

Chapter 2

Erosion Control, Clearing, and Grading

City of Kelso
Engineering Design Manual
June 2008
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CHAPTER 2 – EROSION CONTROL, CLEARING, AND GRADING

2.00 General

The Standards established by this chapter, and the standards notes to be included in the drawings, are intended to represent the minimum design standards for clearing, grading, and erosion control work.

Compliance with these Standards does not relieve the designer of the responsibility to apply sound professional judgment to protect the health, safety, and welfare of the general public. Additionally, since these are minimum standards, special site conditions and environmental constraints may require a greater level of protection than would normally be required under these Standards. The designer must apply these Standards bearing in mind these constraints.

Conditions may change after clearing, grading, or construction has started due to unforeseen conditions. Design elements of the proposed project may have to be changed to comply with the conditions of any permits, codes and regulations, or these Standards.

The primary objective of this chapter is the control of erosion at its source as a means of reducing water pollution, flooding, and habitat damage downstream. Typical examples of techniques for source control are limiting cleared areas (especially on steep terrain or adjacent to other sensitive areas), seasonal limits on work, mulching, hydroseeding or covering cleared areas as soon as work has finished, control of land use in sensitive areas, and establishment and maintenance of setbacks and buffer areas.

Secondary containment measures must be provided to backup the above measures in case of failure. These backup measures include desilting ponds and sediment traps, filter fencing and straw bales, catch basin filtration, and management plans. One method cannot be relied on without the other - both are mandatory to protect property, lives, and habitat.

Land alteration activities are those activities which are commonly referred to as clearing (the act of vegetation removal from the land surface by mechanical or chemical means - often referred to as land clearing), grubbing (the act of root vegetation removal from beneath the surface of the earth - usually in association with clearing), excavation (the mechanical removal of earth material), filling (deposition of earth material placed by artificial means), grading (excavation or filling or combination thereof), compaction (densification of earth material by artificial means), stockpiling (temporary deposition of earth material placed by artificial means), and stabilizing (counteracting the actions of gravity, wind, or water).

Construction activity and/or land disturbing practices disturbing a total area of one (1) acre or more requires a NPDES permit as issued by the State Department of Ecology. Phased construction activities with each portion less than one (1) acre but with a common plan of development greater than one (1) acre will typically still require a state NPDES permit.

2.01 Seasonal Limits

Land alteration operations shall be limited by the seasonal limitations specified below:

- A. When land alteration activities are interrupted by heavy rain, operations shall not be resumed until the City determines that erosion control facilities are operating satisfactorily;
- B. Work shall be stopped and the site shall be secured from erosion at any time when weather conditions change or the threat of heavy rain makes erosion problems likely, as determined by the Director;
- C. From October 1st through April 30th, no unworked soils shall remain exposed for more than two (2) days. From May 1st through September 30th, no unworked soils shall remain exposed for more than seven (7) days; and
- D. No earthwork shall take place on slopes in excess of twenty-five percent (25%) between the dates of October 1st and May 1st. This period may be shortened or extended according to the City Engineer.
 - 1. Extension requests must be provided in writing no later than September 15th. The request must include anticipated weather conditions for the requested time period as well as an implementation schedule.
 - 2. The requestor must demonstrate that every reasonable effort is being made to minimize grading activities.

2.02 Preservation of Existing Vegetation

- A. Existing vegetation shall be preserved whenever possible. Site design must take into consideration the preservation of existing vegetation and designed to minimize cut/fill activities.
- B. All excavations and fills in the proximity of trees and shrubs shall be kept outside the dripline of said trees and shrubs.

2.03 Temporary Erosion/Sedimentation Control

- A. Prior to any clearing and grading of any land development, devices for interception of all runoff from the cleared area shall be approved by the Community Development Director and/or the City Engineer and installed by the applicant. Said interception shall preclude discharging silt-laden runoff from the proposed land development to downstream properties to the maximum extent possible with the best available technology. Said interception shall cause all silt-laden runoff to be conveyed by open swale or other means to whatever temporary facility is necessary or required to remove

silt from said runoff prior to discharge to downstream properties. Sequence of work shall be specified on the plans.

- B. Care shall be taken so as to deposit no material from sites of land alteration activity onto public rights-of-way and/or adjoining properties. If such depositions occur, it shall be the responsibility of the Permittee to immediately remove such material and restore to the original conditions. The use of water is not an acceptable removal technique to remove material deposits.
- C. Since site conditions may change rapidly during construction due to construction activity, weather, and other factors, it should be anticipated that the erosion control measures on the approved plan might become ineffective. Under special conditions, measures additional to those showing on the plan may be required by the City, in order to control erosion and sedimentation.
- D. The following shall be carried as standard construction notes on the Temporary Erosion/Sedimentation Control Plan:
 - 1. All construction shall be in accordance with the City of Kelso Engineering Design Manual for Public Works Construction, Kelso/Longview Standard Plans and Specifications, Kelso Ordinances, Permit Conditions, and all other applicable codes, ordinances, standards, policies and the WSDOT Standard Specifications;
 - 2. The temporary erosion control system shall be installed prior to all other construction activities;
 - 3. Where possible, maintain natural vegetation for erosion and siltation control;
 - 4. As construction progresses and seasonal conditions dictate, more siltation control facilities may be required to ensure complete siltation control. Therefore, during the course of construction it shall be the obligation and responsibility of the contractor and/or applicant to address any new conditions that may be created by construction activities and to provide additional facilities over and above the minimum requirements as may be needed to achieve the performance standards required by the permit;
 - 5. All Erosion control BMP's shall be maintained in a satisfactory condition until such time that clearing and/or construction is completed, permanent drainage facilities are operational, and the potential for erosion has passed. Ponds and controls shall be cleaned or replaced regularly or as directed by the City. Contractor shall maintain a 24-hour contact number for emergency response to maintain and repair all on site erosion and sedimentation control measures and facilities;
 - 6. All disturbed land areas unworked for seven (7) days or more shall be protected from erosion by hydroseeding with a mix or by a method approved by the City. If required due to weather, timing, or site conditions, the hydroseeding shall be

- supplemented by mulching with straw a minimum of one (1) inch thick and stapling jute or utility mesh over the mulch;
7. Approval of the temporary erosion and sedimentation control plan does not constitute an approval of design, nor location of pipes, restrictors, or retention facilities, or an approval of plans required for a building permit; but is an approval of grading and sedimentation control plan only;
 8. Prior to occupancy of the building, the permanent storm drainage system shall be cleaned by pumping (not into the storm drainage system) or other method as approved by the City;
 9. The Contractor shall be responsible for preventing water pollution due to construction materials, methods, or equipment. All exposed aggregate concrete shall be installed and constructed so that no wash water enters the storm drainage system.
 10. The Contractor shall provide a separate area, a minimum of 200 square feet in size, for washing of concrete trucks. This area shall also be isolated so that no water enters the storm drainage system.
- E. General Methods of Erosion and Sedimentation Controls. The types of controls as outlined in the Western Washington Manual shall be utilized in such combination as is necessary to achieve the level of erosion control required by these Standards and meet water quality objectives. Erosion control facilities shall be periodically inspected and maintenance performed daily, or more as necessary, in order to ensure their proper functioning as required by the approved erosion and sedimentation control management plan.
- F. Small and large parcel developments shall implement erosion control plan(s) as required by the following:
1. *Construction vehicle access* shall be limited, wherever possible, to only one (1) route. Evidence of tracking of material from a construction site may require construction activities to cease until corrections are made. Corrections may include the washing of vehicle wheels on the gravel pad. Vehicles not performing a construction activity shall not be permitted off-street. Worker personal vehicles shall be parked in areas approved by the City Engineer.
 2. *Roadways*. If sediment is transported onto a road surface, the roads shall be cleaned thoroughly at the end of the workday, or more often if necessary. Significant soil deposits shall be immediately removed from roads by shoveling or sweeping. Street washing is not an appropriate street cleaning method.

3. *Clearing Limits.* At the site, mark clearing limits and/or any easements, setbacks, sensitive/critical areas and their buffers, trees, and drainage courses.
4. *Exposed Soils.* All exposed and unworked soils shall be stabilized by suitable application of BMP's, including but not limited to sod or other vegetation, plastic covering, mulching, or application of ground base on areas to be paved. All BMP's shall be selected, designed, and maintained in accordance with the BMP manual. Construction materials such as lumber shall be delivered and stored on designated locations that are stabilized and protected from erosion.
5. *Staging.* Sediment ponds and traps, perimeter dikes, sediment barriers, and other BMP's intended to trap sediment on-site shall be constructed as a first step in grading. These BMP's shall be stabilized and functional before land-disturbing activities take place. Earthen structures such as dams, dikes, and diversions shall be seeded and mulched according to the timing noted above.
6. *Infiltration Systems.* Permanent infiltration systems shall be isolated and protected from sedimentation by sediment traps, sacrificial systems, duplicate systems, or redundant systems.
7. *Waterways.* Properties and waterways downstream from development sites shall be protected from erosion due to increases in the volume, velocity, and peak flow rate of stormwater runoff from the project site. Acceptable BMP's include temporary or permanent detention ponds and temporary infiltration BMP's limiting the discharge from a two (2) year storm to one-half (1/2) the pre-development two (2) year storm peak runoff rate.
8. *Water bodies and adjacent properties.* Water bodies and adjacent properties shall be protected from sediment deposition by appropriate use of vegetative buffer strips, sediment barriers or filters, dikes, mulching, or by a combination of these measures and other appropriate BMP's. Each owner, builder, or permit holder shall install and maintain inlet protection on storm drain inlets impacted from construction activity on their site.
9. *Conveyance Systems.* All temporary on-site conveyance channels shall be designed, constructed, and stabilized to prevent erosion from the expected velocity of flow from a two (2) year, twenty-four (24) hour frequency storm for the developed condition. Stabilization adequate to prevent erosion of outlets, adjacent stream banks, slopes, and downstream reaches shall be provided at the outlets of all conveyance systems. BMP's shall be selected, designed, and maintained in accordance with the BMP manual. Outlet protection shall also include energy dissipation structures or devices that retard peak flows to non-erosive conditions.
10. *Storm Inlets.* All storm drain inlets shall be protected so that stormwater runoff shall not enter the conveyance system without first being filtered or otherwise

treated to remove sediment. BMP's shall be selected, designed, and maintained in accordance with the BMP manual. Other BMP's may be utilized, provided they have prior approval by the City Engineer.

11. *Maintenance.* All erosion and sediment control BMP's shall be inspected, maintained, and repaired as needed to ensure continued performance of their intended function. Maintenance and repair shall be conducted in accordance with the BMP manual or approved site plan. Damaged BMP's shall be replaced or repaired immediately.
12. *Underground Utility Construction.* The construction of underground utility lines shall be subject to the following criteria:
 - a. Where feasible, no more than five-hundred (500) feet of trench shall be opened at one time;
 - b. Excavated material shall be placed to minimize runoff into the trench and adjacent roadway consistent with safety and space considerations;
 - c. Trench dewatering devices shall discharge into a sediment trap or sediment pond;
 - d. BMP's shall be used to control erosion during and after construction.
13. *Construction Site Dewatering.* Dewatering devices shall discharge into a sediment trap or sediment pond.
14. *Stock Piles.* Stock piles shall be seeded and/or mulched and be surrounded by sediment fences at toe of stock pile area.
15. *Control of Pollutants Other Than Sediment on Construction Sites.* All pollutants other than sediment that occur on-site during development shall be handled and disposed of in a manner that does not cause contamination of stormwater.
16. *Removal of Temporary BMP's.* It is the responsibility of the applicant/contractor to remove all temporary erosion and sediment control BMP's within thirty (30) days after final site stabilization is achieved or after the temporary BMP's are no longer needed. Trapped sediment shall be removed or stabilized on-site. Disturbed soil areas resulting from removal shall be permanently stabilized.

G. Design Criteria

1. *Construction Entrances.* Access points shall be stabilized with 2- to 4-inch diameter gravel to minimize tracking of sediment (mud) onto public roads. The gravel pad must be eight (8) inches thick and fifty (50) feet in length. Subgrade

geotextile shall be utilized in all cases except single family and duplex construction sites

2. *Sediment Fences.* Selection of filter fabric tensile strength shall be based on standard engineering principals. Synthetic fabric shall contain ultraviolet ray inhibitors and stabilizer to provide a minimum of six (6) months of expected usable construction life. When standard strength fabric is used a wire support fence shall be fastened securely to the upslope side of the posts using heavy-duty 1-inch long tie wire or hog rings. The wire shall extend into the trench a minimum of four (4) inches and shall not extend more than thirty-six (36) inches above the ground surface. When extra strength fabric and closer post spacing is used the wire mesh fence may be eliminated and the filter fabric shall be stapled or wired directly to the posts. All fabric shall be spliced together only at support posts with a six (6) inch overlap. Fences shall be inspected regularly and at no time shall one (1) foot depth be allowed to accumulate.
3. *Undisturbed Buffers.* Undisturbed buffers shall be grassed or consist of dense vegetation. Buffers may not receive concentrated flows and slopes within the buffer area shall not exceed ten percent (10%).
4. *Temporary Erosion Control Grasses.* Grasses must be fully established prior to the wet season (November 1). Hydromulch shall be applied at a rate of two thousand (2000) lb/acre and on slopes greater than ten percent (10%) tackifier shall be used. Straw mulch shall be applied and ‘track walking’ is recommended prior to seeding. Seeding mixtures shall be approved by the City. Fertilization and water shall be applied per the supplier’s recommendations. Netting and anchors may be required on slopes, drainageways, and swales and shall be designed for the application.
5. *Permanent Vegetative Cover.* At the end of site construction or paving, approved permanent landscaping shall be installed per manufacturer’s recommendations.
6. *Straw Mulch.* Straw mulch shall be loose, weed free straw mulch and be applied at double the seeding rate not less than 4000 lb/acre and be a minimum of two (2) inches. Mulch must be stabilized in place by hand, machine punching the straw into the soil, spraying it with a tackifier, or covering with an erosion control blanket.
7. *Erosion Control Blankets.* Erosion control blankets shall be utilized in drainageways, slopes greater than fifty percent (50%) and moderate slopes prone to erosion. Netting shall only be used in conjunction with straw mulch or wood fiber. All erosion control blankets shall be installed per the manufacturer’s recommendations.

8. *Plastic Sheet Covering.* Plastic sheathing shall be of a polyethylene and have a minimum thickness of six (6) mil. Covering shall be installed tightly in place by sandbags, or tires on ropes with a maximum grid spacing of ten (10) feet. All seams shall be taped or weighted down the full length and there shall be a twelve (12) inch overlap. Drainage from all sheathing shall be controlled so that no runoff enters disturbed areas of the construction site. Clear plastic sheathing may be used to provide a greenhouse environment on seeded areas between November 1 and March 31.
9. *Sediment Traps.* Sediment traps may be formed complete by excavation or construction of a compacted embankment with a sediment storage depth not to exceed 1.5 feet and a two (2) foot settlement zone. Side slopes shall be one vertical to three horizontal (3H:1V)or flatter. The outlet shall be a weir or spillway at least one (1) foot below the top of the embankment. A three to one (3:1) ratio of length to width is recommended.
10. *Sediment Ponds.* Sediment ponds may be formed by partial excavation and/or by construction of a compacted embankment. It may have more than one (1) inflow points. Baffles shall be utilized to lengthen the residence time. A securely anchored riser pipe is the preferred discharge mechanism. An emergency overflow shall be provided. The riser pipe shall be perforated with filter fabric and gravel 'cone' for filtration. The sediment pond shall have a sediment depth no greater than three (3) feet with a two (2) to four (4) foot settlement zone and an additional one (1) foot of freeboard. The pond riser pipe shall be sized to carry the 10-year design storm. A 3:1 length to width ratio is recommended.
11. *Temporary Dikes and Swales.* Interceptor dikes or swales shall be stabilized with an approved cover such as grass, rock, or erosion blankets prior to use. Interceptors shall be spaced every three-hundred (300) feet on slopes less than five percent (5%), every two-hundred (200) feet on slopes between five (5) and ten percent (10%) and every one-hundred feet (100) feet on slopes exceeding ten percent (10%). Grades between parallel interceptors shall be between one-half (0.5) and one percent (1%). Maximum grade for interceptor swales shall be five percent (5%) and shall outlet to sediment trap/pond.
12. *Check Dams.* Check dams shall be constructed of either rock or logs. A one (1) foot sump shall be located immediately upstream for storage of settled sediment. Check dams shall be placed such that the toe of the upstream dam is at the same elevation as the top of the next downstream dam. Rock dams shall be constructed of rock spalls four (4) inch-minus and placed by hand or mechanical placement. Log check dams shall be constructed of 4-inch to 6-inch diameter logs.

2.04 Permanent Erosion Control and Vegetation Restoration

- A. Permanent erosion control shall be required per the requirements of the WWM.

- B. Vegetation shall be restored on those areas of the site disturbed by the land alteration activity which are not covered by permanent impervious surface improvements (i.e. buildings, parking lots, etc.) at the earliest possible time consistent with appropriate planting times. The soil shall be stabilized prior to vegetation restoration since vegetation alone cannot provide an effective erosion control cover and prevent soil slippage on a soil that is not stable due to its texture, structure, water movement, or excessive slope.
- C. In no case will the period between the land alteration operation and final and complete restorative, or permanent erosion control, vegetation planting for a given project or project phase be longer than one (1) year. Said planting shall restore the vegetation on site to a condition equal to or better than the precleared condition to the maximum extent possible. Temporary erosion and sedimentation control measures shall be maintained in full operating condition for all areas to be restored until said restoration is complete and the site fully stabilized.

2.05 100-Year Flood Plain

- A. Encroachments, including fills, new construction, substantial improvements, and other development within the regulatory floodway that would result in any increase in flood levels during the occurrence of the "100-year" flood discharge shall be prohibited.
- B. "100-year flood" means the flood having a one percent (1%) chance of being equaled or exceeded in any given year.
- C. Delineation of the "100-year" flood plain shall be in accordance with the elevations established by the Federal Emergency Management Agency (FEMA).
- D. Construction of inhabitable structures in designated floodways is regulated under the Kelso Municipal Code.

2.06 Clearing and Grading on Environmentally Sensitive Lands

Clearing and Grading shall be prohibited in sensitive areas as defined in the Kelso Municipal Code.

2.07 Environmental Protection During Construction

- A. General Policy and Requirements
 - 1. It is the policy of the City of Kelso to require temporary and permanent measures for all construction projects to lessen the adverse effects of construction on the environment.

The Contractor shall properly install, operate, and maintain both temporary and permanent works as provided in this section or in an approved plan, to protect the environment during the term of the project.

The City may, in addition, require that a construction project be scheduled so as to minimize erosion or other environmental harm.

Nothing in this section shall relieve any person from the obligation to comply with the regulations or permits of any federal, state, or other local authority.

2. For all projects, the prohibitions and regulations of this section shall apply. The City may temporarily suspend the work or require additional protection measures if it appears, based upon observed conditions of the project, that the approved plan is insufficient to prevent environmental harm and that such suspension or additional measures will prevent or minimize such harm.

B. Air Pollution Control

Dust shall be minimized to the extent practicable, utilizing all measures necessary, including but not limited to:

1. Sprinkling haul and access roads and other exposed dust-producing areas with water. Obtaining water from a hydrant will require specific authorization from the applicable water jurisdiction.
2. Applying DOE approved dust palliatives on access and haul roads.
3. Establishing temporary vegetative cover.
4. Placing wood chips or other effective mulches on vehicle and pedestrian use areas.
5. Maintaining the proper moisture condition on all fill surfaces.
6. Pre-wetting cut and borrow area surfaces.
7. Use of covered haul equipment.

C. Maintaining Surface Water Quality

1. Pollutants such as fuels, lubricants, bitumens, raw sewage, and other harmful materials shall not be discharged into or near rivers, streams, or impoundments. Sterilizing water from water line construction activities shall not be directly discharged into the public storm drainage system.

2. The use of water from a stream or impoundment shall not result in altering the temperature of the water body enough to affect aquatic life.

D. Fish and Wildlife Habitat Preservation

1. The construction shall be done in a manner to minimize the adverse effects on fish and wildlife resources.
2. The requirements of local, state, and federal agencies charged with wildlife and fish protection shall be adhered to by the entire construction work force.

E. Control of Noise Levels

Construction noise shall be minimized by the use of proper engine mufflers, protective sound reducing enclosures, and other sound barriers. Construction activities producing excessive noise that cannot be reduced by mechanical means shall be restricted to locations where their sound impact is reduced to a minimum at the edge of the work area. All construction noise shall be in accordance with KMC 8.28.

F. Natural Vegetation

1. As far as is practicable; the natural vegetation shall be protected and left in place. Work areas shall be carefully located and marked to reduce potential damage. Trees shall not be used as anchors for stabilizing working equipment.
2. During clearing operations, trees shall not be permitted to fall outside the work area. In areas designated for selective cutting or clearing, care in falling and removing trees and brush shall be taken to avoid injuring trees and shrubs to be left in place. All remaining debris from cutting or removing trees is to be removed from the site. The natural grade is to be restored and reseeded.

G. Historical and Archaeological Areas

When burial sites, buried camp areas, village sites, and other distinctive archaeological or historical items are uncovered, or other items suspected of being of historical or archaeological significance are encountered, the Contractor shall report the matter to the City and the state liaison officer. Construction operations shall be stopped until the appropriate authorities can examine the area and give clearance to proceed with the work.

Under the Natural Historical Preservation Act, state liaison officers shall be notified when historical or archaeological items are unearthed.

The Washington Criminal Code prohibits disinterment of a corpse without permission of the appropriate authorities.

H. Use of Pesticides

1. The use of pesticides including insecticides, herbicides, defoliants, soil sterilants, and so forth, must strictly adhere to federal, state, county, and local restrictions. Time, area, method, and rate of application must be approved by all relevant authorities and their requirements followed.
2. All materials delivered to the job site shall be covered and protected from the weather. None of the materials shall be exposed during storage. Waste material, rinsing fluids, and other such material shall be disposed of in such a manner that pollution of groundwater, surface water, or the air does not occur. In no case shall toxic materials be dumped into drainageways.
3. All personnel shall stay out of sprayed areas for the prescribed time. All such areas should be fenced, appropriately signed, or otherwise protected to restrict entry.

2.08 Signage

Erosion control signage approved by the City Engineer shall be installed at each point of entry for any subdivision or short plat prior to issuance of provisional acceptance by the City.

Removal of signage shall occur no sooner than the latter of: certificates of occupancy have been issued for seventy percent (70%) of the lots; or there being less than ten (10) unoccupied lots remaining within the development; or as determined by the City Engineer.

Figure 2-1: Erosion Control Signage

Erosion Control Strictly Enforced

- **Do NOT stockpile in the street**
- **Do NOT track dirt or mud into the street**
- **Vehicles use gravel construction access**
- **Place filter bags in front of storm drain inlets**



REPORT VIOLATIONS TO
(3 6 0) 4 2 3 - 1 2 7 0

2.09 Contractor Certification

All development activities shall be performed by licensed, bonded and insured contractors shall be supervised by an individual who shall have successfully completed formal training in erosion and sediment control during construction by a recognized organization acceptable to the City Engineer. A certification of successful completion of such training shall be submitted at the pre-construction conference. This certification is not required for residential homeowners constructing on their own parcel.