

# **DEXTER WILSON ENGINEERING, INC.**

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## **SEWER STUDY FOR THE CARLSBAD VILLAGE MIXED USE PROJECT IN THE CITY OF CARLSBAD**

February 20, 2024

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CARLSBAD VILLAGE MIXED USE PROJECT  
IN THE CITY OF CARLSBAD**

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2-20-24

**Prepared by:**

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Job No. 1135-001

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February 20, 2024

1135-001

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11661 San Vicente Blvd, Suite 850  
Los Angeles, CA 90049

Attention: Andrew Cerrina, Vice President

Subject: Sewer Study for the Carlsbad Village Mixed Use Project in the City of Carlsbad

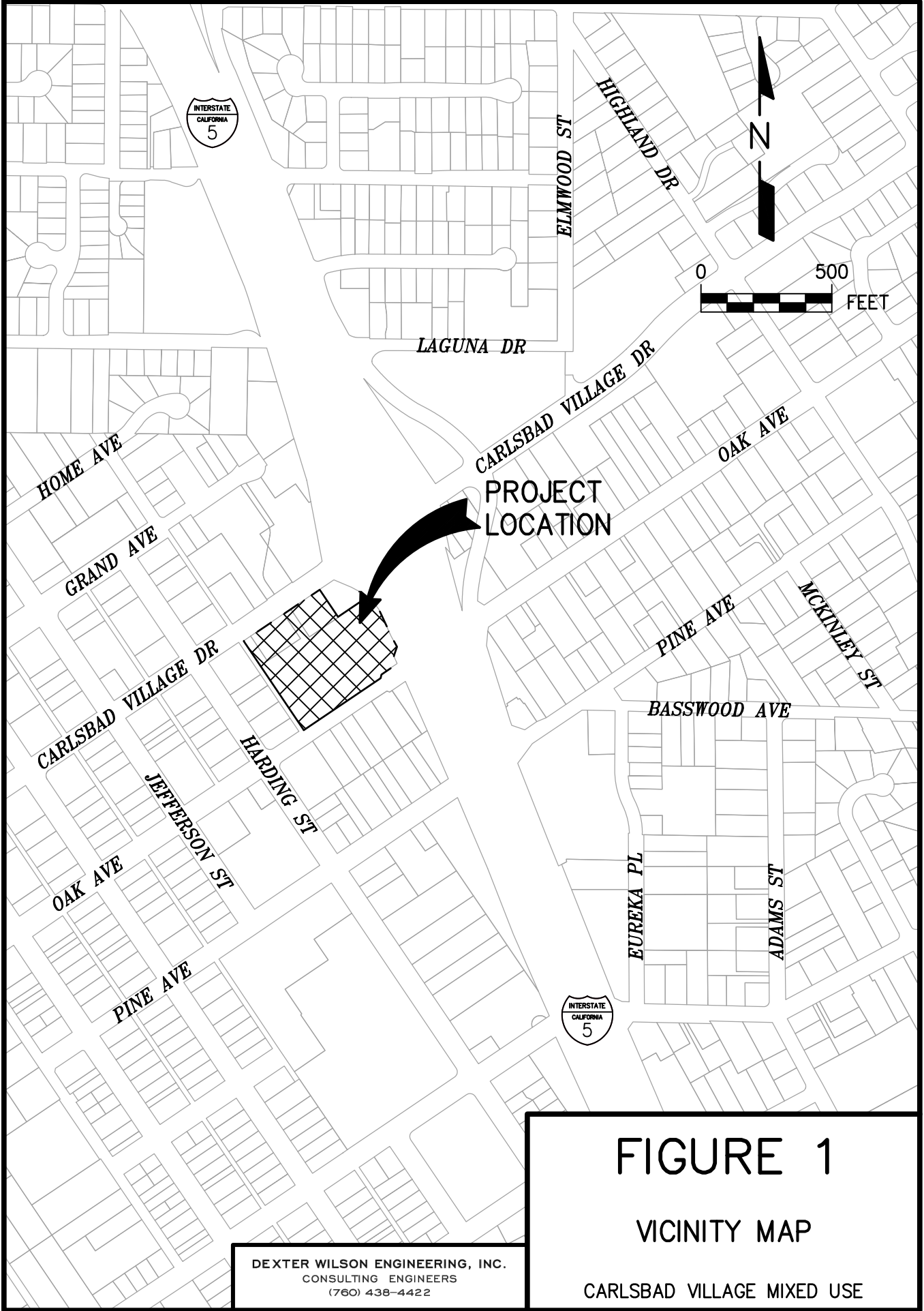
**Introduction**

The Carlsbad Village Mixed Use project is located in the northwest portion of the City of Carlsbad. The project is located between Carlsbad Village Drive and Oak Avenue, west of Interstate 5. A vicinity map for the project is presented in Figure 1.

**Project Description**

The Carlsbad Village Mixed Use project proposes a mixed-use development consisting of 218 multi-family units, as well as approximately 13,800 square feet of commercial space (0.32 acres), on a 4.12 acre site. The proposed commercial uses would be contained in two, one-story buildings along Carlsbad Village Drive, and the residential units would be spread across two five story residential buildings. The site is currently occupied by a retail shopping center, as well as a surface parking lot that would be demolished during project construction. Sewer service to the project site is provided by the City of Carlsbad (the “City”).

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**FIGURE 1**  
**VICINITY MAP**  
CARLSBAD VILLAGE MIXED USE

### **Purpose of Study**

The purpose of this study is to analyze the impact on the existing public sewer system with the addition of the development proposed by the Carlsbad Village Mixed Use project.

### **Sewer System Design Criteria**

The design criteria used for the evaluation of the sewerage system impacts by the Carlsbad Village Mixed Use project are consistent with Volume 1 of the 2022 City of Carlsbad Engineering Standards: General Design Standards (2022 Volume 1 Engineering Standards). Appendix A includes excerpts from the 2022 Volume 1 Engineering Standards pertinent to this report for reference.

### **Sewer Generation Rates**

Chapter 6 in the 2022 Volume 1 Engineering Standards identifies the average daily sewage flow to be 200 gallons per day (gpd) per Equivalent Dwelling Unit (EDU). Per Chapter 6, a multi-family residential unit is equal to 0.8 EDUs and 1,800 square feet of commercial building space is equal to 1 EDU. The sewer generation rate factors used for the Carlsbad Village Mixed Use project is presented in Table 1.

<b>TABLE 1 CARLSBAD VILLAGE MIXED USE SEWER GENERATION RATES <sup>1</sup></b>	
<b>Land Use</b>	<b>Generation Rate</b>
Multi-Family Residential	160 gpd/DU
Commercial	200 gpd/1,800 sq. ft.

1. Based on Volume 1 of the 2022 City of Carlsbad Engineering Standards: General Design Standards, Chapter 6 – Design Criteria for Sewer Facilities.

### **Peaking Factors**

The peaking factor for sewage flow is identified in the 2022 Volume 1 Engineering Standards. For average daily flows of less than 100,000 gpd, a peaking factor of 2.5 shall be used to determine peak daily flows.

### **Manning's "n"**

The gravity sewer analyses are made using a computer program which uses the Manning Equation for all of its calculations. The Manning's "n" used by the computer program is held as a constant for all depths in a circular conduit. The value of Manning's "n" used for this sewer study is 0.013 per the City of Carlsbad Utilities Department comment included in Appendix B of this report (from comment letter dated December 6, 2023) to account for the long-term roughness of the sewer system and simplified calculation approach that omits energy losses for flow through manholes and at junctions and flow transitions at changes in pipe slope.

### **Depth and Velocity of Flow in Gravity Sewers**

Gravity sewer lines are designed to convey peak dry weather flow. Pipes that are 12-inches in diameter and smaller are designed to convey this flow with a maximum depth-to-diameter (d/D) ratio of 0.50. Pipes that are larger than 12-inches in diameter are designed for a maximum d/D ratio of 0.75. All gravity sewer lines are designed to convey peak wet weather flow for a maximum d/D ratio of 0.90. Exceedance of either the peak dry or peak wet weather flow depth criteria will trigger sewer improvements. Gravity sewer lines are designed to maintain a minimum velocity of 2.0 feet per second at peak dry weather flow to prevent the deposition of solids.

**Projected Sewer Generation**

Based on the sewage generation factors presented in Table 2, the estimated average sewer generation for the project is calculated in Table 2.

<b>TABLE 2 CARLSBAD VILLAGE MIXED USE AVERAGE DAILY SEWER FLOW</b>			
<b>Land Use</b>	<b>Quantity</b>	<b>Sewage Generation Factor</b>	<b>Average Daily Flow</b>
Multi-Family Residential	218 DUs	160 gpd/DU	34,880 gpd
Retail Space	13,800 sq. ft.	200 gpd/1,800 sq. ft.	1,533 gpd
<b>TOTAL</b>			<b>36,413 gpd</b>

Per Table 2, average daily sewer flow for the Carlsbad Village Mixed Use project is 36,413 gpd or 25.3 gpm. The peak daily flow is 91,033 gpd or 63.2 gpm (Average Daily Flow x 2.5).

As stated previously, the existing site consists of commercial buildings that will be replaced with the proposed mixed-use residential project. Table 3 presents the average sewage generation for the site based on existing and proposed land uses, and the estimated net change in average daily sewage generation.

<b>TABLE 3 CARLSBAD VILLAGE MIXED USE EXISTING AND PROPOSED SEWAGE GENERATION</b>			
<b>Land Use</b>	<b>Quantity</b>	<b>Generation Factor</b>	<b>Average Sewer Generation</b>
<b>Existing</b>			
Commercial	60,068 sq. ft. <sup>1</sup>	200 gpd/1,800 sq. ft.	6,674 gpd
<b>Existing Subtotal</b>			<b>6,674 gpd</b>
<b>Proposed</b>			
Multi-Family Residential	218 DUs	160 gpd/DU	34,880 gpd
Retail Space	13,800 sq. ft.	200 gpd/1,800 sq. ft.	1,533 gpd
<b>Proposed Subtotal</b>			<b>36,413 gpd</b>
<b>Increase in Sewage Generation</b>			<b>29,739 gpd</b>

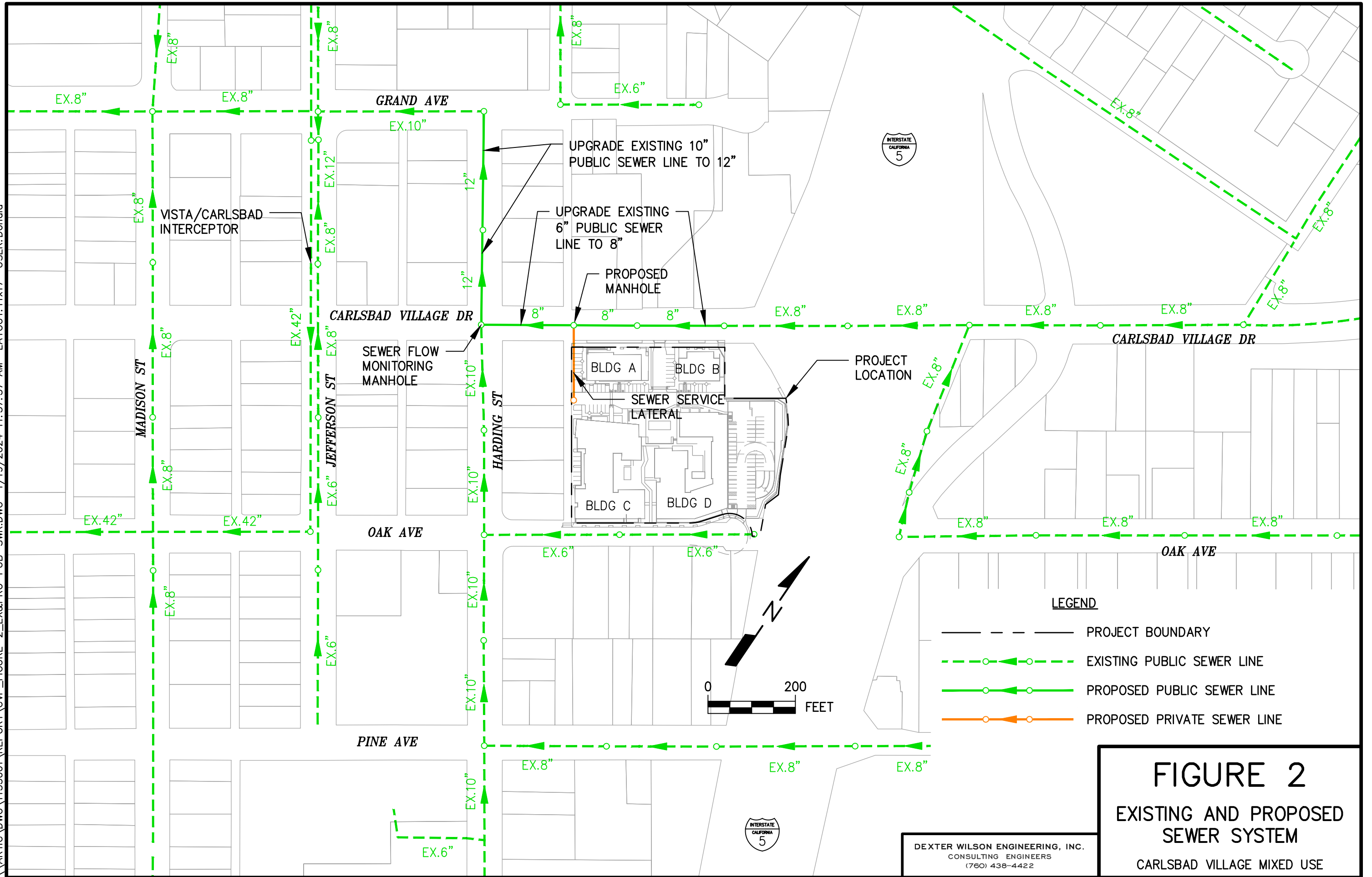
1. The building space of the existing site was obtained from the County of San Diego's San Diego Geographic Information Source (SANGIS). 1 EDU per 1,800 square feet of building space was used to calculate EDUs per Section 6.1.A.2.c of the 2022 City of Carlsbad Engineering Standards, Volume 1.

### Existing Sewer System

The existing project site makes one connection to the existing sewer line in Oak Avenue near the southeast corner of the site and two connections to the existing sewer line in Carlsbad Village Drive to the north. The existing sewer system in the vicinity of the Carlsbad Village Mixed Use project includes a 6-inch gravity sewer line in Carlsbad Village Drive north of the project and a 6-inch gravity sewer line in Oak Avenue south of the project. Each of these 6-inch gravity sewer lines convey flow west to an existing 10-inch gravity sewer line in Harding Street. The 10-inch gravity sewer line in Harding Street conveys flow north to an existing 10-inch gravity sewer line in Grand Avenue that takes flow west to an existing 12-inch gravity sewer line in Jefferson Street. The 12-inch gravity sewer line in Jefferson Street connects to the existing 42-inch Vista/Carlsbad Interceptor Sewer just south of Grand Avenue. Figure 2 presents the existing sewer system in the vicinity of the project.



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**LEGEND**

- PROJECT BOUNDARY
- EXISTING PUBLIC SEWER LINE
- PROPOSED PUBLIC SEWER LINE
- PROPOSED PRIVATE SEWER LINE

**FIGURE 2**  
**EXISTING AND PROPOSED**  
**SEWER SYSTEM**  
CARLSBAD VILLAGE MIXED USE

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### **Proposed Sewer System**

The Carlsbad Village Mixed Use project will connect to the public sewer system in Carlsbad Village Drive near the northwest corner of the project.

Using temporary sewer flow monitoring data provided by the City, the flow depth criteria for 12-inch and smaller diameter sewer mains is exceeded under pre-project, current, conditions (without the addition of project flows) and, therefore, the existing 6-inch sewer line in Carlsbad Village Drive, from Harding Street to the northeast corner of the project site requires upsizing to an 8-inch sewer line and the existing 10-inch sewer line in Harding Street, from Carlsbad Village Drive to Grand Avenue, requires upsizing to a 12-inch sewer line. Per City standards, the project's cost contribution to contract a larger pipe will be based on the proportionate share of project EDUs in accordance with Title 13 of the Carlsbad Municipal Code (13.08.035 and 13.08.040).

Further, when project flows are evaluated for the Master Plan condition, which assumes all sites contributing to the sewer basin are developed to the maximum densities allowed for the zoning assumed in the 2019 Sewer Master Plan, the analysis shows that under pre-project conditions (without the addition of project flows), the existing 10-inch sewer line in Harding Street, from Carlsbad Village Drive to Grand Avenue, requires upsizing to a 12-inch sewer line. As stated above, the project's cost contribution to contract a larger pipe will be based on the proportionate share of project EDUs in accordance with Title 13 of the Carlsbad Municipal Code (13.08.035 and 13.08.040).

Figure 2 presents the proposed sewer system for the Carlsbad Village Mixed Use project. The private onsite gravity sewer system for the project will be designed to connect to the new 8-inch gravity sewer line in Carlsbad Village Drive. Sizing of the onsite private sewer system is outside of the scope of this report.

### **Offsite Public Sewer System Analysis**

The offsite public sewer system analysis consists of determining peak sewer flows within all segments of the public sewer system that will be affected by the proposed development. The existing public sewer system was analyzed under existing flows and under existing flows plus proposed flows using sewer monitoring data provided by the City. The public sewer system was also analyzed under Master Plan flows.

### **Offsite Sewer Analysis Using Temporary Sewer Flow Monitoring**

Existing sewer flows were determined using temporary sewer flow monitoring provided by the City, a sewer study dated December 6, 2017 and prepared by SB&O, Inc. for the Carlsbad Village Lofts project (located across the street from the proposed project), and a sewer study dated April 2022 and prepared by Pasco Laret Suiter & Associates, Inc. for the Hope Avenue Apartments project.

Temporary sewer flow monitoring was performed at the manhole located at the intersection of Carlsbad Village Drive and Harding Street by V&A Consulting Engineers for the City. The sewer flow monitoring was conducted from February 2, 2023 to March 21, 2023. The flow monitoring measured flows in the existing 6-inch line in Carlsbad Village Drive and the existing 10-inch sewer line in Harding Street south of Carlsbad Village Drive. Appendix C contains a copy of the sewer flow monitoring report and corresponding flow summary information (V&A Report).

Results of the temporary sewer flow monitoring show an average dry weather flow of 0.079 mgd in the existing 6-inch sewer line in Carlsbad Village Drive (see Page Site D-East – 8 of the V&A Report) and an average dry weather flow of 0.074 mgd in the existing 10-inch sewer line in Harding Street south of Carlsbad Village Drive (see Page Site D-South – 8 of the V&A Report). These average dry weather flows were multiplied by 2.5 in accordance with City standards to determine peak dry weather flows.

The flow monitoring also captured peak wet weather flows during several rain events over the monitoring period. The peak wet weather flow in the existing 6-inch sewer line in Carlsbad Village Drive was measured to be 0.298 mgd (see Page Site D-East – 2 and 7 of the V&A Report) and the peak wet weather flow in the existing 10-inch sewer line in Harding Street south of Carlsbad Village Drive was measured to be 0.305 mgd (see Page Site D-South – 2 and 7 of V&A Report). The measured average and peak flows pertain to the specific storm event monitored and, although not regarded as the design peak wet weather flow, demonstrate that the existing sewer in Carlsbad Village Drive does not meet the flow depth criterion under pre-project conditions (see Appendix C, Site D-East – 9).

Because the sewer flows from Carlsbad Village Drive combine with the sewer flows from Harding Street (south to north) at the flow monitoring manhole, the measured flows were added together to determine the total sewer flow conveyed north in Harding Street from Carlsbad Village Drive to Grand Avenue.

**Harding Street and Grand Avenue Existing Sewer Flows.** Sewer flows for the lots located along Harding Street and Grand Avenue, downstream of the flow monitoring manhole, were calculated using the actual count of residential units or commercial building floor areas to determine existing EDUs. The building areas of the developed lots along Harding Street and Grand Avenue were obtained from the County of San Diego’s San Diego Geographic Information Source (SANGIS). To convert building space to EDUs, 1 EDU per 1,800 square feet of building space was used per Section 6.1.A.2.c of the 2022 City of Carlsbad Engineering Standards, Volume 1. Appendix D shows the building square footage of each lot along with EDU calculations.

**Jefferson Street Existing Sewer Flows.** Sewer flows downstream of the intersection of Grand Avenue and Jefferson Street were provided by the City in the comment letter dated December 6, 2023 (see Appendix B).

**Sewer Flows for Recently Constructed Projects.** Sewer flows for three recently constructed projects, that are located within the same sewer basin, as the Carlsbad Village Mixed Use project, were accounted for in the temporary sewer flow monitoring. These projects are the following:

Carlsbad Village Lofts – 106 multi-family units and 10,578 sq. ft. of retail/office space  
Windsor Affordable Housing, Harding Building – 26 multi-family units  
Windsor Affordable Housing, Oak Building – 24 multi-family units

The temporary sewer flow monitoring was conducted between February and March 2023, and each of the projects listed above had already been constructed and fully operational during this time.

To account for near-term flows that will contribute to the same sewer basin, the Hope Avenue Apartments project, which has not been constructed but was recently approved, was added to the sewer flows. The Hope Avenue Apartments project will have 156 multi-family residential units; however, of the public sewer lines analyzed for the Carlsbad Village Mixed Use project, the sewer flows for the Hope Avenue Apartments project do not impact the public sewer lines in Carlsbad Village Drive, Harding Street, or Grand Avenue, only the public sewer line in Jefferson Street.

As-built drawings were obtained from the City to determine the sewer slopes of the existing sewer system downstream of the project for the following analysis. The as-built drawings are included in Appendix E for reference.

**Existing Public Sewer System Under Existing Flows.** The analysis in Appendix F presents the results for the existing sewer system under existing flows. Exhibit A presents a Manhole Diagram for the system.

**Peak Dry Weather Flow.** The results of the peak dry weather analysis show that under existing peak dry weather flows the existing system has a maximum d/D ratio of 0.52. The maximum d/D ratio occurs in the sewer reach from Manhole 200 to Manhole 1068, which corresponds to the existing 10-inch gravity sewer line in Harding Street. Flow velocities in the existing public sewer system range from 2.1 fps to 6.7 fps under existing flows. The maximum allowable d/D ratio under peak dry weather flow is 0.50 for sewer lines that are 12-inches in diameter and smaller.

**Peak Wet Weather Flow.** Under peak wet weather flow, the maximum d/D ratio in the existing system is 0.70 in the sewer reach from Manhole 200 to Manhole 1068, which corresponds to the existing 10-inch gravity sewer line in Harding Street. The maximum allowable d/D ratio under peak wet weather flow is 0.90. As previously mentioned, under measured peak wet weather flows, the existing 6-inch sewer line in Carlsbad Village Drive does not meet the flow depth criterion under pre-project conditions for peak wet weather flow (see Appendix C, Site D-East – 9).

**Existing Public Sewer System Under Existing Plus Project Flows.** The analysis in Appendix G presents the results for the existing sewer system under existing plus project flows. Exhibit A presents a Manhole Diagram for the system.

**Peak Dry Weather Flow.** The results of the peak dry weather analysis show that under existing plus project flows the maximum peak dry weather flow d/D ratio increases from 0.52 to 0.57 in the existing 10-inch sewer line in Harding Street (from Manhole 200 to Manhole 1068). Flow velocities in the existing public sewer system range from 2.2 fps to 6.9 fps under existing plus project flows. The maximum allowable d/D ratio under peak dry weather flow is 0.50 for sewer lines that are 12-inches in diameter and smaller.

**Peak Wet Weather Flow.** Under peak wet weather flow, the maximum d/D in the existing system increases from 0.70 to 0.77 in the existing 10-inch sewer line in Harding Street (from Manhole 200 to Manhole 1068). The maximum allowable d/D ratio under peak wet weather flow is 0.90.

Based on the results of the public sewer analysis using temporary sewer flow monitoring data, the flow depth criteria for 12-inch and smaller diameter sewer mains is exceeded under pre-project conditions (without the addition of project flows) and, therefore in accordance with City standards the existing 6-inch sewer line in Carlsbad Village Drive, from Harding Street to the northeast corner of the project site, requires upsizing to an 8-inch sewer line and the existing 10-inch sewer line in Harding Street, from Carlsbad Village Drive to Grand Avenue, requires upsizing to a 12-inch sewer line.

**Proposed Public Sewer System Under Existing Plus Project Flows.** The analysis in Appendix H presents the results for the sewer system under existing plus project flows after A) the existing 6-inch sewer line in Carlsbad Village Drive has been upgraded to an 8-inch sewer line, and B) the existing 10-inch sewer line in Harding Street has been upgraded to a 12-inch sewer line. Exhibit A presents a Manhole Diagram for the system.

**Peak Dry Weather Flow.** The results of the peak dry weather analysis show that under existing plus project peak dry weather flows the proposed system has a maximum d/D ratio of 0.43. The maximum d/D ratio occurs in the sewer reach from Manhole 5258 to Manhole 1068, which corresponds to the proposed 12-inch gravity sewer line in Harding Street. Flow velocities in the public sewer system range from 2.2 fps to 6.9 fps under existing flows. The maximum allowable d/D ratio under peak dry weather flow is 0.50 for sewer lines that are 12-inches in diameter and smaller.

**Peak Wet Weather Flow.** Under existing plus project peak wet weather flow, the maximum d/D ratio in the proposed system is 0.55 in the sewer reach from Manhole 200 to Manhole 1068, which corresponds to the proposed 12-inch gravity sewer line in Harding Street. The maximum allowable d/D ratio under peak wet weather flow is 0.90.

### **Offsite Sewer Analysis Using Master Plan Flows**

The existing and proposed public sewer system was analyzed under Master Plan flows provided by the City, which assumes all sites contributing to the sewer basin are developed to the maximum densities allowed for the zoning assumed in the 2019 Sewer Master Plan. The Master Plan analysis in the 2019 Sewer Master Plan Update does not include the development densities approved in the Village & Barrio Master Plan, which was adopted in 2019.

**Existing Public Sewer System Under Master Plan Flows.** The analysis in Appendix I presents the results for the existing sewer system under Master Plan flows. Exhibit A presents a Manhole Diagram for the system.

**Peak Dry Weather Flow.** The results of the peak dry weather analysis show that under Master Plan peak dry weather flows the existing system has a maximum d/D ratio of 0.67. The maximum d/D ratio occurs in the sewer reach from Manhole 200 to Manhole 1068, which corresponds to the existing 10-inch gravity sewer line in Harding Street. Flow velocities in the existing public sewer system range from 2.3 fps to 6.7 fps under existing flows. The maximum allowable d/D ratio under peak dry weather flow is 0.50 for sewer lines that are 12-inches in diameter and smaller.

**Peak Wet Weather Flow.** Under Master Plan peak wet weather flow, the maximum d/D ratio in the existing system is greater than 1.0 in the sewer reach from Manhole 5258 to Manhole 1068, which corresponds to the existing 10-inch gravity sewer line in Harding Street. The maximum allowable d/D ratio under peak wet weather flow is 0.90.

Based on the results of the existing public sewer system under Master Plan flows without the project, the maximum d/D ratio is exceeded in both peak dry and peak wet scenarios in the existing 10-inch sewer line in Harding Street. This indicates that the 10-inch sewer line in Harding Street, between Carlsbad Village Drive and Grand Avenue, requires a larger sewer main diameter under pre-project conditions (without addition of project flows).

**Existing Public Sewer System Under Master Plan Plus Project Flows.** The analysis in Appendix J presents the results for the existing sewer system under Master Plan plus project flows. Exhibit A presents a Manhole Diagram for the system.

**Peak Dry Weather Flow.** The results of the peak dry weather analysis show that under Master Plan plus project flows the maximum peak dry weather flow d/D ratio increases from 0.67 to 0.73 in the existing 10-inch sewer line in Harding Street (from Manhole 200 to Manhole 1068). Flow velocities in the existing public sewer system range from 2.3 fps to 6.9 fps under Master Plan plus project flows. The maximum allowable d/D ratio under peak dry weather flow is 0.50 for sewer lines that are 12-inches in diameter and smaller.

**Peak Wet Weather Flow.** Under Master Plan plus project peak wet weather flow, the maximum d/D ratio in the existing system remains greater than 1.0 from Manhole 5258 to Manhole 1068, which corresponds to the existing 10-inch gravity sewer line in Harding Street. The maximum allowable d/D ratio under peak wet weather flow is 0.90.



Based on the results of the existing public sewer analysis using Master Plan flows, the maximum allowable d/D ratio is exceeded in the existing 10-inch sewer line in Harding Street, between Carlsbad Village Drive and Grand Avenue, with and without the project. The 10-inch sewer line would be required to be upgraded using Master Plan flows with or without the project.

**Proposed Public Sewer System Under Master Plan Plus Project Flows.** The analysis in Appendix K presents the results for the sewer system under Master Plan plus project flows after A) the existing 6-inch sewer line in Carlsbad Village Drive has been upgraded to an 8-inch sewer line, and B) the existing 10-inch sewer line in Harding Street has been upgraded to a 12-inch sewer line. Exhibit A presents a Manhole Diagram for the system.

**Peak Dry Weather Flow.** The results of the peak dry weather analysis show that under Master Plan plus project peak dry weather flows the proposed system has a maximum d/D ratio of 0.53. The maximum d/D ratio occurs in the sewer reach from Manhole 5258 to Manhole 1068, which corresponds to the proposed 12-inch gravity sewer line in Harding Street. Flow velocities in the public sewer system range from 2.4 fps to 6.9 fps under existing flows. The maximum allowable d/D ratio under peak dry weather flow is 0.50 for sewer lines that are 12-inches in diameter and smaller.

Because the analysis assumes all sites contributing to the sewer basin are fully built out (Master Plan plus project flows), a 12-inch public sewer line is recommended. The final size of the proposed public sewer line in Harding Street will be determined during final engineering.

**Peak Wet Weather Flow.** Under Master Plan plus project peak wet weather flow, the maximum d/D ratio in the proposed system is 0.64 in the sewer reach from Manhole 5258 to Manhole 1068, which corresponds to the proposed 12-inch gravity sewer line in Harding Street. The maximum allowable d/D ratio under peak wet weather flow is 0.90.

### **Conclusions and Recommendations**


The following conclusions have been made related to providing sewer service to the Carlsbad Village Mixed Use project.

1. Existing sewer service is provided to the project site by the City of Carlsbad.
2. The Carlsbad Village Mixed Use project will receive sewer service from the City of Carlsbad.
3. The existing and proposed public sewer system is presented in Figure 2.
4. The project will connect to the proposed 8-inch sewer line in Carlsbad Village Drive near the northwest corner of the project site.
5. Using temporary sewer flow monitoring data provided by the City, the flow depth criteria for 12-inch and smaller diameter sewer mains is exceeded under pre-project conditions (without the addition of project flows) in Carlsbad Village Drive and Harding Street. Therefore, in accordance with City standards, the existing 6-inch sewer line in Carlsbad Village Drive, from Harding Street to the northeast corner of the project site, requires upsizing to an 8-inch sewer line, and the existing 10-inch sewer line in Harding Street, from Carlsbad Village Drive to Grand Avenue, requires upsizing to a 12-inch sewer line.
6. When project flows are evaluated for the Master Plan condition, which assumes all sites contributing to the sewer basin are developed to the maximum densities allowed for the zoning assumed in the 2019 Sewer Master Plan, the analysis shows that the existing 10-inch sewer main in Harding Street between Carlsbad Village Drive and Grand Avenue requires upsizing to a 12-inch sewer line.
7. The project's cost contribution to contract a larger pipe in both Carlsbad Village Drive and Harding Street will be based on the proportionate share of project EDUs in accordance with Title 13 of the Carlsbad Municipal Code (13.08.035 and 13.08.040).

8. All new sewer service laterals to be installed shall conform to the requirements of the City of Carlsbad.

Thank you for the opportunity to provide assistance on this project. If you have any questions about the analysis or conclusions of this sewer study, please let us know.

Dexter Wilson Engineering, Inc.

A handwritten signature in blue ink, appearing to read "Fernando Fregoso".

Fernando Fregoso, P.E.

FF:ah

Attachments

**APPENDIX A**

**CITY OF CARLSBAD  
SEWER SYSTEM DESIGN CRITERIA**

## CHAPTER 6 – DESIGN CRITERIA FOR SEWER FACILITIES

Prior to preparation of improvement plans, Engineer of Work shall submit a preliminary layout of the sewer system for review and approval by the City Engineer. Basis of design shall be demonstrated for the development type and density and corresponding sewer flow generation factors and the following design criteria.

### 6.1 SEWER FLOW GENERATION FACTORS

- A. Flow Rate Generation – The values in the latest adopted Sewer Master Plan shall govern:
- 1) An Equivalent Dwelling Unit (EDU) = 200 gal/day, Average Daily Flow (ADF)
  - 2) For ADF less than 100,000 gal/day, a peaking factor (PF) of 2.5 multiplied times the ADF shall be used to determine Peak Daily Flow (PDF).  $PDF = ADF \times 2.5$ 
    - a) Residential: Single Family Residence = 1 EDU
    - b) Residential: Multi-Family Residence = 0.8 EDU
    - c) Commercial Property: 1 EDU/1,800 square feet of building space
      - i) To convert raw land to square feet of building space, assume 30% coverage. This could vary significantly dependent development constraints.
      - ii) To convert improved pads to square feet of building space, assume 40% of coverage.
    - d) Industrial Property:
      - i) 1 EDU/5,000 square feet of warehouse space
      - ii) 1 EDU/1,800 square feet of office space
      - iii) To convert raw land to square feet of building space, assume 30% coverage. This could vary significantly dependent issues such as environmental restrictions.
      - iv) To convert improved pads to square feet of building space, assume 40% of coverage.
      - v) Assume 60% of building space is warehouse, and 40% is office space.

### 6.2 SEWER MAIN DEPTH AND SIZE

- A. Sewer main depth and size shall be as shown below unless approved by the City Engineer.
- B. Minimum depth, finish grade to top of pipe: 6 feet
- C. Maximum depth, finish grade to top of pipe: 15 feet
- D. Design calculations shall be submitted as a basis for pipe size and bedding design. (Manning "n" for PVC = 0.011).
- E. Minimum pipe diameter of sewer main shall be 8 inches. A 6-inch sewer main may be allowed on cul-de-sac streets with a maximum of 10 units.

- F. A decrease in the pipe diameter in the downstream direction of flow will not be allowed without hydraulic calculations and prior approval of the City Engineer.
- G. All sewer laterals and gravity sewer main invert elevations shall be shown in profile on the improvement plans. Show stationing of manholes and laterals, invert elevations at manholes and lateral connections, and the distance, pipe size, pipe type, standard dimension ratio and pipe slope of sewer main segments.
- H. All sewer mains 15" and greater pipe diameters shall require special design subject to City Engineer approval.

### **6.3 SEWER LATERALS**

- A. Use 4" minimum diameter pipe for each sewer lateral to single-family residences.
- B. Use 6" minimum diameter pipe for sewer laterals for all other development types and sized for the drainage fixture units in accordance with the latest adopted California Plumbing Code or for the proposed industrial use water demand.
- C. Sewer lateral depth at the property line shall be 5 feet (top of pipe to finish grade @ top of curb).
- D. Sewer laterals shall be constructed in accordance with the Carlsbad Standard Drawings. The minimum horizontal distance from water services, fire hydrants, driveways, light standards, electrical utilities, etc. is 10 feet. Special approval is required for horizontal clearance less than specified herein.
  - 1) Install at a right angle or radial to the main.
  - 2) Laterals shall not be located in driveways.
  - 3) No connections shall be permitted on laterals other than as allowed by the Standard Drawings.
  - 4) Location of property cleanout: See Standard Drawing No. S-7.
  - 5) If the lowest sanitary sewer fixture in a building structure is lower than 2-feet above the nearest upstream manhole cover, then the owner must provide a backwater valve on the sewer lateral to prevent sewage backflow into the structure. The valve must be installed in a valve box for accessibility and be visible from the public right-of-way. The property owner shall be responsible for the installation and maintenance of the backwater valve. The backwater valve shall be shown on the precise grading and improvement plans.
  - 6) Install sewer laterals using wye fittings, or manholes as required, sized and located as shown on the Approved Plans.
  - 7) Laterals shall be bedded, backfilled and compacted in the same manner as the sewer main they are connected to.

## 6.4 MATERIALS FOR PIPE AND FITTINGS

- A. Gravity sewer pipe and fittings shall be PVC conforming to ASTM D3034 for diameters 4" through 15" and ASTM F679 for 18" through 24" with integral bell and gasketed joints (gasket and spigot end joint design). Pipe shall be made of PVC plastic having a cell classification of 12454-B or 12364-B as defined in ASTM D1784 and shall have SDR of 35 or thicker, and a minimum stiffness of 46 psi according to ASTM D2412.
- B. All fittings and accessories shall be as manufactured and finished by the pipe manufacturer with joints or joining systems compatible with that of the pipe.
- C. PVC pipe joints shall be elastomeric gasket joints conforming to Standard Specifications for Public Works (Greenbook) most recent edition. Rubber gaskets shall be factory installed and conform to ASTM F477. Pipe joints shall have been tested and meet watertight performance requirements of ASTM D3212, "Joints for Pipe Using Flexible Elastomeric Seals".
- D. PVC pressure pipe conforming to AWWA C900 or HDPE pipe conforming to AWWA C906 shall be used for gravity sewer pipelines with depths of 30 feet or greater or as required by the City Engineer for special installations. Engineering calculations shall be submitted for approval to demonstrate that the pipe material and wall thickness will accommodate the anticipated earth and live loads.
- E. Service connections to the sewer main shall be watertight and not protrude into the sewer pipe. All materials used to make the service connections shall be compatible with the pipe materials to be joined and shall be corrosion proof.
- F. Couplings used for repair or transition to dissimilar pipe materials shall be approved by the City Engineer and provide a corrosion proof watertight seal.
- G. Use of other pipe and fitting materials and types may be required by the City Engineer for special designs for accessibility constraints of adjacent improvements, deep installations, trenchless construction methods or other site conditions. Refer to the Approved Materials List in Volume 2 for alternative materials.

## 6.5 DESIGN CRITERIA FOR PIPE VELOCITY, SLOPE AND FLOW DEPTH

- A. Gravity sewer pipelines shall be designed for a minimum velocity of 2 feet/second. Velocity, unless otherwise stated, shall be calculated from peak dry weather flow.
- B. Pipe slope shall be established to satisfy the minimum velocity criterion. Maximum velocities greater than 12 ft/second should be avoided.

Slopes for 6- through 12-inch diameter pipe, unless otherwise approved by the City Engineer:

- 1) 6" pipe, minimum slope = 2%
- 2) 8" pipe, minimum slope = 0.50%
- 3) 10" pipe, minimum slope = 0.40%
- 4) 12" pipe, minimum slope = 0.30%

Pipe slope for 12-inch diameter or larger pipe shall be designed to meet flow and velocity criteria and shall be approved by the City Engineer. Pipelines with horizontal curvature may require increases slope to achieve minimum required velocities.

- C. Gravity sewer mains up to 12-inch diameter shall be designed to flow at depths of 50% of pipe diameter (0.5D) or less during peak hour dry weather flow. Gravity sewer mains with pipe diameters greater than 12 inches shall be designed to flow at depths of 0.75D during peak hour dry weather flow.
- D. Gravity pipelines shall be designed to convey peak wet weather flow at a flow depth not exceed 90% of pipe diameter ( $d/D = 0.90$ ).
- E. Peak sewer flow rates do not include infiltration or inflow (I/I). Infiltration is defined as the addition of groundwater into the sewer collection system and inflow is the addition of storm water into the sewer collection system. Because sewer collection system I/I is dependent on many factors including season, age of system, pipe material and joint types, root intrusion, and presence of storm water flow, I/I flow rate estimates will vary. The design of sewer mains connecting to sewer systems known to have I/I, or are susceptible to I/I, shall utilize peak wet weather flow estimates from the latest adopted Sewer Master Plan or perform wet weather flow monitoring as directed by the City Engineer.

## 6.6 HORIZONTAL AND VERTICAL LAYOUT

- A. Streets: See City of Carlsbad Standard Drawing No. GS-6 for location.
- B. Alley: The centerline offset between the alley and the sewer main shall be three feet (3') minimum.
- C. Private Street: Sewer mains in private streets shall require special design consideration for access.
- D. Horizontal Curves: SDR 35, PVC pipe may be curved horizontally through longitudinal bending with the following limitations:

<u>Pipe Diameter</u>	<u>Min. Radius of Curvature</u>
6-inch	150 feet
8-inch	200 feet
10-inch	250 feet
12-inch	300 feet
15-inch	375 feet

The City Engineer shall approve the minimum curvature for larger diameter pipe.

- E. Vertical Curves: Vertical curves shall be permitted only when specifically approved by the City Engineer. A profile drawing showing depth of cover, radius of curvature and design constraints that prevent the use of straight pipe segments shall be prepared for review and approval.



**APPENDIX B**

**CITY OF CARLSBAD  
UTILITIES DEPARTMENT COMMENT  
RE: MANNING'S "N" VALUE**

# Memorandum

DATE 12/6/2023

**To:** Jason Goff  
**From:** Neil Irani  
**Via** Planning Division Request for Review  
**Re:** CARLSBAD VILLAGE MIXED USE– SDP2023-0014

Issues of Concern:

1. Address all civil site plan utility markups.
2. Address all markups to sewer study.
3. Upsizing of sewer gravity main in Harding required, see sewer study comments.
4. Conditions of approval for the scope of sewer and water reimbursement agreements must be finalized prior to discretionary approval. Developer to contact CMWD to discuss scope of reimbursement for public water and sewer work.

Please provide the following information and/or document(s) with the requested number of copies as specified.

Information/Document	# of Copies	Submittal Form	Admin. Purposes Only
Sewer Study	1	PDF	
Revised Civil Plan Set	1	HC/PDF	

**Attachments:**

1. Civil site plan, sewer study comments (PDF)

DATE: 8/7/2023

**SEWER STUDY SUMMARY**

JOB NUMBER: 1135-001

FOR: Carlsbad Village Mixed Use Project - Existing System, Existing PDWF  
 BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 1  
 REFER TO PLAN SHEET: \_\_\_\_\_

Where is this number coming from?

LINE	FROM	TO	EXISTING PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' <sup>(1)</sup>	dn (feet)	dn/D <sup>(2)</sup>	C <sub>a</sub> for Velocity <sup>(3)</sup>	VELOCITY (f.p.s.)	COMMENTS <sup>A</sup>
				M.G.D.	C.F.S.								
	5259	6538	140,000	0.140	0.217	6	3.00	0.087356	0.14712	0.29	0.1929	4.49	
	6538	5258	140,000	0.140	0.217	6	2.80	0.090422	0.14976	0.30	0.1978	4.38	Existing Carlsbad Village Mixed Use Site Peak Flow = 20,000 gpd
	5258 <sup>B</sup>	200	321,850	0.322	0.498	10	0.28	0.168346	0.34751	0.42	0.3101	2.31	Carlsbad Village Lofts South (53 DUs + 10,578 retail sqft) Windsor Pointe Apts - Oak & Harding (40 DUs) 1.52 Commercial Acres (14.7 EDUs)
	200	1068	326,950	0.327	0.506	10	0.28	0.171013	0.35058	0.42	0.3137	2.32	1.05 Commercial Acres (10.2 EDUs)
	1068	1060	360,150	0.360	0.557	10	1.16	0.092551	0.25261	0.30	0.2011	3.99	Carlsbad Village Lofts North (53 DUs) 1.38 Commercial Acres (13.4 EDUs)
	1060	1061	490,000	0.490	0.758	12	2.89	0.049060	0.21968	0.22	0.1278	5.93	<del>SB&amp;O Report Model Data</del>
	1061	1062	490,000	0.490	0.758	12	4.00	0.041701	0.20262	0.20	0.1139	6.66	

Use 0.607 MGD Peak Dry, also add hope apts flow

0.618 MGD peak dry, also add hope apts flow

A. Flows added to sewer flow monitoring data.

Min Slope
0.28

Max dn/D
0.42

1 K' based on n = 0.011  
 2 dn/D using K' in Brater King Table 7-14  
 3 From Brater King Table 7-4 based on dn/D

DATE: 8/7/2023

**SEWER STUDY SUMMARY**

JOB NUMBER: 1135-001

FOR: Carlsbad Village Mixed Use Project - Proposed System, Existing + Project PDWF  
 BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 1  
 REFER TO PLAN SHEET:

Include GPDs in this table

LINE	FROM	TO	EXISTING PEAK FLOW (gpd) <sup>A</sup>	PROPOSED PROJECT PEAK FLOW (gpd)	COMBINED PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K <sup>(1)</sup>	dn (feet)	dn/D <sup>(2)</sup>	C <sub>a</sub> for Velocity <sup>(3)</sup>	VELOCITY (f.p.s.)	COMMENTS <sup>B</sup>
						M.G.D.	C.F.S.								
	5259	6538	140,000	0	140,000	0.140	0.217	8	3.00	0.040562	0.13327	0.20	0.1117	4.36	
	6538	5258	120,000	91,033	211,033	0.211	0.327	8	2.80	0.063289	0.16652	0.25	0.1533	4.79	
	5258	200	301,850	91,033	392,883	0.393	0.608	10	0.28	0.205500	0.38874	0.47	0.3592	2.44	Carlsbad Village Lofts South (53 DUs + 10,578 retail sqft) Windsor Pointe Apts - Oak & Harding (40 DUs) 1.52 Commercial Acres (14.7 EDUs)
	200	1068	306,950	91,033	397,983	0.398	0.616	10	0.28	0.208167	0.39163	0.47	0.3627	2.45	1.05 Commercial Acres (10.2 EDUs)
	1068	1060	340,150	91,033	431,183	0.431	0.667	10	1.16	0.110805	0.27748	0.33	0.2288	4.20	Carlsbad Village Lofts North (53 DUs) 1.38 Commercial Acres (13.4 EDUs)
	1060	1061	470,000	91,033	561,033	0.561	0.868	12	2.89	0.056172	0.23515	0.24	0.1408	6.16	SB&O Report Model Data
	1061	1062	470,000	91,033	561,033	0.561	0.868	12	4.00	0.047746	0.21670	0.22	0.1254	6.92	

Min Slope
0.28

Max dn/D
0.47

A. Existing peak flow of 20,000 gpd for existing Carlsbad Village Mixed Use site is subtracted out downstream of Manhole 6538 due to proposed redevelopment.  
 B. Flows added to sewer flow monitoring data.

See prior comments on Jefferson flows

Please detail add'l peak dry added to this number, includes .125 MGD from harding south of MH?

We are approaching 0.5 d/D using 0.011 n factor appropriate for new PVC. 0.013 likely to exceed criteria, upsizing required.

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

**APPENDIX C**

**TEMPORARY SEWER  
FLOW MONITORING REPORT  
(V&A REPORT)**

## Monitoring Site: Site D East

City of Carlsbad | Carlsbad, California

Sanitary Sewer Flow Monitoring

February 02, 2023 - March 21, 2023

Location: Carlsbad Village Drive and Harding Street

## Data Summary Report



Vicinity Map: Site D East

## SITE D EAST

### Site Information

MH ID: MH 10C-53

**Location:** Carlsbad Village Drive and Harding Street

**Coordinates:** 117.3446° W, 33.1619° N

**Rim Elevation:** 64 feet

**Expected Pipe Diameter:** 6 inches

**Measured Pipe Diameter:** 6 inches

**ADWF:** 0.079 mgd

**Peak Measured Flow:** 0.298 mgd

**Sediment:** None

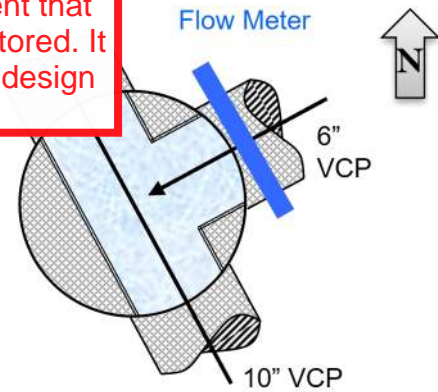


Satellite Map



Sanitary Map

**PWWF**  
(measured peak for the specific storm event that was monitored. It is not the design PWWF.)



Flow Sketch



Street View



Plan View

## SITE D EAST

### Additional Site Photos

---

Effluent Pipe



Monitored East Influent Pipe





## SITE D EAST

### Additional Site Photos

---

#### South Influent Pipe

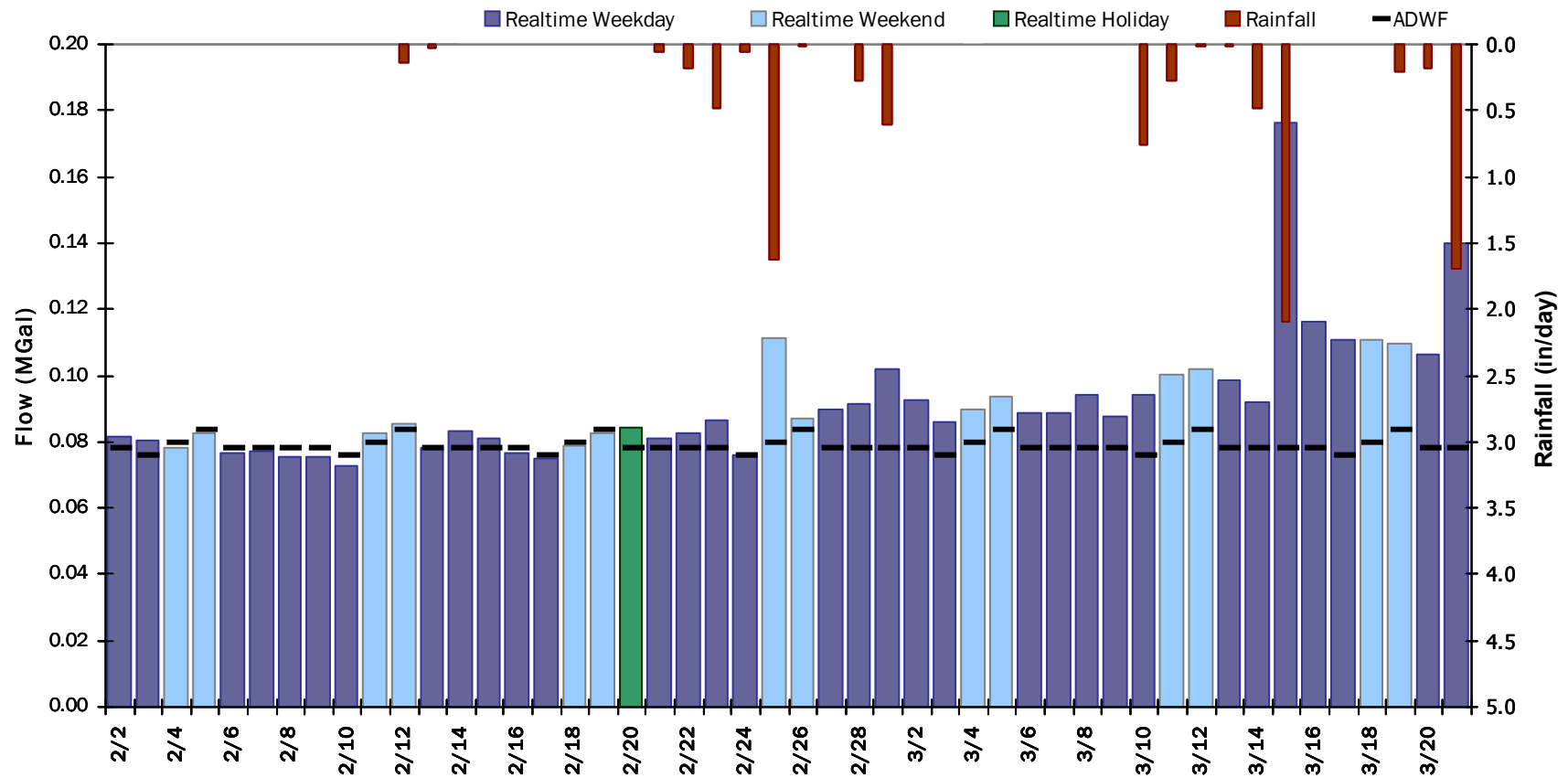


## SITE D EAST

### Period Flow Summary: Daily Flow Totals

Avg Daily Flow: 0.091 MGal    Peak Daily Flow: 0.176 MGal    Min Daily Flow: 0.073 MGal

Total Rainfall: 9.19 inches



## SITE D EAST

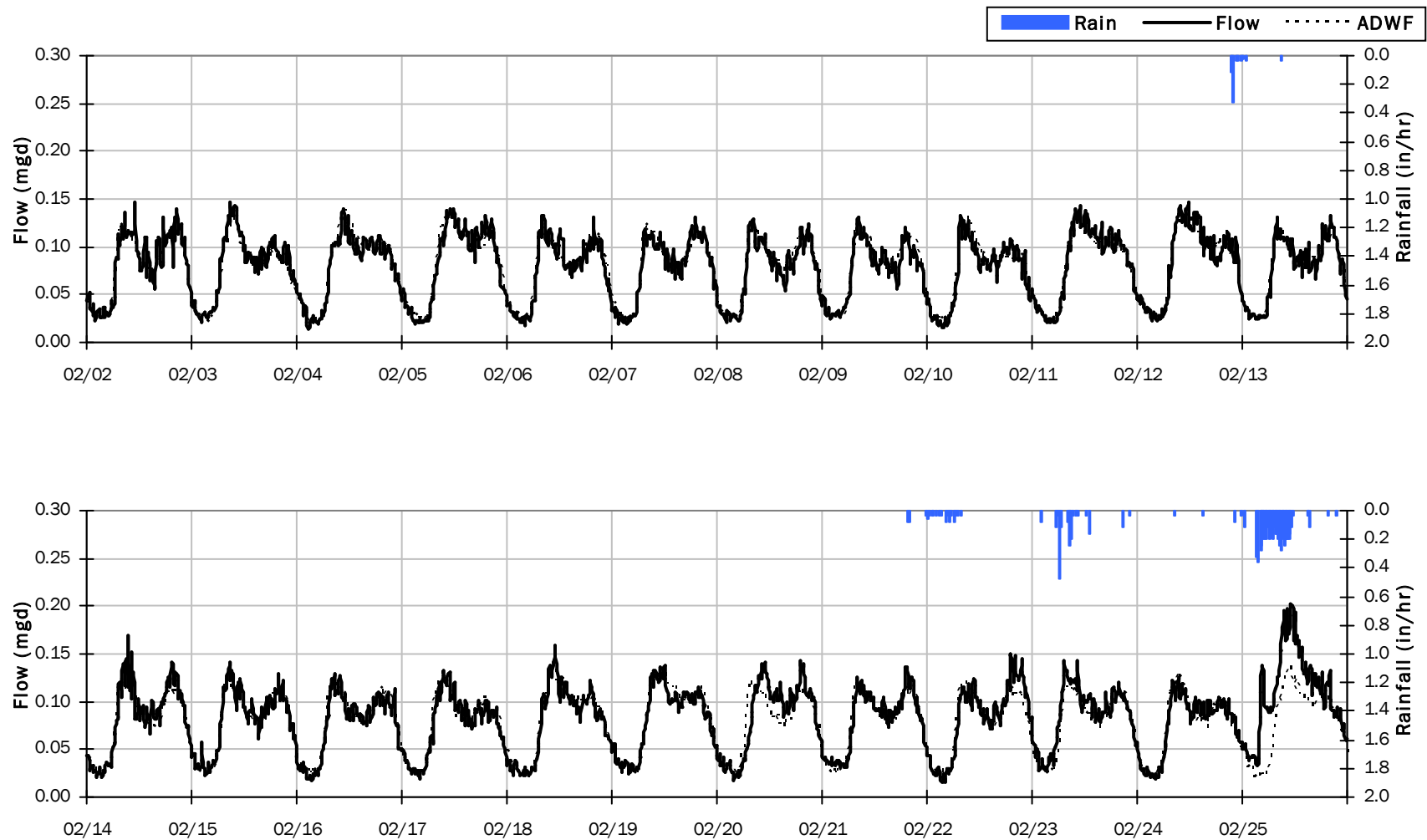
### Flow Summary: 2/2/2023 to 2/25/2023

Period Rainfall: 2.56 inches

Period Avg Flow: 0.081 mgd

Period Peak Flow: 0.202 mgd

Period Min Flow: 0.015 mgd



## SITE D EAST

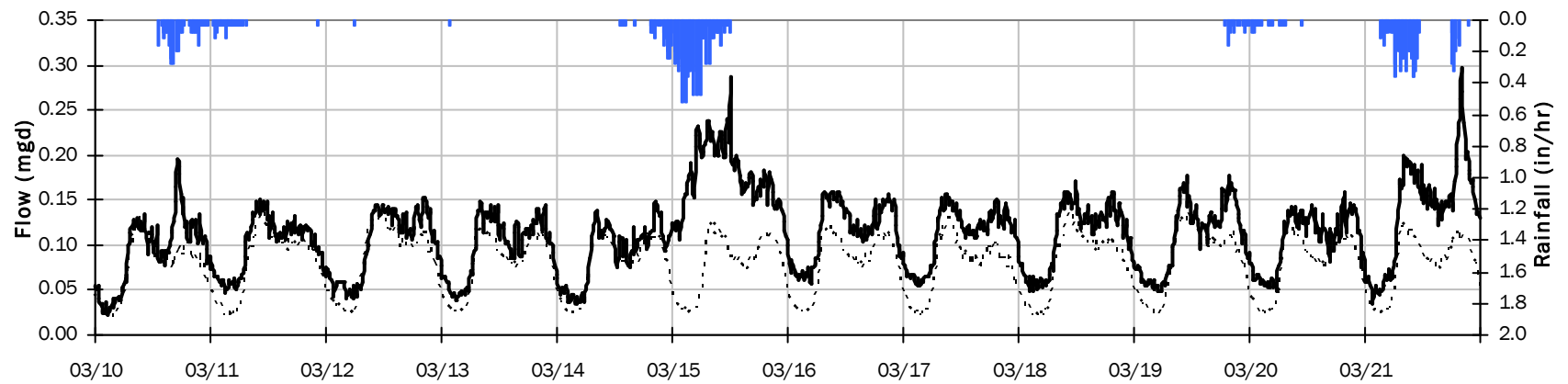
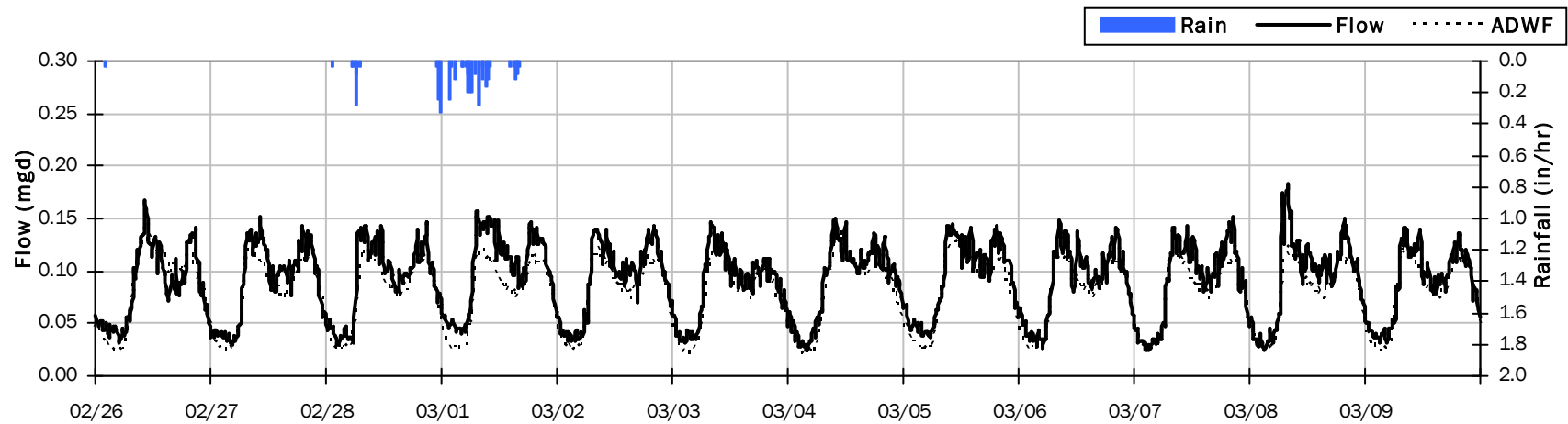
### Flow Summary: 2/26/2023 to 3/21/2023

Period Rainfall: 6.60 inches

Period Avg Flow: 0.102 mgd

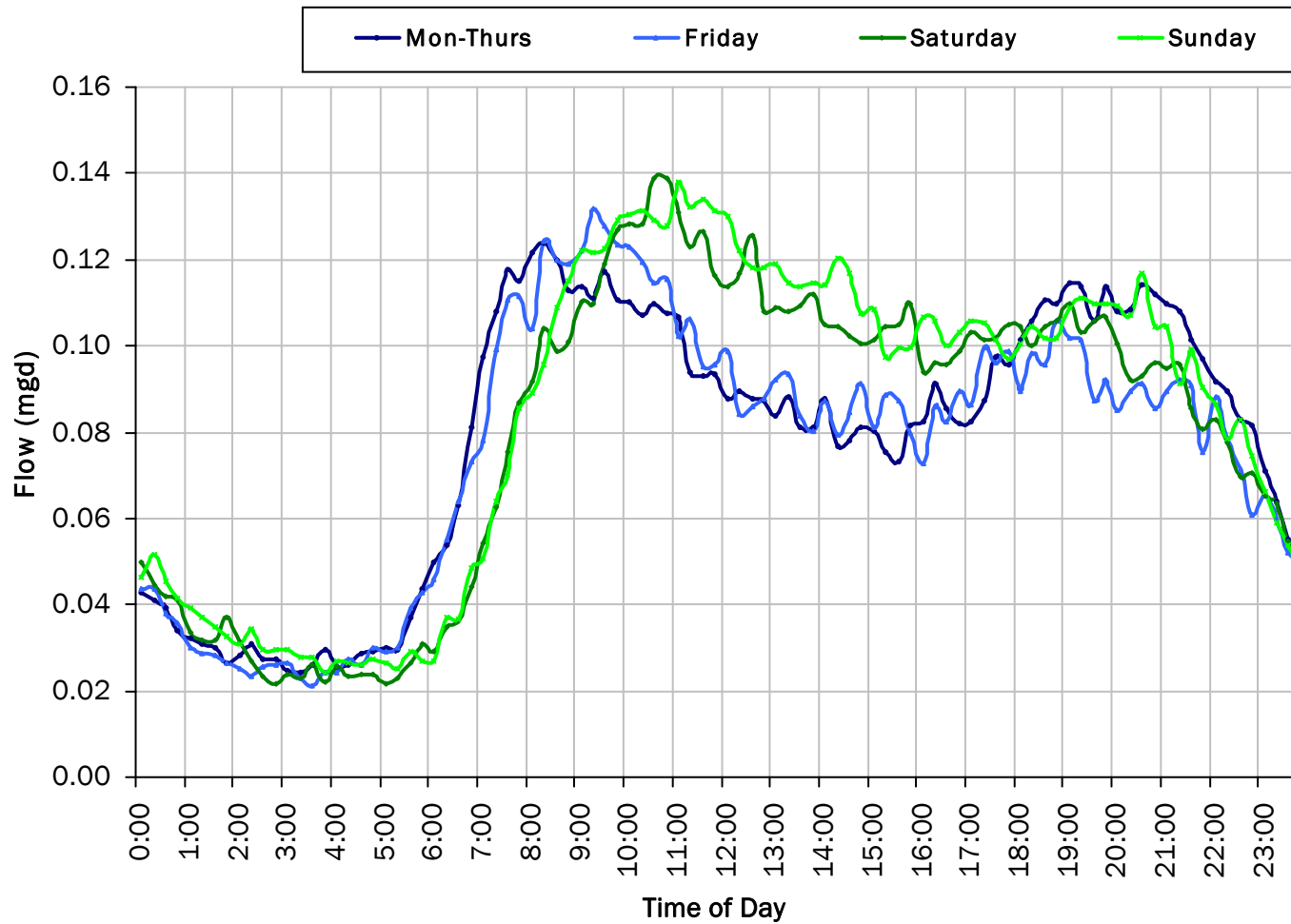
Period Peak Flow: 0.298 mgd

Period Min Flow: 0.023 mgd



### SITE D EAST

### Average Dry Weather Flow Hydrographs



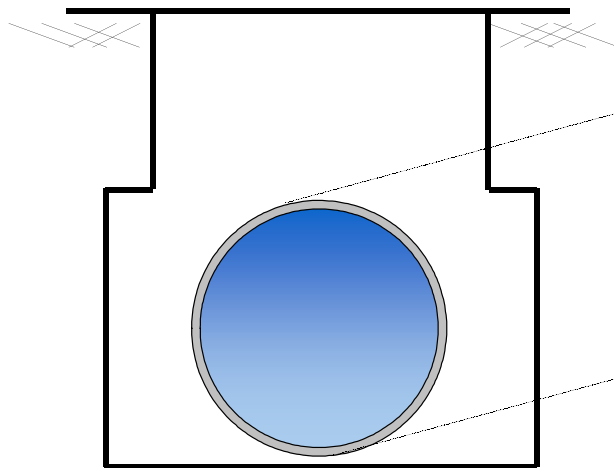
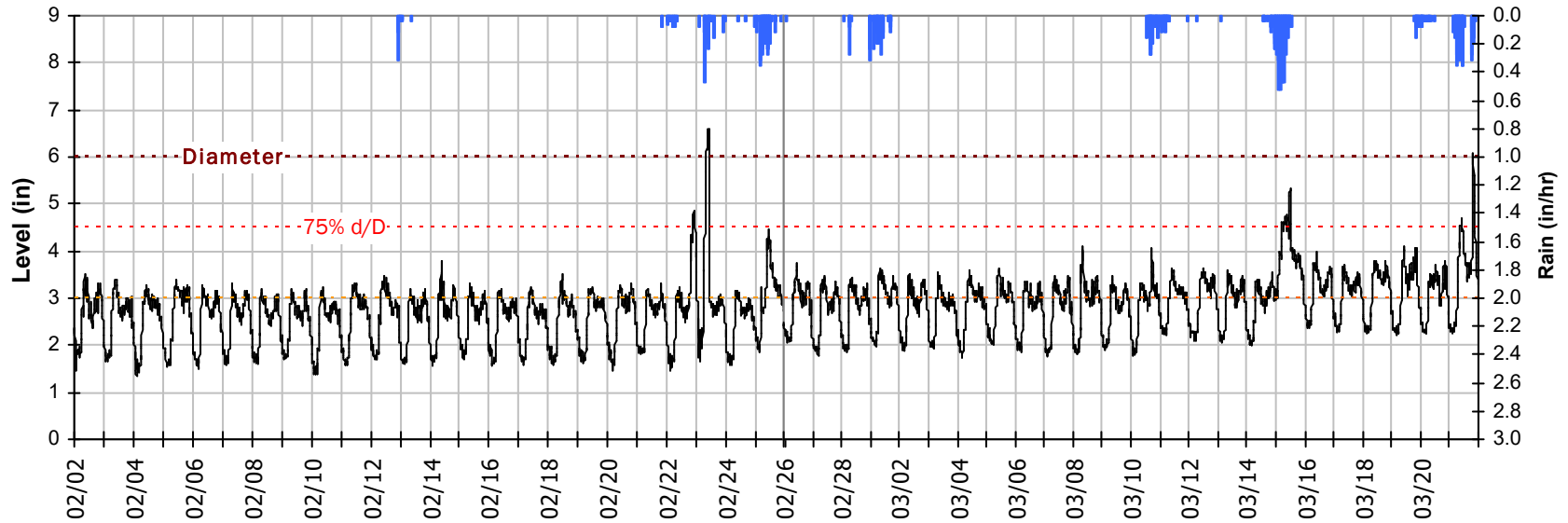
**ADWF:**

$0.079 \text{ mgd} \times 2.5 = 0.1975 \text{ mgd}$   
(PDMF)

## SITE D EAST

### Site Capacity and Surge Summary

Realtime Flow Levels with Rainfall Data over Peak Level Period



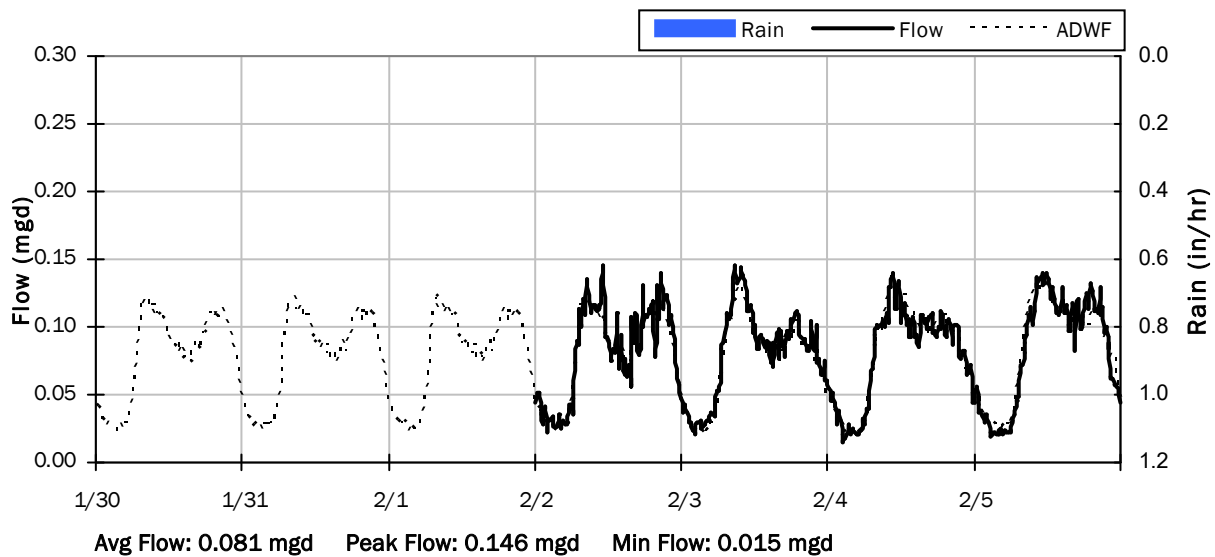
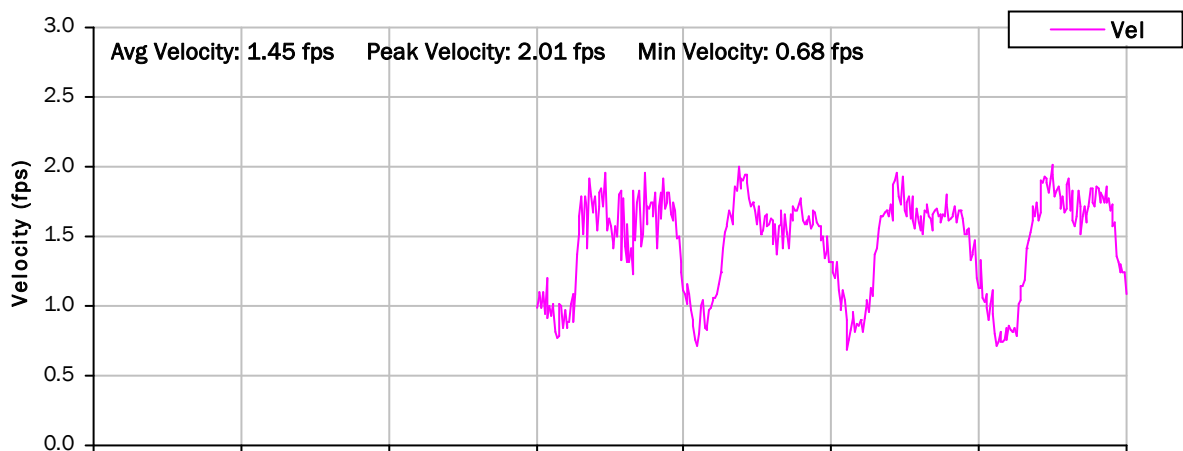
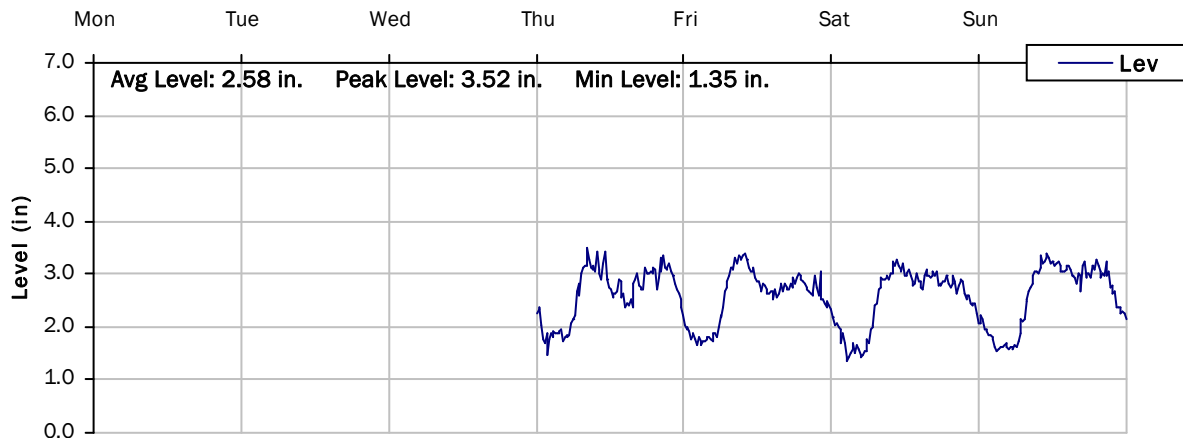
Pipe Diameter:	6	inches
Peak Measured Level:	6.59	inches
Peak d/D Ratio:	1.10	

**Surcharged 0.6 inches over crown**

## SITE D EAST

### Weekly Level, Velocity and Flow Hydrographs

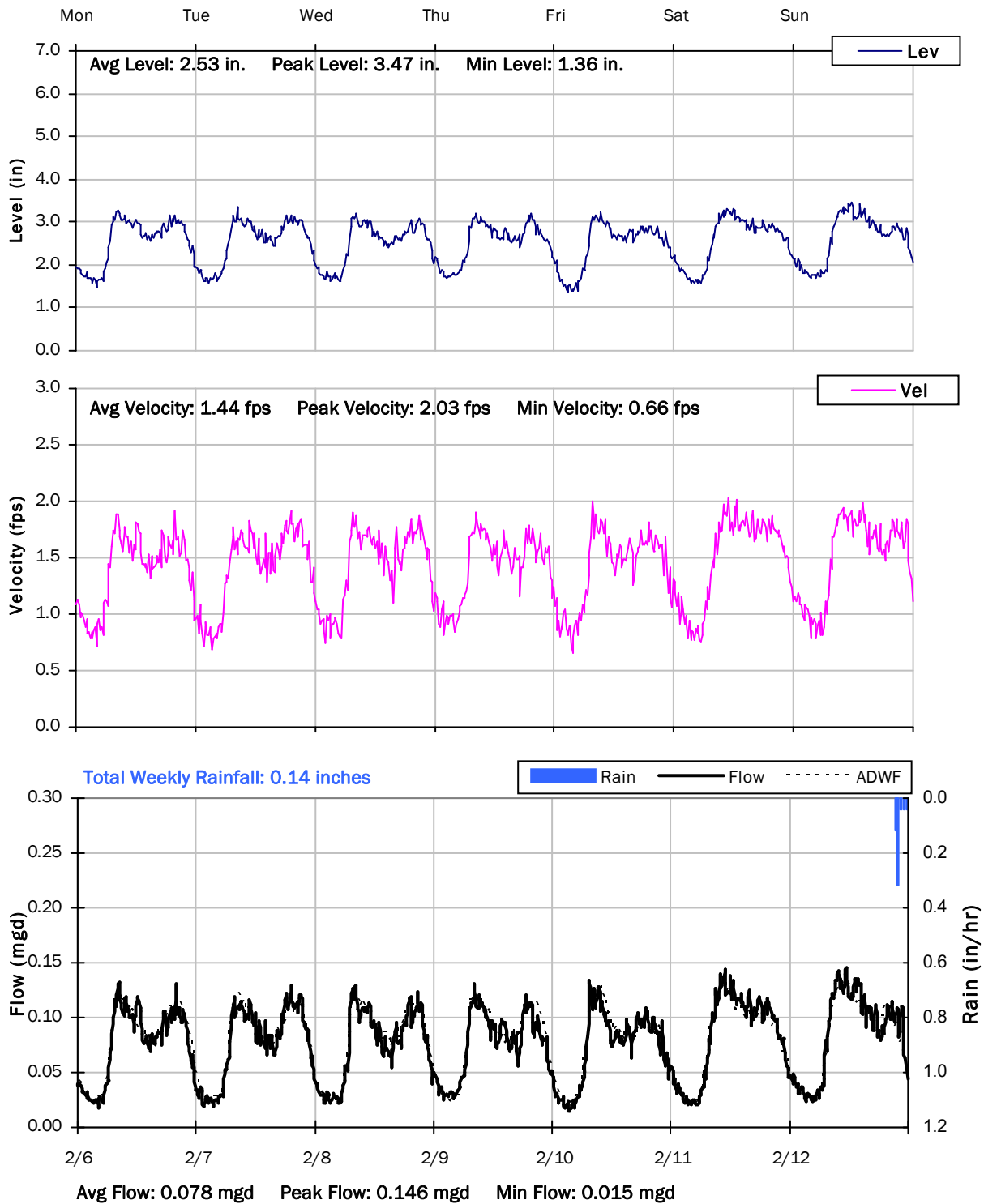
1/30/2023 to 2/6/2023



### SITE D EAST

### Weekly Level, Velocity and Flow Hydrographs

2/6/2023 to 2/13/2023

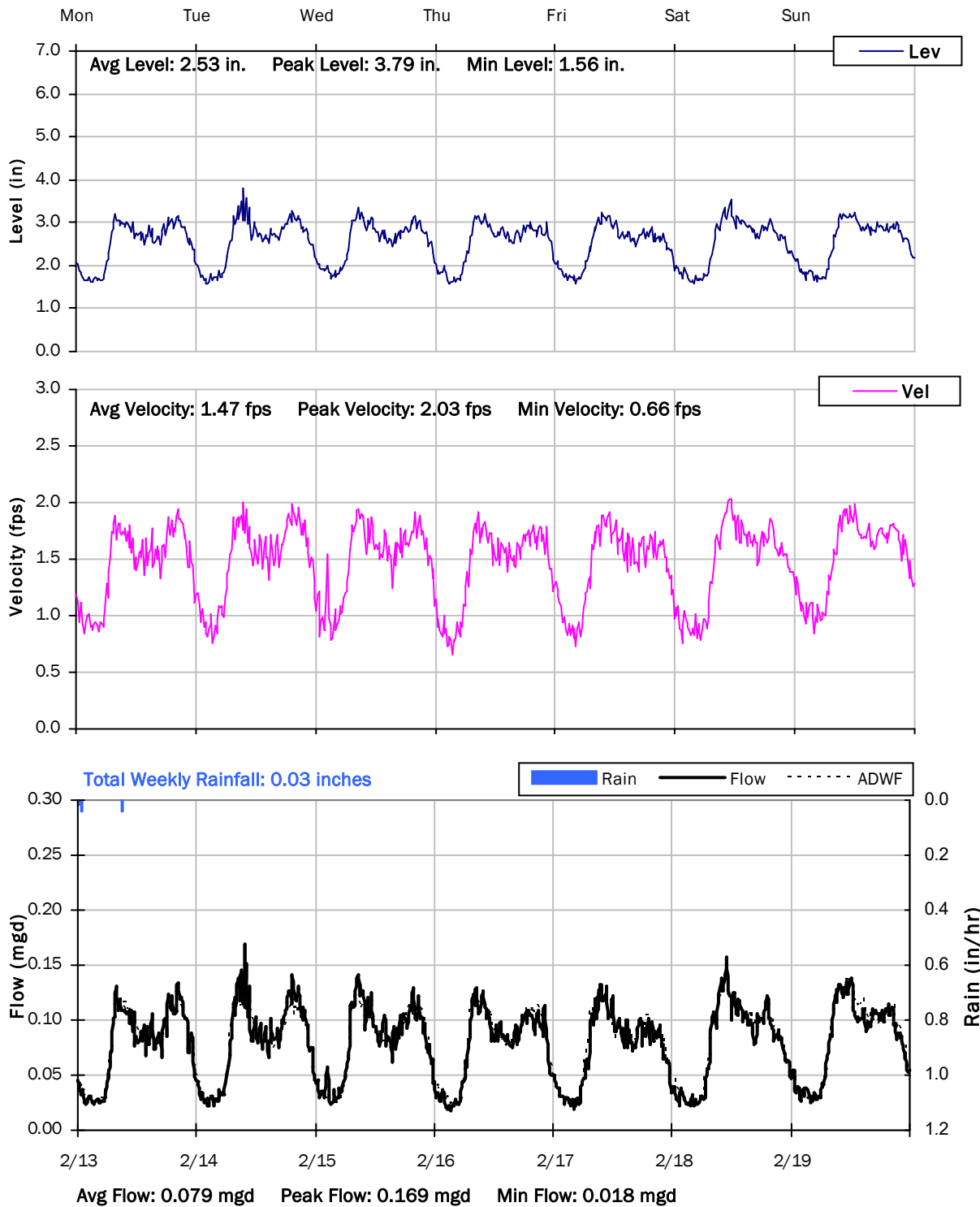




### SITE D EAST

### Weekly Level, Velocity and Flow Hydrographs

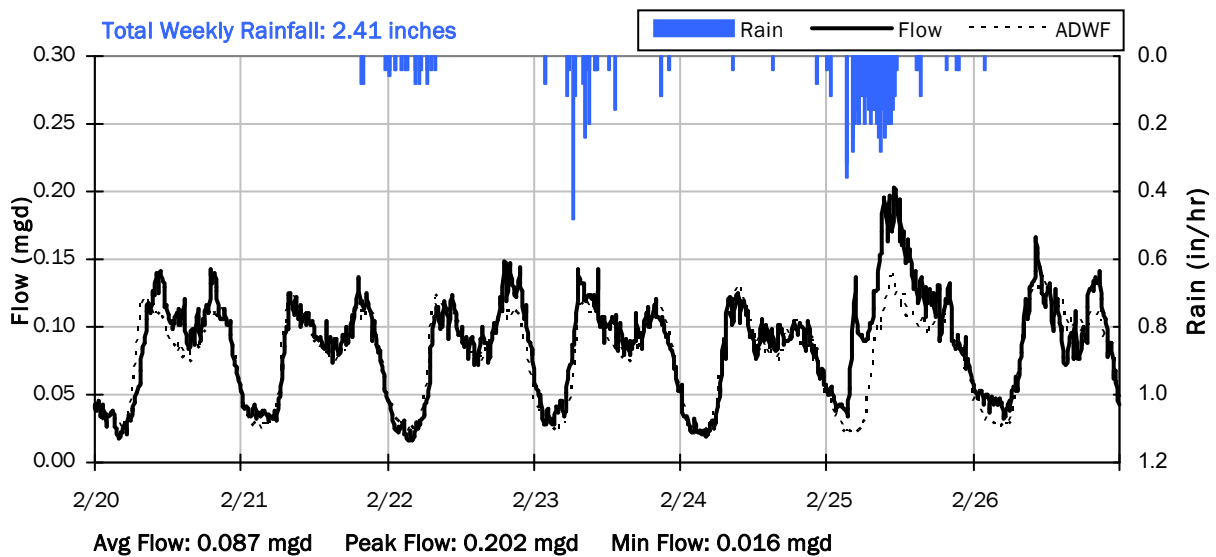
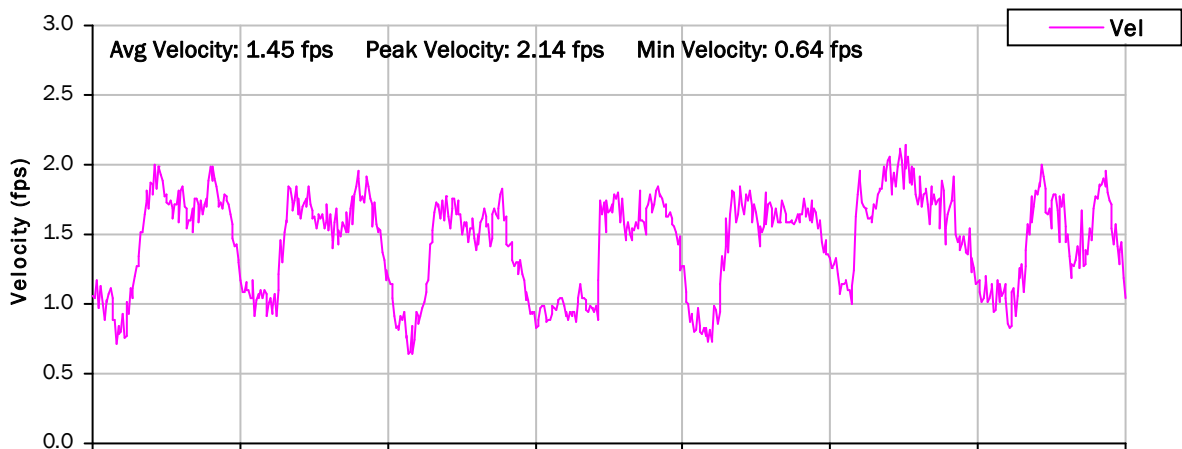
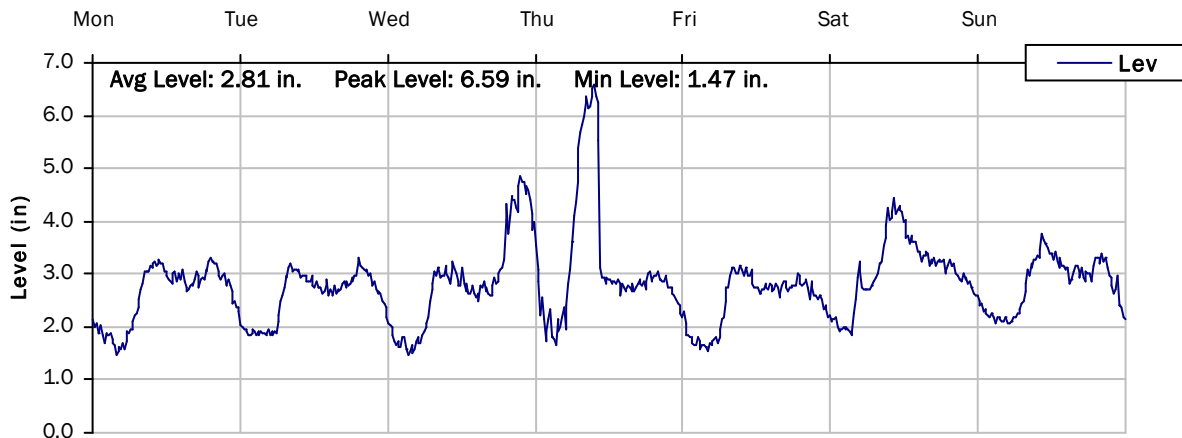
2/13/2023 to 2/20/2023



**SITE D EAST**

**Weekly Level, Velocity and Flow Hydrographs**

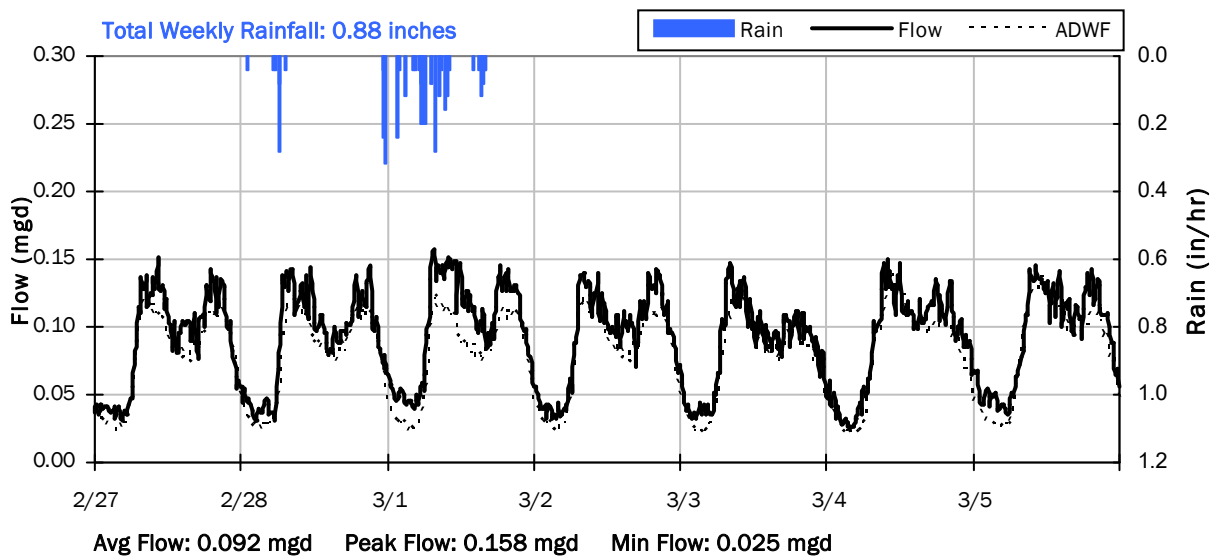
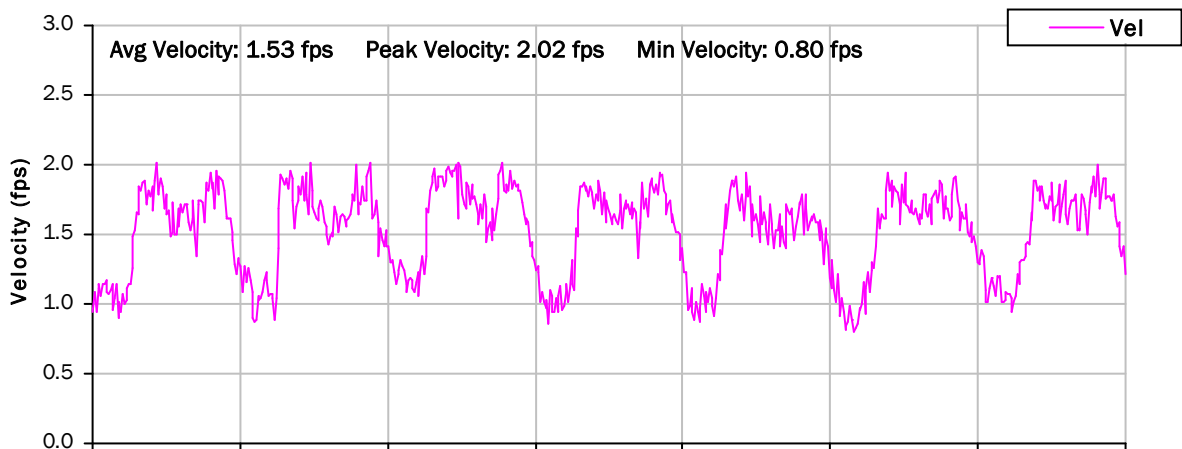
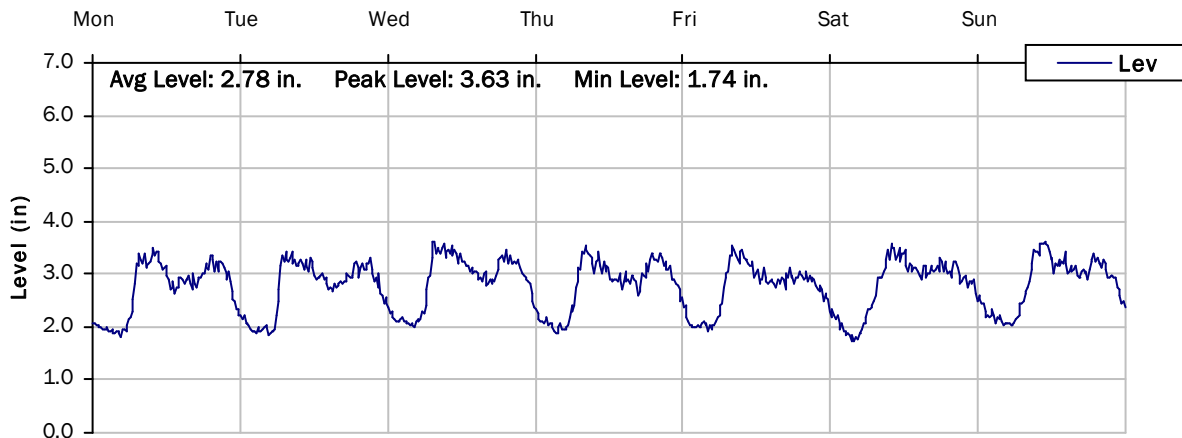
**2/20/2023 to 2/27/2023**



### SITE D EAST

### Weekly Level, Velocity and Flow Hydrographs

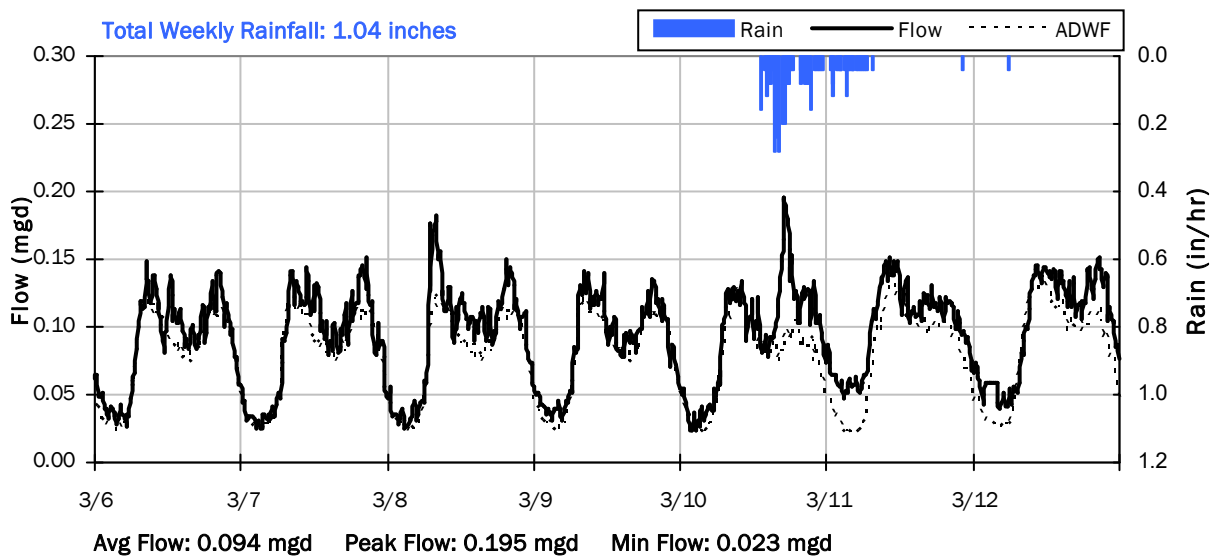
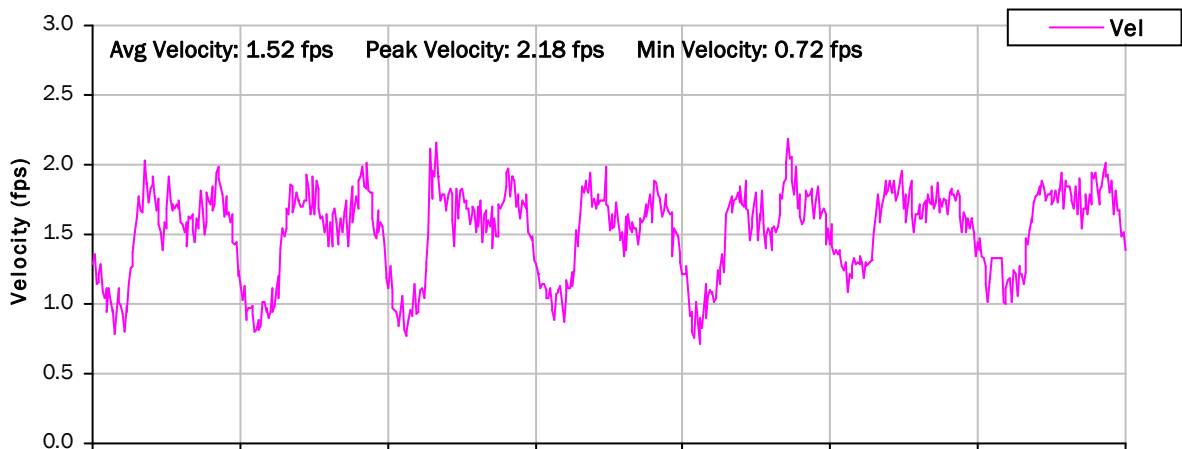
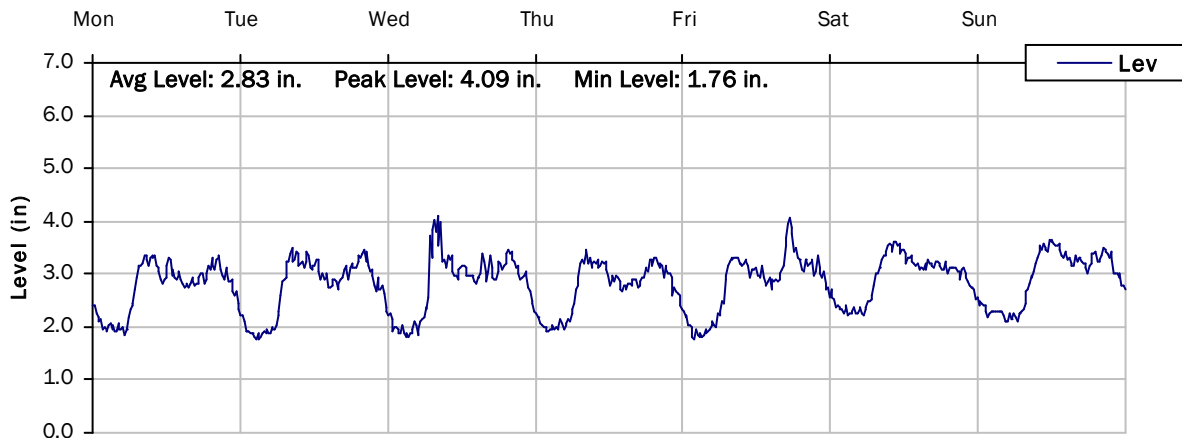
2/27/2023 to 3/6/2023



**SITE D EAST**

**Weekly Level, Velocity and Flow Hydrographs**

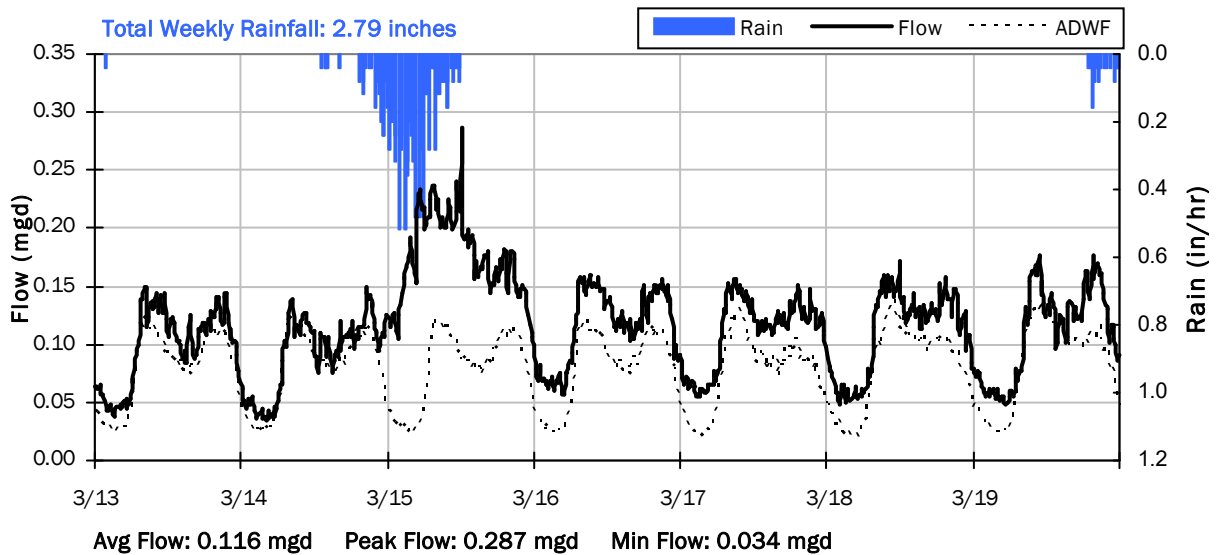
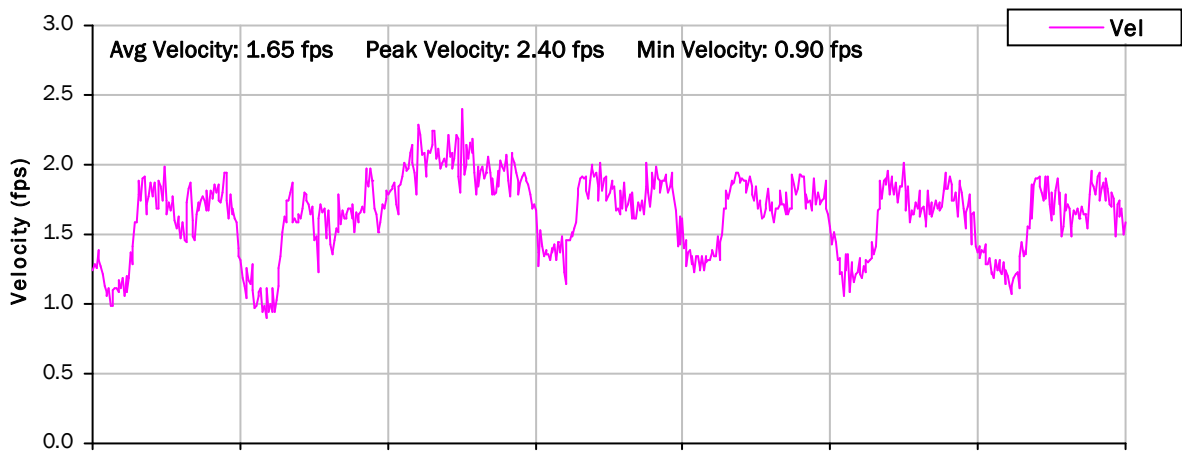
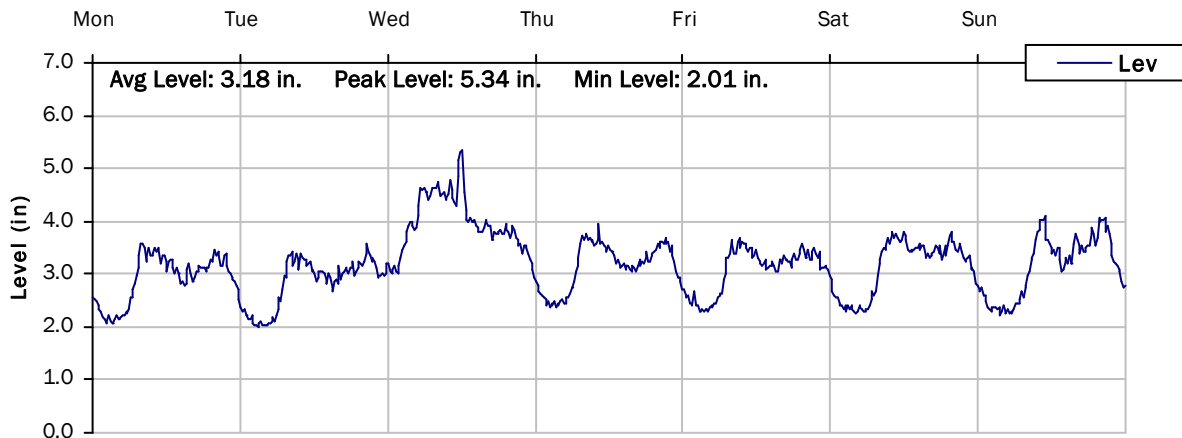
**3/6/2023 to 3/13/2023**



**SITE D EAST**

**Weekly Level, Velocity and Flow Hydrographs**

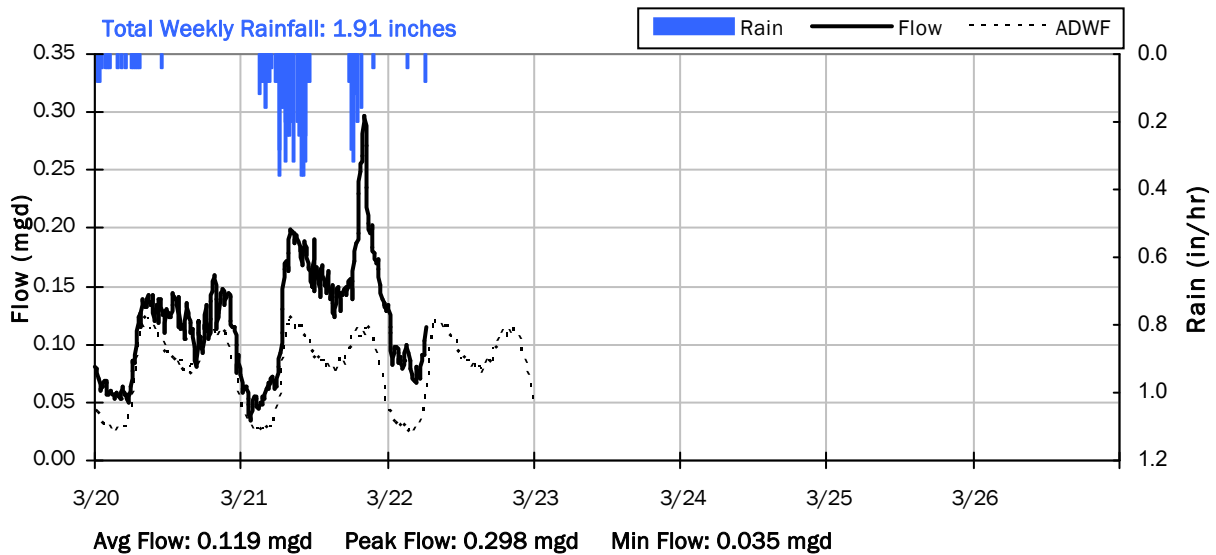
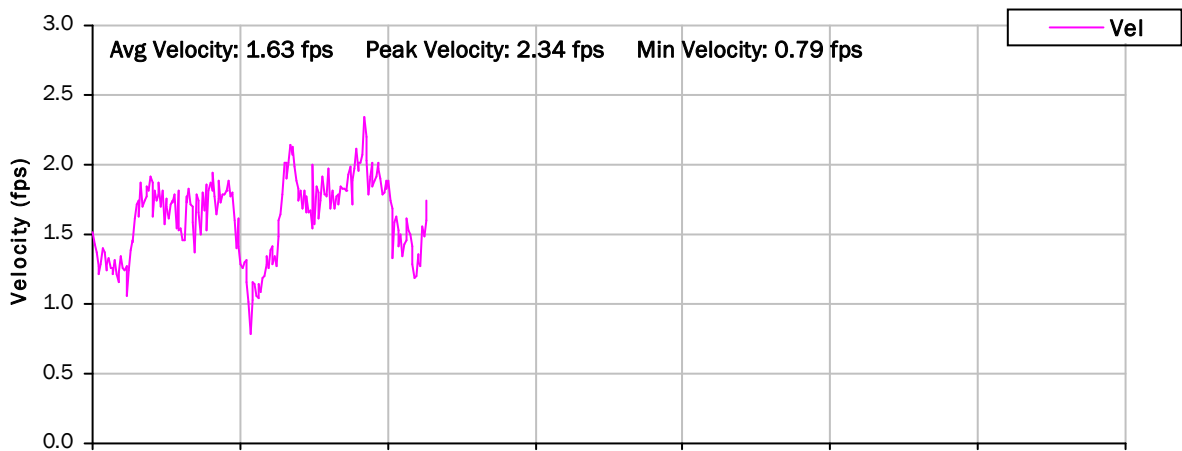
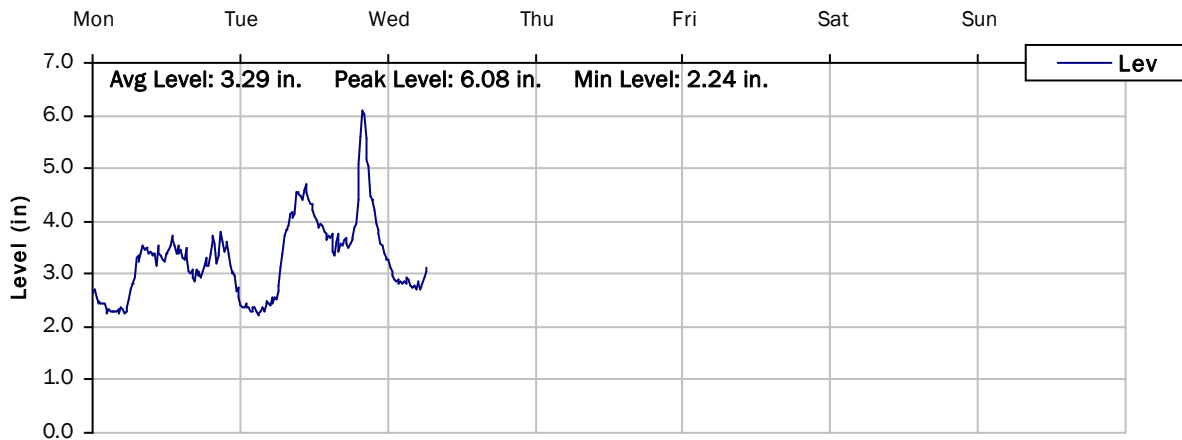
**3/13/2023 to 3/20/2023**



**SITE D EAST**

**Weekly Level, Velocity and Flow Hydrographs**

**3/20/2023 to 3/27/2023**



## Monitoring Site: Site D South

City of Carlsbad | Carlsbad, California

Sanitary Sewer Flow Monitoring

February 02, 2023 - March 21, 2023

Location: Carlsbad Village Drive and Harding Street

## Data Summary Report



Vicinity Map: Site D South

## SITE D SOUTH

### Site Information

MH ID: MH 10C-53

**Location:** Carlsbad Village Drive and Harding Street

**Coordinates:** 117.3446° W, 33.1619° N

**Rim Elevation:** 64 feet

**Expected Pipe Diameter:** 10 inches

**Measured Pipe Diameter:** 10 inches

**ADWF:** 0.074 mgd

**Peak Measured Flow:** 0.305 mgd

**Sediment:** None

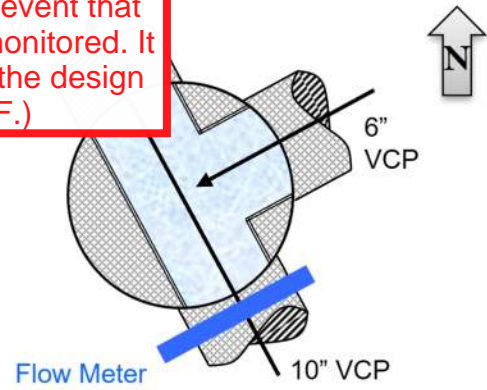


Satellite Map



Sanitary Map

PWWF  
(measured peak  
for the specific  
storm event that  
was monitored. It  
is not the design  
PWWF.)



Flow Sketch



Street View



Plan View



## SITE D SOUTH

### Additional Site Photos

---

Effluent Pipe



Monitored South Influent Pipe



## SITE D SOUTH

### Additional Site Photos

---

East Influent Pipe

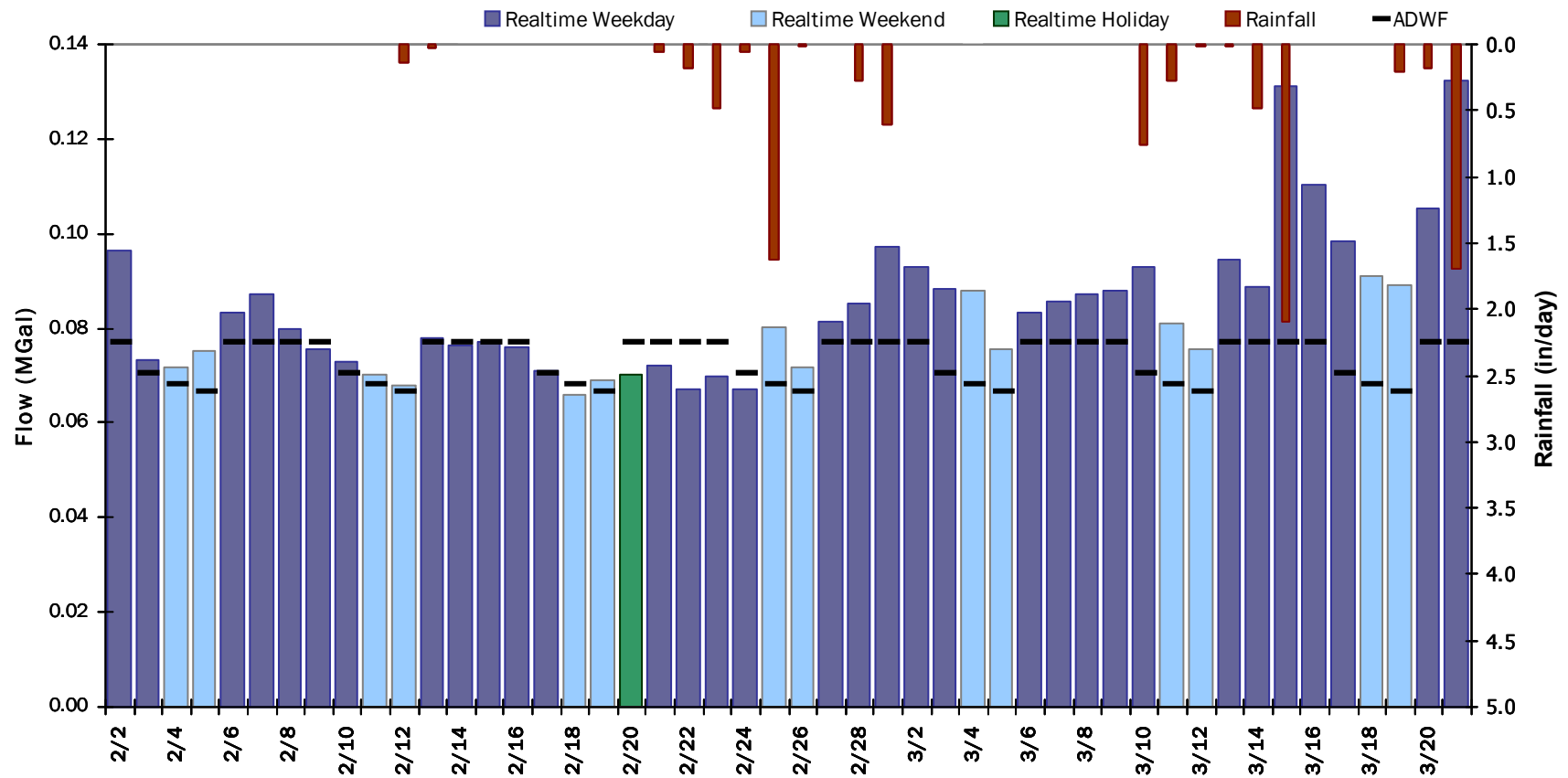


## SITE D SOUTH

### Period Flow Summary: Daily Flow Totals

Avg Daily Flow: 0.084 MGal    Peak Daily Flow: 0.132 MGal    Min Daily Flow: 0.066 MGal

Total Rainfall: 9.19 inches



## SITE D SOUTH

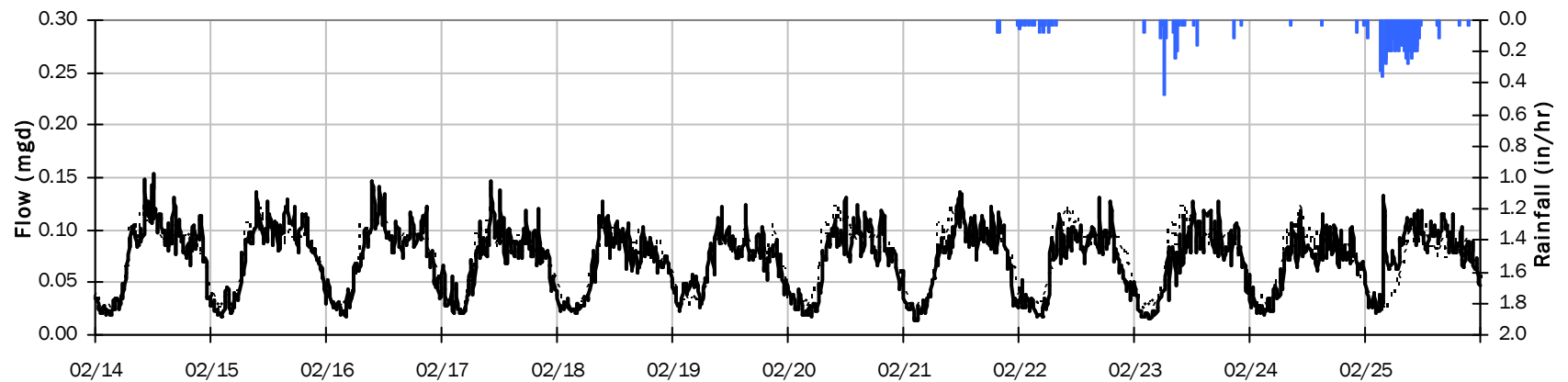
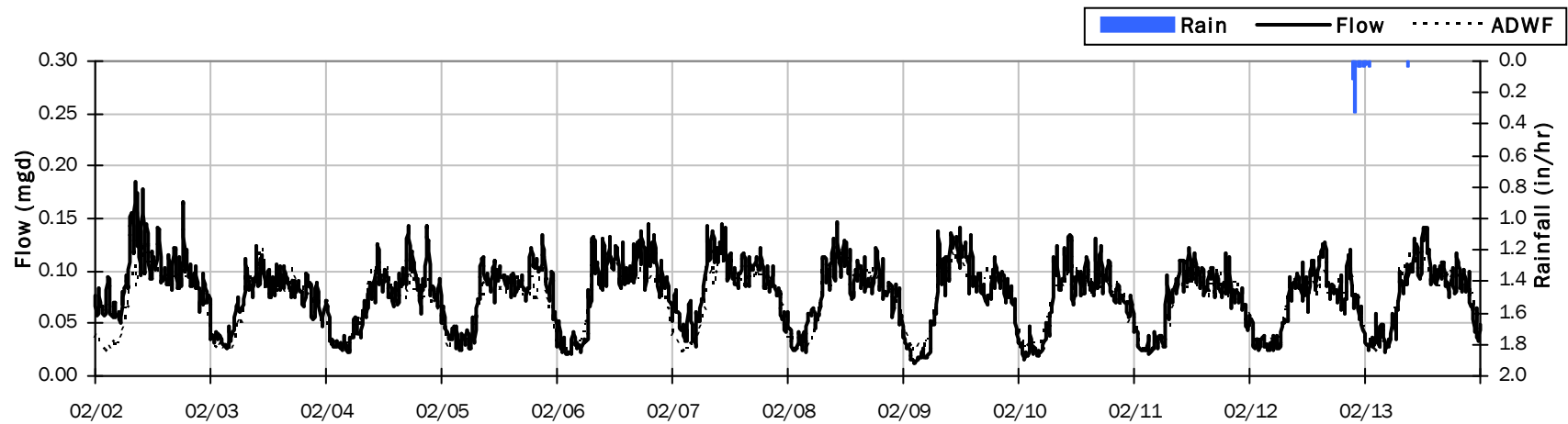
### Flow Summary: 2/2/2023 to 2/25/2023

Period Rainfall: 2.56 inches

Period Avg Flow: 0.075 mgd

Period Peak Flow: 0.184 mgd

Period Min Flow: 0.012 mgd



## SITE D SOUTH

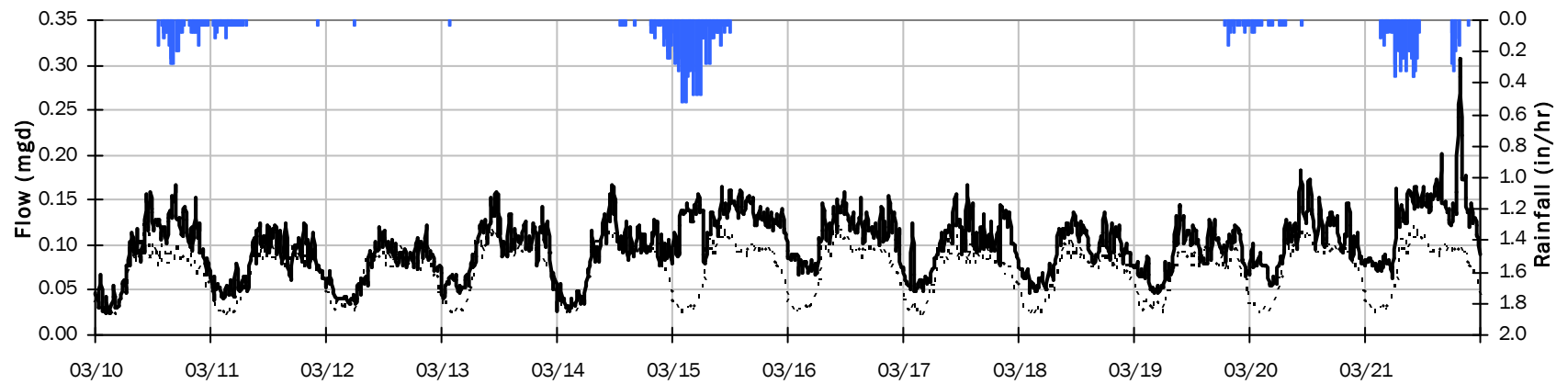
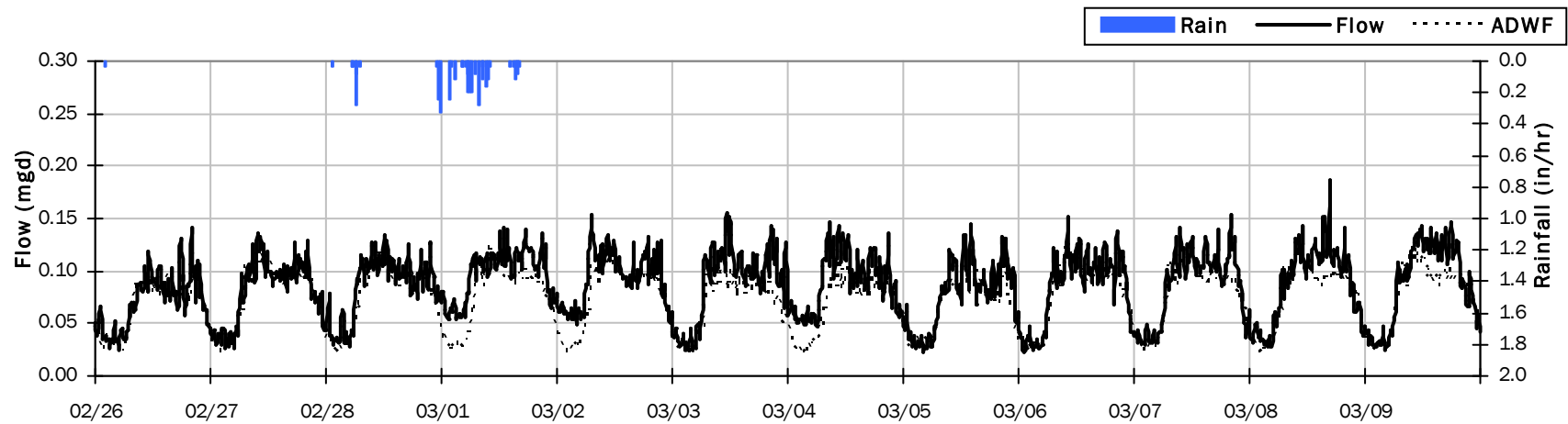
### Flow Summary: 2/26/2023 to 3/21/2023

Period Rainfall: 6.60 inches

Period Avg Flow: 0.092 mgd

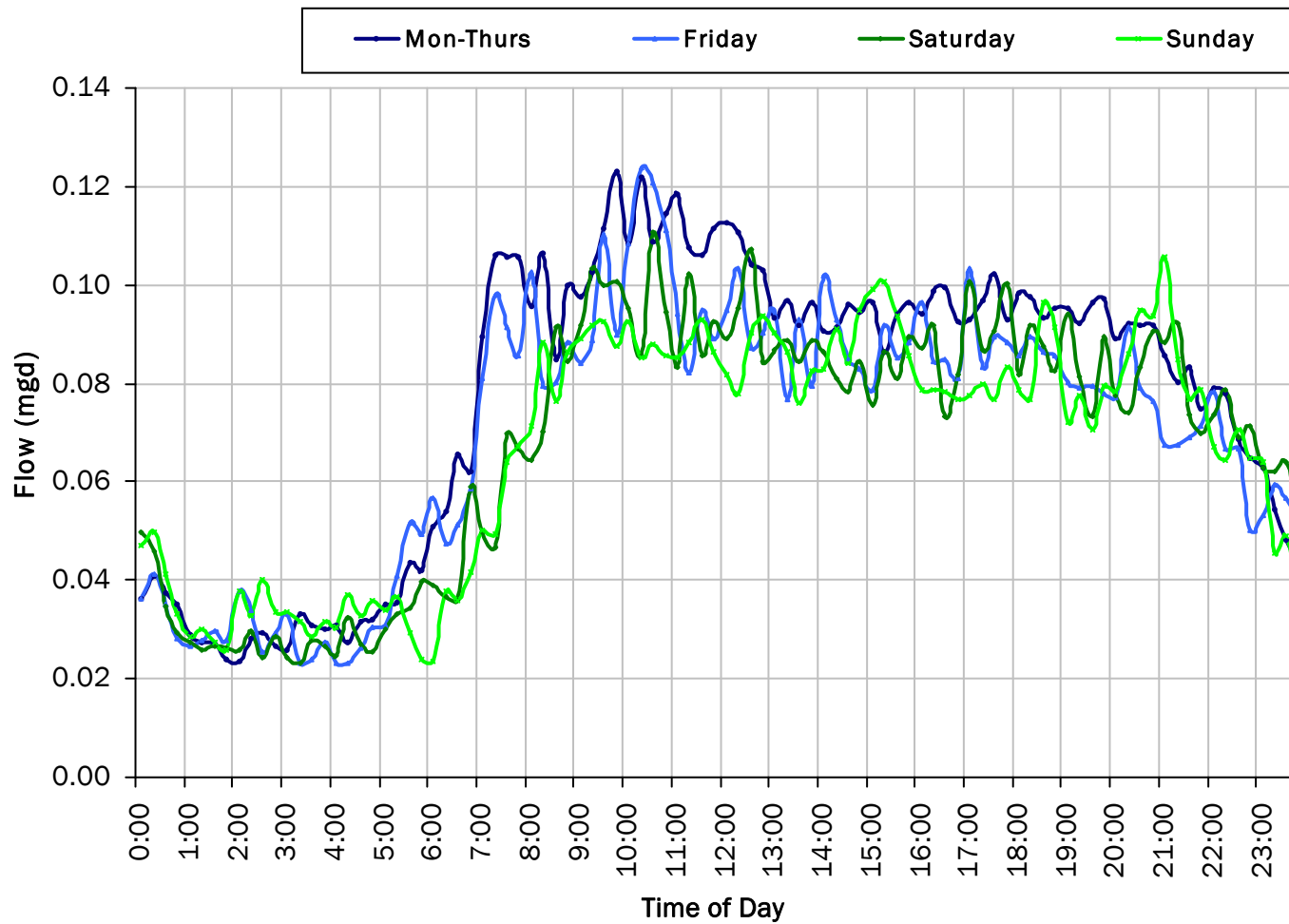
Period Peak Flow: 0.305 mgd

Period Min Flow: 0.022 mgd



## SITE D SOUTH

### Average Dry Weather Flow Hydrographs



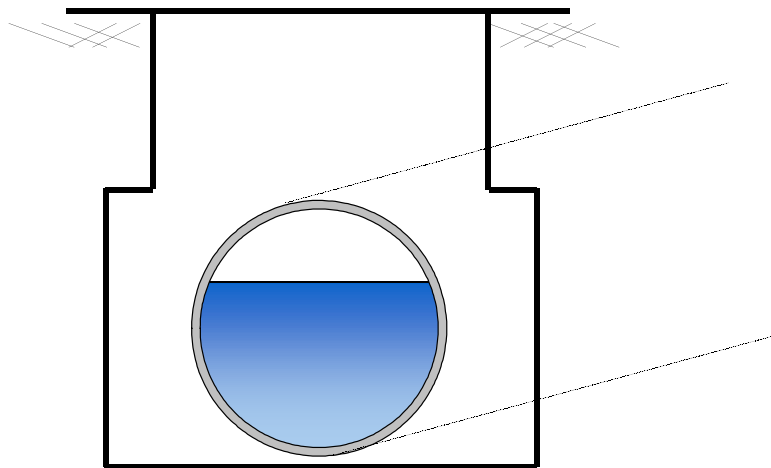
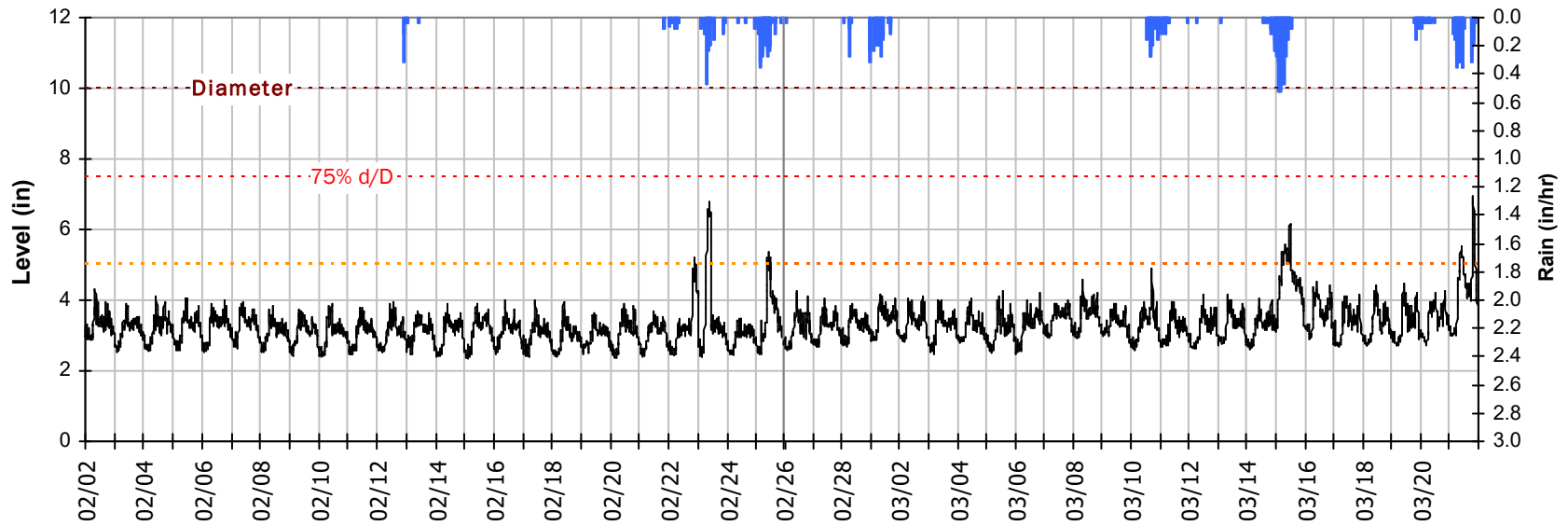
**ADWF:**

$$0.074 \text{ mgd} \times 2.5 = 0.185 \text{ mgd (PDWF)}$$

# SITE D SOUTH

## Site Capacity and Surge Summary

**Realtime Flow Levels with Rainfall Data over Peak Level Period**

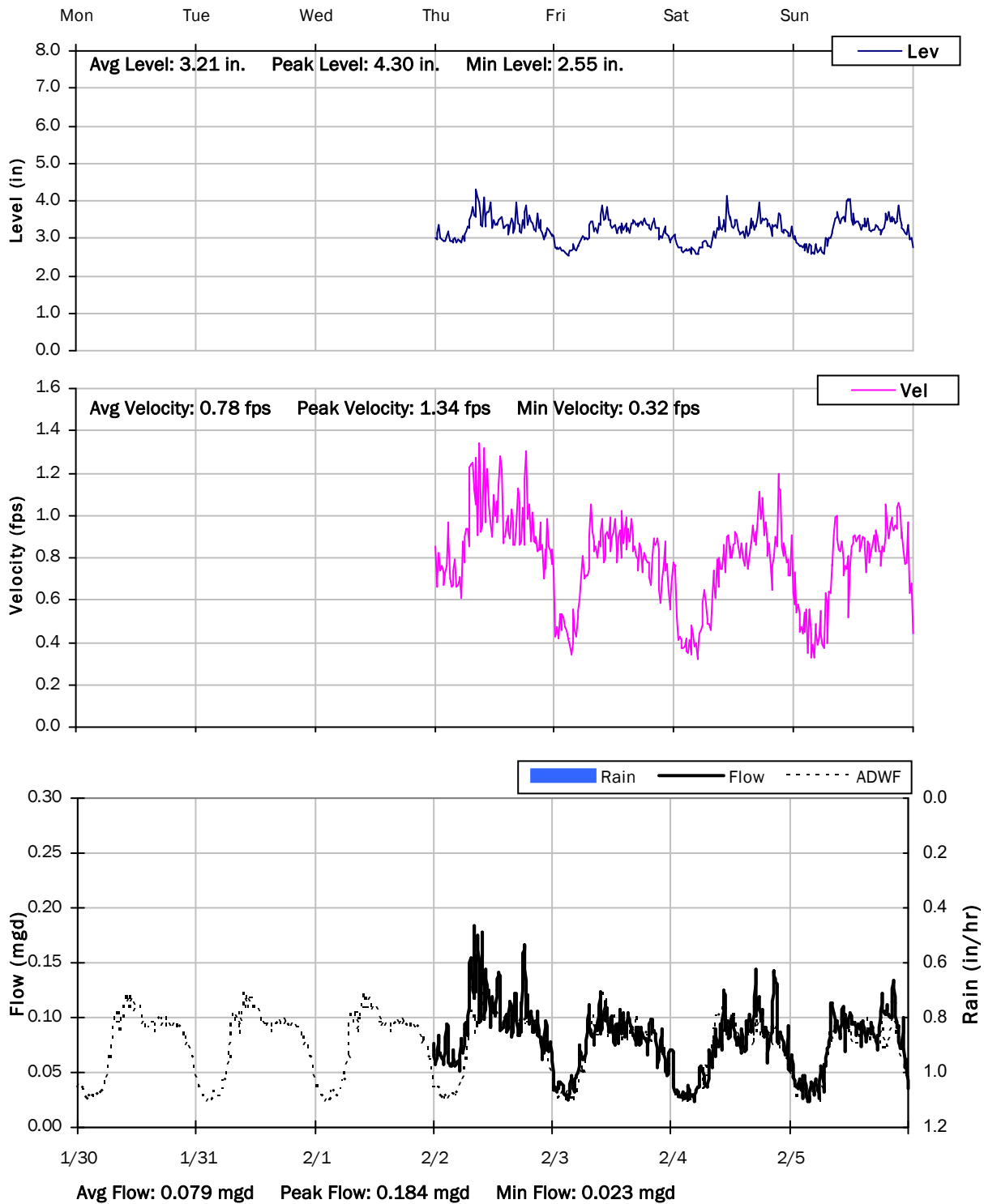


Pipe Diameter:	10	inches
Peak Measured Level:	6.93	inches
Peak d/D Ratio:	0.69	

## SITE D SOUTH

### Weekly Level, Velocity and Flow Hydrographs

1/30/2023 to 2/6/2023

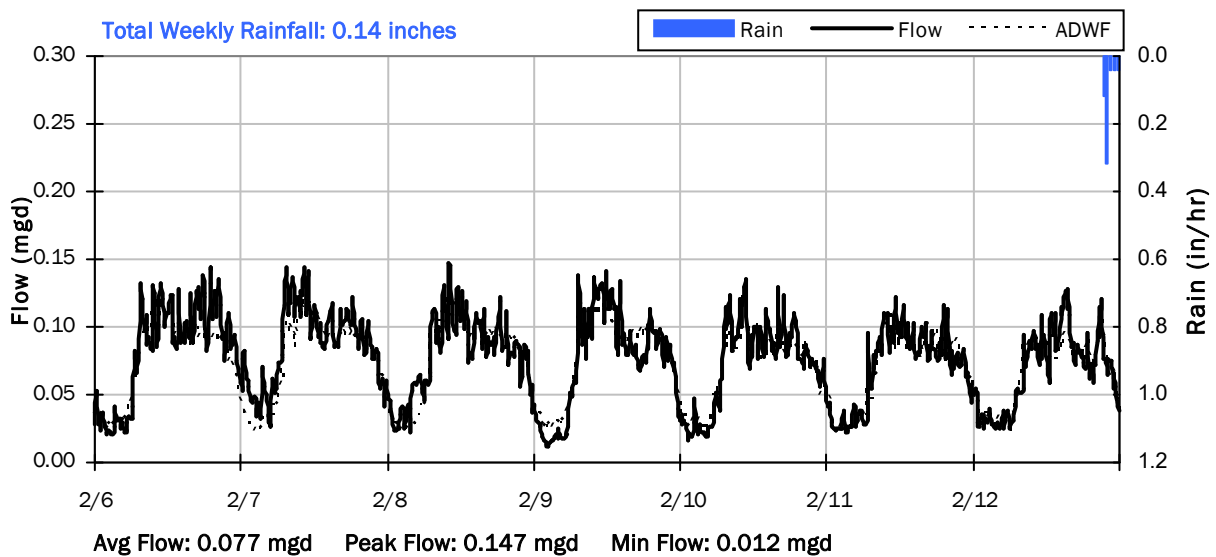
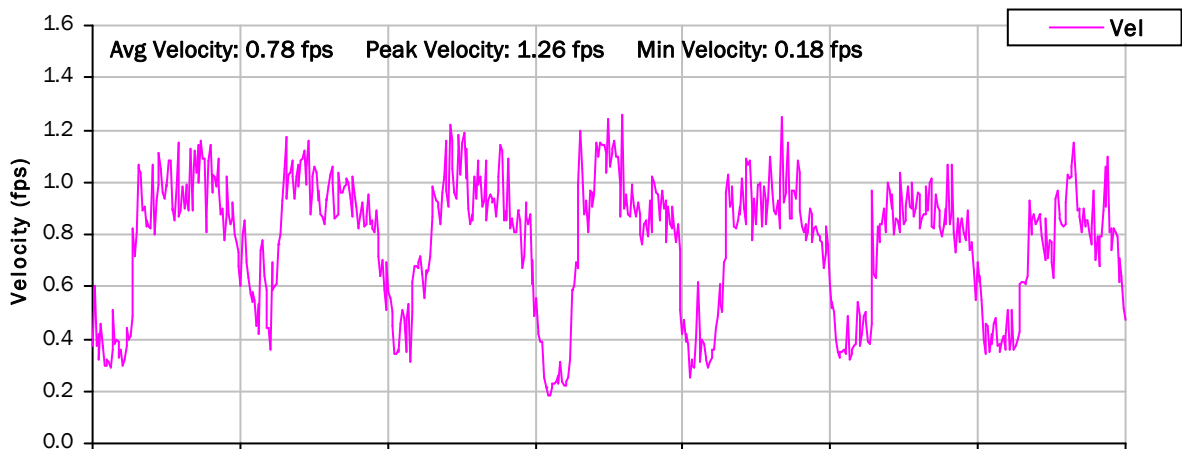
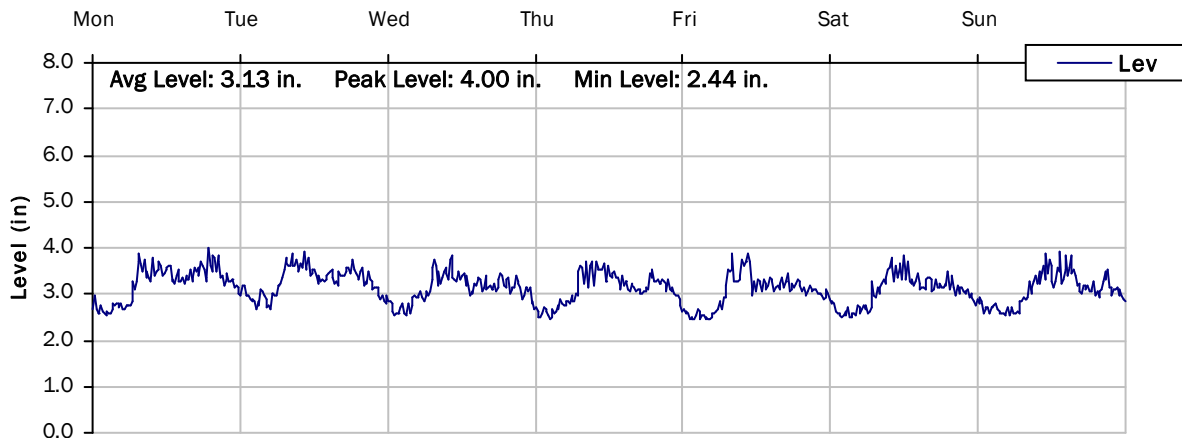




## SITE D SOUTH

### Weekly Level, Velocity and Flow Hydrographs

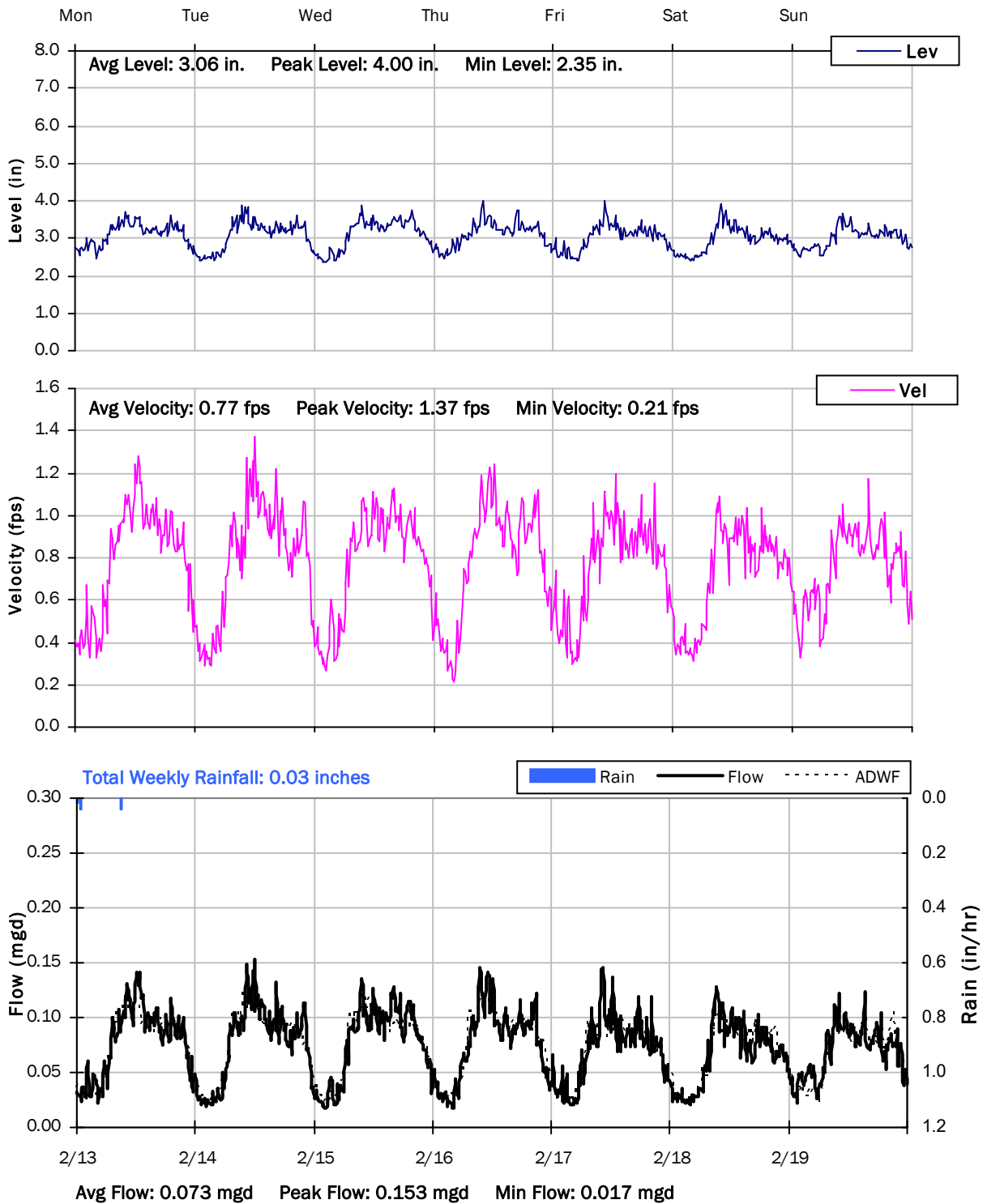
2/6/2023 to 2/13/2023



### SITE D SOUTH

### Weekly Level, Velocity and Flow Hydrographs

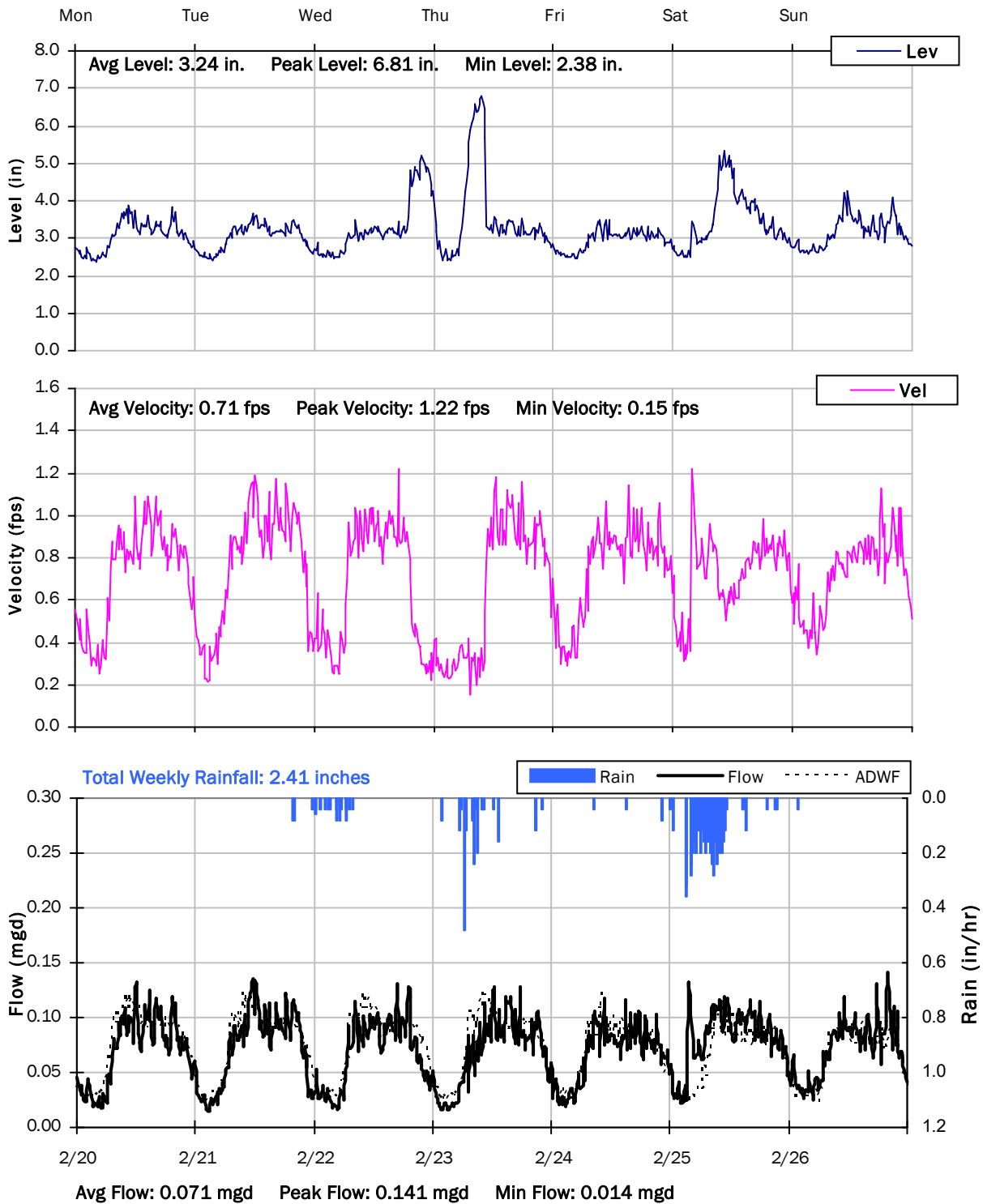
2/13/2023 to 2/20/2023



### SITE D SOUTH

### Weekly Level, Velocity and Flow Hydrographs

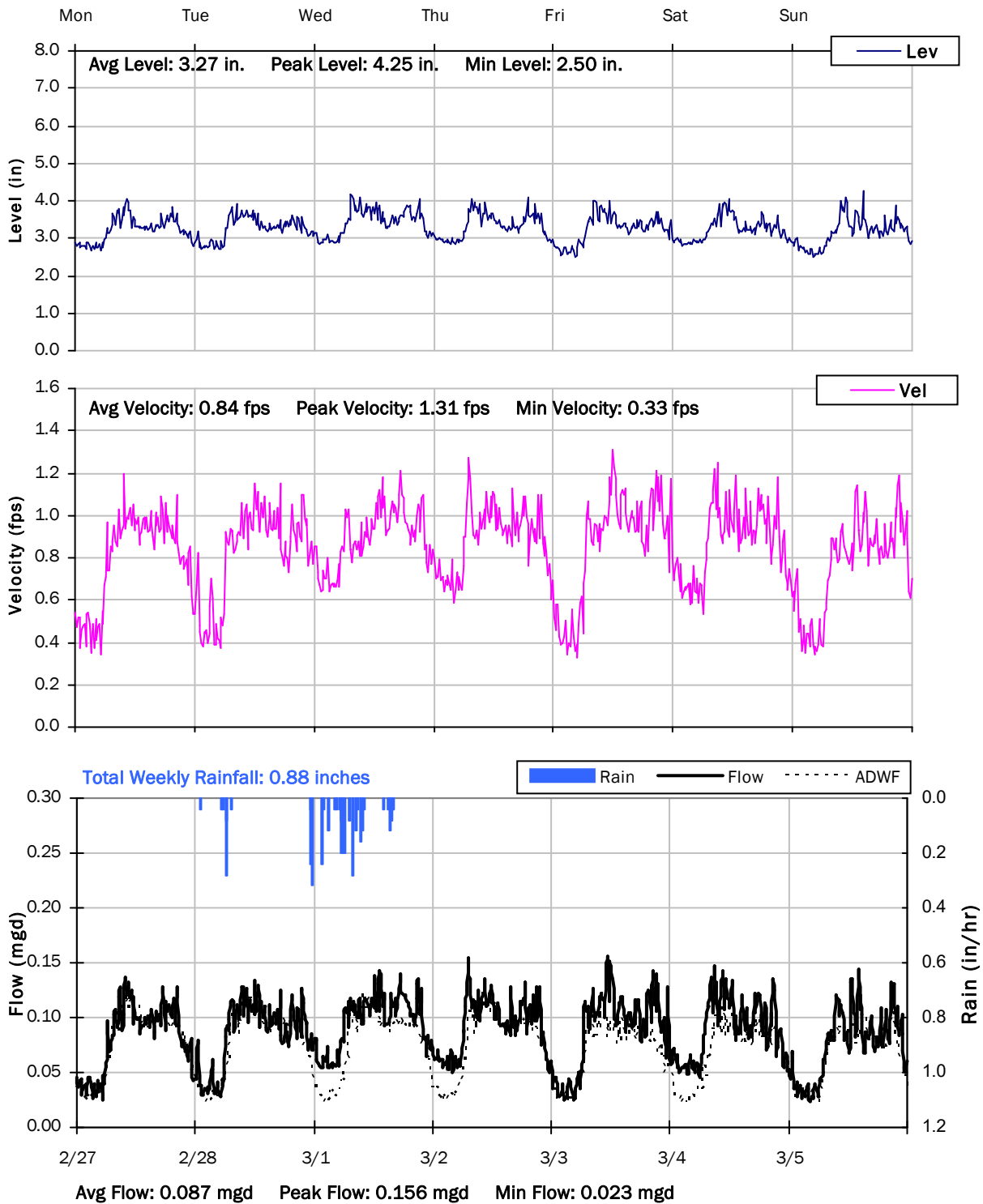
2/20/2023 to 2/27/2023



## SITE D SOUTH

### Weekly Level, Velocity and Flow Hydrographs

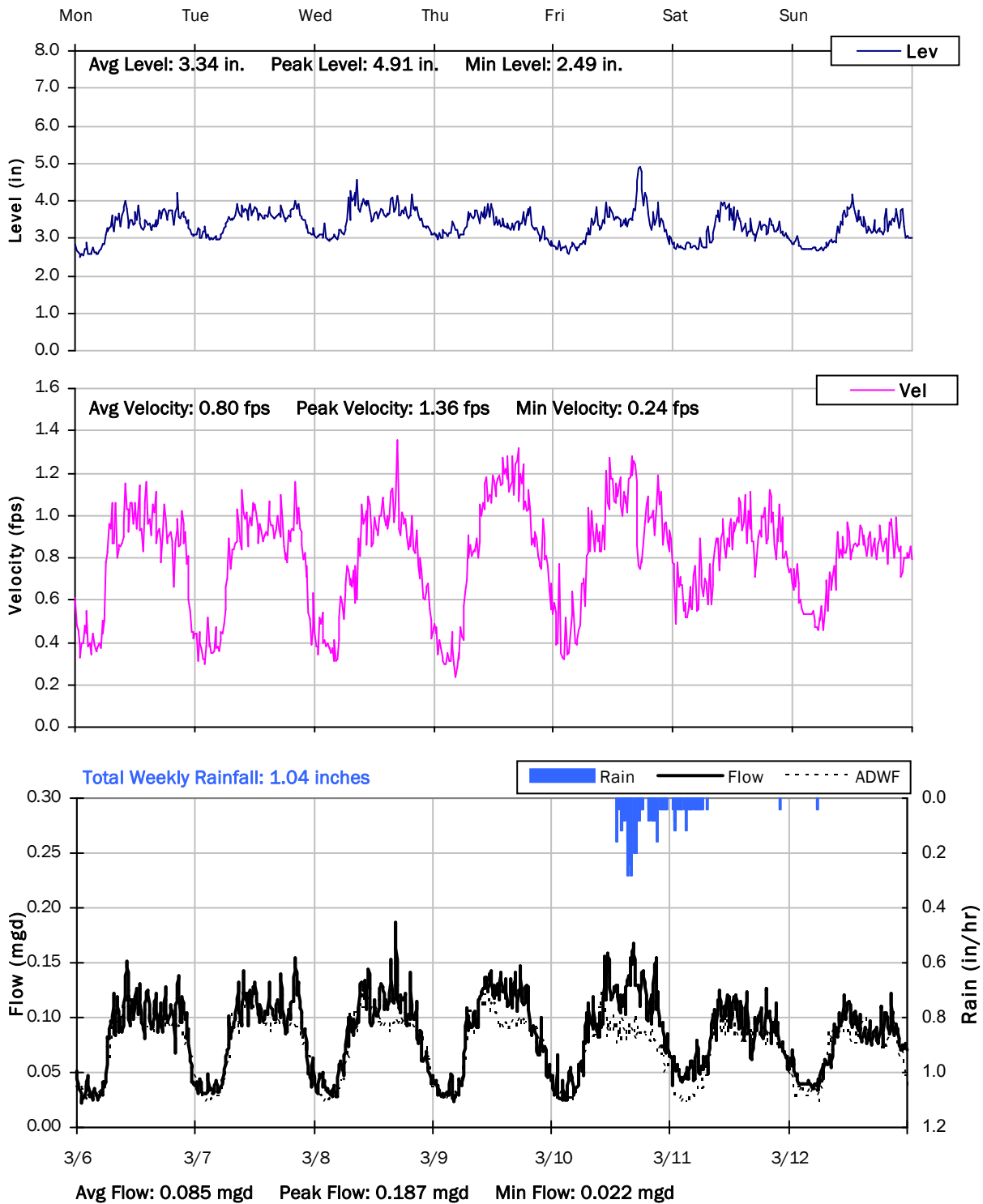
2/27/2023 to 3/6/2023



### SITE D SOUTH

### Weekly Level, Velocity and Flow Hydrographs

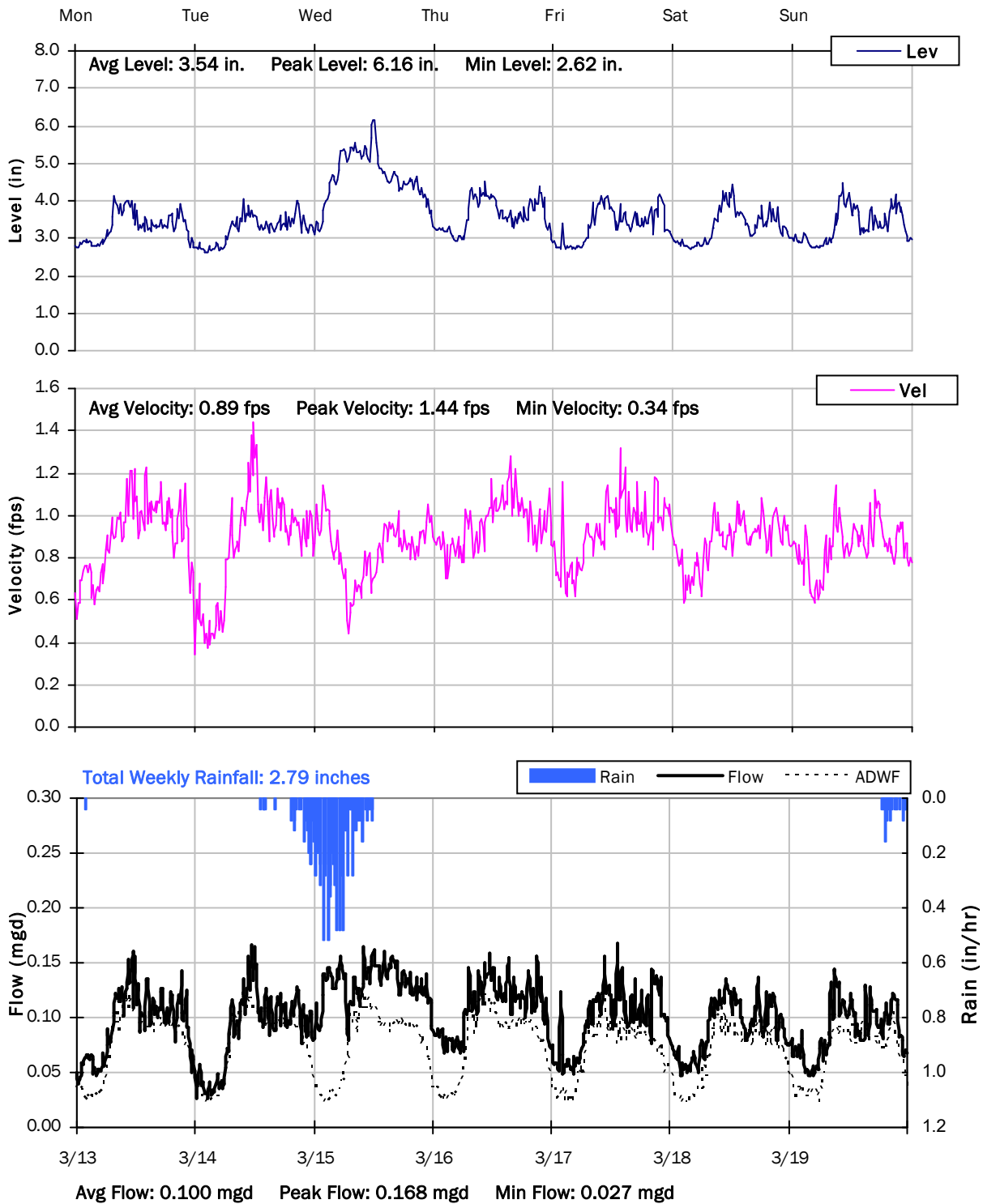
3/6/2023 to 3/13/2023



### SITE D SOUTH

### Weekly Level, Velocity and Flow Hydrographs

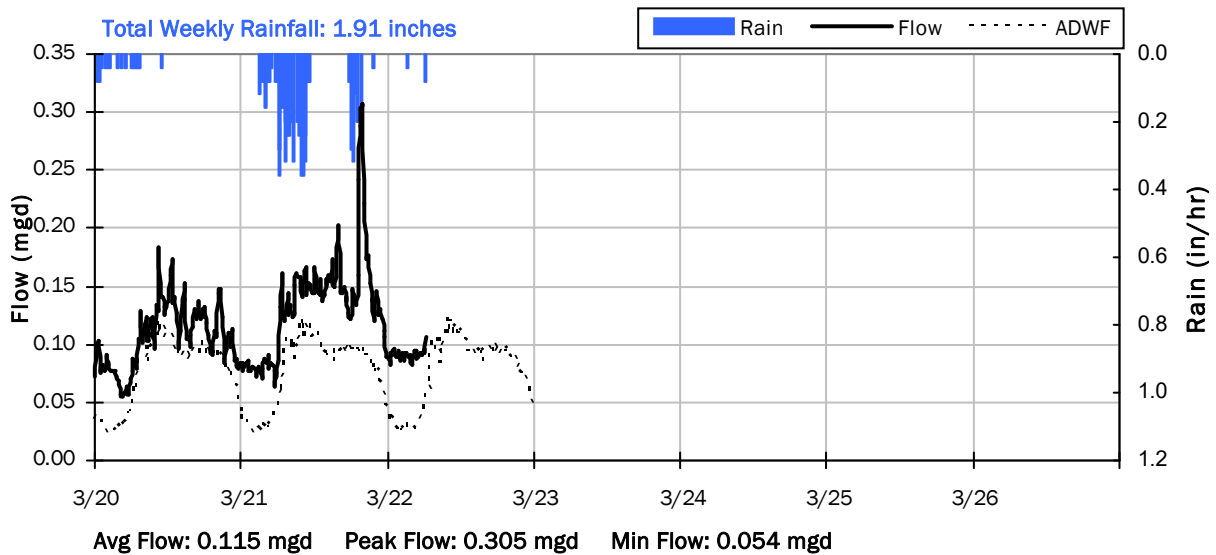
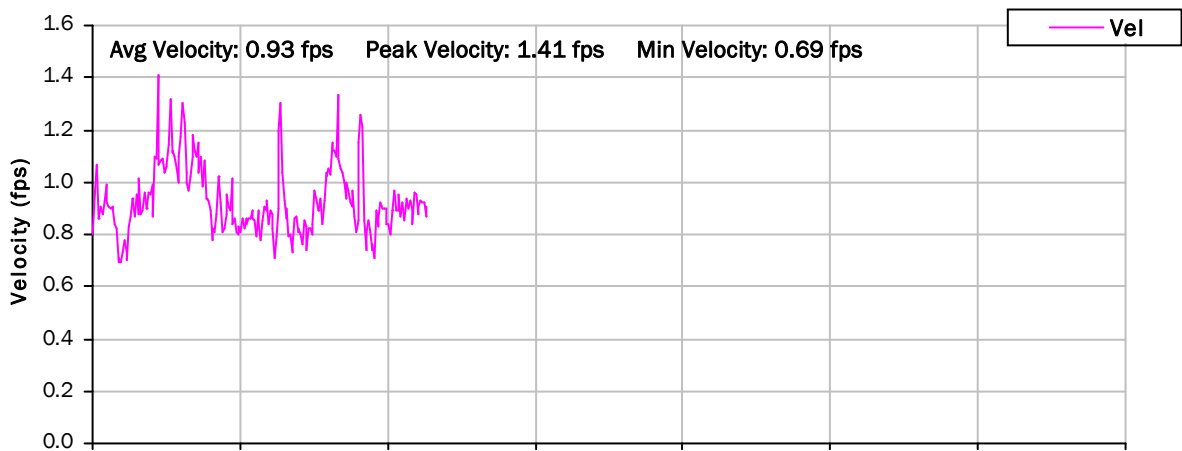
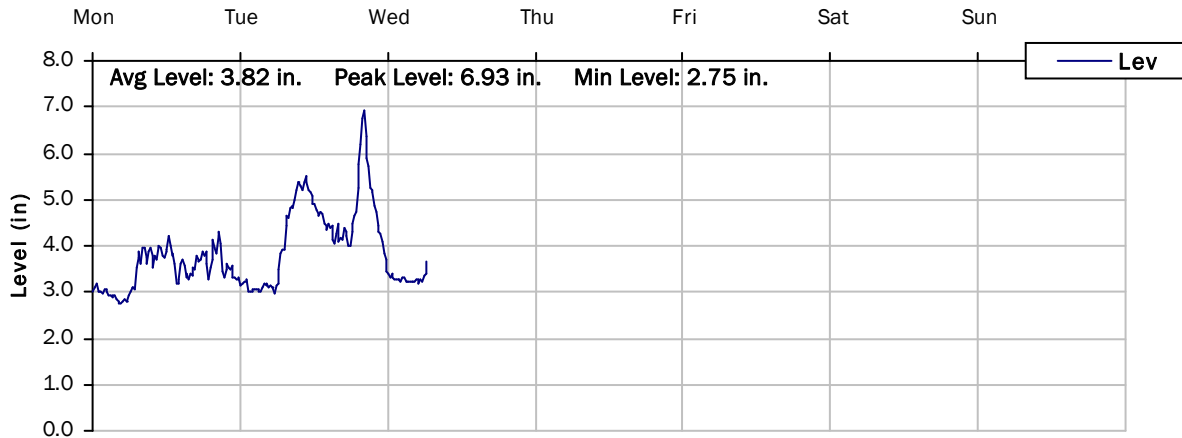
3/13/2023 to 3/20/2023



## SITE D SOUTH

### Weekly Level, Velocity and Flow Hydrographs

3/20/2023 to 3/27/2023

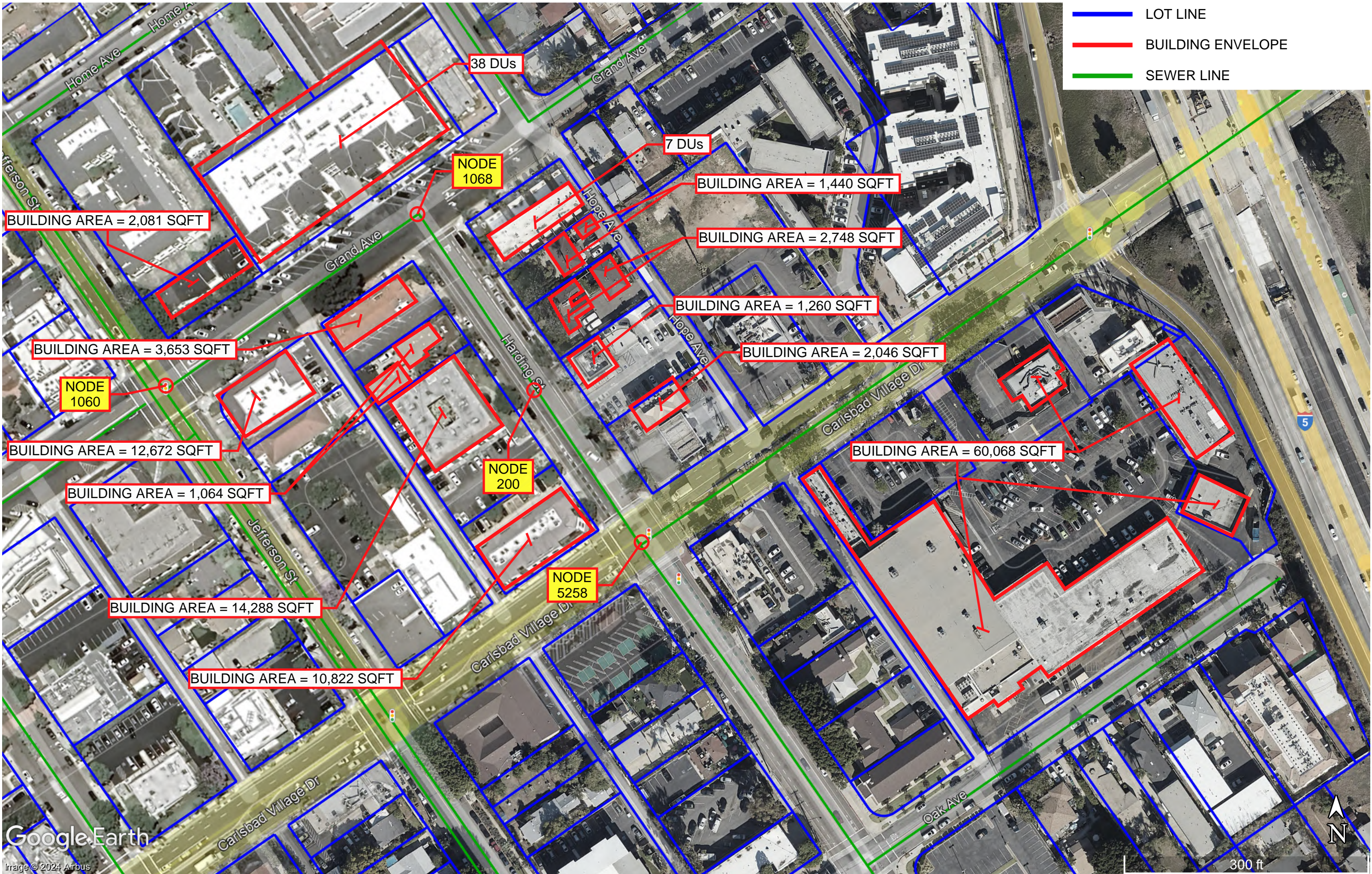


**APPENDIX D**

**HARDING STREET AND GRAND AVENUE  
RESIDENTIAL AND COMMERCIAL EDUs  
AND  
SEWER FLOW CALCULATION**



- LOT LINE
- BUILDING ENVELOPE
- SEWER LINE



Google Earth

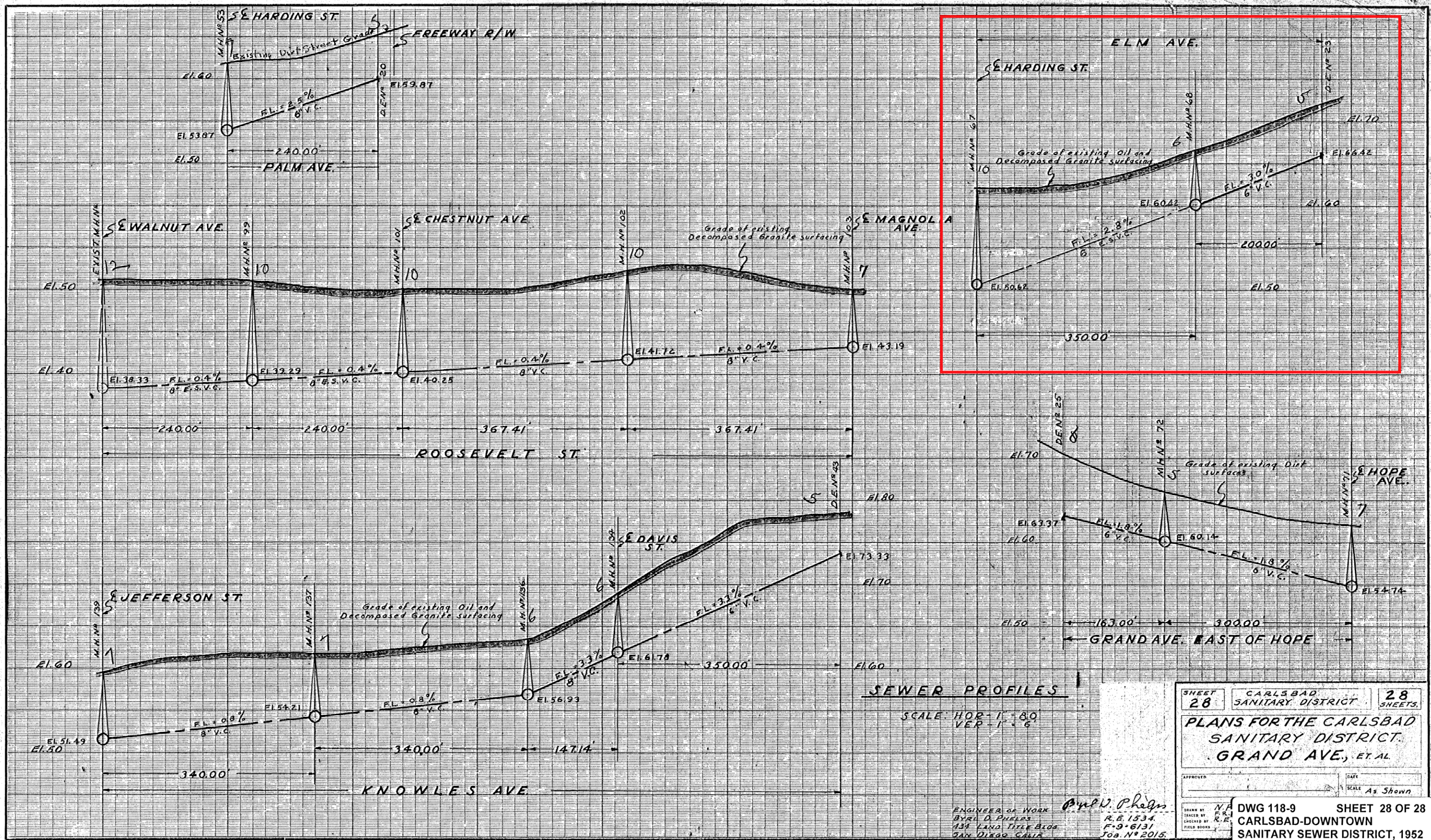
<b>TABLE C-1</b> <b>EXISTING AVERAGE SEWER FLOWS</b> <b>COMMERCIAL LOTS ALONG HARDING STREET AND GRAND AVENUE</b>						
Sewer Reach	Street	Commercial Building Space Sqft. <sup>1</sup>	MF Residential Dus <sup>2</sup>	EDUs	Average Flow, gpd	Peak Flow, gpd
5258 to 200	Harding Street	14,128	0	7.8	1,560	3,900
200 to 1068	Harding Street	23,193	7	18.5	3,700	9,250
1068 to 1060	Grand Avenue	14,753	38	38.6	7,720	19,300
<b>TOTAL</b>	--	<b>52,074</b>	<b>45</b>	<b>64.9</b>	<b>12,980</b>	<b>32,450</b>

1. 1 EDU/1,800 sqft

2. Multi-Family Residence = 0.8 EDU

**APPENDIX E**

**SEWER AS-BUILT DRAWINGS**



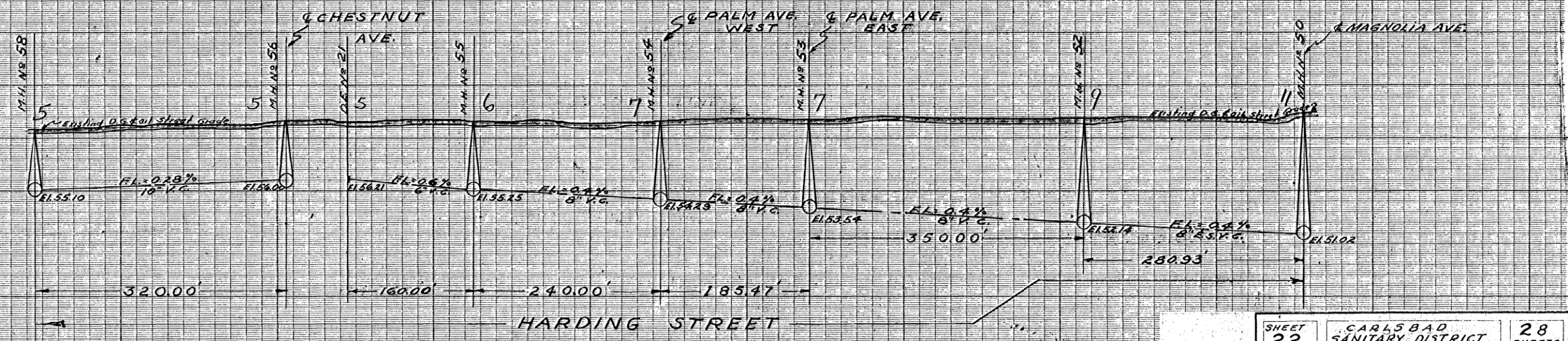
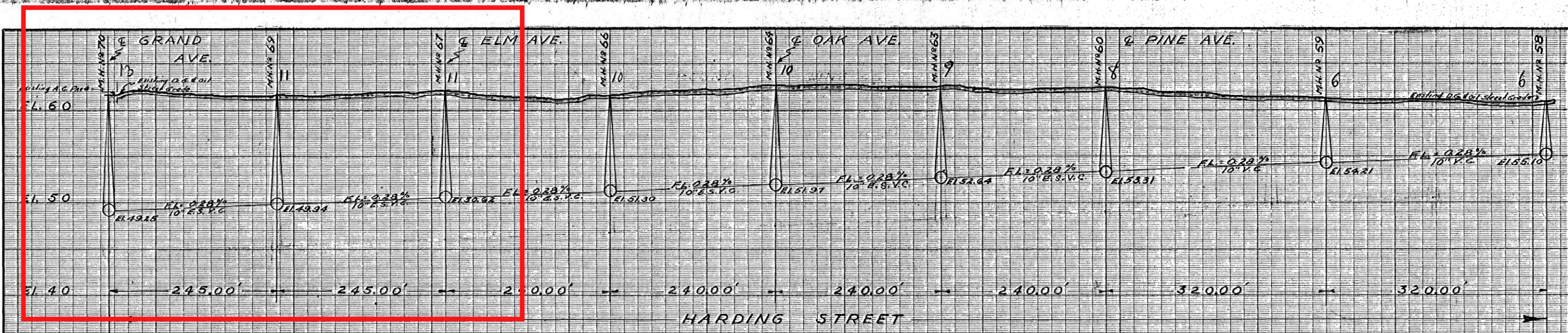
**SEWER PROFILES**

SCALE: HOR - 1" = 80'  
VER - 1" = 6'

ENGINEER OF WORK  
BYRD D. PHILIPS  
434 LAND TITLE BLDG.  
SAN DIEGO, CALIF.

*Byrd D. Philips*  
R.E. 1534  
F-9-6131  
Job. N° 2015.

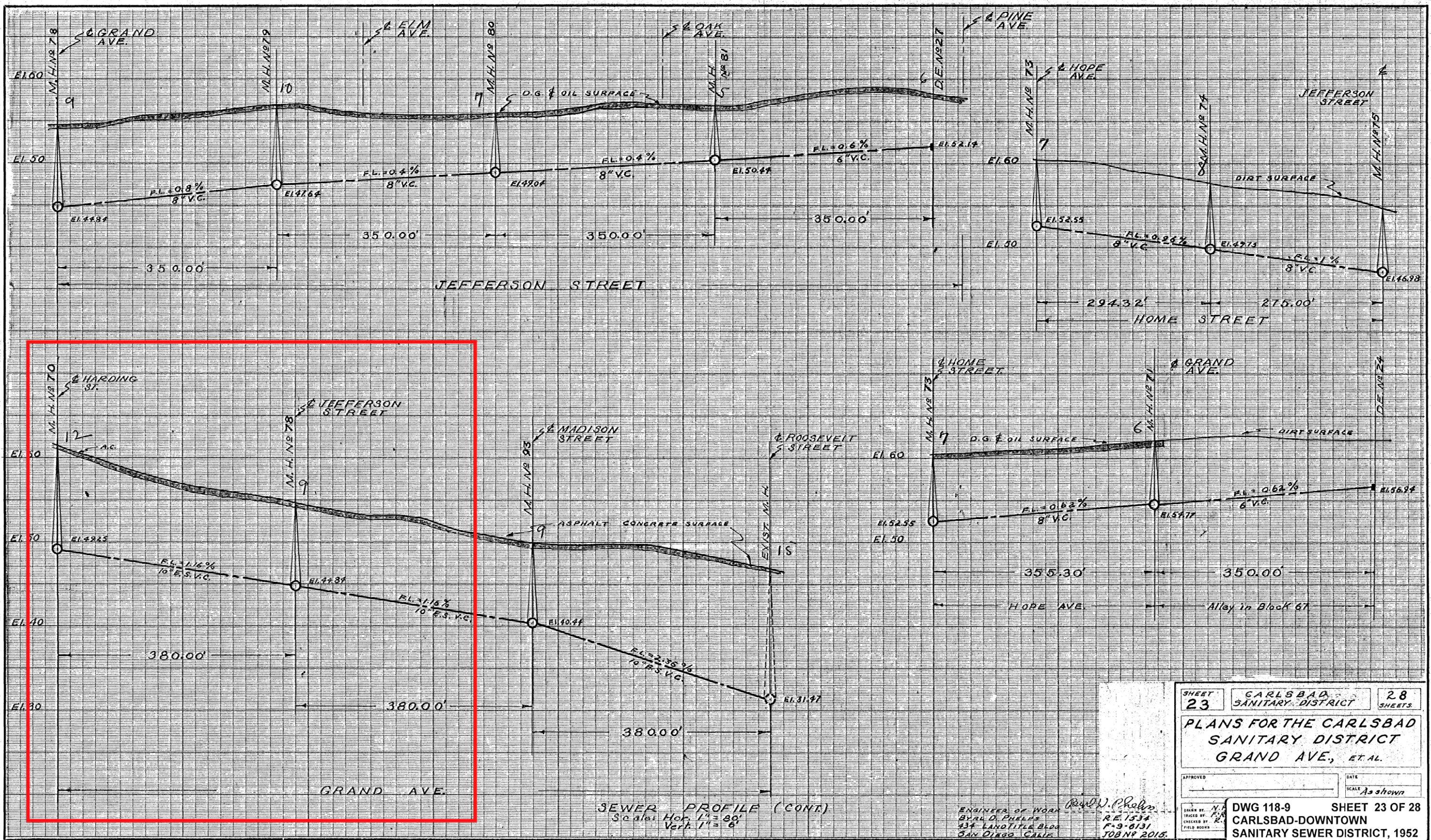
SHEET <b>28</b>	CARLSBAD SANITARY DISTRICT	<b>28</b> SHEETS
<b>PLANS FOR THE CARLSBAD SANITARY DISTRICT. GRAND AVE., ET AL</b>		
APPROVED	DATE	SCALE As Shown
DRAWN BY N.A.		DWG 118-9 SHEET 28 OF 28
CHECKED BY R.E.		CARLSBAD-DOWNTOWN
FIELD BOOKS		SANITARY SEWER DISTRICT, 1952



SEWER PROFILES (CONT.)  
 Scale: HOR. 1" = 80'  
 VERT. 1" = 6'

ENGINEER OF WORK *Paul N. Phelps*  
 BYRON D. PHELPS  
 434 LINDA TITLE BLDG.  
 SAN DIEGO, CALIF.  
 R-E 1534  
 F-9-8131  
 JOB N° 2015

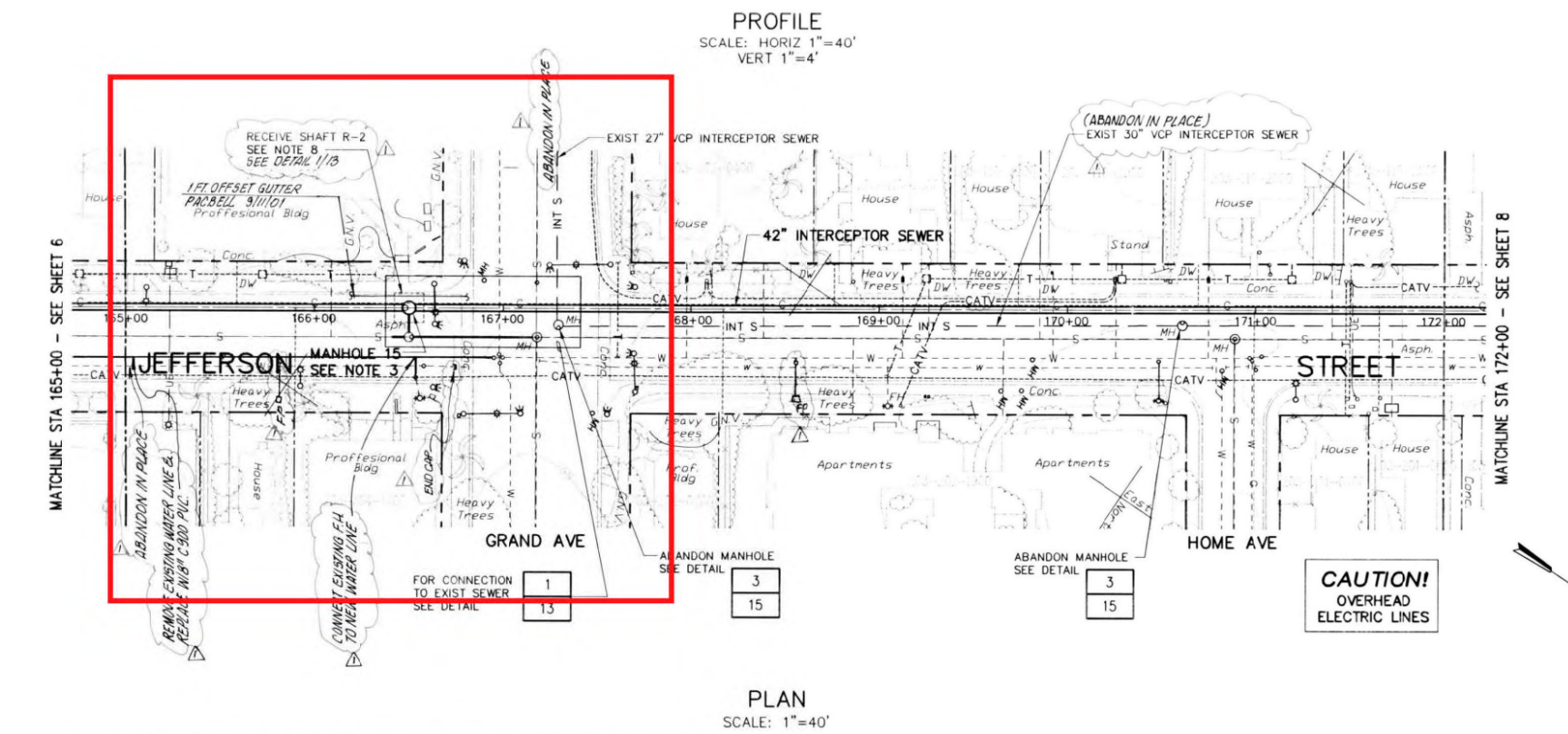
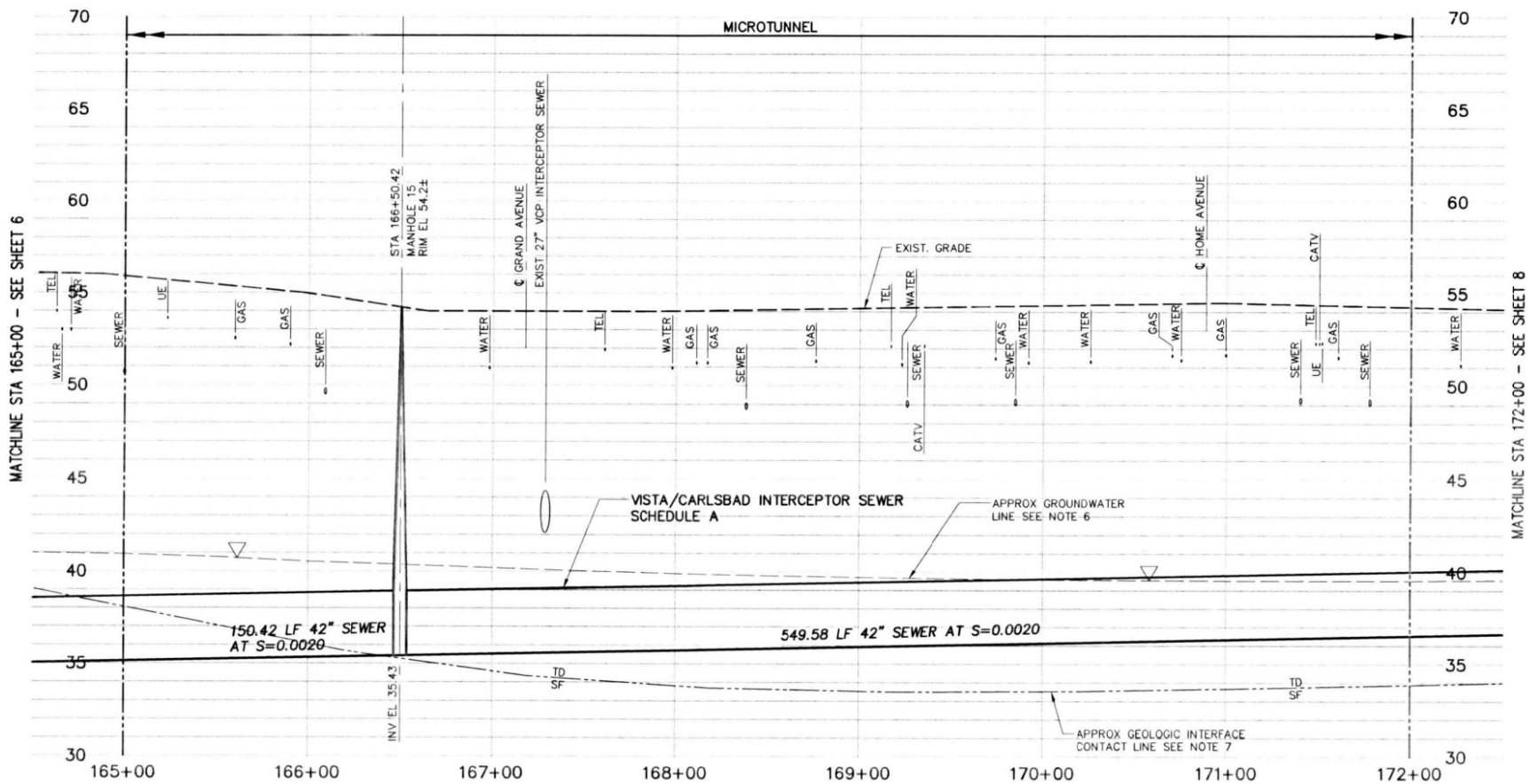
SHEET <b>22</b>	CARLSBAD SANITARY DISTRICT	28 SHEETS
PLANS FOR THE CARLSBAD SANITARY DISTRICT GRAND AVE ET. AL.		
APPROVED	CITY ENGINEER	DATE
CITY MANAGER	CITY ENGINEER	SCALE
		As Shown
DRAWN BY	DWG 118-9	SHEET 22 OF 28
TRACED BY	CARLSBAD-DOWNTOWN	
CHECKED BY	SANITARY SEWER DISTRICT, 1952	
FIELD BOOKS		



SEWER PROFILE (CONT.)  
 Scale: Hor. 1" = 80'  
 Vert. 1" = 6'

ENGINEER OF WORK  
 BYRD D. PHELPS  
 437 LAND TITLE BLDG.  
 SAN DIEGO, CALIF.

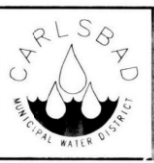
SHEET <b>23</b>	CARLSBAD SANITARY DISTRICT	<b>28</b> SHEETS
PLANS FOR THE CARLSBAD SANITARY DISTRICT GRAND AVE., ET AL.		
APPROVED _____	DATE _____	SCALE As shown
DRAWN BY: N.P.		DWG 118-9 SHEET 23 OF 28
CHECKED BY: R.P.		CARLSBAD-DOWNTOWN
FIELD BOOKS		SANITARY SEWER DISTRICT, 1952



DES DWA  
DWN DWA/JP  
CKD TLS

1 13  
3 15

**Carlsbad Municipal Water District**  
5950 El Camino Real  
Carlsbad, California 92008  
phone: (760) 438-8367



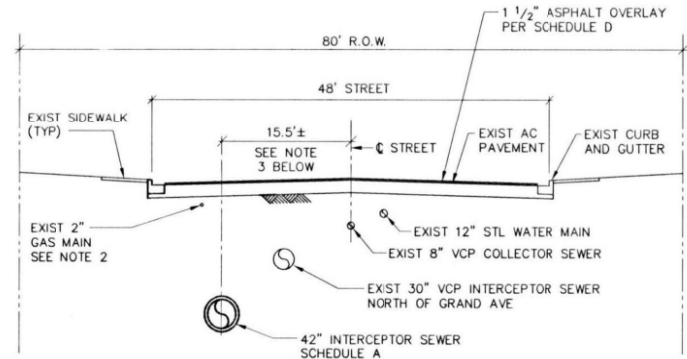
DISTRICT APPROVED CHANGES			
No.	Description	Approved	Date
1	AS-BUILT	WEP	3-13-08

BENCH MARK  
Description: SEE SHEET 1  
Location:  
Record Form:  
Elevation: Datum:

**Plan Set 1 of 2**  
CITY OF VISTA  
PROJECT No. 307 - DWG D-3557  
CARLSBAD MUNICIPAL WATER DISTRICT  
SHEET 7 CITY OF CARLSBAD SHEETS 39  
ENGINEERING DEPARTMENT  
VISTA/CARLSBAD INTERCEPTOR SEWER REACHES VCSB TO VC11A AND SOUTH CARLSBAD STORM DRAIN PROJECTS  
JEFFERSON STREET  
STA 165+00 to STA 172+00  
Deputy City Engineer: WILLIAM E. PLUMMER RCE Date 12-15-99  
REGISTRATION EXPIRES 3-31-02  
DWN BY: JP  
CHKD BY: DWA  
RWD BY: TLS  
CITY No. 3182/3528  
Drawing No. 365-2

- NOTES:**
- FOR LEGEND THIS DRAWING, SEE SHEET 3.
  - FOR ALIGNMENT OF INTERCEPTOR SEWER, SEE BASELINE TRAVERSE TABLE, SHEET 3.
  - SEE MANHOLE SCHEDULE ON SHEET 14.
  - FOR DETAIL OF STANDARD SEWER MANHOLES, SEE SHEET 14.
  - NOT USED.
  - APPROXIMATE GROUNDWATER LEVEL SHOWN, REFER TO SPEC. SECTION 7-16.
  - APPROXIMATE GEOLOGIC INTERFACE CONTACT LINE SHOWN, REFER TO SPEC. SECTION 7-16.
  - FOR JACK AND RECEIVE SHAFTS SEE SHAFT SCHEDULE ON SHEET 3.

HYDRAULIC DATA	
MH 14 to MH 15	Q = 26.52 mgd at D/d = 0.75 PEAK Q = 25.92 mgd D/d = 73.56 n = 0.013
MH 15 to MH 17	Q = 26.52 mgd at D/d = 0.75 PEAK Q = 25.14 mgd D/d = 71.77 n = 0.013

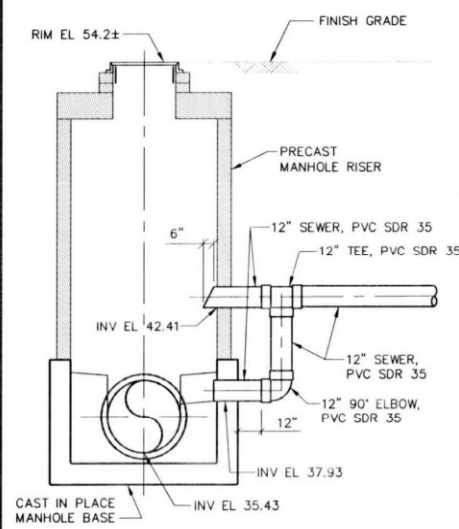


- NOTES:**
- LOCATIONS OF EXIST UTILITIES ARE APPROXIMATE.
  - EXISTING GAS MAIN WILL BE RELOCATED BY OTHERS, SEE SECTION 5 OF THE SPECIAL CONDITIONS.
  - CENTERLINE OFFSET PROVIDED FOR REFERENCE ONLY. SEE HORIZONTAL CONTROL ON SHEET 3.

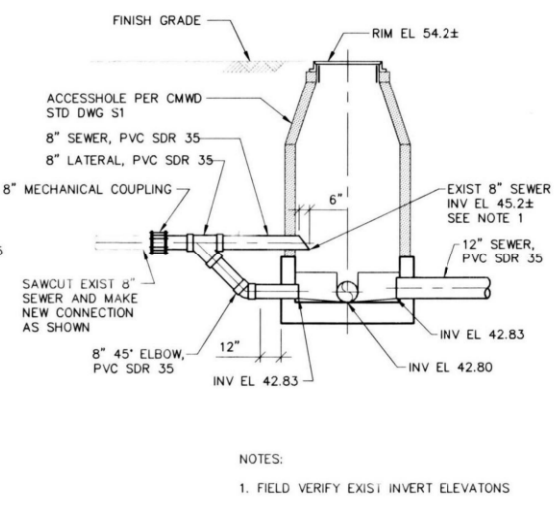
**TYPICAL SECTION**  
STA 165+00 to STA 172+00  
LOOKING UPSTATION  
SCALE: 1"=10'

**CAUTION!**  
OVERHEAD  
ELECTRIC LINES



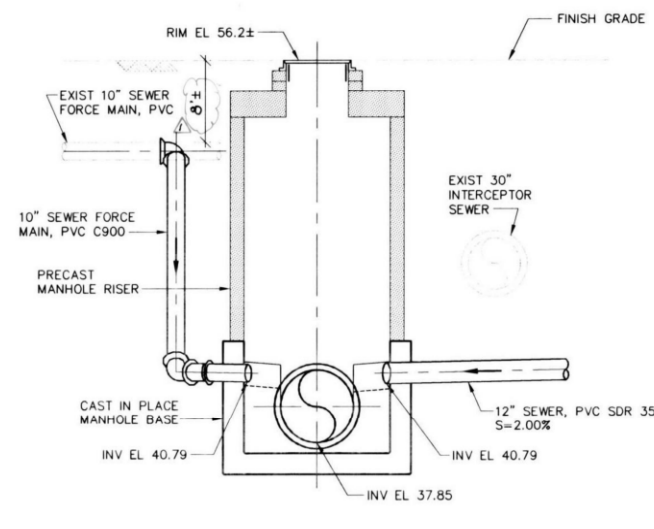


MANHOLE 15  
SECTION 1  
SCALE: 1/4"=1'-0"

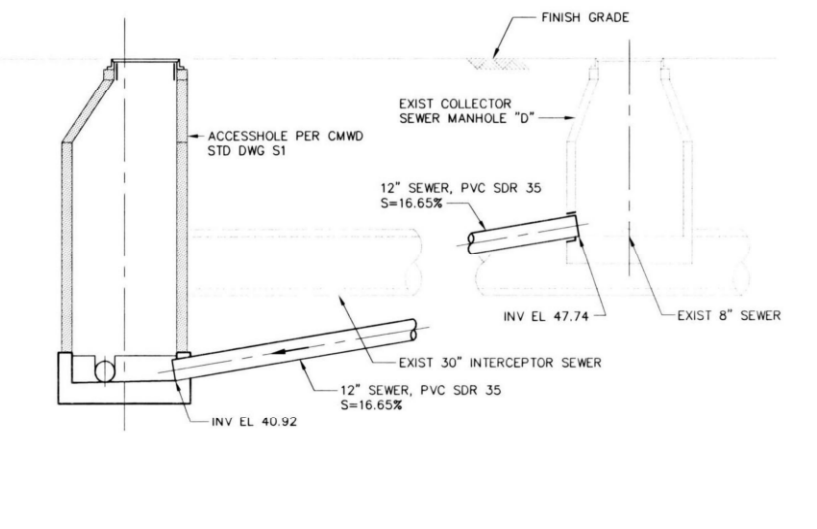


NOTES:  
1. FIELD VERIFY EXIST INVERT ELEVATIONS

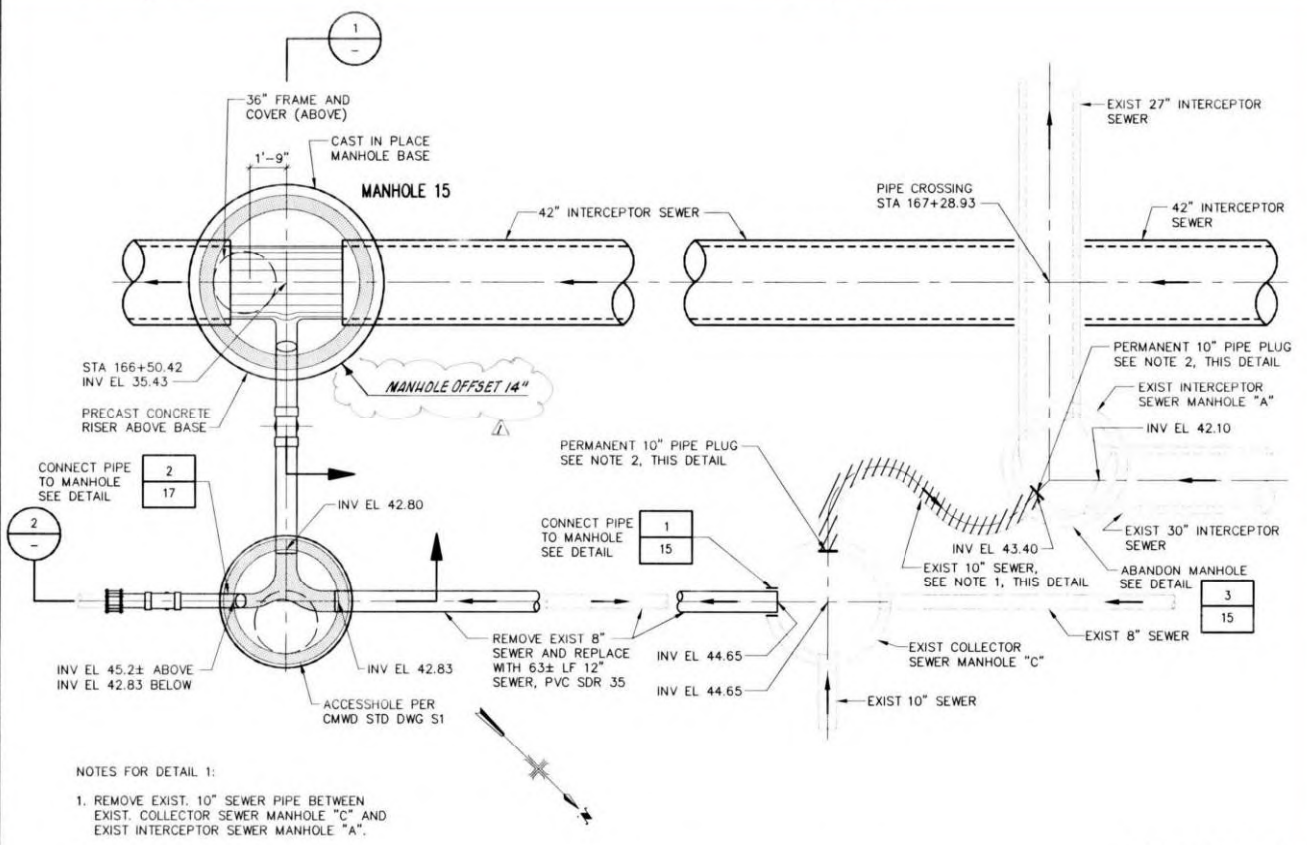
ACCESSHOLE  
SECTION 2  
SCALE: 1/4"=1'-0"



MANHOLE 17  
SECTION 3  
SCALE: 1/4"=1'-0"



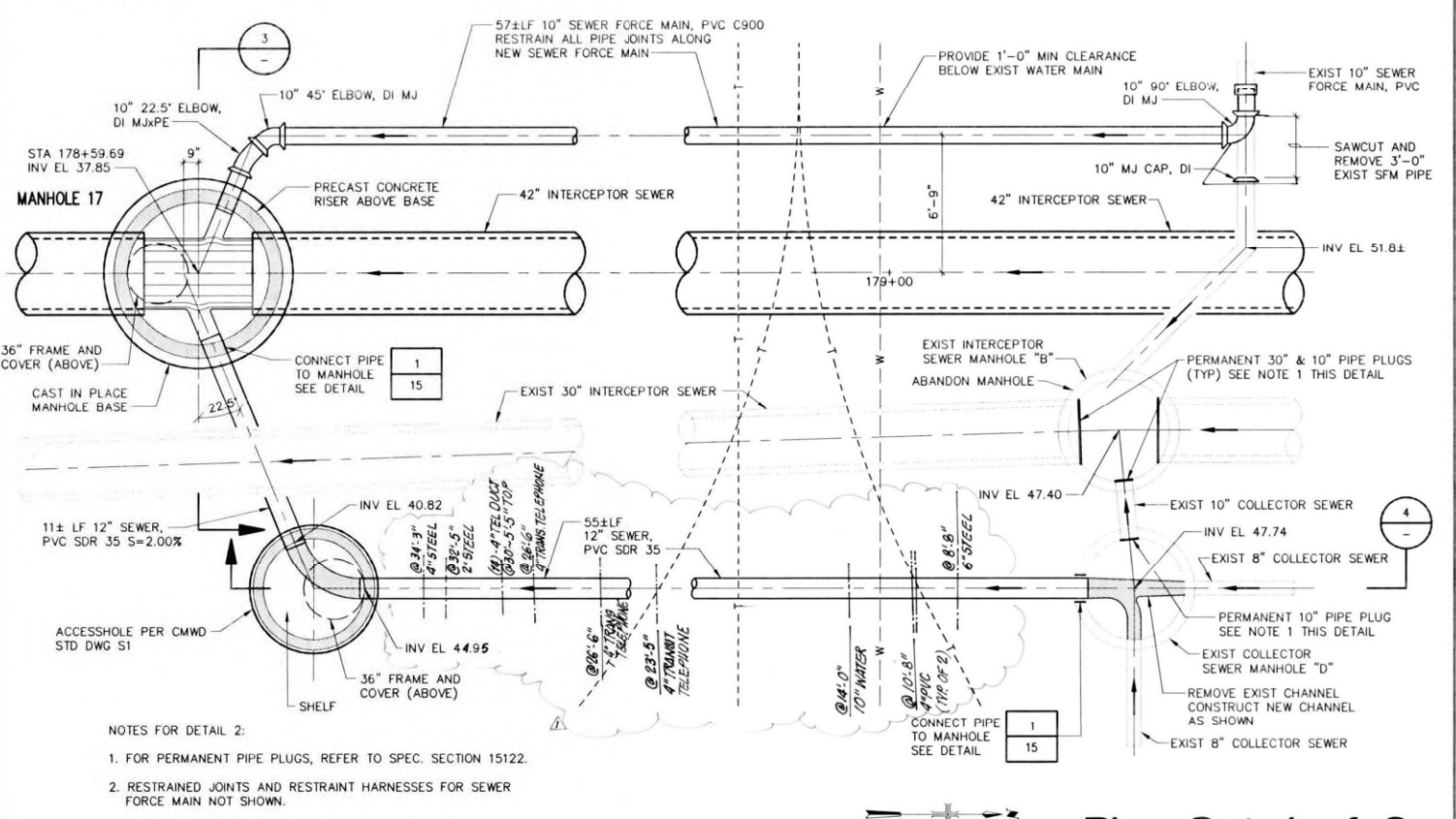
ACCESSHOLE & MANHOLE "D"  
SECTION 4  
SCALE: 1/4"=1'-0"



- NOTES FOR DETAIL 1:
1. REMOVE EXIST. 10" SEWER PIPE BETWEEN EXIST. COLLECTOR SEWER MANHOLE "C" AND EXIST INTERCEPTOR SEWER MANHOLE "A".
  2. FOR PERMANENT PIPE PLUGS, REFER TO SPEC. SECTION 15122.

"AS BUILT"  
William I. Plummer 3-23-06  
P.E. 29176 EXP. 3-31-08 DATE  
REVIEWED BY:  
INSPECTOR DATE

CONNECTION TO EXIST. SEWER  
AT GRAND AVENUE  
PLAN  
DETAIL 1  
SCALE: 1/4"=1'-0"



- NOTES FOR DETAIL 2:
1. FOR PERMANENT PIPE PLUGS, REFER TO SPEC. SECTION 15122.
  2. RESTRAINED JOINTS AND RESTRAINT HARNESSSES FOR SEWER FORCE MAIN NOT SHOWN.

CONNECTION TO EXIST. SEWER  
AT LAGUNA DRIVE  
PLAN  
DETAIL 2  
SCALE: 1/4"=1'-0"

GENERAL NOTES:

1. FOR PLAN AND DETAILS OF MANHOLES 15 AND 17, SEE SHEET 14.
2. PERMANENT PIPE PLUGS ARE SHOWN ONLY FOR THE PURPOSE OF CONDUCTING SEWER TRANSFER SEQUENCES. REFER TO SPEC. SECTION 15051. ADDITIONAL PIPE PLUGS MAY BE REQUIRED FOR ABANDONMENT OF EXIST. INTERCEPTOR SEWER. SEE ABANDON MANHOLE DETAIL 3 SHEET 15.
3. FOR SEWER TRANSFER SEQUENCES AND OPERATIONAL REQUIREMENTS, REFER TO SPEC. SECTION 15051.
4. FOR TYPICAL TRENCH SECTIONS, SEE DETAILS 4 AND 6 SHEET 15.

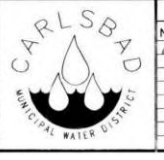
Plan Set 1 of 2

CITY OF VISTA PROJECT No. 307 - DWG D-3557		
CARLSBAD MUNICIPAL WATER DISTRICT		
SHEET 13	CITY OF CARLSBAD ENGINEERING DEPARTMENT	SHEETS 39
VISTA/CARLSBAD INTERCEPTOR SEWER REACHES VC5B TO VC11A AND SOUTH CARLSBAD STORM DRAIN PROJECTS		
CONNECTIONS TO EXIST. SEWER DETAILS AND SECTIONS		
William I. Plummer 28176 12-15-99 Deputy City Engineer WILLIAM E. PLUMMER RCE Date REGISTRATION EXPIRES 3-31-02		
DWN BY: JP	CITY No. 3182/3528	Drawing No. 365-2
CHKD BY: DWA		
RWD BY: TLS		
CAD REF. No. 3325C20		CMWD No. 91-403



DES: DWA  
DWN: JP  
OKD: TLS

Carlsbad Municipal Water District  
5950 El Camino Real  
Carlsbad, California 92008  
phone: (760) 438-3367



DISTRICT APPROVED CHANGES		BENCH MARK	
No.	Description	Approved	Date
1	"AS-BUILT"	WEP	3-23-06

Description: SEE SHEET 1  
Location:  
Record Form:  
Elevation: Datum:

7018 3325004320 L:\3325\004\ACAD\CIVIL\3325C20 Scale: 1:48 Date: 09/28/1999 Time: 15:49



**APPENDIX F**

**EXISTING SEWER SYSTEM ANALYSIS  
UNDER  
EXISTING PEAK DRY WEATHER FLOW  
AND  
EXISTING PEAK WET WEATHER FLOW**

DATE: 2/12/2024

**SEWER STUDY SUMMARY**

JOB NUMBER: 1135-001

FOR: Carlsbad Village Mixed Use Project - Existing System, Existing PDWF  
 BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 1  
 REFER TO PLAN SHEET: \_\_\_\_\_

LINE	FROM	TO	EXISTING PEAK FLOW (gpd)	ADDITIONAL EXISTING PEAK FLOW (gpd) <sup>A</sup>	COMBINED PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' <sup>(1)</sup>	dn (feet)	dn/D <sup>(2)</sup>	C <sub>a</sub> for Velocity <sup>(3)</sup>	VELOCITY (f.p.s.)	COMMENTS <sup>A</sup>
						M.G.D.	C.F.S.								
	5259	6538	197,500	0	197,500	0.198	0.306	6	3.00	0.145640	0.19260	0.39	0.2789	4.38	Sewer Flow Monitoring Data
	6538	5258	197,500	0	197,500	0.198	0.306	6	2.80	0.150752	0.19623	0.39	0.2860	4.27	Existing Project Site Average Flow = 6,674 gpd (see Table 3 of report). Peak Flow = 6,674 gpd x 2.5 = 16,685
	5258	200	382,500	3,900	386,400	0.386	0.598	10	0.28	0.238856	0.42483	0.51	0.4028	2.14	Sewer Flow Monitoring Data 7.8 EDUs added, see Appendix D
	200	1068	382,500	13,150	395,650	0.396	0.612	10	0.28	0.244574	0.43081	0.52	0.4100	2.15	7.8 + 18.5 = 26.3 EDUs added, see Appendix D
	1068	1060	382,500	32,450	414,950	0.415	0.642	10	1.16	0.126022	0.29700	0.36	0.2511	3.68	7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D
	1060	1061	607,000	110,450	717,450	0.717	1.110	12	2.89	0.084893	0.28999	0.29	0.1890	5.87	City Master Plan PDWF 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)
	1061	1062	618,000	110,450	728,450	0.728	1.127	12	4.00	0.073265	0.26897	0.27	0.1702	6.62	City Master Plan PDWF 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)

Min Slope
0.28

Max dn/D
0.52

A. Flows added to sewer flow monitoring data. To calculate EDUs, residential units and commercial building areas were used. Residential units were provided by the City. Building areas were obtained from SANGIS and converted to EDUs using 1 EDU/1,800 sqft. See Appendix D for detail.

1 K' based on n = 0.011  
 2 dn/D using K' in Brater King Table 7-14  
 3 From Brater King Table 7-4 based on dn/D

DATE: 2/12/2024

**SEWER STUDY SUMMARY**

JOB NUMBER: 1135-001

FOR: Carlsbad Village Mixed Use Project - Existing System, Existing PWWF  
 BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 1  
 REFER TO PLAN SHEET: \_\_\_\_\_

LINE	FROM	TO	EXISTING PEAK FLOW (gpd) <sup>A</sup>	ADDITIONAL EXISTING PEAK FLOW (gpd) <sup>B</sup>	COMBINED PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' <sup>(1)</sup>	dn (feet)	dn/D <sup>(2)</sup>	C <sub>a</sub> for Velocity <sup>(3)</sup>	VELOCITY (f.p.s.)	COMMENTS <sup>B</sup>
						M.G.D.	C.F.S.								
	5259	6538	298,000	0	298,000	0.298	0.461	6	3.00	0.219751	0.24240	0.48	0.3775	4.89	Sewer Flow Monitoring Data
	6538	5258	298,000	0	298,000	0.298	0.461	6	2.80	0.227464	0.24723	0.49	0.3873	4.76	Existing Project Site Average Flow = 6,674 gpd (see Table 3 of report). Peak Flow = 6,674 gpd x 2.5 = 16,685
	5258	200	610,350	3,900	614,250	0.614	0.950	10	0.28	0.379703	0.57465	0.69	0.5776	2.37	Sewer Flow Monitoring Data 7.8 EDUs added, see Appendix D
	200	1068	615,450	13,150	628,600	0.629	0.973	10	0.28	0.388574	0.58402	0.70	0.5877	2.38	7.8 + 18.5 = 26.3 EDUs added, see Appendix D
	1068	1060	622,150	32,450	654,600	0.655	1.013	10	1.16	0.198804	0.38147	0.46	0.3505	4.16	7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D
	1060	1061	1,214,000	110,450	1,324,450	1.324	2.049	12	2.89	0.156716	0.40086	0.40	0.2942	6.96	PDWF conservatively multiplied by 2 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)
	1061	1062	1,236,000	110,450	1,346,450	1.346	2.083	12	4.00	0.135422	0.37033	0.37	0.2645	7.88	PDWF conservatively multiplied by 2 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)

Min Slope
0.28

Max dn/D
0.70

A. The PWWF obtained from the sewer flow monitoring data pertain to the specific storm event monitored and, although not regarded as the design PWWF, demonstrate that the existing sewer in Carlsbad Village Drive does not meet the flow depth criterion under pre-project conditions (see Appendix C, Site D-East - 9).

B. Flows added to sewer flow monitoring data. To calculate EDUs, residential units and commercial building areas were used. Residential units were provided by the City. Building areas were obtained from SANGIS and converted to EDUs using 1 EDU/1,800 sqft. See Appendix D for detail.

1 K' based on n = 0.011  
 2 dn/D using K' in Brater King Table 7-14  
 3 From Brater King Table 7-4 based on dn/D

**APPENDIX G**

**EXISTING SEWER SYSTEM ANALYSIS  
UNDER  
EXISTING PLUS PROJECT  
PEAK DRY WEATHER FLOW  
AND  
PEAK WET WEATHER FLOW**

DATE: 12/22/2023

**SEWER STUDY SUMMARY**

JOB NUMBER: 1135-001

FOR: Carlsbad Village Mixed Use Project - Existing System, Existing + Project PDWF  
 BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 1  
 REFER TO PLAN SHEET:

LINE	FROM	TO	EXISTING PEAK FLOW (gpd) <sup>A</sup>	ADDITIONAL EXISTING PEAK FLOW (gpd) <sup>B</sup>	PROPOSED PROJECT PEAK FLOW (gpd)	COMBINED PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' <sup>(1)</sup>	dn (feet)	dn/D <sup>(2)</sup>	C <sub>a</sub> for Velocity <sup>(3)</sup>	VELOCITY (f.p.s.)	COMMENTS <sup>B</sup>
							M.G.D.	C.F.S.								
	5259	6538	180,815	0	0	180,815	0.181	0.280	6	3.00	0.133336	0.18363	0.37	0.2616	4.28	Sewer Flow Monitoring Data
	6538	5258	180,815	0	91,033	271,848	0.272	0.421	6	2.80	0.207502	0.23455	0.47	0.3618	4.65	
	5258	200	365,815	3,900	91,033	460,748	0.461	0.713	10	0.28	0.284815	0.47272	0.57	0.4595	2.23	Sewer Flow Monitoring Data 7.8 EDUs added, see Appendix D
	200	1068	365,815	13,150	91,033	469,998	0.470	0.727	10	0.28	0.290533	0.47868	0.57	0.4664	2.25	7.8 + 18.5 = 26.3 EDUs added, see Appendix D
	1068	1060	365,815	32,450	91,033	489,298	0.489	0.757	10	1.16	0.148601	0.32453	0.39	0.2830	3.85	7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D
	1060	1061	590,315	110,450	91,033	791,798	0.792	1.225	12	2.89	0.093690	0.30507	0.31	0.2029	6.04	City Master Plan PDWF 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)
	1061	1062	601,315	110,450	91,033	802,798	0.803	1.242	12	4.00	0.080743	0.28258	0.28	0.1823	6.81	City Master Plan PDWF 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)

Min Slope
0.28

Max dn/D
0.57

A. Existing peak flow of 16,685 gpd for the existing Carlsbad Village Mixed Use site is subtracted out downstream of Manhole 6538 due to proposed redevelopment (see Table 3 of report).

B. Flows added to sewer flow monitoring data. To calculate EDUs, residential units and commercial building areas were used. Residential units were provided by the City. Building areas were obtained from SANGIS and converted to EDUs using 1 EDU/1,800 sqft. See Appendix D for detail.

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

DATE: 12/22/2023

**SEWER STUDY SUMMARY**

FOR: Carlsbad Village Mixed Use Project - Existing System, Existing + Project PWWF  
 BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 1  
 REFER TO PLAN SHEET:

JOB NUMBER: 1135-001

LINE	FROM	TO	EXISTING PEAK FLOW (gpd) <sup>A,B</sup>	ADDITIONAL EXISTING PEAK FLOW (gpd) <sup>C</sup>	PROPOSED PROJECT PEAK FLOW (gpd)	COMBINED PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' <sup>(1)</sup>	dn (feet)	dn/D <sup>(2)</sup>	C <sub>a</sub> for Velocity <sup>(3)</sup>	VELOCITY (f.p.s.)	COMMENTS <sup>C</sup>
							M.G.D.	C.F.S.								
	5259	6538	281,315	0	0	281,315	0.281	0.435	6	3.00	0.207447	0.23451	0.47	0.3617	4.81	Sewer Flow Monitoring Data
	6538	5258	281,315	0	91,033	372,348	0.372	0.576	6	2.80	0.284213	0.28326	0.57	0.4589	5.02	
	5258	200	593,665	3,900	91,033	688,598	0.689	1.065	10	0.28	0.425662	0.62936	0.76	0.6362	2.41	Sewer Flow Monitoring Data 7.8 EDUs added, see Appendix D
	200	1068	598,765	13,150	91,033	702,948	0.703	1.088	10	0.28	0.434532	0.64102	0.77	0.6483	2.42	7.8 + 18.5 = 26.3 EDUs added, see Appendix D
	1068	1060	605,465	32,450	91,033	728,948	0.729	1.128	10	1.16	0.221384	0.40575	0.49	0.3796	4.28	7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D
	1060	1061	1,197,315	110,450	91,033	1,398,798	1.399	2.164	12	2.89	0.165514	0.41307	0.41	0.3062	7.07	PDWF conservatively multiplied by 2 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)
	1061	1062	1,219,315	110,450	91,033	1,420,798	1.421	2.198	12	4.00	0.142899	0.38128	0.38	0.2751	7.99	PDWF conservatively multiplied by 2 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)

Min Slope
0.28

Max dn/D
0.77

- A. Existing peak flow of 20,000 gpd for existing Carlsbad Village Mixed Use site is subtracted out downstream of Manhole 6538 due to proposed redevelopment (see Table 3 of report).
- B. The PWWF obtained from the sewer flow monitoring data pertain to the specific storm event monitored and, although not regarded as the design PWWF, demonstrate that the existing sewer in Carlsbad Village Drive does not meet the flow depth criterion under pre-project conditions (see Appendix C, Site D-East - 9).
- C. Flows added to sewer flow monitoring data. To calculate EDUs, residential units and commercial building areas were used. Residential units were provided by the City. Building areas were obtained from SANGIS and converted to EDUs using 1 EDU/1,800 sqft. See Appendix D for detail.

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

**APPENDIX H**

**PROPOSED SEWER SYSTEM ANALYSIS  
UNDER  
EXISTING PLUS PROJECT  
PEAK DRY WEATHER FLOW  
AND  
PEAK WET WEATHER FLOW**

DATE: 12/22/2023

**SEWER STUDY SUMMARY**

FOR: Carlsbad Village Mixed Use Project - Proposed System, Existing + Project PDWF  
 BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 1  
 REFER TO PLAN SHEET:

JOB NUMBER: 1135-001

LINE	FROM	TO	EXISTING PEAK FLOW (gpd) <sup>A</sup>	ADDITIONAL EXISTING PEAK FLOW (gpd) <sup>B</sup>	PROPOSED PROJECT PEAK FLOW (gpd)	COMBINED PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' <sup>(1)</sup>	dn (feet)	dn/D <sup>(2)</sup>	C <sub>a</sub> for Velocity <sup>(3)</sup>	VELOCITY (f.p.s.)	COMMENTS <sup>B</sup>
							M.G.D.	C.F.S.								
	5259	6538	180,815	0	0	180,815	0.181	0.280	8	3.00	0.061913	0.16464	0.25	0.1509	4.17	Sewer Flow Monitoring Data
	6538	5258	180,815	0	91,033	271,848	0.272	0.421	8	2.80	0.096350	0.20638	0.31	0.2070	4.57	
	5258	200	365,815	3,900	91,033	460,748	0.461	0.713	12	0.28	0.175151	0.42629	0.43	0.3192	2.23	Sewer Flow Monitoring Data 7.8 EDUs added, see Appendix D
	200	1068	365,815	13,150	91,033	469,998	0.470	0.727	12	0.28	0.178667	0.43102	0.43	0.3239	2.25	7.8 + 18.5 = 26.3 EDUs added, see Appendix D
	1068	1060	365,815	32,450	91,033	489,298	0.489	0.757	10	1.16	0.148601	0.32453	0.39	0.2830	3.85	7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D
	1060	1061	590,315	110,450	91,033	791,798	0.792	1.225	12	2.89	0.093690	0.30507	0.31	0.2029	6.04	City Master Plan PDWF 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)
	1061	1062	601,315	110,450	91,033	802,798	0.803	1.242	12	4.00	0.080743	0.28258	0.28	0.1823	6.81	City Master Plan PDWF 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)

Min Slope
0.28

Max dn/D
0.43

A. Existing peak flow of 16,685 gpd for the existing Carlsbad Village Mixed Use site is subtracted out downstream of Manhole 6538 due to proposed redevelopment (see Table 3 of report).

B. Flows added to sewer flow monitoring data. To calculate EDUs, residential units and commercial building areas were used. Residential units were provided by the City. Building areas were obtained from SANGIS and converted to EDUs using 1 EDU/1,800 sqft. See Appendix D for detail.

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



DATE: 12/22/2023

**SEWER STUDY SUMMARY**

FOR: Carlsbad Village Mixed Use Project - Proposed System, Existing + Project PWWF  
 BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 1  
 REFER TO PLAN SHEET:

JOB NUMBER: 1135-001

LINE	FROM	TO	EXISTING PEAK FLOW (gpd) <sup>A,B</sup>	ADDITIONAL EXISTING PEAK FLOW (gpd) <sup>C</sup>	PROPOSED PROJECT PEAK FLOW (gpd)	COMBINED PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' <sup>(1)</sup>	dn (feet)	dn/D <sup>(2)</sup>	C <sub>a</sub> for Velocity <sup>(3)</sup>	VELOCITY (f.p.s.)	COMMENTS <sup>C</sup>
							M.G.D.	C.F.S.								
	5259	6538	281,315	0	0	281,315	0.281	0.435	8	3.00	0.096325	0.20636	0.31	0.2070	4.73	Sewer Flow Monitoring Data
	6538	5258	281,315	0	91,033	372,348	0.372	0.576	8	2.80	0.131970	0.24350	0.37	0.2596	4.99	
	5258	200	593,665	3,900	91,033	688,598	0.689	1.065	12	0.28	0.261767	0.53846	0.54	0.4315	2.47	Sewer Flow Monitoring Data 7.8 EDUs added, see Appendix D
	200	1068	598,765	13,150	91,033	702,948	0.703	1.088	12	0.28	0.267222	0.54528	0.55	0.4383	2.48	7.8 + 18.5 = 26.3 EDUs added, see Appendix D
	1068	1060	605,465	32,450	91,033	728,948	0.729	1.128	10	1.16	0.221384	0.40575	0.49	0.3796	4.28	7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D
	1060	1061	1,197,315	110,450	91,033	1,398,798	1.399	2.164	12	2.89	0.165514	0.41307	0.41	0.3062	7.07	PDWF conservatively multiplied by 2 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)
	1061	1062	1,219,315	110,450	91,033	1,420,798	1.421	2.198	12	4.00	0.142899	0.38128	0.38	0.2751	7.99	PDWF conservatively multiplied by 2 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)

Min Slope
0.28

Max dn/D
0.55

- A. Existing peak flow of 20,000 gpd for existing Carlsbad Village Mixed Use site is subtracted out downstream of Manhole 6538 due to proposed redevelopment (see Table 3 of report).
- B. The PWWF obtained from the sewer flow monitoring data pertain to the specific storm event monitored and, although not regarded as the design PWWF, demonstrate that the existing sewer in Carlsbad Village Drive does not meet the flow depth criterion under pre-project conditions (see Appendix C, Site D-East - 9).
- C. Flows added to sewer flow monitoring data. To calculate EDUs, residential units and commercial building areas were used. Residential units were provided by the City. Building areas were obtained from SANGIS and converted to EDUs using 1 EDU/1,800 sqft. See Appendix D for detail.

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

**APPENDIX I**

**EXISTING SEWER SYSTEM ANALYSIS  
UNDER  
MASTER PLAN  
PEAK DRY WEATHER FLOW  
AND  
PEAK WET WEATHER FLOW**

DATE: 12/22/2023

**SEWER STUDY SUMMARY**

JOB NUMBER: 1135-001

FOR: CVMU Project - Existing System, Existing PDWF (Master Plan)  
 BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 1  
 REFER TO PLAN SHEET: \_\_\_\_\_

LINE	FROM	TO	EXISTING PEAK FLOW (gpd)	ADDITIONAL EXISTING PEAK FLOW (gpd) <sup>A</sup>	COMBINED PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' <sup>(1)</sup>	dn (feet)	dn/D <sup>(2)</sup>	C <sub>a</sub> for Velocity <sup>(3)</sup>	VELOCITY (f.p.s.)	COMMENTS <sup>A</sup>
						M.G.D.	C.F.S.								
	5259	6538	288,500	0	288,500	0.289	0.446	6	3.00	0.180015	0.21641	0.43	0.3257	5.48	City Master Plan PDWF for Reach 5258 to 200 conservatively divided by 2
	6538	5258	288,500	0	288,500	0.289	0.446	6	2.80	0.186333	0.22062	0.44	0.3340	5.35	Existing Project Site Average Flow = 6,674 gpd (see Table 3 of report). Peak Flow = 6,674 gpd x 2.5 = 16,685
	5258 <sup>B</sup>	200	577,000	3,900	580,900	0.581	0.899	10	0.28	0.359088	0.55113	0.66	0.5512	2.35	City Master Plan PDWF 7.8 EDUs added, see Appendix D
	200	1068	577,000	13,150	590,150	0.590	0.913	10	0.28	0.364806	0.55709	0.67	0.5577	2.36	7.8 + 18.5 = 26.3 EDUs added, see Appendix D
	1068	1060	577,000	32,450	609,450	0.609	0.943	10	1.16	0.185092	0.36632	0.44	0.3324	4.09	7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D
	1060	1061	607,000	110,450	717,450	0.717	1.110	12	2.89	0.084893	0.28999	0.29	0.1890	5.87	City Master Plan PDWF 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)
	1061	1062	618,000	110,450	728,450	0.728	1.127	12	4.00	0.073265	0.26897	0.27	0.1702	6.62	City Master Plan PDWF 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)

Min Slope
0.28

Max dn/D
0.67

A. Flows added to sewer flow monitoring data. To calculate EDUs, residential units and commercial building areas were used. Residential units were provided by the City. Building areas were obtained from SANGIS and converted to EDUs using 1 EDU/1,800 sqft. See Appendix D for detail.

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

DATE: 12/22/2023

**SEWER STUDY SUMMARY**

JOB NUMBER: 1135-001

FOR: CVMU Project - Existing System, Existing PWWF (Master Plan)  
 BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 1  
 REFER TO PLAN SHEET: \_\_\_\_\_

LINE	FROM	TO	EXISTING PEAK FLOW (gpd)	ADDITIONAL EXISTING PEAK FLOW (gpd) <sup>A</sup>	COMBINED PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' <sup>(1)</sup>	dn (feet)	dn/D <sup>(2)</sup>	C <sub>a</sub> for Velocity <sup>(3)</sup>	VELOCITY (f.p.s.)	COMMENTS <sup>A</sup>
						M.G.D.	C.F.S.								
	5259	6538	409,500	0	409,500	0.410	0.634	6	3.00	0.255516	0.26532	0.53	0.4236	5.98	City Master Plan PWWF for Reach 5258 to 200 conservatively divided by 2
	6538	5258	409,500	0	409,500	0.410	0.634	6	2.80	0.264484	0.27093	0.54	0.4349	5.83	Existing Project Site Average Flow = 6,674 gpd (see Table 3 of report). Peak Flow = 6,674 gpd x 2.5 = 16,685
	5258 <sup>B</sup>	200	819,000	3,900	822,900	0.823	1.273	10	0.28	0.508682	#N/A	#N/A	#N/A	#N/A	City Master Plan PWWF 7.8 EDUs added, see Appendix D
	200	1068	819,000	13,150	832,150	0.832	1.288	10	0.28	0.514400	#N/A	#N/A	#N/A	#N/A	7.8 + 18.5 = 26.3 EDUs added, see Appendix D
	1068	1060	819,000	32,450	851,450	0.851	1.317	10	1.16	0.258588	0.44540	0.53	0.4275	4.44	7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D
	1060	1061	1,214,000	110,450	1,324,450	1.324	2.049	12	2.89	0.156716	0.40086	0.40	0.2942	6.96	PDWF conservatively multiplied by 2 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)
	1061	1062	1,236,000	110,450	1,346,450	1.346	2.083	12	4.00	0.135422	0.37033	0.37	0.2645	7.88	PDWF conservatively multiplied by 2 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)

Min Slope
0.28

Max dn/D
#N/A

A. Flows added to sewer flow monitoring data. To calculate EDUs, residential units and commercial building areas were used. Residential units were provided by the City. Building areas were obtained from SANGIS and converted to EDUs using 1 EDU/1,800 sqft. See Appendix D for detail.

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

**APPENDIX J**

**EXISTING SEWER SYSTEM ANALYSIS  
UNDER  
MASTER PLAN PLUS PROJECT  
PEAK DRY WEATHER FLOW  
AND  
PEAK WET WEATHER FLOW**

DATE: 12/22/2023

**SEWER STUDY SUMMARY**

JOB NUMBER: 1135-001

FOR: CVMU Project - Existing System, Existing + Project PDWF (Master Plan)  
 BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 1  
 REFER TO PLAN SHEET:

LINE	FROM	TO	EXISTING PEAK FLOW (gpd) <sup>A</sup>	ADDITIONAL EXISTING PEAK FLOW (gpd) <sup>B</sup>	PROPOSED PROJECT PEAK FLOW (gpd)	COMBINED PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' <sup>(1)</sup>	dn (feet)	dn/D <sup>(2)</sup>	C <sub>a</sub> for Velocity <sup>(3)</sup>	VELOCITY (f.p.s.)	COMMENTS <sup>B</sup>
							M.G.D.	C.F.S.								
	5259	6538	271,815	0	0	271,815	0.272	0.421	6	3.00	0.169604	0.20938	0.42	0.3118	5.40	City Master Plan PDWF for Reach 5258 to 200 conservatively divided by 2
	6538	5258	271,815	0	91,033	362,848	0.363	0.561	6	2.80	0.234353	0.25168	0.50	0.3964	5.67	
	5258	200	560,315	3,900	91,033	655,248	0.655	1.014	10	0.28	0.405046	0.60363	0.72	0.6089	2.40	City Master Plan PDWF 7.8 EDUs added, see Appendix D
	200	1068	560,315	13,150	91,033	664,498	0.664	1.028	10	0.28	0.410764	0.61043	0.73	0.6163	2.40	7.8 + 18.5 = 26.3 EDUs added, see Appendix D
	1068	1060	560,315	32,450	91,033	683,798	0.684	1.058	10	1.16	0.207671	0.39109	0.47	0.3620	4.21	7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D
	1060	1061	590,315	110,450	91,033	791,798	0.792	1.225	12	2.89	0.093690	0.30507	0.31	0.2029	6.04	City Master Plan PDWF 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)
	1061	1062	601,315	110,450	91,033	802,798	0.803	1.242	12	4.00	0.080743	0.28258	0.28	0.1823	6.81	City Master Plan PDWF 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)

Min Slope
0.28

Max dn/D
0.73

A. Existing peak flow of 16,685 gpd for the existing Carlsbad Village Mixed Use site is subtracted out downstream of Manhole 6538 due to proposed redevelopment (see Table 3 of report).

B. Flows added to sewer flow monitoring data. To calculate EDUs, residential units and commercial building areas were used. Residential units were provided by the City. Building areas were obtained from SANGIS and converted to EDUs using 1 EDU/1,800 sqft. See Appendix D for detail.

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

DATE: 12/22/2023

**SEWER STUDY SUMMARY**

JOB NUMBER: 1135-001

FOR: CVMU Project - Existing System, Existing + Project PWWF (Master Plan)  
 BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 1  
 REFER TO PLAN SHEET:

LINE	FROM	TO	EXISTING PEAK FLOW (gpd) <sup>A</sup>	ADDITIONAL EXISTING PEAK FLOW (gpd) <sup>B</sup>	PROPOSED PROJECT PEAK FLOW (gpd)	COMBINED PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' <sup>(1)</sup>	dn (feet)	dn/D <sup>(2)</sup>	C <sub>a</sub> for Velocity <sup>(3)</sup>	VELOCITY (f.p.s.)	COMMENTS <sup>B</sup>
							M.G.D.	C.F.S.								
	5259	6538	392,815	0	0	392,815	0.393	0.608	6	3.00	0.245105	0.25882	0.52	0.4106	5.92	City Master Plan PWWF for Reach 5258 to 200 conservatively divided by 2
	6538	5258	392,815	0	91,033	483,848	0.484	0.749	6	2.80	0.312503	0.30094	0.60	0.4939	6.06	
	5258	200	802,315	3,900	91,033	897,248	0.897	1.388	10	0.28	0.554640	#N/A	#N/A	#N/A	#N/A	City Master Plan PDWF 7.8 EDUs added, see Appendix D
	200	1068	802,315	13,150	91,033	906,498	0.906	1.403	10	0.28	0.560358	#N/A	#N/A	#N/A	#N/A	7.8 + 18.5 = 26.3 EDUs added, see Appendix D
	1068	1060	802,315	32,450	91,033	925,798	0.926	1.433	10	1.16	0.281168	0.46892	0.56	0.4554	4.53	7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D
	1060	1061	1,197,315	110,450	91,033	1,398,798	1.399	2.164	12	2.89	0.165514	0.41307	0.41	0.3062	7.07	PDWF conservatively multiplied by 2 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)
	1061	1062	1,219,315	110,450	91,033	1,420,798	1.421	2.198	12	4.00	0.142899	0.38128	0.38	0.2751	7.99	PDWF conservatively multiplied by 2 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)

Min Slope
0.28

Max dn/D
#N/A

A. Existing peak flow of 20,000 gpd for existing Carlsbad Village Mixed Use site is subtracted out downstream of Manhole 6538 due to proposed redevelopment (see Table 3 of report).

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

**APPENDIX K**

**PROPOSED SEWER SYSTEM ANALYSIS  
UNDER  
MASTER PLAN PLUS PROJECT  
PEAK DRY WEATHER FLOW  
AND  
PEAK WET WEATHER FLOW**



DATE: 12/22/2023

**SEWER STUDY SUMMARY**

JOB NUMBER: 1135-001

FOR: CVMU Project - Proposed System, Existing + Project PDWF (Master Plan)  
 BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 1  
 REFER TO PLAN SHEET:

LINE	FROM	TO	EXISTING PEAK FLOW (gpd) <sup>A</sup>	ADDITIONAL EXISTING PEAK FLOW (gpd) <sup>B</sup>	PROPOSED PROJECT PEAK FLOW (gpd)	COMBINED PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' <sup>(1)</sup>	dn (feet)	dn/D <sup>(2)</sup>	C <sub>a</sub> for Velocity <sup>(3)</sup>	VELOCITY (f.p.s.)	COMMENTS <sup>B</sup>
							M.G.D.	C.F.S.								
	5259	6538	271,815	0	0	271,815	0.272	0.421	8	3.00	0.078753	0.18600	0.28	0.1791	5.28	City Master Plan PDWF for Reach 5258 to 200 conservatively divided by 2
	6538	5258	271,815	0	91,033	362,848	0.363	0.561	8	2.80	0.108818	0.21991	0.33	0.2259	5.59	
	5258	200	560,315	3,900	91,033	655,248	0.655	1.014	12	0.28	0.249089	0.52261	0.52	0.4156	2.44	City Master Plan PDWF 7.8 EDUs added, see Appendix D
	200	1068	560,315	13,150	91,033	664,498	0.664	1.028	12	0.28	0.252605	0.52701	0.53	0.4200	2.45	7.8 + 18.5 = 26.3 EDUs added, see Appendix D
	1068	1060	560,315	32,450	91,033	683,798	0.684	1.058	10	1.16	0.207671	0.39109	0.47	0.3620	4.21	7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D
	1060	1061	590,315	110,450	91,033	791,798	0.792	1.225	12	2.89	0.093690	0.30507	0.31	0.2029	6.04	City Master Plan PDWF 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)
	1061	1062	601,315	110,450	91,033	802,798	0.803	1.242	12	4.00	0.080743	0.28258	0.28	0.1823	6.81	City Master Plan PDWF 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)

Min Slope
0.28

Max dn/D
0.53

A. Existing peak flow of 16,685 gpd for the existing Carlsbad Village Mixed Use site is subtracted out downstream of Manhole 6538 due to proposed redevelopment (see Table 3 of report).

B. Flows added to sewer flow monitoring data. To calculate EDUs, residential units and commercial building areas were used. Residential units were provided by the City. Building areas were obtained from SANGIS and converted to EDUs using 1 EDU/1,800 sqft. See Appendix D for detail.

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

DATE: 12/22/2023

**SEWER STUDY SUMMARY**

JOB NUMBER: 1135-001

FOR: CVMU Project - Proposed System, Existing + Project PWWF (Master Plan)  
 BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 1  
 REFER TO PLAN SHEET:

LINE	FROM	TO	EXISTING PEAK FLOW (gpd) <sup>A</sup>	ADDITIONAL EXISTING PEAK FLOW (gpd) <sup>B</sup>	PROPOSED PROJECT PEAK FLOW (gpd)	COMBINED PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K <sup>1</sup>	dn (feet)	dn/D <sup>2</sup>	C <sub>a</sub> for Velocity <sup>3</sup>	VELOCITY (f.p.s.)	COMMENTS <sup>B</sup>
							M.G.D.	C.F.S.								
	5259	6538	392,815	0	0	392,815	0.393	0.608	8	3.00	0.113810	0.22511	0.34	0.2333	5.86	City Master Plan PWWF for Reach 5258 to 200 conservatively divided by 2
	6538	5258	392,815	0	91,033	483,848	0.484	0.749	8	2.80	0.145106	0.25629	0.38	0.2782	6.05	
	5258	200	802,315	3,900	91,033	897,248	0.897	1.388	12	0.28	0.341084	0.63761	0.64	0.5286	2.63	City Master Plan PDWF 7.8 EDUs added, see Appendix D
	200	1068	802,315	13,150	91,033	906,498	0.906	1.403	12	0.28	0.344600	0.64229	0.64	0.5331	2.63	7.8 + 18.5 = 26.3 EDUs added, see Appendix D
	1068	1060	802,315	32,450	91,033	925,798	0.926	1.433	10	1.16	0.281168	0.46892	0.56	0.4554	4.53	7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D
	1060	1061	1,197,315	110,450	91,033	1,398,798	1.399	2.164	12	2.89	0.165514	0.41307	0.41	0.3062	7.07	PDWF conservatively multiplied by 2 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)
	1061	1062	1,219,315	110,450	91,033	1,420,798	1.421	2.198	12	4.00	0.142899	0.38128	0.38	0.2751	7.99	PDWF conservatively multiplied by 2 7.8 + 18.5 + 38.6 = 64.9 EDUs added, see Appendix D Hope Apts added (156 EDUs x 200 gpd/EDU x 2.5 = 78,000 gpd)

Min Slope
0.28

Max dn/D
0.64

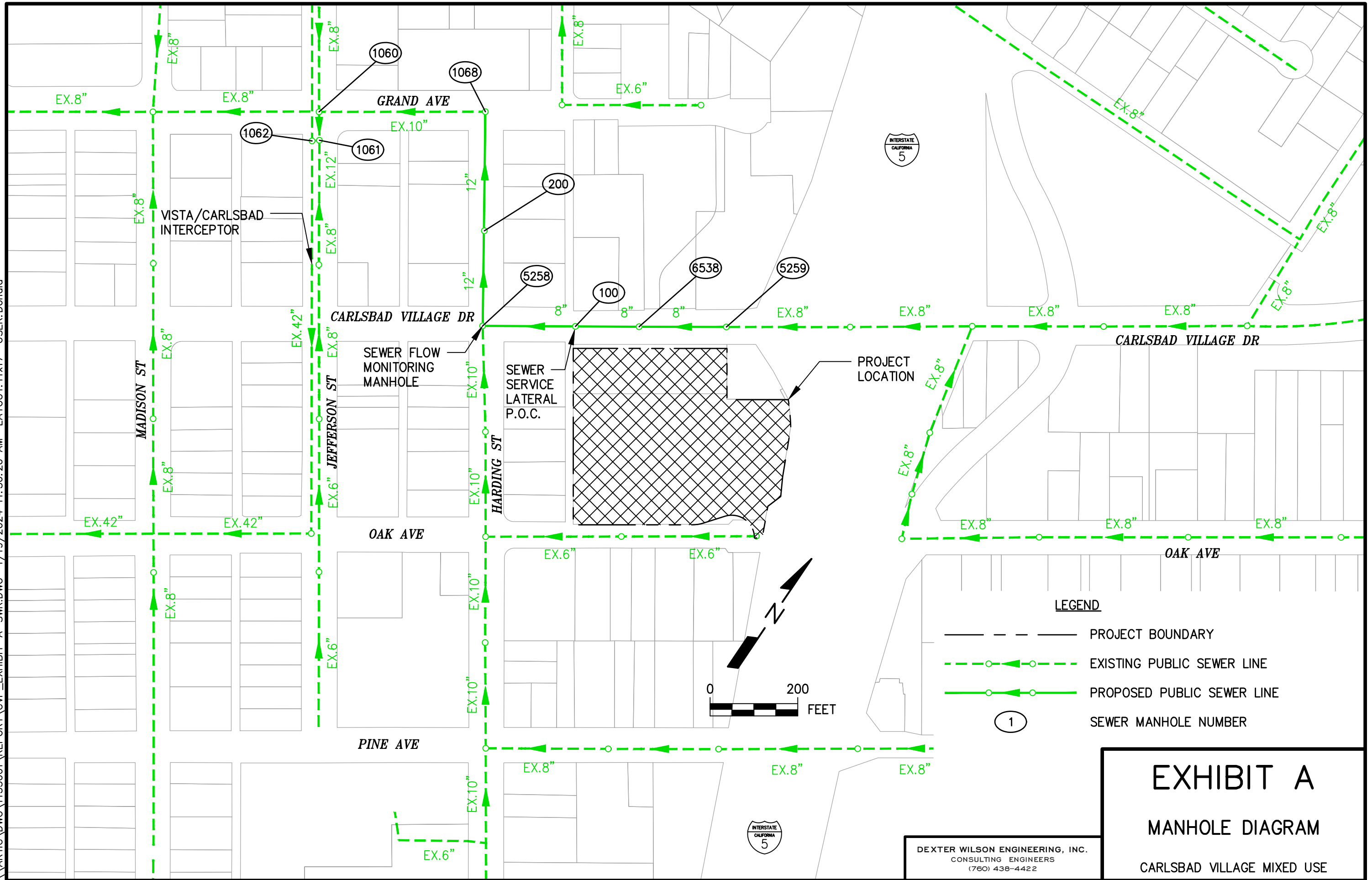
A. Existing peak flow of 20,000 gpd for existing Carlsbad Village Mixed Use site is subtracted out downstream of Manhole 6538 due to proposed redevelopment (see Table 3 of report).

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

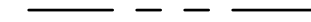



**EXHIBIT A**

**MANHOLE DIAGRAM**

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**LEGEND**

-  PROJECT BOUNDARY
-  EXISTING PUBLIC SEWER LINE
-  PROPOSED PUBLIC SEWER LINE
-  SEWER MANHOLE NUMBER

# EXHIBIT A

## MANHOLE DIAGRAM

CARLSBAD VILLAGE MIXED USE

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