



ALEXANDRA ROAD FOOTBRIDGE

REPLACEMENT OPTIONS REPORT

CPF5467



YGC
Council Offices
Shirehall Street
Caernarfon
LL55 1SH

Document Control Sheet

Document Author:	Jonathan Chapman
Project Manager:	Jonathan Chapman

Revision History

Date	Version No.	Summary of Changes
10/05/2016	0.01	First Issue - Draft
09/06/16	0.02	Second Issue – Cost Estimate & Embeded Photographs included
14/06/16	0.03	Minor revision to 'Public Open Space' description following Clients Comments 13/06

Approvals

Approved by	Signature	Date	Version
O.R. Jones		10/05/2016	0.01
O.R. Jones		09/06/2016	0.02

Distribution

Name	Title	Date	Version
Nina Davies	Countryside Services (Powys)	14/6/2016	0.03

© 2016-17 Gwynedd Council / YGC. All Rights Reserved.

Copyright in any or all of this documentation belongs to Gwynedd Council / YGC of Council Offices, Shirehall Street, Caernarfon, Gwynedd, LL55 1SH (the 'Owner') and may not be used, sold, transferred, copied or reproduced in whole or in part, in any manner of form or on any media to any person other than in accordance with the terms of the Owner's agreement or otherwise without the prior written consent of the Owner.



Summary

YGC were commissioned by Powys Council to consider possible options for the replacement of the footbridge in Llandrindod Wells known as Alexandra Road Footbridge. This report summarises the possible options, cost estimates for the options and the possible restrictions on the construction of compliant options.

The conclusion from the report as to the 'best' option has to be made by Powys, as all options carry some degree of balance be it in cost or design compliance. This is primarily as the height of the bridge above the adjacent land requires 125m of approach ramp.

The report recommended option (Option 3) is one of compromise which incorporates a replacement bridge with improved geometry over the railway, but maintaining stepped approaches as the previous bridge, but with provision of landings where DDA compliant ramps can be incorporated in the future when funding can be committed to the scheme. This option has an estimated cost of £290,500.

Site Location

The location of the proposed bridge is to follow the line of the original Alexandra Road Footbridge. This bridge is located in a suburban area of the town of Llandrindod running from the end of a residential road over the single track Heart of Wales Railway line to an area of public open space (recreational land). (Refer to Appendix A for Drawing of Original Structure.)



Bridge Location

The original bridge at the location is typical of 1960s railway lattice construction incorporating lightweight sections, pedestrian height (1.1m high) parapets of open mesh and very slender supports close to the railway track. Access onto the main span to the East is via a seep ramp and to the West over two flights of steep stairs.

The public open space to the west accessed by the footbridge is also accessible from the North through Rock Park using steep tracks and/or stepped access, or from the South along a non

metaled surfaced track of moderate slope. In both instances the bridge is reached across at least 100m of grass field.

To the North of the bridge the public open space is classed as 'Village Green' and as such has restrictions over its use and could not be used for the construction of approaches for a new bridge.



View to 'Village Green' from West end of bridge.

A previous study of users of the original bridge has identified that the desire line from the West end is for users to walk to the North along the boundary fence with the railway, the new bridge should follow this desire line in the exit of any ramps or stairs.

Design Requirements for Footbridges

Publicly owned footbridges are generally designed in accordance with structural Eurocodes and to the requirements of the Design Manual for Roads and Bridges (DMRB). In addition the requirements of stakeholders and user groups should be considered; specifically Network Rail, DDA compliance and Sustrans in this situation.

Primary Design Standards/codes are:

- DMRB BD 29/04 Design Criteria for Footbridges
- DMRB TD19/06 Requirements for Road Restraint Systems
- BS EN 1990 Basis of Structural Design
- BS EN 1991-2 Traffic Loads on Bridges
- BS EN 1993 Design of Steel Structures
- Sustrans Design Manual Chapter 8 - Bridges and other structures (draft)

Network Rail Requirements

Initial correspondence with network rail has been undertaken to determine if any departure can be gained from their requirements for bridge parapets, and to determine fundamental geometry. They have responded that all new footbridges must comply with future line electrification standards and so require a 1.8m high solid infill parapet over the line.

They have also commented: *“With regards to the foot bridge supporting columns, these must be design as to fall outside Network Rail operational boundary otherwise legal easement agreements will be entered into in order to acquire take up of land within the company’s ownership.”* The precedent set by the original bridge having lineside supports would potentially allow a legal easement to be agreed to reinstate supports at these locations, however there is a risk this may take a time to agree and could put short term delivery in jeopardy.

In discussions they have also confirmed clearance over the line should be 5.1m. the original bridge was 5.15m so to allow for construction tolerance and track maintenance the proposed clearance is to be maintained as 5.15m.

Design Standard Requirements

The critical design standards for footbridges which affect the geometry are:

- Design live loading of 5kN/m^2 - This is a feasible loading as the public open space could be used for an event which would fully loads the bridge when over and people leave in one mass.
- Vibration limitations – the vertical and horizontal limitations provided in design codes need to be met as the location of the bridge in a suburban area may be subject to forced vibration by groups of users. To ensure vibration is within design limits the bridge requires sufficient strength and mass.
- Width between parapets is dependent on usage, as a minimum should be 1.5m. (A wider bridge is better for passing of users and 2.0m is a recommended minimum for cycle use.) A narrower bridge similar to the existing could only be produced if access for wheelchair/mobility scooter users is not possible.
- Ramp gradients should be less than 1in12, but the length of ramps have to be kept short between landings (just 2m at 1in12), hence for a bridge crossings the upper level of ramp is usually used (1in20) with ramp lengths between landings kept to a reasonable length. (For buildings this length is defined as 10m, but this is not feasible on large bridge structure where ramps become dominant.)
- Landings should be 1.8m minimum in length.

Bridge Construction Types

The original bridge span was 10.5m, this is the minimum the bridge can span over the railway and as such the bridge construction type is limited to materials which can span this sort of distance. The original steel truss bridge construction type is very appropriate for this sort of span, making efficient use of the steel elements and having a minimum distance from the underside of the deck to the walking surface. Alternative materials such as timber and concrete are more typical to bridges where the walking surface sits on top of the beams and so it is higher above the railway and requires more approach structure to get to the height.

With modern material sections, more appealing trusses can be produced, Vierendeel trusses, which have vertical members rather than diagonals. These are also better to prevent climbing of the truss which is also the bridge parapet.



Vierendeel Truss bridge. Green members provide structural strength as well as forming parapet.

Other alternative types of construction would include ‘statement’ structures such as cable stayed, bowstring arch or suspension bridges. But all these structure types would be more expensive to manufacture and benefit from a viewing point orthogonal to the bridge. In this situation with the bridge crossing a straight section of railway track there is limited locations to view the bridge and statement structures are not considered appropriate.



Longer Span ‘Feature Bridges’ using a Light weight triangular truss (Left) or Bowstring Arch Truss(Right).



Various styles of ‘Feature Bridge’, Generally dependent on balancing two spans around a support with a cable tower.

Modern composite materials (glass-fibre reinforced polymers) GRP provide a further option for the bridge which are virtually maintenance free. Their initial costs are still high due to the specialist nature of the construction, however whole life costs are more favourable; the bridge over a railway (picture below) cost as a scheme £650k and would provide a comparable solution to the original bridge structure (i.e. not DDA compliant). For a DDA compliance with ramps of GRP the costs would be in the order of three times this bridge (approx. £1.8million) and so is not considered further.



GRP Bridge constructed over railway line in slight cutting.

Inspection & Maintenance

Critical costs to be considered in a scheme are the costs for future Inspection and Maintenance. Modern paint systems applied to paintwork can provide up to 60years to major maintenance. With minor maintenance needed after 25 years. As these specialist paint systems are more expensive it may be beneficial only to apply them to the span over the railway. Using a more conventional paint system on the other sections of the bridge where access is easier.

Inspection of bridges is typically carried out every 2 years in accordance with standards, and every 6th year the Principal Inspection needs access to all areas, close enough to touch. As the bridge is on/over railway land, permission and costs would be needed to access the bridge for inspection. By locating the supports for the bridge off network rail land, the cost to undertake inspections can be reduced as only the soffit of the main span would need to be accessed every 6 years.

The provision of a composite bridge would reduce maintenance liabilities even further with limited maintenance needs for the 120year design life. (As the materials are relatively new these low maintenance characteristics for such a long time are not yet substantiated.)

Environmental Considerations & Permissions

The location of the bridge is suburban and adjacent to a tree lined/overgrown bank. No environmental assessments were carried out for this report although it is suspected that there would be little risk of the presence of protected species it would be prudent to undertake an assessment before committing to construction work.

Nesting birds may be present in the overgrown bank which would need to be cleared for any works. This would therefore push the work to be carried out, outside nesting season (March to September). Alternatively work could be carried out at risk, under a watching brief to check for birds as work progresses.

It is unlikely that environmental consent would be required for the works.



Location of Bridge crossing showing vegetation adjacent to support location

The existence of the original bridge at the site means that a replacement can be erected on the same line and of reasonable similarity without the need for planning consent (the bridge is a direct replacement). However if the bridge is significantly changed in visual appearance i.e. a statement structure, or with the addition of significant approach ramp structures there would be a need to gain planning consent.

Planning is likely to be consented to, for the addition of approach ramps, as they provide improved access, however the planning process may take up to three months from submission of the application and should be factored into any delivery programme considering significant change to the structure.

Options Proposed

Having discounted the provision of a statement structure or GRP alternative; and as the need for minimum height over the railway dictates a truss type structure the options available are based purely on accessibility, width and usage limitations.

Four options have been identified

- Option 1 – **Similar to Existing** 1.5m Wide 1.2 high Parapets
- Option 2 – **Full DDA Compliant** 2.0m Wide 1.2 high Parapets
- Option 3 – **Similar to Existing but with Future DDA Compliance Provision** 2m wide 1.2m Parapets
- Option 4 – **DDA Compliant and Cycle Route** 2.5m wide 1.4m high Parapets

(NB in all options the Parapet on the bridge over the railway has to be 1.8m high with solid infill over the track.)

Option 1

The structurally most basic of options is to construct a bridge similar to the original. This would comprise a flat span over the railway between columns built on railway property where the original supports were, with steps on the approaches to the span over the railway.

The proposed bridge would be wider than the original 1500 of 890 between parapets as the extra width provides better compliance with current standards at little extra construction cost.

This option carries risk in the obtaining of permission from Network Rail to reconstruct the columns on their property, and will incur slight additional cost for the requirement of Network Rail line blockades and supervisory staff during the construction.

(Refer to Appendix B for plan and elevation of Option.)

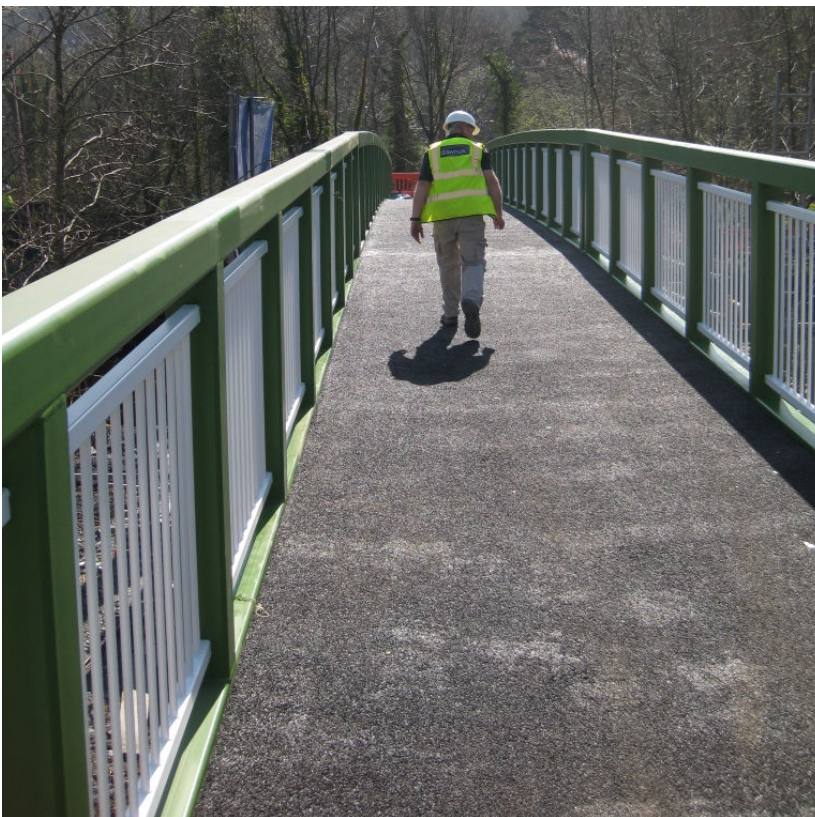
Option 2

This option provides a fully DDA compliant solution which without other limitations should be adopted if at all possible.

The main span over the railway is supported on columns outside the railway boundary providing ease of construction with no need to gain consent to construct on railway property land. In addition the main span can be slightly arched; this achieves the clearance over the railway but starts to reduce the height of the bridge, so slightly reducing the length of approach ramps.

To maintain a shallow gradient of no more than 1in20 this solution requires long lengths of approach ramps, from the public open space they will be a dominant feature looking East. These have potential to be unsightly and as a significant addition to the bridge, planning consent will be required.

The recommended width of the bridge and ramps is 2.0m to allow easy passing of two wheelchairs.



Truss Bridge with 2m width providing sufficient space for passing users.

To save on construction costs it is recommended that the lower length of the approach ramp be constructed by placing an earth embankment rather than steel spans. This embankment can be topsoiled and landscaped in a manner to suit the use of the adjacent land (grass/bushes/trees).

(Refer to Appendix B for plan and elevation of Option.)

Option 3

It is anticipated that as public funds are limited, and use of the original bridge and other routes to the public open space is generally by more able bodied people there may be difficulties in funding the fully DDA compliant option (Option 2). This option provides a bridge similar in alignment and accessibility to the original (Option 1), but with a larger width and landings included in the design to allow for future installation of shallow approach ramps.

This option would be more expensive to construct compared to Option 1 due to the additional landings and greater width, but is unlikely to require planning consent as it would be constructed primarily on the line of the original. With provision for future upgrade to make it DDA compliant, construction could be justified as an interim measure to promptly replace the original bridge with the installation of ramps being possible in the future when further funding can be obtained.

(Refer to Appendix B for plan of proposal, this is similar to Option 2 but without approach ramps included.)

Option 4

This option provides a fully DDA compliant solution with additional provision to suit use for cyclists. Should the installation of a new bridge on this route be considered holistically within the area of Llandrindod it may be that it could be developed into a cycle route for a 'safe route to school' or a local leisure network. This may make it viable to tap into other funding pools and so provide an easier mechanism by which the reinstatement of the bridge can be made.

Cycle provision would however increase the cost of the bridge as the parapets for cycle routes have to be 1.5m high (300mm more than pedestrian) and the bridge needs to be wider, a minimum of 2.5m wide, where there is combined use by cyclists and pedestrians. Other than these changes the alignment and profile, planning requirements and access for construction are all the same as Option 2.

(Refer to Option 2 for details of proposal but with wider ramps and bridge. Ramps will take up 1.0m more space.)

Fabrication, Construction and Erection

Steel structures of the proposed truss type are fabricated off site by specialists; the span lengths are no greater than 20m so for this location they can be fabricated as a complete length and brought to site and lifted into place.

Painting of steelwork elements is also carried out off site by specialists to achieve a high quality paint system in environmentally controlled conditions which should optimise design life. This also reduces the time on site during construction.

Network Rail Requirements

Working adjacent to the railway line on site will require agreement with Network rail. This is required if the works would affect the track, i.e. if a crane could topple onto the track or if working

directly lineside. When working within their boundary, or where risks could occur to their infrastructure they require supervision by their staff, which incurs a cost hence keeping this nature of work to a minimum is beneficial. It is therefore recommended that the main span over the railway be supported outside the rail boundary allowing foundations for the columns to be constructed without the need for Network Rail supervision costs. (Options 2-4)

Actual work over the railway track, lifting the bridge into position will need to be undertaken with a full blockade of the track. This would generally be possible overnight for short periods or for slightly longer periods at weekends. The original bridge was removed over the Easter weekend to provide a good length of time to demolish the structure. The erection of the new bridge should be quicker as it will be designed to be installed quickly and so any weekend blockade should be possible for the works. (Current train times suggest no passenger trains run between 19:30 Sat until 13:30 Sun giving a 18hr working window.)

Access Restrictions to Public Open Space & Road above Bridge

The access to construct a new bridge from the West of the railway is restricted by access widths to the public open space. In addition the field and newly planted community orchard would need to be crossed to get to the site. This therefore precludes access by large construction plant to deliver the bridge and approach spans, and to locate a crane on the land here closest to the bridge.

Access will be needed to the West to construct foundations for the bridge columns, and construction of the earth approach ramp. These works could be carried out reasonably with medium sized plant, although there will be additional costs to reinstate the access routes over the public open space on completion.

Access to the East of the railway can be gained along Temple Avenue and onto the un-adopted highway leading to Alexandra Court. This access would be needed to construct foundations for supports for the East elements of the bridge. In addition this location has been considered to site a large crane to lift the bridge elements into position, for both the East and West sides of the railway.

The largest span proposed for a new footbridge (20m over the railway) has an estimated weight of 18.5tonnes, using this weight and the reach needed from the East side to the furthest access ramp to the West of 50m, a 800te crane would be required. Although these cranes are large, their manoeuvrability is good and could easily be located adjacent to the East of the bridge. Closure of the access to Alexander Court and Temple Avenue would be needed for the duration of the lift with appropriate provision made for access by residents and emergency vehicles. (Refer to Appendix D for crane details.)



Similar crane size lifting 27m span bridge into place.

A search of statutory undertakers equipment has identified buried services of Dwr Cymru, British Telecom, Streetlighting Electric and Wales and West Gas. These services appear to skirt the envisaged location for the crane and should not interfere with its use. Agreement with the apparatus owners would be needed to check the condition for positioning a crane above. A streetlighting column is likely to need taking down for the bridge lift and reinstating on completion. Appendix C provides details of Statutory Undertakers equipment.



Lighting column to be removed during the works.

Programme for Construction

A typical programme for construction is envisaged to take 12 weeks. Typical activities (which can coincide to some extent) would be:

- Fabrication of bridge steel elements off site 8 weeks
- Painting of Bridge Elements off Site 2 weeks
- Construction of Support Foundations/Wall 4 Weeks
- Construction of Approach Ramp to north 2 Weeks
- Erection of Bridge Elements 2No Consecutive Weekends
- Final site demobilisation 1 Week

Advance Works

At present a basic topographic survey of the original bridge line has been undertaken. Prior to detail design a full survey covering the whole bridge area (including ramps would be required). This survey will allow accurate quantification of excavation and fill requirements and depths for foundations.

The proposals in this report have assumed that the bridge will be supported on spread concrete foundations. This is likely to be the case as footbridge loads are not significant and ground conditions appear to be good. To remove the risk during construction and to more efficiently design the foundation it is recommended that geotechnical investigation comprising boreholes and trial pits are carried out on both sides of the railway. Costs for these works are in the order of £2000 and would help direct the detail design.

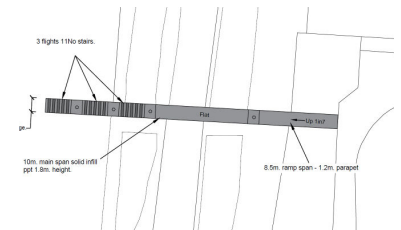
For a tenderer to economically price a scheme the less risk they have to take on the better. As the location of the crane can be critical to the crane size the exact location and type of services in the carriageway/verges are best known. It is recommended that the apparatus owners are brought to site as early as possible in the design stage to locate their apparatus and confirm condition and any restrictions they may have.

Cost Estimate for Works

Costs for the various options have been indicated below. Fabrication, painting, erection and construction costs have been established for the various options based on recent costs for similar works on other projects. In addition to these costs there are design and advance costs similar for all proposals.

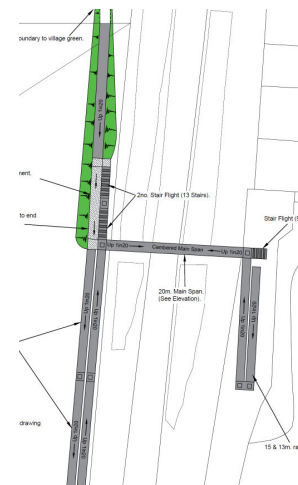
Detail Design & Contract Documentation Fees	£	25,000
Topographic Survey	£	1,500
Advance Geotechnical Works.	£	3,000
Site supervision	£	5,000
Network Rail Agreements	£	10,000
Sub-Total	£	28,500

Option 1 - Similar to Existing				
	Element	Width	Parapet Ht.	Cost £k
1No	Ramp Span 8.5m	1.5	1.2	37.5
1No	Main Span 10m	1.5	1.8	43.5
3No	Stair Flight	1.5	1.2	61.5
4No	Columns & Foundations	1.5x2.0	1.2	44.5
1No	Crainage	-	-	14.5
1No	Site Preliminaries	-	-	10
1No	Network Rail Supervision	-	-	10
Sub Total				221.5



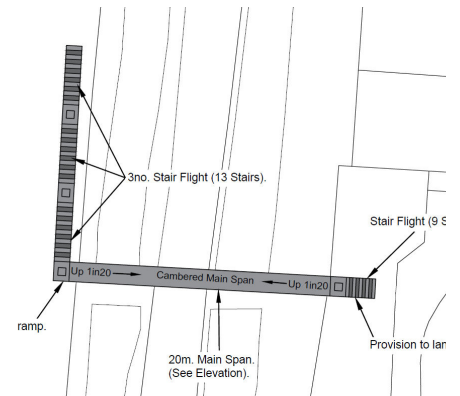
**Scheme Total
£250,000**

Option 2 - Full DDA Compliant				
	Element	Width	Parapet Ht.	Cost £k
1No	Ramp Span 13m	2	1.2	50.5
1No	Ramp Span 15m	2	1.2	61.5
1No	Main Span 20m	2	1.2 to 1.95	96.5
4No	Ramp Span 18m	2	1.2	296
2No	Stair Flight	2	1.2	43.5
8No	Columns & Foundations	2.0x2.0	1.2	98
1No	Crainage	-	-	44
1No	Earth Ramp & End Wall	-	-	25
1No	Site Preliminaries	-	-	30
1No	Network Rail Supervision	-	-	8
Sub Total				753



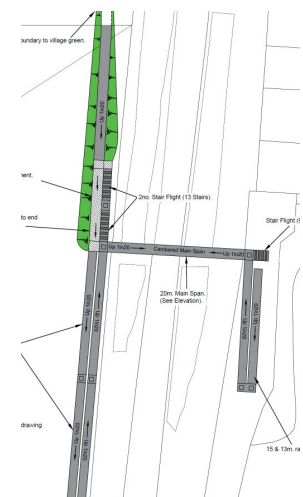
**Scheme Total
£781,500**

Option 3 - Similar to existing - With DDA future provision				
	Element	Width	Parapet Ht.	Cost £k
-	Ramp Span 13m	-	-	-
-	Ramp Span 15m	-	-	-
1No	Main Span 20m	2	1.2 to 1.95	96.5
-	Ramp Span 18m	-	-	-
4No	Stair Flight	2	1.2	87
4No	Columns & Foundations	2.0x2.0	1.2	46
1No	Crainage	-	-	14.5
-	Earth Ramp & End Wall	-	-	-
1No	Site Preliminaries	-	-	15
1No	Network Rail Supervision	-	-	3
Sub Total				262



**Scheme Total
£290,500**

Option 4 - Full DDA Compliant Cycle Route				
	Element	Width	Parapet Ht.	Cost £k
1No	Ramp Span 13m	2.5	1.4	67.5
1No	Ramp Span 15m	2.5	1.4	77.5
1No	Main Span 20m	2.5	1.4 to 1.95	102.5
4No	Ramp Span 18m	2.5	1.4	371.5
2No	Stair Flight	2	1.4	47.5
8No	Columns & Foundations	2.5x2.0	1.4	110
1No	Crainage	-	-	44
1No	Earth Ramp & End Wall	-	-	25
1No	Site Preliminaries	-	-	30
1No	Network Rail Supervision	-	-	10
Sub Total				885.5



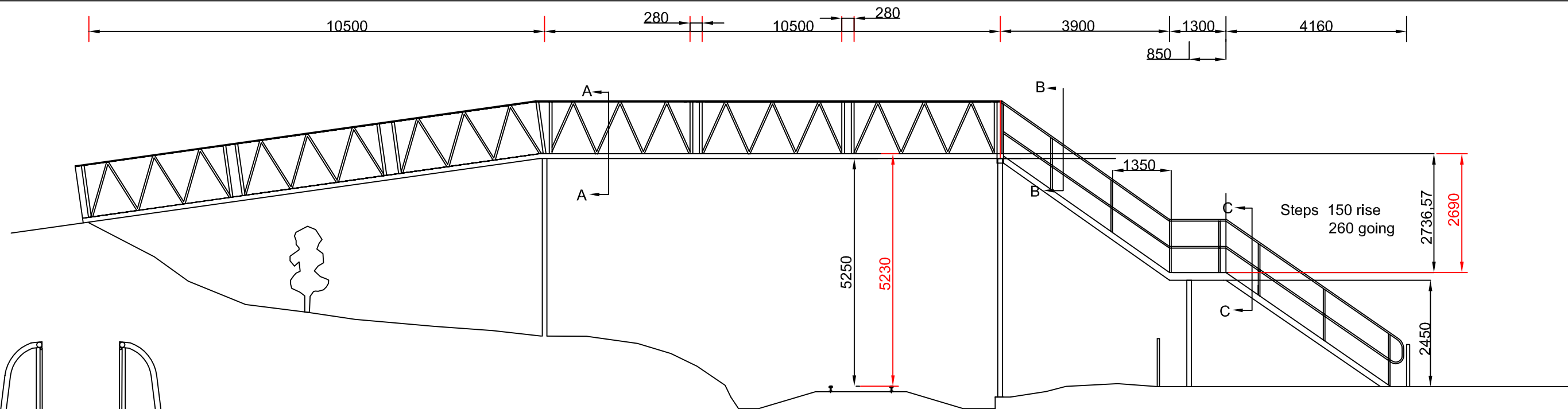
**Scheme Total
£914,000**

Conclusion

The reinstatement of a new bridge at the site of the original Alexandra Road Footbridge can be achieved in various ways. The cost of installation of a fully DDA compliant solution, which would need substantial approach ramps, may not present best use of funds. A replacement structure similar to the original but meeting current design loading standards would be the cheapest option but is not recommended as no consideration is given to future use by mobility impaired users. Hence, if funds are not available for a fully DDA compliant solution, it is recommended a bridge is installed which is wider than the original with provision for future extension to incorporate ramps to make it DDA compliant (Option 3).

Appendix A

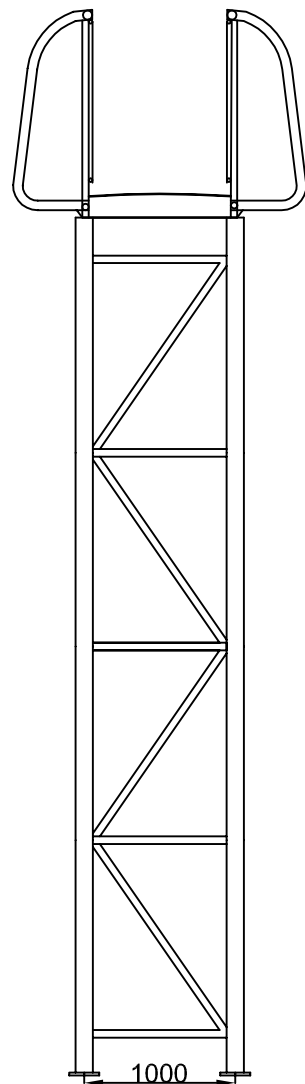
Original Bridge Construction Details



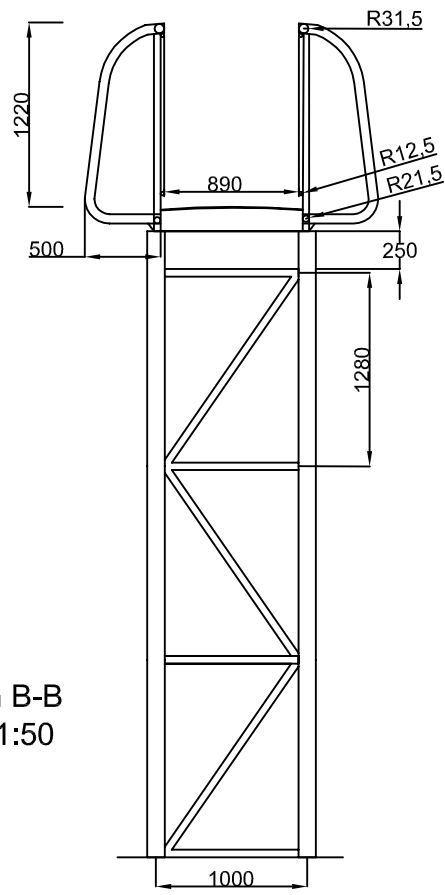
North East Elevation
Scale Approximately 1:100
See Note 2

Notes

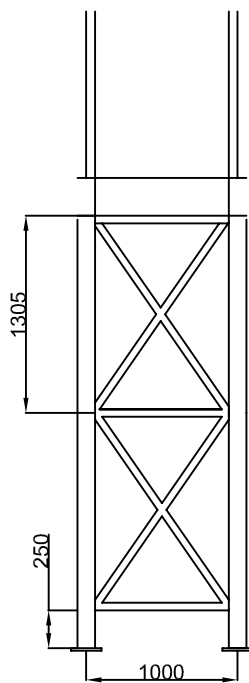
1. Dimensions shown in Red text are from site measurement using a theodolite.
2. All other dimensions are scaled from sketch - 'CB20028.DRG.Unknown' the status of this drawing is not known. This sketch appears to be a fairly close rendition of the footbridge but we were unable to check these dimensions on site and therefore cannot be sure of the accuracy of this drawing.



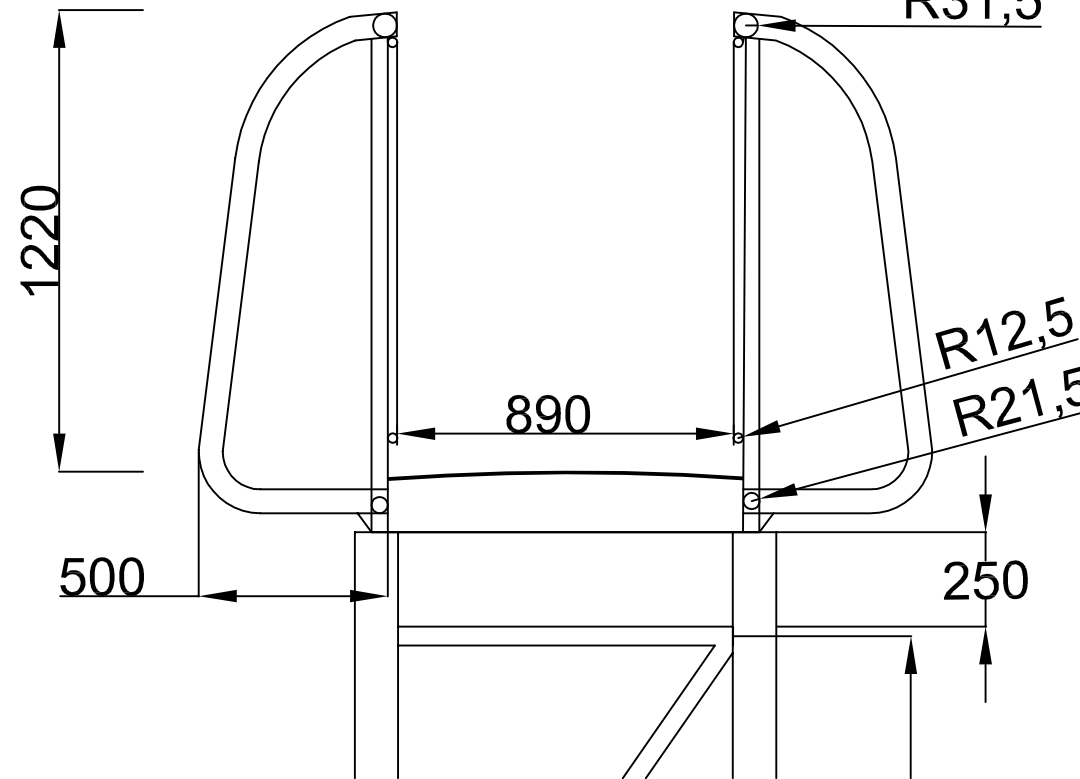
Section B-B
Scale approximately 1:50
see note 2



Section A-A
Scale approximately 1:50
see note 2



Section C-C
Scale approximately 1:50
see note 2



Section D-D
Scale approximately 1:20
see note 2

Engineering Design Services



EDS West Manager : Steve Hallows CEng MICE
01545 572513 hpw@ceredigion.gov.uk
West: County Hall, Market Street, Aberaeron, Ceredigion, SA46 0AT



EDS East Manager : Gareth Price CEng CEnv MICE
0845 607 6060 tls.helpdesk@powys.gov.uk
North: Kirrkhamfjeld Depot, Pool Road, Newtown, Powys, SY16 3AF
Mid: County Hall, Spa Road East, Llandrindod Wells, Powys, LD1 5LG
South: Neuadd Brycheiniog, Cambrian Way, Brecon, Powys, LD3 7HR

CWIC is the Central Wales Infrastructure Collaboration project between Powys County Council and Ceredigion County Council and all copyrights are vested in each respective Authority.
This drawing is the property of CWIC Engineering Design Services and is issued on the condition that it is not copied, reproduced, retained or disclosed to any unauthorised person, either wholly or in part without the consent in writing of CWIC Engineering Design Services.

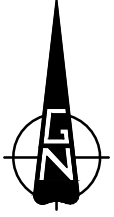
Amendments					
Rev	Date	Description	By	Chkd	

Project	Alexander Road Footbridge
Drawing Title	Existing General Arrangement

By	BJ/JJ	Checked	AE	Scale at A3	Various <small>This drawing should not be scaled. All dimensions are in millimetres unless otherwise stated.</small>
Date	05/04/16				
Project Number	H2393	Drawing Number	H2939/SK001	Revision	
<small>© Hawfrainth y Goron a hawbau cronfa ddaia 2015 Arolwg Ordnans 100024419 (Cymgor Sir Ceredigion) & 100025371 (Cymgor Sir Powys) © Crown copyright and database rights 2015 Ordnance Survey 100024419 (Ceredigion County Council) & 100025371 (Powys County Council)</small>					
Drawing Filename : - Existing GA.dwg Last saved : - 09/06/2016					

Appendix B

Option Sketches and Details



3 flights 11No stairs.

1.5m. Between ppts across bridge.

10m. main span solid infill
ppt 1.8m. height.

Flat

Up 1in7

8.5m. ramp span - 1.2m. parapet

Sefydliwr yr Arolwg Ordnans gyda
chwytir Rheolwr Cymru a Lloegr
© Hyspwrdd y Cymru a Lloegr, 2015
Mae hyspwrdd y Cymru a Lloegr yn
y Cymru a Lloegr a gollir oher ydych chi chi.
Based upon the Ordnance Survey mapping with the
permission of the Controller of Her Majesty's Stationery Office.
© Crown copyright and database rights.
Unauthorised reproduction, storage, copyright
and may lead to prosecution or civil proceedings.
Cymru Gywydd - 10003387 - 2015

CYNLLUN / SCHEME :
Alexandra Road Footbridge.

DARLUNWYD GAN : J.Humphreys

DYDDIAD DARLUNWYD : 10/05/16

GWIRIWDYD GAN : J.Chapman

DYDDIAD GWIRIWDYD : 10/05/16

TEITL LLUNIAD / DRAWING TITLE :
Replacement Option Similar to Existing.
Option 1.

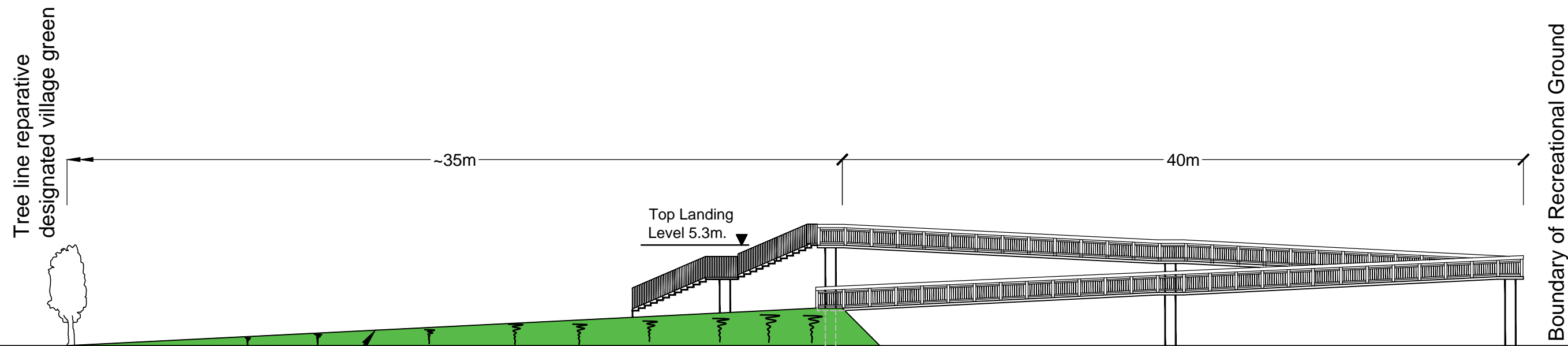
Taflen 1 of 1
Sheet

GRADDFEYDD : 1:200
SCALES :

Rhif Lluniad
Drawing No. 5467/SK/1

CYWI
REV





CYNLLUN / SCHEME :

Alexandra Road Footbridge.

DARLUNWYD GAN : J.Humphreys
DRAWN BY :

DYDDIAD DARLUNWYD : 11/05/16
DATE DRAWN :

GWIRIUYD GAN : J.Chapman
CHECKED BY :

DYDDIAD GWIRIUYD : 10/05/16
DATE CHECKED :

TEITL LLUNIAD / DRAWING TITLE :

Replacement Option - DDA Compliant*.
Option 2 - Elevation.

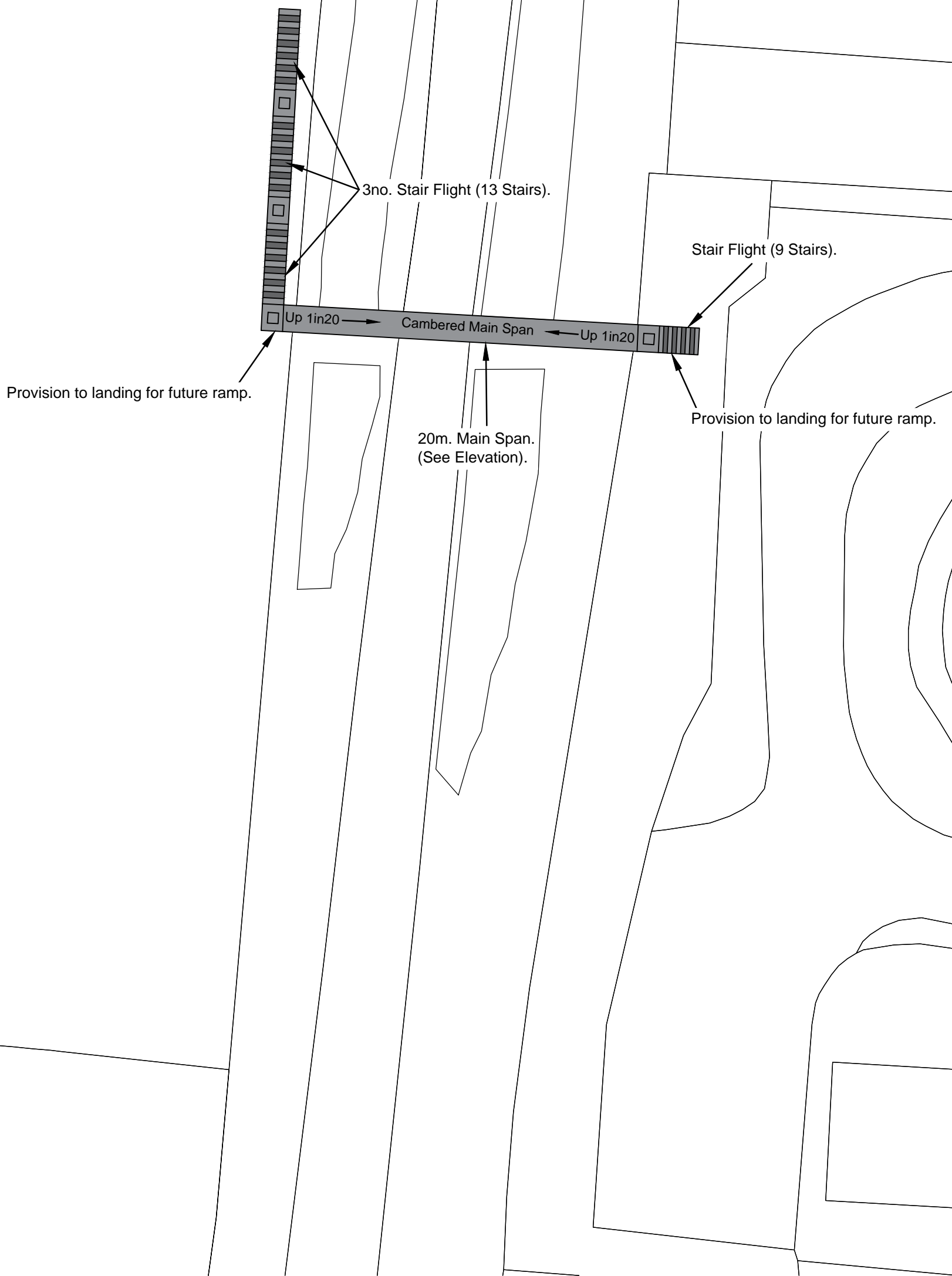
Taflen 1 o 1
Sheet of

GRADDFEYDD : 1:250
SCALES :

Rhif Lluniad
Drawing No. 5467/SK/2A

CYWI
REV





Sefydliwr yr Awdor Orllewin gyda
 awyddedig Rhwystr Ddwyreigol
 © Hyspwrdd y Cwmwl a'r Ffôn, 2015
 Mae'r awyddedig hon yn parhau'n ddwyreigol
 y Cwmwl a'r Ffôn a gollir dim hyspwrdd neu achos arall.
 Based upon the Ordnance Survey mapping with the
 permission of the Controller of Her Majesty's Stationery Office.
 © Crown copyright and database rights.
 Unauthorised reproduction, storage, copyright
 and may lead to prosecution or civil proceedings.
 Cyngor Gwynedd - 10003387 - 2015

CYNLLUN / SCHEME :
 Alexandra Road Footbridge

DARLUNWYD GAN : J.Humphreys
 DRAWN BY :

DYDDIAD DARLUNWYD : 10/05/16
 DATE DRAWN :

GWIRIWDYD GAN : J.Chapman
 CHECKED BY :

DYDDIAD GWIRIWDYD : 10/05/16
 DATE CHECKED :

TEITL LLUNIAD / DRAWING TITLE :
 Replacement Option - Similar to existing with provision
 for future DDA Compliance. Option 3.

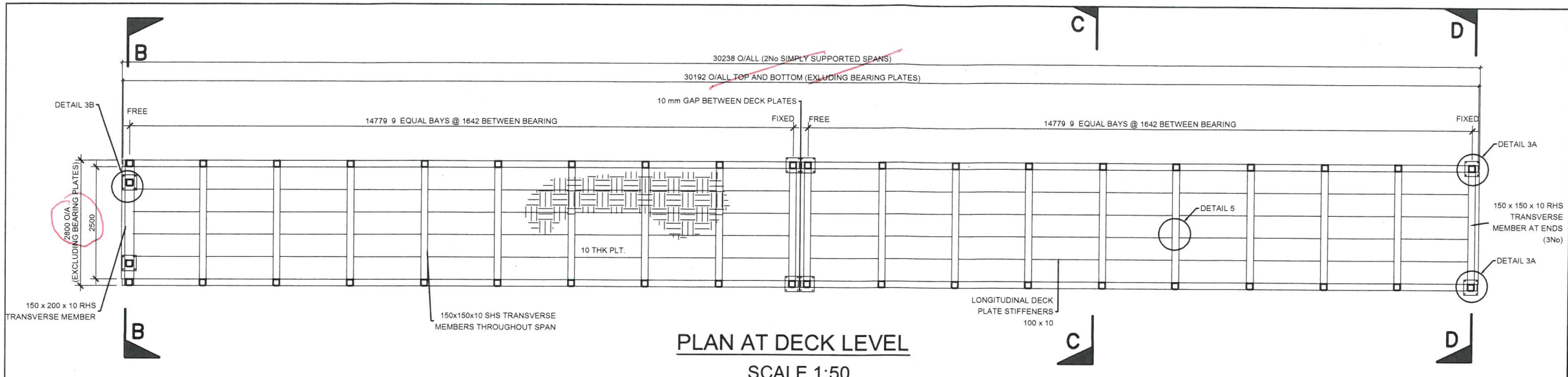
Taflen 1 of 1
 Sheet of

GRADDFEYDD : 1:250
 SCALES :

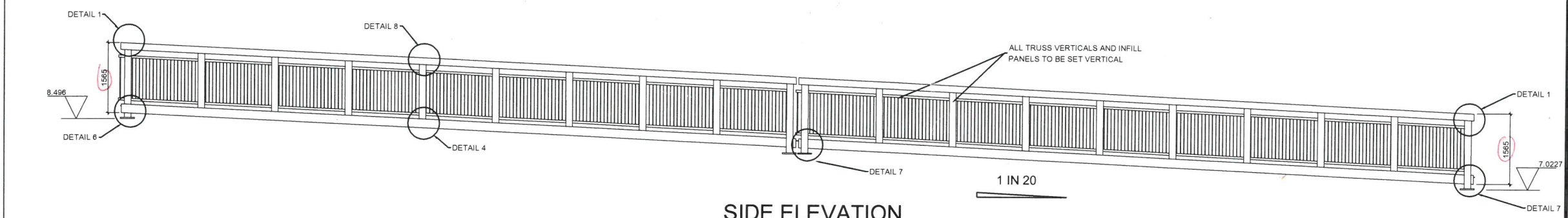
Rhif Lluniad Drawing No. 5467/SK/3

CYWI REV

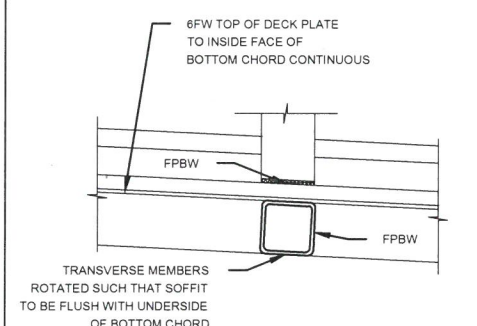




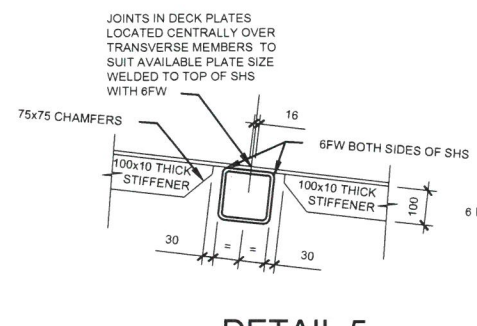
PLAN AT DECK LEVEL
SCALE 1:50



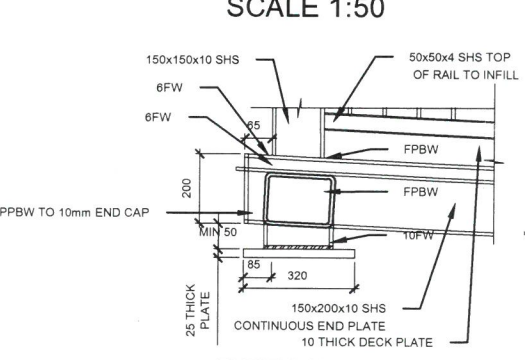
SIDE ELEVATION
SCALE 1:50



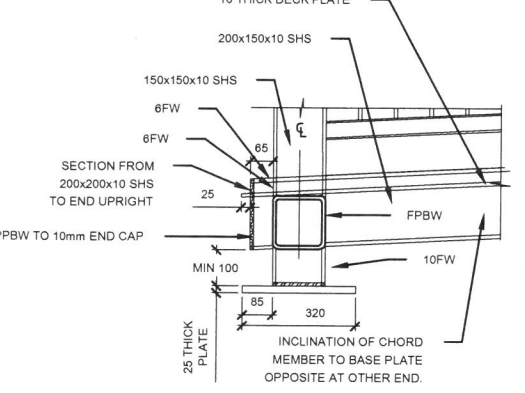
DETAIL 4
SCALE 1:10



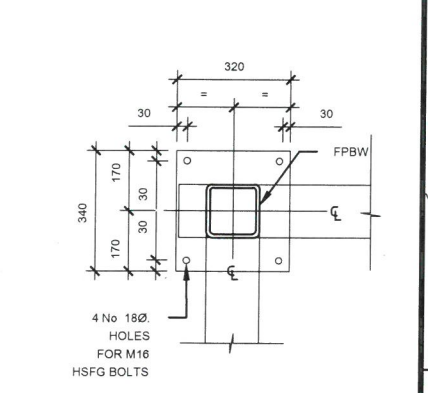
DETAIL 5
AT TRANSVERSE JOINT DECK PLATE
SCALE 1:10



DETAIL 6
SCALE 1:10

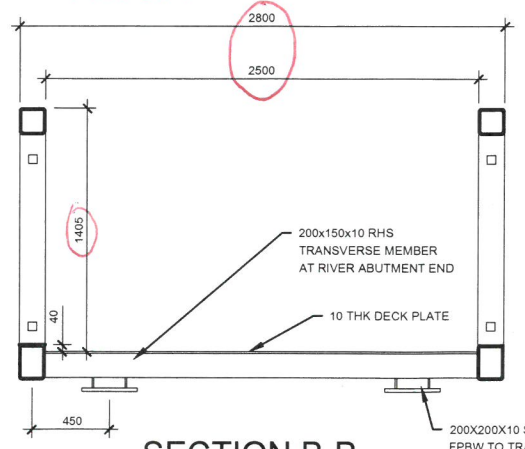


DETAIL 7
SCALE 1:10

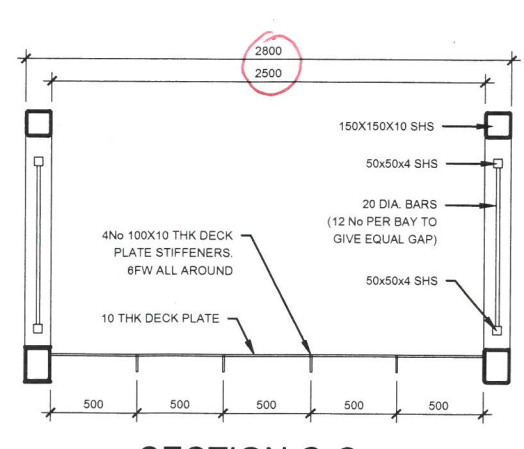


DETAIL 3A
AT 6No BEARING LOCATION
SCALE 1:10

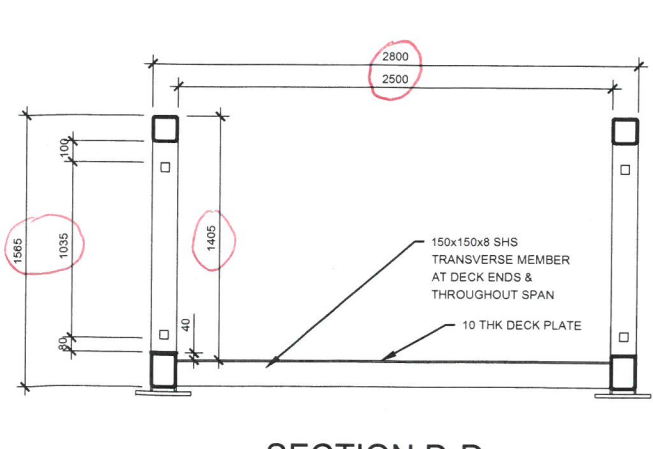
* Options Required For 2.0m Between Parapets AND 1.2m High Parapet.



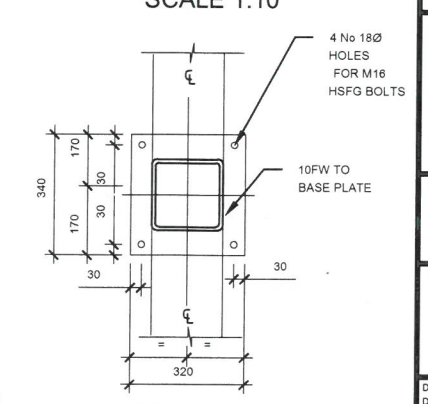
SECTION B-B
SCALE 1:20



SECTION C-C
SCALE 1:20



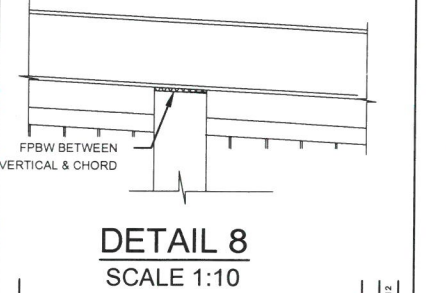
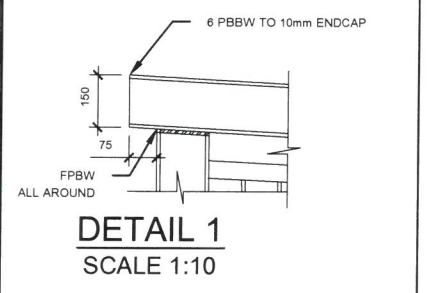
SECTION D-D
SCALE 1:20



DETAIL 3B
AT 2No BEARING LOCATION
SCALE 1:10

CLEIENT/CLIENT :

- NODIADAU/NOTES**
- All dimensions in millimetres unless otherwise stated.
 - All levels in metres above Ordnance Datum.
 - All changes in metres.
 - Span to be pre-cambered in manufacturer to suit dead weight deflection.
 - Refer to drawing 2029/SS/001 for steelwork and deck notes



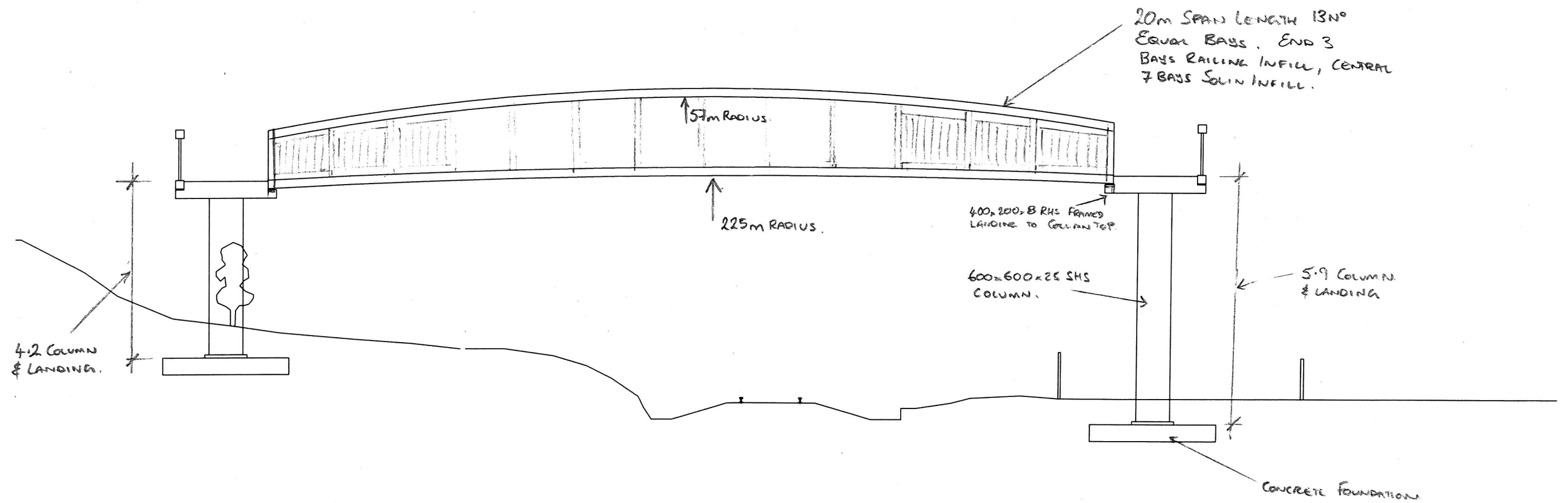
B	As Built Drawing	GRJ	02/03/2012	JJC
A	ADDITIONAL INFORMATION FOR CONSTRUCTION INCLUDING LEVEL AND NOMINAL GAP BETWEEN DECK PLATES	GRJ	16/07/2012	JJC
REV NO.	NEWIADAU MODIFICATIONS	GRJ	16/07/2012	JJC



CYNLLUN/SCHEME :
PONT DROED DR.WILLIAMS BRIDGE REPLACEMENT

TEITL LLUINIAD/DRAWING TITLE :
LAND SPAN STEEL DETAILS

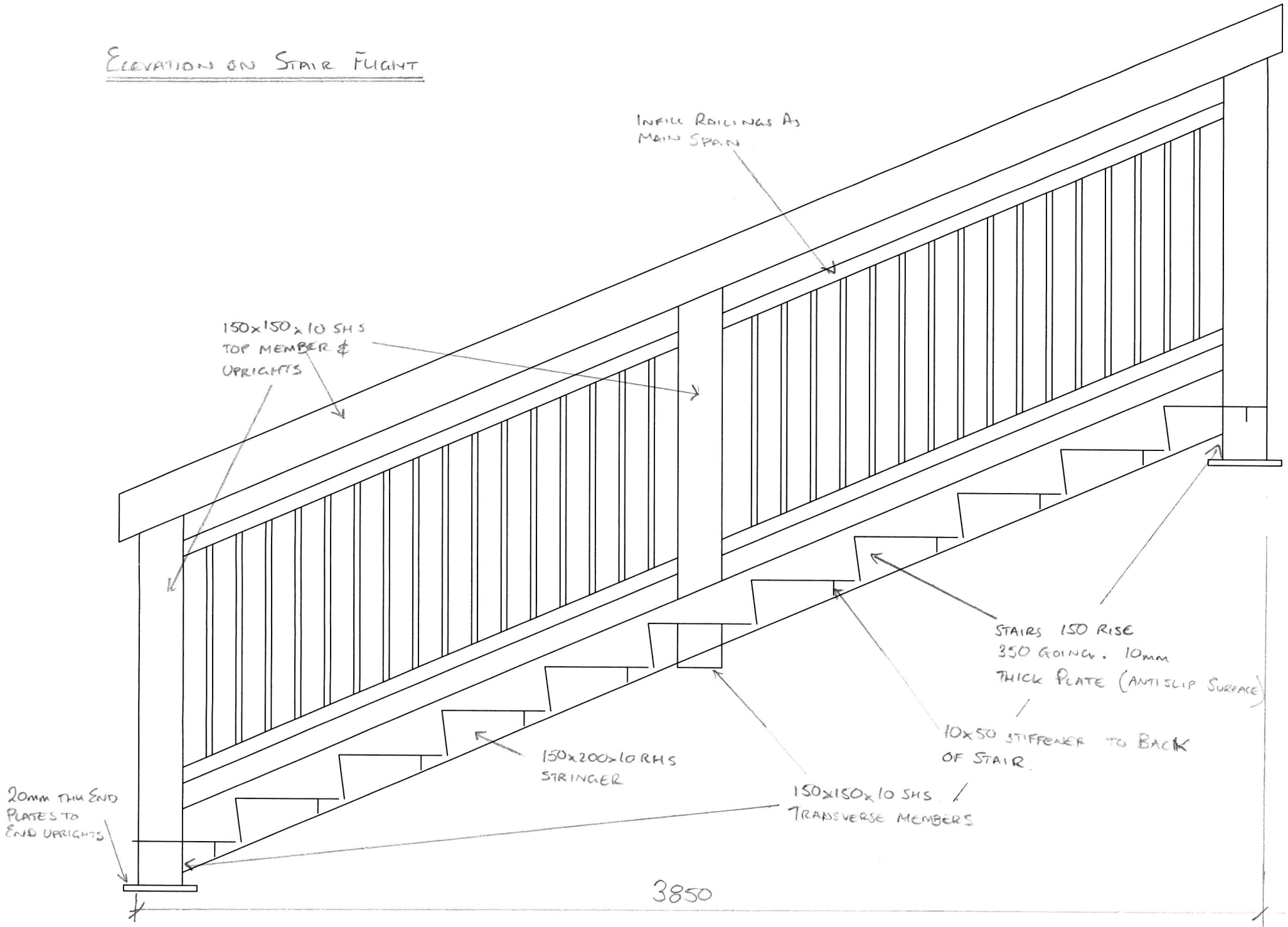
DARLUNWYD GAN : GRJ	DYDDIAD DARLUNWYD : 09/12/2011
GWIRWYD GAN : JJC	DYDDIAD GWIRWYD : 09/12/2011
Taflein Sheet 1 of 1	GRADDFEYDD : AS SHOWN
Rhif Luniad Drawing No. 2029/SS/002	REV B



MAIN BRIDGE SPAN OVER RAILWAY (OPTION 2-3 & 4)

DETAILS SIMILAR TO THOSE SHOWN ON
DRAWING 2029/SS/001 BUT PARAPET
HEIGHT VARIES 1.2m → 1.9m AND SOLID
PANEL INFILL TO CENTRAL SPANS.

ELEVATION ON STAIR FLIGHT



INFILL RAILINGS AS
MAIN SPAN

150x150x10 SHS
TOP MEMBER &
UPRIGHTS

STAIRS 150 RISE
350 GOING. 10mm
THICK PLATE (ANTI-SLIP SURFACE)

10x50 STIFFENER TO BACK
OF STAIR.

150x200x10 RHS
STRINGER

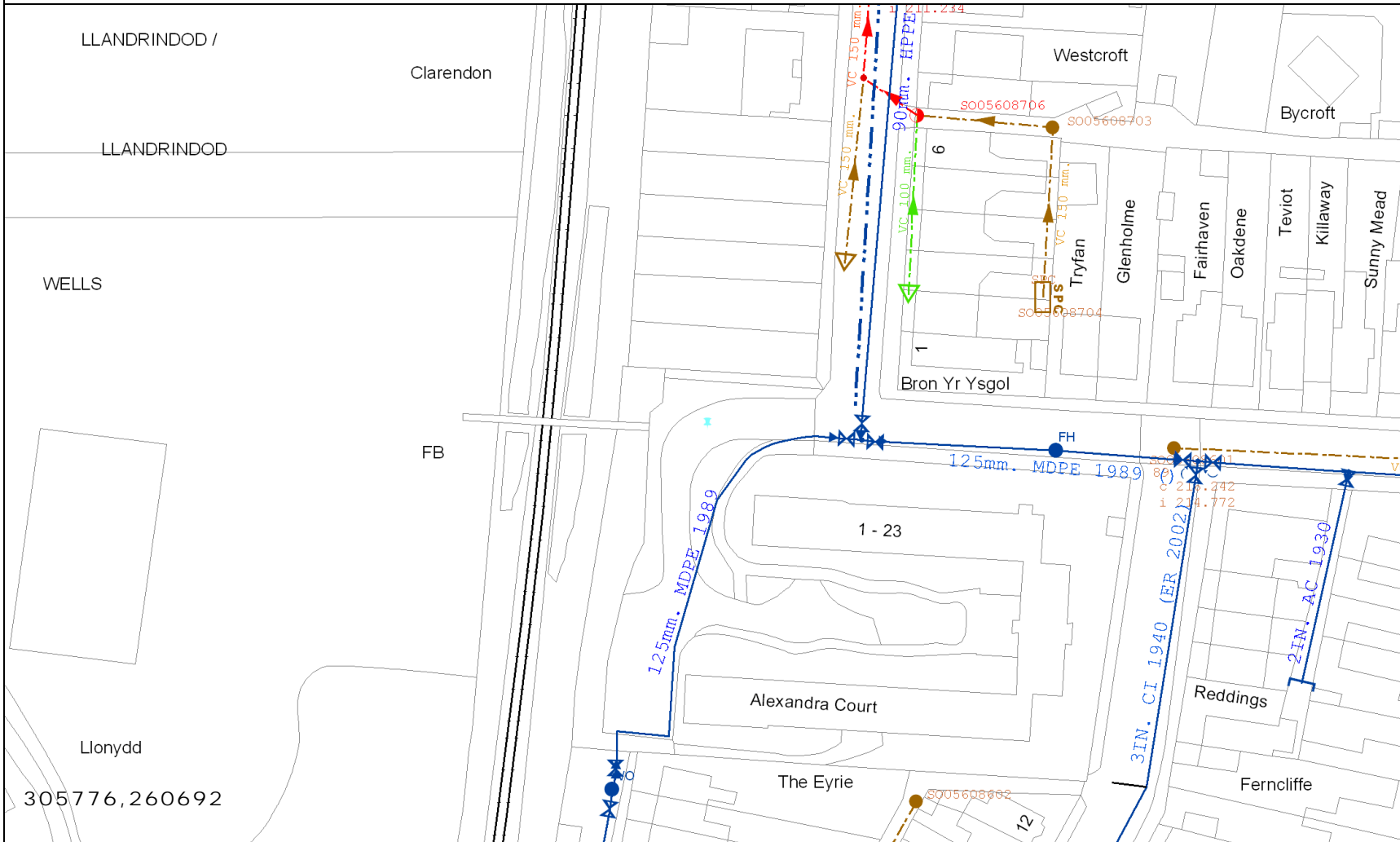
150x150x10 SHS /
TRANSVERSE MEMBERS

20mm THK END
PLATES TO
END UPRIGHTS

3850

Appendix C

Statutory Undertaker Information



- LEGEND**
- Clean Water**
- Sluice Val
 - Air Val, SINGLE
 - Tap
 - Pressure Reducing Valve
 - Meter
 - BULK Meter
 - FH
 - Cap
 - Existing Main
 - NON COMPANY
- Sewerage External**
- Foul
 - Surface Water
 - Combined
 - Rising Main
 - Private
 - Treatment Works
 - Pumping Station
 - Special Purpose
 - Unknown End
 - Change, Combined Overflow
 - Outfall, FOUL
 - Lamp Hole, Foul
 - Private Sewer Transfer
 - Lateral Drain
 - Inspection Chamber

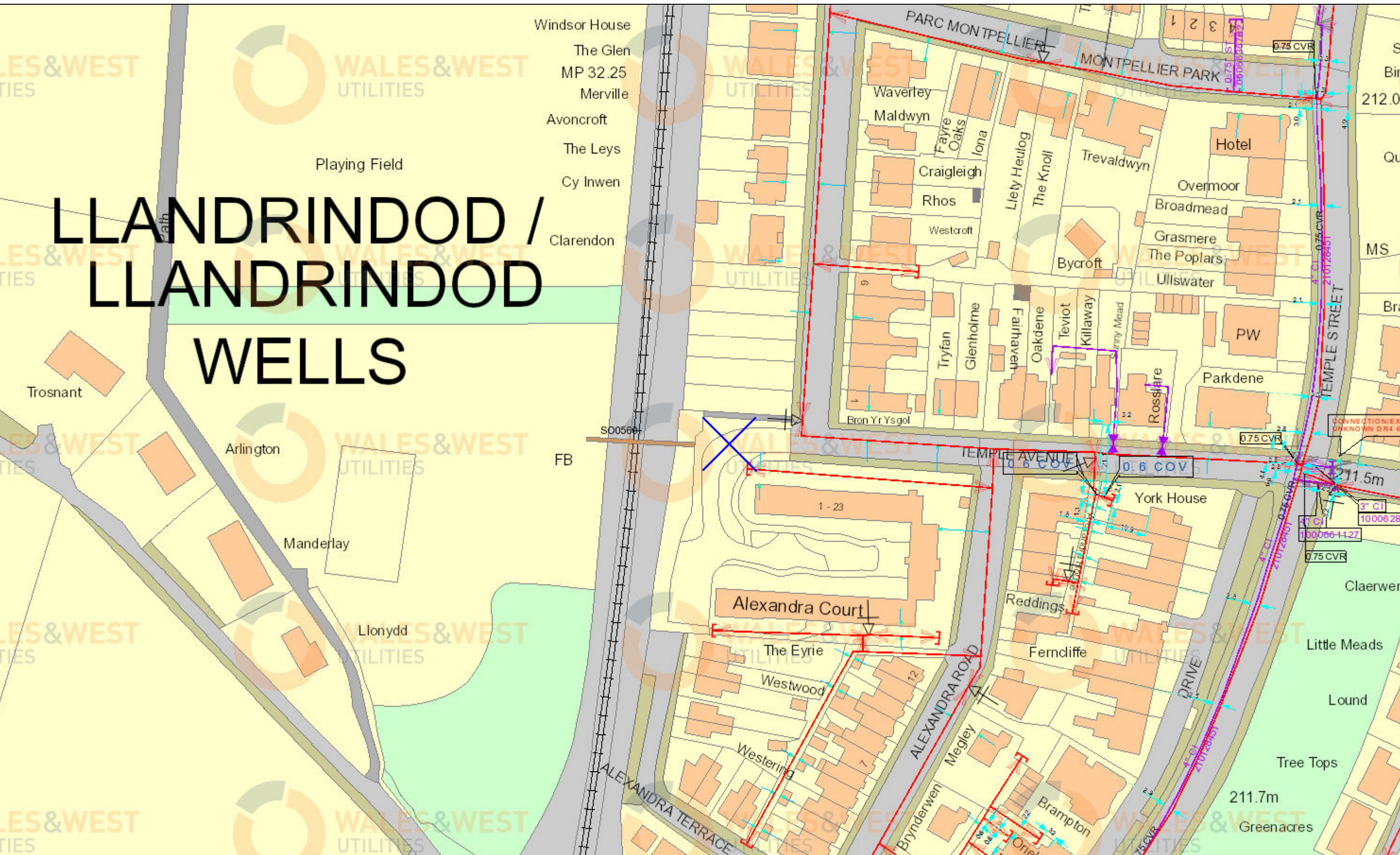
Dŵr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the Company's apparatus and any onus of locating the apparatus before carrying out any excavations rests entirely on you. The information which is supplied hereby by the Company, is done so in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1991 based upon the best information available and in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a drain sewer or disposal main laid before 1 September 1989, or if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the Company's right to be compensated for any damage to its apparatus.

EXACT LOCATION OF ALL APPARATUS TO BE DETERMINED ON SITE

Reproduced from the Ordnance Survey's maps with the permission of the Controller of Her Majesty's Stationary Office, Crown Copyright. Licence No: WU298565.

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation.

LLANDRINDOD / LLANDRINDOD WELLS



Windsor House
The Glen
MP 32.25
Merville
Avoncroft
The Leys
Cy Inwen
Clarendon

Scale	1: 1000@A3
User ID	robatwilliams@gwyned
Date	04/05/2016
Grid Ref.	Easting: 305769 Northing: 260696

Low Pressure	Design Pipes
Medium Pressure	Design Pipes
Intermediate Pressure	Design Pipes
High Pressure	Design Pipes
Abandoned	

Valve	Depth of Cover	Syphon	Diameter Change	Material Change
-------	----------------	--------	-----------------	-----------------

TITLE:

The plan shows those pipes owned by Wales & West Utilities (WU) in its role as a Licensed Gas Transporter (GT). The information shown on this plan is derived from historic information and may have involved re-scaling plans, and the accuracy of it cannot be guaranteed. Service pipes, valves, syphons, stub connections, etc. may not be shown but their presence should be anticipated. No warranties are therefore given in respect of it. WU its employees and contractors do not accept any liability for any inaccuracy or incompleteness in it.

You must use safe digging practices, in accordance with HS(G)47, to establish the actual position of mains, pipes, services and other apparatus on site before any mechanical plant is used. It is your responsibility to ensure that this information is provided to all persons (either direct labour or contractors) working for you or near gas apparatus. The information shown on this plan should not be used beyond 28 days from the date of issue of this plan as it is subject to updating.

The plan also provides indications of gas pipes owned by other GTs, or otherwise privately owned, which may be present in this area. This information is not information of WU and WU is unable to verify this information or to confirm whether it is accurate or complete. It is supplied voluntarily to assist the user in determining whether to make contact with other GTs or others. The user must obtain such information from the other GT or person concerned. WU, its employees and contractors do not accept any liability for this information or any inaccuracy or incompleteness in it.

WALES & WEST UTILITIES

Wales and West Utilities Ltd., Wales and West House, Spooner Close, Celtic Springs, Coedkernew, Newport, NP10 8FZ

© All MasterMap data is reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right 2016. All rights reserved. Ordnance Survey Licence number 0100044308.

Internal Use Only

Maps by email Plant Information Reply



IMPORTANT WARNING

Information regarding the location of BT apparatus is given for your assistance and is intended for general guidance only. No guarantee is given of its accuracy. It should not be relied upon in the event of excavations or other works being made near to BT apparatus which may exist at various depths and may deviate from the marked route.

DIAL BEFORE YOU DIG

FOR PROFESSIONAL ON SITE ASSISTANCE PRIOR TO COMMENCEMENT OF EXCAVATION WORKS

ADVANCE NOTICE REQUIRED
(Office hours: Monday-Friday 09.00 to 17.00)

Tel: 0800 9173993
E-mail: dbyd@openreach.co.uk
Website: www.dialbeforeyoudig.com

Reproduced from the Ordnance Survey map by BT by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationary Office
(C) Crown Copyright British Telecommunications plc 100028040

KEY TO BT SYMBOLS

	UNDERGROUND PLANT		POLE
	OVERHEAD PLANT		CABINET
	JOINT BOX		BURIED JOINT
	DISTRIBUTION POINT		JOINTING POST
	MANHOLE		PROPOSED U/G
	DP BOUNDARY		PROPOSED O/H
	OTHER BT BOUNDARY		PROPOSED BOX

Other proposed plant is shown using dashed lines. BT symbols not listed above may be disregarded. Existing BT plant may not be recorded. Information valid at the time of preparation.

openreach
a BT Group business

BT Ref : ZDH05176H

Map Reference : (centre) S00577660692

Easting/Northing : (centre) 305776,260692

Issued : 04/05/2016 08:17:58

FOOTNOTE: WARNING IT IS ESSENTIAL THAT YOU CONTACT NATIONAL NETWORK HANDLING CENTRE BY EMAIL nnhc@openreach.co.uk BEFORE PROCEEDING WITH ANY WORK IN THE HATCHED AREA

Appendix D

Crane Geometry & Lifting Radii

Crane Capacity Guide

Our crane capacity guide can be used to aid in selecting the crane capacity required for your lift.

The guide has been split into two sections: 0-20 & 21-40 tonnes

0-20 tonnes:

- 1/Locate the weight of load and crane operating radius
- 2/Where the columns intersect, read the capacity of crane required

l/m	7m	8m	9m	10m	12m	14m	16m	18m	20m	22m	24m	26m	28m	30m	32m	34m	36m	38m	40m	42m	44m	46m	48m	50m	52m	54m	
0.5t	20t	20t	20t	20t	20t	20t	20t	20t	20t	20t	25t	25t	35t	35t	50t	50t	70t	70t	80t	80t	80t	90t	120t	120t	120t	120t	120t
1t	20t	20t	20t	20t	20t	20t	20t	20t	25t	25t	35t	35t	50t	50t	60t	70t	70t	70t	80t	80t	90t	100t	120t	120t	120t	120t	120t
2t	20t	20t	20t	20t	20t	20t	25t	25t	35t	35t	50t	50t	60t	60t	70t	80t	80t	80t	90t	100t	100t	120t	120t	160t	160t	160t	160t
3t	20t	20t	20t	20t	20t	25t	35t	35t	50t	50t	60t	70t	70t	80t	80t	90t	90t	100t	100t	120t	120t	160t	160t	160t	160t	200t	200t
4t	20t	20t	20t	20t	25t	32t	35t	50t	50t	60t	70t	80t	80t	90t	90t	100t	100t	120t	120t	160t	160t	160t	160t	160t	200t	225t	225t
5t	20t	20t	25t	25t	35t	35t	50t	50t	60t	70t	80t	80t	90t	100t	100t	120t	120t	160t	160t	160t	160t	160t	200t	200t	225t	250t	300t
6t	25t	25t	25t	25t	35t	50t	50t	60t	70t	80t	90t	90t	100t	100t	120t	160t	160t	160t	160t	160t	160t	200t	225t	225t	225t	250t	300t
7t	25t	25t	25t	35t	50t	50t	60t	70t	80t	90t	100t	100t	120t	120t	160t	160t	160t	160t	160t	200t	200t	225t	225t	250t	250t	300t	300t
8t	25t	35t	35t	35t	50t	60t	60t	80t	90t	90t	100t	100t	120t	120t	160t	160t	160t	200t	200t	225t	225t	250t	250t	250t	300t	300t	800t
9t	35t	35t	35t	50t	50t	60t	70t	80t	90t	100t	120t	120t	160t	160t	160t	160t	200t	225t	225t	225t	250t	250t	250t	300t	300t	800t	800t
10t	35t	35t	35t	50t	60t	70t	80t	90t	100t	100t	120t	160t	160t	160t	160t	200t	225t	225t	225t	250t	250t	250t	300t	800t	800t	800t	800t
11t	35t	35t	50t	50t	60t	80t	90t	100t	100t	120t	160t	160t	160t	200t	225t	225t	250t	250t	250t	300t	300t	300t	400t	800t	800t	800t	800t
12t	35t	50t	50t	50t	70t	80t	100t	100t	120t	120t	160t	160t	160t	200t	225t	225t	250t	250t	300t	300t	300t	400t	800t	800t	800t	800t	800t
13t	35t	50t	50t	50t	80t	80t	100t	120t	120t	160t	160t	160t	200t	200t	225t	250t	250t	250t	300t	300t	300t	400t	400t	800t	800t	800t	800t
14t	50t	50t	50t	50t	80t	90t	100t	120t	120t	160t	160t	200t	200t	225t	250t	250t	250t	250t	300t	300t	400t	400t	400t	800t	800t	800t	800t
15t	50t	50t	60t	70t	80t	100t	100t	120t	160t	160t	160t	200t	225t	225t	250t	250t	250t	300t	300t	400t	400t	400t	400t	800t	800t	800t	800t
16t	50t	50t	60t	70t	80t	100t	120t	120t	160t	160t	200t	200t	225t	250t	250t	250t	300t	300t	400t	400t	400t	400t	400t	800t	800t	800t	800t
17t	50t	60t	70t	70t	90t	100t	120t	160t	160t	160t	200t	225t	225t	250t	250t	300t	300t	400t	400t	400t	400t	400t	400t	800t	800t	800t	800t
18t	60t	70t	70t	80t	90t	100t	120t	160t	160t	200t	200t	225t	250t	250t	250t	300t	400t	400t	400t	400t	400t	400t	500t	800t	800t	800t	800t
19t	60t	70t	70t	80t	100t	120t	120t	160t	160t	200t	200t	225t	250t	250t	300t	400t	400t	400t	400t	400t	400t	400t	500t	800t	800t	800t	800t
20t	60t	70t	80t	80t	100t	120t	160t	160t	200t	200t	225t	225t	250t	250t	300t	400t	400t	400t	400t	400t	400t	400t	500t	800t	800t	800t	800t

www.bobfranciscranehire.co.uk