

Introduction

Tartu, with its population of 101,246 (Population Census data from 2000) in an area of 38.8 square kilometres, is the second largest city of Estonia. Tartu, lying 185 kilometres south of Tallinn, is also the centre of Southern Estonia. The first written records of Tartu date from 1030.

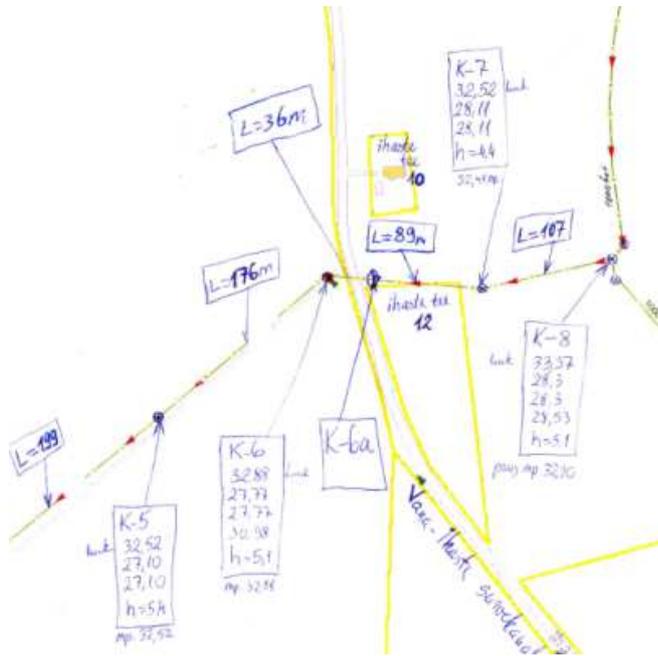
With the constant development of the rainwater and sewage pipelines, city of Tartu arranged tender to renovate old 1500mm concrete rainwater pipeline.

Project description

Mission: To build a new sewage pipeline from the manhole K8 to K1, overall length of the pipeline is 961,5 meters. Concrete manholes shall be replaced with new PE manholes. PE manholes should be ID1000 and there must be room for the portable ladder, hatches of the manholes have to be with a load capacity of 40 tons.

The existing pipeline is DN1500 reinforced concrete. Minimum internal diameter of the new pipeline has to be 800mm. All the pipe joints of the new pipeline have to be welded.

Space between the new and old pipeline has to be filled with concrete.



Pic. 1 – Project blueprint

Project execution

First idea to replace the old concrete pipeline with an open trench method was quite impossible due the really high installation depth – deepest point of the concrete pipe was in 8 meters. Alternative solutions were looked for and among these was Krah Pipes OÜ's solution. The solution offered was Krah ID800 pipe with electro-fusion connection and trenchless installation. Pipe would be pulled/pushed into the existing pipeline.

Construction company choose Krah's solution, their request was that the pipe should be SN8. Pipes were offered with a profile PR54-004.39 s1=5mm, s4=4mm, a=120mm.

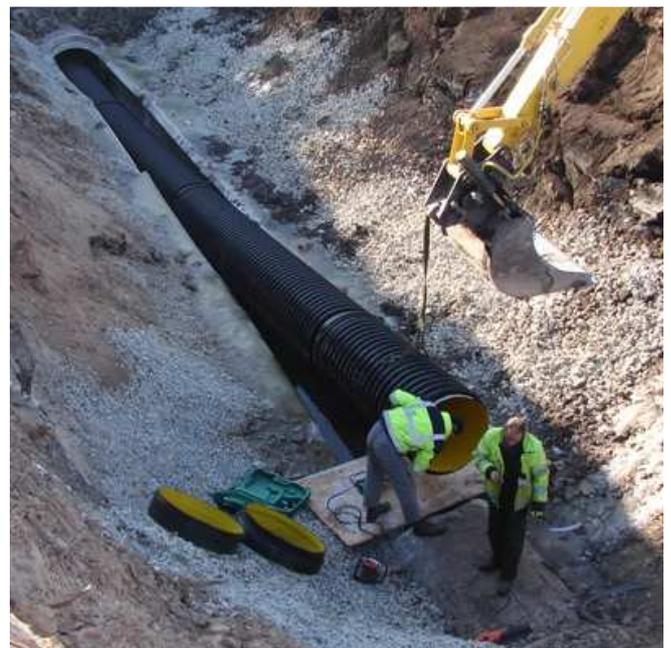
For the installation this pipeline was divided into the 4 homogeneous units

1. From K8 to K6 196m
2. From K6 to K4 375m
3. From K4 to K3 193m
4. From K3 to K1 186m



Pic. 2 – Length of the longest segment is 375m

Each of the segments was pre-welded above the ground and pushed into the old pipeline as one piece of the pipeline. For that the construction company had to dig only from 4 places a trench with a length of approximately 40 meters.



Pic. 3 – Preparation for the welding of two segments

Construction works took part in January and February 2012 with the average temperature around -10 degrees. Main reason for working in the winter time was the high ground water level in this area. To avoid the ground water going into the sewage pipeline, they choose to install everything when the ground was frozen. To hold the necessary temperature of +5 degrees during the welding, tent and heat blowers were used. Pipe sockets and spigots were heated with the gas burners before the actual welding was done. Installation of a pipeline was done with the pushing method and the connections between the units were done with rubber seal connections and were welded with hand extruders afterwards.



Pic. 4 – Pushing pipe segment into the old concrete pipeline

During the installation no special machinery was used, everything was done with the same excavators they had on site to dig the trenches. One of the excavators pushed the pipeline from the back, and some of them held the pipeline up from the ground in the middle of the pipeline to prevent the crooking.



Pic. 5 – Pushing pipe segment into the old concrete pipeline

Manholes were made as a saddle manholes, Manholes K3, K5 and K7 were installed into the old concrete manholes ID1500 no digging method was used with these manholes!



Pic. 6 – Manhole ID1500