1814060

RAMBOLL

Intended for
TfL London Underground
Infrastructure Protection Engineer,
Capital Programmes Directorate
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Report No.
18885-1/REP-007 REV G
Date
Rev G September 2016

KINGS CROSS TRIANGLE
KINGS CROSS BRIDGE
APPROVAL IN PRINCIPLE
SAFE LOAD CARRYING ASSESSMENT FOR COVERED WAY G143

Accepted by

I accept this document as the London Underground person accountable for protection of London Underground's infrastructure only in so far as if the principals laid down herein are followed the risks to London Underground assets and operations will be mitigated to as low as reasonably practical. It is also accepted on the understanding that all outstanding activities listed in here are properly executed.

<Name> M C PAYNE
<Role> Principal Engineer Infrastructure Protection

[redacted]

12-10-16

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KINGS CROSS TRIANGLE KINGS CROSS BRIDGE
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		Signature	Date
Prepared by	I confirm that professional skill and care has been used in the preparation of this deliverable and it meets the project requirements. I also confirm that this deliverable has been checked for accuracy and compliance by competent person(s) employing check process(es) commensurate with the level(s) of risk inherent to the assets and works.		
	J A Heath CEng MICE Associate	[redacted]	Rev G 5.09.2016
Approved by	I approve this deliverable as the designated technical authority for the relevant engineering discipline and am accredited to do so.		
	<Name> <Role>		
Accepted by	I accept this deliverable as the person accountable for its delivery and believe to the best of my knowledge that the above entities have undertaken and fulfilled their legal obligations as required with regard to this product.		
	<Name> Project Manager		
Distributed to	<Name>	Sponsor	

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Revision History

Revision	Date	Purpose / Status	Document Ref	Comments
-	24.11.2014		18885-1/REP-007	
A	11.12.2014		18885-1/REP-007 REV A	Tfl comments of email 9.12.14 included
B	18.03.2015		18885-1/REP-007 REV B	Section 5.1.2 added for check of existing structure as requested by TfL
C	19.05.2015		18885-1/REP-007 REV C	Including final comments from tfl. Appx B-E added
D	14.07.2015		18885-1/REP-007 REV D	Including comments from TfL. Appx B-E removed
E	19.10.2015		18885-1/REP-007 REV E	Including comments from tfl section 5.2 Fig 7 revised, section 5.1.2 (2), section 3.7 LU Standard Category 1 S1061 A2 steel strength assumed to be 230N/mm^2
F	30.06.2016		18885-1/REP-007 REV F	Including comments from TfL- column fixity revised. Other minor amendments as highlighted
G	5.09.2016		1885-1/REP-007 REV G	4.2 update reference to LU standards. Fig 6 increase and included in Appendix A. 5.1.2,

Prepared by	Reviewed by	Approved by
[redacted]		
J A Heath	**J D Miller**	**J D Miller**

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CONTENTS

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KINGS CROSS TRIANGLE KINGS CROSS BRIDGE APPROVAL IN PRINCIPLE SAFE LOAD CARRYING ASSESSMENT FOR COVERED WAY G143

1. NAME OF SCHEME

Kings Cross Triangle, Kings Cross Bridge Building.

The Kings Cross Bridge Building lies over two covered ways. The southern one, owned by London Underground (LUL), is the subject of this AIP. This covered way is over the Metropolitan Line Eastbound and Westbound tracks and platforms of the disused King Cross Underground Station in London, the tracks, however, are still live.

The second covered way, running parallel and to the north side, is owned by Network Rail.

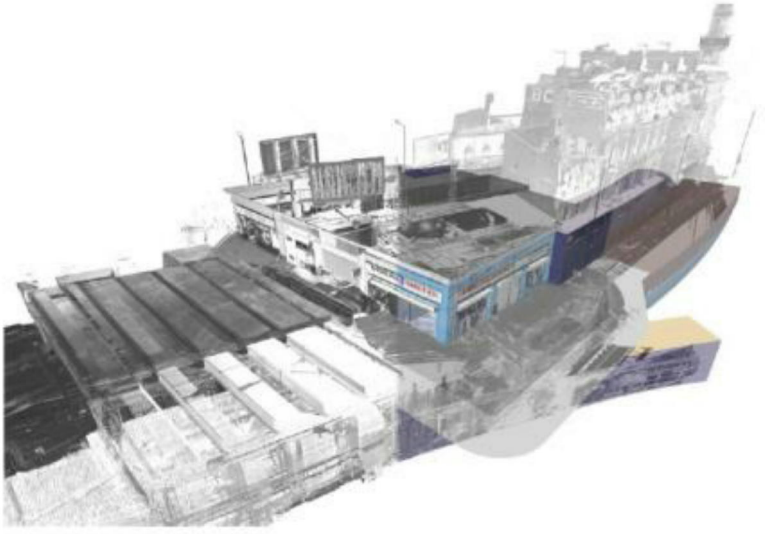


Figure 1 Kings Cross Bridge

2. NAME OF STRUCTURE

Metropolitan Line Asset ref G143

2.1 Type of structure

Riveted steel deep beams span over the tracks supported off riveted steel columns and brick retaining walls. There is a concrete filler joist slab over the beams.

2.2 Obstacle crossed

The covered way crosses the live Metropolitan railway tracks.

3. STRUCTURE DETAILS

3.1 Description of Structure

The disused station, comprising the platforms, basement ticket hall and building above, was built in 1911-12. The building is bounded by Pentonville Road to the north, King's Cross Bridge to the east, Gray's Inn Road to the south and it abuts the Lighthouse Building to the west. The station building sits on the covered way G143, which is immediately to the east of TL97.

The building comprises the three levels of the former King's Cross Underground Station, which served the Metropolitan Line platforms; one level above ground and two levels below ground.

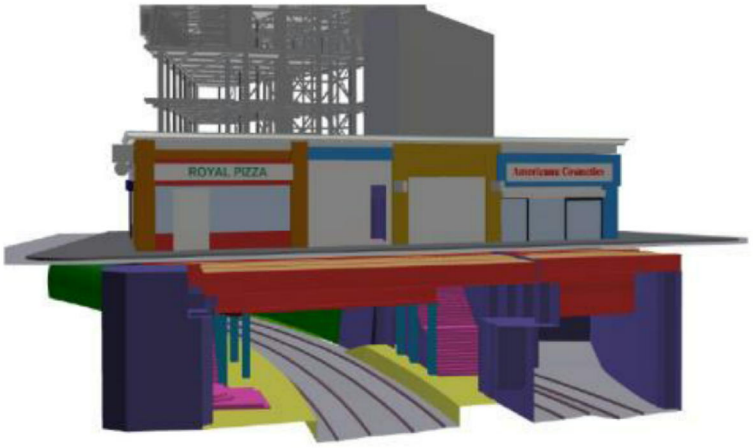
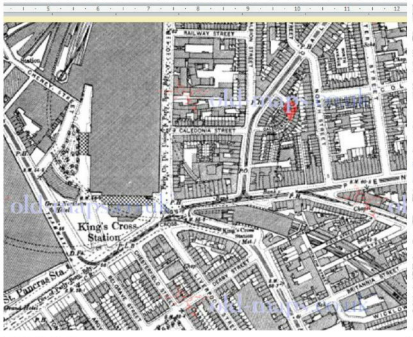


Figure 2 Kings Cross Bridge over the Covered Way

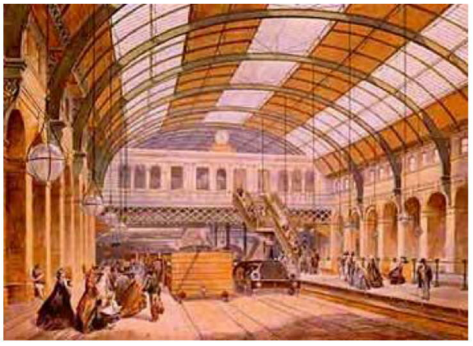
The original Metropolitan Railway station at King's Cross opened in 1863 and was located a short distance to the east of the present disused station location.

At this time there was no road at Kings Cross bridge and the station was in a cutting covered by a glass and iron roof, further east, with an entrance on the east side of Gray's Inn Road. Apart from the glass station roof and the foot bridge the tracks were open, in a cutting until they reached the tunnels under the light house building to the west.



1896 OS map

1916 OS Map



Collection of London Transport Museum

Former Kings Cross Metropolitan Station 1863

In 1911-12 The King's Cross Bridge was built over the west end of the platforms and the station completely reconfigured. The glass roof and original station entrance were removed. A new, separate, entrance was created for the Metropolitan Line (now TfL Metropolitan and Circle Line) in a building designed by Frank Sherrin on the corner of Pentonville Road and King's Cross Bridge. (Steam on the Widened Lines by Geoff Goslin) The building created the upper basement ticket hall and passengers entered off King's Cross Bridge Road down stairs to a circulating area and booking hall. This is the building that remains over TL 143.

In 1936 a new station for the Metropolitan line was started 250m to the west and opened in 1941, to improve interchange with other lines.

After the closure of the station the internal layout of the building was modified.

The ground floor structure comprises 4no. retail units with glazed shop fronts and masonry piers possibly with embedded steel beams and columns supporting a flat roof slab comprising a filler joist concrete slab.

The former station entrance on King's Cross Bridge, has a set of steps leading down to the basement and booking hall area. The current layout only utilises a quarter of the stair width for access to the upper basement, a suspended floor covers the rest of the stairs

At the basement level, (former ticket hall) there are two access stairs down to the platforms. The former ticket hall accommodation facilities comprise an open plan area, which features a pitched glazed roof light with several rooms leading off this area.

The structure supporting the building over the platforms is visible from platform level. This structure comprises five main girders that span over the two tracks and are supported at the back of the platforms. The two most western girders (labelled girders A and B) are supported on the brick retaining walls of the tunnel. The three eastern girders are supported on steel columns located at the back of the platforms. As the structure is thought to date from 1911 the metal beams and columns are likely to be steel. Secondary I-beams span between the main girders and support the concrete deck slab. The construction of the slab is filler joist clinker concrete slab, based on inspection and the investigation of the ground and roof slabs of the building which are clinker concrete.

The ground floor load bearing masonry walls are supported at ground floor level by steel beams, some encased in concrete, which are supported off columns that either sit on the transfer girders over the tracks or directly to platform level via columns or brick retaining walls. The brick piers of the Kings Cross Bridge façade are supported on steel columns on girder E over the tracks and directly on steel columns down to platform level either side. Hence some of the columns visible at track level continue to ground level whilst others just support the girders at basement level.

The ground floor slab, a filler joist concrete slab, is supported by primary floor beams which are connected to continuations of the steel columns supporting the upper basement floor. The floor beams and columns are steel I sections encased in concrete which only contains minimal mesh for fixing.

3.2 Structural Type

The covered way is a cut and cover structure with the second tunnel of filler joist construction immediately to the north.

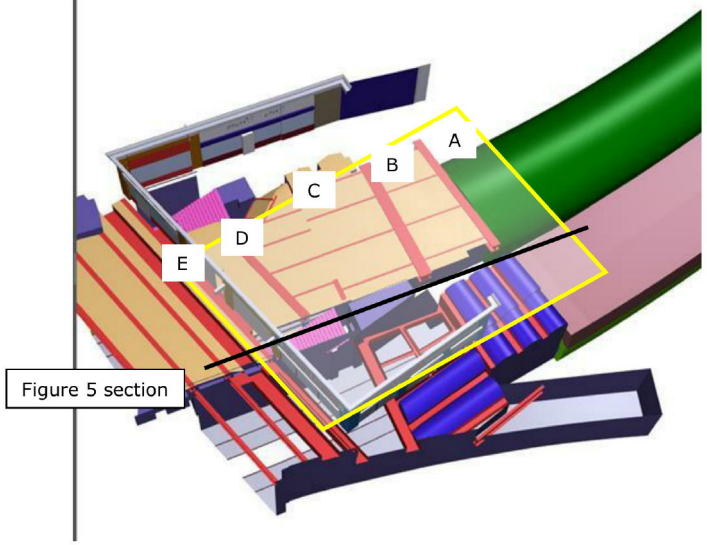


Figure 5 section

Figure 3 Structure Type

3.3 Sub-structure and foundations

Foundations are assumed to be concrete deep footings to the steel columns. As shown in Figure 5, a section at

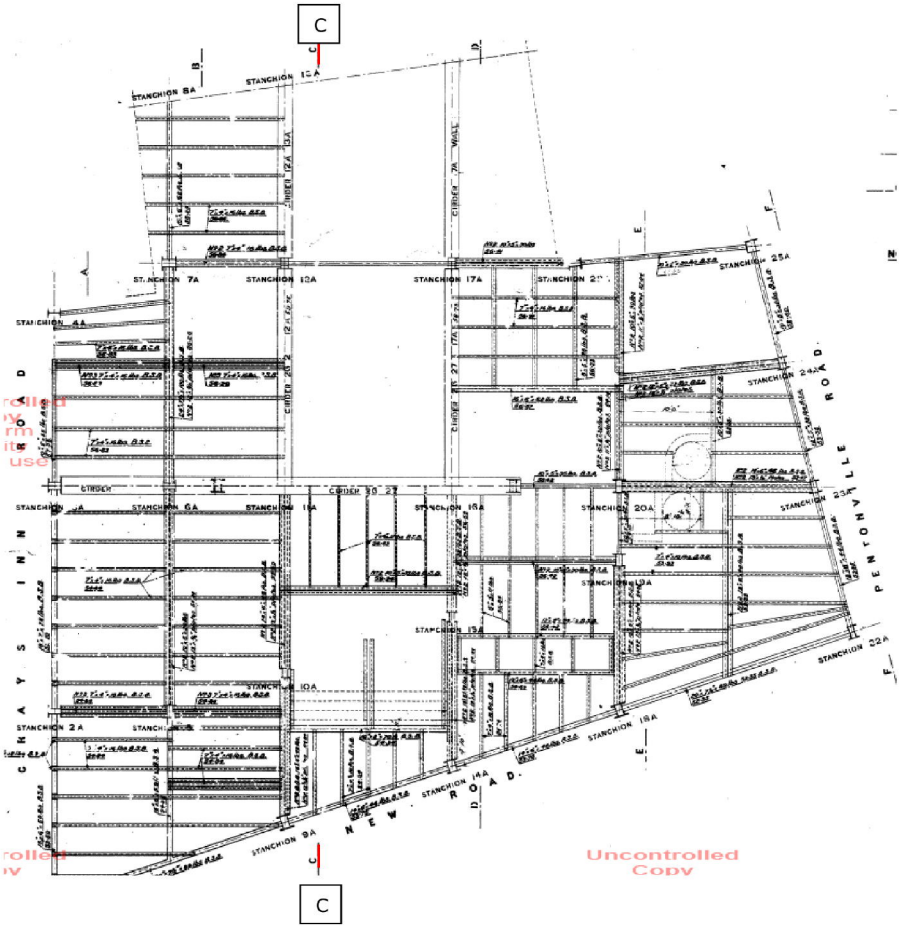


Figure 4 Archive drawing Metropolitan Railway Kings Cross Reconstruction Ground Floor Plan of Girders Joists etc. Contract Drawing No.3.

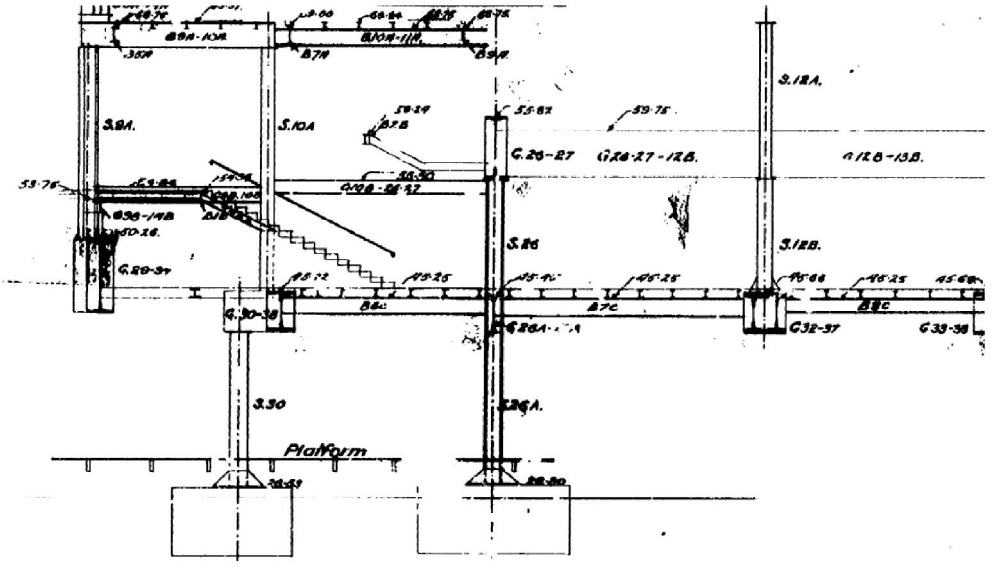


Figure 5 Archive drawing Metropolitan Railway Kings Cross Reconstruction Cross Sections. Contract Drawing No.4. SECTION CC

The foundations for the retaining walls are assumed to be stepped brick footings on concrete, based on experience of similar structures and drawings of similar construction in The Institution of Civil Engineering. Minutes of Proceedings. Volume 81, Issue 1885, pages 1 - 33 "*The Metropolitan and Metropolitan District Railways*." By Benjamin Baker.

3.4 Span Arrangements

Single simply supported single span.

3.5 Articulation Arrangements

No bearings.

3.6 Parapet Type

None

3.7 Material Properties

Material properties will be taken as in the following standards.

Characteristic strength of the masonry (retaining walls):

The properties of materials used in the structural analysis have been based on lower bound representative values and based on those given in BD21/01 and BS 5628 as well as those determined during a verification study involving comparisons with full-scale tests of masonry arch bridges, (Proceedings of the Institution of Civil Engineers Engineering and Computational Mechanics 163 September 2010 pp 203-211 Application of finite/discrete element method to arches C. Brookes) Reference will also be made to LU Category 1 Standard S1060 titled Civil Engineering – Bridge and Structures Inspection Standard and LU Standard Category 1 S1061 A2 titled Civil Engineering – Bridge and Structures Assessment Standard.
stock bricks set in 1:3 lime mortar 2.5 N/mm2;

Characteristic Strength of Steel (column, beams and filler joists)

In accordance with LU Category 1 Standard S1060 titled Civil Engineering – Bridge and Structures Inspection Standard and LU Standard Category 1 S1061 A2 titled Civil Engineering – Bridge and Structures Assessment Standard, a characteristic strength of steel will be taken as 230N/mm^2

Characteristic Strength of concrete (foundations and slabs):

In accordance with LU Category 1 Standard S1060 titled Civil Engineering – Bridge and Structures Inspection Standard and LU Standard Category 1 S1061 A2 titled Civil Engineering – Bridge and Structures Assessment Standard, a characteristic strength of normal concrete will be taken as not greater than 20N/mm^2 and a characteristic strength of clinker concrete will be taken as 5N/mm^2.

4. ASSESSMENT CRITERIA

4.1 Loading

4.1.1 Assessment Live Loading

Unfactored live loads from the proposed building occupation will be in accordance with BS EN 1991-1-1:2002 "Eurocode 1: Actions on structures — Part 1-1: General actions — Densities, self-weight, imposed loads for buildings".

4.1.2 Any special loading not covered here

The initial (current) and permanent (proposed) stress state will be calculated by modelling the construction of the existing building, then demolition and subsequent construction of the new building. Loads will be based on conservative estimates of the existing building loading and design loading from the new building. These will include unfactored dead and imposed loads.

4.2 List of Relevant British European and LU Standards

British Standards, incorporating the latest amendments and corrigenda,

Highways Agency. *Design Manual for Roads and Bridges, BD 21/01, The Assessment of highway bridges and structures*, August 2001

Highways Agency. *Design Manual for Roads and Bridges BA 55/06 Assessment of Bridge Substructures and Foundations, Retaining Walls and Buried Structures*

LU Work Instruction W0822 Structures Assessment for Safe Loading rev A1

LU Category 1 Standard S1060 A6 titled Civil Engineering – Bridge and Structures Inspection Standard

LU Category 1 S1061 A4 titled Civil Engineering – Bridge and Structures Assessment Standard

BS EN 1991-1-1:2002 "Eurocode 1: Actions on structures — Part 1-1: General actions — Densities, self-weight, imposed loads for buildings".

4.3 Proposed departures from LU standards listed above

None

4.4 Proposed Methods of dealing with aspects not covered by LU standards listed in 4.2

N/A

5. STRUCTURAL ANALYSIS

5.1 Methods of Analysis proposed for the superstructure, substructure and foundations

5.1.1 Proposed alterations

The existing building structures will generally be demolished above basement level and a new three-storey lightweight building housing a restaurant and offices will be constructed. The existing basement will be partially used for toilet/bike storage facilities and for TfL access.

The building will be of steel framed construction to keep weight down and for constructability, and will be seated on spring bearings to acoustically and vibrationally isolate the building from the trainlines below.

The new structure is being designed to transfer loads to the existing substructure (i.e. bridge deck, columns and foundations) so that the new loads do not exceed the loads applied by the existing buildings.

The new scheme will apply loads onto the same loading paths of the existing structures along the line of the retained steel girders supporting the slab above the track. New columns will either sit directly on existing columns and retaining walls or they will sit on new beams or trusses just below ground level that span onto existing columns and walls.

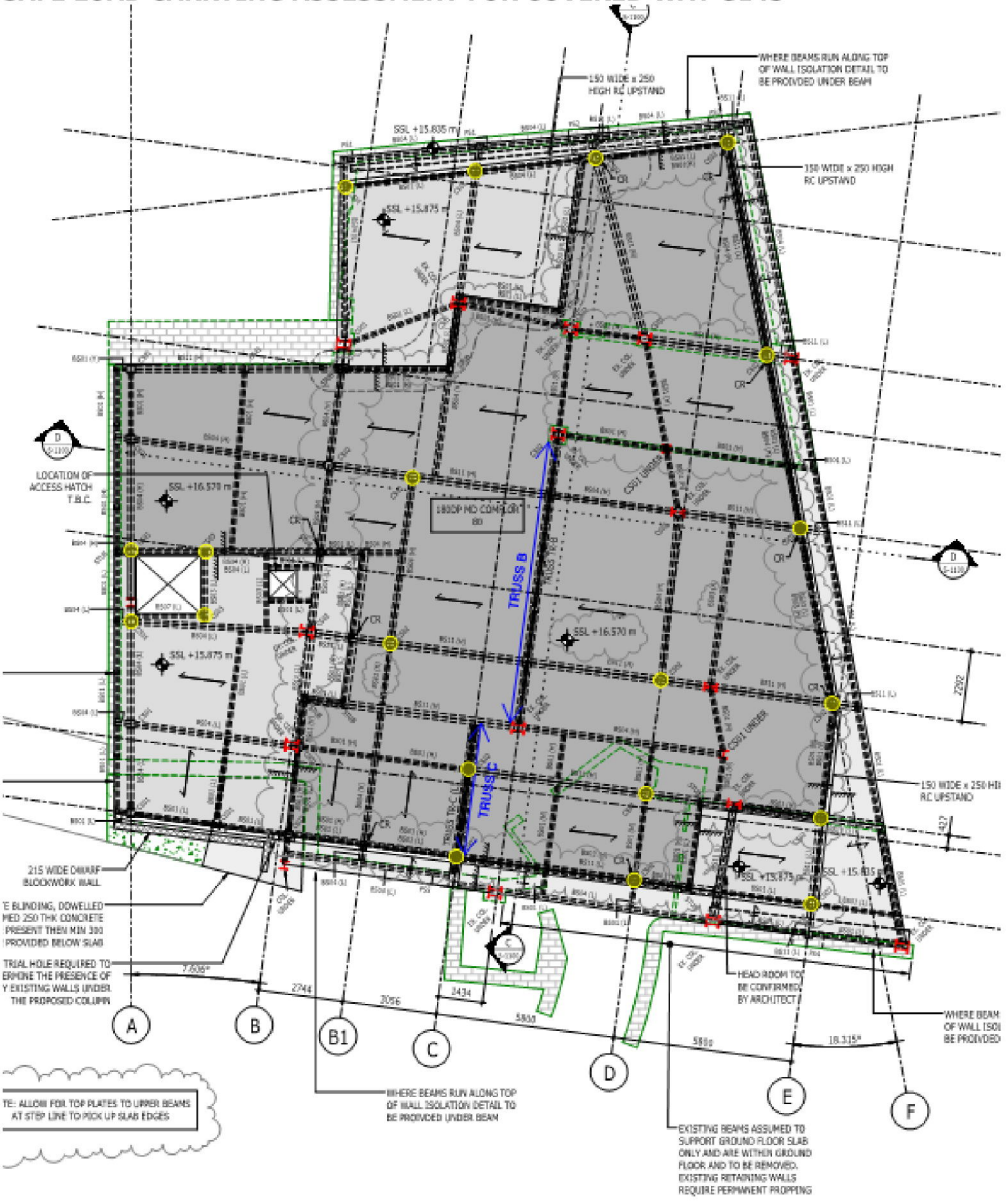


Figure 6 **Extract from drawing 61018885-01-S1001 (included in Appendix A) Ground Floor GA. Columns highlighted yellow are not directly above existing structural beams, trackside columns or retaining walls. Columns in red start at the floor below and terminate at ground level. New trusses highlighted in blue.**

Within the basement there are existing columns which sit on the girders over the tunnels. The principle is to take all loads back to these existing support points to utilise the existing load paths.

In some locations above-ground columns are located directly above the existing basement ones, however in many situations this is not the case. Therefore a series of deep beams and trusses will be provided as transfer structure within the full basement depth to carry the loads back to the support points. Refer to and drawing 61018885-01-S1001 in the Appendix A.

There are two new trusses proposed and these are highlighted in blue in

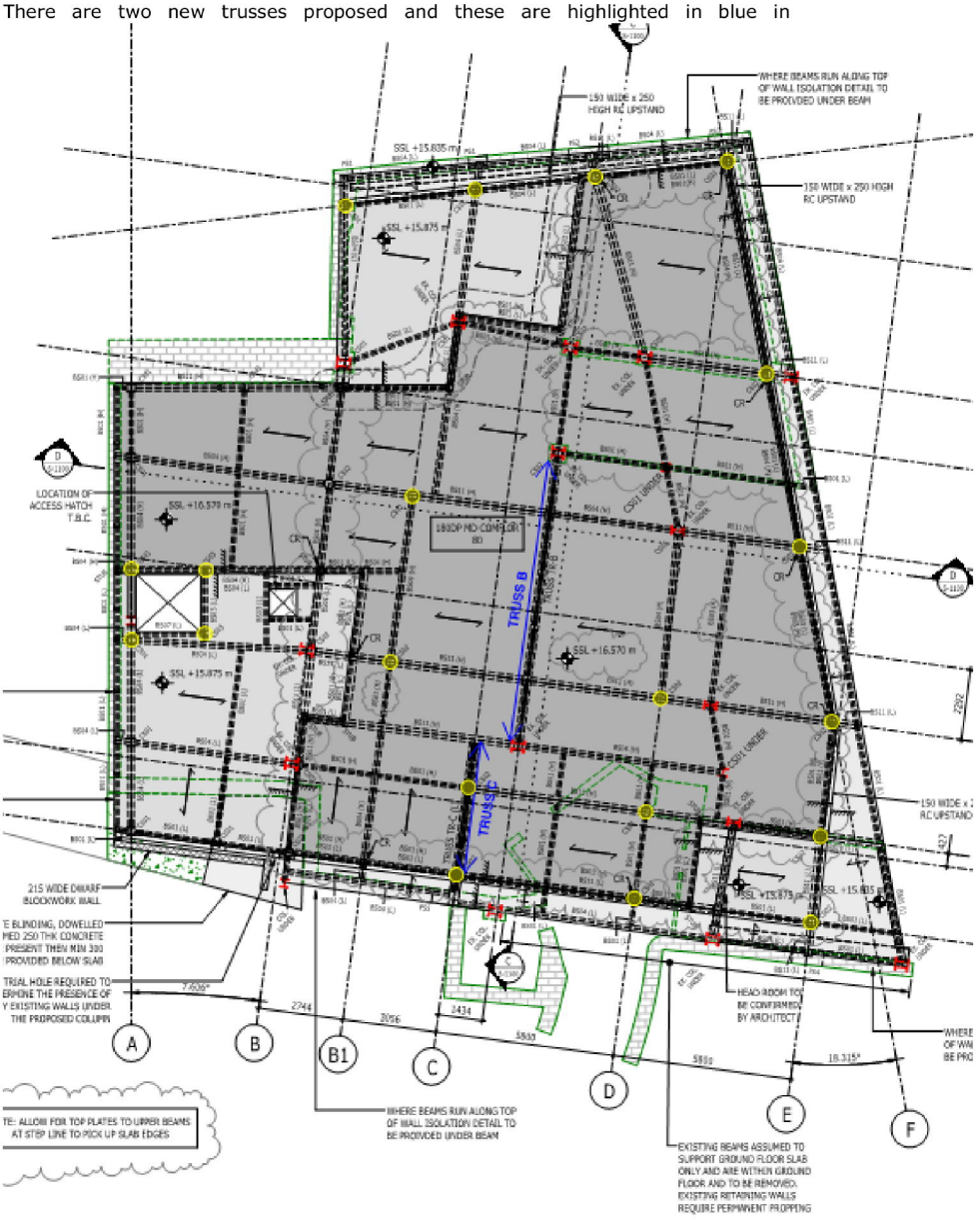


Figure 6. Details of the trusses are shown in drawings 61018885-01-S1001 in the Appendix A.

The new structure will be isolated from the existing by spring bearings which will reduce the transmission of noise and vibrations from the trains passing through the tunnels below.

Primarily bearings will sit underneath column baseplates at ground /basement levels. Dead, wind and imposed loads will be passed to the bearing designer, and design liaison will be required to agree deflection limits of the springs.

5.1.2 Analysis Method: Comparison of existing and proposed loads, and Capacity Check

1. Load Comparison

As the existing and new buildings are located over TfL and NWR tunnels and assets, it will be proved that the existing structure supporting the new building will not be overloaded. The approach that was to be adopted was to carry out an initial check that the proposed increase in additional loads to the existing structure would be less than 10% of the existing load.

A load comparison report (61018885-01-ST-REP-003) has been undertaken which compares an accurate load takedown of the existing structure with the reaction outputs of the new building analysis model. This report summarises the assumed loads, the loaded areas and the comparison of new and existing. Overall the weight of the proposed building is less than the weight of the building being demolished. In general the proposed individual column loads are no more than 10% higher than the existing, and this effectively means that there is no increase in load.

Locally at a few bearings initial calculations indicate the loads increased by more than 10%. In these locations further, more refined, analysis was undertaken to prove that in fact the proposed loads would not be greater than 10% more than the existing. These supplementary calculations are included in section 5 of report 61018885-01-ST-REP-011 *Calculation Package TfL: Covered Way –Existing Capacity Check*, which will be part of the Safe Load Assessment.

Load comparison is a well-established principle for checking existing structures for a change of load, providing there are no structural defects. **However, review with TfL indicated that this comparison was a necessary, but not sufficient, justification for the Safe Load Assessment of the structure for the proposed change of loading. Detailed measured inspections of the beams and columns have been carried out to allow a capacity check of these elements.**

The girder and column capacity check forms the basis of this AIP, not the load comparison, and these will form the Safe Load Assessment.

2. Girder and Column Capacity Assessment

Capacity checks for the girders and columns will be made, based on measurements of the columns and beam dimensions.

A simple linear elastic structural analysis of the beams and columns will be undertaken comparing estimated historic load with proposed load to predict change in stress and deflection. This will also be based upon a laser scan survey, inspection for assessment *(61018885-01-ST-REP-010 Inspection for Assessment of LUL Covered Way G143)*, and scheme design submitted for planning (drawings in Appendix A).

The assessment calculations are included in 61018885-01-ST-REP-011 *Calculation Package TfL: Covered Way –Existing Capacity Check* and will be included in the Safe Load Assessment. It will demonstrate that the existing structure has adequate capacity for the existing load and for the proposed loads.

The beams will be conservatively assumed as simply supported. The columns will be checked both pinned and partially fixed at the top. It is assumed that there is partial fixity at the head of the column, and the maximum degree of fixity is determined based on the maximum moment that is currently transferred.

3. Foundations

A geotechnical desk study will be included in the submission (*61018885-DS-R01 Kings Cross Bridge Geotechnical Desk Study)*. The information gathered from that study will be used to carry out a quantitative geotechnical analysis on the supporting foundations for loads applied in the existing, temporary and permanent conditions. This will also be based upon a laser scan survey, inspection for assessment (*61018885-01-ST-REP-010 Inspection for Assessment of LUL Covered Way G143*), and scheme design submitted for planning (drawings in Appendix A).

Our geotechnical engineering team will estimate the potential for ground movement based on simple linear elastic calculation.

5.2 Diagram of idealised structure

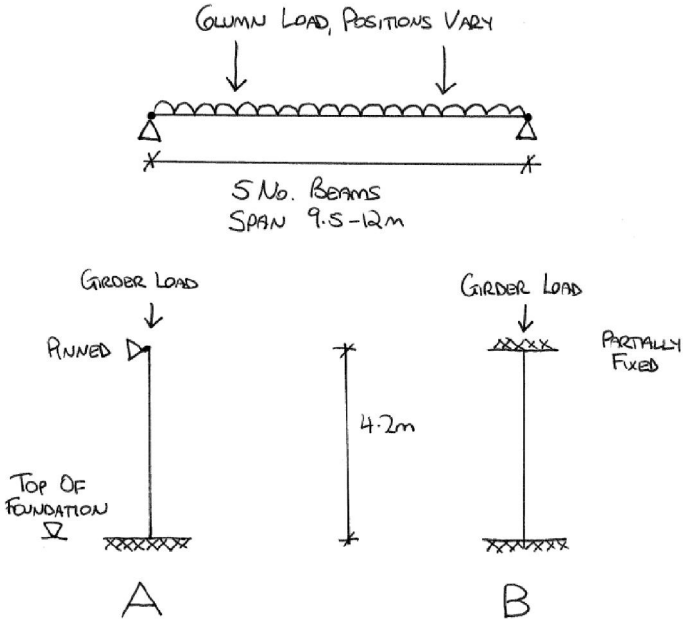


Figure 7 Idealised Diagram of Girders and Columns

6. DRAWINGS AND DOCUMENTS

6.1 List of drawings and other documents accompanying this submission

Appendix A

18885-01-S-1000	Basement plan GA
18885-01-S-1001	Ground floor plan GA
18885-01-S-1002	First Floor plan GA
18885-01-S-1003	Second floor plan GA
18885-01-S-1004	Roof plan GA
18885-01-S-1005	Roof plant room GA
~~18885-01-S-1020~~	~~Basement Spring support locations~~
18885-01-S-1100	Building sections Sheet 1
~~18885-01-S-1101~~	~~Building sections Sheet 2~~
~~18885-01-S-1200~~	~~Basement/Ground truss elevations~~
~~18885-01-S-1210~~	~~Ground floor details & sections~~
~~18885-01-S-1211~~	~~Ground floor details & sections~~

7. ACCEPTANCE

7.1 Acceptance

The above is submitted for acceptance

Signed JHeath	Title: Associate
Name (Print): J A Heath CEng MICE	Date 24.11.2014 Date Rev D 14.07.2015 Date Rev E 18.10.2015 Date Rev F 30.06.2016 Date Rev G 05.09.2016
To be signed by the Assessor responsible for the Assessment to AIP stage or other person authorised to sign on behalf of the organisation responsible for the Assessment	

7.2 Acceptance

The above is agreed subject to the amendments and conditions shown below.

Accepted by

I accept this document as the London Underground person accountable for protection of London Underground's infrastructure only in so far as if the principals laid down herein are followed the risks to London Underground assets and operations will be mitigated to as low as reasonably practical. It is also accepted on the understanding that all outstanding activities listed in here are properly executed.

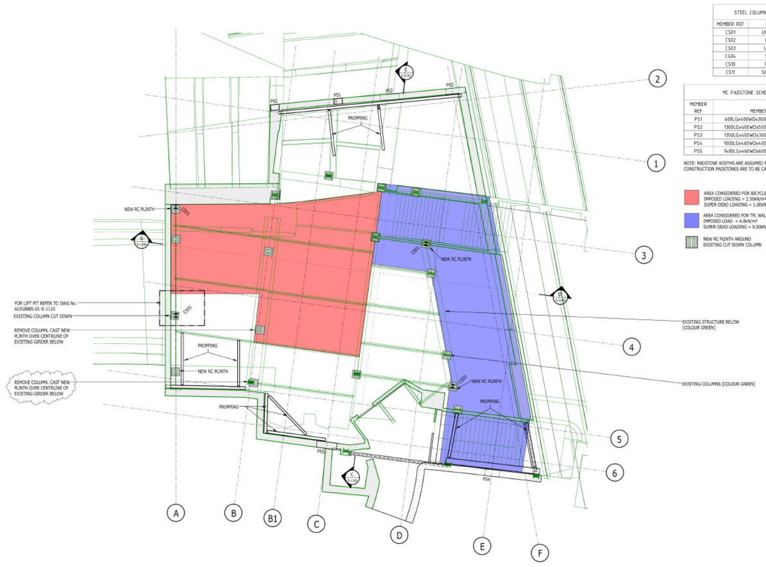
<Name> M C PAYNE
<Role> Principal Engineer Infrastructure Protection

12-10-16

APPENDIX A: DRAWINGS

THIS DRAWING IS COLOUR

NOTE: EXISTING STRUCTURE SHOWN IN GREEN



STEEL COLUMN SCHEDULE	
MEMBER REF	MEMBER SIZE
CS01	UKC254x254x107
CS02	CHS323.9x12.5
CS03	UKC152x152x37
CS04	SHS80x80x6.3
CS10	PFC150x90x24
CS11	SHS200x200x12.5

MC PADSTONE SCHEDULE	
MEMBER REF	MEMBER SIZE
PS1	600LGx400WDx300DP MC PADSTONE
PS2	1300LGx400WDx500DP MC PADSTONE
PS3	1350LGx400WDx300DP MC PADSTONE
PS4	1000LGx460WDx400DP MC PADSTONE
PS5	1400LGx460WDx600DP MC PADSTONE

NOTE: PADSTONE WIDTHS ARE ASSUMED FOR COSTING. FOR CONSTRUCTION PADSTONES ARE TO BE CAST FULL WIDTH OF WALL

AREA CONSIDERED FOR BICYCLE OR LOO
IMPOSED LOADING = 2.50kN/m²
SUPER-DEAD LOADING = 1.00kN/m²

AREA CONSIDERED FOR TFL WALKWAY
IMPOSED LOAD = 4.8kN/m²
SUPER-DEAD LOADING = 0.00kN/m²

NEW RC PLINTH AROUND EXISTING CUT DOWN COLUMN

Notes

1. DO NOT SCALE FROM THIS DRAWING
2. ALL DIMENSIONS ARE MILLIMETRES U.N.O.
3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
5. STEELWORK:
   OBTAIN STEELWORK FROM SOURCE ACCREDITED TO A NATIONAL OR INTERNATIONAL QUALITY STANDARD. REFER TO SPECIFICATION.
   i. GENERAL STEEL SECTIONS & PLATES TO BS EN 10025-2 GRADE S355J0 U.N.O.
   ii. BASEPLATES TO COLUMNS TO BS EN 10025-2 GRADE S275J0 U.N.O.
   iii. HOLLOW STEEL SECTIONS TO BS EN 10210-1 GRADE S355J2H U.N.O.
   iv. ALL WELDS TO BE MIN 6mm FULL PENETRATION FILLET WELDS U.N.O.
   v. DETAILED DESIGN OF ALL STEEL TO STEEL CONNECTIONS BY SPECIALIST SUB-CONTRACTOR
6. STABILITY IS PROVIDED BY MOMENT FRAMES. REFER TO CONNECTION DRAWINGS FOR CONNECITON LOADS
7. ANY DISCREPANCIES BETWEEN SURVEYED LEVELS AND ACTUAL LEVELS ON SITE TO BE REPORTED TO THE ENGINEER IMMEDIATELY
8. SETTING OUT TO ARCHITECTS GA's
9. ALL CONCRETE TO BE GRADE C32/40 U.N.O. REFER TO SPECIFICATION

Rev	Description	Date	By / Chk	App
P05	STAGE 3 ISSUE - SCHEME REVISED	31/05 2016	JR / TC	JH
P04	STAGE E ISSUE	03/10 2014	JM / JK	JH

PRELIMINARY

KINGS CROSS BRIDGE

RAMBOLL

tel 020 7631 5291 fax 020 7323 4645 london@ramboll.co.uk
www.ramboll.co.uk

BASEMENT PLAN
GENERAL ARRANGEMENT

Scale:	Date:	Drawn:	Checked:
As indicated	JUL 2014	JM	JK

Drawing No.: 61018885-01-S-1000 Rev: P05

31/05/2016 17:13:53

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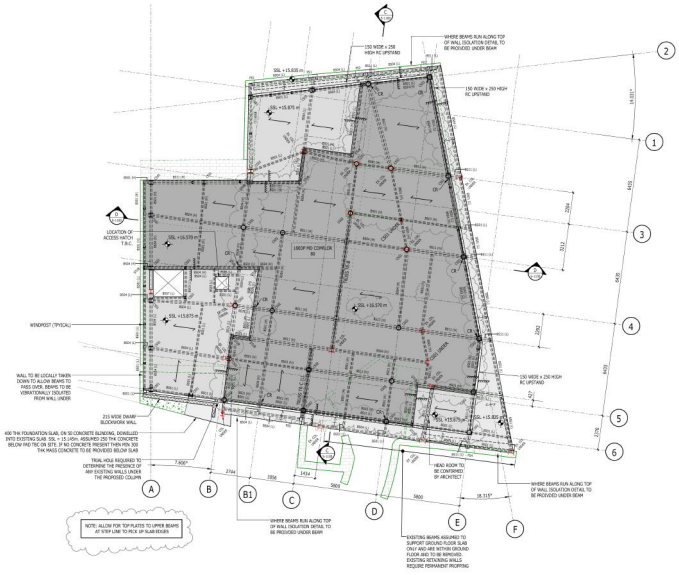

NOTE: EXISTING STRUCTURE SHOWN IN GREEN

STEEL COLUMN SCHEDULE

MEMBER REF	MEMBER SIZE
CS01	UKC254x254x167
CS02	EHS219.1x12.5
CS03	UKC152x152x37
CS04	SHS180x180x6.3
CS10	PFC150x90x24
CS11	SHS200x200x12.5

STEEL BEAM SCHEDULE

MEMBER REF	MEMBER SIZE
BS01	UKB203x133x30
BS02	RHS180x100x5.0
BS03	UKB300x140x44
BS04	UKB406x178x74
BS05	UKB533x210x92
BS06	UB53x47.1
BS07	UKPFC150x75x18
BS07+	UKPFC150x75x18 CRANE
BS08	RHS360x80x8.0
BS10	UKB254x146x37
BS11	UKB610x229x101
BS12	RHS400x200x10.0
BS15	UKC152x152x23
BS16	RHS300x200x8.0
BS17	UKPFC150x90x24

INDICATES 180mm THK COMPOSITE DECK COMFLOR 80 OR SIMILAR APPROVED WITH A252 MESH. 130mm HIGH 19mmØ SHEAR STUDS AT 300mm C/C OR EVERY TROUGH TO EVERY BEAM

INDICATES 140mm THK COMPOSITE DECK COMFLOR 60 OR SIMILAR APPROVED WITH A193 MESH. 100mm HIGH 19mmØ SHEAR STUDS AT 300mm C/C OR EVERY TROUGH TO EVERY BEAM

NOTE: COLUMNS SHOWN IN RED START AT THE FLOOR BELOW AND WILL TERMINATE AT THIS LEVEL

TRUSS TO A TO BE REMOVED FOLLOWING FINAL DETAILED DESIGN CHECKS ON GRID LINE B, CHANE LOCATION & LOADS TO BE ROUTED

TRUSS SCHEDULE

MEMBER SIZE	TYPE
TRUSS TR-B	
SHS150x150x8.0	DIAGONALS
SHS100x100x8.0	VERTICALS
UKC254x254x73	BTM CHORD
UKC254x254x73	END SUPPORT
UKC254x254x73	TOP CHORD
TRUSS TR-C	
SHS150x150x6.3	DIAGONALS
SHS150x150x6.3	VERTICALS
UKC305x305x137	BTM CHORD
UKC305x305x137	TOP CHORD

NOTE: FOR TRUSS DETAILS REFER TO DWG No. 61018885-S-S-1200

PC PADSTONE SCHEDULE

MEMBER REF	MEMBER SIZE
PS1	600Lx440Wx300DP PC PADSTONE
PS2	1000Lx440Wx500DP PC PADSTONE
PS3	1350Lx440Wx300DP PC PADSTONE
PS4	1000Lx440Wx540DP PC PADSTONE
PS5	1400Lx440Wx450DP PC PADSTONE

NOTE: PADSTONE WIDTHS ARE ASSUMED FOR COSTING. FOR CONSTRUCTION PADSTONES ARE TO BE CAST FULL WIDTH OF WALL

STEEL BEAM KEY:
(H) INDICATES BEAM AT HIGHER GROUND FLOOR LEVEL
(L) INDICATES BEAM AT LOWER GROUND FLOOR LEVEL
(CB) INDICATES CRANKED BEAM

Notes

1. DO NOT SCALE FROM THIS DRAWING
2. ALL DIMENSIONS ARE MILLIMETRES U.N.O.
3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
5. STEELWORK:
   EATION STEELWORK FROM SOURCE ACCREDITED TO A QUALITY SYSTEM OF INTERNATIONAL QUALITY STANDARD. REFER TO SPECIFICATION.
   i. GENERAL STEEL SECTIONS & PLATES TO BS EN 10025-2 GRADE S355JO U.N.O.
   ii. BASEPLATES TO COLUMNS TO BS EN 10025-2 GRADE S275JO U.N.O.
   iii. HOLLOW STEEL SECTIONS TO BS EN 10210-1 GRADE S355J0H U.N.O.
   iv. ALL WELDS TO BE MIN 6mm FULL PENETRATION FILLET WELDS.
   v. DETAILED DESIGN OF ALL STEEL TO STEEL CONNECTIONS BY SPECIALIST SUB CONTRACTOR
6. STABILITY IS PROVIDED BY MOMENT FRAMES. REFER TO CONNECTION DRAWINGS FOR CONNECTION LOADS
7. ANY DISCREPANCIES BETWEEN SURVEYED LEVELS AND ACTUAL LEVELS ON SITE TO BE REPORTED TO THE ENGINEER IMMEDIATELY
8. SETTING OUT OF CLADDING DETAILS, SECONDARY STEELWORK & DIMENSIONING OF STEELWORK TO BE TO ARCHITECTS DRAWINGS
9. ALL CONCRETE COMPOSITE DECK SLABS TO BE LIGHTWEIGHT CONCRETE GRADE C40/44 U.N.O. REFER TO SPECIFICATION
10. SETTING OUT OF SLAB EDGE TBC BY ARCHITECT
11. ADDITIONAL SECONDARY STEELWORK TO LIFTSHAFT CLADDING, STAIRCASES ETC IS SHOWN ON CROSS 61018885-SS-S-1116, 1120, 1130 & 1190
12. ALL DETAILS AND SETTING OUT TO BE COORDINATED WITH THE ARCHITECT
13. SERVICE RISERS & LIFT SHAFT DIMENSIONS ARE BASED UPON ARCHITECTS STAGE D+ INFORMATION

SETTING OUT OF EXISTING COLUMNS TBC FOLLOWING SITE SURVEY AND MAY INFLUENCE THE SETTING OUT OF THE NEW COLUMNS

CDM:
PROPPING TO BASEMENT RETAINING WALLS TO GRAYS INN ROAD & PENTONVILLE ROAD TO BE INSTALLED PRIOR TO DEMOLITION OF GROUND FLOOR SLAB

Rev	Description	Date	Drwn	Appd
P03	STAGE 3 ISSUE - SCHEME REVISED GROUND FLOOR SLAB STEPPED, STAIRS REMOVED	13/08/2014	JM	JK
P04	STAGE 3 ISSUE	03/10/2014	JM	JK
P05	STAGE 3 ISSUE	31/03/2016	JM	JK

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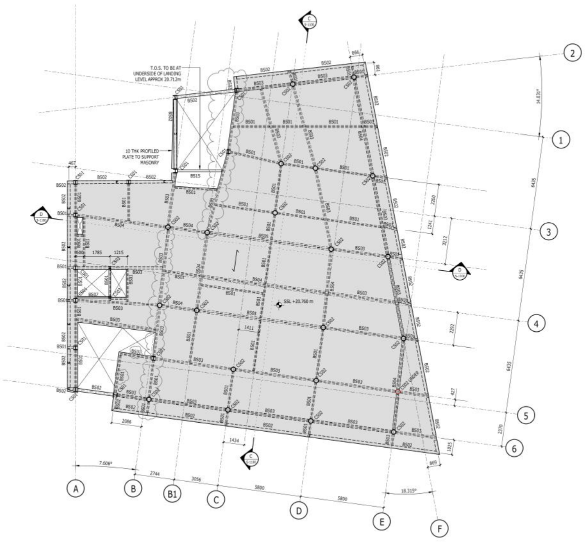
GROUND FLOOR PLAN
GENERAL ARRANGEMENT

Scale	Date	Drawn	Checked
1 : 100	JUL 2014	JM	JK

Drawing No. 61018885-01-S-1001 Rev. P05

31/03/2016 17:13:54

THIS DRAWING IS COLOUR



STEEL COLUMN SCHEDULE	
MEMBER REF	MEMBER SIZE
CS01	UKC254x254x107
CS02	CHS323.9x12.5
CS03	UKC152x152x37
CS04	SHS80x80x6.3
CS10	PFC150x90x24
CS11	SHS200x200x12.5

STEEL BEAM SCHEDULE	
MEMBER REF	MEMBER SIZE
BS01	UKB203x133x30
BS02	RHS300x200x12.5
BS03	UKB305x165x40
BS04	UKB406x178x74
BS05	UKB533x210x92
BS06	LB545x67.1
BS07	UKPFC150x75x18
BS07*	UKPFC150x75x18 CRANK
BS08	RHS160x80x8.0
BS10	UKB254x146x37
BS11	UKB610x229x125
BS12	RHS400x200x10.0
BS15	UKC152x152x23
BS16	RHS300x200x10.0
BS17	UKPFC150x90x24

INDICATES 140mm THK COMPOSITE DECK COMFLOR 80 GAUGE 1.2 OR SIMILAR APPROVED WITH A252 MESH. 100mm HIGH 19mmØ SHEAR STUDS AT 300mm C/C OR EVERY TROUGH TO EVERY BEAM

NOTE: COLUMNS SHOWN IN RED START AT THE FLOOR BELOW AND WILL TERMINATE AT THIS LEVEL

Notes

1. DO NOT SCALE FROM THIS DRAWING
2. ALL DIMENSIONS ARE MILLIMETRES U.N.O.
3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
5. STEELWORK:
   OBTAIN STEELWORK FROM SOURCE ACCREDITED TO A NATIONAL OR INTERNATIONAL QUALITY STANDARD. REFER TO SPECIFICATION.
   i. GENERAL STEEL SECTIONS & PLATES TO BS EN 10025-2 GRADE S355J0 U.N.O.
   ii. BASEPLATES TO COLUMNS TO BS EN 10025-2 GRADE S275J0 U.N.O.
   iii. HOLLOW STEEL SECTIONS TO BS EN 10210-1 GRADE S355J2H U.N.O.
   iv. ALL WELDS TO BE MIN 6mm FULL PENETRATION FILLET WELDS
   v. DETAILED DESIGN OF ALL STEEL TO STEEL CONNECTIONS BY SPECIALIST SUB-CONTRACTOR
6. STABILITY IS PROVIDED BY MOMENT FRAMES. REFER TO CONNECTION DRAWINGS FOR CONNECITON LOADS
7. ANY DISCREPANCIES BETWEEN SURVEYED LEVELS AND ACTUAL LEVELS ON SITE TO BE REPORTED TO THE ENGINEER IMMEDIATELY
8. SETTING OUT OF CLADDING DETAILS, SECONDARY STEELWORK & DIMENSIONING OF STEELWORK TO BE TO ARCHITECTS DRAWINGS
9. ALL CONCRETE COMPOSITE DECK SLABS TO BE LIGHTWEIGHT CONCRETE GRADE LC40/44 U.N.O. REFER TO SPECIFICATION
10. SETTING OUT OF SLAB EDGE TBC BY ARCHITECT
11. ADDITIONAL SECONDARY STEELWORK TO LIFTSHAFT CLADDING, STAIRCASES ETC IS SHOWN ON DRGS 61018885-01-S-1110, 1120, 1130 & 1190
12. ALL DETAILS AND SETTING OUT TO BE COORDINATED WITH THE ARCHITECT
13. SERVICE RISERS & LIFT SHAFT DIMENSIONS ARE BASED UPON ARCHITECTS STAGE E+ INFORMATION

CDM:
STEEL FRAME IS DESIGNED AS PORTALISED FOR LATERAL STABILITY. REFER TO REPORT No.61018885-01-ST-REP-003 FOR DETAILS. CONSTRUCTION SEQUENCE & TEMPORARY STABILITY TO TAKE THIS INTO ACCOUNT

Rev	Description	Date	By / Chk	App
P05	STAGE 3 ISSUE - SCHEME REVISED	31/05 2016	JR / TC	JH
P04	STAGE E ISSUE	03/10 2014	JM / JK	JH

PRELIMINARY

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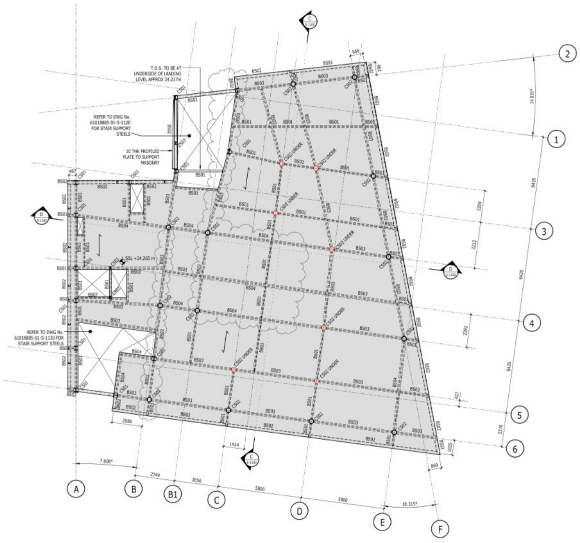
FIRST FLOOR PLAN
GENERAL ARANGEMENT

Scale:	Date:	Drawn:	Checked:
1 : 100	JUL 2014	JM	JK

Drawing No.: 61018885-01-S-1002 Rev: P05

31/05/2016 14:23:20

THIS DRAWING IS COLOUR



STEEL COLUMN SCHEDULE	
MEMBER REF	MEMBER SIZE
CS01	UKC254x254x107
CS02	CHS323.9x12.5
CS03	UKC152x152x37
CS04	SHS80x80x6.3
CS10	PFC150x90x24
CS11	SHS200x200x12.5

STEEL BEAM SCHEDULE	
MEMBER REF	MEMBER SIZE
BS01	UKB203x133x30
BS02	RHS300x200x12.5
BS03	UKB305x165x40
BS04	UKB406x178x74
BS05	UKB533x210x92
BS06	LB545x67.1
BS07	UKPFC150x75x18
BS07*	UKPFC150x75x18 CRANK
BS08	RHS160x80x8.0
BS10	UKB254x146x37
BS11	UKB610x229x125
BS12	RHS400x200x10.0
BS15	UKC152x152x23
BS16	RHS300x200x10.0
BS17	UKPFC150x90x24

INDICATES 140mm THK COMPOSITE DECK COMFLOR 80 OR SIMILAR APPROVED WITH A252 MESH. 100mm HIGH 19mmØ SHEAR STUDS AT 300mm C/C OR EVERY TROUGH TO EVERY BEAM

NOTE: COLUMNS SHOWN IN RED START AT THE FLOOR BELOW AND WILL TERMINATE AT THIS LEVEL

Notes

1. DO NOT SCALE FROM THIS DRAWING
2. ALL DIMENSIONS ARE MILLIMETRES U.N.O.
3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
5. STEELWORK:
   OBTAIN STEELWORK FROM SOURCE ACCREDITED TO A NATIONAL OR INTERNATIONAL QUALITY STANDARD. REFER TO SPECIFICATION.
   i. GENERAL STEEL SECTIONS & PLATES TO BS EN 10025-2 GRADE S355J0 U.N.O.
   ii. BASEPLATES TO COLUMNS TO BS EN 10025-2 GRADE S275J0 U.N.O.
   iii. HOLLOW STEEL SECTIONS TO BS EN 10210-1 GRADE S355J2H U.N.O.
   iv. ALL WELDS TO BE MIN 6mm FULL PENETRATION FILLET WELDS
   v. DETAILED DESIGN OF ALL STEEL TO STEEL CONNECTIONS BY SPECIALIST SUB-CONTRACTOR
6. STABILITY IS PROVIDED BY MOMENT FRAMES. REFER TO CONNECTION DRAWINGS FOR CONNECITON LOADS
7. ANY DISCREPANCIES BETWEEN SURVEYED LEVELS AND ACTUAL LEVELS ON SITE TO BE REPORTED TO THE ENGINEER IMMEDIATELY
8. SETTING OUT OF CLADDING DETAILS, SECONDARY STEELWORK & DIMENSIONING OF STEELWORK TO BE TO ARCHITECTS DRAWINGS
9. ALL CONCRETE COMPOSITE DECK SLABS TO BE LIGHTWEIGHT CONCRETE GRADE LC40/44 U.N.O. REFER TO SPECIFICATION
10. SETTING OUT OF SLAB EDGE TBC BY ARCHITECT
11. ADDITIONAL SECONDARY STEELWORK TO LIFTSHAFT CLADDING, STAIRCASES ETC IS SHOWN ON DRGS 61018885-01-S-1110, 1120, 1130 & 1190
12. ALL DETAILS AND SETTING OUT TO BE COORDINATED WITH THE ARCHITECT
13. SERVICE RISERS & LIFT SHAFT DIMENSIONS ARE BASED UPON ARCHITECTS STAGE E+ INFORMATION

CDM:
STEEL FRAME IS DESIGNED AS PORTALISED FOR LATERAL STABILITY. REFER TO REPORT No.61018885-01-ST-REP-003 FOR DETAILS. CONSTRUCTION SEQUENCE & TEMPORARY STABILITY TO TAKE THIS INTO ACCOUNT

Rev	Description	Date	By / Chk	App
P05	STAGE 3 ISSUE - SCHEME REVISED	31/05 2016	JR / TC	JH
P04	STAGE E ISSUE	03/10 2014	JM / JK	JH

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SECOND FLOOR PLAN
GENERAL ARRANGEMENT

Scale:	Date:	Drawn:	Checked:
1 : 100	JUL 2014	JM	JK

Drawing No.: 61018885-01-S-1003 Rev: P05

31/05/2016 14:23:20

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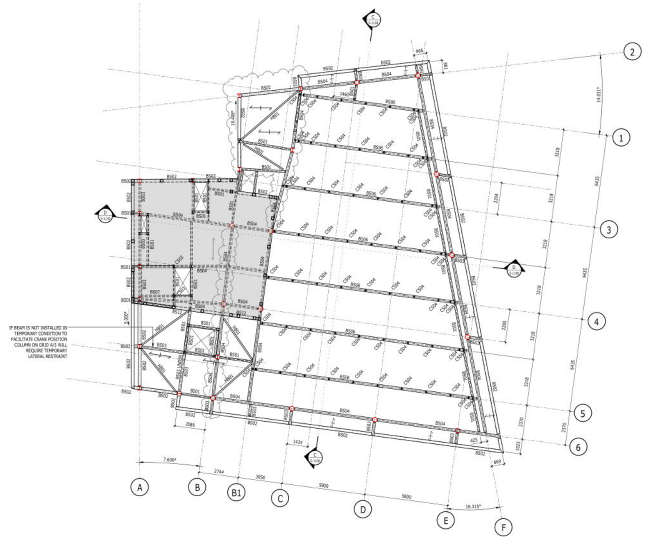

STEEL COLUMN SCHEDULE	
MEMBER REF	MEMBER SIZE
CS01	UKC254x254x107
CS02	CHS323.9x12.5
CS03	UKC152x152x37
CS04	SHS80x80x6.3
CS10	PFC150x90x24
CS11	SHS200x200x12.5

STEEL BEAM SCHEDULE	
MEMBER REF	MEMBER SIZE
BS01	UKB203x133x30
BS02	RHS300x200x12.5
BS03	UKB305x165x40
BS04	UKB406x178x74
BS05	UKB533x210x92
BS06	LB545x67.1
BS07	UKPFC150x75x18
BS07*	UKPFC150x75x18 CRANK
BS08	RHS160x80x8.0
BS10	UKB254x146x37
BS11	UKB610x229x125
BS12	RHS400x200x10.0
BS15	UKC152x152x23
BS16	RHS300x200x10.0
BS17	UKPFC150x90x24

STEEL BRACING SCHEDULE	
MEMBER REF	MEMBER SIZE
HB01	CHS88.9x5.0

NOTE: COLUMNS SHOWN IN RED START AT THE FLOOR BELOW AND WILL TERMINATE AT THIS LEVEL

⟷ INDICATES 140mm THK COMPOSITE DECK COMFLOR 80 OR SIMILAR APPROVED WITH A252 MESH. 100mm HIGH 19mmØ SHEAR STUDS AT 300mm C/C OR EVERY TROUGH TO EVERY BEAM

⟷ INDICATES TATA ROOFDEK D60 1.2mm MAX SPAN 3.6m

STRUCTURAL METAL DECK TO PROVIDE DIAPHRAGM TO ROOF

Notes

1. DO NOT SCALE FROM THIS DRAWING
2. ALL DIMENSIONS ARE MILLIMETRES U.N.O.
3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
5. STEELWORK:
   OBTAIN STEELWORK FROM SOURCE ACCREDITED TO A NATIONAL OR INTERNATIONAL QUALITY STANDARD. REFER TO SPECIFICATION.
   i. GENERAL STEEL SECTIONS & PLATES TO BS EN 10025-2 GRADE S355J0 U.N.O.
   ii. BASEPLATES TO COLUMNS TO BS EN 10025-2 GRADE S275J0 U.N.O.
   iii. HOLLOW STEEL SECTIONS TO BS EN 10210-1 GRADE S355J2H U.N.O.
   iv. ALL WELDS TO BE MIN 6mm FULL PENETRATION FILLET WELDS
   v. DETAILED DESIGN OF ALL STEEL TO STEEL CONNECTIONS BY SPECIALIST SUB-CONTRACTOR
6. STABILITY IS PROVIDED BY MOMENT FRAMES. REFER TO CONNECTION DRAWINGS FOR CONNECITON LOADS
7. ANY DISCREPANCIES BETWEEN SURVEYED LEVELS AND ACTUAL LEVELS ON SITE TO BE REPORTED TO THE ENGINEER IMMEDIATELY
8. SETTING OUT OF CLADDING DETAILS, SECONDARY STEELWORK & DIMENSIONING OF STEELWORK TO BE TO ARCHITECTS DRAWINGS
9. ALL CONCRETE COMPOSITE DECK SLABS TO BE LIGHTWEIGHT CONCRETE GRADE LC40/44 U.N.O. REFER TO SPECIFICATION
10. SETTING OUT OF SLAB EDGE TBC BY ARCHITECT
11. ADDITIONAL SECONDARY STEELWORK TO LIFTSHAFT CLADDING, STAIRCASES ETC IS SHOWN ON DRGS 61018885-01-S-1110, 1120, 1130 & 1190
12. ALL DETAILS AND SETTING OUT TO BE COORDINATED WITH THE ARCHITECT
13. SERVICE RISERS & LIFT SHAFT DIMENSIONS ARE BASED UPON ARCHITECTS STAGE E+ INFORMATION

SETTING OUT OF ROOF LIGHTS TO BE CONFIRMED BY THE ARCHITECT

CDM:
STEEL FRAME IS DESIGNED AS PORTALISED FOR LATERAL STABILITY. REFER TO REPORT No.61018885-01-ST-REP-003 FOR DETAILS. CONSTRUCTION SEQUENCE & TEMPORARY STABILITY TO TAKE THIS INTO ACCOUNT

Rev	Description	Date	By / Chk	App
P05	STAGE 3 ISSUE - SCHEME REVISED	31/05 2016	JR / TC	JH
P04	STAGE E ISSUE	03/10 2014	JM / JK	JH

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ROOF PLAN
GENERAL ARRANGEMENT

Scale:	Date:	Drawn:	Checked:
1 : 100	JUL 2014	JM	JK

Drawing No.:	Rev:
61018885-01-S-1004	P05

31/05/2016 14:23:21

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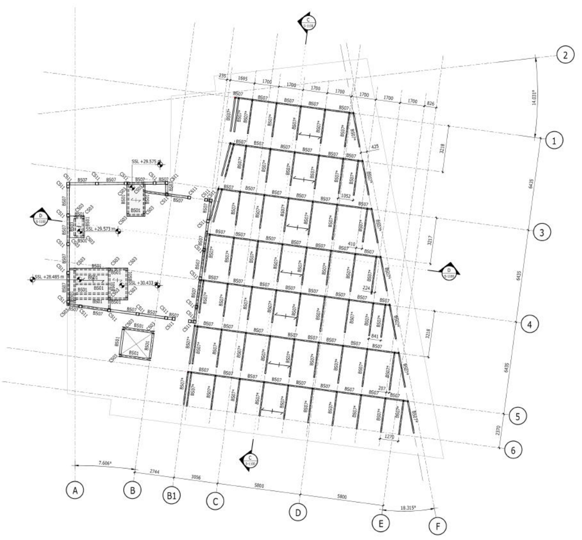

STEEL COLUMN SCHEDULE	
MEMBER REF	MEMBER SIZE
CS01	UKC254x254x107
CS02	CHS323.9x12.5
CS03	UKC152x152x37
CS04	SHS80x80x6.3
CS10	PFC150x90x24
CS11	SHS200x200x12.5

STEEL BEAM SCHEDULE	
MEMBER REF	MEMBER SIZE
BS01	UKB203x133x30
BS02	RHS300x200x12.5
BS03	UKB305x165x40
BS04	UKB406x178x74
BS05	UKB533x210x92
BS06	LBS45x67.1
BS07	UKPFC150x75x18
BS07*	UKPFC150x75x18 CRANK
BS08	RHS160x80x8.0
BS10	UKB254x146x37
BS11	UKB610x229x125
BS12	RHS400x200x10.0
BS15	UKC152x152x23
BS16	RHS300x200x10.0
BS17	UKPFC150x90x24

STEEL BRACING SCHEDULE	
MEMBER REF	MEMBER SIZE
HB01	CHS88.9x5.0

NOTE: COLUMNS SHOWN IN RED START AT THE FLOOR BELOW AND WILL TERMINATE AT THIS LEVEL

TATA ROOFDECK D60 1.2mm TO PROVIDE DIAPHRAGM TO ROOF

Notes

1. DO NOT SCALE FROM THIS DRAWING
2. ALL DIMENSIONS ARE MILLIMETRES U.N.O.
3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
5. STEELWORK:
   OBTAIN STEELWORK FROM SOURCE ACCREDITED TO A NATIONAL OR INTERNATIONAL QUALITY STANDARD. REFER TO SPECIFICATION.
   i. GENERAL STEEL SECTIONS & PLATES TO BS EN 10025-2 GRADE S355J0 U.N.O.
   ii. BASEPLATES TO COLUMNS TO BS EN 10025-2 GRADE S275J0 U.N.O.
   iii. HOLLOW STEEL SECTIONS TO BS EN 10210-1 GRADE S355J2H U.N.O.
   iv. ALL WELDS TO BE MIN 6mm FULL PENETRATION FILLET WELDS
   v. DETAILED DESIGN OF ALL STEEL TO STEEL CONNECTIONS BY SPECIALIST SUB-CONTRACTOR
6. STABILITY IS PROVIDED BY MOMENT FRAMES. REFER TO CONNECTION DRAWINGS FOR CONNECITON LOADS
7. ANY DISCREPANCIES BETWEEN SURVEYED LEVELS AND ACTUAL LEVELS ON SITE TO BE REPORTED TO THE ENGINEER IMMEDIATELY
8. SETTING OUT TO ARCHITECTS GA's

Rev	Description	Date	By / Chk	App
P05	STAGE 3 ISSUE - SCHEME REVISED	31/05 2016	JR / TC	JH
P04	STAGE E ISSUE	03/10 2014	JM / JK	JH

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PLANT ROOM ROOF PLAN
GENERAL ARRANGEMENT

Scale:	Date:	Drawn:	Checked:
1 : 100	JUL 2014	JM	JK

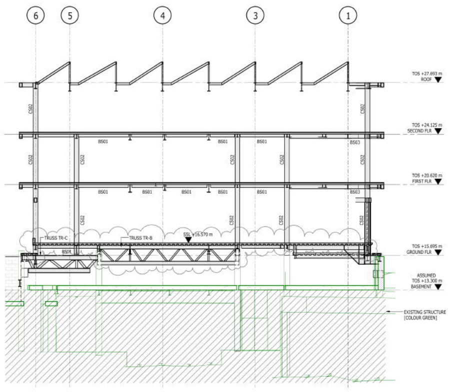
Drawing No.:	Rev:
61018885-01-S-1005	P05

31/05/2016 14:23:21

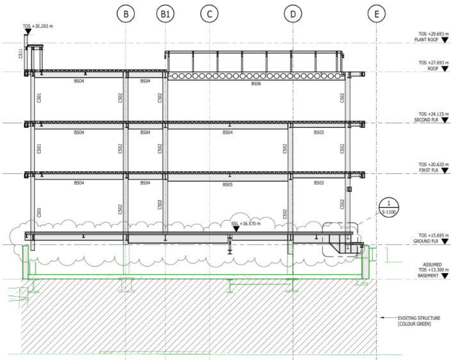
THIS DRAWING IS COLOUR

ALL LEVELS TO BE CONFIRMED

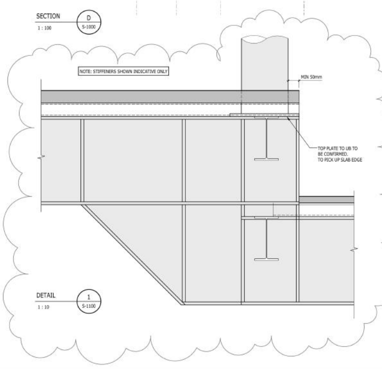
NOTE: EXISTING STRUCTURE SHOWN IN GREEN



SECTION C
1 : 100
S-1000



SECTION D
1 : 100
S-1000



DETAIL 1
1 : 10
S-1100

Notes

1. DO NOT SCALE FROM THIS DRAWING
2. ALL DIMENSIONS ARE MILLIMETRES U.N.O.
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4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
5. STEELWORK:
   OBTAIN STEELWORK FROM SOURCE ACCREDITED TO A NATIONAL OR INTERNATIONAL QUALITY STANDARD. REFER TO SPECIFICATION.
   i. GENERAL STEEL SECTIONS & PLATES TO BS EN 10025-2 GRADE S355J0 U.N.O.
   ii. BASEPLATES TO COLUMNS TO BS EN 10025-2 GRADE S275J0 U.N.O.
   iii. HOLLOW STEEL SECTIONS TO BS EN 10210-1 GRADE S355J2H U.N.O.
   iv. ALL WELDS TO BE MIN 6mm FULL PENETRATION FILLET WELDS
   v. DETAILED DESIGN OF ALL STEEL TO STEEL CONNECTIONS BY SPECIALIST SUB-CONTRACTOR
6. STABILITY IS PROVIDED BY MOMENT FRAMES. REFER TO CONNECTION DRAWINGS FOR CONNECITON LOADS
7. ANY DISCREPANCIES BETWEEN SURVEYED LEVELS AND ACTUAL LEVELS ON SITE TO BE REPORTED TO THE ENGINEER IMMEDIATELY
8. SETTING OUT OF CLADDING DETAILS, SECONDARY STEELWORK & DIMENSIONING OF STEELWORK TO BE TO ARCHITECTS DRAWINGS
9. ALL CONCRETE COMPOSITE DECK SLABS TO BE LIGHTWEIGHT CONCRETE GRADE LC40/44 U.N.O. REFER TO SPECIFICATION
10. SETTING OUT OF SLAB EDGE TBC BY ARCHITECT
11. ADDITIONAL SECONDARY STEELWORK TO LIFTSHAFT CLADDING, STAIRCASES ETC IS SHOWN ON DRGS 61018885-01-S-1110, 1120, 1130 & 1190
12. ALL DETAILS AND SETTING OUT TO BE COORDINATED WITH THE ARCHITECT
13. SERVICE RISERS & LIFT SHAFT DIMENSIONS ARE BASED UPON ARCHITECTS STAGE E+ INFORMATION

VERTICALLY SLOTTED HEAD CONNECTION REQUIRED TO CS10 WINDPOSTS

Rev	Description	Date	By / Chk	App
P05	STAGE 3 ISSUE - SCHEME REVISED GROUND FLOOR SLAB STEPPED. STAIRS REMOVED	31/05 2016	JR / JK	JH
P04	STAGE E ISSUE	03/10 2014	JM / JK	JH

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BUILDING SECTIONS
SHEET 1

Scale:	Date:	Drawn:	Checked:
As indicated	JUL 2014	JM	JK

Drawing No.:	Rev:
61018885-01-S-1100	P05

31/05/2016 16:19:21