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April 24, 2014

Mr. Charles Aspinwall
Town Hall
900 Main Street
Millis, MA 02054

RE: Union Street Sewer Repair
Recommendation

Dear Mr. Aspinwall:

Our office has reviewed the possible cause of the recent sewer breaks on Union Street. During the last break on April 5th, we obtained a piece of the ductile iron sewer pipe and observed the soil conditions surrounding the pipe. The soil within the trench appeared to be naturally occurring to the area and was free from any noticeable foreign debris or odor which may indicate a source of contamination. Groundwater was present at the depth of the pipe.

An entire eighteen foot length of pipe was removed by the DPW, which consisted of two recent repairs by DPW. Approximately half of the length of pipe was corroded through from the outside on the bottom in a series of holes approximately two inches in diameter and included the section of pipe replaced recently by DPW. The remainder of the length of pipe and a two foot section of the connecting pipe on the west end were inspected and no visible corrosion or defects were observed. A closer inspection of the connecting pipe on the east end showed corrosion on the top of the pipe in form of 1/8" deep pitting approximately 1/2" in diameter which did not penetrate the pipe. The wall thickness is approximately 3/8" thick. Approximately two feet of the pipe containing the defects was removed and repairs were completed.

We recommend that further testing be conducted to determine if the pipe corrosion is local to the repair work or exists throughout the entire sewer pipeline. The pipeline extends from the pump station at the DPW along Water, Union and Curve Streets to the intersection with Exchange Street and consists of approximately 3,000 linear feet of 10" diameter ductile iron pipe installed in 1985. We recommend that two test pits be dug approximately 40 feet on either side of the repair work to expose the sewer pipe. Within each test pit, the outside of the pipe should be thoroughly cleaned and inspected for corrosion. If pipe corrosion is present, a soil sample should be taken from around the pipe and tested according to AWWA standards for corrosive soils for levels of resistivity, pH, redox potential, sulfides, and moisture content and rated according to established standards. If the

pipe is corroded and the soil is corrosive, we recommend expanding the testing interval to 200 foot intervals or greater until corrosive conditions are not present.

At this stage, we do not recommend performing test pits on the entire pipe line because we are of the opinion that the corrosion is local and due to a pipe joint that was most likely leaking from the day of installation. The leaking sewer produced anaerobic/aerobic bacteria reactions that reduced sulfides and sulfates in the wastewater and ultimately produced sulfuric acid and corroded the outside of the pipe. We feel that removing and replacing the affected pipe and soil within the localized area with PVC pipe and clean backfill will solve the problem.

We estimate the cost to perform the initial testing work and replace approximately 80 linear feet of sewer pipe to be \$66,687.50 as detailed in the attached estimate. If you require additional information or have any questions, please call.

Respectfully Submitted,
GCG ASSOCIATES, INC.

Michael J. Carter

Michael J. Carter, P.E.

Union Street Sewer Repair Estimate

Engineer's Estimate

Description	Quantity	Unit	Price	Total Price
INITIAL TESTING				
Excavation Contractor	1	DAY	\$ 7,500.00	\$ 7,500.00
Backhoe, 10 wheel dump truck, Utility Truck Compactor, Trench Box, mobilization 1 operator, 1 foreman, 1 truck driver, 1 laborer				
Engineer - field testing/report	2	DAY	\$ 680.00	\$ 1,360.00
Soil Sample Lab Test	2	EA	\$ 500.00	\$ 1,000.00
Gravel Borrow Fill	20	CY	\$ 25.00	\$ 500.00
Police	9	HOUR	\$ 50.00	\$ 450.00
			Subtotal	\$ 10,810.00
PIPE REPLACEMENT				
Excavation Contractor	3	DAY	\$ 7,500.00	\$ 22,500.00
Backhoe, 10 wheel dump truck, Utility Truck Compactor, Trench Box, mobilization 1 operator, 1 foreman, 1 truck driver, 1 laborer				
Bypass Pump Truck	3	DAY	\$ 3,000.00	\$ 9,000.00
Engineering/Bid Documents	1	LS	\$ 3,500.00	\$ 3,500.00
Engineer - Inspection	3	DAY	\$ 680.00	\$ 2,040.00
10" Dia. C900 PVC PIPE	80	LF	\$ 50.00	\$ 4,000.00
Sand Blanket Backfill	75	CY	\$ 25.00	\$ 1,875.00
2" Trench Paving	120	LF	\$ 15.00	\$ 1,800.00
Gravel Borrow Fill	150	CY	\$ 25.00	\$ 3,750.00
Police	27	HOUR	\$ 50.00	\$ 1,350.00
			Subtotal	\$ 49,815.00
				\$ 6,062.50
TOTAL PROJECT COST				\$ 66,687.50