PRELIMINARY HYDROLOGY REPORT

FOR

Wal-Mart Store #5970-01
El Monte Supercenter

4000 Arden Drive

El Monte, CA 91731

DATE: 10/1/13

Prepared for:
Wal-Mart Stores, Inc.
2001 Southeast 10th Street
Bentonville, AR 72716-0550
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Project No. WM1239A
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SECTION I
INTRODUCTION

1.1 PURPOSE

This report presents a hydrologic and hydraulic analysis for the development of a proposed 15.4 acre Wal-Mart site. The main objective of this report is to analyze pre- and post-construction storm water run-off and analyze the mitigation measures required to prevent adverse downstream effects.

1.2 PROJECT DESCRIPTION

The Project site is located at 4000 Arden Drive within the northwesterly portion of the City of El Monte, within Los Angeles County, near the intersection of Valley Boulevard and Arden Drive. Specifically, Arden Drive borders the Project site to the west; the boundary of an existing City of El Monte Maintenance Facility located northerly of Rose Avenue comprises the site's northerly boundary; Valley Circle forms the site's easterly boundary; and parcels containing industrial/office facilities with Valley Boulevard frontages comprise the site's southerly boundary (see Appendix A for Vicinity Map). The Project proposes construction and operation of a new 182,429 square-foot Walmart Supercenter within the 15.4-acre Project site. The project site is located approximately 0.6 miles north of the 10 Freeway near Santa Anita Avenue. The project site is located approximately 300 feet west of the Rio Hondo channel.

1.3 EXISTING AND PROPOSED CONDITIONS

Existing Site Condition:

The Project site (APN 8575-024-043) is roughly rectangular in shape, totaling approximately 15.41 acres. The Project site, is essentially level and currently vacant. The site was historically used for agriculture and the manufacturing of glass containers and, more recently, the production of food and beverage containers. Manufacturing facilities previously occupying the Project site were demolished in 2011.

The Project site has been extensively disturbed by human activities, including demolition of facilities and associated heavy equipment operations. The Project site evidences no topographic features of note; nor is any protected or intrinsically valuable biologic habitat located within the Project site. The limited vegetation that does exist within the Project site consists primarily of non-native, ruderal grasses and shrubs evident along the perimeter of the Project site.

The Project site has been rough-graded, and is essentially flat, with an elevation of approximately 280 feet above mean sea level (MSL).

There are no existing underground utilities or paved surfaces in place to direct storm runoff. Existing surface runoff at the site sheet flows in 3 main directions from 3 respective areas of the site (See Existing Hydrology Map in Appendix A); toward Arden Drive to the west, toward the property to the south, and towards the property to the north.

Runoff within Arden Drive is conveyed south via curb and gutter into an existing 24 inch RCP storm drain system within Valley Blvd., which ultimately outlets into Rio Hondo Channel. Runoff entering the properties to the north and south is collected in those properties' respective storm drains. Both properties' storm drains discharge east to an existing 24 inch diameter storm drain aligned within Valley Circle, which discharges to a 48 inch diameter CMP lateral of the Rio Hondo Channel to the east. All runoff from the site and adjacent property eventually discharges into the Rio Hondo Reach.

Proposed Site Condition:

The proposed improvements consist of construction of an 182,429 square foot Wal-Mart building and a paved parking lot with landscaped islands throughout the remaining area of the site. Refer to the Post Construction Hydrology Map in Appendix A to accompany the discussion of the proposed site's drainage.

The proposed site drainage will follow the existing drainage pattern. Storm water will sheet flow across landscaping and paved parking areas and will be collected in several bioretention planters, pervious concrete under-drains, and curb opening catch basins throughout the site.

The proposed site has 3 main drainage areas and 2 storm drain systems. Drainage area A consists of a portion of the parking lot along the west of the site. Drainage area A will discharge into Arden Drive. Drainage area B will include the southern portion of the site between Valley Circle and drainage area A. Drainage area B will convey runoff through Strom Drain System 1 to a public storm drain lateral located at the southeast corner of the site. Drainage area C will consist of the remaining northerly area of the site between drainage area A and Valley Circle. Drainage area C will covey runoff through Storm Drain System 2 to a second public storm drain lateral located on the eastern side of the site and roughly centered behind the proposed building.

Due to past contamination, new development at this site will not incorporate soil infiltration into the site's developed hydraulic conditions in order to avoid potential ground water contamination.

SECTION II
ONSITE FLOW VOLUMES

2.1 METHODOLOGY

Requirements for drainage system design have been based on The County of Los Angeles Hydrology Manual dated January 2006. A 50-year design storm has been used in developing this study. Consideration was given for County of Los Angeles Low Impact Development (LID) standards to be adopted by the city of El Monte towards the end of 2013.

The program chosen for this hydrology study to calculate runoff and runoff volumes for the site area was the T_C Calculator supplied by the County. The software is written by the Los Angeles County Department of Public Works and implements the Modified Rational Method into calculations for single subareas and small watersheds. The 50-year design storm depths used in calculations were determined from El Monte 50-year 24 hour Isohyet map created by the Los Angeles County Department of Public Works and supplied in the County of Los Angeles Hydrology Manual, appendix B, map 1-H1.20.

The proposed underground detention system volume, peak flows, and total volume of runoff over a 24-hour period of the specified storm event were determined using the U.S. Army Corps of Engineers' Hydrologic Modeling System (HEC-HMS) Version 3.5, successor to HEC-1. The input parameters of HEC-HMS include Precipitation Modeling using hypothetical storm events based on frequency per Los Angeles County estimates and Basin Modeling including determination of losses based on the SCS Curve Number method and transformation of precipitation to runoff through the SCS Unit Hydrograph method.

2.2 DESIGN CRITERIA

Design Storm: 50-yr storm event

Land Use: Commercial

Rainfall Precipitation Depth: 6.6" - Based on Los Angeles County Department of Public Works Isohyet Map

Pervious Loss Rate: Based on Curve Numbers for Pervious Areas per NRCS method based on soil conditions and land use.

Soil Type: 006

2.3 CONCLUSIONS

A previous Hydrology study for the proposed shopping center and surrounding parcels was prepared for the City of El Monte by George G. Boghossian & Associates Inc. in 2008 (See References). The scope of this study encompassed a 37 acre area served by the 48 inch diameter CMP lateral southeast of the proposed Wal-Mart site, which outlets into Los Angeles County Upper Rio Hondo Channel at Station 727+00. Findings of this study were used to develop the hydrologic conditions for the maintenance facility to the north and construct the 24 inch diameter storm drain aligned in Valley Circle tributary to the 48 inch diameter CMP lateral. According to this study, approximately 20 cubic feet per second (cfs) of peak storm water run-off for the 50 year storm event is allowed to be generated in the 24 inch storm drain which collects runoff from three sources: the maintenance facility to the north, the proposed 15.4 acre Wal-Mart site, and the runoff developed in Valley Circle.

A separate Hydrology study performed in October, 2010 by C&V Consulting, Inc. specifically for the maintenance facility to the north, concluded that the peak storm water run-off for the 50 year storm event conveyed from that site to the 24 inch storm drain is 8 cfs (See References).

The existing surface runoff at the site sheet flows in 3 main directions from 3 respective areas of the site (See Existing Hydrology Map in Appendix A); 7.1 cfs toward Arden Drive to the west from Area 1, 21.4 cfs toward the property to the south from Area 2, and 18.1 cfs towards the property to the north from Area 3.

The proposed site consists of 3 drainage areas: Area A – draining to Arden Drive, Area B – draining to Storm Drain System 1, and Area C – draining to Storm Drain System 2. An additional offsite drainage area, Area D, consists of the existing Valley Circle to the east. Area D has been included to determine the existing runoff developed in Valley Circle contributing to the 24 inch public storm drain within Valley Circle.

The George G. Boghossian & Associates Inc. study determined that a portion the proposed Wal-Mart site would be allowed to drain to Arden Drive at a cumulative peak flow rate of 6.30 cfs. The grading concept for the proposed Wal-Mart will utilize the allowed drainage to Arden by directing storm water run-off from an area of 1.57 acres along the site's west property line (referred to as Area A on the Post Construction Hydrology Map in Appendix A) to Arden Drive at a peak flow rate of 5.16 cfs. The remaining on-site run-off will be directed to one of two storm drain systems, System 1 and System 2. Both private storm drain systems will connect to an existing 24 inch storm drain within Valley circle to the east. System 1 will connect to Lateral 1, which is an 18 inch lateral located southeast of the site. System 2 will connect to lateral 2, which is an 18 lateral located east of the site.

Storm Drain System 1 will collect storm water run-off from Subareas B1 thru B13 via bioretention planters, pervious concrete under-drains, and curb opening catch basins that eventually drain to Lateral 1 near the southeast corner of the site. Subareas B1 thru B12

will firstly convey run-off to the 62,000 cf Underground Detention Basin 1 located under the southern portion of the parking lot in front of the Wal-Mart building. Out flow from Detention System 1 will be conveyed at a repressed rate along the southern portion of the site where it will combine with run-off from subarea B13 before leaving the site through Lateral 1 at a peak flow rate of 4.4 cfs.

Storm Drain System 2 will collect storm water run-off from Subareas C1 thru C6 via Filterra bioretention filtration systems, pervious concrete under-drains, and curb opening catch basins that drain to Lateral 2 located behind the proposed Wal-Mart building on the east side of the site. Subareas C1 thru C4 will convey run-off to the 14,000 cf Underground Detention Basin 2 located under the north drive isle. Out flow from Detention System 2 will be conveyed at a repressed rate along the northern portion of the site where it will combine with run-off from subareas C5 and C6 before leaving the site through Lateral 2 at a peak flow rate of 3.8 cfs.

Both underground detention basins will be constructed of molded polypropylene chambers resting on and surrounded by crushed angular stone. To prevent soil infiltration, a thermoplastic liner sandwiched between layers of non-woven geotextile will be placed under the crushed stone bed. These types of underground detention chambers are produced by several manufactures and are successful commonplace solutions for current storm water management requirements.

Using the Los Angeles T_C Calculator, Tait & Associates has determined that the existing 0.99 acres of Valley Circle tributary to the 24 inch storm drain (referred to as Subarea D on the Post Construction Hydrology Map in Appendix A) will develop a peak storm water run-off of 2.78 cfs.

As mentioned above, the 24 inch storm drain along Valley Circle has capacity for 20 cfs. Based on the study by C&V Consulting, Inc., the maintenance facility development will contribute 8 cfs to the 24 inch storm drain. Per calculations shown in this report, Valley Circle's contributory area to the 24 inch storm drain has a runoff of 2.78 cfs. Therefore, the 24 inch storm drain has capacity for 9.22 cfs contribution from the Wal-Mart site. The total peak runoff to the 24 inch Valley Circle storm drain from the project site is 8.2 cfs; thus the existing 24 inch storm drain is adequate for the proposed improvements.

Summary Table of 50-yr Storm Site Runoff

	Existing (cfs)	Proposed (cfs)	Allowed (cfs)
Runoff to Arden Drive	7.1	5.16	6.30
Runoff to Valley Circle Storm Drain	39.5	8.20	9.22
Total:	46.6	13.36	15.52

Not included in peak flow rate calculations is the effect of the bioretention planters, pervious pavement sections, and Filterra bioretention filtration systems. These Low Impact Development elements will increase time of concentrations and decrease the peak flow rates of runoff leaving the site.

Based on the results of this study, the proposed development of Wal-Mart will not have adverse downstream effects. This hydrology report has analyzed the effects of a 24-hr 50 year storm event on the proposed development project. The following sections contain all the pertinent calculations that this summary was based on.

SECTION III
REFERENCES

1. George G. Boghossian Hydrology Study Excerpts, 2008

2. C&V Consulting, Inc. Hydrology Study Excerpts, 2010

CONCEPTUAL HYDROLOGY STUDY
&
CONCEPTUAL GRADING PLAN

FOR

4000 ARDEN DRIVE
(STORM DRAIN IMPROVEMENT)
CITY OF EL MONTE

Prepared For

Xebec Realty Partners

Prepared Under the Supervision of

George G. Boghossian, P.E.

George G. Boghossian & Associates, Inc.

RCE 34361

Exp. 9/30/2009

GEORGE G. BOGHOSSIAN & ASSOC. INC.

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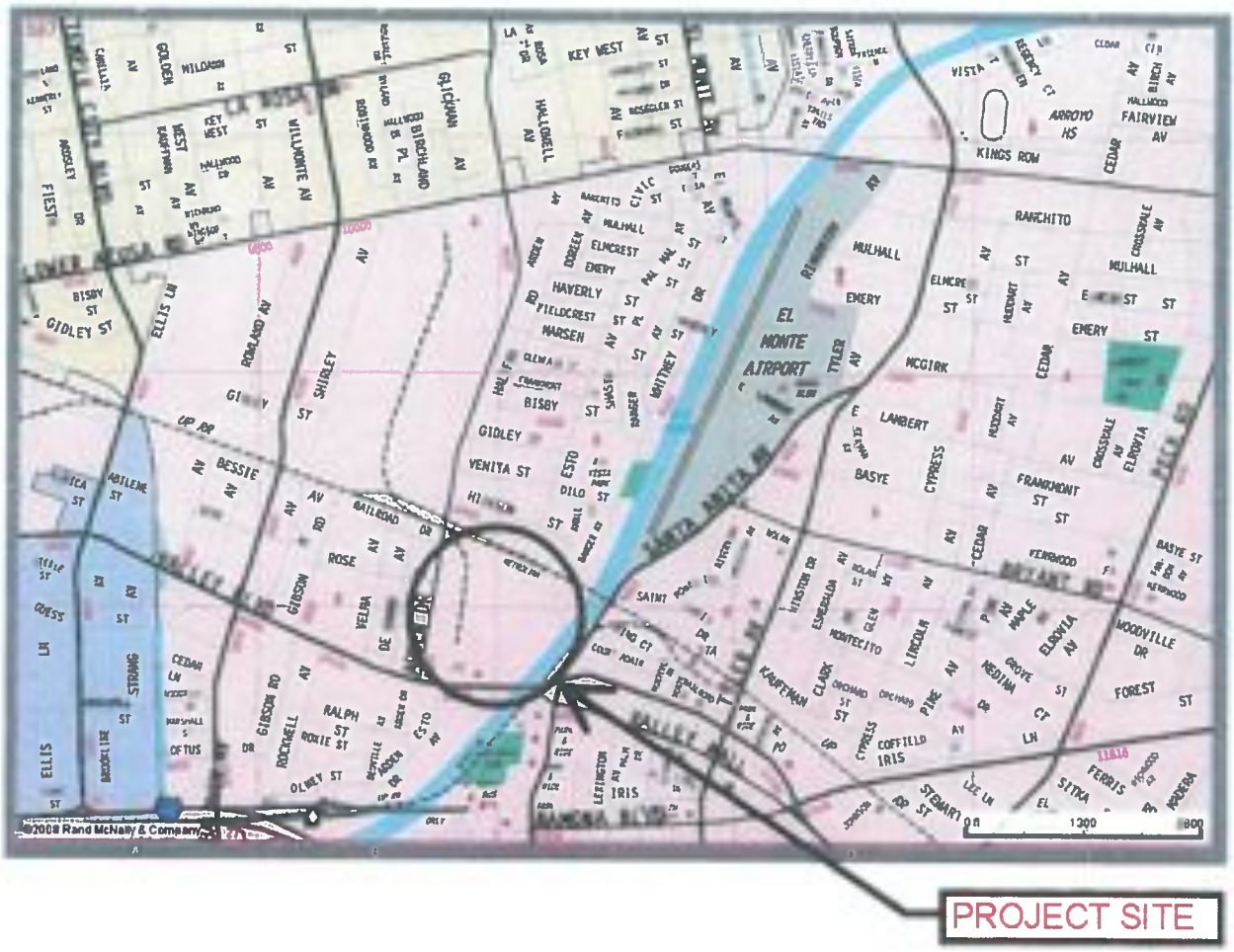
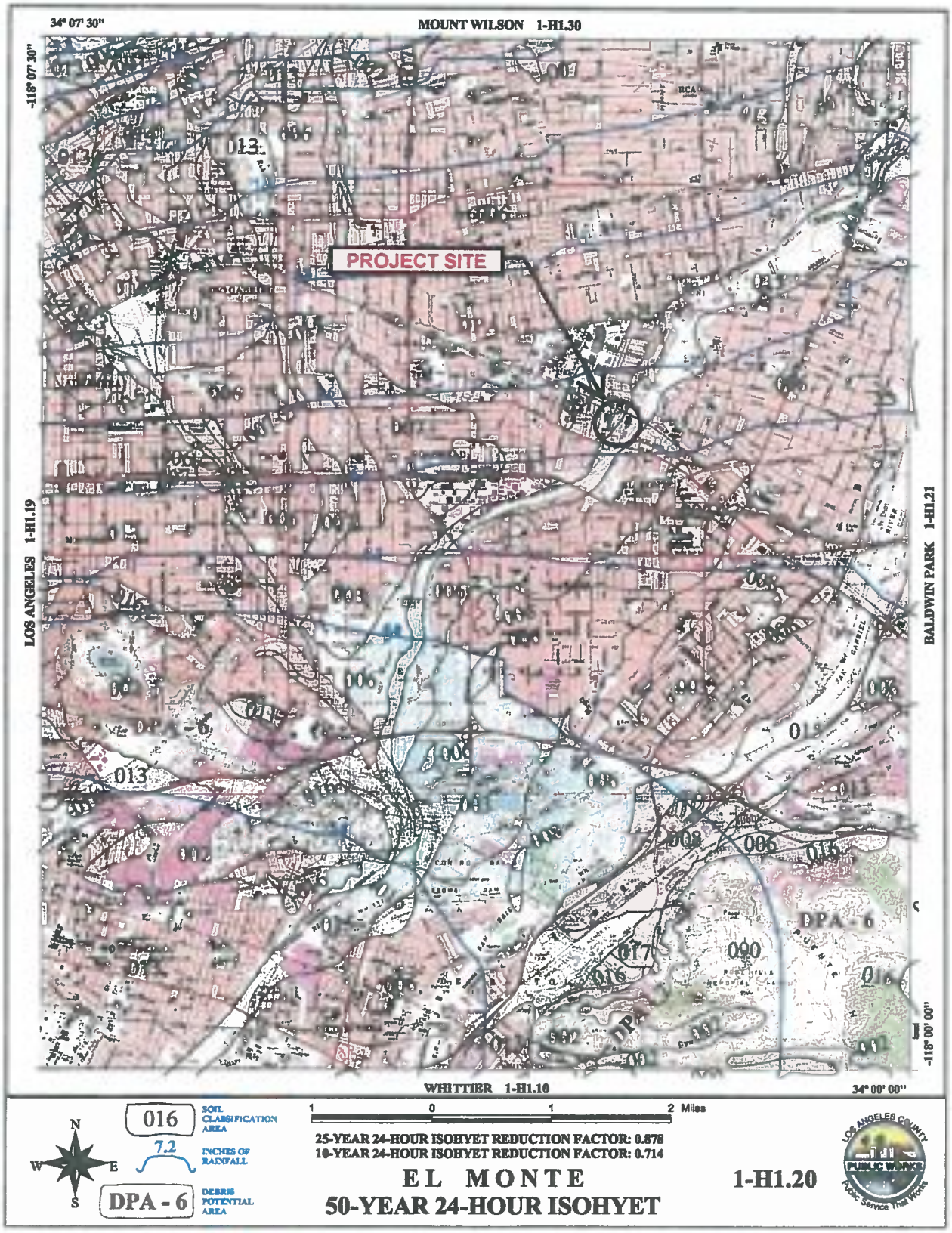


Project Address:

4000 Arden Drive,
El Monte, CA 91731
APN 8575-024-008

Thomas Guide: Page 597, B-6


34° 07' 30"
MOUNT WILSON 1-H1.30
-118° 07' 30"
PROJECT SITE
LOS ANGELES 1-H1.19
BALDWIN PARK 1-H1.21
-118° 00' 00"
WHITTIER 1-H1.10
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25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714
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50-YEAR 24-HOUR ISOHYET
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LOS ANGELES COUNTY
PUBLIC WORKS

OBJECTIVE

This study is prepared to review the existing drainage conditions of the tributary area of which the 4000 Arden Drive and Titan properties are a part of and provide a conceptual grading plan and conceptual hydrology based on exploring two Alternatives for mitigating storm water runoff from the 4000 Arden Drive site along with cost estimates for each Alternative.

Both alternatives are based on the assumption that the Pacific Place Expansion (PPE) Realignment project is constructed.

Alternative No. 1 involves on-site surface detention and utilizing the new Pacific Place Expansion (PPE) 48 Inch Diameter Storm Drain.

Alternative No. 2 involves utilizing the new realigned Pacific Place Expansion 48 Inch Diameter Storm Drain and constructing a new storm drain lateral which will outlet into Upper Rio Hondo Channel (minimal or no on-site surface detention).

BASIS OF STUDY

1) Allowable connection discharge flow based on Los Angeles County Department of Public Works As-Built U.S. Army Corps of Engineers hydrologic data and design calculations, dated November 1956.
2) Concrete Roughness Coefficient N=0.014.
3) CMP roughness coefficient N=0.030.
4) Hydraulic analysis is based on U. S. Army Corps of Engineers' Upper Rio Hondo Channel Hydraulic Calculation, dated 1956.
5) Hydrology study is based on Los Angeles County Department of Public Works Hydrology Manual, January 2006 edition.

REFERENCES

- County of Los Angeles Department of Public Works Hydraulic Design Manual, 1982.
- WSPG Storm Plus, Storm Drain Hydraulic Analysis Software, LACFCD.
- County of Los Angeles U.S. Army Corps of Engineers Upper Rio Hondo Channel As-Built Drawings, Hydraulic Calculations and Hydrologic Data.
- Hydrology & Hydraulic Report for Pacific Place Expansion prepared for Titan Group by George G. Boghossian & Associates, Inc., February 2008.

HYDROLOGY

INTRODUCTION

George G. Boghossian & Associates, Inc. is under contract with Xebec Realty Partners, LLC to provide a conceptual hydrology and grading plan for storm water mitigation for 4000 Arden Drive project site (see Project Location Map) which is located within the City of El Monte in Los Angeles County. The following study has been prepared as a part of these services.

The project has been initiated by Xebec Realty Partners, LLC to solve flooding problems within the project site (approximately 200 feet North of Valley Blvd). The flooding causes pedestrian and vehicular inconveniences within the commercial/industrial complex and may contribute to damages to real property.

DESCRIPTION OF WATERSHED (*Existing Conditions*)

See Attachment B (U.S. Corps of Engineers Upper Rio Hondo Channel As-Built Drawings) & Attachment C (Existing On-Site Drainage System Documents & References, County Assessor Maps)
The project watershed is approximately 37 acres, consisting of 100 percent commercial/industrial development of which approximately 27 acres are within the 4000 Arden Drive site.

This area is served by existing 48 inch diameter CMP lateral which outlets into Los Angeles County Upper Rio Hondo Channel at Station 727+00. Portions of the existing pipe are eroded and do not have adequate capacity to accept all the tributary flows and do not provide adequate protection.

The above mentioned existing storm drain is aligned within parcels (in order of travel) 10423 Valley Blvd., "Lot 35" (APN 8575-024-035), 10501 Valley Blvd., 4000 Arden Dr., 10525 Valley Blvd. and outlets into Los Angeles County's existing U.S. Army Corps of Engineers Upper Rio Hondo Channel existing 48 inch diameter CMP. The storm drain begins from an inlet located within 10423 Valley Blvd. and extends Southeasterly, it intercepts flow from a portion of

4000 Arden Dr., then continues Southeasterly through parcels "Lot 35" (APN 8575-024-035) and 10501 Valley Blvd. and subsequently (near the Northeast corner of 10501 Valley Blvd.) extends Northeasterly into 4000 Arden Dr. and then Southeasterly through 10525 Valley Blvd. to reach the outlet noted above into Upper Rio Hondo Channel. The majority (approximately 1250 linear feet) of the above described storm drain is a 24 inch CMP and a 48 inch CM as it near the outlet into Rio Hondo Channel.

Upon a field visual inspection and collected information (historical and current) available for the project site and adjacent area to the South, it was noted that a detention basin located near the South-East corner of 4000 Arden Dr. has been filled in without consideration of its purpose and impact on the surrounding properties and the above mentioned 24-48 inch CMP storm drain will not solve the flooding issues in the area, as it was originally designed to function in conjunction with the detention basin (4000 Arden Dr.), reducing peak flow rates and preventing a back up of the system leading to Upper Rio Hondo Channel.

The majority of the drainage areas have mild slopes and distinguishable crown lines, curbs and gutters. These characteristics contain flows within the commercial surface, which are then conveyed to existing catch basins.

The County's Drainage Plan was used to determine the hydrologic contributory drainage area for the proposed drainage system. A visual survey was also performed to verify the drainage areas. Drainage boundaries were then modified accordingly to accurately represent existing conditions and the study watershed boundaries were limited to approximately 37 acres.

DESCRIPTION OF WATERSHED (*Proposed Conditions*)

The total tributary area considered in this study is approximately 37 acres, but the proposed conceptual grading is limited to the 4000 Arden Drive project area and covers approximately 27 acres. All 37 acres are consisting of 100 percent commercial/industrial development.

The majority of the proposed redevelopment drainage areas within 4000 Arden Drive have mild slopes and distinguishable crown lines, curbs and gutters. These characteristics contain flows within the commercial surface, which are then conveyed into proposed drainage systems which will consist of storm drain conduits, detention basin and surface detention systems.

Hydrologic data provided by the County of Los Angeles Department of Public Works Design Division Hydraulic Analysis Unit was used to determine maximum allowable discharge flow and calculate storage volume required to detain excess flow until peak flows have subsided. Drainage boundaries were modified accordingly to accurately represent post-development conditions. Storm drain watershed boundaries were limited as follows: 3.385 acres to Arden Drive (generated runoff to be conveyed into existing 24 inch RCP Valley Blvd. storm drain systems, which ultimately outlets into Rio Hondo Channel – see Attachment B) and 23.3 acres to existing 24-48 inch CMP (Rio Hondo Channel lateral).

In addition, the flow currently originating (existing conditions) from 4000 Arden Dr. to the existing storm drain described above in "Introduction" section, should be eliminated and directed to the proposed new drainage system for the project site. See attached post-development Hydrology Map.

METHODOLOGY

1) Existing Los Angeles County Department of Public Works U.S. Army Corps of Engineers Upper Rio Hondo Channel as-built drainage system hydrologic data has been utilized to determine the proposed and existing storm drain hydrologic data and the maximum allowed connection Q limited to discharge into Upper Rio Hondo Channel, as provided by Los Angeles County Department of Public Works Design Division Hydraulic Analysis Unit – Mr. George Aintablian (Information Request Summary, dated 01/27/2008).

   The maximum allowable discharge flow for the existing watershed boundary is 100 cfs.
2) Prepared a hydrology map of the watershed to determine drainage acreage, drainage boundaries and flow rates, based on Loa Angeles County Hydrology Manual, January 2006 edition.
3) Perform hydrology calculations to determine peak flow of the collection point for existing conditions within the study area.
4) Perform hydrology calculations to determine peak flow of the collection point for the proposed re-development project site.

HYDRAULICS

INTRODUCTION

The analysis of the existing system and the hydraulic design of the new facilities are done in accordance with the Los Angeles County Department of Public Works guidelines and standards.

HYDRAULIC ANALYSIS

BASIS OF STUDY

See Attachment A – Conceptual Hydrology & Conceptual Grading Plan

Analysis was based on the assumption that Pacific Place Expansion project 48" Strom Drain Realignment and 24" CMP lining are constructed.

The proposed Pacific Place Expansion (PPE) Storm Drain Realignment design will convey a maximum flow of 48 cfs. The total discharge originating from subareas W, X & Y into the proposed PPE Storm Drain is 28 cfs. The discharge flow rate from subareas A-2, B-1, B-2, B-3, B-4, C, D & E must be limited to a maximum of 20 cfs in order to avoid flooding of the Southerly properties. The discharge from subareas A-1.1, A-1.2, A-1.3 and A-1.4 shall be directed to Arden Drive via curb drains, from where flow will be conveyed to Valley Blvd. existing 24" RCP storm drain which ultimately outlets into Rio Hondo Channel.

Any excess flow originating from subareas A-2, B-1, B-2, B-3, B-4, C, D & E must be detained on-site and within each individual subarea until after peak flows have subsided.

CONCLUSION & RECOMMENDATIONS

Conclusion:

See Attachment A – Conceptual Hydrology & Conceptual Grading Plan

With the current existing configuration and drainage system it is inevitable that flooding will occur within the 4000 Arden Drive project site and the adjacent Southerly parcels along Valley Blvd., and the elimination of the original detention basin and the poor condition of the current storm drain lateral only increase such flooding risks.

Even with the construction of the PPE Storm Drain Realignment Project, a detention basin or equivalent must be introduced back into the design to allow for conveyance of higher flows as it was originally intended to do.

It is recommended that each individual area be graded in the manner shown on the conceptual grading plan (Attachment A) with the implementation of surface detention areas. The drainage system pipe sizes within the site must be, at a minimum, as noted on the conceptual plans. Both the surface storage areas and the on-site drainage system are imperative to achieving adequate protection for the adjacent Southerly parcels and in effect replacing the function of the original detention basin. Subarea A-1 should be graded as shown which will convey flow to Arden Drive and subsequently accepted by storm drain inlet on Valley Blvd which ultimately outlets into Upper Rio Hondo Channel.

With the above mentioned configuration, flow from 4000 Arden Drive Project Site into the PPE Storm Drain Realignment must be limited to 20 cfs. The proposed new development at 4000 Arden Drive has a total combined Q_{50} of 75 cfs, of which 55 cfs must be detained on-site until peak flows have subsided. Since the soil conditions do not allow for infiltration or excavation for sub-surface detention structures, loading dock areas, parking lot areas and a shallow concrete detention swale (within Public Works Yard) shall be utilized to detain the excess flow. Surface detention may cause pedestrian and vehicular inconveniences as the depth of the water detained can reach up to 6".

Recommendations:

The proposed storm water mitigation concept has an engineer estimated cost of $600,000 (See Table No. 1 for Engineer's Cost Estimate) and it does not offer total relief from potential flooding. It does control the pooling of storm water and can prevent damage to the structures on the site, but it does not offer relief for pedestrian and vehicular inconveniences as it utilizes surface detention within the parking lot and loading dock areas. As proposed, the grading shown on the conceptual plan (See Attachment A), is designed to decelerate and control the storm water runoff flow. In addition, the proposed finished floor elevation for the future Pacific Place Expansion (10525 Valley Blvd.) building pad must be at a minimum of +281.00. Each proposed feature contributes to the total design functioning in the manner intended – to provide adequate protection for the site in the event of a 50-year design storm.

TABLES

TABLE NO.1 ***Engineer's Cost Estimate for (On-Site Detention Only)***

Item No.	Approximate Quantity	Unit	Work Items	Unit Price ($)	Total Amount
1	324	L.F.	42" ø HDPE Pipe	144.00	$46,656.00
2	991	L.F.	36" ø HDPE Pipe	126.00	$124,866.00
3	1,930	L.F.	24" ø HDPE Pipe	96.00	$185,280.00
4	2,035	L.F.	18" ø HDPE Pipe	72.00	$146,520.00
5	364	L.F.	12" ø HDPE Pipe	48.00	$17,472.00
6	30	EACH	24"x24" Drain Inlets	960.00	$28,800.00
7	125	C.Y.	12'x2.5' Concrete Ditch (Detention Basin)	400.00	$50,000.00
				Total	$599,594.00

Note: This estimate does not include any additional improvements that may be needed in order to achieve the proposed drainage system configuration. This estimate is only a guide and for comparison purposes and based on the conceptual hydrology and grading study for 4000 Arden Drive, provided by George G. Boghossian & Associates, Inc. and only valid in conjunction with the study. It is not to be used for contractor bids and may not represent actual cost of construction. George G. Boghossian & Associates, Inc. is not responsible for any errors/omissions within the above estimate.

TABLES

TABLE NO.1 ***Engineer's Cost Estimate for Alternative No. 1 (On-Site Detention Only)***

Item No.	Approximate Quantity	Unit	Work Items	Unit Price ($)	Total Amount
1	324	L.F.	42" ø HDPE Pipe	144.00	$46,656.00
2	991	L.F.	36" ø HDPE Pipe	126.00	$124,866.00
3	1,930	L.F.	24" ø HDPE Pipe	96.00	$185,280.00
4	2,035	L.F.	18" ø HDPE Pipe	72.00	$146,520.00
5	364	L.F.	12" ø HDPE Pipe	48.00	$17,472.00
6	30	EACH	24"x24" Drain Inlets	960.00	$28,800.00
7	125	C.Y.	12'x2.5' Concrete Ditch (Detention Basin)	400.00	$50,000.00
				Total	$599,594.00

TABLE NO.2 ***Engineer's Cost Estimate for Alternative No. 2 (Add 36" ø Relief Lateral)***

Item No.	Approximate Quantity	Unit	Work Items	Unit Price ($)	Total Amount
1	324	L.F.	42" ø HDPE Pipe	144.00	$46,656.00
2	991	L.F.	36" ø HDPE Pipe	126.00	$124,866.00
3	394	L.F.	36" ø RCP Pipe	275.00	$108,350.00
4	524	L.F.	30" ø HDPE Pipe	108.00	$56,592.00
5	2,533	L.F.	24" ø HDPE Pipe	96.00	$243,168.00
6	872	L.F.	18" ø HDPE Pipe	72.00	$62,784.00
7	436	L.F.	12" ø HDPE Pipe	48.00	$20,928.00
8	30	EACH	24"x24" Drain Inlets	960.00	$28,800.00
9	1	L.S.	Concrete Outlet Structure	50,000.00	$50,000.00
				Total	$742,144.00

Note: These estimates do not include any additional improvements that may be needed in order to achieve the proposed drainage system configuration. These estimates are only a guide and for comparison purposes and are based on the conceptual hydrology and grading study for 4000 Arden Drive, provided by George G. Boghossian & Associates, Inc. and are only valid in conjunction with the study. They are not to be used for contractor bids and may not represent actual cost of construction. George G. Boghossian & Associates, Inc. is not responsible for any errors/omissions within the above estimates.

ATTACHMENT A

CONCEPTUAL HYDROLOGY MAP
&
GRADING PLAN, HYDROLOGIC DATA

CONCEPTUAL HYDROLOGY AND GRADING MAP

PLAN
SCALE: 1" = 50'

LEGEND:

C
A=0.43 acre
Q_{100}=1.35 cfs

D
A=0.83 acre
Q_{100}=1.93 cfs

E
A=0.97 acre
Q_{100}=2.48 cfs

A-1.4
A=0.76 acre
Q_{100}=2.61 cfs

A-1.3
A=0.765 acre
Q_{100}=2.75 cfs

A-2.2
A=2.73 acre
Q_{100}=8.26 cfs

A-1.2
A=0.98 acre
Q_{100}=3.16 cfs

A-2.1
A=3.14 acre
Q_{100}=8.56 cfs

A-1.1
A=0.96 acre
Q_{100}=3.12 cfs

B-3.3
A=2.22 acre
Q_{100}=6.49 cfs

B-3.2
A=2.35 acre
Q_{100}=7.64 cfs

B-3.1
A=1.25 acre
Q_{100}=4.43 cfs

B-2.10
A=0.95acre
Q_{100}=3.4 cfs

B-1.1
A=1.40 acre
Q_{100}= 4.96 cfs

B-2.1
A=0.52 acre
Q_{100}= 1.84 cfs

B-1.4
A=1.67 acre
Q_{100}= 4.22 cfs

B-2.9
A=0.68 acre
Q_{100}= 2.41 cfs

B-2.2
A=0.61 acre
Q_{100}= 2.16 cfs

B-1.2
A=0.86 acre
Q_{100}= 3.05 cfs

B-2.7
A=0.59 acre
Q_{100}= 2.09 cfs

B-2.8
A=0.39 acre
Q_{100}=1.38 cfs

B-2.6
A=0.26 acre
Q_{100}= 0.89 cfs

B-2.5
A=0.25 acre
Q_{100}= 0.89 cfs

B-1.3
A=0.76 acre
Q_{100}= 2.69 cfs

B-2.4
A=0.29 acre
Q_{100}=1.0 cfs

Z
A =1.53 acre
Q_{100}= 5.43 cfs

B-1.5
A=0.72 acre
Q_{100}= 2.55 cfs

B-2.3
A=0.37 acre
Q_{100}= 1.31 cfs

X
A =1.84 acre
Q_{100}= 6.52 cfs

Y
A =2.92 acre
Q_{100}= 8.83 cfs

W
A =3.50 acre
Q_{100}= 10.58 cfs

SOUTHERN PACIFIC RAILROAD

UNION PACIFIC RAILROAD

FOUNTAIN PLACE

VALLEY BOULEVARD

CONCEPTUAL HYDROLOGY AND GRADING MAP

GEORGE G. BOOKSIN & ASSOC., INC.
CIVIL ENGINEERS AND PLANNING SURVEYORS
PLANS PREPARED UNDER THE DIRECTION OF GEORGE G. BOOKSIN

DRAWN BY:	T.D.
REVISED:	9-23-08
SCALE:	1:50
DATE:	6-13-08
JOB NO.	08-019
SHEET	1 OF 1

HYDROLOGY & HYDRAULICS STUDY
Public Works Yard
4000 ARDEN DRIVE
In the City of El Monte, California

Prepared For:

Calvert Architects
3801 Long Beach Blvd
Long Beach, CA 90807
Contact: Tom Calvert
Tel: (562)-595-7032

Prepared By:

C&V Consulting, Inc.
18 Technology, Suite 154
Irvine, California 92618
(949) 769-6600

October, 2010

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Acknowledgement and Signature Page.....ii

I. Introduction.....1
II. Methodology.....1
III. Design Assumptions.....2
IV. Conclusion.....3
V. References.....4

APPENDICES

A. Supporting Hydrology Documents
B. Sub-Area Runoff Summary
C. Retention Calculations
D. Portion of Approved Hydrology Report Dated 9/19/08
E. SUSMP Calculations
F. Catch Basin Sizing Calculations

List of Exhibits:

1. Prop. Hydrology Map
2. Proposed Grading Plan

Hydrology Study and Hydraulic Analysis
For
4000 Arden Drive
City of El Monte

ACKNOWLEDGEMENT AND SIGNATURE PAGE

This Hydrology Study prepared by C&V Consulting, Inc. under the supervision of Vincent Scarpati, P.E.

_____ _____

Vincent Scarpati R.C.E 33520 Date
C&V Consulting, Inc.

Introduction:

The project site consists of two parcels, known as Parcel 6 and Parcel 7 of TTM 71394. The project site is currently free and clear of any improvements.

The subject project will include one industrial building with loading and access areas, parking, City Yard vehicle staging areas, and minor landscape improvements. The subject site will surface flow into one of two locations. The westerly portion of the project will flow into an underwalk drain flowing into Arden Drive, the easterly portion of the project will flow into (4) proposed catch basin/area drains located throughout the project. As part of the Pacific Place Improvement plans the storm drain will be extended to the subject site. The project ridgeline was preserved in accordance to the originally approved hydrology report.

The flow ultimately flows into storm drain and flows into the Rio Hondo Channel.

Methodology / Rational:

The proposed drainage area was analyzed by utilizing the County of Los Angeles Hydrology Manual dated January 2006. Each drainage area was divided as demonstrated on the hydrology map (Exhibit 1&2). Each area was analyzed for acreage, impervious cover, and time of concentration according to the Rational Method. The flows, expressed in cubic feet per second (cfs), were totaled at outfall locations.

As part of the SUSMP, multiple Filter devices are proposed to treat pollutants of concern. Excessive storm flows will bypass the underwalk drain units and flow into Arden Drive

In accordance to the existing hydrology report, the subject site areas have been designed and analyzed to a maximum out-flow of 8 cfs. The project site as designed is calculated to discharge 23.70 cfs, therefore the difference will be retained on site via sub-surface storage.

Design Assumptions:

1. The onsite drainage area was analyzed for a 50-year storm event using Rational Method Analysis per Count of Los Angeles Standards
2. No additional infiltration was utilized for the projects area specific soils type.
3. The undeveloped portion of the site was assumed to have the same amount of impervious area as the rest of the project.
4. The impervious area has been calculated to be 88.5% for the subject project.
5. All flows are based on the complete future development of land and roads.
6. The Hydrology Map attached to the back of this study is made part of the study.
7. Any pre-existing or post-development off-project flows directed toward the subject site has not been included.
8. Tc and other calculation were obtained by utilizing the Los Angeles County Tc calculator.

Note: Additional Calculation Assumptions Have Been Noted Throughout Report

Conclusions:

The results from this hydrology and hydraulic analysis demonstrate the following:

- The site is designed to manage runoff from a 50-year storm.
- The subject site safely transfers storm water on site into Arden Drive and the future City storm drain system.
- The subject site discharges an allowable 8.0 CFS as required.
- The subject site accommodates the required storage requirement.

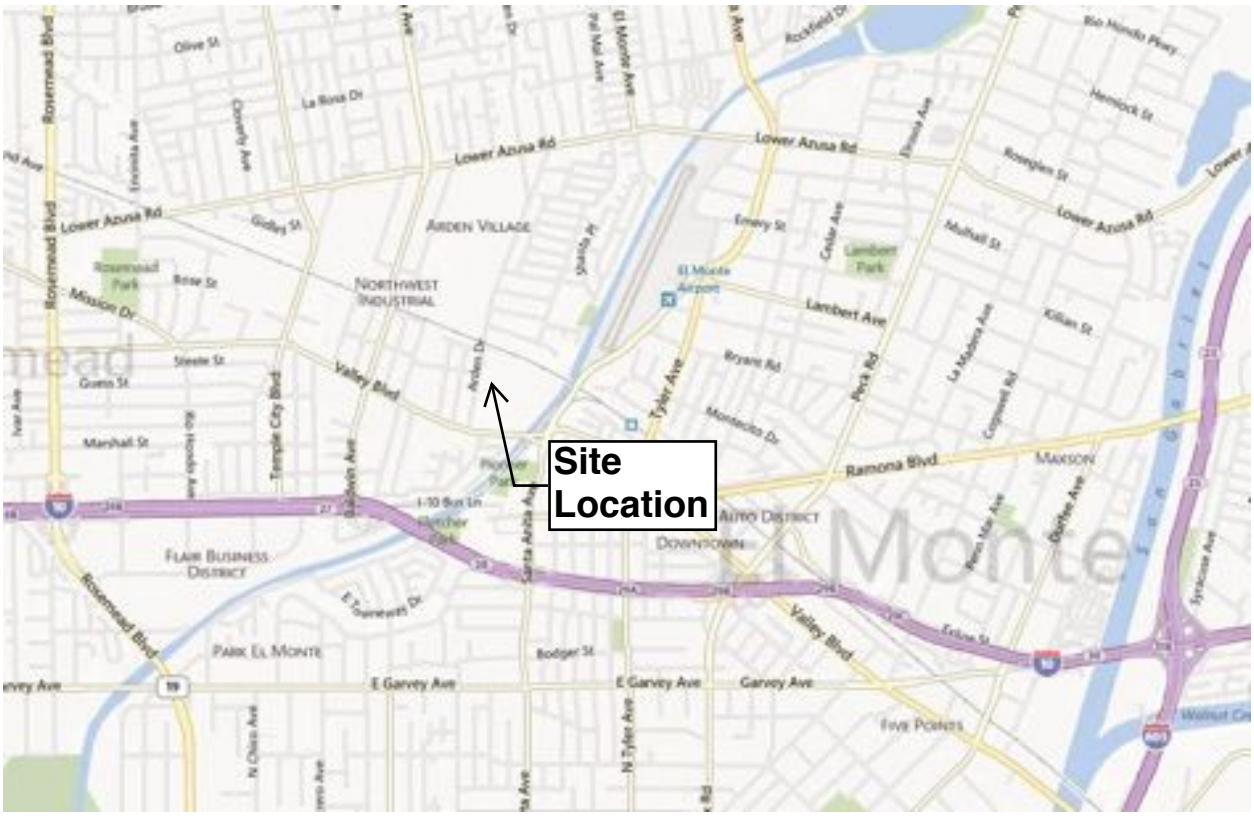
REFERENCES

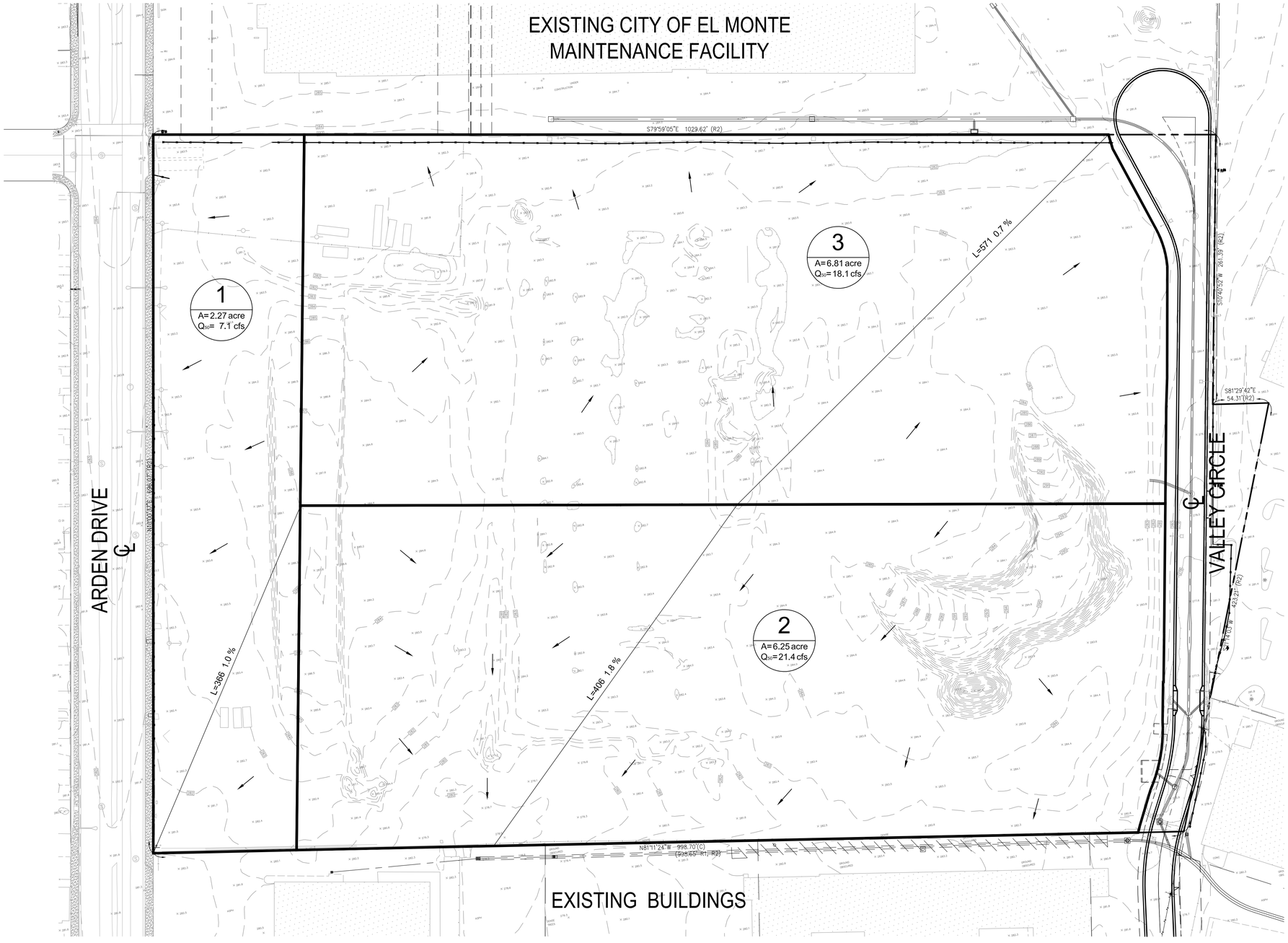
1. County of Los Angeles Hydrology Manual, dated January, 2006.
2. Water Surface and Pressure Gradient (WSPG) Hydraulic Analysis System Software, Los Angeles County Department of Public Works Program No. F0515P, April 1979.
3. Advanced Engineering Software, HELE1 Hydraulic Elements I for Street Flooding and Catch Basin Design, 1996 version.

Appendix A
Supporting Maps

Vicinity Map

El Monte Wal-Mart Supercenter No. 5970-01
4000 Arden Drive
El Monte, California





LEGEND

- PROPERTY LINE
- 284 EXISTING CONTOUR
- (XXX.XX) EXISTING ELEVATION
- EXISTING DRAINAGE AREA BOUNDARY
- EXISTING SLOPE DIRECTION
- X / A=X.XXacre / Q_{50}=X.XXcfs — DRAINAGE AREA LABEL

NO.	DESCRIPTION REVISIONS	BY	DATE	CHK

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

TAIT
Since 1964
701 N. Parkcenter Drive
Santa Ana, CA 92705
p: 714/560/8200
f: 714/560/8211
www.tait.com
Los Angeles Sacramento Boise Dallas Denver

EXISTING HYDROLOGY MAP

WAL-MART# 5970-01
4000 ARDEN DRIVE
EL MONTE, CA 91731
WAL-MART STORES, INC.
2001 SE 10TH STREET
BENTONVILLE, AR 72716

DRAWN: RH
DATE: 9/3/2013
CHECKED: TH
DATE: 9/3/2013
REVISION #:
DATE:
JOB NO: WM12.39

HD-1
VER. 11.11
1 OF 2

Sep 04, 2013 - 3:56pm by rhaskin L:\Walmart\Projects\WM12390 - El Monte\ENG\WM12390-HD_PRE.dwg

IMPORTANT NOTICE
Section 4216/4217 of the Government Code requires a Dig Alert identification Number be issued before a Permit to Excavate will be valid For your Dig Alert ID Number Call

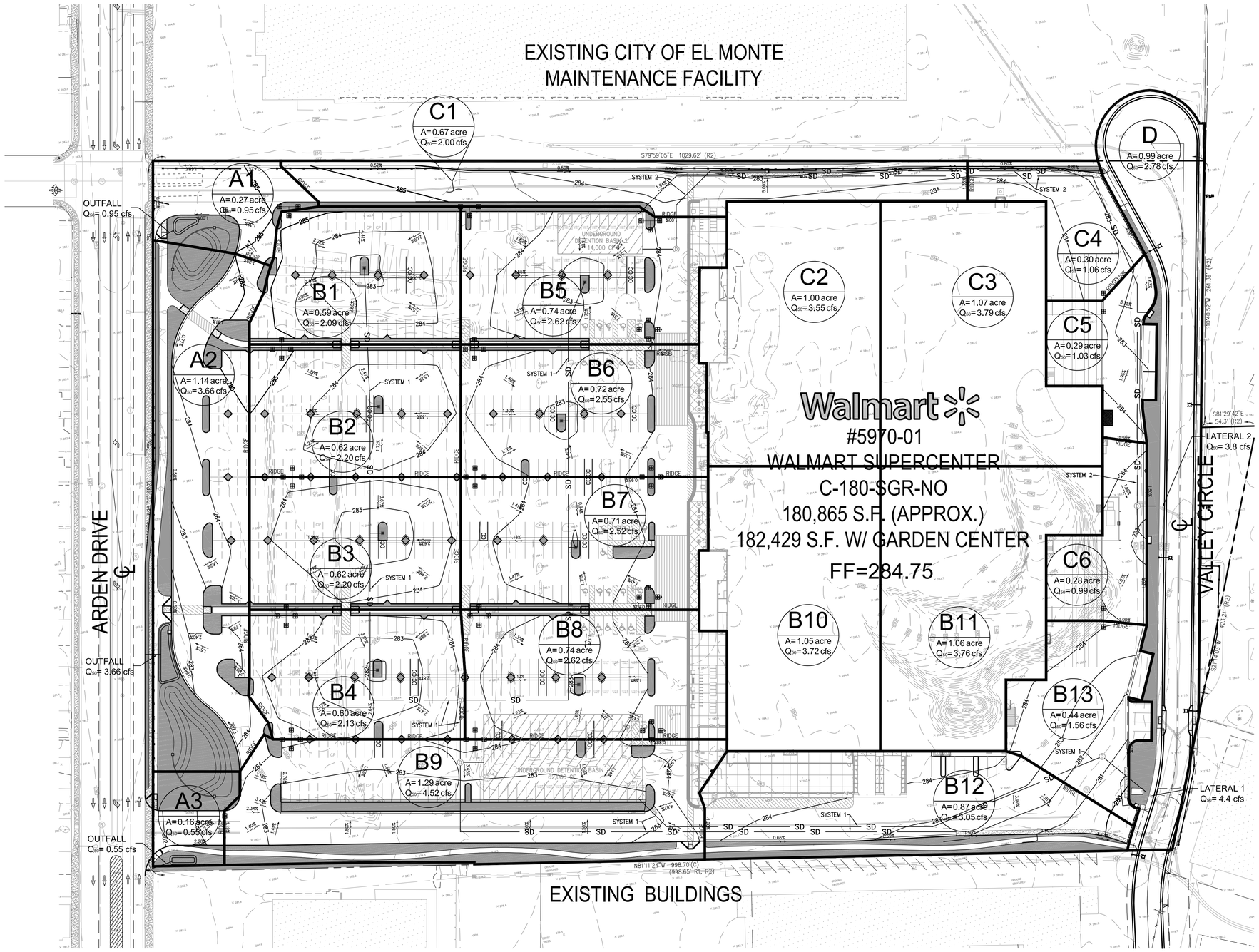
UNDERGROUND SERVICE ALERT
1-800-422-4133
For Underground Locating 2 Working Days before You Dig

UNAUTHORIZED CHANGES & USES:
THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES OF THESE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS PRIOR TO CONSTRUCTION. CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

ENGINEERS NOTE TO CONTRACTOR:
THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES, PIPES, AND/OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. TO OUR KNOWLEDGE, THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THESE PLANS. THE CONTRACTOR SHALL ASCERTAIN THE TRUE VERTICAL AND HORIZONTAL LOCATION OF THOSE UNDERGROUND UTILITIES TO BE USED AND SHALL BE RESPONSIBLE FOR ANY DAMAGE TO PUBLIC OR PRIVATE UTILITIES, SHOWN OR NOT SHOWN HEREON. IF THE CONTRACTOR ENCOUNTERS ANY DISCREPANCIES, CONFLICTS OR AREAS WHICH HE FEELS QUESTIONABLE, HE SHALL NOTIFY THE RECORD ENGINEER IMMEDIATELY PRIOR TO CONTINUING OR DEVIATING FROM THIS PLAN.

Walmart

GRAPHIC SCALE
50 0 25 50 100 200
(IN FEET)
1 inch = 50 ft.



LEGEND

- PROPERTY LINE
- 284 PROPOSED CONTOUR
- 284 EXISTING CONTOUR
- RIDGE LINE
- SD PROPOSED STORM DRAIN LINE
- FF FINISHED FLOOR
- TC TOP OF CURB
- FS FINISH SURFACE
- TG TOP OF GRATE
- HP HIGH POINT
- LP LOW POINT
- XXX.XX PROPOSED ELEVATION
- (XXX.XX) EXISTING ELEVATION
- PROPOSED STORM DRAIN MANHOLE
- PROPOSED CATCH BASIN
- PROPOSED GRATE INLET
- PROPOSED TRENCH DRAIN
- PROPOSED DETENTION BASIN
- PROPOSED LANDSCAPE
- PROPOSED PERVIOUS CONCRETE
- PROPOSED DRAINAGE AREA BOUNDARY
- X / A=X.XXacre / Q50=X.XXcfs DRAINAGE AREA LABEL

NO.	DESCRIPTION	BY	DATE	CHK
	REVISIONS			

FOR REVIEW ONLY - NOT FOR CONSTRUCTION

TAIT
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Santa Ana, CA 92705
p: 714/560/8200
www.tait.com
f: 714/560/8211
Los Angeles Sacramento Boise Dallas Denver

POST CONSTRUCTION HYDROLOGY MAP

WAL-MART# 5970-01
4400 ARDEN DRIVE
EL MONTE, CA 91731
WAL-MART STORES, INC.
2001 SE 10TH STREET
BENTONVILLE, AR 72716

DRAWN: RH
DATE: 9/3/2013
CHECKED: TH
DATE: 9/3/2013
REVISION #:
DATE:
JOB NO: WM12139A

HD-2
VER. 11.11
2 OF 2

Sep 04, 2013 - 4:07pm by rhaskin L:\Walmart\Projects\WM12390 - El Monte\ENG\WM12390-HD_POST.dwg

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1-800-422-4133
For Underground Locating 2 Working Days before You Dig

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THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES OF THESE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS PRIOR TO CONSTRUCTION. CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

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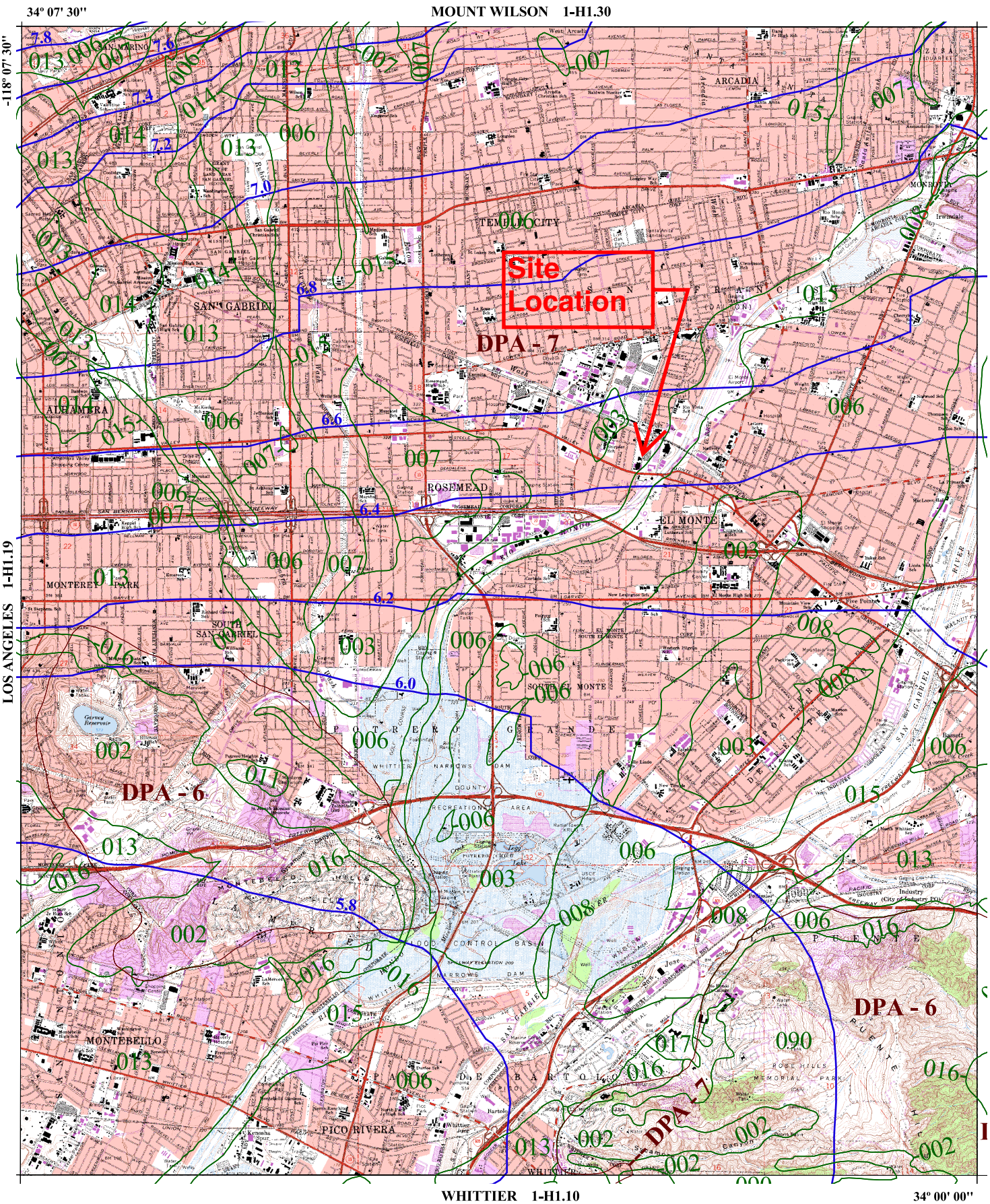
Walmart

GRAPHIC SCALE
50 0 25 50 100 200
(IN FEET)
1 inch = 50 ft.

Appendix B
Supporting Exhibits



N
W E
S

016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

1 0 1 2 Miles

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

EL MONTE
50-YEAR 24-HOUR ISOHYET

1-H1.20

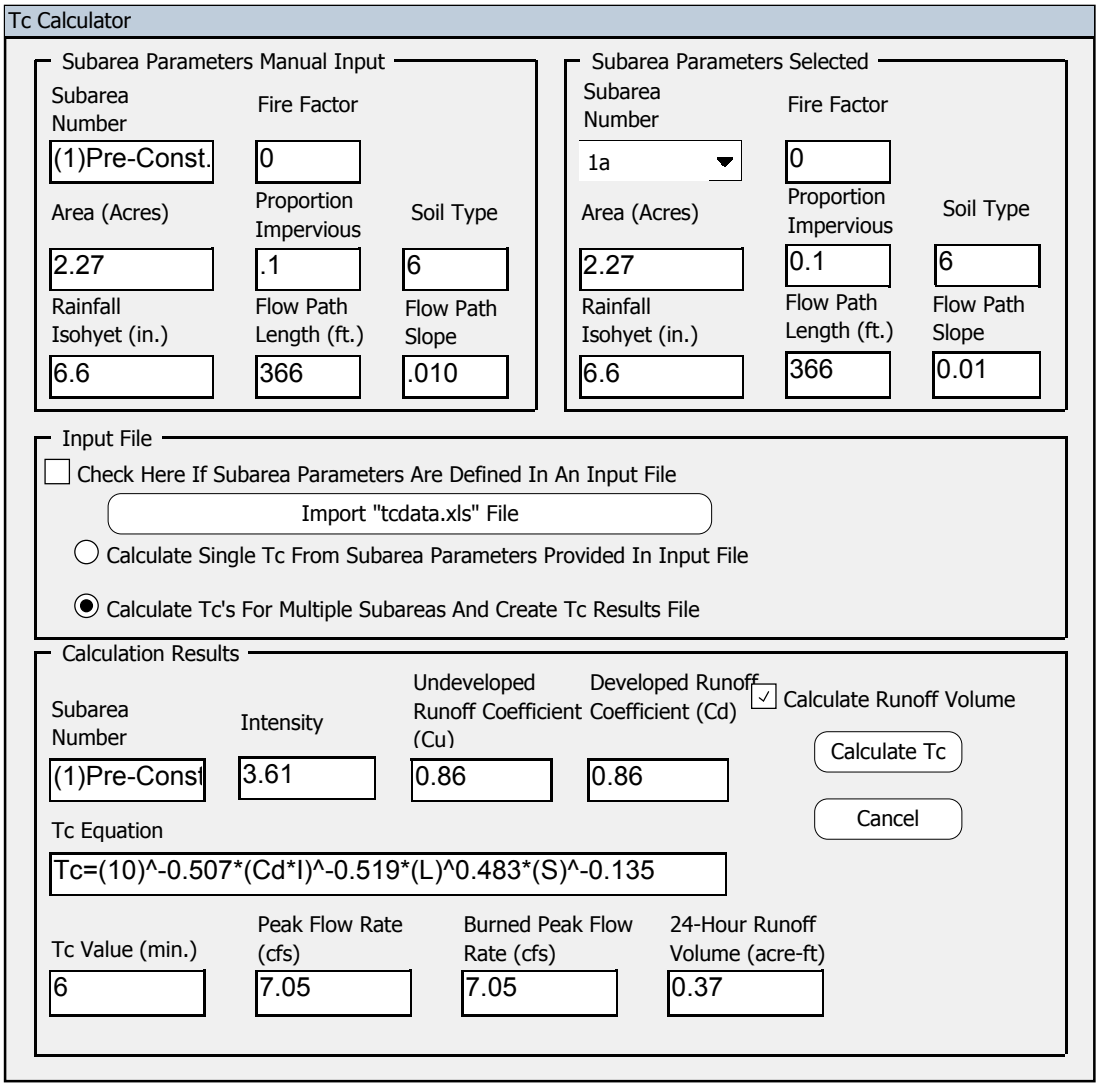
LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works

Los Angeles T_C Calculator Results

Existing Hydrology – Pre Construction

Result Summary Table

Drainage Area	Peak Flow Rate (cfs)
1	7.05
2	21.42
3	18.08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Fire Factor
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Area (Acres)
2.27
Proportion Impervious
.1
Soil Type
6
Rainfall Isohyet (in.)
6.6
Flow Path Length (ft.)
366
Flow Path Slope
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Subarea Number
1a
Fire Factor
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Area (Acres)
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Proportion Impervious
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Soil Type
6
Rainfall Isohyet (in.)
6.6
Flow Path Length (ft.)
366
Flow Path Slope
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Input File
Check Here If Subarea Parameters Are Defined In An Input File
Import "tcdata.xls" File
Calculate Single Tc From Subarea Parameters Provided In Input File
Calculate Tc's For Multiple Subareas And Create Tc Results File
Calculation Results
Subarea Number
(1)Pre-Const
Intensity
3.61
Undeveloped Runoff Coefficient (Cu)
0.86
Developed Runoff Coefficient (Cd)
0.86
Calculate Runoff Volume
Calculate Tc
Cancel
Tc Equation
Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Tc Value (min.)
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Peak Flow Rate (cfs)
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Burned Peak Flow Rate (cfs)
7.05
24-Hour Runoff Volume (acre-ft)
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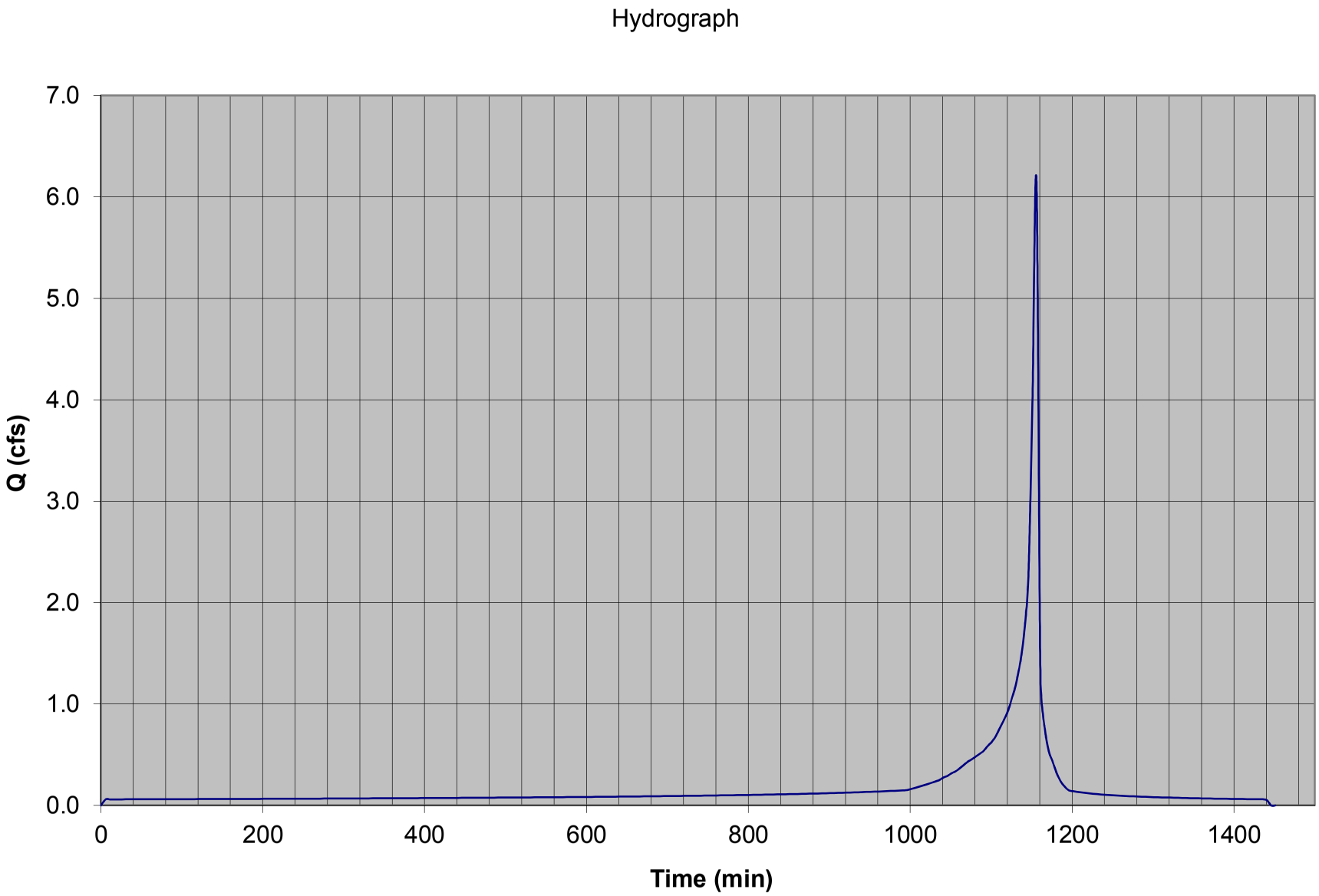
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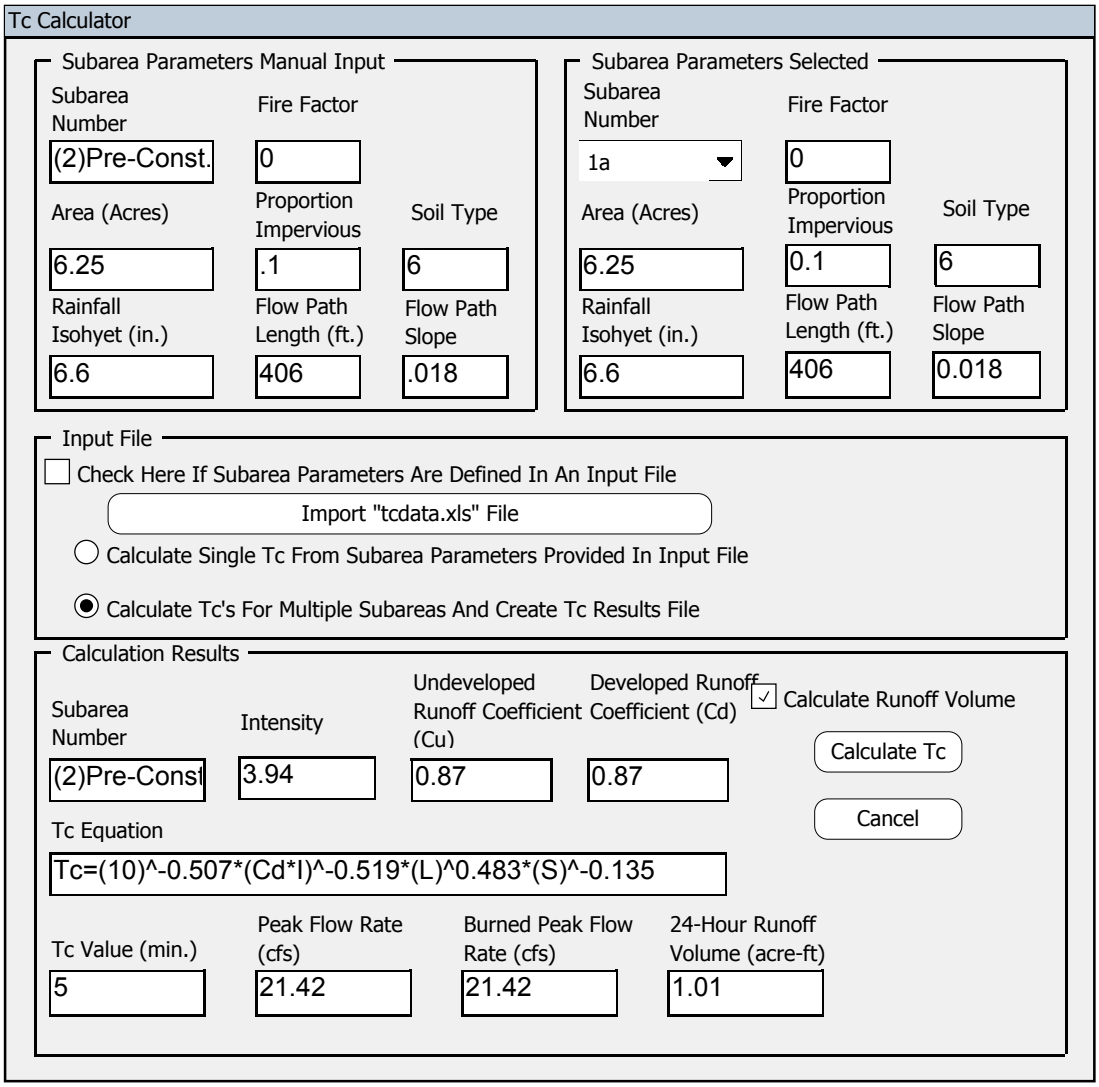
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Q (cfs)
0
200
400
600
800
1000
1200
1400
Time (min)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Area (Acres)
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Proportion Impervious
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Soil Type
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Rainfall Isohyet (in.)
6.6
Flow Path Length (ft.)
406
Flow Path Slope
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Subarea Parameters Selected
Subarea Number
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Fire Factor
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Area (Acres)
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Proportion Impervious
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Soil Type
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Rainfall Isohyet (in.)
6.6
Flow Path Length (ft.)
406
Flow Path Slope
0.018
Input File
Check Here If Subarea Parameters Are Defined In An Input File
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Calculate Single Tc From Subarea Parameters Provided In Input File
Calculate Tc's For Multiple Subareas And Create Tc Results File
Calculation Results
Subarea Number
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Intensity
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Undeveloped Runoff Coefficient (Cu)
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Developed Runoff Coefficient (Cd)
0.87
Calculate Runoff Volume
Calculate Tc
Cancel
Tc Equation
Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Tc Value (min.)
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Peak Flow Rate (cfs)
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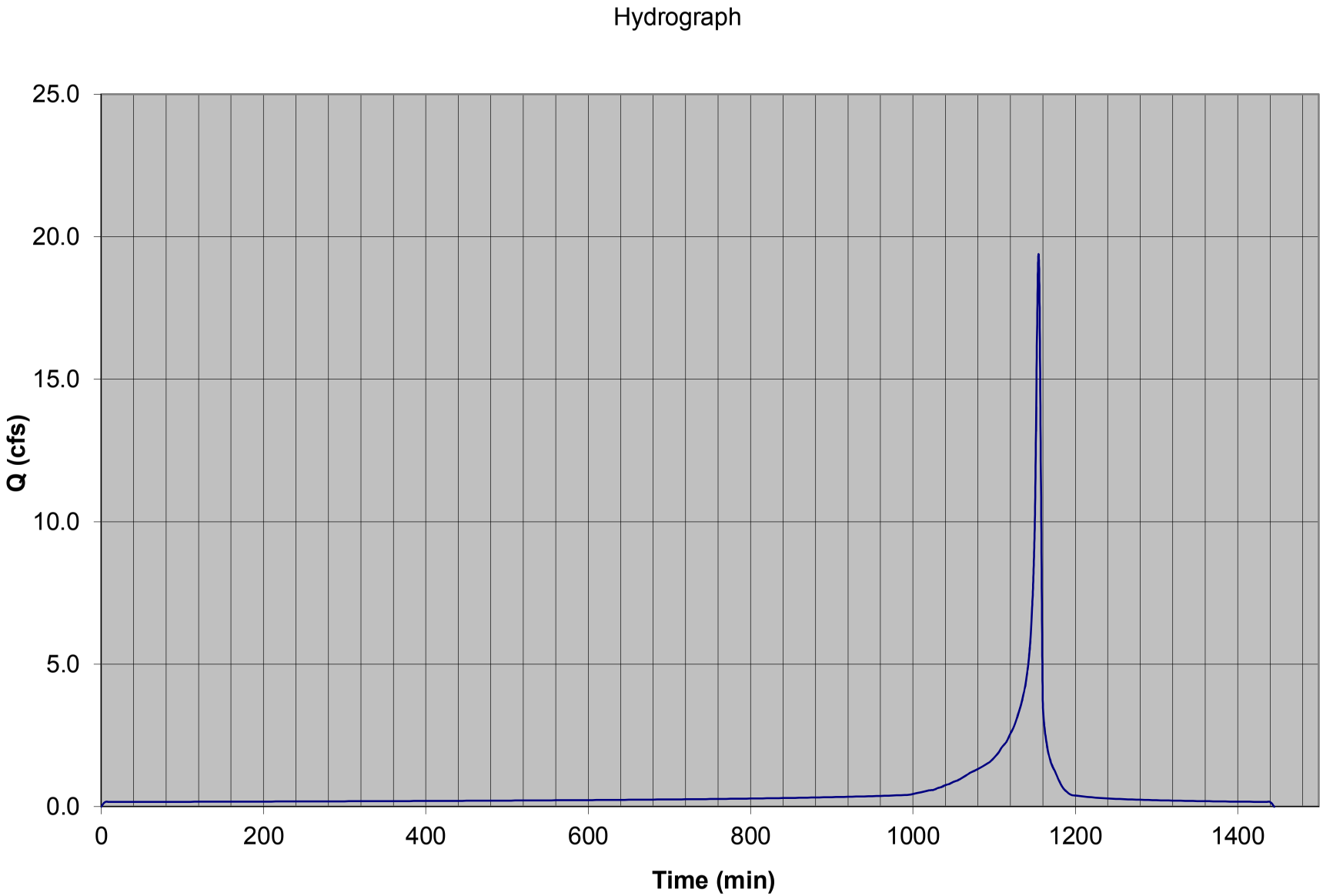
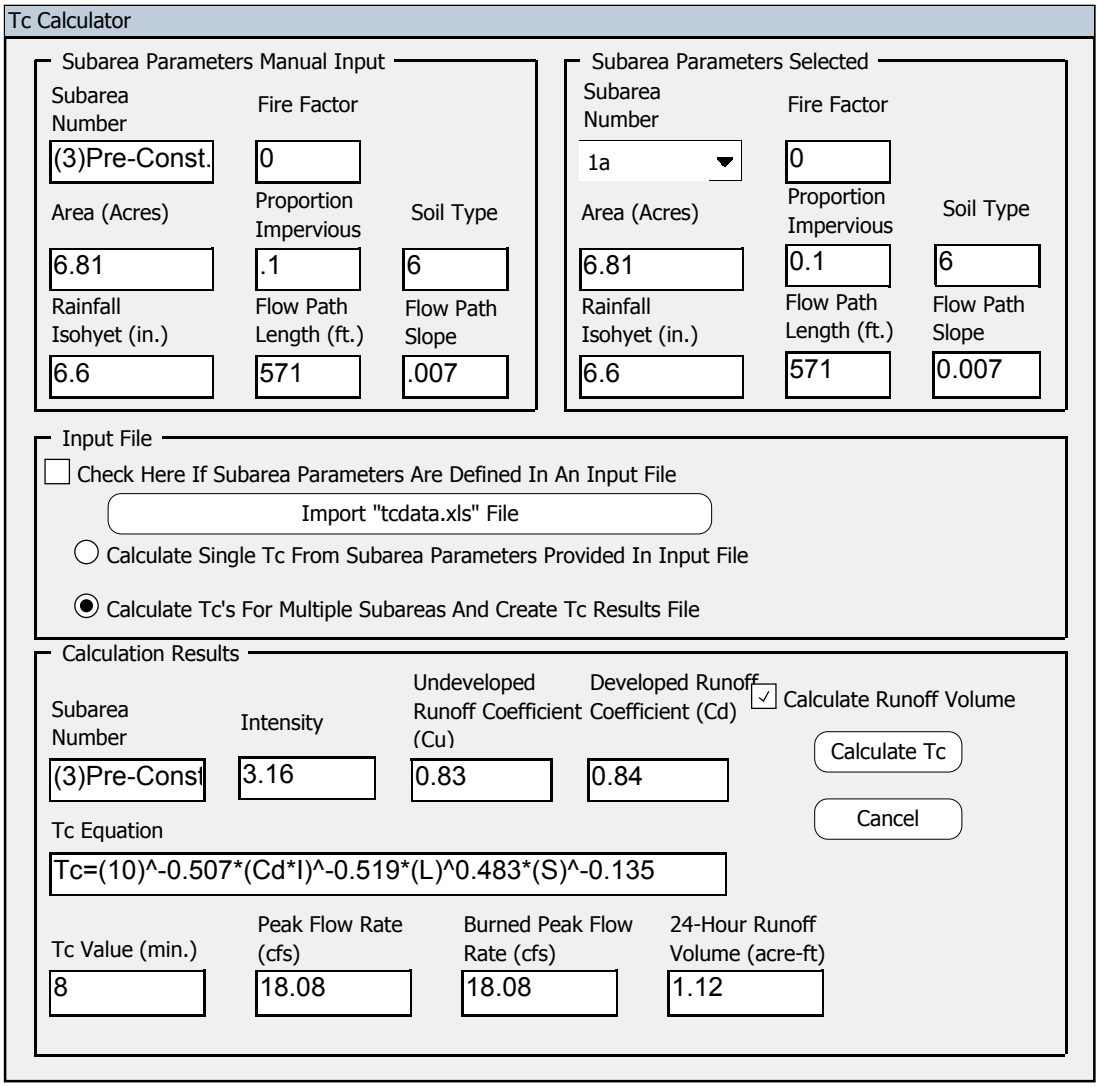
Burned Peak Flow Rate (cfs)
21.42
24-Hour Runoff Volume (acre-ft)
1.01


Hydrograph
25.0
20.0
15.0
10.0
5.0
0.0
Q (cfs)
0
200
400
600
800
1000
1200
1400
Time (min)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Fire Factor
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Area (Acres)
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Proportion Impervious
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Soil Type
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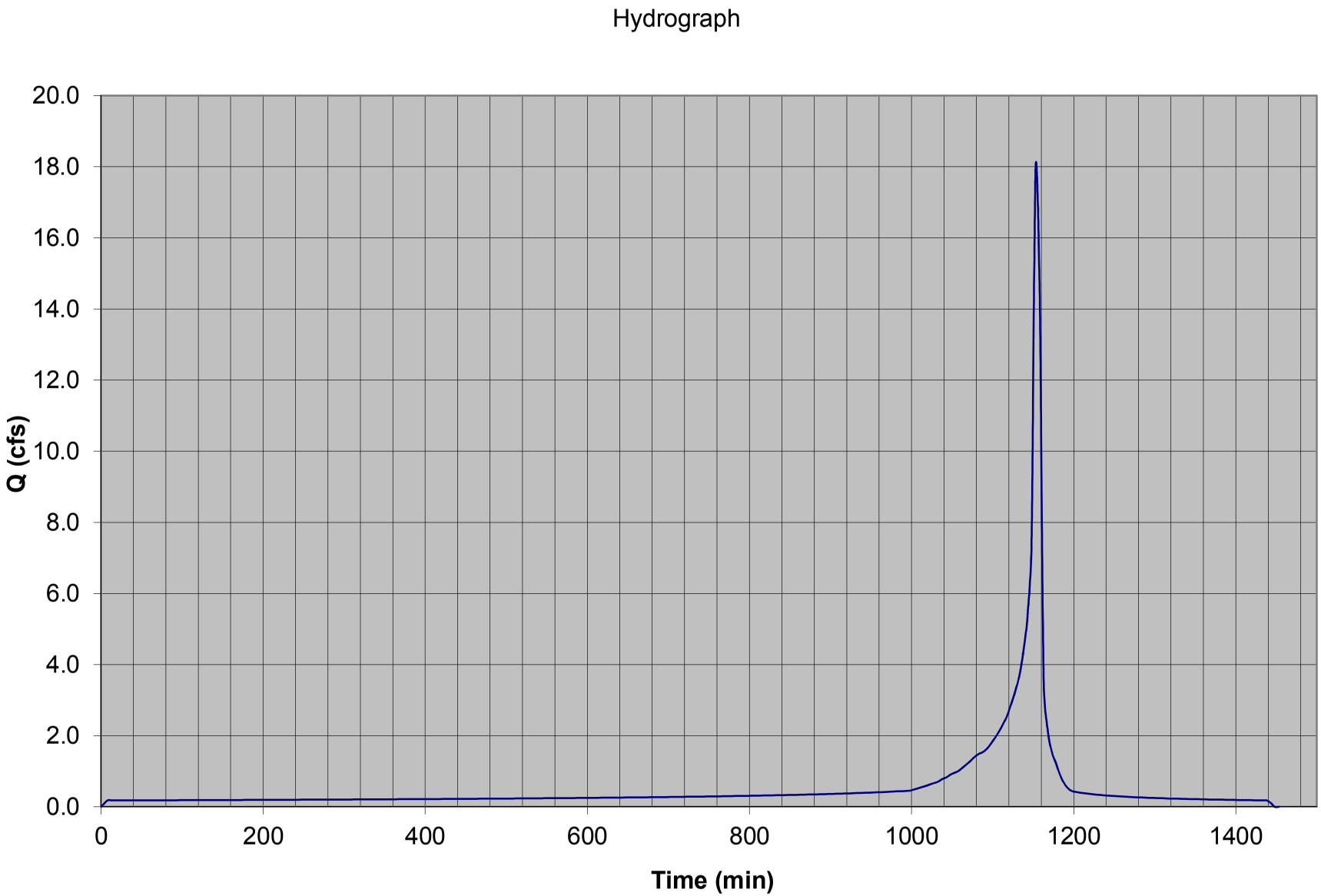
Rainfall Isohyet (in.)
6.6
Flow Path Length (ft.)
571
Flow Path Slope
.007
Subarea Parameters Selected
Subarea Number
1a
Fire Factor
0
Area (Acres)
6.81
Proportion Impervious
0.1
Soil Type
6
Rainfall Isohyet (in.)
6.6
Flow Path Length (ft.)
571
Flow Path Slope
0.007
Input File
Check Here If Subarea Parameters Are Defined In An Input File
Import "tcdata.xls" File
Calculate Single Tc From Subarea Parameters Provided In Input File
Calculate Tc's For Multiple Subareas And Create Tc Results File
Calculation Results
Subarea Number
(3)Pre-Const
Intensity
3.16
Undeveloped Runoff Coefficient (Cu)
0.83
Developed Runoff Coefficient (Cd)
0.84
Calculate Runoff Volume
Calculate Tc
Cancel
Tc Equation
Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Tc Value (min.)
8
Peak Flow Rate (cfs)
18.08
Burned Peak Flow Rate (cfs)
18.08
24-Hour Runoff Volume (acre-ft)
1.12


Hydrograph
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Q (cfs)
0
200
400
600
800
1000
1200
1400
Time (min)

Los Angeles T_C Calculator Results

Proposed Hydrology – Post Construction

Los Angeles T-C Calculator - Post Construction Result Summary date: 8/14/2013

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculate	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)
El Monte	A1	0.27	0.78	50	6	130	0.01	6.6	5	3.94	0.87	0.89	0.95
El Monte	A2	1.14	0.68	50	6	390	0.01	6.6	6	3.61	0.86	0.89	3.66
El Monte	A3	0.16	0.44	50	6	85	0.02	6.6	5	3.94	0.87	0.88	0.55
El Monte	B1	0.59	0.86	50	6	132	0.025	6.6	5	3.94	0.87	0.9	2.09
El Monte	B2	0.62	0.89	50	6	126	0.015	6.6	5	3.94	0.87	0.9	2.20
El Monte	B3	0.62	0.88	50	6	135	0.02	6.6	5	3.94	0.87	0.9	2.20
El Monte	B4	0.60	0.88	50	6	125	0.02	6.6	5	3.94	0.87	0.9	2.13
El Monte	B5	0.74	0.86	50	6	140	0.015	6.6	5	3.94	0.87	0.9	2.62
El Monte	B6	0.72	0.88	50	6	142	0.015	6.6	5	3.94	0.87	0.9	2.55
El Monte	B7	0.71	0.88	50	6	130	0.015	6.6	5	3.94	0.87	0.9	2.52
El Monte	B8	0.74	0.89	50	6	130	0.015	6.6	5	3.94	0.87	0.9	2.62
El Monte	B9	1.29	0.76	50	6	150	0.015	6.6	5	3.94	0.87	0.89	4.52
El Monte	B10	1.05	0.91	50	6	290	0.01	6.6	5	3.94	0.87	0.9	3.72
El Monte	B11	1.06	0.91	50	6	300	0.01	6.6	5	3.94	0.87	0.9	3.76
El Monte	B12	0.87	0.81	50	6	410	0.02	6.6	5	3.94	0.87	0.89	3.05
El Monte	B13	0.44	0.91	50	6	200	0.03	6.6	5	3.94	0.87	0.9	1.56
El Monte	C1	0.67	0.80	50	6	440	0.006	6.6	7	3.36	0.85	0.89	2.00
El Monte	C2	1.00	0.91	50	6	290	0.01	6.6	5	3.94	0.87	0.9	3.55
El Monte	C3	1.07	0.91	50	6	300	0.01	6.6	5	3.94	0.87	0.9	3.79
El Monte	C4	0.30	0.90	50	6	135	0.02	6.6	5	3.94	0.87	0.9	1.06
El Monte	C5	0.29	0.91	50	6	125	0.02	6.6	5	3.94	0.87	0.9	1.03
El Monte	C6	0.28	0.91	50	6	125	0.02	6.6	5	3.94	0.87	0.9	0.99
El Monte	D	0.99	0.80	50	6	617	0.007	6.6	8	3.16	0.83	0.89	2.78

Subarea	Tc Equation	Fire Factor	Burned flow rate	Volume (acre-ft)
A1	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.11
A2	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.42
A3	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.05
B1	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.26
B2	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.28
B3	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.28
B4	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.27
B5	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.33
B6	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.32
B7	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.32
B8	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.33
B9	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.52
B10	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.48
B11	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.49
B12	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.37
B13	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.2
C1	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.28
C2	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.46
C3	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.49
C4	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.14
C5	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.13
C6	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.13
D	Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135	0	n/a	0.42

Detention Basin Calculations

U.S. Army Corps of Engineers' Hydrologic Modeling System
(HEC-HMS) Version 3.5

HEC-HMS

Project : El Monte 2013-08-12

Basin Model : Lateral 1

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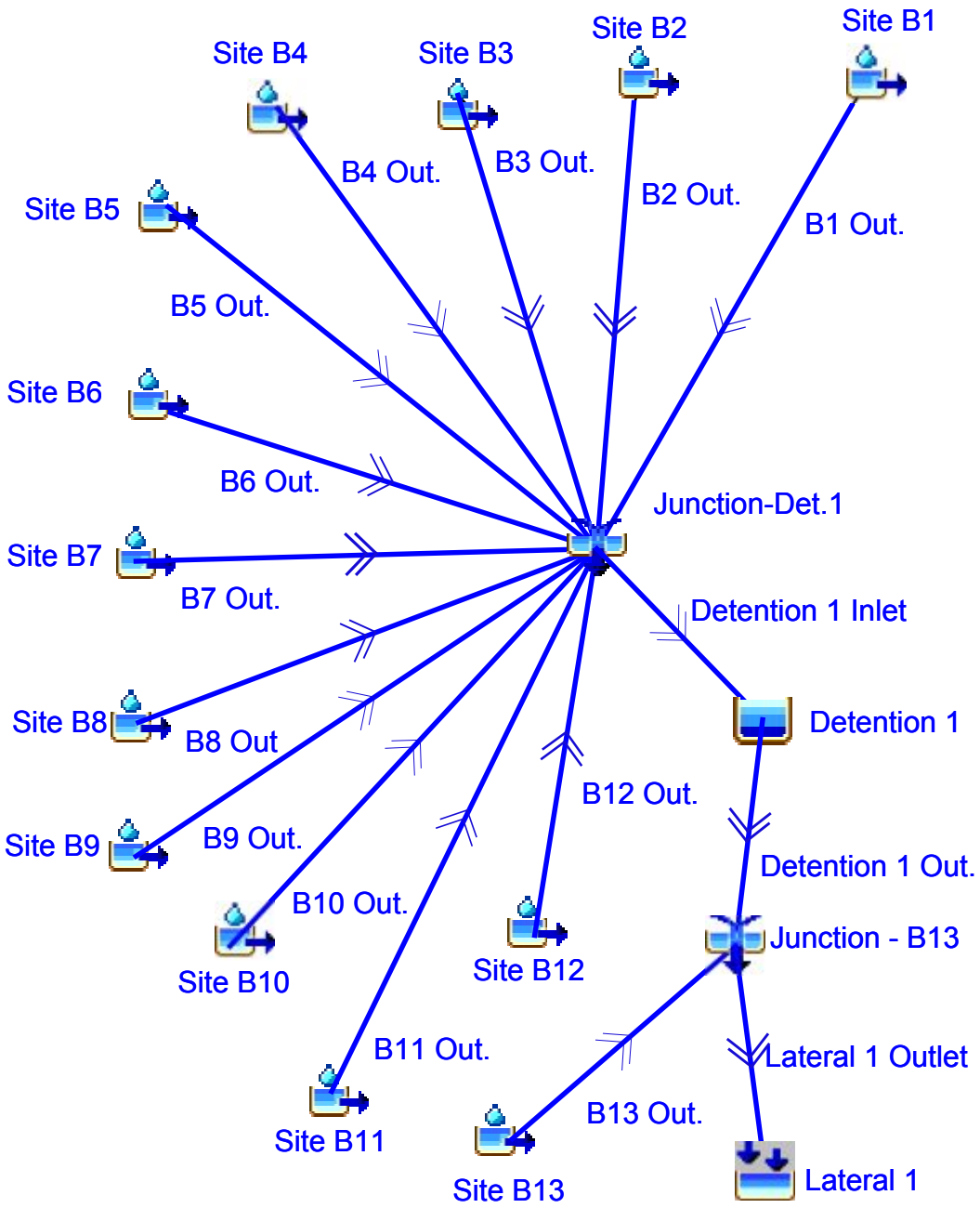


Project: El Monte 2013-08-12 Simulation Run: Run 64

Start of Run: 01Jan2000, 00:00 Basin Model: Lateral 1
End of Run: 02Jan2000, 00:05 Meteorologic Model: 50 yr Storm
Compute Time: 14Aug2013, 10:46:14 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Site B9	0.0020123	3.8	01Jan2000, 09:55	0.4
B9 Out.	0.0020123	3.6	01Jan2000, 10:00	0.4
Site B11	0.0016627	4.5	01Jan2000, 09:55	0.5
B11 Out.	0.0016627	4.5	01Jan2000, 09:55	0.5
Site B10	0.0016370	4.4	01Jan2000, 09:55	0.5
B10 Out.	0.0016370	4.1	01Jan2000, 10:00	0.5
Site B12	0.0013624	3.0	01Jan2000, 09:55	0.3
B12 Out.	0.0013624	2.7	01Jan2000, 10:00	0.3
Site B5	0.0011610	2.8	01Jan2000, 09:55	0.3
B5 Out.	0.0011610	2.7	01Jan2000, 10:00	0.3
Site B8	0.0011533	3.0	01Jan2000, 09:55	0.3
B8 Out	0.0011533	2.8	01Jan2000, 10:00	0.3
Site B6	0.0011208	2.9	01Jan2000, 09:55	0.3
B6 Out.	0.0011208	2.7	01Jan2000, 10:00	0.3
Site B7	0.0011122	2.8	01Jan2000, 09:55	0.3
B7 Out.	0.0011122	2.6	01Jan2000, 10:00	0.3
Site B3	.000965505	2.5	01Jan2000, 09:55	0.3
B3 Out.	.000965505	2.3	01Jan2000, 10:00	0.3
Site B2	.000965241	2.5	01Jan2000, 09:55	0.3
B2 Out.	.000965241	2.3	01Jan2000, 10:00	0.3
Site B4	.000936426	2.4	01Jan2000, 09:55	0.3
B4 Out.	.000936426	2.2	01Jan2000, 10:00	0.3
Site B1	.000920059	2.2	01Jan2000, 09:55	0.2
B1 Out.	.000920059	2.1	01Jan2000, 10:00	0.2
Junction-Det.1	0.0150089	33.7	01Jan2000, 10:00	4.0
Detention 1 Inlet	0.0150089	33.7	01Jan2000, 10:00	4.0

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Detention 1	0.0150089	4.1	01Jan2000, 10:40	2.7
Detention 1 Out.	0.0150089	4.1	01Jan2000, 10:45	2.7
Site B13	.000694033	1.9	01Jan2000, 09:55	0.2
B13 Out.	.000694033	1.9	01Jan2000, 09:55	0.2
Junction - B13	0.0157030	4.4	01Jan2000, 10:30	2.9
Lateral 1 Outlet	0.0157030	4.4	01Jan2000, 10:30	2.9
Lateral 1	0.0157030	4.4	01Jan2000, 10:30	2.9

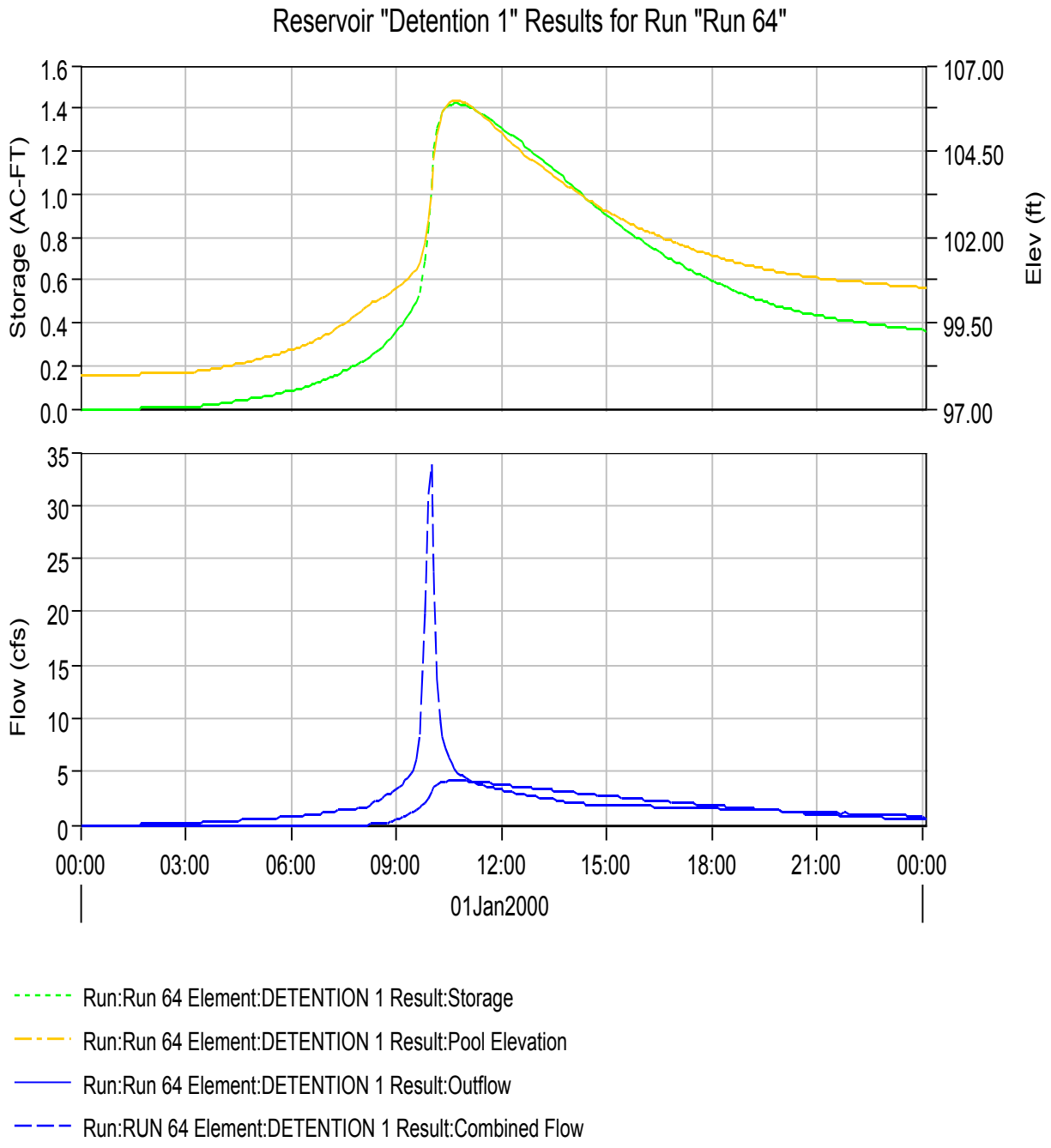
Project: El Monte 2013-08-12
Simulation Run: Run 64 Reservoir: Detention 1

Start of Run:	01Jan2000, 00:00	Basin Model:	Lateral 1
End of Run:	02Jan2000, 00:05	Meteorologic Model:	50 yr Storm
Compute Time:	14Aug2013, 10:46:14	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow :	33.7 (CFS)	Date/Time of Peak Inflow :	01Jan2000, 10:00
Peak Outflow :	4.1 (CFS)	Date/Time of Peak Outflow :	01Jan2000, 10:40
Total Inflow :	4.0 (AC-FT)	Peak Storage :	1.4 (AC-FT)
Total Outflow :	2.7 (AC-FT)	Peak Elevation :	106.0 (FT)


Reservoir "Detention 1" Results for Run "Run 64"
Storage (AC-FT)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Elev (ft)
107.00
104.50
102.00
99.50
97.00
Flow (cfs)
35
30
25
20
15
10
5
0
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
01Jan2000
Run:Run 64 Element:DETENTION 1 Result:Storage
Run:Run 64 Element:DETENTION 1 Result:Pool Elevation
Run:Run 64 Element:DETENTION 1 Result:Outflow
Run:RUN 64 Element:DETENTION 1 Result:Combined Flow

Project: El Monte 2013-08-12

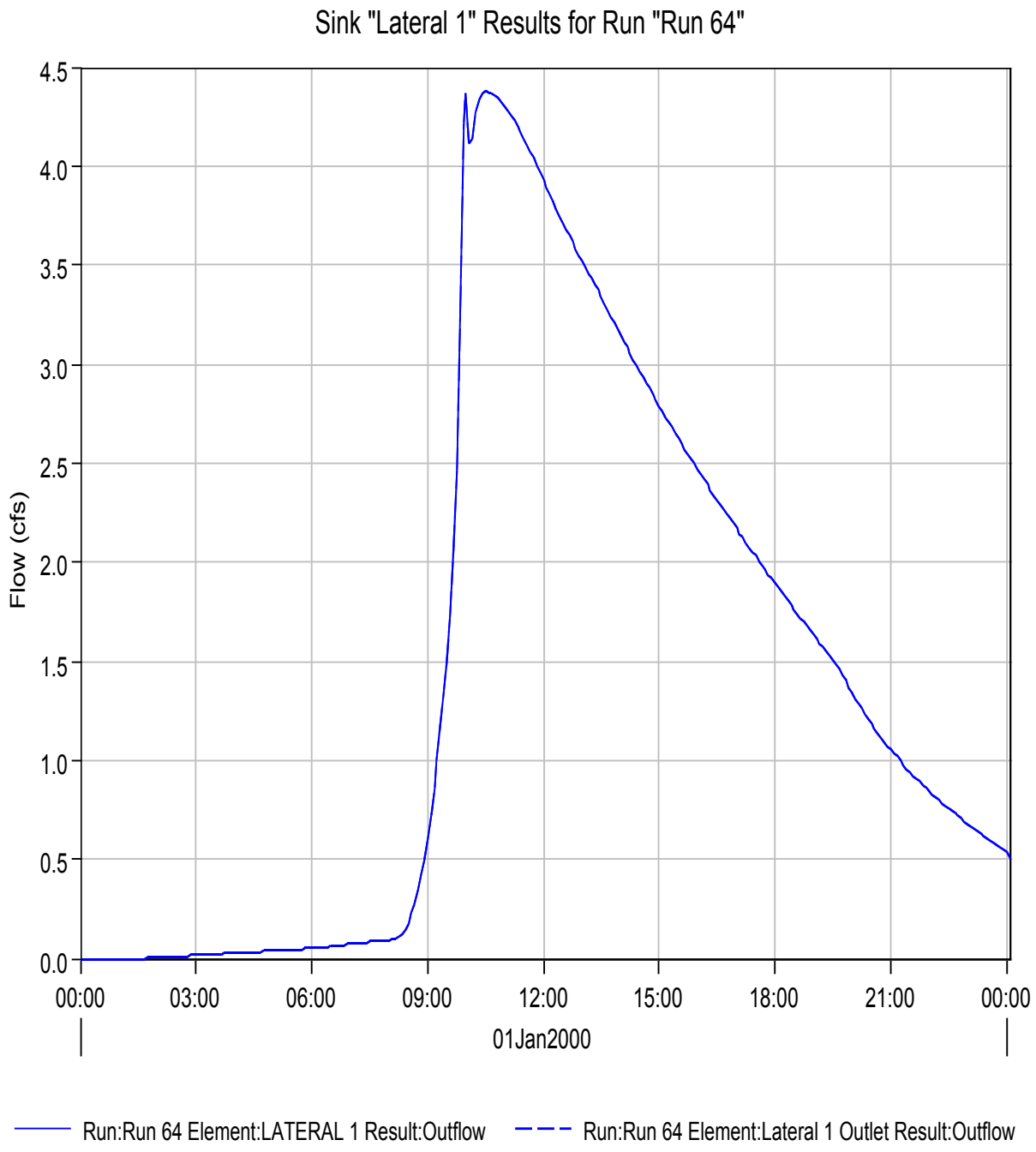
Simulation Run: Run 64 Sink: Lateral 1

Start of Run:	01Jan2000, 00:00	Basin Model:	Lateral 1
End of Run:	02Jan2000, 00:05	Meteorologic Model:	50 yr Storm
Compute Time:	14Aug2013, 10:46:14	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Outflow :	4.4 (CFS)	Date/Time of Peak Outflow :	01Jan2000, 10:30
Total Outflow :	2.9 (AC-FT)		


Sink "Lateral 1" Results for Run "Run 64"
Flow (cfs)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
01Jan2000
Run:Run 64 Element:LATERAL 1 Result:Outflow
Run:Run 64 Element:Lateral 1 Outlet Result:Outflow

HEC-HMS

Project : El Monte 2013-08-12

Basin Model : Lateral 2

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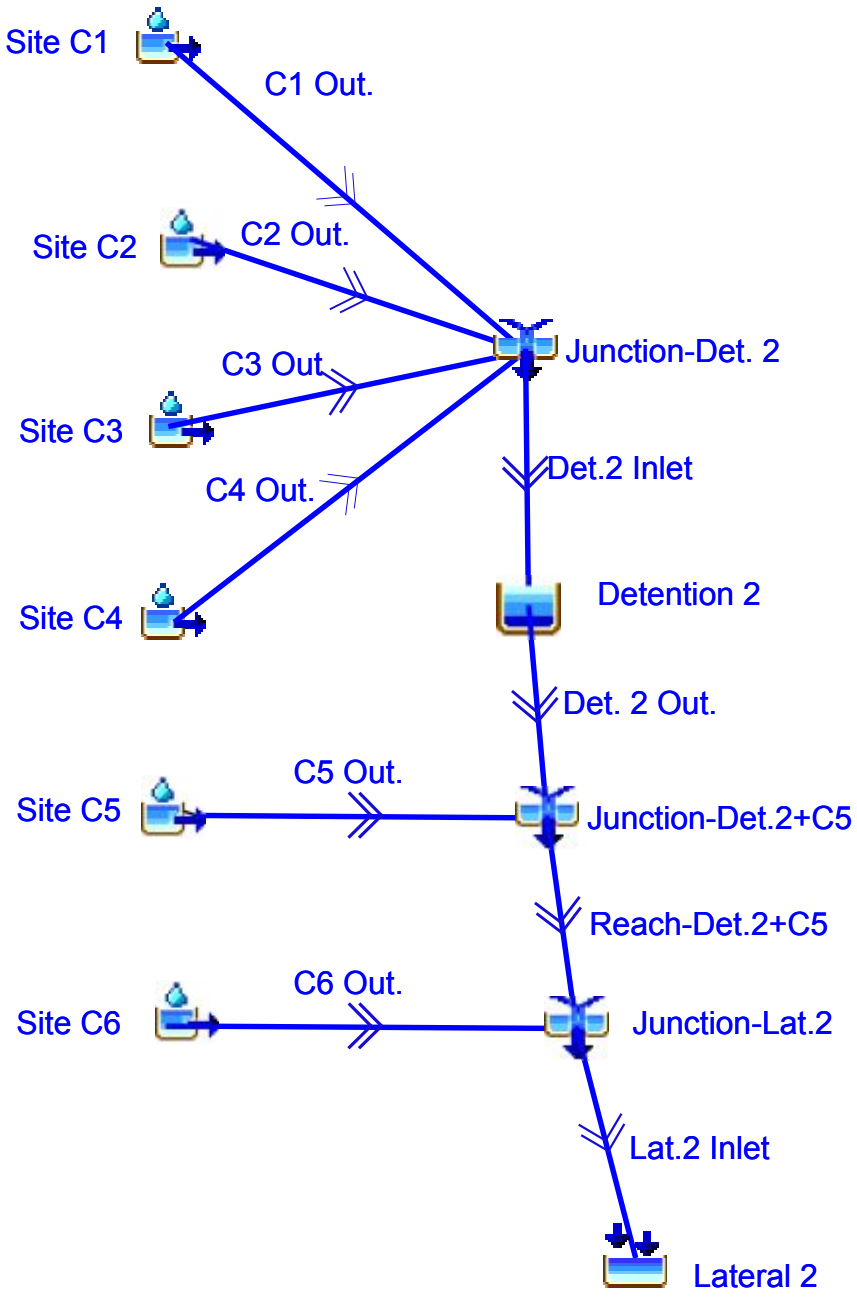


Project: El Monte 2013-08-12 Simulation Run: Run 65

Start of Run: 01Jan2000, 00:00 Basin Model: Lateral 2
End of Run: 02Jan2000, 00:05 Meteorologic Model: 50 yr Storm
Compute Time: 14Aug2013, 10:46:37 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Site C3	0.0016668	4.5	01Jan2000, 09:55	0.5
C3 Out	0.0016668	4.0	01Jan2000, 10:00	0.5
Site C2	0.0015582	4.2	01Jan2000, 09:55	0.5
C2 Out.	0.0015582	3.9	01Jan2000, 09:55	0.5
Site C1	0.0010421	2.0	01Jan2000, 09:55	0.2
C1 Out.	0.0010421	2.0	01Jan2000, 10:00	0.2
Site C4	.000472051	1.2	01Jan2000, 09:55	0.1
C4 Out.	.000472051	1.1	01Jan2000, 10:00	0.1
Junction-Det. 2	0.0047392	10.8	01Jan2000, 09:55	1.3
Det.2 Inlet	0.0047392	10.8	01Jan2000, 09:55	1.3
Detention 2	0.0047392	2.3	01Jan2000, 10:15	0.5
Det. 2 Out.	0.0047392	2.3	01Jan2000, 10:15	0.5
Site C5	.000448214	1.2	01Jan2000, 09:55	0.1
C5 Out.	.000448214	1.2	01Jan2000, 09:55	0.1
Junction-Det.2+C5	0.0051874	2.7	01Jan2000, 10:00	0.7
Reach-Det.2+C5	0.0051874	2.7	01Jan2000, 10:00	0.7
Site C6	.000443614	1.2	01Jan2000, 09:55	0.1
C6 Out.	.000443614	1.2	01Jan2000, 09:55	0.1
Junction-Lat.2	0.0056310	3.8	01Jan2000, 09:55	0.8
Lat.2 Inlet	0.0056310	3.8	01Jan2000, 09:55	0.8
Lateral 2	0.0056310	3.8	01Jan2000, 09:55	0.8

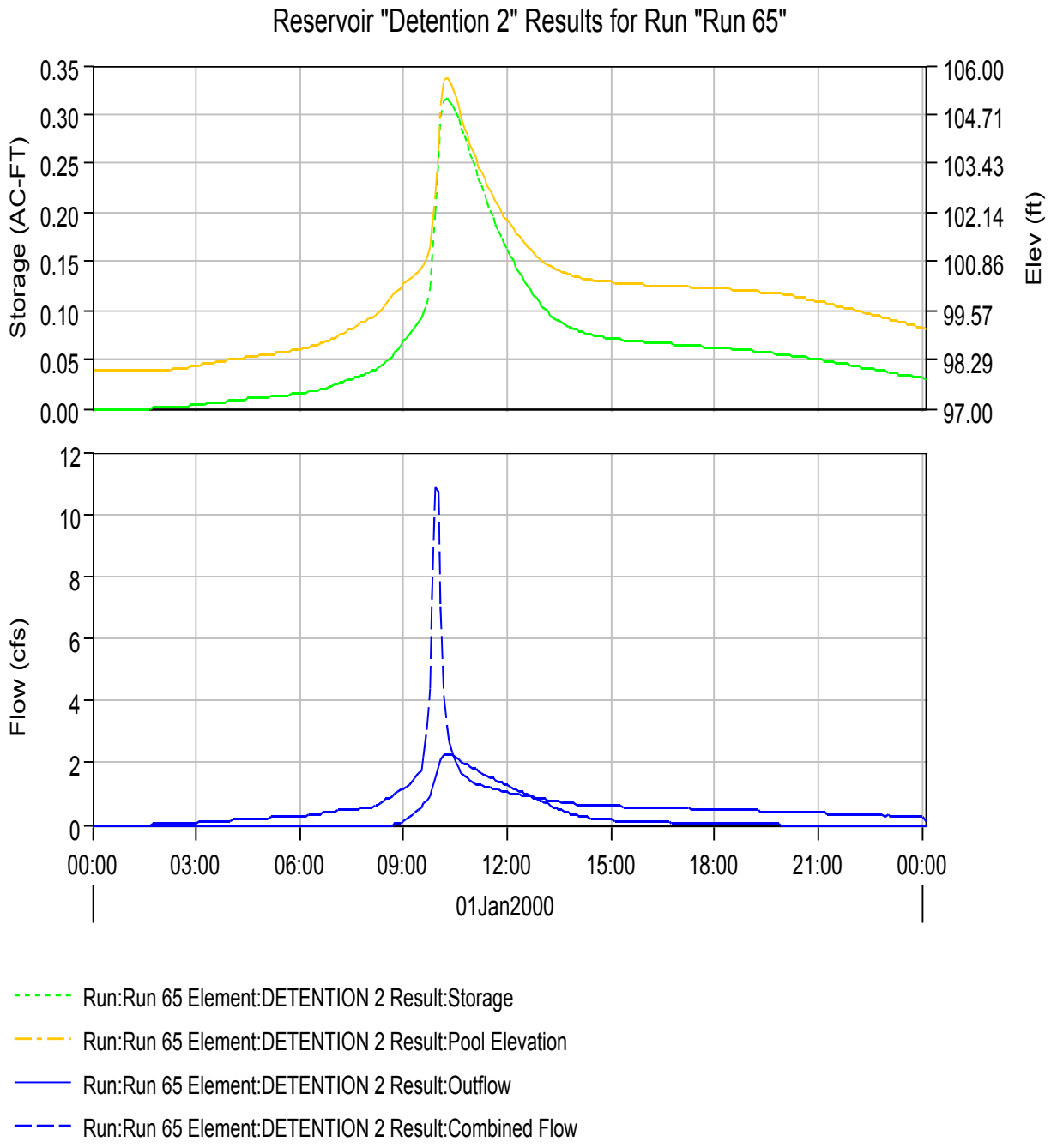
Project: El Monte 2013-08-12
Simulation Run: Run 65 Reservoir: Detention 2

Start of Run:	01Jan2000, 00:00	Basin Model:	Lateral 2
End of Run:	02Jan2000, 00:05	Meteorologic Model:	50 yr Storm
Compute Time:	14Aug2013, 10:46:37	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Inflow :	10.8 (CFS)	Date/Time of Peak Inflow :	01Jan2000, 09:55
Peak Outflow :	2.3 (CFS)	Date/Time of Peak Outflow :	01Jan2000, 10:15
Total Inflow :	1.3 (AC-FT)	Peak Storage :	0.3 (AC-FT)
Total Outflow :	0.5 (AC-FT)	Peak Elevation :	105.7 (FT)


Reservoir "Detention 2" Results for Run "Run 65"
Storage (AC-FT)
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Elev (ft)
106.00
104.71
103.43
102.14
100.86
99.57
98.29
97.00
Flow (cfs)
12
10
8
6
4
2
0
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
01Jan2000
Run:Run 65 Element:DETENTION 2 Result:Storage
Run:Run 65 Element:DETENTION 2 Result:Pool Elevation
Run:Run 65 Element:DETENTION 2 Result:Outflow
Run:Run 65 Element:DETENTION 2 Result:Combined Flow

Project: El Monte 2013-08-12

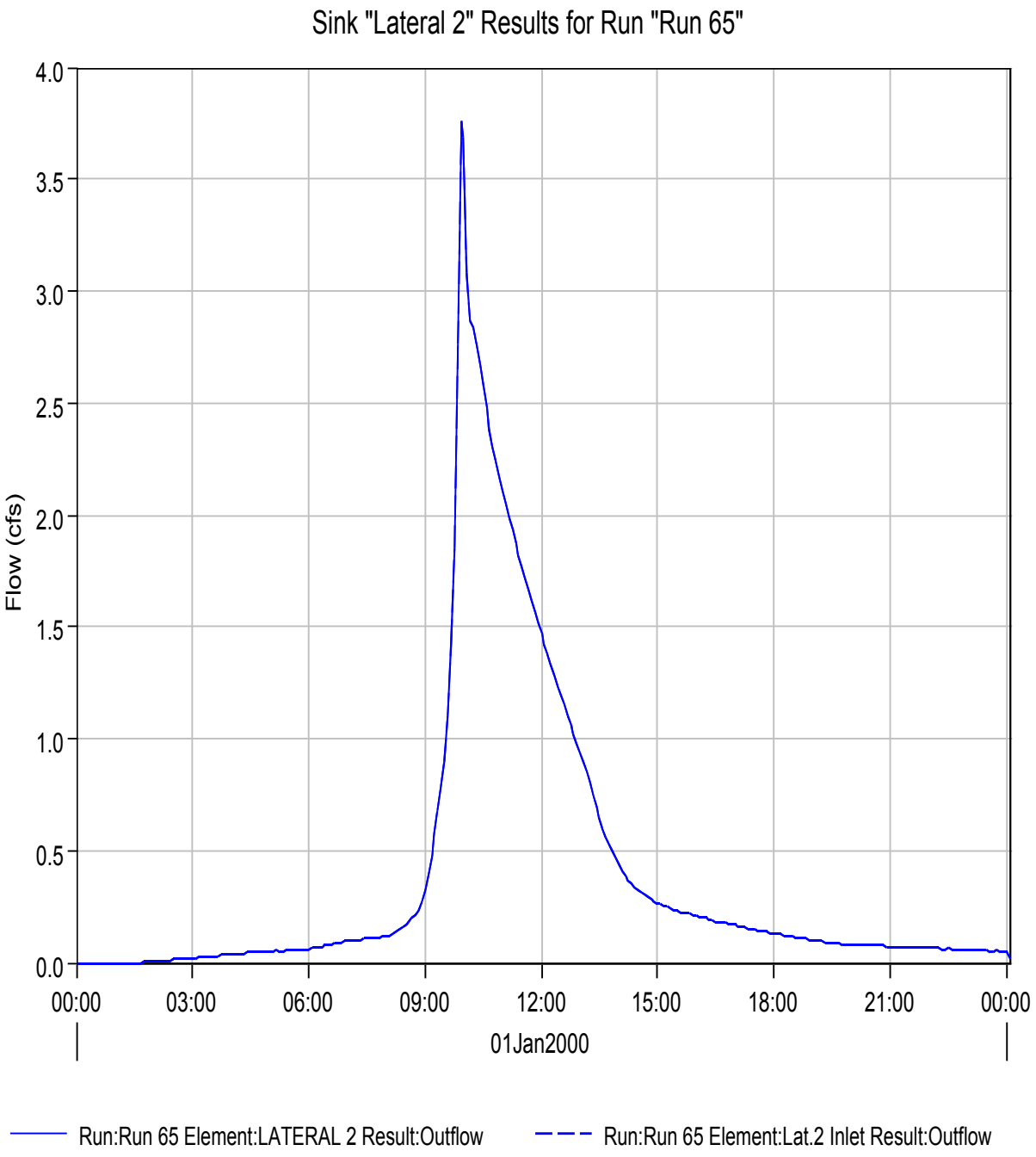
Simulation Run: Run 65 Sink: Lateral 2

Start of Run:	01Jan2000, 00:00	Basin Model:	Lateral 2
End of Run:	02Jan2000, 00:05	Meteorologic Model:	50 yr Storm
Compute Time:	14Aug2013, 10:46:37	Control Specifications:	Control 1

Volume Units: AC-FT

Computed Results

Peak Outflow :	3.8 (CFS)	Date/Time of Peak Outflow :	01Jan2000, 09:55
Total Outflow :	0.8 (AC-FT)		


Sink "Lateral 2" Results for Run "Run 65"
Flow (cfs)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
01Jan2000
Run:Run 65 Element:LATERAL 2 Result:Outflow
Run:Run 65 Element:Lat.2 Inlet Result:Outflow

Appendix C

Manufacturer Specifications

StormTech®
Detention • Retention • Recharge
Subsurface Stormwater Management℠

MC-4500 Site Calculator

Project Information: Detention Basin 2
Project Name: El Monte
Location: El Monte
Date: 5/3/2013
Engineer: RH
StormTech RPM:

System Requirements

Units		Imperial	
Required Storage Volume		14000	CF
Stone Porosity (Industry Standard = 40%)		40	%
Stone Above Chambers	(12 inch min.)	12	inches
Stone Foundation Depth	(9 inch min.)	24	inches
Average Cover over Chambers	(24 inch min.)	36	inches
Bed size controlled by WIDTH or LENGTH?		LENGTH	
Limiting WIDTH or LENGTH dimension		40	feet
Storage Volume per Chamber		180.8	CF
Storage Volume per End Cap		124.8	CF

System Sizing

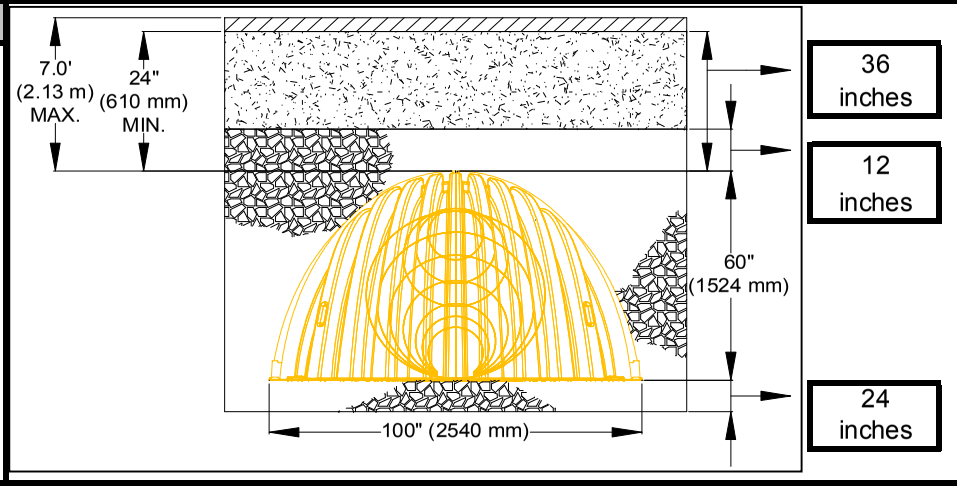
Number of Chambers Required	66	each
Number of End Caps Required	18	each
Bed Size (including perimeter stone)	3,026	square feet
Stone Required (including perimeter stone)	868	tons
Volume of Excavation	1121	cubic yards
Non-woven Filter Fabric Required (20% Safety Factor)	1068	square yards
Length of Isolator Row	39.3	feet
Woven Isolator Row Fabric (20% Safety Factor)	108	square yards
Installed Storage Volume	14,179	cubic feet

Controlled by Length

Maximum Length = 40 feet

8 rows of 8 chambers
1 row of 2 chambers

Maximum Length = 39.3 feet
Maximum Width = 83.0 feet



StormTech®
Detention • Retention • Recharge
Subsurface Stormwater Management℠

MC-4500 Site Calculator

Project Information: Detention Basin 1
Project Name: El Monte
Location: El Monte
Date: 5/3/2013
Engineer: RH
StormTech RPM:

System Requirements

Units		Imperial	
Required Storage Volume		62000	CF
Stone Porosity (Industry Standard = 40%)		40	%
Stone Above Chambers	(12 inch min.)	12	inches
Stone Foundation Depth	(9 inch min.)	24	inches
Average Cover over Chambers	(24 inch min.)	36	inches
Bed size controlled by WIDTH or LENGTH?		LENGTH	
Limiting WIDTH or LENGTH dimension		85	feet
Storage Volume per Chamber		180.8	CF
Storage Volume per End Cap		124.8	CF

System Sizing

Number of Chambers Required	320	each
Number of End Caps Required	34	each
Bed Size (including perimeter stone)	12,884	square feet
Stone Required (including perimeter stone)	3558	tons
Volume of Excavation	4772	cubic yards
Non-woven Filter Fabric Required (20% Safety Factor)	3946	square yards
Length of Isolator Row	83.6	feet
Woven Isolator Row Fabric (20% Safety Factor)	230	square yards
Installed Storage Volume	62,099	cubic feet

Controlled by Length

Maximum Length = 85 feet

16 rows of 19 chambers
1 row of 16 chambers

Maximum Length = 83.6 feet
Maximum Width = 155.7 feet