

Low Impact Development (LID) For Contractors and Developers

LIDI Technical Assistance Memo (TAM)

Low Impact Development, or LID, is required for many new and redevelopment projects, including public projects. It is an approach to managing stormwater by mimicking natural landscapes. LID integrates design features (e.g., specially designed landscapes, permeable hardscapes, and rainwater catchment systems) on-site to meet post-construction stormwater controls. In contrast to post-construction flood control infrastructure (e.g., vaults and detention ponds) LID focuses on infiltration of small storm events to meet water quality requirements for watershed protection and to support water supply objectives. Although projects with LID features may look like conventional development projects, there are key differences for contractors and developers to understand as part of bidding or cost estimating, construction, and maintenance. The goal of this TAM is to give contractors and developers who are new to LID pointers to help identify aspects of LID implementation that impact cost, affect project schedule, or require special construction procedures.

UNDERSTANDING PROJECT DESIGN

It is important to carefully review construction documents (CDs) and specifications for design elements, construction methods, special phasing, and new materials related to LID features that may impact implementation or cost. Subcontractors should also review CDs with this in mind. For public projects, contractors and subcontractors should attend the pre-bid meeting, which is an opportunity to obtain valuable information for bidding the LID features. Additional considerations to better understand the LID project include:

- LID features typically involve excavation. Ensure that potholing is included in the cost estimate where utilities are expected to be present.
- Account for protection of LID features from compaction as identified in CDs and specifications.
- Account for additional sediment and erosion control effort. LID features are designed to intercept stormwater and are often at low points. However, during construction stormwater should be diverted away from LID features until the site is stabilized.
- LID features often require special construction, such as deepened curbs that cannot be built as extruded.
- Verify that suppliers can meet the specifications for LID materials. Substitutions may be limited, or in some cases not allowed.

CONSTRUCTION

Sequencing and Schedule

- Understand the unique needs for construction sequencing of LID features. LID features need protection from compaction, erosion, sedimentation, and construction runoff. Plan to sequence construction of LID features for the least amount of conflict with other aspects of construction.
- Avoid excavation and other work in LID features during wet or saturated conditions.
- Consider lead times and associated submittals on specialized LID materials (e.g., impermeable liner, bioretention aggregate, bioretention soil mix, plants for ponded area of bioretention facility, mulch).

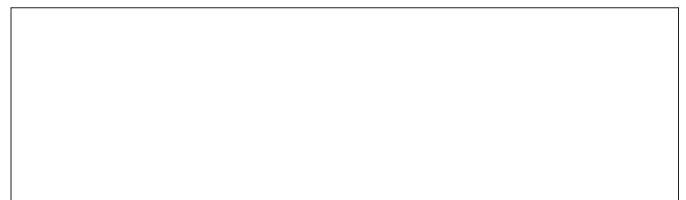


Source: Cannon

CONSTRUCTION

Excavation and Infrastructure

- Excavations for LID features may create utility conflicts. Pothole first. Is there still adequate cover? Are there conflicts? Do utilities need temporary relocation or protection from equipment and compaction?
- Provide clear signs/barriers to prevent entrance and compaction of LID features.
- Meet and walk the property with equipment operators regularly to clarify construction boundaries.
- Machinery performing excavation should be adjacent to, not inside of, the LID facility whenever possible.
- When machinery must operate in the LID facility due to size or location, consult the soils engineer for strategies to minimize compaction, and re-scarification requirements.
- Grading of LID features is non-traditional and assumptions and changes to grades shown on plans should not be made without consulting the designer. Ask questions if grading design is not clear.



Excavation and Infrastructure (continued)

- Curbs and gutters may have unique details for the purpose of directing stormwater to LID features. Don't overlook these details. Ask questions if a detail is unclear or not provided.
- Do you understand the functional intent of the LID feature? What is the stormwater ponding depth and where is the overflow location?
- Drainage overflow structures (e.g., catch basins and raised area drains), their locations in the facility, and inlet elevations are intentional for stormwater ponding. Do not make field adjustments to overflow structures; clarify the design intent if an elevation looks wrong.



Source: David Innis

- Understand where infiltration is desired and where it is not. Road base, utilities trenches, and building foundations must be protected as noted per plans and specifications. Deep curbs, underdrains, impermeable liners, and trench dams keep infiltration away from these undesired locations.
- Filter fabric is not recommended in LID infiltration features. It can clog with sediment and cause the system to fail. Do not substitute or install filter fabric without consulting the designer.
- When underdrains are used, their placement and the orientation of their pipe holes are intentional, and may vary for facilities on the same site. Underdrains at the lowest elevation of the LID facility drain the maximum amount of water. Underdrains installed at a higher elevation allow retention and infiltration of stormwater into underlying soils.

Technical Resources

More information, including standard details and technical specifications for LID design is available on LIDI's website at: centralcoastlidi.org/technical

Soil and Landscape

- Are plans and specifications clear on soil placement and compaction for LID features? Compaction for LID is not like traditional compaction. Systems are designed to infiltrate. Over compaction of underlying or engineered soils inhibits infiltration. Over-compacted soils must be rescarified to a depth identified by the soils engineer to return soils to their desired infiltration rates.
- Are plans and specifications clear on plant locations and spacing? Installation must accurately match landscape plans because special plants are selected to tolerate the ponding areas.
- The contractor should coordinate with the landscape contractor to ensure that final grades are maintained upon completion of plant and mulch installation.
- LID landscapes can receive erosive stormwater flows; inlets should be blocked or otherwise protected until plants establish enough to withstand stormwater flows. Look for direction in the plans and specifications.



Source: Cannon

VERIFICATION

- The Regional Water Board may require field verifications of LID features by the municipality or a third party during construction. Coordinate with the inspector at appropriate construction phases to ensure compliance and avoid re-excavation.
- Obtain approval for submittals/substitutions from the designer or owner's representative before ordering.

MAINTENANCE/WARRANTY

- LID features often require additional maintenance (e.g., sediment and debris removal from inlets and overflows, periodic vacuuming of void spaces within permeable hardscapes). Be sure to clarify what is required for projects that include a maintenance and/or warranty period.