



Neath Abbey Ironworks

Summary of Structural Investigation

for

The Friends of Neath Abbey Iron Company

Project Number: 9446

Date: April 2019

Rev: P3

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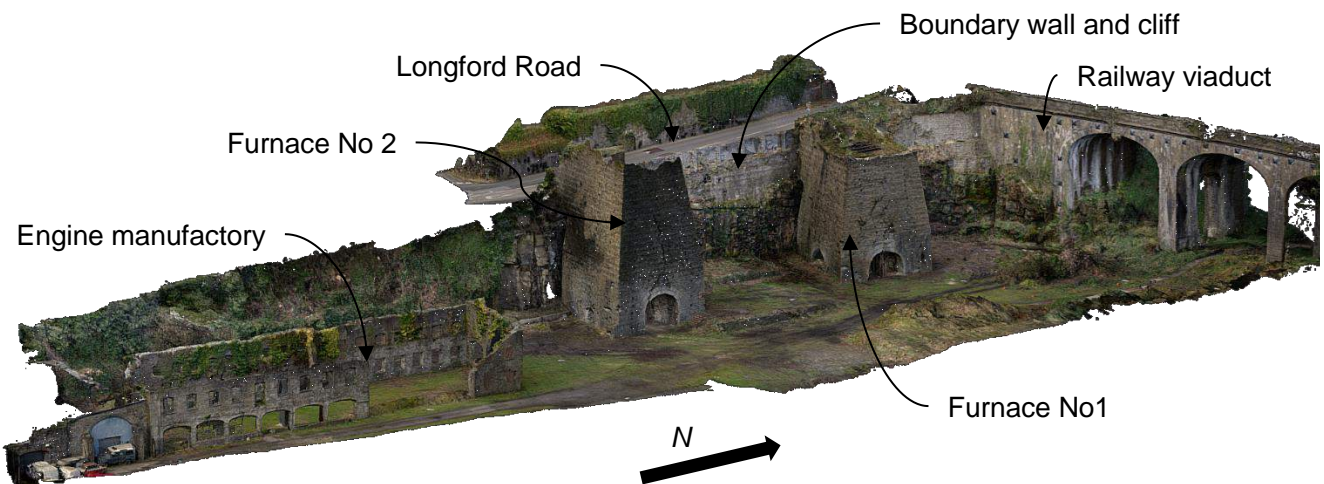
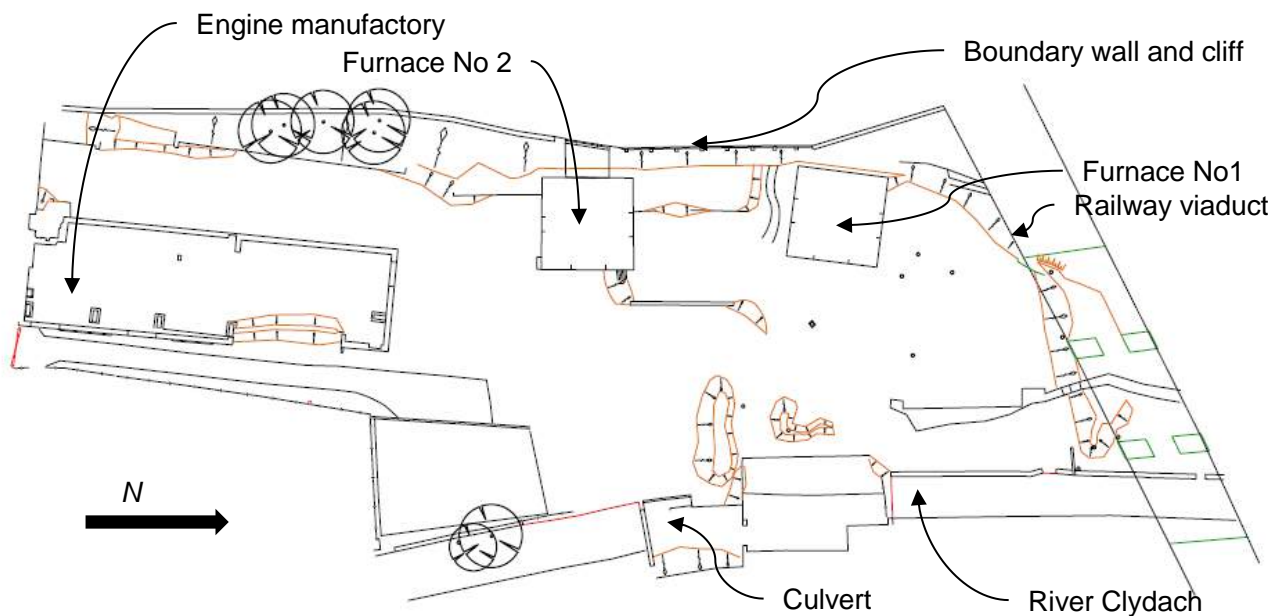
1.0 Executive Summary

- 1.1 Mann Williams were appointed to undertake a visual assessment of the 1795 Neath Abbey Ironworks assisted by iBex Technical Access by the Friends of Neath Abbey Iron Company (FNAICO). This was undertaken over three days from the 16th to 18th of April 2019. The site is a Scheduled Monument and the three main structures are separately listed.
- 1.2 The general condition of the two blast furnaces and engine manufactory are reasonable. However, the conclusion of the visual assessment shows a number of key risks which we recommend are addressed. These have been split into three main categories:
 - Risks relating to safety and welfare of people on and around the site.
 - Immediate risks to the stability of the monument
 - Longer term risks to the stability of the monument
- 1.3 Access to the site is presently via a gate that is controlled by the FNAICO and Neath Port Talbot Council. However, it was clear during our visit it is used as a thoroughfare and has issues with antisocial behaviour. The most significant risk to these users at ground level is items falling from elevated portions of the structure. This includes but is not limited to loose stonework and mortar at high level. During the inspection a number of areas of loose stonework were observed at high level, including the engine manufactory wall heads and the tops of the furnaces. We recommend this is mitigated in the short term by fencing the site to exclude unauthorised access and ensuring authorised site users wear suitable protective equipment (hard hats and steel toe capped boots). Furthermore we recommend a fence is added to the section of the river channel with no edge protection. In the long term the proposed consolidation works together with an ongoing programme of inspection, vegetation clearance and consolidation could make the site suitable for public access.
- 1.4 The other potential risk is to users of the Longford Rd to the west of the site. The road level is some 12m above the site level supported by a cliff and stone retaining wall and separated from the drop by a blockwork wall. We suspect the blockwork wall is insufficient to act as a vehicle restraint barrier and there is no indication of the drop beyond. Furthermore the stone retaining wall supports the highway and should be inspected on a regular basis as required for highway structures.
- 1.5 There are two areas where the monument is at significant risk of local collapse or instability, the north west corner of furnace 1 and the south west corner of the engine manufactory.
- 1.6 In the north west corner of furnace 1 a portion of the facing stone to the furnace and a portion of the adjacent boundary retaining wall have collapsed. The client informed us further material had been lost from this area during a minor earthquake in the area in 2018. There are substantial areas of stonework in poor condition, corroded metal lintels with poor bearing and exposed steep earth slopes. There is a substantial risk of further collapses in this area with the potential for relatively large sections of stonework facing to fall from a substantial height. In the short term we recommend the area below should not be accessed by anyone unless absolutely necessary. In the longer term we recommend a programme of stabilisation works to the furnace and boundary wall.
- 1.7 The south west corner of the engine manufactory appears to have been in significant distress during the works in 1995 with extensive stabilisation works undertaken. This area is again in poor condition primarily due to root action from large shrubs inside and outside the building. A prop has been installed to support a failed iron and timber beam embedded in this wall. There is a risk of further loss of facing material from this area and a less significant risk of local collapses. In the short term we recommend the area below should not be accessed by anyone unless absolutely necessary. In the longer term we recommend a programme of stabilisation works to the corner of the building to remove the significant stumps and reconsolidate the areas of loose stonework.

- 1.8 The longer term risks to stability of the monument are a combination of ongoing degradation mechanisms such as vegetation action and weathering causing loose masonry and degraded or missing pointing. Left unchecked these pose risks to site users, items falling from height, and a risk to the monument as portions deteriorate and collapse. It is not possible to halt these degradation mechanisms so we recommend an initial phase of repair works followed by an ongoing programme of clearing and treating vegetation as well as inspecting and consolidating masonry.

2.0 Introduction

- 2.1 Neath Abbey Ironworks was founded around 1795 by the Fox family and some friends. The existing site comprises two late 18th century blast furnaces, the engine manufactory building, a culvert, channel walls to the river Clydach and a boundary retaining wall and cliff. The site is a Scheduled Monument and the three main structures are separately listed.
- 2.2 Mann Williams were appointed to undertake a visual assessment of the standing structures on the site assisted by iBex Technical Access. This was undertaken over three days from the 16th to 18th of April 2019.
- 2.3 A previous phase of repair and stabilisation works was undertaken in 1995. During these works the masonry piers and associated timber beams in the engine manufactory and the steel frames to the top of the furnaces were constructed. During these works the two furnaces and engine manufactory were both extensively scaffolded.
- 2.4 Prior to our inspection the site was very heavily vegetated. A significant vegetation clearance was undertaken to clear the structures and we understand elements of this are ongoing.



3.0 Form of the Existing Structures

3.1 Furnaces No 1 & No 2 General

3.1.1 The faces of both furnaces are formed from well coursed rubble stone with large stone quoins particularly at low level. The raked walls are formed from distinct steps coinciding with shallower stone courses. There are vertical lines of putlog holes in all of the elevations. The stonework at the top of both furnaces is ruinous suggesting they were originally taller than the current remains.



3.1.2 There are arched openings at the base of the furnaces in some elevations. These vary in size and position but are all semi-circular with two courses of stone in the facing arches. The stone facing arches are formed from 450-500mm deep rectangular stones. Inside the facing arch the opening continues in the same profile perpendicular to the face for 2m. The walls and soffit then taper into a small opening to the furnace. These openings are blocked in furnace No 2. The tapered soffit is formed from corbeled stonework and a series of cast iron beams. These openings would have formed the hearth and tuyere pipe openings into the furnace.



3.1.3 The arched soffit between the west elevations and the cliff are also semi-circular but with one course of stone in the facing arches. The stone in the facing arch is slightly tapered in shape.



3.1.4 On top of both furnaces is a steel frame over a circular opening to the inside. The frame is formed from back to back steel channels and covered with a welded reinforcement mesh.



3.1.5 There are various scars and remnants of previous structures built into the furnaces. There are large cast iron brackets at about 4m above ground level and there are remains of arch springing on the east elevations of both furnaces.



3.2 Furnace No 1 Specifics

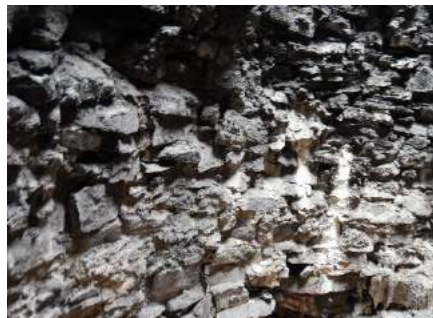
3.2.1 Blast furnace No 1 has a square base approximately 11.5m to a side with a 2m gap to the cliff from the west elevation. It is 14m high with walls which are vertical up to 4.5m above ground level and then slope in by 1.5m to the top. At 8m above ground level the west face arches to the adjacent cliff for the full width of the west elevation. At 3.5m above ground level there is a lower arch between the west face and the cliff, set back from the north and south elevations by 2m. The volume between the two arches appears to be filled. At the north end of the west elevation the set back of the lower arch is infilled with a half arch. The top of the furnace is roughly 1m above Longford Road with a further 1m step up above the west face.



3.2.2 At the base of the furnace there are arched openings in the east and south elevations and a rough opening in the north elevation. The south arched opening is 3m wide and 2.5m high. The east arched opening is 4.5m wide and 3m high. The north rough opening is 3m wide and 3.5m high.



3.2.3 Inside the furnace is a roughly cylindrical void approximately 4m in diameter accessible at ground level through the rough opening in the north elevation and visible through an opening in the top. The surface of this inside face is rough stonework with a potentially cementitious build-up on the inside. The void appears to taper slightly in towards the top but the exact shape was difficult to determine.



3.3 Furnace No 2 Specifics

3.3.1 Blast furnace No 2 has a square base approximately 11.5m to a side with a 1m gap to the cliff. It is 19m high with walls which are vertical up to 4.5m above ground level and then slope in by 2m to the top. At 10m above ground level the west face arches to the adjacent cliff. The top is roughly 6.5m above Longford Road with a lower section adjacent to the road.



3.3.2 At the base of the furnace there are arched openings in the east, north and south elevations. The south arched opening is 2m wide and 2m high, this is different to the other openings not being semi-circular and only having one course of stone in the facing arch. The east arched opening is 4.5m wide and 4m high. The north arched opening is 3m wide and 3.5m high.



3.3.3 At Longford Road level there is an arched opening in the west elevation, it is 2.5m wide and 3m high. This arch is not semi-circular and only is formed from brick with a 1 brick thick facing arch.



3.3.4 Inside the furnace is a cylindrical void approximately 4m in diameter only visible through an opening in the top. The surface of this inside face is brick.



3.4 Engine Manufactory

3.4.1 The engine manufactory was an L shaped two storey building to the south of the two furnaces. Only the northern rectangular portion of the original building is now part of the site and all that remains of this is the external walls. This is a 50x13m building on plan and 7m high to the tops of the walls. One 13m portion of the east wall is missing.

3.4.2 There is evidence the building was constructed in two phases (and the southern portion not included here formed a third phase). There is a change in width, a change of detailing and a line of quoin stones visible in the west façade to support this.

3.4.3 The walls are formed from well coursed rubble stone 600mm thick. This suggests two skins of facing stone with a core between. Many repairs and alterations have been inserted in brick including chimney flues and blocking openings.



3.4.4 The east elevation has a series of brick clad concrete piers with timber horizontal beams between them to the internal face. There is also one pier to the inside face of the north elevation. These were found to be similar to the drawn proposals from the 1995 works and are assumed to be providing lateral restraint to the elevations.



3.4.5 Window openings are generally at very regular centres. In the southern portion they are formed with through thickness stone arches, at ground level in the east elevation they are double width. In the northern portion they are formed with facing stone arches and internal brick relieving arches over timber lintels. These timber lintels were replaced in the 1995 works. Some of the openings have been bricked up.



4.0 Condition of the Existing Structures

4.1 Furnace No 1 and No2

4.1.1 Generally, the condition of both furnaces is similar with repetitive defects across multiple elevations. The two exceptions to this are the high level arch in the south elevation of furnace No 1 and the north west corner of furnace No 1. These three areas and the repetitive defects are each described below.

4.1.2 High Level Arch in the South Elevation of Furnace No 1

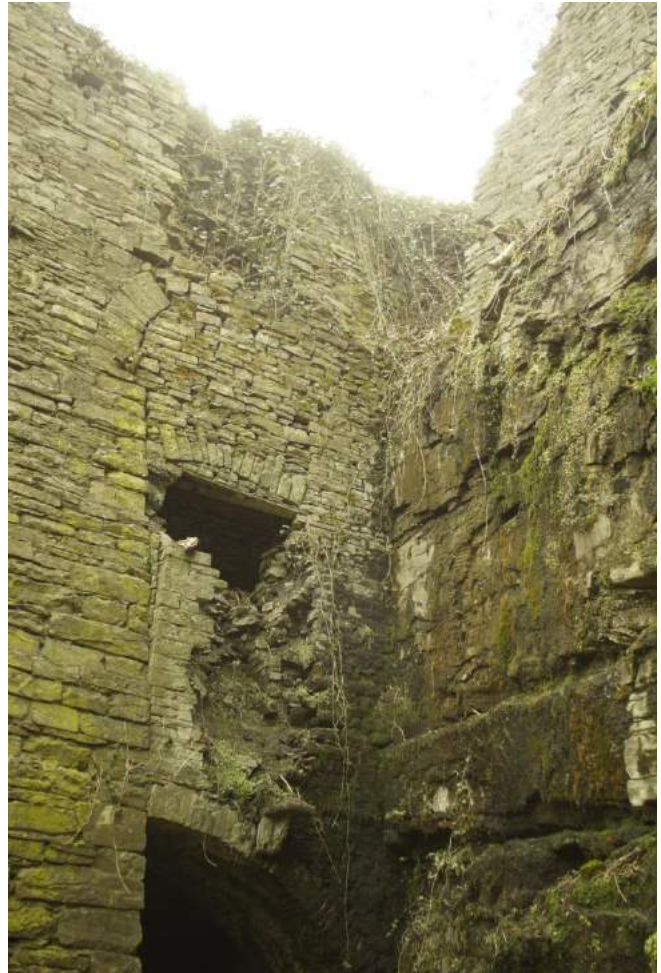
4.1.2.1 The west elevation of furnace No 1 has a high level arch between the furnace face and the cliff similar to furnace No 2. Unlike Furnace No 2 it has a second lower arch with infill between. On the south elevation this lower arch and infill is set back 1m from the face.

4.1.2.2 The infill wall between the two arches has failed historically leaving a rough masonry edge approximately halfway between the west elevation and cliff. Behind the open section a rough rubble slope is visible running up to the soffit of the upper arch. The slope has accumulated debris, such as dead vegetation, which is held at high level. Access to inspect this area was limited due to the narrow entrance.



4.1.3 North West Corner of Furnace No 1

4.1.3.1 The arches between the west elevation and the cliff are similar on the north elevation to the south. However, here there is an additional lower arch flush with the west elevation. This arch is distinct as it is half an arch, the soffit changes to a full arch approx. 1m back from the elevation matching the south side. The infill between the two arches is also flush with the north elevation but a second infill is visible behind approximately on the line of the full lower arch. There are a number of defects in this area showing a progression of failures and repairs.



4.1.3.2 The upper arch between the west elevation and the cliff has failed leaving a section of the facing stonework above unsupported which has also failed. From the remaining facing stone, the arch must have raked back from its springing. The infill wall runs through the line of the failed arch but vertically, so it is offset out from the original facing stone above. This infill is poorly constructed with little or no mortar and can be manually deflected.



4.1.3.3 Below this infill panel is a shallow stone arch and steel lintel over an opening. The lintel is in very poor condition and visibly deflected. Both bearings of the lintel are poor with very little contact to distressed and loose stonework.



- 4.1.3.4 Below the lintel there is a rough opening in the stonework with much loose and displaced stonework down to the lower arch. The masonry adjacent to the furnace is not tied into it, there is no evidence of the original opening and there is a rough slope of exposed corework or rubble.



- 4.1.3.5 At the top of the cliff is a stone retaining wall in line with the cliff. Adjacent to the furnace this has failed over a 2m length. The material from this collapse is visible at the base of the cliff. This has left a steep earth bank and a rough end of the stone retaining wall with some loose stones. The client informed us additional material had fallen from this area during a local minor earthquake in 2018.



4.1.4 Large Open Cracks

4.1.4.1 All faces of both furnaces (except the west faces) have evidence of significant vertical cracks near the centre of the elevations. In some places these are open up to 150mm and were measured as up to 800mm deep. These cracks are shown on undated historic photographs of the furnaces and there is evidence of partial repairs and rebuilding from the 1995 works.

4.1.4.2 FNAICO stated Jennifer Protheroe-Jones, curator National Museum Wales, told them the small brackets on the outside of both furnaces near the tops held wrought iron straps to reinforce and hold together the furnaces. This strengthens the argument for the cracks being caused during operation of the furnaces.



4.1.4.3 The cracks have promoted significant vegetation growth and are currently partially filled with roots, soil and other debris.

4.1.4.4 No evidence was observed to suggest these are actively moving and no structural causes were identified. This suggests the cracks are historic and potentially related to thermal movements from when the furnaces were active.



4.1.5 Vegetation and Stumps

4.1.5.1 All faces of both furnaces have the remains of significant vegetation cover. This has been cut back but a number of stumps remain including some very large stumps. It is likely these have significant root systems which probably penetrate deep into the core material of the furnace construction.

4.1.5.2 Generally, the vegetation growth has not visibly displaced the facing stonework with roots flattened and distorting through the joints. The main exception to this is the top section of the elevations where the vegetation growth in joints is prolific and the weight of stonework is less, here the vegetation has jacked the joints open and distorted the stonework.



4.1.6 Missing and Loose Pointing

- 4.1.6.1 Pointing to both furnaces is very variable. There are two ages of pointing clearly visible, one probably from the 1995 works and one older. During the 1995 works patchwork repointing appears to have been undertaken over the whole of each face with no clear patination as to what was repaired. This pointing is recessed slightly from the face of the stonework and is generally in reasonable condition. The older pointing is visible in some locations recessed from the face and generally friable. The remainder of the joints are open or filled with soil and vegetation. No cement pointing was noted to any of the elevations.



4.1.7 Loose and Missing Stonework

- 4.1.7.1 There are some isolated areas of missing and loose facing stonework across the furnace elevations. Generally, these relate to other defects such as vegetation and the large open cracks. The most significant area is the top half a metre of each elevation where the vegetation growth has loosened the stonework.

4.1.8 Ground level Arches Missing Keystones and Cracks

- 4.1.8.1 The two arched openings at ground level of furnace No1 have a historic defect at the keystone of the arch. The keystone is missing and has been replaced with stone or brick infill. The south elevation arch has missing stones at the crown the full depth but has only been infilled with a half brick skin in the facing arch. The east elevation arch has missing key stones in the facing arch and dropped stones at the crown of the arch for the remainder, these dropped stones have been propped with steel posts and the gap in the facing arch has been infilled with rubble stone.



- 4.1.8.2 Both of these arches and the furnace No2 east face arch have significant cracks which appear to be a continuation of the large open cracks in the elevation faces. These continue through the arch soffit and the side walls of the openings. The arch in the east elevation of furnace No 2 is the most significant, a portion of this facing arch has dropped significantly between two cracks.



4.2 Engine Manufactory

4.2.1 Generally the condition of the remaining structure of the engine manufactory is reasonable. There are a number of defects across the internal and external elevations and one area in the south west corner of particular distress.

4.2.2 South West Corner

4.2.2.1 In this corner of the building there is a re-entrant corner with a raised external area outside. There are a number of different defects in this area making it generally unstable.

4.2.2.2 On the inside face of the west elevation there are two significant tree stumps on a shelf two thirds of the height of the wall. These have caused significant distress and disturbance to the masonry below. There is a large section of loose facing stonework just below one of the stumps and an unstable arch over a recess below the other. This portion of wall has a large section of brick facing which is likely a historic remedial repair, it is not mentioned on the drawings for the 1995 works so may predate this. Above the ledge the masonry is generally stonework with an inserted brick flue, this appears to have been consolidated and is in reasonable condition.



4.2.2.3 The inside face of the south elevation is in less distress. There is an area of loose masonry at high level adjacent to one corner and a straight joint with no tying at the other corner. There is also a cast iron beam embedded in the wall which supports the arch in the west elevation. This beam has failed in the wall and its free end is supported on an Accro prop.



- 4.2.2.4 On the outside ground level is locally raised to just below the shelf on the internal west elevation. This is partially formed from an outcrop of bedrock but also has an arch in its face near ground level. Historic drawings show this to be the site of a waterwheel to power machinery within the engine manufactory and the arch is almost certainly part of a culvert to direct water. There is a large stump on the raised area.
- 4.2.2.5 The external walls are generally stone and roughly 500mm thick although as mentioned above there is a brick flue built into the west wall. This flue is for a section only half a brick thick. There are a number of sections of missing facing to the stone and brick sections, generally close to ground level.



4.2.3 North Elevation Arch Distress

- 4.2.3.1 The arch in the north elevation is formed from a stone facing arch on each side of the wall. There is an open joint between the two facing arches. This is suggestive of the two stonework skins moving apart.

4.2.4 Vegetation

- 4.2.4.1 All elevations have the remains of significant vegetation cover. This has been cut back but some ivy cover and a number of stumps remain including some very large stumps. It is likely these have significant root systems which probably penetrate deep into the core material of the wall construction.
- 4.2.4.2 The larger roots have caused distress to the surrounding stonework by displacing stones and working some of them loose.
- 4.2.4.3 One area of significant distress is the south elevation above the adjacent building. In this area the abundant vegetation growth has displaced and loosened a significant portion of the outer stone skin.



4.2.5 Brick Window Infill Panels

- 4.2.5.1 Where brick infill is present to the windows it does not appear to be tied into the surrounding stonework. Generally, this is not an issue but in locations where the windows have no head the brickwork can be manually deflected.



4.2.6 Missing and Loose Pointing

- 4.2.6.1 Generally, the condition of the pointing to all elevations of the manufactory is reasonable but variable. It is clear some repointing and rebuilding work was undertaken in the 1995 works. There are areas throughout the building where the pointing is missing or loose, the south end is slightly worse, but this is generally randomly distributed. No cement pointing was noted to any of the elevations.



4.2.7 Loose Stones in Window Arches

- 4.2.7.1 Some of the window arches have cracked and or loose stones. There does not appear to be any global distress to the arch or the surrounding masonry. This suggests the damage is the result of weathering or vegetation.



4.2.8 Loose Stonework at Wall Heads

- 4.2.8.1 It is clear the wall heads were consolidated as part of the 1995 works and generally they appear to be in good condition. There are a handful of loose stones on the wall head.

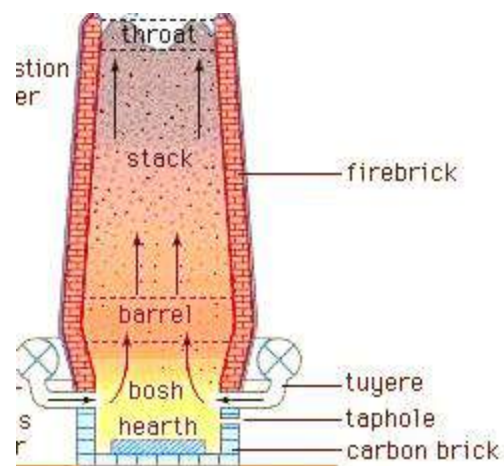


5.0 Discussion

5.1 Iron Blast Furnace Process

- 5.1.1 The following description of the blast furnace process has been developed from a number of online sources including the Encyclopaedia Britannica.
- 5.1.2 Blast furnaces produce pig iron from iron ore by the reducing action of carbon (supplied as coke) at a high temperature in the presence of a fluxing agent such as limestone. Ironmaking blast furnaces consist of several zones: a crucible-shaped hearth at the bottom of the furnace; an intermediate zone called a bosh between the hearth and the stack; a vertical shaft that extends from the bosh to the top of the furnace; and the furnace top, which contains a mechanism for charging the furnace. The furnace charge, or burden, of iron-bearing materials, coke, and flux descends through the shaft, where it is preheated and reacts with ascending reducing gases to produce liquid iron and slag that accumulate in the hearth. Air that has been preheated is blown into the furnace through multiple tuyeres located around the circumference of the furnace near the top of the hearth. The preheated air reacts vigorously with the preheated coke, resulting in both the formation of the reducing gas (carbon monoxide) that rises through the furnace, and a very high temperature of about 1,650° C that produces the liquid iron and slag.

- 5.1.3 The stack is kept full with alternating layers of coke, ore, and limestone admitted at the top during continuous operation. Coke is ignited at the bottom and burned rapidly with the forced air from the tuyeres. The iron oxides in the ore are chemically reduced to molten iron by carbon and carbon monoxide from the coke. The slag formed consists of the limestone flux, ash from the coke, and substances formed by the reaction of impurities in the ore with the flux; it floats in a molten state on the top of the molten iron. Hot gases rise from the combustion zone, heating fresh material in the stack and then passing out of the top of the furnace.



- 5.1.4 In Europe, the blast furnace developed gradually over the centuries from small furnaces operated by the Romans, in which charcoal was used for reducing ore to a semisolid mass of iron containing a relatively small amount of carbon and slag. The iron mass was then hammered to remove the slag, yielding wrought iron. Increases in the height of the furnace, coupled with mechanical bellows for introducing greater amounts of air into it, allowed the higher temperatures needed to produce a high-carbon iron known as cast, or pig, iron. This mode of production was used in central Europe by the mid-14th century and was introduced into England about 1500. Charcoal was the only furnace fuel until the 17th century, when the depletion of forests that provided the charcoal in England led to experiments with coke, which is produced from coal. Coke had been widely adopted for use in blast furnaces by the mid-18th century, and the principle of heating air before it entered the furnace was introduced in the early 19th century.
- 5.1.5 Contemporary evidence provided by FNAICO suggests the blast furnaces at Neath Abbey Ironworks would have produced 4 tonnes of iron per charge which would have taken in the order of twelve hours. The hot air for the blast was provided by a coal powered blowing engine.

5.2 Timeline of the site

5.2.1 The following is a brief timeline of the key dates associated with the site from archive data reviewed. Sources include Cadw listing description, Coflien description and photographs and archive information provided by the FNAICO.

- 1792 – Neath Abbey Ironworks founded
- 1793 – Blast furnaces built
- 1800-1810 – First phase of engine manufactory built
- 1818 – Joseph Price becomes managing partner of company
- 1823 – Third phase of engine manufactory built
- 1840 – Dam built across river Clydach upstream of works
- 1874 – Works taken over by local partnership
- 1886 – Works closed
- 1970s – Fire in north section of engine manufactory
- c1910 – Bridges over Longford rd still present
- 1984 – Earliest photograph showing large crack in No2 furnace
- 1995 – Consolidation Works
- 2004 – No2 furnace cleared at Longford rd level

5.3 Causes of Deterioration

5.3.1 The most significant and visual sign of distress is the large crack to the east elevation of furnace No2 and the similar but less significant cracks to the other elevations of both furnaces. From the observed evidence these cracks have been present for at least 35 years. The cracks have occurred roughly in the centre of each side where the construction is thinnest and are not visible on the inside of the furnaces. We believe these cracks are likely to have been caused by the temperature differential across the thickness of the masonry during cooling and heating of the furnace. In these conditions the inside would be hot, and the outside would be cool, expansion of the hot inside would generate tension forces in the outside face. If this is correct it is likely the cracks appeared relatively soon after construction and have been more or less stable for over 200 years.



1984 image of furnace No2



1994 Image of both furnaces



2019 Image of both furnaces

- 5.3.2 The other significant cause of distress is the action of vegetation growing on the structures. The stepped faces of the furnaces and the putlog holes in the faces make them particularly susceptible to vegetation growth by providing horizontal surfaces for soil and seeds to settle. The tops of the furnaces are also very susceptible to vegetation growth as they are horizontal surfaces with parapet walls to retain soil.
- 5.3.3 No evidence on site has been observed of any ground movements or subsidence impacting the structures.
- 5.3.4 Weathering and water action are also likely causing ongoing deterioration of the masonry structures. However, limited specific evidence of this was observed on site. This is probably attributable to the lack of cement pointing allowing the structures to breathe and the limited locations to hold water and thus promote freeze thaw action.

6.0 Conclusions

- 6.1 The general condition of the two blast furnaces and engine manufactory are reasonable. However, the conclusion of the visual assessment shows a number of key risks which we recommend are addressed. These have been split into three main categories:
- Risks relating to safety and welfare of people on and around the site.
 - Immediate risks to the stability of the monument
 - Longer term risks to the stability of the monument
- 6.2 Access to the site is presently via a gate that is controlled by the FNAICO and Neath Port Talbot Council. However, it was clear during our visit it is used as a thoroughfare and has issues with antisocial behaviour. The most significant risk to these users at ground level is items falling from elevated portions of the structure. This includes but is not limited to loose stonework and mortar at high level. During the inspection a number of areas of loose stonework were observed at high level, including the engine manufactory wall heads and the tops of the furnaces.
- 6.3 The other potential risk is to users of the Longford Rd to the west of the site. The road level is some 12m above the site level supported by a cliff and stone retaining wall and separated from the drop by a blockwork wall. We suspect the blockwork wall is insufficient to act as a vehicle restraint barrier and there is no indication of the drop beyond. Furthermore, the stone retaining wall supports the highway and should be inspected on a regular basis as required for highways structures.
- 6.4 There are two areas where the monument is at significant risk of local collapse or instability, the north west corner of furnace 1 and the south west corner of the engine manufactory.
- 6.5 In the north west corner of furnace 1 a portion of the facing stone to the furnace and a portion of the adjacent boundary retaining wall have collapsed. The client informed us further material had been lost from this area during a minor earthquake in the area in 2018. There are substantial areas of stonework in poor condition, corroded metal lintels with poor bearing and exposed steep earth slopes. There is a substantial risk of further collapses in this area with the potential for relatively large sections of stonework facing to fall from a substantial height.
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- 6.7 The longer-term risks to stability of the monument are a combination of ongoing degradation mechanisms such as vegetation action and weathering causing loose masonry and degraded or missing pointing. Left unchecked these pose risks to site users, items falling from height, and a risk to the monument as portions deteriorate and collapse. It is not possible to halt these degradation mechanisms, so we recommend an initial phase of repair works followed by an ongoing programme of clearing and treating vegetation as well as inspecting and consolidating masonry.

7.0 Recommendations

7.1 Based on the conclusions of this report we have prepared a recommended schedule of works for the site which has been priced by quantity surveyors Mildred Howells, this is presented in appendix A. These works have been split into three priority levels which are described below. In addition to this programme of works we also recommend an ongoing programme of inspection and maintenance works as described below.

7.2 Urgent Works

7.2.1 The proposed urgent works are to minimise the existing potential risks to site users including unauthorised site users. The most significant risk to these users at ground level is items falling from elevated portions of the structure.

7.2.2 We recommend this is mitigated in the short term by fencing the site to exclude unauthorised access and ensuring authorised site users wear suitable protective equipment (hard hats and steel toe caped boots). Furthermore, we recommend a fence is added to the section of the river channel with no edge protection.

7.2.3 In the long term the proposed consolidation works together with an ongoing programme of inspection, vegetation clearance and consolidation could make the site suitable for public access.

7.2.4 In order to mitigate the risks to users of Longford Road we recommend the local highways authority are made aware of the drop behind the blockwork wall, our reservations about this wall and the stone retaining wall supporting the highway.

7.3 Short Term Works

7.3.1 The proposed short-term works are to minimise the immediate risks to the monument. There are two areas where the monument is at significant risk of local collapse or instability, the north west corner of furnace No1 and the south west corner of the engine manufactory.

7.3.2 We recommend no one accesses these areas unless absolutely necessary and the existing herras fencing in the engine manufactory remains in place. Consideration should be given to providing signage and or barriers to make people aware of the risks.

7.3.3 We also recommend a programme of repair works is undertaken to these two areas to consolidate the monument.

7.3.4 We have developed an initial scheme for consolidating the monument which includes allowances for various methods of stabilisation. This is presented as sketches and a schedule in the attached schedule of works. These areas are complex with numerous defects in close proximity and their poor condition made inspection difficult. As a result of this, detailed repair proposals will need to be developed on site so they can be adapted to suit the effectiveness of repairs and interconnections of defects.

7.3.5 In addition to the complexity of the repair works safe access to these areas is also challenging and will need careful consideration. Scaffolding and propping proposals will need to be developed in conjunction with a contractor to ensure they understand the risks posed by the structure's current condition.

7.4 Long Term Works

7.4.1 The long-term works are to stabilise and repair the various minor defects in the monument which have arisen as a result of vegetation action and weathering to enhance its resistance to these effects going forward.

- 7.4.2 We recommend a programme of repair works is undertaken to consolidate the monument as set out in the attached schedule of works.
- 7.4.3 We have developed a schedule of repair works to be undertaken during this phase of works. This has been developed based on the findings of our visual inspection and are our recommendations for bringing the monument into a good state of repair. It is possible additional works may be required if further defects are found on site particularly if these works are delayed.
- 7.4.4 We acknowledge these works may well be undertaken in a phased manner to reduce capital expenditure.
- 7.4.5 These works include repointing, removal of vegetation (inc. large stumps), reconstruction of areas of loose stonework and consolidation of cracks.

7.5 Ongoing Inspection and Maintenance Regime

- 7.5.1 The most significant factors causing ongoing degradation of the monument is vegetation growth and weathering. As it is not possible to halt these processes, we recommend a programme of ongoing inspection and maintenance.
- 7.5.2 The most critical activity to protect the monument is control of vegetation growing in and around the masonry structures. We recommend a programme of spraying, cutting back and poisoning is developed over a number of years to find an effective method of keeping the structures free of damaging vegetation.
- 7.5.3 As a large masonry structure, the potential for risks of items falling from height developing over time is substantial. In order to mitigate this, we recommend the structure is inspected on a regular basis. Similar to bridges and other highways structures we would suggest a system of principal and general inspections. General inspections could be carried out annually by a member of the FNAICO from ground level with binoculars, this would be to assess vegetation growth, identify any loose material at high level and any developing defects. Principal inspections could be every five to ten years or as required following general inspections and would be similar in nature to the inspection we have recently carried out.

Appendix A – Priced Schedule of Works



Neath Abbey Ironworks

Schedule of Works

Project Number:	9446
Date:	June 2019
Rev:	P1

Content/Quality Assurance

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- 2.0 Urgent Works**
 - 2.1 General Site
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- 3.0 Short Term Works**
 - 3.1 General Site
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- 4.0 LongTerm Works**
 - 4.1 General Site
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 - 4.5 General Items, Allowances etc

Document issue details:

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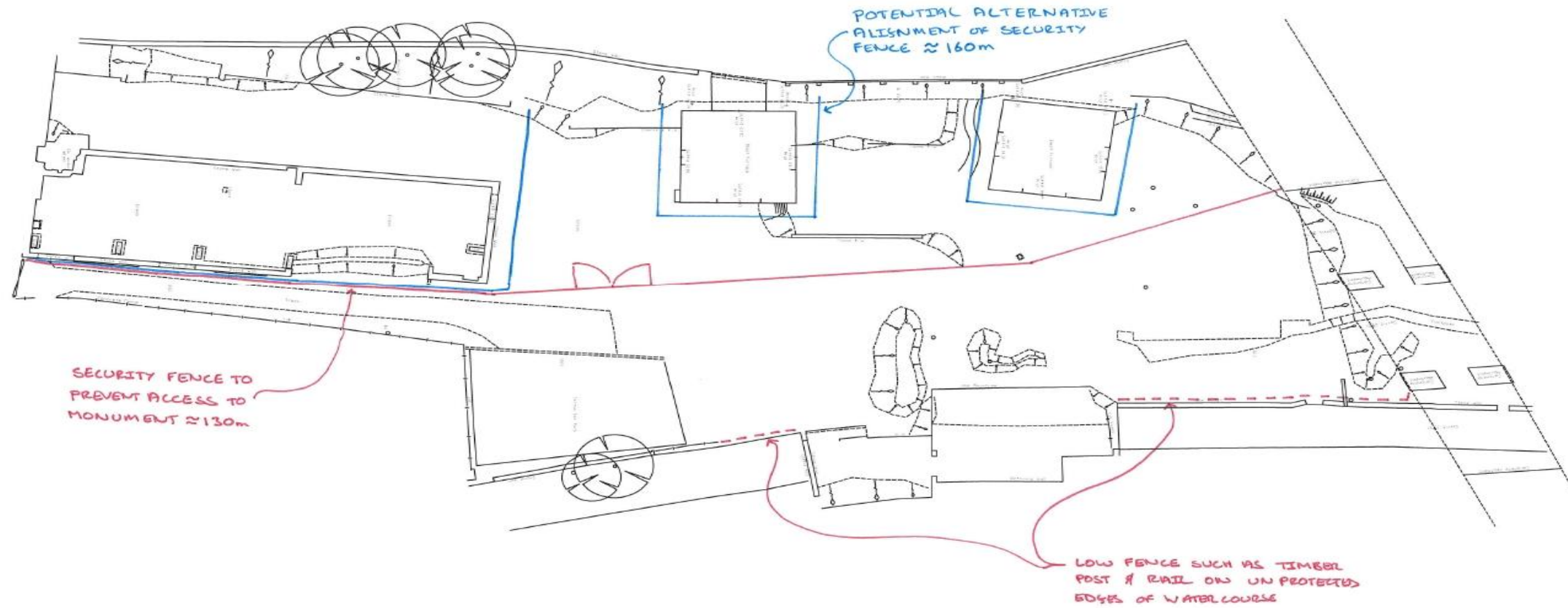
Neath Abbey Ironworks		General Notes	
Item	Description	Works	Product Examples
Scheduled Ancient Monument			
	This structure is a scheduled ancient monument and as such no works should be undertaken other than with scheduled monument consent.		
	During all works care must be taken to avoid unnecessary disturbances to the monument.		
Mechanical Tools			
	All masonry works to be undertaken with hand tools only.		
Lime Mortar			
	All masonry works to be undertaken with lime mortar		
	Appearance including colour and finishing to match surrounding unless noted otherwise		
	Trial area to be undertaken to agree mortar appearance and joint finish for each variation		
	Lime mortar to be NHL 3.5 with sand and fines as required for desired appearance unless noted otherwise		
Small Stumps			
	Stumps in masonry with little or no displacement to masonry and minor anticipated root structure.	Cut off stump and any visible roots at place of masonry and chase out of joists to 100mm depth.	
		Avoid removing sound pointing and stone work wherever possible.	
		Repoint patches as piecemeal repointing note.	
Medium Stumps			
	Stumps in masonry over 25mm Ø with little or no displacement to masonry but significant anticipated root structure.	Cut off stump as close to wall as possible leaving 40mm length 25mm Ø.	
		Treat with poison plugs such as Eco Plug Max.	https://www.frjonesandson.co.uk/products/ecoplug-max-100-pack/?gclid=CjwKCAjwwtTmBRBqEiwA-b6c_7nqI46yHY0z57xyFb51Z6jr8mhvTm8Fp6dU0ja-lfDdJOVSWg6ZYxoC_IeQAvD_BwE
		12 months later cut off and repoint as small stump.	
Dismantle and Rebuild Masonry			
	Loose sections of masonry not possible to consolidate in situ.	Section to be photographed, stones / bricks numbered & recorded.	
		Loose stones / bricks to be carefully dismantled propping masonry above as required.	
		Loose core work & deleterious materials such as roots to be removed as far as possible without removing more face work.	
		Core & face work to be rebuilt in lime mortar. Face work to match existing with stone / bricks in same location as existing but made true & straight.	
Piecemeal Repointing			
	Sections of generally sound masonry with a proportion of missing or loose pointing.	Loose pointing and any accumulated materials to be removed by hand / brush.	
		Any visible roots to be removed / cut back to the face of good pointing.	
		Avoid removing sound pointing wherever possible	
		Repoint in lime mortar, joint finish to match surrounding masonry, typically reassessed 10-25mm.	
Piecemeal Recessed Repointing			
	Sections of blast furnaces with generally sound masonry with a proportion of missing or loose pointing.	Loose pointing and any accumulated materials to be removed by hand / brush to maximum depth of 100mm.	
		Any visible roots to be removed / cut back to the face of good pointing.	
		Avoid removing sound pointing wherever possible	

Neath Abbey Ironworks		General Notes	
Item	Description	Works	Product Examples
		If resulting joint is deeper than 50mm repoint in lime mortar, joint finish to be reassessed by 35mm.	
Ivy Cover			
	At the time of the inspection the majority of the masonry was clear of vegetation however some Ivy cover remained.	Where Ivy is noted for removal consideration should be given to potential defects obscured during the inspection.	
		These should be allowed for even if Ivy clearance works are undertaken by the client under a separate contract	

Neath Abbey Ironworks

Urgent Works

Location	Item	Description	Product Example	Height / Anticipated Access	No	Units	Unit Cost	Total Cost
General Site								
	Fencing	Security fence to prevent access to monument. Spec to be developed with client allow for 1.2m high steel mesh fence with 1 no vehicle gate. Allow for tie in to masonry at both ends.	https://firstfence.co.uk/1-2m-high-safe-top-mesh	All at ground level	130	m	56.00	7,280.00
		Vehicle gate			1	nr	500.00	500.00
	Fencing	Post and rail fence to provide edge protection to river	https://www.jacksons-fencing.co.uk/fencing/agricultural-fencing/post-and-rail-nailed	All at ground level	40	m	46.00	1,840.00



Engine Manufactory									
	NO WORKS								
Furnace 1									
	No Works								
Furnace 2									
	No works								
General Items, Allowances and Contingency									
ST_G_2	Minor vegetation and debris	Area to be cleared of all vegetation (ivy and brambles) and debris	NA			5	m ²	15.00	75.00
ST_G_7	Large stumps at ground level	Large stumps away from buildings / structures on line of proposed fence to be dug out and hole filled with general granular fill to match surrounding ground levels.	NA			2	No	290.00	580.00
ST_G_8	General contingency		NA				%	see summary	

Neath Abbey Ironworks

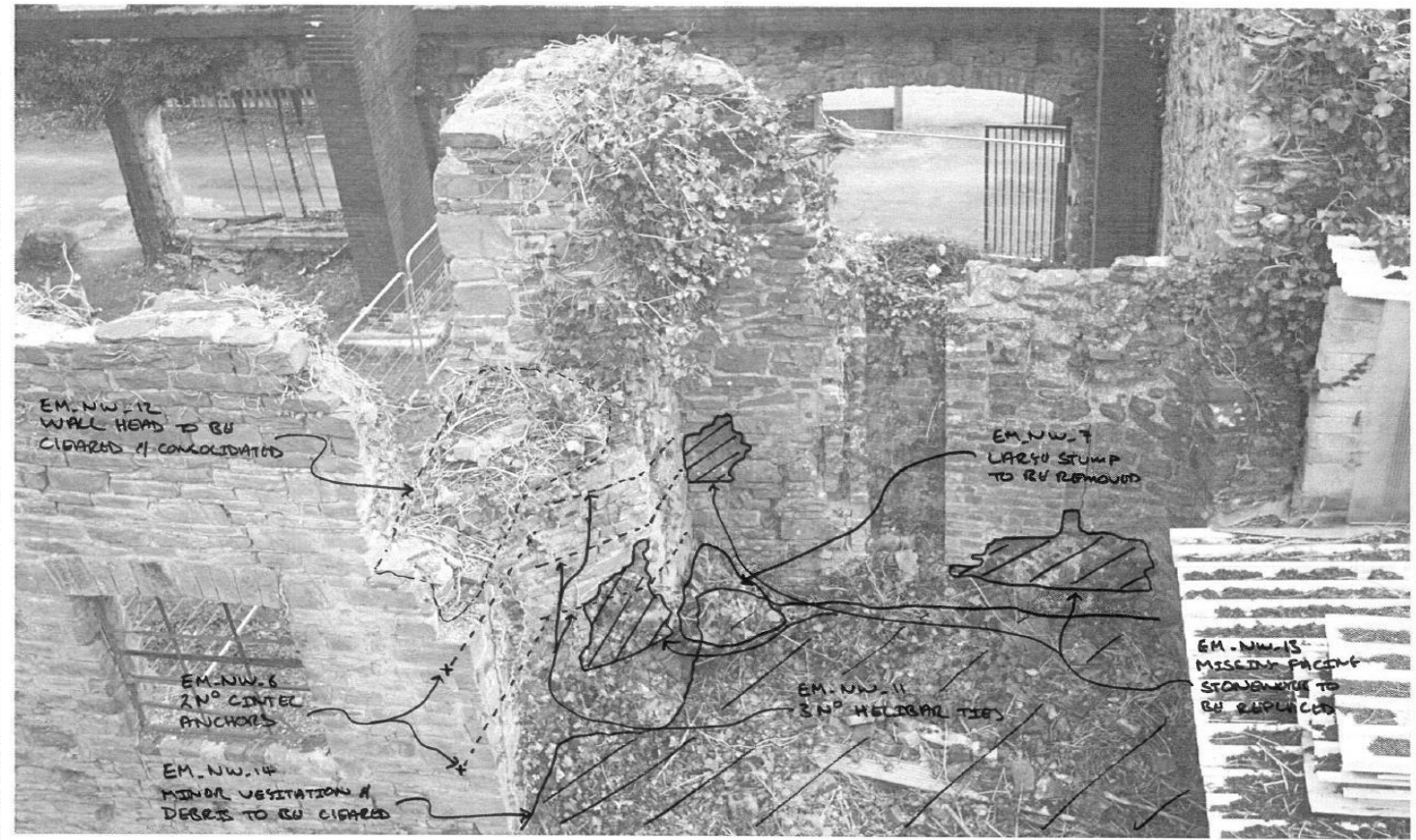
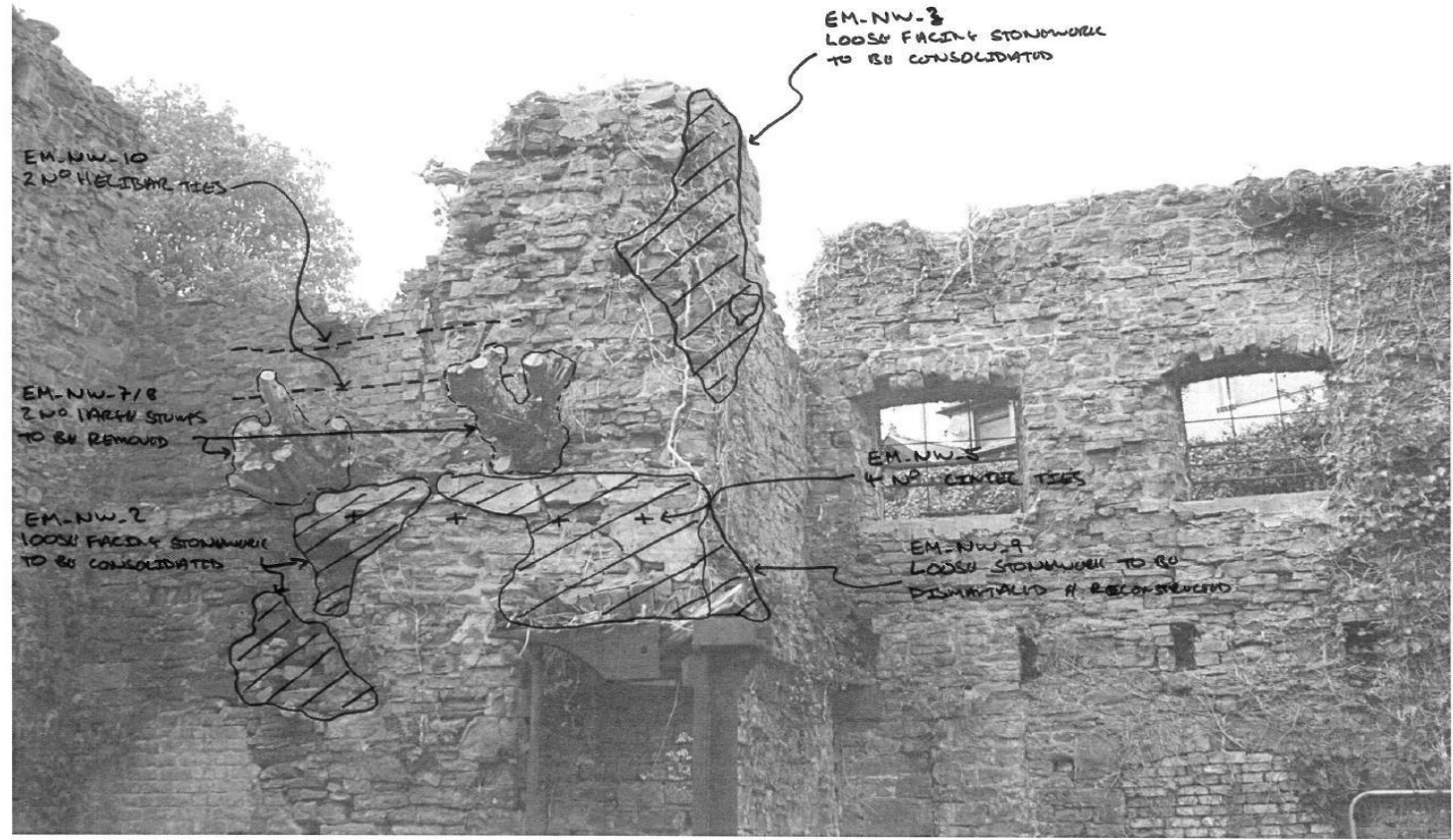
Short Term Works

Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost	
General Site										
	No Works									
Engine Manufactory										
	North West									
	Note	The works in this area are complex and the remains of the structure are in poor condition. As a result the proposed works are an initial estimate of the required repairs and will need to be developed on site as the works progress. The condition of this area is poor enough that additional degradation is likely to occur before works can commence. Sequencing of works and temporary works to enable safe working will also be significant considerations and may require works additional to those scheduled.								
EM_NW_1	Access	Traditional scaffold either side of wall founded at ground level and on high level area and tied over head of wall and through adjacent windows.	NA	7.5m	NA	1	No	6,000.00	6,000.00	
EM_NW_2	Areas of loose facing stone	To be consolidated by propping stonework above removing loose stones and rebedding with lime mortar. Some reworking of core material behind may be required.	NA	7.5m	As EM_NW_1	2	m ²	950.00	1,900.00	
EM_NW_3				2m	NA	1	m ²	1,200.00	1,200.00	
EM_NW_4	Temporary consolidation anchors	12mm dia 500mm long Cintec anchors to stitch existing masonry during consolidation works	https://cintec.com/	up to 7.5m	As EM_NW_1	10	No	140.00	1,400.00	
EM_NW_5	Consolidation anchors	16mm dia 1m long Cintec anchors to stitch existing masonry	https://cintec.com/	4m	As EM_NW_1	5	No	280.00	1,400.00	
EM_NW_6		16mm dia 1.5m long Cintec anchors to stitch existing masonry		5m		2	No	420.00	840.00	
EM_NW_7	Large stump	large stump to be removed roots cut back to face of sound masonry and roots larger than 25mm to be treated with poison plugs	https://www.frjonesandson.co.uk/products/ecoplug-max-100-pack/?gclid=CjwKCAjwwtTmBRBqEiwAb6c_7nql46yHY0z57xyFb51Z6jr8mhvTm8Fp6dU0ja-IfDdJOVSWg6ZYxoC_IEQAvD_BwE	4m	As EM_NW_1	3	No	125.00	375.00	
EM_NW_8		Stonework to be dismantled and rebuilt as general note								NA
EM_NW_9	Areas of loose and displaced stonework	To be dismantled and reconstructed as general note	NA	4m	As EM_NW_1	4	m ²	700.00	2,800.00	
EM_NW_10	Masonry tying	2m long 6mm dia stainless steel bars resin fixed into stonework joints	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/	5m	As EM_NW_1	2	No	140.00	280.00	
EM_NW_11				5m	As EM_NW_1	3	No	140.00	420.00	
EM_NW_12	Wall head clearance	Wall head to be cleared of vegetation and debris, loose stones to be rebedded in lime mortar	NA	6m	As EM_NW_1	2	m	420.00	840.00	
EM_NW_13	Missing section of facing stone	To be rebuilt as general note to match surrounding stonework. Details and geometry to be confirmed	NA	5m	As EM_NW_1	2.5	m ²	800.00	2,000.00	
EM_NW_14	Minor vegetation and debris	Area to be cleared of all vegetation (ivy and brambles) and debris	NA	4m	As EM_NW_1	20	m ²	15.00	300.00	

Neath Abbey Ironworks

Short Term Works

Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
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Neath Abbey Ironworks

Short Term Works

Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
Furnace 1									
	North West Corner								
	Note	The works in this area are complex, the remains of the structure are in poor condition and access for inspection is very limited. As a result the proposed works are an initial estimate of the required repairs and will need to be developed on site as the works progress. The condition of this area is poor enough that additional degradation is likely to occur before works can commence. Sequencing of works and temporary works to enable safe working will also be significant considerations and may require works additional to those scheduled.							
F1_NW_1	Access	Traditional scaffold with access tower on level ground to the east of works, standards in west elevation tunnel and transfer level between fixed to cliff face. Scaffold for works constructed off transfer level full height of furnace. Propping to various areas of stonework to be provided from scaffold.	NA	14m	NA	1	P Sum	15,000.00	15,000.00
F1_NW_2	Missing section of facing stone	To be rebuilt as general note to match surrounding stonework. Details and geometry to be confirmed	NA	10 to 14m	As F1_NW_1	5.5	m ²	750.00	4,125.00
F1_NW_3		To be tied to surrounding stonework with 2m long 6mm dia stainless steel bars resin fixed into stonework joints either side of interface	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/			6	No	560.00	3,360.00
F1_NW_4		200x200x16mm stainless steel angle lintel 2m long to support new facing stonework	NA			1	No	2,000.00	2,000.00
F1_NW_5	Loose / out of plumb stonework	To be dismantled and reconstructed as general note	NA	10m	As F1_NW_1	2	m ²	700.00	1,400.00
F1_NW_6		To be tied to surrounding stonework with 2m long 6mm dia stainless steel bars resin fixed into stonework joints either side of interface	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/			2	No	560.00	1,120.00
F1_NW_7	Opening with deteriorated steel lintel	To be propped from scaffold as required to facilitate works	NA	7.5m	As F1_NW_1	5	No	100.00	500.00
F1_NW_8		New precast concrete lintels to suit wall width and support existing steel lintel	https://www.naylor.co.uk/catalogue/air-faced-lintels/	7.5m		2	No	1,750.00	3,500.00
F1_NW_9		Carefully dismantle and reconstruct stonework at bearings	NA	7.5m		0.5	m ²	750.00	375.00
F1_NW_10		Piece in new stonework at bearings to provide min 100mm bearing to lintels	NA	7.5m		0.5	m ²	750.00	375.00
F1_NW_11		16mm dia 1.5m long Cintec anchors to stitch existing masonry below opening to main furnace elevation	https://cintec.com/	5 to 6m		2	No	420.00	840.00
F1_NW_12		Earth slope in opening to be cleared of debris and soil	NA	5 to 7.5m		1.5	m ³	100.00	150.00
F1_NW_13	High level stone retaining wall and slope	carefully dismantle and reconstruct loose stonework at high level.	NA	11 to 14m	As F1_NW_1	1	m ²	750.00	750.00
F1_NW_14		Stabilise wall and slope with ground anchors such as platypus S6 anchors or soil nails installed by hand	https://www.platipus-anchors.com/#			15	No	750.00	11,250.00
F1_NW_15		Clear slope of vegetation	NA			4	m ²	15.00	60.00

Neath Abbey Ironworks

Short Term Works

Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost

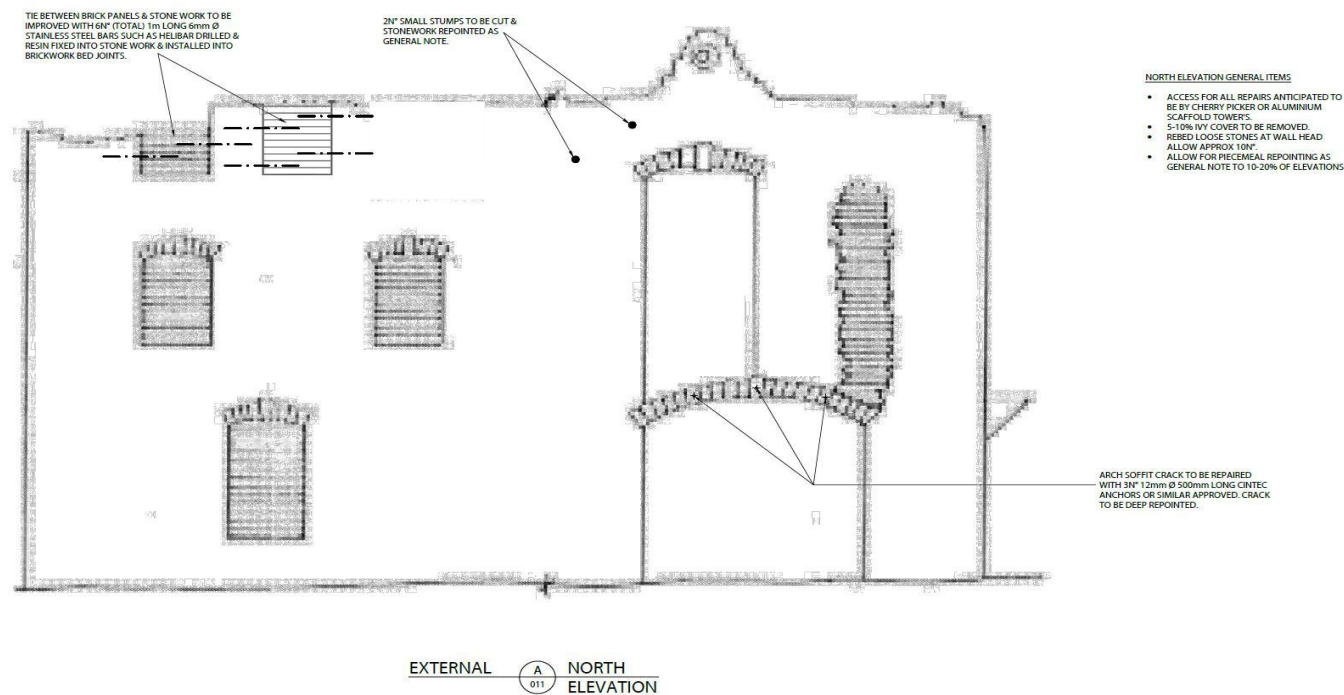
Furnace 2									
	No Works								

General Items, Allowances and Contingency									
ST_G_1	Loose / displaced stone	Stone to be rebbed and pinned with 500mm long 12mm dia stainless steel bars grouted in	NA			5	No	150.00	750.00
ST_G_2	Minor vegetation and debris	Area to be cleared of all vegetation (ivy and brambles) and debris	NA			15	m ²	15.00	225.00
ST_G_3	General minor stitching	Crack to be stitched with 2m long 6mm dia stainless steel bars resin fixed into stonework joints either side of crack	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/			5	No	140.00	700.00
ST_G_4	General significant stitching	To be stitched with 16mm dia 2.5m long Cintec anchors	https://cintec.com/			2	No	700.00	1,400.00
ST_G_5	General pinning	Loose stones to be pined with 500mm long 12mm dia stainless steel bars grouted in	NA			5	No	150.00	750.00
ST_G_6	Repointing	Allowance for piecemeal recessed repointing as general note	NA			15	m ²	150.00	2,250.00
ST_G_7	Small stumps	Small stumps to be cut out and stonework repointed as general note	NA			5	No	100.00	500.00
ST_G_8	General contingency		NA				%	see summary	

Neath Abbey Ironworks

Long Term Works

Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
General Site									
	No Works								
Engine Manufactory									
External North Elevation									
EM_EN_1	Improve tying to brick panels	1m long 6mm dia stainless steel bars resin fixed into stonework and installed in brick joints	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/	7m	Cherry picker	6	No	70.00	420.00
EM_EN_2	Small stumps	Small stumps to be cut out and stonework repointed as general note	NA	7m	Cherry picker	2	No	100.00	200.00
EM_EN_3	Arch soffit crack repair	12mm dia 500mm long Cintec anchors	https://cintec.com/	3m	Scaffold tower	3	No	140.00	420.00
EM_EN_4		Repoint crack	NA			3.5	m		30.00
EM_EN_5	Ivy cover	Remove ivy and make allowance for potential defects obscured by ivy at time of inspection	NA	Up to 7m	Cherry picker	9	m ²	15.00	135.00
		Associated repairs				1	P Sum	2,000.00	2,000.00
EM_EN_6	Loose stones	Rebed loose stone at wall head	NA	7.5m	Cherry picker	10	No	35.00	350.00
EM_EN_7	Repointing	Allowance for piecemeal repointing as general note	NA	Up to 7m	Combination of cherry picker and scaffold tower	18	m ²	75.00	1,350.00
		Access Provision				1	Item	1,500.00	1,500.00

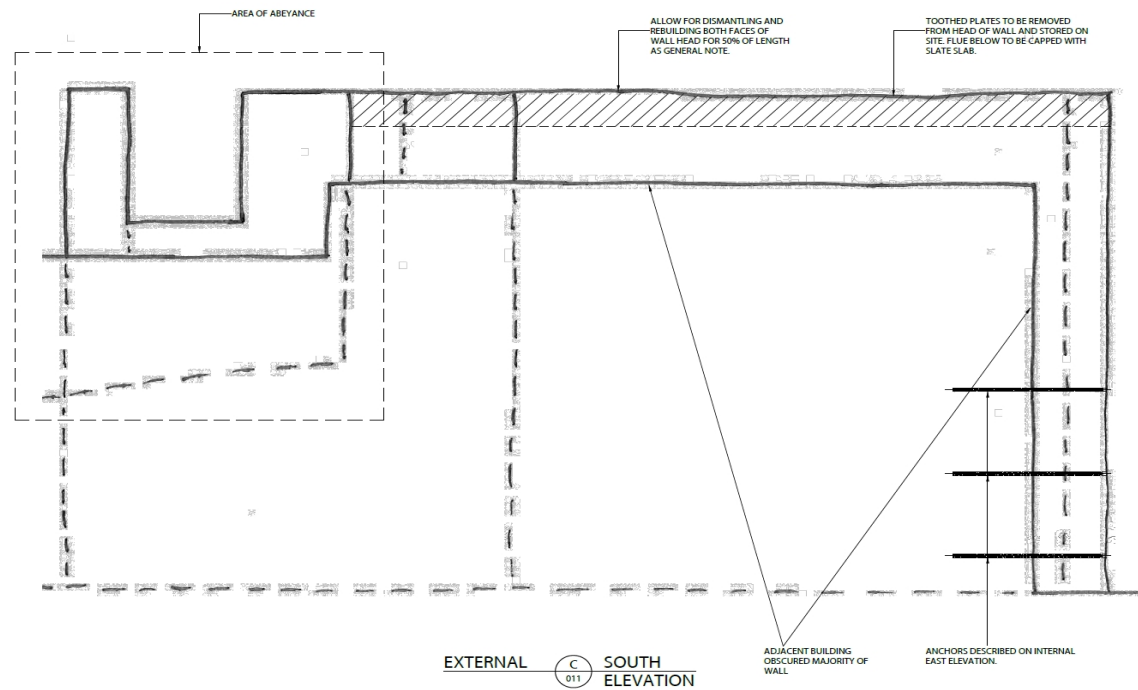


External South Elevation									
EM_ES_1	Rebuild wall head	Both faces of stonework to be dismantled and rebuilt as general note	NA	7.5m	Cherry picker	5	m ²	1,400.00	7,000.00
EM_ES_2	Chimney cap	Toothed plates to be removed from wall head and stored on site	NA	7.5m	Cherry picker	2	No	100.00	200.00
EM_ES_3		Flue to be capped with slate slab	NA	7.5m		1	No	300.00	300.00

Neath Abbey Ironworks

Long Term Works

Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
EM_ES_4	Ivy cover	Remove ivy and make allowance for potential defects obscured by ivy at time of inspection	NA	Up to 7.5m	Cherry picker	8.5	m ²	15.00	127.50
		Associated repairs				1	P Sum	2,000.00	2,000.00
EM_ES_5	Repointing	Allowance for piecemeal repointing as general note	NA	Up to 7.5m	Cherry picker	17	m ²	75.00	1,275.00
EM_ES_6	Obscured	90% of elevation obscured by adjacent building. Assuming no access will be provided during works therefore no works anticipated	NA	NA	NA	NA	NA	NA	
		Access Provision				1	Item	2,500.00	2,500.00



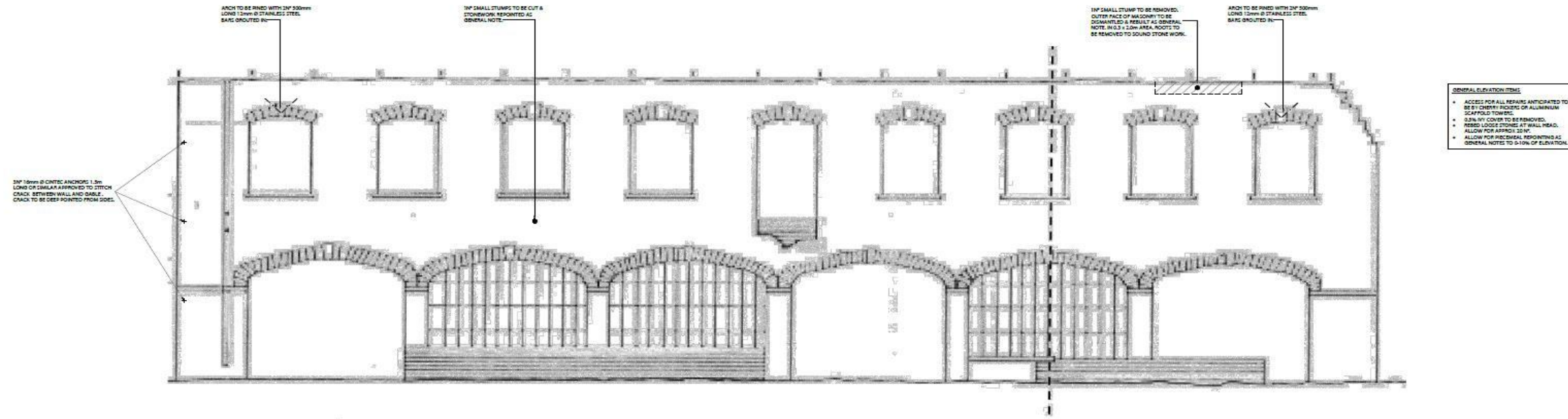
- EXTERNAL SOUTH ELEVATION GENERAL NOTES**
- ACCESS IS ANTICIPATED TO BE BY CHERRY PICKER AND TRADITIONAL SCAFFOLD TO INSIDE FACE
 - 30-40% VEGETATION COVER TO BE REMOVED (6-8.5m)
 - ALLOW FOR PIECEMEAL REPOINTING AS GENERAL NOTE TO 70-80% OF ELEVATION (15-17m)

Neath Abbey Ironworks			Long Term Works						
Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
External East Elevation									
EM_EE_1	Stitch vertical	16mm dia 1.5m long Cintec anchors	https://cintec.com/	Up to	Traditional scaffold	3	No	420.00	1,260.00
EM_EE_2	crack	Deep repoint crack from both sides	NA	6m		6	m	60.00	360.00
EM_EE_3	Pin arch	Arch to be pined with 500mm long 12mm dia stainless steel bars grouted in	NA	5m	Cherry picker	2	No	140.00	280.00
EM_EE_4	Pin arch	Arch to be pined with 500mm long 12mm dia stainless steel bars grouted in	NA	5m	Cherry picker	2	No	140.00	280.00
EM_EE_5	Small stumps	Small stumps to be cut out and stonework repointed as general note	NA	3m	Scaffold tower	1	No	125.00	125.00
EM_EE_6	Small stumps	Small stump to be removed roots cut back to face of sound masonry and roots larger than 25mm to be treated with poison plugs	https://www.frjonesandson.co.uk/products/ecoplug-max-100-pack/?gclid=CjwKCAjwwtTmBRBqEiwA-b6c_7nqI46yHY0z57xyFb51Z6jr8mhvTm8Fp6dU0ja-lfDdJOVSWg6ZYxoC_IEQAvD_BwE	7.5m	Cherry picker	1	No	100.00	100.00
EM_EE_7		Stonework to be dismantled and rebuilt as general note	NA			0.6	m ²	700.00	420.00
EM_EE_8	Medium stump	Medium stump to be removed roots cut back to face of sound masonry and roots larger than 25mm to be treated with poison plugs	https://www.frjonesandson.co.uk/products/ecoplug-max-100-pack/?gclid=CjwKCAjwwtTmBRBqEiwA-b6c_7nqI46yHY0z57xyFb51Z6jr8mhvTm8Fp6dU0ja-lfDdJOVSWg6ZYxoC_IEQAvD_BwE	4m	Cherry picker	1	No	110.00	110.00
EM_EE_9		Brickwork to be dismantled and rebuilt as general note	NA			1	m ²	300.00	300.00
EM_EE_10	Ivy cover	Remove ivy and make allowance for potential defects obscured by ivy at time of inspection	NA	Up to 7.5m	Cherry picker	10	m ²	15.00	150.00
		Associated repairs				1	P Sum	2,000.00	2,000.00
EM_EE_11	Loose stones	Rebed loose stone at wall head	NA	7.5m	Cherry picker	20	No	35.00	700.00
EM_EE_12	Repointing	Allowance for piecemeal repointing as general note	NA	Up to 7.5m	Cherry picker	20	m ²	75.00	1,500.00
		Access Provision				1	Item	2,500.00	2,500.00

Neath Abbey Ironworks

Long Term Works

Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
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EXTERNAL EAST ELEVATION

Neath Abbey Ironworks			Long Term Works						
Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
External West Elevation									
EM_EW_1	Medium stumps	Medium stumps to be cut out and stonework repointed as general note	NA	6m	Cherry picker	7	No	110.00	770.00
EM_EW_2	Large stump	large stump to be removed roots cut back to face of sound masonry and roots larger than 25mm to be treated with poison plugs	https://www.frjonesandson.co.uk/products/ecoplug-max-100-pack/?gclid=CjwKCAjwwtTmBRBqEiwA-b6c_7nqI46yHY0z57xyFb51Z6jr8mhvTm8Fp6dU0ja-lfDdJOVSWg6ZYxoC_IEQAvD_BwE	6m	Cherry picker	1	No	125.00	125.00
EM_EW_3		Stonework to be dismantled and rebuilt as general note	NA			1.8	m ²	700.00	1,260.00
EM_EW_4	Large stump	Large stumps in the ground to be treated with poison plugs	https://www.frjonesandson.co.uk/products/ecoplug-max-100-pack/?gclid=CjwKCAjwwtTmBRBqEiwA-b6c_7nqI46yHY0z57xyFb51Z6jr8mhvTm8Fp6dU0ja-lfDdJOVSWg6ZYxoC_IEQAvD_BwE	0m	NA	7	No	50.00	350.00
EM_EW_5	Improve tying to brick panels	1m long 6mm dia stainless steel bars resin fixed into stonework and installed in brick joints	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/	3 to 7m	Cherry picker	4	No	70.00	280.00
EM_EW_6	Medium stump	Medium stump to be removed roots cut back to face of sound masonry and roots larger than 25mm to be treated with poison plugs	https://www.frjonesandson.co.uk/products/ecoplug-max-100-pack/?gclid=CjwKCAjwwtTmBRBqEiwA-b6c_7nqI46yHY0z57xyFb51Z6jr8mhvTm8Fp6dU0ja-lfDdJOVSWg6ZYxoC_IEQAvD_BwE	6m	Cherry picker	1	No	110.00	110.00
EM_EW_7		Brickwork to be dismantled and rebuilt as general note	NA			0.5	m ²	300.00	150.00
EM_EW_8	Timber lintel	Timber lintel to be removed and replaced with seasoned oak 100x60 lintel	NA	1.5m	NA	1	No	910.00	910.00
EM_EW_9		Masonry between lintel and arch to be dismantled and rebuilt as general note				0.25	m ²	700.00	175.00
EM_EW_10	Small stumps	Small stumps to be cut out and stonework repointed as general note	NA	2m	Scaffold tower	1	No	100.00	100.00
EM_EW_11	Loose stones	Rebed loose stone at wall head	NA	7.5m	Cherry picker	30	No	35.00	1,050.00
EM_EW_12	Repointing	Allowance for piecemeal repointing as general note	NA	Up to 7.5m	Cherry picker	65	m ²	75.00	4,875.00
EM_EW_13	Ivy cover	Remove ivy and make allowance for potential defects obscured by ivy at time of inspection	NA	Up to 7.5m	Cherry picker	65	m ²	15.00	975.00
		Associated repairs				1	P Sum	3,000.00	3,000.00
EM_EW_14	Missing stonework	Missing stonework to be rebuilt as general note	NA	0m	NA	1	m ²	750.00	750.00
		Access Provision				1	Item	2,000.00	2,000.00

Neath Abbey Ironworks

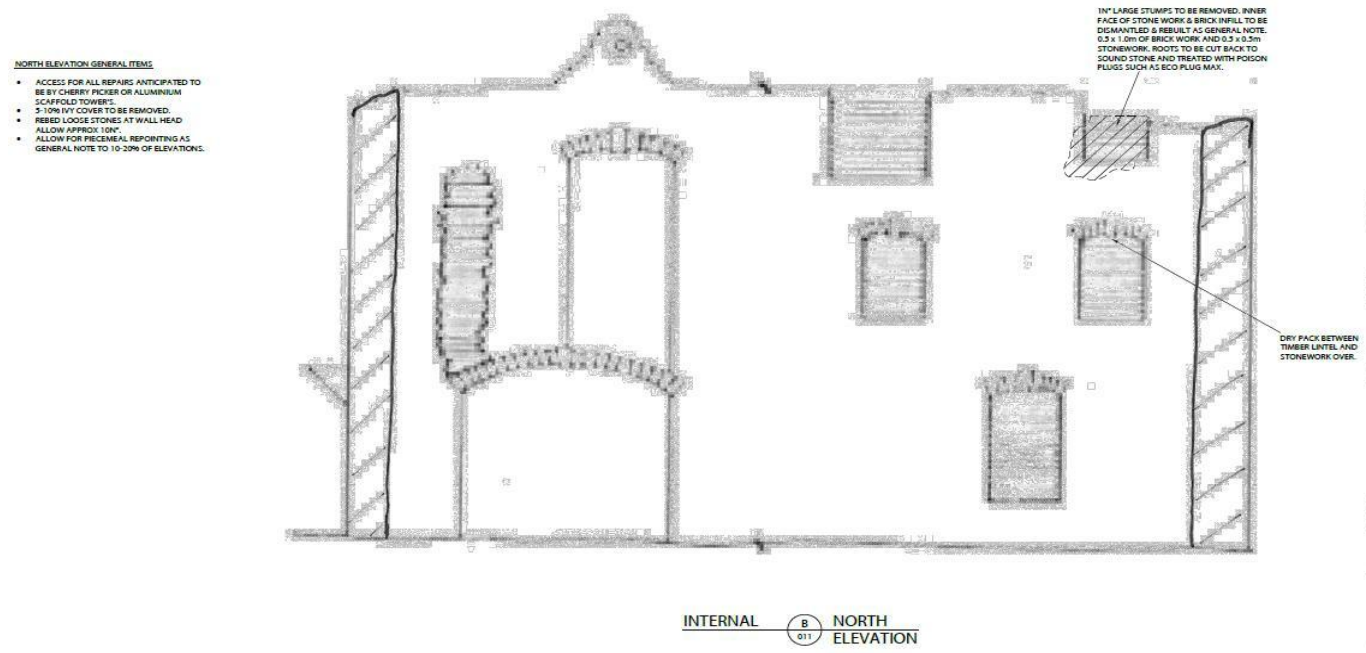
Long Term Works

Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost

Neath Abbey Ironworks

Long Term Works

Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
Internal North Elevation									
EM_IN_1	Large stump	large stump to be removed roots cut back to face of sound masonry and roots larger than 25mm to be treated with poison plugs	https://www.frjonesandson.co.uk/products/ecoplug-max-100-pack/?gclid=CjwKCAjwwtTmBRBqEiwA-b6c_7nqI46yHY0z57xyFb51Z6jr8mhvTm8Fp6dU0ja-lfDdJOVSWg6ZYxoC IEQAvD BwE	7m	Cherry picker	1	No	125.00	125.00
EM_IN_2		Brickwork to be dismantled and rebuilt as general note	NA			0.5	m ²	300.00	150.00
EM_IN_3		Stonework to be dismantled and rebuilt as general note	NA			0.25	m ²	700.00	175.00
EM_IN_4	Dry pack lintel	Dry pack between existing timber lintel and stonework over	NA	5m	Cherry picker	1	No	50.00	50.00
		Access Provision				1	Item	1,000.00	1,000.00

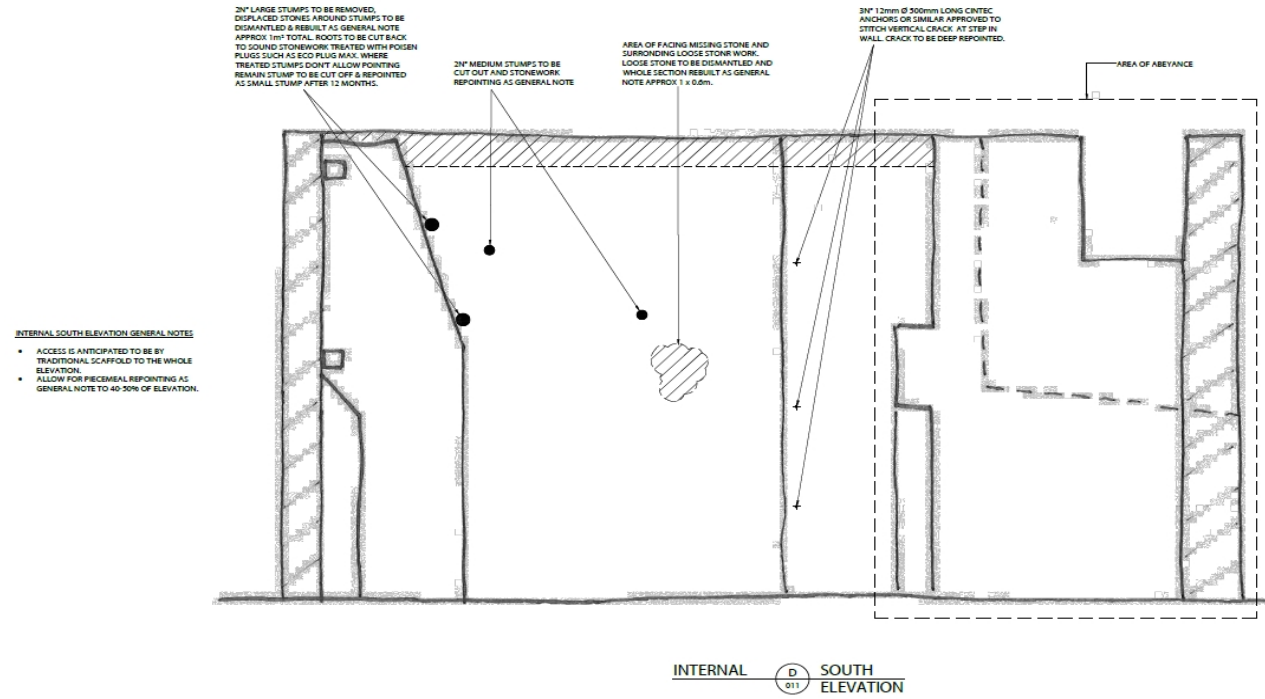


Internal South Elevation									
EM_IS_1	Large stump	large stump to be removed roots cut back to face of sound masonry and roots larger than 25mm to be treated with poison plugs	https://www.frjonesandson.co.uk/products/ecoplug-max-100-pack/?gclid=CjwKCAjwwtTmBRBqEiwA-b6c_7nqI46yHY0z57xyFb51Z6jr8mhvTm8Fp6dU0ja-lfDdJOVSWg6ZYxoC IEQAvD BwE	4 & 6m	Traditional scaffold	2	No	125.00	250.00
EM_IS_2		Stonework to be dismantled and rebuilt as general note	NA			1	m ²	700.00	700.00
EM_IS_3	Medium stumps	Medium stumps to be cut out and stonework repointed as general note	NA	6m	Traditional scaffold	2	No	110.00	220.00
EM_IS_4	Loose and missing stonework	Loose stonework to be dismantled and rebuilt as general note	NA	4m	Traditional scaffold	0.3	m ²	700.00	210.00

Neath Abbey Ironworks

Long Term Works

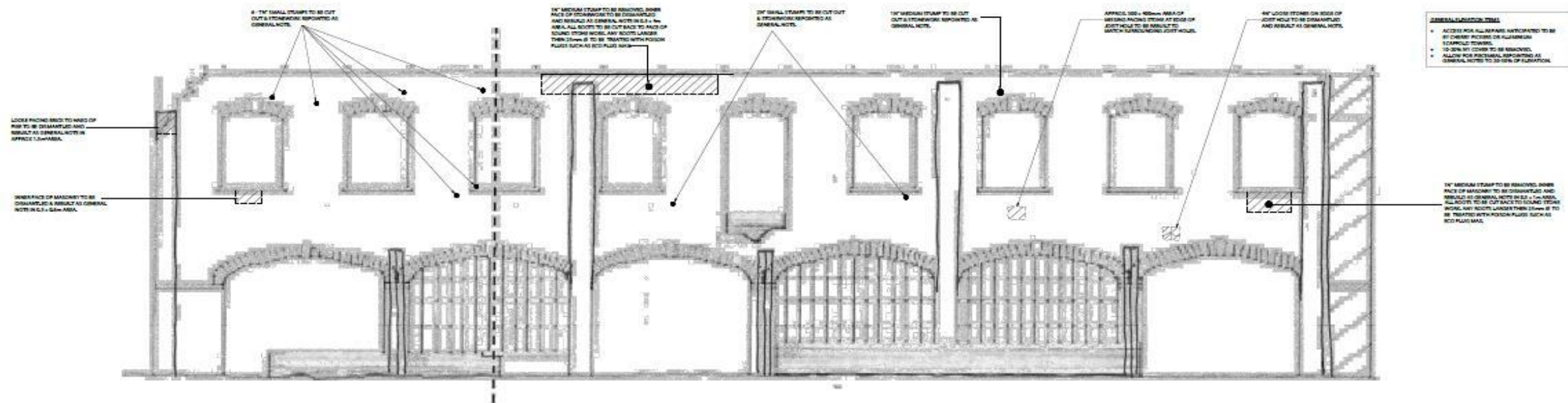
Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
EM_IS_5		Missing stonework to be rebuilt as general note	NA			0.3	m ²	700.00	210.00
EM_IS_6	Stitch vertical crack	12mm dia 500mm long Cintec anchors	https://cintec.com/	Up to 6m	Traditional scaffold	3	No	140.00	420.00
EM_IS_7		Deep repoint crack	NA			6	m	60.00	360.00
EM_IS_8	Repointing	Allowance for piecemeal repointing as general note	NA	Up to 7.5m	Traditional scaffold	35	m ²	75.00	2,625.00
		Access Provision				1	Item	3,000.00	3,000.00



Neath Abbey Ironworks

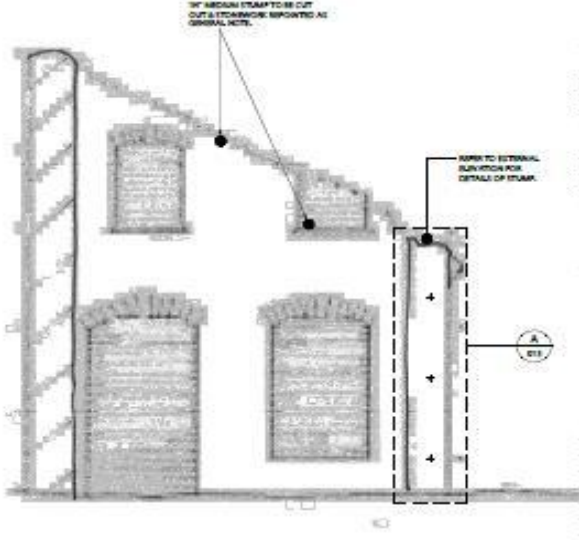
Long Term Works

Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
Internal East Elevation									
EM_IE_1	Loose masonry	Loose brickwork to be dismantled and rebuilt as general note	NA	7.5m	Cherry picker	1.5	m ²	300.00	450.00
EM_IE_2		Loose stonework to be dismantled and rebuilt as general note		4.5	Cherry picker	0.4	m ²	700.00	280.00
EM_IE_3	Small stumps	Small stumps to be cut out and stonework repointed as general note	NA	7m	Cherry picker	4	No	100.00	400.00
EM_IE_4				4.5		5	No	100.00	500.00
EM_IE_5	Medium stumps	Medium stumps to be cut out and stonework repointed as general note	NA	7m	Cherry picker	1	No	110.00	110.00
EM_IE_6				5m	Cherry picker	2	No	110.00	220.00
EM_IE_7	Medium stump	Medium stump to be removed roots cut back to face of sound masonry and roots larger than 25mm to be treated with poison plugs	https://www.frjonesandson.co.uk/products/ecoplug-max-100-pack/?gclid=CjwKCAjwwtTmBRBqEiwA-b6c_7nql46yHY0z57xyFb51Z6jr8mhvTm8Fp6dU0ja-lfDdJOVSWg6ZYxoC IEQAvD BwE	7m	Cherry picker	1	No	110.00	110.00
EM_IE_8				4.5m		1	No	110.00	110.00
EM_IE_9		Brickwork to be dismantled and rebuilt as general note	NA	7m		2	m ²	300.00	600.00
EM_IE_10				4.5m		0.5	m ²	300.00	150.00
EM_IE_11	Missing stonework	Missing stonework at edge of joist hole to be rebuilt as general note	NA	4.5	Cherry picker	0.15	m ²	700.00	105.00
EM_IE_12	Vertical crack to pier	16mm dia 1.25m long Cintec anchors	https://cintec.com/	Up to 3.5m	Scaffold tower	3	No	350.00	1,050.00
EM_IE_13		Fill crack with creasing tiles in lime mortar				0.15	m ³	1,500.00	225.00
EM_IE_14		Deep repoint crack from both sides	NA			1.5	m	60.00	90.00
EM_IE_15	Repointing	Allowance for piecemeal repointing as general note	NA	Up to 7.5m	Combination of cherry picker and scaffold tower	60	m ²	75.00	4,500.00
EM_IE_16	Ivy cover	Remove ivy and make allowance for potential defects obscured by ivy at time of inspection	NA	Up to 7.5m	Cherry picker	40	m ²	15.00	600.00
		Associated repairs				1	P Sum	2,000.00	2,000.00
		Access Provision				1	Item	2,500.00	2,500.00



Neath Abbey Ironworks

Long Term Works

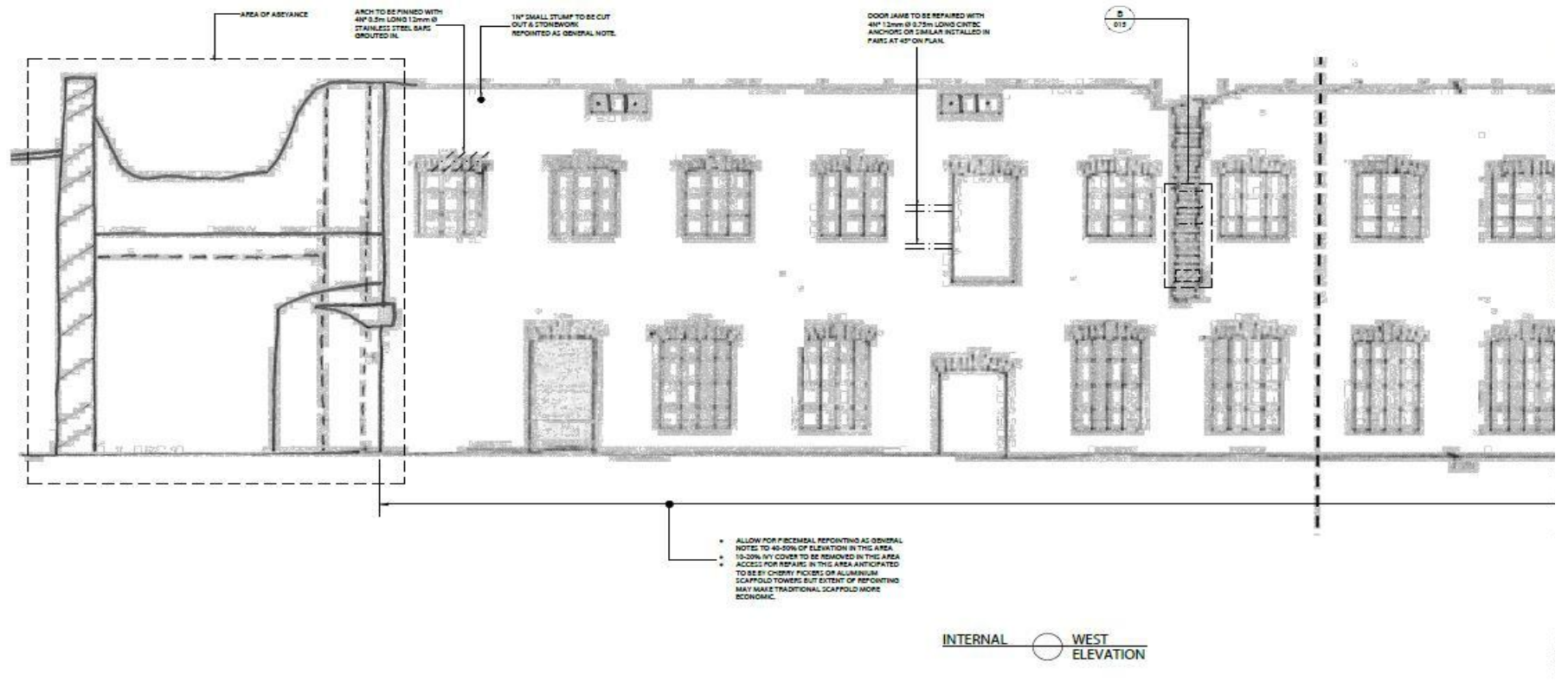
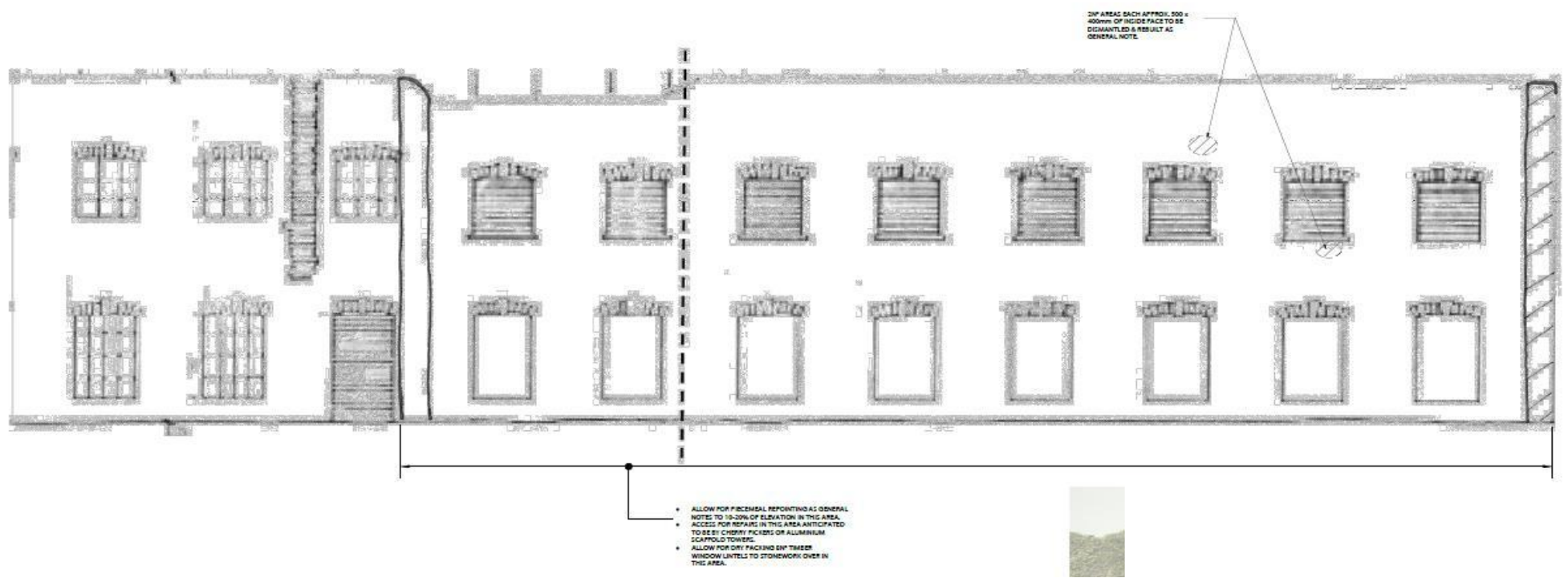
Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
									

Neath Abbey Ironworks			Long Term Works						
Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
Internal West Elevation									
EM_IW_1	Loose stonework	Loose stonework to be dismantled and rebuilt as general note	NA	5.5m	Cherry picker	0.2	m ²	700.00	140.00
EM_IW_2				3.5m		0.2	m ²	700.00	140.00
EM_IW_3	Pin arch	Arch to be pinned with 500mm long 12mm dia stainless steel bars grouted in	NA	5m	Cherry picker	4	No	140.00	560.00
EM_IW_4	Small stumps	Small stumps to be cut out and stonework repointed as general note	NA	7m	Cherry picker	1	No	100.00	100.00
EM_IW_5				3.5m	Scaffold tower	1	No	210.00	210.00
EM_IW_6	Repair door jamb	12mm dia 750mm long Cintec anchors installed at 45 degrees in pairs	https://cintec.com/	3.5m	Scaffold tower	4	No	210.00	840.00
EM_IW_7	Fireplace repairs	1m long 6mm dia stainless steel bars resin fixed into stonework and installed in brick joints	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/	3.5m	Scaffold tower	3	No	70.00	210.00
EM_IW_8		Displaced stones to be dismantled and rebuilt as general note	NA			8	No	35.00	280.00
EM_IW_9		Missing facing stone to be rebuilt as general note	NA			0.15	m ²	700.00	105.00
EM_IW_10	Repointing	Allowance for piecemeal repointing as general note	NA	Up to 7.5m	Combination of cherry picker and scaffold tower	115	m ²	75.00	8,625.00
EM_IW_11	Ivy cover	Remove ivy and make allowance for potential defects obscured by ivy at time of inspection	NA	Up to 7.5m	Cherry picker	35	m ²	15.00	525.00
		Associated repairs				1	P Sum	2,000.00	2,000.00
EM_IW_12	Dry pack lintel	Dry pack between existing timber lintel and stonework over	NA	3.5m	Scaffold tower	1	No	50.00	50.00
EM_IW_13				5m	Cherry picker	6	No	50.00	300.00
		Access Provision				1	Item	1,500.00	1,500.00

Neath Abbey Ironworks

Long Term Works

Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
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INTERNAL WEST ELEVATION

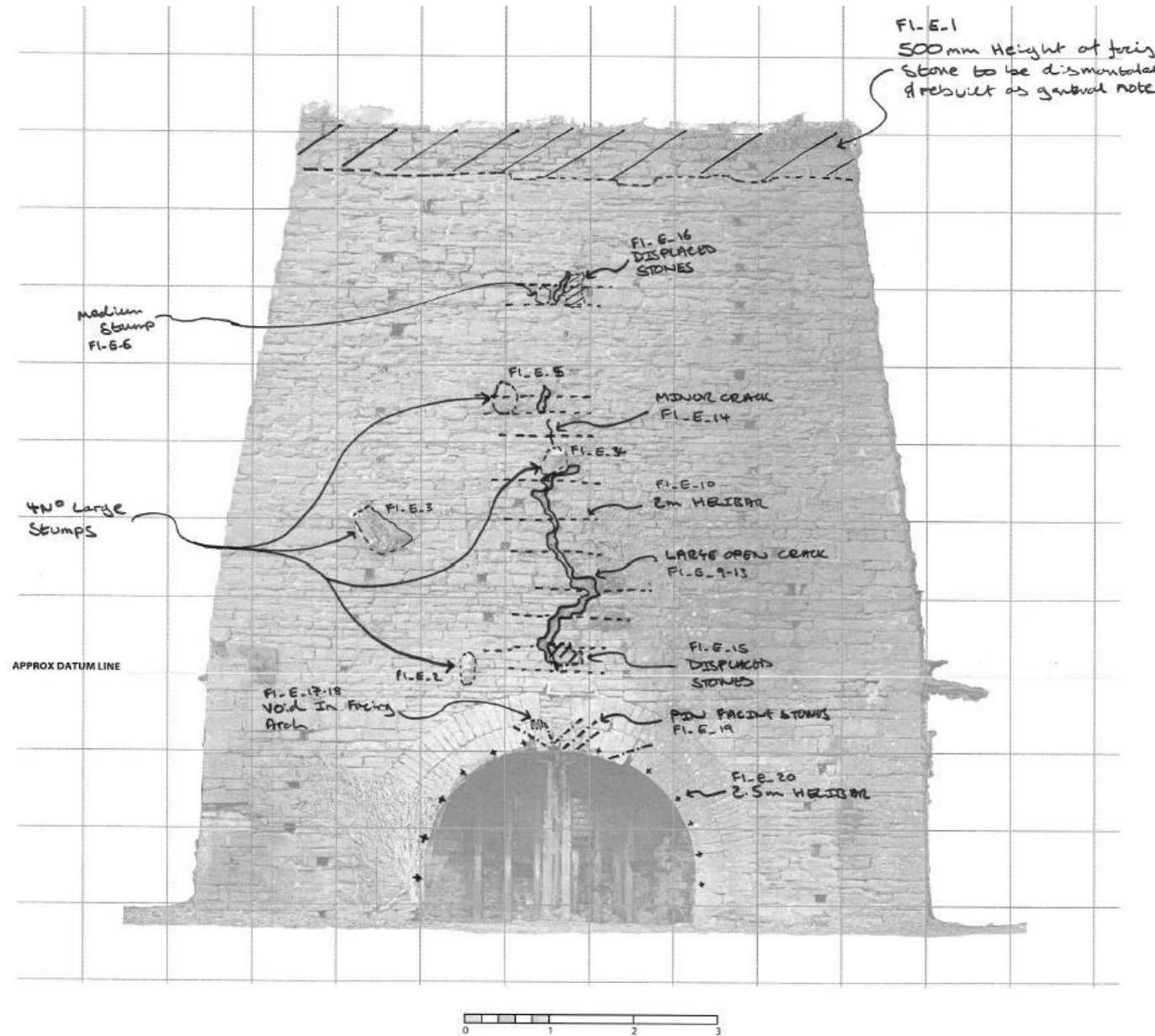
Neath Abbey Ironworks			Long Term Works						
Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
Furnace No 1									
North Elevation									
F1_N_1	Stonework at top of elevation	500mm height of facing stone to be dismantled and rebuilt as general note	NA	14m	Cherry picker / roped access	3.5	m ²	750.00	2,625.00
F1_N_2	Repointing	Allowance for piecemeal recessed repointing as general note	NA	Up to 14m	Cherry picker / roped access	10	m ²	150.00	1,500.00
F1_N_3	Small stumps	Small stumps to be cut out and stonework repointed as general note	NA	Up to 14m	Cherry picker / roped access	10	No	100.00	1,000.00
F1_N_4	Medium stumps	Medium stumps to be cut out and stonework repointed as general note	NA	Up to 14m	Cherry picker / roped access	15	No	110.00	1,650.00
F1_N_5	Large open cracks	Crack to be cleared of debris, soil and roots as far back as practical without removing sound stonework or pointing.	NA	5 to 14m	Cherry picker / roped access	6	m	50.00	300.00
F1_N_6		Crack to be stitched with 2m long 6mm dia stainless steel bars resin fixed into stonework joints either side of crack	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/			10	No	140.00	1,400.00
F1_N_7		Where width allows (say over 30mm) it is to be faced with a skin of creasing tiles (vertically or horizontally aligned to suit) set back from the face of the stonework by 50mm. Colour to be agreed on site to contrast stonework				0.35	m ²	250.00	87.50
F1_N_8		Where not possible to face with creasing tiles it is to be faced with lime mortar or galet with lime mortar set back 50mm from the face of the stonework. Colour to be agreed on site to contrast stonework				5	m	75.00	375.00
F1_N_9		Behind facing, "earth dry" mortar to be placed and compacted by hand to fill voids as far back as practical. (Poured grout not to be used to fill				0.5	m ³	500.00	250.00
F1_N_10	Ground level opening	3m long 6mm dia stainless steel bars resin fixed into stonework joints above opening	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/	0 to 4m	Scaffold tower	3	No	10.00	30.00
F1_N_11		1.5m long 6mm dia stainless steel bars resin fixed into stonework joints to sides of opening				6	No	105.00	630.00
F1_N_12		Stones at head of opening to be pined with 500mm long 12mm dia stainless steel bars grouted in				20	No	140.00	2,800.00
		Access Provision				1	Item	2,500.00	2,500.00

Neath Abbey Ironworks			Long Term Works						
Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
	East Elevation								
F1_E_1	Stonework at top of elevation	500mm height of facing stone to be dismantled and rebuilt as general note	NA	14m	Cherry picker / roped access	4	m ²	750.00	3,000.00
F1_E_2	Large stumps with no distress to stonework	Large stumps to be cut out and stonework repointed as medium stump general note	NA	4m	Scaffold tower	1	No	125.00	125.00
F1_E_3				6m	Cherry picker / roped access	1	No	125.00	125.00
F1_E_4				7.5m		1	No	125.00	125.00
F1_E_5				9m		1	No	125.00	125.00
F1_E_6	Medium stumps	Medium stumps to be cut out and stonework repointed as general note	NA	10m	Cherry picker / roped access	1	No	110.00	110.00
F1_E_7	Small stumps	Small stumps to be cut out and stonework repointed as general note	NA	Up to 14m	Cherry picker / roped access	2	No	100.00	200.00
F1_E_8	Repointing	Allowance for piecemeal recessed repointing as general note	NA	Up to 14m	Cherry picker / roped access	10	m ²	150.00	1,500.00
F1_E_9	Large open cracks	Crack to be cleared of debris, soil and roots as far back as practice without removing sound stonework or pointing.	NA	3 to 10m	Cherry picker / roped access	5	m	50.00	250.00
F1_E_10		Crack to be stitched with 2m long 6mm dia stainless steel bars resin fixed into stonework joints either side of crack	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/			12	No	140.00	1,680.00
F1_E_11		Where width allows (say over 30mm) it is to be faced with a skin of creasing tiles (vertically or horizontally aligned to suit) set back from the face of the stonework by 50mm. Colour to be agreed on site to contrast stonework	NA			0.75	m ²	250.00	187.50
F1_E_12		Where not possible to face with creasing tiles it is to be faced with lime mortar or galet with lime mortar set back 50mm from the face of the stonework. Colour to be agreed on site to				1	m	75.00	75.00
F1_E_13		Behind facing, "earth dry" mortar to be placed and compacted by hand to fill voids as far back as practical. (Poured grout not to be used to fill				1	m ³	500.00	500.00
F1_E_14	Minor cracks	Crack to be stitched with 2m long 6mm dia stainless steel bars resin fixed into stonework joints either side of crack	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/	7.5m	Cherry picker / roped access	1	No	140.00	140.00
F1_E_15	Loose and displaced stonework	Loose or displaced facing stonework to be dismantled and rebuilt as general note	NA	4m	Scaffold tower	0.25	m ²	700.00	175.00
F1_E_16				10m	Cherry picker / roped access	0.25	m ²	700.00	175.00
F1_E_17	Ground level opening	Void in facing arch to be faced with a skin of creasing tiles set back from the face of the stonework by 50mm. Colour to be agreed on site to contrast stonework	NA	4m	Scaffold tower	0.01	m ²	7,500.00	75.00

Neath Abbey Ironworks

Long Term Works

Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
F1_E_18		Void in facing arch - Behind facing, mortar to be placed by hand to fill voids as far back as practical. (Poured grout not to be used to fill voids)				0.01	m ³	500.00	5.00
F1_E_19		Stones at head of opening to be pined with 1m long 12mm dia stainless steel bars grouted in				8	No	280.00	2,240.00
F1_E_20		Vertical crack in opening return wall and arch soffit to be stitched with 16mm dia 2.5m long Cintec anchors	https://cintec.com/			10	No	700.00	7,000.00
		Access Provision				1	Item	2,500.00	2,500.00

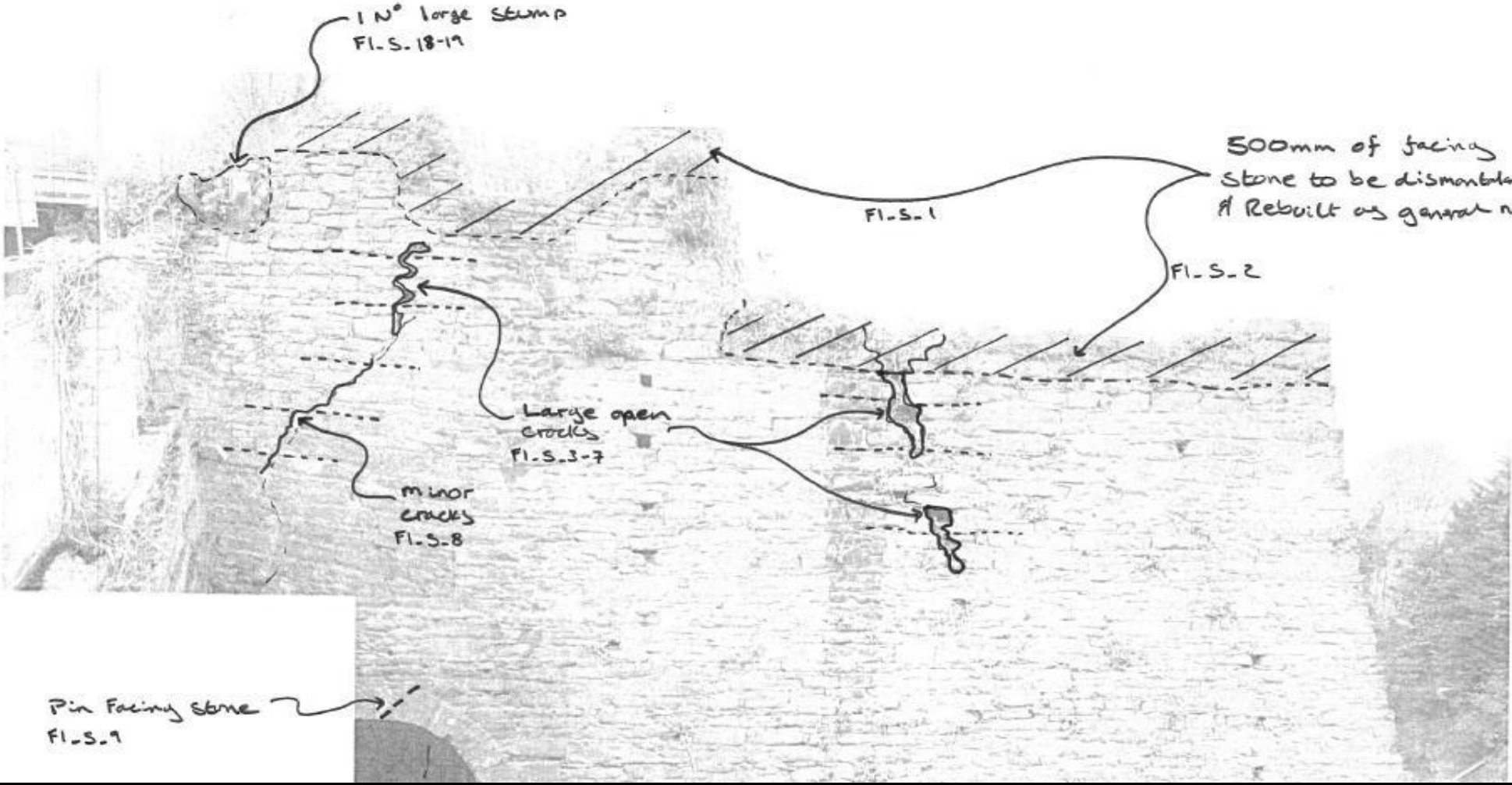


Neath Abbey Ironworks			Long Term Works						
Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
	South Elevation								
F1_S_1	Stonework at top of elevation	500mm height of facing stone to be dismantled and rebuilt as general note	NA	16m	Cherry picker / roped access	2.5	m ²	750.00	1,875.00
F1_S_2				14m		4	m ²	750.00	3,000.00
F1_S_3	Large open cracks	Crack to be cleared of debris, soil and roots as far back as practice without removing sound stonework or pointing.	NA	10 to 16m	Cherry picker / roped access	3	m	50.00	150.00
F1_S_4		Crack to be stitched with 2m long 6mm dia stainless steel bars resin fixed into stonework joints either side of crack	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/			5	No	140.00	700.00
F1_S_5		Where width allows (say over 30mm) it is to be faced with a skin of creasing tiles (vertically or horizontally aligned to suit) set back from the face of the stonework by 50mm. Colour to be agreed on site to contrast stonework	NA			0.25	m ²	250.00	62.50
F1_S_6		Where not possible to face with creasing tiles it is to be faced with lime mortar or galet with lime mortar set back 50mm from the face of the stonework. Colour to be agreed on site to				1	m	75.00	75.00
F1_S_7		Behind facing, "earth dry" mortar to be placed and compacted by hand to fill voids as far back as practical. (Poured grout not to be used to fill voids)				0.25	m ³	500.00	125.00
F1_S_8	Minor cracks	Crack to be stitched with 2m long 6mm dia stainless steel bars resin fixed into stonework joints either side of crack	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/	12.5m	Cherry picker / roped access	3	No	140.00	420.00
F1_S_9	High level arch and recessed area to west of elevation	Stones at head of arch on main elevation to be pinned with 750mm long 12mm dia stainless steel bars grouted in	NA	4 to 9m	Cherry picker / roped access	1	No	210.00	210.00
F1_S_10		Recessed stonework panel to be tied to main body of furnace with 12mm dia 750mm long Cintec anchors installed at 45 degrees on plan	https://cintec.com/			6	No	210.00	1,260.00
F1_S_11		Rough edge of recessed stonework panel, loose stones to be rebedded	NA			6	No	35.00	210.00
F1_S_12		Base of void between recessed stonework panel and cliff to be infilled with a skin of dense blockwork on flat faced with creasing tiles set back from the face of the stonework by 50mm. Colour to be agreed on site to contrast stonework.	NA			0.5	m ²	235.00	117.50

Neath Abbey Ironworks			Long Term Works						
Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
F1_S_13		Proposed skin of creasing tiles to be stitched with 1m long 6mm dia stainless steel bars resin fixed into stonework joints one side and drilled and resin fixed into cliff face the other side.	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/			2	No	70.00	140.00
F1_S_14	Small stumps	Small stumps to be cut out and stonework repointed as general note	NA	Up to 13m	Cherry picker / roped access	4	No	100.00	400.00
F1_S_15	Repointing	Allowance for piecemeal recessed repointing as general note	NA	Up to 13m	Cherry picker / roped access	10	m ²	150.00	1,500.00
F1_S_16	Large stumps with no distress to stonework	Large stumps to be cut out and stonework repointed as medium stump general note	NA	7.5m	Cherry picker / roped access	2	No	125.00	250.00
F1_S_17				0m	NA	1	No	125.00	125.00
F1_S_18	Large stump	large stump to be removed roots cut back to face of sound masonry and roots larger than 25mm to be treated with poison plugs	https://www.frjonesandson.co.uk/products/ecoplug-max-100-pack/?gclid=CjwKCAjwwtTmBRBqEiwAb6c_7nqI46yHY0z57xyFb51Z6jr8mhvTm8Fp6dU0ja-lfDdJOVSWg6ZYxoC_IEQAvD_BwE	16m	Cherry picker	1	No	125.00	125.00
F1_S_19		Stonework to be dismantled and rebuilt as general note	NA			1	m ²	700.00	700.00
F1_S_20	Ground level opening	Low level brickwork wall to be dismantled and rebuilt as general note	NA		0 NA	0.75	m ²	300.00	225.00
F1_S_21		Vertical crack in opening return wall to be stitched with 16mm dia 2.5m long Cintec anchors	https://cintec.com/			2	No	700.00	1,400.00
F1_S_22		Void in facing stonework to be faced with a skin of creasing tiles set back from the face of the stonework by 50mm and infilled behind with lime mortar. Colour to be agreed on site to contrast stonework	NA	2.5m	Scaffold tower	0.25	m ²	250.00	62.50
F1_S_23		Void in arch soffit to be infilled with multiple courses of vertical (radial) creasing tiles and lime mortar	NA	2.5m		0.5	m ³	500.00	250.00
F1_S_24		Access Provision				1	Item	2,500.00	2,500.00

Neath Abbey Ironworks

Long Term Works

Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
 <p>The diagram shows a stone wall with several areas of concern marked by dashed lines and arrows. The annotations include:</p> <ul style="list-style-type: none">1 N° large stump (FI-S-18-19) at the top left corner.500mm of facing stone to be dismantled & Rebuilt as general note (FI-S-2) along the top edge.Large open cracks (FI-S-3-7) in the middle section.minor cracks (FI-S-8) in the lower left section.Pin Facing Stone (FI-S-9) at the bottom left corner. <p>The wall is labeled with FI-S-1 and FI-S-2 in the center and right sections.</p>									

Neath Abbey Ironworks

Long Term Works

Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost

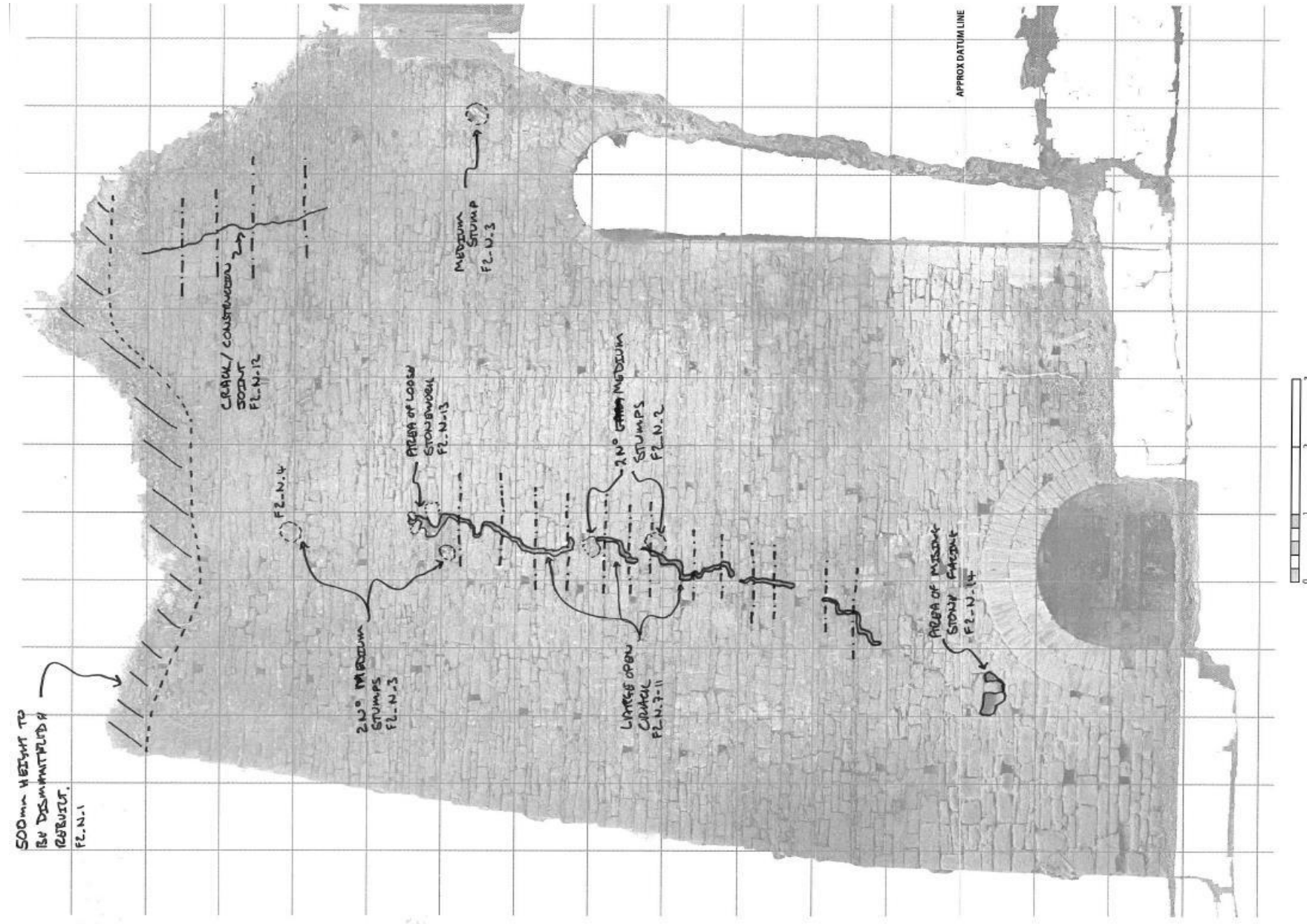
Neath Abbey Ironworks			Long Term Works						
Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
West Elevation									
F1_W_1	Ground level opening	Vertical crack above opening to be stitched with 2m long 6mm dia stainless steel bars resin fixed into stonework joints either side of crack	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/	0m	NA	3	No	140.00	420.00
F1_W_2		Loose stones around opening to be pined with 500mm long 12mm dia stainless steel bars grouted in	NA			7	No	75.00	525.00
F1_W_3	Repointing	Allowance for piecemeal recessed repointing as general note	NA	Up to 12m	Cherry picker / roped access	2.5	m ²	150.00	375.00
									-
Top									
F1_T_1	Minor vegetation and debris	Area to be cleared of all vegetation (ivy and brambles), debris and approx. 250mm of loose soil.	NA	14m	Roped access	100	m ²	15.00	1,500.00
						1	P Sum	5,000.00	5,000.00
F1_T_2	Large stumps	Large stumps to be removed and roots chased out to solid construction.	NA	14m	Roped access	15	No	125.00	1,875.00
F1_T_3		Where practical masonry / corework to be removed to allow roots chased out to 200mm below top surface of furnace and masonry / corework reconstructed.	NA			3	m ³	1,000.00	3,000.00
F1_T_4		All roots larger than 25mm dia once chased out to be treated with poison plugs such as Eco Plug Max.	https://www.frjonesandson.co.uk/products/ecoplug-max-100-pack/?gclid=CjwKCAjwwtTmBRBqEiwAb6c_7nqI46yHY0z57xyFb51Z6jr8mhvTm8Fp6dU0ja-lfDdJOVSWg6ZYxoC_IEQAvD_BwE			60	No	30.00	1,800.00
									-
Inside									
F1_I_1	Loose stones	Loose stones to be pined with 500mm long 12mm dia stainless steel bars grouted in	NA	Up to 14m	Scaffold tower	15	No	75.00	1,125.00
F1_I_2	Large stumps with no distress to stonework	Large stumps to be cut out and stonework repointed as medium stump general note	NA	8m	Cherry picker / roped access	2	No	125.00	250.00
		Access Provision				1	Item	3,000.00	3,000.00

Neath Abbey Ironworks			Long Term Works						
Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
Furnace No 2									
North Elevation									
F2_N_1	Stonework at top of elevation	500mm height of facing stone to be dismantled and rebuilt as general note	NA	18m	Cherry picker / roped access	5	m ²	750.00	3,750.00
F2_N_2	Medium stumps	Medium stumps to be cut out and stonework repointed as general note	NA	10m	Cherry picker / roped access	2	No	110.00	220.00
F2_N_3				12m		2	No	110.00	220.00
F2_N_4				15m		1	No	110.00	110.00
F2_N_5	Small stumps	Small stumps to be cut out and stonework repointed as general note	NA	Up to 18m	Cherry picker / roped access	5	No	100.00	500.00
F2_N_6	Repointing	Allowance for piecemeal recessed repointing as general note	NA	Up to 18m	Cherry picker / roped access	15	m ²	150.00	2,250.00
F2_N_7	Large open cracks	Crack to be cleared of debris, soil and roots as far back as practice without removing sound stonework or pointing.	NA	5 to 14m	Cherry picker / roped access	8	m	50.00	400.00
F2_N_8		Crack to be stitched with 2m long 6mm dia stainless steel bars resin fixed into stonework joints either side of crack	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/			15	No	140.00	2,100.00
F2_N_9		Where width allows (say over 30mm) it is to be faced with a skin of creasing tiles (vertically or horizontally aligned to suit) set back from the face of the stonework by 50mm. Colour to be agreed on site to contrast stonework	NA			0.75	m ²	250.00	187.50
F2_N_10		Where not possible to face with creasing tiles it is to be faced with lime mortar or galet with lime mortar set back 50mm from the face of the stonework. Colour to be agreed on site to				1.5	m	75.00	112.50
F2_N_11		Behind facing, "earth dry" mortar to be placed and compacted by hand to fill voids as far back as practical. (Poured grout not to be used to fill				1	m ³	500.00	500.00
F2_N_12	Minor crack / construction joint	Crack to be stitched with 2m long 6mm dia stainless steel bars resin fixed into stonework joints either side of crack	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/	15 to 18m	Cherry picker / roped access	4	No	140.00	560.00
F2_N_13	Loose and displaced stonework	Loose or displaced facing stonework to be dismantled and rebuilt as general note	NA	14m	Cherry picker / roped access	0.25	m ²	700.00	175.00
F2_N_14	Missing facing stonework	Void to be faced with a skin of creasing tiles set back from the face of the stonework by 50mm. Colour to be agreed on site to contrast	NA	4m	Scaffold tower	0.25	m ²	250.00	62.50
		Access Provision				1	Item	3,000.00	3,000.00

Neath Abbey Ironworks

Long Term Works

Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
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Neath Abbey Ironworks			Long Term Works						
Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
	East Elevation								
F2_E_1	Stonework at top of elevation	500mm height of facing stone to be dismantled and rebuilt as general note	NA	18m	Cherry picker / roped access	4	m ²	750.00	3,000.00
F2_E_2	Small stumps	Small stumps to be cut out and stonework repointed as general note	NA	Up to 18m	Cherry picker / roped access	5	No	100.00	500.00
F2_E_3	Repointing	Allowance for piecemeal recessed repointing as general note	NA	Up to 18m	Cherry picker / roped access	15	m ²	150.00	2,250.00
F2_E_4	Large open cracks	Crack to be cleared of debris, soil and roots as far back as practice without removing sound stonework or pointing.	NA	5 to 14m	Cherry picker / roped access	10	m	50.00	500.00
F2_E_5		Crack to be stitched with 2m long 6mm dia stainless steel bars resin fixed into stonework joints either side of crack	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/			18	No	140.00	2,520.00
F2_E_6		Where width allows (say over 30mm) it is to be faced with a skin of creasing tiles (vertically or horizontally aligned to suit) set back from the face of the stonework by 50mm. Colour to be agreed on site to contrast stonework	NA			1	m ²	250.00	250.00
F2_E_7		Where not possible to face with creasing tiles it is to be faced with lime mortar or galet with lime mortar set back 50mm from the face of the stonework. Colour to be agreed on site to				1	m	75.00	75.00
F2_E_8		Behind facing, "earth dry" mortar to be placed and compacted by hand to fill voids as far back as practical. (Poured grout not to be used to fill				1	m ³	500.00	500.00
F2_E_9	Ground level opening	Concentric curved 2.5m long 6mm dia stainless steel bars resin fixed into arch joints between orders.	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/	4m	Scaffold tower	2	No	250.00	500.00
F2_E_10		Crack in opening arch soffit wall to be stitched with 16mm dia 2.5m long Cintec anchors installed from face of arch	https://cintec.com/			6	No	700.00	4,200.00
F2_E_11		Arch to be stitched with radial 16mm dia 2.5m long Cintec anchors installed from soffit of arch				3	No	700.00	2,100.00
F2_E_12		Arch to be stitched with radial 16mm dia 1m long Cintec anchors installed from soffit of arch				6	No	280.00	1,680.00
		Access Provision				1	Item	3,000.00	3,000.00

Neath Abbey Ironworks

Long Term Works

Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost

Neath Abbey Ironworks			Long Term Works						
Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
	South Elevation								
F2_S_1	Stonework at top of elevation	500mm height of facing stone to be dismantled and rebuilt as general note	NA	18m	Cherry picker / roped access	3	m ²	750.00	2,250.00
F2_S_2	Medium stumps	Medium stumps to be cut out and stonework repointed as general note	NA	2m	Scaffold tower	1	No	110.00	110.00
F2_S_3				10m	Cherry picker / roped access	3	No	110.00	330.00
F2_S_4	Repointing	Allowance for piecemeal recessed repointing as general note	NA	Up to 18m	Cherry picker / roped access	15	m ²	150.00	2,250.00
F2_S_5	Small stumps	Small stumps to be cut out and stonework repointed as general note	NA	Up to 18m	Cherry picker / roped access	5	No	100.00	500.00
F2_S_6	Large open cracks	Crack to be cleared of debris, soil and roots as far back as practice without removing sound stonework or pointing.	NA	5 to 18m	Cherry picker / roped access	11	m	50.00	550.00
F2_S_7		Crack to be stitched with 2m long 6mm dia stainless steel bars resin fixed into stonework joints either side of crack	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/			15	No	140.00	2,100.00
F2_S_8		Where width allows (say over 30mm) it is to be faced with a skin of creasing tiles (vertically or horizontally aligned to suit) set back from the face of the stonework by 50mm. Colour to be agreed on site to contrast stonework	NA			0.1	m ²	250.00	25.00
F2_S_9		Where not possible to face with creasing tiles it is to be faced with lime mortar or galet with lime mortar set back 50mm from the face of the stonework. Colour to be agreed on site to				10	m	75.00	750.00
F2_S_10		Behind facing, "earth dry" mortar to be placed and compacted by hand to fill voids as far back as practical. (Poured grout not to be used to fill				0.5	m ³	500.00	250.00
F2_S_11	Loose / dropped facing arch stones	Loose stones to be pined with 500mm long 12mm dia stainless steel bars grouted in	NA	11m	Cherry picker / roped access	4	No	140.00	560.00
		Access Provision				1	Item	3,000.00	3,000.00

Neath Abbey Ironworks

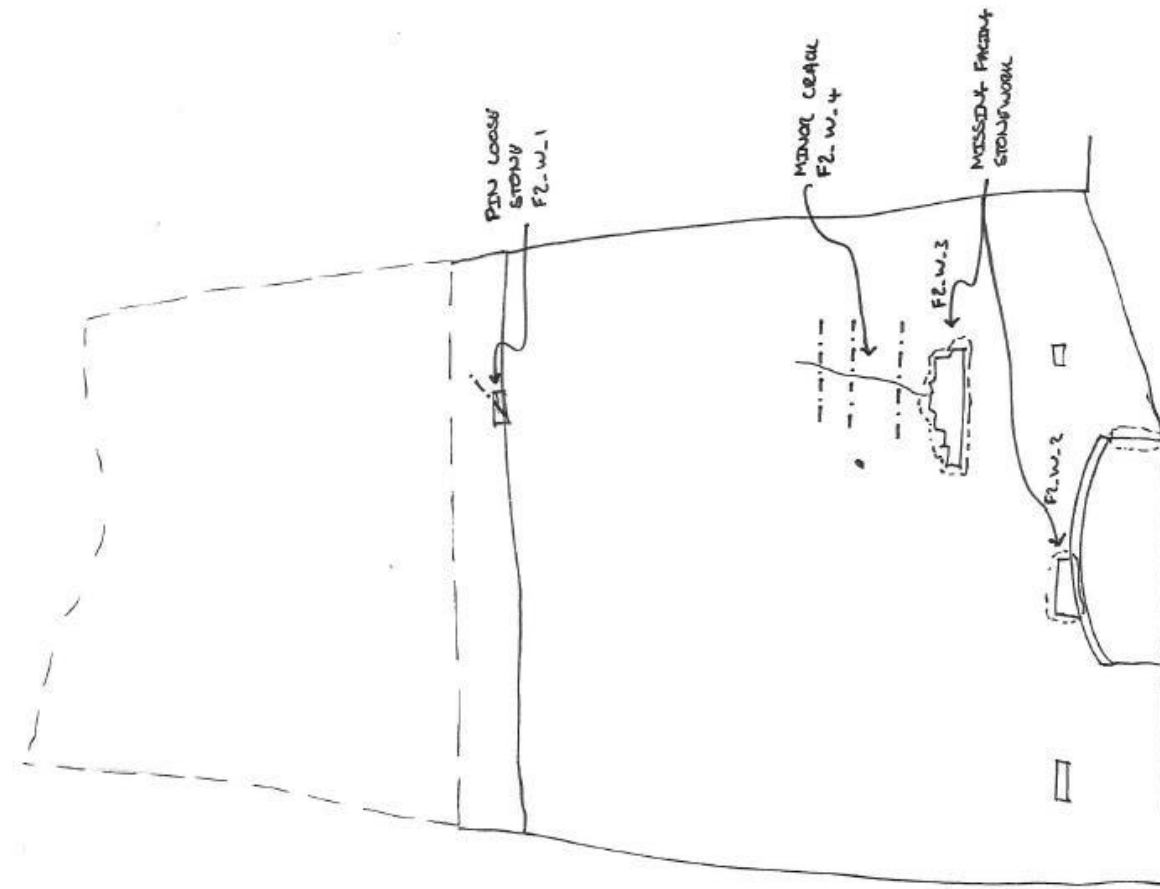
Long Term Works

Location	Item	Description	Product Example	Height	Anticipated Access	No Units	Unit Cost	Total Cost
<p>The drawing shows a stone wall with several annotations:</p> <ul style="list-style-type: none"> FL-S-1: 500mm HEIGHT OF FACED STONY TO BE DISMANTLED & REBUILT (top left corner) LARGE OPEN CRACK FL-S-6-10: A large crack running horizontally across the middle of the wall. 3rd MEDIUM STUMPS FL-S-3: Three small circular features on the wall. MEDIUM STUMP FL-S-2: A single circular feature on the right side of the wall. PIW FACED AREA STONES FL-S-11: A section of the wall at the bottom left. LARGE OPEN CRACK FL-S-6-10: A second large crack running horizontally across the lower middle of the wall. APPROX DATUM LINE: A horizontal line at the base of the wall. <p>A scale bar on the right indicates 0, 1, 2, and 3 units.</p>								

Neath Abbey Ironworks

Long Term Works

Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost
West Elevation									
F2_W_1	Loose / displaced stone	Stone to be rebbed and pinned with 500mm long 12mm dia stainless steel bars grouted in	NA	10m	Cherry picker / roped access	1	No	140	140.00
F2_W_2	Missing facing stonework	Void to be faced with a skin of creasing tiles set back from the face of the stonework by 50mm. Colour to be agreed on site to contrast stonework. Behind facing, mortar to be placed by hand to fill voids as far back as practical. (Poured grout not to be used to fill voids)	NA	1m	Scaffold tower	0.25	m ²	250	62.50
F2_W_3				4m	Scaffold tower	0.5	m ²	250	125.00
F2_W_4	Minor crack	Crack to be stitched with 2m long 6mm dia stainless steel bars resin fixed into stonework joints either side of crack	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/	5m	Scaffold tower	3	No	140	420.00
Access Provision						1	Item	1,000.00	1,000.00



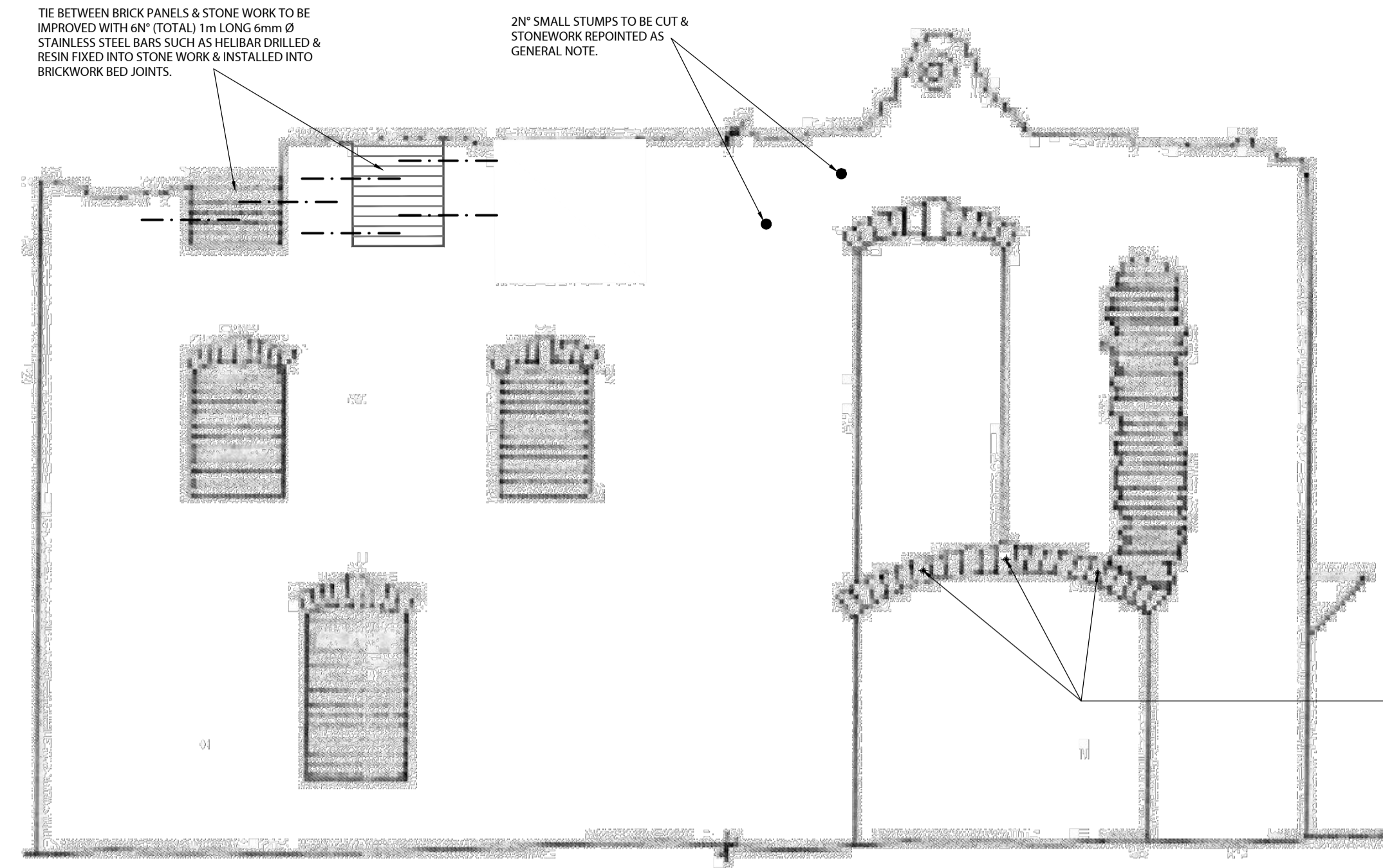
Neath Abbey Ironworks			Long Term Works							
Location	Item	Description	Product Example	Height	Anticipated Access	No	Units	Unit Cost	Total Cost	
General Items, Allowances and Contingency										
LT_G_1	Loose / displaced stone	Stone to be rebedded and pinned with 500mm long 12mm dia stainless steel bars grouted in	NA			20	No	140.00	2,800.00	
LT_G_2	Minor vegetation and debris	Area to be cleared of all vegetation (ivy and brambles) and debris	NA			100	m ²	15.00	1,500.00	
LT_G_3	General minor stitching	To be stitched with 2m long 6mm dia stainless steel bars resin fixed into stonework joints either side of crack	https://www.helifix.co.uk/products/remedial-products/helibar-remedial/			20	No	140.00	2,800.00	
LT_G_4	General significant stitching	To be stitched with 16mm dia 2.5m long Cintec anchors	https://cintec.com/			5	No	700.00	3,500.00	
LT_G_5	General pinning	Loose stones to be pined with 500mm long 12mm dia stainless steel bars grouted in	NA			15	No	140.00	2,100.00	
LT_G_6	Repointing	Allowance for piecemeal recessed repointing as general note	NA			25	m ²	150.00	3,750.00	
LT_G_7	Small stumps	Small stumps to be cut out and stonework repointed as general note	NA			15	No	100.00	1,500.00	
LT_G_8	Missing facing stonework	Void to be faced with a skin of creasing tiles set back from the face of the stonework by 50mm. Colour to be agreed on site to contrast stonework. Behind facing, mortar to be placed by hand to fill voids as far back as practical. (Poured grout not to be used to fill voids)	NA			5	m ²	250.00	1,250.00	
LT_G_9	Investigation cores	1.5m long 50mm diameter cores through masonry (in facing stonework remove 1 No stone and start core on back face) to determine construction of furnaces. Done in pairs, one from inside and one from outside.	NA			4	No	155.00	620.00	
LT_G_10		5m long 50mm diameter cores through masonry (in facing stonework remove 1 No stone and start core on back face) to determine construction of furnaces.	NA			2	No	520.00	1,040.00	
LT_G_11	General contingency		NA				%	see summary		

Neath Abbey Ironworks

SUMMARY

Item	Description			£			
1	Urgent Works			14,919.30			
2	Short Term Works			105,320.82			
3	Long Term Works			348,218.64			
	TOTAL			<u>468,458.76</u>			
	<u>Notes:</u>						
1	Costs based as at 2nd Quarter 2019						
2	No allowance for future inflation						
3	Excluding vat						
4	No allowance for statutory and professional fees						
5	No allowance for Archaeological watching and standing time						
6	Access allowed for as described (combination of traditional scaffold, cherry picker, scaffold towers and rope access)						

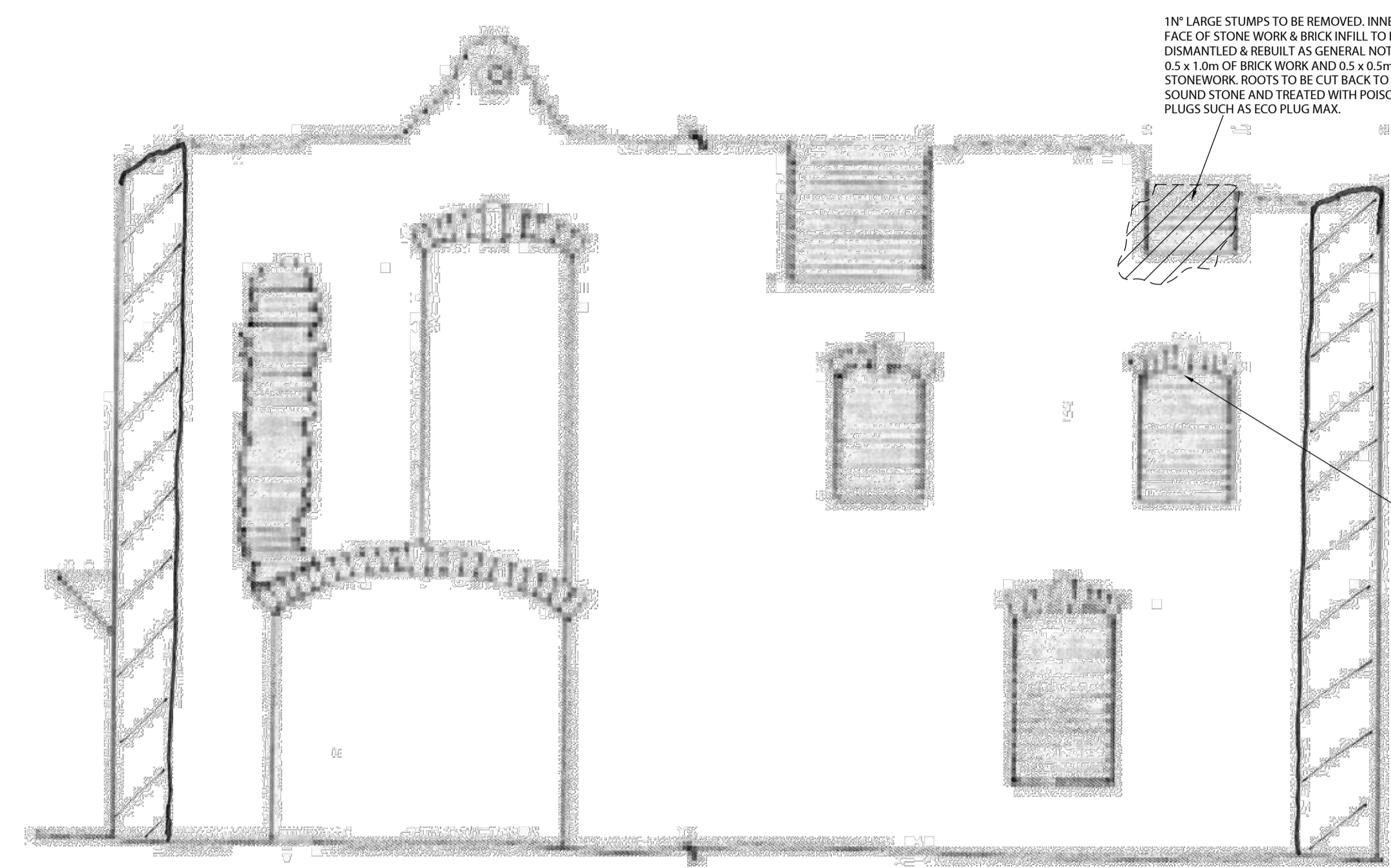
Appendix B – Engine Manufactory Drawings



EXTERNAL (A) NORTH ELEVATION

- NORTH ELEVATION GENERAL ITEMS**
- ACCESS FOR ALL REPAIRS ANTICIPATED TO BE BY CHERRY PICKER OR ALUMINIUM SCAFFOLD TOWERS.
 - 5-10% IVY COVER TO BE REMOVED.
 - REBED LOOSE STONES AT WALL HEAD ALLOW APPROX 10N°.
 - ALLOW FOR PIECEMEAL REPOINTING AS GENERAL NOTE TO 10-20% OF ELEVATIONS.

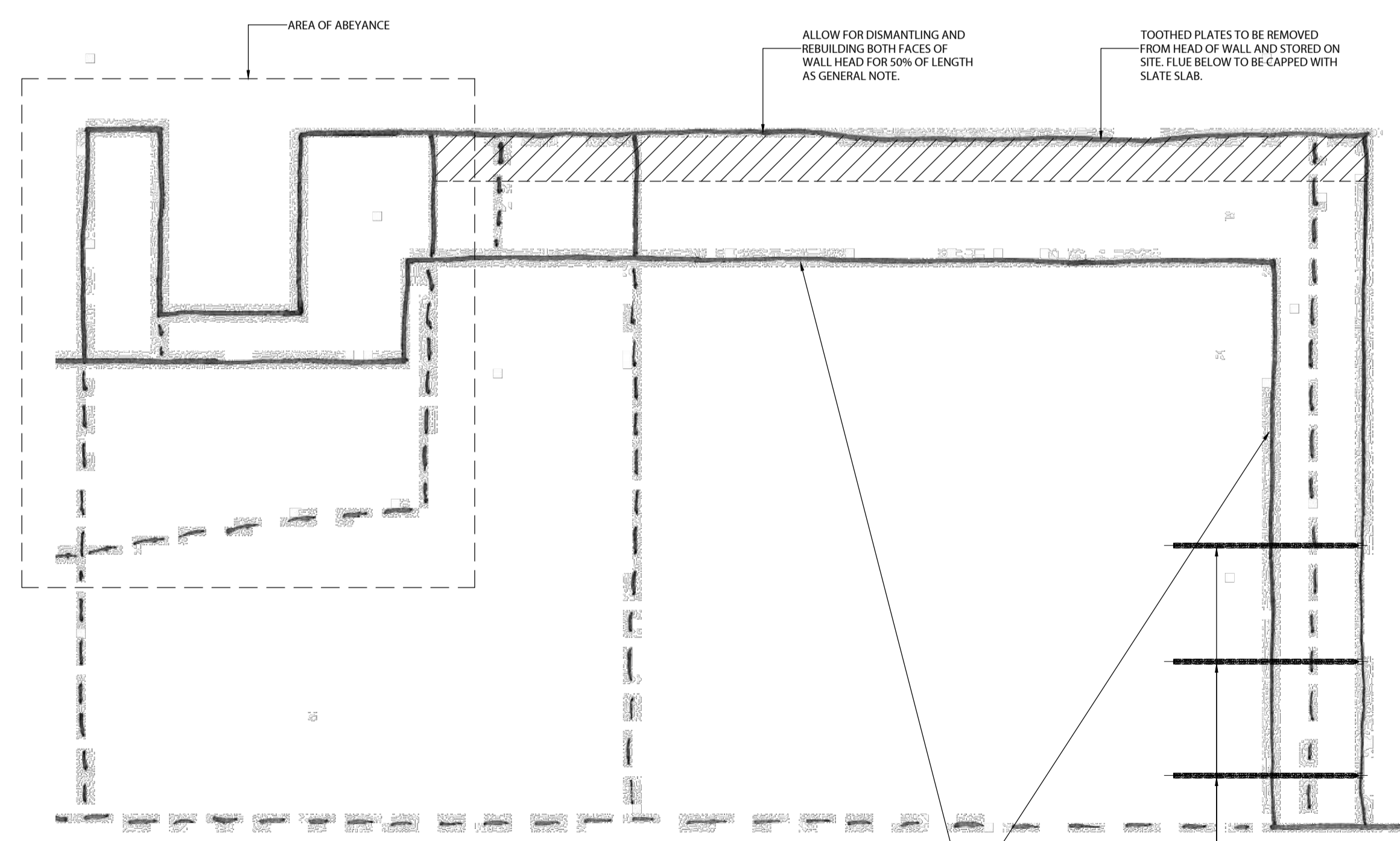
ARCH SOFFIT CRACK TO BE REPAIRED WITH 3N° 12mm Ø 500mm LONG CINTEC ANCHORS OR SIMILAR APPROVED. CRACK TO BE DEEP REPOINTED.



INTERNAL (B) NORTH ELEVATION

1N° LARGE STUMPS TO BE REMOVED. INNER FACE OF STONE WORK & BRICK INFILL TO BE DISMANTLED & REBUILT AS GENERAL NOTE. 0.5 x 1.0m OF BRICK WORK AND 0.5 x 0.5m STONEMASONRY. ROOTS TO BE CUT BACK TO SOUND STONE AND TREATED WITH POISON PLUGS SUCH AS ECO PLUG MAX.

DRY PACK BETWEEN TIMBER LINTEL AND STONEMASONRY OVER.



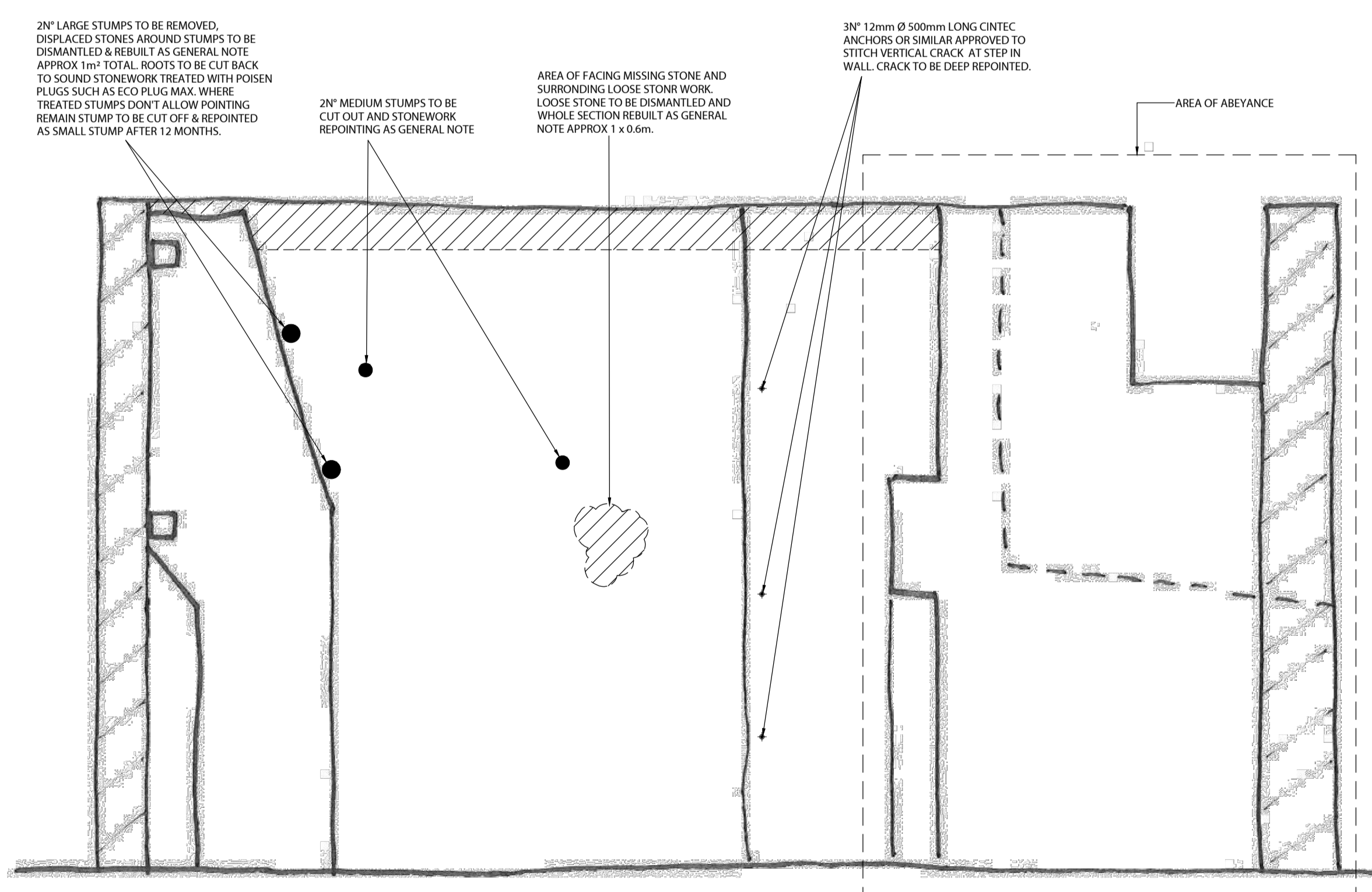
EXTERNAL (C) SOUTH ELEVATION

- EXTERNAL SOUTH ELEVATION GENERAL NOTES**
- ACCESS IS ANTICIPATED TO BE BY CHERRY PICKER AND TRADITIONAL SCAFFOLD TO INSIDE FACE.
 - 30-40% VEGETATION COVER TO BE REMOVED (6.4.2017).
 - ALLOW FOR PIECEMEAL REPOINTING AS GENERAL NOTE TO 70-80% OF ELEVATION (15-17m).

- INTERNAL SOUTH ELEVATION GENERAL NOTES**
- ACCESS IS ANTICIPATED TO BE BY TRADITIONAL SCAFFOLD TO THE WHOLE ELEVATION.
 - ALLOW FOR PIECEMEAL REPOINTING AS GENERAL NOTE TO 40-50% OF ELEVATION.

ADJACENT BUILDING OBSCURED MAJORITY OF WALL

ANCHORS DESCRIBED ON INTERNAL EAST ELEVATION.



INTERNAL (D) SOUTH ELEVATION

2N° LARGE STUMPS TO BE REMOVED. DISPLACED STONES AROUND STUMPS TO BE DISMANTLED & REBUILT AS GENERAL NOTE APPROX 1m² TOTAL. ROOTS TO BE CUT BACK TO SOUND STONEMASONRY TREATED WITH POISON PLUGS SUCH AS ECO PLUG MAX. WHERE TREATED STUMPS DON'T ALLOW POINTING REMAIN STUMP TO BE CUT OFF & REPOINTED AS SMALL STUMP AFTER 12 MONTHS.

2N° MEDIUM STUMPS TO BE CUT OUT AND STONEMASONRY REPOINTING AS GENERAL NOTE

AREA OF FACING MISSING STONE AND SURROUNDING LOOSE STONEMASONRY. LOOSE STONE TO BE DISMANTLED AND WHOLE SECTION REBUILT AS GENERAL NOTE APPROX 1 x 0.6m.

3N° 12mm Ø 500mm LONG CINTEC ANCHORS OR SIMILAR APPROVED TO STITCH VERTICAL CRACK AT STEP IN WALL. CRACK TO BE DEEP REPOINTED.

- NOTES**
1. This drawing is copyright and may not be reproduced without the permission of Mann Williams.
 2. All drawings are to be read in conjunction with the project specification with all works carried out in accordance with the latest British Standards and codes of practice.
 3. Any ambiguities or discrepancies between this drawing and any other information given elsewhere must be reported to Mann Williams for clarification before work commences.
 4. All dimensions to be checked on site and any discrepancies reported to the engineer before work commences.
 5. Only figured or calculated dimensions should be used and no drawing, in any format should be scaled.
- GENERAL NOTES:**
- SMALL STUMPS**
- Stumps in masonry with little or no displacement to masonry and minor anticipated root structure.
- Cut off stump and any visible roots at place of masonry and chase out of joints to 100mm depth.
 - Avoid removing sound pointing and stone work wherever possible.
 - Repoint patches as piecemeal repointing note.
- MEDIUM STUMPS**
- Stumps in masonry over 25mm Ø with little or no displacement to masonry but significant anticipated root structure.
- Cut off stump as close to wall as possible leaving 40mm length 25mm Ø.
 - Treat with poison plugs such as Eco Plug Max.
 - 12months later cut off and repoint as small stump.
- DISMANTLED & REBUILT MASONRY**
- Loose sections of masonry not possible to consolidate in situ.
- Section to be photographed, stones / bricks numbered & recorded.
 - Loose stones / bricks to be carefully dismantled propping masonry above as required.
 - Loose core work & deleterious materials such as roots to be removed as far as possible without removing more face work.
 - Core & face work to be rebuilt in lime mortar. Face work to match existing with stone / bricks in same location as existing but made true & straight.
- PIECEMEAL REPOINTING**
- Sections of generally sound masonry with a proportion of missing or loose pointing.
- Loose pointing and any accumulated materials to be removed by hand / brush.
 - Any visible roots to be removed / cut back to the face of good pointing.
 - Avoid removing sound pointing wherever possible.
 - Reprint in lime mortar to match original pointing where visible. Colour etc to be agreed following on site sample.
- IVY COVER**
- At the time of the inspection the majority of the masonry was clear of vegetation however some ivy cover remained.
- Where ivy is noted for removal consideration should be given to potential defects obscured during the inspection.
 - These should be allowed for even if ivy clearance works are undertaken by the client.
- MECHANICAL TOOLS**
- All masonry works to be undertaken with hand tools only.
- SCHEDULED ANCIENT MONUMENT**
- This structure is a scheduled ancient monument and as such no works should be undertaken other than with scheduled monument consent.
 - During all works care must be taken to avoid unnecessary disturbances to the monument.

REV	DESCRIPTION	BY	DATE
P1	PRELIMINARY ISSUE	MH	30.04.19

P- PRELIMINARY T- TENDER C- CONSTRUCTION

PROJECT
NEATH ABBEY IRONWORKS

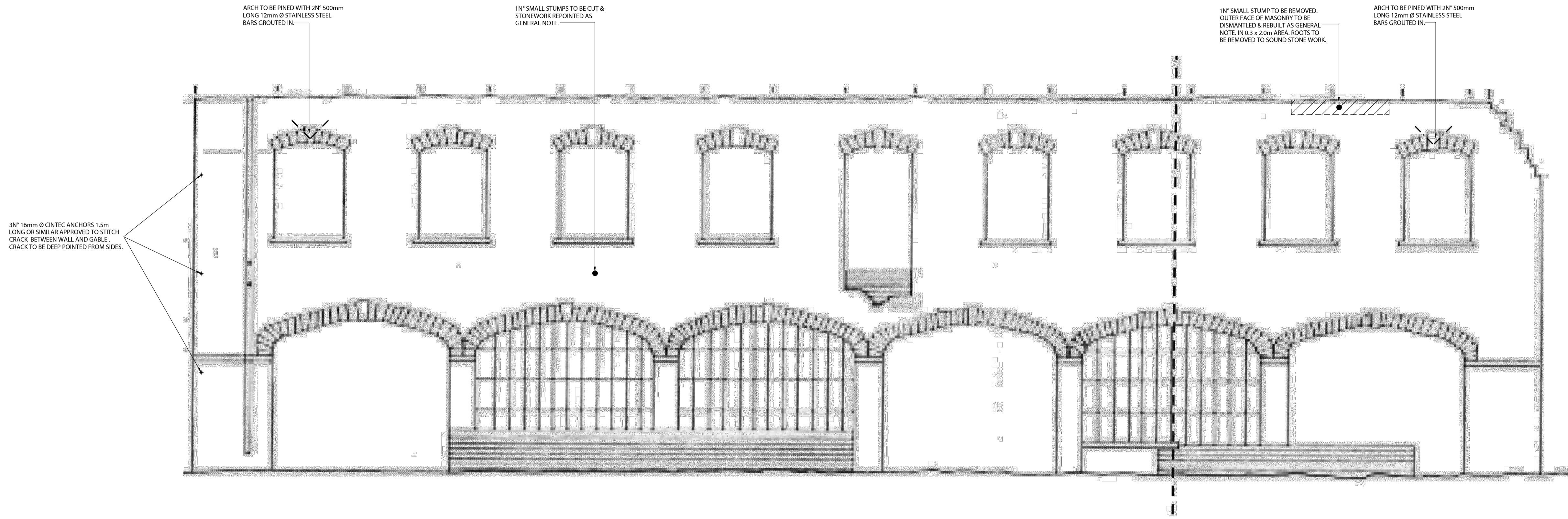
TITLE
PROPOSED ENGINE MANUFACTORY ELEVATIONS 1 OF 5

MANN WILLIAMS
CONSULTING CIVIL AND STRUCTURAL ENGINEERS
53 MOUNT STUART SQUARE
CARDIFF CF10 5LR
T 02920 480333
F 02920 435920
E cardiff@mannwilliams.co.uk

DRAWN	CHKD	SIZE	SCALE	DATE
MH	TH	A1	1:50	24.04.19

STATUS
PRELIMINARY

PROJECT	DRAWING	REV
9446	011	P1



- GENERAL ELEVATION ITEMS**
- ACCESS FOR ALL REPAIRS ANTICIPATED TO BE BY CHERRY PICKERS OR ALUMINIUM SCAFFOLD TOWERS
 - 0.5% IVY COVER TO BE REMOVED.
 - REBED LOOSE STONES AT WALL HEAD. ALLOW FOR APPROX 20 BY.
 - ALLOW FOR PIECEMEAL REPOINTING AS GENERAL NOTES TO 0-10% OF ELEVATION.

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 - All dimensions to be checked on site and any discrepancies reported to the engineer before work commences.
 - Only figured or calculated dimensions should be used and no drawing, in any format should be scaled.

- GENERAL NOTES:**
- SMALL STUMPS**
- Stumps in masonry with little or no displacement to masonry and minor anticipated root structure.
- Cut off stump and any visible roots at place of masonry and chase out of joints to 100mm depth.
 - Avoid removing sound pointing and stone work wherever possible.
 - Repoint patches as piecemeal repointing note.
- MEDIUM STUMPS**
- Stumps in masonry over 25mm Ø with little or no displacement to masonry but significant anticipated root structure.
- Cut off stump as close to wall as possible leaving 60mm length 25mm Ø.
 - Treat with poison plugs such as Eco Plug Max.
 - 12months later cut off and repoint as small stump.

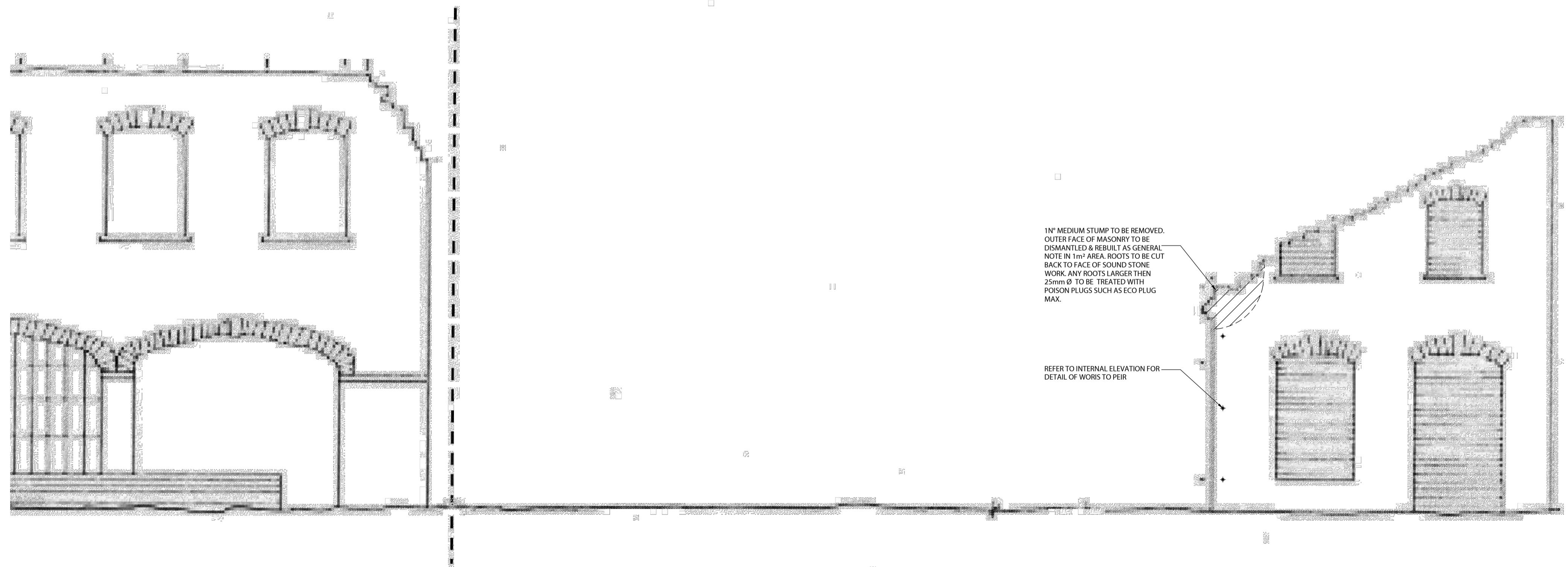
- DISMANTLED & REBUILT MASONRY**
- Loose sections of masonry not possible to consolidate in situ.
- Section to be photographed, stones / bricks numbered & recorded.
 - Loose stones / bricks to be carefully dismantled propping masonry above as required.
 - Loose core work & deleterious materials such as roots to be removed as far as possible without removing more face work.
 - Core & face work to be rebuilt in lime mortar. Face work to match existing with stone / bricks in same location as existing but made true & straight.

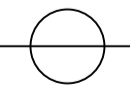
- PIECEMEAL REPOINTING**
- Sections of generally sound masonry with a proportion of missing or loose pointing.
- Loose pointing and any accumulated materials to be removed by hand / brush.
 - Any visible roots to be removed / cut back to the face of good pointing.
 - Avoid removing sound pointing wherever possible.
 - Repoint in lime mortar to match original pointing where visible. Colour etc to be agreed following on site sample.

- IVY COVER**
- At the time of the inspection the majority of the masonry was clear of vegetation however some ivy cover remained.
- Where ivy is noted for removal consideration should be given to potential defects obscured during the inspection.
 - These should be allowed for even if ivy clearance works are undertaken by the client.

- MECHANICAL TOOLS**
- All masonry works to be undertaken with hand tools only.

- SCHEDULED ANCIENT MONUMENT**
- This structure is a scheduled ancient monument and as such no works should be undertaken other than with scheduled monument consent.
 - During all works care must be taken to avoid unnecessary disturbances to the monument.



EXTERNAL  EAST ELEVATION

REV	DESCRIPTION	BY	DATE
P1	PRELIMINARY ISSUE	MH	30.04.19

P- PRELIMINARY T- TENDER C- CONSTRUCTION

PROJECT
NEATH ABBEY IRONWORKS

TITLE
PROPOSED ENGINE MANUFACTORY ELEVATIONS 2 OF 5

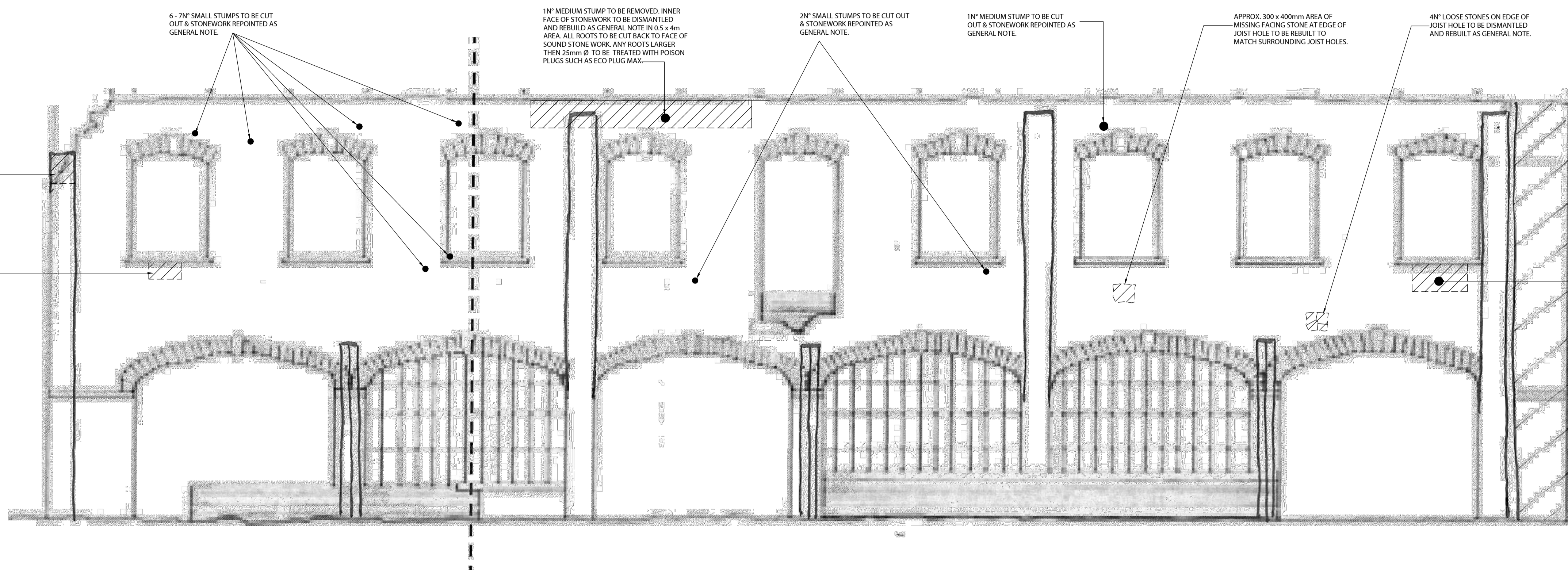


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DRAWN	CHKD	SIZE	SCALE	DATE
MH	TH	A1	1:50	24.04.19

STATUS
PRELIMINARY

PROJECT	DRAWING	REV
9446	012	P1



GENERAL ELEVATION ITEMS

- ACCESS FOR ALL REPAIRS ANTICIPATED TO BE BY CHERRY PICKERS OR ALUMINIUM SCAFFOLD TOWERS
- 10-20% IVY COVER TO BE REMOVED
- ALLOW FOR PIECEMEAL REPOINTING AS GENERAL NOTES TO 20-30% OF ELEVATION.

NOTES

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- All dimensions to be checked on site and any discrepancies reported to the engineer before work commences.
- Only figured or calculated dimensions should be used and no drawing, in any format should be scaled.

GENERAL NOTES:

SMALL STUMPS

Stumps in masonry with little or no displacement to masonry and minor anticipated root structure.

- Cut off stump and any visible roots at place of masonry and chase out of joists to 100mm depth.
- Avoid removing sound pointing and stone work wherever possible.
- Repoint patches as piecemeal repointing note.

MEDIUM STUMPS

Stumps in masonry over 25mm Ø with little or no displacement to masonry but significant anticipated root structure.

- Cut off stumps as close to wall as possible leaving 40mm length 25mm Ø.
- Treat with poison plugs such as Eco Plug Max.
- 12months later cut off and repoint as small stump.

DISMANTLED & REBUILT MASONRY

Loose sections of masonry not possible to consolidate in situ.

- Section to be photographed, stones / bricks numbered & recorded.
- Loose stones / bricks to be carefully dismantled propping masonry above as required.
- Loose core work & deleterious materials such as roots to be removed as far as possible without removing more face work.
- Core & face work to be rebuilt in lime mortar. Face work to match existing with stone / bricks in same location as existing but made true & straight.

PIECEMEAL REPOINTING

Sections of generally sound masonry with a proportion of missing or loose pointing.

- Loose pointing and any accumulated materials to be removed by hand / brush.
- Any visible roots to be removed / cut back to the face of good pointing.
- Avoid removing sound pointing wherever possible.
- Repoint in lime mortar to match original pointing where visible. Colour etc to be agreed following on site sample.

IVY COVER

At the time of the inspection the majority of the masonry was clear of vegetation however some ivy cover remained.

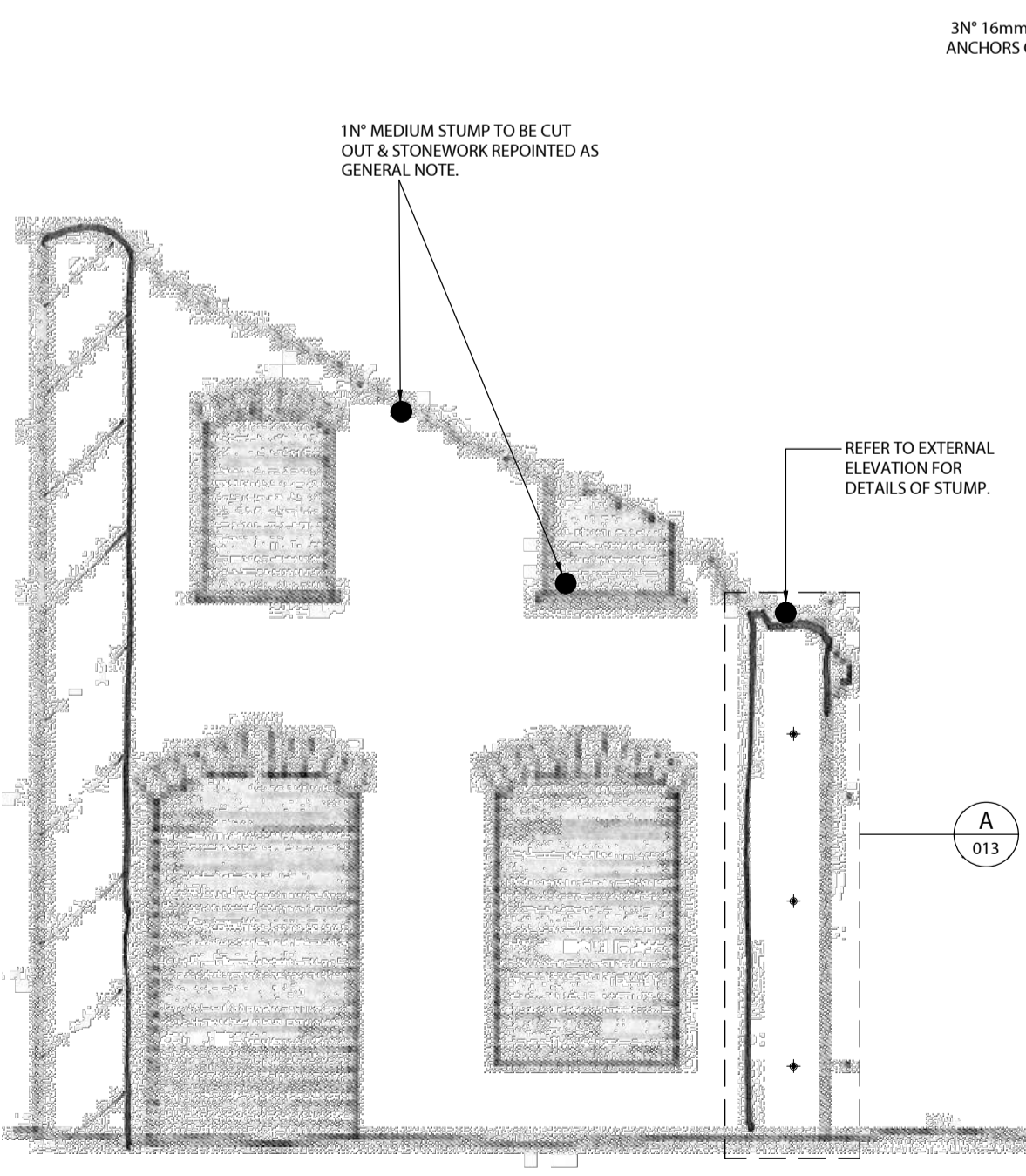
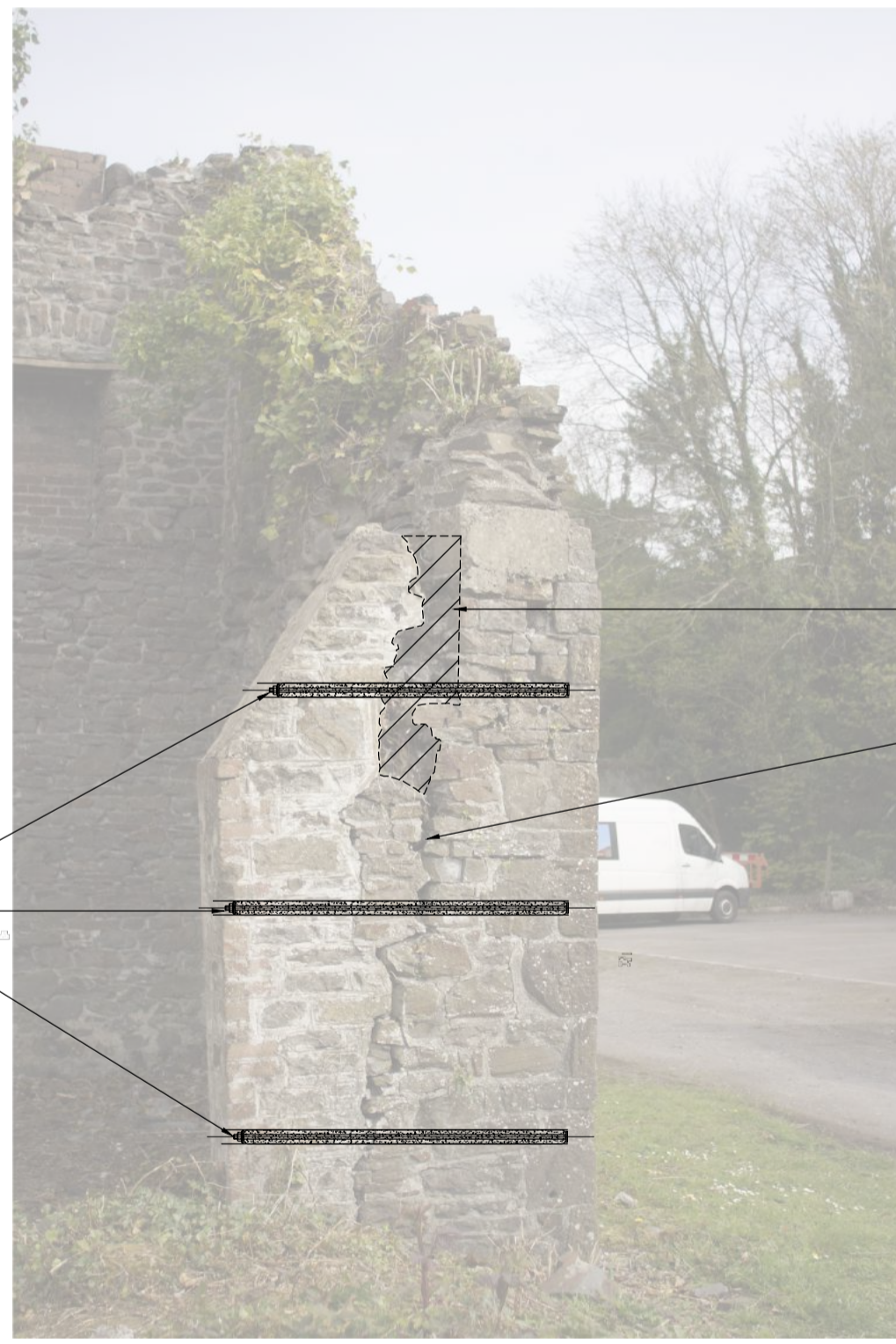
- Where ivy is noted for removal consideration should be given to potential defects obscured during the inspection.
- These should be allowed for even if ivy clearance works are undertaken by the client.

MECHANICAL TOOLS

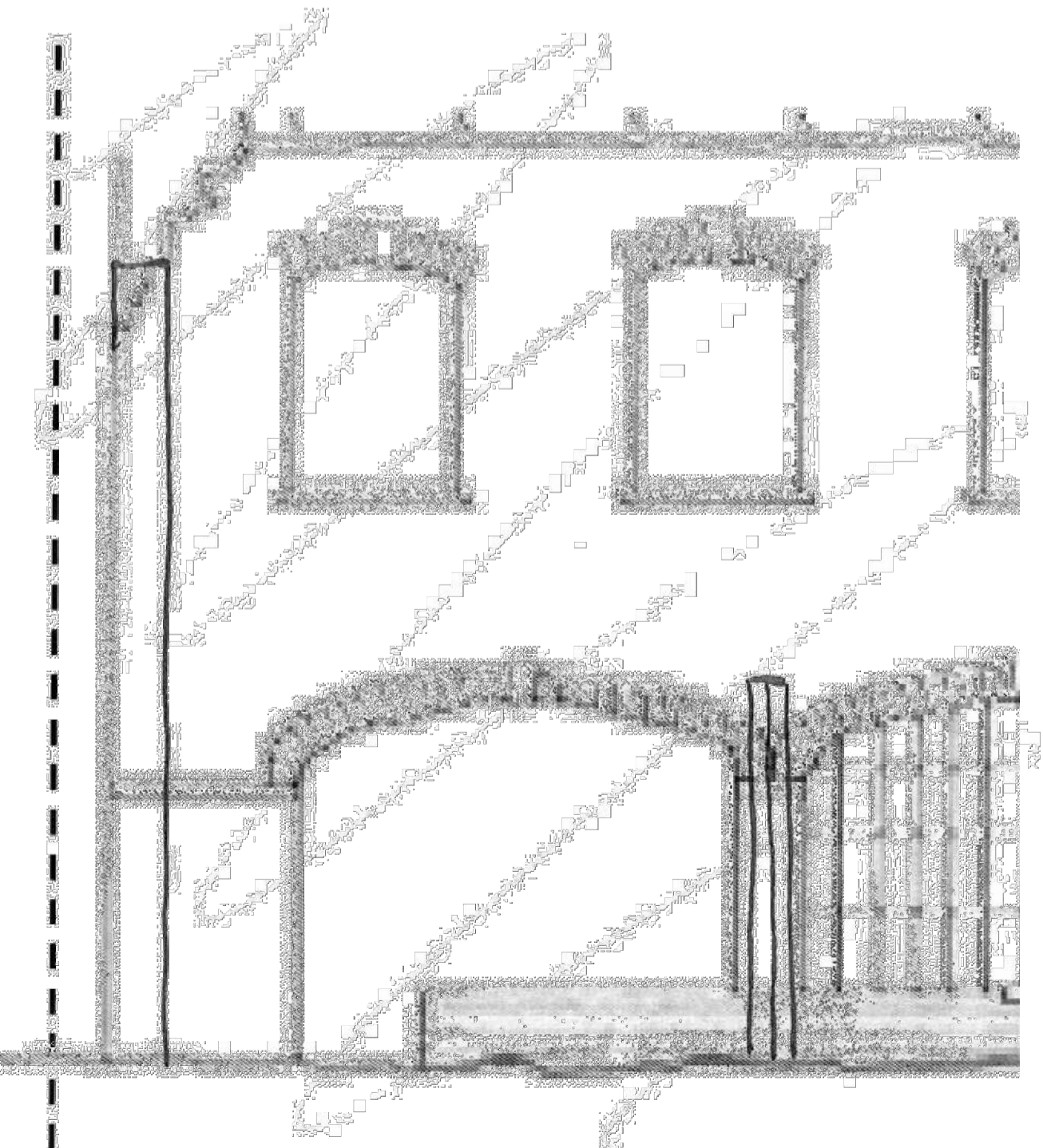
- All masonry work to be undertaken with hand tools only.

SCHEDULED ANCIENT MONUMENT

- This structure is a scheduled ancient monument and as such no works should be undertaken other than with scheduled monument consent.
- During all works care must be taken to avoid unnecessary disturbances to the monument.



DETAIL A 013 REPAIRS PEIR



INTERNAL EAST ELEVATION

REV	DESCRIPTION	BY	DATE
P1	PRELIMINARY ISSUE	MH	30.04.19

P- PRELIMINARY T- TENDER C- CONSTRUCTION

PROJECT
NEATH ABBEY IRONWORKS

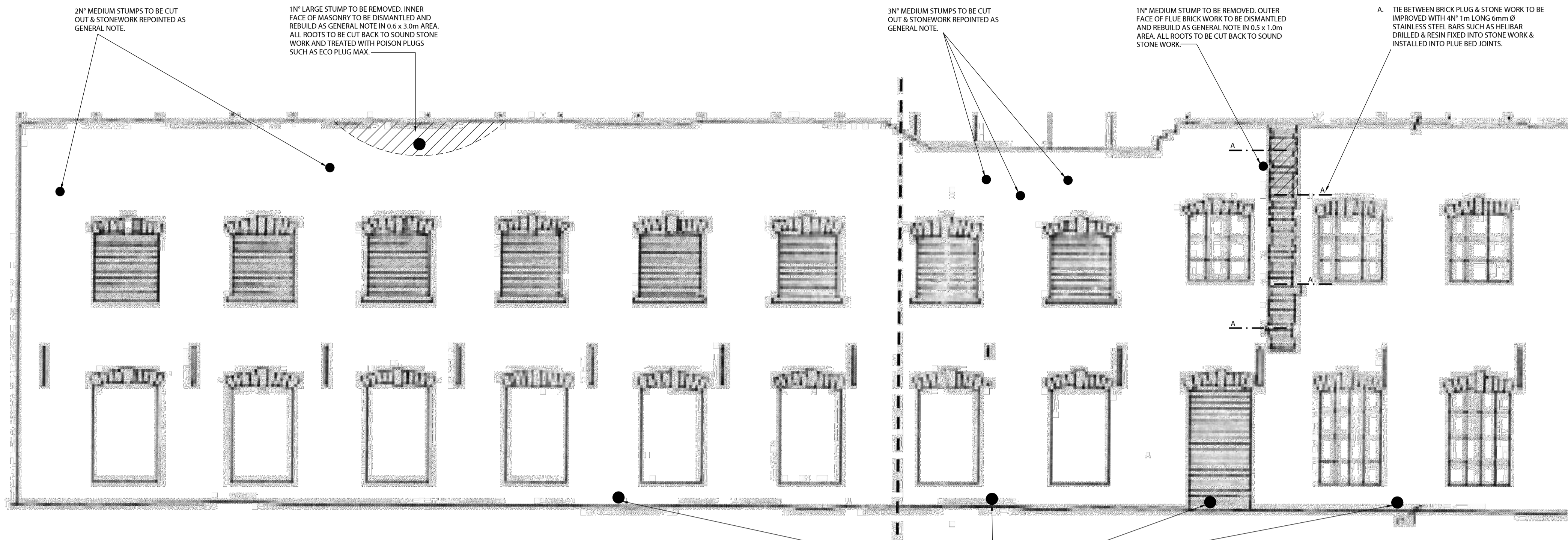
TITLE
PROPOSED ENGINE MANUFACTORY ELEVATIONS 3 OF 5

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MH	TH	A1	1:50	24.04.19

PRELIMINARY

PROJECT	DRAWING	REV
9446	013	P1



- GENERAL ELEVATION NOTES**
- ACCESS FOR ALL REPAIRS ANTICIPATED TO BE BY CHERRY PICKERS OR ALUMINIUM SCAFFOLD TOWERS.
 - 10-20% IVY COVER TO BE REMOVED.
 - ALLOW FOR PIECEMEAL REPOINTING AS GENERAL NOTES TO 10-20% OF ELEVATION.
 - REBED LOOSE STONES @ WALL HEAD ALLOW FOR 30%.

- NOTES**
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 - All dimensions to be checked on site and any discrepancies reported to the engineer before work commences.
 - Only figured or calculated dimensions should be used and no drawing, in any format should be scaled.

- GENERAL NOTES:**
- SMALL STUMPS**
- Stumps in masonry with little or no displacement to masonry and minor anticipated root structure.
- Cut off stump and any visible roots at place of masonry and chase out of joints to 100mm depth.
 - Avoid removing sound pointing and stone work wherever possible.
 - Repoint patches as piecemeal repointing note.

- MEDIUM STUMPS**
- Stumps in masonry over 25mm Ø with little or no displacement to masonry but significant anticipated root structure.
- Cut off stump as close to wall as possible leaving 40mm length 25mm Ø.
 - Treat with poison plugs such as Eco Plug Max.
 - 12months later cut off and repoint as small stump.

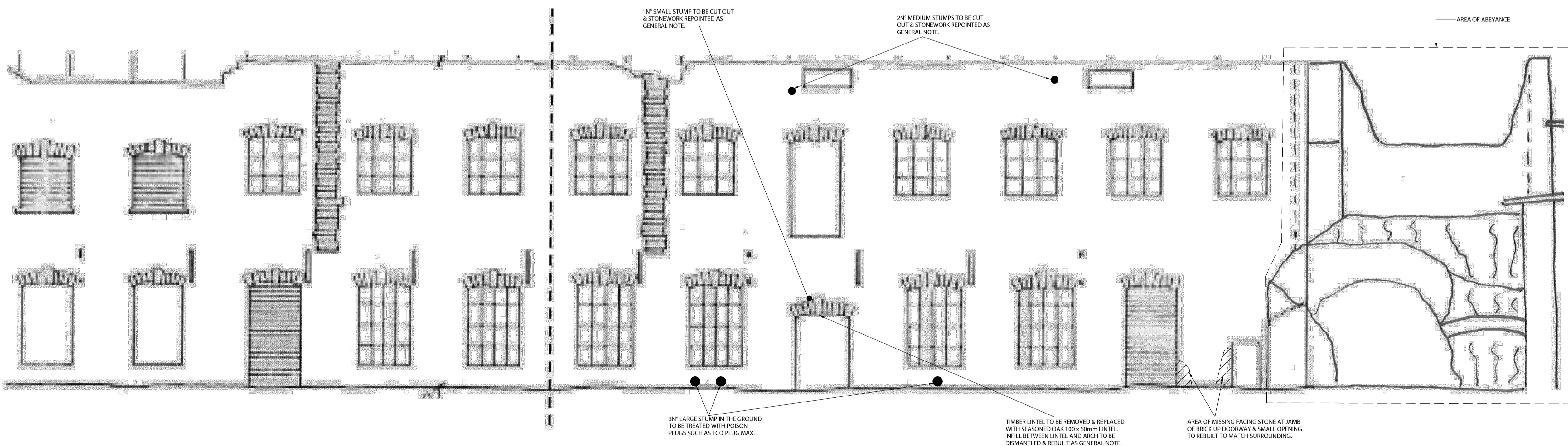
- DISMANTLED & REBUILT MASONRY**
- Loose sections of masonry not possible to consolidate in situ.
- Section to be photographed, stones / bricks numbered & recorded.
 - Loose stones / bricks to be carefully dismantled propping masonry above as required.
 - Loose core work & deleterious materials such as roots to be removed as far as possible without removing more face work.
 - Core & face work to be rebuilt in lime mortar. Face work to match existing with stone / bricks in same location as existing but made true & straight.

- PIECEMEAL REPOINTING**
- Sections of generally sound masonry with a proportion of missing or loose pointing.
- Loose pointing and any accumulated materials to be removed by hand / brush.
 - Any visible roots to be removed / cut back to the face of good pointing.
 - Avoid removing sound pointing wherever possible.
 - Repoint in lime mortar to match original pointing where visible. Colour etc to be agreed following on site sample.

- IVY COVER**
- At the time of the inspection the majority of the masonry was clear of vegetation however some ivy cover remained.
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- MECHANICAL TOOLS**
- All masonry works to be undertaken with hand tools only.

- SCHEDULED ANCIENT MONUMENT**
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 - During all works care must be taken to avoid unnecessary disturbances to the monument.



EXTERNAL WEST ELEVATION

REV	DESCRIPTION	BY	DATE
P1	PRELIMINARY ISSUE	MH	30.04.19

P: PRELIMINARY T: TENDER C: CONSTRUCTION

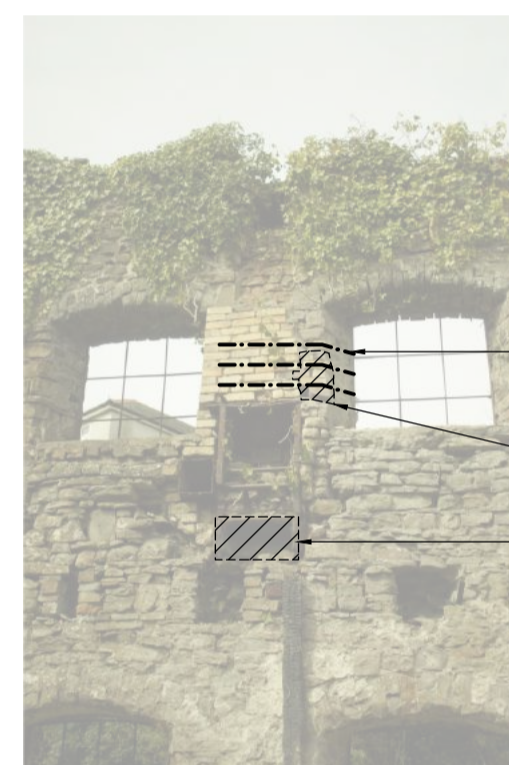
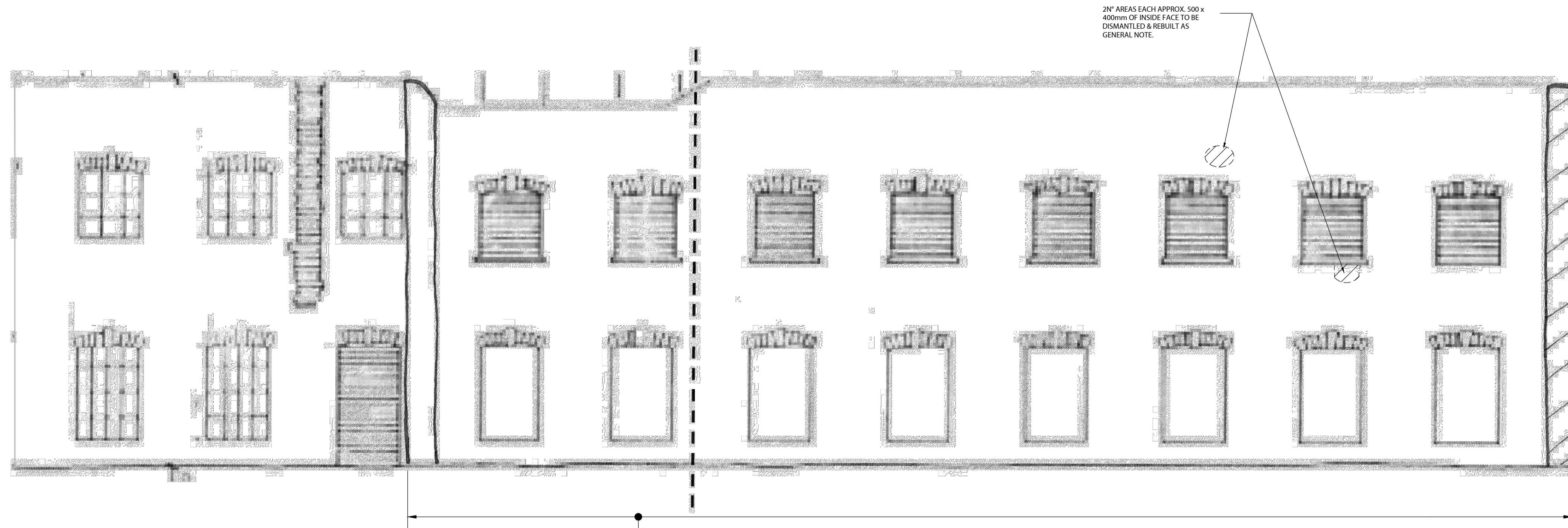
PROJECT: NEATH ABBEY IRONWORKS

TITLE: PROPOSED ENGINE MANUFACTORY ELEVATIONS 4 OF 5

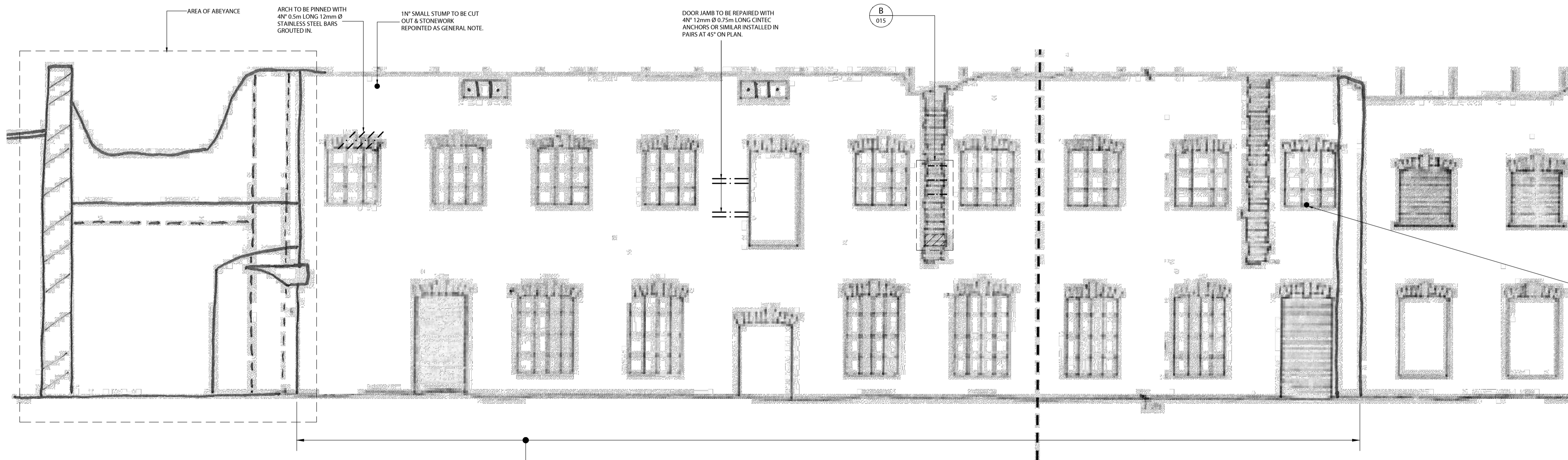
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MH	TH	A1	1:50	24.04.19

PROJECT	DRAWING	REV
9446	014	P1



DETAIL B 015 REPAIRS FIREPLACE



- ALLOW FOR PIECEMEAL REPOINTING AS GENERAL NOTES TO 40-50% OF ELEVATION IN THIS AREA
- 10-20% IVY COVER TO BE REMOVED IN THIS AREA
- ACCESS FOR REPAIRS IN THIS AREA ANTICIPATED TO BE BY CHERRY PICKERS OR ALUMINIUM SCAFFOLD TOWERS BUT EXTENT OF REPOINTING MAY MAKE TRADITIONAL SCAFFOLD MORE ECONOMIC.

INTERNAL WEST ELEVATION

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GENERAL NOTES:

SMALL STUMPS

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MEDIUM STUMPS

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MECHANICAL TOOLS

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SCHEDULED ANCIENT MONUMENT

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REV	DESCRIPTION	BY	DATE
P1	PRELIMINARY ISSUE	MH	30.04.19

P- PRELIMINARY T- TENDER C- CONSTRUCTION

PROJECT
NEATH ABBEY IRONWORKS

TITLE
PROPOSED ENGINE MANUFACTORY ELEVATIONS 5 OF 5

DRAWN	CHKD	SIZE	SCALE	DATE
MH	TH	A1	1:50	24.04.19

PROJECT	DRAWING	REV
9446	015	P1