

Appendix B

Operations and Maintenance Program – Documents and Forms

1. Maintenance Division Focus Program Activity Procedures No 3, 9, 13
2. Example Pump Station Inspection Forms and Logs
3. Flygt Pump Maintenance Procedures
4. SmartCover Infosheet
5. Plumber / Sewer Contractor Brochure

<i>SEWER/STORM LINE REPLACEMENT/REPAIR</i>	CITY OF BENICIA Department of Public Works Maintenance Division Focus Program
ACTIVITY NO. 3 DATE: 2/02, rev 6/25	
DESCRIPTION & PURPOSE: Repair sewer or storm drain main to restore normal flow or to eliminate sources of I/I and blockage.	
SCHEDULING GUIDELINES: When collapsing sewer or storm drain mains, severe dips, and Ill are detected by television inspection.	
CREW SIZE	WORK METHOD
1 Maintenance Worker Ill 3 Field Utilities and Streets Journeyman/Apprentice (FUSJ/FUSA) *See Note	<ol style="list-style-type: none"> 1. Call Underground Service Alert for location of utilities if situation does not require immediate attention. If situation does require immediate attention, call Underground Service Alert on emergency dig basis. 2. Place traffic control devices. Be sure equipment warning lights are on. 3. Excavate and expose damaged main. Repair or replace if necessary. 4. Compact excavation with 3/4" aggregate base 5. topped off with a minimum of 2" of cutback material. 6. Have work order made to hot patch excavation. 7. Clean up tools and equipment. <p style="margin-left: 40px;">Note: Soil conditions and/or 5' depth dictate the use of shoring.</p>
EQUIPMENT	
Backhoe Vactor Dump Truck 3/4 Ton Utility Truck Compressor Jackhammer Tamper Traffic Control Devices	
MATERIAL	AVERAGE DAILY PRODUCTION
3/4 AB Cutback, Pipe Couplings Proper Personal Safety Equip.	One location per day 0.031 units per person per hour
NOTES: * Crew size may increase depending on traffic control and field conditions. Complete pertinent paperwork. * Equipment failure rent from Hertz Big 4: 747-4444	

***CLEANING SEWER
MAINS & STORM DRAINS***

**CITY OF BENICIA
Department of Public Works
Maintenance Division
Focus Program**

ACTIVITY NO. 9

DATE: 2/02, rev 6/25

DESCRIPTION & PURPOSE:

Clean and flush sewer mains to maintain normal flow by removing obstruction, grit, grease, and build-up of other materials using flushing equipment. Regular, routine cleaning of inlets, outlets, catch basins, flapgates, culverts, drainage pipes to remove accumulated debris and ensure satisfactory drainage. Remove weeds and debris from channel and outfalls to eliminate stagnant water and to maintain proper flow. Clean storm drain pipes, culverts and sidewalk culverts to maintain normal flow of water.

SCHEDULING GUIDELINES:

Coordinate work with the Collection System preventive maintenance program. Consolidate work to minimize deadheading and partial days of work. All drainage structures should be cleaned and inspected once a year. Begin the inspection in early September and coordinate this work with other preparations for winter rainy season. Varies as to time of year.

CREW SIZE

2 Field Utilities and Streets Journeyman/
Apprentice
(2 man crew may consist of MWIIIs,
FUSJs, FUSAs)
Varies as to work

WORK METHOD

1. Place traffic control devices. Be sure equipment warning lights are on
2. Flush upstream from downstream manhole using appropriate pressure.
3. Wash down manhole before proceeding to next assignment.
4. Vactor manhole during cleaning as required.
5. Clean Vactor debris body at WWTP.
6. Clean culverts and pipes to remove debris.
7. Clean minor storm drain channels and outfalls of debris.
8. Load debris into dump truck.
9. Locate truck near structure and out of traffic if possible.
10. Remove grate.
11. Clean in and around drainage structure. Remove debris, load into truck.
12. Inspect structure to determine if additional cleaning or repair is needed.
13. Dispose of spoils/debris.

EQUIPMENT

3/4 Ton Utility Truck
1 Vactor (Hydroflusher)
1 Backhoe
1 Dump Truck
Handrod
Clam Shells

MATERIAL

Water
Proper Personal Safety Equipment

AVERAGE DAILY PRODUCTION

6,000 lineal feet per day
375 lineal feet per person-hour

NOTES: Crew varies from area being flushed and traffic. One person may be used for traffic control. Complete pertinent paperwork. The use of backhoe & dump truck may be needed on some culvert cleanings & addition of MW Foreman or MW II (Equip. Operator).

**MISC. SEWER
MAINTENANCE
PROGRAM**

**CITY OF BENICIA
Department of Public Works
Maintenance Division
Focus Program**

ACTIVITY NO. 13

DATE: 2/02, rev 6/25

DESCRIPTION & PURPOSE:

All other sewer main and lateral maintenance activities.

SCHEDULING GUIDELINES:

Consolidate work to minimize deadheading and partial days of work.

CREW SIZE

WORK METHOD

Varies as to work.

1. Notifying public of sewer maintenance programs.
2. Survey/inspection of sewer maintenance programs and activities.
3. Providing assistance to Project Engineering for sewer CIPs.
4. Response to sewer complaints.

EQUIPMENT

Varies as to work.

Be sure to use most effective and efficient resources and methods to complete work satisfactorily.

MATERIAL

AVERAGE DAILY PRODUCTION

Varies as to work.
Proper Personal Safety Equipment

Quantity of work is measured by person-house used

NOTES:

Describe the type of work competed on the work order.

Complete pertinent paperwork.

*Rent Equipment as needed Hertz Big 4: 747-4444

Annual Lift Station Inspection Sheet

Lift Station Name East B. Str. Technician Ian / Kyle Date 8-26-24

Pump #1

Model # <u>3102.090-0995</u>	Serial # <u>3102.090 065006</u>
Hp <u>5 hp</u>	Volts <u>230v</u>
AMPS <u>14</u>	RPM <u>1745</u>
IMP. Curve <u>462</u>	Lubric <u>oil</u>
Disch. Size <u>4"</u>	Ser. Fac. <u>.81</u>

Pump #2

Model # <u>3102.090-6102</u>	Serial # <u>3102.090-886009</u>
Hp <u>5 hp.</u>	Volts <u>230v</u>
AMPS <u>13</u>	RPM <u>1715</u>
IMP. Curve <u>435</u>	Lubric <u>oil</u>
Disch. Size <u>4"</u>	Ser. Fac. <u>.88</u>

Visual Observation and Trouble Shooting #1

Amps L-1 <u>10.0</u>	Amps L-2 <u>10.1</u>	Amps L-3 <u>10.2</u>	
MegaOhms Leg 1/2 <u>⊗</u> <u>550</u>	MegaOhms Leg 1/3 <u>⊗</u> <u>550</u>	MegaOhms Leg 2/3 <u>⊗</u> <u>550</u>	

Good or Poor

Wear Ring gap <u>.70</u>	Volute - condition <u>OK</u>
Oil - condition <u>clear, clean</u> <u>OK</u>	Discharge pipe - condition <u>OK</u>
IMP. condition <u>OK</u>	
Wet-well - condition I/I? <u>OK</u>	

Visual Observation and Trouble Shooting #2

Amps L-1 <u>12.2</u>	Amps L-2 <u>12.1</u>	Amps L-3 <u>12.1</u>	
MegaOhms Leg 1/2 <u>⊗</u> <u>19.1</u>	MegaOhms Leg 1/3 <u>⊗</u> <u>19.2</u>	MegaOhms Leg 2/3 <u>⊗</u> <u>19.1</u>	

Good or Poor

Wear Ring gap <u>1.05</u>	Volute - condition <u>OK</u>
Oil - condition <u>OK (clear, clean)</u>	Discharge pipe - condition <u>OK</u>
IMP. condition <u>OK</u>	
Wet-well - condition I/I? <u>OK</u>	

* Note: When annual is done semiannual needs to be done as well.

Date pulled; _____ Assessment Date; _____ Reinstalled Date; _____

What was found and what Corrective Action was taken and Parts Used;

Comments: _____

Lift Station Alarm Check Sequence

- Change pump overrun time to 1 Minute.
- Turn pump H-O-A switches to off position and let the wetwell fill to “High-High” float.
- Record “High-High” float level.
- Turn both H-O-A switches on.
- Let P-1 and P-2 pump down to the “Low-Low” float (during the pump down you will also trigger the “pump overrun” alarm for each pump)
- Record “Low-Low” float level and turn H-O-A switches to off position.
- Restore overrun time to original station setting.
- For low flow stations change pump on/off levels to closer parameters (i.e. on 2.15 ft. /off 2.00 ft.)
- Manually trip the overloads for P-1 and P-2 (this will cause “overload” alarm for each pump).
- Turn H-O-A switches to auto position to have P-1 and P-2 send a “fail to start” alarm as lead and lag pump are called for.
- Restore on/off levels to original station settings.
- Pull the 110 V power relay to cause “110 V power fail”.
- Pull the 3-Phase relay to cause “station power fail”.
- Cut power to the wireless modem.
- Exercise discharge isolation valves and check valves.
- Check with plant operations staff to verify all alarms.
- Restore power to wireless modem and confirm communication.

Lift Station Semi-Annual Maintenance

Lift Station Name: B St Initials: JJ, KP Date: 1/29/24

*Test All Lift Station Alarms

ALARM WORKS?

ALARM	YES	NO	N/A
Comm. Fail	✓		
Power Fail	✓		
110V Power Fail	✓		
Wetwell High Level	✓		
Wetwell Low Level	✓		
Pump #1 Overrun	✓		
Pump #2 Overrun	✓		
Pump #1 Fail To Start	✓		
Pump #2 Fail To Start	✓		
Pump #1 Overload	✓		
Pump #2 Overload	✓		

- *Exercise Pump Isolation Valves [✓]
- *Test Operation of Check Valves [✓]
- *Check Lift Station Grounds. Maintain As Necessary** [✓]
- *Check Lift Station Control Panel. Maintain As Necessary *** [✓]

** : Building, Lighting, Fence, Weeds, Pruning, Washdown, Locks, etc.

*** : Tighten Wires, Check UPS, Check Comm. Box, Check For Dust/Cobwebs, etc.

NOTES: N/A

LIFT STATION LOG

Station #	Address	PUMP HRS		EXERCISE		INSPECT			COMMENTS
DATE	INTL'S	1	2	1	2	Panel	Wet Well	Dry Well	
8/26/24	PB	20.6	96.4	✓	✓	✓	✓		
9-3-24	JP	21.7	97.3	✓	✓	✓	✓		
9.9.24	PB	22.6	97.9	✓	✓	✓	✓		
9/16/24	mm	23.6	98.7	✓	✓	✓	✓		
9/23/24	PB	24.5	99.4	✓	✓	✓	✓		
9/30/24	JP	25.5	0.2	✓	✓	✓	✓		
10/7/24	PB	26.5	0.9	✓	✓	✓	✓		
10.14.24	JP	27.5	1.6	✓	✓	✓	✓		
10/21/24	mm	29.0	2.7	✓	✓	✓	✓		
10.28.24	JP	29.6	3.1	✓	✓	✓	✓		
11/4	JL	30.6	3.8	✓	✓	✓	✓		
11.12	mm	31.8	4.7	✓	✓	✓	✓		
11/18/24	PB	32.7	5.3	✓	✓	✓	✓		
11/25/24	mm	33.9	6.1	✓	✓	✓	✓		
12/2	JL	34.9	6.8	✓	✓	✓	✓		
12/9/24	mm	35.9	7.6	✓	✓	✓	✓		HEAVY CALUMSIS
12/16/24	PB	37.1	8.4	✓	✓	✓	✓		GREASE
1/6/25	mm	40.6	10.9	✓	✓	✓	✓		
1/13/25	PB	41.8	11.7	✓	✓	✓	✓		
1.21.25	JP	42.9	12.5	✓	✓	✓	✓		
1/27	JL	43.7	13.1	✓	✓	✓	✓		
2/3/25	mm	44.8	13.8	✓	✓	✓	✓		
2/10/25	PB	46.4	14.9	✓	✓	✓	✓		
2/18/25	JP	48.3	16.2	✓	✓	✓	✓		
2/24	JL	49.2	16.9	✓	✓	✓	✓		
3/3/25	mm	50.3	17.7	✓	✓	✓	✓		
3/10/25	PB	51.4	18.4	✓	✓	✓	✓		GREASE
3/17/25	JP	52.5	19.2	✓	✓	✓	✓		
3/24	JL	53.6	19.9	✓	✓	✓	✓		
3/31/25	mm	54.7	20.7	✓	✓	✓	✓		
4/7/25	PB	55.9	21.5	✓	✓	✓	✓		
4/14/25	JP	56.9	22.4	✓	✓	✓	✓		
4/21	JL	58.0	23.3	✓	✓	✓	✓		
4/28/25	mm	59.0	24.1	✓	✓	✓	✓		

STATION WET WELL CLEANING LOG
LOCATION East B st.

DATE	Floats	Transducer	Transducer Tube	Top Mat	Walls	Rails & Plumbing	Secondary Wet Well	Pumps	Bottom	INITIALS
3-28-18	✓	✓	✓	✓	✓	✓	N/A	✓	✓	MV
8-8-18	✓	✓	✓	✓	✓	✓	N/A	✓	✓	MV
12/5/18	✓	✓	✓	✓	✓	✓	N/A	✓	✓	JJ
4-3-19	✓	✓	✓	✓	✓	✓	N/A	✓	✓	TS
8-7-19	✓	✓	✓	✓	✓	✓	N/A	-	-	T.S. Truck Fail
12-4-19	✓	✓	✓	✓	✓	✓	N/A	✓	✓	TS
8-5-20	✓	✓	✓	✓	✓	✓	N/A	✓	✓	TS
9-29-20	✓	✓	✓	✓	✓	✓	N/A	✓	✓	TS
12-2-20	✓	✓	✓	✓	✓	✓	N/A	✓	✓	TS
4-7-21	✓	✓	✓	✓	✓	✓	N/A	✓	✓	IW
8-5-21	✓	✓	✓	✓	✓	✓	NA	✓	✓	IW
12-1-21	✓	✓	✓	✓	✓	✓	NA	✓	✓	IW
4-6-22	✓	✓	✓	✓	✓	✓	N/A	✓	✓	IW
8-3-22	✓	✓	✓	✓	✓	✓	NA	✓	✓	IW
12-19-22	✓	✓	✓	✓	✓	✓	N/A	✓	✓	TS
4-18-23	✓	✓	✓	✓	✓	✓	N/A	✓	✓	IW
8-10-23	✓	✓	✓	✓	✓	✓	N/A	✓	✓	IW/KP
10-31-23	✓	✓	✓	✓	✓	✓	N/A	✓	✓	KP
12-7-23	✓	✓	✓	✓	✓	✓	N/A	✓	✓	KP
4-3-24	✓	✓	✓	✓	✓	✓	N/A	✓	✓	IW
8-28-24	✓	✓	✓	✓	✓	✓	NA	✓	✓	KP
12-4-24	✓	✓	✓	✓	✓	✓	N/A	✓	✓	KP
4-2-25	✓	✓	✓	✓	✓	✓	N/A	✓	✓	KP

FLYGT PUMPS

CARE AND MAINTENANCE



Before starting work on the pump, make sure that the pump is isolated from the power supply and cannot be energized.

This applies to the control circuit as well.



NOTE for Ex version page 3.



Make sure that the pump cannot roll or fall over and injure people or damage property.

The following points are important in connection with work on the pump:

- Make sure that the pump has been thoroughly cleaned.
- Beware of the risk of infection.
- Follow local safety regulations.

The pump is designed for use in liquids which can be hazardous to health. In order to prevent injury to the eyes and skin, observe the following points when working on the pump:

- Always wear goggles and rubber gloves.
- Rinse the pump thoroughly with clean water before starting work.
- Rinse the components in water after dismantling.
- The oil housing may be under pressure. Hold a rag over the oil screw (oil plug) to prevent splatter.

Proceed as follows if hazardous chemicals have splashed into your eyes:

- Rinse your eyes immediately in running water for 15 minutes. Hold your eyelids apart with your fingers.
- Contact an eye specialist.

On your skin:

- Remove contaminated clothes.
- Wash your skin with soap and water.
- Seek medical attention, if required.

Inspection

Regular inspection and preventive maintenance ensure more reliable operation.

The pump should be inspected at least once a year, but more frequently under severe operating conditions.

Under normal operating conditions, the pump should have a major overhaul in a service shop at least every third year for permanent installation and every year for portable pumps. This requires special tools and should be done by an authorized service shop.

If the seals have been replaced an inspection of the oil is recommended after one week of operation.

NOTE! Regular check of the condition of the lifting handle and chain is important.

Inspection of hot water applications

Pumps in hot water applications shall undergo inspection or overhaul at a service shop as follows, depending on the time they have been submerged in the hot water:

Temp.	Mode of operation	Inspection	Shop overhaul
≤70°C (160°F)	Continuous	1000 hours	4000 hours
≤70°C (160°F)	Intermittent	twice a year	once a year

CARE AND MAINTENANCE

N-type impeller - replacing and setting clearance



Warning! The impellers may have very sharp edges.
Use protective gloves.

<p>N3085/3102</p> <p>1.</p>	<p>2.</p>	<p><i>Not valid for 3102 SH-version</i></p> <p>3.</p>
<p>NP/NS/NL3127</p> <p>1.</p> <p>(3x) 0,3 mm (0,012") 298 62 00 (1x) 1,5 mm (0,060") 298 62 01 (2x) 0,5 mm (0,020") 298 62 02</p> <p>A = 3x 0,3 + 1x 1,5 + 2x 0,5 = 2,9 mm</p>	<p>2.</p>	<p>3.</p>
<p>4.</p> <p>$X = A - B - C$</p>	<p>5.</p>	
<p>NT/NZ 3127</p> <p>1.</p> <p>A=3x 298 62 01</p>	<p>2.</p>	
<p>3.</p> <p>A-B-0,25mm(0,01")</p> <p>298 62 00 0,3mm (0,012") 298 62 01 1,5mm (0,060") 298 62 02 0,5mm (0,020")</p>	<p>4.</p>	

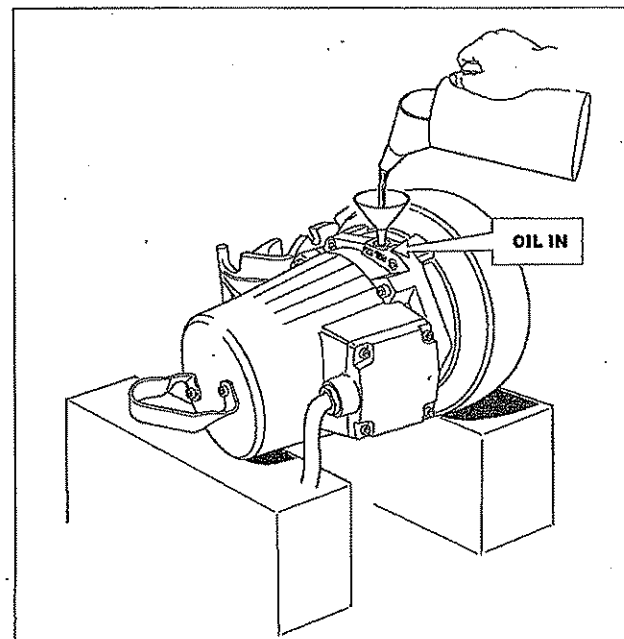
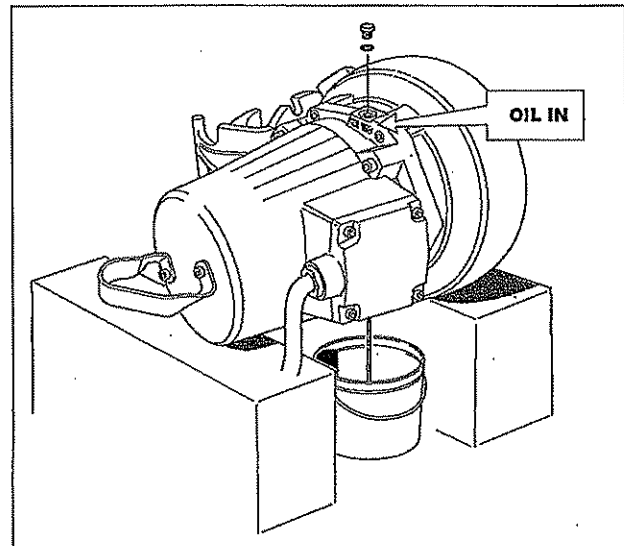
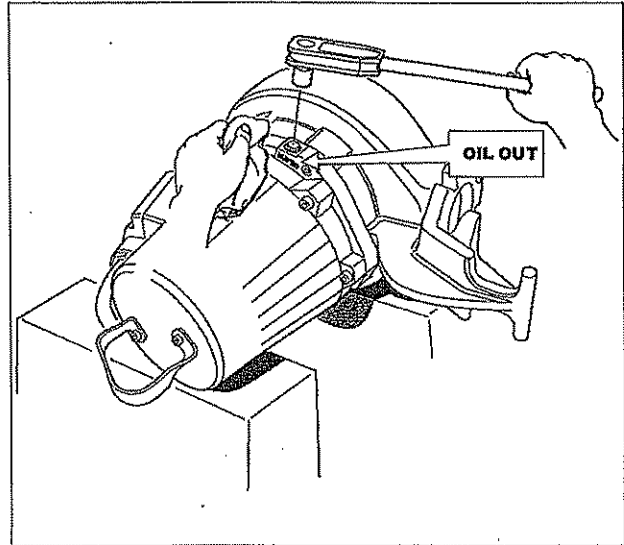
OIL CHANGE



The oil housing may be under pressure. Hold a rag over the oil plug to prevent splatter.

1. Lay the pump on its side on a bench or over two supports. Unscrew the oil housing screw (oil plug) marked "oil out". Emptying the oil must be done through the "oil out" hole.
2. Turn the pump. Unscrew the "oil in" oil hole screw/plug. In order to drain out all oil, the pump must be raised upright for a short while during drainage.
3. Replace the O-rings under the oil housing screws (plugs) with new ones.
4. Install the "oil out" screw/plug and fill with oil through the other hole. It is important that the oil be added through the hole marked "oil in" since the oil housing must contain some air for pressure equalization. The pump should be tilted slightly and put down again horizontally in order to get the full amount of oil in.

A paraffin oil with viscosity close to ISO VG32 is recommended (e.g. Mobil Whiterex 309). The pump is delivered from factory with this type of oil.



Approx. oil quantity		
	l	US quarts
3085	1.0	1.1
3085.280/290	0.8	0.8
3102	1.0	1.1
3127	2.0	2.1

SmartLevel™ Sewer Level Monitoring

SmartLevel™ is used for measuring and reporting sewer levels. SmartLevel provides collection systems with unmanned operations monitoring real time sewer levels 24/7/365. Any subtle nuances in level data are analyzed and when irregularities or anomalies are detected, the system sends notifications for situational assessment. Combined with the SmartTrend analysis tool, the system is able to indicate when and where there may be a potential pipe blockage due to debris, fats, roots, oil or grease causing levels to rise.



Our Subsonic® sensor measures from the bottom of the invert to the manhole cover using both ultrasonic and pressure readings, ensuring level is measured even if the sensor is submerged

Where it Works

SmartLevel is highly versatile for use within different environments:

- Wastewater collection system
- Raw water conveyance system
- Stormwater system
- Any open water channel
- High frequency cleaning locations
- Siphons and easements
- Older high risk pipes
- Flooding
- Lift station back up
- Environmental or politically sensitive areas

Featuring

- Hardware components engineered to function in wet, humid, corrosive conditions
- Flexible patented sensor designs and deployment
- NO CONFINED SPACE ENTRY* installation or service
- Reduces traffic management resources
- Secure, online dashboard with easy-to-read, visual reports
- Compact, long lasting battery
- Two-way communications permits remote settings management
- Fusion with rain, river and tide data
- Done-for-you analytics
- Works when there is no power
- Satellite coverage works with sites difficult to access and withstands cellular outages
- Variable timing options for data scan and notifications
- Built in tilt switch for real time entry detection
- Encrypted secure servers with redundancy
- Mobile app for iOS and Android
- API available
- Configurations for open channels, canals, holding tanks, lift stations, outfalls, reservoirs, and utility vaults

*as defined by OSHA 29 CFR 1910.146b



With the SmartCover mobile app, get the insights you want, when and where you need them. Available for both iOS and Android devices.

Plumbers & Sewer Contractors: Your Actions Can Prevent Sanitary Sewer Overflows!

What are Sanitary Sewer Overflows (SSOs)?

SSOs discharge untreated or partially treated human and industrial waste, debris and disease-causing organisms from the sanitary sewer onto the ground and into homes and potentially into waterways.

What are the impacts of SSOs?

SSOs may result in property damage, environmental damage and/or potential liability to you or your company. Allowing sewage to discharge to a gutter, storm drain or waterway may subject you to penalties and/or out-of-pocket costs to reimburse cities or public agencies for clean-up efforts and regulatory penalties.

How can you prevent SSOs? and avoid associated penalties & fines

When clearing plugged sewer laterals:

- Remove root balls, grease blockages and any other debris; don't push debris from the lateral to the sewer main.
- If you can't prevent a root ball from entering the sewer main when working in our service area, **please call Benicia Public Works Maintenance at (707) 746-4296**, so we can provide you with guidance (free of charge) on how to proceed.
- Use plenty of water to flush lines.
- Don't open manholes. Hazardous sewer gases that exist in manholes are undetectable and can be deadly. Call us to open manholes for you and please note that discharge into a publicly-owned manhole requires a permit. For more information, contact our Maintenance Division at (707) 746-4296.

When constructing sewer laterals:

- Check your work area. Gravel, backfill material and test plugs can become lodged in the sewer line and cause blockages. Make sure no debris is left in the sewer line before you backfill.
- Avoid offset joints – offset joints make sewer lines vulnerable to root intrusion & grease accumulation, cause debris hang-ups and make lines harder to clean. Properly bed your joints and don't hammer tap.
- Contact **Benicia's Permit Counter** for the engineering standard at **(707) 746-4240**.



Who Do I Call to Avoid SSO?

Help us help you...

If you require our free assistance to help clear root balls, grease blockages and other debris from a main sewer line to prevent SSO or to open a manhole in our service area, please call:

**Benicia Public Works
(707) 746-4240**



Bay Area Clean Water Agencies
A Joint Powers Public Agency

