



**DAVID EVANS
AND ASSOCIATES INC.**

**KNOX BUSINESS PARK, BUILDINGS D & E
HYDROLOGY & WATER QUALITY NARRATIVE**



HYDROLOGY

The Knox Business Park, Buildings D & E is located within the County of Riverside at the intersection of Oleander Avenue and Ellsworth Avenue and is part of the Master Drainage Plan for the Perris Valley Area (MDP). The Knox Business Park, Buildings D & E have been submitted to the County of Riverside under two (2) different Plot Plan Numbers. Building D has a net and gross area of approximately 34.5 acres and 37.1 acres, respectively, and is located at the SEC of Oleander Avenue and Ellsworth Avenue. While Building E has a net and gross area of approximately 19.5 acre and 21.5 acres, respectively, and is located at the SWC of Oleander Avenue and Ellsworth Avenue.

In the existing condition, Building D receives storm water runoff from two separate tributary areas in a west-to-east direction as surface sheet flow. The offsite portion of the tributary areas enters the Building D site at two different points from Ellsworth and continues to flow east through the site. The runoff leaves the Building D site in two separate areas, at the northwest corner adjacent to Old Oleander Avenue and its southeastern boundary. A third offsite tributary area exists southwest of the Building D site. The runoff from this tributary areas flows in the northeasterly direction and spills into Ellsworth Street and continues to travel east outside the southern boundary of Building D. Meanwhile, Building E receives storm water runoff from two separate tributary areas in a west-to-east direction as surface sheet flows. The largest offsite tributary areas enters the Building E site at two points, the northwest corner of the site and the approximate mid-point of the site's western boundary, respectively, and travels east across the site until it spills into Ellsworth Street at the sites eastern boundary. A third offsite tributary area exists southwest of the Building E site. The runoff from this tributary area flows in the northeasterly direction and continues to travel east outside the southern boundary of building E, before spilling into Ellsworth Street and continuing farther east.

The purpose of the Master Drainage Plan for the Perris Valley Area, originally prepared in 1987 and amended in June 1991 was to replace the two previous Master Drainage Plan Reports, the Lower Perris Valley Master Drainage Plan (adopted in May 1985) and Perris Valley Master Drainage Plan (adopted in July 1987) and investigated and evaluated the drainage problems of the Perris Valley Area. Since the Perris Valley area is subject to inundation during medium size storm events, the goal of the MDP was to develop a drainage system that will allow orderly development within the study area and will serve as a guide to long term construction scheduling of primary drainage facilities to be constructed by developers and others within the area which considers flood protection of both existing development and potential future development.

Both buildings are tributary to Line F of the MDP via Laterals F-3.1 & F-3 and Lateral F-4. Lateral F-3.1 is a west to east alignment and is currently shown on the MPD to be located within the site limits of Building D property. Lateral F-3 has a west to east alignment that runs within Redwood Street, starting at Ellsworth Avenue and continues east to Harvill Avenue where it ties into Line F. Lateral F-3.1 ties into Lateral F-3 at the southeasterly property line of Building D. Lateral F-4 is a west to east alignment along



the project frontage of Building D and is located within Oleander Avenue right-of-way. At the intersection of Oleander and Harvill Avenue the Lateral F-4 system will continue to the south within the Harvill right-of-way and will connect to Line F approximately 1,200 south of the intersection of Oleander Avenue and Harvill Avenue.

Due to the off-site run-on conditions that are tributary to Buildings D & E from the west and southwest of our projects, Laterals F-3.1 & F-3 will be combined as a single storm drain lateral, labeled as F-3.1 which will collect the perpetual tributary off-site run-on within Ellsworth Avenue and be constructed along the southerly property line of Building D where it will turn into Line F-3 at the easterly property line of Building D and continues as Lateral F-3 until it ties into Line F within Harvill Avenue. Lateral F-3 as shown on the MDP has an available flow of 206 cfs at the easterly property line of Building D. It should be noted that the existing Lateral F-3 storm drain stub extending from Line F at Harvill Avenue has a design flow rate of 296.7 cfs. Moreover, the Line F System which collects the runoff from Lateral F-3 and Lateral F-4 has a capacity of 462.3 cfs.

Lateral F-4 within Oleander Avenue is an existing 42" RCP storm drain which terminates at northeasterly property corner of Building D. Based on research of the available hydrology and hydraulic studies at Riverside County Flood Control & Water Conservation District (RCFC&WCD), calculations show that the available flow rate within Lateral F-4 at this location is approximately 138.1 cfs with a total combined tributary area of 94-acres which includes a portion of Building D & E.

NOTE: The 138.1 cfs was calculated by taking into account the design flow rate of 154.9 cfs at the intersection of Oleander Avenue and Harvill Avenue, per the MDP and Perris Valley MDP Lateral F-4 Improvement Plans, and subtracting 16.8 cfs from the approved hydrology study for the Knox Logistics Center (northwest corner of Oleander Avenue & Harvill Avenue), prepared by Albert A. Webb Associates. The 16.8 cfs is an area that is approximately 15 acres and emanates from the Knox Logistics Center. The 15 acres area has been designated to discharge into Lateral F-4. The improvement plans indicate approximately 32.9 cfs had been planned to be discharged into the Lateral F-4 system, which is based on 154.9 cfs minus 122 cfs shown on the approved storm drain improvement plans. However, the Knox Logistics Center provided a water quality/detention basin which limited the peak 100 year discharge flow rate to 16.8 cfs.

The proposed site plan for Building D, which has a total net project area of 34.5 acres, has approximately 14.5 acres tributary to Lateral F-4 while the remaining 20-acres is tributary to Lateral F-3.1. Building E, which has a total net project area of 19.5 acres, has approximately 13.5 acres tributary to Lateral F-4 while the remaining 6-acres is tributary to Lateral F-3.1.

The project proposes to extend Lateral F-4 within Oleander Avenue per the MDP to the northeast corner of the Building E property limits and will collect the surface run-off from both Buildings D & E and the surrounding properties tributary to Lateral F-4. Lateral F-3.1 will be constructed from Ellsworth Avenue, along the southerly property line of Building D where it will daylight at the easterly property line and discharge into an rip-rap energy dissipater to mitigate downstream erosion. Additionally, the Lateral F-3.1 system at within Ellsworth Avenue will collect the tributary Building E drainage area and the surrounding properties tributary to Lateral F-3.1. The RCFC&WCD Perris Valley MDP indicates that the Lateral F-3.1 will continue to the east and the proposed design provides an interim solution that will allow the system to daylight in a manner that mimics the historical flow patterns. However, in the event that



Lateral F-3.1 is to be constructed downstream of the project, Building D will have the opportunity to design the project based on the ultimate Lateral F-3 and Lateral F-3.1 alignments.

Buildings D & E were analyzed under three different conditions to ensure that any existing facilities or neighboring downstream properties will not be impacted by the new developments. Condition 1 is described as the interim condition where Building D is standalone and operational by itself. Condition 2 is described as the interim condition where only Building E is standalone and operation by itself. Condition 3 is described as the ultimate condition when Building D and Building E are operational together.

Condition 1 – “Building D Only”

Building D is separated into two drainage areas. “D1” is approximately 18.13 acres and all runoff up to the 100-year storm event drains to basin “DB1”. Basin “DB1” will act as a bioretention/detention basin. The outlet structure in basin “DB1” will outlet no more than 10 cfs during the highest 100-year storm peak event. The outlet structure for basin “DB1” will discharge into a separate private line named Lateral F-4A and then into Lateral F-4. “D2” is approximately 16.33 acres and all runoff will be collected into a diversion weir structure. The structure is designed to allow only up to the 10-year storm event into basin “DB2” and the 100-year storm will be discharged into a separate line named Lateral F-3A into Lateral F-3. Basin “DB2” will act as a bioretention/detention basin. The outlet structure in basin “DB2” will outlet no more than 3 cfs during the highest 10-year storm peak event. The outlet structure for basin “DB2” will discharge into a separate private line named lateral F-4A and then into lateral F-4. If the weir structure for basin “DB2” fails, a separate emergency overflow structure is proposed and will connect to Lateral F-3A to allow for any emergency drainage into get into Lateral F-3. However, if the ultimate Lateral F-3 and Lateral F-3 is designed downstream of the project the outlet structure for “DB2” may be connected to Lateral F-3 and perpetuate the flows per the master plan of drainage. A total of 13 cfs will be discharged from Building D into Lateral F-4. A total of 15 cfs will be discharged from Building D into Lateral F-3.

A total of 115 cfs is expected from the undeveloped offsite flows located to the northwest of the Building D property and the street improvements. These offsite flows will be routed north into the proposed Lateral F-4 located within the Old Oleander Avenue right-of-way. Under this condition, a total flow of 128 cfs (115 cfs offsite flows + 13 cfs onsite flows) and will be discharged into Lateral F-4, which is below the available fully developed design flow of 138 cfs. A total of 132 cfs is expected from the undeveloped offsite flows located southwest of the Building D property. These offsite flows will be routed into the proposed Lateral F-3 line located within the Building D property. Under this condition, a total flow of 147 cfs will be discharged into Lateral F-3. The portion of Lateral F-3 that is within the Building D property will be publicly maintained and will have a 20’ foot wide easement associated inside the private property for maintenance purposes. This lateral is located on the southerly side of the property. The flows collected in Lateral F-3 will discharge via energy dissipator at the southeast corner of Building D.

Condition 2 – “Building E Only”

Building E is separated into three drainage areas. “E1” is approximately 3.24 acres and all runoff will be collected into a diversion weir structure. The structure is designed to allow only up to the 10-year storm event into basin “EB1” and the 100-year storm will be discharged into a separate line named Lateral F-4B that drains into Lateral F-4. “E2” is approximately 6.55 acres and all runoff will be collected into a diversion weir structure. The structure is designed to allow only up to the 10-year storm event into the water quality basin located along Ellsworth Street and will ultimately discharge into “EB1”. The 100-year runoff in “E2” will be discharged into a separate line named Lateral F-4B that drains into Lateral F-4. “E3”



is approximately 9.70 acres and all runoff will be collected into a diversion weir structure. The structure is designed to allow only up to the 10-year storm event into the water quality basin located along Ellsworth Street and will ultimately discharge into "EB1". The 100-year runoff in "E3" will be discharged into a separate line named Lateral F-3B1 that drains into onsite Lateral F-3B. Basin "EB1" will act as a bioretention and detention basin. Underground storage will be provided to service only the "increased runoff mitigation" up to the 10-year storm event. The outlet structure in basin "EB1" will outlet no more than 5 cfs during the highest 10-year peak event. The outlet structure for basin "EB1" will discharge into a separate private line named lateral F-4A that drains into Lateral F-4. A total of 16 cfs will be discharged from Building E into Lateral F-4. A total of 11 cfs will be discharged from Building E into Lateral F-3.

A total of 120 cfs is expected from the undeveloped offsite flows located on both sides of the Building E property and the street improvements. The offsite flows northwest of Building E will be collected by a private storm drain line named Lateral F-4C and routed north into the proposed Lateral F-4 underneath Old Oleander Avenue. The offsite flows northwest of Building "E" will remain in its natural drainage pattern and discharge into the existing concrete apron located on the northeast corner of the Building D property. Under this condition, a total flow of 137 cfs is expected into Lateral F-4, which does not exceed the available fully developed design flow of 138 cfs. A total of 115 cfs is expected from the underdeveloped offsite flows located south and southwest of the Building E property. The offsite flows located to the southwest of the site is approximately 13 cfs and will be routed into a privately maintained lateral named Lateral F-3B. This lateral is located on the southerly side of the property. The flows collected in Lateral F-3B will ultimately discharge into Lateral F-3 underneath Ellsworth Street. Under this condition, a total flow of 126 cfs will be discharged into Lateral F-3.

Condition 3 – "Building D and Building E Together"

The drainage areas for both Building D and E are assumed to be in place and operating together. Building D will still only outlet a total of 13 cfs into lateral F-4 and a total of 15 cfs into lateral F-3. Building E will still only outlet a total of 16 cfs into lateral F-4 and a total of 11 cfs into lateral F-3. Under this condition, a total flow of 130 cfs will be discharged into Lateral F-4, which is below the available fully developed design flow of 138 cfs. Under this condition, a total flow of 141 cfs will be discharged into Lateral F-3.

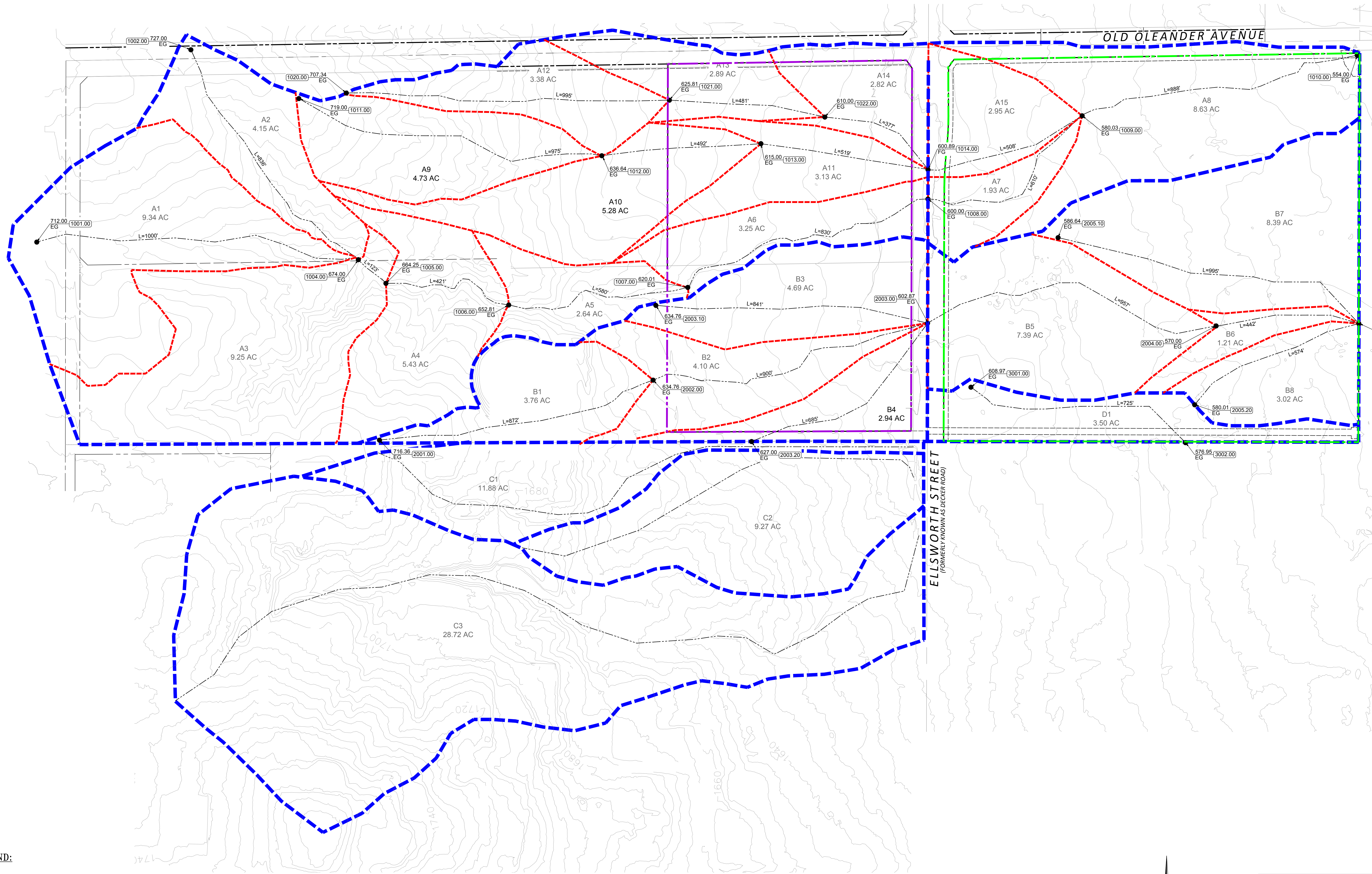
WATER QUALITY

Buildings D & E will comply with the requirements of Riverside County for Ordinance No. 754 which includes the requirement for the preparation and implementation of a Project-Specific WQMP including Low Impact Development Requirements.

KNOX LOGISTICS CENTER

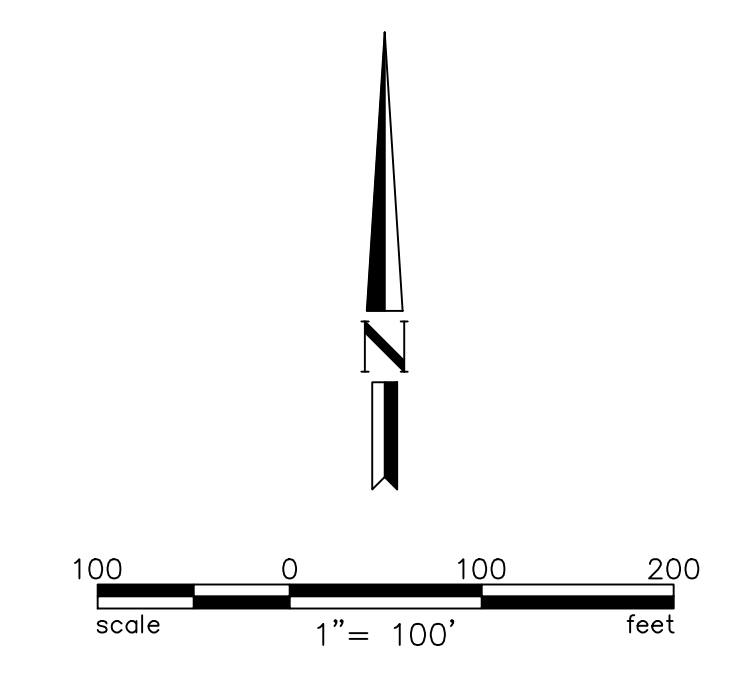
PLOT PLAN 25838/25837

EXISTING CONDITION HYDROLOGY



LEGEND:

\bullet (100.00) (1000.01) EG	NODE POINT WITH SURFACE ELEVATION
---	TRIBUTARY MAJOR-AREA BOUNDARY
---	TRIBUTARY MINOR-AREA BOUNDARY
--- L=725'	FLOW PATH AND DISTANCE
A1	AREA ID
1.00 AC	TRIBUTARY AREA (ACRES)
---	BUILDING D BOUNDARY
---	BUILDING E BOUNDARY



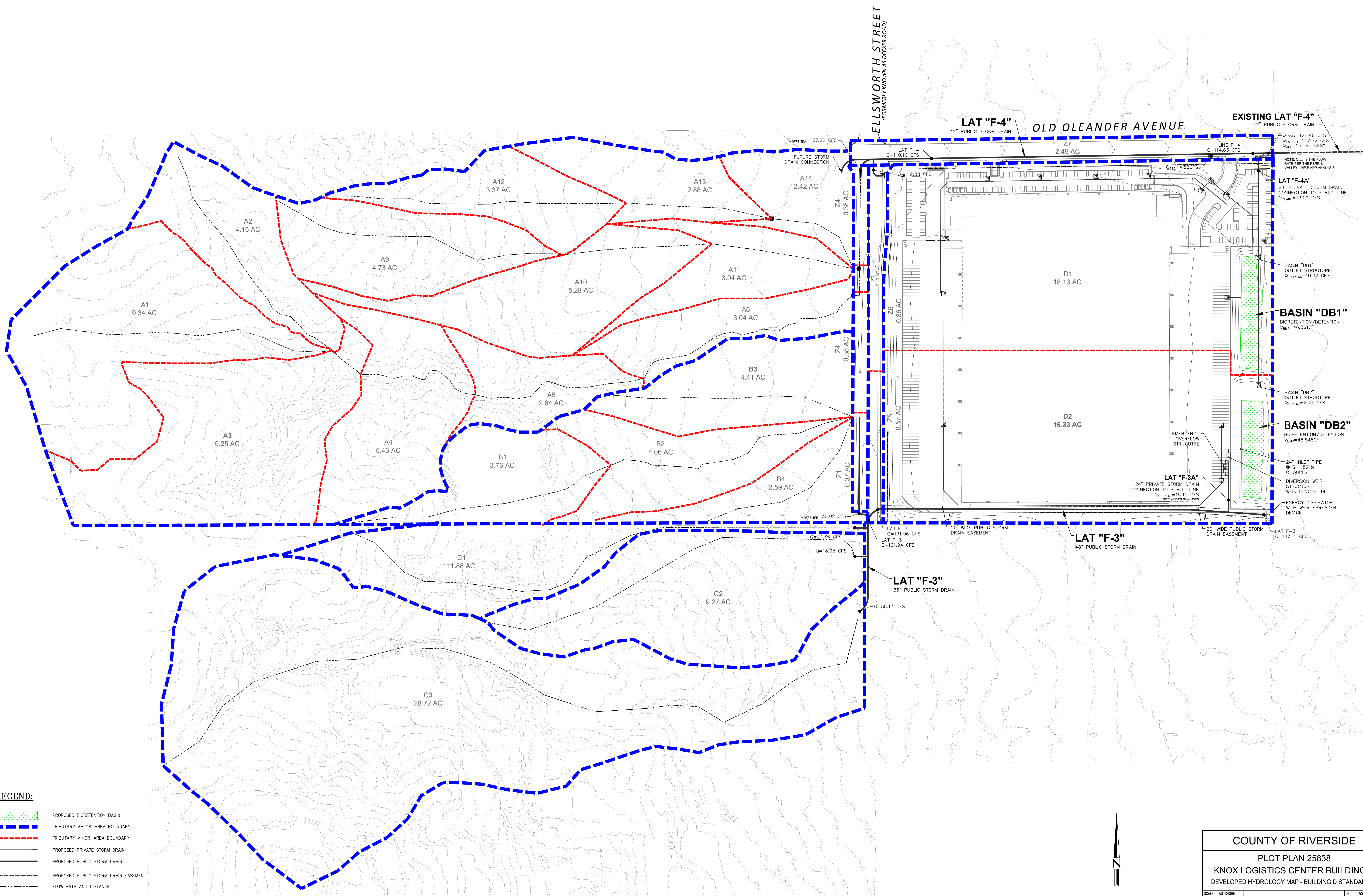
COUNTY OF RIVERSIDE	
PLOT PLAN 25838/25837 KNOX LOGISTICS CENTER BUILDING D & BUILDING E EXISTING HYDROLOGY MAP	
SCALE: AS SHOWN DATE: 03/30/2017 DESIGNED: RJA CHECKED: GWC PLN. OR. REV: FB:	DAVID EVANS AND ASSOCIATES INC. 17782 17TH STREET, SUITE 200 TUSTIN, CA 92780 Phone: 714.665.4500 Fax: 714.665.4501
SHEET NO: 1.150047.000	SHEET NO:

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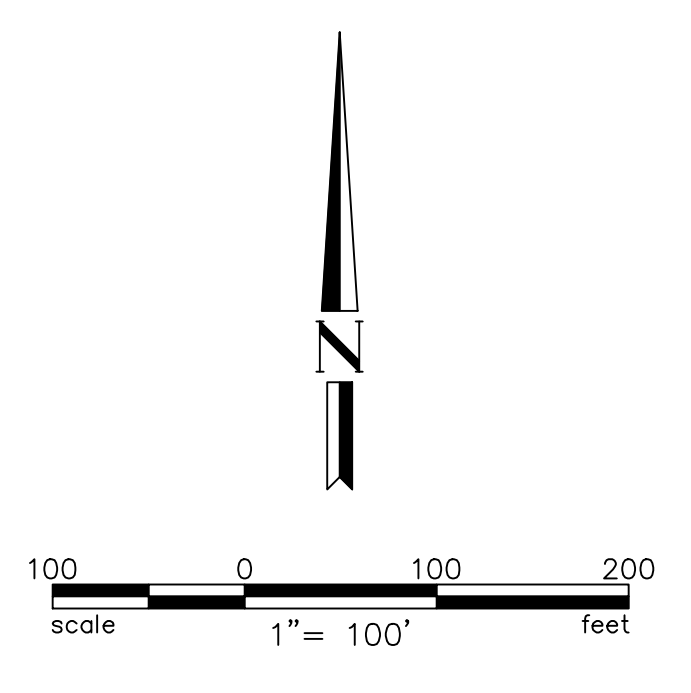
KNOX LOGISTICS CENTER - BUILDING D

PLOT PLAN 25838

DEVELOPED CONDITION HYDROLOGY



- LEGEND:**
- PROPOSED BIORETENTION BASIN
 - TRIBUTARY MAJOR-AREA BOUNDARY
 - TRIBUTARY MINOR-AREA BOUNDARY
 - PROPOSED PRIVATE STORM DRAIN
 - PROPOSED PUBLIC STORM DRAIN
 - PROPOSED PUBLIC STORM DRAIN EASEMENT
 - FLOW PATH AND DISTANCE
 - AREA ID
 - TRIBUTARY AREA (ACRES)
 - STORM DRAIN INLET



COUNTY OF RIVERSIDE

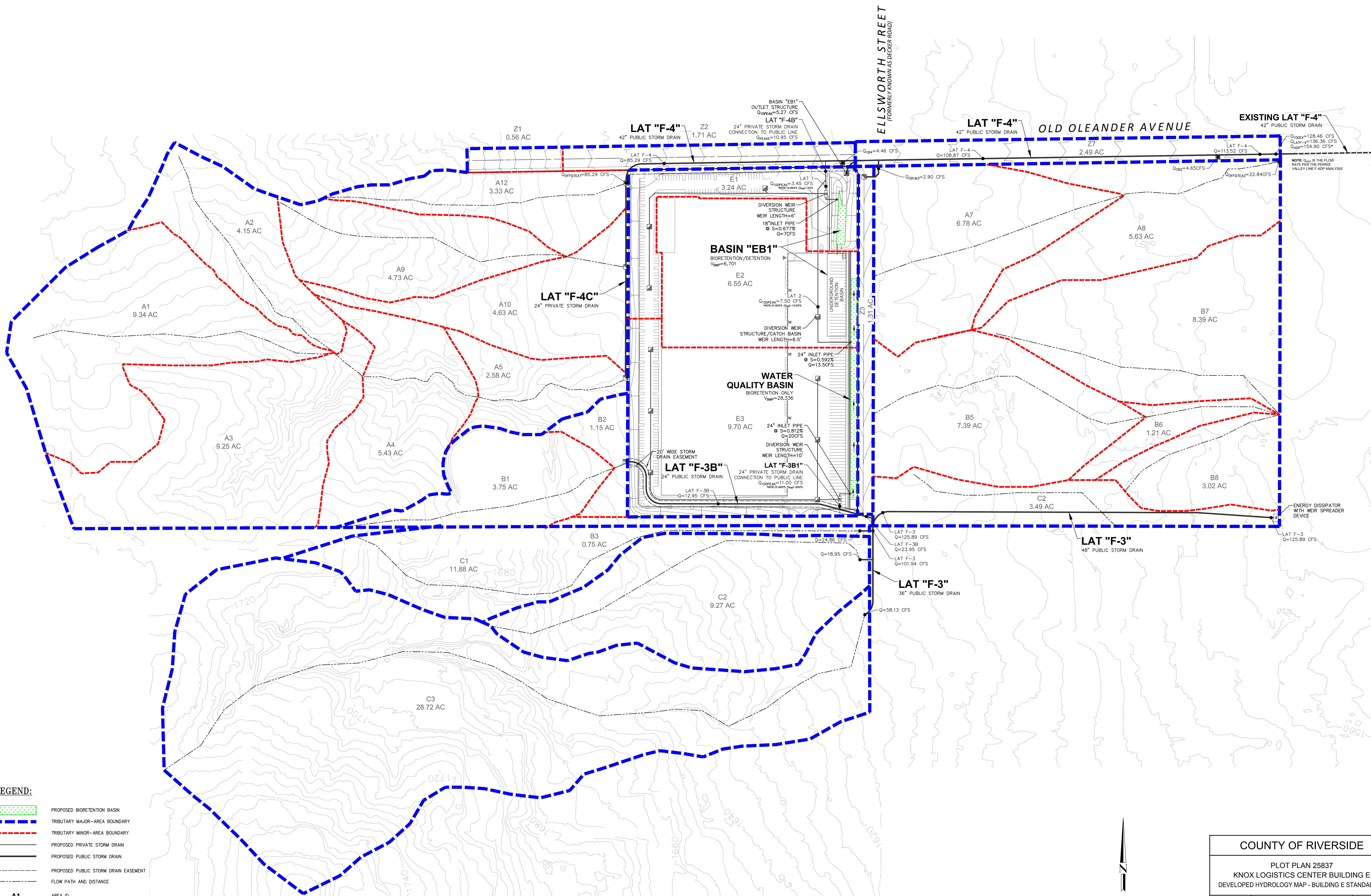
PLOT PLAN 25838
KNOX LOGISTICS CENTER BUILDING D
DEVELOPED HYDROLOGY MAP - BUILDING D STANDALONE

SCALE: AS SHOWN	DATE: 03/30/2017	DAVID EVANS AND ASSOCIATES INC. 17782 17TH STREET, SUITE 200 TUSTIN, CA 92780 Phone: 714.865.4500 Fax: 714.865.4501	SHEET NO:
DESIGNED: RJA	DATE: 03/30/2017		1 OF 2
CHECKED: GWC	DATE: 03/30/2017		
PLN. OR. REV:	DATE: 03/30/2017		

KNOX LOGISTICS CENTER - BUILDING E

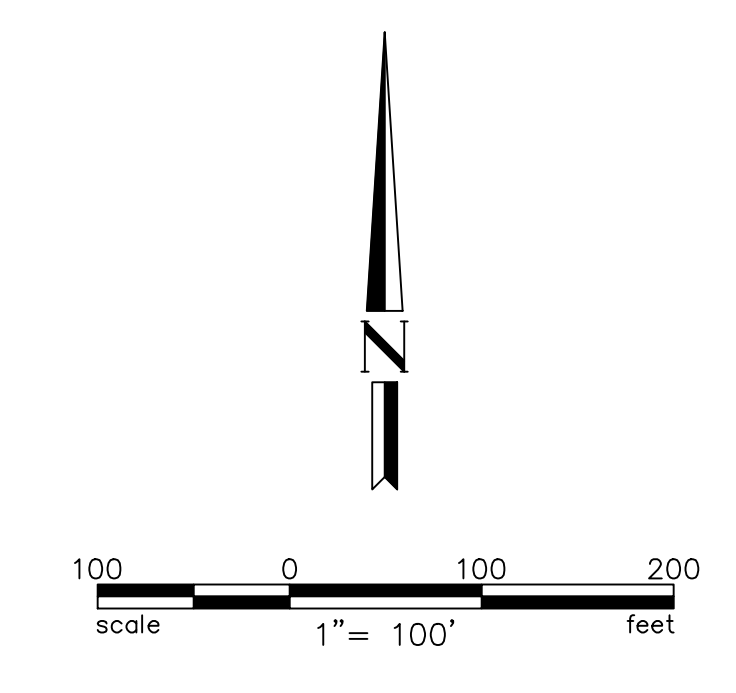
PLOT PLAN 25837

DEVELOPED CONDITION HYDROLOGY



LEGEND:

	PROPOSED BIORETENTION BASIN
	TRIBUTARY MAJOR-AREA BOUNDARY
	TRIBUTARY MINOR-AREA BOUNDARY
	PROPOSED PRIVATE STORM DRAIN
	PROPOSED PUBLIC STORM DRAIN
	PROPOSED PUBLIC STORM DRAIN EASEMENT
	FLOW PATH AND DISTANCE
A1	AREA ID
1.00 AC	TRIBUTARY AREA (ACRES)
	STORM DRAIN INLET



COUNTY OF RIVERSIDE

PLOT PLAN 25837
KNOX LOGISTICS CENTER BUILDING E
DEVELOPED HYDROLOGY MAP - BUILDING E STANDALONE

SCALE: AS SHOWN	DATE: 03/30/2017	SHEET NO: 11/190047.000
DESIGNED: RJA	CHECKED: GWC	DRAWN: GWC
PLN. OR. REV:	DATE:	BY:

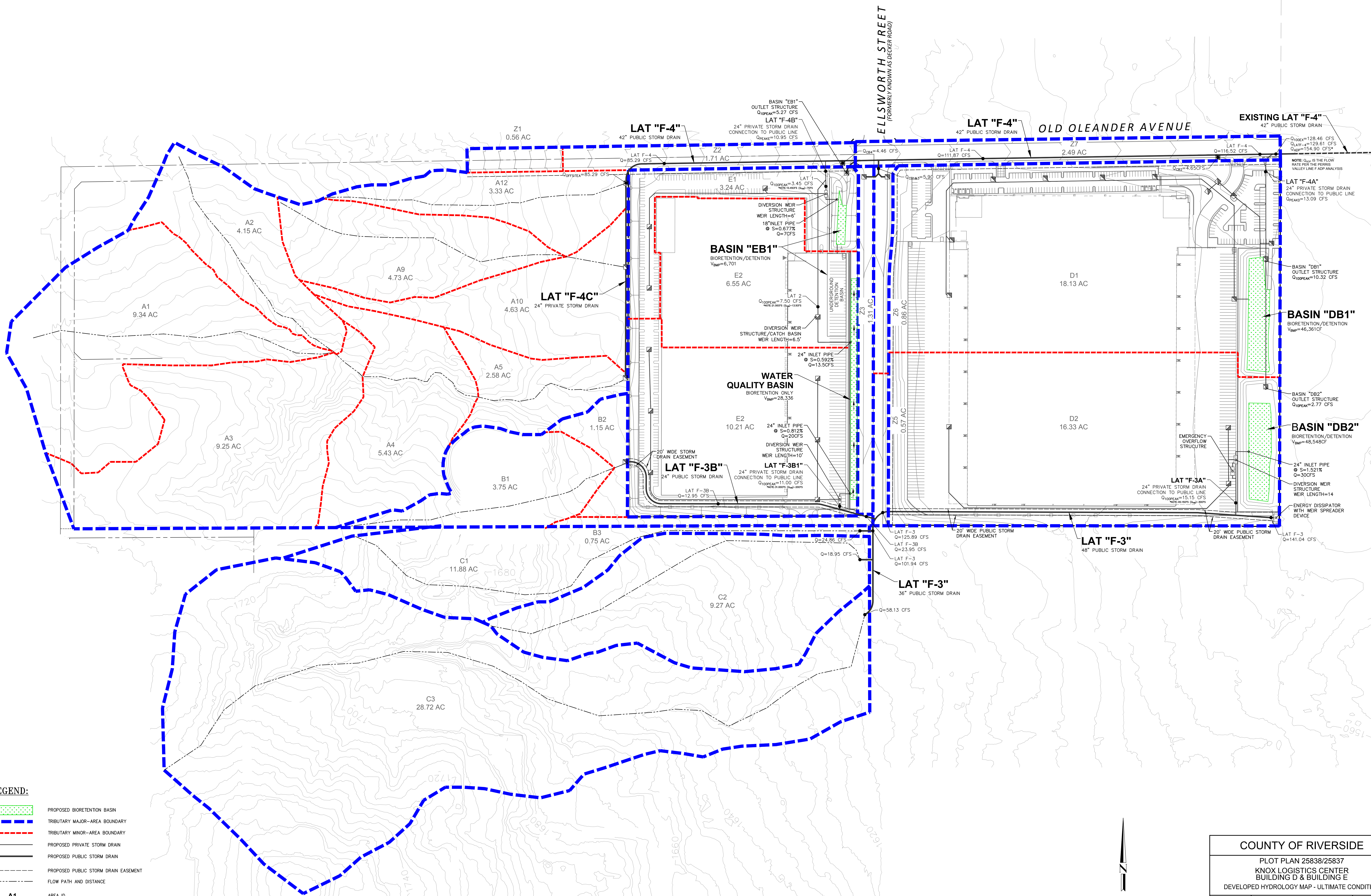
DAVID EVANS AND ASSOCIATES INC.
 17782 17TH STREET, SUITE 200
 TUSTIN, CA 92780
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KNOX LOGISTICS CENTER - ULTIMATE CONDITION

PLOT PLAN 25838/25837

DEVELOPED CONDITION HYDROLOGY



LEGEND:

- PROPOSED BIORETENTION BASIN
- TRIBUTARY MAJOR-AREA BOUNDARY
- TRIBUTARY MINOR-AREA BOUNDARY
- PROPOSED PRIVATE STORM DRAIN
- PROPOSED PUBLIC STORM DRAIN
- PROPOSED PUBLIC STORM DRAIN EASEMENT
- FLOW PATH AND DISTANCE
- A1** AREA ID
- 1.00 AC** TRIBUTARY AREA (ACRES)
- STORM DRAIN INLET

N

100 0 100 200
scale 1" = 100' feet

COUNTY OF RIVERSIDE

PLOT PLAN 25838/25837
KNOX LOGISTICS CENTER
BUILDING D & BUILDING E
DEVELOPED HYDROLOGY MAP - ULTIMATE CONDITION

SCALE: AS SHOWN	DATE: 03/30/2017	DAVID EVANS AND ASSOCIATES INC. 17782 17TH STREET, SUITE 200 TUSTIN, CA 92780 Phone: 714.665.4500 Fax: 714.665.4501	SHEET NO.: 1.150047.000
DESIGNED: RJA	CHECKED: GAC		DATE PLOTTED: 03/30/2017
DRAWN: GAC	PLN. OR. REV:		DATE: 03/30/2017
DATE: 03/30/2017	DATE: 03/30/2017		DATE: 03/30/2017