

GRAVITY SEWER REPAIR  
MARINE DRIVE  
CONSTRUCTION COMPLETION REPORT

*PREPARED*  
OCTOBER 9, 2001

*PREPARED BY:*

CITY OF BLAINE, PUBLIC WORKS DEPARTMENT  
1200 YEW AVENUE  
BLAINE, WA 98230

## ***Introduction***

This completed project included repairs to documented problems in manholes and sewer lines in the City of Blaine's sanitary sewer system along Marine Drive. The goal of this project was to prevent the abrupt failure of a critical conveyance pipeline and to seal pipe joints and manholes that presented visual evidence of possible leakage. The scope of this repair project was initially developed with input from stakeholder groups that had an opportunity to review video inspection tapes from May 2000.

In conformance with state bid laws, the City of Blaine selected GELCO Services, Inc. to perform the needed repairs. GELCO was able to successfully complete the manhole patching and grout injection of pipe joints, but was unable to complete line repairs in the most severely damaged clay pipe sections. Blaine Public Works staff mobilized to complete the line repairs following completion of GELCO's work.

This project was made possible through the financial contributions of WRIA No. 1 Early Action Grant (\$11,000), State Department of Ecology's Coastal Protection Fund (\$9,000), a contribution from the Semiahmoo First Nation (\$5,000), staff support from the Puget Sound Restoration Fund, and the strong support and encouragement of the Drayton Harbor Shellfish Protection District.

## ***Project Rationale***

Elevated fecal coliform levels have been, and are currently measured throughout Drayton Harbor. Efforts have been underway to identify sources of this contamination for a number of years. Various groups and agencies have taken action to begin addressing some of the potential sources of contamination. These efforts include: a survey of the operational status of on-site septic systems, implementing a low-interest loan program for repairing on-site systems, working with hobby or non-commercial farms to implement Best Management Practices (BMPs) for animal waste management, homeowner education programs, and video-taping the transmission line and manholes along Marine Drive near Cain Creek.

The collection system repairs under this project included manholes and pipe sections near Lift Station No. 1, which are in close proximity to marine waters in Blaine Harbor (marina area). Water quality data collected in the vicinity of Lift Station No. 1 shows elevated fecal coliform levels exceeding water quality standards on a frequent basis.

## ***Repair Techniques***

Repairs completed under this project included sealing of pipe joints, patching of manholes, and open-cut pipe replacement.

Pipe joints were sealed by epoxy injection followed by a pressure test to confirm the repair. Figure 1. below shows the equipment that GELCO used to make these joint improvements.



Figure 1. - Joint seal and pressure test device (August 2001).  
*Photo by Jon Walter*

The manhole patching that GELCO completed involved trowel application of a cementacious mastic material as shown in Figure 2 below.



Figure 2. – Trowel application of patching material in manhole on Marine Drive (August 2001).  
*Photo by Jon Walter*

Pipeline replacement was completed by City of Blaine, Public Works by open cut excavation. Broken clay and concrete pipe sections were removed and replaced with new PVC-900 pipe. The ends of the new pipe were fastened to the existing pipe with banded (FERNCO brand) couplings.

The photograph in Figure 3 below shows a water pipe (gray) and parallel electrical conduit above a broken segment of clay sewer pipe (red) below. We determined that the damage to one of the sewer pipe section was caused in part by a large concrete block between the pipes, probably installed to support the water pipe joint above. The concrete was removed and the damaged pipe replaced with new PVC pipe (Figure 4). The excavation was then filled with pea gravel. In one of the other areas repaired by Public Works, a remnant of wooden pilings (probably from an old trolley line) was found directly below the clay sewer pipe causing differential settlement and damage to the pipe. Prior to replacing the broken pipe section, the public works crew removed the top 12" or so of the remnant piling. Roadside surfaces were restored with compacted crushed gravel.



Figure 3.  
On Marine Drive,  
broken 12"  
diameter clay  
sewer pipe below  
water pipe and  
electrical conduit.  
(September 2001)  
*Photo by Jon  
Walter*



Figure 4.  
On Marine Drive,  
12" sewer pipe  
repairs completed  
by Public Works  
(September 2001)  
*Photo by Jon  
Walter*

## ***Scope of Repairs Completed***

The following repairs were completed under contract with GELCO over a three-week period in August 2001:

### *Manhole Repairs*

- B4-1: Mud up ring and riser, replace bench and invert, coat
- B4-1A: Mud up the riser and grout all leaking collars
- A4-5: Coat bench
- A4-1: Mud up riser
- A4-2: Mud up riser
- A5-1: Mud up riser and pipe collars
- A4-3: Coat
- A5-3: Coat and mud up collars
- Examine manhole A4-6 and make repairs as needed
- Examine pipe connecting to Lift Station #1 and make necessary improvements.

### *Line Repairs*

- B4-1 to B4-1A: Repair pulled joint gasket 17 feet west of manhole B4-1.
- B4-1A to A4-6: Repair stub joint crack 2 feet north of B4-1A and grout crack in pipe 54 feet north of B4-1A.
- B4-2 to B4-1: Grout leaking joint 156 feet west of B4-2
- B 3-1 to B 3-2 (3 joints)
- B 3-2 to B 4-2 (2 joints)
- D 3-2 to D 3-1 (1 lateral plug abandoned)

Upon completion of the contracted work (early September 2001), the Blaine Public Works crew was mobilized to complete pipeline repairs which could not be completed by GELCO. Repairs were made in the following three locations:

- Manhole D3-1 to C3-5: one repair of break 128' to 130'
- Manhole D3-1 to C3-5: two back to back repairs of break from 153' to 160'
- Manhole C3-2 to C3-1: two back to back repairs of break from 78' to 83'

These repairs occurred on three separate days. To avoid potential catastrophic failure to the adjacent waterline, the water service in this vicinity was shut off for portions of two separate days.

### ***Project Financial Considerations***

The original contract with GELCO Services for completion of manhole repairs, joint repairs, and spot repairs included lump sum compensation of \$19,109.09.

Change Order No. 1 expanded GELCO’s contract scope to include testing and joint repairs as follows for an additional sum of \$2,697.50.

- B 3-1 to B 3-2 (3 joints)
- B 3-2 to B 4-2 (2 joints)
- D 3-2 to D 3-1 (1 lateral plug abandoned)

Change Order No. 2 credited back to the City, \$4,855.50 for pipeline repairs that they were not able to complete. These are the same repairs that the City crew finally completed in late September 2001. Therefore, GELCO’s total compensation for Marine Drive sewer repairs was \$16,951.09.

For the work performed in-house by the Blaine public works crew, a separate accounting of labor, equipment, and materials expended is provided below in Table 1. Contract administration and inspection services provided by the City are not included in this cost accounting.

<i>Public Works Cost Elements</i>	<i>Actual Costs</i>
Direct Labor	2,951.00
Equipment	2,952.00
Materials	454.54
<b>Total</b>	<b>6,357.54</b>

Table 1

### ***Conclusion***

All repairs identified in the WRIA Grant proposal were successfully completed. Public works crews, using open cut and replacement techniques, completed the original contract elements that could not be completed by GELCO due to further deterioration. The total cost of the repairs was \$23,308.63, which includes both contract and in-house efforts. This report is submitted in fulfillment of the interim report requirement contained in the WRIA Grant Agreement.

A final project report will be prepared by Puget Sound Restoration Fund which summarizes the project results, provides an assessment of fecal coliform levels post-project and evaluates the effectiveness of the project.