Appendix J
Preliminary Hydrology Report

Preliminary Hydrology Study

LA River Bike Path Phase IV

Los Angeles, California

Prepared For:

City of Los Angeles Department of Transportation

United States Army Corps of Engineers

Prepared By:

City of Los Angeles, StreetsLA

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Table of Contents

I. Hydrology Study

A. Introduction

1. Purpose and Scope

The following Hydrology Study has been prepared for the development of the LA River Bikepath Phase IV project in Los Angeles, California. The purpose of this study is to identify the existing and proposed conditions stormwater run-off volumes impacting the LA River Flood Channel (LARFC), and to calculate the Stormwater Quality Design Volume (SWQDv) required to meet the Low Impact Development (LID) requirements per the LA County Low Impact Development Manual

The scope of this study is as follows:

- Identification of existing conditions on-site drainage sub-areas and calculation of total run-off volumes impacting the LARFC
- Identification of proposed conditions on-site drainage sub-areas and calculation of total run-off volumes impacting the LARFC
- Calculation of 85th percentile Stormwater Quality Drainage Volume (SWQDv) and implementation of Low Impact Development (LID) Stormwater Management Practices (SMP)

2. Project Overview

The proposed project entails the construction of a new 0.8 mile Class I bike facility along the south bank of the Los Angeles river, starting from the existing LA river bike path at Riverside Dr, and ending just before the 134 freeway off-ramp at Forest Lawn Dr. The project site and service road right-of-way is located within the LA County flood control. The service road right-of-way is south of the LA River flood channel and north of the Caltrans/134 freeway right-of-way. Griffith park is located to the south of the 134 freeway. The proposed project will also add an equestrian path alongside the bike facility. The equestrian path will terminate at the existing Tunnel 6, which enters into Griffith Park. Tunnel 6 is situated approximately 1,900 feet west of Riverside Drive.

Figure 1 - Aerial view of project site

The existing service road terminates at the eastern side swing gate just west of the Riverside Dr bridge. The swing gate is approximately 1,200 feet west of Riverside Drive. The proposed project will remove the swing gate and connect to the existing bike path just beyond the gate.

Figure 2 - Existing swing gate near Riverside Dr - looking east

The western side of the project site consists of a sloped hillside between the service road and LA river channel.

Figure 3 - Service road in between the hillside and Caltrans - looking east

B. Methodology

1. General Methodology

The requirements and recommendations found in the Los Angeles County Hydrology Manual (January 2006) and Low Impact Development Standards Manual (February 2014) by the Los Angeles County Department of Public Works were used as the basis for methodology and calculations in this study. Storm water run-off calculations were performed for the 50-year and 85th percentile, 24-hour rain event using HydroCalc software provided by LA County Public Works.

2. Sources of Topography

A topographic survey provided by the City of Los Angeles Bureau of Engineering Survey Division was used to identify drainage sub-areas and flow paths for the project site.

3. Soil Classifications and Rainfall Depth

The soil classification and rainfall values used in this study are tabulated below. The soil classification and 50-year storm rainfall depth were taken from the Burbank 50-year 24-hour Isohyet map provided in the Los Angeles County Hydrology Manual. For LID calculations, the 85th percentile rainfall depth was taken from the Los Angeles County 85th Percentile 24-hour Rainfall Isohyetal Map. Refer to Exhibits “A” and “B” for copies of the Isohyetal maps with approximate site locations.

C. Existing Conditions and Drainage Sub-areas

1. Overview

The existing service road runs along the LA river channel just west of Riverside Dr to the 134 freeway off ramp at Forest Lawn Drive. The road is constructed of asphalt pavement material and is approximately 10ft wide. There are some segments of the service road that are in poor condition; including cracks and potholes. It is believed the road is ending its useful service life. Just south of the service road consists of dirt, landscaping, trees, and a chain link fence which provides a barrier between the service road and Caltrans right-of-way (134 freeway). Many large trees, shrubs, plants, and other vegetation can be found between the 134 freeway and service road.

Figure 4 - Service road just west of Riverside Dr - Looking west

Figure 5 - Flat dirt/landscaping area near service road

Located further along the service road is the existing equestrian Tunnel 6 situated 1900 feet west of Riverside Drive. Tunnel 6 is the egress to the Griffith Park Main Trail for equestrian riders. The existing equestrian trail connects to, and follows alongside, the service road west of Tunnel 6.

Further west, an existing 60-in diameter pipe utility bridge, located 2,700 feet west of Riverside Drive, crosses the LARFC. The pipe is enclosed by a tall chain link fence at all sides. The pipe utility bridge houses an active 6" Sanitary Force Mainline and abandoned water line. The width of the service road narrows to 17ft between the fenced 60-in diameter pipe and the chain link fence alongside the Caltrans right-of-way.

Figure 6 - Tunnel 6 leading into Griffith Park

Figure 7 - Narrowed service road at the 60-in pipe bridge

As the service road approaches the western end of the site, it increases in grade and runs between a larger hillside within Caltrans right-of-way and another hillside to the north sloping down toward the LA river channel. There are many trees, stumps, loose vegetation, vines, and miscellaneous plants on both hillsides. The service road at this location is broken, uplifted, and contains many pot holes due to tree roots and years of rainfall.

Figure 8 - Service road between Caltrans and LA River - Looking west

Figure 9 - Steep slope within Caltrans ROW - Looking south

Figure 10 - Service road at west end of project site - Looking west

Figure 11 - Hillside to the south of service road - Looking east

2. Drainage Areas

The project site is approximately 2.71 acres and consists of both pervious and impervious surfaces that impact the LARFC. The service road is the largest impervious surface and makes up roughly 40% of the total project area. The road is also sloped toward the LARFC causing rainfall to sheet flow into the channel. Closer to Riverside Dr, the service road also has a high ridge located at the back edge of the service road, causing rainfall that falls just south of the service road to flow toward the dirt and landscaped area near the Caltrans right-of-way.

A topographic survey was used to identify the existing drainage areas and divide the project site into 5 smaller sub-areas to more easily calculate runoff volumes. Exhibit “C” illustrates the existing conditions drainage sub-areas for this study. Based on the topographic survey, rainfall that falls onto the service road will flow in the direction of the channel. Rainfall outside the service road will flow either north toward the service road or south toward the Caltrans right of way, depending on the sub-area. Figures 12 and 13 highlight the directions of run-off at sub-areas A-1 and A-5 at opposite ends of the project site.

Figure 12: Drainage sub-area A-1 at east end of project site. Run-off flowing across the service road toward the channel

Figure 13: Drainage sub-area A-5 at west end of project site. Run-off flowing from hillside, to service road, to hillside

Sub-area A-5 at the west end of the project site is unique as there are hillsides adjacent on both sides of the service road. Rainfall that falls onto the hillside south of the service road will flow north onto the road, which flows onto the hillside north of the service road. Similar to the other sub-area, all this run-off will continue to flow towards the LARFC.

D. Proposed Conditions and Drainage Sub-areas

1. Overview

The proposed project will construct a new 12ft wide Class I bike path from Riverside Dr to just before the 134 off ramp at Forest Lawn Dr. The bike path will service both directions with 4ft wide travel ways and 2ft wide shoulders on both sides. The bike path will be constructed of asphalt concrete material. Where the bike path is adjacent to a hillside slope, a chain link fence will be installed. The majority of the bike path will have a maximum cross slope of 2% toward the channel, although a short segment starting from Riverside Dr will have a crown along the centerline for drainage purposes. Figure 14 below shows a plan view of the proposed bike path at the beginning of the project site near Riverside Dr.

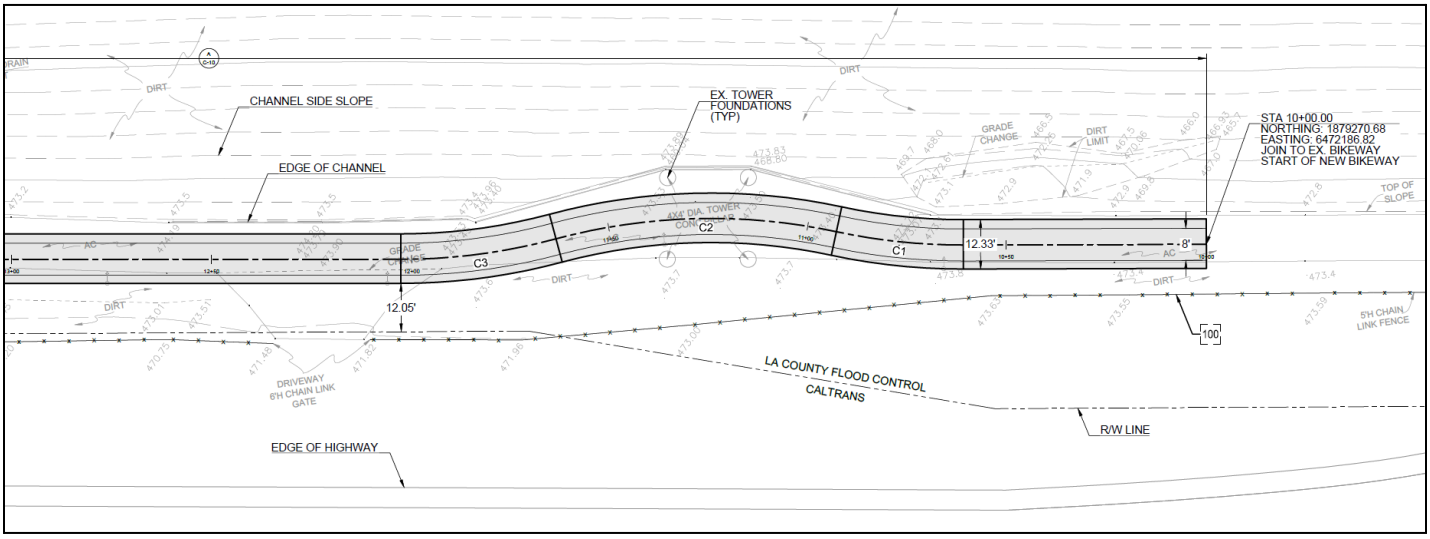


Figure 14: Plan View - Start of proposed bike path just west of Riverside Dr

Alongside the bike path, a new 10ft wide equestrian trail will also be installed. Figure 15 below shows the proposed equestrian trail joining the bike path just outside tunnel 6. The equestrian trail will follow alongside the bike path, only briefly separating to avoid an existing transmission tower foundation. Figure 16 below shows a typical section view of the bike path and equestrian trail alongside the channel. The slope of the equestrian trail will match the existing grades that are just beyond the existing service road. The trail will be constructed of base material to create a strong path and to promote drainage, without disturbing the surrounding dirt/landscaping.

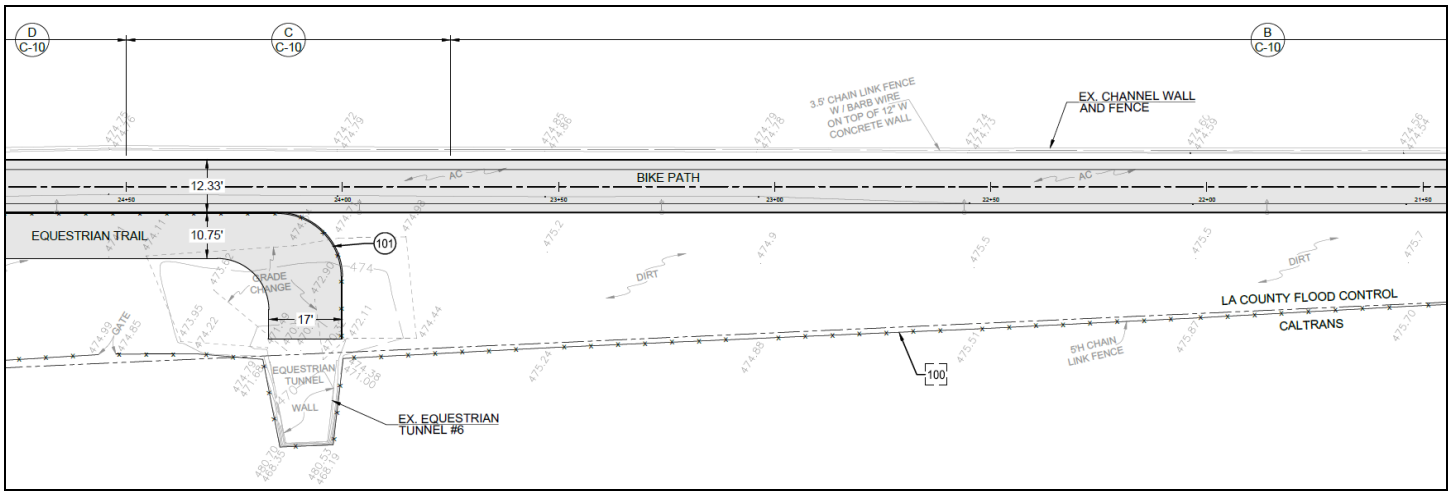


Figure 15: Plan View - Equestrian trail joining bike path at tunnel 6

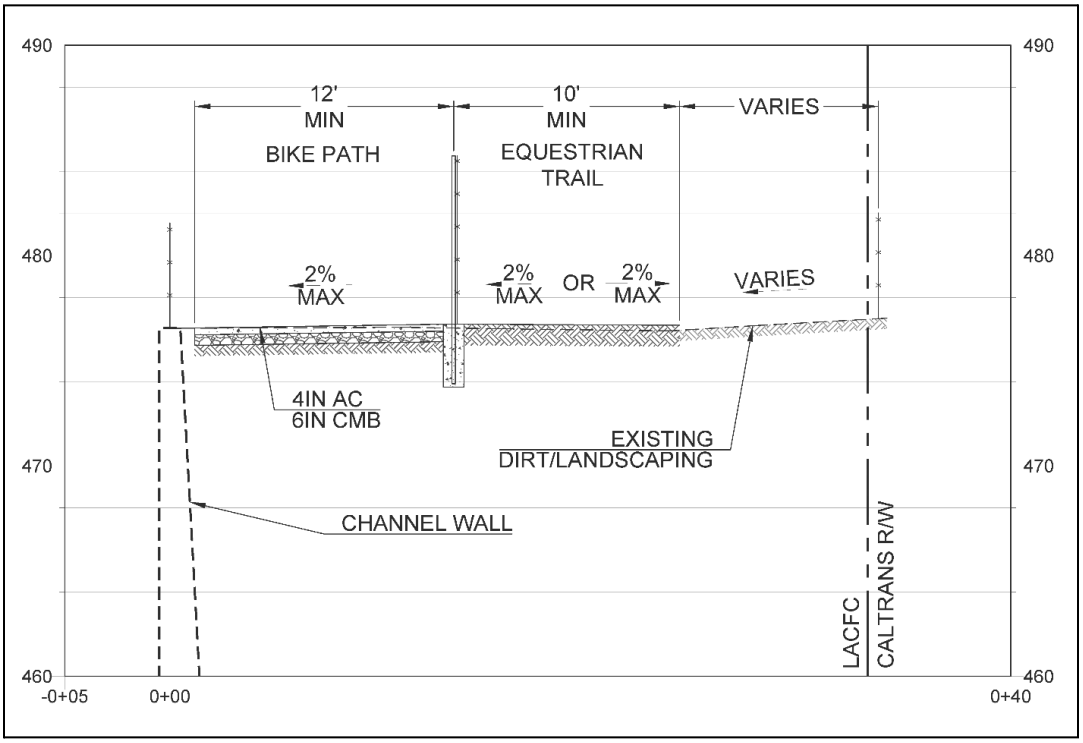


Figure 16: Typical Section H - Proposed bike path and equestrian trail alongside the river channel

The bike path and equestrian trail will continue westbound at grade along the majority of the project site, but will be separated vertically once they reach the hill at the west end of the site. Figure 17 below shows a plan view of the bike path and elevated equestrian trail. As they approach the hill, the bike path will follow the existing service road grade and alignment, while the equestrian trail is elevated to be level with the hillside along the Caltrans right-of-way, then back down to join the bike path. Figure 18 shows a typical section view of the elevated equestrian trail on the hillside near the Caltrans right-of-way. A retaining wall will be constructed

to support the entire length of the elevated equestrian trail. A gate will be installed at the terminus of the bike path, prompting riders to turn around and travel back eastward toward Riverside Dr, while the equestrians are free to continue west.

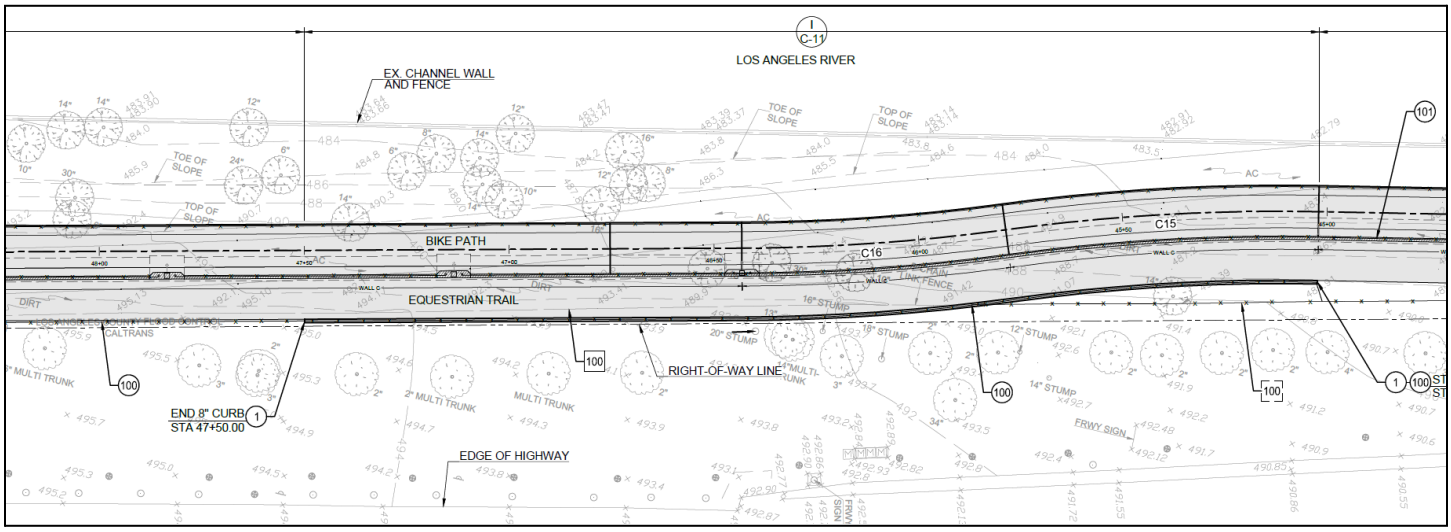


Figure 17: Plan View - Elevated equestrian alongside bike path

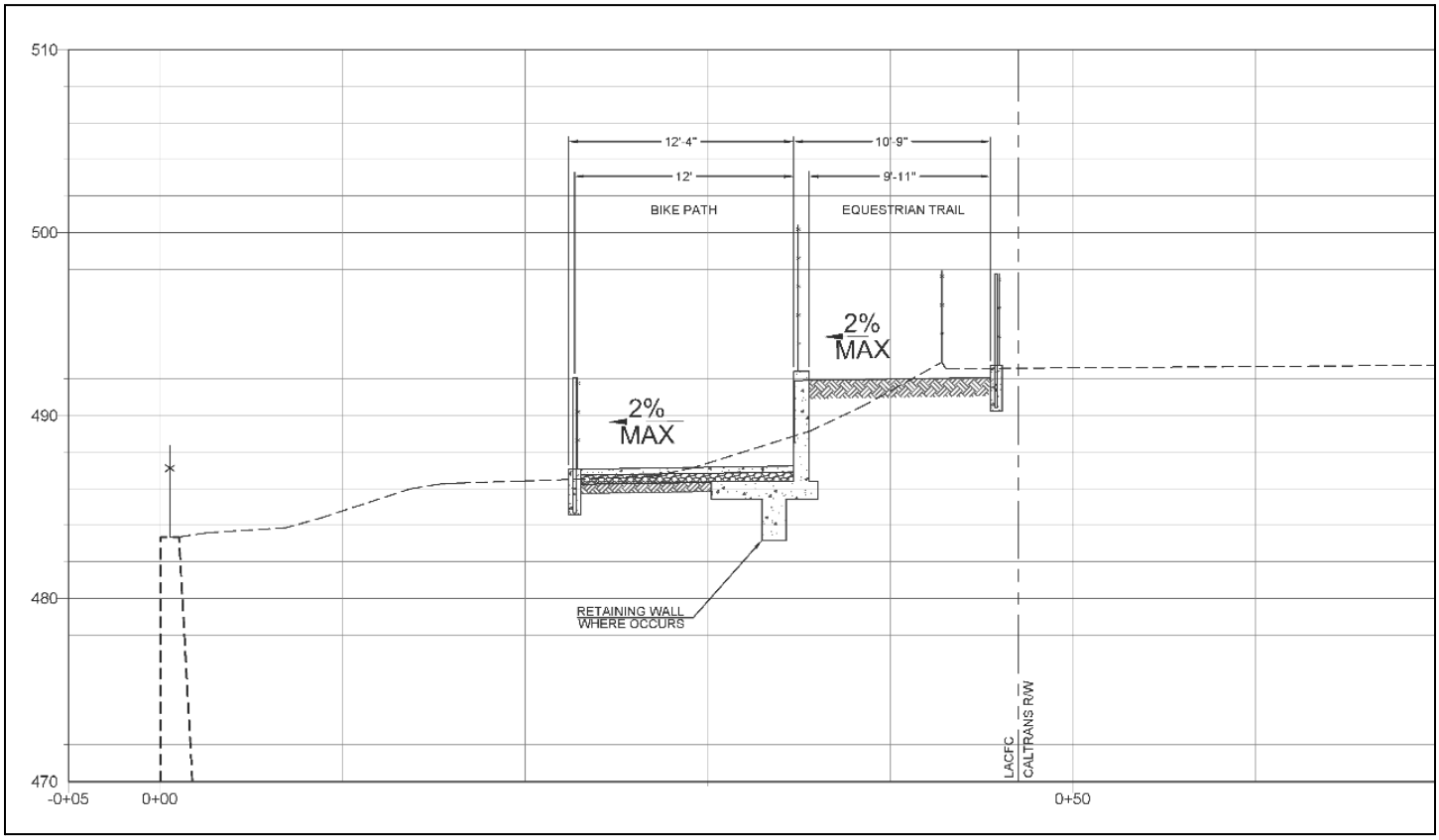


Figure 18: Typical Section I - Proposed bike path and elevated equestrian trail near west side of project

2. Drainage Areas

For our hydraulic analysis, the proposed drainage areas are similar to the existing drainage areas. Exhibit “C” illustrates these drainage areas. Due to the construction of a wider bike path and new equestrian trail, all drainage areas, except for sub-area A-1, see an increase in area. A wider bike path also increases the impervious surface area within the drainage areas. To balance the increase of impervious surface area, approximately 860ft of the proposed bike path within drainage area A-1, will be constructed with a centerline crown to reduce the volume of run-off impacting the channel. Figure 19 below illustrates this sub-area of bike path starting from Riverside Dr.

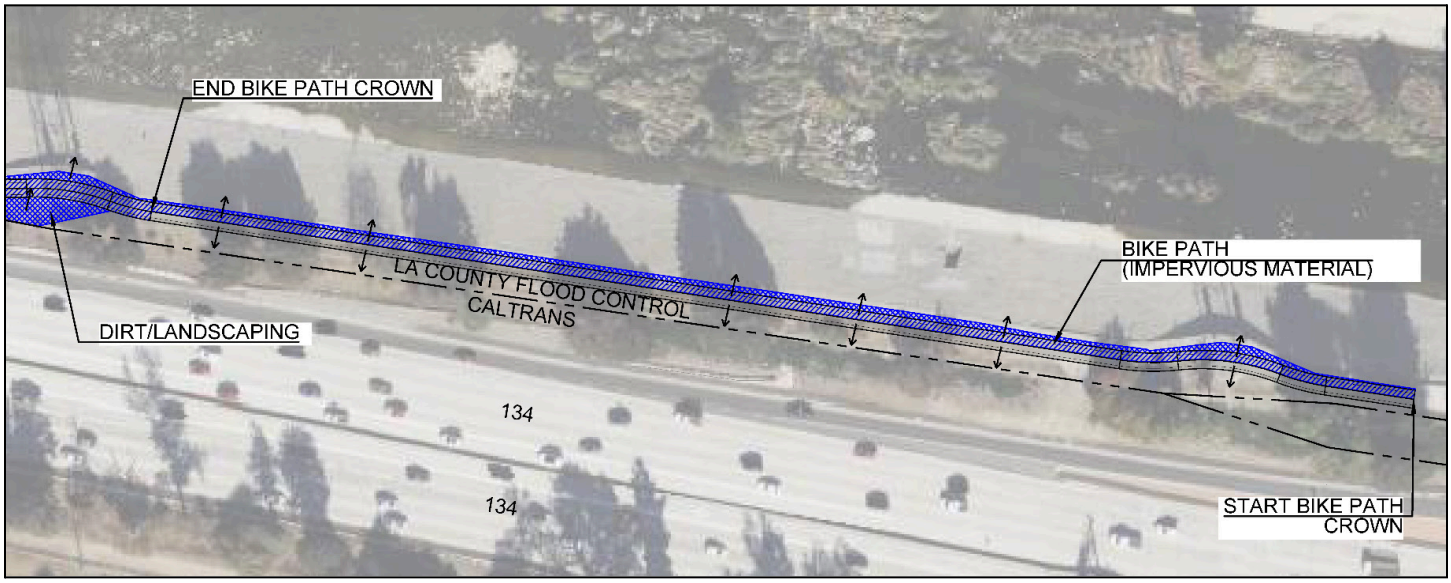


Figure 19: Proposed conditions drainage area at east end of project site. Bike path constructed with centerline crown

By including a crown within this segment of bike path, we calculate less run-off impacting the channel compared to the existing conditions. Figure 21 below shows a typical section view of this segment of bike path with the centerline crown.

As mentioned above, other sub-areas within the project site saw a slight increase of impervious area, due to the wider 12ft bike path. For our analysis, the equestrian trail was considered to be a pervious material, acting similar to the dirt/landscaping within the existing conditions drainage area. This results in similar

behavior of run-off within the drainage areas. Figure 20 below illustrates the proposed conditions drainage area at the west end of the project, with similar run-off flow paths to the existing conditions.

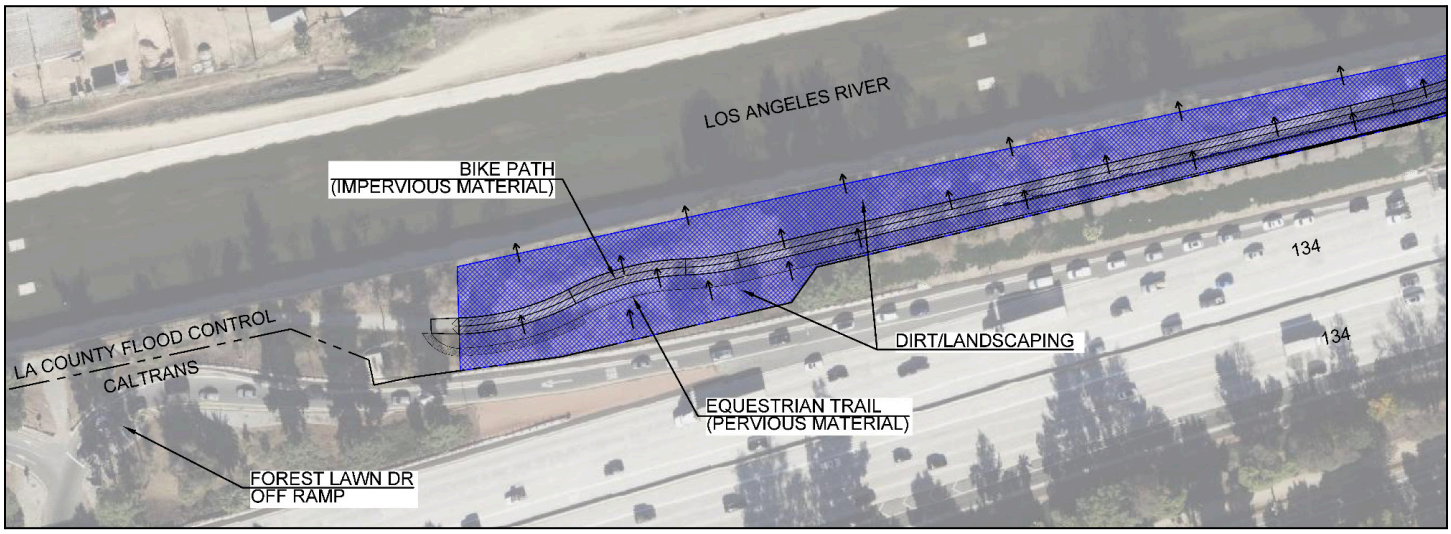


Figure 20: Proposed conditions drainage area at west end of project site. Equestrian trail constructed alongside bike path

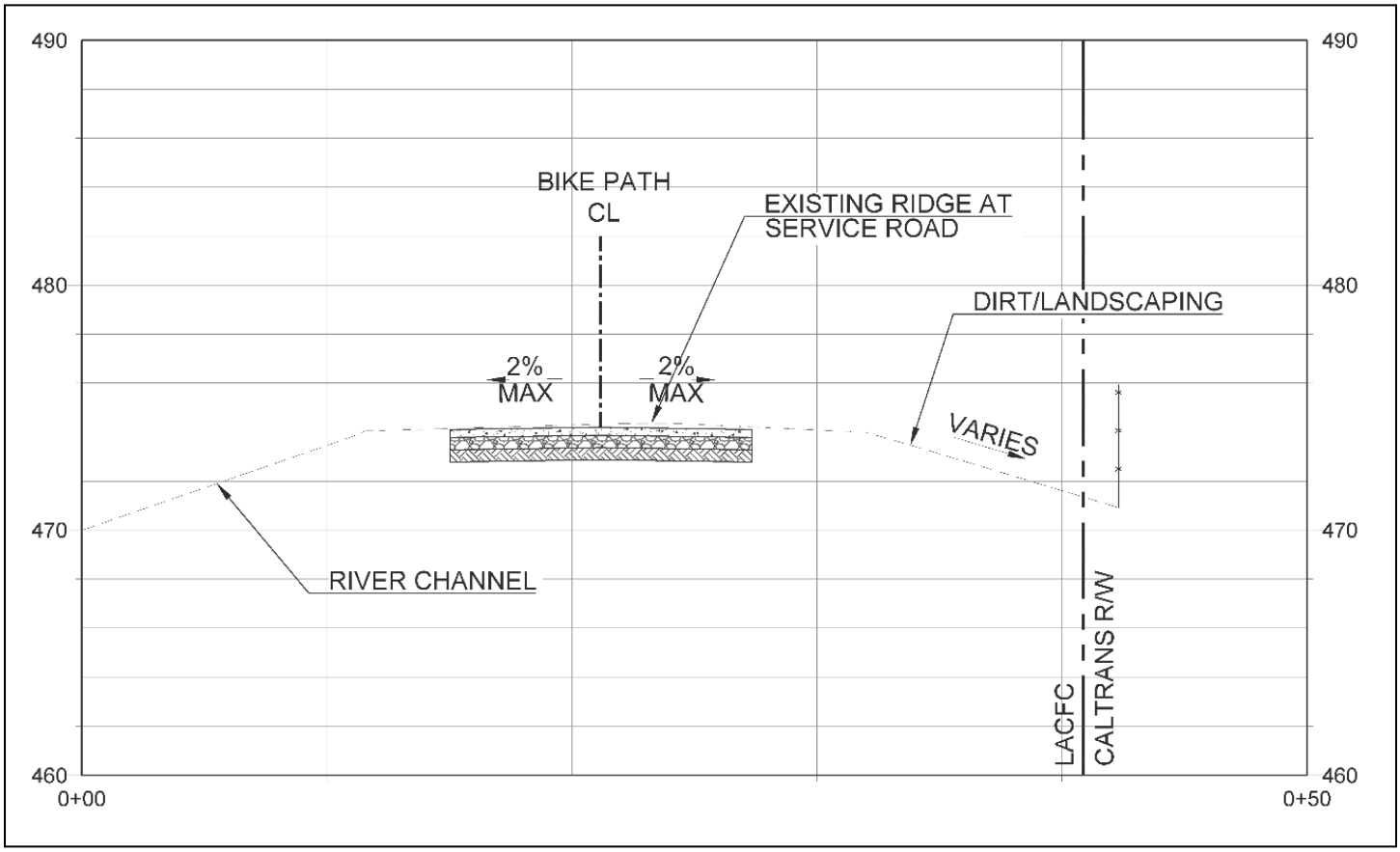


Figure 21: Typical Section A - Proposed bike path with crown for drainage purposes

E. Existing Conditions Hydrology Calculations

1. Existing Conditions Drainage Subareas - Stormwater Run-off Calculations

Exhibit “C” illustrates the existing hydrologic conditions for the project site. Calculations were performed using the LA County HydroCalc software for all existing conditions drainage subareas. Refer to Attachment “1” for input/output HydroCalc calculations for all subareas.

Table 1: Existing Conditions Input Data - 25 & 50-Year/24-Hour Events

Sub-Area	Area (acres)	Flow Path (ft)	Slope	Rainfall Depth (in)	Impervious Fraction	Soil Classification
A-1	0.5737	71	0.018	6.65	0.69	15
A-2	0.2189	24	0.02	6.65	0.79	15
A-3	0.1241	58	0.095	6.65	0.40	15
A-4	0.4516	468	0.02	6.65	0.55	15
A-5	1.3491	50	0.235	6.65	0.19	15
Cumulative	2.7175	468	.02	6.65	0.41	15

Table 2: Existing Conditions Calculations Summary - 25 Year/24-Hour Event

Sub-Area	A-1	A-2	A-3	A-4	A-5	Cumulative
Tc (min)	5	5	5	7	5	8
V25 (cu-ft)	7937	3391	1107	5236	7519	25110

Table 3: Existing Conditions Calculations Summary - 50 Year/24-Hour Event

Sub-Area	A-1	A-2	A-3	A-4	A-5	Cumulative
Tc (min)	5	5	5	6	5	7
V50 (cu-ft)	9058	3866	1269	5986	8674	28779

F. Proposed Conditions Hydrology Calculations and Summary

1. Proposed Conditions Drainage Subareas - Stormwater Runoff Calculations

Exhibit “D” illustrates the proposed conditions hydrologic study area for the project site. Refer to Attachment “2” for input/output calculations for the proposed conditions subareas.

Table 4: Proposed Conditions Input Data - 50 Year/24 Hour Event

Sub-Area	Area (acres)	Flow Path (ft)	Slope	Rainfall Depth (in)	Impervious Fraction	Soil Classification
A-1	0.5061	71	0.015	6.65	0.53	15
A-2	0.2516	27	0.015	6.65	0.81	15
A-3	0.1421	37	0.015	6.65	0.40	15
A-4	0.5181	22	0.015	6.65	0.56	15
A-5	1.3491	50	0.015	6.65	0.22	15

Table 5: Proposed Conditions Calculations Summary - 25 Year/24 Hour Event

Sub-Area	A-1	A-2	A-3	A-4	A-5	Cumulative
TC (min)	5	5	5	7	5	8
V_{25} (cu-ft)	5641	3976	1288	6092	8227	25158
Delta (%)	-28.92%	17.25%	16.35%	16.34%	9.51%	0.19%

Table 6: Proposed Conditions Calculations Summary - 50 Year/24 Hour Event

Sub-Area	A-1	A-2	A-3	A-4	A-5	Cumulative
TC (min)	5	5	5	5	5	8
V_{50} (cu-ft)	6449	4533	1475	6964	9476	25110
Delta (%)	-28.8%	17.25%	16.23%	16.34%	9.25%	0.15%

From these calculations it has been determined that replacing the existing 10ft wide service road with a new 12ft wide bike path, and additional 10ft wide equestrian trail, will not add a significant amount of runoff into the LA River Flood Channel.

G. Low Impact Development Calculations and Mitigation

1. LID Calculations

This development is categorized as a “designated project” per the LA County Low Impact Developement (LID) Standards Manual, and will be designed to capture and retain 100 percent of the Stormwater Quality Drainage Volume (SWQDv) on-site. If on-site infiltration is determined to be infeasible, 1.5 times the SWQDv will be captured and retained off-site.

LID calculations were performed for the proposed conditions sub-areas shown on Exhibit “D”. LID volumes were calculated using HydroCalc provided by LA County. Per the LID Standard Manual (February 2014), the design storm used to calculate the SWQDv, is defined as the greater of:

- The 0.75-inch, 24-hour rain event; or
- The 85th percentile, 24-hour rain event as determined from the LA County 85th percentile precipitation isohyetal map

The 85th percentile, 24-hour rain event was determined to be 1-inch from the isohyetal map shown on Exhibit “B”. This 1-inch rainfall depth is larger than the 0.75-inch rain event, so 1-inch was used for the LID Calculations below:

Table 7: LID Calculations - 85th Percentile/24-Hour Rain Event

Sub-Area	Area (acres)	Flow Path (ft)	Slope	Rainfall Depth (in)	Impervious Fraction	Soil Classification
A-1	0.6324	71	0.015	1	0.62	15
A-2	0.2516	27	0.015	1	0.81	15
A-3	0.1421	37	0.015	1	0.40	15
A-4	0.5181	22	0.015	1	0.56	15
A-5	1.3491	50	0.015	1	0.22	15

Table 8: LID Calculations Summary - 85th Percentile/24-Hour Rain Event

Sub-Area	SWQDv (cu-ft)
A-1	1358
A-2	678
A-3	214
A-4	1029
A-5	1332
Cumulative	4611

To satisfy the LA County LID requirements for “designated projects”, the proposed project will:

- Capture and retain 100 percent of the SWQDv on-site; OR
- Capture and retain 1.5 times the SWQDv off-site; OR
- Capture the SWQDv using engineered, pre-cast solutions and infiltrate directly to the groundwater

2. Mitigation

As a “designated project” this site is required to treat 100 percent of the SWQDv on-site (if feasible). The treatment will be provided by infiltration through Bioretention BMPs. Below are the preliminary calculations to size the BMP with a 96 hour drawdown time:

1. Minimum infiltration rate per LID Manual = 0.5 in/hr
2. Maximum water depth that can be drawdown in 96 hours

   0.5 in/hr x 96 hrs = 48 in = 4 ft
3. Select ponding depth that is less than the maximum water depth (1.5ft max) = 1.5 ft
4. Calculate the bioretention surface area

   A = 4611 cu-ft / 1.5ft = 3074 sf

3. Site Specific Permanent Source Control Measures

The site specific source control measures tabulated below are proposed for the project in accordance with the LA County LID requirements:

Table 9: Site Specific Source Control Measures

LID BMP	Objective	BMP for LID Name	Description
S-1	Source Control	Storm Drain Message and Signage	Informs the public that dumping of wastes into the storm drain inlets is prohibited and/or that the drain ultimately discharges into receiving waters
S-8	Source Control	Landscape Irrigation Practices	Not applicable to the project.
S-9	Source Control	Building Materials Selection	The use of alternative building material can reduce pollutant sources in stormwater runoff by eliminating compounds that can leach into stormwater runoff

H. Summary

Per the findings of this hydrology study, construction of the proposed project will result in a negligible increase of stormwater runoff into the LA River Flood Channel. This is due to the small increases in impervious areas for sub-areas A-2 through A-5, while sub-area A-1 saw a reduction by nearly 29%.

In order to meet LID requirements, the project will capture, retain, and, if feasible, infiltrate the calculated SWQDv on-site through bioretention. If on-site infiltration is found to be infeasible, off-site retention and infiltration will be an alternative. If off-site infiltration is found to be infeasible, the 2nd alternative will be to capture, treat, and infiltrate directly into the groundwater on-site through engineered, pre-cast solutions. The design data is provided in Section G, LID Calculations Section, to complete the design documents.

II. Water Quality for Construction BMPs

The project will implement Best Management Practices (BMP's) per the LA County Department of Public Works (LACDPW) Construction Site Best Management Practices Manual. The project will implement BMP's to protect water quality and to prevent waste and wash water from entering the LA River flood channel which may include, but will not be limited to:

1. SS-1 Scheduling
    a. The project will be scheduled to reduce the amount and duration of soil exposed to erosion by wind, rain, run-off, and vehicle tracking.
2. SC-6 Gravel Bag Berm
    a. Gravel Bag Berms will in installed along the exposed hillsides near the west side of the project to break up the sheet flow lengths and prevent sediment discharge into the flood channel
3. SC-8 Sandbag Barrier
    a. Sandbags will be installed below the toe of the exposed hillside adjacent to the flood channel as well as the perimeter of the project site to prevent sediment discharge into the flood channel
4. NS-1 Water Conservation Practices:
    a. Reasonable measures will be taken to prevent water from flowing offsite.
    b. Paved areas will be swept and vacuumed, not washed.
    c. Vehicles and equipment will not be washed on-site.
    d. Construction water run-off will be directed to areas where it can infiltrate into the existing ground.
5. NS-3 Paving and Grinding Operations:
    a. Plastic materials will be placed under all asphaltic concrete paving equipment when not in use to prevent drips and spills into the soil.
    b. Washing of asphalt equipment will not be conducted on-site.
6. NS-8 Vehicle and Equipment Cleaning:

    a. All vehicles/equipment that regularly enter and leave the construction site will be cleaned off-site.
    b. Reasonable measures will be taken to prevent wash or rinse run-off from entering pervious site surfaces.
7. WM-3 Stockpile Management:
    a. Stockpiles will be located a minimum of 50 ft away from concentrated flows of storm water and drainage courses.
    b. Loose stockpile materials will be covered at all times when not actively in use.
    c. Soil stockpiles will be protected with a temporary perimeter sediment barrier.
8. WM-8 Concrete Waste Management:
    a. Concrete washout areas and other washout areas will not discharge or leak onto the underlying soil. Concrete washout bins will be recommended.

EXHIBIT A

Los Angeles County Soil and 50-yr, 24-hr Isohyet Map

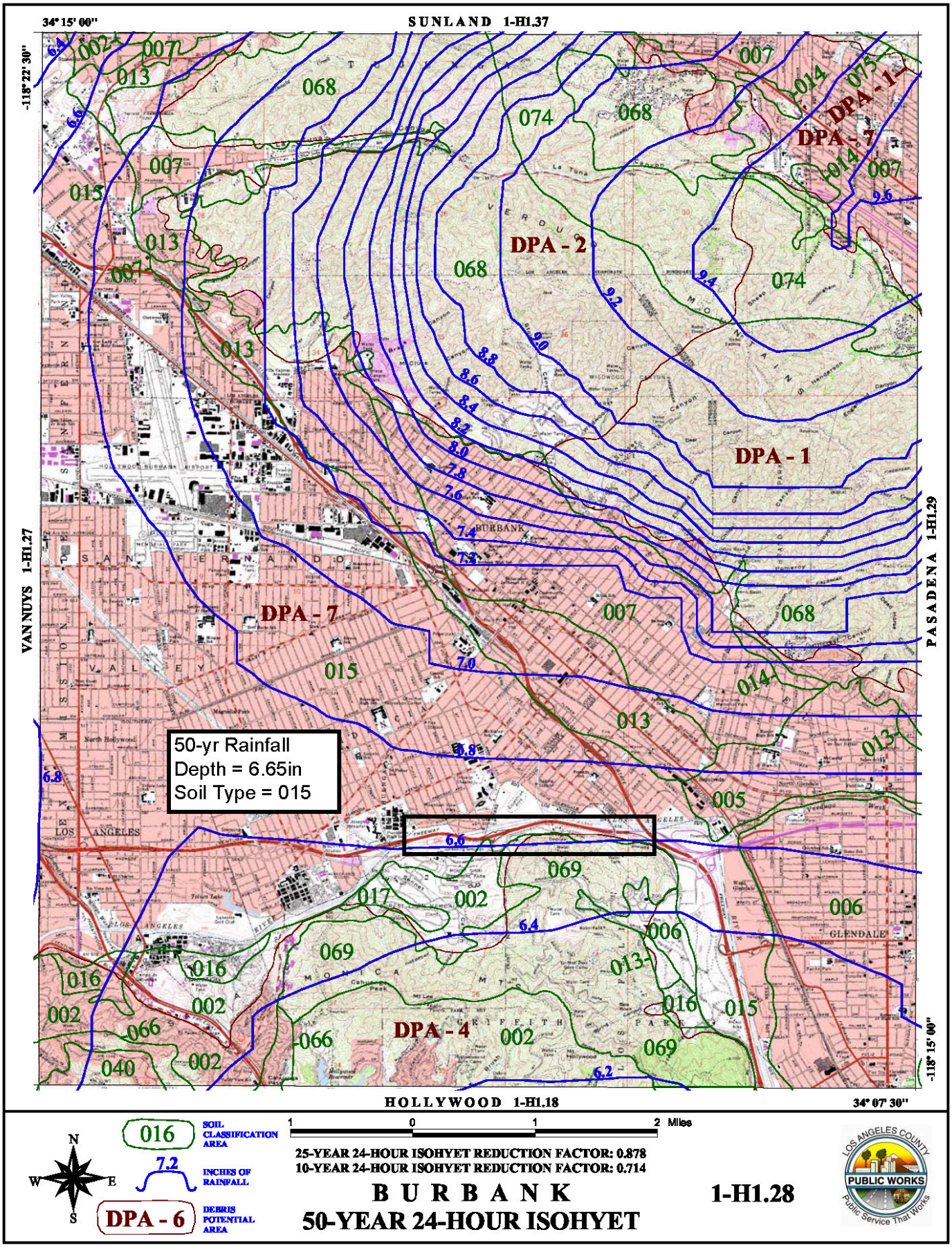

34° 15' 00"
SUNLAND 1-H1.37
-118° 22' 30"
VAN NUYS 1-H1.27
PASADENA 1-H1.29
-118° 15' 00"
HOLLYWOOD 1-H1.18
34° 07' 30"
DPA - 1
DPA - 2
DPA - 4
DPA - 7
50-yr Rainfall
Depth = 6.65in
Soil Type = 015
SAN FERNANDO VALLEY
BURBANK
GLENDALE
LOS ANGELES
SANTA MONICA MTS
VERDUGO MTS
1 0 1 2 Miles
016 SOIL CLASSIFICATION AREA
7.2 INCHES OF RAINFALL
DPA - 6 DEBRIS POTENTIAL AREA
25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714
B U R B A N K
50-YEAR 24-HOUR ISOHYET
1-H1.28
LOS ANGELES COUNTY PUBLIC WORKS
Public Service That Works

EXHIBIT B

Los Angeles County 85th Percentile 24-hour Rainfall Depth

85th Percentile 24-hr Rainfall Isohyetal Map

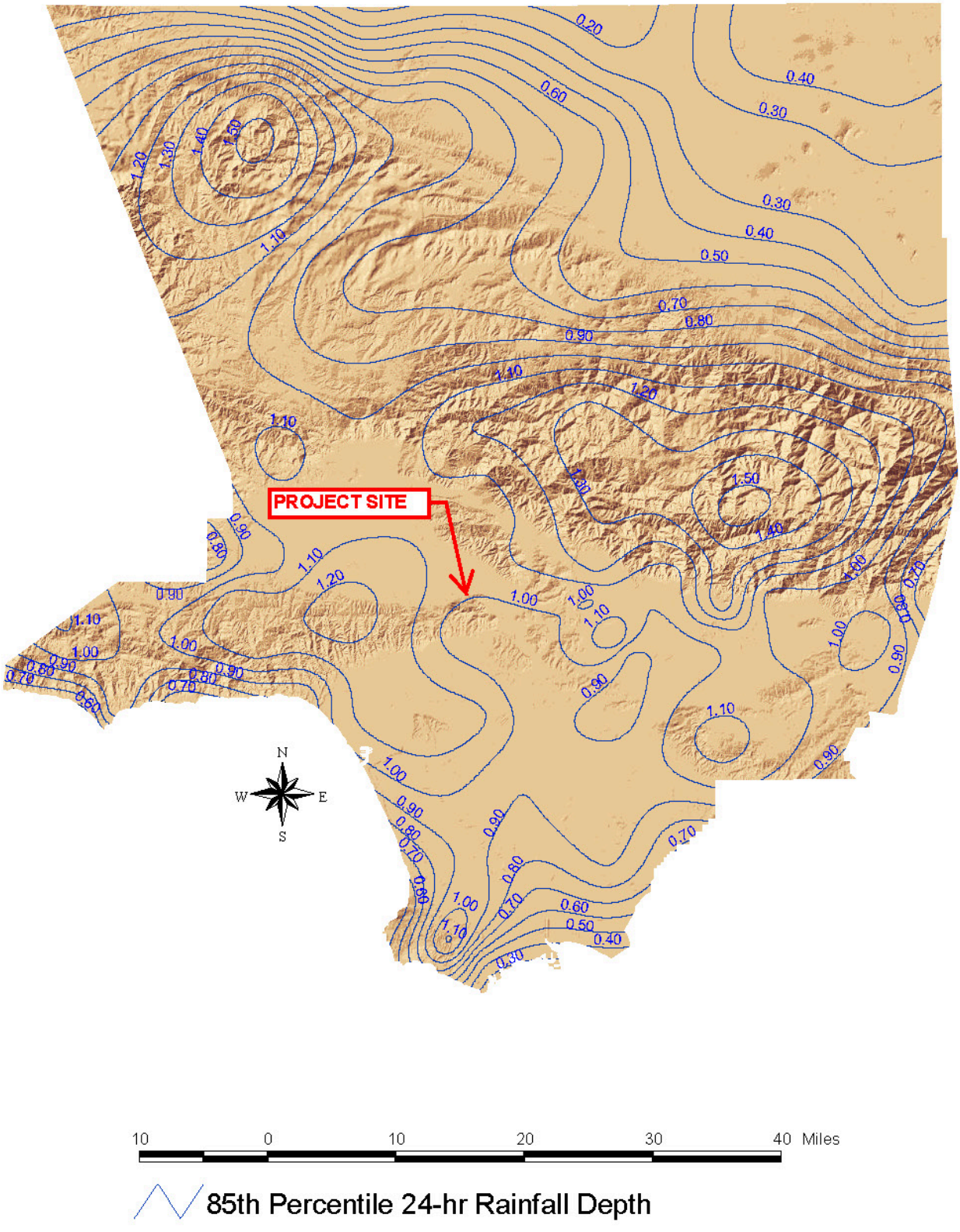
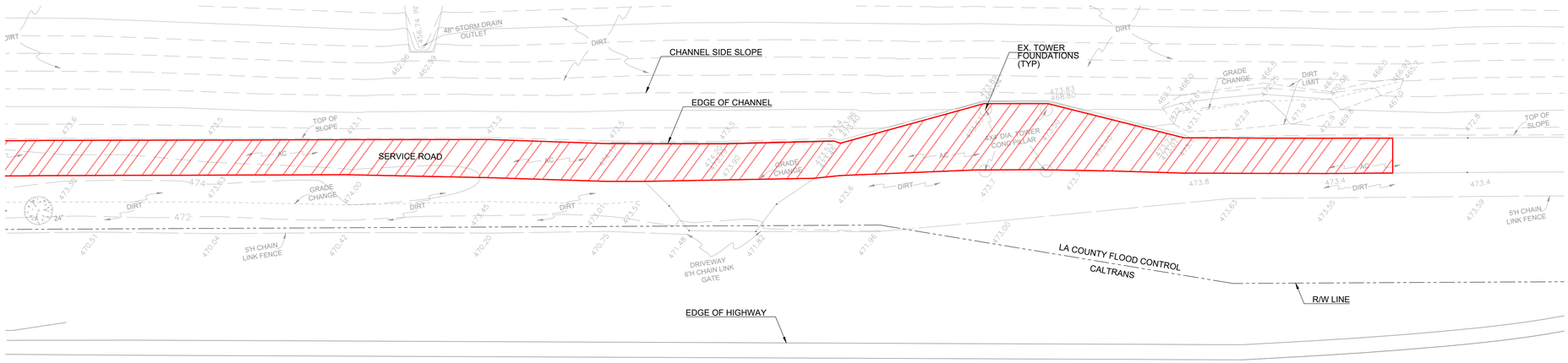
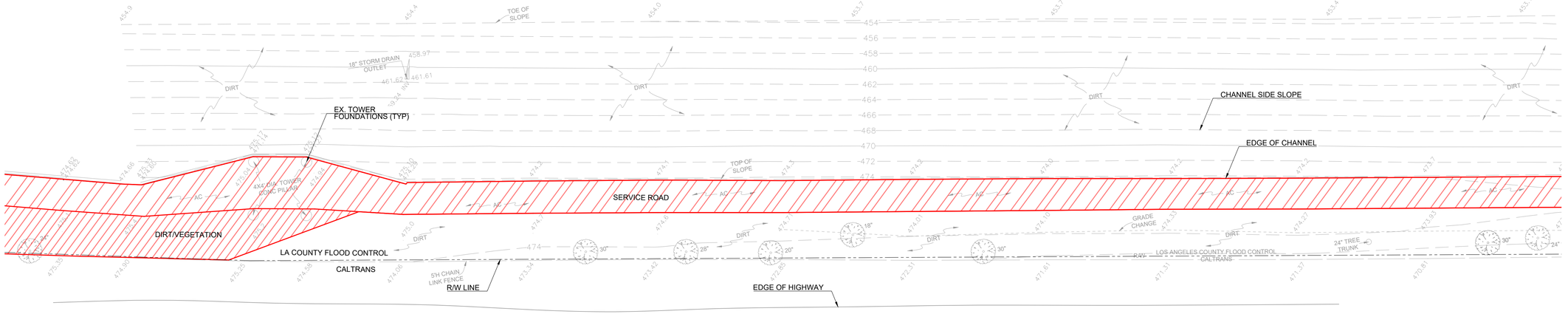
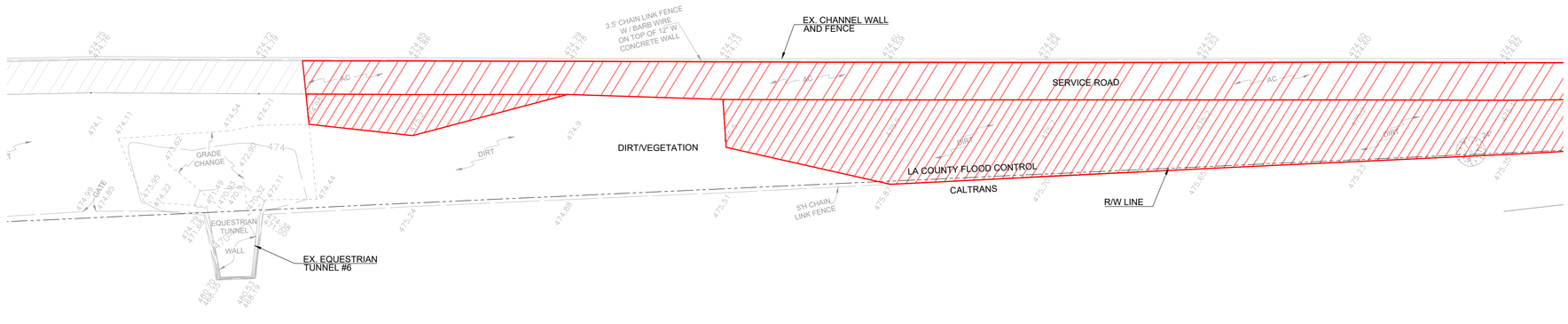


EXHIBIT C

Existing Conditions Hydrologic Study Area







0 10' 20' 40'

STREET SERVICES, 2.12.18

BUREAU OF STREET SERVICES

DESIGN BUILD

NO	REVISION DESCRIPTION	DATE	BY

INDEX NO.

DEPARTMENT OF PUBLIC WORKS

KEITH MOZEE
EXECUTIVE DIRECTOR & GENERAL MANAGER

ENGINEERING SERVICES DIVISION

	INITIAL	DATE
DESIGNED BY: T. SARKISYAN		
CHECKED BY: R. ACOSTA		
APPROVED BY: R. ACOSTA		
APPROVED BY PROJECT MGR. R. ACOSTA		

CITY OF LOS ANGELES

VERTICAL CONTROL: [VCONTROL]
HORIZONTAL CONTROL: [HCONTROL]

SHEET TITLE: EXISTING CONDITIONS HYDROLOGIC STUDY AREA

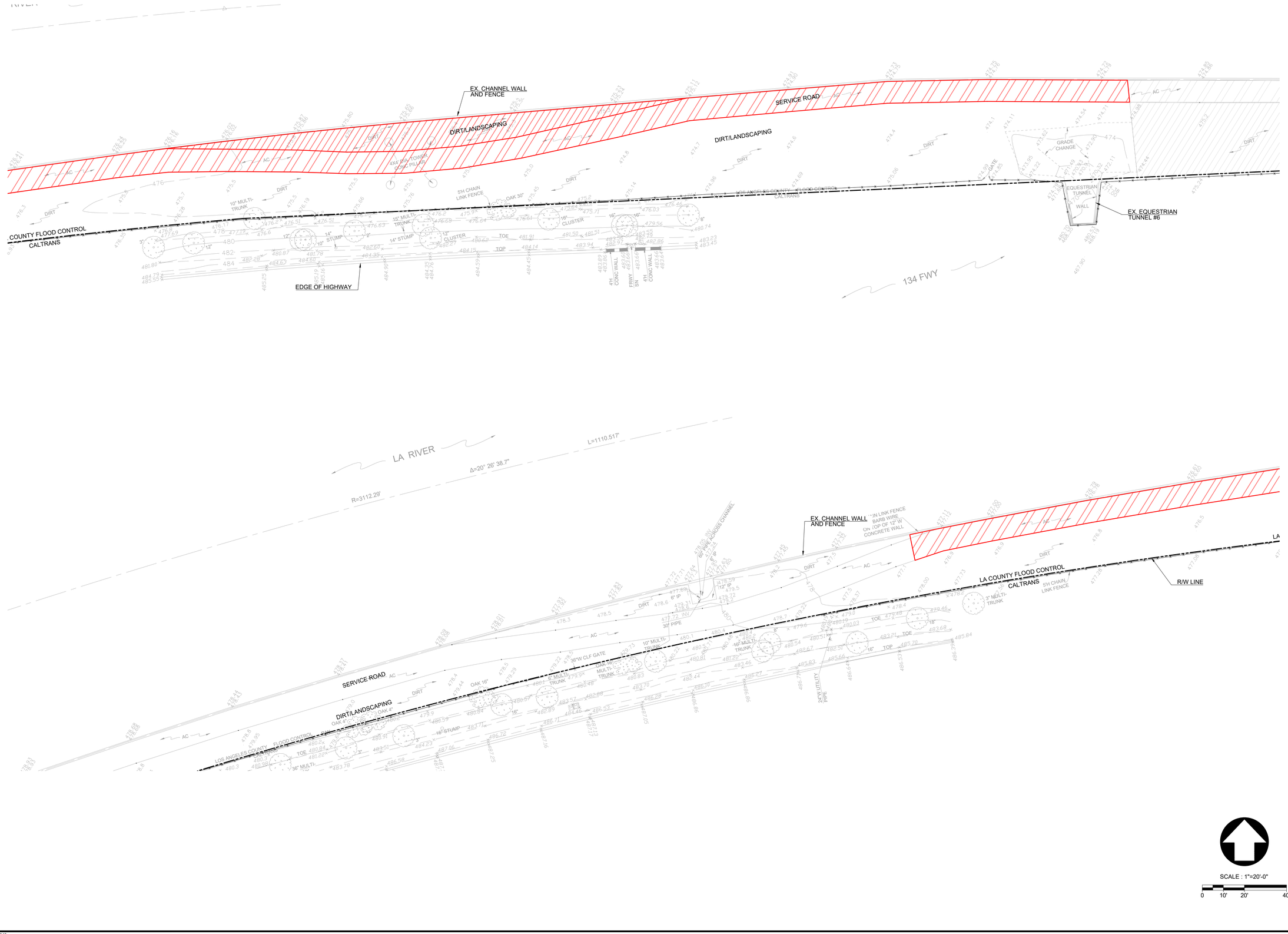
PROJECT: LA RIVER BIKEPATH PHASE IV

ADDRESS: LA RIVER BIKEPATH FROM RIVERSIDE DR TO FOREST LAWN DR

WORK ORDER NO.
M0014090

DRAWING NO.
A-1

SHEET 1 OF 5 SHEETS



CITY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

KEITH MOZEE
EXECUTIVE DIRECTOR & GENERAL MANAGER

ENGINEERING SERVICES DIVISION

DESIGNED BY: T. SARKISYAN
CHECKED BY: R. ACOSTA
APPROVED BY: R. ACOSTA
APPROVED BY PROJECT MGR.: R. ACOSTA

INITIAL	DATE

VERTICAL CONTROL : [VCONTROL]
HORIZONTAL CONTROL : [HCONTROL]

SHEET TITLE : EXISTING CONDITIONS HYDROLOGIC STUDY AREA

PROJECT : LA RIVER BIKEPATH PHASE IV

ADDRESS: LA RIVER BIKEPATH FROM RIVERSIDE DR TO FOREST LAWN DR

WORK ORDER NO.
M0014090

DRAWING NO.
A-2

SHEET 2 OF 5 SHEETS

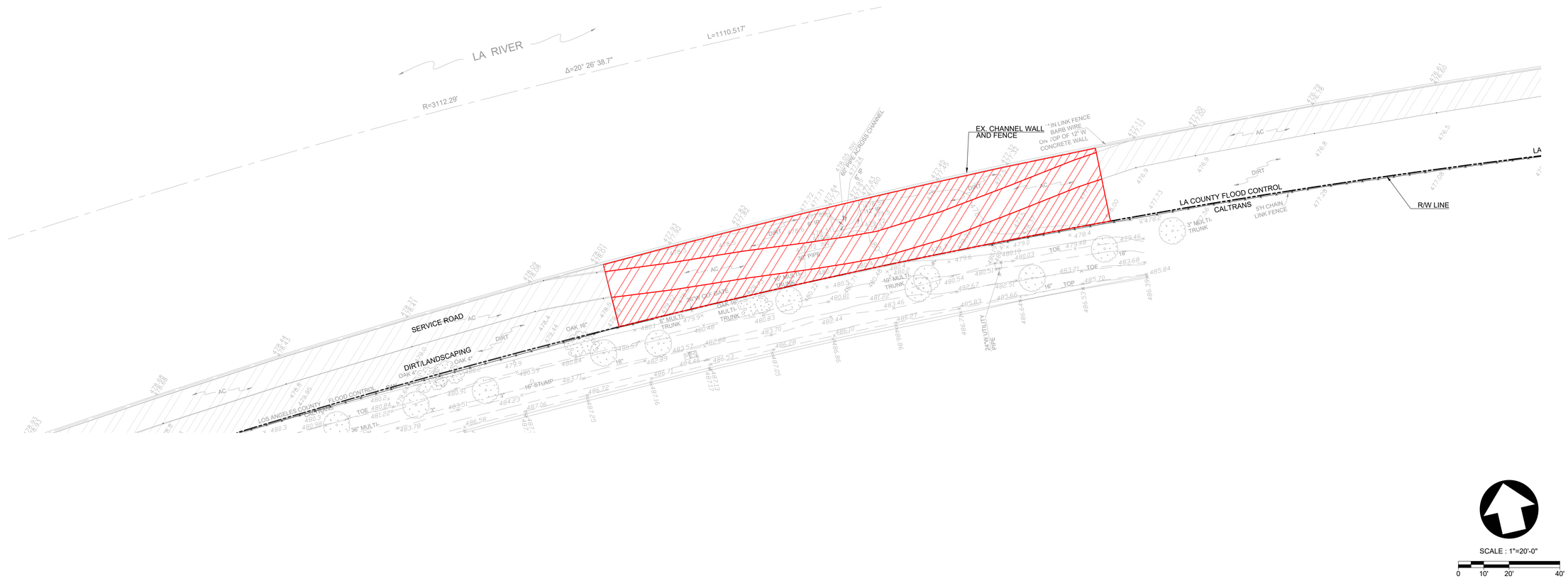
BUREAU OF STREET SERVICES

NO	REVISION DESCRIPTION	DATE	BY

CITY OF LOS ANGELES STREETS LA DESIGN BUILD

INDEX NO.

STREET SERVICES, 2.12.18



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CITY OF LOS ANGELES

VERTICAL CONTROL: [VCONTROL]
HORIZONTAL CONTROL: [HCONTROL]

SHEET TITLE: EXISTING CONDITIONS HYDROLOGIC STUDY AREA

PROJECT: LA RIVER BIKEPATH PHASE IV

ADDRESS: LA RIVER BIKEPATH FROM RIVERSIDE DR TO FOREST LAWN DR

WORK ORDER NO.
M0014090

DRAWING NO.
A-3

SHEET 3 OF 5 SHEETS

DEPARTMENT OF PUBLIC WORKS

KEITH MOZEE
EXECUTIVE DIRECTOR & GENERAL MANAGER

ENGINEERING SERVICES DIVISION

DESIGNED BY:	T. SARKISYAN
CHECKED BY:	R. ACOSTA
APPROVED BY:	R. ACOSTA
APPROVED BY PROJECT MGR.	R. ACOSTA

NO	REVISION DESCRIPTION	DATE	BY

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BUREAU OF STREET SERVICES

STREETS LA
DESIGN BUILD

INDEX NO.

STREET SERVICES, 2.12.18

SCALE : 1"=20'-0"

0 10' 20' 40'

CITY OF LOS ANGELES

VERTICAL CONTROL : [VCONTROL]
HORIZONTAL CONTROL : [HCONTROL]

SHEET TITLE : EXISTING CONDITIONS HYDROLOGIC STUDY AREA

PROJECT : LA RIVER BIKEPATH PHASE IV

ADDRESS: LA RIVER BIKEPATH FROM RIVERSIDE DR TO FOREST LAWN DR

WORK ORDER NO.
M0014090

DRAWING NO.
A-4

SHEET 4 OF 5 SHEETS

DEPARTMENT OF PUBLIC WORKS

KEITH MOZEE
EXECUTIVE DIRECTOR & GENERAL MANAGER

ENGINEERING SERVICES DIVISION

DESIGNED BY: T. SARKISYAN
CHECKED BY: R. ACOSTA
APPROVED BY: R. ACOSTA
APPROVED BY PROJECT MGR: R. ACOSTA

INITIAL | DATE

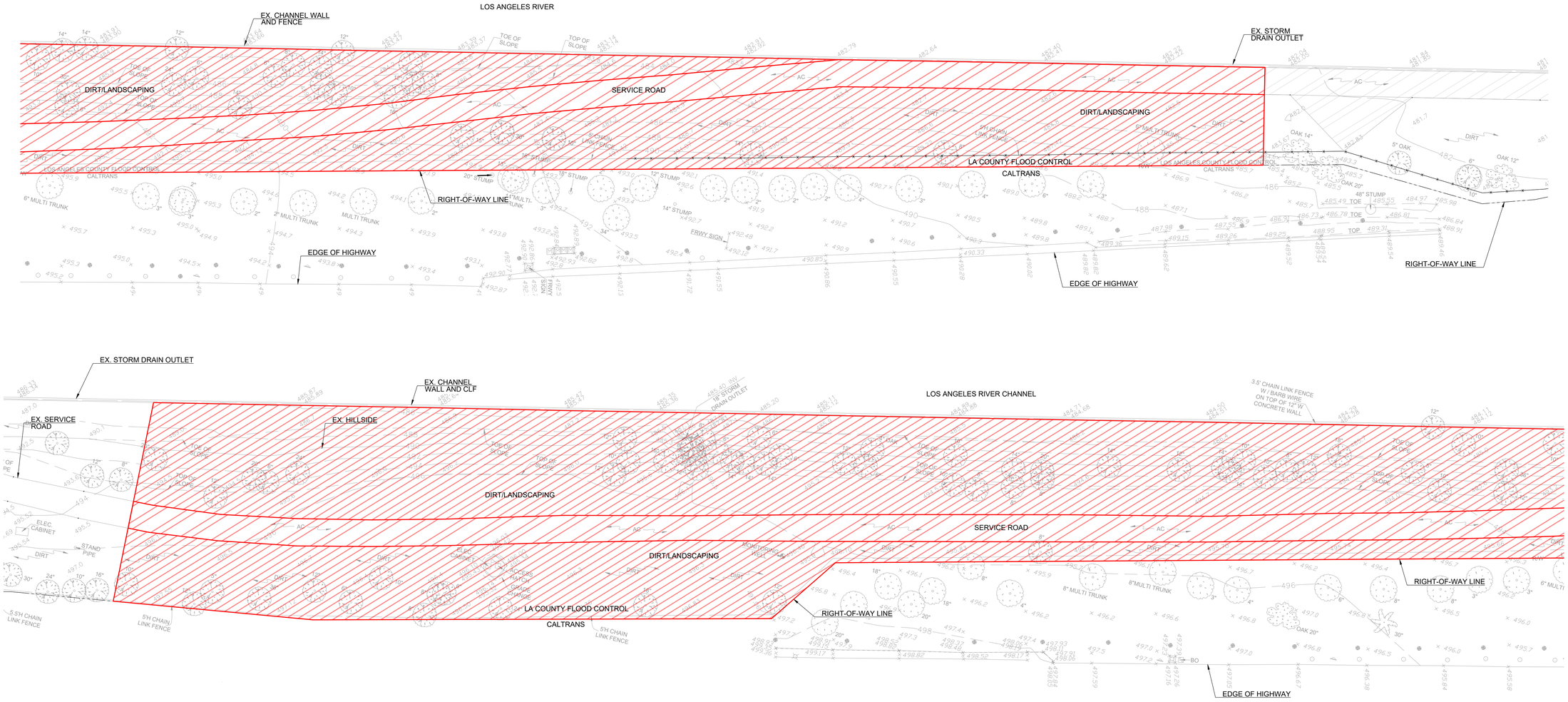
NO | REVISION DESCRIPTION | DATE | BY

INDEX NO.

BUREAU OF STREET SERVICES

CITY OF LOS ANGELES STREETS LA DESIGN BUILD

STREET SERVICES, 2.12.18



STREET SERVICES, 2.12.18

BUREAU OF STREET SERVICES

STREETS LA — DESIGN BUILD

NO	REVISION DESCRIPTION	DATE	BY

INDEX NO.

DEPARTMENT OF PUBLIC WORKS

KEITH MOZEE
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ENGINEERING SERVICES DIVISION

	INITIAL	DATE
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APPROVED BY:	R. ACOSTA	
APPROVED BY PROJECT MGR:	R. ACOSTA	

CITY OF LOS ANGELES

VERTICAL CONTROL: [VCONTROL]
HORIZONTAL CONTROL: [HCONTROL]

SHEET TITLE: EXISTING CONDITIONS HYDROLOGIC STUDY AREA

PROJECT: LA RIVER BIKEPATH PHASE IV

ADDRESS: LA RIVER BIKEPATH FROM RIVERSIDE DR TO FOREST LAWN DR

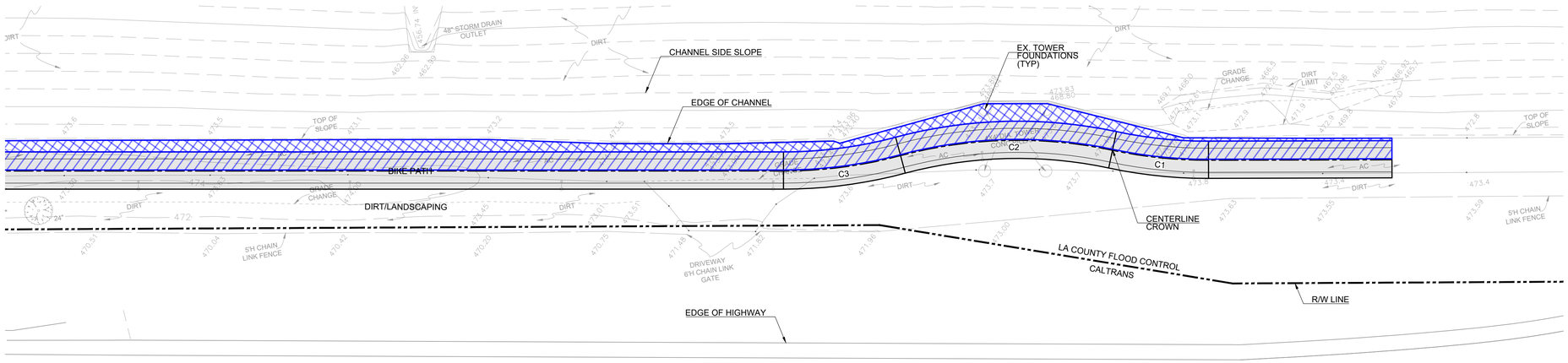
WORK ORDER NO.
M0014090

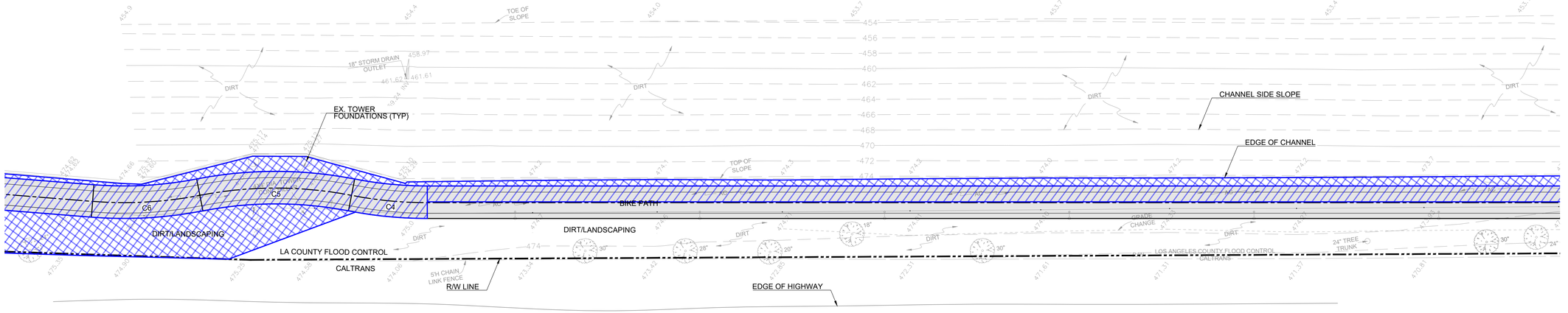
DRAWING NO.
A-5

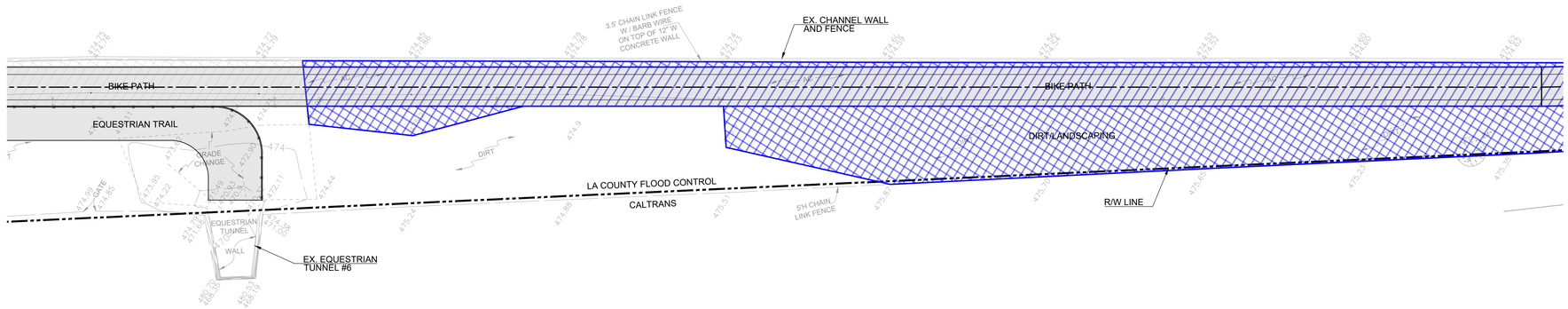
SHEET 5 OF 5 SHEETS

EXHIBIT D

Proposed Conditions Hydrologic Study Area







0 10' 20' 40'

CITY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

KEITH MOZEE
EXECUTIVE DIRECTOR & GENERAL MANAGER

BUREAU OF STREET SERVICES

ENGINEERING SERVICES DIVISION

STREETS LA
DESIGN BUILD

NO	REVISION DESCRIPTION	DATE	BY

INDEX NO.

	INITIAL	DATE
DESIGNED BY:	T. SARKISYAN	
CHECKED BY:	R. ACOSTA	
APPROVED BY:	R. ACOSTA	
APPROVED BY PROJECT MGR.	R. ACOSTA	

VERTICAL CONTROL: [VCONTROL]
HORIZONTAL CONTROL: [HCONTROL]

SHEET TITLE: PROPOSED CONDITIONS HYDROLOGIC STUDY AREA

PROJECT: LA RIVER BIKEPATH PHASE IV

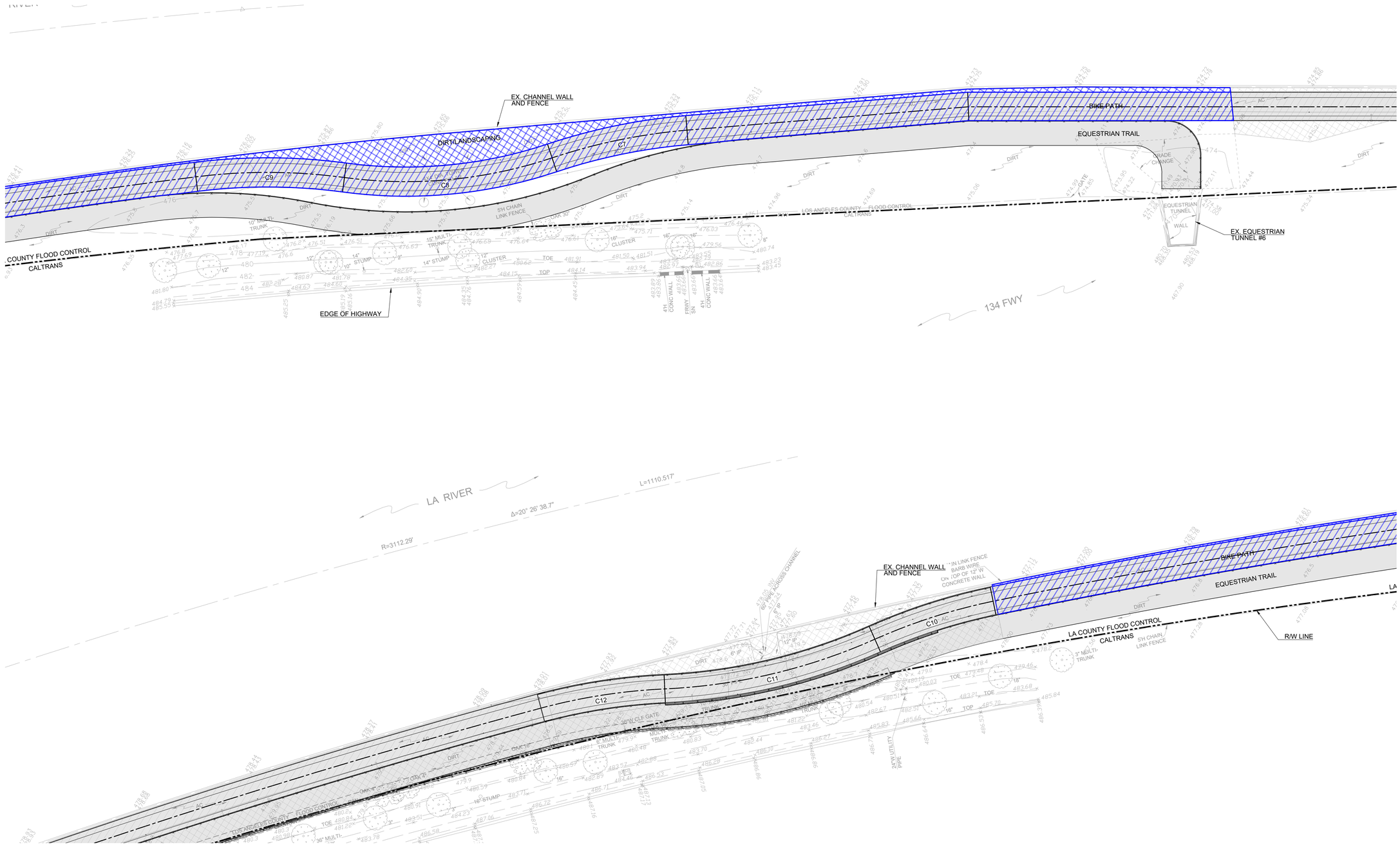
ADDRESS: LA RIVER BIKEPATH FROM RIVERSIDE DR TO FOREST LAWN DR

WORK ORDER NO.
M0014090

DRAWING NO.
A-1

SHEET 1 OF 5 SHEETS

STREET SERVICES, 2.12.18



CITY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

KEITH MOZEE
EXECUTIVE DIRECTOR & GENERAL MANAGER

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DESIGNED BY: T. SARKISYAN
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APPROVED BY: R. ACOSTA
PROJECT MGR.

INITIAL	DATE

VERTICAL CONTROL - [VCONTROL]
HORIZONTAL CONTROL - [HCONTROL]

SHEET TITLE : PROPOSED CONDITIONS HYDROLOGIC STUDY AREA

PROJECT : LA RIVER BIKEPATH PHASE IV

ADDRESS: LA RIVER BIKEPATH FROM RIVERSIDE DR TO FOREST LAWN DR

WORK ORDER NO.
M0014090

DRAWING NO.
A-2

SHEET 2 OF 5 SHEETS

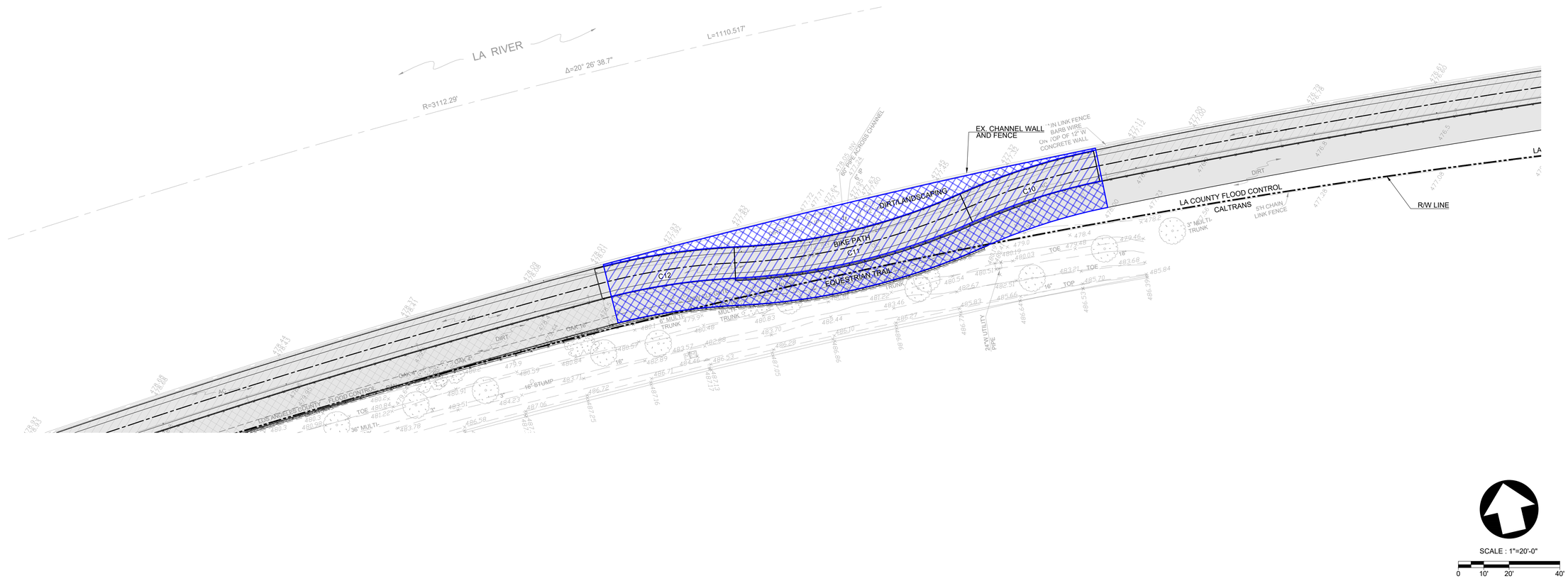
BUREAU OF STREET SERVICES

STREETS LA
DESIGN BUILD

NO	REVISION DESCRIPTION	DATE	BY

INDEX NO.

STREET SERVICES, 2.12.18



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CITY OF LOS ANGELES

VERTICAL CONTROL: [VCONTROL]
HORIZONTAL CONTROL: [HCONTROL]

SHEET TITLE : PROPOSED CONDITIONS HYDROLOGIC STUDY AREA

PROJECT : LA RIVER BIKEPATH PHASE IV

ADDRESS: LA RIVER BIKEPATH FROM RIVERSIDE DR TO FOREST LAWN DR

WORK ORDER NO.
M0014090

DRAWING NO.
A-3

SHEET 3 OF 5 SHEETS

DEPARTMENT OF PUBLIC WORKS

EXECUTIVE DIRECTOR & GENERAL MANAGER
KEITH MOZEE

ENGINEERING SERVICES DIVISION

DESIGNED BY: T. SARKISYAN
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APPROVED BY: R. ACOSTA
APPROVED BY PROJECT MGR.: R. ACOSTA

NO	REVISION DESCRIPTION	DATE	BY

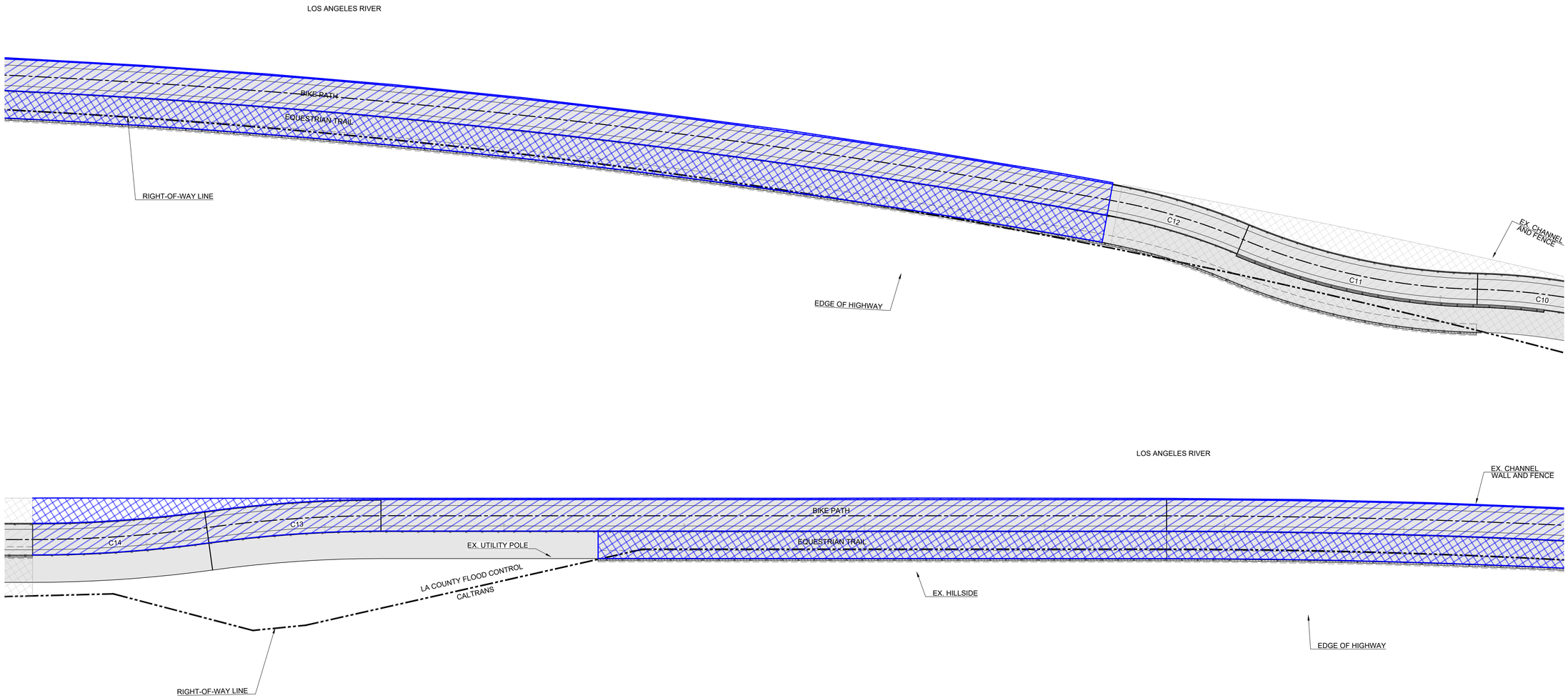
INITIAL | DATE

INDEX NO.

BUREAU OF STREET SERVICES

CITY OF LOS ANGELES STREETS LA DESIGN BUILD

STREET SERVICES, 2.12.18



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0 10' 20' 40'

STREET SERVICES, 2.12.18

BUREAU OF STREET SERVICES

DEPARTMENT OF PUBLIC WORKS

CITY OF LOS ANGELES

STREETS LA

DESIGN BUILD

NO	REVISION DESCRIPTION	DATE	BY

INDEX NO.

KEITH MOZEE
EXECUTIVE DIRECTOR & GENERAL MANAGER

	INITIAL	DATE
ENGINEERING SERVICES DIVISION		
DESIGNED BY: T. SARKISYAN		
CHECKED BY: R. ACOSTA		
APPROVED BY: R. ACOSTA		
APPROVED BY PROJECT MGR. R. ACOSTA		

VERTICAL CONTROL : [VCONTROL]
HORIZONTAL CONTROL : [HCONTROL]

SHEET TITLE : PROPOSED CONDITIONS HYDROLOGIC STUDY AREA

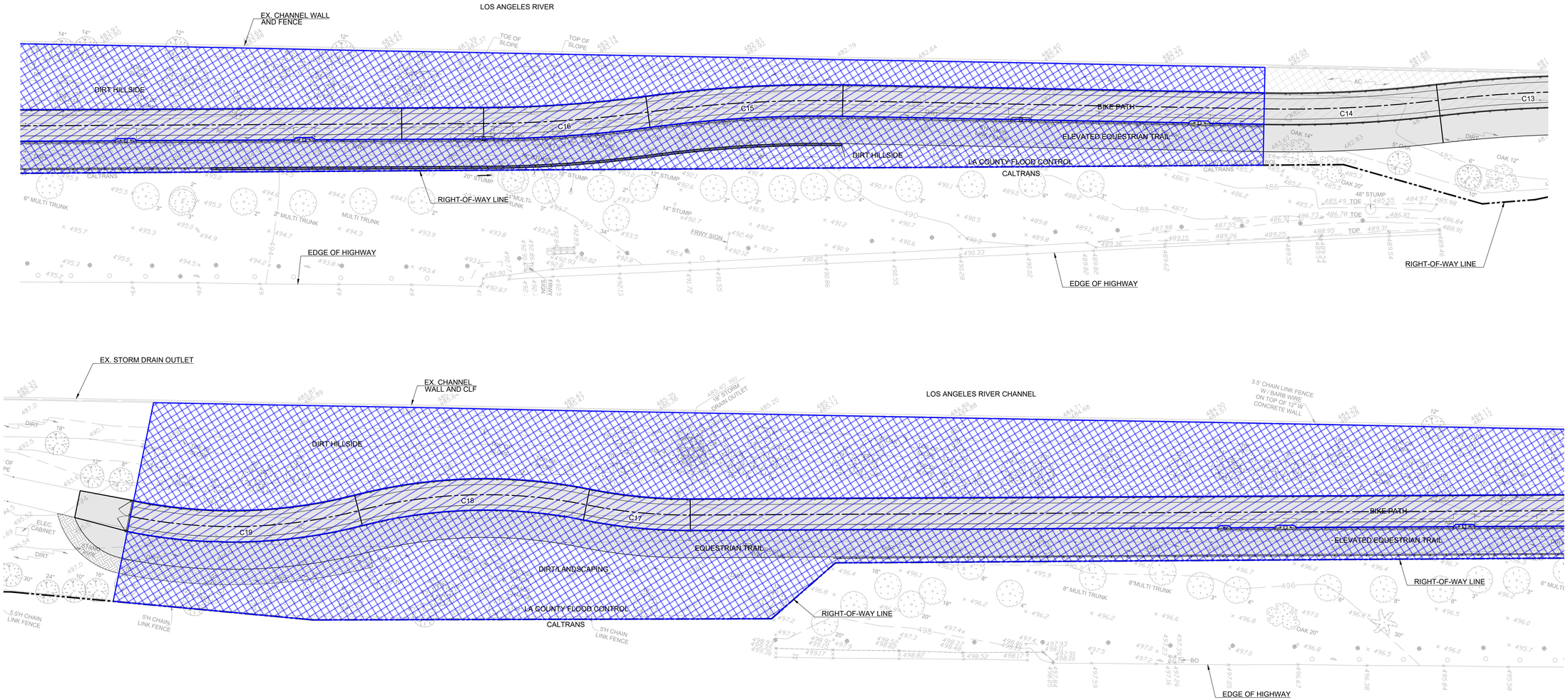
PROJECT : LA RIVER BIKEPATH PHASE IV

ADDRESS: LA RIVER BIKEPATH FROM RIVERSIDE DR TO FOREST LAWN DR

WORK ORDER NO.
M0014090

DRAWING NO.
A-4

SHEET 4 OF 5 SHEETS



STREET SERVICES, 2.12.18

CITY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
BUREAU OF STREET SERVICES
DESIGN BUILD

KEITH MOZEE
EXECUTIVE DIRECTOR & GENERAL MANAGER

ENGINEERING SERVICES DIVISION

NO	REVISION DESCRIPTION	DATE	BY

INDEX NO.

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DESIGNED BY:	T. SARKISYAN	
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VERTICAL CONTROL : [VCONTROL]
HORIZONTAL CONTROL : [HCONTROL]

SHEET TITLE : PROPOSED CONDITIONS HYDROLOGIC STUDY AREA

PROJECT : LA RIVER BIKEPATH PHASE IV

ADDRESS: LA RIVER BIKEPATH FROM RIVERSIDE DR TO FOREST LAWN DR

WORK ORDER NO.
M0014090

DRAWING NO.
A-5
SHEET 5 OF 5 SHEETS

ATTACHMENT 1

Existing Conditions

25-yr and 50-yr HydroCalc Calculations

Peak Flow Hydrologic Analysis

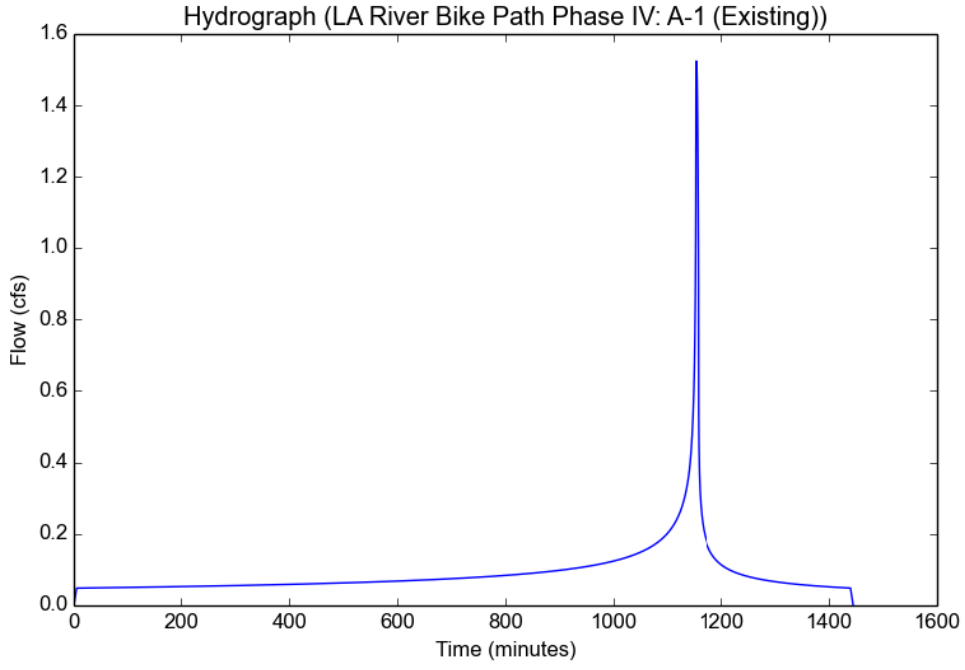
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 1 - Existing Conditic
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-1 (Existing)
Area (ac)	0.5737
Flow Path Length (ft)	71.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.69
Soil Type	15
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.8387
Peak Intensity (in/hr)	3.4835
Undeveloped Runoff Coefficient (Cu)	0.4569
Developed Runoff Coefficient (Cd)	0.7626
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.5241
Burned Peak Flow Rate (cfs)	1.5241
24-Hr Clear Runoff Volume (ac-ft)	0.1822
24-Hr Clear Runoff Volume (cu-ft)	7937.4764



Peak Flow Hydrologic Analysis

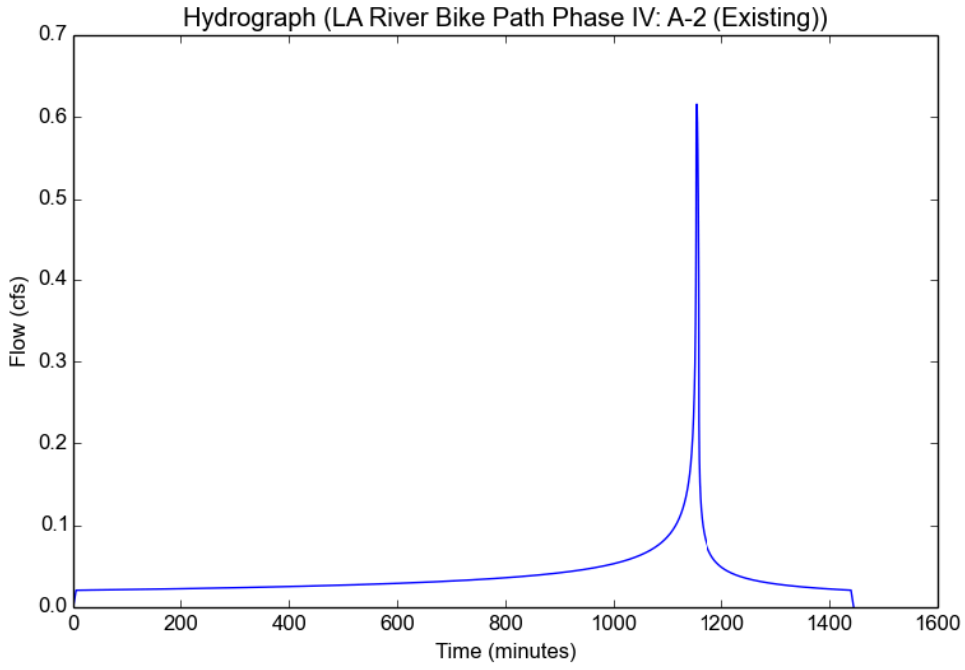
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 1 - Existing Conditi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-2 (Existing)
Area (ac)	0.2189
Flow Path Length (ft)	47.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.791
Soil Type	15
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.8387
Peak Intensity (in/hr)	3.4835
Undeveloped Runoff Coefficient (Cu)	0.4569
Developed Runoff Coefficient (Cd)	0.8074
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.6157
Burned Peak Flow Rate (cfs)	0.6157
24-Hr Clear Runoff Volume (ac-ft)	0.0778
24-Hr Clear Runoff Volume (cu-ft)	3391.0396



Peak Flow Hydrologic Analysis

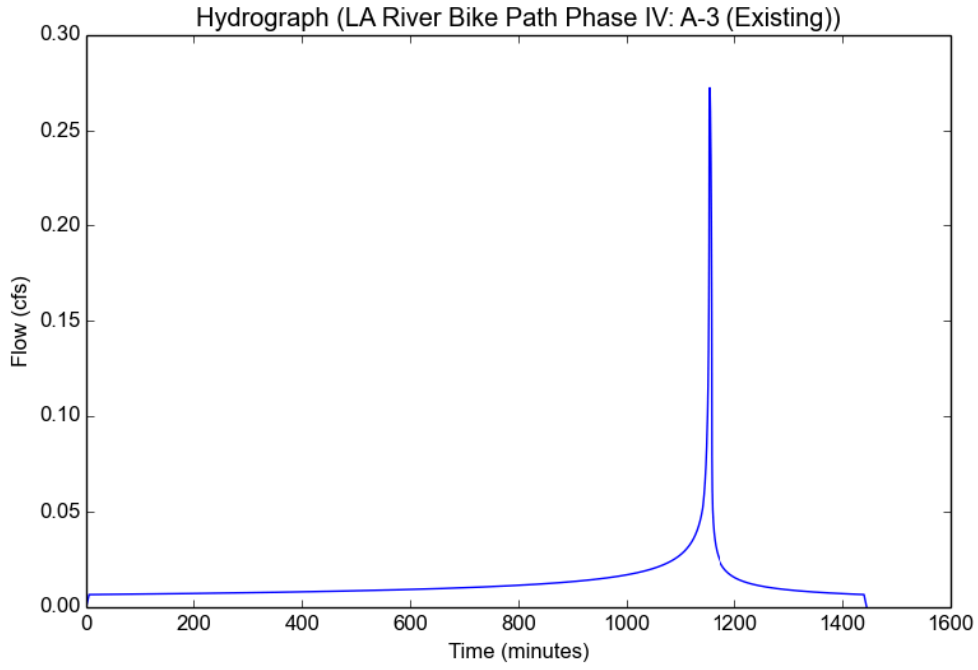
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 1 - Existing Conditi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-3 (Existing)
Area (ac)	0.1242
Flow Path Length (ft)	47.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.39
Soil Type	15
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.8387
Peak Intensity (in/hr)	3.4835
Undeveloped Runoff Coefficient (Cu)	0.4569
Developed Runoff Coefficient (Cd)	0.6297
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.2724
Burned Peak Flow Rate (cfs)	0.2724
24-Hr Clear Runoff Volume (ac-ft)	0.0254
24-Hr Clear Runoff Volume (cu-ft)	1107.5795



Peak Flow Hydrologic Analysis

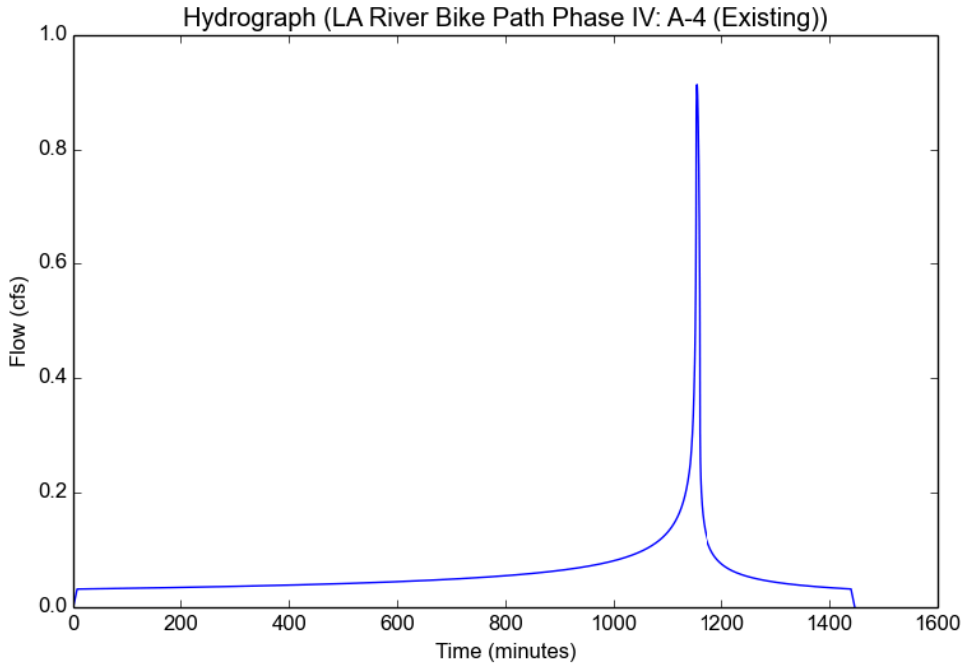
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 1 - Existing Conditi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-4 (Existing)
Area (ac)	0.4516
Flow Path Length (ft)	468.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.554
Soil Type	15
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.8387
Peak Intensity (in/hr)	2.974
Undeveloped Runoff Coefficient (Cu)	0.4075
Developed Runoff Coefficient (Cd)	0.6803
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	0.9137
Burned Peak Flow Rate (cfs)	0.9137
24-Hr Clear Runoff Volume (ac-ft)	0.1202
24-Hr Clear Runoff Volume (cu-ft)	5236.3629



Peak Flow Hydrologic Analysis

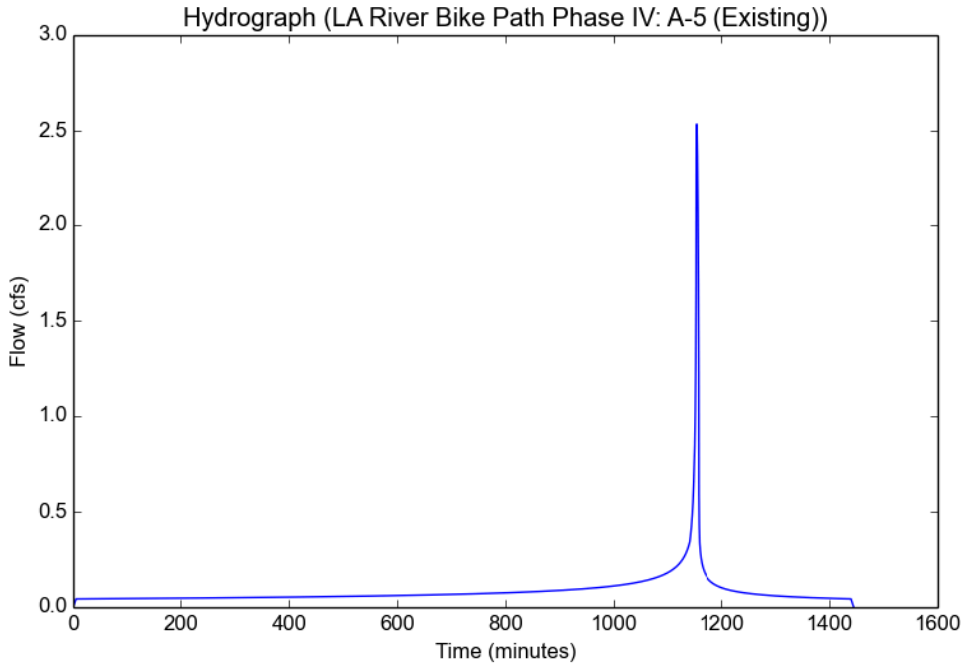
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 1 - Existing Conditi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-5 (Existing)
Area (ac)	1.3491
Flow Path Length (ft)	50.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.186
Soil Type	15
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.8387
Peak Intensity (in/hr)	3.4835
Undeveloped Runoff Coefficient (Cu)	0.4569
Developed Runoff Coefficient (Cd)	0.5393
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	2.5344
Burned Peak Flow Rate (cfs)	2.5344
24-Hr Clear Runoff Volume (ac-ft)	0.1726
24-Hr Clear Runoff Volume (cu-ft)	7519.2803



Peak Flow Hydrologic Analysis

File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 1 - Existing Conditi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-1, A-2, A-3, A-4, A-5 (Existing)
Area (ac)	2.7175
Flow Path Length (ft)	468.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.411
Soil Type	15
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.8387
Peak Intensity (in/hr)	2.7931
Undeveloped Runoff Coefficient (Cu)	0.3857
Developed Runoff Coefficient (Cd)	0.5971
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	4.5321
Burned Peak Flow Rate (cfs)	4.5321
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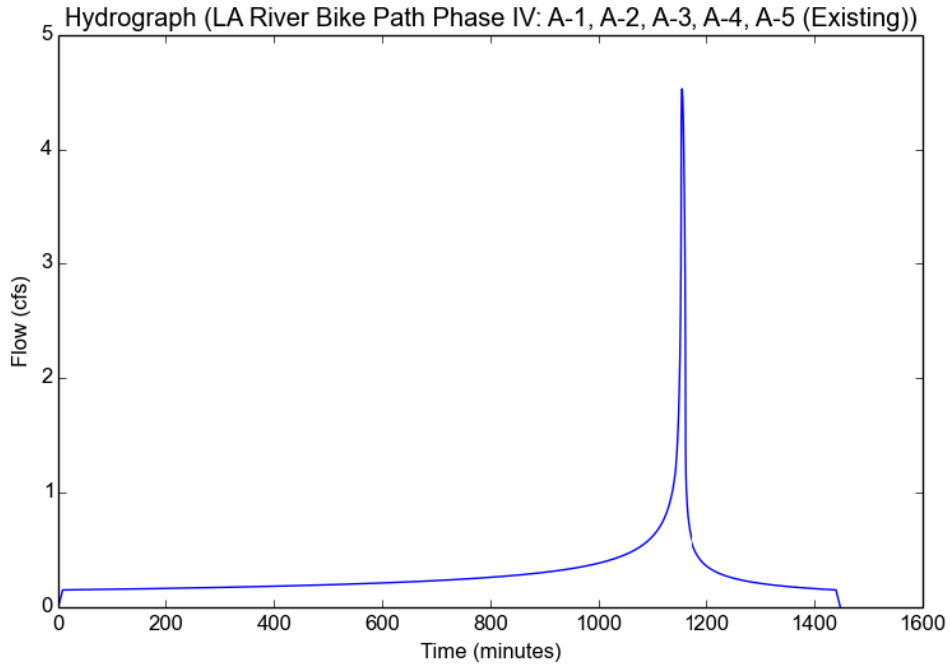
24-Hr Clear Runoff Volume (cu-ft)	25110.4639



Peak Flow Hydrologic Analysis

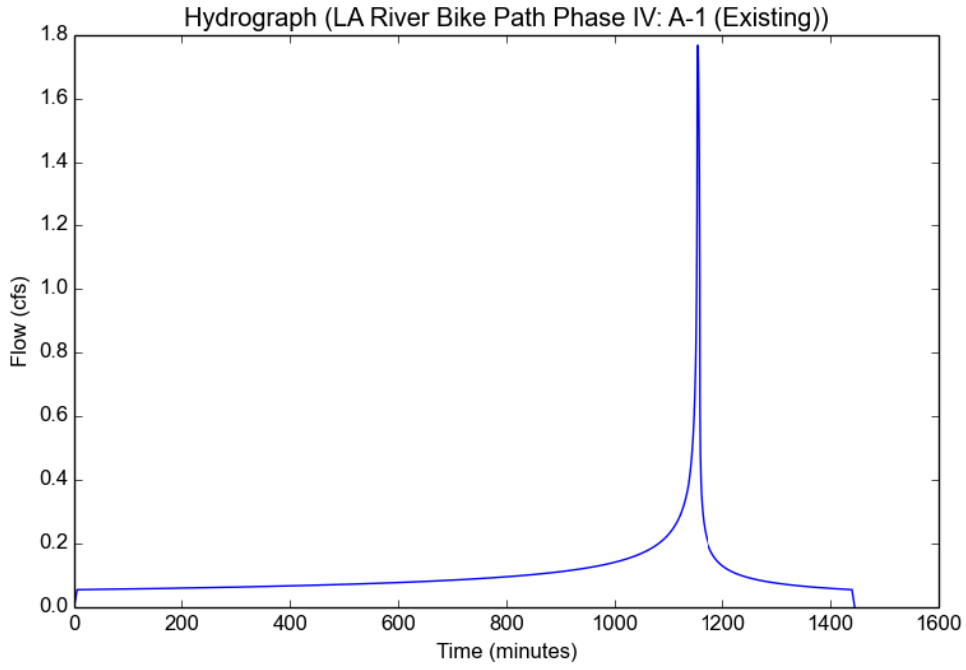
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 1 - Existing Conditi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-1 (Existing)
Area (ac)	0.5737
Flow Path Length (ft)	71.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.69
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.65
Peak Intensity (in/hr)	3.9676
Undeveloped Runoff Coefficient (Cu)	0.5032
Developed Runoff Coefficient (Cd)	0.777
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.7686
Burned Peak Flow Rate (cfs)	1.7686
24-Hr Clear Runoff Volume (ac-ft)	0.208
24-Hr Clear Runoff Volume (cu-ft)	9058.3419



Peak Flow Hydrologic Analysis

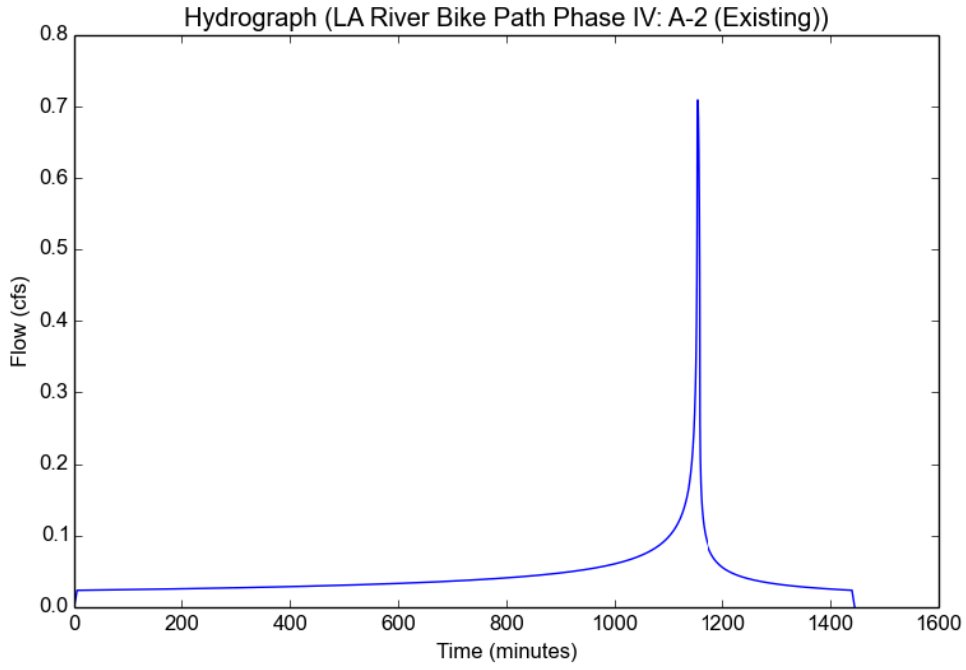
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 1 - Existing Conditi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-2 (Existing)
Area (ac)	0.2189
Flow Path Length (ft)	47.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.791
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.65
Peak Intensity (in/hr)	3.9676
Undeveloped Runoff Coefficient (Cu)	0.5032
Developed Runoff Coefficient (Cd)	0.8171
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.7096
Burned Peak Flow Rate (cfs)	0.7096
24-Hr Clear Runoff Volume (ac-ft)	0.0888
24-Hr Clear Runoff Volume (cu-ft)	3866.8458



Peak Flow Hydrologic Analysis

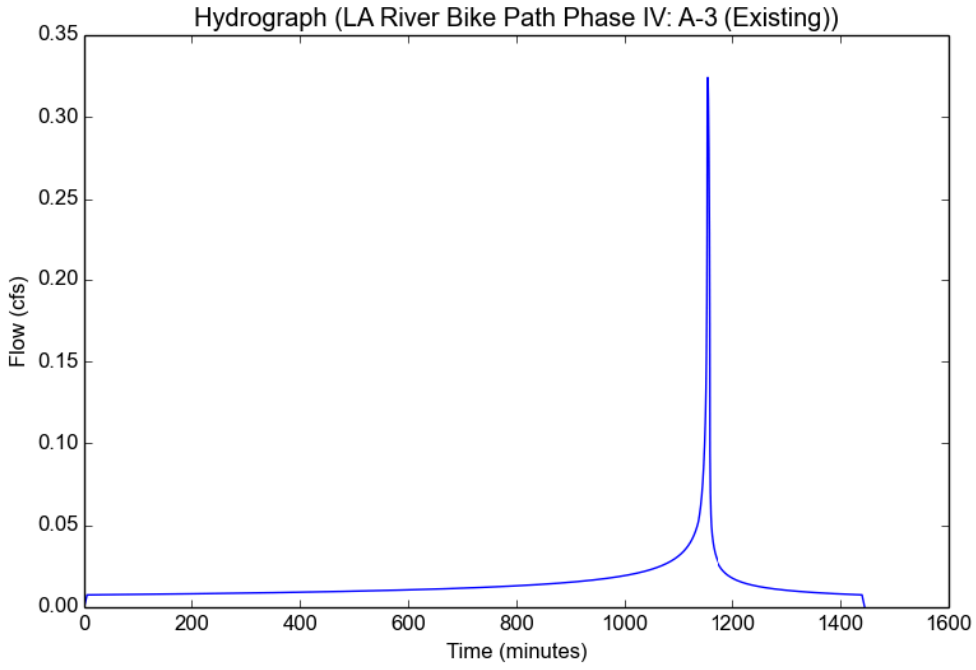
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 1 - Existing Conditi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-3 (Existing)
Area (ac)	0.1242
Flow Path Length (ft)	14.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.39
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.65
Peak Intensity (in/hr)	3.9676
Undeveloped Runoff Coefficient (Cu)	0.5032
Developed Runoff Coefficient (Cd)	0.6579
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.3242
Burned Peak Flow Rate (cfs)	0.3242
24-Hr Clear Runoff Volume (ac-ft)	0.0291
24-Hr Clear Runoff Volume (cu-ft)	1269.1208



Peak Flow Hydrologic Analysis

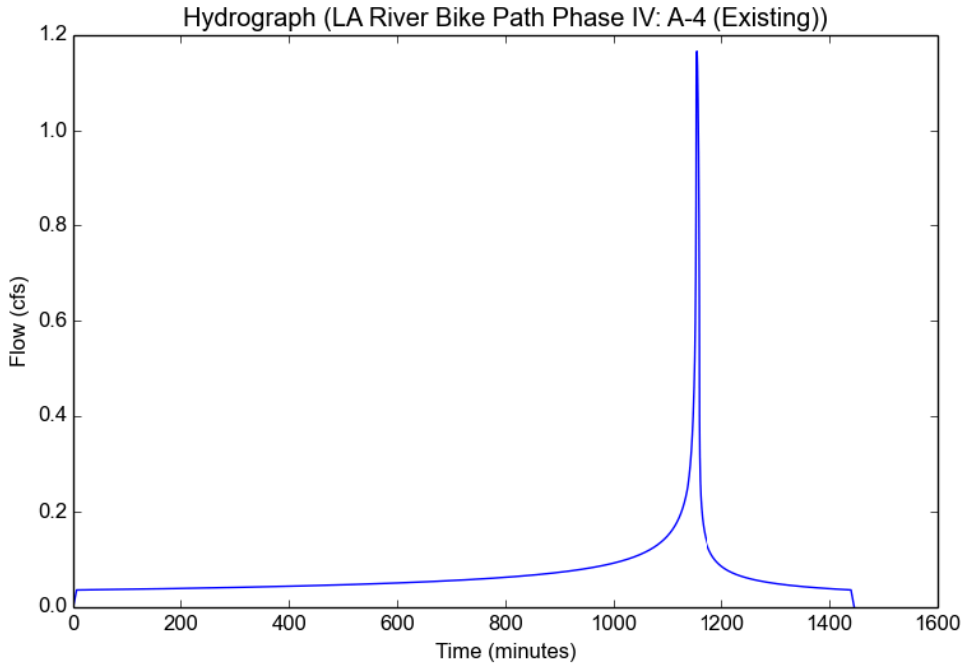
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 1 - Existing Conditi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-4 (Existing)
Area (ac)	0.4516
Flow Path Length (ft)	468.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.554
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.65
Peak Intensity (in/hr)	3.6417
Undeveloped Runoff Coefficient (Cu)	0.472
Developed Runoff Coefficient (Cd)	0.7091
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	1.1662
Burned Peak Flow Rate (cfs)	1.1662
24-Hr Clear Runoff Volume (ac-ft)	0.1374
24-Hr Clear Runoff Volume (cu-ft)	5986.6433



Peak Flow Hydrologic Analysis

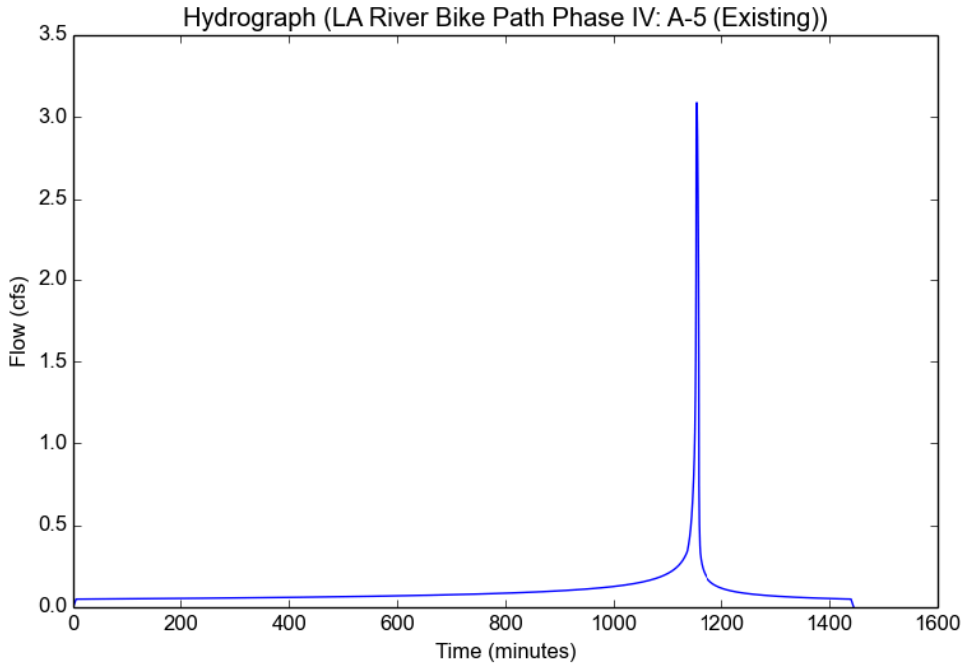
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 1 - Existing Conditi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-5 (Existing)
Area (ac)	1.3491
Flow Path Length (ft)	50.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.186
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.65
Peak Intensity (in/hr)	3.9676
Undeveloped Runoff Coefficient (Cu)	0.5032
Developed Runoff Coefficient (Cd)	0.577
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	3.0883
Burned Peak Flow Rate (cfs)	3.0883
24-Hr Clear Runoff Volume (ac-ft)	0.1991
24-Hr Clear Runoff Volume (cu-ft)	8674.8518



Peak Flow Hydrologic Analysis

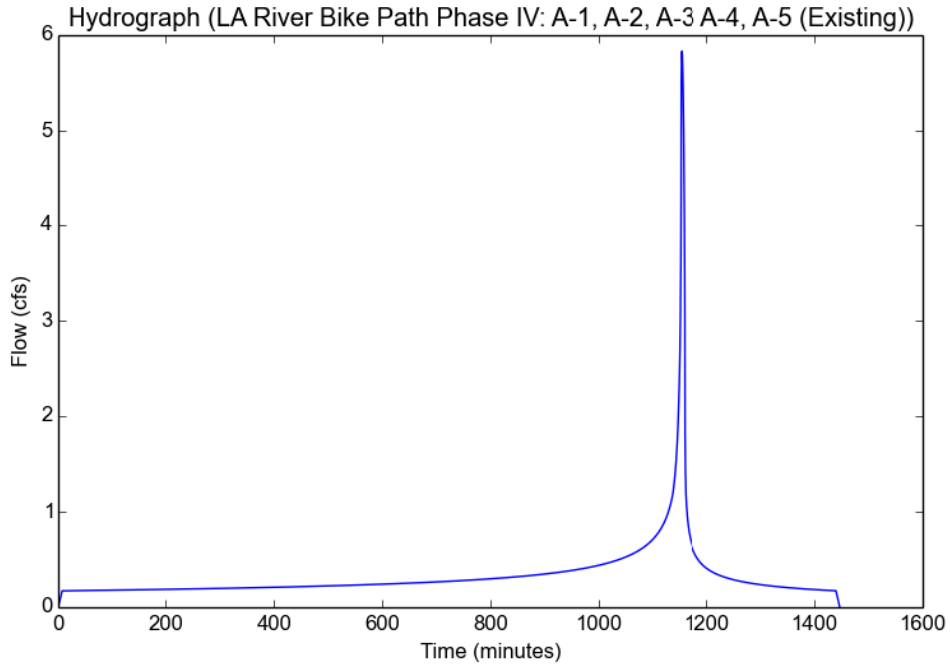
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 1 - Existing Conditi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-1, A-2, A-3 A-4, A-5 (Existing)
Area (ac)	2.7175
Flow Path Length (ft)	468.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.411
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.65
Peak Intensity (in/hr)	3.3872
Undeveloped Runoff Coefficient (Cu)	0.4477
Developed Runoff Coefficient (Cd)	0.6336
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	5.8319
Burned Peak Flow Rate (cfs)	5.8319
24-Hr Clear Runoff Volume (ac-ft)	0.6607
24-Hr Clear Runoff Volume (cu-ft)	28779.8291



ATTACHMENT 2

Proposed Conditions

25-yr and 50-yr HydroCalc Calculations

Peak Flow Hydrologic Analysis

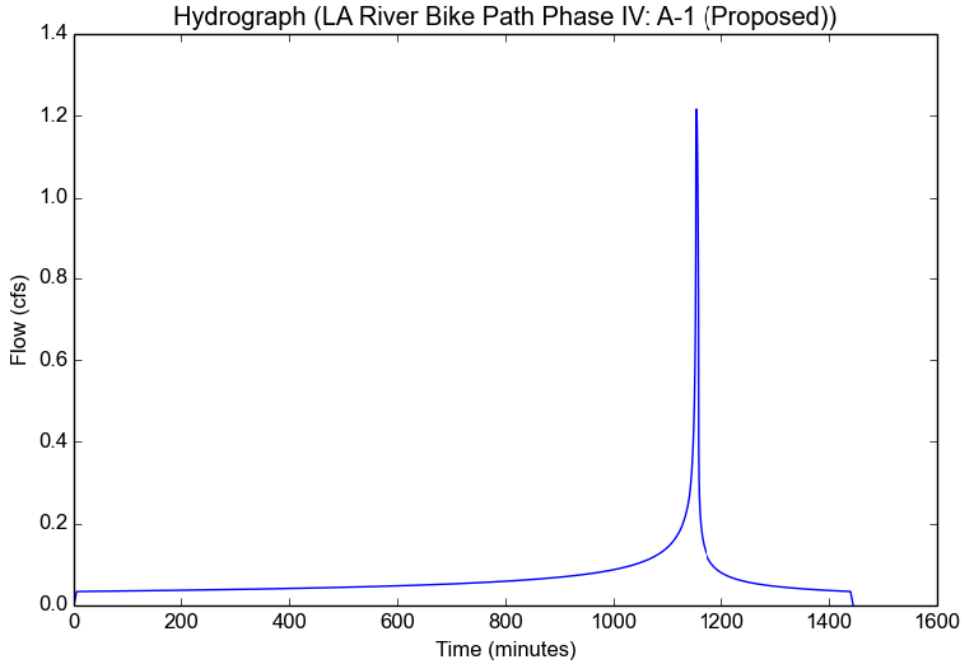
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 2 - Proposed Condi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-1 (Proposed)
Area (ac)	0.5061
Flow Path Length (ft)	71.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.526
Soil Type	15
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.8387
Peak Intensity (in/hr)	3.4835
Undeveloped Runoff Coefficient (Cu)	0.4569
Developed Runoff Coefficient (Cd)	0.69
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.2164
Burned Peak Flow Rate (cfs)	1.2164
24-Hr Clear Runoff Volume (ac-ft)	0.1295
24-Hr Clear Runoff Volume (cu-ft)	5641.5713



Peak Flow Hydrologic Analysis

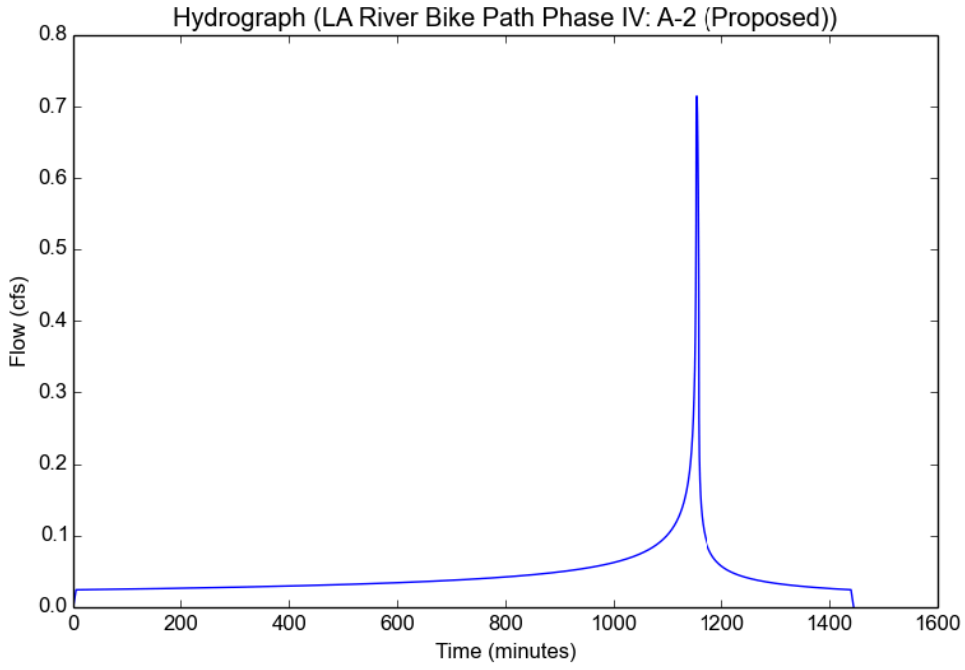
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 2 - Proposed Condi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-2 (Proposed)
Area (ac)	0.2516
Flow Path Length (ft)	47.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.81
Soil Type	15
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.8387
Peak Intensity (in/hr)	3.4835
Undeveloped Runoff Coefficient (Cu)	0.4569
Developed Runoff Coefficient (Cd)	0.8158
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.715
Burned Peak Flow Rate (cfs)	0.715
24-Hr Clear Runoff Volume (ac-ft)	0.0913
24-Hr Clear Runoff Volume (cu-ft)	3975.9689



Peak Flow Hydrologic Analysis

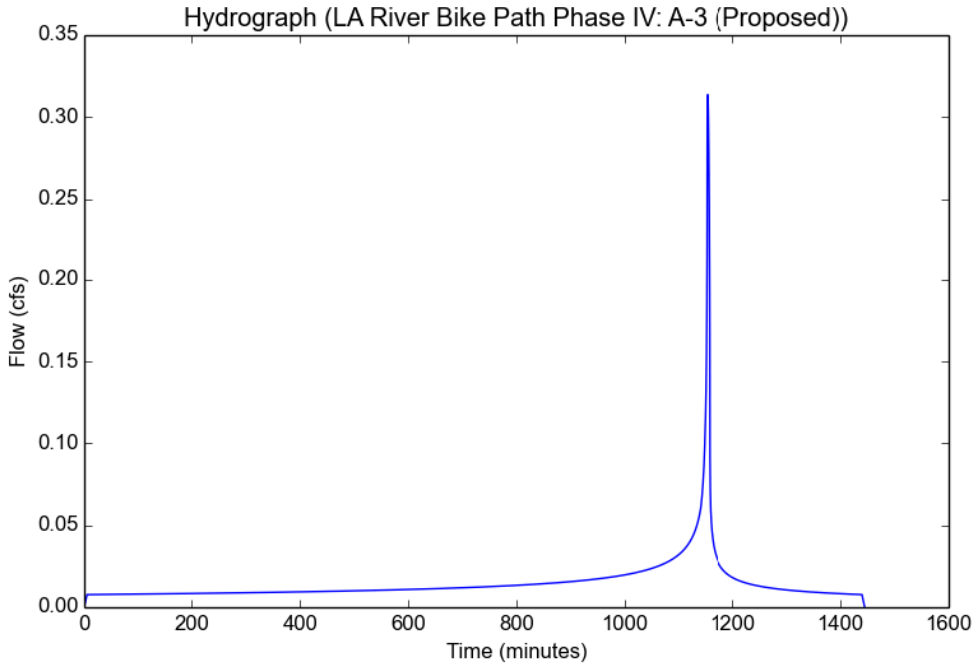
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 2 - Proposed Condi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-3 (Proposed)
Area (ac)	0.1421
Flow Path Length (ft)	14.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.399
Soil Type	15
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.8387
Peak Intensity (in/hr)	3.4835
Undeveloped Runoff Coefficient (Cu)	0.4569
Developed Runoff Coefficient (Cd)	0.6337
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.3137
Burned Peak Flow Rate (cfs)	0.3137
24-Hr Clear Runoff Volume (ac-ft)	0.0296
24-Hr Clear Runoff Volume (cu-ft)	1288.1715



Peak Flow Hydrologic Analysis

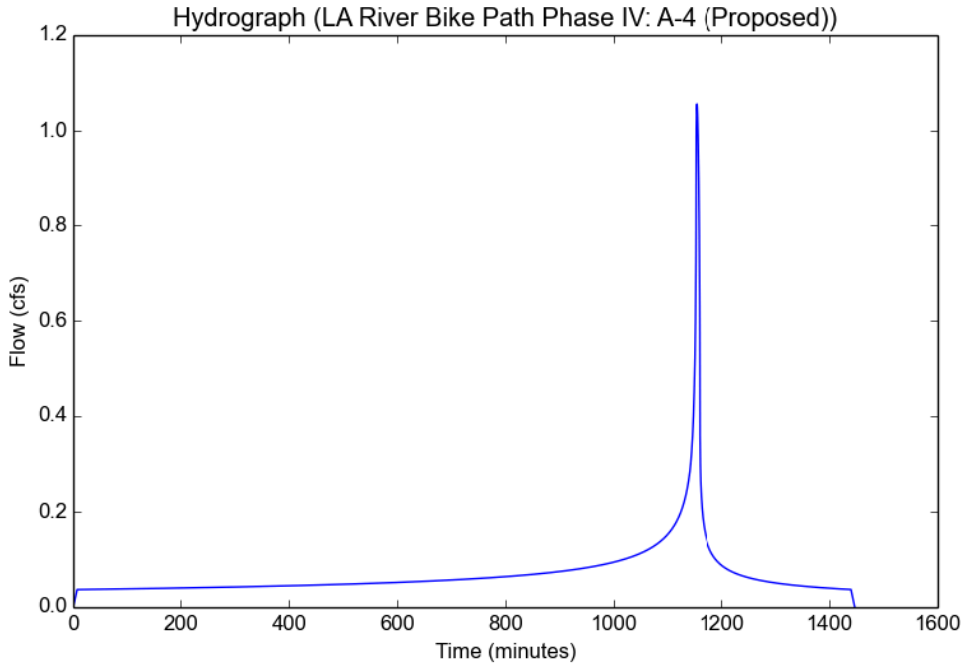
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 2 - Proposed Condi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-4 (Proposed)
Area (ac)	0.5181
Flow Path Length (ft)	468.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.564
Soil Type	15
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.8387
Peak Intensity (in/hr)	2.974
Undeveloped Runoff Coefficient (Cu)	0.4075
Developed Runoff Coefficient (Cd)	0.6853
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	1.0559
Burned Peak Flow Rate (cfs)	1.0559
24-Hr Clear Runoff Volume (ac-ft)	0.1399
24-Hr Clear Runoff Volume (cu-ft)	6092.4991



Peak Flow Hydrologic Analysis

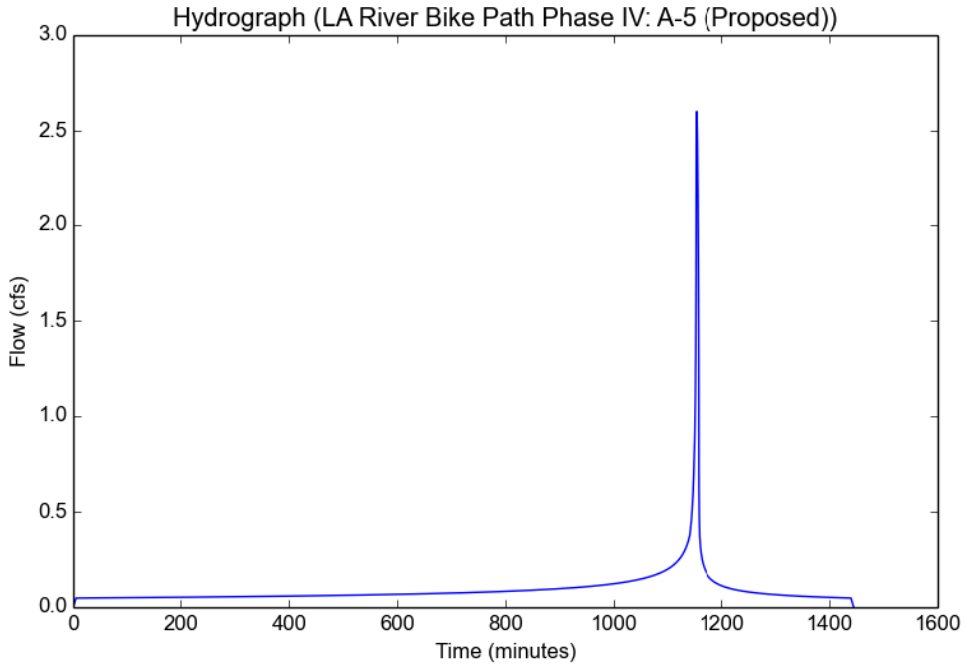
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 2 - Proposed Condi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-5 (Proposed)
Area (ac)	1.3491
Flow Path Length (ft)	50.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.218
Soil Type	15
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.8387
Peak Intensity (in/hr)	3.4835
Undeveloped Runoff Coefficient (Cu)	0.4569
Developed Runoff Coefficient (Cd)	0.5535
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	2.6011
Burned Peak Flow Rate (cfs)	2.6011
24-Hr Clear Runoff Volume (ac-ft)	0.1889
24-Hr Clear Runoff Volume (cu-ft)	8226.9825



Peak Flow Hydrologic Analysis

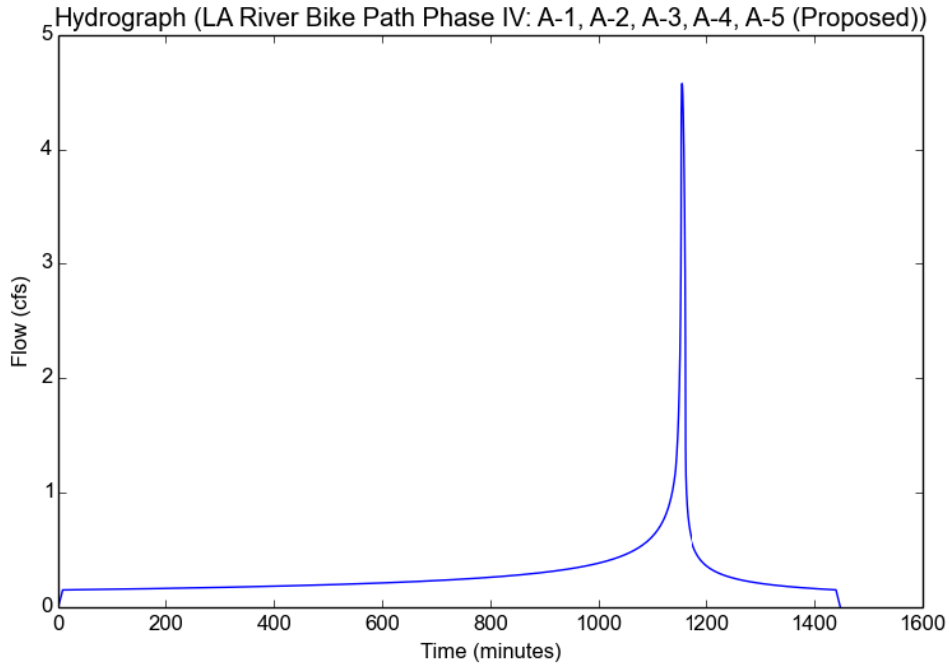
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 2 - Proposed Condi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-1, A-2, A-3, A-4, A-5 (Proposed)
Area (ac)	2.7669
Flow Path Length (ft)	468.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.402
Soil Type	15
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.8387
Peak Intensity (in/hr)	2.7931
Undeveloped Runoff Coefficient (Cu)	0.3857
Developed Runoff Coefficient (Cd)	0.5925
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	4.5787
Burned Peak Flow Rate (cfs)	4.5787
24-Hr Clear Runoff Volume (ac-ft)	0.5775
24-Hr Clear Runoff Volume (cu-ft)	25157.7985



Peak Flow Hydrologic Analysis

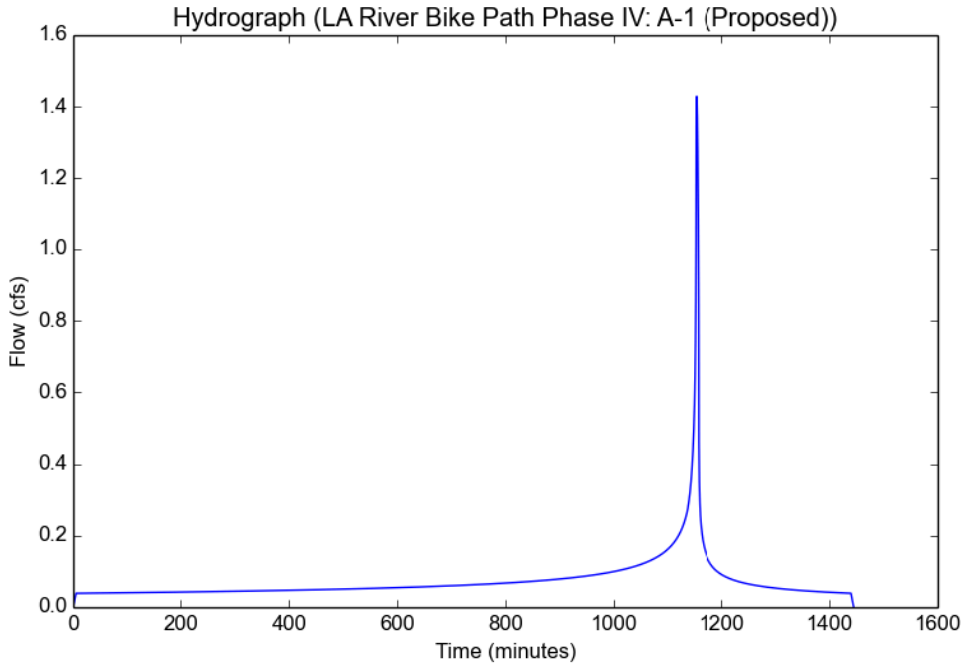
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 2 - Proposed Condi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-1 (Proposed)
Area (ac)	0.5061
Flow Path Length (ft)	71.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.526
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.65
Peak Intensity (in/hr)	3.9676
Undeveloped Runoff Coefficient (Cu)	0.5032
Developed Runoff Coefficient (Cd)	0.7119
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.4295
Burned Peak Flow Rate (cfs)	1.4295
24-Hr Clear Runoff Volume (ac-ft)	0.1481
24-Hr Clear Runoff Volume (cu-ft)	6449.6731



Peak Flow Hydrologic Analysis

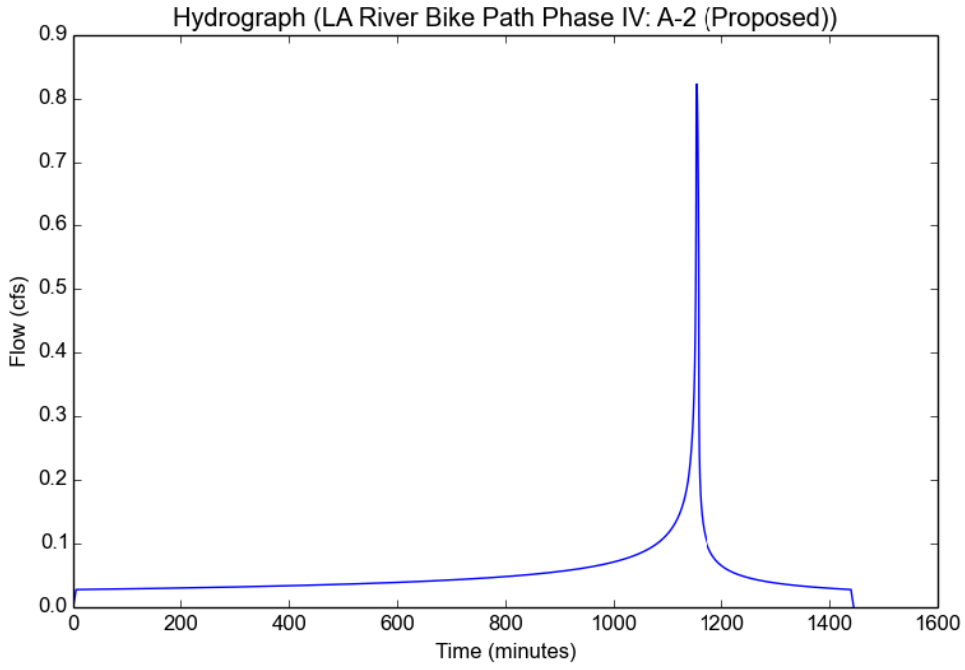
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 2 - Proposed Condi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-2 (Proposed)
Area (ac)	0.2516
Flow Path Length (ft)	47.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.81
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.65
Peak Intensity (in/hr)	3.9676
Undeveloped Runoff Coefficient (Cu)	0.5032
Developed Runoff Coefficient (Cd)	0.8246
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.8232
Burned Peak Flow Rate (cfs)	0.8232
24-Hr Clear Runoff Volume (ac-ft)	0.1041
24-Hr Clear Runoff Volume (cu-ft)	4533.2595



Peak Flow Hydrologic Analysis

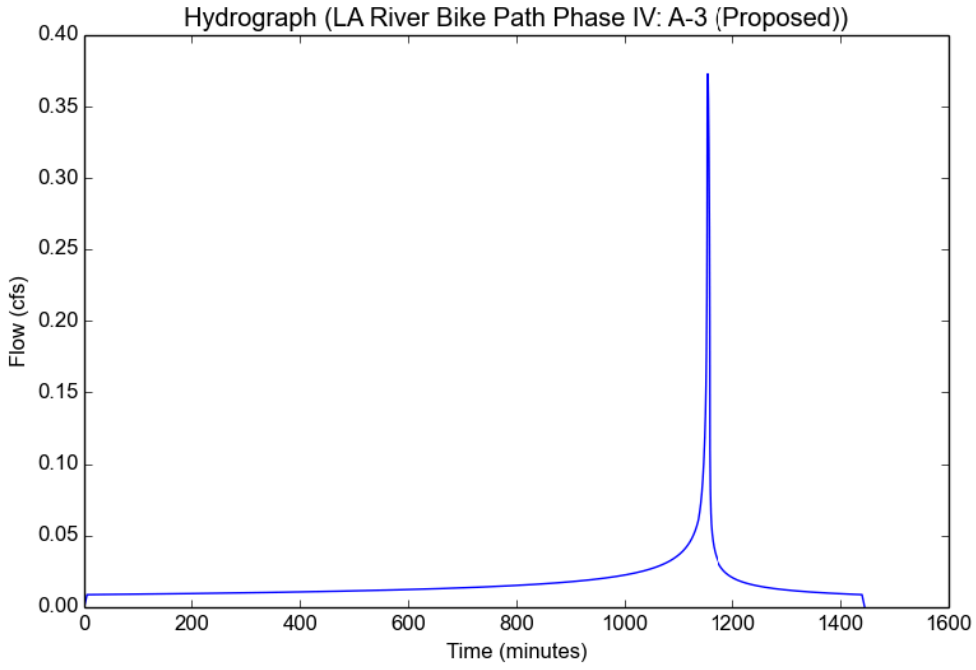
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 2 - Proposed Condi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-3 (Proposed)
Area (ac)	0.1421
Flow Path Length (ft)	14.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.399
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.65
Peak Intensity (in/hr)	3.9676
Undeveloped Runoff Coefficient (Cu)	0.5032
Developed Runoff Coefficient (Cd)	0.6615
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.3729
Burned Peak Flow Rate (cfs)	0.3729
24-Hr Clear Runoff Volume (ac-ft)	0.0339
24-Hr Clear Runoff Volume (cu-ft)	1475.7785



Peak Flow Hydrologic Analysis

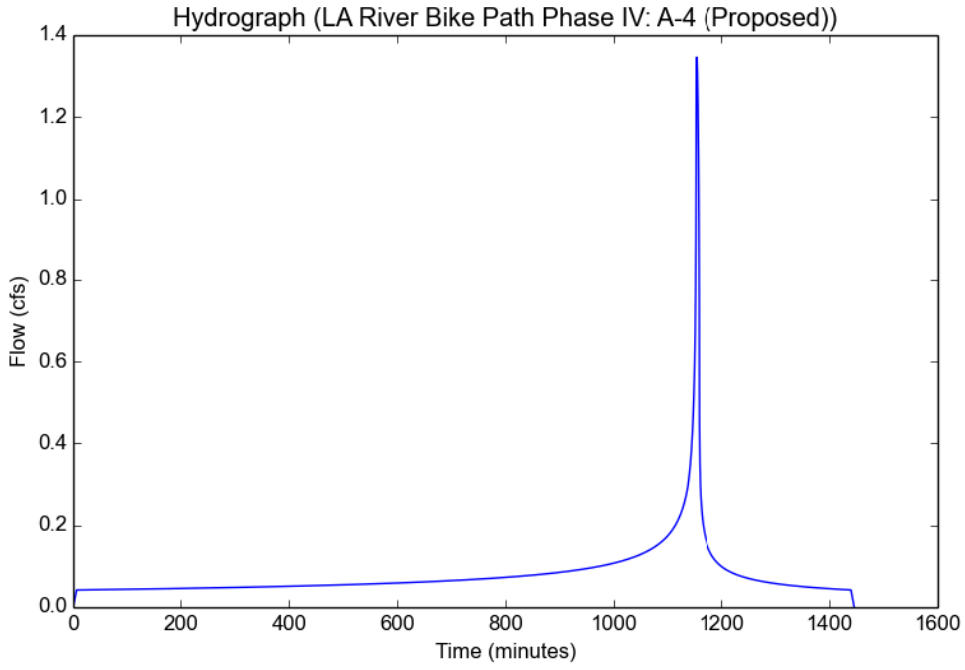
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 2 - Proposed Condi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-4 (Proposed)
Area (ac)	0.5181
Flow Path Length (ft)	468.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.564
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.65
Peak Intensity (in/hr)	3.6417
Undeveloped Runoff Coefficient (Cu)	0.472
Developed Runoff Coefficient (Cd)	0.7134
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	1.346
Burned Peak Flow Rate (cfs)	1.346
24-Hr Clear Runoff Volume (ac-ft)	0.1599
24-Hr Clear Runoff Volume (cu-ft)	6964.4974



Peak Flow Hydrologic Analysis

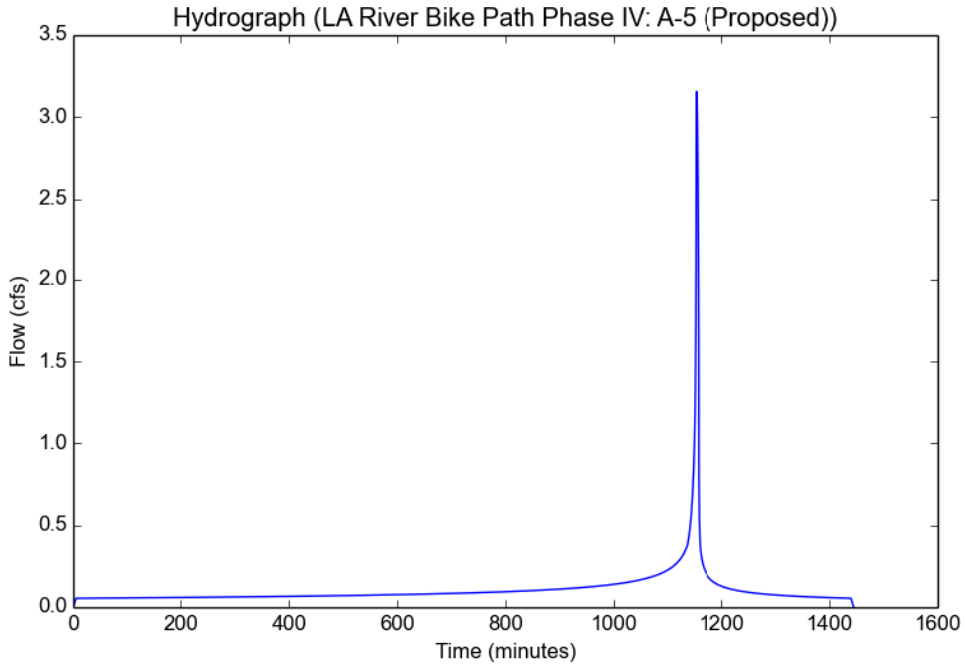
File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 2 - Proposed Condi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-5 (Proposed)
Area (ac)	1.3491
Flow Path Length (ft)	50.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.218
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.65
Peak Intensity (in/hr)	3.9676
Undeveloped Runoff Coefficient (Cu)	0.5032
Developed Runoff Coefficient (Cd)	0.5897
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	3.1563
Burned Peak Flow Rate (cfs)	3.1563
24-Hr Clear Runoff Volume (ac-ft)	0.2176
24-Hr Clear Runoff Volume (cu-ft)	9476.5369



Peak Flow Hydrologic Analysis

File location: N:/00_BIKEWAYS SECTION/LA River Bikepath Ph4/2. Design/5. Calculations/3. Hydrology/3. Attachments/Attachment 2 - Proposed Condi
Version: HydroCalc 1.0.3

Input Parameters

Project Name	LA River Bike Path Phase IV
Subarea ID	A-1, A-2, A-3, A-4, A-5 (Proposed)
Area (ac)	2.7669
Flow Path Length (ft)	468.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	6.65
Percent Impervious	0.402
Soil Type	15
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	6.65
Peak Intensity (in/hr)	3.3872
Undeveloped Runoff Coefficient (Cu)	0.4477
Developed Runoff Coefficient (Cd)	0.6295
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	5.8997
Burned Peak Flow Rate (cfs)	5.8997
24-Hr Clear Runoff Volume (ac-ft)	0.6621
24-Hr Clear Runoff Volume (cu-ft)	28839.8209