Appendix F Site Hydrology and Hydraulics Report for Wildomar Medical Office Building

Appendices

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VCA ENGINEERS, INC.

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SITE HYDROLOGY AND HYDRAULICS REPORT

FOR

WILDOMAR
MEDICAL OFFICE BUILDING

Tract 34301
NWC Baxter Road and I-15
Wildomar, California

March 16, 2020

Prepared For:

CANNONDESIGN
Project No. T2540-22-02
Wildomar, California

Prepared by:

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CANNONDESIGN
Tract 34301
NWC Baxter Road and I-15
Wildomar, California

Subject: MEDICAL OFFICE BUILDING
Wildomar, California

To Whom It May Concern,

We are pleased to submit this letter report regarding the Hydrology and Hydraulics Report for the Wildomar – Medical Office Building.

This report is comprised of three sections:

- **Narrative Report and Results**
  This includes Introduction and Scope, Project Site Hydrology, Project Site Hydraulics, Stormwater Mitigation, Best Management Practices, and Project Conclusions and Recommendations

- **Calculations**
  This includes modeling and calculation results of the hydrology and hydraulics analysis and BMP calculations and sizing.

- **Appendix**
  This includes rainfall information, utility plans, operation and maintenance guidelines for BMPs used in this project.

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1.0 INTRODUCTION

1.1 SCOPE

This Hydrology and Hydraulics Report summarizes the stormwater management for the Wildomar Medical Office Building.

This Report calculates the stormwater runoff generated by the site, the conveyance and discharge system of the runoff, and the stormwater mitigation system using approved Best Management Practices.

1.2 STANDARDS

The standards below used in the design of the site's stormwater management:

1. Riverside County Santa Margarita River Watershed Region Design Handbook for Low Impact Development Best Management Practices
2. Water Quality Management Plan for the City of Wildomar
3. Riverside County Flood Control and Water Conservation District – Hydrology Manual
4. Santa Margarita Region Hydrology Model Guidance Document

2.0 SITE DESCRIPTION

2.1 PROJECT LOCATION AND DESCRIPTION

The property is bounded by the Baxter Road, the east bound by I-15, the north by rural residential housing and the west by White Road, a horse ranch, and rural residential housing. The site is currently vacant with the exception of a former residence and an agricultural observation tower in the southern portion of the site. Both structures have been raised for relocation. Large trees are present in the southeastern and south-central areas of the site, and within a main drainage, which meanders in a south-southwesterly direction across the western portion of the site. Topographically the site consists of a dissected alluvial fan, which descends gently to the southwest from granitic hills to the northeast. Site elevations range from approximately 1,365 feet above mean sea level (MSL) in the northeastern area to approximately 1,335 feet (MSL) at the southwest corner. A main drainage is present within the western portion of the site and consists of a gently sloping valley approximately ten feet below the adjacent alluvial plain with a smaller stream incised about two to three feet into the valley. Several smaller southwest trending drainages cut the alluvial plain in the eastern area of the site. A drainage channel is also present along the southern corner where it is approximately five feet below the surrounding elevations.

Its approximate coordinates as obtained from Google Earth is Longitude: 33°36’46.63”N and Latitude: 117°15’46.79”W. Figure 1 shows the aerial view of the site. The site in relation to local topographic features as shown on Figure 2 and Figure 3. Refer to Appendix H for detailed information regarding the site location and description.

It is understood that proposed development will consist of construction of medical office building (MOB) and supporting facilities.

The proposed site is part of Track 34301, Assessor’s Parcel numbers 376-180-015 and 316-180-043. The approximate location of the site is shown on the Site Location Map, Figure 3.

Figure 1: Aerial View of the Proposed Wildomar Medical Office Building

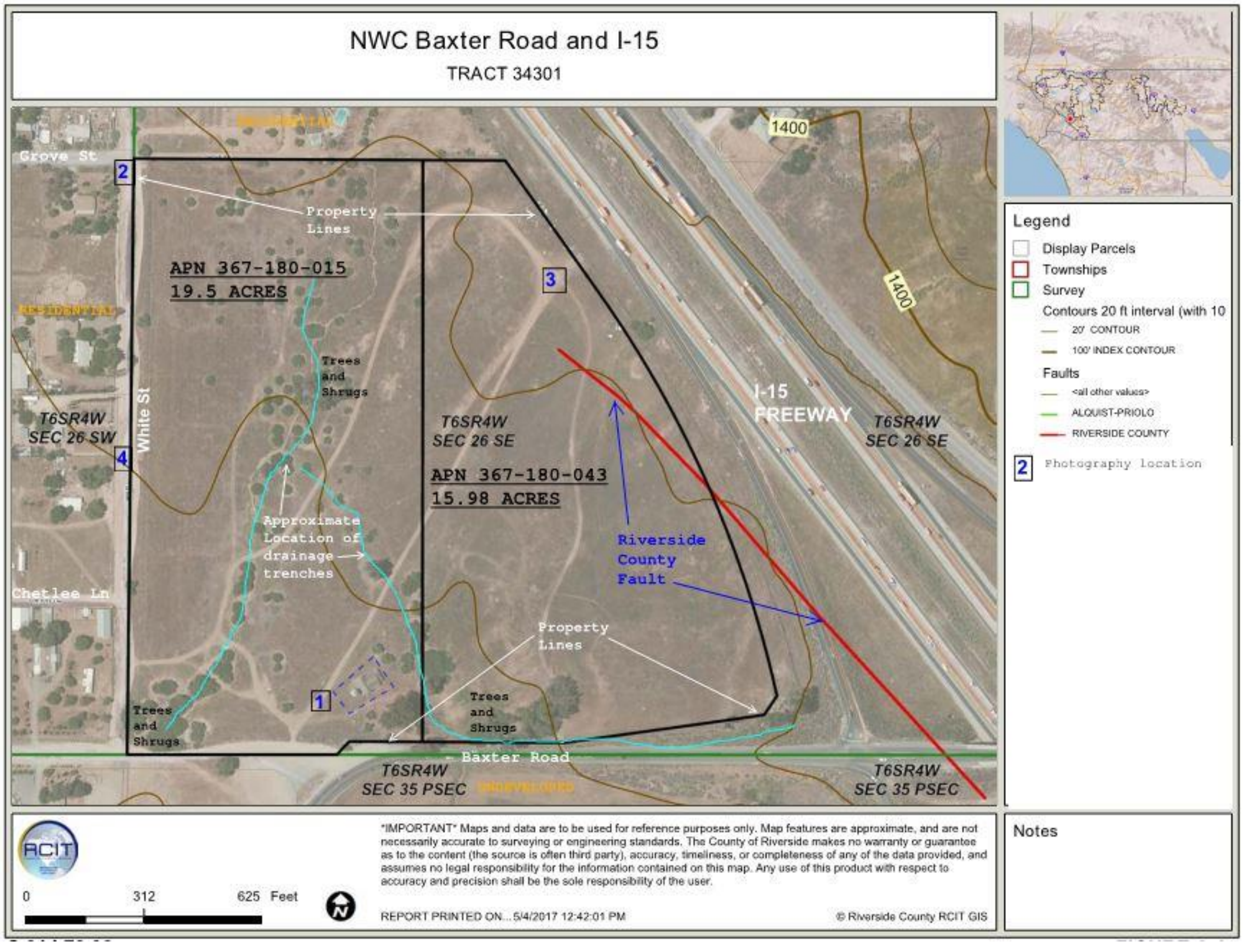


Figure 2: Site Vicinity Map

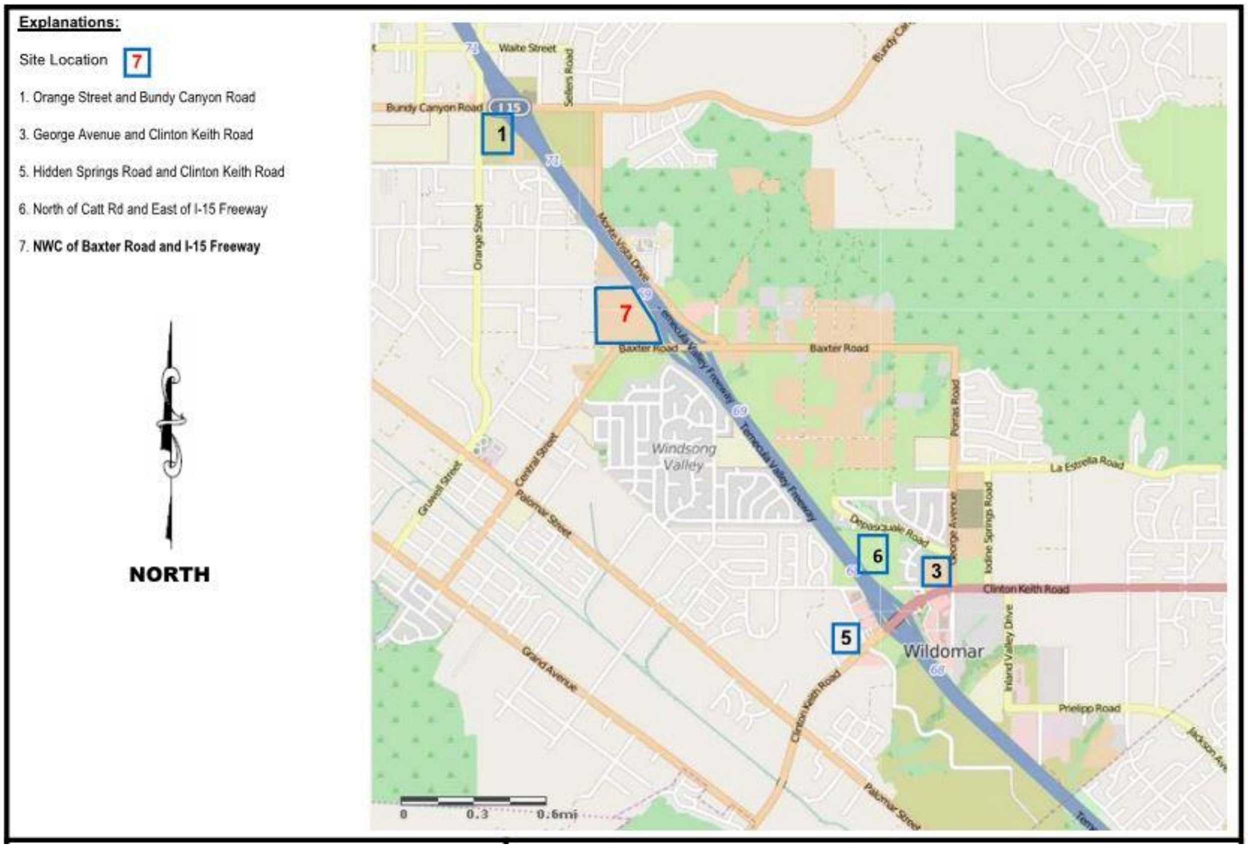


Figure 3: Site Location Map

2.2 EXISTING SITE CONDITIONS AND STORM DRAINAGE SYSTEM

2.2.1 EXISTING SITE IMPROVEMENTS

The site history was determined based on review of aerial photographs and obtained at the Riverside County Flood Control and water Conservation District and geotechnical research at the County and local level. Based on the aerial photographs from soils report, an olive grove occupied the western half of the site between 1962 and 1974. A former residence was observed in the 1983 and later aerial photos. The existing raised house and tower were transported to and now stored on the site. The remainder of the site appears to have been unimproved. Partial plowing of the site and dirt trails were observed on the aerial photos since 1974.

2.2.2 EXISTING DRAINAGE PATTERN

The property is relatively flat to rolling hills with elevations ranging from approximately 1324 to 1372 feet above mean-sea-level (amsl). The majority of the land is covered with medium dense weeds and scattered trees. Drainage appears directed towards the southeast end of the property.

The property features can be observed from the Site Map and Site Photographs, Figures 2 and 4, respectively.

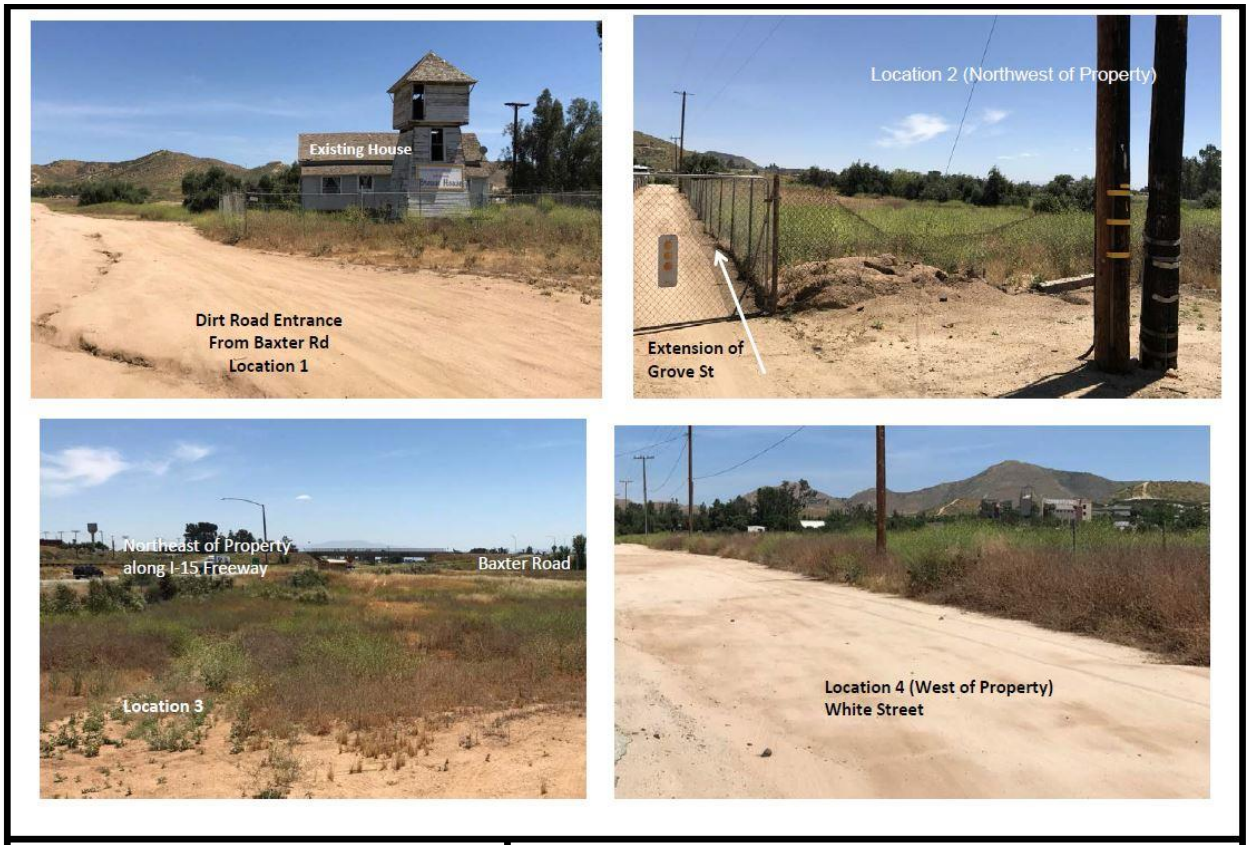


Figure 4: Site Photographs

2.3 GEOLOGICAL CONDITIONS

2.3.1 GEOTECHNICAL REPORT

This section presents information and recommendations from the geotechnical reports prepared by the GEOBASE, INC entitled "Geotechnical Review of Purchase Ten (10) Acres-Wildomar Replacement Northwest Corner of Baxter Road and Interstate 15 (I-15)" dated May 2017, and "Geotechnical Investigation for Proposed Wildomar MOB Campus" prepared by the RMA Group dated December 12, 2019.

2.3.2 SOIL TYPE

Based on the Geotechnical Report dated on December 12, 2012 and revised on March 26, 2015 subsoils at the site include:

- Younger alluvium encountered primarily within the drainage areas consisting of loose to medium dense inter-layered silty sands, sands and clays. At the locations observed, the younger alluvium ranged in thickness from two (2) to eight (8) feet.
- Colluvium overlying granitic bedrock consisting of red-brown clayey sands with abundant carbonate nodules and stringers. Where encountered, in borings and trenches, the colluvium ranges in thickness from one (1) to eight (8) feet.
- Pauba formation sandstone consisting of brown to reddish-brown silty sand.
- Granitic bedrock encountered at depths of three (3) to thirty-nine (39) feet with the borings and trenches.

Geologic mapping by Kennedy (1977) identifies the geologic units at the site as primarily Pauba Sandstone with granitic bedrock occurring along the eastern site boundary. The granite bedrock underlies the site at depth. In general, periodic plowing has disturbed the upper foot of existing site soils.

The additional investigation performed by the RMA Group reaffirm the subsoil at the site indicating in their investigation that they "encountered alluvium, older alluvium, Pauba Formation sandstone and granitic bedrock".

2.3.3 GROUNDWATER LEVEL

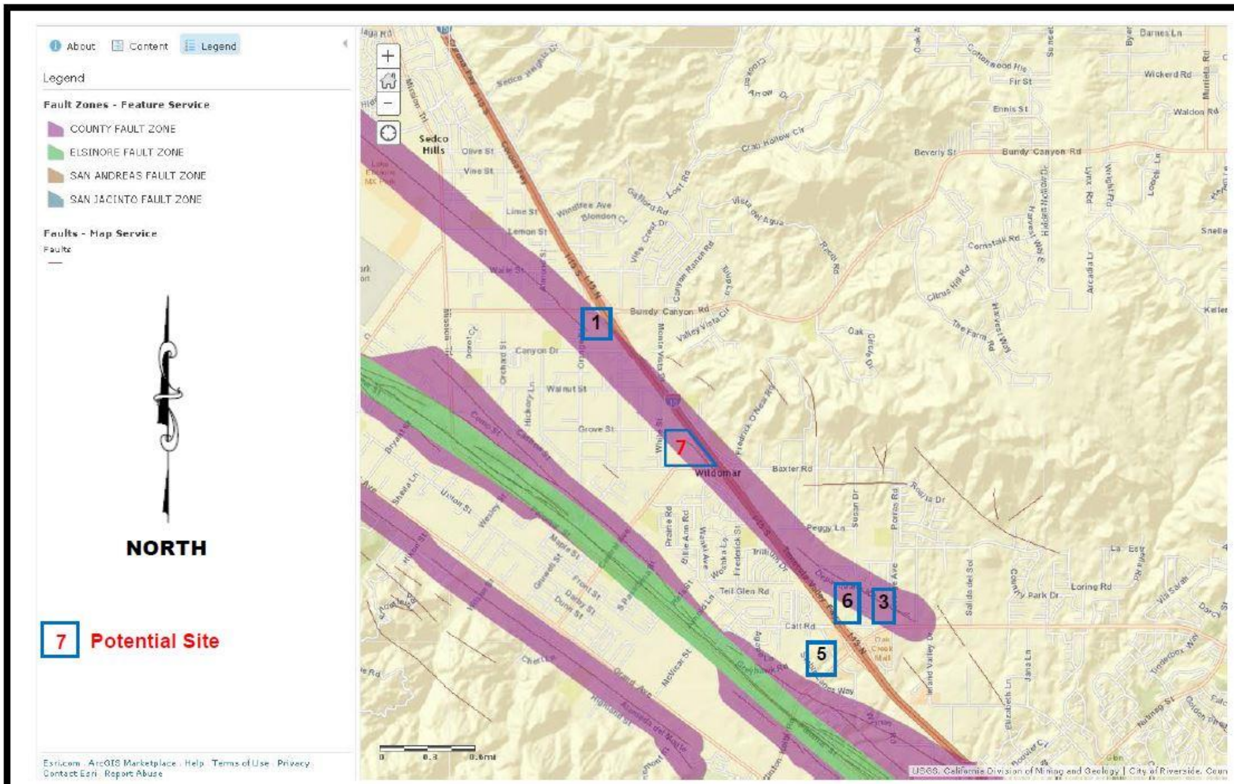
Soils report stated that groundwater depths observed primarily in drainage areas range from thirteen an half (13.5) to twenty-nine (29) feet below ground surface. Additionally, groundwater seepage is common at soil/bedrock contact. Therefore, groundwater may be encountered during grading and appropriate drainage measure should be implemented.

The additional investigation conducted by the RMA Group indicated that groundwater was encountered at depths ranging from 10 to 21 feet below ground based on the variations of surface topography.

2.3.4 FAULTING

The fault classification system adopted by the California Geological Survey (CGS), relative to the State legislation, delineates Earthquake Fault Zones along active or potentially active faults. Such earthquake Fault Zones are in turn used in CGS as a "sufficiently active and well defined fault" that has exhibited surface displacement within Holocene time (approximately the last 11,000 years). A potentially active fault was defined by the State as a fault with a history of movement within Pleistocene time (between 11,000 and 1.6 million years ago). Any fault proven not to have moved within the last 1.6 million years is considered inactive.

Although not zoned by the State of California, geologic mapping by Morton and Webber indicates that a branch of the Elsinore Fault Zone (Glen Ivy segment) is believed to traverse the eastern portion of Site 7, as shown on the County of Riverside Fault Map, Figure 5.



Sources: USGS, California Division of Mining and Geology | City of Riverside, County of Riverside, Esri, HERE, DeLorme, METI/NASA, USGS, EPA, USDA

Figure 5: County of Riverside Fault Map

2.3.5 SEISMICITY

As with all of Southern California, the site has experienced historic earthquakes from various regional faults. The seismicity of the region surrounding the site was formulated based on research of an electronic database of earthquake date. Dynamic compaction of dry and loose sands may occur during major earthquake. Typically, settlements occur in thick beds of such soils. Based on the dense and well consolidated nature of the soils underlying the site, appreciable seismically-induced settlements are not anticipated.

2.3.6 LIQUEFACTION POTENTIAL

Liquefaction is a phenomenon in which loose, saturated, relatively cohesion less soil deposits lose shear strength during strong ground motions. Primary factors controlling liquefaction include intensity and duration of ground motion, gradation characteristics of the subsurface soils, in-situ stress conditions, and the depth to groundwater. Liquefaction is typified by a loss of shear strength in the liquefied layers due to rapid increases in pore water pressure generated by earthquake accelerations.

The current standard of practice, as outlined in the "Recommendation Procedures for Implementation of DMG Special Publication 117 A, Guidelines for Analyzing and Mitigating Liquefaction in California" requires liquefaction analysis to a depth of 50 feet below the lowest portion of the proposed structure. Liquefaction typically occurs in areas where the soils below the water table are composed of poorly consolidated, fine to medium-grained, primarily sandy soil. In addition to the requisite soil conditions, the ground acceleration and duration of the earthquake must also be a sufficient level to induce liquefaction.

According to the Riverside County Land Information System, the site is located within an area of moderate liquefaction potential based on the underlying soil deposits. The younger alluvium present in the drainages at the site may be subject to liquefaction during strong ground motion. However, the Pauba Sandstone and the granite bedrock are well-consolidated and are not considered to be susceptible to liquefaction. Further, no surface manifestations of liquefaction are expected at site.

Based on the findings of the RMA Group indicate that the soil has potential for liquefactions above the Pauba formation and below the design ground water table.

2.3.7 LANDSLIDES

The gently sloping topography at the site precludes slope stability hazards. There are no known landslides near the site, nor is the site in the path of any known or potential landslides.

2.3.8 EARTHQUAKE-INDUCED FLOODING

Earthquake-induced flooding is inundation caused by failure of dams or other water-retaining structures due to earthquakes. There are no water-retaining structures up gradient from the site. Therefore, the probability of earthquake-induced flooding is not a design consideration.

2.3.9 SUBSIDENCE

The Site is within an area that is considered susceptible to subsidence per Riverside County. The site conditions include Pauba Sandstone and alluvium over lying granitic bedrock which was a factor in subsidence in the Murrieta area to the south in the late 1980s and 1990s. After remedial grading at the site the subsurface conditions which make the site vulnerable to subsidence will no longer be present and the possibly of subsidence will not be a design consideration.

2.4 PROPOSED STORM DRAINAGE SYSTEM

2.4.1 DEVELOPMENT AREA

For the proposed site, 75.73% or 5.03 acres is impervious. The rest is pervious. A comparison of existing conditions and proposed conditions is presented in Table 1. Refer to Appendix I for Site Plans.

Table 1 - Proposed Site Pervious and Impervious Areas

Site Condition	Pervious Area (acres)	Impervious Area (acres)	% Pervious	% Impervious
Existing	8.69	0	100	0
Proposed	8.69	5.28	39.28	60.72

2.4.2 PROPOSED RUNOFF CONVEYANCE AND DISCHARGE SYSTEM

Grading will be designed to facilitate staking and construction, plane grades shall be uniform to avoid warped surfaces and grade changes minimized. All areas will be graded for drainage. Walks, parking, ramps, and other surfaces will slope away from buildings. Planes shall be sloped for drainage, typically between 1% and 1.8%, with 1.5% considered optimum. Entrance walks and ramps will not be designed to maximum allowable slope requirements, to minimize potential non-compliant as-built conditions. If the space allows, slopes will be reduced as much as possible, or grading will be designed to avoid the need for ramps. Door landings and similar areas will be graded between 0.5% to 1.8% maximum slopes. Asphalt paving flow lines will be 1% minimum to accommodate construction tolerances. If less, concrete gutter will be used with a flow line minimum slope of 0.5% to accommodate construction tolerances.

Sheet flow will be directed from paved areas onto planted areas. Roof downspouts will be hard connected to the underground storm drain network. Flow lines will be located to avoid concentration on pedestrian walks. Flow lines will be located to avoid tree wells and other objects that might obstruct drainage flow and cause ponding. Drainage from planting areas across paved areas will be avoided. Drainage over public sidewalks will be avoided. Concentrated flow over driveways and pedestrian walkways will be avoided.

Some of the site's tributary areas directly enter the site's storm drain system via drainage inlets. Other tributary areas sheet flow into planter areas with sub-drains (French drains) which connect to the main on-site system. All downspouts of the new Medical Office Building will be hard-piped to the proposed storm drain systems. All runoff that enters the site storm drain system will go through one or more BMPs. These BMPs includes continuous deflective separation (CDS) units, filters installed in catch basins and planters. The proposed storm drain system and BMPs are further explained in detail in following section for each design concept.

3.0 SITE HYDROLOGY

3.1 HYDROLOGY DATA

3.1.1 ISOHYETAL MAP

The hydrology data and design criteria described in this section were used in the calculations. They were obtained from Riverside County Flood Control and Water Conservation District Manual (Refer to Figure 6, Figure 7, Figure 8 and Figure 9).

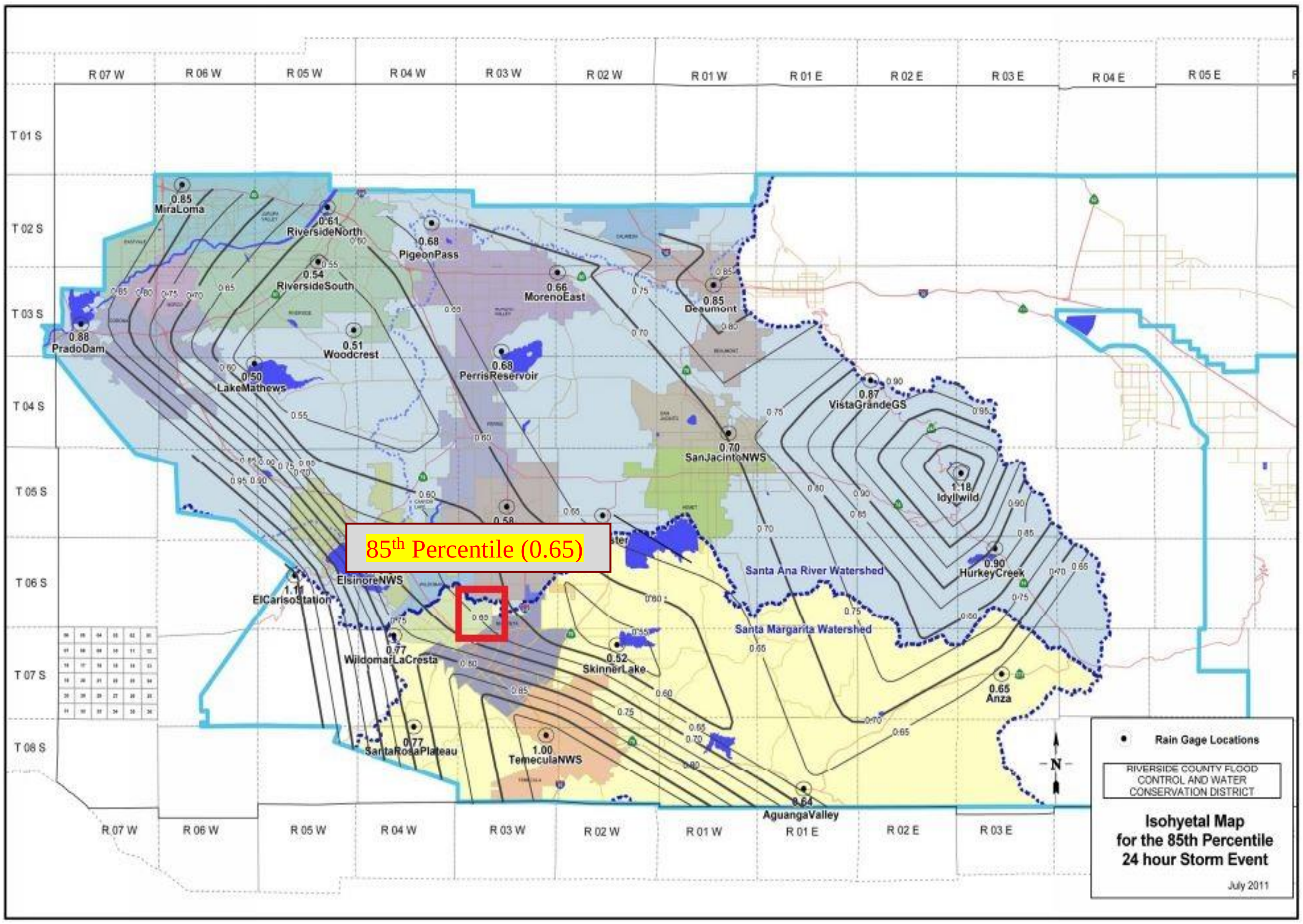
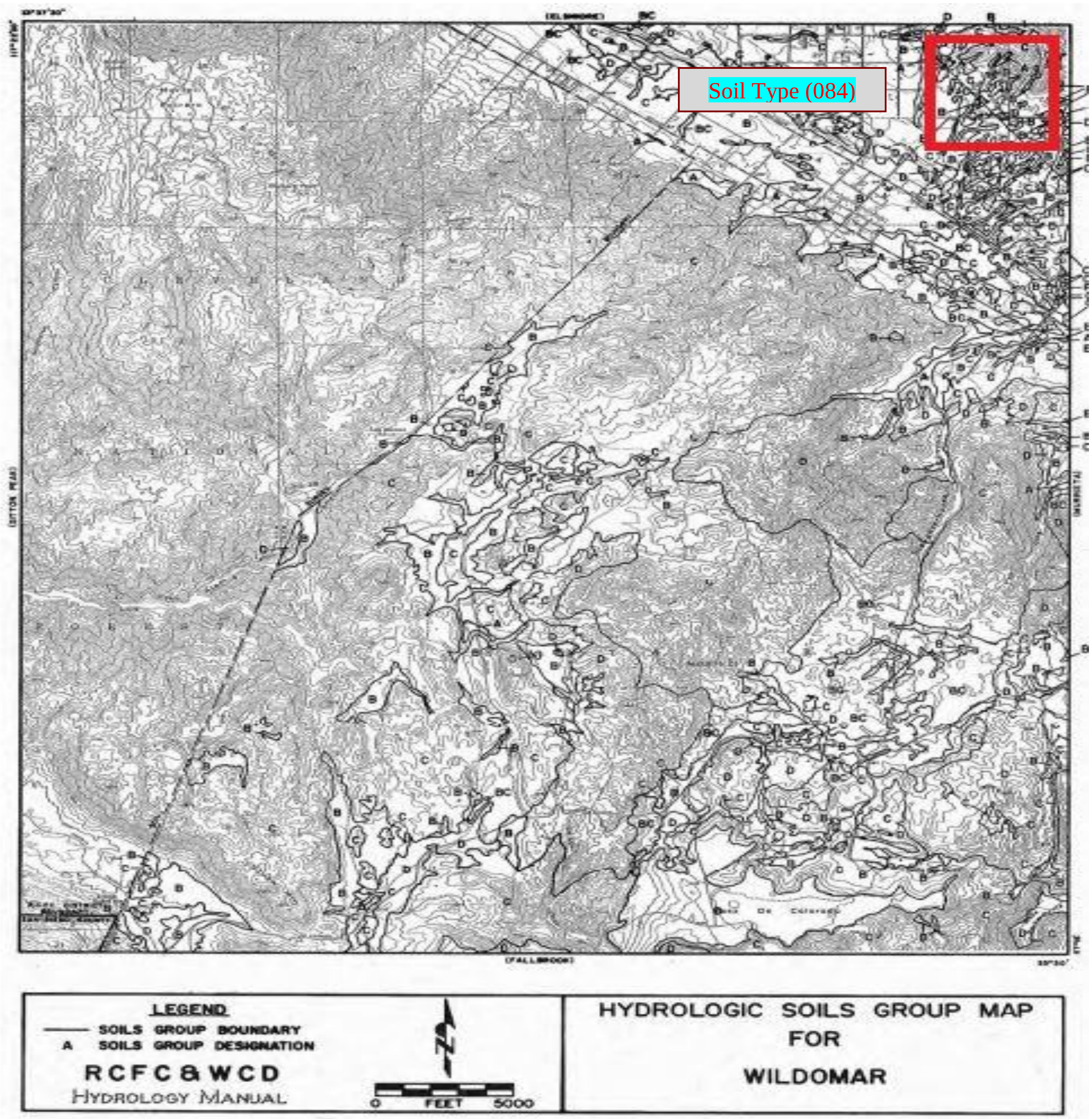


Figure 6: Isohyetal Map for the 85^{th} Percentile 24 hour Storm Event

Figure 7: Hydrologic Soils Group Map for Wildomar



RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

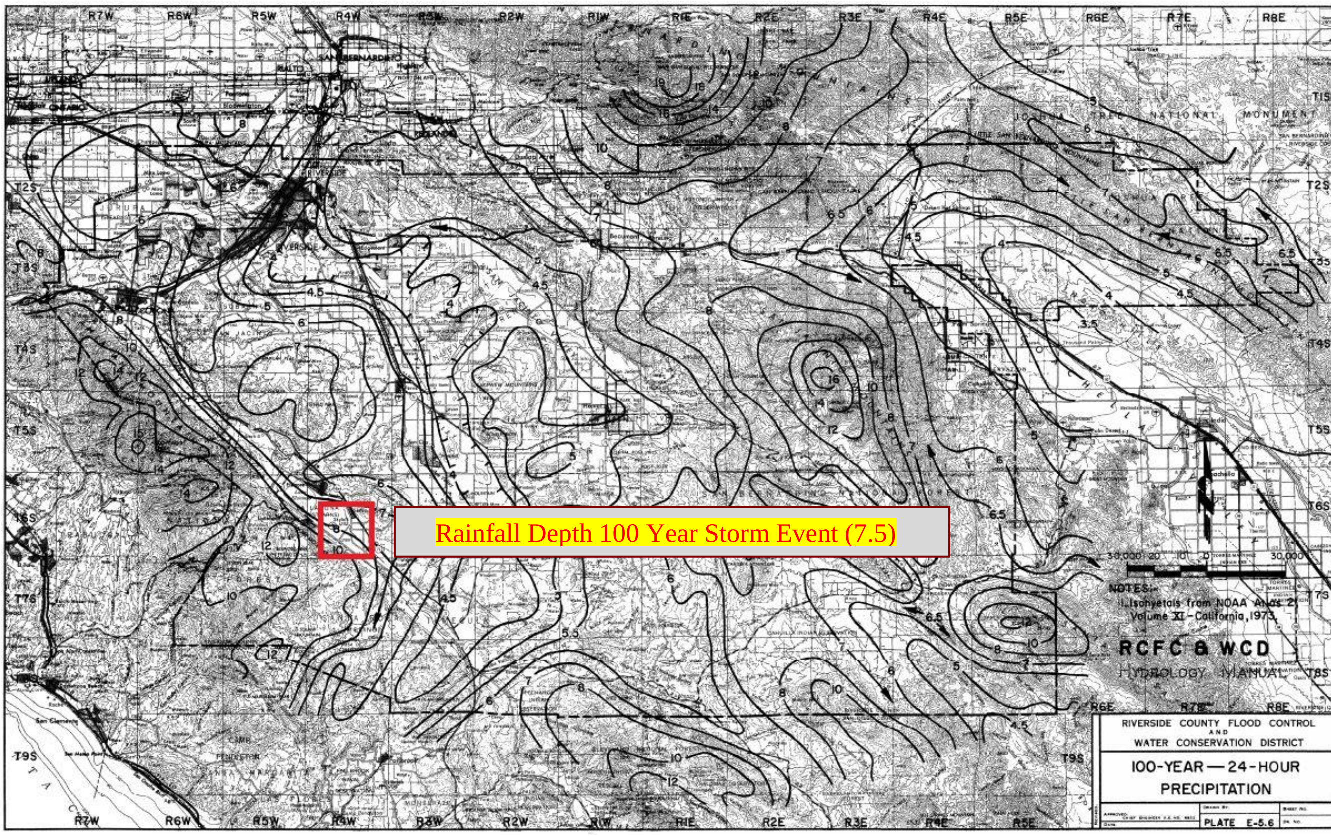
Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	72	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	28	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		76	85	90	92

RCFC & WCD
HYDROLOGY MANUAL

RUNOFF INDEX NUMBERS FOR PERVIOUS AREA

PLATE D-5.5 (1 of 2)

Figure 8: Soil Type Chart


Rainfall Depth 100 Year Storm Event (7.5)
NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 24-HOUR PRECIPITATION
PLATE E-5.6

3.1.2 DESIGN FREQUENCY

Drainage design calculations are based on the 100-year isohyetal as required by the Riverside County Flood Control and Water Conservation District.

3.1.3 RAINFALL DEPTH

Based on the Isohyetal Map, the rainfall for the project site is 7.5 inches for a 100-year, 24-hour storm event.

3.1.4 SOIL TYPE

The Isohyetal Map indicates a numerical soil classification of 84 for the site based on soil classification D as the soil was determined to not be conductive for infiltration. This approximates the soil classification provided by the chart in Figure 8.

3.2 STORMWATER DISCHARGE FOR THE PROPOSED SITE

The stormwater runoff currently produced by the pre-development site was calculated using the software HydroCalc provided by the LA County Department of Public Works.

3.2.1. RUNOFF FLOW AND VOLUME

Based on a 100-year, 24-hour storm event, the proposed site will produce a total of peak flow rate of 36.35 cfs. See Appendix B.

3.2.2 TRIBUTARY AREAS

Tributary areas divided into 13 catchment areas, based on uniformity in drainage conditions for the new site improvements. See Appendix A.

4.0 PROJECT SITE HYDRAULICS

4.1 BASIS OF DESIGN

The recommended storm drain capacity design for Medical Office Building is a 100-year storm event. The analysis of the hydraulic characteristic of the storm drain system is performed using HydroCalc. Manning's Equation is used to determine the velocity and flow capacities. Hydrology Calculations for a 100-year event was shown on Appendix B.

4.2 PROPOSED HYDRAULICS SYSTEM

Stormwater is conveyed using an underground pipe network, which collects surface stormwater through catch basins. Stormwater from the building roofs will be connected directly via hard pipe into the storm drain system.

Most stormwater will enter a Continuous Deflective System (CDS) unit, which captures pollutants such as debris, sediment and oil. Stormwater then enters a detention basin, designed to capture the designed volume, V_{BMP}. The detention basin will be sized based on the requirements of hydromodification utilizing the Santa Margarita Region Hydrology Model program.

4.3 CARRIER PIPE DESIGN

New pipes are Annular High Density Polyethylene Pipe (HDPEP). The preliminary pipe design was based on a Manning's roughness coefficient of 0.009, minimum slope of 0.50%, and flowing 75% full to be conservative. Appendix D shows the pipe size analysis for all proposed storm drain lines. The proposed drainage lines are sized to a 100-year, 24-hour storm frequency.

4.4 DRAINAGE INLET DESIGN

Proposed drainage inlet structures include 36"x36" and 48"x48" catch basins. The flow capacity of the drainage inlets are sufficient to capture the sheet flow in its tributary area. Refer to Appendix E for catch basin design calculations.

4.5 DETENTION BASIN

The Detention Basin designed to capture volume, V_{BMP} along with the volume required for hydromodification. Storm water will be mitigated utilizing the LID principle of biofiltration. through the bottom of the basin into the underlying soil. Flows exceeding the design volume must discharge to a downstream conveyance system. Trash and sediment accumulate within the forebay as stormwater passes into the basin. Biofiltration is highly effective in removing all targeted pollutants from stormwater runoff. Refer to Appendix F for Detention Basin Calculations.

5.0 STORMWATER MITIGATION

5.1 LOW IMPACT DEVELOPMENT (LID) PLAN

Per the Riverside County Design Handbook for Low impact Development Best Management Practices when LID be implemented correctly on a site, LID provides two primary benefits: 1) The post-construction site hydrology will more closely mimic the pre-development hydrology, thus reducing the downstream erosion that may occur due to increased runoff from pervious surfaces; 2) Pollutants in runoff from the site will be significantly reduced.

Low Impact Development (LID) is a stormwater management strategy that mitigates the impacts of runoff and stormwater pollution using BMPs that remove or treat runoff pollution at the source. LID practices are designed to protect surface and groundwater quality, maintain the integrity of ecosystems, and preserve the physical integrity of receiving waters by controlling rainfall and stormwater runoff at or close to the source. LID is implemented in the following hierarchy:

1. Infiltration and/or Bioretention
2. High-efficiency Bio-Filtration/Retention System BMP
3. Flow Through Treatment BMPs

The Stormwater Quality Design Volume is calculated from the 85th percentile, 24-hour rain event as determined from the Riverside County Flood Control and Water Conservation District 85th percentile precipitation isohyetal map (Refer to Figure 6).

6.0 BEST MANAGEMENT PRACTICES

6.1 DRAINAGE INLET FILTERS

All catch basins will have a debris catch with sediment filter bag. These filters direct the stormwater runoff to filtration media which will capture solid waste particles and other pollutants from entering the storm drain network. The filters are designed to treat the flow from the 85th percentile rainfall event. Additionally, all storm drain inlets will have stencils marked “NO DUMPING – DRAINS TO OCEAN” with a graphical icon to discourage illegal dumping.

6.2 CONTINOUS DEFLECTIVE SEPARATION (CDS)

The Contech CDS system is a mechanical device which uses continuous deflective separation to screen, separate and trap pollutants in stormwater runoff. The CDS units are placed near the end of the site stormwater network so that the stormwater runoff from the project site goes through the CDS. The CDS 1 has a treatment capacity of 0.51 CFS and a maximum hydraulic internal bypass of 13.17 CFS and CDS 2 has a treatment capacity of 0.36 CFS and a maximum hydraulic internal bypass of 11.94 CFS. Refer to Appendix G for CDS calculations and details.

6.3 BIOFILTRATION WITH UNDERDRAINS

Based on the geotechnical report, the site is nto conductive for infiltration, in some cases having an infiltration rate of 0.08 in/hr. Additionally the groundwater table was observed to be within 10 feet of the existing ground. Based on LID guidelines and Wildomar’s WQMP requirements, this makes infiltration or partial infiltration unfeasible. The detention basin will act as biofiltration, treating the volume required based on proposed site conditions. Refer to Appendix F for calculations.

6.4 OPERATION AND MAINTENANCE

The Operation and Maintenance (O&M) Plan for the site's BMPs is included in Appendix J.

7.0 PROJECT CONCLUSIONS AND RECOMMENDATIONS

After reviewing the results of the hydrology study, VCA Engineers concludes and recommends that:

1. The proposed storm drain system will be designed to convey the peak flow due to a 100-year, 24- hour rainfall event.
2. LID compliance will be attained by treating all stormwater runoff generated by the 85th percentile 24-hour rain event before it is discharge. Runoff will be treated through a CDS unit and it will be discharged to the biofiltration basin.
3. The detention basin will be designed to comply with hydromodification requirements.

APPENDIX A

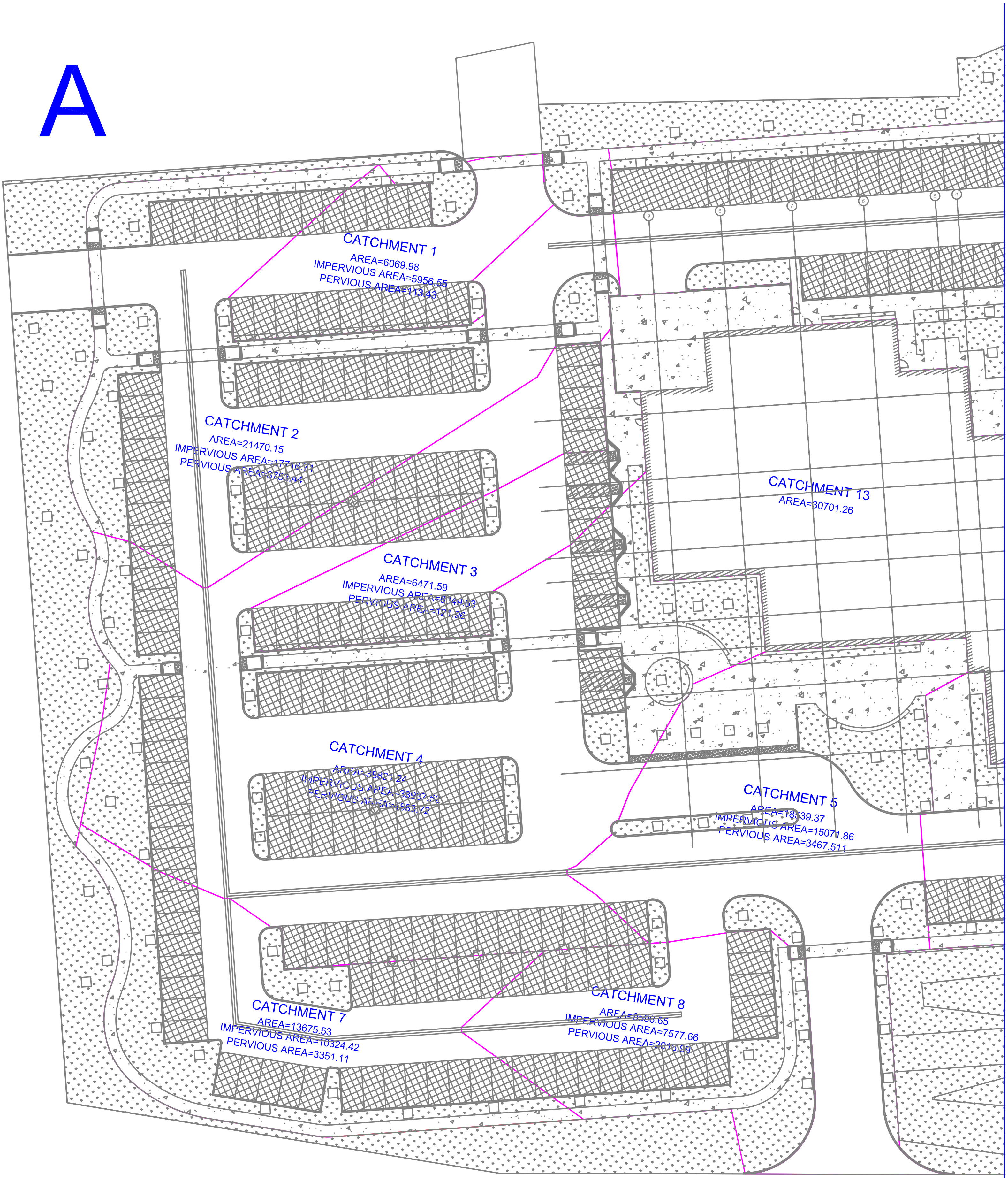
TRIBUTARY AREAS

VCA Engineers, Inc.		**Subarea Information**
Client:	CANNON DESIGN	Job No. 2092-219
Project:	Medical Office Building	Date: 8/21/2019
		Engineer: VCA

Wildomar Site Data

Catchment Area	Area (sf)	Area (acre)	Flow Path Length (ft)	Slope	Impervious	Pervious	% Impervious
1	6,069.98	0.14	146.47	2.00%	5,956.55	113.43	0.98
2	21,470.15	0.49	212.32	2.00%	17,716.71	3,753.44	0.83
3	6,471.59	0.15	189.93	2.00%	6,349.63	121.96	0.98
4	38,821.24	0.89	244.42	2.00%	33,937.52	4,883.72	0.87
5	18,539.37	0.43	189.90	2.00%	15,071.86	3,467.51	0.81
6	39,173.61	0.90	203.04	2.00%	0.00	39,173.61	0.00
7	13,675.53	0.31	219.71	2.00%	10,324.42	3,351.11	0.75
8	9,596.65	0.22	147.49	2.00%	7,577.66	2,018.99	0.79
9	47,911.41	1.10	244.40	2.00%	42,538.50	5,372.91	0.89
10	5,717.17	0.13	161.46	2.00%	5,425.11	292.06	0.95
11	13,460.91	0.31	179.55	2.00%	11,849.95	1,610.96	0.88
12	37,930.41	0.87	282.18	2.00%	31,813.17	6,117.24	0.84
13	30,701.26	0.70	251.22	2.00%	30,701.26	0.00	1.00
Total	**289,539.28**	**6.65**			**219,262.34**	**70,276.94**	

A



CATCHMENT 1
AREA=6069.98
IMPERVIOUS AREA=5956.55
PERVIOUS AREA=113.43
CATCHMENT 2
AREA=21470.15
IMPERVIOUS AREA=17716.71
PERVIOUS AREA=3753.44
CATCHMENT 3
AREA=6471.59
IMPERVIOUS AREA=6349.63
PERVIOUS AREA=121.96
CATCHMENT 4
AREA=35821.24
IMPERVIOUS AREA=33937.52
PERVIOUS AREA=1883.72
CATCHMENT 13
AREA=30701.26
CATCHMENT 5
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PERVIOUS AREA=3467.511
CATCHMENT 7
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CATCHMENT 8
AREA=9596.65
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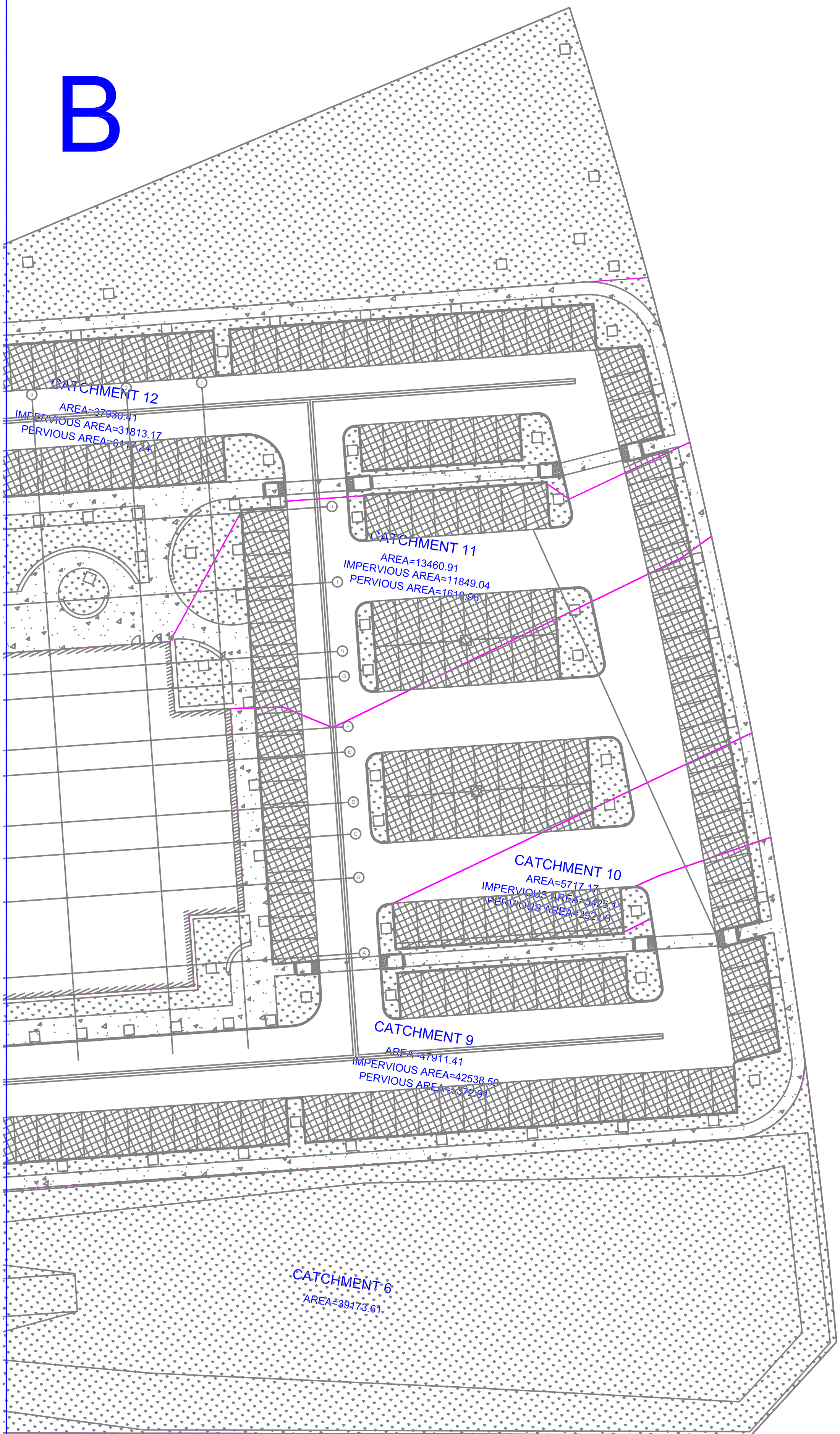
PERVIOUS AREA=2018.99

B


CATCHMENT 12
AREA=37930.41
IMPERVIOUS AREA=31813.17
PERVIOUS AREA=
CATCHMENT 11
AREA=13460.91
IMPERVIOUS AREA=11849.04
PERVIOUS AREA=
CATCHMENT 10
AREA=5717.17
IMPERVIOUS AREA=
PERVIOUS AREA=
CATCHMENT 9
AREA=47911.41
IMPERVIOUS AREA=42538.50
PERVIOUS AREA=
CATCHMENT 6
AREA=39173.61

CALCULATION B

HYDROLOGY CALCULATIONS

Los Angeles County
1041 S. Garfield Ave. Suite #210, Los Angeles CA 91801
Tel: 323-729-6098 ▪ **Fax:** 323-729-6043
e-mail: vca@vcaeng.com

Orange County
2151 Michelson Dr. # 242, Irvine, CA 92612
Tel: 949-679-0870 ▪ **Fax:** 949-679-9370
www.vcaeng.com

Peak Flow Hydrologic Analysis

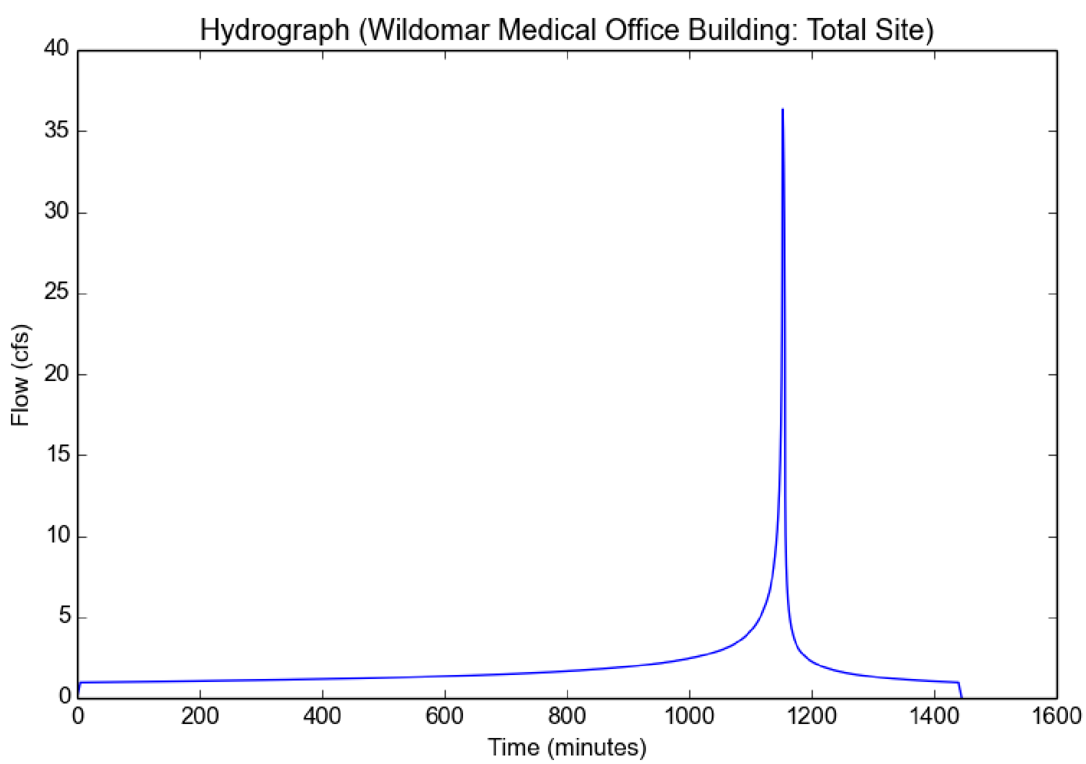
File location: Z:/VCA Projects 5/2013 to XXX/Reports/New Hydrology Report/Wildomar Medical Office Building - Total Site.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	Wildomar Medical Office Building
Subarea ID	Total Site
Area (ac)	8.7
Flow Path Length (ft)	50.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	7.5
Percent Impervious	0.6072
Soil Type	84
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	8.415
Peak Intensity (in/hr)	5.0206
Undeveloped Runoff Coefficient (Cu)	0.7276
Developed Runoff Coefficient (Cd)	0.8323
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	36.3537
Burned Peak Flow Rate (cfs)	36.3537
24-Hr Clear Runoff Volume (ac-ft)	3.6884
24-Hr Clear Runoff Volume (cu-ft)	160667.942



CALCULATION C

STORM DRAIN UTILITY PLANS

Los Angeles County
1041 S. Garfield Ave. Suite #210, Los Angeles CA 91801
Tel: 323-729-6098 ▪ **Fax:** 323-729-6043
e-mail: vca@vcaeng.com

Orange County
2151 Michelson Dr. # 242, Irvine, CA 92612
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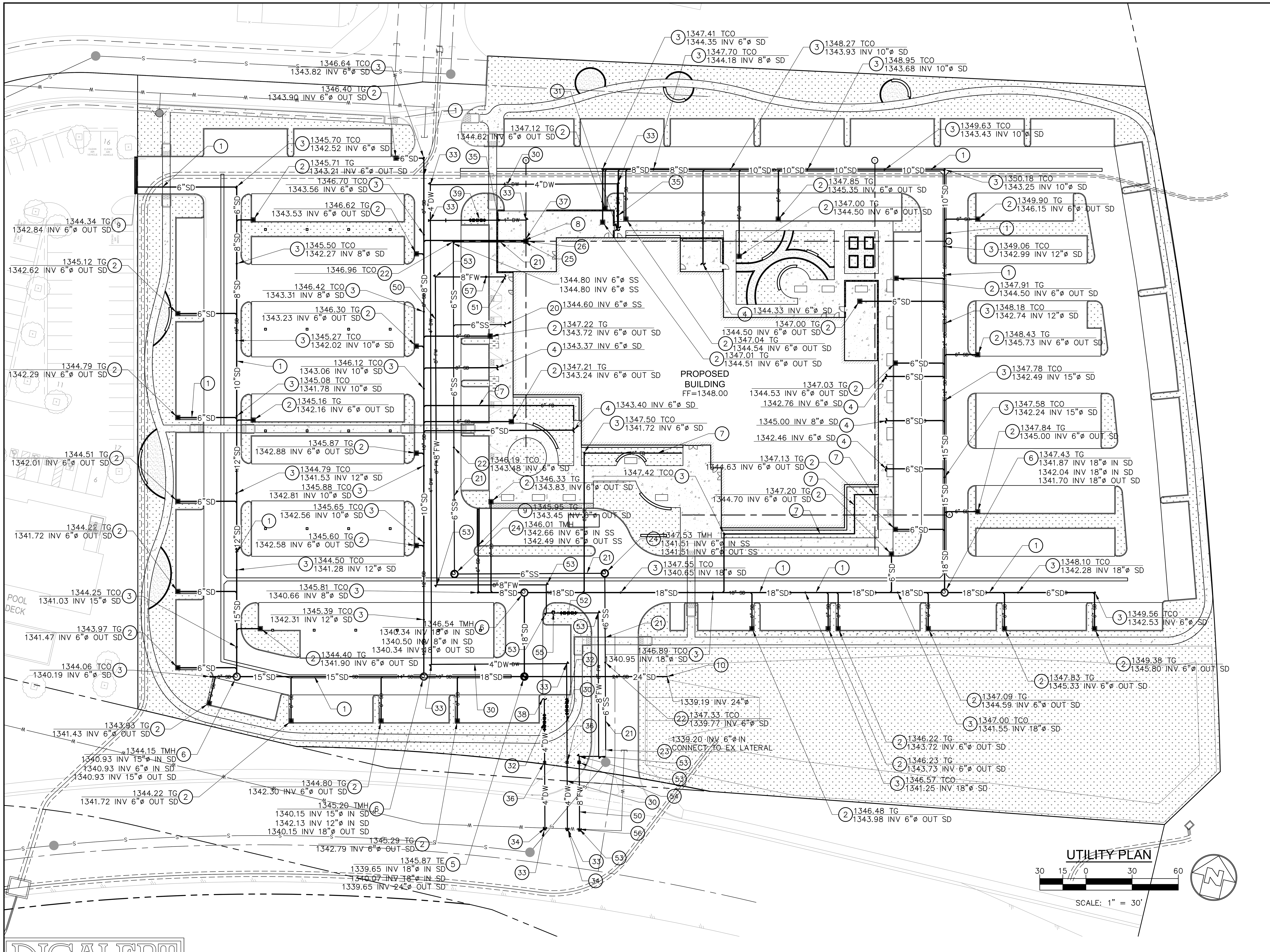
www.vcaeng.com



CONSTRUCTION NOTES:

STORM DRAIN:

1. INSTALL PVC SCH 40 PIPE FOR STORM DRAIN LINE.
2. CONSTRUCT CATCH BASIN.
3. INSTALL CLEANOUT.
4. CONNECT TO BUILDING DOWN SPOUT. COORDINATE AND MATCH LOCATION WITH PLUMBING DRAWINGS. PROVIDE REDUCER AND FITTINGS AS REQUIRED TO MATCH SIZE OF BUILDING DOWN SPOUT.
5. INSTALL CDS UNIT.
6. CONSTRUCT SD MANHOLE PER APWA STD PLAN 321-2.
7. INSTALL 6" FRENCH DRAIN.
8. CONNECT STORM DRAIN LINE TO FOX DRAIN SYSTEM AND VALVE.
9. INSTALL TRENCH DRAIN.
10. POINT OF DISCHARGE TO BIOINFILTRATION DETENTION POND.

SANITARY SEWER:

20. CONNECT TO BUILDING SANITARY SEWER CONNECTION. PROVIDE REDUCING FITTINGS AND COUPLINGS AS NEEDED. FOR CONTINUATION SEE PLUMBING PLANS.
21. INSTALL ABS SCH 40 SANITARY SEWER PIPE.
22. INSTALL CLEANOUT.
23. CONNECT TO THE EXISTING SEWER LINE. PROVIDE REDUCING FITTINGS AND COUPLINGS AND CONTRACTOR SHALL POTHOLE AND FIELD VERIFY EXACT SIZE, DEPTH AND LOCATION OF EX LATERAL PRIOR TO THE TRENCHING OF NEW SYSTEM.
24. CONSTRUCT SS MANHOLE PER APWA STD PLAN 200-3.
25. CONNECT SANITARY LINE TO FOX DRAIN SYSTEM AND VALVE.
26. CONSTRUCT FOX DRAIN SYSTEM.

DOMESTIC WATER:

30. INSTALL COPPER PIPE TYPE K TUBING FOR DOMESTIC WATER LINE.
31. CONNECT TO BUILDING DOMESTIC WATER CONNECTION. PROVIDE REDUCING FITTINGS AND COUPLINGS AS NEEDED. FOR CONTINUATION SEE PLUMBING PLANS.
32. INSTALL DOMESTIC/IRRIGATION WATER REDUCED PRESSURE BACKFLOW PREVENTER. COORDINATE AND VERIFY POINT OF CONNECTION.
33. INSTALL CONCRETE THRUST BLOCK AND TIES FOR WATERLINE.
34. CONNECT TO EXISTING WATER LINE. PROVIDE REDUCING FITTINGS AND COUPLINGS AS NEEDED. VERIFY LOCATION IN FIELD BY POT HOLING PRIOR TO CONSTRUCTION/INSTALLATION OF NEW WATER SYSTEM.
35. INSTALL GATE VALVE.
36. PROPOSED WATER METER TO BE USED FOR DOMESTIC/IRRIGATION WATER SERVICE.
37. CONNECT DOMESTIC WATER LINE TO FOX DRAIN SYSTEM AND VALVE.
38. POINT OF CONNECTION FOR PROPOSED IRRIGATION LINE.
39. FOX DRAIN SYSTEM AND VALVE.

FIRE WATER:

50. INSTALL 8" AWWA C900 PVC PRESSURE CLASS DR14, FIRE WATER LINE.
51. CONNECT TO BUILDING FIRE WATER CONNECTION. PROVIDE REDUCING FITTINGS AND COUPLINGS AS NEEDED. FOR CONTINUATION SEE PLUMBING PLANS.
52. INSTALL DOUBLE CHECK DETECTOR ASSEMBLY.
53. INSTALL CONCRETE THRUST BLOCK AND TIES.
54. PROPOSED WATER METER TO BE USED FOR FIRE WATER.
55. INSTALL FIRE DEPARTMENT CONNECTION.
56. CONNECT TO EXISTING WATER LINE. PROVIDE REDUCING FITTINGS AND COUPLINGS AS NEEDED. VERIFY LOCATION IN FIELD BY POT HOLING PRIOR TO CONSTRUCTION/INSTALLATION OF NEW WATER SYSTEM.
57. INSTALL GATE VALVE.

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A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

NOTE:
WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

The private engineer signing these plans is responsible for assuring the accuracy and acceptability of the design hereon. In the event of discrepancies arising after city acceptance or during construction, the private engineer shall be responsible for determining an acceptable solution and revising the plans for acceptance by the city.

MARK	BY	DATE	REVISIONS	APPR.	DATE
ENGINEER				CITY	

CITY OF WILDOMAR
ACCEPTED BY:
Date:
Daniel A. York, Director of Public Works/ City Engineer, PE 43212
ACCEPTANCE AS TO CONFORMANCE WITH APPLICABLE CITY STANDARDS AND PRACTICES

SEAL-ENGINEER:
REGISTERED PROFESSIONAL ENGINEER VIRGILIO C. ADAMAR No. C36079 Exp. 6/30/20 CIVIL STATE OF CALIFORNIA

VCA ENGINEERS INC
CIVIL • STRUCTURAL
1041 S. Garfield Avenue, Suite #210 Alhambra, CA 91801
Tel. 323.729.6098 Fax. 323.729.6043

PREPARED BY: ____________
R.C.E. No. ________ EXP. ________

BENCHMARK:
Elevation = ________
Datum = ________
BENCHMARK # ________
THIS SURVEY WAS PERFORMED ON (date) BY (surveyor) L.S. (number), EXP. (date)

SCALE:
H: As Noted V: As Noted

CITY OF WILDOMAR
BAXTER VILLAGE - MEDICAL OFFICE BUILDING
ENTITLEMENT SUBMITTAL
UTILITY PLAN

SHEET No.
OF SHTS

CALCULATION D

PIPE SIZING

VCA Engineers, Inc. | **Pipe Sizing 100-Year 24-Hour Rainfall**

Client: CANNONDESIGN
Project: Medical Office Building

Job No. 2092-219
Date: 8/21/2019
Engineer: VCA

Pipe ID	Remarks	Tributary Area	Q_P Peak Flow Rate	V Total Runoff Volume	D Pipe Size	n Roughness Coefficient	S Pipe Slope	v Design Velocity	Test: $v \geq 2$ f/s	a Area of Flow	Q_{MAX} Pipe Capacity	Test: $Q_{MAX} \geq Q_P$	Pipe Size OK?
		(acre)	(cfs)	(cu ft)	(inches)		(ft/ft)	(f/s)		(ft^2)	(cfs)		
SD1	Catchment 13 (1-9 Downspots)	0.078	0.351	2120.58	10	0.009	0.005	4.66	OK	0.44	2.045	OK	YES
SD2	Landscape Zone N	0.064	0.223	506.30	8	0.009	0.005	4.02	OK	0.28	1.128	OK	YES
SD3	SD1 + SD2	0.142	0.574	2626.88	12	0.009	0.005	5.26	OK	0.63	3.325	OK	YES
SD4	Catchment 13 (2-9 Downspots)	0.078	0.351	2120.58	10	0.009	0.005	4.66	OK	0.44	2.045	OK	YES
SD5	SD3 + SD4	0.220	0.925	4747.46	14	0.009	0.005	5.83	OK	0.86	5.016	OK	YES
SD6	Catchment 2 (1-2 CB)	0.245	1.055	5758.84	8	0.009	0.005	4.02	OK	0.28	1.128	OK	YES
SD7	SD 5 + SD6	0.465	1.980	10506.30	18	0.009	0.005	6.90	OK	1.42	9.803	OK	YES
SD8	Catchment 1	0.140	0.630	3760.78	8	0.009	0.005	4.02	OK	0.28	1.128	OK	YES
SD9	SD7 + SD8	0.605	2.610	14267.08	18	0.009	0.005	6.90	OK	1.42	9.803	OK	YES
SD10	Catchment 13 (3-9 Downspots)	0.078	0.351	2120.58	10	0.009	0.005	4.66	OK	0.44	2.045	OK	YES
SD11	SD 9 + SD10	0.682	2.961	16387.66	18	0.009	0.005	6.90	OK	1.42	9.803	OK	YES
SD12	Catchment 2 (2-2 CB)	0.245	1.055	5758.84	8	0.009	0.005	4.02	OK	0.28	1.128	OK	YES
SD13	Catchment 13 (4-9 Downspots)	0.078	0.351	2120.58	10	0.009	0.005	4.66	OK	0.44	2.045	OK	YES
SD14	SD11 + SD12 + SD13	1.005	4.367	24267.07	18	0.009	0.005	6.90	OK	1.42	9.803	OK	YES
SD15	Catchment 3	0.150	0.670	4028.900	8	0.009	0.005	4.02	OK	0.28	1.128	OK	YES
SD16	Catchment 13 (5-9 Downspots)	0.078	0.351	2120.581	10	0.009	0.005	4.66	OK	0.44	2.045	OK	YES
SD17	SD14 + SD15 + SD16	1.233	5.388	30416.56	24	0.009	0.005	8.35	OK	2.53	21.112	OK	YES
SD18	Landscape Zone W	0.179	0.622	1416.06	12	0.009	0.005	5.26	OK	0.63	3.325	OK	YES
SD19	SD17 + SD18	1.412	6.010	31832.62	24	0.009	0.005	8.35	OK	2.53	21.112	OK	YES
SD20	Catchment 4	0.890	3.890	21857.86	14	0.009	0.005	5.83	OK	0.86	5.016	OK	YES
SD21	Catchment 5	0.430	1.850	9994.32	12	0.009	0.005	5.26	OK	0.63	3.325	OK	YES
SD22	SD19 + SD20 + SD21	2.732	11.750	63684.80	24	0.009	0.005	8.35	OK	2.53	21.112	OK	YES
SD23	Catchment 7	0.310	1.310	6818.50	10	0.009	0.005	4.66	OK	0.44	2.045	OK	YES
SD24	Landscape Zone S	0.071	0.247	561.68	8	0.009	0.005	4.02	OK	0.28	1.128	OK	YES
SD25	SD22 + SD23 + SD24	3.113	13.307	71064.97	24	0.009	0.005	8.35	OK	2.53	21.112	OK	YES
SD26	SD25 + Catchment 8	3.333	14.247	76067.88	24	0.009	0.005	8.35	OK	2.53	21.112	OK	YES
SD27	Catchment 12	0.870	3.770	20702.98	14	0.009	0.005	5.83	OK	0.86	5.016	OK	YES
SD28	Catchment 13 (6-9 Downspots)	0.078	0.351	2120.58	10	0.009	0.005	4.66	OK	0.44	2.045	OK	YES
SD29	SD27 + SD28	0.948	4.121	22823.56	14	0.009	0.005	5.83	OK	0.86	5.016	OK	YES
SD30	Catchment 11	0.310	1.360	7654.23	10	0.009	0.005	4.66	OK	0.44	2.045	OK	YES
SD31	SD29 + SD30	1.258	5.481	30477.79	18	0.009	0.005	6.90	OK	1.42	9.803	OK	YES
SD32	Catchment 13 (7-9 Downspots)	0.078	0.351	2120.58	10	0.009	0.005	4.66	OK	0.44	2.045	OK	YES
SD33	SD31 + SD32	1.336	5.832	32598.37	18	0.009	0.005	6.90	OK	1.42	9.803	OK	YES
SD34	Catchment 10	0.130	0.580	3401.59	10	0.009	0.005	4.66	OK	0.44	2.045	OK	YES
SD35	SD33 + SD34	1.466	6.412	35999.96	18	0.009	0.005	6.90	OK	1.42	9.803	OK	YES
SD36	Catchment 9	1.100	4.830	27338.39	14	0.009	0.005	5.83	OK	0.86	5.016	OK	YES
SD37	SD35 + SD36	2.566	11.242	63338.35	24	0.009	0.005	8.35	OK	2.53	21.112	OK	YES
SD38	Catchment 13 (8-9 Downspots)	0.078	0.351	2120.58	10	0.009	0.005	4.66	OK	0.44	2.045	OK	YES
SD39	SD37 + SD38	2.643	11.593	65458.93	24	0.009	0.005	8.35	OK	2.53	21.112	OK	YES
SD40	Catchment 13 (9-9 Downspots)	0.078	0.351	2120.58	10	0.009	0.005	4.66	OK	0.44	2.045	OK	YES
SD41	SD39 + SD40	2.721	11.944	67579.51	24	0.009	0.005	8.35	OK	2.53	21.112	OK	YES

VCA Engineers, Inc.		**Pipe Sizing**
Client:	CANNONDESIGN	Job No. 2092-219
Project:	Medical Office Building	Date: 8/21/2019
		Engineer: VCA

SD 1 = Catchment 13 (1-9 Downspot)				$Q_{100\text{-}YR}$=	0.35
Calculations for Velocity and Discharge					
D =	10		0.83 ft	Diameter of Pipe	
n =	0.009		PVC	Manning's Roughness Coefficient	
S =	0.005	ft/ft	0.50 %	Slope of Pipe	
d =	8	inches	0.63 ft	Flow Depth	
d/D =	0.75			Proportional Depth of Flow	
theta =	4.1888	radians		Angle of Flow	
a =	0.44	sq.ft		Area of Flow	
p =	1.75	ft		Wetted Perimeter	
r =	0.25	ft		Hydraulic Radius	
Using Manning's Equation, for pipe at flow depth 'd'					
v =	4.66	fps		Flow Velocity **OK**	Therefore, Pipe Size is OK
Q =	2.045	cfs		Flow Rate **OK**	

SD 2 = Landscape Zone N				$Q_{100\text{-}YR}$=	0.22
Calculations for Velocity and Discharge					
D =	8		0.67 ft	Diameter of Pipe	
n =	0.009		PVC	Manning's Roughness Coefficient	
S =	0.005	ft/ft	0.50 %	Slope of Pipe	
d =	6	inches	0.50 ft	Flow Depth	
d/D =	0.75			Proportional Depth of Flow	
theta =	4.1888	radians		Angle of Flow	
a =	0.28	sq.ft		Area of Flow	
p =	1.40	ft		Wetted Perimeter	
r =	0.20	ft		Hydraulic Radius	
Using Manning's Equation, for pipe at flow depth 'd'					
v =	4.02	fps		Flow Velocity **OK**	Therefore, Pipe Size is OK
Q =	1.128	cfs		Flow Rate **OK**	

SD 3 = SD1 + SD2					$Q_{100\text{-}YR}$=	0.57
Calculations for Velocity and Discharge						
D =	12		1.00 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	9	inches	0.75 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	0.63	sq.ft		Area of Flow		
p =	2.09	ft		Wetted Perimeter		
r =	0.30	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	5.26	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	3.325	cfs		Flow Rate	**OK**	

SD 4 = Catchment 13 (2-9 Downspot)					$Q_{100\text{-}YR}$=	0.35
Calculations for Velocity and Discharge						
D =	10		0.83 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	8	inches	0.63 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	0.44	sq.ft		Area of Flow		
p =	1.75	ft		Wetted Perimeter		
r =	0.25	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	4.66	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	2.045	cfs		Flow Rate	**OK**	

SD 5 = SD4 + SD3					$Q_{100\text{-}YR}$=	0.93
Calculations for Velocity and Discharge						
D =	14		1.17 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	11	inches	0.88 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	0.86	sq.ft		Area of Flow		
p =	2.44	ft		Wetted Perimeter		
r =	0.35	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	5.83	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	5.016	cfs		Flow Rate	**OK**	

SD 6 = Catchment 2 (1-2 CB)					$Q_{100\text{-}YR}$=	1.06
Calculations for Velocity and Discharge						
D =	8		0.67 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	6	inches	0.50 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	0.28	sq.ft		Area of Flow		
p =	1.40	ft		Wetted Perimeter		
r =	0.20	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	4.02	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	1.128	cfs		Flow Rate	**OK**	

SD 7 = SD5 + SD6					$Q_{100\text{-}YR}$=	1.98
Calculations for Velocity and Discharge						
D =	18		1.50 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	14	inches	1.13 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	1.42	sq.ft		Area of Flow		
p =	3.14	ft		Wetted Perimeter		
r =	0.45	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	6.90	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	9.803	cfs		Flow Rate	**OK**	

SD 8 = Catchment 1					$Q_{100\text{-}YR}$=	0.63
Calculations for Velocity and Discharge						
D =	8		0.67 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	6	inches	0.50 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	0.28	sq.ft		Area of Flow		
p =	1.40	ft		Wetted Perimeter		
r =	0.20	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	4.02	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	1.128	cfs		Flow Rate	**OK**	

SD 9 = SD7 + SD8					$Q_{100\text{-}YR}$=	2.61
Calculations for Velocity and Discharge						
D =	18		1.50 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	14	inches	1.13 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	1.42	sq.ft		Area of Flow		
p =	3.14	ft		Wetted Perimeter		
r =	0.45	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	6.90	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	9.803	cfs		Flow Rate	**OK**	

SD 10 = Catchment 13 (3-9 Downspot)					$Q_{100\text{-}YR}$=	0.35
Calculations for Velocity and Discharge						
D =	10		0.83 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	8	inches	0.63 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	0.44	sq.ft		Area of Flow		
p =	1.75	ft		Wetted Perimeter		
r =	0.25	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	4.66	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	2.045	cfs		Flow Rate	**OK**	

SD 11 = SD9 +SD10					$Q_{100\text{-}YR}$=	2.96
Calculations for Velocity and Discharge						
D =	18		1.50 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	14	inches	1.13 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	1.42	sq.ft		Area of Flow		
p =	3.14	ft		Wetted Perimeter		
r =	0.45	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	6.90	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	9.803	cfs		Flow Rate	**OK**	

SD 12 = Catchment 2 (2-2 CB) $Q_{100\text{-}YR}$= 1.06

Calculations for Velocity and Discharge

D =	8		0.67 ft	Diameter of Pipe
n =	0.009		PVC	Manning's Roughness Coefficient
S =	0.005	ft/ft	0.50 %	Slope of Pipe
d =	6	inches	0.50 ft	Flow Depth
d/D =	0.75			Proportional Depth of Flow
theta =	4.1888	radians		Angle of Flow
a =	0.28	sq.ft		Area of Flow
p =	1.40	ft		Wetted Perimeter
r =	0.20	ft		Hydraulic Radius

Using Manning's Equation, for pipe at flow depth 'd'

v =	4.02	fps	Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	1.128	cfs	Flow Rate	**OK**	

SD 13 = Catchment 13 (4-7 Downspot) $Q_{100\text{-}YR}$= 0.35

Calculations for Velocity and Discharge

D =	10		0.83 ft	Diameter of Pipe
n =	0.009		PVC	Manning's Roughness Coefficient
S =	0.005	ft/ft	0.50 %	Slope of Pipe
d =	8	inches	0.63 ft	Flow Depth
d/D =	0.75			Proportional Depth of Flow
theta =	4.1888	radians		Angle of Flow
a =	0.44	sq.ft		Area of Flow
p =	1.75	ft		Wetted Perimeter
r =	0.25	ft		Hydraulic Radius

Using Manning's Equation, for pipe at flow depth 'd'

v =	4.66	fps	Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	2.045	cfs	Flow Rate	**OK**	

SD 14 = SD11 + SD12 +SD13 $Q_{100\text{-}YR}$= 4.37

Calculations for Velocity and Discharge

D =	18		1.50 ft	Diameter of Pipe
n =	0.009		PVC	Manning's Roughness Coefficient
S =	0.005	ft/ft	0.50 %	Slope of Pipe
d =	14	inches	1.13 ft	Flow Depth
d/D =	0.75			Proportional Depth of Flow
theta =	4.1888	radians		Angle of Flow
a =	1.42	sq.ft		Area of Flow
p =	3.14	ft		Wetted Perimeter
r =	0.45	ft		Hydraulic Radius

Using Manning's Equation, for pipe at flow depth 'd'

v =	6.90	fps	Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	9.803	cfs	Flow Rate	**OK**	

SD 15 = Catchment 3						$Q_{100\text{-}YR}$=	0.67
Calculations for Velocity and Discharge							
D =	8		0.67 ft	Diameter of Pipe			
n =	0.009		PVC	Manning's Roughness Coefficient			
S =	0.005	ft/ft	0.50 %	Slope of Pipe			
d =	6	inches	0.50 ft	Flow Depth			
d/D =	0.75			Proportional Depth of Flow			
theta =	4.1888	radians		Angle of Flow			
a =	0.28	sq.ft		Area of Flow			
p =	1.40	ft		Wetted Perimeter			
r =	0.20	ft		Hydraulic Radius			
Using Manning's Equation, for pipe at flow depth 'd'							
v =	4.02	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK	
Q =	1.128	cfs		Flow Rate	**OK**		

SD 16 = Catchment 13 (5-9 Downspot)						$Q_{100\text{-}YR}$=	0.35
Calculations for Velocity and Discharge							
D =	10		0.83 ft	Diameter of Pipe			
n =	0.009		PVC	Manning's Roughness Coefficient			
S =	0.005	ft/ft	0.50 %	Slope of Pipe			
d =	8	inches	0.63 ft	Flow Depth			
d/D =	0.75			Proportional Depth of Flow			
theta =	4.1888	radians		Angle of Flow			
a =	0.44	sq.ft		Area of Flow			
p =	1.75	ft		Wetted Perimeter			
r =	0.25	ft		Hydraulic Radius			
Using Manning's Equation, for pipe at flow depth 'd'							
v =	4.66	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK	
Q =	2.045	cfs		Flow Rate	**OK**		

SD 17 = SD14 + SD15 + SD16						$Q_{100\text{-}YR}$=	5.39
Calculations for Velocity and Discharge							
D =	24		2.00 ft	Diameter of Pipe			
n =	0.009		PVC	Manning's Roughness Coefficient			
S =	0.005	ft/ft	0.50 %	Slope of Pipe			
d =	18	inches	1.50 ft	Flow Depth			
d/D =	0.75			Proportional Depth of Flow			
theta =	4.1888	radians		Angle of Flow			
a =	2.53	sq.ft		Area of Flow			
p =	4.19	ft		Wetted Perimeter			
r =	0.60	ft		Hydraulic Radius			
Using Manning's Equation, for pipe at flow depth 'd'							
v =	8.35	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK	
Q =	21.112	cfs		Flow Rate	**OK**		

SD 18 = Landscape Zone W					$Q_{100\text{-}YR}$=	0.62
Calculations for Velocity and Discharge						
D =	12		1.00 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	9	inches	0.75 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	0.63	sq.ft		Area of Flow		
p =	2.09	ft		Wetted Perimeter		
r =	0.30	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	5.26	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	3.325	cfs		Flow Rate	**OK**	

SD 19 = SD17 + SD18					$Q_{100\text{-}YR}$=	6.01
Calculations for Velocity and Discharge						
D =	24		2.00 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	18	inches	1.50 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	2.53	sq.ft		Area of Flow		
p =	4.19	ft		Wetted Perimeter		
r =	0.60	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	8.35	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	21.112	cfs		Flow Rate	**OK**	

SD 20 = Catchment 4					$Q_{100\text{-}YR}$=	3.89
Calculations for Velocity and Discharge						
D =	8		0.67 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	6	inches	0.50 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	0.28	sq.ft		Area of Flow		
p =	1.40	ft		Wetted Perimeter		
r =	0.20	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	4.02	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	1.128	cfs		Flow Rate	**NG**	

SD 21 = Catchment 5				Q_{100-YR}=	1.85
Calculations for Velocity and Discharge					
D =	12		1.00 ft	Diameter of Pipe	
n =	0.009		PVC	Manning's Roughness Coefficient	
S =	0.005	ft/ft	0.50 %	Slope of Pipe	
d =	9	inches	0.75 ft	Flow Depth	
d/D =	0.75			Proportional Depth of Flow	
theta =	4.1888	radians		Angle of Flow	
a =	0.63	sq.ft		Area of Flow	
p =	2.09	ft		Wetted Perimeter	
r =	0.30	ft		Hydraulic Radius	
Using Manning's Equation, for pipe at flow depth 'd'					
v =	5.26	fps		Flow Velocity **OK**	Therefore, Pipe Size is OK
Q =	3.325	cfs		Flow Rate **OK**	

SD 22 = SD19+ SD20 + SD21				Q_{100-YR}=	11.75
Calculations for Velocity and Discharge					
D =	24		2.00 ft	Diameter of Pipe	
n =	0.009		PVC	Manning's Roughness Coefficient	
S =	0.005	ft/ft	0.50 %	Slope of Pipe	
d =	18	inches	1.50 ft	Flow Depth	
d/D =	0.75			Proportional Depth of Flow	
theta =	4.1888	radians		Angle of Flow	
a =	2.53	sq.ft		Area of Flow	
p =	4.19	ft		Wetted Perimeter	
r =	0.60	ft		Hydraulic Radius	
Using Manning's Equation, for pipe at flow depth 'd'					
v =	8.35	fps		Flow Velocity **OK**	Therefore, Pipe Size is OK
Q =	21.112	cfs		Flow Rate **OK**	

SD 23 = Catchment 7				Q_{100-YR}=	1.31
Calculations for Velocity and Discharge					
D =	8		0.67 ft	Diameter of Pipe	
n =	0.009		PVC	Manning's Roughness Coefficient	
S =	0.005	ft/ft	0.50 %	Slope of Pipe	
d =	6	inches	0.50 ft	Flow Depth	
d/D =	0.75			Proportional Depth of Flow	
theta =	4.1888	radians		Angle of Flow	
a =	0.28	sq.ft		Area of Flow	
p =	1.40	ft		Wetted Perimeter	
r =	0.20	ft		Hydraulic Radius	
Using Manning's Equation, for pipe at flow depth 'd'					
v =	4.02	fps		Flow Velocity **OK**	Therefore, Pipe Size is OK
Q =	1.128	cfs		Flow Rate **NG**	

SD 24 = Landscape Zone S					$Q_{100\text{-}YR}$=	0.25
Calculations for Velocity and Discharge						
D =	8		0.67 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	6	inches	0.50 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	0.28	sq.ft		Area of Flow		
p =	1.40	ft		Wetted Perimeter		
r =	0.20	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	4.02	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	1.128	cfs		Flow Rate	**OK**	

SD 25 = SD22 + SD23 + SD24					$Q_{100\text{-}YR}$=	13.81
Calculations for Velocity and Discharge						
D =	24		2.00 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	18	inches	1.50 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	2.53	sq.ft		Area of Flow		
p =	4.19	ft		Wetted Perimeter		
r =	0.60	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	8.35	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	21.112	cfs		Flow Rate	**OK**	

SD 26 = SD25 + Catchment 8					$Q_{100\text{-}YR}$=	14.25
Calculations for Velocity and Discharge						
D =	24		2.00 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	18	inches	1.50 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	2.53	sq.ft		Area of Flow		
p =	4.19	ft		Wetted Perimeter		
r =	0.60	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	8.35	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	21.112	cfs		Flow Rate	**OK**	

SD 27 = Catchment 12				$Q_{100\text{-}YR}$=	3.77
Calculations for Velocity and Discharge					
D =	12		1.00 ft	Diameter of Pipe	
n =	0.009		PVC	Manning's Roughness Coefficient	
S =	0.005	ft/ft	0.50 %	Slope of Pipe	
d =	9	inches	0.75 ft	Flow Depth	
d/D =	0.75			Proportional Depth of Flow	
theta =	4.1888	radians		Angle of Flow	
a =	0.63	sq.ft		Area of Flow	
p =	2.09	ft		Wetted Perimeter	
r =	0.30	ft		Hydraulic Radius	
Using Manning's Equation, for pipe at flow depth 'd'					
v =	5.26	fps		Flow Velocity **OK**	Therefore, Pipe Size is OK
Q =	3.325	cfs		Flow Rate **NG**	

SD 28 = Catchment 13 (6-9 Downspots)				$Q_{100\text{-}YR}$=	0.35
Calculations for Velocity and Discharge					
D =	10		0.83 ft	Diameter of Pipe	
n =	0.009		PVC	Manning's Roughness Coefficient	
S =	0.005	ft/ft	0.50 %	Slope of Pipe	
d =	8	inches	0.63 ft	Flow Depth	
d/D =	0.75			Proportional Depth of Flow	
theta =	4.1888	radians		Angle of Flow	
a =	0.44	sq.ft		Area of Flow	
p =	1.75	ft		Wetted Perimeter	
r =	0.25	ft		Hydraulic Radius	
Using Manning's Equation, for pipe at flow depth 'd'					
v =	4.66	fps		Flow Velocity **OK**	Therefore, Pipe Size is OK
Q =	2.045	cfs		Flow Rate **OK**	

SD 29 = SD27 + SD28				$Q_{100\text{-}YR}$=	4.12
Calculations for Velocity and Discharge					
D =	14		1.17 ft	Diameter of Pipe	
n =	0.009		PVC	Manning's Roughness Coefficient	
S =	0.005	ft/ft	0.50 %	Slope of Pipe	
d =	11	inches	0.88 ft	Flow Depth	
d/D =	0.75			Proportional Depth of Flow	
theta =	4.1888	radians		Angle of Flow	
a =	0.86	sq.ft		Area of Flow	
p =	2.44	ft		Wetted Perimeter	
r =	0.35	ft		Hydraulic Radius	
Using Manning's Equation, for pipe at flow depth 'd'					
v =	5.83	fps		Flow Velocity **OK**	Therefore, Pipe Size is OK
Q =	5.016	cfs		Flow Rate **OK**	

SD 30 = Catchment 11					$Q_{100\text{-}YR}$=	1.36
Calculations for Velocity and Discharge						
D =	10		0.83 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	8	inches	0.63 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	0.44	sq.ft		Area of Flow		
p =	1.75	ft		Wetted Perimeter		
r =	0.25	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	4.66	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	2.045	cfs		Flow Rate	**OK**	

SD 31 = SD29 +SD30					$Q_{100\text{-}YR}$=	5.48
Calculations for Velocity and Discharge						
D =	14		1.17 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	11	inches	0.88 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	0.86	sq.ft		Area of Flow		
p =	2.44	ft		Wetted Perimeter		
r =	0.35	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	5.83	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	5.016	cfs		Flow Rate	**NG**	

SD 32 = Catchment 13 (7 -9 Downspots)					$Q_{100\text{-}YR}$=	0.35
Calculations for Velocity and Discharge						
D =	10		0.83 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	8	inches	0.63 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	0.44	sq.ft		Area of Flow		
p =	1.75	ft		Wetted Perimeter		
r =	0.25	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	4.66	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	2.045	cfs		Flow Rate	**OK**	

SD 33 = SD31 +SD32					$Q_{100\text{-}YR}$=	5.83
Calculations for Velocity and Discharge						
D =	18		1.50 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	14	inches	1.13 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	1.42	sq.ft		Area of Flow		
p =	3.14	ft		Wetted Perimeter		
r =	0.45	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	6.90	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	9.803	cfs		Flow Rate	**OK**	

SD 34 = Catchment 10					$Q_{100\text{-}YR}$=	0.58
Calculations for Velocity and Discharge						
D =	10		0.83 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	8	inches	0.63 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	0.44	sq.ft		Area of Flow		
p =	1.75	ft		Wetted Perimeter		
r =	0.25	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	4.66	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	2.045	cfs		Flow Rate	**OK**	

SD 35 = SD33 + SD34					$Q_{100\text{-}YR}$=	6.41
Calculations for Velocity and Discharge						
D =	18		1.50 ft	Diameter of Pipe		
n =	0.009		PVC	Manning's Roughness Coefficient		
S =	0.005	ft/ft	0.50 %	Slope of Pipe		
d =	14	inches	1.13 ft	Flow Depth		
d/D =	0.75			Proportional Depth of Flow		
theta =	4.1888	radians		Angle of Flow		
a =	1.42	sq.ft		Area of Flow		
p =	3.14	ft		Wetted Perimeter		
r =	0.45	ft		Hydraulic Radius		
Using Manning's Equation, for pipe at flow depth 'd'						
v =	6.90	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK
Q =	9.803	cfs		Flow Rate	**OK**	

SD 36 = Catchment 9						$Q_{100\text{-}YR}$=	4.83
Calculations for Velocity and Discharge							
D =	12		1.00 ft	Diameter of Pipe			
n =	0.009		PVC	Manning's Roughness Coefficient			
S =	0.005	ft/ft	0.50 %	Slope of Pipe			
d =	9	inches	0.75 ft	Flow Depth			
d/D =	0.75			Proportional Depth of Flow			
theta =	4.1888	radians		Angle of Flow			
a =	0.63	sq.ft		Area of Flow			
p =	2.09	ft		Wetted Perimeter			
r =	0.30	ft		Hydraulic Radius			
Using Manning's Equation, for pipe at flow depth 'd'							
v =	5.26	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK	
Q =	3.325	cfs		Flow Rate	**NG**		

SD 37 = SD35 +SD36						$Q_{100\text{-}YR}$=	11.24
Calculations for Velocity and Discharge							
D =	18		1.50 ft	Diameter of Pipe			
n =	0.009		PVC	Manning's Roughness Coefficient			
S =	0.005	ft/ft	0.50 %	Slope of Pipe			
d =	14	inches	1.13 ft	Flow Depth			
d/D =	0.75			Proportional Depth of Flow			
theta =	4.1888	radians		Angle of Flow			
a =	1.42	sq.ft		Area of Flow			
p =	3.14	ft		Wetted Perimeter			
r =	0.45	ft		Hydraulic Radius			
Using Manning's Equation, for pipe at flow depth 'd'							
v =	6.90	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK	
Q =	9.803	cfs		Flow Rate	**NG**		

SD 38 = Catchment 13 (8 -9 Downspots)						$Q_{100\text{-}YR}$=	0.35
Calculations for Velocity and Discharge							
D =	10		0.83 ft	Diameter of Pipe			
n =	0.009		PVC	Manning's Roughness Coefficient			
S =	0.005	ft/ft	0.50 %	Slope of Pipe			
d =	8	inches	0.63 ft	Flow Depth			
d/D =	0.75			Proportional Depth of Flow			
theta =	4.1888	radians		Angle of Flow			
a =	0.44	sq.ft		Area of Flow			
p =	1.75	ft		Wetted Perimeter			
r =	0.25	ft		Hydraulic Radius			
Using Manning's Equation, for pipe at flow depth 'd'							
v =	4.66	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK	
Q =	2.045	cfs		Flow Rate	**OK**		

SD 39 =SD37 + SD38						$Q_{100\text{-}YR}$=	11.59
Calculations for Velocity and Discharge							
D =	18		1.50 ft	Diameter of Pipe			
n =	0.009		PVC	Manning's Roughness Coefficient			
S =	0.005	ft/ft	0.50 %	Slope of Pipe			
d =	14	inches	1.13 ft	Flow Depth			
d/D =	0.75			Proportional Depth of Flow			
theta =	4.1888	radians		Angle of Flow			
a =	1.42	sq.ft		Area of Flow			
p =	3.14	ft		Wetted Perimeter			
r =	0.45	ft		Hydraulic Radius			
Using Manning's Equation, for pipe at flow depth 'd'							
v =	6.90	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK	
Q =	9.803	cfs		Flow Rate	**NG**		

SD 40 = Catchment 13 (9 -9 Downspots)						$Q_{100\text{-}YR}$=	0.35
Calculations for Velocity and Discharge							
D =	10		0.83 ft	Diameter of Pipe			
n =	0.009		PVC	Manning's Roughness Coefficient			
S =	0.005	ft/ft	0.50 %	Slope of Pipe			
d =	8	inches	0.63 ft	Flow Depth			
d/D =	0.75			Proportional Depth of Flow			
theta =	4.1888	radians		Angle of Flow			
a =	0.44	sq.ft		Area of Flow			
p =	1.75	ft		Wetted Perimeter			
r =	0.25	ft		Hydraulic Radius			
Using Manning's Equation, for pipe at flow depth 'd'							
v =	4.66	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK	
Q =	2.045	cfs		Flow Rate	**OK**		

SD 41 = SD39 +SD40						$Q_{100\text{-}YR}$=	11.94
Calculations for Velocity and Discharge							
D =	24		2.00 ft	Diameter of Pipe			
n =	0.009		PVC	Manning's Roughness Coefficient			
S =	0.005	ft/ft	0.50 %	Slope of Pipe			
d =	18	inches	1.50 ft	Flow Depth			
d/D =	0.75			Proportional Depth of Flow			
theta =	4.1888	radians		Angle of Flow			
a =	2.53	sq.ft		Area of Flow			
p =	4.19	ft		Wetted Perimeter			
r =	0.60	ft		Hydraulic Radius			
Using Manning's Equation, for pipe at flow depth 'd'							
v =	8.35	fps		Flow Velocity	**OK**	Therefore, Pipe Size is OK	
Q =	21.112	cfs		Flow Rate	**OK**		

APPENDIX E

CATCH BASIN SIZING

VCA Engineers, Inc.	**Catch Basin Sizing**
Client: CANNONDESIGN	Job No. 2092-219
Project: Medical Office Building	Date: 8/21/2019
	Engineer: VCA

CB / TD	Subarea	$Q_{100\text{-year}}$	Head	Catch Basin	Orifice Flow		Weir Flow		CB Design OK?	Type of Flow
			h		Sq Ft Open	$Q_{orifice}$	Perimeter Lineal Feet	Q_{weir}		
No.		(cfs)	(ft)		(ft^2)	(cfs)	(ft)	(cfs)	$Q_{orifice} > Q_{100\text{-year}}$ $Q_{weir} > Q_{100\text{-year}}$	
CB1	1	0.63	0.08	36" x 36"	7.0	14.14	12.0	0.90	OK	WEIR
CB2	2	1.06	0.16	36" x 36"	7.0	20.00	12.0	2.53	OK	WEIR
CB3	2	1.06	0.16	36" x 36"	7.0	14.14	12.0	2.53	OK	WEIR
CB4	3	0.67	0.08	36" x 36"	7.0	14.14	12.0	0.90	OK	WEIR
CB5	4	3.89	0.20	48" x 48"	16.0	51.11	16.0	4.72	OK	WEIR
CB6	5	1.85	0.16	36" x 36"	7.0	20.00	12.0	2.53	OK	WEIR
CB7	7	1.31	0.16	36" x 36"	7.0	20.00	12.0	2.53	OK	WEIR
CB8	8	0.94	0.16	36" x 36"	7.0	20.00	12.0	2.53	OK	WEIR
CB9	12	3.77	0.20	48" x 48"	16.0	51.11	16.0	4.72	OK	WEIR
CB10	11	1.36	0.16	36" x 36"	7.0	20.00	12.0	2.53	OK	WEIR
CB11	10	0.58	0.16	36" x 36"	7.0	20.00	12.0	2.53	OK	WEIR
CB12	9	4.83	0.23	48" x 48"	16.0	54.80	16.0	5.82	OK	WEIR

Orifice Equation

Using the equation: $Q = C \times A_O \times (2gh)^{1/2}$,

Runoff coefficient (C) = 0.89

Gravitational Constant (g) = 32.2 ft/s^2

Weir Equation

Using the equation: $Q = 3.3 \times P \times (h)^{1.5}$

Notes

1. R-xxxx models refer to Neenah Catalog for square feet open and weir perimeter lineal feet values.
2. Existing Catch Basin sizes approximate and based on survey.
3. Existing Catch Basins are assumed to have 50% opening.

APPENDIX F

BMP DESIGN CALCULATION

	Wildomar MOB Effective Impervious Fraction Calculation			
DMA	*Surface Type*	*Area (acres)*	*Effective Impervious Fraction. I_F*	*Area x I_F*
1	Roof	0.653	1	0.653
2	Roads	2.378	1	2.378
3	Sidewalks	0.684	1	0.684
4	Parking	1.566	1	1.566
5	Landscape	0.9	0.1	0.09
6	Detention Pond	0.887	0.1	0.0887
7	Soil D	0.84	0.4	0.336
8	Soil D	0.79	0.4	0.316
	A_T =	8.70		
	$I_F = \frac{\sum_{n=1}^{7}((I_{Fn}) * A_n)}{A_T} =$	0.70		

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	VCA Engineers, Inc.	Date	2/14/2020
Designed by	VCA Engineers, Inc.	County/City Case No	
Company Project Number/Name	Medical Office Building		
Drainage Area Number/Name	All DMAs		

Enter the Area Tributary to this Feature $A_T =$ 8.7 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	Wildomar
Range	
Section	

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.70

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Mixed Surface Types

Effective Impervious Fraction $I_f =$ 0.70

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.50

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.35 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 11,053 ft^3

Notes:

Santa Margarita Watershed

BMP Design Flow Rate, Q_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

Company Name	VCA Engineers, Inc.	Date	2/14/2020
Designed by	VCA Engineers, Inc.	County/City Case No	
Company Project Number/Name	Medical Office Building		
Drainage Area Number/Name	All DMAs		

Enter the Area Tributary to this Feature $A_T =$ 8.7 acres

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Mixed Surface Types

Effective Impervious Fraction $I_f =$ 0.70

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.49

BMP Design Flow Rate

$Q_{BMP} = C \times I \times A_T$ $Q_{BMP} =$ 0.9 ft^3/s

Notes:

Biofiltration with No Infiltration Facility - Design Procedure	BMP ID	Legend:	Required Entries	
			Calculated Cells	
Company Name:	VCA Engineers, Inc.		Date:	2/14/2020
Designed by:	VCA Engineers, Inc.		County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	8.7	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	11,053	ft^3
Estimated footprint of BMP, $Area_{BMP}$ (available space or 3% imp. area)	$Area_{BMP}$=	5,700	ft^2

Note: This area shall be measured at the mid-ponding depth of the BMP. For systems with side-slopes, this should be the contour that is midway between the floor of the basin and the maximum water quality ponding elevation of the basin. The underlying gravel layer for drain pipes should extend to this contour. For systems with vertical walls, the effective area is the full footprint.

Biofiltration with No Infiltration Facility Surface Area

Depth of Surface Ponding Layer (6" minimum, 12" maximum)	d_P =	12.0	inches
Depth of Engineered Soil Media (24" to 36"; 18" if vertically constrained)	d_S =	36.0	inches
Design Media Filtration Rate (2.5 in/hr)	I_{design} =	2.5	in/hr
Allowable Routing Period, $T_{routing}$ (5 hrs)	$T_{routing}$ =	5.0	hr
Effective Biofiltration Depth, d_{E_bio} d_{E_bio} (ft) = (d_P + (0.3 x d_S) + (I_{design} * $T_{routing}$)) (ft)	d_{E_bio} =	2.9	ft
Effective Static Depth, $d_{E\_bio\_static}$ $d_{E\_bio\_static}$ = (d_P + (0.3 * d_S)) (ft)	$d_{E\_bio\_static}$ =	1.9	ft
$V_{biofiltered} = d_{E\_bio} * Area_{BMP}$	$V_{biofiltered}$ =	16767.5	ft^3
$V_{biofiltered\_static} = d_{E\_bio\_static} * Area_{BMP}$	$V_{biofiltered\_static}$ =	10830.0	ft^3

Sizing Option 1 Result

Criteria 1: $V_{biofiltered\ (with\ routing)} \geq$ 150% of V_{BMP} — Results: PASS

Sizing Option 2 Result

Criteria 2: $V_{biofiltered\_static} \geq 0.75 \times V_{BMP}$ — Results: PASS

Note

If neither of these criteria are met increase the footprint and rerun calculations. This calculation is inherently iterative.

Biofiltration with No Retention Facility Properties

Side Slopes in Partial Retention with Biofiltration Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		0	%
Check Dam Spacing		0	feet

Describe Vegetation: Natural Grasses

Notes:

SMRHM

PROJECT REPORT

General Model Information

Project Name:	Wildomar MOB
Site Name:	Medical Office Building
Site Address:	Baxter Rd and the 15 Interstate Freeqay
City:	Wildomar
Report Date:	2/13/2020
Gage:	Wildomar / North Murrieta
Data Start:	1949/10/01
Data End:	2011/09/30
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2019/12/01

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data
Predeveloped Land Use

DMA 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C D,Grass,Mod(5-10%)	7.91
C D,Grass,Very(>20%)	0.79
Pervious Total	8.7
Impervious Land Use	acre
Impervious Total	0
Basin Total	8.7

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

DMA 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A,Grass,Flat(0-5%)	1.789
C D,Grass,Mod(5-10%)	0.84
C D,Grass,Very(>20%)	0.79
Pervious Total	3.419
Impervious Land Use	acre
Roads,Flat(0-5%)	2.378
Roof Area	0.653
Sidewalks,Flat(0-5%)	0.684
Parking,Flat(0-5%)	1.566
Impervious Total	5.281
Basin Total	8.7

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Trapezoidal Pond 1

Bottom Length: 260.00 ft.
Bottom Width: 70.00 ft.
Depth: 4.5 ft.
Volume at riser head: 1.7526 acre-feet.
Side slope 1: 3 To 1
Side slope 2: 3 To 1
Side slope 3: 3 To 1
Side slope 4: 3 To 1
Discharge Structure
Riser Height: 3.5 ft.
Riser Diameter: 36 in.
Notch Type: Rectangular
Notch Width: 1.500 ft.
Notch Height: 0.500 ft.
Orifice 1 Diameter: 1.842 in. Elevation:0 ft.
Element Flows To:
Outlet 1 Outlet 2

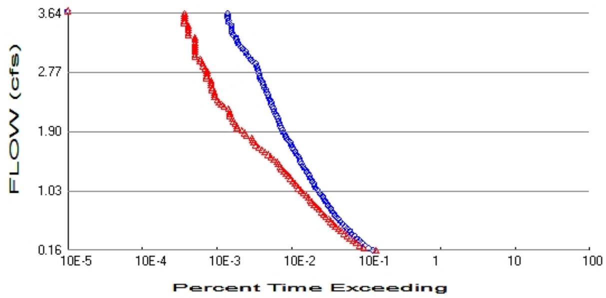
Pond Hydraulic Table

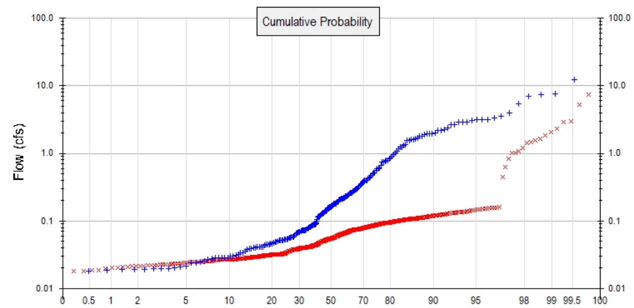
Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.417	0.000	0.000	0.000
0.0500	0.420	0.020	0.020	0.000
0.1000	0.422	0.042	0.029	0.000
0.1500	0.424	0.063	0.035	0.000
0.2000	0.426	0.084	0.041	0.000
0.2500	0.429	0.105	0.046	0.000
0.3000	0.431	0.127	0.050	0.000
0.3500	0.433	0.149	0.054	0.000
0.4000	0.436	0.170	0.058	0.000
0.4500	0.438	0.192	0.061	0.000
0.5000	0.440	0.214	0.065	0.000
0.5500	0.443	0.236	0.068	0.000
0.6000	0.445	0.258	0.071	0.000
0.6500	0.447	0.281	0.074	0.000
0.7000	0.450	0.303	0.077	0.000
0.7500	0.452	0.326	0.079	0.000
0.8000	0.454	0.348	0.082	0.000
0.8500	0.457	0.371	0.084	0.000
0.9000	0.459	0.394	0.087	0.000
0.9500	0.461	0.417	0.089	0.000
1.0000	0.464	0.440	0.092	0.000
1.0500	0.466	0.464	0.094	0.000
1.1000	0.468	0.487	0.096	0.000
1.1500	0.471	0.511	0.098	0.000
1.2000	0.473	0.534	0.100	0.000
1.2500	0.475	0.558	0.102	0.000
1.3000	0.478	0.582	0.105	0.000
1.3500	0.480	0.606	0.107	0.000
1.4000	0.483	0.630	0.108	0.000
1.4500	0.485	0.654	0.110	0.000
1.5000	0.487	0.678	0.112	0.000
1.5500	0.490	0.703	0.114	0.000

1.6000	0.492	0.727	0.116	0.000
1.6500	0.495	0.752	0.118	0.000
1.7000	0.497	0.777	0.120	0.000
1.7500	0.499	0.802	0.121	0.000
1.8000	0.502	0.827	0.123	0.000
1.8500	0.504	0.852	0.125	0.000
1.9000	0.507	0.877	0.126	0.000
1.9500	0.509	0.903	0.128	0.000
2.0000	0.512	0.928	0.130	0.000
2.0500	0.514	0.954	0.131	0.000
2.1000	0.516	0.980	0.133	0.000
2.1500	0.519	1.006	0.135	0.000
2.2000	0.521	1.032	0.136	0.000
2.2500	0.524	1.058	0.138	0.000
2.3000	0.526	1.084	0.139	0.000
2.3500	0.529	1.111	0.141	0.000
2.4000	0.531	1.137	0.142	0.000
2.4500	0.534	1.164	0.144	0.000
2.5000	0.536	1.190	0.145	0.000
2.5500	0.539	1.217	0.147	0.000
2.6000	0.541	1.244	0.148	0.000
2.6500	0.544	1.271	0.149	0.000
2.7000	0.546	1.299	0.151	0.000
2.7500	0.549	1.326	0.152	0.000
2.8000	0.551	1.354	0.154	0.000
2.8500	0.554	1.381	0.155	0.000
2.9000	0.556	1.409	0.156	0.000
2.9500	0.559	1.437	0.158	0.000
3.0000	0.561	1.465	0.159	0.000
3.0500	0.564	1.493	0.216	0.000
3.1000	0.566	1.521	0.320	0.000
3.1500	0.569	1.550	0.453	0.000
3.2000	0.571	1.578	0.611	0.000
3.2500	0.574	1.607	0.790	0.000
3.3000	0.576	1.636	0.988	0.000
3.3500	0.579	1.665	1.202	0.000
3.4000	0.581	1.694	1.433	0.000
3.4500	0.584	1.723	1.678	0.000
3.5000	0.587	1.752	1.938	0.000
3.5500	0.589	1.782	2.295	0.000
3.6000	0.592	1.811	2.946	0.000
3.6500	0.594	1.841	3.788	0.000
3.7000	0.597	1.871	4.783	0.000
3.7500	0.599	1.900	5.908	0.000
3.8000	0.602	1.931	7.144	0.000
3.8500	0.605	1.961	8.477	0.000
3.9000	0.607	1.991	9.892	0.000
3.9500	0.610	2.021	11.37	0.000
4.0000	0.612	2.052	12.91	0.000
4.0500	0.615	2.083	14.49	0.000
4.1000	0.618	2.114	16.10	0.000
4.1500	0.620	2.145	17.72	0.000
4.2000	0.623	2.176	19.33	0.000
4.2500	0.625	2.207	20.93	0.000
4.3000	0.628	2.238	22.50	0.000
4.3500	0.631	2.270	24.02	0.000
4.4000	0.633	2.301	25.49	0.000
4.4500	0.636	2.333	26.88	0.000

4.5000	0.639	2.365	28.20	0.000
4.5500	0.641	2.397	29.43	0.000

Analysis Results
POC 1





+ Predeveloped   x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 8.7
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 3.419
Total Impervious Area: 5.281

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	1.582068
5 year	2.964769
10 year	3.642447
25 year	7.464015

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.143008
5 year	1.108705
10 year	1.89563
25 year	3.141289

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1582	2665	2950	110	Pass
0.1934	2346	2029	86	Pass
0.2286	2111	1762	83	Pass
0.2638	1925	1594	82	Pass
0.2990	1760	1445	82	Pass
0.3342	1631	1321	80	Pass
0.3694	1523	1213	79	Pass
0.4046	1410	1099	77	Pass
0.4398	1319	1006	76	Pass
0.4750	1218	928	76	Pass
0.5102	1139	850	74	Pass
0.5453	1053	787	74	Pass
0.5805	988	737	74	Pass
0.6157	917	686	74	Pass
0.6509	853	628	73	Pass
0.6861	813	582	71	Pass
0.7213	777	547	70	Pass
0.7565	735	508	69	Pass
0.7917	696	477	68	Pass
0.8269	664	438	65	Pass
0.8621	630	408	64	Pass
0.8973	610	387	63	Pass
0.9325	576	367	63	Pass
0.9677	543	340	62	Pass
1.0029	521	315	60	Pass
1.0381	486	292	60	Pass
1.0733	460	272	59	Pass
1.1085	440	254	57	Pass
1.1436	428	241	56	Pass
1.1788	410	226	55	Pass
1.2140	393	213	54	Pass
1.2492	374	199	53	Pass
1.2844	361	185	51	Pass
1.3196	345	173	50	Pass
1.3548	328	161	49	Pass
1.3900	312	153	49	Pass
1.4252	296	146	49	Pass
1.4604	288	138	47	Pass
1.4956	279	125	44	Pass
1.5308	269	115	42	Pass
1.5660	256	106	41	Pass
1.6012	244	95	38	Pass
1.6364	233	88	37	Pass
1.6716	224	79	35	Pass
1.7068	217	72	33	Pass
1.7420	207	68	32	Pass
1.7771	195	65	33	Pass
1.8123	184	64	34	Pass
1.8475	179	54	30	Pass
1.8827	170	51	30	Pass
1.9179	163	47	28	Pass
1.9531	157	40	25	Pass
1.9883	153	40	26	Pass

2.0235	151	38	25	Pass
2.0587	146	36	24	Pass
2.0939	143	35	24	Pass
2.1291	137	32	23	Pass
2.1643	132	32	24	Pass
2.1995	127	32	25	Pass
2.2347	123	31	25	Pass
2.2699	119	27	22	Pass
2.3051	116	25	21	Pass
2.3403	115	23	20	Pass
2.3755	113	22	19	Pass
2.4106	107	20	18	Pass
2.4458	104	20	19	Pass
2.4810	101	20	19	Pass
2.5162	99	19	19	Pass
2.5514	93	19	20	Pass
2.5866	91	18	19	Pass
2.6218	90	18	20	Pass
2.6570	86	18	20	Pass
2.6922	83	16	19	Pass
2.7274	81	16	19	Pass
2.7626	79	16	20	Pass
2.7978	78	16	20	Pass
2.8330	75	15	20	Pass
2.8682	74	14	18	Pass
2.9034	72	14	19	Pass
2.9386	65	13	20	Pass
2.9738	61	13	21	Pass
3.0089	57	11	19	Pass
3.0441	54	11	20	Pass
3.0793	53	11	20	Pass
3.1145	48	11	22	Pass
3.1497	46	11	23	Pass
3.1849	43	11	25	Pass
3.2201	41	11	26	Pass
3.2553	40	11	27	Pass
3.2905	39	11	28	Pass
3.3257	36	9	25	Pass
3.3609	35	9	25	Pass
3.3961	34	9	26	Pass
3.4313	34	9	26	Pass
3.4665	34	9	26	Pass
3.5017	31	8	25	Pass
3.5369	31	8	25	Pass
3.5721	30	8	26	Pass
3.6073	30	8	26	Pass
3.6424	30	8	26	Pass

Water Quality

Rational Method

Data for Rational Method is not available.

Model Default Modifications

Total of 0 changes have been made.

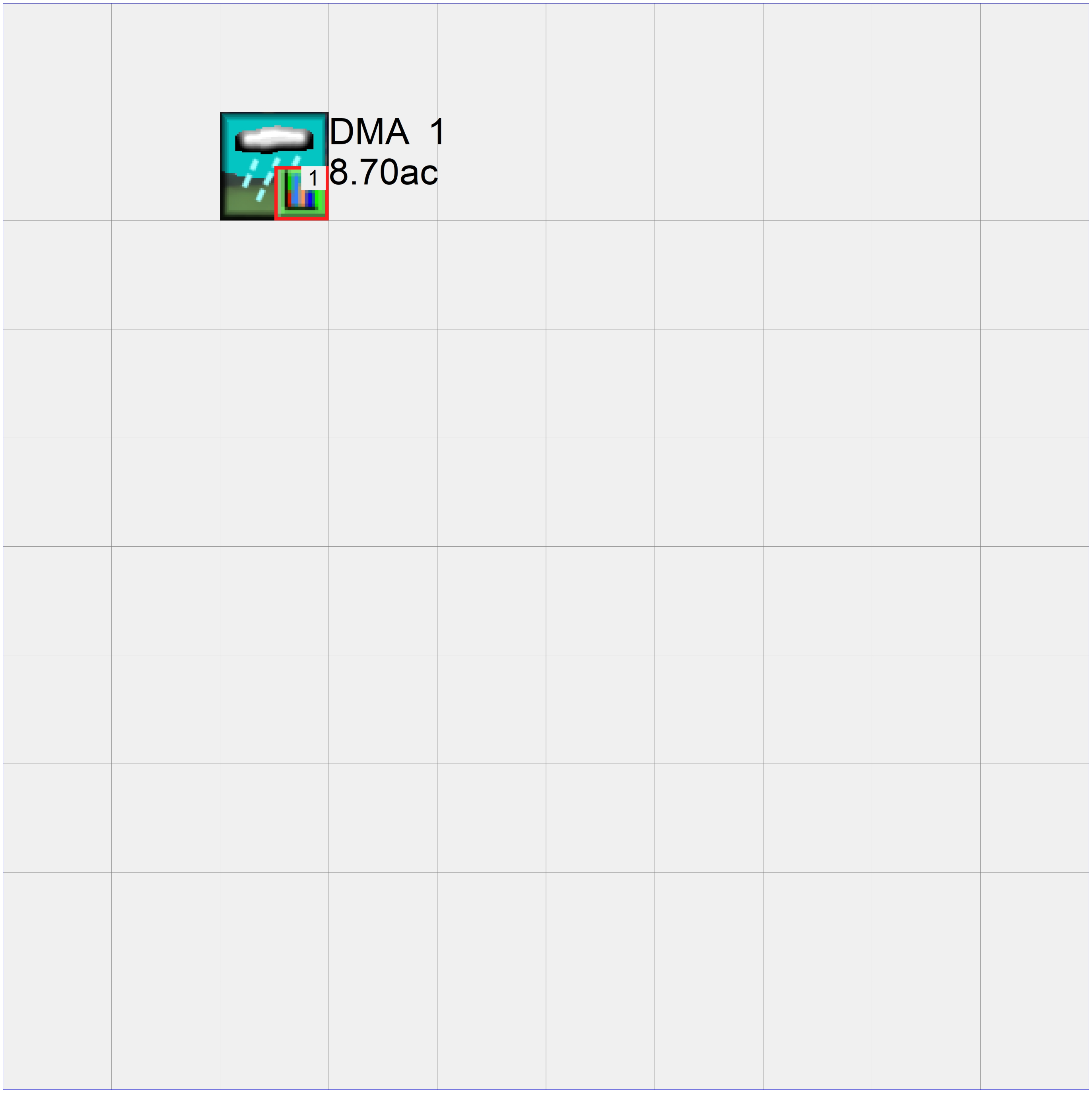
PERLND Changes

No PERLND changes have been made.

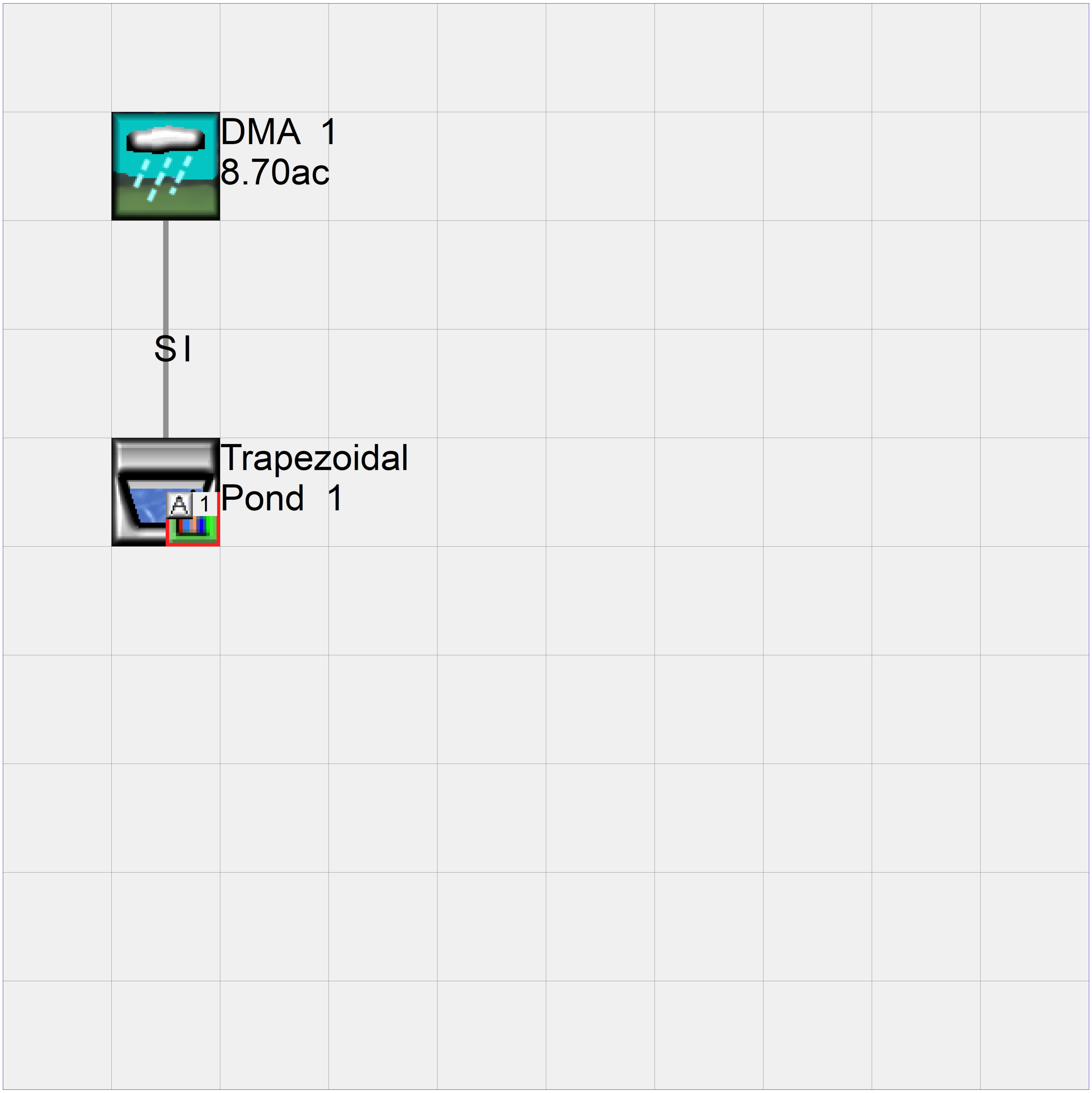
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

Mitigated UCI File

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

Legal Notice

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www.clearcreeksolutions.com

APPENDIX G

CDS CALCULATIONS AND DETAILS

VCA Engineers, Inc. | **Subarea Information**

Client: CANNONDESIGN | Job No. 2092-219
Project: Medical Office Building | Date: 8/21/2019
Engineer: VCA

Site Data - 85TH Percentile

Catchment Area	Area (sf)	Area (acre)	Flow Path Length (ft)	Slope	Peak Flow Rate (cfs)	Runoff Volume (cf)
1	6,069.98	0.14	146.47	2.00%	0.03	289.94
2	21,470.15	0.49	212.32	2.00%	0.08	871.58
3	6,471.59	0.15	189.93	2.00%	0.03	310.61
4	38,821.24	0.89	244.42	2.00%	0.15	1664.75
5	18,539.37	0.43	189.90	2.00%	0.07	755.03
6	39,173.61	0.90	203.04	2.00%	0.01	227.46
7	13,675.53	0.31	219.71	2.00%	0.05	510.66
8	9,596.65	0.22	147.49	2.00%	0.04	376.68
9	47,911.41	1.10	244.40	2.00%	0.18	2085.69
10	5,717.17	0.13	161.46	2.00%	0.03	261.35
11	13,460.91	0.31	179.55	2.00%	0.06	583.41
12	37,930.41	0.87	282.18	2.00%	0.04	1569.57
13	30,701.26	0.70	251.22	2.00%	0.13	1474.21
Total	**289,539.28**	**6.65**			**0.89**	**10,980.94**

Peak Flow Hydrologic Analysis

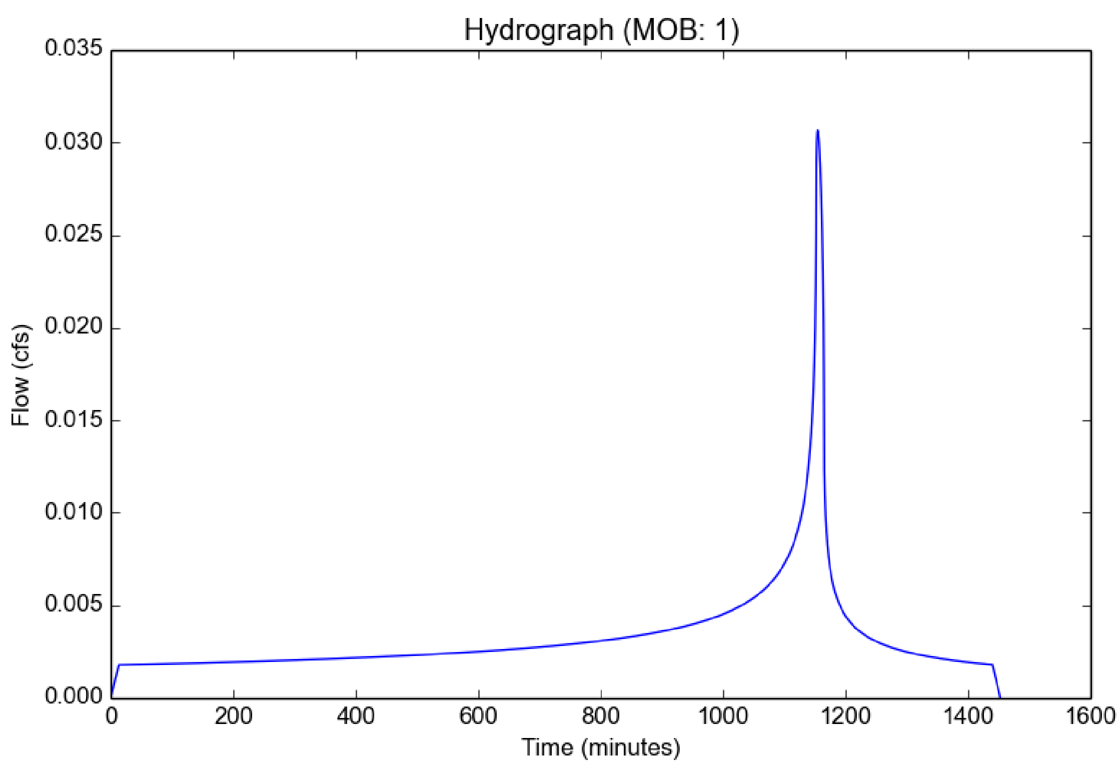
File location: C:/Users/gbarrera/Desktop/MOB Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	MOB
Subarea ID	1
Area (ac)	0.14
Flow Path Length (ft)	146.47
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	0.65
Percent Impervious	0.981312953
Soil Type	69
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.65
Peak Intensity (in/hr)	0.2475
Undeveloped Runoff Coefficient (Cu)	0.1046
Developed Runoff Coefficient (Cd)	0.8851
Time of Concentration (min)	13.0
Clear Peak Flow Rate (cfs)	0.0307
Burned Peak Flow Rate (cfs)	0.0307
24-Hr Clear Runoff Volume (ac-ft)	0.0067
24-Hr Clear Runoff Volume (cu-ft)	289.944



Peak Flow Hydrologic Analysis

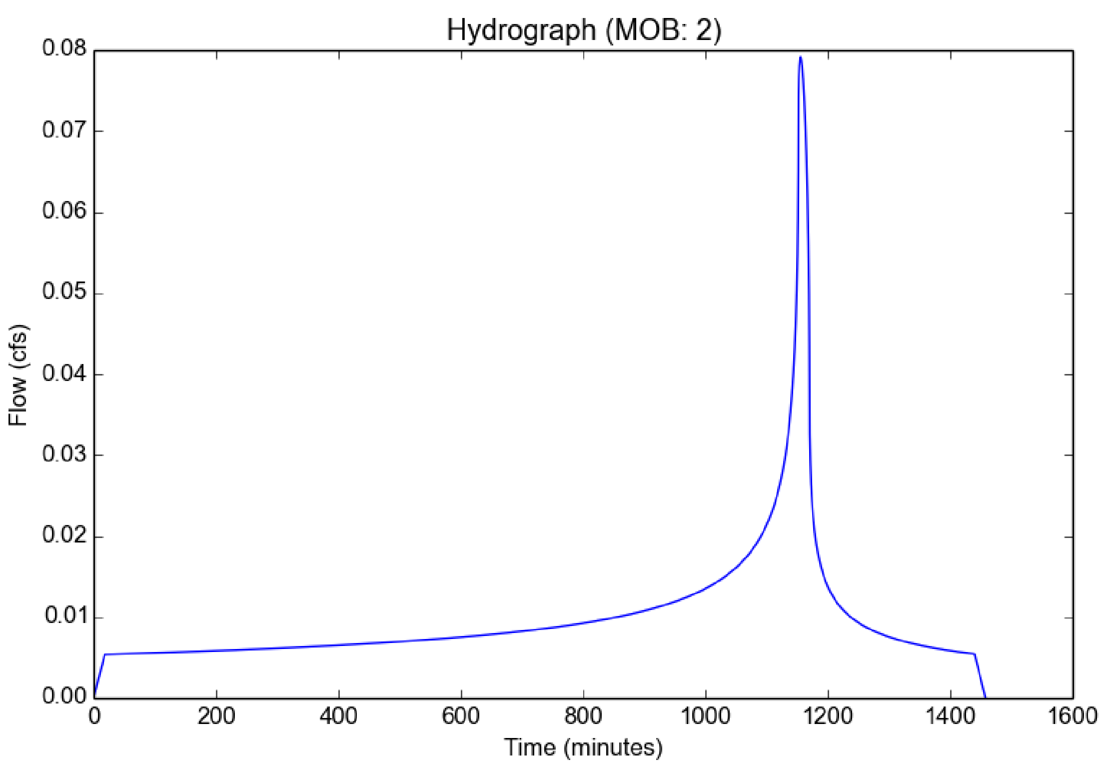
File location: C:/Users/gbarrera/Desktop/MOB Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	MOB
Subarea ID	2
Area (ac)	0.49
Flow Path Length (ft)	212.32
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	0.65
Percent Impervious	0.825178678
Soil Type	69
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.65
Peak Intensity (in/hr)	0.2124
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.7601
Time of Concentration (min)	18.0
Clear Peak Flow Rate (cfs)	0.0791
Burned Peak Flow Rate (cfs)	0.0791
24-Hr Clear Runoff Volume (ac-ft)	0.02
24-Hr Clear Runoff Volume (cu-ft)	871.5835



Peak Flow Hydrologic Analysis

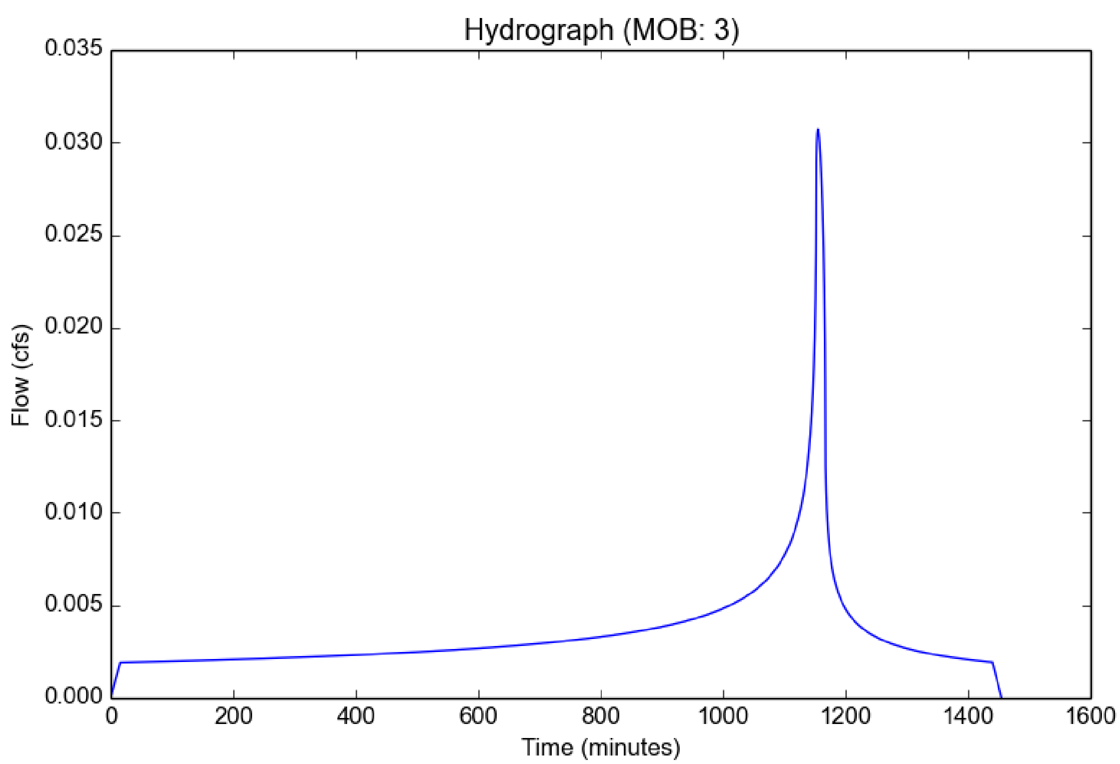
File location: C:/Users/gbarrera/Desktop/MOB Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	MOB
Subarea ID	3
Area (ac)	0.15
Flow Path Length (ft)	189.93
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	0.65
Percent Impervious	0.981154554
Soil Type	69
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.65
Peak Intensity (in/hr)	0.2314
Undeveloped Runoff Coefficient (Cu)	0.1004
Developed Runoff Coefficient (Cd)	0.8849
Time of Concentration (min)	15.0
Clear Peak Flow Rate (cfs)	0.0307
Burned Peak Flow Rate (cfs)	0.0307
24-Hr Clear Runoff Volume (ac-ft)	0.0071
24-Hr Clear Runoff Volume (cu-ft)	310.6091



Peak Flow Hydrologic Analysis

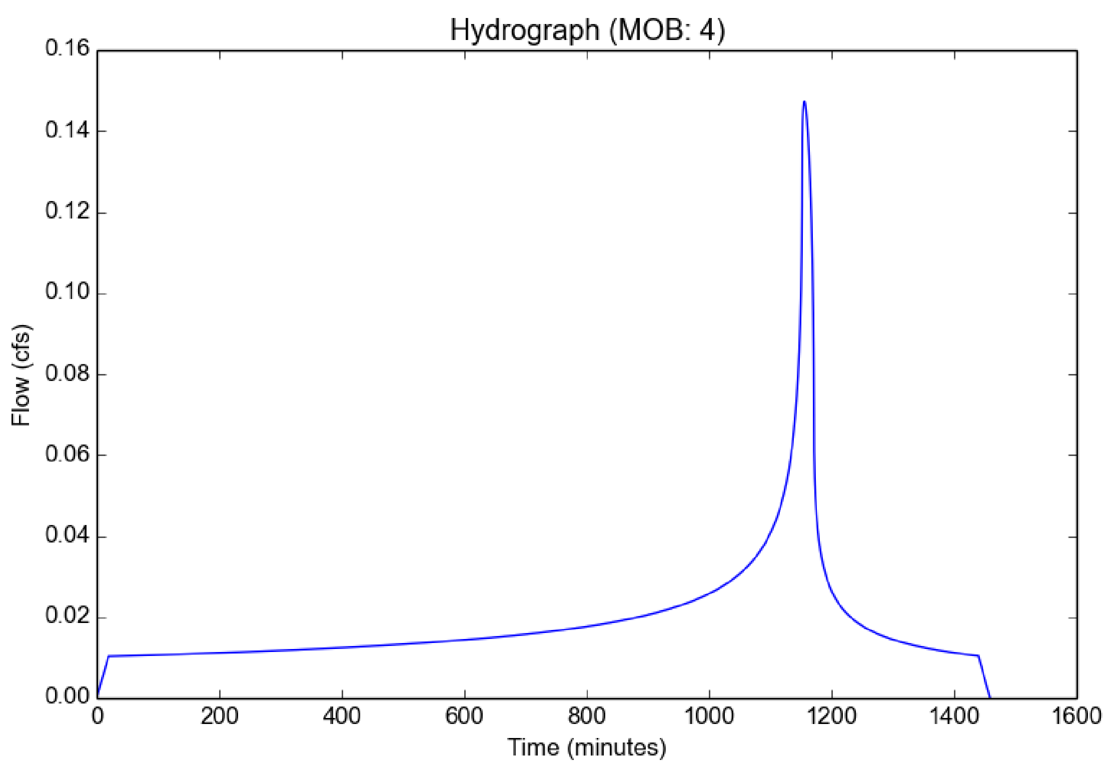
File location: C:/Users/gbarrera/Desktop/MOB Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	MOB
Subarea ID	4
Area (ac)	0.89
Flow Path Length (ft)	244.42
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	0.65
Percent Impervious	0.874199794
Soil Type	69
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.65
Peak Intensity (in/hr)	0.2071
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.7994
Time of Concentration (min)	19.0
Clear Peak Flow Rate (cfs)	0.1473
Burned Peak Flow Rate (cfs)	0.1473
24-Hr Clear Runoff Volume (ac-ft)	0.0382
24-Hr Clear Runoff Volume (cu-ft)	1664.7544



Peak Flow Hydrologic Analysis

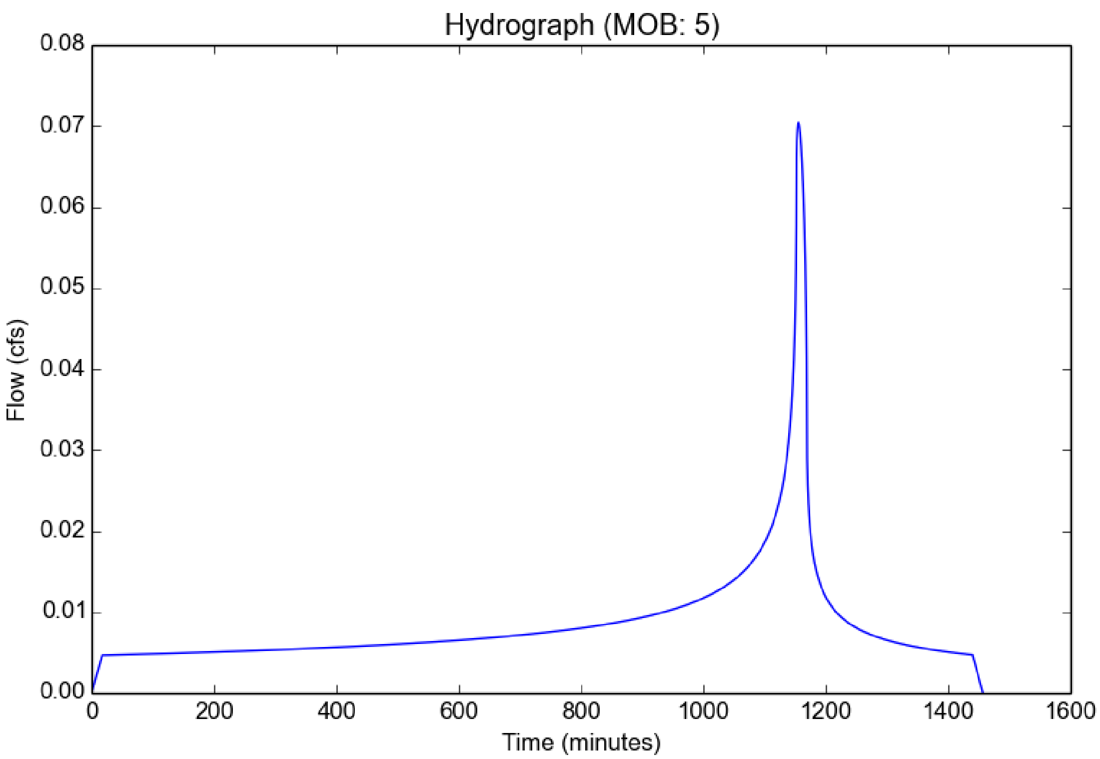
File location: C:/Users/gbarrera/Desktop/MOB Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	MOB
Subarea ID	5
Area (ac)	0.43
Flow Path Length (ft)	189.9
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	0.65
Percent Impervious	0.812965004
Soil Type	69
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.65
Peak Intensity (in/hr)	0.2182
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.7504
Time of Concentration (min)	17.0
Clear Peak Flow Rate (cfs)	0.0704
Burned Peak Flow Rate (cfs)	0.0704
24-Hr Clear Runoff Volume (ac-ft)	0.0173
24-Hr Clear Runoff Volume (cu-ft)	755.0271



Peak Flow Hydrologic Analysis

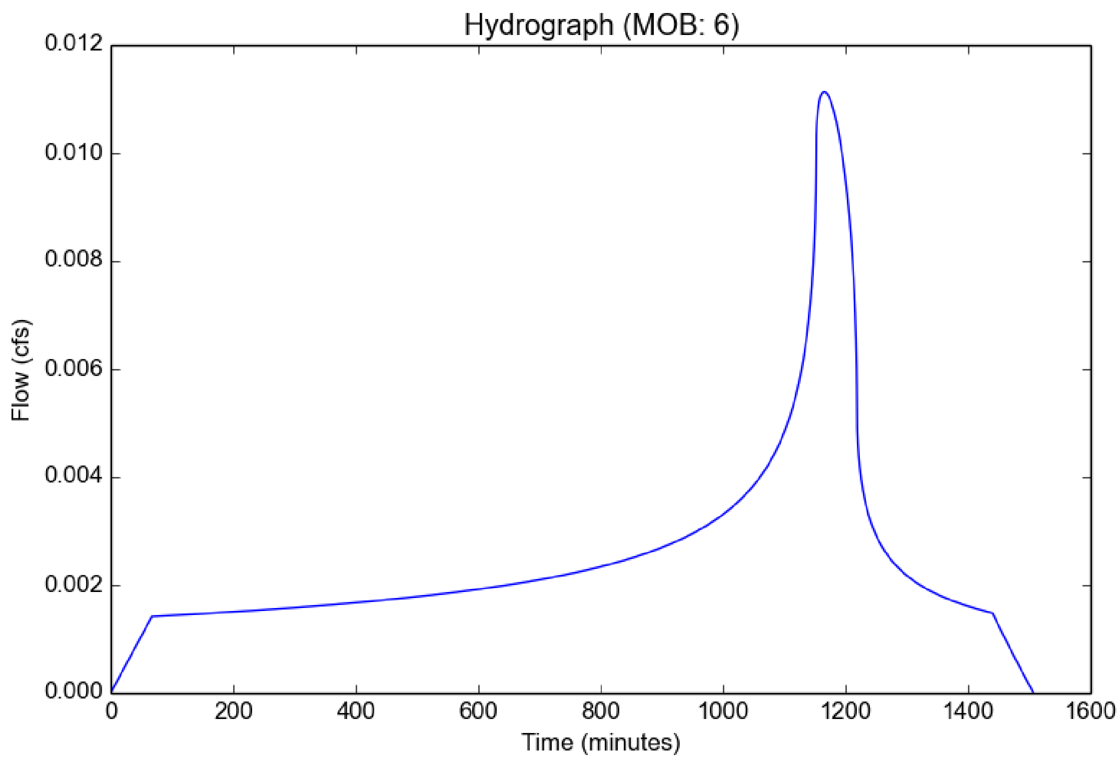
File location: C:/Users/gbarrera/Desktop/MOB Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	MOB
Subarea ID	6
Area (ac)	0.9
Flow Path Length (ft)	203.04
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	0.65
Percent Impervious	0.01
Soil Type	69
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.65
Peak Intensity (in/hr)	0.1145
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	67.0
Clear Peak Flow Rate (cfs)	0.0111
Burned Peak Flow Rate (cfs)	0.0111
24-Hr Clear Runoff Volume (ac-ft)	0.0052
24-Hr Clear Runoff Volume (cu-ft)	227.4613



Peak Flow Hydrologic Analysis

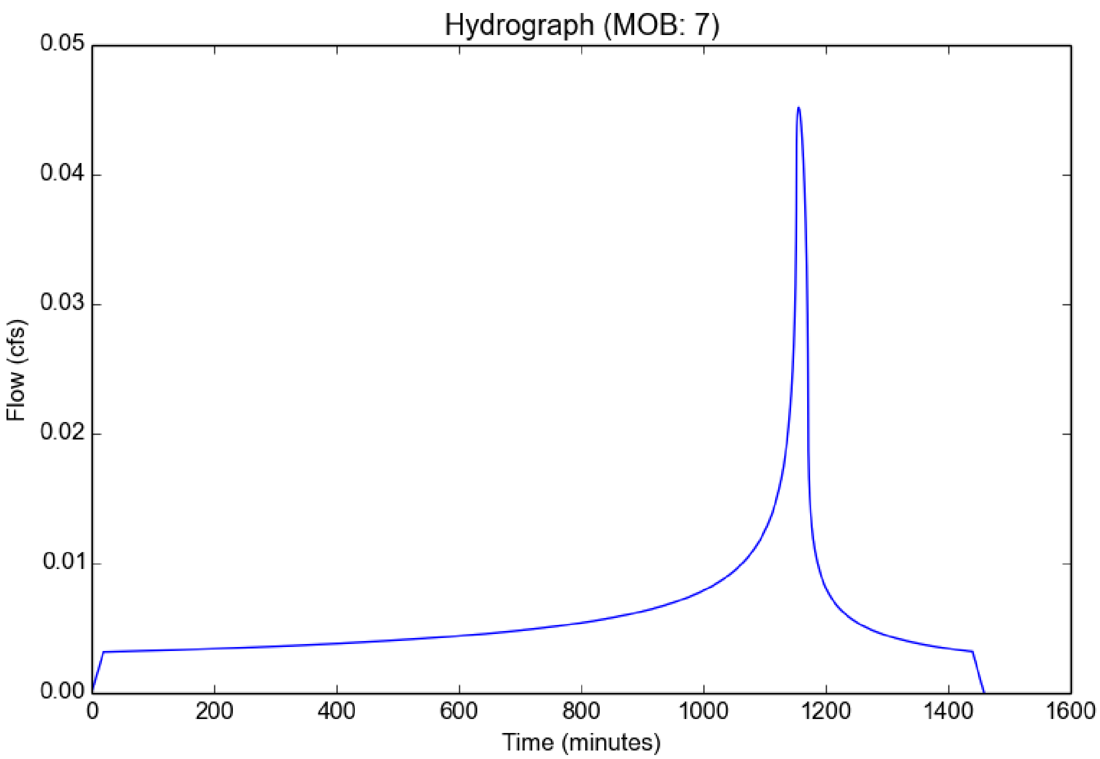
File location: C:/Users/gbarrera/Desktop/MOB Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	MOB
Subarea ID	7
Area (ac)	0.31
Flow Path Length (ft)	219.71
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	0.65
Percent Impervious	0.754955749
Soil Type	69
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.65
Peak Intensity (in/hr)	0.2071
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.704
Time of Concentration (min)	19.0
Clear Peak Flow Rate (cfs)	0.0452
Burned Peak Flow Rate (cfs)	0.0452
24-Hr Clear Runoff Volume (ac-ft)	0.0117
24-Hr Clear Runoff Volume (cu-ft)	510.6583



Peak Flow Hydrologic Analysis

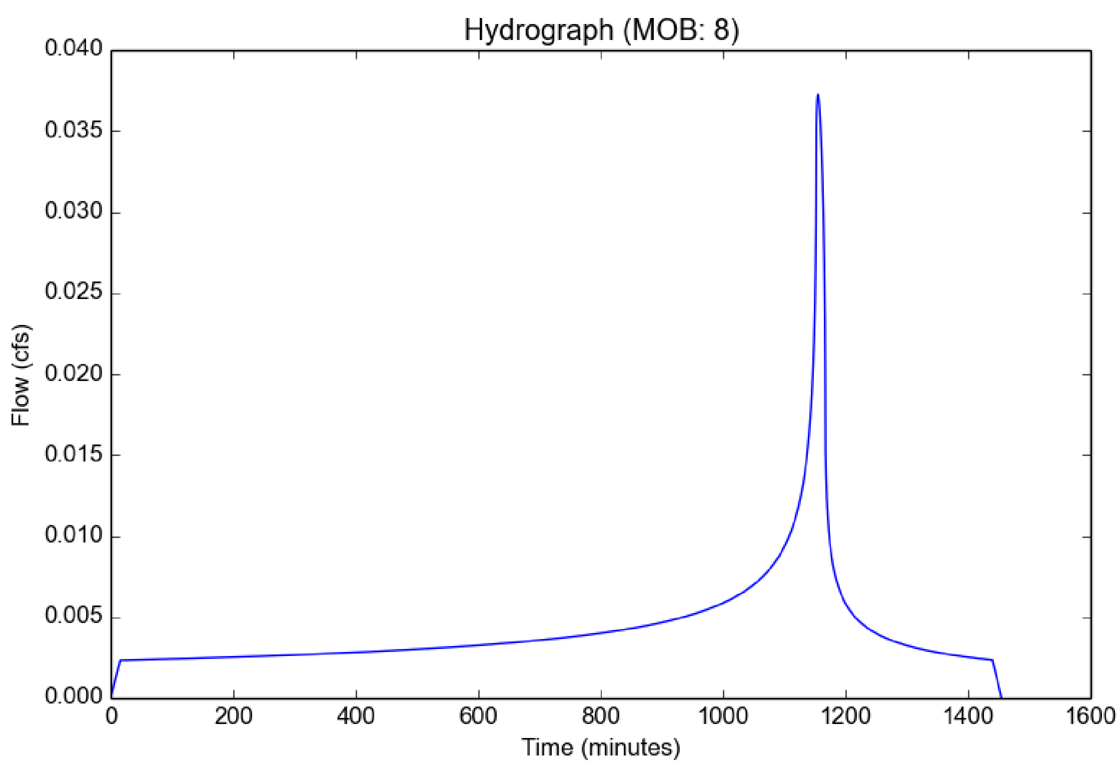
File location: C:/Users/gbarrera/Desktop/MOB Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	MOB
Subarea ID	8
Area (ac)	0.22
Flow Path Length (ft)	147.49
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	0.65
Percent Impervious	0.789615126
Soil Type	69
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.65
Peak Intensity (in/hr)	0.2314
Undeveloped Runoff Coefficient (Cu)	0.1004
Developed Runoff Coefficient (Cd)	0.7318
Time of Concentration (min)	15.0
Clear Peak Flow Rate (cfs)	0.0373
Burned Peak Flow Rate (cfs)	0.0373
24-Hr Clear Runoff Volume (ac-ft)	0.0086
24-Hr Clear Runoff Volume (cu-ft)	376.6766



Peak Flow Hydrologic Analysis

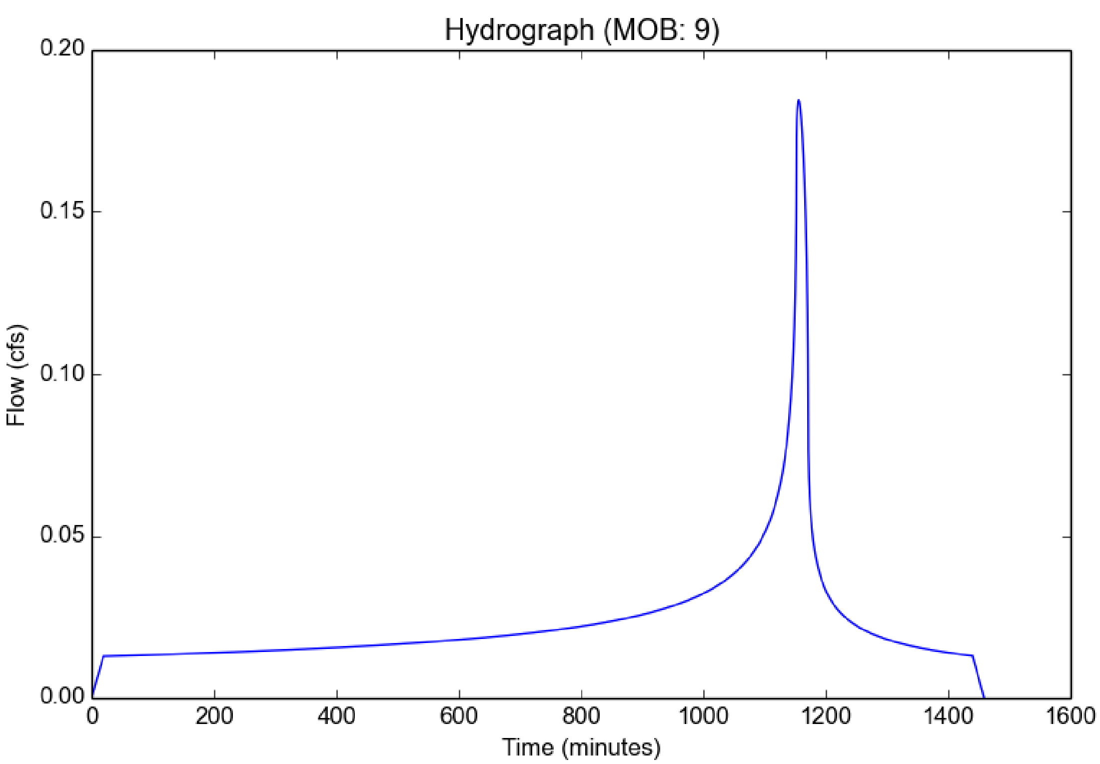
File location: C:/Users/gbarrera/Desktop/MOB Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	MOB
Subarea ID	9
Area (ac)	1.1
Flow Path Length (ft)	244.4
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	0.65
Percent Impervious	0.887857402
Soil Type	69
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.65
Peak Intensity (in/hr)	0.2071
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.8103
Time of Concentration (min)	19.0
Clear Peak Flow Rate (cfs)	0.1846
Burned Peak Flow Rate (cfs)	0.1846
24-Hr Clear Runoff Volume (ac-ft)	0.0479
24-Hr Clear Runoff Volume (cu-ft)	2085.6855



Peak Flow Hydrologic Analysis

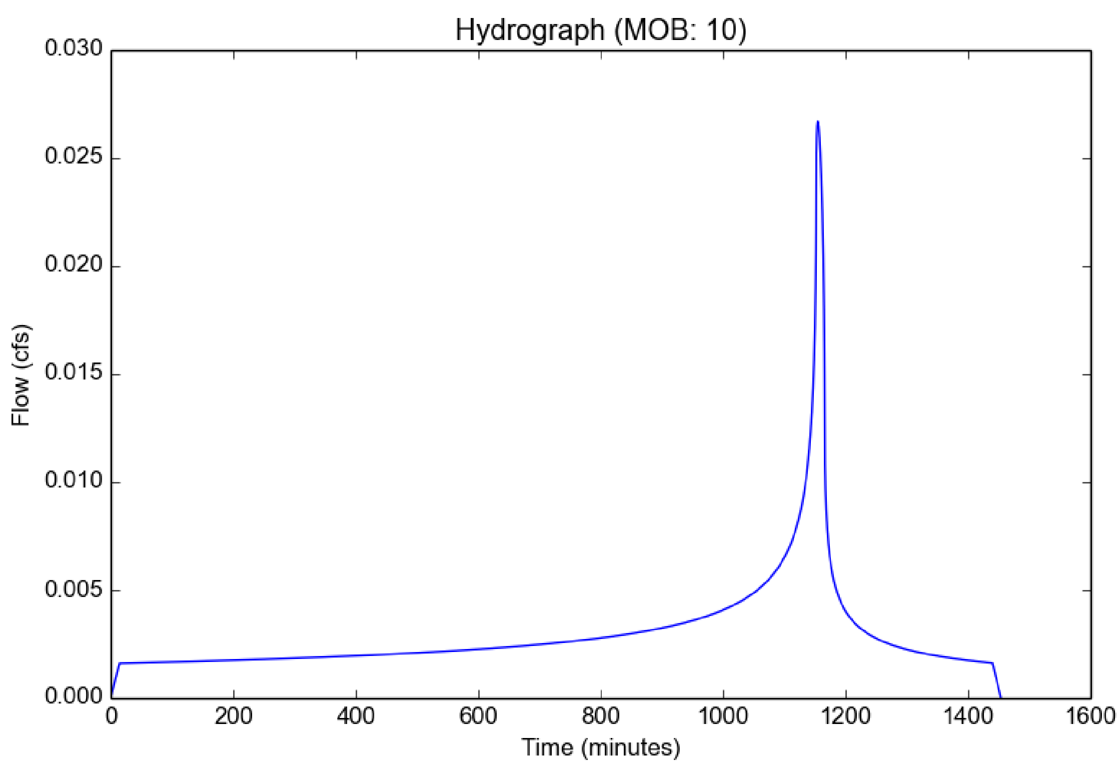
File location: C:/Users/gbarrera/Desktop/MOB Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	MOB
Subarea ID	10
Area (ac)	0.13
Flow Path Length (ft)	161.46
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	0.65
Percent Impervious	0.948915285
Soil Type	69
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.65
Peak Intensity (in/hr)	0.239
Undeveloped Runoff Coefficient (Cu)	0.1024
Developed Runoff Coefficient (Cd)	0.8593
Time of Concentration (min)	14.0
Clear Peak Flow Rate (cfs)	0.0267
Burned Peak Flow Rate (cfs)	0.0267
24-Hr Clear Runoff Volume (ac-ft)	0.006
24-Hr Clear Runoff Volume (cu-ft)	261.3496



Peak Flow Hydrologic Analysis

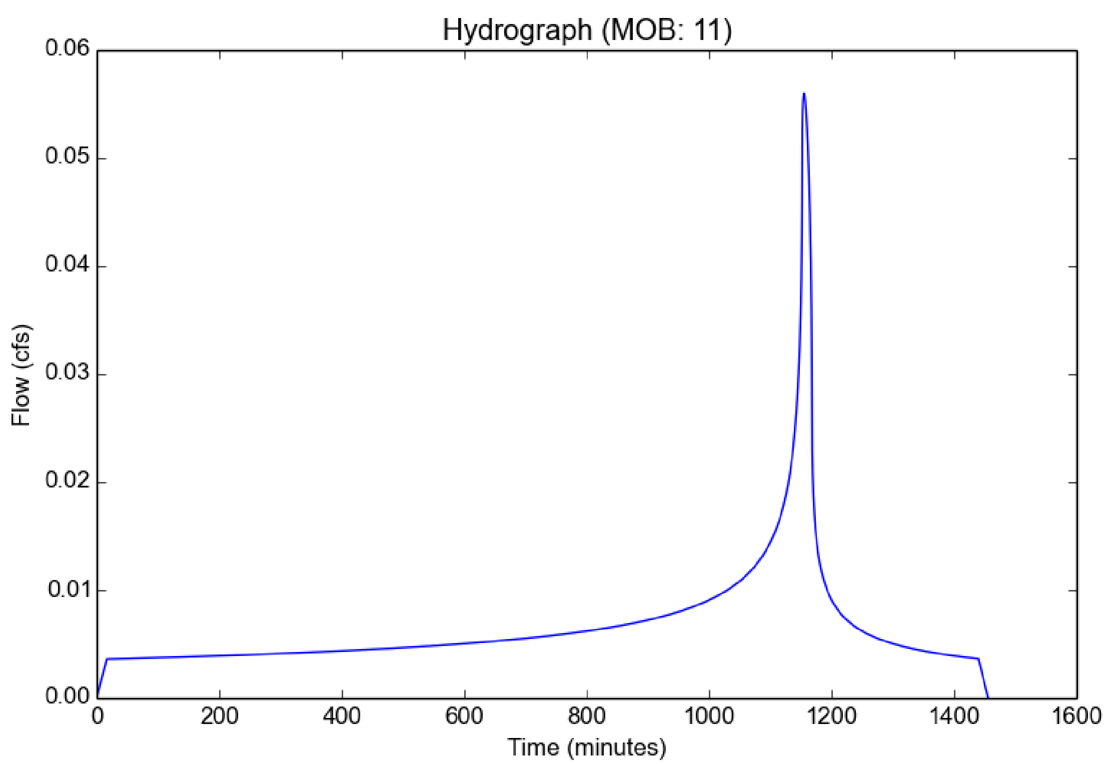
File location: C:/Users/gbarrera/Desktop/MOB Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	MOB
Subarea ID	11
Area (ac)	0.31
Flow Path Length (ft)	179.55
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	0.65
Percent Impervious	0.880323099
Soil Type	69
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.65
Peak Intensity (in/hr)	0.2245
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.8043
Time of Concentration (min)	16.0
Clear Peak Flow Rate (cfs)	0.056
Burned Peak Flow Rate (cfs)	0.056
24-Hr Clear Runoff Volume (ac-ft)	0.0134
24-Hr Clear Runoff Volume (cu-ft)	583.411



Peak Flow Hydrologic Analysis

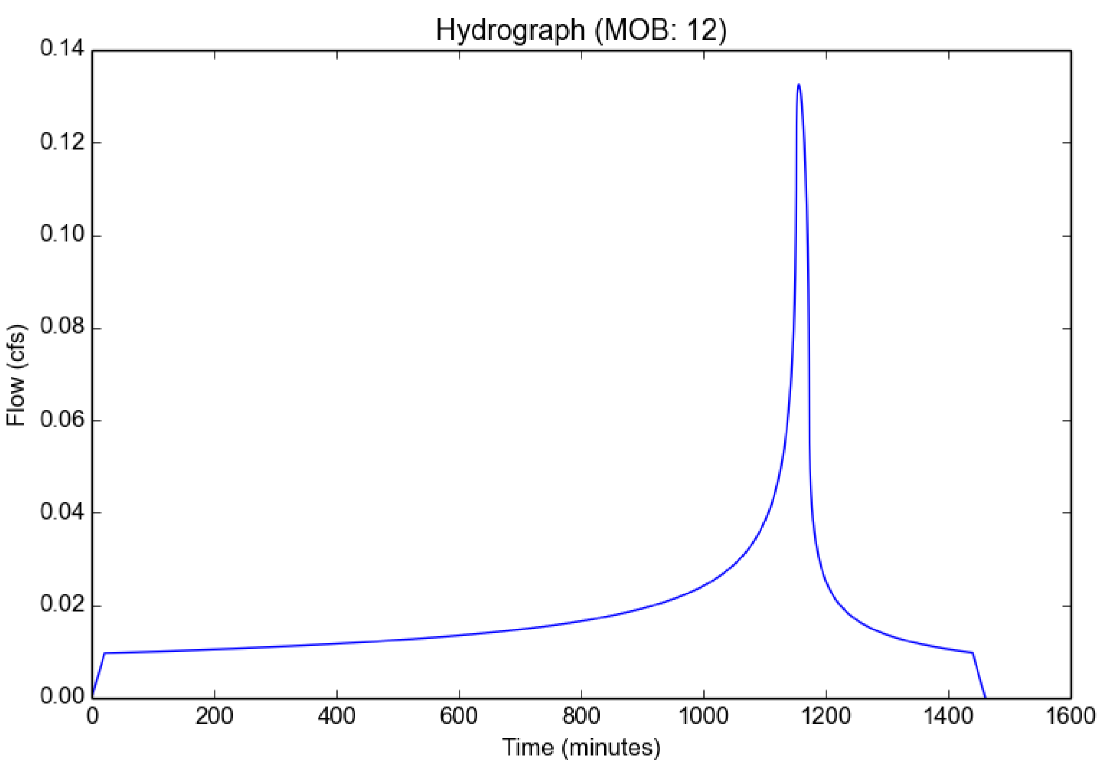
File location: C:/Users/gbarrera/Desktop/MOB Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	MOB
Subarea ID	12
Area (ac)	0.87
Flow Path Length (ft)	282.18
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	0.65
Percent Impervious	0.838724654
Soil Type	69
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.65
Peak Intensity (in/hr)	0.1976
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.771
Time of Concentration (min)	21.0
Clear Peak Flow Rate (cfs)	0.1325
Burned Peak Flow Rate (cfs)	0.1325
24-Hr Clear Runoff Volume (ac-ft)	0.036
24-Hr Clear Runoff Volume (cu-ft)	1569.5693



Peak Flow Hydrologic Analysis

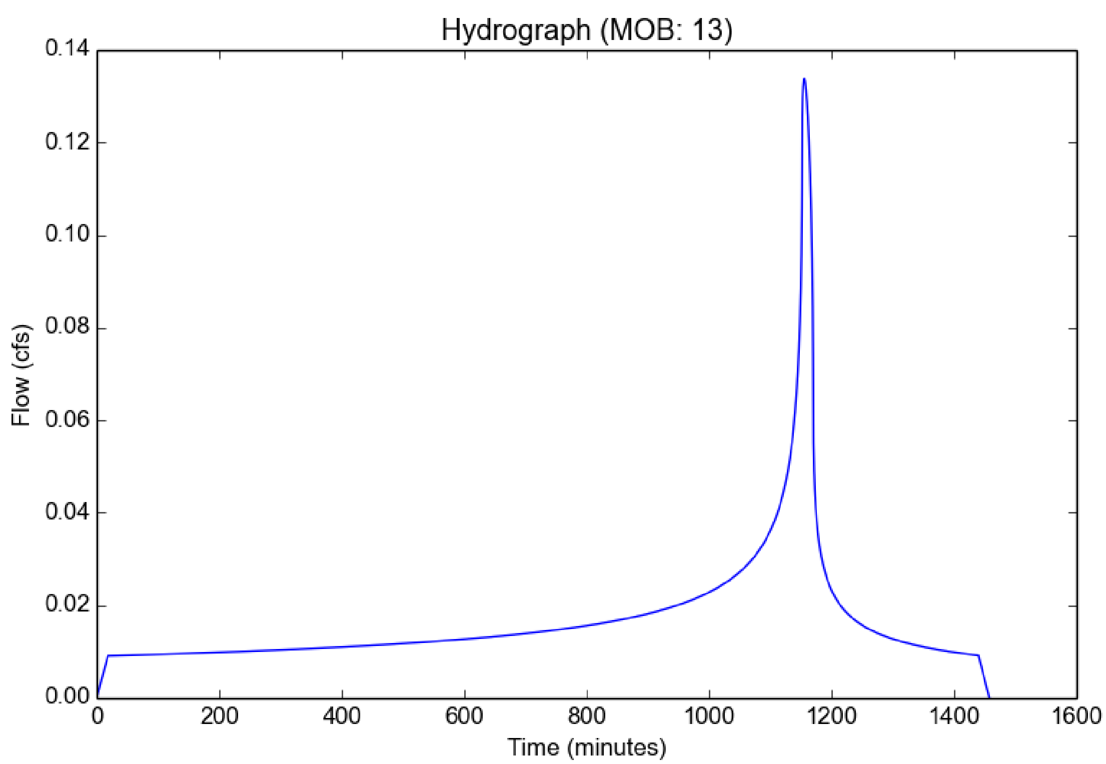
File location: C:/Users/gbarrera/Desktop/MOB Report.pdf
Version: HydroCalc 1.0.2

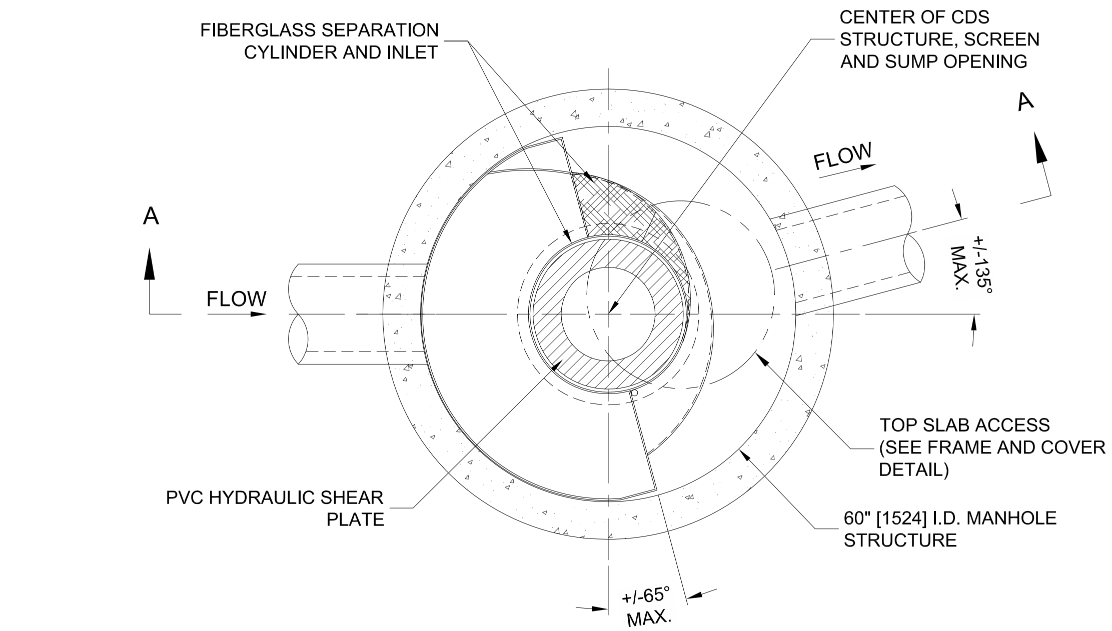
Input Parameters

Project Name	MOB
Subarea ID	13
Area (ac)	0.7
Flow Path Length (ft)	251.22
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	0.65
Percent Impervious	1.0
Soil Type	69
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

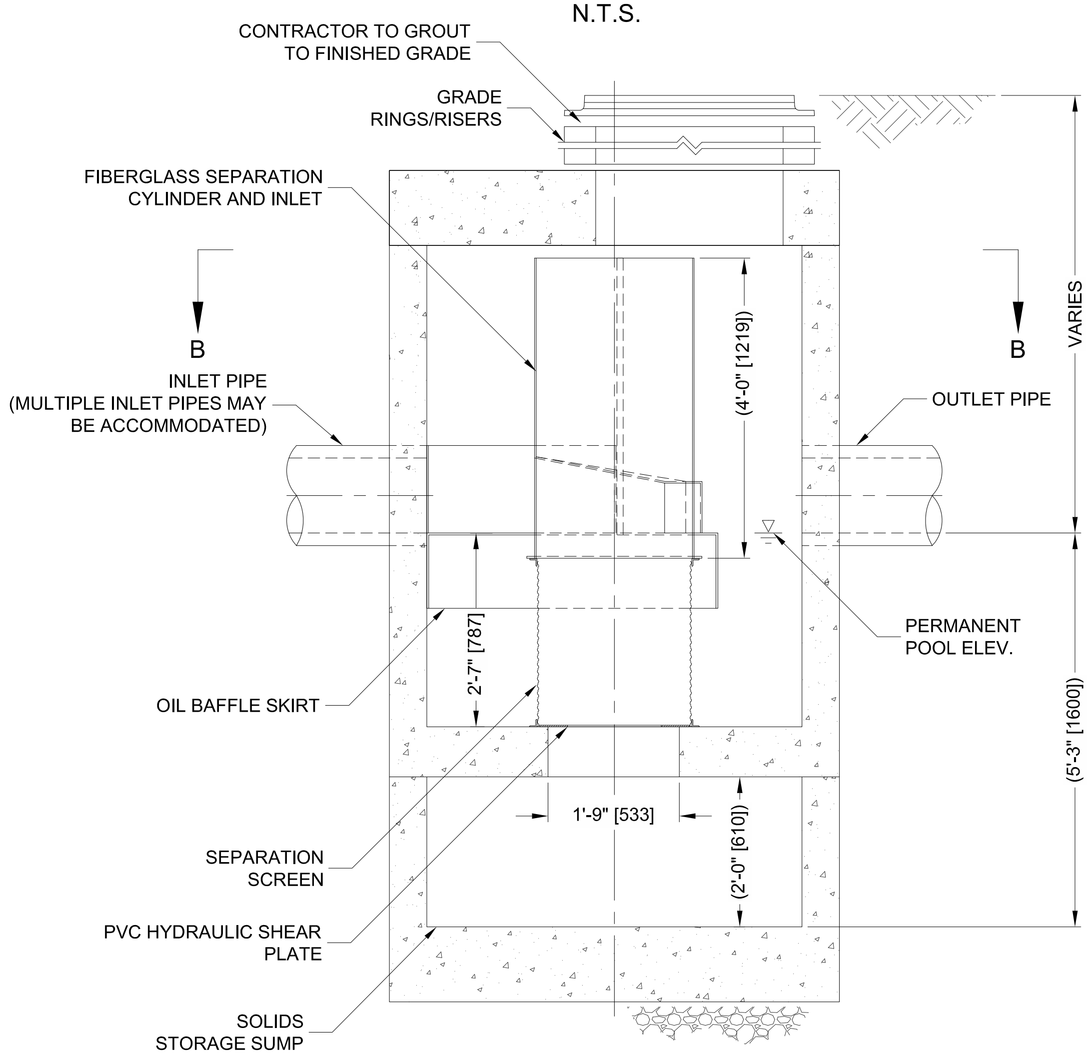
Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.65
Peak Intensity (in/hr)	0.2124
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	18.0
Clear Peak Flow Rate (cfs)	0.1338
Burned Peak Flow Rate (cfs)	0.1338
24-Hr Clear Runoff Volume (ac-ft)	0.0338
24-Hr Clear Runoff Volume (cu-ft)	1474.206





PLAN VIEW B-B
N.T.S.



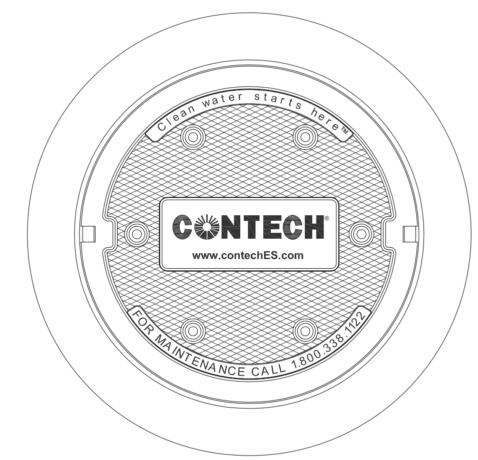
ELEVATION A-A
N.T.S.

CDS2020-5-C DESIGN NOTES

CDS2020-5-C RATED TREATMENT CAPACITY IS 1.1 CFS [31.2 L/s], OR PER LOCAL REGULATIONS. MAXIMUM HYDRAULIC INTERNAL BYPASS CAPACITY IS 14.0 CFS [396 L/s]. IF THE SITE CONDITIONS EXCEED 14.0 CFS [396 L/s], AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

THE STANDARD CDS2020-5-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES
SEPARATE OIL BAFFLE (SINGLE INLET PIPE REQUIRED FOR THIS CONFIGURATION)
SEDIMENT WEIR FOR NJDEP / NJCAT CONFORMING UNITS



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			
WATER QUALITY FLOW RATE (CFS OR L/s)			*
PEAK FLOW RATE (CFS OR L/s)			*
RETURN PERIOD OF PEAK FLOW (YRS)			*
SCREEN APERTURE (2400 OR 4700)			*
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*
RIM ELEVATION			*
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		*	*
NOTES/SPECIAL REQUIREMENTS:			

* PER ENGINEER OF RECORD

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
3. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 2', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO..
5. IF REQUIRED, PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.
6. CDS STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-478 AND AASHTO LOAD FACTOR DESIGN METHOD.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET AND OUTLET PIPE(S). MATCH PIPE INVERTS WITH ELEVATIONS SHOWN. ALL PIPE CENTERLINES TO MATCH PIPE OPENING CENTERLINES.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

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

CDS2020-5-C
ONLINE CDS
STANDARD DETAIL

APPENDIX H

SURVEY PLAN

IN THE UNINCORPORATED TERRITORY OF THE COUNTY
OF RIVERSIDE, STATE OF CALIFORNIA

A.L.T.A./A.C.S.M. SURVEY

A SURVEY OF A PORTION OF THE SOUTHEAST QUARTER OF SECTION 26
TOWNSHIP 6 SOUTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN

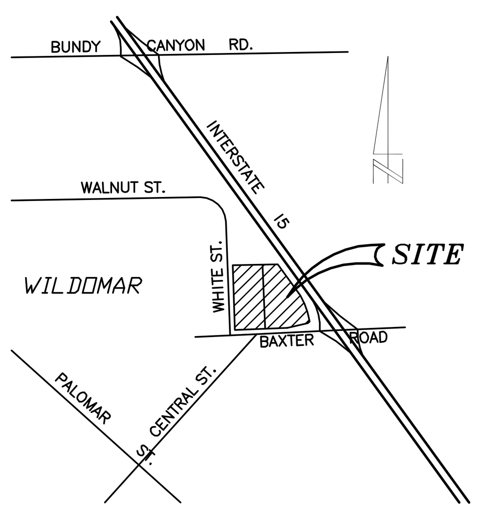
PROPERTY OWNER: 3

APN 367–180–015 AND APN 367–180–043:
WILDOMAR VENTURE, LLC, A DELAWARE LIMITED LIABILITY COMPANY

GRAPHIC SCALE

100 0 50 100 200

SCALE: 1" = 100'



VICINITY MAP
N.T.S.

1 LEGEND:

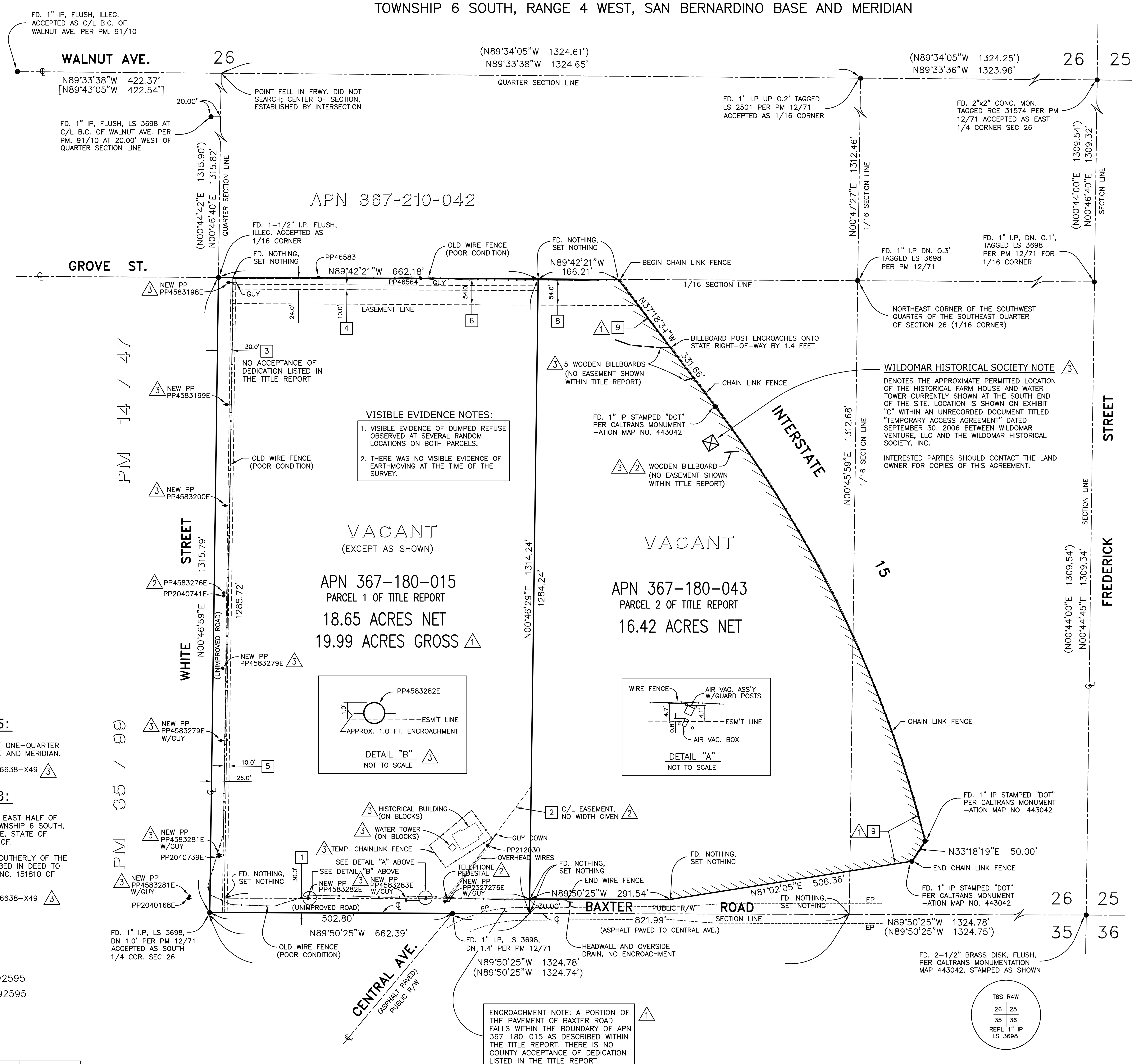
BOUNDARY LINE
CENTERLINE OF STREET
EASEMENT LINE
EXISTING FENCE
POWER POLE
8 PLOTTED EASEMENT
EP EDGE OF PAVEMENT

CURRENT SPECIFIC ZONING:

C–P–S SCENIC HIGHWAY COMMERCIAL

1 FLOOD ZONE DESIGNATION

ZONE C – MINIMAL FLOODING
COMMUNITY PANEL NO. 060245 2710C
MAP REVISED NOVEMBER 20, 1996



LEGAL DESCRIPTION FOR APN 367-180-015:

THE WEST ONE–HALF OF THE SOUTHWEST ONE–QUARTER OF THE SOUTHEAST ONE–QUARTER OF SECTION 26, TOWNSHIP 6 SOUTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN.

NOTE: LEGAL DESCRIPTION IS AS SHOWN ON TITLE REPORT, ORDER NO. 71066638–X49 3

LEGAL DESCRIPTION FOR APN 367-180-043:

THE SOUTHEAST ONE–QUARTER OF THE SOUTHEAST ONE–QUARTER AND THE EAST HALF OF THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 26, TOWNSHIP 6 SOUTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, ACCORDING TO THE UNITED STATES GOVERNMENT SURVEY THEREOF.

EXCEPT THEREFROM THAT PORTION LYING NORTHEASTERLY, EASTERLY AND SOUTHERLY OF THE SOUTHWESTERLY, WESTERLY AND NORTHERLY LINES OF PARCEL 2 AS DESCRIBED IN DEED TO THE STATE OF CALIFORNIA, RECORDED ON AUGUST 8, 1977 AS INSTRUMENT NO. 151810 OF OFFICIAL RECORDS.

NOTE: LEGAL DESCRIPTION IS AS SHOWN ON TITLE REPORT, ORDER NO. 71066638–X49 3

JOB ADDRESSES:

APN 367–180–015: 22600 BAXTER ROAD, WILDOMAR, CA 92595
APN 367–180–043: 22580 BAXTER ROAD, WILDOMAR, CA 92595

3 1 SURVEYOR'S NOTES:

( ) INDICATES RECORD DATA PER PARCEL MAP 5968 AS SHOWN BY MAP ON FILE IN BOOK 12 PAGE 71 OF PARCEL MAPS, RECORDS OF RIVERSIDE COUNTY, CALIF.

[ ] INDICATES RECORD DATA PER PARCEL MAP 16137 AS SHOWN BY MAP ON FILE IN BOOK 91 PAGE 10 OF PARCEL MAPS, RECORDS OF RIVERSIDE COUNTY, CALIF.

● INDICATES FOUND MONUMENT AS NOTED HEREON

INDICATES RESTRICTED ACCESS PER EASEMENT NOTE NO. 9

8 INDICATES EASEMENT ANNOTATION, SEE EASEMENT NOTES BELOW

AREA: APN 367–180–015 = 18.65 ACRES NET OR 19.99 ACRES GROSS 1
APN 367–180–043 = 16.42 ACRES NET
TOTAL AREA = 35.07 ACRES NET

NOTE: NET ACREAGE SHOWN IS BASED ON CURRENT STREET HALF WIDTHS BEING 30.00 FEET ON WHITE STREET AND BAXTER AVENUE.

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CENTERLINE OF BAXTER ROAD BEING NORTH 89°50'25" WEST PER PARCEL MAP 5968 AS SHOWN BY MAP ON FILE IN BOOK 12 PAGE 71 OF PARCEL MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

3 1 THE SURVEY FOR APN 367–180–015 AND APN 367–180–043 WAS BASED UPON DATA CONTAINED WITHIN A TITLE REPORT PREPARED BY CHICAGO TITLE COMPANY OF LOS ANGELES, CALIFORNIA ON NOVEMBER 28, 2007 AT 7:30 A.M. AS ORDER NO. 71066638–X49. THIS OFFICE OR THIS SURVEYOR MAKES NO STATEMENT AS TO THE ACCURACY OR INTEGRITY OF SAID TITLE REPORTS OR THE INFORMATION CONTAINED THEREIN. REFERENCE IS HEREBY MADE TO SAID TITLE REPORTS FOR ENCUMBRANCES NOT PLOTTED OR OTHERWISE NOT SHOWN HEREON.

ALL UTILITIES SHOWN HEREON WERE OBTAINED BY A FIELD SURVEY ONLY. THIS SURVEY DOES NOT INCLUDE ANY LOCATION OR RESEARCH DATA FOR UNDERGROUND UTILITIES OR OTHER FACILITIES OTHER THAN SHOWN HEREON.

THE BOUNDARY DATA SHOWN WAS CALCULATED BY LOCATION OF FOUND MONUMENTS, RECORD DATA AND LEGAL DESCRIPTIONS SHOWN ON GRANT DEEDS WHEN LEGIBLE.

3 1 SURVEYOR'S CERTIFICATION:

TO JULIET PROPERTY CO., INC., WILDOMAR VENTURE, L.L.C., AND CHICAGO TITLE COMPANY:

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH "MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/ACSM LAND TITLE SURVEYS", JOINTLY ESTABLISHED AND ADOPTED BY ALTA, ACSM AND NSPS IN 1999, AND INCLUDES ITEMS 2, 3, 4, 8, 14, 16 AND 17 OF TABLE "A" THEREOF. PURSUANT TO THE ACCURACY STANDARDS AS ADOPTED BY ALTA, ACSM AND NSPS AND IN EFFECT ON THE DATE OF THIS CERTIFICATION, UNDERSIGNED FURTHER CERTIFIES THAT THE POSITIONAL UNCERTAINTIES RESULTING FROM THE SURVEY MEASUREMENTS MADE ON THE SURVEY DO NOT EXCEED THE ALLOWABLE POSITIONAL TOLERANCE.

THE SURVEY SHOWN HEREON WAS MADE BY THE UNDERSIGNED, A DULY REGISTERED PROFESSIONAL LAND SURVEYOR UNDER THE LAWS OF THE STATE OF CALIFORNIA, OR UNDER MY DIRECT PERSONAL SUPERVISION ON FEBRUARY 24, 2005 AND UPDATED ON DECEMBER 13, 2007 FOR THE HEREON DESCRIBED PARCELS OF LAND, NOW INCLUDED IN AND FORMING A PART OF THE COUNTY OF RIVERSIDE.

THE UNDERSIGNED FURTHER STATES THAT THERE ARE NO ENCROACHMENTS EITHER UPON THE LAND SHOWN HEREON OR OVER THE CONTIGUOUS BOUNDARIES OF ANY PROPERTY IMMEDIATELY ADJACENT TO THE PROPERTY SURVEYED EXCEPT AS SHOWN HEREON. THERE ARE NO ABOVE–GROUND VISIBLE IMPROVEMENTS EXCEPT AS SHOWN HEREON.

ALL EASEMENTS OF RECORD AFFECTING SAID LANDS AS DISCLOSED BY THE HEREON REFERENCED TITLE REPORT ARE NOTED ON SAID SURVEY. ALL BUILDINGS AND STRUCTURES AFFECTING SAID LANDS ARE OF THE TYPE AND IN THE LOCATIONS SHOWN HEREON, AND THAT THE NET AREA SHOWN HEREON IS CORRECT.

LEONARD C. FOWLER DATE
LS 7238, EXP. 12/31/08

1 EASEMENT AND ENCUMBRANCE NOTES:

THE FOLLOWING ITEMS ARE REFERENCED IN A PRELIMINARY TITLE REPORT PREPARED BY CHICAGO TITLE COMPANY OF LOS ANGELES, CALIFORNIA ON NOVEMBER 28, 2007 AT 7:30 A.M. AS ORDER NO. 71066638–X49.

EASEMENTS AND ENCUMBRANCES LISTED IN TITLE REPORT FOR APN 367–180–015 (PARCEL 1):

1 AN EASEMENT FOR PUBLIC HIGHWAY AND PUBLIC UTILITY PURPOSES IN FAVOR OF THE COUNTY OF RIVERSIDE RECORDED FEBRUARY 5, 1935 IN BOOK 217 PAGE 84 OF OFFICIAL RECORDS. AFFECTS THE SOUTHERLY 30 FEET.

2 2 AN EASEMENT FOR UTILITY PURPOSES IN FAVOR OF CALIFORNIA ELECTRIC POWER COMPANY, RECORDED JUNE 21, 1950 AS INSTRUMENT NO. 2876, OF OFFICIAL RECORDS. AFFECTS SAID LAND.

3 A DECLARATION OF DEDICATION FOR PUBLIC ROAD, PUBLIC UTILTY AND INCIDENTAL PURPOSES, RECORDED OCTOBER, 3, 1968 AS INSTRUMENT NO. 95449, OFFICIAL RECORDS.

4 AN EASEMENT FOR THE PURPOSE OF UNDERGROUND ELECTRICAL SUPPLY SYSTEMS IN FAVOR OF SOUTHERN CALIFORNIA EDISON COMPANY, A CORPORATION AND GENERAL TELEPHONE COMPANY OF CALIFORNIA, A CORPORATION RECORDED JUNE 1, 1970 AS INSTRUMENT NO. 51276 OF OFFICIAL RECORDS. AFFECTS THE SOUTH 10 FEET OF THE NORTH 24 FEET OF SAID LAND.

5 AN EASEMENT FOR PUBLIC UTILITY PURPOSES IN FAVOR OF SOUTHERN CALIFORNIA EDISON COMPANY, A CORPORATION RECORDED SEPTEMBER 18, 1974 AS INSTRUMENT NO. 120768 OF OFFICIAL RECORDS. AFFECTS THE EAST 10 FEET OF THE WEST 36 FEET OF SAID LAND.

6 AN EASEMENT FOR INGRESS, EGRESS, ROAD AND PUBLIC UTILITY PURPOSES IN FAVOR OF SOUTHWEST PROPERTIES, A SOLE PROPRIETORSHIP, COMPOSED OF VINCENT P. KOWSKY, A SINGLE MAN RECORDED JUNE 17, 1987 AS INSTRUMENT NO. 172476, OF OFFICIAL RECORDS. AFFECTS THE NORTHERLY 54 FT.

EASEMENTS AND ENCUMBRANCES LISTED IN TITLE REPORT FOR APN 367–180–043 (PARCEL 2):

2 7. AN EASEMENT FOR PUBLIC UTILITY PURPOSES IN FAVOR OF SOUTHERN CALIFORNIA EDISON COMPANY RECORDED SEPTEMBER 18, 1974 AS INSTRUMENT NO. 120768 OF OFFICIAL RECORDS. AFFECTS THE EAST 10 FEET OF THE WEST 36 FEET. (SAME AS NO. 5 ABOVE, NO AFFECT TO THIS PARCEL)

3 9 THE FACT THAT THE OWNERSHIP OF SAID LAND DOES NOT INCLUDE RIGHTS OF ACCESS TO OR FROM THE STREET, HIGHWAY OR FREEWAY ABUTTING SAID LAND, SUCH RIGHTS HAVING BEEN RELINQUISHED BY THE DOCUMENT RECORDED AUGUST 8, 1977 AS INSTRUMENT NO. 151810, OFFICIAL RECORDS. AFFECTS STATE HIGHWAY 15.

THE FOLLOWING MATTERS AFFECT PARCELS 1 AND 2 OF TITLE REPORT:

3 10. RIGHTS OF THE PUBLIC IN AND TO ANY PORTION OF THE PROPERTY HEREIN DESCRIBED LYING WITHIN BAXTER ROAD.

3 11. THE RIGHT TO SINK WELLS, TO ESTABLISH AND MAINTAIN PUMPING PLANTS UPON THE HEREIN DESCRIBED PROPERTY AND TO DEVELOP WATER FOR IRRIGATION AND DOMESTIC USE; ALSO RIGHTS OF WAY THROUGH AND ACROSS ANY PORTION OF SAID PROPERTY FOR SURFACE OR UNDERGROUND PIPELINES; ALSO RIGHTS OF WAY THROUGH AND ACROSS ANY PORTION OF SAID PROPERTY FOR THE CONSTRUCTION OF ELECTRIC TRANSMISSION LINES WITH PERPETUAL RIGHT OF ENTRY FOR THE AFORESAID PURPOSES, AS CONVEYED TO SOUTH ELSINORE MUTUAL WATER COMPANY, A CORPORATION, AS DISCLOSED BY THE DECLARATION OF OWNERSHIP OF EXCESS WATER RIGHT RECORDED JUNE 20, 1934 IN BOKK 176 PAGE 293, OFFICIAL RECORDS.

3 12. THE EFFECT OF A QUITCLAIM DEED RECORDED NOVEMBER 30, 2005 AS INSTRUMENT NO. 2005–0985597 OF OFFICIAL RECORDS.

SEE ADDITIONAL EASEMENT NOTE HEREON:

3 ADDITIONAL EASEMENT NOTE:

THE FOLLOWING EASEMENT WAS NOT SHOWN IN THE TITLE REPORT AND HAS AN AFFECT ON APN 367–180–043 (PARCEL 2):

8 AN EASEMENT FOR INGRESS, EGRESS, ROAD AND PUBLIC UTILITY PURPOSES OVER, UNDER, THROUGH AND ACROSS THE NORTHERLY 54 FEET OF THE WEST HALF OF THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 26, TOWNSHIP 6 SOUTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, ACCORDING TO THE UNITED STATES GOVERNMENT SURVEY THEREOF. EXCEPT THAT PORTION LYING WITHIN WHITE STREET.

NO.	DATE	DESCRIPTION	BY
3	12–14–07	UPDATED A.L.T.A. SURVEY AND MAP BASED ON FIELD SURVEY AND PRELIMINARY TITLE REPORT DATED NOV. 28, 2007 BY CHICAGO TITLE COMPANY ORDER NO. 71066638–X49	LCF
2	10–26–05	PLOTTED ESMT #2, REV. ESMTS 2 & 7, REV. BILLBOARDS (SIGNS), ADDED NEW PP4583276E	LCF
1	10–24–05	VARIOUS REVISIONS BASED ON TITLE REPORT DATED 6–22–05 ADDED VISIBLE EVIDENCE NOTES, ADDED ENCROACHMENT NOTE REVISED BOUNDARY PARCEL –015, REV. SURVEYOR'S CERT.	LCF

REVISIONS

UPDATED A.L.T.A./A.C.S.M. SURVEY

ORIGINALLY PREPARED MARCH 3, 2005

PROFESSIONAL LAND SURVEYOR LEONARD C. FOWLER EXP. 12/31/08 No. 7238 STATE OF CALIFORNIA

PREPARED BY:

LEONARD C. FOWLER, PLS DATE
LCF SURVEYING, INC., PRESIDENT
LS 7238, EXPIRES 12/31/08

PREPARED FOR: 3

JULIET PROPERTY CO., INC.
8375 W. FLAMINGO ROAD, #200
LAS VEGAS, NV 89147–4149
ATTN: MR. JOHN STEWART
PH: (702) 368–5800

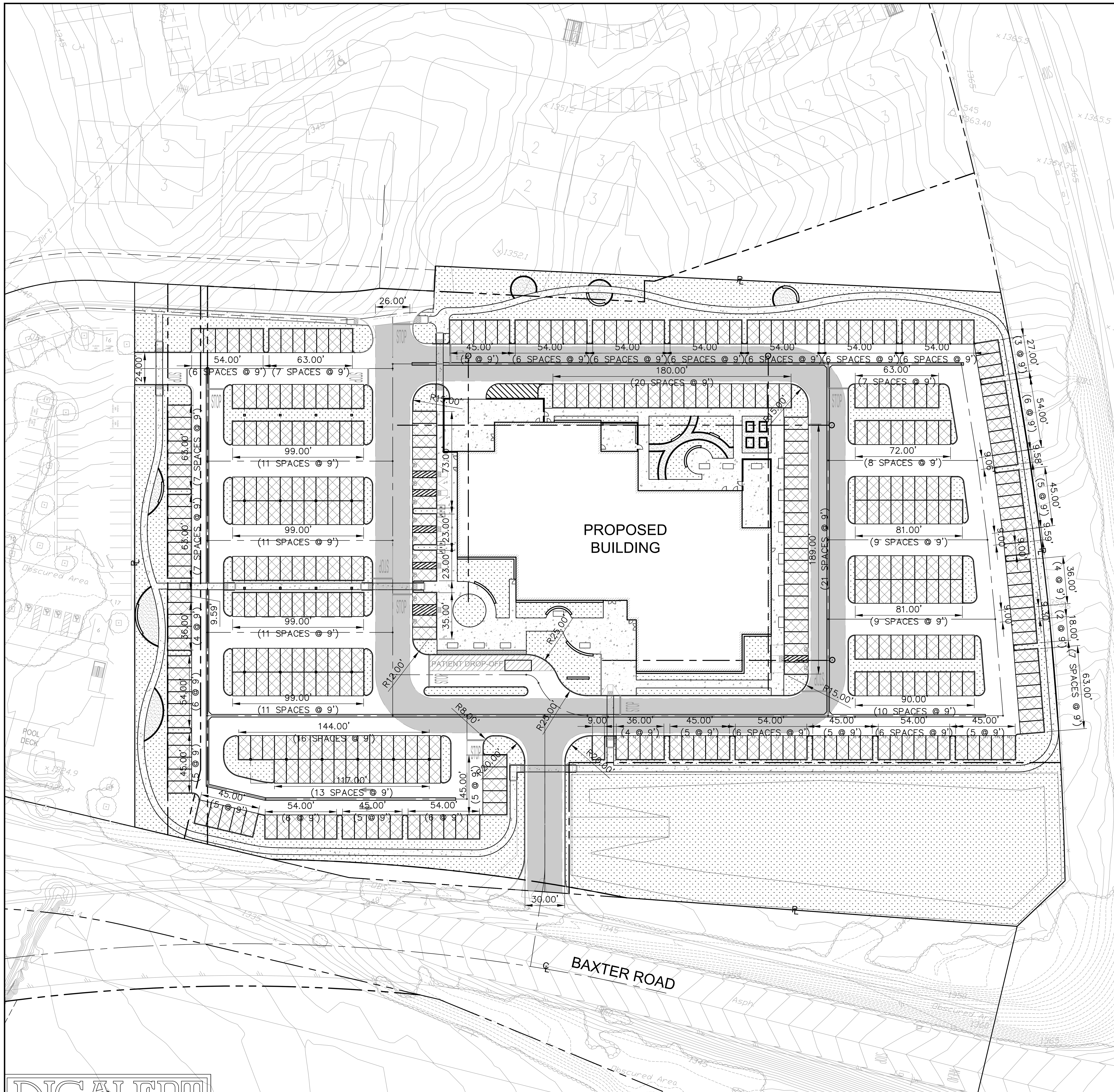
DRAWN BY: LCF
CHECKED BY: LCF
SCALE: 1" = 100'
DATE: DEC., 14, 2007

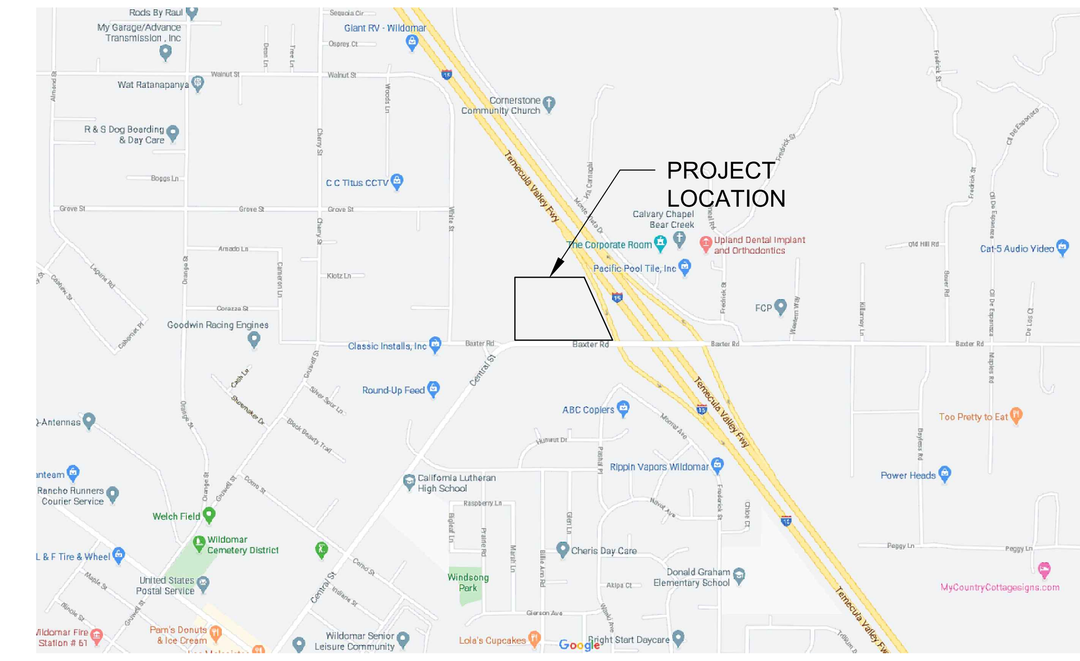
LCF SURVEYING, INC.
39888 SWEETBRIER CIRCLE
TEMECULA, CALIF. 92591
Ph. (951) 699–2603
Fax (951) 699–5157

JN 850.02 ALTA–JULIET.DWG

APPENDIX I

SITE PLANS





VICINITY MAP

NTS

SITE STATUS

ZONING:	MEDICAL USES OVERLAY DISTRICT OF MIXED USE/RESIDENTIAL OVERLAY OF BUSINESS PARK–1 AND RESIDENTIAL VERY HIGH DENSITY.	
GENERAL PLAN DESIGNATION:	MIXED USE/RESIDENTIAL (MUIR) OVERLAY	
BUILDING OCCUPANCY TYPE:	B (MEDICAL OFFICE BUILDING)	
PARKING REQUIRED:		
PARKING PROVIDED:	STD SPACES	373
	ACCESSIBLE SPACES	11
	EV STD SPACES	23
	CLEAN AIR VEHICLES	8
	TOTAL SPACES	415
	BICYCLE	6 SPACES
FLOOR AREA RATIO:	FIRST FLOOR AREA	XXXXX SF
	SECOND FLOOR AREA	XXXXX SF
	TOTAL	XXXXX SF
VACANT LOT AREA:	XXXXX ACRES +/– (XXXXX SF)	
FAR	BP–1 BUILDING PARK. ZONING ALLOWS A 1.0 FAR. (BUILDING AREA / LOT AREA) XXXXX SF / XXXXX SF = XXXXX FAR	

40 20 0 40 80

GRAPHIC SCALE

SCALE 1" – 40'

SHEET NOTE:

1. SEE ENLARGED PLANS FOR CONSTRUCTION NOTES.

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TWO WORKING DAYS BEFORE YOU DIG

TOLL FREE 1-800-227-2600

A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

NOTE:

WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

The private engineer signing these plans is responsible for assuring the accuracy and acceptability of the design hereon. In the event of discrepancies arising after city acceptance or during construction, the private engineer shall be responsible for determining an acceptable solution and revising the plans for acceptance by the city.

MARK	BY	DATE	REVISIONS	APPR.	DATE
ENGINEER				CITY	

CITY OF WILDOMAR · Est. 1886 · Inc. 2008 · Tradition ~ Opportunity ~ Progress

CITY OF WILDOMAR

ACCEPTED BY:

Date:

Daniel A. York, Director of Public Works/ City Engineer, PE 43212

ACCEPTANCE AS TO CONFORMANCE WITH APPLICABLE CITY STANDARDS AND PRACTICES

SEAL-ENGINEER:

REGISTERED PROFESSIONAL ENGINEER · VIRGILIO C. AOANAN · No. C36079 · Exp. 6/30/20 · CIVIL · STATE OF CALIFORNIA

VCA ENGINEERS INC

CIVIL • STRUCTURAL · MBE•DBE•SBE

Quality Service Commitment

1041 S. Garfield Avenue, Suite #210
Alhambra, CA 91801
Tel. 323.729.6098 Fax. 323.729.6043

PREPARED BY: ____________

R.C.E. No. ________ EXP. ________

BENCHMARK:

Elevation = ________
Datum = ________
BENCHMARK # ________

THIS SURVEY WAS PERFORMED ON (date) BY (surveyor) L.S. (number), EXP. (date)

SCALE:
H: As Noted V: As Noted

CITY OF WILDOMAR

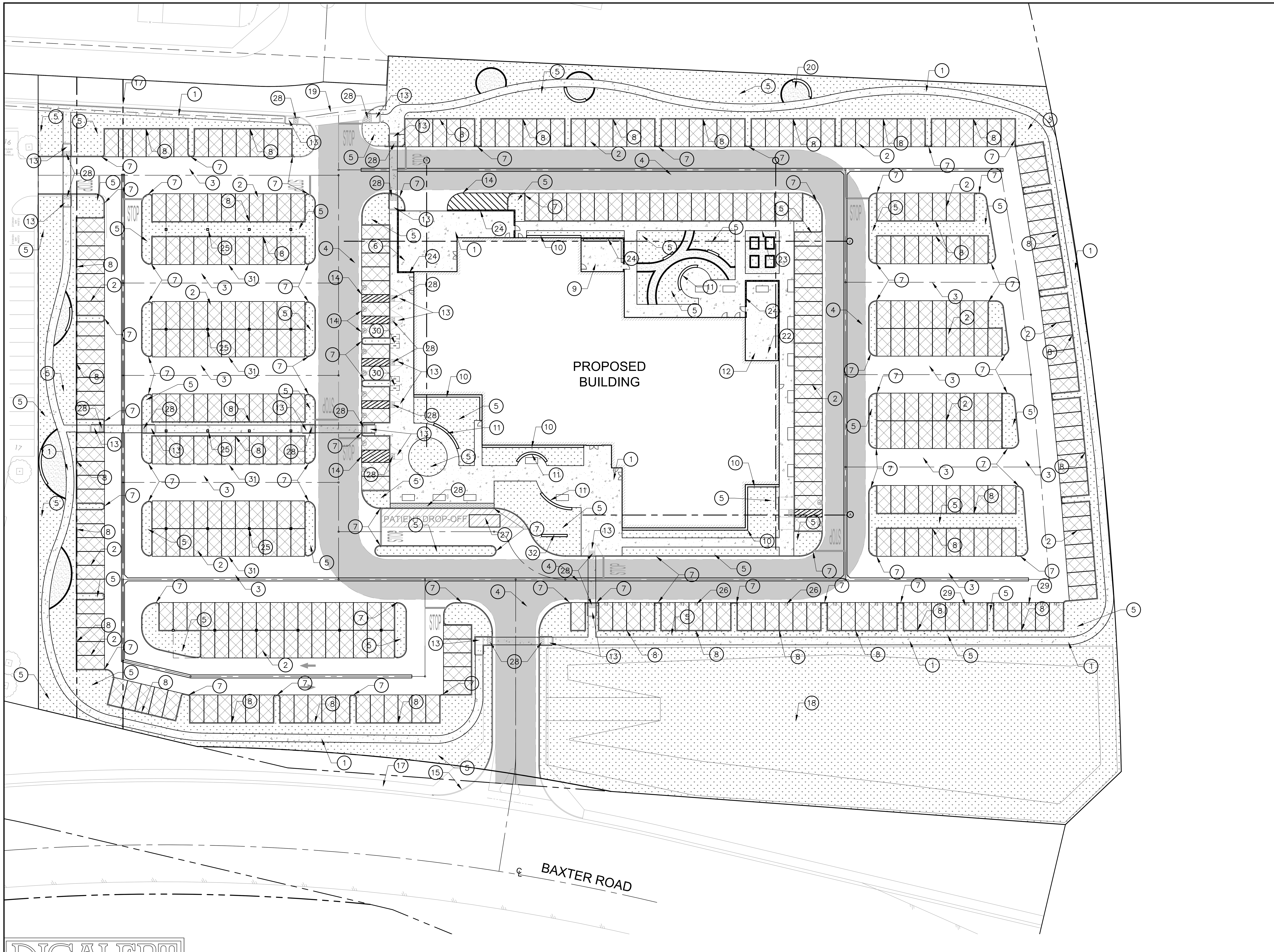
BAXTER VILLAGE - MEDICAL OFFICE BUILDING

ENTITLEMENT SUBMITTAL

OVERALL SITE CONTROL PLAN

SHEET No.

OF SHTS



LEGEND:

- 4" THK. CONCRETE PAVEMENT
- 6.5" THK. AC PAVEMENT
- 4" THK. AC PAVEMENT
- PLANTER AREA
- PLANTER WALL/RETAINING WALL
- 6" THK. FIRELANE
- DECOMPOSE GRANITE

CONSTRUCTION NOTES:

1. 4" THK. CONCRETE PAVEMENT
2. 4" THK. AC PAVEMENT
3. 6.5" THK. AC PAVEMENT
4. 6" THK. FIRELANE
5. PLANTER AREA
6. TRASH ENCLOSURE
7. CONCRETE CURB
8. CONCRETE CURB AND GUTTER
9. EMPLOYEE PATIO
10. CONCRETE MOW STRIP
11. CONCRETE SEAT WALL
12. PHYSICAL THERAPY YARD
13. ACCESSIBLE RAMP
14. ACCESSIBLE PARKING
15. EXISTING STREET CURB LINE
16. EXISTING FIRE HYDRANT TO REMAIN
17. EXISTING CITY SIDEWALK
18. BIO FILTRATION DETENTION POND
19. CONCRETE CROSS/RIBBON GUTTER
20. DECOMPOSE GRANITE
21. CONCRETE TRANSFORMER PAD
22. SYNTHETIC TURF MATERIAL OVER CONCRETE PAVEMENT
23. DECORATIVE FENCE
24. STRUCTURAL FREE STANDING WING WALL
25. PHOTOVOLTAIC CARPORT COLUMN OUTSIDE 9X18 PARKING SPACE
26. ELECTRIC VEHICLE DESIGNATED AREA
27. EMERGENCY VEHICLE DESIGNATED AREA
28. TRUNCATED DOMES
29. CLEAN AIR VEHICLE
30. BIKE RACK
31. PHOTOVOLTAIC (PV PANEL) CANOPY
32. MONUMENT SIGN FOR ILLUSTRATION PURPOSES ONLY. PERMIT REQUIRED SUBSEQUENT TO ENTITLEMENT

SHEET NOTES:

1. REFER TO ARCHITECTURAL DRAWINGS FOR OTHER SITE DIMENSIONS AND IMPROVEMENTS NOT SHOWN ON THIS DRAWING.

SITE CONTROL PLAN

30 15 0 30 60

GRAPHIC SCALE
SCALE 1" – 30'

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A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

NOTE:
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MARK	BY	DATE	REVISIONS	APPR.	DATE
ENGINEER				CITY	

CITY OF WILDOMAR
ACCEPTED BY:
Date:
Daniel A. York, Director of Public Works/ City Engineer, PE 43212
ACCEPTANCE AS TO CONFORMANCE WITH APPLICABLE CITY STANDARDS AND PRACTICES

SEAL-ENGINEER:
REGISTERED PROFESSIONAL ENGINEER VIRGILIO C. AOANAN No. C36079 Exp. 6/30/20 CIVIL STATE OF CALIFORNIA

VCA ENGINEERS INC
CIVIL ● STRUCTURAL MBE●DBE●SBE
1041 S. Garfield Avenue, Suite #210
Alhambra, CA 91801
Tel. 323.729.6098 Fax. 323.729.6043

PREPARED BY: ____________
R.C.E. No. ________ EXP. ________

BENCHMARK:
Elevation = ________
Datum = ________
BENCHMARK # ________
THIS SURVEY WAS PERFORMED ON (date) BY (surveyor) L.S. (number), EXP. (date)

SCALE:
H: As Noted V: As Noted

CITY OF WILDOMAR
BAXTER VILLAGE - MEDICAL OFFICE BUILDING
ENTITLEMENT SUBMITTAL
SITE CONTROL PLAN

SHEET No.
OF SHTS

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TWO WORKING DAYS BEFORE YOU DIG

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CITY OF WILDOMAR

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REGISTERED PROFESSIONAL ENGINEER VIRGILIO C. AOANAN No. C36079 Exp. 6/30/20 CIVIL STATE OF CALIFORNIA

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R.C.E. No. ______ EXP. ______

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Datum = ______
BENCHMARK # ______

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SCALE:
H: As Noted V: As Noted

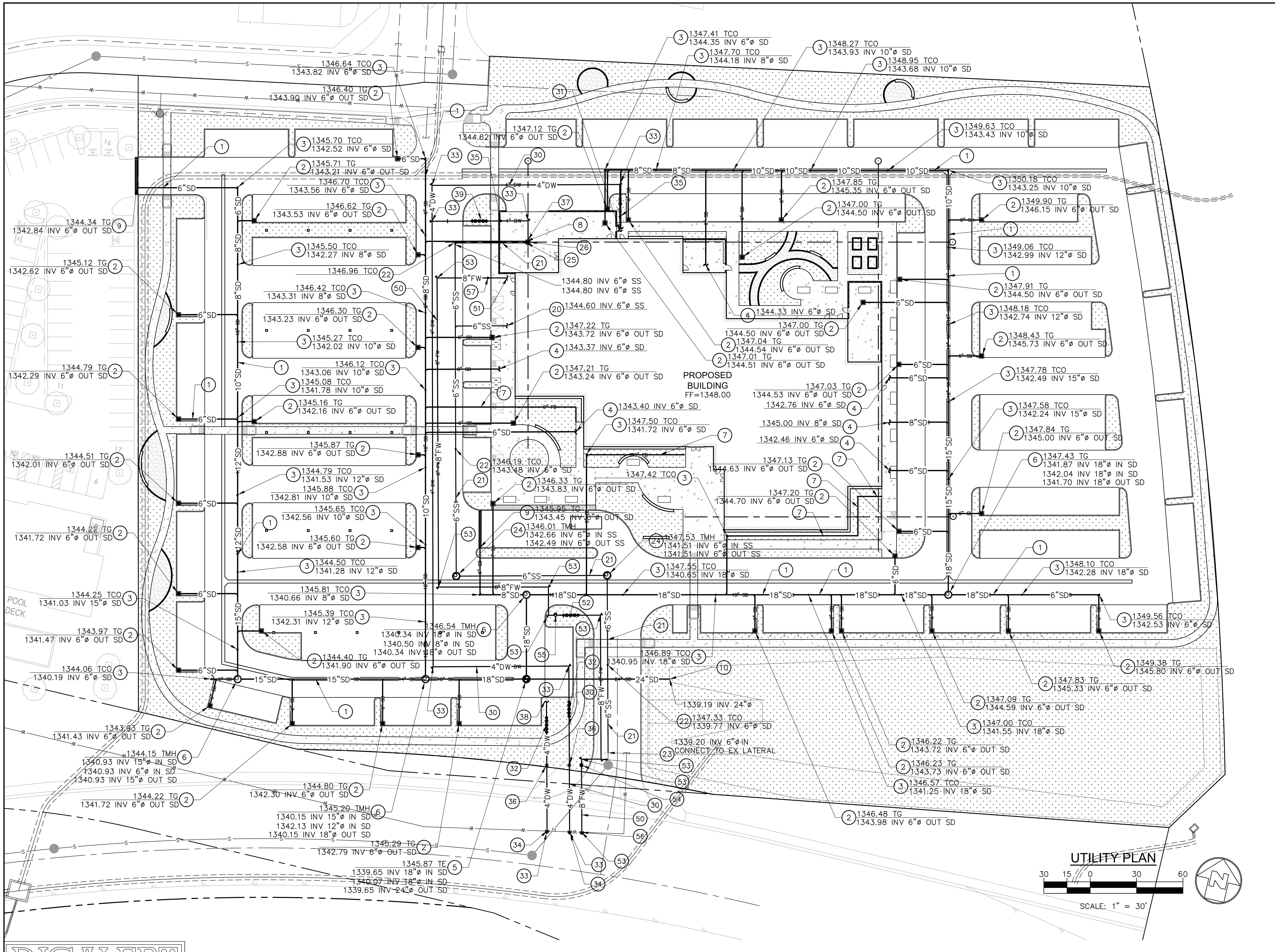
CITY OF WILDOMAR

BAXTER VILLAGE - MEDICAL OFFICE BUILDING ENTITLEMENT SUBMITTAL

OVERALL UTILITY PLAN

SHEET No.

OF SHTS



CONSTRUCTION NOTES:

STORM DRAIN:

1. INSTALL PVC SCH 40 PIPE FOR STORM DRAIN LINE.
2. CONSTRUCT CATCH BASIN.
3. INSTALL CLEANOUT.
4. CONNECT TO BUILDING DOWN SPOUT. COORDINATE AND MATCH LOCATION WITH PLUMBING DRAWINGS. PROVIDE REDUCER AND FITTINGS AS REQUIRED TO MATCH SIZE OF BUILDING DOWN SPOUT.
5. INSTALL CDS UNIT.
6. CONSTRUCT SD MANHOLE PER APWA STD PLAN 321-2.
7. INSTALL 6" FRENCH DRAIN.
8. CONNECT STORM DRAIN LINE TO FOX DRAIN SYSTEM AND VALVE.
9. INSTALL TRENCH DRAIN.
10. POINT OF DISCHARGE TO BIOINFILTRATION DETENTION POND.

SANITARY SEWER:

20. CONNECT TO BUILDING SANITARY SEWER CONNECTION. PROVIDE REDUCING FITTINGS AND COUPLINGS AS NEEDED. FOR CONTINUATION SEE PLUMBING PLANS.
21. INSTALL ABS SCH 40 SANITARY SEWER PIPE.
22. INSTALL CLEANOUT.
23. CONNECT TO THE EXISTING SEWER LINE. PROVIDE REDUCING FITTINGS AND COUPLINGS AND CONTRACTOR SHALL POTHOLE AND FIELD VERIFY EXACT SIZE, DEPTH AND LOCATION OF EX LATERAL PRIOR TO THE TRENCHING OF NEW SYSTEM.
24. CONSTRUCT SS MANHOLE PER APWA STD PLAN 200-3.
25. CONNECT SANITARY LINE TO FOX DRAIN SYSTEM AND VALVE.
26. CONSTRUCT FOX DRAIN SYSTEM.

DOMESTIC WATER:

30. INSTALL COPPER PIPE TYPE K TUBING FOR DOMESTIC WATER LINE.
31. CONNECT TO BUILDING DOMESTIC WATER CONNECTION. PROVIDE REDUCING FITTINGS AND COUPLINGS AS NEEDED. FOR CONTINUATION SEE PLUMBING PLANS.
32. INSTALL DOMESTIC/IRRIGATION WATER REDUCED PRESSURE BACKFLOW PREVENTER. COORDINATE AND VERIFY POINT OF CONNECTION.
33. INSTALL CONCRETE THRUST BLOCK AND TIES FOR WATERLINE.
34. CONNECT TO EXISTING WATER LINE. PROVIDE REDUCING FITTINGS AND COUPLINGS AS NEEDED. VERIFY LOCATION IN FIELD BY POT HOLING PRIOR TO CONSTRUCTION/INSTALLATION OF NEW WATER SYSTEM.
35. INSTALL GATE VALVE.
36. PROPOSED WATER METER TO BE USED FOR DOMESTIC/IRRIGATION WATER SERVICE.
37. CONNECT DOMESTIC WATER LINE TO FOX DRAIN SYSTEM AND VALVE.
38. POINT OF CONNECTION FOR PROPOSED IRRIGATION LINE.
39. FOX DRAIN SYSTEM AND VALVE.

FIRE WATER:

50. INSTALL 8" AWWA C900 PVC PRESSURE CLASS DR14, FIRE WATER LINE.
51. CONNECT TO BUILDING FIRE WATER CONNECTION. PROVIDE REDUCING FITTINGS AND COUPLINGS AS NEEDED. FOR CONTINUATION SEE PLUMBING PLANS.
52. INSTALL DOUBLE CHECK DETECTOR ASSEMBLY.
53. INSTALL CONCRETE THRUST BLOCK AND TIES.
54. PROPOSED WATER METER TO BE USED FOR FIRE WATER.
55. INSTALL FIRE DEPARTMENT CONNECTION.
56. CONNECT TO EXISTING WATER LINE. PROVIDE REDUCING FITTINGS AND COUPLINGS AS NEEDED. VERIFY LOCATION IN FIELD BY POT HOLING PRIOR TO CONSTRUCTION/INSTALLATION OF NEW WATER SYSTEM.
57. INSTALL GATE VALVE.

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A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

NOTE:
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MARK	BY	DATE	REVISIONS	APPR.	DATE
ENGINEER				CITY	

CITY OF WILDOMAR
ACCEPTED BY:
Date:
Daniel A. York, Director of Public Works/ City Engineer, PE 43212
ACCEPTANCE AS TO CONFORMANCE WITH APPLICABLE CITY STANDARDS AND PRACTICES

SEAL-ENGINEER:
REGISTERED PROFESSIONAL ENGINEER VIRGILIO C. ADAME No. C36079 Exp. 6/30/20 CIVIL STATE OF CALIFORNIA

VCA ENGINEERS INC
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PREPARED BY:
R.C.E. No. ________ EXP. ________

BENCHMARK:
Elevation = ________
Datum = ________
BENCHMARK # ________
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SCALE:
H: As Noted V: As Noted

CITY OF WILDOMAR
BAXTER VILLAGE - MEDICAL OFFICE BUILDING
ENTITLEMENT SUBMITTAL
UTILITY PLAN

SHEET No.
OF SHTS

APPENDIX J

OPERATIONS AND MAINTENANCE PLAN

Los Angeles County
1041 S. Garfield Ave. Suite #210, Los Angeles CA 91801
Tel: 323-729-6098 ▪ **Fax:** 323-729-6043
e-mail: vca@vcaeng.com

Orange County
2151 Michelson Dr. # 242, Irvine, CA 92612
Tel: 949-679-0870 ▪ **Fax:** 949-679-9370
www.vcaeng.com

Catch Basin and Trench Drain Filter Inserts

The inspection and maintenance program will include the following key components:

1. Regular Sweeping and Removal of Debris:
Sediment and debris (litter, leaves, papers and cans, etc.) within the area, especially around the drainage inlet, will be collected and removed. The frequency of sweeping will be based on the amount of sediment and debris generated.

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

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

4. Cleaning Out The Filter Insert:
Regardless of the model of filter insert, the devices must be cleaned out on a recurring basis. It is recommended that there be at least three cleanings per year – more in high exposure areas. The filter should be cleaned when the solids level reaches close to the full tip.

a. The Standard Filter, in most cases, can be cleaned out by removing the device from the inlet and dumping the contents into a DOT approved drum for later disposal. If the oil-absorbent pouches need to be changed, the time to change them is immediately after dumping and before the filter is replaced in the inlet.
b. Because of weight, method of installation and so forth, some filter inserts will be cleaned with the aid of a vector truck. If necessary, the oil-absorbent pouches will be changed after the pollutants have been removed and as the filter is being returned to service.

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

6. Maintenance Log
Keep a log of all inspection and maintenance performed on the catch basin and trench drain filter inserts. Keep this log on-site.

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CDS® Inspection and Maintenance Guide

CDS TECHNOLOGIES

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y³	m³
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.3	3.0	0.9	1.3	1.0
CDS2020	5	1.3	3.5	1.1	1.3	1.0
CDS2025	5	1.3	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

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CDS Inspection & Maintenance Log

CDS Model: ______________________ Location: ______________________

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.