ENGINEERING DESIGN AND CONSTRUCTION STANDARDS

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EROSION AND SEDIMENT CONTROL

DESIGN AND CONSTRUCTION STANDARDS
AND
SPECIFICATIONS

SECTION 2

EROSION AND SEDIMENTATION CONTROL

2-1 GENERAL

This section of the standards covers erosion and sediment control for small parcels, where land alteration activities will disturb less than one acre of land. Projects which will disturb one acre of land or more must refer to the most current DOE Storm water Management Manual for large parcel erosion and sediment control requirements.

Land alteration activities are those activities which are commonly referred to as clearing (the act of vegetation removal from the land surface, often referred to as land clearing); grubbing (the act of root vegetation removal from beneath the surface of the earth, usually in conjunction with clearing); excavation (the mechanical removal of earth material); filling (deposition of earth material placed by artificial means); grading (excavation of filling or combination thereof); and stockpiling (temporary deposition of earth material placed by artificial means).

2-1.1 SCOPE, DEFINITIONS AND AUTHORITY

The basis for the following standards is the Washington State Department of Ecology Best Management Practices and the Puget Sound Water Quality Management Plan. The purpose of this section of the standards is to manage water quality for the preservation of aquatic life and to protect property from the damaging effects of erosion and excessive water. Therefore, all land alteration activities within the City that have the potential for damaging off-site property or degrading water quality shall conform to the requirements of the Snohomish City Codes and these Standards.

Types of Land Alteration Regulated:

A. Clearing: the act of vegetation removal from the land surface, often referred to as land clearing (list the threshold for each);
B. Grubbing: the act of root vegetation removal from beneath the surface of the earth, usually in conjunction with clearing;
C. Grading: the mechanical removal and/or deposition of earth material; and
D. Stockpiling: temporary deposition of earth material placed by artificial means.

No land alteration, as defined above, shall occur without prior approval of an erosion and sediment control plan by the City Engineer. All clearing and grading permit applications shall be administered under Chapter 33 of the Uniform Building Code as provided in the 1997 edition
This chapter should always be reviewed in conjunction with Chapter Three: Storm and Surface Water Drainage.

2-2 GENERAL REQUIREMENT

Of primary concern are areas in:

A. Critical drainage areas;
B. Steep Slopes;
C. Sensitive soil conditions; and
D. Areas adjacent to waterways or in waterways.

These areas will require special attention in order for development to be considered, if at all. For sites not located in a critical drainage area, but generally larger than one acre, erosion control requirements will include sedimentation ponds, check dams, filter fabric fences, jute matting or plastic sheeting, and a temporary construction entrance as well as other controls specified by the City Engineer or recommended by the geotechnical/soil survey of the project site.

Developments located on steep slopes (25% or greater) shall require, in addition to the normal requirements for a comparably sized development on a slope less than 25%, the following: gradient terraces, immediate hydro-seeding and mulching, phasing of construction so as to minimize the amount of exposed soils at any given time and seasonal limitation restrictions. See Section 2.4 and 2.5. Depending upon soil and slope conditions, the proximity to a waterway and the size of the site, additional requirements may include flexible down drains, filter fabric fences, jute matting, or other approved means to secure seed and mulch in place, temporary level spreaders, and stabilized channels to convey off-site runoff through or around site.

Development adjacent to waterways may require, in addition to the normal requirements for a comparable sized development not adjacent to a waterway: a vegetative buffer between the waterway and the development, and seasonal limitation restrictions. See Section 2.4 and 2.5. Any work within the waterway will require a hydraulics permit from the Department of Fisheries and/or Game. The City Engineer may make additional requirements, including but not limited to temporary bypass culverts or channels.

After clearing and grading operations are completed, the storm drainage system has been installed, and building construction is underway, the sedimentation pond and interceptor ditches may be abandoned provided sediment traps are provided around all storm drain inlets and there is not possibility of sediment-laden water crossing property lines.

Construction equipment should only be cleaned at the contractor's yard, where methods presented in the Associated General Contractors water quality manual can be followed.

If a S.E.P.A review is required the exact combination of required erosion control measures will be clarified.

2-3 TEMPORARY EROSION/SEDIMENT CONTROL PLANS

A temporary erosion/sedimentation plan is required for the following land alteration activities: greater than 5,000 sq. ft.; on slopes 25% or greater; where cut and/or fill slopes 25% or greater will be created by the proposed work; or where work done may impact on environmentally sensitive area (stream, wetland, etc.). The plan shall clearly indicate the construction sequence for establishment of all erosion control work both temporary and permanent and shall be on a separate sheet.

2-3.1 EMERGENCY MANAGEMENT PLANS

Emergency Management Plans are to be submitted for all clearing and grading permit applications. To include at a minimum:

A. Name, address, and 24-hour telephone number(s) for the person(s) responsible for regular observation and repair or replacement of all erosion and sedimentation control measures.
B. Schedule for regular inspection, maintenance, and replacement of erosion and sedimentation control measures.
C. Location and inventory of materials required to be stockpiled on the site for emergency repair of the approved erosion and sedimentation control system.
D. Contingency plans for the use (of the above) in case of failure of the erosion and sedimentation control system, including how individual erosion control measures would be accessed during undesirable site conditions.

2-3.2 REQUIRED NOTES ON PLANS

The following are the minimum notes required on all Temporary Erosion/Sedimentation Control Plans*:*

A. The temporary erosion control system shall be installed prior to all other construction.

B. Where possible natural vegetation will be maintained for silt control.

C. As construction progresses and seasonal conditions dictate, the erosion control facilities shall be maintained and/or altered as required by the City Engineer to ensure continuing erosion/ sedimentation control.

D. Temporary siltation ponds and all temporary siltation controls shall be maintained in a satisfactory condition until such time that clearing and/or construction is implemented, permanent drainage facilities are operational, and the potential for erosion has passed.

E. All disturbed land areas that will be left for 30 days or more during the periods of March 1 to May 15 and August 15 to October 1 shall be immediately seeded with a mix and by a method approved by the City of Snohomish Public Works Department and maintained until seed germination is assured. In addition to seeding, slopes of 25% or greater will be mulched with 2.0 tons of straw per acre, or with an approved equal. During the rest of the year, temporary soil stabilization must be applied immediately to disturbed areas that will be left exposed for seven days or more, and immediately to slopes greater than 25% that will be left exposed for three days or more.

F) Approval of this plan does not constitute an approval of design, size, nor location of pipes, restrictors, or detention facilities; but is an approval of grading and sedimentation control plan only.

G) The public right-of-way shall be kept clean. Tracking of mud and debris from the site will not be allowed. Failure to comply with this condition will result in all work on the site being stopped.

2-4 SEASONAL AND WEATHER LIMITATIONS

Land alteration operations are restricted to seasonal limitations. The restrictions are site specific and are based on, but not limited to, steepness of slopes on site, distance from sediment/erosion sensitive areas, soil type, etc. These operations shall be governed by the following seasonal limitations:

A. No fill material shall be placed, spread, or rolled while either the fill material or the site surface is frozen or thawing, or during other unfavorable conditions.

B. All land alteration work is subject to stoppage by the City Engineer or his designee due to heavy rain. In these cases operations shall not be resumed until the City Engineer determines that erosion control facilities are operating satisfactorily.

C. Underground utilities and foundation installation are allowed with seasonal limitations under the following conditions:

1. Every effort is made to close utility trenches by the end of the day.

2. If unavoidable circumstances result in the inability to close a utility trench, all open areas and side spoils are covered with plastic sheeting that is staked in place or anchored by rocks, sand bags, tires, or by other approved methods at the end of the day.

3. Discharge from dewatering of utility trenches or foundation areas is directed to the nearest sedimentation pond, or to a specially created sump area, in a non-erosive fashion. Note: Large quantities of silt in the discharge water may result in the dewatering activity being stopped by the City Inspector until the source of the sediment is identified and attempts made to minimize the quantity in the discharge.

4. Utility corridors are re-stabilized by temporary soil stabilization measures immediately following the completion of utility work or if earth is to be left exposed for seven days or more on flat ground or three days or more on slopes greater than 25%,

5. Water is prevented from entering foundation work areas from surface runoff by creating small, compacted earth berms around the perimeter of the building site to divert runoff away from the working area.

2-5 METHODS OF CONTROL

The types of controls as noted in this section and the related Standard Plans for Erosion and Sedimentation Facilities are a minimum requirement, and, in certain conditions, may require much more extensive facilities. Erosion control facilities shall be periodically inspected and maintained by the developer or contractor to ensure continued intended operation.

2-5.1 CHECK DAMS AND ROCK BERMS

Check dams and/or berms constructed of earth, rock, or straw bales shall be incorporated into erosion control facilities as appropriate. . See Standard Plan 210b.

Straw bales (staked in place) may be used as energy dissipating drop structures, flow direction control structures and/or dams to create ponding. See Standard Plan 206.

Rock berms may be substituted for straw bales as filtering devices.

2-5.2 CUT-OFF TRENCHES - INTERCEPTOR DITCHES, DIKES OR BERMS

These structures are constructed to channel water away from unprotected slopes or erodible soils, to convey silt laden water to sedimentation facilities or to dissipate drainage into the natural on-site vegetation.

If the location of the trench, ditch, or dike may result in erosion of the structure itself, stabilization of the structure may be required. Riprap, temporary sodding, or a combination of filter fabric and riprap is methods of structure stabilization that may be required to prevent erosion. See Standard Plan No. 210B.

2-05.3 FILTERING DEVICES

Filtering devices, such as filter fabric fences, shall be used to filter runoff prior to discharge from site. See Standard Plan No. 205a and 205b. Approved filter fabrics are Celanese fiber, polyvinyl chloride woven cloth, reinforced chlorosulfinated polyethylene cloth, chlorinated polyethylene woven cloth, such as Mirafi 100X, Typar 3401, Stabilenka 100, or approved equal.

2-5.4 FLEXIBLE DOWN DRAINS

Flexible down drains may be utilized as temporary structures to protect open slopes and shall be constructed of flared end sections connected by plastic sheet tubing, heavy duty fabric, or non-perforated corrugated plastic pipe. See Standard Plan No. 209.

2-5.5 GRADIENT TERRACE

A gradient terrace is an earth embankment or ridge designed so that the top of the constructed ridge is no lower at any point than the design elevation of the water surface at the outlet under design flow and is installed so as to intercept surface runoff and convey it to a stable outlet at a non-erosive velocity. Gradient terraces may be useful both as a temporary and/or a permanent erosion control measure. See Standard Plan No. 210A.

2-5.6 SEDIMENT TRAPS

Sediment traps are structures of limited capacity designed to create a temporary siltation pond/filter around storm drain inlets or at points where silt-laden storm water is discharged.

Periodic Maintenance by the contractor or developer is crucial to the proper functioning of sediment traps. Examples of typical sediment trap installations are found in Standard Plan No. 211, 212 and 213. Placement of filter fabric under the grate of a catch basin is not an acceptable method of inlet protection.

2-5.7 TEMPORARY CONSTRUCTION ENTRANCE

A temporary construction entrance is a rock stabilized temporary entrance pad and shall be constructed at points where traffic will be entering or leaving a construction site from or onto public right-of-way. The pad shall be of sufficient length and width to eliminate transportation of mud and sediment from the construction area onto the public right-of-way by motor vehicles or by runoff, but under no circumstances shall it be less wide than the ingress/egress at the right-of-way nor less than 50 feet long. The stabilized construction entrance shall be a minimum thickness of eight inches and constructed of material approved by the City Engineer. The entrance shall be maintained to the satisfaction of the City Engineer. See Standard Plan No. 208). When site conditions are such that the temporary entrance pad fails to perform as required, all vehicles exiting the site shall have their tires and wheels cleaned by sweeping, brushing, or washing prior to entering public right-of-way. All washing shall be done on an area draining to an approved erosion control facility.

2-5.8 TEMPORARY SOIL STABILIZATION MEASURES

Soil stabilization measures protect soil from the erosive forces of raindrop impact and flowing water. Acceptable measures include establishing vegetation by sodding or seeding, mulching with 2.0 tons of straw per acre or approved equal, plastic or other impervious covering staked to the ground or anchored with rocks or sandbags, and the early application of gravel base on areas to be paved. The most appropriate measure should be chosen given the time of the year and the site conditions. Seeding alone is acceptable only on flat areas and slopes less than 25%, and only during the periods from March 1 to May 15 and August 15 to October 1 or as otherwise required or approved. Mulch may need to be held in place by utility mesh or netting.

2-5.9 TEMPORARY SILTATION/SEDIMENTATION PONDS

Temporary siltation/sedimentation ponds shall be required of all land alteration operations in order to detain runoff waters and trap sediment from erodible areas thus protecting properties, drainage ways, and streams below the installation from damage by excessive sedimentation and debris deposition. The dam or barrier forming the pond shall be located to provide for maximum volume capacity for trapping sediment behind the structure as well as for greatest ease of clean out. The temporary pond requirement may be waived, at the discretion of the City Engineer, for small areas of land disturbance where potential damage is minimal and pond construction impractical as long as runoff from all such areas is filtered prior to discharge from the site.

Temporary siltation/sedimentation ponds are basins created by construction of a barrier or by excavation or by a combination of both.

Interior surfaces of the sedimentation pond shall be stabilized where required to prevent erosion of the pond bottom and/or sides. Interior sides of the pond shall be no steeper than three feet horizontal to one foot vertical.

Siltation/sedimentation ponds shall provide a minimum of two feet of dead storage below the outflow elevation and will be sized to provide a minimum of one cubic foot of live storage per 100 square feet of channel area.

A stabilized access will be provided to the siltation/sedimentation pond for sediment removal and other maintenance.

2-6 VEGETATION

Addressed under the City Landscape Regulations SMC 14.41

2-6.1 RESTORATION

Areas disturbed by construction activity which are not to be covered by permanent impervious surfaces shall be landscaped or reseeded at the earliest possible time, not to exceed 15 days after final grade is reached during the allowable construction period (see section 2.5). This period may be reduced to seven days if site and weather conditions warrant the reduction. If the need to reduce the 15 day period is likely, the City will provide a verbal notice and a written one if necessary. Existing practical limitations of requesting a reduction of the allowable restoration period will be taken into account when directing a change.

If wet weather prohibits reseeding or landscaping during the given period, temporary soil stabilization measures must be used until conditions are suitable for permanent measures. When the area to be seeded is hard, compacted, or crusted, the top layer of soil shall be loosened by dicing, raking, or other acceptable means before seeding.

Although the specifications for seed, mulch, and fertilizer will depend upon the slope, soil conditions, and the planned use of the site, the following is an example which will usually be considered adequate:

Seed Mixture
- 40% Perennial Rye
- 20% Alta Fescue
- 20% Red Fescue
- 10% Chewing Fescue
- 10% Annual Blue Grass

@ 40 lbs per acre

Mulch 2,200 lbs/acre on slopes
1,000 lbs/acre on level areas

Fertilizers: Fertilizer application should depend on the results of soil testing. In general the following rates are typical:

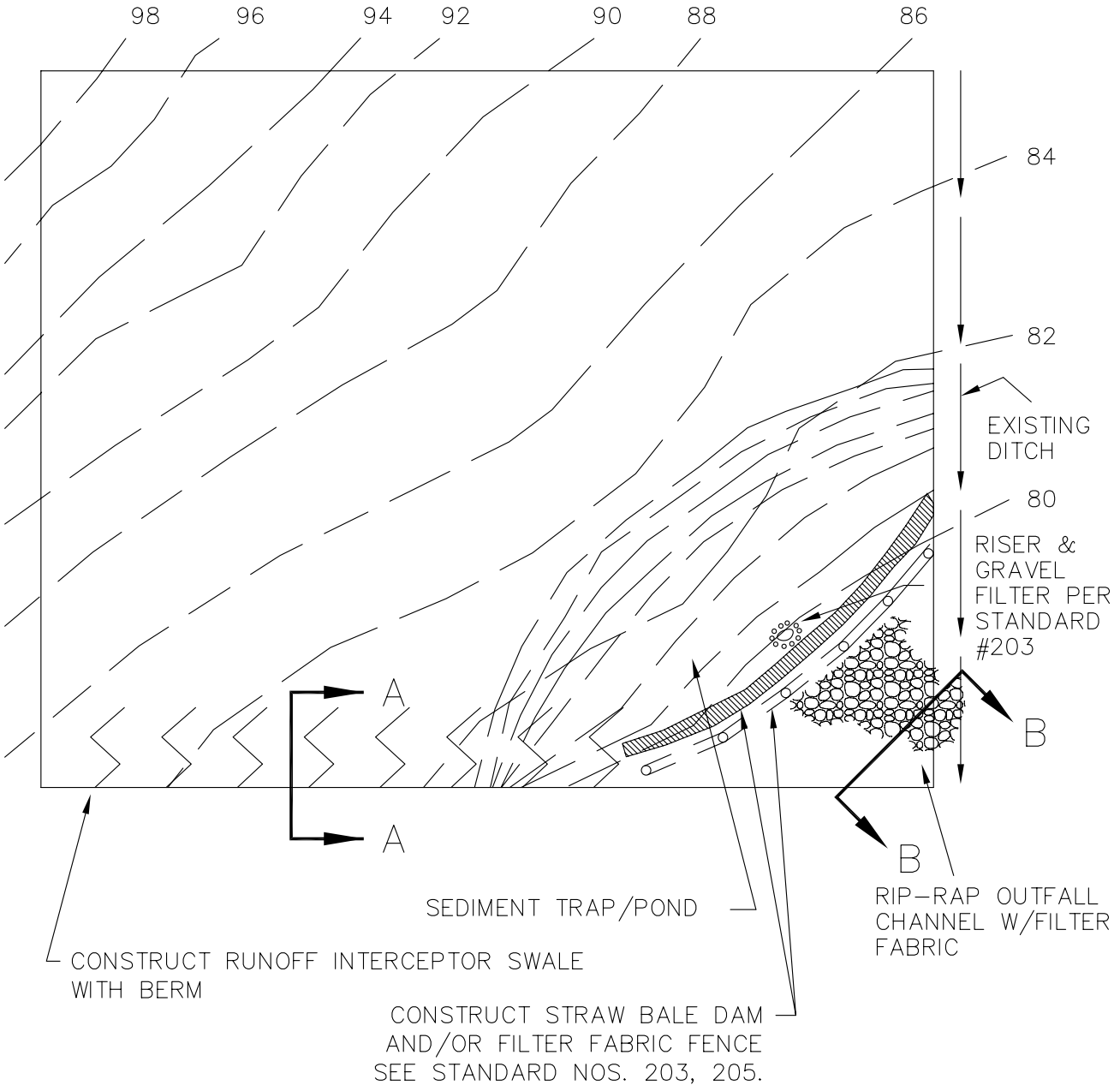
Nitrogen: 20-40 lbs./acre
Phosphorus: 40-60 lbs./acre
Potash: 60 lbs./acre

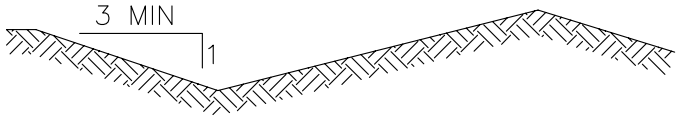
On steep slopes, hydro seeding and mulch anchoring may be required.

NOTE: For repair work or construction that disrupts sodded landscaped City ROW or private easements (existing developed property) restoration shall mean replacement with same-sod, not seed, unless the area is

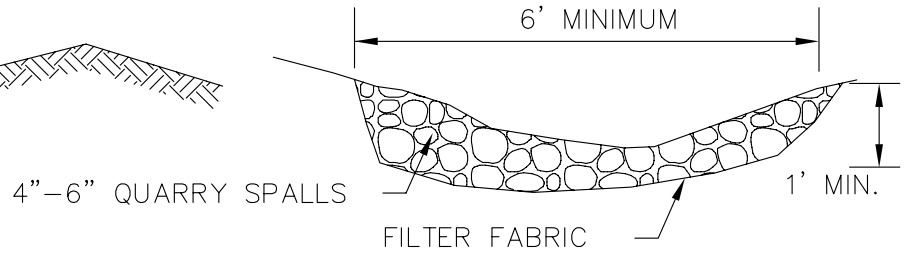
so small as to make sod impractical. While the City and contractors will attempt to preserve to the best of our ability landscaping in the City ROW, the City will not accept responsibility for landscaping in the City ROW, nor hold contractors responsible for such landscaping.

DRAWING INDEX





INTERCEPTOR SWALE
DETAIL SEC. A-A



RIP-RAP OUTFALL CHANNEL SEC. B-B

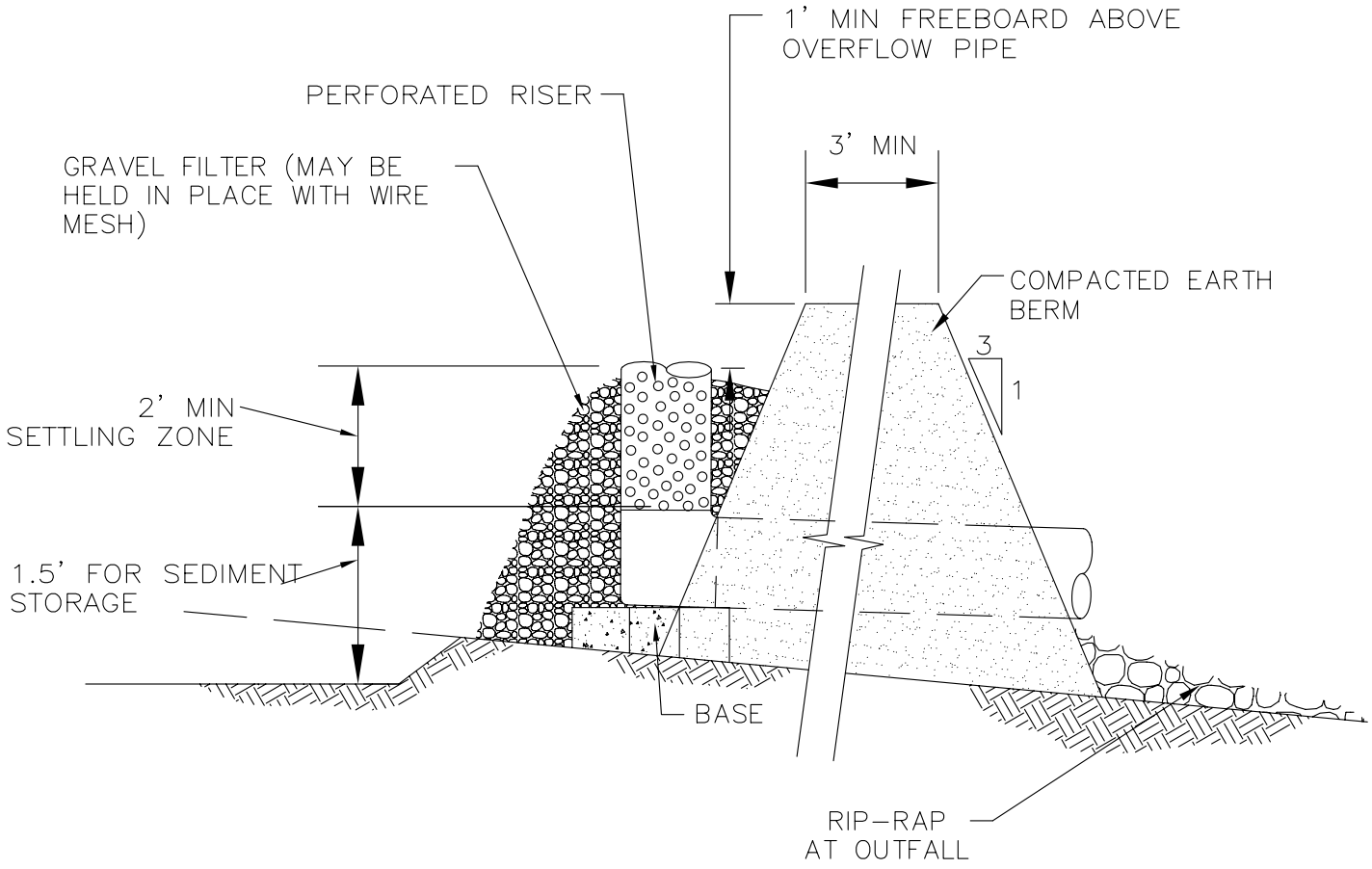
SNOHOMISH
WASHINGTON

TYPICAL TEMPORARY EROSION CONTROL

Approved By:
City Engineer
Date: May 30, 2004

201
Number

City of Snohomish Public Works Department



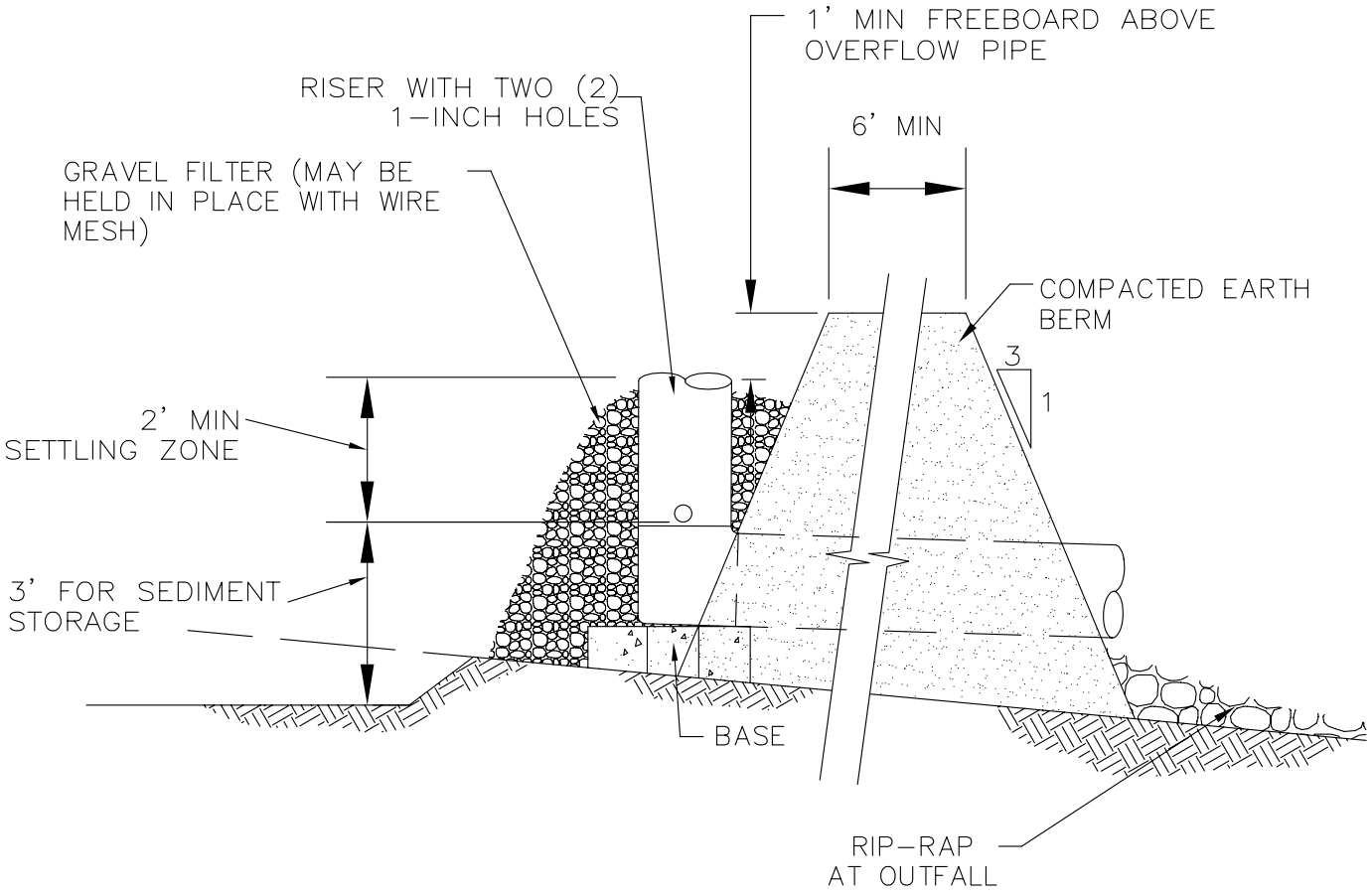
SNOHOMISH WASHINGTON

SEDIMENT TRAP OUTLET

Approved By:
City Engineer
Date: May 30, 2004

202
Number

City of Snohomish Public Works Department



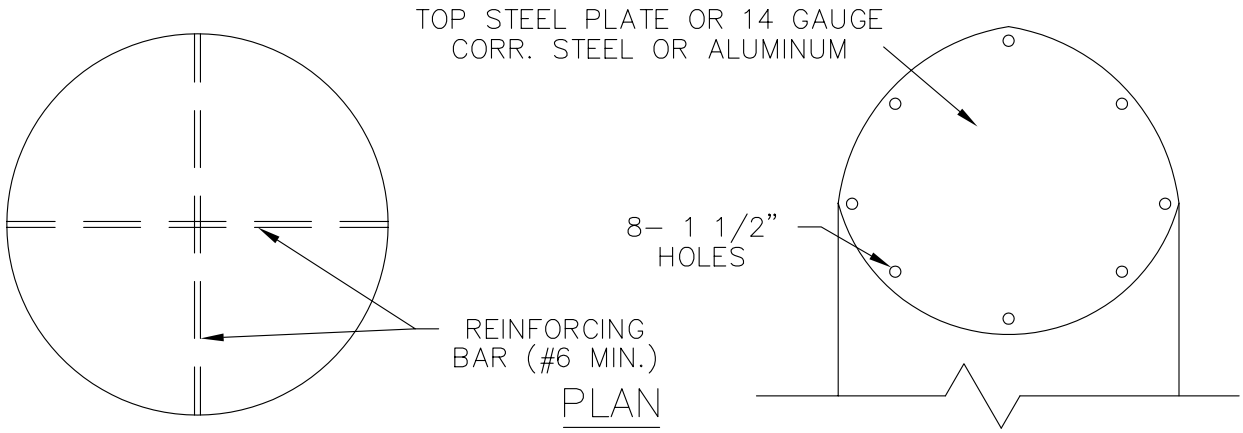
SNOHOMISH WASHINGTON

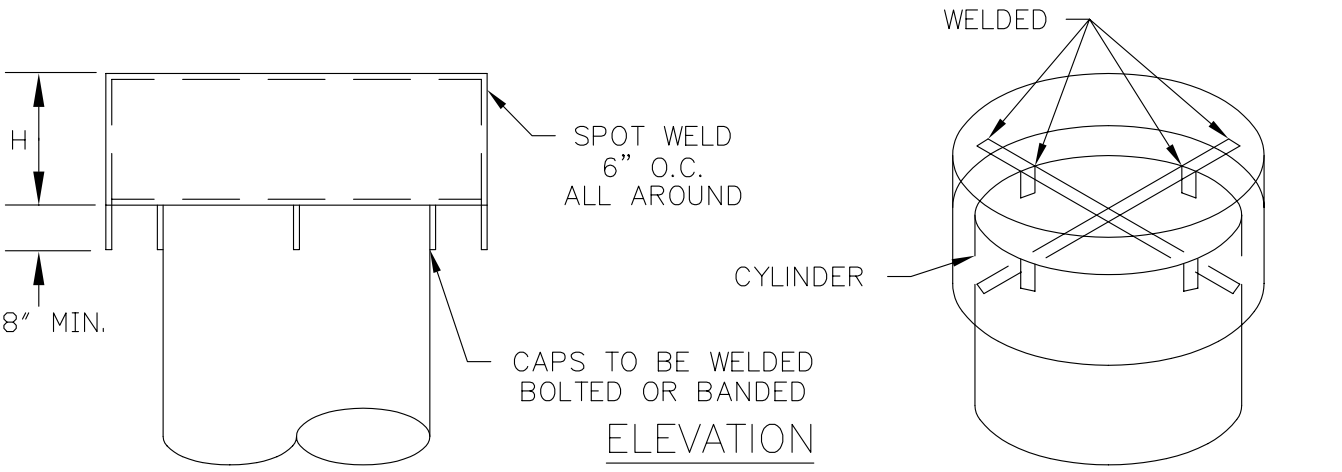
SEDIMENT POND OUTLET

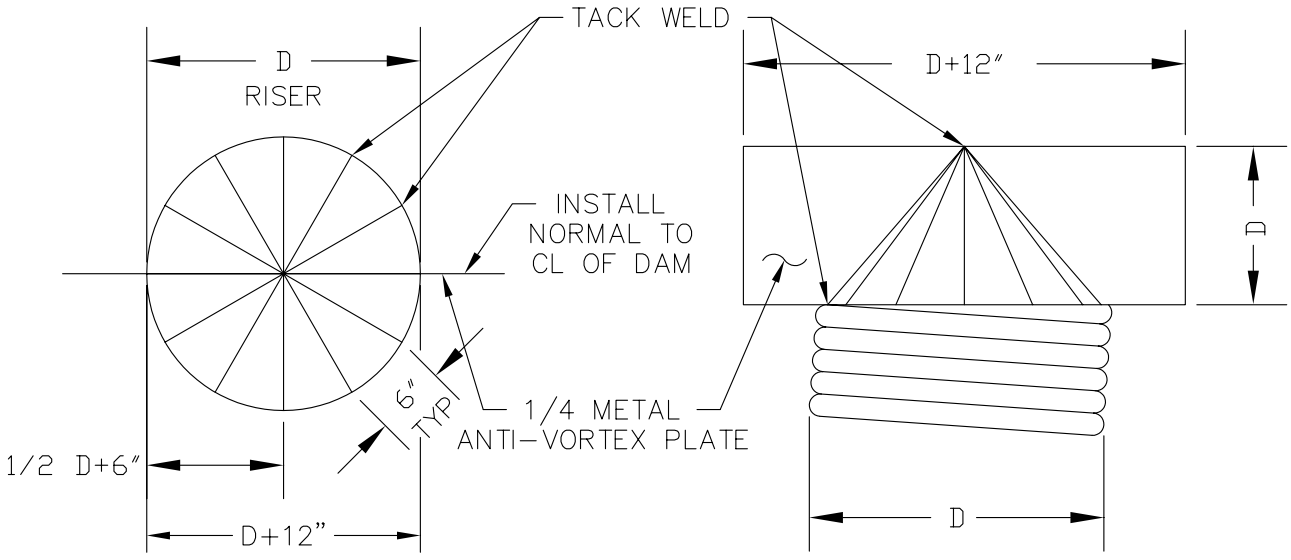
Approved By:
City Engineer
Date: May 30, 2004

203
Number

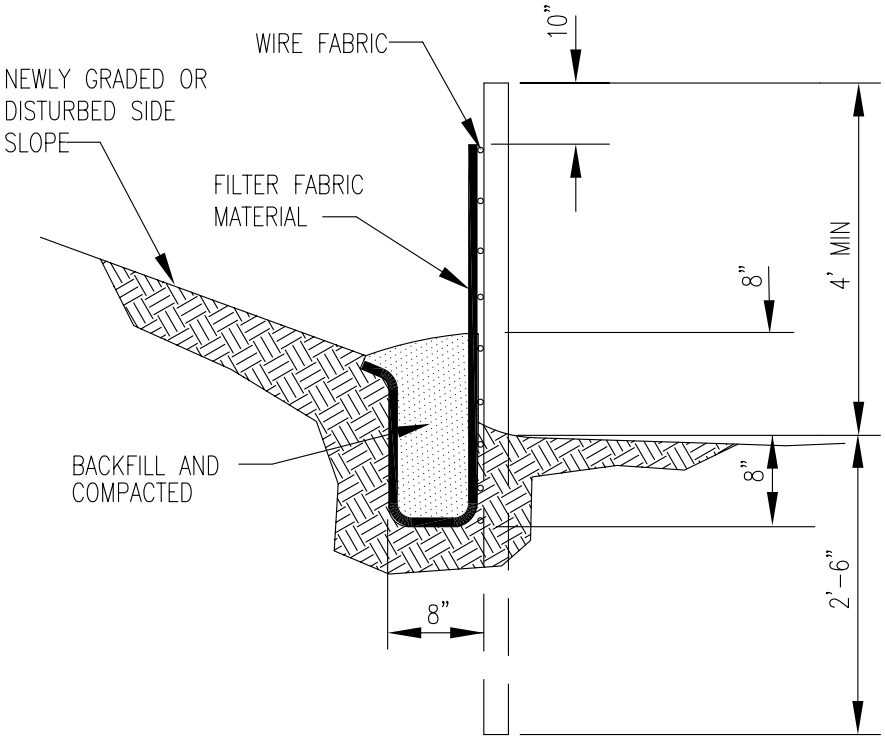
City of Snohomish Public Works Department



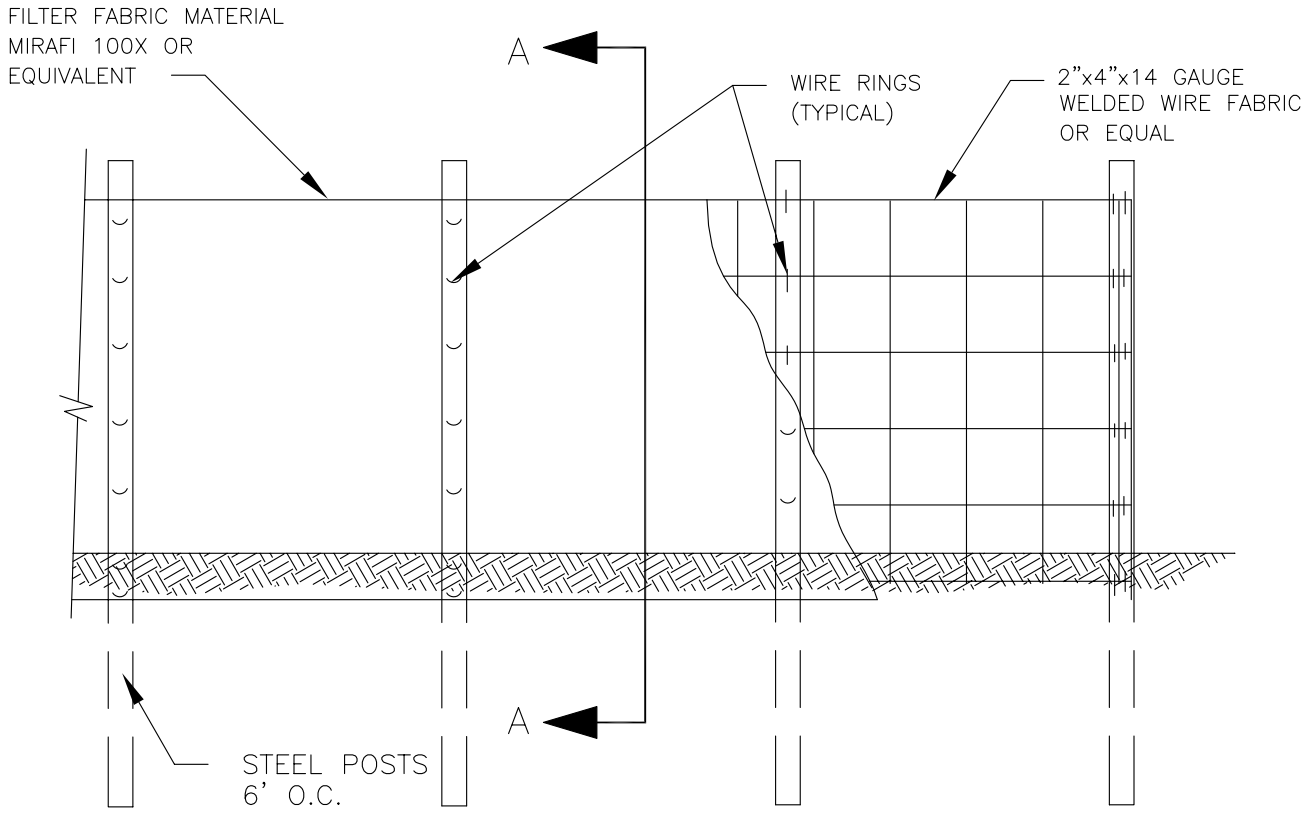




SNOHOMISH WASHINGTON	**ANTI VORTEX DEVICE**	Approved By: City Engineer Date: May 30, 2004	204 Number
	City of Snohomish Public Works Department		



SECTION A–A



ELEVATION

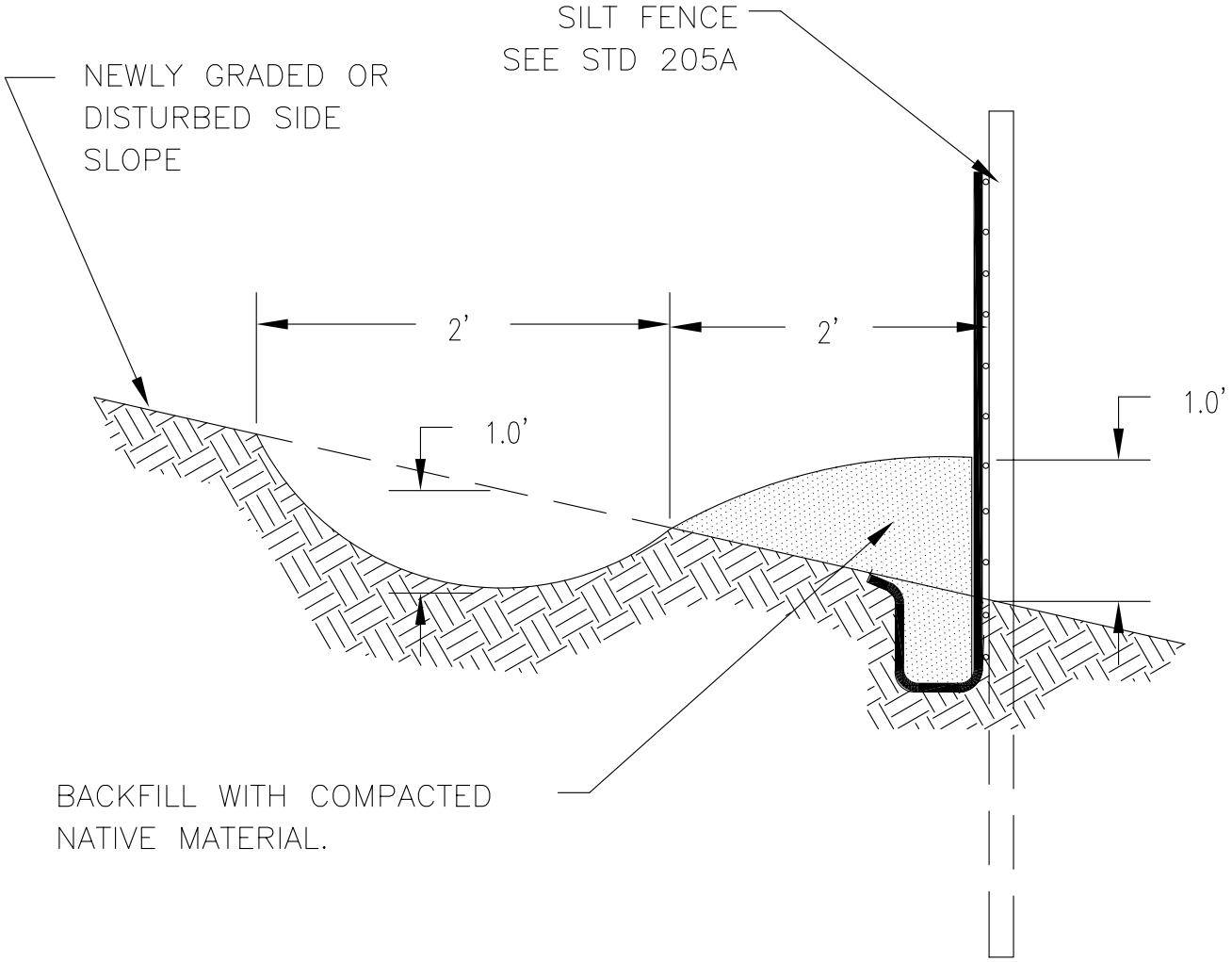
SNOHOMISH
WASHINGTON

TEMPORARY SILT FENCE

Approved By:
City Engineer
Date: May 30, 2004

205a
Number

City of Snohomish Public Works Department



NOTE:

INSTALL THE SILT FENCE FIRST, PER STD #205A. AFTER THE SILT FENCE HAS BEEN INSTALLED, CONSTRUCT BERM AND TRENCH.

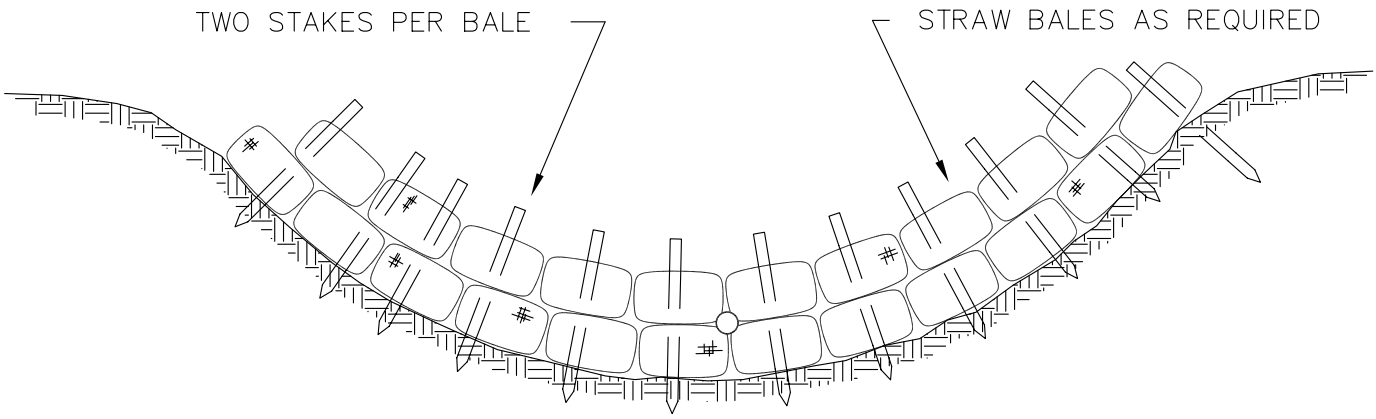
SNOHOMISH
WASHINGTON

A BERM AND TRENCH

Approved By:
City Engineer
Date: May 30, 2004

205b
Number

City of Snohomish Public Works Department



NOTES

1. WHERE POSSIBLE, MAINTAIN NATURAL VEGETATION FOR SILT CONTROL.

2. TEMPORARY SILTATION AND DETENTION PONDS TO BE CONSTRUCTED BY PLACING STRAW BALES OR FILTER FABRIC FENCES ACROSS SWALES OR EXCAVATION SILTATION PONDS UTILIZING FILTER SYSTEM PRIOR TO DISCHARGE. PONDS SHALL BE CONSTRUCTED SO AS TO PROVIDE ONE CUBIC FOOT OF SETTLING POND PER 100 SQUARE FEET OF CLEARED AREA TRIBUTARY TO POND.

3. ALL TEMPORARY SILTATION AND DETENTION PONDS SHALL BE MAINTAINED IN A SATISFACTORY CONDITION UNTIL SUCH TIME THAT CLEARING AND/OR CONSTRUCTION IS COMPLETED AND THE PERMANENT DRAINAGE FACILITIES ARE OPERATIONAL.

4. RETURN SILTATION CONTROL AREAS TO ORIGINAL GROUND CONDITIONS.

5. RIP–RAP BASE (BOTH SIDES) OF BALES OR OUTFALL CHANNEL FOR EROSION CONTROL, AS REQUIRED.

6. APPROVAL OF THIS PLAN DOES NOT CONSTITUTE AN APPROVAL OF DESIGN, SIZE NOR LOCATION OF PIPES, RESTRICTORS, CHANNELS OR RETENTION FACILITIES; BUT IS AN APPROVAL OF TEMPORARY SEDIMENTATION CONTROL PLAN ONLY.

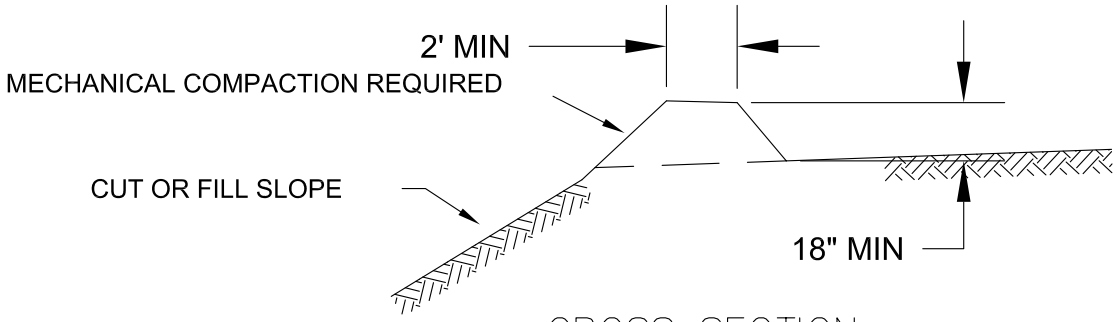
SNOHOMISH
WASHINGTON

STRAW BALE DAM

Approved By:
City Engineer
Date: May 30, 2004

206
Number

City of Snohomish Public Works Department



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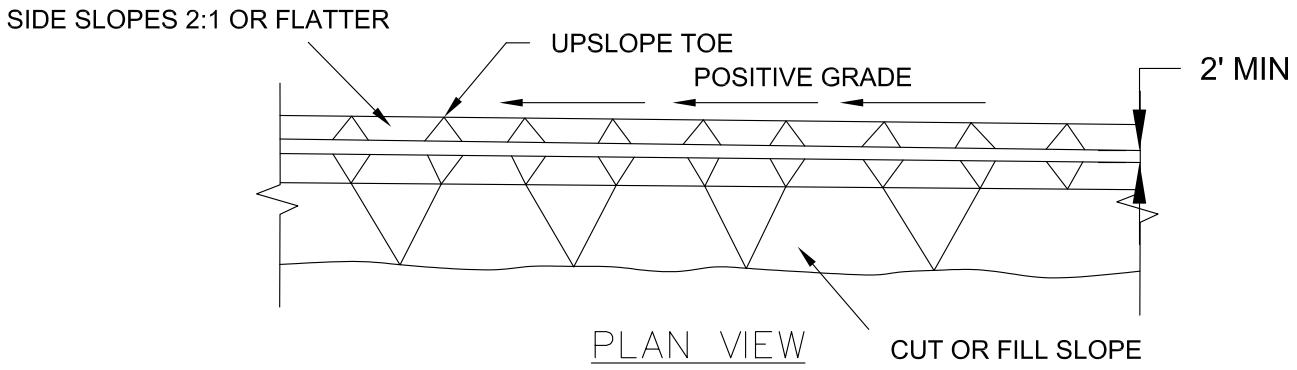
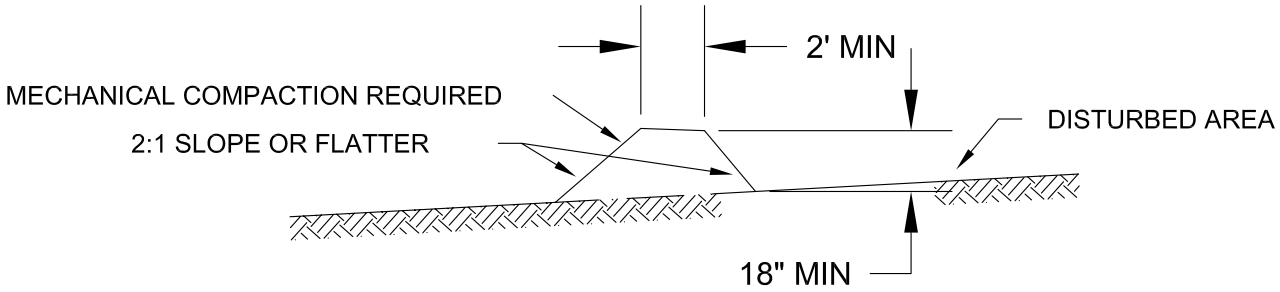


PLAN VIEW

TEMPORARY DIVERSION DIKE



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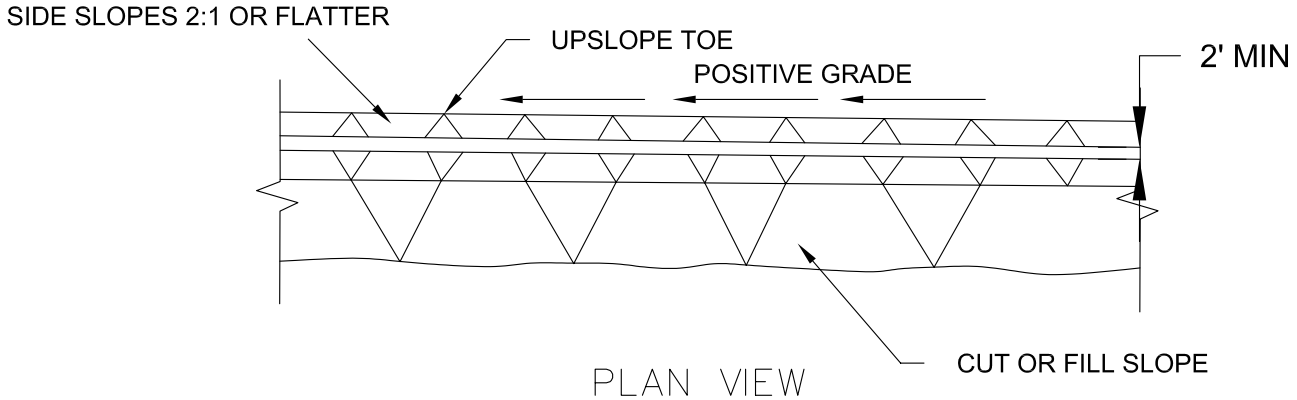


PLAN VIEW

TEMPORARY PERIMETER DIKE

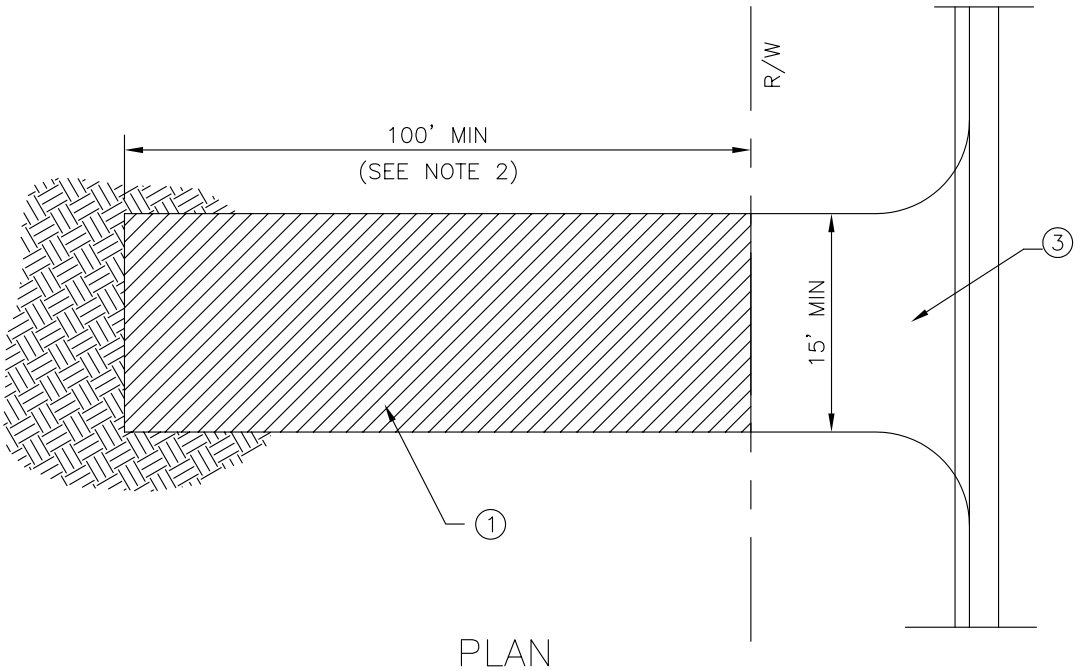
SNOHOMISH WASHINGTON

TEMPORARY DIVERSION AND PERIMETER DIKE

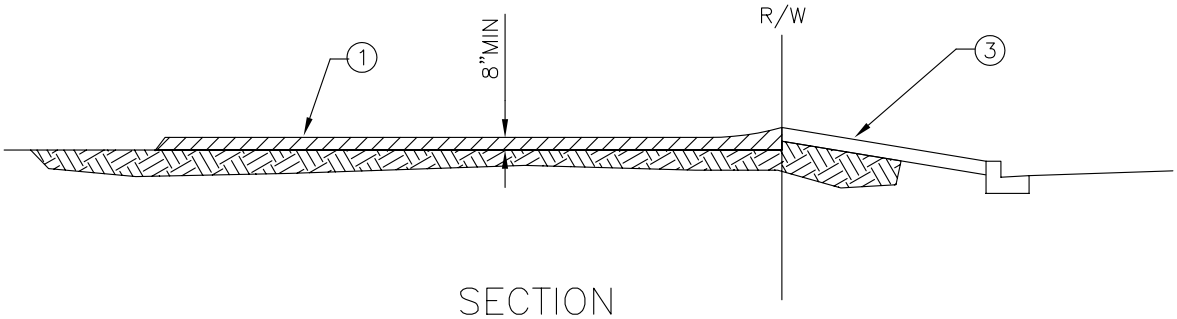
Approved By:
City Engineer
Date: May 30, 2004

207
Number

City of Snohomish Public Works Department



PLAN



SECTION

NOTES:

1. QUARRY SPALLS AS SPECIFIED IN: SECTION 9-13.6 OF THE WSDOT/APWA STANDARD SPECIFICATIONS.

GRADING REQUIREMENTS

SIEVE SIZE	% PASSING
8"	100
3"	40
3/4"	10

2. THE 100' MINIMUM LENGTH SHALL BE LENGTHENED AS NECESSARY TO ENSURE MATERIAL IS NOT TRACKED INTO THE PUBLIC RIGHT-OF-WAY. ALTERNATE CONSTRUCTION ENTRANCES WILL BE ALLOWED WITH APPROVAL OF THE CITY ENGINEER ON A CASE BY CASE BASIS, WHERE PHYSICAL SITE CONDITIONS AND SIZE DICTATE

3. EXISTING DRIVEWAY RAMP, OR SITE ACCESS ROAD 15' WIDE MIN. MATERIAL MUST BE EQUAL TO OR BETTER THAN SPECIFIED IN NOTE 1.

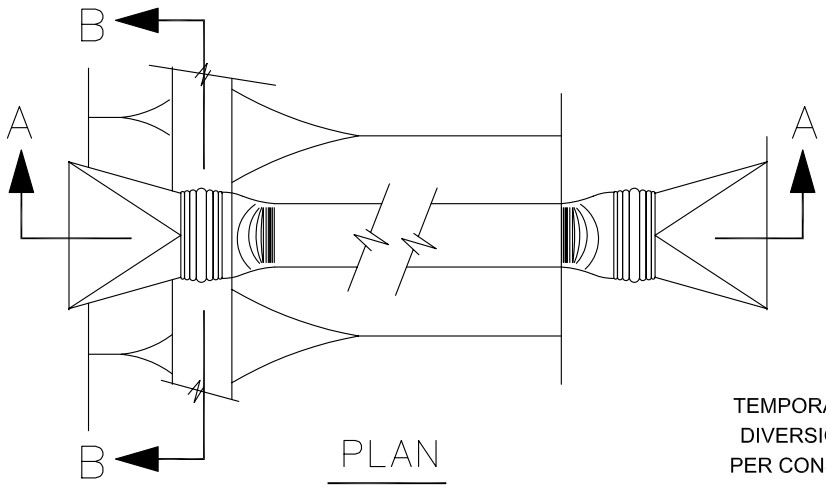
SNOHOMISH WASHINGTON

TEMPORARY CONSTRUCTION ENTRANCE

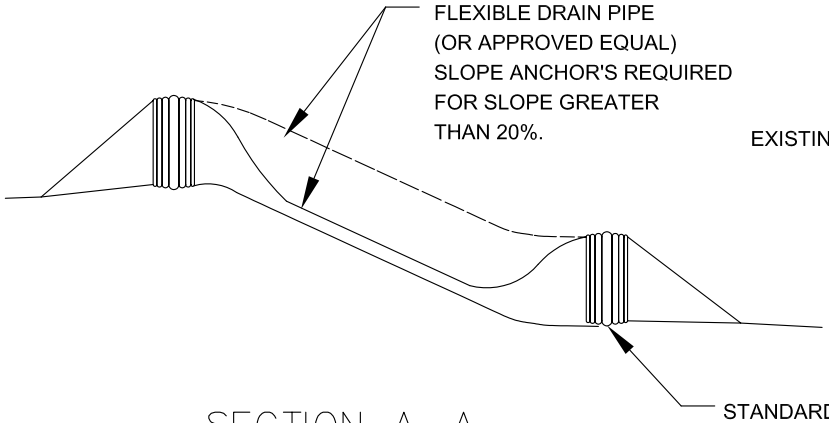
Approved By:
City Engineer
Date: May 30, 2004

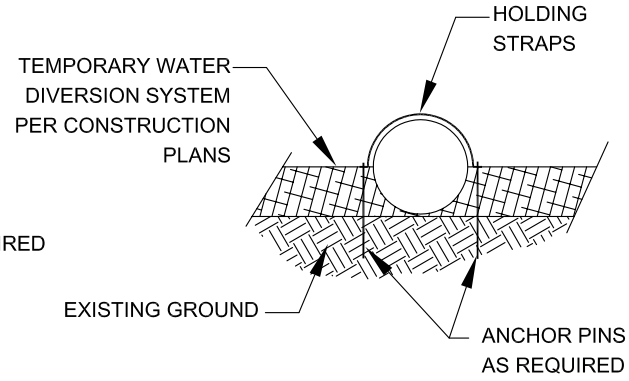
208
Number

City of Snohomish Public Works Department



PLAN

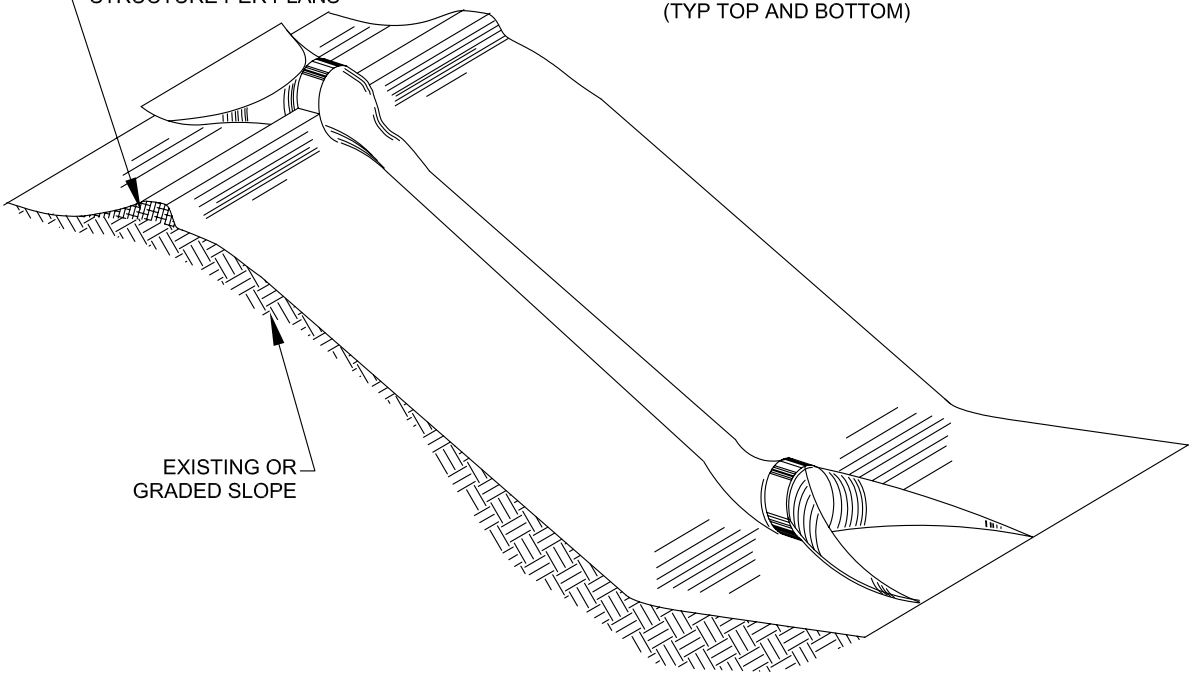




SECTION B–B

STANDARD METAL OR
HIGH DENSITY POLYETHYLENE
END SECTION WITH HOLDING
STRAPS AND ANCHOR PINS
(TYP TOP AND BOTTOM)

SECTION A–A



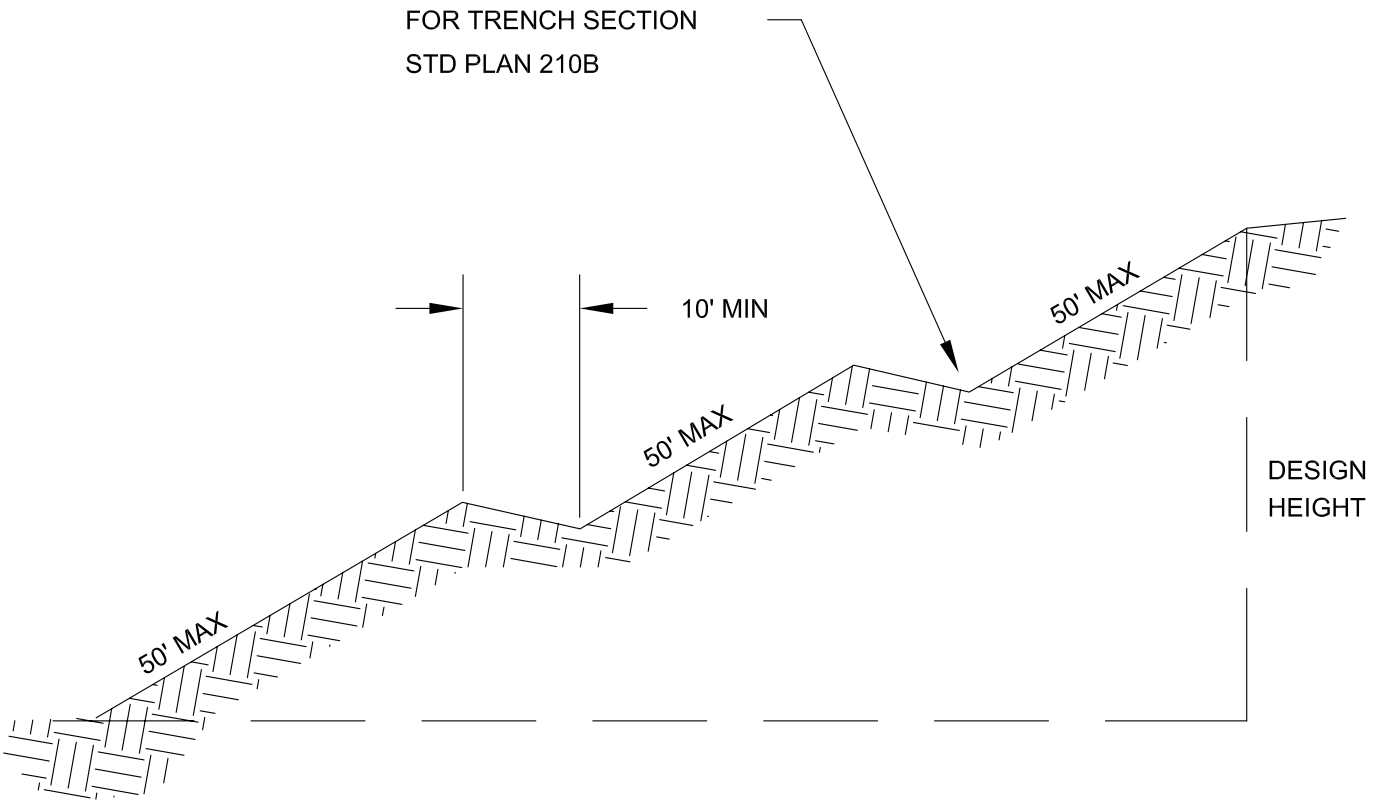
SNOHOMISH
WASHINGTON

TEMPORARY DOWNDRAIN STRUCTURE

Approved By:
City Engineer
Date: May 30, 2004

209
Number

City of Snohomish Public Works Department



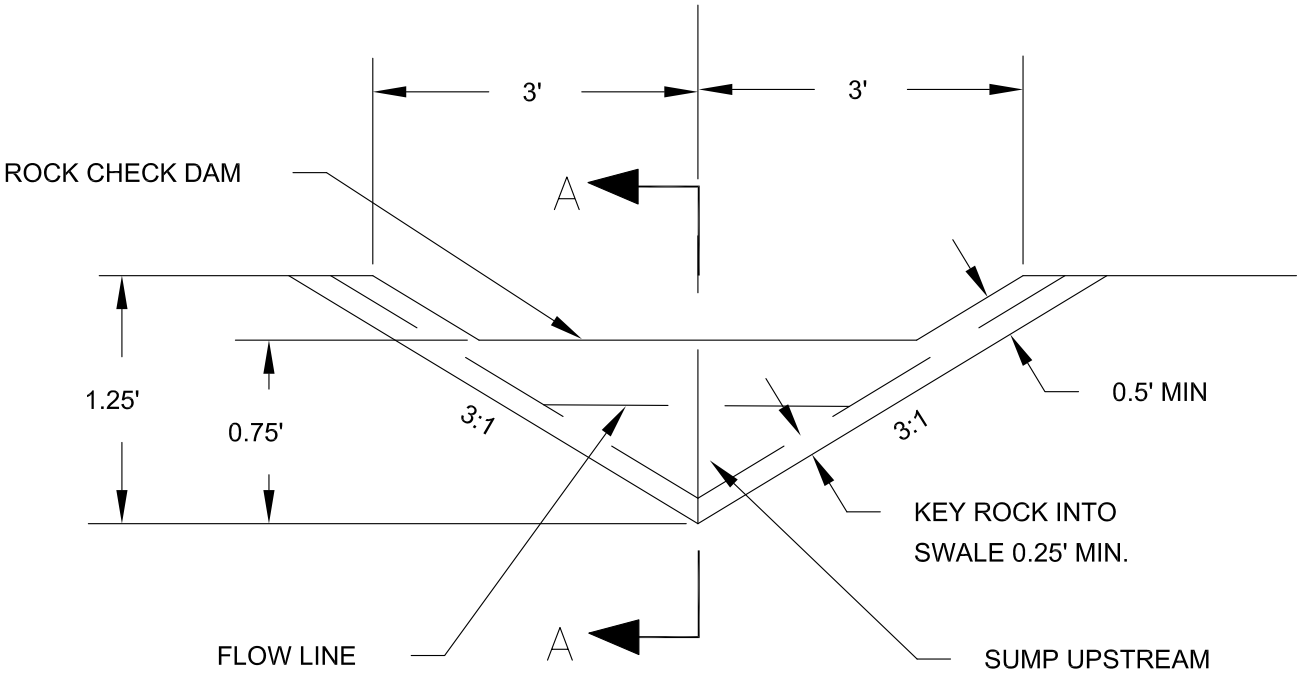
SNOHOMISH
WASHINGTON

GRADIENT TERRACE

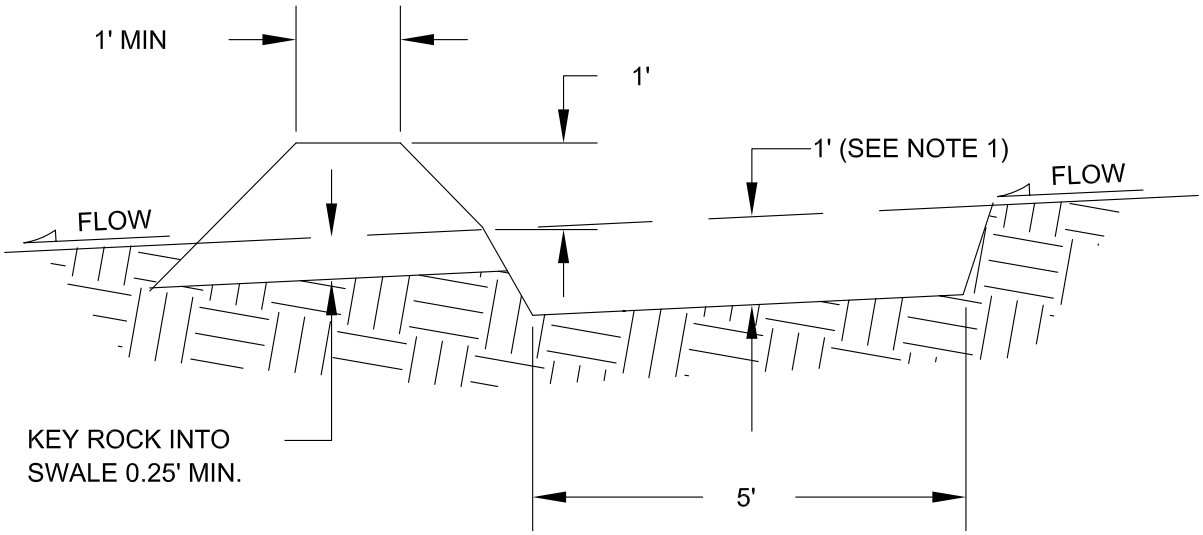
Approved By:
City Engineer
Date: May 30, 2004

210a
Number

City of Snohomish Public Works Department



TYPICAL CROSS SECTION



NOTE:

1. SUMP BEHIND ROCK CHECK DAM SHALL BE INSPECTED DAILY, AND CLEANED WHEN COLLECTED DEBRIS EXCEEDS 1/2 OF ITS DEPTH.

SECTION A–A

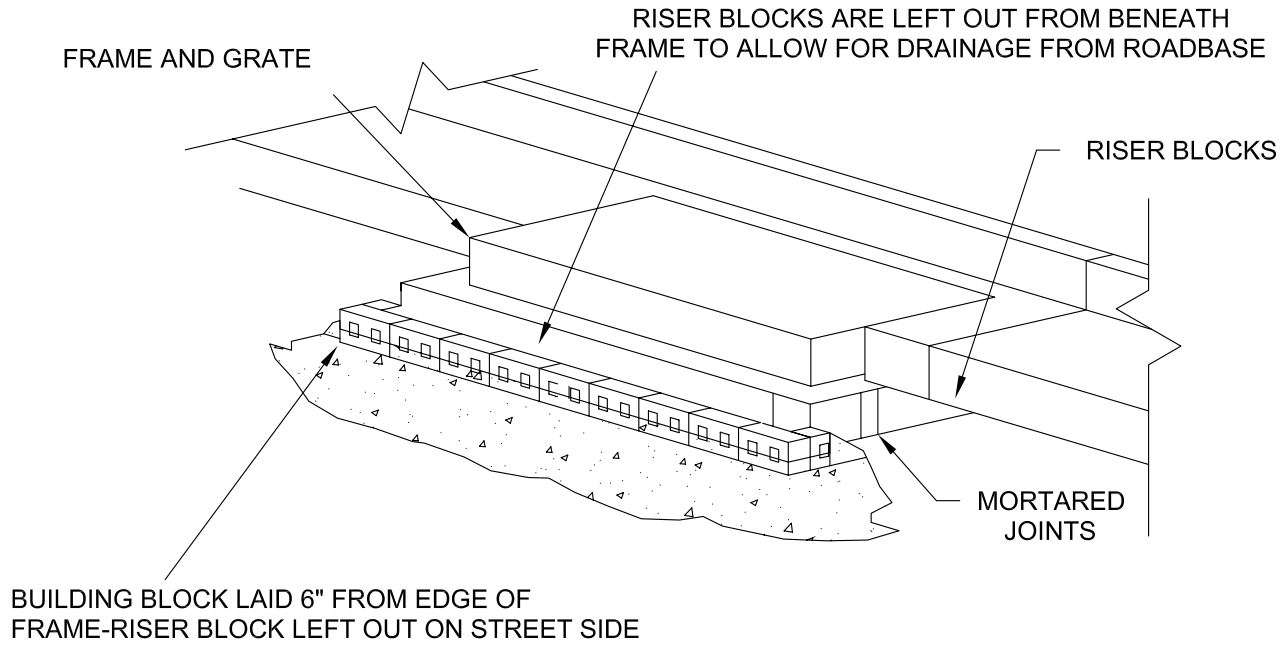
SNOHOMISH WASHINGTON

INTERCEPTOR DITCH WITH ROCK CHECK DAM

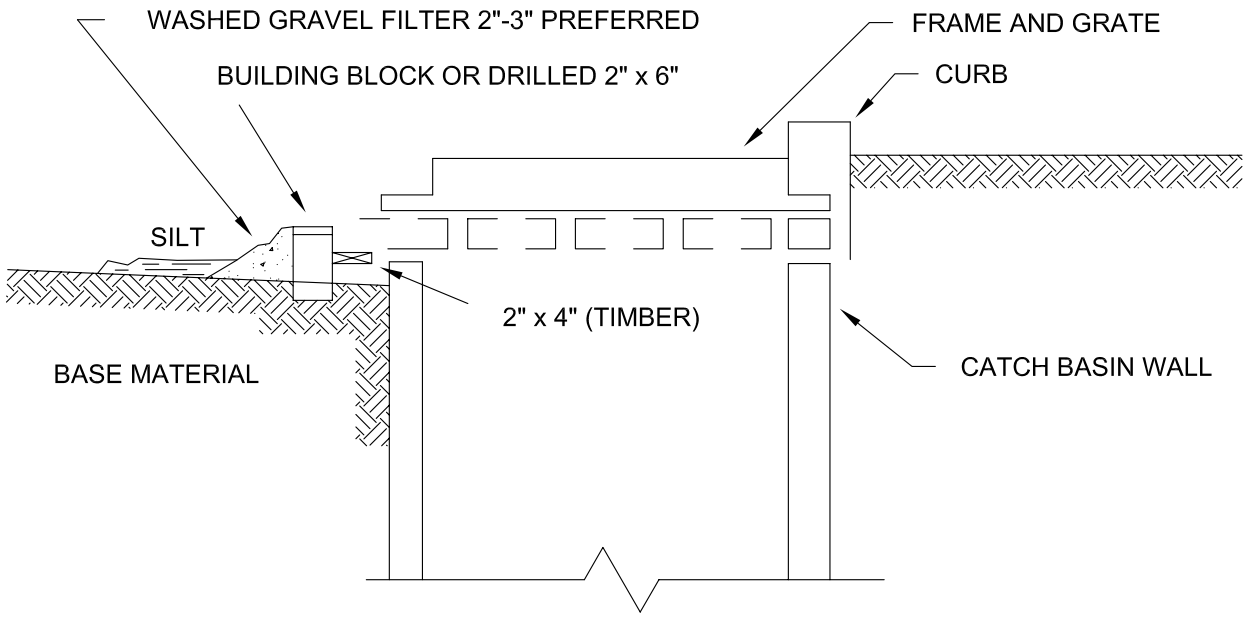
Approved By:
City Engineer
Date: May 30, 2004

210b
Number

City of Snohomish Public Works Department



ISOMETRIC



SECTION

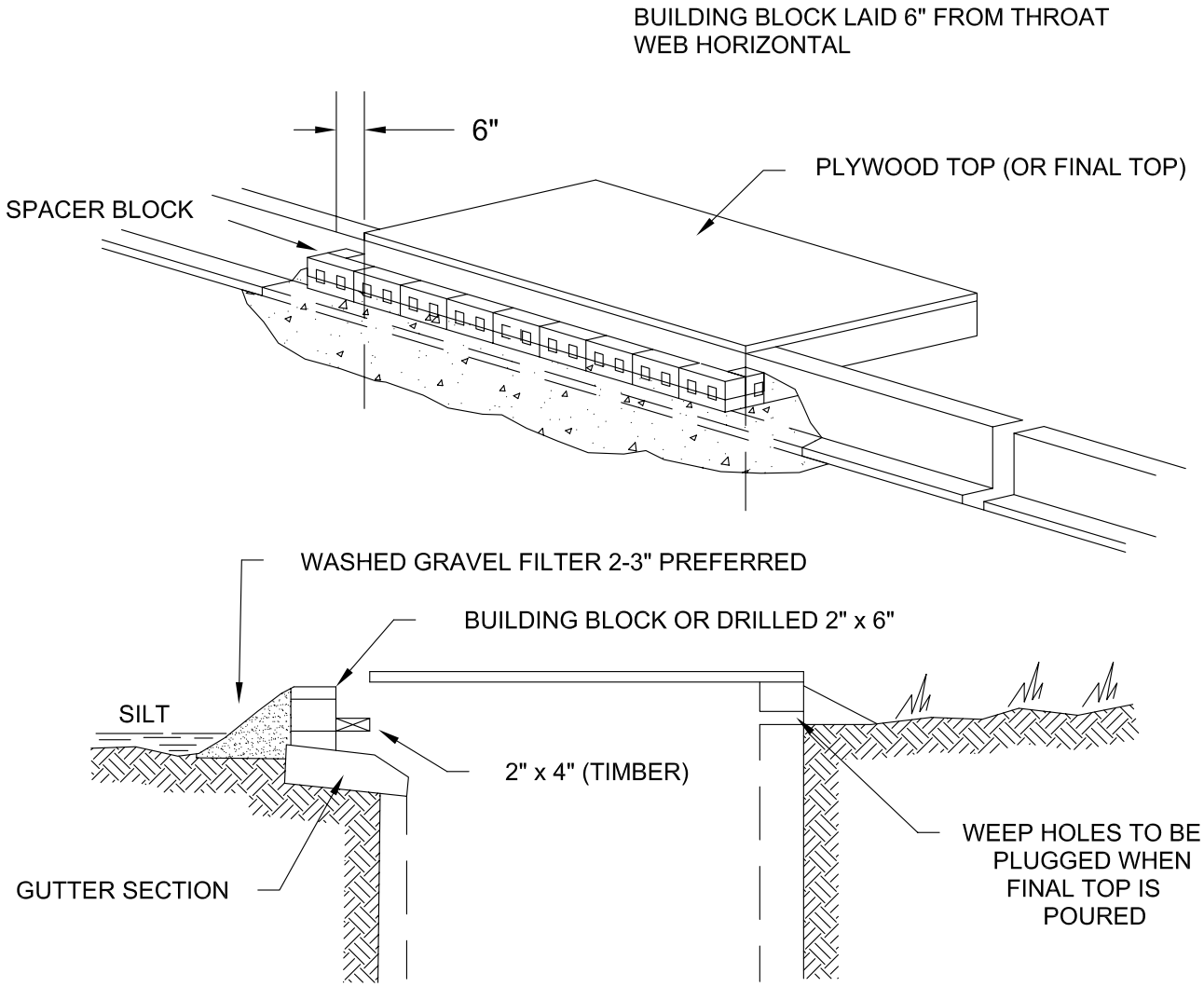
SNOHOMISH
WASHINGTON

CATCH BASIN INLET SEDIMENTATION TRAP-TYPE A

Approved By:
City Engineer
Date: May 30, 2004

211
Number

City of Snohomish Public Works Department



NOTES

1. USE DURING STREET CONSTRUCTION.
2. FULL THROAT IS AVAILABLE FOR HEAVY FLOW.
3. EXPANDED METAL OR HARDWARE CLOTH IN FRONT OF BLOCK PREVENTS GRAVEL FROM WASHING INTO STRUCTURE.
4. 2" x 4" BEHIND BLOCK AND ACROSS THROAT HELPS KEEP BLOCK IN PLACE. PLACE IN OUTER HOLE OF SPACER BLOCK.

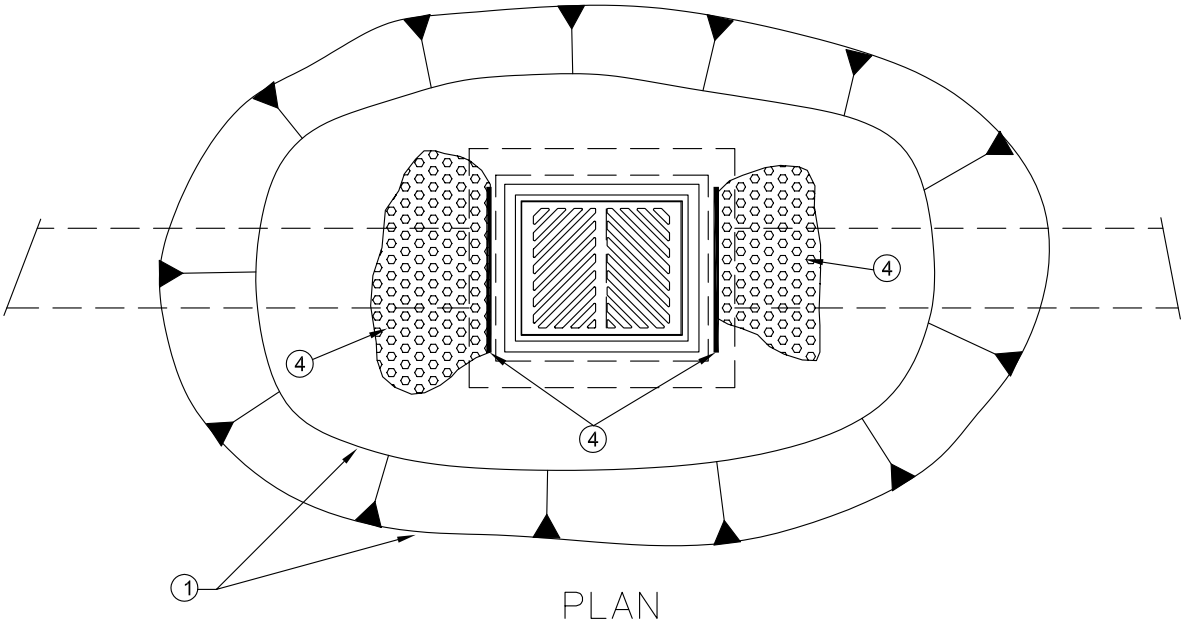
SNOHOMISH WASHINGTON

CATCH BASIN INLET SEDIMENTATION TRAP-TYPE B

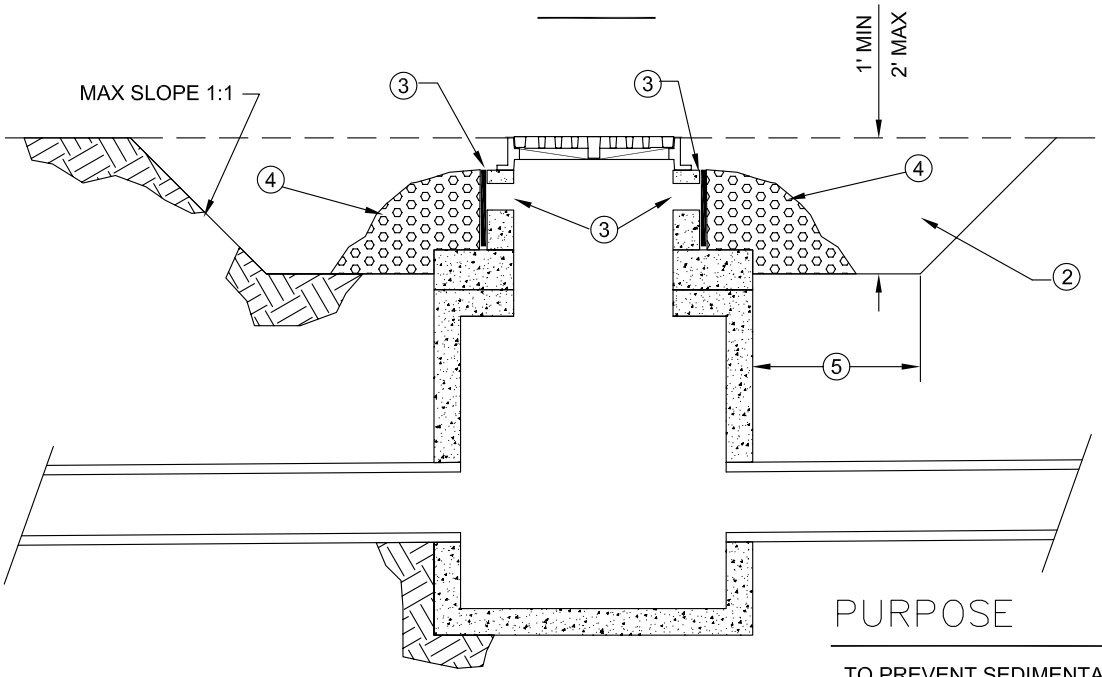
Approved By:
City Engineer
Date: May 30, 2004

212
Number

City of Snohomish Public Works Department



PLAN



SECTION

PURPOSE

TO PREVENT SEDIMENTATION FROM ENTERING STORM DRAINAGE SYSTEM AT CATCH BASIN/INLETS DURING CONSTRUCTION.

NOTES

1. SHAPE OF SEDIMENTATION POND MAY VARY TO FIT DRAINAGE AREA AND TERRAIN. MODIFY AS NECESSARY TO ENSURE SATISFACTORY TRAPPING OF SEDIMENT.HALF-CIRCLE POND MAY BE USED WHEN CURB AND GUTTER ARE INSTALLED DURING STREET CONSTRUCTION.
2. CLEAN OUT WHEN SEDIMENT REACHES 6" BELOW GRATE
3. TEMPORARILY LEAVE OUT BLOCK. COVER OPENING WITH WIRE SCREEN.
4. PLACE GRAVEL IN FRONT OF SCREEN TO FILTER SEDIMENT.
5. SIZE POND BASED ON EXPECTED FLOWS DURING CONSTRUCTION.

SNOHOMISH WASHINGTON

CATCH BASIN INLET SEDIMENTATION TRAP-TYPE C

Approved By:
City Engineer
Date: May 30, 2004

213
Number

City of Snohomish Public Works Department