



CITY OF PERRIS

PUBLIC WORKS DEPARTMENT

Weed Abatement

NPDES Services

Flood Control and Landscape Districts

MEMORANDUM

Date: February 22, 2022

To: Nathan Perez, Senior Planner

DRAFT

From: Michael Morales, CIP Manager

By: Chris Baldino, Landscape Inspector **CB**

Subject: TTM 38071 (TTM21-05032), GPA21-05040, ZC21-05039 – Conditions of Approval –
Proposal to amend the General Plan Land Use and Zoning designation of approximately 31.1 acres to facilitate 192 single-family lots of subdivision with 7 letter lots, located on northeast corner of Ramona Expressway and Evans Road.

-
1. **Dedication and/or Landscape Maintenance Easement.** Offer of Dedication and Landscape Maintenance Easement for City landscape maintenance district shall be provided as follows:

TR-38071-1

- **Evans Road** – Provide offer of dedication as needed to provide for full half width Street (128' ROW (64' half width), curb gutter, sidewalk, median and off-site landscaping requirements, per City General Plan, including minimum 17' public parkway from back of curb.
- **Local Street Side Yard Fronting Lot #12, #13, #1, #192** Provide for full half width Street, curb gutter, sidewalk, off-site landscaping requirement, perimeter walls, fences, and neighborhood entry monuments per City General plan including a minimum 10' public parkway from face of curb.
- **Local Streets "I" & "D"** - Provide for full half width Streets, curb gutter, sidewalk, and off-site landscaping requirements, per City General Plan including a minimum 10' public parkway from face of curb.
- **Lot "A" Bio Retention Basin #1 Interim design** – For grading design of the basin reference Appendix "C" and for Water Quality Design reference attached section 3.7 Sand filter of the Riverside County – Low Impact Development BMP Design Handbook or as approved by the Public Works NPDES Division. Provide a landscape design with a planting pallet that complements the parkway for the retention basin.
- **Lot "B" Trail Access between lots #46 & #47** – Provide for full width improvements including sidewalk, off-site landscaping requirement, decorative perimeter walls, fences, improvement, including a minimum 20' offer of dedication. Provide a landscape design to match the trail adjacent to this access.
- **Lot "C" DG Trail** – Developer shall provide landscaping and DG trail along the perimeter of the homes, including a 20' wide offer of dedication. Provide a landscape design that matches the existing trail to the north of this project.

TR-38071

- **Local Streets "I" & "D"** – Protect in place curb gutter, sidewalk, provide wrought iron fencing with pilasters, and landscape and Irrigation along Streets "I" & "D" fronting lots A, E and F.
- **Lot "A" Bio Retention Basin #1 Permanent design** - For grading design of the basin reference Appendix "C" and for Water Quality Design reference attached section 3.7 Sand filter of the Riverside County – Low

Impact Development BMP Design Handbook or as approved by the Public Works NPDES Division. Provide a landscape design with a planting pallet that complements the parkway for the retention basin.

- **Lot “F” Bio Retention Basin #2** - Provide for full half width street, curb gutter, sidewalk, wrought iron fence with pilasters, and off-site landscaping requirements, per City General Plan including a minimum 10’ public parkway from face of curb. For grading design of the basin reference Appendix “C” and for Water Quality Design reference attached section 3.7 Sand filter of the Riverside County – Low Impact Development BMP Design Handbook or as approved by the Public Works NPDES Division. Provide a landscape design with a planting pallet that complements the parkway for the retention basin.
- **Lot “E” Open Space** - Provide for full half width Street, curb gutter, sidewalk, off-site landscaping requirement, per City General plan within a minimum 10’ public parkway from face of curb. Provide a landscape design and planting pallet that complements the parkway and retention basin. Provide a wrought iron fence with pilasters except adjacent to lots 188 and 189. The design shall also include split faced block wall with columns and decorative caps on the North and East side of the lot, fronting lots 188 and 189.
- **Lot “D” DG Trail (DWR Continued)** – Developer shall provide landscaping and DG trail along the perimeter of the homes, including a minimum 15’ to 20’ wide offer of dedication, including an 8’ wide DG path with mow curbs and landscaping along both side of the path including a two-rail vinyl fence to match existing trail.

2. **Landscape Maintenance Easement and Landscape Easement Agreement.** The developer shall provide, for review and approval, an Offer of Dedication and certificate of acceptance, complete with legal plat map and legal description to the City of Perris. In addition, if required by the City of Perris, the Developer shall provide a landscape easement and Landscape easement agreement, acceptable to the City of Perris. The City shall record the same with the Riverside County Recorder’s Office, and the recorded instrument shall be returned to the City Clerk of the City of Perris for filing.

3. **Landscaping Plans.** Three (3) copies of Construction Landscaping and Irrigation Plans for the off-site landscaping, and electronic copy including any medians or other landscape areas along the dedications shall be submitted to the Planning Department for approval and shall be accompanied by the appropriate filing fee. A maintenance responsibility site plan shall also be submitted for approval, (i.e. City Maintenance areas, HOA Maintenance areas, Privately Maintenance areas. The landscape and irrigation plan shall be prepared by a registered landscape architect and conform to the requirements of Chapter 19.70 of the Municipal Code. The location, maintenance quantity table, number, genus, species, and container size of the plants shall be shown. This landscape plan shall be titled “Off-site Landscape Plan for **TTM 38071-1 and TTM 38071**” and shall be exclusive of any private property, on-site landscaping. Elements of the Landscape Plan shall include but not be limited to:

- a. **Landscape Limits** – Limits of right-of-way areas or easement areas, defined by concrete mow curb, fully dimensioned, that are to be annexed into the Landscape Maintenance District. A planting palette and hardscape plan intended to meet the design intent of the Landscape Guidelines in effect for the area; or if no such guidelines exist the design intent of neighboring development, as determined by the Engineering Administration and Special Districts Division, including:
 - **Evans Road** - Developer shall be required to install new landscape and Irrigation within existing parkway as follows: Trees Primary: Cinnamomum Camphora “Camphor Tree”, Ulmuns parvifolia “Chinese Elm” Secondary tree: Lagerstroemia Faurei “Cherokee (Red)” Crape Myrtle, Brachychiton

Populneus "Bottle Tree". Use of drought resistant shrubs and groundcover intended to complement the existing parkway to the north along Evans Road, including but not be limited to the following: Xylosma C. 'Compacta', Muhlenbergia Capillaris 'pink Muhly', Agapanthus Africans 'Peter Pan', Lantana 'Gold Mound', Lantana Montevicensis Purple Trailing Lantana, Raphiolepis I. Clara 'Spring Time', Hesperaloe Parviflora 'Brake Light', Agapanthus Africans 'Lily of the Nile – White, Myoporum Parvifolium 'Pink', Tulbaghia Violacea Society Garlic, Trachelospermum Jasminiodes Star Jasmine, Parthenocissus Tricuspidata Boston Ives.

- **Evans Road Median** – Developer shall be required to install new raised landscaped median as follows: Trees Brachychiton Populneus Bottle Tree, Lagerstoremia Faure Cherokee (red). Use of drought resistant shrubs and groundcover intended to complement the existing median to the north along Evans Road, including but not be limited to the following: Callistemon Viminalis Little Johns, Lantana 'Gold Mound', Muhlenbergia Capillaris Pink Muhly, Hesperaloe Parviflora 'Brake Lights', Tulbaghia violacea Society Garlic, Tarachelospermum Jasminiodes 'Star Jasmine'.
 - **Lot "B" Pedestrian Pathway Trail Access** - Developer shall provide a 20' wide ADA accessible pedestrian pathway between homes with split faced block wall with columns every 20' and decorative caps to connect from sidewalk to Lot C trail. The landscape design to complement the landscape along the trail and shall have vines along the walls.
 - **Lots "C" & "D" DG Trail** - Developer shall provide a 15' to 20' wide landscape and DG trail along the perimeter of the homes with a design to complement the trail north of this project with an 8' wide DG path and landscaping on both sides of the trail, including a two-rail vinyl fence on the outward side of the trail.
 - **Lot "A" Bio Detention Basin Interim** – Developer shall provide for landscaping and irrigation within the public parkway and bio detention basin which includes a bench at top of slope and concrete access road to the bottom of the basin per City standards. Landscape planting pallet shall complement the off-site landscape adjacent to the basins. Provide a wrought iron fence with pilasters fronting Street "D" and Street "I". Provide a split face block with columns and decorative caps wall along Lot 57, and decorative three rail vinyl fencing around the remaining area of the basin.
 - **Lot "A" Bio Detention Basin Permanent** – Developer shall protect in place existing landscaping within the public right-of-way along street "D" and street "I" and provide a new landscape and irrigation plan for the redesign of the basin to complement the existing landscape along the public right-of-way. Provide a wrought iron fence with pilasters along the public parkway. The design shall also include split faced block wall with columns and decorative caps, fronting lots 57, 112, 128 and 129.
 - **Lot "F" Bio Detention Basins** – Developer shall provide for landscaping and irrigation along the public parkway and within the bio detention basin, (see zoning design guidelines for benching) landscape planting pallet shall complement the off-site landscape adjacent to the basins.
 - **Lot "E" Open Space** – Developer shall provide a landscape design for a green space to accommodate the DWR and EMWD easements within this area along with amenities, i.e. benches, BBQ's, etc.). Landscape design shall complement the parkway along Evans Road and provide a wrought iron fence with pilasters except adjacent to lots 188 and 189. The design shall also include split faced block wall with columns and decorative caps on the North and East side of the lot, fronting lots 188 and 189.
- b. **Irrigation** – A list of irrigation system components intended to meet the performance, durability, water efficiency, and anti-theft requirements for Special District landscape areas as determined by the Engineering Administration and Special Districts Division. Components shall include, but not be limited to

Salco or equal on flexible PVC risers, Sentry Guard Cable Guard and Union Guard, and backflow Wilkens Model 375 (or equal). Controller shall include an ET based controller with weather station that is centrally controlled capable and wi-fi ready (WeatherTrak ET Pro3 Smart Controller, or equal, with Rain Sensor). At the discretion of the Engineering Administration and Special Districts Division public landscape areas utilizing no more than 6 valves/stations, programmed to irrigate consecutively, and none simultaneously, may propose the use of an alternative ET based controller with weather station that is centrally controlled capable and wi-fi ready, such as the Weathermatic System or equal. Proposed system shall be complete with wireless weather station, aircard with flow, one year bundle service, blade antenna and flow sensor.

- c. **Benefit Zone Quantities** – Include a Benefit Zone quantities table (i.e. SF of planting areas, turf, number of trees, SF. of hardscape, etc.) in the lower right hand corner of the cover sheet for off-site landscape areas, indicating the amount of landscaping the district will be required to maintain.
- d. **Meters** – Each District is required to be metered separately. All electrical and water meters shall be located in locations that are easily accessible to maintenance staff while not visually obtrusive in the street scene and away from street intersections. Show location of separate water and electrical utility meters intended to serve maintenance district areas exclusively. Show locations of water and electrical meter for landscape district. Show location of water and electrical meter for flood control district. Show location of electrical meter for Traffic signal and street lighting district, on respective plans. Coordinate location of meters on landscape and civil engineering plan.
- e. **Controllers** - The off-site irrigation controllers are to be located within the right of way (preferably within the off-site landscape area). All point of connection equipment including irrigation controller pedestals, electrical meter pedestals, and backflow preventers are to be located in locations that are easily accessible to maintenance staff while not visually obtrusive in the street scene, and away from street intersections. Backflow preventers are to be screened on at least three sides with (5) gallon plant material. The fourth side shall be open to the back of the landscape area in order to allow the backflow cage to be opened without interference with plant materials. Backflow cages shall meet the required City of Perris Engineering Standards in effect at the time of approval.
- f. **Recycled Water** - If applicable. The project landscape architect shall coordinate with EMWD to verify if the site will be served with recycled water and design all irrigation and landscape plans to meet the requirements of EMWD and provide additional irrigation components as needed.
- g. **EMWD Landscape Plan Approval** – The project landscape architect shall submit a copy of all irrigation plans and specifications to EMWD for approval. The project landscape architect must confirm with EMWD that the plans have been approved by EMWD and submit written proof of approval by EMWD prior to the City approving the final Landscape Plans. Until the final landscape plan has been approved by the City of Perris, the maintenance areas depicted cannot be accepted by the City for maintenance. The developer shall coordinate both reviews to ensure acceptability of plans by both EMWD and the City of Perris, prior to approval by either agency.
- h. **Landscape Weed Barrier** - Weed cloth with a minimum expected life of 10-years shall be required under all gravel, rock, or cobble areas.

- i. **Wire Mesh and Gravel at Pull Boxes-** Provide wire mesh and gravel layer within valve boxes to prevent rodent intrusion.
 - j. **Concrete Maintenance Band at Medians and Mortar Cobble turn Land** – Provide 12” wide concrete maintenance band (safety edge) around entire median. At turn pockets provide mortared cobble creek bed, round stone sized 6” to 12”.
 - k. **Perimeter Walls Graffiti Coating** – Provide anti-graffiti coating at all perimeter walls. Acceptable products shall include Vitrocem Anti-Graffiti Coating or equal.
4. **Landscape Inspections.** The project applicant shall inform the on-site project manager and the landscape contractor of their responsibility to call for only “OFF-SITE” landscape and irrigation inspections at the appropriate stages of construction. Inspections shall be scheduled at least two-working days (Monday through Friday) prior to actual inspection. Contact Public Works-Engineering Administration/Special Districts at (951) 657-3280 to schedule inspections.
- **Inspection #1** - Trenches open, irrigation installed, and system pressurized to 150 PSI for four hours.
 - **Inspection #2** - Soil prepared, and plant materials positioned and ready to plant.
 - **Inspection #3** - Landscaping installed, irrigation system fully operational, and request for “Start of 1 year Maintenance Period” submitted, with all required turn-over submittal items provided to Public-Works Engineering Administration/Special Districts.
 - **Turn-Over Inspection**– On or about the one-year anniversary of Inspection #3, Developer shall call for an inspection to allow the City to review and identify any potential irrigation system defects, dead plants, weed, debris or graffiti; stressed, diseased, or dead trees; mulch condition, hardscape or other concerns with the landscape installation; or to accept final turn over of the landscape installation. At his sole expense, the Developer shall be responsible for rectifying system and installation deficiencies, and the one-year maintenance period shall be extended by the City until all deficiencies are cured to the satisfaction of the City. If in the opinion of the City’s Landscape Inspector the landscape installation is in substantial compliance with the approved landscaping plans, the irrigation and communication system is functioning as intended, and the landscape installation is found to be acceptable to the City, then the Inspector shall recommend to the City’s Special District Coordinator to accept turn-over of water and electrical accounts, wi-fi communication contracts and the entire landscape installation.
5. **One Year Maintenance and Plant Establishment Period**-The applicant will be required to provide a minimum of a one (1) year maintenance and plant establishment period, paid at the sole expense of applicant. This one-year maintenance period commences upon the successful completion of Inspection #3 discussed above, and final approval by the City. During this one-year period the applicant shall be required to maintain all landscape areas free of weeds, debris, trash, and graffiti; and keep all plants, trees, and shrubs in a viable growth condition. Prior to the start of the one-year maintenance period, the Developer shall submit a weekly Landscape Maintenance Schedule for the review and approval by the City’s Special Districts Division. City shall perform periodic site inspections during the one-year maintenance period. The purpose of these periodic inspections is to identify any and all items needing correction prior to acceptance by the City at the conclusion of the one-year maintenance period. Said items needing correction may include but are not limited to: replacement of dead or diseased plant materials, weeding, replenishment of mulches, repair of damaged or non-functioning irrigation components, test of irrigation controller communications, etc. During this period, the City shall begin the annual assessment of the benefit zone in preparation for the landscape installation turn-over to City maintenance staff.

6. **Street/Off-Site Improvements.** The applicant shall submit street improvement plans, accompanied by the appropriate filing fee to the City Engineering Department. Details of treatments off-site improvements, including lighting shall meet both the City Engineer's Design Guidelines, and the additional requirements of the Engineering and Special Districts Division. Components shall include, but not be limited to:
- a. **Street Lighting-**If Street lighting is required, lighting shall meet the type, style, color, and durability requirements, necessary for energy efficiency goals, maintenance, and longevity of improvements of the City Engineer's Office. As determined by the City, new streetlights may be required to be deeded to City of Perris, and not SCE. Street lights deeded to City of Perris shall be constructed per LS-3 account billing standard, which shall include an individually metered pedestal for streetlights.
 - b. **Acceptance By Public Works/Special Districts-** Lighting District facilities required by the City Engineer's Office shall be installed and fully operational and approved by final inspection by the City Engineer's Office, and the City's Consulting Traffic Signal Inspection Team (Riverside County TLMA) at (951) 955-6815. Prior to acceptance for maintenance of "Off-site" traffic signal and lighting facilities by the Public Works-Engineering and Administration Division/Special Districts, the developer shall contact the Public Works Special Districts Division at (951) 657-3280 to schedule the delivery of all required turn-over submittal items. Prior to acceptance into Lighting District 84-1, coordinate turn-over information pertaining to Street Lights, and Traffic Signal Electrical/SCE Service Meters with Wildan Financial Services, the City's Special Districts Consulting Firm at (951) 587-3564. (i.e. Provide electrical meter number, photo of pedestal, and coordinate "request for transfer of billing information" with SCE and City for all new service meters). Developer shall pay 18-month energy charges to the City of Perris for all off-site street lighting. Call Wildan Financial Services, Inc. for amount due, and to obtain receipt for payment. Obtain and provide a clearance form from Riverside County TLMA indicating completion of all punch list items from traffic signal construction. Submit one large format photo-copy of Traffic Signal as-built plans and timing sheets.
7. **Water Quality Management Plans.** The applicant shall submit a Preliminary and Final WQMP, accompanied by the appropriate filing fee to the Planning Department and City Engineering Department, respectively. Details for treatment control facilities shall meet both the Riverside County WQMP Design Guidelines, and the additional requirements of the Engineering and Special Districts Division intended to reduce long term maintenance costs and longevity of improvements. Components shall include, but not be limited to:
- **Storm Drain Screens-**If off-site catch basins are required by the City Engineer's Office, connector pipe screens shall be included in new catch basins to reduce sediment and trash loading within storm pipe. Connector pipe screens shall the type, style, and durability requirements of the Public Work's Engineering Administration and Special Districts Division.
 - **WQMP Inspections-** The project applicant shall inform the on-site project manager and the water quality/utilities contractor of their responsibility to call for both "ON-SITE" and OFF-SITE" WQMP Inspections at the appropriate stages of construction. Contact CGRM at (909) 455-8520 to schedule inspections.
 - **Acceptance By Public Works/Special Districts-**Both on-site and off-site flood control/water quality facilities required for the project, as depicted in the Final WQMP, shall be installed and fully operational, and approved by final inspection by the City's WQMP Consultant, CGRM. The Developer shall obtain a final Clearance Letter from CGRM indicating compliance with all applicable Conditions of Approval for the approved WQMP. The developer shall deliver the same to the Public Works-Engineering and Administration Division/Special Districts. In addition, prior to acceptance by the City, the developer shall

submit a Covenant and Agreement describing on-going maintenance responsibilities for on-site facilities per the approved WQMP, to the Public Works Engineering Administration and Special Districts Division. The Public Works Engineering Administration and Special Districts Division will review and approve the Covenant and Agreement. The City shall record the same with the Riverside County Recorder's Office, and the recorded instrument shall be returned to the City Clerk of the City of Perris for filing.

8. **Flood Control District #1 Maintenance Acceptance.** Flood Control District facilities required by the City Engineer's Office shall be installed and fully operational, and approved by final inspection by the City Engineer's Office. Prior to acceptance for maintenance of "Off-site" flood control facilities by the Public Works-Engineering and Administration Division/Special Districts the developer shall contact the Public Works Special Districts Division at (951) 657-3280 to schedule the delivery of all required turn-over submittal items including as-built storm drain plans in electronic PDF format, one large format photo-copy of as-built plans, storm drain video report in electronic format, and hardcopy of video report with industry standard notations and still photos made during video runs (i.e. facilities sizes, off-sets or damage, facility type, dirt and debris, etc.). The flood control facilities shall be turned over in a condition acceptable to the City, and the developer shall make all necessary repairs and perform initial maintenance to the satisfaction of the City.
9. **Assessment Districts.** Prior to permit issuance, developer shall deposit \$5,250 per district, \$15,750 total due. Payment is to be made to the City of Perris, and the check delivered to the City Engineer's Office. Payment shall be accompanied by the appropriate document for each district indicating intent and understanding of annexation, to be notarized by property owner(s):
 - **Consent and Waiver for Maintenance District No. 84-1** - New street lighting proposed by the project, as determined by the City Engineer
 - **Consent and Waiver for Landscape Maintenance District No. 1** –New off-site parkway, median, open space and any above ground landscaped water quality basins, or trails, proposed by the projects.
 - **Petition for Flood Control Maintenance District No. 1** -For Off-site Flood Control Facilities proposed by the project, as determined by the City Engineer.
 - Original notarized document(s) to be sent to:
Daniel Louie
Wildan Financial Services
27368 Via Industria, #200
Temecula, CA 92590
 - a. Prior to final map recordation or final certificate of occupancy the developer shall annex into the aforementioned districts, posting an adequate maintenance performance bond to be retained by the City as required by the City Engineer. Upon receipt of deposit and Consent and Waiver Forms, the developer shall work with City to meet all required milestones for annexations.
 - i. City prepares the Engineer's Reports which includes a description of the improvements to be maintained, an annual cost estimate and annual assessment amounts.
 - ii. Reports are reviewed and approved by the property owner. The assessment ballots will be based on

- these Reports.
- iii. The Reports and corresponding resolutions are placed, for approval, on the City Council Meeting Agenda. City Council action will include ordering the assessment ballots and setting a Public Hearing for no sooner than 45 days. Property owner attendance at this City Council Meeting is not required.
 - iv. The assessment ballots are sent to the property owner and are opened by the City Clerk at the close of the Public Hearing. With a "YES" vote by the property owner the City Council can move forward with the Resolution that Confirms the Annexation. Property owner attendance at this Public Hearing is not required.
 - v. Confirmation by the City Council completes the annexation process and the condition of approval has been met.

DEVELOPER TO PROVIDE GRAVEL IN LIEU OF SAND. CITY COMMENTS 1/11/2022.

3.7 Sand Filter Basin

Type of BMP	Treatment
Treatment Mechanisms	Filtration, Biofiltration
Maximum Tributary Area	25 acres
Other Names	Sand Filter, Media Filter, Pocket Filter

Description

The Sand Filter Basin (SFB) is a basin where the entire invert is constructed as a stormwater filter, using a sand bed above an underdrain system. Stormwater enters the SFB at its forebay where trash and sediment accumulate or through overland sheet flow. Overland sheet flow into the Sand Filter Basin is biofiltered through the vegetated side slopes or other pre-treatment. Flows pass into the sand filter surcharge zone and are gradually filtered through the underlying sand bed. The underdrain gradually dewateres the sand bed and discharges the filtered runoff to a nearby channel, swale, or storm drain.



The primary advantage of the SFB is its effectiveness in removing pollutants where infiltration into the underlying soil is not practical, and where site conditions preclude the use of a Bioretention Facility. The primary disadvantage is a potential for clogging if silts and clays are allowed to flow into the SFB. In addition, this BMP's performance relies heavily on its being regularly and properly maintained.

While this BMP is not currently considered an LID BMP, when designed in accordance with this manual, a Sand Filter Basin is considered to be a highly effective Treatment Control BMP.

Siting Considerations

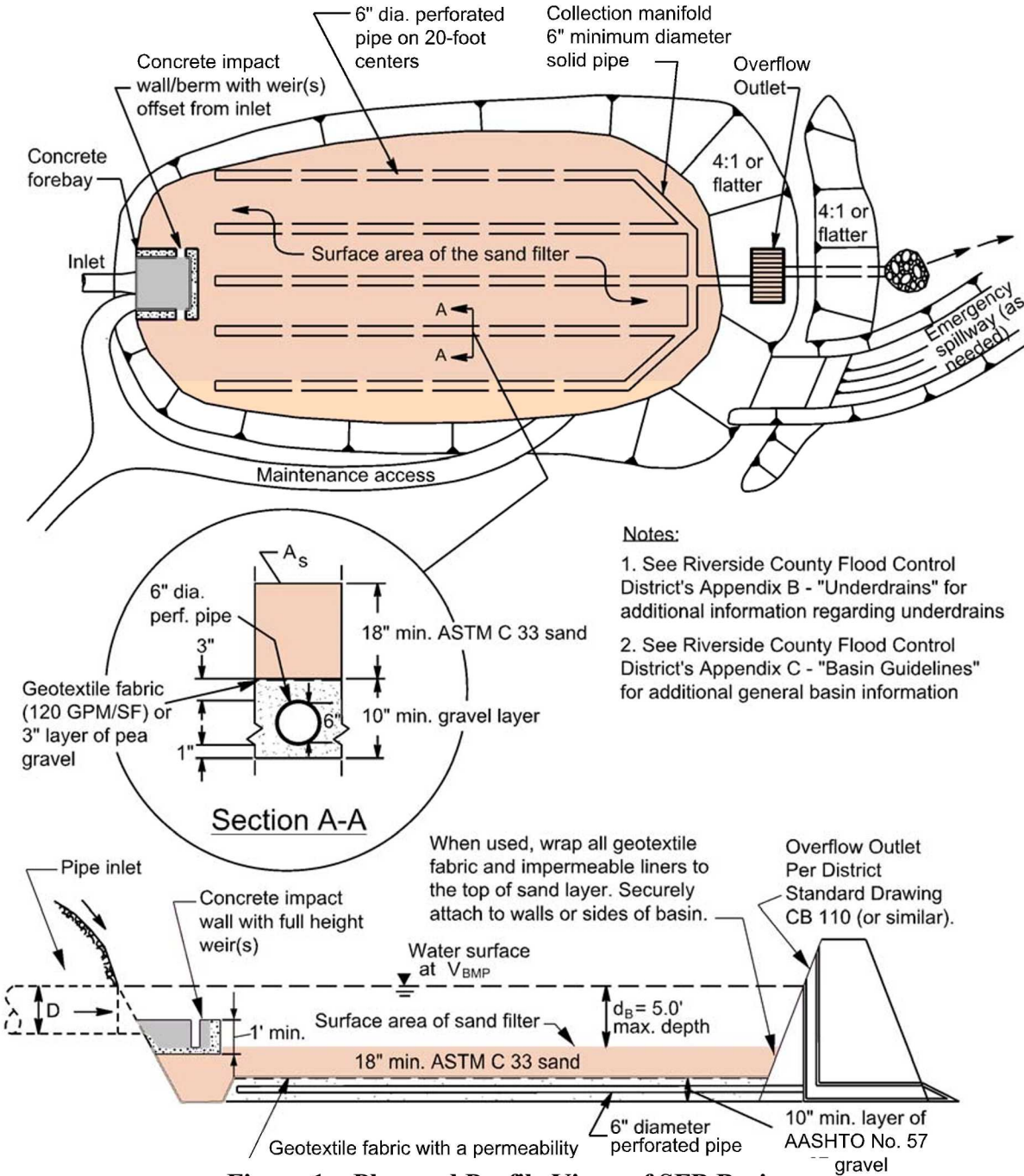
SFBs should be avoided where onsite configurations include a base flow and/or where this BMP would be put into operation while construction, grading or major landscaping activities are taking place in the tributary catchment. **This BMP has a flat surface area**, so it may be challenging to incorporate into steeply sloping terrain. SFBs should be set away from areas that could discharge fine sediments into the basin such as at the bottom of a slope. **See Section 1 of Riverside County Flood Control and Water Conservation District's "Basin Guidelines" (Appendix C) for additional requirements** (i.e., fencing, maintenance access, etc.) or other guidelines issued by the Engineering Authority (EA)¹.

¹ The Engineering Authority (EA) may choose to alter these guidelines and may have different/additional requirements. These entities, along with the District, will be referred to as the EA.

SAND FILTER BASIN BMP FACT SHEET

Setbacks

The bottom of the sand filter should remain above the seasonal high groundwater level. Always consult your geotechnical engineer for additional site specific recommendations.



Notes:

1. See Riverside County Flood Control District's Appendix B - "Underdrains" for additional information regarding underdrains
2. See Riverside County Flood Control District's Appendix C - "Basin Guidelines" for additional general basin information

Figure 1 – Plan and Profile Views of SFB Basin

SAND FILTER BASIN BMP FACT SHEET

Forebay

A concrete forebay shall be provided to reduce sediment clogging and to reduce erosion. The forebay shall have a design volume of at least 0.5% V_{BMP} and a minimum 1 foot high concrete splashwall. Full height notch-type weir(s), offset from the line of flow from the basin inlet to prevent short circuiting shall be used to outlet the forebay. It is recommended that two weirs be used and that they be located on opposite sides of the forebay (see Figure 1).

Underdrains

Underdrain piping shall consist of a manifold (collector) pipe with perforated lateral branching. The lateral branching conveys the filtered water to the manifold where it is discharged into the outlet structure. See Appendix B for additional information.

Overflow Structure

An overflow must be provided to drain volume in excess of V_{BMP} or to help drain the system if clogging were to occur. Overflows shall flow to an acceptable discharge point such as a downstream conveyance system. Overflows must be placed above the water quality capture volume and near the outlet of the system. The overflow structure shall be similar to the District's Standard Drawing CB 110.

SAND FILTER BASIN BMP FACT SHEET

Recommended Maintenance

Table 1 - Recommended Inspection and Maintenance Activities for SFBs

Schedule	Inspection and Maintenance Activity
<p>Semi-monthly including just before the annual storm season and following rainfall events.</p>	<ul style="list-style-type: none"> • Routine maintenance and inspection. • Remove debris and litter from the entire basin to minimize filter clogging and to improve aesthetics. • Check for obvious problems especially filter clogging and signs of long term ponding. Repair as needed. Address odor, insects, and overgrowth issues associated with stagnant or standing water in the basin bottom. There should be no long-term ponding water. • Check for erosion and sediment laden areas in the basin. Repair as needed. Clean forebay if needed. • Revegetate side slopes where needed.
<p>Annually. If possible, schedule these inspections within 72 hours after a significant rainfall.</p>	<ul style="list-style-type: none"> • Inspection of hydraulic and structural facilities. Examine the overflow outlet for clogging, the embankment and spillway integrity, and damage to any structural element. • Check side slopes and embankments for erosion, slumping and overgrowth. • Inspect the sand media at the filter drain to verify it is allowing acceptable infiltration. Scarify the top 3 inches by raking the filter drain's sand surface annually. • Check the filter drain underdrains for damage or clogging. Repair as needed. • Repair basin inlets, outlets, forebays, and energy dissipaters whenever damage is discovered. • No water should be present 72 hours after an event. No long term standing water should be present at all. No algae formation should be visible. Correct problem as needed.
<p>Every 5 years or sooner depending on the observed drain times (no more than 72 hours to empty the basin).</p>	<ul style="list-style-type: none"> • Remove the top 3 inches of sand from the filter drain and backfill with 3 inches of new sand to return the sand layer to its original depth. When scarification or removal of the top 3 inches of sand is no longer effective, remove and replace sand filter layer.

SAND FILTER BASIN BMP FACT SHEET

Table 2 - Design and Sizing Criteria for SFBs

Design Parameter	Extended Detention Basin
Maximum tributary area	25 acres ²
Basin design volume	100% of V _{BMP}
Maximum basin depth	5 feet
Forebay volume	0.5 % of V _{BMP}
Longitudinal Slope	0%
Transverse Slope (min.)	0%
Outlet erosion control	Energy dissipaters to reduce velocities ¹
<small>1. Ventura County's Technical Guidance Manual for Stormwater Quality Control Measures 2. CA Stormwater BMP Handbook for New Development and Significant Redevelopment</small>	

Note: The information contained in this BMP Factsheet is intended to be a summary of design considerations and requirements. Additional information which applies to all detention basins may be found in the District's "Basin Guidelines" (Appendix C). In addition, information herein may be superseded by other guidelines issued by the EA.

Design Procedure

1. Enter the Tributary Area, A_{TRIB}
2. Enter the Design Capture Volume, V_{BMP}, determined from Section 2.1 of this Handbook
3. SFB Geometry

Determine the minimum sand filter area required. The filtration bed surface shall be flat with the maximum depth for the reservoir design volume no greater than 5 feet*. The reservoir design volume does not include the volume of the sand filter. No credit is given for voids in the sand layer toward the reservoir volume since the sand is part of the water quality filter and not a reservoir layer. The design storage volume shall equal 100 percent of V_{BMP}. The minimum sand filter area (A_s) of the basin's bottom shall be determined using the equation:

$$A_s = (V_{BMP} / d_B)$$

Where:

V_{BMP} = Design Volume, ft³

d_B = proposed basin depth (5 feet maximum), ft

Once the basin side slopes, proposed basin depth and depth of freeboard are entered, the spreadsheet will calculate the minimum total depth required to use this BMP. This is the depth from the top of the basin (including freeboard) down to the bottom of the underdrain gravel layer. This depth can be used to determine if enough vertical separation is available between the BMP and its outlet destination.

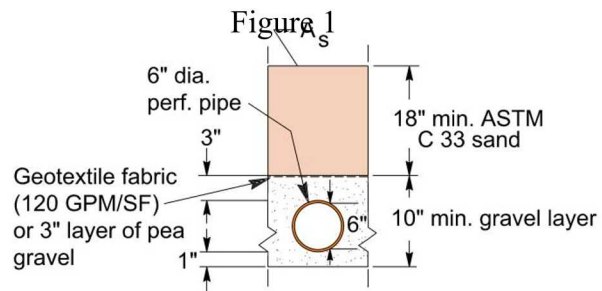
SAND FILTER BASIN BMP FACT SHEET

*Note: The 5 foot maximum depth equates to a minimum filter media infiltration rate of 0.83 inches per hour with a 72 hour drawdown time. Studies have shown that while initially most filter media will infiltrate at a much higher rate, it is not uncommon for that rate to decrease significantly over a very short period of time. (Urbonas, 1996)

4. Enter the proposed surface area of the basin.

5. Forebay

Provide a concrete forebay. Its volume shall be at least 0.5% V_{BMP} with a minimum 1 foot high concrete splashwall. Full-height notch-type weir(s) shall be used to outlet the forebay. The weir(s) must be offset from the line of flow from the basin inlet. It is recommended that two weirs be used and that they be located on opposite sides of the forebay (see Figure 1). Notches shall not be less than 1.5 inches in width.



6. Filter Media

Provide, as a minimum, an 18-inch layer of filter media (ASTM C-33 sand). Other filter media may be considered with sufficient supporting documentation. Where a medium level of removal efficiency is desired for nutrients, the depth of the sand layer must be increased to 36 inches.

5. Underdrains

Underdrains shall be provided per the guidelines outlined in Appendix B.

Sand Filter Basin (SFB) - Design Procedure	BMP ID	Legend:	Required Entries
			Calculated Cells

Company Name: _____ Date: _____
 Designed by: _____ County/City Case No.: _____

Design Volume

Total Tributary area $A_{TRIB} =$ _____ ac
 Enter V_{BMP} determined from Section 2.1 of this Handbook $V_{BMP} =$ _____ ft^3

Basin Geometry

Basin side slopes (no steeper than 4:1) $z =$ _____ :1
 Proposed basin depth (see Figure 1) $d_B =$ _____ ft
 Depth of freeboard (if used) $d_{fb} =$ _____ ft
 Minimum bottom surface area of basin ($A_s = V_{BMP}/d_B$) $A_s =$ _____ ft^2
 Minimum total depth required (includes freeboard, filter media and subdrains) $d_{req} =$ _____ ft
 Proposed Surface Area _____ ft^2

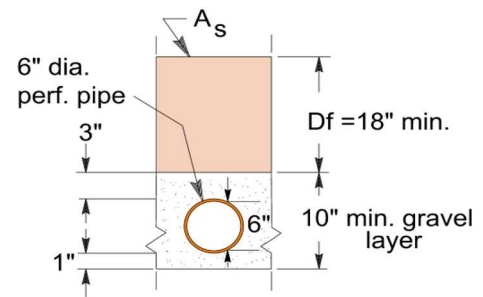
Forebay

Forebay volume (minimum 0.5% V_{BMP}) Volume = _____ ft^3
 Forebay depth (height of berm/splashwall. 1 foot min.) Depth = _____ ft
 Forebay surface area (minimum) Area = _____ ft^2
 Full height notch-type weir Width (W) = _____ in

Filter Media

Description of filter media
 _____ Sand (ASTM C-33)
 _____ Other (Clarify in "Notes" below)

Media depth, $df =$ _____ inches



Underdrains

Diameter of perforated underdrain _____ in
 Spacing of underdrains (maximum 20 feet on center) **OK** _____ ft

Notes: _____