PROJECT MEMORANDUM

CITY OF RIVERSIDE

Independence Sewer Study

Project No.:	204983-00
Date:	March 18, 2026
Prepared By:	Harshada Pednekar
Reviewed By:	Michael Wetterau and Ryan Orgill, PE
Subject:	Independence at Canyon Springs - City of Riverside Sewer Study



1.0 BACKGROUND

Independence at Canyon Springs (Developer) plans to develop a vacant parcel that is 9.13 acres with 156 multi-family residential dwelling units in the City of Riverside (City), California. The planned project, Independence at Canyon Springs (Development), is located on northwest corner of Gateway Drive and Canyon Park. A copy of the Development's site plan is included as Attachment A. The purpose of this study is to understand the impact that the Development could have on the City's wastewater collection system. A hydraulic evaluation of the Development's potential impacts was completed by updating the hydraulic model developed as part of the City's 2020 *Update of the Integrated Master Plan for the Wastewater Collection and Treatment Facilities* (Master Plan Update). This memorandum describes the model update, evaluation criteria, and hydraulic evaluation.

2.0 MODEL UPDATE

The hydraulic model developed by Carollo Engineers (Carollo) included pipelines that are 10 inches in diameter and larger. Some smaller-diameter sewers (8 inches in diameter and smaller) are also included in the hydraulic model, where needed, for connectivity. The major model updates for the purpose of this analysis included updating wastewater flows and adding some smaller sewers for connectivity to the City's existing collection system.

The Development consists of approximately 9.13 acres of multi-family residential space. The Developer is proposing a land use type of high-density residential, which deviates from the 2019 General Plan of commercial. The new average dry weather flow (ADWF) from the Development was developed by Carollo using the same method as in the Master Plan Update and is summarized in Table 1. The new ADWF for the Development is 25,564 gallons per day (gpd), which is slightly greater than the original land use type. For the hydraulic evaluation, the net additional loads associated with the project were allocated to the modeled manhole as ADWF. It was assumed that there was a change in the rain derived inflow and infiltration (RDII) during a peak wet weather flow (PWWF) event due to the development during the

existing conditions. The Development is projected to have a peak RDII of 9,130 gpd during a PWWF event. During the hydraulic model build, ADWF and RDII were allocated to Manhole (MH) 12221, which also serves as a proposed point of connection, as shown in Figure 1.

Table 1 Dry Weather Flow - Summary

Scenario	Area (acre)	Land Use Type	Flow Factor(1) (gpd/ac)	ADWF(2) (gpd)
Master Plan Update	9.13	Commercial	710	6,482
Proposed Development	9.13	High Density Residential	2,800	25,564
Net Additional Flows				19,082

Notes:
gpd/ac - gallons per day per acre
(1) Source: *Update of the Integrated Master Plan for the Wastewater Collection and Treatment Facilities.*

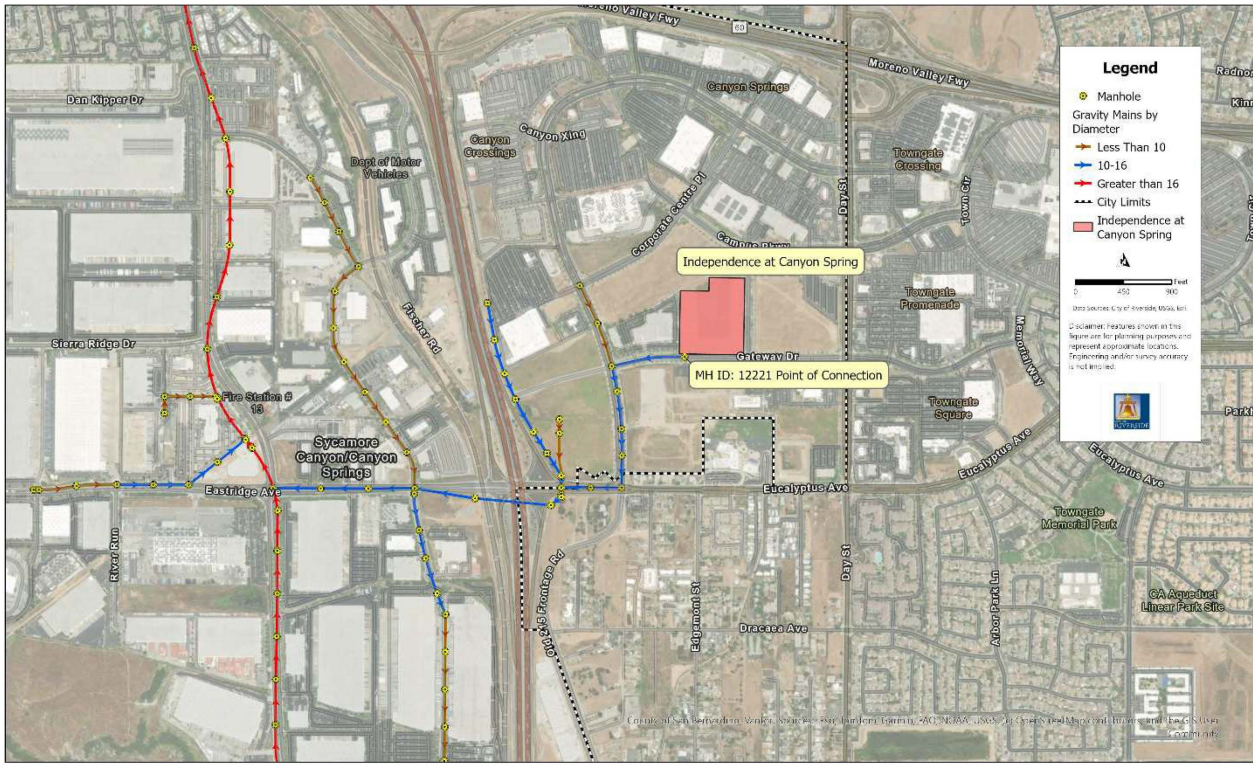


Figure 1 Vicinity Map

3.0 EVALUATION CRITERIA

The evaluation criteria used in this this study are consistent with the evaluation criteria used in Volume 3, Chapter 5: Planning Criteria and Design Flows of the Master Plan Update. This section provides a brief description of the evaluation criteria used in this study.

The primary criterion used to identify capacity-deficient sewers or to size new sewer improvements is the maximum depth to diameter (d/D). The d/D value is defined as the depth of flow (d) in a pipe during peak (design) flow conditions divided by the pipe's diameter (D). The maximum depth criteria were evaluated

under PWWF conditions. The PWWF design storm is a 10-year 24-hour storm event. The maximum depth criteria are summarized in Table 2. The following explains these criteria in more detail:

- Flow Depth for Existing Sewers. Maximum flow depth criteria for existing sanitary sewers are established based on several factors, including the acceptable risk tolerance of the utility, local standards and codes, and other factors. Using a conservative d/D ratio when evaluating existing sewers may lead to unnecessary replacement of existing pipelines. Conversely, lenient flow depth criteria could increase the risk of sanitary sewer overflows (SSOs). Ultimately, the maximum allowable flow depth criteria are established to be as cost-effective as possible while, at the same time, reducing the risk of SSOs to the greatest extent possible. For the City, existing pipelines were flagged if the d/D exceeded 0.90.

  A capacity-deficient sewer (i.e., system bottleneck) raises the hydraulic grade line of upstream sewers, leading to backwater conditions and the possibility of an overflow. The greater the capacity deficiency, the higher water levels will surcharge upstream of the bottleneck pipeline (or pipelines). The hydraulic model is used to determine "backwater" pipelines to specify which specific pipelines are the actual root causes of the capacity deficiency. Capital projects are proposed to provide greater flow capacity for the deficient sewers, which eliminates the backwater conditions that cause surcharging.
- Flow Depth for New Sewers. When sizing new sewer pipelines, it is common practice to adopt different flow depth criteria for various pipe sizes. Design d/D ratios typically range from 0.5 to 0.92, with the lower values typically used for smaller pipes, which may experience flow peaks greater than design flow or blockages from debris, paper, or rags. The recommended d/D criteria for sizing new trunk lines are also summarized in Table 2. For pipelines 10 inches and smaller in diameter, the maximum d/D value is 0.5 or 50 percent of the pipeline diameter. For pipelines that are 12 inches to 18 inches in diameter, the recommended maximum d/D is 0.67. For pipelines larger than 18 inches in diameter, the maximum d/D is 0.75.

Table 2 Maximum Flow Depth Criteria

Pipe Diameter (inches)	Maximum d/D Ratio (during PWWFs)
Maximum d/D for Existing Sewer	
All pipes	0.90
Maximum d/D for New Sewers	
10 inches and smaller	0.50
12 inches to 18 inches	0.67
Larger than 18 inches	0.75

4.0 HYDRAULIC EVALUATION

A capacity analysis entails identifying areas in the sewer system where flow restrictions occur or where pipe capacity is insufficient to convey PWWFs. Sewers that lack sufficient capacity to convey PWWFs create bottlenecks in the collection system that can potentially cause SSOs. This section discusses the impacts of the development and confirms if the recommended improvement projects sizing developed in the Master Plan Update are still adequately sized.

5.0 EXISTING HYDRAULIC EVALUATION

For the existing sewer collection system, the PWWF was routed through the hydraulic model along with the changes to the point of connections for ADWF and RDII. The purpose of the existing system evaluation is to verify that the existing system is appropriately sized to convey existing PWWFs plus the additional flows from the proposed land use change. The Master Plan Update, excluding the planned Development flows, identified no improvement project downstream of the point of connection under existing conditions.

The hydraulic analysis showed that the Master Plan Update's existing system is adequately sized for existing PWWF conditions and the planned Development at the proposed point of connection. No further improvements would be required under existing conditions with the planned Development.

6.0 FUTURE HYDRAULIC SYSTEM EVALUATION

The analysis of the future system was performed in a manner like the existing system analysis. The purpose of the future system evaluation is to verify that the future system improvements were appropriately sized to convey future PWWFs and to identify the locations of existing sewers that are adequately sized to convey existing PWWFs but cannot convey future PWWFs. The Master Plan Update identified one future system improvement project downstream of the Development which is listed below. The project is also illustrated on Figure 2 in purple.

- **New Trunk parallel to Santa Ana Trunk (Project GM-34):** This identified infrastructure improvement project includes installing approximately 9,160 feet of 39-inch diameter trunk sewer parallel to the Phoenix Trunk Sewer between the Santa Ana Trail and Jurupa/Rubidoux Junction Structure. The flow levels within the upstream Phoenix Trunk sewer are expected to surcharge, exceed maximum d/D criteria, and experience backwater effects under build out PWWF conditions. To mitigate the capacity deficiencies during build out PWWF conditions, a parallel trunk sewer is recommended.

This project is identified in Figure 2, as mentioned. The timing of growth under future conditions is expected to occur within the planning horizon of this Master Plan Update, which is the year 2037. As flows continue to increase in the future, there will be some areas of the collection system that cannot convey the future PWWF without flows exceeding capacity. At that time improvements will be needed.

The future capacity evaluation, including the proposed Development, did not identify any new system deficiencies not already identified in the Master Plan Update or the existing hydraulic evaluation discussed above. The hydraulic analysis showed that the proposed Master Plan Update's future projects are adequately sized for the proposed Development.

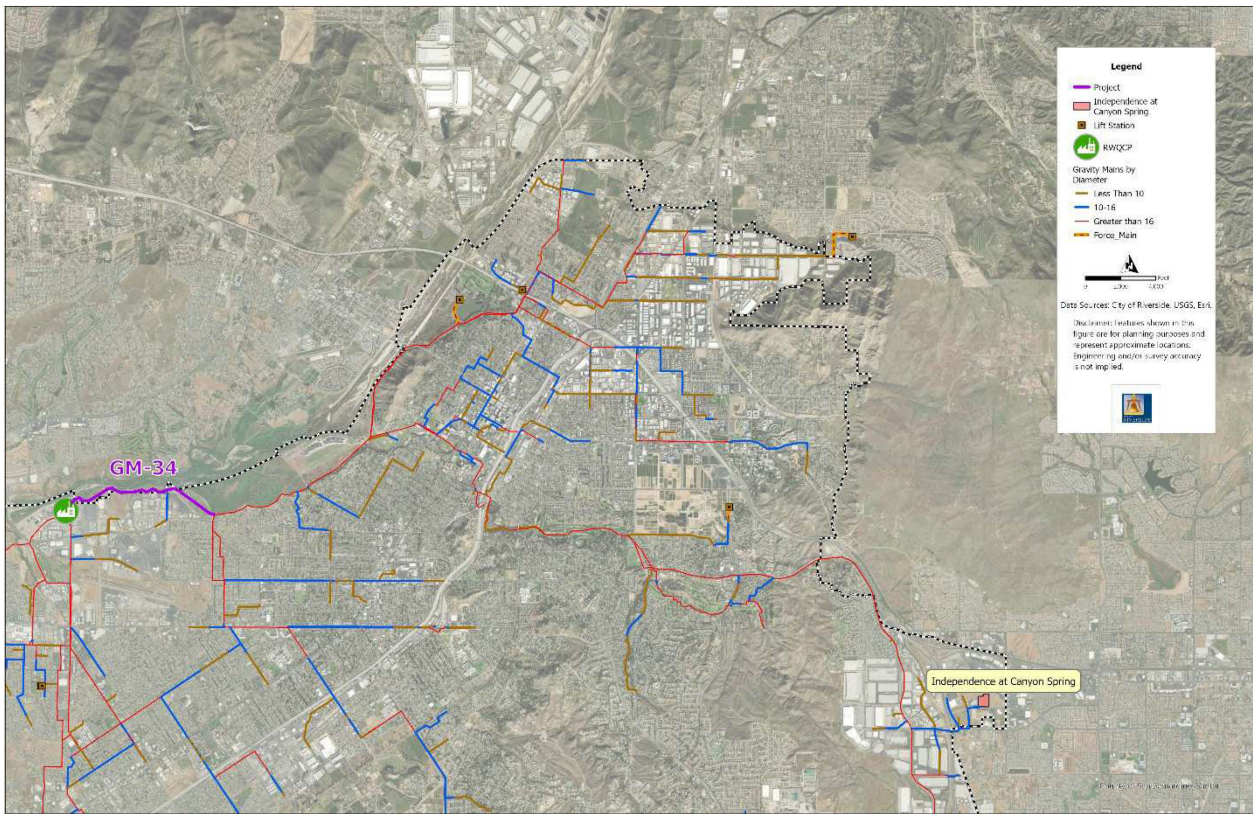


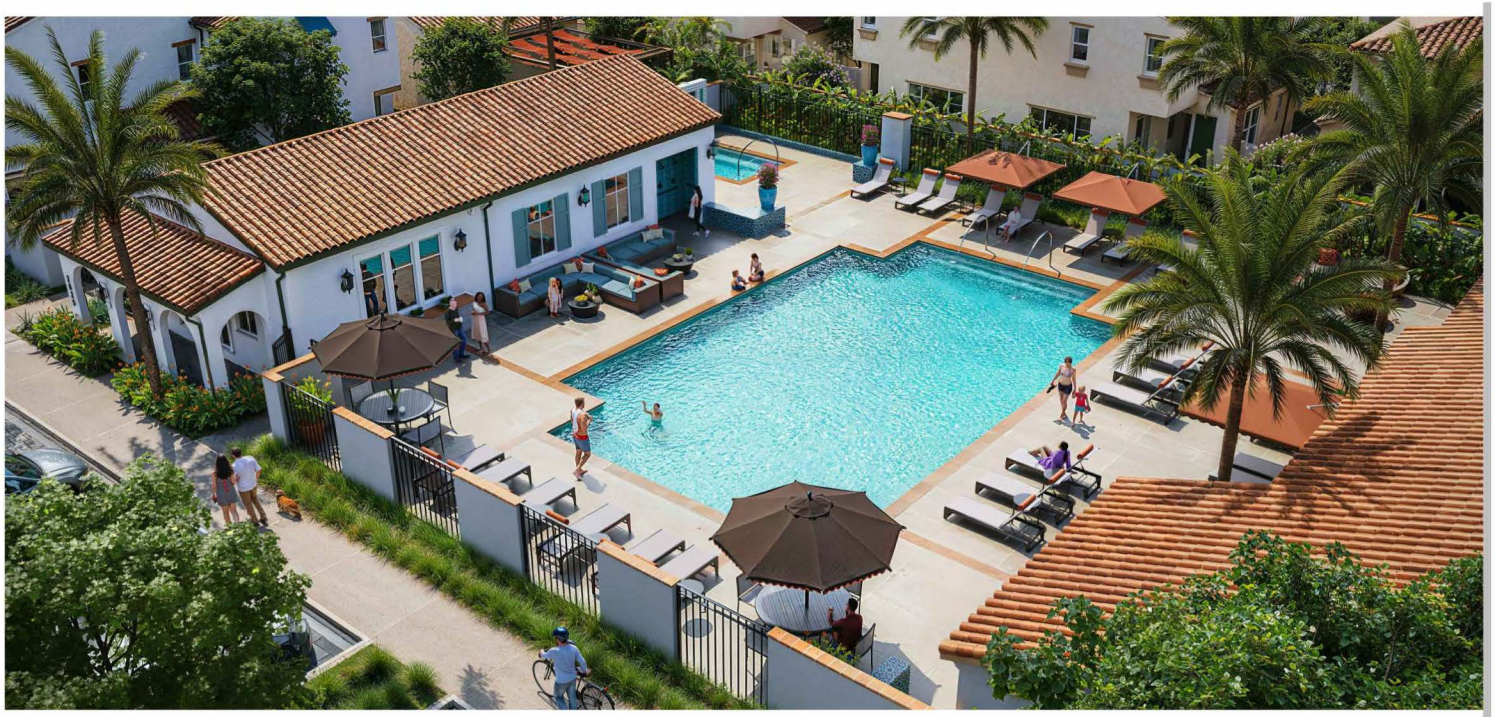
Figure 2 Future System Improvements Identified in the Master Plan Update

7.0 CONCLUSION

The evaluations presented in this analysis show that the Master Plan Update's proposed improvement project for future conditions is adequate to meet the requirements of the proposed Development for areas included in the City's hydraulic model. As a result, no changes to the Master Plan Update are recommended to mitigate this proposed land use change and Development.

ATTACHMENT A

INDEPENDENCE AT CANYON SPRINGS CONCEPTUAL SITE PLAN



SHEET INDEX

T-1	TITLE SHEET
A.1.0	SITE PLAN
A.1.01	FIRE ACCESS, EMERGENCY VEHICLE AND TRASH TRUCK PLAN
A.1.1	PERSPECTIVE - GATEWAY DRIVE - ENTRY VIEW
A.1.2	PERSPECTIVE - CANYON VIEW DRIVE- VIEW 1
A.1.3	PERSPECTIVE - CANYON VIEW DRIVE- VIEW 2
A.1.4	PERSPECTIVE - CANYON VIEW DRIVE- VIEW 3
A.1.5	PERSPECTIVE - CANYON VIEW DRIVE- VIEW 4
A.2.1	UNIT PLAN 1- FLOOR PLANS
A.2.2	UNIT PLAN 1Y- FLOOR PLANS
A.2.3	UNIT PLAN 2- FLOOR PLANS
A.2.4	UNIT PLAN 2Y- FLOOR PLANS
A.2.5	UNIT PLAN 3- FLOOR PLANS
A.2.6	UNIT PLAN 3Y- FLOOR PLANS
A.2.7	UNIT PLAN 3X- FLOOR PLANS
A.2.8	UNIT PLAN 4- FLOOR PLANS
A.2.9	BUILDING PLANS - BUILDINGS 1, 1Y 1X & 1XY
A.2.10	BUILDING PLANS - BUILDINGS 2, 2Y & 2Z
A.2.11	BUILDING PLANS - BUILDINGS 3 , 3Y & 3X
A.2.12	BUILDING PLANS - BUILDING 4
A3.1	BUILDING 1 - ELEVATION 1A
A3.2	BUILDING 1Y - ELEVATION 1YA
A3.3	BUILDING 1 - ELEVATION 1C
A3.4	BUILDING 1Y - ELEVATION 1YD
A3.5	BUILDING 1X - ELEVATION 1XA
A3.6	BUILDING 1XY - ELEVATION 1XYA
A3.7	BUILDING 2 - ELEVATION 2A
A3.8	BUILDING 2Y - ELEVATION 2YA
A3.9	BUILDING 2Z - ELEVATION 2ZA
A3.10	BUILDING 2Z - ELEVATION 2ZA ENH
A3.11	BUILDING 3 - ELEVATION 3A
A3.12	BUILDING 3Y - ELEVATION 3YA
A3.13	BUILDING 3 - ELEVATION 3C
A3.14	BUILDING 3Y - ELEVATION 3YC
A3.15	BUILDING 3X - ELEVATION 3XA
A3.16	BUILDING 3X - ELEVATION 3XC
A3.17	BUILDING 4 - ELEVATION 4A
A3.18	BUILDING 4 - ELEVATION 4B
COMMON BUILDINGS	
A4.1	LEASING BUILDING - PLAN & ELEVATIONS
A4.2	FITNESS BUILDING - PLAN & ELEVATIONS
A4.3	MAINTENANCE BUILDING - PLAN & ELEVATIONS
A4.4	MAIL PAVILION - PLAN & ELEVATIONS
A4.5	TRASH ENCLOSURE - PLANS & ELEVATIONS
CM5.1	COLOR AND MATERIAL BOARDS
LANDSCAPE:	
L-1	PRELIMINARY LANDSCAPE PLAN
L-2	RECREATION AREA ENLARGEMENT PLAN
L-3	TYPICAL BACKYARD DUPLEX ENLARGEMENT PLAN
L-4	FENCE AND WALL PLAN
L-5	FENCE AND WALL DETAILS
L-6	PEDESTRIAN PATH-OF-TRAVEL PLAN
L-7	OPEN SPACE PLAN
PHOTOMETRIC	
E0.1	PHOTOMETRIC SITE PLAN
E0.2	LIGHTING CUT SHEETS
CIVIL:	
C-1	PRELIMINARY GRADING PLAN
C-2	PRELIMINARY GRADING PLAN
C-3	PRELIMINARY SITE SECTIONS
C-4	PRELIMINARY SITE SECTIONS
C-5	PRELIMINARY WET UTILITY PLAN
C-6	PRELIMINARY WET UTILITY PLAN
C-7	PRELIMINARY LID BMP DETAILS
C-8	PRELIMINARY LID BMP DETAILS
SHEET 1	TENTATIVE TRACT MAP NO. 39251 (EXISTING SITE CONDITIONS)
SHEET 2	TENTATIVE TRACT MAP NO. 39251 (PROPOSED SITE PLAN)

VICINITY MAP:



PROJECT INFO:

	DUPLEXES	COMMON AREA BLDGS
OCCUPANCY:	R-3 & U	B & U
CONSTRUCTION TYPE:	V-B	V-B
FIRE SUPPRESSION SYSTEM:	NFPA 13D	NFPA 13 & NONE
PRIVATE ON-SITE DRIVE AISLES:	24' @ NON FIRE ACCESS ROAD 26' @ FIRE ACCESS ROAD	
SOLAR:	TO BE INSTALLED, UTILIZING MASTER METERING	

APPLICABLE CODES

2022 CALIFORNIA RESIDENTIAL CODE (CRC) FOR DUPLEXES
2022 CALIFORNIA MECHANICAL CODE (CMC)
2022 CALIFORNIA PLUMBING CODE (CPC)
2022 CALIFORNIA ELECTRICAL CODE (CEC)
2022 CALIFORNIA FIRE CODE (CFC)
2022 CALIFORNIA GREEN BUILDING STANDARDS CODE (CGBSC)
2022 CALIFORNIA ENERGY CODE (CENRC)
2022 CALIFORNIA BUILDING CODE FOR COMMON AREA BUILDINGS

WET UTILITIES:

PRIVATE ON-SITE DOMESTIC/FIRE WATER MAIN WITH PUBLIC MASTER METER
PRIVATE ON-SITE SEWER MAIN
PRIVATE ON-SITE STORM DRAIN

PROJECT DIRECTORY:

APPLICANT:
LS BTR DEVELOPMENT, LLC
1156 N. MOUNTAIN AVENUE
UPLAND, CA 91786
CONTACT: JAMES KIM
JAMES.KIM@LEWISMC.COM
(909) 985-0971

ARCHITECT:
ANGELENO ASSOCIATES, INC.
147 E. CITY PLACE DR.
SANTA ANA, CA 92705
CONTACT: CHRISTINE LY
CLY@ANGELENOARCHITECTS.COM
(714) 285-1888

EXTERIOR COLORS AND MATERIAL
WHA, ARCHITECTURAL COLOR DESIGN
680 NEWPORT CENTER DR. SUITE 300
NEWPORT BEACH, CA 92660
CONTACT: DONNA ALDRICH
DONNA@WHAINC.COM
(949) 250 0607

CIVIL ENGINEER:
KHR ASSOCIATES
17530 VON KARMAN AVE. SUITE 200
IRVINE, CA 92614
CONTACT: MIKE THOMAS
MTHOMAS@KHRDESIGN.COM
(949) 756-6440

LANDSCAPE ARCHITECT
SITESCAPES
3190 B-2 AIRPORT LOOP DRIVE
COSTA MESA, CA 92626
CONTACT: RICK POLHAMUS
RPOLHAMUS@SITESCAPES.NET
(949) 644-9370

PHOTOMETRIC DESIGNER:
PIVIOTAL CONSULTANTS
CONTACT: SHAWN MAYER
SHAWNMAYER@PIVOTALCONSULTANTS.COM
(916) 835-5643

T-1

INDEPENDENCE AT CANYON SPRINGS

RIVERSIDE, CA

TITLE SHEET

LS BTR DEVELOPMENT, LLC
1156 N. MOUNTAIN AVENUE, UPLAND CA 91786
PHONE: (909) 985-0971

LEWIS GROUP OF COMPANIES

ANGELENO ASSOCIATES, INC.
147 E. CITY PLACE DR. SANTA ANA CA 92705
PHONE: (714) 285-1888

01.13 .26
JOB: 2305

APARTMENTS

NET RENTABLE AREA- INCLUDES WALL THICKNESS OF EXTERIOR WALLS & EXTENDING FROM UNIT-TO-UNIT DEMISING WALL CENTERLINE

	39	25.0%	PLAN 1	1,176 SF, 2 BED, 2 BA
	22	14.1%	PLAN 1Y	1,176 SF, 2 BED, 2 BA
	14	9.0%	PLAN 2	1,477 SF, 3 BED, 2.5 BA
	2	1.3%	PLAN 2Y	1,477 SF, 3 BED, 2.5 BA
	38	24.4%	PLAN 3	1,606 SF, 3 BED, 2.5 BA
	21	13.5%	PLAN 3Y	1,606 SF, 3 BED, 2.5 BA
	5	3.2%	PLAN 3X	1,632 SF, 3 BED, 2.5 BA
	12	7.7%	PLAN 4	1,722 SF, 3 BED, 2.5 BA
	3	1.9%	PLAN 5	1,829 SF, 3 BED, 2.5 BA
	156	100.0%		

BUILDING SUMMARY

	Bldg Type	No. of Bldgs	Area Per Building (nra-sf)	Subtotal	Code Analysis: Occupancy Classification	Type of Construction	Fire Sprinklers	Building Code
Residential	B1	15	2,352	35,280	R-3/U	V-B	13D	CRC 2022
	B1X	8	2,782	22,256				
	B1XY	3	2,782	8,346				
	B1Y	9	2,352	21,168				
	B1YM	1	2,352	2,352				
	B2	10	3,083	30,830				
	B2Y	2	3,083	6,166				
	B2Z	2	2,954	5,908				
	B3	6	3,212	19,272				
	B3Y	8	3,212	25,696				
	B3X	5	3,238	16,190				
	B4	6	3,444	20,664				
	B5	3	3,435	10,305				
	Total	78		224,433				
Common Areas	Leasing Building	1	1,308	1,308	B/S2	V-B	13	CBC 2022
	Fitness Building	1	2,095	2,095	B	V-B	13	
	Maintenance Building	1	600	600	U	V-B	NONE	
	Mail Building	1	255	255	U	V-B	NONE	
	Trash Enclosure	1	448	448	U	V-B	NONE	
	Total	5		4,706				

REQUIRED PARKING

PER SECTION 19.580.060 RMC "Dwelling-Single Family"

	No. of Units	Ratio Required	No. of Stalls	Total
2BD Duplex	61	2	122	312
3BD Duplex	95	2	190	
Total	**156**		312	**312**
Parking Ratio				**2.00**

PROVIDED PARKING

Parking Type	Stall Size	No. of Stalls: Covered	Open	Total
Surface Standard Partially Covered Stalls Plan 1 Floor Plan	9' x 18' (16' + 2' Overhang)	57		312
Garage Stalls	10' x 20'	255		
Surface Standard	9' x 18'		23	53
Surface Compact	9' x 16' + 2' OH		5	
Surface Parallel	8' x 22'		21	
Surface Standard HC	9'+5' x 18'		2	
Surface Standard HC Van	9' +8' x 18'		2	
Total		312	53	**365**



PROJECT SUMMARY:

ADDRESS:	**NWC OF GATEWAY DRIVE & CANYON PARK, RIVERSIDE, 92507**
SITE AREA:	**9.13 ACRES (+/- 397,468 SF)**
ZONE:	**CANYON SPRINGS BUSINESS PARK SPECIFIC PLAN**
DENSITY:	**156 UNITS/9.13 AC= 17.1 DU/AC**
TOTAL UNITS:	**156**
TOTAL BUILDINGS:	**78 DUPLEXES + 5 COMMON AREA BUILDINGS**
PROPOSED MAX HEIGHT:	**29'-9"**
NO OF STORY:	**2-STORY @ DUPLEXES 1-STORY AT COMMON BUILDINGS**

ENHANCED ELEVATIONS

INDEPENDENCE AT CANYON SPRINGS

RIVERSIDE, CA

0 50' 200'
25' 100'

A.1.0

SITE PLAN

LS BTR DEVELOPMENT, LLC
1156 N. MOUNTAIN AVENUE, UPLAND CA 91786
PHONE: (909) 985-0971

LEWIS GROUP OF COMPANIES

ANGELENO ASSOCIATES, INC.
147 E. CITY PLACE DR. SANTA ANA CA 92705
PHONE: (714) 285-1888

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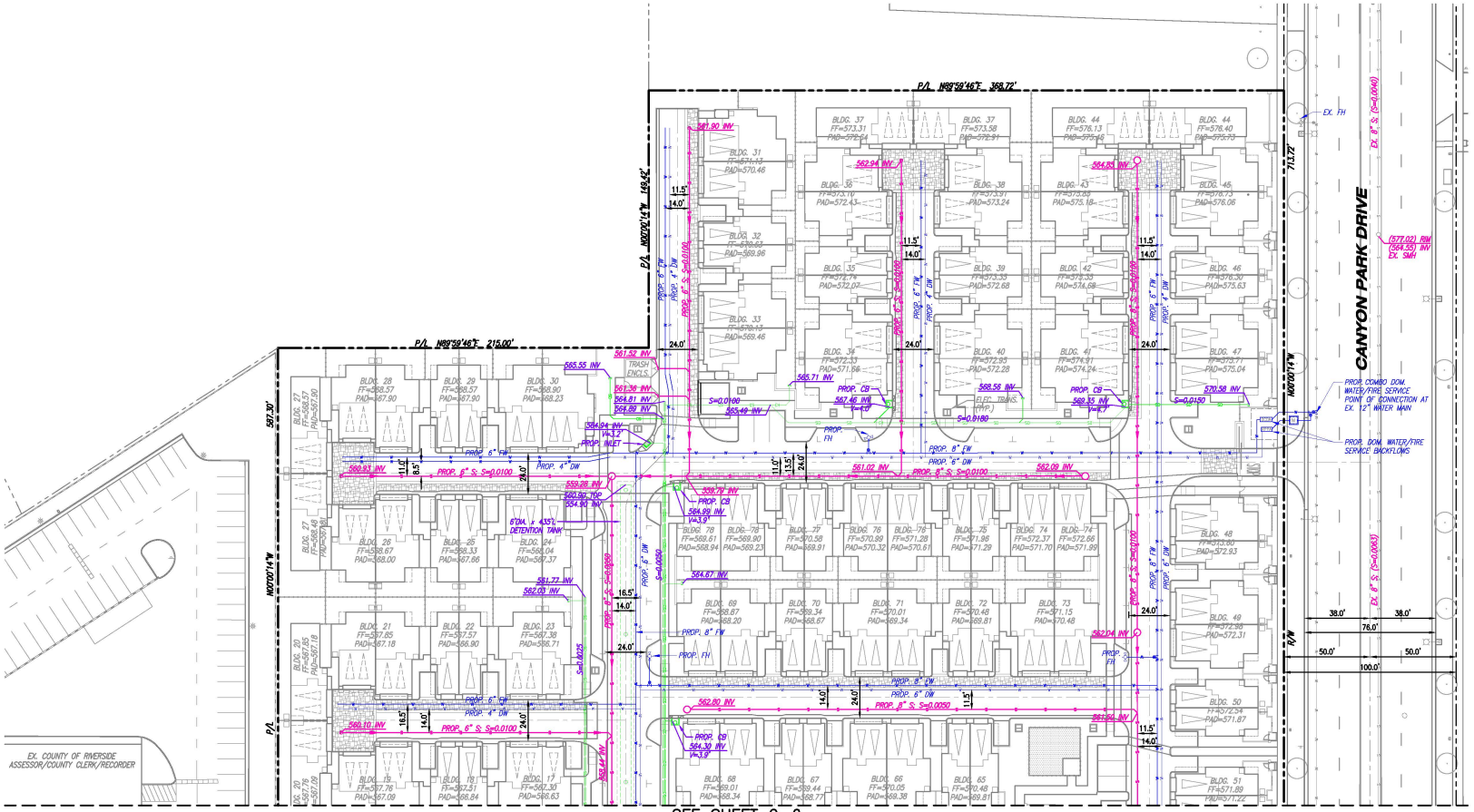

LEGEND

- CENTER LINE
- PROJECT BOUNDARY
- RIGHT OF WAY
- PROP. CURB & GUTTER
- PROPOSED STORM DRAIN (PRIVATE)
- PROPOSED SEWER LINE & MANHOLE (PRIVATE)
- PROPOSED WATER LINE (PRIVATE)
- PROPOSED FIRE HYDRANT
- EXISTING FIRE HYDRANT
- PROPOSED WATER METER
- PROPOSED CATCH BASIN
- PROPOSED GRATED INLET CATCH BASIN
- PROPOSED SEWER CLEANOUT
- WATER VALVE
- SEWER FLOW DIRECTION

NOTES

1. THIS PRELIMINARY UTILITY PLAN IS NOT CONSIDERED FINAL DESIGN OR FOR CONSTRUCTION AND IS SUBJECT TO CHANGE DURING THE DESIGN PHASE.
2. ALL ON-SITE UTILITIES ARE PRIVATE.
3. UTILITIES WITHIN THE PUBLIC RIGHT-OF-WAY/STREETS ARE PUBLIC.
4. THIS SITE FALLS WITHIN THE EASTERN MUNICIPAL WATER DISTRICT (EMWD) SERVICE AREA FOR WATER AND EDGEMONT COMMUNITY SERVICES DISTRICT (ECSD) SERVICE AREA FOR SEWER.
5. THE CITY OF RIVERSIDE ENVIRONMENTAL COMPLIANCE SECTION REQUIRES ALL POOL/SPA DISCHARGES TO BE ROUTED TO SEWER.

ABBREVIATIONS

CB	CATCH BASIN
DCDA	DOUBLE CHECK DETECTOR ASSEMBLY
DMA	DRAINAGE MANAGEMENT AREA
DW	DOMESTIC WATER
EX.	EXISTING
FH	FIRE HYDRANT
FF	FINISHED FLOOR
FS	FINISHED SURFACE
FW	FIRE WATER
INV	INVERT
MWS	MODULAR WETLAND SYSTEMS
P/L	PROPERTY LINE
PROP.	PROPOSED
RPPA	REDUCED PRESSURE PRINCIPLE ASSEMBLY
R&R	REMOVE AND REPLACE
R/W	RIGHT OF WAY
S	SEWER
SD	STORM DRAIN
SDMH	STORM DRAIN MANHOLE
SMH	SEWER MANHOLE
TOP	TOP OF PIPE

0 15 30 60 90

SCALE: 1"=30'

INDEPENDENCE AT CANYON SPRINGS

2764 GATEWAY DRIVE, RIVERSIDE, CA

PRELIMINARY WET UTILITY PLAN C-5

LS BTR DEVELOPMENT, LLC
1156 N. MOUNTAIN AVE. UPLAND, CA 91786
PHONE: (909) 985-0971

LEWIS GROUP OF COMPANIES

KHR ASSOCIATES
17530 VON KARMAN AVE. - SUITE 200, IRVINE, CA 92614
PHONE: (949) 756-6440

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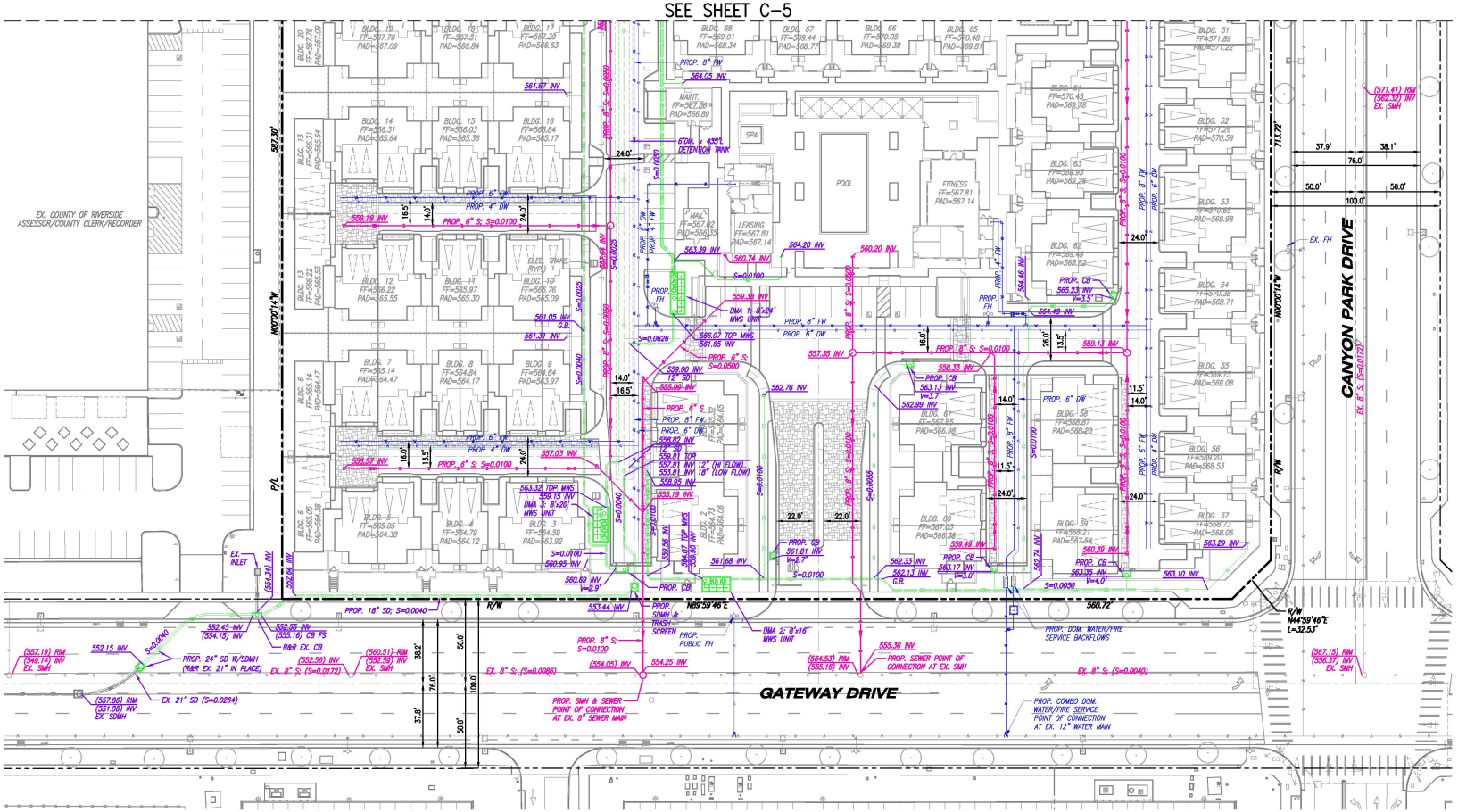

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FW	FIRE WATER
INV	INVERT
MWS	MODULAR WETLAND SYSTEMS
P/L	PROPERTY LINE
PROP.	PROPOSED
RPPA	REDUCED PRESSURE PRINCIPLE ASSEMBLY
R&R	REMOVE AND REPLACE
R/W	RIGHT OF WAY
S	SEWER
SD	STORM DRAIN
SDMH	STORM DRAIN MANHOLE
SMH	SEWER MANHOLE
TOP	TOP OF PIPE

0 15 30 60 90

SCALE: 1"=30'

INDEPENDENCE AT CANYON SPRINGS

2764 GATEWAY DRIVE, RIVERSIDE, CA

PRELIMINARY WET UTILITY PLAN C-6

LS BTR DEVELOPMENT, LLC
1156 N. MOUNTAIN AVE. UPLAND, CA 91786
PHONE: (909) 985-0971

LEWIS GROUP OF COMPANIES

KHR ASSOCIATES
17530 VON KARMAN AVE. - SUITE 200, IRVINE, CA 92614
PHONE: (949) 756-6440

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