The Limes Flood Prevention Scheme

Side Entry Manholes and Stop End Bends

by
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On the outskirts of Bristol in a busy residential area Wessex Water were tasked with providing a solution to a historic surface water flooding problem which could provide storage during heavy storm conditions. Several options were considered during optioneering but with the restrictive location a solution had to be developed that could provide the necessary storage volume within the existing carriageway as there were no available plots of land to locate a large storage tank.

Large diameter storage pipelines under construction *Courtesy of Wessex Engineering & Construction Services*

It was decided that two large diameter pipelines would be installed on-line to provide the necessary storage, the first tank on Downend Road was to be the deepest tank, 1600mm in diameter concrete sewer at a length of approximately 60m, at the top end of this tank a backdrop manhole was installed in order to maximise storage in the 1600mm tank and to reduce the depth of dig further upstream.

Up from 1600mm tank the surface water sewer was then reduced to 225mm which acted as a flow control. In addition to this throttle pipe a mechanical flow control was installed at the top end of the 225mm pipe.

Further up the line another storage tank was installed, this time 1800mm in diameter and approximately 70m in length.

Due to the nature of this scheme, the depth at which we needed to work in a residential road (6.5m at the deepest point) and the sensitive location we opted to use pre-formed side-entry chambers provided by CPM. These chambers/ access points were used in several locations along the length of the 1600mm and 1800mm tanks.

The works were such that the whole scheme had to be build under a full road closure so it was in the interest of Wessex Water and the local residents that the scheme was built to a high standard but within as short a timescale as possible.

On the large diameter tanks side entry manholes were used, these are inserted at regular intervals along the length of the tank sewer. Under normal circumstances 3m diameter manholes would need to be built along the length of the tanks but installing the side entry manholes meant that 3m chambers were no longer required reducing the construction time, materials and the footprint of the storm tanks (especially important within the carriageway where the new tank had to share it's space with the existing utilities already crisscrossing the road).

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The method of constructing a side entry manhole is exactly the same as laying the pipe. You lay your pipe as normal and when you need a manhole you insert a side entry manhole, this is basically a section of pipe (1600mm or 1800mm diameter in this case) with an opening cut out of the top of the pipe where a concrete access shaft is fixed to. The rather confusing term side entry comes from the access shaft being set off to one side for better access. The inner wall of the access shaft is lined up with the furthest inner point in the 1600mm or 1800mm tank so when accessing the tank the step irons follow a straight line from the top of the access shaft down to a point just above the invert of the sewer.

As the tank section and access shaft are all in one section there is no need for an additional base, benching or rocker pipes as the side entry manhole is constructed just the same a laying a traditional pipe section.

Due to the fact that there is no benching the frictional loss across the access point is minimised. These side entry manholes are not even restricted to being used where a straight line storage tank is required, side entry manholes can be designed so most angles/ bends can be accommodated with the access point being slightly off-set of the bend.

In addition to the side entry manholes stop end bends were also used during this scheme, these are formed for use on larger diameter sewers where the diameter of the sewer changes, in this case from 225mm to 1600mm diameter. In this particular case the 1600mm diameter pipe is cut in the factory at a 45 degree angle, the remaining section is then rotated and reattached back onto the 1600mm pipe providing a 90 degree bend and an access shaft which can be added to like laying a vertical pipe to the specified ground level.

During this scheme a backdrop was incorporated upstream of the stop end bend with the incoming pipe entering through a centrally located pre-cut hole at invert level in the back wall of the access pipe, a further hole was also drilled on site for a rodding point once the exact incoming pipe level was established.

The stop end bend again meant that no benching was required as it was naturally formed by the curve of the 1600mm/1800mm pipe, this again reduced materials and construction time.

Staff working on the scheme learnt quickly using the new construction methods and welcomed the more efficient and less labour intensive side entry and stop end bend systems. The sections of pipes including the side entry manholes and stop end bends could be laid in quick succession rather than the traditional method of casting your manhole base and having to wait for the concrete to set before you can start installing your chamber rings up to ground level.

Initial performance after the completion of the scheme seems very positive, after the standard 1 year consultation period to monitor the system Wessex Water will be looking to make more use of this construction method hopefully using it as the preferred choice where conditions permit to save both time, disruption to the general public in sensitive areas and money.

Note: ***The Editor & Publishers thank Andy Roberts, Lead Design Engineer with Wessex Engineering & Construction Services for providing the above article.***■

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