P.C.C.E. INC.
CIVIL ENGINEERING AND DESIGN

(WATER QUALITY MITIGATION PLAN) WQMP

LOCATION: 23401 CIVIC CENTER WAY
CITY OF MALIBU, CALIFORNIA

CLIENT: WHOLE FOODS PLAZA

PREPARED BY:

P.C.C.E. INC.
23801 CALABASAS ROAD #1020
CALABASAS CA 91302
(818)568-5251

April 6, 2011

23801 CALABASAS ROAD, SUITE 1020, CALABASAS, CA 91302
(818) 568-5251 FAX (818) 591-8639

The California Regional Water Quality Control Board, Los Angeles Region(Regional Board) is the state regulatory agency responsible for protecting water quality in Los Angeles and Ventura Counties. To accomplish this, the Regional Board issues permits under the National Pollutant Discharge Elimination System (NPDES) as authorized by the federal Clean Water Act. On December 13, 2001, this Regional Board adopted the Los Angeles County Municipal Separate Storm Sewer System Permit, NPDES Permit No. CAS004001, Order No. 01-182 (LA MS4 Permit), under which the City of Malibu is a Permittee.

1. Description of Project Area

The proposed development is located at 23401 Civic Center Way in the City of Malibu, California. The existing area of development is currently composed of commercial development. The proposed project will be consistent with this existing development. A treatment train is proposed for this development to treat all required flows prior to discharge to the ocean. All the roof downspouts will be outfitted with flogard (FG-DS4 and FG-DS6) filters to treat the first flush of rainfall from the roof. The flows from the roof and parking lot will then traverse through a grassy swale (12,750 square feet) prior to entry into the proposed 18"x18" catch basin. Installed in this basin is an ABTECH 1414H which is designed to treat hydrocarbons, trash, sediment and coliform bacteria. This product is effective in treating 80% of the potential hydrocarbons and TSS (300 microns or greater.) The site has 10 of these basins proposed interspersed throughout the site. From this point, the flows will enter an EPIC stormwater treatment chamber with a 45 mil liner to help prevent the potential for any intrusion of site runoff into the groundwater. The system consists of 8 inches of a sand/compost mixture, 36" of clean washed sand and 4" of ¼" minus aggregate and will treat 2.5 gallons per square foot of surface area.

The remainder of this report intends to show how this drainage system is designed to provide Stormwater Management Plan recommendations and implementations pursuant to City of Malibu Local Coastal Plan Chapter 17.

2. SITE DESIGN, SOURCE CONTROL AND TREATMENT CONTROL BEST MANAGEMENT PRACTICES

SITE DESIGN BMP's

There are a variety of site design BMP's that are useful in minimizing or preventing the introduction of pollutants of concern to receiving waters for single family residences. A treatment technique is to increase rainfall infiltration. The project proposes to use of sand infiltration while utilizing a system to will attempt to limit any potential impacts to the existing groundwater table. We are proposing the installation of downspout filters on all downspouts. In addition, we are also directing all rooftop runoff to pervious areas(where feasible) in the vegetated areas. The project avoids routing rooftop runoff to the roadway or to the urban runoff conveyance system. To maximize rainfall interception and minimize directly connected impervious areas, the project proposes to plant native trees and shrubs. To provide slope and channel protection, the project utilizes paved areas onsite to eliminate the potential for sediment to discharge downstream of the project.

The volume of treatment required for this entire site is 12,080 cubic feet based on the ¾" rainfall calculations provided in this report. The EPIC stormwater treatment chambers provide 11,016 cubic feet of treatment and the proposed grassy swales provide 12,762 square feet of surface area treatment. Pervious landscaped areas provide 9,575 square feet of treatment. This is more than adequate for the treatment required for the site.

SOURCE CONTROL BMP's

An effective source control BMP is storm drain stenciling. Storm drain system stenciling will be provided for this project on the catch basins located within throughout the project to increase awareness that this project drains directly to the ocean. Trash container areas have been designed so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. Trash container areas are also screened or walled to prevent off-site transport of trash.

TREATMENT CONTROL BMP's

Some effective treatment control BMP's proposed for the project include the use of media filtration(TC-40), vegetated swales(TC-30) and infiltration basins(TC-11) lined with EPDM 45 mil liner to provide a thorough treatment train for the proposed project.

BMP IMPLEMENTATION

A commercial development has some general pollutant categories expected as a result of the development. They include sediments, nutrients, trash & debris, oxygen demanding substances, oil & grease, bacteria & viruses and pesticides. According to the treatment control matrix on page 291 of the LCP(included), two effective means of site treatment control include filtration systems and infiltration basins. These two systems will be utilized in series to treat the required Qpm and volume onsite . The first flush flow treated on site will utilize the installation of fossil filter inserts to treat the driveway flows which is the largest source of pollutants on the property. In addition to the fossil filters, an infiltration basin is also provided to eliminate the potential for summer nuisance flows to enter the ocean and to provide the volumetric treatment required by the WQMP study.

The recognized BMP for the removal of pesticides, herbicides, or fertilizers is the proper storage of these chemicals in a water tight room or shed. The application of these chemicals should not occur if the five day forecast contains any chance of rain. These chemicals should also not be applied during high temperatures or windy conditions. Additional basic practice guidelines are included in Exhibit D in the maintenance guidelines section.

Maintenance and monitoring programs are included in this report which detail the maintenance required for the infiltration pit, for the fossil filter inserts provided and for the storage of any chemicals that will be required on the property. This will assist these systems in maintaining the effectiveness of these BMP's throughout the life of the project.

3. DRAINAGE IMPROVEMENTS

The project drainage improvements include collecting all onsite runoff(impervious and pervious) and collecting them via catch basin(w/ fossil filter inserts) and area drain into a proposed mainline system(See the included storm drain exhibit-EXHIBIT B).

4. METHODS FOR ON-SITE PERCOLATION, SITE RE-VEGETATION AND AN ANALYSIS OF OFF-SITE IMPACTS

All efforts have been made to minimize and reduce impervious areas and maximize rainfall interception via the use of infiltrators or natural filtration. Where possible, flows have been directed to pervious areas prior to entering the drainage system. Because of the minimal impacts of the subject project, no cut or fill slopes higher than two feet were required for the construction of the building pad and parking lot. However, where re-vegetation is required, all planting will be completed based on the landscape plans prepared for the project by ValleyCrest.

Because of the fact that multiple filtration systems are used to treat the potential runoff, the fact that we are tying the proposed system into an existing drain system, there will be no additional off-site impacts as a direct result of the construction of this single family residence.

5. MEASURES TO TREAT AND INFILTRATE RUNOFF FROM IMPERVIOUS AREAS

The proposed measures to treat and infiltrate runoff from the impervious areas for this project have been discussed above. The methods of filtration are fossil filters and an infiltration basin. These methods have proven effective in limiting the anticipated and potential pollutants generated by a commercial development. Filtration and infiltration are very effective is removing sediment, nutrients, trash and debris, oxygen demanding substances, oil & grease and bacteria. (See the included flow matrix)

6. MAINTENANCE PLAN AND MONITORING OF THE PROPOSED TREATMENT BMP's FOR THE EXPECTED LIFE OF THE STRUCTURE

- Please see EXHIBIT D for all maintenance guidelines for the proposed fossil filter inserts and infiltration pit proposed for the project.

RECORDING REQUESTED BY
AND WHEN RECORDED, MAIL TO:

City of Malibu
Attention: City Clerk
23815 Stuart Ranch Road
Malibu, California 90265

COVENANT TO MAINTAIN DRAINAGE FACILITIES

RECITALS

A. ______________________________(the "Owner") owns that certain real property commonly known as __________________________________, Malibu, California 90265, which is legally described in Exhibit A, attached hereto and incorporated herein by this reference (the "Property")

B. Owner has applied to the City of Malibu to develop a single-family residence on the Property.

C. The City has approved, subject to certain conditions, permits in accordance with its Ordinances which include the requirement of a storm drain retention system and/or drainage treatment facilities.

D. As a condition of its permit, the City requires that Owner execute and record a covenant to maintain its storm drain retention system or drain treatment facilities (as hereinafter defined).

NOW, THEREFORE, Owner hereby covenants and agrees as follows:

1. Owner hereby accepts full responsibility for maintaining the drainage facilities depicted on Exhibit B, attached hereto (the "Facilities"), in good working order, in perpetuity.

2. Owner hereby acknowledges and understands that the failure to properly maintain the Facilities may result in flooding, property damage and/or the unlawful discharge of pollutants to downstream watershed.

3. Owner covenants and agrees to:

a. Perform routine maintenance of the facilities including, but not limited to, cleaning and removal of accumulated sediment within the Facilities annually during a 90-day the time period prior to the beginning of the rain season (July 1st to October 1st).

b. Dispose of accumulated sediment in an approved landfill;

c. Clean and flush the drainage pipes, as necessary, within the Facilities.

d. Have the Facilities inspected annually by a licensed contractor, who shall certify that he has inspected the Facilities and they are in good working order, or if not, list the remedial work recommended be undertaken to place such Facilities in good working order. In the event any such work is recommended by the licensed contractor, Owner shall perform such work expeditiously.

e. Submit such certifications by a licensed contractor annually (prior to October 15th) to the City Engineer using the Certification Form attached hereto as Exhibit "C".

f. Provide any transferee of the Property with the plans of the Facilities, and records of inspections in escrow upon transfer of the Property.

4. The foregoing covenants and agreements shall run with the land and be binding on the heirs, successors and assigns of Owner and inure the benefit of the City.

5. In addition to any other available remedy at law or in equity, this covenant may be enforced by the City or any other party by an action for specific performance and the Property owner shall pay attorneys' fees and costs incurred by the party or parties enforcing this Covenant.

IN WITNESS WHEREOF, Owner has hereunto set his hand the day and year first written above.

____

Name Date

STATE OF CALIFORNIA)
) ss.
COUNTY OF LOS ANGELES)

On __________, 20__ before me, ______________________ Notary Public, Personally appeared ______________ ______________________, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PURJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

____

Notary Public

(Seal)

EXHIBIT “A”

LEGAL DESCRIPTION: PARCEL 1:

A PARCEL OF LAND BEING A PORTION OF THE RANCHO TOPANGA MALIBU SEQUIT, AS CONFIRMED TO MATTHEW KELLER BY PATENT RECORDED IN BOOK 1, PAGES 407 ET SEQ., OF PATENTS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHEASTERLY CORNER OF THE 6.09–ACRE PARCEL OF LAND DESCRIBED IN A DEED FROM MARBLEHEAD LAND COMPANY TO ALBERT J. ASHKAR AND WIFE, RECORDED IN BOOK 19977, PAGE 245, OFFICIAL RECORDS OF SAID COUNTY, SAID POINT OF BEGINNING BEING ALSO IN THE CENTER LINE OF A 40–FOOT ROAD EASEMENT DESCRIBED IN THE ABOVE–MENTIONED DEED; THENCE NORTH 2°32'55" EAST, 551.20 FEET ALONG THE EASTERLY BOUNDARY OF SAID 6.09–ACRE PARCEL TO AN ANGLE POINT THEREIN; THENCE NORTH 3°31'20" WEST, 220.00 FEET; THENCE SOUTH 85° 47'04" EAST 386.20 FEET; THENCE SOUTH 13°11'15" WEST, 700 FEET, MORE OR LESS, TO A POINT IN THE CENTER LINE OF THE ABOVE–MENTIONED 40–FOOT ROAD EASEMENT; THENCE SOUTH 75°41'35" WEST 244.03 FEET, MORE OR LESS, TO THE POINT OF BEGINNING.

EXCEPT THAT PORTION OF SAID LAND LYING NORTHERLY OF A STRAIGHT LINE AND ITS PROLONGATIONS EXTENDING FROM A POINT IN THE EASTERLY LINE FO SAID LAND THAT IS DISTANT SOUTH 13°11'15" WEST, WEST 318.94 FEET FROM THE NORTHEAST CORNER OF SAID LAND TO A POINT IN THE WESTERLY LINE OF SAID LAND THAT IS DISTANT NORTH 2°32'55" EAST 445.27 FEET FROM THE SOUTHWEST CORNER OF SAID LAND.

ALSO EXCEPT THE SOUTHERLY 30 FEET OF SAID LAND AS CONDEMNED FOR PUBLIC ROAD AND HIGHWAY PURPOSES, BY FINAL DECREE OF CONDEMNATION, CASE NO. 740467, SUPERIOR COURT, RECORDED JUNE 27, 1963 AS INSTRUMENT NO. 4825 IN BOOK D–2082, PAGE 448, OFFICIAL RECORDS.

ALSO EXCEPT THEREFROM ALL MINERALS, OIL, PETROLEUM, ASPHALTUM, GAS, COAL AND OTHER HYDROCARBON SUBSTANCES IN, ON, WITHIN AND UNDER SAID LAND, BUT WITHOUT RIGHT OF ENTRY, AND ALSO ALL WATER ON OR UNDER SAID LANDS AND ALL RIPARIAN RIGHTS TO SAID WATERS AS RESERVED BY MARBLEHEAD LAND COMPANY, A DELAWARE CORPORATION IN DEEDS RECORDED JULY 17, 1943 IN BOOK 20111, PAGE 323, AND IN BOOK 18915, PAGE 85 AND IN BOOK 19901, PAGE 44, ALL OF OFFICIAL RECORDS.

APN: 4458–022–001

PARCEL 2:

A PARCEL OF LAND BEING A PORTION OF THE RANCH TOPANGA MALIBU SEQUIT, AS CONFIRMED TO MATTHEW KELLER BY PATENT RECORDED IN BOOK 1, PAGES 407 ET SEQ., OF PATENTS, OFFICIAL RECORDS OF SAID COUNTY, DESCRIBED AS FOLLOWS:

COMMENCING AT A POINT ON THE EASTERLY LINE OF THE 6.09-ACRE PARCEL OF LAND DESCRIBED IN A DEED FROM MARBLEHEAD LAND COMPANY TO ALBER J. ASHKAR AND WIFE RECORDED IN BOOK 19977, PAGE 245, OFFICIAL RECORDS OF SAID COUNTY, SAID POINT BEING DISTANT NORTH 2°32'55" EAST, 551.20 FEET AND NORTH 3°31'20" WEST, 220.00 FEET FROM THE SOUTHEASTERLY CORNER OF SAID ASHKAR PARCEL, SAID POINT ALSO BEING THE TRUE POINT OF BEGINNING FOR THIS DESCRIPTION; THENCE SOUTH 85°47'04" EAST, 200.84 FEET; THENCE SOUTH 13°11'15" WEST, 187.04 FEET; THENCE SOUTH 85°47'04" EAST, 185.36 FEET; THENCE SOUTH 13°11'15" WEST, 131.90 FEET TO THE NORTHERLY LINE OF THAT CERTAIN PARCEL DESCRIBED IN DOCUMENT NO. 90-1319161, RECORDED IN THE OFFICE OF THE RECORDER OF SAID COUNTY; THENCE WESTERLY ALONG SAID NORTHERLY LINE, NORTH 87°27'08" WEST 303.89 FEET TO A POINT IN SAID EASTERLY LINE OF SAID 6.09-ACRE PARCEL; THENCE SOUTHERLY ALONG LAST MENTIONED EASTERLY LINE, SOUTH 2°32'55" WEST, 413.91 FEET TO THE NORTHERLY LINE OF THAT CERTAIN CONDEMNATION FOR ROAD PURPOSES DESCRIBED IN BOOK D-2082, OFFICIAL RECORDS IN THE OFFICE OF THE RECORDER OF SAID COUNTY; THENCE WESTERLY ALONG LAST MENTIONED NORTHERLY LINE, SOUTH 75°41'35" WEST, 52.24 FEET; THENCE, LEAVING SAID NORTHERLY LINE, NORTH 2°32'55" EAST, 100.00 FEET; THENCE NORTH 10°15'10" WEST, 631.58 FEET; THENCE NORTH 79°44'50" EAST, 170.92 FEET TO THE TRUE POINT OF BEGINNING.

ALSO EXCEPT THEREFROM ALL MINERALS, OIL, PETROLEUM, ASPHALTUM, GAS, COAL AND OTHER HYDROCARBON SUBSTANCES IN, ON, WITHIN AND UNDER SAID LAND, BUT WITHOUT RIGHT OF ENTRY, AND ALSO ALL WATER ON OR UNDER SAID LANDS AND ALL RIPARIAN RIGHTS TO SAID WATERS AS RESERVED BY MARBLEHEAD LAND COMPANY, A DELAWARE CORPORATION IN DEEDS RECORDED MAY 8, 1943 IN BOOK 19977, PAGE 245, AND IN BOOK 19985, PAGE 226, BOTH OF OFFICIAL RECORDS.

APN: 4458-022-022

TITLE REPORT: THE TITLE REPORT DATED NOVEMBER 4, 2009 BY FIRST AMERICAN TITLE INSURANCE COMPANY, ORDER NO. NCS-413318-LA2, WAS USED AND IS A PART OF THIS SURVEY.

SITE ADDRESS: 23401 CIVIC CENTER WAY, MALIBU

AREA: 256,168 SQUARE FEET, 5.88 ACRES

BOUNDARY: THE BOUNDARY SHOWN HEREON IS RECORD INFORMATION ADJUSTED TO FOUND CITY CENTERLINE AND SURVEY MONUMENTS USING STANDARD SURVEYING PROCEDURE.

BASIS OF BEARINGS: THE BEARING OF NORTH 75° 41' 35" EAST WAS USED ON THE CENTERLINE OF CIVIC CENTER WAY PER DEED DESCRIPTION, AS SHOWN HEREON.

BENCH MARK: THE ELEVATION OF 26.073 ON BENCH MARK NO. Y-11376 PER L.A. COUNTY PUBLIC WORKS SURVEY SECTION, MALIBU QUAD 2008 (NAVD 88).

EASEMENTS: ITEM NO. 7, AN EASEMENT FOR PIPE LINES AND INCIDENTAL PURPOSES AS RECORDED ON SEPTEMBER 20, 1948 IN BOOK 28303, PAGE 148, OFFICIAL RECORDS. (NOT PLOTTABLE)

ITEM NO. 8, AN EASEMENT FOR PIPE LINES AND INCIDENTAL PURPOSES AS RECORDED ON JULY 17, 1943 AS INSTRUMENT NO. 570 IN BOOK 20111, PAGE 323, OFFICIAL RECORDS.

ITEM NO. 9, AN EASEMENT FOR TELEPHONE AND ELECTRIC LINES AND INCIDENTAL PURPOSES AS RECORDED ON MAY 11, 1950 AS INSTRUMENT NO. 2323 IN BOOK 33102, PAGE 220, OFFICIAL RECORDS.

ITEM NO. 10, AN EASEMENT FOR POLE LINES AND INCIDENTAL PURPOSES AS RECORDED ON JANUARY 4, 1951 AS INSTRUMENT NO. 2954 IN BOOK 35230, PAGE 159, OFFICIAL RECORDS.

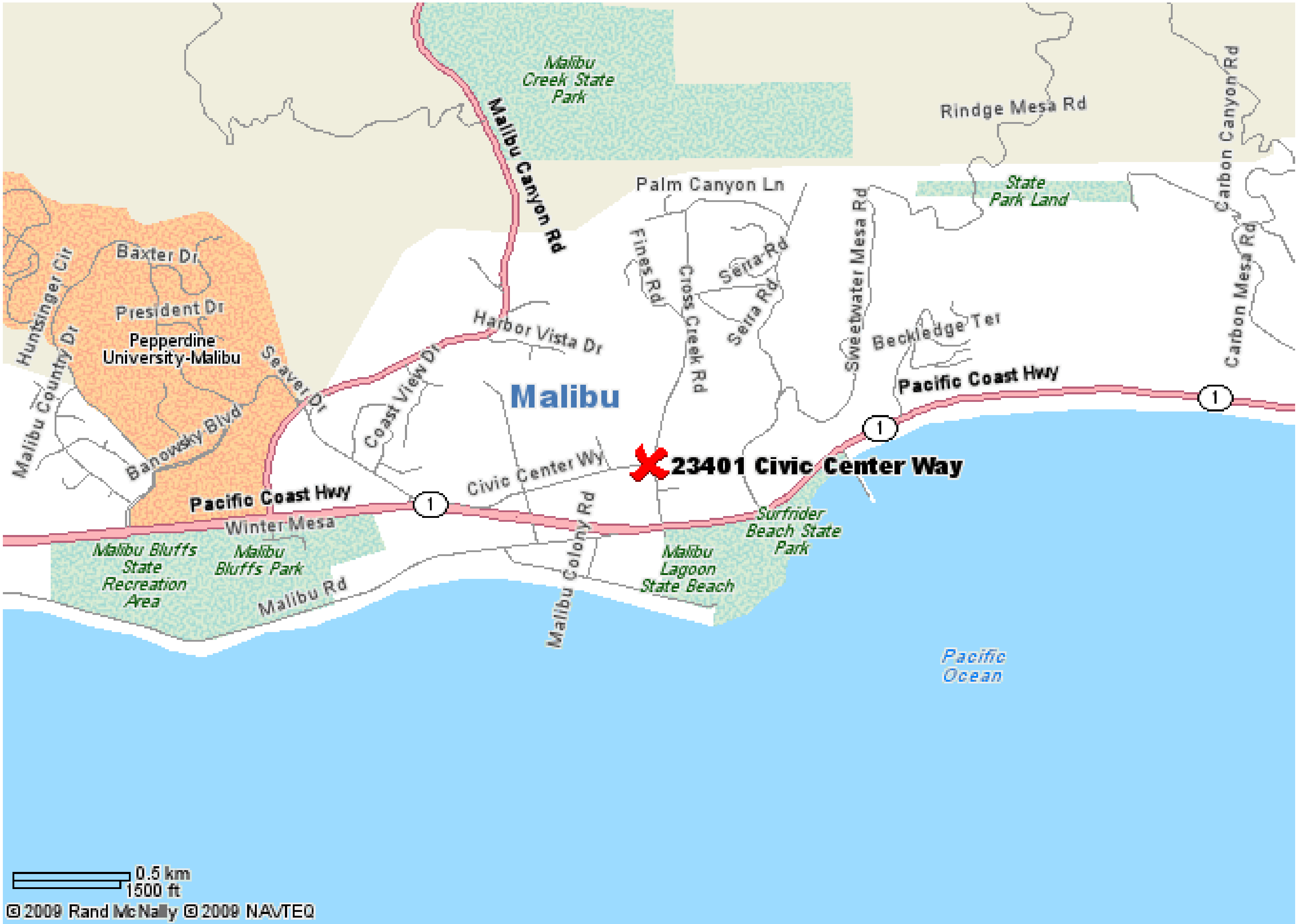
ITEM NO. 11, AN EASEMENT FOR PUBLIC ROAD AND HIGHWAY AND INCIDENTAL PURPOSES AS RECORDED ON JULY 17, 1969 AS INSTRUMENT NO. 2983, OFFICIAL RECORDS.

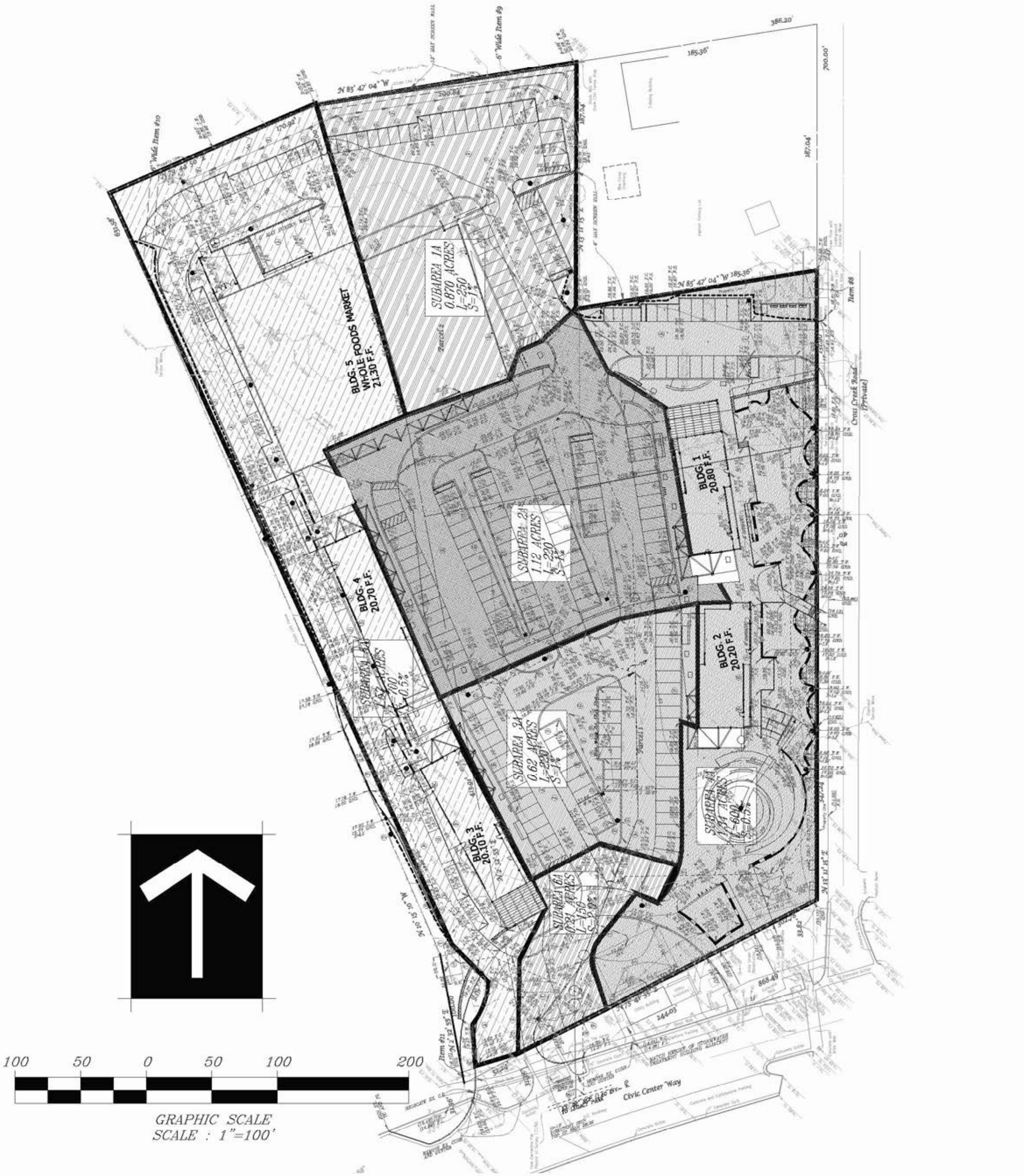
MAPS AND EXHIBITS

P.C.C.E. Inc.
23801 Calabasas Road #1020
Calabasas, California 91302
Tel(818)568-5251 Fax(818)591-8639
E-mail: SRSINVEST@yahoo.com

C) 18x18 CATCH BASIN W/ ABTECH 1414H
F) GRASSY SWALE
H) TRENCH DRAIN(FG-TDOF12)
K) 4" DOWNSPOUT W/FG-DS-4)
L) 6" DOWNSPOUT W/FG-DS-6)
S) EPIC STORMWATER TREATMENT

PROJECT No: 23401 CIVIC CENTER WAY(BMP EXHIBIT)


Malibu Creek State Park
Malibu Canyon Rd
Rindge Mesa Rd
Carbon Canyon Rd
Palm Canyon Ln
State Park Land
Baxter Dr
Huntsinger Cir
President Dr
Pepperdine University-Malibu
Malibu Country Dr
Seaver Dr
Banowsky Blvd
Fines Rd
Cross Creek Rd
Serra Rd
Sweetwater Mesa Rd
Carbon Mesa Rd
Harbor Vista Dr
Beckledge Ter
Coast View Dr
Malibu
Pacific Coast Hwy
1
23401 Civic Center Way
Civic Center Wy
Winter Mesa
Malibu Colony Rd
Surfrider Beach State Park
Malibu Bluffs State Recreation Area
Malibu Bluffs Park
Malibu Lagoon State Beach
Malibu Rd
Pacific Ocean
0.5 km
1500 ft
© 2009 Rand McNally © 2009 NAVTEQ



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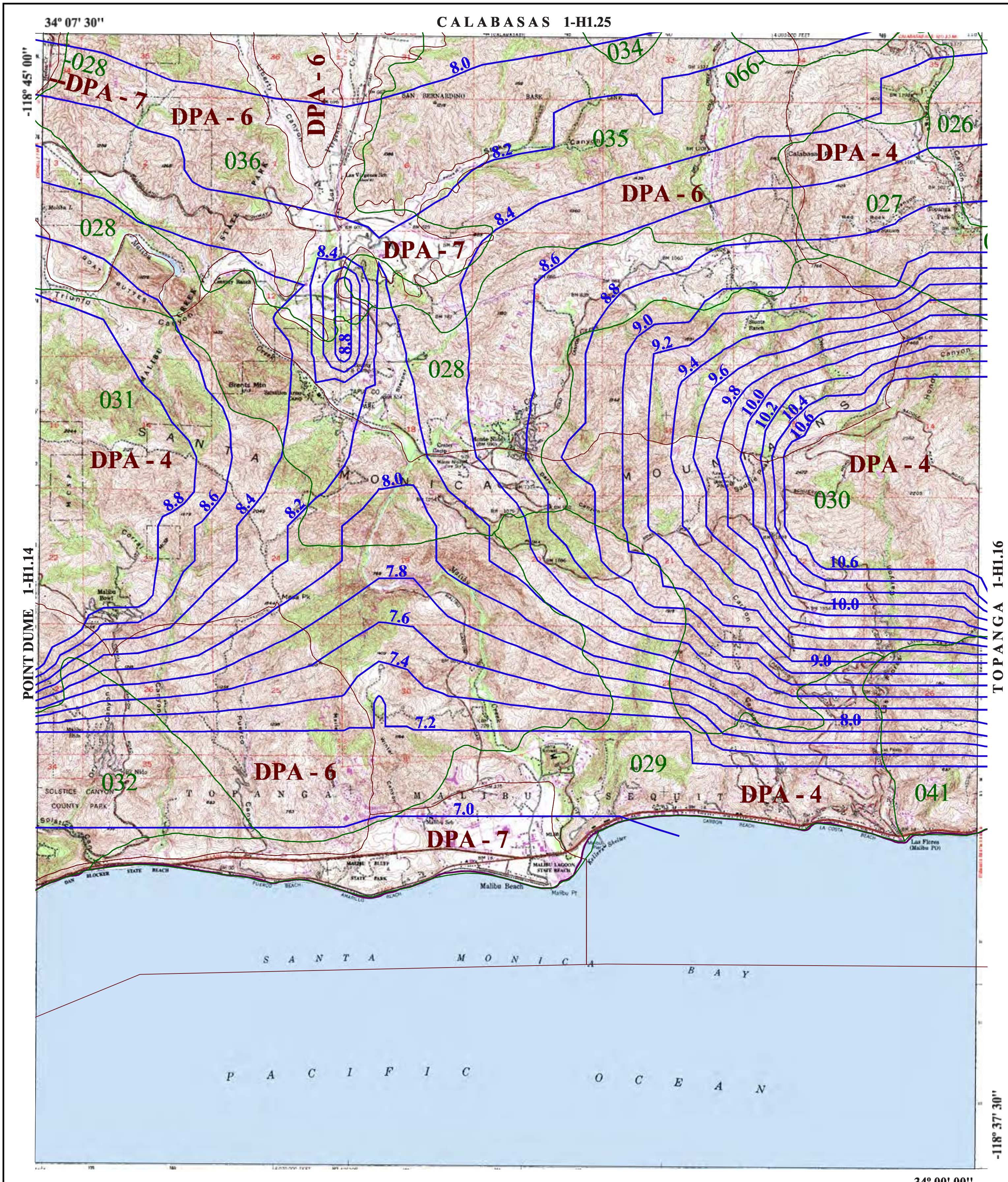
SUBAREA 1A=0.87 ACRES(Qpm=0.15 CFS)
SUBAREA 2A=1.12 ACRES(Qpm=0.21 CFS)
SUBAREA 3A=0.62 ACRES(Qpm=0.19 CFS)
SUBAREA 4A=1.34 ACRES(Qpm=0.19 CFS)
SUBAREA 5A=1.57 ACRES(Qpm=0.22 CFS)
SUBAREA 6A=0.21 ACRES(Qpm=0.05 CFS)

PROJECT No: 23401 CIVIC CENTER WAY(ONSITE HYDROLOGY MAP)



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

MALIBU BEACH
50-YEAR 24-HOUR ISOHYET

1-H1.15

LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works

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

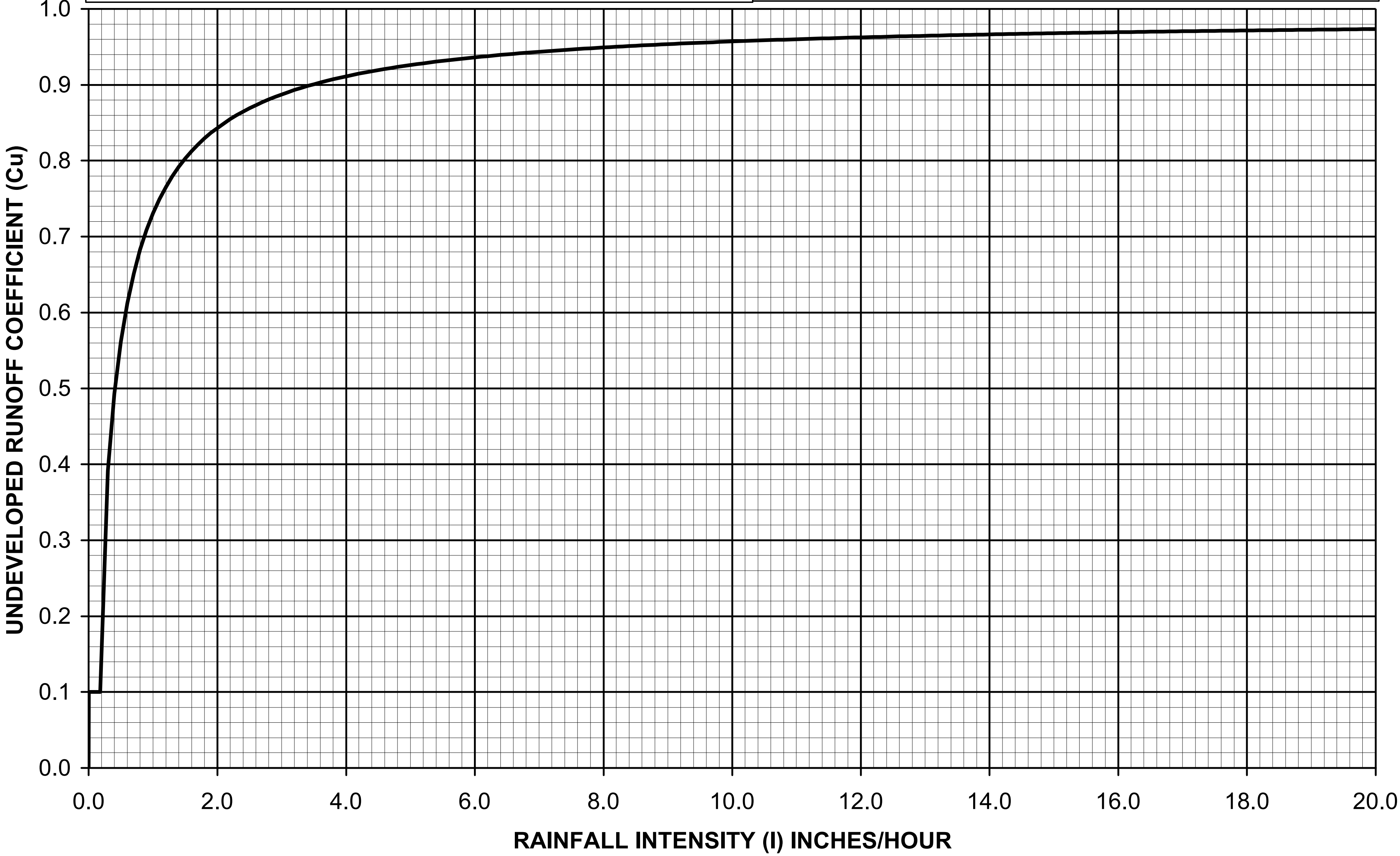
Where: C_D = Developed Runoff Coefficient

IMP = Proportion Impervious

C_U = Undeveloped runoff coefficient

Los Angeles County Department of Public Works

RUNOFF COEFFICIENT CURVE
SOIL TYPE NO. 029

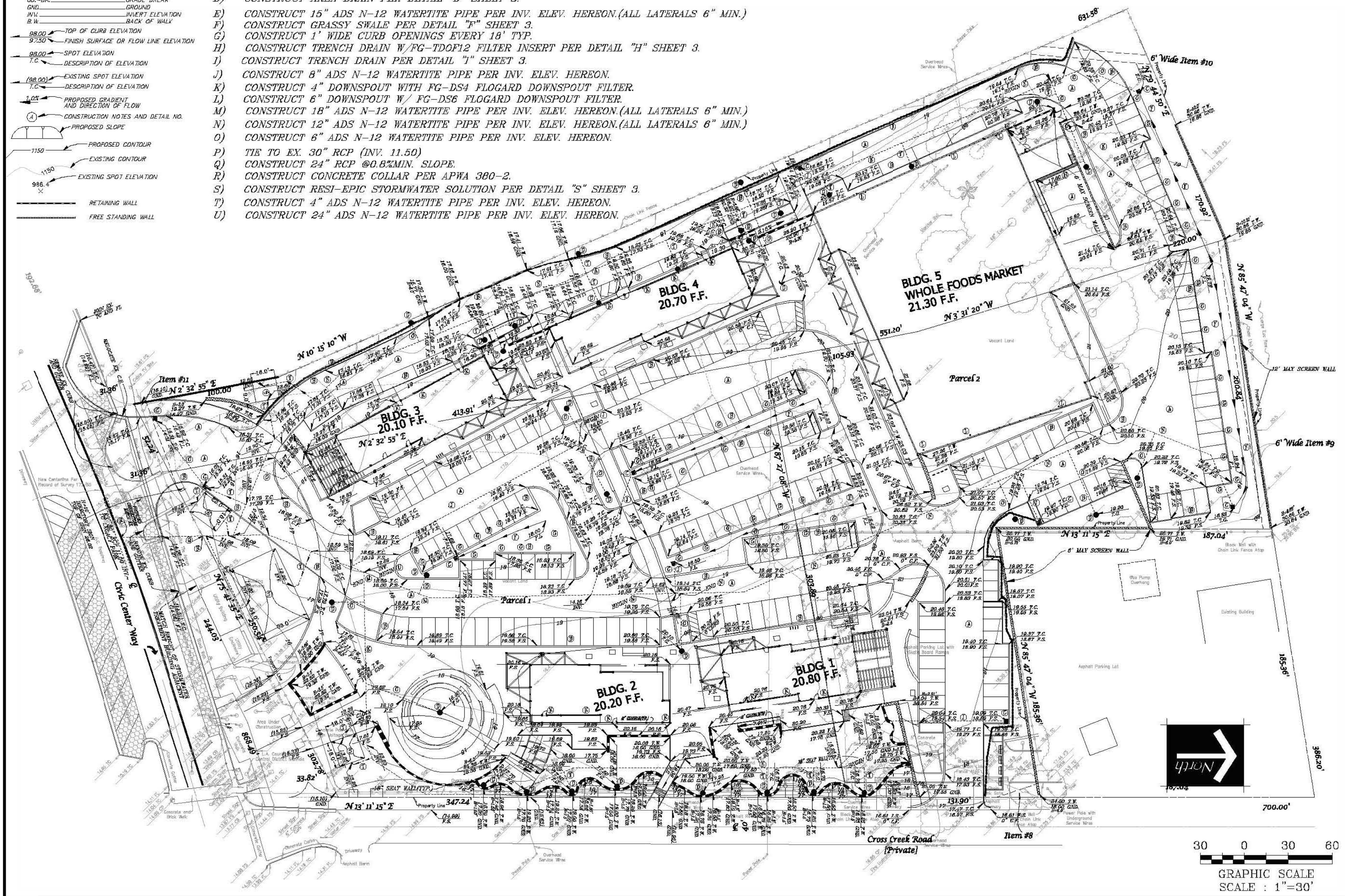


Legend:

F.G.	FINISHED GRADE
F.L.	FLOW LINE
F.S.	FINISHED SURFACE
T.C.	TOP OF CURB
T.W.	TOP OF WALL
H.P.	HIGH POINT
T.G.	TOP OF GRATE
TYP.	TYPICAL
GD.~BK.	GRADE BREAK
GND.	GROUND
INV.	INVERT ELEVATION
B.W.	BACK OF WALK
98.00	TOP OF CURB ELEVATION
97.50	FINISH SURFACE OR FLOW LINE ELEVATION
98.00	SPOT ELEVATION
T.C.	DESCRIPTION OF ELEVATION
(98.00)	EXISTING SPOT ELEVATION
T.C.	DESCRIPTION OF ELEVATION
1.0%	PROPOSED GRADIENT AND DIRECTION OF FLOW
(A)	CONSTRUCTION NOTES AND DETAIL NO.
	PROPOSED SLOPE
1150	PROPOSED CONTOUR
1150	EXISTING CONTOUR
986.4 ×	EXISTING SPOT ELEVATION
	RETAINING WALL
	FREE STANDING WALL

CONSTRUCTION NOTES

A) CONSTRUCT DRIVEWAY PER DETAIL "A" SHEET 3..
B) CONSTRUCT 6" CURB PER APWA 120-1 A1-150(6)
C) CONSTRUCT 18"X18" BROOKS CATCH BASIN W/ ABTECH DI 1414H INSERT PER DETAIL "C" SHEET 3.
D) CONSTRUCT AREA DRAIN PER DETAIL "D" SHEET 3.
E) CONSTRUCT 15" ADS N-12 WATERTITE PIPE PER INV. ELEV. HEREON.(ALL LATERALS 6" MIN.)
F) CONSTRUCT GRASSY SWALE PER DETAIL "F" SHEET 3.
G) CONSTRUCT 1' WIDE CURB OPENINGS EVERY 18' TYP.
H) CONSTRUCT TRENCH DRAIN W/FG-TDOF12 FILTER INSERT PER DETAIL "H" SHEET 3.
I) CONSTRUCT TRENCH DRAIN PER DETAIL "I" SHEET 3.
J) CONSTRUCT 8" ADS N-12 WATERTITE PIPE PER INV. ELEV. HEREON.
K) CONSTRUCT 4" DOWNSPOUT WITH FG-DS4 FLOGARD DOWNSPOUT FILTER.
L) CONSTRUCT 6" DOWNSPOUT W/ FG-DS6 FLOGARD DOWNSPOUT FILTER.
M) CONSTRUCT 18" ADS N-12 WATERTITE PIPE PER INV. ELEV. HEREON.(ALL LATERALS 6" MIN.)
N) CONSTRUCT 12" ADS N-12 WATERTITE PIPE PER INV. ELEV. HEREON.(ALL LATERALS 6" MIN.)
O) CONSTRUCT 6" ADS N-12 WATERTITE PIPE PER INV. ELEV. HEREON.
P) TIE TO EX. 30" RCP (INV. 11.50)
Q) CONSTRUCT 24" RCP @0.8%MIN. SLOPE.
R) CONSTRUCT CONCRETE COLLAR PER APWA 380-2.
S) CONSTRUCT RESI-EPIC STORMWATER SOLUTION PER DETAIL "S" SHEET 3.
T) CONSTRUCT 4" ADS N-12 WATERTITE PIPE PER INV. ELEV. HEREON.
U) CONSTRUCT 24" ADS N-12 WATERTITE PIPE PER INV. ELEV. HEREON.



PLAN REVISION DESCRIPTIONS

PREPARED BY OR UNDER THE DIRECTION OF:

STEPHEN R SMITH P.E. 63480

DATE:

Precise Grading Plan for 23401 Civic Center Way

Prepared for MALIBU WF, LLC MALIBU CA

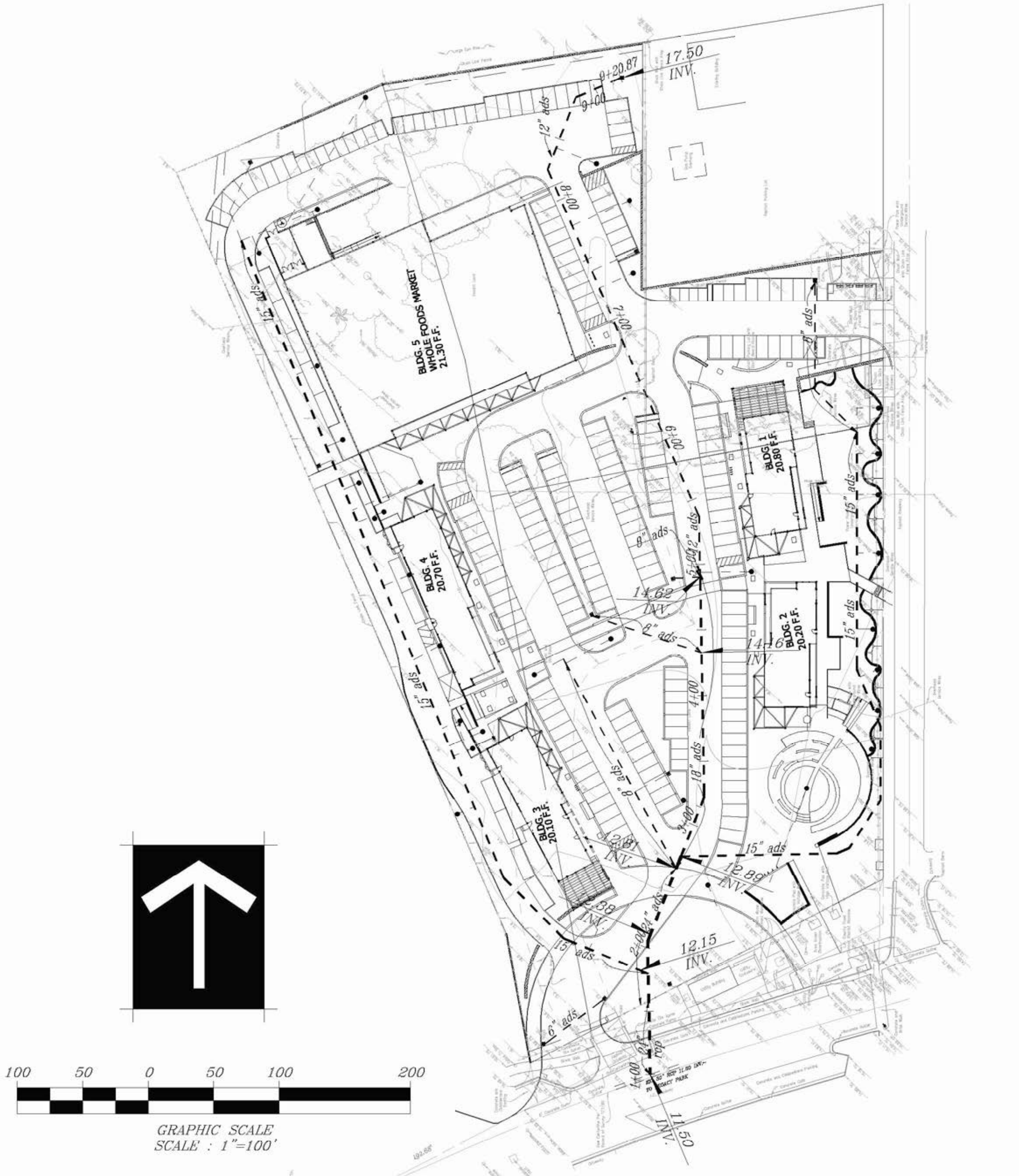
DESCRIPTION:	BY
DESIGNED:	S.S
DRAWN:	S.S
CHECKED:	S.S
SUPERVISED:	S.S
PROJ. ENGINEER:	S.S
DRAWING SCALE:	1"=30'
DWEI JOB NUMBER:	6000-251

SHEET NO.

2

OF 3 SHEETS

PLOT DATE:4-6-11PLANNING REVISION



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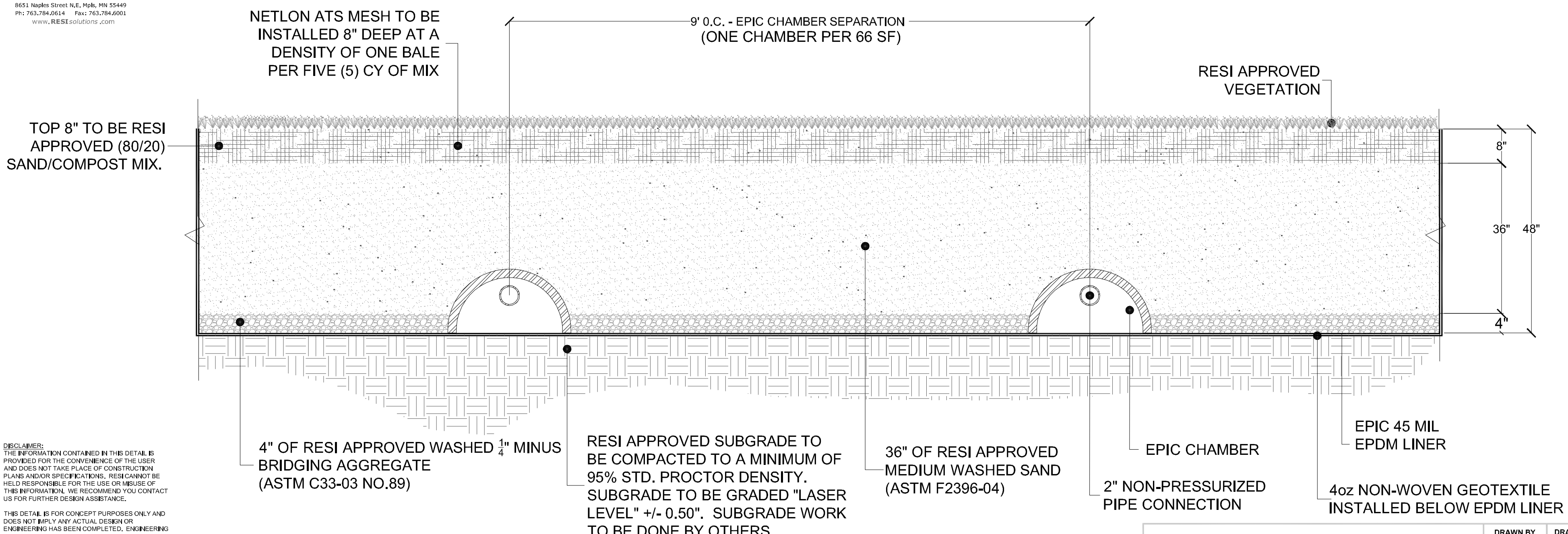
E-mail: SRSINVEST@yahoo.com

PROJECT No: 23401 CIVIC CENTER WAY(STORM DRAIN EXHIBIT)

REHBEIN ENVIRONMENTAL SOLUTIONS, INC
8651 Naples Street N.E. Mpls, MN 55449
Ph: 763.784.0614 Fax: 763.784.6001
www.RESIsolutions.com



DISCLAIMER:
THE INFORMATION CONTAINED IN THIS DETAIL IS PROVIDED FOR THE CONVENIENCE OF THE USER AND DOES NOT TAKE PLACE OF CONSTRUCTION PLANS AND/OR SPECIFICATIONS. RESI CANNOT BE HELD RESPONSIBLE FOR THE USE OR MISUSE OF THIS INFORMATION. WE RECOMMEND YOU CONTACT US FOR FURTHER DESIGN ASSISTANCE.

THIS DETAIL IS FOR CONCEPT PURPOSES ONLY AND DOES NOT IMPLY ANY ACTUAL DESIGN OR ENGINEERING HAS BEEN COMPLETED. ENGINEERING MODELING WILL NEED TO BE PERFORMED TO DETERMINE PROPER HYDROLOGICAL AND STRUCTURAL REQUIREMENTS AND COMPONENTS INCLUDING SAND AND AGGREGATE.

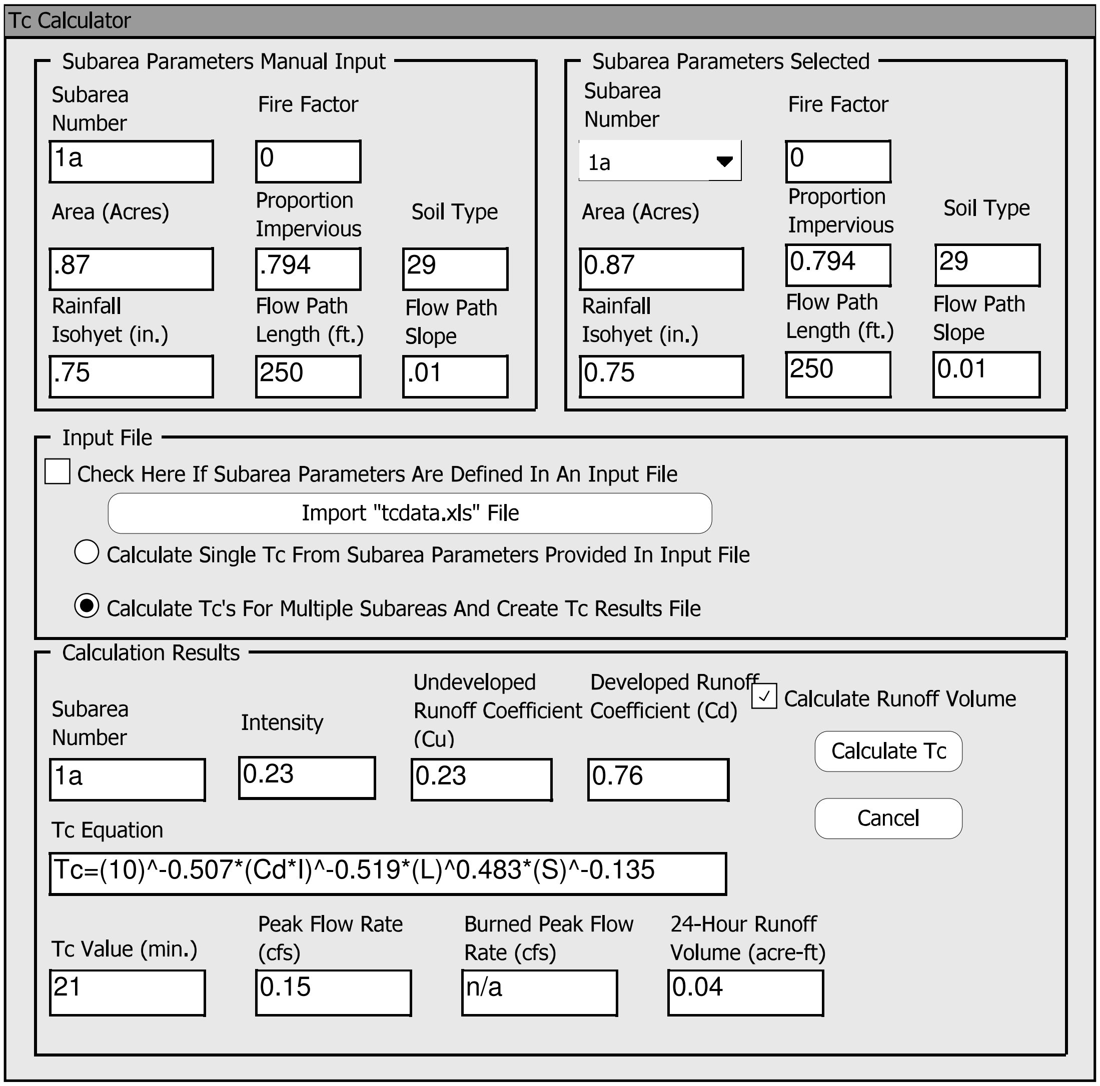
ALL MATERIALS ARE SUBJECT TO APPROVAL BY RESI.

WATER MANAGEMENT APPLICATION NON-INFILTRATION - DEEP PROFILE DETAIL NOT TO SCALE	DRAWN BY TS	DRAWING NO. WMA 2B
		DATE 12-01-08
	CHECKED BY DRL	REVISION DATE 08-01-09

EXHIBIT “B”

SUSMP CALCULATIONS

SUBAREA 1A


Tc Calculator
Subarea Parameters Manual Input
Subarea Number
1a
Fire Factor
0
Area (Acres)
.87
Proportion Impervious
.794
Soil Type
29
Rainfall Isohyet (in.)
.75
Flow Path Length (ft.)
250
Flow Path Slope
.01
Subarea Parameters Selected
Subarea Number
1a
Fire Factor
0
Area (Acres)
0.87
Proportion Impervious
0.794
Soil Type
29
Rainfall Isohyet (in.)
0.75
Flow Path Length (ft.)
250
Flow Path Slope
0.01
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
0.23
Undeveloped Runoff Coefficient (Cu)
0.23
Developed Runoff Coefficient (Cd)
0.76
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.)
21
Peak Flow Rate (cfs)
0.15
Burned Peak Flow Rate (cfs)
n/a
24-Hour Runoff Volume (acre-ft)
0.04

METHOD FOR CALCULATING STANDARD URBAN STORMWATER MITIGATION PLAN FLOW RATES AND VOLUMES BASED ON 0.75-INCHES OF RAINFALL: WORKSHEET

PROJECT NAME

WHOLE FOODS - CIVIC CENTER WAY

NOMENCLATURE

A_I	=	Impervious Area (acres)
A_P	=	Pervious Area (acres)
A_U	=	Contributing Undeveloped Upstream Area (acres)
A_{Total}	=	Total Area of Development and Contributing Undeveloped Upstream Area (acres)
C_D	=	Developed Runoff Coefficient
C_U	=	Undeveloped Runoff Coefficient
I_X	=	Rainfall Intensity (inches / hour)
Q_{PM}	=	Peak Mitigation Flow Rate (cfs)
T_C	=	Time of Concentration (minutes, must be between 5-30 min.)
V_M	=	Mitigation Volume (ft^3)

EQUATIONS

$A_{Total} = A_I + A_P + A_U$

$A_I = (A_{Total}$ * % of Development which is Impervious)

$A_P = (A_{Total}$ * % of Development which is Pervious)

$A_U = (A_{Total}$ * % of Contributing Undeveloped Upstream Area***)

$C_D = (0.9 * \text{Imp.}) + [(1.0 - \text{Imp.}) * C_U]$ If $C_D \bullet C_U$, use $C_D = C_U$

$Q_{PM} = C_D * I_X * A_{Total} * (1 \text{ hour} / 3{,}600 \text{ seconds}) * (1 \text{ ft} / 12 \text{ inches}) * (43{,}560 \text{ ft}^2 / 1 \text{ acre})$

$= C_D * I_X * A_{Total} * (1.008333 \text{ ft}^3\text{-hour} / \text{acre-inches-seconds})$

$T_C = 10^{-0.507} * (C_D * I_X)^{-0.519} * \text{Length}^{0.483} * \text{Slope}^{-0.135}$

$V_M = (0.75 \text{ inches}) * [(A_I)(0.9) + (A_P + A_U)(C_U)] * (1 \text{ ft} / 12 \text{ inches}) * (43{,}560 \text{ ft}^2 / 1 \text{ acre})$

$= (2{,}722.5 \text{ ft}^3 / \text{acre}) * [(A_I)(0.9) + (A_P + A_U)(C_U)]$

***** Contributing Undeveloped Upstream Area is an area where stormwater runoff from an undeveloped upstream area will flow directly or indirectly to the Post-Construction Best Management Practices (BMPs) proposed for the development. This additional flow must be included in the flow rate and volume calculations to appropriately size the BMPs.**

PROVIDE PROPOSED PROJECT CHARACTERISTICS

A_{Total}	0.87	Acres
Type of Development	COMMERCIAL	
Predominate Soil Type #	029	
% of Project Impervious	0.794 = 79.4%	
% of Project Pervious	0.206 = 20.6%	
% of Project Contributing Undeveloped Area	Ø	
A_I	0.691	Acres
A_P	0.179	Acres
A_U	Ø	Acres

DETERMINING THE PEAK MITIGATED FLOW RATE (Q_{PM}):

In order to determine the peak mitigated flow rate (Q_{PM}) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation Q_{PM} for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached **Table 1** for all maximum intensity (I_X) values used.

By trial and error, determine the time of concentration (T_C), as shown below:

CALCULATION STEPS:

1. Assume an initial T_C value between 5 and 30 minutes.

T_C 19 minutes

2. Using Table 1, look up the assumed T_C value and select the corresponding I_X intensity in inches/hour.

I_X 0.239 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient, C_U, using the runoff coefficient curve corresponding to the predominant soil type.

C_U 0.23

4. Calculate the Developed Runoff Coefficient, $C_D = (0.9 * \text{Imp.}) + [(1.0 - \text{Imp.}) * C_U]$

C_D 0.76

5. Calculate the value for $C_D * I_X$

$C_D * I_X$ 0.182

6. Calculate the time of concentration, $T_C = 10^{-0.507} * (C_D * I_X)^{-0.519} * \text{Length}^{0.483} * \text{Slope}^{-0.135}$

Calculated T_C 20.22 minutes

7. Calculate the difference between the initially assumed T_C and the calculated T_C, if the difference is greater than 0.5 minutes. Use the calculated T_C as the assumed initial T_C in the second iteration. If the T_C value is within 0.5 minutes, round the acceptable T_C value to the nearest minute.

TABLE FOR ITERATIONS:

Iteration No.	Initial T_C (min)	I_X (in/hr)	C_U	C_D	C_D*I_X (in/hr)	Calculated T_C (min)	Difference (min)
1	20	0.233	0.23	0.76	0.177	20.48	0.48
2	21	0.228	0.23	0.76	0.173	20.71	0.29
3							
4							
5							
6							
7							
8							
9							
10							

Acceptable T_C value 21 minutes

8. Calculate the Peak Mitigation Flow Rate,
   $Q_{PM} = C_D * I_X * A_{Total} * (1.008333 \text{ ft}^3\text{-hour / acre-inches-seconds})$

Q_{PM} 0.152 cfs

TABLE 1

INTENSITY - DURATION DATA FOR 0.75-INCHES OF RAINFALL
FOR ALL RAINFALL ZONES

Duration, T_C (min)	Rainfall Intensity, I_X (in/hr)
5	0.447
6	0.411
7	0.382
8	0.359
9	0.339
10	0.323
11	0.309
12	0.297
13	0.286
14	0.276
15	0.267
16	0.259
17	0.252
18	0.245
19	0.239
20	0.233
21	0.228
22	0.223
23	0.218
24	0.214
25	0.210
26	0.206
27	0.203
28	0.199
29	0.196
30	0.193

DETERMINING THE VOLUME (V_M)

In order to determine the volume (V_M) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2{,}722.5\ \text{ft}^3 / \text{acre}) * [(A_I)(0.9) + (A_P + A_U)(C_U)]$$

$$= 1{,}805\ \text{Ft}^3$$

SUBAREA 2A

Tc Calculator

Subarea Parameters Manual Input

Field	Value
Subarea Number	2a
Fire Factor	0
Area (Acres)	1.12
Proportion Impervious	.794
Soil Type	29
Rainfall Isohyet (in.)	.75
Flow Path Length (ft.)	220
Flow Path Slope	.01

Subarea Parameters Selected

Field	Value
Subarea Number	1a
Fire Factor	0
Area (Acres)	1.12
Proportion Impervious	0.794
Soil Type	29
Rainfall Isohyet (in.)	0.75
Flow Path Length (ft.)	220
Flow Path Slope	0.01

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	Intensity	Undeveloped Runoff Coefficient (Cu)	Developed Runoff Coefficient (Cd)
2a	0.24	0.25	0.77

☑ 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.)	Peak Flow Rate (cfs)	Burned Peak Flow Rate (cfs)	24-Hour Runoff Volume (acre-ft)
19	0.21	n/a	0.05

METHOD FOR CALCULATING STANDARD URBAN STORMWATER MITIGATION PLAN FLOW RATES AND VOLUMES BASED ON 0.75-INCHES OF RAINFALL: WORKSHEET

PROJECT NAME

WHOLE FOODS - CIVIC CENTER WAY

NOMENCLATURE

A_I	=	Impervious Area (acres)
A_P	=	Pervious Area (acres)
A_U	=	Contributing Undeveloped Upstream Area (acres)
A_{Total}	=	Total Area of Development and Contributing Undeveloped Upstream Area (acres)
C_D	=	Developed Runoff Coefficient
C_U	=	Undeveloped Runoff Coefficient
I_X	=	Rainfall Intensity (inches / hour)
Q_{PM}	=	Peak Mitigation Flow Rate (cfs)
T_C	=	Time of Concentration (minutes, must be between 5-30 min.)
V_M	=	Mitigation Volume (ft^3)

EQUATIONS

$$A_{Total} = A_I + A_P + A_U$$

$$A_I = (A_{Total} * \text{\% of Development which is Impervious})$$

$$A_P = (A_{Total} * \text{\% of Development which is Pervious})$$

$$A_U = (A_{Total} * \text{\% of Contributing Undeveloped Upstream Area***})$$

$$C_D = (0.9 * \text{Imp.}) + [(1.0 - \text{Imp.}) * C_U] \qquad \text{If } C_D \bullet C_U \text{, use } C_D = C_U$$

$$Q_{PM} = C_D * I_X * A_{Total} * (\text{1 hour / 3,600 seconds}) * (\text{1 ft / 12 inches}) * (\text{43,560 ft}^2 \text{ / 1 acre})$$

$$= C_D * I_X * A_{Total} * (\text{1.008333 ft}^3\text{-hour / acre-inches-seconds})$$

$$T_C = 10^{-0.507} * (C_D * I_X)^{-0.519} * \text{Length}^{0.483} * \text{Slope}^{-0.135}$$

$$V_M = (\text{0.75 inches}) * [(A_I)(0.9) + (A_P + A_U)(C_U)] * (\text{1 ft / 12 inches}) * (\text{43,560 ft}^2 \text{ / 1 acre})$$

$$= (\text{2,722.5 ft}^3 \text{ / acre}) * [(A_I)(0.9) + (A_P + A_U)(C_U)]$$

***** Contributing Undeveloped Upstream Area is an area where stormwater runoff from an undeveloped upstream area will flow directly or indirectly to the Post-Construction Best Management Practices (BMPs) proposed for the development. This additional flow must be included in the flow rate and volume calculations to appropriately size the BMPs.**

PROVIDE PROPOSED PROJECT CHARACTERISTICS

A_{Total}	1.12	Acres
Type of Development	COMMERCIAL	
Predominate Soil Type #	029	
% of Project Impervious	0.794 = 79.4%	
% of Project Pervious	0.206 = 20.6%	
% of Project Contributing Undeveloped Area	Ø	
A_I	0.889	Acres
A_P	0.231	Acres
A_U	Ø	Acres

DETERMINING THE PEAK MITIGATED FLOW RATE (Q_{PM}):

In order to determine the peak mitigated flow rate (Q_{PM}) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual.* Use the Modified Rational Method for calculating the peak mitigation Q_{PM} for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached **Table 1** for all maximum intensity (I_X) values used.

By trial and error, determine the time of concentration (T_C), as shown below:

CALCULATION STEPS:

1. Assume an initial T_C value between 5 and 30 minutes.

T_C 15 minutes

2. Using Table 1, look up the assumed T_C value and select the corresponding I_X intensity in inches/hour.

I_X 0.267 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient, C_U, using the runoff coefficient curve corresponding to the predominant soil type.

C_U 0.25

4. Calculate the Developed Runoff Coefficient, $C_D = (0.9 * \text{Imp.}) + [(1.0 - \text{Imp.}) * C_U]$

C_D 0.77

5. Calculate the value for $C_D * I_X$

$C_D * I_X$ 0.206

6. Calculate the time of concentration, $T_C = 10^{-0.507} * (C_D * I_X)^{-0.519} * \text{Length}^{0.483} * \text{Slope}^{-0.135}$

Calculated T_C 17.82 minutes

7. Calculate the difference between the initially assumed T_C and the calculated T_C, if the difference is greater than 0.5 minutes. Use the calculated T_C as the assumed initial T_C in the second iteration. If the T_C value is within 0.5 minutes, round the acceptable T_C value to the nearest minute.

TABLE FOR ITERATIONS:

Iteration No.	Initial T_C (min)	I_X (in/hr)	C_U	C_D	C_D*I_X (in/hr)	Calculated T_C (min)	Difference (min)
1	18	0.245	0.25	0.77	0.189	18.63	0.63
2	19	0.239	0.25	0.77	0.184	18.87	0.13
3							
4							
5							
6							
7							
8							
9							
10							

Acceptable T_C value 19 minutes

8. Calculate the Peak Mitigation Flow Rate,
   $Q_{PM} = C_D * I_X * A_{Total} * (1.008333\ ft^3\text{-hour / acre-inches-seconds})$

Q_{PM} 0.208 cfs

TABLE 1

INTENSITY - DURATION DATA FOR 0.75-INCHES OF RAINFALL
FOR ALL RAINFALL ZONES

Duration, T_C (min)	Rainfall Intensity, I_X (in/hr)
5	0.447
6	0.411
7	0.382
8	0.359
9	0.339
10	0.323
11	0.309
12	0.297
13	0.286
14	0.276
15	0.267
16	0.259
17	0.252
18	0.245
19	0.239
20	0.233
21	0.228
22	0.223
23	0.218
24	0.214
25	0.210
26	0.206
27	0.203
28	0.199
29	0.196
30	0.193

DETERMINING THE VOLUME (V_M)

In order to determine the volume (V_M) of stormwater runoff to be mitigated from the new development, use the following equation:

V_M = (2,722.5 ft^3 / acre) * [(A_I)(0.9) + (A_P + A_U)(C_U)]

= 2335.50 Ft^3

SUBAREA 3A

Tc Calculator

Subarea Parameters Manual Input

Subarea Number	Fire Factor	
3A	0	
Area (Acres)	**Proportion Impervious**	**Soil Type**
.62	.794	29
Rainfall Isohyet (in.)	**Flow Path Length (ft.)**	**Flow Path Slope**
.75	220	.01

Subarea Parameters Selected

Subarea Number	Fire Factor	
3a	0	
Area (Acres)	**Proportion Impervious**	**Soil Type**
0.62	0.794	29
Rainfall Isohyet (in.)	**Flow Path Length (ft.)**	**Flow Path Slope**
0.75	220	0.01

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

☑ Calculate Runoff Volume

[Calculate Tc]

[Cancel]

Subarea Number	Intensity	Undeveloped Runoff Coefficient (Cu)	Developed Runoff Coefficient (Cd)
3A	0.24	0.25	0.77

Tc Equation

Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135

Tc Value (min.)	Peak Flow Rate (cfs)	Burned Peak Flow Rate (cfs)	24-Hour Runoff Volume (acre-ft)
19	0.11	n/a	0.03

METHOD FOR CALCULATING STANDARD URBAN STORMWATER MITIGATION PLAN FLOW RATES AND VOLUMES BASED ON 0.75-INCHES OF RAINFALL: WORKSHEET

PROJECT NAME

WHOLE FOODS . CIVIC CENTER WAY

Developed by I. Nasseri, J. Pereira, T. Piasky, & A. Walden

NOMENCLATURE

A_I	=	Impervious Area (acres)
A_P	=	Pervious Area (acres)
A_U	=	Contributing Undeveloped Upstream Area (acres)
A_{Total}	=	Total Area of Development and Contributing Undeveloped Upstream Area (acres)
C_D	=	Developed Runoff Coefficient
C_U	=	Undeveloped Runoff Coefficient
I_X	=	Rainfall Intensity (inches / hour)
Q_{PM}	=	Peak Mitigation Flow Rate (cfs)
T_C	=	Time of Concentration (minutes, must be between 5-30 min.)
V_M	=	Mitigation Volume (ft^3)

EQUATIONS

$A_{Total} = A_I + A_P + A_U$

$A_I = (A_{Total}$ * % of Development which is Impervious)

$A_P = (A_{Total}$ * % of Development which is Pervious)

$A_U = (A_{Total}$ * % of Contributing Undeveloped Upstream Area***)

$C_D = (0.9 * \text{Imp.}) + [(1.0 - \text{Imp.}) * C_U]$ If C_D • C_U, use $C_D = C_U$

$Q_{PM} = C_D * I_X * A_{Total} * (1 \text{ hour} / 3{,}600 \text{ seconds}) * (1 \text{ ft} / 12 \text{ inches}) * (43{,}560 \text{ ft}^2 / 1 \text{ acre})$

$= C_D * I_X * A_{Total} * (1.008333 \text{ ft}^3\text{-hour} / \text{acre-inches-seconds})$

$T_C = 10^{-0.507} * (C_D * I_X)^{-0.519} * \text{Length}^{0.483} * \text{Slope}^{-0.135}$

$V_M = (0.75 \text{ inches}) * [(A_I)(0.9) + (A_P + A_U)(C_U)] * (1 \text{ ft} / 12 \text{ inches}) * (43{,}560 \text{ ft}^2 / 1 \text{ acre})$

$= (2{,}722.5 \text{ ft}^3 / \text{acre}) * [(A_I)(0.9) + (A_P + A_U)(C_U)]$

***** Contributing Undeveloped Upstream Area is an area where stormwater runoff from an undeveloped upstream area will flow directly or indirectly to the Post-Construction Best Management Practices (BMPs) proposed for the development. This additional flow must be included in the flow rate and volume calculations to appropriately size the BMPs.**

PROVIDE PROPOSED PROJECT CHARACTERISTICS

A_{Total}	0.62	Acres
Type of Development	COMMERCIAL	
Predominate Soil Type #	029	
% of Project Impervious	0.794 = 79.4%	
% of Project Pervious	0.206 = 20.6%	
% of Project Contributing Undeveloped Area	Ø	
A_I	0.492	Acres
A_P	0.128	Acres
A_U	Ø	Acres

DETERMINING THE PEAK MITIGATED FLOW RATE (Q_{PM}):

In order to determine the peak mitigated flow rate (Q_{PM}) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation Q_{PM} for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached **Table 1** for all maximum intensity (I_X) values used.

By trial and error, determine the time of concentration (T_C), as shown below:

CALCULATION STEPS:

1. Assume an initial T_C value between 5 and 30 minutes.

T_C 20 minutes

2. Using Table 1, look up the assumed T_C value and select the corresponding I_X intensity in inches/hour.

I_X 0.233 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient, C_U, using the runoff coefficient curve corresponding to the predominant soil type.

C_U 0.25

4. Calculate the Developed Runoff Coefficient, $C_D = (0.9 * \text{Imp.}) + [(1.0 - \text{Imp.}) * C_U]$

C_D 0.77

5. Calculate the value for $C_D * I_X$

$C_D * I_X$ 0.179

6. Calculate the time of concentration, $T_C = 10^{-0.507} * (C_D * I_X)^{-0.519} * \text{Length}^{0.483} * \text{Slope}^{-0.135}$

Calculated T_C 19.13 minutes

7. Calculate the difference between the initially assumed T_C and the calculated T_C, if the difference is greater than 0.5 minutes. Use the calculated T_C as the assumed initial T_C in the second iteration. If the T_C value is within 0.5 minutes, round the acceptable T_C value to the nearest minute.

TABLE FOR ITERATIONS:

Iteration No.	Initial T_C (min)	I_X (in/hr)	C_U	C_D	C_D*I_X (in/hr)	Calculated T_C (min)	Difference (min)
1	19	0.239	0.23	0.77	0.184	18.87	0.13
2							
3							
4							
5							
6							
7							
8							
9							
10							

Acceptable T_C value 19 minutes

8. Calculate the Peak Mitigation Flow Rate,
   $Q_{PM} = C_D * I_X * A_{Total} * (1.008333\ ft^3\text{-hour / acre-inches-seconds})$

Q_{PM} 0.115 cfs

TABLE 1

INTENSITY - DURATION DATA FOR 0.75-INCHES OF RAINFALL
FOR ALL RAINFALL ZONES

Duration, T_C (min)	Rainfall Intensity, I_X (in/hr)
5	0.447
6	0.411
7	0.382
8	0.359
9	0.339
10	0.323
11	0.309
12	0.297
13	0.286
14	0.276
15	0.267
16	0.259
17	0.252
18	0.245
19	0.239
20	0.233
21	0.228
22	0.223
23	0.218
24	0.214
25	0.210
26	0.206
27	0.203
28	0.199
29	0.196
30	0.193

DETERMINING THE VOLUME (V_M)

In order to determine the volume (V_M) of stormwater runoff to be mitigated from the new development, use the following equation:

V_M = (2,722.5 ft^3 / acre) * [(A_I)(0.9) + (A_P + A_U)(C_U)]

= 1293 FT^3

SUBAREA 4A

Tc Calculator

Subarea Parameters Manual Input

Subarea Number	Fire Factor	
4A	0	
Area (Acres)	**Proportion Impervious**	**Soil Type**
1.34	.794	29
Rainfall Isohyet (in.)	**Flow Path Length (ft.)**	**Flow Path Slope**
.75	600	.005

Subarea Parameters Selected

Subarea Number	Fire Factor	
4a	0	
Area (Acres)	**Proportion Impervious**	**Soil Type**
1.34	0.794	29
Rainfall Isohyet (in.)	**Flow Path Length (ft.)**	**Flow Path Slope**
0.75	600	0.005

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	Intensity	Undeveloped Runoff Coefficient (Cu)	Developed Runoff Coefficient (Cd)
4A	0.19	0.15	0.75

☑ 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.)	Peak Flow Rate (cfs)	Burned Peak Flow Rate (cfs)	24-Hour Runoff Volume (acre-ft)
30	0.19	n/a	0.06

METHOD FOR CALCULATING STANDARD URBAN STORMWATER MITIGATION PLAN FLOW RATES AND VOLUMES BASED ON 0.75-INCHES OF RAINFALL: WORKSHEET

PROJECT NAME

WHOLE FOODS - CIVIC CENTER WAY

APPENDIX G VOLUME & FLOW RATE CALCULATIONS

NOMENCLATURE

A_I	=	Impervious Area (acres)
A_P	=	Pervious Area (acres)
A_U	=	Contributing Undeveloped Upstream Area (acres)
A_{Total}	=	Total Area of Development and Contributing Undeveloped Upstream Area (acres)
C_D	=	Developed Runoff Coefficient
C_U	=	Undeveloped Runoff Coefficient
I_X	=	Rainfall Intensity (inches / hour)
Q_{PM}	=	Peak Mitigation Flow Rate (cfs)
T_C	=	Time of Concentration (minutes, must be between 5-30 min.)
V_M	=	Mitigation Volume (ft^3)

EQUATIONS

$A_{Total} = A_I + A_P + A_U$

$A_I = (A_{Total} * \% \text{ of Development which is Impervious})$

$A_P = (A_{Total} * \% \text{ of Development which is Pervious})$

$A_U = (A_{Total} * \% \text{ of Contributing Undeveloped Upstream Area***})$

$C_D = (0.9 * \text{Imp.}) + [(1.0 - \text{Imp.}) * C_U]$ If C_D • C_U, use $C_D = C_U$

$Q_{PM} = C_D * I_X * A_{Total} * (1 \text{ hour} / 3{,}600 \text{ seconds}) * (1 \text{ ft} / 12 \text{ inches}) * (43{,}560 \text{ ft}^2 / 1 \text{ acre})$

$= C_D * I_X * A_{Total} * (1.008333 \text{ ft}^3\text{-hour} / \text{acre-inches-seconds})$

$T_C = 10^{-0.507} * (C_D * I_X)^{-0.519} * \text{Length}^{0.483} * \text{Slope}^{-0.135}$

$V_M = (0.75 \text{ inches}) * [(A_I)(0.9) + (A_P + A_U)(C_U)] * (1 \text{ ft} / 12 \text{ inches}) * (43{,}560 \text{ ft}^2 / 1 \text{ acre})$

$= (2{,}722.5 \text{ ft}^3 / \text{acre}) * [(A_I)(0.9) + (A_P + A_U)(C_U)]$

***** Contributing Undeveloped Upstream Area is an area where stormwater runoff from an undeveloped upstream area will flow directly or indirectly to the Post-Construction Best Management Practices (BMPs) proposed for the development. This additional flow must be included in the flow rate and volume calculations to appropriately size the BMPs.**

PROVIDE PROPOSED PROJECT CHARACTERISTICS

A_{Total}	1.34	Acres
Type of Development	COMMERCIAL	
Predominate Soil Type #	029	
% of Project Impervious	0.794 = 79.4%	
% of Project Pervious	0.206 = 20.6%	
% of Project Contributing Undeveloped Area	Ø	
A_I	1.06	Acres
A_P	0.276	Acres
A_U	Ø	Acres

DETERMINING THE PEAK MITIGATED FLOW RATE (Q_{PM}):

In order to determine the peak mitigated flow rate (Q_{PM}) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation Q_{PM} for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached **Table 1** for all maximum intensity (I_X) values used.

By trial and error, determine the time of concentration (T_C), as shown below:

CALCULATION STEPS:

1. Assume an initial T_C value between 5 and 30 minutes.

T_C 25 minutes

2. Using Table 1, look up the assumed T_C value and select the corresponding I_X intensity in inches/hour.

I_X 0.210 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient, C_U, using the runoff coefficient curve corresponding to the predominant soil type.

C_U 0.15

4. Calculate the Developed Runoff Coefficient, $C_D = (0.9 * \text{Imp.}) + [(1.0 - \text{Imp.}) * C_U]$

C_D 0.75

5. Calculate the value for $C_D * I_X$

$C_D * I_X$ 0.158

6. Calculate the time of concentration, $T_C = 10^{-0.507} * (C_D * I_X)^{-0.519} * \text{Length}^{0.483} * \text{Slope}^{-0.135}$

Calculated T_C 36.42 minutes

7. Calculate the difference between the initially assumed T_C and the calculated T_C, if the difference is greater than 0.5 minutes. Use the calculated T_C as the assumed initial T_C in the second iteration. If the T_C value is within 0.5 minutes, round the acceptable T_C value to the nearest minute.

TABLE FOR ITERATIONS:

Iteration No.	Initial T_C (min)	I_X (in/hr)	C_U	C_D	C_D*I_X (in/hr)	Calculated T_C (min)	Difference (min)
1	30	0.193	0.15	0.75	0.145	38	8
2							
3							
4							
5							
6							
7							
8							
9							
10							

Acceptable T_C value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,
   $Q_{PM} = C_D * I_X * A_{Total} * (1.008333\ ft^3\text{-hour / acre-inches-seconds})$

Q_{PM} 0.196 cfs

TABLE 1

INTENSITY - DURATION DATA FOR 0.75-INCHES OF RAINFALL
FOR ALL RAINFALL ZONES

Duration, T_C (min)	Rainfall Intensity, I_X (in/hr)
5	0.447
6	0.411
7	0.382
8	0.359
9	0.339
10	0.323
11	0.309
12	0.297
13	0.286
14	0.276
15	0.267
16	0.259
17	0.252
18	0.245
19	0.239
20	0.233
21	0.228
22	0.223
23	0.218
24	0.214
25	0.210
26	0.206
27	0.203
28	0.199
29	0.196
30	0.193

DETERMINING THE VOLUME (V_M)

In order to determine the volume (V_M) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2{,}722.5\ ft^3 / acre) * [(A_I)(0.9) + (A_P + A_U)(C_U)]$$

$$= 3009\ Ft^3$$

SUBAREA 1A

Tc Calculator

Subarea Parameters Manual Input

Subarea Number	Fire Factor	
5a	0	
Area (Acres)	**Proportion Impervious**	**Soil Type**
1.57	.794	29
Rainfall Isohyet (in.)	**Flow Path Length (ft.)**	**Flow Path Slope**
.75	700	.005

Subarea Parameters Selected

Subarea Number	Fire Factor	
1a	0	
Area (Acres)	**Proportion Impervious**	**Soil Type**
1.57	0.794	29
Rainfall Isohyet (in.)	**Flow Path Length (ft.)**	**Flow Path Slope**
0.75	700	0.005

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	Intensity	Undeveloped Runoff Coefficient (Cu)	Developed Runoff Coefficient (Cd)
5a	0.19	0.15	0.75

☑ 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.)	Peak Flow Rate (cfs)	Burned Peak Flow Rate (cfs)	24-Hour Runoff Volume (acre-ft)
30	0.22	n/a	0.07

METHOD FOR CALCULATING STANDARD URBAN STORMWATER MITIGATION PLAN FLOW RATES AND VOLUMES BASED ON 0.75-INCHES OF RAINFALL: WORKSHEET

PROJECT NAME

WILLOCK FOODS - CIVIC CENTER WAY

NOMENCLATURE

A_I	=	Impervious Area (acres)
A_P	=	Pervious Area (acres)
A_U	=	Contributing Undeveloped Upstream Area (acres)
A_{Total}	=	Total Area of Development and Contributing Undeveloped Upstream Area (acres)
C_D	=	Developed Runoff Coefficient
C_U	=	Undeveloped Runoff Coefficient
I_X	=	Rainfall Intensity (inches / hour)
Q_{PM}	=	Peak Mitigation Flow Rate (cfs)
T_C	=	Time of Concentration (minutes, must be between 5-30 min.)
V_M	=	Mitigation Volume (ft^3)

EQUATIONS

$A_{Total} = A_I + A_P + A_U$

$A_I = (A_{Total}$ * % of Development which is Impervious)

$A_P = (A_{Total}$ * % of Development which is Pervious)

$A_U = (A_{Total}$ * % of Contributing Undeveloped Upstream Area***)

$C_D = (0.9 * \text{Imp.}) + [(1.0 - \text{Imp.}) * C_U]$ If $C_D \bullet C_U$, use $C_D = C_U$

$Q_{PM} = C_D * I_X * A_{Total} * (1 \text{ hour} / 3{,}600 \text{ seconds}) * (1 \text{ ft} / 12 \text{ inches}) * (43{,}560 \text{ ft}^2 / 1 \text{ acre})$
$= C_D * I_X * A_{Total} * (1.008333 \text{ ft}^3\text{-hour} / \text{acre-inches-seconds})$

$T_C = 10^{-0.507} * (C_D * I_X)^{-0.519} * \text{Length}^{0.483} * \text{Slope}^{-0.135}$

$V_M = (0.75 \text{ inches}) * [(A_I)(0.9) + (A_P + A_U)(C_U)] * (1 \text{ ft} / 12 \text{ inches}) * (43{,}560 \text{ ft}^2 / 1 \text{ acre})$
$= (2{,}722.5 \text{ ft}^3 / \text{acre}) * [(A_I)(0.9) + (A_P + A_U)(C_U)]$

***** Contributing Undeveloped Upstream Area is an area where stormwater runoff from an undeveloped upstream area will flow directly or indirectly to the Post-Construction Best Management Practices (BMPs) proposed for the development. This additional flow must be included in the flow rate and volume calculations to appropriately size the BMPs.**

PROVIDE PROPOSED PROJECT CHARACTERISTICS

A_{Total}	1.57	Acres
Type of Development	COMMERCIAL	
Predominate Soil Type #	029	
% of Project Impervious	79.4%	
% of Project Pervious	20.6%	
% of Project Contributing Undeveloped Area	Ø	
A_I	1.25	Acres
A_P	0.32	Acres
A_U	Ø	Acres

DETERMINING THE PEAK MITIGATED FLOW RATE (Q_{PM}):

In order to determine the peak mitigated flow rate (Q_{PM}) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation Q_{PM} for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached **Table 1** for all maximum intensity (I_X) values used.

By trial and error, determine the time of concentration (T_C), as shown below:

CALCULATION STEPS:

1. Assume an initial T_C value between 5 and 30 minutes.

T_C 25 minutes

2. Using Table 1, look up the assumed T_C value and select the corresponding I_X intensity in inches/hour.

I_X 0.21 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient, C_U, using the runoff coefficient curve corresponding to the predominant soil type.

C_U 0.15

4. Calculate the Developed Runoff Coefficient, $C_D = (0.9 * \text{Imp.}) + [(1.0 - \text{Imp.}) * C_U]$

C_D 0.75

5. Calculate the value for $C_D * I_X$

$C_D * I_X$ 0.158

6. Calculate the time of concentration, $T_C = 10^{-0.507} * (C_D * I_X)^{-0.519} * \text{Length}^{0.483} * \text{Slope}^{-0.135}$

Calculated T_C 39 minutes

7. Calculate the difference between the initially assumed T_C and the calculated T_C, if the difference is greater than 0.5 minutes. Use the calculated T_C as the assumed initial T_C in the second iteration. If the T_C value is within 0.5 minutes, round the acceptable T_C value to the nearest minute.

TABLE FOR ITERATIONS:

Iteration No.	Initial T_C (min)	I_X (in/hr)	C_U	C_D	C_D*I_X (in/hr)	Calculated T_C (min)	Difference (min)
1	30	0.193	0.15	0.75	0.145	41.06	11.06
2							
3							
4							
5							
6							
7							
8							
9							
10							

Acceptable T_C value 30 minutes

8. Calculate the Peak Mitigation Flow Rate,
   $Q_{PM} = C_D * I_X * A_{Total} * (1.008333\ ft^3\text{-hour / acre-inches-seconds})$

Q_{PM} 0.229 cfs

TABLE 1

INTENSITY - DURATION DATA FOR 0.75-INCHES OF RAINFALL
FOR ALL RAINFALL ZONES

Duration, T_C (min)	Rainfall Intensity, I_X (in/hr)
5	0.447
6	0.411
7	0.382
8	0.359
9	0.339
10	0.323
11	0.309
12	0.297
13	0.286
14	0.276
15	0.267
16	0.259
17	0.252
18	0.245
19	0.239
20	0.233
21	0.228
22	0.223
23	0.218
24	0.214
25	0.210
26	0.206
27	0.203
28	0.199
29	0.196
30	0.193

DETERMINING THE VOLUME (V_M)

In order to determine the volume (V_M) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2{,}722.5\ ft^3/acre) * [(A_I)(0.9) + (A_P + A_U)(C_U)]$$

$= 3{,}193\ FT^3$

SUBAREA 1A

Tc Calculator

Subarea Parameters Manual Input

Subarea Number	Fire Factor	
6A	0	
Area (Acres)	**Proportion Impervious**	**Soil Type**
0.21	.794	29
Rainfall Isohyet (in.)	**Flow Path Length (ft.)**	**Flow Path Slope**
.75	150	.02

Subarea Parameters Selected

Subarea Number	Fire Factor	
1a	0	
Area (Acres)	**Proportion Impervious**	**Soil Type**
0.21	0.794	29
Rainfall Isohyet (in.)	**Flow Path Length (ft.)**	**Flow Path Slope**
7	150	0.02

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	Intensity	Undeveloped Runoff Coefficient (Cu)	Developed Runoff Coefficient (Cd)
6A	0.29	0.31	0.78

☑ 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.)	Peak Flow Rate (cfs)	Burned Peak Flow Rate (cfs)	24-Hour Runoff Volume (acre-ft)
13	0.05	N/A	0.01

METHOD FOR CALCULATING STANDARD URBAN STORMWATER MITIGATION PLAN FLOW RATES AND VOLUMES BASED ON 0.75-INCHES OF RAINFALL: WORKSHEET

PROJECT NAME

WHOLE FOODS - CIVIC CENTER WAY

NOMENCLATURE

A_I	=	Impervious Area (acres)
A_P	=	Pervious Area (acres)
A_U	=	Contributing Undeveloped Upstream Area (acres)
A_{Total}	=	Total Area of Development and Contributing Undeveloped Upstream Area (acres)
C_D	=	Developed Runoff Coefficient
C_U	=	Undeveloped Runoff Coefficient
I_X	=	Rainfall Intensity (inches / hour)
Q_{PM}	=	Peak Mitigation Flow Rate (cfs)
T_C	=	Time of Concentration (minutes, must be between 5-30 min.)
V_M	=	Mitigation Volume (ft^3)

EQUATIONS

$A_{Total} = A_I + A_P + A_U$

$A_I = (A_{Total}$ * % of Development which is Impervious)

$A_P = (A_{Total}$ * % of Development which is Pervious)

$A_U = (A_{Total}$ * % of Contributing Undeveloped Upstream Area***)

$C_D = (0.9 * \text{Imp.}) + [(1.0 - \text{Imp.}) * C_U]$ If $C_D \bullet C_U$, use $C_D = C_U$

$$Q_{PM} = C_D * I_X * A_{Total} * (1 \text{ hour} / 3{,}600 \text{ seconds}) * (1 \text{ ft} / 12 \text{ inches}) * (43{,}560 \text{ ft}^2 / 1 \text{ acre})$$
$$= C_D * I_X * A_{Total} * (1.008333 \text{ ft}^3\text{-hour} / \text{acre-inches-seconds})$$

$$T_C = 10^{-0.507} * (C_D * I_X)^{-0.519} * \text{Length}^{0.483} * \text{Slope}^{-0.135}$$

$$V_M = (0.75 \text{ inches}) * [(A_I)(0.9) + (A_P + A_U)(C_U)] * (1 \text{ ft} / 12 \text{ inches}) * (43{,}560 \text{ ft}^2 / 1 \text{ acre})$$
$$= (2{,}722.5 \text{ ft}^3 / \text{acre}) * [(A_I)(0.9) + (A_P + A_U)(C_U)]$$

***** Contributing Undeveloped Upstream Area is an area where stormwater runoff from an undeveloped upstream area will flow directly or indirectly to the Post-Construction Best Management Practices (BMPs) proposed for the development. This additional flow must be included in the flow rate and volume calculations to appropriately size the BMPs.**

PROVIDE PROPOSED PROJECT CHARACTERISTICS

A_{Total}	0.21	Acres
Type of Development	COMMERCIAL	
Predominate Soil Type #	029	
% of Project Impervious	79.4%	
% of Project Pervious	20.6%	
% of Project Contributing Undeveloped Area	Ø	
A_I	0.167	Acres
A_P	0.043	Acres
A_U	Ø	Acres

DETERMINING THE PEAK MITIGATED FLOW RATE (Q_{PM}):

In order to determine the peak mitigated flow rate (Q_{PM}) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation Q_{PM} for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached **Table 1** for all maximum intensity (I_X) values used.

By trial and error, determine the time of concentration (T_C), as shown below:

CALCULATION STEPS:

1. Assume an initial T_C value between 5 and 30 minutes.

T_C 15 minutes

2. Using Table 1, look up the assumed T_C value and select the corresponding I_X intensity in inches/hour.

I_X 0.267 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient, C_U, using the runoff coefficient curve corresponding to the predominant soil type.

C_U 0.31

4. Calculate the Developed Runoff Coefficient, $C_D = (0.9 * \text{Imp.}) + [(1.0 - \text{Imp.}) * C_U]$

C_D 0.78

5. Calculate the value for $C_D * I_X$

$C_D * I_X$ 0.208

6. Calculate the time of concentration, $T_C = 10^{-0.507} * (C_D * I_X)^{-0.519} * \text{Length}^{0.483} * \text{Slope}^{-0.135}$

Calculated T_C 13.34 minutes

7. Calculate the difference between the initially assumed T_C and the calculated T_C, if the difference is greater than 0.5 minutes. Use the calculated T_C as the assumed initial T_C in the second iteration. If the T_C value is within 0.5 minutes, round the acceptable T_C value to the nearest minute.

TABLE FOR ITERATIONS:

Iteration No.	Initial T_C (min)	I_X (in/hr)	C_U	C_D	C_D*I_X (in/hr)	Calculated T_C (min)	Difference (min)
1	13	0.286	0.31	0.78	0.223	12.92	0.08
2							
3							
4							
5							
6							
7							
8							
9							
10							

Acceptable T_C value 13 minutes

8. Calculate the Peak Mitigation Flow Rate,
   $Q_{PM} = C_D * I_X * A_{Total} * (1.008333\ ft^3\text{-hour / acre-inches-seconds})$

Q_{PM} 0.0368 cfs

TABLE 1

INTENSITY - DURATION DATA FOR 0.75-INCHES OF RAINFALL
FOR ALL RAINFALL ZONES

Duration, T_C (min)	Rainfall Intensity, I_X (in/hr)
5	0.447
6	0.411
7	0.382
8	0.359
9	0.339
10	0.323
11	0.309
12	0.297
13	0.286
14	0.276
15	0.267
16	0.259
17	0.252
18	0.245
19	0.239
20	0.233
21	0.228
22	0.223
23	0.218
24	0.214
25	0.210
26	0.206
27	0.203
28	0.199
29	0.196
30	0.193

DETERMINING THE VOLUME (V_M)

In order to determine the volume (V_M) of stormwater runoff to be mitigated from the new development, use the following equation:

$$V_M = (2{,}722.5 \text{ ft}^3 / \text{acre}) * [(A_I)(0.9) + (A_P + A_U)(C_U)]$$

445 ft^3

EXHIBIT "C"

EXHIBIT "C"

CERTIFICATE OF ANNUAL INSPECTION AND MAINTENANCE OF STORM DRAIN DETENTION/TREATMENT FACILITY

Property Address: ______________________________

Name of Property Owner: ______________________________

Type of Drainage Facility: ______________________________

Inspected by: ______________________________

California Contractor's License No.: ______________________________

Date of inspection: ______________________________

Condition of Facility: ______________________________

____

Recommended Maintenance: ______________________________

____

____

____

Date that recommended maintenance completed: ______________________________

Approximate quantity of sediment/debris removed: ______________________________

I hereby certify that the Storm Drain Treatment/Detention Facility was inspected, cleaned (as necessary) and put in good working order.

Signature of Licensed Contractor: ______________________dated __________

NOTE: SUBMIT THIS FORM TO CITY OF MALIBU (to the attention of the City Engineer) prior to October 15th annually.

Table 3. Treatment Control BMP Selection Matrix(1)

Pollutant of Concern	***Treatment Control BMP Categories***						
	Biofilters	Detention Basins	Infiltration Basins(2)	Wet Ponds or Wetlands	Drainage Inserts	Filtration	Hydrodynamic Separator Systems(3)
Sediment	M	H	H	H	L	H	M
Nutrients	L	M	M	M	L	M	L
Heavy Metals	M	M	M	H	L	H	L
Organic Compounds	U	U	U	U	L	M	L
Trash & Debris	L	H	U	U	M	H	M
Oxygen Demanding Substances	L	M	M	M	L	M	L
Bacteria	U	U	H	U	L	M	L
Oil & Grease	M	M	U	U	L	H	L
Pesticides	U	U	U	U	L	U	L

(1) The City is encouraged to periodically assess the performance characteristics of many of these BMPs to update this table.

(2) Including trenches and porous pavement

(3) Also known as hydrodynamic devices and baffle boxes

L: Low removal efficiency
M: Medium removal efficiency
H: High removal efficiency
U: Unknown removal efficiency

Sources: *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* (1993), *National Stormwater Best Management Practices Database* (2001), *and Guide for BMP Selection in Urban Developed Areas* (2001).

Appendix B

BMP IMPLEMENTATION TABLES

Table 1. Anticipated and Potential Pollutants Generated by Land Use Type

	General Pollutant Categories								
Priority Project Categories	**Sediments**	**Nutrients**	**Heavy Metals**	**Organic Compounds**	**Trash & Debris**	**Oxygen Demanding Substances**	**Oil & Grease**	**Bacteria & Viruses**	**Pesticides**
Detached Residential Development	X	X			X	X	X	X	X
Attached Residential Development	X	X			X	P(1)	P(2)	P	X
Commercial Development >100,000 ft2	P(1)	P(1)		P(2)	X	P(5)	X	P(3)	P(5)
Automotive service facilities			X	X(4)(5)	X		X		
Retail Gasoline Outlets			X	X(4)(5)	X		X		
Restaurants					X	X	X	X	
Hillside development	X	X			X	X	X		X
Parking Lots	P(1)	P(1)	X		X	P(1)	X		P(1)
Streets, Highways & Freeways	X	P(1)	X	X(4)	X	P(5)	X		

X = anticipated
P = potential
(1) A potential pollutant if landscaping exists on-site
(2) A potential pollutant if the project includes uncovered parking areas
(3) A potential pollutant if land use involves food or animal waste products
(4) Including petroleum hydrocarbons
(5) Including solvents

Ultra-Urban Filter Technical Specifications

The Ultra-Urban® Filter with Smart Sponge® developed and manufactured by AbTech Industries, is an innovative low-cost BMP that helps meet NPDES requirements with effective filtration, efficient application, and low maintenance. It is a true water filter that ensures that the water flowing through the system is properly and completely treated. This solution is used to treat stormwater runoff for new or retrofitted sites by absorbing oil and grease and capturing trash and sediment. In addition, AbTech's Smart Sponge Plus® contains an antimicrobial agent that is effective in reducing coliform bacteria found in stormwater, industrial wastewater, and municipal wastewater. Smart Sponge® and Smart Sponge® Plus are comprehensive solutions geared at removing key contaminants and pollutants from stormwater runoff.

The Ultra-Urban Filter is ideal for municipal, industrial, and construction applications ensuring compliance with stormwater regulations. The filter comes in two standard designs; one a modular unit geared toward curb inlet openings, and the other, a single unit designed for typical drop-in catch basin drains.

Ultra Urban Filter Styles to Fit Every Drain

- Curb Opening (CO) • Drain Insert (DI) • Customized Drain Insert

Applications

AbTech's Ultra-Urban® Filter is an ideal solution for new or existing applications. It can be deployed in:

- Municipal Stormwater Drains
- Shopping Center Parking Lot Drains
- Parking Structures
- Airport Tarmac Drains and Fuel Farms
- Commercial Fuel Distributor Facilities
- Commercial and/or Residential Developments
- Truck Stops

How it Works

The Ultra-Urban Filter, made of a high strength corrugated recycled content plastic, is designed for use in storm drains that experience oil and grease pollution accompanied by sediment and debris. Trash and sediment accumulate in the upper basket chamber while oil and grease are absorbed in the filtration media.

Proven Performance

Field and laboratory tests have confirmed the capability of the Smart Sponge to absorb, depending on the type of oil contaminant, up to three times its own weight and remove up to 95% of the hydrocarbons present in Stormwater runoff, typically in the range of 5 to 30 mg/liter (ppm). The captured oil is permanently bound within the Smart Sponge, eliminating leaching and allowing for easy disposal of the filtration media. Flow rates through the filters have been tested to exceed 500 gpm for the DI2020 series at installation. The Ultra-Urban Filter with Smart Sponge has also proven effective at removing 80% TSS (300 Micron).

Key Benefits:

- Low maintenance cycle
- Simple installation
- Easily maintained from the street
- Proven field performance
- Cost effective way to comply with stormwater regulations

AbTech INDUSTRIES

4110 North Scottsdale Road • Suite 235 • Scottsdale, AZ 85251
480.874.4000 • 800.545.8999 • www.abtechindustries.com

MAKERS OF smart sponge® PRODUCTS

Easy Installation

The Ultra-Urban Filter is easily installed. Installation time varies depending upon mounting devices selected. A single mounting bracket made of 16-gauge galvanized steel is required for the installation of the Curb Opening (CO) series. The Ultra-Urban Filter should not be installed where modules obstruct the drain pipe outlet. The size of the drain should allow room for stormwater overflow. The Drain Inlet (DI) series Ultra-Urban Filter will suspend from the drain into the catch basin through a structural plastic mount and funnel mechanism.

Low Maintenance

The Ultra-Urban Filter should be serviced as needed to remove sediment and debris, according to expected debris accumulation. The sediment and debris can be quickly vacuumed out of the modules through the opening of the drain with conventional maintenance equipment. For example, a curb inlet with four to five Ultra-Urban Filter modules can typically be serviced in 10 minutes or less. Under normal operating conditions the Ultra-Urban Filter should be replaced every 1-3 years.

Proven Technology

AbTech developed the Smart Sponge technology based on its proprietary blend of synthetic polymers aimed at removal of hydrocarbons and oil derivatives from surface water. AbTech's process creates a very porous structure (see Figure A) with hydrophobic and oleophilic characteristics capable of selectively removing hydrocarbons while allowing high flow through rates for water. As hydrocarbons are absorbed into its structure, the Smart Sponge® swells and maintains porosity and filtering capabilities.

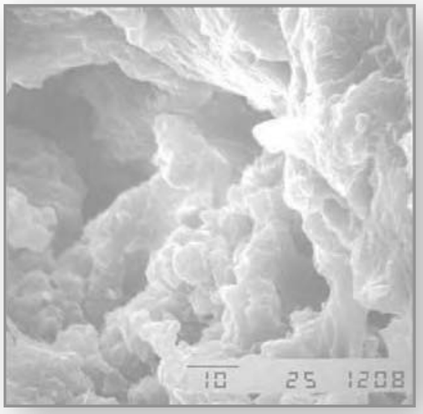
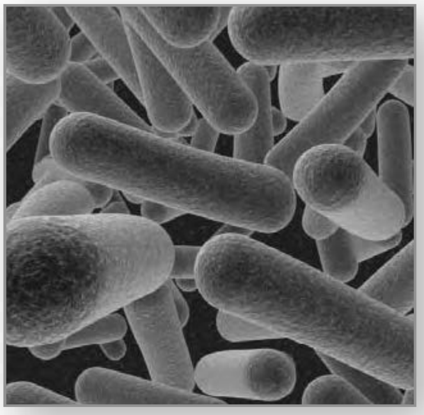


Figure A (1,000 X)

Antimicrobial Solution

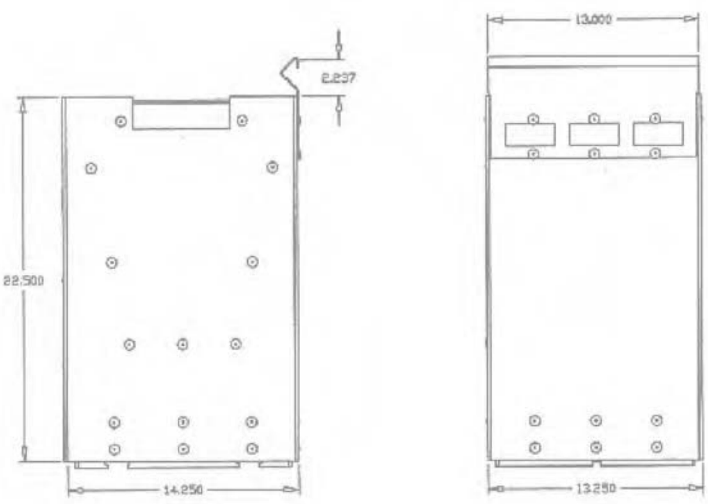
AbTech Industries has successfully deployed its patented antimicrobial technology, Smart Sponge Plus®, which features an antimicrobial agent chemically and permanently bound to the Smart Sponge® polymer surface. The antimicrobial mechanism is based on the patented agent's interaction with the microorganism cell membrane, causing the microorganism disruption – but no chemical or physical change in the agent. Antimicrobial activity does not reduce the agent's capability or cause its depletion and, therefore, maintains long-term effectiveness. Additionally, the hydrocarbon absorption capability is not inhibited.



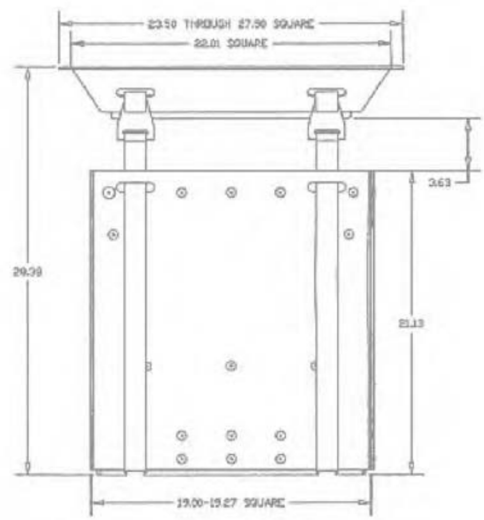
When properly installed and maintained, Smart Sponge® Plus provides a significant reduction in coliform bacteria. As with all AbTech products, field deployment and data generation projects are ongoing.

Ultra-Urban® Filter Drawings

Complete product drawings for each model available from AbTech in CAD or PDF format.



CO1414N Side and Front View



DI2020N

Ultra-Urban® Filter Key Features

Part #	Description	Dimensions	Gross Weight (approx.)	
			With Smart Sponge®	Trash & Debris Only
Curb Opening Module:				
CO1414N	UUF, Normal Size	13.25” x 14.25” x 22.5”	20 lbs.	5.5 lbs.
CO1414H	UUF, Half Size	13.25” x 14.25” x 13”	13 lbs.	4.5 lbs.
Drain Insert Module:				
DI1414N	UUF, Normal Size	13.25” x 14.25” x 21.125”	20 lbs.	5.6 lbs.
DI1414H	UUF, Half Size	13.25” x 14.25” x 13”	13 lbs.	4.5 lbs.
DI1420N	UUF, Normal Size	14” x 19.25” x 21.125”	24 lbs.	6.5 lbs.
DI1420H	UUF, Half Size	14” x 19.25” x 13.375”	18 lbs.	5.0 lbs.
DI1616N	UUF, Normal Size	16” x 16” x 21.125”	24 lbs.	6.5 lbs.
DI1616H	UUF, Half Size	16” x 16” x 13.375”	18 lbs.	5.0 lbs.
DI2020N	UUF, Normal Size	19.25” x 19.25” x 21.125”	30 lbs.	7.5 lbs.
DI2020H	UUF, Half Size	19.25” x 19.25” x 13.375”	22 lbs.	6.0 lbs.

Disposal Options

As local conditions, product use, and exposure can vary widely, the end user must determine the most appropriate disposal method for a spent Smart Sponge® or Smart Sponge Plus® product. However Smart Sponge® samples saturated with hydrocarbons both in the lab and in the field have been tested according to the EPA's Toxicity Characteristic Leaching Procedure ("TCLP"). These tests show that Smart Sponge® is a "non-leaching" (i.e., non-detect or "N.D.") product. As a result, Smart Sponge® technology can afford many cost effective and environmentally friendly disposal options. The following waste disposal and resource recovery industries have accepted spent Smart Sponge® products for disposal and/or recycling.

Waste-to-Energy Facilities - A specialized segment of the solid waste industry has used spent Smart Sponge® as an alternative fuel in the production of electricity. WTE is acknowledged at the federal level as a renewable energy source under the Federal Power Act, Title IV of the Clean Air Act and is a participant in the Department of Energy's National Renewable Energy Program.

Cement Kilns - This industry has used the spent Smart Sponge® as an alternative fuel in the production process of Portland Cement. This process is considered a beneficial reuse of waste products. The BTU value of spent Smart Sponge® is consistently above the average acceptable levels set for this high temperature.

Landfills - As discussed above, spent Smart Sponge® products have been classified as a solid waste and have been accepted at Subtitle D Landfills.

For more information about the Smart Sponge® technology,
visit **www.abtechindustries.com** or call **1-800-545-8999**.

Please keep in mind that, depending upon local conditions, product use, and exposure, a spent Smart Sponge® product could contain one or more of a wide range of contaminants that may impact available disposal options. As a result, generators of spent Smart Sponge products must have their waste analyzed, tested, and classified to determine the appropriate disposal method.

AbTech Industries does not take any responsibility for handling, transport, disposal, or recycling of spent Smart Sponge® products. For a more detailed disposal/recycle overview, please see the "Smart Sponge® Products Disposal Option" documents available upon request from AbTech Industries.

AbTech Smart Sponge® products have been extensively tested both in the laboratory and in the field – with additional testing on-going all the time. Nevertheless, because local conditions, product use, and exposure can vary widely, individual results may differ.

AbTech Smart Sponge® products must be used properly and in accordance with all manufacturer instructions. AbTech Industries does not take responsibility for any product misuse.

AbTech INDUSTRIES

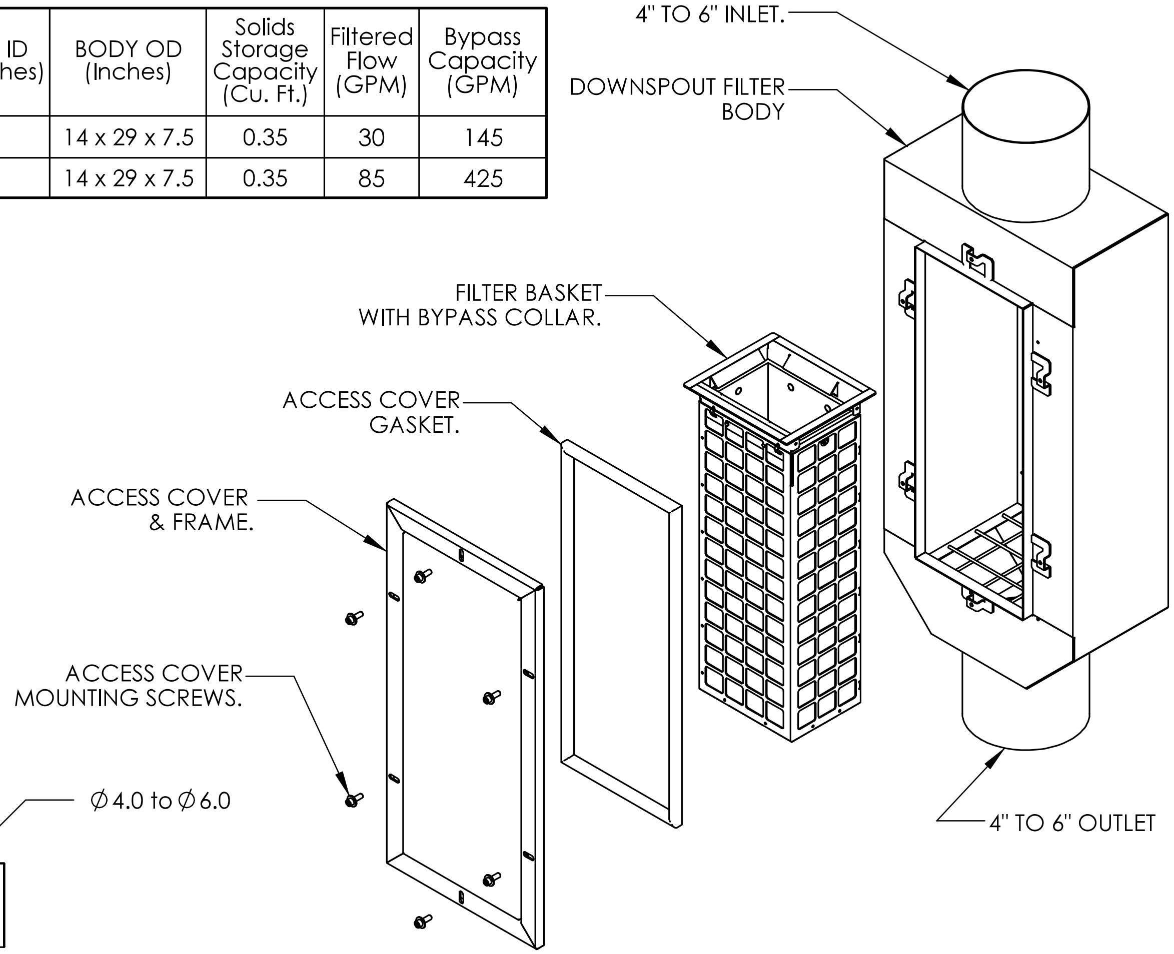
4110 North Scottsdale Road • Suite 235 • Scottsdale, AZ 85251
480.874.4000 • 800.545.8999 • www.abtechindustries.com

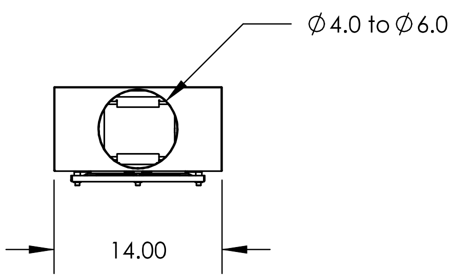
MAKERS OF smart sponge® PRODUCTS

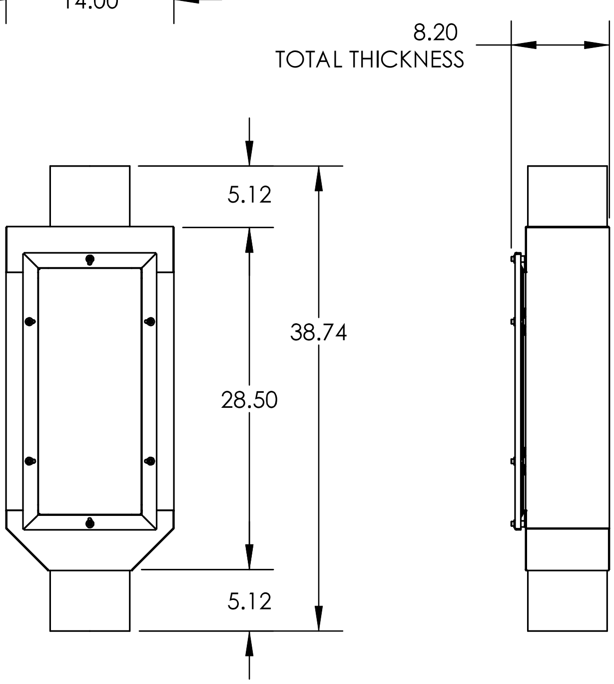
I10V1

DSF-0001

MODEL	INLET ID (Ø/Inches)	BODY OD (Inches)	Solids Storage Capacity (Cu. Ft.)	Filtered Flow (GPM)	Bypass Capacity (GPM)
FG-DS4	4	14 x 29 x 7.5	0.35	30	145
FG-DS6	6	14 x 29 x 7.5	0.35	85	425







NOTES:

1. FloGard Downspout Filter is available to fit most industry-standard downspouts (See Tabulation).

2. Filter Inserts shall have adequate bypass capacity to allow downspout to flow unimpeded at all times.

3. Filter assembly shall be constructed from stainless steel (type 304).

4. Filter medium shall be installed & maintained in accordance with manufacturer recommendations.

TITLE

FloGard® Downspout Filter

4" & 6" Inlet - Outlet

Models FG-DS4 & FG-DS6

KriStar Enterprises, Inc.

360 Sutton Place, Santa Rosa, CA 95407
Ph: 800.579.8819, Fax: 707.524.8186, www.kristar.com

DRAWING NO.	REV	ECO	DATE	
DSF-0001	NR	0063 NEW	JPR 2/11/09	SHEET 1 OF 1

EPIC System

The EPIC System uses the properties of capillary attraction to provide a system of sub-surface irrigation and drainage. This irrigation system consumes 50% - 85% less water than traditional surface or drip irrigation systems. It absorbs natural run-off and effluents, storing it for later re-use use in the system.

Any stormwater surge or runoff is retained and held in the system for re-use or slowly released in a controlled manner. The EPIC System can be incorporated in sustainable designs where not only precipitation, but also grey water may be used for irrigation. This significantly reduces, and in some cases eliminates, the need for any fresh water source in irrigation.

Here the EPIC chamber is shown with its accompanying pan. For large, uniform elevation projects, individual pans are replaced by site-built cells made from EPDM material.

From an analytical perspective, the EPIC system consists of three distinct elements that are combined to work together--the liner pan, the EPIC chamber, and the sand fill that covers and surrounds the first two components. The only moving part in the system is water that is controlled by gravity and capillary physics to travel throughout the system in a predetermined order. The largest component of the system is sand, and we can begin by analyzing this item.

Growing grass in a sand matrix is as "old as dirt". Damp sand and grass are a natural combination like peanut butter and jelly. A large example would be the entire state of Florida. In modern deliberate applications the "California Green" (12" of washed sand over a drainage pipe) has been the sought after standard in the golf industry for the last 35 years. The inherent problem with well drained sand based greens is that irrigation water applied at the surface just kept going and a high water demand ensued to keep the sand moist for grass to grow. The purpose of the liner pan provided by EPIC is to simply provide a barrier to catch and retain water. Polyethylene and EPDM liners have been successfully used for over 30 years as pond liners, and as groundwater protection barriers in hazardous waste landfills. Their durability for that purpose is unquestioned; as such the logical choice for this EPIC function.

That leaves the third component in the EPIC system of the chamber itself. By design it has no moving parts, but simply by strategic placement of holes, controls how water flows through and out of the chamber. Water flow becomes a natural function of gravity between the units. Upward water flow to create the ideal capillary rise is a natural physical law of nature as reliable as gravity. The durable chambers themselves are injection molded to proven designs similar to pipe used in the mining industry for years to withstand the pressures of 20' of overburden, and as support structures as driveway culverts. Once surrounded by sand, the EPIC field is as durable as any sand-based field.

As such with a logical analysis the individual concepts incorporated by the EPIC design are tried and true with a long history of reliability and desirability. EPIC has only combined and controlled the desired features in a unique arrangement of innovative parts to make everything work together. **That is what is new!**

NOTES:

1. Filter outlet adapter shall be constructed from stainless steel Type 304.

2. Filter element is constructed from polypropylene woven monofilament geotextile surrounding a perforated filter housing. Filter element shall not allow the retention of water between storm events.

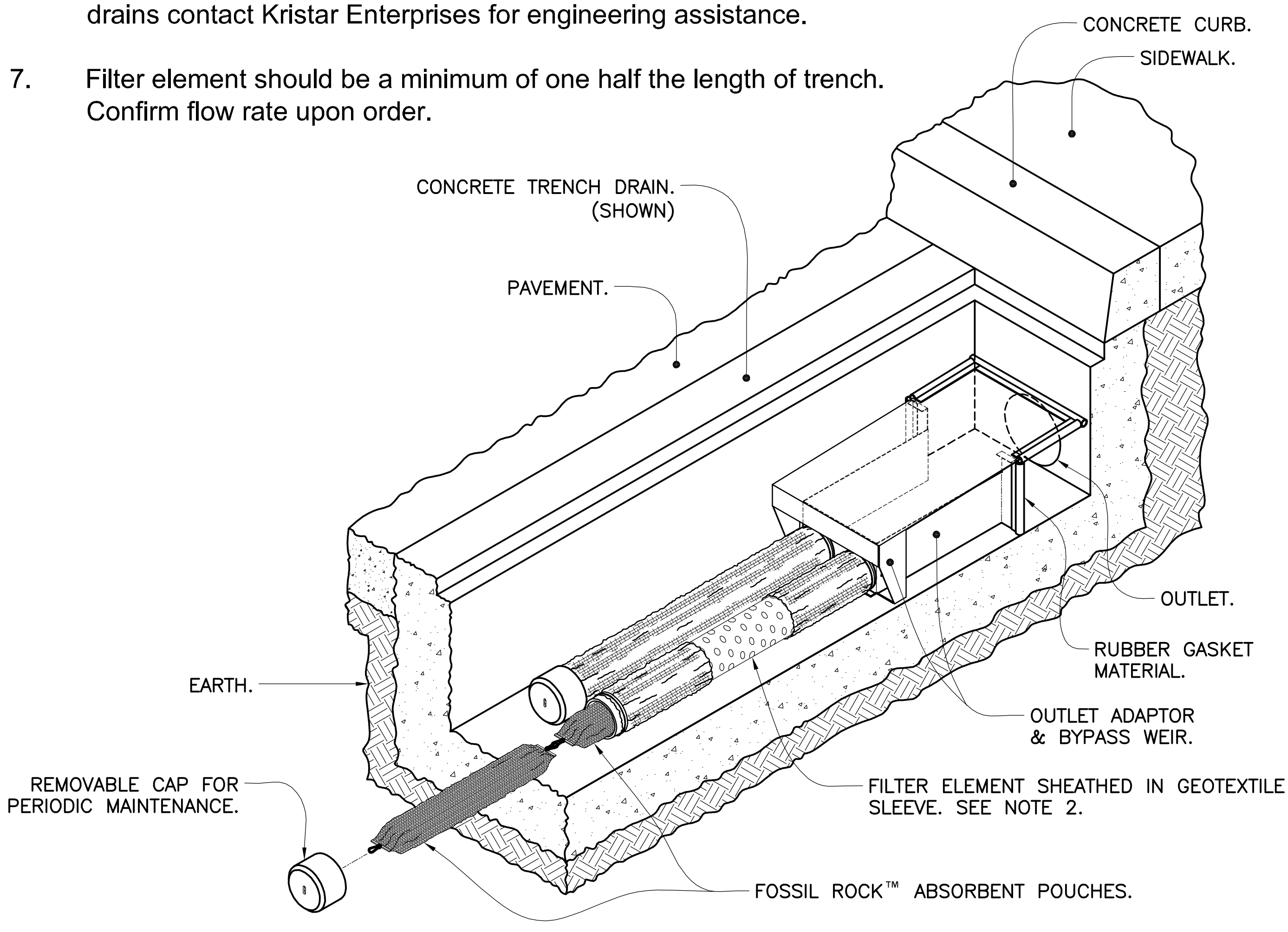
3. Filter inserts are supplied with "clip-in" filter pouches utilizing Fossil Rock ™ filter medium for the collection and retention of petroleum hydrocarbons (oils & greases).

4. FloGard® LoPro™ filter inserts and Fossil Rock™ filter medium pouches must be maintained in accordance with manufacturer recommendations.

5. Outlet adapter can accommodate outlet openings at right angles and/or bottom outlet openings.

6. For alternate outlet adapter configurations used for extremely shallow trench drains contact Kristar Enterprises for engineering assistance.

7. Filter element should be a minimum of one half the length of trench. Confirm flow rate upon order.



TITLE

FloGard® LoPro™

TRENCH DRAIN FILTER INSERT

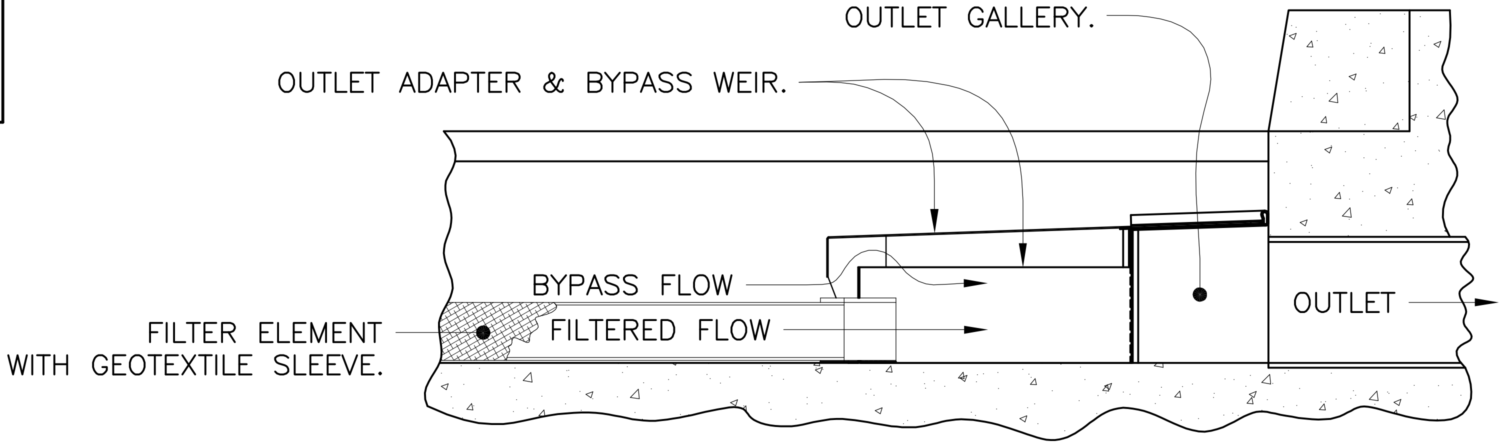
KRISTAR

KriStar Enterprises, Inc.

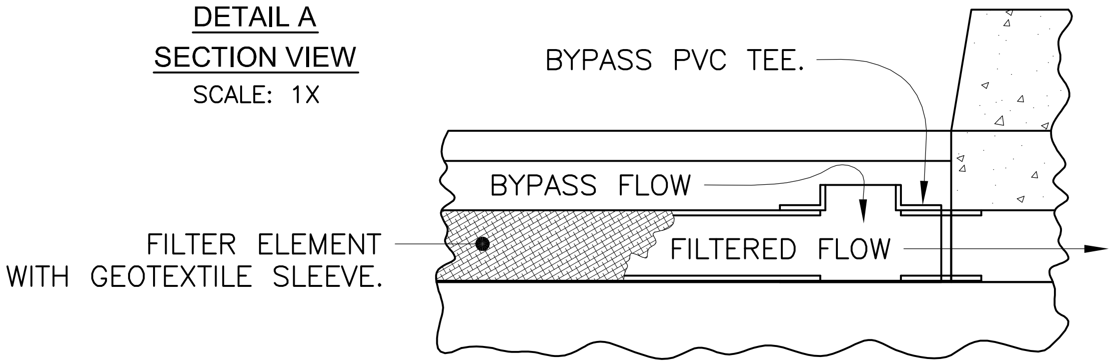
360 Sutton Place, Santa Rosa, CA 95407
Ph: 800.579.8819, Fax: 707.524.8186, www.kristar.com

DRAWING NO.	REV	ECO	DATE	
FG-LP-0002	F	0075 JPR 8/7/09	JPR 2/21/07	SHEET 1 OF 2

FG-LP-0002



DETAIL A
SECTION VIEW
SCALE: 1X



DETAIL B
SECTION VIEW
ALTERNATE ADAPTER CONFIGURATION
SCALE: 1X

SPECIFIER CHART

MODEL	FILTER TYPE	TRENCH WIDTH "ID" (CLEAR OPENING)	MINIMUM TRENCH DEPTH (FROM BOTTOM OF GRATE)	SOLIDS STORAGE CAPACITY CUBIC FEET **	FILTERED FLOW CUBIC FEET / SECOND **	TOTAL BYPASS CAPACITY CUBIC FEET /SECOND
FG-TDOF3	PIPE *	3.0	6.5	0.1	0.5	0.1
FG-TDOF4	PIPE *	4.0	6.5	0.2	0.5	0.1
FG-TDOF6	PIPE	6.0	6.5	0.4	0.5	0.2
FG-TDOF8	PIPE	8.0	6.5	0.7	0.5	0.3
FG-TDOF10	PIPE	10.0	6.5	0.9	0.5	0.5
FG-TDOF12	PIPE	12.0	6.5	0.9	1.0	0.6
FG-TDOF18	PIPE	18.0	6.5	1.3	1.5	1.1
FG-TDOF24	PIPE	24.0	6.5	1.8	2.0	1.5
FG-TDOA6	PANEL	6.0	4.5	0.4	0.2	0.2
FG-TDOA8	PANEL	8.0	4.5	0.7	0.2	0.3
FG-TDOA10	PANEL	10.0	4.5	0.8	0.3	0.5
FG-TDOA12	PANEL	12.0	4.5	1.0	0.4	0.6
FG-TDOA18	PANEL	18.0	4.5	1.4	0.8	1.1
FG-TDOA24	PANEL	24.0	4.5	1.8	1.1	1.5

* ALTERNATE ADAPTER CONFIGURATION. SEE DETAIL B.
**CAPACITY PER 4-FT. SEGMENT USED.

TITLE

FloGard® LoPro™

TRENCH DRAIN FILTER INSERT

KriStar Enterprises, Inc.
360 Sutton Place, Santa Rosa, CA 95407
Ph: 800.579.8819, Fax: 707.524.8186, www.kristar.com

DRAWING NO.	REV	ECO	DATE	
FG-LP-0002	F	0075 JPR 8/7/09	JPR 2/21/07	SHEET 2 OF 2

EXHIBIT “D”

OPERATION & MAINTENANCE PLAN
FOR FILTER INSERT

The maintenance program will include the following key components:

1. **REGULAR SWEEPING AND REMOVAL OF DEBRIS:**
   Vehicle parking lot will be swept on a regular basis. Sediment and debris (litter, leaves, papers and cans, etc.) within the area, especially around the drainage inlet, will be collected and removed. The frequency of sweeping will be based on the amount of sediment and debris generated.

2. **REGULAR INSPECTIONS:**
   The catch basin, downspout, or trench drain filter insert will be inspected on a regular basis. The frequency of inspection will be based on pollutant loading, amount of debris, leaves, etc., and amount of runoff. At a minimum, there will be three inspections per year.

3. **CONDUCT OF THE VISUAL INSPECTION:**
   a. Broom sweep around the inlet and remove the inlet grate.
   b. Inspect the filter liner for serviceability. If called for, the filter body will be replaced.
   c. Check the condition of the adsorbent pouches and visually check the condition of the enclosed adsorbent. If the surface of the granules is more than 50% coated with a dark gray or black substance, the pouches will be replaced with new ones.
   d. Check for loose or missing nuts (on some models) and gaps between the filter and the inlet wall, which would allow bypass of the filter during low flows.
   e. The filter components will be replaced in the inlet and the grate replaced.

4. **CLEANING OUT THE FILTER INSERT:**
   Regardless of the model of filter insert, the devices must be cleaned out on a recurring basis. The manufacturer recommends at least three cleanings per year – more in high exposure areas. For the Hydro-Cartridge filters, the filter must be cleaned when the solids level reaches close to the full tip.
   a. The Standard Filter, in most cases, can be cleaned out by removing the device from the inlet and dumping the contents into a DOT approved drum for later disposal. If the oil-absorbent pouches need to be changed, the time to change them is immediately after dumping and before the filter is replaced in the inlet.
   b. Because of weight, method of installation and so forth, some filter inserts will be cleaned with the aid of a vector truck. If necessary, the oil-absorbent pouches will be changed after the pollutants have been removed and as the filter is being returned to service.

5. **STENCILING**
   Legibility of stencils and/ or signs at all storm drain inlets and catch basins within the project area must be maintained at all time.

6. **MAINTENANCE LOG:**
   Keep a log of all inspections and maintenance performed on the catch basins, trench drains, and filter inserts. Keep this log on-site.

EPIC MAINTENANCE GUIDELINES

How much maintenance does an EPIC system require ?

Regular aeration, fertilization, overseeding, pesticides, and fungicides as awareness of landscape condition dictates. Biological growth is very prolific. Lawns grow so well that you need to keep on top of your mowing. The water is distributed directly to the roots, and the concept of subsurface fertilization becomes a reality. Regular aeration in the Spring and Fall is advisable for the air exchange through the thatch.

How often does the maintenance have to be done?

As often as regular scheduling demands. Golf courses mow 6-7 times per week. Homeowners mow once or twice every 1-2 weeks. The more something is taken care of, the better it will look.

How do you handle emitter flushing or clogging?

EPIC does not employ any emitters or moving parts. EPIC chamber transfer holes are one inch in diameter and we provide over 10 square inches of openings for every foot linear length of EPIC structure. The interface cannot clog and it never requires any maintenance. Mineral buildup and clogging occurs in pressurized systems that employ microscopic holes for water delivery (soaker hoses, drippers). Because the flow is intermittent in these systems, the area around the microscopic exit area experiences a wet period and then a dry period. During the dry period the water droplets evaporate leaving the minerals adhering around the microscopic hole, and constricting the pore even further by crystal formation. Eventually the microscopic hole seals up completely and the surrounding soil pressure will prevent the "plug" from clearing itself even at 100 psi pressures that may be present in the main delivery line. This phenomenon is similar even on relatively larger openings as may be found on the aerator screen of a kitchen faucet head.

Does the soil media ever have to be dug up and replaced?

No, the sand particles do not decompose, so the sand profile does not compact and remains stable indefinitely... unless surface plugging occurs by contamination of clays or silts over time. Regular aeration maintenance and collection of cores resolves the potential clay or silt issue.

FloGard® LoPro Trench Drain Filter Maintenance

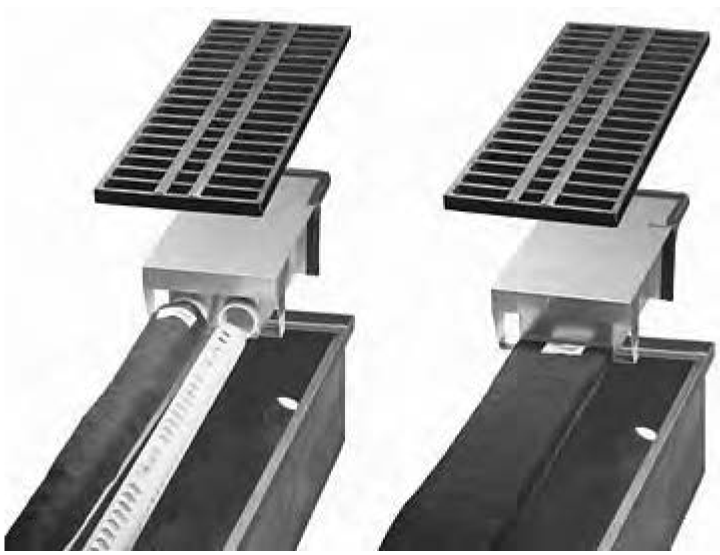
Plan 3:3:1 (Annual)

Three (3) system inspections

Three (3) filter cleanings

One (1) change and disposal of filter medium

*Representative of "typical" site – may vary depending on specific site conditions.



9. Many above-ground fuel storage tanks require a concrete enclosure (secondary containment) in the event of a tank rupture. Also, greenhouses and nurseries that are storing recycled water laden with fertilizer often are required to do the same.

10. Store nitrate-based and other oxidizing fertilizers separately from solvents, fuels and pesticides to reduce fire risk. Follow the general principle of storing like chemicals together.

11. Store chemicals in their original containers, tightly closed, with labels intact. Also inspect them regularly for leaks.

12. Dry chemicals should be stored above liquids and on pallets to ensure that they do not get wet.

13. Locate chemical storage and maintenance areas, as well as vehicle refueling and maintenance areas, away from wells and surface waterbodies in accordance with local regulations, typically at least 50 to 100 feet away.

14. Make available all Material Safety Data Sheets (MSDSs) in a readily accessible area. A list of all hazardous chemicals in the work place must be completed to ensure that all MSDSs are readily available.

15. Do not store large quantities of pesticides for long periods of time. Adopt the "first in-first out" principle, using the oldest products first to ensure that the shelf life does not expire. Buy smaller quantities of pesticides and fertilizers, thereby reducing storage issues.

Spills and Disposal

16. Keep chemical spill cleanup equipment, personal protective equipment and emergency phone numbers available when handling chemicals and their containers.

17. Properly manage chemical spills by cleaning them up as soon as possible, controlling actively spilling or leaking materials, containing the spilled material (e.g., with absorbents, sand), collecting the spilled material, storing or disposing of the spilled material, and following relevant spill reporting requirements. "Washing down" a spill with water is not an appropriate cleanup approach.

18. Basic spill reporting requirements include: name, address and phone number of person reporting and of person responsible for release; date and time; type, name and estimated amount of substance released; location/address of released substance; size/description of affected area; containment/cleanup actions taken; and other agencies/persons contacted.

19. Never pour lawn and garden chemicals or rinse water down storm drains (or sanitary drains) and keep chemicals off of impervious surfaces (e.g., streets, gutters) during application. Use local recycling centers to dispose of chemicals.

20. Follow label directions for disposal. This typically involves triple-rinsing empty containers, puncturing and crushing. All visible chemicals should be cleaned from the container prior to disposal.

Pesticide, Fertilizer and Other Chemical Storage, Handling and Disposal

BMP Type			
Design			
Installation			
Maintenance/Operations			X
Green Industry Relevance			
ASLA		GCC	X
ALCC	X	ISA	X
CALCP	X	RMSGA	X
CGGA	X	WFC	
CNA	X		

Description

Pesticides, herbicides, fertilizers, fuel and other maintenance chemicals must be properly applied, stored, handled and disposed of to prevent contamination of surface water and groundwater. Misuse of pesticides and herbicides can result in adverse impacts to aquatic life, even at low concentrations. Misuse of fertilizer can result in algae overgrowth in waterbodies due to excessive phosphorus and nitrogen loading.

Basic Practice Guidelines

Application and Handling

1. Apply fertilizers, pesticides and other chemicals according to manufacturer's directions. The label is the law for pesticide usage. *(See the Pesticide Application and Fertilizer Application BMPs for more discussion on proper application.)*

2. Keep pesticide and fertilizer equipment properly calibrated according to the manufacturer's instructions and in good repair. Recalibrate equipment periodically to compensate for wear in pumps, nozzles and metering systems. Calibrate sprayers when new nozzles are installed.

3. All mixing and loading operations must occur on an impervious surface.

4. To prevent possible backflow and contamination of a water supply, never submerge a water supply hose in a chemical tank or container. Provide proper backflow prevention devices where required by the Colorado Plumbing Code.

5. Do not apply pesticides during high temperatures or windy conditions.

6. Avoid application of any pesticide, herbicide or fertilizer immediately prior to forecasted or inclement heavy rainfall or irrigation that would result in runoff of the chemicals.

7. Keep records of pesticide application and provide signage as required by law.

Storage

8. Storage areas should be secure and covered, preventing exposure to rain and unauthorized access. Basic safety equipment such as fire extinguishers, warning signs (e.g., "no smoking"), adequate light and ventilation and spill clean-up materials should be present. Floors and shelves should be non-porous (e.g., metal, concrete) to prevent sorption of chemicals. If possible, temperature control should be provided to avoid excessive heat or cold. Storage areas should be kept clear of combustible material and debris.