

Low Impact Development Initiative (LIDI) Bioretention Technical Specifications

The following technical information is for use in conjunction with the complete set of bioretention area standard details developed by the LIDI for in the Central Coast region.

Facility Design/Dimensions

- Bottom width – provide 2’ wide minimum flat bottom for facilities with side slopes and longitudinal slope.
- Allowable standing water duration – 72 hours.
 - Allowable ponding time is typically associated with mosquito vector control, and varies by location. Confirm with local vector control agency to confirm appropriate drawdown time for facility.
- Planter minimum widths are typically associated with their application. Considerations influencing minimum widths include:
 - 4’ minimum for planters in ROW with trees
 - 2’ minimum for planters without trees
- Ponding depth - Min. 6", max. 12"
- Planter depth – (from adjacent pedestrian walking surface to facility finished elevation/planting surface) is based on desired ponding plus freeboard, but also relates to planter width. Planters can be deeper if they are wider, and need to be shallower as they narrow. This is a pedestrian perception and safety issue. Some recommended width to depth guidelines are:

PLANTER WIDTH	MAX. PLANTER DEPTH
< 5’	16”
4’ – 5’	12”
3’ – 4’	10”
2’ – 3’	8”

- Slope/grades
 - Side slope - 4:1 preferred
 - Max. 3:1 allowed with min. 12" wide shoulder (2% slope toward facility) adjacent to pedestrian use or curb.
 - Longitudinal slope – Max. 6% longitudinal slope of bottom.
 - Erosion and movement of soil and mulch intensifies with increased longitudinal slope, minimize longitudinal slope.

- Stair stepping planters on a slope to provide flat bottomed cells separated by check dam/weir overflows can provide more storage and infiltration than a sloped facility.
- Grades on opposite sides within a facility should be similar to optimize ponding across the entire basin/cell.

Hard Infrastructure

- Inlet curb cut design selection should be based on application considerations:
 - Sloped sided or flat/planter facility
 - Curb and gutter adjacent to facility or separated by pedestrian sidewalk
- Sidewalk edge type selection should be based on application considerations:
 - New or retrofit
 - Sloped sided or flat/planter
- Sidewalk wall - flat/planter requires 4" min. height wall adjacent to sidewalk for pedestrian safety.
- Sidewalk wall drainage notch – when sidewalk drains to planter, provide 4"-6" wide notch openings in wall, 1" below sidewalk, slope to facility. Space openings to convey flows.
 - Provide minimum 2" cover between notch and structural dowels in curbs/walls.
- Energy dissipation – provide aggregate or concrete splash pads at inlets per inlet details.
 - For aggregate: 6" depth, 3" – 6" rounded, washed cobble
 - For sloped sided facilities where inlet flow velocity is high, extend cobble into facility, but avoid excessive or decorative use.
- Where impermeable liner is included between facility and adjacent infrastructure (street, parking lot), use 30 ML HDPE or PVC material, see Impermeable Liner detail.
- Check dams – provide for facilities with bottom slope
 - Per check dam details 130,131
 - Use LIDI check dam spacing detail (under development detail TBD).
- Overflow structure – required for on-line systems without an overflow bypass
 - Per overflow structure details 140, 141
 - Connects to approved discharge point or another downstream bioretention area.
- Provide monitoring well in each facility
 - Upright 6 inch rigid PVC (SDR 40 or equivalent) pipe, perforated for the section extending through the depth of the bioretention soil media (and aggregate layer if included), extending 6 inches above the top of soil elevation, with a threaded cap.
 - Locate to avoid damage from maintenance activities.

Facility Media (soil, aggregate, mulch)

- Aggregate layer – where an aggregate layer is included in the design (underdrain design or optional use based on project requirements, depth based on sizing calculations), specify “CalTrans Class 2 Permeable.”
 - CalTrans Class 2 Permeable does not require an aggregate filter course between the aggregate storage layer and the bioretention soil media above.
 - When CalTrans Class 2 Permeable is not available, substitute CalTrans Class 3 Permeable.
 - Class 3 Permeable requires an overlying 3” deep layer of ¾” (No. 4) open graded aggregate (between Class 3 and bioretention soil media above).
- Bioretention soil media (BSM) - use Bay Area Stormwater Management Agencies Association (BASMAA) Specification of Soils for Biotreatment or Bioretention Facilities (Attachment L).
 - Using performance specification for alternative bioretention soil mix is not recommended.
 - A pre-mixed bioretention soil media is preferable to mixing soil on-site.
- BSM depth – 18” minimum depth, 24” recommended.
 - For systems with underdrain, BSM min. depth is 24”.
 - Where aggregate layer is used and trees are specified, replace aggregate with increased BSM depth in tree planting locations.
 - Tree planting in bioretention detail (TBD)
- Bioretention Soil media placement and compaction – place BSM in 6” lifts. Compact each lift with a landscape roller or by lightly wetting. Allow BSM to dry overnight before planting.
- Filter fabric - do not use fabric between BSM and aggregate layer
- Mulch depth – 2” – 3”
 - Mulch use optional below ponding high water mark.
 - Do not apply mulch in ponding zone just prior to or during rainy season.
 - When mulch is used, excavation must allow for specified bioretention soil and mulch depths to achieve finished elevations as shown on civil plans.
- Mulch type - when used in ponding zone, must be aged, stabilized, non-floating mulch, such as a specified compost mulch.

Landscape (planting and irrigation)

- Irrigation - Provide irrigation for plant establishment (2-3 years), and supplemental irrigation during periods of prolonged drought.
 - Provide separate zone for connection to water supply

- Planting - see LIDI plant guidance for bioretention areas technical assistance memo (TAM).
 - Landscape Architects who have not previously designed bioretention systems should use plants from the LIDI TAM plant list. Landscape Architects with experience designing for bioretention may use additional plant species appropriate for the facility design and local conditions.
 - Do not locate plants at inlets. Consider mature growth to determine planting layout and avoid future blockage of inlets by plants.
 - Trees located on slopes should be 5' minimum from inlets to avoid erosion of soil at root ball.

Underdrain Design

- BSM depth – 24" minimum depth.
- Aggregate layer depth – 12" minimum depth.
- Underdrain – use 4" diameter, PVC SDR 35 perforated pipe.
 - Install underdrain with holes facing down.
 - Underdrain discharge elevation shall be near top of aggregate layer.
 - Underdrain slope may be flat.
 - Connects to approved discharge point.
- Provide capped, threaded PVC cleanout for underdrain, 4" min. dia. with sweep bend.