

Session #1 – Collection Systems

“WHEN AN EXISTING FORCE MAIN BECOMES A CASCADING WATERFALL”



New England Water Environment Association
2021 Annual Conference
Tuesday, January 26, 2021



Project Team

- Town of Chelmsford, Massachusetts
 - Michael Vosnakis, Sewer Superintendent
 - Gary Persichetti, Director of Public Works
 - Stephen Jahnle, Assistant Director of Public Works

- Weston & Sampson
 - John C. Potts, P.E., Senior Project Manager
 - John Ellis, CMR, General Manager



Project Location



Project Location (cont'd)



Google Earth
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WOTTON STREET

DEEP BROOK

Drone Flyover of the Emergency Repair (source: N. Granese & Sons)




Project Background

- Southwell Field Pump Station –
 - Designed/constructed between 1985-1988
 - Triplex, variable speed non-clog pumps
 - Rated capacity 2,400 gpm @ 72-feet TDH
 - Pumps replaced/added third pump – 2001
 - Approximately 1.0 mgd ADF
- Existing Force Main –
 - 16-inch ductile iron (DI), Class 52
 - Approx. 6,300-feet to discharge manhole
 - Up to 18-feet deep in spots
 - Tributary to Lowell's Duck Island Regional WWTF




Project Timeline

Date	N. Granese & Sons	United Rental	Paramount Dewatering	South Shore Pipeline	HB Fleming	PanAm Railroad	Badger Daylighting
Tuesday, March 24, 2020		-	-	-	-	-	-
Wednesday, March 25, 2020		-	-	-	-		-
Thursday, March 26, 2020		-	-	-	-		-
Friday, March 27, 2020				-	-		-
Saturday, March 28, 2020							
Sunday, March 29, 2020							
Monday, March 30, 2020				-			-
Tuesday, March 31, 2020							-
Wednesday, April 1, 2020							-
Thursday, April 2, 2020						-	-
Friday, April 3, 2020						-	-
Saturday, April 4, 2020							
Sunday, April 5, 2020							
Monday, April 6, 2020						-	-
Tuesday, April 7, 2020						-	
Wednesday, April 8, 2020							-
Thursday, April 9, 2020				-			-
Friday, April 10, 2020		-		-		-	-
Saturday, April 11, 2020							
Sunday, April 12, 2020							
Monday, April 13, 2020		-	-	-		-	-
Tuesday, April 14, 2020		-	-	-		-	-

 Indicates personnel and equipment onsite and in operation

 Indicates equipment onsite and in use only

 Indicates personnel onsite only

Summary of Events

- Tuesday, March 24th –
 - Town discovered wastewater flowing out of the bank and into Deep Brook at the Southwell Field Pump Station
 - Suspected failure of the existing 16-inch DI force main that exits the pump station and was installed under Deep Brook
 - N. Granese & Sons, Inc. of Salem, MA agreed to make emergency repair
 - Town notified MassDEP and requested an emergency procurement waiver from DCAMM



Summary of Events

- Tuesday, March 24th (cont'd) –
 - Due to the magnitude of flow to the pump station, it was not possible to shut down the station
 - Temporary bypass pumping system would be required
 - Nearest gravity discharge manhole >3,000-feet away
 - Developed a plan to install a line stop in the existing force main and connect bypass piping to the existing force main approximately 600-feet from the pump station



Summary of Events

- Wednesday, March 25th –
 - Identified location along existing force main to make temporary bypass discharge connection – approx. 12- to 14-feet deep
 - Adjacent to active Pan-Am railroad tracks
 - Existing force main located in the woods under heavy trees, bushes, etc.
 - Encountered groundwater at approx. 4-feet below ground during excavation to uncover the existing force main



Summary of Events

- Thursday, March 26th –
 - Overnight, groundwater filled the excavation pit
 - Existing pumps available could not adequately lower the groundwater
 - Paramount Dewatering of Newington, CT arrived to assess the conditions
 - Well points would be installed around the perimeter of the trench box starting Friday, March 27th



Summary of Events

- Friday, March 27th –
 - Commenced installation of the well point dewatering system
 - Completed installation of the temporary bypass piping
 - Installed two (2) temporary bypass pumps outside the pump station entrance
 - Cleared the area surrounding the existing sewer manhole adjacent to the suspected force main failure location



Summary of Events

- Friday, March 27th (cont'd) –



Summary of Events

- Saturday, March 28th –
 - Completed the dewatering system (20 well points and 2 vacuum pumps)
 - After approx. 2 ½-hours, the dewatering system had lowered the groundwater by approx. 5-feet



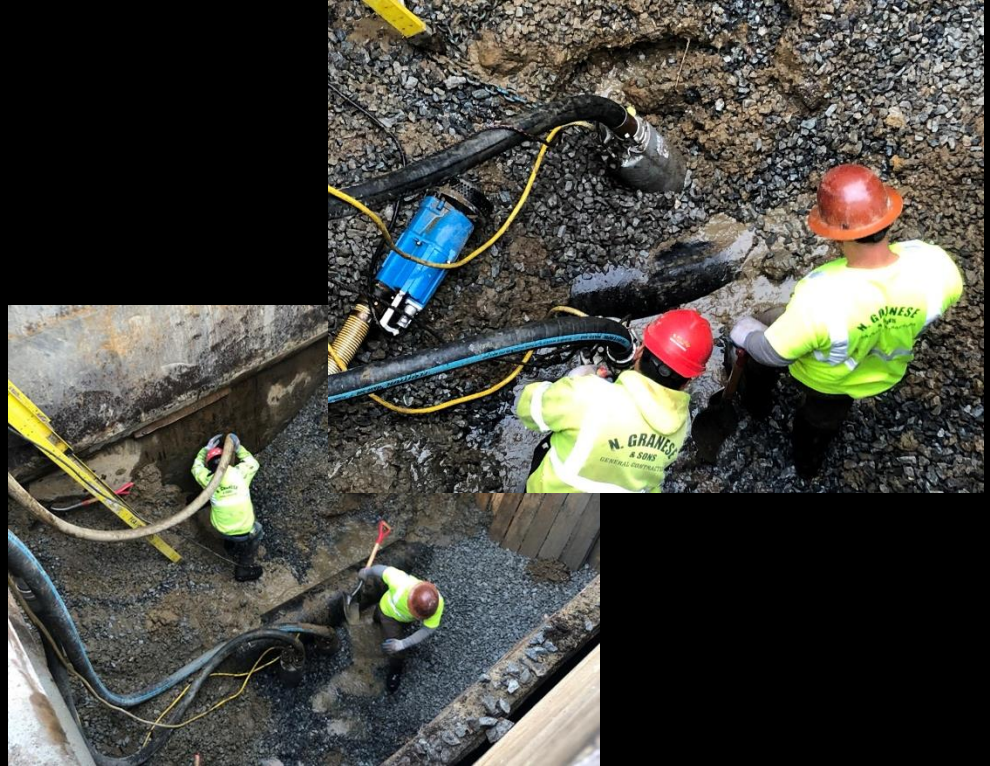
Summary of Events

- Saturday, March 28th (cont'd) –
 - N. Granese & Sons began excavation to expose the existing 16-inch force main
 - Installed 3 trash pumps inside the trench supports and additional steel plates along the outside perimeter to assist the dewatering system
 - Located the top of the existing force main



Summary of Events

- Monday, March 30th –
 - Exposed the existing force main
 - H.B. Fleming, Inc. of South Portland, ME, began installing the support of excavation at the force main repair location
 - Groundwater still presented issues as the force main was being exposed
 - Uncovered more of the existing force main in anticipation of the line stop installation



Summary of Events

- Monday, March 30th (cont'd) –



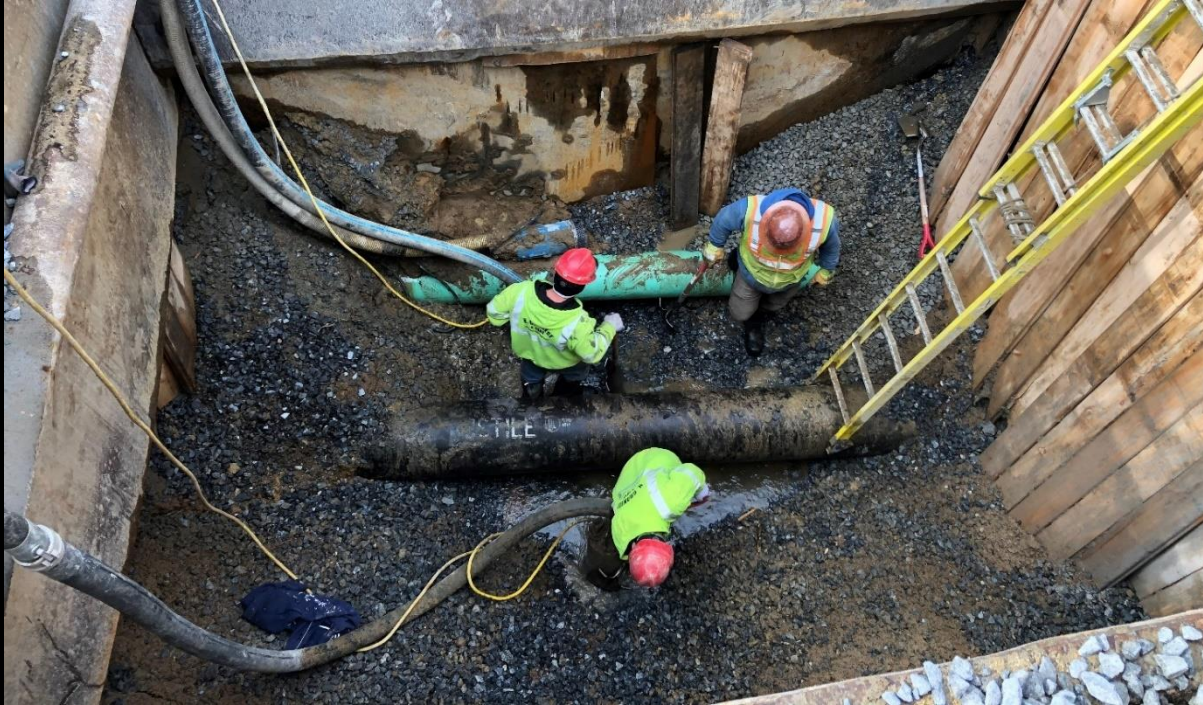
Summary of Events

- Tuesday, March 31st –
 - H.B. Fleming, Inc. continued installing the support of excavation at the force main repair location
 - Continued to expose existing force main for the temporary line stop installation and temporary bypass connection
 - Installed the temporary line stop (South Shore Pipeline of Hanover, MA)
 - Connected the temporary bypass piping (including a temporary gate valve) to the existing force main
 - Installed the temporary bypass pumping suction lines
 - Shut off the pumps at the pump station and ended wastewater flow into Deep Brook



Summary of Events

- Tuesday, March 31st (cont'd) –



Summary of Events

- Tuesday, March 31st (cont'd) –



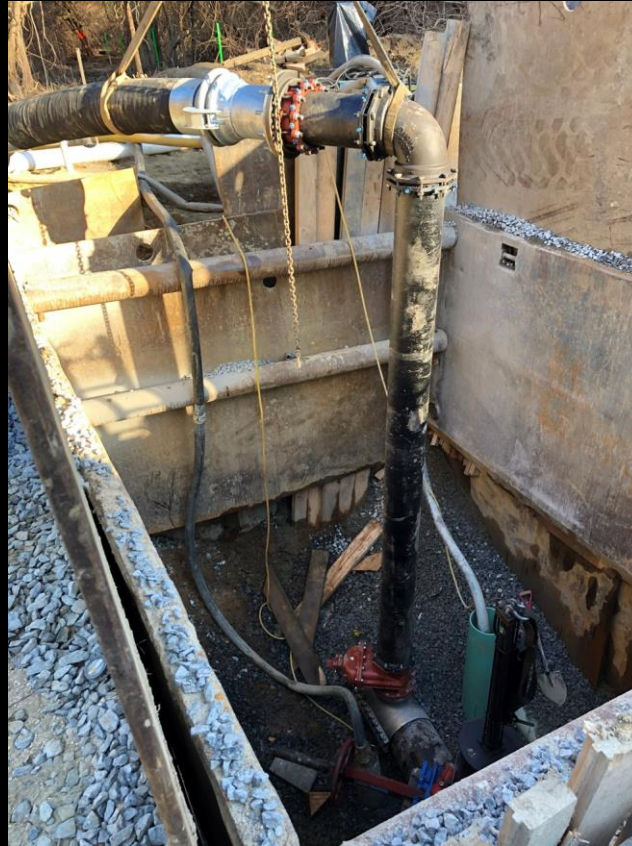
Summary of Events

- Tuesday, March 31st (cont'd) –



Summary of Events

- Tuesday, March 31st (cont'd) –



Summary of Events

- Wednesday, April 1st and Thursday, April 2nd –
 - H.B. Fleming, Inc. completed the installation of the support of excavation at the force main repair location
 - N. Granese & Sons secured the open trench at the connection to the existing force main
 - Paramount Dewatering returned to install a dewatering system at the force main repair location



Summary of Events

- Friday, April 3rd –
 - Paramount Dewatering completed the dewatering system at the force main repair location
 - Existing force main was approx. 18-foot deep at the repair location
 - N. Granese & Sons excavated to approx. 12- to 14-feet so that H.B. Fleming, Inc. could install bottom braces of the excavation support system



Summary of Events

- Monday, April 6th –
 - H.B. Fleming installed the bottom braces of the excavation support system
 - N. Granese & Sons continued excavation to expose the existing force main (including hand-digging)



Summary of Events

- Tuesday, April 7th –
 - N. Granese & Sons, with the assistance of a vactor truck from Badger Daylighting, exposed the existing force main
 - Determined that the wastewater discharge to the brook was caused by a hole in the bottom of the force main
 - Repaired existing force main using a Megalug mechanical joint restraint, a short piece of 16-inch DI pipe and a 16-inch Hymax coupling



Summary of Events

- Tuesday, April 7th (cont'd) –



Summary of Events

- Tuesday, April 7th (cont'd) –



Summary of Events

- Tuesday, April 7th (cont'd) –



Summary of Events

- Tuesday, April 7th (cont'd) –



Summary of Events

- Tuesday, April 7th (cont'd) –



Summary of Events

- Wednesday, April 8th –
 - South Shore Pipeline returned and removed the temporary line stop and installed a completion plug on the existing force main
 - N. Granese & Sons removed the temporary bypass piping and capped the existing force main
 - The pumps at the Southwell Field Pump Station were returned to normal operation



Summary of Events

- Wednesday, April 8th (cont'd) –



Summary of Events

- Thursday, April 9th –
 - N. Granese & Sons removed the sheeting, the dewatering system, and the bypass piping from the excavation pit adjacent to the railroad
 - Removed the suction pipes and repaired the existing manhole
 - Began backfilling over the repaired force main



Summary of Events

- Thursday, April 9th (cont'd) –



Summary of Events

- Friday, April 10th through Tuesday, April 14th –



Before & After



Special Thanks

- All of the Chelmsford personnel who were onsite daily despite being in the initial phases of the MA stay-in-place order due to COVID-19 with special thanks to Chelmsford's Dan Belkas
- N. Granese & Sons, Inc. of Salem, MA
- Paramount Dewatering of Newington, CT
- South Shore Pipeline of Hanover, MA
- H.B Fleming, Inc. of South Portland, ME
- MassDEP – Northeast Regional Office

Weston & SampsonSM

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