

PROJECT: PROPOSED DESIGN OF SECURITY QUARTERS AT GELEPHU AIRPORT

CLIENT: DEPARTMENT OF AIR TRANSPORT

BUILDING: FAMILY QUARTERS

STRUCTURAL DRAWINGS

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TECHNICAL NOTES

CODES AND STANDARDS

1.

IS 456:2000

PLAIN AND REINFORCED CONCRETE CODE OS PRACTICE.
2.

IS 1893: 2002

CRITERIA FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURES.
3.

IS13920:1993

DUCTILE DETAILING OF REINFORCED CONCRETE STRUCTUR
SUBJECTED TO SEISMIC FORES.
4.

S 4326:1993

EARTHQUAKE RESISTANT DESIGN AND CONSTRUCTION OF BUILDINGS.
5.

BTS-002-2003

BUILDING CODE OF BHUTAN 2003.
6.

MANUAL FOR TIMBER ENGINEERING DESIGN (NUDC).

LOADS.

1. THIS STRUCTURE HAS BEEN DESIGNED FOR THE FOLLOWING LOADS.

(a).

DEAD LOADS:

UNIT WEIGHT OF BRICK WALL

19 kN/m³

UNIT WEIGHT OF RCC

25 kN/m³

UNIT WEIGHT OF PCC

24 kN/m³

UNIT WEIGHT OF STONE

28 kN/m³

(b).

SUPERIMPOSED (LIVELOADS)

LIVELOAD FOR FLOORS

2 kN/m²

LIVE LOAD FOR ROOF

0.75 kN/m² (IS:875)

(c).

WIND LOAD

WIND PRESSURE

1.276 kN/m² (BST-002-2003)

(d).

EARTHQUAKE LOAD

AS PER IS 1893:2002, ZONE V
2. MAINTAIN STRUCTURE IN STABLE CONDITION DURING CONSTRUCTION.
3. DONOT PLACE OR STORE BUILDING MATERIALS ON CONCRETE MEMBERS WITHOUT ENGINEER'S APPROVAL.

CONCRETE.

1. CONCRETE QUALITY SHALL COMPLY WITH IS 456:2000
2. PROJECT ASSESSMENT OF CONCRETE STRENGTH IS REQUIRED.
3. GRADE OF CONCRETE IS M20 (1:1.5:3) FOR ALL RCC WORKS.
4. FOR THE ABOVE GRADE TO BE ACHIEVED, MAXIMUM FREE WATER-CEMENT RATIO SHALL BE 0.5, MINIMUM CEMENT CONTENT SHALL BE 300 Kg/m³ AND MAXIMUM AMOUNT OF WATER SHALL BE 180 L.
5. WATER USED FOR MIXING AND CURING SHALL COMPLY WITH CLAUSE 5.4 OF IS 456:2000.

GENERAL NOTES FOR STRUCTURAL DRAWINGS.

1. STRUCTURAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH ARCHITECTURAL DRAWINGS AND OTHER ENGINEERS' DRAWINGS AND SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN MM AND RELATIVE LEVEL IN M UNLESS STATED OTHERWISE.
3. DIMENSIONS SHALL NOT BE SCALED FROM THE DRAWINGS.
4. VERIFY ALL SETTING OUT DIMENSIONS WITH ENGINEER/ARCHITECT.
5. REFER ANY DISCREPANCY TO ENGINEER/ARCHITECT BEFORE PROCEEDING THE WORK.
6. ALL CONSTRUCTION MATERIALS AND WORKMANSHIP SHALL COMPLY WITH THE SPECIFICATIONS FOR BUILDING AND ROAD WORKS TOGETHER WITH THE REQUIREMENTS OF ALL RELEVANT CODES OF PRACTICE REFERRED TO HEREIN AND THE REQUIREMENTS OF ALL STATUTORY AUTHORITIES.
7. ALWAYS REFER ADDITIONAL NOTES PROVIDED IN THE DRAWINGS.

FOUNDATIONS AND FOOTINGS.

1. FOOTINGS ARE DESIGNED FOR AN ALLOWABLE BEARING CAPACITY OF 150 kN/m².
2. SOIL TYPE MEDIUM AS PER IS:1893-2002.
3. WALLS SHALL BE PROVIDED BELOW THE EXTERIOR PLINTH BEAM. IT IS RECOMMENDED TO PROVIDE THE SAME BELOW THE INTERNAL PLINTH BEAM.
4. FOOTINGS ARE DESIGNED CONSIDERING THE MINIMUM DEPTH OF 1.5 M BELOW THE ORIGINAL GROUND LEVEL.
5. ALL CONCRETE SHALL BE PLACED "IN THE DRY" FOR FOUNDATIONS.
6. COMPACTION OF FOUNDATION SHALL BE APPROVED BY ENGINEER PRIOR TO PLACEMENT OF CONCRETE.
7. MECHANICALLY VIBRATE CONCRETE IN THE FORM TO GIVE MAXIMUM COMPACTION WITHOUT SEGREGATION OF THE CONCRETE.
8. CURE CONCRETE AS REQUIRED BY THE CLAUSE 13.5 OF IS456:2000 AND WORK SPECIFICATIONS.
9. CONCRETE SIZES AS DRAWN ARE MINIMUM AND DONOT INCLUDE APPLIED FINISHES.
10. DONOT MAKE UNSPECIFIED HOLES OR CHASES WITHOUT ENGINEER'S APPROVAL.
11. DONOT PLACE CONDUITS, PIPES etc. WITHIN CONCRETE COVER.
12. AGGREGATES SHALL COMPLY WITH CLAUSE 5.3 OF IS456:2000. NOMINAL SIZE OF COARSE AGGREGATES SHALL BE 20MM.
13. THE CHARACTERISTICS STRENGTH OF CONCRETE AT 28 DAYS SHALL BE 20MPA. NOTE THAT THE MEAN COMPRESSIVE STRENGTH OBTAINED FROM THE LABORATORY HAS TO BE WELL ABOVE THIS VALUE.
14. ALL FORMWORKS FOR BEAMS AND SLABS ARE TO REMOVED BEFORE CONSTRUCTION OF WALLS OR OTHER PERMANENT LOADINGS. ALL FORMWORK AND ITS REMOVAL MUST BE IN ACCORDANCE TO IS 456:2000.



ROYAL GOVERNMENT OF BHUTAN
DEPARTMENT OF CIVIL AVIATION

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Client

Ministry of Information and Communications
Department of Air Transport

Aviation Planners & Engineers

Leading Edge Aviation Planning Professionals

Civil Engineering Consultant

Gyaltshen Consultancy

Project Title

BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No. Revision

Date

By

Drawing Title

Technical Notes

Scale nts @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

STR - 101

LEAPP Project Code

12246

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R0

REINFORCEMENT.

1. GRADE OF STEEL USED FOR RCC WORKS SHALL BE FE500.
2. BAR NOTATION GIVES THE FOLLOWING INFORMATION IN THIS ORDER: NUMBER OF BARS, BAR SIZE (MM), SPACING (MM, IF REQUIRED).
3. REINFORCEMENT IS REPRESENTED DIAGRAMATICALLY AND NOT NECESSARILY IN TRUE PROJECTION.
4. LAP REINFORCEMET ONLY AT LOCATIONS SHOWN IN THE DRAWINGS. LAP LENGTH SHALL COMPLY WITH IS456:2000. LAP SPLICES SHALL NOT BE LESS THAN THE DEVELOPMENT LENGTH IN TENSION(GENERALLY 47Ø).
5. REINFORCEMENT SHALL NOT BE CUT, BENT OR HEATED ON SITE WITHOUT ENGINEER'S APPROVAL.
6. THE DEVIATION OF REINFORCEMENT FROM ITS SPECIFIED POSITION SHALL NOT EXCEED THE FOLLOWING(MM)

(a). TOLERANCE FOR COVER -0,+10MM. WHERE A NEGATIVE VALUE INDICATE A DECREASE IN SPECIFED COVER, AND POSITIVE VALUE INDICATES AN INCREASE IN COVER.

(b). TOLERANCE ON PLACEMENT OF REINFORCEMENT.
FOR BEAMS, COLUMNS AND FOUNDATION -15,+15MM.
7. SPACERS AND SUPPORTS SHALL BE LOCATED AT CENTRES CLOSE ENOUGH (PREFERABLY NOT EXCEEDING 750MM C/C FOR COLUMN AND BEAM REINFORCEMENT AND 450MM FOR SLAB REINFORCEMENT). TO PREVENT DISPLACMENT OF REINFORCEMENT BY WORKMEN OR EQUIPMENT DURING FIXING AND SUBSEQUENT CONCRTE PLACEMENT WITHIN TOLERANCE GIVEN ABOVE.
8. THE COVER TO THE REINFORCEMENT NEAREST THE CONCRETE SURFACE SHALL NOT LESS THAN THE FOLLOWING EXCEPT WHERE SPECIFIED OTHERWISE:

FOUNDATION75 MM

COLUMNS40 MM

BEAMS30 MM

SLABS25 MM
9. BENDING OF REINFORCEMENT IN BEAMS AND COLUMNS SHALL COMPLY WITH TH REQUIREMENTS OF IS 456:2000
10. FORMWORK SHALL COMPLY WITH CLAUSE 11 OF IS 456:2000
11. STRIPPING OF FORMWORK SHALL COMPLY WITH CLAUSE 11.3 OF IS:456:2000

WELDING AND BOLTING.

1. WELDING TO BE CARRIED OUT IN ACCORDANCE WITH IS 816:1969, IS 819:1957, IS 1024:1979, IS 1261:1959, IS 1323:1982 AND IS: 9595: 1980 AS APPROPRIATE.
2. THE STRENGTH OF ELECTRODE USED FOR WELDING SHALL BE EQUAL TO OR GREATER THAN THE STRENGTH OF MEMBER THAT IS BEING WELDED.
3. ALL WELD SHALL BE COMPLETE PENETRATION BUTT WELD.
4. ALL BOLTS SHALL BE HIGH STRENGTH FRICTION GRIP GALVANIZED M16 AND M20 IN ACCORDANCE WITH IS 3757:1967 AND IS 800: 1984.
5. ALL MEMBERS OF STEEL TRUSS SHALL BE DRY AND THROUGHLY CLEANED FROM ALL LOOSESCALE AND RUST PRIOR TO PAINTING.
6. THE MEMBERS SHALL BE PROVIDED WITH COAT OF ZINC COATING.



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No.Revision

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Technical Notes

Scale nts @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

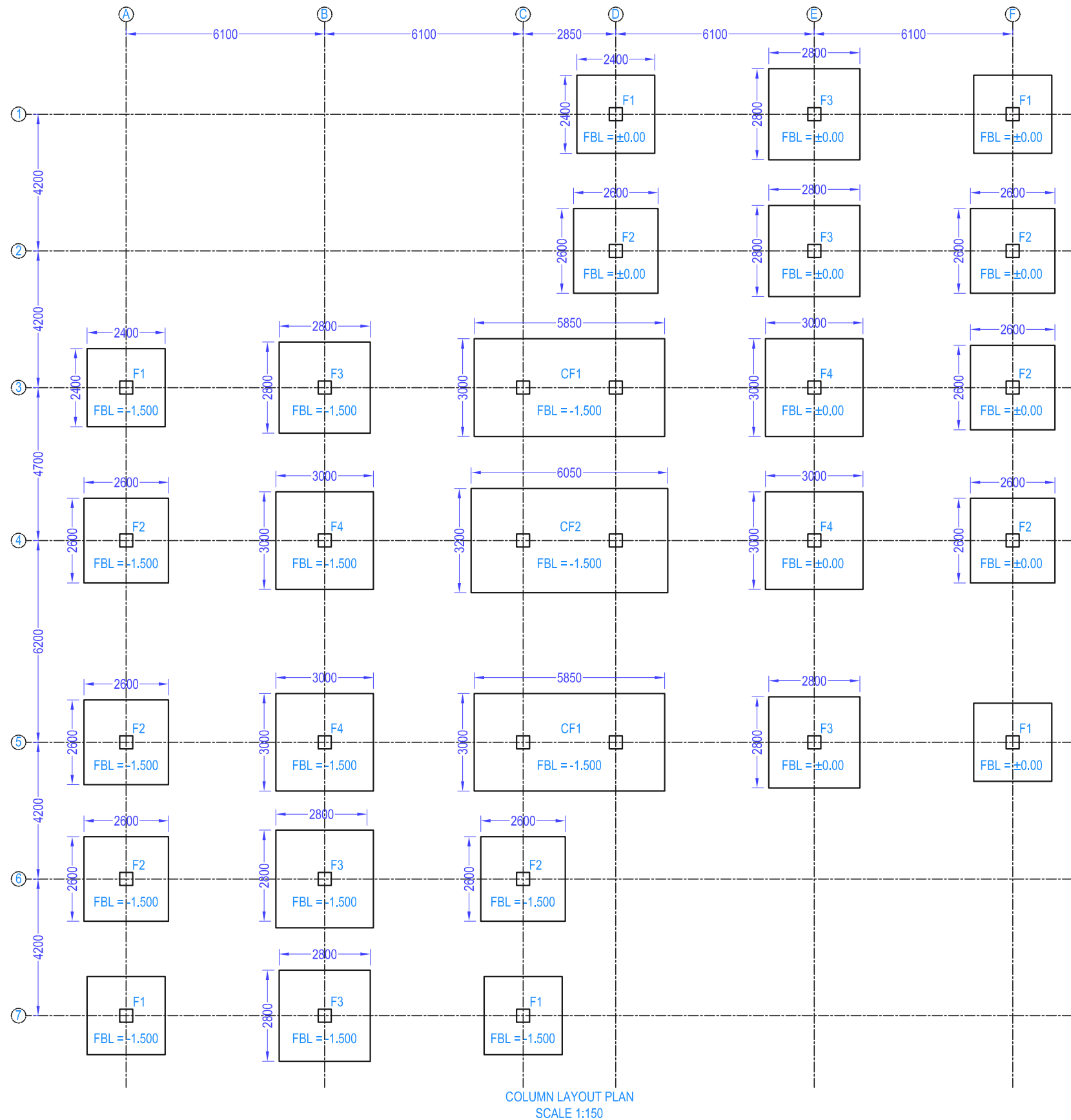
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STR - 102

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COLUMN LAYOUT PLAN
SCALE 1:150



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GELEPHU AIRPORT SECURITY QUARTERS

No. Revision

No.	Revision	Date	By

Drawing Title

Plan Showing Footing Layout

Scale 1 : 150 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

STR - 200

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12246

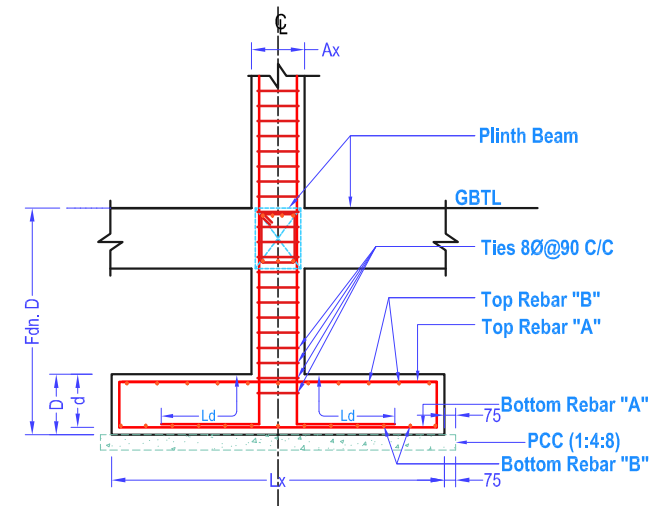
Rev No.

R0

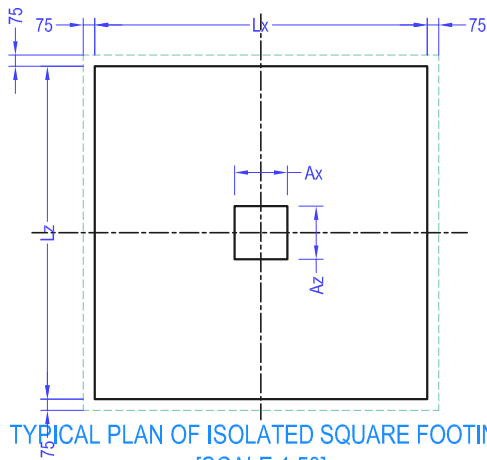
Note:-

1. Proper shuttering shall be provided for foundation slab.
2. Concrete grade for RC work shall be of M20 Grade
3. Aggregate for RC shall be of 20 mm, well graded.
4. Steel reinforcement shall be of TMT Fe500
5. Concrete Cover of 50 mm minimum to be provided.
6. All materials used for RC work shall conform to IS:456-2000.
7. Bearing Capacity of Soil= 150 kN/sq. m

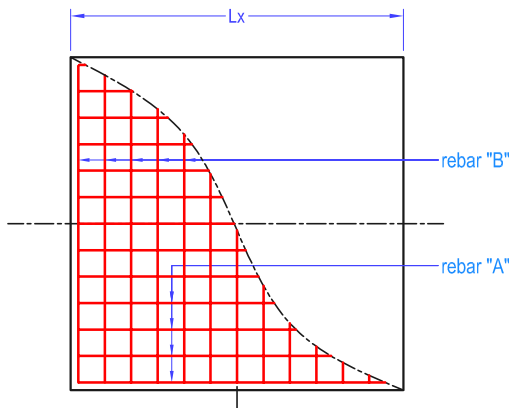
Bar Dia.	Development Length (Ld)
12Ø	564
16Ø	755
20Ø	940
25Ø	1175



TYPICAL SECTION OF ISOLATED SQUARE FOOTING



TYPICAL PLAN OF ISOLATED SQUARE FOOTING
[SCALE 1:50]



TYPICAL REINFORCEMENT PLAN OF ISOLATED SQUARE FOOTING

SCHEDULE OF REBARS OF FOOTINGS

Sl.No.	FOOTING	SIZE (Lx x Lz)	COLUMN (mm x mm)	BOTTOM REBAR		TOP REBAR		PAD DEPTH D	FOUNDATION DEPTH Fdn. D
				A	B	A	B		
1	F1	2400 x 2400	400 x 400	12Ø@125 C/C	12Ø@125 C/C	10Ø@200 C/C	10Ø@200 C/C	425	1500
2	F2	2600 x 2600	400 x 400	12Ø@125 C/C	12Ø@125 C/C	10Ø@200 C/C	10Ø@200 C/C	475	1500
3	F3	2800 x 2800	400 x 400	12Ø@100 C/C	12Ø@100 C/C	10Ø@200 C/C	10Ø@200 C/C	525	1500
4	F4	3000 x 3000	400 x 400	12Ø@100 C/C	12Ø@100 C/C	10Ø@200 C/C	10Ø@200 C/C	550	1500



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BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No. Revision

No.	Revision	Date	By

Drawing Title

Footing Details

Scale 1 : 50 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

STR - 201

LEAPP Project Code
12246

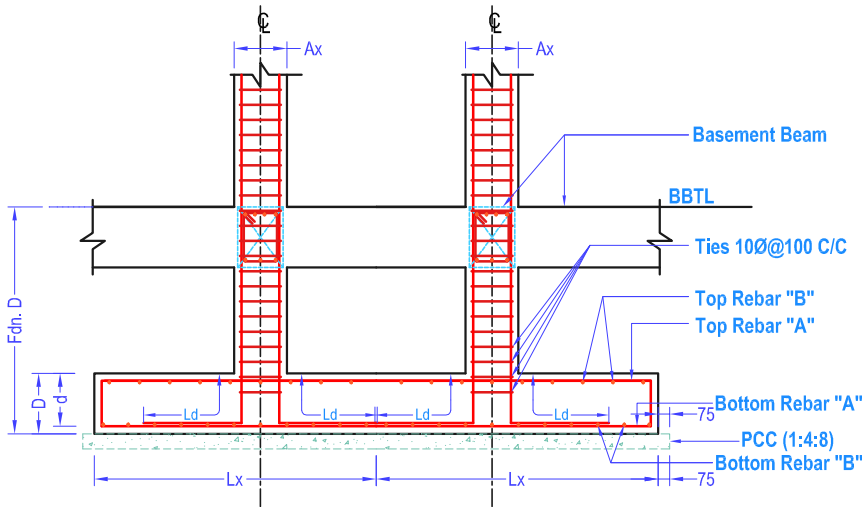
Rev No.

R0

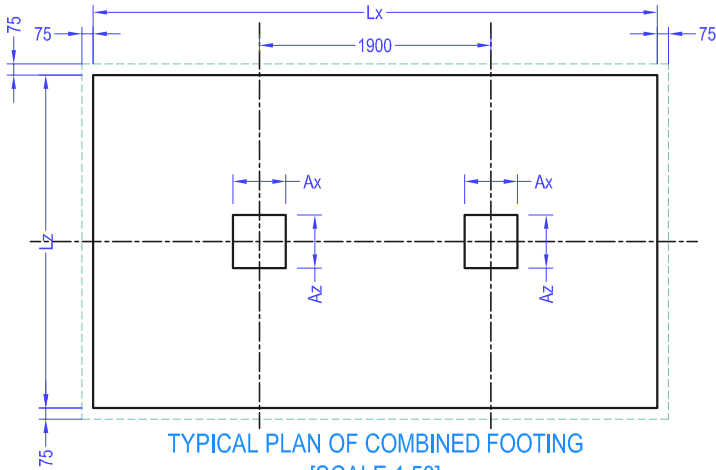
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5. Concrete Cover of 75 mm minimum to be provided.
6. All materials used for RC work shall confirm to IS:456-2000.
7. Bearing Capacity of Soil=150 kN/sq. m

Bar Dia.	Development Length (Ld)
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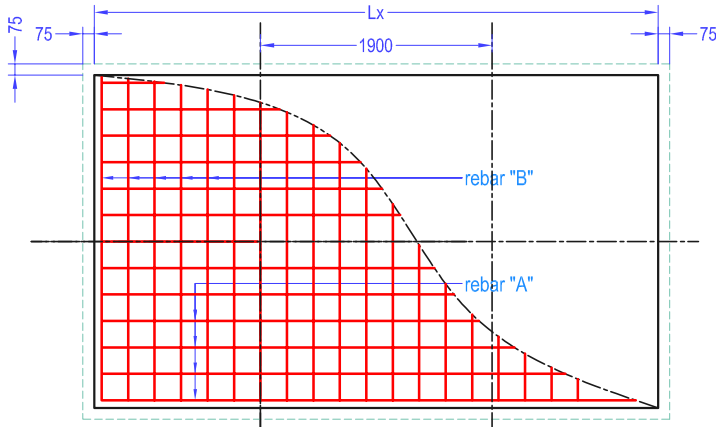


TYPICAL SECTION OF ISOLATED SQUARE FOOTING



SCHEDULE OF REBARS OF FOOTINGS

Sl.No.	FOOTING	SIZE (Lx x Lz)	COLUMN (mm x mm)	BOTTOM REBAR		TOP REBAR		PAD DEPTH D	FOUNDATION DEPTH Fdn. D
				A	B	A	B		
1	CF1	5850 x 3000	400 x 400	12Ø@100 C/C	12Ø@100 C/C	12Ø@100 C/C	12Ø@100 C/C	550	1500
2	CF2	6050 x 3200	400 x 400	12Ø@100 C/C	12Ø@100 C/C	12Ø@100 C/C	12Ø@100 C/C	550	1500



TYPICAL REINFORCEMENT PLAN OF COMBINED FOOTING



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BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No. Revision

No.	Revision	Date	By
1			
2			
3			
4			
5			
6			
7			
8			

Drawing Title

Footings Details

Scale 1 : 50 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

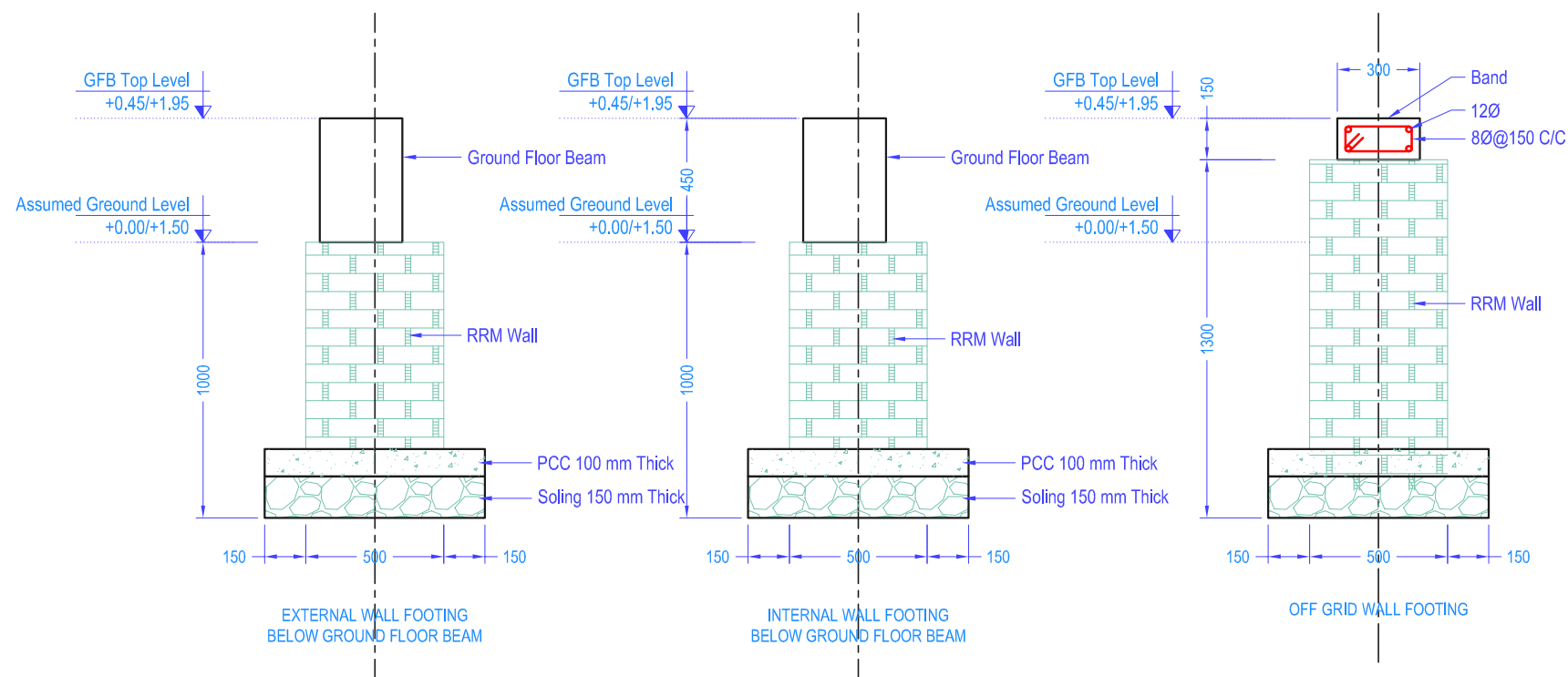
Drawing Number

STR - 202

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No. Revision

No.	Revision	Date	By

Drawing Title

Footing Details

Scale 1 : 25 @ A3

Date December 2016

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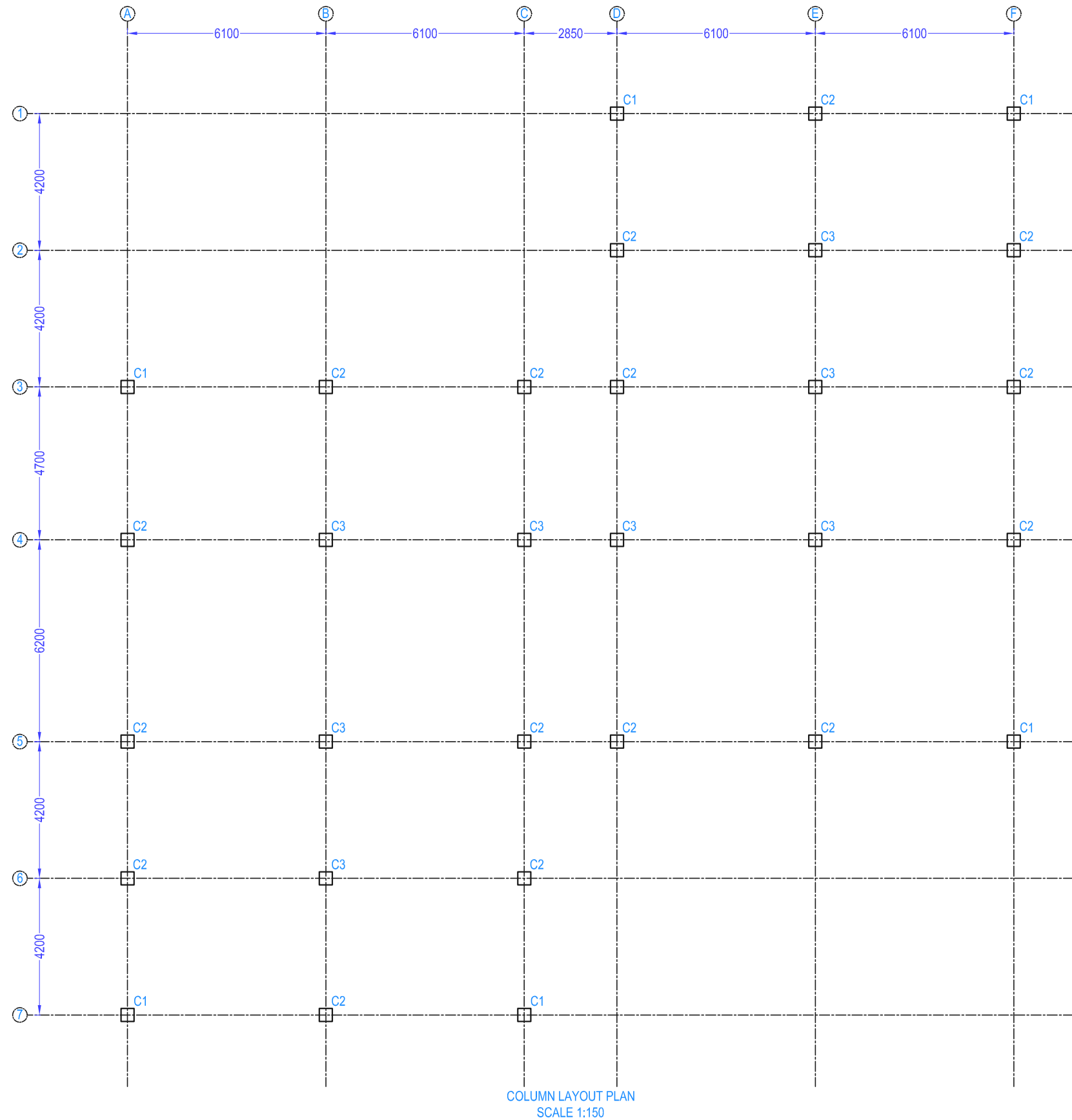
STR - 203

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No. Revision

No.	Revision	Date	By

Drawing Title

Plan Showing Column Layout Plan

Scale 1 : 150 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

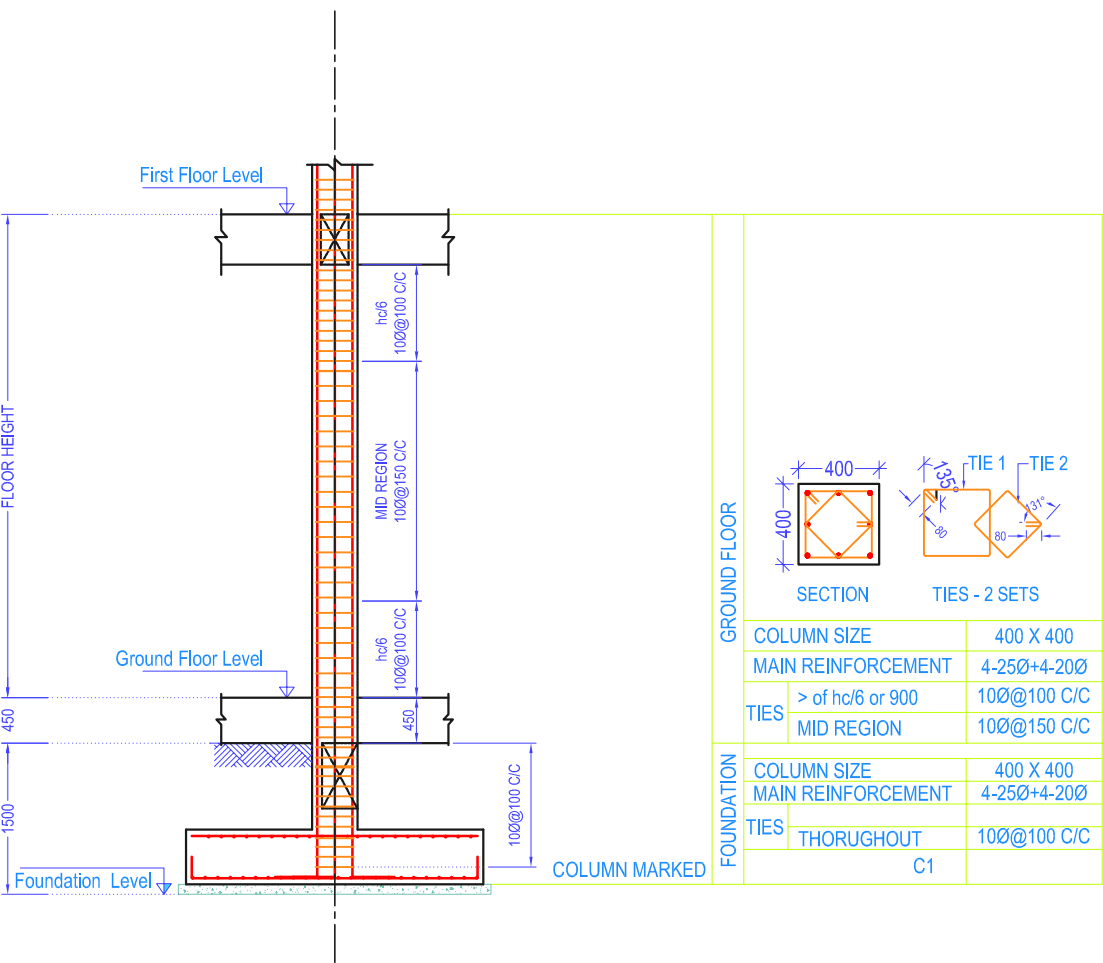
STR - 300

LEAPP Project Code

12246

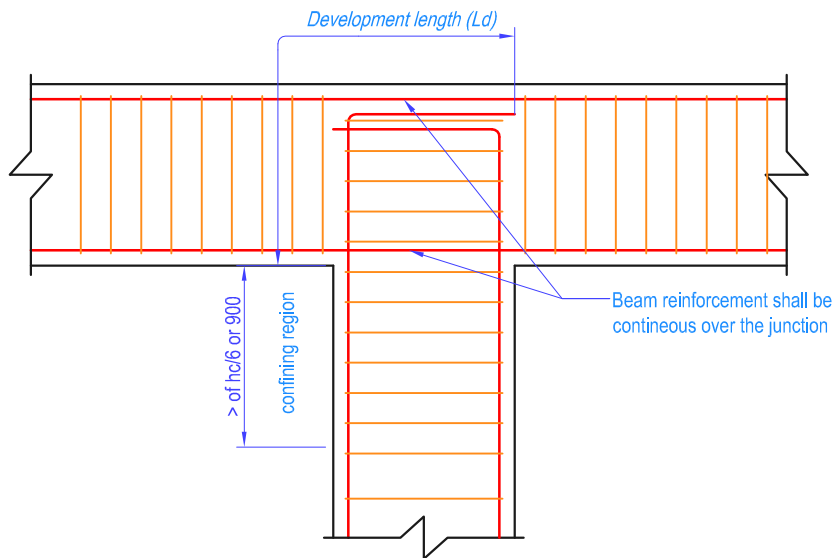
Rev No.

R0

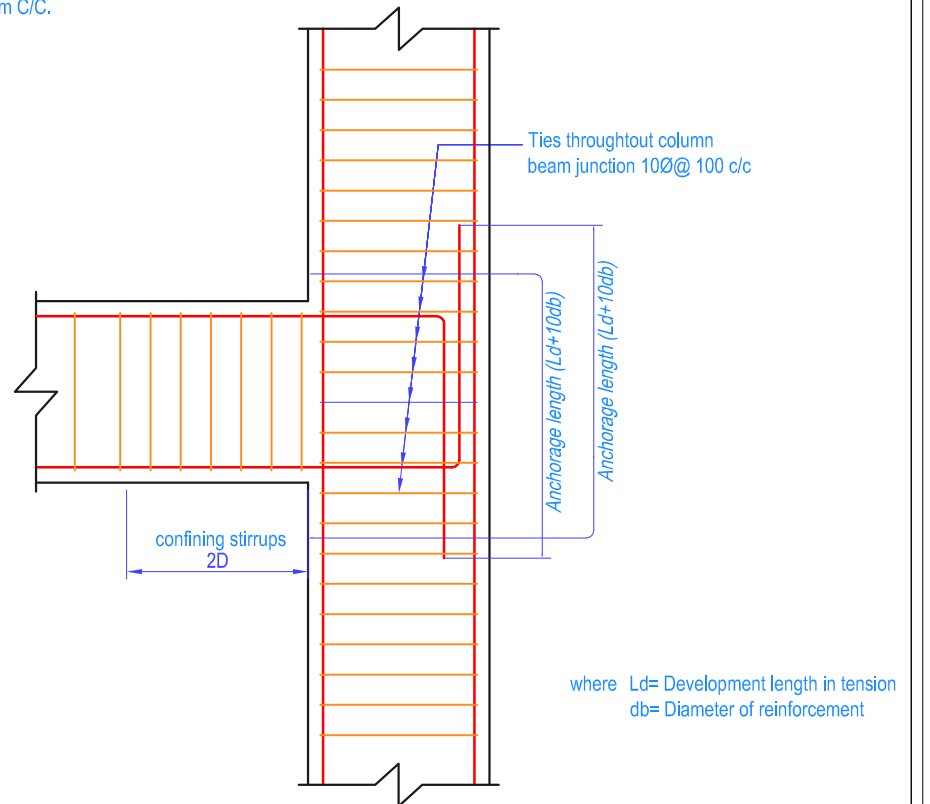


NOTE:-

1. THE HOOKS SHALL ENGAGE PERIPHERAL LONGITUDINAL BARS.
2. NOT MORE THAN 50% OF THE BARS SHALL BE SPLICED AT ONE SECTION.
3. HOOKS SHALL BE STRICTLY 100 MM LONG.
4. IN AN EXTERNAL JOINT, BOTH THE TOP AND THE BOTTOM BARS OF THE BEAM SHALL BE PROVIDED WITH ANCHORAGE LENGTH, BEYOND INNER FACE OF THE COLUMN, EQUAL TO THE DEVELOPMENT LENGTH IN TENSION PLUS 10 TIMES THE BAR DIAMETER I.E ($L_d + 10\phi$).
5. IN AN INTERNAL JOINT, BOTH FACE BARS OF THE BEAMS SHALL BE TAKEN CONTINUOUSLY THROUGH THE COLUMN.
6. COLUMN STIRRUPS MUST BE CONTINUOUS THROUGH BEAM COLUMN JOINT.
7. SPECIAL CONFINING REINFORCEMENT OF 10Ø@ 100MM C/C SHALL CONTINUE UP TO 450MM ON EITHER SIDE FROM THE FACE OF THE SUPPORT.
8. THE MAIN REINFORCEMENT OF COLUMNS SHALL BE STRAIGHT WITHOUT KINKS OR CRANK.
9. THE SPLICE IN THE COLUMN SHALL BE AWAY FROM THE SUPPORT BY H/4 & THE SPLICE LENGTH SHALL BE THE DEVELOPMENT LENGTH(L_d) OR 47xDIAMETER, STIRRUPS ARE SPACED NOT MORE THAN 100 mm C/C.
10. COLUMNS SUPPORTING STAIRCASE SHALL BE PROVIDED WITH STIRRUPS OF 10Ø@100 mm C/C THROUGHOUT.
11. SPLICING AT GROUND FLOOR LEVEL IS PROHIBITED.
12. COVER = 40 mm



ACHORAGE OF BEAM IN MIDDLE JOINT



ACHORAGE OF BEAM BEAM REINFORCEMENT IN AN EXTERNAL JOINT



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No. Revision

No.	Revision	Date	By

Drawing Title

Column C1 Details

Scale 1 : 75 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

STR - 301

LEAPP Project Code

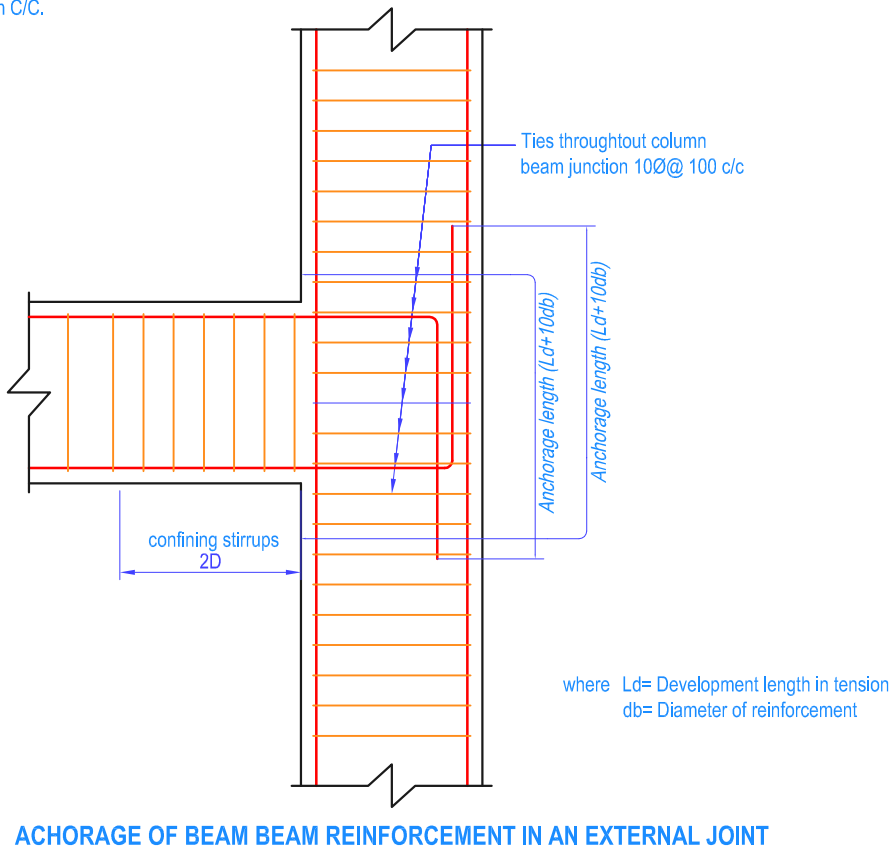
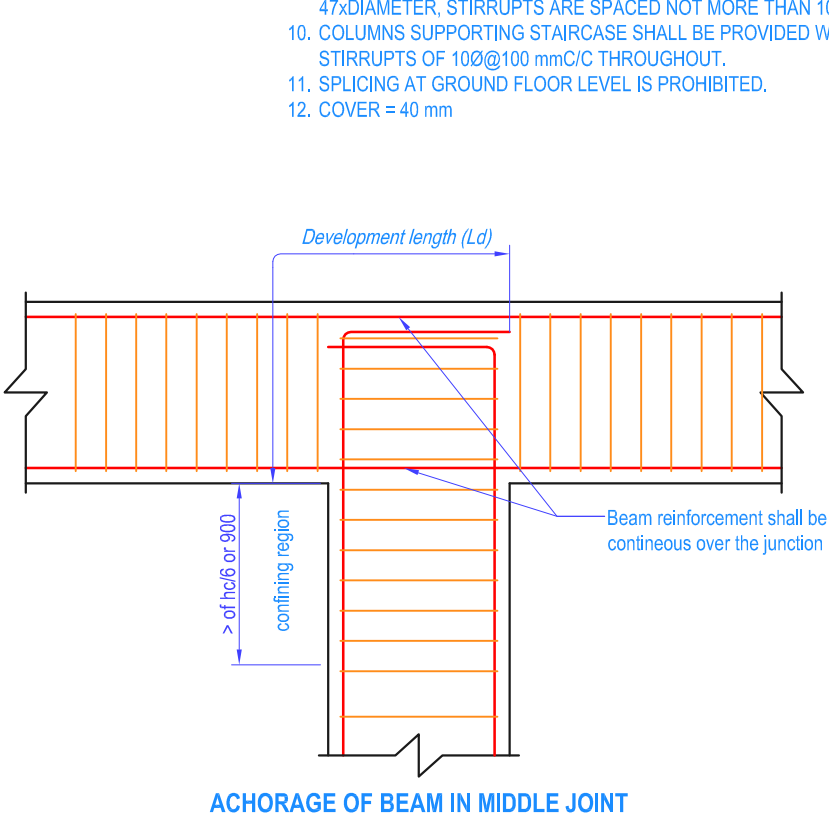
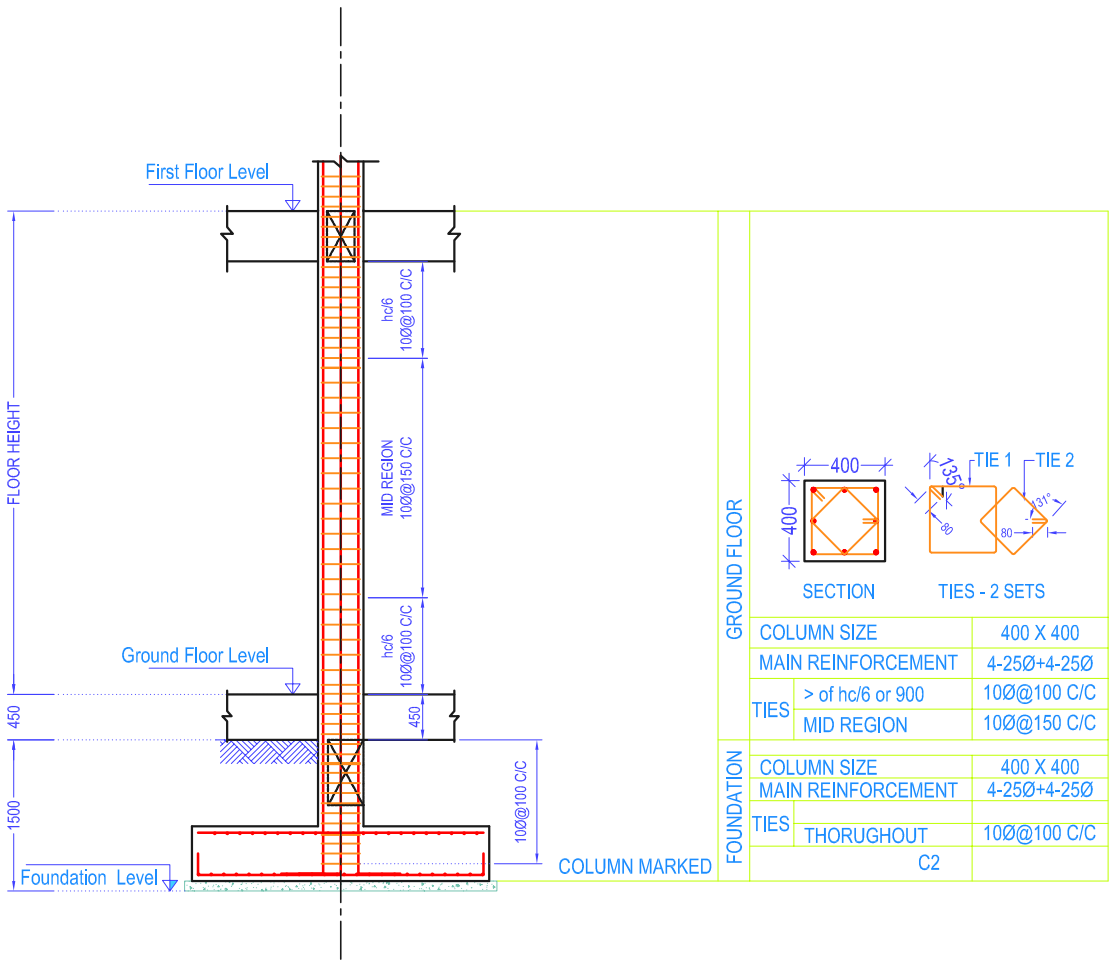
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Rev No.

R0

NOTE:-

1. THE HOOKS SHALL ENGAGE PERIPHERAL LONGITUDINAL BARS.
2. NOT MORE THAN 50% OF THE BARS SHALL BE SPICED AT ONE SECTION.
3. HOOKS SHALL BE STRICTLY 100 MM LONG.
4. IN AN EXTERNAL JOINT, BOTH THE TOP AND THE BOTTOM BARS OF THE BEAM SHALL BE PROVIDED WITH ANCHORAGE LENGTH, BEYOND INNER FACE OF THE COLUMN, EQUAL TO THE DEVELOPMENT LENGTH IN TENSION PLUS 10 TIMES THE BAR DIAMETER I.E ($L_d + 10\phi$).
5. IN AN INTERNAL JOINT, BOTH FACE BARS OF THE BEAMS SHALL BE TAKEN CONTINUOUSLY THROUGH THE COLUMN.
6. COLUMN STIRRUPS MUST BE CONTINUOUS THROUGH BEAM COLUMN JOINT.
7. SPECIAL CONFINING REINFORCEMENT OF $10\phi @ 100\text{MM C/C}$ SHALL CONTINUE UP TO 450MM ON EITHER SIDE FROM THE FACE OF THE SUPPORT.
8. THE MAIN REINFORCEMENT OF COLUMNS SHALL BE STRAIGHT WITHOUT KINKS OR CRANK.
9. THE SPLICE IN THE COLUMN SHALL BE AWAY FROM THE SUPPORT BY $H/4$ & THE SPLICE LENGTH SHALL BE THE DEVELOPMENT LENGTH(L_d) OR $47 \times \text{DIAMETER}$, STIRRUPS ARE SPACED NOT MORE THAN 100 mm C/C.
10. COLUMNS SUPPORTING STAIRCASE SHALL BE PROVIDED WITH STIRRUPS OF $10\phi @ 100\text{ mm C/C}$ THROUGHOUT.
11. SPLICING AT GROUND FLOOR LEVEL IS PROHIBITED.
12. COVER = 40 mm



ROYAL GOVERNMENT OF BHUTAN
DEPARTMENT OF CIVIL AVIATION

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Client

Ministry of Information and Communications
Department of Air Transport

Aviation Planners & Engineers

Leading Edge Aviation Planning Professionals

Civil Engineering Consultant

Gyaltshen Consultancy

Project Title

BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No. Revision

No.	Revision	Date	By

Drawing Title

Column C2 Details

Scale 1 : 75 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

STR - 302

LEAPP Project Code
12246

Rev No.
R0

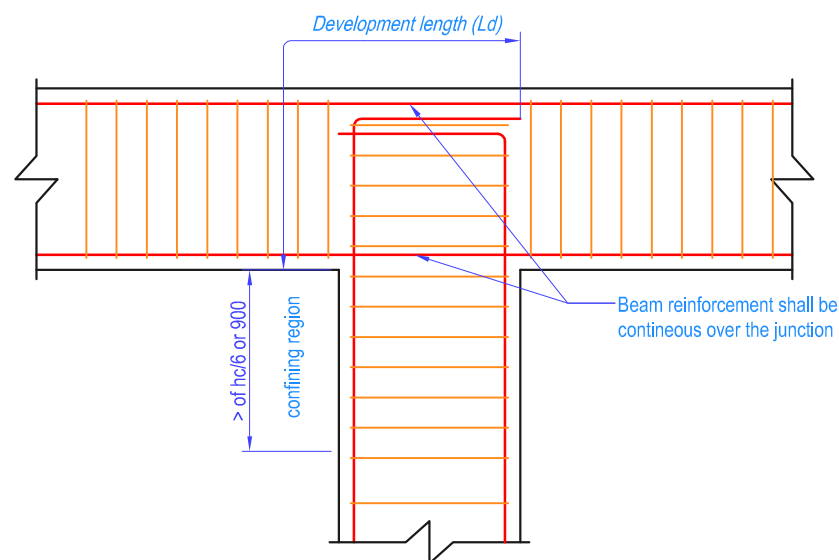


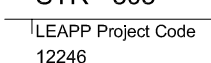
Diagram illustrating the reinforcement details for a beam-column joint, showing the anchorage and development of longitudinal bars.

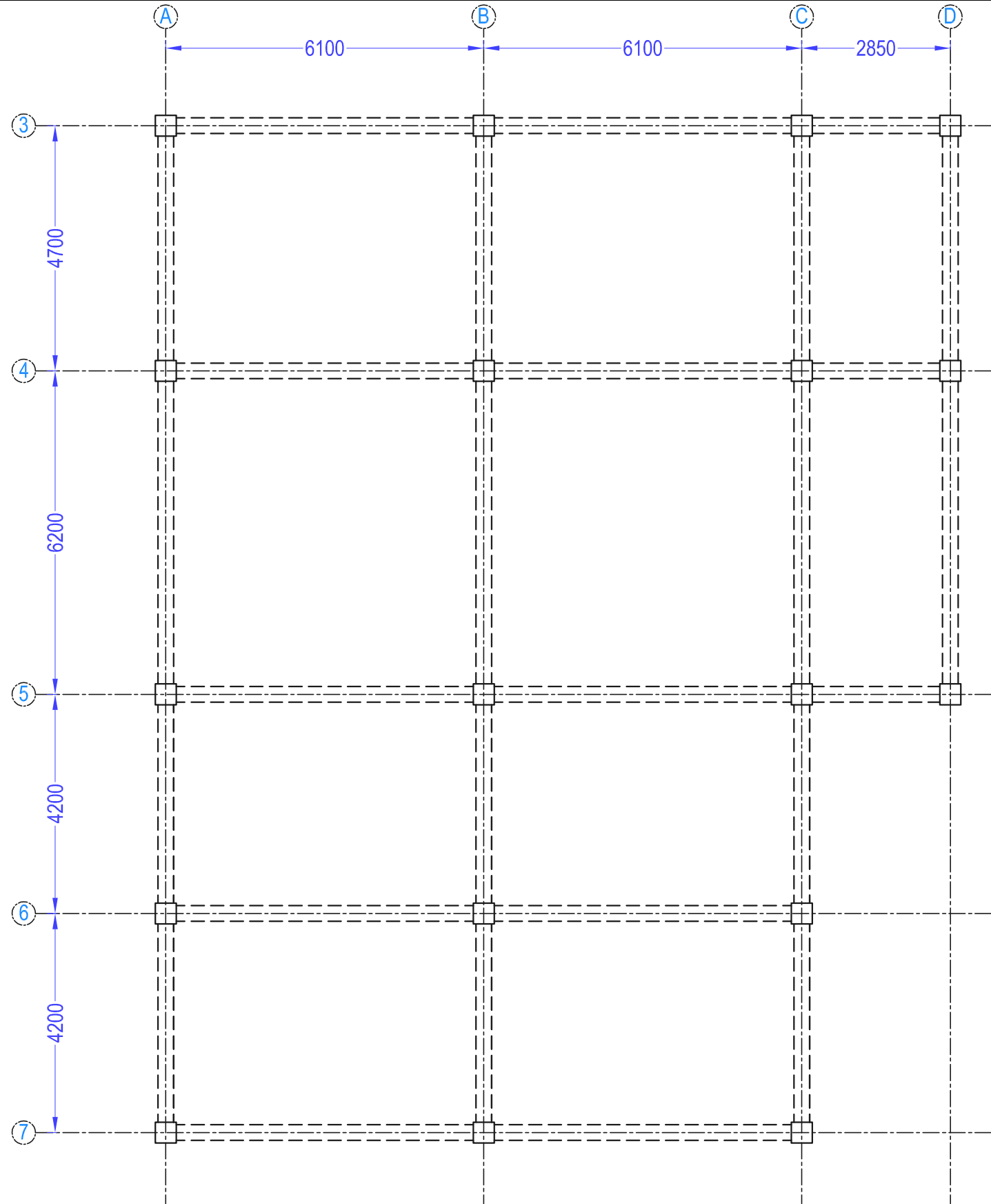
Labels and dimensions shown in the diagram:

- Ties throughout column beam junction $10\phi @ 100$ c/c
- Anchorage length ($L_d + 10d_b$)
- Anchorage length ($L_d + 10d_b$)
- confining stirrups $2D$

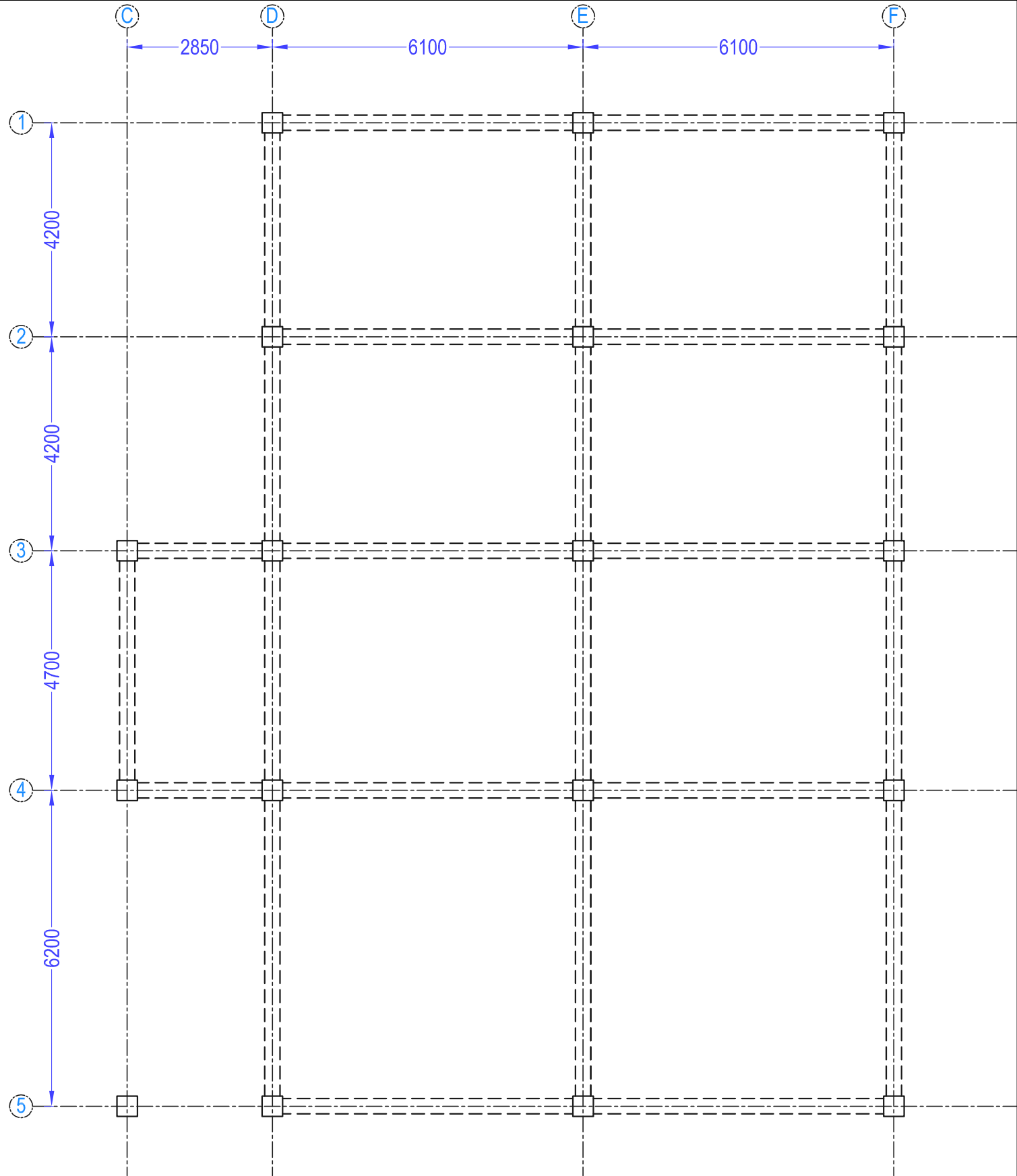
where L_d = Development length in tension
 d_b = Diameter of reinforcement

where L_d = Development length in tension
 d_b = Diameter of reinforcement





LOWER LEVEL GROUND FLOOR BEAM LAYOUT PLAN [+ 0.450]
SCALE 1:100



UPPER LEVEL GROUND FLOOR BEAM LAYOUT PLAN [+ 1.950]
SCALE 1:100



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DEPARTMENT OF CIVIL AVIATION

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Gyaltshen Consultancy

Project Title

BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No. Revision

No.	Revision	Date	By

Drawing Title

Plan Showing Ground Floor Beam Layout Plan

Scale 1 : 100 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

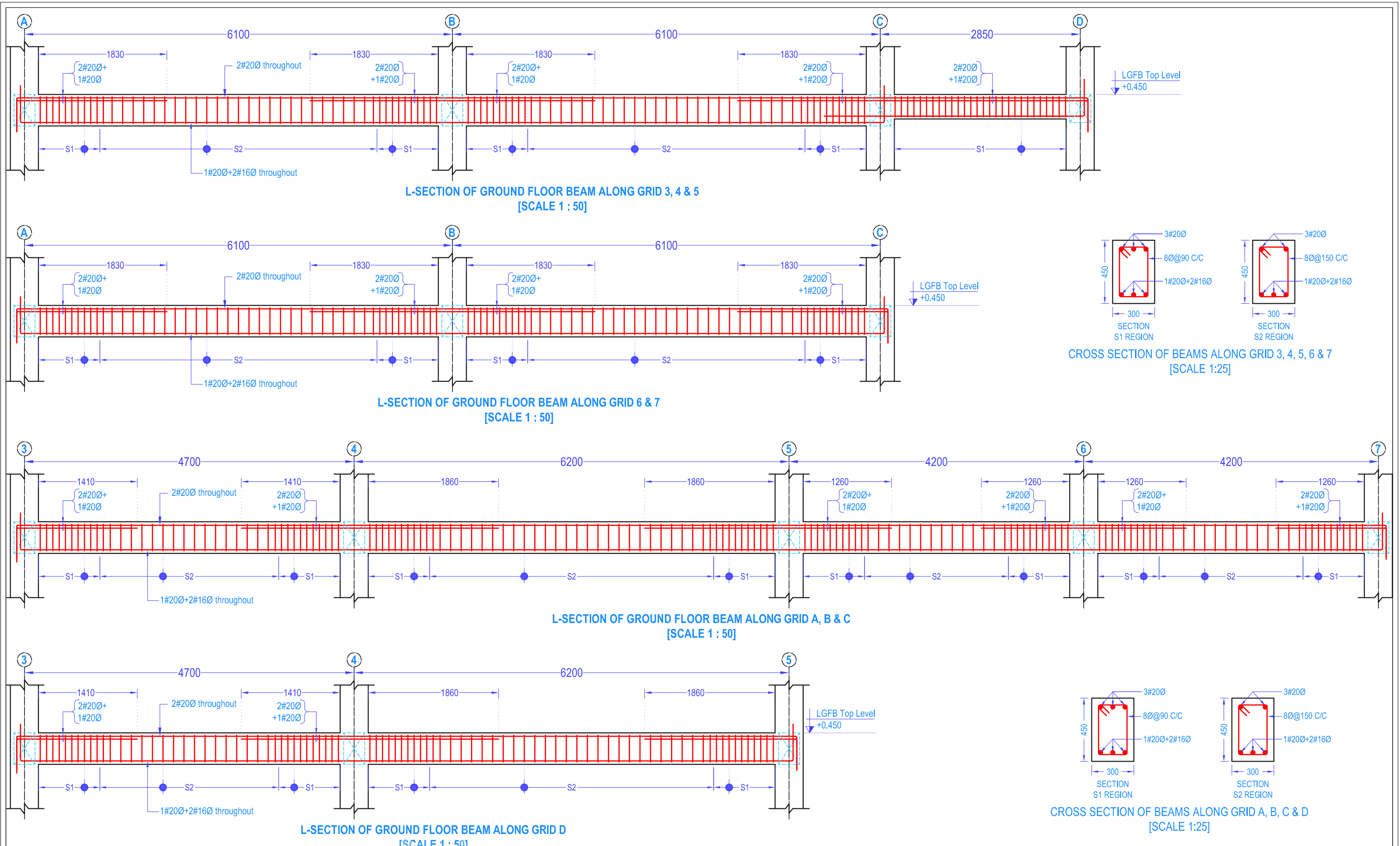
Drawing Number

STR - 400

LEAPP Project Code
12246

Rev No.

R0



ROYAL GOVERNMENT OF BHUTAN
DEPARTMENT OF CIVIL AVIATION

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Project Title

BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUARTERS

No. / Revision

No. / Revision	Date	By

Drawing Title

Ground Floor Beam Details

Scale 1 : 50; 25 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

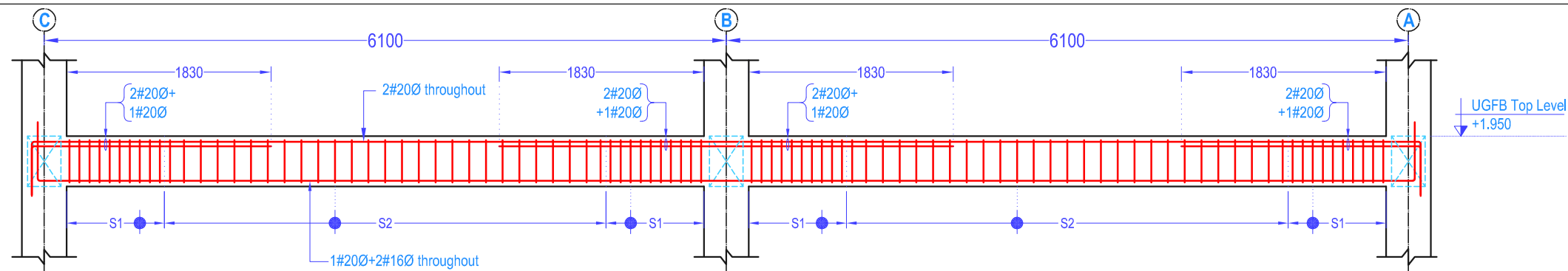
STR - 401

LEAPP Project Code

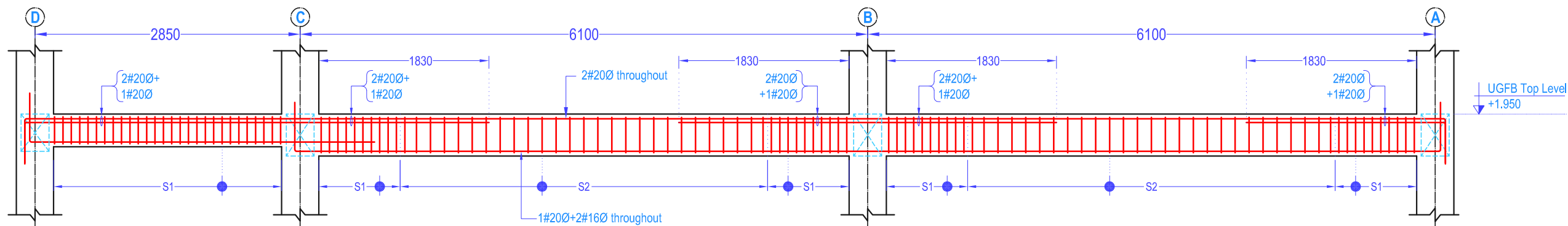
12246

Rev No.

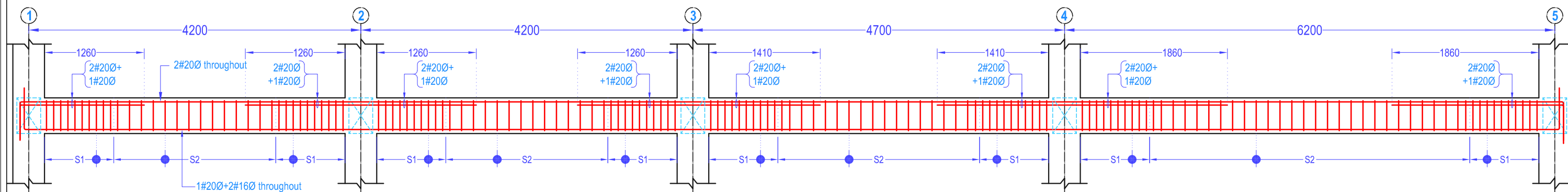
R0



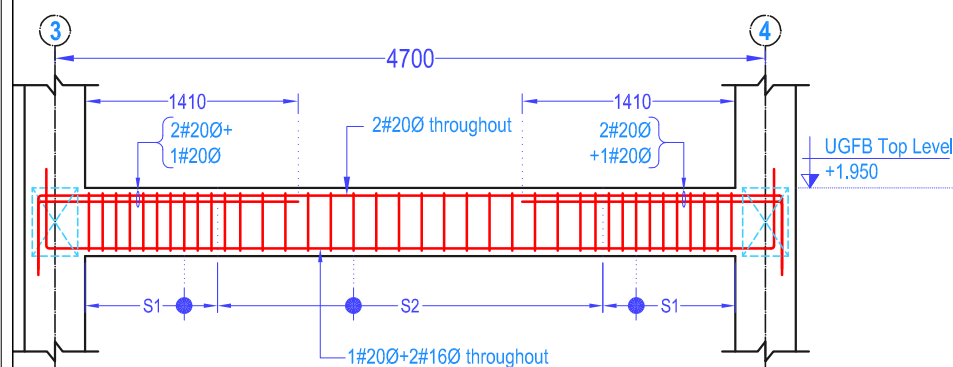
L-SECTION OF GROUND FLOOR BEAM ALONG GRID 1, 2 & 5
[SCALE 1 : 50]



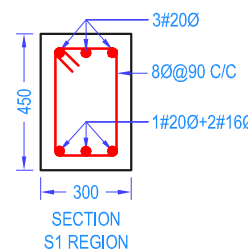
L-SECTION OF GROUND FLOOR BEAM ALONG GRID 3 & 4
[SCALE 1 : 50]



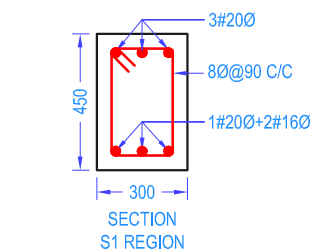
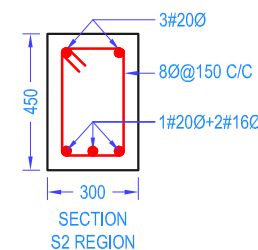
L-SECTION OF GROUND FLOOR BEAM ALONG GRID D, E & F
[SCALE 1 : 50]



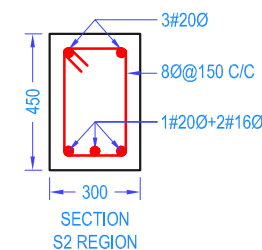
L-SECTION OF GROUND FLOOR BEAM ALONG GRID C
[SCALE 1 : 50]



CROSS SECTION OF BEAMS ALONG GRID 1 TO 5
[SCALE 1:25]



CROSS SECTION OF BEAMS ALONG GRID C TO F
[SCALE 1:25]



ROYAL GOVERNMENT OF BHUTAN
DEPARTMENT OF CIVIL AVIATION

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Gyaltshen Consultancy

Project Title

BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No. Revision

No.	Revision	Date	By

Drawing Title

Ground Floor Beam Details

Scale 1 : 50; 25 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

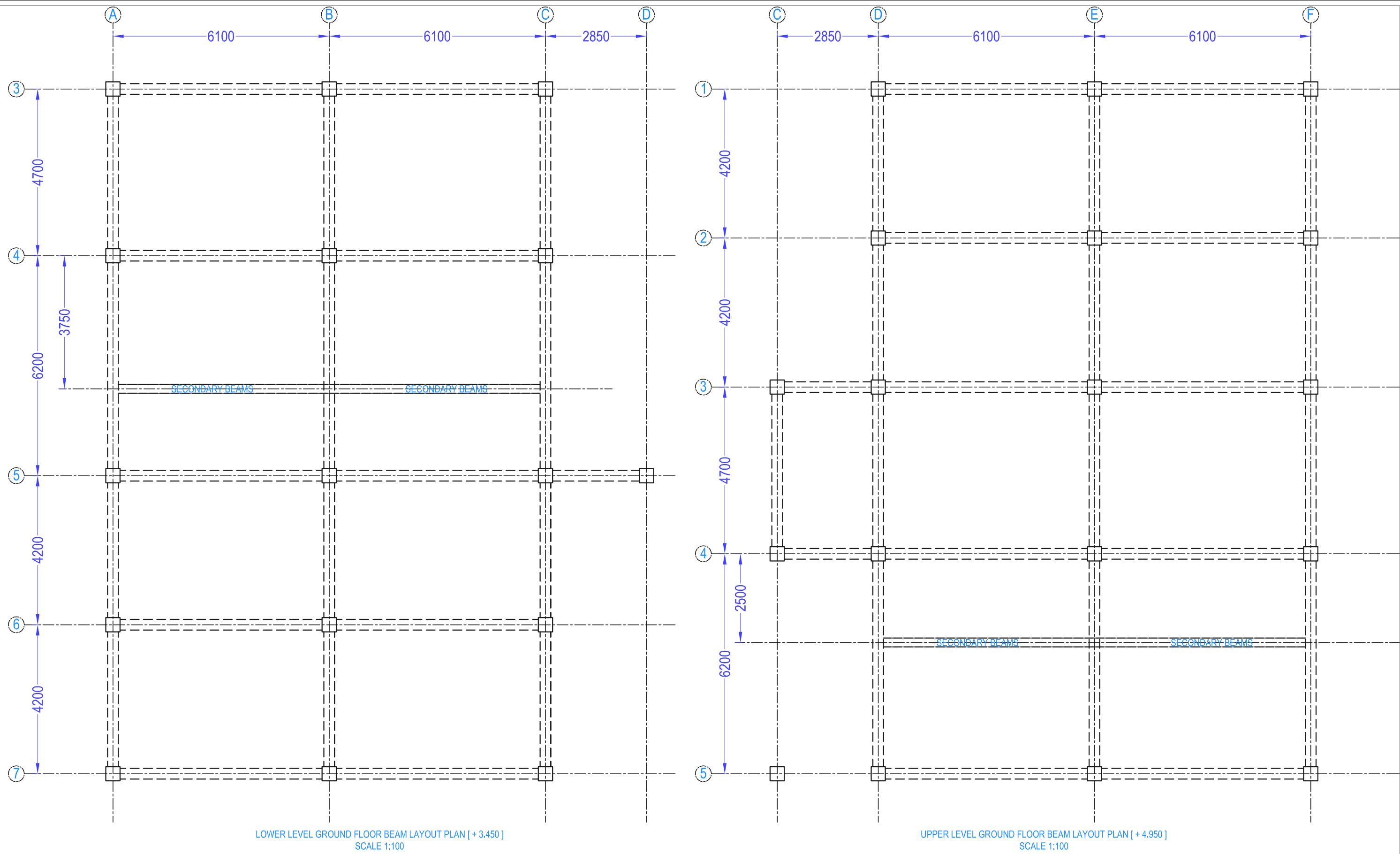
STR - 402

LEAPP Project Code

12246

Rev No.

R0



ROYAL GOVERNMENT OF BHUTAN
DEPARTMENT OF CIVIL AVIATION

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Civil Engineering Consultant

Gyaltshen Consultancy

Project Title

BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUARTERS

No. Revision

No.	Revision	Date	By

Date

By

Drawing Title

Plan Showing First Floor Beam Layout Plan

Scale 1 : 100 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

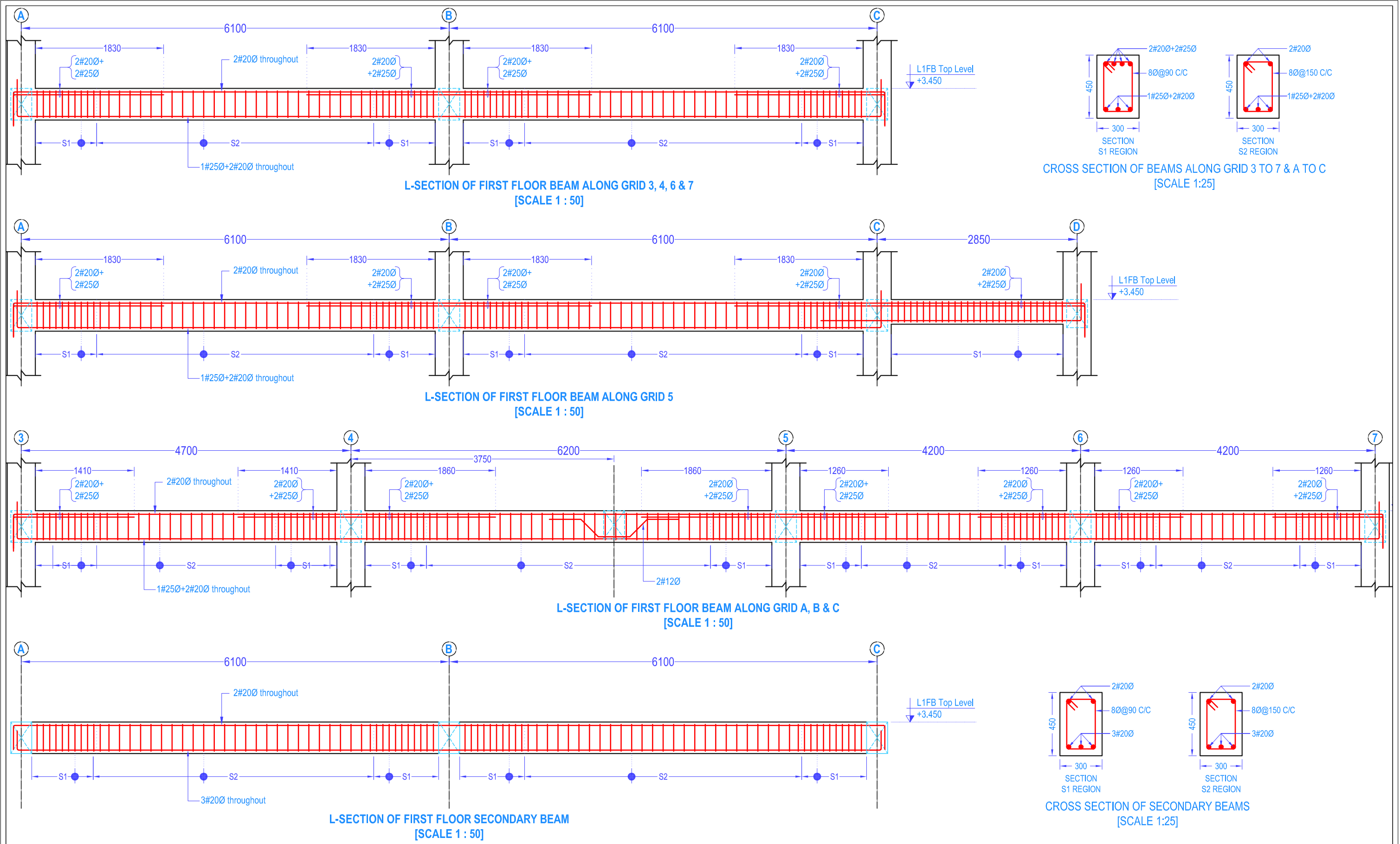
STR - 403

LEAPP Project Code

12246

Rev No.

R0



ROYAL GOVERNMENT OF BHUTAN
DEPARTMENT OF CIVIL AVIATION

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BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No. Revision

No.	Revision	Date	By

Date

Date	By

Drawing Title

First Floor Beam Details

Scale 1 : 50; 25 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

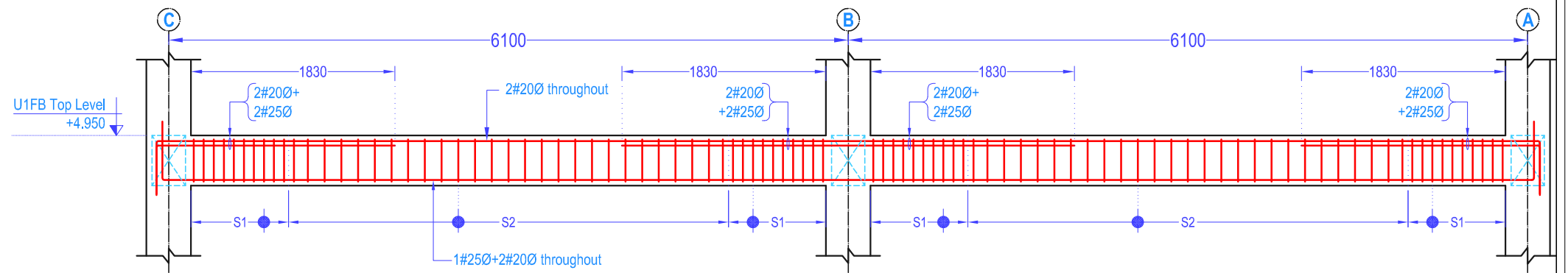
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LEAPP Project Code

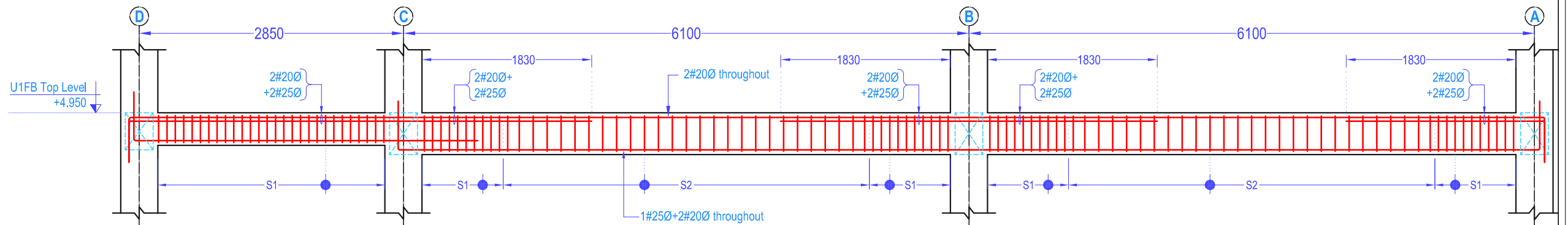
12246

Rev No.

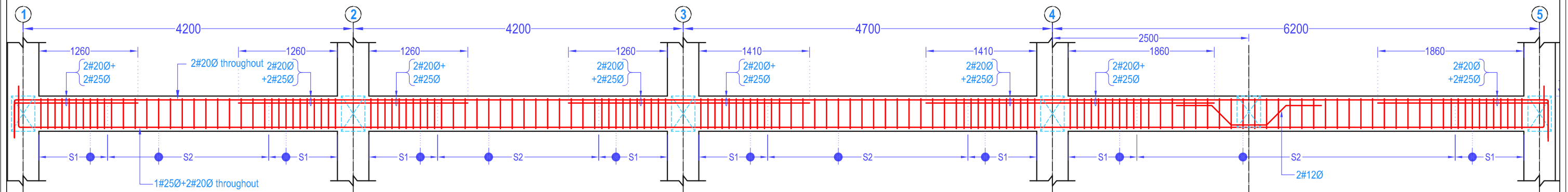
R0



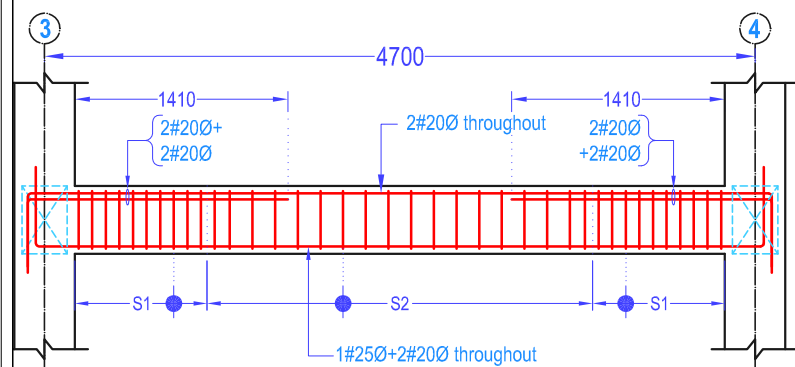
L-SECTION OF FIRST FLOOR BEAM ALONG GRID 1, 2 & 5
[SCALE 1 : 50]



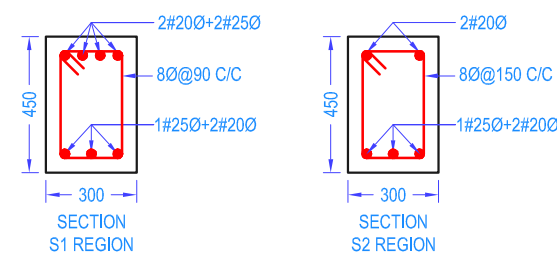
L-SECTION OF FIRST FLOOR BEAM ALONG GRID 3 & 4
[SCALE 1 : 50]



L-SECTION OF FIRST FLOOR BEAM ALONG GRID D, E & F
[SCALE 1 : 50]



L-SECTION OF FIRST FLOOR BEAM ALONG GRID C
[SCALE 1 : 50]



CROSS SECTION OF BEAMS ALONG GRID 1 TO 5 & C TO F
[SCALE 1:25]

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BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No. Revision

No.	Revision	Date	By
1			
2			
3			
4			
5			
6			
7			
8			

Drawing Title

First Floor Beam Details

Scale 1 : 50; 25 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

STR - 405

LEAPP Project Code

12246

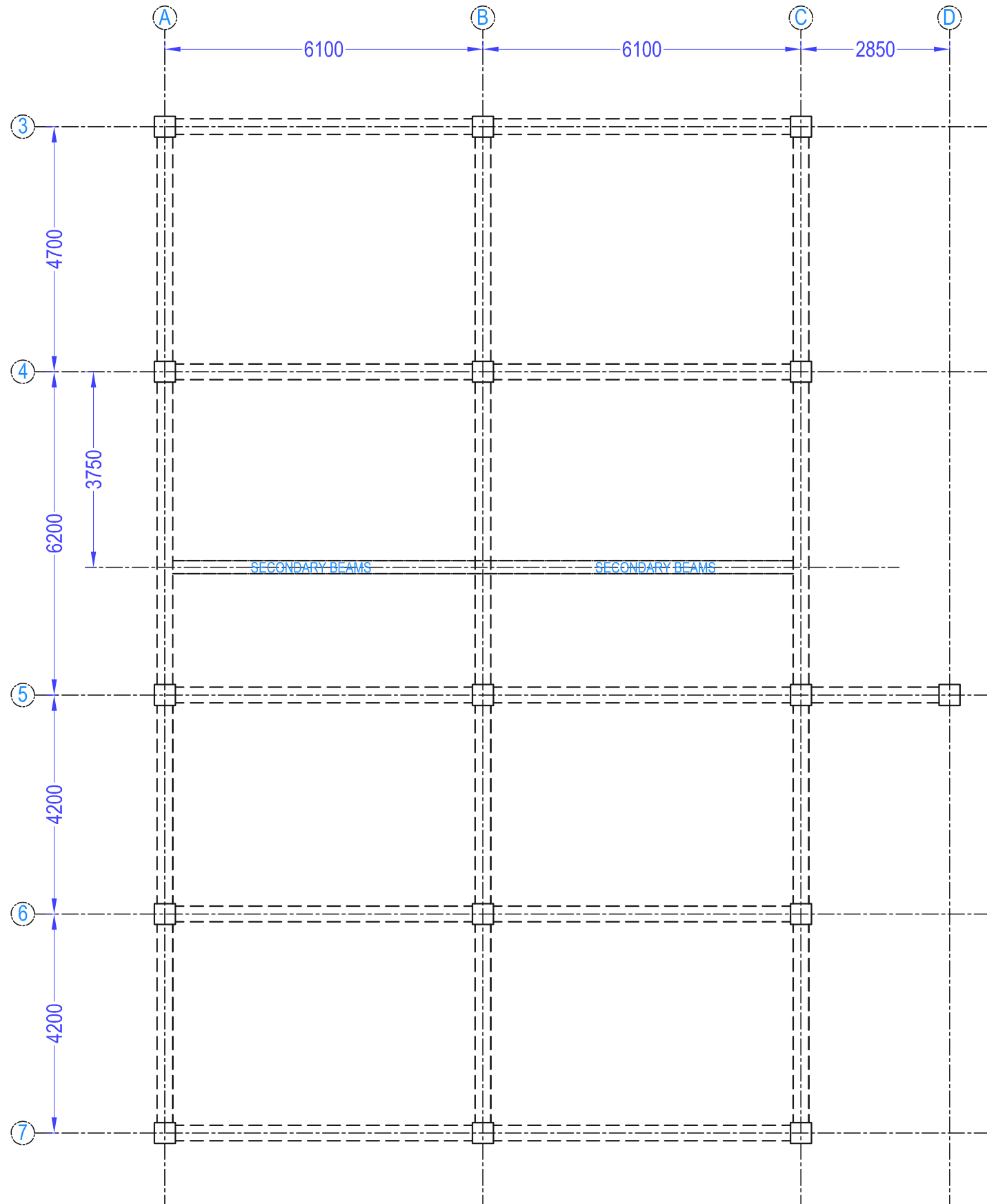
Rev No.

R0

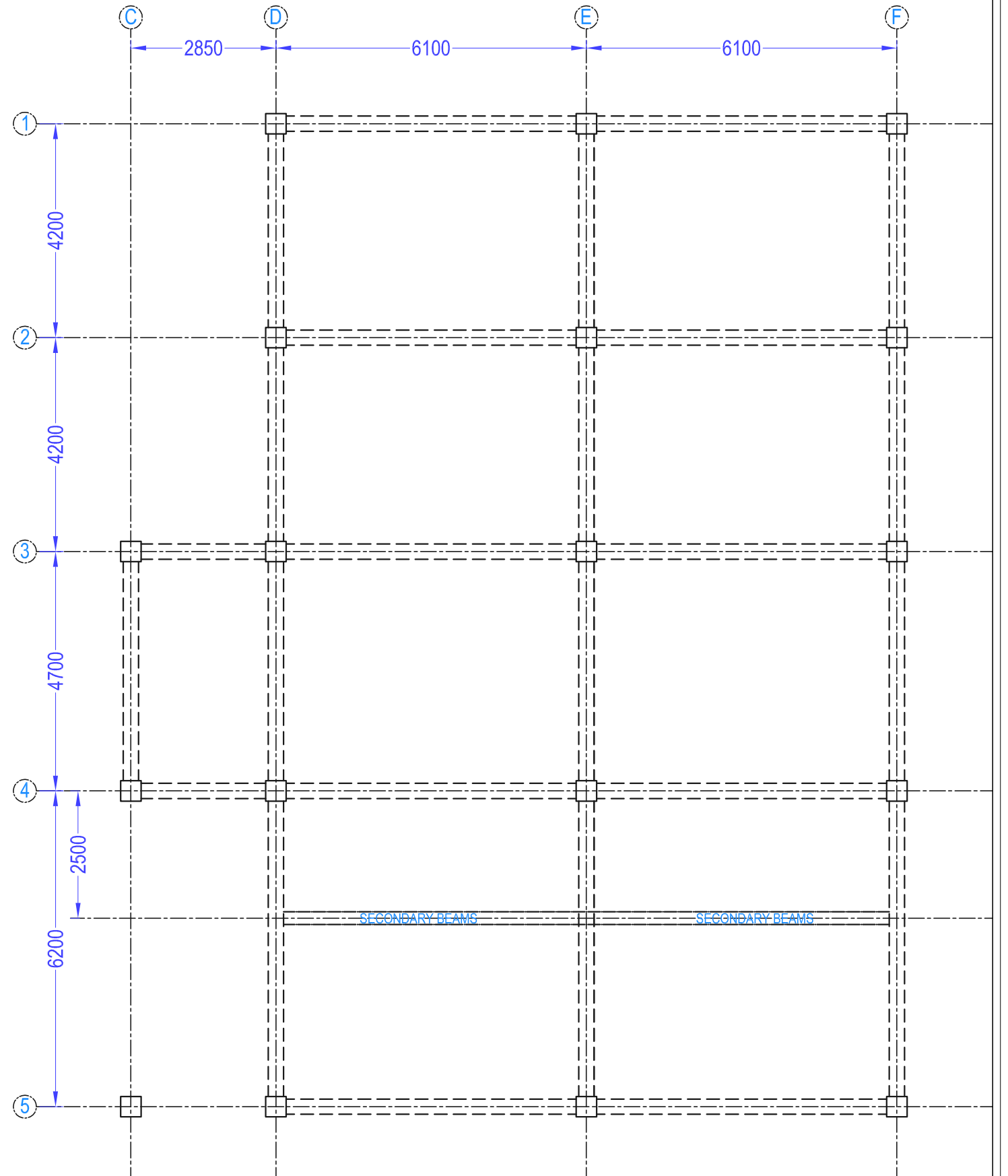


ADB

ROYAL GOVERNMENT OF BHUTAN
DEPARTMENT OF CIVIL AVIATION



LOWER LEVEL GROUND FLOOR BEAM LAYOUT PLAN [+ 6.450]
SCALE 1:100



UPPER LEVEL GROUND FLOOR BEAM LAYOUT PLAN [+ 7.950]
SCALE 1:100



ROYAL GOVERNMENT OF BHUTAN
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Project Title

BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No./ Revision

No.	Revision	Date	By

Drawing Title

Plan Showing Second Floor Beam Layout Plan

Scale 1 : 100 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

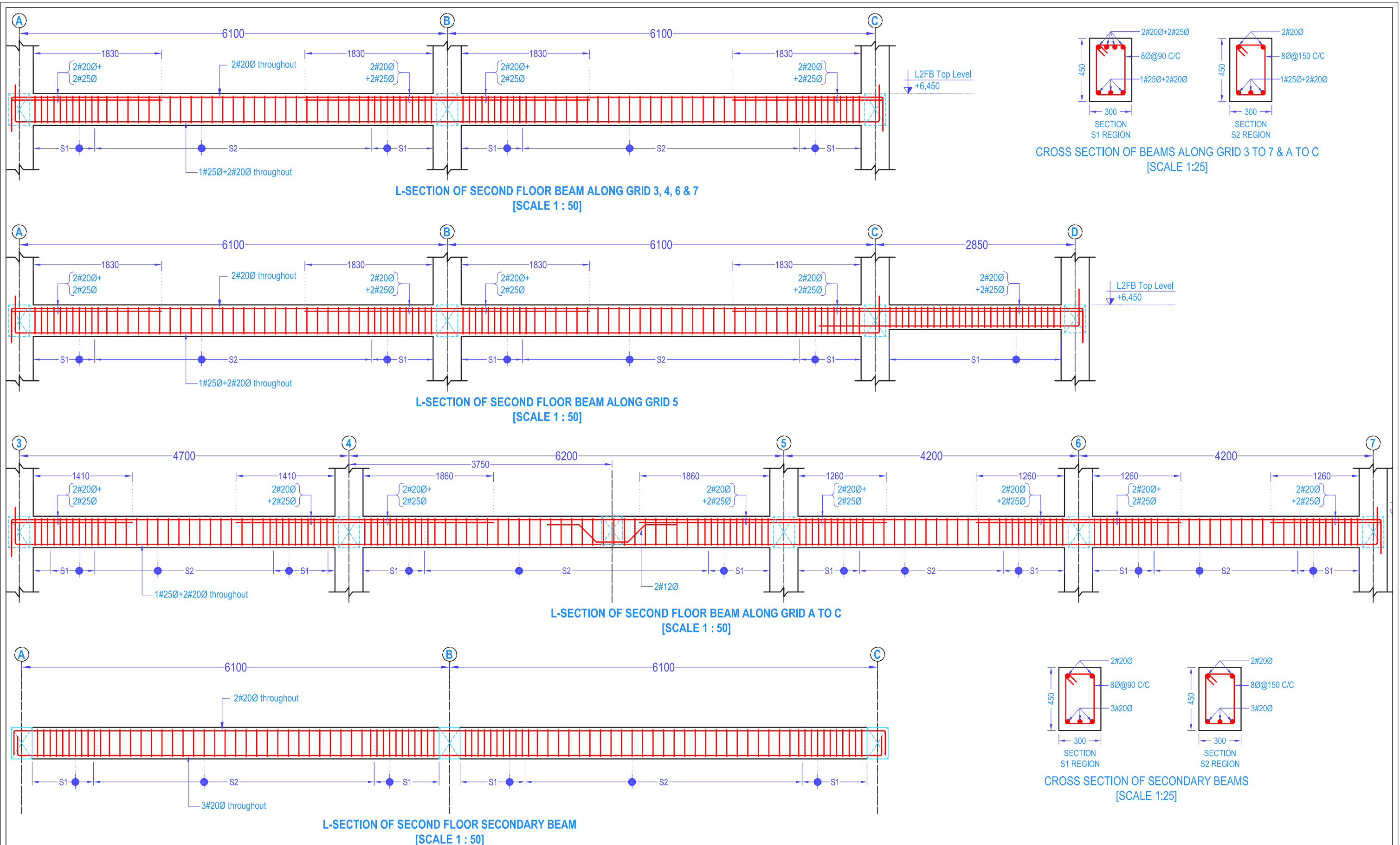
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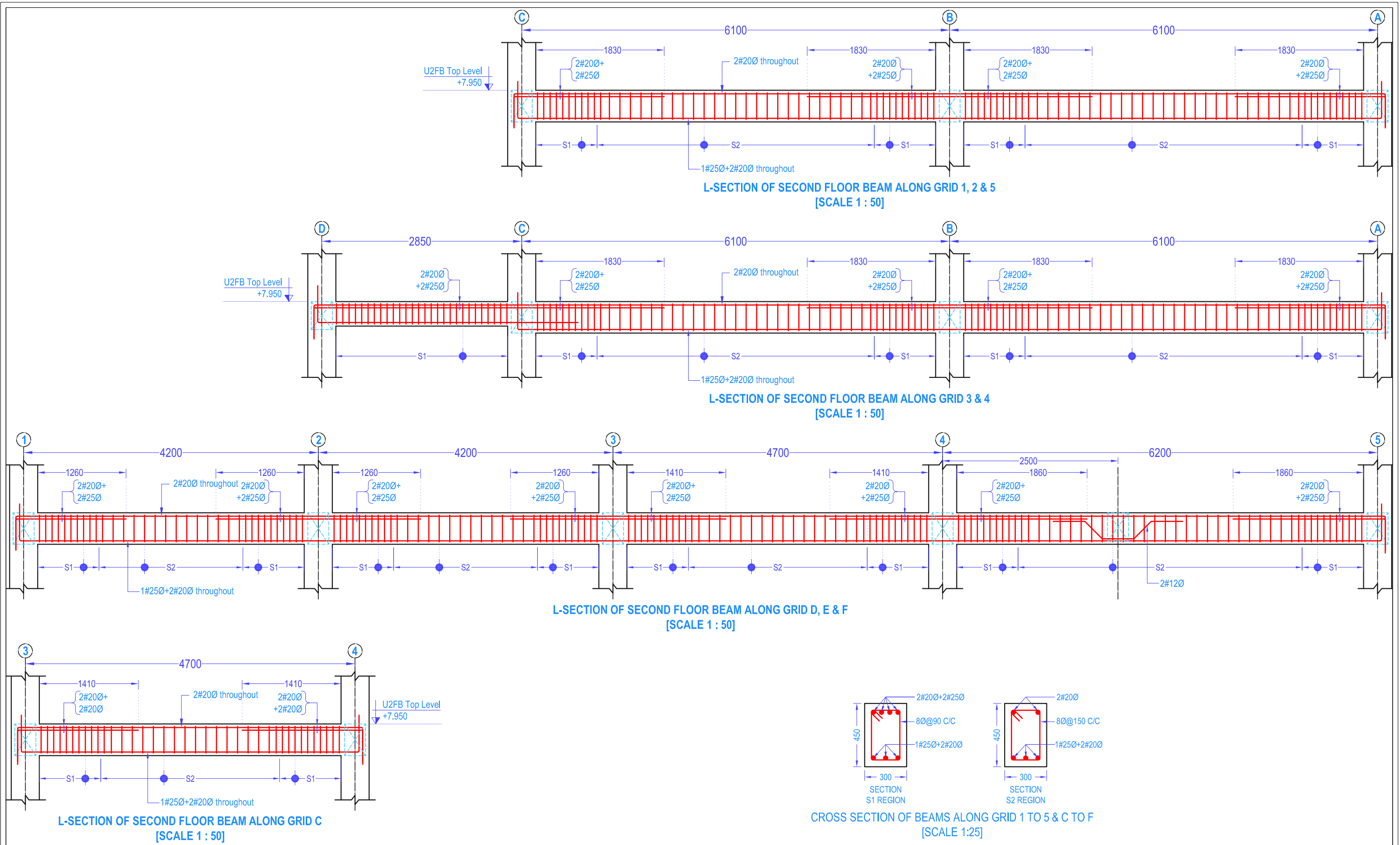
LEAPP Project Code


12246

Rev No.

R0







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Project Title
BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No.	Revision	Date	By

Drawing Title
Second Floor Beam Details

Scale 1 : 50; 25 @ A3

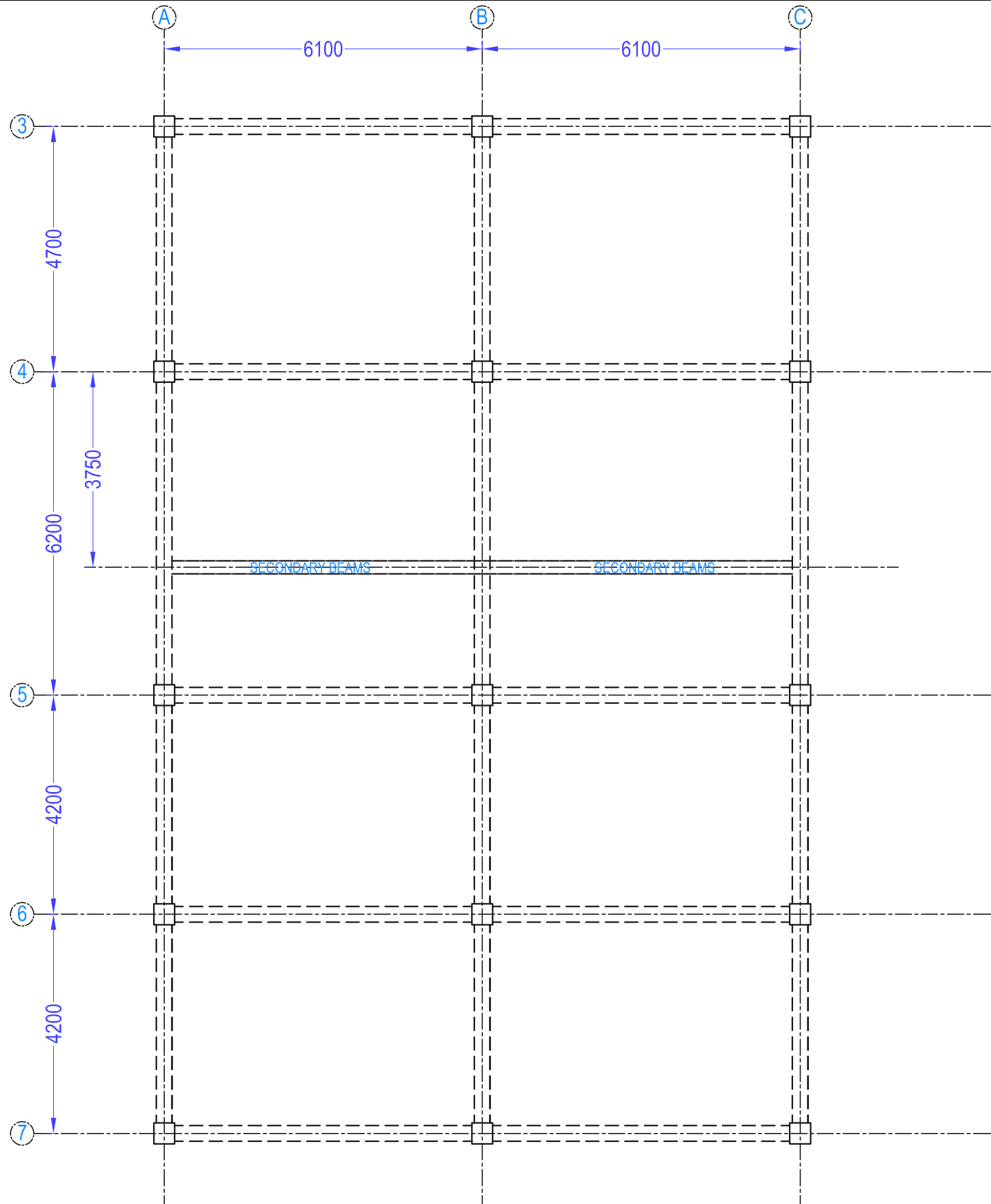
Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

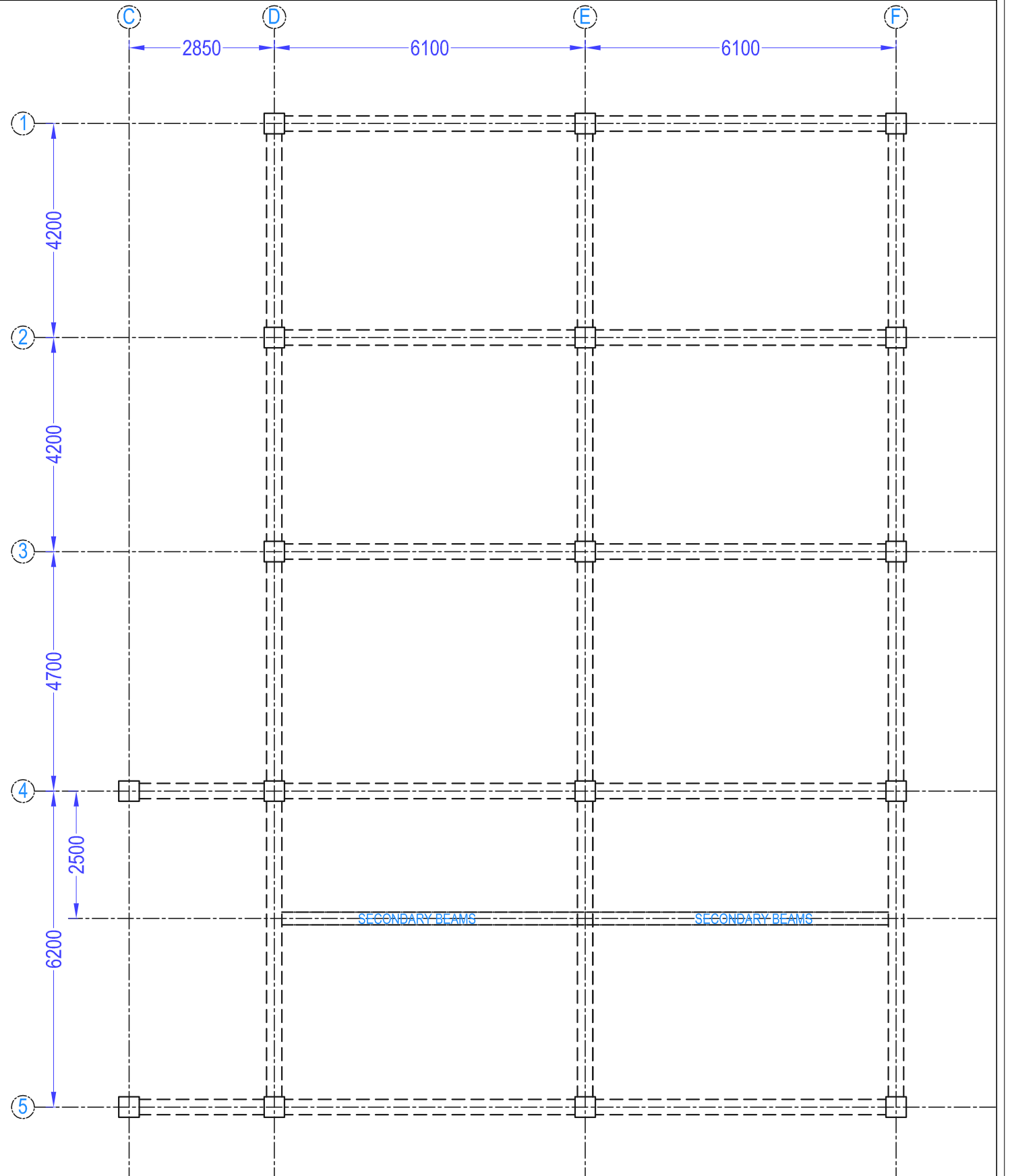
Drawing Number **STR - 408**

LEAPP Project Code 12246

Rev No.
R0



LOWER LEVEL GROUND FLOOR BEAM LAYOUT PLAN [+ 9.450]
SCALE 1:100



UPPER LEVEL GROUND FLOOR BEAM LAYOUT PLAN [+ 10.950]
SCALE 1:100



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Project Title

BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No. Revision

No.	Revision	Date	By

Date

By

Drawing Title

Plan Showing Roof Floor Beam Layout Plan

Scale 1 : 100 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

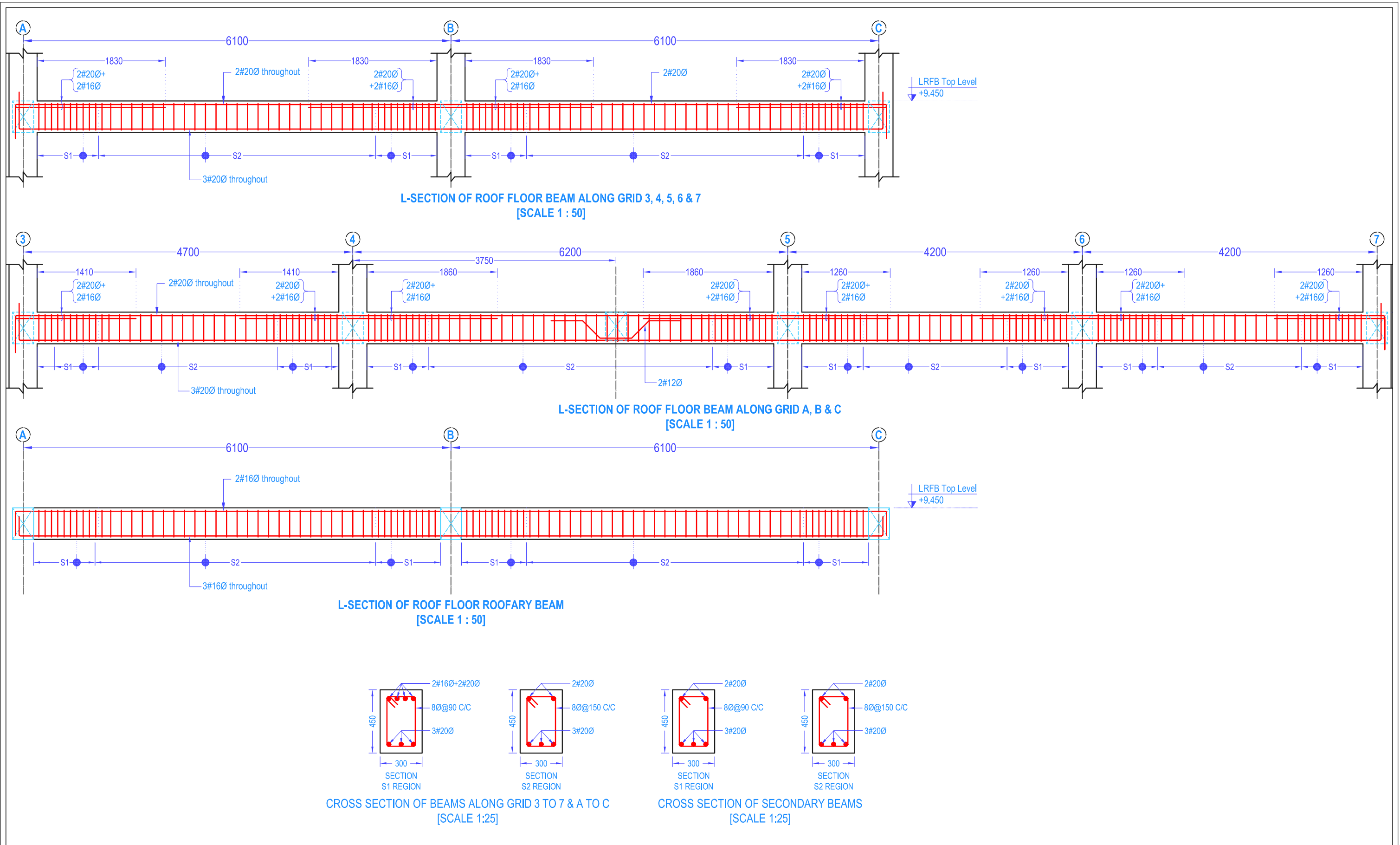
STR - 409

LEAPP Project Code

12246

Rev No.

R0



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Project Title
BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No.	Revision	Date	By

Drawing Title
Roof Floor Beam Details

Scale
1 : 50; 25 @ A3

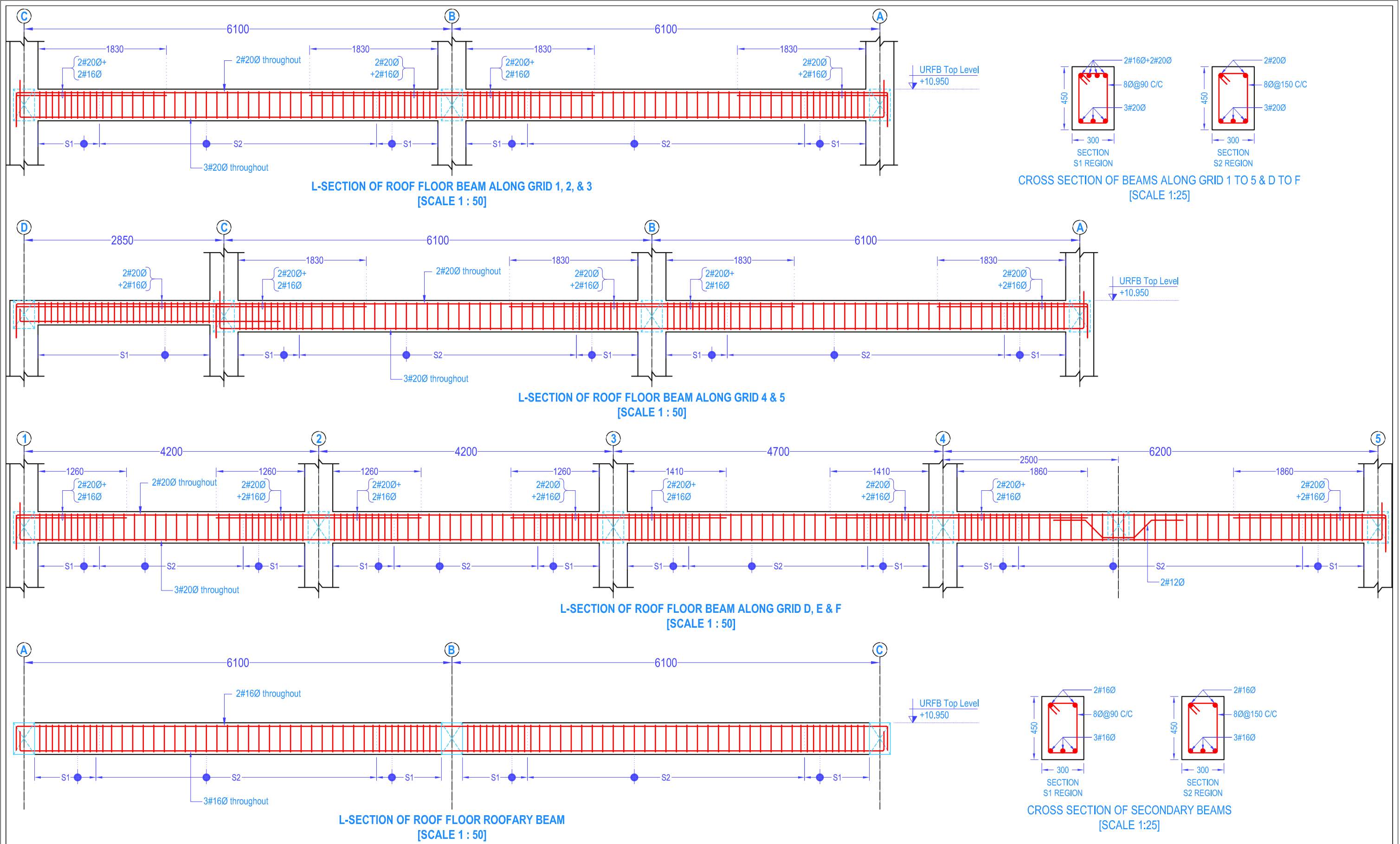
Date
December 2016

Drawn By
S Tobgay, P Dorji & A Pradhan

Drawing Number
STR - 410

Rev No.
R0

LEAPP Project Code
12246



ROYAL GOVERNMENT OF BHUTAN
DEPARTMENT OF CIVIL AVIATION

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Project Title
BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No.	Revision	Date	By

Drawing Title
Roof Floor Beam Details

Scale 1 : 50; 25 @ A3

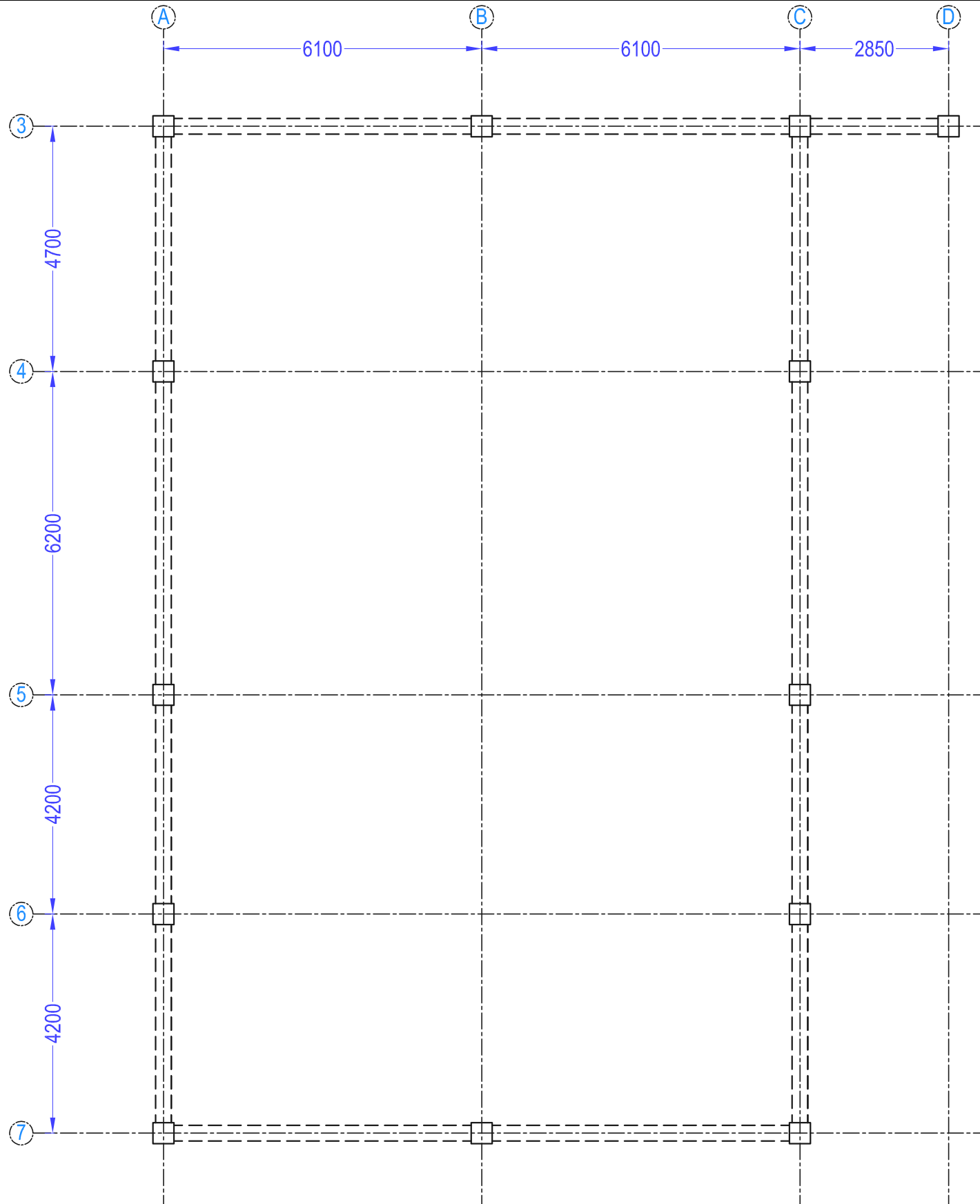
Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

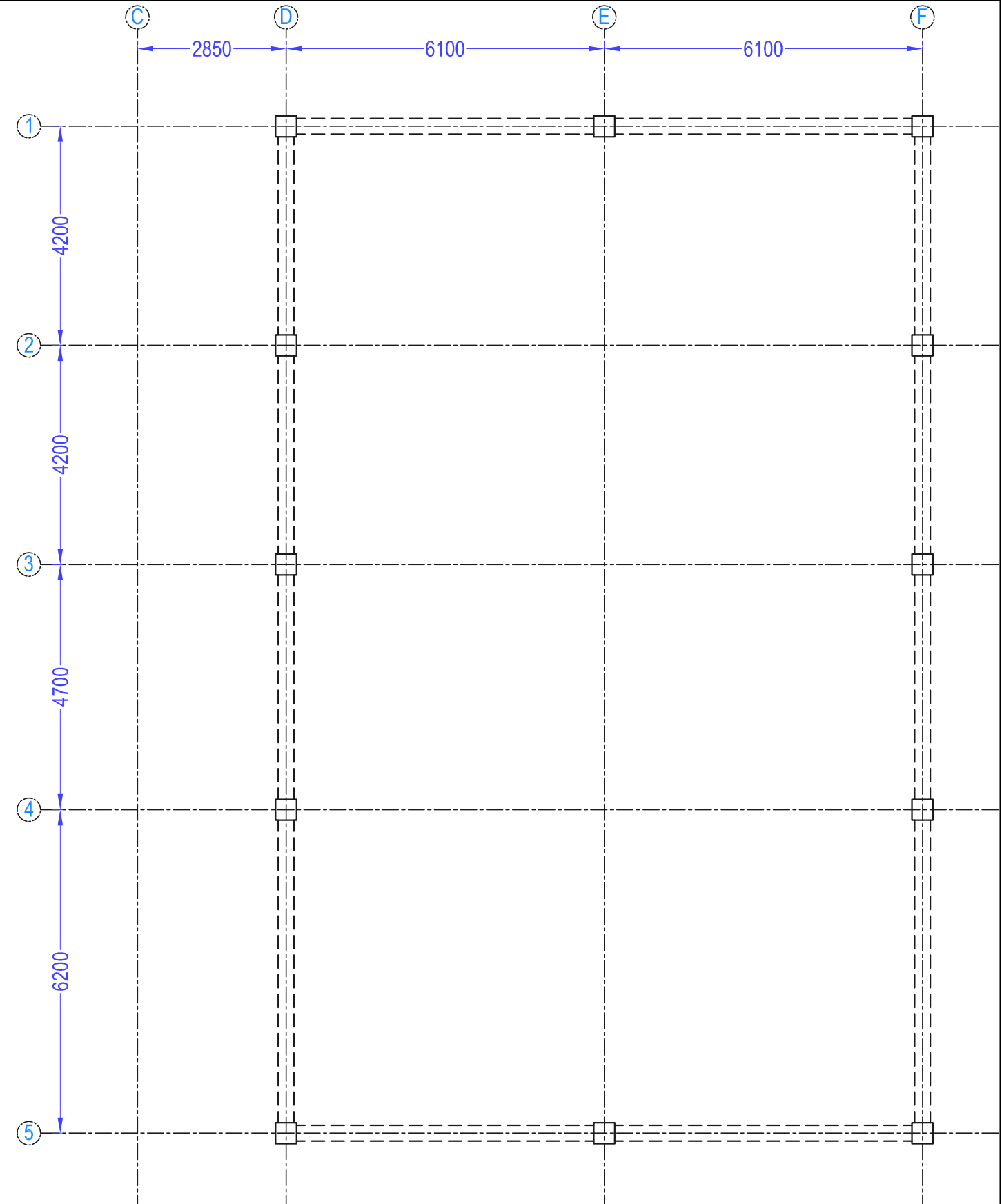
Drawing Number STR - 411

Rev No. R0

LEAPP Project Code 12246



LOWER LEVEL GROUND FLOOR BEAM LAYOUT PLAN [+ 10.240]
SCALE 1:100



UPPER LEVEL GROUND FLOOR BEAM LAYOUT PLAN [+ 11.740]
SCALE 1:100



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Project Title

BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No. / Revision

No. / Revision	Date	By

Date

By

Drawing Title

Plan Showing Roof Truss Tie Beam Layout Plan

Scale 1 : 75 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

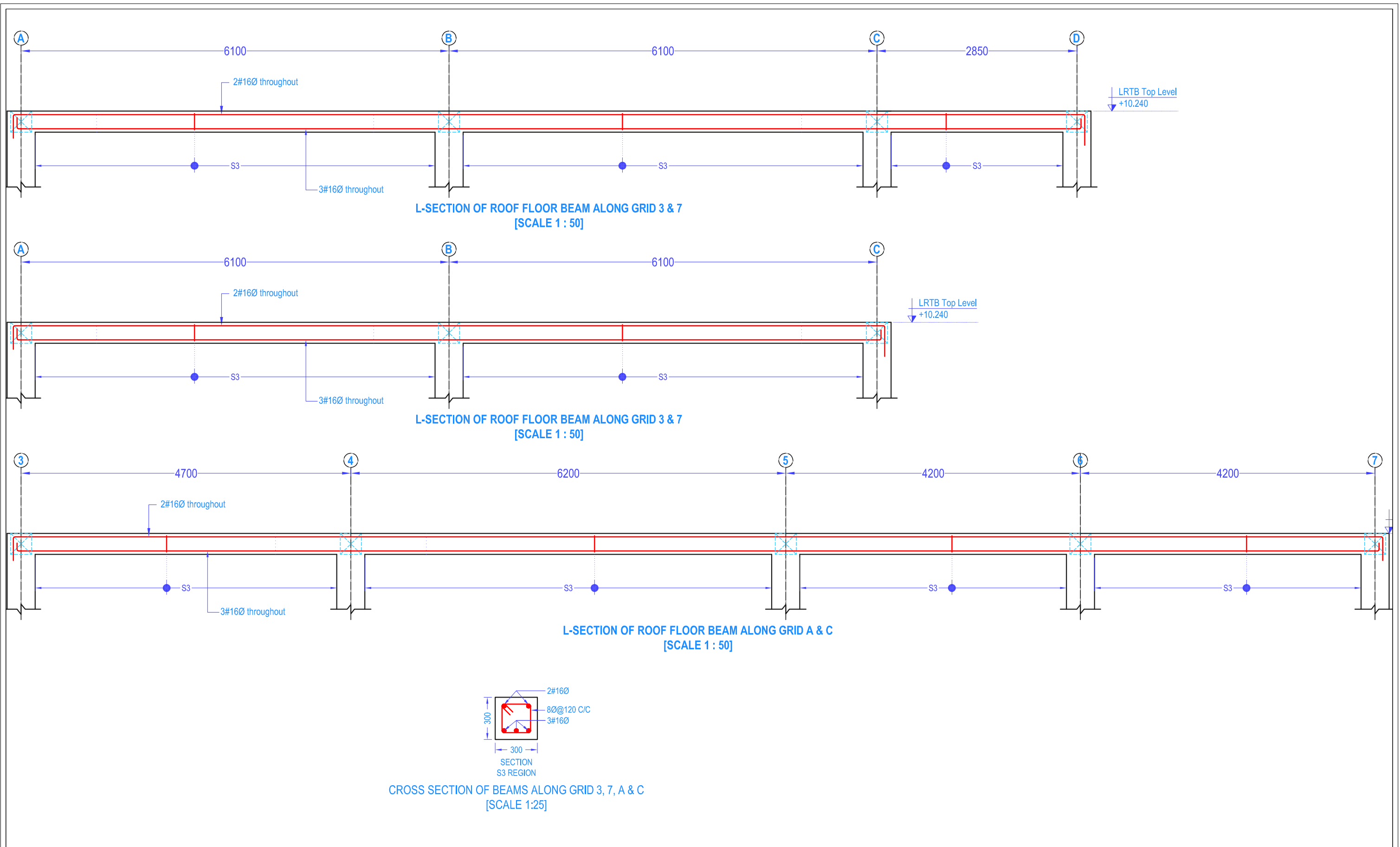
STR - 412

LEAPP Project Code

12246

Rev No.

R0



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8. All construction changes on the site to be agreed with the Client/Supervising Engineer.

Client

Ministry of Information and Communications
Department of Air Transport

Aviation Planners & Engineers

Leading Edge Aviation Planning Professionals

Civil Engineering Consultant

Gyaltshen Consultancy

Project Title

BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No. / Revision

No. / Revision	Date	By

Drawing Title

Roof Truss Tie Beam Details

Scale 1 : 50; 25 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

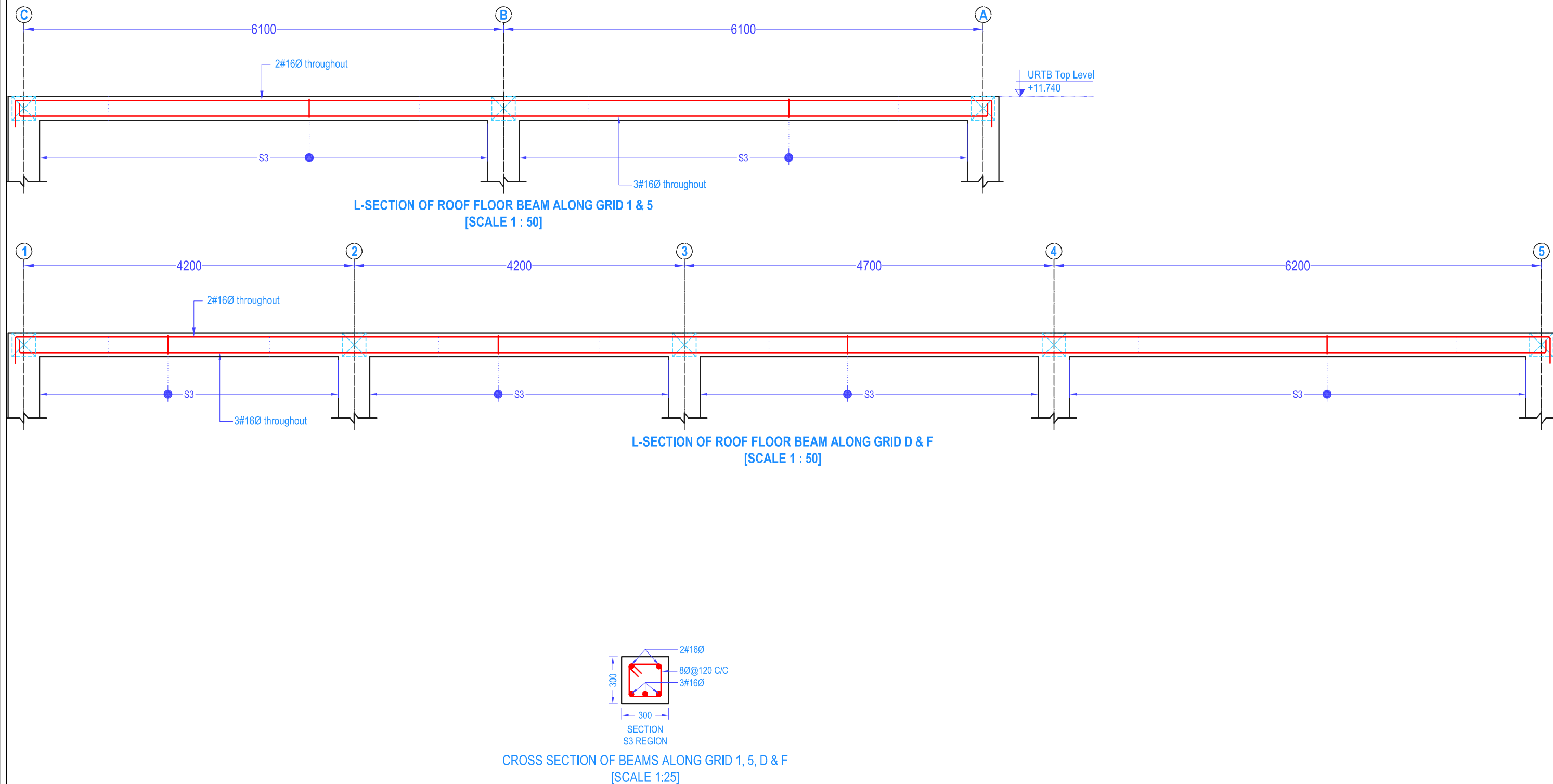
STR - 413

LEAPP Project Code

12246

Rev No.

R0



ROYAL GOVERNMENT OF BHUTAN
DEPARTMENT OF CIVIL AVIATION

Notes

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BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No. Revision

No.	Revision	Date	By

Drawing Title

Roof Truss Tie Beam Details

Scale 1 : 50; 25 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

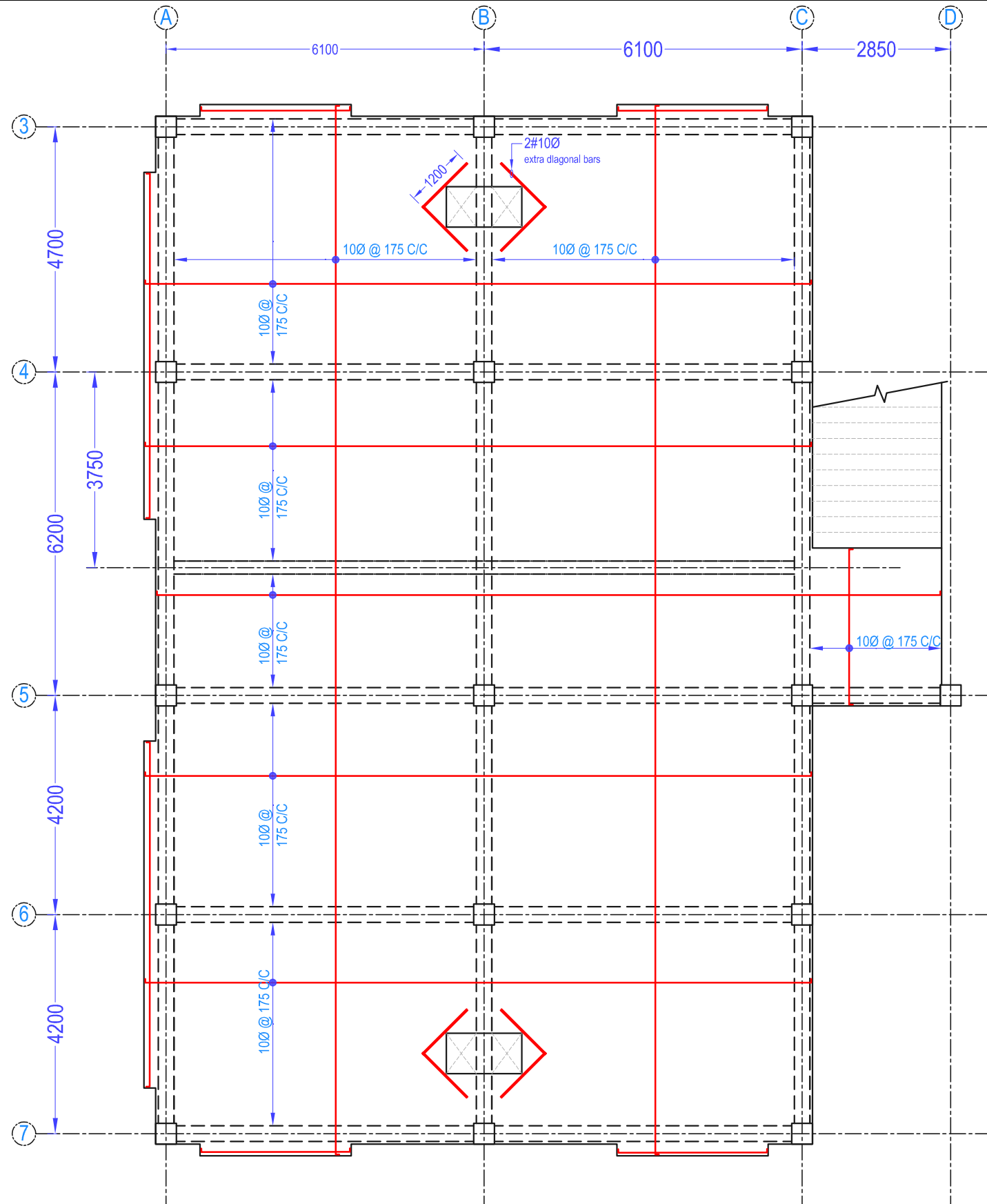
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LEAPP Project Code

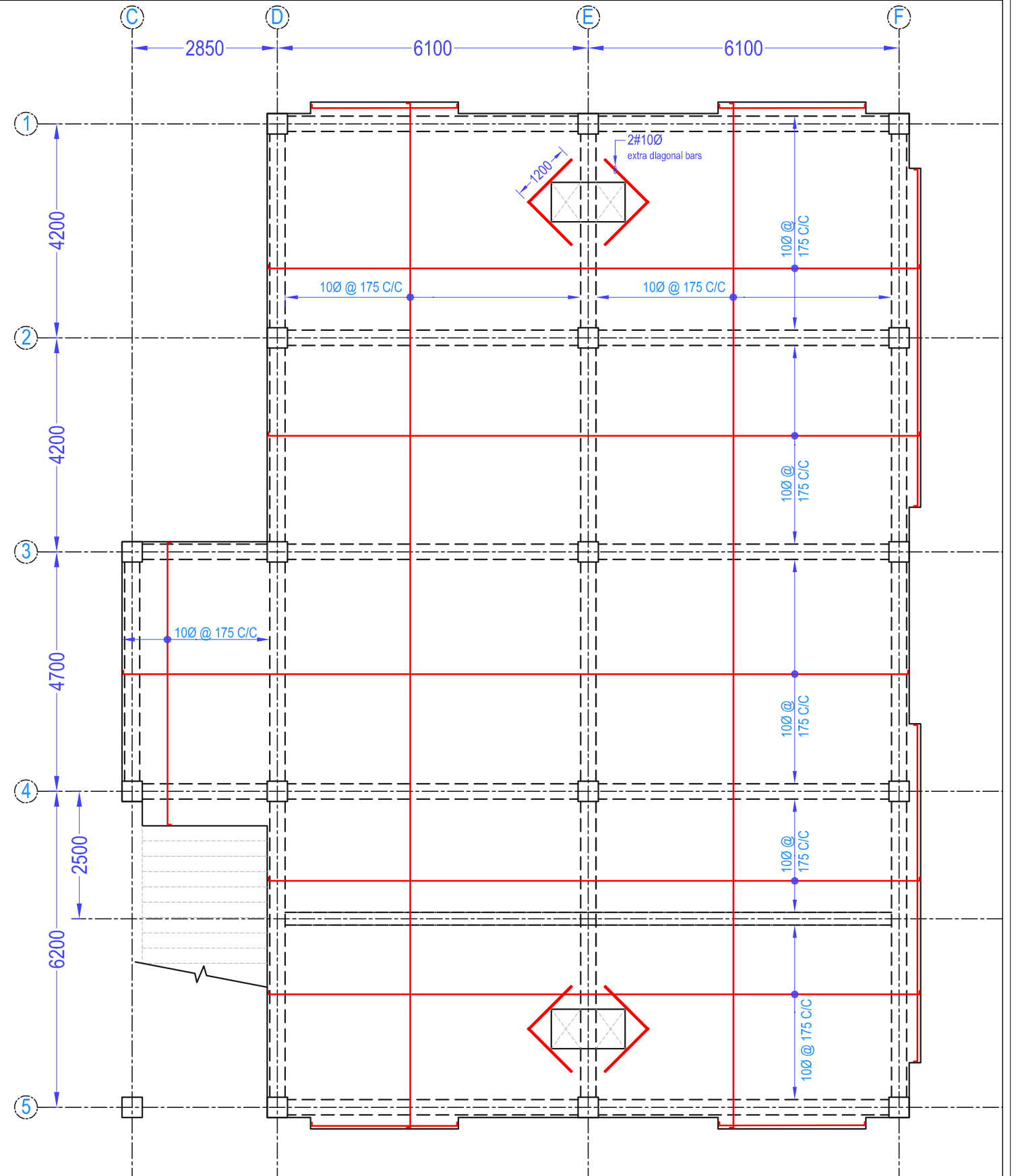
12246

Rev No.

R0



LOWER LEVEL FIRST FLOOR SLAB BOTTOM REINFORCEMENT LAYOUT PLAN [+ 3.450]
SCALE 1:100



UPPER LEVEL FIRST FLOOR SLAB BOTTOM REINFORCEMENT LAYOUT PLAN [+ 4.950]
SCALE 1:100



ROYAL GOVERNMENT OF BHUTAN
DEPARTMENT OF CIVIL AVIATION

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BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No./ Revision

No./ Revision	Date	By

Date

By

Drawing Title

Plan Showing First Floor Slab Bottom Reinforcement Layout Plan

Scale 1 : 100 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

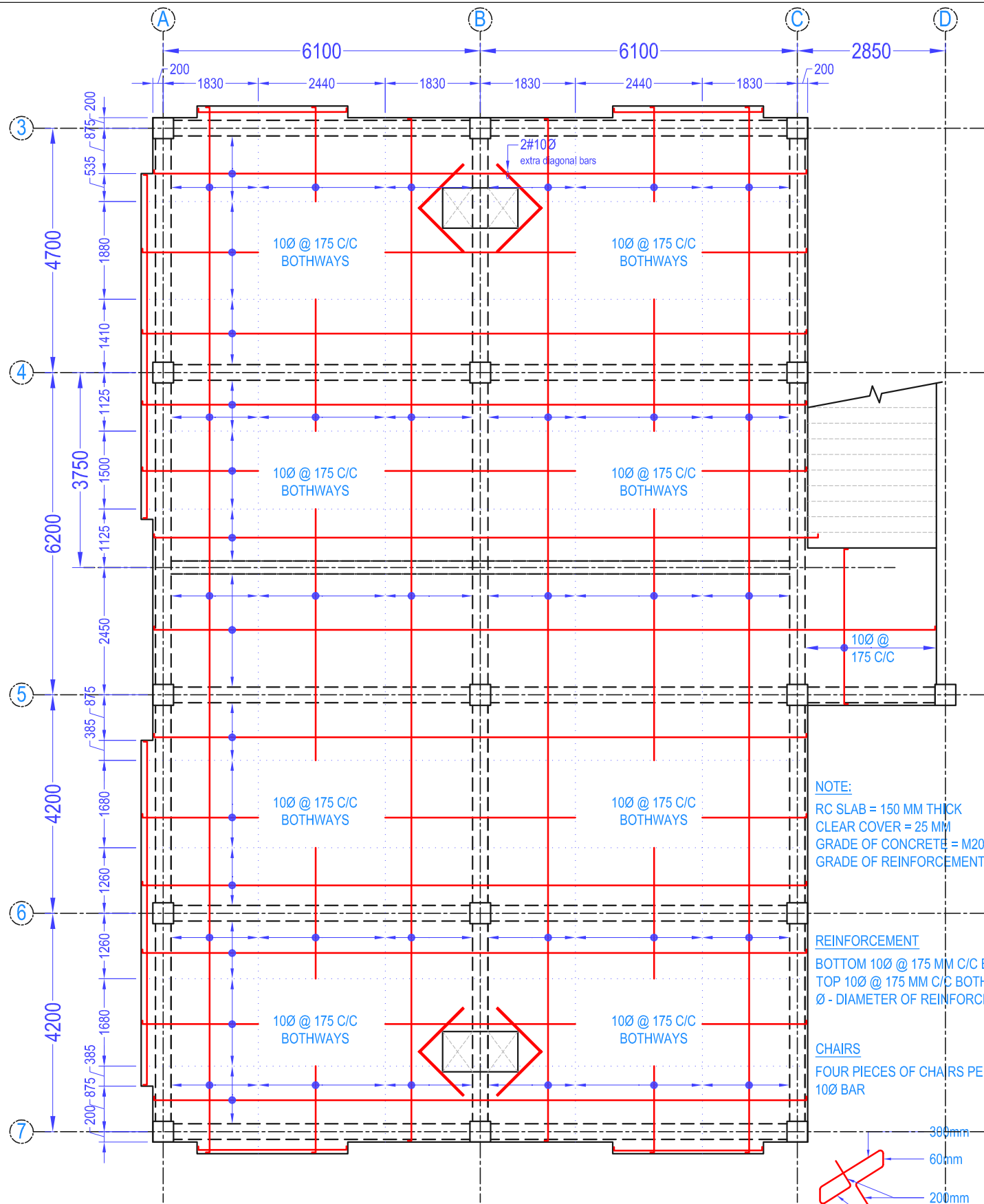
STR - 500

LEAPP Project Code

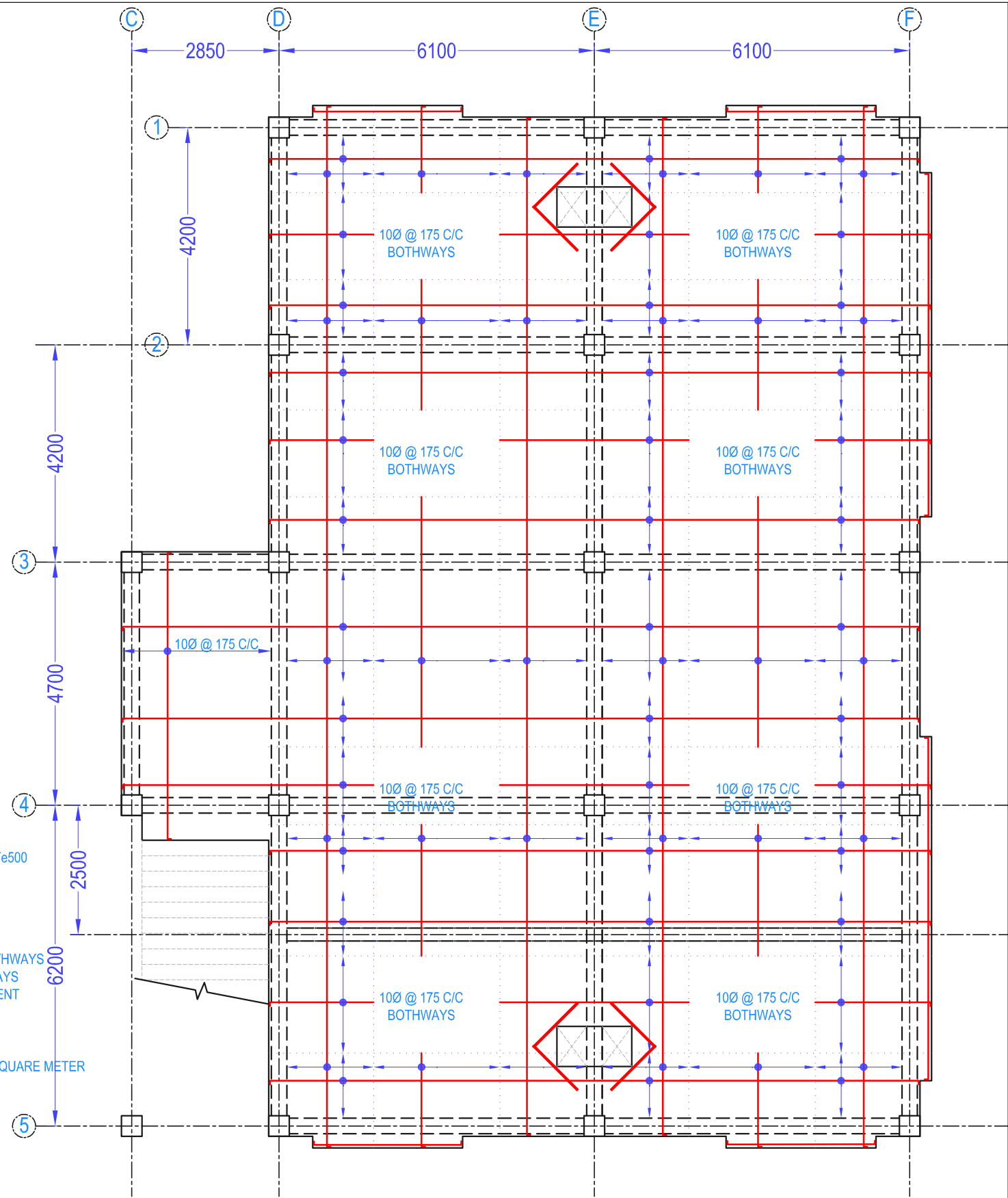
12246

Rev No.

R0



LOWER LEVEL FIRST FLOOR SLAB TOP REINFORCEMENT LAYOUT PLAN [+ 3.450]
SCALE 1:100



UPPER LEVEL FIRST FLOOR SLAB TOP REINFORCEMENT LAYOUT PLAN [+ 4.950]
SCALE 1:100



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BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No./Revision

No./Revision	Date	By

Date

Date	By

Drawing Title

Plan Showing First Floor Slab Top Reinforcement Layout Plan

Scale 1 : 100 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

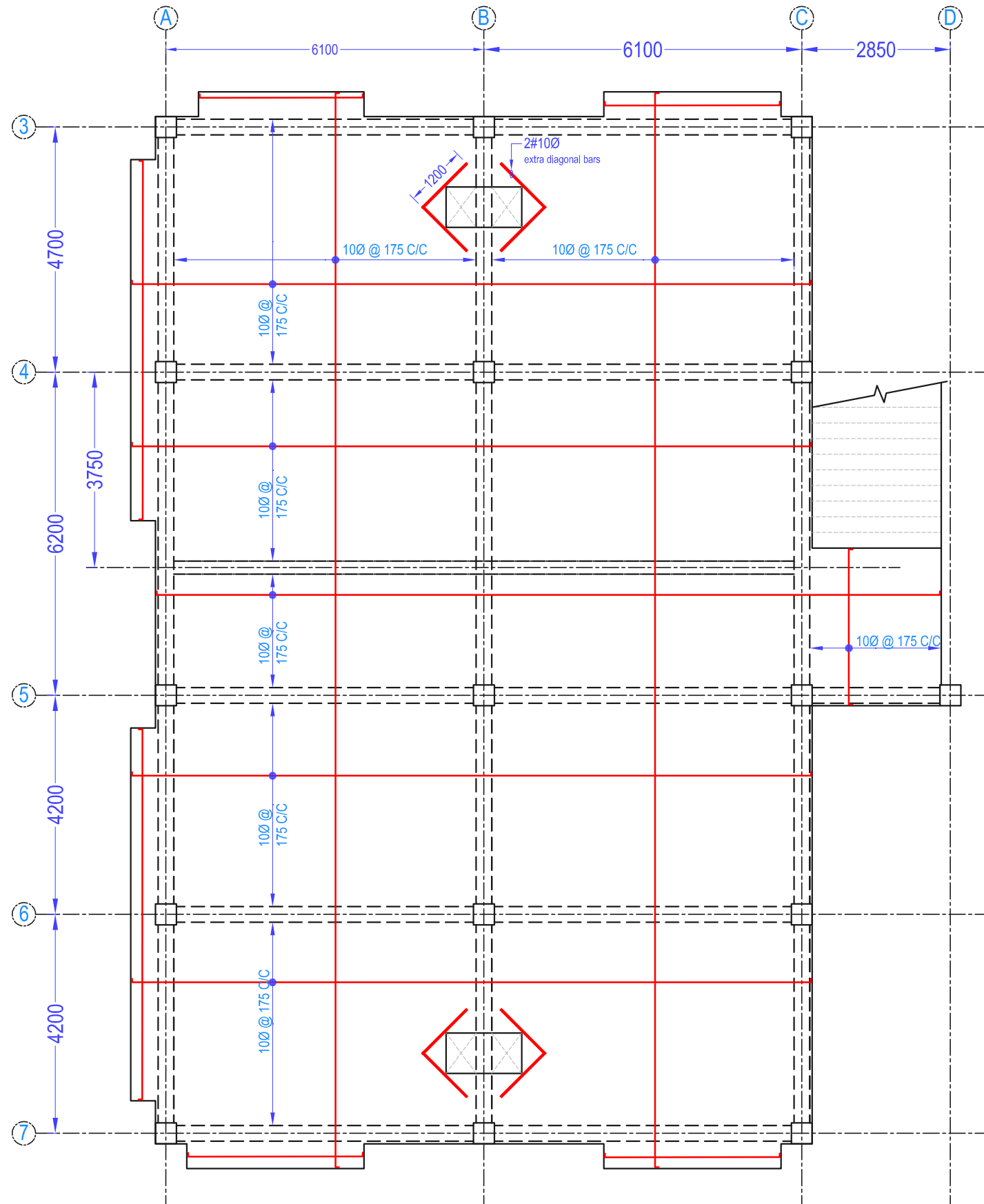
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LEAPP Project Code

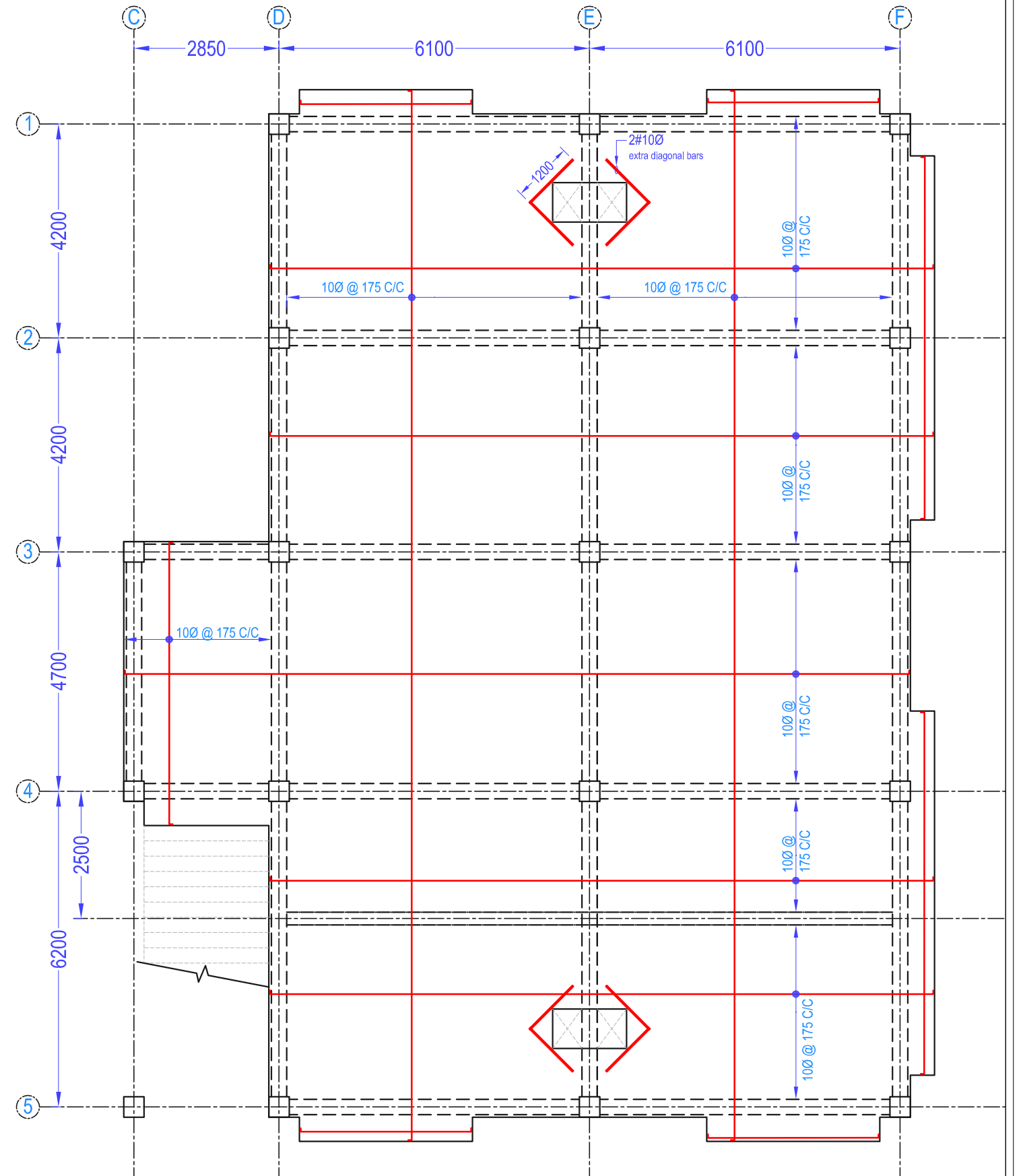
12246

Rev No.

R0



LOWER LEVEL SECOND FLOOR SLAB BOTTOM REINFORCEMENT LAYOUT PLAN [+ 6.450]
SCALE 1:100



UPPER LEVEL SECOND FLOOR SLAB BOTTOM REINFORCEMENT LAYOUT PLAN [+ 7.950]
SCALE 1:100



ROYAL GOVERNMENT OF BHUTAN
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BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No. Revision

No.	Revision	Date	By

Date

By

Drawing Title

Plan Showing Second Floor Slab Bottom Reinforcement Layout Plan

Scale 1 : 75 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

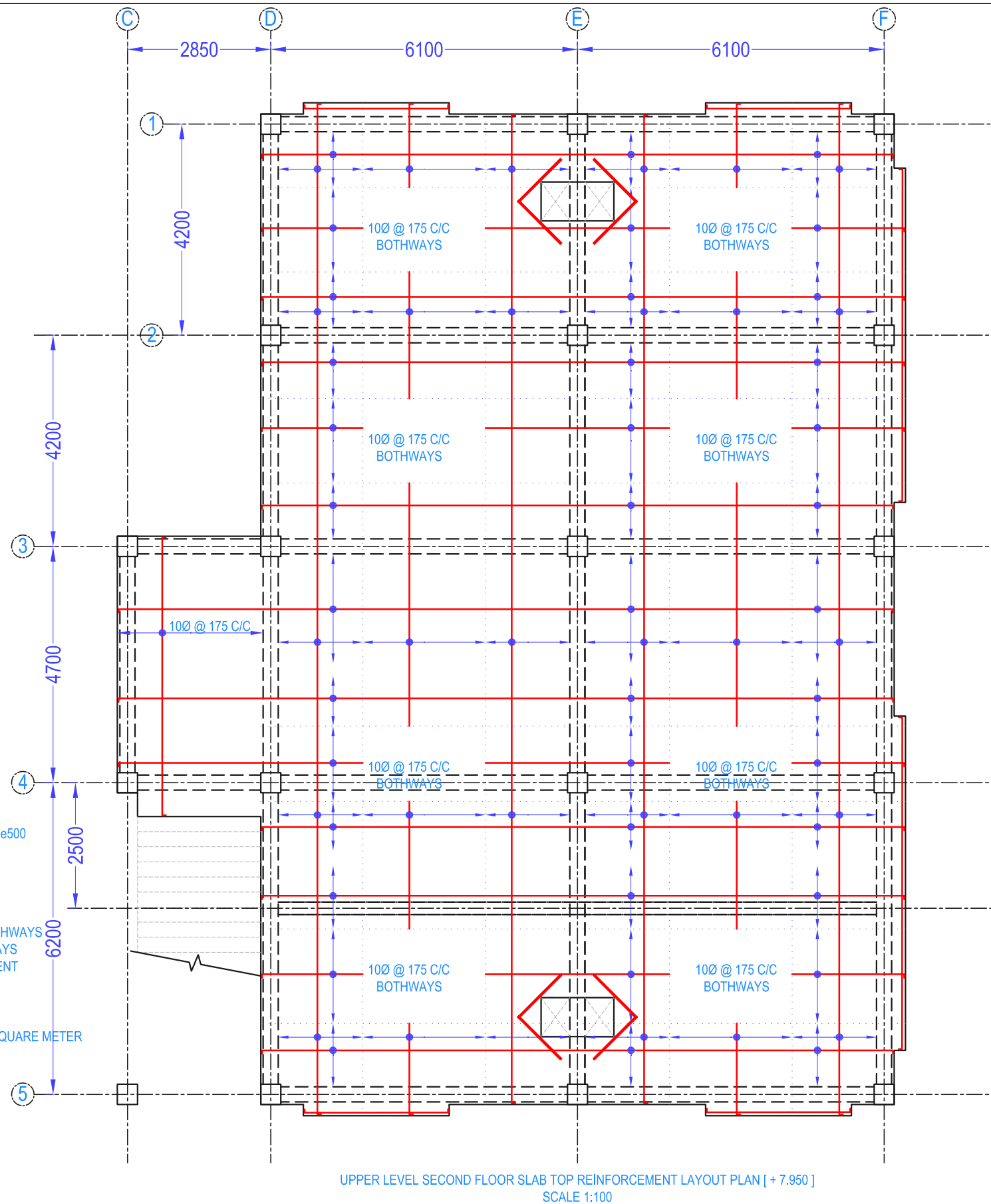
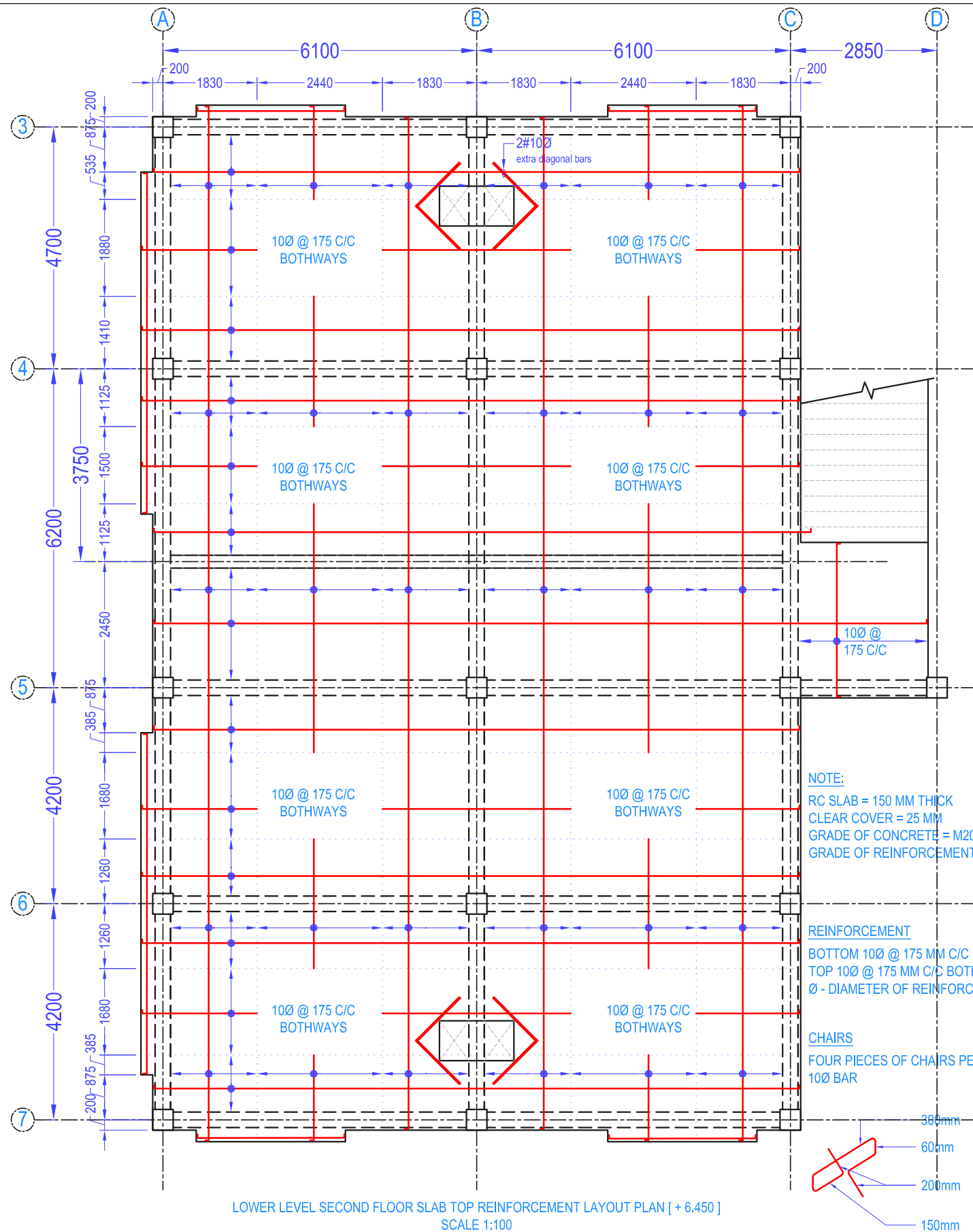
STR - 502

LEAPP Project Code

12246

Rev No.

R0



ADB

ROYAL GOVERNMENT OF BHUTAN
DEPARTMENT OF CIVIL AVIATION

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Project Title

BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No./Revision

No./Revision	Date	By

Date

Date	By

Drawing Title

Plan Showing Second Floor Slab Top Reinforcement Layout Plan

Scale 1 : 75 @ A3

Date December 2016

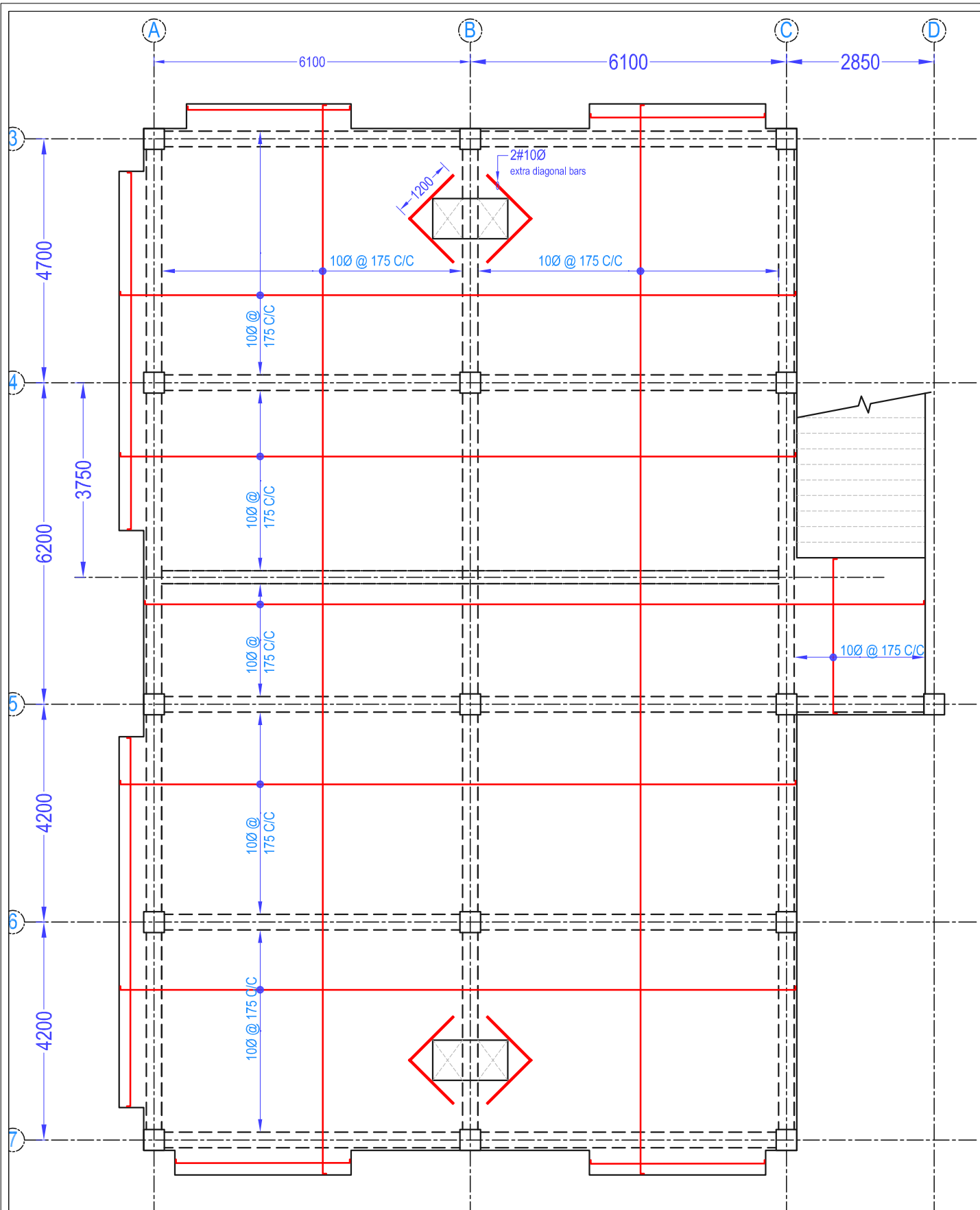
Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

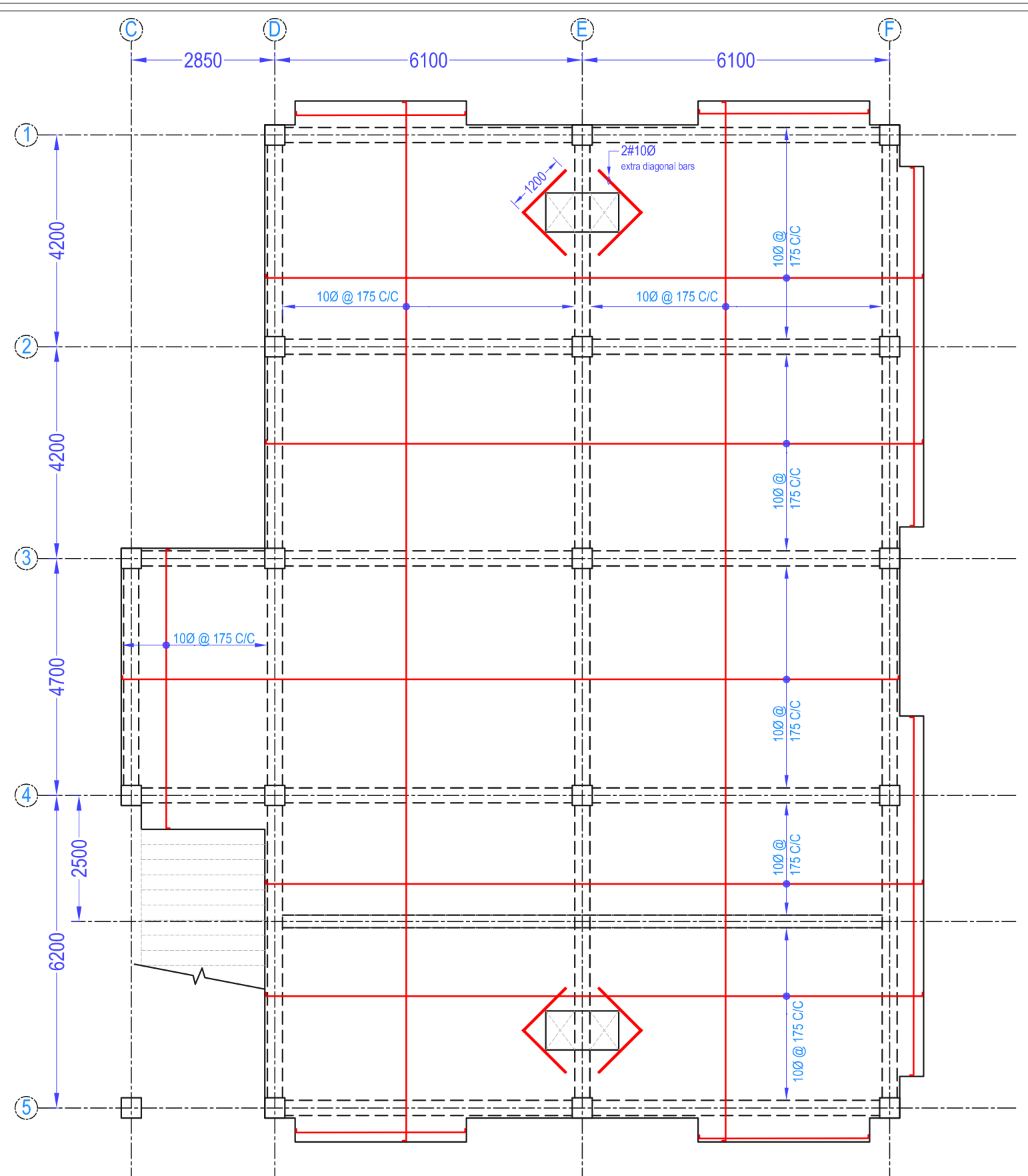
STR - 503

LEAPP Project Code
12246

Rev No.
R0



LOWER LEVEL ROOF SLAB BOTTOM REINFORCEMENT LAYOUT PLAN [+ 9.450]
SCALE 1:100



UPPER LEVEL ROOF SLAB BOTTOM REINFORCEMENT LAYOUT PLAN [+ 10.950]
SCALE 1:100



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Project Title

BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUARTERS

No./Revision

Date

By

Drawing Title

Plan Showing Roof Floor Slab Bottom Reinforcement Layout Plan

Scale 1 : 75 @ A3

Date December 2016

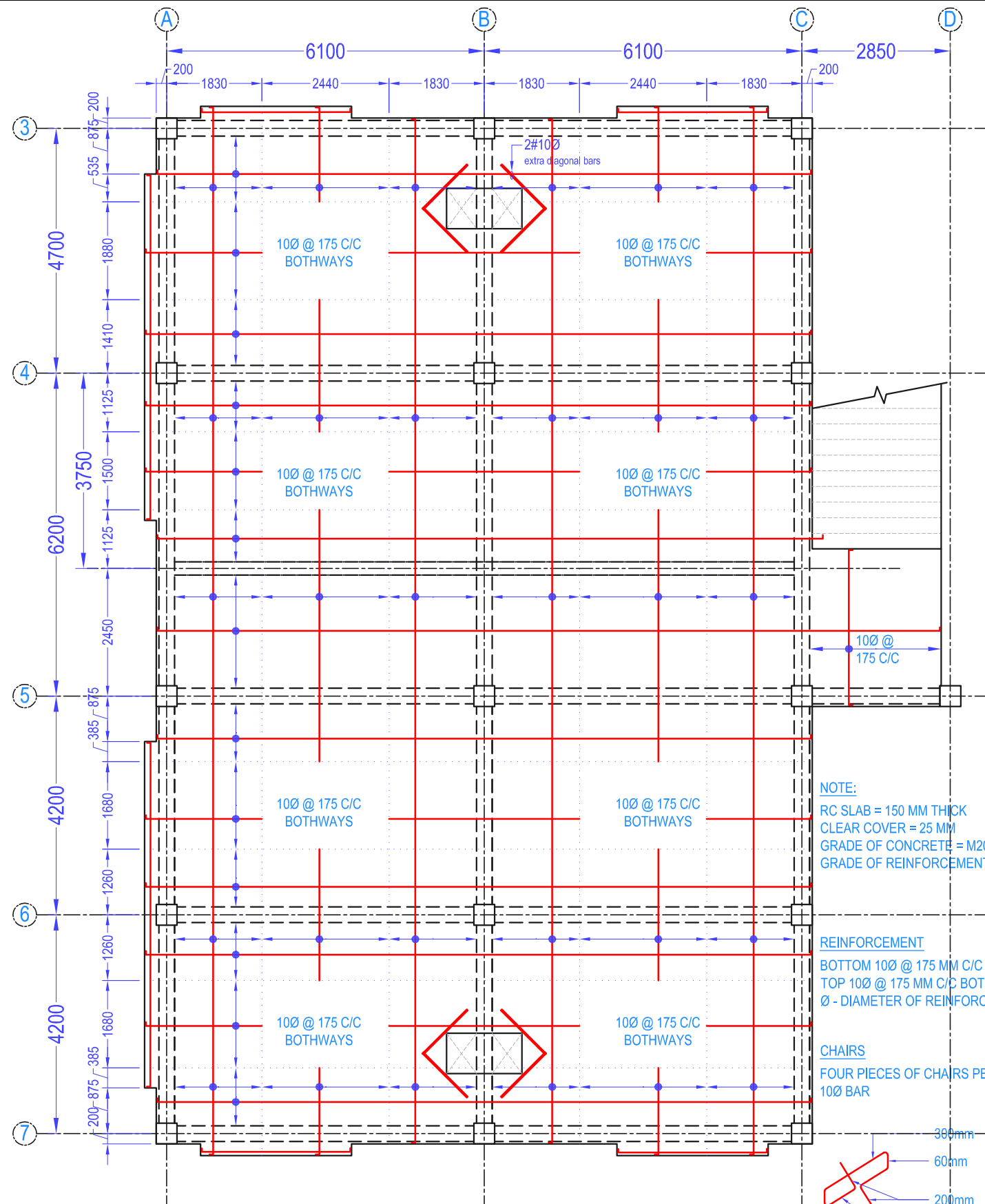
Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

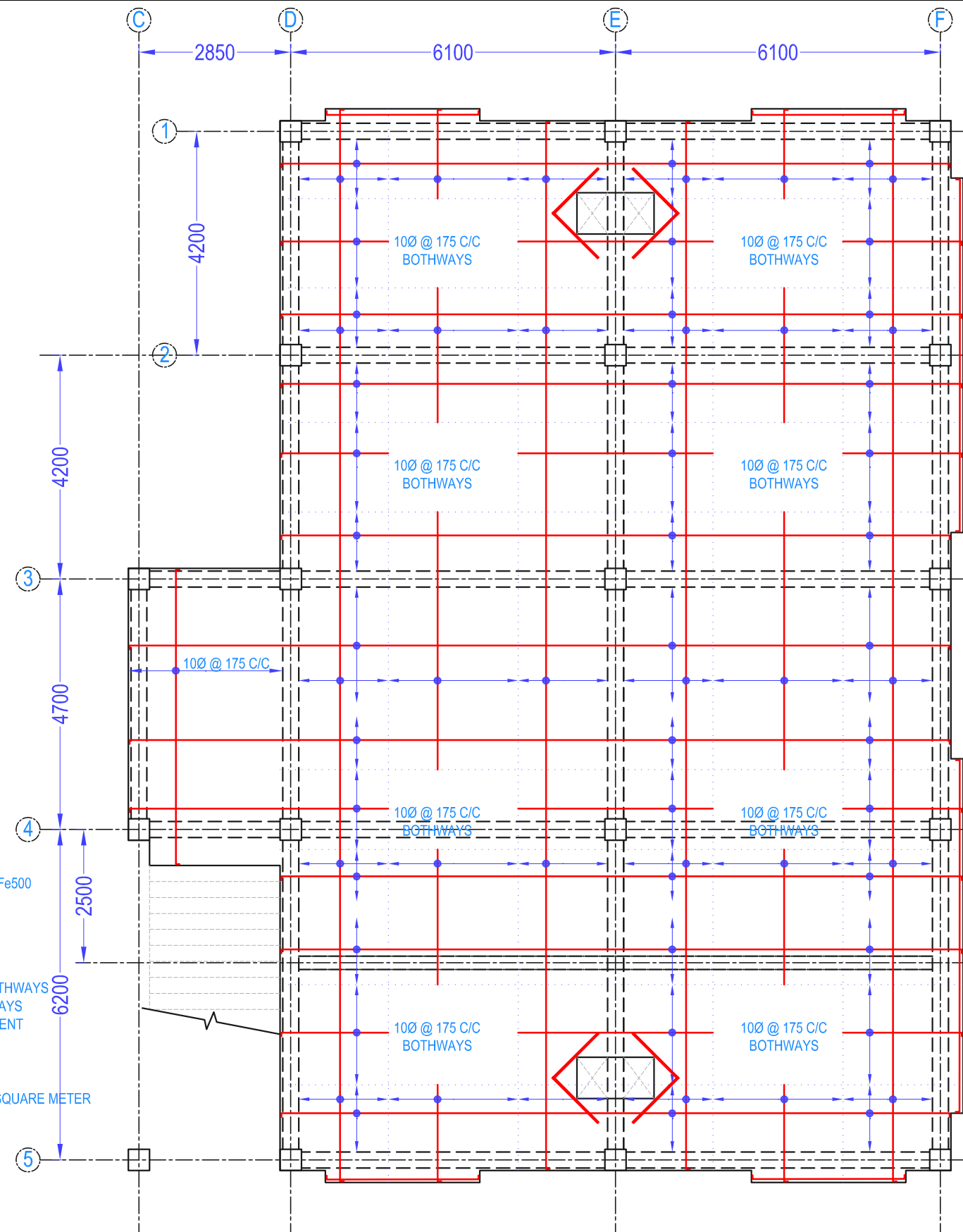
STR - 504

LEAPP Project Code
12246

Rev No.
R0



LOWER LEVEL ROOF SLAB TOP REINFORCEMENT LAYOUT PLAN [+ 9.450]
SCALE 1:100



UPPER LEVEL ROOF SLAB TOP REINFORCEMENT LAYOUT PLAN [+ 10.950]
SCALE 1:100



ADB

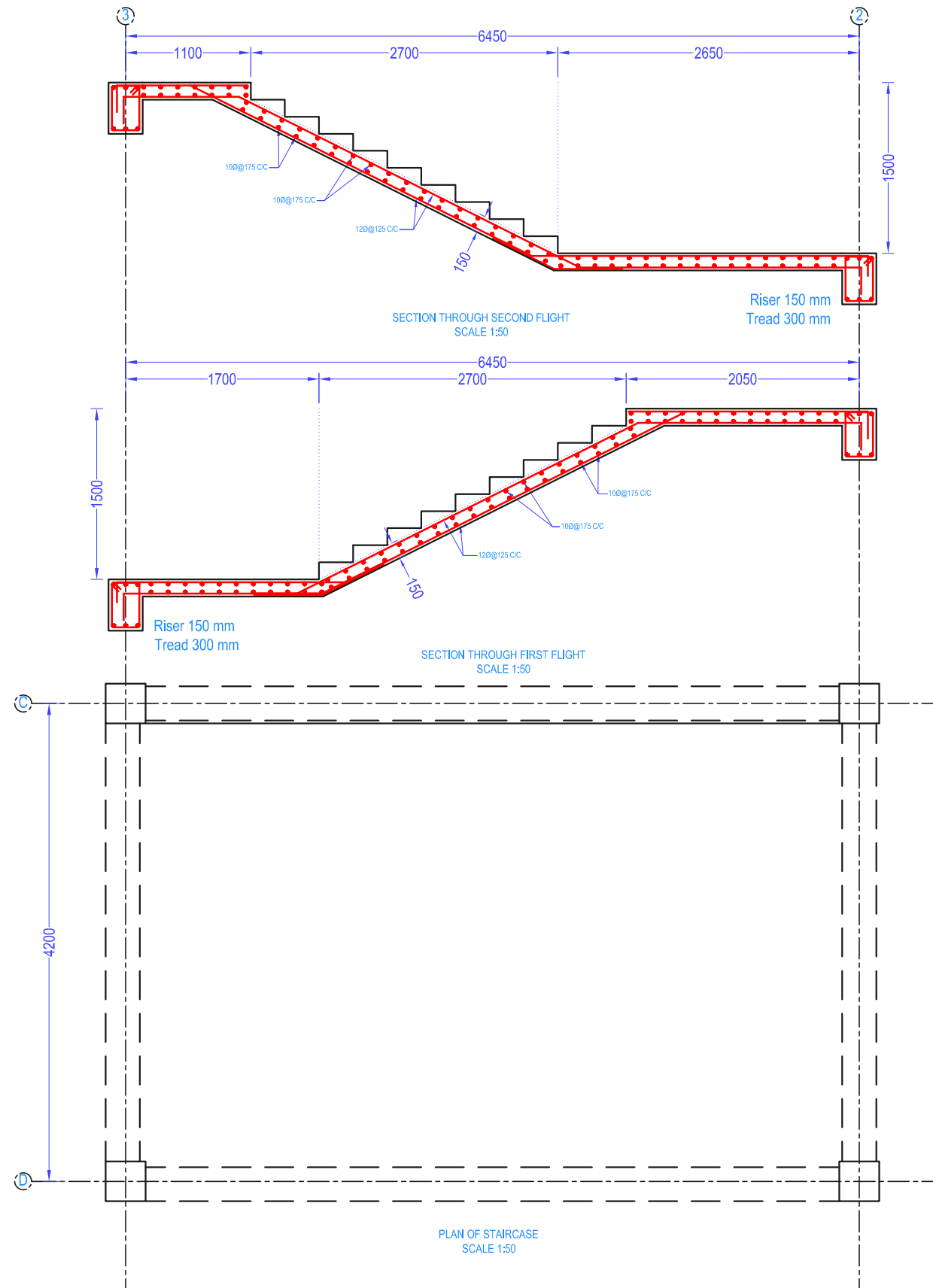
ROYAL GOVERNMENT OF BHUTAN
DEPARTMENT OF CIVIL AVIATION

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Client
Ministry of Information and Communications
Department of Air Transport
Aviation Planners & Engineers
Leading Edge Aviation Planning Professionals
Civil Engineering Consultant
Gyaltshen Consultancy
Project Title
BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No.	Revision	Date	By

Drawing Title
Plan Showing Roof Floor Slab Top Reinforcement Layout Plan
Scale 1 : 75 @ A3
Date December 2016
Drawn By S Tobgay, P Dorji & A Pradhan
Drawing Number STR - 505
Rev No. R0
LEAPP Project Code 12246



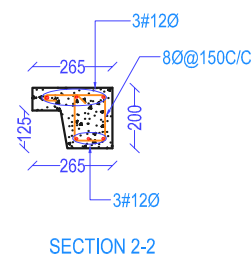
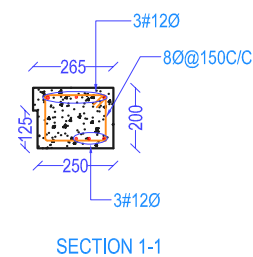
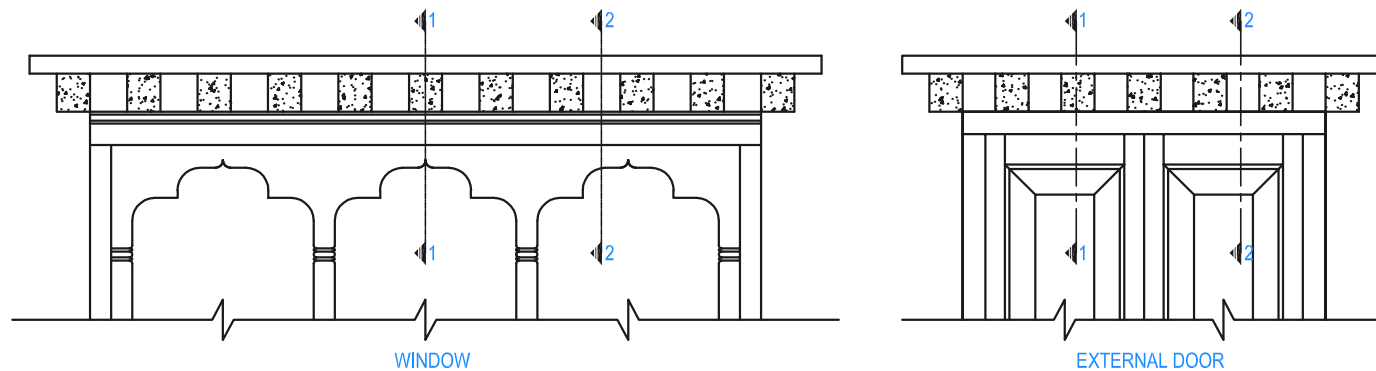
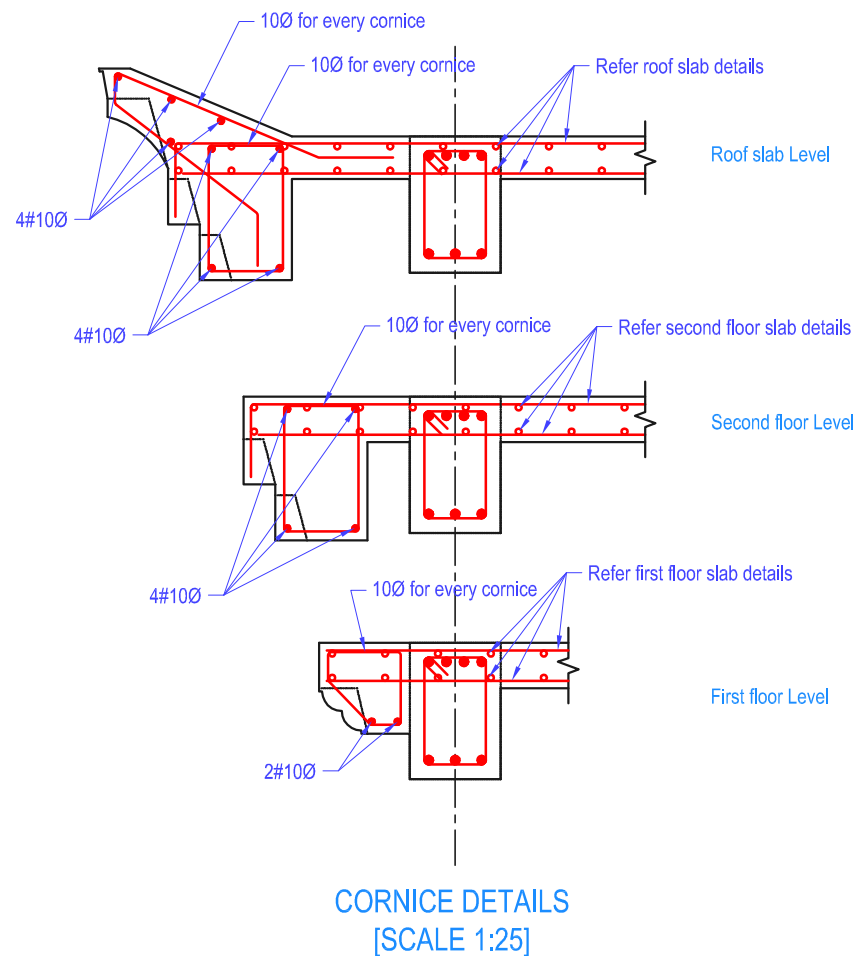
ROYAL GOVERNMENT OF BHUTAN
DEPARTMENT OF CIVIL AVIATION

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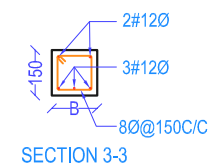
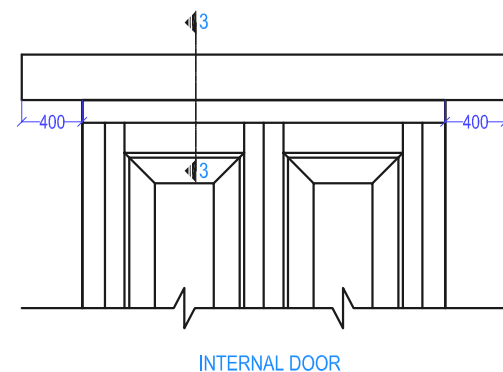
Client
Ministry of Information and Communications
Department of Air Transport
Aviation Planners & Engineers
Leading Edge Aviation Planning Professionals
Civil Engineering Consultant
Gyaltshen Consultancy
Project Title
BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No.	Revision	Date	By

Drawing Title
Plan Showing Staircase Plan and Details
Scale 1 : 50 @ A3
Date December 2016
Drawn By S Tobgay, P Dorji & A Pradhan
Drawing Number STR - 600
Rev No. R0
LEAPP Project Code 12246



NOTES:
THE EXTERNAL WALL WILL HAVE A BAND LINTEL
AND ALL THE INTERNAL WILL HAVE A CUT
LINTEL/LINTEL BEAM ABOVE THE OPENINGS.



LINTEL DETAILS
SCALE 1:25

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BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No. Revision

No.	Revision	Date	By

Drawing Title

Cornice Details

Scale 1 : 25 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

STR - 700

LEAPP Project Code

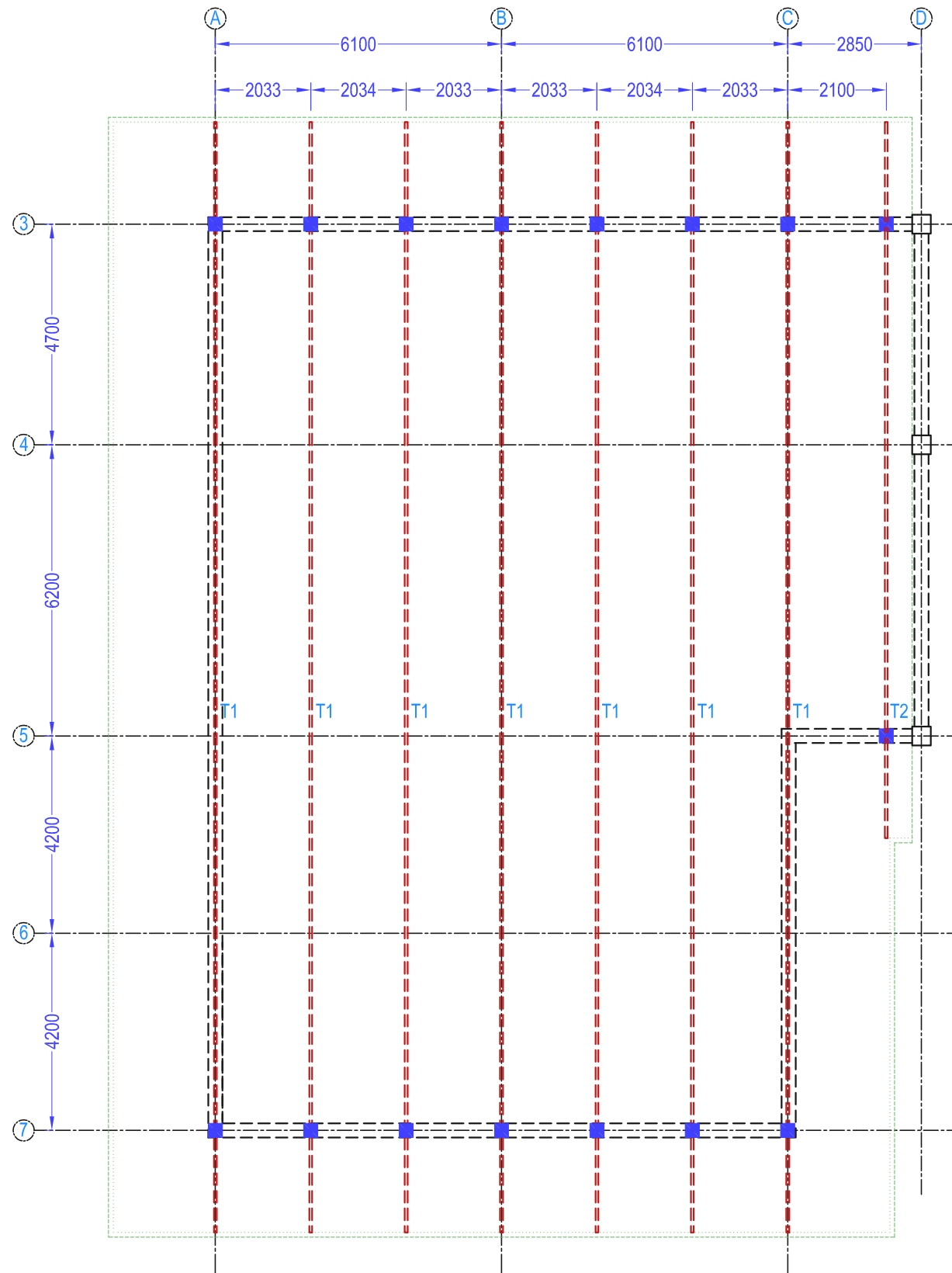
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Rev No.

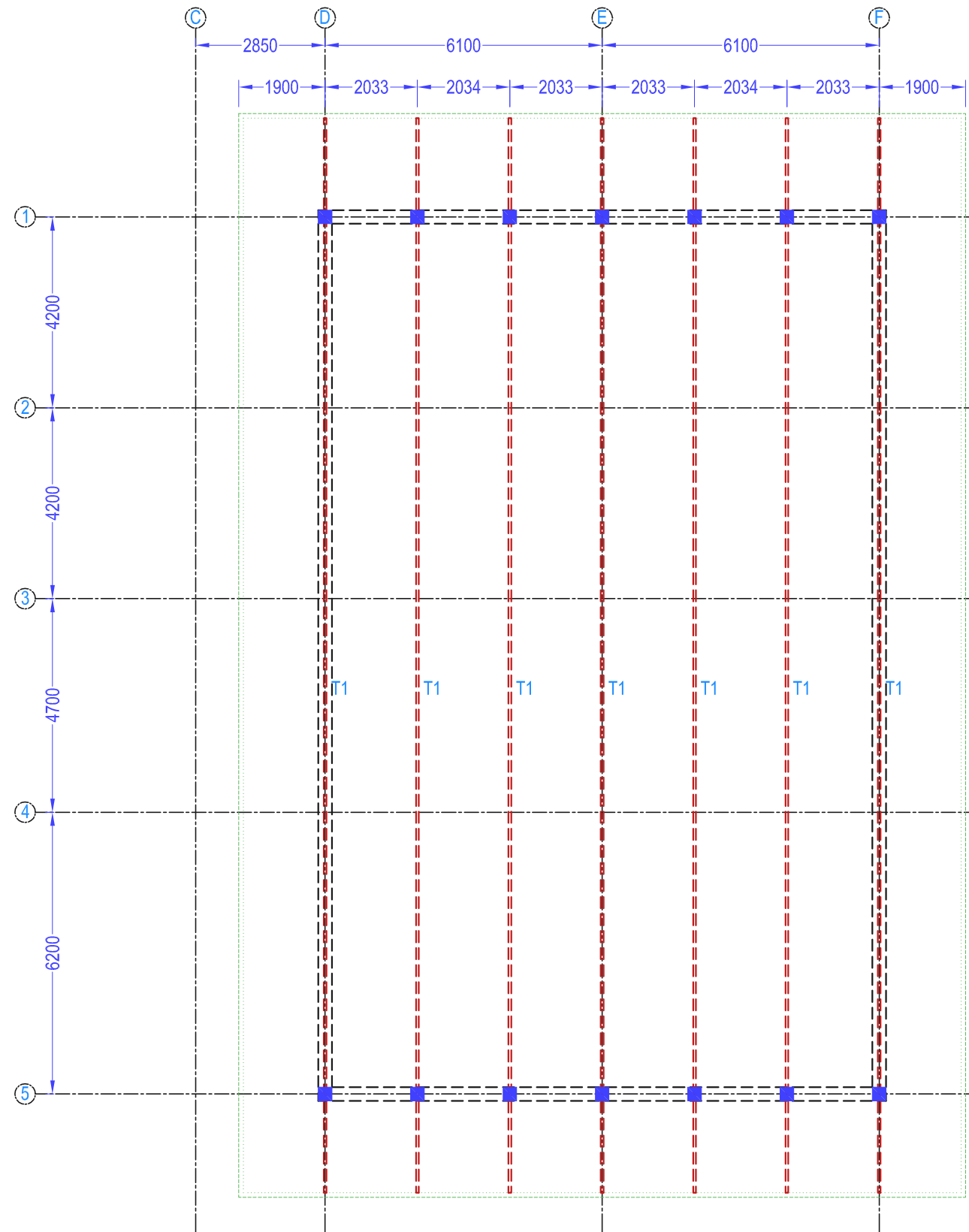
R0



ROYAL GOVERNMENT OF BHUTAN
DEPARTMENT OF CIVIL AVIATION



LOWER LEVEL ROOF TRUSS LAYOUT PLAN
SCALE 1:125



UPPER LEVEL ROOF TRUSS LAYOUT PLAN
SCALE 1:125



ROYAL GOVERNMENT OF BHUTAN
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BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No. Revision

No.	Revision	Date	By

Drawing Title

Plan Showing Truss Layout Plan

Scale 1 : 125 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

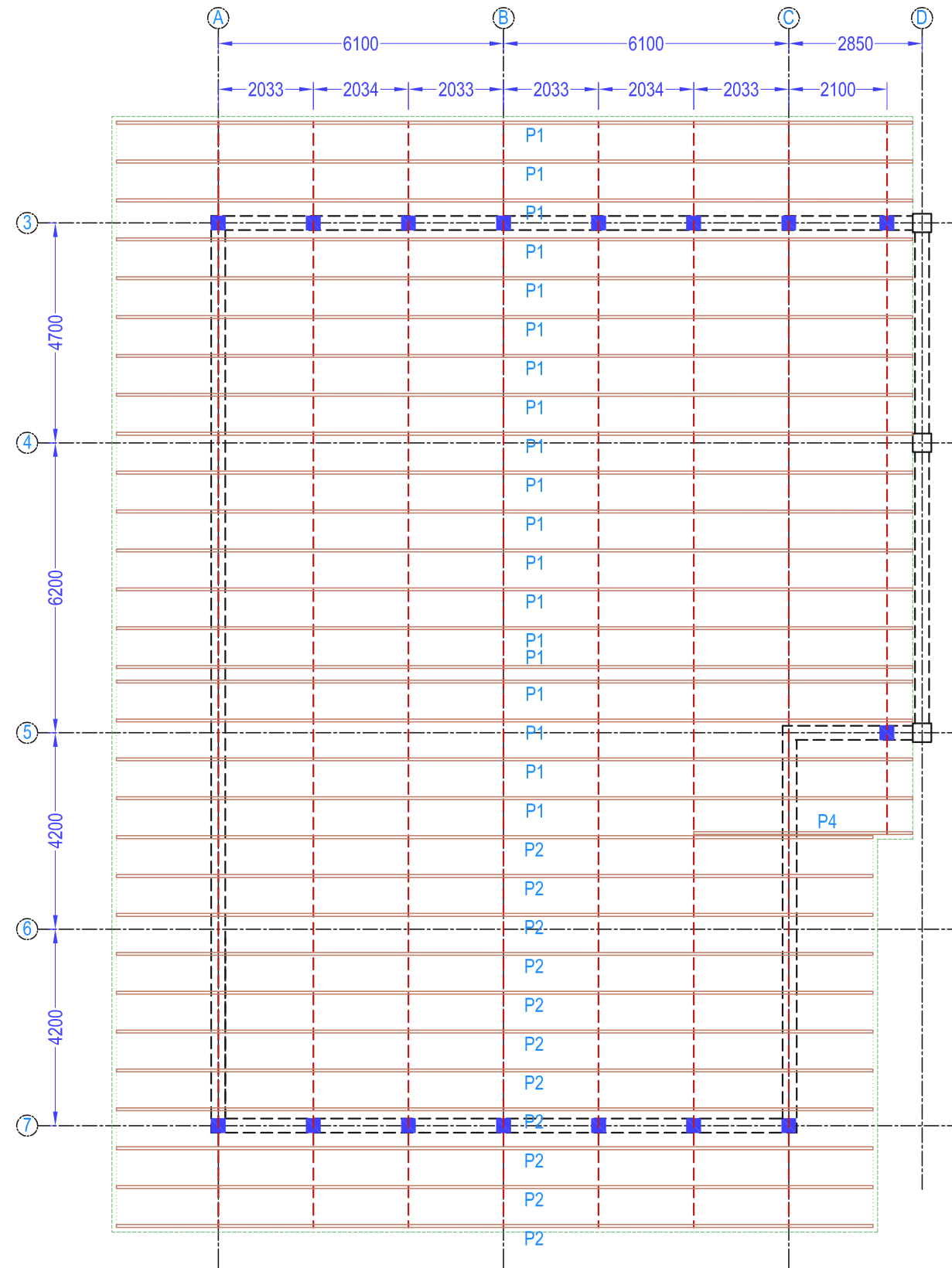
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LEAPP Project Code

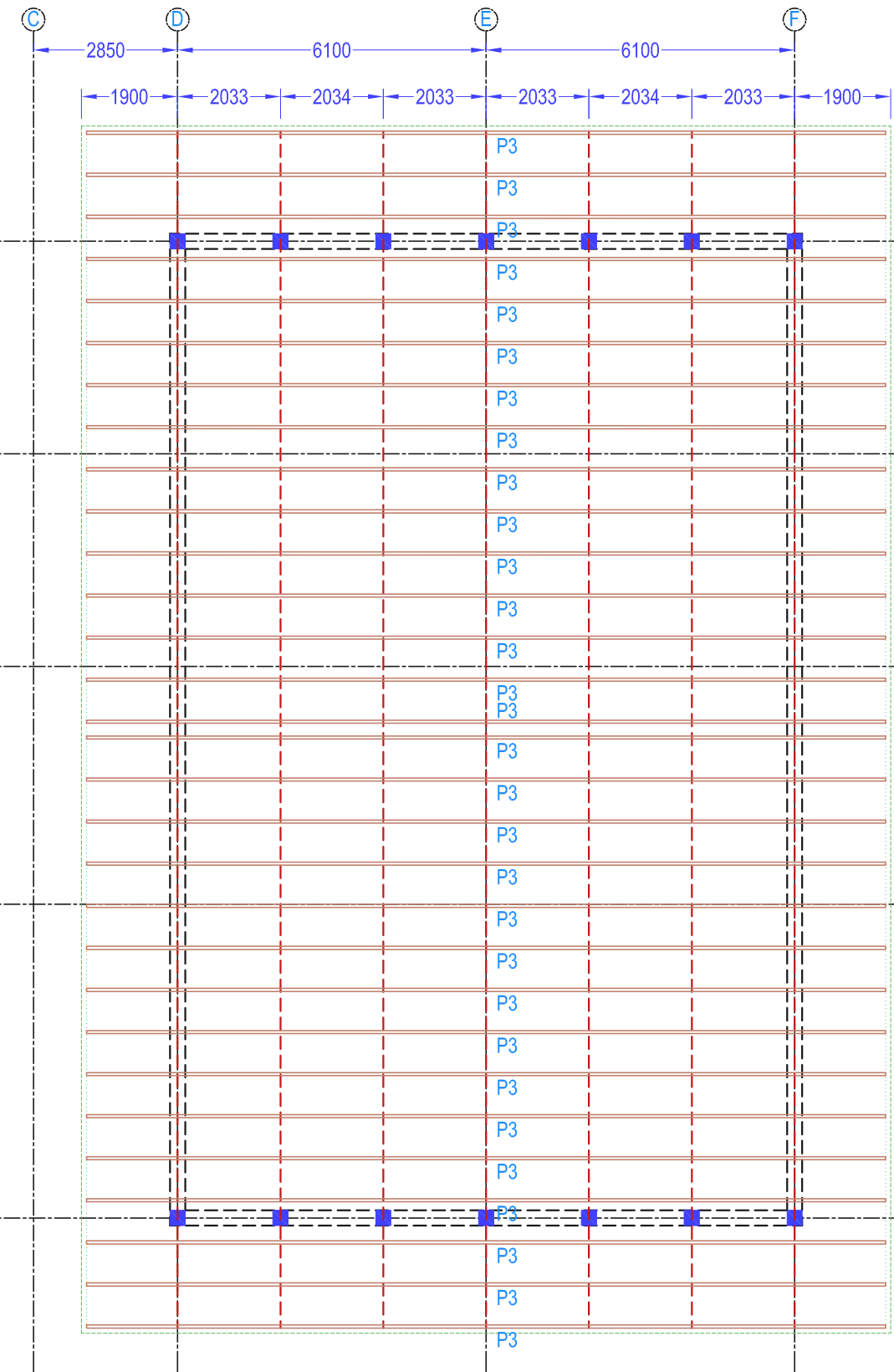
12246

Rev No.

R0



LOWER LEVEL ROOF PURLIN LAYOUT PLAN
SCALE 1:125



UPPER LEVEL ROOF PURLIN LAYOUT PLAN
SCALE 1:125



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GELEPHU AIRPORT SECURITY QUARTERS

No./Revision

No./Revision	Date	By

Drawing Title

Plan Showing Purlin Layout Plan

Scale 1 : 125 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

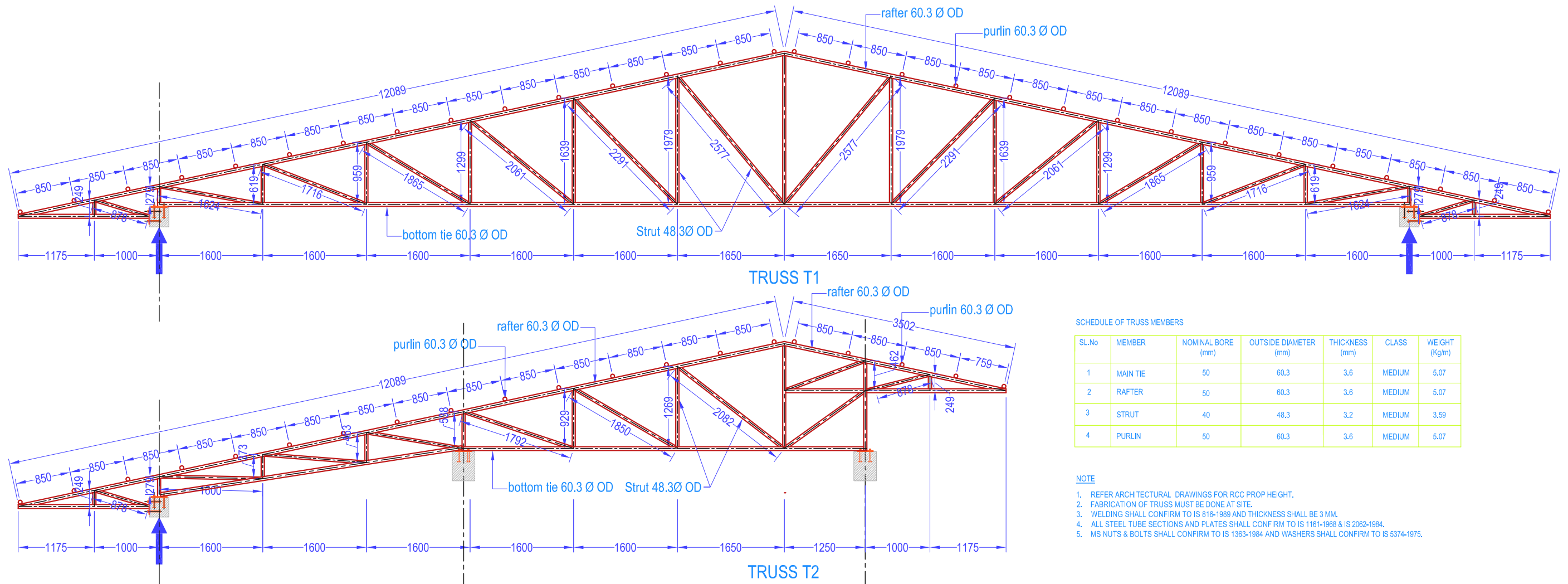
STR - 801

LEAPP Project Code

12246

Rev No.

R0



SCHEDULE OF TRUSS MEMBERS

SL.No	MEMBER	NOMINAL BORE (mm)	OUTSIDE DIAMETER (mm)	THICKNESS (mm)	CLASS	WEIGHT (Kg/m)
1	MAIN TIE	50	60.3	3.6	MEDIUM	5.07
2	RAFTER	50	60.3	3.6	MEDIUM	5.07
3	STRUT	40	48.3	3.2	MEDIUM	3.59
4	PURLIN	50	60.3	3.6	MEDIUM	5.07

NOTE

1. REFER ARCHITECTURAL DRAWINGS FOR RCC PROP HEIGHT.
2. FABRICATION OF TRUSS MUST BE DONE AT SITE.
3. WELDING SHALL CONFIRM TO IS 816-1989 AND THICKNESS SHALL BE 3 MM.
4. ALL STEEL TUBE SECTIONS AND PLATES SHALL CONFIRM TO IS 1161-1968 & IS 2062-1984.
5. MS NUTS & BOLTS SHALL CONFIRM TO IS 1363-1984 AND WASHERS SHALL CONFIRM TO IS 5374-1975.



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BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No. Revision

No.	Revision	Date	By

Drawing Title

Roof Truss Details

Scale 1 : 65 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

Drawing Number

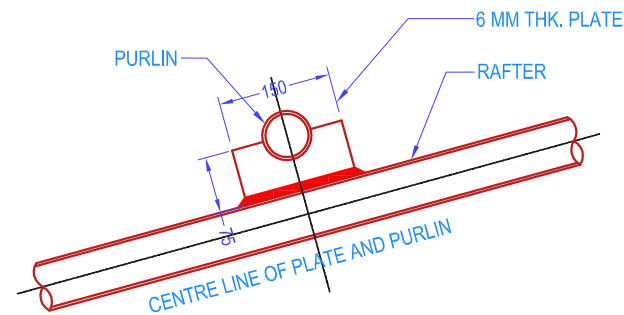
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LEAPP Project Code

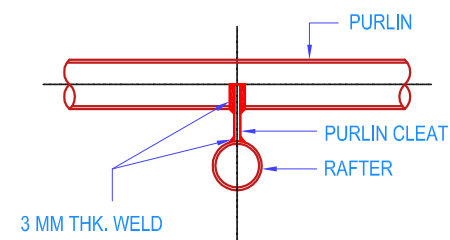
12246

Rev No.

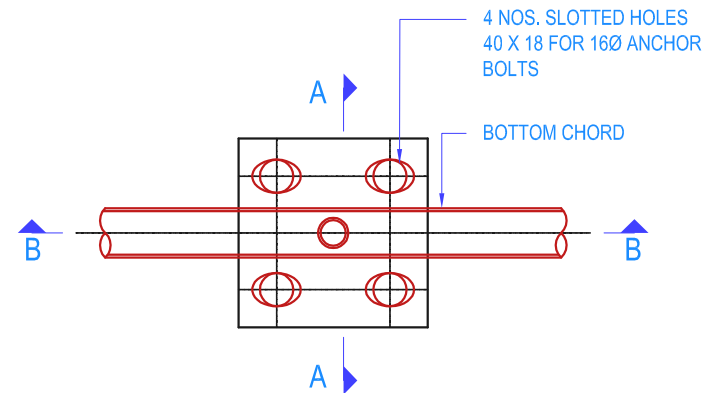
R0



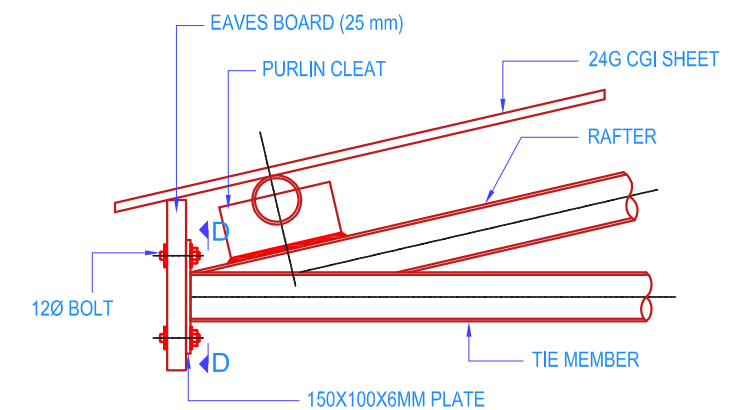
PURLIN CLEAT FIXING DETAILS



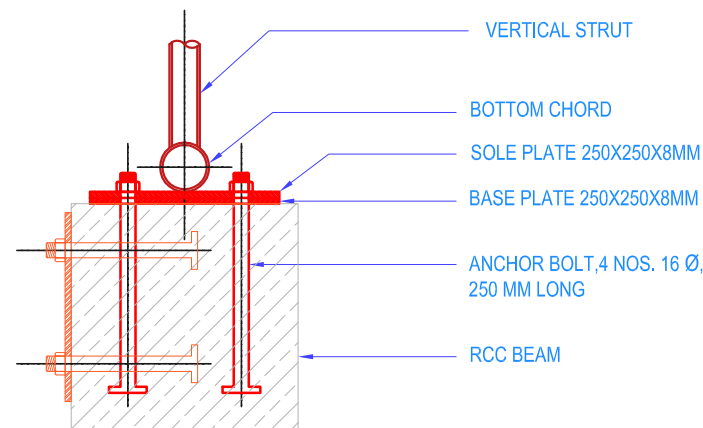
CONNECTION OF PURLIN TO RAFTER



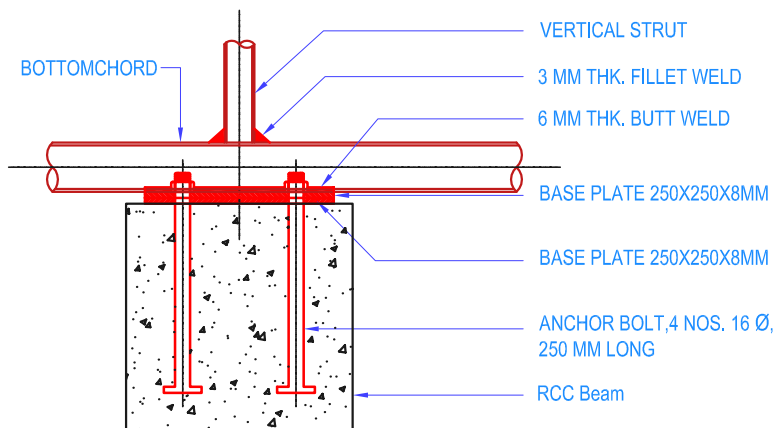
TRUSS HOLD-DOWN DETAIL



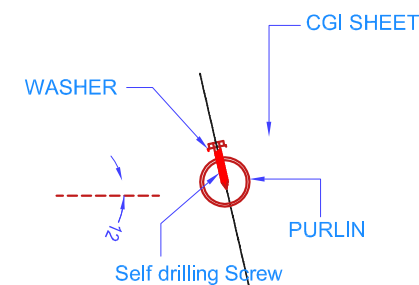
EAVES BOARD CONNECTION DETAILS



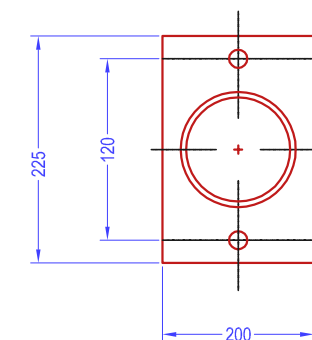
SECTION A-A



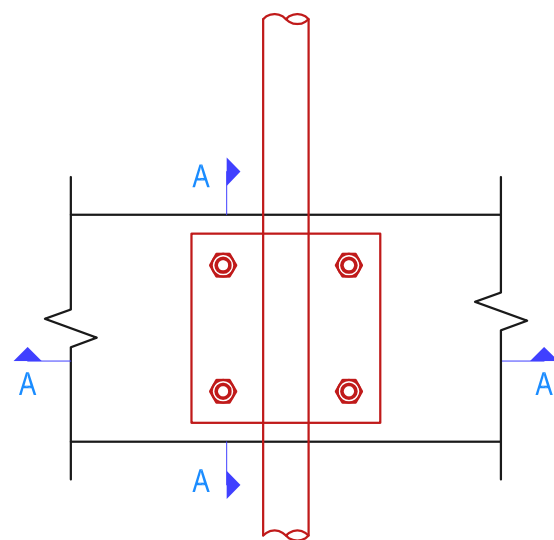
SECTION B-B



CONNECTION OF CGI SHEET TO PURLIN



SECTION D-D



PLAN OF TRUSS CONNECTION WITH BASE PLATE

NOTE:-

1. All members of truss joint shall be in welding.
2. Fabrication of truss must be done at site.
3. Welding shall confirm to IS 816-1989 and thickness shall be 6mm.
4. All Steel Tube Sections and Plates shall confirm to IS 1161-1968 & IS 2062-1984.
5. All MS Nuts & Bolts shall confirm to IS 1363-1984 and Washers shall confirm to IS 5374-1975.
6. All the trusses will be supported on the RCC beam.
7. Brick wall will be laid above the peripheral roof beam enclosed between the RCC columns upto roof truss band.



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5. Any discrepancy in drawing is to be brought to the immediate notice of the Client/Supervising Engineer.
6. Minor adjustments need to be carried out on site to match with existing structure.
7. Verify dimensioning, take real measurements.
8. All construction changes on the site to be agreed with the Client/Supervising Engineer.

Client

Ministry of Information and Communications
Department of Air Transport

Aviation Planners & Engineers

Leading Edge Aviation Planning Professionals

Civil Engineering Consultant

Gyaltshen Consultancy

Project Title

BHUTAN DOMESTIC AIRPORT DESIGN & SUPERVISION
GELEPHU AIRPORT SECURITY QUATERS

No. Revision

No.	Revision	Date	By

Drawing Title

Roof Truss Connection Details

Scale 1 : 10 @ A3

Date December 2016

Drawn By S Tobgay, P Dorji & A Pradhan

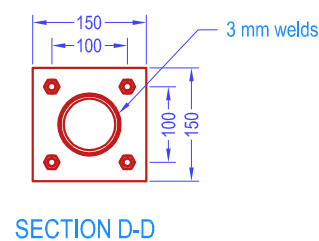
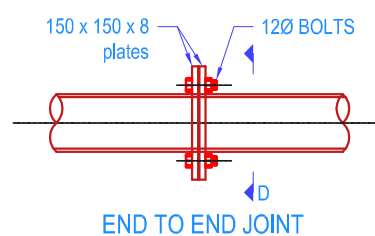
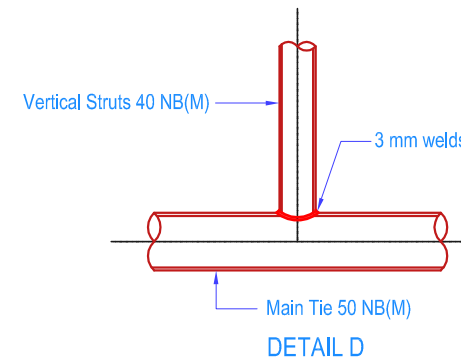
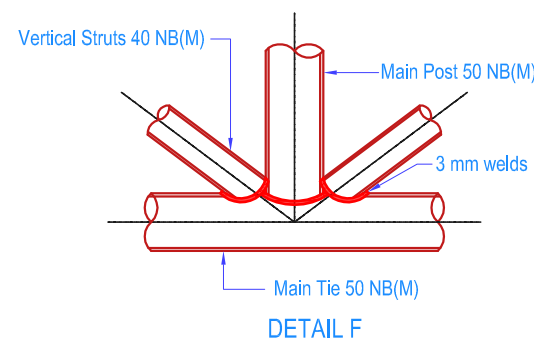
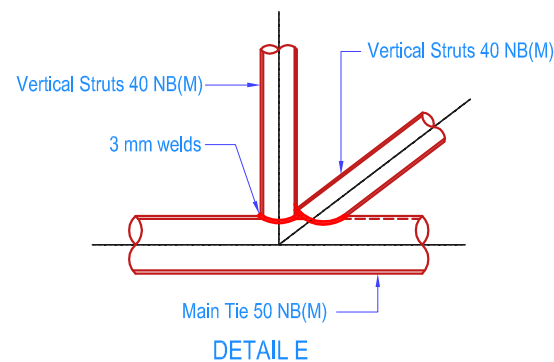
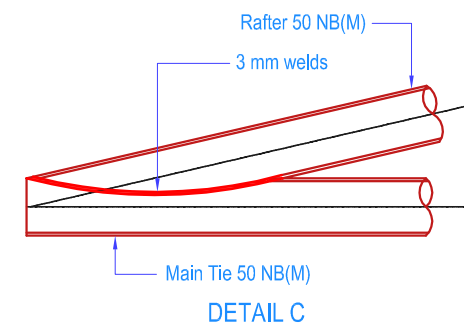
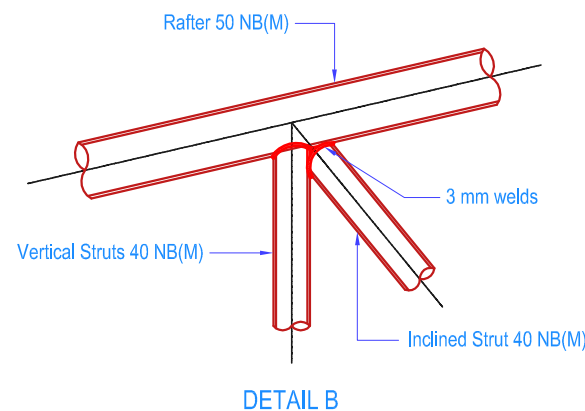
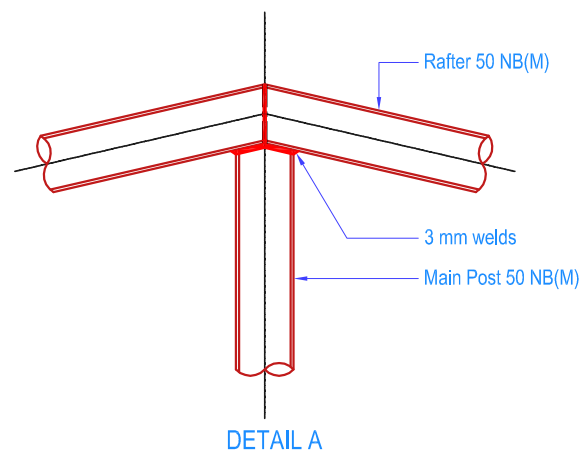
Drawing Number

STR - 805

LEAPP Project Code
12246

Rev No.

R0



NOTE:

1. All dimensions are in mm unless stated otherwise.
2. Connection details shown are for different types of joints and to be taken same for similar joints.
3. All members of truss joint shall be in welding.
4. Fabrication of truss must be done at site.
5. Welding shall conform to IS 816-1989 and thickness shall be 6mm.
6. All Steel Tube Sections and Plates shall conform to IS 1161-1968 & IS 2062-1984.
7. All MS Nuts & Bolts shall conform to IS 1363-1984 and Washers shall conform to IS 5374-1975.



ROYAL GOVERNMENT OF BHUTAN
DEPARTMENT OF CIVIL AVIATION

Notes

1. All dimensions are in meters unless specified otherwise.
2. All relative levels are in meters unless specified otherwise.
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4. All dimensions are to be read and not scaled off.
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Client

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No./Revision

No./Revision	Date	By

Drawing Title

Roof Truss Connection Details

Scale 1 : 10 @ A3

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Drawn By S Tobgay, P Dorji & A Pradhan

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STR - 806

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