Road Safety Factsheet

January 2021

Smart Motorways

Traditionally, a motorway had three (sometimes two) lanes of traffic and a hard shoulder for emergency use. With a predicted 60% increase in traffic by 2040, ways of increasing capacity without widening motorways or building new ones road have been developed. This led to the introduction of what are now called Smart Motorways (previously known as Managed Motorways).

The first Smart Motorway, originally called an Active Traffic Management System, on junctions 3A to 7 of the M42 comprises gantries with electronic variable speed limit signs, enforced by speed cameras, and the hard shoulder is opened as a running lane at times of peak congestion. This creates an extra lane to provide additional capacity, without the expense of widening the road. Data gathered since the M42 Smart Motorway scheme began in 2006 suggests that journey reliability has improved by 22%[1]. Signs on the gantries tell motorists when the hard shoulder may be used. Emergency refuges are placed along the nearside of the hard shoulder at intervals of 500 to 800 metres.

This original design has been further developed, and there are now three types of Smart Motorways in operation in England. They all use technology to actively manage the flow of traffic from a regional control centre where the traffic using the motorway is carefully monitored and managed with overhead gantry signs that control the permitted speed and the lanes that can be used at any given time.

They all open the hard shoulder as a running lane to traffic, either only at busy periods as indicated by the electronic signs, or permanently, and they all have emergency refuges at intervals along the inside of the hard shoulder. However, the distance between the emergency refuges varies between different motorways. The hard shoulder must never be used if a red X is displayed on the gantry sign above the lane.[2]

[1] Smart motorways programme, Highways England, not dated
http://www.highways.gov.uk/smart-motorways-programme/

[2] Driving Safely when you see a red X sign, Highways England, 2016
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/567653/M150469_Red_X_safety_campaign_v2.pdf

Dynamic Hard Shoulder Running

This system is in operation on the M42, M1, M6, M4 and M5. Motorways with dynamic hard shoulder running have a solid white line to differentiate it from the normal carriageway. The hard shoulder must not be used (except in an emergency) unless the electronic signs say that it may be used as a running lane. The emergency refuges are spaced 500-800 metres apart.

All Lane Running

This type of Smart Motorway uses the hard shoulder as a permanent 'live' running lane for traffic and was first trialled on the M25. All running lanes have broken white lines, with the former hard shoulder lane only being closed in an emergency. On all lane running motorways the emergency refuges are spaced 2.5 km apart. This is the standard for all new Smart Motorway schemes from 2013 onwards[3].

Controlled Motorways

This type of Smart Motorway has three or more lanes with variable speed limits controlled by electronic gantry signs, but a normal hard shoulder that may only be used in a genuine emergency.

Driving on a Smart Motorway

Driving on a Smart Motorway is similar in many respects to driving on a traditional motorway where you must obey the rules of the Highway Code and not exceed the National Speed limit of 70 mph or the posted speed shown in the red circular sign above the lane, which is enforced by speed cameras.

When driving on any motorway it is vital to keep a safe distance from the vehicle in front; in normal weather conditions, a two-second gap is the minimum recommended. This can be gauged by noting when the vehicle in front passes a fixed object, say a bridge, and saying 'only a fool breaks the two second rule'. If you reach the stationary object before completing the sentence, you are too close to the vehicle in front. In poor weather, the gap should be increased to at least four seconds on wet roads, and even more in ice, snow and fog.

Drivers should only use the hard shoulder as a running lane when the electronic gantry signs say they may do so. Be aware that the hard shoulder may only be open for traffic that is leaving the motorway at the next exit; the signs will indicate this. On all lane running motorways, drivers may use the former hard shoulder as a normal traffic lane, unless the signs say it is closed due to an emergency.

As on all motorways, if overtaking a number of slower vehicles, return to the left hand lane as soon as you are safely past.

The Red X Sign

A red X shows that a lane is closed and MUST not be used. If you see a red X closing a lane, you should move out of that lane promptly. It might be closed because there is an incident or broken down vehicle ahead, or a

[3] Smart Motorways, AA, 2018
https://www.theaa.com/driving-advice/smart-motorways

person, animal or be road workers in the road. The lane may be closed to provide access for emergency vehicles such as an ambulance.

Never drive in a lane closed by a red X; it is dangerous and illegal. If you do drive in a lane closed by a red X, you could receive a £100 fine.

What to do in the case of a breakdown

A well maintained vehicle will reduce the likelihood of a breakdown, meaning it is important to check your tyres and ensure that you have enough fuel to complete your journey. If you do break down on a Smart Motorway, if possible make it to the next emergency refuge area (or service station if closer) and use the emergency telephone to alert the Control Centre. There is no charge to use this telephone. Exit your vehicle from the passenger door away from the live traffic and if possible stand on the opposite side of the safety barrier as far away from the traffic as possible.

If you have a puncture, wait for a breakdown organisation rather than try to change the wheel yourself as they will have the necessary equipment to change the tyre quickly or to tow you to a garage if it cannot be repaired.

Unlike a traditional hard shoulder, which provides enough space to build up speed before re joining the flow of traffic, the emergency refuges on a Smart Motorway do not have enough space for this. Therefore, Highways England will either send a Traffic Officer to help you or set the motorway signs to temporarily close lane one so you can safely re join the motorway.

If your vehicle breaks down in live traffic and you cannot make it to an emergency refuge area, do not exit your vehicle. Switch on your hazard warning lights, call the police and inform the operator that you have broken down in live traffic on a motorway and let them know your location as accurately as possible. This will help Highways England to spot you as quickly as possible on CCTV and to close the lane you are in.

Keep your seatbelt on for protection in case of a rear end collision.

Research[4,5]

England's motorways are amongst the safest roads in the world and each smart motorway must be at least as safe as the traditional motorway it replaces. A recent assessment of the effect of the installation of smart motorways on the level of road accidents has demonstrated that operational schemes on the M25 motorway have met safety objectives:

[4] Highways England, SM-ALR Monitoring: M25 J5-7 Second Year Evaluation Report, March 2017, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/601568/M25_J5-7_SM-ALR_Monitoring_Yr2_Evaluation_v2.0.pdf

[5] Highways England, SM-ALR Monitoring: M25 J23-27 Second Year Evaluation Report, March 2017, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/601565/M25_J23-27_SM-ALR_Monitoring_Yr2_Evaluation_v2.0.pdf

***Accidents per million vehicle miles**

Smart motorway scheme	Road traffic accident rate before (2011-2014)*	Road traffic accident rate after 1 year (2014-2015)*	Road traffic accident rate after 2 years (2015-2016)*	Road traffic accident rate after 3 years (2016-2017)*
M25 J5-6	13.146	10.13	9.610	9.329
M25 J23-27	12.871	10.369	11.502	11.234

The Future of Smart Motorways

Plans are in place to permanently convert the hard shoulder into a running lane on around 300 miles of motorway. Highways England, who are responsible for motorways in England, has a programme of thirty all lane running schemes costing around £6 billion, over the next nine years.

However, there is concern that this type of Smart Motorway is not as safe as earlier designs because the emergency refuges are much further apart (as much as 1.5 miles apart), meaning that some drivers who break down may be forced to stop in a running lane because they cannot reach the emergency refuge.

The House of Commons Transport Select Committee raised concerns about all lane running in its report, stating "we do not support All Lane Running as the attendant safety risks have not been fully addressed."
The report said that "The type of scheme used on the M42 has a track record of safety and performance" but said the "permanent removal of the hard shoulder is a dramatic shift from previous smart motorway schemes" and "it is the model of the M42 pilot that should be considered the basis of future schemes, rather than a permanent conversion of the hard shoulder into a running lane, an ever-decreasing frequency of emergency refuge areas, and newly introduced hazards impeding emergency and recovery service access to incidents."[6]

In response, the government said that "reviews into Emergency Refuge Areas should be completed swiftly and that action on the recommendations will be taken. To be clear, that means both changing the design of new schemes and retrofitting existing ones, where necessary."[7]

[6] House of Commons Transport Committee, All lane running, Second Report of Session 2016–17, 30 June 2016, www.publications.parliament.uk/pa/cm201617/cmselect/cmtrans/63/63.pdf

[7] Government response to the House of Commons Transport Committee Report on All Lane Running, 29 September 2016, http://www.publications.parliament.uk/pa/cm201617/cmselect/cmtrans/654/654.pdf

Recent research by BBC Panorama has found that 38 people have been killed on the smart motorway network in the last 5 years. This is highly significant as the network constitutes only a small percentage of total road miles. They also found that the number of near-misses on a section of the M25 had increased 20-fold since the removal of the hard shoulder 6 years ago.[8] In January 2020, Transport Secretary Grant Shapps acknowledged these major issues and stated that if smart motorways are not as safe (or safer) than traditional motorways, then we shouldn't have them at all. Furthermore, in 2019 an "evidence stocktake" was carried out by the DfT in order to gather information about smart motorways and develop recommendations.[9]

In March 2020, the government announced an extensive action plan in response to the evidence stocktake, in order to tackle the aforementioned major safety issues brought about by smart motorways. The action plan includes 18 measures to be put into place, which aim to increase public confidence in smart motorways as well as making them safer. The key parts of the action plan are:[10,11]

- Dynamic hard shoulder smart motorways will be scrapped completely, in order to end public confusion about how to use them.
- Making the deployment of "stopped vehicle detection" (SVD) systems faster (the systems will be installed along the entire all lane running smart motorway network within 36 months – several years earlier than originally planned). The systems are radar-based and can identify stationary vehicles in around 20 seconds, automatically changing the electronic signs, and alerting a Highways England operator so a traffic officer can be dispatched. Note: all current smart motorways already possess a MIDAS (Motorway Incident Detection and Automatic Signalling) system which monitors traffic volumes and can also change the electronic signs, however this system is not designed specifically to detect stationary vehicles.
- Measures to ensure that the distance between emergency refuge areas is one mile maximum, ideally ¾ of a mile. This means that motorists will reach a refuge every 45 seconds when travelling at 60mph.
- Emergency refuge areas will be made more visible: they will be given a bright orange road surface, dotted lines on the surface that indicate where to stop, more signs on the approach to the area to indicate where it is, and new signs inside the area that show what to do in an emergency.

[8] BBC, 38 killed on smart motorways in last five years, January 26, 2020, https://www.bbc.co.uk/news/uk-51236375

[9] GOV.UK, Smart motorway evidence stocktake and action plan, March 12, 2020, https://www.gov.uk/government/publications/smart-motorway-evidence-stocktake-and-action-plan

[10] GOV.UK, Action plan announced to boost smart motorway safety, March 12, 2020, https://www.gov.uk/government/news/action-plan-announced-to-boost-smart-motorway-safety

[11] Department for Transport, Smart Motorway Safety: Evidence Stocktake and Action Plan, March 12, 2020, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/873000/smart-motorway-safety-evidence-stocktake-and-action-plan.pdf

- A £5 million national communications campaign to make motorists more aware of not only how to use smart motorways, but how to use them safely.
- Investigations are to be made into specific parts of the smart motorway network by Highways England, namely the M6 and M1, where there have been many incidents.

The full evidence stocktake and action plan can be found here.