Appendix H
Hydrology and Water Quality

ESA

This page left intentionally blank

H-1 Hydrology Calculations

ESA

This page left intentionally blank

Thienes Engineering, Inc.
CIVIL ENGINEERING LAND SURVEYING

CELEBRATING THIRTY YEARS 30th ANNIVERSARY 1986 - 2016

PRELIMINARY HYDROLOGY CALCULATIONS

FOR

AVION BURBANK
HOLLYWOOD WAY AND SAN FERNANDO ROAD
BURBANK, CALIFORNIA

PREPARED FOR

OMP
19300 HAMILTON AVENUE
GARDENA, CALIFORNIA 90248
P. (310) 323- 9100
FAX. (310) 608-7997

JANUARY 6, 2016
REVISED: MARCH 31, 2016
REVISED: JULY 19, 2016
REVISED: MAY 30, 2017
REVISED: OCTOBER 4, 2017

JOB NO. 3421

PREPARED BY

THIENES ENGINEERING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
(714) 521-4811

PRELIMINARY HYDROLOGY CALCULATIONS

FOR

AVION BURBANK

PREPARED BY RICKY HWA
UNDER THE SUPERVISION OF

_____

REINHARD STENZEL DATE:
R.C.E. 56155
EXP. 12/31/18

INTRODUCTION

A: PROJECT LOCATION

The project site is located at the southwest corner of Hollywood Way and San Fernando Road in the City of Burbank. Please see next page for vicinity map.

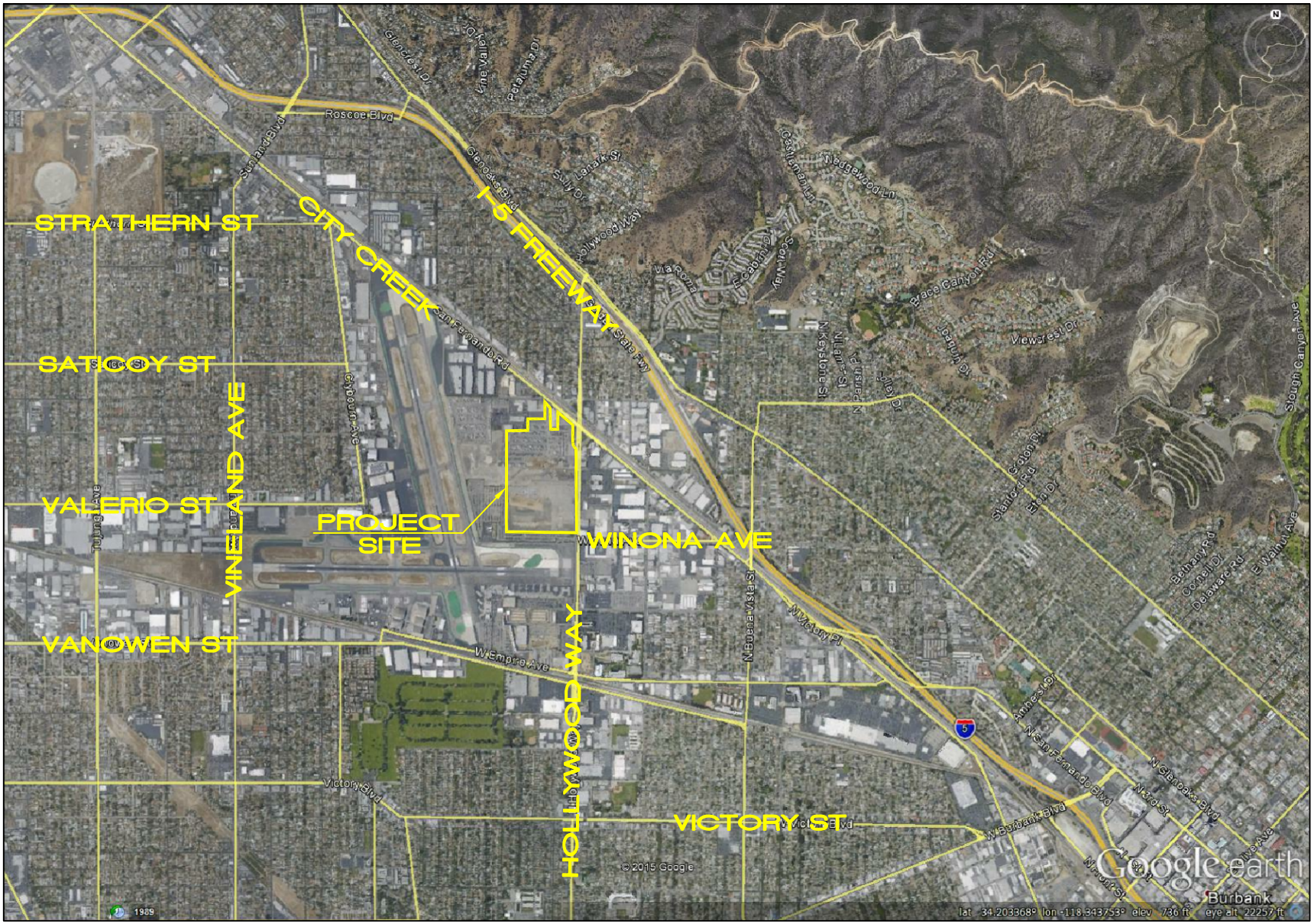
B: STUDY PURPOSE

The purpose of this study is to determine the existing and proposed conditions 50-year peak flow rates from the site that ultimately drains to a 60-inch storm drain in Hollywood Way.

C: PROJECT STAFF:

Thienes Engineering staff involved in this study include:

Reinhard Stenzel
Brian Weil
Ricky Hwa



VICINITY MAP

FOR

AVION BURBANK

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

Last Update:10/4/17
O:\3400-3499\3421\3421VicinityMap.dwg

DISCUSSION

The project site encompasses approximately 61.40 acres. Proposed improvements consist of six commercial type buildings ranging from 94,000 to 274,000 square feet, plus several smaller office buildings, retail buildings, and a hotel building. Adjacent to each commercial type building is a truck yard and several vehicle parking lots. There is also a proposed public access street fronting Hollywood Way and bisecting the site providing access to the proposed buildings, plus a proposed public storm drain in the proposed access street conveying offsite flow tributary to the site. Kenwood Street will be extended southerly to meet the proposed access street. The remainder of the site will be reserved for landscaping.

County Drainage

Per hydrology data from Los Angele County Department of Public Works, there is no County owned or maintained storm drain near the project site. The site is tributary to an existing 60-inch storm drain in Hollywood Way. Please see Appendix "A" for county drainage information, as-built storm drain plans and other pertinent reference materials.

Existing Condition

The project site is currently a paved vehicle parking lot. It generally drains easterly towards catch basins near Hollywood Way and then into the 60-inch storm drain in Hollywood Way. Portions of offsite vehicle parking lots to the west (Subareas 1A, 10B, 11B and 30D) and offsite buildings to the north (Subareas 3A and 4A) also appear to drain onto the site.

There is an existing pump station and two catch basins at the end of Kenwood Street. Offsite flow tributary to Kenwood Street (Subarea 50F) drains to the catch basins and is conveyed northerly via the pump station and a force main to an offsite storm drain in Cohasset Street and, ultimately, to the same 60-inch storm drain system in Hollywood Way. This offsite flow does not currently enter the project site, but it will be tributary to the proposed public storm drain system traversing through the site.

The total 50-year existing condition peak flow rate draining to the 60-inch Hollywood Way storm drain, from the project site plus offsite tributary areas, is approximately 214.5 cfs (35.3 cfs from Subareas 1A-4A + 87.5 cfs from Subareas 10B-12B + 17.4 cfs from Subarea 20C + 16.1 cfs from Subareas 30D-31D + 41.2 cfs from Subarea 40E + 17.0 from Subarea 50F). The total 50-year existing condition peak flow rate, from the project site only, is approximately 132.3 cfs (30.2 cfs from Subarea 2A + 29.4 cfs from Subarea 12B + 17.4 cfs from Subarea 20C + 14.1 cfs from Subarea 31D + 41.2 cfs from Subarea 40E).

See Appendix "B" for existing condition hydrology calculations and Appendix "C" for existing condition hydrology map.

Proposed Condition

The north half of the project site – in particular, Building 5 (Subareas 10A-12A), Building 6 (Subareas 41A-43A), the office buildings, retail buildings and hotel (Subareas 51A-53A), and the smaller parking lots north of Buildings 1, 3 and 4 (Subareas 30A, 54A and 71A) – drain to catch basins in the adjacent truck yards and parking lots. Runoff is then conveyed via proposed private storm drains to the proposed public access street, and then via a proposed public storm drain easterly to the existing 60-inch Hollywood Way storm drain. Also tributary to the proposed public storm drain are runoffs from the proposed public access street (Subareas 22A-23A and 60A-70A), the existing Kenwood Street and the adjacent north-westerly lots (Subareas 20A-21A), the westerly offsite parking lots (Subareas 1A-3A) and portions of northerly existing buildings (Subareas 40A and 50A). The total proposed condition 50-year peak flow rate, from the above mentioned onsite plus offsite areas, is approximately 129.0 cfs. The proposed condition 50-year peak flow rate from the above mentioned onsite-only areas is approximately 54.0 cfs.

Portions of the south half of the project site (Buildings 1 and 3, Subareas 80B-84B) drain to catch basins in the truck yards and parking lots adjacent to Buildings 1 and 3. Runoff will be conveyed easterly to the existing 60-inch Hollywood Way storm drain via a proposed storm drain south of the buildings. The proposed condition 50-year peak flow rate from these areas is approximately 28.4 cfs.

The remainder of the project site's southerly half (Buildings 2 and 4, Subareas 90C-95C) drain to catch basins in the truck yards and parking lots adjacent to Buildings 2 and 4. Similarly, runoff will be conveyed easterly to the existing 60-inch Hollywood Way storm drain via a proposed storm drain south of the buildings. The proposed condition 50-year peak flow rate from these areas is approximately 40.1 cfs.

The easterly landscape area fronting Hollywood Way (Subarea 100D) will surface drain to Hollywood Way, and then southerly to an existing street catch basin tributary to the existing 60-inch storm drain. The proposed condition 50-year peak flow rate surface draining to Hollywood Way from the project site is approximately 2.9 cfs.

The total proposed condition 50-year peak flow rate tributary to the 60-inch Hollywood Way storm drain, from the project site plus offsite tributary areas, is approximately 200.4 cfs (129.0 + 28.4 + 40.1 + 2.9). The total proposed condition 50-year peak flow rate, from the project site only, is approximately 125.4 cfs (54.0 + 28.4 + 40.1 + 2.9). This is less than the existing condition rate of 132.3 cfs.

See Appendix "B" for proposed condition hydrology calculations and Appendix "C" for proposed condition hydrology map.

Methodology

Hydrology calculations were computed using L.A.C.D.P.W. HydroCalc calculator. The soil type is 15. The 50-year rainfall is 7.0" per the Los Angeles County Hydrology Manual. See Appendix "A" for pertinent reference materials.

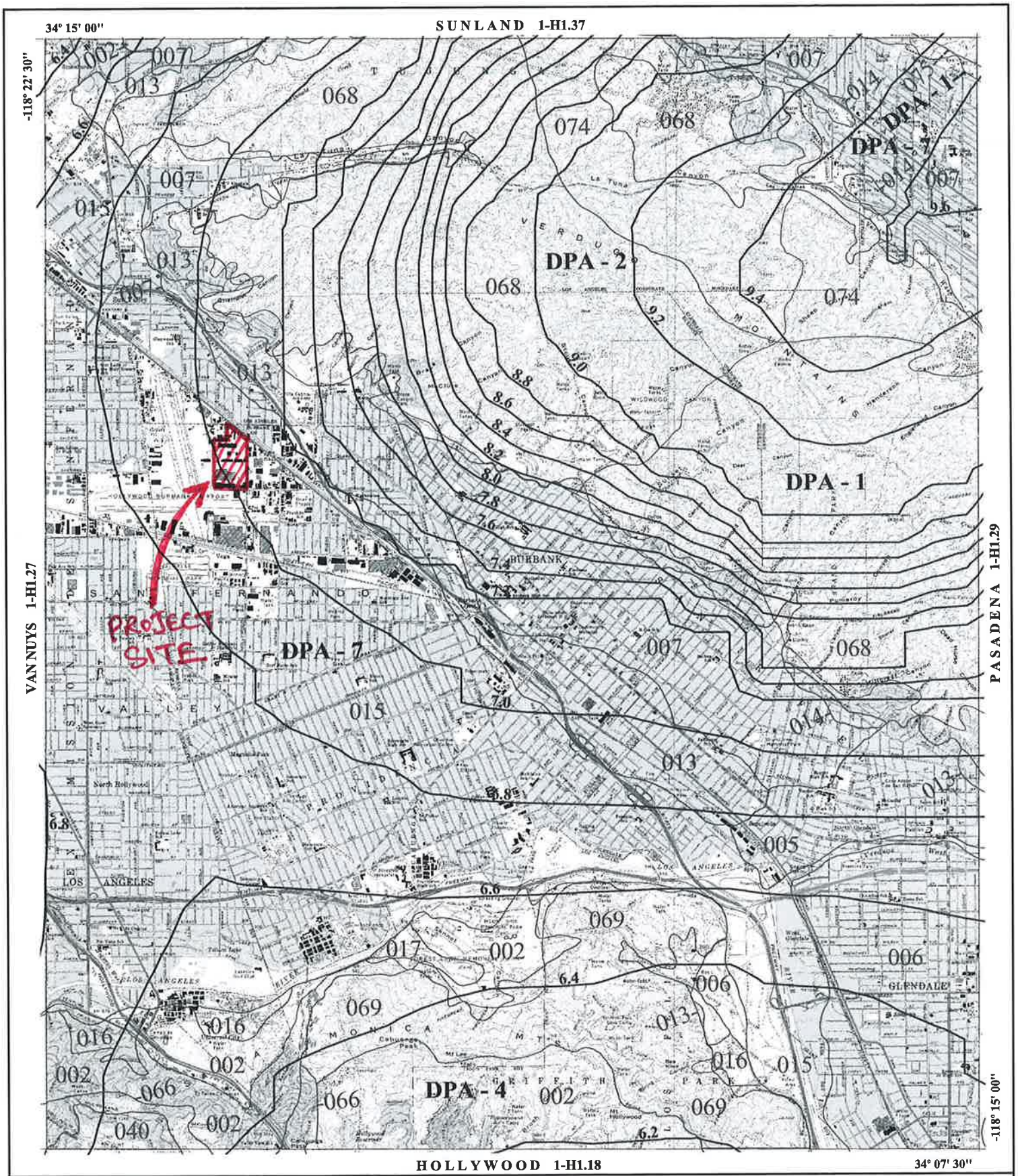
This page left intentionally blank

APPENDIX	DESCRIPTION
A	REFERENCE MATERIALS
B	HYDROLOGY CALCULATIONS
C	HYDROLOGY MAP

This page left intentionally blank

APPENDIX A

REFERENCE MATERIALS



N
W E
S

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

B U R B A N K
50-YEAR 24-HOUR ISOHYET

RAINFALL = 7.0"

1-H1.28

SOIL TYPE 15

LOS ANGELES COUNTY PUBLIC WORKS
Public Service That Works

Office Use Only
☐ Sent Initials: _____
☐ Fax ☒ Email ☐ Other: _____
Date: _____ Time: _____

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION – HYDRAULIC ANALYSIS UNIT

INFORMATION REQUEST SUMMARY

INFORMATION REQUESTED BY

Requester's Name: JILL JOHNSON
Company: THIENES ENGINEERING, INC.
Phone Number: 714. 521.4811 Fax Number: 714. 521. 4173
Email: jill@thienseng.com

Method of Contact: ☐ Walk-in ☐ Phone ☐ Fax ☒ Email ☐ Prelim. Mtg. Date: 11/11/2015

Intended Use: PROPOSED DEVELOPMENT

Proposed Project Type: INDUSTRIAL Acreage Involved: _____

Will information be used in any litigation? ☐ YES ☒ NO
Case Info Name: _____ No: _____ Location: _____

Requester's Signature: J. L. B. J.

INFORMATION REQUESTED (Attach site map if available)

LACFCD Facility: Name: _____
Unit: _____ Line: _____ Station: _____
City: Burbank
Street/Cross-street: West side of Hollywood Way, south of San Fernando Blvd
Thomas Guide: Page: 533 Grid: C4 & C5 ☒ Site Map/Plans Submitted
Info. Requested:
- HYDROLOGY
- ALLOWABLE
- HYDRAULIC

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
Hydraulic Analysis Unit
OFFICIAL RECORD DOCUMENT
Issued By:
Date: 11/18/2015
Public Service That Works

BELOW SECTION TO BE COMPLETED BY THE HYDRAULIC ANALYSIS UNIT

INFORMATION PROVIDED: None.

REFERENCES SEARCHED: _____

COMMENTS, ETC: There is no County owned nor maintained drain near your area of interest. The drain shown on attached map north and east of this said area appears to be owned by the City of LA. Please contact the City for allowable Q and connection permit to this drain.

FOLLOW-UP REQUIRED: _____

INFORMATION PROVIDED BY: Ambrose C. Ajaelo PE. Date: 11/18/2015

INFORMATION REVIEWED BY: _____ Date: _____

From: Ambrose Ajaelo [AAJAELO@dpw.lacounty.gov]
Sent: Wednesday, November 18, 2015 4:02 PM
To: Angie L.
Subject: RE: TEI Job #3421 - Burbank Hydrology Info
Attachments: Final response.pdf; Map from view LA.pdf

Dear Angie,
The attached map, showing drains within your area of interest, shows that Los Angeles County does not own nor maintain any drainage facility within your area of interest. The grayed drains north and east of your area of interest seems to belong to the City of Los Angeles. Please contact the city of Los Angeles for allowable q and or connection permit.

Thank you again for another valuable opportunity to serve you.

Yours sincerely.

Ambrose C. Ajaelo PE.
Record Custodian
Hydraulic Analysis Section,
Design Division, DPW, LA County
Email: aajaelo@dpw.lacounty.gov
Phone: 626-458-7860
Fax: 626-458-7827

From: Angie L. [mailto:angie@thieneseng.com]
Sent: Wednesday, November 11, 2015 5:16 PM
To: Ambrose Ajaelo
Subject: TEI Job #3421 - Burbank Hydrology Info

Good evening Ambrose,
Please see attached request for hydrology information.

Thank you!

Angie Lomeli
Research Assistant

THIENES ENGINEERING, INC.
14349 Firestone Blvd. | La Mirada, California | 90638
P: 714.521.4811 ext: 237 F: 714.521.4173
Angie@ThienesEng.com

Angie Lomeli

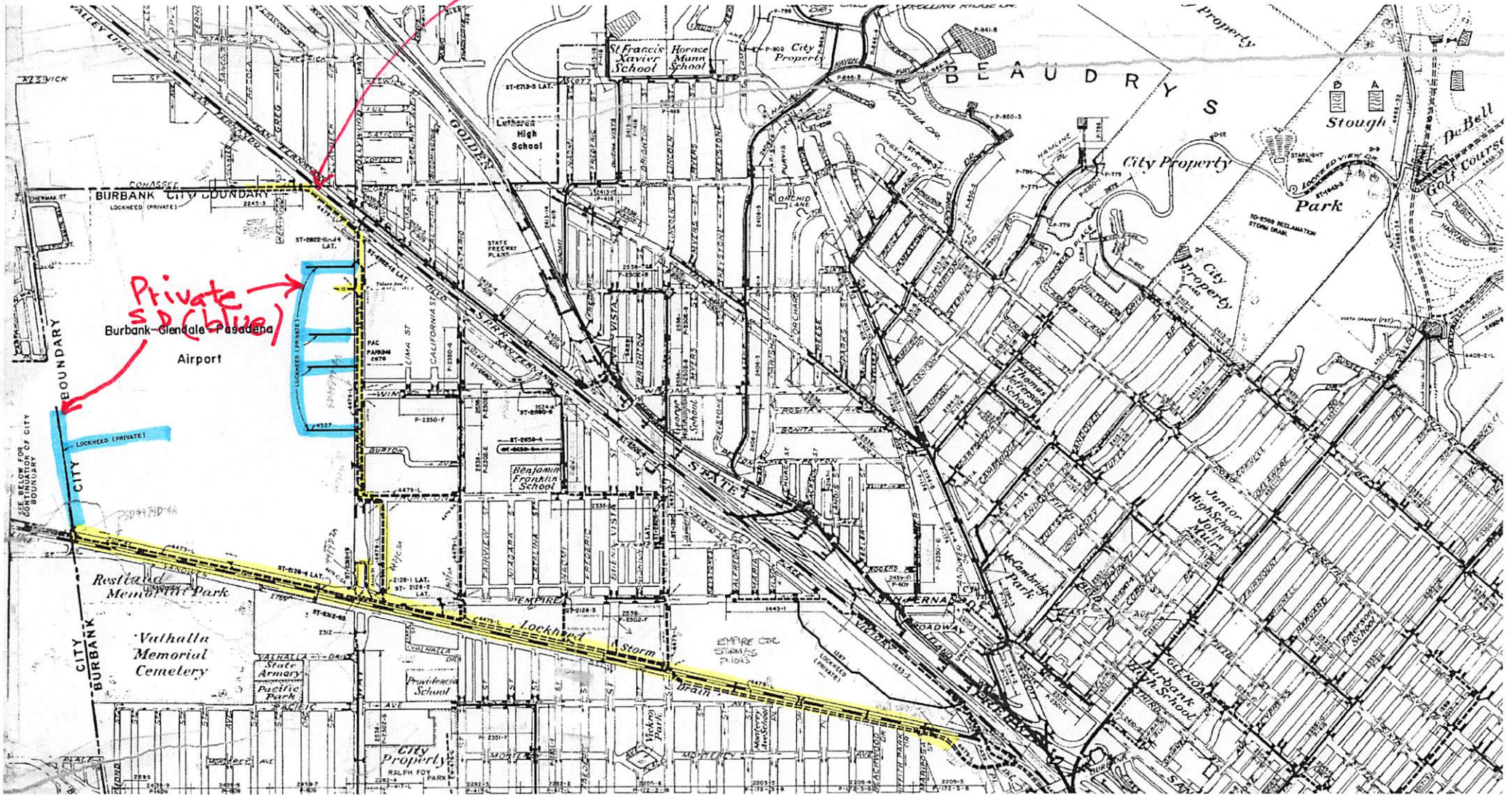
From: Kristie Ferronato
Sent: Monday, April 25, 2016 12:02 PM
To: Angie Lomeli
Subject: FW: Storm Drains - Hollywood Way & San Fernando Blvd. follow up
Attachments: SD Master Index Map.pdf

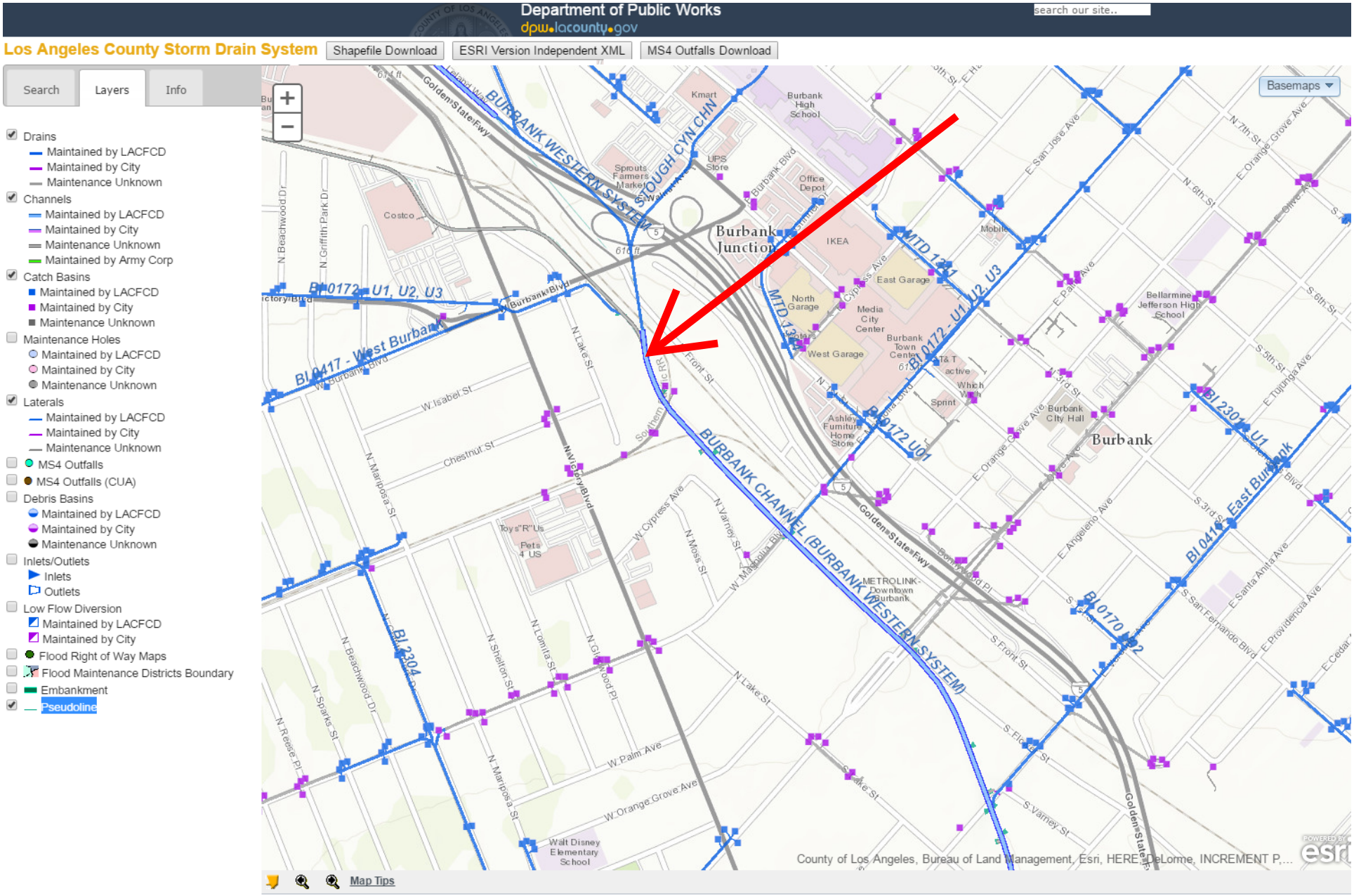
From: Sanchez, Ricardo [mailto:RSanchez@burbankca.gov]
Sent: Monday, April 25, 2016 11:40 AM
To: Kristie Ferronato <Kristie@thieneseng.com>
Subject: Storm Drains - Hollywood Way & San Fernando Blvd. follow up

Hi Kristie,

I'm following up on a letter submitted to Bonnie Teaford, Public Works Director, regarding the storm drains along San Fernando Blvd. and Hollywood Way: After in depth research, the City cannot find any documentation of ownership; however, historically the City has been maintaining the Lockheed Storm Drain facilities; therefore, the storm drain belongs to the City. I've attached a section of the Storm Drain Master Index Map for clarification. Any additional questions, please call or email me.

Ricardo Sanchez, P.E.
Senior Civil Engineer
Public Works Engineering & Permits Supervisor
(818) 238-3954


City of Burbank
Storm Drains (Yellow)
Private
SD (blue)
BURBANK CITY BOUNDARY
LOCKHEED (PRIVATE)
Burbank-Glendale-Pasadena
Airport
CITY BOUNDARY
SEE BELOW FOR CONTINUATION OF CITY BOUNDARY
LOCKHEED (PRIVATE)
Lockheed Storm Drain
Valhalla Memorial Cemetery
Forest Lawn Memorial Park
Pacific Park
Providencia School
City Property
RALPH FOY PARK
Victory Park
Benjamin Franklin School
Thomas Jefferson School
Lathrop High School
St Francis Xavier School
Horace Mann School
City Property
Stough Park
DeBell Golf Course
McCambridge Park
Junior High School
John Muir
Burbank High School
Emerson School
Metropolitan Water District
Empire Gr Storm P-1043
BEAUDRY
GOLDEN STATE
SAN FERNANDO
VALLEY LINE
CALIFORNIA ST
LIMA ST
BURTON AVE
ROSITA AVE
BONITA AVE
EMPIRE
ROADWAY
ORCHID LANE
STATE FREEWAY PLANS
LOCKHEED VIEW DR
STARLIGHT BOWL
RESERVOIR
STORM DRAIN


Department of Public Works
dpw.lacounty.gov
search our site..
Los Angeles County Storm Drain System
Shapefile Download
ESRI Version Independent XML
MS4 Outfalls Download
Search
Layers
Info
Drains
Maintained by LACFCD
Maintained by City
Maintenance Unknown
Channels
Maintained by LACFCD
Maintained by City
Maintenance Unknown
Maintained by Army Corp
Catch Basins
Maintained by LACFCD
Maintained by City
Maintenance Unknown
Maintenance Holes
Maintained by LACFCD
Maintained by City
Maintenance Unknown
Laterals
Maintained by LACFCD
Maintained by City
Maintenance Unknown
MS4 Outfalls
MS4 Outfalls (CUA)
Debris Basins
Maintained by LACFCD
Maintained by City
Maintenance Unknown
Inlets/Outlets
Inlets
Outlets
Low Flow Diversion
Maintained by LACFCD
Maintained by City
Flood Right of Way Maps
Flood Maintenance Districts Boundary
Embankment
Pseudoline
Basemaps
BURBANK WESTERN SYSTEM
SLOUGH CYN CHN
BURBANK CHANNEL (BURBANK WESTERN SYSTEM)
BL 0172 - U1, U2, U3
BL 0417 - West Burbank
BL 0172 U01
BL 0172 - U1 U2 U3
BL 2304
BL 2304 - U1
BL 0417 - East Burbank
BL 0170 U02
MTD 133
MTD 133 - U1
Burbank Junction
Burbank
Golden State Fwy
Burbank Blvd
W Isabel St
Chestnut St
W Palm Ave
W Orange Grove Ave
W Cypress Ave
E San Jose Ave
E Orange Grove Ave
E Angeleno Ave
E Tujunga Ave
E Santa Anita Ave
E Providencia Ave
N Lake St
S Lake St
N Varney St
S Varney St
N Front St
S Front St
N Beachwood Dr
N Griffith Park Dr
N Mariposa St
N Sparks St
N Reese Pl
N Shelton St
N Lomita St
N Glenwood Pl
N Glendale Blvd
N Victory Blvd
Kmart
Burbank High School
UPS Store
Sprouts Farmers Market
Office Depot
Costco
IKEA
Mobile
East Garage
North Garage
West Garage
Media City Center
Burbank Town Center
T&T active
Which Wich
Sprint
Ashley Furniture Home Store
Burbank City Hall
Bellarmine Jefferson High School
Toys"R"Us
Pets 4 US
METROLINK - Downtown Burbank
Walt Disney Elementary School
County of Los Angeles, Bureau of Land Management, Esri, HERE, DeLorme, INCREMENT P,...
Map Tips

WATER RESOURCES DIVISION
HYDROLOGY SECTION

Q-2402

INFORMATION REQUEST SUMMARY

Date: 04/28/2016

Project Name: Burbank Western System

Project Location: Between Burbank Blvd and Magnolia	T.G. Page: 533	Grid: G6 & G7

Project Engineer: Silvia Medina

Technical Review by: Peter Imaa PI

Information Requested: Hydrology Data

Information Requested By: Angie Lomeli Thienes Engineering, Inc. (714)521-4811 Ext.237

Information To Be Used: Planning purposes

Will Information Be Used In Any Litigation? ☐ *Yes* ☒ *No*

Information Provided:

Location	Subarea Area (ac)	Subarea Q_{50} (cfs)	Total Area (ac)	Total Q_{50} (cfs)
4	69	213	-	-
11	49	103	14,363	16,178

See attached map for locations.

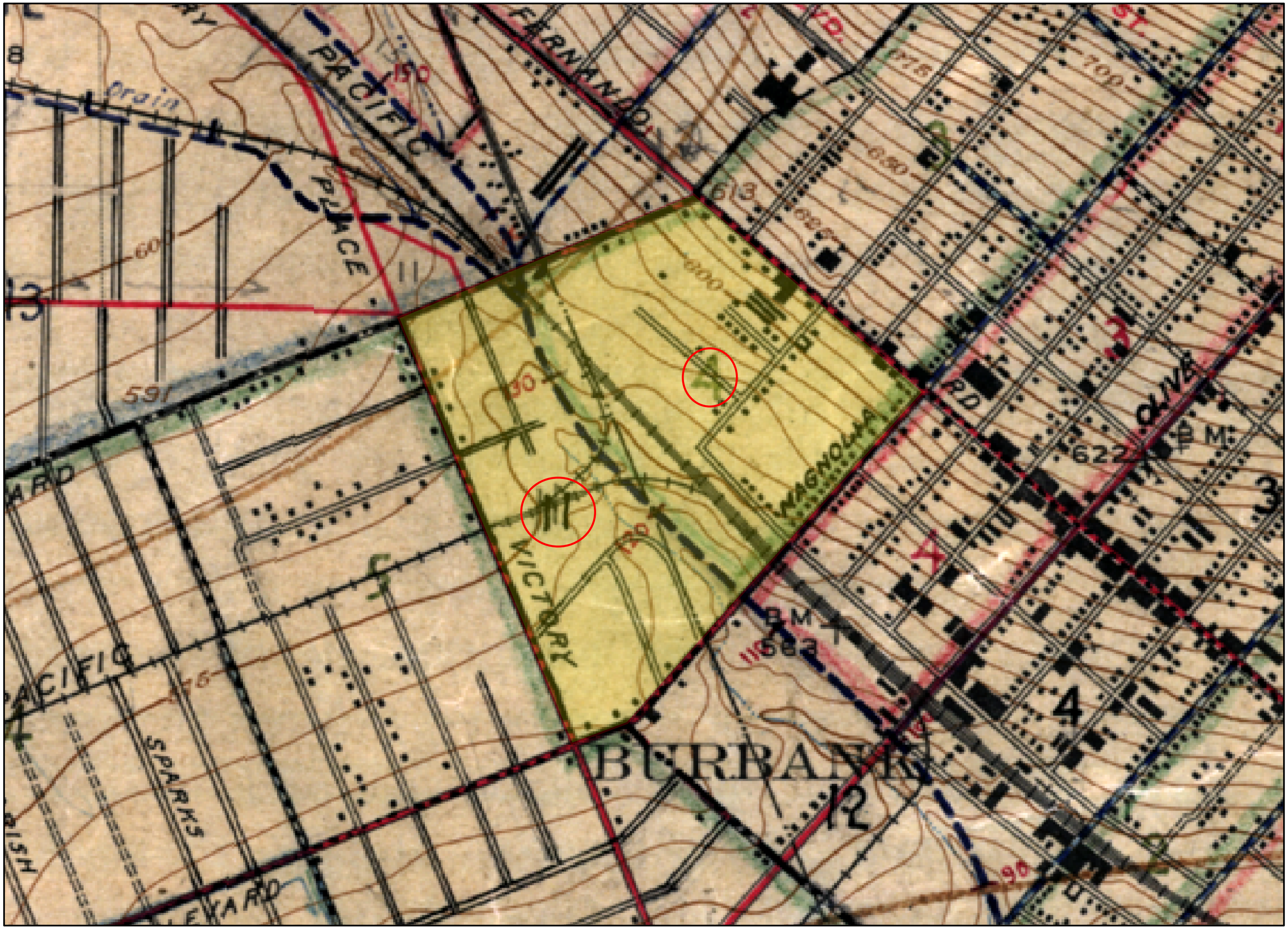
Date Provided: 04/28/2016

References: Los Angeles River Comprehensive Plan Hydrology Study Book#2. 1948. Map No.1/112

Calculations, Comments, Etc...

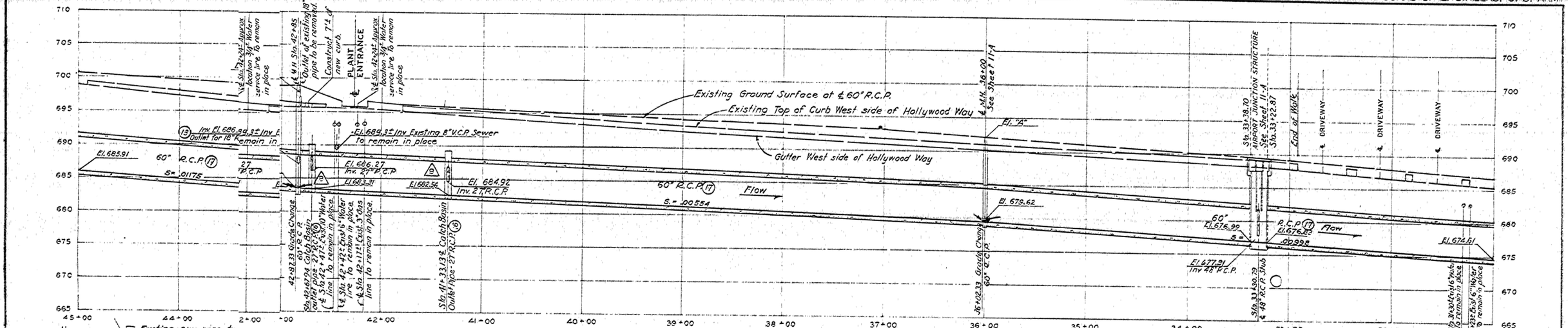
The information provided should be used for planning purposes.

N


PACIFIC
FERNANDO
PLACE
Drain
600
591
613
MAGNOLIA
VICTORY
RD
OLIVE
B M
622
B M
583
BURBANK
12
3
4
PACIFIC
SPARKS

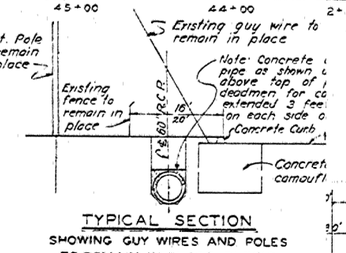
WAR DEPARTMENT

CORPS OF ENGINEERS, U. S. ARMY

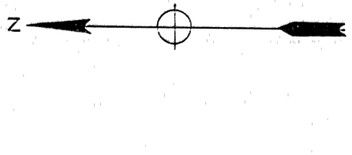


PROFILE

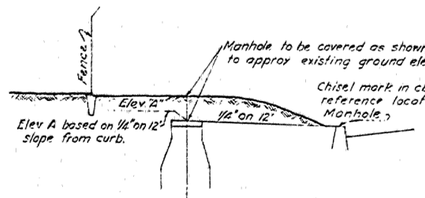
SCALE: HOR. 1 IN. = 40 FT.
VERT. 1 IN. = 5 FT.



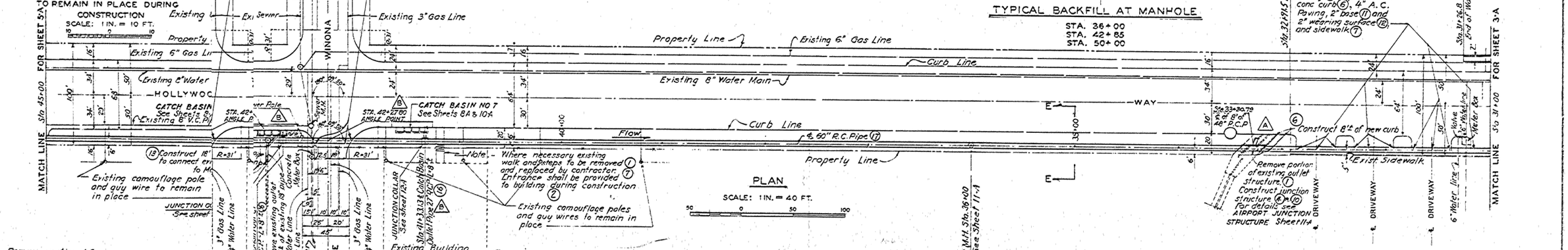
TYPICAL SECTION
SHOWING GUY WIRES AND POLES TO REMAIN IN PLACE DURING CONSTRUCTION
SCALE: 1 IN. = 10 FT.



Z

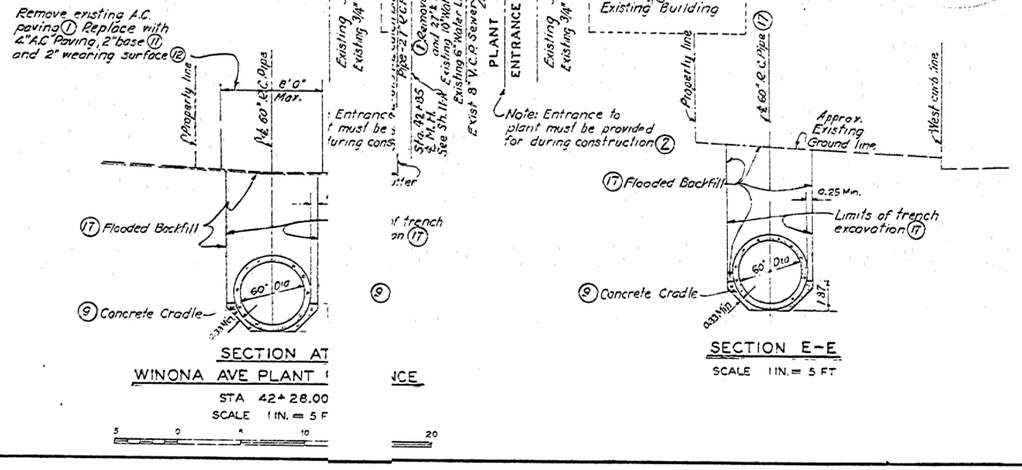


TYPICAL BACKFILL AT MANHOLE
STA. 36+00
STA. 42+85
STA. 50+00



PLAN

SCALE: 1 IN. = 40 FT.



SECTION AT
WINONA AVE PLANT ENTRANCE
STA 42+28.00
SCALE 1 IN. = 5 FT

SECTION E-E
SCALE 1 IN. = 5 FT

GENERAL NOTES

Utility data indicated hereon is the best interpretation of data obtained from various sources and is not guaranteed.
Prospective bidders may verify data in field
Unless otherwise noted, removal of all existing structures and obstructions shall be done by the contractor.
All work in connection with Storm Drain shown hereon shall be constructed by the contractor unless otherwise noted.
Figures in circles indicate contract item numbers under which payment will be made
Where the contractor digs a trench wider than the minimum through carelessness, the extra concrete required to extend the cradle to the sides of the excavation shall be furnished by him at his own expense.
Construction work shall procede without interference with existing or proposed guy wires to poles adjacent to wire fence.

REDRAWN WITHOUT CHANGE AND SIGNATURES TRACED FROM ORIGINAL DRAWINGS OCT 1, 1943

REFERENCE DRAWINGS

For Plan and Profiles No 1, No. 2 and No. 4. .. See Sheets 2-A, 3 A & 5-A
For Catch Basin Location Details (Hollywood Way & Winona Ave.)..... See Sheet 8-A
For Typical Catch Basin Structural Details..... See Sheet 10-A
For Manhole Details - Airport Drain Junction. .... See Sheet 11-A
For details of Junction Collars..... See Sheet 12-A

(R) - SD - 4479F - 4A

SECTION NO. VI

REV. NO.	DATE	REVISION	REV.	CHK.	APP.
		REPLACES CONTRACT DWG. SHEET 4, FILE NO. 388/104			
		FOR CONSTRUCTION	TJC	TGM	TPC
A	3-31-43	Relocated Catch Basin No.7			
		and added stubs to Catch			
		Basins and Junction Structure			
		and changed size of outlet			
		pipe to Catch Basins.	TJC	TGM	FBC
B	5-12-43	Deleted 8'-27" R.C.P. stubs			
		and revised outlet pipe from			
		36" R.C.P. to 27" R.C.P. at Catch			
		Basins No 7 and No 8	TJC	TGM	FBC

FEDERAL WORKS AGENCY
LOCKHEED STORM DRAIN
BURBANK, CALIFORNIA — DOCKET NO. CALIF. 4-458
CONSTRUCTION DETAIL DRAWING

PLAN AND PROFILE NO. 3

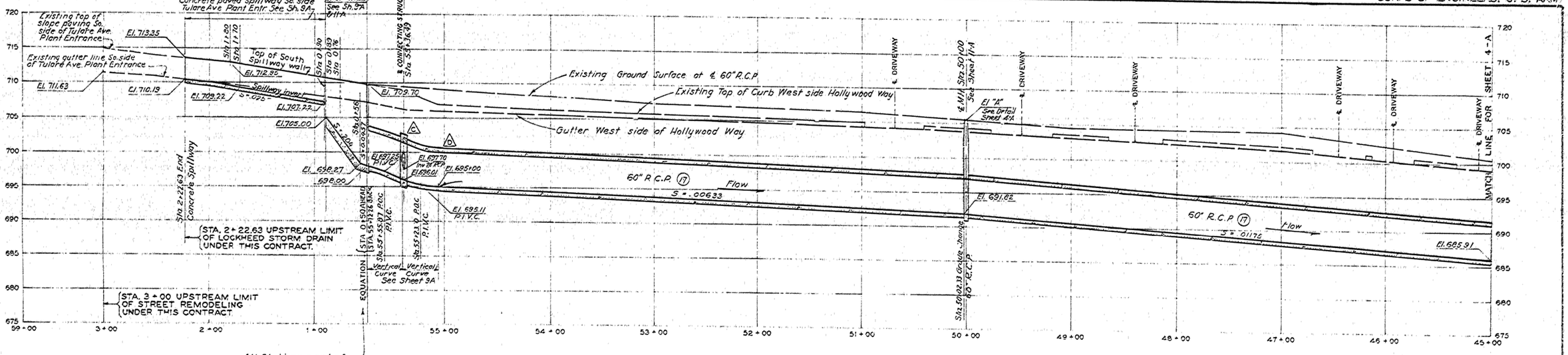
HOLLYWOOD WAY LATERAL-"A" STA 0+37.91 TO STA 55+72.26
SCALE: AS SHOWN IN SHEETS SHEET NO. 4-A
DATUM IS MEAN SEA LEVEL
PLANS PREPARED BY:
U. S. ENGINEER OFFICE, LOS ANGELES, CALIF., FEB. 1943

APPROVED BY: Melvin M. Peterson, COLONEL OF ENGINEERS, U.S. ARMY, DISTRICT ENGINEER
APPROVED BY: Brehon B. Somervell, MAJOR GENERAL, ASSISTANT DIRECTOR OF FEDERAL WORKS AGENCY

FILE NO. 388/115 REVISION-B | DRAWN B.S.A. | CHECKED J.W.A. F.L.H. F.C.C. | APPROVED T.G.M. F.B.C. | TO ACCOMPANY SPECIFICATIONS DATED FEBRUARY 12, 1943

WAR DEPARTMENT

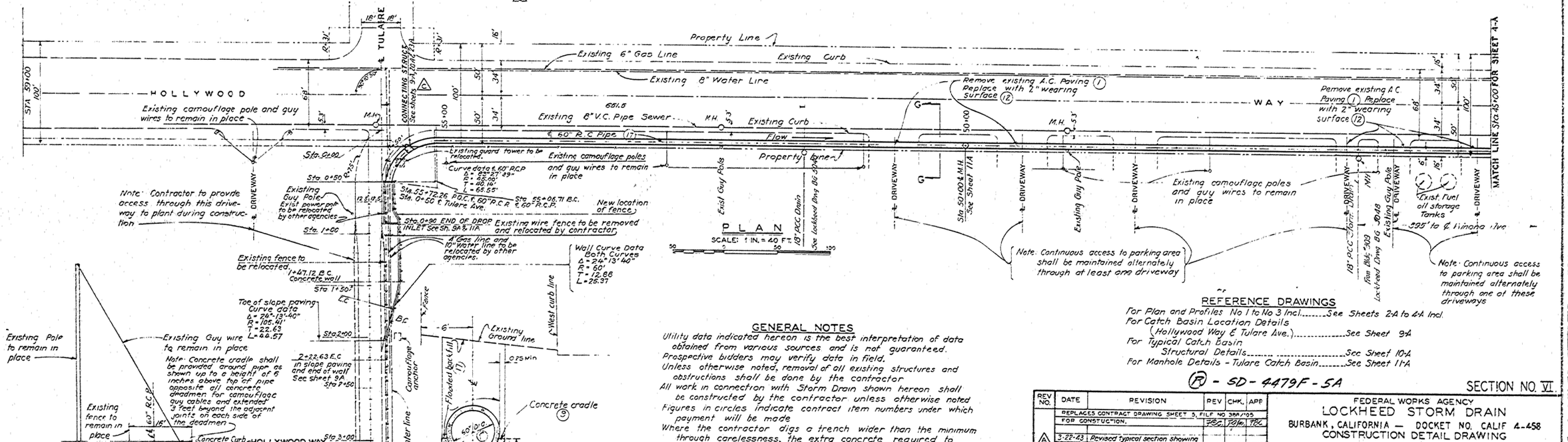
CORPS OF ENGINEERS, U. S. ARMY



All Stations west of sta 55+72.26 are taken on ℄ Tulare Ave Plant Entrance
The ℄ intersection of the plant entrance produced with the west curb face of Hollywood Way - Sta 0+00

PROFILE

SCALE: HORIZ. 1 IN. = 40 FT.
VERT. 1 IN. = 8 FT.



TYPICAL SECTION

SHOWING GUY WIRES AND POLES TO REMAIN IN PLACE DURING CONSTRUCTION
SCALE 1 IN. = 10 FT.

SECTION G-G

SCALE 1 IN. = 5 FT.

PLAN

SCALE: 1 IN. = 40 FT.

REFERENCE DRAWINGS

For Plan and Profiles No 1 to No 3 Incl. ..... See Sheets 2-A to 4-A Incl.
For Catch Basin Location Details (Hollywood Way & Tulare Ave.) ..... See Sheet 9-A
For Typical Catch Basin Structural Details ..... See Sheet 10-A
For Manhole Details - Tulare Catch Basin ..... See Sheet 11-A

GENERAL NOTES

Utility data indicated hereon is the best interpretation of data obtained from various sources and is not guaranteed.
Prospective bidders may verify data in field.
Unless otherwise noted, removal of all existing structures and obstructions shall be done by the contractor
All work in connection with Storm Drain shown hereon shall be constructed by the contractor unless otherwise noted
Figures in circles indicate contract item numbers under which payment will be made
Where the contractor digs a trench wider than the minimum through carelessness, the extra concrete required to extend the cradle to the sides of the excavation shall be furnished by him at his own expense

REDRAWN WITHOUT CHANGE AND SIGNATURES TRACED FROM ORIGINAL DRAWING OCT. 1, 1943

(R) - SD - 4479F - 5A

SECTION NO. VI.

REV NO.	DATE	REVISION	PREV. CHK.	APP.
		REPLACES CONTRACT DRAWING SHEET 5, FILE NO 388/116 FOR CONSTRUCTION.	FBC	FBC
A	3-22-43	Revised typical section showing guy wires and poles to show		
B	4-9-43	Removed Stop order at Sta 54 + 00.	FBC	FBC
C	5-21-43	Added connecting structure at Sta 55 + 36.49	FBC	FBC
D	7-19-43	Added elevation of invert-24 RCP at Sta 55 + 36.49	FBC	FBC

FEDERAL WORKS AGENCY
LOCKHEED STORM DRAIN
BURBANK, CALIFORNIA — DOCKET NO. CALIF 4-458
CONSTRUCTION DETAIL DRAWING

PLAN AND PROFILE NO. 4

HOLLYWOOD WAY LATERAL-"A" STA 27+12.94 TO STA 55+72.26
SCALE: AS SHOWN IN SHEETS SHEET NO. 5-A
PLANS PREPARED BY: DATUM IS MEAN SEA LEVEL
U. S. ENGINEER OFFICE, LOS ANGELES, CALIF., FEB 1943

APPROVED BY: [signature] COL. CORPS OF ENGINEERS, U.S. ARMY DISTRICT ENGINEER

APPROVED BY [signature] ASSIST. REGIONAL DIRECTOR FEDERAL WORKS AGENCY

FILE NO.	DRAWN	CHECKED	APPROVED
388/116 REVISION-D	B.S.A. E.A.O	J.W.A. F.H. F.C.C.	T.G.M. F.B.C.

TO ACCOMPANY SPECIFICATIONS
DATED FEB 12, 1943

This page left intentionally blank

APPENDIX B

HYDROLOGY CALCULATIONS

This page left intentionally blank

EXISTING CONDITION

Peak Flow Hydrologic Analysis

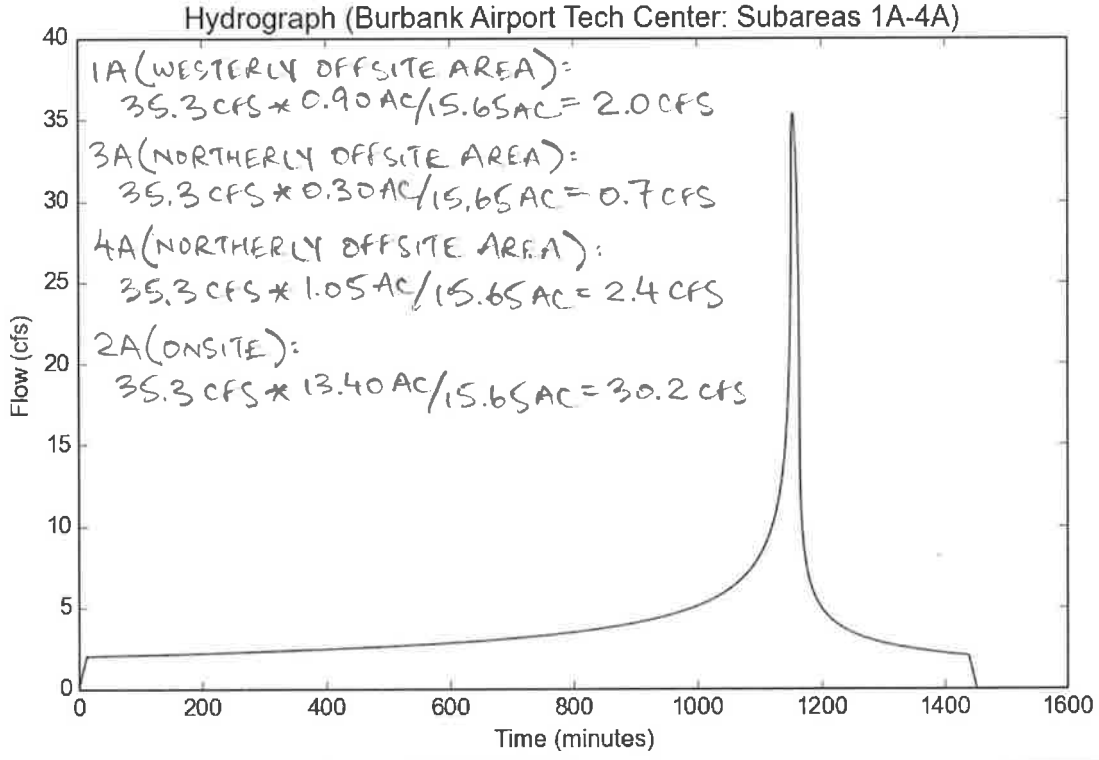
File location: O:/3400-3499/3421/HydroCalc/3421 HydroCalc EX Subareas 1A-4A.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Burbank Airport Tech Center
Subarea ID	Subareas 1A-4A
Area (ac)	15.65
Flow Path Length (ft)	1710.0
Flow Path Slope (vft/hft) = (739.00 - 717.00)/1710 =	0.013
50-yr Rainfall Depth (in)	7.0
Percent Impervious	0.9
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.0
Peak Intensity (in/hr)	2.6654
Undeveloped Runoff Coefficient (Cu)	0.3704
Developed Runoff Coefficient (Cd)	0.847
Time of Concentration (min)	13.0
Clear Peak Flow Rate (cfs)	35.333
Burned Peak Flow Rate (cfs)	35.333
24-Hr Clear Runoff Volume (ac-ft)	7.444
24-Hr Clear Runoff Volume (cu-ft)	324259.7236



Peak Flow Hydrologic Analysis

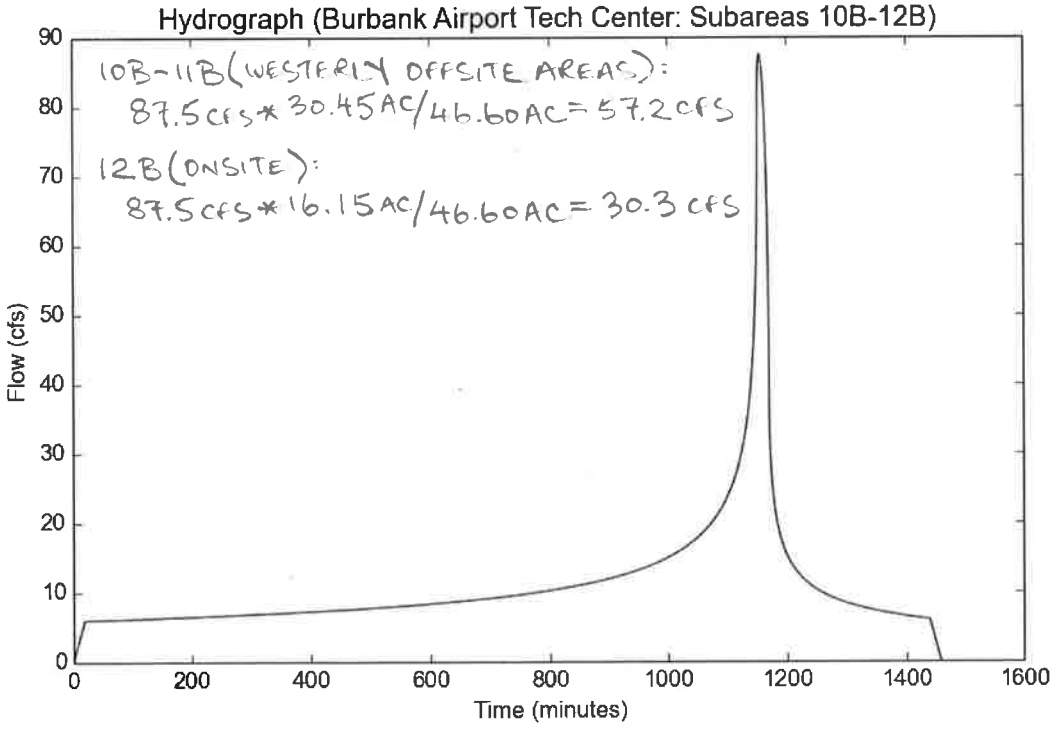
File location: O:/3400-3499/3421/HydroCalc/3421 HydroCalc EX Subareas 10B-12B.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Burbank Airport Tech Center
Subarea ID	Subareas 10B-12B
Area (ac)	46.6
Flow Path Length (ft)	3110.0
Flow Path Slope (vft/hft) = (760.00 − 710.95) / 3110 =	0.016
50-yr Rainfall Depth (in)	7.0
Percent Impervious	0.9
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.0
Peak Intensity (in/hr)	2.23
Undeveloped Runoff Coefficient (Cu)	0.318
Developed Runoff Coefficient (Cd)	0.8418
Time of Concentration (min)	19.0
Clear Peak Flow Rate (cfs)	87.478
Burned Peak Flow Rate (cfs)	87.478
24-Hr Clear Runoff Volume (ac-ft)	22.16
24-Hr Clear Runoff Volume (cu-ft)	965288.8519



Peak Flow Hydrologic Analysis

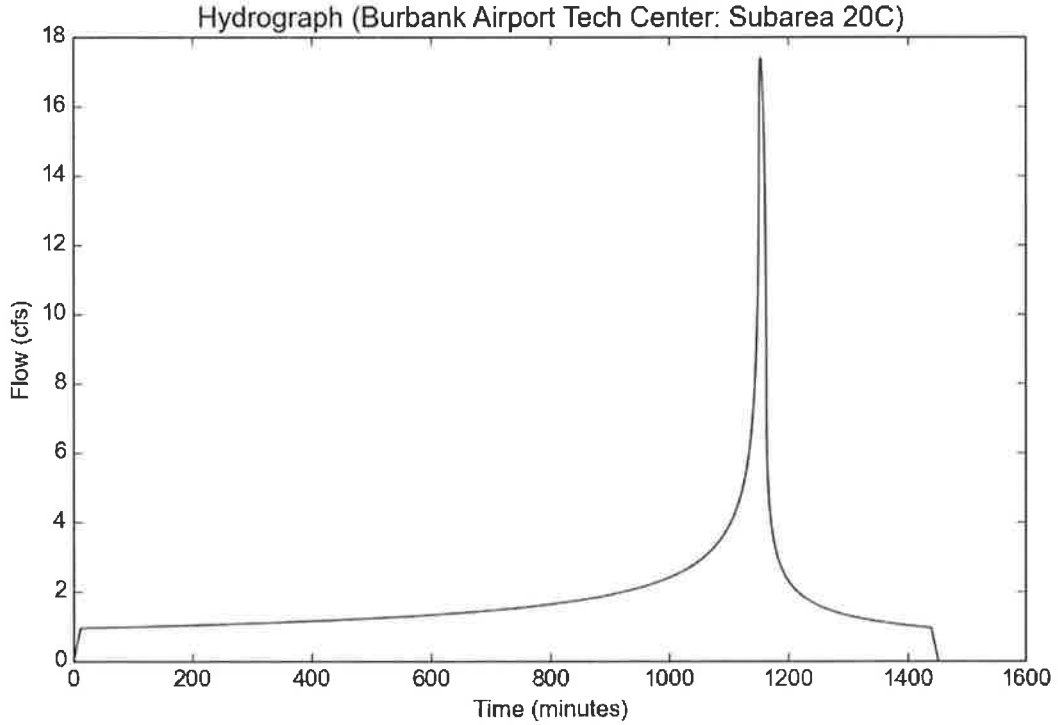
File location: O:/3400-3499/3421/HydroCalc/3421 HydroCalc EX Subarea 20C.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Burbank Airport Tech Center
Subarea ID	Subarea 20C
Area (ac)	7.4
Flow Path Length (ft)	1240.0
Flow Path Slope (vft/hft) = (722.00−710.80)/1240 =	0.009
50-yr Rainfall Depth (in)	7.0
Percent Impervious	0.9
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.0
Peak Intensity (in/hr)	2.7676
Undeveloped Runoff Coefficient (Cu)	0.3827
Developed Runoff Coefficient (Cd)	0.8483
Time of Concentration (min)	12.0
Clear Peak Flow Rate (cfs)	17.3727
Burned Peak Flow Rate (cfs)	17.3727
24-Hr Clear Runoff Volume (ac-ft)	3.52
24-Hr Clear Runoff Volume (cu-ft)	153331.8515



Peak Flow Hydrologic Analysis

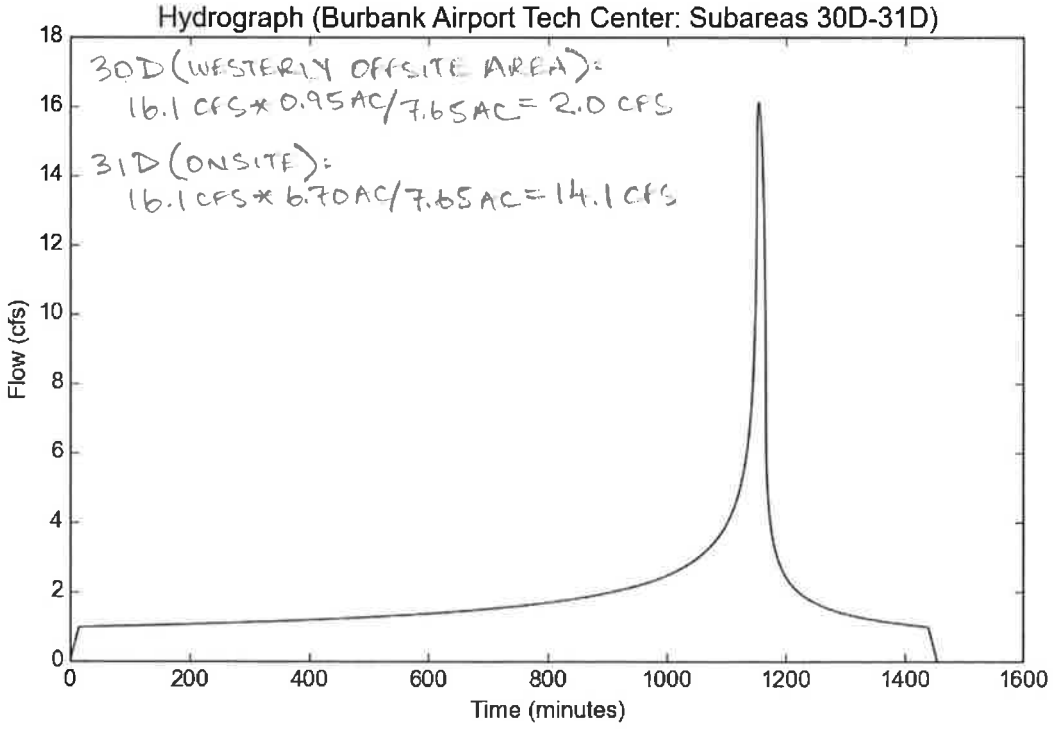
File location: O:/3400-3499/3421/HydroCalc/3421 HydroCalc EX Subareas 30D-31D.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Burbank Airport Tech Center
Subarea ID	Subareas 30D-31D
Area (ac)	7.65
Flow Path Length (ft)	1850.0
Flow Path Slope (vft/hft) =(725.00-708.40)/1850=	0.009
50-yr Rainfall Depth (in)	7.0
Percent Impervious	0.9
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.0
Peak Intensity (in/hr)	2.492
Undeveloped Runoff Coefficient (Cu)	0.3495
Developed Runoff Coefficient (Cd)	0.845
Time of Concentration (min)	15.0
Clear Peak Flow Rate (cfs)	16.1082
Burned Peak Flow Rate (cfs)	16.1082
24-Hr Clear Runoff Volume (ac-ft)	3.6384
24-Hr Clear Runoff Volume (cu-ft)	158489.4703



Peak Flow Hydrologic Analysis

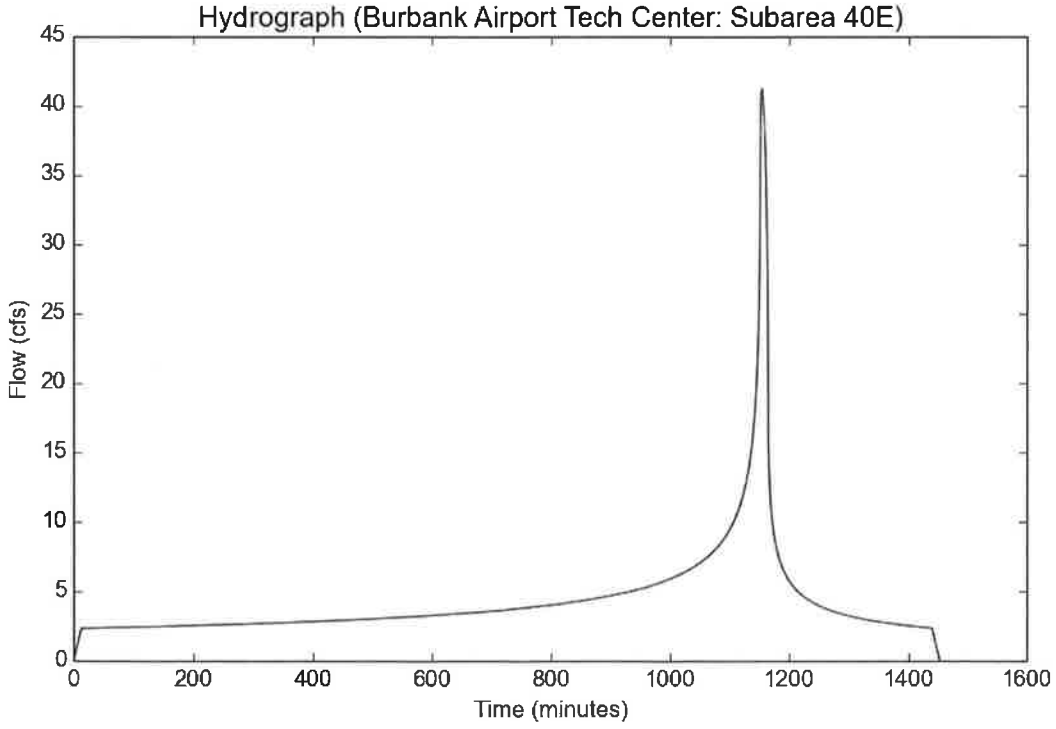
File location: O:/3400-3499/3421/HydroCalc/3421 HydroCalc EX Subarea 40E.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Burbank Airport Tech Center
Subarea ID	Subarea 40E
Area (ac)	18.25
Flow Path Length (ft)	1550.0
Flow Path Slope (vft/hft) = (718.50-700.00)/1550 =	0.012
50-yr Rainfall Depth (in)	7.0
Percent Impervious	0.9
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.0
Peak Intensity (in/hr)	2.6654
Undeveloped Runoff Coefficient (Cu)	0.3704
Developed Runoff Coefficient (Cd)	0.847
Time of Concentration (min)	13.0
Clear Peak Flow Rate (cfs)	41.2031
Burned Peak Flow Rate (cfs)	41.2031
24-Hr Clear Runoff Volume (ac-ft)	8.6807
24-Hr Clear Runoff Volume (cu-ft)	378130.3486



Peak Flow Hydrologic Analysis

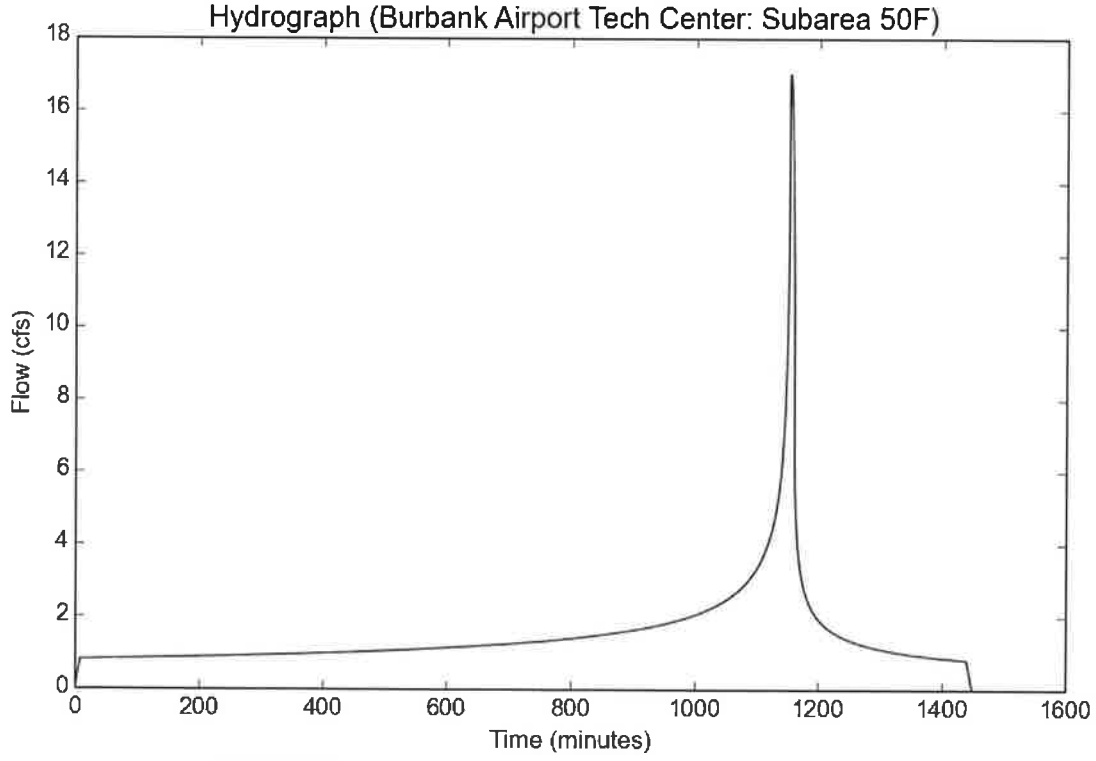
File location: O:/3400-3499/3421/HydroCalc/3421 HydroCalc EX Subarea 50F.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Burbank Airport Tech Center
Subarea ID	Subarea 50F
Area (ac)	6.3
Flow Path Length (ft)	780.0
Flow Path Slope (vft/hft) = (737.50-730.50)/780 =	0.009
50-yr Rainfall Depth (in)	7.0
Percent Impervious	0.9
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.0
Peak Intensity (in/hr)	3.1683
Undeveloped Runoff Coefficient (Cu)	0.4267
Developed Runoff Coefficient (Cd)	0.8527
Time of Concentration (min)	9.0
Clear Peak Flow Rate (cfs)	17.0194
Burned Peak Flow Rate (cfs)	17.0194
24-Hr Clear Runoff Volume (ac-ft)	2.9973
24-Hr Clear Runoff Volume (cu-ft)	130561.9165



This page left intentionally blank

PROPOSED CONDITION

Peak Flow Hydrologic Analysis

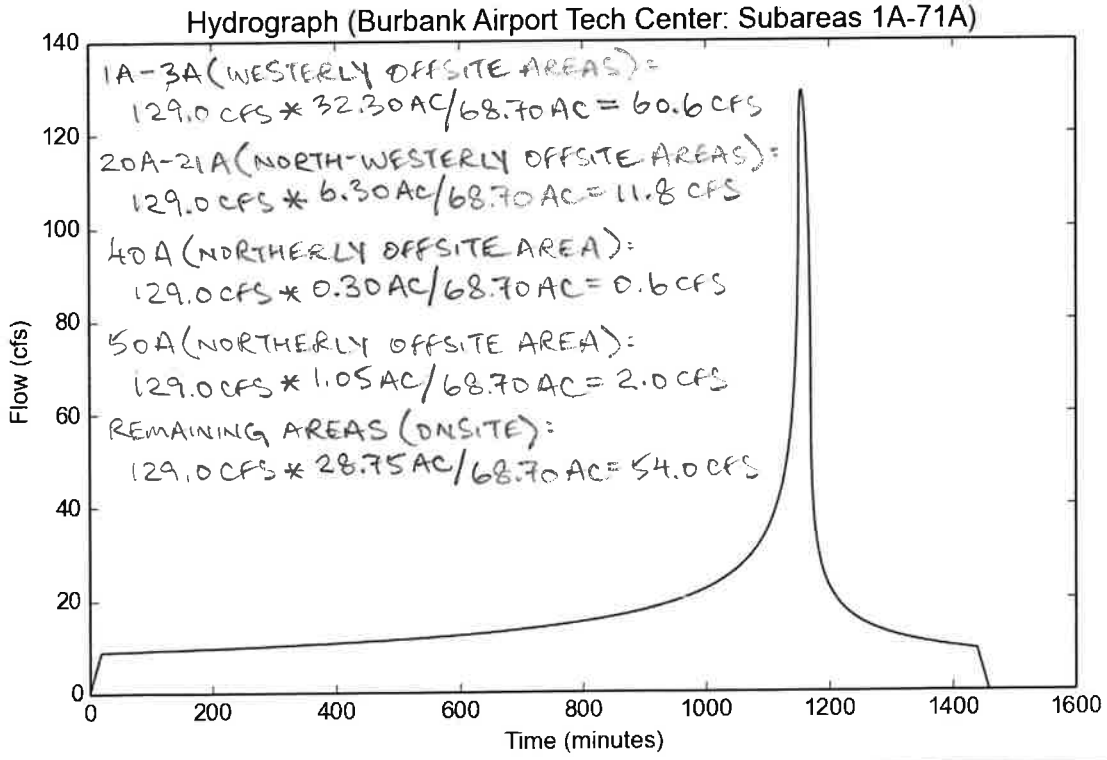
File location: O:/3400-3499/3421/HydroCalc/3421 HydroCalc PROP Subareas 1A-71A.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Burbank Airport Tech Center
Subarea ID	Subareas 1A-71A
Area (ac)	68.7
Flow Path Length (ft)	3140.0
Flow Path Slope (vft/hft) = (760.00 − 700.50)/3140 =	0.019
50-yr Rainfall Depth (in)	7.0
Percent Impervious	0.9
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.0
Peak Intensity (in/hr)	2.23
Undeveloped Runoff Coefficient (Cu)	0.318
Developed Runoff Coefficient (Cd)	0.8418
Time of Concentration (min)	19.0
Clear Peak Flow Rate (cfs)	128.9643
Burned Peak Flow Rate (cfs)	128.9643
24-Hr Clear Runoff Volume (ac-ft)	32.6693
24-Hr Clear Runoff Volume (cu-ft)	1423076.0541



Peak Flow Hydrologic Analysis

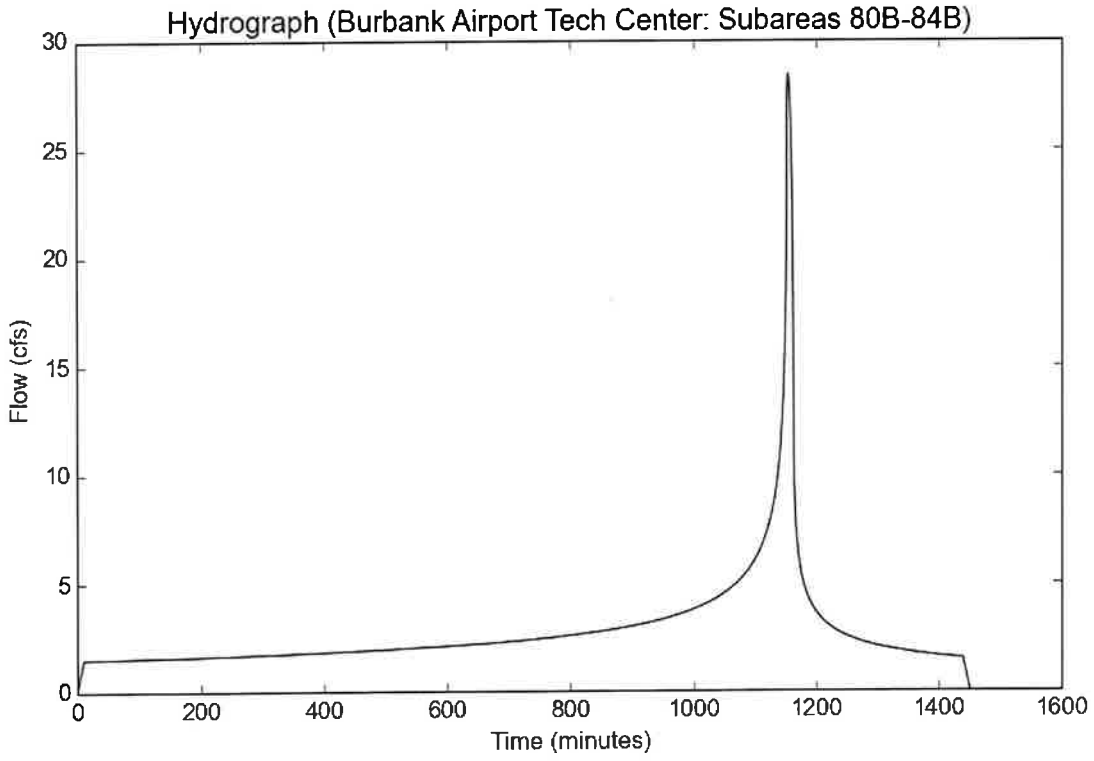
File location: O:/3400-3499/3421/HydroCalc/3421 HydroCalc PROP Subareas 80B-84B.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Burbank Airport Tech Center
Subarea ID	Subareas 80B-84B
Area (ac)	11.6
Flow Path Length (ft)	1425.0
Flow Path Slope (vft/hft) =(719.04-691.75)/1425 =	0.019
50-yr Rainfall Depth (in)	7.0
Percent Impervious	0.9
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.0
Peak Intensity (in/hr)	2.8831
Undeveloped Runoff Coefficient (Cu)	0.3966
Developed Runoff Coefficient (Cd)	0.8497
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	28.416
Burned Peak Flow Rate (cfs)	28.416
24-Hr Clear Runoff Volume (ac-ft)	5.5182
24-Hr Clear Runoff Volume (cu-ft)	240371.351



Peak Flow Hydrologic Analysis

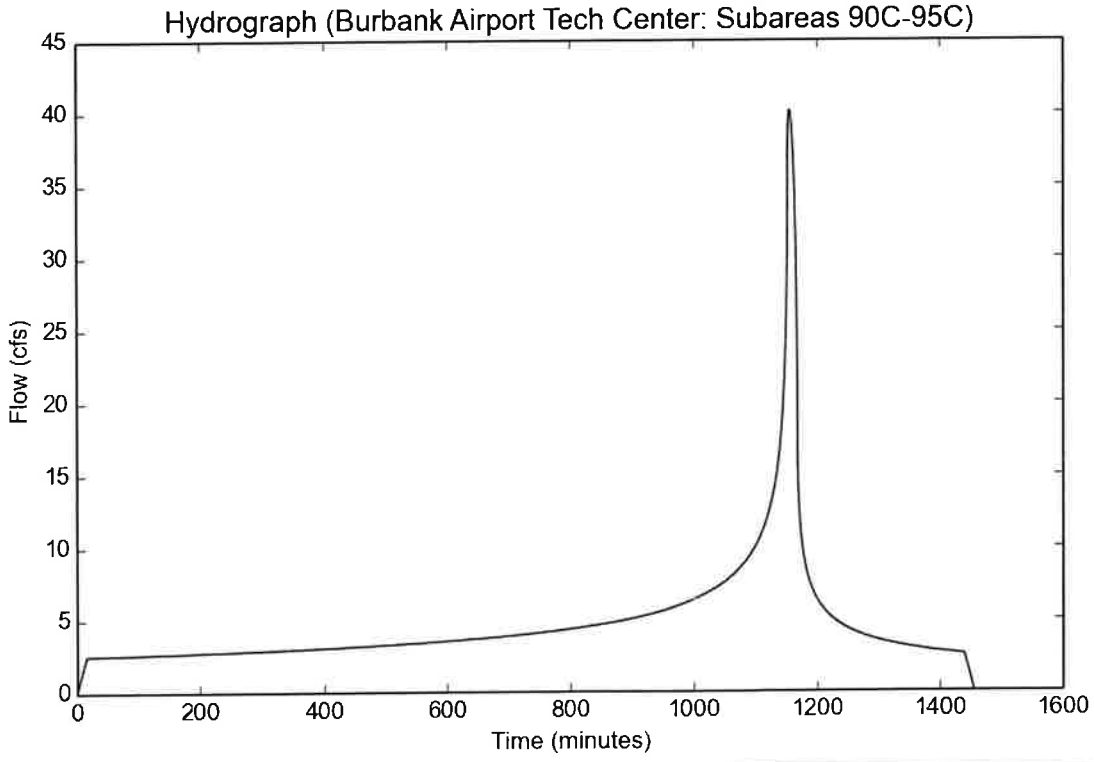
File location: O:/3400-3499/3421/HydroCalc/3421 HydroCalc PROP Subareas 90C-95C.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Burbank Airport Tech Center
Subarea ID	Subareas 90C-95C
Area (ac)	19.65
Flow Path Length (ft)	2410.0
Flow Path Slope (vft/hft) = (722.00 − 686.95)/2410 =	0.015
50-yr Rainfall Depth (in)	7.0
Percent Impervious	0.9
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.0
Peak Intensity (in/hr)	2.4176
Undeveloped Runoff Coefficient (Cu)	0.3406
Developed Runoff Coefficient (Cd)	0.8441
Time of Concentration (min)	16.0
Clear Peak Flow Rate (cfs)	40.0973
Burned Peak Flow Rate (cfs)	40.0973
24-Hr Clear Runoff Volume (ac-ft)	9.3454
24-Hr Clear Runoff Volume (cu-ft)	407083.4781



Peak Flow Hydrologic Analysis

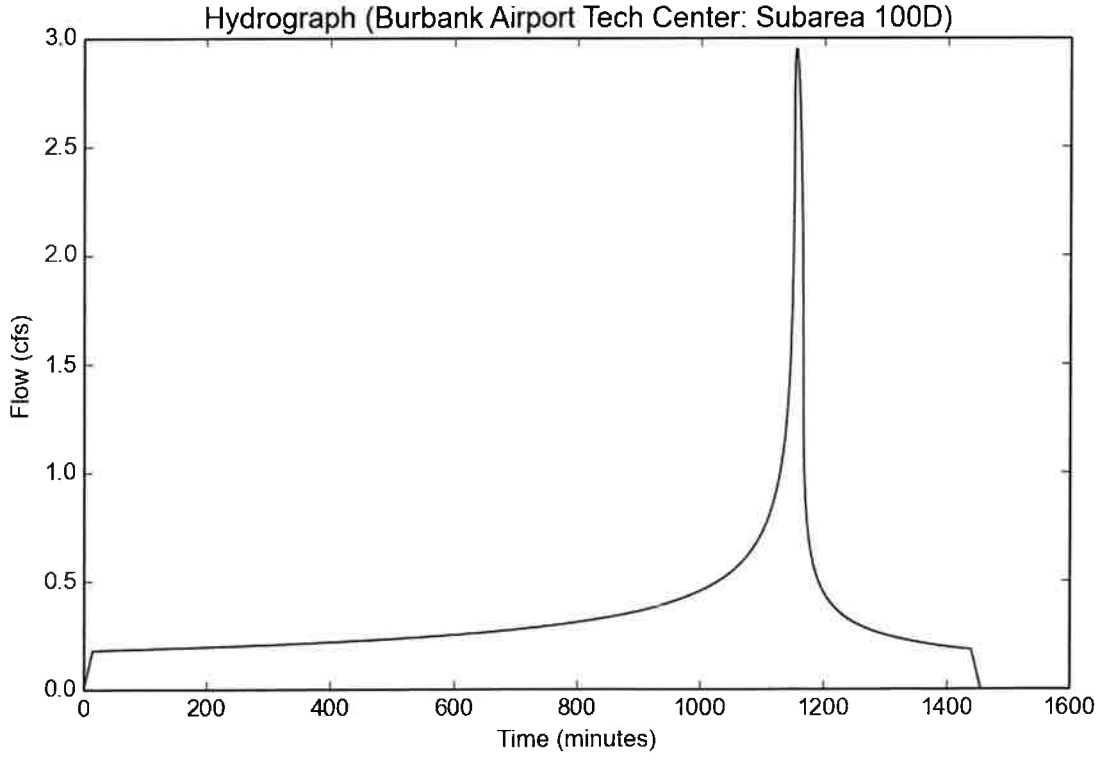
File location: O:/3400-3499/3421/HydroCalc/3421 HydroCalc PROP Subarea 100D.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Burbank Airport Tech Center
Subarea ID	Subarea 100D
Area (ac)	1.4
Flow Path Length (ft)	1700.0
Flow Path Slope (vft/hft) = (711.00-699.20)/1700 =	0.007
50-yr Rainfall Depth (in)	7.0
Percent Impervious	0.9
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.0
Peak Intensity (in/hr)	2.492
Undeveloped Runoff Coefficient (Cu)	0.3495
Developed Runoff Coefficient (Cd)	0.845
Time of Concentration (min)	15.0
Clear Peak Flow Rate (cfs)	2.9479
Burned Peak Flow Rate (cfs)	2.9479
24-Hr Clear Runoff Volume (ac-ft)	0.6659
24-Hr Clear Runoff Volume (cu-ft)	29004.609



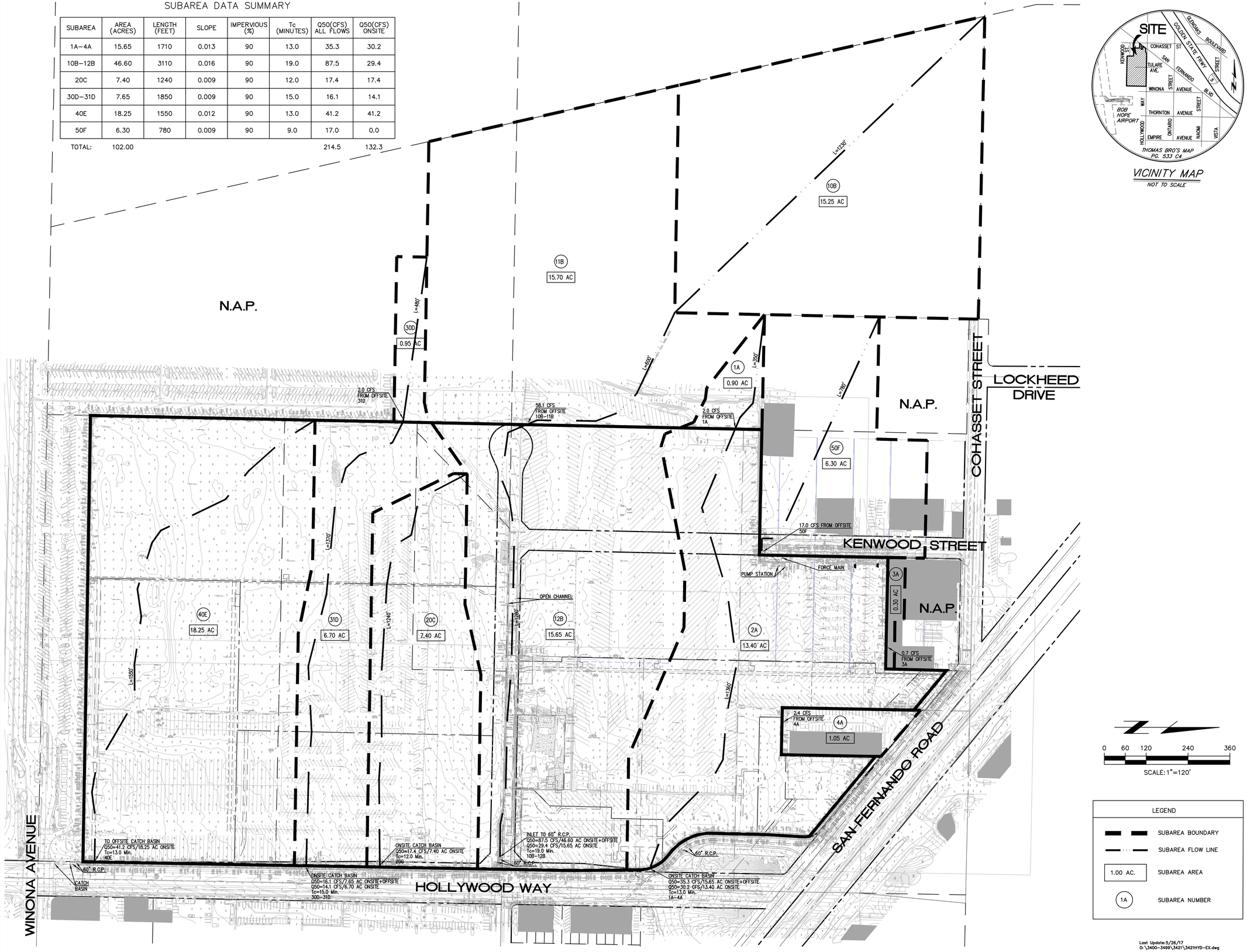
This page left intentionally blank

APPENDIX C

HYDROLOGY MAP

SUBAREA DATA SUMMARY

SUBAREA	AREA (ACRES)	LENGTH (FEET)	SLOPE	IMPERVIOUS (%)	Tc (MINUTES)	Q50(CFS) ALL FLOWS	Q50(CFS) ONSITE
1A–4A	15.65	1710	0.013	90	13.0	35.3	30.2
10B–12B	46.60	3110	0.016	90	19.0	87.5	29.4
20C	7.40	1240	0.009	90	12.0	17.4	17.4
30D–31D	7.65	1850	0.009	90	15.0	16.1	14.1
40E	18.25	1550	0.012	90	13.0	41.2	41.2
50F	6.30	780	0.009	90	9.0	17.0	0.0
TOTAL:	102.00					214.5	132.3



VICINITY MAP
NOT TO SCALE

0 60 120 240 360
SCALE: 1"=120'

LEGEND

- SUBAREA BOUNDARY
- SUBAREA FLOW LINE
- 1.00 AC. — SUBAREA AREA
- 1A — SUBAREA NUMBER

Last Update:5/26/17
O:\3400-3499\3421\3421HYD-EX.dwg

CLIENT
Overton Moore Properties
19300 S Hamilton Ave # 200
Gardena, CA 90248

OVERTON MOORE PROPERTIES

AVION BURBANK
3001 NORTH HOLLYWOOD WAY
BURBANK, CALIFORNIA 91505

Gensler
500 South Figueroa Street
Los Angeles, California 90071
United States
Tel 213.327.3600
Fax 213.327.3601

HPA Architecture
18831 Bardeen Ave
Irvine, California 92612
United States
Tel 949.863.1770

Ridge Landscape Architects
8841 Research Dr # 200
Irvine, CA 92618
United States
Tel 949.387.1323

Thienes Engineering, Inc.
14349 Firestone Boulevard
La Mirada, California 90638
United States
Tel 217.521.4811
Fax 714.521.4173

Gibson Transportation
523 W 6th St Suite 1234
Los Angeles, CA 90014
United States
Tel 213.683.0088

Structural Focus
Building B, Suite 210
Gardena, CA 90248
United States
Tel 210.323.9924

AMA Consulting Engineers, p.c.
2101 E. El Segundo, Suite 303
El Segundo, CA 90245
United States
Tel 310.846.4666
Fax 310.846.4667

Company Name
Street Name, Suite
Country
Tel xxx.xxx.xxxx

strategy and design for visual communication
looking
145 standard street
el segundo, california 90245
looking.la

Date	Description

Seal / Signature

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

Project Name
AVION BURBANK

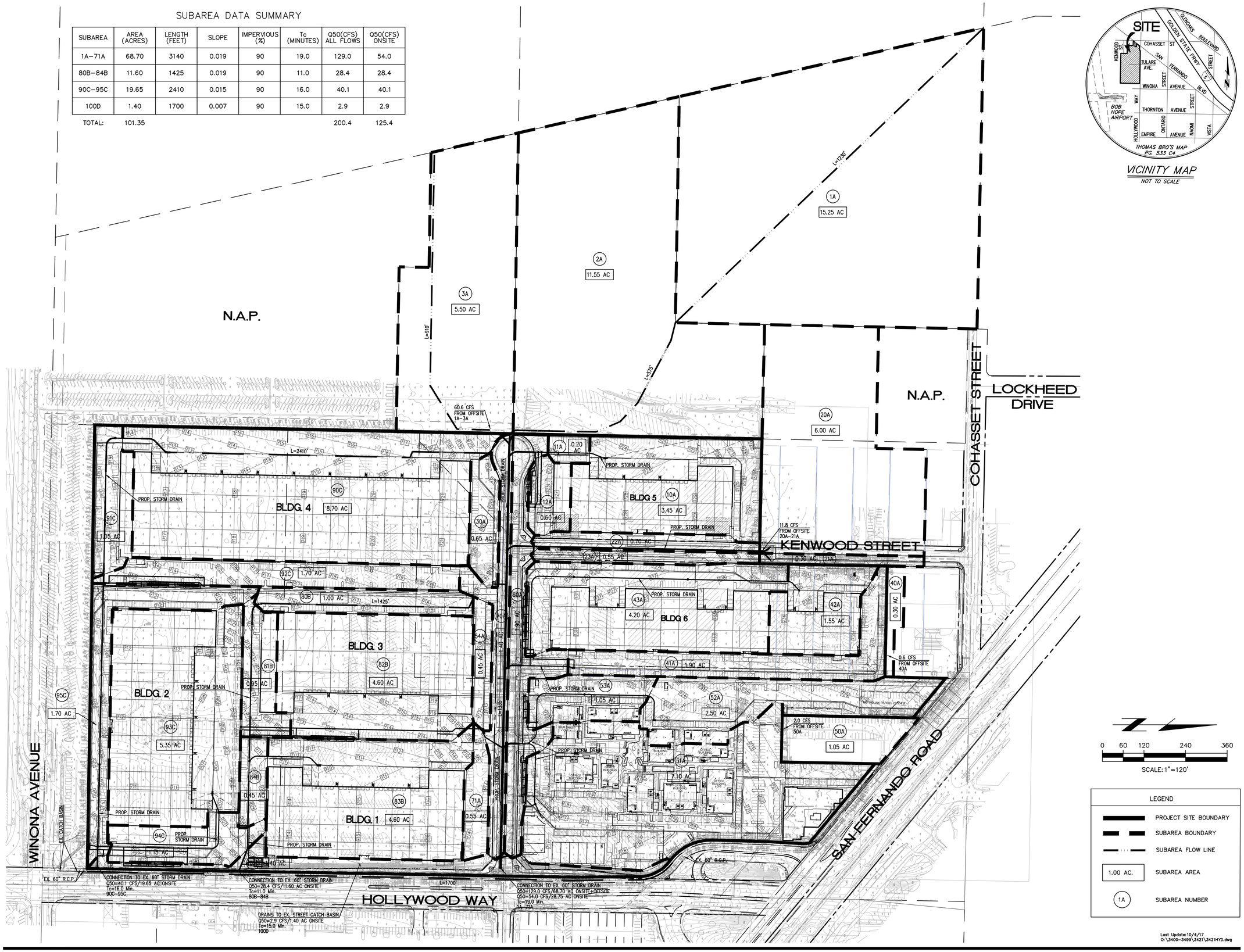
Project Number
-

Description
- EXISTING CONDITION HYDROLOGY MAP

Scale 1"=120'

SUBAREA DATA SUMMARY

SUBAREA	AREA (ACRES)	LENGTH (FEET)	SLOPE	IMPERVIOUS (%)	Tc (MINUTES)	Q50(CFS) ALL FLOWS	Q50(CFS) ONSITE
1A–71A	68.70	3140	0.019	90	19.0	129.0	54.0
80B–84B	11.60	1425	0.019	90	11.0	28.4	28.4
90C–95C	19.65	2410	0.015	90	16.0	40.1	40.1
100D	1.40	1700	0.007	90	15.0	2.9	2.9
TOTAL:	101.35					200.4	125.4



VICINITY MAP
NOT TO SCALE

LEGEND

- PROJECT SITE BOUNDARY
- SUBAREA BOUNDARY
- SUBAREA FLOW LINE
- 1.00 AC. — SUBAREA AREA
- 1A — SUBAREA NUMBER

Last Update:10/4/17
O:\3400–3499\3421\3421HYD.dwg

CLIENT
Overton Moore Properties
19300 S Hamilton Ave # 200
Gardena, CA 90248

OVERTON MOORE PROPERTIES

AVION BURBANK
3001 NORTH HOLLYWOOD WAY
BURBANK, CALIFORNIA 91505

Gensler
500 South Figueroa Street
Los Angeles, California 90071
United States
Tel 213.327.3600
Fax 213.327.3601

HPA architecture
HPA Architecture
18831 Bardeen Ave
Irvine, California 92612
United States
Tel 949.863.1770

RLA
Ridge Landscape Architects
8841 Research Dr # 200
Irvine, CA 92618
United States
Tel 949.387.1323

Thienes Engineering, Inc.
14349 Firestone Boulevard
La Mirada, California 90638
United States
Tel 217.521.4811
Fax 714.521.4173

Gibson transportation consulting, inc
Gibson Transportation
523 W 6th St Suite 1234
Los Angeles, CA 90014
United States
Tel 213.683.0088

STRUCTURAL FOCUS
Structural Focus
Building B, Suite 210
Gardena, CA 90248
United States
Tel 210.323.9924

amaconsulting engineers, p.c.
AMA Consulting Engineers, p.c.
2101 E. El Segundo, Suite 303
El Segundo, CA 90245
United States
Tel 310.846.4666
Fax 310.846.4667

KGM
Company Name
Sreet Name, Suite
Country
Tel xxx.xxx.xxxx

strategy and design for visual communication
Looking
145 standard street
el segundo, california 90245
looking.la

Date	Description

Seal / Signature

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

Project Name
AVION BURBANK

Project Number
-

Description
- PROPOSED CONDITION HYDROLOGY MAP

Scale 1"=120'

This page left intentionally blank

H-2 Low Impact Development (LID) Report

ESA

This page left intentionally blank

LOW IMPACT DEVELOPMENT (LID)

FOR:
AVION BURBANK
HOLLYWOOD WAY, BURBANK, CA 91505
APNs: 2466-011-908, -909, -910, -911 // 2466-028-907, -908

OWNER:
OVERTON MOORE PROPERTIES
19300 HAMILTON AVENUE, SUITE 200
GARDENA, CALIFORNIA 90248
PHONE: (310) 323-9100
CONTACT: JASON HINES

OCTOBER 2, 2017

JOB NO. 3421

PREPARED BY:
THIENES ENGINEERING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PHONE: (714) 521-4811
FAX: (714) 521-4173
CONTACT: LUIS PRADO (luisp@thieneseng.com)

LOW IMPACT DEVELOPMENT (LID)

FOR

“AVION BURBANK”

PREPARED BY LUIS PRADO
UNDER THE SUPERVISION OF

_____

REINHARD STENZEL DATE
R.C.E. 56155
EXP. 12/31/18

TABLE OF CONTENTS

APPENDICES

Appendix A Stormwater Quality Design Calculations
Appendix B LID Site Plan
Appendix C BMP Operation and Maintenance
Appendix D Maintenance Agreement
Appendix E Educational Materials
Appendix F Infiltration Feasibility

1.0 Project Description

The project site is located at the southwest corner of Hollywood Way and San Fernando Road in the City of Burbank., at APNs 2466-011-908, -909, -910, -911 and 2466-028-907, -908, of Los Angeles County. The total site encompasses approximately 61.40 acres.

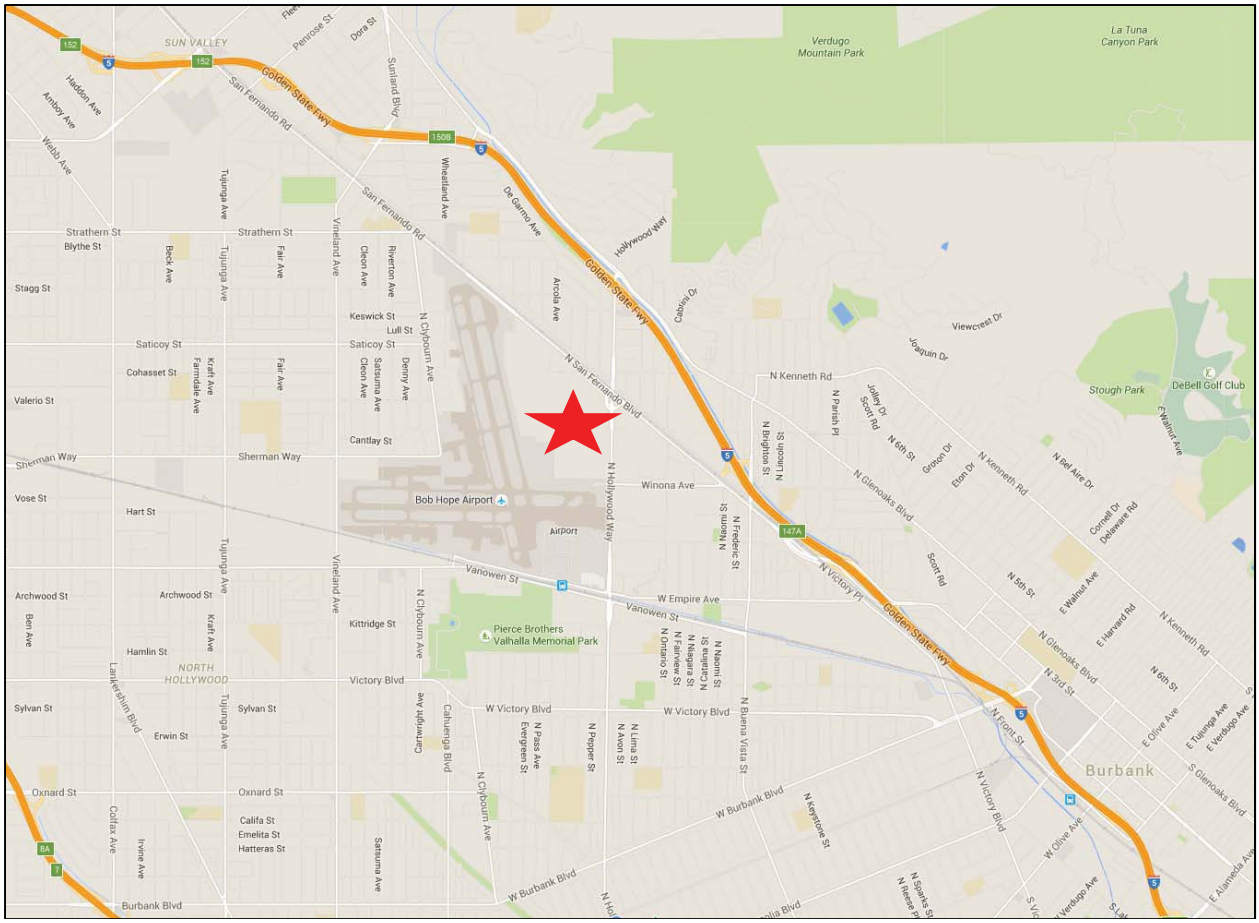


Figure 1 - Vicinity Map (North↑)

The proposed site is a Designated Project identified as a significant redevelopment where 50 percent or more of the impervious surface of a previously developed site is proposed to be altered and the previous development project was not subject to post-construction stormwater quality control measures. Hence, the entire development site must meet the requirements of the LID Standards Manual.

The project will treat stormwater runoff through the use of Filterra systems sized to treat 1.5 times the 85th percentile, 24-hr rain event. Refer to Appendix A for 85th percentile precipitation isohyet map.

In an effort to offer the same volume reduction and pollutant load reduction benefits that conventional biofiltration provides based on Attachment H of the Los Angeles County MS4 Permit (Order No. R4-2012-0175) (MS4 Permit), Contech Engineered Solutions has contracted

with Geosyntec Consultants to develop a design approach and supporting rationale required to compensate for the volume reduction differential by increasing the Filterra system size and/or adding supplemental infiltration capacity. The Filterra systems proposed on this project are sized consistent with the approach conducted by Geosyntec Consultants and are expected to provide equivalent performance to conventional biofiltration.

1.1 Existing Site Description

The project site is currently a paved vehicle parking lot. It generally drains easterly towards catch basins near Hollywood Way and then into the 60-inch storm drain in Hollywood Way. Portions of offsite vehicle parking lots west and north of the project site also appear to drain onto the site.

1.2 Proposed Site Description

The project site encompasses approximately 61.40 acres. Proposed improvements consist of six commercial type buildings ranging from 94,000 to 274,000 square feet, plus several smaller office buildings, retail buildings, and a hotel building. Adjacent to each commercial type building is a truck yard and several vehicle parking lots. There is also a proposed public access street fronting Hollywood Way and bisecting the site providing access to the proposed buildings, plus a proposed public storm drain in the proposed access street conveying offsite flow tributary to the site. Kenwood Street will be extended southerly to meet the proposed access street. The remainder of the site will be reserved for landscaping.

The north half of the project site – in particular, Building 5 (Subareas 10A-12A), Building 6 (Subareas 40A-43A), the office buildings, retail buildings and hotel (Subareas 50A-53A), and the smaller parking lots north of Buildings 1, 3 and 4 (Subareas 30A, 54A and 71A) – drain to catch basins in the adjacent truck yards and parking lots. Filterra systems will collect and treat the required water quality flow rates. Runoff is then conveyed via proposed private storm drains to the proposed public access street, and then via a proposed public storm drain easterly to the existing 60-inch Hollywood Way storm drain. Also tributary to the proposed public storm drain are runoffs from the proposed public access street (Subareas 22A-23A and 60A-70A), the existing Kenwood Street and the adjacent north-westerly lots (Subareas 20A-21A), the westerly offsite parking lots (Subareas 1A-3A) and portions of northerly existing buildings (Subareas 40A and 50A). Vegetated swales along Kenwood Street and Tulare Street (public streets) will be utilized for water quality purposes.

Portions of the south half of the project site (Buildings 1 and 3, Subareas 80B-84B) drain to catch basins in the truck yards and parking lots adjacent to Buildings 1 and 3. Similar to the northern half of the project, Filterra systems will collect and treat the required water quality flow rate. Runoff will be conveyed easterly to the existing 60-inch Hollywood Way storm drain via a proposed storm drain south of the buildings.

The remainder of the project site's southerly half (Buildings 2 and 4, Subareas 90C-95C) drain to catch basins in the truck yards and parking lots adjacent to Buildings 2 and 4. Filterra systems will collect and treat the required water quality volume. Similarly, runoff will be conveyed

easterly to the existing 60-inch Hollywood Way storm drain via a proposed storm drain south of the buildings.

The easterly landscape area fronting Hollywood Way (Subarea 100D) will surface drain to Hollywood Way, and then southerly to an existing street catch basin tributary to the existing 60-inch storm drain.

Landscape areas along the right-of-way will be considered self-treating areas not being routed to the onsite structural BMPs.

1.3 Geological Investigation/Infiltration Feasibility

Based on the Phase I Environmental Site Assessment and Document Review dated January 5, 2016 by Ardent Environmental Group, Inc., from at least 1944 through 1990s, the site was used for aircraft research, manufacturing, warehouse, maintenance, and office purposes. The site is located within the San Fernando Valley Groundwater Basin which has been designated by EPA as a Federal Superfund Site due to groundwater contamination associated with historical industrial land uses. The areas of contamination contain chemicals such as volatile organic compounds (VOCs), namely trichloroethene (TCE) and tetrachloroethylene (PCE), and other chemicals such as hexavalent chromium and 1,4-dioxane. A copy of the full study can be found in Appendix F.

Due to the abovementioned circumstances, infiltration type BMPs are prohibited.

Groundwater
Groundwater was not encountered to the depth of the soil excavations (60 feet being the maximum depth of borings).

Soil Type
The soil investigation boring logs showed brown, fine to medium grained to fine to coarse grained, slightly silty SAND to a medium to coarse grained, gravelly SAND with cobbles were encountered directly beneath the fill and observed to be medium dense to dense an damp. Deeper soils consist predominantly of silty sands and gravelly sands with cobbles which were noted to be dense and damp.

Liquefaction
The site is not located in an area which is mapped by the State of California Seismic Hazards Mapping Act as potentially susceptible to liquefaction.

2.0 Project Specific Requirements

The proposed site is a Designated Project identified as a significant redevelopment where 50 percent or more of the impervious surface of a previously developed site is proposed to be altered and the previous development project was not subject to post-construction stormwater

quality control measures. Hence, the entire development site must meet the requirements of the LID Standards Manual.

2.1 Peak Storm Water Runoff Discharge Rates

Per hydrology data from Los Angele County Department of Public Works, there is no County owned or maintained storm drain near the project site. The site is tributary to an existing 60-inch storm drain in Hollywood Way.

2.2 Source Controls

Source control measures are designed to prevent pollutants from contacting stormwater runoff or prevent discharge of contaminated stormwater runoff to the storm drain system and/or receiving water. This section describes structural-type, source control measures that must be considered for implementation in conjunction with appropriate nonstructural source control measures, such as good housekeeping and employee training, to optimize pollution prevention.

Source control measures should be implemented to the maximum extent practicable to mitigate pollutant mobilization from the project site in stormwater and non-stormwater runoff. A summary of the source control measures that should be implemented for each type of project is summarized below. In Addition, Fact sheets for each source control measure are presented in Appendix E. These fact sheets include design criteria established by LACDPW to ensure effective implementation of the source control measures.

2.2.A Storm Drain Message and Signage (S-1)

All proposed and any existing inlets to remain will be stenciled with prohibitive language and/or graphical icons to prevent dumping. Legibility of the stencils/markers will be maintained on a yearly basis, or as needed.

2.2.B Outdoor Material Storage Area (S-2)

There are no proposed outdoor material storage areas for this project. Any and all materials will be stored indoors.

2.2.C Outdoor Trash Storage/Waste Handling Areas (S-3)

Trash enclosures will be located away from roof drainage. The bin’s lid will remain closed when not in use and will be walled off.

2.2.D Outdoor Loading/Unloading Dock Area (S-4)

The proposed project will construct dock areas for Buildings 1-6. The concrete surface is designed to minimize run-on to the loading docks and will be treated by Filterra systems.

2.2.F Outdoor Vehicle/Equipment Repair/Maintenance Area (S-5)

Not applicable

2.2.G Outdoor Vehicle/Equipment Accessory Wash Area (S-6)

Not applicable

2.2.H Fuel & Maintenance Area (S-7)

Not applicable

2.2.I Landscape Irrigation Practices (S-8)

Install irrigation systems that utilize a weather-based smart irrigation controller to minimize water usage and reduce dry weather urban runoff.

2.2.J Building Materials (S-9)

Alternative building materials could not be used in-lieu of traditional materials due to the nature of the project (industrial warehouse).

2.2.K Animal Care and Handling Facilities (S-10)

Not applicable

2.2.L Outdoor Horticulture Areas (S-11)

Not applicable

2.3 Low Impact Development (LID)

2.3.A Infiltration Feasibility

Refer to section 1.3 Geotechnical Investigation/Infiltration Feasibility.

2.3.B Harvest and Use

This concept was not utilized because it is an industrial facility where the amount of impervious area is much greater than landscape and toilet use. However, stormwater is detained for biofiltration prior to discharging into the storm drain system.

2.3.C Biofiltration

The proposed project will disconnect runoff from impervious areas by means of Filterra systems. The Filterra systems are consistent with a design approach that compensates for the volume reduction differential from conventional biofiltration and alternate biofiltration design criteria.

2.4 Hydromodification

The proposed site is tributary to an engineered channel (Burbank Western Channel) that is regularly maintained and is not susceptible to hydromodification impacts. In addition, the onsite water quality BMPs will assist in increasing the time of concentration and discharging flows at a control rate.

2.5 Conserve Natural Areas

During the subdivision design and approval process, the site layout must be consistent with the applicable General Plan and Local Area Plan policies and implement the following:

- *Concentrate or cluster development on portions of the site while leaving the remaining land in a natural undisturbed condition;*
- *Limit clearing and grading of native vegetation at the site to the minimum amount needed to build lots, allow access, and provide fire protection;*
- *Maximize trees and other vegetation at the site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants;*
- *Promote natural vegetation by using parking lot islands and other landscaped areas;*
- *Preserve riparian areas and wetlands.*

The property was previously developed with no natural areas to conserve.

2.6 Minimize Storm Water Pollutants of Concern

Stormwater runoff from a site has the potential to contribute oil and grease, suspended solids, metals, gasoline, pesticides, and pathogens to the stormwater conveyance system. The development must be designed so as to minimize, to the maximum extent practicable, the introduction of pollutants of concern that may result in significant impacts, generated from site runoff of directly connected impervious areas (DCIA), to the stormwater conveyance system as approved by the building official. Pollutants of concern, consist of any pollutants that exhibit one or more of the following characteristics: current loadings or historic deposits of the

pollutant are impacting the beneficial uses of a receiving water, elevated levels of the pollutant are found in sediments of a receiving water and/or have the potential to bioaccumulate in organisms therein, or the detectable inputs of the pollutant are at concentrations or loads considered potentially toxic to humans and/or flora and fauna.

In meeting this specific requirement, "minimization of the pollutants of concern" will require the incorporation of a BMP or combination of BMPs best suited to maximize the reduction of pollutant loadings in that runoff to the Maximum Extent Practicable.

Anticipated pollutants generated from the proposed development are:

- Suspended Solids
- Total Phosphorus
- Total Nitrogen
- Total Kjeldahl Nitrogen
- Cadmium, Total
- Chromium, Total
- Copper, Total
- Lead, Total
- Zinc, Total

The receiving waters are:

- Burbank Western Channel: Engineered Channel
- Los Angeles River, Reach 3: Engineered Channel
- Los Angeles River, Reach 2: Engineered Channel
- Los Angeles River, Reach 1: Engineered Channel
- Los Angeles River Estuary
- San Pedro Bay Near/Off Shore Zones
- Pacific Ocean

TMDL's for receiving waters:

- Burbank Western Channel: None
- Los Angeles River, Reach 3: Nitrogen, Trash
- Los Angeles River, Reach 2: Nitrogen, Trash
- Los Angeles River, Reach 1: Nitrogen, Trash
- Los Angeles River Estuary: None
- San Pedro Bay Near/Off Shore Zones: None
- Pacific Ocean: None

303d List for receiving waters:

- Burbank Western Channel: Copper, Cyanide, Indicator Bacteria, Lead, Selenium and Trash
- Los Angeles River, Reach 3: Ammonia, Copper, Lead, Nutrients, Trash

- Los Angeles River, Reach 2: Ammonia, Coliform Bacteria, Copper, Lead, Nutrients, Oil and Trash
- Los Angeles River, Reach 1: Ammonia, Cadmium, Coliform Bacteria, Copper (dissolved), Cyanide, Diazinon, Lead, Nutrients, pH, Trash and Zinc, dissolved.
- Los Angeles River Estuary: Chlordane, DDT (sediment), PCBs (Polychlorinated biphenyls) (sediment), Sediment Toxicity, and Trash
- San Pedro Bay Near/Off Shore Zones: Chlordane, DDT (tissue & sediment), PCBs (Polychlorinated biphenyls) and Sediment Toxicity
- Pacific Ocean: None

The pollutants of concern of the project site are:

- Heavy Metals
- Trash
- Nutrients

The proposed project will treat stormwater runoff and disconnect runoff from impervious areas by means of a Filterra systems. Filterra systems are designed to treat for TSS, Total Phosphorus, Total Nitrogen, Total Copper, Dissolved Copper, Total Zinc, Dissolved Zinc, and Total Petroleum Hydrocarbons (pollutants of concern).

2.7 Protect Slopes and Channels

Project plans must include BMPs consistent with local codes and ordinances and LID to decrease the potential of slopes and/or channels from eroding and impacting stormwater runoff:

- *Convey runoff safely from the tops of slopes and stabilize disturbed slopes.*
- *Utilize natural drainage systems to the maximum extent practicable.*
- *Control or reduce or eliminate flow to natural drainage systems to the maximum extent practicable.*
- *Stabilize permanent channel crossings.*
- *Vegetate slopes with native or drought tolerant vegetation.*
- *Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion, with the approval of all agencies with jurisdiction, e.g., the U.S. Army Corps of Engineers and the California Department of Fish and Game.*

The proposed project site is located on a flat terrain. There are no natural drainage systems, or channel crossings to protect.

2.8 Provide Proof of Ongoing BMP Maintenance

Improper maintenance is one of the most common reasons why water quality controls will not function as designed or which may cause the system to fail entirely. It is important to consider who will be responsible for maintenance of a permanent BMP, and what equipment is required

to perform the maintenance properly. If Structural or Treatment Control BMPs are required or included in project plans, the applicant must provide verification of maintenance provisions through such means as may be appropriate, including, but not limited to legal agreements, covenants, CEQA mitigation requirements and/or Conditional Use Permits.

The verification will include the developer's signed statement, as part of the project application, accepting responsibility for all Structural and Treatment Control BMP maintenance until the time the property is transferred and, where applicable, a signed agreement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance. The transfer of property to a private or public owner must have conditions requiring the recipient to assume responsibility for maintenance of any Structural or Treatment Control BMP to be included in the sales or lease agreement for that property, and will be the owner's responsibility. The condition of transfer shall include a provision that the property owners conduct maintenance inspection of all Structural or Treatment Control BMPs at least once a year and retain proof of inspection. For residential properties where the Structural or Treatment Control BMPs are located within a common area, which will be maintained by a homeowner's association, language regarding the responsibility for maintenance must be included in the project's conditions, covenants and restrictions (CC&Rs). Printed educational materials will be required to accompany the first deed transfer to highlight the existence of the requirement and to provide information on what stormwater management facilities are present, signs that maintenance is needed, how the necessary maintenance can be performed, and assistance that the Permittee can provide. The transfer of this information shall also be required with any subsequent sale of the property.

Structural or Treatment Control BMPs located within a public area proposed for transfer will be the responsibility of the developer until accepted for transfer by the appropriate public agency. Structural or Treatment Control BMPs proposed for transfer must meet design standards adopted by the public entity for the BMP installed and should be approved by the appropriate public agency prior to its installation.

The property owner/operator will maintain proof of ongoing maintenance at the site as recorded in the BMP Operation and Maintenance (Appendix C) and Covenant and Agreement (Appendix D).

2.9 Design Standards for Structural or Treatment Controls BMPs

The project is required to incorporate appropriate stormwater mitigation measures into the design plan for the entire site. The proposed project will treat and mitigate flows per LID guidelines by effectively treating the pollutants of concern by means of biofiltration.

The storm drain design allows for the low flows to be directed towards the proposed sump pumps and then pumped into the proposed Filterra systems. These systems will use specially designed filter media to effectively capture and immobilize pollutants. The Filterra system will effectively treat for trash, hydrocarbons, heavy metals and nutrients.

2.10 Provisions Applicable to Individual Priority Project Categories

2.10.A Parking Lots

2.10.A.1 Properly Design Parking Area

Parking lots contain pollutants such as heavy metals, oil and grease, and polycyclic aromatic hydrocarbons that are deposited on parking lot surfaces by motor-vehicles. These pollutants are directly transported to surface waters. To minimize the offsite transport of pollutants, the following design criteria are required:

- *Reduce impervious land coverage of parking areas.*
- *Infiltrate runoff before it reaches storm drain system.*
- *Treat runoff before it reaches storm drain system.*

The proposed project is designed so that pollutants from the impervious surfaces are disconnected prior to discharging offsite. Runoff from the parking lots is transported through Filterra systems for treatment.

2.10.B.2 Properly Design to Limit Oil Contamination and Perform Maintenance

Parking lots may accumulate oil, grease, and water insoluble hydrocarbons from vehicle drippings and engine system leaks.

- *Treat to remove oil and petroleum hydrocarbons at parking lots that are heavily used (e.g. fast food outlets, lots with 25 or more parking spaces, sports event parking lots, shopping malls, grocery stores, discount warehouse stores).*
- *Ensure adequate operation and maintenance of treatment systems particularly sludge and oil removal, and system fouling and plugging prevention control.*

The project owner will ensure that grease and oil are contained. The parking lot will be swept on a monthly basis and before any rain events. Absorbent materials will be used to collect any spilled oil, and disposed of properly, to ensure they do not contaminate stormwater. Drain inserts will be used at proposed onsite inlets and filter drainage from impervious areas prior to flowing through the BMP system for treatment. Hydrocarbon booms from the drain inserts are highly effective in the removal of hydrocarbons.

2.10 Waiver

A Permittee may, through adoption of an ordinance or code incorporating the treatment requirements of LID, provide for a waiver from the requirement if impracticability for a specific property can be established. A waiver of impracticability shall be granted only when all other Structural or Treatment Control BMPs have been considered and rejected as infeasible. Recognized situations of impracticability include, (i) extreme limitations of space for treatment on a redevelopment project, (ii) unfavorable or unstable soil conditions at a site to attempt

infiltration, and (iii) risk of ground water contamination because a known unconfined aquifer lies beneath the land surface or an existing or potential underground source of drinking water is less than 10 feet from the soil surface. Any other justification for impracticability must be separately petitioned by the Permittee and submitted to the Regional Board for consideration. The Regional Board may consider approval of the waiver justification or may delegate the authority to approve a class of waiver justifications to the Regional Board Executive Officer. The supplementary waiver justification becomes recognized and effective only after approval by the Regional Board or the Regional Board Executive Officer. A waiver granted by a Permittee to any development or redevelopment project may be revoked by the Regional Board Executive Officer for cause and with proper notice upon petition.

The proposed project does not require a waiver of impracticability from any LID conditions.

2.11 Mitigation Funding

The Permittees may propose a management framework, for endorsement by the Regional Board Executive Officer, to support regional or sub-regional solutions to storm water pollution, where any of the following situations occur:

- *A waiver for impracticability is granted;*
- *Legislative funds become available;*
- *Off-site mitigation is required because of loss of environmental habitat; or*
- *An approved watershed management plan or a regional storm water mitigation plan exists that incorporates an equivalent or improved strategy for storm water mitigation.*

No management framework for mitigation funding is necessary for the proposed project.

Funding will be the responsibility of the owner:

OVERTON MOORE PROPERTIES
19300 HAMILTON AVENUE, SUITE 200
GARDENA, CA 90248
PHONE: (310) 323-9100
CONTACT: JASON HINES

2.12 Limitation on Use of Infiltration BMPs

Three factors significantly influence the potential for storm water to contaminate ground water. They are (i) pollutant mobility, (ii) pollutant abundance in storm water, (iii) and soluble fraction of pollutant. The risk of contamination of groundwater may be reduced by pretreatment of storm water. A discussion of limitations and guidance for infiltration practices is contained in, Potential Groundwater Contamination from Intentional and Non-Intentional Stormwater Infiltration, Report No. EPA/600/R-94/051, USEPA (1994).

In addition, the distance of the groundwater table from the infiltration BMP may also be a factor determining the risk of contamination. A water table distance separation of ten feet depth in California presumptively poses negligible risk for storm water not associated with industrial activity or high vehicular traffic.

Infiltration BMPs are not recommended for areas of industrial activity or areas subject to high vehicular traffic (25,000 or greater average daily traffic (ADT) on main roadway or 15,000 or more ADT on any intersecting roadway) unless appropriate pretreatment is provided to ensure groundwater is protected and the infiltration BMP is not rendered ineffective by overload.

See Section 1.3 for discussion on infiltration type BMPs.

2.13 Alternative Certification for Storm Water Treatment Mitigation

In lieu of conducting detailed BMP review to verify Structural or Treatment Control BMPs adequacy, a Permittee may elect to accept a signed certification from a Civil Engineer or a Licensed Architect registered in the State of California, that the plan meets the criteria established herein. The Permittee is encouraged to verify that certifying person(s) have been trained on BMP design for water quality, not more than two years prior to the signature date. Training conducted by an organization with storm water BMP design expertise (e.g., a University, American Society of Civil Engineers, American Society of Landscape Architects, American Public Works Association, or the California Water Environment Association) may be considered qualifying.

A California licensed civil engineer has provided a detailed BMP review of this report.

2.14 Resources and Reference

California Storm Water Best Management Practices Handbooks for Construction Activity (2009), Municipal (2003), and Industrial/Commercial (2003).

APPENDIX A

Stormwater Quality Design Calculations

Subarea	Area (ac)	Length (ft)	Slope (ft/ft)	Depth (inches)	Imperviousness	Soil Type	Frequency	Fire	Tc (min)	Infiltration Rate (in/hr)	Filterra Reference
10A	3.45	275	0.026	1.08	0.95	15	85th percentile storm	0	10	0	Unit 1
11A	0.2	117	0.011	1.08	0.95	15	85th percentile storm	0	7	0	
12A	0.6	100	0.014	1.08	0.95	15	85th percentile storm	0	6	0	
TOTAL	**4.25**			**WEIGHTED AVERAGE**	**0.95**				**6**		
30A	0.65	405	0.007	1.08	0.95	15	85th percentile storm	0	16	0	Unit 2
TOTAL	**0.65**			**WEIGHTED AVERAGE**	**0.95**				**16**		
40A&41A	2.2	1155	0.009	1.08	0.95	15	85th percentile storm	0	30	0	Unit 3
42A	1.55	265	0.013	1.08	0.95	15	85th percentile storm	0	11	0	
43A	4.2	1005	0.013	1.08	0.95	15	85th percentile storm	0	26	0	
TOTAL	**7.95**			**WEIGHTED AVERAGE**	**0.95**				**11**		
50A&51A	8.15	1012	0.01	1.08	0.95	15	85th percentile storm	0	27	0	Unit 4
TOTAL	**8.15**			**WEIGHTED AVERAGE**	**0.95**				**27**		
52A	2.5	825	0.01	1.08	0.95	15	85th percentile storm	0	24	0	Unit 5
53A	1.05	475	0.012	1.08	0.95	15	85th percentile storm	0	16	0	
TOTAL	**3.55**			**WEIGHTED AVERAGE**	**0.95**				**16**		
54A	0.45	395	0.007	1.08	0.95	15	85th percentile storm	0	16	0	Unit 6
80B	1	615	0.006	1.08	0.95	15	85th percentile storm	0	22	0	
81B	0.95	365	0.013	1.08	0.95	15	85th percentile storm	0	14	0	
82B	4.6	510	0.01	1.08	0.95	15	85th percentile storm	0	18	0	
TOTAL	**7**			**WEIGHTED AVERAGE**	**0.95**				**14**		
71A	0.55	360	0.011	1.08	0.95	15	85th percentile storm	0	14	0	Unit 7
TOTAL	**0.55**			**WEIGHTED AVERAGE**	**0.95**				**14**		
83B	4.6	485	0.013	1.08	0.95	15	85th percentile storm	0	16	0	Unit 8
84B	0.45	280	0.016	1.08	0.95	15	85th percentile storm	0	11	0	
TOTAL	**5.05**			**WEIGHTED AVERAGE**	**0.95**				**11**		
90C	8.7	960	0.01	1.08	0.95	15	85th percentile storm	0	26	0	Unit 9
91C	1.05	472	0.007	1.08	0.95	15	85th percentile storm	0	18	0	
92C	1.7	1050	0.008	1.08	0.95	15	85th percentile storm	0	29	0	
TOTAL	**11.45**			**WEIGHTED AVERAGE**	**0.95**				**18**		
93C	5.35	565	0.013	1.08	0.95	15	85th percentile storm	0	18	0	Unit 10
94C	1.15	455	0.013	1.08	0.95	15	85th percentile storm	0	16	0	
95C	1.7	1160	0.013	1.08	0.95	15	85th percentile storm	0	28	0	
TOTAL	**8.2**			**WEIGHTED AVERAGE**	**0.95**				**16**		

Project Area
1.08 sq. mi.

Department of Public Works
dpw.lacounty.gov

search our site... Su

Hydrology Map

A GIS viewer application to view the data for the hydrology manual.

LAYERS

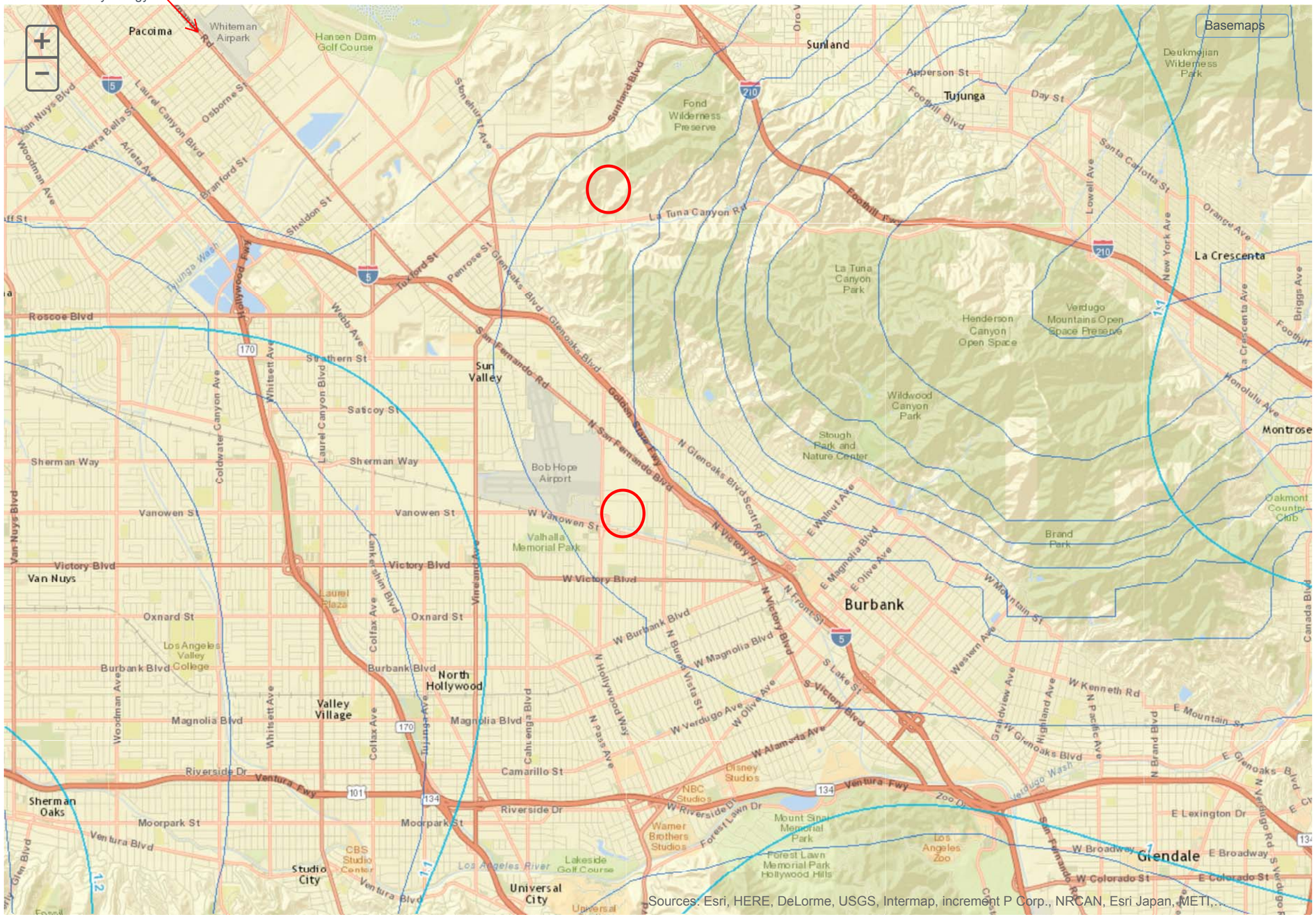
- [ ] 50yr Two Tenths (Rainfall)
- [ ] DPA Zones
- [ ] Soils 2004
- [ ] TG Page
- [x] Final 85th Percentile, 24-hr Rainfall
- [ ] Final 95th Percentile, 24-hr Rainfall
- [x] 1-year, 1-hour Rainfall Intensity

SEARCH

Zoom to TG Page:

Enter Address, Cross Street, or Parcel No.:
(ex: 900 S. Fremont Ave., Fremont@Valley, 5342005904)

Search



Project Site
Soil Type C

Department of Public Works
dpw.lacounty.gov

search our site... Su

Hydrology Map

A GIS viewer application to view the data for the hydrology manual.

LAYERS

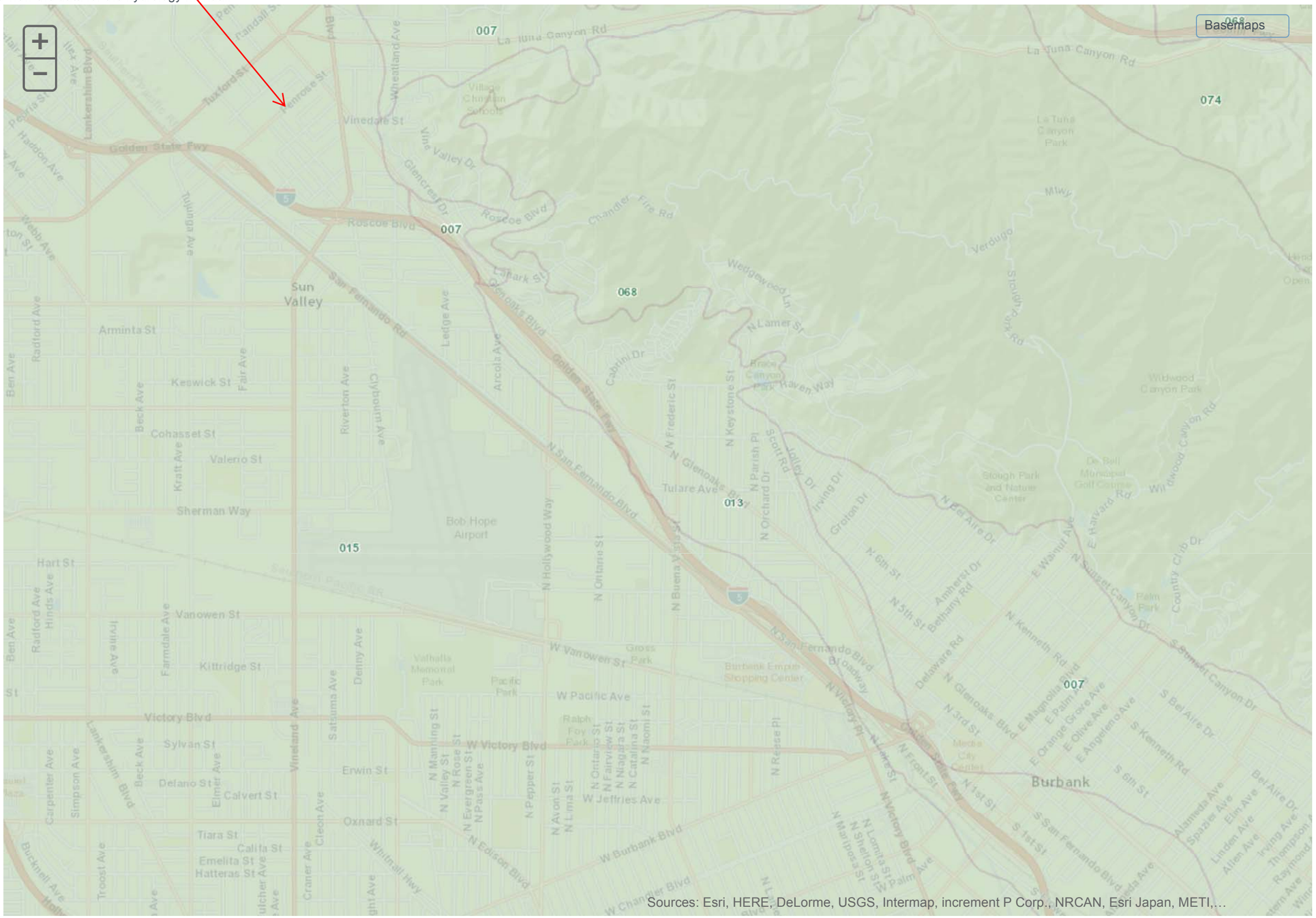
- [ ] 50yr Two Tenths (Rainfall)
- [ ] DPA Zones
- [x] Soils 2004
- [ ] TG Page
- [ ] Final 85th Percentile, 24-hr Rainfall
- [ ] Final 95th Percentile, 24-hr Rainfall
- [ ] 1-year, 1-hour Rainfall Intensity

SEARCH

Zoom to TG Page:

Enter Address, Cross Street, or Parcel No.:
(ex: 900 S. Fremont Ave., Fremont@Valley, 5342005904)

Search



CONTECH ENGINEERED SOLUTIONS

Filterra Sizing for Attachment H Biofilter Equivalency

Drainage Area Inputs

		Unit 1	
Drainage Area	ft^2	185131	
Runoff coefficient	-	0.95	
Time of concentration	min	6	
85th percentile, 24-hour depth	in	1.08	LA County Rainfall Depth Analysis
Long term reliable infiltration rate	in/hr	0.00	

Constants

LAX Airport 85th Percentile, 24-hour depth (for reference only)	in	1.02
Filterra hydraulic loading capacity	gpm/ft^2	1.45

Outputs

Stormwater Quality Design Volume	ft^3	15,829
Stormwater Quality Design Volume X 1.5	ft^3	23,743
Design Rainfall Intensity for Equivalent Long Term Capture	in/hr	0.404
Site Scaling Factor	-	1.06
Stormwater Quality Design Flow Rate	cfs	1.74

Equivalent Filterra Model

Adjusted Filterra Design Intensity	in/hr	0.434	
Stormwater Quality Design Flow Rate	cfs	1.87	
Required Filterra Area	ft^2	579	
Filterra Model ID		FALSE	3(8X20) and 1(8X14)

NOTE: In the area covered by the Los Angeles Region Phase I stormwater permit, conventional biofilters must be sized to treat 1.5X the SWQDV. This results in an average annual capture rate of 93%. The Filterra equivalency sizing approach results in a Filterra that will also treat at least 93% of the average annual runoff volume and thus provides treatment equivalent to treating 1.5X the SWQDV.

CONTECH ENGINEERED SOLUTIONS

Filterra Sizing for Attachment H Biofilter Equivalency

Drainage Area Inputs

		Unit 2	
Drainage Area	ft^2	28314	
Runoff coefficient	-	0.95	
Time of concentration	min	16	
85th percentile, 24-hour depth	in	1.08	LA County Rainfall Depth Analysis
Long term reliable infiltration rate	in/hr	0.00	

Constants

LAX Airport 85th Percentile, 24-hour depth (for reference only)	in	1.02
Filterra hydraulic loading capacity	gpm/ft^2	1.45

Outputs

Stormwater Quality Design Volume	ft^3	2,421
Stormwater Quality Design Volume X 1.5	ft^3	3,631
Design Rainfall Intensity for Equivalent Long Term Capture	in/hr	0.355
Site Scaling Factor	-	1.06
Stormwater Quality Design Flow Rate	cfs	0.23

Equivalent Filterra Model

Adjusted Filterra Design Intensity	in/hr	0.386
Stormwater Quality Design Flow Rate	cfs	0.25
Required Filterra Area	ft^2	79
Filterra Model ID		7x13

NOTE: In the area covered by the Los Angeles Region Phase I stormwater permit, conventional biofilters must be sized to treat 1.5X the SWQDV. This results in an average annual capture rate of 93%. The Filterra equivalency sizing approach results in a Filterra that will also treat at least 93% of the average annual runoff volume and thus provides treatment equivalent to treating 1.5X the SWQDV.

CONTECH ENGINEERED SOLUTIONS

Filterra Sizing for Attachment H Biofilter Equivalency

Drainage Area Inputs

		Unit 3	
Drainage Area	ft^2	346303	
Runoff coefficient	-	0.95	
Time of concentration	min	11	
85th percentile, 24-hour depth	in	1.08	LA County Rainfall Depth Analysis
Long term reliable infiltration rate	in/hr	0.00	

Constants

LAX Airport 85th Percentile, 24-hour depth (for reference only)	in	1.02
Filterra hydraulic loading capacity	gpm/ft^2	1.45

Outputs

Stormwater Quality Design Volume	ft^3	29,609
Stormwater Quality Design Volume X 1.5	ft^3	44,413
Design Rainfall Intensity for Equivalent Long Term Capture	in/hr	0.377
Site Scaling Factor	-	1.06
Stormwater Quality Design Flow Rate	cfs	3.04

Equivalent Filterra Model

Adjusted Filterra Design Intensity	in/hr	0.406	
Stormwater Quality Design Flow Rate	cfs	3.27	
Required Filterra Area	ft^2	1013	
Filterra Model ID		FALSE	6(8X20) and 1(10X6)

NOTE: In the area covered by the Los Angeles Region Phase I stormwater permit, conventional biofilters must be sized to treat 1.5X the SWQDV. This results in an average annual capture rate of 93%. The Filterra equivalency sizing approach results in a Filterra that will also treat at least 93% of the average annual runoff volume and thus provides treatment equivalent to treating 1.5X the SWQDV.

CONTECH ENGINEERED SOLUTIONS

Filterra Sizing for Attachment H Biofilter Equivalency

Drainage Area Inputs

		Unit 4	
Drainage Area	ft^2	355015	
Runoff coefficient	-	0.95	
Time of concentration	min	27	
85th percentile, 24-hour depth	in	1.08	LA County Rainfall Depth Analysis
Long term reliable infiltration rate	in/hr	0.00	

Constants

LAX Airport 85th Percentile, 24-hour depth (for reference only)	in	1.02
Filterra hydraulic loading capacity	gpm/ft^2	1.45

Outputs

Stormwater Quality Design Volume	ft^3	30,354
Stormwater Quality Design Volume X 1.5	ft^3	45,531
Design Rainfall Intensity for Equivalent Long Term Capture	in/hr	0.324
Site Scaling Factor	-	1.06
Stormwater Quality Design Flow Rate	cfs	2.68

Equivalent Filterra Model

Adjusted Filterra Design Intensity	in/hr	0.349	
Stormwater Quality Design Flow Rate	cfs	2.88	
Required Filterra Area	ft^2	893	
Filterra Model ID		FALSE	5(8X20) and 1(12X8)

NOTE: In the area covered by the Los Angeles Region Phase I stormwater permit, conventional biofilters must be sized to treat 1.5X the SWQDV. This results in an average annual capture rate of 93%. The Filterra equivalency sizing approach results in a Filterra that will also treat at least 93% of the average annual runoff volume and thus provides treatment equivalent to treating 1.5X the SWQDV.

CONTECH ENGINEERED SOLUTIONS

Filterra Sizing for Attachment H Biofilter Equivalency

Drainage Area Inputs

		Unit 5	
Drainage Area	ft^2	154639	
Runoff coefficient	-	0.95	
Time of concentration	min	16	
85th percentile, 24-hour depth	in	1.08	LA County Rainfall Depth Analysis
Long term reliable infiltration rate	in/hr	0.00	

Constants

LAX Airport 85th Percentile, 24-hour depth (for reference only)	in	1.02
Filterra hydraulic loading capacity	gpm/ft^2	1.45

Outputs

Stormwater Quality Design Volume	ft^3	13,222
Stormwater Quality Design Volume X 1.5	ft^3	19,832
Design Rainfall Intensity for Equivalent Long Term Capture	in/hr	0.355
Site Scaling Factor	-	1.06
Stormwater Quality Design Flow Rate	cfs	1.28

Equivalent Filterra Model

Adjusted Filterra Design Intensity	in/hr	0.386	
Stormwater Quality Design Flow Rate	cfs	1.39	
Required Filterra Area	ft^2	430	
Filterra Model ID		FALSE	2(8X20) and 1(14X8)

NOTE: In the area covered by the Los Angeles Region Phase I stormwater permit, conventional biofilters must be sized to treat 1.5X the SWQDV. This results in an average annual capture rate of 93%. The Filterra equivalency sizing approach results in a Filterra that will also treat at least 93% of the average annual runoff volume and thus provides treatment equivalent to treating 1.5X the SWQDV.

CONTECH ENGINEERED SOLUTIONS

Filterra Sizing for Attachment H Biofilter Equivalency

Drainage Area Inputs

		Unit 6	
Drainage Area	ft^2	304921	
Runoff coefficient	-	0.95	
Time of concentration	min	14	
85th percentile, 24-hour depth	in	1.08	LA County Rainfall Depth Analysis
Long term reliable infiltration rate	in/hr	0.00	

Constants

LAX Airport 85th Percentile, 24-hour depth (for reference only)	in	1.02
Filterra hydraulic loading capacity	gpm/ft^2	1.45

Outputs

Stormwater Quality Design Volume	ft^3	26,071
Stormwater Quality Design Volume X 1.5	ft^3	39,106
Design Rainfall Intensity for Equivalent Long Term Capture	in/hr	0.363
Site Scaling Factor	-	1.06
Stormwater Quality Design Flow Rate	cfs	2.58

Equivalent Filterra Model

Adjusted Filterra Design Intensity	in/hr	0.394	
Stormwater Quality Design Flow Rate	cfs	2.80	
Required Filterra Area	ft^2	866	
Filterra Model ID		FALSE	(5)8X20 and (1)12X6

NOTE: In the area covered by the Los Angeles Region Phase I stormwater permit, conventional biofilters must be sized to treat 1.5X the SWQDV. This results in an average annual capture rate of 93%. The Filterra equivalency sizing approach results in a Filterra that will also treat at least 93% of the average annual runoff volume and thus provides treatment equivalent to treating 1.5X the SWQDV.

CONTECH ENGINEERED SOLUTIONS

Filterra Sizing for Attachment H Biofilter Equivalency

Drainage Area Inputs

		Unit 7	
Drainage Area	ft^2	23958	
Runoff coefficient	-	0.95	
Time of concentration	min	14	
85th percentile, 24-hour depth	in	1.08	LA County Rainfall Depth Analysis
Long term reliable infiltration rate	in/hr	0.00	

Constants

LAX Airport 85th Percentile, 24-hour depth (for reference only)	in	1.02
Filterra hydraulic loading capacity	gpm/ft^2	1.45

Outputs

Stormwater Quality Design Volume	ft^3	2,048
Stormwater Quality Design Volume X 1.5	ft^3	3,073
Design Rainfall Intensity for Equivalent Long Term Capture	in/hr	0.363
Site Scaling Factor	-	1.06
Stormwater Quality Design Flow Rate	cfs	0.20

Equivalent Filterra Model

Adjusted Filterra Design Intensity	in/hr	0.394
Stormwater Quality Design Flow Rate	cfs	0.22
Required Filterra Area	ft^2	68
Filterra Model ID		6x12

NOTE: In the area covered by the Los Angeles Region Phase I stormwater permit, conventional biofilters must be sized to treat 1.5X the SWQDV. This results in an average annual capture rate of 93%. The Filterra equivalency sizing approach results in a Filterra that will also treat at least 93% of the average annual runoff volume and thus provides treatment equivalent to treating 1.5X the SWQDV.

CONTECH ENGINEERED SOLUTIONS

Filterra Sizing for Attachment H Biofilter Equivalency

Drainage Area Inputs

		Unit 8	
Drainage Area	ft^2	219979	
Runoff coefficient	-	0.95	
Time of concentration	min	11	
85th percentile, 24-hour depth	in	1.08	LA County Rainfall Depth Analysis
Long term reliable infiltration rate	in/hr	0.00	

Constants

LAX Airport 85th Percentile, 24-hour depth (for reference only)	in	1.02
Filterra hydraulic loading capacity	gpm/ft^2	1.45

Outputs

Stormwater Quality Design Volume	ft^3	18,808
Stormwater Quality Design Volume X 1.5	ft^3	28,212
Design Rainfall Intensity for Equivalent Long Term Capture	in/hr	0.377
Site Scaling Factor	-	1.06
Stormwater Quality Design Flow Rate	cfs	1.93

Equivalent Filterra Model

Adjusted Filterra Design Intensity	in/hr	0.406	
Stormwater Quality Design Flow Rate	cfs	2.08	
Required Filterra Area	ft^2	644	
Filterra Model ID		FALSE	4(8X18) and (1)12X6

NOTE: In the area covered by the Los Angeles Region Phase I stormwater permit, conventional biofilters must be sized to treat 1.5X the SWQDV. This results in an average annual capture rate of 93%. The Filterra equivalency sizing approach results in a Filterra that will also treat at least 93% of the average annual runoff volume and thus provides treatment equivalent to treating 1.5X the SWQDV.

CONTECH ENGINEERED SOLUTIONS

Filterra Sizing for Attachment H Biofilter Equivalency

Drainage Area Inputs

		Unit 9	
Drainage Area	ft^2	498764	
Runoff coefficient	-	0.95	
Time of concentration	min	18	
85th percentile, 24-hour depth	in	1.08	LA County Rainfall Depth Analysis
Long term reliable infiltration rate	in/hr	0.00	

Constants

LAX Airport 85th Percentile, 24-hour depth (for reference only)	in	1.02
Filterra hydraulic loading capacity	gpm/ft^2	1.45

Outputs

Stormwater Quality Design Volume	ft^3	42,644
Stormwater Quality Design Volume X 1.5	ft^3	63,966
Design Rainfall Intensity for Equivalent Long Term Capture	in/hr	0.347
Site Scaling Factor	-	1.06
Stormwater Quality Design Flow Rate	cfs	4.03

Equivalent Filterra Model

Adjusted Filterra Design Intensity	in/hr	0.378	
Stormwater Quality Design Flow Rate	cfs	4.39	
Required Filterra Area	ft^2	1359	
Filterra Model ID		FALSE	(8)8X20 and (1)13X7

NOTE: In the area covered by the Los Angeles Region Phase I stormwater permit, conventional biofilters must be sized to treat 1.5X the SWQDV. This results in an average annual capture rate of 93%. The Filterra equivalency sizing approach results in a Filterra that will also treat at least 93% of the average annual runoff volume and thus provides treatment equivalent to treating 1.5X the SWQDV.

CONTECH ENGINEERED SOLUTIONS

Filterra Sizing for Attachment H Biofilter Equivalency

Drainage Area Inputs		Unit 10	
Drainage Area	ft^2	357193	
Runoff coefficient	-	0.95	
Time of concentration	min	16	
85th percentile, 24-hour depth	in	1.08	LA County Rainfall Depth Analysis
Long term reliable infiltration rate	in/hr	0.00	

Constants		
LAX Airport 85th Percentile, 24-hour depth (for reference only)	in	1.02
Filterra hydraulic loading capacity	gpm/ft^2	1.45

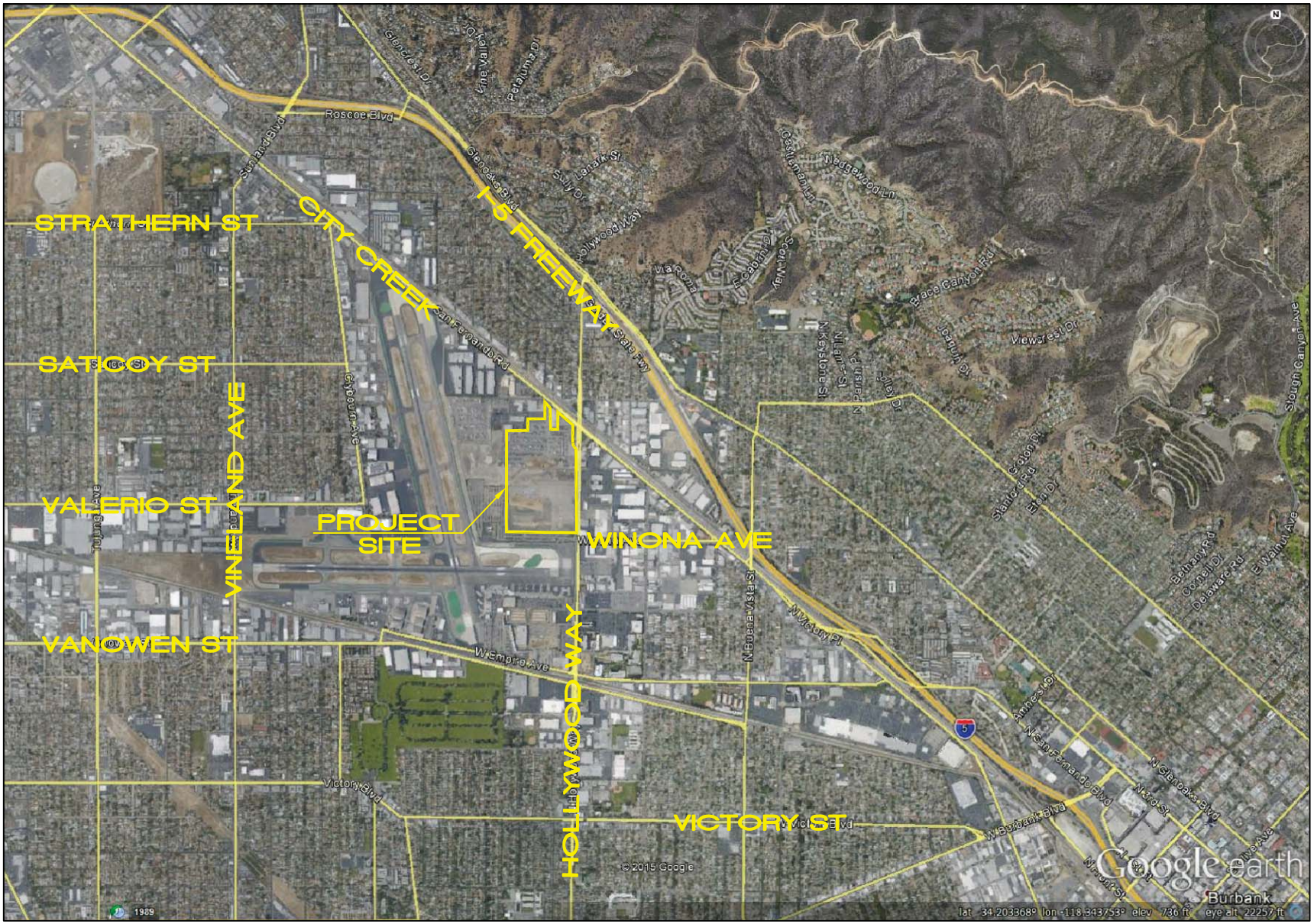
Outputs		
Stormwater Quality Design Volume	ft^3	30,540
Stormwater Quality Design Volume X 1.5	ft^3	45,810
Design Rainfall Intensity for Equivalent Long Term Capture	in/hr	0.355
Site Scaling Factor	-	1.06
Stormwater Quality Design Flow Rate	cfs	2.95

Equivalent Filterra Model			
Adjusted Filterra Design Intensity	in/hr	0.386	
Stormwater Quality Design Flow Rate	cfs	3.21	
Required Filterra Area	ft^2	994	
Filterra Model ID		FALSE	(6)8X20 and (1)12X4

NOTE: In the area covered by the Los Angeles Region Phase I stormwater permit, conventional biofilters must be sized to treat 1.5X the SWQDV. This results in an average annual capture rate of 93%. The Filterra equivalency sizing approach results in a Filterra that will also treat at least 93% of the average annual runoff volume and thus provides treatment equivalent to treating 1.5X the SWQDV.

APPENDIX B

LID Site Plan



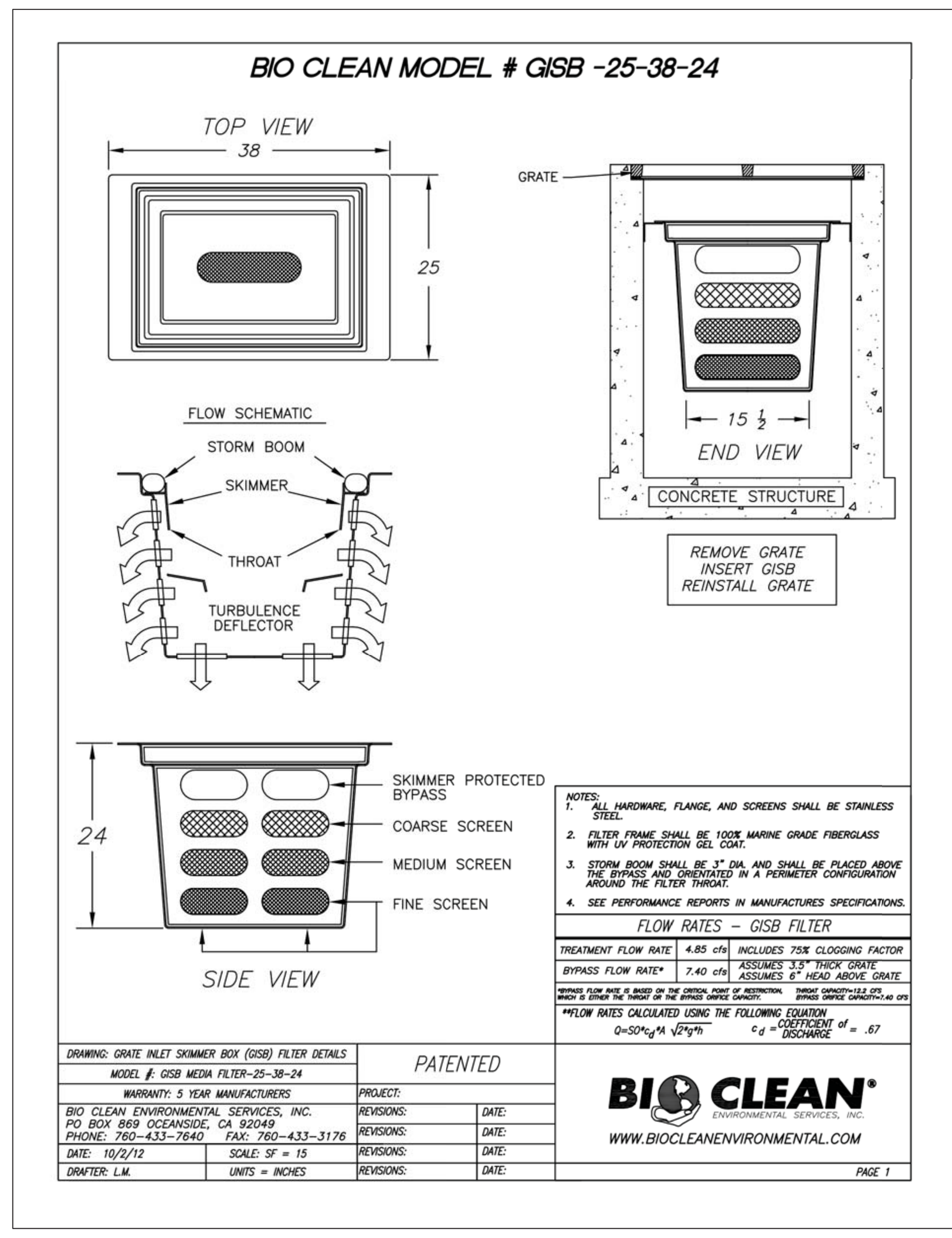
VICINITY MAP

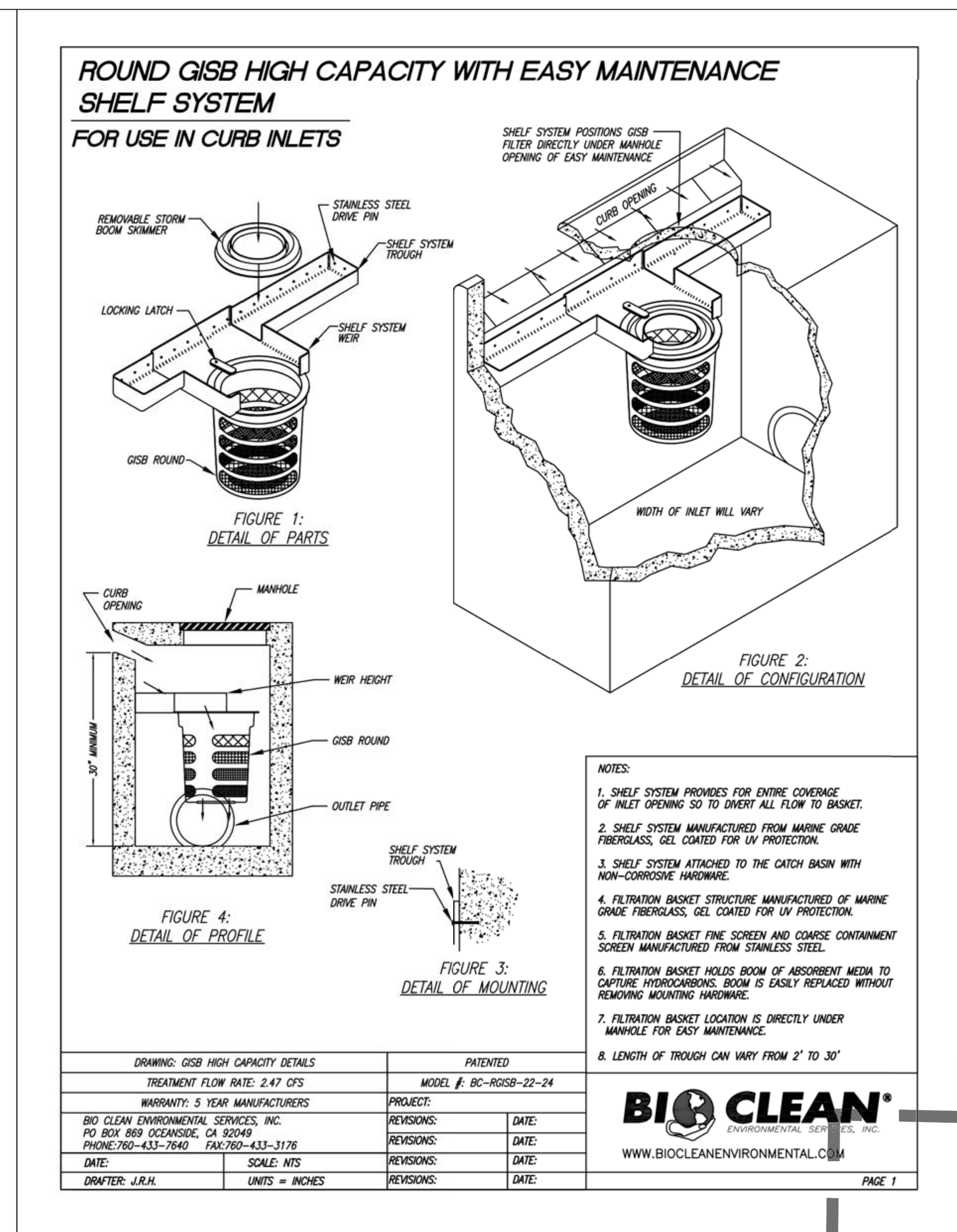
FOR

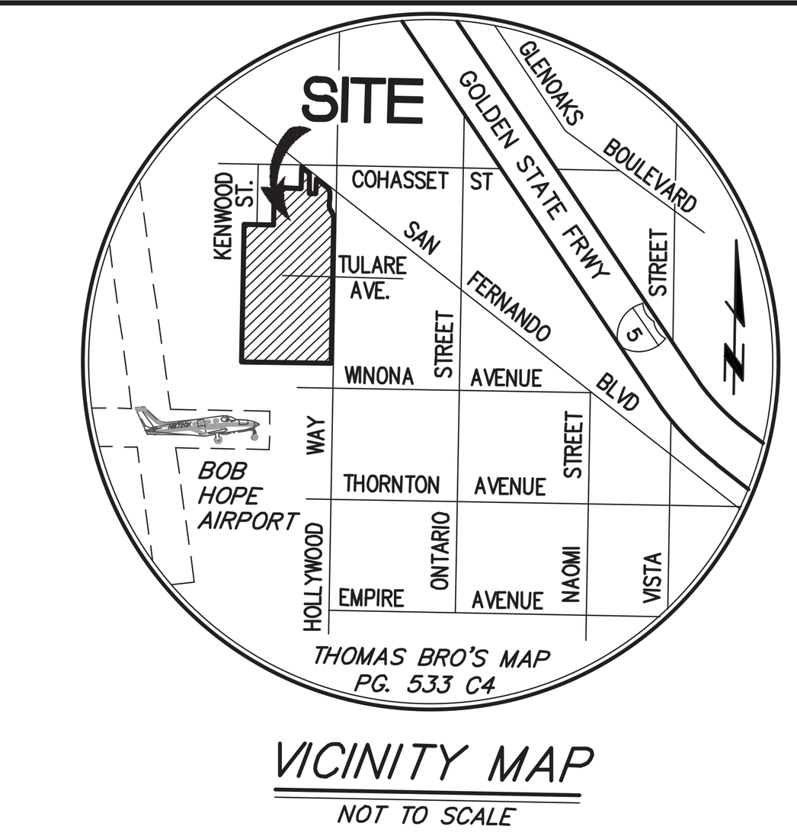
AVION BURBANK

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

Last Update:10/4/17
O:\3400-3499\3421\3421VicinityMap.dwg


BIO CLEAN MODEL # GISB -25-38-24
TOP VIEW
38
25
GRATE
15 1/2
END VIEW
CONCRETE STRUCTURE
REMOVE GRATE INSERT GISB REINSTALL GRATE
FLOW SCHEMATIC
STORM BOOM
SKIMMER
THROAT
TURBULENCE DEFLECTOR
24
SKIMMER PROTECTED BYPASS
COARSE SCREEN
MEDIUM SCREEN
FINE SCREEN
SIDE VIEW
NOTES:
1. ALL HARDWARE, FLANGE, AND SCREENS SHALL BE STAINLESS STEEL.
2. FILTER FRAME SHALL BE 100% MARINE GRADE FIBERGLASS WITH UV PROTECTION GEL COAT.
3. STORM BOOM SHALL BE 3" DIA. AND SHALL BE PLACED ABOVE THE BYPASS AND ORIENTATED IN A PERIMETER CONFIGURATION AROUND THE FILTER THROAT.
4. SEE PERFORMANCE REPORTS IN MANUFACTURES SPECIFICATIONS.
FLOW RATES – GISB FILTER
TREATMENT FLOW RATE 4.85 cfs INCLUDES 75% CLOGGING FACTOR
BYPASS FLOW RATE* 7.40 cfs ASSUMES 3.5" THICK GRATE ASSUMES 6" HEAD ABOVE GRATE
**FLOW RATES CALCULATED USING THE FOLLOWING EQUATION
DRAWING: GRATE INLET SKIMMER BOX (GISB) FILTER DETAILS
MODEL #: GISB MEDIA FILTER–25–38–24
WARRANTY: 5 YEAR MANUFACTURERS
BIO CLEAN ENVIRONMENTAL SERVICES, INC.
PO BOX 869 OCEANSIDE, CA 92049
PHONE: 760–433–7640 FAX: 760–433–3176
DATE: 10/2/12
SCALE: SF = 15
DRAFTER: L.M.
UNITS = INCHES
PATENTED
PROJECT:
REVISIONS:
DATE:
BIO CLEAN
ENVIRONMENTAL SERVICES, INC.
WWW.BIOCLEANENVIRONMENTAL.COM
PAGE 1


ROUND GISB HIGH CAPACITY WITH EASY MAINTENANCE SHELF SYSTEM
FOR USE IN CURB INLETS
REMOVABLE STORM BOOM SKIMMER
STAINLESS STEEL DRIVE PIN
SHELF SYSTEM TROUGH
LOCKING LATCH
SHELF SYSTEM WEIR
GISB ROUND
FIGURE 1: DETAIL OF PARTS
SHELF SYSTEM POSITIONS GISB FILTER DIRECTLY UNDER MANHOLE OPENING OF EASY MAINTENANCE
CURB OPENING
WIDTH OF INLET WILL VARY
FIGURE 2: DETAIL OF CONFIGURATION
CURB OPENING
MANHOLE
WEIR HEIGHT
GISB ROUND
OUTLET PIPE
30" MINIMUM
FIGURE 4: DETAIL OF PROFILE
SHELF SYSTEM TROUGH
STAINLESS STEEL DRIVE PIN
FIGURE 3: DETAIL OF MOUNTING
NOTES:
1. SHELF SYSTEM PROVIDES FOR ENTIRE COVERAGE OF INLET OPENING SO TO DIVERT ALL FLOW TO BASKET.
2. SHELF SYSTEM MANUFACTURED FROM MARINE GRADE FIBERGLASS, GEL COATED FOR UV PROTECTION.
3. SHELF SYSTEM ATTACHED TO THE CATCH BASIN WITH NON-CORROSIVE HARDWARE.
4. FILTRATION BASKET STRUCTURE MANUFACTURED OF MARINE GRADE FIBERGLASS, GEL COATED FOR UV PROTECTION.
5. FILTRATION BASKET FINE SCREEN AND COARSE CONTAINMENT SCREEN MANUFACTURED FROM STAINLESS STEEL.
6. FILTRATION BASKET HOLDS BOOM OF ABSORBENT MEDIA TO CAPTURE HYDROCARBONS. BOOM IS EASILY REPLACED WITHOUT REMOVING MOUNTING HARDWARE.
7. FILTRATION BASKET LOCATION IS DIRECTLY UNDER MANHOLE FOR EASY MAINTENANCE.
8. LENGTH OF TROUGH CAN VARY FROM 2' TO 30'
DRAWING: GISB HIGH CAPACITY DETAILS
TREATMENT FLOW RATE: 2.47 CFS
WARRANTY: 5 YEAR MANUFACTURERS
BIO CLEAN ENVIRONMENTAL SERVICES, INC.
PO BOX 869 OCEANSIDE, CA 92049
PHONE:760–433–7640 FAX:760–433–3176
DRAFTER: J.R.H.
SCALE: NTS
UNITS = INCHES
PATENTED
MODEL #: BC–RGISB–22–24
PROJECT:
REVISIONS:
DATE:
BIO CLEAN
WWW.BIOCLEANENVIRONMENTAL.COM
PAGE 1



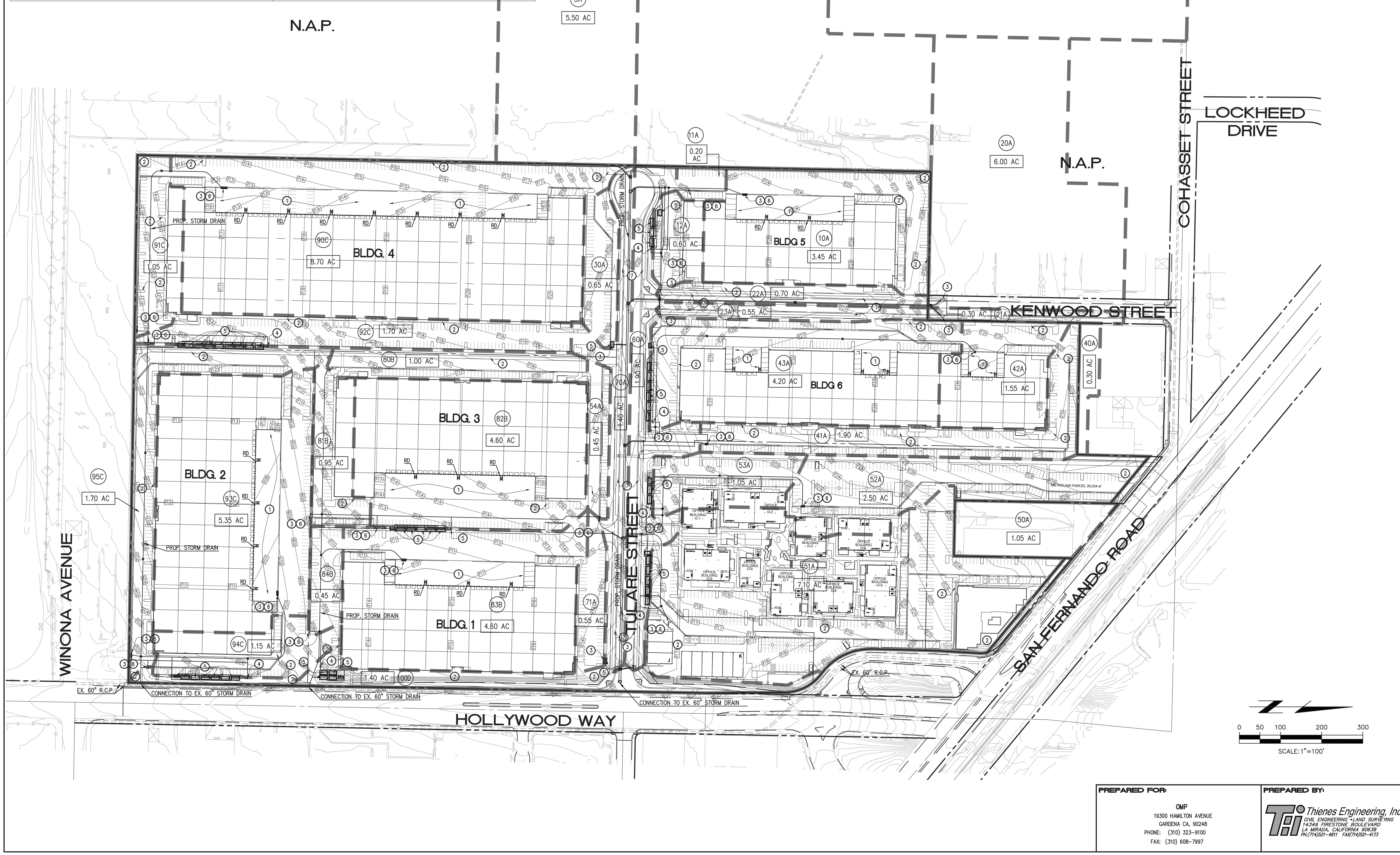
VICINITY MAP
NOT TO SCALE

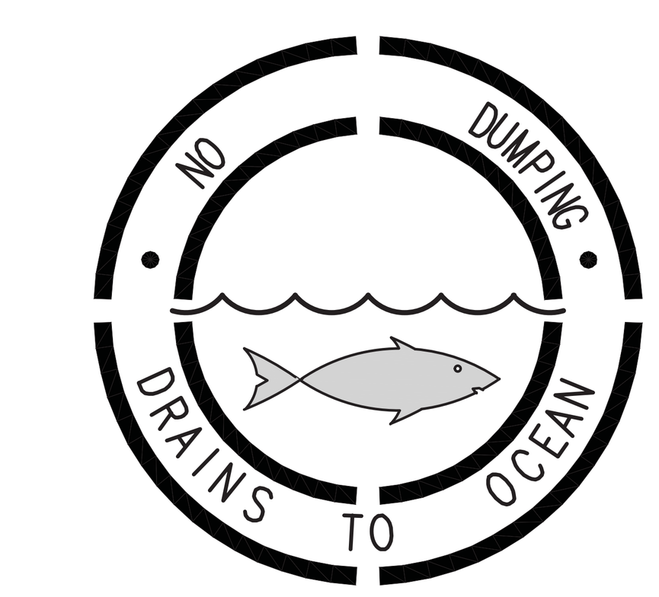
LEGEND

1. LOADING/UNLOADING DOCKS
2. LANDSCAPE MAINTENANCE
3. STORM DRAIN SYSTEM SIGNS "NO DUMPING–DRAINS TO OCEAN"
4. SUMP PUMP
5. FILTERRA SYSTEMS
6. DRAIN INSERT(S)
7. VEGETATED SWALE (STREET BMP)
8. NOT USED

ONGOING OVER THE ENTIRE SITE

- BOUNDARY
- DRAINAGE AREAS
- FLOW LINE


N.A.P.
3A 5.50 AC
2A 11.55 AC
1A 15.25 AC
20A 6.00 AC
11A 0.20 AC
12A 0.60 AC
10A 3.45 AC
BLDG 5
BLDG. 4
90C 8.70 AC
91C 1.05 AC
92C 1.70 AC
30A 0.65 AC
22A 0.70 AC
23A 0.55 AC
21A 0.30 AC
KENWOOD STREET
COHASSET STREET
LOCKHEED DRIVE
40A 0.30 AC
BLDG 6
43A 4.20 AC
42A 1.55 AC
41A 1.90 AC
60A 1.90 AC
70A 1.40 AC
54A 0.45 AC
80B 1.00 AC
BLDG. 3
82B 4.60 AC
81B 0.95 AC
BLDG. 2
93C 5.35 AC
95C 1.70 AC
94C 1.15 AC
84B 0.45 AC
BLDG. 1
83B 4.60 AC
100D 1.40 AC
71A 0.55 AC
53A 1.05 AC
52A 2.50 AC
51A 7.10 AC
50A 1.05 AC
METROLINK PARCEL 28,554 sf
OFFICE BUILDING O-1
OFFICE BUILDING O-2
OFFICE BUILDING O-3
OFFICE BUILDING O-4
OFFICE BUILDING O-5
OFFICE BUILDING O-6
OFFICE BUILDING O-7
OFFICE BUILDING O-8
OFFICE BUILDING O-9
PROP. STORM DRAIN
RD
TULARE STREET
WINONA AVENUE
HOLLYWOOD WAY
SAN FERNANDO ROAD
EX. 60" R.C.P.
CONNECTION TO EX. 60" STORM DRAIN
0 50 100 200 300
SCALE: 1"=100'



SAMPLE STENCIL TO BE USED NEAR GRATE AND CURB OPENING INLETS

Last Update:10/3/17
O:\3400–3499\3421\3421BMPSITEMAP.dwg

CITY OF BURBANK
PUBLIC WORKS DEPARTMENT

LID SITE MAP
AVION BURBANK
HOLLYWOOD WAY

PREPARED FOR:
OMP
19300 HAMILTON AVENUE
GARDENA CA, 90248
PHONE: (310) 323–9100
FAX: (310) 608–7997

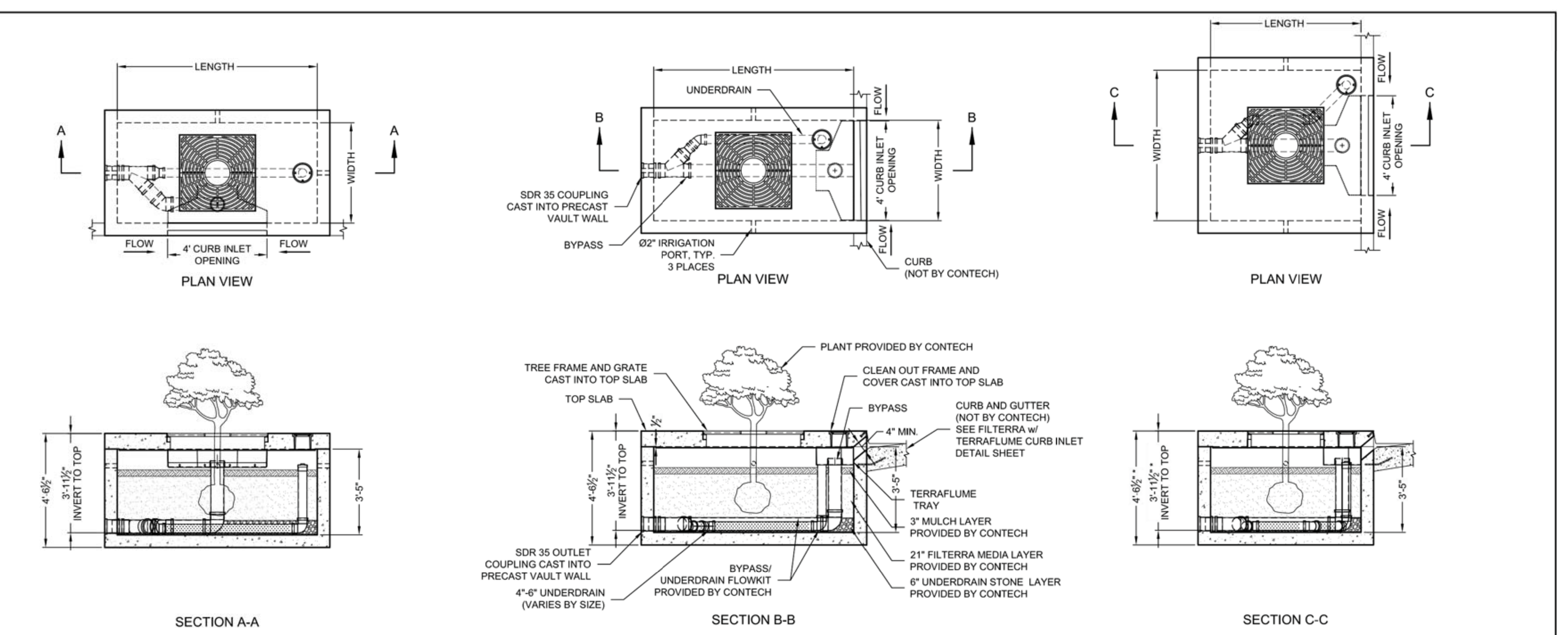
PREPARED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING •LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521–4811 FAX(714)521–4173

Designed by ______
Date ______
Checked by ______
Date ______
Designed by ______
Date ______
Checked by ______
Date ______

Approved by ______ Date ______
Public Works Director R.C.E. XXXXX

Sheet 1 of 2 Sheets

3421/1 OF 2 SHEET



LONG SIDE INLET CONFIGURATION

SHORT SIDE INLET CONFIGURATION

SQUARE INLET CONFIGURATION

LONG SIDE CURB INLET

DESIGNATION	SIZE	LENGTH	WIDTH	MAX. OUTLET/ BYPASS PIPE DIA.	MAX. BYPASS FLOW (CFS)	UNDER-DRAIN PIPE DIA. (PERF)	TREE GRATE QTY. & SIZE
FTIBC0604	6 x 4	6'-0"	4'-0"	8" SDR 35	1.89	4" SDR 35	(1) 3' x 3'
FTIBC0804	8 x 4	8'-0"	4'-0"	8" SDR 35	1.89	4" SDR 35	(1) 3' x 3'
FTIBC0806	8 x 6	8'-0"	6'-0"	10" SDR 35	2.37	4" SDR 35	(1) 4' x 4'
FTIBC1006	10 x 6	10'-0"	6'-0"	10" SDR 35	2.37	6" SDR 35	(1) 4' x 4'
FTIBC1204	12 x 4	12'-0"	4'-0"	8" SDR 35	1.89	4" SDR 35	(2) 3' x 3'
FTIBC1206	12 x 6	12'-0"	6'-0"	10" SDR 35	2.37	6" SDR 35	(2) 4' x 4'
FTIBC1307	13 x 7	13'-0"	7'-0"	10" SDR 35	2.37	6" SDR 35	(2) 4' x 4'

INTERNAL PIPE CONFIGURATION MAY VARY DEPENDING ON VAULT SIZE

SHORT SIDE CURB INLET

DESIGNATION	SIZE	LENGTH	WIDTH	MAX. OUTLET/ BYPASS PIPE DIA.	MAX. BYPASS FLOW (CFS)	UNDER-DRAIN PIPE DIA. (PERF)	TREE GRATE QTY. & SIZE
FTIBC0406	4 x 6	6'-0"	4'-0"	8" SDR 35	1.89	4" SDR 35	(1) 3' x 3'
FTIBC0408	4 x 8	8'-0"	4'-0"	8" SDR 35	1.89	4" SDR 35	(1) 3' x 3'
FTIBC0412	4 x 12	12'-0"	4'-0"	8" SDR 35	1.89	4" SDR 35	(2) 3' x 3'
FTIBC0608	6 x 8	8'-0"	6'-0"	10" SDR 35	2.37	4" SDR 35	(1) 4' x 4'
FTIBC0610	6 x 10	10'-0"	6'-0"	10" SDR 35	2.37	6" SDR 35	(1) 4' x 4'
FTIBC0612	6 x 12	12'-0"	6'-0"	10" SDR 35	2.37	6" SDR 35	(2) 4' x 4'
FTIBC0713	7 x 13	13'-0"	7'-0"	10" SDR 35	2.37	6" SDR 35	(2) 4' x 4'

INTERNAL PIPE CONFIGURATION MAY VARY DEPENDING ON VAULT SIZE

SQUARE CURB INLET

DESIGNATION	SIZE	LENGTH	WIDTH	MAX. OUTLET/ BYPASS PIPE DIA.	MAX. BYPASS FLOW (CFS)	UNDER-DRAIN PIPE DIA. (PERF)	TREE GRATE QTY. & SIZE
FTIBC0404	4 x 4	4'-0"	4'-0"	6" SDR 35	1.42	4" SDR 35	(1) 3' x 3'
FTIBC0606	6 x 6	6'-0"	6'-0"	8" SDR 35	1.89	4" SDR 35	(1) 3' x 3'

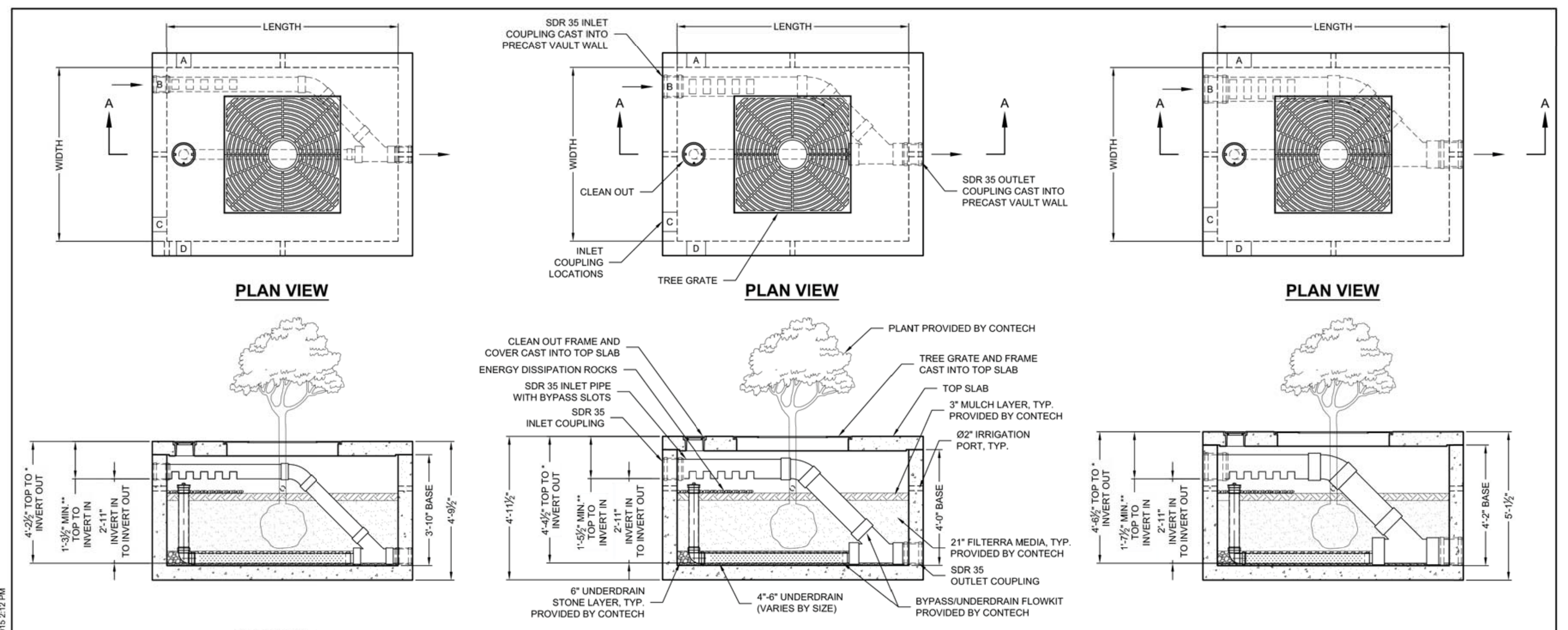
INTERNAL PIPE CONFIGURATION MAY VARY DEPENDING ON VAULT SIZE

* DIMENSIONS MAY VARY ± ½" DEPENDING ON PRECASTER BUILD CONFIGURATION.

filterra

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

FILTERRA
INTERNAL BYPASS CURB (FTIBC)
CONFIGURATION DETAIL



6" BYPASS INLET PIPE CONFIGURATION
APPROXIMATE MAXIMUM BYPASS = 0.6 CFS

DESIGNATION	SIZE	LENGTH	WIDTH	INLET/ OUTLET PIPE DIA.	UNDER-DRAIN PIPE DIA. (PERF.)	TREE GRATE QTY. & SIZE
FTIBP0404-6	4 x 4	4'-0"	4'-0"	6" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0604-6	6 x 4	6'-0"	4'-0"	6" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0606-6	6 x 6	6'-0"	6'-0"	6" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0804-6	8 x 4	8'-0"	4'-0"	6" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0806-6	8 x 6	8'-0"	6'-0"	6" SDR 35	4" SDR 35	(1) 4' x 4'
FTIBP1006-6	10 x 6	10'-0"	6'-0"	6" SDR 35	6" SDR 35	(1) 4' x 4'
FTIBP1204-6	12 x 4	12'-0"	4'-0"	6" SDR 35	6" SDR 35	(2) 3' x 3'
FTIBP1206-6	12 x 6	12'-0"	6'-0"	6" SDR 35	6" SDR 35	(2) 4' x 4'
FTIBP1307-6	13 x 7	13'-0"	7'-0"	6" SDR 35	6" SDR 35	(2) 4' x 4'

INTERNAL PIPING MAY VARY DEPENDING UPON INFLUENT LOCATION
* MAXIMUM TOP TO INVERT OUT = 5'-5"
** MAXIMUM TOP TO INVERT IN = 2'-6"

8" BYPASS INLET PIPE CONFIGURATION
APPROXIMATE MAXIMUM BYPASS = 1.2 CFS

DESIGNATION	SIZE	LENGTH	WIDTH	INLET/ OUTLET PIPE DIA.	UNDER-DRAIN PIPE DIA. (PERF.)	TREE GRATE QTY. & SIZE
FTIBP0604-8	6 x 4	6'-0"	4'-0"	8" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0606-8	6 x 6	6'-0"	6'-0"	8" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0804-8	8 x 4	8'-0"	4'-0"	8" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0806-8	8 x 6	8'-0"	6'-0"	8" SDR 35	4" SDR 35	(1) 4' x 4'
FTIBP1006-8	10 x 6	10'-0"	6'-0"	8" SDR 35	6" SDR 35	(1) 4' x 4'
FTIBP1204-8	12 x 4	12'-0"	4'-0"	8" SDR 35	6" SDR 35	(2) 3' x 3'
FTIBP1206-8	12 x 6	12'-0"	6'-0"	8" SDR 35	6" SDR 35	(2) 4' x 4'
FTIBP1307-8	13 x 7	13'-0"	7'-0"	8" SDR 35	6" SDR 35	(2) 4' x 4'

INTERNAL PIPING MAY VARY DEPENDING UPON INFLUENT LOCATION
* MAXIMUM TOP TO INVERT OUT = 5'-5"
** MAXIMUM TOP TO INVERT IN = 2'-6"

10" BYPASS INLET PIPE CONFIGURATION
APPROXIMATE MAXIMUM BYPASS = 2.2 CFS

DESIGNATION	SIZE	LENGTH	WIDTH	INLET/ OUTLET PIPE DIA.	UNDER-DRAIN PIPE DIA. (PERF.)	TREE GRATE QTY. & SIZE
FTIBP0606-10	6 x 6	6'-0"	6'-0"	10" SDR 35	4" SDR 35	(1) 3' x 3'
FTIBP0806-10	8 x 6	8'-0"	6'-0"	10" SDR 35	4" SDR 35	(1) 4' x 4'
FTIBP1006-10	10 x 6	10'-0"	6'-0"	10" SDR 35	6" SDR 35	(1) 4' x 4'
FTIBP1204-10	12 x 4	12'-0"	4'-0"	10" SDR 35	6" SDR 35	(2) 3' x 3'
FTIBP1206-10	12 x 6	12'-0"	6'-0"	10" SDR 35	6" SDR 35	(2) 4' x 4'
FTIBP1307-10	13 x 7	13' 0"	7'-0"	10" SDR 35	6" SDR 35	(2) 4' x 4'

INTERNAL PIPING MAY VARY DEPENDING UPON INFLUENT LOCATION
* MAXIMUM TOP TO INVERT OUT = 5'-5"
** MAXIMUM TOP TO INVERT IN = 2'-6"

* DIMENSIONS MAY VARY ± ½" DEPENDING ON PRECASTER BUILD CONFIGURATION.

filterra

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

FILTERRA
INTERNAL BYPASS PIPE (FTIBP)
CONFIGURATION DETAILS

Last Update: 10/1/17
O:\3400-3499\3421\3421BMPSITEMAP.dwg

CITY OF BURBANK
PUBLIC WORKS DEPARTMENT

LID SITE MAP
AVION BURBANK
HOLLYWOOD WAY

Last Update: 1/13/16
O:\3400-3499\3421\3421BMPSITEMAP.dwg

PREPARED FOR:
OMP
19300 HAMILTON AVENUE
GARDENA CA, 90248
PHONE: (310) 323-9100
FAX: (310) 608-7997

PREPARED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

Designed by ______
Date ______
Checked by ______
Date ______
Designed by ______
Date ______
Checked by ______
Date ______

Approved by ______ Date ______
Public Works Director R.C.E. XXXXX
Sheet 2 of 2 Sheets

3421/2 OF 2 SHEET

APPENDIX C

BMP Operation and Maintenance

BMP Operation and Maintenance			
BMP	**Operation/Maintenance**	**Inspection Frequency**	**Responsibility**
Storm Drain Stencil and Signage	➢ Visually inspect for legibility and replace/repaint as necessary.	Annually	Owner
Parking Lot Sweeping	➢ At a minimum, sweep on a monthly basis.	Monthly (minimum)	Owner
Filterra System	➢ All work to be done by the supplier or by a supplier approved contractor. ➢ Inspection of unit and surrounding area. ➢ Removal of tree grate and erosion control stones. Silt (if any) and mulch to be dug out. Trash, debris and foreign items will be removed. ➢ Replace mulch evenly across the entire unit to a depth of 3". Ensure correct repositioning of the erosion control stones by the Filterra inlet to allow for entry of trash during a storm event. ➢ Examine the plant's health and replace if dead. Prune as necessary to encourage growth in the correct directions. ➢ Clean area around unit and remove all refuse to be disposed of appropriately.	Semi-annually (October 1st and February 1st) through maintenance service contract with the vendor or equally qualified contractor.	Owner
Sump Pump	➢ Verify automatic and manual operations of pump(s) ➢ Inspect floats for proper elevation and movement. Correct any obstructions. ➢ Check incoming power and amperage for proper voltage. ➢ Hose down lift station to clean pump and floats.	Semi-annually (October 1st and February 1st) through maintenance service contract with the vendor or equally qualified contractor.	Owner
Drain Inserts	➢ Visually inspect for defects and illegal dumping. Notify proper authorities if illegal dumping has occurred. ➢ Using an industrial vacuum, the collected materials shall be removed from the filter basket and disposed of properly. ➢ Inspect biosorb hydrocarbon boom and replace as necessary.	Semi-annually (October 1st and February 1st) through maintenance service contract with the vendor or equally qualified contractor.	Owner
Maintenance Log	➢ Keep a log of all inspection and maintenance performed on the above mentioned BMPs for at least 5 years. Keep this log on-site.	Ongoing	Owner

Storm Drain Signage SD-13

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include “NO DUMPING

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

– DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.

- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

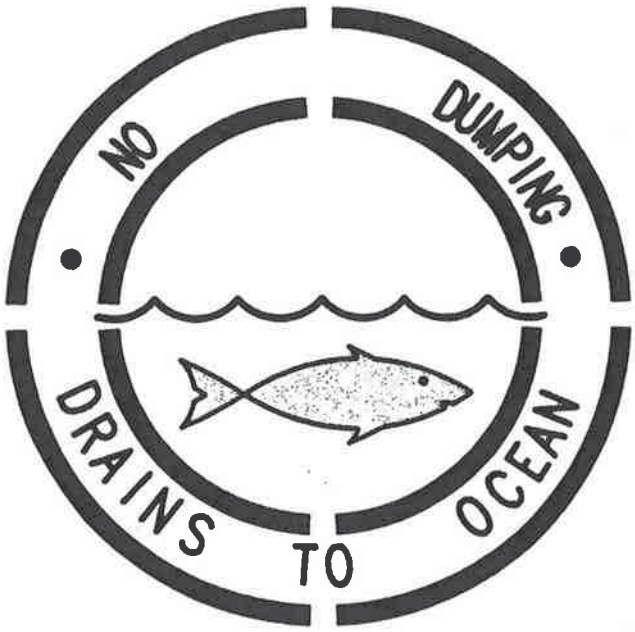
Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.



SAMPLE STENCIL TO BE USED NEAR
GRATE AND CURB OPENING INLETS
SYMBOL TO BE 24" IN DIAMETER

Thienes Engineering
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

SAMPLE CATCH BASIN STENCIL
PER BMP SD-13

LIFT STATION REQUIRED MAINTENANCE

The lift station should be inspected twice a year for proper operation, and should be checked for overabundance of solid matter such as grease and soap buildup.

Proper operation and inspection would include the following:

1) Automatic operation of the system by float activation. One pump starting at lead on levels, second pump starting at high level conditions; manual operation by use of the selector switches.

2) Inspect floats for proper elevation and for proper movement. Correct any obstructions.

3) Check incoming power for proper voltage. Check voltage at motor connections.

4) Check amperage of each motor.

5) Hose down lift station to clean the walls of the wet well, pumps and floats.

MECHANICAL SEAL INSPECTION OF PUMPS

Inspection of the mechanical seals should be done every two years.

The inspection will include the following:

Pull pump out of wet well. Remove oil seal plug and inspect the oil for clarity. Clear oil indicates no water intrusion and chamber is to be topped off with 30 weight turbine oil. If oil is cloudy the mechanical seal and oil needs to be replaced.

PSI recommends that preventive maintenance and service be performed by a qualified technician.

Any question regarding your lift station should be directed to Scott Richardson at 800-358-9095.

Grate Inlet Filter (GISB)

PROVEN STORMWATER TREATMENT TECHNOLOGY

Bio Clean
A Forterra Company

Overview

The Bio Clean Grate Inlet Filter (GISB) for catch basins has been keeping property owners in compliance since 1994. Preferred by public agencies and backed with a 8 year unlimited warranty, this easy to install filter has been chosen because of its durability and easy maintenance.

Constructed of UV coated marine grade fiberglass and high grade stainless steel, it is built to last longer than any other filter brand. The multi-stage filtration provides three different sieve size filtration screens to optimize filtration and water flow. The filter is equipped with a hydrocarbon media boom and deflector shield protected bypass to eliminate scouring.

The filter is designed for grated inlets of any size and depth. Each filter can be custom built to meet specific project needs. Screen size and media type can be modified to remove specific pollutants.

Advantages

- 8 Year Warranty
- Custom Sizes Available
- Fits in Shallow Catch Basins
- No Nets or Geofabrics
- 15+years User Life
- No Replacement Costs as Found with Fabric Filters
- Meets LEED Requirements

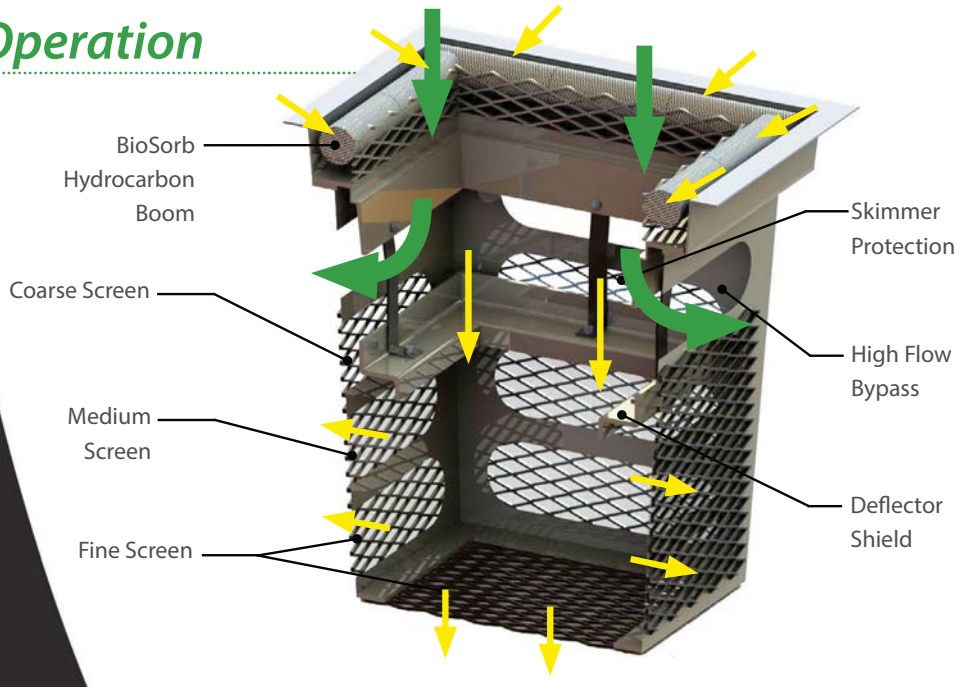
Performance

- 74%-86% Removal of TSS
- 54% Removal of Oils & Grease
- 57%-71% Removal of Phosphorus
- 56%-60% Removal of Nitrogen

Specifications

Model #	Treatment Flow (CFS)	Bypass Flow (CFS)
BC-GISB-12-12-12	0.5	0.5
BC-GISB-18-18-18	0.8	0.8
BC-GISB-24-24-24	3.7	4.4
BC-GISB-36-36-24	5.8	13.4
BC-GISB-48-48-18	6.6	13.3

Operation



www.BioCleanEnvironmental.com

Grate Inlet Filter (GISB)

PROVEN STORMWATER TREATMENT TECHNOLOGY

Bio Clean
A Forterra Company

OPERATION & MAINTENANCE

Bio Clean Environmental Services, Inc.
2972 San Luis Rey Road
Oceanside, CA 92054

www.BioCleanEnvironmental.com
P 760-433-7640
F 760-433-3176

OPERATION & MAINTENANCE

Maintenance Summary –

- Clean filter as needed based on local loading conditions.
- Evaluate and replace hydrocarbon media booms (BioSorb) as needed.

Notes:

- Loading varies at every location due to variations in pollutant and flow volumes.
- Maintenance typically occurs before and after the rainy season.
- Media booms and replacement parts can be provided by Bio Clean Environmental Services, Inc.

Operation –

A. Maintenance can be provided by the Supplier, or a Supplier approved contractor. The cost of this service varies among providers.

B. The Bio Clean Grate Inlet Skimmer Box (GISB) is a multi-stage catch basin filter. These stages include: absorption of hydrocarbons and multi-level screening. It is recommended that the system be inspected every 6 months to evaluate its condition. The first year of inspection and maintenance can be used to predict maintenance requirements for subsequent years.

1. Absorption - is provided by sorbent media booms. This boom is positioned in a tray around the top perimeter of the filtration basket. This booms targets hydrocarbons including diesel, gasoline and oil. This booms utilizes a poly known as BioSorb which permanently absorbs and retains captured hydrocarbons. It is recommended the media boom is replaced when its visual appearance is black in color. This procedure can be performed by hand. *This procedure takes approximately 3-6 minutes depending on size of the filter.*

2. Multi-Level Screening - is provided by a series of filtration screens. The surface area of the screens varies depending on the model number. The lower level contains the finest screens and as you move up the sides of the filter the screens

become larger. This ensures the filter can capture both fine and coarser sediments and associated pollutants while maintaining maximum flow rate capacity. These screens target trash, TSS, debris, and particulate metals and nutrients. **It is recommended that the filter screens cleaned and captured debris removed one the filter is 50% full.** *Removal of captured debris and cleaning of the screens can be done by hand with with a vacuum truck. This procedure takes approximately 10-15 minutes depending on the size of the filter.*

The Bio Clean Grate Inlet Skimmer Box is designed to allow for the use of vacuum removal of captured materials in the sediment chamber. The chamber is serviceable by centrifugal compressor vacuum units without causing damage to the filter or during normal cleaning and maintenance. Filters can be cleaned and vacuumed without entering the catch basin from finish surface. Filter does not need to be removed to replace media or clean.

Maintenance Procedures:

1. Bio Clean Environmental Services, Inc. recommends the **filter and media boom** be inspected annually and cleaned when needed depending on loading. The procedure is easily done with the use of any standard vacuum truck.

    - Remove grate to gain access to the fitler.
    - Remove skimmer tray containing media booms and replace if needed by cutting zip ties, removing old boom, replace with new boom, zip tie into place.
    - Use a vacuum truck hose and insert into the catch basin. Lower the vacuum hose into the bottom of the filter. Begin vacuuming out accumulated sediments until the filter is empty. A pressure washer may be needed to assist with removing sediments that are compacted or stuck to the walls, screens and floor of the filter.
    - Once the filterr is cleaned remove vacuum hose.
    - Remove vacuum hose and replace grate cover.
    - Where possible the maintenance should be performed from the ground surface.

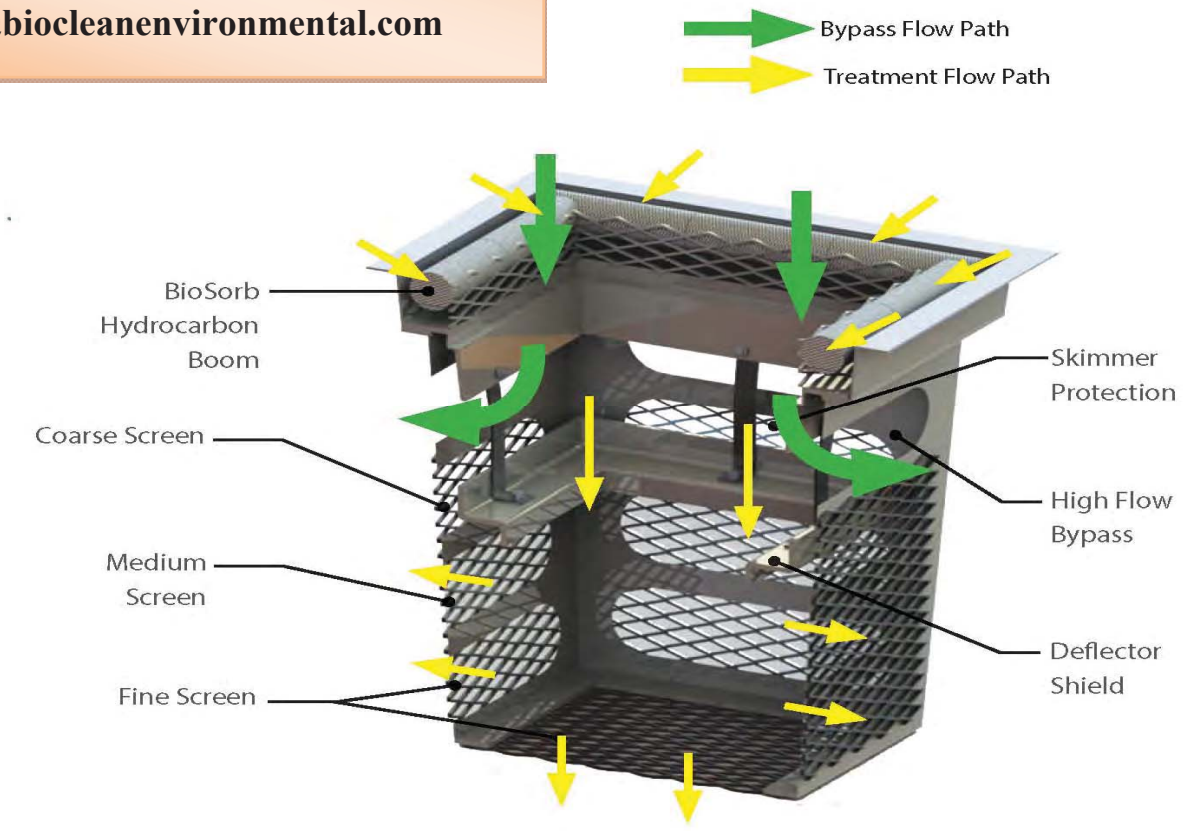
- Note: entry into an underground stormwater catch basin requires certification of confined space training.
- Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.

2. Following maintenance and/or inspection, the maintenance operator shall prepare a maintenance/inspection record. The record shall include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanism.

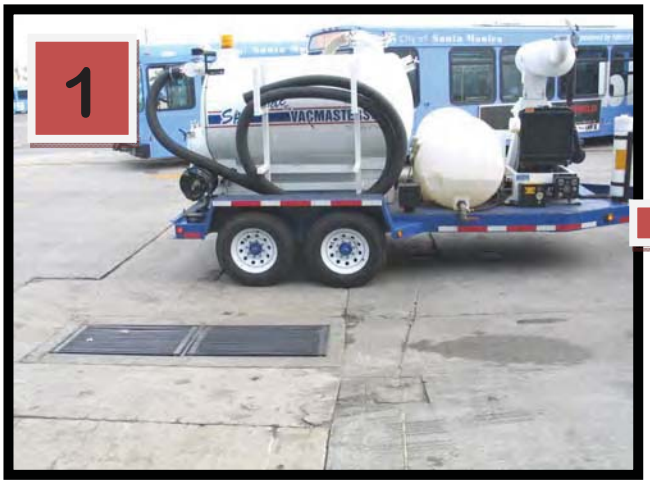
3. The owner shall retain the maintenance/inspection record for a minimum of five years from the date of maintenance. These records shall be made available to the governing municipality for inspection upon request at any time.

4. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.

For Maintenance Services or Replacement Media Please Contact Us At:
760-433-7640
info@biocleanenvironmental.com



Maintenance Sequence

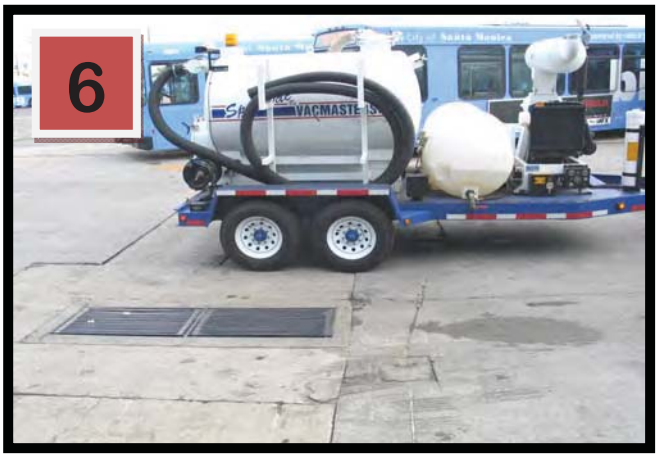


Remove grates from catch basins to gain access to the GISB filters. Special hooks are available from various manufactures which are designed to remove the grates.

Remove skimmer tray and attached media booms.

Remove old media boom by cutting zip ties. Replace with new media boom and fasten with zip ties.

Vacuum out accumulated trash, sediment, and debris OR clean by hand. A pressure washer or metal brush can be used to clean of the screens.



Replace grates. Make sure they are properly re-installed.

Bio Clean
A Forterra Company

Inspection and Maintenance Report
Catch Basin Inserts

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation (lbs)	Foliage Accumulation (lbs)	Sediment Accumulation (lbs)	Total Debris Accumulation (lbs)	Condition of Media 25/50/75/100 (will be replaced @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							

Comments:

2972 San Luis Rey Road, Oceanside, CA 92058 P. 760.433.7640 F. 760.433.3176

Round Curb Inlet Filter (R-GISB)

PROVEN STORMWATER TREATMENT TECHNOLOGY

Bio Clean
A Forterra Company

Overview

The Bio Clean Round Curb Inlet Filter (R-GISB) is a favorite amongst cities and municipalities nationwide. Many agencies have chosen this system as their standard due to its quick cleaning time and large storage capacity.

Its patented 'Shelf System' allows cleaning to be done in less than 15 minutes, and its larger storage capacity of 3.85 cubic feet allows for maximized cleaning intervals and minimized attention required by maintenance crews.

The modularized design of the 'Shelf System' for curb inlets makes it adaptable to any size or type catch basin.

Its multi-stage filtration screens allow this device to meet "full trash capture" requirements by removing 100% of trash & debris 5 mm and greater. Made of marine grade fiberglass and high grade stainless steel these filters come in standard and custom designs.

This filtration system addresses a wide array of pollutants including trash and debris, sediments, TSS, nutrients, metals, and hydrocarbons.

Includes the Patented 'Shelf System'

Higher Storage Capacity & 15 Minute Service Time

Advantages

- 8 Year Warranty
- Works in Any Size Catch Basin
- No Nets or Geofabrics
- 15+ Year User Life
- Meets **LEED** Requirements
- Patented Shelf System
- Fiberglass Construction

Performance

- 74%-86% Removal of TSS
- 54% Removal of Oils & Grease
- 57%-71% Removal of Phosphorus
- 56%-60% Removal of Nitrogen

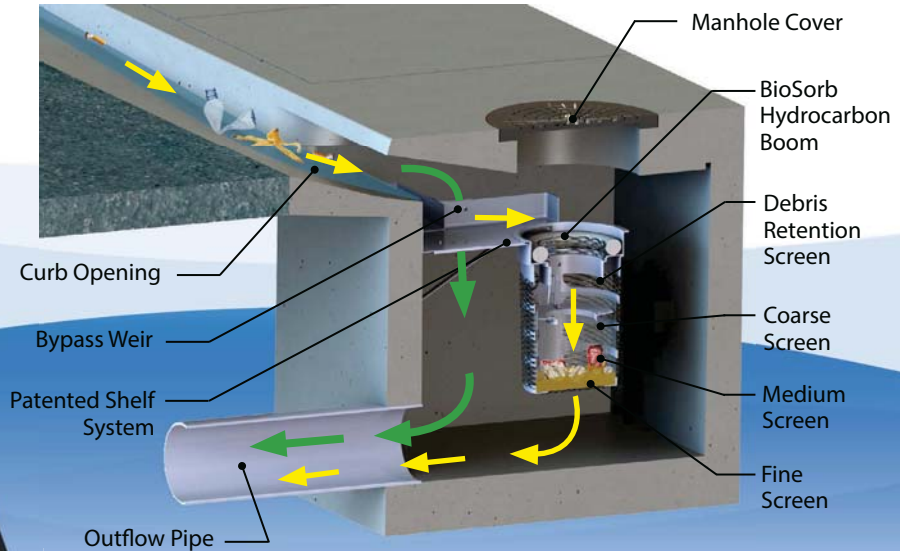
Specifications

Model #	Treatment Flow (CFS)	Bypass Flow (CFS)
BC-RGISB-22-24	2.4	Unlimited

Operation

Bypass Flow Path

Treatment Flow Path



www.BioCleanEnvironmental.com

Cleaning and Maintenance Manual

Curb Inlet Basket/Round Curb Inlet Basket

Maintenance

Maintenance: The filter is designed to allow for the use of vacuum removal of captured materials in the filter basket, serviceable by centrifugal compressor vacuum units without causing damage to the filter or any part of the mounting and attachment hardware during normal cleaning and maintenance. Filters can be cleaned and vacuumed from the manhole-opening. Entering the catch basin to clean the filters is not necessary.

Maintenance Notes:

1. Bio Clean Environmental Services, Inc. recommends cleaning and maintenance of the Curb Inlet Basket a minimum of two to four times per year or following a significant rain event that would potentially accumulate a large amount of debris to the system. The hydrocarbon boom should be replaced a minimum of twice per year or at each service as needed.
2. Any person performing maintenance activities that require entering the catch basin or handle a toxic substance have completed the proper training as required by OSHA.
3. Remove manhole lid to gain access to inlet filter insert. The filter basket should be located directly under the manhole lid. Under normal conditions, cleaning and maintenance of the Curb Inlet Basket will be performed from above ground surface.
4. Special Note: entry into an underground manhole, catch basin and stormwater vault requires training in an approved Confined Space Entry Program.
5. Remove all trash, debris, organics, and sediments collected by the inlet filter insert. Removal of the trash and debris can be done manually or with the use of a vactor truck. Manual removal of debris may be done by lifting the basket from the shelf and pulling the basket from the catch basin and dumping out the collected debris.
6. Any debris located on the shelf system can be either removed from the shelf or can be pushed into the basket and retrieved from basket.
7. Evaluation of the hydrocarbon boom shall be performed at each cleaning. If the boom is filled with hydrocarbons and oils it should be replaced. Removed boom by cutting plastic ties and remove boom. Attach new boom to basket with plastic ties through pre-drilled holes in basket.
8. Place manhole lid back on manhole opening.
9. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements. The hydrocarbon boom with adsorbed hydrocarbons is considered hazardous waste and need to be handled and disposed of as hazardous material. Please refer to state and local regulations for the proper disposal of used motor oil/filters.
10. Following maintenance and/or inspection, the maintenance operator shall prepare a maintenance/inspection record. The record shall include any maintenance activities performed, amount and description of debris collected, and condition of filter. The owner shall retain the maintenance/inspection record for a minimum of five years from the date of maintenance. These records shall be made available to the governing municipality for inspection upon request at any time.
11. Any toxic substance or item found in the filter is considered as hazardous material can only be handled by a certified hazardous waste trained person (minimum 24-hour hazwoper).

BIO CLEAN
ENVIRONMENTAL SERVICES, INC.

398 Via El Centro, Oceanside, CA 92058
(760 433-7640 Fax (760) 433-3176
www.biocleanenvironmental.com

Bio Clean
A Forterra Company

Inspection and Maintenance Report
Catch Basin Inserts

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation (lbs)	Foliage Accumulation (lbs)	Sediment Accumulation (lbs)	Total Debris Accumulation (lbs)	Condition of Media 25/50/75/100 (will be replaced @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							

Comments:

2972 San Luis Rey Road, Oceanside, CA 92058 P. 760.433.7640 F. 760.433.3176

Operation & Maintenance (OM) Manual v01

filterra®

Bioretention Systems

CONTECH®

ENGINEERED SOLUTIONS

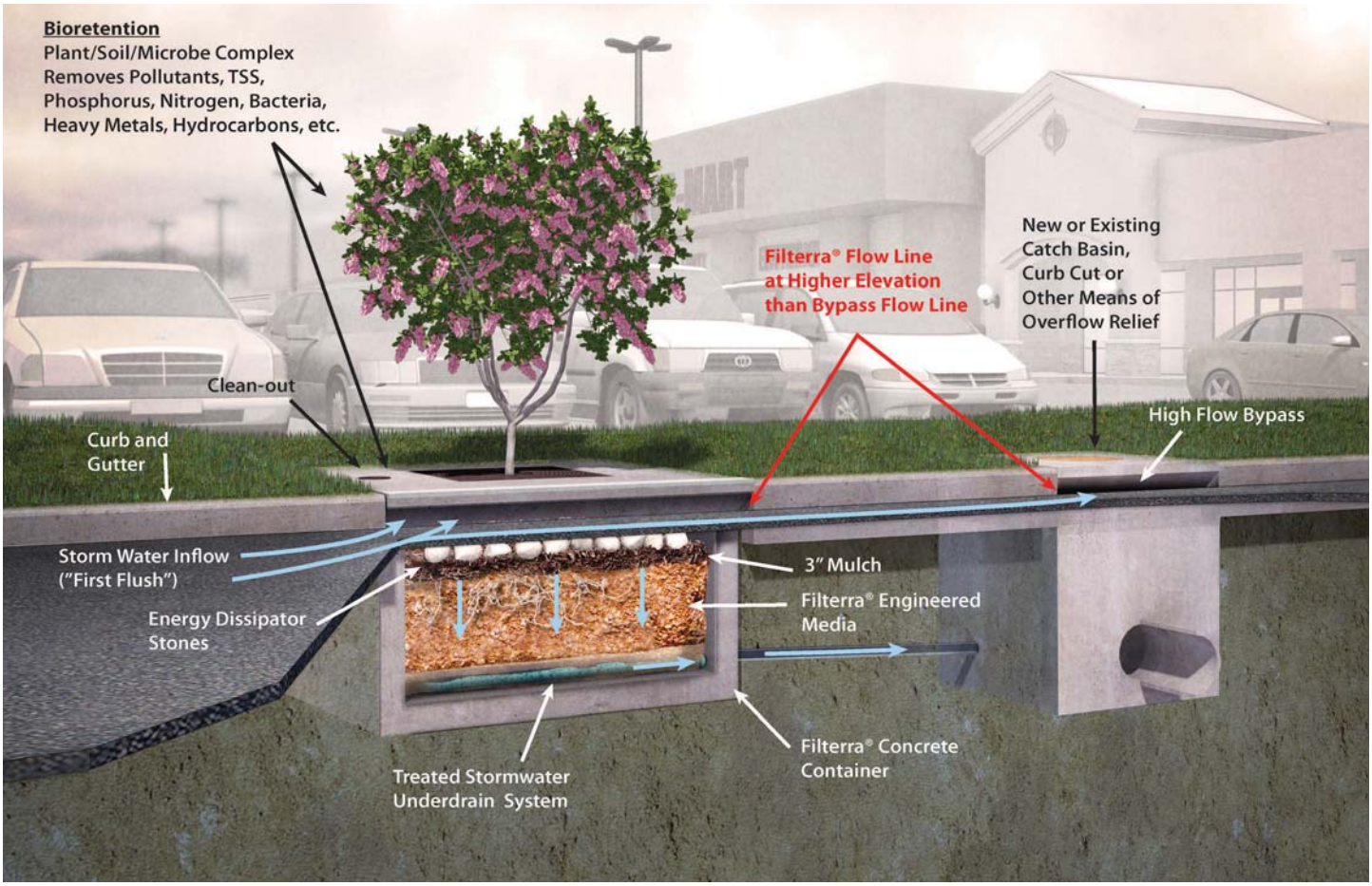
filterra®
Bioretention Systems

Table of Contents

CONTECH®
ENGINEERED SOLUTIONS

General Description

The following general specifications describe the general operations and maintenance requirements for the Contech Engineered Solutions LLC stormwater bioretention filtration system, the Filterra®. The system utilizes physical, chemical and biological mechanisms of a soil, plant and microbe complex to remove pollutants typically found in urban stormwater runoff. The treatment system is a fully equipped, pre-constructed drop-in place unit designed for applications in the urban landscape to treat contaminated runoff.



Stormwater flows through a specially designed filter media mixture contained in a landscaped concrete container. The mixture immobilizes pollutants which are then decomposed, volatilized and incorporated into the biomass of the Filterra® system's micro/macro fauna and flora. Stormwater runoff flows through the media and into an underdrain system at the bottom of the container, where the treated water is discharged. Higher flows bypass the Filterra® to a downstream inlet or outfall. Maintenance is a simple, inexpensive and safe operation that does not require confined space access, pumping or vacuum equipment or specialized tools. Properly trained landscape personnel can effectively maintain Filterra® Stormwater systems by following instructions in this manual.

Basic Operations

Filterra® is a bioretention system in a concrete box. Contaminated stormwater runoff enters the filter box through the curb inlet spreading over the 3-inch layer of mulch on the surface of the filter media. As the water passes through the mulch layer, most of the larger sediment particles and heavy metals are removed through sedimentation and chemical reactions with the organic material in the mulch. Water passes through the soil media where the finer particles are removed and other chemical reactions take place to immobilize and capture pollutants in the soil media. The cleansed water passes into an underdrain and flows to a pipe system or other appropriate discharge point. Once the pollutants are in the soil, the bacteria begin to break down and metabolize the materials and the plants begin to uptake and metabolize the pollutants. Some pollutants such as heavy metals, which are chemically bound to organic particles in the mulch, are released over time as the organic matter decomposes to release the metals to the feeder roots of the plants and the cells of the bacteria in the soil where they remain and are recycled. Other pollutants such as phosphorus are chemically bound to the soil particles and released slowly back to the plants and bacteria and used in their metabolic processes. Nitrogen goes through a very complex variety of biochemical processes where it can ultimately end up in the plant/bacteria biomass, turned to nitrogen gas or dissolves back into the water column as nitrates depending on soil temperature, pH and the availability of oxygen. The pollutants ultimately are retained in the mulch, soil and biomass with some passing out of the system into the air or back into the water.

Design and Installation

Each project presents different scopes for the use of Filterra® systems. To ensure the safe and specified function of the stormwater BMP, Contech reviews each application before supply. Information and help may be provided to the design engineer during the planning process. Correct Filterra® box sizing (by rainfall region) is essential to predict pollutant removal rates for a given area. The engineer shall submit calculations for approval by the local jurisdiction. The contractor is responsible for the correct installation of Filterra units as shown in approved plans. A comprehensive installation manual is available at www.conteches.com.

Maintenance

Why Maintain?

All stormwater treatment systems require maintenance for effective operation. This necessity is often incorporated in your property's permitting process as a legally binding BMP maintenance agreement.

- Avoid legal challenges from your jurisdiction's maintenance enforcement program.
- Prolong the expected lifespan of your Filterra media.
- Avoid more costly media replacement.
- Help reduce pollutant loads leaving your property.

Simple maintenance of the Filterra® is required to continue effective pollutant removal from stormwater runoff before discharge into downstream waters. This procedure will also extend the longevity of the living biofilter system. The unit will recycle and accumulate pollutants within the biomass, but is also subjected to other materials entering the throat. This may include trash, silt and leaves etc. which will be contained within the void below the top grate and above the mulch layer. Too much silt may inhibit the Filterra's® flow rate, which is the reason for site stabilization before activation. Regular replacement of the mulch stops accumulation of such sediment.

When to Maintain?

Contech includes a 1-year maintenance plan with each system purchase. Annual included maintenance consists of a maximum of two (2) scheduled visits. Additional maintenance may be necessary depending on sediment and trash loading (by Owner or at additional cost). The start of the maintenance plan begins when the system is activated for full operation. Full operation is defined as the unit installed, curb and gutter and transitions in place and activation (by Supplier) when mulch and plant are added and temporary throat protection removed.

Activation cannot be carried out until the site is fully stabilized (full landscaping, grass cover, final paving and street sweeping completed). Maintenance visits are scheduled seasonally; the spring visit aims to clean up after winter loads including salts and sands while the fall visit helps the system by removing excessive leaf litter.

It has been found that in regions which receive between 30-50 inches of annual rainfall, (2) two visits are generally required; regions with less rainfall often only require (1) one visit per annum. Varying land uses can affect maintenance frequency; e.g. some fast food restaurants require more frequent trash removal. Contributing drainage areas which are subject to new development wherein the recommended erosion and sediment control measures have not been implemented may require additional maintenance visits.

Some sites may be subjected to extreme sediment or trash loads, requiring more frequent maintenance visits. This is the reason for detailed notes of maintenance actions per unit, helping the Supplier and Owner predict future maintenance frequencies, reflecting individual site conditions.

Owners must promptly notify the (maintenance) Supplier of any damage to the plant(s), which constitute(s) an integral part of the bioretention technology. Owners should also advise other landscape or maintenance contractors to leave all maintenance to the Supplier (i.e. no pruning or fertilizing).

Exclusion of Services

It is the responsibility of the owner to provide adequate irrigation when necessary to the plant of the Filterra® system.

Clean up due to major contamination such as oils, chemicals, toxic spills, etc. will result in additional costs and are not covered under the Supplier maintenance contract. Should a major contamination event occur the Owner must block off the outlet pipe of the Filterra® (where the cleaned runoff drains to, such as drop inlet) and block off the throat of the Filterra®. The Supplier should be informed immediately.

Maintenance Visit Summary

Each maintenance visit consists of the following simple tasks (detailed instructions below).

1. Inspection of Filterra® and surrounding area
2. Removal of tree grate and erosion control stones
3. Removal of debris, trash and mulch
4. Mulch replacement
5. Plant health evaluation and pruning or replacement as necessary
6. Clean area around Filterra®
7. Complete paperwork

Maintenance Tools, Safety Equipment and Supplies

Ideal tools include: camera, bucket, shovel, broom, pruners, hoe/rake, and tape measure. Appropriate Personal Protective Equipment (PPE) should be used in accordance with local or company procedures. This may include impervious gloves where the type of trash is unknown, high visibility clothing and barricades when working in close proximity to traffic and also safety hats and shoes. A T-Bar or crowbar should be used for moving the tree grates (up to 170 lbs ea.). Most visits require minor trash removal and a full replacement of mulch. See below for actual number of bagged mulch that is required in each unit size. Mulch should be a double shredded, hardwood variety; do not use colored or dyed mulch. Some visits may require additional Filterra® engineered soil media available from the Supplier.

Box Length	Box Width	Filter Surface Area (ft^2)	Volume at 3″ (ft^3)	# of 2 ft^3 Mulch Bags
4	4	4	4	2
6	4	6	6	3
8	4	8	8	4
6	6	9	9	5
8	6	12	12	6
10	6	15	15	8
12	6	18	18	9
13	7	23	23	12

Maintenance Visit Procedure

Keep sufficient documentation of maintenance actions to predict location specific maintenance frequencies and needs. An example Maintenance Report is included in this manual.

1. Inspection of Filterra® and surrounding area

- Record individual unit before maintenance with photograph (numbered). Record on Maintenance Report (see example in this document) the following:

Record on Maintenance Report the following:

Standing Water	yes | no
Damage to Box Structure	yes | no
Damage to Grate	yes | no
Is Bypass Clear	yes | no

If yes answered to any of these observations, record with close-up photograph (numbered).

2. Removal of tree grate and erosion control stones

- Remove cast iron grates for access into Filterra® box.
- Dig out silt (if any) and mulch and remove trash & foreign items.

Record on Maintenance Report the following:

Silt/Clay	yes | no
Cups/ Bags	yes | no
Leaves	yes | no
# of Buckets Removed	_____

3. Removal of debris, trash and mulch

- After removal of mulch and debris, measure distance from the top of the Filterra® engineered media soil to the bottom of the top slab. If this distance is greater than 12", add Filterra® media (not top soil or other) to recharge to a 9" distance

Record on Maintenance Report the following:

Distance of Bottom of Top Slab (inches)	_____
# of Buckets of Media Added	_____

4. Mulch replacement

- Please see mulch specifications.
- Add double shredded mulch evenly across the entire unit to a depth of 3".
- Ensure correct repositioning of erosion control stones by the Filterra® inlet to allow for entry of trash during a storm event.
- Replace Filterra® grates correctly using appropriate lifting or moving tools, taking care not to damage the plant.

5. Plant health evaluation and pruning or replacement as necessary

- Examine the plant's health and replace if dead.
- Prune as necessary to encourage growth in the correct directions

Record on Maintenance Report the following:

Height above Grate	(Feet)
Width at Widest Point	(feet)
Health	alive | dead
Damage to Plant	yes | no
Plant Replaced	yes | no

6. Clean area around Filterra®

- Clean area around unit and remove all refuse to be disposed of appropriately.

7. Complete paperwork

- Deliver Maintenance Report and photographs to appropriate location (normally Contech during maintenance contract period).
- Some jurisdictions may require submission of maintenance reports in accordance with approvals. It is the responsibility of the Owner to comply with local regulations.

Maintenance Checklist

Drainage System Failure	Problem	Conditions to Check	Condition that Should Exist	Actions
Inlet	Excessive sediment or trash accumulation.	Accumulated sediments or trash impair free flow of water into Filterra.	Inlet should be free of obstructions allowing free distributed flow of water into Filterra.	Sediments and/or trash should be removed.
Mulch Cover	Trash and floatable debris accumulation.	Excessive trash and/or debris accumulation.	Minimal trash or other debris on mulch cover.	Trash and debris should be removed and mulch cover raked level. Ensure bark nugget mulch is not used.
Mulch Cover	"Ponding" of water on mulch cover.	"Ponding" in unit could be indicative of clogging due to excessive fine sediment accumulation or spill of petroleum oils.	Stormwater should drain freely and evenly through mulch cover.	Recommend contact manufacturer and replace mulch as a minimum.
Vegetation	Plants not growing or in poor condition.	Soil/mulch too wet, evidence of spill. Incorrect plant selection. Pest infestation. Vandalism to plants.	Plants should be healthy and pest free.	Contact manufacturer for advice.
Vegetation	Plant growth excessive.	Plants should be appropriate to the species and location of Filterra.		Trim/prune plants in accordance with typical landscaping and safety needs.
Structure	Structure has visible cracks.	Cracks wider than 1/2 inch or evidence of soil particles entering the structure through the cracks.		Vault should be repaired.
Maintenance is ideally to be performed twice annually.				

CONTECH®
ENGINEERED SOLUTIONS

APPENDIX D

Maintenance and Covenant Agreement

RECORDING REQUESTED BY
AND MAIL TO:

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
BUILDING AND SAFETY DIVISION
900 S. FREMONT AVENUE, 3RD FLOOR
ALHAMBRA, CA 91803-1331

Space above this line is for Recorder's use

COVENANT AND AGREEMENT
REGARDING THE MAINTENANCE OF LOW IMPACT DEVELOPMENT (LID) & NATIONAL POLLUTANTS DISCHARGE ELIMINATION SYSTEM (NPDES) BMPs

The undersigned, Overton Moore Properties ("Owner"), hereby certifies that it owns the real property described as follows ("Subject Property"), located in the County of Los Angeles, State of California:

APNs: 2466-011-908, -909, -910, -911 and 2466-028-907, -908 LEGAL DESCRIPTION

ASSESSOR'S ID # TRACT NO. LOT NO.

ADDRESS: Hollywood Way, Burbank, California, 91505

Owner is aware of the requirements of County of Los Angeles' Green Building Standards Code, Title 3m Section 4.106.4 (LID), and the National Pollutant Discharge Elimination System (NPDES) permit. The following post-construction BMP features have been installed on the Subject Property:

- □ Porous pavement
- □ Cistern/rain barrel
- □ Infiltration trench/pit
- □ Bioretention or biofiltration
- □ Rain garden/planter box
- □ Disconnect impervious surfaces
- □ Dry Well
- □ Storage containers
- □ Landscape and landscape irrigation
- □ Green roof
- ☒ Other Drain inserts and biofiltration devices (Filterra systems)

The location, including GPS x-y coordinates, and type of each post-construction BMP feature installed on the Subject Property is identified on the site diagram attached hereto as Exhibit 1.

Owner hereby covenants and agrees to maintain the above-described post-construction BMP features in a good and operable condition at all times, and in accordance with the LID/NPDES Maintenance Guidelines, attached hereto as Exhibit 2.

Owner further covenants and agrees that the above-described post-construction BMP features shall not be removed from the Subject Property unless and until they have been replaced with other post-construction BMP features in accordance with County of Los Angeles' Green Building Standards Code, Title 31.

Owner further covenants and agrees that if Owner hereafter sells the Subject Property, Owner shall provide printed educational materials to the buyer regarding the post-construction BMP features that are located on the Subject Property, including the type(s) and location(s) of all such features, and instructions for properly maintaining all such features.

Owner makes this Covenant and Agreement on behalf of itself and its successors and assigns. This Covenant and Agreement shall run with the Subject Property and shall be binding upon Owner, future owners, and their heirs, successors and assignees, and shall continue in effect until the release of this Covenant and Agreement by the County of Los Angeles, in its sole discretion.

Owner(s):

By:_____ Date:_____

By:_____ Date:_____

A notary public or other officer completing the attached certificate verifies only the identity of the individual who signed the document to which the certificate is attached, and not the truthfulness, accuracy, or validity of that document.

(PLEASE ATTACH NOTARY)

FOR DEPARTMENT USE ONLY:

MUST BE APPROVED BY COUNTY OF LOS ANGELES BUILDING AND SAFETY DIVISION PRIOR TO RECORDING.

APPROVED BY:_____ _____ Date _____
(Print Name) (Signature)

BMP Operation and Maintenance			
BMP	**Operation/Maintenance**	**Inspection Frequency**	**Responsibility**
Storm Drain Stencil and Signage	➢ Visually inspect for legibility and replace/repaint as necessary.	Annually	Owner
Parking Lot Sweeping	➢ At a minimum, sweep on a monthly basis.	Monthly (minimum)	Owner
Filterra System	➢ All work to be done by the supplier or by a supplier approved contractor. ➢ Inspection of unit and surrounding area. ➢ Removal of tree grate and erosion control stones. Silt (if any) and mulch to be dug out. Trash, debris and foreign items will be removed. ➢ Replace mulch evenly across the entire unit to a depth of 3". Ensure correct repositioning of the erosion control stones by the Filterra inlet to allow for entry of trash during a storm event. ➢ Examine the plant's health and replace if dead. Prune as necessary to encourage growth in the correct directions. ➢ Clean area around unit and remove all refuse to be disposed of appropriately.	Semi-annually (October 1st and February 1st) through maintenance service contract with the vendor or equally qualified contractor.	Owner
Sump Pump	➢ Verify automatic and manual operations of pump(s) ➢ Inspect floats for proper elevation and movement. Correct any obstructions. ➢ Check incoming power and amperage for proper voltage. ➢ Hose down lift station to clean pump and floats.	Semi-annually (October 1st and February 1st) through maintenance service contract with the vendor or equally qualified contractor.	Owner
Drain Inserts	➢ Visually inspect for defects and illegal dumping. Notify proper authorities if illegal dumping has occurred. ➢ Using an industrial vacuum, the collected materials shall be removed from the filter basket and disposed of properly. ➢ Inspect biosorb hydrocarbon boom and replace as necessary.	Semi-annually (October 1st and February 1st) through maintenance service contract with the vendor or equally qualified contractor.	Owner
Maintenance Log	➢ Keep a log of all inspection and maintenance performed on the above mentioned BMPs for at least 5 years. Keep this log on-site.	Ongoing	Owner

Storm Drain Signage SD-13

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include “NO DUMPING

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

SD-13 Storm Drain Signage

– DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.

- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

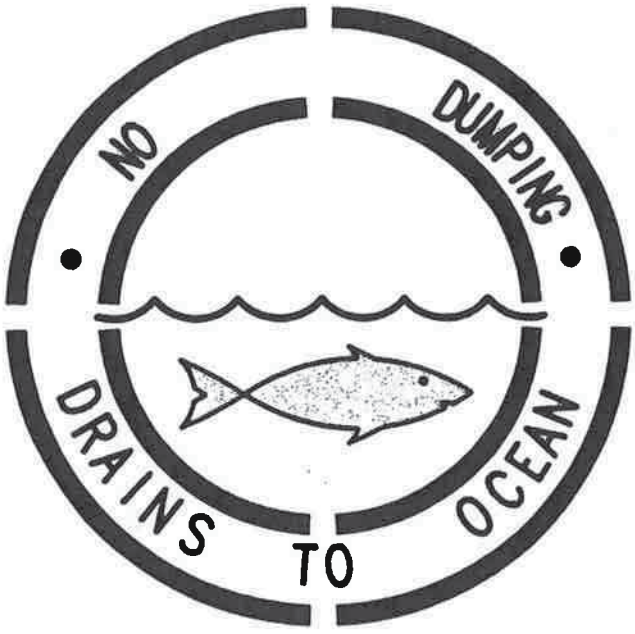
Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.



SAMPLE STENCIL TO BE USED NEAR
GRATE AND CURB OPENING INLETS
SYMBOL TO BE 24" IN DIAMETER

Thienes Engineering
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

SAMPLE CATCH BASIN STENCIL
PER BMP SD-13

LIFT STATION REQUIRED MAINTENANCE

The lift station should be inspected twice a year for proper operation, and should be checked for overabundance of solid matter such as grease and soap buildup.

Proper operation and inspection would include the following:

1) Automatic operation of the system by float activation. One pump starting at lead on levels, second pump starting at high level conditions; manual operation by use of the selector switches.

2) Inspect floats for proper elevation and for proper movement. Correct any obstructions.

3) Check incoming power for proper voltage. Check voltage at motor connections.

4) Check amperage of each motor.

5) Hose down lift station to clean the walls of the wet well, pumps and floats.

MECHANICAL SEAL INSPECTION OF PUMPS

Inspection of the mechanical seals should be done every two years.

The inspection will include the following:

Pull pump out of wet well. Remove oil seal plug and inspect the oil for clarity. Clear oil indicates no water intrusion and chamber is to be topped off with 30 weight turbine oil. If oil is cloudy the mechanical seal and oil needs to be replaced.

PSI recommends that preventive maintenance and service be performed by a qualified technician.

Any question regarding your lift station should be directed to Scott Richardson at 800-358-9095.

Grate Inlet Filter (GISB)

PROVEN STORMWATER TREATMENT TECHNOLOGY

Bio Clean
A Forterra Company

Overview

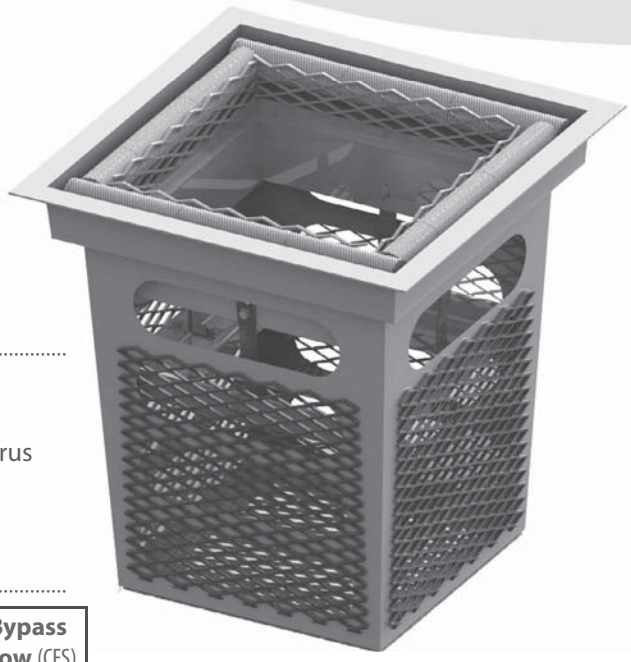
The Bio Clean Grate Inlet Filter (GISB) for catch basins has been keeping property owners in compliance since 1994. Preferred by public agencies and backed with a 8 year unlimited warranty, this easy to install filter has been chosen because of its durability and easy maintenance.

Constructed of UV coated marine grade fiberglass and high grade stainless steel, it is built to last longer than any other filter brand. The multi-stage filtration provides three different sieve size filtration screens to optimize filtration and water flow. The filter is equipped with a hydrocarbon media boom and deflector shield protected bypass to eliminate scouring.

The filter is designed for grated inlets of any size and depth. Each filter can be custom built to meet specific project needs. Screen size and media type can be modified to remove specific pollutants.

Advantages

- 8 Year Warranty
- Custom Sizes Available
- Fits in Shallow Catch Basins
- No Nets or Geofabrics
- 15+years User Life
- No Replacement Costs as Found with Fabric Filters
- Meets LEED Requirements



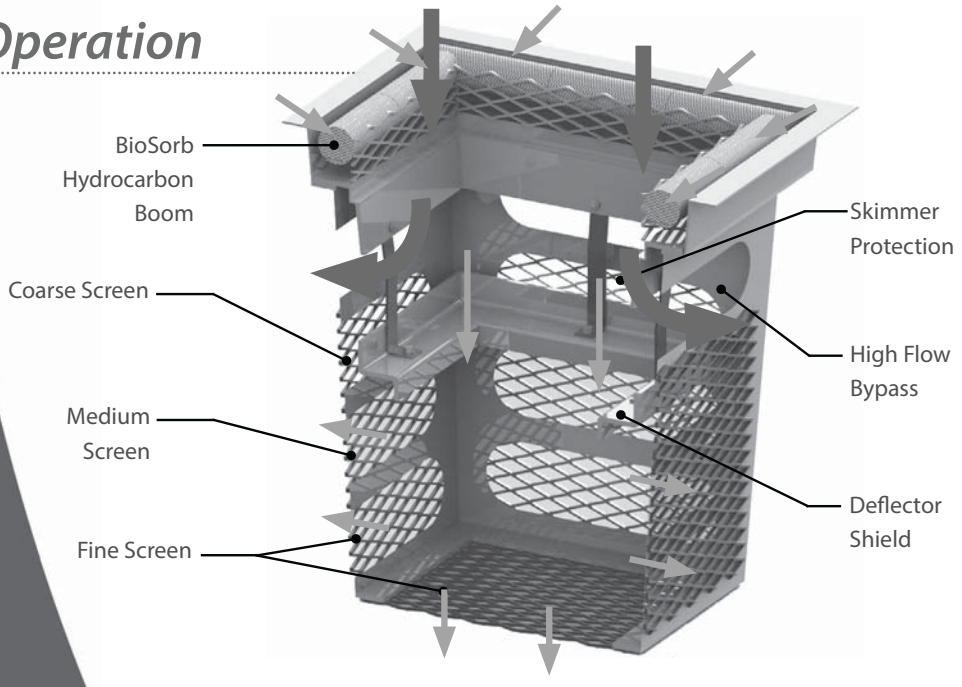
Performance

- 74%-86% Removal of TSS
- 54% Removal of Oils & Grease
- 57%-71% Removal of Phosphorus
- 56%-60% Removal of Nitrogen

Specifications

Model #	Treatment Flow (CFS)	Bypass Flow (CFS)
BC-GISB-12-12-12	0.5	0.5
BC-GISB-18-18-18	0.8	0.8
BC-GISB-24-24-24	3.7	4.4
BC-GISB-36-36-24	5.8	13.4
BC-GISB-48-48-18	6.6	13.3

Operation



Grate Inlet Filter (GISB)

PROVEN STORMWATER TREATMENT TECHNOLOGY

Bio Clean
A Forterra Company

OPERATION & MAINTENANCE

Bio Clean Environmental Services, Inc.
2972 San Luis Rey Road
Oceanside, CA 92054

www.BioCleanEnvironmental.com
P 760-433-7640
F 760-433-3176

OPERATION & MAINTENANCE

Maintenance Summary –

- Clean filter as needed based on local loading conditions.
- Evaluate and replace hydrocarbon media booms (BioSorb) as needed.

Notes:

- Loading varies at every location due to variations in pollutant and flow volumes.
- Maintenance typically occurs before and after the rainy season.
- Media booms and replacement parts can be provided by Bio Clean Environmental Services, Inc.

Operation –

A. Maintenance can be provided by the Supplier, or a Supplier approved contractor. The cost of this service varies among providers.

B. The Bio Clean Grate Inlet Skimmer Box (GISB) is a multi-stage catch basin filter. These stages include: absorption of hydrocarbons and multi-level screening. It is recommended that the system be inspected every 6 months to evaluate its condition. The first year of inspection and maintenance can be used to predict maintenance requirements for subsequent years.

1. Absorption - is provided by sorbent media booms. This boom is positioned in a tray around the top perimeter of the filtration basket. This booms targets hydrocarbons including diesel, gasoline and oil. This booms utilizes a poly known as BioSorb which permanently absorbs and retains captured hydrocarbons. It is recommended the media boom is replaced when its visual appearance is black in color. This procedure can be performed by hand. *This procedure takes approximately 3-6 minutes depending on size of the filter.*

2. Multi-Level Screening - is provided by a series of filtration screens. The surface area of the screens varies depending on the model number. The lower level contains the finest screens and as you move up the sides of the filter the screens

become larger. This ensures the filter can capture both fine and coarser sediments and associated pollutants while maintaining maximum flow rate capacity. These screens target trash, TSS, debris, and particulate metals and nutrients. **It is recommended that the filter screens cleaned and captured debris removed one the filter is 50% full.** *Removal of captured debris and cleaning of the screens can be done by hand with with a vacuum truck. This procedure takes approximately 10-15 minutes depending on the size of the filter.*

The Bio Clean Grate Inlet Skimmer Box is designed to allow for the use of vacuum removal of captured materials in the sediment chamber. The chamber is serviceable by centrifugal compressor vacuum units without causing damage to the filter or during normal cleaning and maintenance. Filters can be cleaned and vacuumed without entering the catch basin from finish surface. Filter does not need to be removed to replace media or clean.

Maintenance Procedures:

1. Bio Clean Environmental Services, Inc. recommends the **filter and media boom** be inspected annually and cleaned when needed depending on loading. The procedure is easily done with the use of any standard vacuum truck.

    - Remove grate to gain access to the fitler.
    - Remove skimmer tray containing media booms and replace if needed by cutting zip ties, removing old boom, replace with new boom, zip tie into place.
    - Use a vacuum truck hose and insert into the catch basin. Lower the vacuum hose into the bottom of the filter. Begin vacuuming out accumulated sediments until the filter is empty. A pressure washer may be needed to assist with removing sediments that are compacted or stuck to the walls, screens and floor of the filter.
    - Once the filterr is cleaned remove vacuum hose.
    - Remove vacuum hose and replace grate cover.
    - Where possible the maintenance should be performed from the ground surface.

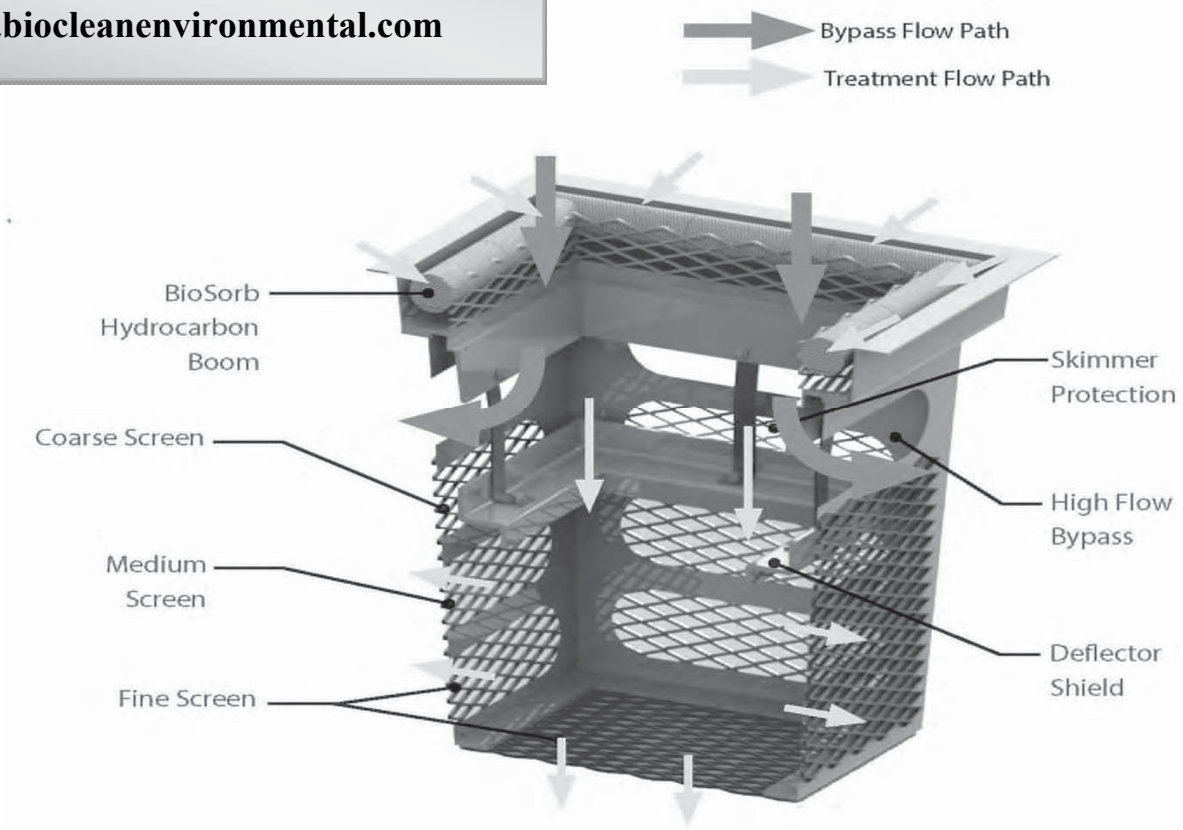
- Note: entry into an underground stormwater catch basin requires certification of confined space training.
- Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.

2. Following maintenance and/or inspection, the maintenance operator shall prepare a maintenance/inspection record. The record shall include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanism.

3. The owner shall retain the maintenance/inspection record for a minimum of five years from the date of maintenance. These records shall be made available to the governing municipality for inspection upon request at any time.

4. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.

For Maintenance Services or Replacement Media Please Contact Us At:
760-433-7640
info@biocleanenvironmental.com

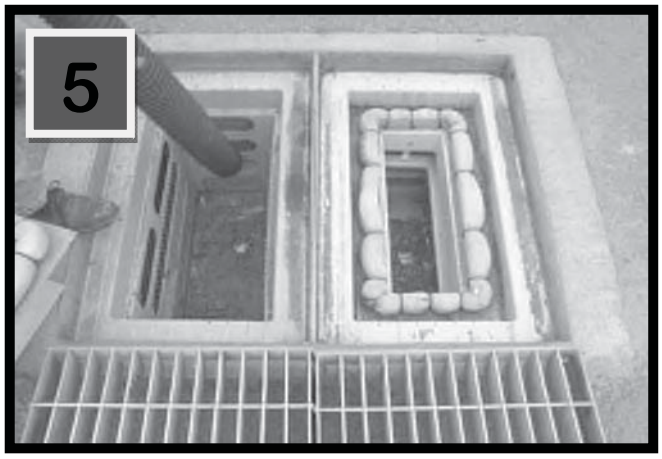


Maintenance Sequence

Remove grates from catch basins to gain access to the GISB filters. Special hooks are available from various manufactures which are designed to remove the grates.

Remove skimmer tray and attached media booms.

Remove old media boom by cutting zip ties. Replace with new media boom and fasten with zip ties.



Vacuum out accumulated trash, sediment, and debris OR clean by hand. A pressure washer or metal brush can be used to clean of the screens.

Replace grates. Make sure they are properly re-installed.

Bio Clean
A Forterra Company

Inspection and Maintenance Report
Catch Basin Inserts

Project Name _____

Project Address _____ (city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation (lbs)	Foliage Accumulation (lbs)	Sediment Accumulation (lbs)	Total Debris Accumulation (lbs)	Condition of Media 25/50/75/100 (will be replaced @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							

Comments:

Round Curb Inlet Filter (R-GISB)

PROVEN STORMWATER TREATMENT TECHNOLOGY

Bio Clean
A Forterra Company

Overview

The Bio Clean Round Curb Inlet Filter (R-GISB) is a favorite amongst cities and municipalities nationwide. Many agencies have chosen this system as their standard due to its quick cleaning time and large storage capacity.

Its patented 'Shelf System' allows cleaning to be done in less than 15 minutes, and its larger storage capacity of 3.85 cubic feet allows for maximized cleaning intervals and minimized attention required by maintenance crews.

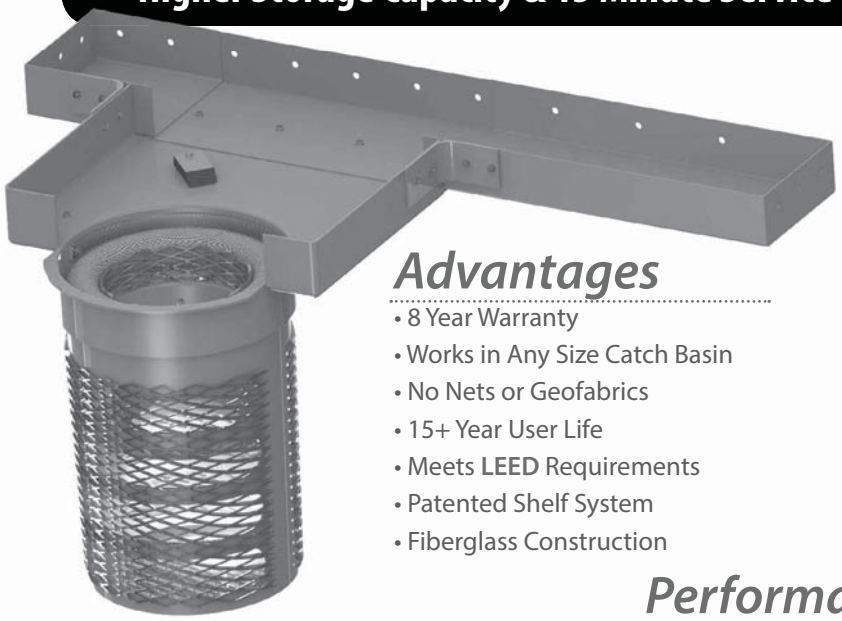
The modularized design of the 'Shelf System' for curb inlets makes it adaptable to any size or type catch basin.

Its multi-stage filtration screens allow this device to meet "full trash capture" requirements by removing 100% of trash & debris 5 mm and greater. Made of marine grade fiberglass and high grade stainless steel these filters come in standard and custom designs.

This filtration system addresses a wide array of pollutants including trash and debris, sediments, TSS, nutrients, metals, and hydrocarbons.

Includes the Patented 'Shelf System'

Higher Storage Capacity & 15 Minute Service Time



Advantages

- 8 Year Warranty
- Works in Any Size Catch Basin
- No Nets or Geofabrics
- 15+ Year User Life
- Meets **LEED** Requirements
- Patented Shelf System
- Fiberglass Construction

Performance

- 74%-86% Removal of TSS
- 54% Removal of Oils & Grease
- 57%-71% Removal of Phosphorus
- 56%-60% Removal of Nitrogen

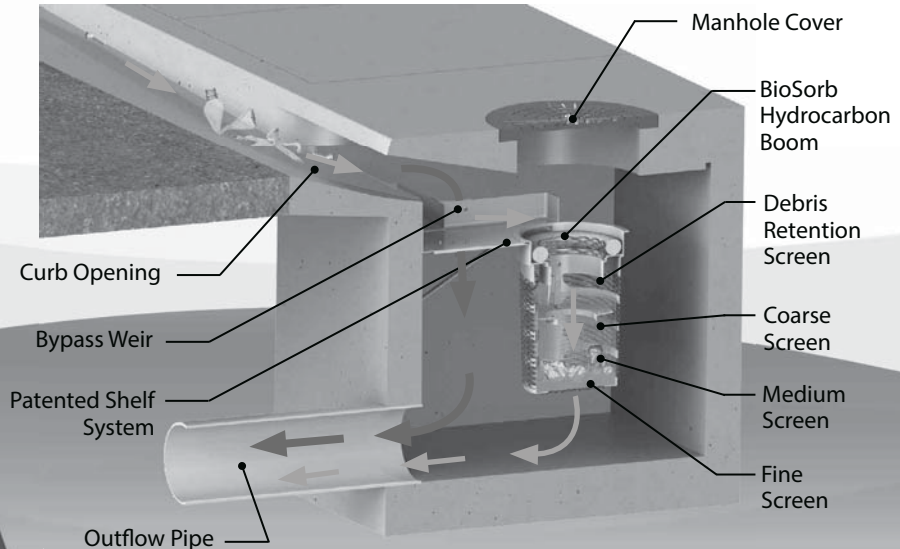
Specifications

Model #	Treatment Flow (CFS)	Bypass Flow (CFS)
BC-RGISB-22-24	2.4	Unlimited

Operation

Bypass Flow Path

Treatment Flow Path



Cleaning and Maintenance Manual

Curb Inlet Basket/Round Curb Inlet Basket

Maintenance

Maintenance: The filter is designed to allow for the use of vacuum removal of captured materials in the filter basket, serviceable by centrifugal compressor vacuum units without causing damage to the filter or any part of the mounting and attachment hardware during normal cleaning and maintenance. Filters can be cleaned and vacuumed from the manhole-opening. Entering the catch basin to clean the filters is not necessary.

Maintenance Notes:

1. Bio Clean Environmental Services, Inc. recommends cleaning and maintenance of the Curb Inlet Basket a minimum of two to four times per year or following a significant rain event that would potentially accumulate a large amount of debris to the system. The hydrocarbon boom should be replaced a minimum of twice per year or at each service as needed.
2. Any person performing maintenance activities that require entering the catch basin or handle a toxic substance have completed the proper training as required by OSHA.
3. Remove manhole lid to gain access to inlet filter insert. The filter basket should be located directly under the manhole lid. Under normal conditions, cleaning and maintenance of the Curb Inlet Basket will be performed from above ground surface.
4. Special Note: entry into an underground manhole, catch basin and stormwater vault requires training in an approved Confined Space Entry Program.
5. Remove all trash, debris, organics, and sediments collected by the inlet filter insert. Removal of the trash and debris can be done manually or with the use of a vactor truck. Manual removal of debris may be done by lifting the basket from the shelf and pulling the basket from the catch basin and dumping out the collected debris.
6. Any debris located on the shelf system can be either removed from the shelf or can be pushed into the basket and retrieved from basket.
7. Evaluation of the hydrocarbon boom shall be performed at each cleaning. If the boom is filled with hydrocarbons and oils it should be replaced. Removed boom by cutting plastic ties and remove boom. Attach new boom to basket with plastic ties through pre-drilled holes in basket.
8. Place manhole lid back on manhole opening.
9. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements. The hydrocarbon boom with adsorbed hydrocarbons is considered hazardous waste and need to be handled and disposed of as hazardous material. Please refer to state and local regulations for the proper disposal of used motor oil/filters.
10. Following maintenance and/or inspection, the maintenance operator shall prepare a maintenance/inspection record. The record shall include any maintenance activities performed, amount and description of debris collected, and condition of filter. The owner shall retain the maintenance/inspection record for a minimum of five years from the date of maintenance. These records shall be made available to the governing municipality for inspection upon request at any time.
11. Any toxic substance or item found in the filter is considered as hazardous material can only be handled by a certified hazardous waste trained person (minimum 24-hour hazwoper).

BIO CLEAN ENVIRONMENTAL SERVICES, INC.

398 Via El Centro, Oceanside, CA 92058
(760 433-7640 Fax (760) 433-3176
www.biocleanenvironmental.com

Bio Clean
A Forterra Company

Inspection and Maintenance Report
Catch Basin Inserts

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation (lbs)	Foliage Accumulation (lbs)	Sediment Accumulation (lbs)	Total Debris Accumulation (lbs)	Condition of Media 25/50/75/100 (will be replaced @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							
	Lat: Long:							

Comments:

Operation & Maintenance (OM) Manual v01

filterra®

Bioretention Systems

CONTECH®

ENGINEERED SOLUTIONS

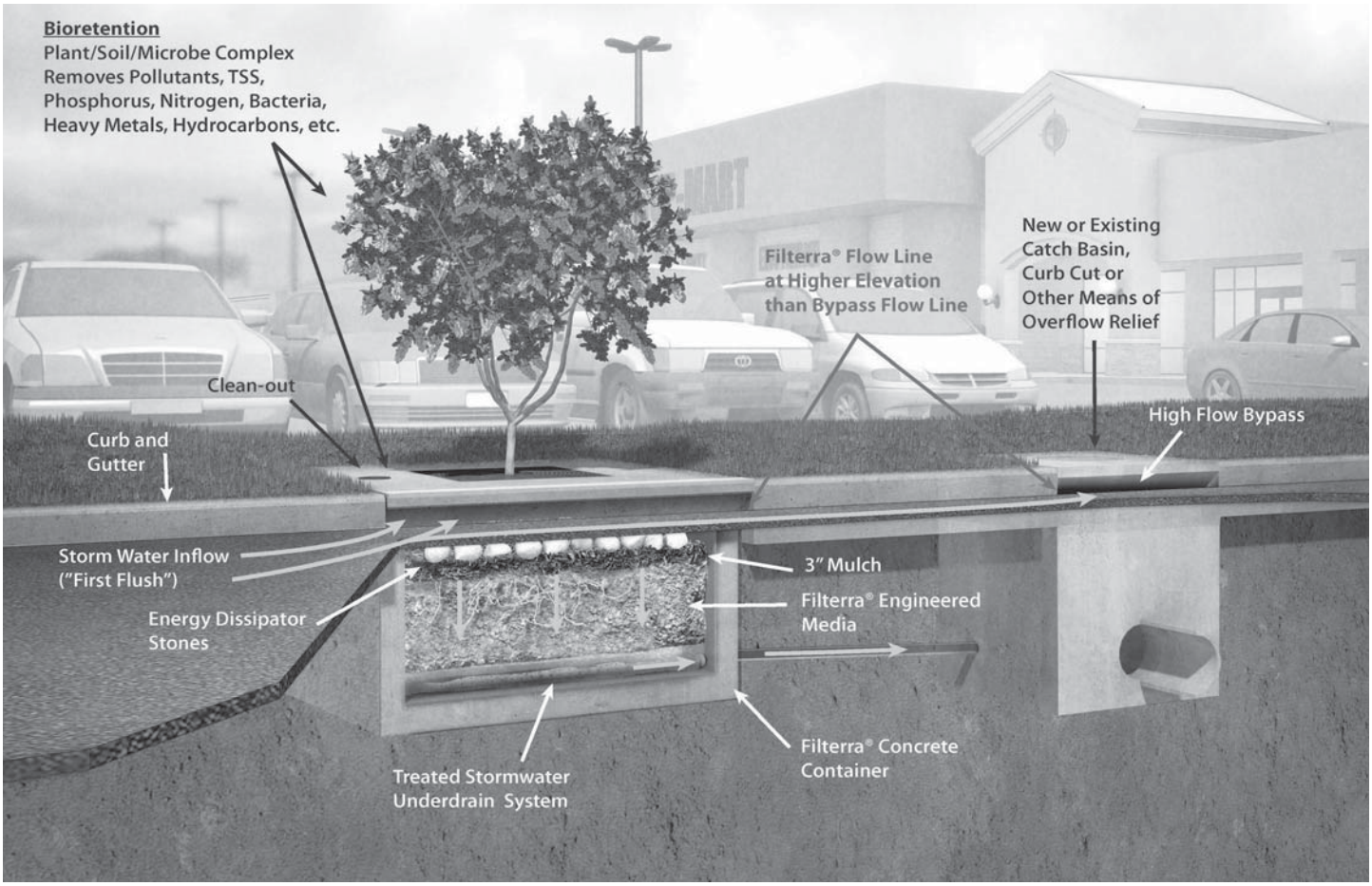
filterra®
Bioretention Systems

Table of Contents

CONTECH®
ENGINEERED SOLUTIONS

General Description

The following general specifications describe the general operations and maintenance requirements for the Contech Engineered Solutions LLC stormwater bioretention filtration system, the Filterra®. The system utilizes physical, chemical and biological mechanisms of a soil, plant and microbe complex to remove pollutants typically found in urban stormwater runoff. The treatment system is a fully equipped, pre-constructed drop-in place unit designed for applications in the urban landscape to treat contaminated runoff.



Stormwater flows through a specially designed filter media mixture contained in a landscaped concrete container. The mixture immobilizes pollutants which are then decomposed, volatilized and incorporated into the biomass of the Filterra® system's micro/macro fauna and flora. Stormwater runoff flows through the media and into an underdrain system at the bottom of the container, where the treated water is discharged. Higher flows bypass the Filterra® to a downstream inlet or outfall. Maintenance is a simple, inexpensive and safe operation that does not require confined space access, pumping or vacuum equipment or specialized tools. Properly trained landscape personnel can effectively maintain Filterra® Stormwater systems by following instructions in this manual.

Basic Operations

Filterra® is a bioretention system in a concrete box. Contaminated stormwater runoff enters the filter box through the curb inlet spreading over the 3-inch layer of mulch on the surface of the filter media. As the water passes through the mulch layer, most of the larger sediment particles and heavy metals are removed through sedimentation and chemical reactions with the organic material in the mulch. Water passes through the soil media where the finer particles are removed and other chemical reactions take place to immobilize and capture pollutants in the soil media. The cleansed water passes into an underdrain and flows to a pipe system or other appropriate discharge point. Once the pollutants are in the soil, the bacteria begin to break down and metabolize the materials and the plants begin to uptake and metabolize the pollutants. Some pollutants such as heavy metals, which are chemically bound to organic particles in the mulch, are released over time as the organic matter decomposes to release the metals to the feeder roots of the plants and the cells of the bacteria in the soil where they remain and are recycled. Other pollutants such as phosphorus are chemically bound to the soil particles and released slowly back to the plants and bacteria and used in their metabolic processes. Nitrogen goes through a very complex variety of biochemical processes where it can ultimately end up in the plant/bacteria biomass, turned to nitrogen gas or dissolves back into the water column as nitrates depending on soil temperature, pH and the availability of oxygen. The pollutants ultimately are retained in the mulch, soil and biomass with some passing out of the system into the air or back into the water.

Design and Installation

Each project presents different scopes for the use of Filterra® systems. To ensure the safe and specified function of the stormwater BMP, Contech reviews each application before supply. Information and help may be provided to the design engineer during the planning process. Correct Filterra® box sizing (by rainfall region) is essential to predict pollutant removal rates for a given area. The engineer shall submit calculations for approval by the local jurisdiction. The contractor is responsible for the correct installation of Filterra units as shown in approved plans. A comprehensive installation manual is available at www.conteches.com.

Maintenance

Why Maintain?

All stormwater treatment systems require maintenance for effective operation. This necessity is often incorporated in your property's permitting process as a legally binding BMP maintenance agreement.

- Avoid legal challenges from your jurisdiction's maintenance enforcement program.
- Prolong the expected lifespan of your Filterra media.
- Avoid more costly media replacement.
- Help reduce pollutant loads leaving your property.

Simple maintenance of the Filterra® is required to continue effective pollutant removal from stormwater runoff before discharge into downstream waters. This procedure will also extend the longevity of the living biofilter system. The unit will recycle and accumulate pollutants within the biomass, but is also subjected to other materials entering the throat. This may include trash, silt and leaves etc. which will be contained within the void below the top grate and above the mulch layer. Too much silt may inhibit the Filterra's® flow rate, which is the reason for site stabilization before activation. Regular replacement of the mulch stops accumulation of such sediment.

When to Maintain?

Contech includes a 1-year maintenance plan with each system purchase. Annual included maintenance consists of a maximum of two (2) scheduled visits. Additional maintenance may be necessary depending on sediment and trash loading (by Owner or at additional cost). The start of the maintenance plan begins when the system is activated for full operation. Full operation is defined as the unit installed, curb and gutter and transitions in place and activation (by Supplier) when mulch and plant are added and temporary throat protection removed.

Activation cannot be carried out until the site is fully stabilized (full landscaping, grass cover, final paving and street sweeping completed). Maintenance visits are scheduled seasonally; the spring visit aims to clean up after winter loads including salts and sands while the fall visit helps the system by removing excessive leaf litter.

It has been found that in regions which receive between 30-50 inches of annual rainfall, (2) two visits are generally required; regions with less rainfall often only require (1) one visit per annum. Varying land uses can affect maintenance frequency; e.g. some fast food restaurants require more frequent trash removal. Contributing drainage areas which are subject to new development wherein the recommended erosion and sediment control measures have not been implemented may require additional maintenance visits.

Some sites may be subjected to extreme sediment or trash loads, requiring more frequent maintenance visits. This is the reason for detailed notes of maintenance actions per unit, helping the Supplier and Owner predict future maintenance frequencies, reflecting individual site conditions.

Owners must promptly notify the (maintenance) Supplier of any damage to the plant(s), which constitute(s) an integral part of the bioretention technology. Owners should also advise other landscape or maintenance contractors to leave all maintenance to the Supplier (i.e. no pruning or fertilizing).

Exclusion of Services

It is the responsibility of the owner to provide adequate irrigation when necessary to the plant of the Filterra® system.

Clean up due to major contamination such as oils, chemicals, toxic spills, etc. will result in additional costs and are not covered under the Supplier maintenance contract. Should a major contamination event occur the Owner must block off the outlet pipe of the Filterra® (where the cleaned runoff drains to, such as drop inlet) and block off the throat of the Filterra®. The Supplier should be informed immediately.

Maintenance Visit Summary

Each maintenance visit consists of the following simple tasks (detailed instructions below).

1. Inspection of Filterra® and surrounding area
2. Removal of tree grate and erosion control stones
3. Removal of debris, trash and mulch
4. Mulch replacement
5. Plant health evaluation and pruning or replacement as necessary
6. Clean area around Filterra®
7. Complete paperwork

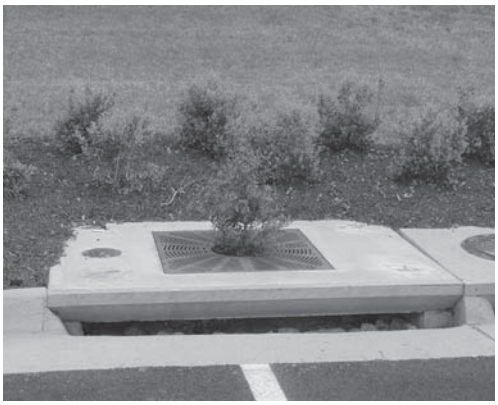
Maintenance Tools, Safety Equipment and Supplies

Ideal tools include: camera, bucket, shovel, broom, pruners, hoe/rake, and tape measure. Appropriate Personal Protective Equipment (PPE) should be used in accordance with local or company procedures. This may include impervious gloves where the type of trash is unknown, high visibility clothing and barricades when working in close proximity to traffic and also safety hats and shoes. A T-Bar or crowbar should be used for moving the tree grates (up to 170 lbs ea.). Most visits require minor trash removal and a full replacement of mulch. See below for actual number of bagged mulch that is required in each unit size. Mulch should be a double shredded, hardwood variety; do not use colored or dyed mulch. Some visits may require additional Filterra® engineered soil media available from the Supplier.

Box Length	Box Width	Filter Surface Area (ft^2)	Volume at 3″ (ft^3)	# of 2 ft^3 Mulch Bags
4	4	4	4	2
6	4	6	6	3
8	4	8	8	4
6	6	9	9	5
8	6	12	12	6
10	6	15	15	8
12	6	18	18	9
13	7	23	23	12

Maintenance Visit Procedure

Keep sufficient documentation of maintenance actions to predict location specific maintenance frequencies and needs. An example Maintenance Report is included in this manual.



1. Inspection of Filterra® and surrounding area

- Record individual unit before maintenance with photograph (numbered). Record on Maintenance Report (see example in this document) the following:

Record on Maintenance Report the following:

Standing Water	yes | no
Damage to Box Structure	yes | no
Damage to Grate	yes | no
Is Bypass Clear	yes | no

If yes answered to any of these observations, record with close-up photograph (numbered).

2. Removal of tree grate and erosion control stones

- Remove cast iron grates for access into Filterra® box.
- Dig out silt (if any) and mulch and remove trash & foreign items.

Record on Maintenance Report the following:

Silt/Clay	yes | no
Cups/ Bags	yes | no
Leaves	yes | no
# of Buckets Removed	_____

3. Removal of debris, trash and mulch

- After removal of mulch and debris, measure distance from the top of the Filterra® engineered media soil to the bottom of the top slab. If this distance is greater than 12", add Filterra® media (not top soil or other) to recharge to a 9" distance

Record on Maintenance Report the following:

Distance of Bottom of Top Slab (inches)	_____
# of Buckets of Media Added	_____

4. Mulch replacement

- Please see mulch specifications.
- Add double shredded mulch evenly across the entire unit to a depth of 3".
- Ensure correct repositioning of erosion control stones by the Filterra® inlet to allow for entry of trash during a storm event.
- Replace Filterra® grates correctly using appropriate lifting or moving tools, taking care not to damage the plant.

5. Plant health evaluation and pruning or replacement as necessary

- Examine the plant's health and replace if dead.
- Prune as necessary to encourage growth in the correct directions

Record on Maintenance Report the following:

Height above Grate	(Feet)
Width at Widest Point	(feet)
Health	alive | dead
Damage to Plant	yes | no
Plant Replaced	yes | no

6. Clean area around Filterra®

- Clean area around unit and remove all refuse to be disposed of appropriately.

7. Complete paperwork

- Deliver Maintenance Report and photographs to appropriate location (normally Contech during maintenance contract period).
- Some jurisdictions may require submission of maintenance reports in accordance with approvals. It is the responsibility of the Owner to comply with local regulations.

Maintenance Checklist

Drainage System Failure	Problem	Conditions to Check	Condition that Should Exist	Actions
Inlet	Excessive sediment or trash accumulation.	Accumulated sediments or trash impair free flow of water into Filterra.	Inlet should be free of obstructions allowing free distributed flow of water into Filterra.	Sediments and/or trash should be removed.
Mulch Cover	Trash and floatable debris accumulation.	Excessive trash and/or debris accumulation.	Minimal trash or other debris on mulch cover.	Trash and debris should be removed and mulch cover raked level. Ensure bark nugget mulch is not used.
Mulch Cover	"Ponding" of water on mulch cover.	"Ponding" in unit could be indicative of clogging due to excessive fine sediment accumulation or spill of petroleum oils.	Stormwater should drain freely and evenly through mulch cover.	Recommend contact manufacturer and replace mulch as a minimum.
Vegetation	Plants not growing or in poor condition.	Soil/mulch too wet, evidence of spill. Incorrect plant selection. Pest infestation. Vandalism to plants.	Plants should be healthy and pest free.	Contact manufacturer for advice.
Vegetation	Plant growth excessive.	Plants should be appropriate to the species and location of Filterra.		Trim/prune plants in accordance with typical landscaping and safety needs.
Structure	Structure has visible cracks.	Cracks wider than 1/2 inch or evidence of soil particles entering the structure through the cracks.		Vault should be repaired.
Maintenance is ideally to be performed twice annually.				

CONTECH®
ENGINEERED SOLUTIONS

This page left intentionally blank

APPENDIX E

Educational Materials

Non-Stormwater Discharges SC-10

Art Credit: Margie Winter

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

Non-stormwater discharges are those flows that do not consist entirely of stormwater. Some non-stormwater discharges do not include pollutants and may be discharged to the storm drain. These include uncontaminated groundwater and natural springs. There are also some non-stormwater discharges that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include car washing, air conditioner condensate, etc. However there are certain non-stormwater discharges that pose environmental concern. These discharges may originate from illegal dumping or from internal floor drains, appliances, industrial processes, sinks, and toilets that are connected to the nearby storm drainage system. These discharges (which may include: process waste waters, cooling waters, wash waters, and sanitary wastewater) can carry substances such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants into storm drains. They can generally be detected through a combination of detection and elimination. The ultimate goal is to effectively eliminate non-stormwater discharges to the stormwater drainage system through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges of pollutants on streets and into the storm drain system and creeks.

Targeted Constituents

Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Approach

Initially the industry must make an assessment of non-stormwater discharges to determine which types must be eliminated or addressed through BMPs. The focus of the following approach is in the elimination of non-stormwater discharges.

CASQA California Stormwater Quality Association

Pollution Prevention

- Ensure that used oil, used antifreeze, and hazardous chemical recycling programs are being implemented. Encourage litter control.

Suggested Protocols

Recommended Complaint Investigation Equipment

- Field Screening Analysis
  - pH paper or meter
  - Commercial stormwater pollutant screening kit that can detect for reactive phosphorus, nitrate nitrogen, ammonium nitrogen, specific conductance, and turbidity
  - Sample jars
  - Sample collection pole
  - A tool to remove access hole covers
- Laboratory Analysis
  - Sample cooler
  - Ice
  - Sample jars and labels
  - Chain of custody forms
- Documentation
  - Camera
  - Notebook
  - Pens
  - Notice of Violation forms
  - Educational materials

General

- Develop clear protocols and lines of communication for effectively prohibiting non-stormwater discharges, especially those that are not classified as hazardous. These are often not responded to as effectively as they need to be.
- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as “Dump No Waste Drains to Stream” stenciled or demarcated next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.

- See SC44 Stormwater Drainage System Maintenance for additional information.

Illicit Connections

- Locate discharges from the industrial storm drainage system to the municipal storm drain system through review of "as-built" piping schematics.
- Isolate problem areas and plug illicit discharge points.
- Locate and evaluate all discharges to the industrial storm drain system.

Visual Inspection and Inventory

- Inventory and inspect each discharge point during dry weather.
- Keep in mind that drainage from a storm event can continue for a day or two following the end of a storm and groundwater may infiltrate the underground stormwater collection system. Also, non-stormwater discharges are often intermittent and may require periodic inspections.

Review Infield Piping

- A review of the "as-built" piping schematic is a way to determine if there are any connections to the stormwater collection system.
- Inspect the path of floor drains in older buildings.

Smoke Testing

- Smoke testing of wastewater and stormwater collection systems is used to detect connections between the two systems.
- During dry weather the stormwater collection system is filled with smoke and then traced to sources. The appearance of smoke at the base of a toilet indicates that there may be a connection between the sanitary and the stormwater system.

Dye Testing

- A dye test can be performed by simply releasing a dye into either your sanitary or process wastewater system and examining the discharge points from the stormwater collection system for discoloration.

TV Inspection of Drainage System

- TV Cameras can be employed to visually identify illicit connections to the industrial storm drainage system.

Illegal Dumping

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.

- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Once a site has been cleaned:

- Post "No Dumping" signs with a phone number for reporting dumping and disposal.
- Landscaping and beautification efforts of hot spots may also discourage future dumping, as well as provide open space and increase property values.
- Lighting or barriers may also be needed to discourage future dumping.
- See fact sheet SC11 Spill Prevention, Control, and Cleanup.

Inspection

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Conduct field investigations of the industrial storm drain system for potential sources of non-stormwater discharges.
- Pro-actively conduct investigations of high priority areas. Based on historical data, prioritize specific geographic areas and/or incident type for pro-active investigations.

Reporting

- A database is useful for defining and tracking the magnitude and location of the problem.
- Report prohibited non-stormwater discharges observed during the course of normal daily activities so they can be investigated, contained, and cleaned up or eliminated.
- Document that non-stormwater discharges have been eliminated by recording tests performed, methods used, dates of testing, and any on-site drainage points observed.
- Document and report annually the results of the program.
- Maintain documentation of illicit connection and illegal dumping incidents, including significant conditionally exempt discharges that are not properly managed.

Training

- Training of technical staff in identifying and documenting illegal dumping incidents is required.
- Consider posting the quick reference table near storm drains to reinforce training.
- Train employees to identify non-stormwater discharges and report discharges to the appropriate departments.

- Educate employees about spill prevention and cleanup.
- Well-trained employees can reduce human errors that lead to accidental releases or spills. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur. Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- Determine and implement appropriate outreach efforts to reduce non-permissible non-stormwater discharges.
- Conduct spill response drills annually (if no events occurred to evaluate your plan) in cooperation with other industries.
- When a responsible party is identified, educate the party on the impacts of his or her actions.

Spill Response and Prevention

- See SC11 Spill Prevention Control and Cleanup.

Other Considerations

- Many facilities do not have accurate, up-to-date schematic drawings.

Requirements

Costs (including capital and operation & maintenance)

- The primary cost is for staff time and depends on how aggressively a program is implemented.
- Cost for containment and disposal is borne by the discharger.
- Illicit connections can be difficult to locate especially if there is groundwater infiltration.
- Indoor floor drains may require re-plumbing if cross-connections to storm drains are detected.

Maintenance (including administrative and staffing)

- Illegal dumping and illicit connection violations requires technical staff to detect and investigate them.

Supplemental Information

Further Detail of the BMP

Illegal Dumping

- Substances illegally dumped on streets and into the storm drain systems and creeks include paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clippings, and pet wastes. All of these wastes cause stormwater and receiving water quality problems as well as clog the storm drain system itself.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots

- Types and quantities (in some cases) of wastes
- Patterns in time of occurrence (time of day/night, month, or year)
- Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
- Responsible parties

One of the keys to success of reducing or eliminating illegal dumping is increasing the number of people at the facility who are aware of the problem and who have the tools to at least identify the incident, if not correct it. Therefore, train field staff to recognize and report the incidents.

What constitutes a "non-stormwater" discharge?

- Non-stormwater discharges to the stormwater collection system may include any water used directly in the manufacturing process (process wastewater), air conditioning condensate and coolant, non-contact cooling water, cooling equipment condensate, outdoor secondary containment water, vehicle and equipment wash water, sink and drinking fountain wastewater, sanitary wastes, or other wastewaters.

Permit Requirements

- Facilities subject to stormwater permit requirements must include a certification that the stormwater collection system has been tested or evaluated for the presence of non-stormwater discharges. The State's General Industrial Stormwater Permit requires that non-stormwater discharges be eliminated prior to implementation of the facility's SWPPP.

Performance Evaluation

- Review annually internal investigation results; assess whether goals were met and what changes or improvements are necessary.
- Obtain feedback from personnel assigned to respond to, or inspect for, illicit connections and illegal dumping incidents.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Spill Prevention, Control & Cleanup SC-11

Photo Credit: Geoff Brosseau

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

Many activities that occur at an industrial or commercial site have the potential to cause accidental or illegal spills. Preparation for accidental or illegal spills, with proper training and reporting systems implemented, can minimize the discharge of pollutants to the environment.

Spills and leaks are one of the largest contributors of stormwater pollutants. Spill prevention and control plans are applicable to any site at which hazardous materials are stored or used. An effective plan should have spill prevention and response procedures that identify potential spill areas, specify material handling procedures, describe spill response procedures, and provide spill clean-up equipment. The plan should take steps to identify and characterize potential spills, eliminate and reduce spill potential, respond to spills when they occur in an effort to prevent pollutants from entering the stormwater drainage system, and train personnel to prevent and control future spills.

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Approach

Pollution Prevention

- Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.

- Develop a Spill Prevention Control and Countermeasure (SPCC) Plan. The plan should include:

- Description of the facility, owner and address, activities and chemicals present
- Facility map
- Notification and evacuation procedures
- Cleanup instructions
- Identification of responsible departments
- Identify key spill response personnel

- Recycle, reclaim, or reuse materials whenever possible. This will reduce the amount of process materials that are brought into the facility.

Suggested Protocols (including equipment needs)

Spill Prevention

- Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.

- If consistent illegal dumping is observed at the facility:
  - Post "No Dumping" signs with a phone number for reporting illegal dumping and disposal. Signs should also indicate fines and penalties applicable for illegal dumping.
  - Landscaping and beautification efforts may also discourage illegal dumping.
  - Bright lighting and/or entrance barriers may also be needed to discourage illegal dumping.

- Store and contain liquid materials in such a manner that if the tank is ruptured, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters, or groundwater.

- If the liquid is oil, gas, or other material that separates from and floats on water, install a spill control device (such as a tee section) in the catch basins that collects runoff from the storage tank area.

- Routine maintenance:
  - Place drip pans or absorbent materials beneath all mounted taps, and at all potential drip and spill locations during filling and unloading of tanks. Any collected liquids or soiled absorbent materials must be reused/recycled or properly disposed.
  - Store and maintain appropriate spill cleanup materials in a location known to all near the tank storage area; and ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
  - Sweep and clean the storage area monthly if it is paved, *do not hose down the area to a storm drain.*

  - Check tanks (and any containment sumps) daily for leaks and spills. Replace tanks that are leaking, corroded, or otherwise deteriorating with tanks in good condition. Collect all spilled liquids and properly dispose of them.

- Label all containers according to their contents (e.g., solvent, gasoline).
- Label hazardous substances regarding the potential hazard (corrosive, radioactive, flammable, explosive, poisonous).
- Prominently display required labels on transported hazardous and toxic materials (per US DOT regulations).
- Identify key spill response personnel.

Spill Control and Cleanup Activities

- Follow the Spill Prevention Control and Countermeasure Plan.
- Clean up leaks and spills immediately.
- Place a stockpile of spill cleanup materials where it will be readily accessible (e.g., near storage and maintenance areas).
- On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste. Physical methods for the cleanup of dry chemicals include the use of brooms, shovels, sweepers, or plows.
- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Chemical cleanups of material can be achieved with the use of adsorbents, gels, and foams. Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Reporting

- Report spills that pose an immediate threat to human health or the environment to the Regional Water Quality Control Board.
- Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hour).
- Report spills to local agencies, such as the fire department; they can assist in cleanup.
- Establish a system for tracking incidents. The system should be designed to identify the following:

  - Types and quantities (in some cases) of wastes

  - Patterns in time of occurrence (time of day/night, month, or year)

- Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
- Responsible parties

Training

- Educate employees about spill prevention and cleanup.
- Well-trained employees can reduce human errors that lead to accidental releases or spills:
  - The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur.
  - Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- Employees should be educated about aboveground storage tank requirements. Employees responsible for aboveground storage tanks and liquid transfers should be thoroughly familiar with the Spill Prevention Control and Countermeasure Plan and the plan should be readily available.
- Train employees to recognize and report illegal dumping incidents.

Other Considerations (Limitations and Regulations)

- State regulations exist for facilities with a storage capacity of 10,000 gallons or more of petroleum to prepare a Spill Prevention Control and Countermeasure (SPCC) Plan (Health & Safety Code Chapter 6.67).
- State regulations also exist for storage of hazardous materials (Health & Safety Code Chapter 6.95), including the preparation of area and business plans for emergency response to the releases or threatened releases.
- Consider requiring smaller secondary containment areas (less than 200 sq. ft.) to be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.

Requirements

Costs (including capital and operation & maintenance)

- Will vary depending on the size of the facility and the necessary controls.
- Prevention of leaks and spills is inexpensive. Treatment and/or disposal of contaminated soil or water can be quite expensive.

Maintenance (including administrative and staffing)

- This BMP has no major administrative or staffing requirements. However, extra time is needed to properly handle and dispose of spills, which results in increased labor costs.

Supplemental Information

Further Detail of the BMP

Reporting

Record keeping and internal reporting represent good operating practices because they can increase the efficiency of the facility and the effectiveness of BMPs. A good record keeping system helps the facility minimize incident recurrence, correctly respond with appropriate cleanup activities, and comply with legal requirements. A record keeping and reporting system should be set up for documenting spills, leaks, and other discharges, including discharges of hazardous substances in reportable quantities. Incident records describe the quality and quantity of non-stormwater discharges to the storm sewer. These records should contain the following information:

- Date and time of the incident
- Weather conditions
- Duration of the spill/leak/discharge
- Cause of the spill/leak/discharge
- Response procedures implemented
- Persons notified
- Environmental problems associated with the spill/leak/discharge

Separate record keeping systems should be established to document housekeeping and preventive maintenance inspections, and training activities. All housekeeping and preventive maintenance inspections should be documented. Inspection documentation should contain the following information:

- The date and time the inspection was performed
- Name of the inspector
- Items inspected
- Problems noted
- Corrective action required
- Date corrective action was taken

Other means to document and record inspection results are field notes, timed and dated photographs, videotapes, and drawings and maps.

Aboveground Tank Leak and Spill Control

Accidental releases of materials from aboveground liquid storage tanks present the potential for contaminating stormwater with many different pollutants. Materials spilled, leaked, or lost from

tanks may accumulate in soils or on impervious surfaces and be carried away by stormwater runoff.

The most common causes of unintentional releases are:

- Installation problems
- Failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves)
- External corrosion and structural failure
- Spills and overfills due to operator error
- Leaks during pumping of liquids or gases from truck or rail car to a storage tank or vice versa

Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code. Practices listed below should be employed to enhance the code requirements:

- Tanks should be placed in a designated area.
- Tanks located in areas where firearms are discharged should be encapsulated in concrete or the equivalent.
- Designated areas should be impervious and paved with Portland cement concrete, free of cracks and gaps, in order to contain leaks and spills.
- Liquid materials should be stored in UL approved double walled tanks or surrounded by a curb or dike to provide the volume to contain 10 percent of the volume of all of the containers or 110 percent of the volume of the largest container, whichever is greater. The area inside the curb should slope to a drain.
- For used oil or dangerous waste, a dead-end sump should be installed in the drain.
- All other liquids should be drained to the sanitary sewer if available. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.
- Accumulated stormwater in petroleum storage areas should be passed through an oil/water separator.

Maintenance is critical to preventing leaks and spills. Conduct routine inspections and:

- Check for external corrosion and structural failure.
- Check for spills and overfills due to operator error.
- Check for failure of piping system (pipes, pumps, flanger, coupling, hoses, and valves).
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.

- Visually inspect new tank or container installation for loose fittings, poor welding, and improper or poorly fitted gaskets.
- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Frequently relocate accumulated stormwater during the wet season.
- Periodically conduct integrity testing by a qualified professional.

Vehicle Leak and Spill Control

Major spills on roadways and other public areas are generally handled by highly trained Hazmat teams from local fire departments or environmental health departments. The measures listed below pertain to leaks and smaller spills at vehicle maintenance shops.

In addition to implementing the spill prevention, control, and clean up practices above, use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- Perform all vehicle fluid removal or changing inside or under cover to prevent the run-on of stormwater and the runoff of spills.
- Regularly inspect vehicles and equipment for leaks, and repair immediately.
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Immediately drain all fluids from wrecked vehicles.
- Store wrecked vehicles or damaged equipment under cover.
- Place drip pans or absorbent materials under heavy equipment when not in use.
- Use adsorbent materials on small spills rather than hosing down the spill.
- Remove the adsorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.
- Oil filters disposed of in trashcans or dumpsters can leak oil and contaminate stormwater. Place the oil filter in a funnel over a waste oil recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask your oil supplier or recycler about recycling oil filters.

- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- Design the fueling area to prevent the run-on of stormwater and the runoff of spills:
  - Cover fueling area if possible.
  - Use a perimeter drain or slope pavement inward with drainage to a sump.
  - Pave fueling area with concrete rather than asphalt.
- If dead-end sump is not used to collect spills, install an oil/water separator.
- Install vapor recovery nozzles to help control drips as well as air pollution.
- Discourage "topping-off' of fuel tanks.
- Use secondary containment when transferring fuel from the tank truck to the fuel tank.
- Use adsorbent materials on small spills and general cleaning rather than hosing down the area. Remove the adsorbent materials promptly.
- Carry out all Federal and State requirements regarding underground storage tanks, or install above ground tanks.
- Do not use mobile fueling of mobile industrial equipment around the facility; rather, transport the equipment to designated fueling areas.
- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Train employees in proper fueling and cleanup procedures.

Industrial Spill Prevention Response

For the purposes of developing a spill prevention and response program to meet the stormwater regulations, facility managers should use information provided in this fact sheet and the spill prevention/response portions of the fact sheets in this handbook, for specific activities. The program should:

- Integrate with existing emergency response/hazardous materials programs (e.g., Fire Department)
- Develop procedures to prevent/mitigate spills to storm drain systems
- Identify responsible departments
- Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures
- Address spills at municipal facilities, as well as public areas

- Provide training concerning spill prevention, response and cleanup to all appropriate personnel

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Stormwater Managers Resource Center http://www.stormwatercenter.net/

Outdoor Loading/Unloading SC-30

Photo Credit: Geoff Brosseau

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

The loading/unloading of materials usually takes place outside on docks or terminals; therefore, materials spilled, leaked, or lost during loading/unloading may collect in the soil or on other surfaces and have the potential to be carried away by stormwater runoff or when the area is cleaned. Additionally, rainfall may wash pollutants from machinery used to unload or move materials. Implementation of the following protocols will prevent or reduce the discharge of pollutants to stormwater from outdoor loading/unloading of materials.

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Keep accurate maintenance logs to evaluate materials removed and improvements made.
- Park tank trucks or delivery vehicles in designated areas so that spills or leaks can be contained.
- Limit exposure of material to rainfall whenever possible.
- Prevent stormwater run-on.
- Check equipment regularly for leaks.

CASQA California Stormwater Quality Association

Suggested Protocols

Loading and Unloading – General Guidelines

- Develop an operations plan that describes procedures for loading and/or unloading.
- Conduct loading and unloading in dry weather if possible.
- Cover designated loading/unloading areas to reduce exposure of materials to rain.
- Consider placing a seal or door skirt between delivery vehicles and building to prevent exposure to rain.
- Design loading/unloading area to prevent stormwater run-on, which would include grading or berming the area, and position roof downspouts so they direct stormwater away from the loading/unloading areas.
- Have employees load and unload all materials and equipment in covered areas such as building overhangs at loading docks if feasible.
- Load/unload only at designated loading areas.
- Use drip pans underneath hose and pipe connections and other leak-prone spots during liquid transfer operations, and when making and breaking connections. Several drip pans should be stored in a covered location near the liquid transfer area so that they are always available, yet protected from precipitation when not in use. Drip pans can be made specifically for railroad tracks. Drip pans must be cleaned periodically, and drip collected materials must be disposed of properly.
- Pave loading areas with concrete instead of asphalt.
- Avoid placing storm drains in the area.
- Grade and/or berm the loading/unloading area to a drain that is connected to a deadend.

Inspection

- Check loading and unloading equipment regularly for leaks, including valves, pumps, flanges and connections.
- Look for dust or fumes during loading or unloading operations.

Training

- Train employees (e.g., fork lift operators) and contractors on proper spill containment and cleanup.
- Have employees trained in spill containment and cleanup present during loading/unloading.
- Train employees in proper handling techniques during liquid transfers to avoid spills.
- Make sure forklift operators are properly trained on loading and unloading procedures.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Contain leaks during transfer.
- Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to all and ensure that employees are familiar with the site's spill control plan and proper spill cleanup procedures.
- Have an emergency spill cleanup plan readily available.
- Use drip pans or comparable devices when transferring oils, solvents, and paints.

Other Considerations (Limitations and Regulations)

- Space and time limitations may preclude all transfers from being performed indoors or under cover.
- It may not be possible to conduct transfers only during dry weather.

Requirements

Costs

Costs should be low except when covering a large loading/unloading area.

Maintenance

- Conduct regular inspections and make repairs as necessary. The frequency of repairs will depend on the age of the facility.
- Check loading and unloading equipment regularly for leaks.
- Conduct regular broom dry-sweeping of area.

Supplemental Information

Further Detail of the BMP

Special Circumstances for Indoor Loading/Unloading of Materials

Loading or unloading of liquids should occur in the manufacturing building so that any spills that are not completely retained can be discharged to the sanitary sewer, treatment plant, or treated in a manner consistent with local sewer authorities and permit requirements.

- For loading and unloading tank trucks to above and below ground storage tanks, the following procedures should be used:
  - The area where the transfer takes place should be paved. If the liquid is reactive with the asphalt, Portland cement should be used to pave the area.
  - The transfer area should be designed to prevent run-on of stormwater from adjacent areas. Sloping the pad and using a curb, like a speed bump, around the uphill side of the transfer area should reduce run-on.

- The transfer area should be designed to prevent runoff of spilled liquids from the area. Sloping the area to a drain should prevent runoff. The drain should be connected to a dead-end sump or to the sanitary sewer. A positive control valve should be installed on the drain.

- For transfer from rail cars to storage tanks that must occur outside, use the following procedures:

  - Drip pans should be placed at locations where spillage may occur, such as hose connections, hose reels, and filler nozzles. Use drip pans when making and breaking connections.

  - Drip pan systems should be installed between the rails to collect spillage from tank cars.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Outdoor Equipment Operations SC-32

Description

Outside process equipment operations and maintenance can contaminate stormwater runoff. Activities, such as grinding, painting, coating, sanding, degreasing or parts cleaning, landfills and waste piles, solid waste treatment and disposal, are examples of process operations that can lead to contamination of stormwater runoff. Source controls for outdoor process equipment operations and maintenance include reducing the amount of waste created, enclosing or covering all or some of the equipment, installing secondary containment, and training employees.

Approach

Pollution Prevention

- Perform the activity during dry periods.
- Use non-toxic chemicals for maintenance and minimize or eliminate the use of solvents.

Suggested Protocols

- Consider enclosing the activity in a building and connecting the floor drains to the sanitary sewer.
- Cover the work area with a permanent roof if possible.
- Minimize contact of stormwater with outside process equipment operations through berming and drainage routing (run-on prevention). If possible, connect process equipment area to public sewer or facility wastewater treatment system. Some municipalities require that secondary containment areas be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.
- Dry clean the work area regularly.

Training

- Train employees to perform the activity during dry periods only or substituting benign materials for more toxic ones.
- Train employee and contractors in proper techniques for spill containment and cleanup. Employees should have the tools and knowledge to immediately begin cleaning up a spill should one occur.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

Sediment	✓
Nutrients	
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

CASQA California Stormwater Quality Association

- Have employees trained in emergency spill cleanup procedures present when dangerous waste, liquid chemicals, or other wastes are delivered.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Prevent operator errors by using engineering safe guards and thus reducing accidental releases of pollutant.
- Inspect storage areas regularly for leaks or spills. Also check for structural failure, spills and overfills due to operator error, and/or failure of piping system.

Other Considerations

- Providing cover may be expensive.
- Space limitations may preclude enclosing some equipment.
- Storage sheds often must meet building and fire code requirements.

Requirements

Costs

Costs vary depending on the complexity of the operation and the amount of control necessary for stormwater pollution control.

Maintenance

- Conduct routine preventive maintenance, including checking process equipment for leaks.
- Clean the storm drain system regularly.

Supplemental Information

Further Detail of the BMP

Hydraulic/Treatment Modifications

If stormwater becomes polluted, it should be captured and treated. If you do not have your own process wastewater treatment system, consider discharging to the public sewer system. Use of the public sewer might be allowed under the following conditions:

- If the activity area is very small (less than a few hundred square feet), the local sewer authority may be willing to allow the area to remain uncovered with the drain connected to the public sewer.
- It may be possible under unusual circumstances to connect a much larger area to the public sewer, as long as the rate of stormwater discharges does not exceed the capacity of the wastewater treatment plant. The stormwater could be stored during the storm and then transferred to the public sewer when the normal flow is low, such as at night.

Industries that generate large volumes of process wastewater typically have their own treatment system and corresponding permit. These industries have the discretion to use their wastewater treatment system to treat stormwater within the constraints of their permit requirements for process treatment. It may also be possible for the industry to discharge the stormwater directly to an effluent outfall without treatment as long as the total loading of the discharged process

water and stormwater does not exceed the loading had a stormwater treatment device been used. This could be achieved by reducing the loading from the process wastewater treatment system. Check with your Regional Water Quality Control Board or local sewering agency, as this option would be subject to permit constraints and potentially regular monitoring.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Stormwater Managers Resource Center http://www.stormwatercenter.net

Waste Handling & Disposal SC-34

Photo Credit: Geoff Brosseau

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

Improper storage and handling of solid wastes can allow toxic compounds, oils and greases, heavy metals, nutrients, suspended solids, and other pollutants to enter stormwater runoff. The discharge of pollutants to stormwater from waste handling and disposal can be prevented and reduced by tracking waste generation, storage, and disposal; reducing waste generation and disposal through source reduction, reuse, and recycling; and preventing run-on and runoff.

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Approach

Pollution Prevention

- Accomplish reduction in the amount of waste generated using the following source controls:
  - Production planning and sequencing
  - Process or equipment modification
  - Raw material substitution or elimination
  - Loss prevention and housekeeping
  - Waste segregation and separation
  - Close loop recycling
- Establish a material tracking system to increase awareness about material usage. This may reduce spills and minimize contamination, thus reducing the amount of waste produced.
- Recycle materials whenever possible.

CASQA California Stormwater Quality Association

Suggested Protocols

General

- Cover storage containers with leak proof lids or some other means. If waste is not in containers, cover all waste piles (plastic tarps are acceptable coverage) and prevent stormwater run-on and runoff with a berm. The waste containers or piles must be covered except when in use.
- Use drip pans or absorbent materials whenever grease containers are emptied by vacuum trucks or other means. Grease cannot be left on the ground. Collected grease must be properly disposed of as garbage.
- Check storage containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.
- Sweep and clean the storage area regularly. If it is paved, do not hose down the area to a storm drain.
- Dispose of rinse and wash water from cleaning waste containers into a sanitary sewer if allowed by the local sewer authority. Do not discharge wash water to the street or storm drain.
- Transfer waste from damaged containers into safe containers.
- Take special care when loading or unloading wastes to minimize losses. Loading systems can be used to minimize spills and fugitive emission losses such as dust or mist. Vacuum transfer systems can minimize waste loss.

Controlling Litter

- Post “No Littering” signs and enforce anti-litter laws.
- Provide a sufficient number of litter receptacles for the facility.
- Clean out and cover litter receptacles frequently to prevent spillage.

Waste Collection

- Keep waste collection areas clean.
- Inspect solid waste containers for structural damage regularly. Repair or replace damaged containers as necessary.
- Secure solid waste containers; containers must be closed tightly when not in use.
- Do not fill waste containers with washout water or any other liquid.
- Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc., may not be disposed of in solid waste containers (see chemical/ hazardous waste collection section below).

- Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal.

Good Housekeeping

- Use all of the product before disposing of the container.
- Keep the waste management area clean at all times by sweeping and cleaning up spills immediately.
- Use dry methods when possible (e.g., sweeping, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.

Chemical/Hazardous Wastes

- Select designated hazardous waste collection areas on-site.
- Store hazardous materials and wastes in covered containers and protect them from vandalism.
- Place hazardous waste containers in secondary containment.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- Stencil or demarcate storm drains on the facility's property with prohibitive message regarding waste disposal.

Run-on/Runoff Prevention

- Prevent stormwater run-on from entering the waste management area by enclosing the area or building a berm around the area.
- Prevent waste materials from directly contacting rain.
- Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropyleneor hypalon.
- Cover the area with a permanent roof if feasible.
- Cover dumpsters to prevent rain from washing waste out of holes or cracks in the bottom of the dumpster.
- Move the activity indoor after ensuring all safety concerns such as fire hazard and ventilation are addressed.

Inspection

- Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.
- Check waste management areas for leaking containers or spills.

- Repair leaking equipment including valves, lines, seals, or pumps promptly.

Training

- Train staff in pollution prevention measures and proper disposal methods.
- Train employees and contractors in proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur.
- Train employees and subcontractors in proper hazardous waste management.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Have an emergency plan, equipment and trained personnel ready at all times to deal immediately with major spills
- Collect all spilled liquids and properly dispose of them.
- Store and maintain appropriate spill cleanup materials in a location known to all near the designated wash area.
- Ensure that vehicles transporting waste have spill prevention equipment that can prevent spills during transport. Spill prevention equipment includes:
  - Vehicles equipped with baffles for liquid waste
  - Trucks with sealed gates and spill guards for solid waste

Other Considerations (Limitations and Regulations)

Hazardous waste cannot be reused or recycled; it must be disposed of by a licensed hazardous waste hauler.

Requirements

Costs

Capital and O&M costs for these programs will vary substantially depending on the size of the facility and the types of waste handled. Costs should be low if there is an inventory program in place.

Maintenance

- None except for maintaining equipment for material tracking program.

Supplemental Information

Further Detail of the BMP

Land Treatment System

Minimize runoff of polluted stormwater from land application by:

- Choosing a site where slopes are under 6%, the soil is permeable, there is a low water table, it is located away from wetlands or marshes, and there is a closed drainage system

- Avoiding application of waste to the site when it is raining or when the ground is saturated with water
- Growing vegetation on land disposal areas to stabilize soils and reduce the volume of surface water runoff from the site
- Maintaining adequate barriers between the land application site and the receiving waters (planted strips are particularly good)
- Using erosion control techniques such as mulching and matting, filter fences, straw bales, diversion terracing, and sediment basins
- Performing routine maintenance to ensure the erosion control or site stabilization measures are working

Examples

The port of Long Beach has a state-of-the-art database for identifying potential pollutant sources, documenting facility management practices, and tracking pollutants.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

Solid Waste Container Best Management Practices – Fact Sheet On-Line Resources – Environmental Health and Safety. Harvard University. 2002.

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Safer Alternative Products SC-35

Description

Promote the use of less harmful products and products that contain little or no TMDL pollutants. Alternatives exist for most product classes including chemical fertilizers, pesticides, cleaning solutions, janitorial chemicals, automotive and paint products, and consumables (batteries, fluorescent lamps).

Approach

Pattern a new program after the many established programs around the state and country. Integrate this best management practice as much as possible with existing programs at your facility.

Develop a comprehensive program based on:

- The "Precautionary Principle," which is an alternative to the "Risk Assessment" model that says it's acceptable to use a potentially harmful product until physical evidence of its harmful effects are established and deemed too costly from an environmental or public health perspective. For instance, a risk assessment approach might say it's acceptable to use a pesticide until there is direct proof of an environmental impact. The Precautionary Principle approach is used to evaluate whether a given product is safe, whether it is really necessary, and whether alternative products would perform just as well.
- Environmentally Preferable Purchasing Program to minimize the purchase of products containing hazardous ingredients used in the facility's custodial services, fleet maintenance, and facility maintenance in favor of using alternate products that pose less risk to employees and to the environment.
- Integrated Pest Management (IPM) or Less-Toxic Pesticide Program, which uses a pest management approach that minimizes the use of toxic chemicals and gets rid of pests by methods that pose a lower risk to employees, the public, and the environment.
- Energy Efficiency Program including no-cost and low-cost energy conservation and efficiency actions that can reduce both energy consumption and electricity bills, along with long-term energy efficiency investments.

Consider the following mechanisms for developing and implementing a comprehensive program:

- Policies

Objectives

- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

CASQA California Stormwater Quality Association

- Procedures
  - Standard operating procedures (SOPs)
  - Purchasing guidelines and procedures
  - Bid packages (services and supplies)
- Materials
  - Preferred or approved product and supplier lists
  - Product and supplier evaluation criteria
  - Training sessions and manuals
  - Fact sheets for employees

Implement this BMP in conjunction with the Vehicle and Equipment Management fact sheets (SC20 – SC22) and SC41, Building and Grounds Maintenance.

Training

- Employees who handle potentially harmful materials in the use of safer alternatives.
- Purchasing departments should be encouraged to procure less hazardous materials and products that contain little or no harmful substances or TMDL pollutants.

Regulations

This BMP has no regulatory requirements. Existing regulations already encourage facilities to reduce the use of hazardous materials through incentives such as reduced:

- Specialized equipment storage and handling requirements,
- Storm water runoff sampling requirements,
- Training and licensing requirements, and
- Record keeping and reporting requirements.

Equipment

- There are no major equipment requirements to this BMP.

Limitations

- Alternative products may not be available, suitable, or effective in every case.

Requirements

Cost Considerations

- The primary cost is for staff time to: 1) develop new policies and procedures and 2) educate purchasing departments and employees who handle potentially harmful materials about the availability, procurement, and use of safer alternatives.

- Some alternative products may be slightly more expensive than conventional products.

Supplemental Information

Employees and contractors / service providers can both be educated about safer alternatives by using information developed by a number of organizations including the references and resources listed below.

The following discussion provides some general information on safer alternatives. More specific information on particular hazardous materials and the available alternatives may be found in the references and resources listed below.

- Automotive products – Less toxic alternatives are not available for many automotive products, especially engine fluids. But there are alternatives to grease lubricants, car polishes, degreasers, and windshield washer solution. Rerefined motor oil is also available.
- Vehicle/Trailer lubrication – Fifth wheel bearings on trucks require routine lubrication. Adhesive lubricants are available to replace typical chassis grease.
- Cleaners – Vegetables-based or citrus-based soaps are available to replace petroleum-based soaps/detergents.
- Paint products – Water-based paints, wood preservatives, stains, and finishes are available.
- Pesticides – Specific alternative products or methods exist to control most insects, fungi, and weeds.
- Chemical Fertilizers – Compost and soil amendments are natural alternatives.
- Consumables – Manufacturers have either reduced or are in the process of reducing the amount of heavy metals in consumables such as batteries and fluorescent lamps. All fluorescent lamps contain mercury, however low-mercury containing lamps are now available from most hardware and lighting stores. Fluorescent lamps are also more energy efficient than the average incandescent lamp.
- Janitorial chemicals – Even biodegradable soap can harm fish and wildlife before it biodegrades. Biodegradable does not mean non-toxic. Safer products and procedures are available for floor stripping and cleaning, as well as carpet, glass, metal, and restroom cleaning and disinfecting.

Examples

There are a number of business and trade associations, and communities with effective programs. Some of the more prominent are listed below in the references and resources section.

References and Resources

Note: Many of these references provide alternative products for materials that typically are used inside and disposed to the sanitary sewer as well as alternatives to products that usually end up in the storm drain.

General Sustainable Practices and Pollution Prevention Including Pollutant-Specific Information

California Department of Toxic Substances Control (www.dtsc.ca.gov)

California Integrated Waste Management Board (www.ciwmb.ca.gov)

City of Santa Monica (www.santa-monica.org/environment)

City of Palo Alto (www.city.palo-alto.ca.us/cleanbay)

City and County of San Francisco, Department of the Environment (www.ci.sf.ca.us/sfenvironment)

Earth 911 (www.earth911.org/master.asp)

Environmental Finance Center Region IX (www.greenstart.org/efc9)

Flex Your Power (www.flexyourpower.ca.gov)

GreenBiz.com (www.greenbiz.com)

Green Business Program (www.abag.org/bayarea/enviro/gbus/gb.html)

Pacific Industrial and Business Association (www.piba.org)

Sacramento Clean Water Business Partners (www.sacstormwater.org)

USEPA BMP fact sheet – Alternative products (http://cfpub.epa.gov/npdes/stormwater/menuofbmps/poll_2.cfm)

USEPA Region IX Pollution Prevention Program (www.epa.gov/region09/p2)

Western Regional Pollution Prevention Network (www.westp2net.org)

Metals (mercury, copper)

National Electrical Manufacturers Association - Environment, Health and Safety (www.nema.org)

Sustainable Conservation (www.suscon.org)

- Auto Recycling Project
- Brake Pad Partnership

Pesticides and Chemical Fertilizers

Bio-Integral Resource Center (www.birc.org)

California Department of Pesticide Regulation (www.cdpr.ca.gov)

University of California Statewide IPM Program (www.ipm.ucdavis.edu/default.html)

Dioxins

Bay Area Dioxins Project (http://dioxin.abag.ca.gov/)

Building & Grounds Maintenance SC-41

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	
Organics	

Description

Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, abnormal pH, and oils and greases. Utilizing the protocols in this fact sheet will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Switch to non-toxic chemicals for maintenance when possible.
- Choose cleaning agents that can be recycled.
- Encourage proper lawn management and landscaping, including use of native vegetation.

CASQA California Stormwater Quality Association

- Encourage use of Integrated Pest Management techniques for pest control.
- Encourage proper onsite recycling of yard trimmings.
- Recycle residual paints, solvents, lumber, and other material as much as possible.

Suggested Protocols

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.
- If soaps or detergents are not used, and the surrounding area is paved, wash runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff.
- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement.

Landscaping Activities

- Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures on exposed soils.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.
- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.
- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.
- Clean paintbrushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.
- Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. This is particularly necessary on rainy days. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

- If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. If directed off-site, you should direct the water through hay bales and filter fabric or use other sediment filters or traps.
- Store toxic material under cover during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

Mowing, Trimming, and Planting

- Dispose of leaves, sticks, or other collected vegetation as garbage, by composting or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures when soils are exposed.
- Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- Consider an alternative approach when bailing out muddy water: do not put it in the storm drain; pour over landscaped areas.
- Use hand weeding where practical.

Fertilizer and Pesticide Management

- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.
- Use less toxic pesticides that will do the job when applicable. Avoid use of copper-based pesticides if possible.
- Do not use pesticides if rain is expected.
- Do not mix or prepare pesticides for application near storm drains.
- Use the minimum amount needed for the job.
- Calibrate fertilizer distributors to avoid excessive application.
- Employ techniques to minimize off-target application (e.g., spray drift) of pesticides, including consideration of alternative application techniques.
- Apply pesticides only when wind speeds are low.
- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- Irrigate slowly to prevent runoff and then only as much as is needed.
- Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Dispose of empty pesticide containers according to the instructions on the container label.

- Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering and repair leaks in the irrigation system as soon as they are observed.

Training

- Educate and train employees on pesticide use and in pesticide application techniques to prevent pollution.
- Train employees and contractors in proper techniques for spill containment and cleanup.
- Be sure the frequency of training takes into account the complexity of the operations and the nature of the staff.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials, such as brooms, dustpans, and vacuum sweepers (if desired) near the storage area where it will be readily accessible.
- Have employees trained in spill containment and cleanup present during the loading/unloading of dangerous wastes, liquid chemicals, or other materials.
- Familiarize employees with the Spill Prevention Control and Countermeasure Plan.
- Clean up spills immediately.

Other Considerations

Alternative pest/weed controls may not be available, suitable, or effective in many cases.

Requirements

Costs

- Cost will vary depending on the type and size of facility.
- Overall costs should be low in comparison to other BMPs.

Maintenance

Sweep paved areas regularly to collect loose particles. Wipe up spills with rags and other absorbent material immediately, do not hose down the area to a storm drain.

Supplemental Information

Further Detail of the BMP

Fire Sprinkler Line Flushing

Building fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water, though in some areas it may be non-potable reclaimed wastewater. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping, but it is subject to rusting and results in lower quality water. Initially, the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; this will contaminate the water from the first flush but not from subsequent flushes. Nitrates, poly-phosphates and other corrosion inhibitors, as well as fire suppressants and antifreeze may be added to the sprinkler water system. Water generally remains in the sprinkler system a long time (typically a year) and between flushes may accumulate iron, manganese, lead, copper, nickel, and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This may result in a significant BOD problem and the water often smells. Consequently dispose fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to storm drain or infiltration due to potential high levels of pollutants in fire sprinkler line water.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Mobile Cleaners Pilot Program: Final Report. 1997. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Building Repair and Construction SC-42

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Recycle

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Description

Modifications are common particularly at large industrial sites. The activity may vary from minor and normal building repair to major remodeling, or the construction of new facilities. These activities can generate pollutants including solvents, paints, paint and varnish removers, finishing residues, spent thinners, soap cleaners, kerosene, asphalt and concrete materials, adhesive residues, and old asbestos installation. Protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants to stormwater from building repair, remodeling, and construction by using soil erosion controls, enclosing or covering building material storage areas, using good housekeeping practices, using safer alternative products, and training employees.

Approach

Pollution Prevention

- Recycle residual paints, solvents, lumber, and other materials to the maximum extent practical.
- Buy recycled products to the maximum extent practical.
- Inform on-site contractors of company policy on these matters and include appropriate provisions in their contract to ensure certain proper housekeeping and disposal practices are implemented.

CASQA California Stormwater Quality Association

- Make sure that nearby storm drains are well marked to minimize the chance of inadvertent disposal of residual paints and other liquids.

Suggested Protocols

Repair & Remodeling

- Follow BMPs identified in Construction BMP Handbook.
- Maintain good housekeeping practices while work is underway.
- Keep the work site clean and orderly. Remove debris in a timely fashion. Sweep the area.
- Cover materials of particular concern that must be left outside, particularly during the rainy season.
- Do not dump waste liquids down the storm drain.
- Dispose of wash water, sweepings, and sediments properly.
- Store materials properly that are normally used in repair and remodeling such as paints and solvents.
- Sweep out the gutter or wash the gutter and trap the particles at the outlet of the downspout if when repairing roofs, small particles have accumulated in the gutter. A sock or geofabric placed over the outlet may effectively trap the materials. If the downspout is tight lined, place a temporary plug at the first convenient point in the storm drain and pump out the water with a vactor truck, and clean the catch basin sump where you placed the plug.
- Properly store and dispose waste materials generated from construction activities. See Construction BMP Handbook.
- Clean the storm drain system in the immediate vicinity of the construction activity after it is completed.

Painting

- Enclose painting operations consistent with local air quality regulations and OSHA.
- Local air pollution regulations may, in many areas of the state, specify painting procedures which if properly carried out are usually sufficient to protect water quality.
- Develop paint handling procedures for proper use, storage, and disposal of paints.
- Transport paint and materials to and from job sites in containers with secure lids and tied down to the transport vehicle.
- Test and inspect spray equipment prior to starting to paint. Tighten all hoses and connections and do not overfill paint containers.
- Mix paint indoors before using so that any spill will not be exposed to rain. Do so even during dry weather because cleanup of a spill will never be 100% effective.
- Transfer and load paint and hot thermoplastic away from storm drain inlets.

- Do not transfer or load paint near storm drain inlets.
- Plug nearby storm drain inlets prior to starting painting and remove plugs when job is complete when there is significant risk of a spill reaching storm drains.
- Cover nearby storm drain inlets prior to starting work if sand blasting is used to remove paint.
- Use a ground cloth to collect the chips if painting requires scraping or sand blasting of the existing surface. Dispose the residue properly.
- Cover or enclose painting operations properly to avoid drift.
- Clean the application equipment in a sink that is connected to the sanitary sewer if using water based paints.
- Capture all cleanup-water and dispose of properly.
- Dispose of paints containing lead or tributyl tin and considered a hazardous waste properly.
- Store leftover paints if they are to be kept for the next job properly, or dispose properly.
- Recycle paint when possible. Dispose of paint at an appropriate household hazardous waste facility.

Training

Proper education of off-site contractors is often overlooked. The conscientious efforts of well trained employees can be lost by unknowing off-site contractors, so make sure they are well informed about what they are expected to do.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Clean up spills immediately.
- Excavate and remove the contaminated (stained) soil if a spill occurs on dirt.

Limitations

- This BMP is for minor construction only. The State's General Construction Activity Stormwater Permit has more requirements for larger projects. The companion "Construction Best Management Practice Handbook" contains specific guidance and best management practices for larger-scale projects.
- Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.
- Be certain that actions to help stormwater quality are consistent with Cal- and Fed-OSHA and air quality regulations.

SC-42 Building Repair and Construction

Requirements

Costs

These BMPs are generally low to modest in cost.

Maintenance

N/A

Supplemental Information

Further Detail of the BMP

Soil/Erosion Control

If the work involves exposing large areas of soil, employ the appropriate soil erosion and control techniques. See the Construction Best Management Practice Handbook. If old buildings are being torn down and not replaced in the near future, stabilize the site using measures described in SC-40 Contaminated or Erodible Areas.

If a building is to be placed over an open area with a storm drainage system, make sure the storm inlets within the building are covered or removed, or the storm line is connected to the sanitary sewer. If because of the remodeling a new drainage system is to be installed or the existing system is to be modified, consider installing catch basins as they serve as effective "in-line" treatment devices. See Treatment Control Fact Sheet TC-20 Wet Pond/Basin in Section 5 of the New Development and Redevelopment Handbook regarding design criteria. Include in the catch basin a "turn-down" elbow or similar device to trap floatables.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Parking/Storage Area Maintenance SC-43

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Description

Parking lots and storage areas can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through stormwater runoff or non-stormwater discharges. The protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants from parking/storage areas and include using good housekeeping practices, following appropriate cleaning BMPs, and training employees.

Approach

The goal of this program is to ensure stormwater pollution prevention practices are considered when conducting activities on or around parking areas and storage areas to reduce potential for pollutant discharge to receiving waters. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Encourage alternative designs and maintenance strategies for impervious parking lots. (See New Development and Redevelopment BMP Handbook)
- Keep accurate maintenance logs to evaluate BMP implementation.

CASQA California Stormwater Quality Association

Suggested Protocols

General

- Keep the parking and storage areas clean and orderly. Remove debris in a timely fashion.
- Allow sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
- Utilize sand filters or oleophilic collectors for oily waste in low quantities.
- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.
- Discharge soapy water remaining in mop or wash buckets to the sanitary sewer through a sink, toilet, clean-out, or wash area with drain.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide an adequate number of litter receptacles.
- Clean out and cover litter receptacles frequently to prevent spillage.
- Provide trash receptacles in parking lots to discourage litter.
- Routinely sweep, shovel, and dispose of litter in the trash.

Surface Cleaning

- Use dry cleaning methods (e.g., sweeping, vacuuming) to prevent the discharge of pollutants into the stormwater conveyance system if possible.
- Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.
- Sweep all parking lots at least once before the onset of the wet season.
- Follow the procedures below if water is used to clean surfaces:
  - Block the storm drain or contain runoff.
  - Collect and pump wash water to the sanitary sewer or discharge to a pervious surface. Do not allow wash water to enter storm drains.
  - Dispose of parking lot sweeping debris and dirt at a landfill.
- Follow the procedures below when cleaning heavy oily deposits:
  - Clean oily spots with absorbent materials.
  - Use a screen or filter fabric over inlet, then wash surfaces.

- Do not allow discharges to the storm drain.
- Vacuum/pump discharges to a tank or discharge to sanitary sewer.
- Appropriately dispose of spilled materials and absorbents.

Surface Repair

- Preheat, transfer or load hot bituminous material away from storm drain inlets.
- Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff.
- Cover and seal nearby storm drain inlets where applicable (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.
- Use only as much water as necessary for dust control, to avoid runoff.
- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Inspection

- Have designated personnel conduct inspections of parking facilities and stormwater conveyance systems associated with parking facilities on a regular basis.
- Inspect cleaning equipment/sweepers for leaks on a regular basis.

Training

- Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.
- Train employees and contractors in proper techniques for spill containment and cleanup.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials where it will be readily accessible or at a central location.
- Clean up fluid spills immediately with absorbent rags or material.
- Dispose of spilled material and absorbents properly.

Other Considerations

Limitations related to sweeping activities at large parking facilities may include high equipment costs, the need for sweeper operator training, and the inability of current sweeper technology to remove oil and grease.

SC-43 Parking/Storage Area Maintenance

Requirements

Costs

Cleaning/sweeping costs can be quite large. Construction and maintenance of stormwater structural controls can be quite expensive as well.

Maintenance

- Sweep parking lot regularly to minimize cleaning with water.
- Clean out oil/water/sand separators regularly, especially after heavy storms.
- Clean parking facilities regularly to prevent accumulated wastes and pollutants from being discharged into conveyance systems during rainy conditions.

Supplemental Information

Further Detail of the BMP

Surface Repair

Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff. Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal. Only use only as much water as is necessary for dust control to avoid runoff.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Drainage System Maintenance SC-44

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff and stormwater that may contain certain pollutants. The protocols in this fact sheet are intended to reduce pollutants reaching receiving waters through proper conveyance system operation and maintenance.

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	
Bacteria	✓
Oil and Grease	
Organics	

Approach

Pollution Prevention

Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Suggested Protocols

Catch Basins/Inlet Structures

- Staff should regularly inspect facilities to ensure compliance with the following:
  - Immediate repair of any deterioration threatening structural integrity.
  - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
  - Stenciling of catch basins and inlets (see SC34 Waste Handling and Disposal).

- Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.
- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed. Do not dewater near a storm drain or stream.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect and pump flushed effluent to the sanitary sewer for treatment whenever possible.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.
- Conduct routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

Open Channel

- Modify storm channel characteristics to improve channel hydraulics, increase pollutant removals, and enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a Steam or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS.

Illicit Connections and Discharges

- Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:
  - Is there evidence of spills such as paints, discoloring, etc?

- Are there any odors associated with the drainage system?
- Record locations of apparent illegal discharges/illicit connections?
- Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of upgradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
- Eliminate the discharge once the origin of flow is established.

- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

- Inspect and clean up hot spots and other storm drainage areas regularly where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots
  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)
  - Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
  - Responsible parties
- Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.
- Allow only properly trained individuals to handle hazardous materials/wastes.
- Have staff involved in detection and removal of illicit connections trained in the following:
  - OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).

- OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).

- Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

Spill Response and Prevention

- Investigate all reports of spills, leaks, and/or illegal dumping promptly.

- Clean up all spills and leaks using "dry" methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.

- Refer to fact sheet SC-11 Spill Prevention, Control, and Cleanup.

Other Considerations (Limitations and Regulations)

- Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.

- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and prohibition against disposal of flushed effluent to sanitary sewer in some areas.

- Regulations may include adoption of substantial penalties for illegal dumping and disposal.

- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget.

- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. The primary cost is for staff time. Cost depends on how aggressively a program is implemented. Other cost considerations for an illegal dumping program include:

  - Purchase and installation of signs.

  - Rental of vehicle(s) to haul illegally-disposed items and material to landfills.

  - Rental of heavy equipment to remove larger items (e.g., car bodies) from channels.

  - Purchase of landfill space to dispose of illegally-dumped items and material.

- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.

Supplemental Information

Further Detail of the BMP

Storm Drain Flushing

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing resuspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. Deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, thereby releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream may be used to recollect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to recollect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75% for organics and 55-65% for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm sewer flushing.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

Ferguson, B.K. 1991. Urban Stream Reclamation, p. 324-322, Journal of Soil and Water Conservation.

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Storm Drain System Cleaning. On line:
http://www.epa.gov/npdes/menuofbmps/poll_16.htm

Drain Insert MP-52

General Description

Drain inserts are manufactured filters or fabric placed in a drop inlet to remove sediment and debris. There are a multitude of inserts of various shapes and configurations, typically falling into one of three different groups: socks, boxes, and trays. The sock consists of a fabric, usually constructed of polypropylene. The fabric may be attached to a frame or the grate of the inlet holds the sock. Socks are meant for vertical (drop) inlets. Boxes are constructed of plastic or wire mesh. Typically a polypropylene "bag" is placed in the wire mesh box. The bag takes the form of the box. Most box products are one box; that is, the setting area and filtration through media occur in the same box. Some products consist of one or more trays or mesh grates. The trays may hold different types of media. Filtration media vary by manufacturer. Types include polypropylene, porous polymer, treated cellulose, and activated carbon.

Inspection / Maintenance Considerations

Washout problems increase with rain intensity. Susceptibility of accumulated sediments to be re-suspended at low flow rates, can be corrected with an energy dissipater between gate and treatment areas.

Inspection Activities	Suggested Frequency
■ Inspect for sediment buildup and proper functioning.	At the beginning of the wet season and after significant storms
■ Verify that stormwater enters the unit and does not leak around the perimeter.	After construction.
Maintenance Activities	**Suggested Frequency**
■ Remove sediment as needed.	At the beginning of the wet season and as necessary

Maintenance Concerns, Objectives, and Goals

■ Sediment Removal

Targeted Constituents

- ✓ Sediment
- ✓ Nutrients
- ✓ Trash
- ✓ Metals
- Bacteria
- ✓ Oil and Grease
- ✓ Organics

Removal Effectiveness

See New Development and Redevelopment Handbook-Section 5.

Efficient Irrigation SD-12

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Storm Drain Signage SD-13

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include “NO DUMPING

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

– DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.

- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Maintenance Bays & Docks SD-31

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Several measures can be taken to prevent operations at maintenance bays and loading docks from contributing a variety of toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to the stormwater conveyance system.

Approach

In designs for maintenance bays and loading docks, containment is encouraged. Preventative measures include overflow containment structures and dead-end sumps. However, in the case of loading docks from grocery stores and warehouse/distribution centers, engineered infiltration systems may be considered.

Suitable Applications

Appropriate applications include commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for vehicle maintenance and repair are governed by Building and Fire Codes, and by current local agency ordinances, and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code requirements.

Designing New Installations

Designs of maintenance bays should consider the following:

- Repair/maintenance bays and vehicle parts with fluids should be indoors; or designed to preclude urban run-on and runoff.
- Repair/maintenance floor areas should be paved with Portland cement concrete (or equivalent smooth impervious surface).

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Repair/maintenance bays should be designed to capture all wash water leaks and spills. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around repair bays to prevent spilled materials and wash-down waters form entering the storm drain system. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.

- Other features may be comparable and equally effective.

The following designs of loading/unloading dock areas should be considered:

- Loading dock areas should be covered, or drainage should be designed to preclude urban run-on and runoff.

- Direct connections into storm drains from depressed loading docks (truck wells) are prohibited.

- Below-grade loading docks from grocery stores and warehouse/distribution centers of fresh food items should drain through water quality inlets, or to an engineered infiltration system, or an equally effective alternative. Pre-treatment may also be required.

- Other features may be comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Trash Storage Areas SD-32

Description

Trash storage areas are areas where a trash receptacle (s) are located for use as a repository for solid wastes. Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations that may be sources of stormwater pollution include dumpsters, litter control, and waste piles.

Approach

This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling. Preventative measures including enclosures, containment structures, and impervious pavements to mitigate spills, should be used to reduce the likelihood of contamination.

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local agency ordinances and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulation.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria in this fact sheet are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection areas. Conflicts or issues should be discussed with the local agency.

Designing New Installations

Trash storage areas should be designed to consider the following structural or treatment control BMPs:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater.
- Make sure trash container areas are screened or walled to prevent off-site transport of trash.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Use lined bins or dumpsters to reduce leaking of liquid waste.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Pave trash storage areas with an impervious surface to mitigate spills.
- Do not locate storm drains in immediate vicinity of the trash storage area.
- Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Maintenance Considerations

The integrity of structural elements that are subject to damage (i.e., screens, covers, and signs) must be maintained by the owner/operator. Maintenance agreements between the local agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local agency, maintenance agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

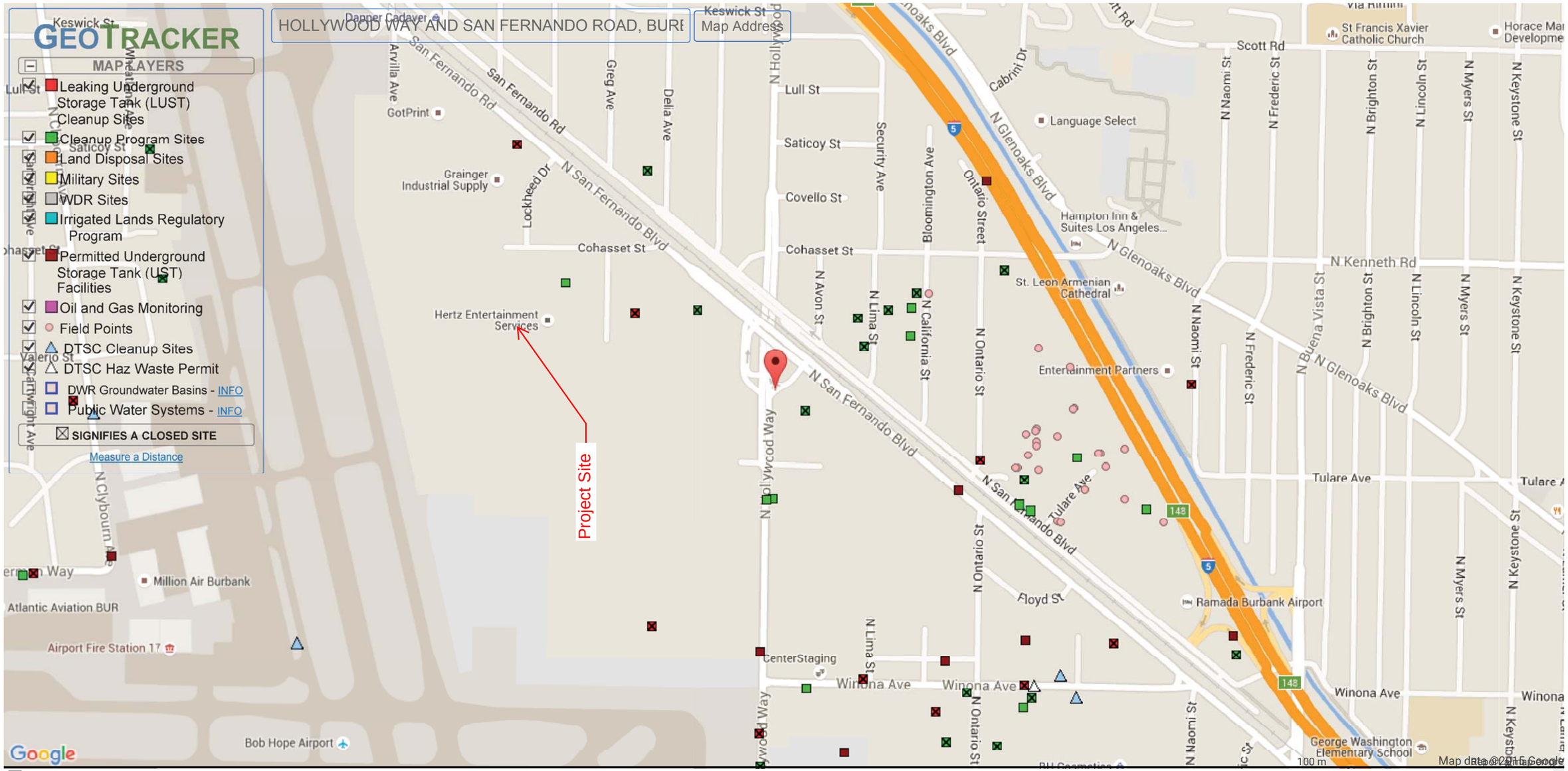
Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

This page left intentionally blank

APPENDIX F

Infiltration Feasibility



SITES CURRENTLY VISIBLE ON MAP — 87 SITES LISTED — EXPORT THIS LIST TO EXCEL

SITE NAME	GLOBAL ID	FAC ID	STATUS	ADDRESS	CITY
5 WEST OLIVE AVENUE	SL0001634400		OPEN - INACTIVE		BURBANK
ADB INDUSTRIES	T10000004735		COMPLETED - CASE CLOSED	2523 NORTH ONTARIO STREET	BURBANK
AEROQUIP FACILITY (FORMER)	T0603700140		COMPLETED - CASE CLOSED	3015 WINONA AVE	BURBANK
ALIGN-RITE INTERNATIONAL / PHOTRONICS INC.	T10000004292		COMPLETED - CASE CLOSED	2422-2428 NORTH ONTARIO STREET	BURBANK
ALUMTREAT INC	CAD983566902	CAD983566902	UNKNOWN	2905 WINONA AVE	BURBANK
ALUMTREAT INC	CAD009561911	CAD009561911	CLOSED	2905 WINOMA AVENUE	BURBANK
ALUMTREAT INC	80001642	80001642	CERTIFIED O&M - LAND USE RESTRICTIONS ONLY	2905 WINOMA AVENUE	BURBANK
AMER. FINE ARTS FOUNDRY	SL603798594		COMPLETED - CASE CLOSED	2520 N.. ONTARIO ST.	BURBANK

ARDENT
ENVIRONMENTAL GROUP, INC.

Phase I Environmental Site Assessment and Document Review

Portions of Former Lockheed Plant B6
Burbank, California

Prepared for:
Overton Moore Properties
19300 South Hamilton Avenue, Suite 200
Gardena, California 90248

Prepared by:
Ardent Environmental Group, Inc.
1827 Capital Street, Suite 103
Corona, California 92880

January 5, 2016
Project No. 100715001

ARDENT
ENVIRONMENTAL GROUP, INC.

January 5, 2016
Project No. 100715001

Mr. Michael Johnson
Overton Moore Properties
19300 South Hamilton Avenue, Suite 200
Gardena, California 90248

Subject: Phase I Environmental Site Assessment and Document Review
Portions of Former Lockheed Plant B6
Burbank, California

Dear Mr. Johnson:

Ardent Environmental Group, Inc. (Ardent) has performed a Phase I Environmental Site Assessment (ESA) and Document Review of Portions of the Lockheed Former Plant B6 property located at in the city of Burbank, California (site). Work was completed in accordance with Ardent's proposal dated October 29, 2015. The attached report presents our methodology, findings, opinions, and conclusions regarding the environmental conditions at the site. We appreciate the opportunity to be of service to you on this project.

Sincerely,
Ardent Environmental Group, Inc.

Connie Lizarraga
Senior Staff Scientist

Paul A. Roberts, P.G.
Principal Geologist

PAR/CL/nw

Distribution: (1) Addressee (electronic copy)

TABLE OF CONTENTS

Page

Figures

Appendices

EXECUTIVE SUMMARY

Ardent Environmental Group, Inc. (Ardent) was retained by Overton Moore Properties (OMP) to perform a Phase I Environmental Site Assessment (ESA) and Document Review for portions of the former Lockheed Plant B6 property located in the city of Burbank, California ("site" or "subject property"). The site encompasses approximately 60-acres of the former 130-acre Lockheed Martin Corporation (Lockheed) Plant B6 property (referred to herein as the "larger property," or "Lockheed Plant B6"). Lockheed formerly used Plant B6 for aircraft research, manufacturing, assembly, and maintenance. A number of environmental investigations and remediation have been completed over this larger property under the direction and oversight of the Regional Water Quality Control Board, Los Angeles Region (RWQCB) and Federal EPA. Lockheed has been identified as a potentially responsible party (PRP) to the Burbank Operable Unit of the San Fernando Valley Groundwater Superfund Site The buildings associated with the former Lockheed Plant B6 property have been razed and the site is currently vacant land. OMP is considering purchasing the site for redevelopment for commercial purposes.

During this investigation, Ardent reviewed files from regulatory agencies and information obtained from the client. It should be noted that because the site was part of a larger property and shared addresses associated with the Lockheed Plant B6 facility, identifying on-site areas of possible concern or determining whether the appropriate investigation activities were completed was extremely difficult. Site assessment activities for this report were conducted between October 30, 2015 and December 21, 2015.

In summary, the following items were noted:

- The site was used for agricultural purposes or vacant land from at least 1928 through the late-1930s. From at least 1944 through the 1990s, the site was used for aircraft research, manufacturing, warehouse, maintenance, and office purposes. The site buildings were razed from 1997 through 2001. The site is currently vacant land, with the exception of a small portion of the northern property which is used by a company for long-term storage of automobiles and miscellaneous personal items in storage pods.

- The site is located within the San Fernando Valley Groundwater Basin which has been designated by EPA as a Federal Superfund Site due to groundwater contamination associated with historical industrial land uses. The areas of groundwater contamination, designated as "Operable Units," contain chemicals such as volatile organic compounds (VOCs), namely trichloroethene (TCE) and tetrachloroethylene (PCE), and other chemicals such as hexavalent chromium and 1,4-dioxane. The site lies within the "Burbank Operable Unit." A number of investigations have been completed over the years, and based on the results, Lockheed

has been named as one of many PRPs for contributing to the groundwater issues. Groundwater investigations completed at the site have shown elevated concentrations of PCE, TCE, and hexavalent chromium. Groundwater has been measured at the site at depths of approximately 220 feet below the ground surface (bgs) and flows in a southeasterly direction. Currently, there are three groundwater wells located on the site and groundwater monitoring is completed by Lockheed on an annual basis.

- The site was investigated in the early- to mid-1990s for possible VOC source areas as part of the Regional Water Quality Control Board, Los Angeles Region (RWQCB) Well Investigation Program (WIP) associated with the San Fernando Valley Groundwater Basin Superfund Site. Investigations began in 1991 with an in-depth environmental assessment of the site presenting a comprehensive study of the historical land use, operations, and areas of concern. Based on the results of this investigation, at least 35 underground features consisting of 25 fuel underground storage tanks (USTs) and 10 non-fuel USTs, sumps, and clarifiers were formerly located on-site. A number of areas of concern (AOCs) were identified including USTs, ASTs, sumps, clarifiers, surface stains, process lines, degreasers, trenches and floor drains, and chemical storage and handling areas. These AOCs were subsequently investigated, impacted soils remediated, and USTs and underground features removed. Based on these investigations, no further action (NFA) letters were issued by the RWQCB in 1996.

- As part of this Phase I ESA, Ardent reviewed these environmental reports and agency NFA letters. Based on our review and the fact that the site was part of a larger facility, it was difficult to determine whether all of the reported underground features had been properly removed from the site. In 1998, a geophysical survey was completed throughout the site to address the status of the underground features. Based on the results of the geophysical survey, no anomalies indicative of a UST were discovered. Based on this information, it appears that the reported USTs and underground features have been removed. In the 1990s, residual contaminants to be left in-place were evaluated by regulatory agencies based on the likelihood of migration to groundwater (i.e. for the protection of groundwater); with a lesser extent for the protection of human health. By the mid-2000s, agencies began evaluating in-place contaminants for the protection of groundwater and human health. Ardent completed a cursory evaluation of the chemical data of the residual contaminants that were allowed to be left in-place by the RWQCB in 1996. Ardent reviewed these data based on current regulatory guidelines based on human health risk criteria. Based on our review, there is a low likelihood that the residual contaminants would pose a human health risk through dermal contact.

- During completion of the earlier studies, soil gas investigations were completed as a screening tool to assess possible source areas of VOCs, and therefore, higher chemical detection limits were used. Current studies, used to evaluate human health risks, use much lower detection limits. Based on our evaluation of these historical data with respect to current human health risk guidelines, there is a high likelihood that residual contaminants could pose a potential threat to human health to future occupants through vapor intrusion.

- In the 2013, the RWQCB again requested investigations be completed at the site and surrounding properties to investigate possible source areas of hexavalent chromium that began being identified in close-by water wells. In 2014, an evaluation of on- and off-site AOCs was

completed based on historical land use information. A number of on- and off-site AOCs were identified on the surrounding Lockheed properties. Laboratory results of subsequent soil sampling completed in the on-site AOCs showed low concentrations of hexavalent chromium. Based on this information, the RWQCB concluded that there was a low likelihood that the site had contributed to the chromium issue. However, because additional investigations are still needed at other Lockheed properties in the site vicinity, this case is still considered open with the RWQCB.

- Asbestos-containing Transite piping is reportedly located beneath the site; the extent of which is unknown.

- During the site reconnaissance, Ardent observed a former Pump House associated with a 509,000-gallon water reservoir located in the mid-eastern portion of the site. Although these features are not considered an environmental concern to the site, these features will need to be managed during redevelopment activities.

- No other- on or off-site environmental issues were noted for the site.

Ardent has performed this Phase I ESA in general conformance with the scope and limitations of the American Society for Testing and Materials (ASTM) Practice E 1527-13, ASTM Practice E 2600-15, and the EPA Standards and Practices for All Appropriate Inquires (AAI), Final Rule (40 CFR, Part 312), for a portion of the former Lockheed Plant B6 property located in the city of Burbank, California. Any limitations or exceptions encountered during completion of this report are stated in Section 1.4. No evidence or indication of recognized environmental conditions (RECs), or conditions indicative of releases or threatened releases of hazardous substances on, at, in, or to the subject property has been revealed, with the exception of the regional groundwater issues, reported Transite piping, and possible vapor intrusion issues.

Based on the results of this investigation, Ardent presents the following recommendations.

- A soil gas survey should be completed to assess current conditions at the site based on human health risk criteria. Following collection of the laboratory data, a Human Health Risk Assessment (HHRA) should be completed to assess whether a human health risk is present and whether engineering controls (e.g. a vapor barrier) are needed beneath the proposed building(s) to limit vapor intrusion.

- Due to the historical land use and residual contaminants known to exist at the site, a Soil Management Plan (SMP) is recommended to be prepared and implemented during grading/redevelopment activities. The SMP will document the program participants including contact information and description of responsibility, agency involvement, and health and safety measures. The SMP will also present procedures to be followed if impacted soil or unknown environmental features are encountered. This will include sampling criteria and analytical procedures.

- Since the existing groundwater monitoring wells are part of a larger monitoring program associated with the Federal Superfund Site, if the wells are needed to be abandoned and/or relocated due to proposed construction plans, authorization needs to be obtained from the EPA. Typically, the well owner/operator would obtain EPA approval.

- If during grading activities Transite piping is discovered, these materials should be removed by a State-licensed abatement contractor. The client should account for the mitigation measures in its grading budget.

1 INTRODUCTION

Ardent Environmental Group, Inc. (Ardent) was retained by Overton Moore Properties (OMP) to perform a Phase I Environmental Site Assessment (ESA) and Document Review for portions of the former Lockheed Plant B6 property located in the city of Burbank, California ("site" or "subject property"). Work was completed in general accordance with the proposal dated October 29, 2015 between OMP and Ardent.

The site encompasses approximately 60-acres of the former 130-acre Lockheed Martin Corporation (Lockheed) Plant B6 property (referred to herein as the "larger property," or "Lockheed Plant B6"). Lockheed formerly used Plant B6 for aircraft research, manufacturing, assembly, and maintenance. A number of environmental investigations and remediation have been completed over this larger property under the direction and oversight of the Regional Water Quality Control Board, Los Angeles Region (RWQCB) and Federal EPA. Lockheed has been identified as a potentially responsible party (PRP) to the Burbank Operable Unit of the San Fernando Valley Groundwater Superfund Site The buildings associated with the former Lockheed Plant B6 property have been razed and the site is currently vacant land. OMP is considering purchasing the site for redevelopment for commercial purposes. The following sections identify the purpose, the involved parties, the scope of work, and the limitations and exceptions associated with the Phase I ESA.

1.1 Purpose of Phase I ESA

In accordance with the American Society for Testing and Materials (ASTM) Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process (ASTM Standard E 1527-13), the objective of the Phase I ESA was to identify, to the extent feasible pursuant to ASTM Standard E 1527-13, recognized environmental conditions (RECs), which are defined by ASTM as "…the presence or likely presence of any hazardous substance or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment."

The United States Environmental Protection Agency ("USEPA" or "EPA") has stated that ASTM Standard E 1527-13, is consistent with the Standards and Practices for All Appropriate Inquires (AAI), Final Rule (40 Code of Federal Regulations [CFR], Part 312) and is

compliant with the statutory criteria for all appropriate inquires. All appropriate inquires, as defined in the AAI Final Rule, must be conducted by persons seeking the landowner liability protections under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) prior to acquiring a property or seeking or receiving federal Brownfields grants under the authorities of CERCLA. The purpose of AAI, as defined in the AAI Final Rule, was to identify releases and threatened releases of hazardous substances which cause or threaten to cause the incurrence of response costs.

As part of this Phase I ESA, Ardent also assessed whether a vapor encroachment condition (VEC) exists at the site. The VEC assessment was completed following the ASTM E 2600-15 Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions (ASTM Standard E 2600-15). The objective of this work was to evaluate whether possible contaminants (e.g. volatile organic compounds [VOCs]) are present in soil and/or groundwater in the site vicinity which might pose a possible vapor intrusion into existing or future buildings at the site.

1.2 Involved Parties

Ms. Connie Lizarraga and Mr. Eric Patschull of Ardent conducted the historical research, site reconnaissance, regulatory inquiries, and document review. Mr. Paul Roberts completed oversight and management. Mr. Roberts, Mr. Patschull, and Ms. Lizarraga meet the definition of an environmental professional as set forth in the AAI Final Rule.

1.3 Scope of Work

Ardent's scope of work for this Phase I ESA is consistent with ASTM Standard E1527-13 and included the activities listed below.

- **Review of User Provided Information** – Review of information regarding title and judicial records for environmental liens or activity and use limitations, recorded environmental liens, actual or specialized knowledge or commonly known information regarding environmental conditions at the site, the relationship of the purchase price of the property to the fair market value, readily available maps, environmental reports, and other environmental documents pertaining to the site, as available and obtained from the user/client.

- **Records Review** – Acquisition and review of records, including federal, state, tribal, and local regulatory agency databases, for the site and for properties located within a speci-

fied radius of the site; local regulatory agency files for the site and selected nearby properties of potential environmental concern; physical setting sources, including topographic maps, geologic maps, and geologic and hydrogeologic reference documents; and historic land use information including aerial photographs, historical fire insurance rate maps, building department records, and city directories, as necessary, that are reasonably ascertainable, publicly available, can be obtained within reasonable time and cost, and are practically reviewable.

- **Vapor Encroachment Condition (VEC)** – Review available regulatory and client provided data to assess Tier 1 non-numeric screening for the site. Ardent evaluated whether contaminants were present in soil and/or groundwater in the site vicinity which might pose a VEC at the site.

- **Site Reconnaissance** – Performance of a site reconnaissance to visually observe the site and any structure(s) located on the site to the extent not obstructed by bodies of water, adjacent buildings, or other obstacles. The purpose of the site reconnaissance is to obtain information indicating the likelihood of identifying RECs in connection with the site, including the general site setting, site usage, use and storage of hazardous materials and petroleum products, disposal of waste products and materials, sources of polychlorinated biphenyls (PCBs), and evidence of releases and possible risks of contamination from activities at adjacent properties.

- **Interviews** – Interviews with site representatives, including owners, occupants, and site managers, regarding the environmental condition of the site to the extent necessary and such persons are available. Interviews with state and/or local government officials as necessary.

- **Report** – Evaluation of the information and data obtained by the Phase I ESA process outlined above and preparation of this Phase I ESA report documenting findings and providing opinions and conclusions regarding possible environmental impacts and RECs at the site.

1.4 Limitations and Exceptions

The environmental services described in this report have been conducted in general accordance with current regulatory guidelines and the standard-of-care exercised by environmental consultants performing similar work in the project area. No warranty, expressed or implied, is made regarding the professional opinions presented in this report.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ardent should be contacted if the reader requires any additional information or has questions regarding the content, interpretations presented, or completeness of this document.

The findings, opinions, and conclusions are based on an analysis of the observed site conditions and the referenced literature. It should be understood that the conditions of a site could change with time as a result of natural processes or the activities of man at the subject property or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ardent has no control. Ardent cannot warrant or guarantee that not finding indicators of any particular hazardous material means that this particular hazardous material or any other hazardous materials do not exist on the site. Additional research, including invasive testing, can reduce the uncertainty, but no techniques now commonly employed can eliminate the uncertainty altogether.

1.5 Special Terms and Conditions

As indicated in Section 13.1.5 of ASTM Standard E 1527-13, the following, which is not intended to be all inclusive, represents out-of-scope items with respect to a Phase I ESA: asbestos-containing building materials (ACMs), radon, lead-based paint (LBP), lead in drinking water, wetlands, regulatory compliance, cultural and historic risk, industrial hygiene, health and safety, ecological resources, endangered species, indoor air quality unrelated to releases of hazardous substances or petroleum products into the environment, biological agents, and mold. As part of our agreement with the client, Ardent visually assessed site buildings (if present) for possible ACMs, LBP, and mold. In addition, ASTM Standard E 2600-15 supplements the ASTM Standard E 1527-13 to include evaluation of VEC using Tier 1 screening.

This study did not include an evaluation of geotechnical conditions or potential geologic hazards. In addition, Ardent did not address interpretations of zoning regulations, building code requirements, or property title issues.

1.6 User Reliance

This report may be relied upon and is intended exclusively for use by the client, its partners, members, investors, affiliates, successors and assigns, and lenders. Any use or reuse of the findings, opinions, and/or conclusions of this report by parties other than the foregoing parties is undertaken at said parties' sole risk.

1.7 Physical Limitations

No physical limitations were encountered during the completion of this Phase I ESA report.

1.8 Data Gaps

No significant data gaps were noted during the preparation of this Phase I ESA report.

2 GENERAL SITE CHARACTERISTICS

The following sections describe the location and the current uses of the site and adjacent properties. A site location map is presented as Figure 1 and a site vicinity map is presented as Figure 2. Selected photographs of the site and surrounding properties are provided in Appendix A.

2.1 Location and Legal Description

The site is located in the city of Burbank, Los Angeles County, California (Figure 1). The site has been assigned the addresses of 2555, 2801, 2949, and 3001 North Hollywood Way and 3525 and 3615 North San Fernando Boulevard. The addresses of 2555, 2801, and 3001 North Hollywood Way were also assigned to portions of the larger property.

It should be noted that “North San Fernando Boulevard” is also referred to as “North San Fernando Road” on different maps and documents. Therefore, these street designations have been used interchangeably throughout this report.

The site is bounded as shown on Figure 2. The site has been assigned the Tax Assessor Parcel Numbers (APNs) of 2466-011-908, 2466-011-909-, 2466-011-911, 2466-028-907, 2466-028-908, and portions of 2466-011-910. A complete legal description is presented in the Preliminary Title Report provided in Appendix F. Site boundary information was obtained during the site reconnaissance and from information provided by the client.

2.2 Site Description and Current Site Uses/Operations

The following paragraphs present a description of the structures present at the site, the tenants currently occupying the site, the activities being conducted on-site, the heating and cooling systems utilized in the site building, the sewage disposal system, and the potable water provider for the site, if any.

2.2.1 Site Description

The subject site is an irregular shaped property that comprises approximately 60-acres. At the time of the site reconnaissance, the site was vacant land, with the exception of a portion of the northern side of the site which was used for truck parking and storage (Figure 2).

2.2.2 Occupants

The site buildings have been razed and the site is currently vacant land with the exception of a northern portion of the site. Affordable Storage located at 3615 North San Fernando Boulevard is used for truck parking and storage (Figure 2).

2.2.3 Heating and Cooling Systems

Future heating and cooling will likely be powered by electricity and/or natural gas provided by local municipalities.

2.2.4 Sewage Disposal/Septic Systems

Future sewage disposal will likely be provided by the city municipalities. There has been no indication that septic systems have been used at the site.

2.2.5 Potable Water

Potable water is provided to the site by the local water purveyor.

2.3 Adjacent Properties

In general, the site vicinity is used for commercial, office, and retail purposes. As noted above, the site was part of a larger property. The site is generally bounded to the north by San Fernando Road, to the south and west by Bob Hope Airport and to the east by Hollywood Way (Figure 2).

No evidence of aboveground storage tanks (ASTs), underground storage tanks (USTs) or other possible hazardous materials or wastes were noted being stored by off-site facilities along the site property line. These off site facilities would not be considered an environmental concern to the site.

3 USER PROVIDED INFORMATION

The following sections summarize information obtained by the user to assist the environmental professional in identifying the possibility of RECs in connection with the subject property, and to fulfill the user's responsibilities in accordance with Section 6 of ASTM Standard E 1527-13. A copy of the user questionnaire as completed by Mr. Michael Johnson of Overton Moore Properties is presented in Appendix B.

3.1 Current Title Information

A Preliminary Title Report provided by the client was reviewed by Ardent. The title report prepared by First American Title Company was dated November 2, 2015. According to the Preliminary Title Report, the current owner of the site is "The Bank of New York Trust Company, N.A., a national banking association, Trustee" A copy of the Preliminary Title Report is provided in Appendix F.

3.2 Environmental Liens or Activity and Use Limitations (AULs)

Mr. Johnson indicated that environmental liens or AULs against the subject property have been filed or recorded under federal, state, or local law. The OMP Purchase and Sale Agreement includes a deed restriction which restricts the site land use to commercial/industrial.

3.3 Specialized Knowledge

Mr. Johnson indicated that, for purposes of this assessment, the client has no specialized knowledge or experience pertaining to the site or the adjacent properties that is material to RECs in connection with the subject property.

3.4 Commonly Known or Reasonably Ascertainable Information

Mr. Johnson was aware of commonly known or reasonably ascertainable information pertaining to the site. Mr. Johnson referred to the previous environmental reports provided to Ardent for review.

3.5 Valuation Reduction for Environmental Issues

In a transaction involving the purchase of a parcel of commercial real estate, the user shall consider the relationship of the purchase price of the property to fair market value of the property if the property was not affected by hazardous substances or petroleum products. Mr. Johnson indicated the purchase price reflects fair market value.

3.6 Reason for Performing Phase I ESA

Ardent was retained to perform the Phase I ESA as part of the real estate due diligence as part of a possible purchase of the site.

3.7 Other User Provided Information

The client provided Ardent a number of environmental documents for review. Ardent also obtained copies of reports from regulatory agency files. The following presents a summary of our review. Figures 3 through 6 present site area designations and areas investigated, while Appendix C, D and E contain copies of pertinent information, key environmental reports and regulatory no further action (NFA) letters.

3.7.1 Historical Land Use

The site was used for agricultural purposes or vacant land from at least 1928 through the late-1930s. In the early-1940s, the Burbank Airport was constructed for use during World War II. Beginning in the early-1940s through the late-1990s, Lockheed used the site and site vicinity for aircraft research, manufacturing, warehouse, maintenance, and office purposes, mainly for the United States Department of Defense. This facility was known as “Plant B6” (Figure 2). In later years, the name of the airport was changed to Bob Hope Airport.

Site development included aircraft hangers, aircraft assembly and testing areas, maintenance areas, and office space. Operations at the Plant B6 included aircraft parking, final assembly and flight support, classified aircraft research and development, minor subassembly work, aircraft functional testing, and ground support. Supporting activities included cleaning and painting, minor tooling, welding, and parts and component machining. Chemicals and materials used and/or stored at the site to support these operations included aircraft fuels, biocides, descalers, fuel oils, gaso-

line, paints, solvents, acids, caustics, and plastic resins and hardeners. Fuels used at the site included automobile gasoline, aviation gasoline, Jet A, JP-4, JP-5, JP-7, JP-8, and other thermally stable jet fuels. Types of oils used included conventional motor oils, turbine lubricating oils, hydraulic system oils, and rust prevention oils. From 1941 to the late 1980s, approximately 65 buildings were constructed at the site (Figure 3).

In 1997 and 1998, most of the buildings, foundations, and pavement were demolished and removed from the site. The remaining on-site buildings were demolished in 2001.

As noted on Figure 2, a small swatch of land located in the mid-eastern portion of the site is not included as part of this assessment. This property was formerly known as the Pacific Airmotive property and was used for testing aircraft engines. Ardent recently completed a Phase I ESA for this property and is very familiar with the former property activities.

3.7.2 Historical Soil Investigations

The Site is located within the San Fernando Valley Groundwater Basin which has been designated by EPA as a Federal Superfund Site due to groundwater contamination associated with historical industrial land uses (Figure 5). The areas of groundwater contamination, designated as “Operable Units,” contain chemicals such as volatile organic compounds (VOCs), namely trichloroethene (TCE) and tetrachloroethylene (PCE), and other chemicals such as hexavalent chromium and 1,4-dioxane. The site lies within the “Burbank Operable Unit.” A number of investigations have been completed over the years, and based on the results, Lockheed has been named as one of many potentially responsible parties (PRPs) for contributing to the groundwater issues. Groundwater investigations completed at the site have shown elevated concentrations of PCE, TCE, and hexavalent chromium. Groundwater has been measured at the site at depths of approximately 220 feet below the ground surface (bgs) and flows in a southeasterly direction.

Since the early-1990s, the site has been investigated by the Regional Water Quality Control Board, Los Angeles Region (RWQCB) under its Well Investigation Program

(WIP) as part of the San Fernando Valley Groundwater Basin Superfund Site. Over the years, a number of investigations have been completed including the collection and analyses of soil, soil gas, and groundwater samples. Work has been completed under the direction and oversight of the RWQCB and Federal EPA

The earlier investigations and soil remediation were completed throughout the larger property with little documentation as to the location of these actions. Therefore, it was very difficult to determine whether these investigations were completed on- or off-site. Pertinent environmental information and key environmental reports are provided in Appendix C and D.

In 1991, McLaren Hart completed an in-depth environmental assessment of the site which presented a comprehensive study of the historical land use, operations at Plant B6, and areas of concern. Based on the results of this investigation, McLaren Hart identified a number of areas of concern (AOC) including underground storage tanks (USTs), aboveground storage tanks (ASTs), sumps, clarifiers, surface stains, process lines, degreasers, trenches and floor drains, and chemical storage and handling areas. This report refers to the site as “Parcel 2” of Plant B6. This report also refers to areas of concern relative to building numbers formerly associated with the larger property. According to McLaren Hart, 25 fuel USTs and 10 non-fuel USTs, sumps, and clarifiers were located throughout Parcel 2. According to McLaren Hart, some were removed and others were abandoned in-place.

From 1992 through 1996, Tetra Tech completed a number of soil gas investigations, soil sampling, and soil remediation on behalf of Lockheed to address the AOCs outlined by McLaren Hart. Based on the results of these investigations and remedial efforts, the RWQCB issued a number of NFA letters for particular areas of the site, stating that there was a low likelihood that the residual contaminants continue to contribute to the regional groundwater issue.

ENSR also completed independent assessments of the site and surrounding properties from 1996 through 1998 on behalf of the Airport Authority. ENSR also collected soil vapor and discrete soil analytical data. In 2001, ENSR completed an environmental summary which outlined the results of the previous investigations and

presented the subsequent NFA letters issued by the RWQCB for the larger property. At the time of the ENSR report, three additional reports had been recently submitted to the RWQCB and agency response had not yet been obtained. These included two reports by KW Brown & Associates, Inc. dated 1998 and 1999, and a 2001 investigation report by ENSR assessing thallium and chromium concentrations in soil samples at the site. The environmental summary report also presented the results of the soil and soil gas sampling completed throughout the site by Tetra Tech and ENSR. Based on these data, elevated concentrations of total VOCs, in the 100s of micrograms per liter, have been detected throughout the site. This report also indicated that Transite piping was known to exist beneath the site. No recommendations were provided in this report.

In the 2000s, groundwater samples from drinking water wells in the San Fernando Groundwater Basin began detecting emergent chemicals, including hexavalent chromium, 1,4-dioxane, and others. In 2013, the RWQCB issued a letter to Lockheed requesting soil sampling be completed in selected areas of the site for hexavalent chromium. The letter specifically outlined areas of the site and surrounding properties where soil sampling was to be conducted. Tetra Tech subsequently completed the work requested by the RWQCB and presented its results in a report dated December 2014. Tetra Tech designated the on-site AOCs as AOC 13, 14, 15, 16, 17, 18, and 19 (Figure 5). Laboratory results indicated no detectable to low concentrations of hexavalent chromium in soil samples analyzed. Based on these results, Tetra Tech concluded that these AOCs did not pose a significant source of hexavalent chromium to groundwater. The RWQCB concurred with these conclusions in a letter dated August 4, 2015. However, because other off-site AOCs still need further evaluation, the RWQCB has not issued a NFA letter for the site. This case is considered open with the RWQCB.

3.7.3 Evaluation of Historical Soil Investigations and Residual Contaminants

Ardent reviewed RWQCB records, which consisted of numerous boxes containing files for many Lockheed properties in the site vicinity, including the site and larger property. Based on our review, Ardent found numerous reports, which correlated to the NFA letters issued to the site. Based on our review and the fact that the site was

part of a larger facility, it was difficult to determine whether all of the reported underground features had been properly removed from the site. In 1998, a geophysical survey was completed throughout the site to address these unknowns. ENSR retained GeoVision to complete the geophysical survey to screen the site for metallic pipes, utility cables, large USTs (greater than 1,000-gallons), and other large buried metallic objects over most of the site. Based on the findings presented in the report, no large USTs (greater than 1,000-gallons) were identified in the area surveyed. Since the site was only screened for metallic objects, the extent of Transite piping was not further evaluated. Based on this information, it appears that the reported USTs and unknown underground features have been removed. It should be noted that a 509,000-gallon underground water reservoir is still apparently located at the site. The reservoir is reportedly located beneath former Building 333 in the mid-eastern portion of the site. The geophysical survey completed by GeoVision did not include this area. This feature would not be considered an environmental concern to the site.

In the 1990s, residual contaminants to be left in-place were evaluated by regulatory agencies based on the likelihood of migration to groundwater (i.e. for the protection of groundwater); with a lesser extent for the protection of human health. By the mid-2000s, agencies began evaluating in-place contaminants for the protection of groundwater and human health. Ardent completed a cursory evaluation of the chemical data of the residual contaminants that were allowed to be left in-place by the RWQCB in 1996. Ardent reviewed these data based on current regulatory guidelines based on human health risk criteria (i.e. Federal EPA Regional Screening Levels for industrial/commercial land use [RSLi] and Department of Toxic Substances Control Screening Levels for industrial/commercial land use [DTSC-SLi]). Based on our review, there is a low likelihood that the residual contaminants would pose a human health risk through dermal contact.

During completion of the earlier studies, soil gas investigations were completed as a screening tool to assess possible source areas of VOCs, and therefore, higher chemical detection limits were used. Current studies, used to evaluate human health risks, use much lower detection limits. Based on our evaluation of these historical da-

ta with respect to current human health risk guidelines, there is a high likelihood that residual contaminants could pose a potential threat to human health to future occupants through vapor intrusion.

3.7.4 Groundwater Investigations

As stated above, the site lies within the San Fernando Valley Groundwater Basin Superfund Site and Lockheed has been named as a RP to the regional VOC groundwater issue (Figure 6). Groundwater investigations have been ongoing at the Plant B6 property and other Lockheed facilities in the Burbank area since 1986. These earlier investigations were completed to assess the extent of VOC-impacted groundwater. In later years, emergent chemicals, including hexavalent chromium, were detected in drinking water wells. Based on this information, additional soil investigations were required to further assess possible source areas of these chemicals.

Currently, there are three groundwater monitoring wells located on the site (Figure 5). Lockheed conducts groundwater monitoring of these and other wells in the site vicinity on an annual basis. Most recently, groundwater has been measured at depths of approximately 220 feet bgs and flows in a southeasterly direction. Laboratory results have indicated elevated concentrations of VOCs, namely PCE, TCE, and hexavalent chromium in groundwater beneath the site. Work has been completed in general accordance with RWQCB Cleanup and Abatement Order No. 87-161 dated December 1987.

3.7.5 Ardent's Summary of Review

Based on review of available documents, Ardent presents the following summary.

- The site was investigated in the early- to mid-1990s for possible VOCs source areas as part of the RWQCB WIP associated with the San Fernando Valley Groundwater Basin Superfund Site. Although Lockheed has been designated as a PRP for contributing VOCs to groundwater as part of its former regional operations, investigations completed on-site did not show a significant risk of VOCs to groundwater. Based on these investigations and subsequent soil remediation, the RWQCB has issued NFA letters for soil only.

- The VOC soil investigations were completed to assess whether a threat to groundwater existed. Since completion of this work, agencies typically require investigation efforts to also address possible human health risks (i.e. through dermal contact and vapor intrusion). Based on the results of soil and soil gas samples collected in the mid- to late-1990s, the residual contaminants do not apparently present a human health risk through dermal contact, however, a vapor intrusion issue may be present at the site.

- Based on the results of the subsurface investigations and subsequent geophysical survey, no USTs or other unknown subsurface features appear to be located at the site. A large underground water reservoir is apparently still present in the mid-eastern portion of the site in the vicinity of former Building 333.

- In 2013, additional soil investigations were completed to assess whether the site had contributed to the regional hexavalent chromium issue in groundwater. Laboratory results of soil samples collected throughout the site have shown low concentrations of hexavalent chromium. Based on this information, the RWQCB has concluded that there is a low likelihood that the site has contributed to the chromium issue. Because additional investigations are needed at other Lockheed properties in the site vicinity, this case is still considered open with the RWQCB.

- Three groundwater monitoring wells are located on-site and are part of a larger groundwater monitoring program currently being completed by Lockheed on an annual basis.

- Asbestos-containing Transite piping is reportedly located beneath the site; the extent of which is unknown.

4 PHYSICAL SETTING

The following sections include discussions of topographic, geologic, and hydrogeologic conditions in the vicinity of the site, based upon our document review and our visual reconnaissance of the site and adjacent areas.

4.1 Site Topography

Based on the review of the United States Geological Survey (USGS) 7.5 Minute Series, Burbank, California, Topographic Quadrangle Map dated 1994, photorevised from 1966, the site has an approximate elevation of 715 feet above mean sea level (msl) and slopes to the southeast.

4.2 Geology

The site is located in the western portion of the Transverse Range Geomorphic Province, on the northwestern structural block of the Los Angeles basin. The Verdugo Mountains, a surface expression of the Verdugo Faults within the San Fernando Valley, are located approximately one-mile northeast of the site. The San Fernando Valley contains up to 2,000 feet of alluvial sediments resting on mid-Tertiary marine sedimentary beds and volcanics. The site is underlain by Quaternary age sand and gravels derived from crystalline and sedimentary rocks in the surrounding mountains.

4.3 Oil and Gas Maps

Based on a review of the Division of Oil, Gas, and Geothermal Resources (DOGGR) on-line well finder the site does not lie in an active oil field and no oil wells have been drilled on the site or in the immediate site vicinity.

4.4 Site Hydrology

The following sections discuss the site hydrology in terms of both surface waters and groundwater.

4.4.1 Surface Waters

No natural surface water bodies, including ponds, streams, or other bodies of water are present on or adjacent to the site.

4.4.2 Groundwater

As noted above, the site is located within the San Fernando Valley Groundwater Basin which has been designated by EPA as a Federal Superfund Site due to groundwater contamination associated with historical industrial land uses. The areas of groundwater contamination, designated as “Operable Units,” contain chemicals such as VOCs, namely TCE and PCE, and other chemicals such as hexavalent chromium and 1,4-dioxane. The site lies within the “Burbank Operable Unit.” A number of investigations have been completed over the years, and based on the results, Lockheed has been named as one of many PRPs for contributing to the groundwater issues. Groundwater investigations completed at the site have shown elevated concentrations of PCE, TCE, total chromium and hexavalent chromium.

Currently, there are three groundwater monitoring wells located on-site, designated B-6-CW06, B-6-CW09, and B-6-CW10 (Figure 3). These wells are part of a larger groundwater monitoring program that includes additional off-site wells. These wells are monitored by Lockheed on an annual basis. Groundwater has been measured at a depth of approximately 220 feet bgs and flows in a southeasterly direction.

Because these wells are part of a regional Superfund Site, if these wells are required to be moved or modified during redevelopment activities, authorization must be obtained from the EPA before abandonment/modification can be completed. Typically, the well owner/operator would obtain EPA approval.

5 HISTORICAL LAND USE

Ardent conducted a historical record search for both the site and surrounding areas. This included a review of one or more of the following sources that were found to be both reasonably ascertainable and useful for the purposes of this Phase I ESA: historical aerial photographs, historical fire insurance maps, historical city directories, building permits and plans, topographic maps, property tax records, zoning/land use records, and a review of prior environmental assessment reports regarding the site. Copies of historical land use information are provided in Appendix F.

5.1 Summary of Historical Land Use of the Property

The site was used for agricultural purposes or vacant land from at least 1928 through the late-1930s. From at least 1944 through the 1990s, the site was used for aircraft research, manufacturing, warehouse, maintenance, and office purposes. The site buildings were razed from 1997 through 2001. The site is currently vacant land, with the exception of a small portion of the northern property which is used by a company for long-term storage of automobiles and miscellaneous personal items in storage pods.

5.2 Summary of Historical Land Use of Adjoining Properties

The site vicinity was used for agricultural purposes, vacant land, and some residential purposes from at least 1928 through the late-1930s. By the early-1940s, properties in the site vicinity started to be developed for commercial, industrial, and some residential purposes.

5.3 Historical Aerial Photographs

Historical aerial photographs for selected years between 1928 and 2012 were provided by EDR. The following presents a summary of our review.

- **1928 and 1938 –** The site and properties in the site vicinity appeared to be used for agricultural purposes or vacant land. The northern portion of the site appeared to be developed with residential structures. The Southern Pacific Railroad spurs were noted north of the site.

- **1952, 1954, 1964, 1977, 1981, 1989, and 1994 –** The site appeared to be developed as part of the larger property with various commercial buildings. In the 1952, 1954, and 1964 photographs, the eastern and southern portions of the site appeared to be used to park small aircrafts. Adjacent properties west and south of the site were developed as part of the Bob Hope Airport.

- **2002, 2005, 2009, 2010, and 2012 –** The site appeared to be vacant land. Portions of the northern portion of the site appeared to be used as a parking lot.

5.4 Building Permits

Building permits for the site are issued and maintained at by the City of Burbank Building Department (BBD). Building permits for the addresses of 2555, 2801, 2949, and 3001 North Hollywood Way were found. The following presents a summary of the permits reviewed.

- **2555 North Hollywood Way:** Building permits associated with this address not only contained information associated with the larger property but it appears that this address was also recently assigned to a new shopping center development located further south of the site. The building permits associated with the new development were dated 2012 through 2014. Building permits associated with the site and larger property were dated 1969 through 1997 and included building repairs, alterations, electrical, plumbing, fire sprinklers, mechanical, and foundation repair. The permits reviewed were issued to Lockheed. A certificate of occupancy issued to owner Lockheed California Company for a re-located office building was dated February 28, 1978. A grading permit dated November 10, 1999 was issued to Lockheed for the “exploratory excavation to evaluate the lateral extent of chemicals in soil.” The permit was issued to contractor Tetra Tech.

- **2801 North Hollywood Way:** Building permits associated with this address also contained information associated with the larger property. Building permits associated with the site and larger properties were dated 1944 through 1997 and included building repairs, alterations, electrical, plumbing, fire sprinklers, mechanical, and heating and ventilation. The permits reviewed were issued to Lockheed. Building permits dated May 29, 1944 were for the construction of an aircraft assembly building. The owner listed was Lockheed Aircraft Corporation. Building permits dated 1996 through 1999 were for the demolition of buildings.

- **2949 North Hollywood Way:** A permit dated July 16, 2014 was for the installation of a temporary power pole. The permit was issued to owner "Arman Naringan." A letter from the city of Burbank dated September 10, 1975 indicates that Lockheed Building No. 326 was issued the address of 2949 North Hollywood Way.

- **3001 North Hollywood Way:** A permit dated July 16, 2014 was for the installation of a temporary power pole. The permit was issued to owner "Arman Naringan."

5.5 Historical Topographic Maps

Historical topographic maps were provided by EDR for review. The maps were dated 1896, 1900, 1901, 1902, 1920, 1926, 1953, 1966, 1972, and 1994. The 1896, 1900, 1901, 1902, 1920, and 1926 maps did not show site specific details. In the 1953 map, the central and southern portions of the site were developed with at least ten commercial structures while the northern side of the site was developed with various smaller structures along North San Fernando Boulevard. In the 1966, 1972, and 1994 maps the former site buildings were noted. Properties in the surrounding vicinity, further north, south, and east of the site were shaded pink indicating these areas was urban development.

5.6 Interviews

Interviews were conducted by Ardent with key site personnel (e.g., past and present owners, operators, and/or occupants) with the objective of obtaining information indicating RECs in connection with the subject property. The following are the site personnel interviewed for purposes of this assessment.

5.6.1 Interview with Owner

The owner of the site was not available for an interview.

5.6.2 Interview with Site Manager

The site manager was not available for an interview.

5.6.3 Interviews with Occupant

The majority of the site was vacant land at the time of the site reconnaissance, therefore no occupants were present.

5.6.4 Interviews with Local Government Officials

Representatives of local regulatory agencies were interviewed during completion of this report. The information obtained is presented throughout this report.

5.6.5 Interviews with Others

A Burbank Airport Authority Police officer escorted Ardent personnel during its site reconnaissance. Ardent interviewed the officer during the site reconnaissance. No other interviews were conducted during this Phase I ESA.

5.7 Previous Reports and Documents

As discussed in Section 3.7, previous environmental reports were provided to Ardent for review.

6 SITE RECONNAISSANCE

The site and site vicinity reconnaissance was performed by Ardent on November 10, 2015. The site reconnaissance involved a walking tour of the site and visual observations of adjoining properties. At the time of the site reconnaissance, the weather was clear and sunny. Selected photographs taken during these activities are included in Appendix A.

At the time of the site reconnaissance, most of the site was vacant land, except for a northern portion of the site located at 3615 North San Fernando Boulevard, which was occupied by Affordable Storage, a truck parking lot and storage facility. The Affordable Storage facility was used to store vehicles and trucks for long term purposes, and also used storage pods to store miscellaneous personnel items. No vehicle maintenance was noted.

6.1 Use and Storage of Hazardous Substances and Petroleum Products

The use and storage of hazardous substances and petroleum products was not observed during the site reconnaissance.

6.2 Storage and Disposal of Hazardous Wastes

The storage and disposal of hazardous wastes was not observed at the time of the site reconnaissance.

6.3 Unidentified Substance Containers

No unidentified substance containers were observed on site during the site reconnaissance.

6.4 Aboveground Storage Tanks (ASTs) and Underground Storage Tanks (USTs)

During the site reconnaissance, Ardent observed an approximately 100 to 150-gallon AST located within a concrete lined basement enclosure. The basement was approximately 10 to 15 feet deep. Based on representatives at the Airport Authority, the basement enclosure was formerly associated with a Pump House that was located beneath former Building 339 and was connected to the 509,000-gallon water reservoir which was located beneath former Building 333. The AST located within the basement possibly contained fuels for the water pump. No evidence of leaks or stains were observed. These features would not be considered an environmental concern to the site.

6.5 Evidence of Releases

Evidence of chemical releases on the site, such as odors, stressed vegetation, stains, leaks, pools of liquids, and spills, was not observed during the site reconnaissance.

6.6 Polychlorinated Biphenyls (PCBs)

Historically, PCBs (a group of hazardous substances and suspected human carcinogens) were widely used as an additive in cooling oils for electrical components. Typical sources of PCBs can include electrical transformers. No electrical transformers were noted on the site.

6.7 Suspect Asbestos-Containing Building Materials (ACMs)

The manufacture of most ACMs in the United States was phased out in the 1970s, ending in 1980. Previously manufactured ACMs that were in stock continued to be used through approximately 1981. Some non-friable ACMs are still manufactured (e.g. roofing mastics). In general, buildings constructed after 1981 have a negligible potential to contain friable ACMs and a low potential for most non-friable ACMs, with the exception of roofing materials. Since the site is currently vacant, the presence of ACMs is not likely. However, as noted in Section 3.7, previous investigations indicated that there were known asbestos-containing Transite piping located beneath the site.

6.8 Lead Based Paint (LBP)

The manufacture of LBP was phased out in approximately 1978. The site is currently vacant land, therefore LPB is not likely present.

6.9 Indications of Water Damage or Mold Growth

Since no structures are present on-site, no visual indications of water damage or mold growth were observed at the site during the site reconnaissance.

6.10 Wastewater Systems

No wastewater systems were observed during the site reconnaissance.

6.11 Stormwater Systems

Storm drains were noted throughout the site (in paved areas). No other stormwater systems were noted during the site reconnaissance.

6.12 Wells

One on-site monitoring well (B-6-CW06) was observed on the northeastern side of the property within a parking lot area (3525 North San Fernando Boulevard). The groundwater monitoring well consisted of three well boxes, indicating the well was perforated at different zones. According to reports reviewed, up to three groundwater monitoring wells are located on the site in the locations shown on Figure 3.

6.13 Other Subsurface Structures

Ardent also observed a vent pipe along the access road, in the general vicinity of the water reservoir. Although the use of the vent pipe is unknown, based on the location with respect to the 509,000-gallon water reservoir, it is our assumption that this vent pipe is associated with this feature. . This feature, therefore, would not be considered an environmental concern to the site.

No other subsurface structures (e.g., sumps, vaults, oil/water separators, and other surface impoundments) were noted during the site reconnaissance.

6.14 Other Issues

No other on- or off-site issues of environmental concern were noted.

7 ENVIRONMENTAL DATABASE SEARCH

A computerized environmental information database search was performed by EDR for this Phase I ESA on November 4, 2015. The database search included federal, state, local, and tribal databases. A summary of the environmental databases searched, their corresponding search radii, and number of noted facilities of environmental concern is presented in Appendix G. In addition, a description of the assumptions and approach to the database search is provided in Appendix G. The review was conducted to evaluate whether the site or properties within the vicinity of the site have been reported as having experienced significant unauthorized releases of hazardous substances or other events with potentially adverse environmental effects.

Five unmapped properties, due to poor or inadequate address information, were identified in the database report. Two of these listings, the San Fernando Valley Groundwater Basin and Pacific Airmotive Corporation, have been identified and are discussed below. Based on the information provided for the remaining properties, and/or the types of databases on which the properties are listed, there is a low likelihood that the environmental integrity of the site has been adversely impacted by these off-site sources.

The following paragraphs describe the databases that contain noted properties of environmental concern, and include a discussion of the regulatory status of the facilities and potential environmental impact to the subject site.

As previously discussed, the site was assigned the addresses of 2555, 2801, 2949, and 3001 North Hollywood Way and 3525 and 3615 North San Fernando Boulevard. The addresses of 2555. 2801, and 3001 North Hollywood Way were also assigned to portions of the larger property. The site was listed on numerous databases listed below, however Ardent could not identify whether the listings were associated with the site or the larger property.

7.1 Federal National Priorities List (NPL): Distance Searched – 1 mile

The NPL is the USEPA's database of uncontrolled or abandoned hazardous waste properties identified for priority remedial actions under the Superfund program. This database includes proposed NPL listings.

The site address is not noted on the EDR report as part of the NPL. The site lies within the San Fernando Valley Groundwater Basin. Portions of the San Fernando Groundwater Basin have been impacted with chlorinated solvents due to historical industrial activities. The site lies within the Burbank Operable Unit of the San Fernando Valley Groundwater Basin.

A Cleanup and Abatement Order was issued in 1987 to the responsible parties of the site and larger property. The responsible parties included Lockheed. The Cleanup and Abatement Order was issued by the RWQCB on behalf of the EPA to cleanup and abate VOC-contamination of soil and groundwater associated with the EPA San Fernando Valley Superfund Site. Lockheed has retained liability of the groundwater responsibilities.

7.2 Federal Delisted NPL: Distance Searched – 0.5 mile

This database contains delisted NPL properties under the Superfund program. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the USEPA uses to delete properties from the NPL. In accordance with 40 Code of Federal Regulations (CFR) 300.425. (e), properties may be deleted from the NPL where no further response is appropriate.

Neither the site nor properties located within a 0.5-mile radius from the site were listed on this database.

7.3 Federal Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) List: Distance Searched – 0.5 mile

The CERCLIS database contains properties which are either proposed or on the NPL and properties which are in the screening and assessment phase for possible inclusion on the NPL. This database also includes properties listed as No Further Remedial Action Planned (NFRAP).

Although a specific site address was not listed, as noted above, the site and larger property have been listed as a responsible party to the San Fernando Valley Groundwater Basin Superfund Site. Portions of the San Fernando Valley Groundwater Basin are listed on the CERCLIS database.

Five other facilities located hydraulically cross- and downgradient from the site were listed on the database as NFRAP.

7.4 Federal Corrective Action Report (CORRACTS): Distance Searched – 1 mile

The USEPA maintains this database of Resource Conservation and Recovery Act (RCRA) facilities that are undergoing corrective action. A corrective action order is issued when there has been a release of hazardous waste or constituents into the environment from a RCRA facility.

The site was not listed on this database. One facility located approximately 0.37-mile east to southeast of and cross- to downgradient from the site was listed. Based on the distance and direction of this facility from the site, and depth to groundwater, this facility would not be considered an environmental concern to the site.

7.5 Federal Resource Conservation and Recovery Act (RCRA) Treatment, Storage, and Disposal (TSD) Facilities List: Distance Searched – 0.5 mile

The RCRA TSD database (non-CORRACTS) is a compilation by the EPA of facilities that report generation, storage, transportation, treatment, or disposal of hazardous waste.

The site was not listed on this database. One facility located approximately 0.37-mile east to southeast of and cross- to downgradient from the site was listed. Based on the distance and direction of this facility from the site, and depth to groundwater, this facility would not be considered an environmental concern to the site.

7.6 Federal RCRA Generators List: Distance Searched – Site and Adjoining Properties

This list identifies sites that generate hazardous waste as defined by RCRA. Inclusion on this list is for permitting purposes and is not indicative of a release.

The site was not listed on this database. Adjoining property listed as “UNC Pacific Airmotive” at 3003 North Hollywood Way as a large generator of hazardous waste. No violations were noted. Listing on this database is not indicative of a release.

7.7 Federal Institutional Control/Engineering Control Registries: Distance Searched – Site

These lists identify properties with engineering and/or institutional controls. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or affect human health. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on the site. Deed restrictions are generally required as part of the institutional controls.

Although the site is not listed, the San Fernando Valley Groundwater Basin is listed on these databases. Lockheed has been identified as a RP.

7.8 Federal Emergency Response Notification System (ERNS) List: Distance Searched – Site

The ERNS database, maintained by the USEPA, contains information on reported releases of oil and hazardous substances.

Site was not listed on this database.

7.9 Federal Brownfield List: Distance Searched – 0.5 mile

The USEPA Brownfield database, entitled Targeted Brownfield’s Assessments (TBA), lists properties for which the USEPA is providing funding and/or technical support for environmental assessments and investigations. The objective of the TBA is to promote cleanup and redevelopment of undesirable properties with environmental issues.

Neither the site nor properties located within a 0.5-mile radius from the site were listed on this database.

7.10 State Calsites Database (Calsites) or State-Equivalent CERCLIS: Distance Searched – 1 mile

The Calsites database, also known as the State-equivalent CERCLIS, is maintained by the Cal-EPA DTSC. This database contains information on AWP and both known and potentially contaminated properties. Two-thirds of these properties have been classified, based on available information, as needing no further action (NFA) by the Department of Toxic Substances Control (DTSC). The remaining properties are in various stages of review and remediation to determine if a problem exists. These properties are presented by EDR on the EnviroStor databases.

The site was listed on this database under the address of 2555 North Hollywood Way. The site was listed due to the groundwater issues previously discussed in Section 3.7.

Sixteen additional facilities were listed; three of which were listed with a regulatory status of closed case. The remaining thirteen facilities were located between approximately 0.002-mile and 0.90-mile hydraulically down- to crossgradient from the site. Based on the distance, direction, depth to groundwater, and/or regulatory status, these facilities would not be considered an environmental concern.

7.11 State Solid Waste Landfill Sites (SWLF): Distance Searched – 0.5 mile

The SWLF database consists of open and closed solid waste disposal facilities and transfer stations. The data comes from the Integrated Waste Management Board's Solid Waste Information System (SWIS) and the SWRCB Waste Management Unit Database (WMUD) database.

Neither the site nor properties located within a 0.5-mile radius from the site were listed on this database.

7.12 State Leaking Underground Storage Tank (LUST) Lists: Distance Searched – 0.5 mile

The LUST information system is obtained from by the SWRCB and the RWQCB (Regional Water Quality Control Board).

The site was not listed on this database. Nineteen facilities were listed on this database within the search radius. Seventeen of the nineteen facilities listed had a regulatory status of "case closed." The remaining two facilities were located hydraulically down- and crossgradient, approximately 0.002-mile east and 0.34-mile southeast of the site. Based on the distance, direction, depth to groundwater, and/or regulatory status, these facilities would not be considered an environmental concern to the site.

7.13 State Underground Storage Tank (UST) and Aboveground Storage Tank (AST) Registration List: Distance Searched – Site and Adjoining Properties

UST and AST databases are provided by the SWRCB. Inclusion on these lists is for permitting purposes and is not indicative of a release.

The site and adjoining properties were not listed on the AST databases. The site was listed on the Statewide Environmental Evaluation and Planning System (SWEEPS) database, as Lockheed Plant B6 at 2801 North Hollywood Way. The listing indicated USTs varying in size from 1,500-gallon to 15,000-gallon containing diesel fuel, jet fuel, and water/oil were located at the site. Based on a review of regulatory records, these USTs were formerly located on the larger property.

7.14 State Voluntary Cleanup Programs (VCPs): Distance Searched – 0.5 mile

The State VCP database lists low threat level properties with either confirmed or unconfirmed releases. Project proponents have requested that the DTSC oversee investigation and/or cleanup activities and have agreed to provide coverage for DTSC's costs.

Neither the site nor facilities located within the search radius were listed on this database.

7.15 Indian Reservations: Distance Searched – 1 mile

This list depicts Indian administered lands of the United States that have an area equal to or greater than 640-acres. No Indian Reservations were listed within a 1-mile radius from the site. Due to the lack of Indian Reservations within 1-mile of the site, other tribal database listings required by ASTM and AAI were deemed not applicable. These listings would include tribal-equivalent NPL, CERCLIS, Landfill and/or Solid Waste Disposal, LUST, UST and AST Registrations, Institutional Control/Engineering Control Registries, VCPs, and Brownfields.

7.16 Other Non-ASTM and AAI Database: Distance Searched – Site

Other databases were included in the EDR Report, but are not required by ASTM or AAI. Based on our review of these databases, the site was listed on the following databases.

7.16.1 Facility Index System Identification Program Summary Report (FINDS)

The FINDS database contains information obtained from other regulatory databases. The FINDS database is maintained by EPA.

Although the site is not listed, the San Fernando Valley Groundwater Basin is listed on these databases. Lockheed has been identified as a RP.

7.16.2 Historical Hazardous Waste and Substances Sites List (HIST CORTESE)

The HIST CORTESE database contains information obtained from other the regulatory databases.

The site and larger property were listed as “Lockheed Plant B-6” at 2801 North Hollywood Way due to its listing on other regulator databases.

7.16.3 California Bond Expenditure Plan (CA BOND EXP. PLAN)

This database contains information obtained from the RWQCB.

The site and larger property were listed under the address of 2555 North Hollywood Way under the name “Lockheed-Burbank Plants A-1, B-1, B-6, and C-1.” As previously discussed, the site has been named a RP for the San Fernando Groundwater Basin Superfund Area 1. The listing indicates the PRP will be providing costs for remediation of the site cleanup under the oversight of the RWQCB.

8 VAPOR ENCROACHMENT CONDITION (VEC)

Ardent completed a VEC study for the site using Tier 1 criteria as recommended by ASTM E 2600-15. The Tier 1 screening identifies surrounding facilities that pose a possible vapor intrusion source to the site based on the results of the Phase I ESA investigations and certain criteria outlined by ASTM. These criteria include a certain distance from the target site (referred to by ASTM as within the “area of concern”); the types of chemicals used (referred to by ASTM

as the “chemicals of concern”); and a plume test to determine if the plume associated with a source of contamination is close enough to the site to impact indoor air quality. Based on our review of regulatory records, files, databases, client furnished data, and site reconnaissance activities, the site would be considered a possible risk for vapor intrusion.

As discussed in Section 3.7, soil vapor samples collected in the mid-1990s have shown elevated concentrations of PCE exceeding screening levels. Based on this information, a current soil gas survey should be completed to obtain recent data. The laboratory results should be evaluation to assess whether engineering controls in new buildings are necessary.

9 REGULATORY RECORDS REVIEW

The South Coast Air Quality Management District (SCAQMD), RWQCB, Los Angeles County Department of Public Health, Environmental Programs (LACDPH), Los Angeles County Department of Public Works (LACDPW), the Department of Toxic Substances Control (DTSC), the City of Burbank Fire Department (BFD) are the lead regulatory agencies for permitting and regulating USTs, ASTs, LUST cases, and/or facilities that use, store, or generate hazardous waste or hazardous materials. Ardent requested file reviews using the site addresses of 2801, 2949, and 3001 North Hollywood Way and 3525 and 3615 North San Fernando Boulevard.

9.1 South Coast Air Quality Management District (SCAQMD)

Records regarding the site were reviewed using the SCAQMD FIND website. The site address of 2801 and 2555 North Hollywood Way was listed. The site was listed under the following Facility Names and ID’s:

- Lockheed Advanced Dev Co (2801 North Hollywood Way) was listed under Facility ID 67709 with an “active” facility status. The facility was listed under the description of “transportation equipment and sales.” One permit dated July 6, 1989 was issued for the operation of a drying oven. Two violations dated July 11, 1989 and August 8, 1989 for not having a proper permit for the use of a spray booth. Both violations were reportedly corrected on February 28, 1990.

- Lockheed Advanced Dev Co (2801 North Hollywood Way) was listed under Facility ID 67389 with a facility status of “out of business.” The facility was listed under the description of “transportation equipment and sales.” No equipment permits, notices of violations or notices of compliance were listed.

- Lockheed Advanced Dev Co (2801 North Hollywood Way) was listed under Facility ID 67834 with a facility status of "out of business." The facility was listed under the description of "transportation equipment and sales." No equipment permits, notices of violations or notices of compliance were listed.

- Lockheed Air Terminal Inc. (2801 North Hollywood Way) was listed under Facility ID 85109 with a facility status of "out of business." No equipment permits, notices of violations or notices of compliance were listed.

9.2 Regional Water Quality Control Board, Los Angeles Region (RWQCB)

Ardent searched the SWQCB GeoTracker website for possible files at the RWQCB regarding the site. According to GeoTracker, the site address of 2801 North Hollywood Way was listed on this database as "Lockheed Plant B-6" a closed leaking underground storage tank (LUST) case as of October 30, 1996. The GeoTracker database, however, had no additional information regarding the case.

The site address of 2555 North Hollywood Way was also listed on this database as "Lockheed Plant A-1" and "Lockheed Plant A-1-F" as closed LUST cases as of May 1, 1994. Additional information regarding the listings was not provided on the GeoTracker database. Based on the title of the listings (Lockheed Plant A-1 and Lockheed Plant A-1-F), these listings are likely associated with the larger property and not the site.

Ardent also requested records regarding the site from the RWQCB. The RWQCB files consisted of numerous boxes containing files for many Lockheed properties in the site vicinity, including the site. Ardent obtained copies of the earlier subsurface investigation reports completed by Tetra Tech as part of the soil closure activities. These reports were reviewed and summarized in Section 3.7.

9.3 Los Angeles County Department of Public Works (LACDPW)

Records regarding the site were requested from the LACDPW. According to the LACDPW, records regarding properties in Burbank were forwarded to the City of Burbank Fire Department (BFD).

9.4 Los Angeles County Department of Public Health (LACDPH)

Records regarding the site were requested from the LACDPH. According to the LACDPH, no records regarding the site were found.

9.5 City of Burbank Fire Department (BFD)

The BFD is the lead regulatory agency for UST and industrial waste closure activities. Records regarding the site were requested from the BFD. Records regarding the site addresses of 2555, 2801, and 3001 North Hollywood Way and 3615 North San Fernando Road were found. The following presents a summary of these records.

- **2555 North Hollywood Way:** Records associated with this address included both the site and larger property. Most of the records associated with this address were not regarding the site. Records regarding the site included a permit dated June 20, 1972 to install a 12,000-gallon liquefied petroleum gas UST west of Building 322 within Plant B-6. A permit dated April 20, 1994 was issued to remove "8" USTs from the "Lockheed Facility."

- **2801 North Hollywood Way:** Most of the records associated with this address were regarding the removal, remediation, and closure of seven USTs located within the larger property (northwest of the site). No records regarding the site were noted.

- **3001 North Hollywood Way:** Hazardous materials inventory summaries dated April 9, 1991, February 1, 1995, November 15, 1996, January 27, 1997 indicated the site contained "electrical equipment in station" and indicated the following hazardous materials were stored "insulating oil, solvent refined hydrotreated middle distillate, butylated hydroxyl toluene, and severely hydrotreated light naphthenic distillate." An investigation report dated October 10, 1999 indicated "Tulare electrical distribution yard is gone, this was located on Lockheed Property Plant B6."

- **3615 North San Fernando Road:** A permit dated February 12, 1979 was for the installation of an 8,000-gallon diesel fuel UST. A permit dated April 8, 1987 issued by the LACDPW was for the removal of the 8,000-gallon diesel fuel UST. A note on the permit indicated the UST was removed on April 12, 1987. A report called "Preliminary Soil Contamination Exploration Abandonment of Underground Storage Tank" by Engineering Geology dated May 11, 1987 outlined the soil sampling completed beneath the former UST. Based on the findings, no petroleum hydrocarbons were noted. Although a closure letter was not noted, based on the results of the sampling completed beneath the UST excavation, the former 8,000-gallon UST would not be considered an environmental concern to the site.

9.6 Department of Toxic Substances Control (DTSC)

Ardent searched the DTSC Envirostor website for records regarding the site. The site was listed on the Envirostor database as "Lockheed Aeronautical Systems Co" under the address of 2555 North Hollywood Way. The listing was for a tiered permit. No additional information regarding the tiered permit was provided on the website.

Ardent has also requested records regarding the site from the DTSC. Records reviewed were dated 1987 through 1995 and were regarding the site and other Lockheed properties in the site vicinity. Records included correspondence associated with tiered permits for wastewater treatment units. Reports dated February 22, 1995, indicated the closure of wastewater treatment units at plants including A-1, B-1, and B-6 (site). No additional records were noted.

10 FINDINGS, OPINIONS AND CONCLUSIONS

Based upon the results of this Phase I ESA the following findings, opinions and conclusions are provided.

10.1 Findings and Opinions

The following presents a summary of findings and opinions associated with this Phase I ESA performed for the subject property, including known or suspect RECs, controlled RECs, and de minimus environmental conditions (i.e., conditions that generally do not present a material risk of harm to public health or the environment).

- The site was used for agricultural purposes or vacant land from at least 1928 through the late-1930s. From at least 1944 through the 1990s, the site was used for aircraft research, manufacturing, warehouse, maintenance, and office purposes. The site buildings were razed from 1997 through 2001. The site is currently vacant land, with the exception of a small portion of the northern property which is used by a company for long-term storage of automobiles and miscellaneous personal items in storage pods.

- The site is located within the San Fernando Valley Groundwater Basin which has been designated by EPA as a Federal Superfund Site due to groundwater contamination associated with historical industrial land uses. The areas of groundwater contamination, designated as “Operable Units,” contain chemicals such as VOCs, namely TCE and PCE, and other chemicals such as hexavalent chromium and 1,4-dioxane. The site lies within the “Burbank Operable Unit.” A number of investigations have been completed over the years, and based on the results, Lockheed has been named as one of many PRPs for contributing to the groundwater issues. Groundwater investigations completed at the site have shown elevated concentrations of PCE, TCE, and hexavalent chromium. Groundwater has been measured at the site at depths of approximately 220 feet below the ground surface (bgs) and flows in a southeasterly direction. Currently, there are three groundwater wells located on the site and groundwater monitoring is completed by Lockheed on an annual basis.

- The site was investigated in the early- to mid-1990s for possible VOC source areas as part of the RWQCB WIP associated with the San Fernando Valley Groundwater Basin Superfund Site. Investigations began in 1991 with an in-depth environmental assessment of the site presenting a comprehensive study of the historical land use, operations, and areas of concern. Based on the results of this investigation, at least 35 underground features consisting of 25 fuel USTs and 10 non-fuel USTs, sumps, and clarifiers were formerly located on-site. A number of AOCs were identified including USTs, ASTs, sumps, clarifiers, surface stains, process lines, degreasers, trenches and floor drains, and chemical storage and handling areas. These AOCs were subsequently investigated, impacted soils remediated, and USTs and underground features removed. Based on these investigations, NFA letters were issued by the RWQCB in 1996.

- As part of this Phase I ESA, Ardent reviewed these environmental reports and agency NFA letters. Based on our review and the fact that the site was part of a larger facility, it was difficult to determine whether all of the reported underground features had been properly removed from the site. In 1998, a geophysical survey was completed throughout the site to address the status of the underground features. Based on the results of the geophysical survey, no anomalies indicative of a UST were discovered. Based on this information, it appears that the reported USTs and underground features have been removed. In the 1990s, residual contaminants to be left in-place were evaluated by regulatory agencies based on the likelihood of migration to groundwater (i.e. for the protection of groundwater); with a lesser extent for the protection of human health. By the mid-2000s, agencies began evaluating in-place contaminants for the protection of groundwater and human health. Ardent completed a cursory evaluation of the chemical data of the residual contaminants that were allowed to be left in-place by the RWQCB in 1996. Ardent reviewed these data based on current regulatory guidelines based on human health risk criteria. Based on our review, there is a low likelihood that the residual contaminants would pose a human health risk through dermal contact.

- During completion of the earlier studies, soil gas investigations were completed as a screening tool to assess possible source areas of VOCs, and therefore, higher chemical detection limits were used. Current studies, used to evaluate human health risks, use much lower detection limits. Based on our evaluation of these historical data with respect to current human health risk guidelines, there is a high likelihood that residual contaminants could pose a potential threat to human health to future occupants through vapor intrusion.

- In the 2013, the RWQCB again requested investigations be completed at the site and surrounding properties to investigate possible source areas of hexavalent chromium that began being identified in close-by water wells. In 2014, an evaluation of on- and off-site AOCs was completed based on historical land use information. A number of on- and off-site AOCs were identified on the surrounding Lockheed properties. Laboratory results of subsequent soil sampling completed in the on-site AOCs showed low concentrations of hexavalent chromium. Based on this information, the RWQCB concluded that there was a low likelihood that the site had contributed to the chromium issue. However, because additional investigations are still needed at other Lockheed properties in the site vicinity, this case is still considered open with the RWQCB.

- Asbestos-containing Transite piping is reportedly located beneath the site; the extent of which is unknown.

- During the site reconnaissance, Ardent observed a former Pump House associated with a 509,000-gallon water reservoir located in the mid-eastern portion of the site. Although these features are not considered an environmental concern to the site, these features will need to be managed during redevelopment activities.

- No other- on or off-site environmental issues were noted for the site.

10.2 Conclusions

Ardent has performed this Phase I ESA in general conformance with the scope and limitations of the ASTM Practice E 1527-13, ASTM Practice E 2600-15, and the EPA Standards and Practices for AAI, Final Rule (40 CFR, Part 312), for a portion of the former Lockheed Plant B6 property located in the city of Burbank, California. Any limitations or exceptions encountered during completion of this report are stated in Section 1.4. No evidence or indication of RECs, or conditions indicative of releases or threatened releases of hazardous substances on, at, in, or to the subject property has been revealed, with the exception of the regional groundwater issues, reported Transite piping, and possible vapor intrusion issues.

11 RECOMMENDATIONS

Based on the results of this investigation, Ardent presents the following recommendations.

- A soil gas survey should be completed to assess current conditions at the site based on human health risk criteria. Following collection of the laboratory data, a Human Health Risk Assessment (HHRA) should be completed to assess whether a human health risk is present and whether engineering controls (e.g. a vapor barrier) are needed beneath the proposed building(s) to limit vapor intrusion.

- Due to the historical land use and residual contaminants known to exist at the site, a Soil Management Plan (SMP) is recommended to be prepared and implemented during grading/redevelopment activities. The SMP will document the program participants including contact information and description of responsibility, agency involvement, and health and safety measures. The SMP will also present procedures to be followed if impacted soil or unknown environmental features are encountered. This will include sampling criteria and analytical procedures.

- Since the existing groundwater monitoring wells are part of a larger monitoring program associated with the Federal Superfund Site, if the wells are needed to be abandoned and/or relocated due to proposed construction plans, authorization needs to be obtained from the EPA. Typically, the well owner/operator would obtain EPA approval.

- If during grading activities Transite piping is discovered, these materials should be removed by a State-licensed abatement contractor. The client should account for the mitigation measures in its grading budget.

12 SELECTED REFERENCES

AESE, 1999, Closure Report, LAT Fuel Farm, Former Lockheed Martin Plant B-6, for property located at 2801 North Hollywood Way, Burbank, California, Report prepared for Lockheed Martin Corporation, Burbank California, dated September.

AESE, 2000, Site Investigation Report for Project Located at Former LAT Fuel Farm, Former Lockheed Plant B-6, 2801 North Hollywood Way, Burbank, California, Report prepared for Lockheed Martin Corporation, Burbank California, dated February 11.

Ardent Environmental Group, Inc., 2015, Phase I Environmental Site Assessment and Document Review, Former Pacific Airmotive Corporation Property, 3003 North Hollywood Way, Burbank, California: Report prepared for Overton Moore Properties, Gardena, California, dated June 17.

Ardent Environmental Group, Inc., 2015, Soil Gas Survey and Vapor Intrusion Evaluation, Former Pacific Airmotive Corporation Property, 3003 North Hollywood Way, Burbank, California: Report prepared for Overton Moore Properties, Gardena, California, dated July 22.

Department of Toxic Substances Control (DTSC), Human and Ecological Risk Office (HERO), 2015, Human Health Risk Assessment (HHRA) Note Number 3, dated October.

EPA Region 9, 2015, Regional Screening Levels (RSLs) Summary Table, dated November.

ENSR International, 2001, Trust Property Environmental Summary: Report prepared for Burbank-Glendale-Pasadena Airport Authority, Burbank, California, dated May.

Environmental Database Research (EDR), 2015, Regulatory Database Report, dated November 4.

GeoVision Geophysical Services (GeoVision), 1998, Geophysical Investigation, Burbank Airport/Lockheed B-6 Facility, Burbank, California: Report prepared for ENSR Corporation, dated August 31.

Lockheed Martin Corporation, 1996a, Request for “No Further Action” status, Parcel L, Plant B-6: Letter prepared for California Regional Water Quality Control Board, Los Angeles Region, Monterey Park, California, dated July 10.

Lockheed Martin Corporation, 1996b, Request for “No Further Action” status, Parcel B, Plant B-6: Letter prepared for California Regional Water Quality Control Board, Los Angeles Region, Monterey Park, California, dated July 26.

Lockheed Martin Corporation, 1996c, Request for “No Further Action” status, Parcel C, Plant B-6: Letter prepared for California Regional Water Quality Control Board, Los Angeles Region, Monterey Park, California, dated July 26.

Lockheed Martin Corporation, 1996d, Request for "Written Closure" Plant B-6 Limited Excavation Delineation Work Plan, Site No. 12 - Building 352, Machine Pit #2 Report of Results: Letter prepared for California Regional Water Quality Control Board, Los Angeles Region, Monterey Park, California, dated July 31.

Lockheed Martin Corporation, 1996e, Request for "Written Closure" Plant B-6 Limited Excavation Delineation Work Plan, Site No. 14 - Building 82, Former Film Tank Report of Results: Letter prepared for California Regional Water Quality Control Board, Los Angeles Region, Monterey Park, California, dated July 26.

Lockheed Martin Corporation, 1996f, Request for "Written Closure" Plant B-6 Limited Excavation Delineation Work Plan, Site No. 15 - Building 82, Northeast Parking Lot Report of Results: Letter prepared for California Regional Water Quality Control Board, Los Angeles Region, Monterey Park, California, dated July 26.

Lockheed Martin Corporation, 1996g, Request for "Written Closure" Plant B-6 Limited Excavation Delineation Work Plan, Site No. 16 - Building 332, Former UST "O"/F32 Report of Results: Letter prepared for California Regional Water Quality Control Board, Los Angeles Region, Monterey Park, California, dated July 26.

Lockheed Martin Corporation, 1996h, Request for "Written Closure" Plant B-6 Limited Excavation Delineation Work Plan, Site No. 17- Building 339, Former UST F31/F4 Report of Results: Letter prepared for California Regional Water Quality Control Board, Los Angeles Region, Monterey Park, California, dated July 26.

Lockheed Martin Corporation, 1996i, Request for "Written Closure" Plant B-6 Limited Excavation Delineation Work Plan, Site No. 18 - Northeast Parking Lot 8 Report of Results: Letter prepared for California Regional Water Quality Control Board, Los Angeles Region, Monterey Park, California, dated July 26.

Lockheed Martin Corporation, 1996j, Request for "Written Closure" Plant B-6 Limited Excavation Delineation Work Plan, Site No. 19 - Building 322, Southeast Corner Report of Results: Letter prepared for California Regional Water Quality Control Board, Los Angeles Region, Monterey Park, California, dated July 26.

Lockheed Martin Corporation, 1996k, Request for "Written Closure" Plant B-6 Limited Excavation Delineation Work Plan, Site No. 11 - Building 82, Sand Pit Report of Results: Letter prepared for California Regional Water Quality Control Board, Los Angeles Region, Monterey Park, California, dated July 31.

Lockheed Martin Corporation, 1996, Request for "Written Closure" Plant B-6 Limited Excavation Delineation Work Plan, Site No. 20 – Southeast Parking Lot 7 Report of Results: Letter prepared for California Regional Water Quality Control Board, Los Angeles Region, Monterey Park, California, dated July 31.

Lockheed Martin Corporation, 1996l, Request for "Written Closure" Plant B-6 Limited Excavation Delineation Work Plan, Site No. 22 - Building 309, Closed UST F9/F11 Report of Results: Letter prepared for California Regional Water Quality Control Board, Los Angeles Region, Monterey Park, California, dated July 31.

Lockheed Martin Corporation, 1996m, Request for "No Further Action" status, Parcel E, Plant B-6: Letter prepared for California Regional Water Quality Control Board, Los Angeles Region, Monterey Park, California, dated November 8.

Lockheed Martin Corporation, 1996n, Request for "No Further Action" status, Parcel J, Plant B-6: Letter prepared for California Regional Water Quality Control Board, Los Angeles Region, Monterey Park, California, dated November 25.

Los Angeles Regional Water Quality Control Board, 2013, Requirement for Technical Report Pursuant to California Water Code Section 13267 Order R4-2013-0063, Former Lockheed Martin Corporation Plants A-1, B-1, B-6 and C-1, Burbank California: Letter prepared for Lockheed Martin Corporation, Burbank, California, dated April 18.

Los Angeles Regional Water Quality Control Board, 2015, Comments response letter for the report entitled Additional Site Investigation Report Pursuant to California Water Code Section 13267 Order R4-2013-0063, Former Lockheed Martin Corporation Plants A-1, B-1, B-6 and C-1, Burbank California: Letter prepared for Lockheed Martin Corporation, Burbank, California, dated August 4.

McLaren Environmental Engineering, 1990, Supplemental Soils Investigation for Lockheed Air Terminal, Inc. Tank 37 Site, Plant B-6, Burbank California: Report prepared for Lockheed Air Terminal, Inc., Burbank, California, dated July 30.

McLaren Hart, 1991, Environmental Assessment Report for the Lockheed Plant B-6 Facility, Parcel 2, Burbank, California: Report prepared for Lockheed Corporation, dated December 23.

State Water Resources Control Board (SWRCB), 2011, Underground Storage Tank Regulations, dated July 1.

Superior Court of the State of California for the County of Los Angeles, North Central District – Burbank, 1999a, Notice of Consent to Order of Indemnification: Prepared for Burbank-Glendale-Pasadena Airport Authority, Plaintiff vs. Lockheed Corporation, et al, dated February 25.

Superior Court of the State of California for the County of Los Angeles, North Central District – Burbank, 1999b, Final Order of Condemnation: Prepared for Burbank-Glendale-Pasadena Airport Authority, Plaintiff vs. Lockheed Corporation, Lockheed Aircraft Corporation, Lockheed Air Terminal Inc., Rainer Equipment Leasing, Inc., Aircraft Service Terminal Inc., Los Angeles County Tax Collector and Doe One through Doe Thirty, dated November 16.

Tetra Tech, 1993, Subsurface Soil Investigation, Lockheed Plant B-6, Burbank, California, Volume VI of IX, Area E Final Data Report: Report prepared for Lockheed Environmental Systems and Technologies Co., Burbank, California, dated November 19.

Tetra Tech, 1994, Plant B-6, Phase II Subsurface Soil Gas Investigation, Burbank, California: Report prepared for Lockheed Environmental Systems and Technologies Co., Burbank, California, dated June 24.

Tetra Tech, 1995a, Closure Report Conditionally Authorized Unit, Lockheed Plant B-6, Burbank, California: Report prepared for Lockheed Environmental Systems and Technologies Co., Burbank, California, dated February 22.

Tetra Tech, 1995b, Final Report Vertical Delineation Soil Gas Investigation, Plant B-6, Burbank, California: Report prepared for Lockheed Martin Corporation, Burbank, California, dated June 22.

Tetra Tech, 1996a, Final Report UST Closure Report, Tanks B6-82-A, B6-82-B, B6-82-C and B6-E, Lockheed Plant B-6, Burbank, California: Report prepared for Lockheed Environmental Systems and Technologies Co., Burbank, California, dated February 14.

Tetra Tech, 1996b, Final Report Subsurface Soil Investigation, Building 82 – Northern Parking Lot, Burbank, California: Report prepared for Lockheed Martin Corporation, Burbank, California, dated March 26.

Tetra Tech, 1996c, Final Report Area #12 Subsurface Soil Investigation, Building 304 – Sump/Sand Trap, Burbank, California: Report prepared for Lockheed Martin Corporation, Burbank, California, dated March 26.

Tetra Tech, 1996d, Final Draft Report, Limited Excavation Stockpile Sampling at Plant B-6, Burbank, California: Report prepared for Lockheed Martin Corporation, Burbank, California, dated September 4.

Tetra Tech, 1996e, Final Report, Plant B-6: Area #4, Subsurface Soil Investigation, Building 353 – Process Lines, Burbank, California: Report prepared for Lockheed Martin Corporation, Burbank, California, dated September 12.

Tetra Tech, 1996f, Final Report, Plant B-6: Area #6, Subsurface Soil Investigation, Building 352 – Former Sewage Sump, Burbank, California: Report prepared for Lockheed Martin Corporation, Burbank, California, dated September 20.

Tetra Tech, 1996g, Geophysical Survey, Parking Lot Northeast of Lockheed Building 82, Burbank, California: Report prepared for Lockheed Martin Corporation, Burbank, California, dated September 23.

Tetra Tech, 1996h, Final Report, Plant B-6: Area #7, Subsurface Soil Investigation, Building 88 – Former Fuel UST, Burbank, California: Report prepared for Lockheed Martin Corporation, Burbank, California, dated September 27.

Tetra Tech, 1996i, Final Report, Plant B-6: Area #8, Subsurface Soil Investigation, Building 88 – Former UT F28, Burbank, California: Report prepared for Lockheed Martin Corporation, Burbank, California, dated October 4.

Tetra Tech, 1996j, Final Report, Plant B-6: Area #10, Subsurface Soil Investigation, Building 310 – Former Closed In-Place UST F20, Burbank, California: Report prepared for Lockheed Martin Corporation, Burbank, California, dated October 11.

Tetra Tech, 1996k, Final Report, Plant B-6: Area #11, Subsurface Soil Investigation, Building 310 – Former Closed In-Place UST F15, Burbank, California: Report prepared for Lockheed Martin Corporation, Burbank, California, dated October 11.

Tetra Tech, 1996l, Final Report, Plant B-6: Area #5, Subsurface Soil Investigation, Building 353 – Former TCA Degrease, Burbank, California: Report prepared for Lockheed Martin Corporation, Burbank, California, dated October 25.

Tetra Tech, 1996m, Final Report, Plant B-6: Area #13, Subsurface Soil Investigation, Building 304 – Former UST F25, Burbank, California: Report prepared for Lockheed Martin Corporation, Burbank, California, dated October 25.

Tetra Tech, 1996n, Final Report, Closure Report, Clarifiers B-6-F, B-6-K and B-6-Z, Lockheed Plant B-6, Burbank, California: Report prepared for Lockheed Martin Corporation, Burbank, California, dated October 29.

Tetra Tech, 1996o, Final Report, Plant B-6: Supplemental Subsurface Soil Investigation, Building 309 – Former UST F14, Burbank, California: Report prepared for Lockheed Martin Corporation, Burbank, California, dated November 6.

Tetra Tech, 1996p, Final Report, Plant B-6: Area #6, Remedial Excavation Report, Building 352 – Former Sewage Sump, Burbank, California: Report prepared for Lockheed Martin Corporation, Burbank, California, dated December 19.

Tetra Tech, 2005, Final Technical Report on Emergent Chemicals within the Burbank Operable Unit, Burbank, California: Report prepared for Lockheed Martin Corporation, Burbank, California, dated December.

Tetra Tech, 2007, Final Well Abandonment Report, Former Plant B-6, Burbank, California: Report prepared for Lockheed Martin Corporation, Burbank, California, dated April 27.

Tetra Tech, 2010, Volume I of II, Final Semiannual Groundwater Monitoring Report, Fourth Quarter 2009 and First Quarter 2010, Burbank Operable Unit, Burbank, California: Report prepared for Lockheed Martin Corporation, Burbank, California, dated June 25.

Tetra Tech, 2014a, Revised Additional Site Investigation Work Plan, Former Lockheed Martin Plants A-1 North, B-1, B-6 and C-1, Burbank California: Report prepared for Lockheed Martin, Burbank, California, dated January.

Tetra Tech, 2014b, Additional Site Investigation Report, Former Lockheed Martin Plants A-1 North, B-1, B-6 and C-1, Burbank California: Report prepared for Lockheed Martin, Burbank, California, dated December.

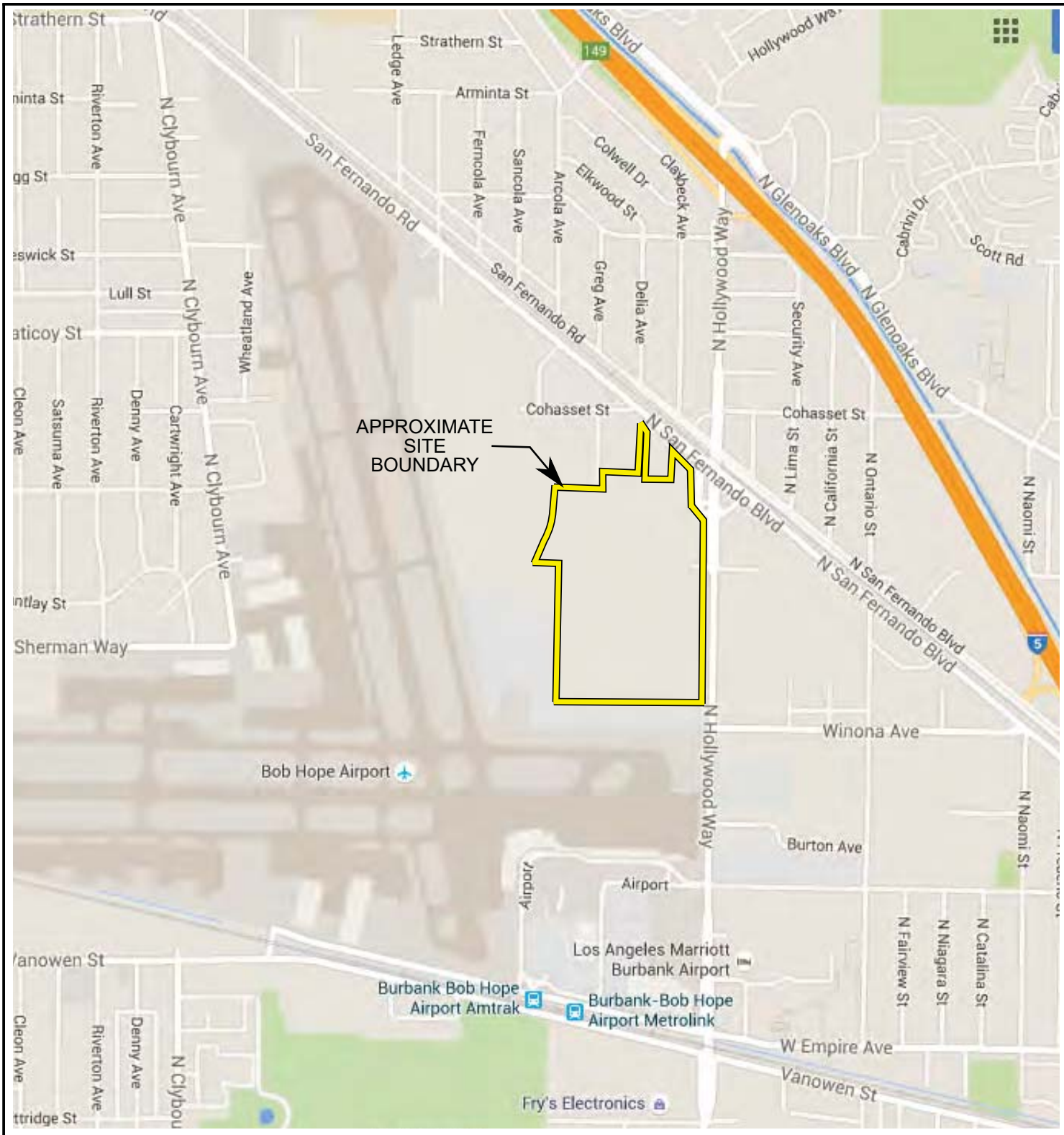
13 QUALIFICATIONS STATEMENT AND SIGNATURE OF ENVIRONMENTAL PROFESSIONAL

Mr. Paul Roberts states that the Phase I ESA was performed under his direct supervision, and that he has reviewed and approved the report, and the methods and procedures employed in the development of the report conform to the minimum industry standards. Mr. Roberts certifies that Ardent project personnel and subcontractors are properly licensed and/or certified to do the work described herein.

Pursuant to Paragraph 12.13 of the ASTM Standard E1527-13:

I declare that, to the best of my professional knowledge and belief, I meet the definition of *Environmental professional* as defined in §312.10 of 40 CFR 312. I have the specific qualifications based on education, training, and experience to assess a *property* of the nature, history, and setting of the subject *property*. I have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

Paul Roberts, P.G.
Principal Geologist

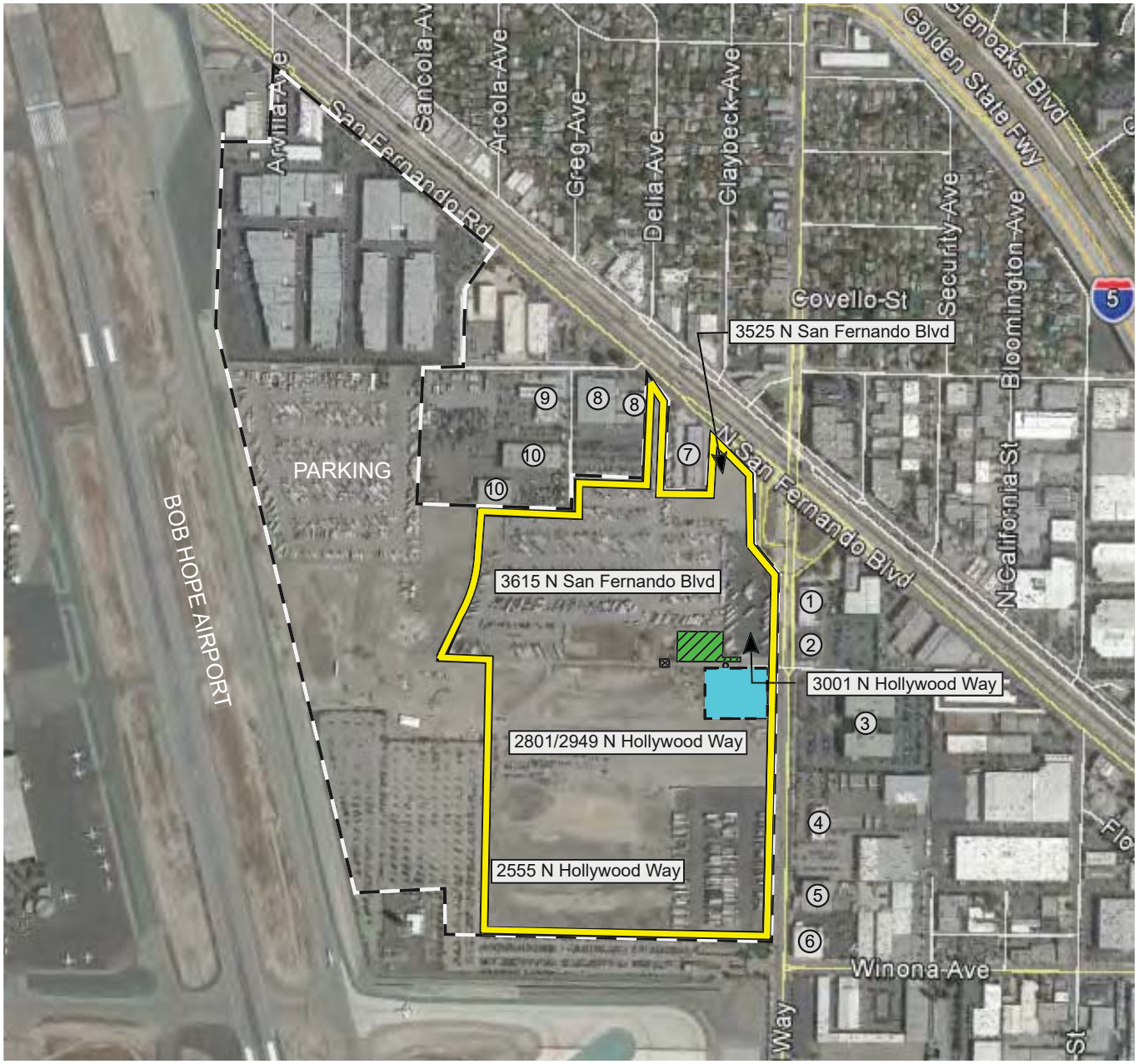


NO SCALE

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

ARDENT ENVIRONMENTAL GROUP, INC.	PROJECT NO. 100715001	**SITE LOCATION MAP**	FIGURE 1
	DATE 12/15	PORTIONS OF FORMER LOCKHEED PLANT B6 BURBANK, CALIFORNIA	

1. PRECISE ROOFING/SO CAL MOTOR
   (3012 - 3032 NORTH HOLLYWOOD WAY)
2. MIDWAY CONTRACTORS
   (3000 NORTH HOLLYWOOD WAY)
3. STARZ
   (2950 NORTH HOLLYWOOD WAY)
4. ARDWIN INC.
   (2940 NORTH HOLLYWOOD WAY)
5. LIEBERMAN BROADCASTING
   (2820 NORTH HOLLYWOOD WAY)
6. COMMUNITY BANK
   (2800 NORTH HOLLYWOOD WAY)
7. SANCTUARY
   (3611 SAN FERNANDO ROAD)
8. MP MONTANOUS
   (3700 SAN FERNANDO ROAD)
9. HYDRA ELECTRIC
   (3151 KENWOOD STREET)
10. HERTZ ENTERTAINMENT DIVISION
    (3121 NORTH KENWOOD STREET)



LEGEND

- APPROXIMATE SITE BOUNDARY
- FORMER LOCKHEED PLANT B6 PROPERTY BOUNDARY (AKA "LARGER PROPERTY")
- FORMER PACIFIC AIRMOTIVE PROPERTY NOT INCLUDED IN THIS REPORT
- APPROXIMATE LOCATION OF VENT PIPE
- APPROXIMATE LOCATION OF FORMER PUMP HOUSE BASEMENT ENCLOSURE
- WATER RESERVOIR

N

NO SCALE

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

ARDENT
ENVIRONMENTAL GROUP, INC.

PROJECT NO. 100715001	**SITE VICINITY MAP**	FIGURE 2
DATE 11/15	PORTIONS OF FORMER LOCKHEED PLANT B6 BURBANK, CALIFORNIA	

LEGEND

APPROXIMATE SITE BOUNDARY

N

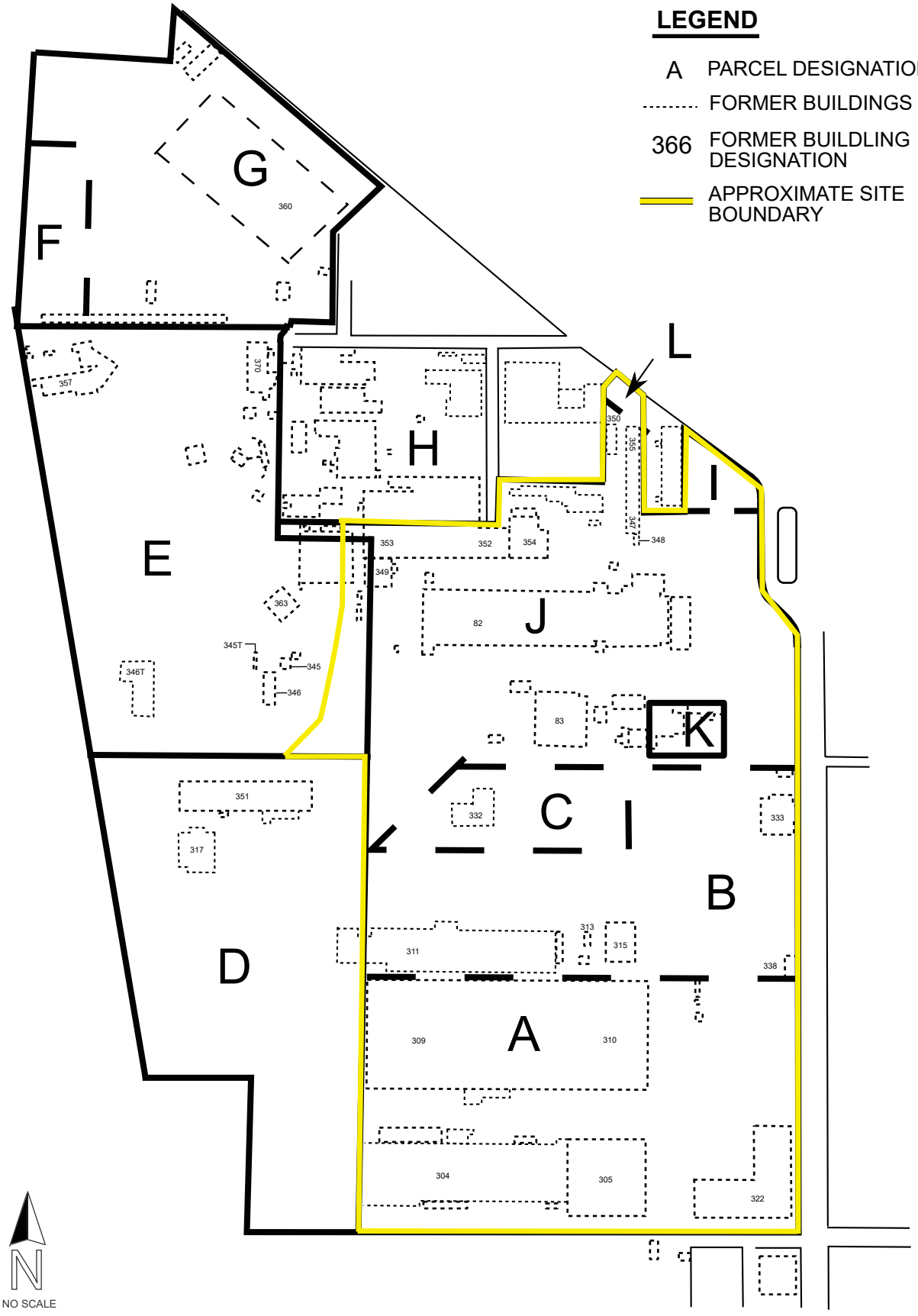
APPROXIMATE SCALE IN FEET

0 500

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

SOURCE: AERIAL PHOTOGRAPH DATED 1981

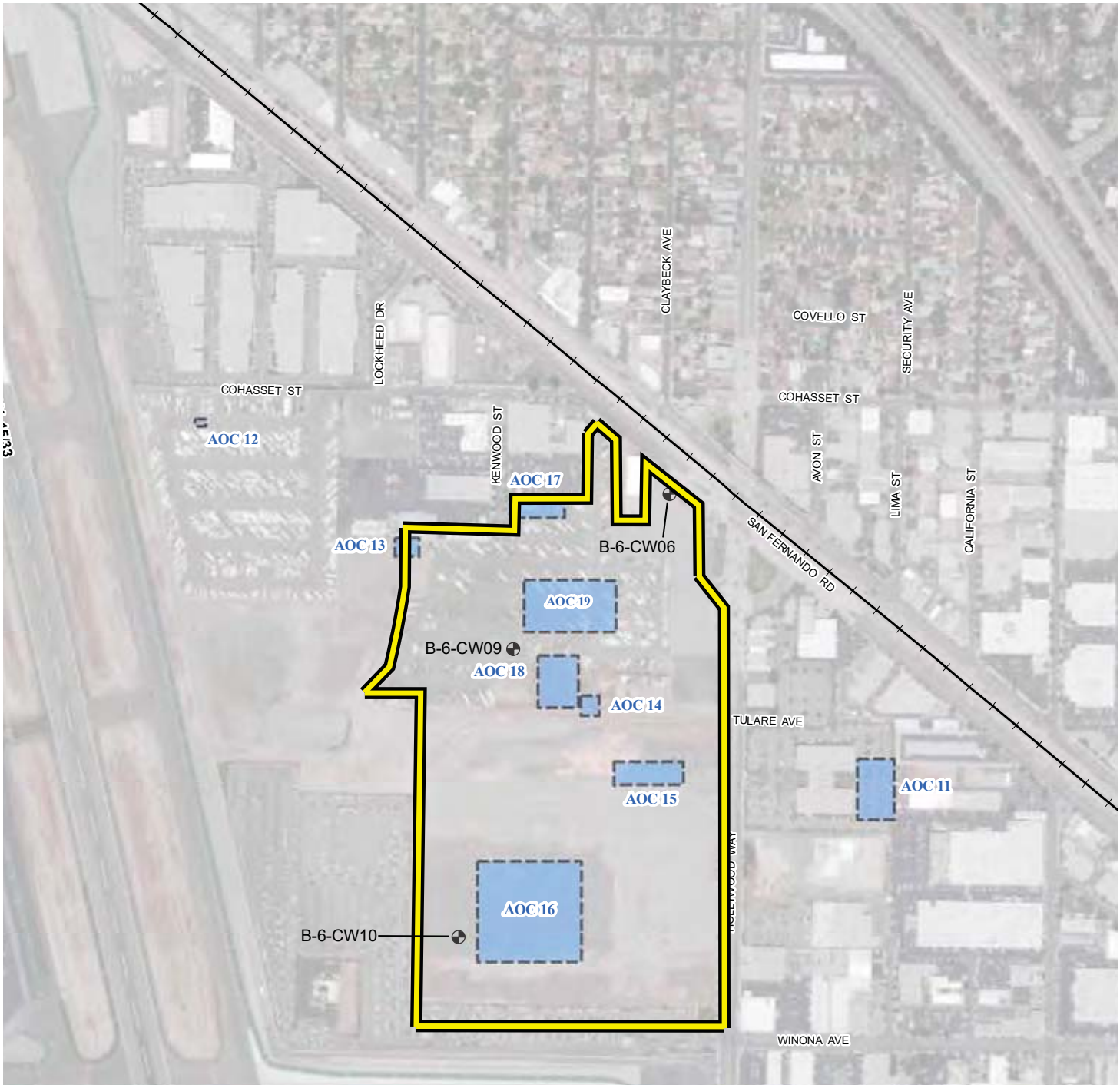
ARDENT ENVIRONMENTAL GROUP, INC.	PROJECT NO. 100715001	**HISTORICAL SITE FEATURES**	FIGURE 3
	DATE 12/15	PORTIONS OF FORMER LOCKHEED PLANT B6 BURBANK, CALIFORNIA	



NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

SOURCE: LOCKHEED MARTIN LETTER, SUBJECT: PARCEL L, PLANT B6, DATED JULY 10, 1996

ARDENT ENVIRONMENTAL GROUP, INC.	PROJECT NO. 100715001	**SITE AREA DESIGNATIONS**	FIGURE 4
	DATE 12/15	PORTIONS OF FORMER LOCKHEED PLANT B6 BURBANK, CALIFORNIA	



LEGEND

- APPROXIMATE SITE BOUNDARY
- RAILROAD
- AREA OF CONCERN (AOC) INVESTIGATED BY TETRA TECH IN 2014
- B-6-CW10 — GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION

N

APPROXIMATE SCALE IN FEET

0 600

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

ARDENT ENVIRONMENTAL GROUP, INC.

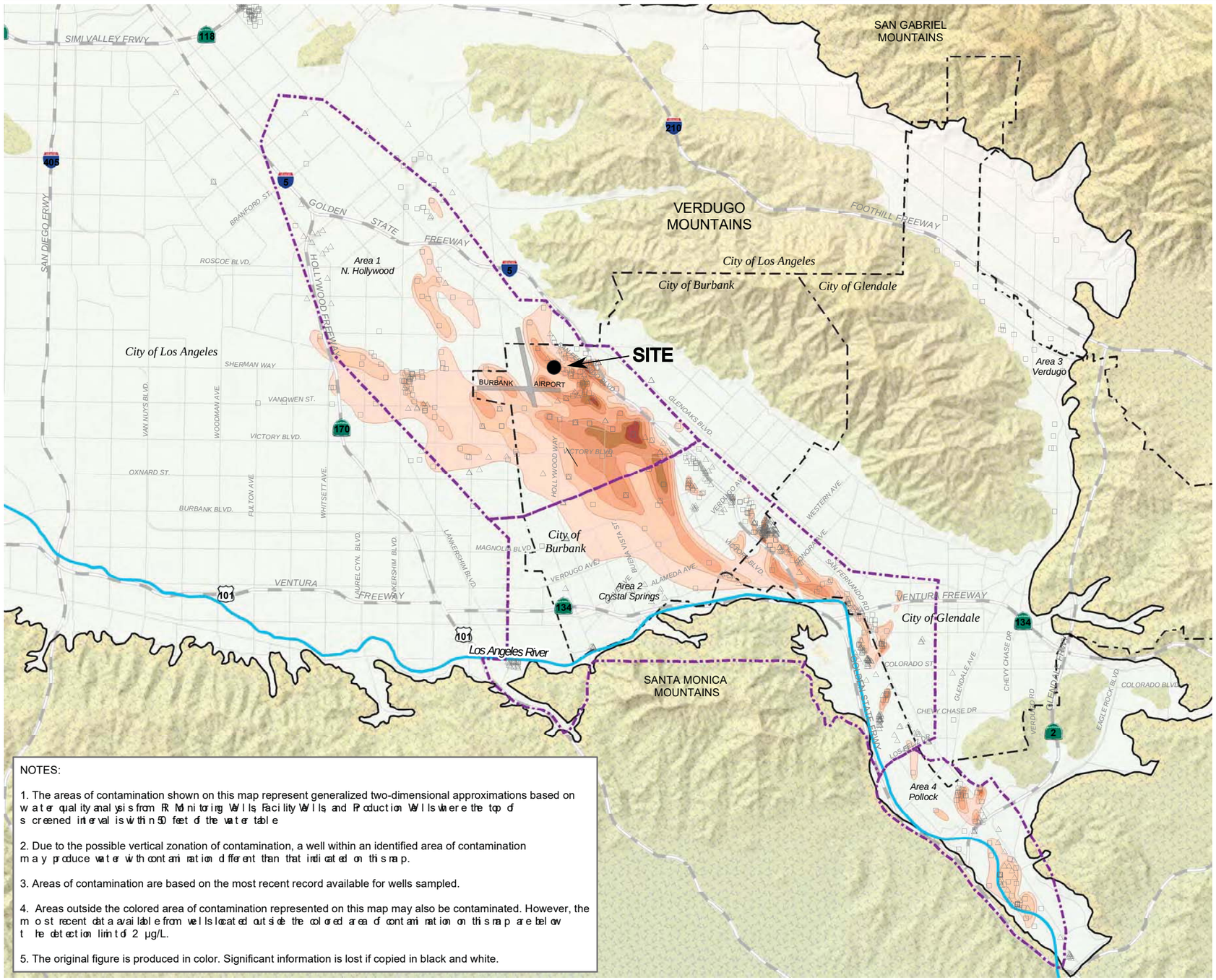
PROJECT NO. 100715001

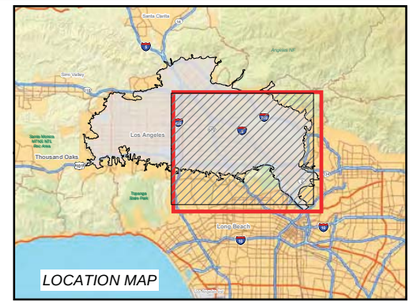
DATE 12/15

AREA OF CONCERN LOCATION MAP

PORTIONS OF FORMER LOCKHEED PLANT B6
BURBANK, CALIFORNIA

FIGURE 5





LEGEND

- Wells Sampled Before 2000
- Wells Sampled 2000 or Later
- Municipal Boundary
- Approximate Boundary of Investigation Areas for San Fernando Valley Area Superfund Sites
- > DL - 5 µg/L (MCL)
- 5.01 - 50 µg/L
- 50.01 - 100 µg/L
- 100.01 - 500 µg/L
- 500.01 - 1000 µg/L
- 1000.01 - 5000 µg/L
- Above 5000 µg/L

N

0 3,500 7,000 14,000
Feet

NOTES:

1. The areas of contamination shown on this map represent generalized two-dimensional approximations based on water quality analysis from RI Monitoring Wells, Facility Wells, and Production Wells where the top of screened interval is within 50 feet of the water table.

2. Due to the possible vertical zonation of contamination, a well within an identified area of contamination may produce water with contamination different than that indicated on this map.

3. Areas of contamination are based on the most recent record available for wells sampled.

4. Areas outside the colored area of contamination represented on this map may also be contaminated. However, the most recent data available from wells located outside the colored area of contamination on this map are below the detection limit of 2 µg/L.

5. The original figure is produced in color. Significant information is lost if copied in black and white.

FIGURE 3-3
PCE Contamination (µg/L)
In Shallow Zone In 2008
San Fernando Valley Superfund Sites

CH2MHILL

\\ZINFADNEL\PROJ\USENVIRONMENTALPROTE\COMMONFILES\GIS\EPASFV\MAPFILES\2009\2008REPORT\OCT2010_VERSION\PCE_2008RPT_SHALLOW.MXD CARCHER 10/22/2010 13:07:38

SOURCE: CH2MHILL, FIGURE 3-3 PCE CONTAMINATION, DATED 2008

ARDENT ENVIRONMENTAL GROUP, INC.

PROJECT NO. 100715001	SAN FERNANDO VALLEY SUPERFUND SITE	FIGURE 6
DATE 12/15	PORTIONS OF FORMER LOCKHEED PLANT B6 BURBANK, CALIKFORNIA	