

Retaining Wall Principal Inspection

FC-056-018-L

Bowling Harbour Retaining Wall

Bowling

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Asset Inspections Manager

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Inspection Report Summary

Data Record

Functional Location:	FC-056-018-L
Structure Name:	Bowling Harbour Retaining Wall
Location:	Bowling, Dunbartonshire
Grid Ref (to centre):	24503 67343
Structure Type :	Principal Retaining Wall
Date of Previous Inspection:	N/A
Previous Condition Grade:	N/A
Previous Consequence of Failure:	N/A
Previous Serviceability :	N/A
Comments:	No previous inspection

Structural Data

Retaining Wall Configuration :	Supporting canal channel
Construction Material:	Masonry
Length:	65 m
Maximum Retained Height:	4.3 m
Parapet Height:	0.55 m
Minimum Freeboard:	100 mm
Minimum Crest Width:	18 m
Pound Length:	200 m

Inspection Data

Inspector:	A Fletcher
Date of Inspection:	23/08/13
Weather Conditions:	Dry
Condition Grade:	E
Consequence of Failure:	1
Serviceability:	2
Structure Type:	Retaining Wall
Next PI due:	2023 (10 years)
Synopsis of Main Defects:	Open joints in wall with extensive voiding behind. Collapsed parapet wall. Vegetation damage. Missing masonry. Undercutting of base by tidal action. Damaged revetment at base of wall.

Summary of Recommended Works

P2:

Removal of vegetation from face of wall.

P3:

Parapet wall requires rebuilding.

Grouting works to voids and associated

repointing.

Repair to toe revetment.

Retaining Wall Inspection Report

Note

Bowling Harbour retaining wall was originally recorded as Embankment 52. Asset records have now been corrected for this.

Description

Bowling Harbour is located at Bowling, Dunbartonshire, and forms the western entrance to the Forth and Clyde Canal from the River Clyde. The harbour area was constructed between 1768 and 1790 and remodelled between 1846 and 1849. Lock 39 is the original entrance to Bowling and is considered to be of an early construction.

The retaining wall is located 18 m to the immediate south of Lock 39 and the Forth and Clyde Cana channel and retains a footpath and grassed area above the River Clyde. The retaining wall is a masonry gravity retaining wall, 65 m in length comprising an ashlar bullnose and a mix of ashlar and rubble wall, retaining a height of 4.3 m. The toe of the wall is protected by a rock revetment adjacent to a sand shingle tidal beach area. A low parapet wall of dressed stone 0.55m in height forms the crest. The ashlar bullnose is generally in a reasonable to poor condition. The remaining ashlar and rubble wall is in a poor to bad condition. A length of steel security fencing is located at the crest of the wall along a 40 m section. This fencing has been installed due to the low parapet wall causing a safety risk to the public and to prevent access to an area where the parapet and upper face has collapsed.

Geology

BGS Geoscience data shows that the area is underlain by Carboniferous Clyde Plateau Volcanic Formation basalts. This is overlain by recent River Clyde sedimentary deposits, post glacial raised beach deposits comprising sands and gravels above boulder clay. BGS borehole records for the area confirm the geology indicated by the map.

Defects

The toe of the retaining wall was originally protected by a revetment to prevent undercutting by the tidal action of the River Clyde. This has now been eroded along the majority of the wall with only the mass rock armour at the bullnose and sporadic patches of basaltic rock revetment remaining. Where missing the toe is undercut by up to 0.3 m with evidence of some voiding behind the facing blocks.

The pointing across the face of the wall is variable in condition and nature and it appears there have been numerous phases of patch repairs. Some areas of the face are devoid of pointing, with open joints typically on the upper face, a result of it being harder to access. The open jointing has allowed the development of voiding behind the facing blocks as tidal action has removed material. The voiding behind the facing blocks was proven to extend at

least 0.75 m. The crest above the wall is exhibiting an area of slight subsidence. This depression may be due to the loss of material from behind the retaining wall.

The face of the retaining wall is suffering from vegetation damage both from scrub and tree growth. This has damaged pointing and caused some masonry loss and deformation of the wall. The vegetation also prevents visual inspection during the summer months.

Condition Assessment

Overall the retaining wall is in a poor to bad condition with areas of missing revetment and tidal undercutting, poor or missing pointing, voiding behind the wall, vegetation damage and collapsing parapet wall.

The wall, although in bad condition, was not noted to be overturning or subsiding. Extensive open joints and masonry loss were however present.

It is considered that the Condition Grade of this wall is a grade E.

Consequence of Failure

A collapse of the wall would not affect the canal channel or Lock 39. It would however close the footpath and be problematic to fully repair due to the tidal nature of the River Clyde below. A Consequence of Failure 1 is deemed appropriate.

Recommendations

P2 - Remove vegetation from the face and crest of the wall - . It is recommended that the vegetation growing from the face and the crest of the retaining wall be removed. This is causing extensive damage to the upper face and, as the vegetation grows, will become progressively worse. The vegetation will require a herbicide treatment to ensure it does not regrow. Scaffolding may be required to access the upper face [REDACTED]

P3 – Retaining wall repairs- It is recommended that the remaining repairs required to the wall are undertaken as a single project. A programme of grout injection to repair the voiding behind the facing blocks, followed by replacing missing masonry, general repointing and rebuilding the collapsed parapet wall and replacing the revetment along the toe should be implemented. [REDACTED]



Retaining wall at low tide.



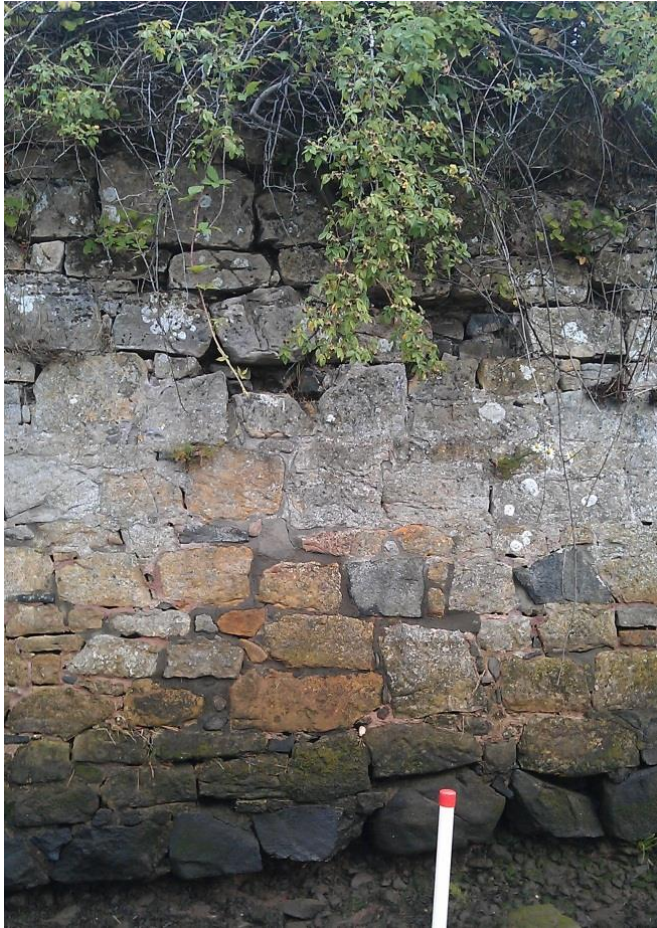
Vegetation damage occurring to the crest of the wall. Note storm debris at toe of the wall.



Voiding of 0.75 m behind facing blocks.



Vegetation damage to face.



Undercut toe of the retaining wall. Note missing masonry, patch repairs to pointing and vegetation growth.