

Envirokerb – A Linear and Combined Drainage System

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Abstract: Poor subsurface drainage is one of the factors that causes pavement distress and reduces pavement service life. The evaluation of roadway subsurface drainage system required good knowledge in groundwater flow especially the unsaturated water flow through pavement layers and related properties that affect the ability of drainage system to remove moisture held in base, sub base and sub grade layers, so that the kerbs are provided in the road pavement.

Kerb is a line of stone or concrete forming an edge between a pavement and a roadway, so that the pavement is some 15 cm above the level of the road. For most purposes, the top of the kerb should be 100 mm above the road surface. If kerbs are placed too high it can induce 'kerb shyness' which is where the width of the carriageway is effectively reduced.

Over the past few years the use of Combined Kerb Drainage has grown rapidly, with engineers appreciating the advantages offered over the traditional gully and pipe drainage systems, for car parks and carriageways. Envirokerb is a revolutionary combined kerb drainage system. Envirokerb is made from recycled plastic composite material. The system has excellent surface drainage efficiency which coupled with its large flow capacity, makes it superior to and much less expensive than conventional kerb and point drainage on many highway and non-highway schemes. Envirokerb is made entirely from recycled materials. It is widely acknowledged that the construction industry has a major impact on the earth's already dwindling resource. Existing combined kerb drainage systems manufactured in traditional materials rely heavily on natural resources. There are additional logistical concerns on the transportation of these materials through the smaller countryside communities in the UK.

Keywords: Envirokerb

1. Introduction

Since its introduction in 2002, Envirokerb has become recognised as the lightest, strongest and greenest kerb drainage solution on the market. Over half a million units of Envirokerb have been installed in hundreds of schemes spanning a growing number of countries from the UK to Germany, Ireland, Italy and more. Envirokerb is the ideal solution for kerb drainage on motorways, trunk roads, car parks and other urban areas. Envirokerb is extremely lightweight being some 70% lighter than conventional concrete or polyester concrete equivalent, yet is strong and robust. Envirokerb is available in 305mm and 480mm high units to half battered HB1 profile, and have a full range of components including droppers, centre stones, inspection and gully units, radius kerbs etc. Envirokerb has 3

inlets in the face of the kerb unit, offering better hydraulic performance, and enabling surface water to drain more quickly from the carriageway. Envirokerb is a one-piece unit 500mm long, with a high-impact resistance and has a positive interlock between all components. Envirokerb is resistant to most forms of effluents found in highway situations, and has a finish in common with standard concrete kerbs.



The main purposes for kerb construction are:

1. To assist drainage.
2. To improve channelization and delineation of traffic flows.
3. To protect pedestrians.
4. Improvement of aesthetic values of the road alignment.
5. To reduce maintenance of shoulders.
6. To provide a boundary to landscaping treatments.

2. Types of Kerbing

The two basic classes of kerbs are barrier and mountable kerbs. Each class has different types including semi-mountable and semi-barrier kerbs with a variety of designs.

A. Barrier Kerb

Barrier kerbs are steep-faced and are designed to prevent vehicle encroachment on the roadside. Their main functions are:

- To discourage vehicles from using areas outside the travelled way, not intended for vehicular travel
- To control drainage
- To control parking of vehicles
- To reduce the risk to pedestrians

The typical barrier kerb is 150mm high. This height is effective to prevent vehicle encroachment into the roadside at low to moderate speeds. Barrier-type kerbs may be used on sections of road where separation of opposing traffic is essential due to the high safety risks associated with traffic volumes, percentage of heavy vehicles, speed, crash history etc.

B. Semi-Barrier

This type of kerbing is recommended where pedestrian traffic is light and a barrier type could tend to reduce traffic capacity due to the impression of restriction.

C. Mountable

Mountable kerbs (Type A and M) are generally used in the following situations:

1. At the outer mountable island area of intersections, small corner islands and roundabouts to outline standard vehicle travelled paths.
2. To define the left edge of a through carriageway where the crossfall of the adjacent shoulder or parking strip is opposite to that of the through carriageway.
3. Where crossing or encroachment by vehicles larger than the design vehicles is permitted (e.g. at roundabouts) or expected under emergency conditions.
4. In front of road safety barriers.
5. On pedestrian and cycle paths along the grassed edge of asphalt paths to reduce damage to the path from the grass growing into the asphalt path. Kerbing along paths also provides visual contrast to the path edge and prevents the verge material erosion onto the path.

D. Semi-Mountable

Semi-mountable kerbing should be used at all intersections, junctions and island treatments and is often used on outer separators and raised medians on bridges. Semi-mountable kerb may also be used along pedestrian and cycle paths.

3. Features and Benefits

Envirokerb combines innovation in design with unique materials to create a product that is strong, lightweight and durable.

1. Light weight: The lightest product on the market by up to 70% allowing easy installation.
2. Durable: high impact resistant greater than traditional materials.
3. Manufactured from recycled materials.
4. Positive interlocking is available: The unit are supplied plain ended as a standard which is “butt” jointed, but they are also available with positive interlocking between each module with the use of preformed male/ female joints providing a method of installing to line and level.
5. Asphaltic adhesion: It is common practices to pre-pitch the face of kerbs to form a seal with the asphalt construction. Envirokerb allows for self-adhesion with hot poured

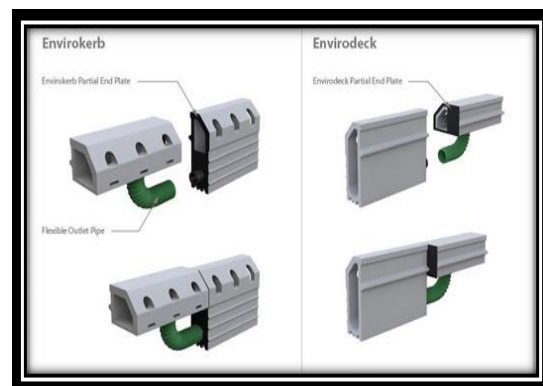
asphalt offering both time and cost saving during installation.

6. Aesthetic appearance: Once installed Envirokerb has a finish almost identical to a standard concrete kerb.
7. Chemical resistance: The product is resistant to all forms of effluents found in highway situations such as road-salts, petrol, diesel, etc.
8. Improved hydraulic performance: Due to the composite material used in the manufacture, Envirokerb gives excellent co efficiency values with the hydraulic performance improved over traditional materials.
9. Available in 305 mm, 385 mm and 480mm depths in 45° SPLAY and HB2 profile.
10. For use on motorways, trunk roads, car parks and most other urban areas.
11. Conforms to EN1433 linear drainage systems D400KN loading.
12. Full Quality Assurance: The system is fully compliant with BSEN433 (Drainage channels for vehicular and pedestrian areas.)

One- Piece – Standard Envirokerb units are supplied in 500 mm long (drop kerbs and centre stones are 457.7mm long) one-piece units. This eliminates the secondary operation of joining two components, as required with some existing systems that are vulnerable to on-site breakage if left exposed.

Matching system components – this system is complemented by a full range of additional components including drop kerbs, numerous centre stones, lightweight dully chamber, rodding access units and numerous outlet possibilities.

4. Environmental Considerations



Installation Guide:

1. Risk assessment should be carried out.
2. Excavate through to line and level.
3. Lay out units prior to installation to ensure all rodding access units and outlets are positioned correctly.
4. Start at outfall and work away, finished line and level should be pre-determined.
5. Sealant is to be applied to unit not yet laid then butt together - keep joints clean of concrete bedding material.
6. A 2 mm gap should be left between units to allow for

concentration and expansion.

7. Asphalt can be laid to the bottom of outlets for a 125mm kerb-face, or to the watermark for 75mm/100mm kerb face.
8. Units should be cleaned prior to hand over.

5. Conclusion

| Concrete / Polymer concrete products | Envirokerb |
|---|--|
| All raw materials are newly quarried using large machinery. | The UK sourced raw material was originally manufactured for other products. There is therefore no extra carbon cost for our products. |
| Products include cement or resins which are all manufactured for the process. | Kerbs are manufactured using heat and moulding. This would be our biggest carbon factor. |
| Products are moved around production facility, and around site using forklifts - less on a pallet than Envirokerb. | Products are moved around production facility and around site using forklifts - but due to light weight we have more units per pallet. |
| HAULAGE - this is one of the major considerations - There is 26 tonnes of raw material, or finished product on an articulated lorry. The meter age of product is much less than our lightweight product. We would be happy to carry out haulage calculations for your client. | HAULAGE - we can now carry 1320 units per load (660mts), compared to 320 (160mts of Concrete kerb drains). This is the largest factor for consideration. |
| Most concrete products will be installed by machinery due to excessive weight - this is a high carbon cost. | The full Envirokerb range is installed manually. Therefore the carbon cost is greatly reduced over concrete type products. |

1. Combined kerb and drainage offers a cost-effective approach to water management, providing an efficient high-flow channel system within the structure of a kerb.
2. For low to medium capacity road drainage, combined kerb and drainage system delivers excellent surface water removal, minimising damage during installation with its simple design. Both offer a choice of finishes suitable for urban and rural developments.
3. Single piece Envirokerb provides another low to medium capacity solution, with high strength M-Tech concrete and a recycled inner plastic core construction. The flexible Envirokerb, one-piece kerb and drainage system offers compatibility with the various drainage systems to provide a total water management solution for highways and carriageways.

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