Appendix M
Sewer Study

DEXTER WILSON ENGINEERING, INC.

WATER • WASTEWATER • RECYCLED WATER

CONSULTING ENGINEERS

SEWER STUDY FOR THE
NORTH IRIS LANE PROJECT IN THE
CITY OF ESCONDIDO

September 13, 2021

2234 FARADAY AVENUE • CARLSBAD, CA • (760) 438-4422

SEWER STUDY FOR THE NORTH IRIS LANE PROJECT IN THE CITY OF ESCONDIDO

September 13, 2021

9-13-2021

Prepared by:
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Job No. 840-005

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September 13, 2021 840-005

Hallmark Communities
760 Lomas Santa Fe Drive, Unit 204
Solana Beach, CA 92075

Attention: Mariana McGrain, Senior Project Manager

Subject: Sewer Study for the North Iris Lane Project in the City of Escondido

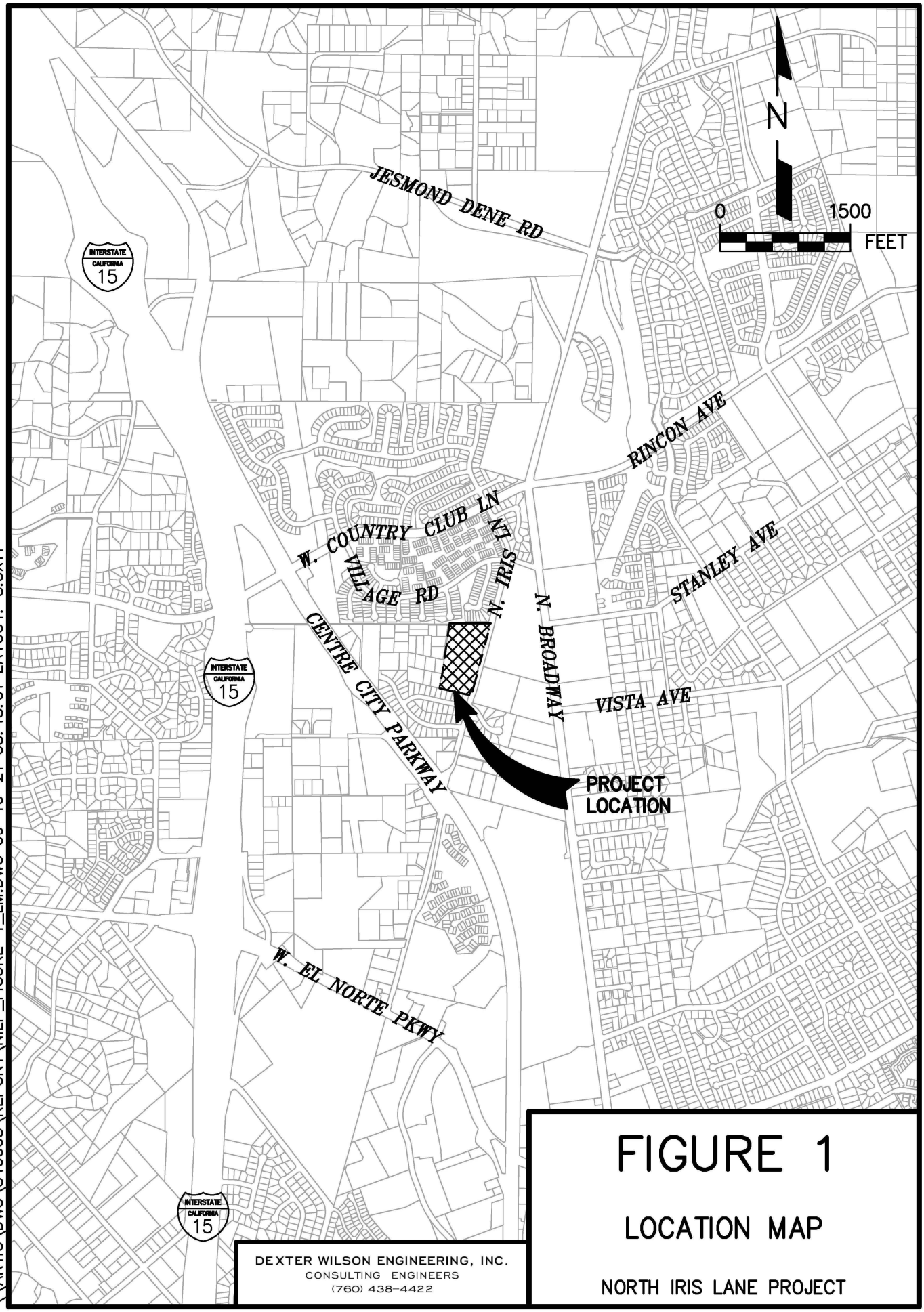
Introduction

The North Iris Lane project is located in the City of Escondido along the west side of N. Iris Lane and south of Robin Hill Lane. The project encompasses approximately 7 net-acres and proposes to develop the site with a total of 102 multi-family residential dwelling units spread across 21 individual buildings.

Figure 1 provides a vicinity map for the project. A Preliminary Site Plan Exhibit for the North Iris Lane project is included in Appendix A.

Sewer System Design Criteria

The North Iris Lane project will receive sewer service from the City of Escondido. The design criteria used for the evaluation of the onsite and offsite sewerage system impacts by the North Iris Lane project are based on the City of Escondido Design Standards, dated April 2, 2014 and the City of Escondido 2012 Wastewater Master Plan. Appendix B contains the pertinent design criteria sections of the City's Design Standards and Master Plan.



\ARTIC\DWG\840005\REPORT\NILP_FIGURE-1_LM.DWG 09-10-21 08:48:01 LAYOUT: 8.5X11

DEXTER WILSON ENGINEERING, INC.
CONSULTING ENGINEERS
(760) 438-4422

FIGURE 1

LOCATION MAP

NORTH IRIS LANE PROJECT

Sewage Generation. Sewage generation estimates for the proposed development were developed in accordance with the City of Escondido Design Standards, dated April 2, 2014, and the City of Escondido 2012 Wastewater Master Plan, dated June 2012. For residential areas, the average flow generation factor used is 200 gpd per dwelling unit. For commercial areas, the average flow generation factor used is 38 gpd per employee.

Peaking Factors. The peaking factor equation used to convert average dry weather flow to peak dry weather flow is provided in Table 3-1 of the City of Escondido 2012 Wastewater Master Plan and is presented below for reference. Flow units for the equation are in cfs.

$$Q_{peaked} = 2.17 Q_{average}^{0.975}$$

Manning's "n". The gravity sewer analyses are made using a computer spreadsheet which uses the Manning Equation for all of its calculations. The Manning's "n" used is held constant for all depths in a circular conduit. The value of Manning's "n" used for this study is 0.013.

Depth and Velocity of Flow in Gravity Sewers. Gravity sewer lines are designed to convey peak wet weather flow. For sewer lines smaller than 12-inch, the depth-to-diameter (d/D) ratio must not exceed 0.50. For sewer lines 12-inch and larger, the d/D ratio must not exceed 0.75.

Gravity sewer lines are designed to maintain a minimum velocity of 2.0 feet per second (fps) at average flow to prevent the deposition of solids.

Sewer Generation

Sewer generation estimates were developed in accordance with the City of Escondido Design Standards, dated April 2, 2014. As shown in Table 1, the projected average dry weather sewer flow for the North Iris Lane project is 20,400 gpd.

TABLE 1 NORTH IRIS LANE PROJECT PROJECTED SEWER GENERATION			
Land Use	**Units**	**Sewer Generation Factor**	**Average Dry Weather Flow**
Residential (Multi-Family)	102 DU	200 gpd/EDU	20,400 gpd
TOTAL			**20,400 gpd 14.2 gpm 0.032 cfs**

An average dry weather flow of 20,400 gpd results in a peak dry weather flow of 48,262 gpd based on the peaking factor equation provided in Table 3-1 of the City of Escondido 2012 Wastewater Master Plan.

Existing Sewer System

Existing sewer facilities pertinent to the North Iris Lane project consist of gravity sewer lines. Figure 2 presents the existing sewer facilities in the vicinity of the North Iris Lane project.

There are existing local gravity sewer lines adjacent to the North Iris Lane project that serve existing development within and around the property. There is an existing 10-inch gravity sewer line along the project's eastern frontage in North Iris Lane. This sewer conveys flow southward primarily through easements up to the City's existing 15-inch diameter North Trunk Sewer. Generally, this existing North Trunk Sewer conveys sewage flow south and southwest. Sewage flow from the trunk sewer is ultimately conveyed to the City of Escondido Hale Avenue Resource Recovery Facility for treatment and disposal.

ROBIN HILL LANE

EX.8"

EX.8"

EX.8"

ROBIN HILL LANE

EX.10"

NORTH IRIS LANE

EX.10"

EX.10"

EX.10"

6"

8"

LEGEND

PROJECT BOUNDARY

EXISTING PUBLIC SEWER LINE

PROPOSED PUBLIC SEWER LINE

PROPOSED PRIVATE SEWER LINE

N

0 100 FEET

FIGURE 2

EXISTING AND PROPOSED SEWER SYSTEM

NORTH IRIS LANE PROJECT

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Overview of Proposed Sewer Service

Onsite sewer facilities for the North Iris Lane project are proposed to include both public and private gravity sewer lines. For residential housing clusters with driveway access, private sewer collection facilities will be used to convey sewer flow to the backbone public gravity sewer system onsite within the main driveways. Figure 2 shows the proposed onsite sewer system.

Sewer service to the North Iris Lane project will be provided by connecting the proposed onsite sewer collection system to a new manhole on the existing 10-inch diameter sewer line in North Iris Lane east of the project site. The new manhole will be constructed between two existing manholes in North Iris Lane and is not proposed to alter the slope or direction of the existing 10-inch diameter sewer line.

Offsite Sewer System Analysis

To analyze the impact of the North Iris Lane project on the existing sewer system, a hydraulic analysis was conducted. Appendix C provides the hydraulic analysis output and Exhibit A provides the corresponding Sewer Manhole Diagram. To perform this analysis, we obtained As-Built Drawings of the existing sewer system so that the pipe sizes and slopes could be inputted to the spreadsheet. The pertinent As-Built drawings of the existing sewer are included in Appendix D.

A key component of the hydraulic analysis is to estimate existing flows within the sewer lines that will be utilized to serve the North Iris Lane project. Existing sewer flow was referenced from the City's Master Plan. As part of the City's Master Plan development there was a sewer flow meter placed on the existing 15-inch diameter sewer line downstream from the project. This particular flow meter (E8) for the City was installed in order to measure the sewer flow from Basin 8 (project's basin). This E8 meter location is indicated on Exhibit A.

Existing development within Basin 8 is stated in the City's Master Plan as 3,940 dwelling units and 1,307 employment population. This stated development equates to 837,666 gpd average flow. Accounting for the 5.3 percent growth in the City since the Master Plan, this

882,062 gpd flow rate was inputted uniformly as existing flow within the overall offsite sewer system analysis in Appendix C.

These pertinent excerpts from Chapter 4 in the City's Master Plan and population growth reference are included within Appendix E.

Sewer System Analysis Results

Appendix C presents the results of the hydraulic analysis for the North Iris Lane project. The results indicate that the existing system has adequate capacity to serve the project. With the additional sewer flow from the North Iris Lane project, all sections of the existing 10-inch diameter sewer line will flow less than half full during peak flow conditions and all sections of the existing 15-inch diameter sewer line will flow less than three quarters full during peak flow conditions.

A summary of the impacts to the existing downstream gravity sewer due to the proposed North Iris Lane project is shown below in Table 2.

TABLE 2
NORTH IRIS LANE PROJECT EXISTING DOWNSTREAM SEWER IMPACTS

Existing Downstream Sewer Section	Maximum d/D Ratio		Minimum Velocity, fps	
	Existing Flow	Existing plus Project Flow	Existing Flow	Existing plus Project Flow
10-inch Diameter	0.41	0.43	2.5	2.7
15-inch Diameter	0.58	0.59	2.8	2.9

Conclusions and Recommendations

The following conclusions and recommendations are summarized based on the sewer system analysis prepared for the proposed North Iris Lane development project in the City of Escondido.

1. The North Iris Lane project consisting of 102 dwelling units will gravity sewer to the existing 10-inch diameter and 15-inch diameter public sewer south of the project.

2. The residential project will include both an onsite public sewer system and onsite private sewer system which will sewer to North Iris Lane.

3. The North Iris Lane project will have an average sewer generation of 20,400 gpd.

4. Public onsite gravity sewer mains within the North Iris Lane project are proposed to be 8-inch diameter designed at a minimum slope of one percent. Figure 2 presents the proposed onsite sewer system for the project

5. New sewer lines shall be designed to meet all requirements of the City of Escondido Design Standards, dated April 2, 2014 or latest edition, and to the satisfaction of the Director of Utilities. Final design will be reflected on the improvement plans to be submitted for review and approval.

If you have any questions regarding the information or conclusions and recommendations presented in this report, please do not hesitate to contact the undersigned.

Dexter Wilson Engineering, Inc.

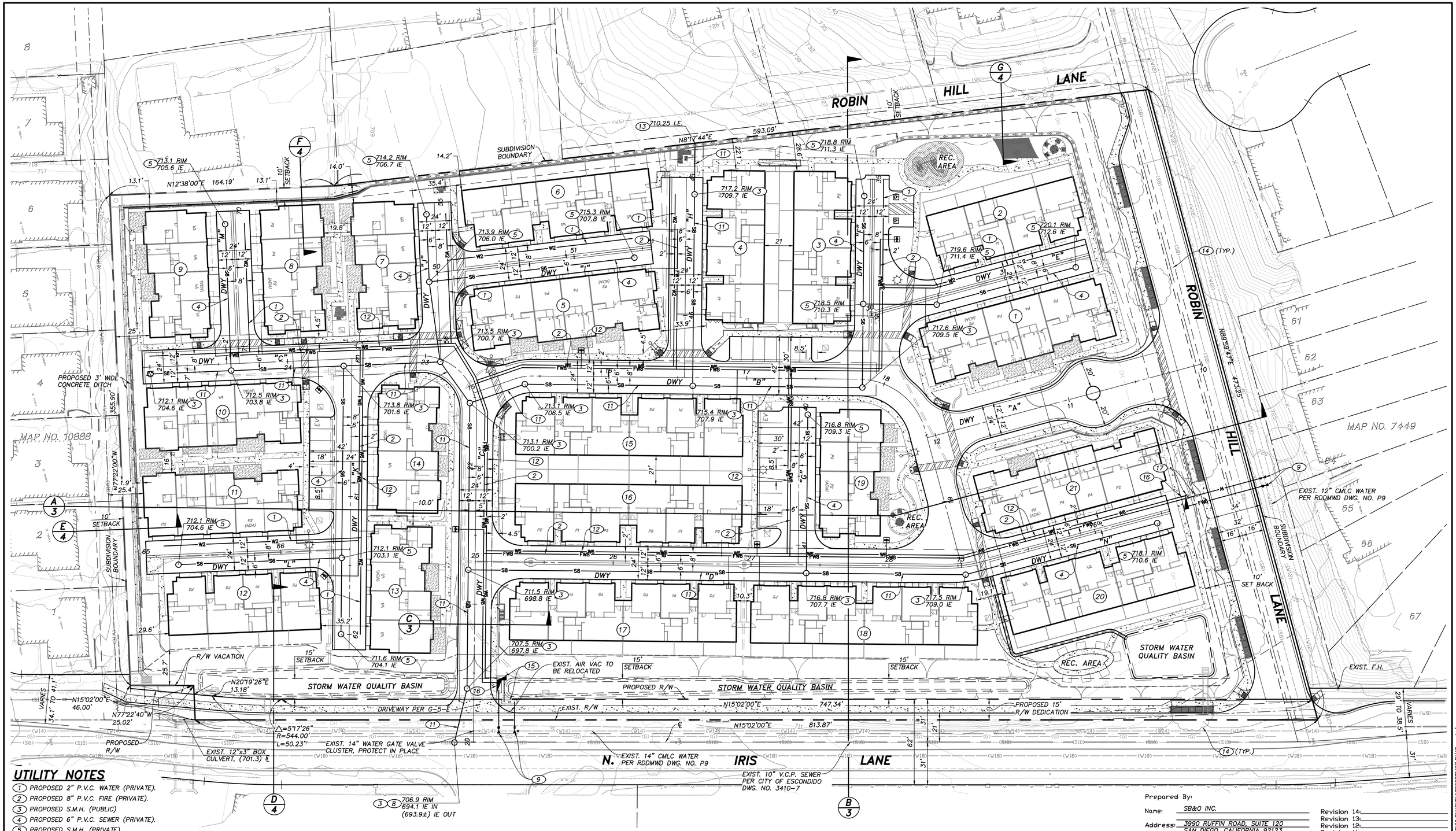
Steven Henderson, P.E.

SH:ps

Attachments

APPENDIX A

PRELIMINARY SITE LAYOUT



UTILITY NOTES

1. PROPOSED 2" P.V.C. WATER (PRIVATE).
2. PROPOSED 8" P.V.C. FIRE (PRIVATE).
3. PROPOSED S.M.H. (PUBLIC)
4. PROPOSED 6" P.V.C. SEWER (PRIVATE).
5. PROPOSED S.M.H. (PRIVATE)
8. CONNECT TO EXIST. 10" V.C.P. SEWER PER CITY OF ESCONDIDO DWG. NO. 3410-7.
9. CONNECT TO EXIST 12" OR 14" WATER PER R.D.D.M.W.D. DWG. NO. P9.
11. PROPOSED 8" P.V.C. SEWER (PUBLIC)
12. PROPOSED 6" P.V.C. WATER (PRIVATE).
13. 8" SEWER MAIN STUB AND RISER FOR FUTURE DEVELOPMENT.
14. PROPOSED STREET TREE.
15. 3" METER AND 3" BACKFLOW PER W.A.S. WR-02, WS-04A AND WS-4B.
16. 8" FIRE DCDA PER R.M.W.D. W-7.
17. 2" WATER METER AND 2" BACKFLOW PER R.D.D.M.W.D., W-2 AND W-6.

EASEMENT NOTE:

(#) FOR EXIST. EASEMENT NOTES SEE SHEET 5.

[#] FOR PROP. EASEMENT NOTES SEE SHEET 6.

SCALE: 1" = 30'

GRAPHIC SCALE

30 0 30 60 90

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AARON PARKER P.E. 68547 7-8-21 DATE

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Project Address:
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Project Name:
N. IRIS LANE

Sheet Title:
HORIZONTAL CONTROL AND UTILITY PLANS

Revision 14:
Revision 13:
Revision 12:
Revision 11:
Revision 10:
Revision 9:
Revision 8:
Revision 7:
Revision 6:
Revision 5:
Revision 4:
Revision 3:
Revision 2:
Revision 1: 7-2-21

Original Date: 3-8-21

Sheet 7 of 8

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APPENDIX B

CITY OF ESCONDIDO DESIGN CRITERIA

SEWER - DESIGN STANDARDS

1. GENERAL

A. All new or existing projects that are require to construct a new sewer system or upgrading of an existing sewer system are responsible for design and construction of sewer improvements in accordance with City's Wastewater Master Plan and to the requirements of the Utility Engineer.

B. All new or existing projects that propose connection to an existing public sewer are responsible to extend public sewer mains across the full property frontage and to all property limits as necessary for future extensions as determined by the Utility Engineer.

C. Deviations from these standards require special approval of the Utility Engineer.

2. MAINS

A. General

(1) All materials used in sewer construction will be per the City of Escondido Utility Department approved material list.

(2) All mains shall be sized in conformance with the City of Escondido Wastewater Master Plan, or at the direction of the Utility Engineer.

(3) Minimum size shall be 8 inches.

(4) Material for all pipelines in easements shall be PVC C-900 or C-905. No service lateral connections to sewers within easements are allowed without specific, prior approval by the Utility Engineer.

(5) Minimum depth of cover is 5 feet, Cover less than 5 feet is only allowed with prior approval by Utility Engineer, and may require special design and construction.

(6) Horizontal or vertical curves are not allowed, except by specific, prior approval of the Utility Engineer.

(7) Design Criteria: For diameters less than 12 inches, depth of flow shall not exceed ½ the diameter. For diameters 12 inch and larger, depth of flow shall not exceed ¾ the diameter. Depths will be calculated for the ultimate design peak flow rates.

(8) All utilities shall be shown in plan and profile on the Sewer and Water plans.

(9) No trees or deep rooted plants shall be planted within 15 feet of sewer mains.

(10) All newly installed or repaired mains shall be CCTV inspected by City of Escondido Wastewater Collection maintenance personnel at contractor's expense. Utilities Field Inspector to coordinate this activity.

(11) Signed and sealed "Record Drawing" plans are required for all new sewer installations, prior to acceptance by City. "Record Drawing" plans shall be submitted as: One set of corrected and signed Mylars, one .PDF file of the complete plan set, and all ACAD files used to create the drawings, on CD.

(12) Bonds shall not be released until “Record Drawing” plans are approved.

B. Locations

(1) Private Streets and Alleys: Mains shall be offset 4 feet north or west of the street or alley centerline.

(2) In the street: Sewer main location shall be at the centerline of the street.

(3) Sewers within easements should be avoided. Where easements are necessary, the minimum easement width shall be 20 feet, with an all-weather road surface, and fenced on both sides. Easements with grades over 10% shall be paved with concrete. Easement roads shall have a 25 feet minimum inside radius, 5% maximum cross-slope, and 15% maximum grade. The centerline of the pipe shall be placed at six (6) feet from the north or west easement edge. Dead-end easements shall be provided with an equipment turn-around, designed to the satisfaction of the Utility Engineer.

(4) Vertical clearance from storm drains shall be 1 foot minimum. Vertical clearance shall be at least 1 foot under water lines in conformance with State Department of Public Health Standards.

C. Minimum slopes shall be per Table S-1 below. Minimum velocity of 2 FPS must be maintained at average flow volume. Pipe sizes cannot be increased solely to reduce minimum slope.

TABLE S-1

SEWER DIAMETER, INCHES	MINIMUM SLOPE
8”	0.50%
12” and larger	0.30%

D. Design Criteria:

(1) For average flows in residential areas, assume 200 gallons per day, per residential unit.

(2) Industrial – for average flows, use 2000 gal/acre/day.

(3) Commercial – for average flows, use 1500 gal/acre/day.

(4) Maximum flows should be based on the following:
Maximum flow = average flow x Peak Factor per Table 3.1 of the 2012 Wastewater Master Plan.

3. MANHOLES

A. Manholes are required at all changes of slope and at the discharge point of all force mains.

B. Manholes are required for all changes in pipe size.

C. Manholes are required at all changes of direction.

D. Manholes are required at intersections of mains - match soffit elevations.

E. Minimum invert slope though a manhole is 2%. In no case shall the manhole invert have a slope less than the upstream main.

F. Manholes are required at permanent ends of lines. A cleanout may be used as a permanent end of line provided that the nearest downstream manhole is less than 200 feet away, and there is no change of direction, either horizontally or vertically, at that manhole.

G. Maximum spacing between manholes is per Table S-2 below:

TABLE S-2

SLOPE	MAXIMUM DISTANCE BETWEEN MANHOLES (FEET)
3% or less	300
>3% - 5%	240
>5% - 7%	180
>7% - 9%	140
Above 9%	100

H. All manholes shall be shown and numbered on the plans.

I. Provide 5 feet minimum, capped stubs for future extension.

J. All manholes shall be 60 inches inside diameter for mains 18 inches in diameter and smaller. Mains larger than 18 inches require special design.

K. Manhole lids shall be 36 inch in diameter with 24 inch inset access lids; shallow manholes (per S-5-E) shall have a 48 inch removable lid with a 24 inch inset access lid.

L. Manholes less than 5 feet deep (rim to invert) require special design and construction, to the satisfaction of the Utility Engineer. (See Standard Drawing No. S-5-E.)

M. Manholes in streets classified as Collector or above shall be reinforced per Standard Drawing No. S-4-E.

N. Extend mains through bottom and break out top. P.C.C. trough should not be formed.

O. All Manholes shall be completely lined with Raven 405 epoxy, or approved equal. A pull test shall be required. The minimum lining thickness shall be 80 mils.

P. Drop manholes are not permitted unless approved in writing by the Utility Engineer. (See Standard Drawing No. S-3-E)

Q. Pipes larger than 12 inches require hydraulic flow design. For the hydraulic calculations use: a) uniform flow calculations for depth and velocity; and b) pressure momentum calculations for manhole junctions using City of Los Angeles formulas. Pipe smaller than 12 inches may require hydraulic design to verify velocities, at request of Utility Engineer.

4. LATERALS

A. Size

(1) Only one lateral connection will be allowed for each legal lot. Each legal parcel must have its own lateral to the public main.

(2) Single family and up to 4 attached residential units on the same legal lot - minimum 4" with 2% minimum slope.

(3) All others - minimum 6 inch with 2% minimum slope,

(4) Laterals 8 inch and larger shall be connected to the public sewer at a manhole. Sewer laterals less than 8 inch in diameter shall be connected to the sewer main with PVC mainline wye fittings or Inserta-Tees. Saddles or break-in taps shall not be used.

B. Location:

(1) Perpendicular to main.

(2) From the center of lot to 5 feet from downstream lot line (shown on plans).

(3) A cleanout shall be located on private property within 18 inches of the Public Right of Way (see Standard Drawing S-2-E).

(4) Sewer laterals shall not be located in the driveway, except in areas of limited frontage at the discretion of the Utility Engineer.

(5) Provide a minimum of 5 feet horizontal clearance from other utilities and a minimum of 10 feet from trees or deep-rooted plantings.

(6) A separate lateral shall be installed to each lot; an "S" shall be stamped on the curb face at the lateral location. Laterals shall be shown on Sewer and Water Improvement Plans.

(7) A sewer lateral data table indicating length, slope, and elevation at the ROW, for each lateral shall be provided on the Sewer and Water Improvement Plans.

(8) All new lateral connections will be inspected at the City main by the City Utilities Field Inspection personnel. Engineering Field Inspector will coordinate this activity.

C. Depth - 5 feet at property line.

D. Service lateral check valves or pop-up relief valves shall be installed by the owner on private property when the pad elevation of the building is lower than the rim elevation of the upstream manhole. Maintenance of the check or relief valve is the responsibility of the owner.

E. Private sewer pumps are not allowed unless reviewed and approved by the Utility Engineer. All maintenance and repair of private sewer pumps and appurtenances shall be the responsibility of the property owner.

5. LIFT STATIONS

A. Private lift stations serving multiple lots will not be allowed.

B. Public Lift stations shall be designed per Utility Department requirements

6. FORCE MAINS:

A. Private force mains are not allowed within City Right-of-Ways, must be within recorded private easements when crossing other lots, and are the responsibility of the owner to maintain.

B. Public Force Mains shall be designed per the Utility Department requirements.

7. INVERTED SIPHONS

A. Inverted siphons shall be used only with specific, prior approval of the Utility Engineer.

B. Siphons shall be designed with two barrels, with a gate system allowing flow to be directed toward either the primary or secondary barrel.

C. A minimum velocity of 3 F.P.S. maintained for two hours a day is required.

RECYCLED WATER - DESIGN STANDARDS

Recycled Water systems shall be designed per the Utility Department requirements.

Section 3
Design Criteria

Design criteria were developed to evaluate the capacity of the existing wastewater collection system under existing and projected dry and wet weather flow conditions. The recommended evaluation criteria presented in Tables 3-1 and 3-2 will be utilized to identify deficient facilities and size replacement infrastructure.

3.1 Existing Design Criteria

The existing wastewater system design criteria are documented in the 2005 Wastewater Collection System Master Plan Update. The criteria, which are similar to other Southern California sewer agencies, are summarized in Table 3-1.

Table 3-1 Existing Design and Evaluation Criteria

Category	Design/Evaluation Criteria
Gravity Mains	• Minimum Velocity – 2 feet per second at peak flow rate • Max Peak depth to diameter ratio for existing sewers – 0.50 Peak Dry Weather Flow for diameter $\leq$ 12-inch – 0.75 Peak Dry Weather Flow for diameter > 12-inch • Inflow and Infiltration – 4,800 gallons per day per mile of pipe • Manning's Roughness Coefficient – 0.013
Force Mains	• Minimum Velocity – 3 feet per second • Maximum Velocity – 10 feet per second • Hazen Williams 'C' Factor – 100
Lift Stations	• Minimum Pump Capacity – ultimate peak wet weather flow Standby Capacity – 100% of largest pump capacity Emergency Power – required • Emergency Storage Capacity – 8 hours of average daily flow
Peaking Factors	$Q_{peaked} = 2.17(Q_{average})^{0.975}$

3.2 Recommended Design Criteria

Additional criteria for design and evaluation of the sewer system were developed based on the existing design criteria to include suggestions to improve operations, reliability, and cost savings. The additional criteria are listed in Table 3-2.

In addition to the updated criteria, the following elements can help with reliability and cost savings in the wastewater system:

- Conduct CCTV inspections of all gravity mains 8” and larger in diameter to determine likely locations of pipe failures.

2.4 Existing Wastewater Generation Rates

Existing wastewater flows were compared with land use data, population estimates and water meter records from the City and portions of Rincon del Diablo Municipal Water District (Rincon MWD) to develop unit wastewater generation rates. This methodology coupled with treatment plant flow records, temporary sewer flow meter records and lift station records can produce fairly accurate sewer flow estimates for individual sewer basins in evaluating existing system capacities.

As a first step in determining the wastewater generation rates, over 70 specific land use categories in the SANDAG database were combined into nine general land use categories. For residential land use, a unit flow generation factor was developed based on the 2010 population per the SANDAG Series 12 data. For non-residential land use, water billing records for 2010 were obtained and assigned to each parcel, and a return-to-sewer generation rate was developed. Water use from irrigation accounts was excluded for this analysis. Flow generation factors were developed through an iterative process in which generated flows were compared with recorded flows at the HARRF and the metered sub-basins. Unit wastewater generation rates were "calibrated" to within one percent of HARRF flows. The unit wastewater generation rates developed from this process are 55 gallons per capita per day (gpcd) for residential population, and 38 gpcd for employment population.

Typically, design and planning standards for agencies in a San Diego County assume per capita wastewater generation rates between 60 to 80 gallons gpcd for residential and 15 to 35 gpcd for employment populations. Wastewater generation rates for non-residential land use can vary widely, and flow estimates based on return to sewer rates are generally more accurate than employment per capita factors. The existing return to sewer rates for commercial, industrial and institutional land use areas was calculated to be 60 percent of the water demand, which excludes irrigation demands supplied from separate meters.

2.5 Peaking Factors

Diurnal peaking curves, also referred to as dry weather hydrogaphs, were determined for upstream basins based on the temporary flow meter data. A 24-hour flow curve was calculated for each upstream basin by averaging the hourly flow for each day during the flow metering period. A peaking curve was then developed for each basin in terms of the hourly flow factor (HFF), which is the hourly average flow divided by the average daily flow. The peak dry weather flow (PDWF) is the maximum HFF times the average daily flow for that basin. Figure 2-7 illustrates each characteristic peaking curve for the temporary flow meter sites. Most of the metered basins are dominated by residential flows, which typically have morning and evening peak flow periods. As is typical with most collections systems, upstream meters, such as Basins 3 and 8, have higher peaks than downstream meters, such as Basin 1, where peak flows are attenuated. It is noted that Basin 3 exhibits atypical peaks, which are presumed to be due to the relatively large number of schools in the service area.

APPENDIX C

OFFSITE SEWER SYSTEM ANALYSIS

MANHOLE DIAGRAM REFERENCE:

Exhibit A in the back of Appendix C

CONDITIONS MODELED:

1. Existing Flows

2. Existing Flows plus Project Flows

SEWER STUDY SUMMARY

DATE: 8/26/2021 FOR: North Iris Lane Project, City of Escondido (200 gpd per EDU plus Emp.) Existing Flows Only SHT 1 OF 1

JOB NUMBER: 840-005 BY: Dexter Wilson Engineering, Inc. REFER TO PLAN SHEET: Exhibit A

LINE	FROM	TO	IN-LINE FLOW (gpd)	AVG DRY WEATHER FLOW (gpd)	PEAKING FACTOR	PEAK WET WEATHER FLOW	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' [1]	dn (feet)	dn/D[2]	C_a for Velocity[3]	VELOCITY (f.p.s.)	COMMENTS
							M.G.D.	C.F.S.								
	18	Prop.	46,425	46,425	2.32	107,598	0.108	0.166	10	0.74	0.040913	0.16729	0.20	0.1124	2.13	
	Prop.	17	46,425	92,850	2.28	211,499	0.211	0.327	10	0.70	0.082687	0.23837	0.29	0.1854	2.54	
	17	16	46,425	139,275	2.25	314,048	0.314	0.486	10	0.70	0.122779	0.29290	0.35	0.2464	2.84	
	16	15	46,425	185,700	2.24	415,730	0.416	0.643	10	0.70	0.162533	0.34078	0.41	0.3022	3.07	
	15	14	46,425	232,125	2.23	516,772	0.517	0.800	15	0.50	0.081080	0.35397	0.28	0.1829	2.80	
	14	13	46,425	278,550	2.22	617,306	0.617	0.955	15	0.50	0.096854	0.38802	0.31	0.2078	2.94	
	13	12	46,424	324,974	2.21	717,418	0.717	1.110	15	0.50	0.112561	0.41965	0.34	0.2314	3.07	
	12	11	46,424	371,398	2.20	817,172	0.817	1.264	15	0.50	0.128212	0.44964	0.36	0.2543	3.18	
	11	10	46,424	417,822	2.19	916,614	0.917	1.418	15	0.50	0.143815	0.47824	0.38	0.2764	3.28	
	10	9	46,424	464,246	2.19	1,015,780	1.016	1.572	15	0.50	0.159373	0.50568	0.40	0.2979	3.38	
	9	8	46,424	510,670	2.18	1,114,697	1.115	1.725	15	0.50	0.174893	0.53242	0.43	0.3189	3.46	
	8	7	46,424	557,094	2.18	1,213,390	1.213	1.878	15	0.50	0.190378	0.55830	0.45	0.3394	3.54	
	7	6	46,424	603,518	2.17	1,311,877	1.312	2.030	15	0.50	0.205830	0.58365	0.47	0.3596	3.61	
	6	5	46,424	649,942	2.17	1,410,174	1.410	2.182	15	0.50	0.221253	0.60842	0.49	0.3794	3.68	
	5	4	46,424	696,366	2.17	1,508,297	1.508	2.334	15	0.50	0.236648	0.63330	0.51	0.3996	3.74	
	4	3	46,424	742,790	2.16	1,606,255	1.606	2.485	15	0.50	0.252018	0.65784	0.53	0.4193	3.79	
	3	2	46,424	789,214	2.16	1,704,061	1.704	2.637	15	0.50	0.267363	0.68182	0.55	0.4385	3.85	
	2	1	46,424	835,638	2.16	1,801,722	1.802	2.788	15	0.50	0.282686	0.70576	0.56	0.4571	3.90	
	1	21	46,424	882,062	2.15	1,899,248	1.899	2.939	15	0.50	0.297988	0.72967	0.58	0.4757	3.95	

[1] K' based on n = 0.013

[2] dn/D using K' in Brater King Table 7-14

[3] From Brater King Table 7-4 based on dn/D

SEWER STUDY SUMMARY

DATE: 8/26/2021 FOR: North Iris Lane Project, City of Escondido (200 gpd per EDU plus Emp.) Existing Flows plus Project SHT 1 OF 1

JOB NUMBER: 840-005 BY: Dexter Wilson Engineering, Inc. REFER TO PLAN SHEET: Exhibit A

LINE	FROM	TO	IN-LINE FLOW (gpd)	AVG DRY WEATHER FLOW (gpd)	PEAKING FACTOR	PEAK WET WEATHER FLOW	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' [1]	dn (feet)	dn/D[2]	C_a for Velocity[3]	VELOCITY (f.p.s.)	COMMENTS
							M.G.D.	C.F.S.								
	18	Prop.	46,425	46,425	2.32	107,598	0.108	0.166	10	0.74	0.040913	0.16729	0.20	0.1124	2.13	
	Prop.	17	66,825	113,250	2.27	256,689	0.257	0.397	10	0.70	0.100354	0.26346	0.32	0.2131	2.68	Project Flow Input
	17	16	46,425	159,675	2.25	358,820	0.359	0.555	10	0.70	0.140283	0.31456	0.38	0.2715	2.95	
	16	15	46,425	206,100	2.23	460,200	0.460	0.712	10	0.70	0.179918	0.36058	0.43	0.3256	3.15	
	15	14	46,425	252,525	2.22	561,005	0.561	0.868	15	0.50	0.088020	0.36922	0.30	0.1939	2.86	
	14	13	46,425	298,950	2.21	661,346	0.661	1.023	15	0.50	0.103764	0.40214	0.32	0.2183	3.00	
	13	12	46,424	345,374	2.20	761,294	0.761	1.178	15	0.50	0.119445	0.43297	0.35	0.2416	3.12	
	12	11	46,424	391,798	2.20	860,906	0.861	1.332	15	0.50	0.135074	0.46227	0.37	0.2640	3.23	
	11	10	46,424	438,222	2.19	960,223	0.960	1.486	15	0.50	0.150657	0.49042	0.39	0.2859	3.33	
	10	9	46,424	484,646	2.19	1,059,276	1.059	1.639	15	0.50	0.166198	0.51753	0.41	0.3071	3.42	
	9	8	46,424	531,070	2.18	1,158,092	1.158	1.792	15	0.50	0.181702	0.54384	0.44	0.3279	3.50	
	8	7	46,424	577,494	2.18	1,256,692	1.257	1.945	15	0.50	0.197172	0.56953	0.46	0.3484	3.57	
	7	6	46,424	623,918	2.17	1,355,094	1.355	2.097	15	0.50	0.212611	0.59457	0.48	0.3684	3.64	
	6	5	46,424	670,342	2.17	1,453,313	1.453	2.249	15	0.50	0.228021	0.61893	0.50	0.3880	3.71	
	5	4	46,424	716,766	2.16	1,551,362	1.551	2.400	15	0.50	0.243405	0.64438	0.52	0.4085	3.76	
	4	3	46,424	763,190	2.16	1,649,252	1.649	2.552	15	0.50	0.258764	0.66838	0.53	0.4277	3.82	
	3	2	46,424	809,614	2.16	1,746,993	1.747	2.703	15	0.50	0.274099	0.69234	0.55	0.4469	3.87	
	2	1	46,424	856,038	2.15	1,844,594	1.845	2.854	15	0.50	0.289412	0.71627	0.57	0.4650	3.93	
	1	21	46,424	902,462	2.15	1,942,063	1.942	3.005	15	0.50	0.304705	0.74016	0.59	0.4841	3.97	

[1] K' based on n = 0.013

[2] dn/D using K' in Brater King Table 7-14

[3] From Brater King Table 7-4 based on dn/D

\\ARTIC\DWG\840005\REPORT\NILP_EXHIBIT-A_MH.DWG 09-13-21 11:47:35 LAYOUT: 11X17

ROBIN HILL LN
STANLEY AVE
PROJECT AREA
EX.10"
18
PROPOSED CONNECTION
16
CHEYENNE LN
EX.10"
15
VISTA AVE
ELKHORN LN
N. IRIS LN
17
EX.15"
14
N. BROADWAY
CENTRE CITY PARKWAY
13
EX.15"
12
EX.15"
11
BAHIA LN
10
EX.15"
9
LESLIE LN
EX.15"
8
CITY METER 8
7
6
S. IRIS LN
EX.15"
5
EX.15"
4
W. EL NORTE PARKWAY
EX.15"
3
SHERIDAN AVE
2
MORNING VIEW DR
EX.15"
EX.15"
1
21
CONNECTION TO EXISTING 15" NORTH TRUNK SEWER

LEGEND

PROJECT BOUNDARY

EXISTING PUBLIC SEWER LINE

1 COMPUTER MODEL MH NUMBER

N

0 400 FEET

DEXTER WILSON ENGINEERING, INC.
CONSULTING ENGINEERS
(760) 438-4422

EXHIBIT A

MANHOLE DIAGRAM

NORTH IRIS LANE PROJECT

APPENDIX D

AS-BUILT DRAWINGS FOR 10-INCH AND 15-INCH SEWER LINE

CITY OF ESCONDIDO

IMPROVEMENT PLANS FOR

SANITARY SEWERS, RELATED APPURTENANCES

ASSESSMENT DISTRICT Nº 3-1969

A 1911 ACT IMPROVEMENT

WORK TO BE DONE

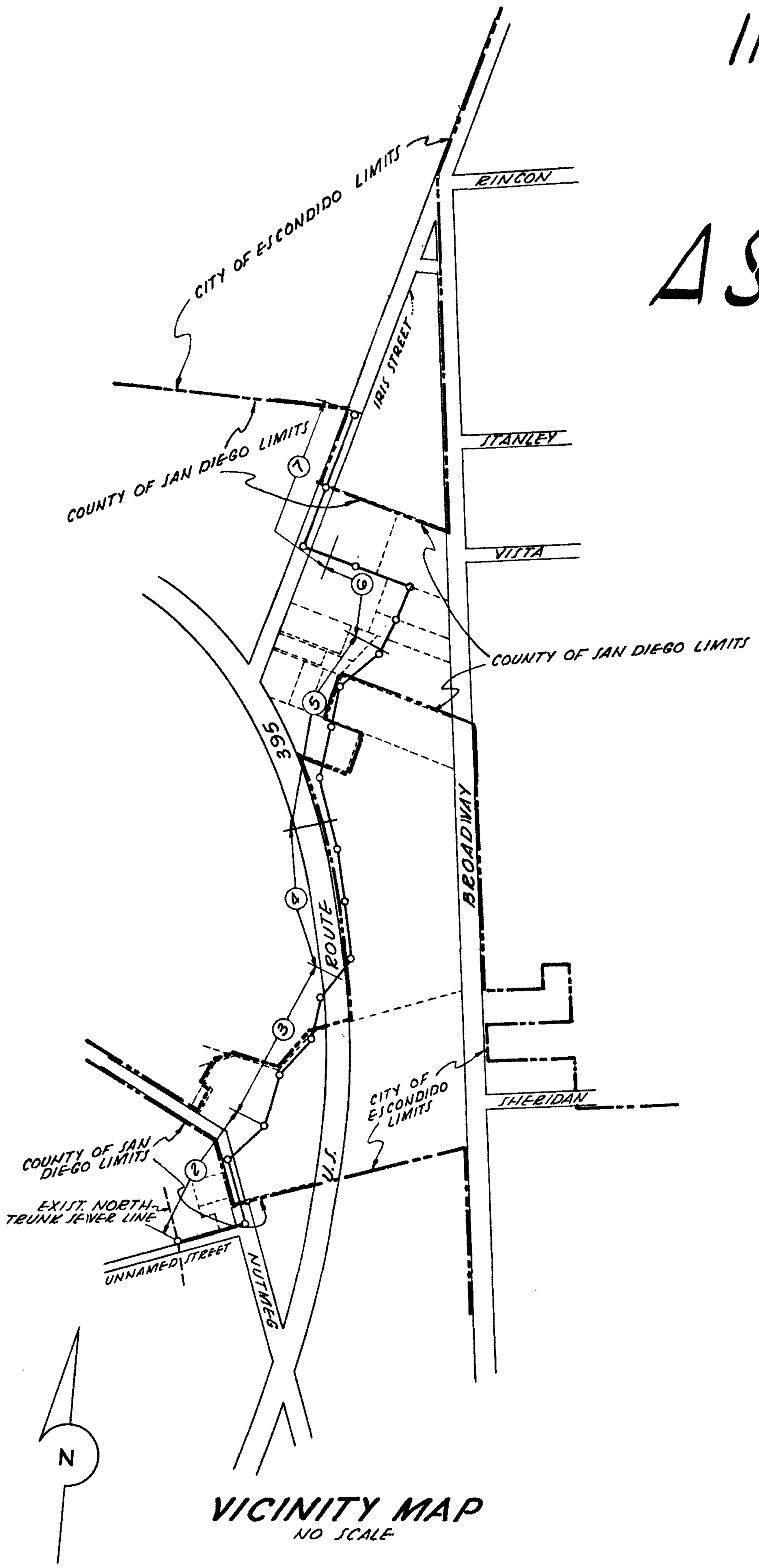
Improvements consist of the following work to be done in accordance with these plans and the current City of Escondido Standard Specifications for the construction of Sanitary Sewers and Standard Reference Drawings:

The construction of sanitary sewer mains shown thus

The construction of sanitary sewer manholes shown thus

LEGEND-EXISTING WORK

- WATER MAIN
- EXIST. RIPRAP
- FENCE
- TOP OF BANK (TOP)
- TOE OF BANK (TOE)
- EXISTING SANITARY SEWER (S)
- EXISTING GAS LINES (G)
- CULVERT
- EXIST. PAVEMENT
- DOWNDRAIN
- POWER POLE (PP)
- GUY ANCHOR
- EXISTING DRAINAGE DITCH



VICINITY MAP
NO SCALE

~QUANTITIES~

ITEM	DESCRIPTION	QUANTITY	UNIT
1.	8" V.C.P. SEWER	12	L.F.
2.	10" V.C.P SEWER	1,708	L.F.
3.	15" V.C.P SEWER	5,275	L.F.
4.	P.C.C MANHOLE TYPE "A"	19	EA
5.	PAVEMENT REPLACEMENT	967	L.F.
6.	CRUSHED ROCK BEDDING	200	C.Y.

~BENCH MARK~

1" PIPE IN CONCRETE MONUMENT AT NW CORNER OF S. IRIS & NUTMEG STREET 5.0' ± NW of TELEPHONE POLE #65
E.S.-94 EL. = 681.94

~GENERAL NOTES~

ALL WORK TO BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS OF THE CITY OF ESCONDIDO AS ADOPTED BY RESOLUTION Nº 1724 AND AMENDMENTS THERETO, EXCEPTING THAT WORK WHICH IS COUNTY TERRITORY, WHICH WORK IS TO BE TO COUNTY SPECIFICATIONS.

IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE ALL SUBSTRUCTURES SHOWN HEREON OR NOT AND PROTECT THEM FROM DAMAGE. THE CONTRACTOR SHALL BEAR THE TOTAL EXPENSE OF REPAIR OR REPLACEMENT OF SAID SUBSTRUCTURES DAMAGED BY HIS OPERATIONS IN CONNECTION WITH THE PROTECTION OF THIS WORK.

ALL STATIONING REFERS TO CENTERLINE OF SEWER.

THE CONTRACTOR SHALL CONTACT OWNERS OF PUBLIC UTILITIES TO VERIFY LOCATION OF MAINS AND SERVICES PRIOR TO EXCAVATION ADJACIENT THERETO.
THE CONTRACTOR SHALL INSTALL WYE'S IN EASEMENTS IN FIELD AS DIRECTED BY ENGINEER OF WORK.
MANHOLES SHALL BE FURNISHED WITH WROUGHT IRON STEPS

~STANDARD PLANS~

TYPE "A" M.H. & J.C.	ST-300
CONCRETE ENCASEMENT	ST-501
SEWER LATERALS	ST-310
STANDARD CLEANOUT	ST-302

DESIGNED BY
TANNER, MARQUARDT, MELVIN & ASSOC., INC.
ENGINEERS & ARCHITECTS
650 S. ESCONDIDO BLVD. ESCONDIDO, CALIF.

NO	CHANGE	BY	DATE	APPROVED
REVISIONS				

SHEET 1 | CITY OF ESCONDIDO | 7 SHEETS

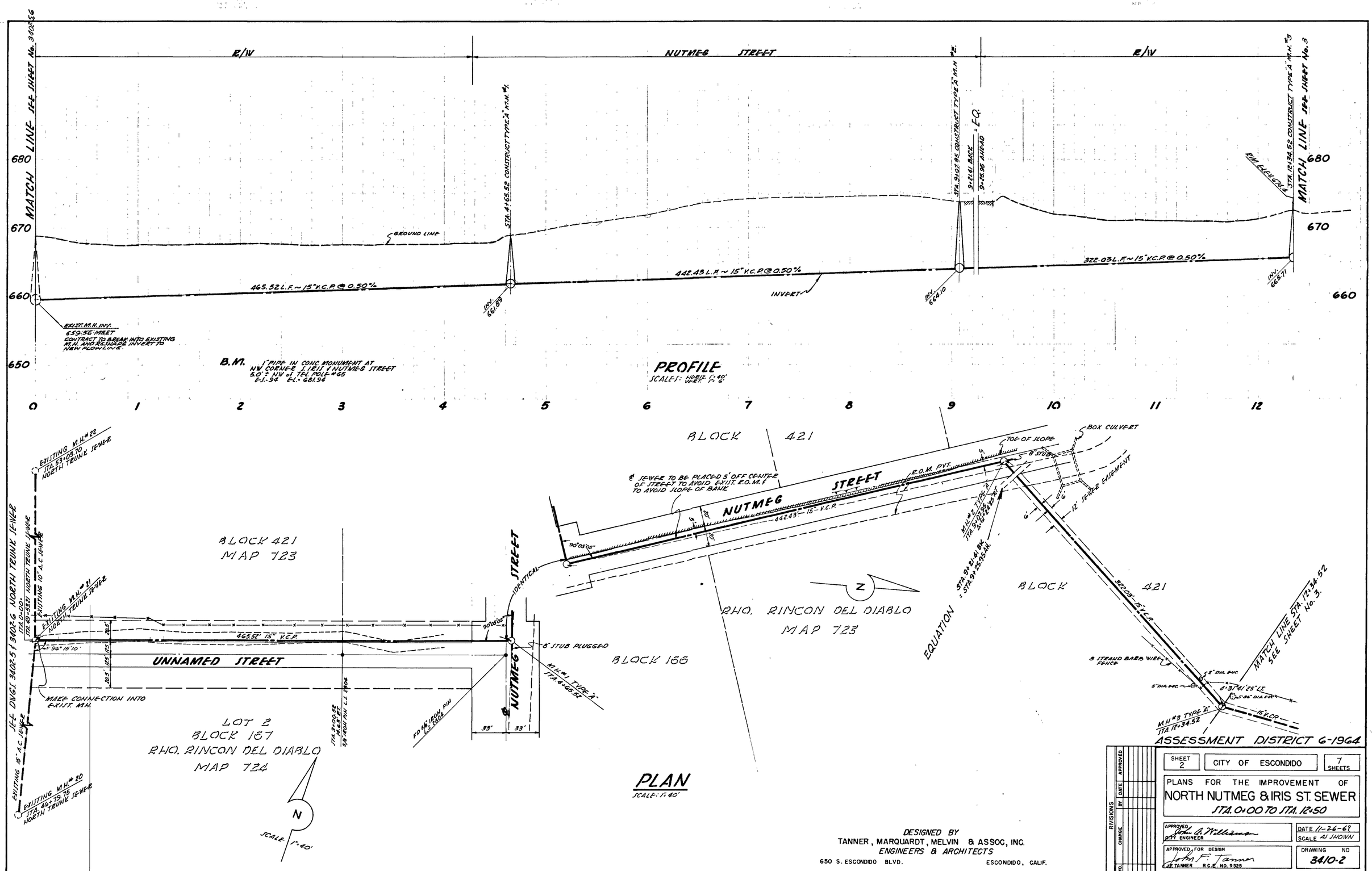
PLANS FOR THE IMPROVEMENT OF
NORTH NUTMEG & IRIS ST. SEWER

APPROVED John A. Williams
CITY ENGINEER
DATE 11-26-69
SCALE AS SHOWN

APPROVED FOR DESIGN John F. Tanner
J.F. TANNER R.C.E. 9585
DRAWING NO 3410-1

F.B. T-117

FILMED: 5/7/92



ASSESSMENT DISTRICT 6-1964

SHEET 2	CITY OF ESCONDIDO	7 SHEETS

PLANS FOR THE IMPROVEMENT OF
NORTH NUTMEG & IRIS ST. SEWER
STA. 0+00 TO STA. 12+50

APPROVED John A. Williams CITY ENGINEER	DATE 11-26-67 SCALE AS SHOWN
APPROVED FOR DESIGN John F. Tanner J.F. TANNER R.C.E. NO. 9525	DRAWING NO 3410-2

REVISIONS				
NO.	CHANGE	BY	DATE	APPROVED

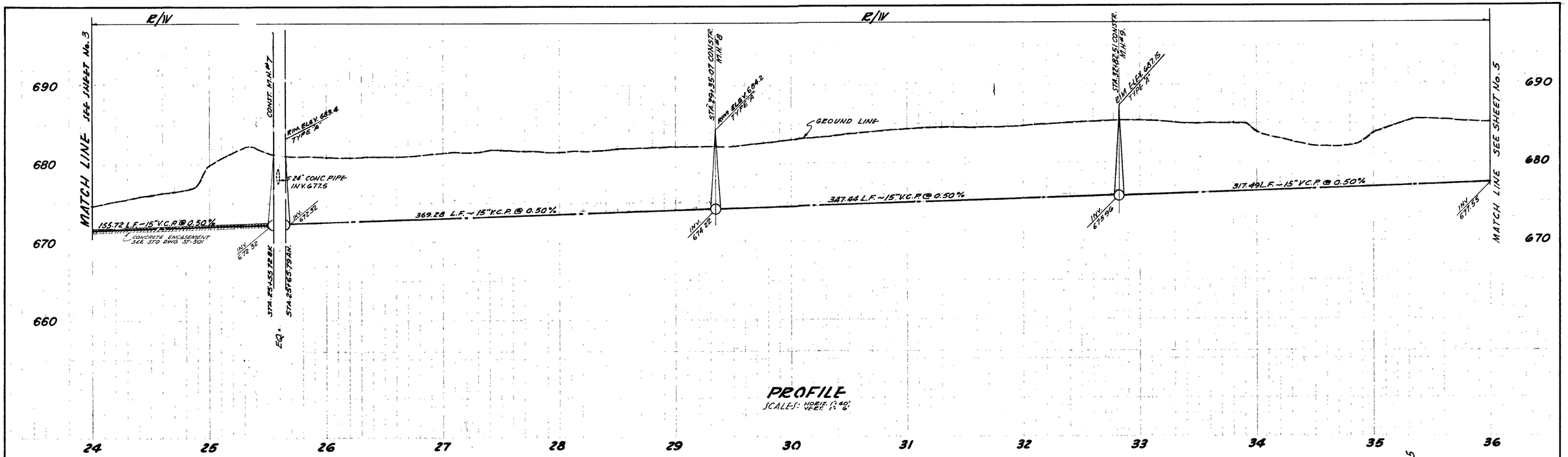
DESIGNED BY
TANNER, MARQUARDT, MELVIN & ASSOC, INC.
ENGINEERS & ARCHITECTS
650 S. ESCONDIDO BLVD. ESCONDIDO, CALIF.

F.B. T-117

FILMED: 5/7/92

F.B.T-117

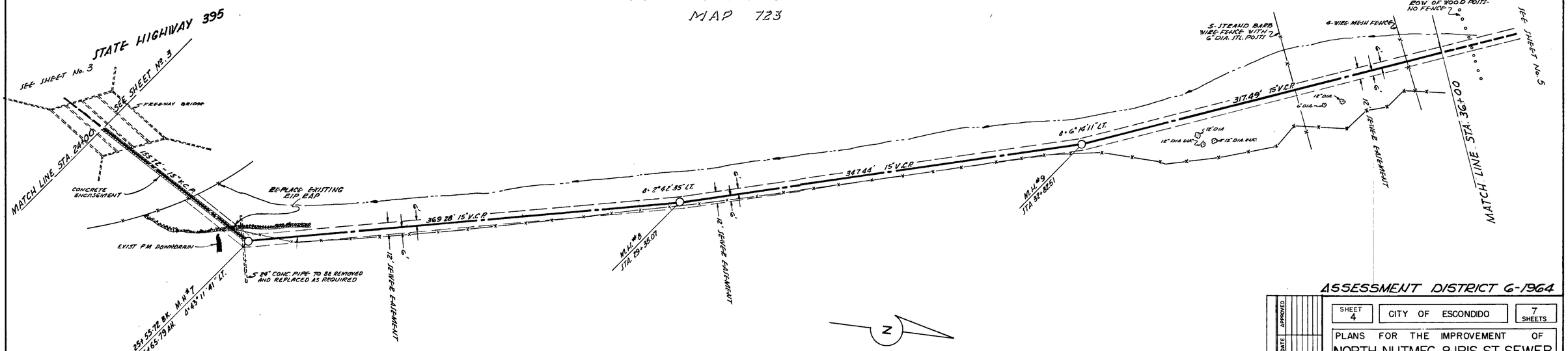
FILMED: 5/7/92



PROFILE

SCALES: HORIZ. 1"=40'
VERT. 1"=6'

BLOCK 421
RHO. RINCON DEL DIABLO
MAP 723



PLAN

SCALE: 1"=40'

ESCONDIDO UNION HIGH SCHOOL

DESIGNED BY
TANNER, MARQUARDT, MELVIN & ASSOC, INC.
ENGINEERS & ARCHITECTS
650 S ESCONDIDO BLVD. ESCONDIDO, CALIF.

ASSESSMENT DISTRICT G-1964

SHEET 4	CITY OF ESCONDIDO	7 SHEETS

PLANS FOR THE IMPROVEMENT OF
NORTH NUTMEG & IRIS ST. SEWER
STA. 24+00 TO STA. 36+00

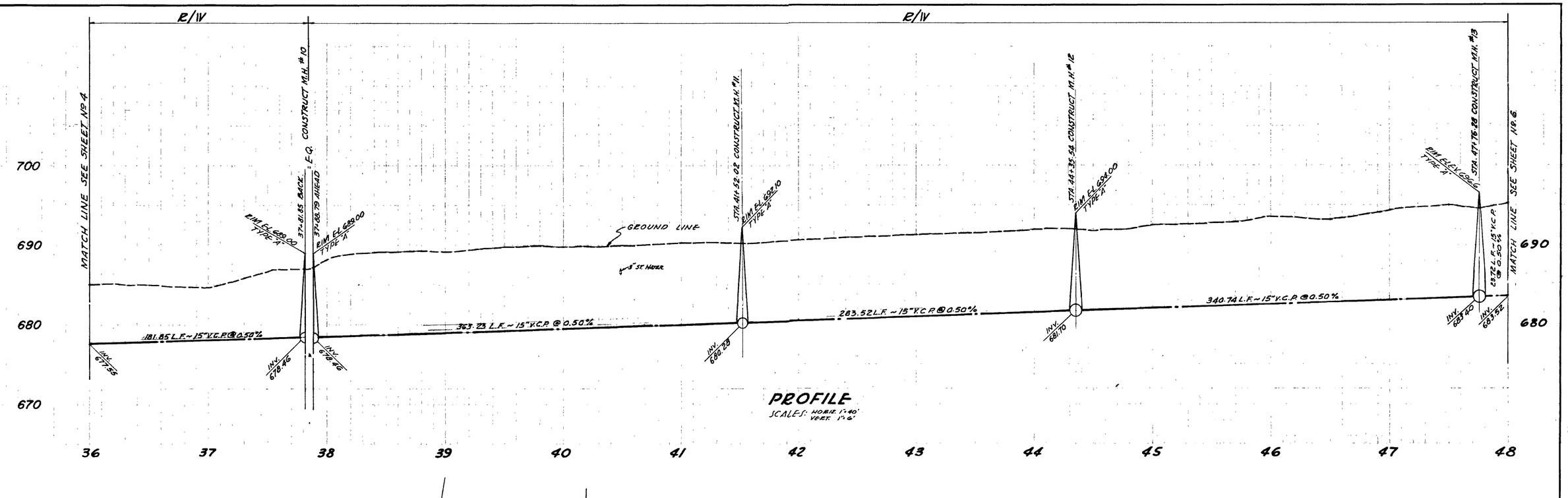
APPROVED Fred A. Williamson CITY ENGINEER — DATE 11-26-69
SCALE AS SHOWN

APPROVED FOR DESIGN William F. Tanner W.F. TANNER R.C.E. NO 9525 — DRAWING NO 3610-4

REVISIONS: NO | CHANGE | BY | DATE | APPROVED

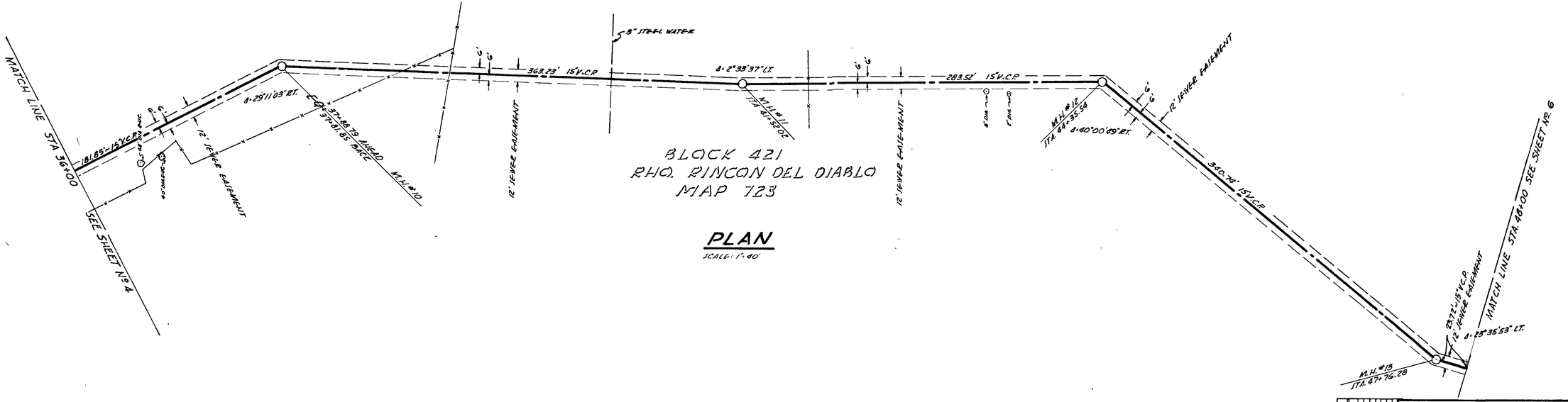
F.B. T-117

FILMED: 5/7/92



PROFILE

SCALES: HORIZ. 1"=40'
VERT. 1"=6'



BLOCK 421
RHO. RINCON DEL DIABLO
MAP 723

PLAN

SCALE: 1"=40'

N

DESIGNED BY
TANNER, MARQUARDT, MELVIN & ASSOC, INC
ENGINEERS & ARCHITECTS
650 S. ESCONDIDO BLVD. ESCONDIDO, CALIF.

REVISIONS			
NO.	CHANGE	BY	DATE
			APPROVED

SHEET 5	CITY OF ESCONDIDO	7 SHEETS

PLANS FOR THE IMPROVEMENT OF
NORTH NUTMEG & IRIS ST. SEWER
STA. 36+00 TO STA. 48+00

APPROVED John A. Williamson
CITY ENGINEER
DATE 11-26-69
SCALE AS SHOWN

APPROVED FOR DESIGN John F. Tanner
J. F. TANNER R.C.E. NO. 9525
DRAWING NO. 3410-5

F.B. T-117

FILMED: 5/7/92

ASSESSMENT DISTRICT 6-1964

SHEET 6	CITY OF ESCONDIDO — 7 SHEETS
PLANS FOR THE IMPROVEMENT OF NORTH NUTMEG & IRIS ST. SEWER STA. 48+00 TO STA. 60+00	
APPROVED John A. Williamson, CITY ENGINEER	DATE 11-26-69, SCALE AS SHOWN
APPROVED FOR DESIGN John F. Tanner, J.F. TANNER R.C.E. NO. 9525	DRAWING NO 3410-6

REVISIONS: NO | CHANGE | BY | DATE | APPROVED

DESIGNED BY
TANNER, MARQUARDT, MELVIN & ASSOC., INC.
ENGINEERS & ARCHITECTS
650 S ESCONDIDO BLVD. ESCONDIDO, CALIF.

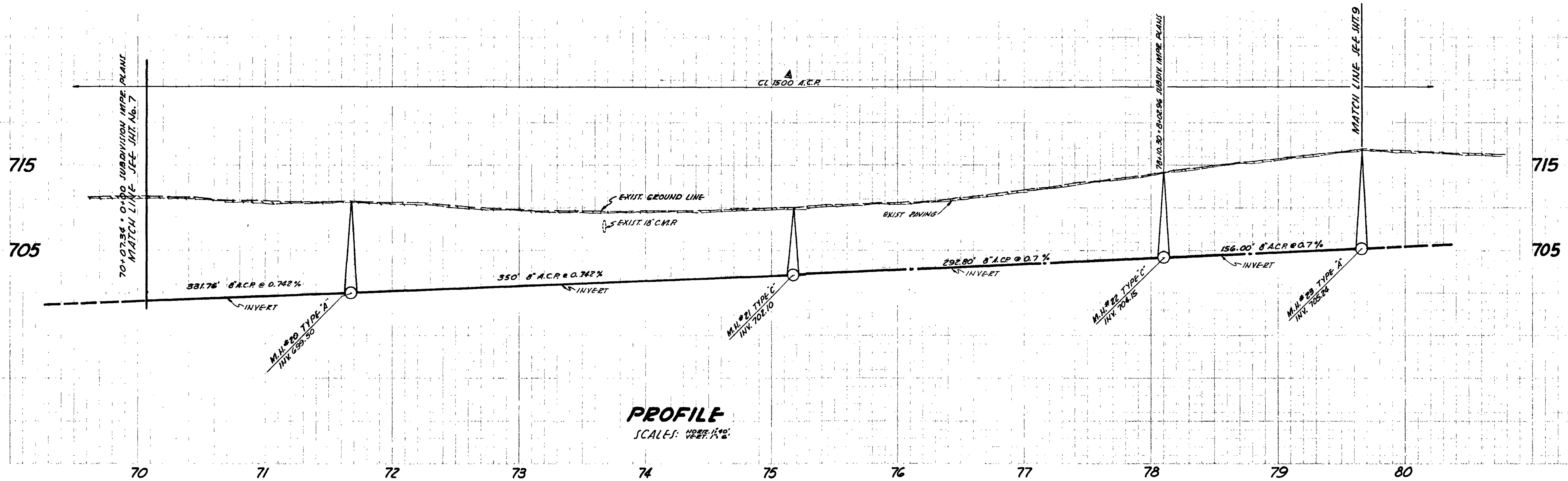
F.B. T-117

FILMED: 5/7/97

646

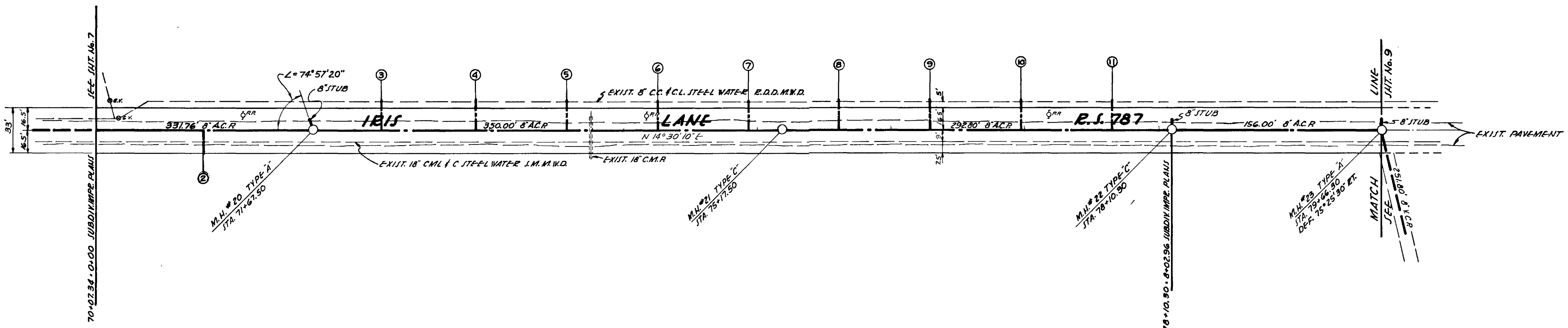
FILMED: 5/7/92

646



PROFILE

SCALES: HORIZ. 1"=40' VERT. 1"=4'



PLAN

SCALE: 1"=40'

N

Not Constructed
G.M.

DESIGNED BY
TANNER, MARQUARDT, MELVIN & ASSOC., INC.
ENGINEERS & ARCHITECTS
650 S. ESCONDIDO BLVD. ESCONDIDO, CALIF.

ASSESSMENT DISTRICT 6-1964

SHEET 8	CITY OF ESCONDIDO	9 SHEETS
PLANS FOR THE IMPROVEMENT OF NORTH NUTMEG & IRIS ST. SEWER STA. 70+07.34 TO STA. 79+66.30		
APPROVED [signature] CITY ENGINEER	DATE 6/10/1964 SCALE AS SHOWN	
APPROVED FOR DESIGN [signature: John F. Tanner] J.F. TANNER R.C.E. NO. 9025	DRAWING NO. 3410-8	

REVISIONS: NO. | CHANGE | BY | DATE | APPROVED

F.B. T-117

FILMED: 5/7/92

DESIGNED BY
TANNER, MARQUARDT, MELVIN & ASSOC., INC.
ENGINEERS & ARCHITECTS
650 S. ESCONDIDO BLVD. ESCONDIDO, CALIF.

ASSESSMENT DISTRICT 6-1964

SHEET 9	CITY OF ESCONDIDO	9 SHEETS

PLANS FOR THE IMPROVEMENT OF
NORTH NUTMEG & IRIS ST. SEWER
STA. 79+66.30 TO STA. 91+04.01

APPROVED CITY ENGINEER: Charles L. Larrick
DATE 6/10/64
SCALE AS SHOWN
APPROVED FOR DESIGN: John F. Tanner, J.F. TANNER R.C.E. NO. 9523
DRAWING NO. 3410-9

REVISIONS — NO. | CHANGE | BY | DATE | APPROVED

F.B. T-98

FILMED: 5/7/92

APPENDIX E

CITY OF ESCONDIDO MASTER PLAN FLOW METER AND BASIN 8 REFERENCE INFORMATION

4.2 Metered Sub-Basins

Separate drainage basins or "sub-basins" were identified within the collection system for the purpose of locating temporary flow meters as part of the model calibration effort (discussed in Section 5). The areas served within each of the eight metered basins and the one unmetered basin are shown on Figure 4-4. Each metered basin includes an upstream collection system and several trunk sewers that combine at a single downstream location where the meter was installed. Figure 4-5 provides a flow schematic for the metered sub-basins.

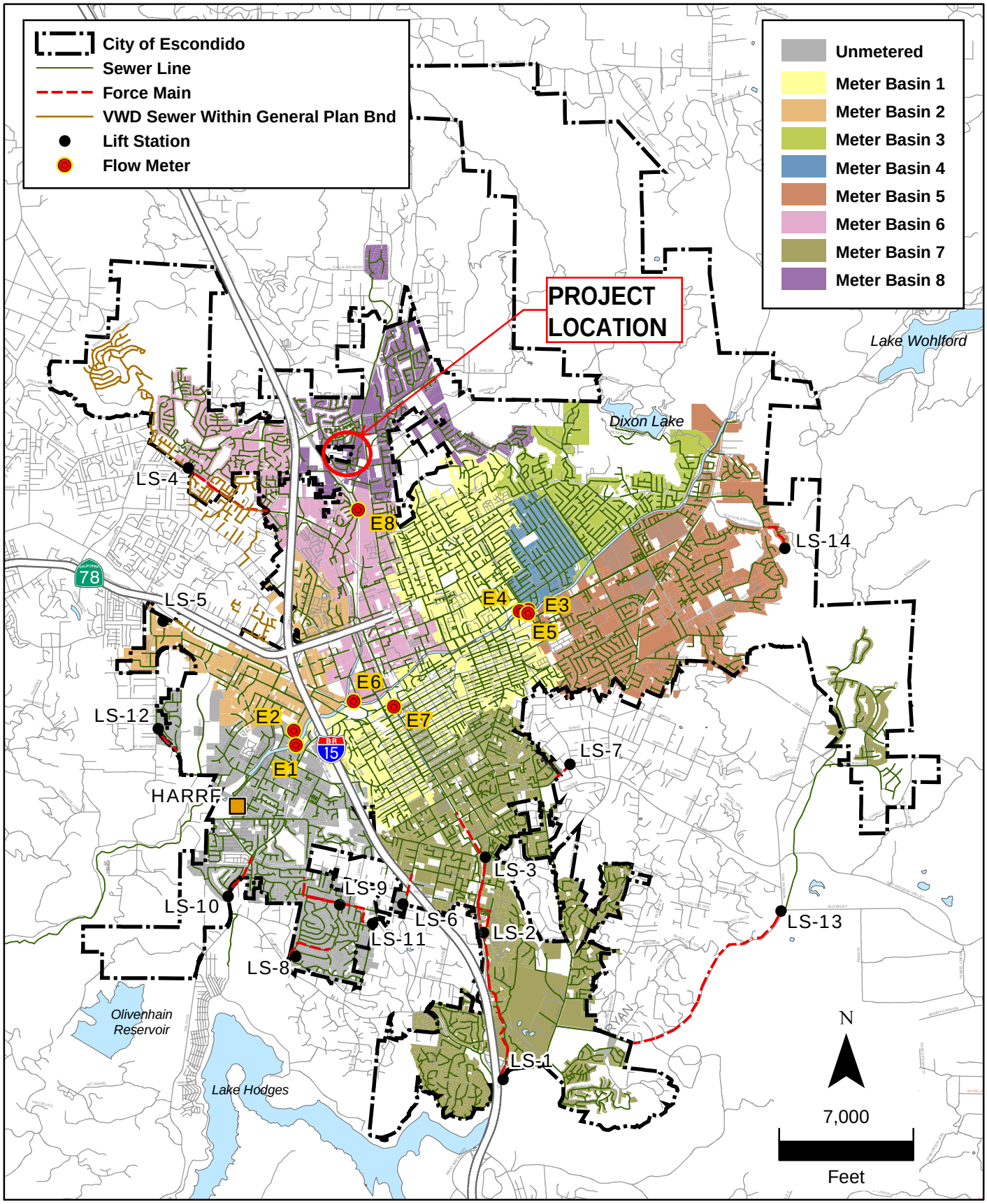
Basins 3, 4 and 5 are located at the east end of the City and discharge to Basin 1 through the main trunk sewers that follow Escondido Creek. Basin 1 extends both north and south of the channel, and includes the downtown area. The main trunk sewer in Basin 1 follows the creek and discharges to the HARRF. Basins 8 and 6 include the northernmost areas of the City and discharge to Basin 2, which includes a primarily industrial area directly north of the HARRF. Basin 2 discharges to a trunk sewer that crosses under Escondido Creek before discharging to the HARRF. Basin 7 includes the southernmost areas of the City and several lift stations, including the station that serves the Rancho San Pasqual area, and discharges to Basin 1. The unmetered "basin" consists of areas near the HARRF with smaller trunk sewers that discharge to the HARRF at several locations, and were thus impractical to meter.

The characteristics of each metered basin with respect to existing development are summarized in Table 4-3. This information is based on information provided by SANDAG for 2010.

Table 4-3 Development Information for Metered Basins

Metered Basin	Residential Area (Acres)	Non Residential Area (Acres)	Percent by Area		Estimated Occupied Dwelling Units	Employment Population
			Residential	Commercial		
1	1,304	413	76%	24%	9,738	11,036
2	1,023	843	55%	45%	4,561	13,542
3	2,480	392	86%	14%	8,263	5,583
4	253	16	94%	6%	1,706	132
5	692	45	94%	6%	2,365	441
6	2,303	528	81%	19%	11,027	10,474
7	4,900	573	90%	10%	9,080	9,288
8	2,233	152	94%	6%	3,940	1,307
TOTALS	**15,190**	**2,961**			**50,679**	**51,803**

Source: SANDAG Series 12

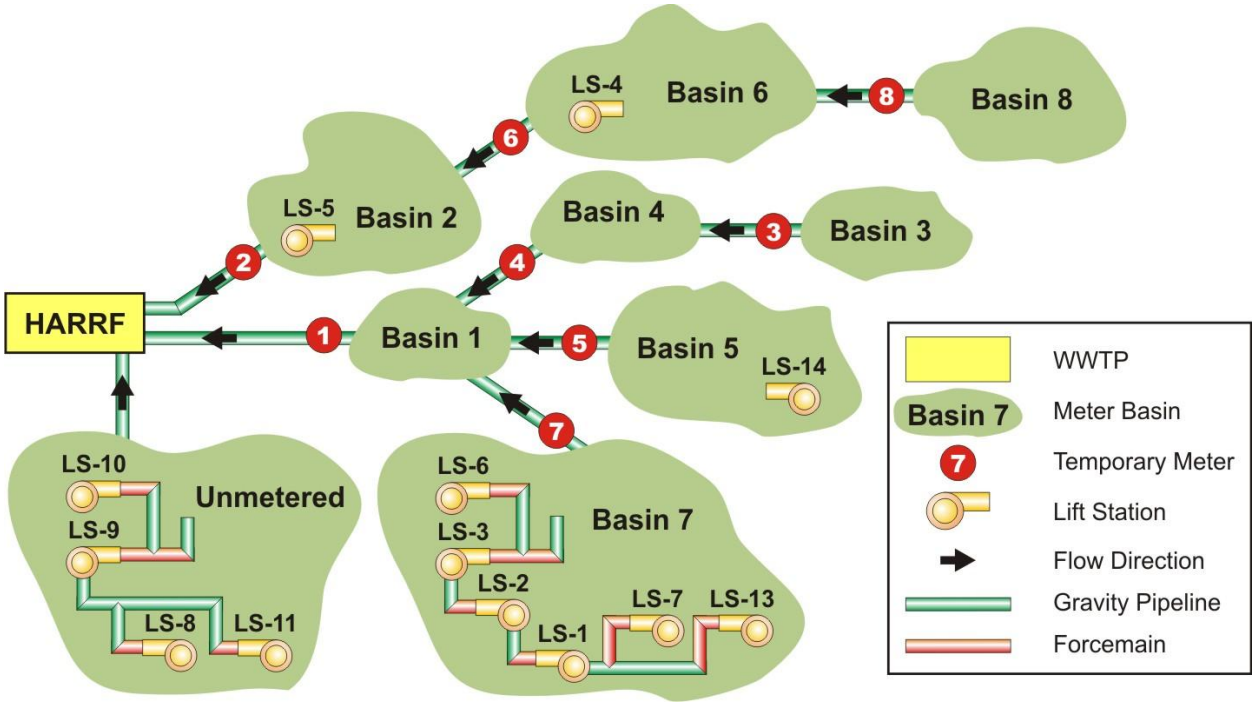


Metered Sewer Basins

Figure 4-4

06-13-2012 KC Z:\Projects\IS\Escondido\SewerMP_2011\mxd\20362_WW_MeterBasins_F4-4.mxd

Figure 4-5 Metered Sub-Basin Flow Schematic



4.3 Collection System Condition Assessment

A sewer lift station evaluation study which evaluated 13 of the 14 sewer lift stations was conducted in 2009-2010 by a consultant for the City. Lift Station 4 was in the process of being replaced and was therefore not included as part of the study. Lift station evaluations were based on site visits, a review of questionnaires completed by City operations and maintenance staff, a review of record drawings, and draw-down pump tests conducted in August 2009. Specifically, the study evaluated:

- station condition
- pumping capacity
- electrical equipment
- ease of operation and maintenance
- wet well capacity
- emergency storage and power
- flows in suction/discharge piping and force mains

The study report, dated May 2010, summarizes the condition of each lift station, evaluates and ranks each station based on developed criteria, summarizes station deficiencies, and recommends upgrades and improvements. The evaluation matrix, which assigns ranking scores from 5 (worst) to 1 (best) in each category, is provided in Table 4-4 and the full study report is provided in Appendix C.

United States Census Bureau

QuickFacts

Escondido city, California

QuickFacts provides statistics for all states and counties, and for cities and towns with a ***population of 5,000 or more***.

Table

Population	Escondido city, California
Households, 2015-2019	**47,101**
PEOPLE	
Population	
Population estimates, July 1, 2019, (V2019)	151,625
Population estimates base, April 1, 2010, (V2019)	143,976
Population, percent change - April 1, 2010 (estimates base) to July 1, 2019, (V2019)	5.3%
Population, Census, April 1, 2020	151,038
Population, Census, April 1, 2010	143,911