



**TOWN OF TRUMBULL
SANITARY SEWER SYSTEM REVIEW
PHASE 4, PART B, CONTRACT III (JOG HILL AREA)**

March 15, 2011

FINAL

EXECUTIVE SUMMARY

Tighe & Bond conducted an investigation of the Contract 3 project to identify and catalog defects in the work, identify causes of the defects, (if any) and prescribe correction actions for these defects and their associated costs. Our investigation is not meant to be an exhaustive review of the Contract 3 work, and is instead based upon available Town records, supplemental video inspection, and spot checks of areas identified as warranting field review based upon our review of the Town records. We also compared as-built quantities to those actually paid to the Contractor.

Our key findings are as follows:

- Approximately 22,000 LF (26%) of the street length within the Contract 3 area exhibits some sign of trench settlement.
- The Town supplied us with their available videotaping records, which constituted 74% of the total pipe length of the project¹. We identified a total of 365 pipe defects for this portion of the project. The highest concentration of pipe defects were at the Chalon Road / Country Club Road / Brookside Road / Clarion Place intersection, and along Quaker Lane and Spinning Wheel Lane. The most frequent type of distress observed was overbelling of the pipe. Where overbelled pipe was identified, 61% of instances were accompanied by trench settlement.
- We confirmed that testing of sanitary sewer trench compaction was discontinued after a few tests early on in the project. It appears that proper sewer trench compaction was not routinely done, and this contributed to trench settlement.
- No air pressure testing records of the sanitary sewer are available, despite the requirement to do so.
- There were a number of differences between the quantities measured on the as-built drawings and those paid for in the final requisition. This difference represents an overpayment to the Contractor of \$463,584.
- 44% of all chimneys installed on the project coincide with observed trench settlement. The chimney detail substituted by the Contractor is unacceptable given the stresses imposed on the main line sanitary sewer.

¹ The Contractor does not have these videos, although specifications require that he retain copies of same.



- Spot checks of work recorded on the drainage as-builts revealed three instances of pipe length or headwall not being installed, and five instances of drainage structures with questionable workmanship that require repair.
- Spot checks of underdrainage as-built work indicated that underdrains appear to be installed as shown on the as-builts.
- In certain locations, underdrains were reportedly installed in the lateral trenches for houses although there was no mainline underdrain in the street to connect to. Exploratory test pits are recommended to determine if these connections were made.
- Follow-up video inspections show that some pipe deficiencies have worsened since the initial video inspection, and infiltration into the mainline was observed through open joints.
- Pavement corings show that pavement over certain trenches was less than the thickness shown in the pavement repair detail.
- Tighe & Bond detected numerous defects and deficiencies in the work, all of which have been photographically documented, including, but not limited to, 1) overbelling, 2) chimney push-throughs, 3) sagging, 4) compressed/misshapen pipes, 5) cracked saddles with water infiltration, 6) pipe push-throughs, 7) PVC fragments at joints, 8) debris at joints, 9) misshaped connections, 10) misshaped/damaged spigots, and 11) ground water infiltration into system. There were 365 total deficiencies noted as of the date of this Report.
- The observed defects and deficiencies in the work 1) increase the risk of blockage and/or system failure and 2) are presently increasing the cost of operation (and will continue to do so) as these defects and deficiencies allow for groundwater infiltration which is then treated as/with effluent (e.g., a 5 gal/min. infiltration of groundwater into the system equals 2,700,000 gal/yr. of groundwater that Town unnecessarily pays to treat).
- The numerous physical defects within the Sewer System detected and detailed in the Report require remediation and repairs that are estimated as of the date of this Report to cost approximately \$4,651,500, to wit:

a.	Storm Drainage	\$ 27,600
b.	Underdrainage	\$ 500
c.	Overbelled Pipe	\$ 561,000
d.	Missing drop connections/splash guards	\$ 19,500
e.	Chimney Replacements	\$ 1,137,900
f.	Pavement repair	\$ 2,849,900
g.	Miscellaneous repairs	\$ 55,100

These repair costs, when added to the nearly \$ 464,000 in overpayments, bring the current damages, **exclusive of increased operational costs, consulting fees and costs and attorney's fees**, to approximately \$ 5,115,000.00.

Booth Hill Road
BO-7 to BO-6

Groundwater
Infiltration at
Manhole Interface



Booth Hill Road
BO-5 to BO-6

Overbelled



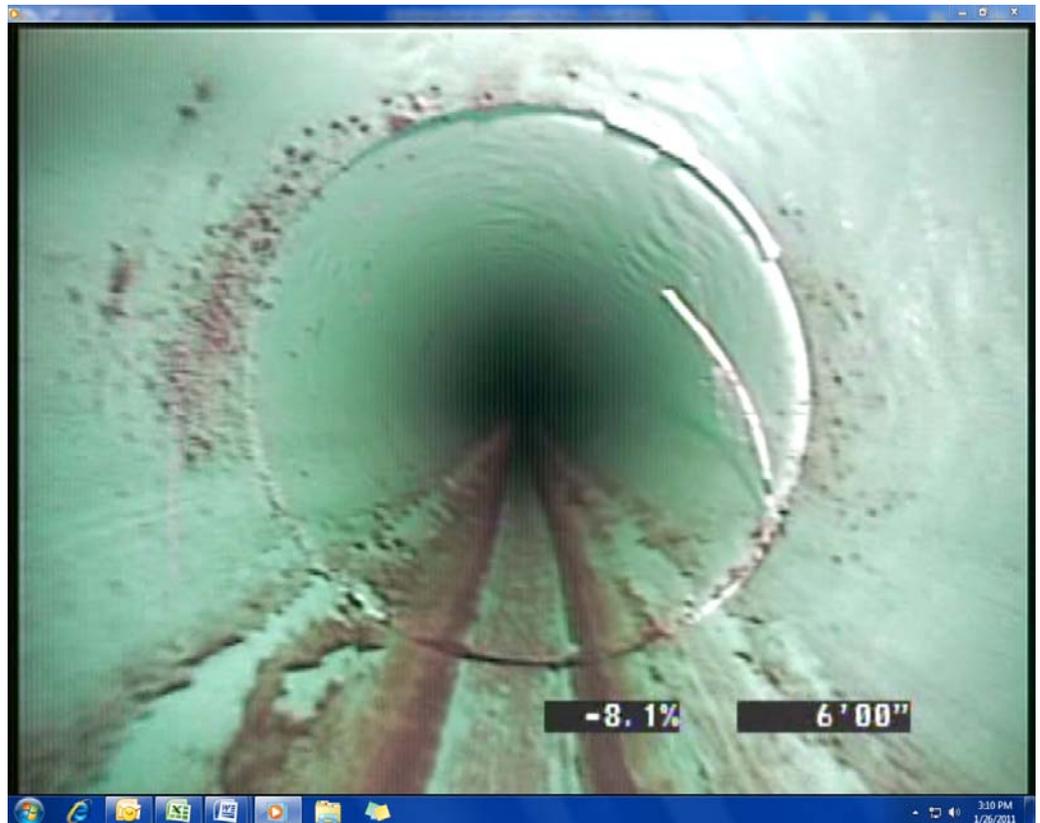
Booth Hill Road
BO-16 to BO-15

Sag with Debris
Buildup



Brookhedge Road
BH-4 to BH-5

PVC Fragment in
Joint



Country Club Road

CU-5 to CU-6

Debris in Joint



Hurd Road

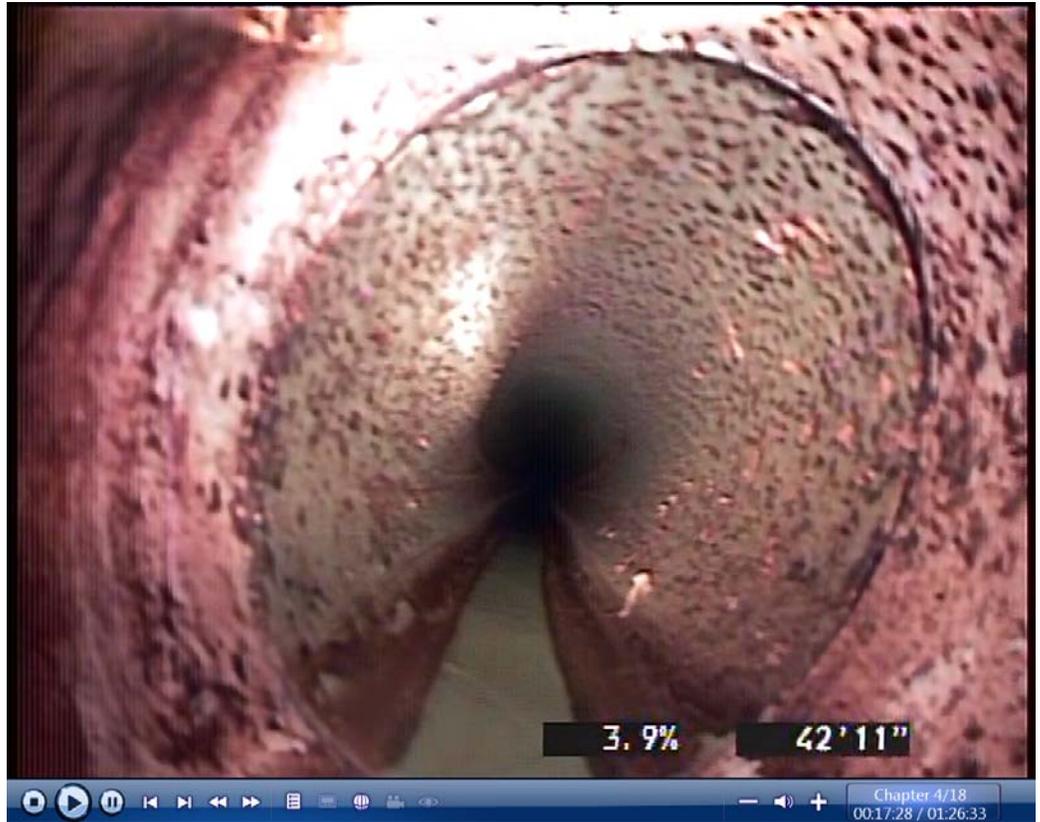
HU-6 to HU-5

Pipe Pushed
Through Chimney
Connection



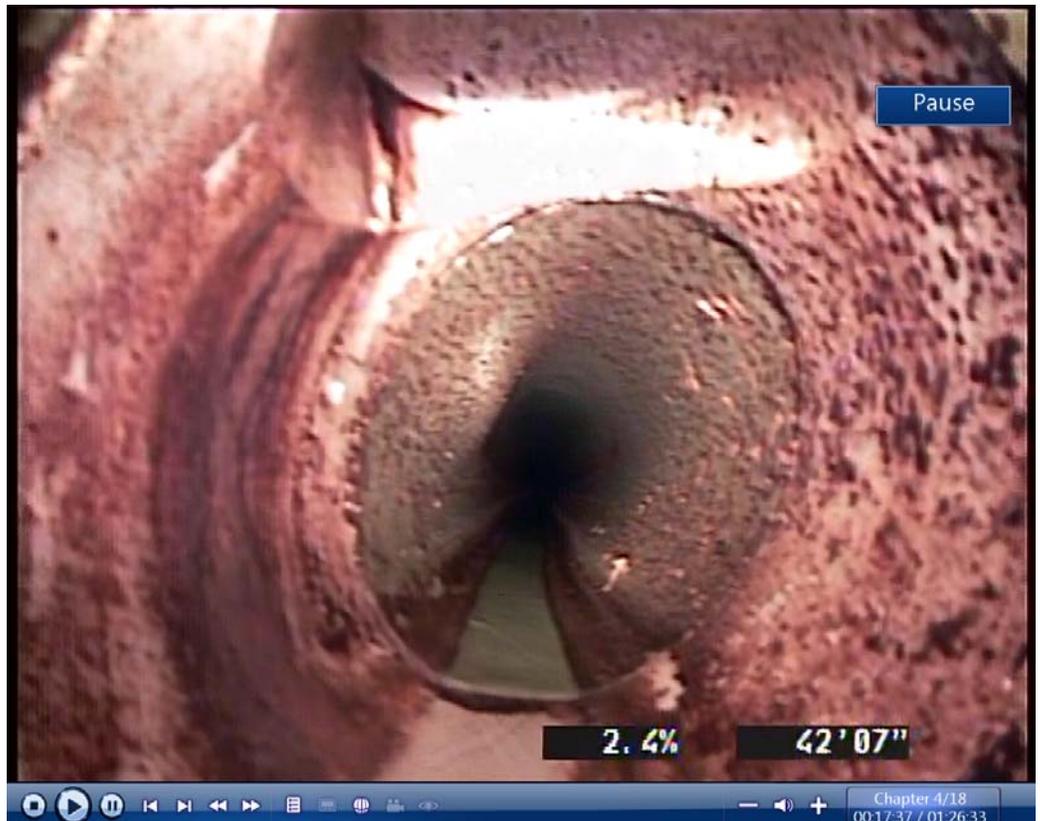
Hurd Road
HU-11 to HU-10

Extremely
Deformed Pipe
(Camera unable to
fit through)



Hurd Road
HU-11 to HU-10

Deformed Pipe
Located Near
Chimney
Connection



Hurd Road
HU-10 to HU-11

Extremely
Overbelled



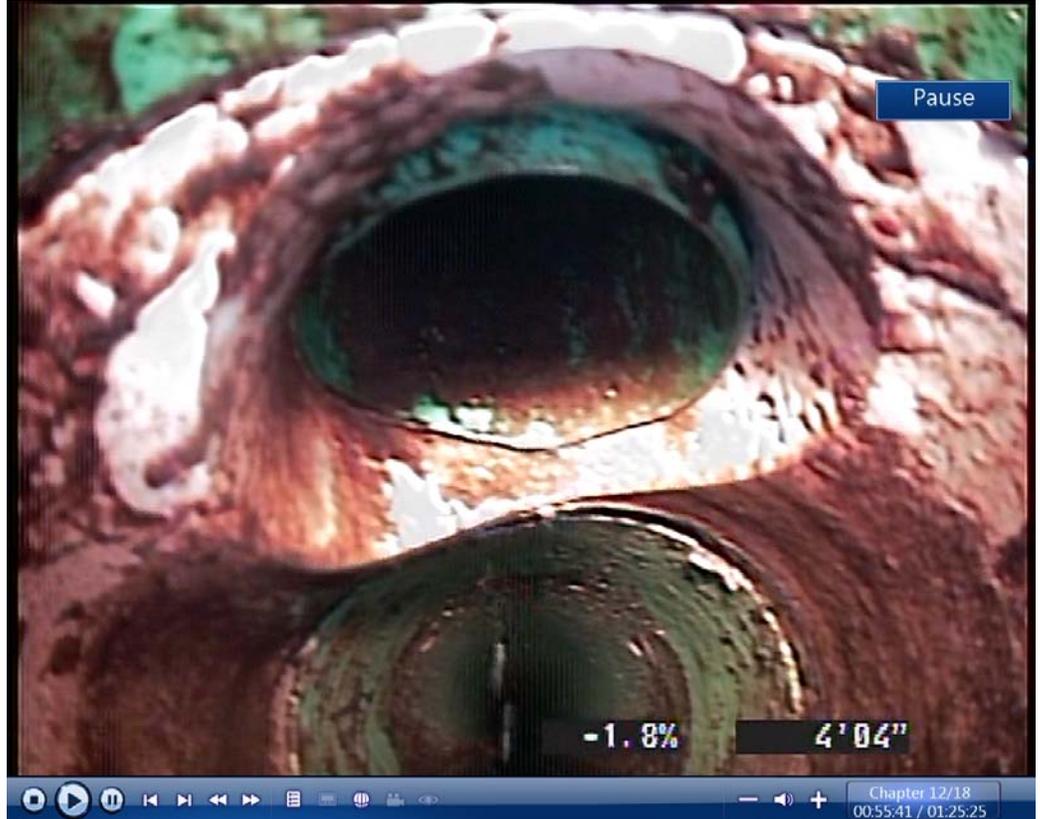
Marathon Road
MR 6A to MR-6

Cracked Saddle
with Groundwater
Infiltration



Marathon Road
MR-6A to MR-6

Top View of
Cracked Saddle



Marathon Road
MR 6A to MR-6

Inflowing Invert at
MH MR-6 is at a
Lower Elevation
than the
Outflowing Pipe



Marathon Road
MR-1 to DF-44

Pipe Pushed
Through Chimney
Connection



Ranch Drive
RA-1 to HU-12

Chimney Failure



Ranch Drive
RA-1 to HU-12

Pipe Pushed
Through Chimney
Connection with
Groundwater
Infiltration

