

## Appendix I

### STEP System History



## **Appendix I.1**

### **Septic Tank Effluent Pump (STEP) History**

Prepared by City of Lacey staff

In 1989 the first Septic Tank Effluent Pump (STEP) systems were introduced. By 1998 1,400 STEP systems had been installed, and failures had increased noticeably, with the failure rate peaking at 26% annually. The high rate of failures was contributing to a significant increase in operating costs. By 2011 there were 2,921 STEP systems connected to the sewer system.

In response to the increasing failure rate, Lacey initiated a Full Service Maintenance (FSM) program in 1999 by hiring two staff and equipment. The FSM program was an aggressive preventive maintenance approach that provides a level of service that calls for replacing most major components and pumping out all tanks on a five-year cycle. After the FSM program was implemented, by the end of 2005 emergency calls reduced slightly to 247 annually; however, the system almost doubled to 2,738 systems, reducing the effective failure rate to 9%.

In 2006 two additional staff were added to the STEP program. The annual failure rate dropped to 6%, with 178 emergency calls and 2,781 active systems.

Lacey's STEP systems are almost entirely made up of components manufactured by Orenco Systems, Inc. For this reason, Orenco contributed resources to review the history of Lacey's system and researching possible improvements. In 2007, City staff along with Orenco performed an evaluation of the STEP program. The first element of the analysis was data collection. Orenco joined Lacey on several site visits to several other large STEP systems throughout the country. Sites included Charlotte County, Florida; Missoula, Montana; Camas, Washington; and Yelm, Washington. Through the site visits opportunities were identified for modifications to the Lacey FSM program. Data was collected from site visits to evaluate risk and quantify financial impacts of potential modifications. In addition to many possible minor modifications, significant opportunities for improvement were also apparent, including tank pump-out intervals, FTE allocation, and pump repair and replacement.

The analysis findings were based on the data and observations made, it was recommended that the interval between FSM visits and tank pump-outs be increased from five years to eight years. Additionally, components previously replaced under the FSM will be inspected and cleaned, but not replaced unless a defect is noted. Four FTEs were committed to the STEP program. There were new programs however, particularly within the water section that required additional resources. Two FTE's from the STEP program were allocated to the Water main repair programs to keep them on schedule. The purchase of a new VacCon optimized the use of these reallocated resources.

Because of the FSM program, the failure rate gradually declined and in 2011 it was reduced to 7%, with 196 emergency calls and 2,921 active systems.

What is a Full Service Maintenance (FSM): The goal of the FSM program is to improve reliability. An FSM is a complete service overhaul of individual STEP sites, including pumps, tank pump-out, power cord inspection, float balls, tank cleaning, control box inspection, etc. The intent of this program is to complete a full system maintenance visit every eight years to each resident.

STEP system repairs are emergency work that is performed on a STEP system due to failure or customer calls.

The STEP crew also maintains all 19 of the STEP/Community Lift Stations facilities. They are responsible for evacuating the debris tanks, which range in size from 6,350 to 50,000 gallons. There are a total of 26 debris tanks having a combined storage volume of 774,874 gallons.



## **Appendix I.2**

**History of the Carpenter Rd and Union Mills, Marvin Rd STEP System\***

\*Prepared by City of Lacey staff

## **Appendix I.2**

### **Septic Tank Effluent Pump (STEP) History**

Prepared by City of Lacey staff

Date: Tuesday, November 08, 2011  
To: Teri O'Neal, Senior Water Resource Engineer  
Cc: Terry Cargil, Water/Wastewater Supervisor  
From: Ed Andrews, Water/Wastewater Quality Control Technician  
Subject: **Brief history of the Carpenter Rd and Union Mills, Marvin Rd STEP System evolution**

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In 1986 a 3" PVC STEP force main was constructed to serve the Pacific Park Development just south of the intersection of Pacific Ave and David St SE. This 3" PVC force main was extended south across Woodland Creek to the intersection of 14<sup>th</sup> Ave SE and Carpenter Rd. and traveled west to outfall into gravity sewer manhole XFT01 in front of the School Bus Barn on Carpenter Rd SE. The flow then traveled south in the gravity system to sewer lift station #7 (now abandoned) at the Le Village apartment complex on Diamond Dr SE. In 1988 this same 3" PVC force main was extended south along Carpenter Rd and east into Sierra Dr. to serve a portion of the Timberlake development. In 1993 another larger STEP main project was constructed in the Carpenter Rd area between 43<sup>rd</sup> Ave SE and Sierra Dr SE to serve the Meadow Lake development (now called The Arbors). This low pressure force main increased in size from its furthest point, a 6" main at 43rd Ave SE up to a 10" main at the intersection of Sierra Dr and Carpenter Rd where it was connected to the existing 3" PVC pipe. Shortly after this time in 1994 a developer building the Laurel Oaks development at the intersection of Union Mills Rd SE and Marvin Rd SE constructed a 14" HDPE (inside diameter of aprox. 12.5") force main from Mayes Rd west along the railroad grade to the Carpenter Rd intersection where it was also connected to the existing 3" main. Immediately after this time another force main project began constructing a 16" PVC main from the 14" connection at the Carpenter Rd / Bus barn location west along the railroad grade to outfall at sewer manhole WB101 at the intersection of Clearbrook and Lacey Blvd (previously called Lift station #1). This was to alleviate the overloaded condition of the old 3" main which now had too many connections added to it. When this 16" main was completed the 3" main outfall at manhole XFT01 was disconnected. All of the STEP sewer flows from Carpenter Rd and Marvin Rd (Laurel Oaks) area were directed to the Clearbrook manhole. Odor and corrosion problems immediately became an issue at the Clearbrook site and an experimental Bioxide injection system was installed at the Keller Plumbing Supply location adjacent to the new 16" STEP main at the Carpenter Rd. crossing. It was quickly determined that more contact time was needed for the Bioxide product to work properly and the temporary injection facility was moved east to a location at the NE corner of the School Bus Barn property. At this time a large trap was constructed on the 16" STEP main at the Clearbrook outfall location. The pipe was raised up above ground to back up the flow and prevent the pipe from draining out too quickly. This solution worked. In 1999 the City of Lacey upsized the old 3" PVC bottle necked main in Carpenter Rd with a new 16" PVC main due to pressure problems occurring in the south Carpenter Rd. system. In late 1996 a developer (Scott Griffin) building the Madrona Park development along Pacific Ave east of Marvin Rd. extended the STEP main from the Laurel Oaks site north along Marvin Rd and east along Pacific Ave. to Madrona Park.

The next year another developer constructing the McAllister Park development extended this same main south on Marvin and east on 19<sup>th</sup> Ave SE into McAllister Park. The mains described above would become the main arteries of the Carpenter / Marvin Rd. STEP system. All other smaller projects in the SE STEP area would make connections to or extend this system.

In 1998 a developer connected to the Marvin STEP force main at the intersection of 15<sup>th</sup> Ave SE and Marvin Rd. This project was called Sylvan Village and is now called Villages at Union Mills. The Village at Union Mills tract was proposed to be single family STEP however, in 2002 the Village at Union Mills Apartment complex project proposed using 3,000 gallon STEP tanks at each apartment building and were designed and placed in a way that would make maintenance nearly impossible. This design was rejected by the city. A decision was made between the city and the developer during the plan review to install a private gravity sewer system at the apartment complex which would be served by a large community pump station. Large fiberglass septic tanks were installed and a wet well with single impeller, solids handling submersible pumps. It was realized and approved at this time by the city that the single impeller style pumps would only be compatible with the existing force main system for a temporary period of time (5 to 10 years) at which time a pump up grade project would be necessary. This would become one of the 1<sup>st</sup> large Community STEP systems owned and operated by the City of Lacey. During this time the number of single family STEPS owned and operated by the city was growing quickly and maintenance was becoming an ever increasing burden. Also, the costs and headaches involved with treating STEP odors and corrosion were adding to an attitude of wanting to reduce the number of proposed STEP systems and have developers install Gravity sewers instead and was then viewed as a cost effective alternative to single family STEP. With more large developments being proposed for the Marvin Rd. area, it was believed that at some point these large Community holding tanks could be abandoned, the community pump stations would be converted to pump conventional sewer into town by way of a new future force main constructed to handle these flows. As a result of this decision another large Community pump station with single impeller pumps was built at the Village at Union Mills called LS# 31. These two pump stations remain in operation today and suffer mild pumping challenges caused by slightly increased system pressures in the Marvin / Union Mills transmission main system.

Another, situation that added to the expansion of the Marvin Rd. STEP system and an increase in number of Large Community STEP pump stations were the small developments built on the back side of Madrona Park along Steilacoom Rd SE. Avalon Ct, LS#26; Pine Crest divisions 1 & 2, LS#28 & LS#36; Steilacoom Heights, LS# 29 and the Regional Athletic Complex, LS#38 were all allowed to connect to the Marvin Rd. STEP main system via Madrona Park. They were allowed as temporary systems and were constructed with gravity sewer dry lines stubbed out to Steilacoom Rd. for future connection to a gravity system and regional pump station proposed in the City of Lacey sewer comprehensive plan. To date, the sewer capital project(s) identified in the comp. plan have not yet been constructed to remove these pump stations from the Marvin Rd. system.

In the McAllister, south Marvin area around 2006 to present day developments were continuing to be designed and constructed with gravity sewer and large community pumping systems. These developments are Evergreen Heights with two pump stations, # 42 & # 50 and Pleasanton with lift

station # 44. One of the reasons the city allowed these large community stations to proceed here was a proposal from the Tri-Way Inc. developer to place a new force main out to this area to tie all of these large community pump stations together and further develop parcels around and south of Evergreen Estates. This plan never fully developed and Tri-Way has since gone bankrupt. Development has stagnated nearly to a stop with the turn in the economy. The City of Lacey has no capital sewer improvement project planned to upgrade this area.

With this years Development Guideline Revisions, the City is eliminating the large community type pumping systems. Pumping of the large (20k to 50k gallon) septic tanks requires too many man hours, is overly strenuous and has caused back injuries to the maintenance crews. Also, the maintenance and electricity cost of the pump stations is a factor. In the last 10 years Orenco has made many advances in single family STEP pumping design components (with the help of the City of Lacey). STEP reliability and performance is far above what it was in the 90's. Pumping / electrical costs are provided by the home owner with a STEP system as opposed to lift stations. The City has refined its maintenance program and has transitioned from 5 years to an 8 year pump out interval of the individual STEP tanks. The city is proposing that all future connections within the STEP basin be constructed as single family connections. No future large community STEP pump stations will be allowed.