Appendix UIS

Utility Impact Study

730 Central Avenue
Utility Impact Study

Prepared for
Rincon Consultants Inc.

and

City of Mountain View
500 Castro Street
Mountain View, CA 94041

DRAFT

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Executive Summary

Schaaf & Wheeler has been retained by Rincon Consultants Inc. to determine impacts from the 730 Central Avenue Project (Project) on the City of Mountain View's (City) water and sanitary sewer systems. The Project site is currently occupied by an existing Automotive Repair Shop with building footprint of 10,480 square feet. The Project proposes to demolish the existing building and construct a new 4-story multi-family residential building with an open air parking garage as the first floor, and 21 (twenty-one) new residential units on floors 2 through 4.

Project impacts are analyzed for both Existing (2010) and Future Cumulative (2030) Conditions for the water system. Hydraulic models simulating pre- and post-Project development scenarios are performed to examine hydraulic deficiencies. The Existing Condition is based on the *2010 Water Master Plan* (WMP) and the Future Cumulative Condition model is created from the *2030 General Plan – Updated Water System Modeling Alternative 1* (GP-UWSM Alt 1; Schaaf & Wheeler, November 2014) model. The Existing Condition model includes recent City approved projects and projects under construction near the Project site. The Future Cumulative Condition model includes CIPs from the NBPPII UIS and recent City approved projects not accounted for or in exceedance of the 2030 GPUUIS projections. The Future Cumulative Condition model also includes other projects under review near the Project site.

Project impacts to the sewer system are analyzed for Existing (2010) and Future Cumulative (2030) hydraulic models simulating pre- and post-Project development scenarios are performed to examine hydraulic deficiencies. The Existing Condition is based on the *2010 Sewer Master Plan* (SMP). The Existing Condition model includes recent City approved projects and projects under construction near the Project site. The Future Cumulative Condition sewer model is created from the *General Plan Update Utility Impact Study* (GPUUIS; IEC, October 2013) model and includes all sewer system CIPs recommended in the GPUUIS. The Future Cumulative Condition model also includes other projects under review near the Project site.

Water System Project Impacts

The Project development does not significantly impact the water system under peak hour demand (PHD) at Existing Condition. Under the Future Cumulative Condition assuming all of the recommended CIPs in the GPUUIS have been constructed, the system generally meets performance criteria under PHD. Pressures near Shoreline Golf Links fall just under PHD performance criteria of 40 psi; however no additional nodes outside of the Golf Links area fall below the PHD performance criteria. There are no new deficiencies resulting from the additional demands associated with the Project.

The Project specific fire flow requirement is based on the California Fire Code, 2019; the Project-specific fire flow of 2,193 gpm is met during Existing Condition and during Future Cumulative Condition. There are some deficient fire nodes within Pressure Zone 1; however they are far from the Project site. No new deficiencies are created as a result of adding the incremental Project specific water demands.

The actual fire flow requirement may change as the planning process continues and Project specific requirements are determined by the City Fire Marshal. If Project conditions require higher fire flow than what is analyzed, revised modeling should be conducted.

Sewer System Project Impacts

The sewer system has existing deficiencies for both pre- and post-Project flows in the Existing Condition. The Project does not create any new deficiencies in the Existing Condition system. In the Future Cumulative Condition, the sewer system does have sufficient capacity for pre- or post-Project flows assuming all CIPs in the GPUUIS have been constructed.

Three recommended CIPs or portions thereof in the 2030 GPUUIS are downstream of the Project: CIPs # P-25, P-26, P-100 and P-108. The CIPs P-25 and P-26 are based on 2010 SMP modeled pipes as 8-inch diameter pipes, these appear to be 10-inch diameter pipes within the City sewer block maps and may not be required if the current block maps are correct. For this analysis, CIP #100 conforms to City-provided plans from January 2018 for crossing State Highway 101. No new CIPs are required to accommodate the Project incremental sewer flows. The Project contribution to the recommended CIPs along the flowpath is determined and may be used to estimate developer impact fees for fair share impact to the system.

Chapter 1. Introduction

1.1. Project Description

The 730 Central Avenue Project (Project) is located on a 0.24 acre parcel on Central Avenue, north of Santa Rosa Avenue as shown on Figure B-1. The Project proposes to demolish the existing building and construct a new multi-family residential building with the first floor utilized for parking and floors two through four utilized for residential units. The Project requires a General Plan Amendment to increase the allowable density by 50%, and increasing the total number of units from 14 to 21. The parcel is currently zoned for commercial/residential – arterial and has a General Plan Designation of Mixed-Use Corridor.

1.2. Water System Analysis Approach

Project impacts are analyzed using the City's water models for two conditions: Existing (2010) and Future Cumulative (2030). As a baseline for system performance, each condition is evaluated pre-Project for existing hydraulic deficiencies. The estimated incremental water demand resulting from Project development is added to the model and post-Project deficiencies are examined. In total, four model simulations of the water system are performed, as shown in Figure 1.

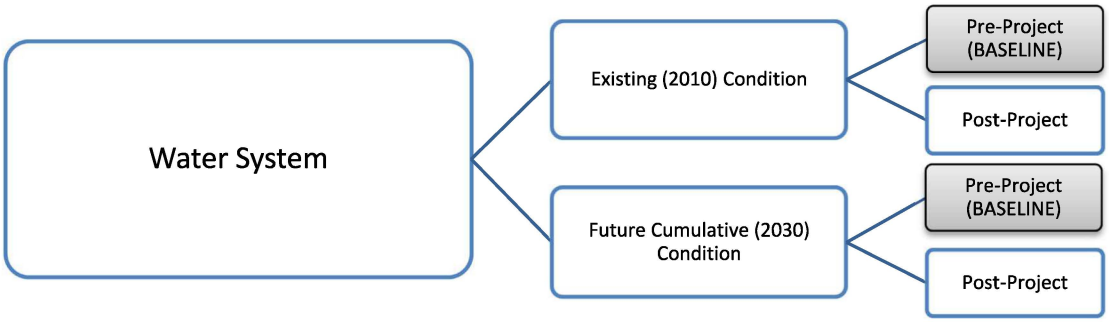


Figure 1. Water System Model Simulations

The Existing Condition model consists of the existing distribution system and operating parameters along with water demands based on existing land use from the *2010 Water Master Plan* (WMP) and has since been revised to include recent City approved projects and projects currently under construction near the Project site. The Future Cumulative Condition water demand is based on the 2030 General Plan Update (GPU) land use and has since been revised to include recent City approved projects not accounted for or in exceedance of the 2030 GPU projections. The Future Cumulative Condition demands also include projects under review near the Project site. Table A-1 in Appendix A provides a list of all of the considered development projects. The Future Cumulative Condition model is based on the *2030 General Plan – Updated Water System Modeling Alternative 1* (GP-UWSM Alt 1) model and assumes all of the recommended CIPs in the *North Bayshore Precise Plan Phase II Utility Impact Study* (NBPPII UIS; Schaaf & Wheeler, October 2016) have been constructed. The GP-UWSM Alt 1 updates the *General Plan Update Utility Impact Study* (GPUUIS; IEC, October 2011) with revisions to demands, network components, boundary conditions, fire flow requirements, and recommended CIPs. The

NBPPII UIS updates some CIPs recommended in the GP-UWSM Alt 1 based on revised demand and fire flow requirements within the North Bayshore Precise Plan boundary.

1.3. Sewer System Analysis Approach

Project impacts to the sewer system are analyzed using the City's sewer models for two conditions: Existing (2010) and Future Cumulative (2030). As a baseline for system performance, each condition is evaluated pre-Project for existing hydraulic deficiencies. The estimated sewer flow resulting from Project development is added to the model and post-Project deficiencies are examined. In total, four model simulations of the sewer system are performed, as shown in Figure 2.

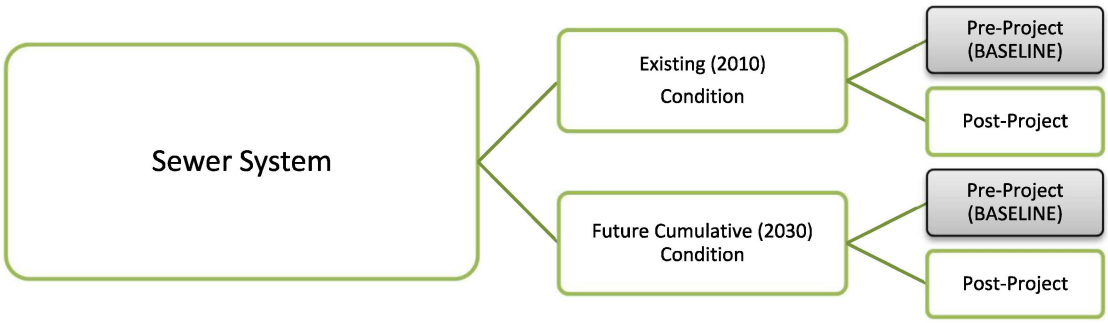


Figure 2. Sewer System Model Simulations

The Existing Condition model consists of the existing collection system and operating parameters along with sewer flow based on existing land use from the *2010 Sewer Master Plan* (SMP) and has since been revised to include recent City approved projects and projects under construction near the Project site. The Future Cumulative Condition sewer flows are based on the 2030 General Plan Update (GPU) land use and have since been revised to include recent City approved projects not accounted for or in exceedance of the 2030 GPU projections. The Future Cumulative Condition sewer flows also include projects under review near the Project site. Table A-1 in Appendix A provides a list of all of the considered development projects.

1.4. Report Organization

This report is organized into four following sections. Chapter 2 discusses the water demand estimates for the Project and Chapter 3 covers the impacts and capital improvement recommendations for the water system. Chapter 4 discusses the sewer flow estimates and Chapter 5 covers the capital improvements recommendations for the sewer system.

Chapter 2. Water Demand Projections

This chapter discusses the estimated water demand and required fire flow for the Project development. Water demand in this section represents Average Daily Demand (ADD). The ADD is an estimated daily average of water use patterns that varies by season and customer type.

Project impact is evaluated by adding the incremental increase in water demand at the Project site post-Project and comparing to the pre-Project baseline demand. The pre-Project baseline demand in the Existing and Future Cumulative Condition follows the methodology described in the 2010 WMP and 2030 GPUUIS. The water unit duty factor for estimating total Project demand is taken from previous technical studies to remain consistent with the City-wide demand projections used in the hydraulic models.

2.1. Project Water Demand

Project water demand is estimated from number of dwelling units in the Project Plans dated July 14, 2021 and water unit duty factors developed for the City. Water unit duty factors used in this report were developed as part of the North Bayshore Precise Plan Phase II (Table 2-2, NBSPPII) from water meter records of recent developments throughout the City. The duty factors applied are representative of multi-family residential buildings for the proposed residential buildings. Table 2-1 provides the Project specific demand

Table 2-1: Project Estimated Water Demand

Building	Number of Dwelling Units	Land Use Type	Water Duty Factor (gpd/DU or gpd/1000 sf)	Water Demand (gpd)
730 Central Ave	21	Multi-family *	100	2,100
Total	***21***	**-**	**-**	***2,100***

**Multi-Family residential used for calculating projected water demands*

2.1.1. Project Required Fire Flow

The anticipated Project-specific fire flow requirement at the site is based on the 2019 California Fire Code (CFC) Appendix B, which gives the minimum fire flow requirement based on fire-flow area and building construction type. Construction type and estimated floor area for the Project and existing buildings are taken from the Project Plan Set dated July 14, 2021. Based on the California State Fire Marshal Code Interpretation 11-015 for mixed use construction, the fire flow requirement for the proposed buildings is estimated using a percentage approach between Type V-A construction proposed for the multi-family residential levels (Floors 2, 3, and 4) and Type I-V for first floor parking garage.

Building-specific fire flow requirements based on the CFC are presented in Table 2-2. Because the proposed buildings will have fire sprinklers, a 50 percent reduction is applied to the required fire flow rates from the CFC. This is a conservative assumption since a 75 percent reduction is allowed upon approval on an approved automatic sprinkler system according to CFC Section B105.2.

Table 2-2 – Anticipated New Building Project Fire Flow (FF) Requirement

Building	FF Calculation Area (sq ft)	Construction Type	CFC Required FF (gpm)	FF with 50% Reduction (gpm)	FF with 75% Reduction (gpm)
Parking Garage (1st Floor)	11,036	I-V	4,385	2,193	1,500*
Residential (Floors 2-4)	19,218	V-A			

**Based on 2019 CFC minimum reduced Fire Flow requirement*

2.2. Existing Condition (2010)

2.2.1. Pre-Project (Baseline) Land Use and Demand

The pre-Project (baseline) condition includes parcel-level demand adopted from the City's InfoWater model, developed as part of the 2010 WMP. The demand in the model is calibrated against water billing records from 2005 and 2006, as further explained in the 2010 WMP. For some non-Project parcels, these WMP demands have since been updated to include recent City approved projects and projects under construction near the Project site outlined in Table A-1 in Appendix A. Table 2-3 details the model demand at the parcels, which were designated as Commercial/Retail.

Table 2-3: Baseline Demand for Existing Condition (Based on Model)

Address	APN	2010 Master Plan Existing Land Use Designation	Acreage	Water Demand (gpd)
730 Central Avenue	158-45-001	Commercial/Retail	.24	150*

**Water Demand allocated to the specific parcel in the Existing Condition hydraulic model*

2.2.2. Post-Project Incremental Demand

For the Project impact analysis in the Existing Condition, total post-Project demand is added to the Existing Condition model as an incremental increase in water flow to the pre-Project demand. The incremental increase in demand in the Existing Condition is given in Table 2-4.

Table 2-4: Incremental Project Demand for Existing Condition

	Water Demand (gpd)
Pre-Project (Baseline) Demand	150
Total Post-Project Demand	2,100
Incremental Increase in Demand	***+1,950***

2.3. Future Cumulative Condition (2030)

2.3.1. Pre-Project (Baseline) Land Use and Demand

Future Cumulative (baseline) demand for the Project is adopted from the City's InfoWater model developed as part of the 2030 GPUUIS. In the 2030 GPUUIS model, water demands are based on the 2030 General Plan Update

(GPU) land use; these demands have since been updated to include recent City approved projects and projects under review as outlined in Table A-1 in Appendix A. Table 2-5 presents the parcel level pre-project demand from the model. Whereas the Existing Condition model was populated with demand based on billing records, the Future Cumulative Condition model has a higher projected future demand for the parcel based on the water duty factors developed as part of the 2010 WMP.

Table 2-5 – Baseline Demand for Future Cumulative Condition (Based on Model)

Address	APN	GPUUIS Land Use Designation	Acreage	Water Demand (gpd)
730 Central Avenue	158-45-001	Commercial/Residential - Arterial	.24	1,030*

**Water Demand allocated to the specific parcel in the Future Cumulative hydraulic model*

2.3.2. Post-Project Incremental Demand

Total post-Project demand is added to the model as an additional increase in water demand to the pre-Project demand. The incremental increase in demand in the Future Cumulative Condition is given in Table 2-6.

Table 2-6: Incremental Project Demand for Future Cumulative Condition

	Water Demand (gpd)
Pre-Project (Baseline) Demand	1,030
Total Post-Project Demand	2,100
Incremental Increase in Demand	***+1,070***

Chapter 3. Water System Impact

Project impacts to water supply, water storage, hydraulic conveyance, and fire flow requirements are evaluated in this chapter to ensure the Project demand can be adequately met. Hydraulic conveyance and available fire flow are assessed for both Existing (2010) and Future Cumulative (2030) Condition. Water supply and water storage are evaluated for the Future Cumulative Condition.

3.1. Demand Scenarios and Performance Criteria

Hydraulic performance within the water system are evaluated under two demand scenarios: Peak Hour Demand (PHD) and Maximum Day Demand with Fire Flow (MDD + FF). The MDD and PHD peaking factors from the 2010 Water Mater Plan (WMP) are used for this analysis. As detailed in the 2010 WMP, MDD and PHD peaking factors are developed using SCADA data from peak usage months in 2006 and 2007. The peak hour occurred on the day with the largest daily demand, which was observed to be August 8, 2007. The calculated peaking factors, presented in Table 3-1, are applied to Average Day Demand (ADD).

Table 3-1: Peaking Factors

Category	Peaking Factor
Maximum Day	1.71
Peak Hour	2.79

Established design criteria used to evaluate the Project impact for all scenarios are summarized in Table 3-2.

Table 3-2: Water System Performance Criteria

Criteria	PHD	MDD + FF
Minimum Allowable Pressure (psi)	40	20

3.2. Water Supply Analysis

The increased water demand from Project development in the Future Cumulative Condition is compared with the City's supply turnouts and groundwater well capacities to ensure demand can be met. The Mountain View water system is divided into three pressure zones to maintain reasonable pressures throughout the City's rising topography moving south, further from the Bay. The Project site is located in Pressure Zone 1, which is, at this time, supplied by only one San Francisco Public Utilities Commission (SFPUC) turnout (Turnout #5).

Water demand versus supply capacity by Pressure Zone is given in Table 3-3. Total capacity for Pressure Zone 1 includes peak hour turnout capacity from SFPUC Turnout #5 and additional supply supplemented from Wells #22 and #23. Demand in Pressure Zone 1 cannot be sufficiently supplied by the current supply operation; however, as discussed in the *2030 General Plan Update Utility Impact Study* (IEC, 2011), surplus supply in Pressure Zone 2 could be routed to Pressure Zone 1 to make-up the supply deficiency in the Pressure Zone 1. A pressure reducing valve (PRV) moving water from Pressure Zone 2 to Pressure Zone 1 at North Whisman Road, between Walker Drive and Whisman Court, is included in the *North Bayshore Precise Plan II Utility Impact Study*

(NBPPII UIS; Schaaf & Wheeler, October 2016). The ability of the system to meet Project demand and the fire flow requirement at Future Cumulative Condition assumes this CIP has been constructed. The additional Project demand does not impact the City's ability to meet total system demand.

Table 3-3: Future Cumulative Condition Demand Versus Supply

Pressure Zone	2030 Future Cumulative Demand			Total Capacity (mgd)*
	Pre-Project		Post-Project	
	ADD (mgd)	PHD (mgd)	PHD (mgd)	
1	7.98	22.26	22.26	16.56
2	8.41	23.46	23.46	30.53
3	1.62	4.52	4.52	5.1
Total	**18.01**	**50.25**	**50.25**	**52.19**

** Total Capacity from Table 3-8 in the General Plan Update Utility Impact Study (IEC, 2011)*

3.3. Water Storage Analysis

Project impact to water storage volume requirements is evaluated according to the State Water Resources Control Board Division of Drinking Water (DDW). DDW requires storage equal to 8 hours of Maximum Day Demand (MDD) plus fire flow storage in each pressure zone. The required storage versus active storage in the City is detailed in Table 3-4 pre- and post-Project. The maximum active storage in the City is 17 MG. However, the City currently operates with only the operational active storage of 14.3 MG.

The fire flow volume in Table 3-4 revises the requirement in the 2010 WMP and is estimated from the largest fire flow requirement in each pressure zone. Based on CFC requirements the fire flow volume is calculated as 5,000 gpm for 4 hours. Pressure Zone 3 has the potential for a reduction in required fire flow volume since the controlling fire flow requirement is the hospital along Grant Road, which has a planning-level fire flow requirement of 3,500 for 4 hours.

Since the City has the storage volume available to meet DDW requirements in the Future Cumulative Condition pre- and post-Project, no additional storage improvements are recommended. In the future, when City demand and storage requirements exceed the current operating storage, the City may need to alter reservoir operation schemes.

Table 3-4: DDW Storage Requirements

Pressure Zone	Maximum Active Storage* (MG)	Operational Active Storage (MG)	Fire Flow (MG)	Future Cumulative Condition Demand					
				Pre-Project			Post-Project		
				ADD (mgd)	8 Hours of MDD (MG)	DDW Requirement (MG)	ADD (mgd)	8 Hours of MDD (MG)	DDW Requirement (MG)
1	6.00	5.1	1.2	7.98	4.55	5.25	7.98	4.55	5.25
2	8.00	6.5	1.2	8.41	4.79	6.30	8.41	4.79	6.30
3	3.00	2.7	1.2	1.62	0.92	2.12	1.62	0.92	2.12
Total	**17.00**	**14.3**	**3.6**	**18.01**	**10.27**	**13.67**	**18.01**	**10.27**	**13.67**

** Maximum Active Storage from Table 4-2 in the General Plan Update Utility Impact Study (IEC, 2011)*

3.4. Existing Condition (2010) Results

3.4.1. Hydraulic Model Information

Existing water system performance is analyzed with the demands and land use type in the City's InfoWater model developed for the City's 2010 WMP. Domestic and fire services for the Project will connect to the existing 8-inch water mains in Central Avenue. For this analysis, only City-owned utilities are modeled; interior site piping is not evaluated.

The Existing Condition pre-Project fire flow requirement is based on the planning level fire flow of 3,500 gpm. The proposed fire flow requirements for new buildings are identified in Table 2-2, and is 2,193 gpm as discussed in Section 2.1.1.

3.4.2. Peak Hour Demand (PHD) – Pre and Post Project

System pressures are evaluated under Peak Hour Demand (PHD) pre-Project (Figure B-2) and post-Project (Figure B-3). At Existing Condition the system meets performance criteria system-wide. The Project development does not impact the system hydraulic performance under PHD.

3.4.3. Maximum Day Demand with Fire Flow (MDD+FF) – Pre and Post Project

The pre-Project planning-level required fire flow of 3,500 gpm is met at the existing hydrant locations at the proposed Project site (Figure B-4).

After Project development, the anticipated project-specific fire flow requirement of 2,193 gpm is met at the site as illustrated in Figure B-5 and detailed in Table 3-5. The other existing deficiencies in Pressure Zone 1 shown on Figures B-4 and B-5 are not near the Project site and are independent of the Project.

Table 3-5: Existing Condition Evaluated Project Fire Flow Nodes

Node ID	Location	Required Fire Flow Rate (gpm)	Available Flow Pre-Project (gpm)	Available Flow Post-Project (gpm)
J-2584	Project Location – Central Avenue	Pre-Project: 3,500 Post-Project: 2,193	11,619	11,619

3.4.4. Deficiencies – Pre and Post Project

With Existing Condition demand, the water system meets system design criteria at PHD and is able to adequately supply the increased Project demand.

Existing fire flow nodes are evaluated within the Project Pressure Zone (Zone 1) for Project impact. There are several deficient fire nodes within Pressure Zone 1; however, none of the deficient nodes are near the Project site. The increase in water demand results in less than a 1% decrease in available fire flow at the nearest deficient nodes; therefore, the impact is not considered significant.

Table 3-6: Selected Existing Condition Fire Flow Deficient Nodes Pre- and Post-Project

Node ID	Location	Required Fire Flow Rate (gpm)	Available Flow Pre-Project (gpm)	Available Flow Post-Project (gpm)
J-1201	Laura Lane	1,500	893	893
J-2624	Jackson Street	2,500	2,375	2,374
J-4185	San Leandro St, north of San Pablo	3,500	3,396	3,395

3.5. Future Cumulative Condition (2030) Results

3.5.1. Hydraulic Model Information

Outside of the North Bayshore Precise Plan boundary, the Future Cumulative Condition model is created using water demand based on the 2030 General Plan Update (GPU) land use and includes the additional projects listed in Table A-1 in Appendix A. Within the North Bayshore Precise Plan Boundary, demands in the Future Cumulative Condition model are based on demands developed as part of the *North Bayshore Precise Plan Phase II Utility Impact Study* (NBPPII UIS; Schaaf & Wheeler, October 2016). System performance is analyzed under the assumption that all recommended CIPs in the NBPPII UIS have been constructed. Domestic and fire services for the Project will connect to the existing 8-inch water main in Central Avenue.

The Future Cumulative Condition pre-Project fire flow requirement is not changed from the updated Existing Condition pre-Project fire flow requirement. The pre-Project fire flow requirement of 3,500 gpm, based on planning level fire flow requirements. After Project development, the Project specific required fire flow at the site is anticipated to be a fire flow of 2,193 gpm, utilizing a 50% reduction in fire flow as discussed in Section 2.1.1.

3.5.2. Peak Hour Demand (PHD) – Pre and Post Project

The system has adequate pressures pre-Project (Figure B-6). Pressures pre and post-Project near Shoreline Golf Links are just under the performance criteria of 40 psi, however, none fall below 37 psi.

3.5.3. Maximum Day Demand with Fire Flow (MDD+FF) – Pre and Post Project

In the Future Cumulative Condition, the system is able to meet the fire flow requirements at the site pre-Project as shown on Figure B-8. Available Fire Flow pre and post Project are provided on Table 3-7 for three closest deficient nodes within Pressure Zone 1 for comparison of pre- and post-Project available flow.

Table 3-7: Selected Future Condition Fire Flow Deficient Nodes Pre- and Post-Project

Node ID	Location	Required Fire Flow Rate (gpm)	Available Flow Pre-Project (gpm)	Available Flow Post-Project (gpm)
J-2873	Linda Vista Avenue	3,500	3,330	3,330
J-4187	San Leandro St, south of Terra Bella Ave	3,500	3,439	3,439
J-4185	San Leandro St, north of San Pablo	3,500	3,018	3,018

Note: Red font indicates available fire flow that does not meet the required fire flow rate.

3.5.4. Deficiencies – Pre and Post Project

With Future Cumulative Condition demand, all nodes within Pressure Zone 1, excluding the Golf Links golf course, meet the performance criteria of 40 psi during PHD.

The fire flow deficient nodes within Pressure Zone 1 are evaluated for Project impact. There are several deficient fire nodes within Pressure Zone 1; however, none of the deficient nodes are near the Project site. The increase in water demand results in less than a 1% decrease in available fire flow at the nearest deficient nodes; therefore, the impact is not considered significant.

Chapter 4. Sewer Flow Projections

This chapter discusses the sewer flow estimate for Project development and provides a comparison to pre-Project baseline condition. The incremental Project flow is determined for both Existing (2010) and Future Cumulative (2030) Condition, as discussed in the following sections. The sewer generation factor for estimating Project sewer flow is taken from previous technical studies (2010 SMP, 2030 GPUUIS, and NBPPII) to remain consistent with the City-wide flow projections used in the hydraulic models.

Three types of sewer flow loading are used to model the sewer system: base wastewater flow, groundwater infiltration (GWI), and rainfall-dependent infiltration/inflow (RDI/I). GWI includes base infiltration (BI) and pumped groundwater discharged to the sewer system. RDI/I is stormwater that enters the sewer system. GWI and RDI/I values are modeled as constant flows.

Base wastewater flow (BWF) is from residential, commercial, institutional, office, and industrial sources. As described in the 2010 Sewer Master Plan (SMP), BWF is developed on an individual parcel level using the 2005 and 2006 water billing records and applying a return-to-sewer (RTS) ratio calculated for land use type. Change in BWF throughout the day due to daily use patterns is known as diurnal variation and is accounted for by applying residential and non-residential diurnal curves. BWF and diurnal curves used in this analysis are taken from the 2010 SMP to remain consistent with previous City-wide modeling. The sewer flows discussed in this section are the BWF values representing average flows and are not peaked.

4.1. Project Sewer Flow

Project generated sewer flow is estimated from the number of multi-family residential units provided in the Project Plan Set dated July 14, 2021. A return-to-sewer (RTS) ratio is applied to the water duty factor from Table 2-1 to estimate sewer flow. An RTS ratio of 0.75 was used for residential units based on the 2010 SMP RTS ratio for multi-family residential land use (SMP Table 3-2). Table 4-1 provides the sewer flow estimation for each building.

Table 4-1: Project Estimated Sewer Flow

Building	Number of Dwelling Units	Land Use Type	Sewer Duty Factor (gpd/DU)	Sewer Flow (gpd)
730 Central Ave	21	Multi-Family*	75	1,575
Total	***21***			***1,575***

**Multi-Family residential used for calculating projected sewer generation*

4.2. Existing Condition (2010)

4.2.1. Pre-Project (Baseline)

The pre-Project (baseline) condition includes parcel-level sewer flow adopted from the City's InfoSWMM model, developed as part of the 2010 SMP. For some non-Project parcels, these SMP flows have since been updated to

include recent City approved projects and projects under construction near the Project site outlined in Table A-1 in Appendix A. Table 4-2 details the parcel-level sewer flow in the model; the model sewer flows are based on the sewer generation rates used in the 2010 SMP. The parcel specific demand is based on the weighted contribution to a specific model node and may be lower than the actual parcel sewer generation rate.

Table 4-2: Baseline Flow for Existing Condition (Based on Model)

Address	APN	2010 Master Plan Existing Land Use Designation	Acreage	Sewer Flow (gpd)
730 Central Avenue	158-45-001	Commercial/Retail	.24	30*

**Flow allocated to specific parcel within the Existing Condition hydraulic model*

4.2.2. Post-Project Incremental Demand

For the Project impact analysis in the Existing Condition, total post-Project sewer flow is added to the Existing model pre-Project flow as an additional increase in sewer flow. The incremental increase in flow is given in Table 4-3.

Table 4-3: Incremental Project Flow for Existing Condition

	Sewer Flow (gpd)
Pre-Project (Baseline) Flow	30
Total Post-Project Flow	1,575
Incremental Increase in Flow	***+1,545***

4.3. Future Cumulative Condition (2030)

4.3.1. Pre-Project (Baseline)

Future Cumulative (baseline) flow for the Project is adopted from the City's InfoSWMM model developed as part of the 2030 GPUUIS. In the 2030 GPUUIS model, sewer flows are based on the 2030 General Plan Update (GPU) land use; these flows have since been updated to include recent City approved projects and projects under review as outlined in Table A-1 in Appendix A.

Table 4-4 presents the parcel-level pre-project flow from the Future Cumulative hydraulic model. The Future Cumulative Condition model has a higher projected future sewer flow based on the 2010 SMP generation factors. The specific parcel demand is based on the weighted contribution to a specific model node in the hydraulic model.

Table 4-4: Baseline Flow for Future Cumulative Condition (Based on Model)

Address	APN	GPUUIS Land Use Designation	Acreage	Sewer Flow (gpd)
730 Central Avenue	158-45-001	Commercial/Residential - Arterial	.24	490*

**Flow allocated to specific parcel within the Future Cumulative hydraulic model*

4.3.2. Post-Project Incremental Demand

Total post-Project flow is added to the Future Cumulative Condition model as an additional increase in sewer flow from pre-Project flow. The incremental post-Project flow is given in Table 4-5.

Table 4-5: Incremental Project Flow for Future Cumulative Condition

	Sewer Flow (gpd)
Pre-Project (Baseline) Flow	490
Total Post-Project Flow	1,575
Incremental Increase in Flow	***+1,085***

Chapter 5. Sewer System Impact

The impact of Project development on the sewer system is analyzed under Existing (2010) and Future Cumulative (2030) conditions. The specific affected area of the gravity system evaluated for Project impact begins at the Project site on Central Avenue and flows west, then flows north on Stierlin Rd, Stierlin Rd turns into North Shoreline Blvd and continues north across Hwy 101 and continues to the north to the Shoreline Sewer Pump Station via the Central Trunk.

5.1. Scenarios and Performance Criteria

Sewer capacity is analyzed under Peak Wet Weather Flow (PWWF) and Average Dry Weather Flow (ADWF). PWWF is used to determine hydraulic deficiencies according to the performance criteria in Table 5-1. ADWF is used to determine adequacy of treatment capacity.

The ADWF scenario is developed in the model by adding BWF and GWI. Since the ADWF scenario models average daily flows, BWF is not peaked. The PWWF scenario applies the diurnal peaking curves for residential and non-residential flows and simulates system response to rainfall dependent inflow and infiltration. The diurnal peaking curves are adopted from the City's 2010 SMP. Groundwater Infiltration (GWI) and rainfall-dependent infiltration/inflow (RDI/I) are included, but are not peaked.

Table 5-1: Sewer System Performance Criteria

Criteria	Pipe Diameter ≤ 12 inch	Pipe Diameter > 12 inch
Maximum Flow Depth/Pipe Diameter (d/D)	0.50	0.75

5.2. Sewer Treatment, Joint Interceptor, and San Antonio Interceptor Capacity

Sewage generated within the City is treated at the Regional Water Quality Control Plant (RWQCP) in Palo Alto. The sewer collection system is a gravity system with the majority of flow discharging into three main trunk lines that convey flow from the south to the north and terminate at the SPS located within the City's Shoreline Park. Flow is then pumped to the gravity Joint Interceptor Sewer that conveys flow to the RWQCP. The remaining flow not received at the SPS is discharged to the Los Altos' San Antonio Interceptor that also conveys flow into the Joint Interceptor.

The City entered into a joint agreement, referred to as the Basic Agreement, with the cities of Palo Alto and Los Altos in 1968 for the construction and maintenance of the joint sewer system addressing the need for conveyance, treatment, and disposal of wastewater to meet Regional Board requirements. In accordance with the Basic Agreement, Palo Alto owns the RWQCP and administers the Basic Agreement with the partnering agencies purchasing individual capacity rights in terms of an average annual flow that can be discharged to the RWQCP. Capacity rights of the three cities can be rented or purchased from other neighboring agencies and each partnering agency can sell their capacity to others. Contractual capacity is based upon the 1985 Addendum No. 3 of the 1968 Joint Sewer System agreement that revised capacity rates in relationship to facility expansion and is based upon Average Annual Flow (defined as 1.05 times Average Dry Weather Flow). Separate service

agreements with the RWQCP have since reallocated current capacity rights to include six partnering agencies. Table 5-2 presents the current capacity rights for each agency.

Table 5-2: RWQCP Joint Facilities Capacity Rights

Partner Agency	Treatment Capacity	72-inch Joint Interceptor Capacity
	Average Annual Flow (MGD)	Peak Wet Weather Flow (MGD)
Palo Alto	15.3	14.59
East Palo Alto Sanitary District	3.06	0
Los Altos Hills	0.63	3.41
Stanford University	2.11	0
Mountain View	15.1	50
Los Altos	3.8	12
Total	***40***	***80***

Source: Long Range Facilities Plan for the Regional Water Quality Control Plant (City of Palo Alto, May 2012)

The City's total capacity rights include flow leaving the City through the SPS and the amount of flow that the City discharges into the Los Altos' San Antonio Interceptor, per the 1970 Los Altos San Antonio Trunk Sewer Capacity Agreement between the two cities. The total system-wide contractual capacity for Mountain View is evaluated in the Existing and Future Cumulative Conditions with increased Project flow. Table 5-3 shows the City's projected flows compared to the RWQCP Joint Facilities capacity rights.

Per the Basic Agreement, the partnering agencies agree to conduct an engineering study when their respective service area reaches 80% of their contractual capacity rights. The Future Cumulative Condition estimates that the projected demand pre-Project and post-Project will exceed the 80% capacity threshold. The required engineering study when the City reaches 80% of their capacity shall redefine the anticipated future needs of the treatment plant.

Table 5-3: Capacity Rights Comparison

RWQCP Joint Facility	Mountain View Contractual Capacity (MGD)	Pre-Project		Post-Project	
		2010 Existing (MGD)	2030 Future Cumulative (MGD)	2010 Existing (MGD)	2030 Future Cumulative (MGD)
Treatment	15.1	10.16	14.15	10.16	14.15
Joint	50	16.98	21.91	16.98	21.91

** Treatment = Average Annual Flow (AAF), Joint Interceptor = PWWF*

5.3. Existing Condition (2010) Results

5.3.1. Hydraulic Model Information

The Existing Condition sewer system is modeled using the City's InfoSWMM model developed as part of the *2010 Sewer Master Plan* (SMP). The Project connects to an existing 10-inch VCP pipe; however, the pipe immediately transitions to an 8-inch VCP downstream of the Project site. For the purposes of modeling the impacts, the Project sewer flow is assumed to discharge into the existing 8-inch diameter public sewer main along Central Avenue.

5.3.2. Peak Wet Weather Flow (PWWF) Scenario – Pre and Post Project

The sewer system meets the City's d/D performance criteria along the Project flow path. There are no pipes along the flow path that are at risk of surcharging. Both pre-Project and post-Project pipes along the flow path in the for the Existing Condition are shown in Figures B-10a, B-10b, B-11a, and B-11b.

5.3.3. Deficiencies – Pre and Post Project

Existing Condition model results comparing pre- and post-Project d/D are presented in Table 5-4. The system meets d/D performance criteria in all pipes downstream of the Project.

5.4. Future Cumulative Condition (2030) Results

5.4.1. Hydraulic Model Information

The Future Cumulative Condition model is created using sewer flows based on the 2030 General Plan Update (GPU) land use and includes additional projects listed in Table A-1 in Appendix A. System performance is analyzed under the assumption that all recommended CIPs in the 2030 GPUUIS have been constructed. Project sewer flow is assumed to discharge into the existing 8-inch diameter public main along Central Avenue.

Three recommended CIPs or portions thereof in the 2030 GPUUIS are downstream of the Project: CIPs # P-25, P-28, P-100 and P-108. In the 2030 GPUUIS, CIP # P-26 includes upsizing 536 feet of existing 10-inch diameter pipe to 12-inch diameter pipe along Central Avenue between Moffet Blvd and Stierlin Rd, CIP #P-25 includes upsizing 334 feet of 10-inch diameter pipe to 12-inch diameter pipe along Stierlin Rd between Central Avenue and Wright Avenue. The CIPs P-25 and P-26 are based on 2010 SMP modeled pipes as 8-inch diameter pipes, these appear to be 10-inch diameter pipes within the City sewer block maps and may not be required if the current block maps are correct.

CIP #P-100 includes upsizing 4,419 feet of existing 18-inch diameter pipe to a 21-inch diameter pipe along North Shoreline Boulevard between Terra Bella Avenue and Charleston Road. However, for this analysis, CIP #100 conforms to City-provided plans from January 2018 for crossing State Highway 101 such that approximately 5,792 feet of pipe is upsized to 21-inch diameter pipe. CIP #108 recommends upsizing 241 feet of existing 21-inch diameter pipe to 24-inch diameter pipe along North Shoreline Boulevard north of Crittenden Lane.

5.4.2. Peak Wet Weather Flow (PWWF) Scenario – Pre and Post Project

The system meets d/D performance criteria downstream of the Project in the Future Cumulative Condition pre-Project and post-Project as shown in Figures B-12a and B-12b, assuming recommended CIPs are constructed.

5.4.3. Deficiencies – Pre and Post Project

There are no new deficiencies due to the Project incremental increase in sewer flow under the Future Cumulative Condition. Results comparing the pre- and post-Project d/D and flows are presented in Table 5-5, the pipes downstream of the Project are shown on Figures B-12a through B-13b. Recommended CIP diameters from the 2030 GPUUIS are indicated by green font in Table 5-5.

5.5. Project Contribution to Deficient Sewer Pipes

Several projects are identified downstream of the Project site, including pipes recommended to be upsized as part of the 2030 GPUUIS. Some of the projects may be based on older pipe diameters, and it is possible the CIPs P-25 and P-26 may not be needed if the current City sewer block maps are correct. The pipes identified to be upsized are identified on Table 5-5, and Table 5-6 provides a comparison of ADWF in order to determine the Project contribution for the recommended pipe improvement projects.

Table 5-4: Existing Condition Model Results – Pre and Post Project

Sewer Main Model ID	Upstream MH ID	Downstream MH ID	Existing Diameter (in)	Length (ft)	Slope (%)	ADWF				PWWF				
						Pre-Project		Post-Project		Pre-Project		Post-Project		
						Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)
1493	G4-113	G4-111	8	172	0.420	0.124	0.3250	0.126	0.3278	0.225	0.4486	0.229	0.4526	9
1473	G4-111	G4-107	10	187	0.472	0.124	0.2647	0.127	0.2668	0.227	0.3610	0.231	0.3640	27
1461	G4-107	G4-163	10	85	0.279	0.128	0.2703	0.130	0.2725	0.234	0.3697	0.238	0.3727	25
1457	G4-163	G4-155	10	264	0.422	0.129	0.2789	0.131	0.2811	0.237	0.3831	0.241	0.3863	23
1425	G4-155	G4-035	10	334	0.285	0.132	0.2693	0.134	0.2715	0.244	0.3703	0.247	0.3732	25
1366	G4-035	G4-033	15	35	1.579	0.841	0.3387	0.843	0.3391	1.590	0.4852	1.594	0.4859	35
1354	G4-033	G4-080	15	310	0.386	0.851	0.3771	0.854	0.3775	1.613	0.5436	1.616	0.5444	27
1304	G4-080	G4-052	15	389	0.631	0.861	0.3532	0.863	0.3537	1.627	0.5019	1.631	0.5025	33
1240	G4-052	F4-063	15	649	0.631	0.897	0.3489	0.899	0.3493	1.673	0.4926	1.677	0.4932	34
1069	F4-063	F4-027	15	314	0.808	0.928	0.3399	0.930	0.3403	1.725	0.4777	1.728	0.4783	36
1000	F4-027	F4-015	15	348	0.802	0.932	0.3391	0.934	0.3395	1.731	0.4763	1.734	0.4769	36
905	F4-015	F4-013	15	194	0.831	0.932	0.3781	0.934	0.3785	1.732	0.5396	1.735	0.5403	28
884	F4-013	F4-074	15	25	0.372	0.934	0.4263	0.936	0.4268	1.734	0.6122	1.738	0.6130	18
771	F4-074	F4-072	15	180	0.495	0.958	0.3487	0.960	0.3491	1.778	0.4910	1.781	0.4916	34
749	F4-072	F4-070	15	318	2.284	0.960	0.3300	0.963	0.3304	1.783	0.4649	1.786	0.4655	38
722	F4-070	F4-018	15	20	0.883	0.972	0.2733	0.974	0.2736	1.793	0.3846	1.797	0.3850	49
609	F4-018	F4-016	15	272	22.740	0.972	0.3018	0.974	0.3020	1.793	0.4099	1.797	0.4103	45
607	F4-016	E4-003	18	190	0.396	1.296	0.4947	1.298	0.4951	2.239	0.6614	2.243	0.6620	12
525	E4-003	E4-008	18	243	0.014	1.296	0.5094	1.298	0.5099	2.240	0.6851	2.244	0.6858	9
501	E4-008	E4-007	18	217	0.304	1.297	0.4136	1.299	0.4140	2.241	0.5667	2.245	0.5673	24

Note: Pipe IDs 1473, 1461, 1457, and 1425 are identified as 10-inch diameter pipes within the City Sewer block maps, the 2010 SMP modeled these pipes as 8-inch diameter.

Table 5-4 (Continued): Existing Condition Model Results – Pre and Post Project

Sewer Main Model ID	Upstream MH ID	Downstream MH ID	Existing Diameter (in)	Length (ft)	Slope (%)	ADWF				PWWF				
						Pre-Project		Post-Project		Pre-Project		Post-Project		
						Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)
492	E4-007	E4-001	18	212	0.304	1.297	0.3711	1.299	0.3714	2.243	0.5022	2.246	0.5027	33
478	E4-001	E4-006	18	240	0.724	1.298	0.3223	1.300	0.3225	2.244	0.4328	2.248	0.4332	42
457	E4-006	E4-005	18	250	0.724	1.298	0.3223	1.300	0.3226	2.245	0.4330	2.249	0.4333	42
446	E4-005	E4-004	18	109	0.724	1.299	0.3224	1.301	0.3226	2.247	0.4331	2.250	0.4335	42
434	E4-004	E4-003	18	129	0.724	1.299	0.3224	1.301	0.3227	2.248	0.4332	2.252	0.4336	42
424	E4-003	E4-062	18	162	0.724	1.300	0.3381	1.302	0.3384	2.249	0.4561	2.253	0.4566	39
420	E4-062	E4-002	18	111	0.510	1.300	0.3538	1.302	0.3541	2.251	0.4791	2.254	0.4795	36
389	E4-002	E4-001	18	397	0.510	1.301	0.3538	1.303	0.3541	2.252	0.4955	2.256	0.4961	34
377	E4-001	E4-060	18	36	0.510	1.301	0.3952	1.303	0.3955	2.253	0.5557	2.257	0.5563	26
373	E4-060	E4-012	18	9	0.265	1.302	0.4030	1.304	0.4033	2.255	0.5509	2.258	0.5515	26
349	E4-012	E4-002	18	294	0.437	1.306	0.3854	1.308	0.3858	2.261	0.5256	2.265	0.5261	30
331	E4-002	D4-035	18	375	0.377	1.405	0.3982	1.407	0.3985	2.417	0.5441	2.420	0.5446	27
306	D4-035	D4-033	18	166	0.423	1.419	0.3806	1.421	0.3809	2.439	0.5143	2.443	0.5148	31
290	D4-033	SW-1	18	296	0.422	1.421	0.3344	1.423	0.3347	2.443	0.4469	2.447	0.4473	40
CDT-13	SW-1	D4-021	18	24	0.277	1.436	0.3451	1.438	0.3453	2.456	0.4649	2.459	0.4653	38
260	D4-021	D4-050	18	341	0.429	1.438	0.3909	1.440	0.3912	2.460	0.5309	2.463	0.5314	29
241	D4-050	D4-068	18	364	0.434	1.442	0.3901	1.444	0.3904	2.466	0.5296	2.470	0.5301	29
209	D4-068	SW-2	18	509	0.440	1.445	0.4130	1.447	0.4133	2.471	0.5519	2.474	0.5524	26
CDT-17	SW-2	SW-3	18	39	0.083	1.445	0.4063	1.447	0.4066	2.471	0.5366	2.474	0.5370	28
CDT-19	SW-3	D4-006	21	15	0.650	1.625	0.3873	1.627	0.3876	2.747	0.5201	2.751	0.5205	31
177	D4-006	C4-021	30	420	0.100	1.944	0.3173	1.946	0.3175	3.134	0.4072	3.138	0.4075	46

Table 5-4 (Continued): Existing Condition Model Results – Pre and Post Project

Sewer Main Model ID	Upstream MH ID	Downstream MH ID	Existing Diameter (in)	Length (ft)	Slope (%)	ADWF				PWWF				
						Pre-Project		Post-Project		Pre-Project		Post-Project		
						Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)
156	C4-021	C4-017	30	396	0.135	1.944	0.3103	1.946	0.3105	3.135	0.4024	3.139	0.4026	46
144	C4-017	C4-016	30	244	0.113	1.945	0.3201	1.947	0.3202	3.136	0.4221	3.140	0.4224	44
118	C4-016	C4-012	30	160	0.182	2.123	0.3621	2.125	0.3623	3.390	0.4687	3.394	0.4690	37
113	C4-012	C4-010	30	323	0.031	2.123	0.3567	2.125	0.3569	3.391	0.4662	3.395	0.4665	38
103	C4-010	C4-008	30	59	0.340	2.124	0.3493	2.126	0.3495	3.392	0.4618	3.396	0.4621	38
96	C4-008	C4-004	30	213	0.098	2.142	0.4198	2.144	0.4200	3.424	0.5274	3.427	0.5277	30
88	C4-004	B4-019	30	276	0.029	2.142	0.3660	2.144	0.3662	3.425	0.4600	3.428	0.4603	39
83	B4-019	B4-017	21	582	0.438	2.150	0.3674	2.152	0.3676	3.437	0.4769	3.440	0.4772	36
72	B4-017	B4-007	21	125	0.760	2.164	0.3345	2.167	0.3347	3.460	0.4312	3.463	0.4314	42
64	B4-007	B4-005	21	464	0.782	2.166	0.4409	2.168	0.4411	3.466	0.5618	3.470	0.5622	25
60	B4-005	B4-003	21	70	0.001	2.166	0.4094	2.168	0.4096	3.470	0.5182	3.473	0.5185	31
58	B4-003	B4-001	27	108	1.256	2.166	0.3089	2.168	0.3090	3.473	0.3908	3.477	0.3910	48
56	B4-001	B4-024	27	300	0.115	2.166	0.3140	2.168	0.3142	3.477	0.3976	3.480	0.3979	47
50	B4-024	B4-022	27	292	1.036	2.166	0.2671	2.168	0.2673	3.480	0.3472	3.484	0.3474	54
45	B4-022	B4-016	21	274	0.398	2.166	0.3918	2.168	0.3920	3.487	0.5104	3.491	0.5107	32
19	B4-016	B4-014	42	556	0.189	4.885	0.2726	4.887	0.2727	8.478	0.3624	8.481	0.3624	52
21	B4-014	B4-012	42	368	0.272	4.885	0.2720	4.887	0.2720	8.481	0.3616	8.485	0.3617	52
22	B4-012	B4-010	42	450	0.222	4.885	0.2293	4.887	0.2293	8.485	0.3035	8.488	0.3036	60
20	B4-010	B4-003	42	86	1.388	4.885	0.1956	4.887	0.1956	8.488	0.2579	8.492	0.2579	66
24	B4-003	B4-001	42	200	0.500	4.885	0.2310	4.887	0.2310	8.492	0.3017	8.495	0.3018	60
25	B4-001	B4-006	42	338	0.444	4.885	0.2090	4.887	0.2090	8.496	0.2867	8.499	0.2868	62

Table 5-5: Future Cumulative Condition Model Results – Pre and Post Project

Sewer Main Model ID	CIP ID	Model Diameter (in)	Length (ft)	Slope (%)	ADWF				PWWF				
					Pre-Project		Post-Project		Pre-Project		Post-Project		
					Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)
1493		8	172	0.42	0.1415	0.342	0.1431	0.344	0.2574	0.472	0.2602	0.475	5
1473	P-26	8/12	187	0.47	0.1428	0.222	0.1444	0.223	0.2602	0.299	0.2630	0.301	60
1461	P-26	8/12	85	0.28	0.1454	0.226	0.1470	0.227	0.2660	0.306	0.2688	0.307	59
1457	P-26	8/12	264	0.42	0.1467	0.232	0.1483	0.233	0.2688	0.315	0.2716	0.316	58
1425	P-25	8/12	334	0.29	0.1499	0.225	0.1515	0.226	0.2753	0.306	0.2781	0.307	59
1366		15	35	1.58	1.0924	0.390	1.0940	0.390	1.9917	0.559	1.9945	0.559	25
1354		15	310	0.39	1.1022	0.435	1.1038	0.435	2.0130	0.628	2.0159	0.629	16
1304		15	389	0.63	1.1143	0.407	1.1159	0.407	2.0315	0.575	2.0344	0.576	23
1240		15	649	0.63	1.1679	0.403	1.1695	0.403	2.1005	0.566	2.1033	0.567	24
1069		15	314	0.81	1.2153	0.393	1.2169	0.393	2.1808	0.550	2.1836	0.550	27
1000		15	348	0.80	1.2234	0.392	1.2250	0.393	2.1943	0.549	2.1971	0.549	27
905		15	194	0.83	1.2239	0.440	1.2255	0.440	2.1952	0.631	2.1980	0.632	16
884		15	25	0.37	1.2269	0.498	1.2285	0.499	2.2003	0.718	2.2031	0.719	4
771		8	253	0.38	0.0398	0.181	0.0398	0.181	0.0596	0.225	0.0596	0.225	55
749		8	191	1.79	0.0025	0.038	0.0025	0.038	0.0052	0.055	0.0052	0.055	89
722		15	20	0.88	1.2764	0.317	1.2780	0.317	2.2770	0.445	2.2799	0.446	41
609		15	272	22.74	1.2767	0.357	1.2783	0.358	2.2773	0.479	2.2801	0.479	36
SR_CIP-1	P-100	18/21	389	0.30	1.7997	0.390	1.8013	0.391	3.0240	0.524	3.0269	0.525	30
SR_CIP-2	P-100	18/21	322	0.29	1.7997	0.395	1.8013	0.395	3.0234	0.531	3.0263	0.531	29
CDT-29	P-100	18/21	353	0.28	1.7997	0.396	1.8013	0.396	3.0232	0.533	3.0260	0.533	29

Note: Model Diameter in green text represents a 2030 GPUUIS CIP pipe diameter. Pipe IDs 1473, 1461, 1457, and 1425 are identified as 10-inch diameter pipes within the City Sewer block maps, the CIPs P-26 and P-25 are based on the 2010 SMP modeled pipes as 8-inch diameter. The need for upsizing if the pipes are 10-inches in diameter is not considered high priority.

Table 5-5 (Continued): Future Cumulative Condition Model Results – Pre and Post Project

Sewer Main Model ID	CIP ID	Model Diameter (in)	Length (ft)	Slope (%)	ADWF				PWWF				
					Pre-Project		Post-Project		Pre-Project		Post-Project		
					Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)
CDT-31	P-100	18/21	53	0.28	1.7997	0.396	1.8013	0.397	3.0229	0.533	3.0257	0.534	29
CDT-33	P-100	18/21	915	0.28	1.7997	0.396	1.8013	0.396	3.0230	0.533	3.0258	0.533	29
CDT-35	P-100	18/21	140	0.28	1.7997	0.396	1.8013	0.396	3.0222	0.533	3.0250	0.533	29
CDT-23	P-100	18/21	105	0.28	1.7997	0.397	1.8013	0.397	3.0222	0.534	3.0250	0.534	29
363	P-100	18/21	139	0.28	1.8090	0.397	1.8106	0.398	3.0313	0.534	3.0341	0.534	29
SR_CIP-3	P-100	18/21	763	0.28	1.8090	0.398	1.8106	0.398	3.0308	0.535	3.0336	0.535	29
311	P-100	18/21	53	0.28	1.8090	0.399	1.8106	0.400	3.0304	0.536	3.0332	0.537	28
309	P-100	18/21	26	0.28	1.8306	0.402	1.8322	0.402	3.0569	0.538	3.0597	0.538	28
310	P-100	18/21	325	0.28	1.8494	0.404	1.8510	0.405	3.0745	0.542	3.0773	0.543	28
CDT-37	P-100	18/21	265	0.28	1.8499	0.397	1.8515	0.397	3.0757	0.525	3.0785	0.526	30
306	P-100	18/21	166	0.42	2.1114	0.407	2.1130	0.407	3.3833	0.534	3.3861	0.534	29
290	P-100	18/21	418	0.30	2.1290	0.434	2.1306	0.435	3.3998	0.569	3.4026	0.569	24
CDT-13	P-100	18/21	121	0.28	2.1290	0.414	2.1306	0.414	3.3997	0.539	3.4025	0.540	28
260	P-100	18/21	341	0.43	2.1295	0.390	2.1311	0.390	3.4008	0.508	3.4036	0.509	32
241	P-100	18/21	364	0.43	2.2064	0.413	2.2080	0.413	3.5171	0.541	3.5200	0.541	28
209	P-100	18/21	509	0.34	2.2101	0.408	2.2117	0.408	3.4981	0.529	3.5009	0.529	29
CDT-17	P-100	18/21	24	0.25	2.2101	0.409	2.2117	0.409	3.4981	0.520	3.5009	0.521	31
CDT-19		27	39	0.65	2.6073	0.405	2.6089	0.405	4.3187	0.559	4.3212	0.559	25
177		30	420	0.10	3.1187	0.406	3.1203	0.406	4.9440	0.525	4.9471	0.526	30
156		30	396	0.14	3.1192	0.403	3.1208	0.403	4.7849	0.518	4.7877	0.518	31
144		30	244	0.10	3.120	0.417	3.1213	0.417	4.7749	0.541	4.7777	0.541	28

Note: Model Diameter in green text represents a 2030 GPUUIS CIP pipe diameter.

Table 5-5 (Continued): Future Cumulative Condition Model Results – Pre and Post Project

Sewer Main Model ID	CIP ID	Model Diameter (in)	Length (ft)	Slope (%)	ADWF				PWWF				
					Pre-Project		Post-Project		Pre-Project		Post-Project		
					Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Max Flow (MGD)	d/D	Pipe Capacity Remaining (% of Allowed d/D)
118		30	160	0.18	3.3226	0.464	3.3242	0.464	4.9707	0.590	4.9735	0.591	21
113		30	323	0.03	3.3231	0.462	3.3247	0.462	4.9708	0.588	4.9736	0.589	22
103		30	59	0.34	3.3236	0.458	3.3252	0.458	4.9713	0.585	4.9741	0.585	22
96		30	292	0.10	3.3771	0.524	3.3787	0.524	5.0245	0.644	5.0273	0.644	14
88		30	323	0.03	3.3776	0.456	3.3792	0.456	5.0254	0.566	5.0282	0.566	25
83		21	445	0.44	3.3933	0.478	3.3949	0.478	5.0498	0.614	5.0526	0.614	18
72		21	216	0.76	3.4690	0.424	3.4706	0.424	5.1664	0.533	5.1692	0.533	29
64	P-108	21/24	143	0.78	3.4706	0.463	3.4722	0.463	5.1735	0.570	5.1763	0.571	24
60	P-108	21/24	98	0.00	3.4706	0.435	3.4722	0.436	5.1772	0.534	5.1800	0.534	29
58		27	64	1.26	3.4706	0.390	3.4722	0.391	5.1808	0.482	5.1836	0.482	36
56		27	347	0.11	3.4706	0.397	3.4722	0.397	5.1844	0.491	5.1872	0.491	35
50		27	75	1.04	3.4706	0.320	3.4722	0.320	5.1880	0.397	5.1908	0.397	47
45		27	432	0.40	3.4706	0.355	3.4722	0.355	5.1951	0.441	5.1979	0.442	41
19		42	556	0.19	7.4586	0.339	7.4602	0.339	11.6638	0.430	11.6665	0.430	43
21		42	368	0.27	7.4586	0.338	7.4602	0.338	11.6670	0.429	11.6697	0.429	43
22		42	450	0.22	7.4586	0.284	7.4602	0.284	11.6703	0.358	11.6729	0.359	52
20		42	86	1.39	7.4586	0.242	7.4602	0.242	11.6739	0.304	11.6765	0.304	60
24		42	200	0.50	7.4586	0.283	7.4602	0.283	11.6775	0.353	11.6802	0.353	53
25		42	338	0.44	7.4586	0.266	7.4602	0.266	11.6811	0.345	11.6838	0.345	54

Note: Model Diameter in green text represents a 2030 GPUUIS CIP pipe diameter.

Table 5-6: Pipes Recommended for Upsizing and Percentage of Contributed Flow

Sewer Main Model ID	CIP #	Existing Diameter (in)	Proposed Diameter (in)	Total Future Cumulative ADWF Flow With Project (MGD)	Project Incremental Contribution		City of Mountain View Contribution	
					ADWF Flow (MGD)	Percentage of Total Flow (%)	ADWF Flow (MGD)	Percentage of Total Flow (%)
1473	P-28	10	12	0.1444	0.002	1.1	0.143	98.9
1461	P-28	10	12	0.1470	0.002	1.1	0.145	98.9
1457	P-28	10	12	0.1483	0.002	1.1	0.147	98.9
1425	P-29	10	12	0.1515	0.002	1.1	0.150	98.9
SR_CIP-1	P-100	18	21	1.8013	0.002	0.1	1.800	99.9
SR_CIP-2	P-100	-	21	1.8013	0.002	0.1	1.800	99.9
CDT-29	P-100	-	21	1.8013	0.002	0.1	1.800	99.9
CDT-31	P-100	-	21	1.8013	0.002	0.1	1.800	99.9
CDT-33	P-100	-	21	1.8013	0.002	0.1	1.800	99.9
CDT-35	P-100	-	21	1.8013	0.002	0.1	1.800	99.9
CDT-23	P-100	-	21	1.8013	0.002	0.1	1.800	99.9
363	P-100	8	21	1.8106	0.002	0.1	1.809	99.9
SR_CIP-3	P-100	-	21	1.8106	0.002	0.1	1.809	99.9
311	P-100	8	21	1.8106	0.002	0.1	1.809	99.9
309	P-100	8	21	1.8322	0.002	0.1	1.831	99.9
310	P-100	8	21	1.8510	0.002	0.1	1.849	99.9
CDT-37	P-100	-	21	1.8515	0.002	0.1	1.850	99.9
306	P-100	18	21	2.1130	0.002	0.1	2.111	99.9
290	P-100	18	21	2.1306	0.002	0.1	2.129	99.9
CDT-13	P-100	18	21	2.1306	0.002	0.1	2.129	99.9
260	P-100	18	21	2.1311	0.002	0.1	2.129	99.9
241	P-100	18	21	2.2080	0.002	0.1	2.206	99.9
209	P-100	18	21	2.2117	0.002	0.1	2.210	99.9
CDT-17	P-100	18	21	2.2117	0.002	0.1	2.210	99.9
CDT-19	P-100	18	21	2.6089	0.002	0.1	2.607	99.9
64	P-108	21	24	3.4722	0.002	0.0	3.471	100.0
60	P-108	21	24	3.4722	0.002	0.0	3.471	100.0

APPENDIX A:

Additional Considered Projects

Table A-1: Additional Considered Projects

	Project	Change Area/Planning Area	Address	Status*
1	Mountain View Co-Housing Community	Central Neighborhood	445 Calderon Ave	Completed
2	Hope Street Investors	Downtown/Evelyn Corridor	231-235 Hope St	Approved
3	Downtown Mixed Use Building	Downtown/Evelyn Corridor	605 Castro St	Completed
4	Residential Condominium Project	Downtown/Evelyn Corridor	325, 333, 339 Franklin St	Under Review
5	St Joseph's Church	Downtown/Evelyn Corridor	599 Castro St	Completed
6	Fairmont Mixed Use	Downtown/Evelyn Corridor	881 Castro Street	Completed
7	Bryant/Dana Office	Downtown/Evelyn Corridor	250 Bryant St	Completed
8	Quad/Lovewell	East Whisman	369 N Whisman Rd	Approved but Inactive
9	Renault & Handley	East Whisman	625-685 Clyde Ave	Completed
10	Symantec	East Whisman	575 E Middlefield Rd	On Hold
11	LinkedIn	East Whisman	700 E Middlefield Rd	Under Construction
12	National Avenue Partners	East Whisman	600 National Ave	Completed
13	2700 West El Camino Real	El Camino Real	2700 El Camino Real W	Under Construction
14	SummerHill Apt	El Camino Real	2650 El Camino Real W	Completed
15	Hotel Expansion	El Camino Real	2300 W El Camino Real	Completed
16	Lennar Multi-Family Communities	El Camino Real	2268 El Camino Real W	Completed
17	UDR	El Camino Real	1984 El Camino Real W	Completed
18	Residence Inn Gatehouse	El Camino Real	1854 El Camino Real W	Completed
19	Residence Inn	El Camino Real	1740 El Camino Real W	Completed
20	Tropicana Lodge - Prometheus	El Camino Real	1720 El Camino Real W	Completed
21	Austin's - Prometheus	El Camino Real	1616 El Camino Real W	Completed
22	1701 W El Camino Real	El Camino Real	1701 El Camino Real W	Completed
23	First Community Housing	El Camino Real	1585 El Camino Real W	Completed
24	Harv's Car Wash - Regis House	El Camino Real	1101 El Camino Real W	Completed
25	Greystar	El Camino Real	801 El Camino Real W	Completed
26	Medical Building	El Camino Real	412 El Camino Real W	Completed
27	Lennar Apartments	El Camino Real	865 El Camino Real E	Completed

**Source: City of Mountain View Planning Division Current Project List (City of Mountain View, October 2021)*

Table A-1: Additional Considered Projects (Continued)

	Project	Change Area/Planning Area	Address	Status*
28	Wonder Years Preschool	El Camino Real	86 El Camino Real	Completed
29	Evelyn Family Apartments	Grant/Sylvan	779 East Evelyn Ave	Completed
30	344 Bryant Ave	Grant/Sylvan	344 Bryant Ave	Under Building Review
31	Adachi Project	Grant/Sylvan	1991 Sun Mor Ave	Completed
32	840 E El Camino Real	Grant/Sylvan	840 El Camino Real E	Approved
33	Loop Convenience Store	Grant/Sylvan	790 El Camino Real E	Completed
34	El Camino Real Hospital Campus	Miramonte/Springer	2500 Grant Ave	Completed
35	City Sports	Miramonte/Springer	1040 Grant Ave	Completed
36	Prometheus	Moffett/Whisman	100 Moffett Blvd	Completed
37	Hampton Inn Addition	Moffett/Whisman	390 Moffett Blvd	Completed
38	Calvano Development	Moffett/Whisman	1075 Terra Bella Avenue	Under Construction
39	Moffett Gateway	Moffett/Whisman	750 Moffett Blvd	Under Construction
40	Holiday Inn Express	Moffett/Whisman	870 Leong Dr	Approved
41	Warmington Residential	Moffett/Whisman	660 Tyrella Avenue	Completed
42	Dividend Homes	Moffett/Whisman	111 and 123 Fairchild Dr	Completed
43	133-149 Fairchild Dr	Moffett/Whisman	133-149 Fairchild Dr	Completed
44	Warmington Residential	Moffett/Whisman	277 Fairchild Dr	Under Construction
45	Hetch-Hetchy Property	Moffett/Whisman	450 N Whisman Dr	Completed
46	DeNardi Homes	Moffett/Whisman	186 East Middlefield Road	Under Construction
47	Tripointe Homes	Moffett/Whisman	135 Ada Ave	Completed
48	Tripointe Homes	Moffett/Whisman	129 Ada Ave	Completed
49	Robson Homes	Moffett/Whisman	137 Easy St	Completed
50	167 N Whisman Rd	Moffett/Whisman	167 N Whisman Rd	Completed
51	Antenna Farm (Pacific Dr)	Moffett/Whisman	Pacific Dr	Completed
52	Pulte Homes	Moffett/Whisman	100, 420-430 Ferguson Dr	Completed
53	EFL Development	Moffett/Whisman	500 Ferguson Dr	Completed
54	Shenandoah Square Precise Plan	Moffett/Whisman	500 Moffett Blvd	On Hold

**Source: City of Mountain View Planning Division Current Project List (City of Mountain View, October 2021)*

Table A-1: Additional Considered Projects (Continued)

	Project	Change Area/Planning Area	Address	Status*
55	1185 Terra Bella Ave	Moffett/Whisman	1185 Terra Bella Ave	Approved
56	Linde Hydrogen Fueling Station	Moffett/Whisman	830 Leong Dr	Completed
57	Windsor Academy	Monta Loma/Farley/Rock	908 N Rengstorff Ave	Completed
58	D.R. Horton	Monta Loma/Farley/Rock	827 N Rengstorff Ave	Completed
59	ROEM/Eden	Monta Loma/Farley/Rock	819 N Rengstorff Ave	Completed
60	Paul Ryan	Monta Loma/Farley/Rock	858 Sierra Vista Ave	Under Construction
61	William Lyon Homes	Monta Loma/Farley/Rock	1951 Colony St	Completed
62	Dividend Homes	Monta Loma/Farley/Rock	1958 Rock St	Completed
63	Paul Ryan	Monta Loma/Farley/Rock	2392 Rock St	Completed
64	San Antonio Station	Monta Loma/Farley/Rock	100 & 250 Mayfield Ave	Completed
65	Northpark Apartments	Monta Loma/Farley/Rock	111 N Rengstorff Ave	Completed
66	333 N Rengstorff Ave	Monta Loma/Farley/Rock	333 N Rengstorff Ave	Under Construction
67	Classic Communities	Monta Loma/Farley/Rock	1946 San Luis Ave	Completed
68	1998-2024 Montecitio Ave	Monta Loma/Farley/Rock	1998-2024 Montecito Ave	Under Construction
69	Classic Communities	Monta Loma/Farley/Rock	647 Sierra Vista Ave	Completed
70	Dividend Homes	Monta Loma/Farley/Rock	1968 Hackett Ave & 208-210 Sierra Vista Ave	Completed
71	California Communities	Monta Loma/Farley/Rock	2025 & 2065 San Luis Ave	Completed
72	2044 and 2054 Montecito Ave	Monta Loma/Farley/Rock	2044 & 2054 Montecito Ave	Under Construction
73	Shorebreeze Apartments	Monta Loma/Farley/Rock	460 North Shoreline Blvd	Under Construction
74	Intuit	North Bayshore	2600 Marine Way	Completed
75	Sobrato Organization	North Bayshore	1255 Pear Ave	Approved
76	Charleston East	North Bayshore	2000 North Shoreline Blvd	Under Construction
77	LinkedIn and Sywest	North Bayshore	1400 North Shoreline Blvd	On Hold
78	Broadreach	North Bayshore	1625 Plymouth Street	Completed
79	Microsoft	North Bayshore	1045-1085 La Avenida St	Under Construction
80	Shashi Hotel	North Bayshore	1625 North Shoreline Blvd	Under Construction

**Source: City of Mountain View Planning Division Current Project List (City of Mountain View, October 2021)*

Table A-1: Additional Considered Projects (Continued)

	Project	Change Area/Planning Area	Address	Status*
81	Community School of Music and Art	San Antonio	250 San Antonio Circle	Approved
82	Prometheus	San Antonio	400 San Antonio Rd	Completed
83	Octane Fayette	San Antonio	2645 & 2655 Fayette Dr	Under Review
84	Merlone Geier Partners (MGP)	San Antonio	405 San Antonio Rd	Completed
85	Anton Calega	San Antonio/Rengstorff/ Del Medio	394 Ortega Ave	Completed
86	Barry Swenson Builder	San Antonio/Rengstorff/ Del Medio	1958 Latham St	Approved
87	2296 Mora Drive	San Antonio/Rengstorff/ Del Medio	2296 Mora Dr	Completed
88	St Francis High School	Miramonte/Springer	1885 Miramonte Ave	Under Review
89	Franklin	Central/Downtown	325 Franklin Street	Under Review
90	California	Central/Downtown	756 California Street	Under Review
91	North Shorelin	Moffett/Whisman	1001 North Shorelin Boulevard	Under Review
92	555 West Middlefield Road	Moffett/Whisman	555 West Middlefield Road	Under Review
93	Mountain View Academy	Central/Downtown	360 South Shoreline Boulevard	Under Review
94	DeNardini	San Antonio	1919-1933 Gamel Way, 574 Escuela Ave	Under Review
95	Tyrella	Moffett/Whisman	294-296 Tyrella Avenue	Under Review
96	Logue	Moffett/Whisman	400 Logue Avenue	Under Review
97	Sobrato	Moffett/Whisman	465 Fairchild Drive	Under Review
98	Google Landings	North Bayshore	1860-2159 Landings Dr., 1014-1058 Huff Ave, 900 Alta Avenue, 2000 North Shoreline	Under Review
99	Phan	Moffett/Whisman	198 Easy Street	Under Review

**Source: City of Mountain View Planning Division Current Project List (City of Mountain View, October 2021)*

Table A-1: Additional Considered Projects (Continued)

	Project	Change Area/Planning Area	Address	Status*
100	Cosma	El Camino Real	1510 West El Camino Real	Under Review
101	Dana Street	Downtown	676 West Dana Street	Under Review
102	Summer Hill	Monta Loma/Farley/Rock	1555 West Middlefield Road	Under Review
103	Ambrosio	El Camino Real	855-1023 West El Camino Real	Under Review
104	BPR	El Camino Real	2300 West El Camino Real	Under Review
105	Dutchints	San Antonio	570 South Rengstorff Avenue	Under Review
106	GPRV	Central/Downtown	881 Castro Street	Under Review
107	Ambra	Monta Loma/Farley/Rock	901-987 N. Rengstorff Avenue	Under Review
108	Hylan	Monta Loma/Farley/Rock	410-414 Sierra Vista Avenue	Under Review
109	Maston	Miramonte/Springer	982 Bonita Avenue	Under Review
110	McKim	Monta Loma/Farley/Rock	2019 Leghorn Street	Under Review
111	Sand Hill	Moffett/Whisman	1989 North Bernardo Avenue	Under Review
112	Maston	El Camino Real	1313 and 1347 West El Camino Real	Under Review
113	Anderson	El Camino Real	601 Escuela Ave and 1873 Latham Street	Under Review
114	SummerHill	Moffett/Whisman	355-418 E Middlefield Road	Approved
115	Prometheus	Monta Loma/Farley/Rock	1950 Montecito Avenue	Under Construction
116	Dividend Homes	Monta Loma/Farley/Rock	2310 Rock Street	Under Construction
117	Insight Realty	Downtown	701 W. Evelyn Avenue	Approved
118	Prometheus	Downtown	1720 Villa Street	Under Construction
119	Fortbay	Moffett/Whisman	777 West Middlefield Road	Approved

**Source: City of Mountain View Planning Division Current Project List (City of Mountain View, October 2021)*

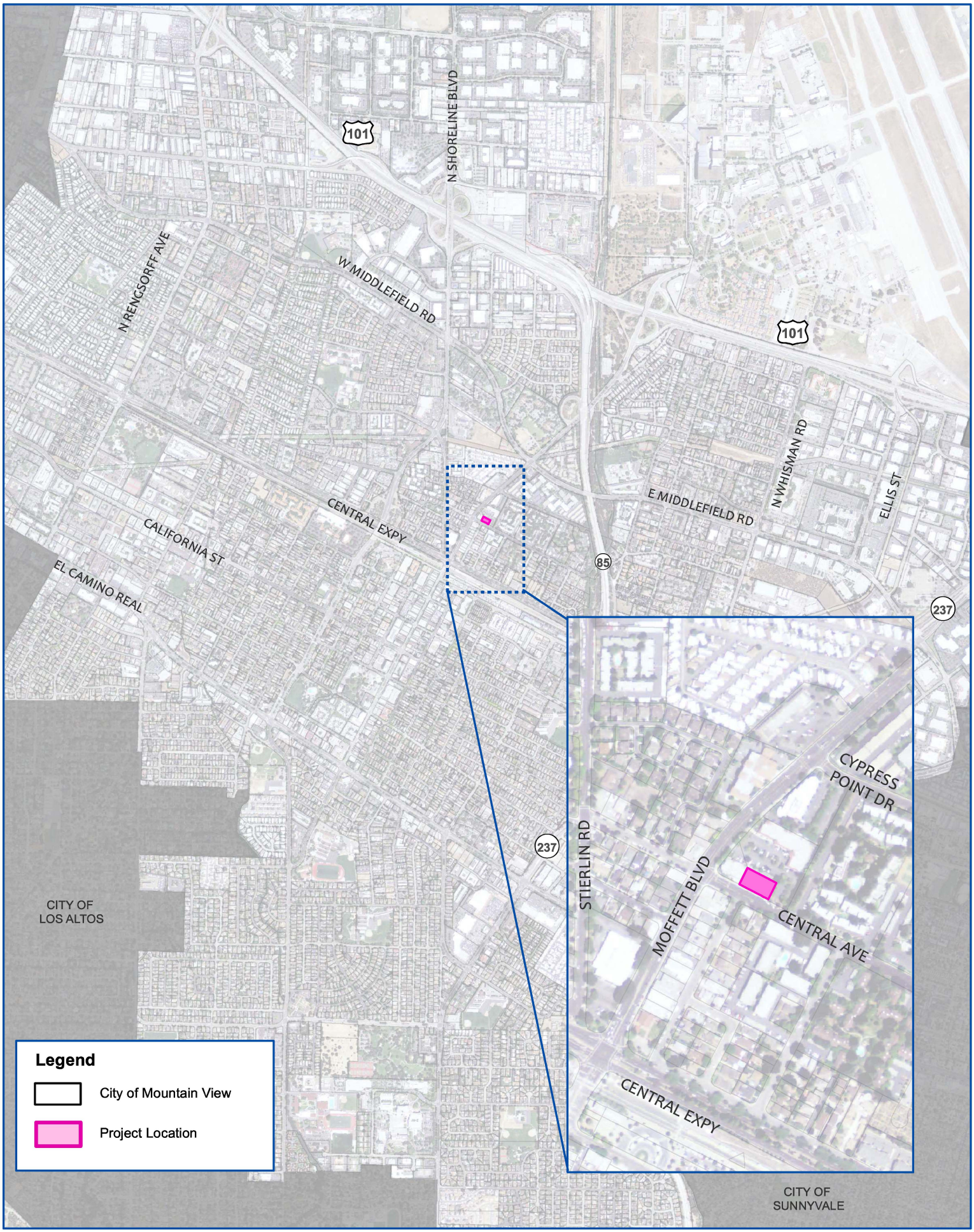
Table A-1: Additional Considered Projects (Continued)

	Project	Change Area/Planning Area	Address	Status*
120	Buddhist Temple	Moffett/Whisman	759 W. Middlefield Road	Approved
121	Green Company	Downtown	Hope Street Lots 4 & 8	Approved
122	Dividend Homes	Monta Loma/Farley/Rock	2005 Rock Street	Under Construction
123	Classic Communities	Monta Loma/Farley/Rock	315 & 319 Sierra Vista	Under Construction
124	SummerHill	Downtown	257-279 Calderon Ave	Under Construction
125	SummerHill	Moffett/Whisman	535 and 555 Walker Drive	Under Construction
126	Google	-	Nasa Research Park	Under Construction
127	Renault & Handly	Moffett/Whisman	580-620 Clyde Avenue	Under Construction
128	Sand Hill	Moffet/Whisman	189 North Bernardo Avenue	Under Review
129	Equity Residential	El Camino Real	870 El Camino Real	Under Review
130	Sobrato	Downtown	590 Castro Street	Under Review
131	San Antonio Center (Tan Group)	San Antonio	365-405 San Antonio and 2585-2595 California Street	Under Review
132	The Tan Group	El Camino Real	707 Continental Circle	Under Review
133	747 West Dana Street	Downtown	747 West Dana Street	Under Review
134	705 West Dana Street	Downtown	705 West Dana Street	Under Review
135	City Lot 12	Downtown	Bryant Street and Mercy Street	Under Review
136	DeNardi Group	Moffet/Whisman	282 E Middlefield	Under Review
137	730 Central	Moffet/Whisman	730 Central Avenue	Under Review
138	Terra Bella	Moffet/Whisman	1155 and 1185 Terra Bella Avenue	Under Review

**Source: City of Mountain View Planning Division Current Project List (City of Mountain View, October 2021)*

APPENDIX B:

Figures

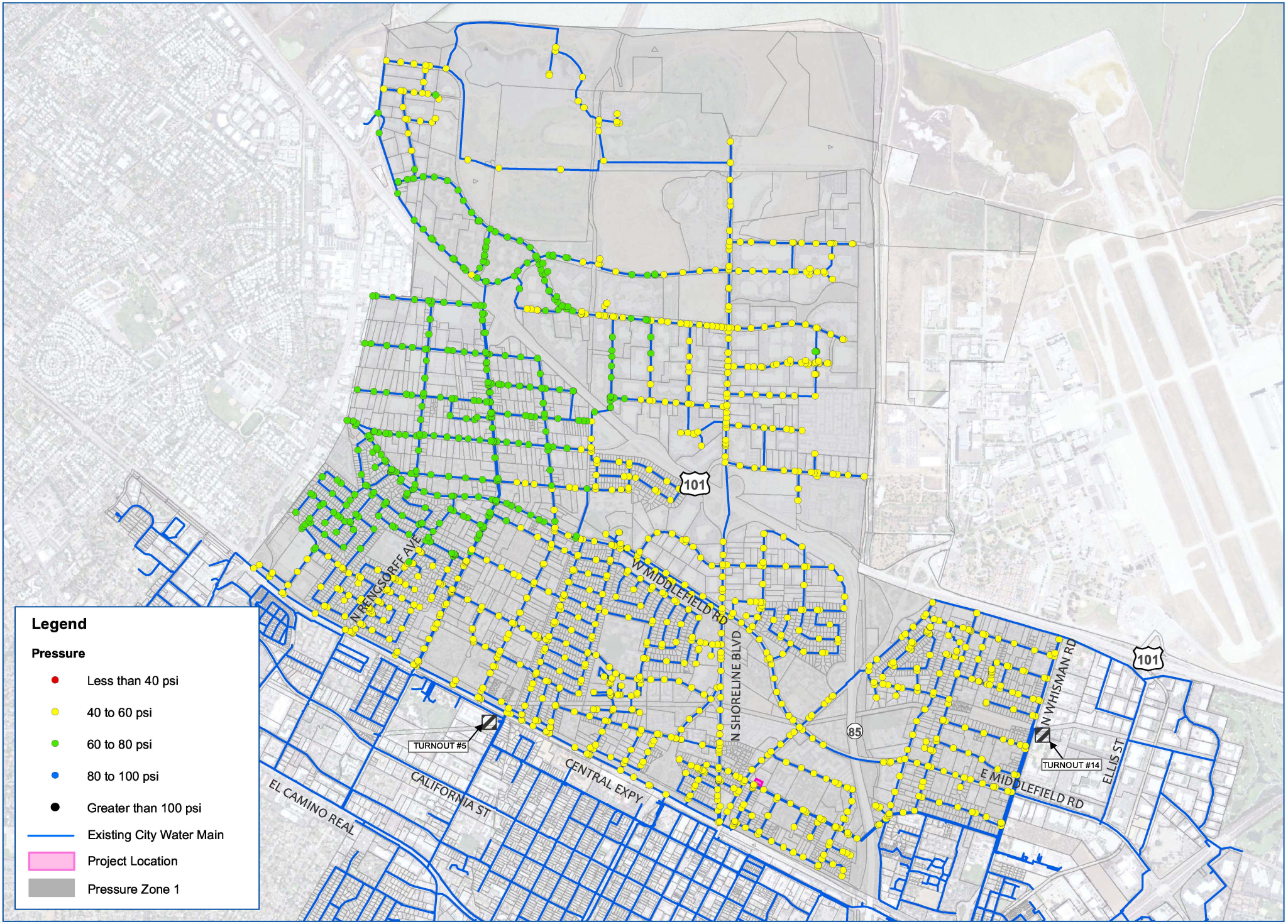


Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

0 1,000 2,000 Feet

N

FIGURE 1: **Project Location**



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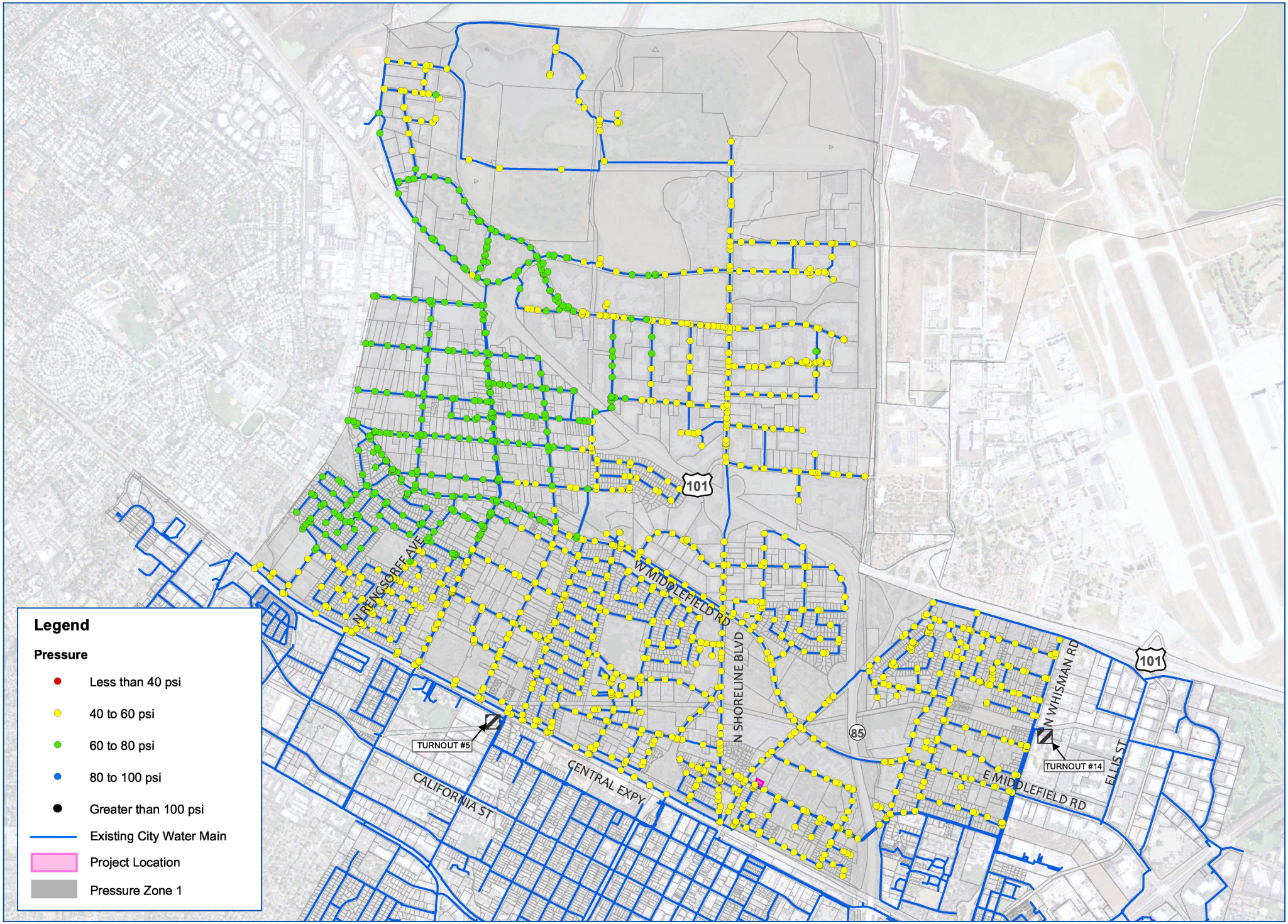
0 1,050 2,100 Feet

N

FIGURE B-2:

Peak Hour Demand (PHD) - Without Project

Water System Model - Existing Condition



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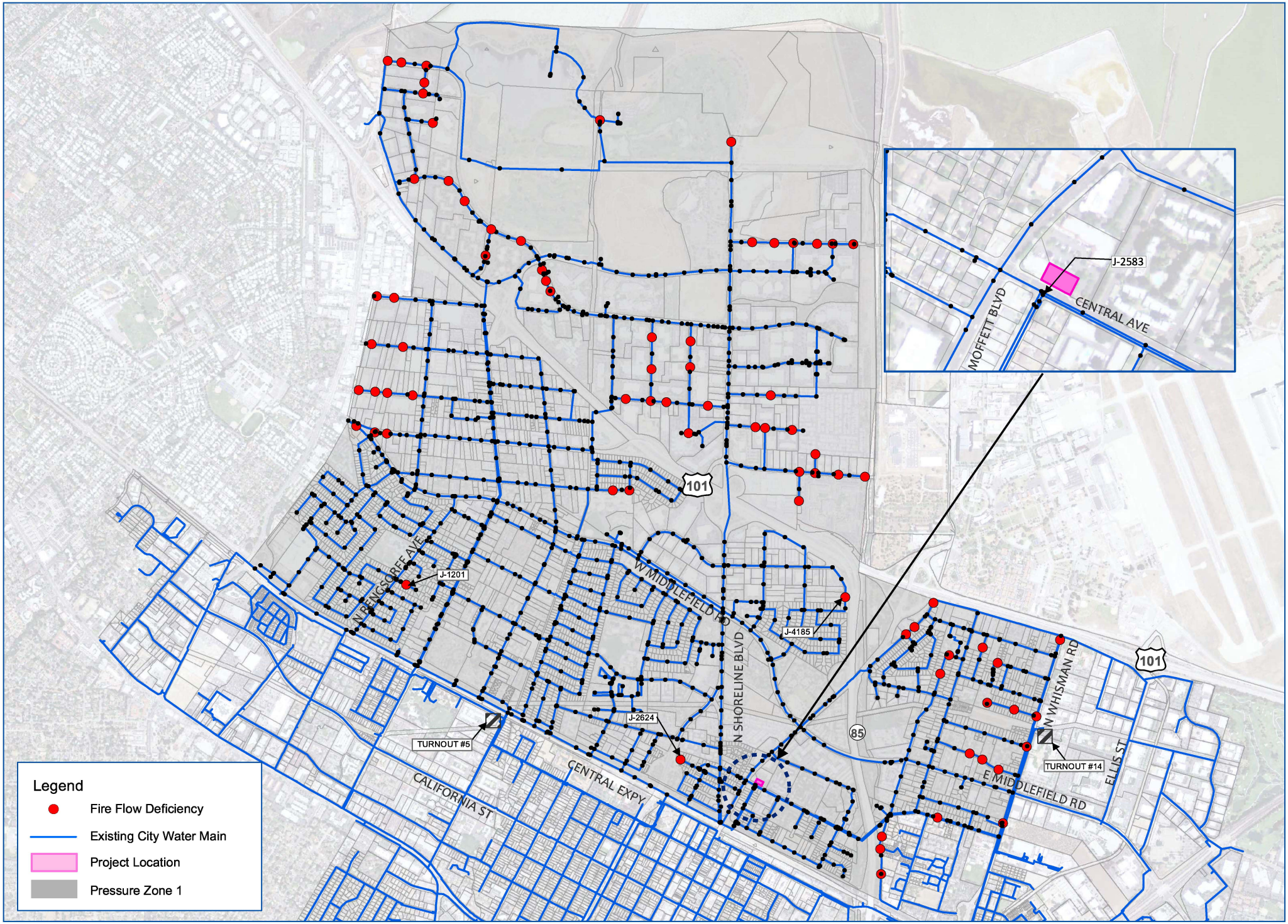
0 1,100 2,200 Feet

N

FIGURE B-3:

Peak Hour Demand (PHD) - With Project

Water System Model - Existing Condition



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0 255 510 Feet

N

FIGURE B-4:

Fire Flow Analysis - Without Project
Water System Model - Existing Condition

730 Central Avenue Utility Impact Study | October 2021

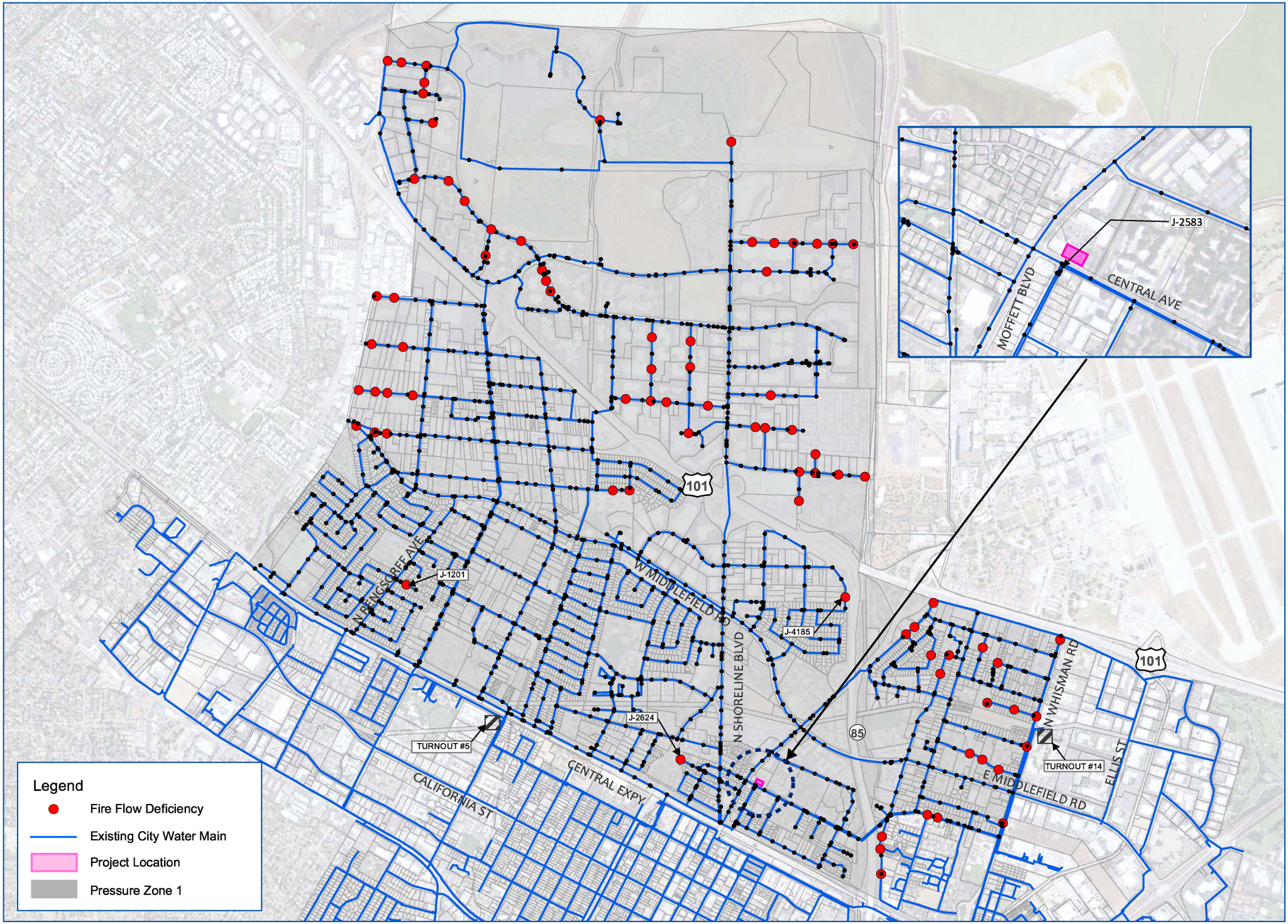

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FIGURE B-5:

Fire Flow Analysis - With Project
Water System Model - Existing Condition

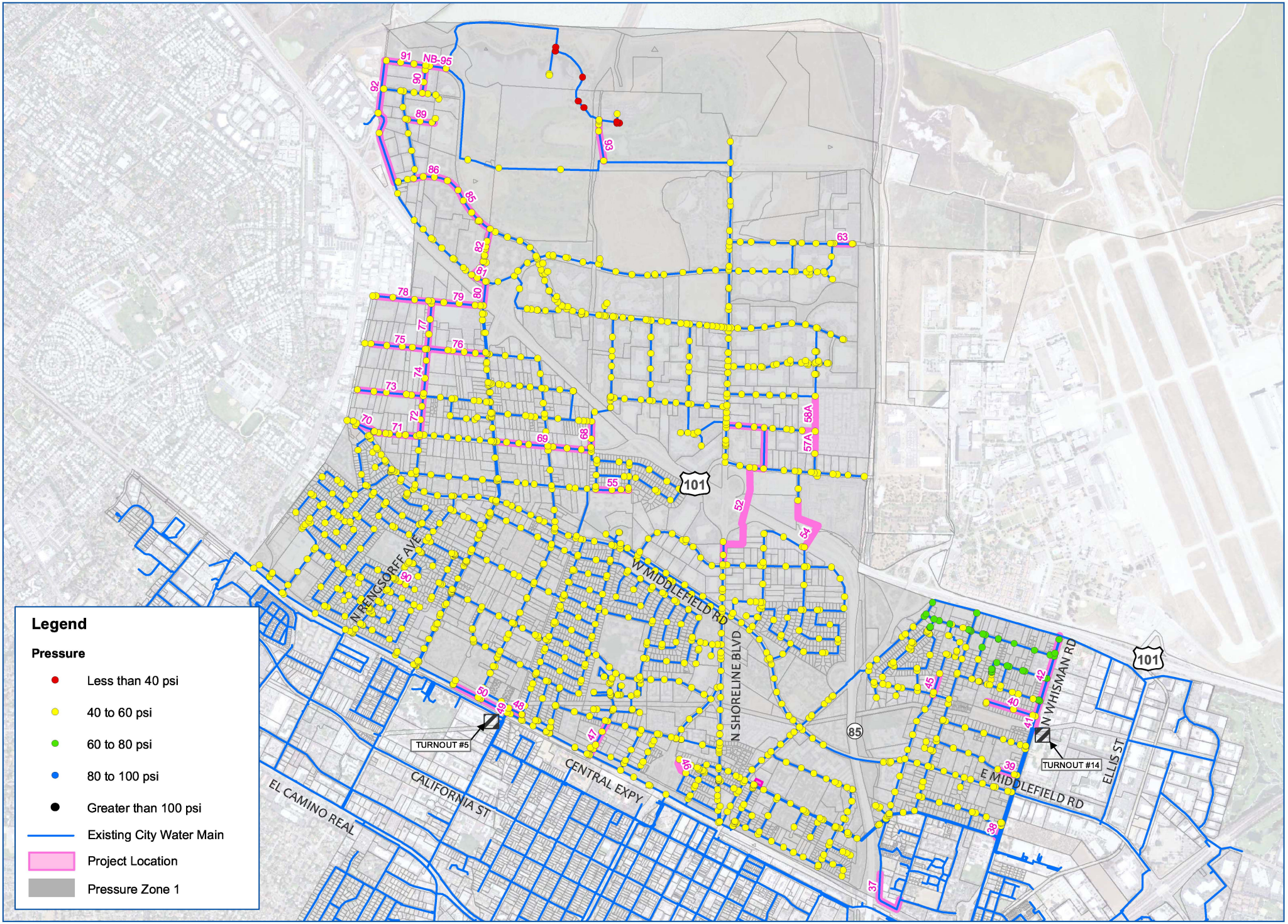

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FIGURE B-6:

Peak Hour Demand (PHD) - Without Project

Water System Model - Future Cumulative Condition

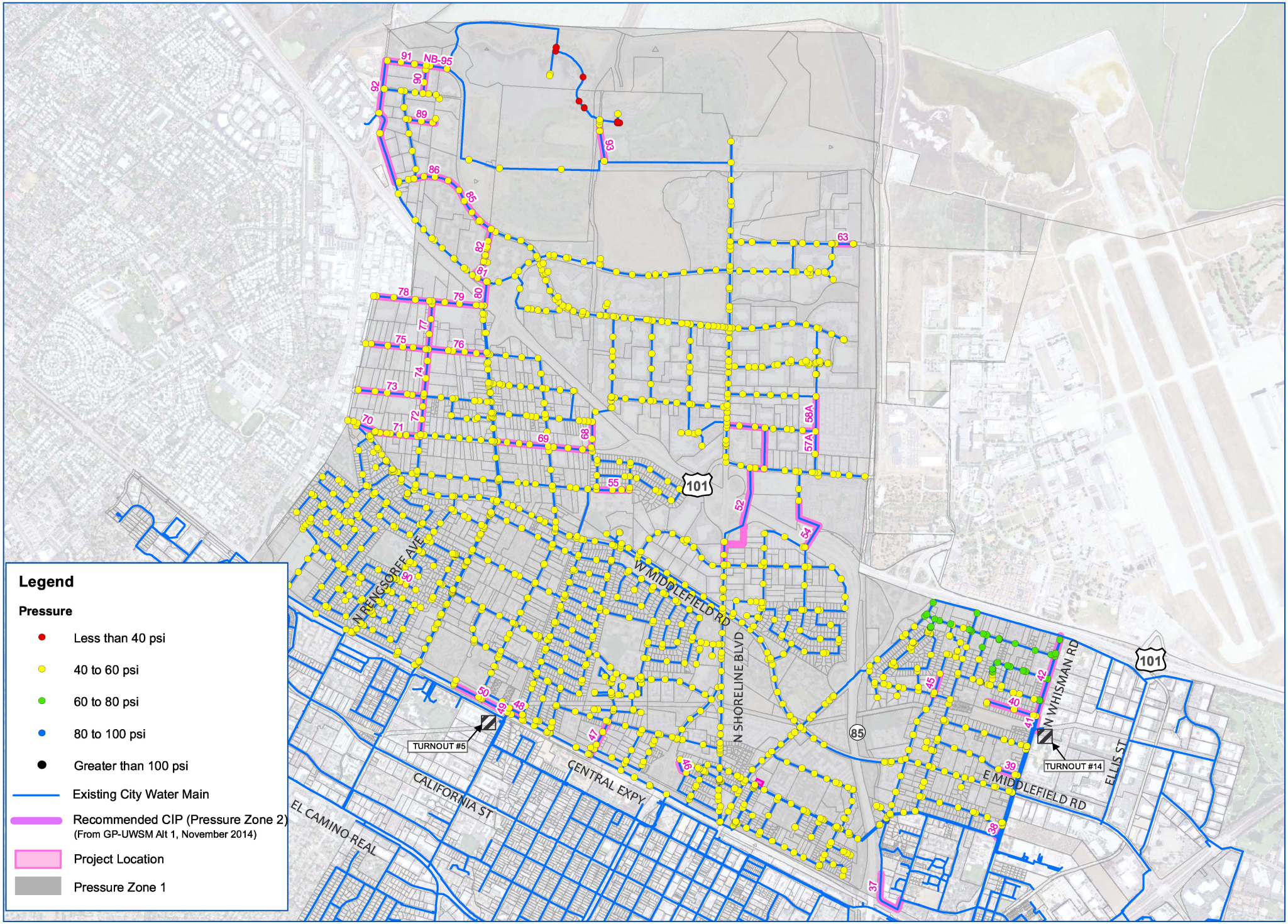

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FIGURE B-7:

Peak Hour Demand (PHD) - With Project
Water System Model - Future Cumulative Condition

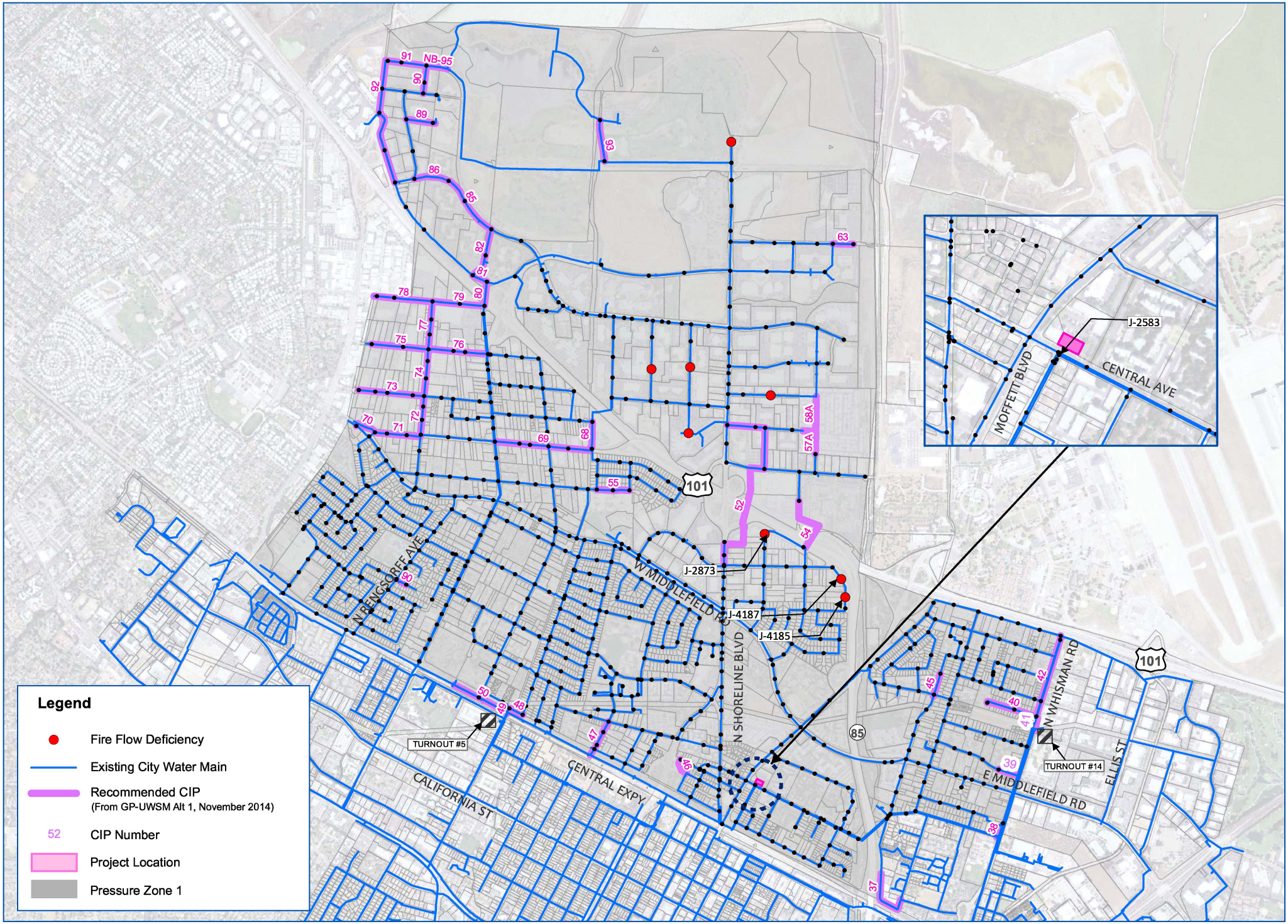

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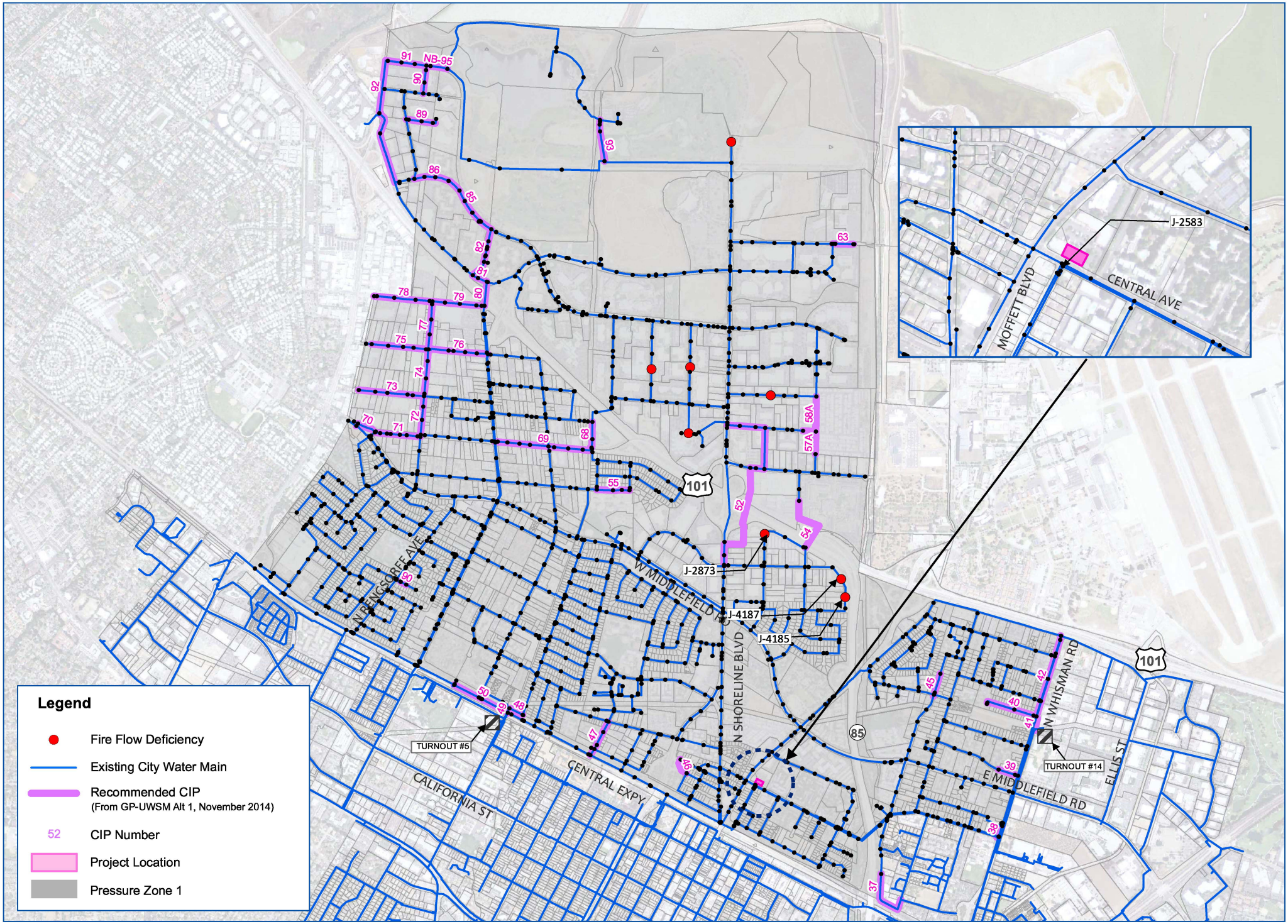
FIGURE B-8:

Fire Flow Analysis - Without Project
Water System Model - Future Cumulative Condition



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0 365 730 Feet

N

FIGURE B-9:

Fire Flow Analysis - With Project
Water System Model - Future Cumulative Condition

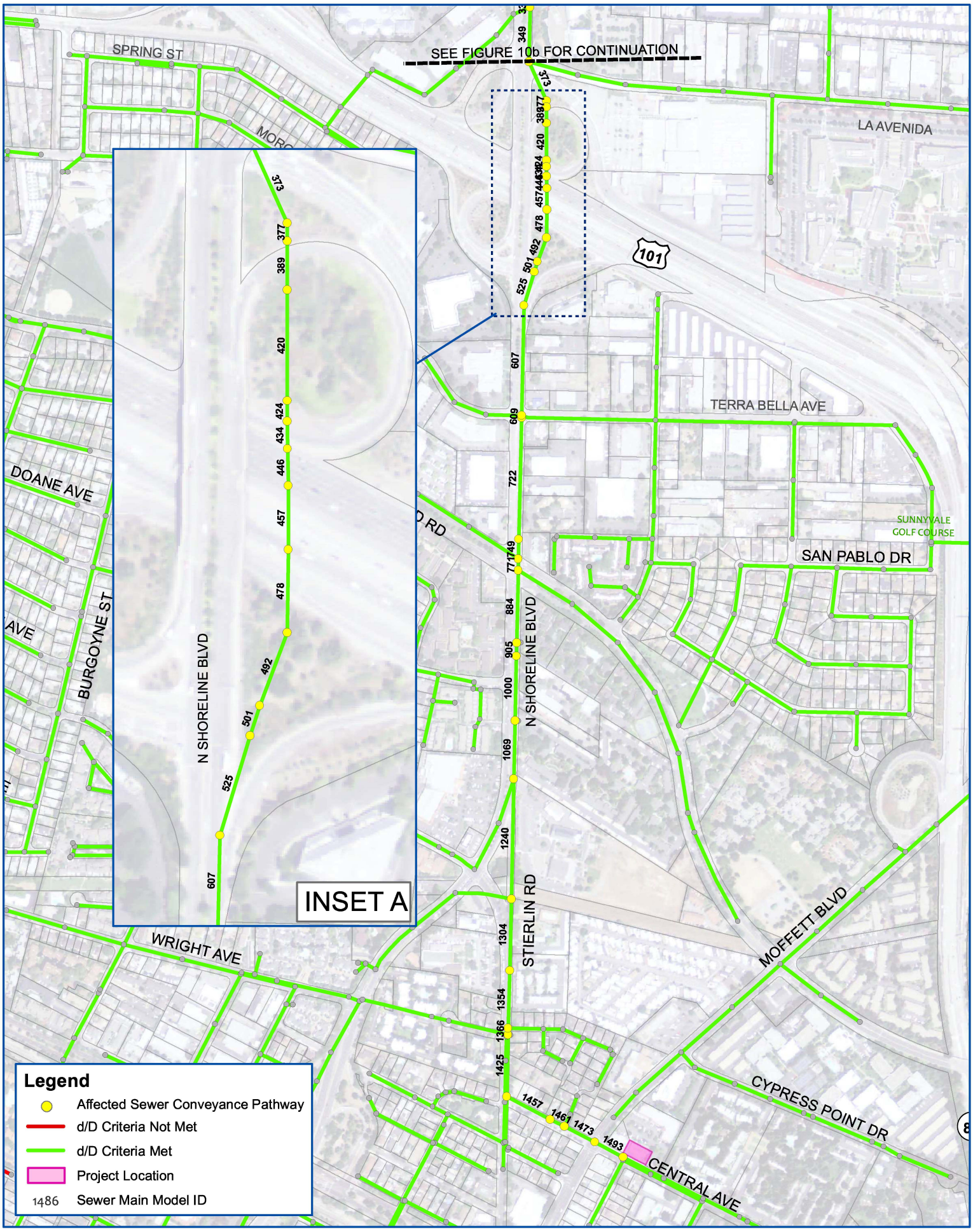

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FIGURE B-10a: **PWWF - Without Project**

Sewer System Model - Existing Condition

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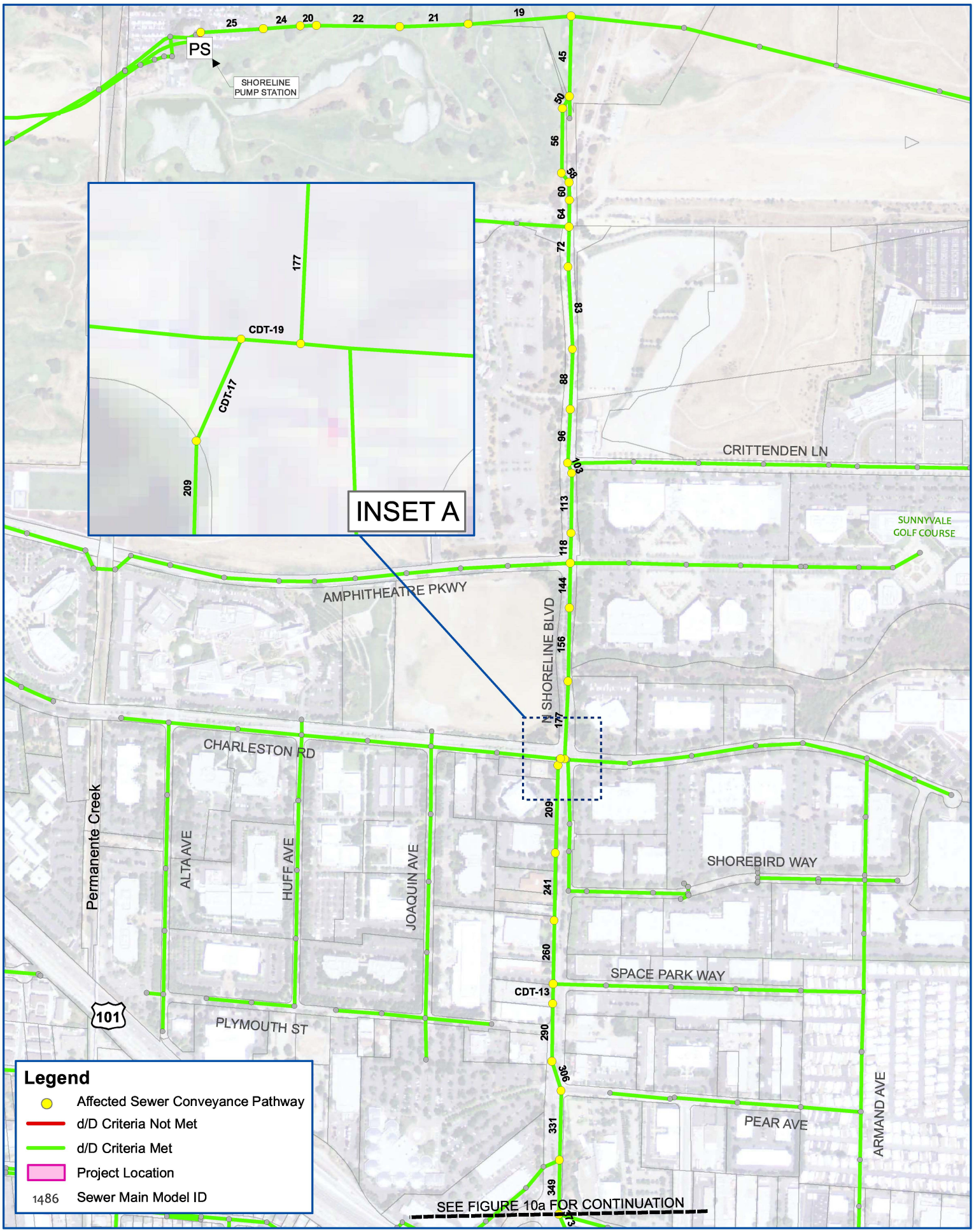

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0 350 700 Feet

FIGURE B-10b: **PWWF - Without Project**

Sewer System Model - Existing Condition

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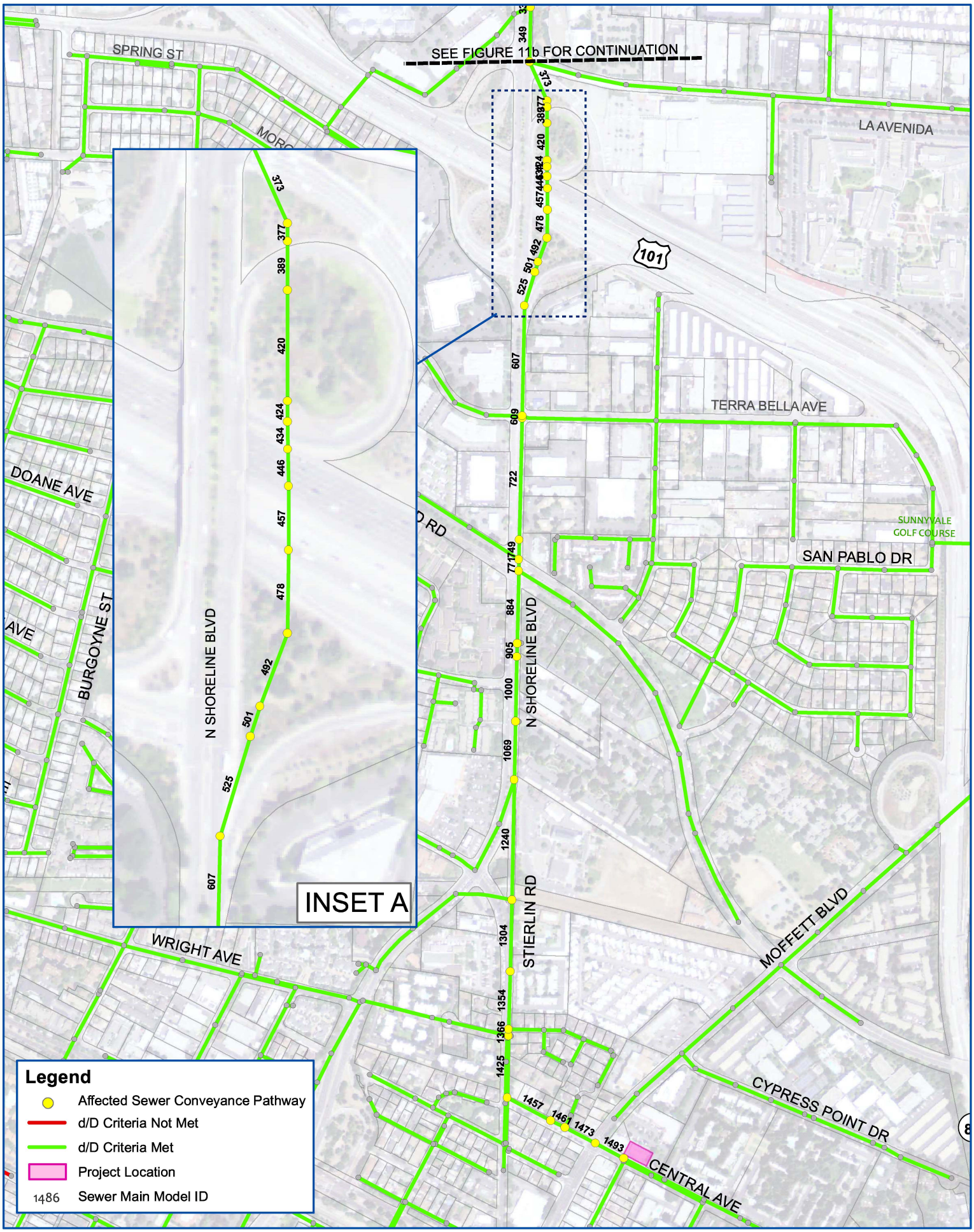

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FIGURE B-11a: **PWWF - With Project**
Sewer System Model - Existing Condition

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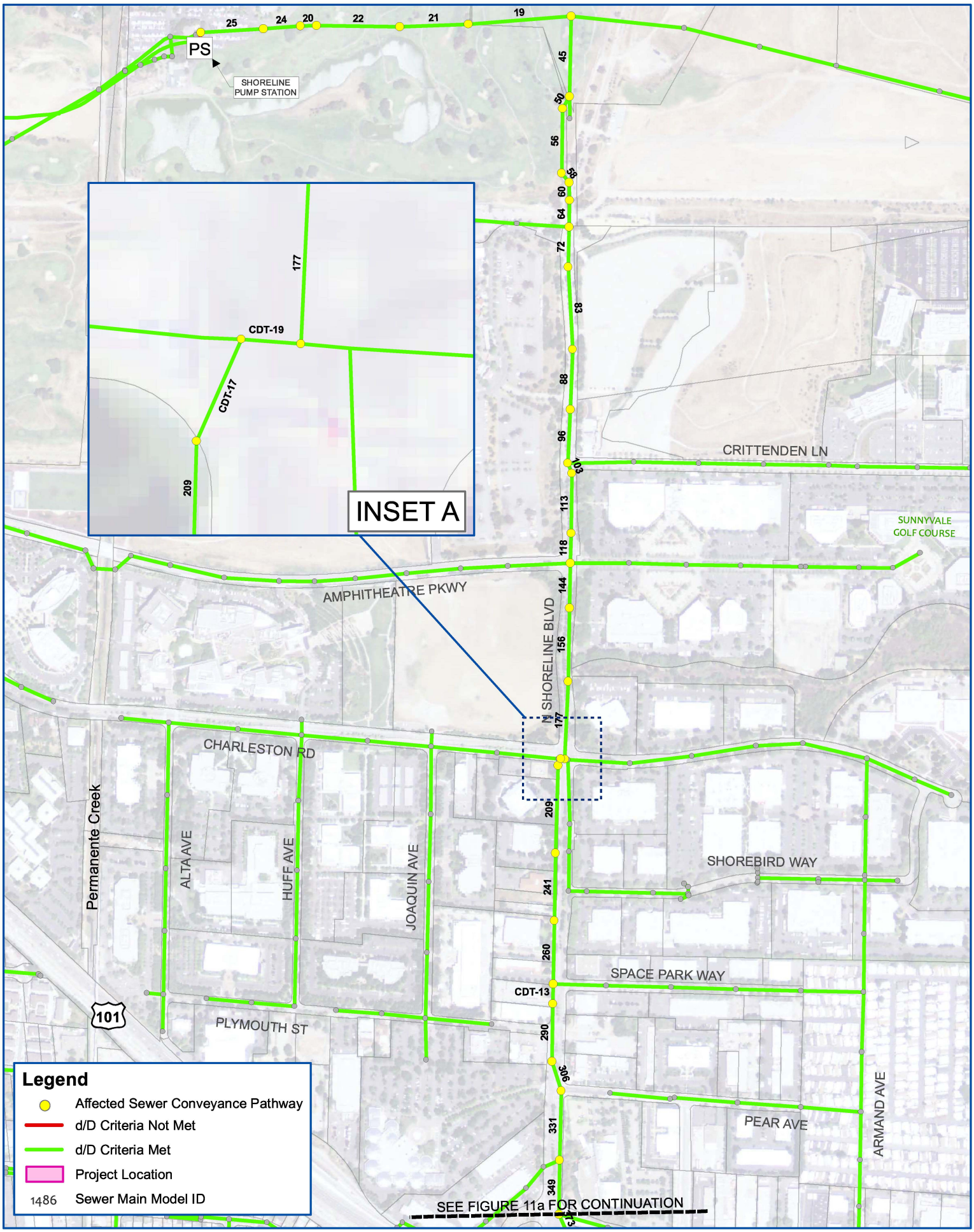

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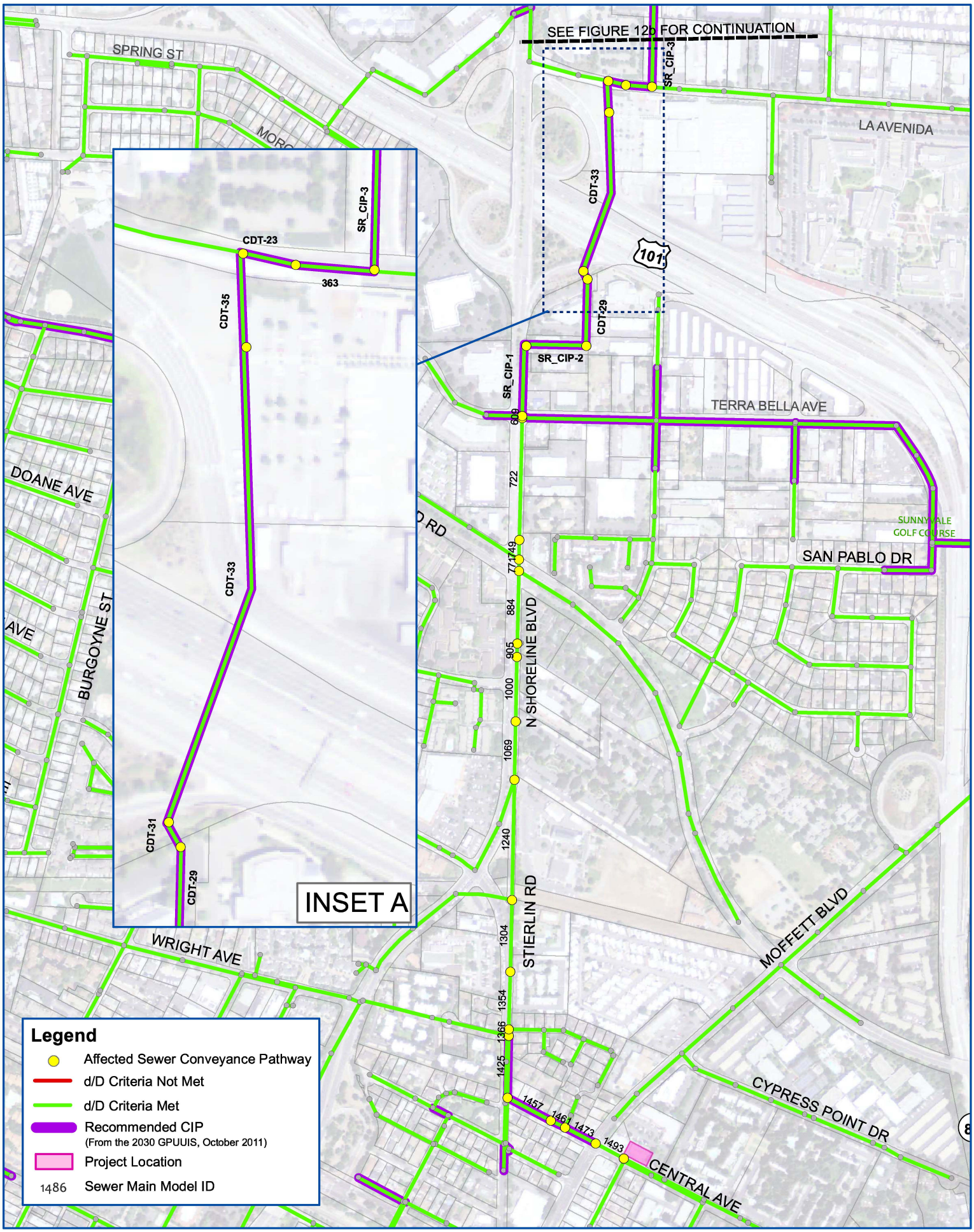
FIGURE B-11b: **PWWF - With Project**
Sewer System Model - Existing Condition



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0 350 700 Feet

FIGURE B-12a: **PWWF - Without Project**

Sewer System Model - Future Cumulative Condition

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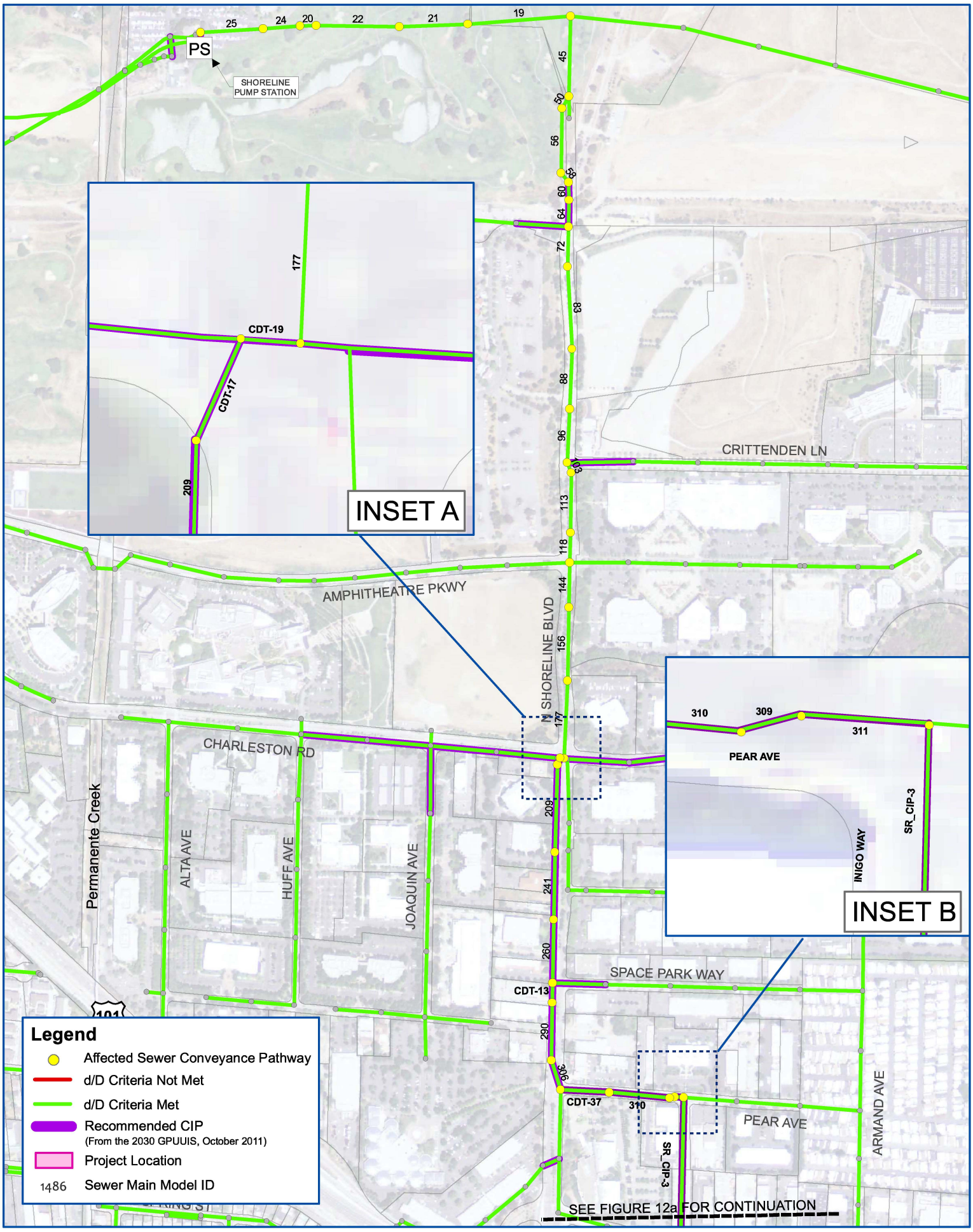

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0 350 700 Feet

FIGURE B-12b: **PWWF - Without Project**

Sewer System Model - Future Cumulative Condition

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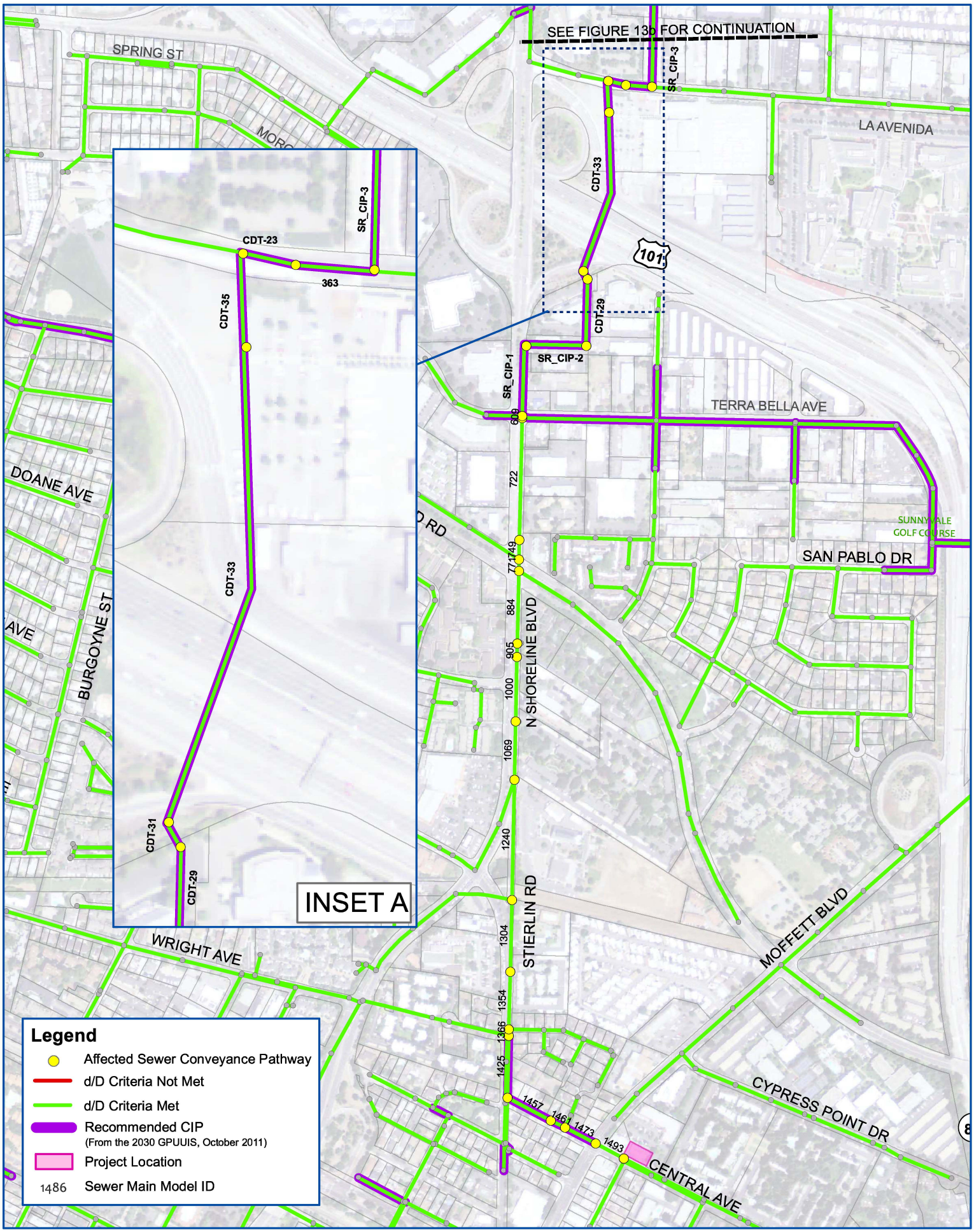

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0 350 700 Feet

FIGURE B-13a: **PWWF - With Project**

Sewer System Model - Future Cumulative Condition

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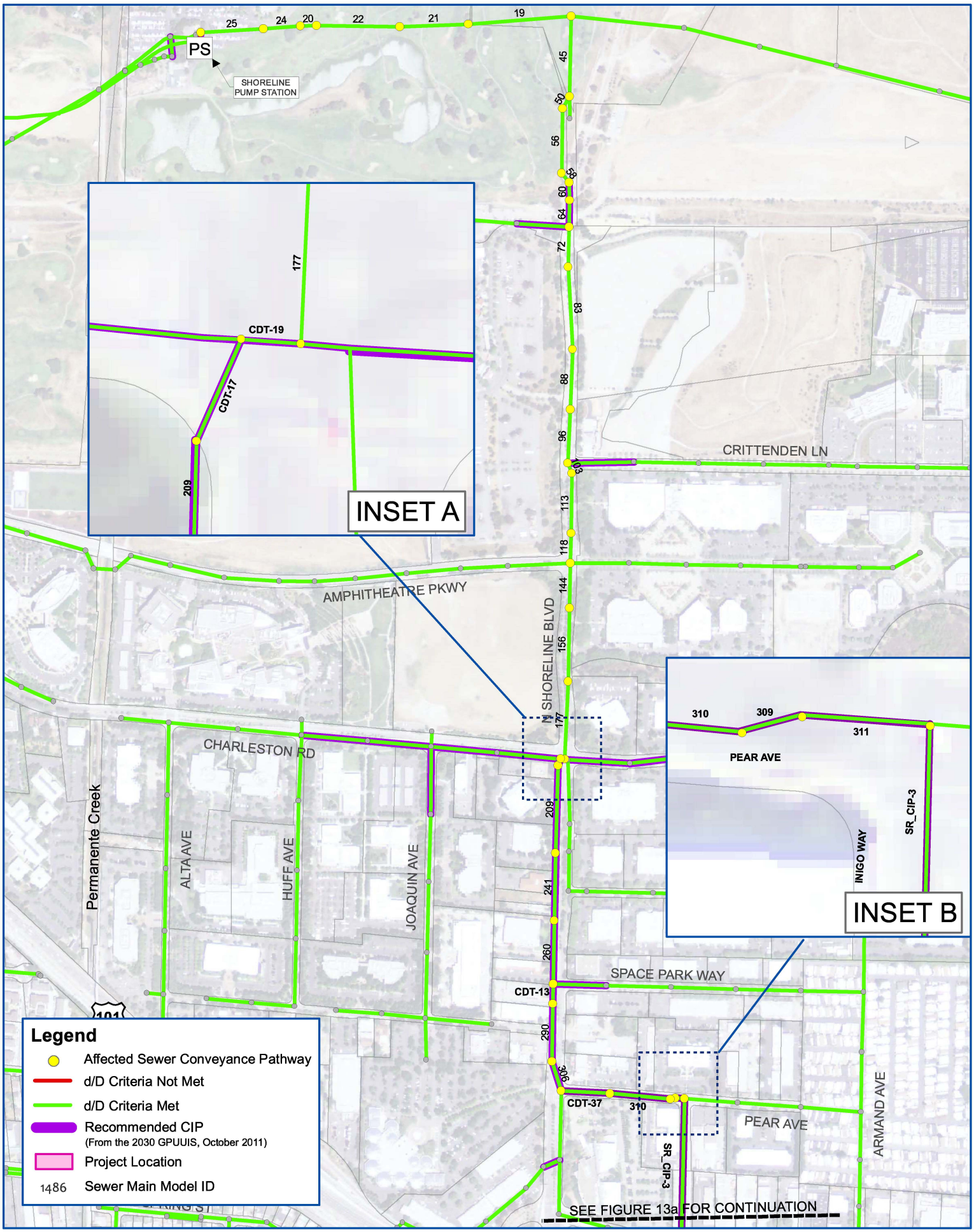

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0 350 700 Feet

FIGURE B-13b: **PWWF - With Project**

Sewer System Model - Future Cumulative Condition

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