Missoula City Public Works
Standards and Specifications Manual

CHAPTER 8 – EROSION CONTROL

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8.1.1 References

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C. MDEQ General Permit for Construction Discharges
D. Montana DEQ *Stormwater Management During Construction Field Guide for Best Management Practices*
E. Montana Department of Transportation - *Erosion and Sediment Control Best Management Practices Manual*
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A. Appendix 8-A – City Stormwater Compliance Permits Flow Chart
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8.1.3 Standard Modifications to MPWSS

Specifications not specifically contained herein related to transportation improvements shall be in conformance with the *Montana Public Works Standard Specifications* (MPWSS), 6th Edition, and the following City of Missoula Modifications to the MPWSS.

8.1.4 Standard Drawings

Standard drawings related to erosion control shall be in conformance with the MPWSS, 6th Edition, 2010 Standard Drawings; the MDEQ Stormwater Management, *Construction Field Guide for Best Management Practices*; the MDT Erosion and Sediment Control BMP Manual Standard Drawings; and the 800-series of the City of Missoula Standard Drawings on the *Missoula City Public Works Standards and Specifications Manual* web page.

8.2 General Requirements

8.2.1 Design Standards

A. The best management practices (BMPs) described in this chapter apply to the management of stormwater, erosion, and sediment during construction. Post-construction storm water management controls are addressed in Chapter 6 of this Manual.

B. A disturbance area greater than or equal to 2,500 square feet (0.05 acre) requires a City Stormwater Permit (Appendix 8-A and Appendix 8-B).

1. Disturbance area is any area that is subject to clearing, excavating, grading, and/or placement of earth materials and includes utility installation, utility maintenance work, and boring operations.
2. Land disturbance activities related to agricultural practices or improvements are exempt from this requirement.
3. Emergency repairs by a public utility or any other governmental agency are exempt from this requirement.

C. A disturbance area greater than or equal to 1 acre requires a City Stormwater Permit and a Montana Pollutant Discharge Elimination System (MPDES) General Permit for Stormwater Discharges Associated with Construction Activity (Construction General Permit). The Construction General Permit shall be obtained from MDEQ, per the eligibility requirements defined in the Construction General Permit.

D. City Stormwater Permit applicants shall provide details of the on-site drainage system, structures, BMPs, concepts, and techniques that will be used to manage stormwater runoff during construction. An Erosion Control Site Plan is required as part of the Stormwater Permit application.

1. The applicant shall use the Erosion Control Site Plan Checklist (Appendix 8-C) to ensure their plan meets City requirements.
2. The applicant shall complete the Stormwater Site Evaluation Form (Appendix 6-B) to identify the priority ranking of the project.
    a. The priority ranking determines the construction inspection frequency and whether a Stormwater Management Site Plan is required for post-construction stormwater management controls.
3. For projects that are required to obtain coverage under a Construction General Permit, the City requires the following be submitted to them before a City Stormwater Permit will be issued: Stormwater Pollution Prevention Plan (SWPPP), Notice of Intent (NOI), and MDEQ confirmation letter.
    a. Specific requirements for this plan and the Construction General Permit can be found on the MDEQ website.
4. The City requires notification that City Stormwater Permit coverage should be terminated. This will usually occur upon project closeout and/or upon request for a Certificate of Occupancy.

a. Once permanent erosion control has been established on 70% or greater of the disturbed areas (i.e., final stabilization), the City Stormwater Permit may be closed.

b. All temporary BMPs shall be removed, all construction equipment and vehicles shall be removed, and all potential pollutant-generating actives due to construction activity shall be complete.

c. On low priority sites, a Landscape Agreement (Appendix 8-D) may be submitted prior to final stabilization, to close the City Stormwater Permit and issue a Certificate of Occupancy.

d. For post-construction stormwater management (Chapter 6 of this Manual), a recorded covenant for maintenance, a utility easement, and an accurate post-construction (as-built) plan of the system, signed and sealed by a Montana-licensed professional engineer shall be submitted to the City.

e. An NOT for Stormwater Construction (NOT-SWC) is required by MDEQ for activities covered under the Construction General Permit, and a copy shall be submitted to the City to close the City Stormwater Permit.

8.2.2 Plan Requirements

A. **Erosion Control Site Plan**. For any site disturbance greater than or equal to 2,500 square feet (0.05 acre), an Erosion Control Site Plan shall be submitted with the Stormwater Permit application. The plan shall show which BMPs are proposed to be used—when and where, specific to the project scope—along with the total disturbance area and installation details and notes for the proposed BMPs. Measures include those necessary to delineate areas of work, prevent erosion of unstable or bare soil, plan for construction staging and storage logistics, construction of stabilized access points, and proper containment measures for construction materials and waste. An Erosion Control Site Plan Checklist is provided in Appendix 8-C.

B. The following minimum requirements apply to the Erosion Control Site Plan:

1. Anticipated construction schedule and construction duration (in weeks or months);

2. Point of contact. Include name and contact information for the person responsible for maintaining erosion prevention and sediment control measures;

3. Boundary lines of the site;

4. Vicinity map of the site, showing relation to the surrounding adjacent area;

5. North arrow and legend;

6. Sufficient scale and size to clearly display site conditions;

7. Outfall location(s);

8. Locations and details of all BMPs;

9. State waters and other water bodies;

a. Width, direction of flow, and approximate location of top and toe of banks of water bodies, if applicable;

10. Accurate contours showing the topography of the existing ground extending at least 10 feet outside all boundary lines of the project site. The contour lines shall be at intervals sufficient to show the configuration of the ground before disturbance;

11. All existing buildings, structures, public easements, or underground utilities;
12. Existing vegetation, location, and type. Within 25 feet of any cut or fill, the plan shall identify the location, diameter, species, and appropriate elevation at the base of all trees over 12 inches in diameter measured at 4.5 feet above ground level;
13. Revegetation plan;
14. Existing drainage patterns and direction of flow;
15. Limits of disturbed areas;
16. Areas not to be disturbed and off-limits to construction activity;
17. Location of proposed vegetative erosion control measures (e.g., seeding and landscaping), including type, quantity, planting schedule, and irrigation; and
18. Location and details of all proposed drainage systems, walls, cribbing, or other erosion protection devices to be constructed in connection with, or as a part of, the proposed work.

8.3 Design Requirements

8.3.1 Best Management Practices

A. BMPs are used to minimize or eliminate the potential for pollutants to reach state waters in stormwater runoff. Construction-related pollutants include, but are not limited to, trash, paint, masonry, drywall, and dust. Emphasis is placed on managing erosion through preventative practices and control measures, including planning, project phasing, minimizing disturbance, vegetative cover, and grading controls. Sediment control BMPs are designed to prevent soil particles already being carried in stormwater and discharging from the construction site. Sediment control BMPs are not as effective as erosion prevention BMPs and are typically considered secondary practices, installed after all opportunities for erosion prevention have been implemented. Examples of sediment control BMPs include inlet protection, silt fence, rock wattles, sediment traps, and other perimeter control devices.

B. The BMPs described in *Stormwater Management During Construction, Field Guide for Best Management Practices* published by MDEQ, *Erosion and Sediment Control Best Management Practices Manual* published by the Montana Department of Transportation, City standard drawings (Appendix 2-B) shall be used for compliance with the City Stormwater Permit.

C. All BMPs require regular maintenance to function properly. The construction inspection frequency is determined per the Stormwater Site Evaluation Form that is filled out by the applicant for City approval with the Stormwater Permit application. The City will inspect the site per the site priority. Project erosion and sediment control measures shall be maintained as necessary—throughout the duration of the permit—to be effective.

8.3.2 Erosion Prevention BMPs

A. Conserving the existing natural vegetation is the most effective erosion prevention BMP, thus it is a critical consideration in project planning and phasing. Once these conservation areas have been identified, geotextile mats, surface roughening, drainage structures, check dams, and temporary slope drains are some examples of BMPs that can be implemented to prevent

erosion. It is not practicable to provide an exhaustive list in this chapter, so the City suggests also consulting the BMP information found in the References section of this chapter. Temporary construction BMPs shall be properly installed, regularly maintained, and removed after construction is complete.

1. **Natural Vegetation**. The identification and planned protection of existing natural vegetation (e.g., trees, shrubs, grasses, and forbs) within the construction area is the most effective and least expensive BMP for soil stabilization. Its purpose is to minimize erosion; reduce the velocity of stormwater runoff; reduce sediment transport and tracking; provide an area for runoff to permeate the soil; provide buffers, screens, and aesthetic value; provide bio filtration (capture/process of pollutants); and provide habitat for wildlife. Thus, natural vegetation and vegetated buffers should be conserved to the maximum extent practicable.
2. **Geotextile Mats**. Geotextile mats, or other rolled erosion prevention materials, are used when disturbed soils are difficult to stabilize. They reduce rainfall impact and improve infiltration; provide a microclimate to promote seed establishment; minimize erosion caused by concentrated flows; and hold mulch, seed, fertilizer, and topsoil in place. A wide range of materials and combination of materials are used to produce geotextile mats, including straw, jute, wood fiber, and coir (coconut fiber). Correct installation is critical, as good ground contact prevents runoff concentrating under the mat, causing significant unplanned erosion.
3. **Surface Roughening**. Surface roughening creates a series of ridges and depressions that run horizontal across the slope and parallel to the contour. Notably, it is important not to create vertical ridges down the slope, as this facilitates channeling and erosion. Surface roughening increases infiltration, reduces erosion, and traps sediment.
4. **Drainage Structures**. A drainage structure is a ridge of compacted soil or a lined swale with vegetative lining located at the top, base, or somewhere along a sloping disturbed area. The dike or swale intercepts and conveys smaller flows along low-gradient drainage ways to larger conveyances, such as piped slope drains, or to a stabilized outlet. Dikes and swales may be used individually or in combination with each other.
5. **Check Dams**. Check dams are small dams (6 to 12 inches high) constructed across a swale or ditch to reduce velocities of concentrated flows, thereby reducing erosion in the swale or ditch. Check dams not only prevent gully erosion from occurring before vegetation is established, but also allow a significant amount of suspended sediment to settle out. Steep slopes may also be managed using a series of check dams to terrace the swale and reduce the slope to within acceptable limits. The use of check dams with swales also promotes infiltration.
6. **Temporary Slope Drains.** A temporary pipe or lined chute may be used to intercept run-on/runoff and carry concentrated flows from the top of a slope into a stabilized swale, sediment trapping device, or large stabilized area at the toe of the slope. Slope drains are often used with dikes and lined ditches to intercept and direct surface flow. Their primary purpose is to prevent run-on/runoff from flowing over slopes that are at high risk of erosion or slope failure. Velocity dissipation is an important component of temporary slope drains.

These temporary devices are placed at conveyance outlets to prevent scour and reduce the velocity and/or energy of stormwater flows and discharges. This BMP is temporary and shall not be confused with permanent outlet protection and velocity dissipation devices.

8.3.3 Sediment Control BMPs

A. The purpose of sediment control BMPs is to ensure that sediments or other contaminants do not leave the construction site. Some common sediment control measures include BMPs related to the construction entrance, inlet protection, sediment fencing, concrete washout, and portable toilets. Like the erosion prevention BMPs, it is not practicable to provide an exhaustive list in this chapter. The City suggests consulting the additional information provided in the References section of this chapter during the site planning and design phase of a project. Temporary construction BMPs shall be properly installed, regularly maintained, and removed after construction is complete.

1. **Construction Entrance/Exit**. Sediment tracking from vehicular traffic on construction sites can be a major challenge, as well as an early BMP failure and violation, for contractors. A defined point of entrance/exit to a construction site should be stabilized to reduce the tracking of mud and dirt onto public streets by construction vehicles. Once sediment is tracked onto impervious surfaces, it is extremely difficult to manage and is readily transported with runoff. Evaluating soil conditions, site access, traffic patterns, seasonal weather, and appropriate BMP alternatives all factor into implementing an environmentally responsible construction entrance. An effective construction entrance/exit will include numerous administrative and structural BMPs to minimize and control sediment tracking. These other BMPs may include limiting site access, stabilized parking areas, project scheduling changes, halting work, wheel wash stations, subcontractor training, and vehicle track pads.
2. **Inlet Protection**. Inlet protection is installed to prevent sediment-laden runoff from entering a storm drain inlet; this is the last line of defense and the final opportunity to prevent illicit discharge. It is used at storm drain dry wells and inlets that are subject to runoff from construction activities. The purpose is to detain runoff and allow sediment to settle/filter out prior to discharging into the storm drain system or water bodies. These are most effective when the appropriate material and method are chosen for the location based on the anticipated flow velocity. These BMPs are least effective when they are not regularly maintained. Thus, regular maintenance is critical to their success. Landscape fabric shall not be used for inlet protection.
3. **Sediment Fencing**. A sediment fence is a temporary linear sediment barrier of permeable fabric designed to intercept and slow the flow of sediment-laden sheet flow runoff. Silt fences allow sediment to settle from runoff before water leaves the construction site. Silt fences should be used between the edge of construction disturbance and a critical resource or right of way line that is adjacent to the construction activity. These BMPs are not effective unless they are trenched and keyed in, and they must be regularly maintained.
4. **Compacted Earthen Berms**. Temporary earthen berms can be implemented in coordination with grading. Compaction is critical for these BMPs to function as designed, to prevent

seepage and by-pass. Berms are usually located along a contour with a relatively gentle slope. They may serve various functions, such as creating a barrier, retaining flow, infiltration, or directing flow. Compacted earthen berms must be vegetated with an approved seed mix, if in place for more than 14 calendar days.

5. **Concrete Washout**. Liquid and solid waste from concrete operations is a significant pollutant source due to its high pH and chemical constituents. Thus, concrete washout and slurry must be properly contained. A designated concrete washout area needs to be large enough to completely contain all liquid wastes generated from concrete operations. Procedures and practices shall be implemented to prevent pollutants from concrete waste materials from entering the storm drain system.
    a. Secondary containment is required for certain quantities of regulated substances and must comply with the Missoula Valley Water Quality Ordinance. Please contact the Missoula Valley Water Quality District for more information.

8.3.4 Vegetation Management BMPs

A. To the maximum extent practicable, existing native vegetation should be conserved and protected from disturbance. This has been shown to be the most effective and least expensive BMP. Disturbed areas are especially susceptible to invasion by noxious weeds, which are a major threat to Montana's economy and environment. During the past century, weeds have expanded to infest over 8.2 million acres, degrading ecosystem productivity and diversity. Further, the County Weed Management Act (MCA §7-22-2102 to 2104) states that it is unlawful to permit noxious weeds to propagate. When a property is offered for sale, the person who owns the property shall notify the owner's agent and the purchaser of: (a) the existence of noxious weed infestations on the property offered for sale; and (b) the existence of a noxious weed management program or a noxious weed management agreement. Please refer to current Montana Noxious Weed List to prioritize management.

1. **Revegetation Plan.** Appendix E of the *Missoula Parks and Recreation Design Manual* provides revegetation guidelines that should be followed in the Erosion Control Site Plan. Further, Appendix B of the Missoula County Noxious Weed Management Plan provides methods to control weeds and revegetate disturbed areas. The City encourages owners or operators to consult with the Missoula County Weed District at any point, from initial planning to monitoring and evaluation. To prevent noxious weed establishment, the City requires the submittal of a revegetation plan with the Stormwater Permit application (Appendix 8-B). A revegetation plan shall describe the time and method of seeding/planting, fertilization, and watering practices; recommended native plant species; use of weed-free seed; weed management procedures; monitoring and evaluation guidelines; and the final objective. It should also note the size of the overall disturbed area, size of common areas and parks, who will be responsible for management, and the responsibilities of the owner/developer in managing non-native species.
2. **Long-term Success.** Revegetation is a long-term process. Maintaining stable, native plant communities on adjacent lands will help support revegetation efforts on disturbed areas by

providing a seed bank and supporting the appropriate pollinators. To ensure successful revegetation, an environmental scientist should perform long-term monitoring and evaluation. Some sites may take several years to become established enough to outcompete noxious weeds. Monitoring may cease once the final objective, per the revegetation plan, has been met.