Section 4

Existing Wastewater Facilities

SECTION 4
EXISTING WASTEWATER FACILITIES

4.1. Introduction

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.

4.2. General Overview of Existing Wastewater Facilities

Junction City's wastewater facilities consist of a conventional gravity collection system that conveys wastewater from the users to one of eight pump stations. Five of the eight pump stations discharge into a common 16-inch forcemain that conveys the wastewater to the treatment facility located west of the City. The remaining three pump stations discharge into manholes where the wastewater flows by gravity to one of the other pump stations.

The treatment facility is located north of High Pass Road near the western side of the urban growth boundary. The treatment plant consists of a headworks, two facultative lagoons, a chlorination building with chlorine disinfection equipment, a chlorine contact chamber, and an outfall to Flat/Crow Creek. 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 and **4-3** show the existing wastewater collection facilities. These collection system maps show the sizes and material for each line segment. The reader is encouraged to refer to these figures throughout the following discussion.

4.3. History and Development of Sewerage Facilities.

Junction City's original sewer system was built in 1948. It served most of the area within the present City limits from Nyssa Street east to Birch Street and from 3rd Avenue north to 17th Avenue. Concrete, mortar joint pipe was used for the construction of the gravity collection piping. Three sewage lift stations were constructed as part of the original system in 1948. These included the 14th & Elm station, the 9th & Ivy station, and the 17th & Ivy station. Though modified over the years, these pump stations are still in operation today. As originally constructed, the 9th & Ivy and 17th & Ivy stations discharged into the upper ends of the gravity collection system that drained to the treatment facility. The treatment facility was constructed in 1948 and consisted of a primary treatment plant located at the current site of the City shops facilities at 14th & Elm Street. The 14th & Elm Street pump station originally served to lift raw wastewater into the treatment plant. Plant effluent from the 1948 treatment facility was discharged to the Willamette River through a 14-inch outfall pipeline.

In 1968, a new facultative lagoon treatment facility was constructed west of the City. To convey wastewater to the new lagoon site, a 16-inch diameter forcemain was constructed from the old treatment plant site to the new facility. At that time, the 14th & Elm Street lift station was converted into a pump station that discharged into the 16-inch forcemain. Similar modifications were made to the 17th & Ivy and 9th & Ivy pump stations. The modifications to the 9th & Ivy station included the construction of a new forcemain that discharged directly into the 16-inch common forcemain. The discharge point for the 17th & Ivy Station remained unchanged. These facilities currently operate in this configuration.

In the time since the lagoons were constructed, additional development in town resulted in the construction of new gravity mains and five subsequent pump stations. These new pump stations include the 3rd & Maple Street pump station, the 10th & Rose Street pump station, the 1st & Monaco pump station, the Rosewood Estates pump station, and the Chapel Creek pump station. Of these, the 3rd & Maple, 10th & Rose, and Chapel Creek stations discharge directly into the 16-inch forcemain. The 1st & Monaco and Rosewood Estates Pump station discharge into the upper ends of the 14th & Elm Street basin and the Chapel Creek basin respectively as shown in **Figure 4-1**.

4.4. 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 eight 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 99 right-of-way. While Lane County technically has jurisdictional oversight for sewer facilities constructed within County right-of-ways. Lane County typically defers review to the City for sewer facilities in County right-of-ways within City Limits.

4.4.1 User Connections

The City's system currently serves 1,577 users. The users are classified as residential, commercial, and industrial as shown in **Table 4-1**.

TABLE 4-1
Sewer Connection Summary
(As of September 2004)

User Classification	Number of Services
Residential	1,328
Commercial/Schools	244
Industrial	5
Total	1,577

4.4.2 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, urban growth boundaries, as well as the existing drainage patterns and pump station locations. The collection system is divided into 11 distinct basins as shown in **Figure 4-4**. The major basins are named for the pump station to which the basin ultimately drains.

The name and approximate area within each of the major sewer drainage basins are listed in **Table 4-2**. 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 solid lines are currently served. It should be noted that the existing treatment plant site together with the two City-owned parcels to the west and south of the site are not included in any of the drainage basins. For planning purposes, it was assumed that these parcels will be used for the construction of new wastewater treatment facilities and will, therefore, not be developed.

Table 4-2 lists the basin, name and approximate area within each of the basins.

TABLE 4-2 Collection System – Drainage Basin Areas			
Sewer Basin Designation	Total Area (Acres)	Sewered Area (Acres)	Nonsewered Area (Acres)
17th & Ivy	90	32	58
14th & Elm	291	277	14
Chapel Creek	145	87	58
Rosewood Estates	60	39	21
10th & Rose	159	68	91
9th & Ivy	134	134	0
3rd & Maple	194	77	118
1st & Manoco	216	31	105
West 10th	333	0	333
Prairie Road	206	0	251
South Industrial	263	0	298
Totals	2091	745	1346

4.4.3 Gravity Collection System

The City is served by a conventional gravity collection system that conveys wastewater to one of eight pump stations. The original collection system was constructed in 1948 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, and most recently PVC. Most pipelines installed after 1960 use some type of rubber gasket to seal the joint. Pipes with rubber gaskets generally leak much less the mortar jointed pipe. In the late 1960's and early 1970's, the City replaced large section of the 1948 collection piping. The concrete mortar jointed pipe was generally replaced with AC pipe with rubber gaskets. It appears that only the mainlines were replaced and that the existing manholes and service laterals were reconnected. These service laterals could potentially collect large amounts of I/I. Most new construction has utilized PVC pipe with rubber gaskets. Public Works design standards were adopted in 1998. The public works design standards allow only rubber gasketed PVC and ductile iron pipe for the construction of gravity sewers.

As previously stated, the original collection system is built of mortar-jointed concrete pipe. Since installation, it has collected large quantities of groundwater and stormwater during wet periods of the year. The soils beneath Junction City consist generally of sands, gravels, and silt material. These soils are permeable and the groundwater levels vary from about 15 feet below ground surface (BGS) in the summer to about 7-8 feet BGS during the winter months. In the winter, when groundwater levels are high, many of the sanitary sewers are beneath the groundwater where they collect large amounts of infiltration. Infiltration and inflow (I/I) is disruptive because it can overload the sewage lift stations, the forcemain, and the stabilization ponds. Because the topography of Junction City is quite flat and there are few basements, surcharged sanitary sewers have not traditionally been a major problem. When the system is in a surcharged condition, the wastewater entering the system through the service connections essentially enters into a reservoir. The level of the reservoir is maintained below basement levels by the pump stations. As long as basement levels are constructed above the highest groundwater levels overflows should not occur. As discussed later in this section, groundwater levels have a tremendous influence on the I/I flows within the sewer system. Major portions of the sewer system lie beneath the static groundwater level during most of the winter months, and many of these sewers collect large amounts of infiltration.

4.4.4 Existing Pump Stations

Wastewater is conveyed by the gravity collection system to one of eight pump stations as discussed above. **Table 4-3** contains a summary of some of the important characteristics of each of the pump stations. A more detailed description of each of the stations is presented in the following sections.

TABLE 4-3
Summary of Existing Pump Stations

Category	14th & Elm Pump Station	9th & Ivy Pump Station	17th & Ivy Pump Station	3rd & Maple Pump Station
General • Basin served • Construction date(s) • Type	 14th & Elm 1948/1968 Wetwell/Drypit	 9th & Ivy 1948/1969 Wetwell/Drypit	 17th & Ivy 1948/1969 Wetwell/Drypit	 3rd & Maple 1965/1976 Hydronix packaged, below-grade pump chamber over wetwell
• Firm Capacity	1400 gpm @ 60 ft TDH	250 gpm @ 66 ft TDH	300 gpm @ 21 ft TDH	240 gpm @ 74 ft. TDH
Wetwell • Type • Size • Rim Elevation • Influent Invert Elev. • Bottom Elev. • Depth (Rim to Bottom)	 Concrete w/hopper bottom 10' by 19'4" 324.00 ft. 308.00 ft. 303.00 ft. 21.00 ft.	 Concrete w/hopper bottom 8'11" by 6'6" 322.00 ft. 308.00 ft. 303.00 ft. 19.00 ft.	 Concrete w/hopper bottom 8'11" by 6'6" 322.00 ft. 308.65 ft. 303.00 ft. 19.00 ft.	 Concrete 5 ft diameter 324.80 ft. 314.29 ft. 310.85 ft. 13.85 ft.
Pumps • Type • Number • Manufacturer & Model • Motor Size & Speed • Power Supply	 Wetwell/drypit 2 Chicago VPMOMC-6 30 HP 1150 RPM 240-Volt 3-Phase	 Wetwell/drypit 2 Chicago VPMLMC-4 10 HP 1750 RPM 240-Volt 3-Phase	 Wetwell/drypit 2 Chicago VPMLMC-4 3 HP 1750 RPM 240-Volt 3-Phase	 Self-priming 2 Hydromatic 40 MMPC 15 HP 1750 RPM 240-Volt 3-Phase
Force Main • Size & Type • Length • FM Discharge • FM Discharge Elev.	 16" AC 10,000 ft. 16" Common Forcemain ± 327.50 (WWTP Hdwks)	 6" AC 1230 ft. 16" Common Forcemain ± 327.50 (WWTP Hdwks)	 6" Steel 840 ft. MH A142 (14th&Elm) ± 312.00	 6" AC 3290 ft. 16" Common Forcemain ± 327.50 (WWTP Hdwks)
Hydrogen Sulfide Control	none	none	none	none
Auxiliary Power • Type & Location • Fuel Supply • Transfer Switch • Trans. Switch Rating	 100 KW Fixed Gen Diesel Automatic 400 amp	 60 KW Fixed Gen Diesel Automatic 150 amp	 30 KW Fixed Gen Diesel Automatic 75 amp	 50 KW Fixed Gen Diesel Automatic 200 amp
Telemetry	Telephone autodialer	Telephone autodialer	Telephone autodialer	Telephone autodialer
Overflow • Location • Type • Elevation • Discharge point	 MH A3 MH Lid Rim El. ±318.60 ft. Storm drainage system	 MH B18 MH Lid Rim El. ±320.00 ft. Storm drainage system	 Cleanout AA6CO Cleanout Lid Rim El. ±315.70 ft. Storm drainage system	 MH C32 MH Lid Rim El. ±321.50 ft. Storm drainage system

TABLE 4-3 Continued Summary of Existing Pump Stations				
Category	10th & Rose Pump Station	1st & Monaco Pump Station	Chapel Creek Pump Station	Rosewood Pump Station
General • Basin served • Construction date • Type	10th & Rose 1975 Hydronix packaged, below-grade pump chamber over wetwell	1st & Monaco 1972 Hydronix packaged, below-grade pump chamber over wetwell	Chapel Creek 1996 Hydronix packaged, below-grade pump chamber over wetwell	Rosewood 1993 Hydronix packaged, below-grade pump chamber over wetwell
• Rated Capacity	350 gpm @ 56 ft. TDH	80 gpm @ 23 ft. TDH	440 gpm @ 75 ft. TDH (current) 575 gpm @ 83 ft. TDH (ultimate)	80 gpm @ 20 ft. TDH
Wetwell • Type • Size • Rim Elevation • Influent Invert Elev. • Bottom Elev. • Depth (Rim to Bottom)	Concrete 5 ft. diameter 320.40 ft. 304.40 ft. 300.50 ft. 19.90 ft.	Concrete 5 ft. diameter 323.00 ft. 308.00 ft. 303.00 ft. 20.00 ft.	Concrete 8 ft. diameter 319.50 ft. 300.39 ft. 295.00 ft. 24.50 ft.	Concrete 5 ft. diameter 318.50 ft. 305.50 ft. 298.50 ft. 20.00 ft.
Pumps • Type • Number • Manufacturer & Model • Motor Size & Speed • Power Supply	Self-priming 2 Hydromatic 40 MMP 10 HP 1750 RPM 240-Volt 3-Phase	Self-priming 2 Hydromatic 40 MMPC 2HP 1150 RPM 240-Volt 3-Phase	Self-priming 2 Hydromatic 60 MP 30 HP 1765 RPM 480-Volt 3-Phase	Self-priming 2 Hydromatic 40 MP 3 HP 1750 RPM 230-Volt 1-Phase
Force Main • Size & Type • Length • FM Discharge • FM Discharge Elev.	6" AC 262 ft. 16" Common Forcemain ± 327.50 (WWTP Hdwks)	4" AC 890 ft. MH A14 (14th & Elm) ± 320.93	6" PVC Class 160 IPS 950 ft. 16" Common Forcemain ± 327.50 (WWTP Hdwks)	3" PVC 340 ft. MH E36 (Chapel Crk) ± 315.20
Hydrogen Sulfide Control	none	none	none	Pneumatic pinch valve controlled forcemain drainback system
Auxiliary Power • Type & Location • Fuel Supply • Transfer Switch • Trans. Switch Rating	42 KW Mobile Gen. Diesel Manual 100 amp	25 KW Mobile Gen. Diesel Manual 60 amp	80 KW Fixed Gen Diesel Automatic 100 amp	25 KW Mobile Gen. Diesel Manual 75 amp
Telemetry	Telephone autodialer	Telephone autodialer	Telephone autodialer	Telephone Autodialer
Overflow • Location • Elevation • Discharge point	MH D1 Lid Rim El. ±318.50 ft. Storm drainage system	MH AB5 Lid Rim El. ±324.50 ft. Storm drainage system	MH E49 Lid Rim El. ±315.26 ft. Storm drainage system	MH F1 Lid Rim El. ±318.00 ft Storm drainage system

4.4.4.1 14th & Elm Pump Station

The 14th & Elm Pump Station is located at the City shops building on Elm Street. The 14th & Elm station is located at the site of the old wastewater treatment plant. This station is the largest of the eight pump stations and currently serves the largest number of users. The station was originally constructed in 1948 and served as a lift station to lift wastewater into the treatment plant. The station is a wetwell/drypit type pump station with end-suction, centrifugal, solids handling pumps mounted in the dry pit. In 1968, a new treatment plant was constructed west of the City. In order to convey wastewater to this location, the City converted the 14th Elm into a pump station with a 10,000-foot, 16-inch diameter forcemain. Major elements of the 1968 improvements included the installation of new pumps, motors, and discharge piping in the drypit, construction of the new forcemain, and the installation of new control equipment. In 2000, the pump station was again modified. These modifications included the addition of an automatic transfer switch, permanent auxiliary power generator, and an updated alarm telemetry system.

The 14th & Elm Pump Station is a duplex, wetwell/drypit station. The pumps and discharge piping are housed in a dry pit. The pumps discharge into a 16-inch diameter, AC, forcemain that discharges at the wastewater treatment plant headworks. There are no provisions to control the generation of hydrogen sulfide. The pump station is equipped with two 30 horsepower, vertically mounted dry pit, constant speed, pumps. The pumps are Chicago, model VPMOMC-6 with 14-inch impellers. The pump motors are powered by 240-volt three phase power. The motors are directly coupled to the pump in a vertical configuration. The pump station was originally constructed without provisions for auxiliary power. In 2000, the City added an automatic transfer switch and a permanent, onsite, diesel generator to power the station in the event of a line power failure. A series of float switches provides on/off control for the pumps.

The conditions currently monitored by the autodialer alarm system include the following.

- Power Transfer (ATS switch to generator)
- Line Power Fail
- Power Fail (ATS)
- Drywell Flooding
- Generator Fail
- Generator Trouble
- Generator Low Fuel
- High Water Level

In the event of a prolonged pump station failure, sewage will flow out the lid of manhole A3 located in the Front Street right of way two blocks south of the pump station. Sewage will flow from the manhole lid into the storm drainage ditch adjacent to the railroad and ultimately into Flat Creek.

Westech and City personnel inspected the pump station in the fall of 2004. With the exception of the auxiliary power generator, the equipment is in fairly poor condition. The pump station structure is over 50 years old. The pumping equipment and discharge piping are well over 30 years old and are showing signs of aging. The pumps and equipment are antiquated and replacement parts are becoming increasingly difficult to find. Access to the dry pit is achieved by a steep concrete stairway. The building that houses the control equipment is deteriorated and in need of repair work.

During most years, winter rains cause the groundwater levels to rise above the elevation of most of the collection system piping draining to the 14th & Elm Pump Station. Most of this gravity collection piping is old and accumulates large amounts of groundwater infiltration. During prolonged wet periods, the 14th & Elm collection system and pump station operate in a surcharged condition. During these times, both pumps at the 14th & Elm Station turn on and run continuously for several days in a row. An examination of historical pump run times shows that this condition can persist for weeks at a time and occurs during all but the driest winters. Typically, pump stations are designed to convey the peak flow to the station with the largest single pump out of service. The 14th & Elm pump station cannot accomplish this. During high-flow periods, the station cannot convey the peak flows with a single pump. Both pumps are required. If one of the pumps were to fail during these periods, sewage overflows might occur. Therefore, this station does not have the required pumping capacity and upgrades are necessary early in the planning period. These upgrades will be discussed in greater detail in **Section 6**.

4.4.4.2 9th & Ivy Pump Station

The 9th & Ivy Pump Station is located on the 9th Street one-half block west of Ivy Street. The 9th & Ivy station is a wetwell/drypit type pump station with end-suction, centrifugal, solids handling pumps mounted in the dry pit. The station was originally constructed with the pumps in the dry pit and motor extensions to enable the motors to be mounted above the dry pit. In 1969, major modifications to the pump station were made. These included the installation close-coupled motors mounted in the drypit, construction of a new forcemain, and the installation of new control equipment. Prior to the 1969 improvements, the 9th & Ivy pump station served as a lift station to lift wastewater into the gravity collection system that drained to the old treatment plant located at the site of the 14th and Elm pump station. In order to convey raw wastewater to the new treatment plant, a 16-inch diameter forcemain was constructed from the old treatment plant site to the new site. After the 16-inch forcemain was in place, a new 6-inch diameter forcemain was constructed to convey wastewater from the 9th and Ivy station to the new 16-inch forcemain. This configuration remains in place. In 2000, the pump station was again modified. These modifications included the addition of an automatic transfer switch, permanent auxiliary power generator, and an updated alarm telemetry system. The pump station is situated north of 9th Street and has good vehicular access.

The 9th & Ivy Pump Station is a duplex, wetwell/drypit station. The pumps and discharge piping are housed in a dry pit. The pumps discharge into a 6-inch diameter, AC, forcemain that discharges directly into the 16-inch common forcemain in 13th Street. The forcemain is constructed at a continuously ascending grade from the pump station to the 16-inch common forcemain. There are no provisions to control the generation of hydrogen sulfide.

The pump station is equipped with two 10 horsepower, vertically mounted dry pit, constant speed, pumps. The pumps are Chicago, model VPM LMC-4 with 8.5-inch impellers. The pump motors are powered by 240-volt three phase power. The motors are directly coupled to the pump in a vertical configuration. The pump station was originally constructed without provisions for auxiliary power. In 2000, the City added an automatic transfer switch and a permanent, onsite, diesel generator to power the station in the event of a line power failure. A bubbler tube pressure sensor is used to control pump operation.

The conditions currently monitored by the autodialer alarm system include the following.

- Power Transfer (ATS switch to generator)
- Line Power Fail
- Power Fail (ATS)
- Drywell Flooding
- Generator Fail
- Generator Trouble
- Generator Low Fuel

In the event of a prolonged pump station failure, sewage will flow out the lid of manhole B18 located in 9th Street one block west of the pump station. Sewage will flow from the manhole lid into the storm drainage system and ultimately into Flat Creek.

Westech and City personnel inspected the pump station in the fall of 2004. With the exception of the auxiliary power generator, the equipment is in fairly poor condition. The pump station structure and discharge piping are over 50 years old. The pumping equipment is well over 30 years old. Access to the dry pit is achieved through a 24-inch square opening. Therefore, it is very difficult to service the equipment in the dry pit including the pumps and motors. The building that houses the control equipment is deteriorated and in need of repair work.

Like the 14th & Elm station, the 9th & Ivy pump station operates in a surcharged condition during wet periods. This is caused by large amounts of groundwater infiltration into the gravity collection piping draining to the station. During high-flow periods, the station cannot convey the peak flows with a single pump. Both pumps are required. If one of the pumps were to fail during these periods, sewage overflows might occur. Therefore, this station does not have the required pumping capacity and upgrades are necessary early in the planning period. These upgrades will be discussed in greater detail in **Section 6**.

4.4.4.3 17th & Ivy Pump Station

The 17th & Ivy Pump Station is located on the east side of the intersection of 17th and Ivy Streets at the north end of the City. The 17th & Ivy and 9th & Ivy pump stations are nearly identical. The 17th & Ivy station was originally constructed in 1948 as part of the original collection system. The station is a wetwell/drypit type pump station with end-suction, centrifugal, solids handling pumps mounted in the dry pit. The station was originally constructed with the pumps in the dry pit and motor extensions to enable the motors to be mounted above the dry pit. In 1969, the line-shaft motors were replaced with close-coupled motors mounted in the drypit. This pump and motor configuration remains in operation. In 1969, the pump controls were also updated. In 2000, the pump station was again modified. These modifications included the addition of an automatic transfer switch, permanent auxiliary power generator, an updated alarm telemetry system, and updated pump controls. The pump station is situated in a large parking area east of Ivy Street and has good vehicular access.

The 17th & Ivy pump station is a duplex, wetwell/drypit station. The pumps and discharge piping are housed in a dry pit. The pumps discharge into a 6-inch diameter, steel, forcemain that discharges into manhole A142. From this manhole, flow is routed by gravity to the 14th & Elm Pump Station. The forcemain is constructed at a continuously ascending grade from the pump station to the discharge manhole. There are no provisions to control the generation of hydrogen sulfide.

The pump station is equipped with two 3-horsepower, vertically mounted dry pit, constant speed, pumps. The pumps are Chicago, model LMC-4 with 6.3125-inch impellers. The pump motors are powered by 240-volt three phase power. The motors are directly coupled to the pump in a vertical configuration. The pump station was originally constructed without provisions for auxiliary power. In 2000, the City added an automatic transfer switch and a permanent, onsite, diesel generator to power the station in the event of a line power failure.

Pump operation is controlled by a Multitrode level probe manufactured by ITT Flygt. The probe includes 10 sensors spaced at even intervals to sense the water level in the wetwell. Individual sensors are wired to provide pump on/off control as well as to provide a high level alarm.

The conditions currently monitored by the autodialer alarm system include the following.

- Power Transfer (ATS switch to generator)
- Line Power Fail
- Power Fail (ATS)
- High Water Level
- Generator Fail
- Generator Trouble
- Generator Low Fuel

In the event of a prolonged pump station failure, sewage will flow out the lid of cleanout AA6CO located in the alley south of 7th Street and one-half block west of Ivy Street. Sewage will flow from the cleanout lid into the storm drainage system and ultimately into Flat Creek.

Westech and City personnel inspected the pump station in the fall of 2004. With the exception of the auxiliary power generator and the level controls, the equipment is in fairly poor condition. The pump station structure and discharge piping are over 50 years old. The pumping equipment is well over 30 years old. Access to the dry pit is achieved through a 24-inch square opening. Therefore, it is very difficult to service the equipment in the dry pit including the pumps and motors. The building that houses the control equipment is deteriorated and in need of repair work.

An examination of the pump run times shows that two pumps run for extended times during wet periods in the winter months. Unlike the 14th & Elm and 9th & Ivy stations, both pumps do not run for 24 hours a day for several days. However, both pumps run for several hours a day for consecutive days. This suggests that the capacity problem is not a severe as it is for the 14th & Elm and the 9th & Ivy pump stations. Nonetheless, the fact that both pumps are routinely called upon to convey the peak flows suggests that the station is over capacity and that capacity upgrades are necessary early in the planning period.

4.4.4.4 3rd & Maple Pump Station

The 3rd & Maple pump station is located near the intersection of 3rd and Maple Streets in the Southwest corner of the City. The station was originally constructed in 1965 as a submersible pump station. In 1976, the station was converted from a submersible station to a packaged Hydronix Station. All mechanical equipment and the top portion of the wetwell were removed. A below grade chamber housing self-priming pumps was installed over the lower portion of the wetwell. In 2000, the pump station was again modified. These modifications included the addition of an automatic transfer switch, permanent auxiliary power generator, and an updated alarm telemetry system. The pump station is situated adjacent to 3rd Street and has good vehicular access.

The 3rd & Maple Pump Station is a duplex, packaged station manufactured by Hydronix. The pumps and discharge piping are housed in a below grade fiberglass chamber that is mounted over the concrete wetwell. The pumps discharge into a 6-inch diameter, AC, forcemain that discharges into the 16-inch common forcemain at the intersection of 13th and Laurel Streets. The 16-inch diameter common forcemain discharges into the headworks at the WWTP. There are no provisions to control the generation of hydrogen sulfide.

The pump station is equipped with two 15 horsepower, self-priming, constant speed, pumps. The pumps are Hydromatic, model 40 MMPC with 9-inch impellers. The pump motors are powered by 240-volt three phase power. The motors are directly coupled to the pump. The pump station was originally constructed without provisions for auxiliary power. In 2000, the City added an automatic transfer switch and a permanent, onsite, diesel generator to power the station in the event of a line power failure.

Pump operation is controlled by three float switches in the wet well. From the lowest to highest, the three float switches provide pumps off (Elev 311.80 ft.), lead pump on (Elev. 312.80 ft.), and lag pump on (Elev. 313.80 ft.) functions. A fourth high level alarm float switch (Elev. 314.70 ft.) is also included.

The conditions currently monitored by the autodialer alarm system include the following.

- Power Transfer (ATS switch to generator)
- Line Power Fail
- Power Fail (ATS)
- High Water Level
- Generator Fail
- Generator Trouble
- Generator Low Fuel

In the event of a prolonged pump station failure, sewage will flow out the lid of manhole C32 located west of the intersection of 3rd and Maple Streets. Sewage will flow from the manhole lid overland for a short distance and into Flat Creek.

Westech and City personnel inspected the pump station in the fall of 2004. The equipment is in reasonable condition considering that it is almost 30 years old. The pumps have been rebuilt in the last three years. As such, they are in good condition. Nonetheless, the pumps are fairly antiquated, and replacement parts are expected to become more difficult to find. The pump discharge lines are fitted with knife gate valves. These valves leak and are in need of repair.

An examination of the pump run times shows that two pumps run for extended times during wet periods in the winter months. Unlike the 14th & Elm and 9th & Ivy stations, both pumps do not run for 24 hours a day for several days. However, both pumps run for several hours a day for consecutive days. This suggests that the capacity problem is not a severe as it is for the 14th & Elm and the 9th & Ivy pump stations. Nonetheless, the fact that both pumps are routinely called upon to convey the peak flows suggests that the station is over capacity and that capacity upgrades are necessary early in the planning period.

4.4.4.5 10th & Rose Pump Station

The 10th & Rose pump station is located on the south side of 10th Street near the intersection of Rose Street west of the downtown area. The station was originally constructed in 1975 to serve the 10th & Rose sewer basin as shown in **Figure 4-6**. In 2000, the pump station was modified. These modifications included the addition of a manual transfer switch and an updated alarm telemetry system. The pump station is situated adjacent to 10th Street. A wooden fence with a man-gate separates the pump station from the street. Therefore, vehicular access is poor.

The 10th & Rose pump station is a duplex, packaged station manufactured by Hydronix. The pumps and discharge piping are housed in a below grade fiberglass chamber that is mounted over the concrete wetwell. The pumps discharge into a 6-inch diameter, AC, forcemain that discharges into the 16-inch common forcemain at the intersection of 10th Avenue and Rose Street. The 16-inch diameter common forcemain discharges into the headworks at the WWTP. There are no provisions to control the generation of hydrogen sulfide.

The pump station is equipped with two 10 horsepower, self-priming, constant speed, pumps. The pumps are Hydromatic, model 40 MMP with 8.5-inch impellers. The pump motors are powered by 240-volt three phase power. The pump station was originally constructed without provisions for auxiliary power. In 2000, the City added a manual transfer switch and purchased a 42-KW, trailer mounted, diesel generator to power the station in the event of a prolonged power failure.

Pump operation is controlled by three float switches in the wet well. From the lowest to highest, the three float switches provide pumps off (Elev 301.40 ft.), lead pump on (Elev. 302.40 ft.), and lag pump on (Elev. 303.40 ft.) functions. A fourth high level alarm float switch (Elev. 305.00 ft.) is also included.

The conditions currently monitored by the autodialer alarm system include the following.

- Line Power Fail
- High Water Level

In the event of a prolonged pump station failure, sewage will flow out the lid of manhole D1 located immediately upstream of the station. Sewage will flow from the manhole lid into the adjacent surface water drainage swale.

Westech and City personnel inspected the pump station in the fall of 2004. The equipment is in reasonable condition considering that it is almost 30 years old. The pumps are fairly antiquated, and replacement parts are difficult to find.

4.4.4.6 1st & Monaco Pump Station

The 1st & Monaco pump station is located on the south side of 1st Street near the intersection of Birch Street south of the downtown area. The station was originally constructed in 1972 to serve the industrial property south of 1st street and east of the railroad. A large motor home manufacturing facility is located immediately south of the pump station. The pump station was named for the Monaco Coach Corporation that originally owned the facility. In recent years, the Country Coach Corporation purchased the facility from Monaco. Nonetheless, the Monaco namesake remains. In 2000, the pump station was modified. These modifications included the addition of a manual transfer switch and an updated alarm telemetry system. The pump station is situated adjacent to 1st Street and has good vehicular access.

The 1st & Monaco Pump Station is a duplex, packaged station manufactured by Hydronix. The pumps and discharge piping are housed in a below grade fiberglass chamber that is mounted over the concrete wetwell. The pumps discharge into a 4-inch diameter, AC, forcemain that discharges into manhole A14. From this manhole, flow is routed by gravity to the 14th & Elm Pump Station. The forcemain is constructed at a continuously ascending grade from the pump station to the discharge manhole. There are no provisions to control the generation of hydrogen sulfide.

The pump station is equipped with two 2 horsepower, self-priming, constant speed pumps. The pumps are Hydromatic, model 40 MMPC with 7.75-inch impellers. The pump motors are powered by 240-volt three phase power. The pump station was originally constructed without provisions for auxiliary power. In 2000, the City added a manual transfer switch and purchased a 25-KW, trailer mounted, diesel generator to power the station in the event of a prolonged power failure.

Pump operation is controlled by three float switches in the wet well. From the lowest to highest, the three float switches provide pumps off (Elev 304.50 ft.), lead pump on (Elev. 307.00 ft.), and lag pump on (Elev. 307.50 ft.) functions. A fourth high level alarm float switch (Elev. 308.00 ft.) is also included.

The conditions currently monitored by the autodialer alarm system include the following.

- Line Power Fail
- High Water Level

In the event of a prolonged pump station failure, sewage will flow out the lid of manhole AB5 located south of the station. Sewage will flow from the manhole lid overland and ultimately into a nearby storm drainage ditch.

Westech and City personnel inspected the pump station in the fall of 2004. The equipment is in reasonable condition considering that it is over 30 years old. The pumps have recently been rebuilt. As such, they are in good condition. Nonetheless, the pumps are fairly antiquated, and replacement parts are expected to become more difficult to find. The area around the pump station is subject to flooding. The control panel for the manual transfer switch was installed in 2000 above the known high water level.

4.4.4.7 Chapel Creek Pump Station

The Chapel Creek pump station is located near the intersection of West 17th and Rose Streets in the Northwest corner of the City. The station was originally constructed in 1996 to serve the Chapel Creek Projects, existing development served by the now abandoned 13th Avenue Pump Station, and the surrounding area. In 2000, the pump station was modified. These modifications included the addition of an automatic transfer switch, permanent auxiliary power generator, and an updated alarm telemetry system. The pump station is situated adjacent to Rose Street and has good vehicular access.

The Chapel Creek Pump Station is a duplex, packaged station manufactured by Hydronix. The pumps and discharge piping are housed in a below grade fiberglass chamber that is mounted over the concrete wetwell. The pumps discharge into a 6-inch diameter, PVC, forcemain that discharges into the 16-inch common forcemain near to the intersection of 13th and Rose Streets. The 16-inch diameter common forcemain discharges into the headworks at the WWTP. The 6-inch diameter forcemain is constructed at a continuously ascending grade from the pump station to the common forcemain. There are no provisions to control the generation of hydrogen sulfide.

During the initial startup of the system, the station was troubled by excessive noise from the pumping equipment. In an effort to reduce noise, the belt drive coupling the motor to the pump was reconfigured to reduce the speed of the pump. The pump is powered by a constant speed 1750 RPM motor. The motor is coupled to the pump by a belt drive system. The pump was originally designed to operate at a speed of 1680 RPM to deliver 575 gpm at 83 ft. TDH. To reduce noise and vibration, the sheave/belt configuration was replaced to reduce the pump speed to 1480 RPM. At this speed, the pump delivers 325 gpm at 75 ft TDH. The station O&M manuals includes specifications for the sheave/belt combinations required to operate the pumps at the two speeds. The slower speed provides the capacity necessary to convey existing pump station flows, but is not likely to be adequate to convey flows at buildout. Therefore, as development in the basin continues, the City may have to upsize the sheave/belt configuration to increase the pump speed as appropriate. When the pump speed is increased, the noise will likely become problematic. As such, the City should also plan to address these problems when the need to increase the capacity of the station arises.

The pump station is equipped with two 30 horsepower, self-priming, constant speed, pumps. The pumps are Hydromatic, model 60 MP with 11.25-inch impellers. The pump motors are powered by 480-volt three phase power. The pump station was originally constructed with a manual transfer switch with a connection for an portable generator. In 2000, the City added an automatic transfer switch and a permanent, onsite, diesel generator to power the station in the event of a line power failure.

Pump operation is controlled by three float switches in the wet well. From the lowest to highest, the three float switches provide pumps off (Elev 296.00 ft.), lead pump on (Elev. 300.00 ft.), and lag pump on/high level alarm (Elev. 305.00 ft.) functions.

The conditions currently monitored by the autodialer alarm system include the following.

- Power Transfer (ATS switch to generator)
- High Water Level
- Pump 1 fail
- Pump 2 fail

- Generator Fail
- Generator Trouble
- Generator Low Fuel

In the event of a prolonged pump station failure, sewage will flow out the lid of manhole E49 located on West 17th Street. Sewage will flow from the manhole lid into the street storm drainage system and ultimately into Flat Creek.

Westech and City personnel inspected the pump station in the fall of 2004. The equipment appeared to be well maintained and in good condition. No significant problems were noted.

4.4.4.8 Rosewood Estates Pump Station

The Rosewood Estates Pump Station is located near the intersection of 13th Street and Unity Drive in the Northwest corner of the City. The station was originally constructed in 1993 to serve the Rosewood Estates subdivision and surrounding area. In 2000, the pump station was modified. These modifications included the addition of a manual transfer switch and an updated alarm telemetry system. The pump station is situated adjacent to 13th Street and has good vehicular access.

The Rosewood Estates Pump Station is a duplex, packaged station manufactured by Hydronix. The pumps and discharge piping are housed in a below grade fiberglass chamber that is mounted over the concrete wetwell. The pumps discharge into a 3-inch diameter, PVC, forcemain that discharges into manhole E36. From this manhole, flow is routed by gravity to the Chapel Creek Pump Station. The forcemain is constructed at a continuously ascending grade from the pump station to the discharge manhole. The forcemain is equipped with a drainback system controlled by a pneumatic pinch valve. When the pumps stop, the pinch valve opens and the forcemain drains back into the wetwell.

The pump station is equipped with two 3 horsepower, self-priming, constant speed pumps. The pumps are Hydromatic, model 40 MP with ± 9.16-inch impellers. The pump motors are powered by 230-volt single phase power. The motors are connected to the pumps by a belt drive. The pump station was originally constructed without provisions for auxiliary power. In 2000, the City added a manual transfer switch and purchased a 25-KW, trailer mounted, diesel generator to power the station in the event of a prolonged power failure.

Pump operation is controlled by three float switches in the wet well. From the lowest to highest, the three float switches provide pumps off (Elev 299.50 ft.), lead pump on (Elev. 303.50 ft.), and lag pump on (Elev. 304.50 ft.) functions. A fourth high level alarm float switch (Elev. 305.50 ft.) is also included.

The conditions currently monitored by the autodialer alarm system include the following.

- High water level
- Pump 1 fail
- Pump 2 fail
- Drain back system failure

In the event of a prolonged pump station failure, sewage will flow out the lid of the adjacent manhole and flow into the storm drainage system for 13th Street.

Westech and City personnel inspected the pump station in the fall of 2004. The equipment appeared to be well maintained and in good condition. No significant problems were noted. Drawdown tests were performed to confirm the capacity of each pump.

4.4.5 Existing Common Force main

As shown in **Figure 4-1**, the 14th & Elm, 9th & Ivy, 3rd & Maple, 10th & Rose, and the Chapel Creek pump stations discharge into a common 16-inch forcemain that discharges at the WWTP. The force main begins at the 14th & Elm pump station and generally extends west through the intersection of West 10th Street and Oaklea Drive. West of this intersection, the forcemain is routed across agricultural fields to the treatment plant site. The forcemain is constructed of 16-inch diameter asbestos cement pipe installed in 1968. The total length of the forcemain from the 14th & Elm station to the WWTP is approximately 9,000 feet.

4.4.6 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). Base sewage flow at the WWTP measured during the months of August and September is approximately 0.35 MGD. The wet weather flow from November 1 through April 30 averages approximately 2.32 MGD. This increase in flow is strongly related to precipitation. However, the relationship between precipitation and flow is different in Junction City than in most Western Oregon communities. Typically wastewater flows respond quickly and tend to track precipitation over time. There is typically a direct correlation between rainfall and wastewater flow. For a number of factors discussed in **Section 5**, the relationship between precipitation and flow in Junction City is more complicated. In Junction City, groundwater infiltration contributes much more significantly to wastewater flows than rainfall induced infiltration. As such, wastewater flows respond to groundwater elevations more than precipitation. By monitoring the groundwater levels over the years, the City has learned that when the groundwater elevation rises above 316.00 feet (as monitored at the 7th & Front Street well), infiltration becomes significant. Furthermore, the volume of infiltration does not strongly track groundwater elevations. Infiltration is either "on" or "off" when the groundwater elevation is above or below elevation 316.00 respectively. This relationship is discussed in more detail in **Section 5.**

The I/I problem is significant and is a major concern to the City. The ratio between the base sewage flow and the peak day flow is approximately 11. 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 Junction City 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.

4.4.7 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 a combination of inadequate pump station capacity, inadequate trunk sewer capacity, and excessive infiltration and inflow. The shortcomings in the existing system can generally be divided into the following categories; lack of capacity, end of useful life, and excessive infiltration and inflow. 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.

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.

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. The systems operate in a surcharged condition for weeks at a time during all but the driest years.

Excessive infiltration and inflow is far and away the most significant problem in the City's collection system. It is the underlying cause of the capacity problems in the trunk sewers and pump stations. The recommended I/I correction measures are presented in **Section 6**. **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
1948 Concrete Mortar Joint Collection Piping	End of Useful Life/Excessive I/I
14th & Elm Basin	Excessive I/I
14th & Elm Trunk Sewers	Lack of Capacity
14th & Elm Pump Station	Lack of Capacity/End of Useful Life
9th & Ivy Basin	Excessive I/I
9th & Ivy Trunk Sewers	Lack of Capacity
9th & Ivy Pump Station	Lack of Capacity/End of Useful Life
17th & Ivy Basin	Excessive I/I
17th & Ivy Pump Station	Lack of Capacity/End of Useful Life
3rd & Maple Pump Station	Lack of Capacity

4.4.8 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**.

4.5. Wastewater Treatment and Disposal System

The City of Junction City owns, operates and maintains the wastewater treatment plant (WWTP) serving the City. The WWTP is located west of the City on the north side of High Pass Road. The WWTP has two stabilization lagoons that normally operate in parallel on a summer-land application winter-discharge operational scheme. Treated wastewater is discharged through an outfall pipeline during the winter discharge season (November 1-April 30) to a ditch that drains to Flat/Crow Creek. During the summer months, plant effluent is land applied to 60 acres of City-owned farmland adjacent to the WWTP site. In addition the City-owned reuse area, plant effluent is also spray irrigated on 40 acres of privately owned farmland east of the treatment plant. The plant was originally constructed in 1968, and has undergone one significant modification since it was originally constructed. In the summer of 2000 a new headworks structure and influent piping were constructed. The headworks includes an 18-inch Parshall flume for flow measurement, and a grinder to reduce the size of solid material that enters the lagoons. The headworks is also equipped with a refrigerated wastewater sampler for collecting influent composite samples. In addition to the lagoons and headworks, the treatment facilities include a chemical building with chlorine disinfection equipment, a chlorine contact chamber, effluent flow meter, an irrigation pump, and a sprinkler system. The wastewater facilities are schematically presented in **Figure 4-1**. The existing treatment plant plan is presented in **Figure 4-5**. The following sections provide brief descriptions of each to the individual unit processes that comprise the treatment facility.

4.5.1 Headworks

Discharge from the pump stations is delivered to the treatment facilities through a 16-inch diameter force main that discharges into the headworks structure at the WWTP. Prior to entering the headworks structure, the forcemain piping increases in size to 24-inch diameter. The headworks structure provides for distributing raw sewage from the forcemain into the treatment lagoons. It also provides for influent flow measurement and monitoring as well as solids grinding. The headworks is not equipped with an energy dissipater at the forcemain discharge point. However provisions have been provided to add a dissipater if the need arises in the future.

Flow measurement is accomplished in an 18-inch Parshall flume. The flume is equipped with a staff gauge for verification of the flow meter reading. An ultrasonic flow meter is mounted over the flume to measure the depth of liquid in the flume. This depth measurement is electronically converted into a flow reading by flow meter processor. The flow meter displays instantaneous and total flow. The flow meter also has data logging capabilities and provides a flow signal that may be used for the collection of flow paced samples. Solids grinding is accomplished by a motor-driven, channel-mounted grinder manufactured by JWC Environmental. A programmable, refrigerated, composite, wastewater sampler is provided for influent sampling.

The headworks is equipped with three outlet pipes. Two are directed to each of the two existing facultative lagoons. The third outlet pipe is for routing flow into a future primary lagoon cell. Flow from the headworks can be directed into one or both of the existing primary lagoons by positioning FRP slide gates upstream of the outlet piping. Under normal operating conditions, flow is equally split to both lagoons. Flow from the headworks is conveyed through 20-inch discharge piping to the two lagoons and discharged at multiple points along the northern edge of each lagoon as shown in **Figure 4-5**. The headworks is in good condition and is expected to provide adequate service through the planning period.

4.5.2 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 are operated in parallel and are intended to provide both storage of wastewater during the non-discharge periods and treatment to secondary standards. The lagoons are designed to operate between a minimum depth of 2 feet and a maximum depth of 6 feet. These design parameters provide for two feet of freeboard from the top of the dikes.

Each lagoon is 23.5 acres in size for a total lagoon water surface area of 47 acres. Flow is equally split between the two lagoons at the headworks structure. The lagoon inlet piping was reconstructed in 2000 and includes multiple ports to distribute wastewater evenly across each lagoon. The maximum water level in each lagoon is controlled by a 12-inch diameter overflow pipe. The overflow pipe is unvalved. Therefore, if the water level in one lagoon rises above the inlet elevation of the overflow pipe water will flow into the other lagoon. Overflow of this nature will only occur when the water in one lagoon is above the overflow elevation and the water level of the other lagoon is below the overflow elevation. Under this scenario, the water level in the two lagoons will eventually equalize.

Treated effluent is withdrawn from the lagoons at a single point near the south end of each lagoon. Canal gates are used to control the flow of effluent from each lagoon. Effluent from the outlet structures flows through a 12-inch diameter pipeline to the chlorine contact chamber.

The lagoons have been in service since 1968. Biosolids tend to accumulate in the lagoons over time. In the past, the lagoons were operated in series with the western lagoon serving as the primary lagoon cell. As such, the majority of the biosolids accumulated in the western lagoon cell. In June of 1999, the average solids depth in the western lagoon cell was 1.5 feet. To increase the treatment capacity of the facilities, these biosolids were removed in 2001. Since that time, only minimal amounts of biosolids have accumulated in the two lagoon cells. Unless a major commercial or industrial user with a high solids load is connected to the system, it is not likely that the City will need to remove the biosolids during the planning period.

In the summer of 2001, 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 October of 2001. No treated effluent was discharged from the WWTP during the test. The leak testing showed average seepage rates of 0.031 inches per day from both lagoons. Based upon this evaluation, the seepage rate from the lagoons is acceptable and no corrective work related to lagoon leakage is anticipated to be necessary during the planning period.

4.5.3 Chemical Building and Chlorine Disinfection Equipment.

Lagoon effluent is disinfected by a chlorine gas disinfection system. The disinfection equipment is housed in a chemical feed building. The chemical building is a single room concrete block building with inside dimensions of 7'4" by 7'4". The building is located on top of the chlorine contact chamber. The building houses, the chlorinator, chlorine injector, chlorine bottles, chlorine scale, carrier water feed pump, effluent flow meter, and electrical panels. The chlorinator is a Wallace & Tiernan V-notch chlorinator. The dosage and feed rate are set manually at the chlorinator. The chlorination system is a solution feed system. Chlorine gas is mixed with feed water at the injector. Feed water is withdrawn from the chlorine contact chamber and fed into the chlorine injector by a small booster pump. The chlorine gas and feed water solution is piped through a ¾-inch line to the chlorine contact chamber inlet where the chlorine solution is mixed with lagoon effluent. The chlorination system is designed for 150-pound chlorine cylinders. A two-cylinder scale is used to measure chlorine consumption. Chlorine contact time is provided in the contact chamber. The contact chamber is a baffled concrete structure that provides approximately 15,000 gallons of contact volume. The chemical feed building, chlorination equipment, effluent flow meter, and chlorine contact chamber were all constructed in 1968 with the construction of the lagoons. These facilities have not been significantly modified over the years and largely operate as originally designed.

4.5.4 Flat/Crow Creek Outfall

A 12-inch diameter pipe conveys effluent from the chlorine contact chamber to a drainage ditch that runs along the southern edge of the lagoons and discharges into Flat/Crow Creek as shown in **Figure 4-5**. The total length of drainage ditch between the contact chamber and Flat/Crow Creek is approximately 1040 feet. Treated effluent flows by gravity from the chlorine contact chamber into the drainage ditch to the discharge point at Flat/Crow Creek.

4.5.5 Land Application Facilities

Summer time plant effluent is land applied to fields adjacent to the WWTP. The land application facilities consist of a 30 hp irrigation pump and two 1,320 foot wheel line sprinkle systems. Effluent is land applied to either a 20 acre field immediately west of the lagoon site or a 40 acre field immediately south of the lagoon site. Both fields are owned by the City. The City also irrigates a corn crop on a privately owned 40 acre field located east of the lagoons.

4.5.6 Description of Existing Treatment System Deficiencies

The influent and effluent BOD and TSS concentrations are listed below in **Table 4-5** along with the removal efficiencies for the last six years. Since at least the early 1990's, the plant has been unable to consistently meet the effluent BOD requirement of 30 mg/L set forth in the permit. The data listed in **Table 4-5**, demonstrate this trend. In 1995, the City entered into a Mutual Agreement Order (MAO) with the DEQ and began the process of undertaking plant upgrades. Since that time, the City has been operating the WWTP under relaxed regulatory standards set forth in the MAO. In addition to the performance shortcomings in regard to final effluent BOD concentrations, the existing outfall and receiving stream are insufficient to meet state regulations regarding chlorine and ammonia toxicity. The following sections include further discussions on the existing plant deficiencies.

TABLE 4-5
Wet Weather Treatment Plant Performance

Discharge Season (Nov. 1 – April 30)	BOD			TSS		
	Average Influent BOD (mg/L)	Average Effluent BOD (mg/L)	BOD Removal Efficiency %	Average Influent TSS (mg/L)	Average Effluent TSS (mg/L)	TSS Removal Efficiency %
1998-1999	141	23.5	83	188	20.1	89
1999-2000	121	17.9	85	133	23.8	82
2000-2001	193	36.6	81	198	25.4	87
2001-2002	427	47.2	89	307	38.5	87
2002-2003	308	22.6	93	441	24.7	94
2003-2004	433	36.2	92	590	41.1	93

NPDES permit mandates effluent BOD and TSS maximum monthly concentrations of 30/50 mg/L respectively and BOD and TSS removal efficiencies of 85% and 65% respectively.

4.5.6.1 Existing Facultative Lagoons

The existing facultative lagoons do not have the organic treatment capacity to consistently meet discharge permit requirements. This is due largely to the organic and solids loading in the influent waste stream. Based on average domestic wastewater strength and the existing community size, the existing lagoons should be sufficient to provide the required treatment. As shown in **Table 4-5**, the influent BOD concentrations measured after the summer of 2001 are much higher than normally observed for domestic wastewater. In the summer of 2001 the City constructed a new headworks facility and began collecting composite samples of the influent waste stream. Prior to that time, the City collected grab samples only. It is likely that BOD and TSS measurements collected prior to 2001 are in error as a result of the grab sampling method and that composite samples may have resulting in higher readings.

The elevated BOD and TSS measurements suggest that a large industrial user in the City is discharging a high strength waste stream into the City's system. As part of the facilities planning effort, the City collected and analyzed wastewater samples at various locations in the collection system to determine the source of the high-strength waste. Through this work, the City believes they have identified the source of the high-strength waste stream and have entered into negotiations with the industrial user to remove the waste stream from the City's system. More details on the sampling work are included in **Section 5**. One of the fundamental recommendations of this facilities plan is that the particular industrial user either pre-treat their waste stream or make the necessary process modifications to remove their waste stream from the City's system. As demonstrated in **Section 5**, any alternative that includes treating this waste stream is cost prohibitive and not recommended. Once the particular high-strength waste stream is removed from the City's system, the existing lagoons may begin producing an effluent that reliably meets permit standards.

In addition to the strength of the influent stream, short-circuiting and poor mixing limit the treatment capacity of the lagoons. In 2001, the City reconfigured the lagoon influent piping to better distribute plant influent across the entire lagoon. Currently, the City operates the lagoons in parallel. The existing transfer piping does not have the capacity to adequately convey water between the two lagoons. Therefore, the parallel operation scheme is preferred. Parallel operation is less efficient than series operation, and therefore tends to produce a lower quality effluent. However, parallel operation is necessary to evenly distribute the influent loads and avoid plant upset.

4.5.6.2 Disinfection Facilities

The existing disinfection facilities consist of a gas chlorine feed system, a chlorination building, and a small chlorine contact chamber. The facilities are adequate for the present time, but are now more than 35 years old. These facilities are rapidly becoming obsolete and will likely require upgrades during the planning period. The existing chlorine contact chamber provides only a portion of the required contact time required to disinfect the effluent stream. The remainder of the contact time is provided in the ditch between the outfall pipeline and Flat/Crow Creek. It is unlikely that DEQ will approve continued usage of this ditch for chlorine contact time when the facilities are upgraded. As such, all of the alternatives evaluated herein include an additional contact chamber.

4.5.6.3 Outfall and Receiving Stream

The existing surface water discharge is a single port outfall to Crow/Flat Creek. For all practical purposes, Crow/Flat Creek is agricultural drainage ditch immediately upstream and downstream of the treatment plant outfall. Flowrates in Crow/Flat Creek are not sufficient to promote the dilution and mixing necessary to comply with current regulatory standards. In short, Crow/Flat Creek is an unacceptable receiving stream for a treated waste stream of the size of Junction City's.

4.5.6.4 Land Application Facilities

The existing land application facilities consist of an irrigation pump and wheel line sprinklers. This equipment is old and will likely reach the end of it's useful life during the planning period.

4.6. 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.

4.6.1 Sewer User Fee

The City's Sewer Rates and Charges Ordinance #289 (**Appendix C**) provides the method for assessing sewer user fees. The sewer users are billed on a monthly basis for sanitary sewer service. Sewer fees are tied to water usage either through the water meter size or through the actual water consumed. Users are first classified as residential or commercial users. Residential and commercial users are charged a fixed monthly fee. The amount of the fee is dependent upon water meter size. The base fees are listed in **Table 4-6**.

TABLE 4-6
Existing Base Sewer Rates

Meter Size	Residential Users(1)	Commercial Users(1)
5/8 and 3/4 Inch	$9.89	$9.89
1 Inch	$11.50	$11.50
1 ½ Inch	$12.51	$14.73
2 Inch	$18.56	$33.75
3 Inch	$23.36	$53.43
4 Inch	NA	$101.62
6 Inch	NA	$190.00
8 Inch	NA	$235.83
10 Inch	NA	$281.50

(1) If water usage exceeds 400 cubic feet per month, users are charged for actual water consumed as described below.

The fixed fee structure shown in **Table 4-6** allows usage up to 400 cubic feet per billing cycle. In the event that water usage exceeds 400 cubic feet in a billing cycle, the rate is determined by multiplying 1.119 by the quantity of water consumed. For residential users, the quantity of water consumed is the average usage during the months of November through March. For commercial users the quantity of water consumed is the amount of actual water consumption during the billing cycle.

Residential and small commercial accounts pay a wastewater treatment debt service fee of $22.00 per month.

For large commercial accounts (i.e., water consumption greater than 800 cubic feet per month), the wastewater treatment debt service is determined by allocating the total large commercial user debt service amongst the various large commercial users. The total large commercial user debt service is determined by adjusting the total annual sewer debt service by a value sufficient to compensate for bad debts (typically 10%) and subtracting the debt service paid by the residential and small commercial users. This amount is divided amongst all the large commercial users based on their relative winter water consumption. For example, if a particular large commercial user consumes 30% of the total water consumed by all of the large commercial users, then that user pays 30% of the total large commercial debt service.

The City's sewer use ordinance does not contain provisions for adjusting the user fee for high strength wastes.

4.6.2 Sewer SDC

The City's System Development Charges Ordinance #963-A (**Appendix C**) provides the method for assessing sewer SDC's. The actual SDC fees are set by resolution of the Council. In early 2005, the City updated the SDC fees. The 2005 Resolution is included in **Appendix C**. SDC fees are currently based plumbing fixture units as defined by the Uniform Plumbing Code. The SDC fee per plumbing fixture unit is $113.15. The plumbing fixture units for a typical single-family residential unit varies between 16 and 22. Assuming an average of 19 units per dwelling, the SDC for a typical residential unit would be $2,149.89.