SEWER LINE INVESTIGATION

Asnuntuck Community College

MAY 4, 2023

PREPARED FOR
Asnuntuck Community College
CT Department of Administrative Services
Project No. BI-CTC-651
Contents

1. Introduction ................................................................................................................................................. 3
   Background: .............................................................................................................................................. 3

2. Investigation .................................................................................................................................................. 4
   Closed Circuit Television Inspection: ........................................................................................................ 4

3. Analysis ........................................................................................................................................................ 6

4. Summary of Findings and Recommendations .......................................................................................... 7
   Recommendations: ........................................................................................................................................ 7
   Conclusion: .................................................................................................................................................. 8

Appendix A: "First Floor Plumbing Construction Plan" .................................................................................. 9
1. Introduction

BSC Group, Inc. (BSC) is pleased to submit the following summary of findings and recommendations to the Connecticut Division of Administrative Services (CT DAS) following various investigations of the existing sewer system at Asnuntuck Community College (ACC) in Enfield, Connecticut. BSC performed this investigation in accordance with the applicable provisions of our On-Call contract with the Department of Administrative Services (DAS) Contract No. OC-DCS-CIV-LA-0045.

Background:

BSC attended a Project initiation meeting on February 8, 2023 with representatives from CT DAS and ACC facilities to review information provided by the school in advance of the meeting and to understand from representatives on the scene what issues occurred.

At the meeting, facility representatives indicated that in previous semesters, a janitor’s closet wash sink, toilets and floor drains in the men’s and women’s restrooms on the ground floor on the eastern side of the building flooded. The clog was severe enough to require emergency jetting to release the clog. This flooding situation occurred a number of times during that semester.

Prior to the meeting, DAS provided to BSC the bid set for the Campus Renovations Project No. BI-CTC-437 for the renovations at ACC construction after 2015 at the campus. BSC reviewed the document and determined that Sheet No. P2.201 identifies a 4” sanitary discharge pipe running east by a set of bathrooms on the ground floor. From these bathrooms, the sanitary discharge pipe turns north in a main hallway, passing a café, before upsizing to a 6” pipe and exiting the building.

During the meeting, representatives indicated the bathroom identified on the above-mentioned sheet is the bathroom that previously flooded. Representatives expressed concern of a potential "belly" in the sanitary discharge, either caused by faulty construction or settlement of base material beneath the sanitary piping. This belly, if severe enough in depth, could potentially cause the slowing or even stoppage of sewage as it exits the facility. This slowing or stoppage of sewage flow could cause a situation where solids and paper in the sewage could begin to accumulate over time, resulting in an eventual clog.

ACC Representatives also supplied to BSC a CCTV inspection that was performed at the time the clogs were occurring for further background information and comparison purposes.

Please find Sheet P2.201 attached as Appendix A with the sanitary discharge pipe highlighted for clarity.
2. Investigation

Closed Circuit Television Inspection:

A component of BSC’s investigation is to ascertain the potential presence of a "belly" in the sanitary piping system in question. This physical observation is most easily accomplished through the use of a Closed Circuit Television Camera inspection (CCTV).

For this procedure, a small lighted camera on a long flexible lead is threaded into the sanitary system at a convenient system access point, such as a system clean out. The camera is designed to record the total distance it travels along the piping system and is also designed to be traceable, meaning the camera location can be identified below grade through non-invasive means using a locator wand on the surface. This allows the investigator the ability to pinpoint the location of a clog, or abnormality in the pipe at a precise location on the surface, potentially saving the need for costly investigative measures. The additional benefit of the CCTV inspection is the ability to examine all points in the discharge line for signs of clogging, damage, accumulated sewage, root encroachment, etc.

BSC contracted with Fletcher Sewer and Drain Services of Ludlow Massachusetts for the purposes of performing the CCTV inspection of the sanitary discharge piping in the location where flooding previously occurred.

Prior to the investigation, BSC identified three (3) potential cleanout locations in the floor slab as potential entrance points for the CCTV. The cleanout locations are identified in Appendix A by red circles.

On February 20, 2023, representatives from BSC, ACC, and Fletcher Sewer were onsite to perform the CCTV inspection.

At just after 9:30 am, the Fletcher contractor opened the primary in-line cleanout located at the start of the sanitary discharge run with the history of flooding. This cleanout is located at the farthest point away from the discharge from the building and will allow the camera to pass all relevant connections that flooded in the past, including the floor sink in the janitor’s closet, the women’s bathroom toilets and floor drain, the men’s bathroom toilets and floor drain, the 90-degree bend to the north, and the discharge to the sewer manhole located within the front plaza. The primary in-line cleanout is identified on Appendix A with a double red circle.

Documentation of Inspection

Fletcher Sewer and Drain provides with their service a USB drive with the recorded inspection saved for project record. Please see Appendix B for the 16-minute-long CCTV video of the inspection of the line.

The major points in the video are documented below in order at which they were observed.

1. The clip starts with inserting the camera into the system and through the cleanout companion flange that closes off the piping while not in use. Once in the pipe, the initial view shows the apparent women’s bathroom sink connection on the right and the janitor closet just beyond on the left (2'0" - 0:50 sec)

Green arrows represent inlets into line. (disregard time shown on camera)
2. At 7’7”, sewage level is above the camera lens.

3. At 12’0”, the camera is just above the water level and waste in the form of toilet paper is evident in front of the camera. The important information garnered from this is that the flow is not blocked through this section since the camera is not below the water level. In the Fletcher technician’s previous experience, the blocked sewage from 7’ to 12’ is simply a toilet paper blockage and will disintegrate quickly.

4. From approximately 12’ to 38’ the sewage is again above the camera lens.

5. At approximately 38’9” (1:28 sec.) the camera again enters free flowing pipe. The technician felt the camera pass through the two 45° bends shown on the plumbing design. There is additional evidence of toilet paper in the piping again potentially restricting the free flow of sewage from 12’ to 38’.

6. From 39’ through to 56’ and beyond the piping appears to be 100% clear and free flowing.

7. At approximately 66’, debris collects on the camera lens and obscures the view. Speaking with the Fletcher technician, the camera is still sliding freely down the pipe, so there is no physical obstruction.

8. Although still obscured, there is evidence at 78’ of free flowing material in the pipe (observed on the lower left corner of the screen where flowing material flowing by the stationary camera is evident.)

9. At 86’, the piping transitions from Ductile Iron Pipe to green PVC. At this time BSC requested the Fletcher Technician to field locate the camera from the surface. The camera was ultimately located approximately 5’ from the front planter area in the entry plaza, outside the building.

10. The technician extended the camera out to 129’ 8” with no obstructions, at which point further extension was halted to prevent the potential for getting stuck in a manhole.
3. Analysis

Analysis of the CCTV inspection, as well as other information collected throughout this investigation, reveal a number of relevant facts that can be used to develop potential theories why there is a history of flooding in the bathrooms and janitors closet in question. They include (in no particular order):

1. Upon performing the CCTV investigation, it was apparent the piping beneath the slab in the building is Ductile Iron Pipe (D.I.P.). D.I.P has a history of interior deterioration overtime, causing scale to form and in some cases, begin to delaminate from the interior sidewalls of the pipe. This delamination can pull away from the walls, creating a sharp edge that debris can snag on and get stuck.

2. There were two locations in the section of piping investigated that showed accumulated sewage of enough volume to cover the camera lens (the camera is approximately 1.5" high). These areas were easily pushed through with the camera manually by the Fletcher technician, and in his experienced opinion, the blockages were most likely caused by an accumulation of toilet paper only (most likely on the bottom of the pipe). There was no apparent damage to any of the piping observed, and no apparent evidence of a "sag" or "belly" in the system accumulating sewage. All clear piping appeared to be flowing freely throughout the entire investigated run.

3. Toilet paper is designed to break down relatively quickly in sanitation systems. However, there is industry wide anecdotal evidence that many other products make their way into toilets every year, such as facial tissues, paper towels, sanitary napkins, "Flushable wipes", and quite often cloths or pieces of fabric. These products do not break down with the rapidity of toilet paper and pose a much greater risk in causing a blockage that will not disintegrate over time. These materials also have a high potential to “snag” on the delaminated layers of D.I. pipe mentioned in item 1, above.

4. Through conversation with ACC facilities representatives, it was determined that a regular maintenance schedule for the building sanitary piping, consisting of routine cleaning and other measures, has never been implemented.

5. Also through conversations with ACC staff, the flooding events apparently occurred over a defined time-period in 1 semester, after which the line was water-jet cleaned. There is a possibility the issues observed at the college were the result a single individual using an excess amount of toilet paper, or some other temporary cause at that time.
Given the above information provided to BSC from representatives from ACC and gathered through the CCTV investigation, a number of theories to the origin of the flooding could be constructed, all with relatively equal likelihood of occurrence.

Therefore, BSC cannot definitively determine the root cause of the flooding. What BSC can provide are the following summary of findings:

1. The sanitary piping observed during the CCTV inspection did not identify any evidence of "bellying" or "Sagging" in any of the piping observed. Therefore, no slab cutting or physical alteration of the existing sanitary piping is necessary.

2. The CCTV inspection did not identify any substantial clogs or buildup that caused undue concern or need for immediate corrective action. Those open areas that were observed are free flowing, draining to the exit point from the building.

Recommendations:

BSC would like to offer the following recommended maintenance regimen to ACC to mitigate the potential for clogs or flooding to occur in the future:

1. **CCTV Inspection** (Every Year)
   a) The night prior to a period of low flow (weekend or day when the college is closed), the toilets in the men's and women's restrooms should be flushed consecutively to clear any minimal reduction in flow due to accumulated toilet paper.
   b) 12 hours after the initial flush, perform a CCTV inspection to observe the condition of the sanitary piping system. Look for scaling of the pipe interior walls that could cause a snag, "bellies" holding water, evidence of damage or excessive deterioration of the piping, etc.
   c) Record findings for future reference.

2. **Jetting** (Every 2-3 years)

   A nozzle directs high-pressure jets of water against the pipe walls to clear debris and grease buildup and can clear blockages. Usually enters from the outlet point of the discharge and uses the force of the jet to propel itself up the pipe. Once to the end, the nozzle is pulled back out to clear any remaining debris.

3. **Rodding or Snaking** (as needed depending on severity of clog or delamination of interior walls of pipe)

   Uses a rotating drive unit and rods with a rotating blade at the end that fits inside the pipe an scour the inside of the pipe clear of grease deposits, clogs, stuck debris, and pipe scale.

   Rodding can be highly effective in clearing piping, but also has the potential to damage severely deteriorated piping and should be used only as specifically needed.
Conclusion:

Following the CCTV inspection and investigation of the actions taken in the past few years, the sanitary system associated with the historic flooding issues appears to be operating effectively at this time. BSC was unable to identify any significant issues with the building’s sanitary sewer piping system that was investigated. With continued maintenance as recommended in this report, there is little evidence to suggest that the system will not function for the remaining duration of its service life.
Appendix A: "First Floor Plumbing Construction Plan"

Plan Sheet P2.201
GENERAL SERVICE COMPRESSED AIR

VOLTAGE

LENGTH

11

19.

17.

10.

9.

6.

AN ENCLOSED CONTROLLER. REQUIREMENTS ARE SPECIFIED UNDER DIVISION 26: "ENCLOSED CONTROLLERS".

ARCHITECT. MOUNTING HEIGHTS SHALL BE APPROVED BY THE ARCHITECT.

PARALLEL TO BEAM. PROVIDE ALL NECESSARY FITTINGS AND TRANSITIONS.

TAKE-OFF REQUIRED. CONSULT THE DETAILS AND SPECIFICATIONS.

PROVIDE DUCT TAKE-OFF TYPES AND VOLUME DAMPERS PER THE SPECIFICATIONS AND DUCT TAKE-OFF

STANDARDS. TURN OVER TO THE OWNER EQUIPMENT SO INDICATED.

IT IS NOT THE INTENT OF THESE DOCUMENTS TO SHOW EVERY DEVICE, APPURTENANCE, PIPE, WIRE OR

NO MECHANICAL OR ELECTRICAL SYSTEM COMPONENTS MAY BE SUPPORTED FROM STRUCTURAL BRACED

ENGINEER SHALL REVIEW THE INSTALLATION AND PROVIDE A REPORT OF THE FINDINGS.

ELEVATOR MACHINE ROOMS OR SHAFTS.

SEISMICALLY SUPPORT THE EQUIPMENT AS REQUIRED BY CODE, THE AUTHORITY HAVING JURISDICTION, AND/OR

BEFORE INSTALLATION. COORDINATE INVERTS WITH THE STRUCTURE AND SYSTEM REQUIREMENTS PRIOR TO

INACCESSIBLE CEILING OR BEHIND A WALL, AN APPROPRIATE ACCESS DOOR SHALL BE PROVIDED AND THE

INSTALL ALL EQUIPMENT IN ACCESSIBLE LOCATIONS. WHERE EQUIPMENT MUST BE INSTALLED ABOVE AN

PERFORM ALL WORK IN COMPLIANCE WITH THE SPECIFICATIONS, APPLICABLE CODES, ORDINANCES AND THE

EQUIPMENT. ALL SUCH EQUIPMENT AND EQUIPMENT COLORS AND FINISHES SHALL BE COORDINATED WITH THE

IS PROVIDED ON THE VARIOUS DRAWINGS, SCHEDULES, SPECIFICATIONS AND ALL OF THE VARIOUS

THE INTENT OF THESE DOCUMENTS IS FOR THE MEP TRADES TO FURNISH AND INSTALL COMPLETE

FIGURES AND TABLES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>VAV System</td>
</tr>
<tr>
<td>F2</td>
<td>HVAC System</td>
</tr>
<tr>
<td>T1</td>
<td>Temperature Sensors</td>
</tr>
<tr>
<td>P1</td>
<td>Pressure Sensors</td>
</tr>
</tbody>
</table>

**Notes:**
- VAV: Variable Air Volume
- HVAC: Heating, Ventilation, and Air Conditioning
- Temperature Sensors: Used to measure air and water temperatures
- Pressure Sensors: Used to measure pressure in the system

**Abbreviations:**
- VAV: Variable Air Volume
- HVAC: Heating, Ventilation, and Air Conditioning
- ASHRAE: American Society of Heating, Refrigerating, and Air-Conditioning Engineers
- NFPA: National Fire Protection Association

**Units:**
- Centigrade (°C)
- Fahrenheit (°F)
- Watts (W)
- Horsepower (HP)
- Bar (bAr)

**Equipment:**
- Furnace
- Air Handler
- Chiller
- Heat Pump
- Ductwork

**Installation Notes:**
- All equipment and associated components shall be installed in accordance with the manufacturer's instructions and all applicable codes and standards.
- All equipment shall be tested and commissioned prior to turnover.
- All electrical systems shall be installed in accordance with the National Electrical Code (NFPA 70).
- All mechanical systems shall be installed in accordance with the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) standards.
- All piping systems shall be tested for leaks and pressure before turnover.

**Additional Information:**
- The mechanical systems shall be designed to meet or exceed the energy efficiency standards outlined in the International Energy Conservation Code (IECC).
- All systems shall be designed to meet or exceed the indoor air quality standards outlined in the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) 62.1 standard.

**Acknowledgments:**
- The design team acknowledges the contributions of all parties involved in the project, including the业主 (owner), architect, structural engineer, and mechanical and electrical engineers.