



**MAIN PUMP STATION 30" FORCE MAIN REPAIR  
PROJECT SUMMARY  
CITY OF PETERSBURG**

April 26, 2016



**Prepared for  
PETERSBURG UTILITY LINE DIVISION  
424 ST. ANDREWS STREET  
PETERSBURG, VA 23803**



**2901 SOUTH LYNNHAVEN ROAD  
SUITE 200  
VIRGINIA BEACH, VA 23452**



2901 S. Lynnhaven Rd.  
Suite 200  
Virginia Beach, VA 23452

P 757.213.6679  
F 757.340.1415  
[www.timmons.com](http://www.timmons.com)

April 26, 2016

Mr. Daniel Harrison.  
Interim Public Works Director  
City of Petersburg  
103 W Tabb Street  
Petersburg, Virginia 22555

RE: Main Pump station 30" force main repair summary

Dear Mr. Harrison:

Timmons Group was requested to assist with coordinating the repair of the existing 30" force main between main pump station and South Central Waste Water Treatment Plant. This work was successfully completed on April 14, 2016 and a summary of the repair is provided in this attached report.

We appreciate the opportunity to assist Petersburg with this effort.

Sincerely,

Kenneth Turner PE

Senior Project Manager

## INTRODUCTION

Timmons Group was contacted by Gajuan Clarke of Petersburg Utility line Division on March 14, 2016 regarding a leak in the 30' force main between Main Pump Station and the South Central Waste Water Treatment Plant (SCWWTP). There was uncertainty on how the leak at an existing 90 degree bend could be repaired without experiencing a sanitary sewer overflow. Timmons Group Senior Project Manager, Ken Turner began to work with City Staff and Southern Contracting to formulate plan. Coordination with SCWWTP staff would also be required and a plan of action was discussed to move forward with the repair. A bypass pumping operation was discussed and would be implemented to complete the work without resulting in a sanitary sewer overflow.

This leak was in a 1940's vintage cast iron pipe. The method used in providing watertight connections was to pour molten lead in a form which cooled between the bell and spigot of each piece of pipe. This was normal and customary for installing pressure pipe during this time period. Over time, the lead is exposed to pressure surges, expansion and contraction due to temperature changes and settlement of the pipe may also occur over time, compromising the integrity of the lead seal.

The flow from this pump station on average is about 4 MGD and the repair was expected to take at least 12 hours to complete if everything went well. Peak flow during certain times of the day or during rain events could easily approach a flow rate of 8-10 MGD for short periods of time. It is important to note that any release of raw sewerage into state waters is a violation of the Clean Water Act. Enforcement of the Clean Water Act is administered by the Environmental Protection Agency and any violations could be subject to legal actions by the United States Department of Justice. The Virginia Department of Environmental Quality also has jurisdiction over pollution of state waters and an uncontrolled overflow of this magnitude for this duration would certainly draw the attention of these regulatory agencies as well as other potential negative implications.

## REPAIR PLAN STRATEGY

A meeting was scheduled with Southern Construction on March 16 to go over details on setting up a temporary sewer bypass operation to handle anticipated peak dry weather flows of up to 10 MGD or about 7000 gallons per minute. A 16" force main would also need to be temporarily installed from the main pump station to the SCWWTP. This flow is too high for a pump and haul operation which utilized tanker trucks be used to pump and haul flow from one location to another. The SCWWTP also had concerns about receiving this magnitude of raw flow with solids which could potentially upset operation of the treatment plant and result in violations of their discharge permit which could result in stipulated penalties from regulatory agencies.

In order to confirm some assumptions a meeting was scheduled with SCWWTP staff and their executive director. During the meeting the executive director reiterated the importance of preventing any overflow which would result in violations of SCWWTP permits. He indicated any monetary stipulated penalties imposed by regulatory agencies would be passed onto the City of Petersburg. During the meeting, a target flowrate of 8 MGD was established as the peak dry weather flow we could expect based on historic flow monitoring of Petersburg flow from the main pump station.

The contractor was directed to install bypass pumping with 8 MGD pumping capacity with a 16" temporary force main. The SCWWTP staff also indicated the discharge could enter the treatment plant headwork's in a fashion acceptable to SCWWTP operations staff.



**TEMPORARY BYPASS PUMPS AND FORCE MAIN TO SCWWTP**

The temporary pump operation and force main were installed and weather/treatment plant flow was monitored until conditions were favorable to begin the repair. Contractor was directed to demonstrate proper operation of the bypass before the pipe could be cut.



**TEMPORARY BYPASS PUMPS WITH SUCTION MANIFOLD AND DISCHARGE FORCE MAIN**



**TEMPORAY FORCE MAIN DISCHARGE INSTALLATION AT SCWWTP HEADWORKS**

## **COMPLETION OF REPAIR**

The bypass pumps were tested on April 7 and found to operate in a satisfactory fashion and the contractor had prepositioned 15 employees, equipment and material needed to complete the repair with a contingency plan if pipe connection could not be complete as planned. The pumps at main pump station were locked out and tagged out, bypass pumping operation was initiated and SCWWTP staff began to close 70 year old isolation valve which was suspected to be in good operating condition. After valve was suspected to be closed, the leak in existing 30" main was monitored until residual system pressure decreased. The estimated flow from the leak was about 100 gallons per minute and it was anticipated that after one hour, pressure in main would drop off sufficiently to cut pipe and complete repair.

After 3 hours of monitoring the leak, flow did not appear to have decreased at all and it was assumed the valve at SCWWTP was not holding and the head from treatment plant was still being seen at the repair site. If pipe was cut, all flow from SCWWTP would come out of the 30" force main without any means to isolate or control all the flow from SCWWTP. Specifically all of the sewer flow from Petersburg, Colonial Heights, Chesterfield County and Prince George would flow into the Appomattox River if the pipe were cut and removed.

Given this condition, the contractor was directed to install a temporary valve in proximity to the treatment plant under controlled conditions to isolate the treatment plant from repair site. This work was needed to complete the repair without having a release of flow into the environment. The bypass pumping operation was discontinued, valve at SCWWTP was opened and main pump station was placed back in service.

Installation of the line stop was completed on April 11 and the repair was rescheduled for April 13. The main pump was secured and the bypass operation was placed back in service. Once the line stop was closed, the contractor began cutting the pipe. With a 12" cut in the 30" pipe, there was a sharp increase in pressure in the force main and flow sprayed out of the pipe 15 feet into the air for 6 minutes, then stopped. This increase in pressure occurred every 21 minutes and it was suspected there was a pump station still connected to the force main. Petersburg staff systematically cycled any pump station which could potentially be connected to the 30" pipe and after a couple hours, it was discovered that Colonial Heights had a pump station which cycled every 21 minutes and pumped a flow of 1000 gallons per minute.

Colonial Heights staff were contacted and provisions to implement a pump and haul operation were scheduled without delay so repair could be completed. The pump and haul operation was in place by 3 pm and work resumed at the repair site. The pipe was cut and all liquid inside was pumped out. Then the pipe was removed, new pipe was installed and restraining mechanisms were install to allow Colonial Heights pump station to be placed back in service by 2 am on April 14. A concrete thrust block was needed to restrain the 30" from the thrust exerted on the pipe when main pump station was on line. This work was completed on April 14 and the line stop was removed from the 30" pipe. After the concrete achieved adequate compressive strength, the main pump station was placed back in service and bypass operation was discontinued.



**EXISTING 30" FORCE MAIN READY TO BE REMOVED**



**30" FORCE MAIN REMOVAL**

Flushing of the temporary force main, removal of pumps and piping was completed over the following week and right of way restoration was completed.



**NEW 30" 90 DEGREE BEND AND PIPE READY FOR INSTALLATIO**



**NEW 30" PIPE WITH CONCRETE THRUST BLOCK INSTALLATION 9 CY OF CONCRETE**

Upon completion of the thrust block installation, the main pump station was placed back in service and the excavation remained open until the following day. There were no visible signs of leakage from the repair section or existing lead joint pipe connections directly adjacent to the new repair section.