

# A92 Tay Road Bridge Improvement Works

## Summary of Proposed Works

### PROJECT DESCRIPTION

The proposed works involve carriageway maintenance works to the full extents of the Tay Road Bridge, Dundee, Scotland. The existing surfacing on the bridge is the original as installed in 1966 and is fast approaching the end of its serviceable life. The bridge will be stripped of its existing asphalt pavement, the existing concrete deck will be repaired and prepared (as necessary), the concrete deck will then be waterproofed, new kerbs and asphalt pavement laid before new expansion joints are installed before final road markings and traffic signage is installed prior to reopening. The works will be undertaken in two phases over two calendar years utilising carriageway closures with contraflow traffic management. The carriageway closures will also be utilised to allow access to the bridge deck cantilever soffits to undertake necessary concrete repairs to maintain the integrity of the structure.



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### LOCATION

Dundee, Scotland  
E341643 N729399  
What3words – clots.chair.showering

### PROJECT VALUE

£10m

### CLIENT

Tay Road Bridge Joint Board

### STATUS

Estimated Construction Dates  
Phase 1 – June 2023 to October 2023  
Phase 2 – Apr 2024 to August 2024

### Structure Information

The Tay Road Bridge carries the A92 dual carriageway over the Firth of Tay between Dundee and Newport-on-Tay, Fife. The bridge is a 42no. span, 2,250m long structure with a composite twin box girder and reinforced concrete deck over reinforced concrete piers. Of the 42no. spans, four are classed as navigation spans comprising of varying depth box girders over two 70.1m spans and two 76.3m spans. Each bridge span is simply supported apart from the navigation spans which are continuous over the piers.

The Tay Road Bridge is accessed/egressed by means of on / off ramps at the northern end at the Dundee Waterfront and by means of the South Tay Road Bridge roundabout at the southern end in Fife.

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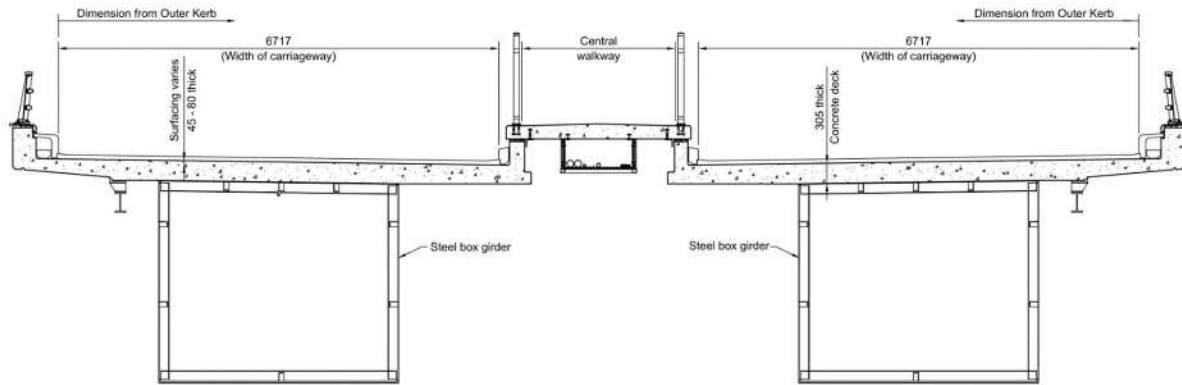


Figure 1.1 – Existing Tay Road Bridge Typical Cross Section

### Site Information

The Firth of Tay and the Eden Estuary are designated as Special Protection Areas (SPA), as Ramsar wetlands and as Special Areas of Conservation (SAC). Several parts of the firth are within a SSSI. The Firth of Tay is noted for its extensive sand and mudflats, population of common seals and wintering birds.

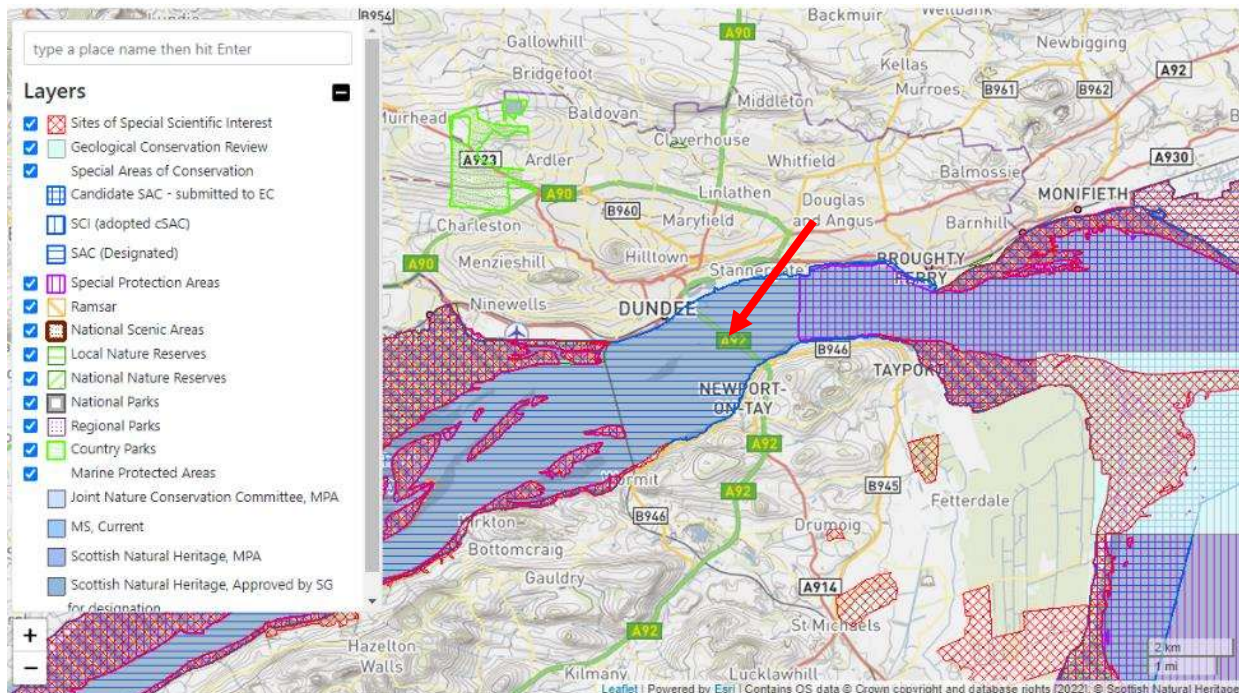


Figure 1.2 – Firth of Forth Designated Sites <https://sitelink.nature.scot/map>

### **Works Information**

The existing surfacing on the Tay Road Bridge is now 57 years old with the only previous treatment undertaken in the mid-1990's when it was surface dressed to prolong the service life of the pavement system. Detailed investigations of the existing pavement in 2020 confirmed that it is now fast approaching the end of its serviceable life and it should be replaced. Intrusive investigations were undertaken in September 2021 to ascertain the condition of the concrete deck and the presence of any waterproofing. It was identified that there is no waterproofing present on the concrete deck and the surface of the concrete deck is variable therefore preparatory work would be required to ensure the deck is prepared to a level that it can receive a waterproofing system that will improve the integrity and prolong the serviceable life of the bridge deck. A review of the existing maintenance record information identified that the majority of the expansion joints were more than 30 years old and recent reports from the Tay Road Bridge Joint Board who are responsible for the operation and maintenance of the structure noting that joints are starting to fail at an increasing rate resulting in full carriageway closures to accommodate emergency repair works and to safely reopen the carriageway to traffic. Therefore all joints would need to be replaced as part of the works.

A separate underdeck condition survey was carried out in April 2021 by means of the mobile access gantries and this identified a number of defects to the reinforced concrete soffit associated with the historic ingress of water through defective expansion joints. Therefore, it was decided to utilise the planned carriageway closures for the resurfacing works to gain access to the bridge deck cantilevers, undertake the necessary repairs and in turn minimise future disruption to the travelling public.

A summary of the proposed works and methodology is provided below. It is anticipated that the works will be undertaken in two construction phases, one each in 2023 and 2024.

#### **Step 1**

In Phase 1 of the works the northbound carriageway will be closed completely to traffic to allow the works to be undertaken safely with traffic management in the form of contraflow moving both northbound and southbound traffic to the southbound carriageway for the duration of the works.

The appointed Contractor will then commence the works by removing the existing surfacing and expansion joints. This will be done by planing (cold milling) down to a safe depth to avoid clashes with the concrete deck, after which the remainder of the bituminous surfacing will be removed by scraping using excavators, see images of typical activities below. It is likely that the excavators will also be used to remove the existing expansion joints that are surface mounted onto the deck. The existing kerbs and defective gully gratings will also be fully removed from both sides of the carriageway.



**Figure 1.3 – Existing surfacing cold planing & scraping of remaining surfacing**

#### **Step 2**

It is likely that there will be residual material on the concrete deck surface that cannot be removed by scraping. Captive shot blasting will be used to remove residual material from the deck surface and scabbling (fine milling) to remove tougher sections of residual material which will allow for an inspection of the concrete surface of the



deck to inform the need for concrete repairs. Agreed concrete repairs will be undertaken as necessary and once cured the concrete deck will be prepared using captive shot blasting again to provide a suitably smooth concrete surface to accept the new waterproofing system.



**Figure 1.4 – Scabbling of Concrete Deck & Captive Shot Blasting**

### **Step 3**

Once the concrete deck has been suitably prepared it will be waterproofed with a two coat spray applied system. This will cover the entire surface of the bridge deck and up both concrete upstands in order to seal the concrete deck and protect the concrete from the future ingress of water and increased rate of deterioration. Once cured the new kerbs will be installed along the inner and outer upstands, new sub-surface drainage channels will be installed transversely across the deck adjacent to expansion joints and new gully frames and gratings will be installed.



**Figure 1.5 – Spray applied waterproofing**

### **Step 4**

The expansion gaps in the deck will be covered with plates/membranes and gully's covered prior to laying the new surfacing material. The surfacing material will be laid using modern conventional pavers along the full length of the bridge at depths varying between approximately 40 and 100mm. The surfacing will vary between being laid in either one or two courses (layers) depending on thickness required.



**Figure 1.6 – Conventional paving**

### **Step 5**

Once the surfacing has been laid, at the expansion gaps in the deck pre-marked strips will be cut out to allow for installation of the new expansion joints which will consist of a variety of joint types including buried joints and elastomeric in metal rail joints.



**Figure 1.7 – Typical joint installation after new surfacing cut out over gap**

### **Step 6**

On completion of the expansion joint installation final works will include the installation of road markings, kerb cover plates and the replacement of traffic signs before the reopening of the closed carriageway to traffic.

### **Step 7**

Phase 2 of the works will be undertaken the following calendar year which will involve repeating steps 1 to 6 for the southbound carriageway.

### **Additional Steps**

The concrete repairs to the reinforced concrete soffit will be undertaken at various stages throughout the resurfacing in a manner which ensures there is no clashes that could disrupt the progress of the top of deck works. The concrete repairs will require proprietary suspended scaffold to provide access to the soffit of the outer cantilevers of the concrete bridge deck. The method of repair will require hydro-demolition around the existing defects to expose reinforcement steel and provide a suitable key to cast in the new repair material. The access platform will be encapsulated to ensure solid waste is captured and taken off site to a licensed waste facility and blast water is captured in a sump and pumped back up to bridge deck level where it will be treated using mobile water treatment plant to reduce the alkalinity and suspended sediment levels that will allow for it to be discharged directly to the marine environment.

The repair area will be fitted with sacrificial anodes to prevent ongoing corrosion and prevent the formation of new adjacent corrosion sites. The concrete repair material will be spray applied due to the depths required and then trowel finished before the temporary access platform is removed entirely or moved to the next repair location.



**Figure 1.8 – Hydro-demolition, Sprayed Concrete Repair & Access example**

