Proposal For Design of a Boardwalk to Traverse the 30m Wide Breach in the Embankment at Calstock Flood Defence (v.5)

Brief:

A small committee has been requested to come up with a proposed design to put forward to the Planning Officer. This proposal should also include an estimated cost budget, and suggestions for professional advisors and contractors.

Constraints:

- Loading – Standard live load (people) is 0.5 tonne/sq m. The dead weight of the structure and its supports has to be taken by the structure and its foundations.
- Poor ground conditions for working – travelling with plant needs to be kept down, loads must be limited.
- Poor ground conditions for foundations – firm strata are 8-9m down, more in places, so ideally we would rely on friction between the piles and the soil or use pad foundations. Typical bearing pressures are unlikely to be able to exceed one tonne per square meter.
- Use where possible materials supplied by EA.
- Channel Width – at field level could be up to 16m or so , more than the length of greenheart that we can use for a span.
- Flow in the channel – possible erosion, but flow velocities should be low. Likewise the breach is just grass lined, and therefore changes in breach dimensions may occur with time.
- Non-slip finish for decking. Suitable hand railing and guard rails/toe boards.
- All metals bolts and fittings should be in Stainless Steel.
- Maintenance – minimum maintenance should be designed in.
- Timing – the construction will mostly be done before the breach is made, and preferably before the new bund is built to facilitate access to site. A gap of at least 5m in the bridge should be left until after the breach is made.
- Aesthetics – the structure should be of rustic construction that fits into the landscape.

Construction Materials

The Environment Agency has sourced for us the following materials:

46 Piles of Greenheart 300mm x 300mm approx. 7-9m long each weighing 1 ton

46 boards 100mm x 300mm approx. 5-6m Total: 230m+

190 boards approx. 2.7m long (100mm x 300mm). Total: 513m

This timber is durable and does not rot, ideal for construction.

Based on the Design Proposal, this is a list of Materials from the above list that we shall use:

20 Piles of Greenheart 300mm x 300mm approx. 7-9m long pile driven to 4m depth, 3-4m protruding above ground, plus 2 cantilever spans.

There are 5 of 5m and 2 of 3m spans requiring 7 x 5m boards 100mmx300mm.

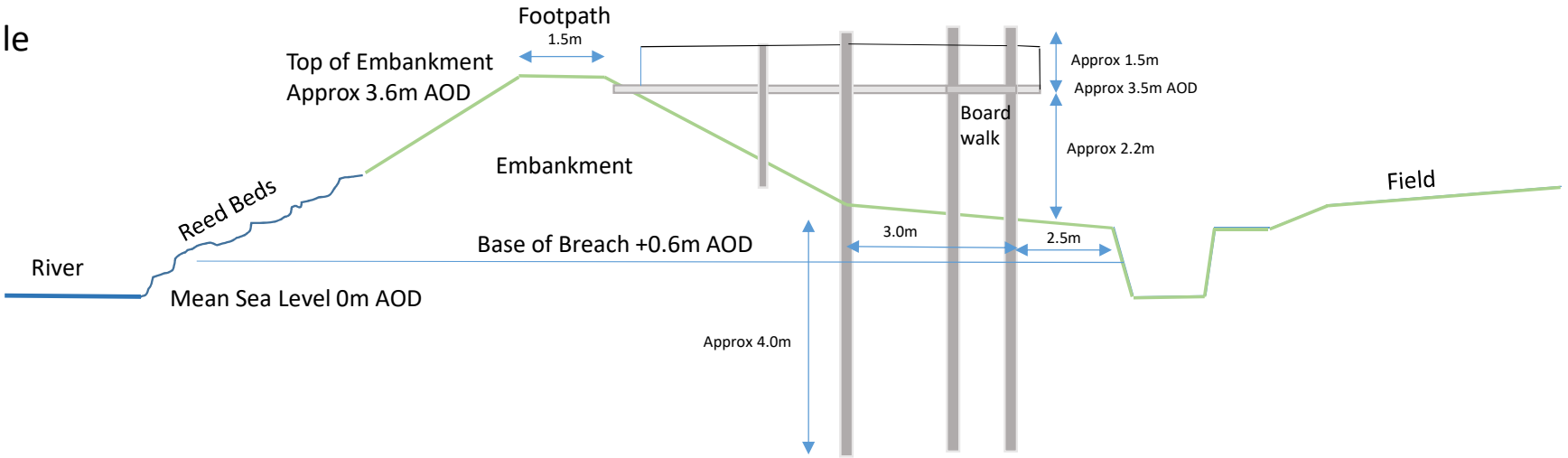
At each pair of supports, 2 x 1.7m long 100mm x 300m cross members total 20, equivalent to 7 of the 5m boards.

If we go for a wooden decking, total 55m of board walk, which will require 500 boards of 1.0m length and 100mm width. Equivalent to 150 of the 2.7m boards.

Also handrails and guard rails etc. will be required.

Cross Section of Embankment and Walkway with Relative Heights

Not to Scale

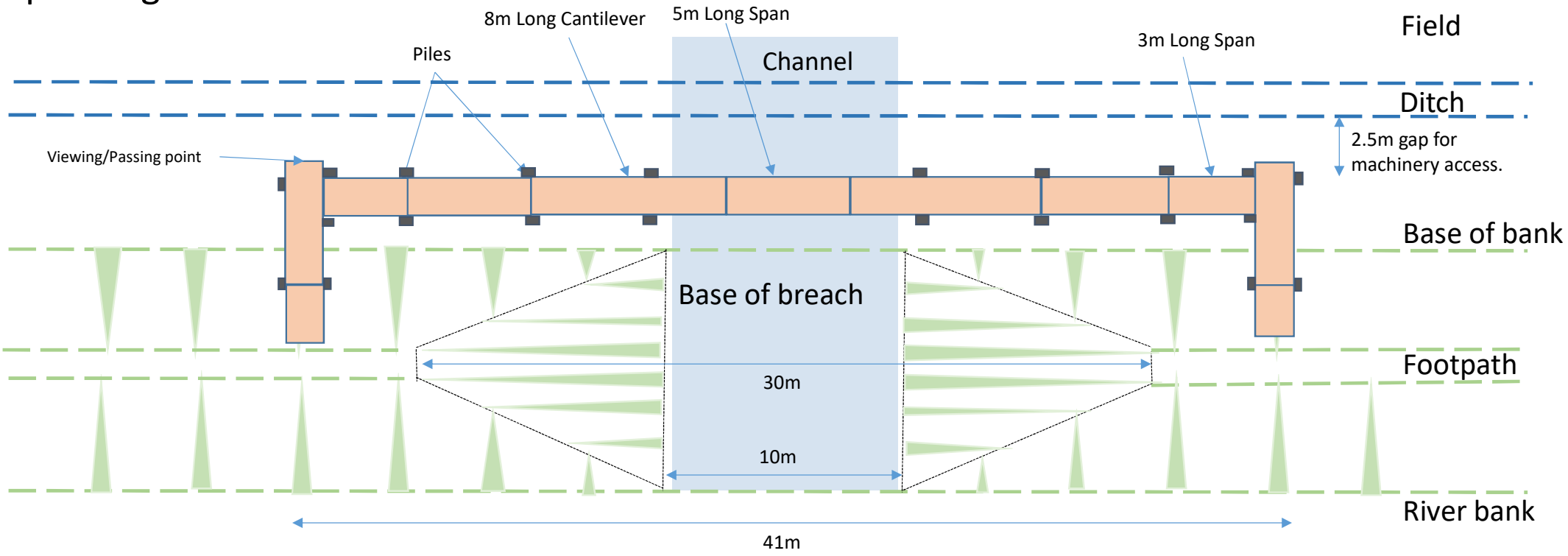


Top of embankment is approx. 3.6m AOD. We are aiming for the Boardwalk to be about 3.5 – 3.6m AOD.
A typical spring tide ranges from 2.5m to 2.9m AOD, and a neap tide about 1.3m AOD.
The ground slope ranges from about 1.5m AOD at the base of the embankment to 1.0m AOD by the ditch.
The boardwalk will therefore be typically 2.2m above the ground level.

A minimum gap of 2.5m has been set between the boardwalk and the edge of the ditch. This is to enable machinery to work on the boardwalk and access the breach without collapsing the edge of the ditch.

AOD means Above Ordnance Datum. Ordnance Datum is the same as mean sea level.

Plan View of Walkway Spanning Breach

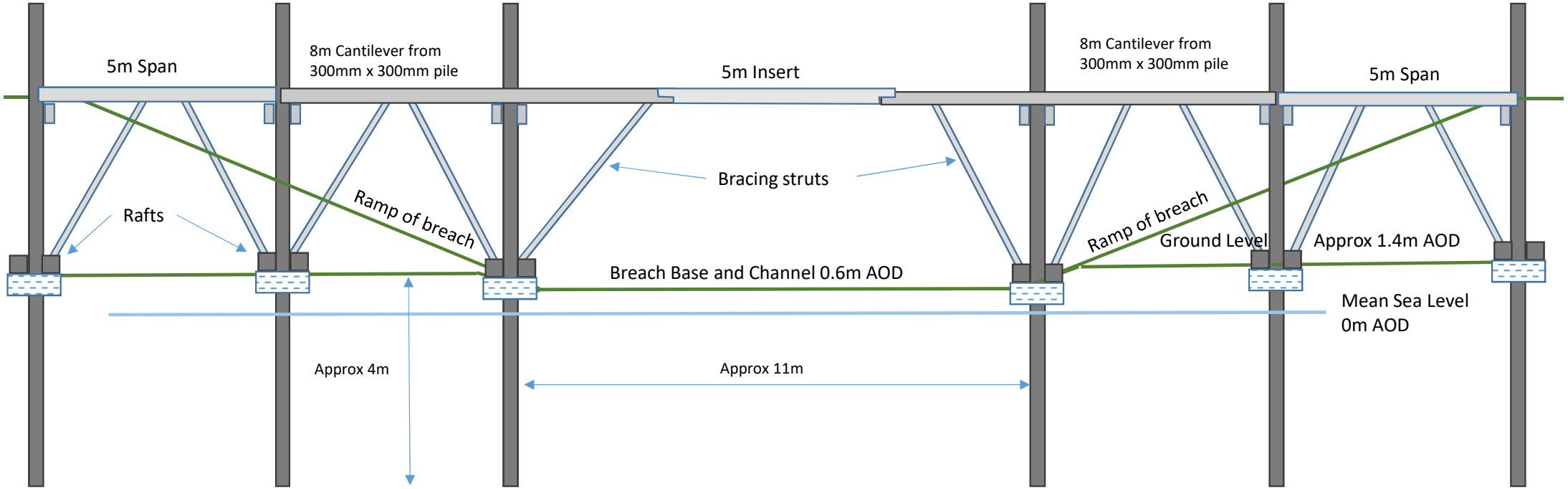


Design Requirement:
18 piles (plus 4 short piles), 5 x 5m spans, 2 x 3m spans and 2 x 8m cantilever spans

Not to Scale

Front View of Breach Span

This is an indicative view not to scale to show how the spans are constructed, handrails and guards have been intentionally left off.



The reason for the 8m cantilevers and 5m span is two fold:

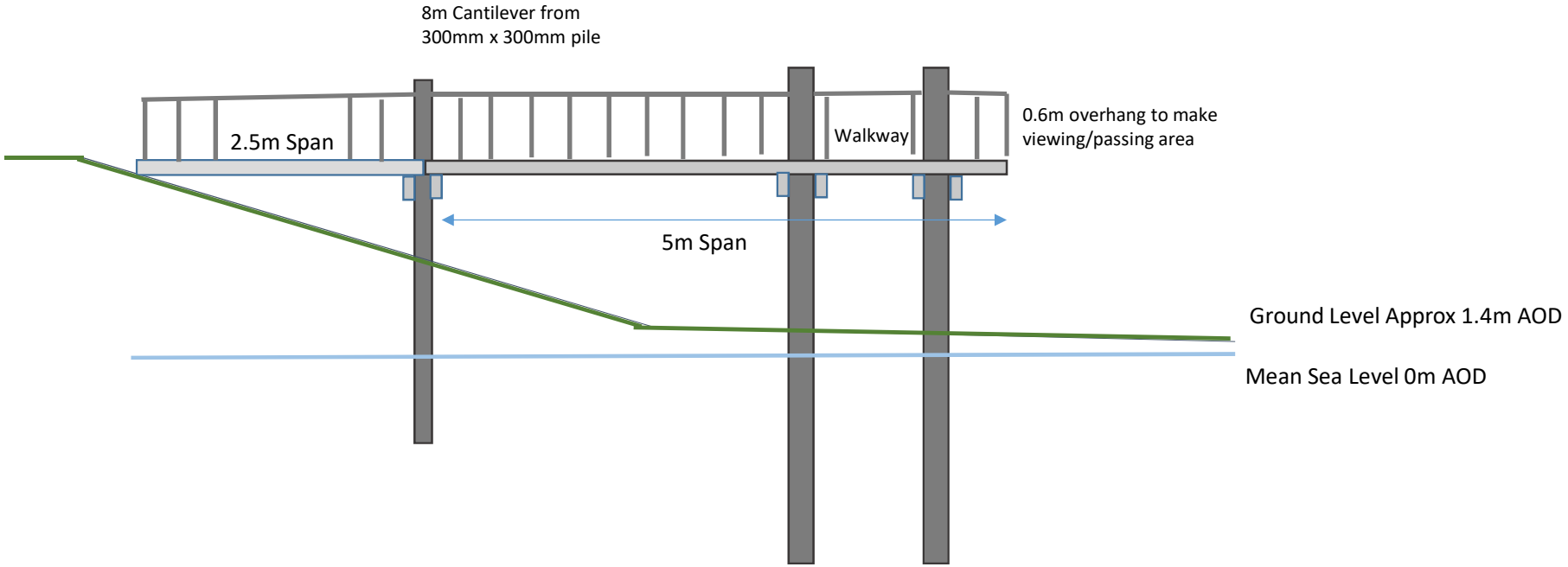
1. To make sure the centre piles are not in direct line of the current from water flowing through the breach.
2. The centre span section is installed after the breach is made in order to provide access for machinery to construct the breach.

Note: handrails will be fitted, but have been left off drawing for clarity.

Rafts consist of a collar of 300mmx300mm green heart sections bolted to the pilings. These in turn rest on a concrete bed to help distribute and stabilise the load.

Side View of Access Ramp

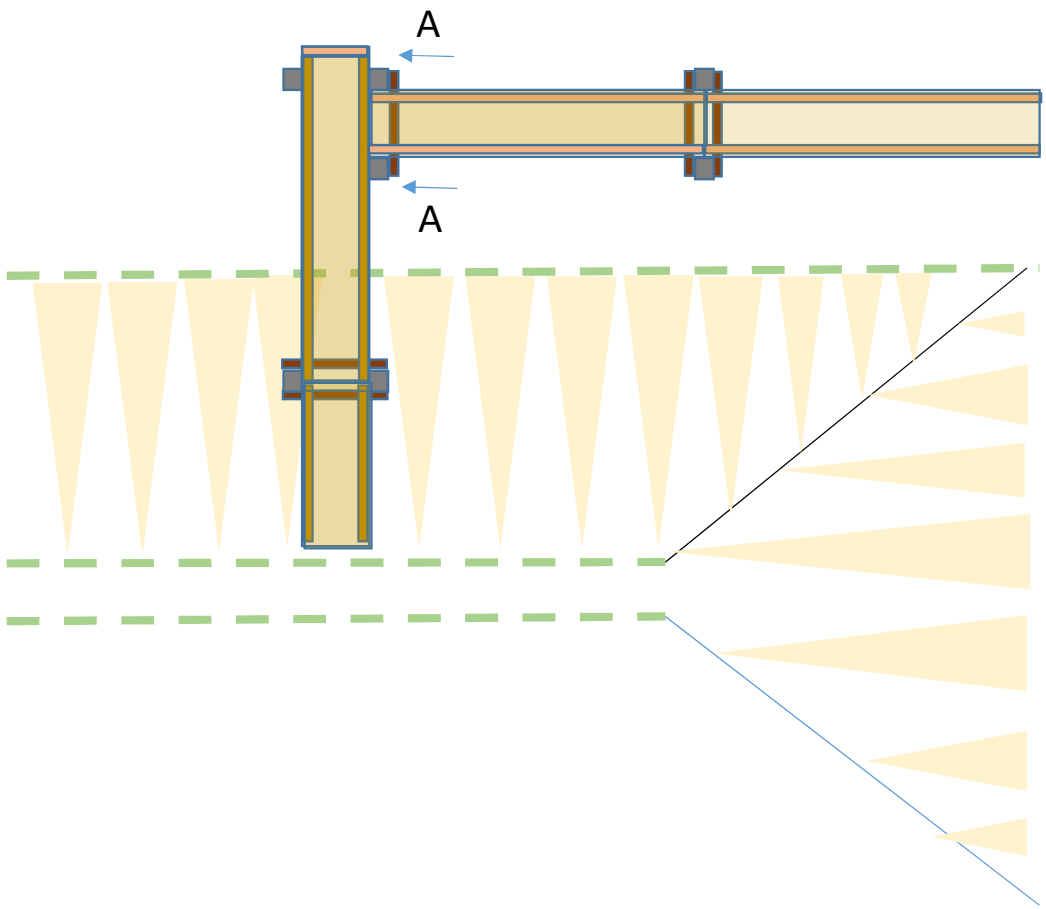
This is an indicative view not to scale to show how the spans are constructed, handrails and guards have been intentionally left off.



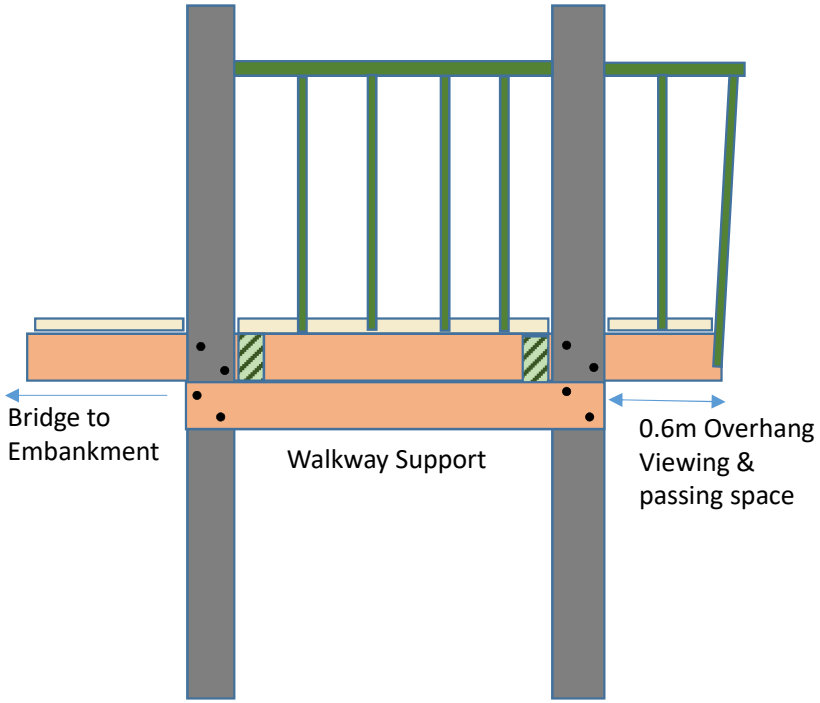
The access ramp runs out from the top of the embankment. It is set back about 5m from the edge of the breach.

At the right angle corner to the walkway span is a small extension which acts as both a viewing platform, and a space for people to pass.

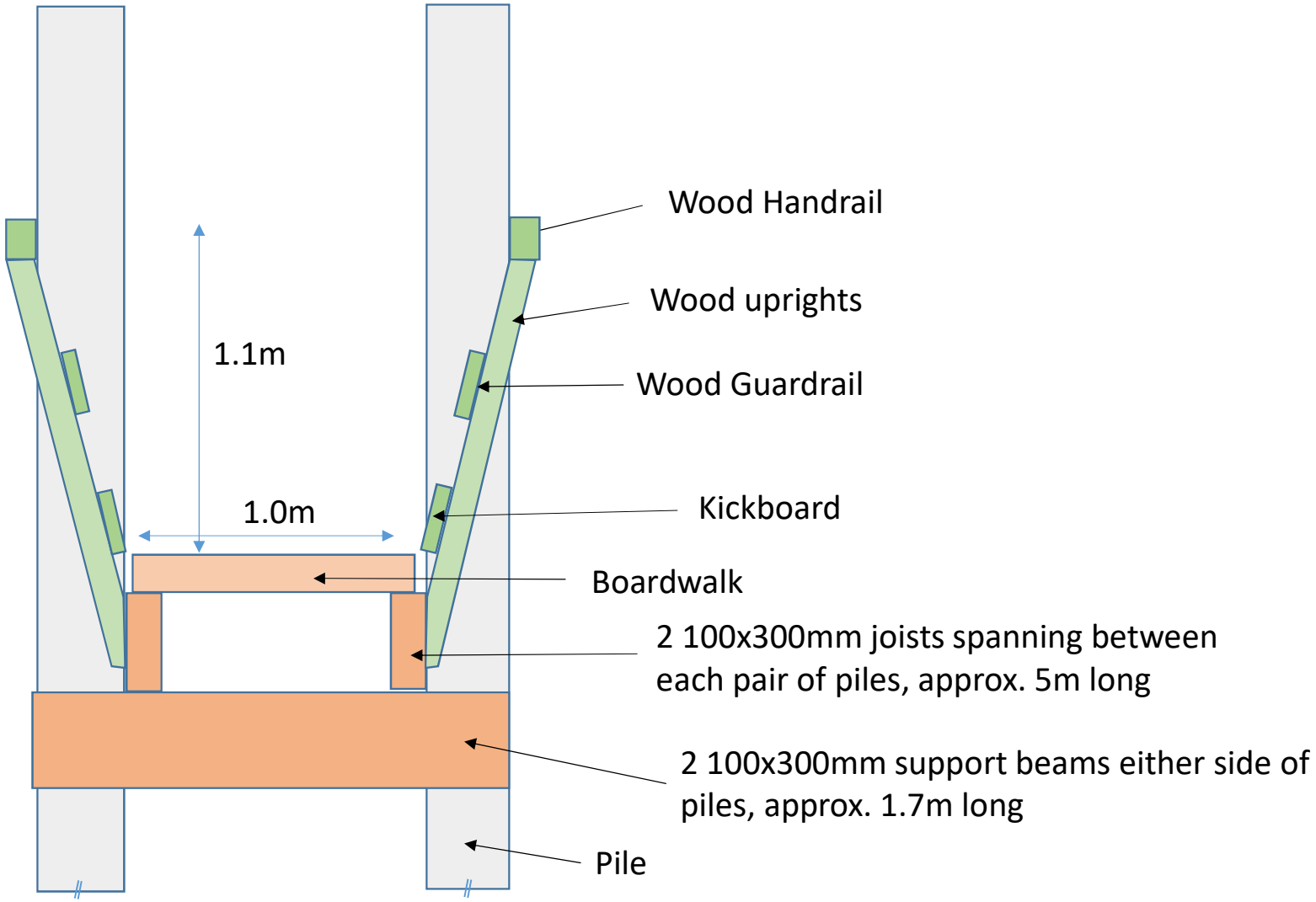
Plan View of Access Ramp



Side View at A - A

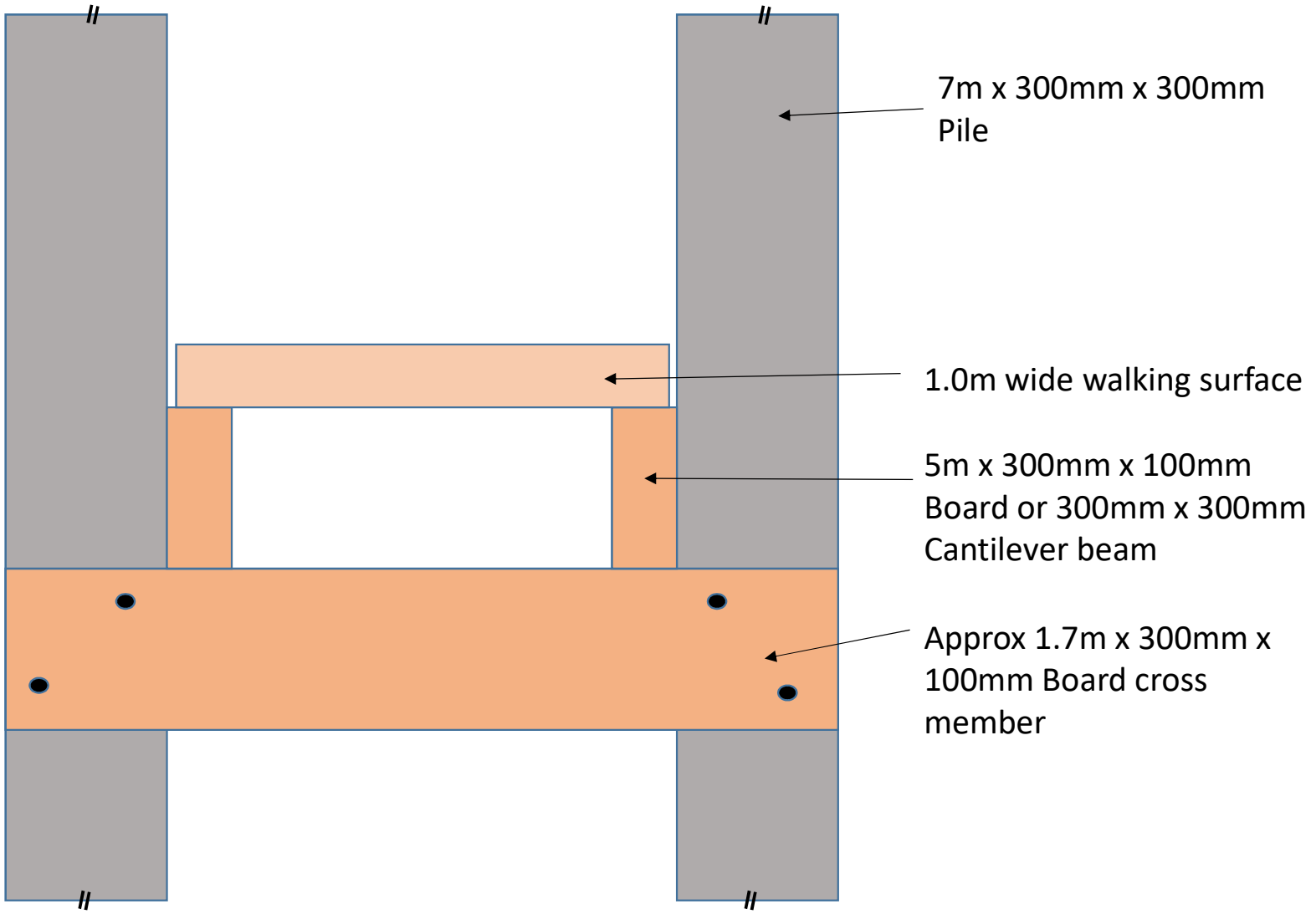


Cross Section of Support & Span.

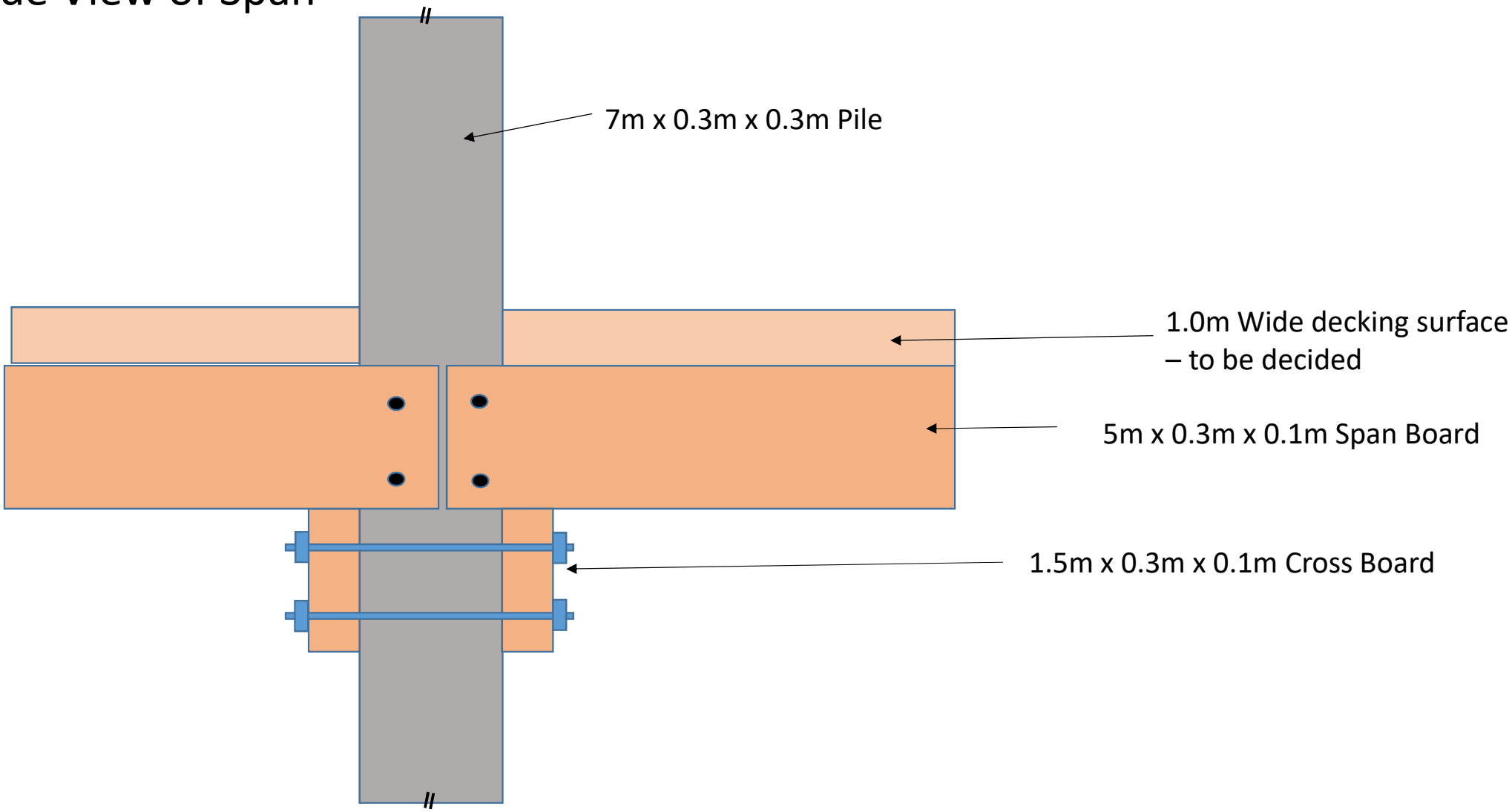


Cross Section of Support

Note: Piles may be more than 1m apart – diagram for guidance only



Side View of Span



Impression of what the walkway would look like (Graphic):

Proposed walkway shown in green.

Artist Impression of the Walkway:

Painted by local artist Ley Roberts

The view is looking to the south west, with Tuckermarsh cottages in the background.

In the foreground is the existing drainage ditch blocked off, with the main channel flowing in to the marsh to the right.

Map of Overall Scheme Showing Location of Breach and Walkway