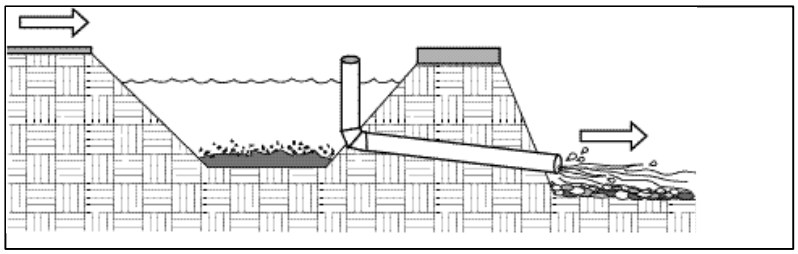


- Sediment Control
- Heavy Metals
- Pathogens
- Pollution Control

Description

Practices to protect water quality by controlling sediments through the use and proper operation and maintenance of sediment basins. Sediment basins are designed to slow velocity and temporarily retain water to allow sediments to settle out. The basin is created by excavation or by constructing an embankment across a waterway or low drainage area. The basin allows storm water runoff to collect, and detain that water to allow sediments to settle out before being discharged. Sediment basins are temporary structures.

Applicability

- Use in association with dikes, temporary channels, and/or pipes being used to divert storm water from disturbed areas into the basin and from undisturbed areas around the basin.
- Outlets of disturbed watersheds 10 acres or greater.
- As necessary, outlets within smaller disturbed watersheds with concentrated flow or in areas with erosive soils.
- Any maintenance project that disturbs areas during the rainy season.
- Areas where a basin could prevent sediment-containing runoff from entering drainage ways or channels.
- Locations where permanent detention basins will be located.

This measure will likely have a significant impact reducing sediment; and may have a significant impact, depending on specific site characteristics in reducing heavy metals, oxygen demanding substances, and pathogens.

Approach and Standards

Installation

- Locate basins:
  - ➔ Where a low embankment can be built across a swale or excavation
  - ➔ Where failure would not cause loss of life or property;
  - ➔ In locations that allow for maintenance access and include room for protected sediment removal and stockpiling areas.

- Size sediment basins using the following recommendations provided by the San Francisco Bay Regional Water Quality Control Board (1998):

1) $Q = CIA$

Where,

Q = Flow expected from the site in cubic feet per second

C = Coefficient of runoff (typically between 0.4 to 0.7), depending on the imperviousness of the contributing area

I = Expected rainfall, in inches per hour

A = Contributing area in acres

2) $A_s = 1.2Q/V_s$

Where,

A_s = Surface area of settling basin with 2-feet of minimum depth

Q = Flow as calculated above

V_s = Settling velocity of particles, in feet per second

A = Contributing area in acres

Particle Size (mm)	Particle Description	Settling Velocity V_s, (fps)
0.5	Coarse sand	0.19
0.2	Medium sand	0.067
0.1	Fine sand	0.023
0.05	Coarse silt	0.0062
0.02	Medium silt	0.00096
0.01	Fine silt	0.00024
0.005	Clay	0.00006

- Build the sediment basin before the wet season and construction activities begin. In the Bay Area, the wet season is generally defined as October 15 through April 15.
- Clear areas under embankments, structural works, and sediment basins. Strip the areas of vegetation (see BMPs VDM-2 and VDM-4).
- Ensure the basin length to width ratio is greater than 3:1 (L:W).
- Provide baffles to prevent the short-circuiting of inlet flows that would reduce residence time.
- Place the basin inlet to maximize the distance from the basin outlet.
- Use rock or vegetation to protect the inlet and slopes from erosion.
- Consider using a forebay built upstream of the basin to remove debris and larger particles.
- Use corrugated metal or reinforced concrete riser pipe with dewatering holes and an anti-vortex device and trash rack attached to the top of the riser for the principal outlet. This will prevent floating debris from flowing out of the basin or from clogging the system. Make sure the principal outlet is designed to handle the inflow design storm.

- Locate the outlet structure on a firm and smooth foundation. The base should be anchored securely with concrete, etc. to prevent the base from floating.
- Connect the riser pipe using a watertight connection, to the horizontal pipe (barrel) that extends through the embankment to the toe of the fill. Provide anti-seep collars on the horizontal barrel.
- Clearly mark the basin's cleanout level on the riser pipe.
- Include an emergency spillway to handle flows that are not contained by the principal spillway. The spillway should be comprised of an open earthen or vegetated channel on top of undisturbed material (not fill), or constructed of non-erodible riprap.
- Place outlet protection at the pipe outlet (see BMP VR-4).
- Install a safety fence around the basin suitable for keeping children out of the basin.
- For removing sediment, use a hydraulic or barge-mounted dredge to reduce the impacts to vegetation and wildlife on channel banks.
- If any contaminated material or hazardous material is excavated, or needs to be transported or disposed of, follow the regulations of the following agencies: United States Department of Transportation, United States Environmental Protection Agency; California Environmental Protection Agency; Department of Toxic Substances Control; and California Division of Occupational Safety and Health Administration.

Limitations

- Some sites may not be situated in areas that allow for easy removal of sediments from the top of the banks.
- Erosion controls should be considered before sediment controls.
- Sediment and detention basins require a large enough surface area to allow for sediment settling. The basins need to be designed with enough length to prevent reduced residency time from short-circuiting.
- Multiple basins should be used for drainage areas greater than 100 acres (40 ha).
- Basin design should be created by a registered professional civil engineer and approved by the overseeing regulatory agency.
- Requires fencing to protect children.
- Do not locate sediment basins in streams.
- Standing water could provide suitable habitat for mosquitoes or other pests to breed.
- Frequent sediment removal can be labor-intensive and costly.

Requirements

Maintenance

- Conduct routine inspections of sediment and detention basins; make corrective repairs and perform maintenance including desilting as necessary. Inspect the basins before and after rain storms, and weekly through the wet season. Inspect sediment traps at least every 24 hours during extended storms.
- Dewater sediment basins or plug the outlet before beginning desilting operations.
- Work from the top of the banks when possible. Off-haul all materials once removed
- Do not stockpile silt from sediment basins onsite where they can drain to the waterway.
- Require siltation removal on both a routine and corrective basis to promote effective stormwater pollutant removal efficiencies for wet or dry detention ponds, infiltration devices, and sediment basins.
- Observe or sample inlets and outlets frequently for total suspended solids to make sure the erosion control measures and sediment basins are working correctly.
- Examine the banks of the basin for structural soundness and any seepage.
- Examine the outlet structure and spillway for obstructions or damage, and repair as necessary.
- Check the outlet area for erosion and repair and stabilize as necessary.
- When the storage areas are one-third full, remove the sediment. Protect the sediment removed from the basin and stockpiled appropriately (see BMP SC-1).
- For most dry sediment basins, rakes, shovels, sickles and machetes may be all that is necessary for maintenance. Basins should be designed to allow access from heavy equipment as well, however. For wet basins, necessary maintenance equipment may include access vehicles, dump trucks, bulldozers, and dredging / excavation equipment.
- Necessary staffing includes a minimum of two people per crew for health and safety reasons, and a program manager who should be easily assessable to provide necessary direction.

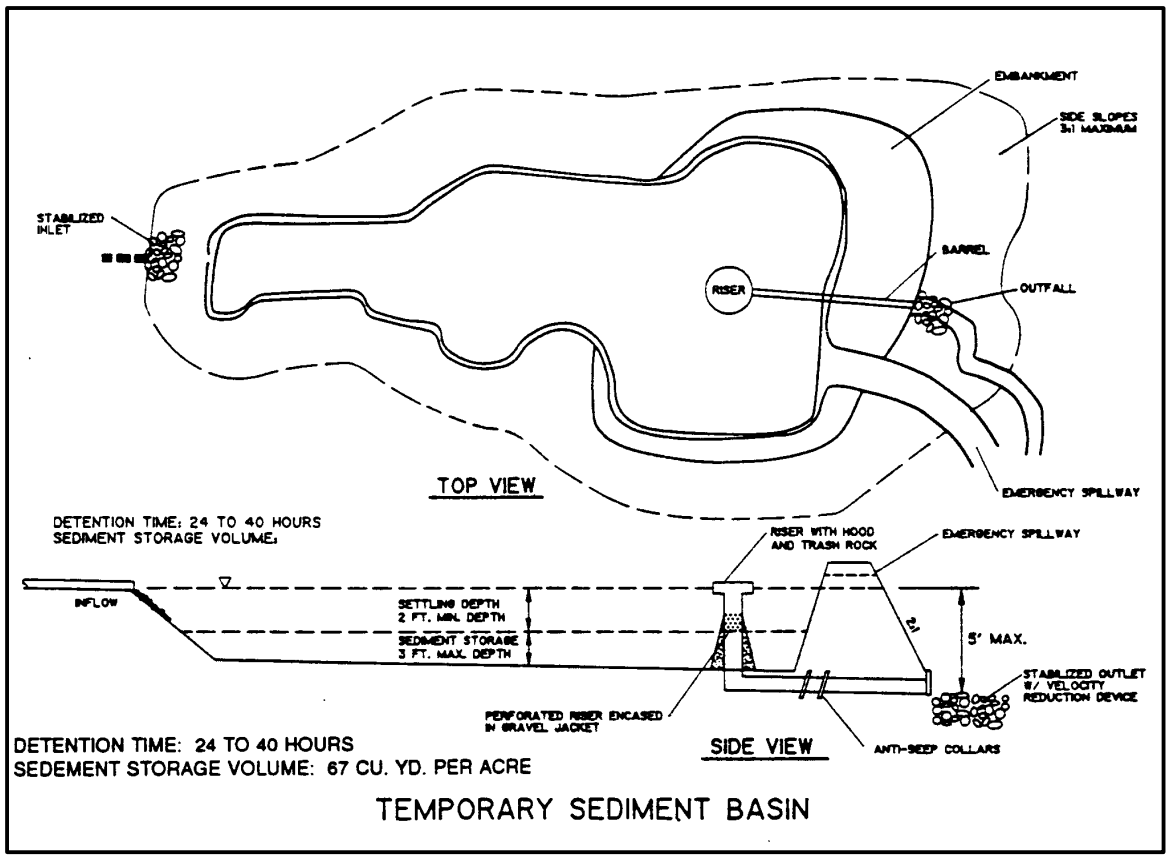
Costs

- Frequent sediment removal can be costly and require intensive labor requirements. These costs can be reduced if ponds are properly designed so that accumulated sediments are easily removed.
- Costs for waste material removal, transport, and disposal.
- Material costs may be incurred for the following equipment: vehicles, dump trucks, bulldozers, trackhoes, excavators, mowers, weed trimmers, sickles, machetes, shovels, rakes, personal protective equipment including goggles, dust masks, coveralls, boots, and gloves.

- In 1992, the USEPA estimated that the average annual cost for installation and maintenance of a sediment basin sized less than 50,000 cubic feet and designed to be used for 2 years was $0.40 per cubic foot, or $700 per drainage acre. For basins sized greater than 50,000 cubic feet, the USEPA estimated a cost of $0.20 per cubic foot, or $350 per drainage acre (SWQTF, Construction BMP Handbook, March 1993).

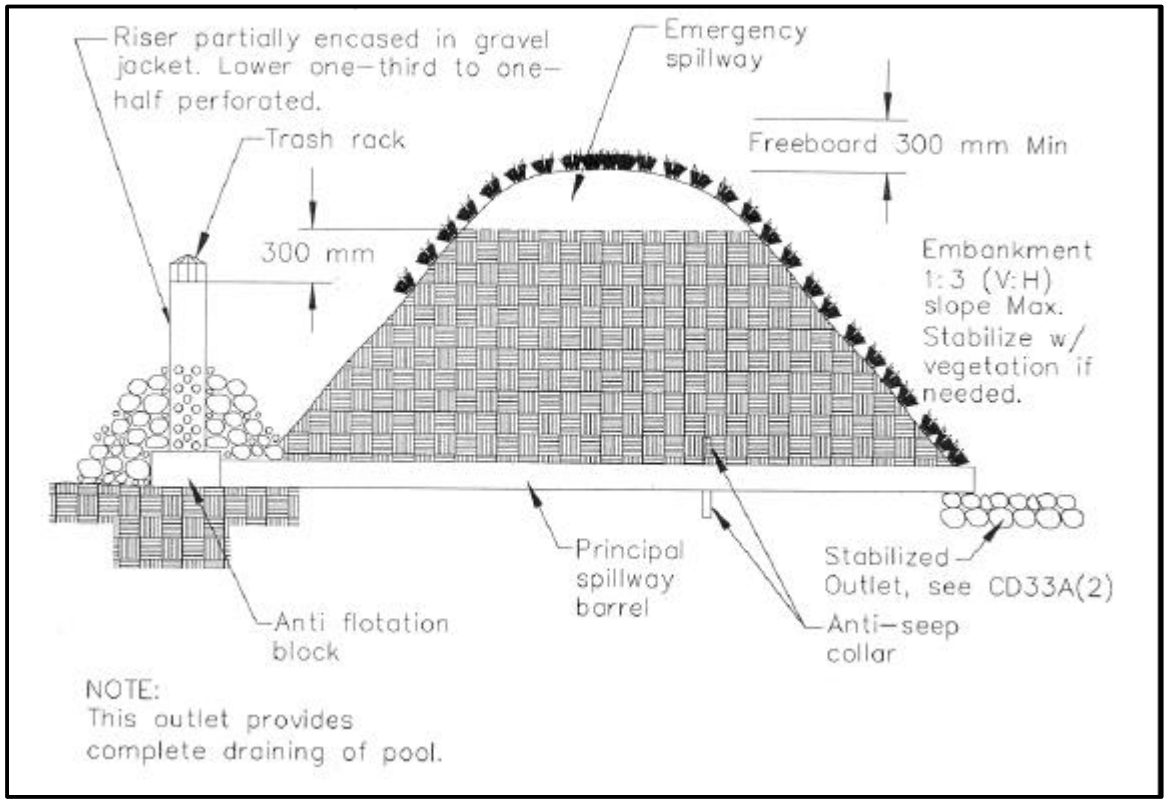
Training

- Necessary training includes proper excavation and maintenance procedures, and proper waste disposal procedures.
- Registered Professional Civil Engineer necessary for design.

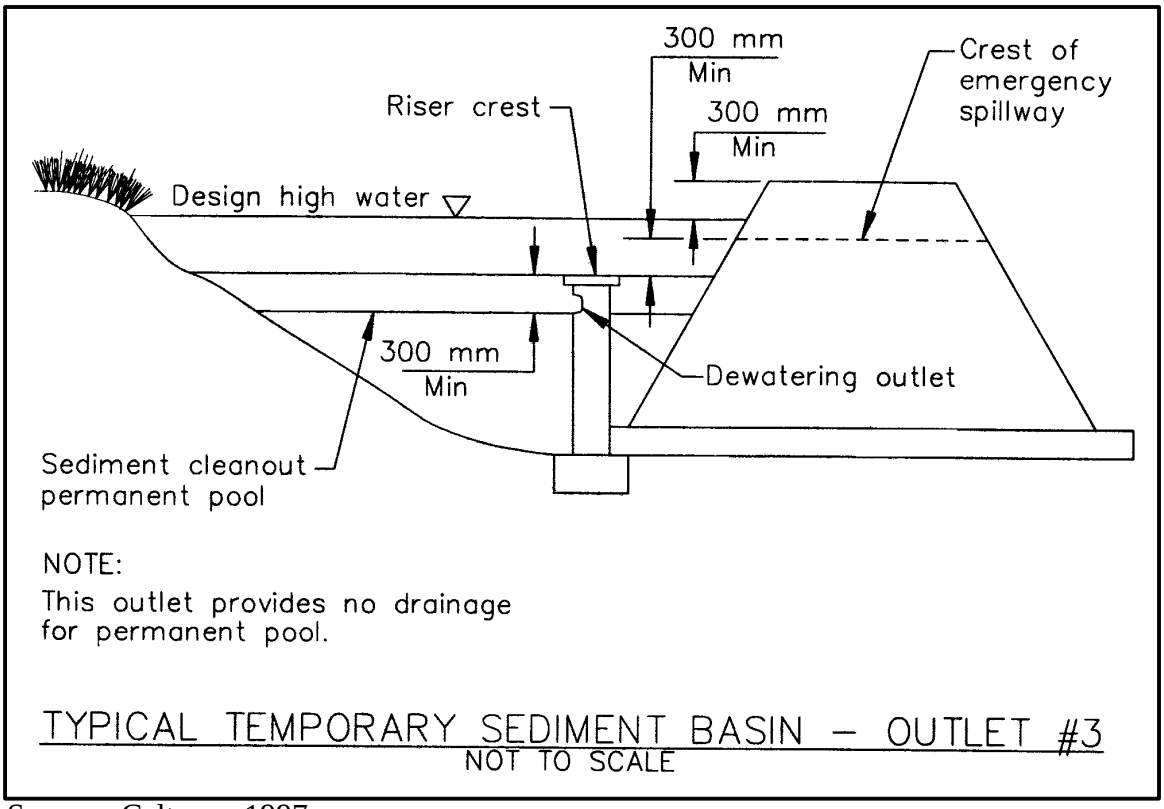


Source: California Storm Water Quality Task Force, "Construction…," 1993.

Sediment Basin Outlets:



Source: Caltrans, 1997.



Source: Caltrans, 1997.

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