

# M5 – High Friction Surfacing

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# High Friction Surfacing

**As a result of the citywide application of 20mph streets, high friction surfacing (HFS) is unlikely to be required in most streets within central Edinburgh.**

DMRB document [HD 36/06](#) considers trunks roads and high speeds (50mph+) and applies a minimum HFS treatment length of 50m. Applying this framework to 20mph streets is considered to be an overly conservative approach.

For this reason, it is the presumption that HFS is not required on 20mph streets unless there is a significant hazard identified. Due to lower speeds within central Edinburgh, treatment lengths of much less than 50m are usually appropriate. (See **Minimum Treatment Length Factsheet** for details).

The Design Manual for Roads and Bridges (DMRB, [HD 36/06](#)) determines factors for application include (but are not limited to):

- Site category
- Polished stone value (**PSV**),
- Investigatory level (**IL**) based on 50m approach to the feature (e.g. crossing)
- Traffic volume - commercial vehicles (cv) only (e.g. HGV, buses etc.)



The City of Edinburgh Council



HFS on large bend in the road with wet weather conditions, [Albert Bridge \(2012\)](#)

## Related Factsheets:

Speed Reduction and Traffic Management (G6)  
Signalled Crossings at or near junctions (G5)

Crossings (G4)

## DMRB Application

The surface aggregate is the main contributor to skidding resistance and the micro-texture characteristics of a particular stone is measured by PSV test.

Site category, IL and volume of commercial vehicle (cv) are the determining factors for higher PSV aggregates and HFS use. ILs which are most applicable to Edinburgh streets are highlighted (in purple) in table 3.1.

Most urban streets in Edinburgh will be designed for low speeds and low ranges of commercial vehicles (cv/lane/day), especially in 20-30mph areas. This should be given due consideration when determining whether to provide HFS in an urban environment.

|          | Site Category<br>( <a href="#">DMRB HD28/15</a> )  | IL*  | Minimum PSV required for given IL, traffic level and type of site<br>( <a href="#">HD36/06 – Table 3.1</a> ) |         |         |          |           |           |           |           |           |           |
|----------|--|------|--|---------|---------|----------|-----------|-----------|-----------|-----------|-----------|-----------|
|          |  |      | Traffic (cv/lane/day) at design life   |         |         |          |           |           |           |           |           |           |
|          |  |      | 0-250  | 251-500 | 501-750 | 751-1000 | 1001-2000 | 2001-3000 | 3001-4000 | 4001-5000 | 5001-6000 | Over 6000 |
| <b>K</b> | Approaches to pedestrian (including signal) crossings and other high risk situations               | 0.5  | 65   | 65      | 65      | 68+      | 68+       | 68+       | HFS       | HFS       | HFS       | HFS       |
|          |  | 0.55 | 68+  | 68+     | HFS     | HFS      | HFS       | HFS       | HFS       | HFS       | HFS       | HFS       |
| <b>Q</b> | Approaches to and across minor and major junctions, approaches to roundabouts and traffic signals. | 0.45 | 60   | 65      | 65      | 68+      | 68+       | 68+       | 68+       | 68+       | 68+       | HFS       |
|          |  | 0.5  | 65   | 65      | 65      | 68+      | 68+       | 68+       | HFS       | HFS       | HFS       | HFS       |
|          |  | 0.55 | 68+  | 68+     | HFS     | HFS      | HFS       | HFS       | HFS       | HFS       | HFS       | HFS       |
| <b>R</b> | Roundabout circulation areas (excl mini roundabouts)   | 0.45 | 50   | 55      | 60      | 60       | 65        | 65        | 68+       | 68+       | HFS       | HFS       |
|          |  | 0.5  | 68+  | 68+     | 68+     | HFS      | HFS       | HFS       | HFS       | HFS       | HFS       | HFS       |
| <b>G</b> | G1- Gradients 5-10% longer than 50m<br>G2- Gradients >10% longer than 50m                          | 0.45 | 55   | 60      | 60      | 65       | 65        | 68+       | 68+       | 68+       | 68+       | HFS       |
|          |  | 0.5  | 60   | 68+     | 68+     | HFS      | HFS       | HFS       | HFS       | HFS       | HFS       | HFS       |
|          |  | 0.55 | 68+  | HFS     | HFS     | HFS      | HFS       | HFS       | HFS       | HFS       | HFS       | HFS       |

For further details about IL and site category see [DMRB HD28/15](#) and [HD 36/06](#).

### Where it is identified that additional surface friction is required, the following should be considered:

- Where surface aggregate PSV  $\geq 60$  can be sourced, HFS is unlikely to be required in 20mph streets.
- Where practical to source material with a high PSV ( $\geq 60$  for 20mph, or PSV as in table 3.1 for 30mph+ streets) this is the preferred option over providing HFS.
- If this is not feasible, HFS treatment lengths should be reduced to suit the environment that it is to be applied (e.g. 20mph urban street etc.)
- Setts should have appropriate surface friction material properties, suitable to the site category as defined by HD 36/06.

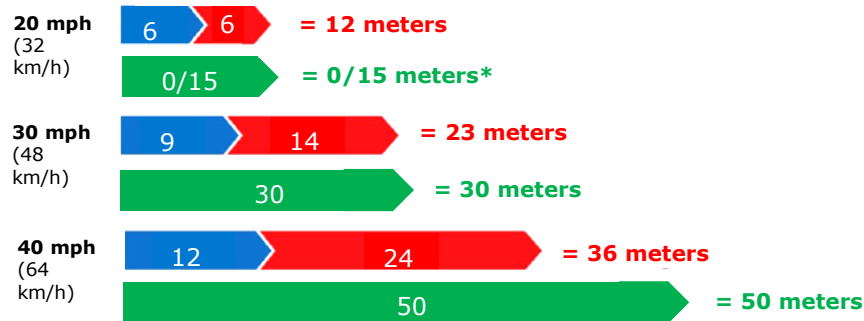
### Related Factsheets:

Minimum Treatment Length (M5)

## Minimum Treatment Lengths

Where site conditions identify the need for high PSV or HFS and within urban streets, the minimum treatment lengths should be considered as below.

### Stopping distance & minimum HFS treatment lengths



The distances shown are a general guide. The distance will depend on your attention (thinking) distance, the road surface, the weather conditions and the condition of your vehicle at the time.

The treatment lengths shown are the recommended minimum distances. These may require to be increased depending on the site specific conditions.



Average car length – 4 metres (13 feet)

[Highway Code Stopping Distance Diagram](#)

The HFS minimum treatment length calculations were determined using the stopping distance research by TRL: ([TRL Report 367: High and low speed skidding resistance: the influence of texture depth](#)).

#### NOTE:

- These values assume a negligible gradient and a direct approach to the hazard with good visibility.
- \*A HFS treatment length of 0m applies when the above condition is met. When this is not met a minimum HFS treatment length of 15m is applied.
- These values are based on stopping distances for a standard car.
- These values are based on having a PSV  $\geq 60$  on approach to the hazard, prior to the HFS treatment.

**The minimum treatment length should be increased as appropriate, depending on the site specific conditions, including but not limited to:**

- Gradient of slope on approach to hazard;
- Geometry (e.g. significant bends on roads, reduced visibility, roads subject to icing etc.); and
- Traffic conditions etc.

**See overleaf for additional requirements and risk mitigation measures, which must be read in conjunction with this factsheet.**

#### Advanced stop line (ASL)

ASL red chippings generally have a PSV  $< 60$ . So where an ASL is present the length of the HFS should be increased, equal to the length of the ASL.

#### Related Factsheets:

Speed Reduction and Traffic Management (G6)  
Signalled Crossings at or near junctions (G5)

Crossings (G4)

# Minimum Treatment Lengths

## Risk mitigation measures

- Where the downhill gradient is greater than or equal to 2%, **increase** the length of high PSV/HFS by L (in metres), where:

$$L = \frac{G \times S}{20}$$

- G=% gradient, S=speed limit (mph)
- Note that this formula is only appropriate for roads up to 40mph.
- This formula provides stopping distances that are no less than those calculated by the relationship shown in Manual For Streets 2, paragraph 10.1.5.
- Provide a minimum of 15m HFS on 20mph roads with poor visibility on approach to a junction or crossing.
- Avoid reducing HFS on routes with significant bends where the speed limit exceeds 20mph.

### Related Factsheets:

Speed Reduction and Traffic Management (G6)  
Signalled Crossings at or near junctions (G5)

Crossings (G4)

## Image References

### High Friction Surfacing

20 advertisement: The City of Edinburgh Council

HFS, Church Road J4078 : The Church Road, Holywood (4) : Albert Bridge, 2012. [ONLINE]. Available at: <http://www.geograph.ie/photo/2982714> [Accessed 26 April 2017]. Licensed for reuse under the Creative Commons Licence: <https://creativecommons.org/licenses/by-nc-nd/2.0/legalcode>.

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