

City of Temple City

Low Impact Development For Small Sites Technical Guidance Manual





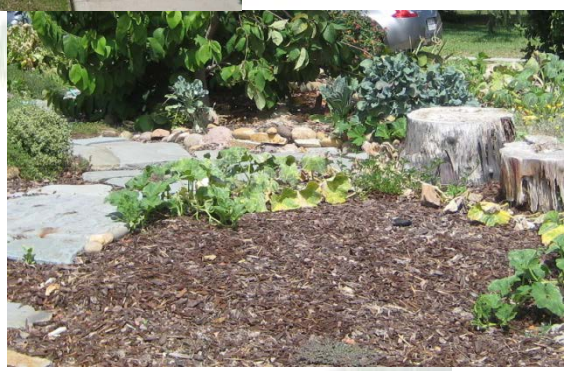


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SECTION 1 – INTRODUCTION

1.1 WHAT IS LID?

LID Stands for: Low Impact Development, it is a stormwater management strategy that emphasizes conservation and the use of existing natural site features integrated with distributed, small-scale stormwater controls to more closely mimic natural hydrologic patterns in residential, commercial, and industrial settings.

1.2 WHY IS LID BEING REQUIRED?

The urbanization of Southern California has disrupted the natural flow of stormwater runoff. Rain falling on roofs now flows into metal or plastic downspouts, then to concrete curbs and gutters along asphalt roads, then to concrete storm drains, then to concrete river channels, and then finally into estuaries and the Pacific Ocean.

You can see the problem; rainwater no longer comes into contact with dirt and vegetation. Any pollutants (heavy metals, bacteria, nutrients, pesticides) that would have previously been naturally degraded, are now flowing straight out to environmentally sensitive areas.

LID is a new design strategy that corrects this problem. There are many highly technical manuals for designing LID systems, some of which are listed in Section 4 herein. The purpose of this guidance manual is to simplify your design.

Typical LID systems include:

- Flow-Through Planter Boxes
- Vegetative Swales
- Rain Gardens
- “Hollywood” Driveways
- Bottomless Trenches

In addition to the LID systems listed above, there are many other acceptable systems such as capture and re-use (cisterns/ rain barrels), green roofs, pervious pavement/pavers, turf block, etc. However, the design, installation, and subsequent operation and maintenance of these systems can be complex and should be carefully evaluated prior to being proposed. When using these other systems, a published design standard shall be followed.

1.3 PROJECT APPLICABILITY

Step 1: Categories.

There are four LID categories. The first step in LID design is to determine which category the project fits into.

Category 1. The project will disturb less than 500 square feet of soil

The project is exempt from LID requirements.

Category 2. The project is residential, will involve 4 or less dwelling units and will disturb more than 500 square feet of soil

The project falls under the Residential LID Category.

Category 3. The project will involve 5 or more dwelling units or is at a commercial or industrial site. It will disturb more than 500 square feet of soil

The project falls under the Commercial/Industrial LID Category.

Category 4. The project is subject to the provision of the Municipal Separate Storm Sewer System permit (MS4) issued by the California Regional Water Quality Control Board. These projects typically include (but are not limited to): new industrial parks 10,000 square feet or more; new commercial malls 10,000 square feet or more; Retail gasoline outlets 5,000 square feet or more; new restaurants 5,000 square feet or more; new parking lots 5,000 square feet or more; or the creation or addition or replacement of 5,000 square feet or more of impervious surfaces of existing projects meeting the Regional Board's applicability criteria.

The project is beyond the scope of this manual and is subject to the requirements as outlined in the MS4 Permit.

Step 2: LID Design Requirements.

For Residential LID Projects (Category 2)

- A Residential LID Project must incorporate two or more of the following LID systems in the project design (The systems must be shown on the plans submitted to the City):

    1. Porous pavement:
    Install porous pavement that allows rainwater to infiltrate through it. Porous pavement includes, but is not limited to, porous asphalt, porous concrete, ungrouted paving blocks, and gravel. At least 50 percent of the pavement on the lot shall be porous. For an example of a driveway that allows rainwater infiltration, see section 3.5, "Hollywood driveway."

    2. Downspout routing
    Each roof downspout shall be directed to one of the following BMPs. The sum of the capacity of the downspout BMPs shall total at least 200 gallons.

a. Cistern/rain barrel
Direct roof downspouts to rain barrels or cisterns. The stored stormwater can then be used for irrigation or other nonpotable uses as permitted under the Los Angeles County Building/Plumbing Code.

b. Rain garden/planter box
Direct roof downspouts to rain gardens or planter boxes that provide retention and treatment of stormwater (see Section 3.4 for details).

3. Disconnect impervious surfaces
Slope driveways and other impervious surfaces to drain toward pervious surfaces. If possible, runoff should be directed toward vegetated areas or water quality BMPs. The ratio of impervious to pervious area shall be no less than 2:1. Limit the total area not directed toward vegetated areas or water quality BMPs to 10 percent or less of the impervious surfaces.

4. Dry well
Install a dry well to infiltrate stormwater. The dry well shall be sized to contain and infiltrate at least 200 gallons of stormwater in a 36 hour period.

5. Bottomless trench
Install a bottomless trench across the end driveway to catch rainfall as it washes down the driveway towards the street (see Section 3.6 for details).

6. Landscaping and landscape irrigation
Plant trees near impervious surfaces to intercept rainfall in their leaves. Trees planted adjacent to impervious surfaces can intercept water that otherwise would have become runoff. A minimum of two 15 gallon trees shall be planted a maximum of 10 feet from impervious surfaces. Install irrigation systems that minimize water usage and eliminate dry-weather urban runoff.

- Before a project can be approved, the following must be verified through the plan check process:
    - The following statement must be included on the plans:

      As the engineer/architect of record for this project, I have designed the LID system in accordance with the design criteria of the City of Temple City's LID Guidance Manual.
    - The project engineer/architect must make sure the safety and soil stability of the LID system is carefully evaluated prior to its inclusion in the design.
    - Language describing maintenance activities and indicating the responsible party for such activities (including signature) must be located on the document(s) submitted to the City.
    - The entire project area must drain to the LID system(s). If water is flowing to the LID system from areas outside the project area, the LID system must be designed accordingly to treat all tributary areas. In instances where a project cannot treat the runoff from the development area, an equivalent area may be treated as an alternative.

For Commercial/Industrial LID Projects (Category 3 above)

- A Commercial/Industrial LID Project must incorporate one or more LID system(s), as found in Section 3 of this manual, in the project design. The system(s) must be shown on the plans submitted to the City.
- Include the following statement:

  As the engineer/architect of record for this project, I have designed the LID system in accordance with the design criteria of the City of Temple City's LID Guidance Manual.
- The project engineer/architect must make sure the safety and soil stability of the LID system is carefully evaluated prior to its inclusion in the design.
- Language describing maintenance activities and indicating the responsible party for such activities (including signature) must be located on the document(s) submitted to the City.
- The entire project area must drain to the LID system(s). If water is flowing to the LID system from areas outside the project area, the LID system must be designed accordingly to treat all tributary areas. In instances where a project cannot treat the runoff from the development area, an equivalent area may be treated as an alternative.
- Calculations must be included on the plans showing the LID system is adequately sized. A calculation template is shown in Section 3.1. For Commercial/Industrial LID Projects, the BMP(s) must be sized to treat the entire design capture volume (DCV).

Step 3: Plan development and submittal.

The LID system(s) design and location must be shown on the plans and submitted to the City. The Standard Plans are available (yet not required) for guidance.

1.4 LID EXEMPTIONS

Exemptions from LID Requirements. LID requirements do not apply to any of the following:

1. A Development that only creates, adds or replaces less than 500 square feet of impervious area;
2. A Development involving only emergency construction activity required to immediately protect public health and safety;
3. Infrastructure projects within the public right-of-way;
4. A Development or Redevelopment involving only activity related to gas, water, cable, or electricity services on private property;
5. A Development involving only resurfacing and/or re-striping of permitted parking lots, where the original line and grade, hydraulic capacity, and original purpose of the facility is maintained;
6. A project involving only exterior movie or television production sets, or facades on an existing developed site;
7. A project not requiring a City building, grading, demolition or other permit for construction activity.

SECTION 2 – COMMONLY ASKED QUESTIONS

1. **I am adding a second story to my house. The existing footprint will remain unchanged, does LID apply?**

   No, LID is required only where 500 square feet of soil is being disturbed.

2. **I will be adding a new 500 square foot room that will replace some of my backyard. Does LID apply?**

   Yes, you've crossed the 500 square foot threshold.

3. **I will be building a new addition that will be over 500 square feet, but I can't fit an LID system into the new addition. Can I create an LID system for an equivalent area of the existing building?**

   Yes, you can create an LID system for an equivalent area of the existing building.

4. **I own a business. It is concrete and asphalt all around. Will LID be required if infeasible?**

   A waiver for technical infeasibility may be issued by the Director; however in this situation it is unlikely to be granted. Generally there is always a way to implement LID requirements.

5. **How big do I have to design the LID systems?**

   On the following pages are design criteria. Generally you have to make the systems big enough to treat runoff from a ¾ inch storm.

6. **I am removing a 500 square foot concrete pad that is in need of repair and replacing it with an identical new concrete pad. Does LID apply?**

   If the construction would not result in soil disturbance, this would be considered routine maintenance. However, if the construction did result in soil disturbance an LID system would be required.

7. **I am installing new interior electrical and new plumbing and will have more than 500 square feet of disturbed soil. When the project is finished, the trenches will be patched to match the existing surrounding surfaces. The existing building will be unchanged. Will LID apply?**

   No, utility projects are exempt from LID requirements. See Section 1.4 of this document.

8. **My project does not require any permits from the City, does LID apply?**

   No, only projects requiring city permits need to comply with LID.

9. **If at some time in the future I want to change the design of the LID system, can I?**

   Only with Community Development Department approval.

SECTION 3 – DESIGN GUIDELINES AND SPECIFICATIONS

3.1 DESIGN CAPTURE VOLUME

The Design Capture Volume (DCV) is required to design the flow through planter box, vegetated swale, rain garden, and any other volume-based LID system.

DCV Equation:

$$DCV\ (ft3) = C\ x\ d\ x\ A\ x\ 43560\ x\ \frac{1}{12}$$

With:

$$C = (0.75\ x\ Impervious\ Area) + 0.15$$

$$d = Design\ Storm\ Depth\ (assume\ 0.75\ inch\ unless\ otherwise\ known)$$

$$A = Tributary\ Area$$

The information provided below are guidelines that must be followed when designing LID for your project. Standard drawings for each LID are included for reference.

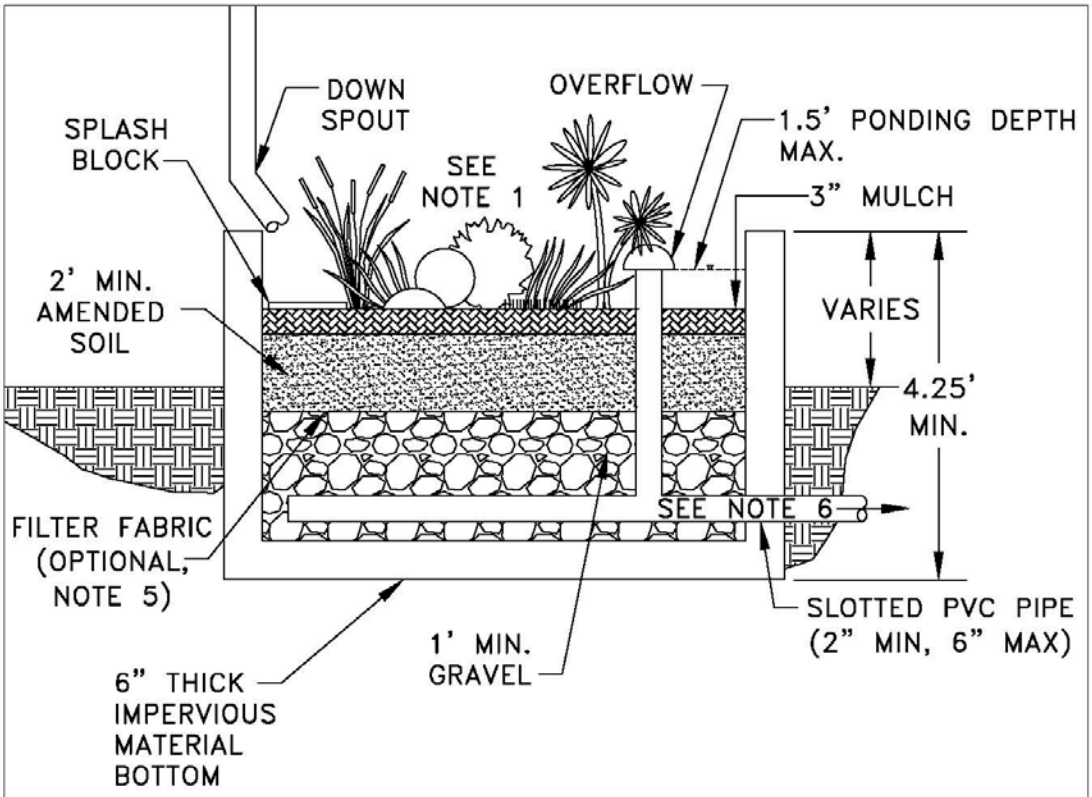
3.2 FLOW-THROUGH PLANTER BOX



Figure 1: Flow-through planter box (http://lateameffort.blogspot.com).

Design criteria for a flow-through planter box include the following:

- Design drawdown time = 48 hours (surface); 72 hours (total)
- Factor of safety = 2
- Max ponding depth = 18 inches
- Soil depth = 2 feet (3 preferred)
- Slotted PVC pipe (2 inches Minimum) within 6 inches of bottom of facility
- The area (width * length) must equal 4% of the tributary area
- Flows my outlet to a curb drain, rain garden, or equivalent
- Cover must be dense, wet, and dry tolerant vegetation



GENERAL NOTES:

1. DENSE, WET AND DRY TOLERANT VEGETATION.
2. PONDED WATER MUST DRAIN WITHIN 72 HOURS TO PREVENT VECTOR BREEDING.
3. IF NEEDED, MULTIPLE PIPES MAY BE USED.
4. THE PLANTER BOX AREA (WIDTH * LENGTH) MUST EQUAL 4% OF THE TRIBUTARY AREA.
5. FILTER FABRIC AVAILABLE AT LOCAL HARDWARE STORES.
6. FLOWS MAY OUTLET TO A CURB DRAIN, RAIN GARDEN, OR EQUIVALENT.

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REVISIONS	CITY OF TEMPLE CITY PUBLIC WORKS DEPT.	
	LID–FLOW THROUGH PLANTER BOX	

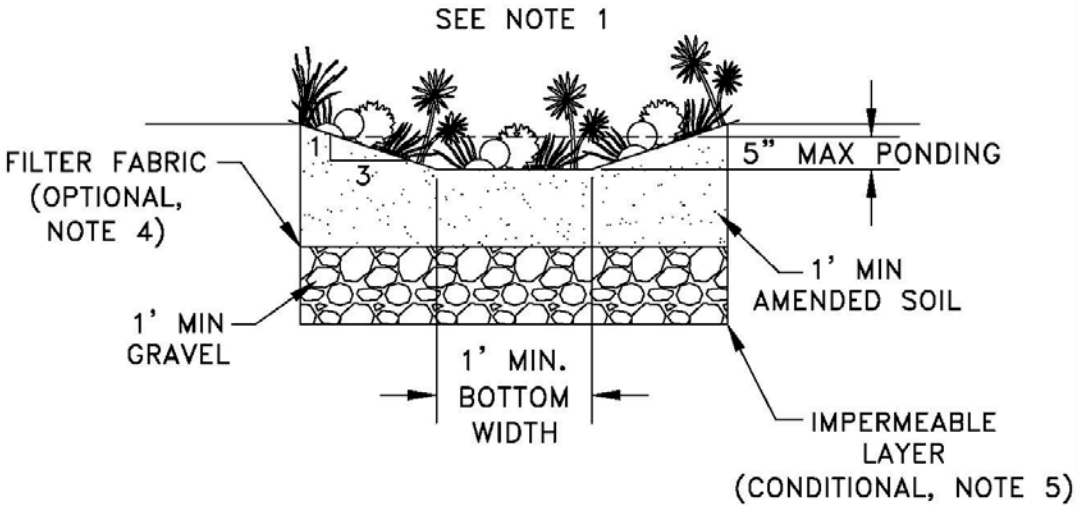
3.3 VEGETATED SWALE



Figure 2: Vegetated Swale (Signal Hill, CA).

Design criteria for a vegetated swale include the following:

- Design flow velocity ≤ 1 ft/sec.
- Side slopes shall not exceed 3:1 (H:V).
- Slope in flow direction 1% (min) to 6% (max).
- Minimum bottom width = 1 foot
- Minimum swale length = 15 feet
- Max ponding depth = 5 Inches
- Soil depth = 2 feet min
- Design drawdown time = 48 hours (surface); 72 hours (total)
- The area (width * length) must equal 4% of the tributary area
- Cover must be dense, wet, and dry tolerant vegetation



GENERAL NOTES:

1. DENSE, WET AND DRY TOLERANT VEGETATION.
2. PONDED WATER MUST DRAIN WITHIN 72 HOURS TO PREVENT VECTOR BREEDING.
3. THE BOTTOM AREA (WIDTH * LENGTH) MUST EQUAL 4% OF THE TRIBUTARY AREA.
4. FILTER FABRIC AVAILABLE AT LOCAL HARDWARE STORES.
5. AN IMPERMEABLE LAYER MUST BE USED IF GROUNDWATER IS LESS THAN 10 FEET FROM THE BOTTOM OF THE GRAVEL LAYER.

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	LID–VEGETATED SWALE	

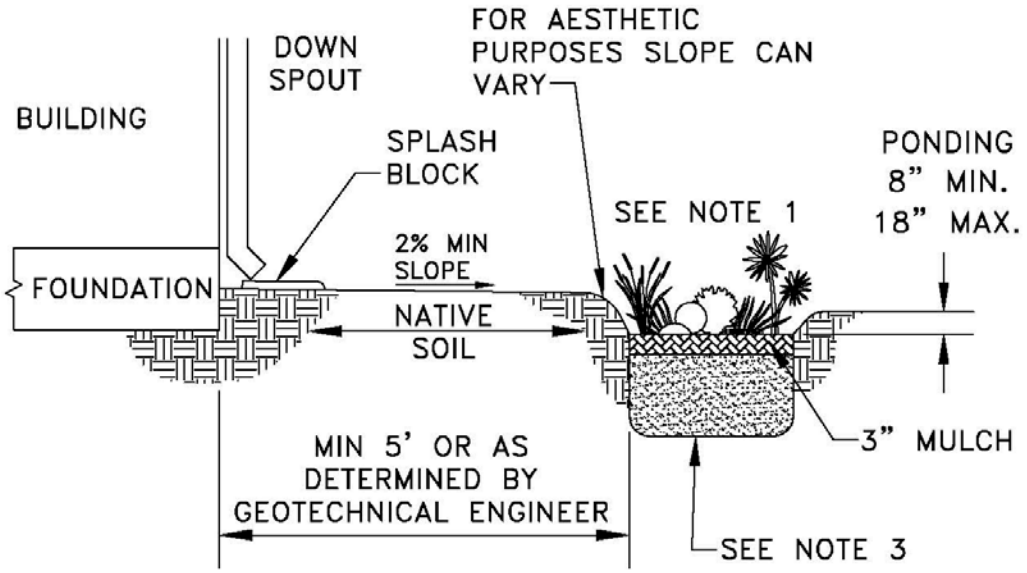
3.4 RAIN GARDEN



Figure 3: Rain Garden (http://www.prairiefirenewspaper.com/2009/04/rain-gardens).

Design criteria for a rain garden include the following:

- Design drawdown time = 48 hours (surface); 72 hours (total)
- Factor of safety = 2
- Maximum ponding depth = 18 inches
- Minimum ponding depth = 8 inches
- Soil depth = 2 feet minimum (3 preferred)
- If downspout is directed to rain garden, slope must be 2% minimum
- Cover must be dense, wet, and dry tolerant vegetation
- The bottom of the rain garden should be no less than 10 feet from the groundwater table



GENERAL NOTES:

1. DENSE, WET AND DRY TOLERANT VEGETATION.
2. PONDED WATER MUST DRAIN WITHIN 72 HOURS TO PREVENT VECTOR BREEDING.
3. BIORETENTION SOIL DEPTH 2' MINIMUM (3' PREFERRED).
4. THE RAIN GARDEN AREA (WIDTH * LENGTH) MUST EQUAL 4% OF THE TRIBUTARY AREA.
5. THE BOTTOM OF THE RAIN GARDEN SHOULD BE NO LESS THAN 10' FROM THE GROUNDWATER TABLE.

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	LID–RAIN GARDEN	

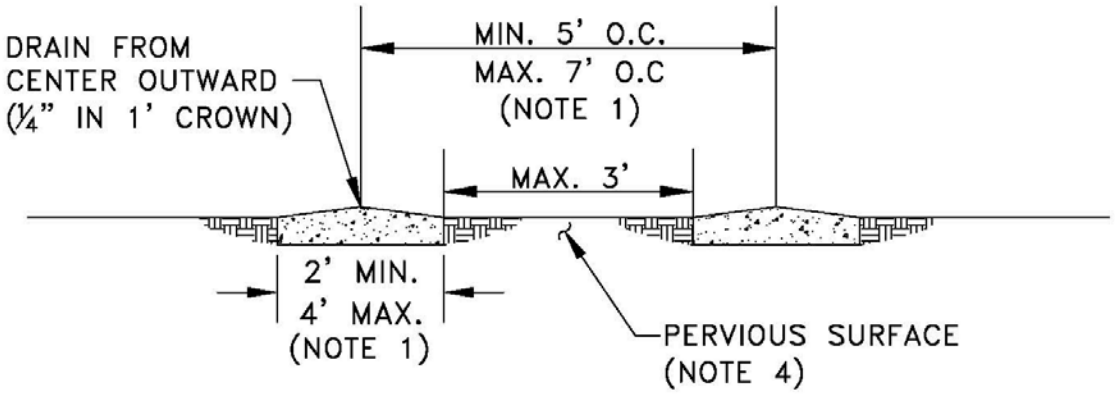
3.5 "HOLLYWOOD" DRIVEWAY



Figure 4: "Hollywood Driveway" (Temple City, CA).

Design criteria for a "Hollywood" Driveway include the following:

- Recommended spacing between ribbons is 5 to 7 feet (may vary depending on expected traffic)
- Ribbon width = 2 feet minimum
- Ribbon thickness = 6 inches minimum (with mesh or rebar)
- Ribbons should drain outward from the center of crown
- Center strip should include an irrigation line



GENERAL NOTES:

1. MAXIMUM WIDTH AND SPACING ARE RECOMMENDED AND MAY VARY DEPENDING ON EXPECTED TRAFFIC.
2. DRIVEWAY RIBBONS SHOULD BE AT LEAST 2 FEET IN WIDTH.
3. DRIVEWAY RIBBONS SHOULD BE AT LEAST 6 INCHES THICK WITH MESH OR REBAR.
4. PERVIOUS SURFACE INCLUDES; VEGETATION (GRASS), WIDELY SPACED INTERLOCKING PAVERS, AND GRAVEL.
5. DRIVEWAY RIBBONS SHALL BE CONCRETE, TRAFFIC RATED PAVERS, BRICK, OR EQUIVALENT MATERIAL.

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	LID– SEMI–PERVIOUS DRIVEWAY	

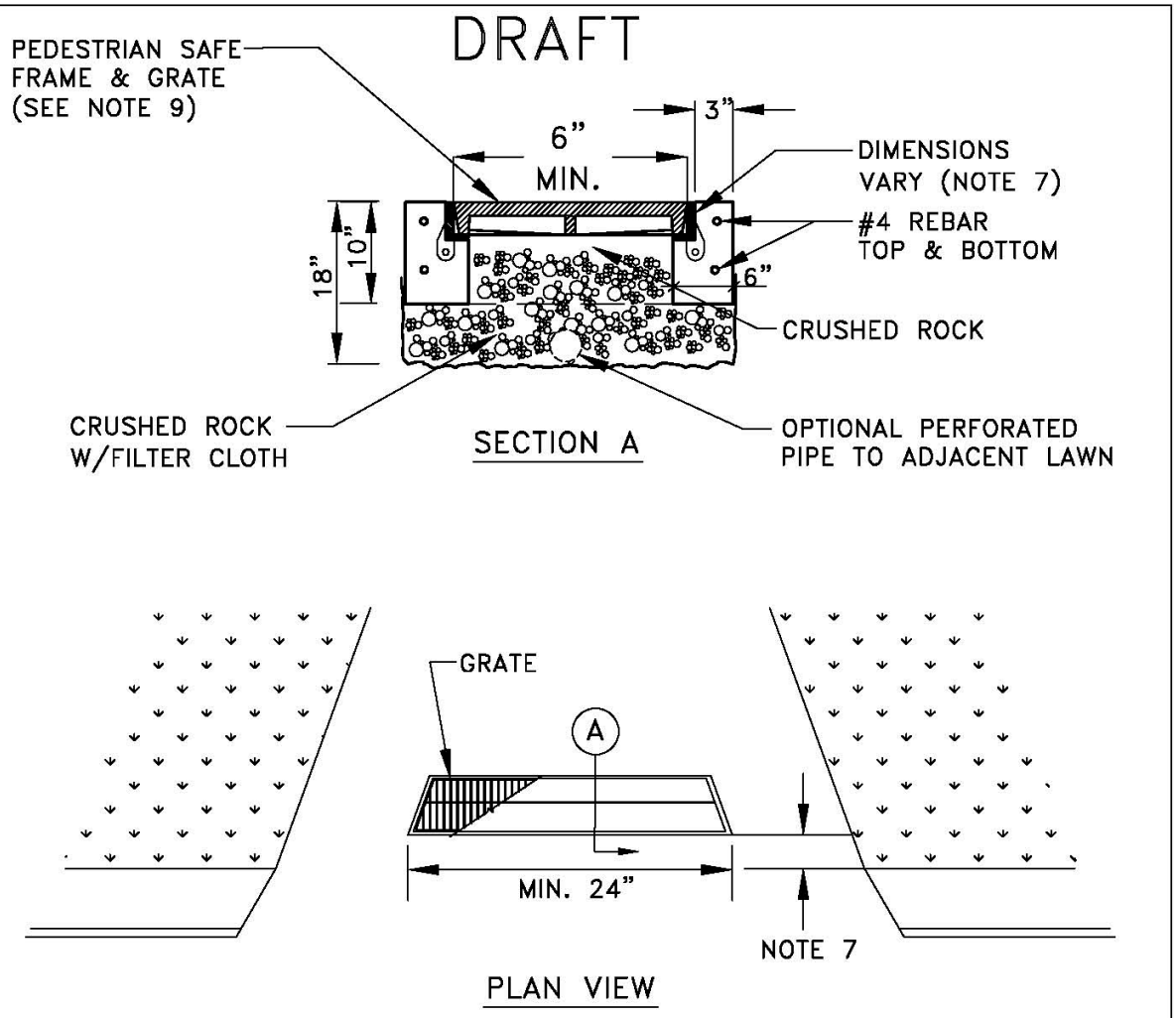
3.6 BOTTOMLESS TRENCH



Figure 5: Bottomless trench (http://www.cob.org/services/environment/water-quality/).

Design criteria for a Bottomless Trench include the following:

- Trench width = 24 inches (across driveway)
- Trench depth = 18 inches
- Bottom 8 inches of the trench must be filled with crushed rock
- Trench must be at least 12 inches from back of sidewalk (or edge of pavement in the case of no sidewalk)
- Longitudinal width = 6 inches (along driveway)
- Frame and grate must be pedestrian safe



GENERAL NOTES:

1. TRENCH SHOULD BE 24" WIDE (ACROSS DRIVEWAY) X 18" DEEP.
2. PRECAST MAY BE USED.
3. FILTER CLOTH MUST BE PLACED IN THE TRENCH EXTENDING 12" VERTICAL.
4. BOTTOM 8" OF THE TRENCH MUST BE FILLED WITH CRUSHED ROCK.
5. DIMENSIONS DETERMINED BY GRATE FRAME DIMENSION. USE FRAME AS A FORM.
6. MUST BE APPLIED AT LEAST 12" FROM BACK OF SIDEWALK OR EDGE OF PAVEMENT IN THE CASE OF NO SIDEWALK.
7. MINIMUM LONGITUDINAL WIDTH (MEASURED ALONG DRIVEWAY) OF FRAME & GRATE IS EQUAL TO 6" WITH ⅜" SLOT OPENINGS. EAST JORDAN IRON OR EQUAL.

SECTION 4 – REFERENCES

The Los Angeles County Low Impact Development Standards Manual at:

http://dpw.lacounty.gov/wmd/dsp_LowImpactDevelopment.cfm

The City of Los Angeles Low Impact Development Best Management Practices Handbook at:

http://lacitysan.org/wpd/Siteorg/program/LID/lidintro.htm

Please note that the City of Temple City's LID ordinance takes precedent in the event of any inconsistencies with any outside references.