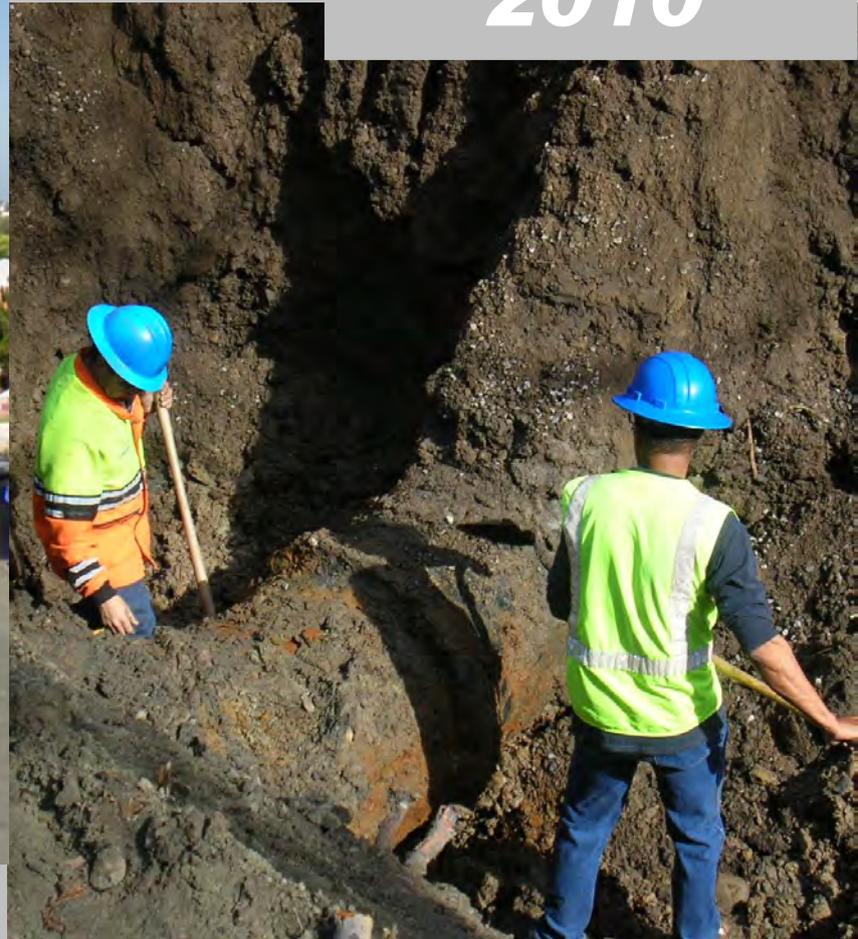


Upas Street Pipeline Replacement Project Planning Study

***July
2010***



***Public Utilities Department
Engineering and Program Management Division***



**City of San Diego
Public Utilities Department
Engineering and Program
Management Division**

Upas Street Pipeline Replacement Project

Planning Study July 2010

Prepared By: Hudson McLintock, P.E., Assistant Civil Engineer
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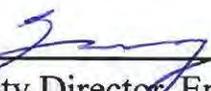
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Approval Sheet

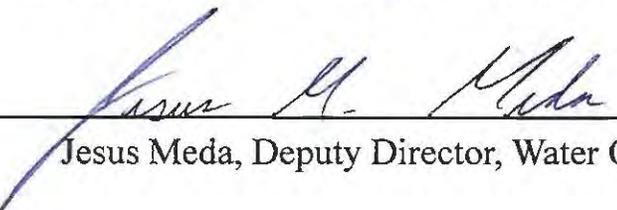
Upas Street Pipeline Replacement Project

Planning Study
July 2010

I concur with and support the recommendations
stated in this Planning Study:

 6/23/10

Guann Hwang., Deputy Director, Engineering and Program Management Division

 7/12/10

Jesus Meda, Deputy Director, Water Operations Division

Table of Contents

	<u>Page</u>
Executive Summary	i
Proposed Upas Project Design Changes Figure	v
Vicinity Map	vi
Abbreviation	vii
1.0 Introduction	
1.1 General.....	1
1.2 Background.....	1
1.3 Purpose and Procedure.....	2
1.4 Function of Upas Pipeline Service Area.....	3
1.5 Source of Information.....	3
2.0 Existing Conditions	
2.1 Upas Project.....	8
2.1.1 Upas Street Pipeline.....	8
2.1.2 Park PL.....	8
2.1.3 5 th PL.....	8
2.2 Corrosion.....	9
2.3 Water Pressure.....	9
2.4 Crossing.....	10
2.4.1 Crossing of Fault Lines.....	10
2.5 Upas Street and Ray Street Intersection.....	10
2.5.1 30 th Street Pipeline Gap.....	11
3.0 Water Modeling	
3.1 Findings and Recommendations.....	12
3.2 Pressure Requirements.....	13
3.2.1 Leading Design Factor.....	13
3.3 Fire Flow.....	14
3.4 Transmission Mains Segments Out of Services.....	15
3.5 54 th Street Pipeline.....	16
3.6 Co-Built Projects.....	18
4.0 Recommendations	
4.1 Summary.....	20
4.1.1 Trenchless Replacement.....	20
4.2 Upas Pipeline – Alternative 1.....	20
4.2.1 Eastern Segment.....	22
4.2.1.1 Parallel Pipeline.....	22
4.2.2 Middle Segment.....	28
4.2.2.1 Consolidation.....	28
4.2.3 Western Segment.....	31
4.3 Upas Pipeline – Alternative 2.....	33

4.3.1 Eastern Segment.....	33
4.3.1.1 Consolidation.....	35
4.3.2 Middle Segment.....	35
4.3.3 Western Segment	35
4.4 30 th Street Pipeline Gap.....	40
4.5 Isolation Valves.....	40
4.6 Pressure Regulator Station.....	40
4.7 Construction Constraints.....	41
4.8 Park PL.....	43
4.8.1 Construction Constraints.....	43
4.9 5th PL.....	43
4.9.1 Construction Constraints.....	43
4.10 Project Execution.....	43
4.11 Community and Aesthetics.....	43
4.12 Easement Requirements.....	43

5.0 Cost Estimate

5.1 Cost Estimate Method.....	44
5.1.1 Pipeline.....	45
5.1.2 Pressure Regulator Station.....	46
5.2 Construction Cost Estimation	46
5.3 Total Cost Estimation.....	47
5.4 Estimated Cost Comparison.....	47
5.5 Budget.....	48
5.6 Schedule.....	48

6.0 Environmental

6.1 Environmental Assessment.....	49
6.1.1 CEQA and Permitting Compliance.....	51

Appendices (CD)

Appendix A	Pictures
Appendix B	Model Data
	- Exhibit 1- 2007 Peak Hour Model - Existing
	- Exhibit 2- 2030 Peak Hour Model – Existing
	- Exhibit 3- 2030 Peak Hour Model - Proposed Alternative 1
	- Exhibit 4- 2030 Peak Hour Model - Proposed Alternative 2
	- Exhibit 5 - Alternative 2 – TS2 Out of Service - Low Pressure Area
	- Exhibit 6 - Alternative 2 – TS3 Out of Service - Low Pressure Area
	- Exhibit 7 - SPLASH Model - Photo
	- Exhibit B-1 – Alternative 1 – Pipeline Diameter
	- Exhibit B-2 – Alternative 1 – Pipeline Velocity
	- Exhibit B-3 – Alternative 1 – Pipeline Headloss
	- Exhibit B-4 – Alternative 1 – Pipeline HGL
	- Exhibit B-5 – Alternative 1 – Pipeline Pressure
	- Exhibit B-6 – Alternative 1 – Pipeline Flow
	- Exhibit B-7 – Alternative 2 – Pipeline Diameter
	- Exhibit B-8 – Alternative 2 – Pipeline Velocity

- Exhibit B-9 – Alternative 2 – Pipeline Headloss
- Exhibit B-10 – Alternative 2 – Pipeline HGL
- Exhibit B-11 – Alternative 2 – Pipeline Pressure
- Exhibit B-12 – Alternative 2 – Pipeline Flow
- Appendix C As-builts
- Appendix D Group Jobs
- Appendix E Miscellanies
 - Corrosion Survey Report – Upas Street Pipeline dated January 18, 2006
 - 30 inch Upas Street Pipeline Cabrillo Sewer Line
 - City of San Diego – Seismic Safety Study- Geologic Hazard and Faults Grid 17
 - City of San Diego – Seismic Safety Study- Geologic Hazard and Faults Grid 21
 - City of San Diego – Water Facilities master Plan – CIP Project – Prioritization Criteria Documentation Form
 - Seismic Retrofit of Water Transmission Pipeline – Survey Limits of Existing Conditions Upas 24-inch Water Figure 4A
 - Water Facilities Master Plan CIP Project – Prioritization Criteria Documentation Form
 - Water Facilities Master Plan CIP Project – Summary Form
 - Table E – 1 thru 4 – Fire Flow
 - Exhibit E – 1 – Break and Leaks
- Appendix F Relining (Rehabilitation)
- Appendix E Comments

Index of Figures, Tables, Exhibits

Figures

Figure 1-1 Existing Conditions	5
Figure 1-2 Supply System to the Central City Area.....	6
Figure 1-3 Central City Water System.....	7
Figure 2-1 30th Street Pipeline No Gap.....	10
Figure 2-2 30 th Street Pipeline Gap.....	10
Figure 3-1 Limits of Transmission Main Segments.....	18
Figure 4-1 ALTERNATIVE 1 – Proposed Design Changes.....	21
Figure 4-2 PROPOSED PARALLEL DISTRIBUTION PIPELINE OVERVIEW MAP... 23	23
Figure 4-3 Parallel A	24
Figure 4-4 Parallel B	25
Figure 4-5 Parallel C.....	26
Figure 4-6 Parallel D.....	27
Figure 4-7 PROPOSED DESIGN CHANGES (Between Front & Albatross).....	29
Figure 4-8 Proposed Design Changes (Between Brant to Albatross).....	30
Figure 4-9 Proposed Design Changes - Install 12" Pipeline.....	32
Figure 4-10 ALTERNATIVE 2 – Proposed Design Changes.....	34
Figure 4-11 CONSOLIDATION OVERVIEW.....	36
Figure 4-12 CONSOLIDATION A (AC Mains 28th to 30th).....	37
Figure 4-13 CONSOLIDATION B (AC Mains Vermont to Georgia).....	38
Figure 4-14 CONSOLIDATION C (AC Mains 5th to 7th).....	39
Figure 4-15 30th Street Pipeline Gap Infill for Alternative 1	40
Figure 4-16 Group Job Overview.....	42

Tables

Table 3-1	Pressure Criteria.....	13
Table 3-2	Fire Flow per Land Use.....	14
Table 4-1	Quantities of Upas Project – Alternative 1.....	20
Table 4-2	Quantities of Upas Project – Alternative 2.....	33
Table 5-1	Quantities and Cost of Upas Project– Alternative 1.....	45
Table 5-2	Quantities and Cost of Upas Project– Alternative 2.....	45

Executive Summary

The Upas Pipeline Project Planning Study is identified by the following:

Official Project Name	WBS #	Council	Community Planning Area	Water CIP Priority Rank
Upas Street Pipeline Replacement Project	S-11022	2, 3	Greater North Park (GNP) Uptown (UPT) Midway-Pacific Highway (MPH)	17

The Upas Street Pipeline Cast-Iron Replacement Project will consist of four parts:

1. Upas Street Pipeline – Replace and abandon existing 30” and 24” cast iron mains in Upas Street from Ray Street to Pacific Highway (south of the intersection of Pacific Highway and Frontage Road) with 30” and 16” pipelines. See chapter four for details.
2. Park Pipeline – Replace 16” cast iron in Park Boulevard from the Park and Upas Pressure Reducing Station to Robinson Avenue with 16” PVC. Total length of 2,090’.
3. 5th Pipeline – Replace 16” & 20” cast iron in 5th Avenue from Upas Street to Robinson Avenue with 16” PVC. Total length of 2,240’.
4. The Upas and Brant Pressure Reducing Station and Upas and Hawk Pressure Reducing Station will be rehabilitated. The proposed Upas and Balboa Pressure Reducing Station will be installed at the interconnection of Upas Street Pipeline and Balboa Park Pipeline.

The estimated construction cost is **\$11.6 million** with a total project cost of **\$17.3 million**. The list below is the budgeted amounts for the Upas Project.

- FY10 = 0
- FY11 = \$156,000
- FY12 = Remainder needed for the Project

The facility age and cast iron main replacement are the primary drivers for this project. The total length of the project is 28,500’ (5.4 miles), which 22,184’ is cast iron replacement.

The Upas Street Pipeline was originally installed to supply the Pacific Beach and Mission Beach communities via the Pacific Beach Pipeline from the old University Heights Water Treatment Plant. The University Heights Water Treatment Plant was decommissioned in 1950. The pipeline now serves as both a transmission and a distribution pipeline. Large sections of the Upas Street Pipeline were replaced in the early 1960’s. The Upas Street Pipeline diameter from

Ray Street to 5th Avenue is 30” and the diameter from 5th Avenue to Pacific Highway is 24”. The pressure zone for the Upas Street Pipeline, east of Upas and Hawk Pressure Reducing Station, length of 13,150’, is the Alvarado 536 Zone and the rest of the pipeline, length of 2,700’, is within the University Heights 390 Zone. The Upas and Hawk Pressure Reducing Station drops the Hydraulic Grade Line down from 536’ to 390’. The pressure settings at the Upas and Hawk Pressure Reducing Station are set to 55 psi and 50 psi and are currently the main feed to the Pacific Beach Pipeline.

Park Pipeline is a 16” cast iron distribution pipeline that begins at the intersection of Upas Street and Park Boulevard then runs north up Park Boulevard where it ends at the intersection of Park Boulevard and Robinson Avenue. It was installed in 1913.

5th Pipeline is a distribution pipeline that consists of four sections beginning at the intersection of Upas Street and 5th Avenue then runs north up 5th Avenue where it ends at the intersection of 5th Avenue and Robinson Avenue. The first section, a 16” cast iron installed in 1958, begins at Upas Street and ends at Walnut Avenue. The second section, a 16” cast iron installed in 1902, begins at Walnut Avenue and ends half a block north of Anderson Place. The third section, a 20” cast iron installed in 1907, begins half a block north of Anderson Place and ends at Pennsylvania Avenue. The fourth section, a 20” cast iron installed in 1958, begins at Pennsylvania Avenue and ends at Robinson Avenue.

The traffic is heavy where Upas Street intersects 30th Street, Park Boulevard, 5th Avenue and 6th Avenue. Balboa Park has narrow trails, steep slopes, limited amount of space for construction, and Highway 163 crossing. The Interstate 5 crossing area has heavy traffic and a limited amount of space for construction. Park Pipeline and 5th Pipeline have heavy traffic along their pipeline lengths. It is recommended that this project proceed as a design/build project and not a design/bid/build project. This will save approximately 6 months on the total project duration.

Approximately 250 feet of pipeline just east of Hwy 163 is within the City of San Diego’s Multi-Habitat Planning Area. Any work within or near the City of San Diego’s Multi-Habitat Planning Area boundary should be avoided during bird breeding season (February 15th – September 15th). A biological survey and report may be necessary to determine if a Mitigation Monitoring and

Reporting Program would be necessary. The project sites cross three faults; the Old Town fault, the Florida Canyon fault, and the Texas Street fault. The majority of the project site is underlain by gently sloping to steep terrain that pose a low geological risk. Noise generating construction activities for the proposed project would be limited to the hours of 7am to 7pm. A Water Pollution Control Plan would be required.

Summary of Scope

Name	Existing Mains		Proposed Mains			Cost (Millions)
	Diameter	Material	Diameter	Material	Length	
Upas Street Pipeline - Eastern Replacement	30"	Cast Iron	30"	Cement Mortar Lined and Coated Steel Pipeline	9,620'	\$5.10
Installed Parallel - 12"	6",8",10"	Asbestos Cement, Unknown, Polyvinyl Chloride	12"	Polyvinyl Chloride	6,238'	\$1.61
Upas Pipeline - Middle Replacement	24"	Cast Iron	16"	Polyvinyl Chloride	2,454'	\$0.80
Upas Street Pipeline - Abandon Segment	24"	Cast Iron			290'	\$0.14
Upas Street Pipeline - Western Replacement	24"	Cast Iron	16"	Polyvinyl Chloride	870'	\$0.28
Replacement - 8"	24"	Cast Iron	8"	Polyvinyl Chloride	250'	\$0.05
Install - 12"			12"	Polyvinyl Chloride	930'	\$0.24
Upas Street Pipeline - Abandon Segment	24"	Cast Iron			3,440'	\$1.66
Park Pipeline	16"	Cast Iron	16"	Polyvinyl Chloride	2,090'	\$0.68
5th Pipeline	16", 20"	Cast Iron	16"	Polyvinyl Chloride	2,240'	\$0.73
Pressure Regulator Station						\$0.35
Total Construction Cost					28,422'	\$11.6

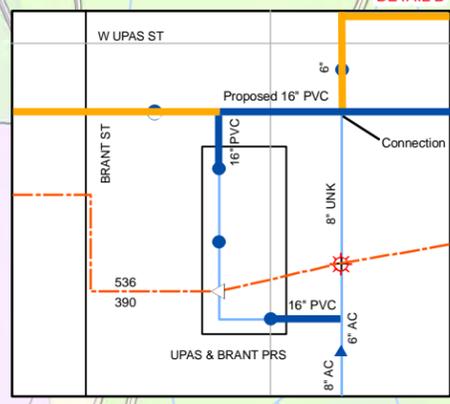
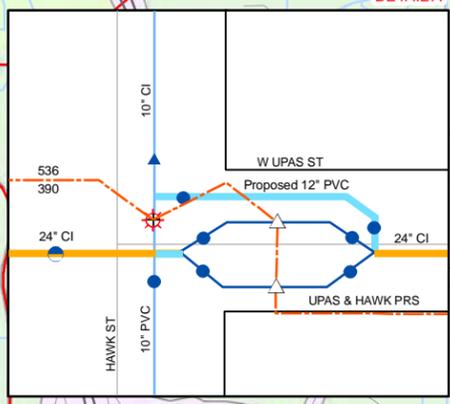
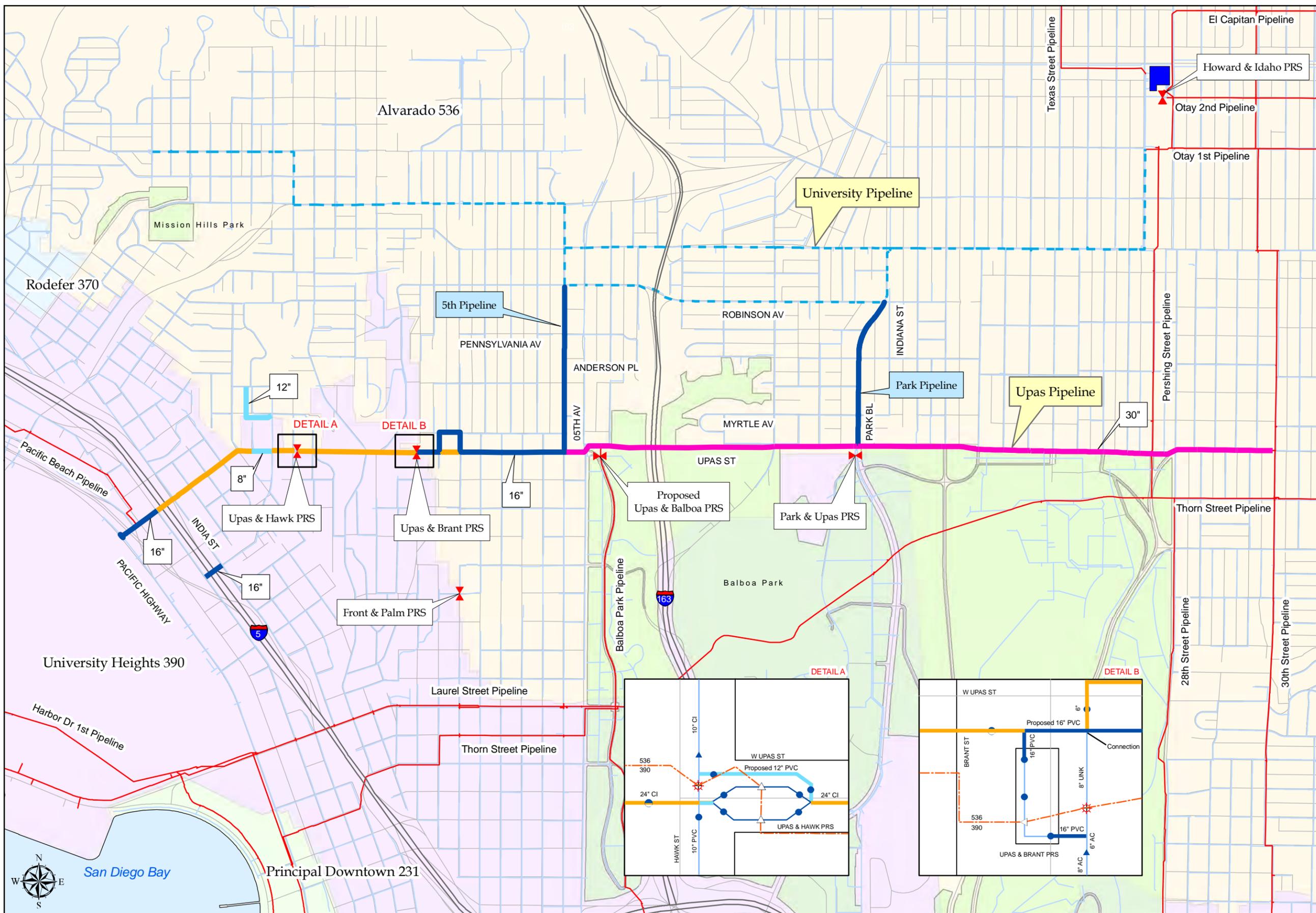


Legend

- Abandon Pipe
- Install 30" Pipe
- Install 16" Pipe
- Install 8" or 12" Pipe
- Transmission Pipes
- Water Pipes
- - - University Pipeline Project (16")
- X Pressure Regulating Station
- University Hgts Reservoir (North & South)

HGL Zones

- ALVARADO 536
- UNIVERSITY HEIGHTS 390
- PRINCIPAL DOWNTOWN 231
- RODEFER 370



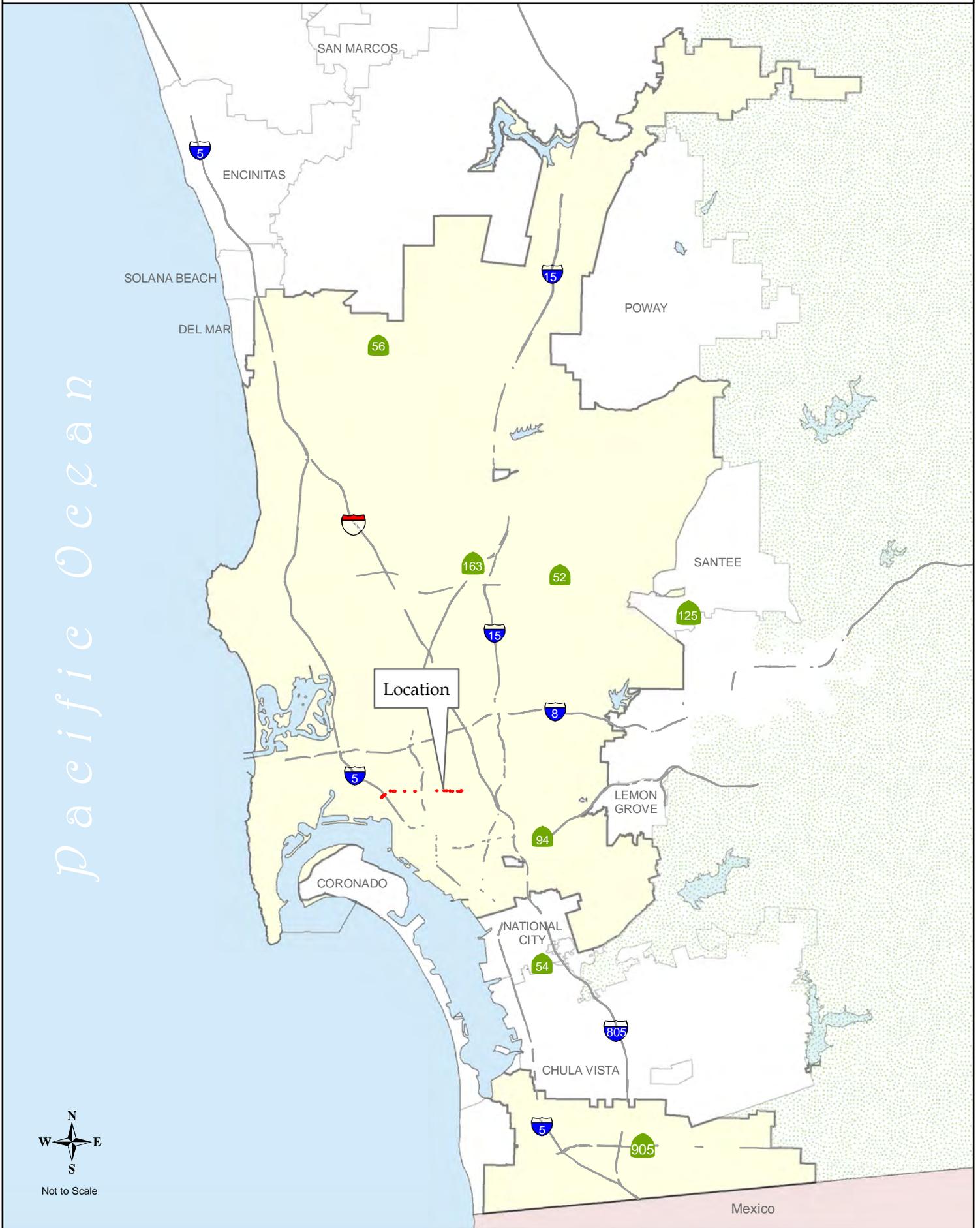
**Upas Pipeline
ALTERNATIVE 1
Proposed Design Changes**



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Upas Pipeline Project Vicinity Map



Abbreviations:

„– feet

” – inches

8”, 16” – Pipe size given by internal diameter

AC – Asbestos Cement

Alvarado 2nd Pipeline Extension Projects – Alvarado 2nd Pipeline Extension – Pacific Beach and Morena Boulevard Cast-Iron Pipeline Replacement

BMPs – Best Management Practices

CALTRANS – California Department of Transportation

CEQA – California Environmental Quality Act

CI – Cast Iron

CIP – Capital Improvement Program

CIP Facility Design Guideline – The Water Department systems and facility design manual

CMLC – cement mortar lined and coated steel pipe

City – City of San Diego

Distribution – Smaller facilities that convey lower volumes of water over shorter distances and serve local areas

DSD – City of San Diego’s Development Services Department

EPM – Engineering and Program Management Division

EAS – Environmental Analysis Section

Ex. – Existing

fps – feet per second

FY – Fiscal Year

GIS – Geographic Information Systems

gpm – gallons per minute

HGL – Hydraulic Grade Line

Land Use Zone – Planning designation of land usage (ex. Residential, commercial, industrial)

LDC – City of San Diego’s Land Development Code

LS – Laurel Street Pipeline

Master Plan – Alvarado Water Treatment Plant Service Area Master Plan - Draft Volume 2:

Central City Focus Area - Dated: April 2009

Max-Day Demand (also Max-Day, MDD) – The highest 24-hour water demand for the year

MHPA – City of San Diego’s Multi-Habitat Planning Area

MMRP – Mitigation Monitoring and Reporting Program

Peak-Hour Demand (also Peak-Hour, PHD) – The highest 1-hour water demand for the year

PL – Pipeline

PM – post meridiem meaning “after noon”

PPA – Public Project Assessment

PRS – Pressure Regulator Station

PRV – Pressure Regulator Valve

psi – Water pressure given in pounds per square inch

PVC – Polyvinyl Chloride

RWQCB – Regional Water Quality Control Board

SCADA – Supervisory Control and Data Acquisition

SPLASH – System Planning & Locator Application for Sewer & Hydrographics

Static Pressure – Pressure with no flow in the system

Transmission – Large facilities that convey high volumes of water over distance and serve regions of the water system

TS – Thorn Street PL

UCSD – University of California, San Diego

University Project – University Avenue Pipeline Cast-Iron Replacement Project

UNK – Unknown

UnS – University Avenue Pipeline

Upas Project – Upas Street Pipeline Replacement Project

Upas PL – Upas Street Pipeline

WTP – Water Treatment Plant

Chapter 1

Introduction

1.0 Introduction

1.1 General

The Upas Street Pipeline Replacement Project (Upas Project) is a part of the City of San Diego (City) Public Utilities Department Capital Improvement Program (CIP) and is identified by WBS No. S-11022. The City's continuing effort to replace all the cast iron (CI) pipelines within the City is in accordance with the California Department of Public Health's compliance order 04-14-96CO-022. This project was driven by the need to replace a facility that is reaching the end of its life cycle. The Upas Project is comprised of the Upas Street Pipeline (Upas PL), the 16" CI in Park Boulevard from Upas Street to Robinson Way (Park PL), the 16" and 20" CI in 5th Avenue from Upas Street to Robinson Way (5th PL). See Figure 1-1 to 1-3 for more details.

1.2 Background

The Upas PL was built around 1940 using CI. The Upas PL was originally installed to supply the Pacific Beach and Mission Beach communities via the Pacific Beach Pipeline from the old University Heights Water Treatment Plant (WTP). The University Heights WTP was decommissioned in 1950. The Upas PL now serves as both a transmission and a distribution pipeline that serves residential, commercial, and industrial areas. The Upas PL begins at the intersection of Upas Street and Ray Street and terminates at the 12" CI pipeline south of the intersection of Pacific Highway and Frontage Road. The diameter of the Upas Pipeline is 30" from the connection at the 30th Street Pipeline until the intersection of Upas Street and 5th Avenue, where it decreases to a 24". The pipeline stays 24" for the rest of its length, where it terminates just south of the intersection of Pacific Highway and Frontage Road. Some sections of the Upas PL were replaced in-kind in the early 1960's using the same diameter and material. The pressure zone for the Upas PL, east of Upas and Hawk Pressure Regulator Station (PRS), length of 13,150', is the Alvarado 536 Zone and the rest of the pipeline, length of 2,700', is within the University Heights 390 Zone. The Upas and Hawk PRS drops the Hydraulic Grade Line (HGL) in the Upas PL down from 536 to 390. The pressure settings for the Upas and

Hawk PRS are currently set at 55 psi and 50 psi. The Upas PL currently feeds the Pacific Beach Pipeline.

Park PL and 5th PL are an important part of the distribution system, interconnecting the Upas PL and University PL. The Park PL was installed in 1913 and the 5th PL was installed in 1902, both using CI.

1.3 Purpose and Procedure

The purpose of the Upas Project is to replace existing CI mains and update the transmission and distribution system to better suit its current and future needs. Currently, the Upas PL has water service connections. Transmission pipelines cannot be directly tapped for service connections. They will need to be relocated to a distribution pipeline which in this study is 16” or smaller. This is based on City Standards Section 3.3.1.D.

The condition of the Upas PL is known to be badly deteriorated with a recent history of leakages and pipe breaks. The pipeline runs in several canyons and open space areas where accessibility is difficult. It will need parallel distribution pipelines wherever Upas PL is larger than 16”.

All recommendations made for the following items will need to be part of a separate study and should be further evaluated by a hydraulic study:

- University PL (Planning Study in progress)
- Pacific Beach Pipeline (south of Alvarado 1st Pipeline) – being addressed by Group Jobs
- Cast Iron pipelines in the area (addressed by Cast Iron Pipeline Replacement)
- 30th Street Pipeline – Ranked 20 on Draft Capital Improvements Program-Project Prioritization Criteria dated September 2009
- Low pressure area in Balboa Park based on 2030 model
- Low pressure area around the intersection of 5th and Laurel Street
- Mid-City Pipeline Phase II – Ranked 5 on Draft Capital Improvements Program-Project Prioritization Criteria dated September 2009

- Alvarado 2nd Pipeline Extension – Pacific Beach and Morena Boulevard Cast-Iron Pipeline Replacement (Alvarado 2nd Pipeline Extension Projects) – Ranked 14 on Draft Capital Improvements Program-Project Prioritization Criteria dated September 2009

This project will be limited to the Upas PL, Park PL, and 5th PL and the PRS (Park and Upas PRS, Upas and Brant PRS, and the proposed Upas and Balboa PRS). The scope will not address CI replacement in other nearby areas.

There are several Group Jobs in the area that will need to be coordinated. See Appendix D for more details.

- Group Job 761 (Map 2) is replacing and realigning sewer at the intersection of Reynard Way and Curlew Street.
- Group Job 761 (Map 3) is replacing sewer in West Upas Street from Ibis Street to Jackdaw Street and is replacing the sewer and water in Hawk Street from West Upas Street to West Walnut Avenue.
- Group Job 682 is replacing sewer in 6th Avenue from Upas Street to Maple Street.

1.4 Function of Upas Pipeline Service Area

The Upas PL serves the southern Alvarado 536 Zone. At the Upas and Hawk PRS the HGL drops down from 536 to 390, to help feed the University Heights 390 Zone around San Diego International Airport and the Pacific Beach PL. It is currently being fed by the Alvarado 1st PL, El Capitan PL, Otay 1st PL, and Otay 2nd PL.

1.5 Source of Information

Hydraulic analyses in this report were done using the Engineering and Program Management Divisions, Modeling Section water modeling software titled “ SynerGEE Water 4.3.1” by Advantica. The specific water model used for the analysis of this report is the year 2030_24hr_ZMDD_Alvarado_revised-Upas and University Alt1 model and 2030_24hr_ZMDD_Alvarado_revised-Upas and University Alt2 model of the City of San Diego Water Distribution System. Other sources of information included the

Supervisory Control and Data Acquisition (SCADA) system, System Planning & Locator Application for Sewer & Hydrographics (SPLASH) View 4.1 GIS application system, as-built, discussions with Water Operations Personnel, and the City of San Diego Water Department 1999 CIP Facility Design Guidelines. Most of the SCADA data timeframe is August 27, 2008.



Legend

- Upas Pipeline Project
- University Pipeline Project
- Existing University Pipeline outside of this Project Scope (NW portion addressed by Group Job 665)
- Transmission Pipelines
- Water Pipelines
- Pressure Regulating Station
- University Hgts Reservoir (North & South)

HGL Zones

- ALVARADO 536
- UNIVERSITY HEIGHTS 390
- PRINCIPAL DOWNTOWN 231
- NORMAL HEIGHTS 536
- RODEFER 370
- ARNOLD HILLS 358

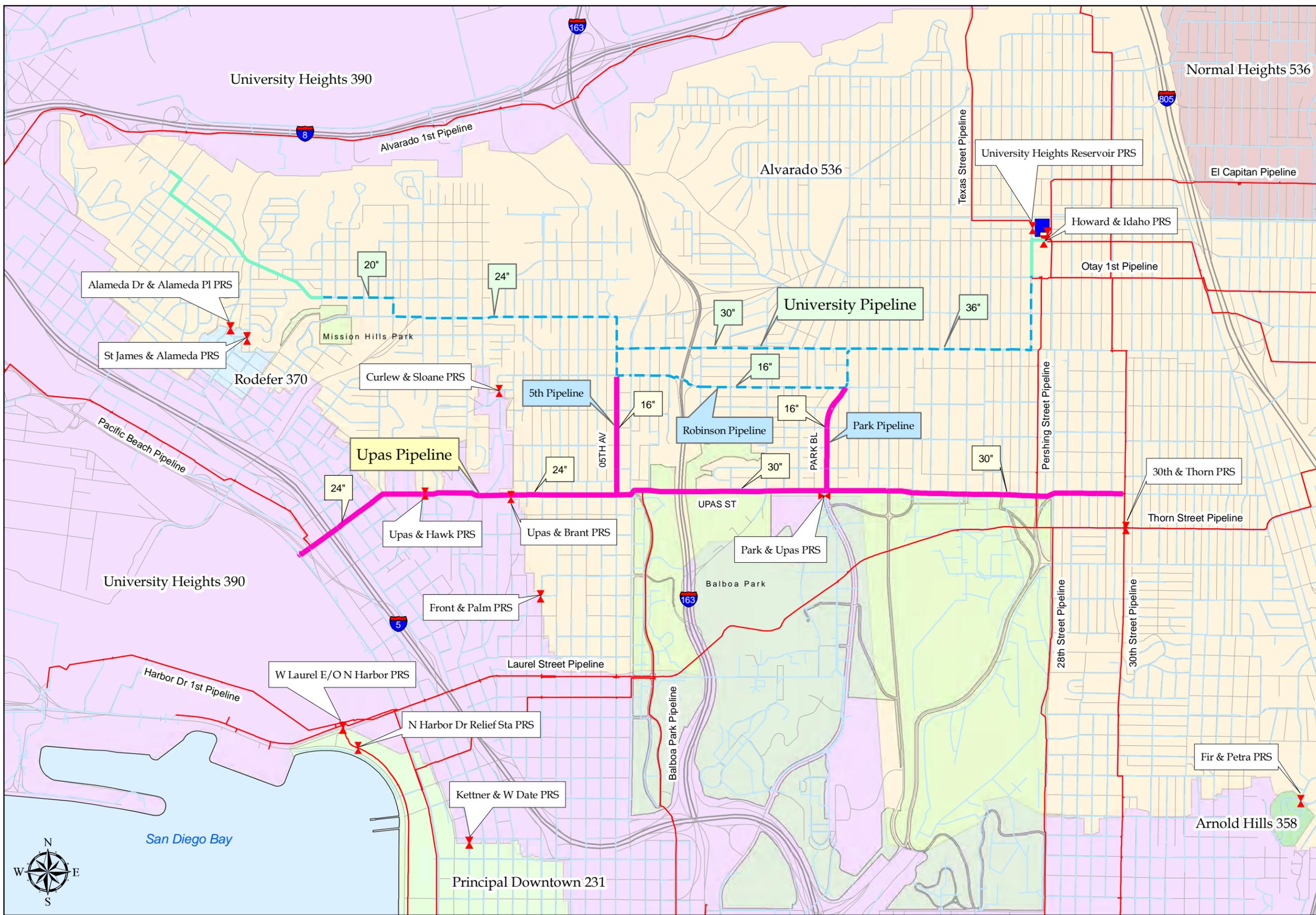


Figure 1-1

Upas Pipeline Project
EXISTING CONDITIONS



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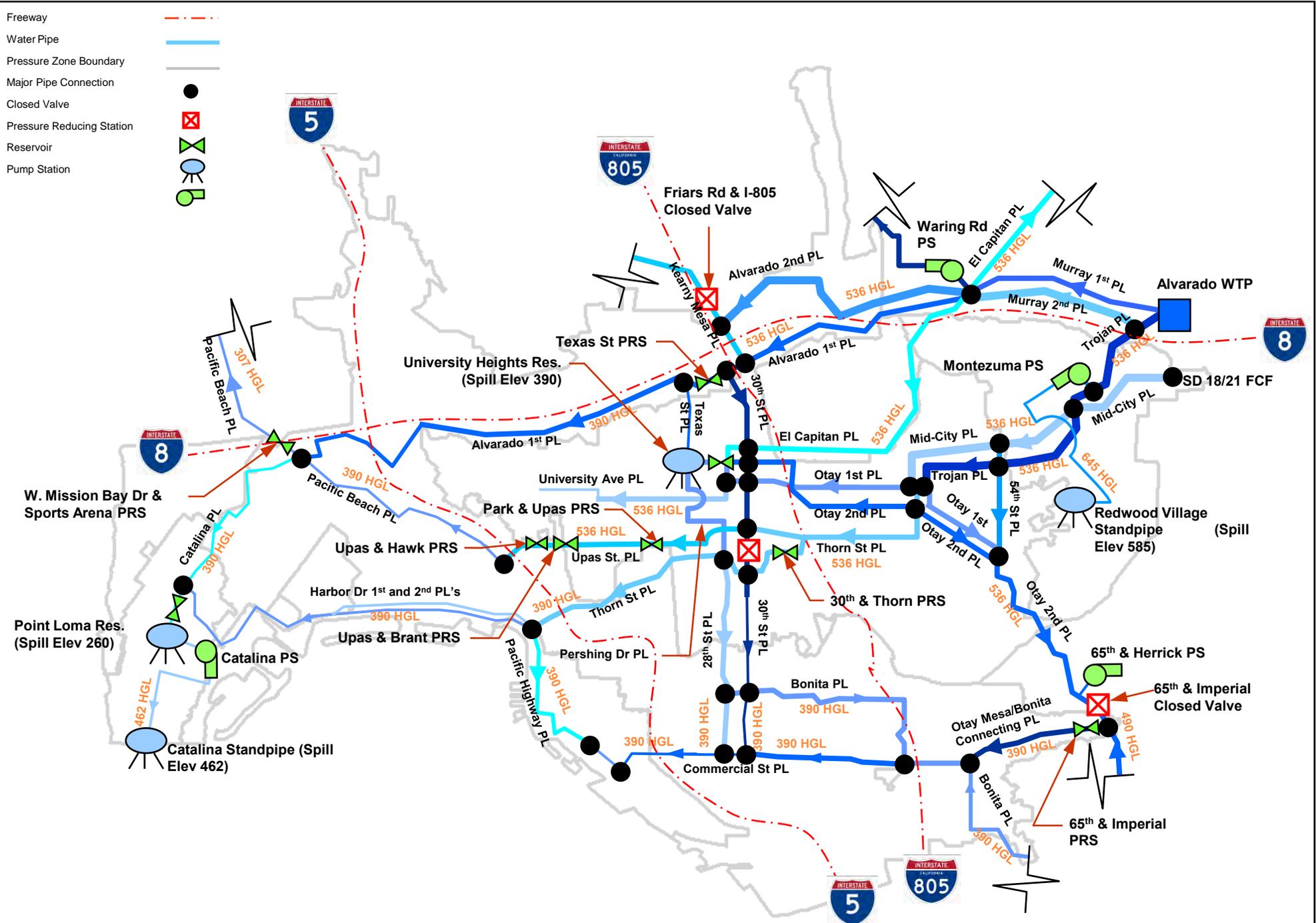
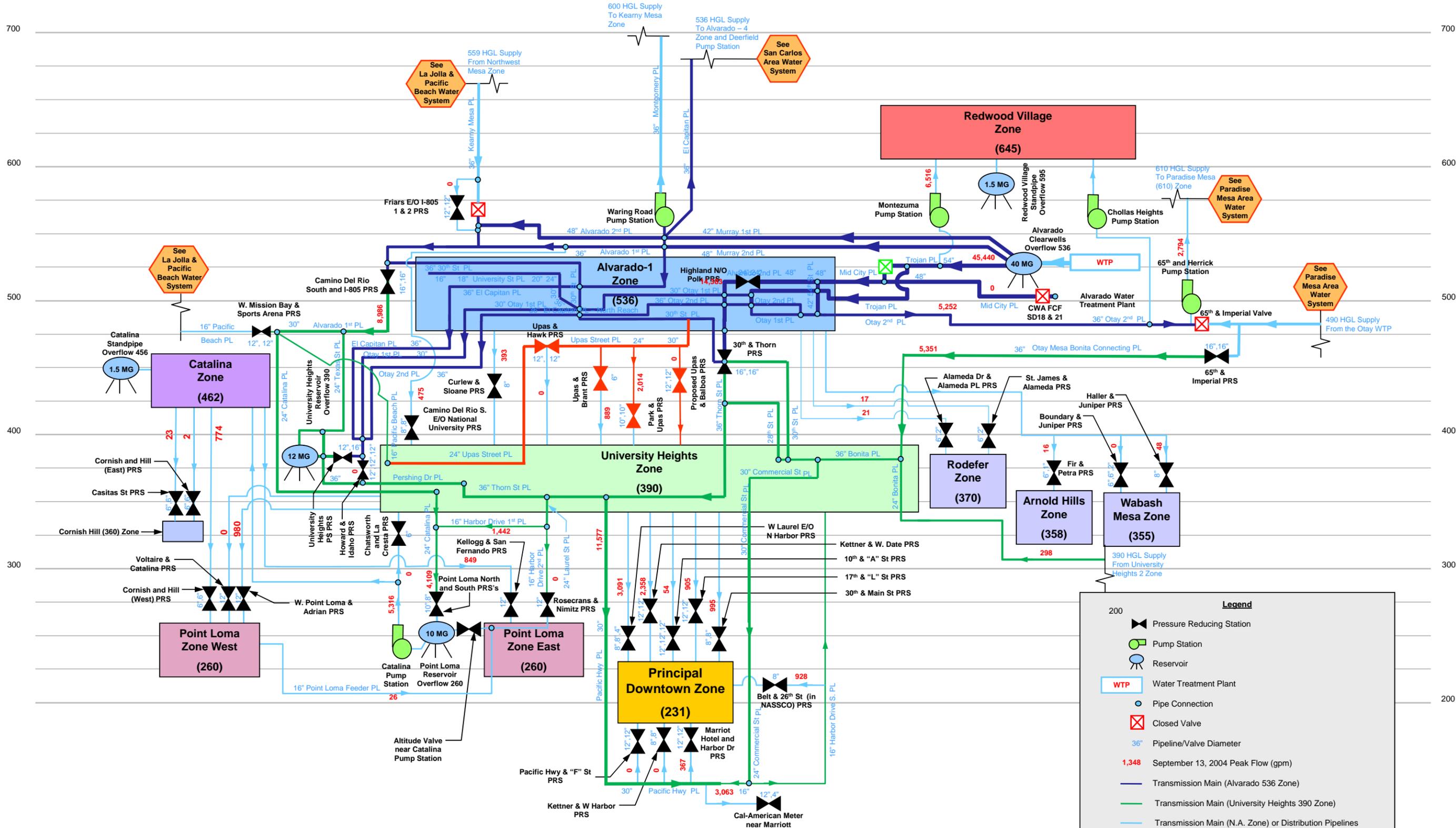


Figure 1-2: Supply System to the Central City Area

Static HGL (Feet)



Legend

- 200 Pressure Reducing Station
- Pump Station
- Reservoir
- Water Treatment Plant
- Pipe Connection
- Closed Valve
- 36" Pipeline/Valve Diameter
- 1,348 September 13, 2004 Peak Flow (gpm)
- Transmission Main (Alvarado 536 Zone)
- Transmission Main (University Heights 390 Zone)
- Transmission Main (N.A. Zone) or Distribution Pipelines

Note: This graphic does not show pipeline outflow at distribution connections along major transmission lines and therefore is not flow balanced.

Upas Pipeline Project

Figure 1-3

Central City Water System

Drawn by: H. McLintock	Date: 06/25/10	No Scale
Sheet 1 of 1		

Chapter 2

Existing Conditions

2.0 Existing Conditions

2.1 Upas Project

The Upas Project will be broken up into three segments consisting of Upas PL, Park PL and 5th PL. See Figure 1-1 for more details.

2.1.1 Upas Street Pipeline

The Upas PL was built around 1940 using CI. Large sections of the Upas PL were replaced in the early 1960's. The largest section is roughly 750' long and is located between Upas and Hawk PRS and Horton Avenue. The second largest section is roughly 600' long and is located between Front Street and Brant Street. East of the intersection of Upas Street and 5th Avenue the pipeline is 30" CI and to the west of 5th Avenue is 24" CI. The Upas and Hawk PRS is where the HGL of Upas PL drops from Alvarado 536 Zone to University Heights 390 Zone'. Upas PL supply's the Pacific Beach Pipeline along with the Alvarado 1st PL and Electric Avenue PL.

2.1.2 Park PL

Park PL is a 16" CI distribution pipeline that begins at the intersection of Upas Street and Park Boulevard then runs north up Park Boulevard where it ends at the intersection of Park Boulevard and Robinson Avenue. It was installed in 1913. In 1958, a section roughly 700' long was installed from Myrtle Avenue to Cypress Avenue. The rest of the 16" CI pipelines in Park Boulevard will be addressed by the University Avenue Pipeline Cast-Iron Replacement Project (University Project).

2.1.3 5th PL

5th PL is a distribution pipeline that begins at the intersection of Upas Street and 5th Avenue then runs north up 5th Avenue where it ends at the intersection of 5th Avenue and Robinson Avenue. The first section, a 16" CI that was installed in 1958, begins at Upas Street and ends at Walnut Avenue. The second section, a 16" CI that was installed in 1902, begins at Walnut Avenue and ends half a block north of Anderson Place. The third

section, a 20" CI that was installed in 1907, begins half a block north of Anderson Place and ends at Pennsylvania Avenue. The fourth section, a 20" CI that was installed in 1958, begins at Pennsylvania Avenue and ends at Robinson Avenue. The rest of the CI pipeline in 5th Avenue will be addressed by the University Project.

2.2 Corrosion

The Corrosion Engineering Section did a limited report on the Upas PL dated January 18, 2006. The report states that:

- There is no cathodic protection or corrosion monitoring test stations along the pipeline alignment.
- A galvanic anode system is currently protecting the section of pipe and fittings in the Upas & Brant PRS vault by mitigating the corrosion effects of continual water immersion. The galvanic anode together with the protective coating on the metallic structures inside the vault is providing adequate protection.
- With the absence of monitoring stations, pipe to soil potentials were recorded on air valves and fire hydrants. This data may not provide accurate information regarding corrosion activity on the pipe. However, this information will be used to evaluate overall potential changes when compared to future readings on the same structures.
- Recommendations/Action Required: There is no action required at this time.

2.3 Water Pressure

The Upas PL, Park PL, 5th PL and the surrounding area do not have a low pressure problem. The area east of the Upas Street & Brant Street PRS has a pressure range of 60 to 130 psi. The area west of the Upas Street & Brant Street PRS has a problem with high pressure, with pressure range of 40 to 165 psi.

2.4 Crossings

There are three main crossings for the Upas PL. The first is at Highway 163. This crossing is a small deep canyon. Recently, a severe leak was fixed at this crossing. The second crossing is at Reynard Way. This crossing is in small canyon. The pipeline goes through the intersection of Reynard Way and Curlew Street. The last crossing is at Interstate 5. This crossing limit is from India Street to the end of the 12” pipeline in Pacific Highway. There is no canyon at this location. On both sides of Interstate 5 there are two critical roads. On the east side of Interstate 5 is India Street and on the west side is Kettner Boulevard. West of Kettner Boulevard is the rail tracks that are used by Amtrak and the Trolley – Blue Line. The Upas Street PL ends on the southbound Pacific Highway.

2.4.1 Crossings of Fault Lines

The Upas PL crosses at least two known faults. One crosses Upas Street around Crestwood Place. The second crosses Upas Street around Villa Terrace. There is also a potential fault around the western end of the pipeline. All these faults are classified as “Potentially Active”.

2.5 Upas Street and Ray Street Intersection

There is conflicting information about the pipeline layout at the intersection Upas Street and Ray Street. The as-builts indicate that there are two possible pipeline layouts, as shown below.

Figure 2-1 30th Street Pipeline No Gap

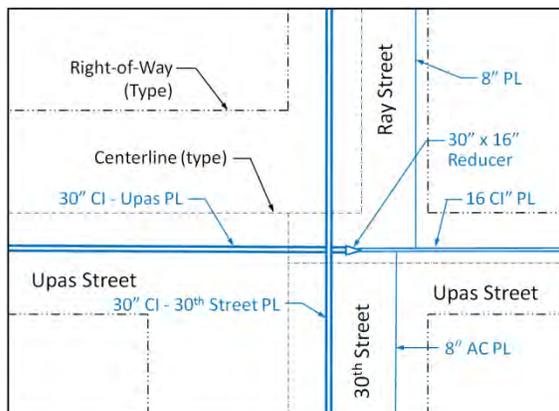
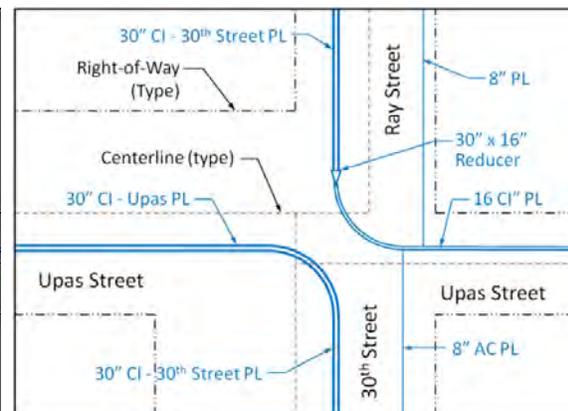


Figure 2-2 30th Street Pipeline Gap



The design engineer needs to determine which of the pipeline layouts is correct.

2.5.1 30th Street Pipeline Gap

The 30th Street PL in Ray Street enters the intersection reduces down from a 30” to a 16” pipeline. The 16” pipeline then turns east onto Upas Street. The 30th Street PL in 30th Street enters the intersection and turns west into Upas. At the intersection of 30th Street and Upas Street, the 30th Street PL has a physical gap. See Figure 2-2 for more details.

List of Drawings showing the gap in the 30th Street PL:

- 6774-W
- 27028-20-D
- 7669-W

Chapter 3

Water Modeling

3.0 Water Modeling

3.1 Findings and Recommendations

The 2030 water model was setup to evaluate the most efficient pipeline layout while still meeting the City of San Diego Design Guideline and general requirements. Two alternatives were studied. It is assumed that several projects (listed below) will be built around the same time as the proposed University PL. These projects will make the model less conservative and therefore save the City millions of dollars.

- **Alternative 1:** Replace the existing 30” from Ray Street to 5th Avenue with 30”. Replace the existing 24” from 5th Avenue to Brant Street with 16”. West of Brant Street to Ibis Street abandoned the 24”. Replace the 24” between Ibis Street to Jackdaw Street with 8”. Abandoned the 24” from Jackdaw Street to India Street. Replace and relocate the 24” under the Interstate 5 to Sassafras Street underpass and use a 16”. Replace the 24” from Kettner Boulevard to Pacific Highway with 16”. It is assumed that Mid-City Pipeline Phase II will be built around the same time as the proposed Upas PL. Modeling was done with Mid-City Pipeline Phase II in service.
- **Alternative 2:** Replace the existing 30” and 24” from Ray Street to Brant Street with 16”. For pipeline layout west of Brant Street see Alternative 1 for details. It is assumed that Mid-City Pipeline Phase II and Alvarado 2nd Pipeline Extension Projects will be built around the same time as the proposed Upas PL. Modeling was done with Mid-City Pipeline Phase II and Alvarado 2nd Pipeline Extension Projects in service (Master Planning Section Recommendation).

The following setups will be a part of both alternatives.

- Change the pressure settings in Upas and Hawk PRS to 20 psi and 21 psi (2030 Peak Hour Demand - Normal Conditions).
- Install the proposed Upas and Balboa PRS at the interconnection of Balboa Park PL and Upas PL. Set the PRS to 21 and 20 psi (2030 Peak Hour Demand - Normal Conditions).

- Add a parallel 12” pipeline. The parallel 12” pipeline will start at the intersection of West Brookes Avenue and Jackdaw Street. It then heads south down Jackdaw Street until it turns east onto West Walnut Avenue. It ends at the intersection of West Walnut Avenue and Hawk Street.
- The University PL from the intersection of Polk Avenue and Oregon Street to the intersection of Stephens Street and West Lewis Street was changed to 16” PVC. This pipeline size was chosen as this is the smallest possible diameter for the future University PL. This will be the most conservative approach, as it creates the worst hydraulics scenario for University PL. A separate planning study will be done to determine the final pipeline size for University PL.

Pressure was not a concern for either Alternative. See Section 3.2 for more details. Fire Flow was not a concern for Alternative 1, but is a concern for Alternative 2. See Section 3.3 for more details.

3.2 Pressure Requirements

The model system pressure was checked against Design Guidelines Book 2 Pressure Criteria (Table 3-1)

Table 3-1 Pressure Criteria

Criteria	Pressure
Minimum Static	65 psi
Maximum Desired Static	120 psi
Minimum Peak Hour	40 psi
Minimum Max. Day + Fire Flow	20 psi
Allowable Pressure Drop During Fire Flow	25 psi

3.2.1 Leading Design Factors

There are two main factors that will determine the final Upas PL recommendation. The first factor is maintaining a minimum pressure of 60 psi at University of California, San Diego (UCSD) Hillcrest Medical Center under peak hour condition and under non-emergency conditions. The second factor is Upas PL being a back up (an emergency

condition) for the surrounding transmission mains while still maintaining a minimum pressure of 40 psi at Hillcrest Medical Center. Both Alternatives meet these requirements.

- **Alternative 1:** The pressure at the northern connection of Hillcrest Medical Center Inpatient Tower is 70 psi (2030 PHD).
- **Alternative 2:** The pressure at the northern connection of Hillcrest Medical Center Inpatient Tower is 65 psi (2030 PHD).

3.3 Fire Flow

The fire flow requirements are based on City of San Diego Water CIP Guidelines and Standards Facility Design Guidelines - Section 2.6 Fire Demand for Water System. Most of the area around the Upas PL is designated either Single Family Residential, Open Space with no fire flow demand, Multi-Family or Unzoned (3,000 gpm). There are three areas with a Commercial designation. The first is at the intersection of Upas Street and 30th Street. The second is between 5th and 3rd Avenue. The last area is at the western end of the pipeline with both Commercial and Industrial designation. All fire flows need to maintain a minimum pressure of 20 psi. Fire flows were analyzed using SynerGEE, during 5 hour timeframe from 18:30 to 23:30. See Table 3-2 for fire flow requirements:

Table 3-2 Fire Flow per Land Use

Fire Flow Type	Fire Flow (gpm)
Residential – Single Family	2,000
Duplexes - Multi-Family	2,500
Apartments - Multi-Family	3,000
Commercial	4,000
Industrial	6,000

Fire flow was applied between the hours of 18:30 to 23:30 in order to get the peaking factor closest to one. The fire flow scenarios was done by picking as many fire hydrants (nodes) around Upas PL using both alternatives and running the Fire Flow Analysis function in SynerGEE. The fire flow scenarios did not have a significant source out of service. Each selected node was tested over a 5 hour period with demands determined by

Land Use Demand (see Table 3-2). If a node did not meet the City's pressure criteria then the node was tested using the minimum required pressure of 20 psi to determine the flow from that node. See Appendix E for Table E-1 thru E-4 for results and comparisons of fire hydrant analysis.

The model was first tested using existing conditions for both 2007 and 2030. This analysis showed that there are currently several fire hydrants that do not meet City Standards. The modeling showed that both alternatives, compared with existing conditions 2030 model, reduced the number of fire hydrants that did not meet City Standards and reduced the severity of the ones that do not meet City Standards. Future Group Jobs will need to fix the fire hydrants that currently do not meet City Standards.

An additional fire flow test using the fire hydrant at the western end of Dove Street was done by putting a load of 4,000 gpm and observing the pressure drop around the Hillcrest Medical Center. The location was chosen because hydraulically this is the worst location in this area for a fire flow because it is located at a high elevation and is one of furthest pipelines from Upas PL and University PL. The pressure should not drop below 40 psi.

- **Alternative 1:** The pressure around Hillcrest Medical Center did not drop below 40 psi. The lowest pressure for a connection to the Hillcrest Medical Center Inpatient Tower is 47 psi.
- **Alternative 2:** The pressure around Hillcrest Medical Center did drop below 40 psi. The lowest pressure for a connection to the Hillcrest Medical Center Inpatient Tower is 38 psi.

3.4 Transmission Mains Segments Out of Services

An important hydraulic test for the proposed Upas PL is having the capacity to backup the surrounding transmission mains. The three transmission mains that need backup are Thorn Street Pipeline (TS), University Avenue Pipeline (UnS) and Laurel Street Pipeline (LS). To test the capacity of Upas PL to back up the surrounding transmission mains, one segment of a transmission main is taken out of service and the hydraulic model is run to test if the distribution grid can still meet minimum City standards. Once the hydraulic model is reviewed then that segment is put back into service and the next segment is

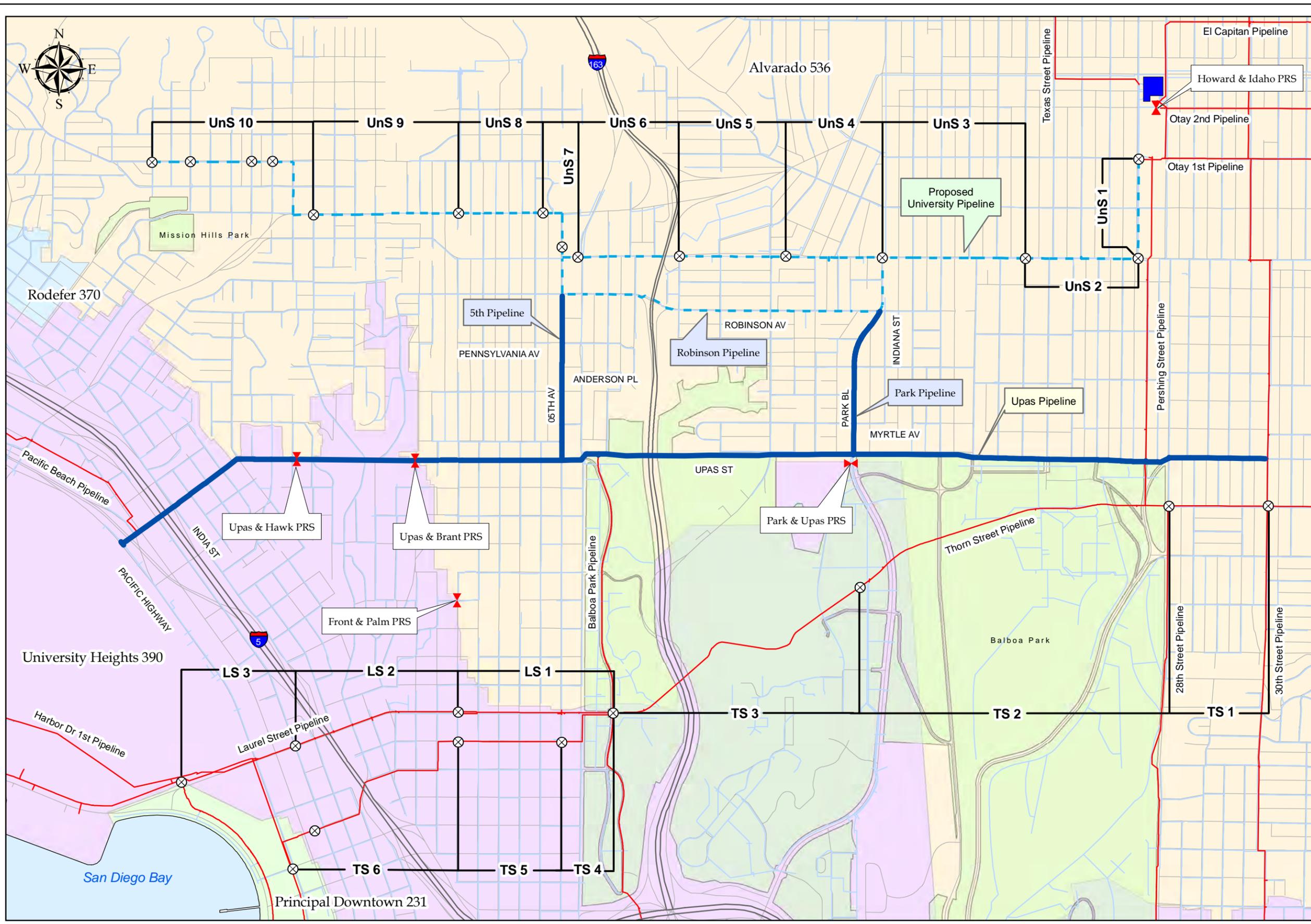
taken out of service and then the hydraulic model is run. This process is continued for the rest of the transmission main until all designated segments are tested. Then the process starts all over again for each of the remaining transmission mains, until all segments for all the transmission mains are tested. The limits of these segments are from existing valve to existing valve. See Figure 3- 1 for limits of transmission mains segments. The tests were done at peak hour with no fire demand.

The hydraulic modeling for Alternative 1 showed that there were no hydraulic issues when each one of the segments were taken out of service for all three transmission mains. The nodes around Hillcrest Medical Center was able to maintain 40 psi or higher.

The hydraulic modeling for Alternative 2 showed that there were no hydraulic issues when each one of the segments were taken out of service for University Avenue PL and Laurel Street PL and the nodes around Hillcrest Medical Center was able to maintain 40 psi or higher. There were hydraulic issues when two of the segments, for Thorn Street PL, were taken out of service, TS 2 and TS 3. For TS 2 being out of service, most of the nodes west of Park Boulevard and in the Alvarado 536 Zone were below 40 psi. For TS 3 being out of service, the nodes around Hillcrest Medical Center and a large number of nodes in the Alvarado 536 Zone between 6th Avenue and 2nd Avenue were below 40 psi. See Exhibit 5 and 6 for low pressure areas. There were no other significant hydraulic issues when the rest of Thorn Street PL segments were taken out of service.

3.5 54th Street Pipeline

The original SynerGEE models do not contain the 54th Street Pipeline (54th PL). The reason for this is that the 54th PL was not in service when the original SynerGEE models were created, but currently is in service. The 54th PL was added to the two alternative models. See Section 1.5 for name of modified models.



Legend

- Upas Project
- - - University Project
- Transmission Pipelines
- Water Pipelines
- TS = Thorn St Pipeline Segments 1 - 6
- UnS = University Pipeline Segments 1 - 10
- LS = Laurel Street Pipeline Segments 1 - 3
- ⊗ Existing Water Valves
- ⚡ Pressure Regulating Station
- University Hgts Reservoir (North & South)

HGL Zones

- ALVARADO 536
- UNIVERSITY HEIGHTS 390
- PRINCIPAL DOWNTOWN 231
- RODEFER 370

Figure 3-1

Upas Pipeline Project
LIMITS OF TRANSMISSION MAIN
SEGMENTS



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3.6 Co-Built Projects

It is assumed that several projects (listed below) will be built around the same time as the proposed Upas PL. These projects were included in the modeling making the final design less conservative.

- **Alternative 1:** Mid-City Pipeline Phase II in service.
- **Alternative 2:** Mid-City Pipeline Phase II and Alvarado 2nd Pipeline Extension Projects in service.

Below is a short description of the Mid-City Pipeline Phase II and Alvarado 2nd Pipeline Extension Projects. See Section 1.3 for project ranking in Draft Capital Improvements Program-Project Prioritization Criteria dated September 2009.

- **Mid-City Pipeline Phase II:** Install 54” pipeline from Alvarado clearwell (Earl Thomas Reservoir) to the existing 48” Mid-City Pipeline. Its total length is roughly 6,500’. This project is needed to provide a backup supply for the aging 54” Trojan Pipeline. The project provides a second supply line to the largest region of the Alvarado WTP service area and provides backup service to the Trojan PL. The project will also provide connections for a new 69th and Mohawk Pump Station to become the lead supply to the Redwood Village (645) Zone. This project increases the HGL in the Alvarado 536 Zone by more than 12’.
- **Alvarado 2nd Pipeline Extension Projects:** For Alvarado 2nd Pipeline Extension Projects install a 48” pipeline from the western terminus of the existing 48” Alvarado 2nd Pipeline at I-805 and Friars Road to Morena Boulevard and Napa Street. Its total length is roughly 22,500’. For Morena Boulevard Cast-Iron Pipeline Replacement replace the existing 20” and 16” Morena Boulevard Pipeline with a new 36” pipeline and install a parallel 16” distribution line from Friars Road and Morena to Morena and Balboa Avenue. The rough length of Morena Boulevard Pipeline replacement is 17,000’ and rough length of the parallel 16” distribution line is 15,600’. The 36” pipeline will run from the end of the proposed 48” Alvarado 2nd Pipeline Extension Projects and connect to the Existing Kearny Mesa Pipeline at the north end, operating at a 536 HGL. The proposed 16” pipeline will operate at 390 HGL and connect to the existing 16”

pipeline on Friars Road and terminating at Morena and Bunker Hill Street. For Pacific Beach Pipeline install 30” pipeline from the end of the proposed 48” Alvarado 2nd Pipeline Extension Projects at Friars Road and Morena Boulevard along Sea World Drive to Sea World Drive and West Mission Bay Drive. Its total length is roughly 10,850’. Replace the existing Morena and Balboa West PRS with a new pressure reducing station at Morena Boulevard and Bunker Hill Street. Build a new Sea World Drive and West Mission Bay Drive PRS reducing pressure from 536 => 307. The new station will supply the proposed new 30” Pacific Beach Pipeline running north on Ingraham Street. The Alvarado 2nd Pipeline Extension Projects will replace the aging Kearny Mesa Pipeline transmission route with a new transmission route that uses the Alvarado 2nd Pipeline. These projects are needed to replace cast-iron pipe, for redundant transmission to the coastal zones of La Jolla and Pacific Beach to provide a reliability supply, to improve water quality, to reduce energy waste at the Miramar CWA Pumpback facility, to reduce peaking problems in the Miramar WTP service area, and to provide supply flexibility (Alvarado vs Miramar). These projects decrease the amount of water flowing through the Upas and Brant PRV and Upas and Hawk PRV which Upas PL was a major feed to them.

Chapter 4

Recommendations

4.0 Recommendations

4.1 Summary

The Upas PL will be replaced using Alternative 1. See figure 4-1 and Section 4.2 for details of this alternative pipeline layout. It is assumed that Mid-City Pipeline Phase II will be built around the same time. This alternative was chosen because it meets the City Standards and addressed Operations concerns about the pressure at Hillcrest Medical Center. This alternative will update the transmission and distribution system to better suit its current and future needs. This alternative will also remove the Upas PL from several canyons and open space areas where accessibility is difficult. Design/build is the recommended method to shorten the amount of time from start of project to completion.

4.1.1 Relining (Rehabilitation)

Relining of Upas PL was at one time considered a possible solution for Upas PL. After reviewing relining solutions, it was determined not to be a viable solution. Relining cost is almost the same as replacement and did not remove the cast iron from the City’s water system. See Appendix F for more details.

4.2 Upas Pipeline Replacement - Alternative 1

Alternative 1 is one of the two pipeline layouts being studied. It is assumed that the Mid-City Pipeline Phase II will be in service around the same time as the proposed Upas PL. This will make the model less conservative and therefore reduce the size of the Upas PL. See Figure 4-1 for details.

Table 4-1 Quantities of Upas Project – Alternative 1

Name	Existing Mains		Proposed Mains		
	Diameter	Material	Diameter	Material	Length
Upas PL - Eastern Replacement	30"	CI	30"	CMLC	9,620'
Installed Parallel - 12"	6",8",10"	AC, UNK, PVC	12"	PVC	6,238'
Upas PL - Middle Replacement	24"	CI	16"	PVC	2,454'
Abandon Segment	24"	CI			290'
Upas PL - Western Replacement	24"	CI	16"	PVC	870'
Replacement - 8"	24"	CI	8"	PVC	250'
Install - 12"			12"	PVC	930'
Abandon Segment	24"	CI			3,440'
Park PL	16"	CI	16"	PVC	2,090'
5th PL	16", 20"	CI	16"	PVC	2,240'
				Total	28,422'



Legend

- Abandon Pipe
- Install 30" Pipe
- Install 16" Pipe
- Install 8" or 12" Pipe
- Transmission Pipes
- Water Pipes
- - - University Pipeline Project (16")
- X Pressure Regulating Station
- University Hgts Reservoir (North & South)

HGL Zones

- ALVARADO 536
- UNIVERSITY HEIGHTS 390
- PRINCIPAL DOWNTOWN 231
- RODEFER 370

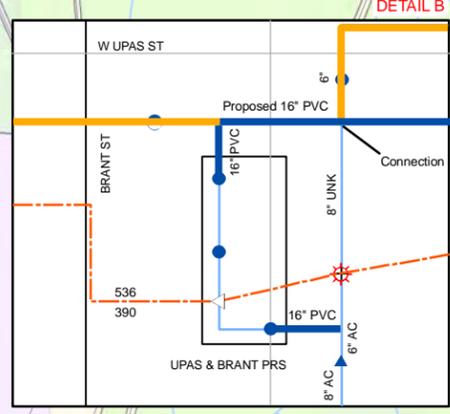
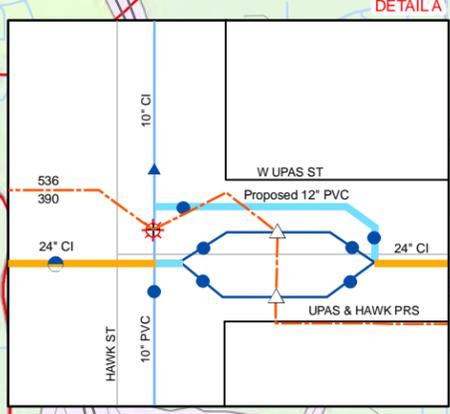
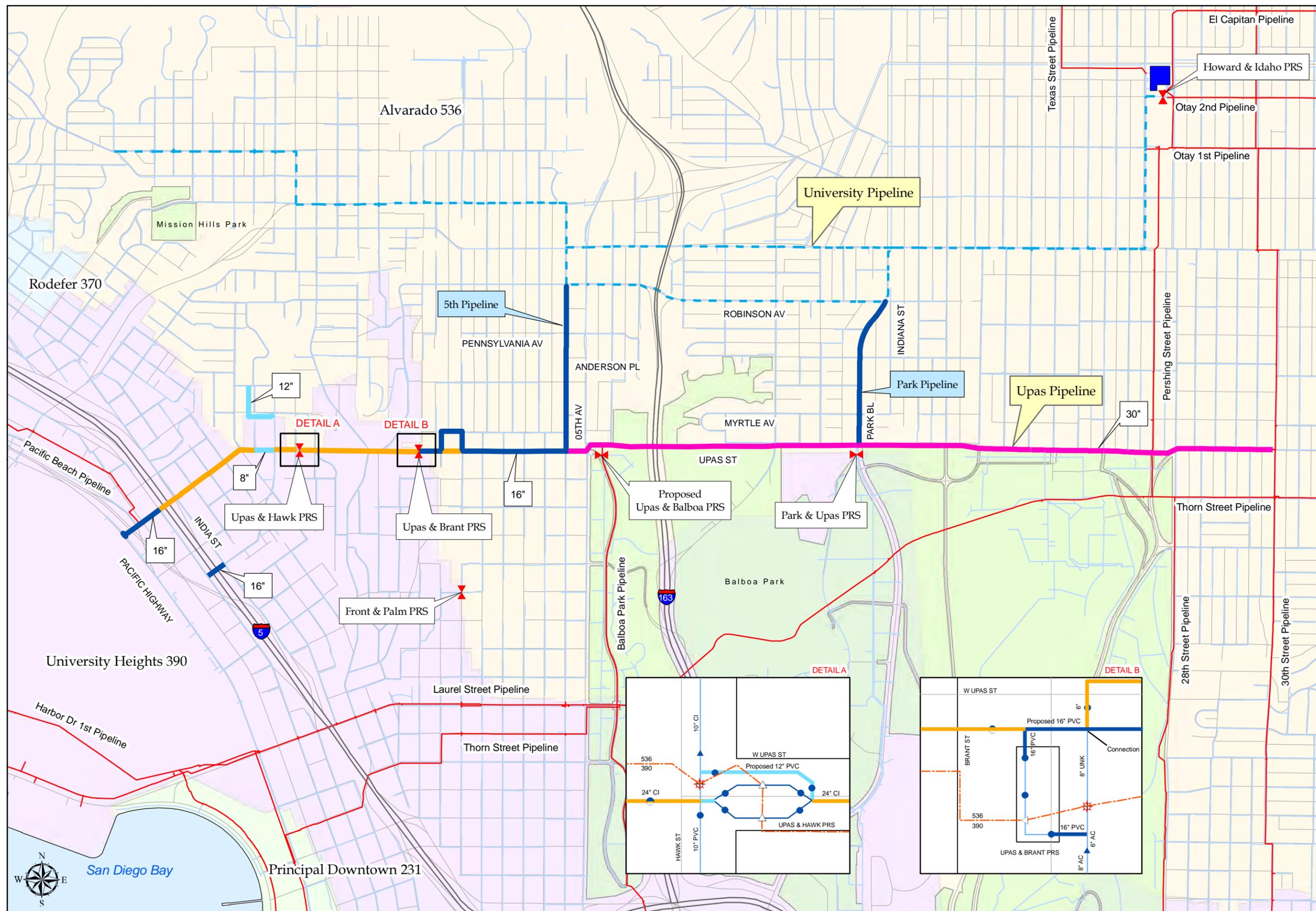


Figure 4-1

Upas Pipeline
ALTERNATIVE 1
Proposed Design Changes



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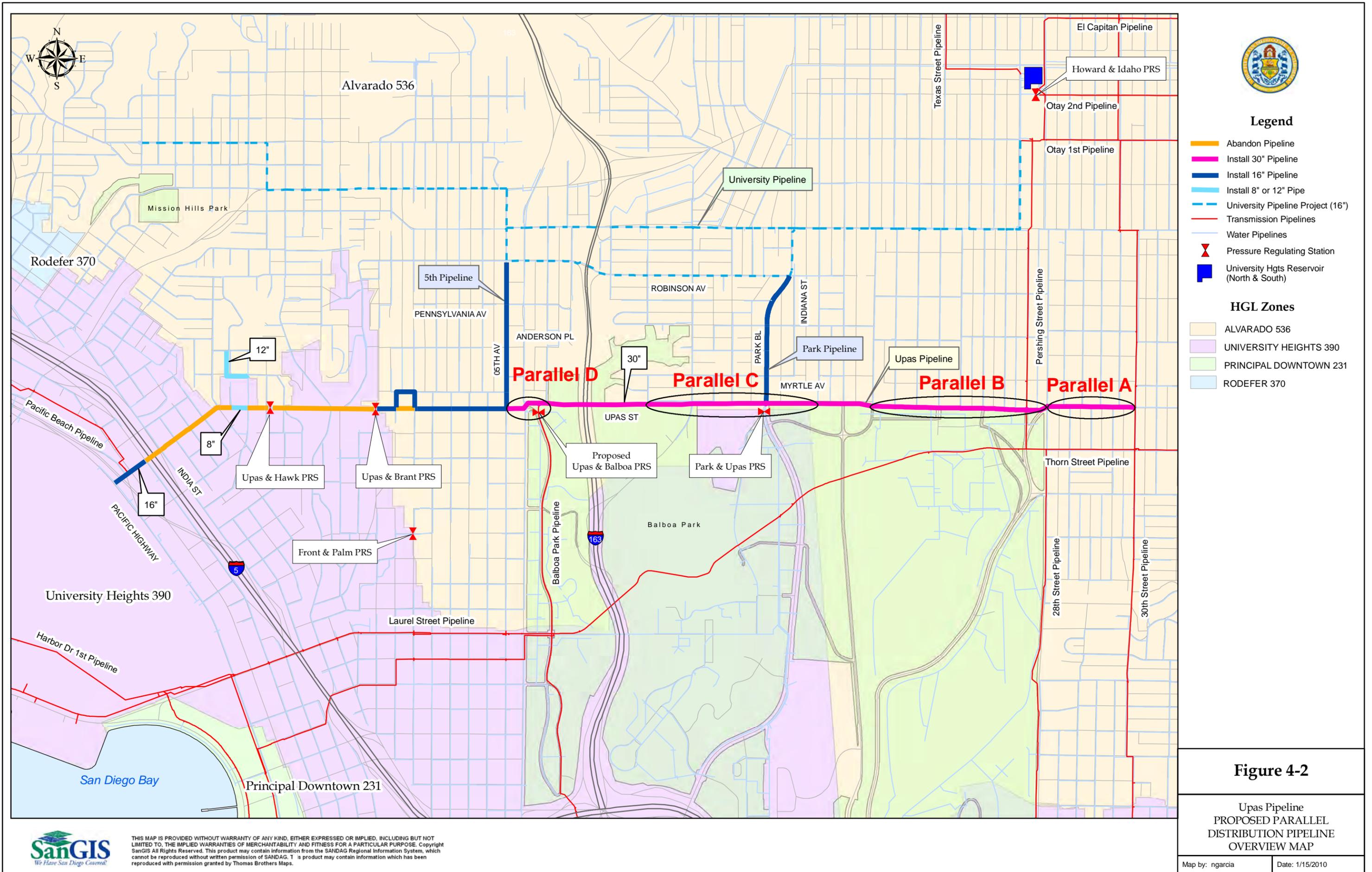
4.2.1 Eastern Segment

The 30” segment of Upas PL, from Ray Street to 5th Avenue, will be replaced with a 30” CMLC pipeline. There are two segments of pipeline that will not be in a paved street. The first segment of pipeline is from Alabama Street to Florida Street. See photos in Appendix A – 10 thru 13. The second segment of pipeline is from Vermont Street to 7th Avenue. This segment goes through Balboa Park and under Highway 163. See photos in Appendix A – 27 thru 45.

4.2.1.1 Parallel Pipelines

The proposed 30” Upas PL is a transmission main and therefore cannot be directly tapped for water services per City Guidelines Section 3.3.1.D. All current service connections to the transmission main will need to be relocated to distribution pipelines. To accommodate the service relocation, a parallel distribution pipeline needs to be installed. See Figure 4-2 for details.

- **Parallel A:** The limit of Parallel A is from Ray Street to 28th Street. There is an existing 12” AC pipeline between 30th Street to 28th Street. Install a 12” pipeline from Ray Street to 30th Street. At the intersection of Upas Street and 30th Street, replace the parallel 8” AC and its connection to the Upas PL with a 12” pipeline. At the intersection of Upas Street and 28th Street, replace the parallel 10” AC and its connection to the Upas PL with a 12” pipeline. See Figure 4-3.
- **Parallel B:** The limit of Parallel B is from 28th Street to Alabama Street. There is no parallel pipeline. Install a 12” pipeline from 28th Street to Alabama Street. There are currently nine pipeline connections to Upas PL. Connect the proposed 12” pipeline to all existing connections and replace the section of pipeline between the proposed 12” pipeline and Upas PL with a 12” pipeline. See Figure 4-4.
- **Parallel C:** The limit of Parallel C is from 6” AC from Georgia Street to Vermont Street. Replace all the existing 6” and 8” AC pipeline, the entire length of Parallel C, with 12” pipeline. See Figure 4-5.
- **Parallel D:** The limit of Parallel D is from 7th Avenue to 5th Avenue. Replace the existing 8” AC pipeline with 12” pipeline. Connect the proposed 12” pipeline to Upas PL at the intersection of Upas Street and 7th Avenue. See Figure 4-6.



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Legend

- Proposed 12" Pipeline
- Pipeline Proposed to be Abandoned
- Pipeline to be Replaced or Installed w/12" PVC
- Upas Pipeline
- Water Pipelines
- Water Service
- + Fire Hydrant
- Water Valve

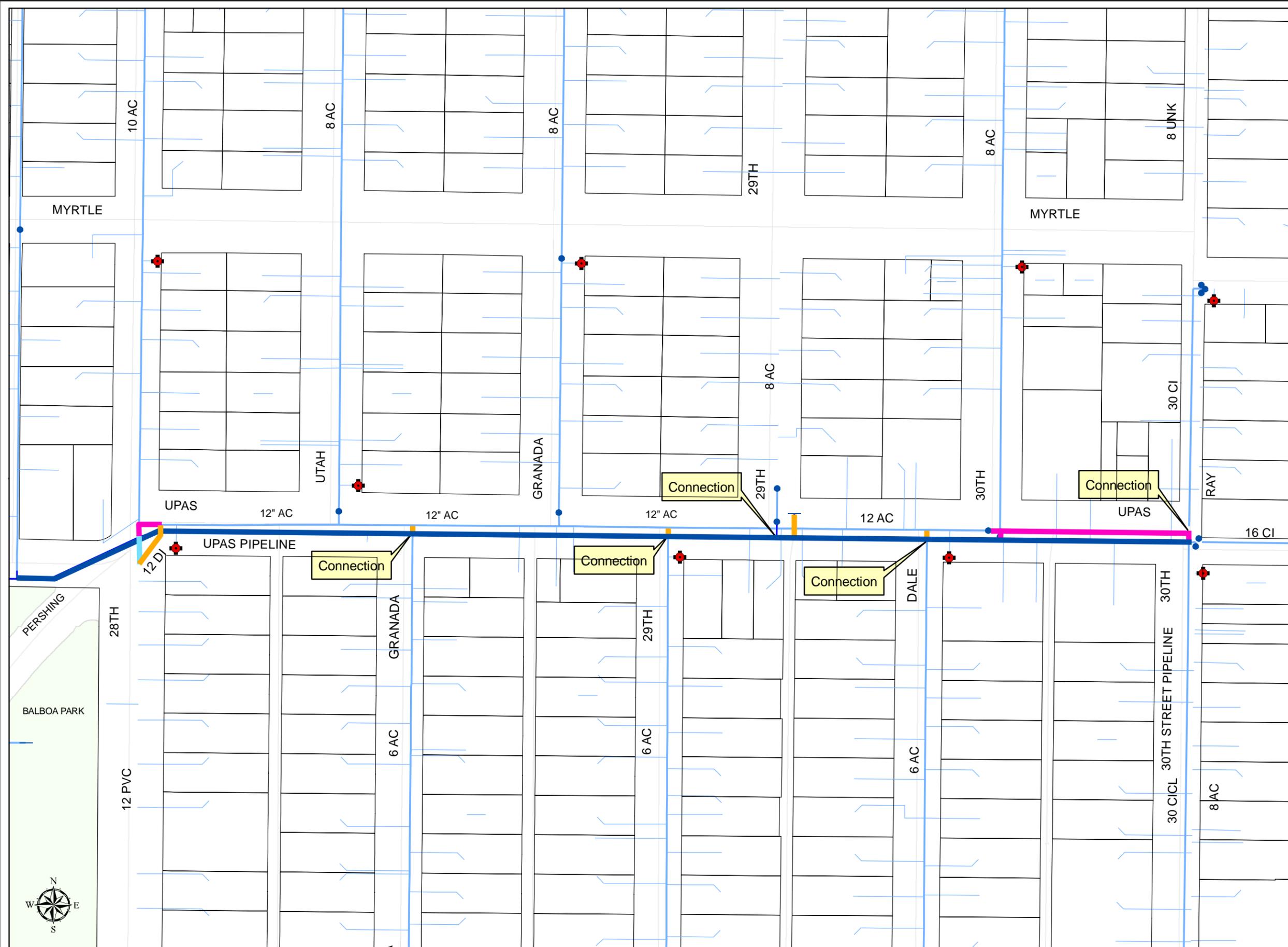


Figure 4-3

Upas Pipeline
PARALLEL A



Legend

- █ Upas Pipeline
- █ Proposed 12" Pipeline
- █ Water Pipelines
- █ Water Service
- + Fire Hydrant
- Water Valve

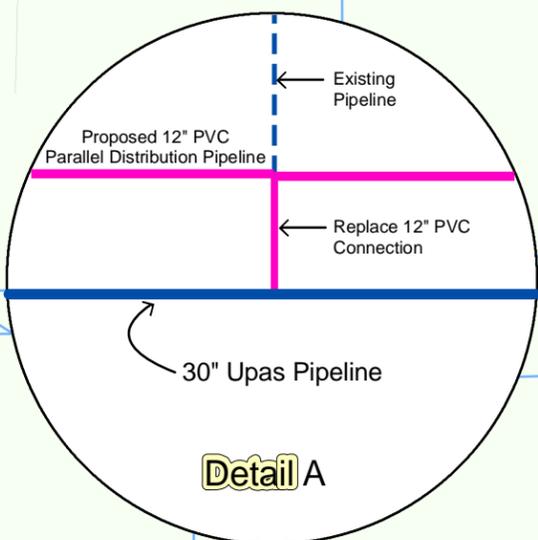
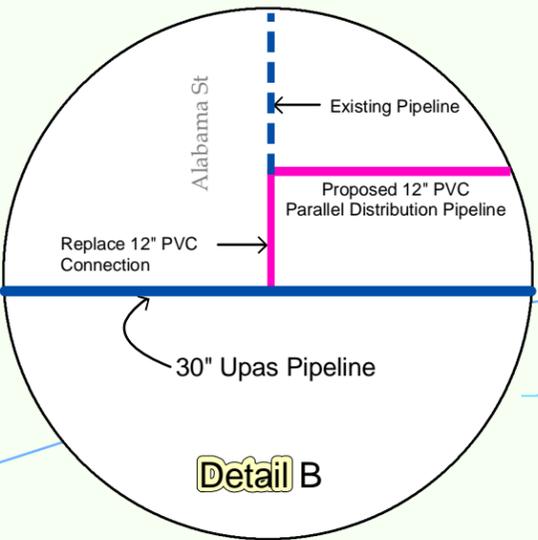
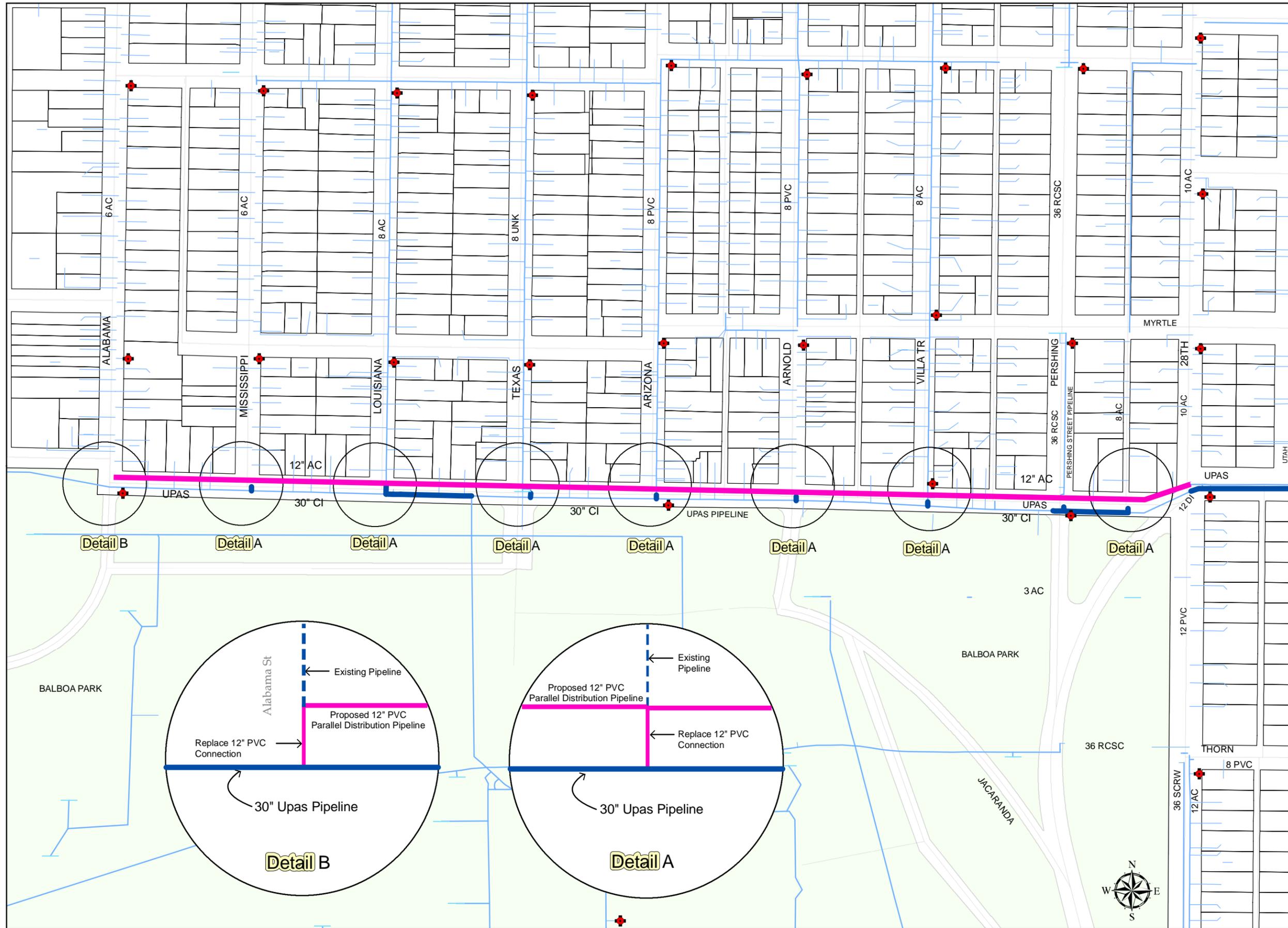


Figure 4-4

Upas Pipeline
PARALLEL B



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Legend

-  Upas Pipeline
-  Proposed to be Replace with 12" Pipeline
-  Existing Water Pipelines
-  Water Service
-  Fire Hydrant
-  Water Valve
-  Proposed Pipeline Connection between the Upas Pipeline and Proposed 12"

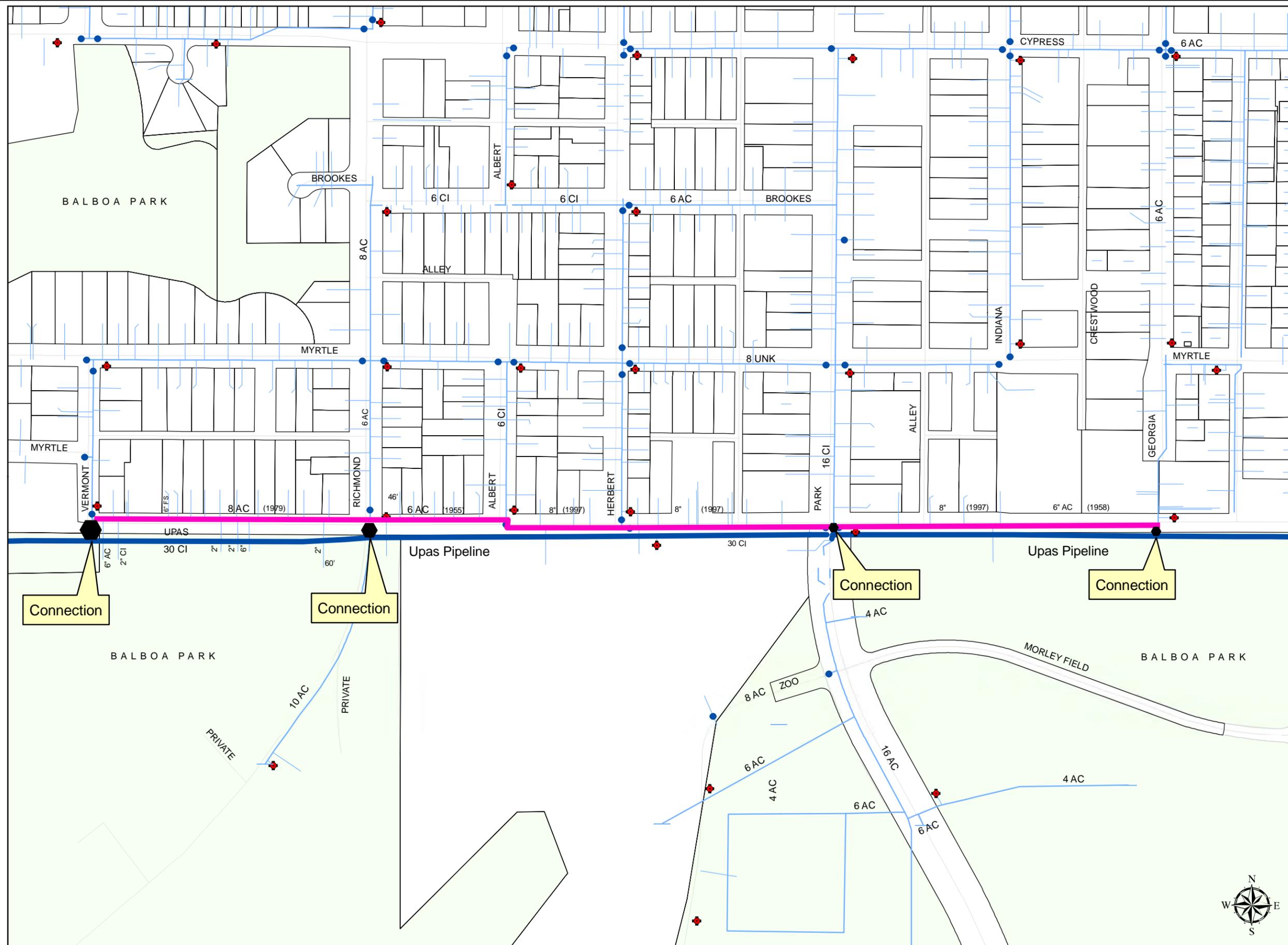


Figure 4-5

Upas Pipeline
PARALLEL C



Legend

-  Upas Pipeline
-  Pipeline Replacement
-  Existing Water Pipelines
-  Water Service
-  Hydrant
-  Butterfly Valve
-  Gate Valve
-  Air Valve
-  Pressure Regulating Station
-  Pipeline Connection

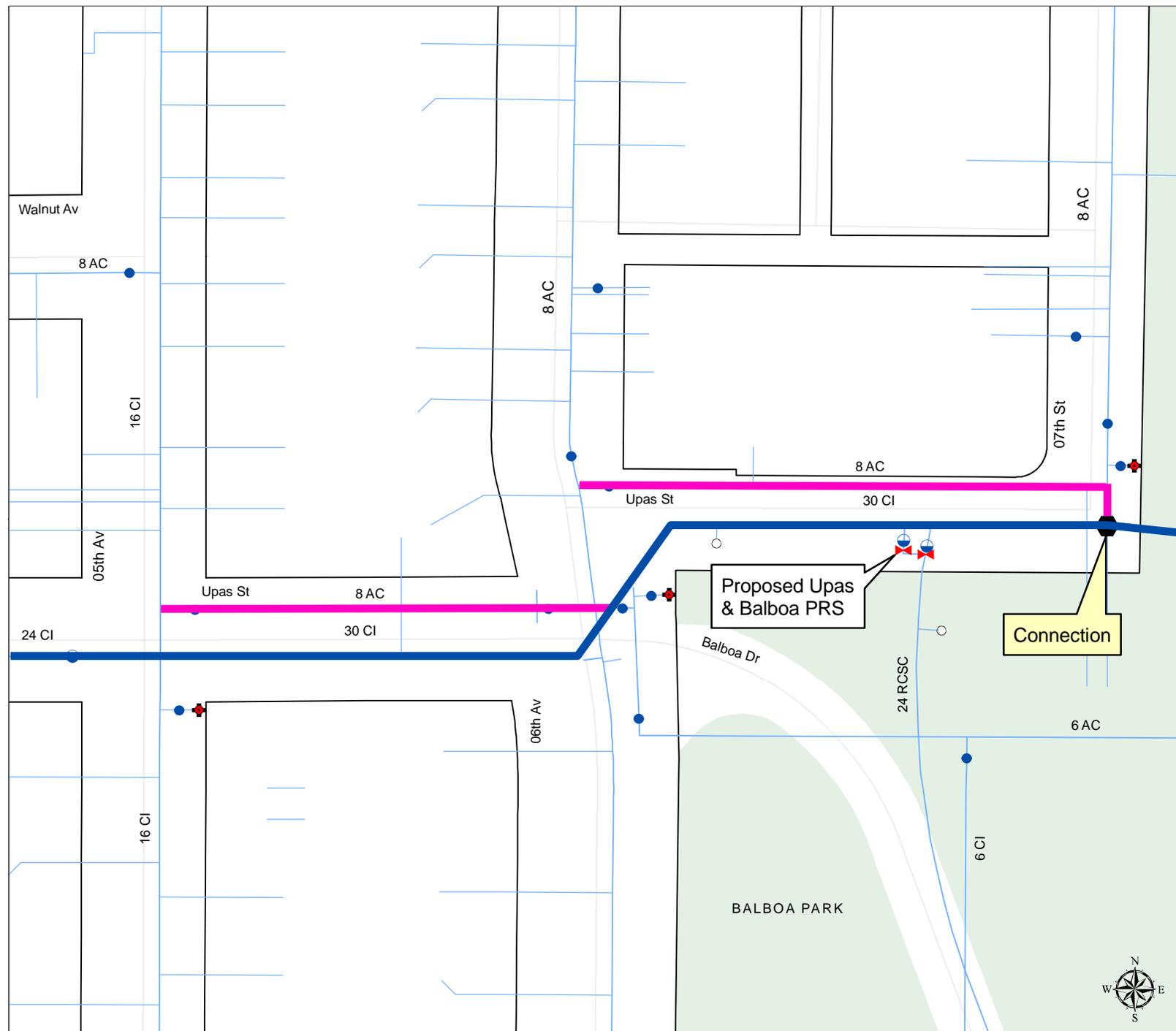


Figure 4-6

Upas Pipeline
PARALLEL D



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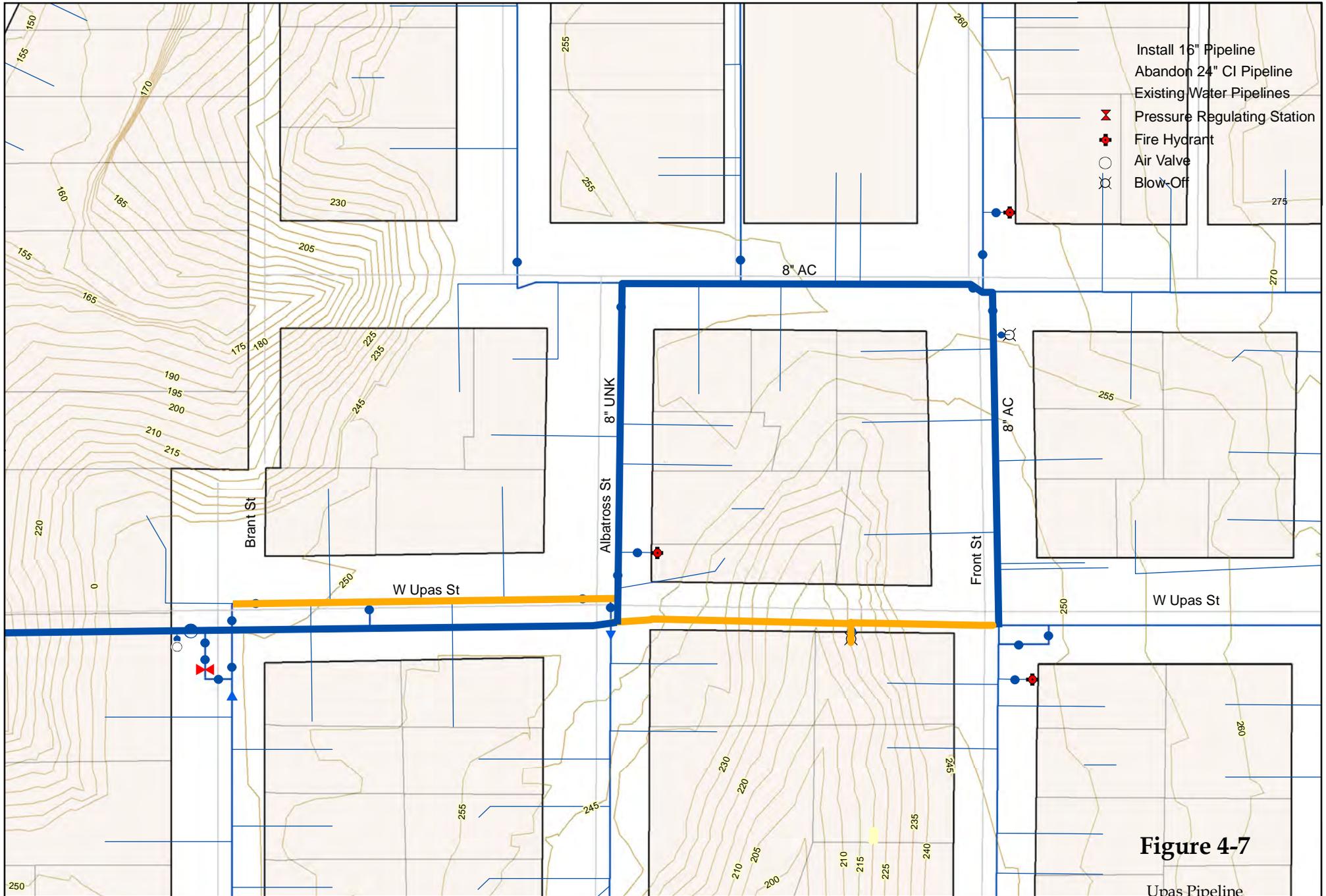
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4.2.2 Middle Segment

The limit of the Middle Segment is from 5th Avenue to Upas and Brant PRS. The existing 24" will be replaced with a 16". The proposed 16" will follow the same alignment as the existing 24" except the segment of pipeline between Front Street and Albatross Street. This segment will be abandoned because of a small canyon between Front Street and Albatross Street. The proposed 16" Upas PL will go around the canyon by using Front Street, West Walnut Avenue and Albatross Street. See Figure 4-7 for details.

4.2.2.1 Consolidation

To minimize the number of pipelines in the distribution grid, all parallel pipelines to the proposed 16" Upas PL will be abandoned and all services and distribution pipeline connections will be reconnected to the proposed 16" Upas PL. There is one consolidation within the Middle Segment. It is located between Albatross Street and the Upas and Brant PRS. Remove as much of the abandoned parallel pipelines as possible. The rest of the parallel pipelines, that cannot be removed, need to be slurry filled. See Figure 4-8 for more details.



- Install 16" Pipeline
- Abandon 24" CI Pipeline
- Existing Water Pipelines
- Pressure Regulating Station
- Fire Hydrant
- Air Valve
- Blow-Off

Figure 4-7

Upas Pipeline

PROPOSED DESIGN CHANGES
(Between Front & Albatross)

Map by: ngarcia

Date: 1/21/2010



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Legend

-  Pipeline Proposed to be Abandoned
-  Install 16" Pipeline
-  Existing Water Pipelines
-  Water Service
-  Pressure Regulating Valve
-  Hydrant
-  Water Valve
-  Air Valve

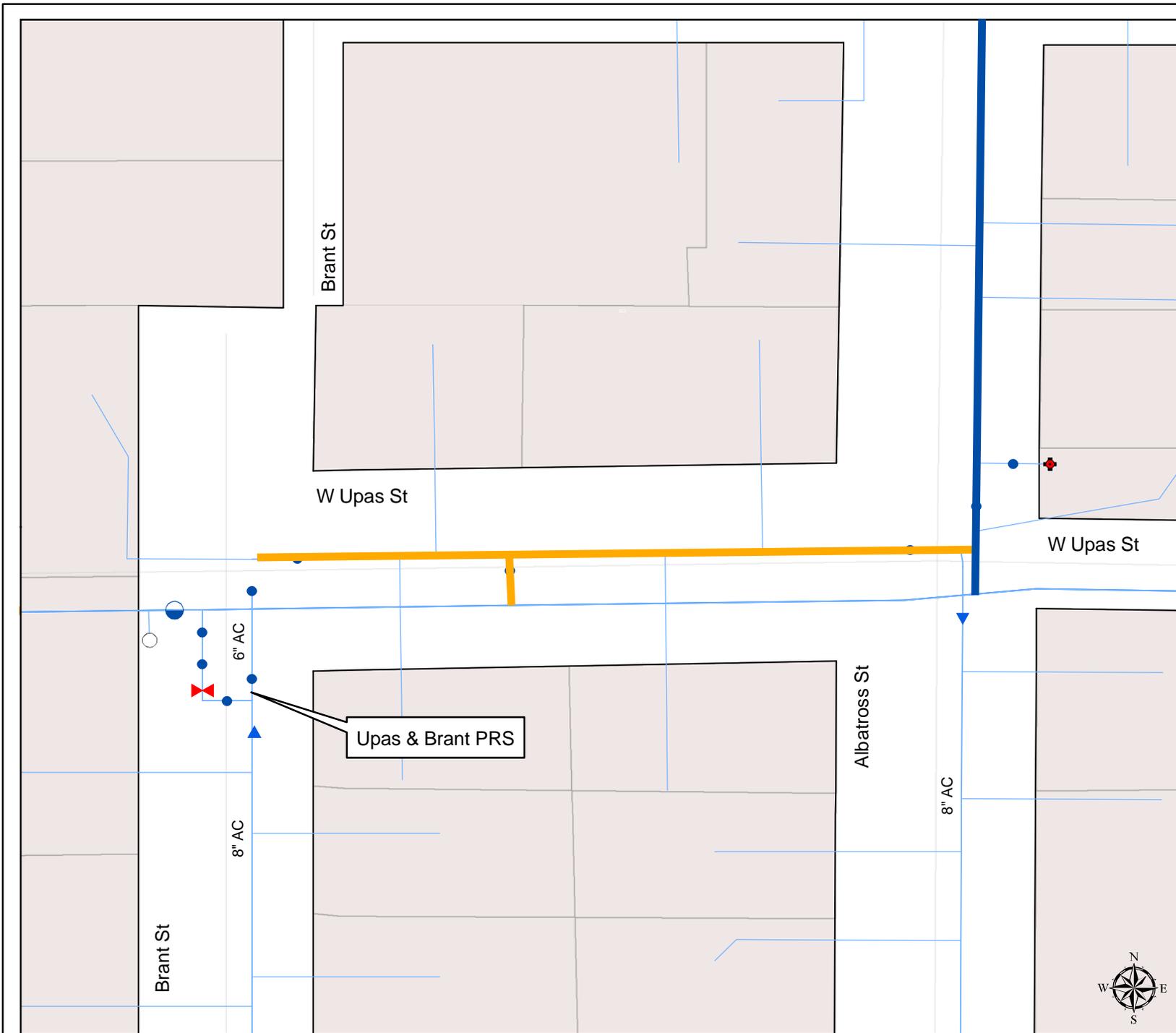


Figure 4-8

Upas Pipeline
PROPOSED DESIGN CHANGES
(Between Brant to Albatross)



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4.2.3 Western Segment

The limit of the Western Segment is from Upas and Brant PRS to where it terminates just south of the intersection of Pacific Highway and Frontage Road. The segment of 24" from Upas and Brant PRS to Ibis Street will be abandoned. The 24" from Ibis Street to Jackdaw Street will be replaced with an 8". This length of pipeline was replaced to keep the 6" AC and 4" AC in Jackdaw Street connected to the distribution grid. The segment of 24" from Jackdaw Street to India Street will be abandoned. The Upas PL under the Interstate 5, from the 12" in India Street to the 12" in Kettner Boulevard, will be relocated to the Sassafras Street underpass and replaced with a 16". It was relocated for easier installation and maintenance. The segment of 24" Upas PL from the 12" in Kettner Boulevard to the 12" in Pacific Highway will be replaced with a 16". This segment of pipeline will go under the Hertz parking lot and under the rail track for the Blue Line and Amtrak. This segment of pipeline is needed to keep the pipelines in this area interconnected. Remove as much of the abandoned pipelines as possible. The rest of the abandoned pipelines, that cannot be removed, need to be slurry filled.

The abandonment of the existing 24" Upas PL, from Upas and Brant PRS to Ibis Street has created a dead end issues with the Alvarado 536 Zone distribution grid around the area of Jackdaw Street and West Brookes Avenue. To solve these problems, a parallel 12" will be installed starting at the intersection of Jackdaw Street and West Brookes Avenue. The 12" will then head south until it turns east on to West Walnut Avenue. The 12" will end at the intersection of West Walnut Avenue and Hawk Street. This will reduce the number of houses on this dead end to within City Standards per Section 2.8. See Figure 4-9 for limits of deadend.

4.3 Upas Pipeline Replacement - Alternative 2

It is assumed that Mid-City Pipeline Phase II and Alvarado 2nd Pipeline Extension Projects will be in service around the same time as the proposed Upas PL. These projects will make the model less conservative therefore reducing the size of the Upas PL. See Figure 4-10 for more details.

Table 4-2 Quantities of Upas Project – Alternative 2

Name	Existing Mains		Proposed Mains		
	Diameter	Material	Diameter	Material	Length
Upas PL - Eastern Replacement	30"	CI	16"	PVC	9,620'
Upas PL - Middle Replacement	24"	CI	16"	PVC	2,454'
Abandon Segment	24"	CI			290'
Upas PL - Western Replacement	24"	CI	16"	PVC	870'
Replacement - 8"	24"	CI	8"	PVC	250'
Install - 12"			12"	PVC	930'
Abandon Segment	24"	CI			3,440'
Park PL	16"	CI	16"	PVC	2,090'
5th PL	16", 20"	CI	16"	PVC	2,240'
				Total	22,184'

4.3.1 Eastern Segment

The 30” segment of Upas PL, from Ray Street to 5th Avenue will be replaced with 16”.

There are two segments of pipeline that will not be in a paved street. The first segment of pipeline is from Alabama Street to Florida Street. See photos in Appendix A – 10 thru 13. The second segment of pipeline is from Vermont Street to 7th Avenue. This segment goes through Balboa Park and under Highway 163. See photos in Appendix A – 27 thru 45.



Legend

- Abandon Pipe
- Install 16" Pipe
- Install 8" or 12" Pipe
- Transmission Pipes
- Water Pipes
- - - University Pipeline Project (16")
- X Pressure Regulating Station
- University Hgts Reservoir (North & South)

HGL Zones

- ALVARADO 536
- UNIVERSITY HEIGHTS 390
- PRINCIPAL DOWNTOWN 231
- RODEFER 370

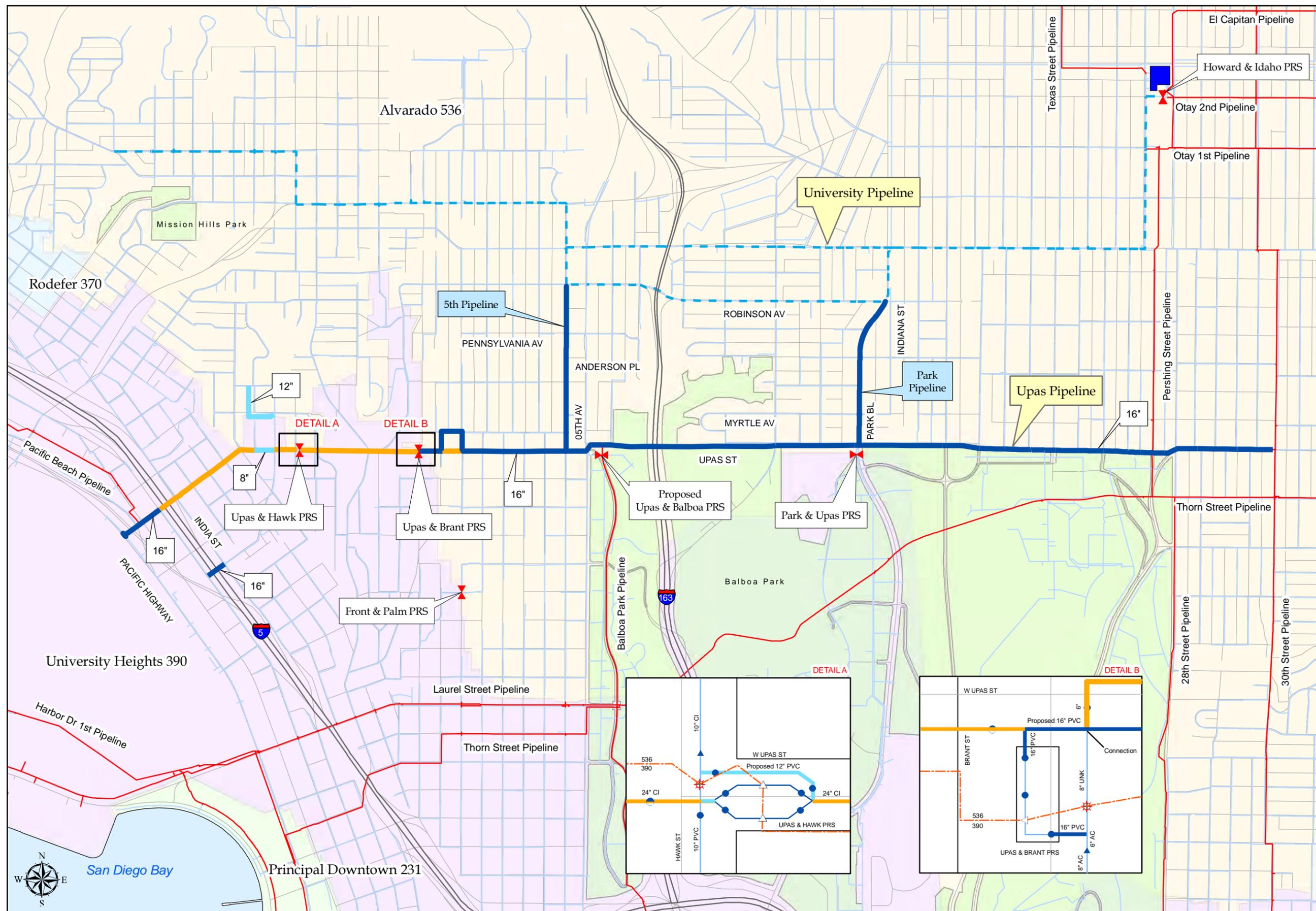


Figure 4-10

Upas Pipeline
ALTERNATIVE 2
Proposed Design Changes



4.3.1.1 Consolidation

To minimize the number of pipelines in the distribution grid, all parallel pipelines to the proposed 16" Upas PL will be abandoned and all services and distribution pipeline connections will be reconnected to the proposed 16" Upas PL. Remove as much of the abandoned parallel pipelines as possible. The rest of the parallel pipelines, that cannot be removed, need to be slurry filled. There are a total of three areas that have parallel pipelines that need to be consolidated. See Figure 4-11 for locations.

- **Consolidation A:** It is located within Upas Street from 30th Street to 28th Street. See Figure 4-12 for more details.
- **Consolidation B:** It is located within Upas Street from Georgia Street to Vermont Street. See Figure 4-13 for more details.
- **Consolidation C:** It is located within Upas Street from 7th Avenue to 5th Avenue. See Figure 4-14 for more details.

4.3.2 Middle Segment

Alternative 2 Middle Segment pipeline layout is the same as Alternative 1 Middle Segment. See Section 4.2.2 for details.

4.3.3 Western Segment

Alternative 2 Western Segment pipeline layout is the same as Alternative 1 Western Segment. See Section 4.2.3 for details.



Legend

- Abandon Pipeline
- Install 16" Pipeline
- Install 8" or 12" Pipeline
- Transmission Pipelines
- Water Pipelines
- - - University Pipeline Project
- ▲ Pressure Regulating Station
- University Hgts Reservoir (North & South)

HGL Zones

- ALVARADO 536
- UNIVERSITY HEIGHTS 390
- PRINCIPAL DOWNTOWN 231
- RODEFER 370

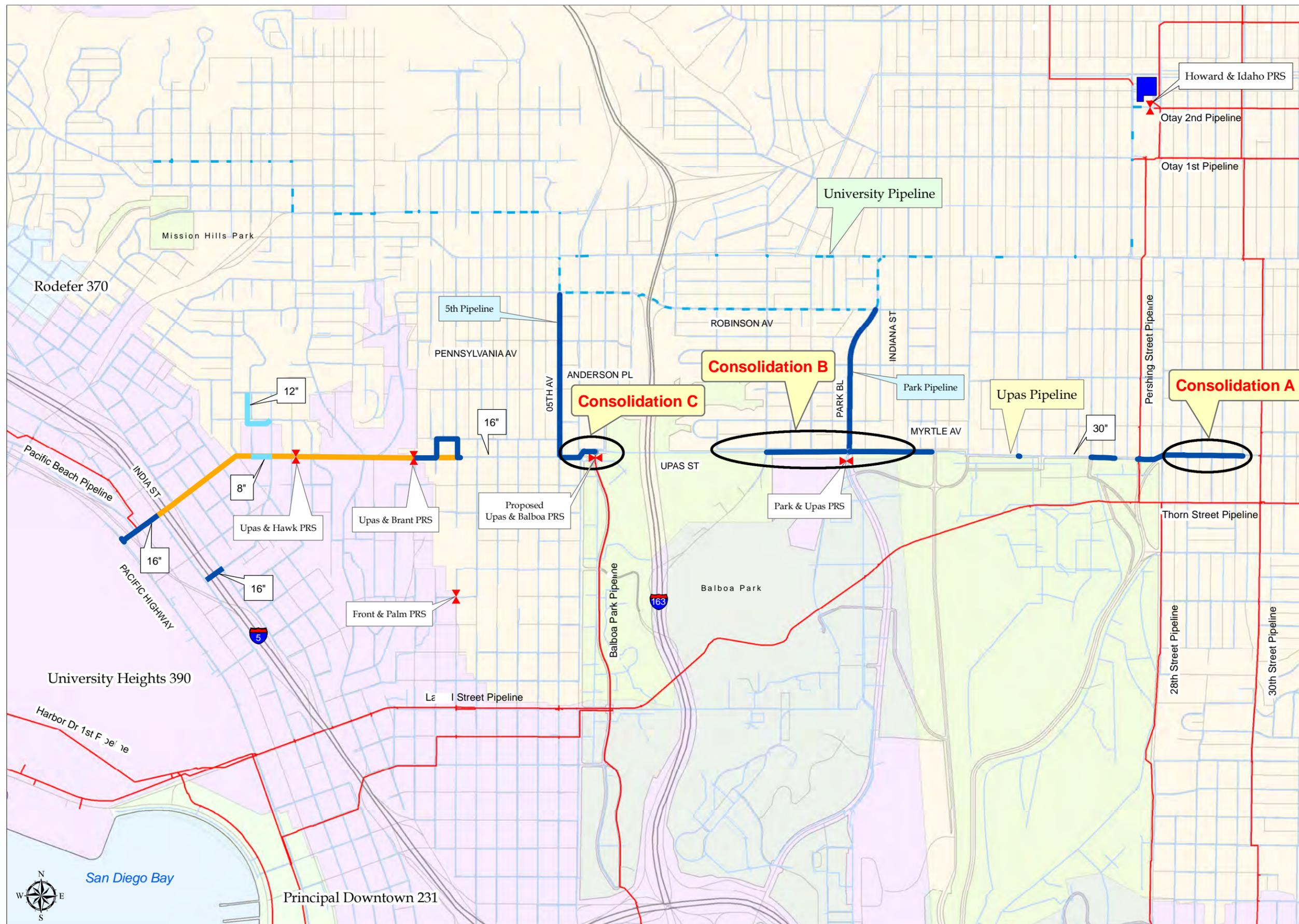


Figure 4-11

Upas Pipeline CONSOLIDATION OVERVIEW



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Legend

-  Upas Pipeline
-  AC Mains Proposed to be Abandoned
-  Water Pipelines
-  Water Service
-  Fire Hydrant
-  Water Valve
-  Proposed Connection

Note: 6" AC in Granada Av, 29th St, and Dale St plus 12" PVC in 28th St will be disconnected from 12" AC and reconnected to Upas PL



Figure 4-12

Upas Pipeline
CONSOLIDATION A
(AC Mains 28th to 30th)

Map by: ngarcia

Date: 1/25/2010



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Legend

- Upas Pipeline
- Pipeline Proposed to be Abandoned
- Water Pipelines (Date Installed)
- Water Service
- Pressure Regulating Station
- Hydrant
- Water Valve
- Proposed Connection

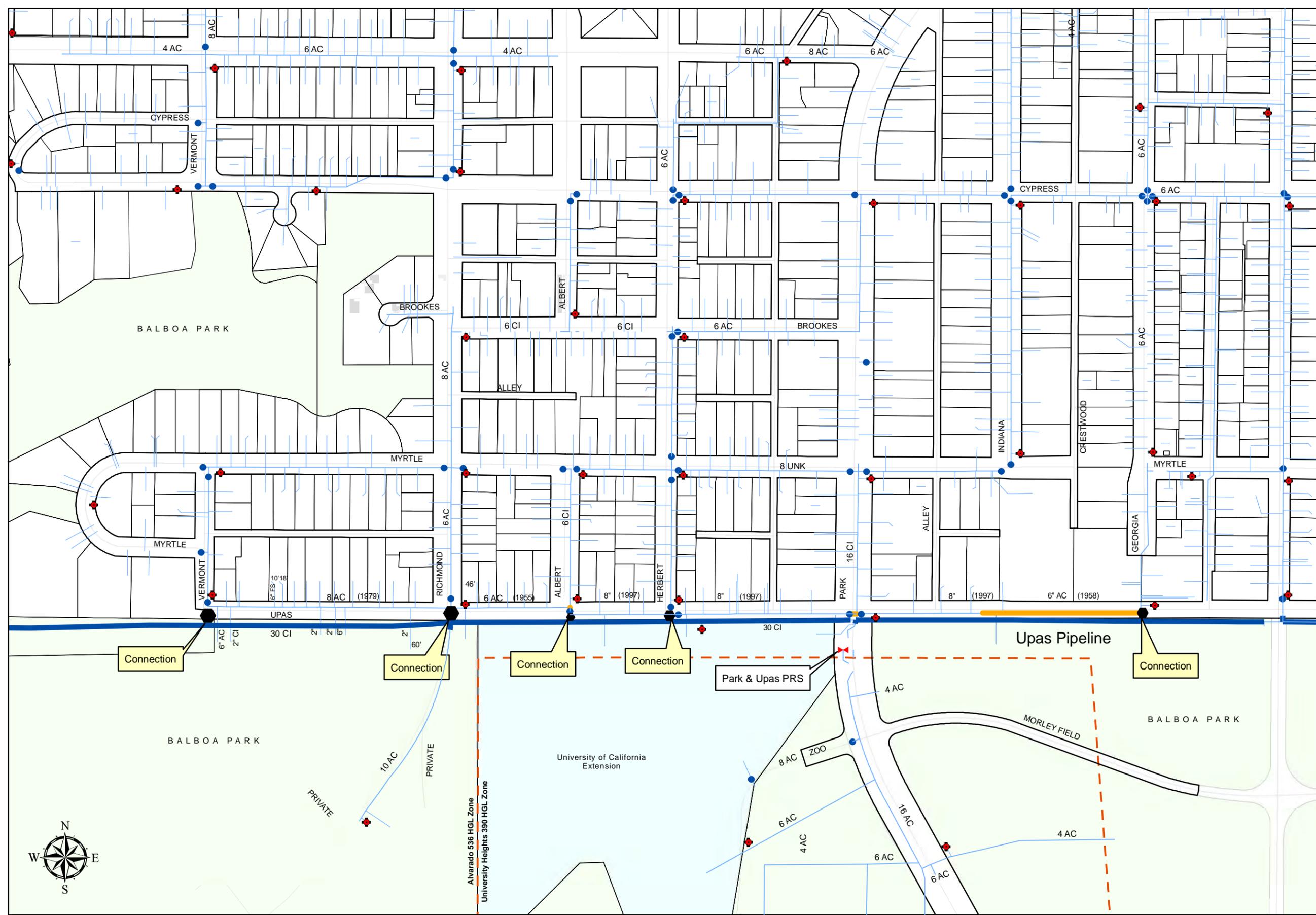


Figure 4-13

Upas Pipeline
 CONSOLIDATION B
 (AC Mains Vermont to Georgia)

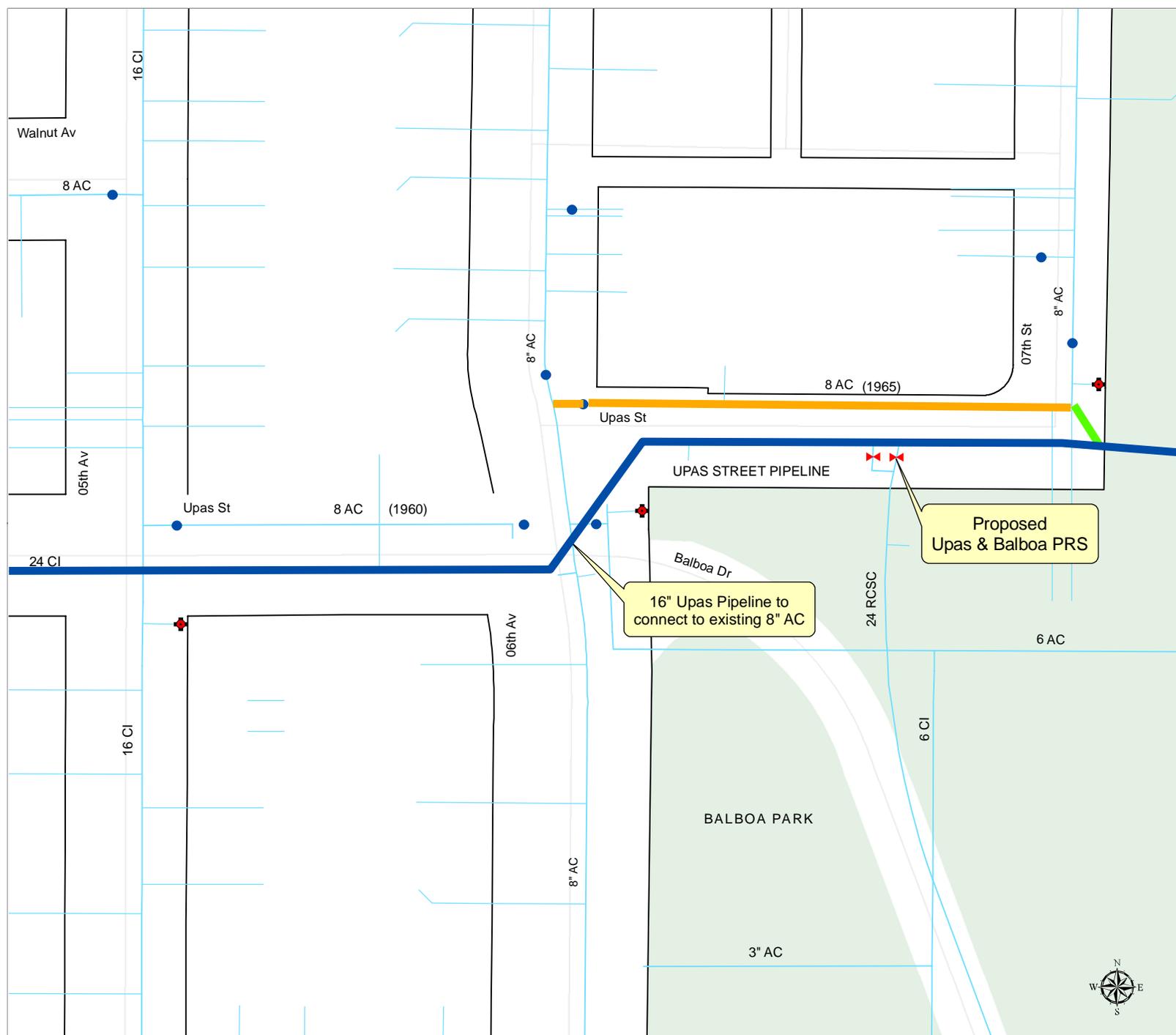


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Legend

-  Upas Pipeline
-  Pipeline Proposed to be Abandoned (Date Installed)
-  Proposed Connection
-  Water Pipelines
-  Water Service
-  Pressure Regulating Station
-  Hydrant
-  Water Valve



16" Upas Pipeline to connect to existing 8" AC

Proposed Upas & Balboa PRS



Figure 4-14

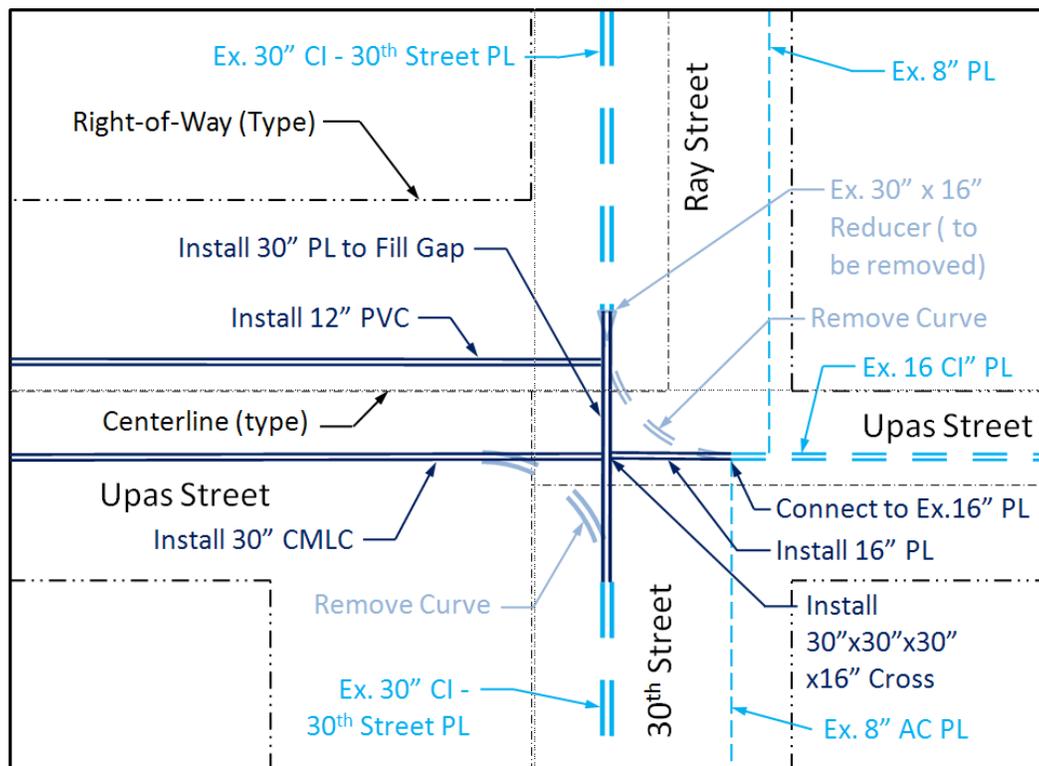
Upas Pipeline
CONSOLIDATION C
(AC Mains 5th to 7th)



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4.4 30th Street Pipeline Gap

Figure 4-15 30th Street Pipeline Gap Infill for Alternative 1



If it is determined that the 30th Street Pipeline layout at the interconnection of the Upas Street and Ray Street has a gap, then install a 30"x30"x30"x16" cross to connect the 30" pipeline in 30th Street with the 16" pipeline in Upas Street. See Section 2.6 for more information.

4.5 Isolation Valves

The Upas PL will need several isolation valves. This location include, but not limited to all major crossings (Interstate 5 and Highway 163), all fault crossings (see Section 2.5.1) and all locations where Upas PL encounters a steep slope.

4.6 Pressure Regulator Stations

Upas and Brant PRS and Upas and Hawk PRS will be replaced. Upas and Balboa PRS will need to be installed at the interconnection of Upas PL and Balboa Park PL. This PRS is needed to help back up Thorn Street PL and Laurel Street PL in emergency

situations. Set Upas and Balboa PRS valves to 21 and 20 psi. Park and Upas PRS do not need to be replaced at this moment. It is currently not being used.

4.7 Construction Constraints

The Eastern Section of the pipeline replacement goes through several different terrains and neighborhoods. The traffic is heavy where Upas Street intersects 30th Street, Park Boulevard, 5th Avenue and 6th Avenue. Theodore Roosevelt Junior High School is located at the intersection of Upas Street and Park Boulevard. Some of the construction constraints in Balboa Park are narrow trails, steep slopes, limited amount of space for construction, and Highway 163 crossing. For Highway 163 crossing, the contractor has to coordinate with CALTRANS.

The Middle Section of the pipeline has heavy traffic where Upas Street intersects 4th Avenue and 5th Avenue.

The Western Section of the pipeline replacement goes through several different terrains and neighborhoods. The main constraint is Interstate 5 crossing. See Section 4.2.3 for limits. The traffic is heavy in this area. Night work should be looked at. There is a limited amount of space for construction in this area. The contractor has to coordinate with CALTRANS.

This area has several Group Jobs in different stages of development. See Section 1.3 for list of Group Jobs. The City limits only one active construction site per given area. The City will determine the limits of the area when the contractor pulls the permits. This limit is primary for traffic concerns. See Figure 4-16 for locations of surrounding Group Jobs.



Legend

- Existing University Pipeline Project
- Existing Upas Pipeline Project
- Distribution Pipelines
- Transmission Pipelines
- Pressure Regulating Station
- University Hgts Reservoir (North & South)

HGL Zones

- ALVARADO 536
- UNIVERSITY HEIGHTS 390
- PRINCIPAL DOWNTOWN 231
- NORMAL HEIGHTS 536
- RODEFER 370
- ARNOLD HILLS 358

Group Jobs

- Water Group 665
- Sewer Main Replacement Group 678
- Water Group 919 CI (Understudy)
- Sewer Group 682
- Sewer & Water Group Job 799
- Group Job 761 Sewer
- Water
- Replacement Group 689 Sewer
- Water

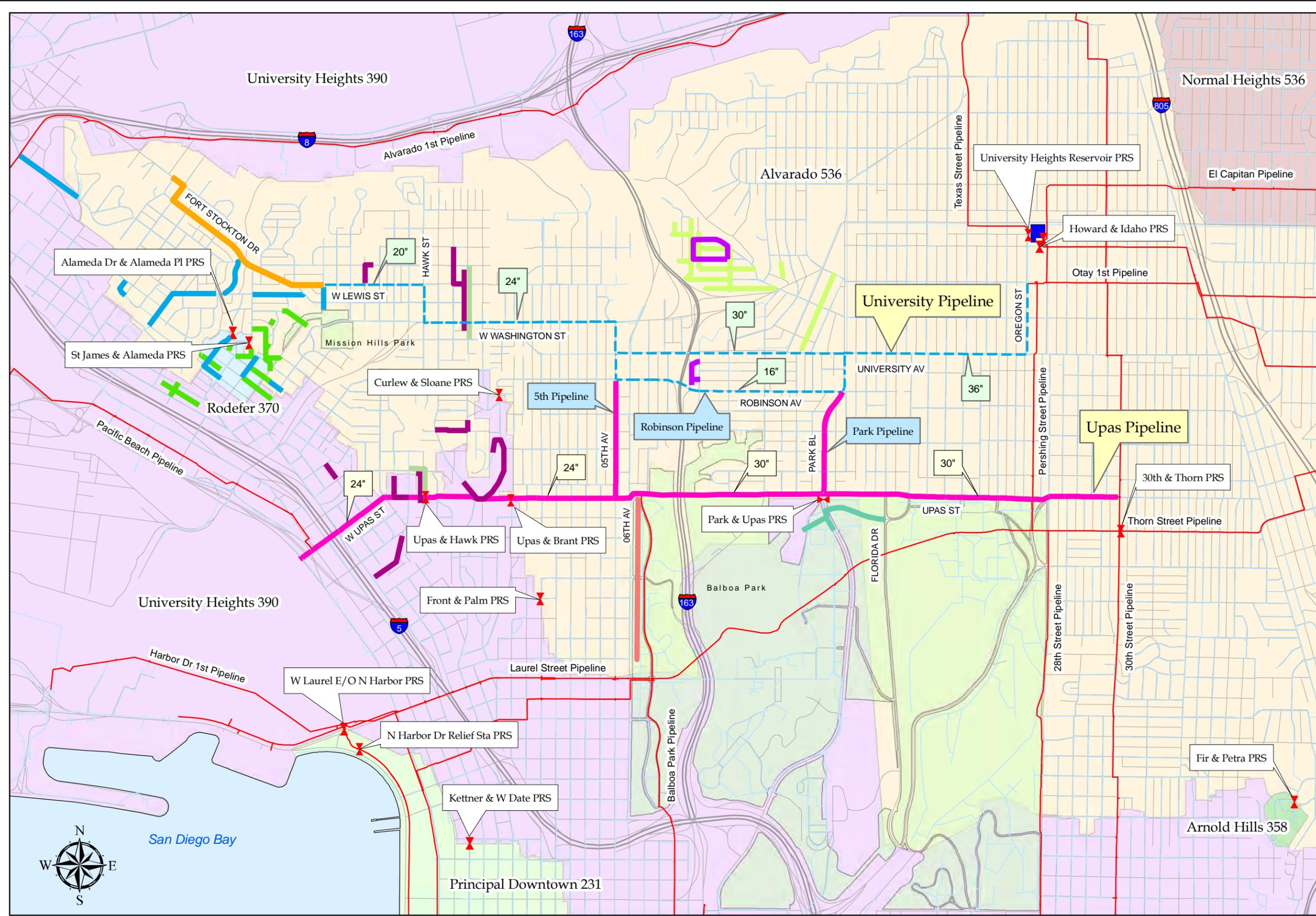


Figure 4-16

Upas Pipeline Project
GROUP JOB OVERVIEW



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4.8 Park PL

Park PL will replace the existing 16" CI in Park Boulevard with 16" PVC. The limits of the replacement are from the Park and Upas PRS to the existing 16" CI in Robinson Avenue.

4.8.1 Construction Constraints

Park Boulevard has a high volume of traffic.

4.9 5th PL

5th PL will replace the existing 16" and 20" CI in 5th Avenue with a 16" PVC. The limits of the replacement are from the proposed 16" Upas PL to the existing 16" CI in Robinson Avenue.

4.9.1 Construction Constraints

5th Avenue has a high volume of traffic.

4.10 Project Execution

This project is recommended to be a design/build.

4.11 Community and Aesthetics

The Upas Project is exempt from Council Policy 900-11 (public art), since it is underground utilities.

4.12 Easement Requirements

No additional permanent easements are needed.

Chapter 5

Cost Estimate

5.0 Cost Estimate

5.1 Cost Estimate Method

The cost estimating method was based on the Master Planning Sections parametric curves developed for small and large diameter pipelines. As the design of the project is nearing 100% complete, more detailed cost estimates with a smaller percent error should be provided. All cost estimates will be rounded to the nearest \$100,000.

5.1.1 Pipeline

Cost per Liner Foot for Small Diameter Pipeline

$$\text{Cost per Liner Foot} = 26.181 + 21.484 \times \text{Pipeline Diameter} - 0.1778 \times \text{Pipeline Diameter}^2$$

<i>Cost of Small Diameter Pipeline</i>	
<i>Diameter Pipeline</i>	<i>Cost per liner foot</i>
8"	\$186.67
12"	\$258.39
16"	\$324.41

Cost per Liner Foot for Large Diameter Pipeline

$$\text{Cost per Liner Foot} = 0.685 \times \text{Pipeline Diameter}^2 - 29.321 \times \text{Pipeline Diameter} + 792.97$$

<i>Cost of Small Diameter Pipeline</i>	
<i>Diameter Pipeline</i>	<i>Cost per liner foot</i>
24"	\$483.83
30"	\$529.84

5.1.2 Pressure Regulator Station

Cost per Pressure Regulator Station

Rehabilitation of Upas and Brant PRS - One 6" PRV

\$12,000	1 - 6" PRV
\$33,000	Vault Piping and Miscellaneous Parts
<u>\$32,500</u>	Metal Seated Valve w/ Electric Actuator
\$77,500	Total
\$80,000	Round Up

Rehabilitation of Upas and Hawk PRS

\$28,000	2 - 12" PRV (\$14,000)
\$35,000	Vault Piping and Miscellaneous Parts
<u>\$40,000</u>	Metal Seated Valve w/ Electric Actuator
\$103,000	Total
\$110,000	Round Up

Proposed of Upas and Balboa PRS

\$28,000	2 - 12" PRV (\$14,000)
\$35,000	Vault Piping and Miscellaneous Parts
\$50,000	Vault
<u>\$40,000</u>	Metal Seated Valve w/ Electric Actuator
\$153,000	Total
\$160,000	Round Up

Total Construction Cost PRS

\$80,000	Upas and Brant PRS
\$110,000	Upas and Hawk PRS
<u>\$160,000</u>	Upas and Balboa PRS
\$350,000	

5.3 Total Cost Estimation

Total cost is administration and engineering cost plus construction cost. Administration & engineering cost assume the following % of construction cost: 10% design, 9% city forces, 20% contingency and 10% construction management. This means soft cost is 49% of construction cost including contingency:

Alternative 1:

$$\$11,600,000 \times 49\% = \$5,684,000$$

Soft cost is estimated at \$5.7 million

$$\$5,700,000 + \$11,600,000 = \$17,700,000$$

Total cost is estimated at **\$17.3 million**

Alternative 2:

$$\$8,000,000 \times 49\% = \$3,920,000$$

Soft cost is estimated at \$3.9 million

$$\$3,900,000 + \$8,000,000 = \$11,900,000$$

Total cost is estimated at **\$11.9 million**

5.4 Estimated Cost Comparison

Master Planning Section total cost estimate is \$6,961,642 \approx \$7.0 million. The difference between Master Planning Section and 10% Design Section is

- **Alternative 1:** $\$17,300,000 - \$7,000,000 = \$10,300,000$
- **Alternative 2:** $\$11,900,000 - \$7,000,000 = \$4,900,000$

The main reason for the difference in cost is caused by the difference in project pipeline length and pipeline size. The total project length for the Master Planning Section was only 12,093' of 16" pipeline. The 10% Design Section total project length for Alternative 1 is 28,422' of 30", 16", 12" and 8" pipeline and Alternative 2 is 22,184 of 30 16", 12" and 8" pipeline. The difference between Master Planning Section and 10% Design Section pipeline lengths are for Alternative 1 it is 16,329' and for Alternative 2 it is 10,091'.

5.4 Budget

The following is the budgeted amounts for the Upas Project.

- FY10 = 0
- FY11 = \$156,000
- FY12 = Remainder needed for the Project

5.5 Schedule

The following is a projected time table for the Upas Project.

- Planning Completed – May 2010
- Transfer to Project Implementations & Technical Services– June 2010
- Transfer to Engineering & Capital Project Department – July 2010
- Bridging Documents – January 2011
- Hire Design/builder – July 2011

Chapter 6

Environmental

6.0 Environmental

6.1 Environmental Assessment

Prepared by Environmental Section of the E.P.M. Division

This preliminary environmental review provides a preliminary analysis of the environmental issues anticipated with implementation of the proposed project at 10% design. In addition, potential actions to achieve compliance with CEQA are outlined. This review is based on information gathered from Associate Engineer, Eric Rubalcava, as well as from the City of San Diego's Land Development Code (LDC) and other state and local regulations.

The Upas Pipeline Project includes replacing and/or abandoning aging 16" to 30" cast iron water pipelines (1902 – 1960) along and near Upas Street. Replacement pipe will occur parallel to the existing pipes and existing pipes will be abandoned. Excavation would be 5' to 17' deep, with the majority of the pipeline being 5' to 7' deep. The total length of replacement pipe = 18,510 feet (3.5 miles). The total length of new pipe = 680 feet.

The majority of the project is located within street right of ways and is not located within the City of San Diego's Multi-Habitat Planning Area (MHPA). However, approximately 250 feet of pipeline just east of Hwy 163 is within the MHPA. Any work within or near the MHPA boundary should be avoided during bird breeding season (February 15th – September 15th). If work needs to be completed during bird breeding season then a bird survey may be necessary to determine if breeding birds exist. If breeding birds are found then the work would have to be closely monitored for noise levels, or the work would have to be postponed until breeding season is over. All staging areas should be located in developed areas.

This project could potentially require the removal of native and non-native vegetation along 1000 – 1500 ft of pipeline replacement. A biological survey and report may be necessary to determine if a Mitigation Monitoring and Reporting Program (MMRP) would be necessary.

This project did not receive a preliminary archaeological review. A cultural resources survey and report may be required to determine if a MMRP would be necessary.

Impacts to paleontological resources could occur if excavation depths are proposed at depths greater than 10 feet and if grading exceeds 1,000 cubic yards. A paleontological survey and report may be necessary to determine if a MMRP would be necessary.

The project sites cross three faults; the Old Town fault, the Florida Canyon fault, and the Texas Street fault. The majority of the project site is underlain by gently sloping to steep terrain that pose a low geological risk.

Noise generating construction activities for the proposed project would be limited to the hours of 7am to 7pm. Significant noise impacts to residential homes are not expected to occur because construction activities would comply with the City of San Diego's Noise Ordinance, which stipulates a not-to-exceed average hourly noise level of 75 dBA during a 12-hour period, between 7am to 7pm.

A Water Pollution Control Plan would be required which would address standard Best Management Practices (BMPs) to minimize water quality impacts from potential stormwater runoff during construction. In addition, any hydrostatic test or potable water discharges would be treated, as necessary, in accordance with Regional Water Quality Control Board (RWQCB) requirements, and then directed into the storm drain system.

Standard dust control measures should be implemented during project construction to minimize air quality impacts from fugitive dust emissions.

6.1.1 CEQA and Permitting Compliance

A final determination of the appropriate CEQA clearance for the proposed project will be made by the City of San Diego's Development Services Department (DSD) Land Development Review Division, Environmental Analysis Section (EAS). This will occur when the project is submitted to DSD by the Engineering and Capital Projects Department. A Public Project Assessment (PPA) by DSD staff is highly recommended to identify the CEQA document (Exemption, Mitigated Negative Declaration, or Environmental Impact Report) required to achieve CEQA compliance. The PPA would also identify if any discretionary permits are required, such as a Coastal Development Permit. Depending on the complexity of impacts and DSD workload, the PPA process may take a couple months, and the permit process to follow could take an additional six to nine months.