APPENDIX E

DEVELOPMENT AND REMODELING BEST MANAGEMENT PRACTICES

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Chapter 6 of the Best Management Practices Manual for the City's Storm Water Management Program

Planning Department
Public Works Department
809 Center Street, Santa Cruz, CA 95060

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FOR
DEVELOPMENT AND REMODELING PROJECTS

BACKGROUND

The City is mandated by new state and federal storm water regulations to require a new development or remodel project to incorporate design standards into project plans in order to reduce storm water pollution and mitigate any increased storm water flows created by the site. The City developed these Best Management Practices (BMPs) based on the minimum design standards for development and remodeling projects specified by the State of California Water Quality Control Board. Developers, contractors, architects, and property owners should address these BMPs during the initial planning process to ensure that they are incorporated into a project's design from the beginning.

All project plans submitted to the City for development and remodeling projects must include these BMPs, as applicable, and consistent with the City Municipal Code. A definition of the terms used in this document is provided in Appendix A.

APPLICABILITY

Any project that falls into one of the following categories is subject to these Design Standards:

- **Hillside Residences** (includes single-family homes, apartments, condos, townhouses, and mobile homes)- All new construction and remodeling projects.
- **Commercial and Industrial Developments Equal to or Greater Than 1 Acre-** All new construction and remodeling projects.
- **Automotive Repair Shops-** All new construction and remodeling projects. In addition, any construction activity shall subject the facility to these Design Standards unless specifically exempted by the City.
- **Retail Gasoline Outlets-** All new construction and remodeling projects. In addition, any construction activity shall subject the facility to these Design Standards unless specifically exempted by the City.
- **Restaurants and Food Processing/Manufacturing Facilities including Wineries-** All new construction and remodeling projects. In addition, any construction activity shall subject the facility to these Design Standards unless specifically exempted by the City.
- **Multi-Family Housing Developments-** All new construction projects with equal to or greater than three units are subject to these Design Standards although specific exemptions may be granted by the City.
- **Housing Developments of 10 or more units** (includes single or multi-family homes, apartments, condos, townhouses, and mobile homes)- All new construction projects.
- **Parking lots 1,000 square feet or more in size, or with 25 or more parking spaces and potentially exposed to storm water runoff**- All new construction projects or additions.

BEST MANAGEMENT PRACTICES (BMPs)

1. Peak Storm Water Runoff Discharge Rates

a) Peak storm water runoff discharge rates shall not exceed the estimated pre-development rate if this will result in increased potential for downstream erosion.

b) Storm water runoff resulting from the project must be minimized. Sediment loading in storm water runoff may not be increased above pre-construction levels.

c) The City may require that structural devices, such as sediment basins and filtration devices, or system controls, such as swales and retention basins, be installed or implemented to minimize storm water runoff and to prevent additional sediment loadings. This will be determined on a case-by-case basis as appropriate, or as specified in an adopted area plan or wetlands management plan.

2. Conserve Natural Areas

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process:

a) Concentrate or cluster development on portions of a site while leaving the remaining land in a natural undisturbed condition.

b) Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.

c) Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.

d) Promote and preserve natural vegetation by using parking lot islands and other landscaped areas.

e) Preserve riparian areas and wetlands.

3. Minimize Storm Water Pollutants of Concern

Storm water runoff from a site has the potential to contribute oil and grease, suspended solids, metals, gasoline, pesticides, and pathogens to the storm drain system. A new development or redevelopment site must be designed to minimize, to the maximum extent practicable (MEP), the introduction of pollutants of concern that may result in significant impacts to the storm drain system. A pollutant of concern is a pollutant that exhibits one or more of the following characteristics:

- a current or past impact on the beneficial uses of a receiving water,
- elevated levels of the pollutant are found in sediments of a receiving water and/or have the potential to bio-accumulate in organisms therein, or
- the potential discharge amount of the pollutant is at a concentration or load considered potentially toxic to humans or flora and fauna.

Therefore, the most appropriate Best Management Practice (BMP), or combination of BMPs, must be selected and included in the project design in order to reduce pollutant loadings to the Maximum Extent Practicable.

4. Protect Slopes and Channels

Project plans must include the following to decrease the potential of slopes and/or channels from eroding and impacting storm water runoff:

a) Convey runoff safely from the tops of slopes and stabilize disturbed slopes.

b) Utilize natural drainage systems to the maximum extent practicable.

c) Stabilize permanent channel crossings.

d) Vegetate slopes with native or drought tolerant vegetation, as appropriate.

e) Install energy dissipaters, such as riprap, at the outlets of the new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion, with the approval of all agencies with jurisdiction.

5. Provide Storm Drain System Stenciling and Signage

Storm drain stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets. The stencil shall consist of a brief statement prohibiting the dumping of improper materials into the storm drain system. Graphical icons, either illustrating anti-dumping symbols or images of receiving water fauna, are effective supplements to the anti-dumping message. All storm drain inlets and catch basins within the project area must be stenciled with prohibitive language (such as: *No Dumping–Drains To Bay*) and/or graphical icons to discourage illegal dumping. Signs and prohibitive language or graphical icons, which prohibit illegal dumping, must be posted at public access points along channels and creeks within the project area. Legibility of stencils and signs must be maintained.

6. Properly Design Material Storage Areas

Improper storage of materials outdoors may provide an opportunity for toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to enter the storm water conveyance system. If project plans include a material storage area(s), the following is required:

a) If the storage area will or may contain materials with the potential to contaminate storm water, the area must be located indoors. The floor must be constructed of material sufficiently impervious to contain leaks and spills.

b) Tallow drum storage areas must be located indoors.

7. Properly Design Trash Storage Areas

A trash storage area refers to an area where a trash receptacle or receptacles (dumpsters) are located for use as a repository for solid wastes. All trash storage areas, except those at a single-family residence, must meet the following requirements:

a) The trash storage area must have drainage from adjoining roofs and pavement diverted around the area.

b) The trash storage area must be screened or walled to prevent off-site transport of trash.

c) The trash storage area shall have a roof to prevent storm water from entering.

d) The trash storage area shall be paved and impervious to leaks and spills.

e) Storm drains are prohibited in a trash storage area.

f) The trash storage area must have a drain to the sanitary sewer so that wastewater from the cleaning of the trash storage area may be drained to the sanitary sewer unless exempted by the Department of Public Works.

g) The trash storage area must be large enough to accommodate projected amounts of both refuse and recyclable materials.

8. Properly Design Parking Lot Areas

Parking lots may accumulate oil, grease, and water insoluble hydrocarbons from vehicle drippings and engine system leaks. In order to limit oil contamination and minimize the offsite transport of pollutants from motor vehicles, the following is required:

a) Reduce impervious land coverage of parking areas.

b) Infiltrate or treat runoff. One or more oil and sediment traps must be installed as directed by and in accordance with design criteria specified by the Department of Public Works. The Department of Public Works may require a more effective structural BMPs or bioswale to be installed in lieu of an oil and sediment trap.

c) For a parking lot that will be heavily used, a treatment system to remove oil and petroleum hydrocarbons is required. Heavily used parking lots are considered associated with one of the following: fast food outlets, lots with 25 or more parking spaces, sports event parking lots, shopping malls, grocery stores, and discount warehouse stores.

d) Ensure adequate operation and maintenance of treatment systems, particularly sludge and oil removal, and system fouling and plugging prevention control.

9. Additional Requirements For Restaurants and Food Processing/Manufacturing Facilities Including Wineries

1.) Properly Design Equipment and Accessory Wash Areas

Project plans must include an area for the washing/steam cleaning of equipment and accessories including floor mats. The wash area must be:

a) Self-contained, equipped with a grease trap or interceptor, and properly connected to the sanitary sewer. Food processing/manufacturing facilities including wineries may be exempted from this specific requirement by the Department of Public Works.

b) If the wash area is to be located outdoors, it must be covered, paved, have secondary containment, and be connected to the sanitary sewer.

c) Whether located inside or outdoors, the wash area drain shall have a screen to retain particles larger than one-half inch in order to prevent the discharge of these particles to the sanitary sewer.

2.) Location and Design of Grease Interceptors, Trash Enclosures, and/or Wash Areas Relative to Storm Drain Inlets

If project plans include an outdoor grease interceptor, trash enclosure, or wash area, these areas shall be located and designed in such a manner that an accidental overflow, blockage, leak, or spill cannot discharge or runoff into a storm drain inlet. Project design shall incorporate proper sloping, berming, and/or channeling.

10. Additional Requirements For Retail Gasoline Outlets and Other Fueling Areas

The fueling area shall be properly designed to minimize the potential for gasoline, oil and grease, solvents, car battery acids, and coolants to reach the storm drain system. Project plans for a fueling area must include the following:

a) The fuel dispensing area must be covered with an overhanging roof structure or canopy. The canopy's minimum dimensions must be equal to or greater than the area within the grade break. The canopy must not drain onto the fuel dispensing area, and the canopy downspouts must be routed to prevent drainage across the fueling area.

b) The fuel dispensing area must be paved with Portland cement concrete (or equivalent smooth impervious surface approved by the City). The use of asphalt concrete is prohibited.

c) The fuel dispensing area must have a 2% to 4% slope to prevent "ponding," and must be separated from the rest of the site by a grade break that prevents run-on of storm water to the maximum extent practicable.

d) At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.

11. Additional Requirements For Automotive Repair Shops

1. Properly Design Repair and Maintenance Bays

Design plans for repair and maintenance bays must include the following:

a) Repair and maintenance bays must be located indoors with the exception of boat repair facilities.

b) Boat repair facilities located outdoors must be designed in such a way that does not allow storm water run-on or contact with storm water runoff.

c) Floor drains connected to the sanitary sewer or storm drain system are prohibited.

2.) Properly Design Vehicle and Equipment Wash Areas

Project plans must include an area for the washing and/or steam cleaning of vehicles and equipment. This wash area design must include the following:

a) If only washing is conducted (not steam cleaning), the wash area must be self-contained and equipped with a clarifier or other pretreatment system (i.e. interceptor). The pretreatment system must be properly connected to either the sanitary sewer, as permitted by the Department of Public Works, or to a recycling system, holding tank, or some other type of "zero discharge" system.

b) If steam cleaning is conducted or if the wash area will be used for engine or parts cleaning, the wash area must be self-contained and all drains directed to a closed-loop recycling system or a holding tank for disposal off-site. If no drains are installed, then the area must be bermed or sloped and trenched (with no exit) to allow for the capture and collection of the wastewater. No wastes, including rinse water, from any engine or parts cleaning may be discharged to the sanitary sewer or storm drain system.

c) The wash pad area must be sloped and bermed to prevent discharge to the storm drain and to prevent excess storm water from running to the wash pad drain. The wash pad must be covered.

3.) Properly Design Loading/Unloading Dock Areas

Loading dock areas must include the following in order to minimize the potential for spills to be quickly transported to the storm drain system:

a) Cover loading dock areas or design drainage to minimize run-on and runoff of storm water.

b) Direct connections to a storm drain from depressed loading docks (truck wells) are prohibited.

4.) Properly Design Fueling Areas

Project plans for an automotive repair shop or other type of vehicle service facility with a fueling area must include the following:

a) The fuel dispensing area must be covered with an overhanging roof structure or canopy. The canopy's minimum dimensions must be equal to or greater than the area within the grade break. The canopy must not drain onto the fuel dispensing area, and the canopy downspouts must be routed to prevent drainage across the fueling area.

b) The fuel dispensing area must be paved with Portland cement concrete (or equivalent smooth impervious surface approved by the City). The use of asphalt concrete is prohibited.

c) The fuel dispensing area must have a 2% to 4% slope to prevent "ponding," and must be separated from the rest of the site by a grade break that prevents run on of storm water to the extent practicable.

d) At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.

12. Additional Requirements For Commercial and Industrial Developments Equal to or Greater Than 1 Acre

1.) Loading/Unloading Dock Areas

To minimize the potential for material spills to be quickly transported to the storm water conveyance system, the following design criteria are required:

a) Cover loading dock areas or design drainage to minimize run-on and runoff of storm water.

b) Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.

2.) Repair/Maintenance Bays

Project plans for repair and/or maintenance bays must include the following:

a) Repair/maintenance bays must be located indoors.

b) Floor drains connected to the sanitary sewer or the storm drain systems are prohibited.

3.) Vehicle or Equipment Wash Areas

Project plans must include an area for washing or steam cleaning of vehicles and equipment. The area must be:

a) If only washing is conducted (not steam cleaning), the wash area must be self-contained and equipped with a clarifier or other pretreatment system (i.e. interceptor). The pretreatment system must be properly connected to either the sanitary sewer, as permitted by the Department of Public Works, or to a recycling system, holding tank, or some other type of "zero discharge" system.

b) If steam cleaning is conducted or if the wash area will be used for engine or parts cleaning, the wash area must be self-contained and all drains directed to a closed-loop recycling system or a holding tank

for disposal off-site. If no drains are installed, then the area must be bermed or sloped and trenched (with no exit) to allow for the capture and collection of the wastewater. No wastes, including rinse water, from any engine or parts cleaning may be discharged to the sanitary sewer or storm drain system.

c) The wash pad area must be sloped and bermed to prevent discharge to the storm drain and to prevent excess storm water from running to the wash pad drain. The wash pad must be covered unless exempted by the Department of Public Works.

13. Structural and Treatment Control BMPs

Where applicable or appropriate, the City may require that project plans include a structural or treatment control BMP, or a combination of BMPs, to reduce potential pollutant loadings in storm water runoff to the maximum extent practicable. The structural or treatment control BMP shall be designed to keep runoff at pre-development rates and to keep storm water from flowing onto adjacent sites. A structural or treatment control BMP may be used alone or in combination with another BMP, subject to approval by the City.

Structural or treatment control BMPs may include, but are not limited to, the following:

a. infiltration systems (e.g. infiltration trench or basin)
b. retention/detention systems (wet pond, detention basin)
c. biological or vegetative systems (e.g. vegetated strips, grassy swales)
d. filtration systems (e.g. silt and grease trap, media filtration, or CDS unit)

Project plans shall include the details of any and all BMPs such as the location, size, and hydraulic calculations that show how the BMP meets City requirements. Project plans shall also include a signed certification from a licensed Civil Engineer or Architect registered in the State of California that the proposed Structural or Treatment Control BMP(s) meet the design standards criteria established herein.

All required structural or treatment control BMPs must meet the following requirements:

a) The BMP shall be an above ground system whenever possible. An underground system may be proposed if it can be demonstrated that above ground treatment is inferior or impractical due to extreme space limitations, excessive cost, or another limiting factor.

b) The BMP shall be located on-site and in an area where it can be easily inspected and maintained at all times. In addition, long-term BMP inspection and maintenance is required (see Section 14).

c) The BMP shall incorporate either a volumetric or flow based treatment control design standard, or both, as identified below to mitigate (infiltrate, filter or treat) storm water runoff:

1) Volumetric Treatment Control BMP

(i) The 85th percentile 24-hour runoff event determined as the maximized capture storm water volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or

(ii) The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in the California Storm Water Best Management Practices Handbook–Industrial & Commercial, (2003) (see Appendix D for Unit Basin Storage Volume Sizing Curves); or

(iii) The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" that achieves approximately the same reduction in pollutant loads achieved by the 85th percentile 24-hour runoff event.

2) Flow Based Treatment Control BMP

(i) The flow of runoff produced from a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the area; or

(ii) The flow of runoff produced from a rain event that will result in treatment of the same portion of runoff as treated using volumetric standards above.

3) Limited Exclusion

Restaurants and retail gasoline outlets, where the land area for development or redevelopment is less than 5,000 square feet, are excluded from Section 13 (c) only.

d) If project plans include a vegetated system, such as a grassy swale, biofilter, or a bio-retention system, as a control BMP, the system should be sized to provide 800-1,000 sq. feet for each acre of directly connected impervious area.

14. Provide Proof of Ongoing BMP Maintenance

Improper maintenance is one of the primary reasons a structural or treatment control BMP may cease to function properly. Therefore, if a structural or treatment control BMP is required, the property owner shall be responsible for inspection and maintenance of the BMP. As part of the project application, the property owner shall agree in a signed statement, entitled "Maintenance Agreement" which is included in Attachment E, to the following conditions:

1. To inspect and maintain the BMP on a schedule, at a minimum of once per year, by **October 1st**, or more as necessary in order to retain the required capacity.
2. For residential properties, if the BMP is located in a common area that will be maintained by a homeowner's association, the homeowner's association shall be responsible for the inspection and maintenance.
3. To provide proof of inspection and maintenance to the City of Santa Cruz, Department of Public Works, Engineering Division, at 809 Center Street, Room 201, Santa Cruz, CA 95060. Proof of inspection and maintenance shall be submitted by **December 1st** annually.
4. To ensure that, if the property is sold, transferred, or leased to another person or entity, the sales, transfer, or lease agreement is conditioned so that the recipient assumes responsibility for Conditions 1-5. The first deed transfer or any lease agreements shall include the details of these requirements and information about the BMP such as the following: a) BMP location; b) how and when to perform the necessary inspections and maintenance; and c) how to send proof of inspection and maintenance to the City. The transfer of this information shall also be required with any subsequent sale of the property.

Waiver

A waiver from the requirements may be obtained from the City (Department of Public Works or the Department of Planning) if impracticability for a specific property can be established. A waiver of impracticability shall be granted only when all other Structural or Treatment Control BMPs have been considered and rejected as infeasible. Recognized situations of impracticability include: (i) extreme limitations of space for treatment on a redevelopment project, (ii) unfavorable or unstable soil conditions

at a site to attempt infiltration, and (iii) risk of ground water contamination because a known unconfined aquifer lies beneath the land surface or an existing or potential underground source of drinking water is less than 10 feet from the soil surface. Any other justification for impracticability must be separately petitioned by the City and submitted to the Central Coast Regional Water Quality Control Board (RWQCB) for consideration. The RWQCB may consider approval of the waiver justification or may delegate the authority to approve a class of waiver justifications to the RWQCB EO. The supplementary waiver justification becomes recognized and effective only after approval by the RWQCB or the RWQCB EO. A waiver granted by the City to any development or redevelopment project may be revoked by the RWQCB EO for cause and with proper notice upon petition.

Limitation on Use of Infiltration BMPs

Three factors significantly influence the potential for storm water to contaminate ground water. They are (1) pollutant mobility, (2) pollutant abundance in storm water, and (3) soluble fraction of pollutant. The risk of contaminating groundwater may be reduced by the pretreatment of storm water. A discussion of limitations and guidance for infiltration practices is contained in *Potential Groundwater Contamination from Intentional and Non-Intentional Stormwater Infiltration, Report No. EPA/600/R-94/051, USEPA (1994)*. In addition, the distance of the groundwater table from the infiltration BMP may also be a factor determining the contamination risk. A water table distance separation of ten feet depth in California presumptively poses negligible risk for storm water not associated with industrial activity or high vehicular traffic.

Site-specific conditions must be evaluated when determining the most appropriate BMP. Additionally, monitoring and maintenance must be provided to ensure groundwater is protected and the infiltration BMP is not rendered ineffective by overload. This is especially important for infiltration BMPs for areas of industrial activity or areas subject to high vehicular traffic [25,000 or greater average daily traffic (ADT) on main roadway or 15,000 or more ADT on any intersecting roadway]. In some cases, pretreatment may be necessary.

For more information, please contact:

Department of Planning and Community Development:

Alex Khoury, Principal Planner, at (831) 420-5116

Dick Stubendorff, Chief Building Official, at (831) 420-5127

Department of Public Works:

Tom Sharp, Engineering Associate, at (831) 420-5423

Suzanne Healy, Environmental Projects Analyst, at (831) 420-5131

APPENDIX A

Definitions

"Best Management Practice (BMP)" means any program, technology, process, operational methods or measures, or engineered systems, which when implemented prevent, control, remove, or reduce pollution.

"Development" means land disturbing activities requiring a permit; structural development, including construction or installation of a building or structure; remodels; expansions; creation of impervious surfaces; and land subdivision.

"Directly Connected Impervious Area (DCIA)" means the area covered by a building, impermeable pavement, and/ or other impervious surfaces, which drains directly into the storm drain without first flowing across permeable land area (e.g. lawns).

"Directly Discharging" means outflow from a drainage conveyance system that is composed entirely or predominantly of flows from the subject property, and not commingled with the flows from adjacent lands.

"85^{th} percentile 24-hour runoff event" means the 85^{th} percentile 24-hour runoff event as defined by the Regional Water Quality Control Board.

"Hillside" means a slope greater than 30 % percent.

"Remodeling Project" means any construction project that includes or is due to any of the following: a) an increase in 1000 square feet or 50% or more of a facility's existing square footage, which ever is less; b) remodeling of 50% or more of a facility's existing square footage; c) intensification (change) of a facility's use; or d) the addition of 1,000 square feet or more of impervious surface area on an already developed site. Remodeling projects do not include routine maintenance activities.

"Source Control BMP" means any schedule of activities, structural devices, prohibitions of practices, maintenance procedures, managerial practices or operational practices that aim to prevent storm water pollution by reducing the potential for contamination at the source of pollution.

"State of California Design Standards" means the design standards specified in the State Water Quality Control Board Storm Water General Permit, Attachment #4, to WQ Order No. 2003-0005-DWQ, Section B, Design Standards, April 2003.

"Structural BMP" means any structural facility designed and constructed to mitigate the adverse impacts of storm water and urban runoff pollution. The category may include both Treatment Control BMPs and Source Control BMPs.

"Treatment Control BMP" means any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media adsorption or any other physical, biological, or chemical process.

APPENDIX B
Resources and References

SUGGESTED RESOURCES	HOW TO GET A COPY
Start at the Source (1999) by Bay Area Stormwater Management Agencies Association Detailed discussion of permeable pavements and alternative driveway designs presented.	**Bay Area Stormwater Management Agencies Association** 2101 Webster Street Suite 500 Oakland, CA (510) 286-1255
California Storm Water Best Management Practices Handbooks (2003) for Construction Activity, Municipal, and Industrial/Commercial Presents a description of a large variety of Structural BMPs, Treatment Control, BMPs and Source Control BMPs	**CASQA-CA Storm Water Quality Association** c/o City of San Diego-Storm Water Pollution Prevention Program 1970 B. Street, MS 27A San Diego, CA 92102 (619) 525-8647
Caltrans Storm Water Quality Handbook: Planning and Design Staff Guide *(Best Management Practices Handbooks (1998)* Presents guidance for design of storm water BMPs	California Department of Transportation P.O. Box 942874 Sacramento, CA 94274-0001 (916) 653-2975

APPENDIX C

EXAMPLES OF BEST MANAGEMENT PRACTICES (BMPS)

The following are examples of BMPs that can be used for minimizing the introduction of pollutants to the storm water conveyance system:

- Permeable materials or pavers for private sidewalks, driveways and spillover parking areas
- Vegetated landscaping strips adjacent to sidewalks, driveways, and parking lots
- Biological or vegetative systems such grassy or vegetated swales
- Dry detention basins
- Retention/detention basins, i.e. wet ponds
- Media filtration units
- Silt and grease traps
- Sediment basins
- Infiltration basins, trenches, or vaults
- Constructed wetlands

Appendix D

Unit Basin Storage Volume Sizing Curves

Design Storm Volume Calculation

Hydrologic calculations for design of volumetric-based storm water quality BMPs shall be in accordance with the procedures set forth herein.

Calculation Procedure:

1. Review the area draining to the proposed BMP. Determine the percentage of Directly Connected Impervious Area (DCIA), the drainage area that is considered impervious. Impervious area includes paved areas, roofs, and other developed, non-vegetated areas. Non-vegetated, compacted soil areas shall be considered an impervious area.

2. Figure B-1 provides a direct reading of Unit Detention Basin Storage Volumes required for 80% annual capture of runoff based on the percentage of Directly Connected Impervious Area (DCIA) on the site. Enter the vertical axis of Figure 1 with the percentage DCIA. Move horizontally across Figure 1 until the line is intercepted. Move vertically down Figure 1 from this point until the horizontal axis is intercepted. Read the Unit Basin Storage Volume along the horizontal axis.

3. The basin volume or basic volume of the BMP is then calculated by multiplying the Unit Basin Storage Volume by the BMP's drainage area. Due to the mixed units that result (e.g., acre-inches, acre-feet) it is recommended that the resulting volume be converted to cubic feet for use during design.

Example Use of Unit Basin Storage Volume Curves Sizing a Dry Detention Basin

Determine the drainage area for the BMP, A_t.

Example: 10 acres.

Determine the area of impervious surfaces in the drainage area, Ai.

Example: 6 acres.

Calculate the percentage of imperious, Percent Impervious = (Ai/ At)*100

Example: Percent Impervious = (Ai/ At)*100 = (6 acres/10 acres)*100 = 60%

Determine the Unit Basin Storage Volume for 80% Annual Capture, Vu using Figure 1. Interpolate between curves, if necessary.

Example: For DCIA = 0.60, the Detention Basin Storage Volume, Vu = 0.032 acre-feet/acre.

Calculate the volume of the basin, Vb, where Vb = Vu* At.

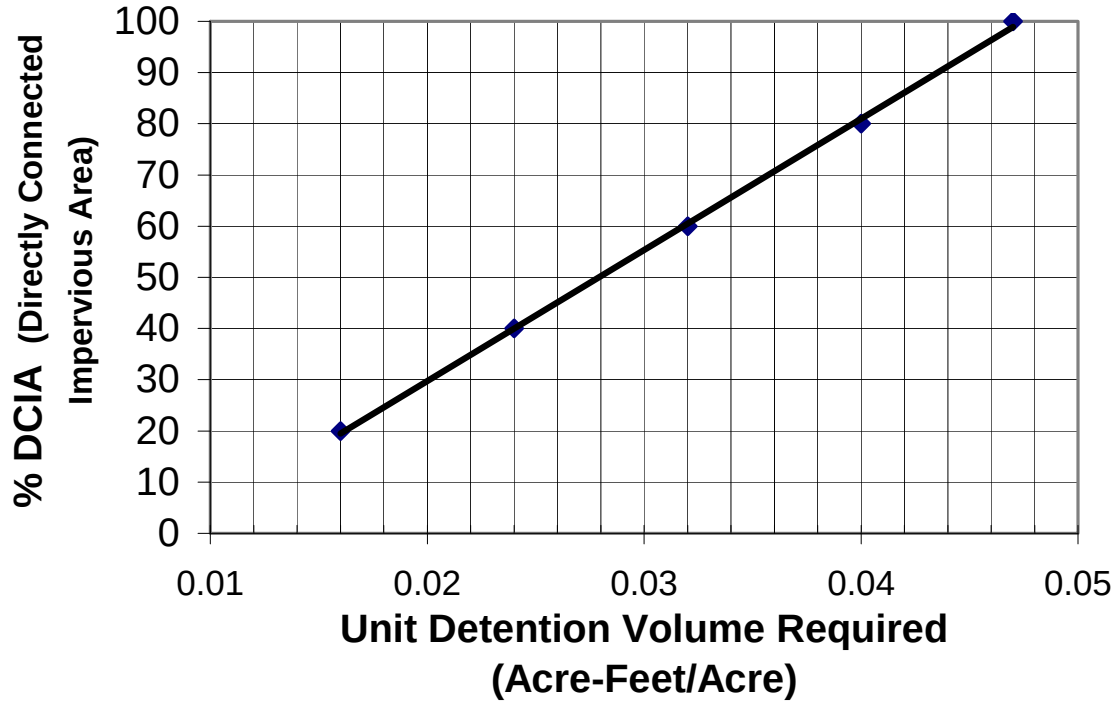
Example: Vb = (.032 acre-feet/acre)(10 ac)= .32 acre-feet

To convert to cubic feet, multiply by (43,560 ft^2 / ac):

(.32 acre-feet) (43,560 ft^2 /acre) = 13,939 ft^3.

Solution: Size the dry detention basin for 13,939 ft3 (.32 acre-feet) and 40-hour drawdown.

Figure 1. Detention Sizing Requirements
40 Hour Detention Storage
80% Annual Capture of Runoff



Appendix E
Maintenance Agreement Regarding Maintenance of Structural or Treatment Control Best Management Practices (BMPs)

for: *Address* _____
*APN No.*_____

I, _____, being the owner of the real property, APN No. _____, which is located at _____, Santa Cruz, California, consents and agrees to inspect and maintain any and all structural or treatment control Best Management Practices (BMPs) a minimum of once per year prior to October 1 on the subject property. The structural or treatment control BMPs on the subject property include(s):
_____.

I agree to send a letter that provides proof of inspection and maintenance to the City of Santa Cruz, Public Works Department, Environmental Projects Analyst, prior to December 1 of each year. Proof of inspection and maintenance shall include a log of inspection and maintenance dates for the past year, and receipts if conducted by a hired service. The log should also indicate any significant observations or repairs made.

In the event that the property is sold, transferred, or leased, the obligations hereby imposed on the property owner shall be assumed by subsequent property owners and lessees. To this end, property owner, in any deed transferring an ownership interest in the property or in any lease agreement for the property, shall include a term by which the subsequent property owner or lessee acknowledges his or her understanding of the obligations imposed by this agreement and expressly agrees to accept and assume responsibility for complying with all said obligations imposed by this agreement.

In addition, I will provide printed information to the new property owner or lesee regarding proper BMP inspection and maintenance frequency and methods. The information shall accompany the first deed transfer. This information shall include the following: (1) a description of any and all storm water structural or treatment control BMPs; (2) a map of the property indicating the BMP locations; and (3) a description of how inspections and necessary maintenance can be performed. The transfer of this information shall also be required with any subsequent sale of the property.

I have read the above agreement and understand it.

_____ _____
Owner Date