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Assessment of field installation of Clark-Drain 300SR

Introduction:

Two new Clark-Drain 300SR recess tray covers were fitted to access chambers (AC) located within a private driveway on a property in Skelmersdale, West Lancashire on Wednesday, January 18th 2006 by KGC Paving, a specialist contractor undertaking the driveway extension and reconstruction.

Both access chambers were 225mm internal diameter (ID) and had previously been fitted with Osma Square covers. These would be left in position while the preparatory work and new paving was put in place around the site of each AC to prevent rubble, sub-base material, sand and other detritus falling into the chamber.

The 300SR covers supplied for this trial came in two formats: while both have a polypropylene frame, the tray may be polypropylene or pressed, galvanised steel. The property owner required both fittings to match and so it was decided to fit polypropylene trays to each of the ACs.

The 300SR frame features a series of concentric steps that can be cut out as required to enable it to be fitted to any circular chamber with an ID of 225mm to 300mm. As both of the chambers on this project were 225mm diameter, there was no need for the frames to be cut to suit. However, a third cover and frame will be fitted to a 30mm ID AC at a later date and documented accordingly.

Installation:

On the first AC to be fitted with the 300SR frame and cover, the chamber had previously been cut down to accommodate the previous cover at a level lower than that of the new paving. The backfill material surrounding the chamber was cleared and reduced in level sufficiently to enable the frame component to be put into position. The tray component was removed from the frame, which was then offered onto position on top of the cleared chamber. A spirit level was used to span the gap in the paving directly over the chamber and the distance between the underside of the level and the top of the frame measured to determine the amount of build-up required. This was found to be in excess of the 25mm considered to be the maximum suitable depth for an accommodation bed of mortar. (See Figures 1 to 3)

A Class II mortar (3:1) was prepared and a bed of approximately 15mm depth was placed around the chamber, directly over the well-compacted backfill surround. A layer of concrete shims were then pressed into the mortar to build-up the level to approximately 10mm beneath the required bed level for the 300SR frame. A further bed of the Class II mortar, approximately 15mm depth, was then placed over the concrete shims, and the frame bedded onto it. (See figures 4 to 6)

For the second AC, the chamber was high, relative to the required level, and so it was necessary to cut down the chamber to accommodate the frame component. As before, a spirit level was used to span the gap in the paving around the AC, and the distance between the underside of the level and the top of the chamber was measured. The chamber could then be cut down to the required level using an angle grinder. Vertical slots of the calculated depth were cut into the chamber wall at regular intervals and then a series of horizontal cuts were created to join up the slots and thereby reduce the chamber as required. (See figures 12 to 14)

When reduced, the top of the chamber was 10mm lower than the underside of the frame when in position: this would be used to accommodate the bedding mortar.

When placing the frames, a spirit level was used as a guide, with the frame being tapped down to the required level (approximately 6mm below the Finished Paving Level) using a rubber mallet, ensuring the frame remained square with the paving layout. (See figures 7 and 16)

As the frame was tapped down to the required level, some of the bedding mortar was squeezed out between the frame and the top of the chamber. This was removed manually, although a small quantity did fall into the chamber base. When the contractor was satisfied that the frame was at the required level, the joint between frame and chamber was pointed by smearing extruded mortar along the joint using a gloved hand. On completion, the mortar that had dropped into the chamber base was washed away using clean water.

Once the frame was correct in both position and level, it was haunched in position by placing additional mortar around the external edges, bringing the mortar over the base flange in the process. (See figures 8 and 17)

Each frame was covered with a road plate and left for 24 hours to give the mortar bedding and haunching sufficient time to undergo initial cure and hardening prior to fitting the tray components and cutting-in the paving to suit.

When cutting-in, the paving outside the cover was completed first. The sand laying course was prepared up to the external edges of the frame and paving blocks cut to fit, ensuring the joint between frame and block did not exceed 5mm.

Once the surround cutting-in was complete, the tray was offered into the frame. Although the Clark-Drain guidance sheet recommends covering the frame-tray joint and the integral key block with masking tape during the cutting-in and final consolidation process, this was not done during this installation as the contractor pointed out that it was most unlikely that this would ever be done under normal site conditions, and it was felt that replicating typical installation conditions was of greater relevance than following an "idealised protocol" that would be disregarded on site.

A layer of the bedding sand was screeding within the tray and blocks cut to maintain the laying pattern of the driveway. The contractor elected to use a power saw fitted with a diamond blade to cut the blocks as it was felt that this would facilitate more accurate cutting-in, particularly around the integral key block with the 90° return cuts.

The paving used on this project (Toberore Shannon in Heather colour) was laid as transverse broken bond coursework and so the frame and tray had been aligned square to the coursework. This ensured all cut blocks were similarly "square" and no acute-angled cuts were required. (See figures 18 to 20)

On completion of the cutting-in, the whole pavement was jointed with kiln-dried sand and then consolidated (referred to as "wackering" in the Clark-Drain guidance sheet) using a vibrating plate compactor. Following consolidation, the surplus sand was swept off the pavement surface and the Clark-Drain fittings were examined. The integral keys were extracted to check that they had not become jammed with the jointing sand, and the trays were lifted out. Very little sand had found its way into the integral key block and the keys could be extracted without any difficulty. A small amount of sand had been vibrated into the joint between tray and frame although this did not impede this initial removal. The extraneous sand was removed from inside the frame using a fine brush and the tray was replaced. (See figure 21)

Comments and observations:

- How is the fitting supplied? The units provided by Clark-Drain for this installation were wrapped in cling-film, ensuring the frame and tray components could not become separated.
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- The polypropylene frame and tray are better able to withstand accidental bumps and knocks that might be experienced during transit. Steel frames/trays have a tendency to bend and/or permanently deform.
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- The unit is noticeably lighter than an equivalent steel unit.
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- The facility to use either a pressed steel or a polypropylene tray is welcome.
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- The ability to fit the 300SR to any circular AC with a diameter of 225-300mm renders them more versatile than similar products from other manufacturers.
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- The square profile with circular fitting flange enables the unit to be positioned to best suit the layout of the paving and not necessarily aligned with the drainage pipes.
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- The polypropylene flange is easily cut using an angle grinder but trimming to fit, say, a 300mm ID chamber is slightly awkward and requires a deal of care to ensure a neat finish is achieved. The stepped profile of the fitting flange was considered to be a significant boon to this task as it helped prevent over-cutting.
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- The pressed steel tray has substantially thinner walls that those of the polypropylene. When used with the polypropylene tray, it was felt that the overall width of the frame-tray fitting at the surface was somewhat wider than would be ideal. However, when the steel tray is used, the contrast in colour and texture between the black polypropylene tray and shiny galvanised tray seemed to be less discreet. In consultation with the property owner, the polypropylene tray was selected as being the more discreet despite the additional width.
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- There is a need to use a minimal haunch over the base flange to accommodate full-thickness 60mm blocks.
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- The drainage holes in the base of the tray are a welcome improvement to standard trays as their inclusion should facilitate drainage of the bedding layer and so prevent the ‘retained moisture’ problem observed with other trays.
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- The square external edges of the frame facilitate simple cutting-in

Access Chamber 1

Figure 1 - AC 1 - Old cover in place

Figure 2 - Old cover removed and 300SR brought in

Figure 3 - Testing level of cover

Figure 4 - First bed of mortar

Figure 5 - Concrete shims laid onto mortar bed

Figure 6 - Second layer of mortar

Figure 7 - Place frame and set to level

Figure 8 - Tray placed in frame

Access Chamber 2

Figure 9 - AC 2 with old cover

Figure 10 - Old cover removed and 300SR brought in

Figure 11 - Testing frame for level

Figure 12 - Making vertical cuts in chamber wall

Figure 13 - Making horizontal cuts in chamber wall

Figure 14 - Chamber reduced to formation level

Figure 15 - Mortar bed for Frame

Figure 16 - Tapping down frame to required level

Figure 17 - Tray placed into frame

Figure 18 - Cutting-in completed

Figure 19 - AC1 (top) and AC2 completed

Figure 20 - Two covers completed and in place

Figure 21 - Testing integral key