RECORD OF SITE VISIT

JNP GROUP CONSULTING ENGINEERS www.jnpgroup.co.uk	Site: MEC8445 - Biggleswade Station Footbridge Client: AMCO.GIFFEN Job No: S12375

Date Of Inspection	15 February 2024	Time	10.0 am
Weather	Mild and dry		

Introduction

AMCO GIFFEN contacted JNP Group to arrange an urgent site inspection after the steel supports to one of the concrete steps on the stairs from the footbridge over the rail tracks down to Platforms 1& 2 in Biggleswade Railway Station had failed during the previous weekend (10-11 February 2024).

The aim was to assess the safety of the existing stairs and recommend remedial action if required. Calum Howis of AMCO GIFFEN was present during the inspection. Later on, during the inspection Aaron Colbourne and one of his colleagues from the AMCO GIFFEN's internal fabrication workshop joined us.

Description of structure

There is a footbridge over the rail tracks to Biggleswade Train Station. Access to Platforms 1& 2 and 3&4 is provided by two separate set of external stairs from the footbridge down to the platforms.

Each stair flight has two sets of 12 concrete steps with a half landing to break the length of the total stair flight into two parts. The half landing is supported by a "T" shaped concrete column. Twin 180x180 SHS cranked steel beams, span from platform level up to midway column and then up to footbridge over.

The flights are made up of individual concrete treads, each tread is supported by two "L" shaped steel plates, welded to the top of each cracked steel SHS beam. In some locations new steel shoe brackets were observed to the soffit of the steps, these are bolted to the side faces of the cranked steel beams.

Steel balustrades each side of the flights are fixed to the ends of concrete steps with standards every six steps. Please refer to photographs on page P6 at the back of this report.

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Inspection observations

One of the single bent steel plate brackets supporting one of the concrete steps above the twin cranked SHS beam sections had given way due to extensive corrosion.

This concrete step was temporarily supported by three pieces of wood. These pieces were placed between the front edge of the step and the back of the nest step below it to prop the front edge of the step and prevent it from dropping as a temporary measure.

There was no immediate risk of this step falling and the concrete treads are stable in the temporary condition with the pieces of wood placed one at each end and one at the middle of the step.

Almost all of the existing "L" shaped brackets providing primary support of the tread off the twin cranked steels were badly corroded. Please refer to photograph F16 at the back of this report.

The shoe brackets considered implemented as remedial work to some but not all tread locations, offer extended bearing and offer enhanced stability to the treads. If the existing "L" shaped elements supporting the treads failed due to progressive corrosion, the new shoe brackets would act to support the treads. Please refer to the structural details provided on page P2 and photograph F16 at the back of this report.

All the existing 180x180 SHS twin cranked beam sections were generally badly corroded.

It is apparent that the corrosion is a combination of exposure to the external environment and their general arrangement, with corrosion noted in locations exposed and vulnerable to water runoff from the treads.

The water run off most probably contains de-icing salts at certain times of the year making it even more corrosive than purely water alone. This has caused extensive corrosion. Please refer to photographs on page P11 to P14 at the back of this report.

Where steel sections were sheltered and away from the effects of water runoff, there were no noticeable signs of corrosion. Please refer to photographs on page P9 and P10 at the back of this report.

During the inspection [redacted] of AMCO GIFFEN mentioned the possibility of the need to provide additional support for the existing concrete steps like the steel shoe brackets on site with the same details and dimensions. This has been confirmed formally to JNP by the client on 16 February 2024. Please refer to photograph F18 at the back of this report. A detailed set of calculations will be provided separately to cover this requirement.

RECORD OF SITE VISIT

JNP GROUP CONSULTING ENGINEERS www.jnpgroup.co.uk	Site Footbridge	MEC8445 - Biggleswade Station
	Client	AMCO.GIFFEN
	Job No	S12375

Conclusion

From the purely visual inspection, it is not possible to determine the section loss due to corrosion. It is difficult to know what portion of the steel section is still effective to support the applied loads. What is apparent is the "L" shaped plates directly supporting the treads are the weakest part of the structure, based on vulnerability to corrosion and past failures of these elements. The introduction of the shoe brackets in all locations will mitigate this deficiency.

Indicative calculations for the existing exposed corroded 180x180 SHS sections has shown by assuming a minimum 6.3 mm original wall thickness and allowing for a conservative annual rate of section loss due to exposure to environmental conditions it will take 107 years for these SHS sections to lose their required strength.

Based on this conservative estimate of possible section loss, it is considered the twin cranked steel SHS beams will be adequate for their intended purpose and continue to provide structural integrity for many years to come.

Recommendations

Since it is not possible to comment on the integrity of the existing bent plate brackets but considering recent failure and previous implemented remedial shoe brackets in some locations, it is recommended to provide short-term temporary support to all steps without the additional steel brackets to reduce the risk to the public.

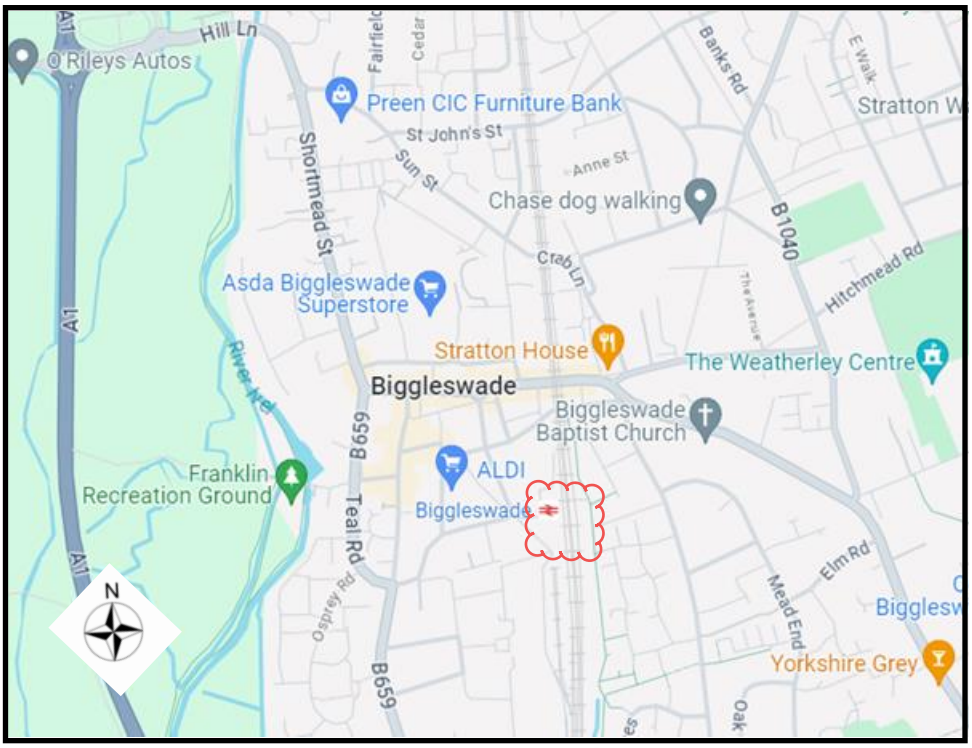
Temporary support to steps is to be provided by using timber sections with similar details to that already in place for the failed step. Please refer to photograph F10 at the back of this report.

A permanent solution to support concrete treads, is to provide new steel shoe brackets like those already on site but for all concrete treads that do not already have steel shoe brackets. Please refer to the structural details provided on page P3 to P5 at the back of this report.

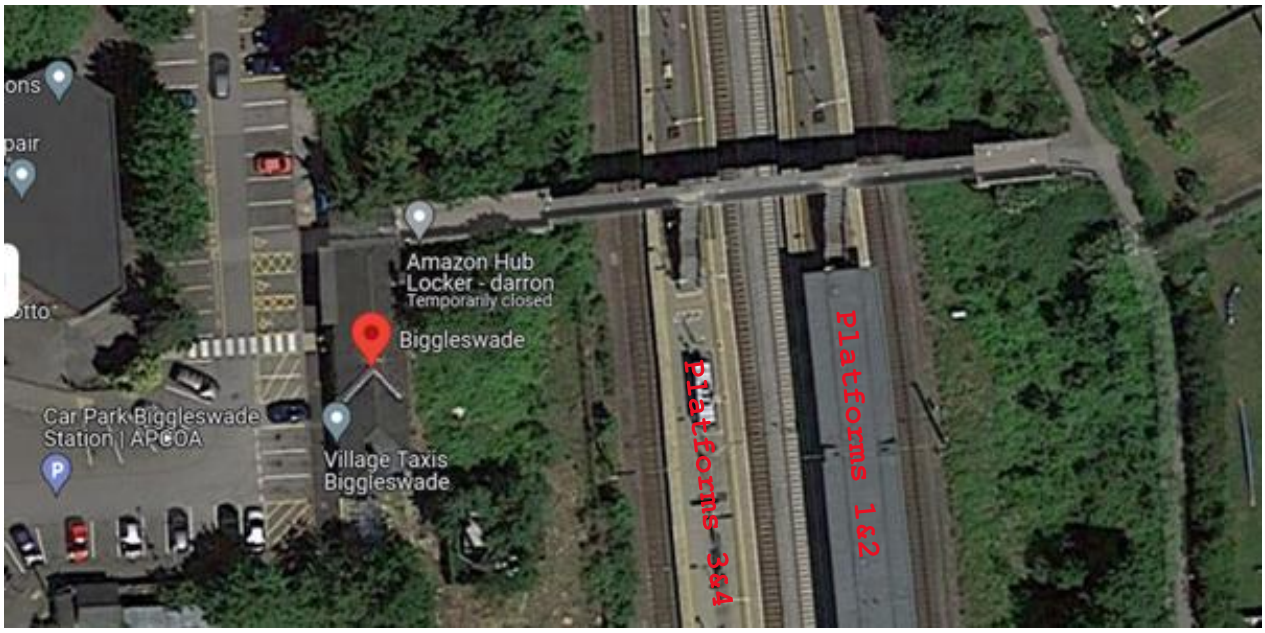
All steelwork supporting the stairs is to be cleaned of rust and protective coating applied, a maintenance schedule is then to be implemented to include intermediate inspections between scheduled protective coating repairs based on the manufacturers protective coating guidance.

Inspection Made by: [redacted]

Project: Biggleswade Train Station Footbridge Stairs to Platforms 1&2 and 3&4	Job No: S12375 Page No: L1



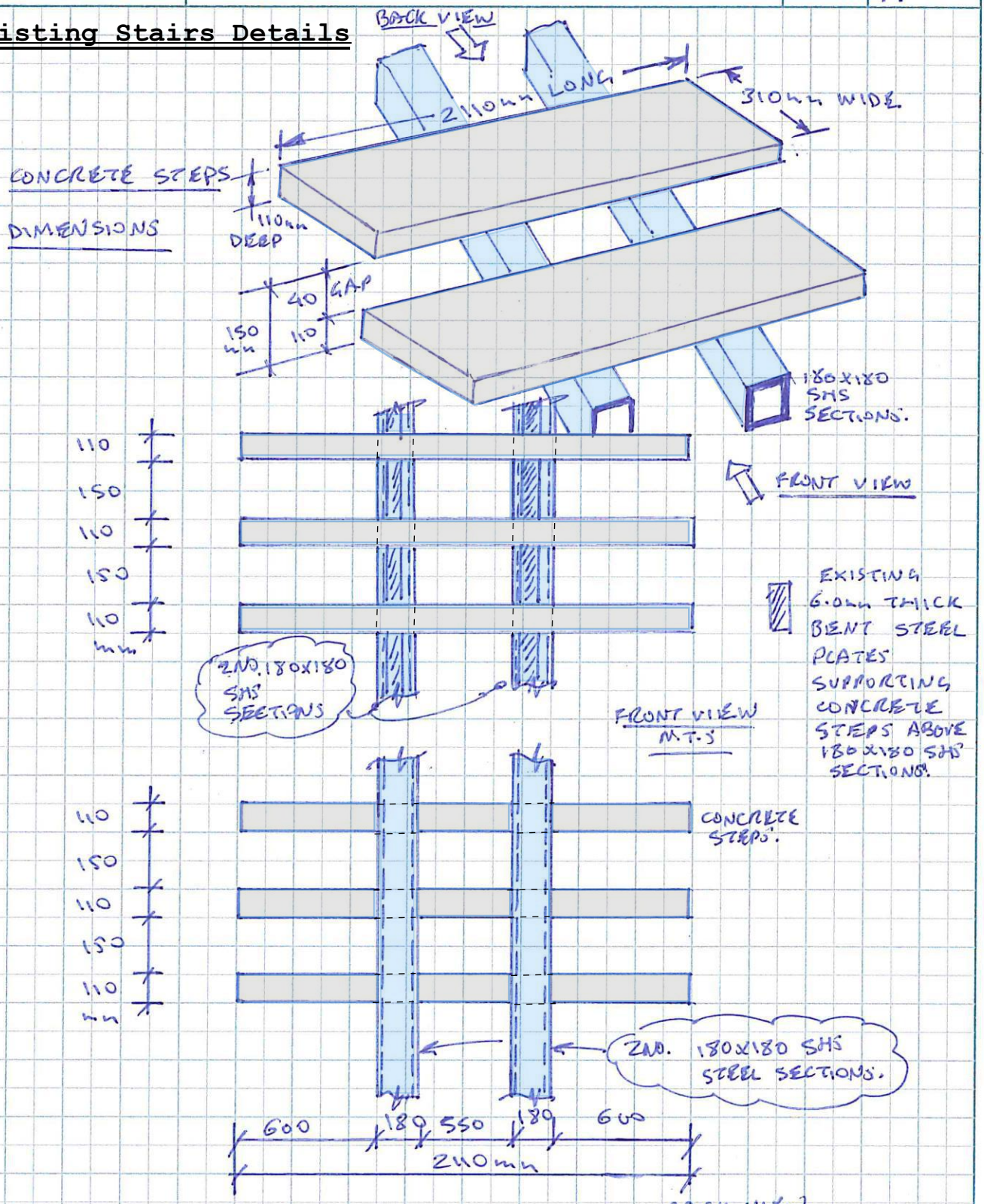
Biggleswade Train Station



Biggleswade Train Station With Its Footbridge and Stairs to Platforms 1&2 and 3&4

CALCULATIONS FOR:	BIGGLESWADE STATION STAIRS DETAILS	JOB No.	S12375
		PAGE No.	P1

Existing Stairs Details



EXISTING STEPS DETAILS
IN BIGGLESWADE TRAIN STATION
FROM FOOTBRIDGE OVER RAIL TRACKS
DOWN TO PLATFORMS 1&2 AND 3&4

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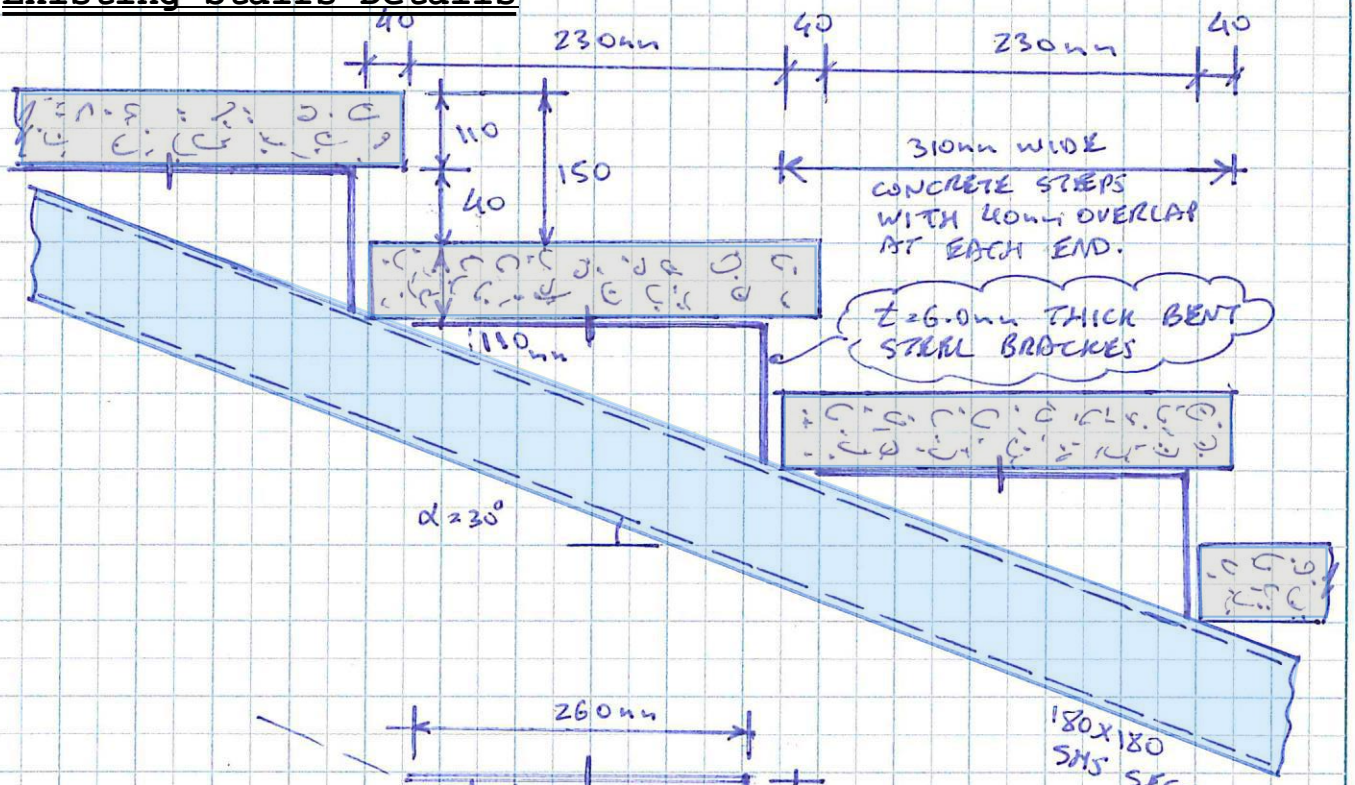
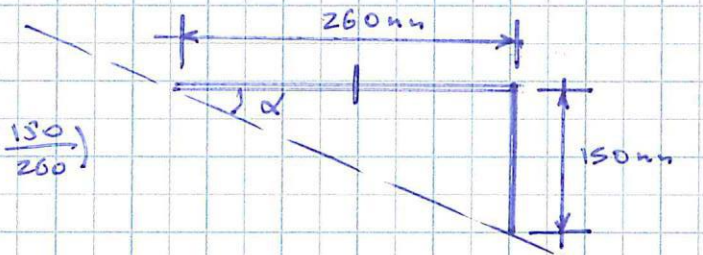
Date	16 FEB 2024		
Office	AMERSHAM		

CALCULATIONS FOR:	BIGGLESWADE STATION STAIRS DETAILS	JOB No.	S 12375
		PAGE No.	P2.

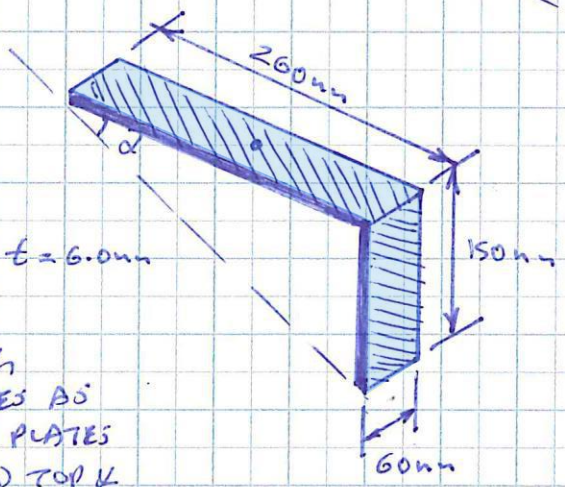
Existing Stairs Details





$\alpha = \tan^{-1}\left(\frac{150}{260}\right)$

$\alpha \approx 30^\circ$



THE EXISTING STEEL BRACKES AS BENT STEEL PLATES ARE WELDED TOP & BOTTOM TO 180x180 SHS AND BOLTED ON TOP TO CONCRETE STEPS.

EXISTING 6.0mm THICK 260mm LONG 60 mm WIDE 150mm DEEP BENT STEEL PLATES SUPPORTING CONCRETE STEPS ABOVE EACH OF (180x180) SHS STEEL BEAMS

EXISTING CONCRETE STEPS SUPPORTING DETAILS.

(N.T.S)

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Date	16 FEB 2024		
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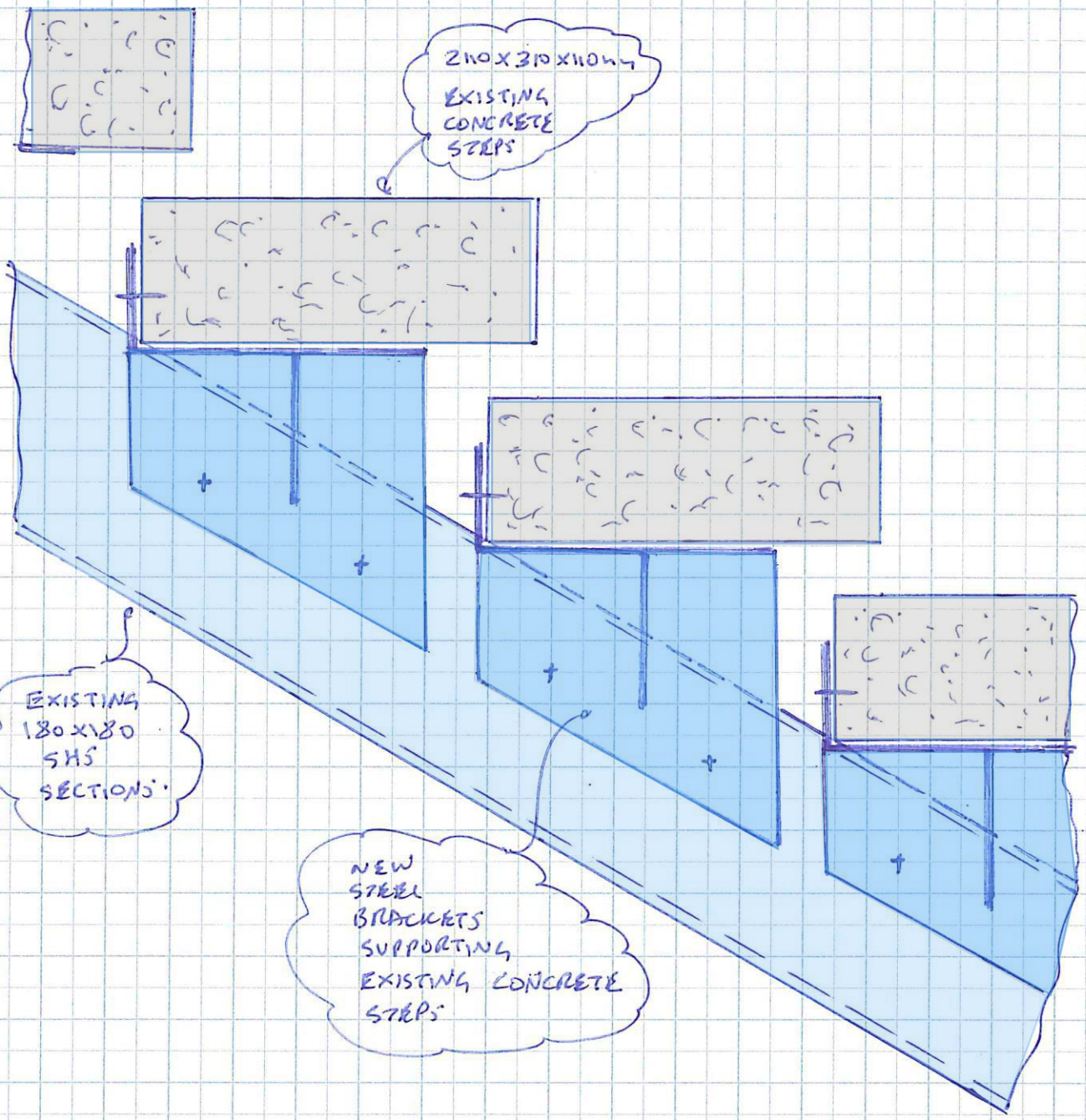
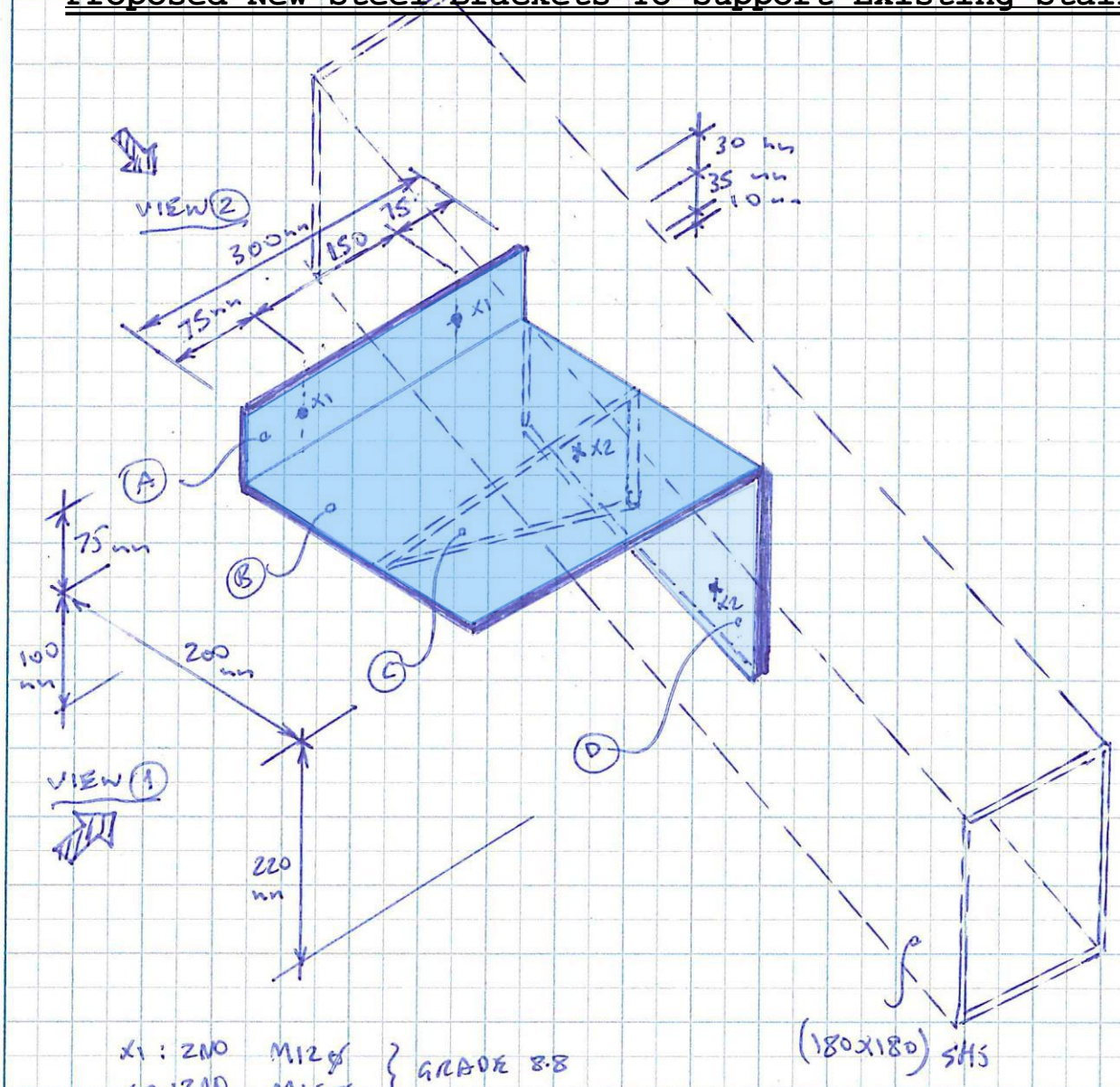
Proposed New Steel Brackets To Support Existing Stairs



NEW STEEL BRACKETS SUPPORTING EXISTING CONCRETE STEPS.

Proposed New Steel Brackets To Support Existing Stairs



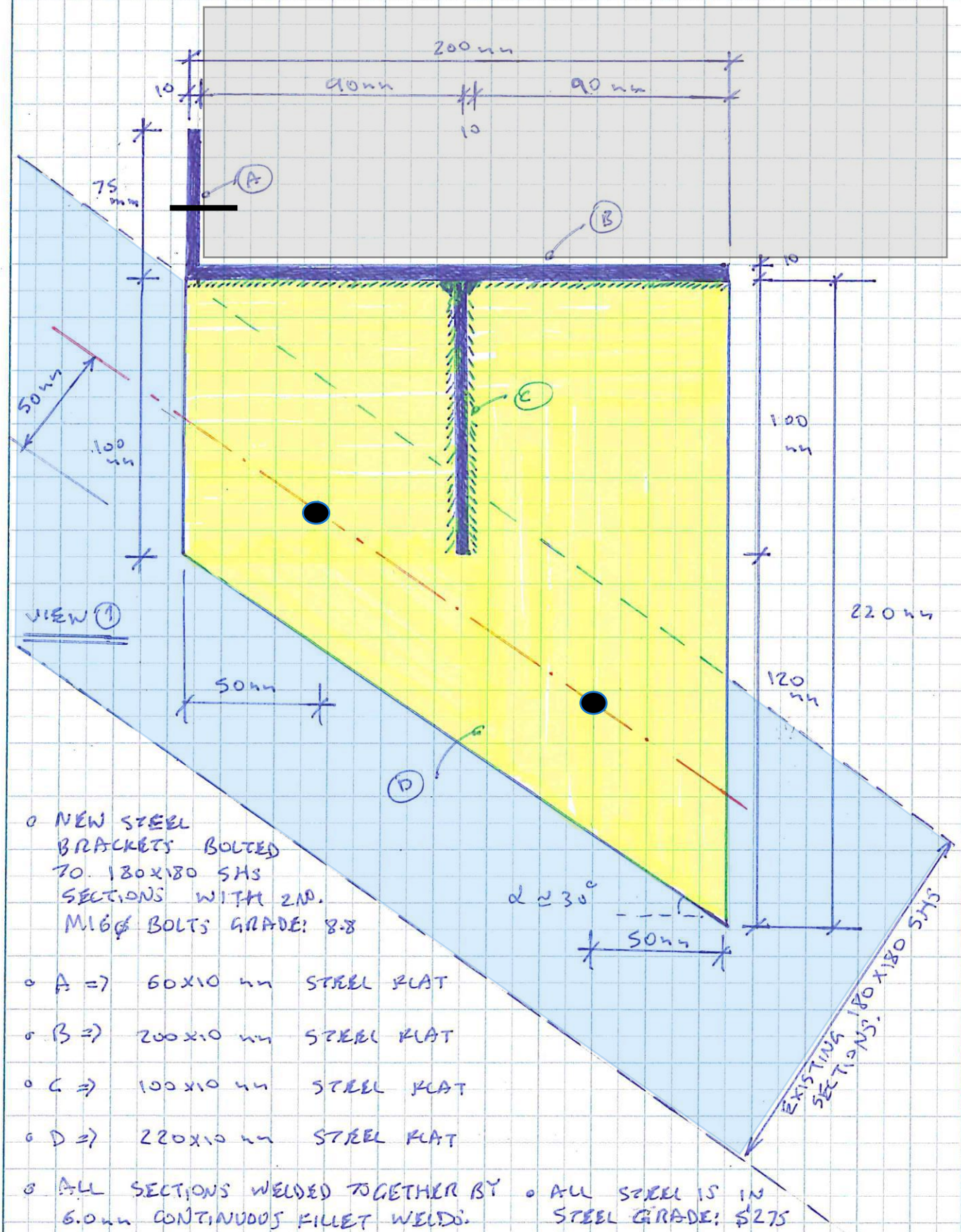
X1 : 2NO M12 Ø } GRADE 8.8
X2 : 2NO M16 Ø }

X1 : FOR FIXING TO CONCRETE STEPS
X2 : FOR FIXING TO 180X180 SHS

NEW STEEL BRACKETS FOR SUPPORTING EXISTING CONCRETE STEPS.

CALCULATIONS FOR:	BIGGLESWADE TRAIN STATION NEW STEEL BRACKES SUPPORTING CONCRETE STEPS.	JOB No.	S12375
		PAGE No.	P5

Proposed New Steel Brackets To Support Existing Stairs



- NEW STEEL BRACKETS BOLTED TO 180x180 SHS SECTIONS WITH 2ND. M16Ø BOLTS GRADE: 8.8
- A => 60x10 mm STEEL FLAT
- B => 200x10 mm STEEL FLAT
- C => 100x10 mm STEEL FLAT
- D => 220x10 mm STEEL FLAT
- ALL SECTIONS WELDED TOGETHER BY 6.0mm CONTINUOUS FILLET WELDS.
- ALL STEEL IS IN STEEL GRADE: S275

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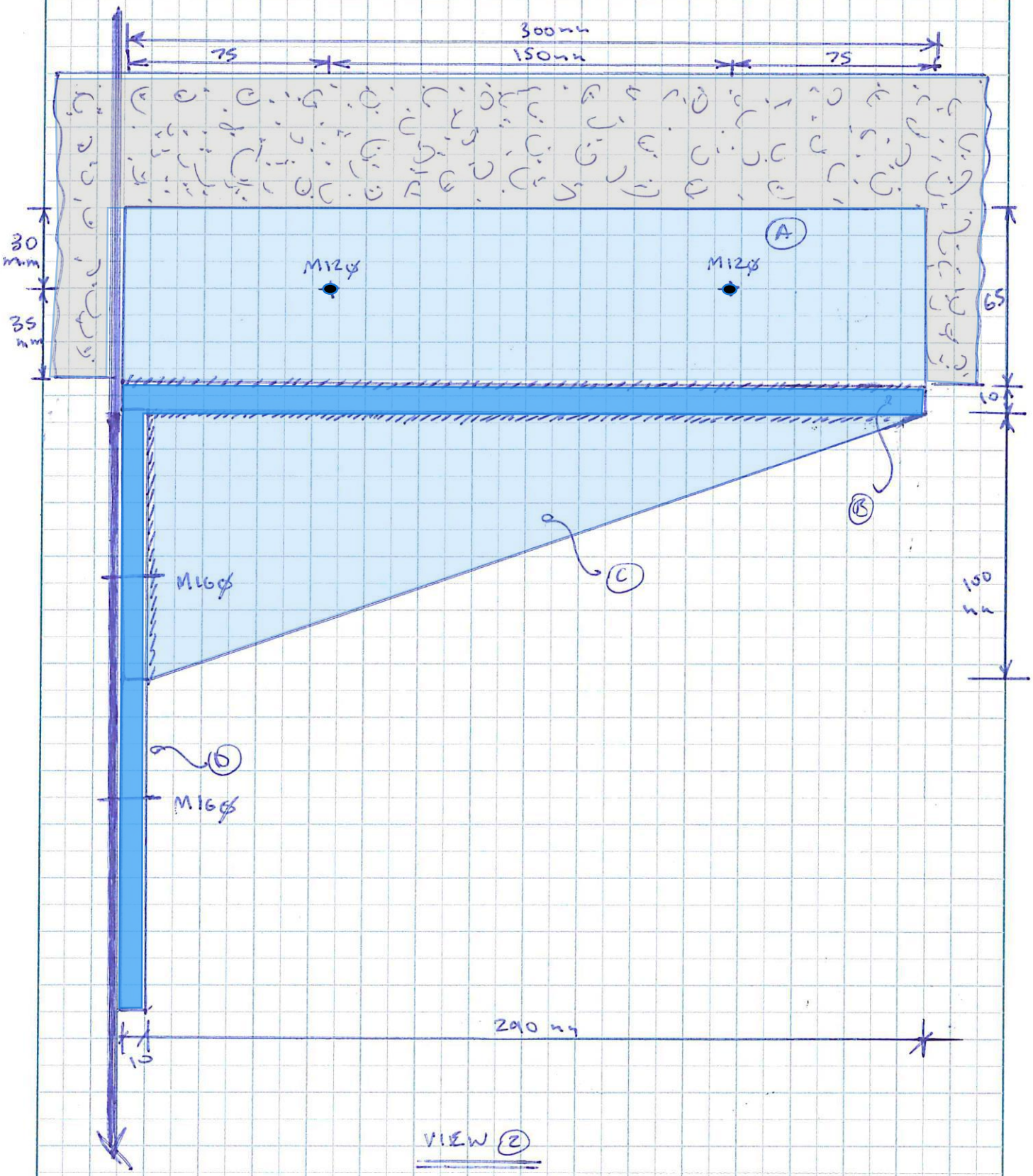
	Office	AMERSHAM

CALCULATIONS FOR:	BIGGLESWADE TRAIN STATION NEW STEEL BRACKETS SUPPORTING CONCRETE STEPS	JOB No.	S12 375
		PAGE No.	PG



Proposed New Steel Brackets To Support Existing Stairs

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Date 16-FEB 2024	
Office AMERSHAM	

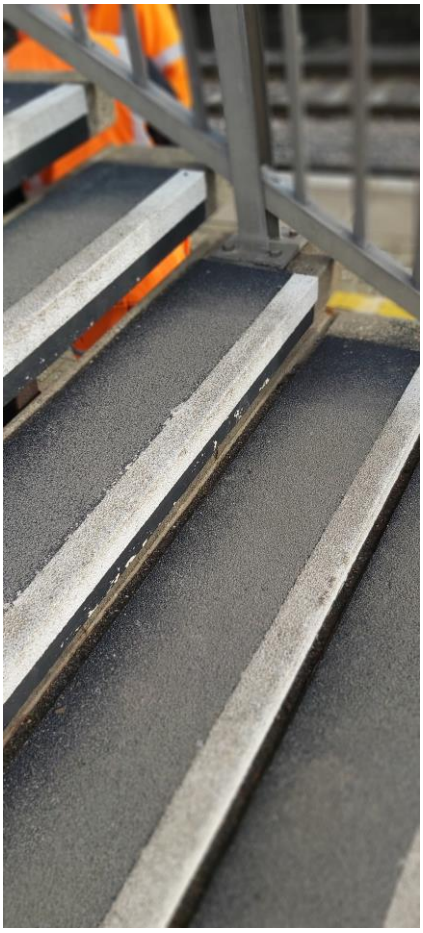
F
S
P

[redacted]

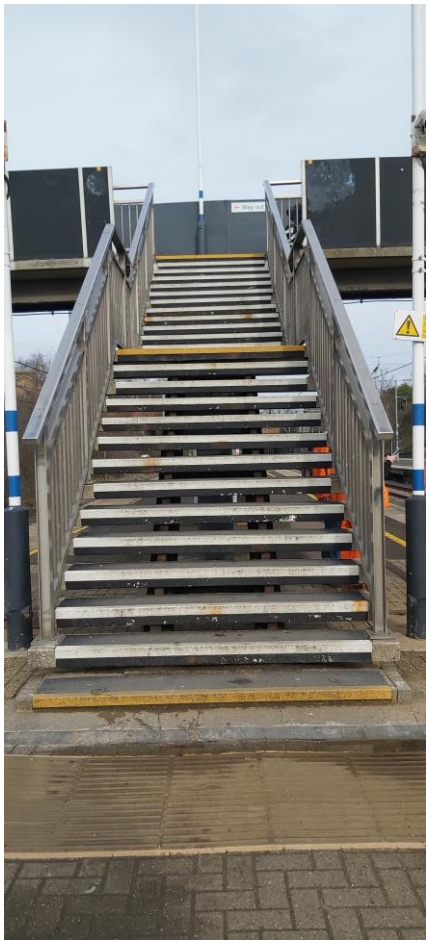
F2
Stairs for Platforms 3&4

F3
Stairs for Platforms 1&2 in front and 3&4 at the back with footbridge above

F4
Stairs for Platforms 1&2 with footbridge above



F6
Stairs with anti slip member

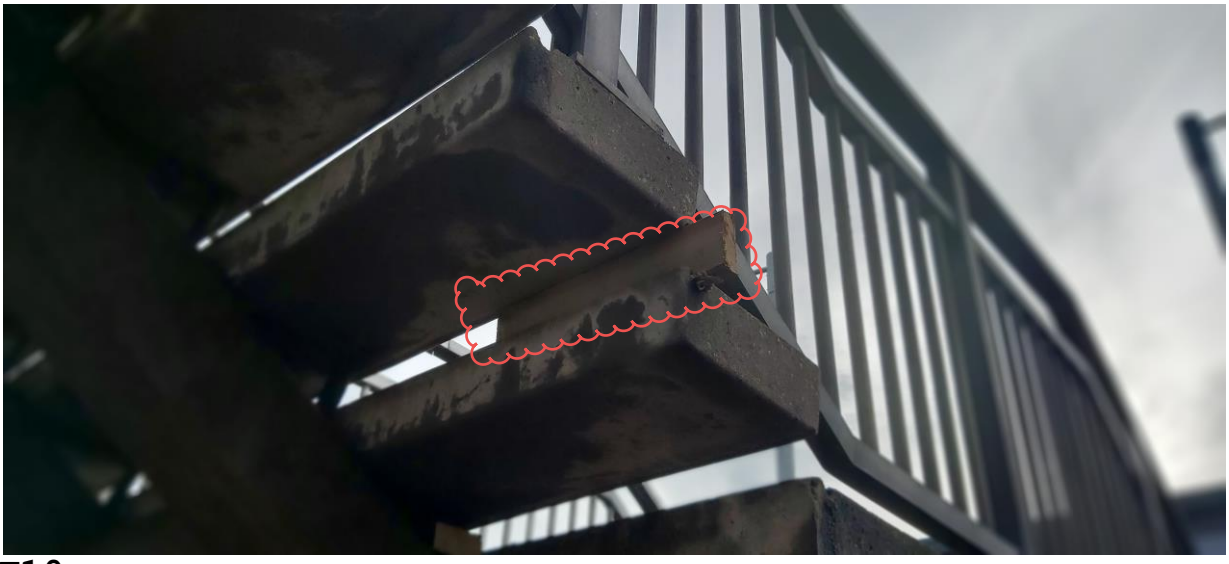


F5
Stairs for front and 3&4 with footbridge above

F7
Footbridge double steel beams and concrete slab deck

F8
Bearing on top of [redacted]

F9
Bearing on top of concrete T Column under central landing side view



F10
Temporary timber support under the front edge of the concrete step

F11 above & F12 below
Central landing concrete "T" column support showing bearings to Platforms 1&2 with sheltered parts of 180x180 SHS protected from corrosion and the exposed parts corroded

F14

F15

F13, F14 & F15
180X180 SHS sections supported at central column position on Platform 1&2 showing corrosion to parts not sheltered

F16
A typical view of the badly corroded "L" shaped steel bent plate connected to concrete step soffit with a single bolt and welded to 180x180 SHS section at the top and bottom

F17
180X180 SHS section supported at central column position on Platform 1&2 showing corrosion to parts not sheltered

F18
A typical view of the more recently added partly corroded steel brackets for enhanced support to the existing concrete steps bolted to the external face of each of 180x180 SHS sections.

F19
A view showing corroded 180x180 SHS section connections at the top of the stairs to the footbridge beams where the joint in the concrete bridge deck above the concrete column support has leaked and has caused corrosion.

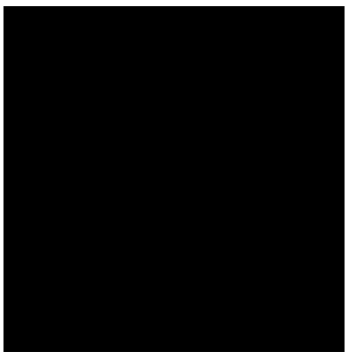
F20
2No 180X180 SHS sections with a cross beam at the top connection to footbridge beams

F21
2No 180X18[redacted]
with a cros[redacted]op
connection [redacted]mn
under the l[redacted]

F22
2No 180X180 SHS sections with a cross beam connection to the plinth at the bottom on Platform 1&2

F23 & F24
Views of badly corroded 180X180 SHS sections with steel brackets on Platform 1&2

F26



F25

F27

Views of badly corroded 180X180 SHS sections above the landing for stairs on Platform 3 & 4