the standard accepted practices of the industry.*

RECEIVED  
PERMIT CENTER  
FEB 19 2020  
CITY OF PORT ORCHARD  
COMMUNITY DEVELOPMENT



PW20-014

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## PROJECT DESCRIPTION

This project will propose the construction of six residential buildings and a community center consisting of a total of 107 dwelling units along with the required infrastructure such as roads, sewer, water, and stormwater facilities. There does not appear to be any significant utilities that run through the subject site, and no apparent evidence of a previous residence(s).

The *2012 Storm Water Management Manual for Western Washington (SWMM)* and the requirements of the City of Port Orchard will establish the methodology and design criteria used for this project.

## EXISTING SITE CONDITIONS

### Pre-Developed Site Conditions

The project consists of multiple vacant Kitsap County parcels. The site appears to be a vacant parcel with no obvious signs of residence in the past. The site is comprised mostly of small vegetation with some trees in the southeast corner of the site.

|                         |                             |                     |
|-------------------------|-----------------------------|---------------------|
| Parcel #:               | 4598-005-028-0007           | 19,602 SF (0.45 Ac) |
|                         | 4598-005-022-0003:          | 23,522 SF (0.54 AC) |
|                         | 4598-005-017-0109:          | 23,522 SF (0.54 AC) |
|                         | 4598-006-001-0303:          | 31,363 SF (0.72 AC) |
|                         | 4598-006-004-0003:          | 23,522 SF (0.54 AC) |
|                         | 4598-006-007-0000:          | 23,522 SF (0.54 AC) |
|                         | 4598-006-010-0104:          | 7,841 SF (0.18 AC)  |
| Governing Jurisdiction: | City of Port Orchard        |                     |
| Zoning:                 | Residential – 12 units/acre |                     |

### Topography, Ground Cover and Native Soils

The site has significant grade drop across the parcels, approximately 80 feet of vertical relief. Stormwater runoff generated from the site generally flows west onto nearby developed parcels.

The majority of the site appears to be covered with light vegetation consisting mostly of grass, shrubs, and bushes. The south east and north west corners of the site have a group of trees. Native soils appear have roughly six to 18 inches of forest duff/topsoil underlain by iron stained sand or sand with gravel.

For additional soils information see Appendix C of the Stormwater Report for a copy of the geotechnical report.

## **Adjacent Land Uses**

The site is adjacent to the following:

- North – ROW (Orlando Street)
- East – Singly family dwellings
- South – Single Family Dwellings
- West – Multi Family Development

## **Drainage Patterns**

Due to the soil conditions of the site, it appears a large portion of the runoff from the site is infiltrated. Any runoff which is not infiltrated will sheet flow down the hill onto the neighboring properties to the west.

## **Critical and Sensitive Areas**

No wetlands or wetland buffers are located on or adjacent to the site. Due to the steep slopes located on site, there is a building setback required from the top of slopes. The building setback from top of slope shall be 10' minimum which may be reduced through the use of extended foundations. See Geotechnical report for additional details.

## **EROSION PROBLEM AREAS**

There are no known or visible erosion control problem areas currently on the site and no apparent potential problem areas.

## **CONSTRUCTION STORMWATER POLLUTION PREVENTION ELEMENTS**

The Elements have been addressed and the appropriate BMPs have been incorporated into the Temporary Erosion and Sedimentation Control (TESC) Plan (See Appendix B). BMPs used in the sites TESC Plan can be found in the most current Department of Ecologies Stormwater Management Manual, along with some others that may be needed if site conditions change as construction progresses. The list of BMPs was taken from the *2012 Storm Water Management Manual for Western Washington* (SWMM) and includes:

- BMP C103: High Visibility Plastic or Metal Fence
- BMP C105: Stabilized Construction Entrance
- BMP C120: Temporary and Permanent Seeding
- BMP C121: Mulching
- BMP C123: Plastic Covering
- BMP C160: Certified Erosion and Sediment Control Lead
- BMP C220: Storm Drain Inlet Protection
- BMP C233: Silt Fence

○  
Other BMPs that may be needed:

- BMP C106: Wheel Wash
- BMP C140: Dust Control
- BMP C150: Materials on Hand
- BMP C151: Concrete Handling
- BMP C152: Sawcutting and Surfacing Pollution Prevention
- BMP C153: Material Delivery, Storage and Containment
- BMP C154: Concrete Washout Area
- BMP C162: Scheduling

If necessary, contractor shall review all available BMPs to provide proper erosion, sediment, and pollutant control onsite.

### **Element #1: Mark Clearing Limits**

Prior to beginning construction activities, all clearing and construction limits shall be delineated. Some portions of the clearing limits will be delineated with High Visibility Plastic Fencing (BMP C103) as needed. The TESC Plan shows the clearing limits for the project.

### **Element #2: Establish Construction Access**

Construction vehicle ingress and egress shall be limited to location depicted on the plans. If needed, Stabilized Construction Entrances (BMP C105) shall be implemented as necessary. The entrance shall be stabilized with quarry spalls or crushed rock to minimize the tracking of sediment onto public roads and BMP C105. It shall be maintained and repaired as needed.

No sediment tracking on the roadway is allowed. In the event that sediment is inadvertently tracked onto the road, the road shall be cleaned immediately. Sediment shall be removed from roads by shoveling, sweeping or by another approved means and transported to a controlled sediment disposal area. No street washing of sediments to the storm drain system will be allowed. If needed, a Wheel Wash (BMP C106) shall be utilized either constructed on-site or an approved portable unit can be brought onto the site.

### **Element #3: Control Flow Rates**

Since the project site is over 3 acres, a sediment pond is required. The sediment pond has been sized based on the 10-year peak flow of the site. A temporary riser will be installed to control flow rates leaving the site. Additional Calculations are included within Appendix B. Silt Fencing should be sufficient to control generated runoff along the perimeter of the site. See the plan exhibits in Appendix B. If it is determined that

additional measures are needed or instructed by the Inspector, contact the project Erosion Control Lead (CESCL – BMP C160) and the Project Engineer immediately to discuss. Additional BMPs may be employed as needed as field conditions warrant.

Permanent ditches (swales) and temporary ditches (swales) should have Rock Check Dams (BMP 207) installed as needed or as instructed by inspector.

#### **Element #4: Install Sediment Controls**

As previously stated, Silt Fencing should be adequate for containing sediments on site. Rip Rap should be installed at all pipe outlets per plans, or as needed. Straw Wattles (BMP C235) shall be installed as needed. These could be used in areas of sheet flow to slow down velocities and capture sediments if determined to be needed to prevent erosion. Due to the size of the site, A Temporary Sediment Pond (BMP C241) will need to be constructed. A Temporary sediment pond with surface area of 7,200 SF, 3.5 feet in depth, with 1' of freeboard. See Appendix B for additional details. Areas not needing to be disturbed for the construction operations should be left un-disturbed.

#### **Element #5: Stabilize Soils**

Exposed and un-worked soils, such as soil stockpiles, shall be stabilized by application of effective erosion control measures that protect the soil from the erosive forces of raindrops, flowing water, and wind. Such measures include Plastic Covering (BMP C123), Temporary and Permanent Seeding (BMP C120), and Dust Control (BMP 140). Graded slopes of 2:1 or steeper, temporary or permanent, will need to have additional stability measures installed to provide adequate slope protection until stabilized. These additional measures include the use of Mulching (BMP C121), Nets and Blankets (BMP C122), or Sodding (BMP C124).

Staging areas and vehicle parking areas shall be stabilized per BMP C107.

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.

The "Wet Season" is from October 1 to April 30. Within this period, no soils shall remain exposed and un-worked for more than 2 days. The "Dry Season" is from May 1 to September 30. Within this period, no soils shall remain exposed and un-worked for more than 7 days. This stabilization requirement applies to all soils on-site, whether at final grade or not. Soils shall be stabilized at the end of each 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 be conducted to meet the soil stabilization requirements. Contractors shall install the bedding materials, roadbeds, structures, pipelines, or utilities and re-stabilize the disturbed soils so to adhere to the season timelines outlined in the above paragraph.

### **Element #6: Protect Slopes**

Since a large portion of the project area contains slopes, protection of the slopes will be needed during grading of the site. The primary BMP to protect the slopes is to excavate and grade the site during the dry season, when erosion can be minimized since runoff is minimal. All exposed slopes should be immediately seeded (BMP C120) and further stabilized utilizing Mulching (BMP C121) or Nets and Blankets (BMP C122) as per plans in Appendix B or as needed based on field conditions and direction of City Inspector or Project CESCL. Exposed slopes during the wet season shall also be protected with Plastic Covering (BMP C123), Mulching (BMP C121), or Nets and Blankets (BMP C122). See BMPs in Appendix C.

### **Element #7: Protect Drain Inlets**

It is important to protect storm conveyance systems from any sediment-laden runoff. Both existing and constructed catch basins and other inlets should be protected per the Storm Drainage Inlet Protection BMP (BMP C220). All culvert pipe inlets shall have rip rap protection installed.

### **Element #8: Stabilize Channels and Outlets**

Interceptor Dikes and Swales (BMP C200) shall be constructed throughout the site, due to the steep slopes throughout the site. Rock check dams (BMP C207) shall be installed to provide energy dissipation and some sediment containment. These may be installed as needed per field conditions. The interior channel sides of dikes and swales shall be stabilized using seeded or sodded (BMP C201), rock lined, or nets or blankets (BMP C122) installed if showing signs of any erosion or if field conditions warrant. Interceptor dikes and swales shall be seeded for protection during the "Wet Season". All pipe inlets and outlets will have rip rap placed as needed to ensure proper 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 surface water. Woody debris may be chopped and spread on site. Guidelines for the handling of these materials can be found in (BMP C153) Material Delivery, Storage and Containment.

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 surface water 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 on-site using temporary plastic placed beneath and, if raining, over the vehicle.

Application of agricultural chemicals including fertilizers and pesticides shall be conducted in a manner and at application rates that will not result in loss of chemical to surface water runoff. Manufacturers' recommendations for application rates and procedures shall be followed.

All applicable BMPs shall be used to prevent or treat contamination of surface water 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. Some applicable BMPs include Concrete Handling (BMP C151), Sawcutting and Surfacing Pollution Prevention (BMP C152) and those within Chapter 4 of *Volume IV – Source Control BMPs of the 2012 SWMM*.

#### **Element #10: Control Dewatering**

It is anticipated that dewatering will not be needed. However, if needed the following guidance is provided.

Discharge from foundation, vault, and trench dewatering water that has similar characteristics to site stormwater runoff into a controlled conveyance system prior to discharge to a stabilized outfall location.

Clean, non-turbid dewatering water, such as well-point groundwater, can be discharged to systems tributary to state surface waters, provided the dewatering flow does not cause erosion or flooding of receiving waters. These clean waters should not be routed through stormwater sediment ponds/tanks.

Handle highly turbid or contaminated dewatering water from construction equipment operation, clamshell digging, concrete tremie pour, or work inside a cofferdam separately from stormwater at the site.

Other disposal options, depending on site constraints, may include:

- Infiltration
- Transport off-site in vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters
- Ecology approved on-site chemical treatment or other suitable treatment technologies
- Use of a sedimentation bag with outfall to a ditch or swale for small volumes of localized dewatering



### **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 events during the "Dry Season" and daily during the "Wet Season". The inspection frequency for stabilized inactive sites shall be determined by the City based on the level of soil stability and potential for adverse environmental impacts.

Remove temporary erosion and sediment control BMPs within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed with approval of the inspector. Trapped sediment shall be removed or stabilized on site. Permanently stabilize disturbed soil resulting from removal of BMPs or vegetation.

### **Element #12: Manage the Project**

Development projects shall be phased in order to prevent the transport of sediment from the development site during construction, unless the project engineer can demonstrate that construction phasing is infeasible. Re-vegetation 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 developments 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 the City, shall be delineated on the site plans and the development site.

Seasonal Work Limitations are from October 1 to April 30 where clearing, grading, and other soil disturbing activities shall only be permitted if shown to the satisfaction of the City that the transport of sediment from the construction site will be prevented. Based on the information provided and local weather conditions, the City may expand or restrict the seasonal limitation on site disturbance. The City may take enforcement action (such as a notice of violation, administrative order, penalty, or stop-work order) if violations are noticed, required BMPs are not being maintained, or the approved plans are not being followed. 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.

All BMPs shall be inspected, maintained, and repaired as needed to assure continued performance of their intended function. Additional BMPs and erosion control measures shall be installed as deemed necessary to protect adjacent properties and County right-of-ways.

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.

Spillage and/or discharge of pollutants shall be reported within 24-hours. 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 surface water 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 on-site using temporary plastic placed beneath and, if raining, over the vehicle.

Report spillage or discharge of pollutants within 24-hours to the local jurisdiction.

### **Element #13: Protect Low Impact Development BMPs**

Protect all Bioretention and Rain Garden BMPs from sedimentation through installation and maintenance of Construction SWPPP BMPs on portions of the site that drain into Bioretention and/or Rain Garden BMPs. Restore the BMPs to their fully functioning condition if they accumulate sediment during construction. Restoring 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, including permeable pavement subgrade, reservoir course, or wearing course.

Pavements fouled with sediments or no longer passing an initial infiltration test must be cleaned using procedures shown in Volume III of this 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.

The Construction SWPPP shall be retained on-site 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. The inspector shall be notified of any changes to the Construction SWPPP. The inspector may require a plan modification to go through the City review process.

### CONSTRUCTION SEQUENCE

1. Conduct a pre-construction meeting with the city and obtain required permits.
2. Field locate and verify all existing services and utilities within the project area prior to construction. See verification note, this sheet. Field verify all utility points of connections. Contact project engineer if connection points differ from plans.
3. Post "notice of construction activity" sign with name and phone number of tesc supervisor.
4. Establish clearing and grading limits.
5. Install inlet protection. See inlet protection note on this sheet.
6. Install perimeter protection (silt fence, brush barrier, etc.), and other erosion control measures as noted.
7. Grade, install and stabilize construction entrance and access through unopened row of wendell ave. To the onsite project area. Side slopes shall be stabilized until walls are constructed.
8. Construct sediment pond. Contractor shall clean sediment pond as needed through construction.
9. Clear and grade remainder of site while constructing and/or modifying surface water controls (interceptor ditches/swales, check dams, etc.) see city of port orchard erosion and sediment control notes on sheet c4.
10. Maintain all erosion control measures in accordance with the city of port orchard standards.
11. Relocate surface water controls and erosion control measures, or install new measures to ensure that as site conditions change the erosion and sediment control is always in accordance with the city of port orchard erosion and sediment control standards.
12. Install onsite infiltration systems. No sediment laden stormwater shall be allowed to enter the system. No stormwater shall enter system until entire site is deemed fully stabilized by city inspector and/or project engineer.
13. Install walls (per structural plans by others).
14. Construct buildings and associated extended foundations as building permits become available.
15. Install utilities and storm systems per plans (on-site and off-site).

16. Construct remainder of on-site improvements and pave site.
17. Grade and construct off-site road improvements per plan. See verification note.
18. Arrange final inspection with the city.
19. On-site siltation fence to remain until the site is stabilized to the approval of the inspector.
20. Remove tesc measures when allowed by the city inspector.
21. Upon completion of the project, all disturbed areas must be stabilized and best management practices removed, if appropriate.

### **CONSTRUCTION SCHEDULE**

Construction is anticipated to begin once all necessary permits have been issued. The project will be constructed in a single phase.

**FINANCIAL/OWNERSHIP RESPONSIBILITIES**

OLAA, LLC  
15234 SE 366<sup>th</sup> Place  
Auburn, WA 98092

**EROSION CONTROL SPECIALIST**

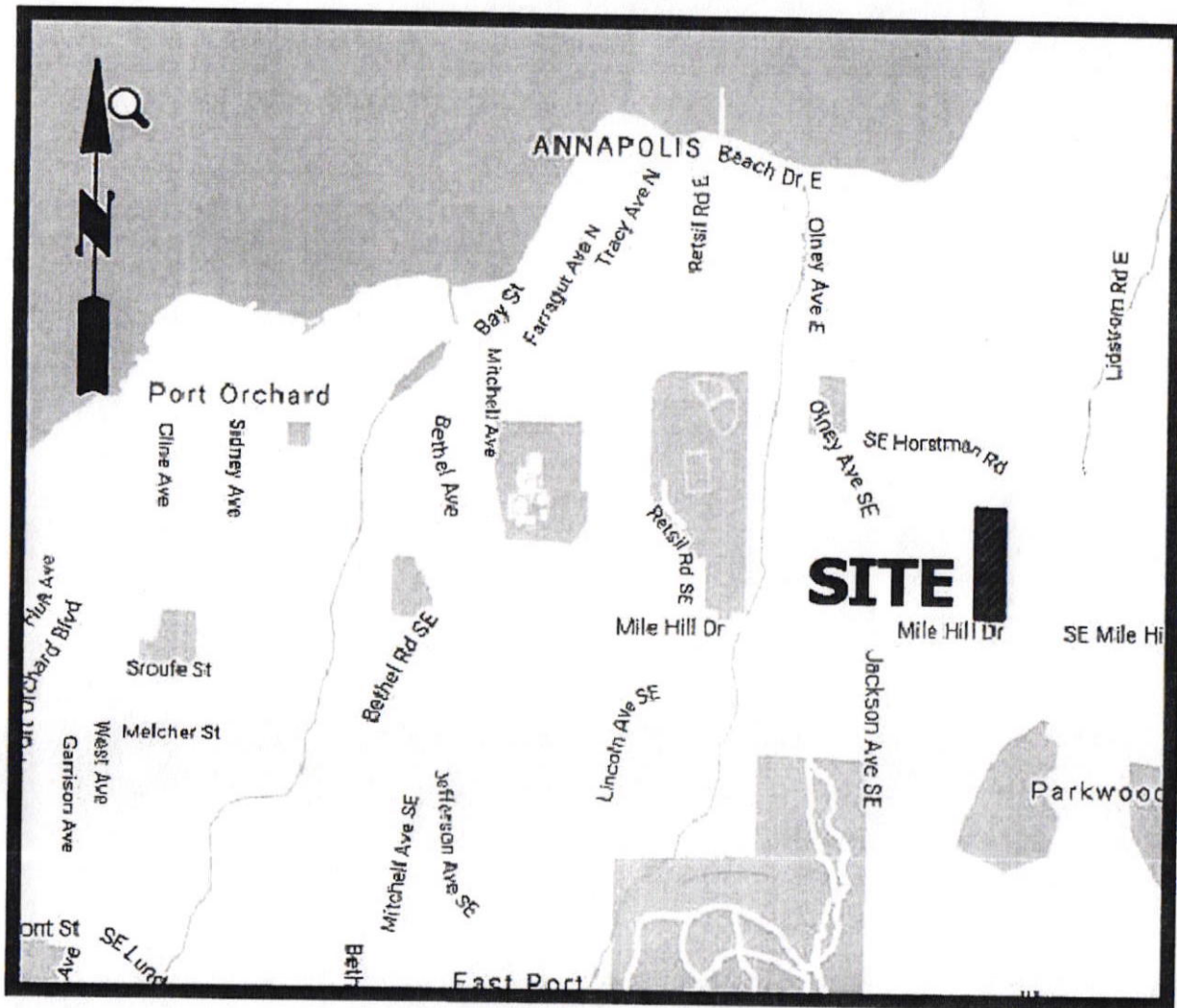
A Certified Professional in Erosion and Sediment Control shall be identified in the Construction SWPPP and shall be on-site or on-call at all times. Certification may be through the WSDOT/AGC of Washington Education Foundation Construction Site Erosion and Sediment Control Certification Program or any equivalent local or national certification and/or training program.

Name: \_\_\_\_\_

Phone: \_\_\_\_\_

# **APPENDIX A**

## General Exhibits



# VICINITY MAP

NOT TO SCALE

Appended on: 20:47:46 Thursday, February 13, 2020

**B-001 Event Summary**

| Event   | Peak Q (cfs) | Peak T (hrs) | Hyd Vol (acft) | Area (ac) | Method | Raintype |
|---------|--------------|--------------|----------------|-----------|--------|----------|
| 10 Year | 3.4652       | 8.00         | 1.1459         | 4.1300    | SBUH   | TYPE1A   |

**Record Id: B-001**

|   |                    |                          |               |
|---|--------------------|--------------------------|---------------|
| <b>Design Method</b>                        | SBUH               | <b>Rainfall type</b>     | TYPE1A        |
| <b>Hyd Intv</b>                             | 10.00 min          | <b>Peaking Factor</b>    | 484.00        |
|   |                    | <b>Abstraction Coeff</b> | 0.20          |
| <b>Pervious Area (AMC 2)</b>                | 0.00 ac            | <b>DCIA</b>              | 4.13 ac       |
| <b>Pervious CN</b>                          | 0.00               | <b>DC CN</b>             | 94.05         |
| <b>Pervious TC</b>                          | 0.00 min           | <b>DC TC</b>             | 5.00 min      |
| <b>Directly Connected CN Calc</b>           |                    |                          |               |
| <b>Description</b>                          |                    | <b>SubArea</b>           | <b>Sub cn</b> |
| Impervious surfaces (pavements, roofs, etc) |                    | 2.77 ac                  | 98.00         |
| Open spaces, lawns, parks (<50% grass)      |                    | 1.36 ac                  | 86.00         |
| <b>DC Compositd CN (AMC 2)</b>              |                    |                          | 94.05         |
| <b>Directly Connected TC Calc</b>           |                    |                          |               |
| <b>Type</b>                                 | <b>Description</b> | <b>Length</b>            | <b>Slope</b>  |
|   |                    |                          | <b>Coeff</b>  |
|   |                    |                          | <b>Misc</b>   |
|   |                    |                          | <b>TT</b>     |
| Fixed                                       |                    |                          | 5.00 min      |
| <b>Directly Connected TC</b>                |                    |                          | 5.00min       |

Licensed to: Contour Engineering PLLC

$3.465 \cdot 2080 = 7200 \text{ SF Required at top}$



Dewatering Orifice

$$A_o = \frac{A_s (2h)^{0.5}}{0.6 \cdot 3600 \cdot T g^{0.5}}$$

$$\rightarrow A_s = \frac{7200}{3.5}$$

$$\rightarrow A_o = \frac{7200 (2h)^{0.5}}{(0.6) (3600) (24) (32.2)^{0.5}}$$

$$A_o = \underline{0.06} \text{ ft}^2$$

Diameter of orifice, D (inches)

$$\rightarrow D = 13.54 (\sqrt{A_o})$$

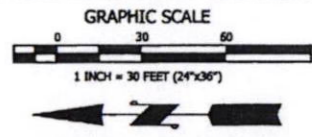
$$\rightarrow D = 13.54 (\sqrt{\quad})$$

$$\boxed{D = \underline{3.45} \text{ in}}$$

- $A_o$  = Orifice Area (ft<sup>2</sup>)
- $A_s$  = Pond surface Area (ft<sup>2</sup>)
- $h$  = Head of water above orifice
- $T$  = Dewatering time (24 hr)
- $g$  = Acc. of gravity (ft/sec<sup>2</sup>)

# **APPENDIX B**

## Plan Exhibits

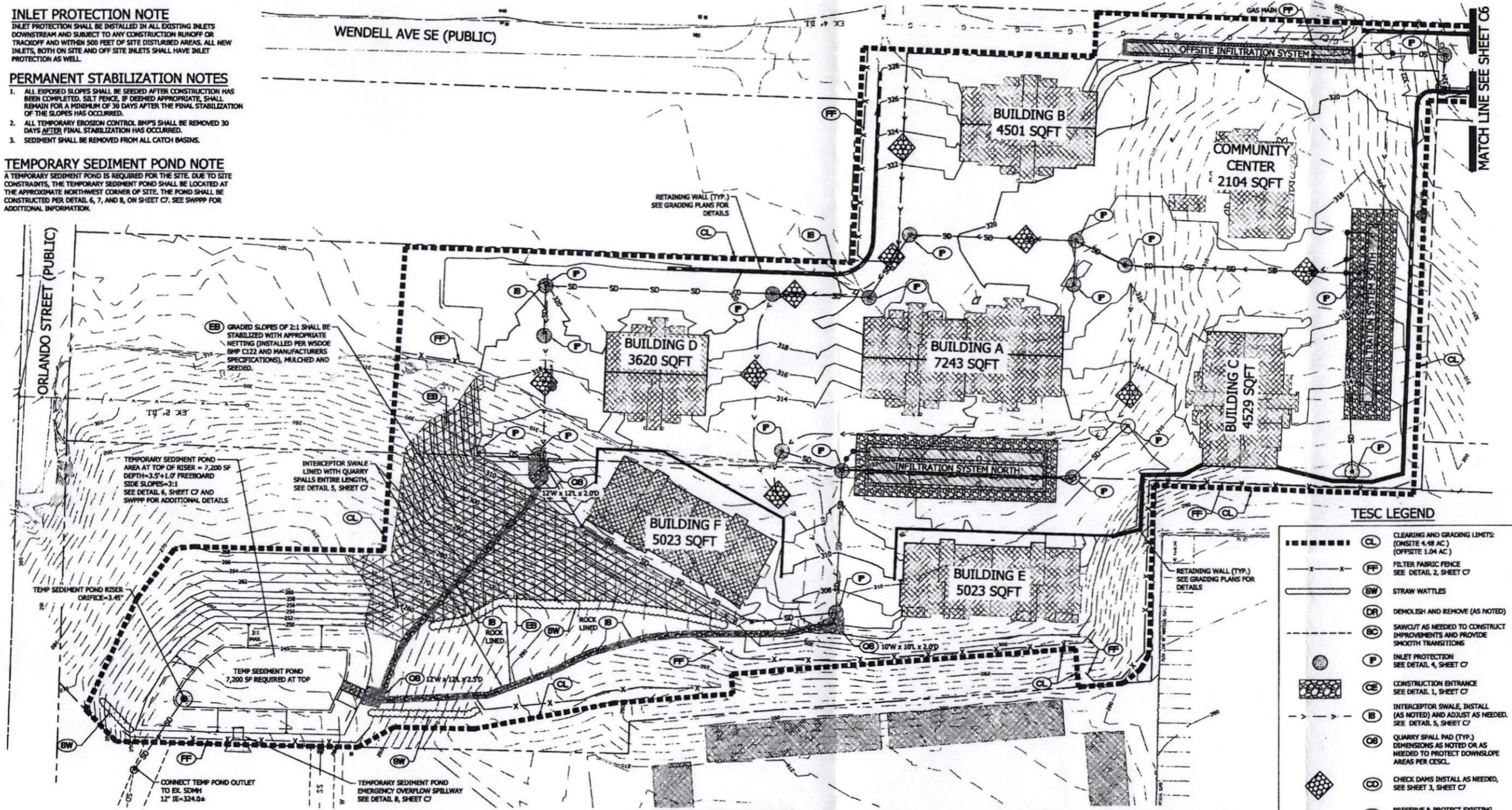


**OVERLOOK APARTMENTS PHASE II**  
 A PORTION OF THE SE 1/4 OF THE SW 1/4 OF SECTION 30, TOWNSHIP 24 NORTH, RANGE 2 EAST W.M.  
 CITY OF PORT ORCHARD, KITSAP COUNTY, WASHINGTON

**INLET PROTECTION NOTE**  
 INLET PROTECTION SHALL BE INSTALLED IN ALL EXISTING INLETS DOWNSTREAM AND SUBJECT TO ANY CONSTRUCTION RUNOFF OR TRACKOFF AND WITHIN 500 FEET OF SITE DISTURBED AREAS. ALL NEW INLETS, BOTH ON SITE AND OFF SITE INLETS SHALL HAVE INLET PROTECTION AS WELL.

**PERMANENT STABILIZATION NOTES**  
 1. ALL EXPOSED SLOPES SHALL BE SEDED AFTER CONSTRUCTION HAS BEEN COMPLETED. SILT FENCE, IF DEEMED APPROPRIATE, SHALL REMAIN FOR A MINIMUM OF 30 DAYS AFTER THE FINAL STABILIZATION OF THE SLOPES HAS OCCURRED.  
 2. ALL TEMPORARY EROSION CONTROL BMP'S SHALL BE REMOVED 30 DAYS AFTER FINAL STABILIZATION HAS OCCURRED.  
 3. SEDIMENT SHALL BE REMOVED FROM ALL CATCH BASINS.

**TEMPORARY SEDIMENT POND NOTE**  
 A TEMPORARY SEDIMENT POND IS REQUIRED FOR THE SITE. DUE TO SITE CONSTRAINTS, THE TEMPORARY SEDIMENT POND SHALL BE LOCATED AT THE APPROXIMATE NORTHWEST CORNER OF SITE. THE POND SHALL BE CONSTRUCTED PER DETAIL 6, 7, AND 8, ON SHEET C7. SEE SWPPP FOR ADDITIONAL INFORMATION.



**TESC LEGEND**

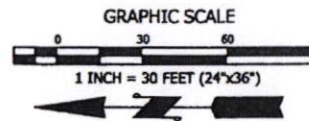
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|--|---|
|  | CLEARING AND GRADING LIMITS:<br>(ONSITE 1.48 AC)<br>(OFFSITE 1.04 AC)                         |
|  | FILTER FABRIC FENCE<br>SEE DETAIL 2, SHEET C7   |
|  | STRAW WATTLES   |
|  | DEMOLISH AND REMOVE (AS NOTED)  |
|  | SAWCUT AS NEEDED TO CONSTRUCT IMPROVEMENTS AND PROVIDE SMOOTH TRANSITIONS                     |
|  | INLET PROTECTION<br>SEE DETAIL 4, SHEET C7  |
|  | CONSTRUCTION ENTRANCE<br>SEE DETAIL 1, SHEET C7   |
|  | INTERCEPTOR SWALE, INSTALL (AS NOTED) AND ADJUST AS NEEDED. SEE DETAIL 5, SHEET C7            |
|  | QUARRY SPALL PAD (TYP.) DIMENSIONS AS NOTED OR AS NEEDED TO PROTECT DOWNSLOPE AREAS PER CESCL |
|  | CHECK DAMS INSTALL AS NEEDED, SEE SHEET 3, SHEET C7   |
|  | PRESERVE & PROTECT EXISTING FACILITY/FEATURE DURING CONSTRUCTION (AS NOTED)                   |
|  | PRESERVE AND RELOCATE (AS NOTED)  |
|  | 2:1 SLOPE (TYP.) (WITH EROSION CONTROL BLANKETS) INSTALLED AND ANCHORED                       |

- CONSTRUCTION SEQUENCE**
1. CONDUCT A PRE-CONSTRUCTION MEETING WITH THE CITY AND OBTAIN REQUIRED PERMITS.
  2. FIELD LOCATE AND VERIFY ALL EXISTING SERVICES AND UTILITIES WITHIN THE PROJECT AREA PRIOR TO CONSTRUCTION. SEE VERIFICATION NOTE. THIS SHEET, FIELD VERIFY ALL UTILITY POINTS OF CONNECTIONS. CONTACT PROJECT ENGINEER IF CONNECTION POINTS DIFFER FROM PLANS.
  3. POST "NOTICE OF CONSTRUCTION ACTIVITY" SIGN WITH NAME AND PHONE NUMBER OF TESC SUPERVISOR.
  4. ESTABLISH CLEARING AND GRADING LIMITS.
  5. INSTALL INLET PROTECTION. SEE INLET PROTECTION NOTE ON THIS SHEET.
  6. INSTALL PERIMETER PROTECTION (SILT FENCE, BRUSH BARRIER, ETC.), AND AND OTHER EROSION CONTROL MEASURES AS NOTED.
  7. GRADE, INSTALL AND STABILIZE CONSTRUCTION ENTRANCE AND ACCESS THROUGH UNPAVED ROW OF WENDELL AVE. TO THE ONSITE PROJECT AREA. SIDE SLOPES SHALL BE STABILIZED UNTIL WALLS ARE CONSTRUCTED.
  8. CONSTRUCT SEDIMENT POND. CONTRACTOR SHALL CLEAN SEDIMENT POND AS NEEDED THROUGH CONSTRUCTION.
  9. CLEAR AND GRADE REMAINDER OF SITE WHILE CONSTRUCTING AND/OR MODIFYING SURFACE WATER CONTROLS (INTERCEPTOR DITCHES/SWALES, CHECK DAMS, ETC.). SEE CITY OF PORT ORCHARD EROSION AND SEDIMENT CONTROL NOTES ON SHEET C4.
  10. MAINTAIN ALL EROSION CONTROL MEASURES IN ACCORDANCE WITH THE CITY OF PORT ORCHARD STANDARDS.
  11. RELOCATE SURFACE WATER CONTROLS AND EROSION CONTROL MEASURES, OR INSTALL NEW MEASURES TO ENSURE THAT AS SITE CONDITIONS CHANGE THE EROSION AND SEDIMENT CONTROL IS ALWAYS IN ACCORDANCE WITH THE CITY OF PORT ORCHARD EROSION AND SEDIMENT CONTROL STANDARDS.
  12. INSTALL ONSITE INFILTRATION SYSTEMS. NO SEDIMENT LADEN STORMWATER SHALL BE ALLOWED TO ENTER THE SYSTEM. NO STORMWATER SHALL ENTER SYSTEM UNTIL ENTIRE SITE IS DEEMED FULLY STABILIZED BY CITY INSPECTOR AND/OR PROJECT ENGINEER.
  13. INSTALL WALLS (PER STRUCTURAL PLANS BY OTHERS).
  14. CONSTRUCT BUILDINGS AND ASSOCIATED EXTENDED FOUNDATIONS AS BUILDING PERMITS BECOME AVAILABLE.
  15. INSTALL UTILITIES AND STORM SYSTEMS PER PLANS (ON-SITE AND OFF-SITE).
  16. CONSTRUCT REMAINDER OF ON-SITE IMPROVEMENTS AND PAVE SITE.
  17. GRADE AND CONSTRUCT OFF-SITE ROAD IMPROVEMENTS PER PLAN. SEE VERIFICATION NOTE.
  18. ARRANGE FINAL INSPECTION WITH THE CITY.
  19. ON-SITE SILTATION FENCE TO REMAIN UNTIL THE SITE IS STABILIZED TO THE APPROVAL OF THE INSPECTOR.
  20. REMOVE TESC MEASURES WHEN ALLOWED BY THE CITY INSPECTOR.
  21. UPON COMPLETION OF THE PROJECT, ALL DISTURBED AREAS MUST BE STABILIZED AND BEST MANAGEMENT PRACTICES REMOVED, IF APPROPRIATE.

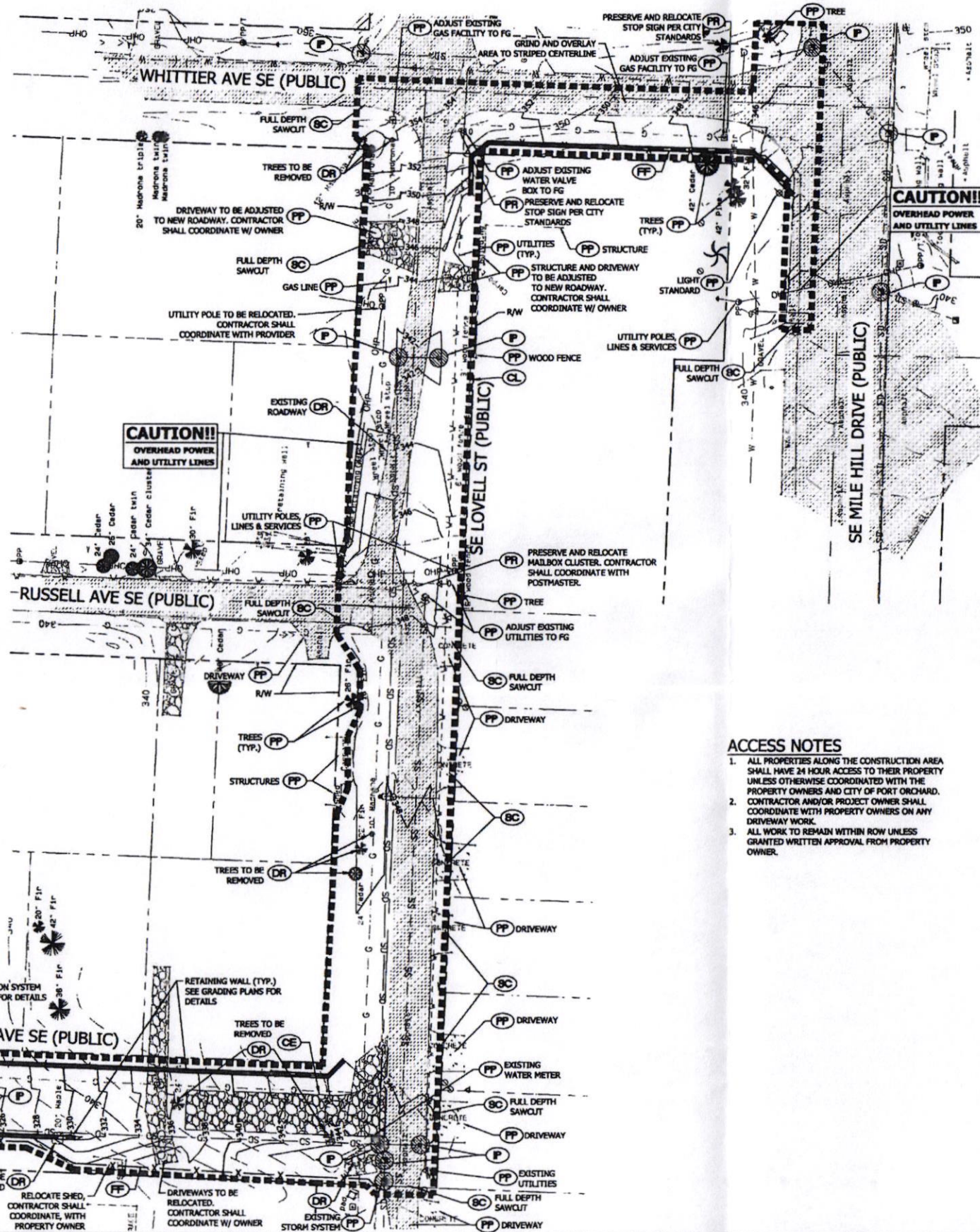
**VERIFICATION NOTE**  
 ALL EXISTING UTILITIES IN THE CONSTRUCTION AREA SHALL BE IDENTIFIED AND VERIFIED FOR DEPTH AND LOCATION PRIOR TO ANY CONSTRUCTION ACTIVITIES SO TO IDENTIFY ANY POTENTIAL CONFLICTS WITH PROPOSED CONSTRUCTION. CONTACT PROJECT ENGINEER IMMEDIATELY IF ANY CONFLICTS ARE IDENTIFIED.  
 PRIOR TO ANY CONSTRUCTION ACTIVITIES, VERIFY EXISTING TOPOGRAPHY IS CONSISTENT WITH WHAT IS SHOWN ON PLANS AND IF THERE ARE ANY POTENTIAL CONFLICTS WITH PROPOSED CONSTRUCTION ACTIVITIES, CONTACT PROJECT ENGINEER IMMEDIATELY IF ANY CONFLICTS ARE IDENTIFIED.

**CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG**

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| BY  |   |
| DATE  |   |
| DESCRIPTION   |   |
| REVISION  |   |
| <b>CONTOUR ENGINEERING, L.L.C.</b><br>CIVIL ENGINEERS-SURVEYORS-LAND PLANNERS<br>1309 56th Street NW, Suite 106 Gig Harbor, WA 98335<br>Phone: 253-857-5454 • Fax: 253-509-0044 • info@contourllc.com |   |
|   |   |
| SHEET TITLE: TESC PLAN-ONSITE   | DESIGNER: K. ROSE<br>ENGINEER: J. HALIG<br>DRAWN: B. MORRIS<br>S 30 T 24N R 2E WM<br>DATE: 2020.02.14<br>REVISED: |
| CLIENT: OLAA, LLC<br>15224 SE 365TH PLACE<br>AUBURN, WA 98002   | PHONE: (253) 255-7624   |
| PROJECT: 16-300<br>DWG NAME: 16-300-C   |   |
| SHEET   | REV.  |
| C5  | 5 OF 42   |



**OVERLOOK APARTMENTS PHASE II**  
 A PORTION OF THE SE 1/4 OF THE SW 1/4 OF SECTION 30, TOWNSHIP 24 NORTH, RANGE 2 EAST W.M.  
 CITY OF PORT ORCHARD, KITSAP COUNTY, WASHINGTON



**CITY OF PORT ORCHARD EROSION AND SEDIMENT CONTROL NOTES**

- APPROVAL OF THESE TEMPORARY EROSION AND SEDIMENT CONTROL (TESC) PLANS DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G., SIZE AND LOCATION OF ROADS, PIPES, RESTRICTORS, CHANNELS, RETENTION FACILITIES, UTILITIES, ETC.).
- THE IMPLEMENTATION OF THESE TESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE TESC FACILITIES IS THE RESPONSIBILITY OF THE APPLICANT/TEC SUPERVISOR UNTIL ALL CONSTRUCTION IS APPROVED.
- THE BOUNDARIES OF THE CLEARING LIMITS SHOWN ON THESE PLANS SHALL BE CLEARLY FLAGGED BY A CONTINUOUS LENGTH OF SURVEY TAPE (OR FENCING, IF REQUIRED) PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE CLEARING LIMITS SHALL BE PERMITTED. THE CLEARING LIMITS SHALL BE MAINTAINED BY THE APPLICANT/TEC SUPERVISOR FOR THE DURATION OF CONSTRUCTION.
- STABILIZED CONSTRUCTION ENTRANCES, IN ACCORDANCE WITH STANDARD DETAILS SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES, SUCH AS CONSTRUCTED WHEEL WASH SYSTEMS OR WASH PADS, MAY BE REQUIRED TO ENSURE THAT ALL PAVED AREAS ARE KEPT CLEAN AND TRACK-OUT TO STREET RIGHT-OF-WAY DOES NOT OCCUR FOR THE DURATION OF THE PROJECT.
- THE TESC FACILITIES SHOWN ON THESE PLANS MUST BE CONSTRUCTED PRIOR TO ALL CLEARING AND GRADING TO ENSURE THAT THE TRANSPORT OF SEDIMENT TO SURFACE WATERS, DRAINAGE SYSTEMS, AND ADJACENT PROPERTIES IS MINIMIZED.
- THE TESC FACILITIES SHOWN ON THESE PLANS ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE TESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND MODIFIED TO ACCOUNT FOR CHANGING SITE CONDITIONS (E.G., ADDITIONAL COVER MEASURES, ADDITIONAL SLUMP PUMPS, RELOCATION OF DITCHES AND SILT FENCES, ADDITIONAL PERIMETER PROTECTION, ETC.), AS DIRECTED BY THE CITY ENGINEER.
- THE TESC FACILITIES SHALL BE INSPECTED DAILY BY THE APPLICANT/TEC SUPERVISOR AND MAINTAINED TO ENSURE CONTINUED PROPER FUNCTIONING. WRITTEN RECORDS SHALL BE KEPT OF WEEKLY REVIEWS OF THE TESC FACILITIES DURING THE WET SEASON (OCTOBER 1 TO APRIL 30) AND OF MONTHLY REVIEWS DURING THE DRY SEASON (MAY 1 TO SEPTEMBER 30).
- ANY AREAS OF EXPOSED SOILS, INCLUDING ROADWAY EMBANKMENTS, THAT WILL NOT BE DISTURBED FOR TWO DAYS DURING THE WET SEASON OR SEVEN DAYS DURING THE DRY SEASON SHALL BE IMMEDIATELY STABILIZED WITH THE APPROVED TESC METHODS (E.G., SEEDING, MULCHING, PLASTIC COVERING, ETC.).
- ANY AREA NEEDING TESC MEASURES NOT REQUIRING IMMEDIATE ATTENTION SHALL BE ADDRESSED WITHIN SEVEN (7) DAYS.
- THE TESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE A MONTH OR WITHIN TWENTY-FOUR (24) HOURS FOLLOWING A STORM EVENT.
- AT NO TIME SHALL MORE THAN ONE (1) FOOT OF SEDIMENT BE ALLOWED TO ACCUMULATE WITHIN A CATCH BASIN. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEANED PRIOR TO FINAL INSPECTION. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT-LADEN WATER INTO A DOWNSTREAM SYSTEM.
- ANY PERMANENT FLOW CONTROL FACILITY USED AS A TEMPORARY SETTLING BASIN SHALL BE MODIFIED WITH THE NECESSARY EROSION CONTROL MEASURES AND SHALL PROVIDE ADEQUATE STORAGE CAPACITY. IF THE FACILITY IS TO FUNCTION ULTIMATELY AS AN INFILTRATION SYSTEM, THE TEMPORARY FACILITY MUST BE GRADED SO THAT THE BOTTOM AND SIDES ARE AT LEAST THREE (3) FEET ABOVE THE FINAL GRADE OF THE PERMANENT FACILITY.
- WHERE STRAW MULCH FOR TEMPORARY EROSION CONTROL IS REQUIRED, IT SHALL BE APPLIED AT A MINIMUM THICKNESS OF 2 TO 3 INCHES.
- PRIOR TO THE BEGINNING OF THE WET SEASON (OCTOBER 1), ALL DISTURBED AREAS SHALL BE REVIEWED TO IDENTIFY WHICH AREAS CAN BE SEED IN PREPARATION FOR THE WINTER RAINS. DISTURBED AREAS SHALL BE SEED WITHIN ONE WEEK OF THE BEGINNING OF THE WET SEASON. A SKETCH MAP OF THOSE AREAS TO BE SEED AND THOSE AREAS TO REMAIN UNCOVERED SHALL BE SUBMITTED TO THE CITY OF PORT ORCHARD CITY ENGINEER. THE INSPECTOR CAN REQUIRE SEEDING OF ADDITIONAL AREAS IN ORDER TO PROTECT SURFACE WATERS, ADJACENT PROPERTIES, OR DRAINAGE FACILITIES.

**CONTRACTOR NOTES**

- INLET PROTECTION SHALL BE INSTALLED ALONG ALL IMPACTED FRONTAGE AREAS AND ANY INLETS DOWNSTREAM THAT COULD RECEIVE ANY CONSTRUCTION RUNOFF OR AS REQUIRED BY THE CITY INSPECTOR.
- ORANGE CONSTRUCTION FENCE PER WSDOT 1-10.10-01 CAN BE UTILIZED IN PLACE OF FILTER FABRIC FENCE ONLY IN AREAS WHERE THE GRADES DO NOT ALLOW THE POTENTIAL FOR ANY STORMWATER FROM LEAVING THE SITE.
- ALL DEMOLISHED MATERIALS (BUILDING, CONCRETE, PAVEMENT, TREES, DECKS, ETC.) SHALL BE REMOVED FROM THE SITE AND DISPOSED OF AT A CITY APPROVED LOCATION AND IN A MANNER CONSISTENT WITH CURRENT REGULATIONS AND REQUIREMENTS.
- FILTER FABRIC FENCE LOCATION SHALL BE ADJUSTED AS NEEDED DURING CONSTRUCTION TO ENSURE THAT NO SEDIMENT IS ALLOWED TO LEAVE THE SITE. FENCE SHALL BE MAINTAINED UNTIL SITE IS FULLY STABILIZED AND AS ALLOWED BY THE CITY INSPECTOR.
- SECURE CONSTRUCTION FENCE SHOULD BE LOCATED AROUND PROJECT PERIMETER AND BE ADJUSTED AS NEEDED.
- CONTRACTOR SHALL DESIGNATE A WASHINGTON DEPT OF ECOLOGY CERTIFIED EROSION CONTROL LEAD PERSON, AND SHALL COMPLY WITH THE CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (SWPPP) PREPARED FOR THE PROJECT. A COPY OF THE SWPPP SHALL REMAIN ON SITE AT ALL TIMES.
- SEDIMENT LADEN RUNOFF SHALL NOT BE ALLOWED TO DISCHARGE BEYOND THE LIMITS OF THE IMPROVEMENTS. ADDITIONAL MEASURES SHALL BE INSTALLED AS NEEDED.
- AT ANY TIME DURING CONSTRUCTION IT IS DETERMINED BY THE CITY THAT MUD AND DEBRIS ARE BEING TRACKED ONTO PUBLIC STREETS WITH INSUFFICIENT CLEANUP, ALL WORK SHALL CEASE ON THE PROJECT UNTIL THIS CONDITION IS CORRECTED. THE CONTRACTOR AND/OR THE OWNER SHALL IMMEDIATELY TAKE ALL STEPS NECESSARY TO PREVENT FUTURE TRACKING OF MUD AND DEBRIS INTO THE PUBLIC ROW, WHICH MAY INCLUDE THE INSTALLATION OF A WHEEL WASH FACILITY ON-SITE.

**ACCESS NOTES**

- ALL PROPERTIES ALONG THE CONSTRUCTION AREA SHALL HAVE 24 HOUR ACCESS TO THEIR PROPERTY UNLESS OTHERWISE COORDINATED WITH THE PROPERTY OWNERS AND CITY OF PORT ORCHARD.
- CONTRACTOR AND/OR PROJECT OWNER SHALL COORDINATE WITH PROPERTY OWNERS ON ANY DRIVEWAY WORK.
- ALL WORK TO REMAIN WITHIN ROW UNLESS GRANTED WRITTEN APPROVAL FROM PROPERTY OWNER.

**VERIFICATION NOTE**

ALL EXISTING UTILITIES IN THE CONSTRUCTION AREA SHALL BE IDENTIFIED AND VERIFIED FOR DEPTH AND LOCATION PRIOR TO ANY CONSTRUCTION ACTIVITIES SO TO IDENTIFY ANY POTENTIAL CONFLICTS WITH PROPOSED CONSTRUCTION. CONTACT PROJECT ENGINEER IMMEDIATELY IF ANY CONFLICTS ARE IDENTIFIED.

PRIOR TO ANY CONSTRUCTION ACTIVITIES, VERIFY EXISTING TOPOGRAPHY IS CONSISTENT WITH WHAT IS SHOWN ON PLANS AND IF THERE ARE ANY POTENTIAL CONFLICTS WITH PROPOSED CONSTRUCTION ACTIVITIES, CONTACT PROJECT ENGINEER IMMEDIATELY IF ANY CONFLICTS ARE IDENTIFIED.

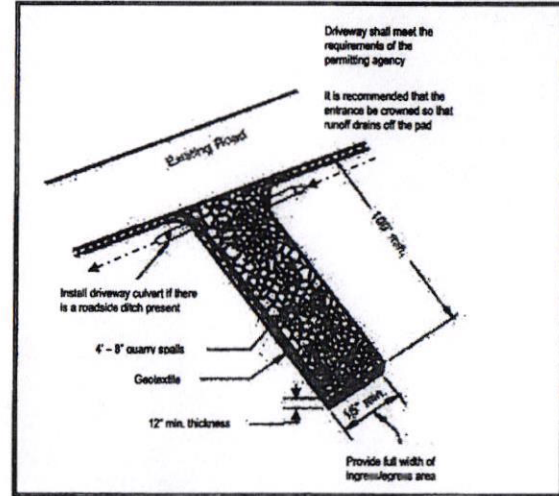
**CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG**

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| <b>CONTOUR</b>   |                       |
| ENGINEERING & LAND PLANNERS                                      |                       |
| CIVIL ENGINEERS/SURVEYORS  |                       |
| 3309 56th Street NW, Suite 106, Gig Harbor, WA 98335             |                       |
| Phone: 253-857-5454 Fax: 253-509-0044 Email: info@contourpac.com |                       |
|  |                       |
| SHEET TITLE: TESC PLAN - OFFSITE                                 |                       |
| OVERLOOK APARTMENTS PHASE II                                     |                       |
| CLIENT: OLAA, LLC  | PHONE: (253) 255-7624 |
| 15234 SE 86TH PLACE  |                       |
| AUBURN, WA 98002   |                       |
| CONTACT: MARK NORDLIE  |                       |
| DESIGNER: K. ROBE  |                       |
| ENGINEER: J. HAUG  |                       |
| DRAWN: B. MORRIS   |                       |
| S 30 T 24N R 2E WM   |                       |
| DATE: 2020.02.14   |                       |
| REVISOR:   |                       |
| PROJECT: 16-300  |                       |
| DWG NAME: 16-300-C   |                       |
| SHEET  | REV.                  |
| C6   |                       |
| 6 OF 42  |                       |

**OVERLOOK APARTMENTS PHASE II**  
 A PORTION OF THE SE 1/4 OF THE SW 1/4 OF SECTION 30, TOWNSHIP 24 NORTH, RANGE 2 EAST W.M.  
 CITY OF PORT ORCHARD, KITSAP COUNTY, WASHINGTON

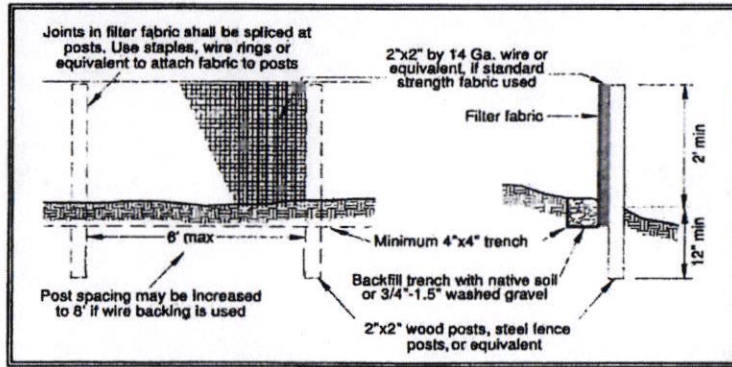


**Figure 4.1.1 - Stabilized Construction Entrance**

**CONSTRUCTION ENTRANCE NOTES**

- MATERIAL SHALL BE 4" TO 6" QUARRY SPALLS (4 TO 6 INCH FOR RESIDENTIAL SINGLE FAMILY LOTS) AND MAY BE TOP-DRESSED WITH 1 TO 3 INCH ROCK.
- THE ROCK PAD SHALL BE AT LEAST 12" THICK AND 100' LONG (REDUCED TO 20 FEET FOR SITES LESS THAN 1 ACRE OF DISTURBED SOIL) WIDTH SHALL BE FULL WIDTH OF INGRESS AND EGRESS AREA. SMALLER PADS MAY BE APPROVED FOR SINGLE-FAMILY RESIDENTIAL AND COMMERCIAL SITES.
- ADDITIONAL ROCK SHALL BE ADDED PERIODICALLY TO MAINTAIN FUNCTION OF THE PAD.
- IF THE PAD DOES NOT ADEQUATELY REMOVE MUD FROM THE VEHICLE WHEELS, THE WHEELS SHALL BE HOSED OFF BEFORE THE VEHICLE ENTERS A PAVED STREET. THE WASHING SHALL BE DONE ON AN AREA COVERED WITH CRUSHED ROCK AND WASH WATER SHALL DRAIN TO A SEDIMENT RETENTION FACILITY OR THROUGH A SILT FENCE.

**1 STABILIZED CONSTRUCTION ENTRANCE**  
NOT TO SCALE

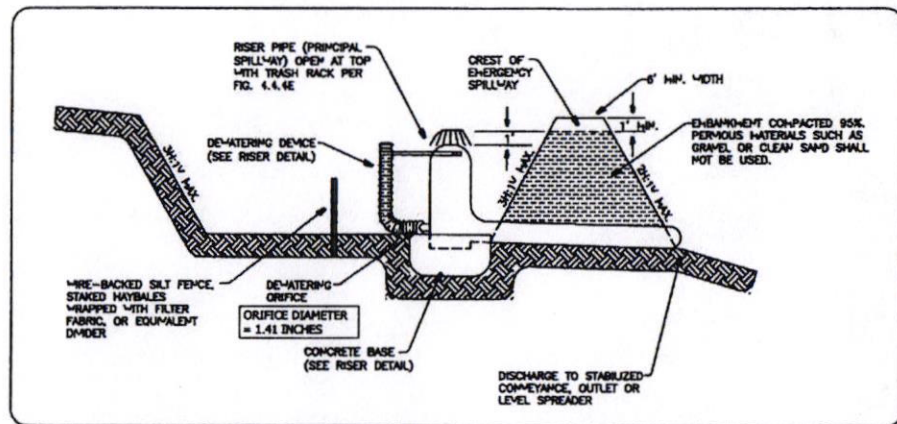


**Figure 4.2.12 - Silt Fence**

**FILTER FABRIC FENCE NOTES**

- FILTER FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL AND 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 A MINIMUM 6-INCH OVERLAP, AND SECURELY FASTENED AT BOTH ENDS TO POSTS.
- POSTS SHALL BE SPACED A MAXIMUM OF 6 FEET APART AND DRIVEN SECURELY INTO THE GROUND (MINIMUM OF 30 INCHES).
- A TRENCH SHALL BE EXCAVATED APPROXIMATELY 8 INCHES WIDE AND 13 INCHES DEEP ALONG THE LINE OF POSTS AND UPSLOPE FROM THE BARRIER. THIS TRENCH SHALL BE BACKFILLED WITH WASHED GRAVEL.
- WHEN STANDARD STRENGTH FILTER FABRIC IS USED, 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. THE WIRES OR HOG RINGS, THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 4 INCHES AND SHALL NOT EXTEND MORE THAN 24 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
- THE STANDARD STRENGTH FILTER FABRIC SHALL BE STAPLED OR WIRED TO THE FENCE, AND 20 INCHES OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT EXTEND MORE THAN 24 INCHES ABOVE THE ORIGINAL GROUND SURFACE. FILTER FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
- WHEN EXTRA-STRENGTH FILTER FABRIC AND CLOSER POST SPACING IS USED, THE WIRE MESH SUPPORT FENCE MAY BE ELIMINATED. IN SUCH A CASE, THE FILTER FABRIC IS STAPLED OR WIRED DIRECTLY TO THE POSTS WITH ALL OTHER PROVISIONS OF ABOVE NOTES APPLYING.
- FILTER FABRIC FENCES SHALL NOT BE REMOVED BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.
- FILTER FABRIC FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
- SILT FENCES WILL BE INSTALLED PARALLEL TO ANY SLOPE CONTOURS.
- CONTRIBUTING LENGTH TO FENCE WILL NOT BE GREATER THAN 100 FEET.
- DO NOT INSTALL BELOW AN OUTLET PIPE OR WEIR.
- INSTALL DOWNSLOPE OF EXPOSED AREAS.
- DO NOT DRIVE OVER OR FILL OVER SILT FENCES.

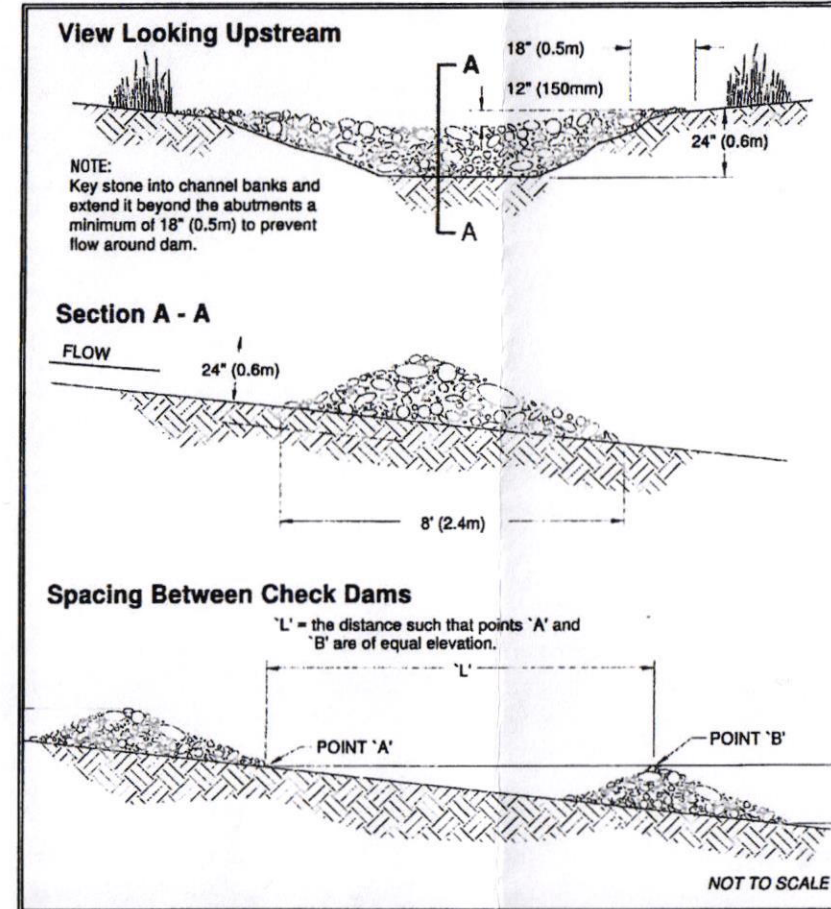
**2 FILTER FABRIC FENCE**  
NOT TO SCALE  
WSDOE FIG. 14.2.12



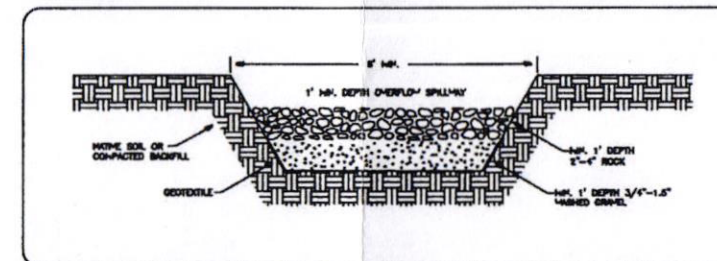
**6 TEMPORARY SEDIMENT POND**  
NOT TO SCALE  
COT SWM FIG. 2-31

**INTERCEPTOR DITCH NOTE**

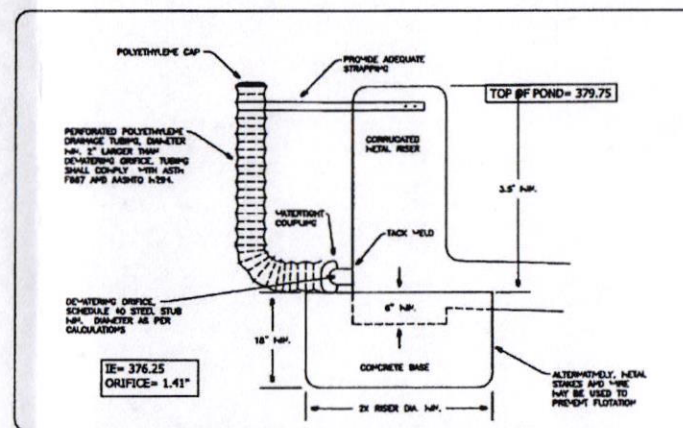
INTERCEPTOR DITCHES SHOWN ARE A SUGGESTION BASED ON FINISH GRADES. CONTRACTOR SHALL ADD/REMOVE AND ADJUST DITCHES AS NEEDED AND AS FIELD CONDITIONS WARRANT. INTERCEPTOR DITCH SHALL HAVE A MINIMUM SLOPE OF 2.5%.



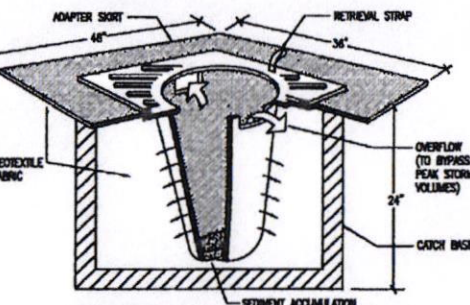
**3 ROCK CHECK DAM**  
NOT TO SCALE  
WSDOE FIG. 4.2.7



**8 TEMPORARY SEDIMENT POND EMERGENCY OVERFLOW SPILLWAY**  
NOT TO SCALE  
COT SWM FIG. 2-29



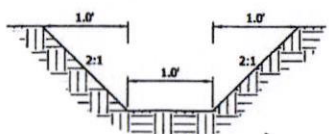
**7 SEDIMENT POND TEMPORARY RISER**  
NOT TO SCALE  
COT SWM FIG. 2-32



**INLET PROTECTION NOTES:**

- FILTERS SHALL BE INSPECTED AFTER EACH STORM EVENT AND CLEANED OR REPLACED WHEN 1/3 FULL.
- ALL CATCH BASINS WITHIN 500' DOWNSLOPE OF PROJECT SITE SHALL AS WELL AS ANY OTHER CATCH BASINS THAT COULD POSSIBLY RECEIVE RUNOFF FROM THE CONSTRUCTION SITE SHALL HAVE INLET PROTECTION INSTALLED AND MAINTAINED.

**4 INLET PROTECTION**  
NOT TO SCALE



**5 INTERCEPTOR DITCH CROSS SECTION**  
NOT TO SCALE

| REVISION   | DESCRIPTION | DATE |  | BY |  |
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|  |             |      |  |    |  |
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|  |             |      |  |    |  |
| <b>COUNTOUR</b><br>ENGINEERING • L.L.C.<br>CIVIL ENGINEERS ~ SURVEYORS ~ LAND PLANNERS<br>3309 56th Street NW, Suite 106, Gig Harbor, WA 98335<br>Phone: 253-857-5454 ~ Fax: 253-595-0044 ~ info@countourllc.com |             |      |  |    |  |
|  |             |      |  |    |  |
| <b>SHEET TITLE: RES NOTES &amp; DETAILS</b><br>OVERLOOK APARTMENTS PHASE II<br>CLIENT: OJAA, LLC<br>15234 SE 366TH PLACE<br>AUBURN, WA 98002<br>CONTACT: MARK NORDLIE<br>PHONE: (253) 255-7624                   |             |      |  |    |  |
| DESIGNER: K. ROSE<br>ENGINEER: J. HAUG<br>DRAWN: B. MORRIS<br>DATE: 2020.02.14<br>REVISED:<br>PROJECT: 16-300<br>DWG NUMBER: 16-300-C  |             |      |  |    |  |
| SHEET C7<br>7 OF 42  |             |      |  |    |  |

# **APPENDIX C**

## Construction BMPs

damage from burying and smothering.

- Vegetative buffer zones for streams, lakes or other waterways shall be established by the local permitting authority or other state or federal permits or approvals.

### ***Maintenance Standards***

Inspect the area frequently to make sure flagging remains in place and the area remains undisturbed. Replace all damaged flagging immediately.

## **BMP C103: High Visibility Fence**

### ***Purpose***

Fencing is intended to:

1. Restrict clearing to approved limits.
2. Prevent disturbance of sensitive areas, their buffers, and other areas required to be left undisturbed.
3. Limit construction traffic to designated construction entrances, exits, or internal roads.
4. Protect areas where marking with survey tape may not provide adequate protection.

### ***Conditions of Use***

To establish clearing limits plastic, fabric, or metal fence may be used:

- At the boundary of sensitive areas, their buffers, and other areas required to be left uncleared.
- As necessary to control vehicle access to and on the site.

### ***Design and Installation Specifications***

High visibility plastic fence shall be composed of a high-density polyethylene material and shall be at least four feet in height. Posts for the fencing shall be steel or wood and placed every 6 feet on center (maximum) or as needed to ensure rigidity. The fencing shall be fastened to the post every six inches with a polyethylene tie. On long continuous lengths of fencing, a tension wire or rope shall be used as a top stringer to prevent sagging between posts. The fence color shall be high visibility orange. The fence tensile strength shall be 360 lbs./ft. using the ASTM D4595 testing method.

If appropriate install fabric silt fence in accordance with BMP C233: Silt Fence (p.367) to act as high visibility fence. Silt fence shall be at least 3 feet high and must be highly visible to meet the requirements of this BMP.

Metal fences shall be designed and installed according to the manufacturer's specifications.

Metal fences shall be at least 3 feet high and must be highly visible.

Fences shall not be wired or stapled to trees.

### ***Maintenance Standards***

If the fence has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.

## **BMP C105: Stabilized Construction Entrance / Exit**

### ***Purpose***

Stabilized Construction entrances are established to reduce the amount of sediment transported onto paved roads by vehicles or equipment. This is done by constructing a stabilized pad of quarry spalls at entrances and exits for construction sites.

### ***Conditions of Use***

Construction entrances shall be stabilized wherever traffic will be entering or leaving a construction site if paved roads or other paved areas are within 1,000 feet of the site.

For residential construction provide stabilized construction entrances for each residence, rather than only at the main subdivision entrance. Stabilized surfaces shall be of sufficient length/width to provide vehicle access/parking, based on lot size/configuration.

On large commercial, highway, and road projects, the designer should include enough extra materials in the contract to allow for additional stabilized entrances not shown in the initial Construction SWPPP. It is difficult to determine exactly where access to these projects will take place; additional materials will enable the contractor to install them where needed.

### ***Design and Installation Specifications***

See Figure II-4.1.1 Stabilized Construction Entrance (p.273) for details. Note: the 100' minimum length of the entrance shall be reduced to the maximum practicable size when the size or configuration of the site does not allow the full length (100').

Construct stabilized construction entrances with a 12-inch thick pad of 4-inch to 8-inch quarry spalls, a 4-inch course of asphalt treated base (ATB), or use existing pavement. Do not use crushed concrete, cement, or calcium chloride for construction entrance stabilization because these products raise pH levels in stormwater and concrete discharge to surface waters of the State is prohibited.



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 min.                     |
| Grab Tensile Elongation (ASTM D4632)   | 30% max.                         |
| Mullen Burst Strength (ASTM D3786-80a) | 400 psi min.                     |
| AOS (ASTM D4751)                       | 20-45 (U.S. standard sieve size) |

- Consider early installation of the first lift of asphalt in areas that will be paved; this can be used as a stabilized entrance. Also consider the installation of excess concrete as a stabilized entrance. During large concrete pours, excess concrete is often available for this purpose.
- Fencing (see BMP C103: High Visibility Fence (p.269)) shall be installed as necessary to restrict traffic to the construction entrance.
- Whenever possible, the entrance shall be constructed on a firm, compacted subgrade. This can substantially increase the effectiveness of the pad and reduce the need for maintenance.
- Construction entrances should avoid crossing existing sidewalks and back of walk drains if at all possible. If a construction entrance must cross a sidewalk or back of walk drain, the full length of the sidewalk and back of walk drain must be covered and protected from sediment leaving the site.

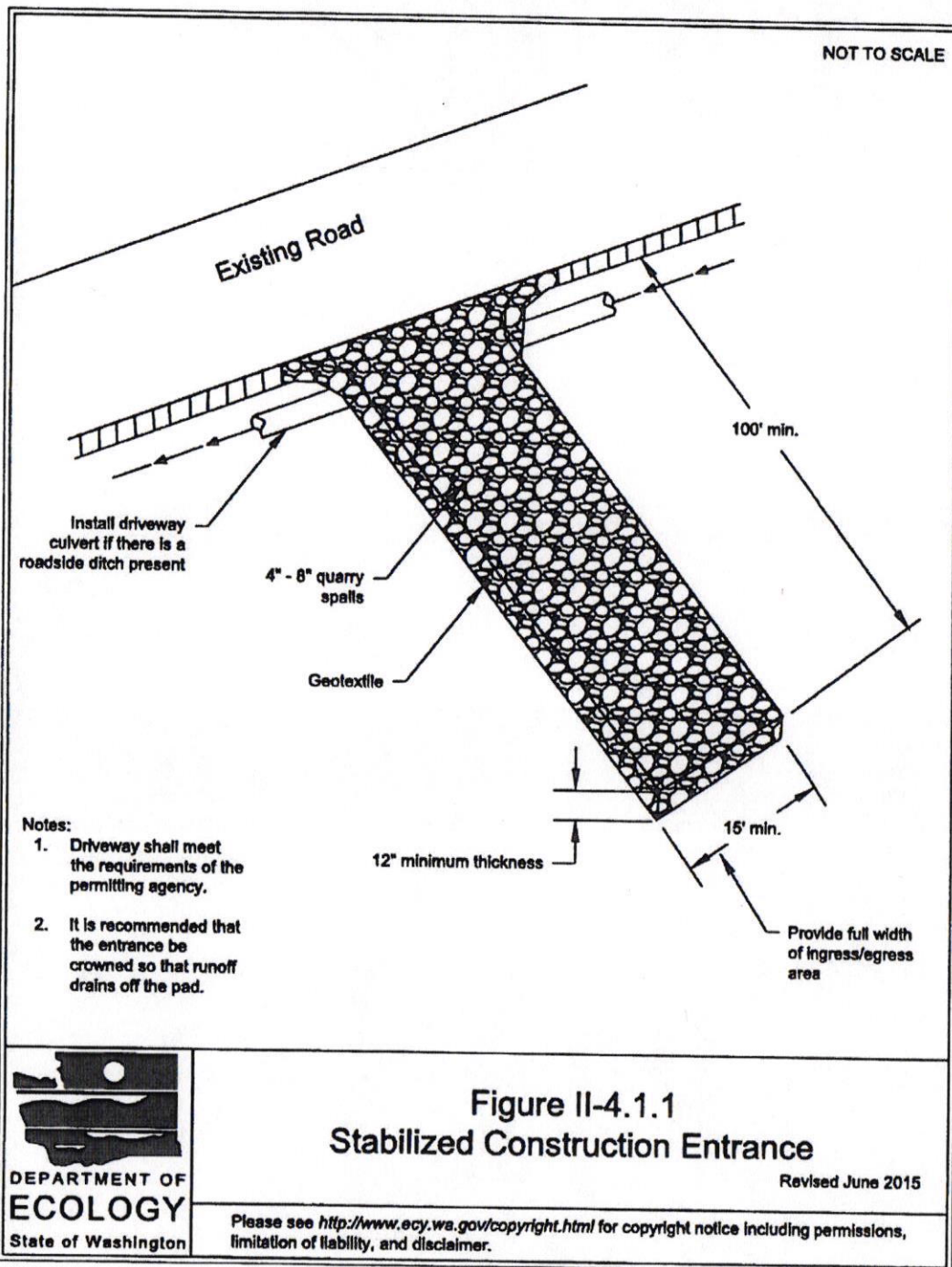
### ***Maintenance Standards***

Quarry spalls shall be added if the pad is no longer in accordance with the specifications.

- 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, street sweeping, an increase in the dimensions of the entrance, or the installation of a wheel wash.
- Any sediment that is tracked onto pavement shall be removed by shoveling or street sweeping. The sediment collected by sweeping shall be removed or stabilized on site. The pavement shall not be cleaned by washing down the street, except when high efficiency sweeping is ineffective and there is a threat to public safety. If it is necessary to wash the streets, the construction of a small sump to contain the wash water shall be considered. The sediment would then be washed into the sump where it can be controlled.
- Perform street sweeping by hand or with a high efficiency sweeper. Do not use a non-high efficiency mechanical sweeper because this creates dust and throws soils into storm systems or conveyance ditches.

- Any quarry spalls that are loosened from the pad, which end up on the roadway shall be removed immediately.
- If vehicles are entering or exiting the site at points other than the construction entrance(s), fencing (see BMP C103) shall be installed to control traffic.
- Upon project completion and site stabilization, all construction accesses intended as permanent access for maintenance shall be permanently stabilized.

**Figure II-4.1.1 Stabilized Construction Entrance**



- Storm drain inlets shall be protected to prevent sediment-laden water entering the storm drain system (see BMP C220: Storm Drain Inlet Protection (p.357)).

### ***Maintenance Standards***

Inspect stabilized areas regularly, especially after large storm events.

Crushed rock, gravel base, etc., shall be added as required to maintain a stable driving surface and to stabilize any areas that have eroded.

Following construction, these areas shall be restored to pre-construction condition or better to prevent future erosion.

Perform street cleaning at the end of each day or more often if necessary.

### **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 with straw 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 (p.284) 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 per-

manent stabilization measures (such as pavement, riprap, gabions, or geotextiles) which will prevent erosion.

### ***Design and Installation Specifications***

Seed retention/detention ponds as required.

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 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 hydromulch and erosion control 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 (p.284) 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.
- 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:
  1. Phase 1- Install all seed and fertilizer with 25-30 percent mulch and tackifier onto soil in the first lift.
  2. Phase 2- Install the rest of the mulch and tackifier over the first lift.

Or, enhance vegetation by:

1. Installing the mulch, seed, fertilizer, and tackifier in one lift.
2. Spread or blow straw over the top of the hydromulch at a rate of 800-1000 pounds per acre.
3. 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 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 the tables below include recommended mixes for both temporary and permanent seeding.
  - Apply these mixes, with the exception of the wetland mix, at a rate of 120 pounds per acre. This rate can be reduced if soil amendments or slow-release fertilizers are used.
  - Consult the local suppliers or the local conservation district for their recommendations because 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.
  - Other mixes may be appropriate, depending on the soil type and hydrology of the area.
- Table II-4.1.2 Temporary Erosion Control Seed Mix (p.280) lists the standard mix for areas requiring a temporary vegetative cover.

**Table II-4.1.2 Temporary Erosion Control Seed Mix**

|  | % Weight | % Purity | % Germination |
|--|----------|----------|---------------|
| Chewings or annual blue grass<br><i>Festuca rubra var. commutata</i> or <i>Poa annua</i> | 40       | 98       | 90            |
| Perennial rye<br><i>Lolium perenne</i>   | 50       | 98       | 90            |
| Redtop or colonial bentgrass<br><i>Agrostis alba</i> or <i>Agrostis tenuis</i>           | 5        | 92       | 85            |
| White dutch clover<br><i>Trifolium repens</i>  | 5        | 98       | 90            |

- Table II-4.1.3 Landscaping Seed Mix (p.281) lists a recommended mix for landscaping seed.

**Table II-4.1.3 Landscaping Seed Mix**

|  | % Weight | % Purity | % Germination |
|--|----------|----------|---------------|
| Perennial rye blend  | 70       | 98       | 90            |
| <i>Lolium perenne</i>  |          |          |               |
| Chewings and red fescue blend                                      | 30       | 98       | 90            |
| <i>Festuca rubra</i> var. <i>commutata</i> or <i>Festuca rubra</i> |          |          |               |

- Table II-4.1.4 Low-Growing Turf Seed Mix (p.281) lists a turf seed mix for dry situations where there is no need for watering. This mix requires very little maintenance.

**Table II-4.1.4 Low-Growing Turf Seed Mix**

|   | % Weight | % Purity | % Germination |
|---|----------|----------|---------------|
| Dwarf tall fescue (several varieties)     | 45       | 98       | 90            |
| <i>Festuca arundinacea</i> var.           |          |          |               |
| Dwarf perennial rye (Barclay)             | 30       | 98       | 90            |
| <i>Lolium perenne</i> var. <i>barclay</i> |          |          |               |
| Red fescue                                | 20       | 98       | 90            |
| <i>Festuca rubra</i>                      |          |          |               |
| Colonial bentgrass                        | 5        | 98       | 90            |
| <i>Agrostis tenuis</i>                    |          |          |               |

- Table II-4.1.5 Bioswale Seed Mix\* (p.281) lists a mix for bioswales and other intermittently wet areas.

**Table II-4.1.5 Bioswale Seed Mix\***

|  | % Weight | % Purity | % Germination |
|--|----------|----------|---------------|
| Tall or meadow fescue                                | 75-80    | 98       | 90            |
| <i>Festuca arundinacea</i> or <i>Festuca elatior</i> |          |          |               |
| Seaside/Creeping bentgrass                           | 10-15    | 92       | 85            |
| <i>Agrostis palustris</i>                            |          |          |               |
| Redtop bentgrass                                     | 5-10     | 90       | 80            |
| <i>Agrostis alba</i> or <i>Agrostis gigantea</i>     |          |          |               |

\* Modified Briargreen, Inc. Hydroseeding Guide Wetlands Seed Mix

- Table II-4.1.6 Wet Area Seed Mix\* (p.282) lists a low-growing, relatively non-invasive seed mix appropriate for very wet areas that are not regulated wetlands. Apply

this mixture at a rate of 60 pounds per acre. Consult Hydraulic Permit Authority (HPA) for seed mixes if applicable.

**Table II-4.1.6 Wet Area Seed Mix\***

|   | <b>% Weight</b> | <b>% Purity</b> | <b>% Germination</b> |
|---|-----------------|-----------------|----------------------|
| Tall or meadow fescue<br><i>Festuca arundinacea</i> or <i>Festuca elatior</i> | 60-70           | 98              | 90                   |
| Seaside/Creeping bentgrass<br><i>Agrostis palustris</i>                       | 10-15           | 98              | 85                   |
| Meadow foxtail<br><i>Alepocurus pratensis</i>                                 | 10-15           | 90              | 80                   |
| Alsike clover<br><i>Trifolium hybridum</i>                                    | 1-6             | 98              | 90                   |
| Redtop bentgrass<br><i>Agrostis alba</i>                                      | 1-6             | 92              | 85                   |

\* Modified Briargreen, Inc. Hydroseeding Guide Wetlands Seed Mix

- Table II-4.1.7 Meadow Seed Mix (p.282) lists 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.

**Table II-4.1.7 Meadow Seed Mix**

|   | <b>% Weight</b> | <b>% Purity</b> | <b>% Germination</b> |
|---|-----------------|-----------------|----------------------|
| Redtop or Oregon bentgrass<br><i>Agrostis alba</i> or <i>Agrostis oregonensis</i> | 20              | 92              | 85                   |
| Red fescue<br><i>Festuca rubra</i>  | 70              | 98              | 90                   |
| White dutch clover<br><i>Trifolium repens</i>                                     | 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 performance 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 of mulch with approximately 10 percent tackifier. Achieve a minimum of 95 percent soil coverage during application. Numerous products are available commercially. Installed products per manufacturer's instructions. 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.

- BFM 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 80 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, or nets/blankets. If winter weather prevents adequate grass growth, this time limit may be relaxed at the discretion of the local authority when sensitive areas would otherwise be protected.

- 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 runoff.

### ***Approved as Equivalent***

Ecology has approved products as able to meet the requirements of BMP C120: Temporary and Permanent Seeding. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at <http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html>.

## **BMP C121: Mulching**

### ***Purpose***

Mulching soils provides immediate temporary protection from erosion. Mulch also enhances plant establishment by conserving moisture, holding fertilizer, seed, and topsoil in place, and moderating soil temperatures. There is an enormous variety of mulches that can be used. This section discusses only the most common types of mulch.

### ***Conditions of Use***

As a temporary cover measure, mulch should be used:

- For less than 30 days on disturbed areas that require cover.
- At all times for seeded areas, especially during the wet season and during the hot summer months.
- During the wet season on slopes steeper than 3H:1V with more than 10 feet of vertical relief.

Mulch may be applied at any time of the year and must be refreshed periodically.

- For seeded areas mulch may be made up of 100 percent: cottonseed meal; fibers made of wood, recycled cellulose, hemp, kenaf; compost; or blends of these. Tackifier shall be plant-based, such as guar or alpha plantago, or chemical-based such as polyacrylamide or polymers. Any mulch or tackifier product used shall be installed per manufacturer's instructions. Generally, mulches come in 40-50 pound bags. Seed and fertilizer are added at time of application.

### ***Design and Installation Specifications***

For mulch materials, application rates, and specifications, see Table II-4.1.8 Mulch Standards and Guidelines (p.286). Always use a 2-inch minimum mulch thickness; increase the thickness until the ground is 95% covered (i.e. not visible under the mulch layer). Note: Thickness may be increased for disturbed areas in or near sensitive areas or other areas highly susceptible to erosion.

Where the option of "Compost" is selected, it should be a coarse compost that meets the following size gradations when tested in accordance with the U.S. Composting Council "Test Methods for the Examination of Compost and Composting" (TMECC) Test Method 02.02-B.

#### **Coarse Compost**

Minimum Percent passing 3" sieve openings 100%

Minimum Percent passing 1" sieve openings 90%

Minimum Percent passing ¾" sieve openings 70%

Minimum Percent passing ¼" sieve openings 40%

Mulch used within the ordinary high-water mark of surface waters should be selected to minimize potential flotation of organic matter. Composted organic materials have higher specific gravities (densities) than straw, wood, or chipped material. Consult Hydraulic Permit Authority (HPA) for mulch mixes if applicable.

### ***Maintenance Standards***

- The thickness of the cover must be maintained.
- Any areas that experience erosion shall be remulched and/or protected with a net

or blanket. If the erosion problem is drainage related, then the problem shall be fixed and the eroded area remulched.

**Table II-4.1.8 Mulch Standards and Guidelines**

| Mulch Material | Quality Standards  | Application Rates   | Remarks   |
|----------------|--|---|---|
| Straw          | Air-dried; free from undesirable seed and coarse material.   | 2"-3" thick; 5 bales per 1,000 sf or 2-3 tons per acre              | Cost-effective protection when applied with adequate thickness. Hand-application generally requires greater thickness than blown straw. The thickness of straw may be reduced by half when used in conjunction with seeding. In windy areas straw must be held in place by crimping, using a tackifier, or covering with netting. Blown straw always has to be held in place with a tackifier as even light winds will blow it away. Straw, however, has several deficiencies that should be considered when selecting mulch materials. It often introduces and/or encourages the propagation of weed species and it has no significant long-term benefits. It should also not be used within the ordinary high-water elevation of surface waters (due to flotation). |
| Hydromulch     | No growth inhibiting factors.  | Approx. 25-30 lbs per 1,000 sf or 1,500 - 2,000 lbs per acre        | Shall be applied with hydromulcher. Shall not be used without seed and tackifier unless the application rate is at least doubled. Fibers longer than about 3/4 - 1 inch clog hydromulch equipment. Fibers should be kept to less than 3/4 inch.   |
| Compost        | No visible water or dust during handling. Must be produced per WAC 173-350, Solid Waste Handling Standards, but may have up to 35% | 2" thick min.; approx. 100 tons per acre (approx. 800 lbs per yard) | More effective control can be obtained by increasing thickness to 3". Excellent mulch for protecting final grades until landscaping because it can be directly seeded or tilled into soil as an amendment. Compost used for mulch has a coarser size gradation than compost used for <u>BMP C125: Topsoiling / Composting (p.297)</u> or <u>BMP T5.13: Post-Construction Soil Quality and Depth (p.911)</u> . It is more stable and practical to use in wet areas and during rainy weather conditions. Do not use near wetlands or near phosphorous impaired water bodies.  |

**Table II-4.1.8 Mulch Standards and Guidelines (continued)**

| Mulch Material                 | Quality Standards  | Application Rates  | Remarks   |
|--------------------------------|--|--|---|
|                                | biosolids.   |  |   |
| Chipped Site Vegetation        | Average size shall be several inches. Gradations from fines to 6 inches in length for texture, variation, and interlocking properties.                     | 2" thick min.;   | This is a cost-effective way to dispose of debris from clearing and grubbing, and it eliminates the problems associated with burning. Generally, it should not be used on slopes above approx. 10% because of its tendency to be transported by runoff. It is not recommended within 200 feet of surface waters. If seeding is expected shortly after mulch, the decomposition of the chipped vegetation may tie up nutrients important to grass establishment. |
| Wood-based Mulch or Wood Straw | No visible water or dust during handling. Must be purchased from a supplier with a Solid Waste Handling Permit or one exempt from solid waste regulations. | 2" thick min.; approx. 100 tons per acre (approx. 800 lbs. per cubic yard) | This material is often called "hog or hogged fuel". The use of mulch ultimately improves the organic matter in the soil. Special caution is advised regarding the source and composition of wood-based mulches. Its preparation typically does not provide any weed seed control, so evidence of residual vegetation in its composition or known inclusion of weed plants or seeds should be monitored and prevented (or minimized).                            |
| Wood Strand Mulch              | A blend of loose, long, thin wood pieces derived from native conifer or deciduous trees with   | 2" thick min.  | Cost-effective protection when applied with adequate thickness. A minimum of 95-percent of the wood strand shall have lengths between 2 and 10-inches, with a width and thickness between 1/16 and 3/8-inches. The mulch shall not contain resin, tannin, or other compounds in quantities that would be detrimental to plant life. Sawdust or wood shavings shall not be used as mulch. (WSDOT specification (9-14.4(4)))                                      |

## **BMP C123: Plastic Covering**

### ***Purpose***

Plastic covering provides immediate, short-term erosion protection to slopes and disturbed areas.

### ***Conditions of Use***

Plastic covering may be used on disturbed areas that require cover measures for less than 30 days, except as stated below.

- Plastic is particularly useful for protecting cut and fill slopes and stockpiles. Note: The relatively rapid breakdown of most polyethylene sheeting makes it unsuitable for long-term (greater than six months) applications.
- Due to rapid runoff caused by plastic covering, do not use this method upslope of areas that might be adversely impacted by concentrated runoff. Such areas include steep and/or unstable slopes.
- Plastic sheeting may result in increased runoff volumes and velocities, requiring additional on-site measures to counteract the increases. Creating a trough with wattles or other material can convey clean water away from these areas.
- To prevent undercutting, trench and backfill rolled plastic covering products.
- While plastic is inexpensive to purchase, the added cost of installation, maintenance, removal, and disposal make this an expensive material, up to \$1.50-2.00 per square yard.
- Whenever plastic is used to protect slopes install water collection measures at the base of the slope. These measures include plastic-covered berms, channels, and pipes used to convey clean rainwater away from bare soil and disturbed areas. Do not mix clean runoff from a plastic covered slope with dirty runoff from a project.
- Other uses for plastic include:
  1. Temporary ditch liner.
  2. Pond liner in temporary sediment pond.
  3. Liner for bermed temporary fuel storage area if plastic is not reactive to the type of fuel being stored.
  4. Emergency slope protection during heavy rains.
  5. Temporary drainpipe ("elephant trunk") used to direct water.

## ***Design and Installation Specifications***

- Plastic slope cover must be installed as follows:
  1. Run plastic up and down slope, not across slope.
  2. Plastic may be installed perpendicular to a slope if the slope length is less than 10 feet.
  3. Minimum of 8-inch overlap at seams.
  4. On long or wide slopes, or slopes subject to wind, tape all seams.
  5. Place plastic into a small (12-inch wide by 6-inch deep) slot trench at the top of the slope and backfill with soil to keep water from flowing underneath.
  6. Place sand filled burlap or geotextile bags every 3 to 6 feet along seams and tie them together with twine to hold them in place.
  7. Inspect plastic for rips, tears, and open seams regularly and repair immediately. This prevents high velocity runoff from contacting bare soil which causes extreme erosion.
  8. Sandbags may be lowered into place tied to ropes. However, all sandbags must be staked in place.
- Plastic sheeting shall have a minimum thickness of 0.06 millimeters.
- If erosion at the toe of a slope is likely, a gravel berm, riprap, or other suitable protection shall be installed at the toe of the slope in order to reduce the velocity of runoff.

## ***Maintenance Standards***

- Torn sheets must be replaced and open seams repaired.
- Completely remove and replace the plastic if it begins to deteriorate due to ultra-violet radiation.
- Completely remove plastic when no longer needed.
- Dispose of old tires used to weight down plastic sheeting appropriately.

## ***Approved as Equivalent***

Ecology has approved products as able to meet the requirements of BMP C123: Plastic Covering. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at <http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html>

## **BMP C160: Certified Erosion and Sediment Control Lead**

### ***Purpose***

The project proponent designates at least one person as the responsible representative in charge of erosion and sediment control (ESC), and water quality protection. The designated person shall be the Certified Erosion and Sediment Control Lead (CESCL) who is responsible for ensuring compliance with all local, state, and federal erosion and sediment control and water quality requirements.

### ***Conditions of Use***

A CESCL shall be made available on projects one acre or larger that discharge stormwater to surface waters of the state. Sites less than one acre may have a person without CESCL certification conduct inspections; sampling is not required on sites that disturb less than an acre.

- The CESCL shall:
  - Have a current certificate proving attendance in an erosion and sediment control training course that meets the minimum ESC training and certification requirements established by Ecology (see details below).

Ecology will maintain a list of ESC training and certification providers at:  
<http://www.ecy.wa.gov/programs/wq/stormwater/cescl.html>

**OR**

- Be a Certified Professional in Erosion and Sediment Control (CPESC); for additional information go to: <http://www.envirocertintl.org/cpesc/>

### ***Specifications***

- Certification shall remain valid for three years.
- The CESCL shall have authority to act on behalf of the contractor or developer and shall be available, or on-call, 24 hours per day throughout the period of construction.
- The Construction SWPPP shall include the name, telephone number, fax number, and address of the designated CESCL.
- A CESCL may provide inspection and compliance services for multiple construction projects in the same geographic region.

Duties and responsibilities of the CESCL shall include, but are not limited to the following:



- Maintaining permit file on site at all times which includes the Construction SWPPP and any associated permits and plans.
- Directing BMP installation, inspection, maintenance, modification, and removal.
- Updating all project drawings and the Construction SWPPP with changes made.
- Completing any sampling requirements including reporting results using WebDMR.
- Keeping daily logs, and inspection reports. Inspection reports should include:
  - Inspection date/time.
  - Weather information; general conditions during inspection and approximate amount of precipitation since the last inspection.
  - A summary or list of all BMPs implemented, including observations of all erosion/sediment control structures or practices. The following shall be noted:
    1. Locations of BMPs inspected.
    2. Locations of BMPs that need maintenance.
    3. Locations of BMPs that failed to operate as designed or intended.
    4. Locations of where additional or different BMPs are required.
  - Visual monitoring results, including a description of discharged stormwater. The presence of suspended sediment, turbid water, discoloration, and oil sheen shall be noted, as applicable.
  - Any water quality monitoring performed during inspection.
  - General comments and notes, including a brief description of any BMP repairs, maintenance or installations made as a result of the inspection.
- Facilitate, participate in, and take corrective actions resulting from inspections performed by outside agencies or the owner.

## **BMP C162: Scheduling**

### ***Purpose***

Sequencing a construction project reduces the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking.

### ***Conditions of Use***

The construction sequence schedule is an orderly listing of all major land-disturbing activities together with the necessary erosion and sedimentation control measures

1. If the discharge velocity at the outlet is less than 5 fps (pipe slope less than 1 percent), use 2-inch to 8-inch riprap. Minimum thickness is 1-foot.
  2. For 5 to 10 fps discharge velocity at the outlet (pipe slope less than 3 percent), use 24-inch to 48-inch riprap. Minimum thickness is 2 feet.
  3. For outlets at the base of steep slope pipes (pipe slope greater than 10 percent), an engineered energy dissipater shall be used.
- Filter fabric or erosion control blankets should always be used under riprap to prevent scour and channel erosion.
  - New pipe outfalls can provide an opportunity for low-cost fish habitat improvements. For example, an alcove of low-velocity water can be created by constructing the pipe outfall and associated energy dissipater back from the stream edge and digging a channel, over-widened to the upstream side, from the outfall. Overwintering juvenile and migrating adult salmonids may use the alcove as shelter during high flows. Bank stabilization, bioengineering, and habitat features may be required for disturbed areas. This work may require a HPA. See Volume V (p.765) for more information on outfall system design.

### ***Maintenance Standards***

- Inspect and repair as needed.
- Add rock as needed to maintain the intended function.
- Clean energy dissipater if sediment builds up.

## **BMP C220: Storm Drain Inlet Protection**

### ***Purpose***

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

### ***Conditions of Use***

Use storm drain inlet protection at inlets that are operational before permanent stabilization of the disturbed drainage area. Provide protection for all storm drain inlets downslope and within 500 feet of a disturbed or construction area, unless conveying runoff entering catch basins to a sediment pond or trap.

Also consider inlet protection for lawn and yard drains on new home construction. These small and numerous drains coupled with lack of gutters in new home construction 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 pre-

vent sediment from entering the system until completion of landscaping. Provide 18-inches of sod around each finished lawn and yard drain.

Table II-4.2.2 Storm Drain Inlet Protection (p.358) lists several options for inlet protection. All of the methods for storm drain inlet protection tend to plug and require a high frequency of maintenance. Limit drainage areas to one acre or less. Possibly provide emergency overflows with additional end-of-pipe treatment where stormwater ponding would cause a hazard.

**Table II-4.2.2 Storm Drain Inlet Protection**

| Type of Inlet Protection               | Emergency Overflow                 | Applicable for Paved/ Earthen Surfaces | Conditions of Use  |
|--|------------------------------------|--|--|
| <b>Drop Inlet Protection</b>           |                                    |  |  |
| Excavated drop inlet protection        | Yes, temporary flooding will 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                                 |  | Applicable for heavy concentrated flows. Will pond. Can withstand traffic.         |
| Catch basin filters                    | Yes                                | Paved or Earthen                       | Frequent Maintenance required.   |
| <b>Curb Inlet Protection</b>           |                                    |  |  |
| 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.  |
| <b>Culvert Inlet Protection</b>        |                                    |  |  |
| Culvert inlet Sediment trap            |                                    |  | 18 month expected life.  |

**Design and Installation Specifications**

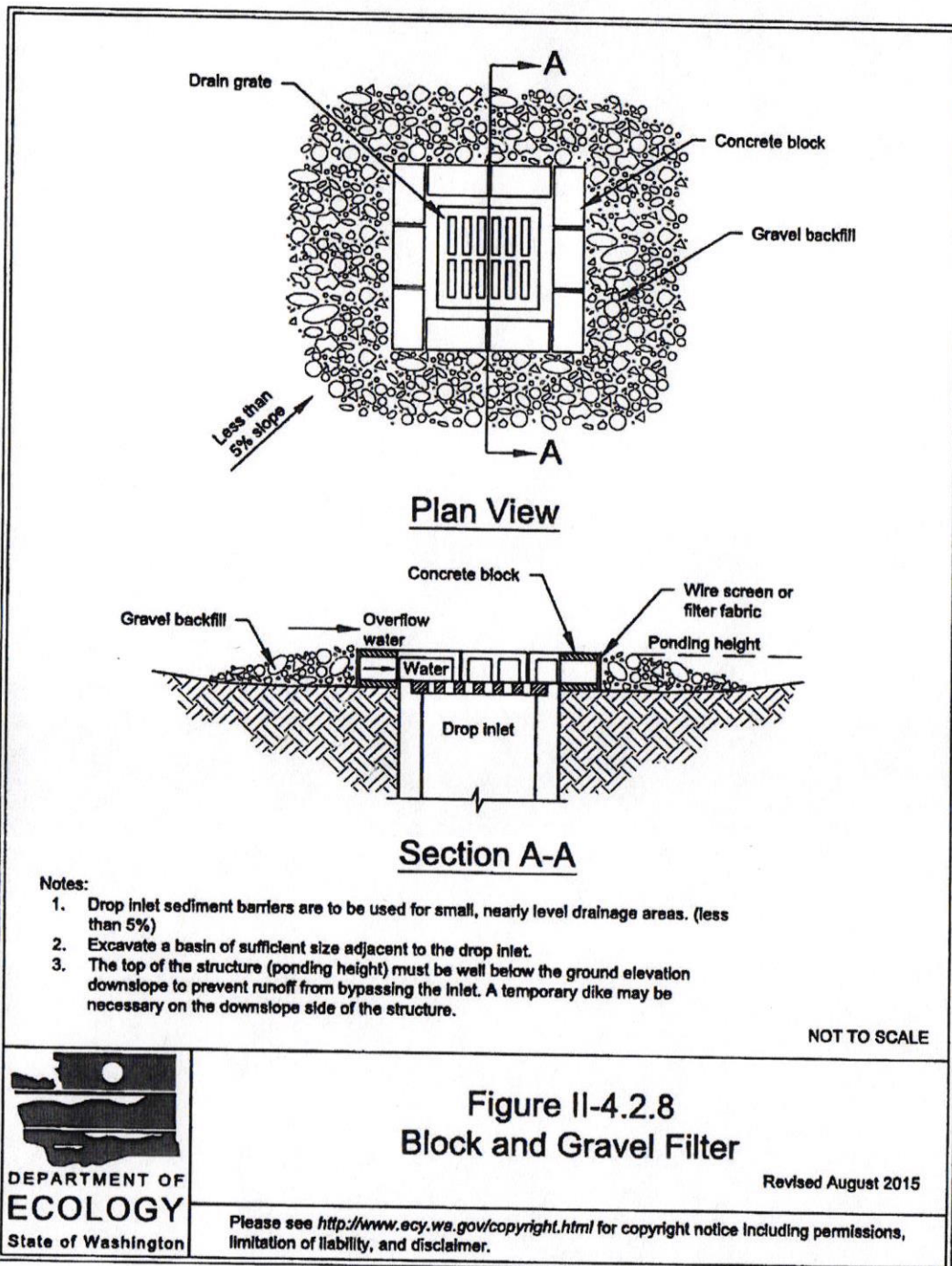
*Excavated Drop Inlet Protection* - An excavated impoundment around the storm drain. Sediment settles out of the stormwater prior to entering the storm drain.

- Provide a depth of 1-2 ft as measured from the crest of the inlet structure.
- Slope sides of excavation no steeper than 2H:1V.
- Minimum volume of excavation 35 cubic yards.
- Shape basin to fit site with longest dimension oriented toward the longest inflow area.
- Install provisions for draining to prevent standing water problems.
- 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 barrier formed around the storm drain inlet with standard concrete blocks and gravel. See Figure II-4.2.8 Block and Gravel Filter (p.360).

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

**Figure II-4.2.8 Block and Gravel Filter**



**Figure II-4.2.8  
Block and Gravel Filter**

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**Gravel and Wire Mesh Filter** - A gravel barrier placed over the top of the inlet. This structure does not provide an overflow.

- Use a hardware cloth or comparable wire mesh with ½-inch openings.
- Use coarse aggregate.
- Provide a height 1-foot or more, 18-inches wider than inlet on all sides.
- 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 gravel over the entire inlet opening and extend at least 18-inches on all sides.

**Catchbasin Filters** – Use inserts 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 catchbasin 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.

- 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 catchbasin filter in the catchbasin just below the grating.

**Curb Inlet Protection with Wooden Weir** – Barrier formed around a curb inlet with a wooden frame and gravel.

- 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 wire/fabric.
- Place weight on frame anchors.

**Block and Gravel Curb Inlet Protection** – Barrier formed around a curb inlet with concrete blocks and gravel. See Figure II-4.2.9 Block and Gravel Curb Inlet Protection (p.363).

- 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.

***Curb and Gutter Sediment Barrier*** – Sandbag or rock berm (riprap and aggregate) 3 feet high and 3 feet wide in a horseshoe shape. See Figure II-4.2.10 Curb and Gutter Barrier (p.364).

- 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 outside of the berm sized to sediment trap standards for protecting a culvert inlet.

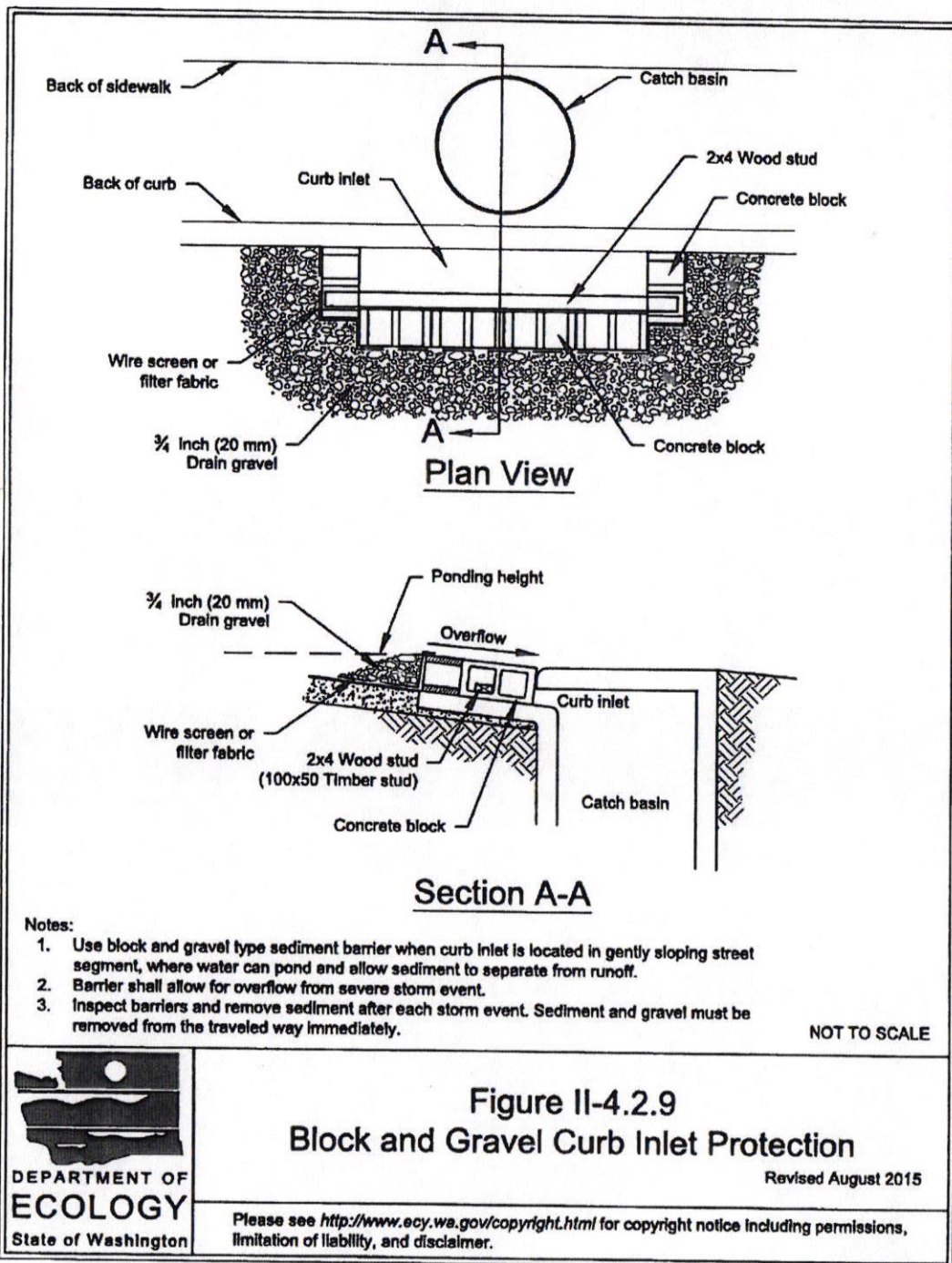
### ***Maintenance Standards***

- Inspect catch basin filters frequently, especially after storm events. Clean and replace clogged inserts. For systems with clogged stone filters: pull away the stones from the inlet and clean or replace. An alternative approach would be to use the clogged stone as fill and put fresh stone 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 Equivalent***

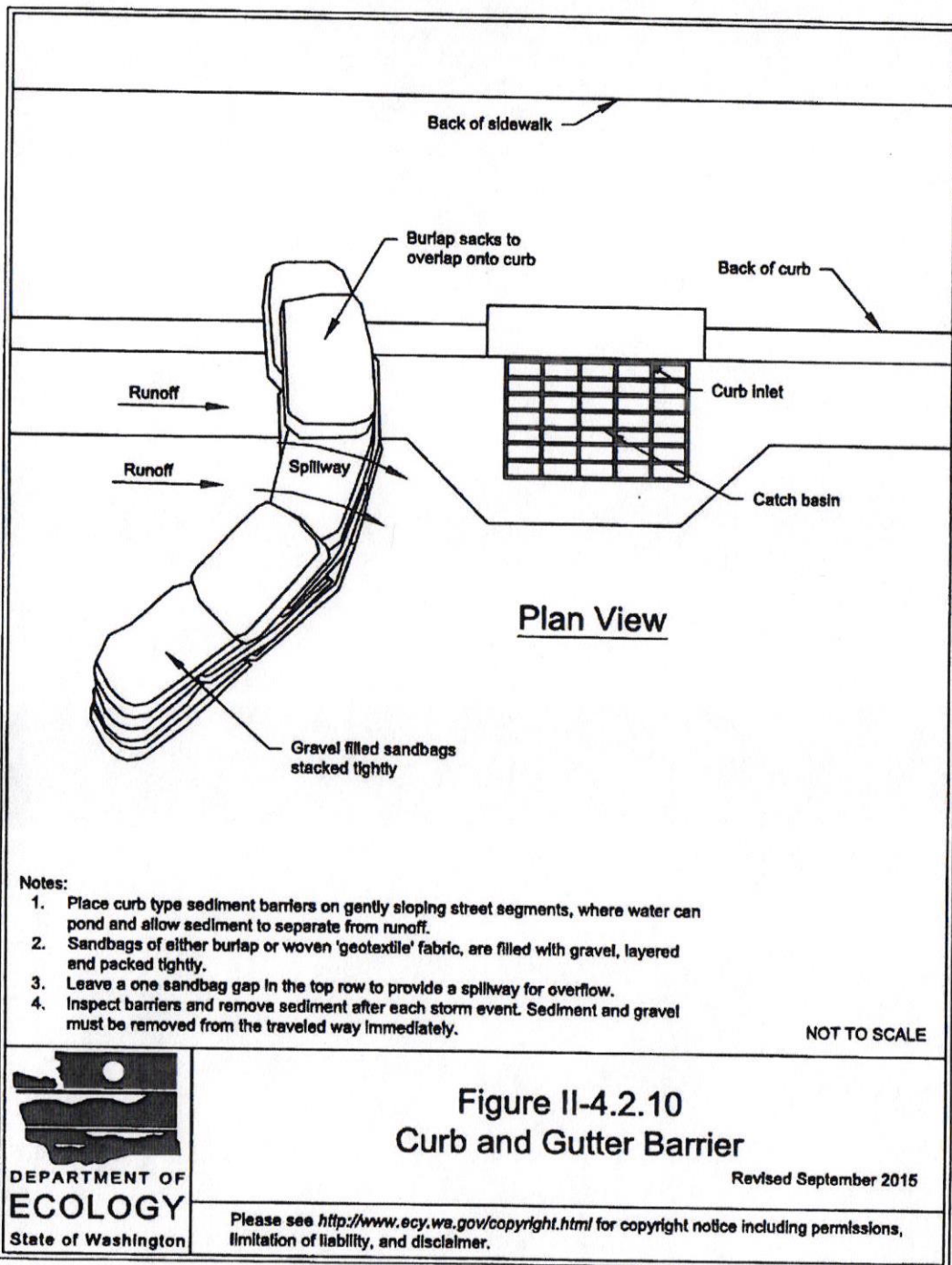
Ecology has approved products as able to meet the requirements of BMP C220: Storm Drain Inlet Protection. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at <http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html>

**Figure II-4.2.9 Block and Gravel Curb Inlet Protection**





**Figure II-4.2.10 Curb and Gutter Barrier**



## **BMP C232: Gravel Filter Berm**

### ***Purpose***

A gravel filter berm is constructed on rights-of-way or traffic areas within a construction site to retain sediment by using a filter berm of gravel or crushed rock.

### ***Conditions of Use***

Where a temporary measure is needed to retain sediment from rights-of-way or in traffic areas on construction sites.

### ***Design and Installation Specifications***

- Berm material shall be ¾ to 3 inches in size, washed well-grade gravel or crushed rock with less than 5 percent fines.
- Spacing of berms:
  - Every 300 feet on slopes less than 5 percent
  - Every 200 feet on slopes between 5 percent and 10 percent
  - Every 100 feet on slopes greater than 10 percent
- Berm dimensions:
  - 1 foot high with 3H:1V side slopes
  - 8 linear feet per 1 cfs runoff based on the 10-year, 24-hour design storm

### ***Maintenance Standards***

- Regular inspection is required. Sediment shall be removed and filter material replaced as needed.

## **BMP C233: Silt Fence**

### ***Purpose***

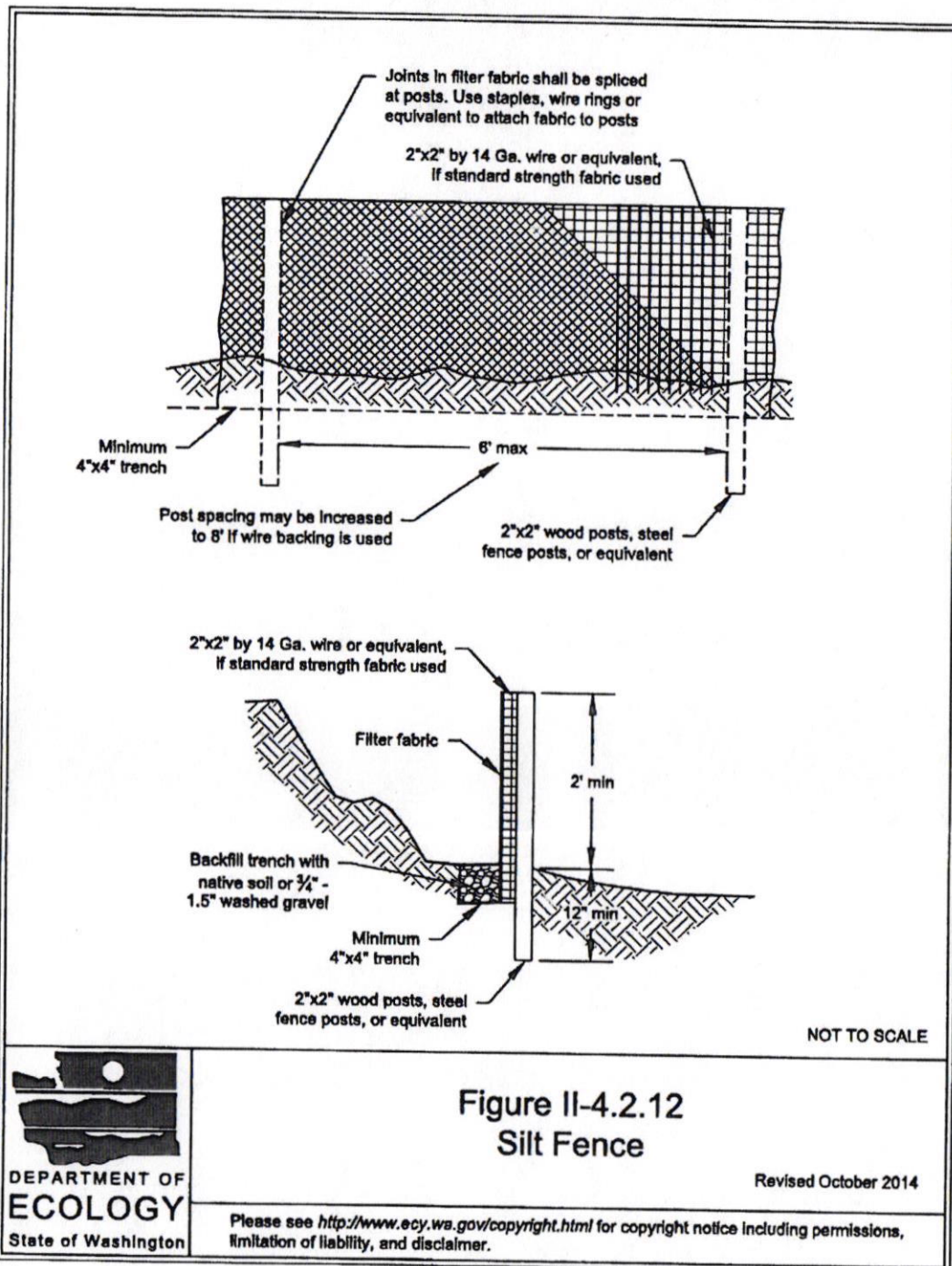
Use of a silt fence reduces the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow. See [Figure II-4.2.12 Silt Fence \(p.369\)](#) for details on silt fence construction.

### ***Conditions of Use***

Silt fence may be used downslope of all disturbed areas.

- Silt fence shall prevent soil carried by runoff water 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 pond.
- 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-4.2.12 Silt Fence**



## Design and Installation Specifications

- Use in combination with sediment basins or other BMPs.
- Maximum slope steepness (normal (perpendicular) to fence line) 1H:1V.
- Maximum sheet or overland flow path length to the fence of 100 feet.
- Do not allow flows greater than 0.5 cfs.
- The geotextile used shall meet 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-4.2.3 Geotextile Standards (p.370)):

**Table II-4.2.3 Geotextile Standards**

|  |   |
|--|---|
| Polymeric Mesh AOS<br>(ASTM D4751)     | 0.60 mm maximum for slit film woven (#30 sieve).<br>0.30 mm maximum for all other geotextile types (#50 sieve).<br>0.15 mm minimum for all fabric types (#100 sieve). |
| Water Permittivity<br>(ASTM D4491)     | 0.02 sec <sup>-1</sup> minimum  |
| Grab Tensile Strength<br>(ASTM D4632)  | 180 lbs. Minimum for extra strength fabric.<br>100 lbs minimum for standard strength fabric.  |
| Grab Tensile Strength<br>(ASTM D4632)  | 30% maximum   |
| Ultraviolet Resistance<br>(ASTM D4355) | 70% minimum   |

- Support standard strength fabrics with wire mesh, chicken wire, 2-inch x 2-inch wire, safety fence, or jute mesh to increase the strength of the fabric. Silt fence materials are available that have synthetic mesh backing attached.
- Filter fabric 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 local regulations.
- Refer to Figure II-4.2.12 Silt Fence (p.369) 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-foot min. and a 2½-foot max. height above the original ground surface.
4. The filter fabric shall be sewn together at the point of manufacture to form filter fabric lengths as required. Locate all sewn seams at support posts. Alternatively, two sections of silt fence can be overlapped, provided the Contractor can demonstrate, to the satisfaction of the Engineer, that the overlap is long enough and that the adjacent fence sections are close enough together to prevent silt laden water from escaping through the fence at the overlap.
5. Attach the filter fabric on the up-slope side of the posts and secure with staples, wire, or in accordance with the manufacturer's recommendations. Attach the filter fabric to the posts in a manner that reduces the potential for tearing.
6. Support the filter 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 filter 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 ultra-violet radiation as the filter fabric it supports.
8. Bury the bottom of the filter fabric 4-inches min. below the ground surface. Backfill and tamp soil in place over the buried portion of the filter fabric, so that no flow can pass beneath the 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 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:

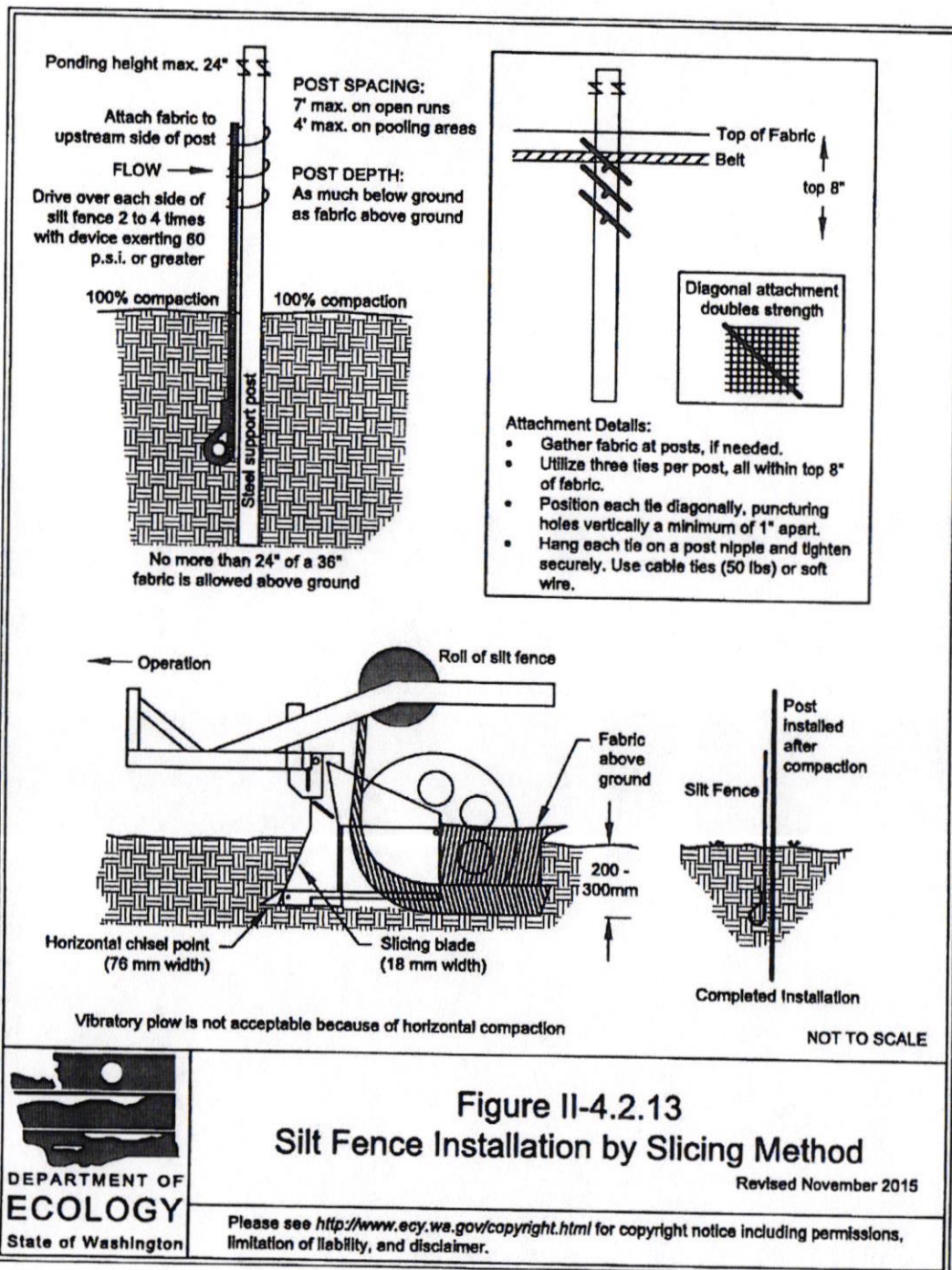
- Wood with dimensions of 2-inches by 2-inches wide min. and a 3-foot min. length. Wood posts shall be free of defects such as knots, splits, or gouges.
  - No. 6 steel rebar or larger.
  - ASTM A 120 steel pipe with a minimum diameter of 1-inch.
  - U, T, L, or C shape steel posts with a minimum weight 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 gravel 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.
    - Gravel check dams shall be approximately 1-foot deep at the back of the fence. Gravel 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.
    - Gravel check dams shall consist of crushed surfacing base course, gravel backfill for walls, or shoulder ballast. Gravel check dams shall be located every 10 feet along the fence where the fence must cross contours.
- Refer to Figure II-4.2.13 Silt Fence Installation by Slicing Method (p.374) for slicing method details. Silt fence installation using the slicing method specifications:
    1. The base of both end posts must be at least 2- to 4-inches above the top of the filter 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 filter fabric, enabling posts to support the filter fabric from upstream water pressure.
    4. Install posts with the nipples facing away from the filter fabric.

5. Attach the filter fabric to each post with three ties, all spaced within the top 8-inches of the filter fabric. Attach each tie diagonally 45 degrees through the filter 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 fabric around the end posts and secure with 3 ties.
7. No more than 24-inches of a 36-inch filter fabric is allowed above ground level.

Compact the soil immediately next to the filter 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 fabric deeper into the ground if necessary.



**Figure II-4.2.13 Silt Fence Installation by Slicing Method**



**Figure II-4.2.13**  
**Silt Fence Installation by Slicing Method**

Revised November 2015

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## Maintenance Standards

- Repair any damage immediately.
- Intercept and convey all evident concentrated flows uphill of the silt fence to a sediment pond.
- Check the uphill side of the 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 or 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 filter fabric that has deteriorated due to ultraviolet breakdown.

## BMP C234: Vegetated Strip

### Purpose

Vegetated strips reduce 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

- Vegetated strips may be used downslope of all disturbed areas.
- Vegetated strips are not intended to treat concentrated flows, nor are they intended to treat substantial amounts of overland flow. Any concentrated flows must be conveyed through the drainage system to a sediment pond. The only circumstance in which overland flow can be treated solely by a strip, rather than by a sediment pond, is when the following criteria are met (see Table II-4.2.4 Contributing Drainage Area for Vegetated Strips (p.375)):

**Table II-4.2.4 Contributing Drainage Area for Vegetated Strips**

| Average Contributing Area Slope | Average Contributing Area Percent Slope | Max Contributing area Flowpath Length |
|---------------------------------|---|---------------------------------------|
| 1.5H : 1V or flatter            | 67% or flatter                          | 100 feet                              |
| 2H : 1V or flatter              | 50% or flatter                          | 115 feet                              |
| 4H : 1V or flatter              | 25% or flatter                          | 150 feet                              |
| 6H : 1V or flatter              | 16.7% or flatter                        | 200 feet                              |
| 10H : 1V or flatter             | 10% or flatter                          | 250 feet                              |