CITY OF ANAHEIM BMP DESIGN GUIDELINES

To be utilized in conjunction with the City of Anaheim
WQMP Review Checklist and the
City of Anaheim WQMP Template

Introduction

The following requirements and standards shall be used during the BMP design process for all proposed projects within the City of Anaheim. All standards were developed in order to improve BMP functionality and lifespan and improve stormwater treatment for all new projects within the City.

Compliance with these standards should be reflected within both the grading plans and Water Quality Management Plan (WQMP) submitted to the City through both design narrative and construction details. See below for Table of Contents to assist with navigating through this document.

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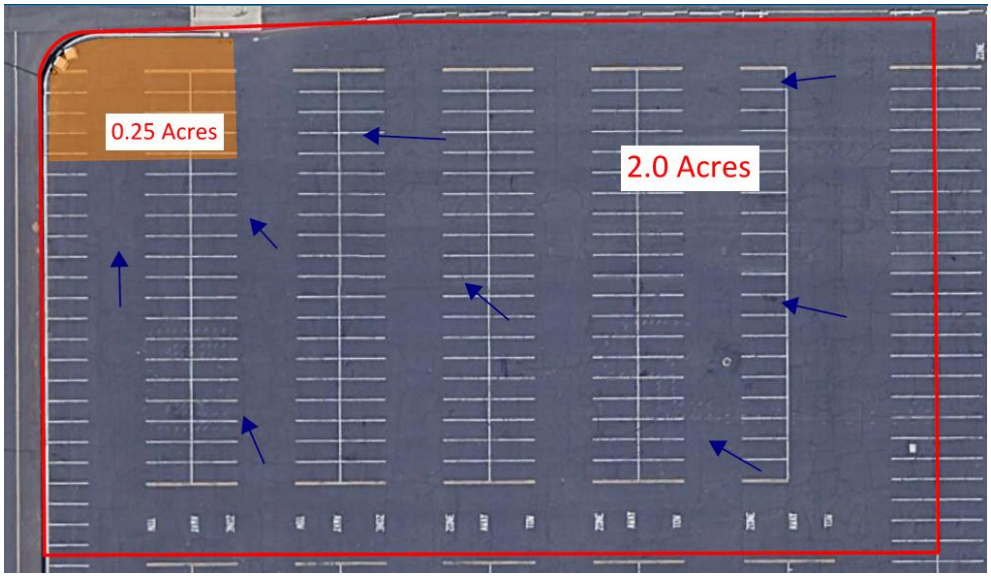
Permeable Concrete /Pervious Pavement – LID BMP Criteria

Permeable concrete and other pervious pavements are designed to allow liquids to pass through into an aggregate reservoir layer prior to infiltrating into the native soils below. All proposed permeable pavements should use the terms “Permeable” or “Pervious” rather than “Porous”, as porosity refers only to the amount of void space within the concrete and not the passage of water through the concrete layer.

Design Standard #1 – 4:1 Ratio Design Guidelines: *If permeable pavement is implemented and the ratio of the total tributary area to the permeable pavement area exceeds 4:1, the applicant must demonstrate that flows will not bypass the permeable pavement during the 85th percentile storm event. This can be implemented in the following ways.* ***Note that in any scenario where the proposed permeable pavement aggregate layer is deeper than the length and width of the footprint, the BMP shall be considered to be focused infiltration, and associated requirements from the TGD and this document will apply.***

1. *<u>Provide Opportunity for Ponding within Permeable Surface:</u> In order to prevent bypass of the permeable pavement system, the permeable pavement should be surrounded by a barrier or in a sump condition, with all sides sloping towards the infiltrating area. This will ensure stormwater flows will infiltrate rather than bypass in the event that the system is clogged. This will also result in ponded stormwater which will be an indicator that the site manager must maintain the BMP. An overflow should be provided so that high flows beyond the design storm event are able to bypass the system.*

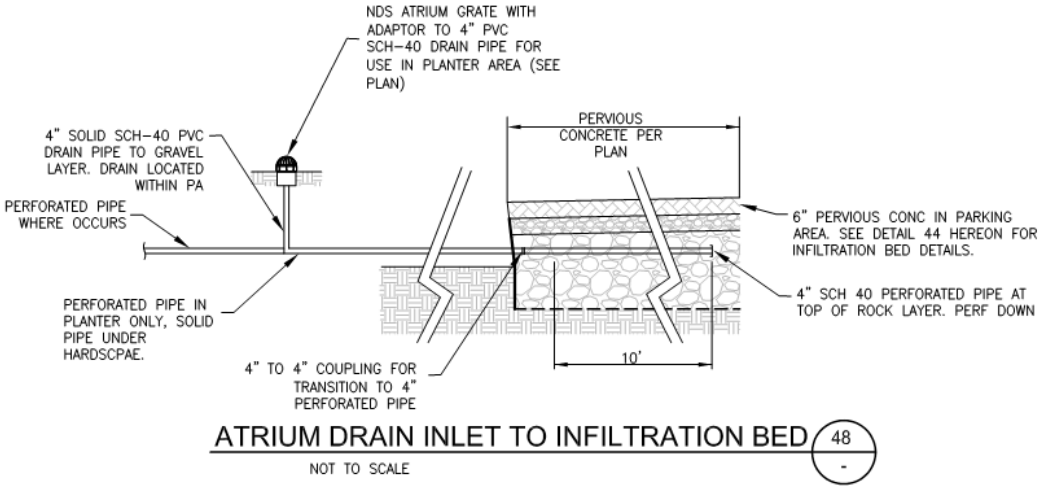
   Graphic #1.1



<u>Ponding Opportunity:</u> In the scenario above, the permeable pavement (orange) is bounded on three sides by an existing curb. Stormwater will be unable to bypass which will ensure infiltration of the water quality volume. The site manager will also notice ponding in the case of heavy sediment loading. The 4:1 ratio can be exceeded in this scenario.

2. *<u>Design Trench Drain or Equivalent at Downstream End to Reroute Flows into Permeable Pavement:</u> Where the 4:1 ratio is exceeded, another option is to implement trench drains or equivalent inlets at the downstream end of the permeable pavement to redirect any flows that bypass the permeable pavement system due to clogging. The drain will route flows back into the permeable pavement area, ensuring that flows are adequately treated.* ***If this design is implemented, the BMP will be considered focused infiltration and the requirements within this guidance and the TGD shall apply.*** *As a focused infiltration BMP, pretreatment will be necessary prior to the trench drain inlet.*

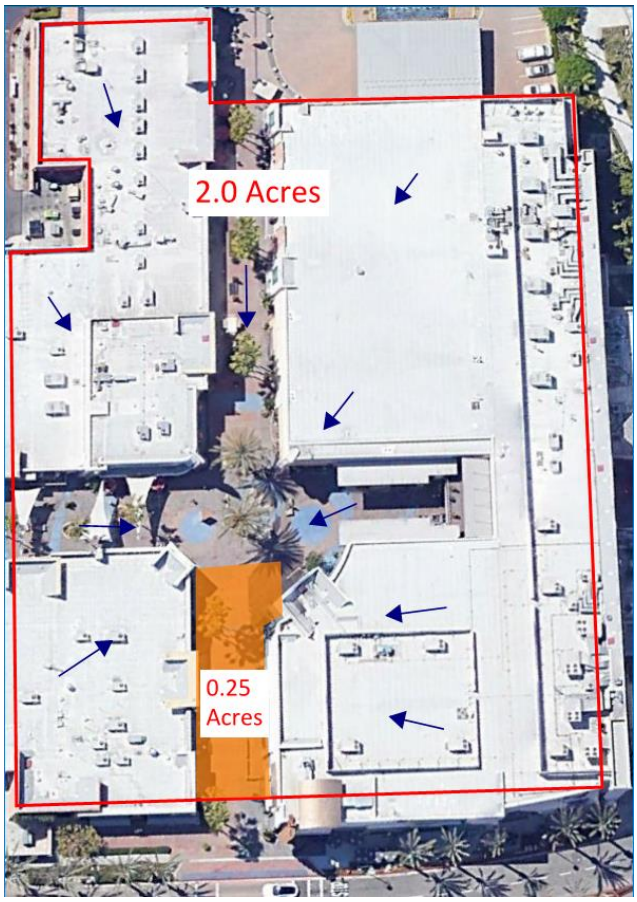
Graphic #1.2



<u>Post-Permeable Pavement Drainage</u>: In the example above, a DMA that flows to permeable pavement goes beyond the 4:1 ratio. Flows that bypass the permeable concrete are capture by a drain and redirected into the permeable pavement media for infiltration. Flows first travel through landscaping to receive pretreatment prior to entering the drain and media.

3. *<u>Demonstrate Clogging will not occur because of Proposed Land Uses within Tributary Area:</u> In cases where the proposed land uses tributary to the permeable pavement system will not contribute any sediment (roof runoff, sidewalks), the 4:1 ratio can be exceeded. The applicant must demonstrate to the City that clogging due to sediment will not occur.*

Graphic #1.3



<u>Pollutant Loading:</u> In the scenario above, the permeable pavement (orange) only receives runoff from roof and sidewalk areas. As there is no land use that would contribute to significant of sediment loading, the 4:1 ratio can be exceeded.

Design Standard # 2 – Cross Section Detail Guideline: *The construction detail in the grading plans and WQMP must include specific depths and materials for each layer within the permeable concrete system (e.g. 12" aggregate reservoir layer of AASHTO No. 57 stone), based on an existing proven design standard (OC TGD, Caltrans Standards, Greenbook, etc.) or other design that meets the performance of the standards above.*

Graphic #2:

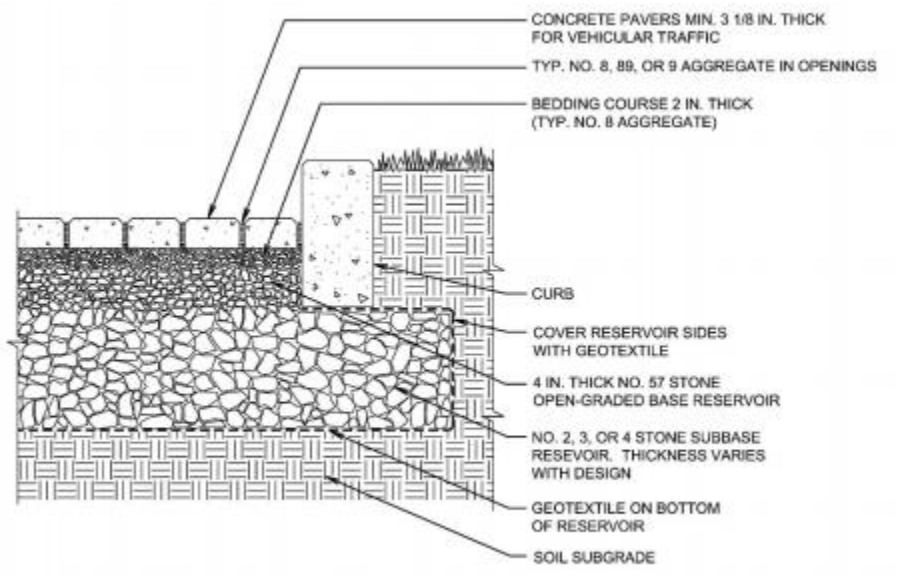


Figure 13: Typical permeable interlocking concrete pavement cross section

Sample permeable pavement cross section. Source: CASQA

Pre-Treatment for Focused Infiltration

Focused infiltration is defined as any infiltration BMP that receives focused (piped or routed) flow directly into the infiltrating media. Focused infiltration BMPs include infiltration trenches and subsurface infiltration galleries. Focused infiltration BMPs require pre-treatment. See below for design guidelines for pre-treatment scenarios involving focused infiltration.

Design Standard #1 – Double Infiltration Gallery: *In cases where a traditional pre-treatment BMP cannot be incorporated for infiltration galleries, the size of the gallery can be doubled in order to provide redundancy and eliminate the need for any upstream pre-treatment BMPs. This doubled infiltration gallery must feature a root barrier or other physical separation in between two chambers, creating two galleries each capable of infiltrating the entire DCV.*

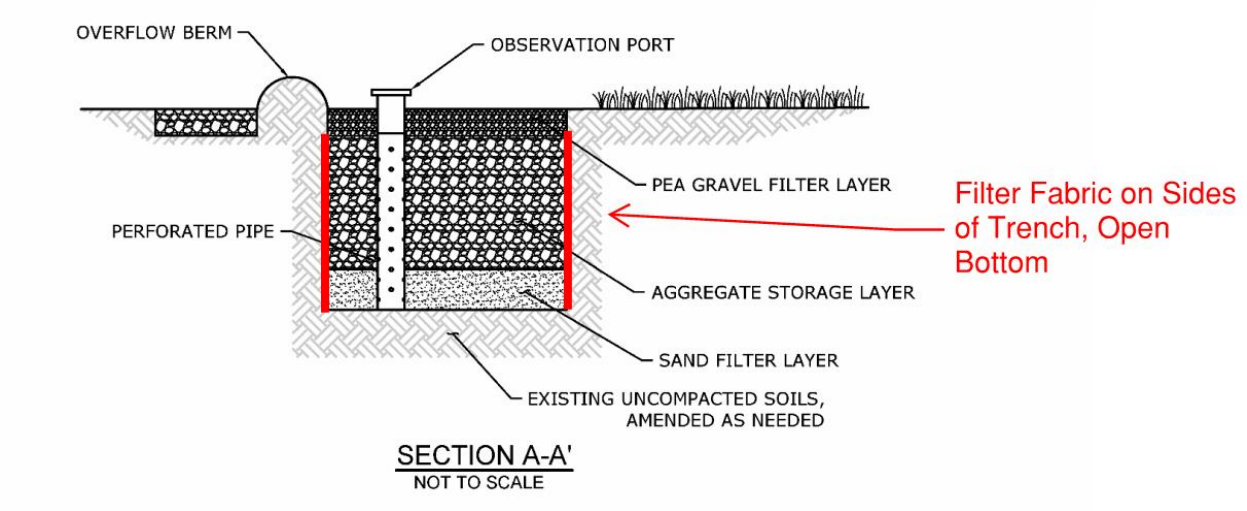
Design Standard #2 – Size Biotreatment BMP for 50% of Flow/Volume: *If biotreatment is utilized as pre-treatment, it can be sized for 50% of the DCV in the case of volume-based BMPs or 50% of the design flow-rate in the case of proprietary and flow-based biotreatment BMPs. Although only 50% of the design flow must pass through proprietary flow based biotreatment BMPs for pretreatment, the entire LID design flow/volume must be routed to the focused infiltration BMP through a bypass system. This is in accordance with the reduced sizing of filter strips as pretreatment outlined in the TGD.*

Design Standard #3 – Size Cartridge Media Filter for 100% of Flow Rate: *Cartridge media filters can be utilized as pre-treatment but must be sized for 100% of the design flow rate and can require a high level of maintenance.*

Infiltration Trenches

Design Standard #1 – Filter Fabric Liner: *Infiltration trenches must feature a filter fabric layer along sidewalls to prevent intrusion of dirt and debris into media layer. Filter fabric shall be non-woven polypropylene and shall be cleared for commercial or large-scale use.*

Graphic #1:



Source: South Orange County Technical Guidance Document

Bioretention With or Without Underdrain

Design Standard #1 – Planting and Storage Media: *Planting/storage media layer specifications provided and are consistent with the TGD or equivalent standard. 20 % media porosity is required for assumptions unless otherwise supported by technical documentation.*