CITY OF PETALUMA

PIPS FORCE MAIN CONTINGENCY PLAN

To be used in conjunction with the Sanitary Sewer Overflow and Backup Response Plan

December 2014

NUTE ENGINEERING
907 Mission Ave
San Rafael, CA 94901

CITY OF PETALUMA

PIPS FORCE MAIN - CONTINGENCY PLAN

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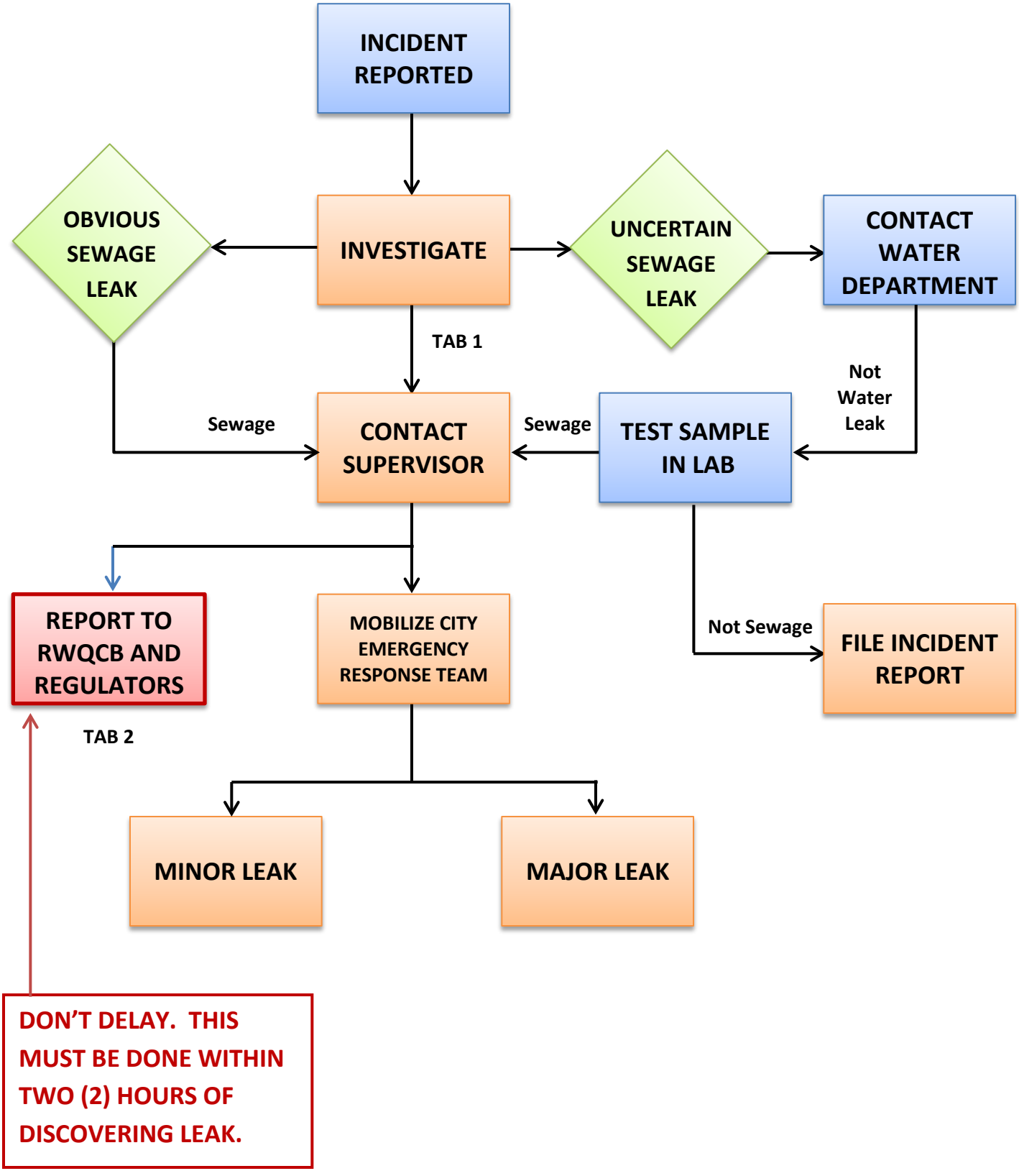


Diagram 1
August 18, 2014

CITY OF PETALUMA – PIPS FORCE MAIN CONTINGENCY PLAN - MINOR LEAK

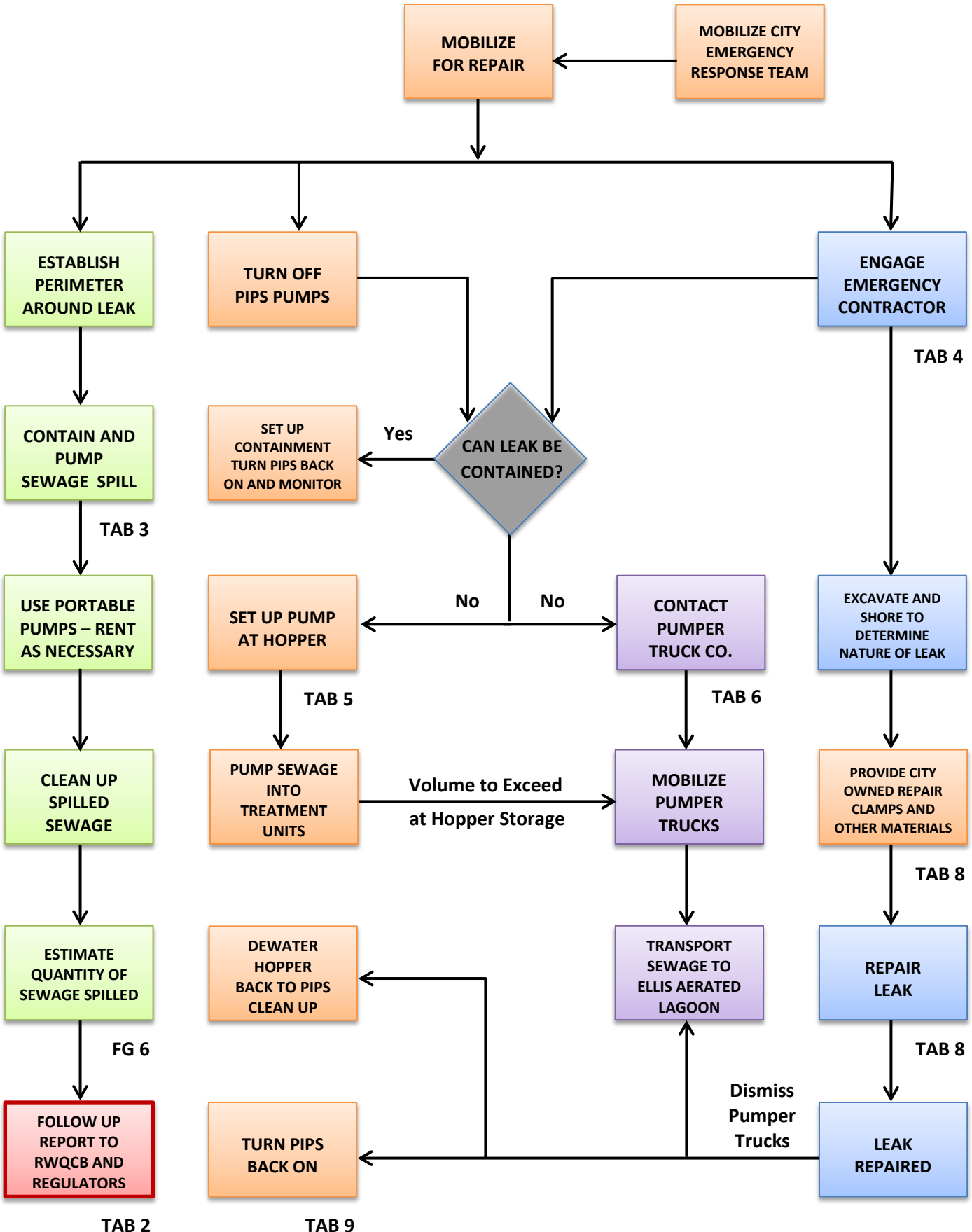


Diagram 2
June 24, 2015

CITY OF PETALUMA – PIPS FORCE MAIN CONTINGENCY PLAN - MAJOR LEAK

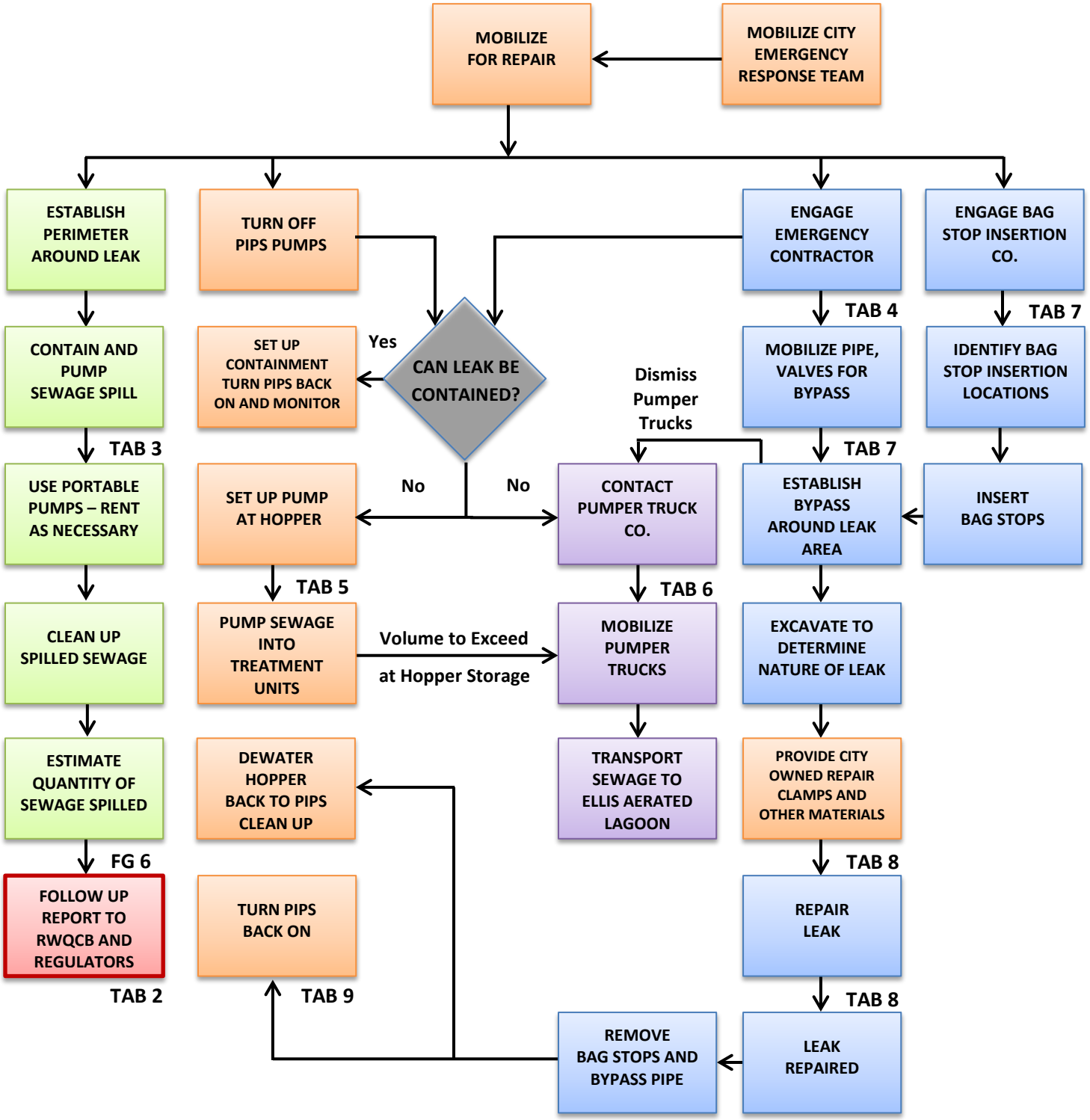


Diagram 3
June 24, 2015

TAB 1 – LEAK INVESTIGATION

1.1 Investigate site of reported leak – Make sure you have a set of system maps with you. Make a note of the street, street address and nearby manhole numbers.

1.2 Report to your operation's supervisor the severity of the leak. If necessary call for backup.

1.3 Post signs, barricades, cones and tape to secure perimeter around the leak.

1.4 Check system map to see if there is a gravity sewer or force main in the vicinity. If a gravity sewer is nearby open the manholes on either side of the leak to determine if the sewer is plugged. The leak may be from a blocked lateral so check for cleanouts on the lateral and open it to see if the lateral is plugged. If you determine that a gravity sewer is leaking proceed to clear the blockage.

1.5 If a force main is in the vicinity check the leaking water to see if it looks like sewage. Sometimes small leaks can travel laterally through the soil and come out in places away from above the actual pipeline.

1.6 If the water does not look like sewage call the City water department.

1.7 If there is still a question about sewage take a sample and have lab test for MBAS, caffeine or ammonia.

1.8 Attempt to quantify the amount of the leak for the report to the RWQCB. See guidance in the City's Sanitary Sewer Overflow and Backup response Plan – Field Guide.

1.9 If sewage is leaking from the PIPS force main proceed to mobilize the emergency response team.

TAB 2 – REGULATORY NOTIFICATION

Regulatory notification instructions are found in the City of Petaluma – Sanitary Sewer Overflow and Backup Response Plan.

2.1 SEE ATTACHED FORMS

Refer to the Guide to Reporting to Regulatory Authorities for notification instructions and the list of agencies which need to be notified.

Contents:

IMPORTANT: INITIAL NOTIFICATION OF A SSO MUST BE COMPLETED WITHIN TWO (2) HOURS OF DISCOVERING A LEAK

2.2 PUBLIC RELATIONS

It is important for employees to communicate effectively with the public including homeowners and residents, especially in sewage overflow or backup situations. How we communicate - on the phone, in writing, or in person – is how we are perceived. Good communication with the public results in greater confidence in our ability to address the problem satisfactorily, less chance of having the people making and prolonging a claims process, and less chance of him/her exaggerating the damage done to their property.

As a representative of the City, you will occasionally have to deal with an irate homeowner. A calm reasonable homeowner can become unreasonable and irate should he/she perceive us as being indifferent, uncaring, unresponsive, or incompetent. Although sometimes difficult, effective management of a sewage overflow or backup situation is critical. If it is not managed well, the situation can get out of hand and the City can end up with a costly prolonged battle. We want the public to be assured that the City is responsive and their best interest is a top priority.

2.3 FOLLOWUP WITHIN 24 HOURS

As soon as possible, but no later than twenty-four (24) hours after becoming aware of a discharge to a drainage channel or surface water, the City Staff shall submit to the Regional Water Quality Control Board a certification that the State Office of Emergency Services and the County Health Officers have been notified of the discharge.

2.4 SANITARY SEWER OVERFLOW REPORTING

Category 1 Discharge:- Discharge of sewage resulting from a failure in City's sewer system that: equal or exceed 1000 gallons; result in a discharge to a drainage channel and/or surface water; or a discharge to a storm drainpipe that was not fully captured and returned to the sanitary sewer system.

Category 2 Discharge: Any other discharge resulting from a failure in the City's sanitary sewer system.

2.5 SSO REPORTING TIME FRAMES

Category 1 SSOs, in addition to the above initial notification requirements, shall be reported **as soon as: the City Staff has knowledge of the discharge; reporting is possible; and reporting can be provided without substantially impeding cleanup or other emergency measures.** Initial reporting of Category 1 SSOs must be reported to the Online SSO System as soon as possible but no later than three (3) business days after the District is made aware of the SSO. A final certified report must be completed within fifteen (15) calendar days from the conclusion of the SSO response and remediation.

Category 2 SSOs must be reported to the Online SSO Database within thirty (30) days after the end of the calendar month in which the SSO occurs.

2.6 SSO ELECTRONIC REPORTING SYSTEM (ERS)

After a SSO event staff must submit SSO reports through the State Water Board's web-based SSO ERS at http://ciwqs.waterboards.ca.gov/ciwqs/. The Director of Public Works, The Director of Field Maintenance and Operations, and the Asst. Superintendent of Public Works are authorized to report on the State SSO ERS.

2.7 ANNUAL REPORT

An annual report for the January 1 to December 31 reporting year must be submitted no later than March 15 of the following year. At a minimum, the annual report must include the following:

One or more charts showing trends in the number, volume, and causes of SSOs, and by location of SSOs, experienced during the reporting year.

Discussion or any data and potential deficiencies/redundancies in the monitoring system of reporting program.

The report must be certified and signed by either a principal executive officer or a ranking elected official. The report must be certified with the following statement:

"I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Submit one paper copy (required) of the report and one electronic PDF copy (requested but not required).

ELLIS CREEK WATER RECYCLING FACILITY
ORAL SPILL REPORT
WITHIN 2 HOURS OF THE EVENT

Call Matt Pierce: Blackberry 249-3197, Personal Cell 415-272-4099 -OR-
Margaret Orr: Blackberry 849-6528, Personal Cell 843-1326, Home 843-4016

OFFICE OF EMERGENCY SERVICES (OES): 1-800-852-7550

Name of person from OES contacted: _____

Time of spill: _____ Date of spill: _____

Time of phone call: _____ Date of phone call: _____

Description of what spilled: _____

_____

Location of spill: _____

Estimated volume (gallons) of spill: _____

Reason for the spill: _____

Description of response: _____

How was the cleanup handled? _____

Responsibility for the spill resides with: _____

Did spill reach any waters of the State? _____
Waters of the State include: wetlands, creeks and/or any watershed that flows to a larger water body.

OES Number: _____

REGIONAL WATER QUALITY CONTROL BOARD ELECTRONIC REPORT:
http://www.wbers.net/Default.aspx User Name: **PetalumaMWTP** Password: **outfall**
If electronic reporting is not possible then call the spill hotline at (510) 622-2369

Time of Phone call to RWQCB: _____ Message left with whom: _____

LOCAL HEALTH DEPARTMENT: (707) 565-6565

Time of Phone call to CDPH: _____ Message left with whom: _____

_____ _____
Signature of Reporting Person (Date)

Back-up Attachments: ☐ Yes ☐ No

\\Xara4-4\engineer\water resources & conservation\Wastewater\66700\Spill Response\2-hour Spill Response Form.doc

TAB 3 – SPILL CONTAINMENT

3.1 Refer to the City's Sanitary Sewer Overflow and Backup Response Plan – Field Guide. The following procedures are attached.

FG 3 - Containment Procedures

FG 4.1 – Flow Volume Estimation Procedures: Contained Volume

FG 4.3 – Flow Volume Estimation Procedures: Duration and Flow Rate

FG 5.1 - Bypass Pump Selection Table: 0-25 Feet Total Lift

For additional procedures refer to the Sanitary Sewer Overflow and Backup Response Plan

3.2 Trash Pump Rental Companies (See Appendix A)

3.3 Post Notices – see attached Notice

NOTICE

CITY OF PETALUMA

EMERGENCY PUMPING

THE CITY OF PETALUMA HAS INSTALLED EMERGENCY PUMPS TO ALLOW REPAIR OF ITS SEWER LINE

PLEASE EXERCISE CAUTION AND STAY AWAY FROM THE PUMPS AND PIPES

CONTACT CITY OF PETALUMA PUBLIC WORKS AT 707-778-4546

The overflow must be contained. Containment becomes more difficult if the overflow reaches the storm drain system or drainage way since the overflow can rapidly contaminate receiving waters such as creeks, streams, rivers, and other water bodies. During dry weather, the storm drain system can be used to store the overflow if it can be plugged downstream of the overflow or if the downstream storm drain pump station can be deactivated.

Options for containing overflow

Overflow onto ground	• Rubber mats at catch basin or inlet • Sand bags in gutter • Dig earthen trench
Overflow in building	• Evacuate affected people if necessary • Use sand bags/plastic sheeting if necessary • Avoid electrical shock - have power turned off
Overflow into storm drain/drainage way	• Trace overflow in storm drainage system to downstream end point • Plug all affected storm system outlets and coordinate with appropriate personnel for strategy to contain spill • Turn off storm water pump station

Required equipment for containing overflow

Overflow onto ground and in buildings	• Rubber mats • Sand bags • Plastic sheets • Bypass pumps and pipe/hose
Overflow into storm drain/drainage way	• Plugs • Bypass pump
Overflow at pump station	• Emergency generator • Bypass pump

Refer to Regulatory Notifications Packet to begin preliminary notifications.

Flow Volume Estimation Procedures: Contained Volume

FG 4.1

The volume of some small spills can be estimated using this method if the overflow is contained in one area and if it is not raining. In addition, the shape, dimensions, and depth of the spilled wastewater are needed. The shape and dimensions are used to calculate the area of the spills and the depth is used to calculate the volume.

Step 1 Sketch the shape of the contained sewage

Step 2 Measure or pace off the dimensions.

Step 3 Measure the depth in several locations. Calculate an average depth for the entire area by adding all measured depths together and dividing by the number of measurements taken.

Step 4 Convert the dimensions, including depth to feet.

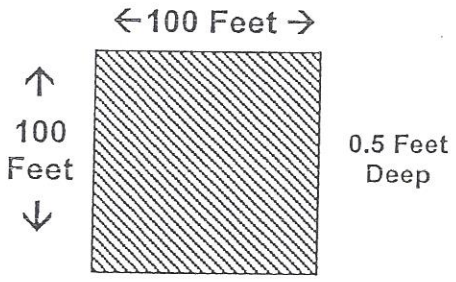
Step 5 Calculate the area using the following formulas:

Rectangle	Area = length x width
Circle	Area = diameter x diameter x 0.785
Triangle	Area = base x height x 0.5

Step 6 Multiply the area times the depth

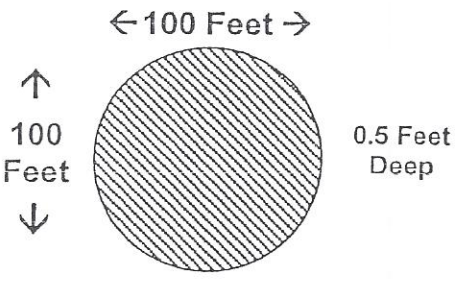
Step 7 Multiply the volume by 7.48 to convert the area to gallons

EXAMPLE:



Volume = 100' x 100' x 0.5' x 7.48
Volume = 37,400 gallons

EXAMPLE:



Volume = 100' x 100' x 0.5' x .785 x 7.48
Volume = 37,400 gallons

Flow Volume Estimation Procedures: Duration and Flow Rate

FG 4.3

In this method, separate estimates are made for the overflow duration and flow rate.

Flow Rate: There are four methods to estimate the overflow rate:

1: SSO Flow Estimation Form: Pictures presented in this procedure manual show sewage flowing from a maintenance hole at different rates. The observations of staff members are used to select the appropriate value from the pictures.

2. Tabulated Values: Table 1, Table 2 and Table 3 contain tabulated values for different maintenance hole overflows.

3. Open Channel Flow: Overflows often run into nearby ditched, channels, gutters, etc. Flow can be quantified by measuring the cross sectional area and velocity of the overflow. First measure the depth of flow and the dimensions of the channel. Then measure the velocity by dropping a floating object into the flow and measuring the time it takes to travel a set distance. The resulting velocity will be in the units of feet per second. Several measurements should be taken and the average flow rate should be used in volume estimates. Calculate the flow into the channel using the following formula:

$$\text{Flow (gal/min)} = \text{Velocity (ft/sec)} \times \text{Area (ft}^2\text{)} \times 449$$

4. Pump Stations: Sewer pump stations often have flow or pump run time data available through the SCADA system. Pump curves my need to be obtained to determine pump discharge rates.

Overflow Duration: The start and end times of the overflow can be estimated by staff or public bystanders who saw the overflow begin and/or end. Flow meters and information from the SCADA system can be useful in estimating overflow duration.

Volume Calculation: The overflow volume can be estimated with the following equation:

$$\text{Volume (gal)} = \text{Flow Rate (gal/min)} \times \text{Duration (min)}$$

Bypass Pump Selection Table: 0-25 Feet Total Lift

Bypass Pump Selection Table
0-25 feet total lift

Pipe size (in)	Flowrate (gpm)	50	100	150	200	250	300	350	400	450	500	600	700	800	900	1000
18	4500	8"	8"	8"	8"											
18	4000	8"	8"	8"	8"	8"	8"	8"								
18	3500	8"	8"	8"	8"	8"	8"	8"	8"	8"	8"					
18	3000	8"	8"	8"	8"	8"	8"	8"	8"	8"	8"	8"	8"	8"		
18	2500	8"	8"	8"	8"	8"	8"	8"	8"	8"	8"	8"	8"	8"	8"	8"
15	2000	6"	6"	6"	8"	8"	8"	8"	8"	8"	8"	8"	8"	8"	8"	8"
15	1500	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	8"	8"	8"	8"	8"
15	1000	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"
10	750	4"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"
8	500	4"	4"	4"	4"	4"	4"	4"	6"	6"	6"	6"	6"	6"	6"	6"
8	400	4"	4"	4"	4"	4"	4"	4"	4"	4"	4"	4"	6"	6"	6"	6"
6	300	[illegible]	[illegible]	[illegible]	4"	4"	4"	4"	4"	4"	4"	4"	4"	4"	4"	4"
4	200	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4"	4"	4"	4"	4"	4"
4	100	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Hose Length (ft)

Assumptions

1. All loses are ignored except for frictional losses.
2. Velocity heads are zero because of low speeds.
3. Pump curves are from www.rainforrent.com.
   a. 3" pump DV-80 @ 2800 rpm
   b. 4" pump DV-100 @ 2200 rpm
   c. 6" pump DV-150 @ 2200 rpm
   d. 8" pump DV-200c @ 1900 rpm
4. Hose diameter is same as pump size.
5. Fire hose roughness coefficient C~120
6. Inlet and outlet pressures are at atmospheric pressure.
7. Average flowrates for pipe diameters are calculated using average slopes.
8. Maximum 25 feet suction lift.

Pipe Size (in)	Avg Flowrate (gpm)
4	270
6	314
8	486
10	764
12	1667
15	2153
18	4444

TAB 4 - MOBILIZE EMERGENCY CONTRACTOR

4.1 If the leak is sewage is from the PIPS force main it will be necessary to dig down to the force main and make a repair.

4.2 Keep your operation's supervisor advised about steps being taken

4.3 Call one of the City's on call contractors mobilize to excavate down to the pipe and safely shore the excavation. (See Appendix A)

4.4 Have office issue Emergency Purchase Order

4.5 Meet Contractor's superintendent at the job site and direct contractor to establish the necessary work perimeter and traffic controls.

4.6 The emergency contractor may be able to assist with the spill containment.

4.7 Provide Emergency Contractor with a copy of the system map and show him location of the manholes on the PIPS force main and on nearby gravity sewers – mark with green paint. Ground water and any sewage must be pumped to a gravity sewer.

TAB 5 – STORAGE IN HOPPER TREATMENT UNITS

5.1 Turn off PIPS pump station

5.2 Mobilize City pump and connecting hoses are stored at Hopper. The City pump is diesel engine driven similar to the attached catalog cut. Depending how it is connected the pump capacity will be around 3,000 gpm.

5.3 Bypass flow from manhole in front of PIPS to the various abandoned structures at the Hopper treatment plant using rental pump – see diagram.

5.3 See attached for the storage volumes available in each structure with 2' freeboard and the expected hourly flow.

5.4 Estimate time to complete repair –request time estimate from with emergency contractor

5.5 Estimate the amount of time structures can hold flow based on time of day and PIPS flow meter (See chart)

5.6 The expected sewage flows at Hopper are as follows:

Average dry weather flow – non rainy periods	4.5 - 5.0 mgd 3,130 gpm – 3,475 gpm
Peak dry weather flow	4,300 gpm – 4,700 gpm
Flow during heaviest rain 3/20/2011	22 - 25 mgd 15,920 gpm – 17,375 gpm

5.7 If time to repair appears to exceed the emergency storage time proceed to mobilize pumper trucks - Tab 6.

5.8 If pumper trucks will be insufficient and the repair time will be prolonged install bag stops and establish bypass around leak area – Tab 7.

5.9 IMPORTANT – Regulators will expect the City to make a maximum effort to contain the sewage spill so in a major sewage spill event it will be important to show a good faith effort and continue to store flow in the Hopper structures.

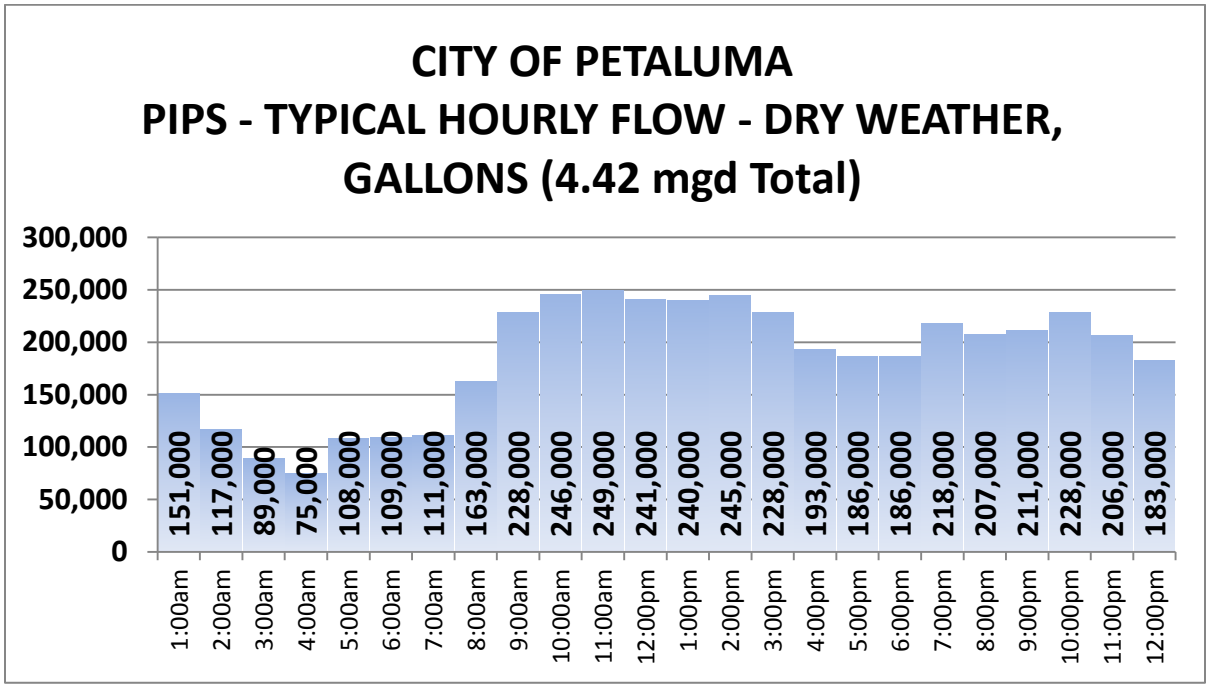
STORAGE AT HOPPER – WORK TIME CALCULATOR

CALCULATE AVAILABLE WORK TIME WHEN USING STORAGE AT HOPPER. IF TIME THREATENS TO EXCEED STORAGE TIME MOBILIZE PUMPER TRUCKS

1. **AVAILABLE STORAGE VOLUMES IN THE ABANDONED STRUCTURES OF THE OLD HOPPER TREATMENT PLANT ASSUMING 2' OF FREEBOARD**

Headworks, motor room and pump room	122,500 gallons
Primary sedimentation including grit chamber, preservation and sludge pump pit (assuming holes were cut through the walls)	203,609 gallons
Aeration tanks	1,010,000 gallons
Secondary sedimentation tank	316,600 gallons
Chlorine contact chamber	135,800 gallons
TOTAL	1,800,000 gallons

2. **EXPECTED HOURLY FLOW AT PIPS – ADD HOURLY FLOWS TO DETERMINE AVAILABLE WORK TIME BASED ON AVAILABLE STORAGE BEING USED**



ACDEU

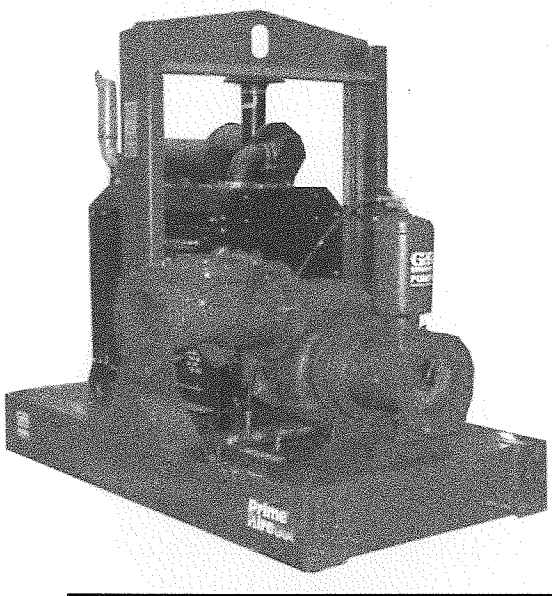
Priming Assisted Centrifugal Pump w/Autostart

Model PA10A60-4045H

Size 10" x 10"

Prime Aire®

Total Head		Capacity of Pump in U.S. Gallons per Minute (GPM) at Continuous Performance				
P.S.I.	Feet					
60.7	140	780	780	780	780	780
52.0	120	1590	1840	1920	1920	1920
43.4	100	1840	2400	2820	3020	3020
34.7	80	1920	2520	3020	3500	3620
26.0	60	2020	2580	3100	3630	3820
17.3	40	2100	2640	3180	3720	3920
8.7	20	2180	2700	3260	3820	4030
Suction Lift		24'	20'	15'	10'	5'



PUMP SPECIFICATIONS

Size: 10" x 10" (254 mm x 254 mm) Flanged.
Casing: Gray Iron 30.
Maximum Operating Pressure 98 psi (676 kPa).*
Semi-Open Type, Two Vane Impeller: Ductile Iron 65-45-12.
Handles 3.25" (82,6 mm) Diameter Spherical Solids.
Suction Spool: Gray Iron 30.
Impeller Shaft: Stainless Steel 17-4 PH.
Externally Adjustable Front Wear Ring: Ductile Iron 80-55-06.
Intermediate: Gray Iron 30.
Seal Plate: Gray Iron 30.
Seal: Mechanical, Oil-Lubricated, Double Floating, Self-Aligning. Silicon Carbide Rotating and Stationary Faces. Stainless Steel 316 Stationary Seat. Fluorocarbon Elastomers (DuPont Viton® or Equivalent). Stainless Steel 316 Cage and Spring. Maximum Temperature of Liquid Pumped, 160°F (71°C).*
Priming Chamber: Gray Iron 30 Housing w/Stainless Steel Float and Linkage.
Discharge Check Valve: Ductile Iron Housing w/Buna-N Flapper.
Radial Bearing: Open Single Ball.
Thrust Bearing: Open Double Ball.
Bearing and Seal Cavity Lubrication: SAE 30 Non-Detergent Oil.
Gaskets: Resistant Synthetic Rubber, PTFE, Cork, Vegetable Fiber, and Compressed Synthetic Fibers.
O-Rings: Buna-N.
Hardware: Standard Plated Steel.
Bearing and Seal Cavity Oil Level Sight Gauges.
**Consult Factory for Applications Exceeding Maximum Pressure and/or Temperature Indicated.*
Standard Equipment: Gear-Driven Air Compressor. Hoisting Bail. Combination Skid Base w/Fuel Tank. Strainer. Single Ball Type Float Switch. **
Optional Equipment: Battery. Heated. G-R Hard Iron Impeller. NPT Threaded Flanges. High Speed (55 MPH/89 KM/H) Tandem Axle Pneumatic-Tired Wheel Kit w/wo DOT-Approved Lights and Electric Brakes. Over-the-Road Trailer (Meets DOT and Transport Canada Requirements) Available w/Either Electric or Hydraulic Surge Brakes, Running Lights, Trailer Jack Stands and Safety Chains/Cables. Heated Priming Chamber Kit. Suction Vacuum and Discharge Pressure Gauge Kit. EPS w/Submersible Transducer Liquid Level Sensor.**
***50 Ft. (15 m) Standard Length; Dual Switches and Alternate Cable Lengths Available From the Factory.*

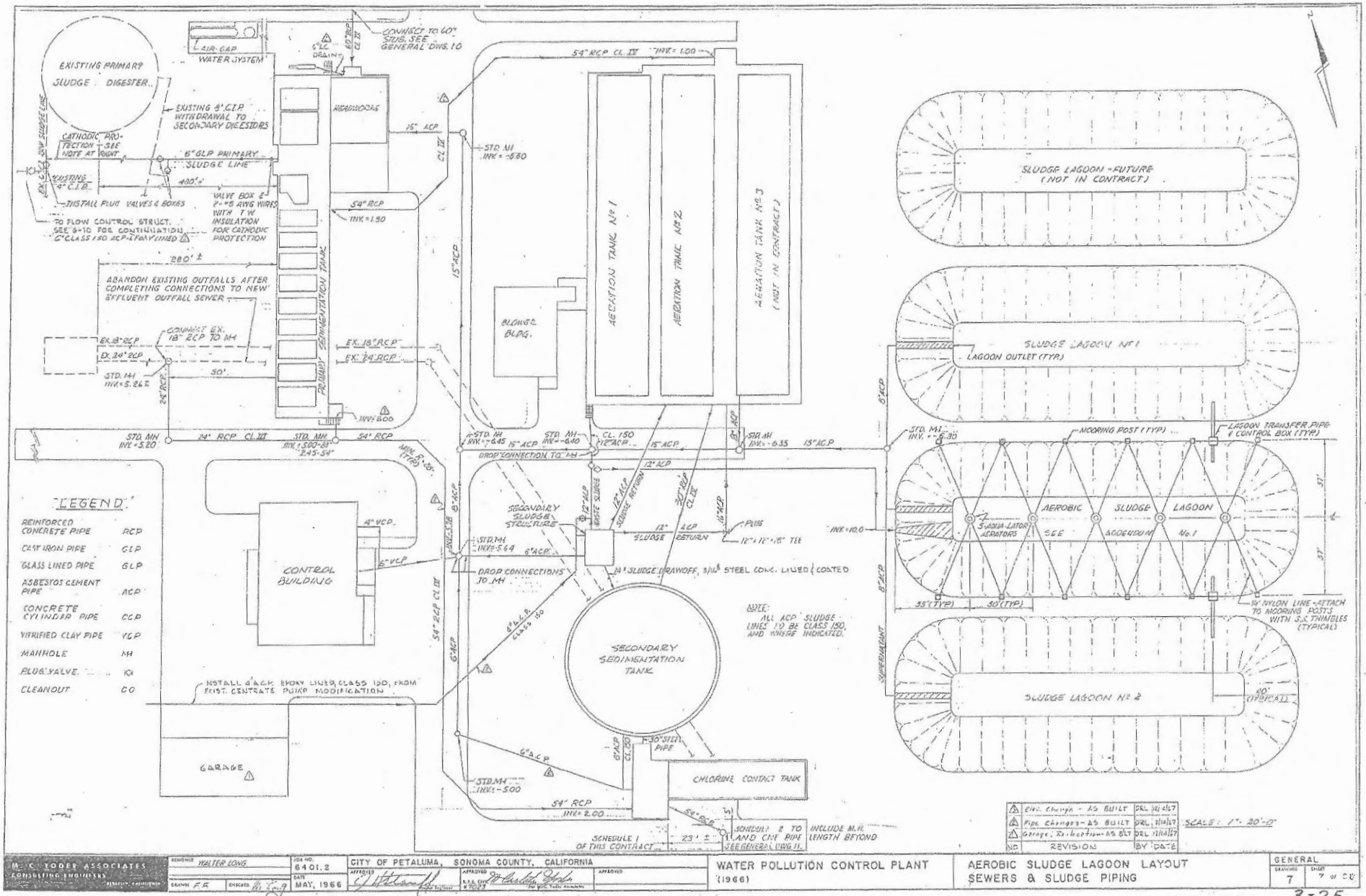
WARNING!
Do not use in explosive atmosphere or for pumping volatile flammable liquids.

ENGINE SPECIFICATIONS

Model: John Deere 4045H "Power Tech".
Type: Four Cylinder, Turbocharged, Charge Air Cooled, Enclosed, Liquid Cooled Diesel Engine.
Displacement: 275 Cu. In. (4,5 liters).
Governor: Electronic Isochronous.
Lubrication: Forced Circulation.
Air Cleaner: Dry Type.
Oil Reservoir: 15.5 U.S. Qts. (14,7 liters) Dry; 14.5 U.S. Qts. (13,7 liters) Refill.
Fuel Tank: 110 U.S. Gals. (416 liters).
Full Load Operating Time: 17.8 Hrs.
Starter: 12V Electric.
Standard Features: Low Oil Pressure and High Coolant Temperature Safety Shut Down Switches. Autostart Instrument Panel Includes: Tachometer, Voltmeter, Hourmeter, Coolant Temperature Gauge, Oil Pressure Gauge, Manual/Stop/Auto Key Switch, 10 Amp Pushbutton Circuit Breaker, Startup Warning Delay. Muffler w/Weather Cap. Throttle Control.

JOHN DEERE PUBLISHED PERFORMANCE:
Maximum Gross BHP (Intermittent Duty)
140 (104 kW) @ 2400 RPM

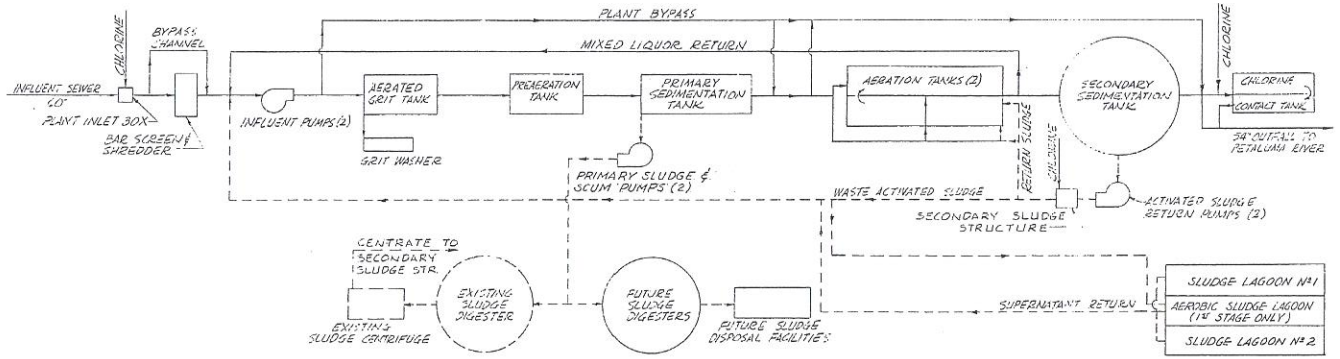
GORMAN-RUPP PUMPS
THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO
GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA
www.grpumps.com
Specifications Subject to Change Without Notice
Printed in U.S.A.



M. C. TODER ASSOCIATES CONSULTING ENGINEERS BERKELEY, CALIFORNIA	DESIGNED WALTER LONG	JOB NO. 6401.2	CITY OF PETALUMA, SONOMA COUNTY, CALIFORNIA	WATER POLLUTION CONTROL PLANT (1966)	AEROBIC SLUDGE LAGOON LAYOUT SEWERS & SLUDGE PIPING	GENERAL DRAWING 7 SHEET 7 of 28
	DRAWN F.C. CHECKED	DATE MAY, 1966	APPROVED	APPROVED	APPROVED	

REVISED PER ADDENDA

3-25



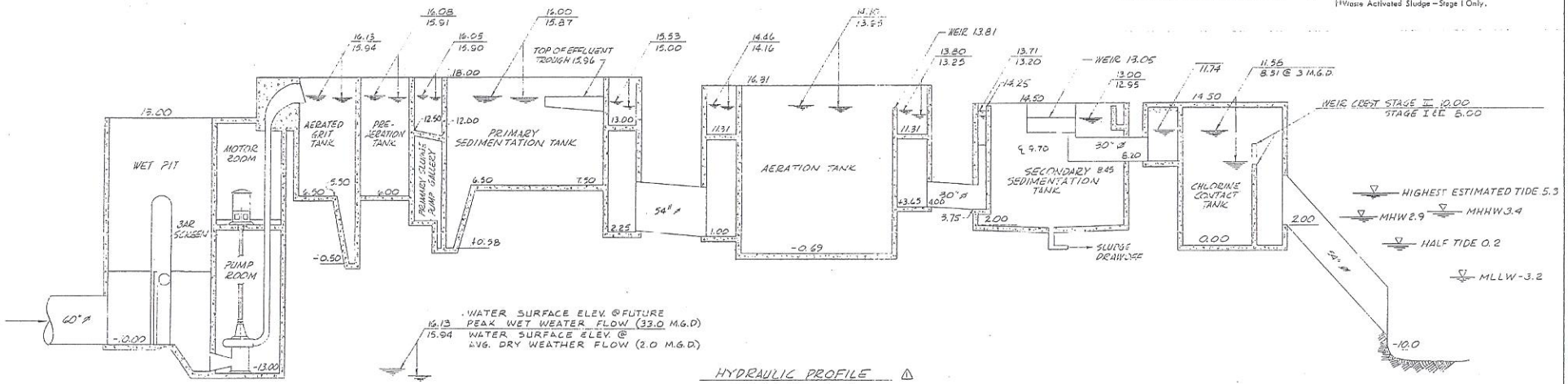
FLOW DIAGRAM
NO SCALE

DESIGN FACTORS*

FLOW, mgd	
Initial Design, Average Dry Weather	2.0
Initial Design, Peak Wet Weather	8.0
Future Design, Average Dry Weather	14.0
Future Design, Peak Wet Weather	33.0
DESIGN LOADINGS, PLANT INFLUENT	
Initial Design Population Equivalent	37,000
Future Design Population Equivalent	235,000
Biochemical Oxygen Demand, lbs/day	
Per Capita Basis	0.20
Initial Design	7,450
Future Design	47,000
Suspended Solids, lbs/day	
Per Capita Basis	0.18
Initial Design	6,200
Future Design	39,000
BAR SCREENS AND SHREDDERS	
Number	
Initial Design	1
Future Design	2
Width, feet	3
PLANT INFLUENT PUMPS	
Number	
Initial Design	2
Future Design	3
Total Capacity, mgd	
Initial Design	14
Future Design	45
AERATED GRIT TANKS	
Number	
Initial Design	1
Future Design	7
Size, feet	18 x 10 x 10 SWD
PREAERATION TANKS	
Number	
Initial Design	1
Future Design	7
Size, feet	18 x 15 x 10 SWD
Detention Time, hours†	0.25
PRIMARY SEDIMENTATION TANKS	
Number	
Initial Design	1
Future Design	7
Size, feet	18 x 110 x 9 SWD
Detention Time, hours†	1.60
Overflow Rate, gal/sq. ft./day†	1,000
PRIMARY TREATMENT	
Assumed BOD Reduction, per cent	35
Assumed Suspended Solids Reduction, per cent	58

AERATION TANKS	
Number	
Initial Design	2
Future Design	10
Size, feet	30 x 150 x 15 SWD
Detention Time, hours†	
Initial Design	12.0
Future Design	6.5
Loading, lbs. BOD/1000 cu. ft.	
Initial Design	35
Future Design	50
Return Sludge, per cent	13-100
AERATION BLOWERS	
Number	
Initial Design	3
Future Design	5
Capacity, cfm (Total)	
Initial Design	5,600
Future Design	36,800
SECONDARY SEDIMENTATION TANKS	
Number	
Initial Design	3
Future Design	5
Size, feet	70 Dia. x 11 SWD
Detention Time, hours†	
Initial Design	3.8
Future Design	2.5
Overflow Rate, gal/sq. ft./day†	785
OVERALL PLANT EFFICIENCY	
Assumed BOD Reduction, per cent	95
Assumed Suspended Solids Reduction, per cent	95
Effluent BOD, mg/l	23
Effluent Suspended Solids, mg/l	19
CHLORINE CONTACT TANK**	
Volume, cu. ft.	
Initial Design	8,350
Future Design	39,000
Detention Time, hours†	0.5
AEROBIC SLUDGE LAGOONS††	
Volume, cu. ft.	60,000
Total Solids, lbs. dry wt./day	1,900
Detention Time, days @ 2% solids concentration	23.5
SLUDGE LAGOONS††	
Number	2
Volume Each, cu. ft.	60,000

*Except where noted, capacity of existing treatment facilities is excluded.
†Based on average dry weather flow.
**Includes existing plant flows.
††Waste Activated Sludge – Stage I Only.



HYDRAULIC PROFILE △
SCALE: VERT.- 1"=5'-0"
HORIZ.- NONE

ELEVATIONS BASED ON 1929 SEA LEVEL DATUM

No.	REVISION	DR.	CH.	APP'D	BY	DATE
5	AS BUILT					

M. C. YODER ASSOCIATES
CONSULTING ENGINEERS BERKELEY, CALIFORNIA

DESIGNED WALTER LONG | DRAWN F.F. | CHECKED

JOB NO. 6401.2
DATE MAY, 1966

CITY OF PETALUMA, SONOMA COUNTY, CALIFORNIA
APPROVED Project Engineer
APPROVED R.E. & L.S. CIVIL # 7023 For M. C. Yoder Associates
APPROVED

WATER POLLUTION CONTROL PLANT (1966)

FLOW SHEET & DESIGN DATA

GENERAL
DRAWING 5 | SHEET 5 OF 98

5-5

3-25

TAB 6 – MOBILIZE PUMPER TRUCKS

6.1 Consult with team supervisor regarding the need for pumper trucks for containing the spill, dewatering excavation, PIPS manholes and force main when it is cut. Pumper trucks may be needed for additional bypass pumping.

6.2 Pumper trucks come in various sizes, the maximum size is 5,000 gallons and is difficult to maneuver in tight spaces. It takes time to fill a pumper truck so sufficient trucks should be ordered and sufficient suction points should be identified.

6.3 Direct pumper trucks to discharge into one of the aerated lagoons at the Ellis Creek Water Recycling Facility.

6.4 Pumper truck route to the aerated lagoon – See attached map. Round trip from PIPS to the aerated lagoon is about 8 miles.

6.5 Contact one or more of the pumper truck companies. (See Appendix A)

Caulfield Ln
Baywood Dr
Casa Grande Rd
Ely Blvd S
Frates Rd
Payran St
Lakeville St
S McDowell Blvd
116
S Ely Rd
Browns Ln
101
6-2
N
© 2014 Google
Google earth
1993
PIPS FORCE MAIN CONTINGENCY PLAN - PUMPER TRUCK ROUTE TO AERATED LAGOON
Imagery Date: 4/20/2013 38°13'37.82" N 122°35'35.62" W elev 10 ft eye alt 17746 ft

TAB 7 – INSTALLATION OF BYPASS PIPELINE

7.1 Installation of an aboveground pipeline to isolate a section of the PIPS force main to make a repair is a major undertaking and will take time. Three alternatives are described below.

7.2 Bypass Pipeline Alternatives – see attached maps

Alternative A – Bypass a specific section of the PIPS force main

Alternative B – Bypass the westerly half of the PIPS force main between the PIPS and Cader Lane or between PIPS and Manhole X09000

Alternative C – Bypass the easterly half of the PIPS force main between Cader Lane or Manhole X09000 and the Ellis Creek Water Recycling Facility

Alternative D – Bypass entire PIPS force main between the PIPS and the Ellis Creek Water Recycling Facility

Table 7-1: Bypass Alternatives Requirements

BYPASS ALTERNATIVE	A	B	C	D
Repair Section	**Individual Sections**	**West of Cader Lane**	**East of Cader Lane**	**Entire Force Main**
# of Bag Stops	2	1	1	0
# of Portable Pumps @ 3,000 gpm ea	0 Use PIPS	2	0 Use PIPS	2
Bypass Pipe, Total Length in Feet				
12” Single	3,000	--	--	--
12” Double	6,000	11,200	12,000	21,000
18” Single	3,000	5,600	6,000	10,500

7.3 Decide on which bypass pipeline alternative to install. Proceed to appropriate Section.

7.4 Mobilize emergency contractor to install a bypass pipeline around repair area.

7.5 See Appendix A for list of emergency contractors, pump rental, pipe rental, bag stop installers.

7.A **Alternative A – Install bypass pipeline to isolate a specific section of PIPS force main**

7.A.1 Alternative A requires installation of two bag stops in access manholes, one upstream and one downstream of repair section and a bypass pipe between the next upstream and downstream manholes. PIPS provides the pumping and no portable pumps are necessary.

7.A.2 Check force main manholes to confirm that standpipes are available. If there are no standpipes it will be necessary to modify the manholes as shown on the attached sketch to allow installation of bag stops and bypass pipe.

7.A.3 Mobilize bag stop contractor – see list in Appendix A

7.A.4 Measure length of bypass pipe necessary and order a suitable length of 12" or 18" diameter portable pipe – see Appendix A for list for rental companies of pipe and road ramps

7.A.5 Layout and connect the bypass pipe between upstream and downstream manholes. Install signs, barricades, road ramps and stiles over walking paths as necessary.

7.A.6 Turn off PIPS and install bypass pipe on standpipes between manholes upstream and downstream of bag stop manholes

7.A.7 Turn off PIPS and Install bag stops through standpipes on the manholes on either side of repair section

7.A.8 Turn PIPS back on to pump through bypass pipe.

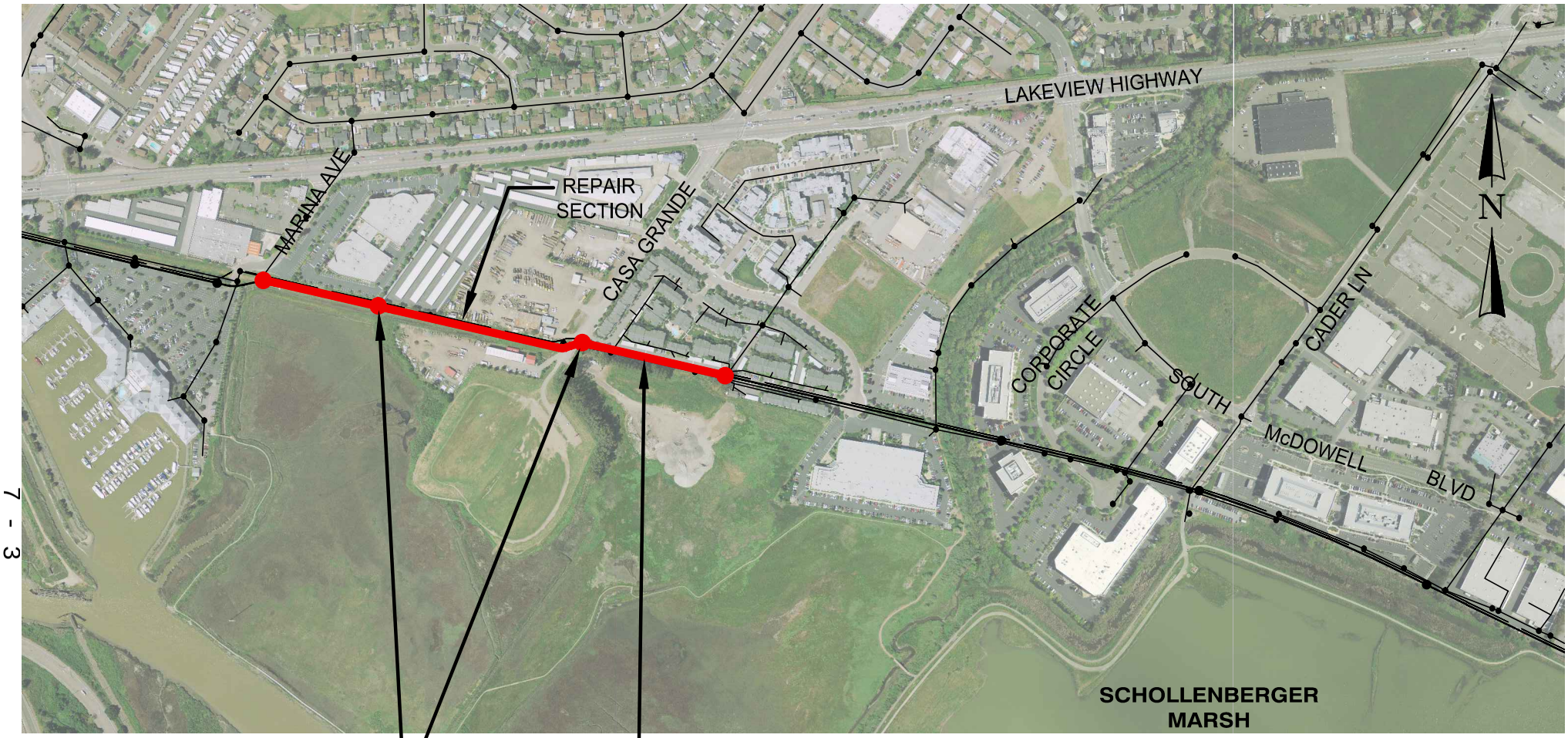
7.A.9 Make repair – See Tab 8

7.A.10 Once repair is made turn PIPS off and remove upstream bag stop in upstream manhole

7.A.11 Prior to backfilling repair turn PIPS back on and observe repair to make sure it is not leaking

7.A.12 If repair is not leaking turn off PIPS and remove other bag stop and remove bypass pipe

7.A.13 Restore normal pumping through PIPS – See Tab 9



ALTERNATIVE A - BYPASS SPECIFIC SECTION OF THE PIPS FORCE MAIN, REQUIRES STANDPIPES IN FOUR FORCE MAIN MANHOLES

BAG STOPS:	2
PUMPING:	PIPS
BYPASS PIPE:	DOUBLE 10" OR 12", 6,000 LF LENGTH
STANDPIPE MANHOLES:	4
SET UP TIME:	3 TO 4 WEEKS

PIPS FORCE MAIN BYPASS
ALTERNATIVE A
TYPICAL INSTALLATION

7.B Alternative B – Bypass the westerly half of the PIPS force main between the PIPS and Cader Lane or between PIPS and Manhole X09000

7.B.1 Alternative B requires installation of a bag stop at the force main manhole at Cader Lane, positioning of portable pumps to pump from manholes on the gravity sewer east of Highway 101 through an above ground bypass pipeline to force main Manhole X 09000 – see attached maps for alternative routes for the temporary pipeline.

7.B.2 Check force main manholes to confirm that standpipes are available. If there are no standpipes it will be necessary to modify the manholes as shown on the attached sketch to allow installation of bag stops and bypass pipe.

7.B.3 Mobilize bag stop contractor – see list in Appendix A

7.B.4 Measure length of bypass pipe necessary. Use two parallel 12" diameter portable pipes or a single 18" diameter portable pipe. See Appendix A for list of rental companies for pipe and road ramps.

7.B.5 Layout the aboveground bypass pipe(s) on the selected route together – see attached map for Alternatives B-1, B-2 or B-3. Install signs, barricades, road ramps and stiles over walking paths as necessary.

7.B.6 Order two engine driven portable pumps each with a 3,000 gpm capacity. Position pumps at manhole A06000 on the gravity sewer. If the pumps are near residential units order extra quiet pumps. Connect pump discharges to the bypass pipe

7.B.7 Turn off PIPS and connect bypass pipe to the standpipe at either force main Manhole X09000.

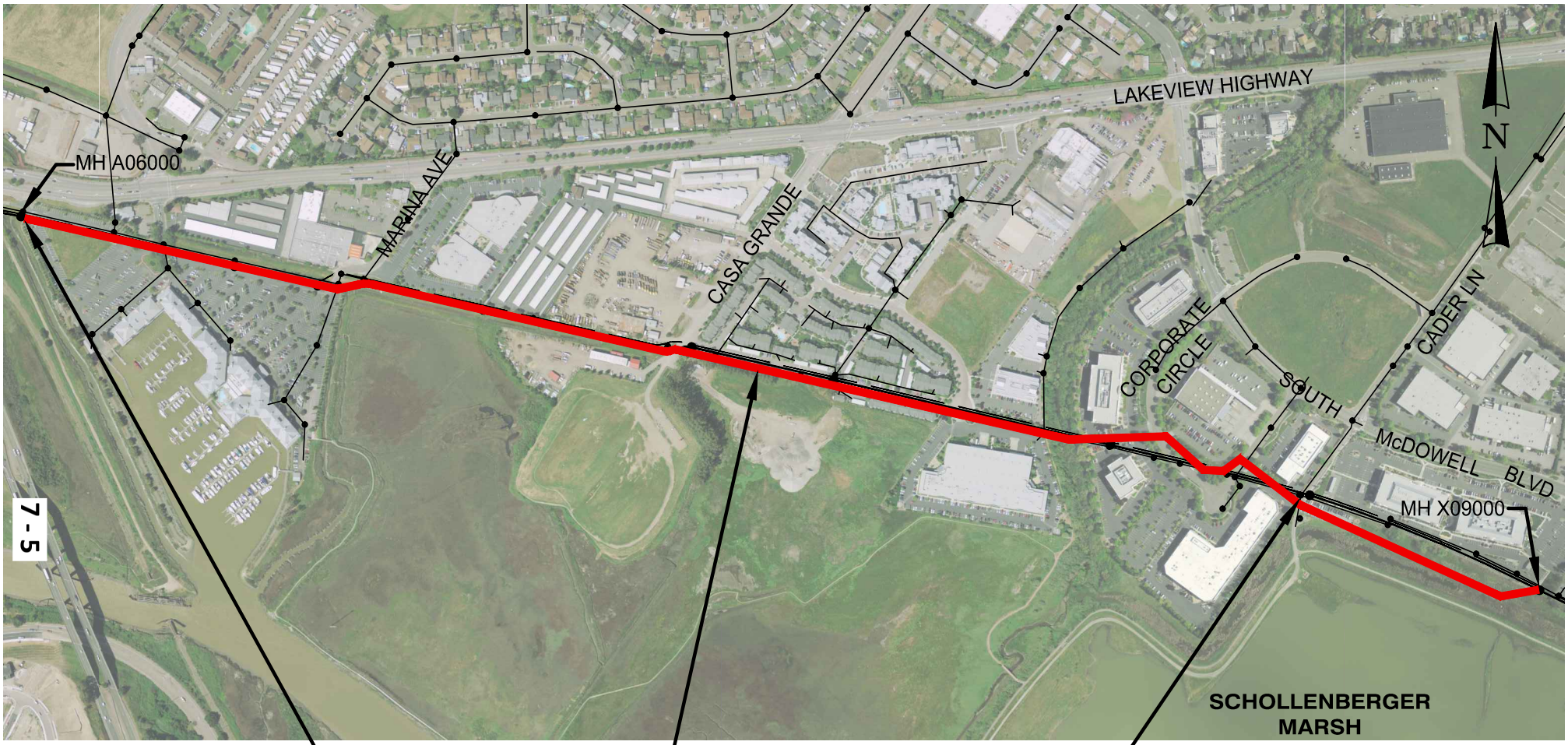
7.B.8 Turn off PIPS and install bag stop at the force main manhole at Cader Lane or Manhole X09000. Monitor water level in upstream sewers. Add additional portable pumps as necessary to maintain water level below overflow point.

7.B.9 Make repair – see Tab 8

7.B.10 Prior to backfilling repair turn PIPS back on and observe repair to make sure it is not leaking

7.B.11 If repair is not leaking turn off PIPS and remove bag stop and disconnect bypass pipe form manhole standpipe

7.B.12 Restore normal pumping through PIPS – see Tab 9



ALTERNATIVE B-1 - BYPASS THE WESTERLY HALF OF THE PIPS FORCE MAIN BETWEEN THE PIPS AND CADER LANE OR BETWEEN THE PIPS AND MANHOLE X09000. ROUTE BYPASS PIPES THROUGH CORPORATE CIRCLE. PLACE PORTABLE PUMPS AT MANHOLE A 06000.

BAG STOPS:	1
PUMPING:	2 PORTABLE PUMPS
BYPASS PIPE:	DOUBLE 12", 10,000 LF LENGTH
STANDPIPE MANHOLES:	2
SET UP TIME:	3 TO 4 WEEKS

PIPS FORCE MAIN BYPASS
ALTERNATIVE B-1

7 - 6

ALTERNATIVE B-2 - BYPASS THE WESTERLY HALF OF THE PIPS FORCE MAIN BETWEEN THE PIPS AND CADER LANE OR BETWEEN THE PIPS AND MANHOLE X09000. ROUTE BYPASS PIPES ALONG ADOBE CREEK AND SCHOLLENBERGER MARSH. PLACE PORTABLE PUMPS AT MANHOLE A06000.

BAG STOPS:	1
PUMPING:	2 PORTABLE PUMPS
BYPASS PIPE:	DOUBLE 12", 11,600 LF LENGTH
STANDPIPE MANHOLES:	2
SET UP TIME:	3 TO 4 WEEKS

PIPS FORCE MAIN BYPASS
ALTERNATIVE B-2

7 - 7

ALTERNATIVE B-3 - BYPASS THE WESTERLY HALF OF THE PIPS FORCE MAIN BETWEEN THE PIPS AND CADER LANE OR BETWEEN THE PIPS AND MANHOLE X09000. ROUTE BYPASS PIPES THROUGH SCHOLLENBERGER MARSH. PLACE PORTABLE PUMPS AT MANHOLE A06000.

BAG STOPS:	1
PUMPING:	2 PORTABLE PUMPS
BYPASS PIPE:	DOUBLE 12", 11,200 LF LENGTH
STANDPIPE MANHOLES:	2
SET UP TIME:	3 TO 4 WEEKS

PIPS FORCE MAIN BYPASS
ALTERNATIVE B-3

7.C Alternative C – Bypass the easterly half of the PIPS force main between Cader Lane or Manhole X09000 and the Ellis Creek Water Recycling Facility

7.C.1 Alternative C requires installation of a bag stop at the force main manhole at Cader Lane or at Manhole X09000, and installation of an aboveground bypass pipeline from force main Manhole X 09000 or Manhole X10000 to the Ellis Creek Water Recycling Facility. PIPS will provide the bypass pumping – see attached map

7.C.2 Check force main manholes to confirm that standpipes are available. If there are no standpipes it will be necessary to modify the manhole as shown on the attached sketch to allow installation of bag stops and bypass pipe.

7.C.3 Mobilize bag stop contractor – see list in Appendix A

7.C.4 Measure length of bypass pipe necessary. Use two parallel 12" diameter portable pipes or a single 18" diameter portable pipe. See Appendix A for list of pipe rental companies

7.C.5 Layout and connect together the aboveground bypass pipe(s) on the selected route – see attached map for Alternative C. Install signs, barricades, road ramps and stiles over walking paths as necessary.

7.C.6 Turn off PIPS and connect bypass pipe to the standpipe at either force main Manhole X08000 at Cader Lane or Manhole X09000. Position discharge end of bypass pipe to discharge into aerated lagoon.

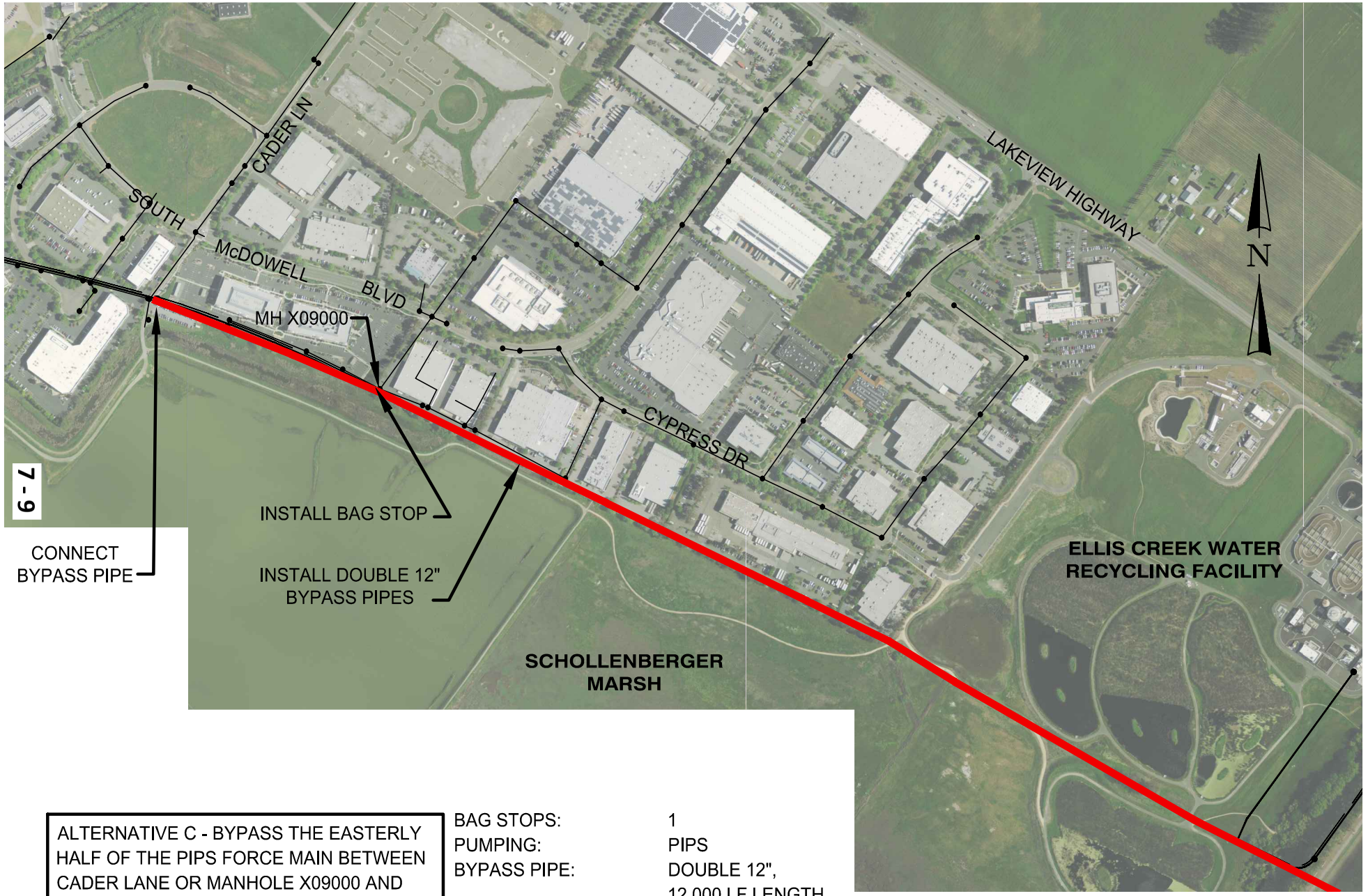
7.C.7 Turn off PIPS and install bag stop at the force main Manhole X09000 or X10000

7.C.8 Turn PIPS back on and pump through bypass pipe. Make repair – see Tab 8

7.C.9 Prior to backfilling repair remove bag stop and turn PIPS back on and observe repair to make sure it is not leaking

7.C.10 If repair is not leaking turn off PIPS disconnect bypass pipe form manhole standpipe

7.C.11 Restore normal pumping through PIPS – see Tab 9



ALTERNATIVE C - BYPASS THE EASTERLY HALF OF THE PIPS FORCE MAIN BETWEEN CADER LANE OR MANHOLE X09000 AND THE ELLIS CREEK WATER RECYCLING FACILITY.

BAG STOPS:	1
PUMPING:	PIPS
BYPASS PIPE:	DOUBLE 12", 12,000 LF LENGTH
STANDPIPE MANHOLES:	2
SET UP TIME:	3 TO 4 WEEKS

PIPS FORCE MAIN BYPASS
ALTERNATIVE C

7.D Alternative D – Bypass entire PIPS force main between the PIPS and the Ellis Creek Water Recycling Facility

7.D.1 Alternative D requires the positioning of portable pumps to pump from manholes on the gravity sewer east of Highway 101 through an above ground bypass pipeline all the way to the Ellis Creek Water Recycling Facility. Once the bypass pipe is installed it will allow repair anywhere along the PIPS force main from PIPS to the valve at the Ellis Creek Water Recycling Facility.

7.D.2 See attached map for location of bypass pipe

7.D.3 Measure length of bypass pipe necessary. Use two parallel 12" diameter portable pipes or a single 18" diameter portable pipe – see Table 7-1 for estimated pipeline lengths

7.D.4 Order rental bypass pipes – see Appendix A for list of pipe rental companies

7.D.5 Layout the aboveground bypass pipe(s) on the selected route together – see attached map for Alternative D. Install signs, barricades, road ramps and stiles over walking paths as necessary.

7.D.6 Order two engine driven portable pumps each with a 3,000 gpm capacity. Position pumps at manhole A06000 on the gravity sewer. If the pumps are near residential units order extra quiet pumps.

7.D.7 Connect pump discharges to the bypass pipe. Position discharge end of the bypass pipe to discharge into aerated lagoon.

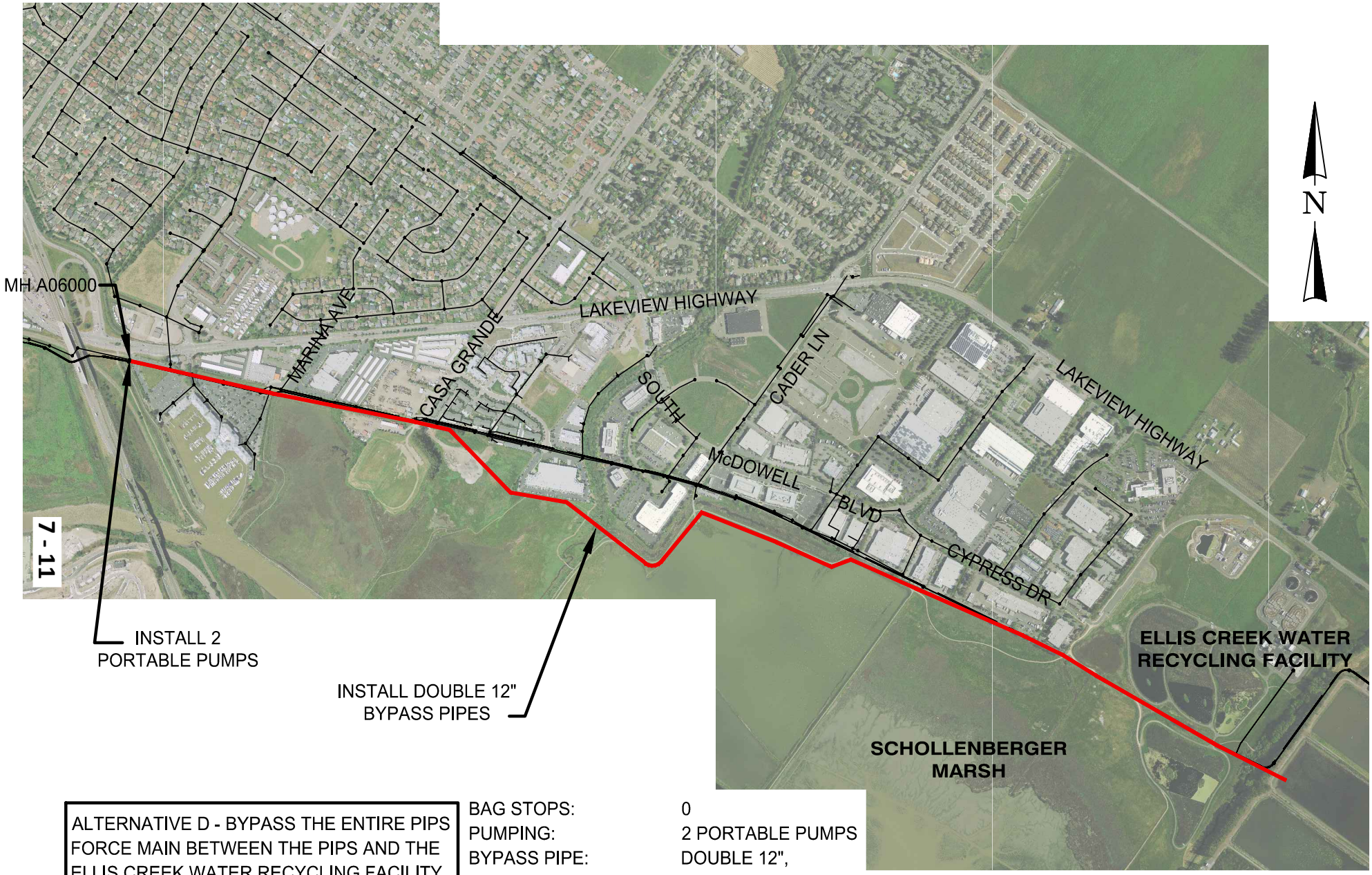
7.D.8 Turn off PIPS. Monitor water level in upstream sewers. Add additional portable pumps as necessary to maintain water level below overflow point.

7.D.9 Make repair – see Tab 8

7.D.10 Prior to backfilling repair turn PIPS back on and observe repair to make sure it is not leaking

7.D.11 Restore normal pumping through PIPS – see Tab 9

7.D.12 Return portable pumps, disassemble portable bypass pipe and return to rental company



ALTERNATIVE D - BYPASS THE ENTIRE PIPS FORCE MAIN BETWEEN THE PIPS AND THE ELLIS CREEK WATER RECYCLING FACILITY. PLACE PORTABLE PUMPS AT MANHOLE A06000.

BAG STOPS:	0
PUMPING:	2 PORTABLE PUMPS
BYPASS PIPE:	DOUBLE 12", 21,000 LF LENGTH
STANDPIPE MANHOLES:	0
SET UP TIME:	7 DAYS

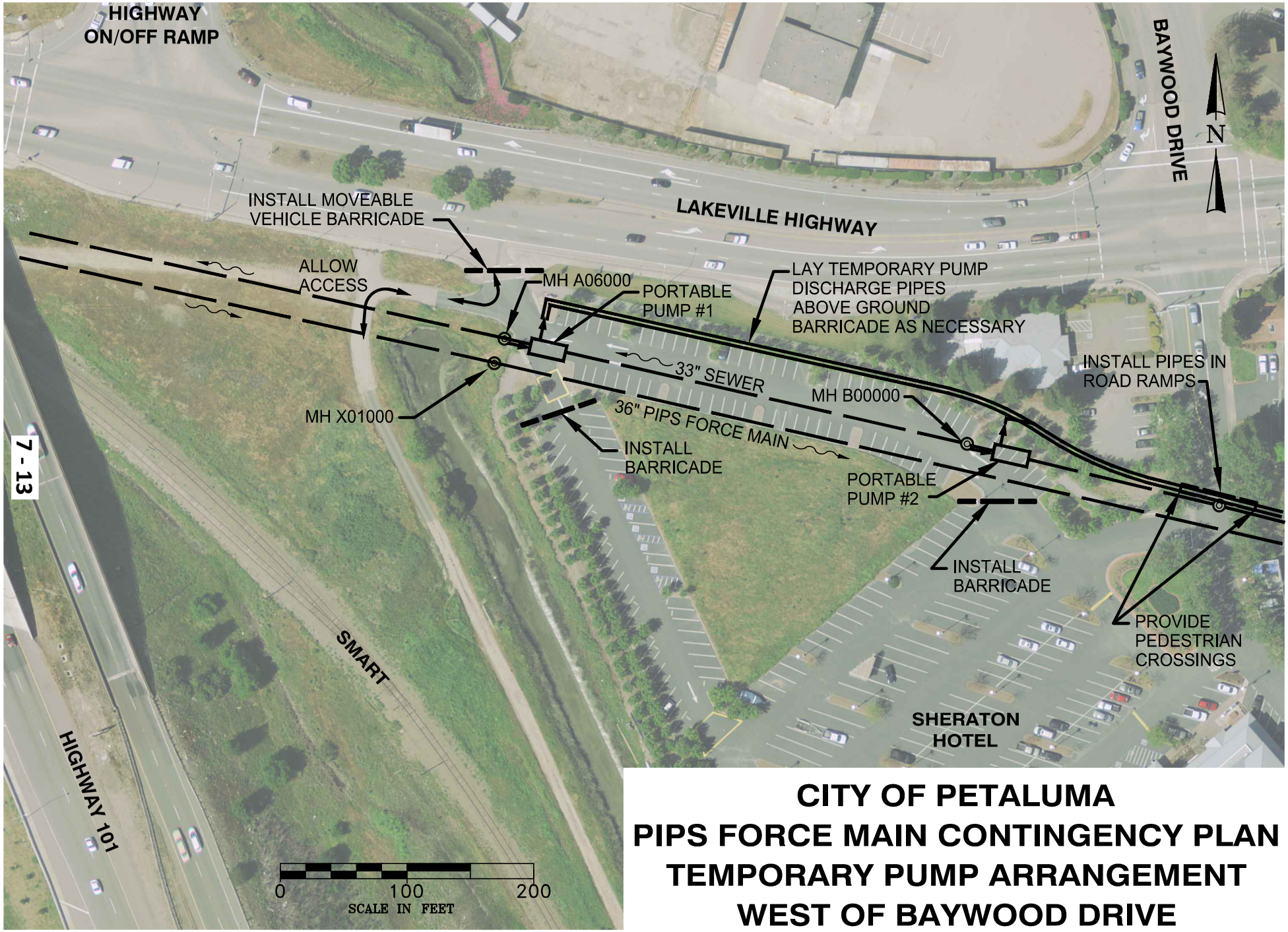
PIPS FORCE MAIN BYPASS
ALTERNATIVE D

7.E Temporary pump arrangement west of Baywood Drive at the Marina Business Center/Sheraton Hotel parking lot

7.E.1 Notify businesses regarding the need to close off some parking and to set up temporary pumps and piping. Contacts include:

Marina Business Center – Administration - 707-778-1900
Harbor Master – 707-778-4489
Sheraton Hotel – 707-283-2888

7.E.2 Post signs notifying the public of parking lot closure - see NOTICE (Tab 3)



CITY OF PETALUMA
PIPS FORCE MAIN CONTINGENCY PLAN
TEMPORARY PUMP ARRANGEMENT
WEST OF BAYWOOD DRIVE

7.F Temporary Road Ramps – see attached

7.F.1 Provide barricades and install temporary road ramps and pedestrian crossings over the discharge pipes – see contact information in Appendix A.

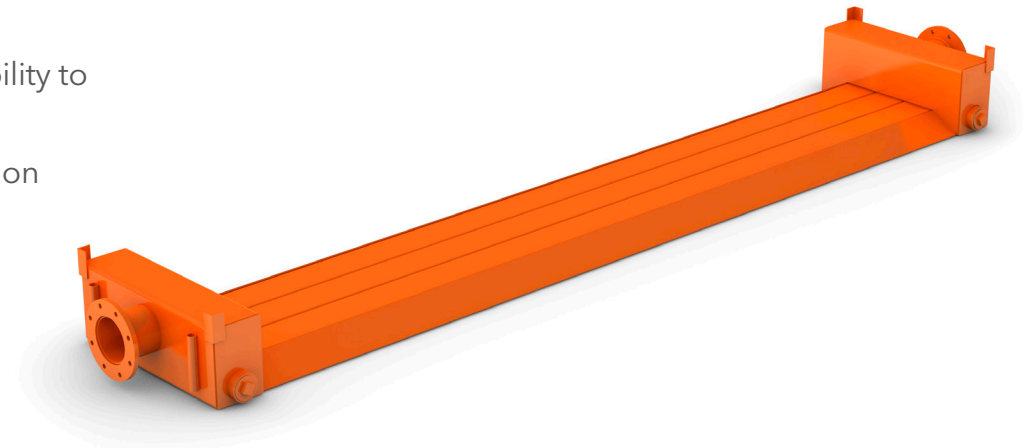
Godwin Temporary Road Ramps

For use with 4-, 6-, 8-, 12-, 18- and 24-inch pipelines, Godwin road ramps provide a temporary crossing for low-traffic industrial, mining, commercial and residential areas where providing vehicular access over a pipeline is required.

Providing everything from pumps, valves and hoses to light towers, generators and road ramps, we can completely outfit your temporary and long-term project site needs.

Features

- Sturdy structural steel construction
- Passable vehicle width of 12 feet (15 feet for 24-inch model)
- Low profile for easy crossing
- Capable of passing solids and fitted with 150 lb. flanged inlet and outlet connections
- Drain valve provides capability to drain ramp after use
- Sturdy, stackable construction enables easy storage

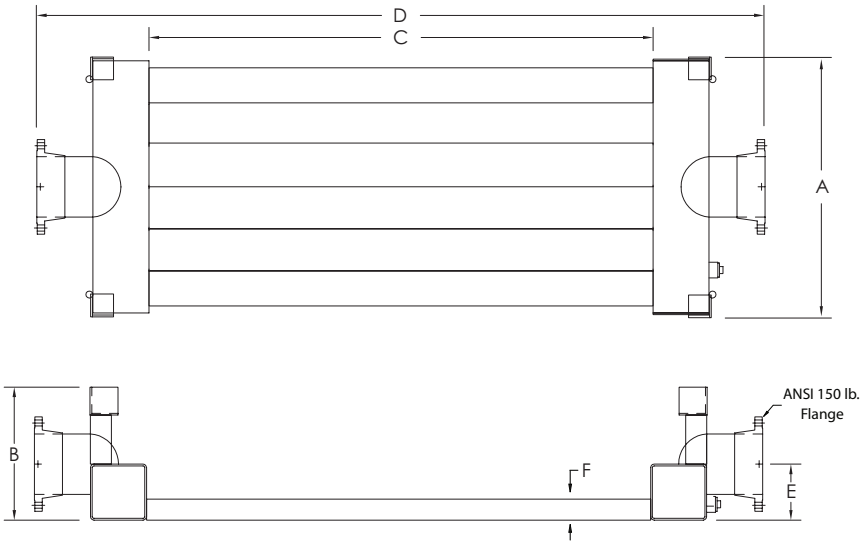


godwin
a xylem brand

Applications

Godwin road ramps are designed to provide easy crossing of a pipeline in low-traffic areas and can be used in a series to re-route traffic patterns.

Drawing



Specifications

Size	A	B	C	D	E	F	Max. Capacity (GPM)	Solids Passing	Approx. Weight (lbs.)	Est. Equiv. Length	Pressure Rating (psi)
4"	24 3/4"	14 1/2"	144"	166"	6 1/8"	3"	500	2 1/2"	650	60'	100
6"	30 3/4"	15 1/2"	144"	172"	6 1/8"	3"	1,000	2 1/2"	850	90'	75
8"	36 1/2"	19"	144"	176"	8"	3"	2,000	2 1/2"	1,900	120'	50
12"	61"	24"	144"	180 1/2"	10 1/2"	3"	4,000	2 1/2"	2,300	180'	50
18"	95"	30 1/4"	144"	188 1/2"	13 5/8"	4"	7,000	3 1/2"	5,000	270'	25
24"	98"	36"	180"	233"	18"	6"	12,000	3 1/2"	7,000	360'	25

- Maximum load capacity of 21,600 pounds per axle
- Maximum crossing speed is 5 MPH
- Custom configurations are available upon request

xylem
Let's Solve Water

Dewatering Solutions
84 Floodgate Road
Bridgeport, NJ 08014
Tel +1.856.467.3636
www.godwinpumps.com

www.godwinpumps.com

TAB 8 – LEAK REPAIR PROCEDURES

8.1 The PIPS force main is nominal 36" diameter with cement lining and coating. The outside diameter of the concrete coating is approximately 39.5". If the coating is removed down to the steel the outside diameter of the steel cylinder should be 37.5".

8.2 The pipe depth varies from 5' to 12' deep. Consult the attached profile and the project plans. The project plans were prepared prior to development so the ground line may be incorrect.

8.3 Check City inventory and locate repair materials. See attached list of available repair materials.

8.4 **Full Circle Clamp Repair** – The full circle clamp must be sized to either fit the outside diameter of the force man or if the concrete pipe coating is removed the full circle clamp must fit the steel cylinder (see diameters in 8.1 above). Full circle clamps are manufactured specific to the OD of the pipe being repaired with very little play. A full circle clamp sized for the OD of the PIPS force main should be in stock (check City inventory).

If the proper sized full circle clamp is not available contact:
Romac Industries Inc.: (209) 601-1087
Smith Blair: (800) 643-9705, emergency: (903) 277-9398

8.5 **Carbon Fiber Wrap** – Carbon fiber wrap systems are available which may be easier to use than a full circle clamp. Companies which provide carbon fiber wrap systems are:

Team Industrial Services
Trans Wrap™ - Carbon Fiber Pipeline Repair System: (800) 328-0090

The pipe must be not leaking and the surface must be clean and dry. Follow the manufacturer's instructions.

8.6 **Weld Repair** – Where indicated it may be possible to repair the pipe by welding a joint or a patch. The steel cylinder is thin so the welding must be done by a very experienced welder.

8.7 **Repair completion**

8.7.1 Check visually for any leakage with one of the PIPS pumps
8.7.2 Fix any leaks: Tighten bolts on full circle clamp. Fix weld as necessary.
8.7.3 Prior to backfilling put PIPS back into service – Tab 9

8.7.4 Before recoating repair install cathodic test station – see details

8.7.5 Full circle clamp - Wrap entire full circle clamp including all bolts and exposed 8.7.2 metal with two layers of 35 mil polyethylene tape

8.7.6 Weld repair - Repair coating over weld repair with concrete.

8.7.7 Backfill pipe, pull shoring, repave and restore ground surface

8.7.8 Remove barricades and cleanup all work sites

TAB 9 – RESTORE NORMAL PUMPING THRU PIPS FORCE MAIN

9.1 Confirm that repair is complete and watertight – See 8.7.1.

9.2 Start the smallest pump and check for any anomalies.

9.3 If no anomalies return PIPS to regular pump program.

9.4 Check air release valves along PIPS force main to make sure trapped air is vented from the high points.

9.5 Pump sewage stored in emergency storage basins back to the PIPS wet well.

9.6 Inspect emergency storage basins for residual solids that could cause odors. Clean out storage basins as necessary.

APPENDIX A

RESOURCES AND CONTACTS

City Personnel Emergency Contacts

Emergency Contractors

Pumper Trucks

Trash Pump Rental

Pipe Rental

Pipe Purchase

Bag Stop Insertion

Road Ramp

CITY PERSONNEL EMERGENCY CONTACTS

City of Petaluma publicworks@ci.petaluma.ca.us

Matt Pierce
202 N. McDowell Blvd
Petaluma, CA 94954
Phone: (707) 776-3726
Fax: (707) 778-4508

Patrick Dirrane
202 N. McDowell Blvd
Petaluma, CA 94954
Phone: (707) 778-4561
Fax: (707) 778-4508

EMERGENCY CONTRACTOR

Maggiora & Ghillotti http://maggiora-ghilotti.com/

Mark Greving
555 Dubois Street
San Rafael, CA 94901
Phone: (415) 459-8640
Fax: (415) 459-2065

Michael Paul Co.

1200 Casa Grande Road
Petaluma, CA 94954
Phone: (707) 769-1006
Fax: (707) 769-0650

Goebel Mechanical aka Global Paving, Grading and Underground

Greg Goebel
227 Howard St.
Petaluma, CA 94952
Phone: (707) 763-0888
Cell: (707) 974-1237

Team Ghilotti

2531 Petaluma Blvd South
Petaluma, CA 94952
Phone: (707) 763-8700

PUMPER TRUCK

Roy's Sewer Service 577 Portal Street Cotati, CA 94931 Phone: (415) 892-5480	**Team Ghilotti** 2531 Petaluma Blvd South Petaluma, CA 94952 Phone: (707) 763-8700
Fremouw Environmental Services 6940 Tremont Road Dixon, CA 95620 Phone: (800) 559-3274 Brittan Thomas Direct: N/A E.R. Mobile: (530) 723-8466 bthomas@hazwasteremoval.com	 Marty Mosley Direct: N/A Mobile: (209) 602-6976 mmosley@hazwasteremoval.com
Industrial Carting Curtis Michelini P.O. Box 2638 Rohnert Park, Ca 94927 Cell: (707) 396-0473 Home: (707) 528-2171	

TRASH PUMP RENTAL

Pac Machine Company http://www.pacmachine.com 5326 Gateway Plaza Drive Benicia, CA 94510 USA Phone: (707) 746-4940	
Rain for Rent (800) 742 7246 info@rainforrent.com 5301 Live Oak Avenue Oakley, CA 94561 Phone: (925) 679-2803 Fax: (925) 679-2839	 390 West Kentucky Woodland, CA 95695 Phone: (530) 662-1024

TRASH PUMP RENTAL (continued)

Hertz Equipment Rental http://www.hertzequip.com

Hertz Equipment Rental (Store 9741)

5500 Commerce Boulevard
Rohnert Park, CA 94928
Phone: (707) 586-4444
Fax: (707) 586-4417

Hertz Equipment Rental (Store 9745)

2400 San Pablo Dam Road
San Pablo, CA 94806
Phone: (510) 307-4444
Fax: (510) 232-2256

Hertz Equipment Rental (Store 9740)

5750 Paradise Drive
Corte Madera, CA 94925
Phone: (415) 924-4444
Fax: (415) 924-5946

Hertz Equipment Rental (Store 9748)

5251 Industrial Way
Benicia, CA 94510
Phone: (707) 747-4444
Fax: (707) 747-4460

PIPE RENTAL

Rain for Rent (800) 742 7246 info@rainforrent.com

5301 Live Oak Avenue
Oakley, CA 94561
Phone: (925) 679-2803
Fax: (925) 679-2839

390 West Kentucky
Woodland, CA 95695
Phone: (530) 662-1024

Pac Machine Company http://www.pacmachine.com

5326 Gateway Plaza Drive
Benicia, CA 94510 USA
Phone: (707) 746-4940

PIPE PURCHASE

HDPE pipe can be purchased from P&F Distributors

P&F Distributors http://www.pfdistributors.com/

511 Tunnel Ave
Brisbane, CA 94005
Phone: (415) 467-4630
Fax: (415) 467-1010

BAG STOP INSERTION

Team Industrial Services www.teamindustrialservices.com

4650 E. Second Street, Suite E
Benicia, CA 94510
Phone: (707) 751-5850

ROAD RAMP

Pac Machine Company http://www.pacmachine.com

5326 Gateway Plaza Drive
Benicia, CA 94510 USA
Phone: (707) 746-4940

Rain for Rent (800) 742 7246 info@rainforrent.com

5301 Live Oak Avenue
Oakley, CA 94561
Phone: (925) 679-2803
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APPENDIX B

TECHNICAL MEMORANDUM

November 3, 2014

November 3, 2014

TECHNICAL MEMORANDUM (Updated 11/3/14)

CITY OF PETALUMA
PIPS FORCE MAIN CONTINGENCY PLAN
BYPASS ALTERNATIVES

Prepared by: Mark Wilson, David Stier and Ed Nute

As a part of the Contingency Plan for the plant influent pump station (PIPS) force main it will be necessary to identify one or more methods to bypass around the section of pipe which has developed a leak and needs to be repaired. It is assumed that in order to repair a leak the PIPS will need to be turned off and the force main will need to be shut down and dewatered.

If the leak is small and can be temporarily contained at the site it might be possible to make the necessary excavation and install shoring during the day and then schedule the actual repair at night during low flows when the PIPS can be turned off. Additional time can be provided by setting up pumps and storing flows in the existing structures at the Hopper plant and/or by utilizing pumper trucks.

However, if the repair is going to take more time and it becomes necessary to make a longer shut down of the force main a formal bypass arrangement will need to be installed. This could take time depending on the availability of the necessary pipe and equipment.

The purpose of this Technical Memorandum is to outline alternatives for setting up a pipeline bypass around the various sections of the force main. The bypass alternatives were analyzed for dry weather flows. During wet weather additional pumps and bypass pipes will be necessary.

BYPASS REQUIREMENTS

In order to accommodate the PIPS average dry weather flow the bypass pipe will need to be either an 18” diameter pipe or two parallel 12” diameter pipes. The present ADWF is around 4.5 mgd and will require a peak pumping capacity of around 4,400 gpm. A single 12” bypass pipe would produce a velocity of around 12 feet per second (fps), which is well above the recommended force main velocity. However, if two parallel 12” pipes are used the velocity for half the flow will be around 6 fps. Two parallel 10” pipes could only be used if the distances are short.

Where the pipe(s) must cross a travelled way a temporary road ramp will need to be rented to allow vehicle access. If the pipe crosses a walking path a wooden stile can be constructed. The bypass pipe would be aboveground so appropriate signs, barricades and possible security guards will be necessary.

During wet weather it will be necessary to install additional bypass pipes and additional portable pumps, which will require pipe manifolds and possibly multiple reentry points into the downstream PIPS force main.

ALTERNATIVE BYPASS METHODS

The following are possible alternatives bypass methods for the PIPS force main. A summary of the alternative bypass pipe routes is given in Table 1 and shown on the attached figures.

Alternative A – Install bypass around a single section of force main to be repaired. In this alternative the repair section will need to be isolated by installing a temporary plugs such as bag stops in the manholes on either side of the leak together with a bypass pipe running between the two manholes upstream and downstream of the bag stops. The distance between manholes varies but near the south end of the PIPS force main the manholes are further apart and the distance could be over 3,000 feet. This bypass alternative will require installation of standpipes on the 20" diameter outlets in at least four force main manholes to allow installation of the bag stops and the bypass pipe connections on either side. Portable pumps are not necessary since the PIPS would pump through the bypass pipe.

Without knowing which section of force main will need to be repaired it will not be possible to know which manholes to reconstruct with the 20" standpipe. This means that in order to anticipate a repair anywhere along the force main virtually all 12 manholes will need to be reconstructed with a standpipe. It would be very difficult to extend the 20" standpipes during emergency conditions unless the leak is minor and can be contained during the standpipe installation. If the repair location is in the vicinity of Corporate Circle the route of the bypass pipe would take it through some busy parking areas which will be very disruptive to the public. In this section Alternative B-2 or B-3 would be a better choice.

Alternative B (Repair in westerly half of force main) – Pump from manholes on the existing gravity sewer paralleling the PIPS force main around a westerly repair section. For this bypass portable pumps will be placed with their suction pipes in manhole A06000 east of Highway 101 and the SMART tracks. In order to work the gravity sewer will need to flow backwards from the PIPS to the suctions of the portable pumps. A 12" pump can pump around 4,000 gpm to 5,000 gpm. At least two pumps will be necessary to provide reliability and redundancy.

The water level in the manhole will need to be kept low enough to prevent any sewage backups in the upstream sewer system. Elevations have been taken and have identified low manholes on East Court in the vicinity of Maselli's hardware.

A bag stop would need to be installed at Cader Lane and the bypass pipe would need to discharge into the one of the downstream manhole on the PIPS force main behind the buildings at 2100 and 2080 South McDowell Blvd. These manholes would need to be modified to allow installation of the bag stop and connection to the bypass pipe. This will allow a repair to be made in the westerly half of the force main.

From this location there are three possible routes for the bypass pipe which would divert the flow to Cader Lane. In Alternative B-1 the buildings and parking areas along Corporate Circle make it difficult to route a pipeline through this area. The least obstructed pipeline route will be around the west side of the buildings along the edge of the marsh and on private property up to the existing easements north of Casa Grande Road. Three bypass pipe routing alternatives are shown on the following attached figures.

Alternative B-1 – Bypass pipe through Corporate Circle – Distance = 6,500 feet

Alternative B-2 – Bypass pipe through Adobe Creek and Shollenberger Marsh – Distance = 7,300 feet

Alternative B-3 – Bypass pipe around all buildings and through the Schollenberger Marsh – distance = 7,100 feet

The number of temporary road crossing ramps will depend on the route selected.

Alternative C (Repair in the eastern half of the force main) – Bypass around east end of PIPS force main. If a repair must be made in the east end of the PIPS force main, i.e. in the section east of Cader Lane, a bypass pipe could be installed from Cader Lane to discharge to the nearest aeration pond at the Ellis Creek Water Recycling Facility. The same manholes at Cader Lane and behind 2100 and 2080 South McDowell could be used for this bypass arrangement. Portable pumps would not be necessary since the PIPS would be pumping through the bypass pipes.

The distance is 6,000 feet and the manhole at Cader Lane would need to be modified with a standpipe to allow connection of the bypass pipe. The standpipe could be designed with a side outlet crossing Cader Lane to avoid the need for a temporary road ramp.

If a leak occurs in the section of force main between Cader Lane and the first manhole to the east the temporary bypass pipe will need to connect to a standpipe in the next manhole to the east. This means that at least three manholes will need to be modified in this area.

Alternative D – Bypass entire PIPS force main using portable pumps – With a long enough bypass pipe the portable pumps described in Alternative B could be used to pump all the way to the nearest aeration pond at the Ellis Creek plant. The distance would be around 12,000 feet. This would allow the access to the entire length of the PIPS force main to make repairs.

Alternative E – Bypass entire PIPS force main using PIPS to pump the flow – As described below it will take a matter of one or two weeks to set up bag stops. In order to expedite installation of a bypass the bypass pipe could be connected directly to the discharge pipe at PIPS and the aboveground bypass pipe could be strung out as far as the nearest aeration pond at the Ellis Creek plant. This alternative will require that the bypass pipes cross the Caltrans right of way and be threaded through an empty casing under the SMART tracks, if it is in place. The total distance is around 13,300 feet, which if double 12" pipes are used totals 26,600 feet of pipe. In order to implement Alternative E emergency connections in PIPS or on the PIPS force main need to be available for the bypass pipe.

MEANS AND METHODS

Table 1 lists the length of bypass pipe, number of bypass pumps and other equipment and materials necessary for the alternative bypass arrangements described above. Also shown in Table 1 are the required pumping heads for the various bypass pipe sizes.

Table 2 provides estimates of the costs of advance construction on the force main to facilitate setting up the bypass. Also included in Table 2 are estimates of the cost of setting up the bypass assuming a one week rental of the equipment and materials and the time involved. The various elements necessary for installing a bypass are discussed below.

Bypassing PIPS by Pumping from the Parallel Gravity Sewer - Alternatives B and D involve using portable pumps to pump from one or more manholes along the gravity sewer which runs parallel to the PIPS force main east of Highway 101 and the SMART tracks. The best manhole for the portable pump suctions is manhole A06000 located next to the ditch just east of the Highway 101 right of way. This manhole is very deep and will need to surcharge so the pump suctions can cause the gravity sewer to flow backwards from the PIPS. The manhole at Baywood Drive and those further to the east are not as deep and the necessary surcharge level might cause sewage to overflow somewhere in the system.

The pumps will need to keep water level in the gravity sewers low enough to prevent sewage overflows or backups in the upstream sewer system. Elevations have been taken and have identified low manhole rims on East Court in the vicinity of Maselli's hardware. There may be other low manholes in the system which will need to be monitored while the temporary pumping is taking place. Reliance on portable pumps on the gravity sewer is not as safe as using PIPS for the bypass pumping as described in Alternative E.

Rental of Portable Pumps – Portable pumps which are rented for the force main bypass should be engine driven, self-priming and have a capacity of at least 4,000 gpm. Two pumps should be rented in order to provide the necessary reliability and redundancy. The necessary suction and discharge hosing and connections will also need to be rented. If the pumps must be positioned near residential development the quiet models should be provided.

Prior to renting the pumps the discharge head pressure will need to be checked. If small bypass pipes are used the pumps will need a high discharge head. Use of double 10" bypass pipes creates very high pumping heads as shown in Table 1.

Stopping the Flow – Unless the entire force main is bypassed as described in Alternatives D and E it will be necessary to stop the flow somewhere along the force main while the repair is being made. Stopping the flow somewhere in the middle of the force main will reduce the length of bypass pipe needed. The PIPS force main does not have any in-line valves to allow isolation of individual sections. The only way to stop the flow will be to insert a bag stop, line stop or cut in a permanent valve as described below.

- **Bag Stops** – Team Industries Inc. of Benicia can provide bag stops for 36" diameter pipes, which can be inserted through a 20" standpipe. It will take 3 – 4 days (routine) to secure the necessary

installation equipment or 24 to 48 hours (expedited) and one long day to install the bag stop and one day to remove it. This assumes that the bag is already acquired and ready to go. Otherwise it will take 2-3 weeks (routine) is to fabricate the bag or 7-10 days on an expedited basis, There will be additional charges to expedite the installation and/or fabrication of the bag on a priority basis.

The cost of a bag stop installation including the cost of the bag stop is around $35,000. The bag stop is generally a one use installation because it can be damaged during extraction. If the City were to pre-purchase one or more bag stops there would be no fabrication time and the emergency installation time to stop the flow would be greatly reduced. The cost of a bag stop if it were pre-purchased by the City is $18,200.

- **Line Stops** – A line stop is a mechanical device that is inserted through a flange on the pipeline that will stop the flow. A minimum flange diameter of 24" is necessary for installation of a 36" diameter line stop. According to Team Industries there is limited availability of 36" line stops and one might not be readily available if needed in an emergency.

  In order to install a line stop an 8' x 8' pit will need to be dug and shored and a 24" hot tap will need to be made into the force main. The installation cost of the hot tap and line stop for a 36" pipeline is around $60,000 plus the cost of excavation and shoring. Once the line stop is removed the shoring will need to be removed and the ground surface restored. The total cost of a single line stop installation could be over $100,000.

- **Permanent Valve and Standpipe Assembly** – Installation of a permanent valve and standpipe assembly somewhere in the middle of the force main would eliminate the need for insertion of a bag stop or line stop and would provide rapid isolation of a section of the pipe. If one valve assembly is inserted it should be located near Cader Lane, which would divide the force main into two long segments. Two valve assemblies to divide the force main into three segments would be better and allow use of shorter lengths of bypass pipe. The second valve assembly could be inserted somewhere between Marina Ave and Casa Grande Road.

  At the present time the only way to insert a valve in the force main is to excavate and shore a pit and then cut out a section of pipe and replace it with a section with a valve. On a 36" diameter line this represents a substantial construction project which could require more than a 12 hour shut down of the flow assuming all goes well. The estimated cost of each permanent valve installation is over $120,000 without a concrete vault. If a vault is necessary the costs would be considerable higher. It is recommended that the valve assembly include 24" tees on each side to act as standpipes for connection of the bypass pipe. Otherwise two standpipe manholes would need to be constructed on either side of the valve to allow connections of the bypass pipes.

Rental of Bypass Pipe – Portable pipe is used in agriculture and for emergency situations and can be rented from several companies. The most common sizes are 10" and 12" diameter. The lengths of 10" and 12" diameter pipe sections will vary from 10' to 40'. Individual sections can be connected using Bauer quick couplers or Victaulic couplings. Plastic Yelomine pipe might also be available. Where large quantities of pipe are needed the rental company will need to source pipe from their subsidiary companies.

Alternative A will require the bypass pipe to cover a distance of up to 3,000 feet. Alternative E requires a bypass pipe to cover a distance of 13,200 feet. Two parallel 12" pipes will be necessary for the dry weather flow. As discussed below 10" and 12" irrigation type pipe is readily available and easy to install.

- 10" pipe is available in 40' long lengths with Victaulic couplings. 12" pipe comes in 10' long lengths and is connected with a Bauer type couplings. The short lengths of these pipe sections are light and can be connected together relatively quickly, depending on the amount of labor applied to the job. The irrigation industry uses a lot of both 10" and 12" pipe so it should be readily available.

- 18" pipe is available as HDPE pipe which comes in 50' lengths, each of which will weigh over 1,200 pounds. Connection of pipe sections together requires equipment to move and drag the pipe and one or more fusing machines. It takes about 40 minutes to fuse together two joints on an 18" diameter HDPE pipe. Thus it will take 67 hours to fuse together a 5,000 foot long length of HDPE pipe, which is more than eight - 8 hour days. Rental of several fusing machines would speed up the fusing process.

- A thin wall roll out pipe is used in the irrigation industry. This pipe is light weight and available in 12" and 18" diameter and comes in 670' or 1320' long lengths. The wall thicknesses can be up to 15 mils. However, the pipe is only good for about 6' of pressure, which will make it unsuitable for this application. Furthermore, use of this very thin wall pipe may be suitable for plowed fields but could be very risky in an urban environment. The ground must be smooth without projecting rocks so the pipe does not tear. The pipe could also be subject to vandalism. A type of tape is available to make repairs.

Table 1 provides the lengths and pumping head for 10", 12" and 18" pipe used in the various alternatives. Double 10" pipes require the highest pumping heads and beyond a distance of 3,000 feet it is probably unsuitable.

Rental of Road Ramps – Road ramps can be rented which will allow traffic to cross without a large hump to drive over. Road ramps are 12' wide and are painted orange to warn the traffic. Some road ramps are not suitable for sewage as they tend to plug up. It might be better to simply bury the bypass pipe under roads and restore the road when the pipe is removed.

Construction of Manhole Standpipes – The existing force main manholes are 5' in diameter with an upper cone section. The 20" diameter flanged connections to the force main are near the bottom of their manholes. There are two functions of the manholes on the force main; one type is on high points and has an air release valve (ARV) and the other type is on the low points and has a 4" diameter valve for a drain. As originally designed the ARV was connected directly to the top of the blind flange.

However in a 1999 project the ARV connections were modified by installing a welded steel insert inside the 20" standpipe terminating with a rolled section of steel conforming to the curvature of the top of the pipeline. It is assumed that the purpose of this modification was to facilitate the cleaning of the 2" pipe connection. The standpipe being 20" diameter probably accumulated grease that made it difficult to clean and maintain the ARVs. This insert may be difficult to remove.

If the blind flange is opened and the insert is removed sewage will exit the force main requiring that it be pumped back into a manhole on a nearby gravity sewer. In order to facilitate insertion of a bag stop the manhole cone will need to be replaced with a 5' diameter barrel section with a larger casting and lid.

The ARV manholes are located at high points and there should not be any need to extend the standpipe any higher since the water level in the force main can be lowered when the PIPS is turned off. The ARV with its insert can be left in place and the larger manhole barrel will facilitate the opening of the blind flange.

The manholes at the drains are deeper and apparently do not have inserts. In these manholes the standpipe should be extended higher in the rebuilt manhole so they are easier to access without dealing with much sewage when they are removed.

In order to prepare for an emergency it is recommended that the cones on the manholes where a bag stop or bypass pipe connections are required be replaced with a 5' diameter barrel section and large diameter casting on top to facilitate access. For the drain manholes the barrel section should be replaced and the 20" diameter standpipe should be extended to reduce the amount of sewage that escapes when the blind flange is opened.

If it is necessary to use these standpipes during an emergency it will take additional time to install the bypass pipe. It is estimated that to replace the manhole cone and cover, install a 20" diameter standpipe and deal with the sewage from the force main will cost about $20,000 each.

SUMMARY OF ALTERNATIVES

If a leak develops in the PIPS force main it will be necessary to shut off the flow while the repair is made. A bypass will need to be installed if the repair cannot be completed overnight when the PIPS can be turned off and excess flows can be stored in the old Hopper St. plant structures or removed by tanker truck. The selection of the appropriate and most economical bypass alternative will depend on the type and urgency of the leak.

If the leak can be contained long enough to fabricate the necessary bag stops then Alternatives A, B or C can be used. However, if the leak is urgent Alternatives D or E will need to be used with 12" pipe which

can be strung out and connected vary rapidly. If one or two permanent valve and standpipe assemblies are inserted into the force main the time required to construct the bypass will be greatly reduced and modification of the existing standpipe manholes will not be necessary.

The following is a summary of the bypass alternatives.

- Individual sections of the force main could be isolated using two bag stops and a bypass pipe as described in Alternative A. Four manholes will need to be modified with flanged standpipes and an up to 3,000 feet long double bypass pipe will be necessary.

- It is possible to bypass longer sections of the PIPS force main using portable pumps as described in Alternatives B and D or using the PIPS itself in Alternatives A, C and E. In Alternatives B-1, B-2 and B-3 a total of three manholes in the vicinity of Cader Lane will need to be modified with a standpipe to allow insertion of a bag stop and connection of the bypass pipe. The distance for the bypass pipe will range from 6,500 feet to 7,300 feet depending on the route of the aboveground bypass pipe. The main difficulty in routing the bypass pipe is in the vicinity of Corporate Circle where there are numerous buildings and parking lots. Because of this it is recommended that the bypass pipe follow the route of Alternatives B-2 or B-3 and be routed around the back of the buildings adjacent to the marsh.

- Alternative C involves bypassing the easterly half of the PIPS force main by installing a bag stop in a manhole to the east of Cader Lane and uses the PIPS to pump through an above ground bypass pipe to a discharge into one of the aerated lagoons at the Ellis Creek Water Recycling Facility.

- In Alternatives D and E the entire PIPS force main can be bypassed using portable pumps and without the use of any bag stops. However the distance will be around 12,000 and 13,200 feet of double 12" pipes requiring a total of 24,000 and 26,400 feet of bypass pipe respectively.

- Considering the long lead time to secure and install the bag stops required in the above alternatives it may be more expedient to string out bypass pipe all the way from the PIPS to the Ellis Creek plant as described in Alternative E. Using double 12" irrigation pipe will be a lot faster than fusing 18" HDPE pipe. However, this alternative will require crossing Caltrans right of way and installing the bypass pipe through an empty casing under the SMART tracks, assuming it exists.

- Installation of permanent valve and standpipe assemblies would greatly facilitate the installation of the necessary bypass piping for a force main repair.

ESTIMATED COSTS AND BYPASS INSTALLATION TIMES

Table 2 provides estimates of the costs to install the alternative bypasses and also provides an estimate of the installation times. Also given in Table 2 are estimated costs of advance preparations which will reduce costs and shorten the bypass setup time when an emergency occurs. These cost and time

estimates are very preliminary and will depend on the exact situation, the City's advance preparation and the availability of the emergency equipment and materials. The following observations are made:

- Setting up bypasses using bag stops can take up to 4 weeks unless the procedure is expedited at additional cost, in which case the time can be shortened to about 2 weeks.
- Pre-purchase of one or two bag stops will shorten the time for their installation.
- Alternatives D and E which do not involve bag stops but require long lengths of bypass pipe can be implemented in less time depending on the amount of labor applied to the job of connecting the pipe sections. If a casing under the SMART tracks does not exist Alternative E would not be viable.
- Installation of one or two valve and standpipe assemblies in the force main will shorten the length and time for setting up the bypass pipes. Valves would also eliminate the need for modification of the existing force main manholes to provide a standpipe and eliminate the need for inserting a bag stop to shut off the flow.
- Use of portable pumps which pump from the gravity sewer in Alternatives B and D are not as reliable as using PIPS in Alternative E. When portable pumps are used the sewage level in upstream sewers will need to be carefully monitored.

RECOMMENDATION

The selection of the best bypass alternative to implement under emergency conditions will depend on the City's investment in advance preparations. In order to facilitate installation of a bypass to make a repair it is recommended that the City install one or more valve and standpipe assemblies in the force main. With valves in the line the bypass pipe can be very quickly setup along the routes described in Alternatives B or C.

TABLE 1
CITY OF PETALUMA

PIPS FORCE MAIN CONTINGENCY PLAN
ALTERNATIVE BYPASS PIPE INSTALLATIONS FOR ADWF = 4.5 MGD with peak flow = 4,400 gpm

ALTERNATIVE	A	B-1	B-2	B-3	C	D	E
Repair section	Individual segments between standpipe manholes	Force main west of Cader Lane	Force main west of Cader Lane	Force main west of Cader Lane	Force main east of Cader Lane	Entire force main	Entire force main
Description	Install bypass around pipe section being repaired	Install bypass pipe through Corporate Circle to Cader Lane	Install bypass pipe along Adobe Creek to Schollenberger marsh to Cader Lane	Install bypass pipe around south side of buildings to Schollenberger marsh to Cader Lane	Install bypass pipe from Cader Lane along north side of Schollenberger marsh to Ellis Creek WRF	Install bypass pipe around south side of buildings to Schollenberger marsh to Ellis Creek WRF	Install bypass pipe from PIPS through casing under SMART to Ellis Creek WRF
Bag stops	2	1	1	1	1	0	0
Bypass pipe							
Distance, feet	up to 3,000'	5,000'	5,800'	5,600'	6,000'	10,500'	13,200
10" light steel or aluminum	Double 10"	Double 10"	Double 10"	Double 10"	Double 10"	Double 10"	Double 10"
Head loss @2,200 gpm	92'	154'	178'	172'	184'	323'	406'
Pipe length required, feet	up to 6,000'	10,000	11,600	11,200	12,000	21,000	26,400
12" Light steel or aluminum	Double 12"	Double 12"	Double 12"	Double 12"	Double 12"	Double 12"	Double 12"
Head loss @ 2,200 gpm	38	63	73	60	76	133	167 ***
Pipe length required, feet	up to 6,000'	10,000	11,600	11,200	12,000	21,000	26,400
18" HDPE pipe	Single 18"	Single 18"	Single 18"	Single 18"	Single 18"	Single 18"	Single 18"
Head loss @2,200 gpm	9.5	16	18	18	19	33	42
Pipe length required, feet	up to 3,000'	5,000	5,800	5,600	6,000	10,500	13,200
Road ramps *	Varies - est. 4	8	4	2	2	2	4
Bypass pumps	PIPS	Portable	Portable	Portable	PIPS	Portable	PIPS
Number		2	2	2		2	
Minimum capacity each, gpm @ TDH		4,200	4,200	4,200		4,200	
Force Main Manhole Modification							
Standpipe required, number	12	3	3	3	3	0	0

TABLE 2
CITY OF PETALUMA

PIPS FORCE MAIN CONTINGENCY PLAN
ALTERNATIVE BYPASS PIPE INSTALLATIONS FOR ADWF
ESTIMATED COSTS AND BYPASS INSTALLATION TIMES

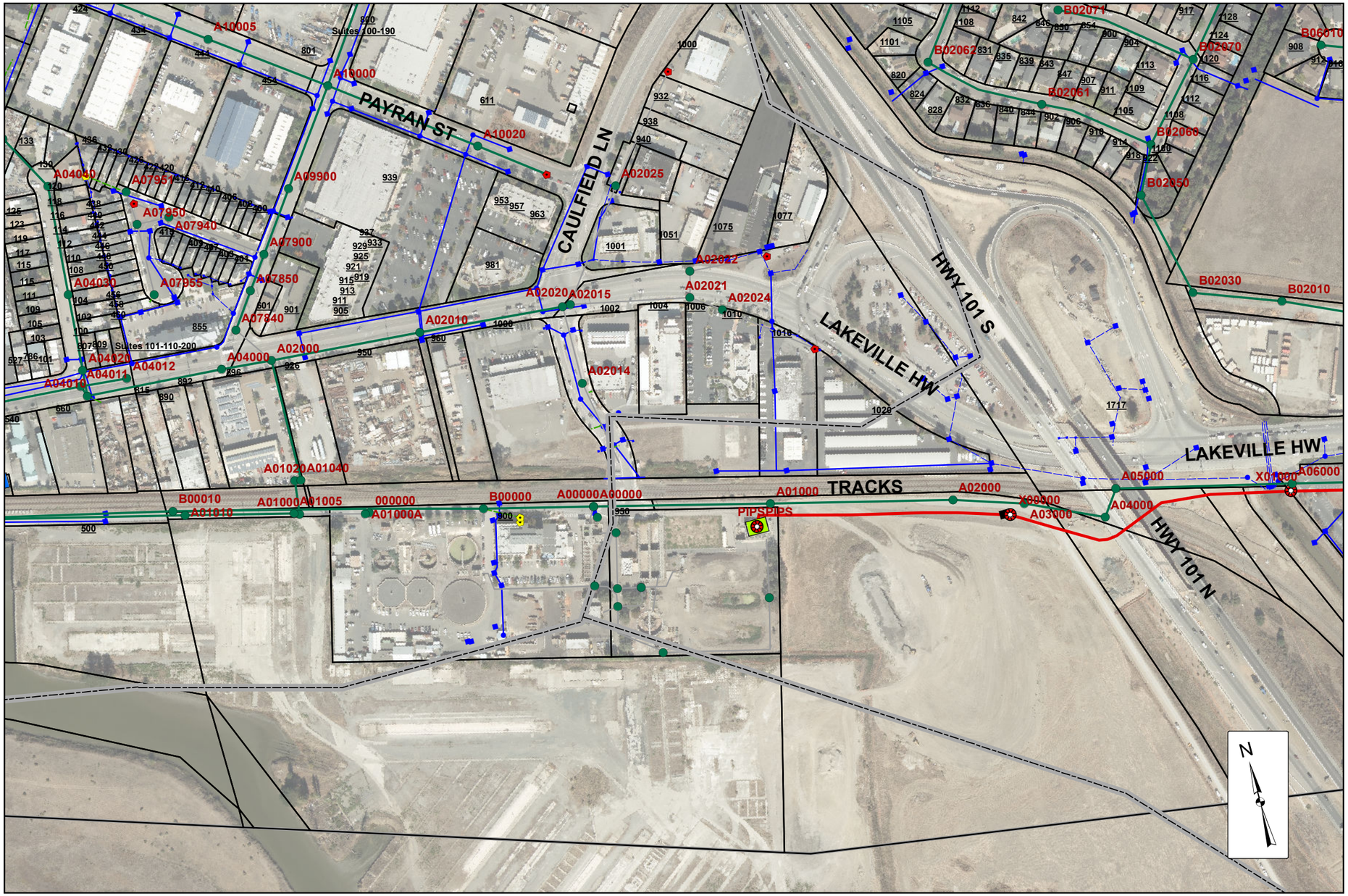
ALTERNATIVE	A	B-1	B-2	B-3	C	D	E
Repair section	Individual segments between standpipe manholes	Force main west of Cader Lane	Force main west of Cader Lane	Force main west of Cader Lane	Force main east of Cader Lane	Entire force main	Entire force main
Description	Install bypass around pipe section being repaired	Install bypass pipe through Corporate Circle to Cader Lane	Install bypass pipe along Adobe Creek to Schollenberger marsh to Cader Lane	Install bypass pipe around south side of buildings to Schollenberger marsh to Cader Lane	Install bypass pipe from Cader Lane along north side of Schollenberger marsh to Ellis Creek WRF	Install bypass pipe around south side of buildings to Schollenberger marsh to Ellis Creek WRF	Install bypass pipe from PIPS through casing under SMART to Ellis Creek WRF
ESTIMATED OPTIONAL ADVANCE COSTS							
Standpipes @$20,000 ea	$240,000	$60,000	$60,000	$60,000	$60,000		
Prepurchase of bag stops	2 @ $18,200	1 @ $18,200	1 @ $18,200	1 @ $18,200	1 @ $18,200		
Bypass pipe connections at PIPS							$50,000
Optional valve installation in force main		$100,000	$100,000	$100,000	$100,000		
ESTIMATED BYPASS COSTS PER WEEK							
Bag Stop including installation @ $35,000 ea.	$70,000	$35,000	$35,000	$35,000	$35,000		
Portable pumps 2 @ $2,500/wk		$5,000	$5,000	$5,000		$5,000	***
Pump hoses and fittings		$600	$600	$600		$600	
10" bypass pipe rental (week) @ $1,50/LF	$9,000						
12" bypass pipe rental (week) @ $4.50/LF		$45,000	$52,200	$50,400	$54,000	$94,500	$118,800
Bypass pipe installation - 2 man crew @ $80/hr **	$1,600	$5,300	$6,200	$6,000	$6,400	$11,200	$14,100
Road ramps @ $350/wk *	$1,400	$2,800	$1,400	$700	$700	$700	$1,400
Freight (est.)	$10,000	$15,000	$15,000	$15,000	$16,000	$20,000	$20,000
TOTAL ESTIMATED WEEKLY RENTAL COST	$92,000	$108,700	$115,400	$112,700	$112,100	$132,000	$154,300
ESTIMATED BYPASS INSTALLTION TIME - ROUTINE	2-3 weeks for bag stop fabrication, one week to install. Install bypass pipe concurrently. Total 3 to 4 weeks.	2-3 weeks for bag stop fabrication, one week to install. Install bypass pipe concurrently. Total 3 to 4 weeks.	2-3 weeks for bag stop fabrication, one week to install. Install bypass pipe concurrently. Total 3 to 4 weeks.	2-3 weeks for bag stop fabrication, one week to install. Install bypass pipe concurrently. Total 3 to 4 weeks.	2-3 weeks for bag stop fabrication, one week to install. Install bypass pipe concurrently. Total 3 to 4 weeks.	2 days for bypass pipe delivery and up to one week for connection depending on number or crews. Total 7 days.	2 days for bypass pipe delivery and up to one week for connection depending on number or crews. Total 7 days.
ESTIMATED BYPASS INSTALLATION TIME - EXPEDITED	Bag stop fabrication and installation can be expedited to 2 weeks at an extra cost of $5,000+.	Bag stop fabrication and installation can be expedited to 2 weeks at an extra cost of $5,000+.	Bag stop fabrication and installation can be expedited to 2 weeks at an extra cost of $5,000+.	Bag stop fabrication and installation can be expedited to 2 weeks at an extra cost of $5,000+.	Bag stop fabrication and installation can be expedited to 2 weeks at an extra cost of $5,000+.	Expedite delivery add extra crews for bypass pipe installation. Total 4 - 5 days	Expedite delivery add extra crews for bypass pipe installation. Total 5 - 6 days.
ESTIMATED BYPASS INSTALLATION TIME WITH VALVE		2-3 days for bypass pipe installation	2-3 days for bypass pipe installation	2-3 days for bypass pipe installation	2-3 days for bypass pipe installation		

Notes:
* Pipes can also be buried at road crossings
** 10" pipe can come in 40' lengths with Victaulic couplings. A good 2 man crew can connect two 40' long sections in 7-8 minutes (say 8 minutes) = 0.2 minutes per foot.
12" pipe can come in 10' lengths with Bauer type couplings. A good crew can connect two 10' long pipe sections in 3 -4 minutes (say 4 minutes) = 0.4 minutes per foot.
*** Check available pumping head and capacity of pumps in the PIPS.

APPENDIX C

ROUTE MAPS AND PIPS FORCE MAIN PROFILE

PIPS Force Main Contingency Plan



The City of Petaluma
Sonoma County, California

Legend

- MH Gravity
- MH Force Main
- Force Main
- Gravity
- Other
- StormLinePublic

NUTE Nute Engineering
Civil & Sanitary Consultants
907 Mission Ave / San Rafael, CA 94901
P 415-453-4480 / F 415-453-0343

PIPS TO HWY 101

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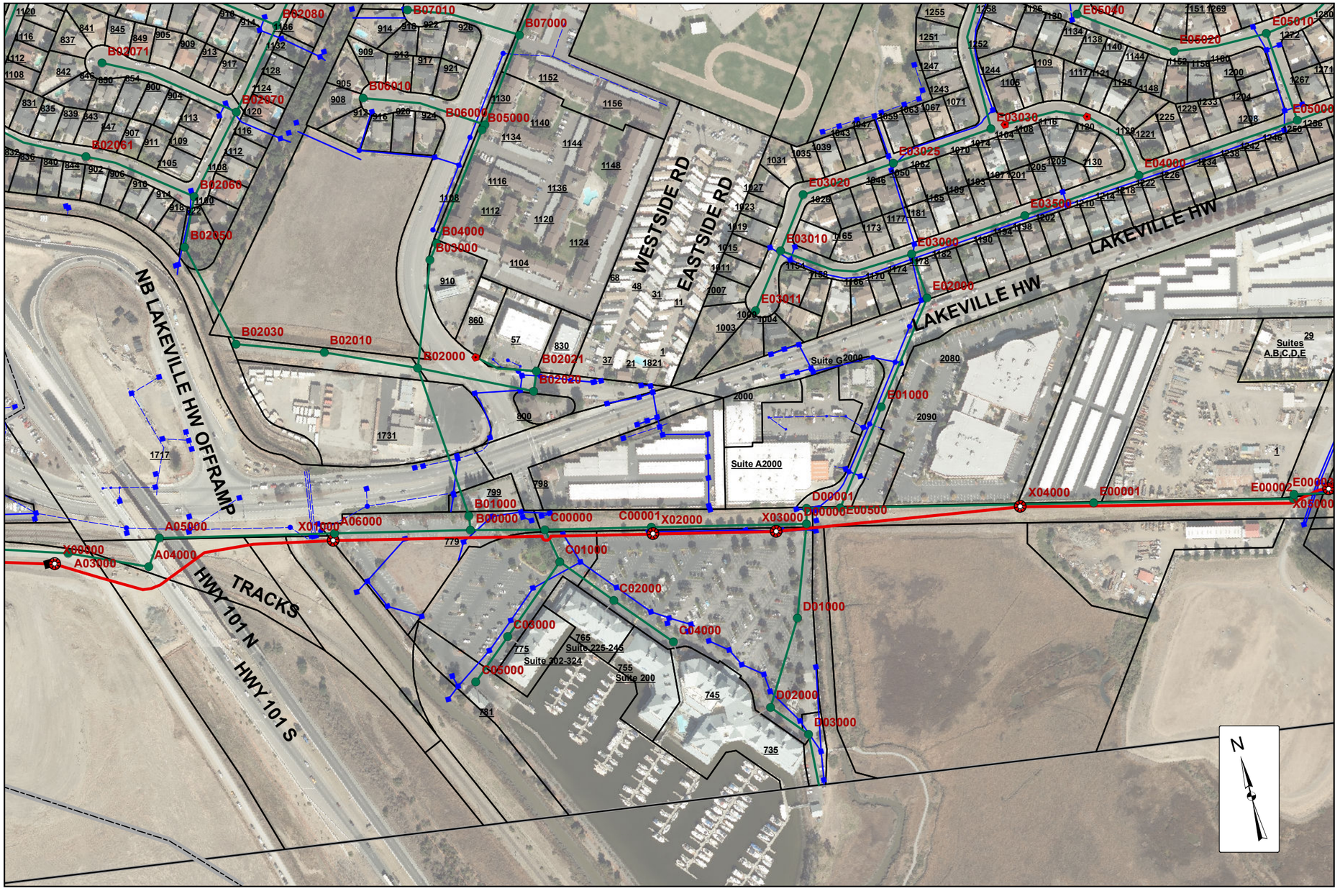
300 150 0 300 Feet

SCALE:1 inch = 300 feet

PIPS Force Main Contingency Plan



The City of Petaluma
Sonoma County, California

Legend

- MH Gravity
- MH Force Main
- Force Main
- Gravity
- Other
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NUTE Nute Engineering
Civil & Sanitary Consultants
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HWY 101 to Casa Grande Rd

300 150 0 300 Feet

SCALE:1 inch = 300 feet

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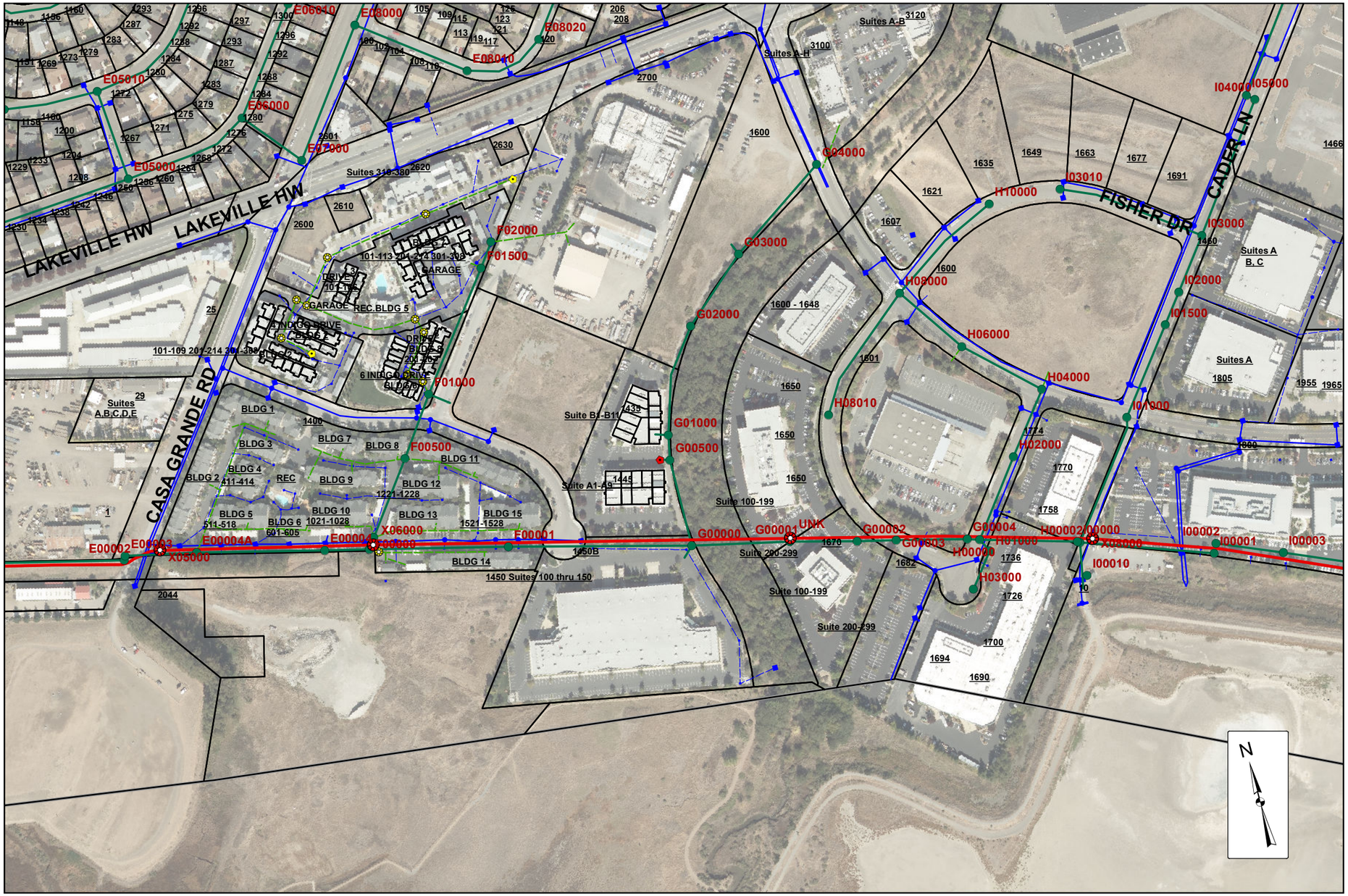
PIPS Force Main Contingency Plan



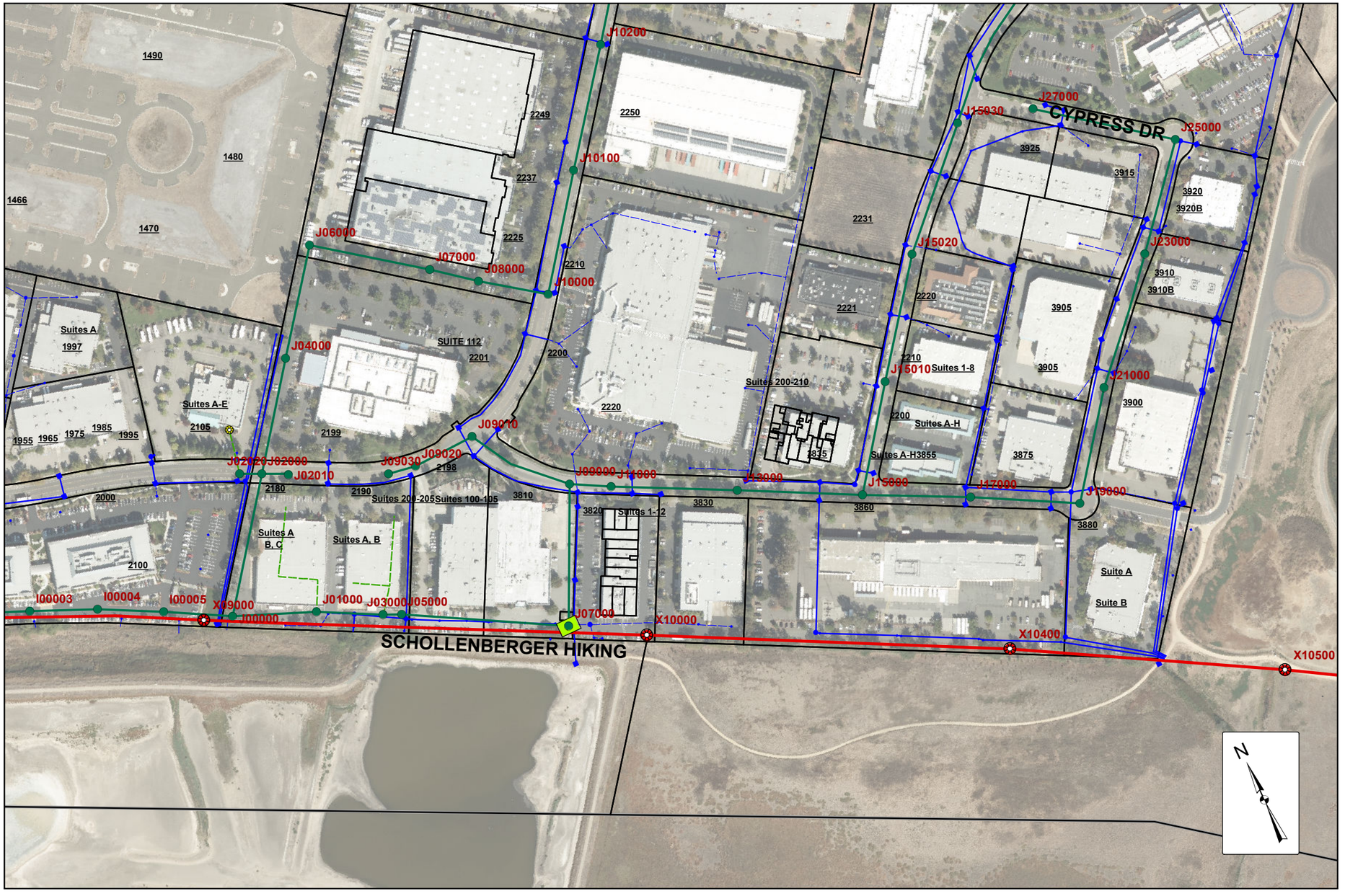
The City of Petaluma
Sonoma County, California

Legend

- MH Gravity
- MH Force Main
- Force Main
- Gravity
- Other
- StormLinePublic

Nute Engineering Civil & Sanitary Consultants 907 Mission Ave / San Rafael, CA 94901 P 415-453-4480 / F 415-453-0343	**Casa Grande Rd to Cader Ln**		300 150 0 300 Feet SCALE:1 inch = 300 feet
	Project # 8352	PAGE 3 OF 5	Date: 8/13/2014

PIPS Force Main Contingency Plan



The City of Petaluma
Sonoma County, California

Legend

- MH Gravity
- MH Force Main
- Force Main
- Gravity
- Other
- StormLinePublic

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Carden Ln to Schollenberger Park

300 150 0 300 Feet

SCALE:1 inch = 300 feet

Project # 8352 | PAGE 4 OF 5 | Date: 8/13/2014

PIPS Force Main Contingency Plan

The City of Petaluma
Sonoma County, California

Legend

- MH Gravity
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- Force Main
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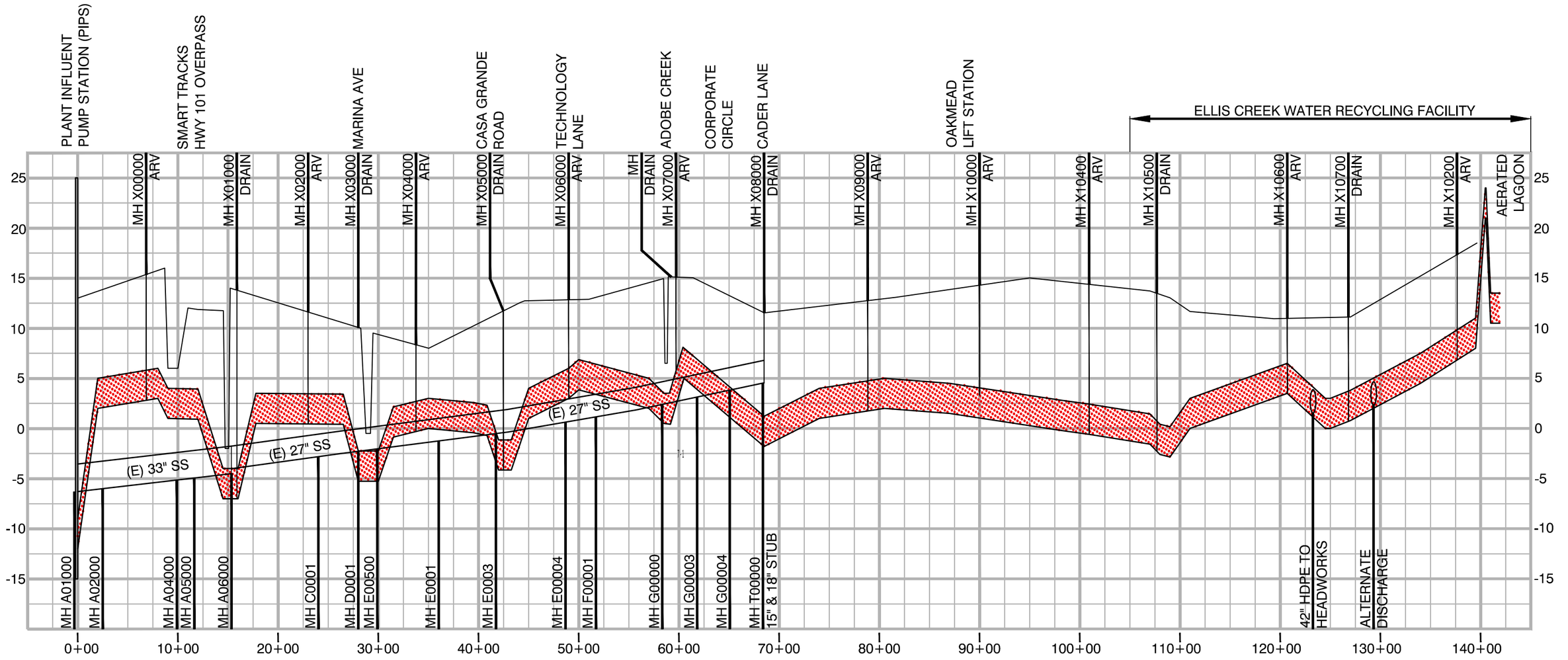
Schollenberger Park Rd to Treatment Plant

Project # 8352 | PAGE 5 OF 5 | Date: 8/13/2014

300 150 0 300 Feet

SCALE:1 inch = 300 feet



CITY OF PETALUMA

EXISTING PIPS FORCE MAIN PROFILE

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