Pacoima Wash Greenway
Master Plan

Prepared for
The City of San Fernando

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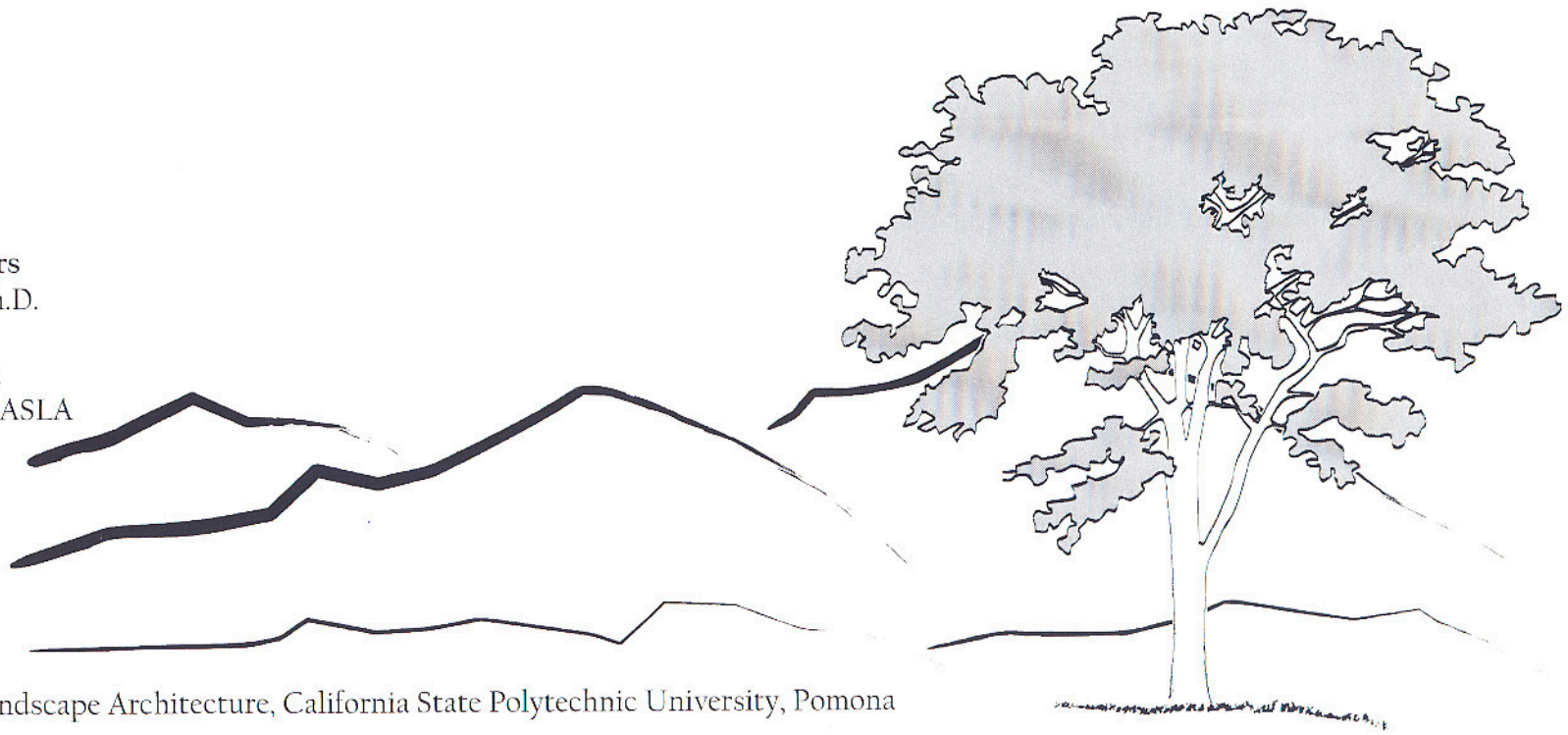

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Department of Landscape Architecture, California State Polytechnic University, Pomona

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Our families who gave us support and compassion through this process.

And to Violette Creel, who waited to the very end before making her appearance.

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The 606 Studio

The 606 Studio is a consortium of faculty and graduate students in the Department of Landscape Architecture at California State Polytechnic University, Pomona. The studio promotes the application of advanced methods of analysis and design with particular emphasis on the preservation and restoration of sensitive natural systems. Projects address serious and important ecological, social, and aesthetic issues related to urban, suburban, rural, or natural landscapes.

THE DESIGN TEAM

Jeffery Paul Creel

Jeff is a Master of Landscape Architecture candidate at California State Polytechnic University, Pomona. He also holds a bachelor's degree in economics from the University of California, Santa Cruz. On May 21, 2004, during the peak production time for this project, Jeff's wife Sonja gave birth to an 8-pound baby girl named Violette. Jeff will be moving to Portland, Oregon where he hopes to continue his work in greenway and open space design.

Ian Fitzsimmons

Ian is a Master of Landscape Architecture candidate at California State Polytechnic University, Pomona. He also holds a bachelor's degree in English from the University of Southern Oregon. Ian authored the 606 proposal for the Pacoima Wash Greenway Master Plan and is a member of the Sigma Lambda Alpha Honor Society for Landscape Architecture. He plans to remain a resident of the San Fernando Valley and continue his work with art in the landscape.

Laurel Gollong

Laurel is a Master of Landscape Architecture candidate at California State Polytechnic University, Pomona. She also holds a bachelor's degree in history from the University of California, Los Angeles. Laurel recently received a Merit Award from the American Society of Landscape Architects for her research work with habitat restoration. She hopes to continue her work with ecological restoration as a landscape architect or environmental advocate in the Los Angeles area.

Lynn Neyman

Lynn is a Master of Landscape Architecture candidate at California State Polytechnic University, Pomona. She also holds both bachelor's and master's degrees in architecture from the University of Buffalo. Lynn recently received an Honor Award from the American Society of Landscape Architects for her continuing research on social issues within environmental design. Following completion of this project, Lynn will be returning to Buffalo, New York to pursue a career in urban renewal.

Executive Summary

The Pacoima Wash is a tributary of the Los Angeles River, running from Angeles National Forest in the north to the Tujunga Wash in the south. In this short distance, the wash runs through native coastal sage scrub and riparian habitat; new residential developments in the foothills of Sylmar; well-established neighborhoods, industrial sites, and commercial developments in San Fernando; and the densely populated Los Angeles neighborhoods of Pacoima and Arleta.

In its current state, the wash has several flood control structures affecting its course: the Pacoima Dam, located within the upper Pacoima Canyon; the Lopez Debris Basin, situated at the base of the foothills within the community of Sylmar; the concrete channel that is the current footprint of the Pacoima Wash; and the Pacoima Spreading Grounds, located where the wash is diverted to join the Tujunga Wash.

The Pacoima Wash Greenway Master Plan focuses on the concrete section of the Pacoima Wash that runs between the Lopez Debris Basin and the Pacoima Spreading Grounds, dividing the neighborhoods along its path. Within this context, the plan addresses the following overarching goals:

- To improve the environmental functioning of the Pacoima Wash, Lopez Debris Basin, Pacoima Spreading Grounds, and surrounding communities

- To increase recreational opportunities along the Pacoima Wash with the provision of bicycle and walking lanes, new park space, and connections to larger amenities such as the upper Pacoima Wash and Angeles National Forest

- To promote the redevelopment of the wash into a unifying element for surrounding communities while addressing social needs and safety concerns

The Pacoima Wash Greenway Master Plan illustrates the importance of restoring the functionality of natural systems within an urban context, while meeting the recreational and social needs of a community. This landmark project reinforces San Fernando's role as a historic and visionary city.

Introduction

Clean air and water, a safe place to walk or ride a bike, a shady tree to sit under — this is the vision of the city of San Fernando, a small, independent community surrounded by the city of Los Angeles in the northeastern San Fernando Valley. City leaders are seeking to create a more sustainable environment while addressing the community's recreation and transportation needs. However, they face a daunting obstacle as spaces suitable for these purposes continue to disappear.

To meet this challenge, the city of San Fernando has turned to an unlikely resource, a stark concrete flood control channel called the Pacoima Wash. To many San Fernando residents, the wash is nothing more than a storm sewer, dividing neighborhoods and attracting unwanted activity. However, like the city itself, the Pacoima Wash is much more than it seems.

THE PACOIMA WASH

Located in the northeastern San Fernando Valley, the Pacoima Wash originates in the upper reaches of the San Gabriel Mountains. After winding its way to the valley floor, the wash becomes channelized and moves southward, eventually joining the Tujunga Wash. This channel inadvertently acts as a barrier, further separating communities already divided by freeways and concrete walls. The Pacoima Wash, however, has the potential to be radically different. The wash could be transformed into an amenity, a natural corridor knitting together the communities on either side of its banks. The Pacoima Wash Greenway Master Plan will provide much needed open space to this densely populated community while restoring much of the natural function of the waterway.

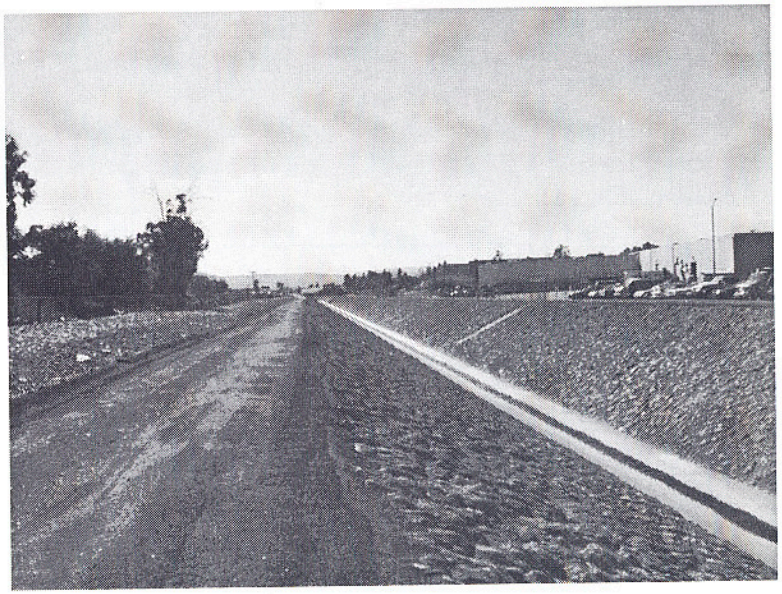
Under the master plan, the Pacoima Wash Greenway begins below the Pacoima Dam in an area characterized by an uneasy balance between humans and nature. Housing tracts creep up the highly erodable slopes. Invasive castor bean, giant reed, and sweet alyssum compete with native vegetation. Many portions of the still natural wash are suffering from excessive litter and are marred by graffiti. Within these surroundings sagebrush, mulefat, and willows thrive, birds chirp, and the sound of crunching gravel can be heard as people walk along the rocky wash.

View of the Upper Pacoima Wash

Crowds gather on weekends to watch children play baseball, hang gliders soar from the mountains above, and model airplanes buzz through the sky. Occasionally, nature sees fit to flush this area clean with storms that send water and sandy debris into the protective circle of the Lopez Debris Basin.

At the southern mouth of the debris basin, the wash is directed into a concrete channel that travels through dense residential neighborhoods periodically broken by industrial districts. The strips of land running alongside the wash are paved with asphalt. Noise from freeways, industrial machinery, and truck traffic dominate the space. Sunlight ricochets off concrete causing a harsh glare and radiating heat. Trash accumulates in this no-man's-land surrounded by barbed wire. Plants and people are discouraged from using the channel right-of-way, but their presence persists. Small cactus gardens, occasional clumps of grass, and people defiantly walking along the wash allude to the desperate need for recreation and open space.

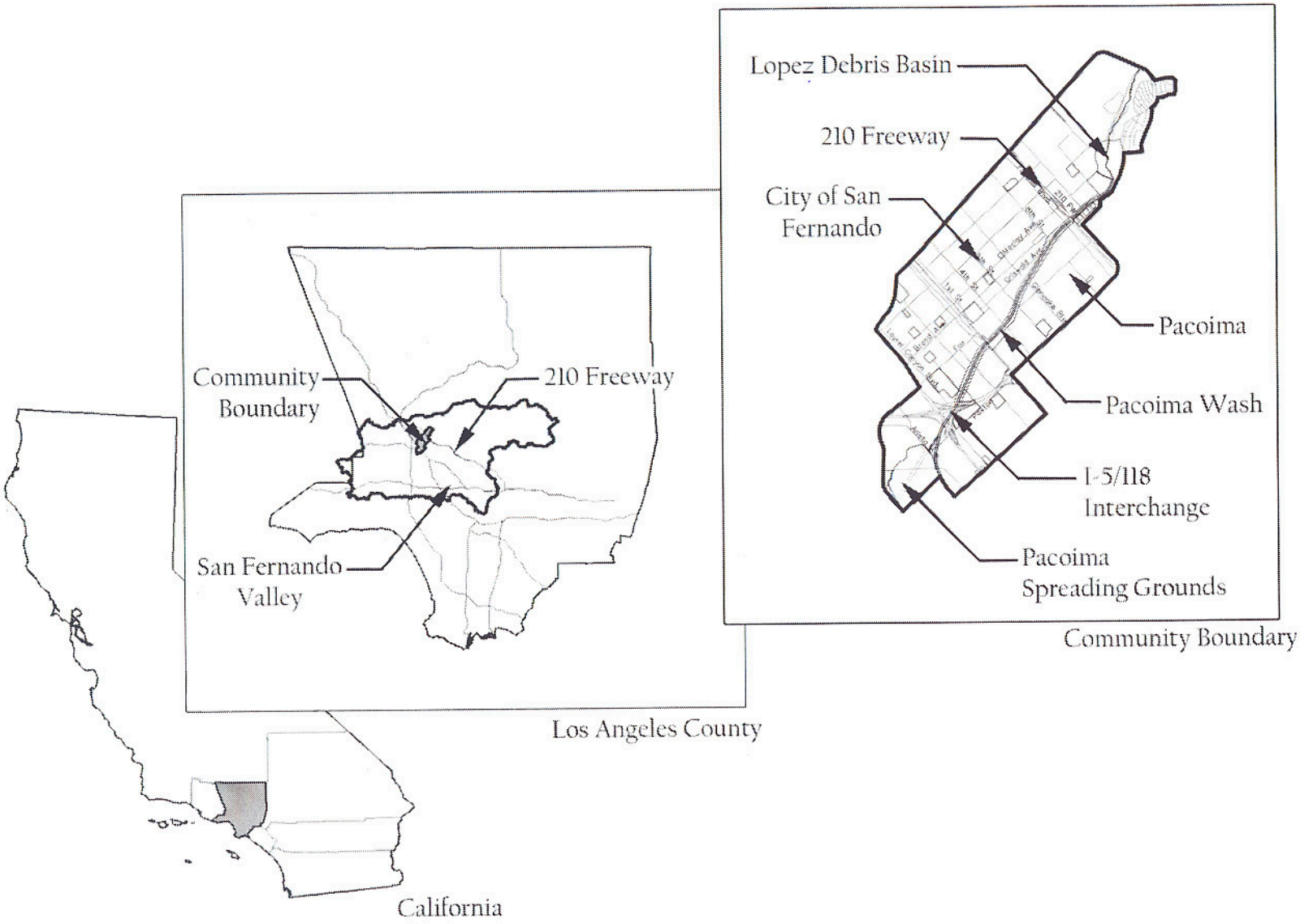
As the concrete and asphalt corridor continues southward, it is funneled into a square culvert that snakes under the I-5/118 interchange, eventually re-emerging at the Pacoima Spreading Grounds. These spreading grounds will be the ending point for the Pacoima Wash Greenway Master Plan. Here the landscape opens up once again. Birds chirp in the trees and grassy basins hide behind chain link, barbed wire, and padlocks, enticing those who pass by on the narrow ribbon of sidewalk that lines the fence.



Pacoima Wash Channel

These diverse areas constitute the future site of the Pacoima Wash Greenway. The rehabilitation of neglected waterways to stimulate urban renewal is an idea that has been gaining momentum over the last decade. Within California, the cities of Santa Rosa and San Luis Obispo have successfully reinvigorated slumping retail districts by centering them around restored creeks and streams. In heavily urbanized Los Angeles, the installation of trails and enhanced vegetation along the Los Angeles River channel in Studio City has successfully invigorated surrounding neighborhoods. Now San Fernando has an opportunity to redefine its surroundings by creating a more pedestrian and nature-friendly city.

Location

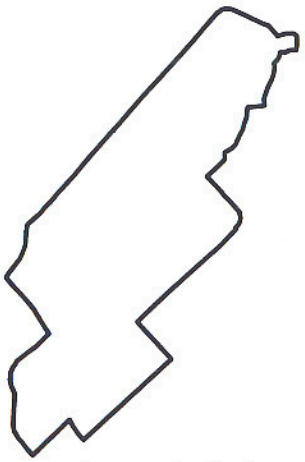

Lopez Debris Basin
210 Freeway
City of San Fernando
Pacoima
Pacoima Wash
I-5/118 Interchange
Pacoima Spreading Grounds
Community Boundary
210 Freeway
Community Boundary
San Fernando Valley
Los Angeles County
California

Purpose

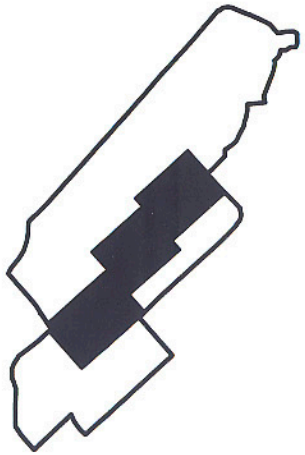
The purpose of the Pacoima Wash Greenway Master Plan is to develop designs, guidelines, and strategies for human recreation, natural systems restoration, and site remediation in and along the Pacoima Wash. The plan will embody the vision of the community, address critical environmental issues, and provide for the mental and physical health of future generations. The master plan will go beyond the confines of the project site to examine the community's social and environmental issues; seeking opportunities to heal social scars with shared recreation spaces and increased care in the environment. To accomplish this, the master plan must address three scales of concern: the regional, community, and site scales.

- Regional Scale: The regional scale is defined by the boundaries of the San Fernando Valley. This scale will be used to assess San Fernando's functional connections to the surrounding region.
- Community Scale: The community scale includes the city of San Fernando and portions of Pacoima, Sylmar, and Arleta that have direct interaction with the wash. This scale will be used to determine how the greenway design will be integrated into surrounding communities.
- Site Scale: The site scale includes the portion of the wash between the 210 freeway and the I-5/118 freeway interchange and areas that lie directly adjacent to it. This scale will feature specific designs that address issues raised at all scales.

Regional Scale



Community Scale



Site Scale

Issues

ENVIRONMENTAL ISSUES

Reducing Groundwater Levels

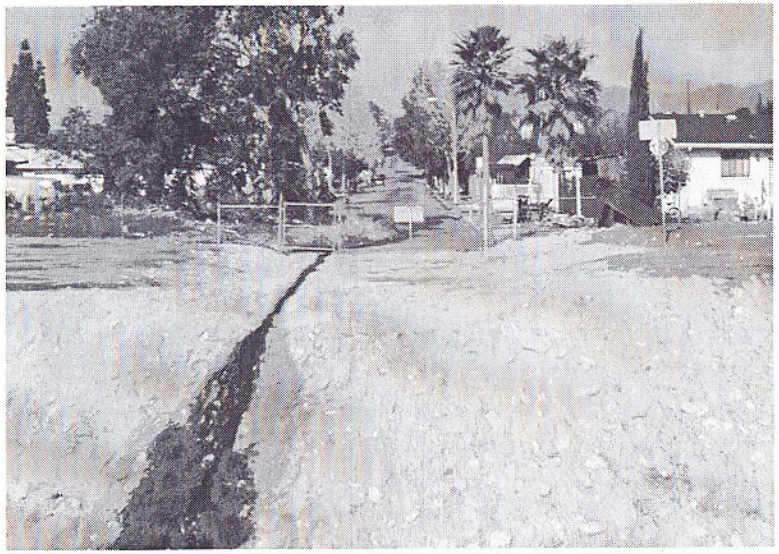
Water naturally percolates through the porous alluvial soils of the Pacoima Wash into an aquifer below. Maintaining the natural replenishment of groundwater stores is essential as the region depends upon these hidden water resources for the municipal water supply. Due to the system of channelization in the Pacoima Wash and other rivers and streams throughout Los Angeles, water moves quickly through the streets into awaiting channels. There it is flushed directly into the ocean, never allowed to percolate into the aquifer. The impermeability of the current river system is leading to a reduction of the water supply for the entire region.

Urban Runoff and Poor Water Quality

Much of the water that can be seen in the Pacoima Wash channel today comes from runoff, the overland flow of water that carries with it contaminants found on streets, lawns, and parking lots. During heavy storms, the initial pulse of runoff, known as the first flush, contains the highest levels of contaminants which are washed into the channel, negatively impacting any vegetation and wildlife found within downstream habitats and reducing the quality of the water available for recharge into the aquifer. Industrial pollutants originating from businesses that currently line the channel further affect water quality.

Soil Pollution

The industrial nature of the properties surrounding the wash raises concerns about the quality of the soil beneath these sites. The use and maintenance of heavy machinery often results in spilled solvents and oils, causing harm to the surrounding environment. An asphalt plant located along the wash was recently enclosed, but in prior years any contaminants onsite were in direct contact with the soil, leaving a permanent harmful residue under the surface.



Urban Runoff Entering the Wash

Air Pollution

An additional by-product of a heavy industrial core is air pollution caused by the manufacturing machinery and heavy truck traffic necessary for the distribution of goods. This air pollution source combines with the automobile traffic traveling along the 118, 210, and I-5 freeways and

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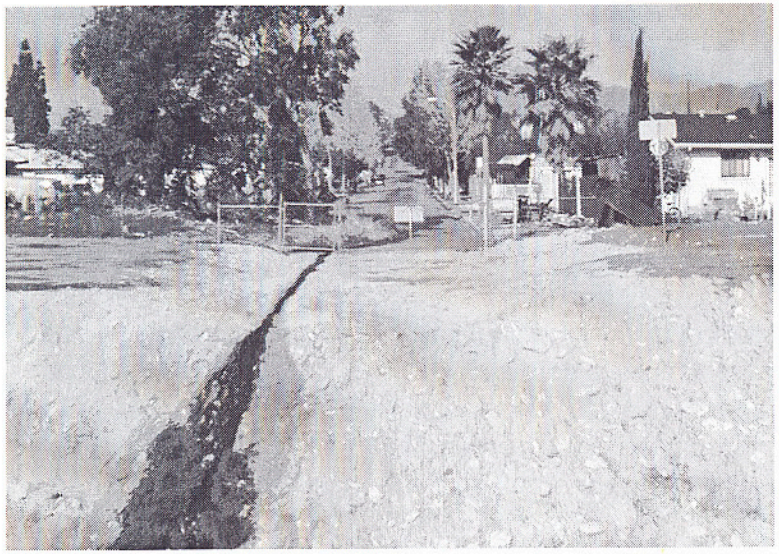

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idling on neighborhood surface streets. The resulting reduction in air quality raises concerns over long-term impacts upon the health of residents.

Loss of Native Habitat

Increased urbanization in the upper Pacoima Wash and Lopez Debris Basin has fragmented and altered the vegetation, open space, and food and water sources that are necessary for the health of wildlife populations. Engineered structures such as the Pacoima Dam, Lopez Debris Basin, and Pacoima Wash flood control channel have all contributed to the overall decrease in and fragmentation of habitat. The development of homes and the corresponding increase in human use of the upper Pacoima Wash has brought with it the spread of non-native plant species. Destruction of native habitat leaves natural areas vulnerable to the seeds and spores of invasive plants that are tracked in by hikers and equestrians or are washed down from the landscaped yards above the wash. These invasives can spread rapidly and have few natural controls, allowing them to crowd out native species. This habitat loss negatively impacts native wildlife that depends upon it for survival. In response, animals alter their behavior to search for habitat beyond their home range, increasing the chance for conflict with humans.

COMMUNITY ISSUES

Isolated Communities

The city of San Fernando and the communities of Pacoima, Sylmar, and Arleta suffer from a lack of interconnection resulting from the built structures that divide them. This division results from the inadequate number of pedestrian connections across the wash and the industrial core that functions as a barrier along the length of the wash between Foothill Boulevard and San Fernando Road.

Vandalism, Graffiti, Dumping, and Litter

Public access to the Pacoima Wash is currently prohibited, but chain-link fencing and barbed wire have not prevented people from illegally dumping garbage and other debris into both the channel and the upper wash. Additionally, graffiti can be seen throughout the wash along the channel's banks, on the block walls that line the industrial and residential districts, on the pavement surfaces, and upon most signage.

Noise Pollution

Industrial activity and vehicular traffic increase noise pollution. Many residential areas lining the wash are negatively impacted by noise emanating from the machinery and trucks of the nearby industrial zone.

Homelessness Along the Wash

Homeless individuals have been observed using the wash to travel between Foothill Boulevard and the 210 freeway. This population is often found beneath the overpasses, which provide shelter and protection, or at the local armory during inclement weather. The homeless are perceived as a risk to the safety of those who live close by and to the health of the local environment. Protecting the homeless from violent crimes and abuse is another important consideration.

Safety

The safe interaction of vehicular and pedestrian traffic is a significant concern for the community. Several major streets, large freeways, and a major rail line crisscross the area with heavy vehicular traffic concentrated around the more popular destinations in and around San Fernando. Older roads suffer from narrow sidewalks, a lack of crosswalks, and limited accessibility for the disabled. Several ill-maintained pedestrian tunnels provide access beneath the expansive freeways. These tunnels have poor lighting, suffer from vandalism, and act as a magnet for illegal activity.

RECREATION AND TRANSPORTATION ISSUES

Lack of Recreational Areas and Community Centers

The parks-to-people ratio within the city of San Fernando is lower than both the Los Angeles and national averages, resulting in the heavy use of the park space that is currently available. This can lead to conflicts within parks, negative impacts upon sensitive environments, and degraded facilities that require extensive upkeep. Fewer parks and community centers can also reduce the number of available after-school programs that keep children from straying into inappropriate areas such as streets, alleys, and parking lots.

Lack of Recreational Activities for Children

A significant portion of the population of San Fernando is under the age of eighteen. However, there are few recreational activities within the designated parks to accommodate this age group. Only a handful of basketball courts, baseball and soccer fields, and teen centers are available for after-school activities. There are also limited playground spaces appropriate for younger children.

Lack of Easy Access to Recreational Areas

Several parks and community centers can be found throughout San Fernando. Many of these areas, however, are far apart and lack any connection. While auto-oriented signage is common, the only signage that assists in pedestrian wayfinding is found along the Mission City Trail, a linear path that runs east/west for a short distance between San Fernando Recreation Park and the Metrolink station.

Lack of Alternative Transportation Options

With a transportation system that favors the automobile and a constant increase in population, the San Fernando Valley is suffering from transportation problems at all scales. Surface streets and freeways are paralyzed by gridlock. Recent improvements to public transit systems have only begun to scratch the surface of this issue. Within San Fernando, intersections with the railroad and streets that surround local schools become clogged during peak periods and alternative travel routes are scarce.

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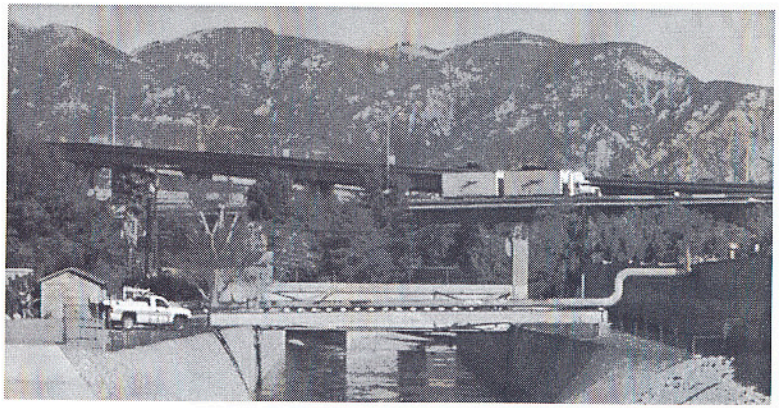
Goals & Objectives

ENVIRONMENT

1. Restore the processes of hydrologic regeneration within the Pacoima Wash watershed
    - A. Increase opportunities for infiltration of storm water throughout the watershed
    - B. Reduce storm water runoff volumes and rates throughout the watershed
2. Improve environmental quality for residents of San Fernando and the surrounding communities
    - A. Prevent groundwater contamination from storm water runoff and urban land uses
    - B. Protect the Pacoima Wash and related surface water bodies from pollutants
    - C. Remediate contaminated sites along the wash to reduce environmental hazards
    - D. Reduce the production of air pollutants within San Fernando and mitigate the presence of pollutant generators in the surrounding landscape
    - E. Reduce noise pollution in and around residential areas and open spaces
3. Restore native biological resources in the watershed
    - A. Reintroduce native vegetation in and around the Pacoima Wash
    - B. Promote opportunities to connect biological resources within a comprehensive network
    - C. Reduce threats to native plant habitat and wildlife species

COMMUNITY

1. Create a community vision for the Pacoima Wash
    - A. Incorporate historic and cultural influences upon the Pacoima Wash
    - B. Integrate community needs and concerns into the design process
    - C. Unite disparate communities
2. Address safety concerns raised by the residents of San Fernando and surrounding communities
    - A. Increase care and maintenance of community features
    - B. Reduce conflicts between the homeless population and the community
    - C. Reduce vehicular conflicts with bicyclists and pedestrians
3. Provide opportunities for environmental education
    - A. Integrate educational elements into the greenway design



Freeways Dividing the Community

RECREATION AND TRANSPORTATION

1. Increase recreational opportunities within San Fernando and surrounding communities
    - A. Provide diverse recreational spaces that engage all ages and abilities
    - B. Identify current and future lots suitable for park space
2. Improve the connection between current and proposed park spaces and the surrounding community
    - A. Connect local attractions to the greenway
    - B. Create a comprehensive wayfinding system
3. Increase alternative transportation at all scales
    - A. Promote bicycling and pedestrian activity
    - B. Increase connections to mass transit
    - C. Decrease use of vehicular transportation for local trips
    - D. Create alternative connections between neighborhoods, schools, and commercial centers currently divided by the wash

Teenager Using the Wash for Recreation

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January 31, 2006

Pacoima Wash: 8th Street Park Project

Conceptual Hydrologic Layout

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Project Summary

Objectives:

In their efforts to comply with regulatory standards cities are faced with the task of dealing with storm water pollution originating in neighborhoods and industrial areas along streams and storm water channels. It has been common practice to route storm water from stream-adjacent neighborhoods directly into the water course through overflow structures along the channel right-of-way, often where streets dead-end into the channel.

The primary objective of this project is to develop a multi-purpose natural park that captures, cleans, and infiltrates storm water runoff from a surrounding residential neighborhood along Pacoima Wash in the City of San Fernando. The project will provide improved flood management and opportunities for ecosystem restoration. Infiltration of stormwater will replenish groundwater resources and reduce flood peaks in the flood control channel.

A secondary objective is to provide a crucial link and access point to a proposed river greenway along Pacoima Wash that will provide trail access and habitat connectivity between underserved communities of the eastern San Fernando Valley and the San Gabriel Mountains.

Pacoima Wash Greenway:

The planned Pacoima Wash Greenway, is a 3-mile long corridor of natural open space that will protect the land and water resources of the watershed. One of the goals of the greenway is to capture all storm runoff from stream channel-adjacent neighborhoods for treatment and infiltration in BMPs integrated into a series of parks along the Pacoima Wash channel. The greenway will extend from the Angeles National Forest and the Rim of the Valley Trail Corridor to the communities of the northeast San Fernando Valley.

Project Site:

The project site is located on the north side of Pacoima Wash between Foothill Blvd. and 8th Street in the City of San Fernando. It is proposed to convert approximately 3 acres of undeveloped land into a park that collects, treats and infiltrates residential runoff onsite.

Project Partners:

The Project will be done in close cooperation between the City of San Fernando and the Mountains Recreation and Conservation Authority, MRCA, a joint powers authority of the Santa Monica Mountains Conservancy. In accordance with its mission to develop an interlinking system of urban, rural, and river parks, open space, trails, and wildlife habitats that are accessible to the general public, the Santa Monica Mountains Conservancy has funded the acquisition of the property in April of 2005.

Proposed Best Management Practices (BMPs):

The proposed project will demonstrate how runoff can be managed through detention and infiltration along the existing channel right-of-way while also providing a community amenity. It is anticipated that this strategy will be replicated along the entire 3 mile-long Pacoima Wash Greenway and that the project serves as a demonstration project for other locations.

All surface waters of the 33-acre residential area will be intercepted at the curbs of Bromont Avenue and 8th Street and routed through a sequential treatment train. Primary target pollutants are trash, sediment, heavy metals, nutrients, bacteria, scum, oil and grease. At the primary capture point trash and the majority of solids will be removed by a device that captures suspended solids. Preferentially, this would be a custom built sediment trap with a coarse sand media insert that is integrated into the park hardcape. Alternatively, a Stormceptor® or prefabricated sediment trap could be used. The pretreated stormwater is then passed on to a sand media infiltration pond with bioretention function. A vegetated bioswale mimicking a natural stream channel will provide a link between the capture point at Bromont Ave. and the infiltration pond.

The system will capture and treat the ¾- inch storm for all target pollutants by providing pond-storage and infiltration capacity for the entire storm. The pond base will be augmented with gravels and sands to assure infiltration of the entire storm volume within 48 hours. Runoff in excess of the ¾-inch storm will be treated for a substantial amount of trash and heavy solids while passing the excess flow on to Pacoima Wash via an overflow channel at the downstream end of the pond.

Habitat:

Ecosystem restoration will be accomplished by removal of invasive exotic plants and the introduction of native vegetation. A riparian plant palette, native to the Los Angeles River watershed, will be utilized. As a component of the larger greenway this project provides much needed connectivity between isolated patches of natural habitat in the San FernandoValley and the San Gabriel Mountains. It offers a significant opportunity to restore riparian habitat and increase the capacity for wildlife movement. It is anticipated that captured "dry-weather" runoff will allow sufficient moisture to maintain a small area of riparian plant communities along the bioswale.

Recreation:

Recreation and public access will be directly improved by allowing for passive recreation, such as bird watching and picnicking. Interpretive signs that contain educational information about water protection and water quality, the Pacoima Wash watershed, and native biology will be located on site.

Hydrologic Analysis

Introduction:

The goal of this section is to summarize the existing hydrologic conditions, perform a preliminary surface runoff calculation for the project area, and make design suggestions for the hydrologic layout and approximate size of the hydrologic park components.

Cautionary Statement:

This work and all attachments thereto are conceptual and preliminary. Implementation of all work including conversion to construction drawings may require further review and approval by a licensed engineer and/or landscape architect. It remains the sole responsibility of the MRCA to perform any further review and secure any required engineering approval and permits.

Jurisdiction:

The project area is located in the City of San Fernando, County of Los Angeles. A significant portion of the contributing basin area is located in the City of Los Angeles. Runoff calculations were performed following the guidelines of the most recent Hydrology and Sedimentation Manuals of the Los Angeles County Department of Public Works.

Drainage Area:

To perform the runoff analysis the contributing basin area was determined using the following maps:

1. City of Los Angeles: Drainage maps
2. City of San Fernando: Storm Drain Corage and Topography (CAD Format)
3. Los Angeles County Assessor: Parcel Plats and Parcel Data

In addition to the above sources the entire area was visually surveyed on foot to confirm all drainage patterns and to make minor adjustments and additions. The existence and condition of all drains and catch basin inlets was checked. All maps were graphically overlain and scaled to determine the total drainage area. Map 1 shows the existing drainage pattern.

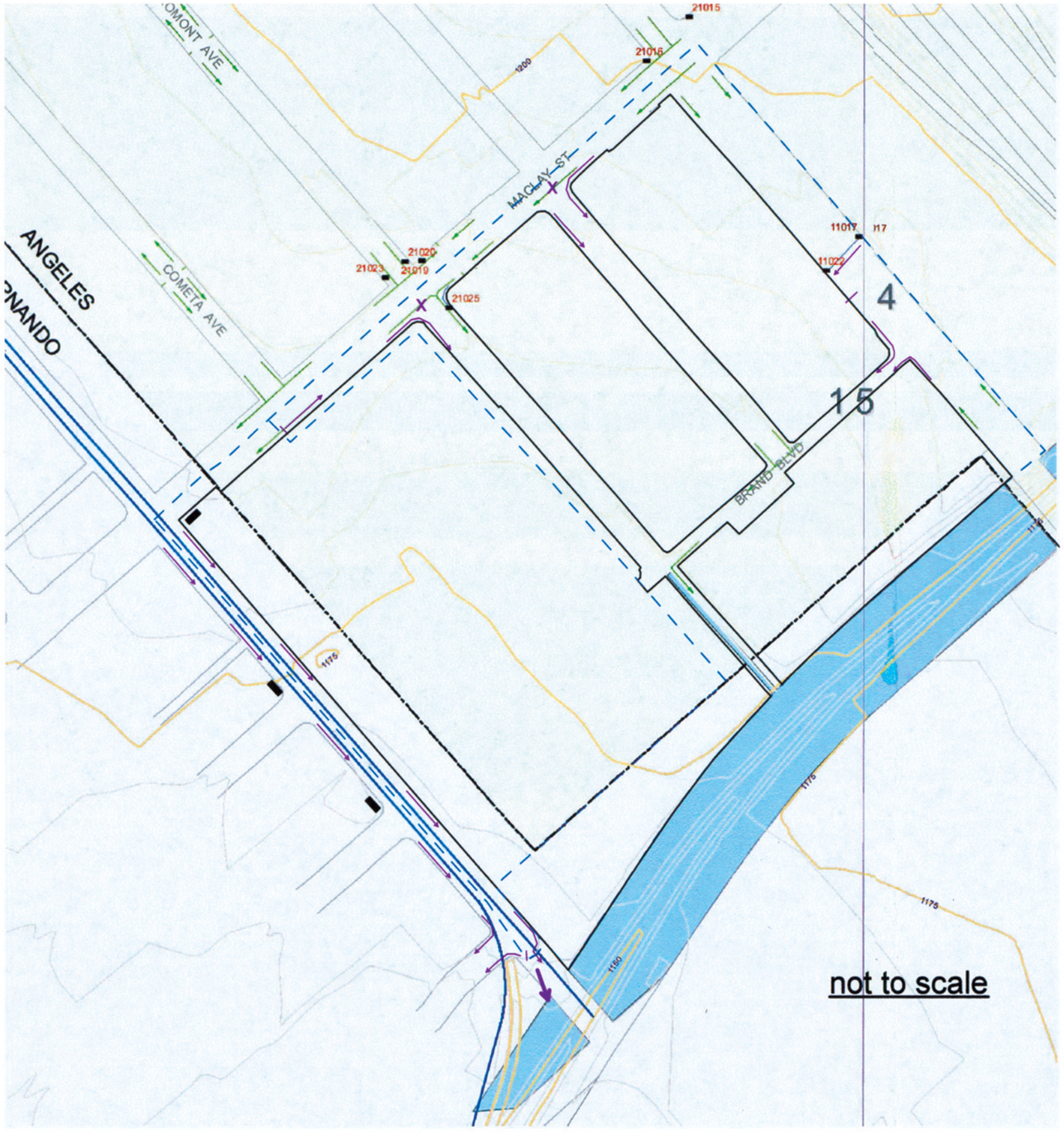
Land Use Data:

To determine the percentage of drainage area that is impervious, a complete land use analysis was performed in the field. Map 2 shows the parcel boundaries, Map 3 shows the result of the land use analysis, and Table 1 shows acreages and the proportional areas of the various land use classes. Appendix E of the Hydrology and Sedimentation Manuals was consulted to assign the proportion impervious values. Since park surfaces are not listed in Appendix E, a value of 0.2 was assumed to accurately account for a small portion of hardscape to be included in the proposed park project.

Table 1: Land Use and Hydrologic Data

Land Use Type	Proportion of Total	Acres	Proportion Impervious
SF Residential	0.46	15.273	0.418
MF Residential	0.13	4.399	0.855
Commercial	0.11	3.697	0.909
School/Church	0.17	5.748	0.819
Parks	0.12	3.870	0.2

Total Area:	32.987	acres
Weighted Proportion Impervious:	0.576	
Soil Type:	014	
50-year 24hr. Rainfall:	6.9	inches
25y-reduction:	0.878	
10y-reduction:	0.714	
Level of Flood Protection:	Urban - 25yr	
Max. Distance:	2240	ft
Slope:	0.018	



Pacoima Wash, 8th Street Park
City of San Fernando
Drainage Map
January 19, 2006

Mountains Recreation and Conservation Authority

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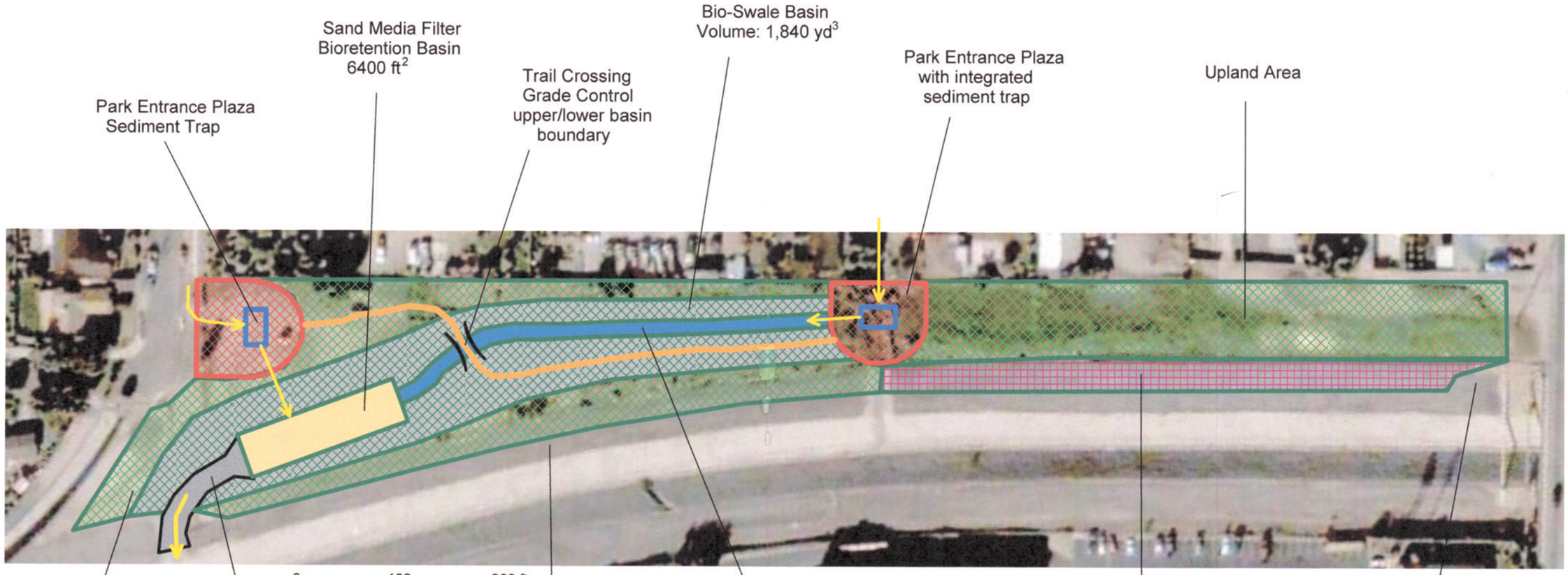

HYDROLOGY GEOMORPHOLOGY MK CONSULTING

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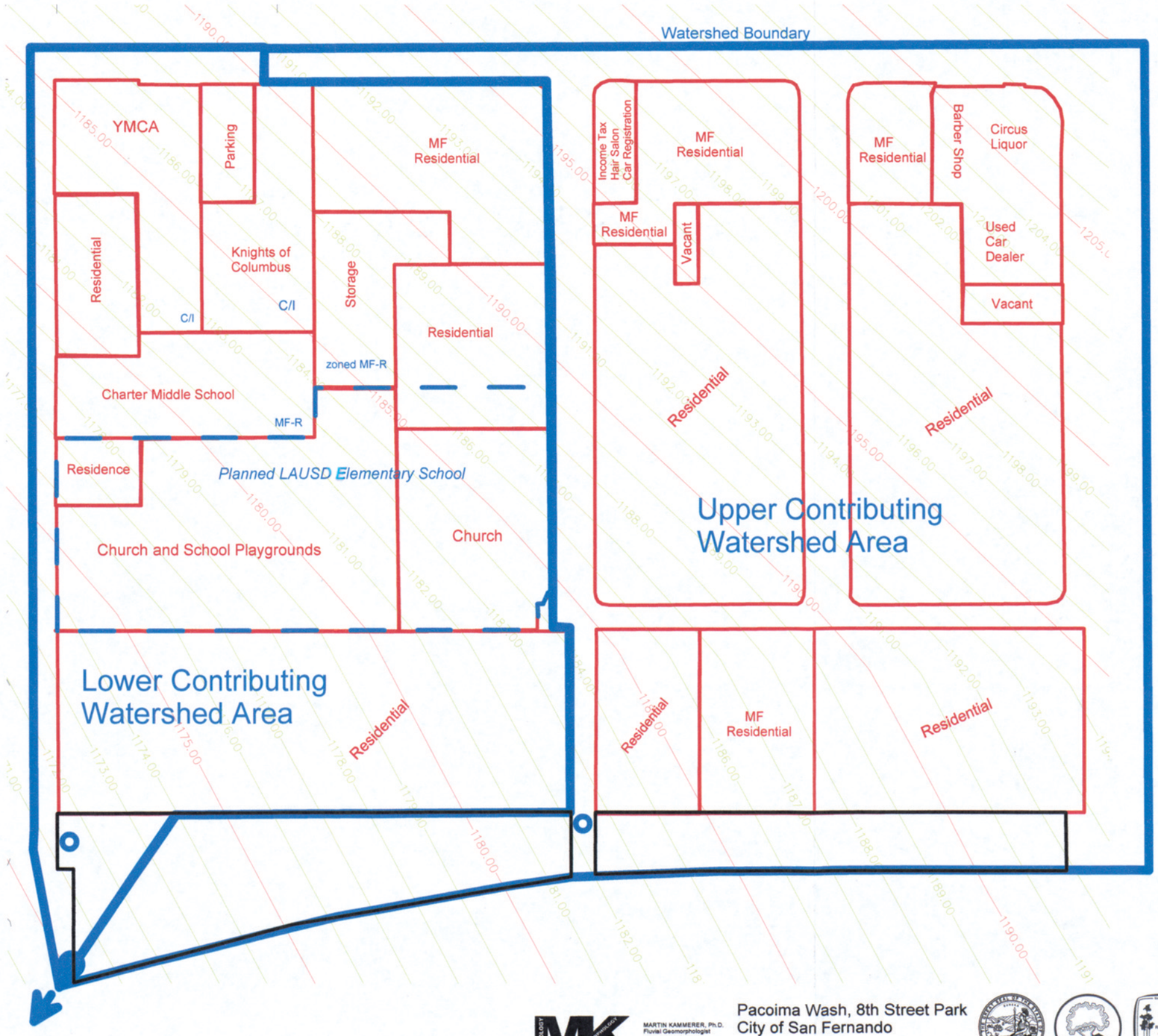
Pacoima Wash, 8th Street Park
City of San Fernando
Conceptual Park Layout
January 25, 2006

Mountains Recreation and Conservation Authority



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Pacoima Wash, 8th Street Park
City of San Fernando
Land Use Map
January 25, 2006

Mountains Recreation and Conservation Authority

Surface Runoff Calculation:

When designing a BMP it is important that it is capable of treating the Water Quality Volume. However, it is equally important that it safely passes flow generated by a large storm that is greater than the design capacity of the BMP. Hence, the BMP and surrounding landscape and infrastructure have to be designed to route stormwater to a stormdrain or flood channel regardless of whether the BMP functions properly.

Following the Los Angeles County Department of Public Works "Policy on Levels of Flood Protection" this project requires Urban Flood Protection for a 25-year storm event. In addition, the BMP should be designed to treat a Water Quality Volume equivalent to the ¾-inch storm.

The soil type was determined by using MAP 1-H1-36 of the Hydrology and Sedimentation Manuals of the Los Angeles County Department of Public Works. The contributing basin area for the project has dominantly soil 014 and a minor portion of soil 015. Following a conservative approach soil 014 was used for the runoff calculation since soil 015 shows smaller runoff coefficients generating smaller discharges. All other relevant hydrologic variables are summarized in tables 1 and 2.

The final calculation was done using the Modified Rational Method for the ¾-inch storm and the 25-year urban storm event. Both peak flows and total volumes were calculated using the "Time of Concentration Calculator" by the Los Angeles County Department of Public Works. Summary data for both storms are presented in table 2 and hydrographs and model outputs are contained in the Appendix.

Since the Modified Rational Method is most reliable for sub-areas of around 40 acres the entire contributing basin area was modeled as one sub-area with one collection or outlet point at the lower property boundary. Since there are interception points at Bromont Avenue and at 8th Street, peak flows and volumes were calculated based on the proportional basin areas at these points allowing an estimate of the contributions of the upper and the lower contributing areas. This resulted in the formulation of the design goals for the individual hydrologic components of the project summarized in table 3.

Table 2: Summary of Hydrologic Data

Subarea	Total		Upper Area		Lower Area	
Frequency	**25 year**	**3/4 inch**	**25 year**	**3/4 inch**	**25 year**	**3/4 inch**
Area (acres)	32.99	32.99	17.15	17.15	15.83	15.83
%Impervious	0.576	0.576	0.576	0.576	0.576	0.576
Soil Type	14	14				
Length (ft)	2240	2240				
Slope (ft/ft)	0.018	0.018				
Isohyet (in.)	6.06	0.75	6.06	0.75	6.06	0.75
Tc-calculated (min.)	17	30	17	30	17	30
Intensity (in./hr)	2.03	0.19				
Cu	0.63	0.10				
Cd	0.79	0.56				
Flow rate (cfs)	52.90	3.51	27.51	1.83	25.39	1.68
Volume (acre-ft)	9.62	1.14	5.00	0.59	4.62	0.55

Table 3: Design Goals

	Peak Flow (cfs)	Max. Volume (ft^3)
Overflow Outlet to Pacoima Wash:	53	
Inlet at Bromont Avenue:	27.5	
Inlet at 8th Street:	25.5	
Swale	27.5	
BMP Basin	53	49658

BMP Design:

As initially proposed, the preferred BMP choice would have been a simple Delaware-type underground Sand Media Filter at the park entrances that would direct bypass-flow into a bioswale and drypond system. Given the relatively large Water Quality Volume that needs to be treated, a standard Delaware filter would be too large for the entrance areas.

An alternative is to separate the sediment removal function from the process by using an underground sediment trap with a coarse "high throughput" filter at the park entrance, and pass the pre-filtered water to an infiltration pond with an integrated sand media filter with bio-retention function. Map 4 shows the conceptual park layout.

The custom built sediment trap would be integrated into the hardscape of a park entrance plaza and have fine-screened curb entrances that prevent trash and larger sediment particles to enter. To compensate for the head loss created by the screens, the openings would have to be over-dimensioned. This design would significantly lower maintenance costs as virtually all trash and larger solids could be picked up by a standard street cleaner. The sediment trap itself would be a gravel lined bottomless concrete box with one baffle.

The trap would function like a Delaware Sand Media Filter with the difference that the sand chamber is filled with very coarse sand of high hydraulic conductivity allowing for much greater throughput. The unit would be comparable in size to two large catch basins and would be constructed with two large hinged and grated covers so that they can be serviced without special equipment. Other than removing trapped sediment and replacing coarse sand, no maintenance would be required. The screened inlets would prevent the larger volume of trash from entering the trap and reduce the requirement for trap maintenance to once a year.

MACLAY AVE. | MACLAY | TA | ST. | MACLAY | ST. | MACLAY | ST. | FOOTHILL BLVD.

8TH ST. | BROMONT AVE. | ADELPHIA AVE. | BRAND | BRAND BLVD. | FOOTHILL BLVD.

BLK. 75 POR.

CODE 660 — CODE 16

THE MACLAY RANCHO
EX MISSION DE SAN FERNANDO
M. R. 37 - 5 - 16

0 100 200 ft

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Pacoima Wash, 8th Street Park
City of San Fernando
Parcel Boundaries
January 25, 2006

Mountains Recreation and Conservation Authority

Minimizing introduction of solids into the actual sand media filter is crucial because failure in sand media filters is commonly caused by clogging by solids and sediment. Further, bio-retention functions in open filters may become inefficient and significantly increase draw-down times.

The sand media filter portion of this BMP would essentially function like the filter bed of an Austin-type sand media filter with the difference that under-drains are unlikely to be required as the total Water Quality Volume would be retained, and because the gravelly sub-soils in the area are likely to allow complete infiltration in less than 48 hours.

Following design guidelines for an Austin–type filter with an 18 inch sand bed and 48 hrs. of draw-down time, the filter bed in the center of the dry pond would have to have a size of 6400 ft^2. In order to enhance bio-retention function, the filter bed could be covered by a sand /soil mixture that is planted. This may require an increase in the size of the basin floor to account for a reduction of infiltration capacity if a large amount of soil and plants are introduced.

The total volume of the basin should be 1.14 acre-feet or 49,700ft^3 . Since the basin is planned to be integrated into the accessible natural terrain of the park, the slopes leading into the basin should not be steeper than 4H:1V, and maximum water depth should not exceed 3ft. The shape and position of the basin is at the discretion of the landscape architect.

Finally, the BMP train requires an outflow spillway. This spillway needs to be designed to accommodate an overflow of at least 53 cfs from the basin into Pacoima Wash Flood Control Channel. It is recommended to incorporate a small emergency drain pipe into the sand filter or the overflow structure that allows the pond to be drained manually if it were to become clogged. The surface of the spillway should be river cobble placed in grout. The spillway crest elevation must be no higher than 3 ft above the sand filter to limit water depth to a maximum of 3 ft at all times.

Appendix: Supporting Materials

016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

1 0 1 2 Miles

25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

SAN FERNANDO 1-H1.36
50-YEAR 24-HOUR ISOHYET

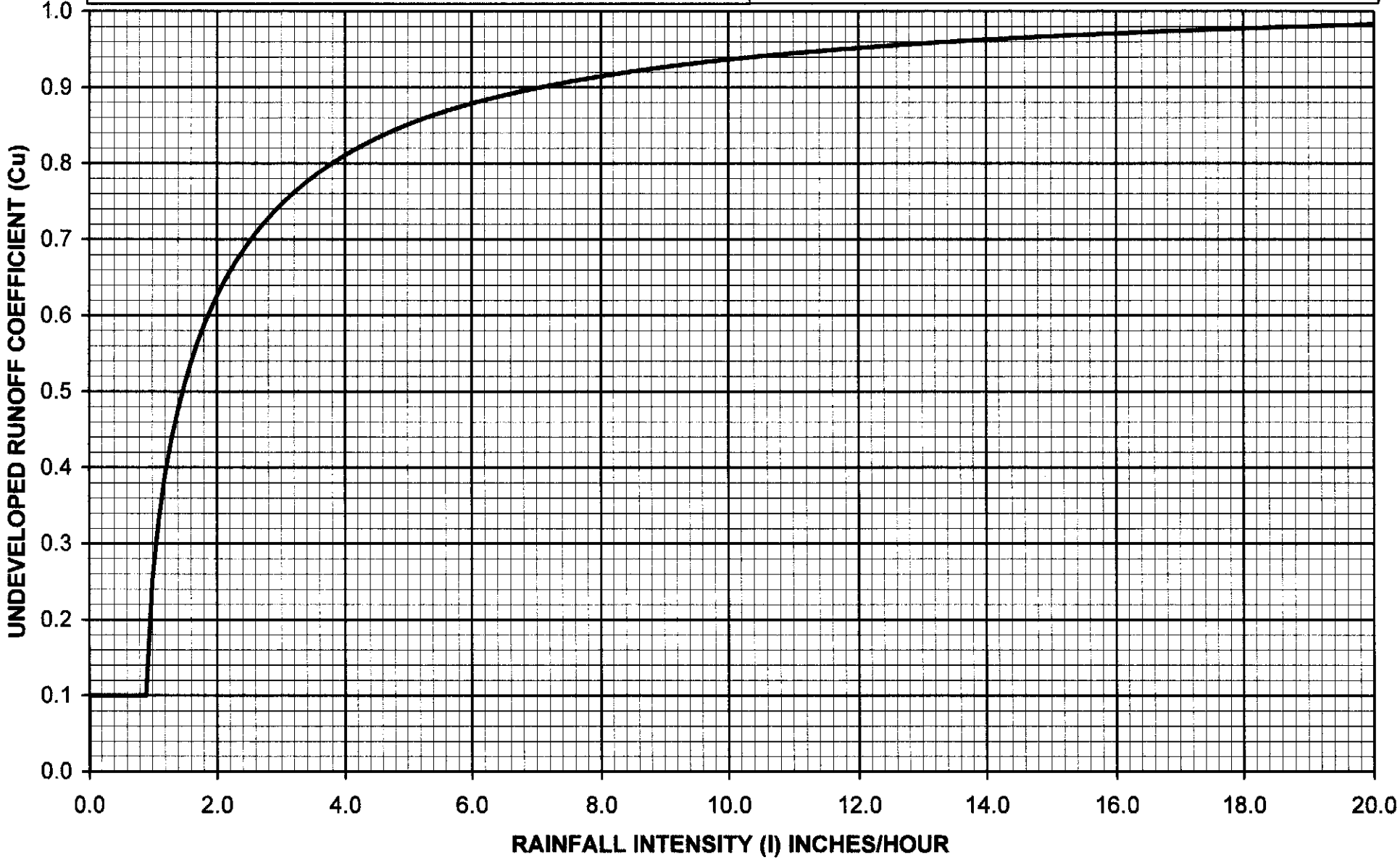
LOS ANGELES COUNTY PUBLIC WORKS

$C_D = (0.9 * IMP) + (1.0 - IMP) * C_U$

Where: C_D = Developed Runoff Coefficient
IMP = Proportion Impervious
C_U = Undeveloped runoff coefficient

Los Angeles County Department of Public Works

RUNOFF COEFFICIENT CURVE
SOIL TYPE NO. 014

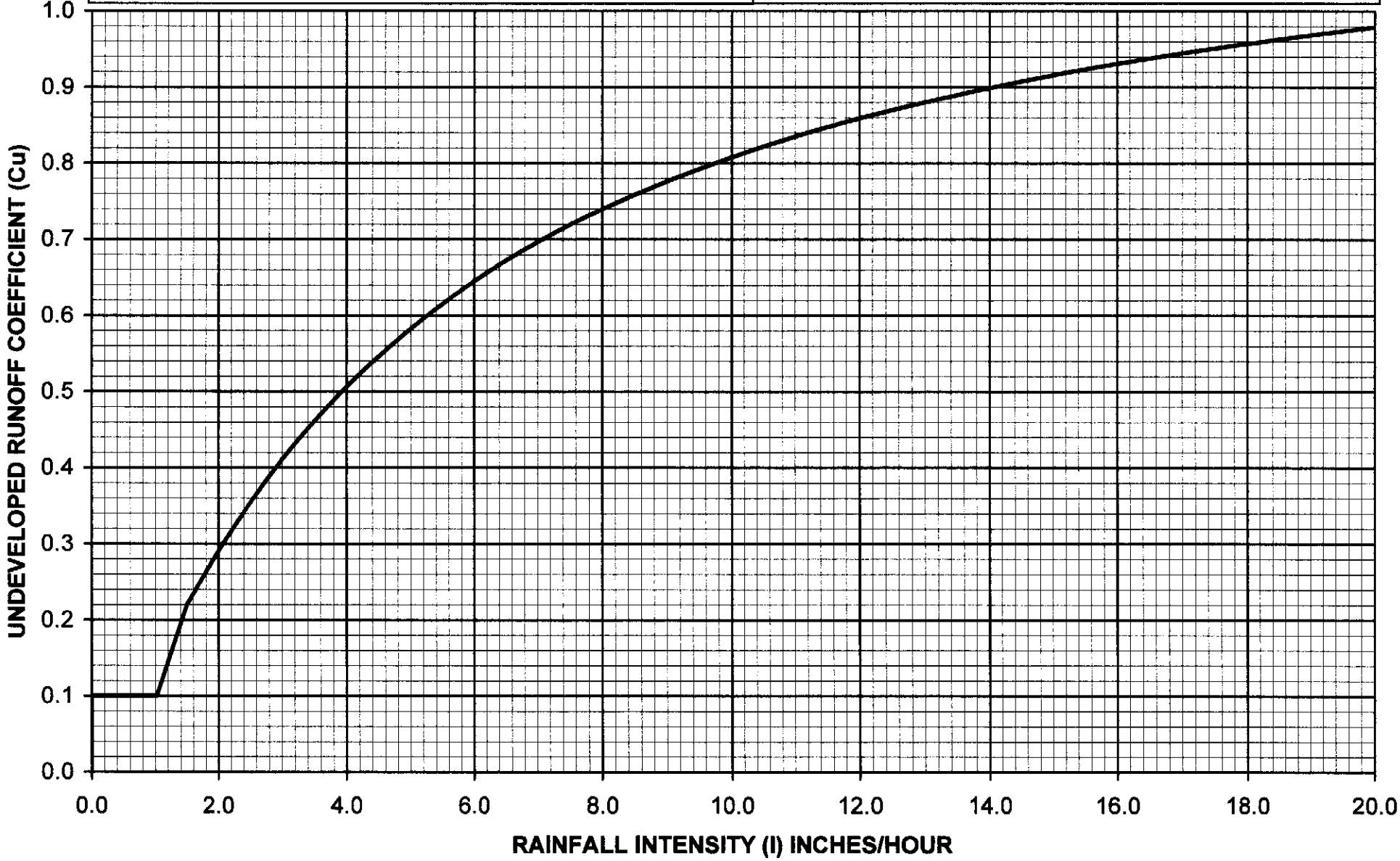


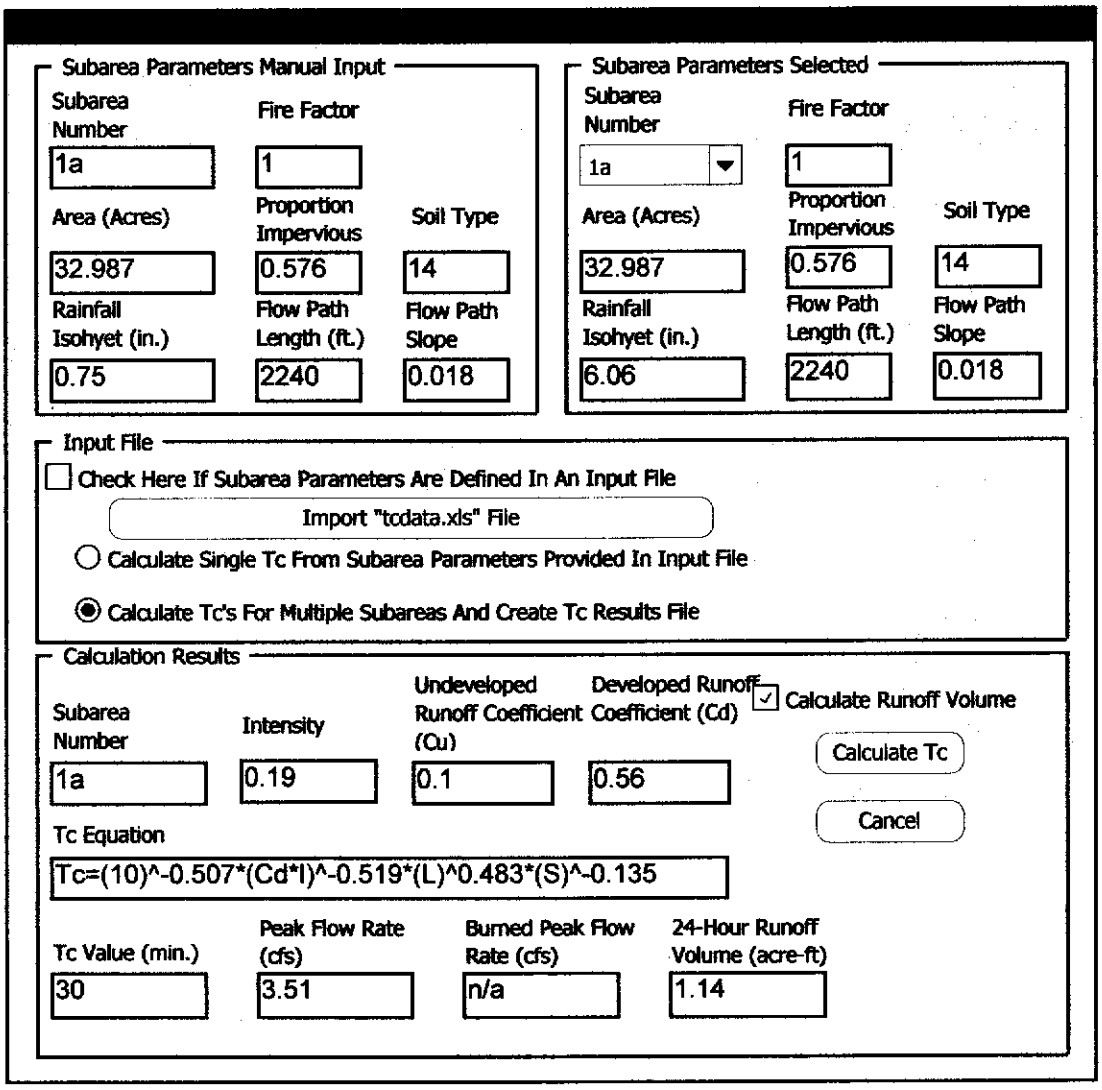
$C_D = (0.9 * IMP) + (1.0 - IMP) * C_U$

Where: C_D = Developed Runoff Coefficient
IMP = Proportion Impervious
C_U = Undeveloped runoff coefficient

Los Angeles County Department of Public Works

RUNOFF COEFFICIENT CURVE
SOIL TYPE NO. 015

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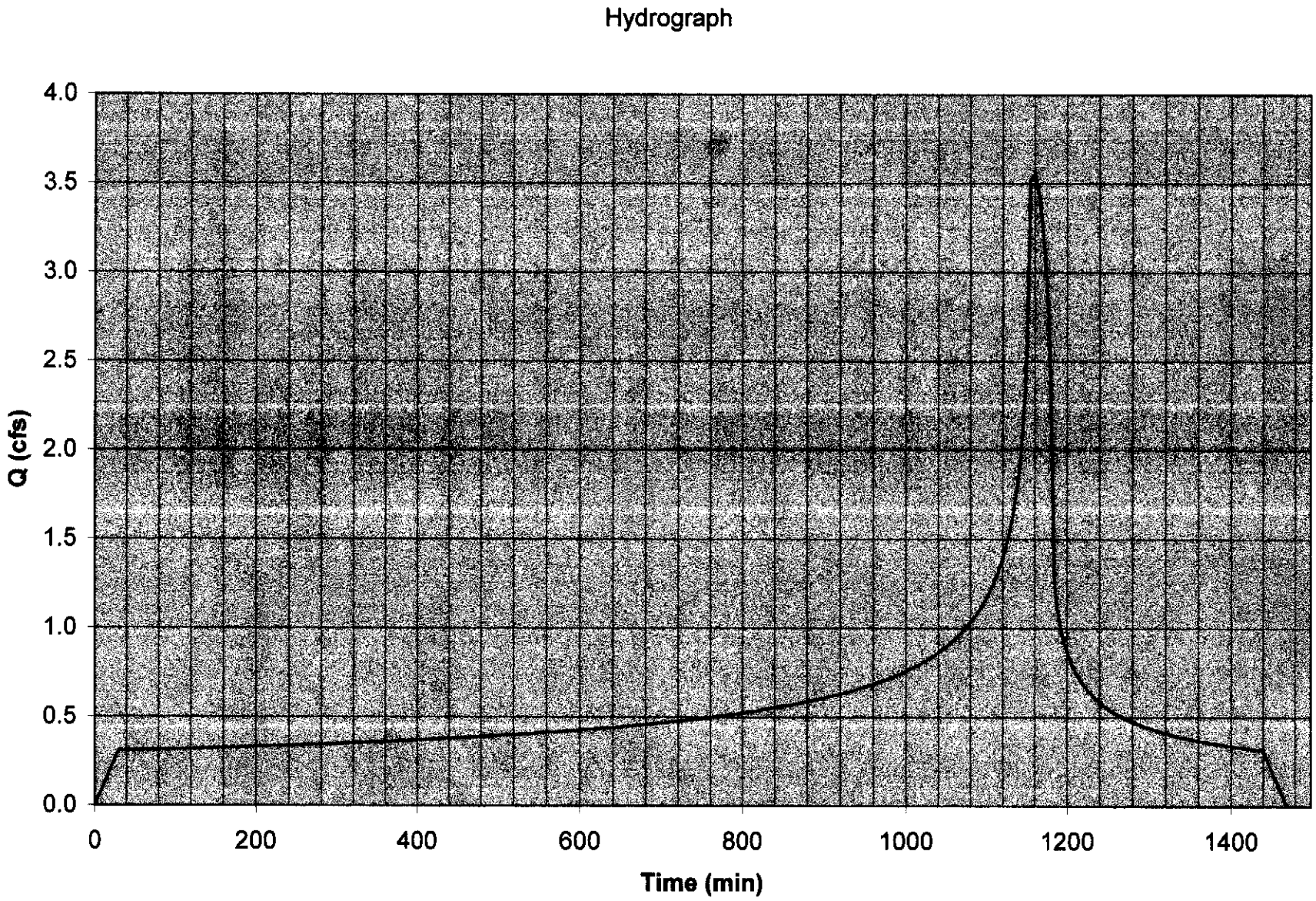
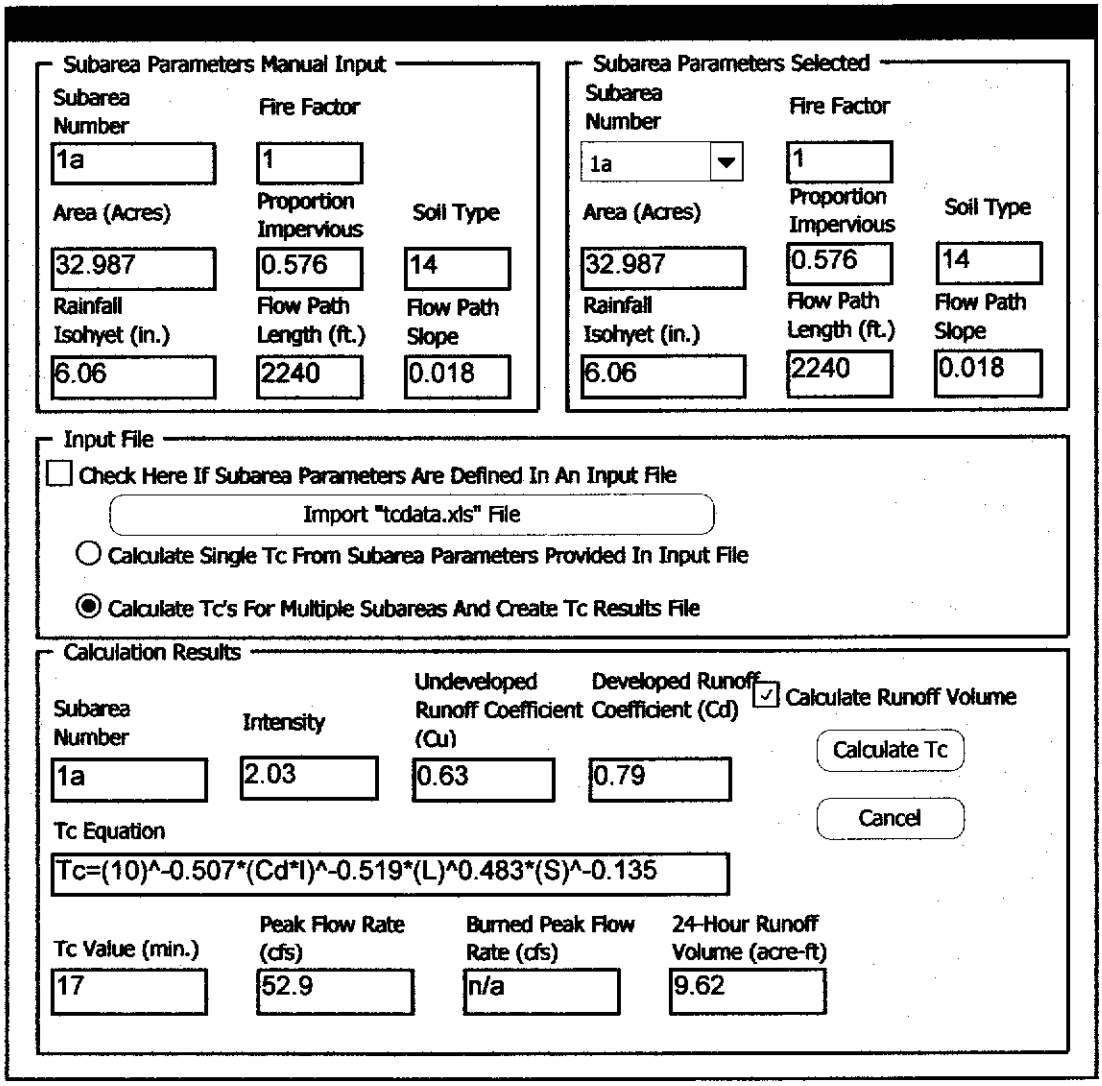
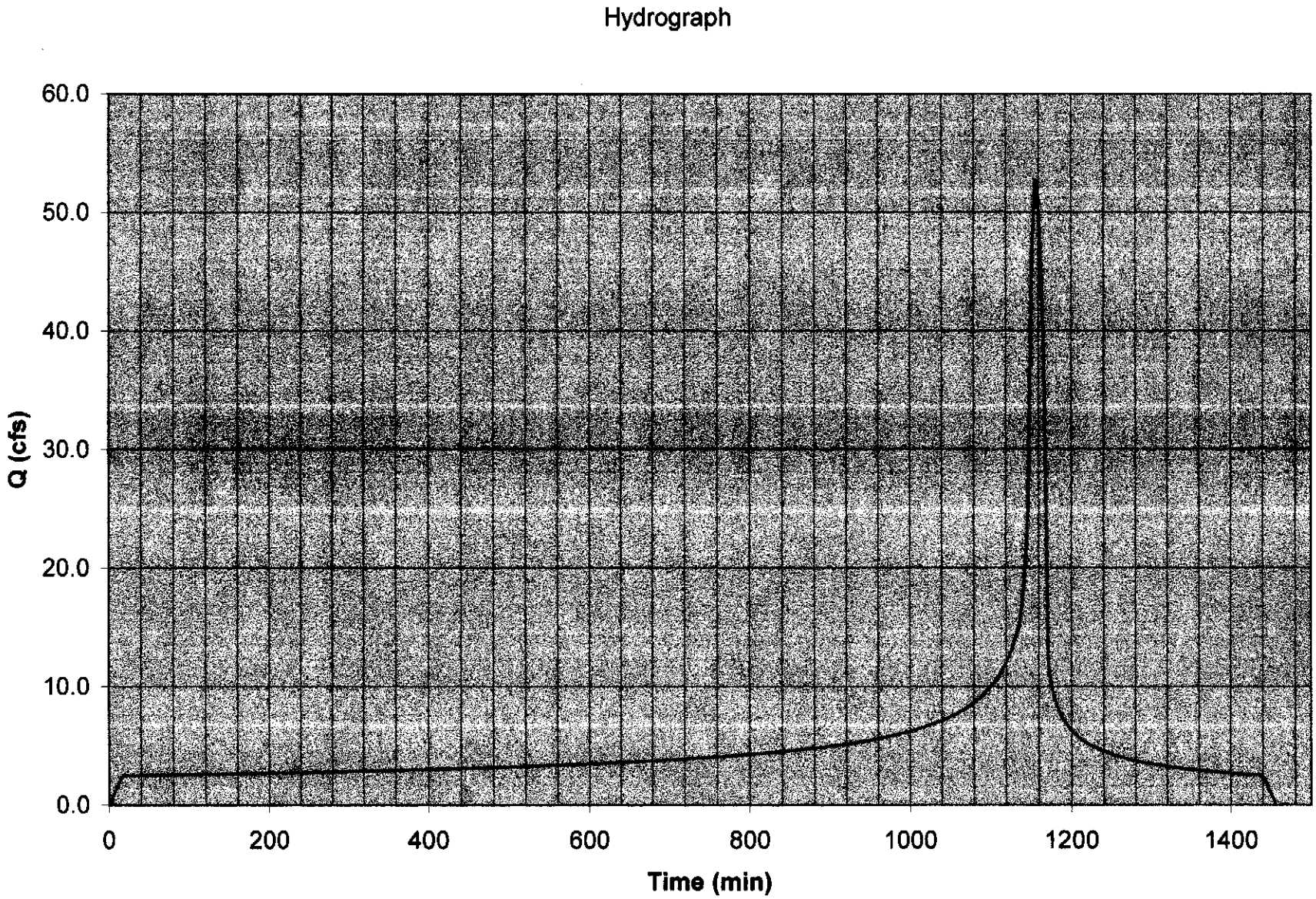
Subarea Number
1a
Fire Factor
1
Area (Acres)
32.987
Proportion Impervious
0.576
Soil Type
14
Rainfall Isohyet (in.)
0.75
Flow Path Length (ft.)
2240
Flow Path Slope
0.018
Subarea Parameters Selected
Subarea Number
1a
Fire Factor
1
Area (Acres)
32.987
Proportion Impervious
0.576
Soil Type
14
Rainfall Isohyet (in.)
6.06
Flow Path Length (ft.)
2240
Flow Path Slope
0.018
Input File
Check Here If Subarea Parameters Are Defined In An Input File
Import "tcdata.xls" File
Calculate Single Tc From Subarea Parameters Provided In Input File
Calculate Tc's For Multiple Subareas And Create Tc Results File
Calculation Results
Subarea Number
1a
Intensity
0.19
Undeveloped Runoff Coefficient (Cu)
0.1
Developed Runoff Coefficient (Cd)
0.56
Calculate Runoff Volume
Calculate Tc
Cancel
Tc Equation
Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Tc Value (min.)
30
Peak Flow Rate (cfs)
3.51
Burned Peak Flow Rate (cfs)
n/a
24-Hour Runoff Volume (acre-ft)
1.14

Pacoima Wash 8th Street 3/4-inch Storm




Subarea Parameters Manual Input
Subarea Number
1a
Fire Factor
1
Area (Acres)
32.987
Proportion Impervious
0.576
Soil Type
14
Rainfall Isohyet (in.)
6.06
Flow Path Length (ft.)
2240
Flow Path Slope
0.018
Subarea Parameters Selected
Subarea Number
1a
Fire Factor
1
Area (Acres)
32.987
Proportion Impervious
0.576
Soil Type
14
Rainfall Isohyet (in.)
6.06
Flow Path Length (ft.)
2240
Flow Path Slope
0.018
Input File
Check Here If Subarea Parameters Are Defined In An Input File
Import "tcdata.xls" File
Calculate Single Tc From Subarea Parameters Provided In Input File
Calculate Tc's For Multiple Subareas And Create Tc Results File
Calculation Results
Subarea Number
1a
Intensity
2.03
Undeveloped Runoff Coefficient (Cu)
0.63
Developed Runoff Coefficient (Cd)
0.79
Calculate Runoff Volume
Calculate Tc
Cancel
Tc Equation
Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Tc Value (min.)
17
Peak Flow Rate (cfs)
52.9
Burned Peak Flow Rate (cfs)
n/a
24-Hour Runoff Volume (acre-ft)
9.62

Pacoima Wash 8th Street -- 25 Year

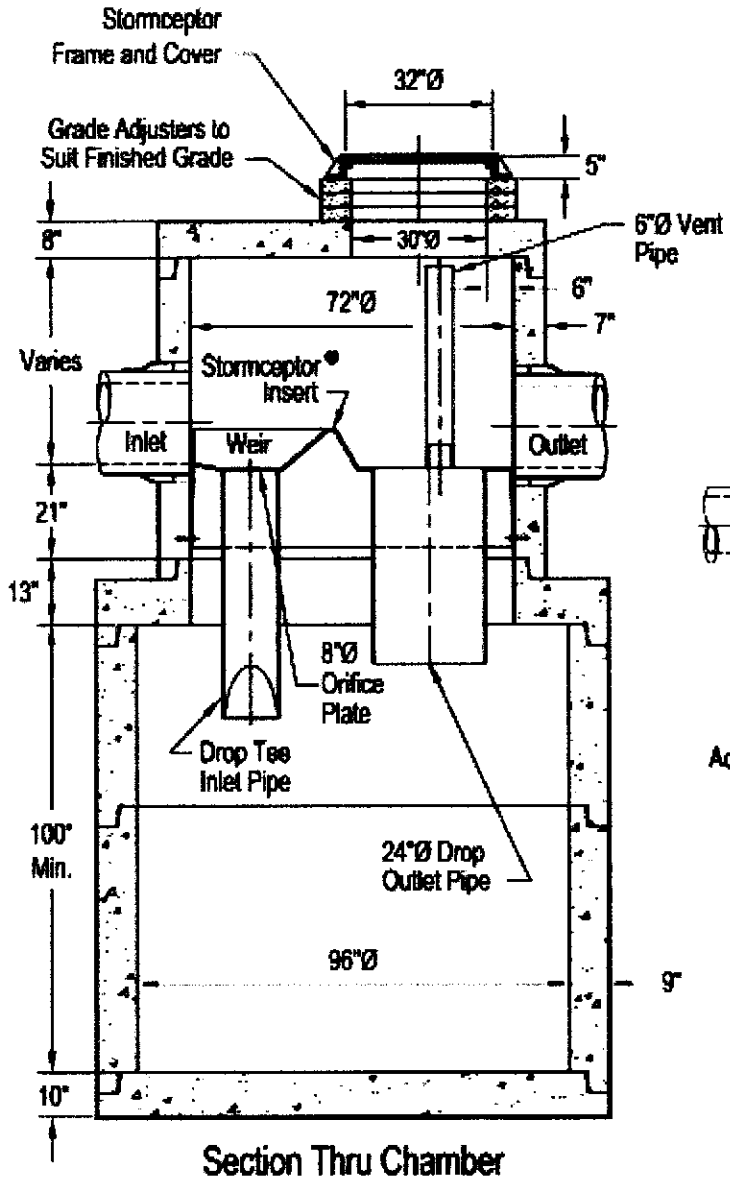


Appendix A

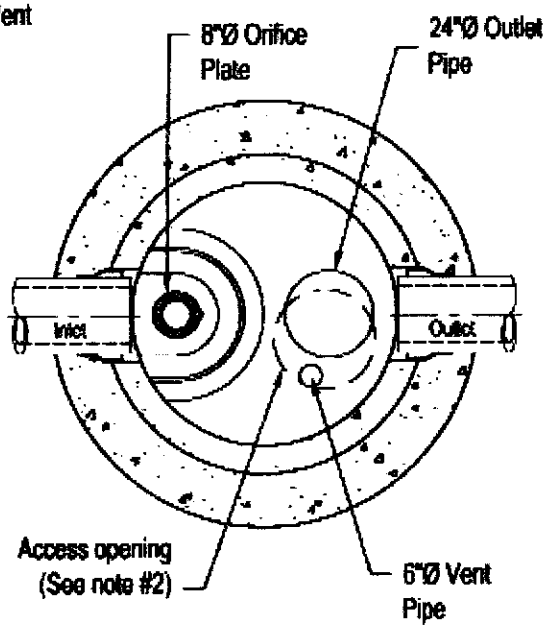
STC 3600 Precast Concrete Stormceptor®

(3600 US Gallon Capacity)

$ 204
+ Inst.



Section Thru Chamber



Plan View

Notes:

1. The Use Of Flexible Connection is Recommended at The Inlet and Outlet Where Applicable.
2. The Cover Should be Positioned Over The Outlet Drop Pipe and The Vent Pipe.
3. The Stormceptor System is protected by one or more of the following U.S. Patents: #4985148, #5498331, #5725760, #5753115, #5849181, #6068765, #6371690.
4. Contact a Hydro Conduit representative for further details not listed on this drawing.

8THSTPARKSTORMCEPTOR1

Stormceptor CD Sizing Program Version 4.0.0

Country United States

Date 2/27/06

Project Number	
Project Name	8TH STREET PARK
Project Location	SAN FERNANDO
Company	
Designer	MARTIN

Notes

Rainfall Station	CHATSWORTH RESERVOIR
Rainfall File	CA1682.NDC
Latitude =	N 34 deg 13 min
Longitude =	W 118 deg 37 min
Elevation =	905. ft
Rainfall Period of Record	1984 to 1994

Site Parameters

Total Drainage Area	18.00 ac
Total Imperviousness (%)	57.00
Overland Flow Width	1771. ft
Overland Slope (%)	2.0
Impervious Depression Storage	0.020 in
Pervious Depression Storage	0.200 in
Impervious Mannings n	0.015
Pervious Mannings n	0.250

Infiltration Parameters

Horton Infiltration Used	
Initial (Max) Infiltration Rate	2.44 in/h
Final (Min) Infiltration Rate	0.40 in/h
Infiltration Decay Rate (1/sec)	0.00055
Infiltration Regeneration Rate (1/sec)	0.010

Daily evaporation 0.100 in/day

Sediment build-up reduces the storage volume for settling calculations
A maintenance cycle of 12 months was chosen
(The Stormceptor will be cleaned out every 12 months)

TSS Loading Calculations

Buildup / Washoff Loading Chosen

Buildup Washoff allocates more washoff in the rising limb of the hydrograph

Target Event Mean Concentration (mg/l) 125.

Buildup Exponent	0.400
Washoff Exponent	0.200
Availability Factors for Particles >=	400. um
Availability = A + Bi^C	
A =	0.057
B =	0.040
i =	rainfall intensity
C =	1.100

Stormwater Particle Size Distribution Table

Diameter (um)	Percent (%)	Specific Gravity	Settling Velocity ft/s
20.0	20.0	1.30	0.0013
60.0	20.0	1.80	0.0051
150.0	20.0	2.20	0.0354
400.0	20.0	2.65	0.2123
2000.0	20.0	2.65	0.9417

Flocculated settling assumed for particles <= 20 um

Rainfall records	1984 to 1994
Total rainfall period	11 years
Total rainfall =	123.1 in
Average annual rainfall =	11.2 in

Rainfall event analysis

2.0 hour inter event time used to determine # of events

< in	Events	%	Vol in	%
0.25	194	60.2	16.	13.1
0.50	48	14.9	17.	13.9
0.75	27	8.4	16.	13.3
1.00	20	6.2	18.	14.3
1.25	10	3.1	11.	8.9
1.50	7	2.2	10.	7.9
1.75	4	1.2	7.	5.4
2.00	3	0.9	5.	4.5
2.25	4	1.2	8.	6.9
2.50	0	0.0	0.	0.0
2.75	1	0.3	3.	2.1
3.00	2	0.6	6.	4.8
3.25	2	0.6	6.	4.9
3.50	0	0.0	0.	0.0
3.75	0	0.0	0.	0.0
4.00	0	0.0	0.	0.0
4.25	0	0.0	0.	0.0
4.50	0	0.0	0.	0.0
4.75	0	0.0	0.	0.0
5.00	0	0.0	0.	0.0
5.25	0	0.0	0.	0.0
5.50	0	0.0	0.	0.0
5.75	0	0.0	0.	0.0
6.00	0	0.0	0.	0.0
6.25	0	0.0	0.	0.0

	6.50	0	0.0	0.	0.0
	6.75	0	0.0	0.	0.0
	7.00	0	0.0	0.	0.0
	7.25	0	0.0	0.	0.0
	7.50	0	0.0	0.	0.0
	7.75	0	0.0	0.	0.0
	8.00	0	0.0	0.	0.0
	8.25	0	0.0	0.	0.0
>	8.25	0	0.0	0.	0.0

Total rain 123. in
Number of rain events 322

Rainfall intensity analysis

Average intensity = 0.12 in/h

< in/h	Number	%	Vol in	%
0.25	3877	91.9	89.	71.9
0.50	282	6.7	24.	19.3
0.75	44	1.0	7.	5.3
1.00	12	0.3	3.	2.2
1.25	6	0.1	2.	1.3
1.50	0	0.0	0.	0.0
1.75	0	0.0	0.	0.0
2.00	0	0.0	0.	0.0
2.25	0	0.0	0.	0.0
2.50	0	0.0	0.	0.0
2.75	0	0.0	0.	0.0
3.00	0	0.0	0.	0.0
3.25	0	0.0	0.	0.0
3.50	0	0.0	0.	0.0
3.75	0	0.0	0.	0.0
4.00	0	0.0	0.	0.0
4.25	0	0.0	0.	0.0
4.50	0	0.0	0.	0.0
4.75	0	0.0	0.	0.0
5.00	0	0.0	0.	0.0
5.25	0	0.0	0.	0.0
5.50	0	0.0	0.	0.0
5.75	0	0.0	0.	0.0
6.00	0	0.0	0.	0.0
6.25	0	0.0	0.	0.0
6.50	0	0.0	0.	0.0
6.75	0	0.0	0.	0.0
7.00	0	0.0	0.	0.0
7.25	0	0.0	0.	0.0
7.50	0	0.0	0.	0.0
7.75	0	0.0	0.	0.0
8.00	0	0.0	0.	0.0
8.25	0	0.0	0.	0.0
> 8.25	0	0.0	0.	0.0

Total rainfall = 123.1 in
Total evaporation = 4.2 in
Total infiltration = 52.8 in
% Rainfall as runoff = 53.8 %

Average Event Mean Concentration for TSS (mg/l) 116.2

TSS Removal Simulation Results Table

Stormceptor Model	Treated Q cfs	% Runoff Treated	Tank TSS Removal (%)	Overall TSS Removal (%)
STC 450	0.283	29.	62.	36.
STC 900	0.636	51.	65.	50.
STC 1200	0.636	51.	65.	50.
STC 1800	0.636	51.	65.	51.
STC 2400	1.059	67.	67.	59.
STC 3600	1.059	67.	68.	60.
STC 4800	1.766	82.	70.	67.
STC 6000	1.766	82.	70.	67.
STC 7200	2.472	89.	73.	71.
STC 11000	3.531	95.	77.	76.
STC 13000	3.531	95.	77.	77.
STC 16000	4.944	97.	80.	80.

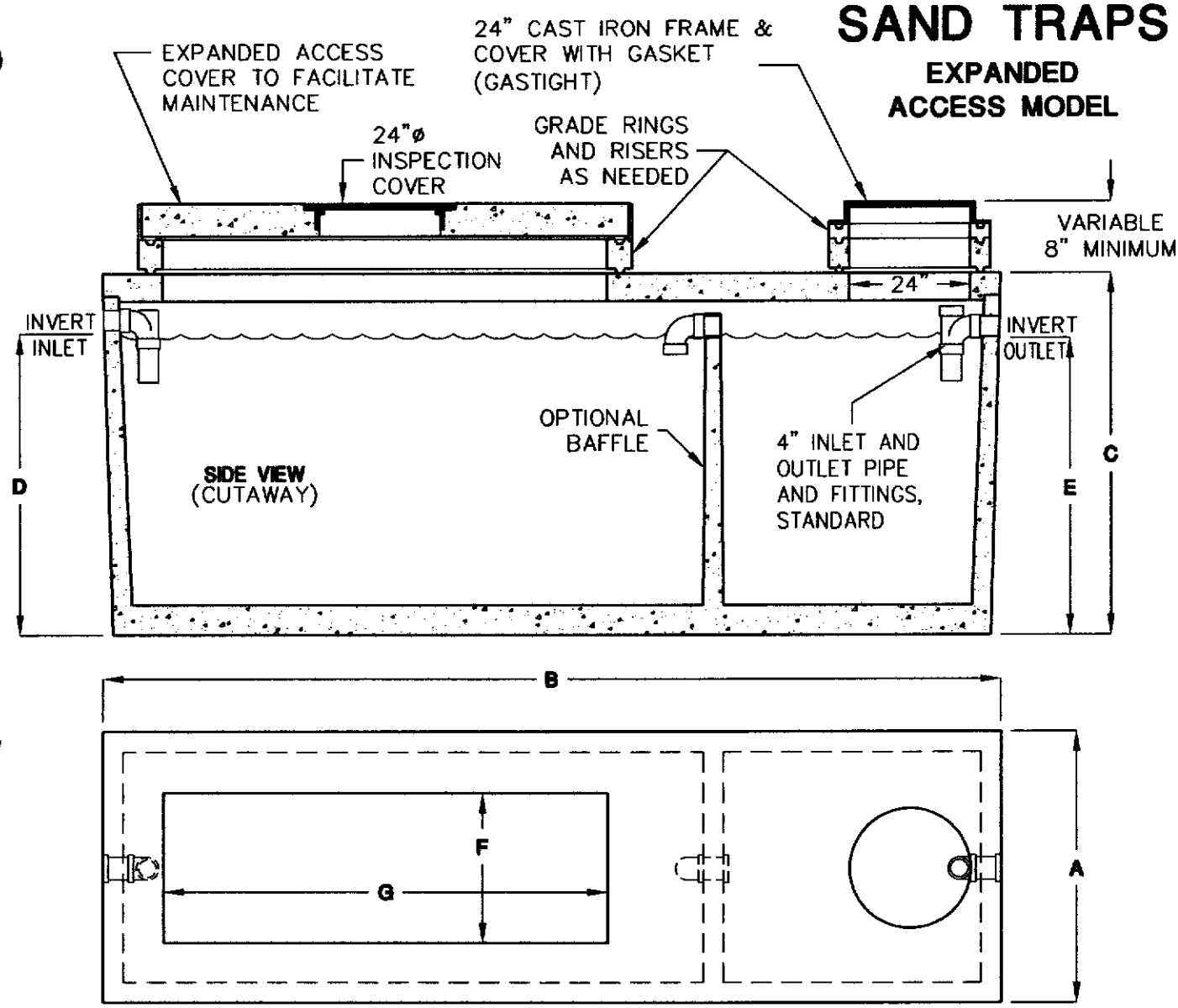
Hydrology Table - Volume of Runoff Treated vs By-Pass Flow Rate

Treated Q cfs	Treated Vol ft3	Over Vol ft3	Tot Vol ft3	% Treated
0.035	216550.	4110574.	4327125.	5.0
0.141	724337.	3602796.	4327125.	16.7
0.318	1364856.	2962258.	4327125.	31.5
0.565	2036089.	2291026.	4327125.	47.1
0.883	2648749.	1678443.	4327125.	61.2
1.271	3143121.	1184000.	4327125.	72.6
1.730	3512976.	814259.	4327125.	81.2
2.260	3784024.	543097.	4327125.	87.4
2.860	3974745.	352428.	4327125.	91.9
3.531	4094148.	232980.	4327125.	94.6
4.273	4170478.	156666.	4327125.	96.4
5.085	4223681.	103443.	4327125.	97.6
5.968	4260069.	67064.	4327125.	98.5
6.922	4284565.	42559.	4327125.	99.0
7.946	4299910.	27218.	4327125.	99.4
9.041	4311770.	15355.	4327125.	99.6
10.206	4319802.	7326.	4327125.	99.8
11.442	4325036.	2090.	4327125.	100.0
12.749	4327111.	15.	4327125.	100.0
14.126	4327125.	0.	4327125.	100.0
15.574	4327125.	0.	4327125.	100.0
17.092	4327125.	0.	4327125.	100.0
18.681	4327125.	0.	4327125.	100.0
20.341	4327125.	0.	4327125.	100.0
22.072	4327125.	0.	4327125.	100.0
23.873	4327125.	0.	4327125.	100.0
25.744	4327125.	0.	4327125.	100.0
27.687	4327125.	0.	4327125.	100.0
29.700	4327125.	0.	4327125.	100.0
31.783	4327125.	0.	4327125.	100.0

End of Simulation

SAND TRAPS

EXPANDED ACCESS MODEL



TOP VIEW (COVERS AND RISERS REMOVED)

MODEL NUMBER	LIQUID CAPACITY GALLONS	DIM A	DIM B	DIM C	DIM D	DIM E	DIM F	DIM G	MINIMUM EXCAVATION WIDTH	MINIMUM EXCAVATION LENGTH
JP-750EE-TPE	750	4'-0"	8'-1"	6'-0"	5'-0"	4'-9"	2'-0"	3'-0"	5'-0"	9'-1"
JP-1000EE-TPE	1000	5'-1"	8'-2"	6'-0"	5'-0"	4'-9"	3'-0"	*3'-0"	6'-1"	9'-2"
JP-1200EE-TPE	1200	5'-9"	8'-6"	6'-0"	5'-0"	4'-9"	3'-0"	*3'-0"	6'-9"	9'-6"
JP-1500EE-TPE	1500	5'-7"	10'-8"	6'-0"	5'-0"	4'-9"	3'-0"	*5'-0"	6'-7"	11'-8"
JP-2000EE-TPE	2000	4'-11"	15'-11"	6'-0"	5'-0"	4'-9"	3'-0"	6'-0"	5'-11"	16'-11"
JZ-2500EE-TPE	2500	5'-9"	16'-10"	6'-0"	5'-0"	4'-9"	3'-6"	8'-6"	6'-9"	17'-10"
JZ-3000EE-TPE	3000	5'-9"	16'-10"	6'-9"	5'-9"	5'-6"	3'-6"	8'-6"	6'-9"	17'-10"
JZ-4000EE-TPE	4000	7'-8"	16'-7"	6'-9"	5'-6"	5'-3"	4'-6"	8'-0"	8'-8"	17'-7"
JZ-5000EE-TPE	5000	7'-8"	16'-7"	7'-11"	6'-9"	6'-6"	4'-6"	8'-0"	8'-8"	17'-7"

#5-64 with modifications

FOR COMPLETE DESIGN AND PRODUCT INFORMATION CONTACT JENSEN PRECAST.

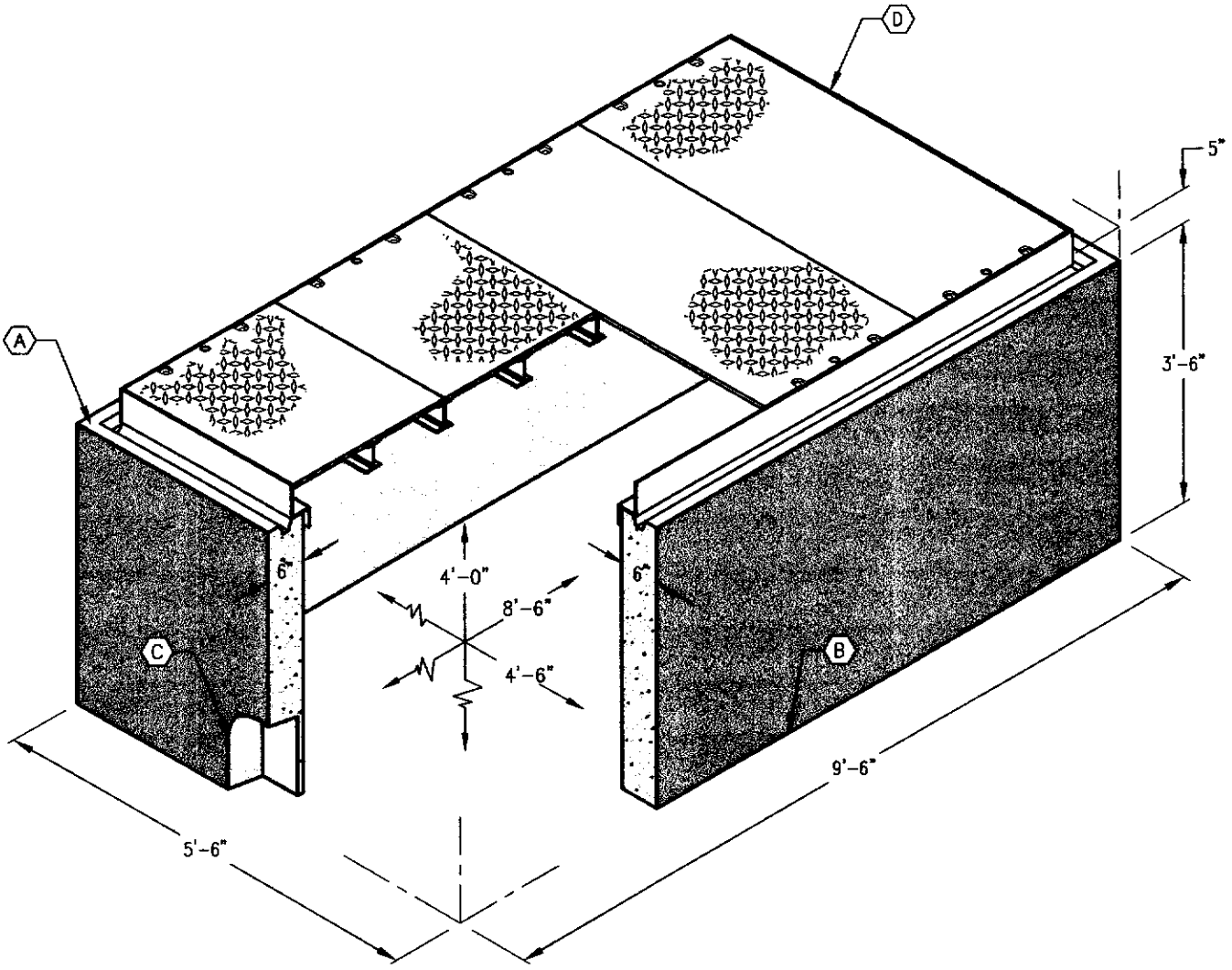
BOX DESIGN LOAD : H-20 TRAFFIC

*3'-0" x 6'-0" ACCESS COVER MAY BE USED IF THE INDIVIDUAL 24"ø COVER IS NOT INCLUDED.

9/23/02
SANDTRAPS_EA.dwg

JENSEN PRECAST

$ 104



■ ILLUSTRATION IS TYPICAL ONLY OF GENERAL SERIES CONFIGURATION: FOR SPECIFIC CONFIGURATION, CALL JENSEN PRECAST.

MINIMUM EXCAVATION SIZE:
6'-6" x 10'-6" x DEPTH REQUIRED.

Ⓐ EXTENSION SECTIONS AVALIABLE.

Ⓑ BOTTOM SECTION WT.= 7,037 Lbs.

Ⓒ 12" WIDE X 12" TALL PIPE KNOCKOUT ON EACH END WALL, CUSTOM SIZES AVALIABLE UPON REQUEST.

Ⓓ FOR COVERS: SEE COVER AND NECKING SECTION.

■ DESIGNED FOR PEDESTRIAN OR LIGHT TRAFFIC LOADING.

■ PLEASE CALL WITH DEPTH REQUIREMENTS, OTHER SIZES ARE AVALIABLE THAN WHAT IS SHOWN.

4'-6" x 8'-6" VARIABLE DEPTH FLAT WALL WATER / GAS VAULT

JENSEN PRECAST

W-4686 SERIES

ORD. DWG. DATE: 11-29-00

REV. DWG. DATE:

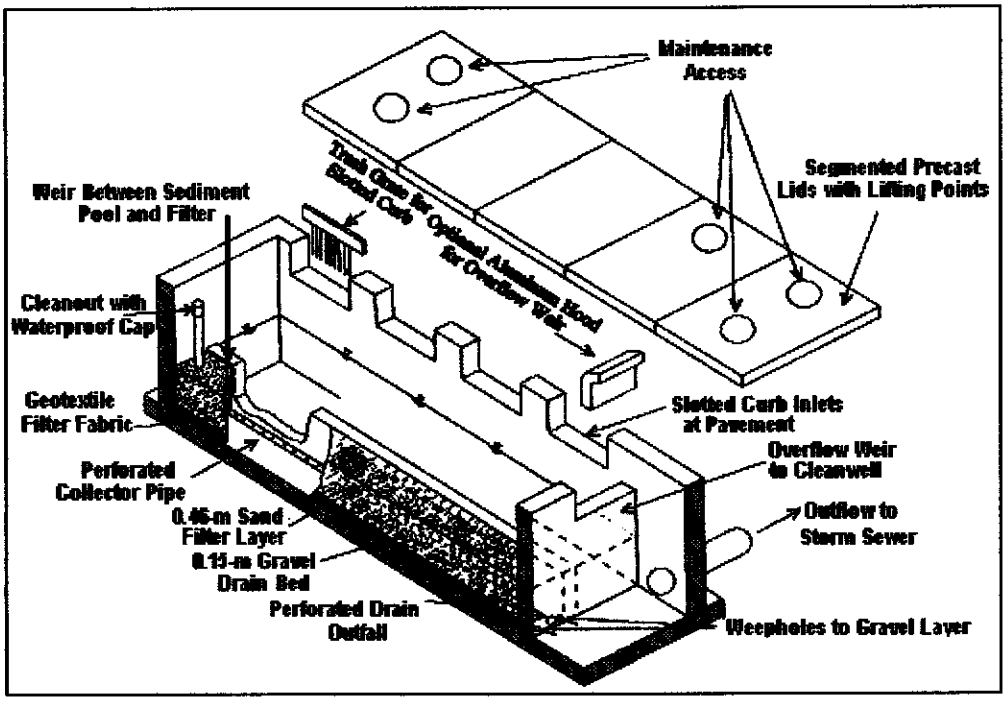


Figure 2-3 Schematic of a Delaware Sand Filter (Young et al., 1996)

Figure 2-4 Escondido MS Delaware Sand Filter

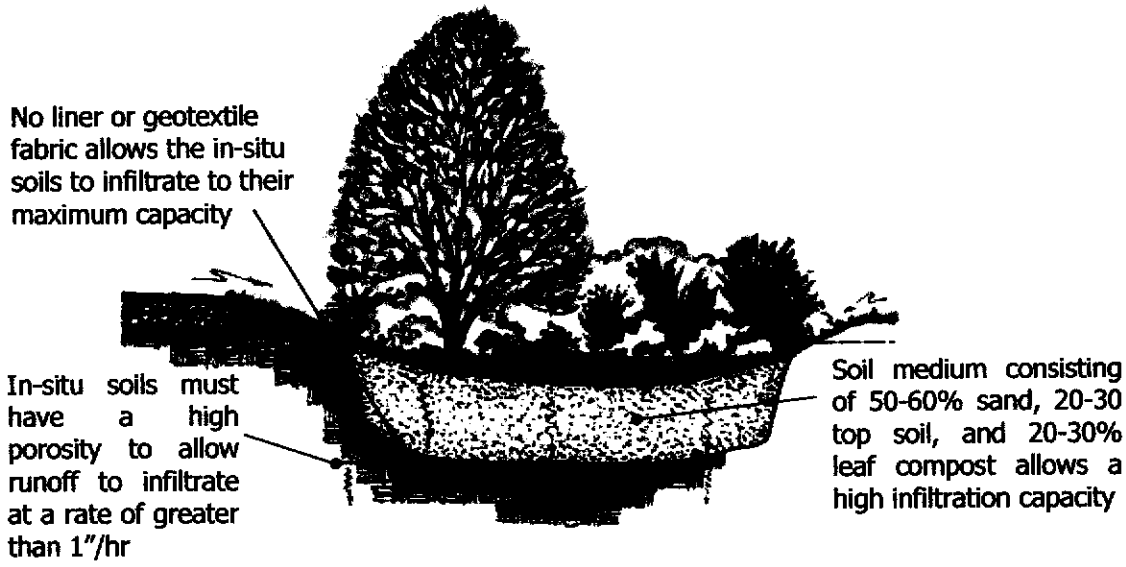


Figure 2.6: Infiltration/Recharge Facility (enhanced infiltration)

This type of facility is recommended for areas where high recharge of groundwater would be beneficial. Because there is no underdrain, the in-situ soils need to have a high infiltration rate to accommodate the inflow levels. The infiltration rate of the in-situ soils must be determined through proper soil testing/diagnostics. Preferably, facilities of this type should have infiltration rates of 1"/hr or greater. Facilities must be at least 2.5 feet deep to allow adequate filtration processes to occur. Siting of these facilities should be in areas where visibility is not a concern because hydraulic overload can cause extended periods of standing water conditions. This facility type is suitable for areas and land uses that are expected to generate nutrient runoff (i.e.; residential and business campuses) that can be infiltrated and captured by the facility. Fresh mulch rather then aged shredded bark mulch can be used to enhance denitrification processes.