

HS2's 'box' bridge will be a highway-spanning first

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HS2 is bringing a bit of rail ingenuity to the highways for the first time ever as part of a new, motorway-spanning bridge.

Engineers will use a 10,000 tonne box-like structure as its base to cut disruption as it is placed over the busy M42. The base, three walls and a top slab will be constructed on land next to the motorway and then a high-tech raft will glide it into position.

This method is used on rail, but this is the first time over a road.

A traditional structure would have caused disruption – two years of reduced lane widths, speed limits reduced to 50mph and weekend and night closures.

This will mean only two one-week closures over a 12-month period. It is also, HS2 says, safer for the workforce, who will not have to work with the same exposure to a live carriageway.

This section of the route will carry HS2 over the motorway as it heads north to Crewe, or on its southward journey as it loops into Birmingham Curzon Street or continues straight on to Interchange Station in Solihull, Old Oak Common Station and London Euston.

HS2 Ltd's contractor Balfour Beatty VINCI (BBV) had begun preparing to construct the 'Marston Box' bridge near Junction 9 of the M42 in North Warwickshire. The M42 will be closed for one week for the first stage of preparation work between Christmas and New Year 2021, with plans to move the structure into place during a week's closure in winter 2022.

Client project director for HS2 Ltd David Speight, said: "At HS2 Ltd we're always looking for innovative ways to reduce our impact on local communities, and this UK-first 'box slide' provides a quicker and safer solution. We're working very closely with National Highways to ensure traffic management plans are in place, with a clearly signed diversion route to minimise any impacts during the motorway closure."

Site agent at Balfour Beatty VINCI, Chris Hurrell, said: "At Balfour Beatty VINCI, we want to drive innovative solutions that benefit local communities, whilst we work to transform the UK's railway network."

"Through forward-thinking methods such as the 'box slide,' we are able to significantly reduce disruption for the travelling public, using the skills and expertise of over 100 of our people across a range of disciplines, to cut the motorway closure period to just two weeks over a 12-month period."

During the one-week motorway closure this year, from 9pm on 24 December to 9pm on 31 December, the team will remove the motorway surface, excavate approximately 3m deep across the footprint of the structure, remove a redundant fuel pipeline, and remove an existing drainage system and reinstall it in its new location. Ground improvements will also be made in preparation for the box slide.

Two tower cranes will be put in place on land next to the motorway to service the construction of the guide raft and the box structure in early 2022. The guide raft – a reinforced concrete slab, will be constructed first and then the box constructed on top. It will be a reinforced concrete box structure with base, three walls and top slab, with part of the jacking mechanism cast carefully into the base of the box.

The box slide itself involves a jacking system designed by specialist civil and structural engineering company Freyssinet, which will push the box across on the guiding raft. Once in motion, the box can reach speeds of over 2m per hour, so the whole operation of the box slide should only take 4 days, with a week closure required for the preparation, box slide and re-opening of the M42.

National Highways Senior Network Planner, Frank Bird said: "We've been working closely with colleagues at HS2 Ltd to plan this closure over the Christmas period when we know that major A-roads and motorways are quieter. While we appreciate this closure will cause some disruption on this part of the M42, we'll be lifting and completing hundreds of miles of roadworks across the country between Christmas and New Year to help keep traffic flowing."