Appendix N-5

EMWD Sewer Capacity Study

SEWER CAPACITY STUDY

EMWD

FOR

CARGO GATEWAY D1 PARCEL

Riverside, CA

Prepared for:

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03-18-2024

DRC Job No. 20-522

TABLE OF CONTENTS

SECTION 1.0 NARRATIVE

1.1 Introduction

1.2 Site Description

1.3 Proposed Sewer Systems

1.4 Wastewater Generation

1.5 Sewer Capacity Analysis

1.6 Conclusion

SECTION 2.0 Sewer Capacity Calculation

Manning's Calculations for Proposed Sewer Laterals

SECTION 3.0 Figures

Fig. 3.0 Location Map

Fig. 3.1 Conceptual Sewer Map

SECTION 4.0 Reference Plans

EMWD Sewer Generation Rate Table

EMWD Water and Sewer Improvement Plans (D-13849)

SECTION 1.0 NARRATIVE

1.1 Introduction

The purpose of this report is to determine the capacity of the proposed sewer main conveying wastewater to the existing 8" EMWD sewer line and proposed manhole (Node 202) along Heacock Street. This report will analyze the capacity of the proposed 8" sewer main extending from the 8" EMWD existing sewer line and the proposed 8" sewer main going into the Node 202 manhole. The study will focus on the proposed sewer flows generated by the Cargo Gateway D1 Parcel and the existing Amazon building to the south of the private drive.

1.2 Site Description

The area of this study includes one proposed development with one ~180,000 sf building and one existing development with one ~225,000 sf building. The uses are summarized as follows (See Ultimate Tributary Area Land Use map in Section 3):

- Proposed D-1 Building
  - Light Industrial – 10.54 tributary acres
- Existing Amazon Building
  - Light Industrial – 14.85 tributary acres

1.3 Proposed Sewer Systems

The proposed sewer system consists of two 8" services joining at a point (Node 201) and discharging to the existing 8" EMWD sewer line (Node 202). The initial 8" sewer line services the proposed D-1 building and cargo plane lavatory discharge line. Existing sewer studies performed on other sites with airport land use indicated that the lavatory discharge adds negligible flow to the peak sewer capacity requirement and no sewer flow is accounted for from this lateral (node 101). The second 8" sewer line services the existing Amazon building to the south of the private drive by intercepting the existing 4.5" sewer force main and conveying the discharge to the 8" main in the private drive. The laterals are 8" PVC pipe. The proposed D-1 building site includes 10.54 tributary acres of sewer service and the remaining portion of the site is composed of airport ramps. The existing Amazon building accounts for 14.85 tributary acres.

Based on EMWD standards for design, utilizing a manning's value of 0.013, the maximum allowable percentage full of sewage flow is 50% for 8" pipes.

1.4 Wastewater Generation

The wastewater generation is estimated by land use and the generation factors from Eastern Municipal Water District 2015 Wastewater Collection System Master Plan Table 1 (See Table 1 in Section 4).

The proposed D-1 building and Amazon building are best described under the business park/light industrial land use with an EDU/ACRE of 5 and have a sewer generation rate of 1,175 GPD/ACRE per EMWD Sewer Design Guidelines. After the base daily flow is determined, EMWD requires a peaking factor to be applied to determine the peak design flow rate. The peaking factor is based upon the daily flow rate per the Peaking Factor Comparison chart from 3A2.2 of the 2015 Wastewater Collection System Master Plan. For the studied mains, the peaking factor used was 2.87.

The flow conditions in existing and proposed sewers were calculated in accordance with EMWD Sewer Design Guidelines. Manning's Equation is used to calculate the sewage flow condition in each pipe segment by using a roughness coefficient (n) of 0.015, the minimum pipe slope is per the record drawings and the minimum flow velocity is 2 fps. The flow rate from each tributary area is equal to the area acreage multiplied by the generation rate factor multiplied by the peaking factor:

PDWF (Q) = Acreage (A) x Generation Rate (Z) x Peaking Factor

The following table summarizes the average dry weather flow (ADWF) and peak dry weather flow (PDWF).

Table 3-1 Peak Flow Summary Table

Peak Flow Summary							
LAND USE CATEGORY	**DISCHARGE LOCATION**	**ACREAGE (A)**	**DEVELOPMENT DENSITY (EDU/ACRE)**	**WASTEWATER GENERATION FACTOR (Z)**	**PEAKING FACTOR**	**ADWF (CFS)**	**PDWF (CFS)**
Business Park/Light Industrial	D-1	10.54	5	1,175 GPD/ACRE	2.87	0.0192	0.0550
	Amazon	14.85	5	1,175 GPD/ACRE	2.87	0.0270	0.0775
Total		25.39	5	1,175 GPD/ACRE	2.87	0.0462	0.1325

1.5 Sewer Capacity Analysis

Figure 3.1 shows the proposed sewer system with the corresponding tributary flow relationships of each lot. The figure also shows the land use and corresponding acreages for each proposed development. Using this map, the areas tributary to the EMWD sewer lines were tabularized. See Sewer Generation Tables on the Sewer Map in Section 3.

Max flow from the Cargo Gateway D-1 Parcel (North) – 0.0550 CFS at a water depth of 0.125’ (19.0%).

Max flow from the combined D-1 Parcel and Amazon building (South) – 0.1325 CFS at a water depth of 0.117’ (23.1%).

The EMWD lateral will flow under their potential design capacity (50%) based on the minimum slopes seen in the laterals.

1.6 Conclusion

In conclusion, the proposed 8” sewer lines and existing 8” EMWD sewer main have the capacity to handle flows from the proposed future developments.

Section 2 Sewer Capacity Calculation

Worksheet for 8" Pipe - D1 (Node 102)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.0040 ft/ft
Diameter	8.0 in
Discharge	0.0550 cfs

Results

Normal Depth	1.5 in
Flow Area	0.0 ft²
Wetted Perimeter	0.6 ft
Hydraulic Radius	0.9 in
Top Width	0.51 ft
Critical Depth	1.3 in
Percent Full	18.2 %
Critical Slope	0.0069 ft/ft
Velocity	1.27 ft/s
Velocity Head	0.03 ft
Specific Energy	0.15 ft
Froude Number	0.772
Maximum Discharge	0.8221 cfs
Discharge Full	0.7642 cfs
Slope Full	0.0000 ft/ft
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	15.3 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.5 in
Critical Depth	1.3 in
Channel Slope	0.0040 ft/ft
Critical Slope	0.0069 ft/ft

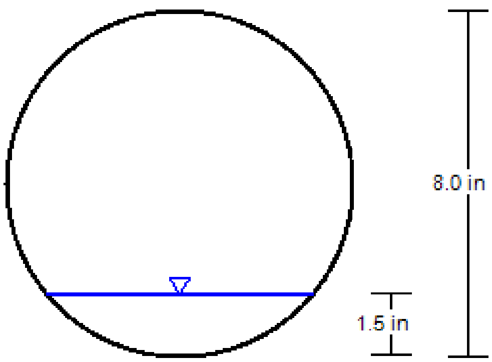
Cross Section for 8" Pipe - D1 (Node 102)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.0040 ft/ft
Normal Depth	1.5 in
Diameter	8.0 in
Discharge	0.0550 cfs



V: 1
H: 1

Worksheet for 8" Pipe - D1 & Amazon (Node 202)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.0032 ft/ft
Diameter	8.0 in
Discharge	0.1325 cfs

Results

Normal Depth	2.4 in
Flow Area	0.1 ft²
Wetted Perimeter	0.8 ft
Hydraulic Radius	1.4 in
Top Width	0.61 ft
Critical Depth	2.0 in
Percent Full	29.9 %
Critical Slope	0.0065 ft/ft
Velocity	1.51 ft/s
Velocity Head	0.04 ft
Specific Energy	0.23 ft
Froude Number	0.705
Maximum Discharge	0.7353 cfs
Discharge Full	0.6835 cfs
Slope Full	0.0001 ft/ft
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

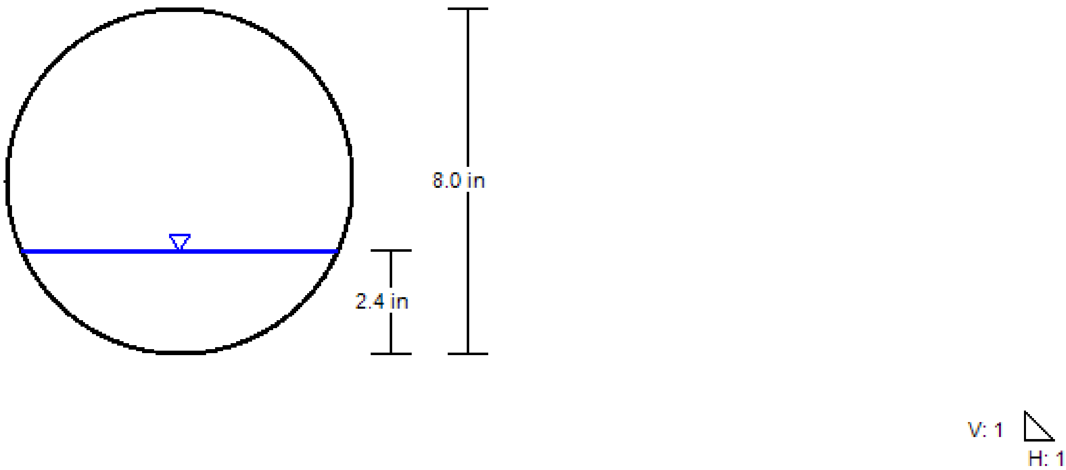
GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	2.4 in
Critical Depth	2.0 in
Channel Slope	0.0032 ft/ft
Critical Slope	0.0065 ft/ft

Cross Section for 8" Pipe - D1 & Amazon (Node 202)

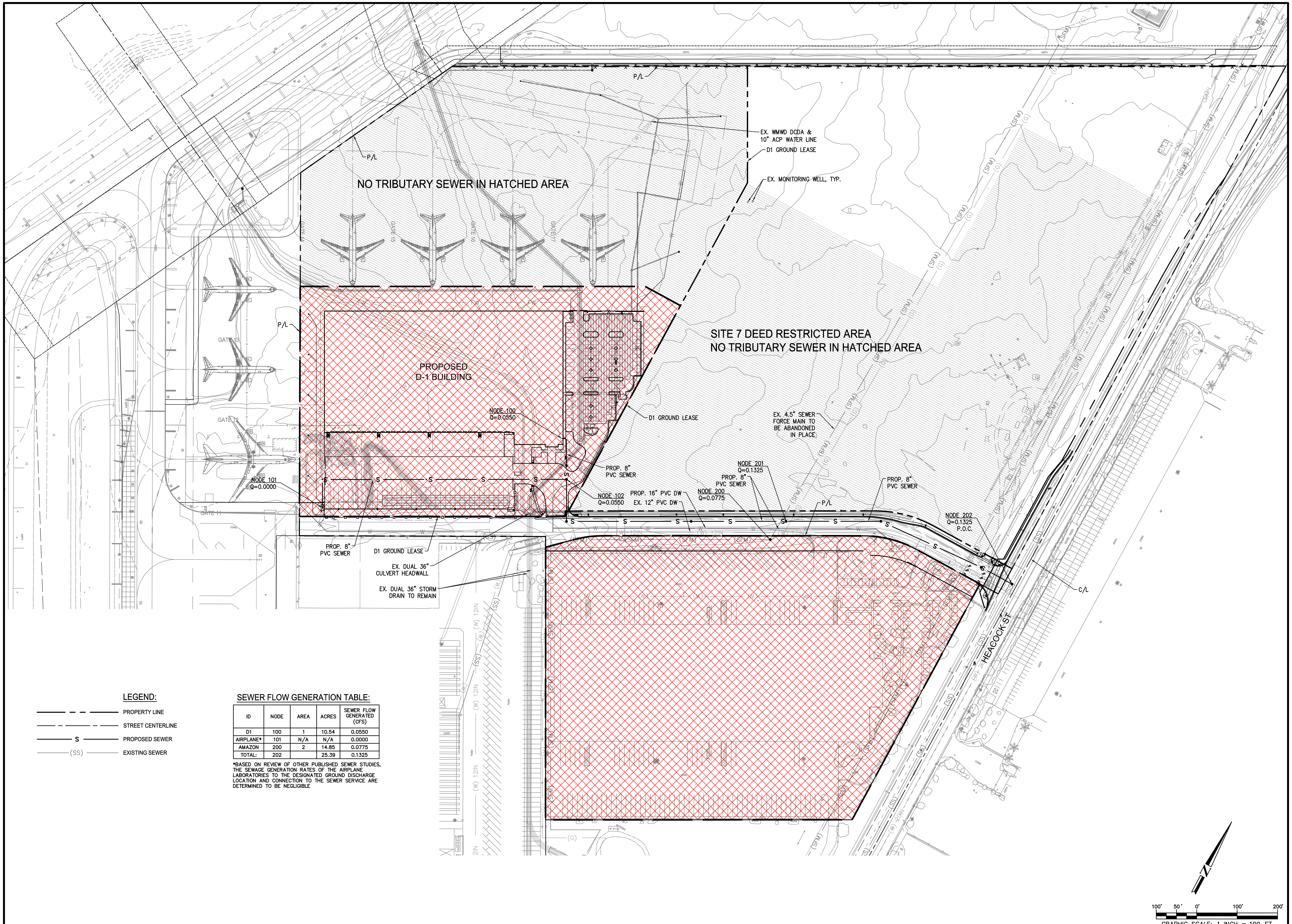
Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.0032 ft/ft
Normal Depth	2.4 in
Diameter	8.0 in
Discharge	0.1325 cfs



Section 3 Figures

Fig. 3.0 Location Map



LEGEND:

- PROPERTY LINE
- STREET CENTERLINE
- S — PROPOSED SEWER
- (SS) — EXISTING SEWER

SEWER FLOW GENERATION TABLE:

ID	NODE	AREA	ACRES	SEWER FLOW GENERATED (CFS)
D1	100	1	10.54	0.0550
AIRPLANE*	101	N/A	N/A	0.0000
AMAZON	200	2	14.85	0.0775
TOTAL:	202		25.39	0.1325

*BASED ON REVIEW OF OTHER PUBLISHED SEWER STUDIES, THE SEWAGE GENERATION RATES OF THE AIRPLANE LABORATORIES TO THE DESIGNATED GROUND DISCHARGE LOCATION AND CONNECTION TO THE SEWER SERVICE ARE DETERMINED TO BE NEGLIGIBLE

NOT FOR CONSTRUCTION

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

NO.	REVISION:	DATE:

PROJECT: MARCH INLAND PORT AUTHORITY
CARGO GATEWAY D1 PARCEL
RIVERSIDE COUNTY, CA

DRAWING NAME: SEWER MAP

ISSUE:	CONCEPTUAL
DATE:	3/18/2024
CHECKED: JB	DRAWN: DG
DRAWING FILE:	
PROJECT NO.:	20-522
SHEET NUMBER:	1
OF 1 SHEETS	
SCALE:	AS SHOWN

FILENAME: M:\2020\20-522 Riverside Meridian Base D1 Parcel\EMWD\Sewer Study\20-522 SW Map.dwg, LAST SAVED ON: Mar 18 2024 12:44pm PLOTTED BY: DREW, ON: Mar 18 2024 1:14pm, CFG:

Section 4 Reference Plans

F. Sewer Calculation Tables

Table 1 - EMWD - System Design and Loading Criteria
Average Daily Flow:

Table 1: Development Densities

LAND USE CATEGORY	UNITS	AVERAGE RESIDENTIAL DENSITY (DU/ACRE)	RESIDENTIAL (EDU/DU)	DEVELOPMENT DENSITY (EDU/ACRE)
Residential Land Use				
Estate Density	DU	0.5	1.5	0.8
High Density	DU	12	0.7	8.4
Low Density	DU	2	1.3	2.6
Medium Density	DU	4.5	1	4.5
Medium High Density	DU	6	0.9	5.4
Mobile Home Park	DU	10	0.65	6.5
Rural Mountainous (1)	DU	0.1	3	0.3
Rural (1)	DU	0.2	3	0.6
Very High Density	DU	17	0.65	11.1
Very Low Density (1)	DU	1	1	1.5
Non-Residential Use				
Agriculture (1)	acre			0
Business Park/Light Industrial	acre			5
Business Park/Light Industrial/Warehouse	acre			1.25
Commercial Office	acre			5
Commercial Retail	acre			5
Heavy Industrial	acre			7.5
Hospital	acre			5
Mixed Use Policy Area	acre			5
Open Space (Conservation, Landscape, Recreation, Rural, or Water) (1)	acre			5
Public Facilities (Municipal or School)	acre			5

(1) The following uses were assumed to be served by septic systems and do not contribute flow to the wastewater collection system: Rural Mountainous, Rural, Very Low Density, and Agriculture, and Open Space.

Rev.
12/28/21

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EASTERN MUNICIPAL WATER DISTRICT

10/19/91
CIVIL ENGR. OF SUBDIVISION — DATE

APPROVALS

	INITIAL	DATE		INITIAL	DATE
PROJ. ENG.	TRS	10-1-91	SEWER OPER	—	—
PLANNING	—	—	CONSTRUCTION	—	—
WATER OPER	—	—	DESIGN	—	—

E.M.W.D. INSPECTOR: RICHARD KEELINE — EMWD INSPECTOR DEAN CORNISH

IMPROVEMENT DISTRICT U-28 & U-27

M-31 AT THE INTERS. OF PERRIS BL. AND P.V.S.D. CHANNEL (BRIDGE #8011 P) ; 27.0 FEET WEST OF PERRIS BL; AT THE SOUTHEAST CORNER OF A 12 INCH X 115.0 FOOT, A BRASS DISK SET IN THE TOP OF THE HEADWALL AND MARKED M-31 1963 ELEV. 1475.588

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

DATE	BY	MARK	REVISIONS	APPR.	DATE
5-3-06	RE	7	AS CONST CO 66723 (CR 3-21-06)		5-3-06
10-24-05	CHS	6	ADDED TEMP 8" DCDA & FUTURE 2-2" WTR MTR SVCS. S.O.# 209503, 207703 & 207936		10/25/05
9-16-05	CHS	5	ABANDON & SALVAGE 1-2" WTR SVC & 1-8" WL, ADDED 20"x12" HOT TAP FOR 10" DCDA PER S.O. 207704, 208711 & 208712		9/16/05
8-4-05	JJW	4	ADD 12" METER PER S.O. 206934		8/4/05
2/1/00	KER	3	ADD 12" CONNECTION @ 111+09 PER S.O. 126046		2/1/00
12/1/95	MG	2	AS CONSTRUCTED, C.O. 49450/460 (C.R. 9/20/93)	H.S.	12/7/95
10-26-92	TRS	1	REVISE SERVICE & VALVE CALLOUT	MB	10/27/92
ENGINEER			REVISIONS	COUNTY	

DESIGNED BY J.W. — DRAWN BY L.V. / S.A. — CHECKED BY M.V.

RECOMMENDED FOR APPROVAL

DATE

CHECKED BY

DATE

SEAL COUNTY

SEAL — RICHARD J. SIDOR — No. C 042966 — Ex. 3/31/07 — CIVIL — STATE OF CALIFORNIA

APPROVED BY — DATE 10-21-91
PUBLIC WORKS DIRECTOR

APPROVED BY — DATE 4/16/91
RICHARD J. SIDOR
R.C.E. NO. 42966 — EXP. DATE 3-31-92

THE KEITH COMPANIES
Inland Empire
6296 RIVERCREST DRIVE
SUITE K
RIVERSIDE, CALIFORNIA 92507
(714) 653-0234

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WATER AND SEWER
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FOR CITY OF MORENO VALLEY
PROJECT NO. 91 - 13908

41 & 32
SERV. AREA
W.O. 91-439
C.O.
COORD. 10,11-H
SHT 13 OF 17
D-
SD-

P40 SEWER/WATER "HEACOCK" SHT. 9 - 72[0.100]PF; 794003 2609 22-Feb-91 01:50 PM / 794003-5/..

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