CHAPTER 600 EROSION AND SEDIMENT CONTROL FOR CONSTRUCTION SITES

SECTION 601 GENERAL

601.01 Purpose and Background

The requirements contained in this Chapter are intended to prevent storm water pollution resulting from soil erosion and sedimentation or from the mishandling of solid and hazardous waste. Practices and measures included herein are intended to prevent foreign substances (e.g. sediment, construction debris, chemicals) from entering a drainageway, whether intentionally or accidentally, by machinery, wind, rain, runoff, or other means.

The major pollutant of concern during construction is sediment. Natural erosion processes are accelerated at a project site by the construction process for a number of reasons including the loss of surface vegetation and compaction damage to the soil structure itself, resulting in reduced infiltration and increased surface runoff. Clearing and grading operations also expose subsoils which are often poorly suited to re-establish vegetation, leading to long-term erosion problems.

Other pollutants of concern during the construction process are hazardous wastes or hydrocarbons associated with construction equipment or processes. Examples include concrete wash-off, paints, solvents, and hydrocarbons from refueling operations.

601.02 Abbreviations and Definitions

Abbreviations

COE:	United States Army Corps of Engineers
IDEM:	Indiana Department of Environmental Management
IDNR:	Indiana Department of Natural Resources
INDOT:	Indiana Department of Transportation
NRCS:	USDA-Natural Resources Conservation Service
USDA:	United States Department of Agriculture

Definitions

Construction Activity: Land disturbing activities, and land disturbing activities associated with the construction of infrastructure and structures. This term does not include routine ditch maintenance or minor landscaping projects.

Construction Plan:	A representation of a project site and all activities associated with the project. The plan includes the location of the project site, buildings and other infrastructure, grading activities, schedules for implementation and other pertinent information related to the project site. A storm water pollution prevention plan is a part of the construction plan.
Construction Site Access:	A stabilized stone surface at all points of ingress or egress to a project site, for the purpose of capturing and detaining sediment carried by tires of vehicles or other equipment entering or exiting the project site.
Contractor Or Subcontractor:	An individual or company hired by the developer or the individual lot operator, or their agent, to perform services on the project site.
Developer:	Any person or company having financial and operational control of construction activities and project plans and specifications; or an owner of property who sells or leases, or offers for sale or lease, any lots in a subdivision
Erosion:	The detachment and movement of soil, sediment, or rock fragments by water, wind, ice, or gravity.
Erosion and Sediment Control Measure	A practice or a combination of practices, to control erosion and resulting sedimentation.
Erosion and Sediment Control System	The use of appropriate erosion and sediment control measures to minimize sedimentation by first reducing or eliminating erosion at the source and then as necessary, trapping sediment to prevent it from being discharged from or within a project site.
Final Stabilization:	The establishment of permanent vegetative cover or the application of a permanent non-erosive material to areas where all land disturbing activities have been completed and no additional land disturbing activities are planned under the current permit.

Grading:	The cutting and filling of the land surface to a desired slope or elevation.
Impervious Surface:	Surfaces, such as pavement and rooftops, which prevent the infiltration of storm water into the soil.
Individual Building Lot:	A single parcel of land within a multi-parcel development.
Individual Lot Operator:	A person who has financial control of construction activities for an individual building lot and is required to comply with the terms of this chapter
Land Disturbing Activity:	Any manmade change of the land surface, including removing vegetative cover that exposes the underlying soil, excavating, filling, transporting, and grading.
Larger Common Plan of Development Or Sale:	A plan, undertaken by a single project site owner or a group of project site owners acting in concert, to offer lots for sale or lease; where such land is contiguous, or is known, designated, purchased or advertised as a common unit or by a common name, such land shall be presumed as being offered for sale or lease as part of a larger common plan. The term also includes phased or other construction activity by a single entity for its own use.
Measurable Storm Event:	A precipitation event that results in a total measured precipitation accumulation equal to, or greater than, one-half (0.5) inch of rainfall.
MS4 Area:	A land area comprising one (1) or more places that receives coverage under one (1) NPDES storm water permit regulated by 327 IAC 15-13 or 327 IAC 5-4-6(a)(3) and 327 IAC 5-4-6(a)(4).
MS4 Operator:	The person responsible for development, implementation, or enforcement of the minimum control measures for a designated MS4 area regulated under 327 IAC 15-13.
Municipal Separate Storm Sewer System (MS4):	The same meaning set forth at 327 IAC 15-13-5(42).

Peak Discharge:	The maximum rate of flow during a storm, usually in reference to a specific design storm event.
Permanent Stabilization:	The establishment, at a uniform density of seventy percent (70%) across the disturbed area, of vegetative cover or permanent nonerosive material that will ensure the resistance of the soil to erosion, sliding, or other movement.
Phasing of Construction:	Sequential development of smaller portions of a large project site, stabilizing each portion before beginning land disturbance on subsequent portions, to minimize exposure of disturbed land to erosion.
Project Site Owner:	The person required to comply with the terms of this chapter, including the developer or the person who has financial and operational control of construction activities and project plan and specifications, including the ability to make modifications to those plans and specifications.
Sediment:	Solid material (both mineral and organic) that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface.
Sedimentation:	The settling and accumulation of unconsolidated sediment carried by storm water run-off.
Soil:	The unconsolidated mineral and organic material on the surface of the earth that serves as the natural medium for the growth of plants.
Soil and Water Conservation District (SWCD):	A political subdivision established under IC 14-32.
Storm water Pollution Prevention Plan (SWPPP):	A plan developed to minimize the impact of storm water pollutants resulting from construction activities.
Storm Water Quality Measure:	A practice, or a combination of practices, to control or minimize pollutants associated with storm water run-off.

Strip Development:	A multi-lot project where building lots front on an existing road.
Subdivision:	Any land that is divided or proposed to be divided into lots, whether contiguous or subject to zoning requirements, for the purpose of sale or lease as part of a larger common plan of development or sale.
Temporary Stabilization:	The covering of soil to ensure its resistance to erosion, sliding, or other movement. The term includes vegetative cover, anchored mulch, or other non-erosive material applied at a uniform density of seventy percent (70%) across the disturbed area.
Tracking:	The deposition of soil that is transported from one (1) location to another by tires, tracks of vehicles, or other equipment.
Trained Individual:	An individual who is trained and experienced in the principles of storm water quality, including erosion and sediment control and is certified by the Hamilton County SWCD, registered professional or is a Certified Professional in Erosion and Sediment Control.

SECTION 602 BASIC POLICIES AND PROCEDURES

602.01 Applicability and Exemptions

The City of Carmel will require a Storm Water Pollution Prevention Plan (SWPPP), which includes erosion and sediment control measures and materials handling procedures, to be submitted as part of the construction plans and specifications. Any project located within the City of Carmel which falls under the jurisdictional authority of the City of Carmel and includes the disturbance of ¼ acre or more of land due to clearing, grading, excavation, and other land disturbing activities is subject to the requirements of this Chapter. This includes both new development and re-development. This chapter also applies to disturbances that are part of a larger common plan of development or sale within the area under the jurisdictional authority of the City of Carmel. Section 602.03 of this Chapter provides guidelines for calculating land disturbance. Projects meeting the coverage requirements of 327 IAC 15-5 (Rule 5) shall also be in compliance with 327 IAC 15-5.

All projects disturbing ¼ acre or more of land are required to have a Stormwater Management Permit before beginning any grading or land disturbance activity. Plans shall be approved by all applicable governing entities prior to the issuance of the permit. An individual lot located within a larger permitted project site, is considered part of the larger permitted project site, and the individual lot operator must comply with the terms and conditions of the Stormwater Management Permit approved for the larger project site. The storm water permit application for the larger project site must include typical detailed erosion and sediment control measures for individual building lots.

All persons engaging in construction and land disturbing activities on a permitted project site must comply with the requirements of this Chapter and Carmel City Code.

602.02
Policy on Storm Water Pollution Prevention

Effective storm water pollution prevention on construction sites is dependent on a combination of preventing movement of soil from its original position (erosion control), intercepting displaced soil prior to entering a waterbody (sediment control), and proper on-site materials handling. The project site owner must submit to the City of Carmel a SWPPP with detailed erosion and sediment control plans as well as a narrative describing materials handling and storage, and construction sequencing. The following principles apply to all land-disturbing activities and should be considered in the preparation of a Storm Water Pollution Prevention Plan within the City of Carmel.

A. Minimize the potential for soil erosion by designing a development that fits the topography and soils of the site. Deep cuts and fills in areas with steep slopes should be avoided wherever possible, and natural contours should be followed as closely as possible.

B. Existing natural vegetation should be retained and protected wherever possible. Areas immediately adjacent (within 35 feet of top of bank) to watercourses and lakes also should be left undisturbed wherever possible. Unvegetated or vegetated areas with less than 70% cover that are scheduled or likely to be left inactive for 15 days or more must be temporarily or permanently stabilized with measures appropriate for the season to reduce erosion potential.

C. All activities on a site should be conducted in a logical sequence so that the smallest practical area of land will be exposed for the shortest practical period of time during development.

D. The length and steepness of designed slopes should be minimized to reduce erosion potential. Drainage channels and swales must be designed and adequately protected so that their final gradients and resultant velocities will not cause erosion in the receiving channel or at the outlet. Methods for determining acceptable velocities are included in the Storm Water Technical Standards Manual.

E. Sediment-laden water which otherwise would flow from the project site shall be treated by erosion and sediment control measures appropriate to minimize sedimentation. A stable construction site access shall be provided at all points of construction traffic ingress and egress to the project site.

F. Appropriate measures shall be implemented to prevent wastes or unused building materials, including, garbage, debris, packaging material, fuels and petroleum products, hazardous materials or wastes, cleaning wastes, wastewater, concrete truck washout, and other substances from being carried from a project site by runoff or wind. Identification of areas where concrete truck washout is permissible must be clearly posted at appropriate areas of the site. Wastes and unused building materials shall be managed and disposed of in accordance with all applicable State statutes and regulations. Proper storage and handling of materials such as fuels or hazardous wastes, and spill prevention and cleanup measures (including having spill response equipment

on-site) shall be implemented to minimize the potential for pollutants to contaminate surface or ground water or degrade soil quality.

G. Public or private roadways shall be kept cleared of accumulated sediment that is a result of runoff or tracking. Bulk clearing of accumulated sediment shall not include flushing the area with water. Cleared sediment shall be redistributed or disposed of in a manner that is in accordance with all applicable statutes and regulations.

H. Collected runoff leaving a project site must be either discharged directly into a well-defined, stable receiving channel, or diffused and released to adjacent property without causing an erosion or pollutant problem to the adjacent property owner.

I. Natural features, including wetlands, shall be protected from pollutants associated with storm water runoff.

602.03 Other Agency Permits

The City is not responsible for verifying if permits are required by the state or by other agencies that may have jurisdiction. For work within a watercourse located on or adjacent to a project within the City, or for a watercourse that may potentially be impacted by a project within the City, prior to plan approval, the project site owner shall provide a copy of all State and/or Federal permits or written documentation from the State that such work in or adjacent to a watercourse is the jurisdiction of the MS4. If it is demonstrated in writing from the State or other agency, that the State or other agency does not have jurisdiction over certain work within or adjacent to a watercourse, then the City requires, upon completion of work, the area within or adjacent to the watercourse shall, at a minimum, be stabilized within one week of completion of work, or before the next anticipated measurable storm event, whichever comes first.

602.04 Calculating Total Area of Land Disturbance

In calculating the total area of land disturbance, for the purposes of determining applicability of this Chapter to the project, the following guidelines should be used:

A. Off-site construction activities that provide services (for example, road extensions, sewer, water, and other utilities) to a land disturbing project site, must be considered as a part of the total land disturbance calculation for the project site, when the activity is under the control of the project site owner.

B. Strip developments will be considered as one (1) project site and must comply with this Chapter unless the total combined disturbance on all individual lots is less than 1/4 acre and is not part of a larger common plan of development or sale.

C. To determine if multi-lot project sites are regulated by the City of Carmel, the area of land disturbance shall be calculated by adding the total area of land disturbance for improvements, such as, roads, utilities, or common areas, and the expected total disturbance on each individual lot, as determined by the following:

i. For a single-family residential project site where the lots are one-half (0.5) acre or more, one-half (0.5) acre of land disturbance must be used as the expected lot disturbance.

ii. For a single-family residential project site where the lots are less than one half (0.5) acre in size, the total lot must be calculated as being disturbed.

iii. To calculate lot disturbance on all other types of projects sites, such as industrial and commercial project sites, a minimum of one (1) acre of land disturbance must be used as the expected lot disturbance, unless the lots are less than one (1) acre in size, in which case the total lot must be calculated as being disturbed.

602.05
Common Erosion and Sediment Control Practices

All erosion control and storm water pollution prevention measures required to comply with the City of Carmel's Ordinance shall meet the design criteria, standards, and specifications similar to or the same as those outlined in the latest editions of the "Indiana Storm Water Quality Manual" and "Indiana Handbook for Erosion Control in Developing Areas". **Table 602-1** lists some of the more common and effective practices for preventing storm water pollution from construction sites. Details of each practice can be found in the Indiana Storm Water Quality Manual, the Indiana Handbook for Erosion Control in Developing Areas, or in **Appendix 602-1**. These practices should be used to protect ***every*** potential pollution pathway to storm water conveyances.

An approved list of acceptable storm water inlet protection may be obtained from the City of Carmel Engineering Department. Inlet protection should be cleaned at least every two weeks.

Pond banks and inlet/outlet pipes shall be stabilized within one week of pond installation, including, at a minimum, erosion control blankets on the slopes of the pond extending five feet past the top of bank and appropriate size rock placed around the inlet/outlet pipe per the approved storm water pollution prevention plans.

Streets in active construction areas should be swept at least twice per week.

602.06
Individual Building Lot Controls

A standard erosion control plan for individual lots is provided as **Exhibit 602-1**. Individual lot operators are responsible for ensuring all storm water leaving the lot is treated. The standard plan includes perimeter silt fence, a stabilized construction entrance, curb inlet protection, drop inlet protection, stockpile containment, stabilized drainage swales, downspout extensions, temporary seeding and mulching, and permanent vegetation. Every relevant measure shall be installed at each individual building lot site.

There will be situations where perimeter protection may be needed between two lots. It is the Individual Lot Operator's responsibility to adapt and overcome any changes or deficiencies that may develop during the building process. Failure to do so can result in damage to adjacent property, damage to the City's storm sewer system, and contribute to storm water pollution.

Construction sequence on individual building lots shall be as follows:

1. Clearly delineate areas of trees, shrubs, and vegetation that are to be undisturbed. To prevent root damage, the areas delineated for tree protection should be at least the same diameter as the crown.
2. Ensure that all inlet protection is in place and functioning for both area inlets and curb inlets along the property frontage.
3. Install perimeter silt fence at construction limits. Position the fence to intercept runoff prior to leaving the lot or entering drainage swales.
4. Avoid disturbing drainage swales. Install BMP's to protect any drainage swales or any part of an established or existing drainage system adjacent to the property. If drainage swales are bare, install erosion control blankets or sod to immediately stabilize.
5. Install gravel construction entrance that extends from the street to the building pad. Geotextile fabric shall be placed under the stone on the graded surface.

6. Perform primary grading operations.
7. Contain erosion from any soil stockpiles created on-site with silt fence around the base.
8. Establish temporary seeding and straw mulch on disturbed areas.
9. Construct the home and install utilities.
10. Install downspout extenders once the roof and gutters have been constructed. Extenders should outlet to a stabilized area.
11. Re-seed any areas disturbed by construction and utilities installation with temporary seed mix within 3 days of completion of disturbance.
12. Grade the site to final elevations and stabilize. Add topsoil as needed to minimize erosion of underlying soil and to quickly establish grass. Perimeter protection may be temporarily removed in order to complete final grading but must be replaced or re-installed each evening or until the lot is stabilized. The lot is considered stabilized when it has been fully sodded or, when using seed, has reached 75% cover through mature growth or the addition of mulch.

All erosion and sediment control measures must be properly maintained throughout construction. The individual lot operator is responsible for cleaning the streets along the lot property frontage at the end of every work day. Temporary and permanent seeding should be watered as needed until established.

602.07 Inspection, Maintenance, Record Keeping, and Reporting

Following approval of the Stormwater Management Permit by the City of Carmel and commencement of construction activities, the City of Carmel has the authority to conduct inspections of the site to ensure full compliance with the provisions of this Chapter, the *Indiana Stormwater Quality Manual*, and the terms and conditions of the approved permit.

A self-monitoring program must be implemented by the project site owner to ensure the storm water pollution prevention plan is working effectively. A trained individual, acceptable to the City of Carmel, shall perform a written evaluation of the project site by the end of the next business day following each measurable storm event. If there are no measurable storm events within a given week, the site should be monitored at least once in that week. Weekly inspections by the trained individual shall continue until the entire site has been stabilized and a "verified" copy of the Notice of Termination has been issued. The trained individual should look at the maintenance of existing storm water pollution prevention measures, including erosion and sediment control measures, drainage structures, and construction materials storage/containment facilities, to ensure they are functioning properly. The trained individual should also identify additional measures, beyond those originally identified in the storm water pollution prevention plan, necessary to remain in compliance with all applicable statutes and regulations. A standard form to record the self-monitoring/inspection results is provided as **Exhibit 602-2**.

The resulting evaluation reports must include the name of the individual performing the evaluation, the date of the evaluation, problems identified at the project site, and details of maintenance, additional measures, and corrective actions recommended and completed.

The storm water pollution prevention plan shall serve as a guideline for storm water quality, but should not be interpreted to be the only basis for implementation of storm water quality measures for a project site. The project site owner is responsible for implementing, in accordance with this Chapter, all measures necessary to adequately prevent polluted storm water runoff. Recommendations by the trained individual for modified storm water quality measures should be implemented.

All evaluation reports for the project site shall be submitted to the City of Carmel Engineering Department, in an organized fashion, within forty-eight (48) hours of the inspection, Attn: Storm Water Administrator.

Practice No.	BMP Description	Applicability	Fact Sheet
1	Site Assessment	All sites	1
2	Construction Sequencing	All sites	CN - 101
3	Tree Preservation and Protection	Nearly all sites	1
4	Temporary Gravel Construction Entrance Pad	All sites	1
5	Wheel Wash	All sites	CN - 102
6	Silt Fence	Small drainage areas	1
7	Surface Roughening	Sites with slopes that are to be stabilized with vegetation	1
8	Temporary Seeding	Areas of bare soil where additional work is not scheduled to be performed for a minimum of 15 days	1
9	Mulching	Temporary surface stabilization	1
10	Erosion Control Blanket (Surface)	Temporary surface stabilization, anchor for mulch	1
11	Temporary Diversion	Up-slope and down-slope sides of construction site, above disturbed slopes within construction site	1
12	Rock Check Dam	2 acres maximum contributing drainage area	1
13	Temporary Slope Drain	Sites with cut or fill slopes	1
14	Straw Bale Dam	Small drainage areas	1
15	Fabric Drop Inlet Protection	1 acre maximum contributing drainage area	1
16	Basket Curb Inlet Protection	1 acre maximum contributing drainage area	1
17	Sandbag Curb Inlet Protection	1 acre maximum contributing drainage area	1
18	Temporary Sediment Trap	5 acre maximum contributing drainage area	1
19	Temporary Sediment Basin	30 acre maximum contributing drainage area	1
20	Dewatering Structure	Sites requiring dewatering	CN - 103
21	Dust Control	All sites	1
22	Spill Prevention and Control	All sites	CN - 104
23	Solid Waste Management	All sites	CN - 105
24	Hazardous Waste Management	All sites	CN - 106

Fact sheet Location: 1. Indiana Storm Water Quality Manual

TABLE 602-1: Common Storm Water Pollution Control Practices for Construction Sites

Stormwater Pollution Prevention on Home Lots

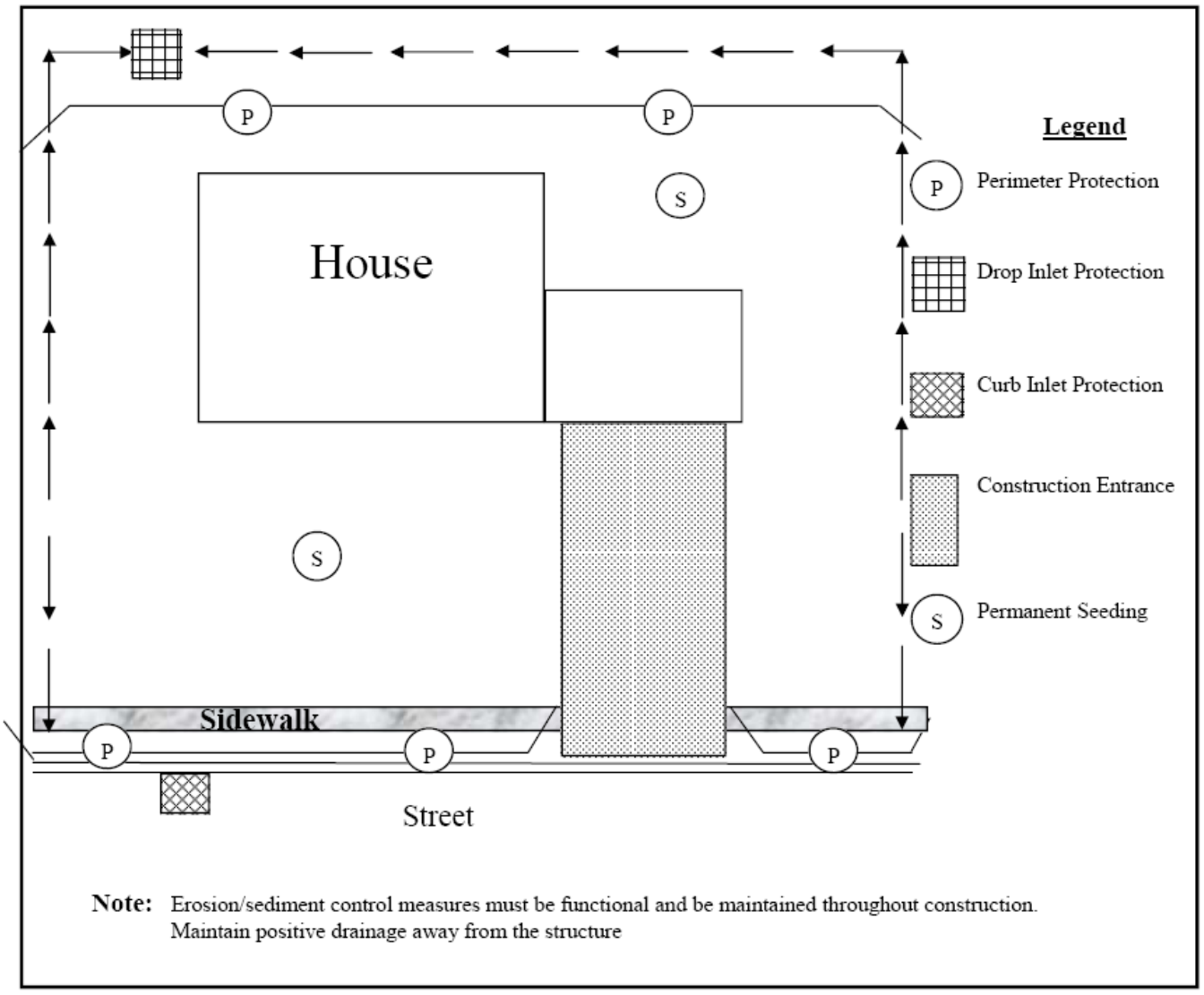


Exhibit 602-1.: Individual Building Lot Typical Erosion & Sediment Control Plan and Certification

Date: _____
Project: _____
Inspected by: _____

Type of Inspection: ☐ Scheduled Weekly ☐ Rain Event
Weather at time of Inspection: _____

CONSTRUCTION SITE INSPECTION AND MAINTENANCE LOG

(To be completed by Property Owner or Agent)

Yes	No	N/A	
			1. Is the site information posted at the entrance?
			2. Are all necessary permits attained and special provisions being implemented?
			3. Is a construction entrance installed and functioning properly?
			4. Are construction staging & parking areas restricted to areas designated on the plans?
			5. Are public and private streets clean of sediment, debris and mud?
			6. Are appropriate practices installed where storm water leaves the site?
			7. Are all discharge points (outfalls) free of erosion or sediment transport?
			8. Has all silt fence been installed properly and being maintained? *(entrenched - upright - fabric not torn - terminated to higher ground - properly joined at ends)*
			9. Are sediment basins & traps installed according to plan & pipe or rock spillways functional?
			10. Are other sediment control barriers in place and functioning properly?
			11. Is the earthwork for erosion control practices properly graded, seeded and/or mulched?
			12. Are diversion swales and/or waterbars installed to plan & protected?
			13. Do perimeter practices have adequate capacity & do they need to be cleaned out?
			14. Is inlet protection installed properly on all functioning inlets & being maintained?
			15. Is catch basin insert protection installed where required & being maintained?
			16. Have swales and ditches been stabilized or protected?
			17. Are storm water outlets adequately stabilized?
			18. Has temporary stabilization of disturbed ground been addressed? (dormant for 15 days?)
			19. Is permanent stabilization of disturbed ground progressing on all completed areas?
			20. Has hard or soft armoring been installed where natural vegetation will erode?
			21. Do water pumping operations have a protected outlet and discharge clear water?
			22. Are all dewatering structures functioning properly?
			23. Is a designated equipment washout area established, clearly marked and being utilized?
			24. Is solid waste properly contained & a stable access provided to the storage & pickup area?
			25. Are fuel tanks and other hazardous materials safely stored and protected?
			26. Is spill response equipment on-site and easily accessible?
			27. Are temporary soil stockpiles in approved areas & properly protected?

If you answered “no” to any of the above questions, describe any corrective action which must be taken to remedy the problem and when the corrective actions are completed.

Corrective Action Log

Date	Location	Correction Needed	Date Completed	Initials	Notes

Notes:

I certify under penalty of law that this document was completed to the best of my knowledge and belief on the date listed below per my signature. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature of Inspector: _____Date: _____

APPENDIX 602-1

CONSTRUCTION BMP FACT SHEETS

BMP CN – 101
CONSTRUCTION SEQUENCING

DESCRIPTION

The construction sequence schedule is an orderly listing of all major land-disturbing activities together with the necessary erosion and sedimentation control measures planned for the project. This type of schedule guides the contractor on work to be done before other work is started so that serious erosion and sedimentation problems can be avoided. Sequencing a construction project reduces the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking.

ADVANTAGE

1. Following a specified work schedule that coordinates the timing of land-disturbing activities and the installation of control measures is perhaps the most cost-effective way of controlling erosion during construction. The removal of surface ground cover leaves a site vulnerable to accelerated erosion. Construction procedures that limit land clearing, provide timely installation of erosion and sedimentation controls, and restore protective cover quickly can significantly reduce the erosion potential of a site.

DESIGN CRITERIA

1. Avoid rainy periods.
2. Schedule projects to disturb only small portions of the site at any one time. Complete grading as soon as possible. Immediately stabilize the disturbed portion before grading the next portion. Practice staged seeding in order to revegetate cut and fill slopes as the work progresses.

REFERENCE

City of Tacoma, Surface Water Management Manual, 2003 or later

BMP CN – 102
WHEEL WASH

DESCRIPTION

When a stabilized construction entrance is not preventing sediment from being tracked onto pavement, a wheel wash may be installed. Wheel washing is generally an effective BMP when installed with careful attention to topography. For example, a wheel wash can be detrimental if installed at the top of a slope abutting a right-of-way where the water from the dripping truck can run unimpeded into the street. Pressure washing combined with an adequately sized and surfaced pad with direct drainage to a large 10-foot x 10-foot sump can be very effective.

ADVANTAGES

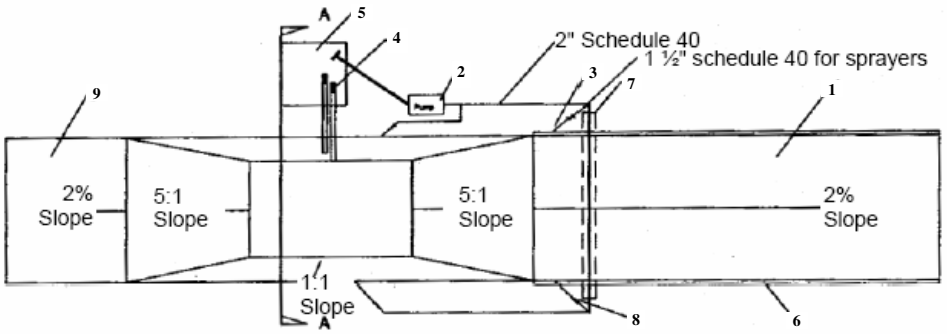
1. Wheel washes reduce the amount of sediment transported onto paved roads by motor vehicles.

DESIGN CRITERIA

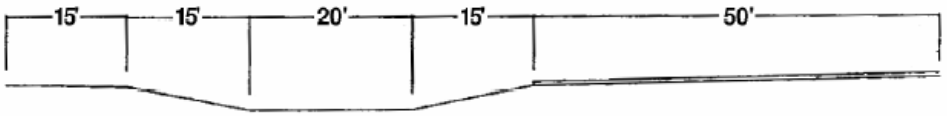
1. Suggested details are shown in Figure CN-102-A. The City of Carmel may allow other designs.
2. A minimum of 6 inches of asphalt treated base (ATB) over crushed base material or 8 inches over a good subgrade is recommended to pave the wheel wash.
3. Use a low clearance truck to test the wheel wash before paving. Either a belly dump or lowboy will work well to test clearance.
4. Keep the water level from 12 to 14 inches deep to avoid damage to truck hubs and filling the truck tongues with water.
5. Midpoint spray nozzles are only needed in extremely muddy conditions.
6. Wheel wash systems should be designed with a small grade change, 6 to 12 inches for a 10-foot-wide pond, to allow sediment to flow to the low side of pond to help prevent re-suspension of sediment.
7. A drainpipe with a 2- to 3-foot riser should be installed on the low side of the pond to allow for easy cleaning and refilling.
8. Polymers may be used to promote coagulation and flocculation in a closed-loop system. Polyacrylamide (PAM) added to the wheel wash water at a rate of 0.25 - 0.5 pounds per 1,000 gallons of water increases effectiveness and reduces cleanup time.
9. If PAM is already being used for dust or erosion control and is being applied by a water truck, the same truck can be used to change the wash water.
10. The wheel wash should start out the day with fresh water. The wash water should be changed a minimum of once per day.
11. On large earthwork jobs where more than 10-20 trucks per hour are expected, the wash water will need to be changed more often.
12. Wheel wash or tire bath wastewater shall be discharged to a separate on-site treatment system, such as closed-loop recirculation or land application, or to the sanitary sewer with proper local sewer utility approval.

REFERENCE

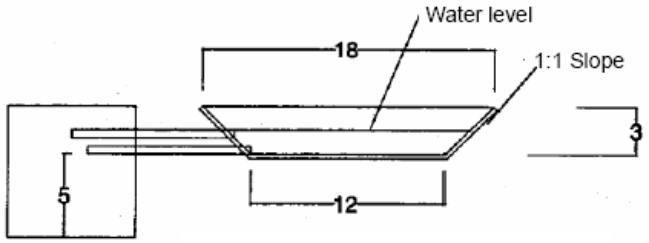
City of Tacoma, Surface Water Management Manual, 2003 or later



Wheel Wash Plan



Elevation View



Section A-A
NTS

Notes:

1. Asphalt construction entrance 6 in. asphalt treated base (ATB).
2. 3-inch trash pump with floats on the suction hose.
3. Midpoint spray nozzles, if needed.
4. 6-inch sewer pipe with butterfly valves. Bottom one is a drain. Locate top pipe's invert 1 foot above bottom of wheel wash.
5. 8 foot x 8 foot sump with 5 feet of catch. Build so can be cleaned with trackhoe.
6. Asphalt curb on the low road side to direct water back to pond.
7. 6-inch sleeve under road.
8. Ball valves.
9. 15 foot. ATB apron to protect ground from splashing water.

Figure CN-102-A

BMP CN – 103
DEWATERING STRUCTURE

DESCRIPTION

Water which is pumped from a construction site usually contains a large amount of sediment. A dewatering structure is designed to remove the sediment before water is released off-site.

This practice includes several types of dewatering structures which have different applications dependent upon site conditions and types of operation. Other innovative techniques for accomplishing the same purpose are encouraged, but only after specific plans and details are submitted to and approved by the City of Carmel.

DESIGN CRITERIA

1. A dewatering structure must be sized (and operated) to allow pumped water to flow through the filtering device without overtopping the structure.
2. Material from any required excavation shall be stored in an area and protected in a manner that will prevent sediments from eroding and moving off-site.
3. An excavated basin (applicable to "Straw Bale/Silt Fence Pit") may be lined with filter fabric to help reduce scour and to prevent the inclusion of soil from within the structure.
4. Design criteria more specific to each particular dewatering device can be found in Figures CN-103-A through CN-103-C.
5. A dewatering structure may not be needed if there is a well-stabilized, vegetated area onsite to which water may be discharged. The area must be stabilized so that it can filter sediment and at the same time withstand the velocity of the discharged water without eroding. A minimum filtering length of 75 feet must be available in order for such a method to be feasible.
6. The filtering devices must be inspected frequently and repaired or replaced once the sediment build-up prevents the structure from functioning as designed.
7. The accumulated sediment which is removed from a dewatering device must be spread on-site and stabilized or disposed of at an approved disposal site as per approved plan.

Portable Sediment Tank (see Figure CN103-A)

- The structure may be constructed with steel drums, sturdy wood or other material suitable for handling the pressure exerted by the volume of water.
- Sediment tanks will have a minimum depth of 2 ft.
- The sediment tank shall be located for easy clean-out and disposal of the trapped sediment and to minimize the interference with construction activities.
- The following formula shall be used to determine the storage volume of the sediment tank:

  Pump discharge (gallons/min.) x 16 = cubic feet of storage required

- Once the water level nears the top of the tank, the pump must be shut off while the tank drains and additional capacity is made available.
- The tank shall be designed to allow for emergency flow over top of the tank. Clean-out of the tank is required once one-third of the original capacity is depleted due to sediment accumulation. The tank shall be clearly marked showing the clean-out point.

Filter Box (see Figure CN-103-B)

- The box selected should be made of steel, sturdy wood or other materials suitable to handle the pressure requirements imposed by the volume of water. Normally readily available 55 gallon drums welded top to bottom will suffice in most cases.
- Bottom of the box shall be made porous by drilling holes (or some other method).
- Coarse aggregate shall be placed over the holes at a minimum depth of 12 inches, metal "hardware" cloth may need to be placed between the aggregate and the holes if holes are drilled larger than the majority of the stone.
- As a result of the fast rate of flow of sediment-laden water through the aggregate, the effluent must be directed over a well-vegetated strip of at least 50 feet after leaving the base of the filter box.
- The box shall be sized as follows:

  Pump discharge (gallons/min.) x 16 = cubic feet of storage required
- Once the water level nears the top of the box, the pump must be shut off while the box drains and additional capacity is made available.
- The box shall be designed/constructed to allow for emergency flow over the top of this box.
- Clean-out of the box is required once one-third of the original capacity is depleted due to sediment accumulation. The tank shall be clearly marked showing the clean-out point.
- If the stone filter does become clogged with sediment so that it no longer adequately performs its function, the stones must be pulled away from the inlet, cleaned and replaced.
- Using a filter box only allows for minimal settling time for sediment particles; therefore, it should only be used when site conditions restrict the use of the other methods.

Straw Bale/Silt Fence Pit (see Figure CN-103-C)

- Measure shall consist of straw bales, silt fence, a stone outlet (a combination of riprap and aggregate) and a wet storage pit oriented as shown in Figure CN-103-C.
- The structure must have a capacity which is dictated by the following formula:

  Pump discharge (gallons/min.) x 16 = cubic feet of storage required
- In calculating the capacity, one should include the volume available from the floor of the excavation to the crest of the stone weir.
- In any case, the excavated area should be a minimum of 3 feet below the base of the perimeter measures (straw bales or silt fence).
- The perimeter measures must be installed as per the guidelines found in fact sheets associated with STRAW BALE BARRIER and SILT FENCE BMPs.
- Once the water level nears the crest of the stone weir (emergency overflow), the pump must be shut off while the structure drains down to the elevation of the wet storage.
- The wet storage pit may be dewatered only after a minimum of 6 hours of sediment settling time. This effluent should be pumped across a well vegetated area or through a silt fence prior to entering a watercourse.
- Once the wet storage area becomes filled to one-half of the, excavated depth, accumulated sediment shall be removed and properly disposed of.

- Once the device has been removed, ground contours will be returned to original condition.

REFERENCE

United States Army Corps of Engineers, Handbook for the Preparation of Storm Water Pollution Prevention Plans for Construction Activities, 1997 or later

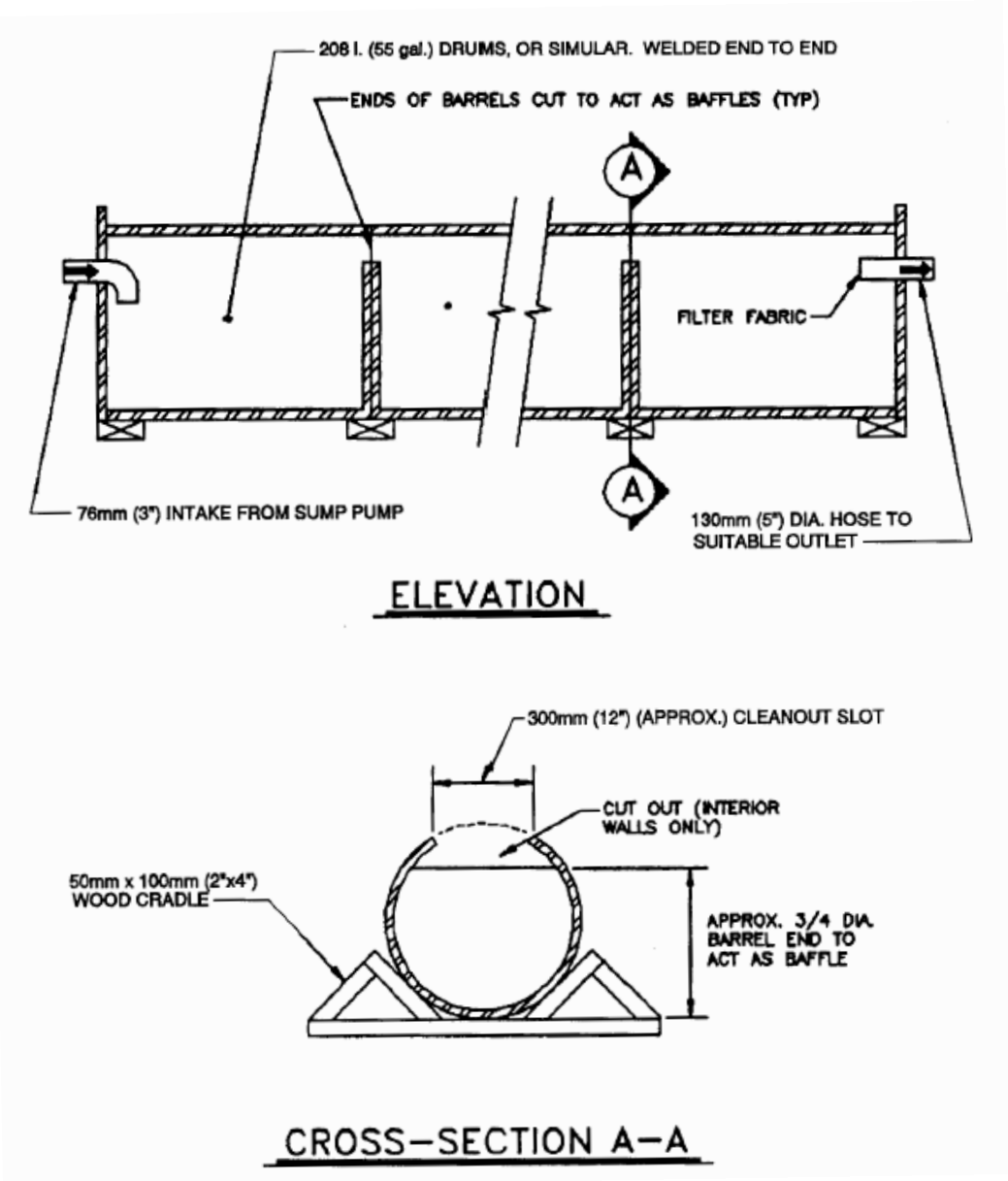


Figure CN-103-A
Portable Sediment Tank

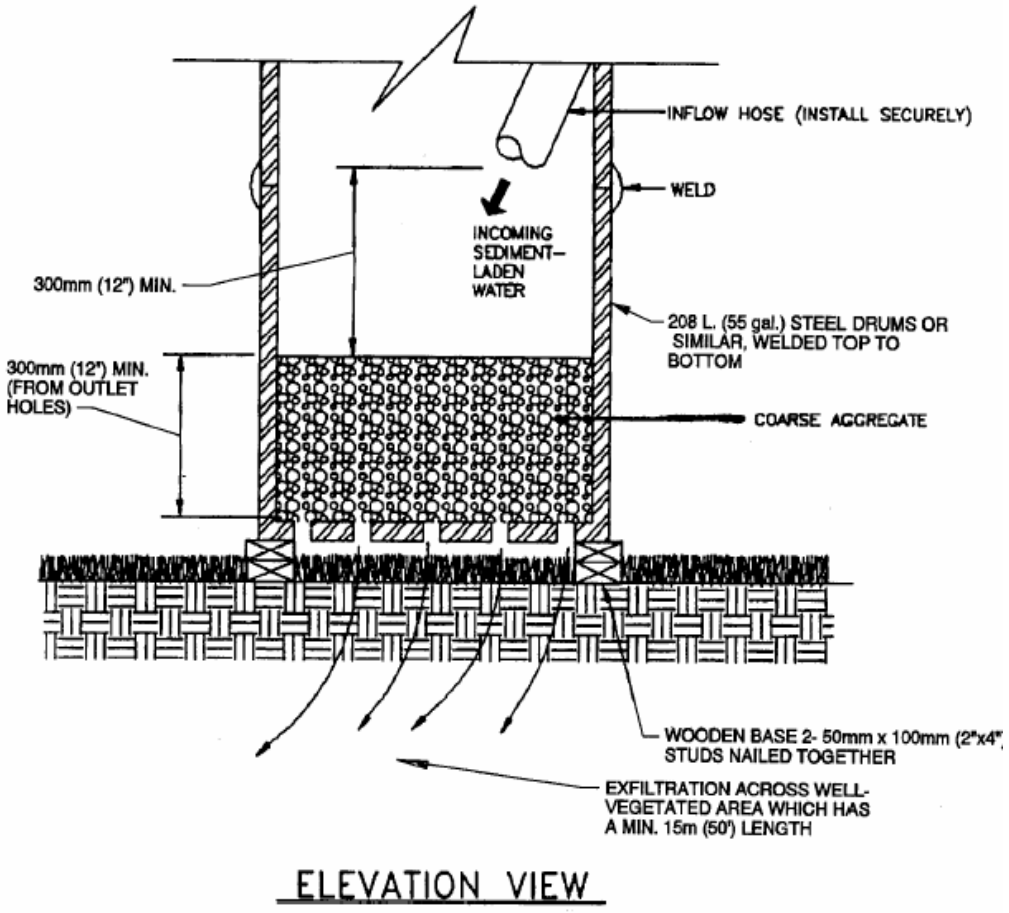
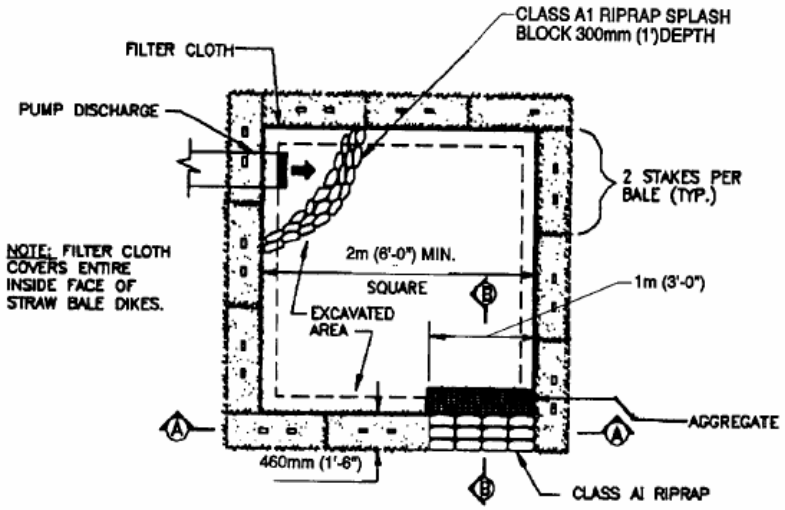
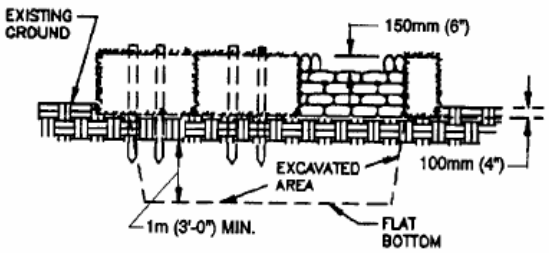


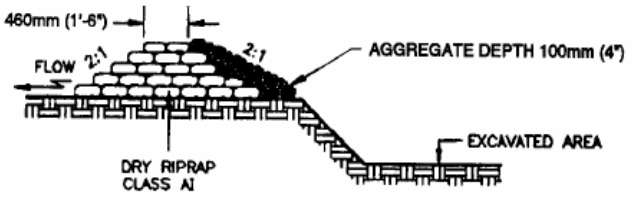
Figure CN-103-B
Filter Box



PLAN VIEW



CROSS-SECTION A-A



CROSS-SECTION B-B

Figure CN-103-C
Straw Bale/Silt Fence Pit

BMP CN – 104
SPILL PREVENTION AND CONTROL

DESCRIPTION

These procedures and practices are implemented to prevent and control spills in a manner that minimizes or prevents the discharge of spilled material to the drainage system or watercourses.

This best management practice (BMP) applies to all construction projects. Spill control procedures are implemented anytime chemicals and/or hazardous substances are stored. Substances may include, but are not limited to:

- Soil stabilizers/binders
- Dust Palliatives
- Herbicides
- Growth inhibitors
- Fertilizers
- Deicing/anti-icing chemicals
- Fuels
- Lubricants
- Other petroleum distillates

To the extent that the work can be accomplished safely, spills of oil, petroleum products, sanitary and septic wastes, and substances listed under 40 Code of Federal Regulations (CFR) parts 110, 117, and 302 shall be contained and cleaned up immediately.

LIMITATIONS

1. This BMP only applies to spills caused by the contractor.
2. Procedures and practices presented in this BMP are general. Contractor shall identify appropriate practices for the specific materials used or stored on-site in advance of their arrival at the site.

DESIGN CRITERIA

1. To the extent that it doesn't compromise clean up activities, spills shall be covered and protected from storm water runoff during rainfall.
2. Spills shall not be buried or washed with water.
3. Used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose shall be stored and disposed of in conformance with BMP CN-106: Hazardous Waste Management.
4. Water used for cleaning and decontamination shall not be allowed to enter storm drains or watercourses and shall be collected and disposed of in accordance with BMP CN-106: Hazardous Waste Management.
5. Water overflow or minor water spillage shall be contained and shall not be allowed to discharge into drainage facilities or watercourses.

6. Proper storage, clean-up and spill reporting instruction for hazardous materials stored or used on the project site shall be posted at all times in an open, conspicuous and accessible location.
7. Waste storage areas shall be kept clean, well organized and equipped with ample clean-up supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers and liners shall be repaired or replaced as needed to maintain proper function.
8. Verify weekly that spill control and clean up materials are located near material storage, unloading, and use areas.
9. Update spill prevention and control plans and stock appropriate clean-up materials whenever changes occur in the types of chemicals used or stored onsite.

Cleanup and Storage Procedures for Minor Spills

- Minor spills typically involve small quantities of oil, gasoline, paint, etc., which can be controlled by the first responder at the discovery of the spill.
- Use absorbent materials on small spills rather than hosing down or burying the spill.
- Remove the absorbent materials promptly and dispose of properly.
- The practice commonly followed for a minor spill is:
    - Contain the spread of the spill.
    - Recover spilled materials.
    - Clean the contaminated area and/or properly dispose of contaminated materials.

Cleanup and Storage Procedures for Semi-Significant Spills

- Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.
- Clean up spills immediately:
- Notify the project foreman immediately. The foreman shall notify the City of Carmel Emergency Management Agency's Hazardous Materials Response Team.
- Contain spread of the spill.
- If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
- If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
- If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Cleanup and Storage Procedures for Significant/Hazardous Spills

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.

- For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor shall notify the National Response Center at (800) 424-8802.
- Notification shall first be made by telephone and followed up with a written report.
- The services of a spills contractor or a Haz-Mat team shall be obtained immediately. Construction personnel shall not attempt to clean up the spill until the appropriate and qualified personnel have arrived at the job site.

REFERENCE

California Department of Transportation, Construction Site BMP Manual, 2000 or later

BMP CN – 105
SOLID WASTE MANAGEMENT

DESCRIPTION

Solid waste management procedures and practices are designed to minimize or eliminate the discharge of pollutants to the drainage system or to watercourses as a result of the creation, stockpiling, or removal of construction site wastes.

Solid waste management procedures and practices are implemented on all construction projects that generate solid wastes.

Solid wastes include but are not limited to:

1. Construction wastes including brick, mortar, timber, steel and metal scraps, sawdust, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials.
2. Landscaping wastes, including vegetative material, plant containers, and packaging materials.
3. Litter, including food containers, beverage cans, coffee cups, paper bags, plastic wrappers, and smoking materials, including litter generated by the public.

LIMITATIONS

1. Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season.

DESIGN CRITERIA

1. Dumpsters of sufficient size and number shall be provided to contain the solid waste generated by the project and properly serviced.
2. Littering on the project site shall be prohibited.
3. To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines shall be a priority.
4. Trash receptacles with lids shall be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
5. Construction debris and litter from work areas within the construction limits of the project site shall be collected and placed in watertight dumpsters at least weekly regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris shall not be placed in or next to drain inlets, storm water drainage systems or watercourses.
6. Full dumpsters shall be removed from the project site and the contents shall be disposed of, off-site, in an appropriate manner.
7. Litter stored in collection areas and containers shall be handled and disposed of by trash hauling contractors.
8. Construction debris and waste shall be removed from the site at least every two weeks.
9. Storm water run-off shall be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.

10. Except during fair weather, construction and landscaping waste not stored in watertight dumpsters shall be securely covered from wind and rain by covering the waste with tarps, plastic sheeting, or equivalent.
11. Solid waste storage areas shall be located at least 50 ft from drainage facilities and watercourses and shall not be located in areas prone to flooding or ponding.
12. Dumpster washout on the project site is not allowed.
13. Notify trash hauling contractors that only watertight dumpsters are acceptable for use on-site.
14. Plan for additional containers during the demolition phase of construction.
15. Plan for more frequent pickup during the demolition phase of construction.
16. Construction waste shall be stored in a designated area. Access to the designated area shall either be well vegetated ground, a concrete or asphalt road or drive, or a gravel construction entrance, to avoid mud tracking by trash hauling contractors.
17. Segregate potentially hazardous waste from non-hazardous construction site waste.
18. Keep the site clean of litter debris.
19. Make sure that toxic liquid wastes (e.g., used oils, solvents, and paints) and chemicals (e.g., acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
20. For disposal of hazardous waste, see BMP CN-106: Hazardous Waste Management. Have hazardous waste hauled to an appropriate disposal and/or recycling facility.
21. Salvage or recycle useful vegetation debris, packaging and/or surplus building materials when practical. For example, trees and shrubs from land clearing can be converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.
22. Prohibit littering by employees, subcontractors, and visitors.
23. Wherever possible, minimize production of solid waste materials.

REFERENCE

California Department of Transportation, Construction Site BMP Manual, 2000 or later

BMP CN – 106
HAZARDOUS WASTE MANAGEMENT

DESCRIPTION

These are procedures and practices to minimize or eliminate the discharge of pollutants from construction site hazardous waste to the storm drain systems or to watercourses.

This best management practice (BMP) applies to all construction projects.

Hazardous waste management practices are implemented on construction projects that generate waste from the use of:

- Petroleum Products,
- Asphalt Products,
- Concrete Curing Compounds,
- Pesticides,
- Acids,
- Paints,
- Stains,
- Solvents,
- Wood Preservatives,
- Roofing Tar, or
- Any materials deemed a hazardous waste in 40 CFR Parts 110, 117, 261, or 302.

DESIGN CRITERIA

Storage Procedures

1. Wastes shall be stored in sealed containers constructed of a suitable material and shall be labeled as required by 49 CFR Parts 172,173, 178, and 179.
2. All hazardous waste shall be stored, transported, and disposed as required in 49 CFR 261-263.
3. Waste containers shall be stored in temporary containment facilities that shall comply with the following requirements:
   - Temporary containment facility shall provide for a spill containment volume able to contain precipitation from a 24-hour, 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest tank within its boundary, whichever is greater.
   - Temporary containment facility shall be impervious to the materials stored there for a minimum contact time of 72 hours.
   - Temporary containment facilities shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks accumulated rainwater and spills shall be placed into drums after each rainfall. These liquids shall be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids shall be sent to an approved disposal site.
   - Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.
   - Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.

- Throughout the rainy season, temporary containment facilities shall be covered during non-working days, and prior to rain events. Covered facilities may include use of plastic tarps for small facilities or constructed roofs with overhangs. A storage facility having a solid cover and sides is preferred to a temporary tarp. Storage facilities shall be equipped with adequate ventilation.

4. Drums shall not be overfilled and wastes shall not be mixed.
5. Unless watertight, containers of dry waste shall be stored on pallets.
6. Paint brushes and equipment for water and oil based paints shall be cleaned within a contained area and shall not be allowed to contaminate site soils, watercourses or drainage systems. Waste paints, thinners, solvents, residues, and sludge that cannot be recycled or reused shall be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths shall be disposed of as solid waste.
7. Ensure that adequate hazardous waste storage volume is available.
8. Ensure that hazardous waste collection containers are conveniently located.
9. Designate hazardous waste storage areas on site away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills.
10. Minimize production or generation of hazardous materials and hazardous waste on the job site.
11. Use containment berms in fueling and maintenance areas and where the potential for spills is high.
12. Segregate potentially hazardous waste from non-hazardous construction site debris.
13. Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.
14. Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.
15. Place hazardous waste containers in secondary containment.
16. Do not allow potentially hazardous waste materials to accumulate on the ground.
17. Do not mix wastes.

<u>Disposal Procedures</u>

1. Waste shall be removed from the site within 90 days of being generated.
2. Waste shall be disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility utilizing properly completed Uniform Hazardous Waste Manifest forms.
3. A certified laboratory shall sample waste and classify it to determine the appropriate disposal facility.
4. Make sure that toxic liquid wastes (e.g., used oils, solvents, and paints) and chemicals (e.g., acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for solid waste construction debris.
5. Properly dispose of rainwater in secondary containment that may have mixed with hazardous waste.
6. Recycle any useful material such as used oil or water-based paint when practical.

<u>Maintenance and Inspection</u>

1. A foreman and/or construction supervisor shall monitor on-site hazardous waste storage and disposal procedures.
2. Waste storage areas shall be kept clean, well organized, and equipped with ample clean-up supplies as appropriate for the materials being stored.

3. Storage areas shall be inspected in conformance with the provisions in the contract documents.
4. Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.
5. Hazardous spills shall be cleaned up and reported in conformance with the applicable Material Safety Data Sheet (MSDS) and the instructions posted at the project site.
6. The National Response Center, at (800) 424-8802, shall be notified of spills of Federal reportable quantities in conformance with the requirements in 40 CFR parts 110, 117, and 302.
7. Copy of the hazardous waste manifests shall be provided to the owner.

REFERENCE

California Department of Transportation, Construction Site BMP Manual, 2000 or later