CITY OF PHILOMATH
Wastewater System Facilities Plan,
Philomath, Oregon

Section 4

Existing Wastewater Facilities

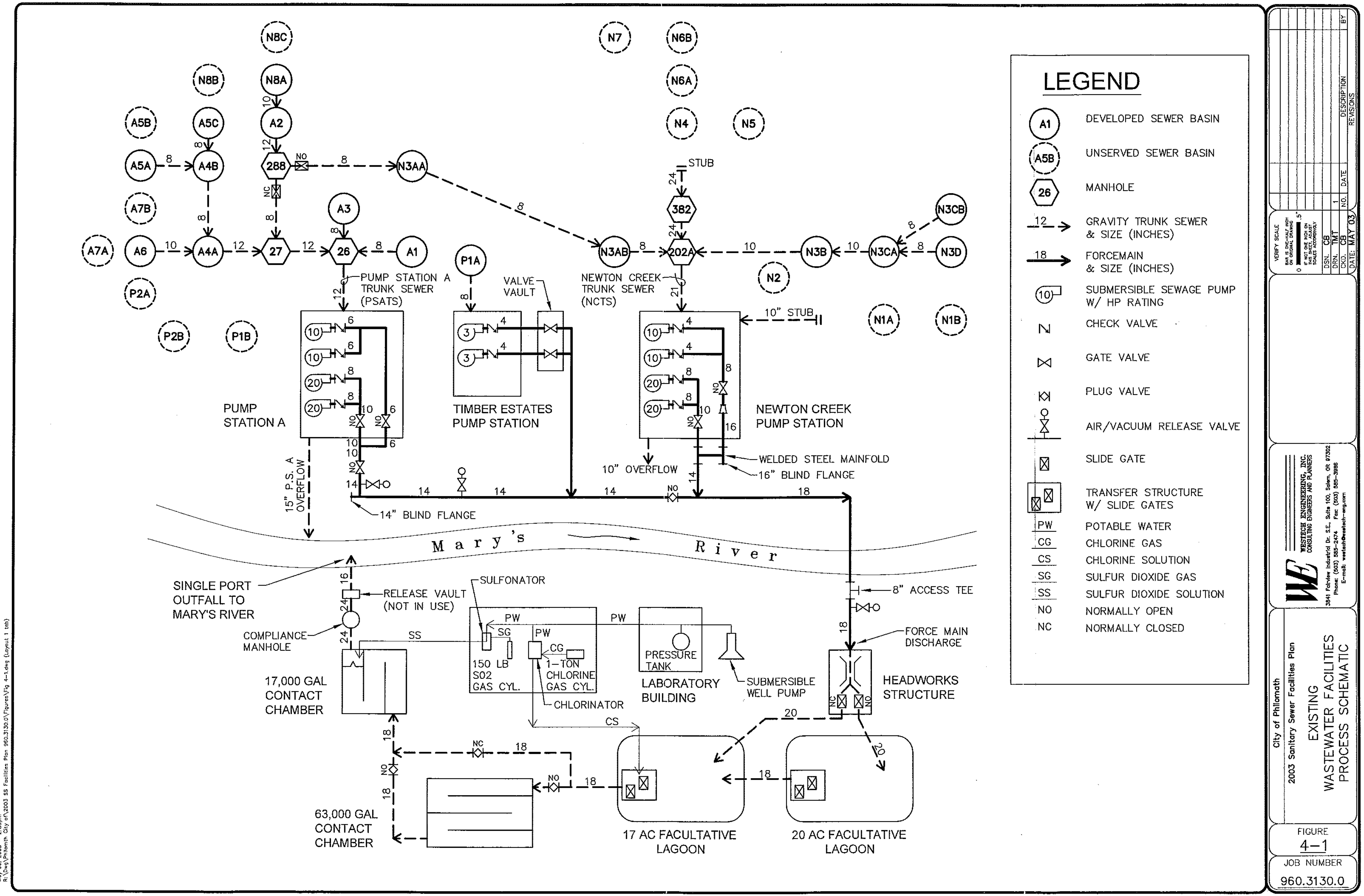
SECTION 4
EXISTING WASTEWATER FACILITIES

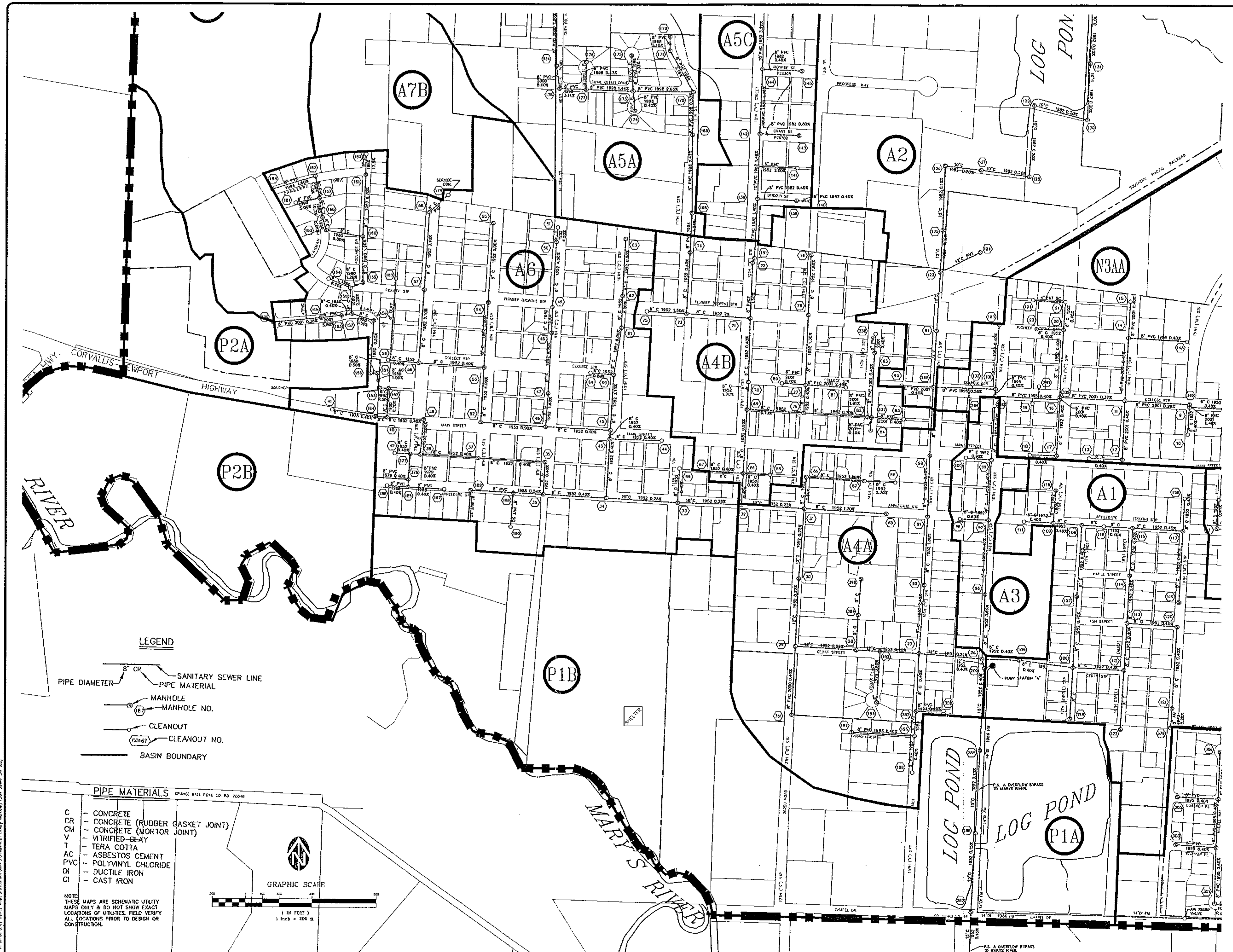
This section provides an overview of the existing wastewater facilities including the existing wastewater collection system, pump stations, and the wastewater treatment plant. It also summarizes known or reported problems related to each of these components.

4.1. General Overview of Existing Wastewater Facilities

Philomath's wastewater facilities consist of a conventional gravity collection system that conveys wastewater from the users to one of three pump stations. In general, the collection system serving the western portion of town conveys flows to Pump Station A. Pump Station A is located at the City shops complex near the south end of 16th street. The collection system serving the eastern portion of town conveys flows to the Newton Creek Pump Station. The Newton Creek Pump Station is located on Chapel Drive west of the Newton Creek Bridge. The Timber Estates Pump Station is a minor pump station located on Chapel Drive west of the Newton Creek Pump Station. This pump station serves a moderately sized residential subdivision known as Timber Estates. The three stations pump wastewater through a common force main to the treatment plant located south of the Marys River on the west side of Bellfountain Road. The treatment plant consists of a headworks for flow measurement and influent sampling, two facultative lagoons, a chlorination building with chlorine disinfection equipment, a laboratory building, a chlorine contact chamber, and an outfall to the Marys River. An overall schematic representation of the existing wastewater collection and treatment system including pump stations and force mains is presented in **Figure 4-1**.

Figures 4-2 through **4-5** show the existing wastewater collection facilities. Larger scale plots of these figures are included in **Appendix A**. These collection system maps show the sizes, pipe material, and year constructed for each line segment. The reader is encouraged to refer to these figures throughout the following discussion.


LEGEND
DEVELOPED SEWER BASIN
UNSERVED SEWER BASIN
MANHOLE
GRAVITY TRUNK SEWER & SIZE (INCHES)
FORCEMAIN & SIZE (INCHES)
SUBMERSIBLE SEWAGE PUMP W/ HP RATING
CHECK VALVE
GATE VALVE
PLUG VALVE
AIR/VACUUM RELEASE VALVE
SLIDE GATE
TRANSFER STRUCTURE W/ SLIDE GATES
PW POTABLE WATER
CG CHLORINE GAS
CS CHLORINE SOLUTION
SG SULFUR DIOXIDE GAS
SS SULFUR DIOXIDE SOLUTION
NO NORMALLY OPEN
NC NORMALLY CLOSED
PUMP STATION A TRUNK SEWER (PSATS)
NEWTON CREEK TRUNK SEWER (NCTS)
VALVE VAULT
PUMP STATION A
TIMBER ESTATES PUMP STATION
NEWTON CREEK PUMP STATION
10" STUB
STUB
10" OVERFLOW
WELDED STEEL MAINFOLD
16" BLIND FLANGE
14" BLIND FLANGE
15" P.S. A OVERFLOW
Mary's River
SINGLE PORT OUTFALL TO MARY'S RIVER
RELEASE VAULT (NOT IN USE)
SULFONATOR
COMPLIANCE MANHOLE
150 LB S02 GAS CYL.
1-TON CHLORINE GAS CYL.
CHLORINATOR
PRESSURE TANK
LABORATORY BUILDING
SUBMERSIBLE WELL PUMP
8" ACCESS TEE
FORCE MAIN DISCHARGE
HEADWORKS STRUCTURE
17,000 GAL CONTACT CHAMBER
63,000 GAL CONTACT CHAMBER
17 AC FACULTATIVE LAGOON
20 AC FACULTATIVE LAGOON
WESTECH ENGINEERING, INC.
CONSULTING ENGINEERS AND PLANNERS
City of Philomath
2003 Sanitary Sewer Facilities Plan
EXISTING WASTEWATER FACILITIES PROCESS SCHEMATIC
DSN. CB
DRN. TMT
CKD. CB
DATE: MAY 03
FIGURE 4-1
JOB NUMBER 960.3130.0



CITY OF PHILOMATH, OREGON

SANITARY SEWER SYSTEM MAP
SOUTHWEST QUADRANT

WESTECH ENGINEERING, INC.
CONSULTING ENGINEERS AND PLANNERS
3841 Fairview Industrial Dr. S.E., Suite 100, Salem, OR 97302
Phone: (503) 585-2474 Fax: (503) 585-3986
E-mail: westech@westech-eng.com

MAP UPDATED: APRIL 2003

SCALE
HORIZ: 1" = 200'
VERT:

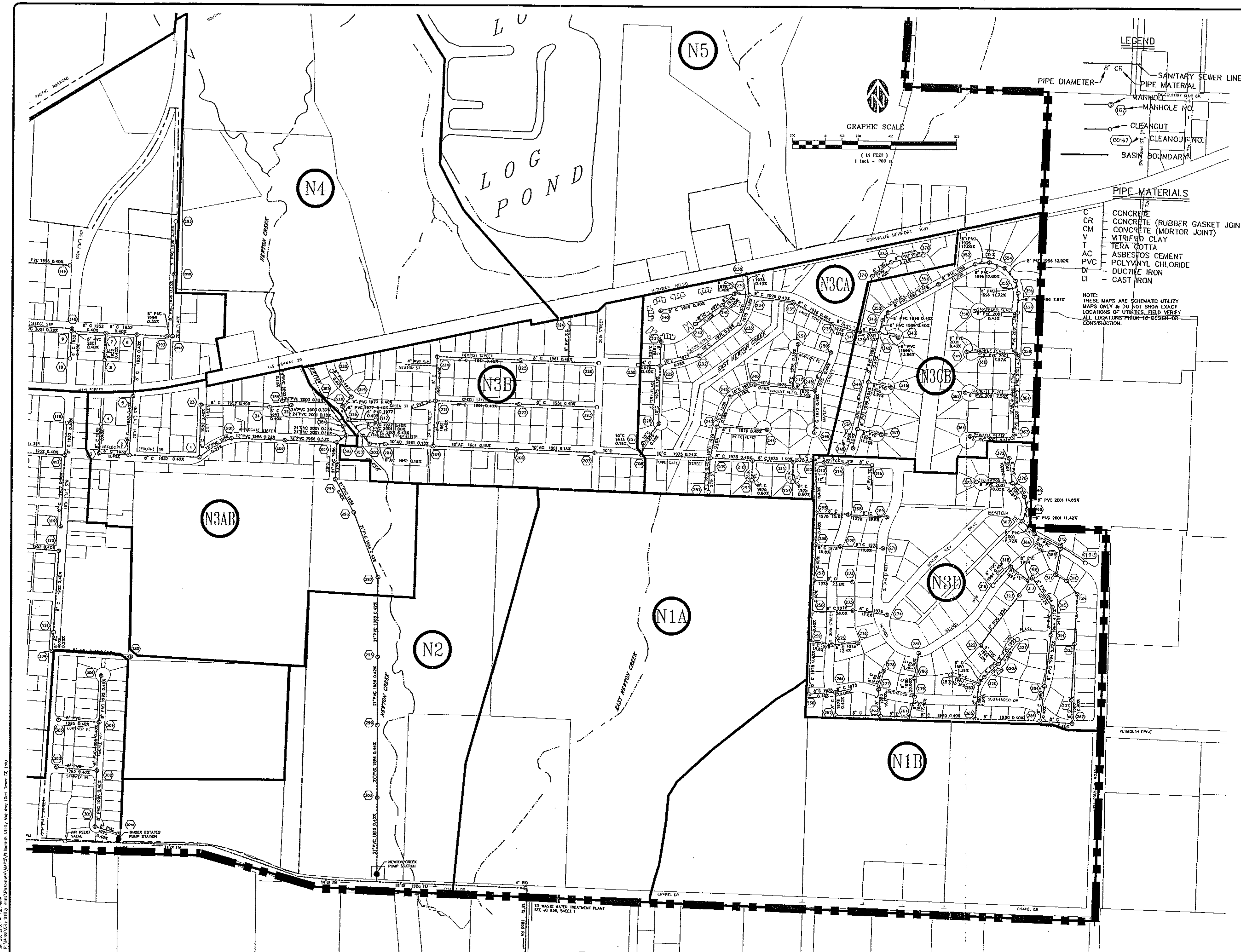
DSN.	DM
DRN.	RG
CKD.	DM
DATE:	FEB. 1998

NO.	DATE	DESCRIPTION	BY
1			

REVISIONS

SHEET 1 OF 4

JOB NUMBER 960.308.0



MAP UPDATED: APRIL 2003

SCALE HORIZ: 1" = 200'

DSN. DM | DRN. RG | CKD. | DATE FEB. 1998

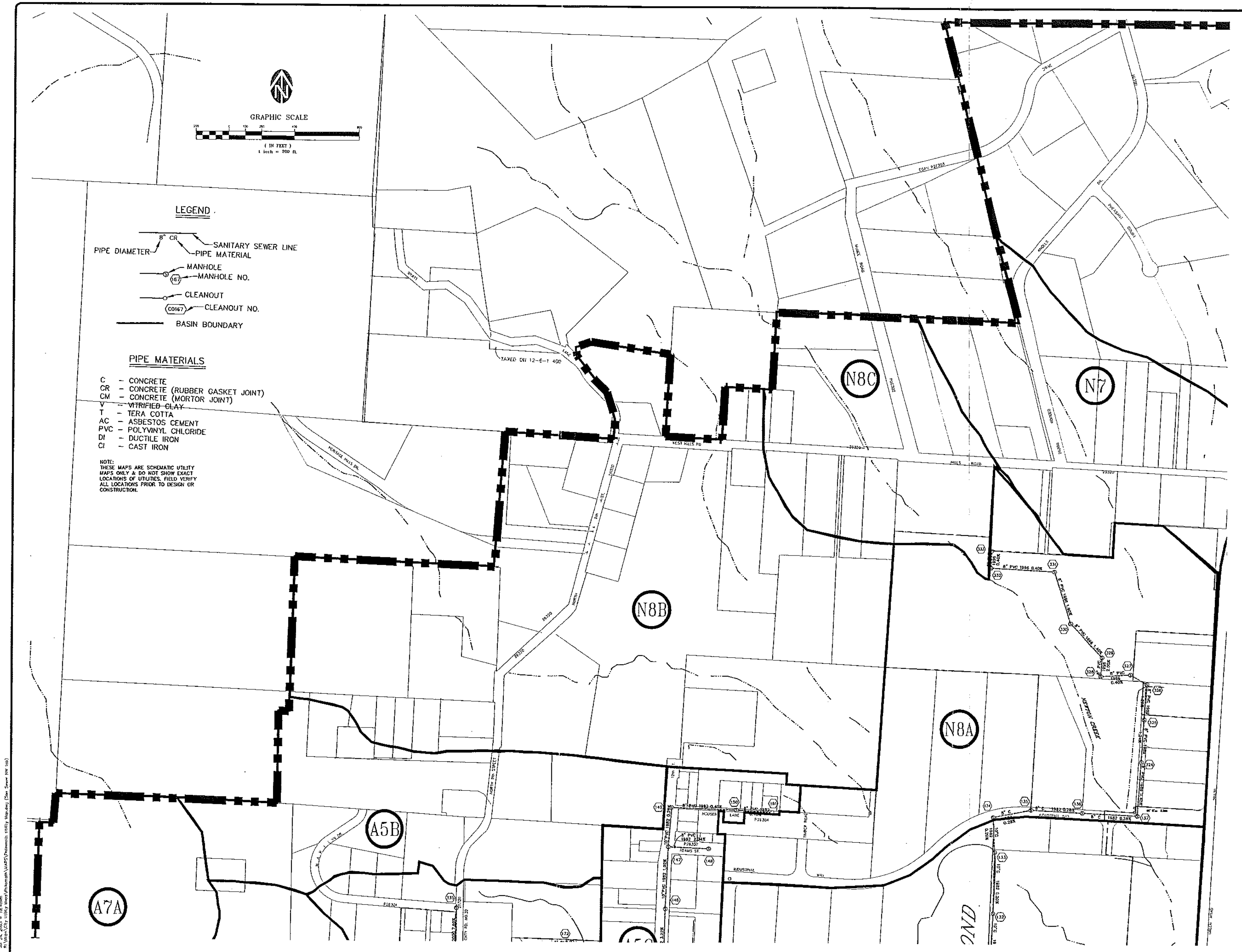
WESTECH ENGINEERING, INC.
CONSULTING ENGINEERS AND PLANNERS

CITY OF PHILOMATH, OREGON

SANITARY SEWER SYSTEM MAP
SOUTHEAST QUADRANT

SHEET 2 OF 4

JOB NUMBER 960.308.0



CITY OF PHILOMATH, OREGON

SANITARY SEWER SYSTEM MAP
NORTHWEST QUADRANT

MAP UPDATED: APRIL 2003

SCALE
HORIZ: 1" = 200'
VERT:

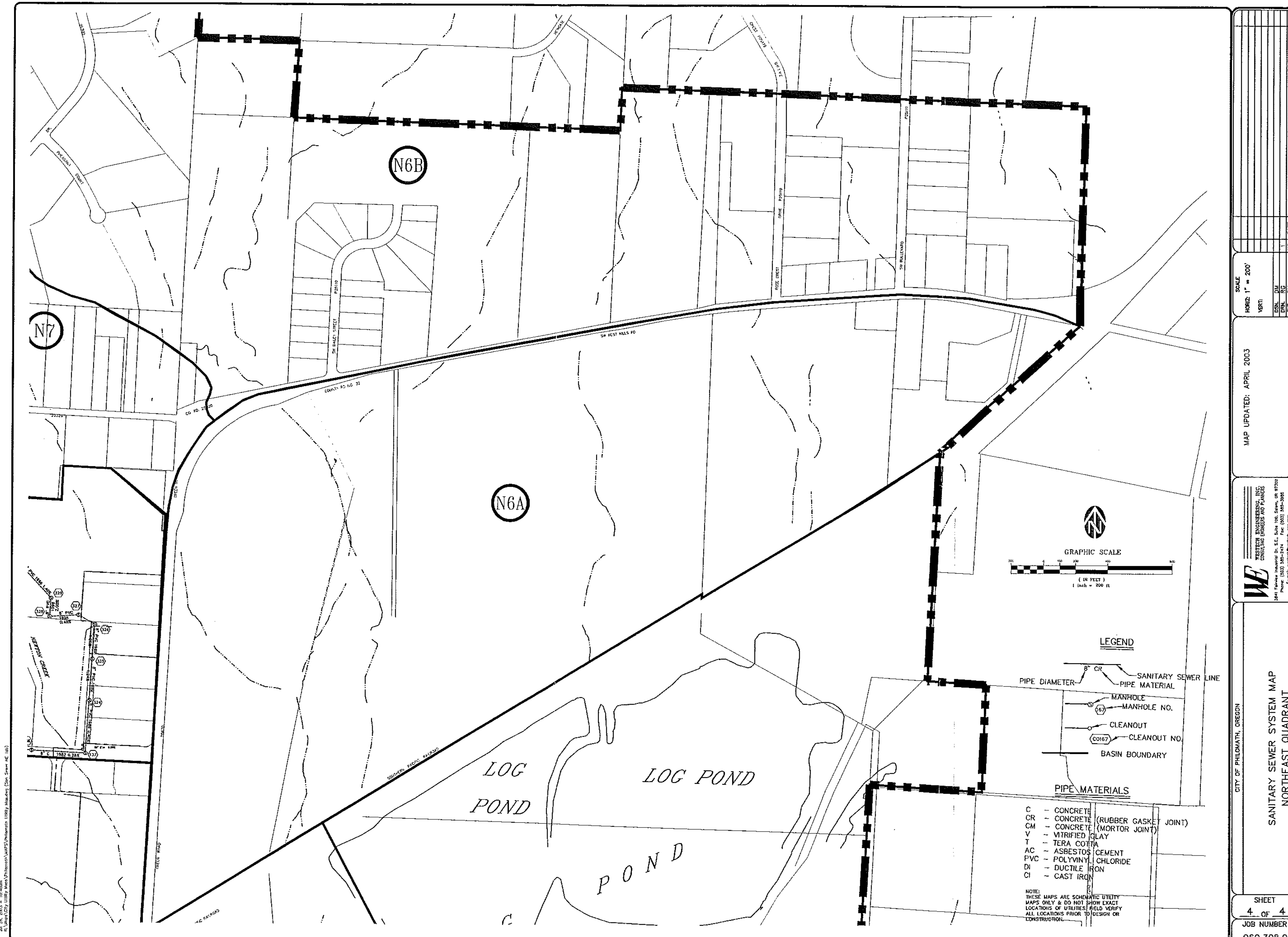
DSN. DM
DRN. RG
CKD. DM
DATE FEB. 1998

NO. | DATE | DESCRIPTION | BY
REVISIONS

WESTECH ENGINEERING, INC.
CONSULTING ENGINEERS AND PLANNERS

SHEET
3 OF 4

JOB NUMBER
960.308.0


N6B
N6A
N7
LOG POND
LOG POND
POND
SW WEST HILLS RD
COUNTY RD NO 32
SOUTHERN PACIFIC RAILROAD
NEWTON CREEK
GRAPHIC SCALE
(IN FEET)
1 inch = 200 ft
LEGEND
8" CR
SANITARY SEWER LINE
PIPE DIAMETER
PIPE MATERIAL
MANHOLE
167
MANHOLE NO.
CLEANOUT
CO167
CLEANOUT NO.
BASIN BOUNDARY
PIPE MATERIALS
C - CONCRETE
CR - CONCRETE (RUBBER GASKET JOINT)
CM - CONCRETE (MORTOR JOINT)
V - VITRIFIED CLAY
T - TERA COTTA
AC - ASBESTOS CEMENT
PVC - POLYVINYL CHLORIDE
DI - DUCTILE IRON
CI - CAST IRON
NOTE:
THESE MAPS ARE SCHEMATIC UTILITY MAPS ONLY & DO NOT SHOW EXACT LOCATIONS OF UTILITIES. FIELD VERIFY ALL LOCATIONS PRIOR TO DESIGN OR CONSTRUCTION.
CITY OF PHILOMATH, OREGON
SANITARY SEWER SYSTEM MAP
NORTHEAST QUADRANT
WESTECH ENGINEERING, INC.
CONSULTING ENGINEERS AND PLANNERS
MAP UPDATED: APRIL 2003
SCALE
HORIZ: 1" = 200'
VERT:
DSN. DM
DRN. RG
CKD. DM
NO. DATE
DESCRIPTION
REVISIONS
BY
SHEET
4 OF 4
JOB NUMBER
960.308.0

4.2. History and Development of Sewerage Facilities.

Philomath's original sewer system was built in 1952. It served most of the area within the present City limits west of Newton Creek. Concrete, mortar joint pipe was used for the sewer construction. Two sewage lift stations were built at that time. One was located at the sewage treatment plant and was intended to lift all sewage into the treatment plant. This was known as pump station A. At that time the sewage treatment plant was located at the City shops facility near the south end of 16th Street. A second lift station was constructed near the High School on Applegate Street. This lift station, known as pump station B, originally served the portion of the City east of 16th Street on the north side of Main Street and all of the area east of 19th Street on the south side of Main Street. Pump station B discharged through a force main into Manhole #117 on Applegate Street where sewage flowed by gravity to pump Station A. Pump stations A and B essentially divided the City into two distinct drainage basins. This configuration remained until the mid 1980's, when large-scale sewer improvements were constructed.

In 1985, the capacity of pump station A was increased. The station was converted to a submersible pump station with four new submersible pumps, new pump controls, new discharge piping, and a new top slab on the wet well. In 1986 the City constructed large-scale sewerage system improvements that changed the overall configuration of the collection and treatment system. As part of this project, pump station B was abandoned. This reduced flows to pump station A, since pump station B discharged into the collection system for pump station A. Therefore, the 1985 renovation of pump station A together with the 1986 demolition of pump station B provided the additional capacity in pump station A required for growth. As part of the 1986 project, flows from the collection system that originally drained to pump station B were rerouted to a new pump station on Chapel drive. This new pump station is known as the Newton Creek Pump Station, and remains in service essentially unaltered from the original 1986 project. In order to reroute flows, the sewer between Manhole #1 and Manhole #202A was reconstructed. The slope of this segment was reversed so that flow occurred from Manhole #1 to Manhole #202A. A new 21-inch gravity trunk sewer was constructed to convey flows south of Manhole #202A to the Newton Creek Pump Station.

The 1986 project also included the construction of a new treatment plant south of the Marys River. New force mains from pump station A and the Newton Creek pump station were constructed to convey flows to the new treatment plant,. From pump station A, a new 14-inch ductile iron force main was constructed south to Chapel Drive and east along Chapel Drive where it joined with a common 18-inch ductile iron force main at the Newton Creek Pump Station. Flows from both pump stations are conveyed through a common force main east of the Newton Creek Pump Station across Newton Creek and south to the new Treatment Plant.

The new treatment plant was designed as a summer-holding winter-discharge facility with a headworks, two facultative lagoons, and disinfection facilities. A new single-port discharge into the Marys River was also constructed. With the exception of a few minor modifications and the dechlorination project discussed below, the treatment plant has been operated as designed since originally constructed. Once the new WWTP was placed into service, the existing WWTP near the City shops was decommissioned.

Another project that had a significant impact on the configuration of the City's sewerage system was the 1995 Basin Transfer. This project consisted of rerouting a significant portion of the Pump Station A collection basin to the Newton Creek Pump Station. This decreased flow to Pump Station A, and thereby increased its useful life. In order to reroute the flows, a new sewer was constructed in College Street from Manhole #16 to Manhole #288 at 15th Street. All flows upstream of Manhole #288, that were originally routed to pump Station A were redirected to the Newton Creek Pump Station.

A final project that impacted the configuration of the City's sewerage system was the Timber Estates residential development located northwest of the intersection of Chapel Drive and 19th Street. Wastewater from this development is collected and conveyed by gravity to a small pump station located on Chapel Drive. This pump station discharges into the 14-inch ductile iron force main between Pump Station A and the Newton Creek Pump Station.

4.3. Wastewater Collection System

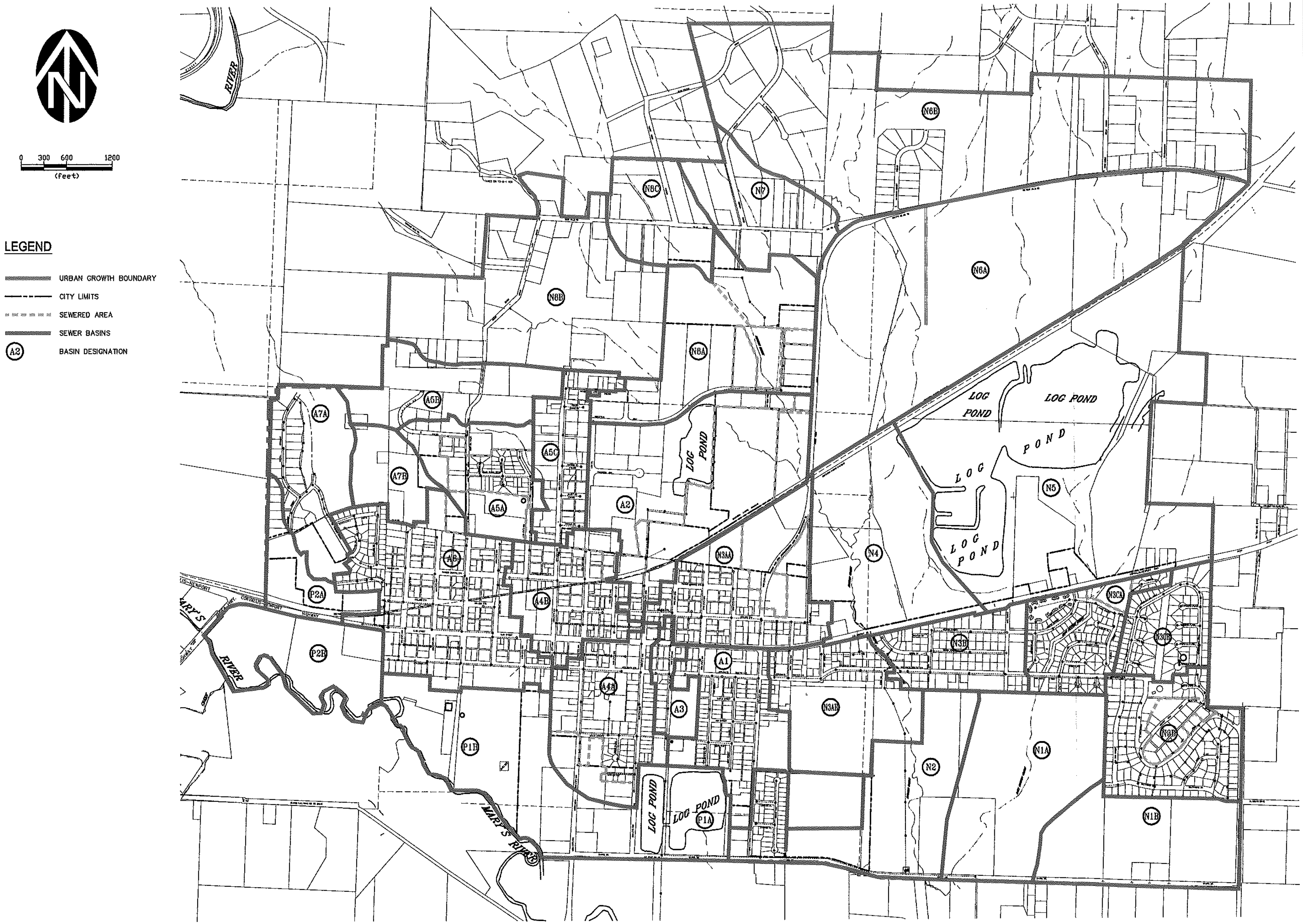
The City's existing sanitary sewage collection system collects wastewater from residences, businesses, industries, and public facilities and conveys the water to one of three pump stations where it is pumped through a common force main to the City's wastewater treatment plant. This section provides an overview of the existing wastewater collection system within the study area with an emphasis on flow routing and known and reported problems.

Although all public sewers within the study area are owned by the City, three entities have jurisdiction over the right-of-ways within which the sewer mainlines are located. In addition to the City, the Oregon Department of Transportation (ODOT) has jurisdictional oversight for facilities constructed within the Highway 34/20 right-of-way. While Benton County technically has jurisdictional oversight for sewer facilities constructed within County right-of-ways. Benton County typically defers review to the City for sewer facilities in County right-of-ways within City Limits.

4.3.1 Sewer Drainage Basins

To aid in the analysis of the collection system, it is convenient to divide the collection system into separate drainage basins. The basin boundaries are based on a combination of factors including topography, the layout of the existing system, property boundaries, and land use. The collection system is divided into 32 distinct basins as shown in **Figure 4-6**. The basin designations and boundaries are modified from the original basins as determined in the 1985 Facilities Plan.

As part of the 1985 Facilities Plan, the basins were designated by prefixes with "A" designating basins served by Pump Station A, "N" designating basins served by the Newton Creek Pump Station, and "P" designating basins which require additional pump stations. In order to maintain consistency with previous work, this basin designation scheme was retained even though the drainage patterns have developed differently than originally planned. For example, basin N8A was originally planned to be routed to the Newton Creek Pump Station via a trunk sewer running parallel to Green Road. Instead, sewer was extended into basin N8A from basin A2. Therefore, until the 1995 basin transfer project the sewered portion of basin N8A was routed to pump station A. As part of the 1995 basin transfer project, flows from Basin A2 were diverted through basin N3AA toward the Newton Creek Pump Station. Therefore, at the present time, flows from basin N8A are routed into basin A2 which discharges in to the Newton Creek Pump Station gravity collection system. The routing of the existing system is shown schematically in **Figure 4-1.** Though all of the sewer basins are shown in **Figure 4-1**, only those connected with the gravity piping symbol are currently served.



LEGEND

- URBAN GROWTH BOUNDARY
- CITY LIMITS
- SEWERED AREA
- SEWER BASINS
- (A2) BASIN DESIGNATION

NO.	DATE	DESCRIPTION	BY
1		REVISIONS	

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DSN. CB
DRN. TMT
CKD. CB
DATE: JULY 03

WESTECH ENGINEERING, INC.
CONSULTING ENGINEERS AND PLANNERS
3841 Fairview Industrial Dr. S.E., Suite 100, Salem, OR 97302
Phone: (503) 585-2474 Fax: (503) 585-3986
E-mail: westech@westech-eng.com

CITY OF PHILOMATH
2003 SANITARY SEWER FACILITIES PLAN

SANITARY SEWER BASIN MAP

FIGURE
4-6

JOB NUMBER
960.3130.0

Aug 25, 2004 - 10:43am
R:\Dwg\Philomath City of\2003 SS Facilities Plan 960.3130.0\Figures\Fig 4-6.dwg (Layout1 tab)

Table 4-1 lists the basin, name and approximate area within each of the basins.

TABLE 4-1
Collection System – Drainage Basin Areas

Sewer Basin Designation	Total Area (Acres)	Sewered Area (Acres)	Nonsewered Area (Acres)
A1	68	68	0
A2	120	55	65
A3	15	15	0
A4A	61	48	13
A4B	50	44	6
A5A	46	18	28
A5B	48	0	48
A5C	35	35	0
A6	108	106	2
A7A	50	0	50
A7B	24	0	24
N1A	90	0	90
N1B	68	0	68
N2	68	0	68
N3AA	74	54	20
N3AB	61	61	0
N3B	41	41	0
N3CA	41	37	4
N3CB	34	34	0
N3D	62	52	10
N4	94	0	94
N5	268	0	268
N6A	248	0	248
N6B	256	0	256
N7	47	0	47
N8A	93	37	56
N8B	138	0	138
N8C	38	0	38
P1A	50	12	38
P1B	91	0	91
P2A	24	0	24
P2B	51	0	51
Totals	2563	717	1846

4.3.2 Gravity Collection System

The service area with the City is served by a conventional gravity collection system. Wastewater is collected and conveyed by gravity to Pump Station A, the Newton Creek Sump Station, or the Timber Estates Pump Station.

The original collection system was constructed in 1952 as part of the original sewer system. The original construction utilized primarily concrete mortar joint pipe. Additions to the original system have utilized a variety of pipe materials including concrete with rubber joints, Asbestos Cement pipe, ABS truss pipe, and most recently PVC. Public Works design standards were adopted in 1998. The public works design standards allow only PVC and ductile iron pipe for the construction of gravity sewers.

The total estimated length of pipe in the gravity collection system is approximately 91,930 feet (±17.4 miles) with approximately 393 manholes and mainline cleanouts. **Table 4-2** contains a summary of the estimated quantities of piping by size and material type in the gravity collection system.

TABLE 4-2
Gravity Collection System
Estimated Piping Quantities

Pipe Size	Total Estimated Pipe Quantities (feet)				
	AC	Concrete	Clay	PVC	Totals
6"	-	379	499	436	1,314
8"	668	46,477	-	26,134	73,279
10"	1,398	6,201	-	2,175	9,774
12"	-	3,041	-	1,030	4,071
21"	-	-	-	2,657	2,657
24"	-	-	-	835	835
Totals	2,066	56,098	499	33,267	91,930

Review of **Table 4-2** above shows that the majority of the collection system is constructed of 8-inch sewer mains. Nearly 80% of the total length of the gravity sewer main is 8-inch diameter pipe. In regard to pipe materials, the majority of the gravity collection system is constructed of concrete pipe. As previously discussed, the original gravity collection system was constructed in 1952. In fact, approximately 33,270 feet or 36% of the total pipe length was constructed in 1952 and is now more than 50 years old. Due to the age of the concrete pipe, as well as the construction methods employed at the time, much of the original 1952 system collects excessive amounts of I/I and is generally in questionable condition.

It should be noted that the Newton Creek Sanitary Sewer Extension project is tentatively scheduled for completion in the summer of 2003. This project includes the construction of a 24-inch diameter trunk sewer north from manhole #382 across the Highway. This sewer extension is included on the utility maps and in quantities listed in **Table 4-2**, and is considered to be existing for the purposes of this facilities plan.

4.3.3 Existing Pump Stations

Wastewater is conveyed by the gravity collection system to one of three pump stations as discussed above. In general, the collection system serving the western portion of town conveys flows to Pump Station A. Pump Station A is located at the City shops complex near the south end of 16th street. The collection system serving the eastern portion of town conveys flows to the Newton Creek Pump Station. The Newton Creek Pump Station is located on Chapel Drive west of the Newton Creek Bridge. The Timber Estates Pump Station is a minor pump station located on Chapel Drive west of the Newton Creek Pump Station. This pump station serves the moderately sized Timber Estates subdivision northwest of the 19th Street and Chapel Drive intersection in sewer basin P1A. The three stations pump wastewater through a common force main to the treatment plant located south of the Marys River on the west side of Bellfountain Road.

A fourth minor pump station is located at the City Park south of Applegate Street on 23rd Street. This pump station serves the public restroom facility located at Pioneer Park. This pump station is relatively small and similar in nature to a single-unit residential pump station. As such, it is not included in the facilities planning effort, and is only mentioned here for completion. **Table 4-3** contains a summary of some of the import characteristics of each of the three pump stations. A more detailed description of each of the stations is then presented.

TABLE 4-3
Summary of Existing Pump Stations

Category	Pump Station A (PSA)	Newton Creek Pump Station (NCPS)	Timber Estates Pump Station (TEPS)
• Basins served • Construction date	A1, A3, A4A, A4B, A5A, A5C, A6 1952, Renovated 1985	A2, N3AA, N3AB, N3B, N3CA, N3CB, N3D 1986	P1A 1995
Flows • Design Discharge Rate	2.23 MGD (1550 GPM) @ 44' TDH	3.04 MGD (2110 GPM) @ 43' TDH (Ultimate wet well capacity = 7.05 MGD)	0.155 MGD (108 GPM) @ 37' TDH
Wetwell • Type • Diameter • Rim Elevation • 100 Yr Flood Elevation • Influent Invert Elevation • Low Water Pump Off Elev. • Depth • Operational Storage • Additional Pipe Stubs	 • Concrete • 10' • 265.25 • 264 • 247.15 • 243.00 • 24.25' • 2,400 gallons • none	 • Concrete • 16' • 252.00 • 251.01 • 241.25 • 229.20 • 23.75' • 13,200 gallons • 10" SE Side of wet well	 • Concrete • 6' • 272.50 • ± 260 • 262.67 • 257.50 • 16' • 283 gallons • none

TABLE 4-3 Continued
Summary of Existing Pump Stations

Category	Pump Station A (PSA)	Newton Creek Pump Station (NCPS)	Timber Estates Pump Station (TEPS)
Pumps • Type • Number • Manufacturer & Model • Motor Size • Motor Speed • Power	• Submersible Sewage Pumps • 4 total • (2) Flygt CP 3152 (434) (2) Flygt CP 3127 (442) • (2) 20 hp & (2) @ 10 hp • (4) 1750 rmp, single speed • 230 Volt 3 phase	• Submersible Sewage Pumps • 4 total • (2) Flygt CP 3152 (432) (2) Flygt CP 3127 (461) • (2) 20 hp & (2) @ 10 hp • (4) 1750 rmp, single speed • 460 Volt 3 phase	• Submersible Sewage Pumps • 2 total • (2) ABS AFP 1040-1 Series AFP 1 • (2) 3.7 hp • (4) 1780 rmp, single speed • 230 Volt 1 phase
Force Mains • Size & Type • Length • FM Discharge • FM Discharge El. • Maximum Static Head	• 14" DI (PSA to NCPS) 18" DI (NCPS to WWTP) • 4640' (14" PSA to NCPS) 5360' (18" NCPS to WWTP) • Common F.M. Sta 0+00 • ± 256 • 13 feet	• 18" DI (NCPS to WWTP) • 5360' (18" NCPS to WWTP) • Common F.M. Sta 46+36.50 • ± 256 • 26.80 feet	• 4" DI (TEPS to 14" FM Sta ± 31+44) 14" DI (Sta ±31+44 to NCPS) 18" DI (NCPS to WWTP) • 30' (TEPS to 14" FM Sta ± 31+44) 1493' (14" FM Sta to NCPS) 5360' (18" NCPS to WWTP) • Common F.M. Sta 31+44 • ± 256 • -1.5 feet
Hydrogen Sulfide Control	none	none	None
Auxiliary Power • Type & Location • Fuel Supply • Transfer Switch • Rating • Min Equipment to Operate	• Permanent onsite Natural Gas Powered Generator • Natural Gas Line • Automatic • 60 KW, 230V 3 phase • (2) 20 HP pumps started sequentially, building Lighting	• Permanent onsite Diesel Powered Generator • 240 gal capacity buried fuel tank • Automatic • 30 KW, 480V 3 phase 60 Hz • (2) 10 HP pumps started sequentially, building Lighting	• Portable Gas Powered Generator located at City shops • 1.6 gallon fuel tank • Manual • 3.5 KW, 230V 1 phase 60 Hz • (1) 3.7 HP pump
Telemetry	Telephone Dialer System	Telephone Dialer System	Telephone Dialer System
Overflow • Location • Type • Elevation • Discharge point • Overflow Storage	• Bypass in MH #200 • Overflow pipe in MH #200 • 258.00 • Marys River • 8,800 gallons	• Roadside ditch north of Chapel Drive • Overflow pipe from wet well to ditch • 250.00 • Newton Creek • 18,000 gallons	• Roadside ditch north of Chapel Drive • Overflow pipe from wet well to ditch • 268.25 • Newton Creek • 2,300 gallons

4.3.3.1 Pump Station A

Pump Station A consists of a circular wet well, four submersible sewage pumps, and associated controls and piping. Pump Station A is a four-plex pump station with two 20 HP and two 10 HP submersible pumps that are individually controlled in response to the water level in the wet well. The pumps pump from the concrete wet well through valved discharge piping and into the 14-inch force main. The pump station controls are located in a control building adjacent to the wet well.

The wet well is a cast-in-place concrete structure originally built in 1952 with an intermediate floor about 16 feet below grade. The intermediate slab was removed during the 1985 improvements. Access to the wet well is gained through a hatch on the northeastern quarter of the top slab. A ladder descends to within one foot of the wet well floor. The wet well is equipped with ventilation equipment.

Most of the pump discharge piping is located in the wet well. Sewage is pumped from the wet well by the pumps into vertical standpipes. Each standpipe is equipped with a check valve. A 6-inch pipe collects sewage from the small pumps and conveys it outside of the wet well. Likewise, 10-inch pipe conveys flow from the large pumps to the outside of the wet well. Immediately outside the wet well, a 6-inch by 10-inch tee connects the two discharge lines. Immediately downstream of this tee, the discharge piping connects to the 14-inch force main.

In general, the station has operated as designed since 1985 with a few modifications. In 1986, the City added a natural gas fired auxiliary power unit with an automatic transfer switch to provide backup power for the pump station. The auxiliary power unit is located in a weatherproof enclosure adjacent to the pump station and the automatic transfer switch is located in the control building. Another modification was the replacement of the wet well float switches with an ultrasonic water surface level sensor (Miltronics MultiRanger Plus). The original 1985 modifications included the installation of two 20 HP and two 5 HP submersible pumps. The two 5 HP submersible pumps were replaced with two 10 HP submersible pumps in 1999 as an interim means to increase the capacity of the station.

The pump station is equipped with an alarm and telemetry system that monitors high and low water level conditions as well as a generator fail to start condition. When an alarm condition occurs, the signal is transferred to Guardian Alarm of Corvallis through a phone dialer system. Guardian Alarm monitors the system and contacts the operator when an alarm signal is received. The telemetry system does not allow for remote monitoring, nor does the station have any data logging capabilities.

The City currently utilizes a portable crane for the retrieval of the pumps. A socket is mounted inside each of the hatch openings.

4.3.3.2 Newton Creek Pump Station

The Newton Creek Pump Station consists of a circular wet well, a small CMU block control building, four submersible sewage pumps, an auxiliary power unit, and associated controls and piping. The pump station was completed in 1986 and has operated largely as designed ever since.

The wet well is a cast in place concrete structure approximately 25 feet deep and 16 feet in diameter. While the existing pumps provide a capacity of 3.04 MGD, the wet well is sized for an ultimate capacity of 7.05 MGD. In addition to the main 21-inch inlet, a 10-inch diameter ductile iron stub enters the wet well at an invert elevation of 237.90 feet. This stub is intended to serve sewer basins N1A and N1B. The wet well is accessed through a hatch on the northeastern quarter of the top slab. A ladder descends to within one foot of the wet well floor. The wet well is equipped with ventilation equipment.

Most of the pump discharge piping is located in the wet well. Sewage is pumped from the wet well by the pumps into vertical standpipes. Each standpipe is equipped with a check valve. An 8-inch pipe collects sewage from the small pumps and conveys it outside of the wet well. Likewise, 10-inch pipe conveys flow from the large pumps to the outside of the wet well. Immediately outside the wet well, the 8-inch and 10-inch pipes flow into a welded steel manifold onto which a 14-inch ductile iron force main is attached. The steel manifold is equipped with a flange connection for a future 16-inch force main. The 14-inch ductile iron force main extends a short distance to Chapel Drive where it intersects the 14" force main from Pump Station A. The two force mains are connected with a ductile iron tee. On the downstream side of the tee, the force main increases to 18-inches in diameter.

The pumps operate according to the water level in the wet well. Ten float switches in the wet well open and close circuits, thereby starting and stopping the individual pumps. Each pump has a float switch that turns it on, and another that turns it off.

The control building is located adjacent to the pump station with approximate dimensions of 11 feet by 19 feet. The building houses the electrical control panels and pump motor starters, the auxiliary power unit, and the blower and ductwork for the wet well ventilation system. The building is equipped with an automatic intake louver located south of the auxiliary power unit that opens when the auxiliary power unit is in operation.

The pump station is equipped with an alarm and telemetry system that monitors high and low water level conditions as well as a generator fail to start condition. When an alarm condition occurs, the signal is transferred to Guardian Alarm of Corvallis through a phone dialer system. Guardian Alarm monitors the system and contacts the operator when an alarm signal is received. The telemetry system does not allow for remote monitoring, nor does the station have any data logging capabilities.

The station is also equipped with a 30 KW auxiliary power unit. The auxiliary power unit is sized to operate the two 10 HP pumps, the control system and building lighting. Fuel is supplied to the auxiliary power unit from a 240 gallon underground tank buried south of the control building.

The City currently utilizes a portable crane for the retrieval of the pumps. A socket is mounted inside each of the hatch openings.

4.3.3.3 Timber Estates Pump Station

Timber Estates Pump Station consists of a circular wet well, two submersible sewage pumps, and associated controls and piping. Timber Estates Pump Station is a duplex pump station with two 3.7 HP submersible pumps that are individually controlled in response to the water level in the wet well. The pumps pump from the concrete wet well through valved discharge piping and into the 14-inch force main. The pump station controls are located in a control cabinet adjacent to the wet well.

The wet well is a cast in place concrete structure approximately 16 feet deep and 6 feet in diameter. An 8-inch gravity sewer enters at invert elevation 262.67. There is an 8-inch overflow located at invert elevation 268.50 feet. The overflow discharges in the roadside ditch on the north side of Chapel Drive. This ditch ultimately discharges to Newton Creek. The wet well is accessed through a hatch on the top slab.

The existing pumps provide a capacity of 0.155 MGD. Each pump is mounted on a guide rail system to permit raising and lowering of the pumps. A lifting chain is attached to each pump. The pumps are controlled according to the water level in the wet well. There are four float switches in the wet well that open and close the control circuits, thereby starting and stopping the individual pumps.

The 4-inch discharge pipe from each pump passes through a 4-foot diameter precast circular valve vault. The vault is constructed using manhole barrel sections and contains no drainage provisions. Consequently, the valve vault remains full of water most of the time. This problem should be addressed during the planning period. The valve vault contains two 4-inch ball type check valves and two 4-inch gate valves. Shortly outside the valve vault the two discharge pipes joint into a single 4-inch pipe that connects to the 14" common force main in Chapel Drive.

The City owns a portable gas generator that is capable of running one of the pumps at the station. A manual transfer switch is provided for switching to auxiliary power

The pump station is equipped with an alarm and telemetry system that monitors high level and overflow. When an alarm condition occurs, an automatic dialer system begins to call preprogrammed telephone numbers. When a call is answered, the autodialer will deliver a prerecorded message and reset itself upon reception of a signal from the person being called. The telemetry system does not allow for remote monitoring, nor does the station have any data logging capabilities.

In general, the station has operated as designed since 1995 with no modifications.

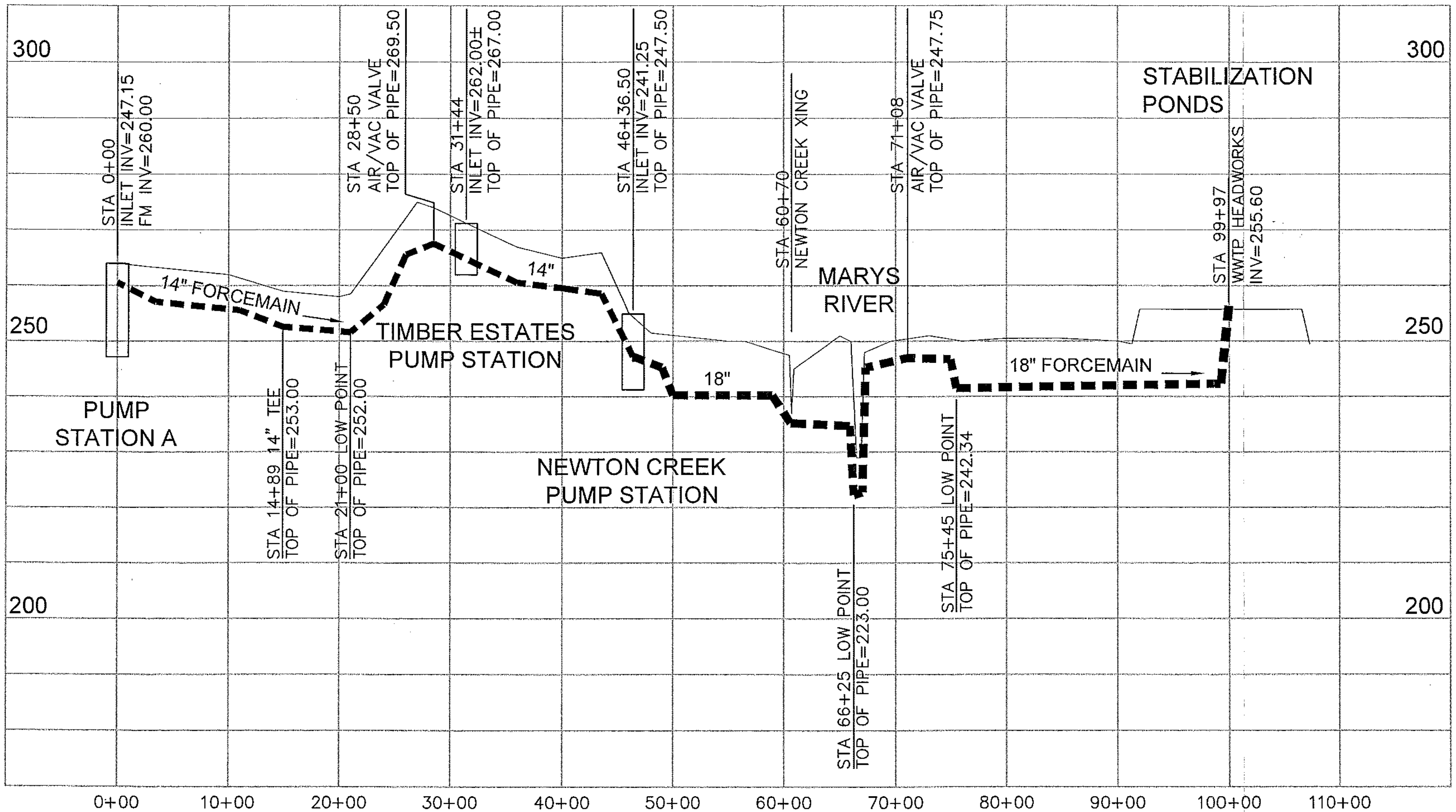
4.3.4 Existing Force main

The three pump stations described above pump wastewater through a common force main to the treatment plant located south of the Marys River on the west side of Bellfountain Road. Portions of the force main are shown in **Figures 4-1** and **4-2**. The force main begins at Pump Station A, where it extends south to Chapel Drive. The force main continues east on Chapel Drive to the Timber Estates Pump Station near the intersection of Chapel Drive and 19th Street. From the Timber Estates Pump station, the force main continues east along Chapel Drive to the Newton Creek Pump Station. The entire force main between Pump Station A and the Newton Creek Pump Station is 14-inch diameter class 50 ductile iron pipe. Immediately downstream of the connection with the Newton Creek Pump Station, the force main transitions to 18-inch diameter class 50 ductile iron pipe. From the Newton Creek Pump Station, the force main continues east along Chapel Drive for approximately 920 feet, where it bends south, and continues under the Marys River and discharges at the treatment plant headworks. The total length of the 14-inch force main between Pump Station A and the Timber Estates Pump Station is approximately 3,144 feet. From the Timber Estates Pump Station to the Newton Creek Pump Station the length of 14-inch force main is approximately 1,496 feet. From the Newton Creek Pump Station to the wastewater treatment plant, the length of 18-inch force main is approximately 5,360 feet.

The profile of the force main is continuously descending from Pump Station A to a low point beyond the 14-inch tee in Chapel Drive. The horizontal distance along the pipe from Pump Station A to the low point is approximately 2,100 feet. From the low point, the force main ascends to a high point with an air/vacuum release valve at approximately 750 feet east along Chapel Drive. The elevation of the top of the pipe at this high point is approximately 270 feet. From the high point in Chapel Drive the force main descends toward the Newton Creek Pump Station. Approximately 294 feet east of the high point, the Timber Estates Pump Station connects to the 14-inch force main. From the transition to the 18-inch force main at the Newton Creek Pump Station, the force main continues to descend before and after a 900 foot flat section to a low point under the Marys River. The horizontal distance along the pipe alignment from the Newton Creek Pump Station to the low point is approximately 1,984 feet. From the low point under the Marys River, the 18-inch force main ascends to a high point with an air/vacuum release valve located approximately 483 feet from the Marys River low point along the pipe alignment. The elevation of the top of the pipe at this high point is approximately 247.75 The force main then descends to a low point located approximately 437 feet from the high point along the pipe alignment. From this final low point, the 18-inch force main continues to ascend for the final 2,452 feet to the wastewater treatment plant headworks. The elevation of the invert of the flume in the headworks which controls gravity flow into the lagoons is approximately 256.35 feet.

The approximate profile of the force main from Pump Station A to the WWTP is shown in **Figure 4-7.**

The force main is equipped with a few notable appurtenances in addition to the two air/vacuum release valves mentioned above. These include a 14-inch eccentric plug valve located immediately west of the discharge tee for the Newton Creek Pump Station and an access port immediately south of the Marys River. Also worth noting is that two bores with bore casings were used in the construction of the force main. These are located under Chapel Drive where the force main crosses to the treatment plant and under the Marys River.



COMMON FORCEMAIN PROFILE

SCALE: 1" = 1000' H
1" = 20' V

CITY OF PHILOMATH
2003 SANITARY SEWER FACILITIES PLAN
COMMON FORCEMAIN PROFILE

WESTECH ENGINEERING, INC.
CONSULTING ENGINEERS AND PLANNERS
3841 Fairview Industrial Dr. S.E., Suite 100, Salem, OR 97302
Phone: (503) 585-2474 Fax: (503) 585-3986
E-mail: westech@westech-eng.com

VERIFY SCALE
BAR IS ONE-HALF INCH ON ORIGINAL DRAWING
0 .5"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DSN. CB
DRN. TMT
CKD. CB
DATE: MAY 03

NO.	DATE	DESCRIPTION	BY
1			

REVISIONS

FIGURE 4-7
JOB NUMBER 960.3130

May 07, 2003 – 6:53pm
R:\Dwg\Philomath City of\2003 SS Facilities Plan 960.3130.0\Figures\Fig 4-7.dwg (Layout 1 tab)

4.3.5 Infiltration and Inflow

The collection system is typical of many western Oregon sewer systems in that it experiences higher flows during the winter months because of infiltration and inflow (I/I). Average dry weather flow to the WWTP is about 0.454 mgd, while the average wet weather flow is about 1.100 mgd. This increase in flow is strongly related to precipitation. During prolonged dry periods, flow to the treatment plant will asymptotically decrease approaching dry weather flow values. During these low flow periods, the majority of the waste stream is composed of wastewater collected from the individual users. After a period of rainfall, flow increases as the ground becomes saturated and the amount of groundwater entering the collection pipes increases. During prolonged wet periods flow to the WWTP will actually track precipitation. In other words, when precipitation increases, flow to the WWTP also increases, and when precipitation decreases, flow to the WWTP decreases. This is known as rainfall induced infiltration and inflow. During high flow periods the waste stream is made up of wastewater collected from the individual users and groundwater resulting from I/I. The relationship between sewer flows and rainfall is so pronounced, that DEQ now recommends that sewer flows be related to rainfall amounts for determining critical flow quantities used for sizing wastewater facilities. This is discussed in more detail in **Section 5**. By utilizing the methodology recommended by the DEQ, it becomes possible to assign a return interval to a particular flow rate. In other words, it becomes possible to estimate flow associated with a 2-year 24-hour storm, a 5-year 24-hour storm, a 10-year 24-hour storm, and so on. For the purposes of this plan, only the flow associated with a 5-year 24-hour storm (PDAF5) was estimated. For Philomath, this value is approximately 4.080 mgd.

The I/I problem is significant and is a major concern to the City. The ratio between the average daily dry weather flow and the PDAF5 is approximately 9. This ratio is higher than many comparable collection systems in the Willamette Valley. High I/I flows are problematic for a number of reasons. They utilize reserve capacity and ultimately decrease the useful life of the gravity collection system. Since all of the wastewater in Philomath is pumped to the treatment plant, I/I increases pump run times and power costs. Finally, I/I is a burden to the treatment facilities since it must be treated and discharged as though it was wastewater.

4.3.6 Field Investigations

Westech personnel inspected the collection system on multiple days during and immediately following a major winter storm in late January 2003. Work on the first day of fieldwork was concentrated in the Pump Station A basin. No surcharging was observed in the Pump Station A basin during the first day of fieldwork. During the second day of fieldwork, a large portion of the Pump Station A basin was surcharged. The surcharging limits are shown in **Figure 4-8**. Field investigations included manhole inspections, spot checking instantaneous flows in the sewers, noting surcharging limits and flow mapping.

Flow mapping is a method used to help identify those portions of the collection system which contribute the most I/I and to quantify the amount of I/I originating within a section of the collection system. It consists of measuring the instantaneous flow in the sewer at strategic manholes in the collection system. The work is typically performed between midnight and 6 A.M. when sanitary flows are lowest. This allows the assumption that all flow in the collection system is from I/I. Typically, flow mapping is completed either during or immediately following a major winter storm so that the I/I contributions are highest. The results of the flow mapping are shown on **Figure 4-8**.

Based upon the field investigations, a review of the Daily Monitoring Reports (DMRs), and pump station hour readings the following statements can be made regarding I/I and the City's efforts to reduce I/I. The reader is encouraged to refer to **Figure 4-8** during the following discussion.

- While the City has some base I/I throughout the winter months. The vast majority of the I/I is either direct inflow or rainfall induced infiltration (RII). Once the soil is wet during the winter and early spring a major rainstorm will result in increased flows observed at the WWTP within a few hours after the precipitation starts.

- Though I/I flows decrease after a major storm, prolonged dry periods (i.e., a few weeks) are required before flows to the WWTP return to near summer levels. This suggests that a significant volume of groundwater must be drained before I/I levels return to low flow values. Conceptually, one can envision that the I/I flows slowly drain a relatively large storage reservoir.

- The newer portions of the collection system that are constructed of PVC pipe materials contribute very little I/I.

- Inadequate pump station and trunk sewer capacity results in surcharging in the lower portions of the pump station A collection basin.

- Surcharging of the lower portions of the Newton Creek Pump Station collection basin occurs during very large storms as a result of inadequate capacity in the 8-inch trunk sewer upstream of manhole 1.

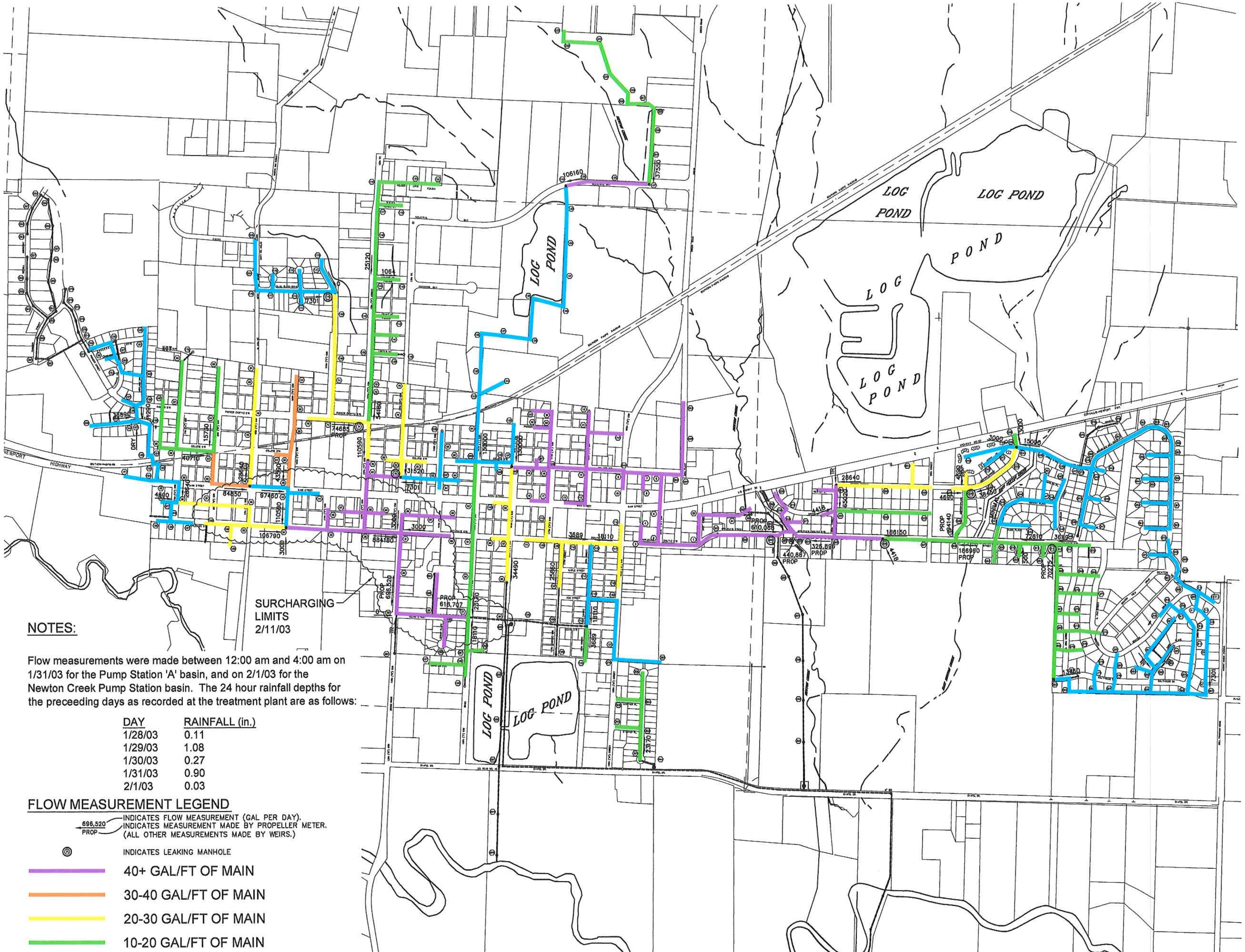
- Surcharged conditions in the lower end of the Pump Station A collection system during major storm events may act to reduce I/I into that portion of the collection system.

- I/I originates from all major components within the collection system – manholes, service laterals and sewer mains.

- Of 40 manholes that were inspected and were not surcharged, 8, or approximately 20% were observed to leak at various locations.

- Within the Pump Station A collection system, approximately 35% of the I/I originates in sewer basins A4A and A4B, from manhole 27 upstream to manholes 34 and 70. This area represents approximately 10-15% of the overall length of sewer main in the Pump Station A basin. Therefore, future I/I reduction efforts might best be focused in this area.

- Within the Newton Creek Pump Station collection system, the most severe I/I problems were observed in sewer basins N3AA, N3AB, and N3B from manhole 202A upstream to manholes 206, 224, and 290. This includes the portion of College Street Sewer that was replaced in 2001. It is not likely that the new College Street Sewer has a significant I/I problem. That the flow mapping data suggests this, is an artifact of where the readings were taken. A closer examination of this basin will likely show that the older portions of the sewer pipe contribute large amounts of I/I.



NOTES:

Flow measurements were made between 12:00 am and 4:00 am on 1/31/03 for the Pump Station 'A' basin, and on 2/1/03 for the Newton Creek Pump Station basin. The 24 hour rainfall depths for the preceeding days as recorded at the treatment plant are as follows:

DAY	RAINFALL (in.)
1/28/03	0.11
1/29/03	1.08
1/30/03	0.27
1/31/03	0.90
2/1/03	0.03

FLOW MEASUREMENT LEGEND

696,520 PROP — INDICATES FLOW MEASUREMENT (GAL PER DAY). INDICATES MEASUREMENT MADE BY PROPELLER METER. (ALL OTHER MEASUREMENTS MADE BY WEIRS.)

INDICATES LEAKING MANHOLE

40+ GAL/FT OF MAIN

30-40 GAL/FT OF MAIN

20-30 GAL/FT OF MAIN

10-20 GAL/FT OF MAIN

LESS THAN 10 GAL/FT OF MAIN

Aug 25, 2004 - 10:42am
R:\Dwg\Philomth City of\2003 SS Facilities Plan 960.3130.0\Figures\Fig 4-8 FLOWMAP.dwg (Layout1 tab)

NO.	DATE	DESCRIPTION	BY
1		REVISIONS	

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DSN. CB
DRN. TMT
CKD. CB
DATE: MAY 03

WESTECH ENGINEERING, INC.
CONSULTING ENGINEERS AND PLANNERS
3841 Fairview Industrial Dr. S.E., Suite 100, Salem, OR 97302
Phone: (503) 585-2474 Fax: (503) 585-3986
E-mail: westech@westech-eng.com

CITY OF PHILOMATH
2003 SANITARY SEWER FACILITIES PLAN

COLLECTION SYSTEM FLOW MAPPING DATA

FIGURE 4-8

JOB NUMBER 960.3130.0

4.3.7 Description of Known Existing Collection System Deficiencies

Problems with the Collection System were identified from meetings and discussions with City staff and from field investigations. During major winter storms, the lower portions of the collection system surcharge due to inadequate capacity in Pump Station A and inadequate capacity in portions of the collection system piping. The types of problems discussed can generally be divided into the following categories; lack of capacity, end of useful life and lack of maintenance. A short discussion of each of these categories follows. The deficiencies listed in this section are largely based on field observations and operational problems. Since components of the collection system (i.e., gravity collection piping) are not monitored on a full-time basis, this list of deficiencies should not be considered all-inclusive. As described in **Section 6**, several additional collection system deficiencies exist that are revealed through quantitative analysis.

Pump Station A lacks capacity to convey existing peak flows and should be replaced early in the planning period. The Newton Creek pump station is in relatively good condition and is sufficiently sized to convey the existing peak flows. A few minor improvements may be required during the planning period. These are likely to include control and telemetry modifications and removal and replacement of the existing buried fuel tank.

Lack of Capacity. This type of problem results from pipes that are too small to handle the peak sewage flows. This problem is a result of peak sewage flows increasing either due to development upstream or deterioration of the upstream system (i.e., increased I/I). Portions of the lower gravity collection piping appear to lack the capacity to convey peak flows.

End of Useful Life. This type of problem is the result of old, damaged, or worn out facilities that no longer function as designed. The most common example of this type of problem includes broken or collapsed pipes. The correction of these types of problems requires replacement or reconstruction of the existing system.

Lack of Maintenance. Grease, dirt, sediment, and other debris introduced into the sanitary sewer system may settle out or become lodged in pipes and manholes, resulting in surcharging due to the reduced capacity of the system. This type of problem can be prevented or minimized by routine inspection and cleaning of the gravity system.

A second problem in this category results when manholes are located within or adjacent to ditches or other storm drainage facilities that are not maintained. Under this scenario, the stormwater in the ditches often enters the sanitary sewer system through manhole lids or castings that are not tightly grouted to the manhole cone.

Infiltration/Inflow. I/I flows in the collection system utilize capacity in the sewer mains which was intended for sanitary sewage. When excessive, it results in surcharged sewers, abnormally high pump run times and bypasses. As stated in prior sections, the lower end of the collection system surcharges and upon occasion bypasses to surface waters or backs up into residences.

Table 4-4 outlines the major known problem areas, as well as the category that the problem falls under.

TABLE 4-4
Known Collection System Problem Areas

Location	Problem Category
Pump Station A Collection System	
Pump Station A	Lack of Capacity; Wet Well at end of Useful Life
Basin A4A, A4B, A6	I/I
Cedar Street (From MH 26 to MH 29)	Lack of Capacity
13th Street (From MH 29 to MH31)	Lack of Capacity
Applegate Street (From MH 31 to MH 35)	Lack of Capacity
10th Street (From MH 34 to MH 45)	Lack of Capacity
Main Street (From MH 45 to MH 46)	Lack of Capacity
12th Street (From MH 32 to MH 71)	Lack of Capacity
Manholes Throughout the Collection System	I/I
Newton Creek Pump Station Collection System	
Buried fuel tank at Newton Creek Pump Station	End of Useful Life
Basin N3AA, N3AB, N3B	I/I
Applegate Street (From MH 203 to MH 208)	Lack of Capacity
Applegate Street (From MH 1 to MH 2)	Lack of Capacity
20th Street (From MH 2 to MH 6)	Lack of Capacity
College Street (From MH 6 to MH 9)	Lack of Capacity
Manholes Throughout the Collection System	I/I

4.3.8 Collection System Non-Compliance Issues

The City has not received any notice of non-compliance letters (NON's) from DEQ for the past few years addressed to problems in the collection system.

There are a number of areas in the collection system that will likely experience compliance problems unless significant upgrades are completed within the planning period. These include the replacement or reconstruction of over capacity and faulty sewers that contribute significant I/I. Continued I/I control efforts are needed in the collection system regardless if growth within the collection system occurs. The specific projects are discussed in more detail in **Section 6**.

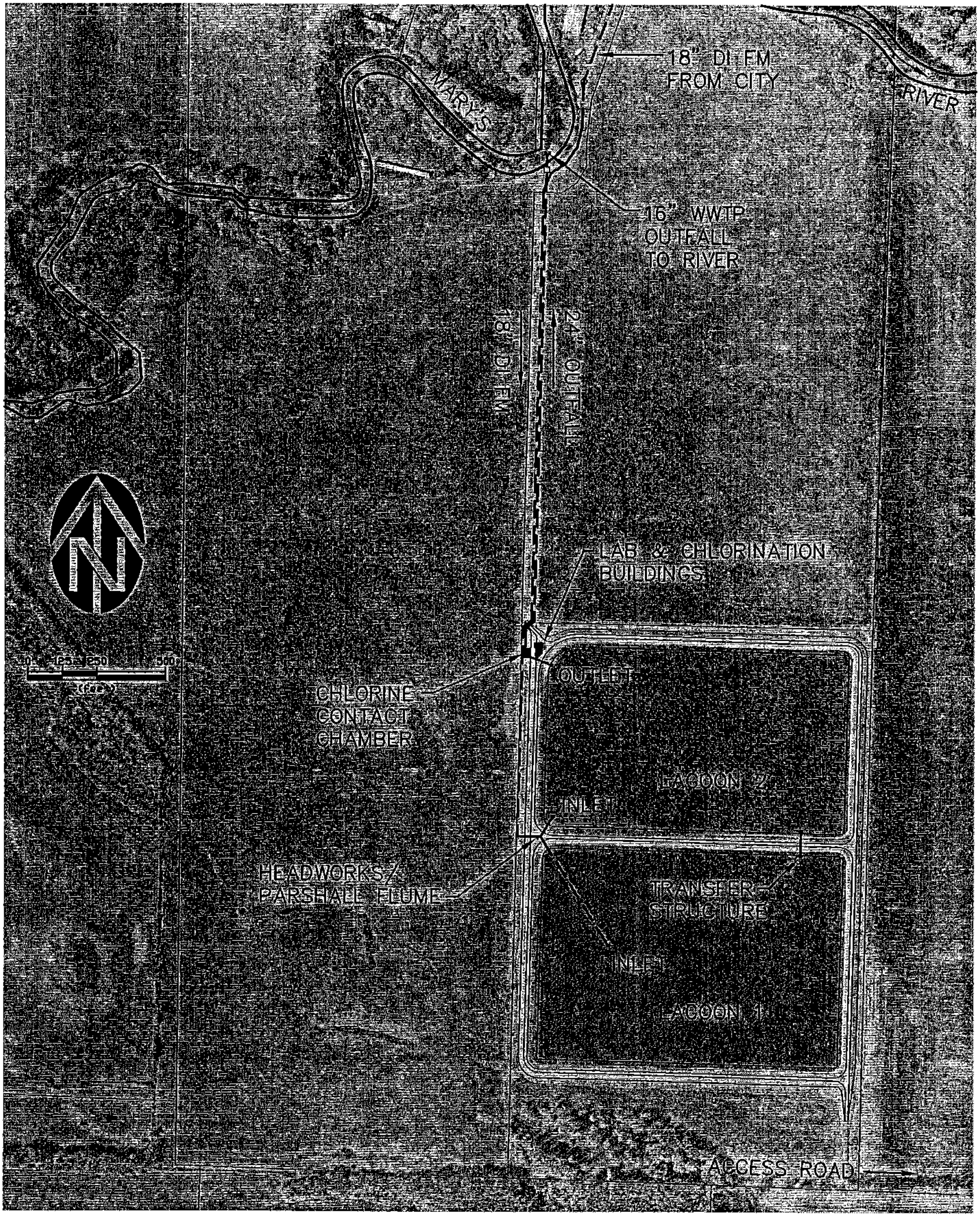
4.4. Wastewater Treatment and Disposal System

The City of Philomath owns, operates and maintains the wastewater treatment plant (WWTP) serving the City. The WWTP is located south of the City on the south side of the Marys River west of Bellfountain Road. The WWTP has two stabilization lagoons that normally operate in series on a summer-holding winter-discharge operational scheme. Treated wastewater is discharged through an outfall pipeline during the winter discharge season (November 1-April 30) to the Marys River. The WWTP and outfall were constructed in 1986 and continue to operate largely as designed. In addition to the lagoons, the treatment plant includes a headworks for flow measurement and influent sampling, a chemical building with chlorine disinfection equipment, a laboratory building, and a chlorine contact chamber. The wastewater facilities are schematically presented in **Figure 4-1**. The existing treatment plant plan is presented in **Figure 4-9**. The City is currently constructing dechlorination improvements that will add an additional chlorine contact chamber as well as a sulfur dioxide dechlorination system. These improvements are included in **Figure 4-1** and are considered completed for the purposes of this report. A summary of the existing treatment facilities is presented in **Table 4-5** followed by a short discussion of the individual unit processes.

TABLE 4-5
Summary of Existing Treatment Facilities

Design Year	1996	
Organic Loading Rates • First Lagoon • Average of All Lagoons	 • 50 lbs BOD/acre/day • 35 lbs BOD/acre/day	
Design Flows • ADWF • AWWF • PWWF	 • 0.475 MGD • 1.20 MGD • 3.73 MGD	
Design Loadings • BOD • TSS	 • 976 PPD • 1081 PPD	
Design Net Summer Evaporation	15 Inches	
Lagoon Features • Type • Area • Storage • Minimum Depth • Maximum Depth • Minimum Freeboard • Width at Dike Top • Inside Dike Slope • Outside Dike Slope	Northern Lagoon • Facultative (non aerated) • 17.5 Ac • 123.2 Ac -ft • 2 Feet • 8 Feet • 3 Feet • 12 Feet • 3:1 Feet • 2:1 Feet	Southern Lagoon • Facultative (non aerated) • 20.0 Ac • 108.6 Ac-ft. • 2 Feet • 8 Feet • 3 Feet • 12 Feet • 3:1 Feet • 2:1 Feet
Influent Flow Measurement • Primary Device • Location • Measurement Range • Meter Type • Meter Range	 • 12" Parshall Flume • Headworks • 0.258 – 7.500 MGD • Stevens Model 61R Float Operated Mechanical Meter • 0 – 7.0 MGD	

TABLE 4-5 Continued Summary of Existing Treatment Facilities	
Influent Sampling • Location • Method • Automatic Sampler	 • Headworks • Grab & Composite • ISCO Portable Sampler
Disinfection Facilities • Type • Location • Chlorinator • Maximum Feed Rate • Control System • Injection Point • Contact Chamber • Contact Volume • Minimum Contact Time	 • Gas Chlorination System (1 Ton Cylinders) • Chemical Building • Wallace & Tiernan V500 • 200 lbs per day • Flow paced from effluent meter reading • Northerly Lagoon Outlet Structure • Two Cast-in-Place Concrete Tanks with Baffles • 80,000 gallons • 30 minutes at 3.85 MGD
Dechlorination Facilities • Type • Location • Sulfonator • Maximum Feed Rate • Control System • Injection Point	 • Sulfur Dioxide Gas Feed System (150-lb Cylinders) • Chemical Building • Capitol Series NXT 3000 • 50 ppd with spare parts required to resize to 100 ppd • manual • Effluent Measurement Weir
Effluent Flow Measurement • Primary Device • Location • Measurement Range • Meter Type • Meter Range	 • 4- Foot Sharp Crested Rectangular Weir • Contact Chamber Outlet • 0.779 – 8.705 MGD • Stevens Model 61R Float Operated Mechanical Meter • 0 – 3.5 MGD
Effluent Sampling • Location • Method • Automatic Sampler	 • Compliance Manhole • Grab & Composite • ISCO Portable Sampler
Telemetry System	none
Auxiliary Power	none
Outfall • Location • Size & Type	 • Marys River • 16-inch Class 50 Ductile Iron Single Port



Jul 28, 2003 - 4:18pm
R:\Dwg\Philomath City of\2003 SS Facilities Plan 960.3130.0\Figures\Fig 4-9.dwg (8.5x11 tab)

WESTECH ENGINEERING, INC.
CONSULTING ENGINEERS AND PLANNERS

3841 Fairview Industrial Dr. S.E., Suite 100, Salem, OR 97302
Phone: (503) 585-2474 Fax: (503) 585-3986
E-mail: westech@westech-eng.com

SCALE
HORIZ:
VERT:

DSN.	CB
DRN.	TMT
CKD.	CB
DATE:	JULY 2003

City of Philomath 2003 Sanitary Sewer Facilities Plan

EXISTING
PHILOMATH
SEWAGE TREATMENT PLANT

FIGURE
4-9

JOB NUMBER
960.3130.0

4.4.1 Headworks

Discharge from the pump stations is delivered to the treatment facilities through an 18-inch diameter force main that discharges into the headworks structure. The headworks structure includes a Parshall flume for flow measurement. The flume has a 12-inch wide throat and is equipped with an adjustable steel baffle designed to reduce turbulence in the flume. The flume is equipped with a staff gauge for spot checking. Adjacent to the flume is a stilling well and float operated mechanical flow recorder. Influent sampling is accomplished by a non-refrigerated, portable sampler. Flow from the flume is directed into either pond by positioning the aluminum slide gate at the outlet. Under normal operating conditions, flow is directed to the southerly lagoon. Flow from the headworks is carried through 20-inch discharge piping to the two lagoons and discharged at a single location below the water surface. The discharge piping to the southerly lagoon extends approximately 475 feet to a single port discharge located as shown in **Figure 4-9**. The discharge piping to the northerly lagoon extends approximately 100 feet to a single port discharge located as shown in **Figure 4-9**. The concrete in the headworks structure shows signs of minor to moderate hydrogen sulfide attack.

4.4.2 Influent Flow Measurement

Influent flow is measured at the Parshall flume. A Stevens Model 61R flow meter measures the total and instantaneous flow. Total flows are recorded on the totalizer and instantaneous flows are recorded on a 4-inch wide strip chart recorder. The flow meter is equipped with two sets of gears for measuring summer and winter flows. There is no telemetry system for the remote monitoring of the flow signal.

4.4.3 Facultative Lagoons

The two facultative lagoons provide biological treatment and biosolids digestion for the wastewater. The ponds were constructed of native onsite clay soils. The lagoons have no synthetic liners. The lagoons operate in series and are intended to provide both storage of wastewater during the non-discharge season and treatment to secondary standards. The lagoons are designed to operate between a minimum depth of 2 feet and a maximum depth of 8 feet. These design parameters provide for three feet of freeboard from the top of the dikes. The sizing criteria for the south lagoons is governed primarily by the need to store wastewater during the six month non discharge season.

The southerly lagoon provides the initial treatment of the waste stream. From the southerly lagoon, wastewater flows by gravity through a transfer structure at the northeast corner of the lagoon and into the southeast corner of the northerly lagoon. The transfer structure is a cast-in-place concrete structure that regulates flow between the two lagoons. Canal gates are positioned at different elevations and allow the operator to draw off water from different levels in the water column. The structure has two 13-inch by 24-inch blockouts near the top of the walls. The blockouts function as emergency overflows if pond levels become to high. Access to the interior of the structure is gained through a hinged wooden hatch. Flow between the two lagoons is thorough an 18-inch ductile iron pipeline.

Following additional treatment in the northerly lagoon, treated effluent is withdrawn from the northwest corner of the lagoon. The outlet structure is almost identical to the transfer structure. The outlet structure has an interior two foot high concrete wall to prevent pond water depth from falling below two feet. A shear gate in the interior wall allows the pond water to be drawn down for maintenance purposes. Effluent from the outlet structure flows through an 18-inch ductile iron pipeline to the chlorine contact chamber.

The lagoons have been in service since 1986. Biosolids tend to accumulate in the lagoons over time, especially in the first cell near the influent pipe discharge point. Biosolids have not been removed from the lagoons to date. In order to ascertain the quantity of biosolids present in the lagoons, Westech Engineering completed a biosolids survey of the lagoons in November 2001 (see **Appendix C**). The survey shows that the biosolids accumulations in the primary lagoon have a maximum depth of about 2.0 feet immediately adjacent to the discharge point. As is typical in most lagoon biosolids surveys, the maximum depth occurs in the immediate vicinity around the influent pipe discharge. The biosolids depth decreases quickly a short distance (e.g., ±75 feet) from the pipe discharge. The average biosolids depth measured was about 0.35 feet. The average depth of biosolids measured in the second lagoon is less than 0.1 feet. The relatively small accumulation of biosolids is believed to be due to the fact that the lagoons are lightly loaded from an organic standpoint and because there are no major commercial or industrial users in the collection system. The City is required to perform a biosolids survey every five years. Based on the amount of accumulated biosolids measured during the 2001 survey, it is not likely that the City will need to remove the biosolids during the planning period if the recommendations included herein are implemented in the next ± 5 years and the characteristics of the waste stream remain constant.

A lagoon leakage test was performed to determine if the seepage rate from the lagoons exceeded the DEQ's maximum allowable seepage rate of 1/8 inch per day. City personnel conducted a leakage test of the lagoons in August 2002 (See **Appendix C**). Each lagoon was isolated from the other lagoon during the test period. No treated effluent was discharged from the WWTP during the test. The leak testing showed average seepage rates of 0.049 and 0.011 inches per day for the southerly and northerly lagoons respectively. Based upon this evaluation, the seepage rate from the lagoons is acceptable and no corrective work is necessary at this time.

4.4.4 Chemical and Control Building

The chemical and control building is a two room concrete block building. The chlorinator, sulfonator, chlorine injector, sulfur dioxide injector, electrical panel, and chlorine scale gauge are housed in a small room on the south side of the building. The chlorine scale, 1-ton chlorine cyliners, 150-pound sulfur dioxide cylinders, and the sulfur dioxide scale are housed in the building's north room. The building is equipped with a chlorine leak detector and exhaust fan.

4.4.5 Laboratory Building

The laboratory building is a single room portable facility that was constructed in 2002. The laboratory building houses the lab equipment refrigerators, and the pressure tank for the onsite water supply system. The laboratory building is equipped with a sink and a restroom.

4.4.6 Chlorine Gas Disinfection System

The chlorination system includes a chlorinator and injector housed in the south room of the control building. The chlorinator is a Wallace & Tiernan V500 flow proportional unit. It has a V-notch orifice and maximum feed rate of 50 pounds per day. The injector is a 1½-inch unit-injector mounted on a PVC panel. The dosage is set manually at the chlorinator and the feed rate is paced off of a flow signal from the effluent flow meter. The chlorination system is a solution feed system. Chlorine gas is mixed with feed water at the injector. The chlorine gas and feed water solution is piped through a 2-inch PVC line to the outlet structure where it is discharged through a diffuser.

The north room of the control building is designed for ton chlorine cylinders. The scale is designed for two cylinders. One spare cylinder can also be placed in the room. The cylinders rest on trunions that allow for the cylinders to be rotated. The building is equipped with an electric hoist and trolley for loading and unloading the cylinders. Chlorine gas is withdrawn from the ton cylinders with equipment designed for automatic switchover. The Chlorine gas is under pressure only to the vacuum regulator check unit. Beyond this unit, the gas is under vacuum. Adjacent to each vacuum regulator check unit is a drip-leg heater to ensure that no liquid chlorine is withdrawn from the ton cylinders.

Chlorine contact time is provided in two contact chambers. The initial chamber was constructed in the summer of 2003 and provides approximately 63,000 gallons of contact volume. The second chamber was constructed as part of the original WWTP construction project and provides approximately 17,000 gallons of contact volume. The original treatment facilities utilized the 24-inch outfall pipeline to provide contact time. This pipeline terminated in an outfall structure that included an overflow weir to keep the 24-inch pipe flowing full. This outfall structure is located adjacent to the Marys River outfall. When the dechlorination improvements were made, the City decided to inject the dechlorinating agent downstream of the effluent measurement weir so the dechlorination equipment could be housed in the existing chemical building. The new contact chamber was required to provide the contact volume originally provided in the outfall pipeline. With the new contact chamber, the contact volume available in the 24-inch pipeline was no longer required and, consequently, the outfall structure is no longer in use. The two contact chambers are designed to provide a minimum 30 minutes of contact time at a discharge rate of 3.85 MGD. Effluent from the lagoon flows into the 63,000 gallon tank then through the 17,000 gallon tank. The inlet piping for the 63,000 gallon tank is valved to allow for bypassing directly into the 17,000 gallon tank.

4.4.7 Effluent Flow Measurement

Treated effluent is measured at the second chlorine contact chamber as it passes over a 4 foot rectangular suppressed weir. A Stevens model 61R flow meter similar to the influent meter is used to measure and record flow values. The effluent meter is geared to measure flows to a maximum of 7.0 MGD. The effluent meter provides a 4 to 20 mA signal which is used to pace the chlorinator.

4.4.8 Sulfur Dioxide Gas Dechlorination System

The dechlorination system is similar in many respects to the chlorination sytem. The dechlorination system includes a sulfonator and injector housed in the south room of the control building. The sulfonator is a Capitol Series NXT 3000 unit. It has a V-notch orifice and is currently set for a maximum feed rate of 50 pounds per day. The City has spare parts that allow the sulfonator to be resized to feed 100 pounds per day. The injector is a 1½-inch unit-injector mounted on a PVC panel. The dosage and feed rate are set manually at the sulfonator. The sulfonator is not flow proportionally controlled, although this feature may be added should the City desire to do so. The dechlorination system is a solution feed system. Sulfur dioxide gas is mixed with feed water at the injector to create a sulfur solution. The sulfur solution is piped through a 1-inch PVC line to the effluent measurement weir where it is discharged through a diffuser.

The 150-pound sulfur dioxide gas cylinders are located in the north room of the chemical building. The scale is designed for two cylinders. Several spare cylinders can also be placed in the room. The cylinders rest in racks located against the interior wall of the building. Sulfur dioxide gas is withdrawn from the cylinders with equipment designed for automatic switchover. The gas is under pressure only to the vacuum regulator check unit. Beyond this unit, the gas is under vacuum.

4.4.9 Marys River Outfall

A 24-inch ductile iron pipe conveys effluent to the outfall structure discussed above. Downstream from the outfall structure, a 16-inch ductile iron pipe conveys the disinfected effluent from the outlet box to the Marys River. The outfall discharges with a single port near the south bank of the river.

In August of 2001, Westech Engineering prepared a mixing zone study to fulfill the requirements of the MAO between the City and the DEQ. The results of this study are included in **Appendix C**. The purpose of the study was to determine if the existing outfall met chlorine and ammonia toxicity standards. The results of the study indicated the existing single port outfall met the ammonia toxicity limit, but did not meet chlorine toxicity limits. The study further demonstrated that a multiple port diffuser would not meet the chlorine toxicity limits for all cases. Based on this finding the City decided to install the dechlorination system discussed above. As a result of the dechlorination improvements, the WWTP effluent now meets the chlorine toxicity limits.

4.4.10 Feed Water Supply System

A small submersible well pump and pressure tank system provides feed water for generating chemical solutions and for supplying the various fixtures in the laboratory building. The well is located north of the laboratory building. According to discussions with the City, the capacity of the well is approximately 5-10 gallons per minute.

4.4.11 Description of Existing Treatment System Deficiencies

The existing treatment facilities have functioned well since their construction. The treatment facilities have no serious deficiencies at this time. With the exception of a few minor deficiencies, the treatment plant as a whole is in reasonably good condition. There are some minor improvements that should be made. The lagoons need some routine maintenance including adding additional rock to the dike roadways and adding dike riprap to guard against erosion and Nutria problems. The influent and effluent samplers and flow meters are becoming outdated and will reach the end of their useful life during the planning period. As such, the City should plan to replace these facilities.

Based upon the biosolids survey performed in 2001, it appears that the primary lagoon may not require removal of biosolids during the planning period. If biosolids must be removed from the lagoon during the planning period, it will likely be near the end of the planning period. As a condition of the City's NPDES permit, biosolids surveys are required at five year intervals to aid in determining when biosolids must be removed.

The existing lagoons are adequately sized on both a hydraulic and organic loading basis for the present flows and loads. If the City grows as projected, additional treatment, storage, and disposal capacity will be required during the planning period. Options for expanding the capacity of the plant are discussed in **Section 7**.

4.5. Existing Sanitary Sewer Funding Mechanisms

Funding for the City's existing wastewater system comes from two major sources, user fees and system development charges (SDC). Since SDCs cannot be used to finance operation, maintenance (O&M), and replacement costs of a sewer system, the O&M and repair costs must be financed from the user fees.

Sewer User Fee. The City's sewer Ordinance #624 (**Appendix D**) provides the method for assessing sewer user fees. The City sewer users are billed on a monthly basis for sanitary sewer service. Users are first classified as residential, commercial, or industrial. Residential users are charged a base monthly fee plus a use charge based upon actual water consumption during the winter months, and the average winter consumption during the summer months. Commercial and Industrial users are charge a base monthly fee plus a use charge based on actual water consumption on a year-around basis. The present base rate is $10.00. For multi-unit residential connections the base charge is multiplied by the number of units and discounted by 50%. The use charge varies depending on user classification. For residential users the use charge is $1.80 per 100 cubic feet (748 gallons). For commercial and industrial users, the use charge is $1.91 per 100 cubic feet. For typical residential users, this monthly rate equates to approximately $345.30 per year or $28.78 per month per dwelling unit. The City's sewer use ordinance also contains provisions for adjusting the user fee for high strength wastes.

Sewer SDC. SDC fees are tied to water meter size as shown in **Table 4-6**.

TABLE 4-6
Existing Sewer SDC Fees

Meter Size	SDC Fee
¾ Inch	$1,346
1 Inch	$1,912
1 ½ Inch	$3,243
2 Inch	$5,194
3 Inch	$10,497