

T5, Heathrow Airport

Combination of bespoke and standard ACO surface water drainage systems



A series of unique, high performance channel drainage systems designed and manufactured by ACO Technic, the bespoke product development division of water management specialist ACO Technologies, has been installed across Heathrow's award winning Terminal Five.

As well as helping to overcome some significant challenges posed by the site's design, the systems have played a key role in creating some of the terminal's striking public areas.

As leaders in combined kerb drainage, ACO was one of the first organisations the consulting engineers approached when they started to look for a suitable system for the critical passenger set-down/pick-up area on level six of the multi storey car park directly opposite the main terminal building.

"A combined kerb drainage system was our preferred option for this area as it would greatly simplify the below ground infrastructure and be quicker to install," says Guy Collingwood, Consulting Engineer for BAA Airports Ltd. "Due to the restricted depth of the deck structure, however, no standard product was available that could give us the capacity and hydraulic performance we required. We weren't sure though that it would be possible to manufacture a bespoke system that could meet our tight tolerances, delivery schedules and budget.

"As ACO has a separate bespoke division, ACO Technic, we were able to work with a dedicated team that quickly determined that our proposals were feasible. Not only were they able to develop

a purpose-built kerb drainage system for the deck, we were also able to realise bespoke designs for other drainage systems across the terminal complex."

A total of 1752 metres of the new kerb drainage system have been installed within the set-down area and along the vehicle entry and exit ramps from ground level. Based on ACO's Queen's Award winning KerbDrain system, two unit sizes were developed, both manufactured from durable polymer concrete.

On the set-down deck the half metre units have a width of 260mm, a depth of 235mm and a 200mm internal bore. As well as draining run-off directly from the road surface, special knock-out sections on the rear face allow the installed system to accept rainwater down-pipes from the canopies protecting the four passenger entrances. A further series of knock-outs on the base allow the system outlets to be accurately located to the mains drainage connectors cast into the original deck structure.

Blank versions of the stones are installed where the canopy down-pipes connect into the drainage line. These prevent, during heavy rainfall, 'gully boiling': a condition where a surge in rainwater can locally overload the kerb drain system, forcing a backflow out of the road-side inlets.

Project:

New Terminal at London's Heathrow Airport.

Objective:

Satisfy the surface water drainage requirements on varying applications across the site.

Brief:

Passenger set area

Provide a drainage system capable of matching the hydraulic demands and restricted depth requirements of the installation.

Ground floor plaza area

Provide a drainage concept that could meet the aesthetic requirements of the project.

Solution:

Passenger set down area

A purpose built combined kerb and drainage system.

Ground floor plaza area

A unique inlet configuration on a discreet slot drainage system.

The units on the entry and exit ramps are the same length and width but, due to tighter depth restrictions, are 15mm shallower at 220mm. They are cast with faceted ends to produce, when installed, internal and external curves that exactly follow the road bends. They also have a series of internal baffles that improve outlet discharge along the channel length and prevent overloading at the lower end of the installed run.

Allowing kerb drain runs to be connected across the four level-threshold pedestrian access ways on the set-down deck is another bespoke drainage channel developed ACO Technic. Consisting of a shallow depth, 100mm wide polymer concrete base channel, the units are fitted with bespoke stainless steel gratings.



ACO Brickslot used in the ground floor plaza area

Laser cut with a heelsafe slotted finish, the half metre long anti-slip sections are equipped with a special lock-down system that ensures there is no movement when installed but which allows quick release for cleaning and maintenance.

A third bespoke system has been developed for the ground floor plaza area between the terminal building and the multi-storey car park. "Here we needed a drainage concept that could help us meet the architect's aesthetic requirements," explains Guy Collingwood. "This is an extremely visually sensitive area. The objective was to create a surface that could unobtrusively accommodate water features, lighting and drainage, allowing the granite slabs covering the plaza to cleanly intersect with the main car park and terminal structures.



Shallow depth ACO KerbDrain installed along vehicle entry and exit ramps of multi-storey car park

"Our initial investigations lead us to ACO's Brickslot system which, due to its narrow 10mm wide inlet, makes it almost invisible when installed. However, in subsequent discussions with the Technic team, we were able to design a unique inlet configured so that it could be hidden beneath the granite along the natural grout lines between the slabs."

Again, two sizes were manufactured. The first, which comprises a 200mm deep polymer concrete channel, is fitted with an offset 10mm inlet that extends 35mm above the base. When installed the top of the inlet rail sat level with the surrounding bedding layers, allowing the edges of the granite slabs to be set exactly above and along the drainage line. For passengers using the terminal the finished surface appears completely smooth and unbroken.

This system is used to prevent surface water running from the exposed plaza into the bus and coach stops on the car park ground level. Where the granite slabs meet the glazed façade of the terminal building, the second bespoke Brickslot system has been installed.

Designed to capture run-off from the plaza and from the curtain wall, the 10mm inlet sits directly beneath the glazing giving the impression that the glass continues down below ground level. The effect is created using a stepped inlet as opposed to the level inlet on the first system.

The back rail of the inlet, which sits flush with the rear face of the base channel, is 18mm higher than the front. The edges of the granite slabs, as before, sit along the front rail while the glazing drops directly on to the back edge where the joint is sealed. Again the drainage inlet is completely hidden.

"Both systems work extremely well and the surface finish adds a striking visual dynamic to the completed plaza," says Guy Collingwood. "The area blends perfectly with the strong geometry of the surroundings and complements the contemporary styling of the terminal building and car park."

In addition to the bespoke systems, a number of standard ACO products have been used across the Terminal 5 complex. S100 and N100K channels with locked cast iron gratings are installed around the bus pull-ins and ticket barriers within the multi storey car park. And drainage to the main staff car park is provided by 660 metres of ACO's Qmax 225 and 350 high capacity slot drainage systems; selected because of their attenuation performance and speed of installation.



ACO KerbDrain used to drain surface water from the new passenger set down area

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