Stirling Old Bridge Illustrative Method Statement FOR CONSENT PURPOSES ONLY.

A Contractor specific Method Statement is to be submitted by the Contractor based on their own preferred layouts, programmes, methods and materials and may differ from those theoretically discussed below.

Project Location:

Stirling Old Bridge [W3W: //////stood.glows.strong]

Stirling Old Bridge is over 500 years old and was the main crossing point of the River Forth in Stirling for the majority of this time. It is used today only for pedestrian and cycle access. The profile of the 4-span masonry arch structure rises toward the central pier. Masonry parapets are provided over the full length. The width of the path increases at the west and east approaches where the footway is retained by the wingwalls.

There are three piers supporting the bridge, formed with acute buttress cutwaters to approximately mid-height. The masonry forming the pier bases is protected by rock armour of various sizes. It is likely given the age of the structure, that the piers and abutments are supported directly on the natural ground.

Project Description:

Shearwater Marine Services Ltd (SMS) carried out an underwater inspection of the bridge in May 2021 and they identified a total of 5 No. scour defects on the eastern and central piers. Subsequent bathymetric surveys have been undertaken to inform scour risk assessments. Deep scour pools have been identified in the riverbed both upstream and downstream of the bridge, however these are presumed to be stable.

The proposed works comprise a permanent repair, designed to fully fill the identified voids using porous fabric formworks bags filled with a micro-concrete mix.

The Structure:

There are three piers supporting the bridge, formed with acute buttress cutwaters to approximately mid-height. The masonry forming the pier bases is protected by rock armour of various sizes. It is likely given the age of the structure, that the piers and abutments are supported directly on the natural ground.

Weight limit: With assumed min. arch depth of 550mm and condition factor 0.7 the bridge is able to sustain 3 tonnes vehicles on top. HES have confirmed that investigations are under way to ascertain the arch thickness and therefore the max. weight of vehicles.

Parapet: HES have assessed for wind and also crowd loading from people leaning against the parapet. The parapet failed the assessment for high crowd loading which is not expected to act on the bridge during construction works. For any other loading an assessment will have to be made.

No plant or materials are to utilise the bridge structure. All access to the scour defects is to be via the river.

Commencement Date:

Start date and site access will be XX/XX/XX as agreed with Historic Environment Scotland (HES, The Client).

Working Hours:

Working hours are XXX.

Programme:

The programme is structured to ensure that site security, protection measures and temporary works are fully established before any works are undertaken.

A detailed programme will be submitted in Gantt chart format, identifying task durations, dependencies and key milestones. Programme performance will be monitored throughout the works and updated where required.

The programme duration is based on assumed access arrangements, approved working hours, weather and flow rate constraints. Where these assumptions change, or where safety-related stop-work events occur, the programme will be reviewed and updated in consultation with the Client / Project Manager.

The programme is structured into the following phases:

Phase 1: Mobilisation and Pre-Start

Includes confirmation of contract award and access dates, confirmation of the project team and supervisory arrangements, submission and acceptance of RAMS and task-specific method statements, confirmation of subcontractors, specialist resources and establishment of the management arrangements required prior to site access.

Phase 2: Site Establishment and Enabling Works

Includes site access handover and induction, establishment of compound, welfare and secure storage, installation of site security measures, barriers and signage and completion of a photographic condition survey of roads, footpaths and adjacent assets.

Phase 3: Implementation of works

Includes undertaking of the void filling works as set out in the specification. Daily briefings and dynamic risk reviews will form part of routine programme control. Progress rates will be governed by safety, weather conditions, tide times, flow rates and real-time assessment rather than fixed production targets.

Phase 5: Inspection, Demobilisation and Completion

Includes a final inspection/survey, removal of all temporary works, removal of all site security measures, final site tidy including roads, footpaths and hard standings, completion photographs, site walkover and submission of records for inclusion in the Health and Safety File.

Where statutory approvals, permits or third-party consents are required, adequate time will be allowed for submission, review and acceptance prior to commencement of the affected activities.

The programme recognises the potential impact of wind, rainfall, tide and flow conditions on safe working. Daily weather assessments and task-specific go/no-go decisions will be used to manage programme risk while maintaining safety.

Site Access & Site Plan:

Site access, compound arrangement, welfare location, storage and delivery arrangements will be agreed prior to mobilisation and briefed during induction. Site compound boundaries will be clearly defined, installed and inspected daily.

Where statutory approvals, permits or third-party consents are required to establish a compound, adequate time will be allowed for submission, review and acceptance prior to mobilisation and establishment.

An example site layout plan is shown in Figure 1 below. **Note: This layout plan is illustrative for consent purposes only. An appropriate compound location, configuration and diver / boat access is to be proposed by the Contractor based on their specialist requirements of the works and is likely to differ from those theoretically shown below.**

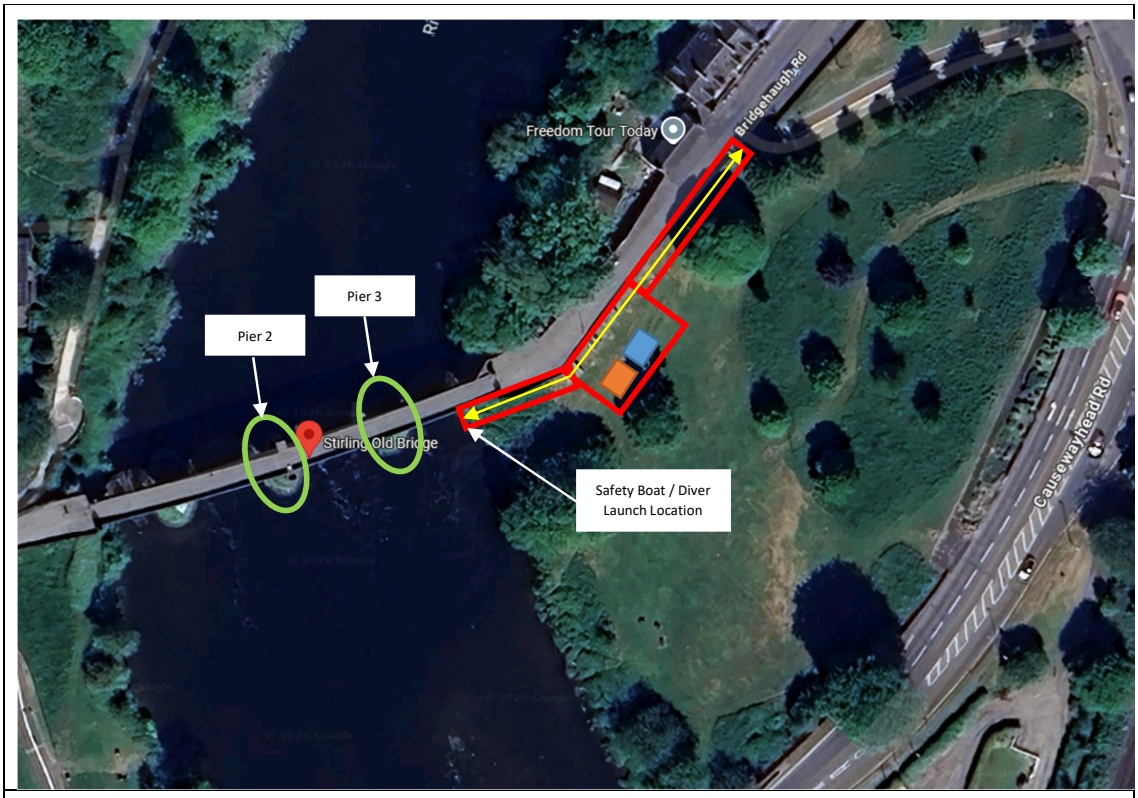

Figure 1: Example Site Layout Plan, illustrative for consent purposes only.
Red line indicates a secure site boundary.
Yellow arrows indicate vehicle / boat / pedestrian access and egress route between Bridgehaugh Road and the River Forth.
Orange and blue polygons indicate compound buildings e.g. welfare and secure storage.
Green circles indicate the location of Pier 2 & 3 working areas.

All vehicle access, manoeuvring, loading, and unloading within the works area will be coordinated by the Site Supervisor, with nominated operatives managing vehicle movements and exclusion zones.

Staff parking will be accommodated on street within the surrounding area with due consideration given to residents, access requirements, and local restrictions.

Site Security:

Site security arrangements will be implemented prior to commencement. Security controls may include secure barriers; controlled entry points; clear signage; and manned positions where required.

Temporary Heras style fencing shall be assembled to restrict public access to the work zone. Panels shall be positioned in continuous runs and connected using approved anti-tamper couplers.

All gate access points shall be fitted with signage as detailed below, including Construction Site, No Unauthorised Access, hazard warning signage, and Principal Contractor contact details.

Security will be in place prior to commencement of any works activities etc.

Welfare:

The Contractor will provide suitable welfare facilities for all operatives and contractors on site for the duration of works. The welfare unit will be placed in a secure and safely accessible location on site away from the work zone etc.

Photographic Condition Survey:

Prior to commencing works, the Contractor will undertake a photographic condition survey of agreed adjacent assets and surrounding areas. This will be completed to provide a clear record of pre-existing condition and to support any subsequent queries relating to access, protection, or potential inadvertent damage.

The extent and locations to be surveyed will be confirmed with the Client in advance, and photographs will be retained as part of the project record.

Ground Protection:

The Contractor will position temporary ground protection to support safe site operations, protect existing surfaces, and reduce damage to footpaths, access routes and working areas. Ground protection is intended to support safe movement of operatives, materials and vehicles, and will assist in maintaining good housekeeping throughout the works.

Ground protection will be installed to suit the site layout and constraints and may include (as required):

- Ground protection mats / trackway to protect footpaths, roads and access routes
- Localised protection to prevent rutting, sinkage or surface damage where materials are stored
- Protection beneath loading / unloading areas

Ground protection will be positioned in accordance with the site layout.

Ground protection will be inspected routinely and adjusted or extended as required due to:

- weather and ground saturation
- increased vehicle movements
- any signs of damage or deterioration to the existing ground surface

No vehicles will be moved into position until access routes and ground protection arrangements are confirmed suitable by the Site Supervisor.

Expected River Working Conditions (recommended inclusion by ProServe)

The Contractor will outline their expected working conditions within the River Forth based on their specialist expertise.

Void Filling:

Note: The following specification, methodology and temporary works suggestions (points 1 to 11) was received from ProServe in Feb 2026, a manufacturer of underpinning grout bags, and is included for illustrative for consent purposes only. A Contractor specific Method Statement is to be submitted by the Contractor based on their own preferred methods and materials and may differ from those discussed below.

1. *Underpinning Grout Bag*

"This specification is for Underpinning grout bags that are filled in-situ with a highly fluid mix. The system includes the use of a vent standpipe that pressurises the inside of the grout bag to approximately 10-13kPa thus guaranteeing top contact and effective structural underpinning.

The underpinning bags, when filled with the fluid mix could roll out of the void if face restraint is not provided. This face restraint prevents the fluid concrete in the bag from moving to a lower point outside of the void, or rolling away from the back of the void. The face restraint is simple and essential and can often require a capacity of 10kN/m restraint force or higher depending on the size and shape of the void.

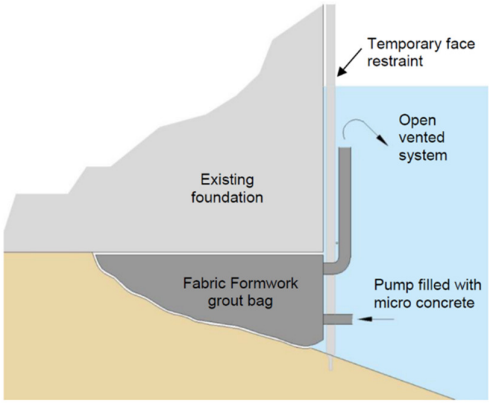

Figure 2. Typical Underpinning Arrangement suggested by ProServe

The underpinning grout bags are to be fabricated from a twin-layer fabric supplied by Proserve or Engineer approved equivalent. The Contractor may propose an alternative grout bags and manufacturer to the Engineer for approval, where the materials and the Manufacturer's experience and engineering support is considered to be equivalent. The grout bags are placed within voids, temporarily restrained, and then pump filled with a sand:cement micro concrete. The system can be installed above or below water.

The underpinning grout bags shall be installed in accordance with the manufacturer's recommendations and this specification, including the installation of further scour protection along side the underpinning bags to prevent future undermining of the repairs.

Grout bags are a temporary works system to form structural underpinning in plain concrete. The grout bag fabric consist of two woven layers which prevent wash-out of micro concrete before setting. All grout bags are engineered and manufactured bespoke for each project arrangement and installation conditions. The grout bags are fabricated with generous surplus to ensure that the material can expand out, fully filling voids, forming intimate bearing contact with soffits and restoring grout bearing support to structures".

2. *Manufacturer's Engineering*

"The Manufacturer shall provide the following specialist engineering support working in conjunction with the Contractor, to ensure that the underpinning is competently installed:-

A. *Review of Contractor's proposed method of working and arrangement of the underpinning system to suit the working method and river conditions.*
B. *Temporary works calculations for the load on the face restraint, and co-ordination with the contractor to ensure the planned face restraint is sufficient.*
C. *Preparation of General Arrangement drawings for Engineer approval.*
D. *Preparation of Fabrication drawings for grout bags.*
E. *Installation guidance.*
F. *Site support visit at the start of installation and office based support during preparation and installation".*

3. *Fabric Formwork*

"The fabric used in the manufacture of fabric formwork units shall be a specially woven polyamide/polypropylene/Polyester fabric that is designed to avoid entrapped water voids and allow for the bleeding described above. In addition, the fabric shall allow the concrete to be protected from wash out until the mix acquires sufficient strength.

The opening size in the fabric, O90 should be less than the D50 size of the sand in the micro concrete mix to ensure micro concrete tightness.

The formworks shall be engineered so that –

- *The pressure in the forms is controlled (by vent standpipes 1m high minimum for underpinning works)*
- *SF>4 for underpinning and irreversible work*
- *SF>3 for other works.*

From a survey of the voids, a General Arrangement drawing showing the proposed underpinning bags is prepared by the Manufacturer for approval. Grout bag fabrication drawings are then produced, incorporating additional fabric to ensure voids are fully infilled and sufficient grout bearing support is restored to the structures".

4. *Micro Concrete Mix*

"The mix shall be supplied by ready mix, or site batched, to give a sufficient output.

Mattresses shall be pump filled with a micro concrete of 35 N/mm2 minimum cube strength (C28/35). Micro concrete is typically a mix of local sand(s) and cement of 2:1 (S:C) proportions.

Cement	*650 kg/m3*
Sand – Fine sharp washed	*1,300 kg/m3*
Water (based on water:cement ratio of 0.55	*350 kg/m3*

(but may vary to suit sand grading)

Other mix proportions may be used subject to strength tests and pump filling tests. Suitable cement replacement may be proposed where supported by test results. The water:cement ratio varies with the

exact granulometry of the sand used and shall be determined on site using the Manufacturer's flow cone and advice.

Free water bleed through the permeable fabric lowers the water:cement ratio in the cast mattress panels. 100 mm ø permeable fabric test socks… may be used to take concrete samples for testing. Typically 100mm ø cylinders x 200 mm high are cut and tested at 7 days (1 No) and 28 days (2 No). No testing is required where a mix has been previously proven and details can be submitted. The concrete has good strength and abrasion resistance due to the low water:cement ratio.

A retarder is typically used to prolong the fluid period of the mix, to allow for transportation, wagon waiting time, and any site delays".

5. *Face Restraint – Temporary Works*

Face restraint must be installed as part of the underpinning works. The restraint is to prevent the grout bag pushing/rolling out of the void during filling.

The grout bag manufacturer is to provide the filling forces which are to be resisted based on temporary works calculations.

The contractor is to provide suitable face restraint arrangement for the advised filling pressures and site conditions with advise and support from the manufacturer.

Figure 3. Example Face Restraint provided by ProServe

Typical arrangements for face restraint often include A393 mesh, supported by props. Note, due to the historical significant and scheduled monument status of the bridge structure, no physical fixing to any part of the bridge structure is allowable. The temporary face restraint must be secured in place by other means. The contractor is to submit proposed temporary work arrangements for approval.

6. *Dive Teams for Grout Bag Installation*

"Where installation is underwater by divers, diver installation teams shall generally have an audio and visual link, by way of dive camera, for monitoring, quality control, progress and safety.

Dive teams are to be trained as required in grout bag installation and are to keep the quality control records associated with their works".

7. *Grout Bag Installation*

"Grout bag Installation and Filling shall be in accordance with this specification and with the Manufacturers installation guidance. Grout bags are pump filled in tremie fashion, typically with filling from the bottom and venting from the top to ensure concrete quality is maintained. Grout bags are to be filled continuously without the formation of cold joints.

The vent is to be filled until good concrete is observed in the vent. This ensures any poor quality concrete created at the start of filling has been expelled from the grout bag and that the insitu concrete in contact with the soffit is of the required quality.

The level of the concrete in the vent is to be monitored and to be topped up if the level drops below 0.5m underwater following pouring before the concrete sets. Topping up is usually undertaken within 10-30 minutes following bleed".

8. *Quality Control*

"Daily records are to be kept of the works typically including:-

- *Volume pumped into each grout bag*
- *Vent sleeve fill height when cast.*

9. *As Built Record Drawing*

"Foundation levels, other useful information and any departures from the design are to be recorded upon an 'As-Built' record plan drawing. This is to give a detailed representation of the installed underpinning, and is to act as the reference point for future inspection and maintenance".

10. *Environmental Control (River Working)*

"The Contractor is to ensure the works are compliant with the requirements of environmental authorities.

The casting of grout bags can raise the local pH level mainly from the release of bleed water from filling. A rise in pH level of 1 is normally accepted for both drinking water reservoirs and rivers with fish stocks etc.

Where grout bags are installed in rivers, the pH levels are monitored before grout bags placement and during filling to check and control the rate of filling. Readings of pH levels are to be recorded to demonstrate compliance to regulatory authorities. In addition to the above control, the works are to be arranged to minimise the release of cement fines that may cause visual concern to the public. For further information please see Environmental Control sheet".

11. *Inspection And Maintenance*

"The grout bag underpinning system comprises plain concrete which is highly durable and no maintenance is expected during the design life, subject to adequate installation.

Monitoring and maintenance is generally undertaken by the owner using the As-built record information produced by the Contractor. Initial survey inspections are recommended annually and/or after extreme flood events. Inspection requirements may be relaxed subject to results of initial monitoring".

Extreme Events and Environmental Aspects (recommended inclusion by ProServe)

'The Contractors proposals for handling extreme events and environmental aspects specific to specialist overwater / in-water works.'

Daily Housekeeping

The Contractor will maintain good housekeeping throughout and will ensure the site is left safe, tidy and secure at the end of each shift, with no accessible hazards or loose debris.

At the end of each working day the Contractor will:

- confirm all temporary controls (fencing, gates, debris containment measures) remain in place and effective; and
- remove tools from site or secure them within the designated storage containers.

Completion & Demobilisation

On completion of the works, the Contractor will undertake a final inspection and snagging inspection to confirm scope completion and site condition.

This will be completed to confirm the agreed scope has been delivered, outstanding items (if any) are identified, and the site is left in a safe and acceptable condition.

Following sign-off and once instructed, the Contractor will complete demobilisation activities, including the controlled removal of all temporary works and site security measures installed as part of the project. This will include the removal of fencing, gates, bag restraint and the welfare/storage setup, ensuring no residual hazards are left accessible.

The work area will be left tidy and secure with all equipment, tools, and materials removed from site.

As part of handover, the Contractor will provide completion photographs and supporting close-out records as required, confirming the final condition of the works and supporting the Client's project close-out process.

Site Entry Requirements

Access to site will only be permitted to personnel who have completed the required site induction(s) and are deemed competent for the activities they are undertaking. All operatives will hold appropriate certification for their role and will present evidence of competency upon request.

Site Hazards

- Adjacent Activities: working area is adjacent to the A9 (Causewayhead Road) through Stirling city. Potential for road works to cause disruption.
- Restricted Site: scour repairs are required on bridge piers at locations in the river below the water level. No vehicles allowed on bridge. No hardstanding between main road and work site. No plant or materials are to utilise the bridge structure. All access to the scour defects is to be via the river.
- Traffic: Public roads present nearby the site however not at the working location.
- Interface with Public: bridge and riverbank are accessible to members of the public.
- Near to Highways: Public roads present nearby the site however not at the working location.
- Near to Waterways: works are required in the River Forth.
- Tidal Working: bridge is located within the tidal zone.
- Contamination: potential for pumped concrete to contaminate the watercourse.
- Inundation: works will take place underwater.

- Services: unlikely to be present however Contractor to confirm.
- Unstable Structures: Stirling Old Bridge is over 500 years old. Unbound rock armour around the piers with identified scour holes. No plant or materials are to utilise the bridge structure. All access to the scour defects is to be via the river.
- Bird Droppings: likely to be present.
- Dust: potential for dust to be generated while mixing concrete.
- Hazardous Materials: concrete specified as part of the works.
- Manual Handling: manoeuvring materials and equipment into position.
- Unforseen Ground Conditions: potential voids are a different volume and geometry to that specified.
- Leptospirosis: potential for the watercourse to be contaminated with Leptospira and cause infection in personnel.
- Unexpected Water Velocities: potential for unexpected high water velocities during unseasonal weather.
- Scheduled Monument: Stirling Old Bridge is a scheduled monument.
- Special Area of Conservation: work site is located within River Teith Special Area of Conservation.

Communication

Primary communication tools will be verbal, radios and mobile phones. These devices are considered as tools and, as such, will be securely tethered to prevent the possibility of accidental drops.

Emergency, Rescue and First Aid

To be defined by the Contractor specific to specialist overwater / in-water works.

PPE, COSHH, HAVS & Noise

To be defined by the Contractor specific to specialist works.