



Eurocode 8: Seismic Design of Buildings Worked examples

Worked examples presented at the Workshop “EC 8: Seismic Design of Buildings”, Lisbon, 10-11 Feb. 2011

Support to the implementation, harmonization and further development of the Eurocodes

**P. Bisch, E. Carvalho, H. Degee, P. Fajfar, M. Fardis, P. Franchin, M. Kreslin, A. Pecker,
P. Pinto, A. Plumier, H. Somja, G. Tsionis**



Editors
B. Acun, A. Athanasopoulou, A. Pinto
E. Carvalho, M. Fardis

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European Commission
Joint Research Centre

Contact information

Address: JRC, ELSA Unit, TP 480, I-21020, Ispra (VA), Italy
E-mail: eurocodes@jrc.ec.europa.eu
Tel.: +39-0332-789989
Fax: +39-0332-789049

<http://www.jrc.ec.europa.eu/>

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List of authors and editors

Authors:

Chapter 1- Overview of Eurocode 8. Performance requirements, ground conditions and seismic action

Eduardo C. Carvalho, *GAPRES SA, Chairman of CEN/TC250-SC8*

Chapter 2- Introduction to the RC building example. Modeling and analysis of the design example

Peter Fajfar, *University of Ljubljana*

Maja Kreslin, *University of Ljubljana*

Chapter 3- Specific rules for design and detailing of concrete building. Design for DCM and DCH. Illustration of elements design

Michael N. Fardis, *University of Patras*

Georgios Tsionis, *University of Patras*

Chapter 4- Introduction to the RC building example. Modeling and analysis of the design example

Alain Pecker, *Geodynamique and Structure*

Chapter 5- Specific rules for the design and detailing of steel buildings:

(i) Steel moment resisting frames

André Plumier, *University of Liege*

(ii) Composite steel concrete moment resisting frames

Hughes Somja, *INSA Rennes*

Hervé Degee, *University of Liege*

André Plumier, *University of Liege*

(iii) Composite steel concrete frame with eccentric and concentric bracings

Hervé Degee, *University of Liege*

André Plumier, *University of Liege*

Chapter 6- Base Isolation. Overview of key concepts

Philippe Bisch, *IOSIS, EGIS group*

Chapter 7- Eurocode 8 Part 3. Assessment and retrofitting of buildings

Paolo Emilio Pinto, *University of Rome, La Sapienza*

Paolo Franchin, *University of Rome, La Sapienza*

Editors:

Bora ACUN, Adamantia ATHANASOPOULOU, Artur V. PINTO

European Laboratory for Structural Assessment (ELSA)

Institute for the Protection and Security of the Citizen (IPSC)

Joint Research Center (JRC), European Commission

Eduardo C. Carvalho

Gapres SA, Chairman of CEN/TC250 SC8

Michael N. Fardis

University of Patras, Former Chairman of CEN/TC 250 SC8

Foreword

The **construction sector** is of strategic importance to the EU as it delivers the buildings and infrastructure needed by the rest of the economy and society. It represents more than **10% of EU GDP and more than 50% of fixed capital formation**. It is the largest single economic activity and it is the biggest industrial employer in Europe. The sector employs directly almost 20 million people. In addition, construction is a key element for the implementation of the **Single Market** and other construction relevant EU Policies, e.g.: **Environment and Energy**.

In line with the EU's strategy for smart, sustainable and inclusive growth (EU2020), **Standardization** will play an important part in supporting the strategy. The **EN Eurocodes** are a set of **European standards** which provide common rules for the design of construction works, to check their strength and stability against live and extreme loads such as earthquakes and fire.

With the publication of all the 58 Eurocodes Parts in 2007, the implementation of the Eurocodes is extending to all European countries and there are firm steps toward their adoption internationally. The Commission Recommendation of 11 December 2003 stresses the importance of **training in the use of the Eurocodes**, especially in engineering schools and as part of continuous professional development courses for engineers and technicians, should be promoted both at national and international level.

In light of the Recommendation, DG JRC is collaborating with DG ENTR and CEN/TC250 "Structural Eurocodes" and is publishing the Report Series '**Support to the implementation, harmonization and further development of the Eurocodes**' as JRC Scientific and Technical Reports. This Report Series include, at present, the following types of reports:

1. Policy support documents – Resulting from the work of the JRC and cooperation with partners and stakeholders on 'Support to the implementation, promotion and further development of the Eurocodes and other standards for the building sector';
2. Technical documents – Facilitating the implementation and use of the Eurocodes and containing information and practical examples (Worked Examples) on the use of the Eurocodes and covering the design of structures or its parts (e.g. the technical reports containing the practical examples presented in the workshop on the Eurocodes with worked examples organized by the JRC);
3. Pre-normative documents – Resulting from the works of the CEN/TC250 Working Groups and containing background information and/or first draft of proposed normative parts. These documents can be then converted to CEN technical specifications;
4. Background documents – Providing approved background information on current Eurocode part. The publication of the document is at the request of the relevant CEN/TC250 Sub-Committee;
5. Scientific/Technical information documents – Containing additional, non-contradictory information on current Eurocode part, which may facilitate its implementation and use, preliminary results from pre-normative work and other studies, which may be used in future revisions and further developments of the standards.. The authors are various stakeholders involved in Eurocodes process and the publication of these documents is authorized by relevant CEN/TC250 Sub-Committee, Horizontal Group or Working Group.

Editorial work for this Report Series is **assured by the JRC** together with partners and stakeholders, when appropriate. The publication of the reports type 3, 4 and 5 is made after approval for publication from the CEN/TC250 Co-ordination Group.

The publication of these reports by the JRC serves the purpose of implementation, further harmonization and development of the Eurocodes. However, it is noted that neither the Commission nor CEN are obliged to follow or endorse any recommendation or result included in these reports in the European legislation or standardization processes.

This report is part of the so-called Technical documents (Type 2 above) and contains a comprehensive description of the practical examples presented at the workshop "Eurocode 8: Seismic Design of Buildings" with emphasis on worked examples. The workshop was held on

10-11 February 2011 in Lisbon, Portugal and was co-organized with CEN/TC250/Sub-Committee 8, the National Laboratory for Civil Engineering (Laboratorio Nacional de Engenharia Civil - LNEC, Lisbon), with the support of CEN and the Member States. The workshop addressed representatives of public authorities, national standardisation bodies, research institutions, academia, industry and technical associations involved in training on the Eurocodes. The main objective was to facilitate training on Eurocode 8 related to building design through the transfer of knowledge and training information from the Eurocode 8 writers (CEN/TC250 Sub-Committee 8) to key trainers at national level and Eurocode users.

The workshop was a unique occasion to compile a state-of-the-art training kit comprising the slide presentations and technical papers with the worked example for a structure designed following the Eurocode 8. The present JRC Report compiles all the technical papers prepared by the workshop lecturers resulting in the presentation of a reinforced concrete building designed using Eurocodes 8.

The editors and authors have sought to present useful and consistent information in this report. However, it must be noted that **the report is not a complete design example** and that **the reader may identify some discrepancies** between chapters. The chapters presented in the report have been prepared by different authors and are reflecting the different practices in the EU Member States both “.” (full stop) and “,” (comma) are used as decimal separator. **Users of information contained in this report must satisfy themselves of its suitability for the purpose for which they intend to use it.**

We would like to gratefully acknowledge the workshop lecturers and the members of CEN/TC250 Sub-Committee 8 for their contribution in the organization of the workshop and development of the training material comprising the slide presentations and technical papers with the worked examples. We would also like to thank the Laboratorio Nacional de Engenharia Civil, especially Ema Coelho, Manuel Pipa and Pedro Pontifice for their help and support in the local organization of the workshop.

All the material prepared for the workshop (slides presentations and JRC Report) is available to download from the “Eurocodes: Building the future” website (<http://eurocodes.jrc.ec.europa.eu>).

Ispra, November 2011

Bora Acun, Adamantia Athanasopoulou, Artur Pinto

European Laboratory for Structural Assessment (ELSA)

Institute for the Protection and Security of the Citizen (IPSC)

Joint Research Centre (JRC), European Commission

Eduardo C. Carvalho

Gapres SA, Chairman of CEN/TC250 SC8

Michael N. Fardis

University of Patras, Former Chairman of CEN/TC 250 SC8

ANNEXES

Annex 3A: Detailed design of beams, columns, walls and footings

3A 1. DESIGN OF BEAMS IN BENDING

3A 1.1 FRAME A

```

*-----*
* STOREY: 6 * BEAMS: 1 2 3 4 5
*-----*
* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *
*-----*
          GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT
+-----+
|Beam:    1|Length l: 5.50m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----|
|          |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----|
| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|
|          |fl width|          |steel area|Contin Addit|steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+---(mm2)---+---(kNm)---|
|L end top | 0.25  |   85.2 |   464.  | 2Φ14    -- |   454.  |   83.4 |
|L end bot. | 0.43  |   40.8 |   287.  | 2Φ14    -- |   308.  |   58.5 |
|midspan   | 1.27  |   37.2 |   287.  | 2Φ14    -- |   308.  |   59.4 |
|R end top  | 0.25  |  112.6 |   627.  | 2Φ14    1Φ12|   607.  |  109.4 |
|R end bot. | 0.61  |   43.6 |   313.  | 2Φ14    -- |   308.  |   58.9 |
|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |
+-----+
+-----+
|Beam:    2|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----|
|          |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----|
| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|
|          |fl width|          |steel area|Contin Addit|steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+---(mm2)---+---(kNm)---|
|L end top | 0.25  |  124.5 |   700.  | 2Φ14    2Φ12|   720.  |  127.9 |
|L end bot. | 0.61  |   60.1 |   350.  | 2Φ14    1Φ20|   622.  |  117.2 |
|midspan   | 1.09  |   26.8 |   287.  | 2Φ14    -- |   308.  |   59.3 |
|R end top  | 0.25  |  129.1 |   728.  | 2Φ14    1Φ16|   695.  |  123.8 |
|R end bot. | 0.61  |   52.8 |   364.  | 2Φ14    1Φ20|   622.  |  117.2 |
|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |
+-----+
+-----+

```

```

|Beam:      3|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----|
|           |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----|
| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|
|           |fl width|          |steel area|Contin Addit|steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+---(mm2)---+---(kNm)---|
|L end top | 0.25  | 125.9  | 708.   | 2Φ14  1Φ16| 695.   | 123.8 |
|L end bot. | 0.61  | 55.9   | 354.   | 2Φ14  1Φ20| 622.   | 117.2 |
|midspan   | 1.09  | 25.4   | 287.   | 2Φ14  --  | 308.   | 59.3  |
|R end top  | 0.25  | 125.9  | 708.   | 2Φ14  1Φ16| 695.   | 123.8 |
|R end bot. | 0.61  | 55.9   | 354.   | 2Φ14  1Φ20| 622.   | 117.2 |
|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |

```

```

|Beam:      4|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----|
|           |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----|
| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|
|           |fl width|          |steel area|Contin Addit|steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+---(mm2)---+---(kNm)---|
|L end top | 0.25  | 129.1  | 728.   | 2Φ14  1Φ16| 695.   | 123.8 |
|L end bot. | 0.61  | 52.8   | 364.   | 2Φ14  1Φ20| 622.   | 117.2 |
|midspan   | 1.09  | 26.8   | 287.   | 2Φ14  --  | 308.   | 59.3  |
|R end top  | 0.25  | 124.5  | 700.   | 2Φ14  2Φ12| 720.   | 127.9 |
|R end bot. | 0.61  | 60.1   | 350.   | 2Φ14  1Φ20| 622.   | 117.2 |
|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |

```

```

|Beam:      5|Length l: 5.50m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----|
|           |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----|
| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|
|           |fl width|          |steel area|Contin Addit|steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+---(mm2)---+---(kNm)---|
|L end top | 0.25  | 112.6  | 627.   | 2Φ14  1Φ12| 607.   | 109.4 |
|L end bot. | 0.61  | 43.6   | 313.   | 2Φ14  --  | 308.   | 58.9  |
|midspan   | 1.27  | 37.2   | 287.   | 2Φ14  --  | 308.   | 59.4  |
|R end top  | 0.25  | 85.2   | 464.   | 2Φ14  --  | 454.   | 83.4  |
|R end bot. | 0.43  | 40.8   | 287.   | 2Φ14  --  | 308.   | 58.5  |

```

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR W_{max}=0.3mm & min STEEL AREA

|Beam: 1 |

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for	
	Moment	steel	concrete	Moment	concrete	Crack	spacing	width	min provd
L end top	26.1	0.369	0.126	22.2	0.107	353.9	0.17	253	307
Midspan	28.9	0.444	0.062	24.5	0.053	359.1	0.20	62	307
R end top	40.7	0.439	0.177	34.5	0.150	277.5	0.16	291	420

|Beam: 2 |

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for	
	Moment	steel	concrete	Moment	concrete	Crack	spacing	width	min provd
L end top	38.0	0.308	0.133	32.2	0.113	249.2	0.10	285	534
Midspan	20.8	0.321	0.049	17.7	0.041	359.1	0.15	62	307
R end top	45.0	0.380	0.159	38.2	0.135	268.0	0.13	316	508

|Beam: 3 |

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for	
	Moment	steel	concrete	Moment	concrete	Crack	spacing	width	min provd
L end top	41.3	0.348	0.146	35.0	0.124	268.0	0.12	316	508
Midspan	19.7	0.304	0.046	16.7	0.039	359.1	0.14	62	307
R end top	41.3	0.348	0.146	35.0	0.124	268.0	0.12	316	508

|Beam: 4 |

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for	
	Moment	steel	concrete	Moment	concrete	Crack	spacing	width	min provd
L end top	45.0	0.380	0.159	38.2	0.135	268.0	0.13	316	508

Midspan	20.8	0.321	0.049		17.7	0.041	359.1	0.15		62	307	
R end top	38.0	0.308	0.133		32.2	0.113	249.2	0.10		285	534	
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+												
Beam: 5												
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+												
Location	Characteristic loads G+Q				Quasi-permanent loads G+ψ2Q				Steel for			
	Moment steel		concrete		Moment concrete		Crack		cracking			
	stress/fyk		stress/fck		stress/fck		spacing width		min provd			
	----- (kNm) -----		----- (kNm) -----		----- (kNm) -----		----- (mm) -----		----- (mm2) -----			
L end top	40.7	0.402	0.172		34.5	0.146	275.4	0.14		291	420	
Midspan	28.9	0.444	0.062		24.5	0.053	359.1	0.20		62	307	
R end top	26.1	0.329	0.120		22.2	0.102	350.1	0.15		253	307	

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ		J width		J hor. shear		J hor. shear		J hor. steel		J ver. steel
			bj		Vjh		strength		area Ash		area Asv
	----- (mm) -----		----- (m) -----		----- (kN) -----		----- (kN) -----		----- (mm2) -----		----- (mm2) -----
1	14		0.40		0.		809.		0.		0.
2	30		0.30		0.		1747.		0.		0.
3	30		0.30		0.		1765.		0.		0.
4	30		0.30		0.		1765.		0.		0.
5	30		0.30		0.		1747.		0.		0.
6	14		0.40		0.		809.		0.		0.

* STOREY: 5 * BEAMS: 1 2 3 4 5

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

Beam: 1	Length l: 5.50m X-section InvL Depth h: 0.50m Width bw: 0.25m										
	+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+										
	Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)										
	+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+										
Location	Effect.		max MEd		Required		Beam bars		Provided		Flexural
	fl width		steel area		Contin Addit		steel area		capacity		
	----- (m) -----		----- (kNm) -----		----- (mm2) -----		----- (mm2) -----		----- (kNm) -----		----- (kNm) -----
L end top	0.25		138.9		789.		2Φ14 2Φ14		762.		134.6

L end bot.	0.43	72.9	395.	2Φ14	1Φ14	462.	86.9
midspan	1.27	32.2	287.	2Φ14	--	308.	59.4
R end top	0.25	149.6	858.	2Φ14	3Φ12	833.	145.8
R end bot.	0.61	89.1	469.	2Φ14	1Φ20	622.	117.2

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

-----+
+-----+
|Beam: 2|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|-----+-----+
| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin Addit	steel area	capacity
-----+-- (m) ---+--	(kNm) ---+--	(mm ²) ---+--	(mm ²) ---+--	(mm ²) ---+--	(mm ²) ---+--	(kNm) ---+--
L end top	0.25	163.9	952.	2Φ14	4Φ12	947. 163.1
L end bot.	0.61	101.8	538.	2Φ14	1Φ20	622. 117.2
midspan	1.09	27.0	287.	2Φ14	--	308. 59.3
R end top	0.25	171.5	1003.	2Φ14	3Φ14	956. 164.5
R end bot.	0.61	93.2	502.	2Φ14	1Φ20	622. 117.2

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

-----+
+-----+
|Beam: 3|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|-----+-----+
| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin Addit	steel area	capacity
-----+-- (m) ---+--	(kNm) ---+--	(mm ²) ---+--	(mm ²) ---+--	(mm ²) ---+--	(mm ²) ---+--	(kNm) ---+--
L end top	0.25	167.8	978.	2Φ14	3Φ14	956. 164.5
L end bot.	0.61	98.4	520.	2Φ14	1Φ20	622. 117.2
midspan	1.09	25.8	287.	2Φ14	--	308. 59.3
R end top	0.25	167.8	978.	2Φ14	3Φ14	956. 164.5
R end bot.	0.61	98.4	520.	2Φ14	1Φ20	622. 117.2

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

-----+
+-----+
|Beam: 4|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|-----+-----+
| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
----------	---------	---------	----------	-----------	----------	----------

	fl width		steel area	Contin	Addit	steel area	capacity
	(m)	(kNm)	(mm2)			(mm2)	(kNm)
L end top	0.25	171.5	1003.	2Φ14	3Φ14	956.	164.5
L end bot.	0.61	93.2	502.	2Φ14	1Φ20	622.	117.2
midspan	1.09	27.0	287.	2Φ14	--	308.	59.3
R end top	0.25	163.9	952.	2Φ14	4Φ12	947.	163.1
R end bot.	0.61	101.8	538.	2Φ14	1Φ20	622.	117.2

|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |

|Beam: 5|Length l: 5.50m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

Location	Effect.	max MED	Required	Beam bars	Provided	Flexural
	fl width		steel area	Contin	Addit	steel area
	(m)	(kNm)	(mm2)			(mm2)
L end top	0.25	149.6	858.	2Φ14	3Φ12	833.
L end bot.	0.61	89.1	469.	2Φ14	1Φ20	622.
midspan	1.27	32.2	287.	2Φ14	--	308.
R end top	0.25	138.9	789.	2Φ14	2Φ14	762.
R end bot.	0.43	72.9	395.	2Φ14	1Φ14	462.

|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR $W_{max}=0.3mm$ & min STEEL AREA

|Beam: 1

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for	
	Moment	steel	concrete	Moment	concrete	Crack	cracking	
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd	
	(kNm)			(kNm)		(mm)	(mm2)	
L end top	38.9	0.300	0.142	33.0	0.120	247.4	0.09	253 615
Midspan	25.1	0.384	0.054	21.3	0.046	359.1	0.18	62 307
R end top	35.6	0.261	0.120	30.2	0.102	230.3	0.08	282 647

|Beam: 2

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for	
	Moment	steel	concrete	Moment	concrete	Crack	cracking	
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd	

	-- (kNm) -----			-- (kNm) -----			-- (mm) -----		-- (mm ²) --	
L end top	36.6	0.220	0.116	31.0	0.099	215.4	0.06	279	760	
Midspan	21.0	0.323	0.049	17.8	0.042	359.1	0.15	62	307	
R end top	46.1	0.275	0.146	39.1	0.124	221.2	0.08	302	769	

-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|Beam: 3 |

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for	
	Moment	steel	concrete	Moment	concrete	Crack	cracking	
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd	

	-- (kNm) -----			-- (kNm) -----			-- (mm) -----		-- (mm ²) --	
L end top	40.9	0.244	0.130	34.7	0.110	221.2	0.07	302	769	
Midspan	20.1	0.310	0.047	17.1	0.040	359.1	0.14	62	307	
R end top	40.9	0.244	0.130	34.7	0.110	221.2	0.07	302	769	

-----+-----+-----+-----+-----+-----+-----+-----+-----+
|Beam: 4 |

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for	
	Moment	steel	concrete	Moment	concrete	Crack	cracking	
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd	

	-- (kNm) -----			-- (kNm) -----			-- (mm) -----		-- (mm ²) --	
L end top	46.1	0.275	0.146	39.1	0.124	221.2	0.08	302	769	
Midspan	21.0	0.323	0.049	17.8	0.042	359.1	0.15	62	307	
R end top	36.6	0.220	0.116	31.0	0.099	215.4	0.06	279	760	

-----+-----+-----+-----+-----+-----+-----+-----+-----+
|Beam: 5 |

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for	
	Moment	steel	concrete	Moment	concrete	Crack	cracking	
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd	

	-- (kNm) -----			-- (kNm) -----			-- (mm) -----		-- (mm ²) --	
L end top	35.6	0.246	0.118	30.2	0.100	229.3	0.07	282	647	
Midspan	25.1	0.384	0.054	21.3	0.046	359.1	0.18	62	307	
R end top	38.9	0.281	0.139	33.0	0.118	246.1	0.09	253	615	

-----+-----+-----+-----+-----+-----+-----+-----+-----+
JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
	(mm)	(m)	(kN)	(kN)	(mm ²)	(mm ²)

1	14	0.40	0.	768.	0.	0.
---	----	------	----	------	----	----

	2	32	0.30	0.	1635.	0.	0.
	3	32	0.30	0.	1673.	0.	0.
	4	32	0.30	0.	1673.	0.	0.
	5	32	0.30	0.	1635.	0.	0.
	6	14	0.40	0.	768.	0.	0.

+-----+-----+-----+-----+-----+-----+-----+-----+

* STOREY: 4 * BEAMS: 1 2 3 4 5

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

+-----+-----+-----+-----+-----+-----+-----+-----+

|Beam: 1|Length l: 5.50m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|-----+-----+-----+-----+-----+-----+-----+-----|

| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

|-----+-----+-----+-----+-----+-----+-----+-----|

Location	Effect.	max MED	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin	Addit	steel area capacity
-----+--- (m) ---+--- (kNm) ---+--- (mm2) ---+-----+--- (mm2) ---+--- (kNm) ---						
L end top	0.25	140.5	800.	2Φ14	2Φ14	762. 134.6
L end bot.	0.43	79.0	419.	2Φ14	1Φ14	462. 86.9
midspan	1.27	32.8	287.	2Φ14	--	308. 59.4
R end top	0.25	155.9	899.	2Φ14	2Φ16	896. 155.5
R end bot.	0.61	92.7	489.	2Φ14	1Φ20	622. 117.2

|-----+--- (m) ---+--- (kNm) ---+--- (mm2) ---+-----+--- (mm2) ---+--- (kNm) ---

|L end top | 0.25 | 140.5 | 800. | 2Φ14 2Φ14| 762. | 134.6 |

|L end bot. | 0.43 | 79.0 | 419. | 2Φ14 1Φ14| 462. | 86.9 |

|midspan | 1.27 | 32.8 | 287. | 2Φ14 -- | 308. | 59.4 |

|R end top | 0.25 | 155.9 | 899. | 2Φ14 2Φ16| 896. | 155.5 |

|R end bot. | 0.61 | 92.7 | 489. | 2Φ14 1Φ20| 622. | 117.2 |

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

+-----+-----+-----+-----+-----+-----+-----+-----+

+-----+-----+-----+-----+-----+-----+-----+-----+

|Beam: 2|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|-----+-----+-----+-----+-----+-----+-----+-----|

| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

|-----+-----+-----+-----+-----+-----+-----+-----|

Location	Effect.	max MED	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin	Addit	steel area capacity
-----+--- (m) ---+--- (kNm) ---+--- (mm2) ---+-----+--- (mm2) ---+--- (kNm) ---						
L end top	0.25	170.4	995.	2Φ14	3Φ16	1097. 193.7
L end bot.	0.61	106.9	566.	2Φ14	1Φ20	622. 117.2
midspan	1.09	26.9	287.	2Φ14	--	308. 59.3
R end top	0.25	176.5	1037.	2Φ14	2Φ18	1003. 177.2
R end bot.	0.61	99.4	525.	2Φ14	1Φ20	622. 117.2

|-----+--- (m) ---+--- (kNm) ---+--- (mm2) ---+-----+--- (mm2) ---+--- (kNm) ---

|L end top | 0.25 | 170.4 | 995. | 2Φ14 3Φ16| 1097. | 193.7 |

|L end bot. | 0.61 | 106.9 | 566. | 2Φ14 1Φ20| 622. | 117.2 |

|midspan | 1.09 | 26.9 | 287. | 2Φ14 -- | 308. | 59.3 |

|R end top | 0.25 | 176.5 | 1037. | 2Φ14 2Φ18| 1003. | 177.2 |

|R end bot. | 0.61 | 99.4 | 525. | 2Φ14 1Φ20| 622. | 117.2 |

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

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+-----+
+-----+
|Beam:      3|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----+
|          |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----+
| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|
|          |fl width|          |steel area|Contin Addit|steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+---(mm2)---+---(kNm)---|
|L end top | 0.25  | 173.1  | 1014.  | 2Φ14   2Φ18| 1003.  | 177.2 |
|L end bot. | 0.61  | 103.7  | 548.   | 2Φ14   1Φ20| 622.   | 117.2 |
|midspan   | 1.09  | 25.8   | 287.   | 2Φ14   --  | 308.   | 59.3  |
|R end top  | 0.25  | 173.1  | 1014.  | 2Φ14   2Φ18| 1003.  | 177.2 |
|R end bot. | 0.61  | 103.7  | 548.   | 2Φ14   1Φ20| 622.   | 117.2 |
|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |
+-----+

```

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+-----+
+-----+
|Beam:      4|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----+
|          |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----+
| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|
|          |fl width|          |steel area|Contin Addit|steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+---(mm2)---+---(kNm)---|
|L end top | 0.25  | 176.5  | 1037.  | 2Φ14   2Φ18| 1003.  | 177.2 |
|L end bot. | 0.61  | 99.4   | 525.   | 2Φ14   1Φ20| 622.   | 117.2 |
|midspan   | 1.09  | 26.9   | 287.   | 2Φ14   --  | 308.   | 59.3  |
|R end top  | 0.25  | 170.4  | 995.   | 2Φ14   3Φ16| 1097.  | 193.7 |
|R end bot. | 0.61  | 106.9  | 566.   | 2Φ14   1Φ20| 622.   | 117.2 |
|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |
+-----+

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+-----+
+-----+
|Beam:      5|Length l: 5.50m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----+
|          |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----+
| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|
|          |fl width|          |steel area|Contin Addit|steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+---(mm2)---+---(kNm)---|
|L end top | 0.25  | 155.9  | 899.   | 2Φ14   2Φ16| 896.   | 155.5 |
|L end bot. | 0.61  | 92.7   | 489.   | 2Φ14   1Φ20| 622.   | 117.2 |
|midspan   | 1.27  | 32.8   | 287.   | 2Φ14   --  | 308.   | 59.4  |
+-----+

```

```
|R end top | 0.25 | 140.5 | 800. | 2Φ14 2Φ14| 762. | 134.6 |
|R end bot. | 0.43 | 79.0 | 419. | 2Φ14 1Φ14| 462. | 86.9 |
|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |
```

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-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA
```

```
|Beam: 1 |
```

```
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|Location | Characteristic loads G+Q | Quasi-permanent loads G+ψ2Q | Steel for|
|          | Moment steel   concrete | Moment concrete     Crack      | cracking|
|          | stress/fyk  stress/fck| stress/fck spacing width |min provd|
|-----+-(kNm)-----+-(kNm)-----+-(mm)-----+---(mm2)--|
|L end top| 36.2  0.279  0.132 | 30.7  0.112  247.4  0.09 | 253  615|
| Midspan | 25.6  0.392  0.055 | 21.7  0.047  359.1  0.18 |  62  307|
|R end top| 37.3  0.252  0.123 | 31.6  0.104  235.4  0.08 | 323  709|
```

```
|Beam: 2 |
```

```
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|Location | Characteristic loads G+Q | Quasi-permanent loads G+ψ2Q | Steel for|
|          | Moment steel   concrete | Moment concrete     Crack      | cracking|
|          | stress/fyk  stress/fck| stress/fck spacing width |min provd|
|-----+-(kNm)-----+-(kNm)-----+-(mm)-----+---(mm2)--|
|L end top| 37.4  0.193  0.113 | 31.7  0.096  214.0  0.05 | 327  911|
| Midspan | 20.9  0.322  0.049 | 17.7  0.041  359.1  0.15 |  62  307|
|R end top| 45.4  0.257  0.142 | 38.5  0.120  227.8  0.07 | 345  816|
```

```
|Beam: 3 |
```

```
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|Location | Characteristic loads G+Q | Quasi-permanent loads G+ψ2Q | Steel for|
|          | Moment steel   concrete | Moment concrete     Crack      | cracking|
|          | stress/fyk  stress/fck| stress/fck spacing width |min provd|
|-----+-(kNm)-----+-(kNm)-----+-(mm)-----+---(mm2)--|
|L end top| 41.0  0.232  0.128 | 34.7  0.108  227.8  0.07 | 345  816|
| Midspan | 20.1  0.309  0.047 | 17.0  0.040  359.1  0.14 |  62  307|
|R end top| 41.0  0.232  0.128 | 34.7  0.108  227.8  0.07 | 345  816|
```

```
|Beam: 4 |
```

```
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|Location | Characteristic loads G+Q | Quasi-permanent loads G+ψ2Q | Steel for|
|          | Moment steel   concrete | Moment concrete     Crack      | cracking|
|          | stress/fyk  stress/fck| stress/fck spacing width |min provd|
```

	-- (kNm) -----			-- (kNm) -----			-- (mm) -----		-- (mm2) --	
L end top	45.4	0.257	0.142	38.5	0.120	227.8	0.07	345	816	
Midspan	20.9	0.322	0.049	17.7	0.041	359.1	0.15	62	307	
R end top	37.4	0.193	0.113	31.7	0.096	214.0	0.05	327	911	
+-----+										
Beam: 5										
+-----+										
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for			
	Moment steel		concrete	Moment concrete		Crack	cracking			
	stress/fyk		stress/fck	stress/fck		spacing	min provd			
	-- (kNm) -----			-- (kNm) -----			-- (mm) -----		-- (mm2) --	
L end top	37.3	0.238	0.121	31.6	0.102	234.3	0.07	323	709	
Midspan	25.6	0.392	0.055	21.7	0.047	359.1	0.18	62	307	
R end top	36.2	0.262	0.130	30.7	0.110	246.1	0.08	253	615	
+-----+										

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
+-----+	+(mm)+	---(m)---	----(kN)----	----(kN)----	----(mm2)----	----(mm2)----
1	14	0.40	0.	724.	0.	0.
2	34	0.30	0.	1515.	0.	0.
3	32	0.30	0.	1576.	0.	0.
4	32	0.30	0.	1576.	0.	0.
5	34	0.30	0.	1515.	0.	0.
6	14	0.40	0.	724.	0.	0.
+-----+						

* STOREY: 3 * BEAMS: 1 2 3 4 5

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

Beam: 1	Length l: 5.50m	X-section InvL	Depth h: 0.50m	Width bw: 0.25m
+-----+				
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)				
+-----+				
Location	Effect.	max MED	Required	Beam bars
	fl width	steel area	Contin Addit	steel area
			Capacit	capacity

	(m)	(kNm)	(mm ²)	(mm ²)	(kNm)
L end top	0.25	142.9	815.	2Φ14 3Φ12	793. 139.5
L end bot.	0.43	83.1	441.	2Φ14 1Φ14	462. 86.9
midspan	1.27	32.6	287.	2Φ14 --	308. 59.4
R end top	0.25	161.0	933.	2Φ14 2Φ16	896. 155.5
R end bot.	0.61	95.3	503.	2Φ14 1Φ20	622. 117.2

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

|Beam: 2|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
	fl width		steel area	Contin Addit	steel area	capacity
	(m)	(kNm)	(mm ²)	(mm ²)	(kNm)	

L end top	0.25	175.2	1028.	2Φ14 3Φ16	1097.	193.7
L end bot.	0.61	110.7	586.	2Φ14 1Φ20	622.	117.2
midspan	1.09	26.8	287.	2Φ14 --	308.	59.3
R end top	0.25	180.3	1063.	2Φ14 2Φ18	1003.	177.2
R end bot.	0.61	104.1	551.	2Φ14 1Φ20	622.	117.2

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

|Beam: 3|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
	fl width		steel area	Contin Addit	steel area	capacity
	(m)	(kNm)	(mm ²)	(mm ²)	(kNm)	

L end top	0.25	177.2	1042.	2Φ14 2Φ18	1003.	177.2
L end bot.	0.61	107.8	571.	2Φ14 1Φ20	622.	117.2
midspan	1.09	25.8	287.	2Φ14 --	308.	59.3
R end top	0.25	177.2	1042.	2Φ14 2Φ18	1003.	177.2
R end bot.	0.61	107.8	571.	2Φ14 1Φ20	622.	117.2

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

|Beam: 4|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin Addit	steel area	capacity
--- (m) ---	--- (kNm) ---	--- (mm2) ---	--- (mm2) ---	--- (mm2) ---	--- (kNm) ---	
L end top	0.25	180.3	1063.	2Φ14 2Φ18	1003.	177.2
L end bot.	0.61	104.1	551.	2Φ14 1Φ20	622.	117.2
midspan	1.09	26.8	287.	2Φ14 --	308.	59.3
R end top	0.25	175.2	1028.	2Φ14 3Φ16	1097.	193.7
R end bot.	0.61	110.7	586.	2Φ14 1Φ20	622.	117.2

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

|Beam: 5|Length l: 5.50m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin Addit	steel area	capacity
--- (m) ---	--- (kNm) ---	--- (mm2) ---	--- (mm2) ---	--- (mm2) ---	--- (kNm) ---	
L end top	0.25	161.0	933.	2Φ14 2Φ16	896.	155.5
L end bot.	0.61	95.3	503.	2Φ14 1Φ20	622.	117.2
midspan	1.27	32.6	287.	2Φ14 --	308.	59.4
R end top	0.25	142.9	815.	2Φ14 3Φ12	793.	139.5
R end bot.	0.43	83.1	441.	2Φ14 1Φ14	462.	86.9

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

|Beam: 1 |

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for
Moment steel concrete	Moment concrete	Crack spacing width	cracking
stress/fyk stress/fck	stress/fck	min provd	
--- (kNm) ---	--- (kNm) ---	--- (mm) ---	--- (mm2) ---
L end top	35.2 0.259 0.127	29.9 0.107 234.2 0.08	237 647
Midspan	25.4 0.389 0.055	21.5 0.046 359.1 0.18	62 307
R end top	38.7 0.261 0.127	32.8 0.108 235.4 0.08	323 709

|Beam: 2 |

|Location | Characteristic loads G+Q | Quasi-permanent loads G+ψ2Q | Steel for|

	Moment	steel	concrete	Moment	concrete	Crack	cracking	
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd	
	(kNm)			(kNm)	(mm)		(mm2) --	
L end top	38.0	0.196	0.115	32.2	0.098	214.0	0.05	327 911
Midspan	20.9	0.321	0.049	17.7	0.041	359.1	0.15	62 307
R end top	44.9	0.254	0.140	38.1	0.119	227.8	0.07	345 816

|Beam: 3 |

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for	
	Moment	steel	concrete	Moment	concrete	Crack	cracking	
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd	
	(kNm)			(kNm)	(mm)		(mm2) --	
L end top	40.9	0.232	0.128	34.7	0.108	227.8	0.07	345 816
Midspan	20.1	0.310	0.047	17.1	0.040	359.1	0.14	62 307
R end top	40.9	0.232	0.128	34.7	0.108	227.8	0.07	345 816

|Beam: 4 |

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for	
	Moment	steel	concrete	Moment	concrete	Crack	cracking	
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd	
	(kNm)			(kNm)	(mm)		(mm2) --	
L end top	44.9	0.254	0.140	38.1	0.119	227.8	0.07	345 816
Midspan	20.9	0.321	0.049	17.7	0.041	359.1	0.15	62 307
R end top	38.0	0.196	0.115	32.2	0.098	214.0	0.05	327 911

|Beam: 5 |

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for	
	Moment	steel	concrete	Moment	concrete	Crack	cracking	
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd	
	(kNm)			(kNm)	(mm)		(mm2) --	
L end top	38.7	0.247	0.125	32.8	0.106	234.3	0.07	323 709
Midspan	25.4	0.389	0.055	21.5	0.046	359.1	0.18	62 307
R end top	35.2	0.244	0.124	29.9	0.105	233.1	0.07	237 647

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv

	(mm)	(m)	(kN)	(kN)	(mm ²)	(mm ²)
1	14	0.40	0.	679.	0.	0.
2	34	0.30	0.	1386.	0.	0.
3	34	0.30	0.	1473.	0.	0.
4	34	0.30	0.	1473.	0.	0.
5	34	0.30	0.	1386.	0.	0.
6	14	0.40	0.	679.	0.	0.

-----*

* STOREY: 2 * BEAMS: 1 2 3 4 5

-----*

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

-----*

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

Beam: 1 Length l: 5.50m X-section InvL Depth h: 0.50m Width bw: 0.25m							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
	fl width		steel area	Contin Addit	steel area	capacity	
	(m)	(kNm)	(mm ²)		(mm ²)	(kNm)	
L end top	0.25	138.1	785.	2Φ14 2Φ14	762.	134.6	
L end bot.	0.43	80.2	426.	2Φ14 1Φ14	462.	86.9	
midspan	1.27	32.1	287.	2Φ14 --	308.	59.4	
R end top	0.25	157.5	910.	2Φ14 2Φ16	896.	155.5	
R end bot.	0.61	88.7	467.	2Φ14 1Φ20	622.	117.2	
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension							

Beam: 2 Length l: 5.30m X-section InvL Depth h: 0.50m Width bw: 0.25m							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
	fl width		steel area	Contin Addit	steel area	capacity	
	(m)	(kNm)	(mm ²)		(mm ²)	(kNm)	
L end top	0.25	169.7	991.	2Φ14 3Φ16	1097.	193.7	
L end bot.	0.61	103.8	549.	2Φ14 1Φ20	622.	117.2	
midspan	1.09	26.8	287.	2Φ14 --	308.	59.3	
R end top	0.25	173.6	1018.	2Φ14 2Φ18	1003.	177.2	

```

|R end bot. | 0.61 | 98.7 | 521. | 2Φ14 1Φ20| 622. | 117.2 |
|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |
+-----+
+-----+
|Beam:      3|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----|
|           |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----|
| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|
|           |fl width|          | steel area | Contin Addit | steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+-----+---(mm2)---+---(kNm)---|
|L end top | 0.25 | 171.1 | 1000. | 2Φ14 2Φ18| 1003. | 177.2 |
|L end bot. | 0.61 | 101.7 | 538. | 2Φ14 1Φ20| 622. | 117.2 |
|midspan   | 1.09 | 25.9 | 287. | 2Φ14 -- | 308. | 59.3 |
|R end top | 0.25 | 171.1 | 1000. | 2Φ14 2Φ18| 1003. | 177.2 |
|R end bot. | 0.61 | 101.7 | 538. | 2Φ14 1Φ20| 622. | 117.2 |
|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |
+-----+
+-----+
|Beam:      4|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----|
|           |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----|
| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|
|           |fl width|          | steel area | Contin Addit | steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+-----+---(mm2)---+---(kNm)---|
|L end top | 0.25 | 173.6 | 1018. | 2Φ14 2Φ18| 1003. | 177.2 |
|L end bot. | 0.61 | 98.7 | 521. | 2Φ14 1Φ20| 622. | 117.2 |
|midspan   | 1.09 | 26.8 | 287. | 2Φ14 -- | 308. | 59.3 |
|R end top | 0.25 | 169.7 | 991. | 2Φ14 3Φ16| 1097. | 193.7 |
|R end bot. | 0.61 | 103.8 | 549. | 2Φ14 1Φ20| 622. | 117.2 |
|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |
+-----+
+-----+
|Beam:      5|Length l: 5.50m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----|
|           |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----|
| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|
|           |fl width|          | steel area | Contin Addit | steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+-----+---(mm2)---+---(kNm)---|
|L end top | 0.25 | 157.5 | 910. | 2Φ14 2Φ16| 896. | 155.5 |

```

L end bot.	0.61	88.7	467.	2Φ14	1Φ20	622.	117.2	
midspan	1.27	32.1	287.	2Φ14	--	308.	59.4	
R end top	0.25	138.1	785.	2Φ14	2Φ14	762.	134.6	
R end bot.	0.43	80.2	426.	2Φ14	1Φ14	462.	86.9	

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

|Beam: 1 |

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for
	Moment steel concrete	Moment concrete	cracking
	stress/fyk stress/fck	stress/fck	spacing width min provd
-----+--	(kNm)	(kNm)	(mm)-----+-- (mm ²)--
L end top	34.1 0.263 0.124	28.9 0.106	247.4 0.08 253 615
Midspan	25.0 0.384 0.054	21.2 0.046	359.1 0.18 62 307
R end top	40.5 0.273 0.133	34.4 0.113	235.4 0.08 323 709

|Beam: 2 |

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for
	Moment steel concrete	Moment concrete	cracking
	stress/fyk stress/fck	stress/fck	spacing width min provd
-----+--	(kNm)	(kNm)	(mm)-----+-- (mm ²)--
L end top	38.8 0.200 0.118	32.9 0.100	214.0 0.05 327 911
Midspan	20.9 0.321 0.049	17.7 0.041	359.1 0.15 62 307
R end top	44.1 0.250 0.138	37.4 0.117	227.8 0.07 345 816

|Beam: 3 |

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for
	Moment steel concrete	Moment concrete	cracking
	stress/fyk stress/fck	stress/fck	spacing width min provd
-----+--	(kNm)	(kNm)	(mm)-----+-- (mm ²)--
L end top	40.9 0.231 0.127	34.7 0.108	227.8 0.07 345 816
Midspan	20.1 0.310 0.047	17.1 0.040	359.1 0.14 62 307
R end top	40.9 0.231 0.127	34.7 0.108	227.8 0.07 345 816

|Beam: 4 |

|Location | Characteristic loads G+Q | Quasi-permanent loads G+ψ2Q | Steel for|

	Moment steel	concrete	Moment concrete	Crack	cracking
	stress/fyk	stress/fck	stress/fck	spacing	width
	(kNm)		(kNm)	(mm)	(mm2)
L end top	44.1	0.250	0.138	37.4	0.117
Midspan	20.9	0.321	0.049	17.7	0.041
R end top	38.8	0.200	0.118	32.9	0.100

|Beam: 5

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for		
	Moment steel	concrete	cracking		
	stress/fyk	stress/fck	stress/fck		
	(kNm)		(kNm)		
			spacing		
			width		
			(mm)		
			(mm2)		
L end top	40.5	0.259	0.131	34.4	0.111
Midspan	25.0	0.384	0.054	21.2	0.046
R end top	34.1	0.247	0.122	28.9	0.103

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		b _j	V _{jh}	strength	area A _{sh}	area A _{sv}
	(mm)	(m)	(kN)	(kN)	(mm ²)	(mm ²)
1	14	0.40	0.	633.	0.	0.
2	36	0.30	0.	1244.	0.	0.
3	34	0.30	0.	1365.	0.	0.
4	34	0.30	0.	1365.	0.	0.
5	36	0.30	0.	1244.	0.	0.
6	14	0.40	0.	633.	0.	0.

* STOREY: 1 * BEAMS: 1 2 3 4 5

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

|Beam: 1|Length l: 5.50m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|-----|

| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

|-----|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin Addit	steel area	capacity
-----+-- (m) -----+-- (kNm) -----+-- (mm2) -----+-- (mm2) -----+-- (kNm) --						
L end top	0.25	116.5	650.	2Φ14 2Φ12	856.	149.3
L end bot.	0.43	68.6	362.	2Φ14 1Φ14	462.	86.9
midspan	1.27	33.3	287.	2Φ14 --	308.	59.4
R end top	0.25	146.4	837.	2Φ14 1Φ20	808.	141.9
R end bot.	0.61	70.7	419.	2Φ14 1Φ20	622.	117.2

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

+-----+
+-----+
|Beam: 2|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|-----+
| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin Addit	steel area	capacity
-----+-- (m) -----+-- (kNm) -----+-- (mm2) -----+-- (mm2) -----+-- (kNm) --						
L end top	0.25	157.8	912.	2Φ14 1Φ20	808.	141.9
L end bot.	0.61	89.3	470.	2Φ14 1Φ20	622.	117.2
midspan	1.09	26.6	287.	2Φ14 --	308.	59.3
R end top	0.25	159.0	920.	2Φ14 2Φ16	896.	155.5
R end bot.	0.61	86.3	460.	2Φ14 1Φ20	622.	117.2

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

+-----+
+-----+
|Beam: 3|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|-----+
| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin Addit	steel area	capacity
-----+-- (m) -----+-- (kNm) -----+-- (mm2) -----+-- (mm2) -----+-- (kNm) --						
L end top	0.25	156.9	906.	2Φ14 2Φ16	896.	155.5
L end bot.	0.61	87.7	461.	2Φ14 1Φ20	622.	117.2
midspan	1.09	25.9	287.	2Φ14 --	308.	59.3
R end top	0.25	156.9	906.	2Φ14 2Φ16	896.	155.5
R end bot.	0.61	87.7	461.	2Φ14 1Φ20	622.	117.2

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

+-----+
+-----+
|Beam: 4|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

-----+-----							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
-----+-----							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin Addit	steel area	capacity	
-----+-- (m) -----+-- (kNm) -----+-- (mm2) -----+-- (mm2) -----+-- (kNm) --							
L end top	0.25	159.0	920.	2Φ14 2Φ16	896.	155.5	
L end bot.	0.61	86.3	460.	2Φ14 1Φ20	622.	117.2	
midspan	1.09	26.6	287.	2Φ14 --	308.	59.3	
R end top	0.25	157.8	912.	2Φ14 1Φ20	808.	141.9	
R end bot.	0.61	89.3	470.	2Φ14 1Φ20	622.	117.2	
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension							
+-----+-----+							
+-----+-----+							
Beam: 5 Length l: 5.50m X-section InvL Depth h: 0.50m Width bw: 0.25m							
-----+-----							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
-----+-----							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin Addit	steel area	capacity	
-----+-- (m) -----+-- (kNm) -----+-- (mm2) -----+-- (mm2) -----+-- (kNm) --							
L end top	0.25	146.4	837.	2Φ14 1Φ20	808.	141.9	
L end bot.	0.61	70.7	419.	2Φ14 1Φ20	622.	117.2	
midspan	1.27	33.3	287.	2Φ14 --	308.	59.4	
R end top	0.25	116.5	650.	2Φ14 2Φ12	856.	149.3	
R end bot.	0.43	68.6	362.	2Φ14 1Φ14	462.	86.9	
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension							
+-----+-----+							
+-----+-----+							
SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR W _{max} =0.3mm & min STEEL AREA							
+-----+-----+							
+-----+-----+							
Beam: 1							
+-----+-----+							
Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ ₂ Q	Steel for				
Moment steel	concrete	Moment concrete	Crack	cracking			
stress/fyk	stress/fck	stress/fck	spacing width	min provd			
-----+-- (kNm) -----+-- (kNm) -----+-- (mm) -----+-- (mm2) --							
L end top	28.2	0.191	0.099	23.9	0.084	253.2	0.06 299 709
Midspan	25.9	0.398	0.056	22.0	0.047	359.1	0.18 62 307
R end top	44.6	0.339	0.152	37.8	0.129	258.7	0.11 348 622
+-----+-----+							
+-----+-----+							
Beam: 2							

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for			
	Moment	steel	concrete	Moment	concrete	Crack	cracking				
	stress/fyk	stress/fck		stress/fck	spacing	width	min	provd			
	(kNm)			(kNm)				(mm)		(mm2)	
L end top	40.4	0.288	0.135	34.3	0.115	257.2	0.09	348	622		
Midspan	20.7	0.319	0.048	17.6	0.041	359.1	0.15	62	307		
R end top	42.9	0.274	0.139	36.4	0.118	234.3	0.08	323	709		

Beam: 3

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for			
	Moment	steel	concrete	Moment	concrete	Crack	cracking				
	stress/fyk	stress/fck		stress/fck	spacing	width	min	provd			
	(kNm)			(kNm)				(mm)		(mm2)	
L end top	40.8	0.261	0.132	34.6	0.112	234.3	0.08	323	709		
Midspan	20.2	0.311	0.047	17.1	0.040	359.1	0.14	62	307		
R end top	40.8	0.261	0.132	34.6	0.112	234.3	0.08	323	709		

Beam: 4

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for			
	Moment	steel	concrete	Moment	concrete	Crack	cracking				
	stress/fyk	stress/fck		stress/fck	spacing	width	min	provd			
	(kNm)			(kNm)				(mm)		(mm2)	
L end top	42.9	0.274	0.139	36.4	0.118	234.3	0.08	323	709		
Midspan	20.7	0.319	0.048	17.6	0.041	359.1	0.15	62	307		
R end top	40.4	0.288	0.135	34.3	0.115	257.2	0.09	348	622		

Beam: 5

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for			
	Moment	steel	concrete	Moment	concrete	Crack	cracking				
	stress/fyk	stress/fck		stress/fck	spacing	width	min	provd			
	(kNm)			(kNm)				(mm)		(mm2)	
L end top	44.6	0.318	0.149	37.8	0.127	257.2	0.10	348	622		
Midspan	25.9	0.398	0.056	22.0	0.047	359.1	0.18	62	307		
R end top	28.2	0.181	0.097	23.9	0.082	251.9	0.06	299	709		

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		b_j	V_{jh}	strength	area A_{sh}	area A_{sv}
+	+	+	+	+	+	+
-----	-----	-----	-----	-----	-----	-----
(mm)	(mm)	(m)	(kN)	(kN)	(mm ²)	(mm ²)
1	14	0.40	0.	590.	0.	0.
2	36	0.30	0.	1092.	0.	0.
3	36	0.30	0.	1254.	0.	0.
4	36	0.30	0.	1254.	0.	0.
5	36	0.30	0.	1092.	0.	0.
6	14	0.40	0.	590.	0.	0.

3A 1.2 FRAME B

```

*-----*
* STOREY: 6 * BEAMS: 6 7
*-----*
* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *
*-----*

```

GEOMETRY - BENDING MOMENTS M_{Ed} - LONGITUDINAL REINFORCEMENT

```

+-----+
|Beam: 6|Length l: 5.60m|X-section T | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----+-----+-----+-----+-----+
| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----+-----+-----+-----+-----+
| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|
| |fl width| |steel area |Contin Addit |steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+-----+---(mm2)---+---(kNm)---|
|L end top | 0.25 | 206.6 | 1251. | 2 $\Phi$ 14 5 $\Phi$ 12| 1241. | 217.9 |
|L end bot. | 0.61 | 7.1 | 625. | 2 $\Phi$ 14 2 $\Phi$ 14| 616. | 116.0 |
|midspan | 2.29 | 60.4 | 312. | 2 $\Phi$ 14 1 $\Phi$ 14| 462. | 89.2 |
|R end top | 0.25 | 117.7 | 709. | 2 $\Phi$ 14 -- | 730. | 129.5 |
|R end bot. | 0.97 | 53.8 | 355. | 2 $\Phi$ 14 -- | 462. | 88.5 |
|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |
+-----+

```

```

+-----+
|Beam: 7|Length l: 5.50m|X-section T | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----+-----+-----+-----+-----+
| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----+-----+-----+-----+-----+
| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|

```


	fl width		steel area	Contin	Addit	steel area	capacity
	(m)	(kNm)	(mm ²)			(mm ²)	(kNm)
L end top	0.25	127.5	718.	2Φ14	--	730.	129.5
L end bot.	0.97	22.9	359.	2Φ14	--	462.	88.5
midspan	2.29	69.1	357.	2Φ14	1Φ14	462.	89.2
R end top	0.25	157.8	912.	2Φ14	3Φ12	890.	154.4
R end bot.	0.61	22.0	456.	2Φ14	--	462.	87.7

Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension

Note:1. Addit. bot. midspan bars extended: 1Φ14 to L end - 1Φ14 to R end

2. Addit. bot. midspan bars extended to Right end of beam 1: 1Φ14

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for
	Moment steel	Moment concrete	cracking
	stress/fyk	stress/fck	spacing width
	(kNm)	(kNm)	(mm)
L end top	117.5	0.628	0.361
Midspan	47.0	0.478	0.062
R end top	37.8	0.474	0.163

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for
	Moment steel	Moment concrete	cracking
	stress/fyk	stress/fck	spacing width
	(kNm)	(kNm)	(mm)
L end top	61.7	0.636	0.248
Midspan	53.7	0.547	0.071
R end top	80.1	0.497	0.273

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
	(mm)	(m)	(kN)	(kN)	(mm ²)	(mm ²)
1	14	0.40	0.	800.	0.	0.
2	22	0.50	0.	2013.	0.	0.

```
| 3| 22 | 0.50 | 0. | 1654. | 0. | 0. |
+-----+-----+-----+-----+-----+-----+-----+
```

```
*-----*
* STOREY: 5 * BEAMS: 6 7
*-----*
* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *
*-----*
```

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

```
+-----+
|Beam: 6|Length l: 5.60m|X-section T | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----+-----+-----+-----+-----+-----|
| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----+-----+-----+-----+-----+-----|
| Location |Effect. | max MED | Required | Beam bars | Provided |Flexural|
| |fl width| |steel area |Contin Addit |steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+-----+---(mm2)---+---(kNm)---|
|L end top | 0.25 | 266.6 | 1731. | 2Φ14 9Φ12| 1693. | 294.0 |
|L end bot. | 0.61 | 29.4 | 866. | 2Φ14 4Φ14| 924. | 171.4 |
|midspan | 2.29 | 55.1 | 287. | 2Φ14 -- | 308. | 59.6 |
|R end top | 0.25 | 152.4 | 876. | 2Φ14 1Φ14| 884. | 153.6 |
|R end bot. | 0.97 | 112.3 | 589. | 2Φ14 1Φ20| 622. | 118.6 |
|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |
+-----+
+-----+
```

```
|Beam: 7|Length l: 5.50m|X-section T | Depth h: 0.50m| Width bw: 0.
25m |
|-----+-----+-----+-----+-----+-----+-----|
| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----+-----+-----+-----+-----+-----|
| Location |Effect. | max MED | Required | Beam bars | Provided |Flexural|
| |fl width| |steel area |Contin Addit |steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+-----+---(mm2)---+---(kNm)---|
|L end top | 0.25 | 171.4 | 1002. | 2Φ14 2Φ14| 1038. | 183.4 |
|L end bot. | 0.97 | 75.3 | 501. | 2Φ14 1Φ20| 622. | 118.6 |
|midspan | 2.29 | 59.9 | 309. | 2Φ14 1Φ14| 462. | 89.2 |
|R end top | 0.25 | 218.6 | 1340. | 2Φ14 3Φ18| 1314. | 230.4 |
|R end bot. | 0.61 | 49.9 | 670. | 2Φ14 2Φ20| 936. | 173.6 |
|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |
+-----+
+-----+
```

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

Beam: 6									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk		stress/fck	stress/fck		spacing	width	min provd	
	(kNm)			(kNm)			(mm)		(mm2)
L end top	139.7	0.512	0.348	118.6	0.295	183.3	0.12	92	1325
Midspan	42.9	0.647	0.069	36.4	0.059	359.1	0.30	62	307
R end top	23.7	0.216	0.086	20.0	0.073	255.8	0.07	222	461

Beam: 7									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk		stress/fck	stress/fck		spacing	width	min provd	
	(kNm)			(kNm)			(mm)		(mm2)
L end top	56.6	0.363	0.184	48.0	0.156	228.6	0.11	222	615
Midspan	46.6	0.474	0.061	39.5	0.052	296.6	0.18	62	461
R end top	99.4	0.410	0.254	84.3	0.216	208.8	0.11	293	1071

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
	(mm)	(m)	(kN)	(kN)	(mm2)	(mm2)
1	14	0.40	0.	739.	0.	0.
2	24	0.50	0.	1824.	0.	0.
3	22	0.50	0.	1538.	0.	0.

* STOREY: 4 * BEAMS: 6 7

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

Beam:	6	Length l:	5.60m	X-section	T	Depth h:	0.50m	Width bw:	0.25m
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)									

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin Addit	steel area	capacity
--- (m) ---	--- (kNm) ---	--- (mm2) ---	--- (mm2) ---	--- (mm2) ---	--- (kNm) ---	
L end top	0.25	266.1	1727.	2Φ14 9Φ12	1693.	294.0
L end bot.	0.61	42.8	864.	2Φ14 4Φ14	924.	171.4
midspan	2.29	56.4	291.	2Φ14 1Φ14	462.	89.2
R end top	0.25	162.4	942.	2Φ14 1Φ16	931.	160.8
R end bot.	0.97	111.7	585.	2Φ14 1Φ20	622.	118.6

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

|Beam: 7|Length l: 5.50m|X-section T | Depth h: 0.50m| Width bw: 0.25m |

|Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin Addit	steel area	capacity
--- (m) ---	--- (kNm) ---	--- (mm2) ---	--- (mm2) ---	--- (mm2) ---	--- (kNm) ---	
L end top	0.25	178.3	1049.	2Φ14 2Φ16	1132.	199.7
L end bot.	0.97	77.0	525.	2Φ14 1Φ20	622.	118.6
midspan	2.29	61.4	317.	2Φ14 1Φ14	462.	89.2
R end top	0.25	219.6	1348.	2Φ14 3Φ18	1314.	230.4
R end bot.	0.61	60.1	674.	2Φ14 2Φ20	936.	173.6

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

|Beam: 6 |

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for
Moment steel concrete	Moment concrete	Crack	cracking
stress/fyk stress/fck	stress/fck	spacing width	min provd
--- (kNm) ---	--- (kNm) ---	--- (mm) ---	--- (mm2) ---
L end top	131.5 0.482 0.328	111.7 0.278	183.3 0.11 92 1325
Midspan	43.9 0.446 0.058	37.2 0.049	296.6 0.17 62 461
R end top	30.0 0.253 0.106	25.3 0.090	252.1 0.08 241 508

|Beam: 7 |

|Location | Characteristic loads G+Q | Quasi-permanent loads G+ψ2Q | Steel for|

	Moment steel	concrete	Moment concrete	Crack	cracking
	stress/fyk	stress/fck	stress/fck	spacing	width min provd
	(kNm)		(kNm)	(mm)	(mm2)
L end top	59.7	0.344	0.187	50.6	0.159 223.6 0.10 250 709
Midspan	47.8	0.486	0.063	40.5	0.053 296.6 0.18 62 461
R end top	94.0	0.388	0.241	79.8	0.204 208.8 0.10 293 1071

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		b_j	V_{jh}	strength	area A_{sh}	area A_{sv}
	(mm)	(m)	(kN)	(kN)	(mm2)	(mm2)
1	14	0.40	0.	672.	0.	0.
2	24	0.50	0.	1609.	0.	0.
3	24	0.50	0.	1412.	0.	0.

* STOREY: 3 * BEAMS: 6 7

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *

GEOMETRY - BENDING MOMENTS M_{Ed} - LONGITUDINAL REINFORCEMENT

Location	Effect.	max M_{Ed}	Required	Beam bars	Provided	Flexural
	fl width	(kNm)	steel area	Contin	Addit	steel area capacity
	(m)	(kNm)	(mm2)			(mm2)-----(kNm)---
L end top	0.25	267.5	1740.	2 Φ 14	7 Φ 14	1753. 303.4
L end bot.	0.61	50.7	870.	2 Φ 14	4 Φ 14	924. 171.4
midspan	2.29	56.1	290.	2 Φ 14	1 Φ 14	462. 89.2
R end top	0.25	169.8	992.	2 Φ 14	1 Φ 18	985. 168.8
R end bot.	0.97	112.0	587.	2 Φ 14	1 Φ 20	622. 118.6

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

|Beam: 7|Length l: 5.50m|X-section T | Depth h: 0.50m| Width bw: 0.25m |

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin	Addit	steel area	capacity
--- (m) ---	--- (kNm) ---	--- (mm ²) ---	--- (mm ²) ---	--- (mm ²) ---	--- (mm ²) ---	--- (kNm) ---	---
L end top	0.25	184.1	1090.	2Φ14	2Φ18	1239.	217.6
L end bot.	0.97	79.1	545.	2Φ14	1Φ20	622.	118.6
midspan	2.29	60.8	314.	2Φ14	1Φ14	462.	89.2
R end top	0.25	222.8	1372.	2Φ14	3Φ18	1314.	230.4
R end bot.	0.61	65.6	686.	2Φ14	2Φ20	936.	173.6
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension							

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

Beam: 6									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd		
---	--- (kNm) ---	---	---	--- (kNm) ---	---	--- (mm) ---	---	---	---
L end top	127.7	0.450	0.315	108.4	0.267	185.9	0.11	121	1385
Midspan	43.6	0.444	0.057	37.0	0.049	296.6	0.17	62	461
R end top	34.2	0.265	0.118	28.9	0.100	248.4	0.08	263	562

Beam: 7									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd		
---	--- (kNm) ---	---	---	--- (kNm) ---	---	--- (mm) ---	---	---	---
L end top	61.9	0.320	0.188	52.5	0.159	218.8	0.09	279	816
Midspan	47.3	0.481	0.062	40.2	0.053	296.6	0.18	62	461
R end top	92.7	0.382	0.237	78.6	0.201	208.8	0.10	293	1071

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
---	--- (mm) ---	--- (m) ---	--- (kN) ---	--- (kN) ---	--- (mm ²) ---	--- (mm ²) ---
1	14	0.40	0.	598.	0.	0.

```

| 2| 26 | 0.50 | 0. | 1358. | 0. | 0. |
| 3| 24 | 0.50 | 0. | 1273. | 0. | 0. |
+-----+-----+-----+-----+-----+-----+-----+

```

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*-----*
* STOREY: 2 * BEAMS: 6 7
*-----*
* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *
*-----*

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GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

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+-----+
|Beam: 6|Length l: 5.60m|X-section T | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----+-----+-----+-----+-----+
| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----+-----+-----+-----+-----+
| Location |Effect. | max MED | Required | Beam bars | Provided |Flexural|
| |fl width| |steel area |Contin Addit |steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+---(mm2)---+---(kNm)---|
|L end top | 0.25 | 256.2 | 1642. | 2Φ14 6Φ14| 1599. | 278.7 |
|L end bot. | 0.61 | 49.1 | 821. | 2Φ14 3Φ16| 911. | 169.1 |
|midspan | 2.29 | 55.9 | 289. | 2Φ14 -- | 308. | 59.6 |
|R end top | 0.25 | 170.2 | 994. | 2Φ14 1Φ18| 985. | 168.8 |
|R end bot. | 0.97 | 102.1 | 534. | 2Φ14 1Φ20| 622. | 118.6 |
|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |
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+-----+
|Beam: 7|Length l: 5.50m|X-section T | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----+-----+-----+-----+-----+
| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----+-----+-----+-----+-----+
| Location |Effect. | max MED | Required | Beam bars | Provided |Flexural|
| |fl width| |steel area |Contin Addit |steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+---(mm2)---+---(kNm)---|
|L end top | 0.25 | 183.2 | 1083. | 2Φ14 2Φ18| 1239. | 217.6 |
|L end bot. | 0.97 | 72.8 | 542. | 2Φ14 1Φ20| 622. | 118.6 |
|midspan | 2.29 | 60.3 | 312. | 2Φ14 1Φ14| 462. | 89.2 |
|R end top | 0.25 | 216.2 | 1322. | 2Φ14 3Φ18| 1314. | 230.4 |
|R end bot. | 0.61 | 63.1 | 661. | 2Φ14 2Φ20| 936. | 173.6 |
|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |
+-----+

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SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

Beam: 6									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk		stress/fck	stress/fck		spacing	width	min provd	
	(kNm)			(kNm)			(mm)	(mm2)	
L end top	122.0	0.478	0.310	103.5	0.264	191.7	0.12	121	1231
Midspan	43.5	0.656	0.070	36.9	0.059	359.1	0.30	62	307
R end top	40.2	0.312	0.139	34.1	0.117	248.4	0.10	263	562

Beam: 7									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk		stress/fck	stress/fck		spacing	width	min provd	
	(kNm)			(kNm)			(mm)	(mm2)	
L end top	65.0	0.336	0.198	55.2	0.168	218.8	0.09	279	816
Midspan	47.0	0.478	0.062	39.8	0.052	296.6	0.18	62	461
R end top	90.3	0.372	0.231	76.6	0.196	208.8	0.10	293	1071

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
	(mm)	(m)	(kN)	(kN)	(mm2)	(mm2)
1	16	0.40	0.	515.	0.	0.
2	28	0.50	0.	1048.	0.	0.
3	26	0.50	0.	1119.	0.	0.

* STOREY: 1 * BEAMS: 6 7

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

Beam:	6	Length l:	5.60m	X-section	T	Depth h:	0.50m	Width bw:	0.25m
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)									

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin Addit	steel area	capacity
--- (m) ---	--- (kNm) ---	--- (mm2) ---	--- (mm2) ---	--- (mm2) ---	--- (kNm) ---	
L end top	0.25	230.4	1431.	2Φ14 5Φ14	1445.	251.9
L end bot.	0.61	42.5	716.	2Φ14 2Φ16	710.	133.2
midspan	2.29	56.8	293.	2Φ14 1Φ14	462.	89.2
R end top	0.25	158.9	919.	2Φ14 1Φ16	931.	160.8
R end bot.	0.97	74.0	460.	2Φ14 1Φ20	622.	118.6

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

|Beam: 7|Length l: 5.50m|X-section T | Depth h: 0.50m| Width bw: 0.25m |

|Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin Addit	steel area	capacity
--- (m) ---	--- (kNm) ---	--- (mm2) ---	--- (mm2) ---	--- (mm2) ---	--- (kNm) ---	
L end top	0.25	166.3	968.	2Φ14 1Φ16	931.	160.8
L end bot.	0.97	47.3	484.	2Φ14 1Φ20	622.	118.6
midspan	2.29	60.9	315.	2Φ14 1Φ14	462.	89.2
R end top	0.25	191.3	1140.	2Φ14 3Φ16	1154.	203.3
R end bot.	0.61	48.2	570.	2Φ14 1Φ20	622.	117.2

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR W_{max}=0.3mm & min STEEL AREA

|Beam: 6

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for
Moment steel concrete	Moment concrete	Crack spacing width	cracking
stress/fyk stress/fck	stress/fck		min provd
--- (kNm) ---	--- (kNm) ---	--- (mm) ---	--- (mm2) ---
L end top	110.6 0.491 0.312	93.9 0.265 198.1 0.12	121 1077
Midspan	44.2 0.450 0.058	37.5 0.049 296.6 0.17	62 461
R end top	50.1 0.423 0.177	42.5 0.150 252.1 0.14	241 508

|Beam: 7

|Location | Characteristic loads G+Q | Quasi-permanent loads G+ψ2Q | Steel for|

	Moment steel	concrete	Moment concrete	Crack	cracking
	stress/fyk	stress/fck	stress/fck	spacing	width min provd
	(kNm)		(kNm)	(mm)	(mm2)
L end top	70.1	0.517	0.237	59.5	0.201 249.3 0.16 241 508
Midspan	47.4	0.482	0.062	40.2	0.053 296.6 0.18 62 461
R end top	84.3	0.400	0.250	71.5	0.212 212.7 0.11 271 911

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		b _j	V _{jh}	strength	area A _{sh}	area A _{sv}
	(mm)	(m)	(kN)	(kN)	(mm2)	(mm2)
1	16	0.40	0.	419.	0.	0.
2	30	0.50	0.	570.	0.	0.
3	26	0.50	0.	943.	0.	0.

* STOREY: 0 * BEAMS: 6 7

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *

GEOMETRY - BENDING MOMENTS M_{Ed} - LONGITUDINAL REINFORCEMENT

Location	Effect.	max M _{Ed}	Required	Beam bars	Provided	Flexural
	fl width	(kNm)	steel area	Contin Addit	steel area	capacity
	(m)	(kNm)	(mm2)		(mm2)	(kNm)
L end top	0.25	132.7	750.	2Φ10 3Φ16	760.	134.3
L end bot.	0.61	-57.3	149.	2Φ10 --	157.	30.3
midspan	2.29	54.8	283.	2Φ10 1Φ14	311.	60.2
R end top	0.25	85.4	466.	2Φ10 1Φ20	785.	138.3
R end bot.	0.97	-17.3	149.	2Φ10 --	157.	30.4

Beam:	7 Length l:	5.50m X-section	T	Depth h:	0.50m Width bw:	0.25m
		Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)				

Location	Effect. fl width	max MEd (kNm)	Required steel area (mm ²)	Beam bars	Contin Addit	Provided steel area (mm ²)	Flexural capacity (kNm)
L end top	0.25	102.8	568.	2Φ10 1Φ20		785.	138.3
L end bot.	0.97	-26.3	149.	2Φ10	--	157.	30.4
midspan	2.29	60.0	310.	2Φ10 1Φ14		311.	60.2
R end top	0.25	108.4	601.	2Φ10 2Φ16		559.	101.4
R end bot.	0.61	-26.8	149.	2Φ10	--	157.	30.3

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for cracking						
Moment (kNm)	steel stress/fyk	concrete stress/fck	Moment concrete stress/fck						
			Crack spacing (mm)						
			width (mm)						
			min provd (mm ²)						
L end top	103.2	0.633	0.399	87.6	0.339	218.9	0.18	493	760
Midspan	42.7	0.638	0.068	36.2	0.058	321.8	0.26	62	311
R end top	60.6	0.362	0.233	51.4	0.197	220.7	0.10	708	785

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for cracking						
Moment (kNm)	steel stress/fyk	concrete stress/fck	Moment concrete stress/fck						
			Crack spacing (mm)						
			width (mm)						
			min provd (mm ²)						
L end top	76.1	0.414	0.284	64.5	0.241	218.9	0.12	708	785
Midspan	46.7	0.698	0.075	39.6	0.063	321.8	0.29	62	311
R end top	79.7	0.558	0.321	67.6	0.273	240.7	0.17	482	559

* STOREY: -1 * BEAMS: 6 7

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

Beam: 6 Length l: 5.60m X-section T Depth h: 0.50m Width bw: 0.25m							
-----+-----							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
-----+-----							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin Addit	steel area	capacity	
-----+-- (m) -----+-- (kNm) -----+-- (mm2) -----+-- (mm2) -----+-- (kNm) --							
L end top	0.25	111.2	618.	2Φ10 3Φ14	619.	111.3	
L end bot.	0.61	-71.5	149.	2Φ10 --	157.	30.3	
midspan	2.29	56.7	293.	2Φ10 1Φ14	311.	60.2	
R end top	0.25	95.7	526.	2Φ10 3Φ12	609.	109.8	
R end bot.	0.97	-61.1	149.	2Φ10 --	157.	30.4	

Beam: 7 Length l: 5.50m X-section T Depth h: 0.50m Width bw: 0.25m							
-----+-----							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
-----+-----							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin Addit	steel area	capacity	
-----+-- (m) -----+-- (kNm) -----+-- (mm2) -----+-- (mm2) -----+-- (kNm) --							
L end top	0.25	107.0	593.	2Φ10 4Φ12	609.	109.8	
L end bot.	0.97	-66.8	149.	2Φ10 --	157.	30.4	
midspan	2.29	59.3	306.	2Φ10 1Φ14	311.	60.2	
R end top	0.25	94.6	519.	2Φ10 3Φ12	496.	90.7	
R end bot.	0.61	-57.9	149.	2Φ10 --	157.	30.3	

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

Beam: 6							
-----+-----							
Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for				
Moment steel	concrete	Moment concrete	Crack	spacing	width	min provd	
stress/fyk	stress/fck	stress/fck	spacing	width	min provd		
-----+-- (kNm) -----+-- (kNm) -----+-- (mm) -----+-- (mm2) --							
L end top	86.5	0.630	0.353	73.4	0.300	227.3	0.18 465 618
Midspan	44.1	0.659	0.071	37.4	0.060	321.8	0.27 62 311
R end top	74.5	0.549	0.306	63.2	0.259	211.8	0.15 586 609

Beam: 7							
-----+-----							

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for	
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd		
	-----+-- (kNm)-----+-- (kNm)-----+-- (mm)-----+-- (mm2)---								
L end top	83.3	0.548	0.329	70.7	0.279	210.1	0.15	586 609	
Midspan	46.2	0.690	0.074	39.2	0.063	321.8	0.28	62 311	
R end top	73.6	0.560	0.305	62.4	0.259	234.2	0.17	442 496	
+-----+-----+-----+-----+-----+-----+-----+-----+-----+									
+-----+-----+-----+-----+-----+-----+-----+-----+-----+									

3A 1.3 FRAME C

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*-----*
* STOREY: 6 * BEAMS: 10 11 12 13 14
*-----*
* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *
*-----*
          GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT
+-----+
|Beam: 10|Length l: 5.50m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----|
|          |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----|
| Location |Effect. | max MED | Required | Beam bars | Provided |Flexural|
|          |fl width|          | steel area | Contin Addit | steel area|capacity|
|-----+-- (m) ---+-- (kNm) ---+-- (mm2) ---+-----+-- (mm2) ---+-- (kNm) ---|
|L end top | 0.25  | 85.7  | 467.  | 2Φ14  -- | 454.  | 83.4 |
|L end bot. | 0.43  | 32.4  | 287.  | 2Φ14  -- | 308.  | 58.5 |
|midspan   | 1.27  | 38.7  | 287.  | 2Φ14  -- | 308.  | 59.4 |
|R end top  | 0.25  | 101.2 | 558.  | 2Φ14  -- | 494.  | 90.3 |
|R end bot. | 0.61  | 45.3  | 287.  | 2Φ14  -- | 308.  | 58.9 |
|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |
+-----+
+-----+
|Beam: 11|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----|
|          |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----|
| Location |Effect. | max MED | Required | Beam bars | Provided |Flexural|
|          |fl width|          | steel area | Contin Addit | steel area|capacity|

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	(m)	(kNm)	(mm ²)	(mm ²)	(kNm)
L end top	0.25	117.0	653.	2Φ14	494. 90.3
L end bot.	0.61	56.6	327.	2Φ14	308. 58.9
midspan	1.09	27.3	287.	2Φ14	308. 59.3
R end top	0.25	124.9	702.	2Φ14 1Φ14	648. 116.2
R end bot.	0.61	46.0	351.	2Φ14 1Φ20	622. 117.2

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

|Beam: 12|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
	fl width		steel area	Contin Addit	steel area	capacity

L end top	0.25	120.9	677.	2Φ14 1Φ14	648.	116.2
L end bot.	0.61	50.6	339.	2Φ14	308.	58.9
midspan	1.09	25.1	287.	2Φ14	308.	59.3
R end top	0.25	120.9	677.	2Φ14 1Φ14	648.	116.2
R end bot.	0.61	50.6	339.	2Φ14	308.	58.9

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

|Beam: 13|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
	fl width		steel area	Contin Addit	steel area	capacity

L end top	0.25	124.9	702.	2Φ14 1Φ14	648.	116.2
L end bot.	0.61	46.0	351.	2Φ14 1Φ20	622.	117.2
midspan	1.09	27.3	287.	2Φ14	308.	59.3
R end top	0.25	117.0	653.	2Φ14 1Φ12	648.	116.2
R end bot.	0.61	56.6	327.	2Φ14	308.	58.9

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

|Beam: 14|Length l: 5.50m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

Location	Effect. fl width	max MEd (kNm)	Required steel area (mm ²)	Beam bars	Contin Addit	Provided steel area (mm ²)	Flexural capacity (kNm)
L end top	0.25	101.2	558.	2Φ14	--	494.	90.3
L end bot.	0.61	45.3	287.	2Φ14	--	308.	58.9
midspan	1.27	38.7	287.	2Φ14	--	308.	59.4
R end top	0.25	85.7	467.	2Φ14	--	454.	83.4
R end bot.	0.43	32.4	287.	2Φ14	--	308.	58.5

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR W_{max}=0.3mm & min STEEL AREA

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ ₂ Q	Steel for						
Moment	steel stress/fyk	concrete stress/fck	cracking						
(kNm)	stress/fyk	stress/fck	min provd						
L end top	31.4	0.443	0.151	26.7	0.128	353.9	0.20	253	307
Midspan	30.1	0.462	0.065	25.6	0.055	359.1	0.21	62	307
R end top	33.0	0.466	0.159	28.0	0.134	330.4	0.20	302	307

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ ₂ Q	Steel for						
Moment	steel stress/fyk	concrete stress/fck	cracking						
(kNm)	stress/fyk	stress/fck	min provd						
L end top	35.6	0.448	0.164	30.2	0.139	327.0	0.19	302	307
Midspan	21.3	0.327	0.050	18.0	0.042	359.1	0.15	62	307
R end top	46.5	0.425	0.169	39.5	0.144	273.7	0.15	302	461

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ ₂ Q	Steel for						
Moment	steel stress/fyk	concrete stress/fck	cracking						
(kNm)	stress/fyk	stress/fck	min provd						
L end top	41.5	0.381	0.171	35.2	0.145	269.4	0.13	302	461
Midspan	19.6	0.301	0.046	16.6	0.039	359.1	0.14	62	307

R end top	41.5	0.381	0.171		35.2	0.145	269.4	0.13		302	461
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+											
Beam: 13											
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+											
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for				
	Moment steel		concrete	Moment concrete		Crack			cracking		
	stress/fyk		stress/fck	stress/fck		spacing	width		min provd		
-----+--	(kNm)		-----+--	(kNm)		-----	(mm)		-----+--	(mm2)--	
L end top	46.5	0.425	0.169		39.5	0.144	273.7	0.15		302	461
Midspan	21.3	0.327	0.050		18.0	0.042	359.1	0.15		62	307
R end top	35.6	0.327	0.147		30.2	0.125	275.6	0.11		315	461
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+											

Beam: 14											
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+											
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for				
	Moment steel		concrete	Moment concrete		Crack			cracking		
	stress/fyk		stress/fck	stress/fck		spacing	width		min provd		
-----+--	(kNm)		-----+--	(kNm)		-----	(mm)		-----+--	(mm2)--	
L end top	33.0	0.303	0.136		28.0	0.115	275.6	0.11		315	461
Midspan	30.1	0.462	0.065		25.6	0.055	359.1	0.21		62	307
R end top	31.4	0.394	0.145		26.7	0.123	350.1	0.18		253	307
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+											

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel					
		bj	Vjh	strength	area Ash	area Asv					
-----+--	(mm)	+--- (m)	-----+---	(kN)	-----+---	(kN)	-----+---	(mm2)	-----+---	(mm2)	-----+---
1	14	0.40	0.	807.	0.	0.					
2	30	0.30	0.	1749.	0.	0.					
3	30	0.30	0.	1765.	0.	0.					
4	30	0.30	0.	1765.	0.	0.					
5	30	0.30	0.	1749.	0.	0.					
6	14	0.40	0.	807.	0.	0.					
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+											

* STOREY: 5 * BEAMS: 10 11 12 13 14

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT


```

+-----+
|Beam:   10|Length l: 5.50m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----|
|          |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----|
| Location |Effect. | max MEd | Required | Beam bars   | Provided |Flexural|
|          |fl width|          | steel area| Contin Addit| steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+-----+---(mm2)---+---(kNm)---|
|L end top | 0.25  |  138.5 |   787.  | 2Φ14  2Φ14|   762.  | 134.6 |
|L end bot. | 0.43  |   58.7 |   393.  | 2Φ14  1Φ14|   462.  |  86.9 |
|midspan   | 1.27  |   33.1 |   287.  | 2Φ14  --  |   308.  |  59.4 |
|R end top  | 0.25  |  133.2 |   754.  | 2Φ14  1Φ18|   749.  | 132.4 |
|R end bot. | 0.61  |   89.0 |   469.  | 2Φ14  1Φ20|   622.  | 117.2 |
|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |
+-----+

```

```

+-----+
|Beam:   11|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----|
|          |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----|
| Location |Effect. | max MEd | Required | Beam bars   | Provided |Flexural|
|          |fl width|          | steel area| Contin Addit| steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+-----+---(mm2)---+---(kNm)---|
|L end top | 0.25  |  153.4 |   883.  | 2Φ14  2Φ18|  1003.  | 177.2 |
|L end bot. | 0.61  |   94.6 |   499.  | 2Φ14  1Φ20|   622.  | 117.2 |
|midspan   | 1.09  |   27.2 |   287.  | 2Φ14  --  |   308.  |  59.3 |
|R end top  | 0.25  |  163.9 |   952.  | 2Φ14  2Φ16|   896.  | 155.5 |
|R end bot. | 0.61  |   83.1 |   476.  | 2Φ14  1Φ20|   622.  | 117.2 |
|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |
+-----+

```

```

+-----+
|Beam:   12|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----|
|          |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----|
| Location |Effect. | max MEd | Required | Beam bars   | Provided |Flexural|
|          |fl width|          | steel area| Contin Addit| steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+-----+---(mm2)---+---(kNm)---|
|L end top | 0.25  |  159.4 |   922.  | 2Φ14  2Φ16|   896.  | 155.5 |
|L end bot. | 0.61  |   89.9 |   473.  | 2Φ14  1Φ20|   622.  | 117.2 |
|midspan   | 1.09  |   25.8 |   287.  | 2Φ14  --  |   308.  |  59.3 |
|R end top  | 0.25  |  159.4 |   922.  | 2Φ14  2Φ16|   896.  | 155.5 |
+-----+

```

R end bot.	0.61	89.9	473.	2Φ14	1Φ20	622.	117.2
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension							
+-----+							
+-----+							
Beam:	13	Length l: 5.30m	X-section InvL	Depth h: 0.50m	Width bw: 0.25m		
-----+							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
-----+							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
	fl width		steel area	Contin Addit	steel area	capacity	
-----+--- (m) ---+--- (kNm) ---+--- (mm ²) ---+-----+--- (mm ²) ---+--- (kNm) ---							
L end top	0.25	163.9	952.	2Φ14	2Φ16	896.	155.5
L end bot.	0.61	83.1	476.	2Φ14	1Φ20	622.	117.2
midspan	1.09	27.2	287.	2Φ14	--	308.	59.3
R end top	0.25	153.4	883.	2Φ14	2Φ18	1003.	177.2
R end bot.	0.61	94.6	499.	2Φ14	1Φ20	622.	117.2
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension							

Beam:	14	Length l: 5.50m	X-section InvL	Depth h: 0.50m	Width bw: 0.25m		
-----+							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
-----+							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
	fl width		steel area	Contin Addit	steel area	capacity	
-----+--- (m) ---+--- (kNm) ---+--- (mm ²) ---+-----+--- (mm ²) ---+--- (kNm) ---							
L end top	0.25	133.2	754.	2Φ14	1Φ18	749.	132.4
L end bot.	0.61	89.0	469.	2Φ14	1Φ20	622.	117.2
midspan	1.27	33.1	287.	2Φ14	--	308.	59.4
R end top	0.25	138.5	787.	2Φ14	2Φ14	762.	134.6
R end bot.	0.43	58.7	393.	2Φ14	1Φ14	462.	86.9

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

Beam:	10						
-----+							
Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for				
	Moment steel	concrete	Moment concrete	Crack	cracking		
	stress/fyk	stress/fck	stress/fck	spacing	width	min provd	
-----+--- (kNm) -----+--- (kNm) ----- (mm) -----+--- (mm ²) ---							

L end top	46.9	0.361	0.171		39.9	0.145	247.4	0.11		253	615
Midspan	25.8	0.396	0.056		21.9	0.047	359.1	0.18		62	307
R end top	26.2	0.218	0.092		22.1	0.078	264.1	0.07		333	562

+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|Beam: 11 |

Location	Characteristic loads G+Q				Quasi-permanent loads G+ψ2Q			Steel for			
	Moment	steel	concrete		Moment	concrete	Crack	cracking			
	stress/fyk stress/fck		stress/fck spacing width min provd		(kNm)----- (kNm)-----		(mm)-----	(mm2)---			
L end top	34.6	0.196	0.108		29.4	0.092	227.8	0.06		345	816
Midspan	21.2	0.326	0.049		18.0	0.042	359.1	0.15		62	307
R end top	47.6	0.304	0.154		40.4	0.131	234.3	0.09		323	709

+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|Beam: 12 |

Location	Characteristic loads G+Q				Quasi-permanent loads G+ψ2Q			Steel for			
	Moment	steel	concrete		Moment	concrete	Crack	cracking			
	stress/fyk stress/fck		stress/fck spacing width min provd		(kNm)----- (kNm)-----		(mm)-----	(mm2)---			
L end top	41.0	0.262	0.133		34.7	0.112	234.3	0.08		323	709
Midspan	20.1	0.309	0.047		17.0	0.040	359.1	0.14		62	307
R end top	41.0	0.262	0.133		34.7	0.112	234.3	0.08		323	709

+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|Beam: 13 |

Location	Characteristic loads G+Q				Quasi-permanent loads G+ψ2Q			Steel for			
	Moment	steel	concrete		Moment	concrete	Crack	cracking			
	stress/fyk stress/fck		stress/fck spacing width min provd		(kNm)----- (kNm)-----		(mm)-----	(mm2)---			
L end top	47.6	0.304	0.154		40.4	0.131	234.3	0.09		323	709
Midspan	21.2	0.326	0.049		18.0	0.042	359.1	0.15		62	307
R end top	34.6	0.196	0.108		29.4	0.092	227.8	0.06		345	816

+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|Beam: 14 |

Location	Characteristic loads G+Q				Quasi-permanent loads G+ψ2Q			Steel for			
	Moment	steel	concrete		Moment	concrete	Crack	cracking			
	stress/fyk stress/fck		stress/fck spacing width min provd		(kNm)----- (kNm)-----		(mm)-----	(mm2)---			
L end top	26.2	0.203	0.090		22.1	0.076	262.5	0.07		333	562
Midspan	25.8	0.396	0.056		21.9	0.047	359.1	0.18		62	307

|R end top| 46.9 0.339 0.168 | 39.9 0.143 246.1 0.11 | 253 615|

+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+-----+-----+-----+-----+

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

+-----+-----+-----+-----+-----+-----+-----+-----+-----+

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
+-----+	-(mm)+	---(m)---	----(kN)---	----(kN)---	----(mm2)---	----(mm2)---
1	14	0.40	0.	764.	0.	0.
2	32	0.30	0.	1639.	0.	0.
3	32	0.30	0.	1673.	0.	0.
4	32	0.30	0.	1673.	0.	0.
5	32	0.30	0.	1639.	0.	0.
6	14	0.40	0.	764.	0.	0.

+-----+-----+-----+-----+-----+-----+-----+-----+-----+

* STOREY: 4 * BEAMS: 10 11 12 13 14

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

+-----+-----+-----+-----+-----+-----+-----+-----+-----+

|Beam: 10|Length l: 5.50m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|-----+-----+-----+-----+-----+-----+-----+-----+-----|

| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

|-----+-----+-----+-----+-----+-----+-----+-----+-----|

Location	Effect.	max MED	Required	Beam bars	Provided	Flexural
fl width		steel area	Contin Addit	steel area	capacity	
-----+	-(m)---	-(kNm)---	-(mm2)---	-----+	-(mm2)---	-(kNm)---

L end top	0.25	138.4	786.	2Φ14 2Φ14	762.	134.6
L end bot.	0.43	63.8	393.	2Φ14 1Φ14	462.	86.9
midspan	1.27	33.9	287.	2Φ14 --	308.	59.4
R end top	0.25	138.1	785.	2Φ14 1Φ18	749.	132.4
R end bot.	0.61	90.8	478.	2Φ14 1Φ20	622.	117.2

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

+-----+-----+-----+-----+-----+-----+-----+-----+-----+

+-----+-----+-----+-----+-----+-----+-----+-----+-----+

|Beam: 11|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|-----+-----+-----+-----+-----+-----+-----+-----+-----|

| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

|-----+-----+-----+-----+-----+-----+-----+-----+-----|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin Addit	steel area	capacity
(m)	(kNm)	(mm2)	(mm2)		(mm2)	(kNm)
L end top	0.25	157.9	912.	2Φ14 2Φ18	1003.	177.2
L end bot.	0.61	97.8	517.	2Φ14 1Φ20	622.	117.2
midspan	1.09	27.2	287.	2Φ14 --	308.	59.3
R end top	0.25	167.0	973.	2Φ14 2Φ16	896.	155.5
R end bot.	0.61	87.3	487.	2Φ14 1Φ20	622.	117.2

Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension

Beam: 12 | Length l: 5.30m | X-section InvL | Depth h: 0.50m | Width bw: 0.25m

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin Addit	steel area	capacity
(m)	(kNm)	(mm2)	(mm2)		(mm2)	(kNm)
L end top	0.25	162.8	945.	2Φ14 2Φ16	896.	155.5
L end bot.	0.61	93.2	491.	2Φ14 1Φ20	622.	117.2
midspan	1.09	25.7	287.	2Φ14 --	308.	59.3
R end top	0.25	162.8	945.	2Φ14 2Φ16	896.	155.5
R end bot.	0.61	93.2	491.	2Φ14 1Φ20	622.	117.2

Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension

Beam: 13 | Length l: 5.30m | X-section InvL | Depth h: 0.50m | Width bw: 0.25m

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin Addit	steel area	capacity
(m)	(kNm)	(mm2)	(mm2)		(mm2)	(kNm)
L end top	0.25	167.0	973.	2Φ14 2Φ16	896.	155.5
L end bot.	0.61	87.3	487.	2Φ14 1Φ20	622.	117.2
midspan	1.09	27.2	287.	2Φ14 --	308.	59.3
R end top	0.25	157.9	912.	2Φ14 2Φ18	1003.	177.2
R end bot.	0.61	97.8	517.	2Φ14 1Φ20	622.	117.2

Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension

Beam: 14 | Length l: 5.50m | X-section InvL | Depth h: 0.50m | Width bw: 0.25m

-----+-----							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
-----+-----							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
	fl width		steel area	Contin Addit	steel area	capacity	
	(m)	(kNm)	(mm ²)		(mm ²)	(kNm)	
L end top	0.25	138.1	785.	2Φ14 1Φ18	749.	132.4	
L end bot.	0.61	90.8	478.	2Φ14 1Φ20	622.	117.2	
midspan	1.27	33.9	287.	2Φ14 --	308.	59.4	
R end top	0.25	138.4	786.	2Φ14 2Φ14	762.	134.6	
R end bot.	0.43	63.8	393.	2Φ14 1Φ14	462.	86.9	

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

|Beam: 10 |

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for	
	Moment steel	concrete	Moment concrete	Crack
	stress/fyk	stress/fck	stress/fck	spacing width
	(kNm)		(kNm)	(mm)
L end top	43.9	0.338	0.160	37.3 0.136 247.4 0.11 253 615
Midspan	26.4	0.404	0.057	22.4 0.048 359.1 0.18 62 307
R end top	28.0	0.233	0.099	23.7 0.083 264.1 0.08 333 562

|Beam: 11 |

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for	
	Moment steel	concrete	Moment concrete	Crack
	stress/fyk	stress/fck	stress/fck	spacing width
	(kNm)		(kNm)	(mm)
L end top	35.4	0.200	0.110	30.0 0.094 227.8 0.06 345 816
Midspan	21.1	0.326	0.049	17.9 0.042 359.1 0.15 62 307
R end top	47.0	0.300	0.152	39.9 0.129 234.3 0.09 323 709

|Beam: 12 |

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for	
	Moment steel	concrete	Moment concrete	Crack
	stress/fyk	stress/fck	stress/fck	spacing width
	(kNm)		(kNm)	(mm)

L end top	41.0	0.262	0.133		34.8	0.113	234.3	0.08		323	709
Midspan	20.0	0.308	0.047		17.0	0.040	359.1	0.14		62	307
R end top	41.0	0.262	0.133		34.8	0.113	234.3	0.08		323	709

+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|Beam: 13 |

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for				
	Moment	steel	concrete	Moment	concrete	Crack	cracking				
	stress/fyk		stress/fck	stress/fck		spacing	width	min provd			
-----+--	(kNm)	-----+--		(kNm)	-----		(mm)	-----+--	(mm2)--		
L end top	47.0	0.300	0.152		39.9	0.129	234.3	0.09		323	709
Midspan	21.1	0.326	0.049		17.9	0.042	359.1	0.15		62	307
R end top	35.4	0.200	0.110		30.0	0.094	227.8	0.06		345	816

+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|Beam: 14 |

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for				
	Moment	steel	concrete	Moment	concrete	Crack	cracking				
	stress/fyk		stress/fck	stress/fck		spacing	width	min provd			
-----+--	(kNm)	-----+--		(kNm)	-----		(mm)	-----+--	(mm2)--		
L end top	28.0	0.217	0.096		23.7	0.082	262.5	0.07		333	562
Midspan	26.4	0.404	0.057		22.4	0.048	359.1	0.18		62	307
R end top	43.9	0.318	0.157		37.3	0.133	246.1	0.10		253	615

+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+-----+-----+-----+-----+

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
+-----+--	(mm)	+---(m)	+----(kN)	+----(kN)	+----(mm2)	+----(mm2)
1	14	0.40	0.	719.	0.	0.
2	34	0.30	0.	1522.	0.	0.
3	32	0.30	0.	1577.	0.	0.
4	32	0.30	0.	1577.	0.	0.
5	34	0.30	0.	1522.	0.	0.
6	14	0.40	0.	719.	0.	0.

+-----+-----+-----+-----+-----+-----+-----+-----+-----+

* STOREY: 3 * BEAMS: 10 11 12 13 14

+-----+-----+-----+-----+-----+-----+-----+-----+-----+

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

+-----+

|Beam: 10|Length l: 5.50m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|-----|

| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

|-----|

| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|

| |fl width| |steel area |Contin Addit |steel area|capacity|

|-----+-- (m) ---+-- (kNm) ---+-- (mm2) ---+-----+-- (mm2) ---+-- (kNm) --|

|L end top | 0.25 | 139.8 | 795. | 2Φ14 2Φ14| 762. | 134.6 |

|L end bot. | 0.43 | 66.7 | 398. | 2Φ14 1Φ14| 462. | 86.9 |

|midspan | 1.27 | 33.6 | 287. | 2Φ14 -- | 308. | 59.4 |

|R end top | 0.25 | 141.7 | 807. | 2Φ14 1Φ20| 808. | 141.9 |

|R end bot. | 0.61 | 92.2 | 486. | 2Φ14 1Φ20| 622. | 117.2 |

|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |

+-----+

+-----+

|Beam: 11|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|-----|

| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

|-----|

| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|

| |fl width| |steel area |Contin Addit |steel area|capacity|

|-----+-- (m) ---+-- (kNm) ---+-- (mm2) ---+-----+-- (mm2) ---+-- (kNm) --|

|L end top | 0.25 | 161.0 | 933. | 2Φ14 2Φ20| 1122. | 198.0 |

|L end bot. | 0.61 | 100.1 | 529. | 2Φ14 1Φ20| 622. | 117.2 |

|midspan | 1.09 | 27.1 | 287. | 2Φ14 -- | 308. | 59.3 |

|R end top | 0.25 | 169.4 | 989. | 2Φ14 3Φ14| 956. | 164.5 |

|R end bot. | 0.61 | 90.4 | 494. | 2Φ14 1Φ20| 622. | 117.2 |

|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |

+-----+

+-----+

|Beam: 12|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|-----|

| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

|-----|

| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|

| |fl width| |steel area |Contin Addit |steel area|capacity|

|-----+-- (m) ---+-- (kNm) ---+-- (mm2) ---+-----+-- (mm2) ---+-- (kNm) --|

|L end top | 0.25 | 165.4 | 962. | 2Φ14 3Φ14| 956. | 164.5 |

|L end bot. | 0.61 | 95.8 | 506. | 2Φ14 1Φ20| 622. | 117.2 |

midspan	1.09	25.7	287.	2Φ14	--	308.	59.3
R end top	0.25	165.4	962.	2Φ14	3Φ14	956.	164.5
R end bot.	0.61	95.8	506.	2Φ14	1Φ20	622.	117.2

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

+-----
+-----
|Beam: 13|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|-----
| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin Addit	steel area	capacity
-----	---	---	---	---	---	---
(m)	(kNm)	(mm ²)	(mm ²)	(mm ²)	(mm ²)	(kNm)
L end top	0.25	169.4	989.	2Φ14	3Φ14	956.
L end bot.	0.61	90.4	494.	2Φ14	1Φ20	622.
midspan	1.09	27.1	287.	2Φ14	--	308.
R end top	0.25	161.0	933.	2Φ14	2Φ20	1122.
R end bot.	0.61	100.1	529.	2Φ14	1Φ20	622.

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

+-----
+-----
|Beam: 14|Length l: 5.50m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

|-----
| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin Addit	steel area	capacity
-----	---	---	---	---	---	---
(m)	(kNm)	(mm ²)	(mm ²)	(mm ²)	(mm ²)	(kNm)
L end top	0.25	141.7	807.	2Φ14	1Φ20	808.
L end bot.	0.61	92.2	486.	2Φ14	1Φ20	622.
midspan	1.27	33.6	287.	2Φ14	--	308.
R end top	0.25	139.8	795.	2Φ14	2Φ14	762.
R end bot.	0.43	66.7	398.	2Φ14	1Φ14	462.

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

+-----
+-----
SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

|Beam: 10 |

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for
Moment	steel	concrete	Moment concrete
			Crack
			cracking

	stress/fyk	stress/fck	stress/fyk	stress/fck	spacing	width	min	provd
(kNm)	(kNm)	(mm)	(mm2)					
L end top	43.0	0.331	0.157	36.6	0.133	247.4	0.10	253 615
Midspan	26.2	0.401	0.056	22.2	0.048	359.1	0.18	62 307
R end top	29.3	0.223	0.100	24.8	0.085	258.7	0.07	348 622
+-----+-----+-----+-----+-----+								
Beam: 11								
+-----+-----+-----+-----+-----+								
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for	
	Moment	steel	concrete	Moment	concrete	Crack	cracking	
	stress/fyk	stress/fck	stress/fck	stress/fck	spacing	width	min provd	
(kNm)	(kNm)	(mm)	(mm2)					
L end top	35.9	0.181	0.108	30.5	0.092	221.8	0.05	360 936
Midspan	21.1	0.325	0.049	17.9	0.042	359.1	0.15	62 307
R end top	46.5	0.277	0.147	39.5	0.125	221.2	0.08	302 769
+-----+-----+-----+-----+-----+								
Beam: 12								
+-----+-----+-----+-----+-----+								
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for	
	Moment	steel	concrete	Moment	concrete	Crack	cracking	
	stress/fyk	stress/fck	stress/fck	stress/fck	spacing	width	min provd	
(kNm)	(kNm)	(mm)	(mm2)					
L end top	41.0	0.244	0.130	34.8	0.110	221.2	0.07	302 769
Midspan	20.0	0.308	0.047	17.0	0.040	359.1	0.14	62 307
R end top	41.0	0.244	0.130	34.8	0.110	221.2	0.07	302 769
+-----+-----+-----+-----+-----+								
Beam: 13								
+-----+-----+-----+-----+-----+								
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for	
	Moment	steel	concrete	Moment	concrete	Crack	cracking	
	stress/fyk	stress/fck	stress/fck	stress/fck	spacing	width	min provd	
(kNm)	(kNm)	(mm)	(mm2)					
L end top	46.5	0.277	0.147	39.5	0.125	221.2	0.08	302 769
Midspan	21.1	0.325	0.049	17.9	0.042	359.1	0.15	62 307
R end top	35.9	0.181	0.108	30.5	0.092	221.8	0.05	360 936
+-----+-----+-----+-----+-----+								
Beam: 14								
+-----+-----+-----+-----+-----+								
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for	
	Moment	steel	concrete	Moment	concrete	Crack	cracking	
	stress/fyk	stress/fck	stress/fck	stress/fck	spacing	width	min provd	
(kNm)	(kNm)	(mm)	(mm2)					

L end top	29.3	0.209	0.098		24.8	0.083	257.2	0.07		348	622
Midspan	26.2	0.401	0.056		22.2	0.048	359.1	0.18		62	307
R end top	43.0	0.311	0.154		36.6	0.131	246.1	0.10		253	615

-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
 -----+-----+-----+-----+-----+-----+-----+-----+-----+-----+

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
-----+-	(mm)-----	(m)-----	(kN)-----	(kN)-----	(mm2)-----	(mm2)-----
1	14	0.40	0.	670.	0.	0.
2	34	0.30	0.	1396.	0.	0.
3	34	0.30	0.	1475.	0.	0.
4	34	0.30	0.	1475.	0.	0.
5	34	0.30	0.	1396.	0.	0.
6	14	0.40	0.	670.	0.	0.

 * STOREY: 2 * BEAMS: 10 11 12 13 14

 * Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *

GEOMETRY - BENDING MOMENTS MEd - LONGITUDINAL REINFORCEMENT

Beam: 10	Length l: 5.50m	X-section InvL	Depth h: 0.50m	Width bw: 0.25m		

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)						

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
	fl width	(kNm)	steel area	Contin Addit	steel area	capacity
-----+--	(m)-----	(kNm)-----	(mm2)-----	-----+--	(mm2)-----	(kNm)-----
L end top	0.25	135.2	766.	2 Φ 14 2 Φ 14	762.	134.6
L end bot.	0.43	63.7	383.	2 Φ 14 1 Φ 14	462.	86.9
midspan	1.27	33.2	287.	2 Φ 14 --	308.	59.4
R end top	0.25	138.6	787.	2 Φ 14 2 Φ 14	802.	140.9
R end bot.	0.61	86.3	454.	2 Φ 14 1 Φ 20	622.	117.2
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension						
-----+-----+-----+-----+-----+-----+-----+-----+-----+						
Beam: 11	Length l: 5.30m	X-section InvL	Depth h: 0.50m	Width bw: 0.25m		
-----+-----+-----+-----+-----+-----+-----+-----+-----+						

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin Addit	steel area	capacity	
---(m)---	---(kNm)---	---(mm2)---	---(mm2)---	---	---(mm2)---	---(kNm)---	
L end top	0.25	156.1	901.	2Φ14 3Φ14	956.	164.5	
L end bot.	0.61	94.0	496.	2Φ14 1Φ20	622.	117.2	
midspan	1.09	27.1	287.	2Φ14 --	308.	59.3	
R end top	0.25	163.4	949.	2Φ14 2Φ16	896.	155.5	
R end bot.	0.61	85.6	474.	2Φ14 1Φ20	622.	117.2	
Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension							

|Beam: 12|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin Addit	steel area	capacity	
---(m)---	---(kNm)---	---(mm2)---	---(mm2)---	---	---(mm2)---	---(kNm)---	
L end top	0.25	159.8	925.	2Φ14 2Φ16	896.	155.5	
L end bot.	0.61	90.3	476.	2Φ14 1Φ20	622.	117.2	
midspan	1.09	25.8	287.	2Φ14 --	308.	59.3	
R end top	0.25	159.8	925.	2Φ14 2Φ16	896.	155.5	
R end bot.	0.61	90.3	476.	2Φ14 1Φ20	622.	117.2	
Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension							

|Beam: 13|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin Addit	steel area	capacity	
---(m)---	---(kNm)---	---(mm2)---	---(mm2)---	---	---(mm2)---	---(kNm)---	
L end top	0.25	163.4	949.	2Φ14 2Φ16	896.	155.5	
L end bot.	0.61	85.6	474.	2Φ14 1Φ20	622.	117.2	
midspan	1.09	27.1	287.	2Φ14 --	308.	59.3	
R end top	0.25	156.1	901.	2Φ14 3Φ14	956.	164.5	
R end bot.	0.61	94.0	496.	2Φ14 1Φ20	622.	117.2	
Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension							

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+-----+
|Beam:   14|Length l: 5.50m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----+-----+-----+-----+-----+-----+
|           |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----+-----+-----+-----+-----+
| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|
|           |fl width|          | steel area |Contin Addit | steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+-----+---(mm2)---+---(kNm)---+
|L end top | 0.25  |  138.6 |   787.  | 2Φ14  2Φ14|   802.  | 140.9 |
|L end bot. | 0.61  |   86.3 |   454.  | 2Φ14  1Φ20|   622.  | 117.2 |
|midspan   | 1.27  |   33.2 |   287.  | 2Φ14  --  |   308.  |  59.4 |
|R end top  | 0.25  |  135.2 |   766.  | 2Φ14  2Φ14|   762.  | 134.6 |
|R end bot. | 0.43  |   63.7 |   383.  | 2Φ14  1Φ14|   462.  |  86.9 |
|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |
+-----+

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SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR $W_{max}=0.3mm$ & min STEEL AREA

```

+-----+
|Beam:   10
+-----+
|Location | Characteristic loads G+Q | Quasi-permanent loads G+ψ2Q |Steel for|
|           |Moment steel   concrete |Moment concrete   Crack   | cracking|
|           | stress/fyk stress/fck| stress/fck spacing width |min provd|
|-----+---(kNm)---+-----+---(kNm)---+-----+---(mm)---+---(mm2)---+
|L end top| 42.1  0.324  0.154 | 35.8  0.130  247.4  0.10 | 253 615|
| Midspan | 25.8  0.396  0.056 | 21.9  0.047  359.1  0.18 |  62 307|
|R end top| 30.9  0.237  0.106 | 26.1  0.090  242.6  0.07 | 302 615|
+-----+

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+-----+
|Beam:   11
+-----+
|Location | Characteristic loads G+Q | Quasi-permanent loads G+ψ2Q |Steel for|
|           |Moment steel   concrete |Moment concrete   Crack   | cracking|
|           | stress/fyk stress/fck| stress/fck spacing width |min provd|
|-----+---(kNm)---+-----+---(kNm)---+-----+---(mm)---+---(mm2)---+
|L end top| 36.6  0.218  0.116 | 31.1  0.098  221.2  0.06 | 302 769|
| Midspan | 21.1  0.325  0.049 | 17.9  0.042  359.1  0.15 |  62 307|
|R end top| 45.8  0.293  0.148 | 38.9  0.126  234.3  0.09 | 323 709|
+-----+

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+-----+
|Beam:   12
+-----+
|Location | Characteristic loads G+Q | Quasi-permanent loads G+ψ2Q |Steel for|
|           |Moment steel   concrete |Moment concrete   Crack   | cracking|
+-----+

```

	stress/fyk stress/fck		stress/fck		spacing	width	min provd	
	-- (kNm) --		-- (kNm) --		-- (mm) --		-- (mm2) --	
L end top	41.0	0.261	0.133	34.7	0.112	234.3	0.08	323 709
Midspan	20.1	0.309	0.047	17.0	0.040	359.1	0.14	62 307
R end top	41.0	0.261	0.133	34.7	0.112	234.3	0.08	323 709

|Beam: 13

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for	
	Moment	steel	concrete	Moment	concrete	Crack	cracking	
	stress/fyk stress/fck		stress/fck		spacing	width	min provd	
	-- (kNm) --		-- (kNm) --		-- (mm) --		-- (mm2) --	
L end top	45.8	0.293	0.148	38.9	0.126	234.3	0.09	323 709
Midspan	21.1	0.325	0.049	17.9	0.042	359.1	0.15	62 307
R end top	36.6	0.218	0.116	31.1	0.098	221.2	0.06	302 769

|Beam: 14

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for	
	Moment	steel	concrete	Moment	concrete	Crack	cracking	
	stress/fyk stress/fck		stress/fck		spacing	width	min provd	
	-- (kNm) --		-- (kNm) --		-- (mm) --		-- (mm2) --	
L end top	30.9	0.223	0.104	26.1	0.088	241.4	0.07	302 615
Midspan	25.8	0.396	0.056	21.9	0.047	359.1	0.18	62 307
R end top	42.1	0.304	0.150	35.8	0.128	246.1	0.10	253 615

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
+-----+	-(mm)	+--- (m)	---- (kN)	---- (kN)	---- (mm2)	---- (mm2)
1	14	0.40	0.	621.	0.	0.
2	36	0.30	0.	1259.	0.	0.
3	34	0.30	0.	1368.	0.	0.
4	34	0.30	0.	1368.	0.	0.
5	36	0.30	0.	1259.	0.	0.
6	14	0.40	0.	621.	0.	0.

* STOREY: 1 * BEAMS: 10 11 12 13 14

 * Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

+-----+							
Beam: 10 Length l: 5.50m X-section InvL Depth h: 0.50m Width bw: 0.25m							
-----+							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
-----+							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin	Addit	steel area	capacity
-----	---	---	---	---	---	---	---
(m)	(kNm)	(kNm)	(mm2)		(mm2)	(kNm)	
L end top	0.25	114.3	636.	2Φ14	1Φ14	608.	109.6
L end bot.	0.43	52.7	318.	2Φ14	--	308.	58.5
midspan	1.27	34.4	287.	2Φ14	--	308.	59.4
R end top	0.25	126.1	709.	2Φ14	1Φ16	695.	123.8
R end bot.	0.61	67.1	355.	2Φ14	1Φ20	622.	117.2
Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension							

+-----+							
Beam: 11 Length l: 5.30m X-section InvL Depth h: 0.50m Width bw: 0.25m							
-----+							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
-----+							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin	Addit	steel area	capacity
-----	---	---	---	---	---	---	---
(m)	(kNm)	(kNm)	(mm2)		(mm2)	(kNm)	
L end top	0.25	141.1	804.	2Φ14	2Φ16	896.	155.5
L end bot.	0.61	76.6	402.	2Φ14	1Φ20	622.	117.2
midspan	1.09	26.9	287.	2Φ14	--	308.	59.3
R end top	0.25	146.1	836.	2Φ14	1Φ20	808.	141.9
R end bot.	0.61	70.3	418.	2Φ14	1Φ20	622.	117.2
Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension							

+-----+							
Beam: 12 Length l: 5.30m X-section InvL Depth h: 0.50m Width bw: 0.25m							
-----+							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
-----+							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin	Addit	steel area	capacity
-----	---	---	---	---	---	---	---
(m)	(kNm)	(kNm)	(mm2)		(mm2)	(kNm)	
L end top	0.25	141.1	804.	2Φ14	2Φ16	896.	155.5
L end bot.	0.61	76.6	402.	2Φ14	1Φ20	622.	117.2
midspan	1.09	26.9	287.	2Φ14	--	308.	59.3
R end top	0.25	146.1	836.	2Φ14	1Φ20	808.	141.9
R end bot.	0.61	70.3	418.	2Φ14	1Φ20	622.	117.2

L end top	0.25	143.1	816.	2Φ14	1Φ20	808.	141.9
L end bot.	0.61	73.7	408.	2Φ14	1Φ20	622.	117.2
midspan	1.09	25.8	287.	2Φ14	--	308.	59.3
R end top	0.25	143.1	816.	2Φ14	1Φ20	808.	141.9
R end bot.	0.61	73.7	408.	2Φ14	1Φ20	622.	117.2

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

-----+
-----+

|Beam: 13|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----|
| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width		steel area	Contin	Addit	steel area	capacity	
-----+---(m)-----+---(kNm)-----+---(mm ²)-----+---(mm ²)-----+---(kNm)---							
L end top	0.25	146.1	836.	2Φ14	1Φ20	808.	141.9
L end bot.	0.61	70.3	418.	2Φ14	1Φ20	622.	117.2
midspan	1.09	26.9	287.	2Φ14	--	308.	59.3
R end top	0.25	141.1	804.	2Φ14	2Φ16	896.	155.5
R end bot.	0.61	76.6	402.	2Φ14	1Φ20	622.	117.2

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

-----+
-----+

|Beam: 14|Length l: 5.50m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----|
| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width		steel area	Contin	Addit	steel area	capacity	
-----+---(m)-----+---(kNm)-----+---(mm ²)-----+---(mm ²)-----+---(kNm)---							
L end top	0.25	126.1	709.	2Φ14	1Φ16	695.	123.8
L end bot.	0.61	67.1	355.	2Φ14	1Φ20	622.	117.2
midspan	1.27	34.4	287.	2Φ14	--	308.	59.4
R end top	0.25	114.3	636.	2Φ14	1Φ14	608.	109.6
R end bot.	0.43	52.7	318.	2Φ14	--	308.	58.5

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

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SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

-----+-----+

|Beam: 10 |

-----+-----+

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for	
	Moment	steel	concrete	Moment	concrete	Crack		cracking	
		stress/fyk	stress/fck		stress/fck	spacing	width	min	provd
	(kNm)			(kNm)		(mm)		(mm2)	
L end top	36.2	0.361	0.154	30.8	0.131	282.5	0.13	253	461
Midspan	26.8	0.411	0.058	22.7	0.049	359.1	0.19	62	307
R end top	34.9	0.317	0.127	29.5	0.107	269.7	0.11	316	508

Beam: 11

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for	
	Moment	steel	concrete	Moment	concrete	Crack		cracking	
		stress/fyk	stress/fck		stress/fck	spacing	width	min	provd
	(kNm)			(kNm)		(mm)		(mm2)	
L end top	38.1	0.243	0.123	32.3	0.104	234.3	0.07	323	709
Midspan	21.0	0.323	0.049	17.8	0.041	359.1	0.15	62	307
R end top	44.7	0.319	0.150	37.9	0.127	257.2	0.10	348	622

Beam: 12

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for	
	Moment	steel	concrete	Moment	concrete	Crack		cracking	
		stress/fyk	stress/fck		stress/fck	spacing	width	min	provd
	(kNm)			(kNm)		(mm)		(mm2)	
L end top	40.9	0.292	0.137	34.7	0.116	257.2	0.10	348	622
Midspan	20.1	0.309	0.047	17.0	0.040	359.1	0.14	62	307
R end top	40.9	0.292	0.137	34.7	0.116	257.2	0.10	348	622

Beam: 13

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for	
	Moment	steel	concrete	Moment	concrete	Crack		cracking	
		stress/fyk	stress/fck		stress/fck	spacing	width	min	provd
	(kNm)			(kNm)		(mm)		(mm2)	
L end top	44.7	0.319	0.150	37.9	0.127	257.2	0.10	348	622
Midspan	21.0	0.323	0.049	17.8	0.041	359.1	0.15	62	307
R end top	38.1	0.243	0.123	32.3	0.104	234.3	0.07	323	709

Beam: 14

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for	
	Moment	steel	concrete	Moment	concrete	Crack		cracking	

	stress/fyk	stress/fck	stress/fck	spacing	width	min	provd
	(kNm)	(kNm)	(kNm)	(mm)	(mm)	(mm)	(mm)
L end top	34.9	0.294	0.123	29.5	0.104	268.0	0.10 316 508
Midspan	26.8	0.411	0.058	22.7	0.049	359.1	0.19 62 307
R end top	36.2	0.333	0.149	30.8	0.127	280.3	0.12 253 461

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
(mm)	(mm)	(m)	(kN)	(kN)	(mm ²)	(mm ²)
1	14	0.40	0.	574.	0.	0.
2	36	0.30	0.	1112.	0.	0.
3	36	0.30	0.	1257.	0.	0.
4	36	0.30	0.	1257.	0.	0.
5	36	0.30	0.	1112.	0.	0.
6	14	0.40	0.	574.	0.	0.

* STOREY: 0 * BEAMS: 10 11 12 13 14

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

Location	Effect.	max MED	Required	Beam bars	Provided	Flexural
fl width		(kNm)	steel area	Contin	Addit	steel area capacity
(m)		(kNm)	(mm ²)	(mm ²)	(mm ²)	(kNm)
L end top	0.25	115.6	645.	2 Φ 10	3 Φ 14	619. 111.3
L end bot.	0.43	-53.9	149.	2 Φ 10	--	157. 30.2
midspan	1.27	56.0	290.	2 Φ 10	1 Φ 14	311. 60.0
R end top	0.25	92.7	508.	2 Φ 10	1 Φ 20	785. 138.3
R end bot.	0.61	-30.1	149.	2 Φ 10	--	157. 30.3

|Beam: 11|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

```

|-----+-----|
|           |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----|
| Location |Effect. | max MEd | Required | Beam bars   | Provided |Flexural|
|           |fl width|          | steel area| Contin Addit| steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+---(mm2)---+---(kNm)---|
|L end top  | 0.25   | 105.7   | 585.    | 2Φ10  1Φ20| 785.   | 138.3 |
|L end bot. | 0.61   | -29.1   | 149.    | 2Φ10   -- | 157.   | 30.3  |
|midspan    | 1.09   | 53.8    | 279.    | 2Φ10  1Φ14| 311.   | 59.9  |
|R end top  | 0.25   | 110.7   | 615.    | 2Φ10  2Φ16| 559.   | 101.4 |
|R end bot. | 0.61   | -35.0   | 149.    | 2Φ10   -- | 157.   | 30.3  |
+-----+-----+

```

|Beam: 12|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

```

|-----+-----|
|           |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----|
| Location |Effect. | max MEd | Required | Beam bars   | Provided |Flexural|
|           |fl width|          | steel area| Contin Addit| steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+---(mm2)---+---(kNm)---|
|L end top  | 0.25   | 109.3   | 606.    | 2Φ10  2Φ16| 559.   | 101.4 |
|L end bot. | 0.61   | -33.3   | 149.    | 2Φ10   -- | 157.   | 30.3  |
|midspan    | 1.09   | 53.7    | 279.    | 2Φ10  1Φ14| 311.   | 59.9  |
|R end top  | 0.25   | 109.3   | 606.    | 2Φ10  2Φ16| 559.   | 101.4 |
|R end bot. | 0.61   | -33.3   | 149.    | 2Φ10   -- | 157.   | 30.3  |
+-----+-----+

```

|Beam: 13|Length l: 5.30m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

```

|-----+-----|
|           |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----|
| Location |Effect. | max MEd | Required | Beam bars   | Provided |Flexural|
|           |fl width|          | steel area| Contin Addit| steel area|capacity|
|-----+---(m)---+---(kNm)---+---(mm2)---+---(mm2)---+---(kNm)---|
|L end top  | 0.25   | 110.7   | 615.    | 2Φ10  2Φ16| 559.   | 101.4 |
|L end bot. | 0.61   | -35.0   | 149.    | 2Φ10   -- | 157.   | 30.3  |
|midspan    | 1.09   | 53.8    | 279.    | 2Φ10  1Φ14| 311.   | 59.9  |
|R end top  | 0.25   | 105.7   | 585.    | 2Φ10  1Φ20| 785.   | 138.3 |
|R end bot. | 0.61   | -29.1   | 149.    | 2Φ10   -- | 157.   | 30.3  |
+-----+-----+

```

|Beam: 14|Length l: 5.50m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin Addit	steel area	capacity	
-----	---	---	---	-----	---	---	---
(m)	(kNm)	(kNm)	(mm ²)		(mm ²)	(kNm)	
L end top	0.25	92.7	508.	2Φ10 1Φ20	785.	138.3	
L end bot.	0.61	-30.1	149.	2Φ10 --	157.	30.3	
midspan	1.27	56.0	290.	2Φ10 1Φ14	311.	60.0	
R end top	0.25	115.6	645.	2Φ10 3Φ14	619.	111.3	
R end bot.	0.43	-53.9	149.	2Φ10 --	157.	30.2	

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

Beam: 10									

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd		
-----	---	---	---	---	---	---	---	---	---
(kNm)				(kNm)		(mm)	---	---	---
L end top	89.9	0.697	0.375	76.4	0.318	234.0	0.21	380	618
Midspan	43.6	0.661	0.094	37.0	0.080	321.8	0.27	62	311
R end top	72.1	0.452	0.281	61.1	0.238	229.3	0.13	536	785

Beam: 11									

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd		
-----	---	---	---	---	---	---	---	---	---
(kNm)				(kNm)		(mm)	---	---	---
L end top	79.5	0.474	0.305	67.4	0.259	228.3	0.14	536	785
Midspan	41.9	0.638	0.098	35.6	0.083	321.8	0.26	62	311
R end top	85.9	0.680	0.361	72.9	0.306	243.4	0.21	482	559

Beam: 12									

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd		
-----	---	---	---	---	---	---	---	---	---
(kNm)				(kNm)		(mm)	---	---	---
L end top	84.0	0.665	0.353	71.3	0.299	243.4	0.21	482	559

Midspan	41.8	0.637	0.098		35.5	0.083	321.8	0.26		62	311
R end top	84.0	0.665	0.353		71.3	0.299	243.4	0.21		482	559

| Beam: 13

Location	Characteristic loads G+Q				Quasi-permanent loads G+ψ2Q				Steel for		
	Moment	steel	concrete		Moment	concrete	Crack		cracking		
	stress/fyk		stress/fck		stress/fck		spacing width		min provd		
	-----		-----		-----		-----		-----		
	(kNm)				(kNm)		(mm)		(mm2)		
L end top	85.9	0.680	0.361		72.9	0.306	243.4	0.21		482	559
Midspan	41.9	0.638	0.098		35.6	0.083	321.8	0.26		62	311
R end top	79.5	0.474	0.305		67.4	0.259	228.3	0.14		536	785

| Beam: 14

Location	Characteristic loads G+Q				Quasi-permanent loads G+ψ2Q				Steel for		
	Moment	steel	concrete		Moment	concrete	Crack		cracking		
	stress/fyk		stress/fck		stress/fck		spacing width		min provd		
	-----		-----		-----		-----		-----		
	(kNm)				(kNm)		(mm)		(mm2)		
L end top	72.1	0.430	0.277		61.1	0.234	228.3	0.12		536	785
Midspan	43.6	0.661	0.094		37.0	0.080	321.8	0.27		62	311
R end top	89.9	0.655	0.367		76.4	0.312	232.8	0.19		380	618

* STOREY: -1 * BEAMS: 10 11 12 13 14

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

Beam: 10	Length l: 5.50m X-section InvL Depth h: 0.50m Width bw: 0.25m										
	Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)										
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural					
	fl width		steel area	Contin	Addit	steel area	capacity				
	-----	-----	-----	-----	-----	-----	-----				
	(m)	(kNm)	(mm2)	(mm2)	(mm2)	(kNm)					
L end top	0.25	104.9	580.	2Φ10	2Φ16	559.	101.4				
L end bot.	0.43	-68.8	149.	2Φ10	--	157.	30.2				
midspan	1.27	56.8	295.	2Φ10	1Φ14	311.	60.0				

R end top	0.25	101.7	561.	2Φ10	2Φ16	559.	101.4	
R end bot.	0.61	-65.3	149.	2Φ10	--	157.	30.3	
+-----+								
+-----+								
Beam:	11	Length l: 5.30m X-section InvL			Depth h: 0.50m		Width bw: 0.25m	

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)								

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural		
	fl width		steel area	Contin	Addit	steel area	capacity	
-----	+-	(m)	+-	(kNm)	+-	(mm2)	+-	(mm2)----+- (kNm)--
L end top	0.25	105.0	580.	2Φ10	2Φ16	559.	101.4	
L end bot.	0.61	-65.9	149.	2Φ10	--	157.	30.3	
midspan	1.09	53.4	277.	2Φ10	1Φ14	311.	59.9	
R end top	0.25	108.4	601.	2Φ10	2Φ16	559.	101.4	
R end bot.	0.61	-68.3	149.	2Φ10	--	157.	30.3	
+-----+								
+-----+								
Beam:	12	Length l: 5.30m X-section InvL			Depth h: 0.50m		Width bw: 0.25m	

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)								

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural		
	fl width		steel area	Contin	Addit	steel area	capacity	
-----	+-	(m)	+-	(kNm)	+-	(mm2)	+-	(mm2)----+- (kNm)--
L end top	0.25	107.9	598.	2Φ10	2Φ16	559.	101.4	
L end bot.	0.61	-68.4	149.	2Φ10	--	157.	30.3	
midspan	1.09	53.9	279.	2Φ10	1Φ14	311.	59.9	
R end top	0.25	107.9	598.	2Φ10	2Φ16	559.	101.4	
R end bot.	0.61	-68.4	149.	2Φ10	--	157.	30.3	
+-----+								
+-----+								
Beam:	13	Length l: 5.30m X-section InvL			Depth h: 0.50m		Width bw: 0.25m	

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)								

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural		
	fl width		steel area	Contin	Addit	steel area	capacity	
-----	+-	(m)	+-	(kNm)	+-	(mm2)	+-	(mm2)----+- (kNm)--
L end top	0.25	108.4	601.	2Φ10	2Φ16	559.	101.4	
L end bot.	0.61	-68.3	149.	2Φ10	--	157.	30.3	
midspan	1.09	53.4	277.	2Φ10	1Φ14	311.	59.9	

R end top	0.25	105.0	580.	2Φ10	2Φ16	559.	101.4		
R end bot.	0.61	-65.9	149.	2Φ10	--	157.	30.3		
+-----+									
+-----+									
Beam:	14	Length l:	5.50m	X-section	InvL	Depth h:	0.50m	Width bw:	0.25m

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)									

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural			
	fl width		steel area	Contin	Addit	steel area	capacity		
-----+	---(m)	---(kNm)	---(mm2)	---+	-----+	---(mm2)	---+	---(kNm)---	
L end top	0.25	101.7	561.	2Φ10	2Φ16	559.	101.4		
L end bot.	0.61	-65.3	149.	2Φ10	--	157.	30.3		
midspan	1.27	56.8	295.	2Φ10	1Φ14	311.	60.0		
R end top	0.25	104.9	580.	2Φ10	2Φ16	559.	101.4		
R end bot.	0.43	-68.8	149.	2Φ10	--	157.	30.2		
+-----+									
+-----+									
SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA									
+-----+									
+-----+									
Beam:	10								
+-----+									
Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for						
	Moment steel	concrete	Moment concrete	Crack	cracking				
	stress/fyk	stress/fck	stress/fck	spacing	width	min provd			
-----+	---(kNm)	-----+	---(kNm)	-----	---(mm)	-----+	---(mm2)	---	
L end top	81.6	0.691	0.350	69.3	0.297	252.2	0.22	395 559	
Midspan	44.2	0.671	0.096	37.5	0.081	321.8	0.27	62 311	
R end top	79.2	0.671	0.340	67.1	0.288	244.9	0.21	482 559	
+-----+									
+-----+									
Beam:	11								
+-----+									
Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for						
	Moment steel	concrete	Moment concrete	Crack	cracking				
	stress/fyk	stress/fck	stress/fck	spacing	width	min provd			
-----+	---(kNm)	-----+	---(kNm)	-----	---(mm)	-----+	---(mm2)	---	
L end top	81.7	0.646	0.343	69.3	0.291	243.4	0.20	482 559	
Midspan	41.6	0.633	0.098	35.3	0.083	321.8	0.26	62 311	
R end top	84.4	0.668	0.354	71.6	0.301	243.4	0.21	482 559	
+-----+									
+-----+									
Beam:	12								
+-----+									

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for	
	Moment	steel	concrete	Moment	concrete	Crack		cracking	
		stress/fyk	stress/fck		stress/fck	spacing	width	min	provd
	(kNm)			(kNm)		(mm)		(mm ²)	
L end top	83.9	0.664	0.352	71.2	0.299	243.4	0.21	482	559
Midspan	41.9	0.639	0.098	35.6	0.083	321.8	0.26	62	311
R end top	83.9	0.664	0.352	71.2	0.299	243.4	0.21	482	559

Beam: 13

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for	
	Moment	steel	concrete	Moment	concrete	Crack		cracking	
		stress/fyk	stress/fck		stress/fck	spacing	width	min	provd
	(kNm)			(kNm)		(mm)		(mm ²)	
L end top	84.4	0.668	0.354	71.6	0.301	243.4	0.21	482	559
Midspan	41.6	0.633	0.098	35.3	0.083	321.8	0.26	62	311
R end top	81.7	0.646	0.343	69.3	0.291	243.4	0.20	482	559

Beam: 14

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for	
	Moment	steel	concrete	Moment	concrete	Crack		cracking	
		stress/fyk	stress/fck		stress/fck	spacing	width	min	provd
	(kNm)			(kNm)		(mm)		(mm ²)	
L end top	79.2	0.626	0.332	67.1	0.282	243.4	0.19	482	559
Midspan	44.2	0.671	0.096	37.5	0.081	321.8	0.27	62	311
R end top	81.6	0.645	0.342	69.3	0.291	250.7	0.21	395	559

3A 1.4 FRAME 1

* STOREY: 6 * BEAMS: 22 21

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

+-----+

|Beam: 22|Length l: 4.65m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

-----+-----								
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)								
-----+-----								
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural		
fl width			steel area	Contin Addit	steel area	capacity		
-----+-- (m) -----+-- (kNm) -----+-- (mm2) -----+-- (mm2) -----+-- (kNm) --								
L end top	0.25	186.7	1108.	2Φ14 6Φ12	1083.	188.3		
L end bot.	0.46	151.6	824.	2Φ14 2Φ20	936.	170.8		
midspan	1.44	23.3	287.	2Φ14 --	308.	59.5		
R end top	0.25	228.9	1420.	2Φ14 8Φ12	1399.	245.3		
R end bot.	0.67	157.9	845.	2Φ14 2Φ20	936.	174.3		
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension								
+-----+-----+								
+-----+-----+								
Beam: 21 Length l: 4.65m X-section InvL Depth h: 0.50m Width bw: 0.25m								
-----+-----								
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)								
-----+-----								
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural		
fl width			steel area	Contin Addit	steel area	capacity		
-----+-- (m) -----+-- (kNm) -----+-- (mm2) -----+-- (mm2) -----+-- (kNm) --								
L end top	0.25	226.0	1397.	2Φ14 8Φ12	1399.	245.3		
L end bot.	0.67	160.0	856.	2Φ14 2Φ20	936.	174.3		
midspan	1.44	23.6	287.	2Φ14 --	308.	59.5		
R end top	0.25	188.5	1121.	2Φ14 6Φ12	1083.	188.3		
R end bot.	0.46	149.0	810.	2Φ14 2Φ20	936.	170.8		
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension								
+-----+-----+								
+-----+-----+								
SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR W _{max} =0.3mm & min STEEL AREA								
+-----+-----+								
+-----+-----+								
Beam: 22								
+-----+-----+								
+-----+-----+								
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ ₂ Q			Steel for	
	Moment	steel	concrete	Moment	concrete	Crack	cracking	
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd	
-----+-- (kNm) -----+-- (kNm) -----+-- (mm) -----+-- (mm2) --								
L end top	20.6	0.102	0.055	17.6	0.047	201.4	0.03	299 986
Midspan	18.2	0.278	0.037	15.4	0.031	359.1	0.13	62 307
R end top	41.9	0.171	0.107	35.5	0.091	187.4	0.04	293 1212
+-----+-----+								
+-----+-----+								
Beam: 21								

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking			
	stress/fyk	stress/fyk	stress/fck	stress/fck	stress/fck	spacing	width	min provd		
	(kNm)			(kNm)			(mm)		(mm2)	
L end top	39.0	0.153	0.099	33.0	0.083	187.0	0.04	293	1212	
Midspan	18.3	0.280	0.037	15.6	0.031	359.1	0.13	62	307	
R end top	23.2	0.109	0.062	19.7	0.052	200.8	0.03	299	986	

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
	(mm)	(m)	(kN)	(kN)	(mm2)	(mm2)
1	30	0.30	0.	1415.	0.	0.
2	176	0.30	0.	10378.	0.	0.
3	30	0.30	0.	1413.	0.	0.

* STOREY: 5 * BEAMS: 22 21

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

Beam:	22	Length l:	4.65m	X-section InvL	Depth h:	0.50m	Width bw:	0.25m
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)								
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural		
	fl width		steel area	Contin	Addit	steel area	capacity	
	(m)	(kNm)	(mm2)			(mm2)	(kNm)	
L end top	0.25	228.3	1415.	2Φ14	3Φ20	1347.	232.7	
L end bot.	0.46	185.4	1022.	2Φ14	3Φ20	1250.	223.2	
midspan	1.44	21.9	287.	2Φ14	--	308.	59.5	
R end top	0.25	247.6	1569.	2Φ14	4Φ18	1512.	263.4	
R end bot.	0.67	182.4	981.	2Φ14	3Φ20	1250.	229.4	

|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |

Beam: 21 Length l: 4.65m X-section InvL Depth h: 0.50m Width bw: 0.25m							
-----+-----							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
-----+-----							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin Addit	steel area	capacity	
-----+--- (m) -----+--- (kNm) -----+--- (mm2) -----+--- (mm2) -----+--- (kNm) ---							
L end top	0.25	245.3	1551.	2Φ14 4Φ18	1512.	263.4	
L end bot.	0.67	183.6	989.	2Φ14 3Φ20	1250.	229.4	
midspan	1.44	22.0	287.	2Φ14 --	308.	59.5	
R end top	0.25	229.2	1422.	2Φ14 3Φ20	1347.	232.7	
R end bot.	0.46	183.6	1011.	2Φ14 3Φ20	1250.	223.2	
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension							

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR $W_{max}=0.3\text{mm}$ & min STEEL AREA

Beam: 22							
-----+-----							
Location	Characteristic loads G+Q		Quasi-permanent loads G+ψ2Q		Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking
	stress/fyk	stress/fyk	stress/fck	stress/fck	spacing	width	min provd
	-----+--- (kNm) -----+---	-----+---	-----+---	-----+---	-----+---	-----+---	-----+---
L end top	25.2	0.099	0.058	21.4	0.049	208.2 0.03	377 1250
Midspan	17.1	0.261	0.035	14.5	0.029	359.1 0.12	62 307
R end top	38.7	0.144	0.088	32.6	0.074	198.1 0.04	374 1325

Beam: 21							
-----+-----							
Location	Characteristic loads G+Q		Quasi-permanent loads G+ψ2Q		Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking
	stress/fyk	stress/fyk	stress/fck	stress/fck	spacing	width	min provd
	-----+--- (kNm) -----+---	-----+---	-----+---	-----+---	-----+---	-----+---	-----+---
L end top	36.5	0.131	0.082	30.8	0.069	197.7 0.03	374 1325
Midspan	17.1	0.262	0.035	14.5	0.029	359.1 0.12	62 307
R end top	27.0	0.102	0.061	22.8	0.052	207.6 0.03	377 1250

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv

	(mm)	(m)	(kN)	(kN)	(mm ²)	(mm ²)
1	32	0.30	0.	1343.	0.	0.
2	178	0.30	0.	10199.	0.	0.
3	32	0.30	0.	1338.	0.	0.

-----*

* STOREY: 4 * BEAMS: 22 21

-----*

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

-----*

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

Beam: 22 Length l: 4.65m X-section InvL Depth h: 0.50m Width bw: 0.25m							

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
	fl width		steel area	Contin Addit	steel area	capacity	
-----	--- (m) ---	--- (kNm) ---	--- (mm ²) ---	-----	--- (mm ²) ---	--- (kNm) ---	
L end top	0.25	226.6	1402.	2Φ14 3Φ20	1347.	232.7	
L end bot.	0.46	184.3	1015.	2Φ14 3Φ20	1250.	223.2	
midspan	1.44	22.2	287.	2Φ14 --	308.	59.5	
R end top	0.25	249.6	1586.	2Φ14 4Φ18	1512.	263.4	
R end bot.	0.67	182.9	985.	2Φ14 3Φ20	1250.	229.4	
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension							

Beam: 21 Length l: 4.65m X-section InvL Depth h: 0.50m Width bw: 0.25m							

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
	fl width		steel area	Contin Addit	steel area	capacity	
-----	--- (m) ---	--- (kNm) ---	--- (mm ²) ---	-----	--- (mm ²) ---	--- (kNm) ---	
L end top	0.25	246.6	1561.	2Φ14 4Φ18	1512.	263.4	
L end bot.	0.67	184.8	995.	2Φ14 3Φ20	1250.	229.4	
midspan	1.44	22.3	287.	2Φ14 --	308.	59.5	
R end top	0.25	228.4	1416.	2Φ14 3Φ20	1347.	232.7	
R end bot.	0.46	181.4	998.	2Φ14 3Φ20	1250.	223.2	
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension							

-----+
 SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA
 -----+

Beam: 22									
-----+									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk		stress/fck	stress/fck		spacing	width	min provd	
	(kNm)			(kNm)			(mm)	(mm2)	
L end top	24.9	0.098	0.057	21.2	0.049	208.2	0.03	377	1250
Midspan	17.3	0.264	0.035	14.7	0.030	359.1	0.12	62	307
R end top	39.4	0.147	0.089	33.3	0.076	198.1	0.04	374	1325

Beam: 21									
-----+									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk		stress/fck	stress/fck		spacing	width	min provd	
	(kNm)			(kNm)			(mm)	(mm2)	
L end top	36.5	0.132	0.082	30.9	0.069	197.7	0.03	374	1325
Midspan	17.4	0.266	0.035	14.7	0.030	359.1	0.12	62	307
R end top	27.6	0.105	0.063	23.5	0.053	207.6	0.03	377	1250

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 JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR
 -----+

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
	(mm)	(m)	(kN)	(kN)	(mm2)	(mm2)
1	32	0.30	0.	1268.	0.	0.
2	180	0.30	0.	10017.	0.	0.
3	30	0.30	0.	1258.	0.	0.

-----*
 * STOREY: 3 * BEAMS: 22 21
 -----*
 * Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *
 -----*

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

-----+
 |Beam: 22|Length l: 4.65m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |
 -----+

-----+-----							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
-----+-----							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin Addit	steel area	capacity	
-----+--- (m) ---+--- (kNm) ---+--- (mm2) ---+-----+--- (mm2) ---+--- (kNm) ---							
L end top	0.25	223.0	1374.	2Φ14 3Φ20	1347.	232.7	
L end bot.	0.46	179.0	984.	2Φ14 3Φ20	1250.	223.2	
midspan	1.44	22.2	287.	2Φ14 --	308.	59.5	
R end top	0.25	242.9	1531.	2Φ14 3Φ20	1437.	251.8	
R end bot.	0.67	177.9	956.	2Φ14 2Φ20	936.	174.3	
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension							

|Beam: 21|Length l: 4.65m|X-section InvL | Depth h: 0.50m| Width bw: 0.25m |

-----+-----							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
-----+-----							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin Addit	steel area	capacity	
-----+--- (m) ---+--- (kNm) ---+--- (mm2) ---+-----+--- (mm2) ---+--- (kNm) ---							
L end top	0.25	240.1	1509.	2Φ14 3Φ20	1437.	251.8	
L end bot.	0.67	179.5	966.	2Φ14 2Φ20	936.	174.3	
midspan	1.44	22.3	287.	2Φ14 --	308.	59.5	
R end top	0.25	224.6	1386.	2Φ14 3Φ20	1347.	236.2	
R end bot.	0.46	176.4	969.	2Φ14 2Φ20	936.	170.8	
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension							

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR W_{max}=0.3mm & min STEEL AREA

-----+-----+-----+-----+-----+-----+-----+-----							
Beam: 22							
-----+-----+-----+-----+-----+-----+-----+-----							
Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ ₂ Q	Steel for				
	Moment steel	concrete	Moment concrete	Crack	cracking		
	stress/fyk	stress/fck	stress/fck	spacing	width	min provd	
-----+--- (kNm) ---+-----+--- (kNm) ---+-----+--- (mm) ---+-----+--- (mm2) ---							
L end top	25.9	0.102	0.059	22.0	0.051	208.2	0.03 377 1250
Midspan	17.3	0.264	0.035	14.7	0.030	359.1	0.12 62 307
R end top	38.4	0.152	0.097	32.5	0.082	203.9	0.04 388 1250

|Beam: 21 |

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for	
	Moment	steel stress/fyk	concrete stress/fck	Moment	concrete stress/fck	Crack spacing	width	cracking	
	(kNm)			(kNm)		(mm)		(mm2)	
L end top	35.8	0.137	0.090	30.3	0.076	203.3	0.04	388	1250
Midspan	17.4	0.265	0.035	14.7	0.030	359.1	0.12	62	307
R end top	28.3	0.108	0.071	24.1	0.060	205.7	0.03	377	1250

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
	(mm)	(m)	(kN)	(kN)	(mm2)	(mm2)
1	30	0.30	0.	1188.	0.	0.
2	182	0.30	0.	9832.	0.	0.
3	30	0.30	0.	1173.	0.	0.

* STOREY: 2 * BEAMS: 22 21

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

Beam:	22	Length l:	4.65m	X-section InvL	Depth h:	0.50m	Width bw:	0.25m
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)								
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural		
	fl width	(kNm)	steel area	Contin	Addit	steel area	capacity	
	(m)	(kNm)	(mm2)			(mm2)	(kNm)	
L end top	0.25	202.2	1218.	2Φ14	3Φ18	1168.	204.1	
L end bot.	0.46	155.6	848.	2Φ14	2Φ20	936.	170.8	
midspan	1.44	22.2	287.	2Φ14	--	308.	59.5	
R end top	0.25	218.1	1336.	2Φ14	3Φ18	1258.	220.4	
R end bot.	0.67	155.4	831.	2Φ14	2Φ20	936.	174.3	

|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |

Beam: 21 Length l: 4.65m X-section InvL Depth h: 0.50m Width bw: 0.25m							
-----+-----							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
-----+-----							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin Addit	steel area	capacity	
-----+-- (m) -----+-- (kNm) -----+-- (mm2) -----+-- (mm2) -----+-- (kNm) --							
L end top	0.25	215.8	1319.	2Φ14 3Φ18	1258.	220.4	
L end bot.	0.67	156.8	838.	2Φ14 2Φ20	936.	174.3	
midspan	1.44	22.2	287.	2Φ14 --	308.	59.5	
R end top	0.25	203.5	1228.	2Φ14 3Φ18	1168.	204.1	
R end bot.	0.46	153.5	835.	2Φ14 2Φ20	936.	170.8	
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension							

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

Beam: 22							
-----+-----							
Location	Characteristic loads G+Q		Quasi-permanent loads G+ψ2Q		Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking
	stress/fyk	stress/fyk	stress/fck	stress/fck	spacing	width	min provd
-----+-- (kNm) -----+-- (kNm) -----+-- (mm) -----+-- (mm2) --							
L end top	27.3	0.125	0.072	23.3	0.061	212.6 0.03	362 1071
Midspan	17.3	0.264	0.035	14.6	0.030	359.1 0.12	62 307
R end top	37.0	0.169	0.097	31.3	0.082	209.6 0.05	371 1071

Beam: 21							
-----+-----							
Location	Characteristic loads G+Q		Quasi-permanent loads G+ψ2Q		Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking
	stress/fyk	stress/fyk	stress/fck	stress/fck	spacing	width	min provd
-----+-- (kNm) -----+-- (kNm) -----+-- (mm) -----+-- (mm2) --							
L end top	34.9	0.153	0.091	29.5	0.077	208.9 0.04	371 1071
Midspan	17.3	0.265	0.035	14.7	0.030	359.1 0.12	62 307
R end top	29.4	0.128	0.076	25.0	0.065	211.9 0.03	362 1071

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv

	(mm)	(m)	(kN)	(kN)	(mm ²)	(mm ²)
1	30	0.30	0.	1108.	0.	0.
2	184	0.30	0.	9646.	0.	0.
3	30	0.30	0.	1086.	0.	0.

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* STOREY: 1 * BEAMS: 22 21

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* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

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GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

Beam: 22 Length l: 4.65m X-section InvL Depth h: 0.50m Width bw: 0.25m							

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
	fl width		steel area	Contin Addit	steel area	capacity	
-----	--- (m) ---	--- (kNm) ---	--- (mm ²) ---	-----	--- (mm ²) ---	--- (kNm) ---	
L end top	0.25	158.5	916.	2Φ14 2Φ18	913.	158.0	
L end bot.	0.46	111.9	599.	2Φ14 1Φ20	622.	116.0	
midspan	1.44	22.7	287.	2Φ14 --	308.	59.5	
R end top	0.25	170.4	996.	2Φ14 2Φ18	1003.	177.2	
R end bot.	0.67	109.3	577.	2Φ14 1Φ20	622.	117.5	
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension							

Beam: 21 Length l: 4.65m X-section InvL Depth h: 0.50m Width bw: 0.25m							

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
	fl width		steel area	Contin Addit	steel area	capacity	
-----	--- (m) ---	--- (kNm) ---	--- (mm ²) ---	-----	--- (mm ²) ---	--- (kNm) ---	
L end top	0.25	168.9	986.	2Φ14 2Φ18	1003.	177.2	
L end bot.	0.67	110.4	583.	2Φ14 1Φ20	622.	117.5	
midspan	1.44	22.8	287.	2Φ14 --	308.	59.5	
R end top	0.25	159.5	923.	2Φ14 2Φ18	913.	158.0	
R end bot.	0.46	110.5	591.	2Φ14 1Φ20	622.	116.0	
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension							

-----+
 SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA
 -----+

Beam: 22									
-----+									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk	stress/fyk	stress/fck	stress/fck	stress/fck	spacing	width	min provd	
	----- (kNm) -----			----- (kNm) -----			----- (mm) -----		----- (mm2) -----
L end top	27.4	0.161	0.086	23.3	0.074	232.1	0.05	358	816
Midspan	17.7	0.270	0.036	15.0	0.030	359.1	0.12	62	307
R end top	36.1	0.213	0.114	30.6	0.096	227.2	0.06	366	816

Beam: 21									
-----+									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk	stress/fyk	stress/fck	stress/fck	stress/fck	spacing	width	min provd	
	----- (kNm) -----			----- (kNm) -----			----- (mm) -----		----- (mm2) -----
L end top	34.6	0.193	0.108	29.3	0.091	226.1	0.06	366	816
Midspan	17.7	0.271	0.036	15.0	0.030	359.1	0.12	62	307
R end top	28.8	0.161	0.089	24.5	0.076	231.0	0.05	358	816

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 JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR
 -----+

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		b _j	V _{jh}	strength	area A _{sh}	area A _{sv}
	(mm)	(m)	(kN)	(kN)	(mm ²)	(mm ²)
1	32	0.30	0.	1032.	0.	0.
2	186	0.30	0.	9462.	0.	0.
3	30	0.30	0.	1004.	0.	0.

3A 1.5 FRAME 2

-----*
 * STOREY: 6 * BEAMS: 28 27
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 * Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *
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GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

+-----+							
Beam: 28 Length l: 6.60m X-section T Depth h: 0.50m Width bw: 0.25m							
-----+							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
-----+							
Location	Effect.	max MED	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin Addit	steel area	capacity	
-----+--	(m)-----	(kNm)---	(mm2)---	-----+--	(mm2)---	(kNm)---	----
L end top	0.25	118.6	663.	2Φ14 --	713.	126.8	
L end bot.	0.67	-8.0	331.	2Φ14 --	308.	59.0	
midspan	2.63	112.2	581.	2Φ14 2Φ14	616.	118.8	
R end top	0.25	181.6	1072.	2Φ14 1Φ20	1045.	184.5	
R end bot.	1.09	-53.5	536.	2Φ14 --	616.	117.6	
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension							
Note:1. Addit. bot. midspan bars extended: 2Φ14 to Right end.							
2. Addit. bot. midspan bars extended to Left end of beam 2: 2Φ14							
+-----+							

+-----+							
Beam: 27 Length l: 6.60m X-section T Depth h: 0.50m Width bw: 0.25m							
-----+							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
-----+							
Location	Effect.	max MED	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin Addit	steel area	capacity	
-----+--	(m)-----	(kNm)---	(mm2)---	-----+--	(mm2)---	(kNm)---	----
L end top	0.25	184.1	1090.	2Φ14 1Φ20	1045.	184.5	
L end bot.	1.09	-57.3	545.	2Φ14 --	616.	117.6	
midspan	2.63	111.8	579.	2Φ14 2Φ14	616.	118.8	
R end top	0.25	115.4	643.	2Φ14 --	600.	108.3	
R end bot.	0.67	-5.6	322.	2Φ14 --	308.	59.0	
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension							
Note:1. Addit. bot. midspan bars of beam 2 ext. to L end of beam 1: 2Φ14							
+-----+							

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR W_{max}=0.3mm & min STEEL AREA

+-----+							
Beam: 28							
-----+							
Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for				
	Moment steel	concrete	Moment concrete	Crack	cracking		
+-----+							

	stress/fyk	stress/fck	stress/fyk	stress/fck	spacing	width	min	provd
	(kNm)		(kNm)		(mm)		(mm2)	
L end top	74.5	0.717	0.312	63.3	0.265	271.0	0.25	203 420
Midspan	87.3	0.668	0.093	74.0	0.079	262.4	0.22	62 615
R end top	138.6	0.970	0.463	117.5	0.392	240.7	0.30	370 622

|Beam: 27

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for					
	Moment steel	concrete	Moment concrete					
	stress/fyk	stress/fck	stress/fck					
	(kNm)		spacing					
	(kNm)		width					
	(kNm)		min					
	(kNm)		provd					
L end top	142.4	0.876	0.456	120.7	0.387	238.1	0.27	370 622
Midspan	87.0	0.666	0.093	73.8	0.079	262.4	0.22	62 615
R end top	71.3	0.696	0.300	60.5	0.255	312.8	0.28	215 307

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
	(mm)	(m)	(kN)	(kN)	(mm2)	(mm2)
1	14	0.40	0.	799.	0.	0.
2	22	0.50	0.	2013.	0.	0.
3	14	0.40	0.	799.	0.	0.

* STOREY: 5 * BEAMS: 28 27

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

Beam:	28	Length l:	6.60m	X-section	T	Depth h:	0.50m	Width bw:	0.25m	
	Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)									
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural				
	fl width	steel area	Contin	Addit	steel area	capacity				
	(m)	(kNm)	(mm2)	(mm2)	(kNm)					
L end top	0.25	186.3	1105.	2Φ14	3Φ14	1062.	187.6			

L end bot.	0.67	-4.0	553.	2Φ14	--	616.	116.4
midspan	2.63	100.0	518.	2Φ14	2Φ14	616.	118.8
R end top	0.25	200.5	1206.	2Φ14	3Φ14	1192.	209.8
R end bot.	1.09	-2.8	603.	2Φ14	--	616.	117.6
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension							
Note:1. Addit. bot. midspan bars extended: 2Φ14 to L end - 2Φ14 to R end							
2. Addit. bot. midspan bars extended to Left end of beam 2: 2Φ14							

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+-----+
|Beam: 27|Length l: 6.60m|X-section T | Depth h: 0.50m| Width bw: 0.25m |
|-----+
| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+
| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|
| |fl width| |steel area |Contin Addit |steel area|capacity|

Location	Effect. fl width	max MEd (kNm)	Required steel area (mm ²)	Beam bars	Contin Addit	Provided steel area (mm ²)	Flexural capacity (kNm)
L end top	0.25	204.6	1236.	2Φ14	3Φ14	1192.	209.8
L end bot.	1.09	-8.5	618.	2Φ14	--	616.	117.6
midspan	2.63	99.7	516.	2Φ14	2Φ14	616.	118.8
R end top	0.25	181.2	1069.	2Φ14	3Φ14	1062.	187.6
R end bot.	0.67	-0.1	535.	2Φ14	--	616.	116.4
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension							
Note:1. Addit. bot. midspan bars extended: 2Φ14 to Right end.							
2. Addit. bot. midspan bars of beam 2 ext. to L end of beam 1: 2Φ14							

-----+
+-----+
SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR W_{max}=0.3mm & min STEEL AREA
+-----+
+-----+

Beam: 28							
+-----+ +-----+							
Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ ₂ Q	Steel for				
	Moment steel stress/fyk	concrete stress/fck	Moment concrete stress/fck	Crack spacing	width	min provd	
	(kNm)	(kNm)	(kNm)	(mm)	(mm)	(mm ²)	
L end top	112.1	0.657	0.354	95.1	0.301	219.6	0.18 215 769
Midspan	77.8	0.596	0.083	66.0	0.070	262.4	0.20 62 615
R end top	120.0	0.703	0.379	101.7	0.321	211.7	0.19 302 769

+-----+ +-----+ Beam: 27							
+-----+ +-----+							
Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ ₂ Q	Steel for				
	Moment steel stress/fyk	concrete stress/fck	Moment concrete stress/fck	Crack spacing	width	min provd	

	stress/fyk	stress/fck	stress/fck	spacing	width	min	provd
	(kNm)	(kNm)	(kNm)	(mm)	(mm ²)		
L end top	125.7	0.661	0.384	106.6	0.326	210.1	0.18 302 769
Midspan	77.6	0.594	0.083	65.8	0.070	262.4	0.20 62 615
R end top	106.8	0.562	0.327	90.6	0.277	217.7	0.16 215 769

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
	(mm)	(m)	(kN)	(kN)	(mm ²)	(mm ²)
1	14	0.40	0.	747.	0.	0.
2	24	0.50	0.	1824.	0.	0.
3	14	0.40	0.	749.	0.	0.

* STOREY: 4 * BEAMS: 28 27

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
	fl width	(kNm)	steel area	Contin	Addit	steel area capacity
	(m)	(kNm)	(mm ²)	(mm ²)	(mm ²)	(kNm)
L end top	0.25	179.2	1056.	2Φ14	3Φ14	1062. 187.6
L end bot.	0.67	-0.9	528.	2Φ14	--	616. 116.4
midspan	2.63	101.5	525.	2Φ14	2Φ14	616. 118.8
R end top	0.25	201.7	1215.	2Φ14	3Φ14	1192. 209.8
R end bot.	1.09	-7.9	607.	2Φ14	--	616. 117.6

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

|Note:1. Addit. bot. midspan bars extended: 2Φ14 to L end - 2Φ14 to R end |

| 2. Addit. bot. midspan bars extended to Left end of beam 2: 2Φ14 |

|Beam: 27|Length l: 6.60m|X-section T | Depth h: 0.50m| Width bw: 0.25m |

-----+-----							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
-----+-----							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
	fl width		steel area	Contin Addit	steel area	capacity	
-----+-- (m)-----+-- (kNm)-----+-- (mm2)-----+-- (mm2)-----+-- (kNm)-----							
L end top	0.25	205.7	1244.	2Φ14 3Φ14	1192.	209.8	
L end bot.	1.09	-13.4	622.	2Φ14 --	616.	117.6	
midspan	2.63	101.2	524.	2Φ14 2Φ14	616.	118.8	
R end top	0.25	175.6	1031.	2Φ14 4Φ12	1053.	186.0	
R end bot.	0.67	1.5	516.	2Φ14 --	616.	116.4	
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension							
Note:1. Addit. bot. midspan bars extended: 2Φ14 to Right end.							
2. Addit. bot. midspan bars of beam 2 ext. to L end of beam 1: 2Φ14							

-----+-----
SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR W_{max}=0.3mm & min STEEL AREA
-----+-----

-----+-----							
Beam: 28							
-----+-----							
Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for				
	Moment steel	concrete	Moment concrete	Crack	cracking		
	stress/fyk	stress/fck	stress/fck	spacing	width	min provd	
-----+-- (kNm)-----+-- (kNm)-----+-- (mm)-----+-- (mm2)-----							
L end top	106.1	0.622	0.335	90.1	0.285	219.6	0.17 215 769
Midspan	79.0	0.605	0.084	67.0	0.071	262.4	0.20 62 615
R end top	123.6	0.725	0.391	104.8	0.331	211.7	0.20 302 769

-----+-----							
Beam: 27							
-----+-----							
Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for				
	Moment steel	concrete	Moment concrete	Crack	cracking		
	stress/fyk	stress/fck	stress/fck	spacing	width	min provd	
-----+-- (kNm)-----+-- (kNm)-----+-- (mm)-----+-- (mm2)-----							
L end top	129.2	0.680	0.395	109.6	0.335	210.1	0.18 302 769
Midspan	78.8	0.603	0.084	66.8	0.071	262.4	0.20 62 615
R end top	102.3	0.543	0.314	87.1	0.267	212.1	0.15 191 760

-----+-----
JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR
-----+-----

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
-------	-------	---------	--------------	--------------	--------------	--------------

	bj	Vjh	strength	area Ash	area Asv
(mm)	(m)	(kN)	(kN)	(mm2)	(mm2)
1 14	0.40	0.	693.	0.	0.
2 24	0.50	0.	1609.	0.	0.
3 14	0.40	0.	696.	0.	0.

* STOREY: 3 * BEAMS: 28 27

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

Beam: 28 Length l: 6.60m X-section T Depth h: 0.50m Width bw: 0.25m							

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin	Addit	steel area	capacity
(m)		(kNm)	(mm2)			(mm2)	(kNm)
L end top	0.25	174.2	1022.	2Φ14	3Φ12	1062.	187.6
L end bot.	0.67	-0.4	511.	2Φ14	--	616.	116.4
midspan	2.63	101.1	523.	2Φ14	2Φ14	616.	118.8
R end top	0.25	200.4	1205.	2Φ14	3Φ14	1192.	209.8
R end bot.	1.09	-11.3	603.	2Φ14	--	616.	117.6
Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension							
Note:1. Addit. bot. midspan bars extended: 2Φ14 to L end - 2Φ14 to R end							
2. Addit. bot. midspan bars extended to Left end of beam 2: 2Φ14							

Beam: 27 Length l: 6.60m X-section T Depth h: 0.50m Width bw: 0.25m							

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin	Addit	steel area	capacity
(m)		(kNm)	(mm2)			(mm2)	(kNm)
L end top	0.25	204.6	1236.	2Φ14	3Φ14	1192.	209.8
L end bot.	1.09	-17.1	618.	2Φ14	--	616.	117.6
midspan	2.63	100.9	522.	2Φ14	2Φ14	616.	118.8
R end top	0.25	171.2	1001.	2Φ14	3Φ12	1062.	187.6

|R end bot. | 0.67 | 1.4 | 501. | 2Φ14 -- | 616. | 116.4 |
 |Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |
 |Note:1. Addit. bot. midspan bars extended: 2Φ14 to Right end. |
 | 2. Addit. bot. midspan bars of beam 2 ext. to L end of beam 1: 2Φ14 |

-----+-----+-----+-----+-----+-----+-----+-----+-----+
 SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

Beam: 28									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd		
	-(kNm)			-(kNm)			-(mm)		
L end top	103.2	0.605	0.326	87.3	0.276	226.5	0.17	242	769
Midspan	78.7	0.603	0.084	66.8	0.071	262.4	0.20	62	615
R end top	124.9	0.732	0.395	105.9	0.334	211.7	0.20	302	769

Beam: 27									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd		
	-(kNm)			-(kNm)			-(mm)		
L end top	130.7	0.688	0.400	110.8	0.339	210.1	0.18	302	769
Midspan	78.5	0.601	0.084	66.6	0.071	262.4	0.20	62	615
R end top	100.0	0.526	0.306	84.9	0.260	224.4	0.15	242	769

-----+-----+-----+-----+-----+-----+-----+-----+-----+
 JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
	-(mm)	-(m)	-(kN)	-(kN)	-(mm ²)	-(mm ²)
1	14	0.40	0.	633.	0.	0.
2	26	0.50	0.	1358.	0.	0.
3	14	0.40	0.	638.	0.	0.

-----*
 * STOREY: 2 * BEAMS: 28 27
 -----*

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *

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GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

+-----+

|Beam: 28|Length l: 6.60m|X-section T | Depth h: 0.50m| Width bw: 0.25m |

|-----|

| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

|-----|

| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|

| |fl width| |steel area |Contin Addit |steel area|capacity|

|-----+---(m)---+---(kNm)---+---(mm2)---+---(mm2)---+---(kNm)---|

|L end top | 0.25 | 167.4 | 976. | 2Φ14 3Φ12| 940. | 162.0 |

|L end bot. | 0.67 | -11.5 | 488. | 2Φ14 -- | 462. | 87.9 |

|midspan | 2.63 | 100.4 | 520. | 2Φ14 2Φ14| 616. | 118.8 |

|R end top | 0.25 | 191.7 | 1143. | 2Φ14 2Φ16| 1132. | 199.7 |

|R end bot. | 1.09 | -22.1 | 572. | 2Φ14 -- | 616. | 117.6 |

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

|Note:1. Addit. bot. midspan bars extended: 1Φ14 to L end - 2Φ14 to R end |

| 2. Addit. bot. midspan bars extended to Left end of beam 2: 2Φ14 |

+-----+

+-----+

|Beam: 27|Length l: 6.60m|X-section T | Depth h: 0.50m| Width bw: 0.25m |

|-----|

| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

|-----|

| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|

| |fl width| |steel area |Contin Addit |steel area|capacity|

|-----+---(m)---+---(kNm)---+---(mm2)---+---(mm2)---+---(kNm)---|

|L end top | 0.25 | 193.2 | 1154. | 2Φ14 2Φ16| 1132. | 199.7 |

|L end bot. | 1.09 | -25.1 | 577. | 2Φ14 -- | 616. | 117.6 |

|midspan | 2.63 | 100.0 | 518. | 2Φ14 2Φ14| 616. | 118.8 |

|R end top | 0.25 | 162.0 | 940. | 2Φ14 2Φ14| 908. | 157.3 |

|R end bot. | 0.67 | -7.4 | 470. | 2Φ14 -- | 462. | 87.9 |

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

|Note:1. Addit. bot. midspan bars extended: 1Φ14 to Right end. |

| 2. Addit. bot. midspan bars of beam 2 ext. to L end of beam 1: 2Φ14|

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+-----+

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

+-----+

|Beam: 28 |

+-----+

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for		
	Moment	steel	concrete	Moment	concrete	Crack		cracking		
	stress/fyk	stress/fck		stress/fck	spacing	width	min	provd		
	-(kNm)			-(kNm)			-(mm)		-(mm2)	
L end top	105.4	0.717	0.370	89.5	0.314	225.8	0.21	194	647	
Midspan	78.1	0.598	0.083	66.3	0.071	262.4	0.20	62	615	
R end top	126.1	0.791	0.407	106.9	0.345	222.4	0.22	333	709	

Beam: 27

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for		
	Moment	steel	concrete	Moment	concrete	Crack		cracking		
	stress/fyk	stress/fck		stress/fck	spacing	width	min	provd		
	-(kNm)			-(kNm)			-(mm)		-(mm2)	
L end top	129.2	0.722	0.402	109.1	0.340	220.4	0.20	333	709	
Midspan	77.8	0.596	0.083	66.0	0.070	262.4	0.20	62	615	
R end top	99.8	0.621	0.340	84.7	0.289	234.8	0.19	215	615	

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
	(mm)	(m)	(kN)	(kN)	(mm2)	(mm2)
1	16	0.40	0.	569.	0.	0.
2	28	0.50	0.	1048.	0.	0.
3	16	0.40	0.	575.	0.	0.

* STOREY: 1 * BEAMS: 28 27

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

Beam:	28	Length l:	6.60m	X-section	T	Depth h:	0.50m	Width bw:	0.25m
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)									
Location	Effect.	max MED	Required	Beam bars	Provided	Flexural			
	fl width		steel area	Contin Addit	steel area	capacity			

	(m)	(kNm)	(mm ²)	(mm ²)	(kNm)
L end top	0.25	132.8	751.	2Φ14 1Φ14	754. 133.3
L end bot.	0.67	-22.6	375.	2Φ14 --	462. 87.9
midspan	2.63	103.7	537.	2Φ14 2Φ14	616. 118.8
R end top	0.25	174.4	1023.	2Φ14 2Φ14	1038. 183.4
R end bot.	1.09	-54.0	511.	2Φ14 --	616. 117.6

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

|Note:1. Addit. bot. midspan bars extended: 1Φ14 to L end - 2Φ14 to R end |

| 2. Addit. bot. midspan bars extended to Left end of beam 2: 2Φ14 |

|Beam: 27|Length l: 6.60m|X-section T | Depth h: 0.50m| Width bw: 0.25m |

|Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
	fl width		steel area	Contin Addit	steel area	capacity

	(m)	(kNm)	(mm ²)	(mm ²)	(kNm)
L end top	0.25	181.3	1071.	2Φ14 2Φ14	1038. 183.4
L end bot.	1.09	-60.3	535.	2Φ14 --	616. 117.6
midspan	2.63	103.8	537.	2Φ14 2Φ14	616. 118.8
R end top	0.25	126.5	712.	2Φ14 1Φ12	713. 126.8
R end bot.	0.67	-17.8	356.	2Φ14 --	462. 87.9

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

|Note:1. Addit. bot. midspan bars extended: 1Φ14 to Right end. |

| 2. Addit. bot. midspan bars of beam 2 ext. to L end of beam 1: 2Φ14|

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

|Beam: 28 |

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for
	Moment steel	concrete	Moment concrete
	stress/fyk	stress/fck	stress/fck
			spacing
			width
			min provd

	(kNm)	(kNm)	(mm)	(mm ²)
L end top	91.5	0.816	0.351	77.7 0.298 267.7 0.28 215 461
Midspan	80.7	0.618	0.086	68.5 0.073 262.4 0.21 62 615
R end top	134.7	0.951	0.451	114.2 0.382 227.2 0.27 302 615

|Beam: 27 |

Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for	
	Moment	steel stress/fyk	concrete stress/fck	Moment	concrete stress/fck	Crack spacing	width	cracking min provd	
	(kNm)			(kNm)		(mm)		(mm2)	
L end top	141.1	0.874	0.453	119.7	0.385	224.9	0.25	302	615
Midspan	80.8	0.619	0.086	68.5	0.073	262.4	0.21	62	615
R end top	85.0	0.684	0.315	72.1	0.267	269.0	0.23	203	420

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
	(mm)	(m)	(kN)	(kN)	(mm2)	(mm2)
1	16	0.40	0.	499.	0.	0.
2	30	0.50	0.	570.	0.	0.
3	16	0.40	0.	508.	0.	0.

* STOREY: 0 * BEAMS: 28 27 26

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

Beam	28	Length l:	6.60m	X-section	T	Depth h:	0.50m	Width bw:	0.25m
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)									
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural			
	fl width		steel area	Contin Addit	steel area	capacity			
	(m)	(kNm)	(mm2)		(mm2)	(kNm)			
L end top	0.25	179.6	1058.	3Φ10 3Φ18	999.	174.0			
L end bot.	0.67	-106.8	149.	2Φ10 --	157.	30.3			
midspan	2.63	86.8	449.	2Φ10 2Φ14	465.	89.9			
R end top	0.25	145.0	829.	3Φ10 3Φ16	839.	146.6			
R end bot.	1.09	-78.8	149.	2Φ10 --	157.	30.4			

Beam: 27 | Length l: 6.60m | X-section T | Depth h: 0.50m | Width bw: 0.25m |

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin Addit	steel area	capacity	
--- (m) ---	--- (kNm) ---	--- (mm2) ---	--- (mm2) ---	--- (kNm) ---	--- (mm2) ---	--- (kNm) ---	---
L end top	0.25	150.2	862.	3Φ10 3Φ16	839.	146.6	
L end bot.	1.09	-82.3	149.	2Φ10 --	157.	30.4	
midspan	2.63	83.5	432.	2Φ10 2Φ14	465.	89.9	
R end top	0.25	181.0	1068.	3Φ10 7Φ12	1027.	178.4	
R end bot.	0.67	-106.9	149.	2Φ10 --	157.	30.3	

|Beam: 26|Length l: 6.70m|X-section T | Depth h: 0.50m| Width bw: 0.25m |

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin Addit	steel area	capacity	
--- (m) ---	--- (kNm) ---	--- (mm2) ---	--- (mm2) ---	--- (kNm) ---	--- (mm2) ---	--- (kNm) ---	---
L end top	0.25	159.7	924.	3Φ10 6Φ12	914.	158.2	
L end bot.	1.09	-97.0	149.	2Φ10 --	157.	30.4	
midspan	2.63	88.2	456.	2Φ10 2Φ14	465.	89.9	
R end top	0.25	162.1	940.	3Φ10 6Φ12	914.	158.2	
R end bot.	0.67	-100.9	149.	2Φ10 --	157.	30.3	

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

|Beam: 28 |

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for	
Moment steel	concrete	Moment concrete	Crack	cracking
stress/fyk	stress/fck	stress/fck	spacing width	min provd
--- (kNm) ---	--- (kNm) ---	--- (kNm) ---	--- (mm) ---	--- (mm2) ---
L end top	139.7	0.670	0.503	118.6 0.427 202.0 0.17 531 999
Midspan	67.5	0.680	0.083	57.3 0.070 277.9 0.24 62 464
R end top	112.9	0.627	0.424	95.7 0.359 201.5 0.16 716 838

|Beam: 27 |

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for	
Moment steel	concrete	Moment concrete	Crack	cracking

	stress/fyk	stress/fck	stress/fck	spacing	width	min	provd
	(kNm)	(kNm)	(kNm)	(mm)	(mm ²)		
L end top	116.9	0.588	0.426	99.1	0.362	200.1	0.15 716 838
Midspan	65.0	0.654	0.079	55.1	0.067	277.9	0.23 62 464
R end top	140.9	0.607	0.492	119.5	0.417	186.2	0.14 462 1027

|Beam: 26

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for
	Moment steel	concrete	Moment concrete
	stress/fyk	stress/fck	stress/fck
	(kNm)	(kNm)	(kNm)
L end top	124.3	0.586	0.445
Midspan	68.6	0.691	0.084
R end top	126.2	0.595	0.452

* STOREY: -1 * BEAMS: 28 27 26

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *

GEOMETRY - BENDING MOMENTS MEd - LONGITUDINAL REINFORCEMENT

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
	fl width	(kNm)	steel area	Contin	Addit	steel area capacity
	(m)	(kNm)	(mm ²)	(mm ²)	(mm ²)	(kNm)
L end top	0.25	163.1	947.	3Φ10	6Φ12	914. 158.2
L end bot.	0.67	-104.0	149.	2Φ10	--	157. 30.3
midspan	2.63	87.9	455.	2Φ10	2Φ14	465. 89.9
R end top	0.25	159.2	921.	3Φ10	2Φ20	864. 150.5
R end bot.	1.09	-102.6	149.	2Φ10	--	157. 30.4

|Beam: 27|Length l: 6.60m|X-section T | Depth h: 0.50m| Width bw: 0.25m |

|-----|

| Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end) |

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin Addit	steel area	capacity
--- (m) ---	--- (kNm) ---	--- (mm2) ---	--- (mm2) ---	--- (mm2) ---	--- (kNm) ---	
L end top	0.25	159.5	923.	3Φ10 2Φ20	864.	150.5
L end bot.	1.09	-104.0	149.	2Φ10 --	157.	30.4
midspan	2.63	83.4	431.	2Φ10 2Φ14	465.	89.9
R end top	0.25	171.9	1006.	3Φ10 7Φ12	1027.	178.4
R end bot.	0.67	-111.9	149.	2Φ10 --	157.	30.3

|Beam: 26|Length l: 6.70m|X-section T | Depth h: 0.50m| Width bw: 0.25m |

|Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin Addit	steel area	capacity
--- (m) ---	--- (kNm) ---	--- (mm2) ---	--- (mm2) ---	--- (mm2) ---	--- (kNm) ---	
L end top	0.25	166.7	971.	3Φ10 6Φ12	914.	158.2
L end bot.	1.09	-105.9	149.	2Φ10 --	157.	30.4
midspan	2.63	87.0	450.	2Φ10 2Φ14	465.	89.9
R end top	0.25	157.6	910.	3Φ10 2Φ20	864.	150.5
R end bot.	0.67	-98.8	149.	2Φ10 --	157.	30.3

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

|Beam: 28 |

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for
Moment steel concrete	Moment concrete	Crack	cracking
stress/fyk stress/fck	stress/fck	spacing	width min provd
--- (kNm) ---	--- (kNm) ---	--- (mm) ---	--- (mm2) ---
L end top 126.9 0.656 0.467	107.7 0.396	192.7 0.16	461 914
Midspan 68.4 0.689 0.084	58.0 0.071	277.9 0.24	62 464
R end top 123.9 0.672 0.462	105.1 0.392	207.8 0.18	775 863

|Beam: 27 |

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for
Moment steel concrete	Moment concrete	Crack	cracking
stress/fyk stress/fck	stress/fck	spacing	width min provd

	-- (kNm) -----			-- (kNm) -----			-- (mm) -----		-- (mm2) --	
L end top	124.1	0.611	0.450	105.3	0.382	206.2	0.16	775	863	
Midspan	64.9	0.653	0.079	55.0	0.067	277.9	0.23	62	464	
R end top	133.8	0.576	0.467	113.5	0.396	186.2	0.14	462	1027	
+-----+										
Beam: 26										
+-----+										
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for			
	Moment steel		concrete	Moment concrete		Crack	cracking			
	stress/fyk		stress/fck	stress/fck		spacing	width min provd			
	-- (kNm) -----			-- (kNm) -----			-- (mm) -----		-- (mm2) --	
L end top	129.7	0.611	0.464	110.0	0.394	187.3	0.15	659	914	
Midspan	67.7	0.681	0.083	57.4	0.070	277.9	0.24	62	464	
R end top	122.6	0.603	0.444	104.0	0.377	212.7	0.16	543	863	
+-----+										
+-----+										

3A 1.6 FRAME 3

* STOREY: 6 * BEAMS: 31 30										

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *										

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT										
+-----+										
Beam: 31	Length l: 6.60m			X-section T	Depth h: 0.50m		Width bw: 0.25m			
+-----+										
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)										
+-----+										
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural				
	fl width	steel area		Contin	Addit	steel area	capacity			
	(m)	(kNm)	(mm2)			(mm2)	(kNm)			
L end top	0.25	90.9	579.	2Φ14	--	600.	108.3			
L end bot.	0.67	13.7	290.	2Φ14	--	308.	59.0			
midspan	2.63	72.8	376.	2Φ14	1Φ14	462.	89.3			
R end top	0.25	141.3	805.	2Φ14	--	843.	147.3			
R end bot.	1.09	-20.1	402.	2Φ14	--	462.	88.6			
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension										
Note:1. Addit. bot. midspan bars extended: 1Φ14 to Right end.										

2. Addit. bot. midspan bars extended to Left end of beam							2: 1Φ14
Beam: 30 Length l: 6.60m X-section T							Depth h: 0.50m Width bw: 0.25m
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
Location	Effect. fl width	max MEd (kNm)	Required steel area (mm ²)	Beam bars	Contin Addit	Provided steel area (mm ²)	Flexural capacity (kNm)
L end top	0.25	143.4	818.	2Φ14	--	843.	147.3
L end bot.	1.09	-23.5	409.	2Φ14	--	462.	88.6
midspan	2.63	72.5	375.	2Φ14	1Φ14	462.	89.3
R end top	0.25	88.1	579.	2Φ14	--	600.	108.3
R end bot.	0.67	15.7	290.	2Φ14	--	308.	59.0
Note: Top reinforcements include 250mm ² /m of EC8s eff. slab width in tension							
Note:1. Addit. bot. midspan bars of beam 2 ext. to L end of beam 1: 1Φ14							

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR W_{max}=0.3mm & min STEEL AREA

Beam: 31									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for	
	Moment	steel stress/fyk	concrete stress/fck	Moment	concrete stress/fck	Crack spacing	width	min provd	
	(kNm)			(kNm)		(mm)		(mm ²)	
L end top	45.4	0.551	0.206	38.6	0.175	319.4	0.22	215	307
Midspan	56.7	0.574	0.069	48.1	0.059	296.6	0.22	62	461
R end top	95.2	0.913	0.374	80.7	0.317	252.1	0.29	285	420

Beam: 30									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q				Steel for	
	Moment	steel stress/fyk	concrete stress/fck	Moment	concrete stress/fck	Crack spacing	width	min provd	
	(kNm)			(kNm)		(mm)		(mm ²)	
L end top	98.4	0.792	0.364	83.4	0.309	248.6	0.25	285	420
Midspan	56.5	0.572	0.069	47.9	0.059	296.6	0.22	62	461
R end top	42.6	0.416	0.180	36.2	0.152	312.8	0.17	215	307

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		b_j	V_{jh}	strength	area A_{sh}	area A_{sv}
	(mm)	(m)	(kN)	(kN)	(mm ²)	(mm ²)
1	14	0.40	0.	807.	0.	0.
2	22	0.50	0.	2067.	0.	0.
3	14	0.40	0.	807.	0.	0.

* STOREY: 5 * BEAMS: 31 30

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

Beam:	31	Length l:	6.60m	X-section	T	Depth h:	0.50m	Width bw:	0.25m

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)									

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural			
	fl width		steel area	Contin	Addit	steel area capacity			
	(m)	(kNm)	(mm ²)			(mm ²)	(kNm)		
L end top	0.25	145.6	833.	2 Φ 14	2 Φ 12	827.	144.7		
L end bot.	0.67	27.0	416.	2 Φ 14	--	462.	87.9		
midspan	2.63	65.1	336.	2 Φ 14	1 Φ 14	462.	89.3		
R end top	0.25	163.9	952.	2 Φ 14	1 Φ 16	931.	160.8		
R end bot.	1.09	23.5	476.	2 Φ 14	--	462.	88.6		

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

|Note:1. Addit. bot. midspan bars extended: 1 Φ 14 to L end - 1 Φ 14 to R end |

| 2. Addit. bot. midspan bars extended to Left end of beam 2: 1 Φ 14 |

Beam:	30	Length l:	6.60m	X-section	T	Depth h:	0.50m	Width bw:	0.25m

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)									

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural			
	fl width		steel area	Contin	Addit	steel area capacity			
	(m)	(kNm)	(mm ²)			(mm ²)	(kNm)		
L end top	0.25	167.3	975.	2 Φ 14	1 Φ 16	931.	160.8		

L end bot.	1.09	18.5	487.	2Φ14	--	462.	88.6
midspan	2.63	64.8	335.	2Φ14	1Φ14	462.	89.3
R end top	0.25	141.1	803.	2Φ14	2Φ12	827.	144.7
R end bot.	0.67	30.2	402.	2Φ14	--	462.	87.9

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

|Note:1. Addit. bot. midspan bars extended: 1Φ14 to Right end. |

| 2. Addit. bot. midspan bars of beam 2 ext. to L end of beam 1: 1Φ14 |

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR W_{max}=0.3mm & min STEEL AREA

Beam: 31										
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ ₂ Q			Steel for			
	Moment	steel	concrete	Moment	concrete	Crack	cracking			
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd			
	(kNm)			(kNm)			(mm)	(mm ²)		
L end top	69.8	0.555	0.258	59.3	0.219	244.6	0.17	197	534	
Midspan	50.6	0.513	0.062	43.0	0.053	296.6	0.19	62	461	
R end top	82.9	0.685	0.309	70.2	0.262	245.5	0.21	323	508	

Beam: 30										
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ ₂ Q			Steel for			
	Moment	steel	concrete	Moment	concrete	Crack	cracking			
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd			
	(kNm)			(kNm)			(mm)	(mm ²)		
L end top	87.8	0.623	0.312	74.4	0.265	242.4	0.19	323	508	
Midspan	50.4	0.511	0.062	42.8	0.052	296.6	0.19	62	461	
R end top	65.3	0.449	0.230	55.5	0.195	241.6	0.14	197	534	

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		b _j	V _{jh}	strength	area A _{sh}	area A _{sv}
	(mm)	(m)	(kN)	(kN)	(mm ²)	(mm ²)
1	14	0.40	0.	765.	0.	0.
2	22	0.50	0.	1923.	0.	0.
3	14	0.40	0.	765.	0.	0.

* STOREY: 4 * BEAMS: 31 30

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

+-----+

| Beam: 31 | Length l: 6.60m | X-section T | Depth h: 0.50m | Width bw: 0.25m |

|-----|

| Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end) |

|-----|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
	fl width		steel area	Contin Addit	steel area	capacity
	(m)	(kNm)	(mm ²)		(mm ²)	(kNm)

L end top	0.25	139.5	793.	2Φ14 1Φ12	801.	140.8
L end bot.	0.67	28.9	397.	2Φ14 --	462.	87.9
midspan	2.63	66.1	341.	2Φ14 1Φ14	462.	89.3
R end top	0.25	163.6	950.	2Φ14 1Φ16	931.	160.8
R end bot.	1.09	19.6	475.	2Φ14 --	462.	88.6

| Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

| Note: 1. Addit. bot. midspan bars extended: 1Φ14 to L end - 1Φ14 to R end |

| 2. Addit. bot. midspan bars extended to Left end of beam 2: 1Φ14 |

+-----+

+-----+

| Beam: 30 | Length l: 6.60m | X-section T | Depth h: 0.50m | Width bw: 0.25m |

|-----|

| Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end) |

|-----|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
	fl width		steel area	Contin Addit	steel area	capacity
	(m)	(kNm)	(mm ²)		(mm ²)	(kNm)

L end top	0.25	166.9	972.	2Φ14 1Φ16	931.	160.8
L end bot.	1.09	14.7	486.	2Φ14 --	462.	88.6
midspan	2.63	65.8	340.	2Φ14 1Φ14	462.	89.3
R end top	0.25	137.0	778.	2Φ14 1Φ14	754.	133.3
R end bot.	0.67	30.1	389.	2Φ14 --	462.	87.9

| Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |

| Note: 1. Addit. bot. midspan bars extended: 1Φ14 to Right end. |

| 2. Addit. bot. midspan bars of beam 2 ext. to L end of beam 1: 1Φ14 |

+-----+

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

Beam: 31									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk		stress/fck	stress/fck		spacing	width	min provd	
	(kNm)			(kNm)			(mm)	(mm2)	
L end top	65.2	0.539	0.244	55.3	0.206	274.1	0.19	259	508
Midspan	51.4	0.521	0.063	43.6	0.053	296.6	0.20	62	461
R end top	85.0	0.702	0.317	72.0	0.269	245.5	0.22	323	508

Beam: 30									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk		stress/fck	stress/fck		spacing	width	min provd	
	(kNm)			(kNm)			(mm)	(mm2)	
L end top	89.8	0.638	0.319	76.1	0.271	242.4	0.20	323	508
Midspan	51.2	0.519	0.063	43.5	0.053	296.6	0.20	62	461
R end top	62.8	0.476	0.228	53.5	0.194	263.8	0.16	215	461

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
	(mm)	(m)	(kN)	(kN)	(mm2)	(mm2)
1	14	0.40	0.	720.	0.	0.
2	24	0.50	0.	1765.	0.	0.
3	14	0.40	0.	721.	0.	0.

* STOREY: 3 * BEAMS: 31 30

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

|Beam: 31|Length l: 6.60m|X-section T | Depth h: 0.50m| Width bw: 0.25m |

| Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end) |

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin Addit	steel area	capacity
(m)	(kNm)	(mm ²)	(mm ²)		(mm ²)	(kNm)
L end top	0.25	136.7	775.	2Φ14 1Φ14	754.	133.3
L end bot.	0.67	27.1	388.	2Φ14 --	462.	87.9
midspan	2.63	65.9	340.	2Φ14 1Φ14	462.	89.3
R end top	0.25	161.5	936.	2Φ14 1Φ16	931.	160.8
R end bot.	1.09	16.8	468.	2Φ14 --	462.	88.6

Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension
Note:1. Addit. bot. midspan bars extended: 1Φ14 to L end - 1Φ14 to R end
2. Addit. bot. midspan bars extended to Left end of beam 2: 1Φ14

Beam: 30 | Length l: 6.60m | X-section T | Depth h: 0.50m | Width bw: 0.25m

Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin Addit	steel area	capacity
(m)	(kNm)	(mm ²)	(mm ²)		(mm ²)	(kNm)
L end top	0.25	164.9	959.	2Φ14 1Φ16	931.	160.8
L end bot.	1.09	11.7	479.	2Φ14 --	462.	88.6
midspan	2.63	65.6	339.	2Φ14 1Φ14	462.	89.3
R end top	0.25	134.7	763.	2Φ14 1Φ14	754.	133.3
R end bot.	0.67	27.8	382.	2Φ14 --	462.	87.9

Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension
Note:1. Addit. bot. midspan bars extended: 1Φ14 to Right end.
2. Addit. bot. midspan bars of beam 2 ext. to L end of beam 1: 1Φ14

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

Beam: 31

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for						
	Moment steel	concrete	Moment concrete						
	stress/fyk	stress/fck	stress/fck						
(kNm)			spacing						
			width						
			min provd						
			(mm ²)						
L end top	64.7	0.577	0.248	54.8	0.210	267.7	0.20	215	461
Midspan	51.2	0.519	0.063	43.5	0.053	296.6	0.20	62	461
R end top	85.4	0.705	0.319	72.3	0.270	245.5	0.22	323	508

Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for
	Moment steel	concrete	Moment concrete
	stress/fyk	stress/fck	Crack spacing
	(kNm)	(kNm)	(mm)
L end top	90.4	0.642	0.321
Midspan	51.1	0.518	0.063
R end top	62.8	0.476	0.228

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
	(mm)	(m)	(kN)	(kN)	(mm2)	(mm2)
1	14	0.40	0.	674.	0.	0.
2	24	0.50	0.	1592.	0.	0.
3	14	0.40	0.	674.	0.	0.

* STOREY: 2 * BEAMS: 31 30

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

Location	Effect.	max MED	Required	Beam bars	Provided	Flexural
	fl width		steel area	Contin Addit	steel area	capacity
	(m)	(kNm)	(mm2)		(mm2)	(kNm)
L end top	0.25	129.8	732.	2Φ14 1Φ12	713.	126.8
L end bot.	0.67	16.9	366.	2Φ14 --	462.	87.9
midspan	2.63	65.5	338.	2Φ14 1Φ14	462.	89.3
R end top	0.25	152.4	876.	2Φ14 1Φ14	884.	153.6
R end bot.	1.09	7.4	438.	2Φ14 --	462.	88.6

[Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension]

|Note:1. Addit. bot. midspan bars extended: 1Φ14 to L end - 1Φ14 to R end |
 | 2. Addit. bot. midspan bars extended to Left end of beam 2: 1Φ14 |
 +-----+
 +-----+
 |Beam: 30|Length l: 6.60m|X-section T | Depth h: 0.50m| Width bw: 0.25m |
 |-----+-----|
 | |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
 |-----+-----|
 | Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|
 | |fl width| |steel area |Contin Addit |steel area|capacity|
 |-----+--- (m) ---+--- (kNm) ---+--- (mm2) ---+-----+--- (mm2) ---+--- (kNm) ---|
L end top	0.25	156.1	900.	2Φ14 1Φ14	884.	153.6
L end bot.	1.09	2.0	450.	2Φ14 --	462.	88.6
midspan	2.63	65.0	336.	2Φ14 1Φ14	462.	89.3
R end top	0.25	127.7	719.	2Φ14 1Φ12	713.	126.8
R end bot.	0.67	17.7	360.	2Φ14 --	462.	87.9
Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension						
Note:1. Addit. bot. midspan bars extended: 1Φ14 to Right end.						
2. Addit. bot. midspan bars of beam 2 ext. to L end of beam 1: 1Φ14						

+-----+
 +-----+
 SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR W_{max}=0.3mm & min STEEL AREA
 +-----+
 +-----+
 |Beam: 31 |
 +-----+
 +-----+
Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for
	Moment steel concrete	Moment concrete Crack	cracking
	stress/fyk stress/fck	stress/fck spacing width	min provd
-----+--- (kNm) ---+--- (kNm) ---+--- (mm) ---+--- (mm2) ---			
L end top	66.5 0.637 0.261	56.5 0.222 273.2 0.22	203 420
Midspan	51.0 0.517 0.062	43.3 0.053 296.6 0.20	62 461
R end top	85.5 0.763 0.328	72.5 0.278 248.7 0.24	302 461

+-----+
 +-----+
 |Beam: 30 |
 +-----+
 +-----+
Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for
	Moment steel concrete	Moment concrete Crack	cracking
	stress/fyk stress/fck	stress/fck spacing width	min provd
-----+--- (kNm) ---+--- (kNm) ---+--- (mm) ---+--- (mm2) ---			
L end top	90.8 0.688 0.330	77.0 0.280 245.4 0.21	302 461
Midspan	50.6 0.513 0.062	42.9 0.053 296.6 0.19	62 461
R end top	64.4 0.518 0.238	55.0 0.204 269.0 0.18	203 420

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+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+-----+-----+-----+

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JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

```

+-----+-----+-----+-----+-----+-----+-----+-----+
|Joint|Max Φ| J width | J hor. shear| J hor. shear| J hor. steel| J ver. steel|
|      |      | bj      | Vjh          | strength    | area Ash   | area Asv   |
+-----+- (mm)+--- (m) ---+----- (kN)-----+----- (kN)-----+----- (mm2)-----+----- (mm2)-----+
|  1  |  14 |  0.40  |  0.          |  624.       |  0.        |  0.        |
|  2  |  26 |  0.50  |  0.          |  1399.      |  0.        |  0.        |
|  3  |  14 |  0.40  |  0.          |  625.       |  0.        |  0.        |
+-----+-----+-----+-----+-----+-----+-----+-----+

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*-----*
* STOREY:  1 * BEAMS:  31  30
*-----*
* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *
*-----*

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GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

```

+-----+-----+-----+-----+-----+-----+-----+-----+
|Beam:   31|Length l: 6.60m|X-section T | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----+-----+-----+-----+-----+-----+-----+
|          |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----+-----+-----+-----+-----+-----+-----+
| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|
|          |fl width|          | steel area| Contin Addit| steel area|capacity|
|-----+-----+- (m) ---+----- (kNm) ---+----- (mm2) ---+----- (mm2) ---+----- (kNm) ---+
|L end top | 0.25  |  101.4  |  579.    | 2Φ14    -- |  600.    | 108.3  |
|L end bot. | 0.67  |    2.0  |  290.    | 2Φ14    -- |  308.    |  59.0  |
|midspan   | 2.63  |   67.4  |  348.    | 2Φ14    1Φ14|  462.    |  89.3  |
|R end top  | 0.25  |  133.4  |  755.    | 2Φ14    1Φ12|  884.    | 153.6  |
|R end bot. | 1.09  |  -20.1  |  377.    | 2Φ14    -- |  462.    |  88.6  |
|Note: Top reinforcements include 250mm2/m of EC8s eff. slab width in tension |
|Note:1. Addit. bot. midspan bars extended:  1Φ14 to Right end.                |
|      2. Addit. bot. midspan bars extended to Left end of beam                2: 1Φ14 |
+-----+-----+-----+-----+-----+-----+-----+-----+

```

```

+-----+-----+-----+-----+-----+-----+-----+-----+
|Beam:   30|Length l: 6.60m|X-section T | Depth h: 0.50m| Width bw: 0.25m |
|-----+-----+-----+-----+-----+-----+-----+-----+
|          |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|
|-----+-----+-----+-----+-----+-----+-----+-----+
| Location |Effect. | max MEd | Required | Beam bars | Provided |Flexural|
|          |fl width|          | steel area| Contin Addit| steel area|capacity|
+-----+-----+- (m) ---+----- (kNm) ---+----- (mm2) ---+----- (mm2) ---+----- (kNm) ---+

```

	(m)	(kNm)	(mm ²)	(mm ²)	(kNm)
L end top	0.25	137.5	780.	2Φ14 1Φ12	884. 153.6
L end bot.	1.09	-25.7	390.	2Φ14 --	462. 88.6
midspan	2.63	68.3	353.	2Φ14 1Φ14	462. 89.3
R end top	0.25	94.8	579.	2Φ14 --	600. 108.3
R end bot.	0.67	7.4	290.	2Φ14 --	308. 59.0

|Note: Top reinforcements include 250mm²/m of EC8s eff. slab width in tension |
|Note:1. Addit. bot. midspan bars of beam 2 ext. to L end of beam 1: 1Φ14|

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

Beam: 31									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd		
	(kNm)			(kNm)	(mm)		(mm ²)--		
L end top	58.5	0.710	0.266	49.7	0.226	319.4	0.29	215	307
Midspan	52.5	0.532	0.064	44.5	0.055	296.6	0.20	62	461
R end top	90.6	0.808	0.347	76.7	0.294	253.8	0.26	322	461

Beam: 30									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk	stress/fck		stress/fck	spacing	width	min provd		
	(kNm)			(kNm)	(mm)		(mm ²)--		
L end top	96.2	0.729	0.349	81.6	0.296	250.4	0.23	322	461
Midspan	53.1	0.539	0.065	45.1	0.055	296.6	0.20	62	461
R end top	51.4	0.502	0.217	43.7	0.184	312.8	0.20	215	307

JOINT GEOMETRY - SHEAR FORCES - VERIFICATION IN SHEAR

Joint	Max Φ	J width	J hor. shear	J hor. shear	J hor. steel	J ver. steel
		bj	Vjh	strength	area Ash	area Asv
	(mm)	(m)	(kN)	(kN)	(mm ²)	(mm ²)
1	16	0.40	0.	573.	0.	0.
2	26	0.50	0.	1179.	0.	0.
3	16	0.40	0.	575.	0.	0.

* STOREY: 0 * BEAMS: 31 30 29

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

+-----+							
Beam: 31 Length l: 6.60m X-section T Depth h: 0.50m Width bw: 0.25m							
-----+							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
-----+							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin Addit	steel area	capacity	
-----	---	---	---	-----	---	---	---
(m)		(kNm)	(mm2)		(mm2)		(kNm)
L end top	0.25	110.3	612.	2Φ10 3Φ14	619.	111.3	
L end bot.	0.67	-60.1	149.	2Φ10 --	157.	30.3	
midspan	2.63	59.1	305.	2Φ10 1Φ14	311.	60.2	
R end top	0.25	97.9	539.	2Φ10 3Φ12	723.	128.3	
R end bot.	1.09	-47.7	149.	2Φ10 --	157.	30.4	
+-----+							

+-----+							
Beam: 30 Length l: 6.60m X-section T Depth h: 0.50m Width bw: 0.25m							
-----+							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
-----+							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin Addit	steel area	capacity	
-----	---	---	---	-----	---	---	---
(m)		(kNm)	(mm2)		(mm2)		(kNm)
L end top	0.25	96.4	530.	2Φ10 3Φ12	723.	128.3	
L end bot.	1.09	-47.6	149.	2Φ10 --	157.	30.4	
midspan	2.63	50.6	261.	2Φ10 1Φ14	311.	60.2	
R end top	0.25	128.8	726.	2Φ10 5Φ12	723.	128.3	
R end bot.	0.67	-72.9	149.	2Φ10 --	157.	30.3	
+-----+							

+-----+							
Beam: 29 Length l: 6.70m X-section T Depth h: 0.50m Width bw: 0.25m							
-----+							
Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)							
-----+							
Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural	
fl width			steel area	Contin Addit	steel area	capacity	
-----	---	---	---	-----	---	---	---
(m)		(kNm)	(mm2)		(mm2)		(kNm)
L end top	0.25	96.4	530.	2Φ10 3Φ12	723.	128.3	
L end bot.	1.09	-47.6	149.	2Φ10 --	157.	30.4	
midspan	2.63	50.6	261.	2Φ10 1Φ14	311.	60.2	
R end top	0.25	128.8	726.	2Φ10 5Φ12	723.	128.3	
R end bot.	0.67	-72.9	149.	2Φ10 --	157.	30.3	
+-----+							

	(m)	(kNm)	(mm ²)		(mm ²)	(kNm)
L end top	0.25	159.7	924.	3Φ10	6Φ12	914. 158.2
L end bot.	1.09	-99.1	149.	2Φ10	--	157. 30.4
midspan	2.63	93.8	485.	2Φ10	2Φ14	465. 89.9
R end top	0.25	150.8	866.	3Φ10	2Φ20	864. 150.5
R end bot.	0.67	-91.3	149.	2Φ10	--	157. 30.3

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

Beam: 31									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk		stress/fck	stress/fck		spacing	width	min provd	
	(kNm)			(kNm)			(mm)		
L end top	85.8	0.612	0.348	72.9	0.296	225.3	0.18	483	618
Midspan	46.0	0.684	0.069	39.0	0.058	321.8	0.28	62	311
R end top	76.2	0.479	0.297	64.6	0.252	200.1	0.12	661	722

Beam: 30									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk		stress/fck	stress/fck		spacing	width	min provd	
	(kNm)			(kNm)			(mm)		
L end top	75.1	0.422	0.283	63.6	0.240	198.6	0.11	661	722
Midspan	39.3	0.586	0.059	33.4	0.050	321.8	0.24	62	311
R end top	100.2	0.563	0.378	85.0	0.320	205.2	0.15	463	722

Beam: 29									
Location	Characteristic loads G+Q			Quasi-permanent loads G+ψ2Q			Steel for		
	Moment	steel	concrete	Moment	concrete	Crack	cracking		
	stress/fyk		stress/fck	stress/fck		spacing	width	min provd	
	(kNm)			(kNm)			(mm)		
L end top	124.3	0.586	0.445	105.5	0.378	187.3	0.14	659	914
Midspan	73.0	0.735	0.089	61.9	0.076	277.9	0.26	62	464
R end top	117.4	0.578	0.425	99.5	0.361	212.7	0.16	543	863

* STOREY: -1 * BEAMS: 31 30 29

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

GEOMETRY - BENDING MOMENTS MED - LONGITUDINAL REINFORCEMENT

+-----+

|Beam: 31|Length l: 6.60m|X-section T | Depth h: 0.50m| Width bw: 0.25m |

|-----|

| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

|-----|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin	Addit	steel area capacity
-----	---	---	---	-----	---	---
(m)	(kNm)	(kNm)	(mm2)	(mm2)	(mm2)	(kNm)

L end top	0.25	108.1	599.	2Φ10	2Φ16	559. 101.4
L end bot.	0.67	-67.9	149.	2Φ10	--	157. 30.3
midspan	2.63	57.2	295.	2Φ10	1Φ14	311. 60.2
R end top	0.25	103.8	573.	2Φ10	2Φ16	760. 134.3
R end bot.	1.09	-66.0	149.	2Φ10	--	157. 30.4

+-----+

+-----+

|Beam: 30|Length l: 6.60m|X-section T | Depth h: 0.50m| Width bw: 0.25m |

|-----|

| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

|-----|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin	Addit	steel area capacity
-----	---	---	---	-----	---	---
(m)	(kNm)	(kNm)	(mm2)	(mm2)	(mm2)	(kNm)

L end top	0.25	102.0	563.	2Φ10	2Φ16	760. 134.3
L end bot.	1.09	-65.7	149.	2Φ10	--	157. 30.4
midspan	2.63	52.0	269.	2Φ10	1Φ14	311. 60.2
R end top	0.25	120.3	673.	2Φ10	2Φ18	666. 119.1
R end bot.	0.67	-77.6	149.	2Φ10	--	157. 30.3

+-----+

+-----+

|Beam: 29|Length l: 6.70m|X-section T | Depth h: 0.50m| Width bw: 0.25m |

|-----|

| |Top flange thickness (m): 0.18 (L end) 0.18 (centre) 0.18 (R end)|

|-----|

Location	Effect.	max MEd	Required	Beam bars	Provided	Flexural
fl width			steel area	Contin	Addit	steel area capacity
-----	---	---	---	-----	---	---
(m)	(kNm)	(kNm)	(mm2)	(mm2)	(mm2)	(kNm)

L end top	0.25	162.6	943.	3Φ10	3Φ18	999.	174.0	
L end bot.	1.09	-102.4	149.	2Φ10	--	157.	30.4	
midspan	2.63	89.4	462.	2Φ10	2Φ14	465.	89.9	
R end top	0.25	156.9	905.	3Φ10	2Φ20	864.	150.5	
R end bot.	0.67	-99.6	149.	2Φ10	--	157.	30.3	

SLS CHECKS: STRESS LIMITS, CRACK WIDTH CONTROL FOR Wmax=0.3mm & min STEEL AREA

Beam: 31										
Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for							
	Moment steel	concrete	Moment concrete	Crack	cracking					
	stress/fyk	stress/fck	stress/fck	spacing	width	min provd				
	-----+-- (kNm)	-----+-- (kNm)	-----+-- (kNm)	-----+-- (mm)	-----+-- (mm2)	-----+-- (mm2)				
L end top	84.1	0.651	0.351	71.4	0.298	240.8	0.20	501	559	
Midspan	44.5	0.663	0.067	37.8	0.057	321.8	0.27	62	311	
R end top	80.8	0.487	0.311	68.5	0.264	209.7	0.13	731	760	

Beam: 30										
Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for							
	Moment steel	concrete	Moment concrete	Crack	cracking					
	stress/fyk	stress/fck	stress/fck	spacing	width	min provd				
	-----+-- (kNm)	-----+-- (kNm)	-----+-- (kNm)	-----+-- (mm)	-----+-- (mm2)	-----+-- (mm2)				
L end top	79.4	0.430	0.296	67.3	0.251	207.9	0.11	731	760	
Midspan	40.5	0.603	0.061	34.4	0.051	321.8	0.25	62	311	
R end top	93.6	0.558	0.359	79.4	0.305	230.9	0.16	531	666	

Beam: 29										
Location	Characteristic loads G+Q	Quasi-permanent loads G+ψ2Q	Steel for							
	Moment steel	concrete	Moment concrete	Crack	cracking					
	stress/fyk	stress/fck	stress/fck	spacing	width	min provd				
	-----+-- (kNm)	-----+-- (kNm)	-----+-- (kNm)	-----+-- (mm)	-----+-- (mm2)	-----+-- (mm2)				
L end top	126.5	0.557	0.444	107.4	0.377	196.0	0.14	758	999	
Midspan	69.6	0.700	0.085	59.0	0.072	277.9	0.25	62	464	
R end top	122.1	0.601	0.442	103.5	0.375	212.7	0.16	543	863	

3A 2. DESIGN OF COLUMNS

3A 2.1. COLUMN C1

* COLUMN: 1 *

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

NORMAL STRESS-RESULTANTS

STOREY: 6	Base			Top		
Actions Combination	My	Mz	N	My	Mz	N
	(kNm)	(kNm)	(kN)	(kNm)	(kNm)	(kN)
EN1990 Eq. 6.10a	-27.5	19.6	116.9	33.5	-28.5	95.6
EN1990 Eq. 6.10b	-26.2	18.7	109.1	31.9	-27.1	91.1
G+ψ2Q+E +X +Y/maxN	34.3	127.5	150.8	84.5	150.7	135.0
G+ψ2Q+E -X +Y/maxN	-70.6	127.5	150.8	-40.3	150.7	135.0
G+ψ2Q+E +X -Y/maxN	34.3	-101.5	150.8	84.5	-188.5	135.0
G+ψ2Q+E -X -Y/maxN	-70.6	-101.5	150.8	-40.3	-188.5	135.0
G+ψ2Q+E +X +Y/minN	34.3	127.5	7.0	84.5	150.7	-8.7
G+ψ2Q+E -X +Y/minN	-70.6	127.5	7.0	-40.3	150.7	-8.7
G+ψ2Q+E +X -Y/minN	34.3	-101.5	7.0	84.5	-188.5	-8.7
G+ψ2Q+E -X -Y/minN	-70.6	-101.5	7.0	-40.3	-188.5	-8.7

+-----+

STOREY: 5	Base			Top		
Actions Combination	My	Mz	N	My	Mz	N
	(kNm)	(kNm)	(kN)	(kNm)	(kNm)	(kN)
EN1990 Eq. 6.10a	-23.1	15.8	239.4	22.4	-14.0	218.1
EN1990 Eq. 6.10b	-22.0	15.0	223.6	21.3	-13.3	205.5
G+ψ2Q+E +X +Y/maxN	37.2	110.0	318.8	67.8	83.8	303.0
G+ψ2Q+E -X +Y/maxN	-67.6	110.0	318.8	-38.3	83.8	303.0
G+ψ2Q+E +X -Y/maxN	37.2	-89.1	318.8	67.8	-102.3	303.0
G+ψ2Q+E -X -Y/maxN	-67.6	-89.1	318.8	-38.3	-102.3	303.0
G+ψ2Q+E +X +Y/minN	37.2	110.0	4.2	67.8	83.8	-11.5
G+ψ2Q+E -X +Y/minN	-67.6	110.0	4.2	-38.3	83.8	-11.5
G+ψ2Q+E +X -Y/minN	37.2	-89.1	4.2	67.8	-102.3	-11.5
G+ψ2Q+E -X -Y/minN	-67.6	-89.1	4.2	-38.3	-102.3	-11.5

+-----+

STOREY: 4	Base			Top		
Actions Combination	My	Mz	N	My	Mz	N
	(kNm)	(kNm)	(kN)	(kNm)	(kNm)	(kN)

EN1990 Eq. 6.10a	-23.0	17.3	360.9		23.4	-17.5	339.7	
EN1990 Eq. 6.10b	-21.9	16.4	337.2		22.3	-16.6	319.1	
G+ψ2Q+E +X +Y/maxN	41.3	120.6	486.5		72.5	95.2	470.7	
G+ψ2Q+E -X +Y/maxN	-71.7	120.6	486.5		-41.6	95.2	470.7	
G+ψ2Q+E +X -Y/maxN	41.3	-97.8	486.5		72.5	-118.4	470.7	
G+ψ2Q+E -X -Y/maxN	-71.7	-97.8	486.5		-41.6	-118.4	470.7	
G+ψ2Q+E +X +Y/minN	41.3	120.6	0.5		72.5	95.2	-15.3	
G+ψ2Q+E -X +Y/minN	-71.7	120.6	0.5		-41.6	95.2	-15.3	
G+ψ2Q+E +X -Y/minN	41.3	-97.8	0.5		72.5	-118.4	-15.3	
G+ψ2Q+E -X -Y/minN	-71.7	-97.8	0.5		-41.6	-118.4	-15.3	

-----+

STOREY: 3	Base				Top			
Actions Combination	My	Mz	N		My	Mz	N	
-----+-----	(kNm)	(kNm)	(kN)		(kNm)	(kNm)	(kN)	
EN1990 Eq. 6.10a	-21.5	16.7	482.5		22.1	-17.3	461.2	
EN1990 Eq. 6.10b	-20.5	15.9	450.7		21.0	-16.4	432.6	
G+ψ2Q+E +X +Y/maxN	42.7	120.2	652.3		70.8	81.5	636.5	
G+ψ2Q+E -X +Y/maxN	-71.1	120.2	652.3		-41.6	81.5	636.5	
G+ψ2Q+E +X -Y/maxN	42.7	-98.1	652.3		70.8	-104.4	636.5	
G+ψ2Q+E -X -Y/maxN	-71.1	-98.1	652.3		-41.6	-104.4	636.5	
G+ψ2Q+E +X +Y/minN	42.7	120.2	-1.4		70.8	81.5	-17.2	
G+ψ2Q+E -X +Y/minN	-71.1	120.2	-1.4		-41.6	81.5	-17.2	
G+ψ2Q+E +X -Y/minN	42.7	-98.1	-1.4		70.8	-104.4	-17.2	
G+ψ2Q+E -X -Y/minN	-71.1	-98.1	-1.4		-41.6	-104.4	-17.2	

-----+

STOREY: 2	Base				Top			
Actions Combination	My	Mz	N		My	Mz	N	
-----+-----	(kNm)	(kNm)	(kN)		(kNm)	(kNm)	(kN)	
EN1990 Eq. 6.10a	-23.5	22.7	604.1		22.2	-19.7	582.8	
EN1990 Eq. 6.10b	-22.4	21.6	564.3		21.1	-18.7	546.3	
G+ψ2Q+E +X +Y/maxN	40.7	116.4	809.4		66.7	57.9	793.7	
G+ψ2Q+E -X +Y/maxN	-71.8	116.4	809.4		-37.4	57.9	793.7	
G+ψ2Q+E +X -Y/maxN	40.7	-86.4	809.4		66.7	-83.9	793.7	
G+ψ2Q+E -X -Y/maxN	-71.8	-86.4	809.4		-37.4	-83.9	793.7	
G+ψ2Q+E +X +Y/minN	40.7	116.4	5.5		66.7	57.9	-10.2	
G+ψ2Q+E -X +Y/minN	-71.8	116.4	5.5		-37.4	57.9	-10.2	
G+ψ2Q+E +X -Y/minN	40.7	-86.4	5.5		66.7	-83.9	-10.2	
G+ψ2Q+E -X -Y/minN	-71.8	-86.4	5.5		-37.4	-83.9	-10.2	

-----+

STOREY: 1	Base				Top			
Actions Combination	My	Mz	N		My	Mz	N	
-----+-----	(kNm)	(kNm)	(kN)		(kNm)	(kNm)	(kN)	

EN1990 Eq. 6.10a		-6.2	6.1	730.9		12.6	-14.0	702.6	
EN1990 Eq. 6.10b		-5.9	5.8	682.2		12.0	-13.3	658.1	
G+ψ2Q+E +X +Y/maxN		44.8	112.8	953.4		44.2	25.7	932.4	
G+ψ2Q+E -X +Y/maxN		-53.0	112.8	953.4		-27.6	25.7	932.4	
G+ψ2Q+E +X -Y/maxN		44.8	-104.7	953.4		44.2	-44.2	932.4	
G+ψ2Q+E -X -Y/maxN		-53.0	-104.7	953.4		-27.6	-44.2	932.4	
G+ψ2Q+E +X +Y/minN		44.8	112.8	33.6		44.2	25.7	12.6	
G+ψ2Q+E -X +Y/minN		-53.0	112.8	33.6		-27.6	25.7	12.6	
G+ψ2Q+E +X -Y/minN		44.8	-104.7	33.6		44.2	-44.2	12.6	
G+ψ2Q+E -X -Y/minN		-53.0	-104.7	33.6		-27.6	-44.2	12.6	

FOR NEGLIGIBLE 2ND-ORDER EFFECTS IN COLUMN, per EC2 pa.5.8.3.1, 5.8.3.2, 5.8.7.2

Storey	Combination	column direction x				column direction z			
		of actions	slenderness	column	slenderness	column	slenderness	column	
per EN1990		limit	actual	eff.10	req.size	limit	actual	eff.10	req.size
		(m)				(m)			
6	Eq. 6.10a	276.4	17.4	1.50	0.30	261.8	8.0	1.62	0.70
	Eq. 6.10b	279.6	17.4	1.50	0.30	264.6	8.0	1.62	0.70
5	Eq. 6.10a	179.6	17.1	1.48	0.30	171.7	8.0	1.61	0.70
	Eq. 6.10b	183.2	17.1	1.48	0.30	175.0	8.0	1.61	0.70
4	Eq. 6.10a	160.9	17.1	1.48	0.30	160.9	8.0	1.61	0.70
	Eq. 6.10b	164.0	17.1	1.48	0.30	163.9	8.0	1.61	0.70
3	Eq. 6.10a	138.7	17.2	1.49	0.30	138.3	8.0	1.62	0.70
	Eq. 6.10b	141.5	17.2	1.49	0.30	141.1	8.0	1.62	0.70
2	Eq. 6.10a	123.2	17.2	1.49	0.30	124.8	8.1	1.63	0.70
	Eq. 6.10b	126.1	17.2	1.49	0.30	127.9	8.1	1.63	0.70
1	Eq. 6.10a	93.6	23.6	2.05	0.30	91.0	11.2	2.27	0.70
	Eq. 6.10b	95.6	23.6	2.04	0.30	92.9	11.2	2.26	0.70

GEOMETRY & LONGITUDINAL REINFORCEMENT

| Storey 6 Clear height (m) : 2.50 hcr (m) : 0.70 X-sect. RECT by (m) : 0.70 bz (m) : 0.30 |

| Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14 |

| 2Φ16 & 3Φ14 along by 2Φ16 & 1Φ14 along bz |

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|Storey 5 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.70 bz(m):0.30|
+-----+
| Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14 |
|           2Φ16 & 3Φ14 along by 2Φ16 & 1Φ14 along bz |
+-----+
|Storey 4 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.70 bz(m):0.30|
+-----+
| Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14 |
|           2Φ16 & 3Φ14 along by 2Φ16 & 1Φ14 along bz |
+-----+
|Storey 3 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.70 bz(m):0.30|
+-----+
| Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14 |
|           2Φ16 & 3Φ14 along by 2Φ16 & 1Φ14 along bz |
+-----+
|Storey 2 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.70 bz(m):0.30|
+-----+
| Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14 |
|           2Φ16 & 3Φ14 along by 2Φ16 & 1Φ14 along bz |
+-----+
|Storey 1 Clear height(m):3.50 hcr(m):0.70 X-sect. RECT by(m):0.70 bz(m):0.30|
+-----+
| Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14 |
|           2Φ16 & 3Φ14 along by 2Φ16 & 1Φ14 along bz |
+-----+
|Starter bars at base: 4Φ16 & 8Φ14 |
|           2Φ16 & 3Φ14 along by 2Φ16 & 1Φ14 along bz |
+-----+

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COLUMN DESIGN MOMENT RESISTANCE $M_{Rd,c}$ (for minN/maxN)

Storey	Locat.	Direction of M_{Rd} Vector :							
		+y		-y		+z		-z	
		(kNm)		(kNm)		(kNm)		(kNm)	
6	Top	84.0/	102.9	-84.0/	-102.9	340.8/	369.5	-340.8/	-369.5
	Base	86.2/	104.8	-86.2/	-104.8	344.1/	372.4	-344.1/	-372.4
5	Top	83.6/	121.7	-83.6/	-121.7	340.2/	399.2	-340.2/	-399.2
	Base	85.9/	123.3	-85.9/	-123.3	343.5/	401.7	-343.5/	-401.7
4	Top	83.1/	137.5	-83.1/	-137.5	339.5/	424.7	-339.5/	-424.7
	Base	85.3/	138.8	-85.3/	-138.8	342.8/	426.9	-342.8/	-426.9

3	Top	82.8/ 150.6	-82.8/ -150.6	339.0/ 446.0	-339.0/ -446.0
	Base	85.1/ 151.7	-85.1/ -151.7	342.4/ 447.9	-342.4/ -447.9
+-----+					
2	Top	83.8/ 160.9	-83.8/ -160.9	340.5/ 462.6	-340.5/ -462.6
	Base	86.0/ 161.8	-86.0/ -161.8	343.8/ 464.0	-343.8/ -464.0
+-----+					
1	Top	87.0/ 168.4	-87.0/ -168.4	345.3/ 474.2	-345.3/ -474.2
	Base	89.9/ 169.4	-89.9/ -169.4	349.6/ 475.7	-349.6/ -475.7
+-----+					

SUM OF BEAM DESIGN MOMENT RESISTANCES, MRd,b, AROUND JOINT

Storey	Locat.	Direction of MRd Vector :			
		+y	-y	+z	-z
		(kNm)	(kNm)	(kNm)	(kNm)
6	Top	83.4	58.5	188.3	170.8
	Base	134.6	86.9	232.7	223.2
+-----+					
5	Top	134.6	86.9	232.7	223.2
	Base	134.6	86.9	232.7	223.2
+-----+					
4	Top	134.6	86.9	232.7	223.2
	Base	139.5	86.9	232.7	223.2
+-----+					
3	Top	139.5	86.9	232.7	223.2
	Base	134.6	86.9	204.1	170.8
+-----+					
2	Top	134.6	86.9	204.1	170.8
	Base	149.3	86.9	158.0	116.0
+-----+					
1	Top	149.3	86.9	158.0	116.0
	Base	0.0	0.0	0.0	0.0
+-----+					

DESIGN OF TRANSVERSE REINFORCEMENT IN SHEAR (for maxN/minN)

Storey	Des. Shear VEd (kN)	Provided Ties		strut angle (deg)	VR,s		VR,max					
		dia.	legs spacing-s middle-mm		(middle-kN)	(middle-kN)						
		y	z	y	z	y	z	y	z			
6	maxN	37.	83.	6	5.0 3.0	170	22	22	216.	354.	490.	545.
	minN	37.	83.				22	22	203.	315.	490.	545.
+-----+												
5	maxN	32.	78.	6	5.0 3.0	170	22	22	229.	394.	490.	545.

minN	30.	76.		22	22	203.	315.		490.	545.					
+-----+															
4 maxN	31.	77.	6	5.0	3.0	170		22	22	243.	434.		490.	545.	
minN	30.	76.		22	22	203.	314.		490.	545.					
+-----+															
3 maxN	32.	77.	6	5.0	3.0	170		22	22	256.	474.		490.	545.	
minN	31.	76.		22	22	202.	313.		490.	545.					
+-----+															
2 maxN	31.	67.	6	5.0	3.0	170		22	22	269.	512.		490.	545.	
minN	30.	67.		22	22	203.	315.		490.	545.					
+-----+															
1 maxN	77.	187.	6	5.0	3.0	170		22	22	259.	481.		490.	545.	
minN	52.	147.		22	22	205.	320.		490.	545.					
+-----+															

CONFINEMENT REINFORCEMENT AT COLUMN ENDS (for maxN/minN)

Story	Wwd-req.		aWwd-req.		Stirrups					Wwd-prov.		aWwd-prov.	
	base	top	base	top	dia.	legs	spacing-mm	base	top	base	top		
					(mm)	y	z	base	top				
6	0.00	0.00	0.000	0.000	6	5.0	3.0	110	110	0.177	0.177	0.055	0.055
5	0.00	0.00	0.000	0.000	6	5.0	3.0	110	110	0.177	0.177	0.055	0.055
4	0.00	0.00	0.000	0.000	6	5.0	3.0	110	110	0.177	0.177	0.055	0.055
3	0.00	0.00	0.000	0.000	6	5.0	3.0	110	110	0.177	0.177	0.055	0.055
2	0.00	0.00	0.000	0.000	6	5.0	3.0	110	110	0.177	0.177	0.055	0.055
1	0.08	0.00	0.086	0.000	6	5.0	3.0	80	110	0.243	0.177	0.088	0.055

3A 2.2. COLUMN C2

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*-----*
* COLUMN: 2 *
*-----*
* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *
*-----*

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NORMAL STRESS-RESULTANTS

STOREY: 6	Base			Top			
Actions Combination	My	Mz	N	My	Mz	N	
-----+-----	(kNm)	(kNm)	(kN)	+-----	(kNm)	(kNm)	-----
EN1990 Eq. 6.10a	0.2	77.7	260.2		-3.1	-93.0	239.0
EN1990 Eq. 6.10b	0.2	73.9	245.7		-3.0	-88.5	227.6
G+ψ2Q+E +X +Y/maxN	122.9	98.4	192.5		169.1	-6.6	176.7
G+ψ2Q+E -X +Y/maxN	-122.7	98.4	192.5		-173.2	-6.6	176.7
G+ψ2Q+E +X -Y/maxN	122.9	4.2	192.5		169.1	-116.3	176.7
G+ψ2Q+E -X -Y/maxN	-122.7	4.2	192.5		-173.2	-116.3	176.7
G+ψ2Q+E +X +Y/minN	122.9	98.4	154.6		169.1	-6.6	138.8
G+ψ2Q+E -X +Y/minN	-122.7	98.4	154.6		-173.2	-6.6	138.8
G+ψ2Q+E +X -Y/minN	122.9	4.2	154.6		169.1	-116.3	138.8
G+ψ2Q+E -X -Y/minN	-122.7	4.2	154.6		-173.2	-116.3	138.8
+-----+							
STOREY: 5	Base			Top			
Actions Combination	My	Mz	N	My	Mz	N	
-----+-----	(kNm)	(kNm)	(kN)	+-----	(kNm)	(kNm)	-----
EN1990 Eq. 6.10a	-0.6	66.6	526.4		1.5	-64.7	505.2
EN1990 Eq. 6.10b	-0.5	63.4	497.0		1.4	-61.6	478.9
G+ψ2Q+E +X +Y/maxN	122.8	88.0	398.6		131.1	0.7	382.9
G+ψ2Q+E -X +Y/maxN	-123.6	88.0	398.6		-129.2	0.7	382.9
G+ψ2Q+E +X -Y/maxN	122.8	0.0	398.6		131.1	-86.2	382.9
G+ψ2Q+E -X -Y/maxN	-123.6	0.0	398.6		-129.2	-86.2	382.9
G+ψ2Q+E +X +Y/minN	122.8	88.0	303.3		131.1	0.7	287.6
G+ψ2Q+E -X +Y/minN	-123.6	88.0	303.3		-129.2	0.7	287.6
G+ψ2Q+E +X -Y/minN	122.8	0.0	303.3		131.1	-86.2	287.6
G+ψ2Q+E -X -Y/minN	-123.6	0.0	303.3		-129.2	-86.2	287.6
+-----+							
STOREY: 4	Base			Top			
Actions Combination	My	Mz	N	My	Mz	N	
-----+-----	(kNm)	(kNm)	(kN)	+-----	(kNm)	(kNm)	-----
EN1990 Eq. 6.10a	0.3	67.5	792.1		-0.2	-68.0	770.9
EN1990 Eq. 6.10b	0.3	64.3	747.9		-0.2	-64.7	729.8
G+ψ2Q+E +X +Y/maxN	136.6	89.8	603.8		141.2	-0.2	588.1
G+ψ2Q+E -X +Y/maxN	-136.2	89.8	603.8		-141.5	-0.2	588.1
G+ψ2Q+E +X -Y/maxN	136.6	-0.6	603.8		141.2	-89.6	588.1
G+ψ2Q+E -X -Y/maxN	-136.2	-0.6	603.8		-141.5	-89.6	588.1
G+ψ2Q+E +X +Y/minN	136.6	89.8	452.4		141.2	-0.2	436.7
G+ψ2Q+E -X +Y/minN	-136.2	89.8	452.4		-141.5	-0.2	436.7
G+ψ2Q+E +X -Y/minN	136.6	-0.6	452.4		141.2	-89.6	436.7

G+ψ2Q+E -X -Y/minN -214.2 -5.0 921.2 -102.8 -44.0 900.2									
+-----+ FOR NEGLIGIBLE 2ND-ORDER EFFECTS IN COLUMN, per EC2 pa.5.8.3.1, 5.8.3.2, 5.8.7.2 +-----+									
Storey	Combination	column direction x				column direction z			
	of actions	slenderness	column	slenderness	column	slenderness	column	slenderness	column
	per EN1990	limit	actual	eff.10	req.size	limit	actual	eff.10	req.size
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+ (m)-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+ (m)-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+									
6	Eq. 6.10a	121.6	8.0	1.61	0.70	175.9	17.4	1.50	0.30
	Eq. 6.10b	123.0	8.0	1.61	0.70	177.9	17.3	1.50	0.30
5	Eq. 6.10a	101.2	7.9	1.60	0.70	121.9	17.2	1.49	0.30
	Eq. 6.10b	102.6	7.9	1.60	0.70	123.7	17.2	1.49	0.30
4	Eq. 6.10a	81.4	7.9	1.60	0.70	107.1	17.3	1.50	0.30
	Eq. 6.10b	82.3	7.9	1.60	0.70	108.7	17.3	1.50	0.30
3	Eq. 6.10a	96.2	7.9	1.60	0.70	92.9	17.5	1.52	0.30
	Eq. 6.10b	98.1	7.9	1.60	0.70	94.4	17.5	1.51	0.30
2	Eq. 6.10a	85.9	8.0	1.61	0.70	83.5	17.8	1.54	0.30
	Eq. 6.10b	88.3	8.0	1.61	0.70	85.0	17.8	1.54	0.30
1	Eq. 6.10a	61.6	11.1	2.24	0.70	66.3	24.9	2.16	0.30
	Eq. 6.10b	62.7	11.1	2.24	0.70	67.4	24.8	2.15	0.30

GEOMETRY & LONGITUDINAL REINFORCEMENT

Storey 6	Clear height(m):2.50	hcr(m):0.70	X-sect. RECT by(m):0.30	bz(m):0.70
	Vertical steel ratio: 0.0097,	Bars: 4Φ16 & 8Φ14		
	2Φ16 & 1Φ14 along by		2Φ16 & 3Φ14 along bz	
Storey 5	Clear height(m):2.50	hcr(m):0.70	X-sect. RECT by(m):0.30	bz(m):0.70
	Vertical steel ratio: 0.0097,	Bars: 4Φ16 & 8Φ14		
	2Φ16 & 1Φ14 along by		2Φ16 & 3Φ14 along bz	
Storey 4	Clear height(m):2.50	hcr(m):0.70	X-sect. RECT by(m):0.30	bz(m):0.70
	Vertical steel ratio: 0.0097,	Bars: 4Φ16 & 8Φ14		
	2Φ16 & 1Φ14 along by		2Φ16 & 3Φ14 along bz	

+-----+									
Storey 3 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.30 bz(m):0.70									
+-----+									
Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14									
2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz									
+-----+									
Storey 2 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.30 bz(m):0.70									
+-----+									
Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14									
2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz									
+-----+									
Storey 1 Clear height(m):3.50 hcr(m):0.70 X-sect. RECT by(m):0.30 bz(m):0.70									
+-----+									
Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14									
2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz									
+-----+									
Starter bars at base: 4Φ16 & 8Φ14									
2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz									
+-----+									
COLUMN DESIGN MOMENT RESISTANCE MRd,c (for minN/maxN)									
+-----+									
Storey	Locat.	Direction of MRd Vector :							
		+y	-y	+z	-z				
+-----+	+-----+	+----- (kNm)	+----- (kNm)	+----- (kNm)	+----- (kNm)	+-----+	+-----+	+-----+	+-----+
6	Top	370.2/ 377.2	-370.2/ -377.2	103.3/ 107.8	-103.3/ -107.8				
	Base	373.1/ 380.1	-373.1/ -380.1	105.2/ 109.7	-105.2/ -109.7				
+-----+									
5	Top	396.6/ 411.9	-396.6/ -411.9	120.1/ 129.5	-120.1/ -129.5				
	Base	399.2/ 414.2	-399.2/ -414.2	121.7/ 131.0	-121.7/ -131.0				
+-----+									
4	Top	419.9/ 440.2	-419.9/ -440.2	134.5/ 147.0	-134.5/ -147.0				
	Base	422.2/ 442.2	-422.2/ -442.2	135.9/ 148.2	-135.9/ -148.2				
+-----+									
3	Top	440.1/ 462.5	-440.1/ -462.5	146.9/ 160.8	-146.9/ -160.8				
	Base	442.0/ 463.9	-442.0/ -463.9	148.1/ 161.7	-148.1/ -161.7				
+-----+									
2	Top	457.4/ 478.5	-457.4/ -478.5	157.6/ 171.2	-157.6/ -171.2				
	Base	459.0/ 479.5	-459.0/ -479.5	158.6/ 171.9	-158.6/ -171.9				
+-----+									
1	Top	471.7/ 488.4	-471.7/ -488.4	166.7/ 181.6	-166.7/ -181.6				
	Base	473.4/ 489.1	-473.4/ -489.1	167.8/ 181.8	-167.8/ -181.8				
+-----+									

SUM OF BEAM DESIGN MOMENT RESISTANCES, MRd,b, AROUND JOINT

Storey	Locat.	Direction of MRd Vector :			
		+y	-y	+z	-z
		(kNm)	(kNm)	(kNm)	(kNm)
6	Top	186.8	226.6	126.8	59.0
	Base	280.3	263.0	187.6	116.4
5	Top	280.3	263.0	187.6	116.4
	Base	310.9	272.6	187.6	116.4
4	Top	310.9	272.6	187.6	116.4
	Base	310.9	272.6	187.6	116.4
3	Top	310.9	272.6	187.6	116.4
	Base	310.9	272.6	162.0	87.9
2	Top	310.9	272.6	162.0	87.9
	Base	259.0	259.0	133.3	87.9
1	Top	259.0	259.0	133.3	87.9
	Base	0.0	0.0	0.0	0.0

DESIGN OF TRANSVERSE REINFORCEMENT IN SHEAR (for maxN/minN)

Storey	Des. Shear	Provided Ties				strut angle		VR,s		VR,max			
		VEd (kN)		dia. legs		spacing-s		(deg)		(middle-kN)			
		y	z	y	z	middle-mm	y	z	y	z	y	z	
6	maxN	100.	47.	6	3.0	5.0	170	22	22	364.	219.	545.	490.
	minN	100.	45.					22	22	351.	215.	545.	490.
5	maxN	64.	24.	6	3.0	5.0	170	22	22	413.	236.	545.	490.
	minN	64.	24.					22	22	387.	227.	545.	490.
4	maxN	71.	23.	6	3.0	5.0	170	22	22	463.	252.	545.	490.
	minN	70.	23.					22	22	422.	239.	545.	490.
3	maxN	70.	23.	6	3.0	5.0	170	22	22	512.	269.	545.	490.
	minN	70.	23.					22	22	459.	251.	545.	490.
2	maxN	70.	19.	6	3.0	5.0	170	22	22	551.	285.	556.	490.

minN	70.	19.				22	22	496.	263.	545.	490.		

1 maxN	195.	68.	6	3.0	5.0	170		22	22	525.	273.	545.	490.
minN	190.	64.						22	22	472.	255.	545.	490.

CONFINEMENT REINFORCEMENT AT COLUMN ENDS (for maxN/minN)													

Story	Wwd-req.	aWwd-req.	Stirrups				Wwd-prov.	aWwd-prov.					
	base top	base top	dia.	legs	spacing-mm	base top	base top						
			(mm)	y	z	base top							

6	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055

5	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055

4	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055

3	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055

2	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055

1	0.08	0.00	0.140	0.000	8	3.0	5.0	85	110	0.407	0.315	0.144	0.098

3A 2.3. COLUMN C3

* COLUMN: 3 *											

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *											

NORMAL STRESS-RESULTANTS											

STOREY:	6	Base				Top					
Actions Combination	My	Mz	N		My	Mz	N				
	(kNm)		(kNm)		(kNm)		(kNm)				
EN1990 Eq. 6.10a	4.2	49.3	212.5		-5.9	-59.2	191.3				
EN1990 Eq. 6.10b	4.0	46.9	200.2		-5.6	-56.3	182.2				
G+ψ2Q+E +X +Y/maxN	133.0	77.5	158.1		177.9	13.2	142.3				
G+ψ2Q+E -X +Y/maxN	-127.5	77.5	158.1		-185.7	13.2	142.3				

G+ψ2Q+E +X -Y/maxN	133.0	-12.4	158.1		177.9	-91.4	142.3	
G+ψ2Q+E -X -Y/maxN	-127.5	-12.4	158.1		-185.7	-91.4	142.3	
G+ψ2Q+E +X +Y/minN	133.0	77.5	126.0		177.9	13.2	110.3	
G+ψ2Q+E -X +Y/minN	-127.5	77.5	126.0		-185.7	13.2	110.3	
G+ψ2Q+E +X -Y/minN	133.0	-12.4	126.0		177.9	-91.4	110.3	
G+ψ2Q+E -X -Y/minN	-127.5	-12.4	126.0		-185.7	-91.4	110.3	

-----+

STOREY: 5	Base			Top		
Actions Combination	My	Mz	N	My	Mz	N
	(kNm)	(kNm)	(kN)	(kNm)	(kNm)	(kN)
EN1990 Eq. 6.10a	3.2	42.3	432.4	-3.0	-41.0	411.1
EN1990 Eq. 6.10b	3.0	40.2	407.4	-2.8	-39.0	389.3
G+ψ2Q+E +X +Y/maxN	131.4	69.8	330.6	133.6	14.3	314.8
G+ψ2Q+E -X +Y/maxN	-127.2	69.8	330.6	-137.5	14.3	314.8
G+ψ2Q+E +X -Y/maxN	131.4	-13.9	330.6	133.6	-68.4	314.8
G+ψ2Q+E -X -Y/maxN	-127.2	-13.9	330.6	-137.5	-68.4	314.8
G+ψ2Q+E +X +Y/minN	131.4	69.8	247.2	133.6	14.3	231.5
G+ψ2Q+E -X +Y/minN	-127.2	69.8	247.2	-137.5	14.3	231.5
G+ψ2Q+E +X -Y/minN	131.4	-13.9	247.2	133.6	-68.4	231.5
G+ψ2Q+E -X -Y/minN	-127.2	-13.9	247.2	-137.5	-68.4	231.5

-----+

STOREY: 4	Base			Top		
Actions Combination	My	Mz	N	My	Mz	N
	(kNm)	(kNm)	(kN)	(kNm)	(kNm)	(kN)
EN1990 Eq. 6.10a	3.0	43.0	650.8	-3.2	-43.3	629.6
EN1990 Eq. 6.10b	2.8	40.9	613.3	-3.0	-41.2	595.2
G+ψ2Q+E +X +Y/maxN	145.1	71.4	501.6	146.0	13.8	485.8
G+ψ2Q+E -X +Y/maxN	-141.2	71.4	501.6	-150.2	13.8	485.8
G+ψ2Q+E +X -Y/maxN	145.1	-14.5	501.6	146.0	-71.0	485.8
G+ψ2Q+E -X -Y/maxN	-141.2	-14.5	501.6	-150.2	-71.0	485.8
G+ψ2Q+E +X +Y/minN	145.1	71.4	368.1	146.0	13.8	352.3
G+ψ2Q+E -X +Y/minN	-141.2	71.4	368.1	-150.2	13.8	352.3
G+ψ2Q+E +X -Y/minN	145.1	-14.5	368.1	146.0	-71.0	352.3
G+ψ2Q+E -X -Y/minN	-141.2	-14.5	368.1	-150.2	-71.0	352.3

-----+

STOREY: 3	Base			Top		
Actions Combination	My	Mz	N	My	Mz	N
	(kNm)	(kNm)	(kN)	(kNm)	(kNm)	(kN)
EN1990 Eq. 6.10a	2.5	41.9	868.9	-2.7	-42.4	847.7
EN1990 Eq. 6.10b	2.4	39.8	818.8	-2.5	-40.3	800.7
G+ψ2Q+E +X +Y/maxN	152.2	68.4	671.7	141.5	11.0	655.9
G+ψ2Q+E -X +Y/maxN	-148.9	68.4	671.7	-145.0	11.0	655.9

G+ψ2Q+E +X -Y/maxN	152.2	-13.1	671.7		141.5	-67.1	655.9	
G+ψ2Q+E -X -Y/maxN	-148.9	-13.1	671.7		-145.0	-67.1	655.9	
G+ψ2Q+E +X +Y/minN	152.2	68.4	489.5		141.5	11.0	473.7	
G+ψ2Q+E -X +Y/minN	-148.9	68.4	489.5		-145.0	11.0	473.7	
G+ψ2Q+E +X -Y/minN	152.2	-13.1	489.5		141.5	-67.1	473.7	
G+ψ2Q+E -X -Y/minN	-148.9	-13.1	489.5		-145.0	-67.1	473.7	

+-----+								
STOREY: 2	Base				Top			
Actions Combination	My	Mz	N		My	Mz	N	
-----+	(kNm)	(kNm)	(kN)		(kNm)	(kNm)	(kN)	
EN1990 Eq. 6.10a	2.1	46.6	1086.7		-2.2	-44.0	1065.5	
EN1990 Eq. 6.10b	2.0	44.4	1024.0		-2.1	-41.9	1006.0	
G+ψ2Q+E +X +Y/maxN	141.9	67.8	838.9		122.1	3.5	823.2	
G+ψ2Q+E -X +Y/maxN	-139.1	67.8	838.9		-125.0	3.5	823.2	
G+ψ2Q+E +X -Y/maxN	141.9	-6.1	838.9		122.1	-61.7	823.2	
G+ψ2Q+E -X -Y/maxN	-139.1	-6.1	838.9		-125.0	-61.7	823.2	
G+ψ2Q+E +X +Y/minN	141.9	67.8	613.2		122.1	3.5	597.5	
G+ψ2Q+E -X +Y/minN	-139.1	67.8	613.2		-125.0	3.5	597.5	
G+ψ2Q+E +X -Y/minN	141.9	-6.1	613.2		122.1	-61.7	597.5	
G+ψ2Q+E -X -Y/minN	-139.1	-6.1	613.2		-125.0	-61.7	597.5	

+-----+								
STOREY: 1	Base				Top			
Actions Combination	My	Mz	N		My	Mz	N	
-----+	(kNm)	(kNm)	(kN)		(kNm)	(kNm)	(kN)	
EN1990 Eq. 6.10a	0.5	20.6	1308.6		-1.1	-29.1	1280.3	
EN1990 Eq. 6.10b	0.5	19.6	1232.5		-1.0	-27.7	1208.4	
G+ψ2Q+E +X +Y/maxN	217.4	34.5	1003.1		105.3	-4.5	982.1	
G+ψ2Q+E -X +Y/maxN	-216.7	34.5	1003.1		-106.7	-4.5	982.1	
G+ψ2Q+E +X -Y/maxN	217.4	-7.3	1003.1		105.3	-34.0	982.1	
G+ψ2Q+E -X -Y/maxN	-216.7	-7.3	1003.1		-106.7	-34.0	982.1	
G+ψ2Q+E +X +Y/minN	217.4	34.5	746.7		105.3	-4.5	725.7	
G+ψ2Q+E -X +Y/minN	-216.7	34.5	746.7		-106.7	-4.5	725.7	
G+ψ2Q+E +X -Y/minN	217.4	-7.3	746.7		105.3	-34.0	725.7	
G+ψ2Q+E -X -Y/minN	-216.7	-7.3	746.7		-106.7	-34.0	725.7	

FOR NEGLIGIBLE 2ND-ORDER EFFECTS IN COLUMN, per EC2 pa.5.8.3.1, 5.8.3.2, 5.8.7.2

+-----+											
Storey	Combination	column direction x					column direction z				
	of actions	slenderness	column		slenderness	column					
	per EN1990	limit	actual	eff.10	req.size	limit	actual	eff.10	req.size		
-----+	-----+	(m)					(m)				
6	Eq. 6.10a	187.1	7.9	1.61	0.70	196.4	17.6	1.52	0.30		

	Eq. 6.10b	189.1	7.9	1.61	0.70	198.6	17.6	1.52	0.30
+-----+									
5	Eq. 6.10a	127.8	7.9	1.60	0.70	134.5	17.5	1.52	0.30
	Eq. 6.10b	129.6	7.9	1.60	0.70	136.6	17.5	1.51	0.30
+-----+									
4	Eq. 6.10a	116.2	7.9	1.60	0.70	118.5	17.6	1.53	0.30
	Eq. 6.10b	118.0	7.9	1.60	0.70	120.4	17.6	1.53	0.30
+-----+									
3	Eq. 6.10a	100.7	7.9	1.60	0.70	102.8	17.8	1.54	0.30
	Eq. 6.10b	102.4	7.9	1.60	0.70	104.6	17.8	1.54	0.30
+-----+									
2	Eq. 6.10a	90.9	7.9	1.60	0.70	92.2	18.0	1.56	0.30
	Eq. 6.10b	92.4	7.9	1.60	0.70	94.0	18.0	1.56	0.30
+-----+									
1	Eq. 6.10a	68.9	11.0	2.22	0.70	76.0	25.2	2.18	0.30
	Eq. 6.10b	70.1	11.0	2.22	0.70	77.3	25.1	2.18	0.30
+-----+									

GEOMETRY & LONGITUDINAL REINFORCEMENT

+-----+									
Storey 6 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.30 bz(m):0.70									
+-----+									
Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14									
2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz									
+-----+									
Storey 5 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.30 bz(m):0.70									
+-----+									
Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14									
2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz									
+-----+									
Storey 4 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.30 bz(m):0.70									
+-----+									
Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14									
2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz									
+-----+									
Storey 3 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.30 bz(m):0.70									
+-----+									
Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14									
2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz									
+-----+									
Storey 2 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.30 bz(m):0.70									
+-----+									
Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14									

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|          2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz          |
+-----+
|Storey 1 Clear height(m):3.50 hcr(m):0.70 X-sect. RECT by(m):0.30 bz(m):0.70|
+-----+
| Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14          |
|          2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz          |
+-----+
|Starter bars at base: 4Φ16 & 8Φ14                          |
|          2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz          |
+-----+

```

COLUMN DESIGN MOMENT RESISTANCE $M_{Rd,c}$ (for minN/maxN)

```

+-----+
|Storey|Locat.|          Direction of MRd Vector          :          |
|      |      |          +y          |          -y          |          +z          |          -z          |
+-----+-----+-----+-----+-----+-----+-----+-----+
|      |      |      (kNm)      |      (kNm)      |      (kNm)      |      (kNm)      |
+-----+-----+-----+-----+-----+-----+-----+
|  6  | Top  | 364.7/ 370.8 | -364.7/ -370.8 | 99.8/ 103.8 | -99.8/ -103.8 |
|      | Base | 367.8/ 373.8 | -367.8/ -373.8 | 101.8/ 105.7 | -101.8/ -105.7 |
+-----+-----+-----+-----+-----+-----+-----+
|  5  | Top  | 387.0/ 401.1 | -387.0/ -401.1 | 114.0/ 122.9 | -114.0/ -122.9 |
|      | Base | 389.8/ 403.6 | -389.8/ -403.6 | 115.8/ 124.4 | -115.8/ -124.4 |
+-----+-----+-----+-----+-----+-----+-----+
|  4  | Top  | 407.1/ 426.9 | -407.1/ -426.9 | 126.6/ 138.8 | -126.6/ -138.8 |
|      | Base | 409.6/ 429.0 | -409.6/ -429.0 | 128.1/ 140.1 | -128.1/ -140.1 |
+-----+-----+-----+-----+-----+-----+-----+
|  3  | Top  | 425.2/ 448.3 | -425.2/ -448.3 | 137.7/ 151.9 | -137.7/ -151.9 |
|      | Base | 427.4/ 450.0 | -427.4/ -450.0 | 139.1/ 153.0 | -139.1/ -153.0 |
+-----+-----+-----+-----+-----+-----+-----+
|  2  | Top  | 441.4/ 465.3 | -441.4/ -465.3 | 147.7/ 162.6 | -147.7/ -162.6 |
|      | Base | 443.3/ 466.7 | -443.3/ -466.7 | 148.9/ 163.5 | -148.9/ -163.5 |
+-----+-----+-----+-----+-----+-----+-----+
|  1  | Top  | 455.9/ 477.7 | -455.9/ -477.7 | 156.7/ 170.7 | -156.7/ -170.7 |
|      | Base | 458.0/ 479.0 | -458.0/ -479.0 | 158.0/ 171.6 | -158.0/ -171.6 |
+-----+-----+-----+-----+-----+-----+-----+

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SUM OF BEAM DESIGN MOMENT RESISTANCES, $M_{Rd,b}$, AROUND JOINT

```

+-----+
|Storey|Locat.|          Direction of MRd Vector          :          |
|      |      |          +y          |          -y          |          +z          |          -z          |
+-----+-----+-----+-----+-----+-----+-----+
|      |      |      (kNm)      |      (kNm)      |      (kNm)      |      (kNm)      |
+-----+-----+-----+-----+-----+-----+-----+
|  6  | Top  |          241.0 |          241.0 |          108.3 |          59.0 |
|      | Base |          281.7 |          281.7 |          144.7 |          87.9 |
+-----+-----+-----+-----+-----+-----+-----+
|  5  | Top  |          281.7 |          281.7 |          144.7 |          87.9 |

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	Base	294.4	294.4	140.8	87.9
4	Top	294.4	294.4	140.8	87.9
	Base	294.4	294.4	133.3	87.9
3	Top	294.4	294.4	133.3	87.9
	Base	294.4	294.4	126.8	87.9
2	Top	294.4	294.4	126.8	87.9
	Base	272.6	272.6	108.3	59.0
1	Top	272.6	272.6	108.3	59.0
	Base	0.0	0.0	0.0	0.0

DESIGN OF TRANSVERSE REINFORCEMENT IN SHEAR (for maxN/minN)

Storey	Des. Shear VED (kN)	Provided Ties				strut angle		VR,s		VR,max		
		dia.	legs	spacing-s	(deg)	(middle-kN)	(middle-kN)	y	z	y	z	
	y	z	(mm)	y	z	middle-mm	y	z	y	z	y	z
6 maxN	106.	46.	6	3.0	5.0	170	22	22	356.	216.	545.	490.
minN	106.	44.					22	22	344.	213.	545.	490.
5 maxN	64.	19.	6	3.0	5.0	170	22	22	397.	230.	545.	490.
minN	64.	18.					22	22	373.	222.	545.	490.
4 maxN	67.	17.	6	3.0	5.0	170	22	22	438.	244.	545.	490.
minN	66.	17.					22	22	402.	232.	545.	490.
3 maxN	66.	16.	6	3.0	5.0	170	22	22	479.	258.	545.	490.
minN	66.	16.					22	22	431.	242.	545.	490.
2 maxN	66.	15.	6	3.0	5.0	170	22	22	519.	271.	545.	490.
minN	66.	15.					22	22	461.	252.	545.	490.
1 maxN	194.	63.	6	3.0	5.0	170	22	22	490.	261.	545.	490.
minN	187.	59.					22	22	442.	245.	545.	490.

CONFINEMENT REINFORCEMENT AT COLUMN ENDS (for maxN/minN)

Story	Wwd-req.	aWwd-req.	Stirrups			Wwd-prov.	aWwd-prov.	
			base	top	base			
	base	top	base	top	base	top	base	top
			dia.	legs	spacing-mm			

				(mm)	y	z	base	top					
6	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055
5	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055
4	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055
3	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055
2	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055
1	0.08	0.00	0.110	0.000	8	3.0	5.0	100	110	0.346	0.315	0.113	0.098

3A 2.4. COLUMN C7

* COLUMN: 7 *

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

NORMAL STRESS-RESULTANTS

STOREY: 6		Base			Top		
Actions	Combination	My	Mz	N	My	Mz	N
		(kNm)	(kNm)	(kN)	(kNm)	(kNm)	(kN)
EN1990	Eq. 6.10a	-23.7	3.9	527.3	30.1	-4.8	502.0
EN1990	Eq. 6.10b	-22.5	3.7	499.7	28.6	-4.5	478.1
G+ψ2Q+E	+X +Y/maxN	111.9	105.3	354.2	179.6	122.9	335.4
G+ψ2Q+E	-X +Y/maxN	-143.2	105.3	354.2	-139.9	122.9	335.4
G+ψ2Q+E	+X -Y/maxN	111.9	-100.0	354.2	179.6	-129.2	335.4
G+ψ2Q+E	-X -Y/maxN	-143.2	-100.0	354.2	-139.9	-129.2	335.4
G+ψ2Q+E	+X +Y/minN	111.9	105.3	346.0	179.6	122.9	327.2
G+ψ2Q+E	-X +Y/minN	-143.2	105.3	346.0	-139.9	122.9	327.2
G+ψ2Q+E	+X -Y/minN	111.9	-100.0	346.0	179.6	-129.2	327.2
G+ψ2Q+E	-X -Y/minN	-143.2	-100.0	346.0	-139.9	-129.2	327.2

STOREY: 5		Base			Top		
Actions	Combination	My	Mz	N	My	Mz	N

	(kNm)	(kNm)	(kN)	(kNm)	(kNm)	(kN)
EN1990 Eq. 6.10a	-19.0	3.4	1021.6	18.4	-3.4	996.3
EN1990 Eq. 6.10b	-18.0	3.3	968.0	17.5	-3.2	946.5
G+ψ2Q+E +X +Y/maxN	113.2	97.2	685.7	139.6	91.2	667.0
G+ψ2Q+E -X +Y/maxN	-138.3	97.2	685.7	-115.2	91.2	667.0
G+ψ2Q+E +X -Y/maxN	113.2	-92.7	685.7	139.6	-95.7	667.0
G+ψ2Q+E -X -Y/maxN	-138.3	-92.7	685.7	-115.2	-95.7	667.0
G+ψ2Q+E +X +Y/minN	113.2	97.2	671.2	139.6	91.2	652.4
G+ψ2Q+E -X +Y/minN	-138.3	97.2	671.2	-115.2	91.2	652.4
G+ψ2Q+E +X -Y/minN	113.2	-92.7	671.2	139.6	-95.7	652.4
G+ψ2Q+E -X -Y/minN	-138.3	-92.7	671.2	-115.2	-95.7	652.4

STOREY: 4	Base			Top		
Actions Combination	My	Mz	N	My	Mz	N
EN1990 Eq. 6.10a	-18.3	3.6	1524.4	18.9	-3.7	1499.1
EN1990 Eq. 6.10b	-17.4	3.4	1444.3	18.0	-3.5	1422.8
G+ψ2Q+E +X +Y/maxN	124.5	101.8	1023.1	150.9	94.9	1004.3
G+ψ2Q+E -X +Y/maxN	-148.6	101.8	1023.1	-125.8	94.9	1004.3
G+ψ2Q+E +X -Y/maxN	124.5	-97.0	1023.1	150.9	-99.8	1004.3
G+ψ2Q+E -X -Y/maxN	-148.6	-97.0	1023.1	-125.8	-99.8	1004.3
G+ψ2Q+E +X +Y/minN	124.5	101.8	1001.6	150.9	94.9	982.9
G+ψ2Q+E -X +Y/minN	-148.6	101.8	1001.6	-125.8	94.9	982.9
G+ψ2Q+E +X -Y/minN	124.5	-97.0	1001.6	150.9	-99.8	982.9
G+ψ2Q+E -X -Y/minN	-148.6	-97.0	1001.6	-125.8	-99.8	982.9

STOREY: 3	Base			Top		
Actions Combination	My	Mz	N	My	Mz	N
EN1990 Eq. 6.10a	-16.3	3.6	2030.4	17.0	-3.8	2005.1
EN1990 Eq. 6.10b	-15.5	3.4	1923.7	16.2	-3.6	1902.2
G+ψ2Q+E +X +Y/maxN	126.9	98.2	1362.7	146.9	85.7	1343.9
G+ψ2Q+E -X +Y/maxN	-148.6	98.2	1362.7	-124.3	85.7	1343.9
G+ψ2Q+E +X -Y/maxN	126.9	-93.4	1362.7	146.9	-90.8	1343.9
G+ψ2Q+E -X -Y/maxN	-148.6	-93.4	1362.7	-124.3	-90.8	1343.9
G+ψ2Q+E +X +Y/minN	126.9	98.2	1334.2	146.9	85.7	1315.4
G+ψ2Q+E -X +Y/minN	-148.6	98.2	1334.2	-124.3	85.7	1315.4
G+ψ2Q+E +X -Y/minN	126.9	-93.4	1334.2	146.9	-90.8	1315.4
G+ψ2Q+E -X -Y/minN	-148.6	-93.4	1334.2	-124.3	-90.8	1315.4

STOREY: 2	Base			Top		
Actions Combination	My	Mz	N	My	Mz	N

	(kNm)	(kNm)	(kN)	(kNm)	(kNm)	(kN)
EN1990 Eq. 6.10a	-14.9	4.6	2540.7	15.3	-4.3	2515.4
EN1990 Eq. 6.10b	-14.1	4.3	2407.2	14.5	-4.1	2385.7
G+ψ2Q+E +X +Y/maxN	130.9	94.4	1704.6	136.3	69.8	1685.9
G+ψ2Q+E -X +Y/maxN	-150.6	94.4	1704.6	-116.1	69.8	1685.9
G+ψ2Q+E +X -Y/maxN	130.9	-88.3	1704.6	136.3	-75.5	1685.9
G+ψ2Q+E -X -Y/maxN	-150.6	-88.3	1704.6	-116.1	-75.5	1685.9
G+ψ2Q+E +X +Y/minN	130.9	94.4	1670.0	136.3	69.8	1651.2
G+ψ2Q+E -X +Y/minN	-150.6	94.4	1670.0	-116.1	69.8	1651.2
G+ψ2Q+E +X -Y/minN	130.9	-88.3	1670.0	136.3	-75.5	1651.2
G+ψ2Q+E -X -Y/minN	-150.6	-88.3	1670.0	-116.1	-75.5	1651.2

STOREY: 1	Base			Top		
Actions Combination	My	Mz	N	My	Mz	N
EN1990 Eq. 6.10a	-9.9	2.8	3074.9	10.5	-3.6	3041.1
EN1990 Eq. 6.10b	-9.4	2.6	2912.6	10.0	-3.4	2883.9
G+ψ2Q+E +X +Y/maxN	103.2	52.7	2063.9	88.9	25.5	2038.9
G+ψ2Q+E -X +Y/maxN	-116.3	52.7	2063.9	-74.9	25.5	2038.9
G+ψ2Q+E +X -Y/maxN	103.2	-49.0	2063.9	88.9	-30.3	2038.9
G+ψ2Q+E -X -Y/maxN	-116.3	-49.0	2063.9	-74.9	-30.3	2038.9
G+ψ2Q+E +X +Y/minN	103.2	52.7	2021.2	88.9	25.5	1996.2
G+ψ2Q+E -X +Y/minN	-116.3	52.7	2021.2	-74.9	25.5	1996.2
G+ψ2Q+E +X -Y/minN	103.2	-49.0	2021.2	88.9	-30.3	1996.2
G+ψ2Q+E -X -Y/minN	-116.3	-49.0	2021.2	-74.9	-30.3	1996.2

STOREY: 0	Base			Top		
Actions Combination	My	Mz	N	My	Mz	N
EN1990 Eq. 6.10a	-7.5	0.8	3579.1	9.9	-2.3	3553.8
EN1990 Eq. 6.10b	-7.2	0.7	3390.3	9.4	-2.1	3368.8
G+ψ2Q+E +X +Y/maxN	6.9	2.8	2396.4	43.3	15.3	2377.6
G+ψ2Q+E -X +Y/maxN	-16.9	2.8	2396.4	-30.3	15.3	2377.6
G+ψ2Q+E +X -Y/maxN	6.9	-1.8	2396.4	43.3	-18.4	2377.6
G+ψ2Q+E -X -Y/maxN	-16.9	-1.8	2396.4	-30.3	-18.4	2377.6
G+ψ2Q+E +X +Y/minN	6.9	2.8	2358.6	43.3	15.3	2339.8
G+ψ2Q+E -X +Y/minN	-16.9	2.8	2358.6	-30.3	15.3	2339.8
G+ψ2Q+E +X -Y/minN	6.9	-1.8	2358.6	43.3	-18.4	2339.8
G+ψ2Q+E -X -Y/minN	-16.9	-1.8	2358.6	-30.3	-18.4	2339.8

STOREY: -1	Base			Top		
Actions Combination	My	Mz	N	My	Mz	N

	(kNm)	(kNm)	(kN)	(kNm)	(kNm)	(kN)
EN1990 Eq. 6.10a	-1.8	-0.2	4099.8	3.7	0.4	4074.5
EN1990 Eq. 6.10b	-1.7	-0.2	3883.7	3.5	0.4	3862.1
G+ψ2Q+E +X +Y/maxN	3.9	6.1	2742.7	8.6	5.8	2724.0
G+ψ2Q+E -X +Y/maxN	-6.2	6.1	2742.7	-3.7	5.8	2724.0
G+ψ2Q+E +X -Y/maxN	3.9	-6.4	2742.7	8.6	-5.2	2724.0
G+ψ2Q+E -X -Y/maxN	-6.2	-6.4	2742.7	-3.7	-5.2	2724.0
G+ψ2Q+E +X +Y/minN	3.9	6.1	2703.7	8.6	5.8	2684.9
G+ψ2Q+E -X +Y/minN	-6.2	6.1	2703.7	-3.7	5.8	2684.9
G+ψ2Q+E +X -Y/minN	3.9	-6.4	2703.7	8.6	-5.2	2684.9
G+ψ2Q+E -X -Y/minN	-6.2	-6.4	2703.7	-3.7	-5.2	2684.9

FOR NEGLIGIBLE 2ND-ORDER EFFECTS IN COLUMN, per EC2 pa.5.8.3.1, 5.8.3.2, 5.8.7.2

Storey	Combination	column direction x				column direction z			
		slenderness		column		slenderness		column	
	of actions	limit	actual	eff.10	req.size	limit	actual	eff.10	req.size
	per EN1990	(m)				(m)			
6	Eq. 6.10a	130.5	11.0	1.58	0.50	132.3	10.9	1.57	0.50
	Eq. 6.10b	132.0	11.0	1.58	0.50	133.5	10.9	1.57	0.50
5	Eq. 6.10a	94.1	10.9	1.57	0.50	96.7	10.9	1.57	0.50
	Eq. 6.10b	95.2	10.9	1.57	0.50	97.8	10.9	1.57	0.50
4	Eq. 6.10a	83.3	10.9	1.57	0.50	83.7	10.9	1.58	0.50
	Eq. 6.10b	84.5	10.9	1.57	0.50	84.7	10.9	1.57	0.50
3	Eq. 6.10a	72.5	10.9	1.57	0.50	72.2	11.0	1.58	0.50
	Eq. 6.10b	73.5	10.9	1.57	0.50	73.1	11.0	1.58	0.50
2	Eq. 6.10a	65.5	11.0	1.59	0.50	67.5	11.0	1.59	0.50
	Eq. 6.10b	66.5	11.0	1.58	0.50	68.6	11.0	1.59	0.50
1	Eq. 6.10a	59.1	15.3	2.20	0.50	55.2	15.3	2.21	0.50
	Eq. 6.10b	60.0	15.2	2.20	0.50	55.9	15.3	2.21	0.50
0	Eq. 6.10a	51.4	11.0	1.59	0.50	42.2	11.1	1.60	0.50
	Eq. 6.10b	52.2	11.0	1.59	0.50	42.6	11.1	1.60	0.50
-1	Eq. 6.10a	42.6	9.8	1.41	0.50	42.8	9.8	1.41	0.50
	Eq. 6.10b	43.2	9.8	1.41	0.50	43.7	9.7	1.41	0.50

GEOMETRY & LONGITUDINAL REINFORCEMENT

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+-----+
|Storey  6 Clear height(m):2.50 hcr(m):0.50 X-sect. RECT by(m):0.50 bz(m):0.50|
+-----+
| Vertical steel ratio: 0.0090, Bars:  4Φ18 &  8Φ14 |
|           2Φ18 &  2Φ14 along by  2Φ18 &  2Φ14 along bz |
+-----+
|Storey  5 Clear height(m):2.50 hcr(m):0.50 X-sect. RECT by(m):0.50 bz(m):0.50|
+-----+
| Vertical steel ratio: 0.0090, Bars:  4Φ18 &  8Φ14 |
|           2Φ18 &  2Φ14 along by  2Φ18 &  2Φ14 along bz |
+-----+
|Storey  4 Clear height(m):2.50 hcr(m):0.50 X-sect. RECT by(m):0.50 bz(m):0.50|
+-----+
| Vertical steel ratio: 0.0090, Bars:  4Φ18 &  8Φ14 |
|           2Φ18 &  2Φ14 along by  2Φ18 &  2Φ14 along bz |
+-----+
|Storey  3 Clear height(m):2.50 hcr(m):0.50 X-sect. RECT by(m):0.50 bz(m):0.50|
+-----+
| Vertical steel ratio: 0.0090, Bars:  4Φ18 &  8Φ14 |
|           2Φ18 &  2Φ14 along by  2Φ18 &  2Φ14 along bz |
+-----+
|Storey  2 Clear height(m):2.50 hcr(m):0.50 X-sect. RECT by(m):0.50 bz(m):0.50|
+-----+
| Vertical steel ratio: 0.0090, Bars:  4Φ18 &  8Φ14 |
|           2Φ18 &  2Φ14 along by  2Φ18 &  2Φ14 along bz |
+-----+
|Storey  1 Clear height(m):3.50 hcr(m):0.60 X-sect. RECT by(m):0.50 bz(m):0.50|
+-----+
| Vertical steel ratio: 0.0090, Bars:  4Φ18 &  8Φ14 |
|           2Φ18 &  2Φ14 along by  2Φ18 &  2Φ14 along bz |
+-----+
|Storey  0 Clear height(m):2.50 hcr(m):0.50 X-sect. RECT by(m):0.50 bz(m):0.50|
+-----+
| Vertical steel ratio: 0.0090, Bars:  4Φ18 &  8Φ14 |
|           2Φ18 &  2Φ14 along by  2Φ18 &  2Φ14 along bz |
+-----+
|Storey -1 Clear height(m):2.50 hcr(m):0.50 X-sect. RECT by(m):0.50 bz(m):0.50|
+-----+
| Vertical steel ratio: 0.0090, Bars:  4Φ18 &  8Φ14 |
|           2Φ18 &  2Φ14 along by  2Φ18 &  2Φ14 along bz |
+-----+

```

|Starter bars at base: 4Φ18 & 8Φ14 |
 | 2Φ18 & 2Φ14 along by 2Φ18 & 2Φ14 along bz |

-----+
 COLUMN DESIGN MOMENT RESISTANCE MRd,c (for minN/maxN)
 -----+

Storey	Locat.	Direction of MRd Vector :							
		+y		-y		+z		-z	
		(kNm)		(kNm)		(kNm)		(kNm)	
6	Top	275.6/	277.2	-275.6/	-277.2	275.6/	277.2	-275.6/	-277.2
	Base	279.3/	281.0	-279.3/	-281.0	279.3/	281.0	-279.3/	-281.0
5	Top	355.1/	356.4	-355.1/	-356.4	355.1/	356.4	-355.1/	-356.4
	Base	356.8/	358.2	-356.8/	-358.2	356.8/	358.2	-356.8/	-358.2
4	Top	381.2/	382.6	-381.2/	-382.6	381.2/	382.6	-381.2/	-382.6
	Base	382.4/	383.7	-382.4/	-383.7	382.4/	383.7	-382.4/	-383.7
3	Top	397.5/	398.5	-397.5/	-398.5	397.5/	398.5	-397.5/	-398.5
	Base	398.1/	399.0	-398.1/	-399.0	398.1/	399.0	-398.1/	-399.0
2	Top	403.8/	403.9	-403.8/	-403.9	403.8/	403.9	-403.8/	-403.9
	Base	403.9/	403.9	-403.9/	-403.9	403.9/	403.9	-403.9/	-403.9
1	Top	406.2/	403.4	-406.2/	-403.4	406.2/	403.4	-406.2/	-403.4
	Base	404.6/	401.7	-404.6/	-401.7	404.6/	401.7	-404.6/	-401.7
0	Top	382.9/	380.2	-382.9/	-380.2	382.9/	380.2	-382.9/	-380.2
	Base	381.5/	378.8	-381.5/	-378.8	381.5/	378.8	-381.5/	-378.8
-1	Top	357.1/	354.0	-357.1/	-354.0	357.1/	354.0	-357.1/	-354.0
	Base	355.6/	352.4	-355.6/	-352.4	355.6/	352.4	-355.6/	-352.4

-----+
 SUM OF BEAM DESIGN MOMENT RESISTANCES, MRd,b, AROUND JOINT
 -----+

Storey	Locat.	Direction of MRd Vector :			
		+y	-y	+z	-z
		(kNm)		(kNm)	
6	Top	218.0	218.0	302.2	302.2
	Base	302.0	272.2	327.4	327.4
5	Top	302.0	272.2	327.4	327.4
	Base	318.3	279.4	327.4	327.4

+-----+											
	4	Top		318.3		279.4		327.4		327.4	
		Base		336.2		287.4		327.4		327.4	
+-----+											
	3	Top		336.2		287.4		327.4		327.4	
		Base		336.2		287.4		317.3		317.3	
+-----+											
	2	Top		336.2		287.4		317.3		317.3	
		Base		279.4		279.4		301.1		301.1	
+-----+											
	1	Top		279.4		279.4		301.1		301.1	
		Base		168.6		168.6		177.0		177.0	
+-----+											
	0	Top		168.6		168.6		177.0		177.0	
		Base		140.2		140.2		180.9		180.9	
+-----+											
	-1	Top		140.2		140.2		180.9		180.9	
		Base		0.0		0.0		0.0		0.0	
+-----+											

DESIGN OF TRANSVERSE REINFORCEMENT IN SHEAR (for maxN/minN)

+-----+																					
	Storey		Des. Shear		Provided Ties				strut angle		VR,s		VR,max								
			VEd (kN)		dia.	legs	spacing-s		(deg)		(middle-kN)		(middle-kN)								
			y z		(mm)	y z	middle-mm		y z		y z		y z								
+-----+																					
	6		maxN		96.	122.		6	4.0	4.0	170		22	22		350.	350.		629.	629.	
			minN		96.	121.							22	22		346.	346.		629.	629.	
+-----+																					
	5		maxN		75.	81.		6	4.0	4.0	170		22	22		403.	403.		629.	629.	
			minN		75.	81.							22	22		398.	398.		629.	629.	
+-----+																					
	4		maxN		72.	75.		6	4.0	4.0	170		22	22		457.	457.		629.	629.	
			minN		73.	75.							22	22		451.	451.		629.	629.	
+-----+																					
	3		maxN		75.	73.		6	4.0	4.0	170		22	22		512.	512.		629.	629.	
			minN		76.	74.							22	22		504.	504.		629.	629.	
+-----+																					
	2		maxN		74.	70.		6	4.0	4.0	170		22	22		567.	567.		629.	629.	
			minN		75.	70.							22	22		558.	558.		629.	629.	
+-----+																					
	1		maxN		44.	47.		6	4.0	4.0	170		22	22		530.	530.		629.	629.	
			minN		44.	47.							22	22		522.	522.		629.	629.	
+-----+																					

0 maxN		3.	4.	6	4.0	4.0	170		23	23	658.	658.	661.	661.
minN		3.	4.						23	23	652.	652.	655.	655.

-1 maxN		0.	4.	6	4.0	4.0	170		25	25	692.	692.	698.	698.
minN		0.	4.						25	25	686.	686.	692.	692.

CONFINEMENT REINFORCEMENT AT COLUMN ENDS (for maxN/minN)														

Story	Wwd-req.		aWwd-req.		Stirrups						Wwd-prov.		aWwd-prov.	
	base top		base top		dia.	legs	spacing-mm		base top		base top		base top	
					(mm)	y	z	base top						

6	0.00	0.00	0.000	0.000	6	4.0	4.0	110	110	0.131	0.131	0.078	0.078	

5	0.00	0.00	0.000	0.000	6	4.0	4.0	110	110	0.131	0.131	0.078	0.078	

4	0.00	0.00	0.000	0.000	6	4.0	4.0	110	110	0.131	0.131	0.078	0.078	

3	0.00	0.00	0.000	0.000	6	4.0	4.0	110	110	0.131	0.131	0.078	0.078	

2	0.00	0.00	0.000	0.000	6	4.0	4.0	110	110	0.131	0.131	0.078	0.078	

1	0.08	0.00	0.191	0.000	8	4.0	4.0	85	110	0.302	0.233	0.192	0.139	

0	0.00	0.00	0.000	0.000	6	4.0	4.0	110	110	0.131	0.131	0.078	0.078	

-1	0.00	0.00	0.000	0.000	6	4.0	4.0	110	110	0.131	0.131	0.078	0.078	

3A 2.5. COLUMN C8

* COLUMN: 8 *-----*														
* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *-----*														
NORMAL STRESS-RESULTANTS														

	STOREY:	6	Base						Top					

Actions Combination	My	Mz	N		My	Mz	N	
-----+-----	(kNm)	(kNm)	(kN)	+	(kNm)	(kNm)	(kN)	-
EN1990 Eq. 6.10a	73.5	3.4	341.8		-100.7	-4.1	316.5	
EN1990 Eq. 6.10b	70.0	3.2	323.0		-95.9	-3.9	301.5	
G+ψ2Q+E +X +Y/maxN	113.7	100.1	253.3		23.8	117.4	234.6	
G+ψ2Q+E -X +Y/maxN	-16.6	100.1	253.3		-156.8	117.4	234.6	
G+ψ2Q+E +X -Y/maxN	113.7	-95.5	253.3		23.8	-122.9	234.6	
G+ψ2Q+E -X -Y/maxN	-16.6	-95.5	253.3		-156.8	-122.9	234.6	
G+ψ2Q+E +X +Y/minN	113.7	100.1	202.1		23.8	117.4	183.3	
G+ψ2Q+E -X +Y/minN	-16.6	100.1	202.1		-156.8	117.4	183.3	
G+ψ2Q+E +X -Y/minN	113.7	-95.5	202.1		23.8	-122.9	183.3	
G+ψ2Q+E -X -Y/minN	-16.6	-95.5	202.1		-156.8	-122.9	183.3	

-----+-----
| STOREY: 5 | Base | Top |

Actions Combination	My	Mz	N		My	Mz	N	
-----+-----	(kNm)	(kNm)	(kN)	+	(kNm)	(kNm)	(kN)	-
EN1990 Eq. 6.10a	58.3	3.0	676.0		-53.3	-2.9	650.7	
EN1990 Eq. 6.10b	55.5	2.8	638.7		-50.8	-2.8	617.2	
G+ψ2Q+E +X +Y/maxN	103.9	92.1	516.5		34.1	86.5	497.8	
G+ψ2Q+E -X +Y/maxN	-27.0	92.1	516.5		-104.6	86.5	497.8	
G+ψ2Q+E +X -Y/maxN	103.9	-88.2	516.5		34.1	-90.4	497.8	
G+ψ2Q+E -X -Y/maxN	-27.0	-88.2	516.5		-104.6	-90.4	497.8	
G+ψ2Q+E +X +Y/minN	103.9	92.1	384.2		34.1	86.5	365.4	
G+ψ2Q+E -X +Y/minN	-27.0	92.1	384.2		-104.6	86.5	365.4	
G+ψ2Q+E +X -Y/minN	103.9	-88.2	384.2		34.1	-90.4	365.4	
G+ψ2Q+E -X -Y/minN	-27.0	-88.2	384.2		-104.6	-90.4	365.4	

-----+-----
| STOREY: 4 | Base | Top |

Actions Combination	My	Mz	N		My	Mz	N	
-----+-----	(kNm)	(kNm)	(kN)	+	(kNm)	(kNm)	(kN)	-
EN1990 Eq. 6.10a	60.1	3.2	1010.5		-61.5	-3.2	985.1	
EN1990 Eq. 6.10b	57.3	3.0	954.7		-58.5	-3.0	933.2	
G+ψ2Q+E +X +Y/maxN	112.4	96.3	781.7		34.6	90.0	762.9	
G+ψ2Q+E -X +Y/maxN	-33.0	96.3	781.7		-115.8	90.0	762.9	
G+ψ2Q+E +X -Y/maxN	112.4	-92.0	781.7		34.6	-94.2	762.9	
G+ψ2Q+E -X -Y/maxN	-33.0	-92.0	781.7		-115.8	-94.2	762.9	
G+ψ2Q+E +X +Y/minN	112.4	96.3	564.6		34.6	90.0	545.9	
G+ψ2Q+E -X +Y/minN	-33.0	96.3	564.6		-115.8	90.0	545.9	
G+ψ2Q+E +X -Y/minN	112.4	-92.0	564.6		34.6	-94.2	545.9	
G+ψ2Q+E -X -Y/minN	-33.0	-92.0	564.6		-115.8	-94.2	545.9	

-----+-----
| STOREY: 3 | Base | Top |

Actions Combination	My	Mz	N		My	Mz	N	
-----+-----	(kNm)	(kNm)	(kN)	+	(kNm)	(kNm)	(kN)	-
EN1990 Eq. 6.10a	56.9	2.9	1344.4		-57.9	-3.3	1319.1	
EN1990 Eq. 6.10b	54.2	2.8	1270.2		-55.2	-3.1	1248.7	
G+ψ2Q+E +X +Y/maxN	114.0	92.5	1047.9		34.3	81.1	1029.2	
G+ψ2Q+E -X +Y/maxN	-38.8	92.5	1047.9		-110.8	81.1	1029.2	
G+ψ2Q+E +X -Y/maxN	114.0	-88.6	1047.9		34.3	-85.4	1029.2	
G+ψ2Q+E -X -Y/maxN	-38.8	-88.6	1047.9		-110.8	-85.4	1029.2	
G+ψ2Q+E +X +Y/minN	114.0	92.5	743.4		34.3	81.1	724.7	
G+ψ2Q+E -X +Y/minN	-38.8	92.5	743.4		-110.8	81.1	724.7	
G+ψ2Q+E +X -Y/minN	114.0	-88.6	743.4		34.3	-85.4	724.7	
G+ψ2Q+E -X -Y/minN	-38.8	-88.6	743.4		-110.8	-85.4	724.7	

-----+-----
| STOREY: 2 | Base | Top |

Actions Combination	My	Mz	N		My	Mz	N	
-----+-----	(kNm)	(kNm)	(kN)	+	(kNm)	(kNm)	(kN)	-
EN1990 Eq. 6.10a	60.5	4.7	1677.2		-58.1	-3.9	1651.8	
EN1990 Eq. 6.10b	57.6	4.5	1584.5		-55.4	-3.7	1563.0	
G+ψ2Q+E +X +Y/maxN	116.4	89.1	1311.9		26.0	65.8	1293.1	
G+ψ2Q+E -X +Y/maxN	-36.5	89.1	1311.9		-102.7	65.8	1293.1	
G+ψ2Q+E +X -Y/maxN	116.4	-82.9	1311.9		26.0	-71.1	1293.1	
G+ψ2Q+E -X -Y/maxN	-36.5	-82.9	1311.9		-102.7	-71.1	1293.1	
G+ψ2Q+E +X +Y/minN	116.4	89.1	922.8		26.0	65.8	904.0	
G+ψ2Q+E -X +Y/minN	-36.5	89.1	922.8		-102.7	65.8	904.0	
G+ψ2Q+E +X -Y/minN	116.4	-82.9	922.8		26.0	-71.1	904.0	
G+ψ2Q+E -X -Y/minN	-36.5	-82.9	922.8		-102.7	-71.1	904.0	

-----+-----
| STOREY: 1 | Base | Top |

Actions Combination	My	Mz	N		My	Mz	N	
-----+-----	(kNm)	(kNm)	(kN)	+	(kNm)	(kNm)	(kN)	-
EN1990 Eq. 6.10a	45.1	0.1	2021.3		-46.8	-2.6	1987.5	
EN1990 Eq. 6.10b	43.0	0.1	1908.8		-44.5	-2.4	1880.1	
G+ψ2Q+E +X +Y/maxN	115.9	48.3	1577.4		13.4	24.9	1552.4	
G+ψ2Q+E -X +Y/maxN	-56.3	48.3	1577.4		-75.1	24.9	1552.4	
G+ψ2Q+E +X -Y/maxN	115.9	-48.1	1577.4		13.4	-28.3	1552.4	
G+ψ2Q+E -X -Y/maxN	-56.3	-48.1	1577.4		-75.1	-28.3	1552.4	
G+ψ2Q+E +X +Y/minN	115.9	48.3	1117.0		13.4	24.9	1092.0	
G+ψ2Q+E -X +Y/minN	-56.3	48.3	1117.0		-75.1	24.9	1092.0	
G+ψ2Q+E +X -Y/minN	115.9	-48.1	1117.0		13.4	-28.3	1092.0	
G+ψ2Q+E -X -Y/minN	-56.3	-48.1	1117.0		-75.1	-28.3	1092.0	

-----+-----
| STOREY: 0 | Base | Top |

Actions Combination	My	Mz	N		My	Mz	N	
-----+-----	(kNm)	(kNm)	(kN)		(kNm)	(kNm)	(kN)	
EN1990 Eq. 6.10a	55.9	-1.2	2334.2		-56.2	1.5	2308.9	
EN1990 Eq. 6.10b	53.2	-1.2	2204.3		-53.6	1.5	2182.8	
G+ψ2Q+E +X +Y/maxN	50.4	1.1	1797.7		7.3	16.5	1779.0	
G+ψ2Q+E -X +Y/maxN	23.4	1.1	1797.7		-81.6	16.5	1779.0	
G+ψ2Q+E +X -Y/maxN	50.4	-2.6	1797.7		7.3	-14.6	1779.0	
G+ψ2Q+E -X -Y/maxN	23.4	-2.6	1797.7		-81.6	-14.6	1779.0	
G+ψ2Q+E +X +Y/minN	50.4	1.1	1313.9		7.3	16.5	1295.1	
G+ψ2Q+E -X +Y/minN	23.4	1.1	1313.9		-81.6	16.5	1295.1	
G+ψ2Q+E +X -Y/minN	50.4	-2.6	1313.9		7.3	-14.6	1295.1	
G+ψ2Q+E -X -Y/minN	23.4	-2.6	1313.9		-81.6	-14.6	1295.1	

STOREY: -1			Base			Top		
Actions Combination	My	Mz	N		My	Mz	N	
-----+-----	(kNm)	(kNm)	(kN)		(kNm)	(kNm)	(kN)	
EN1990 Eq. 6.10a	17.9	-0.3	2647.4		-37.7	0.6	2622.1	
EN1990 Eq. 6.10b	17.1	-0.3	2500.0		-35.9	0.6	2478.5	
G+ψ2Q+E +X +Y/maxN	18.1	5.8	2004.6		-16.0	5.6	1985.9	
G+ψ2Q+E -X +Y/maxN	5.5	5.8	2004.6		-33.7	5.6	1985.9	
G+ψ2Q+E +X -Y/maxN	18.1	-6.2	2004.6		-16.0	-4.8	1985.9	
G+ψ2Q+E -X -Y/maxN	5.5	-6.2	2004.6		-33.7	-4.8	1985.9	
G+ψ2Q+E +X +Y/minN	18.1	5.8	1524.6		-16.0	5.6	1505.9	
G+ψ2Q+E -X +Y/minN	5.5	5.8	1524.6		-33.7	5.6	1505.9	
G+ψ2Q+E +X -Y/minN	18.1	-6.2	1524.6		-16.0	-4.8	1505.9	
G+ψ2Q+E -X -Y/minN	5.5	-6.2	1524.6		-33.7	-4.8	1505.9	

FOR NEGLIGIBLE 2ND-ORDER EFFECTS IN COLUMN, per EC2 pa.5.8.3.1, 5.8.3.2, 5.8.7.2

Storey	Combination	column direction x				column direction z			
	of actions	slenderness	column	slenderness	column	slenderness	column	slenderness	column
	per EN1990	limit	actual	eff.10	req.size	limit	actual	eff.10	req.size
-----+-----		(m)				(m)			
6	Eq. 6.10a	160.7	11.1	1.60	0.50	166.4	11.0	1.59	0.50
	Eq. 6.10b	162.5	11.1	1.60	0.50	167.9	11.0	1.59	0.50
5	Eq. 6.10a	113.0	11.0	1.59	0.50	118.9	11.0	1.59	0.50
	Eq. 6.10b	114.6	11.0	1.59	0.50	120.4	11.0	1.59	0.50
4	Eq. 6.10a	103.3	11.0	1.59	0.50	103.3	11.0	1.59	0.50
	Eq. 6.10b	104.9	11.0	1.59	0.50	104.7	11.0	1.59	0.50

3	Eq. 6.10a	90.2	11.0	1.59	0.50	87.3	11.1	1.60	0.50	
	Eq. 6.10b	91.6	11.0	1.59	0.50	88.5	11.1	1.60	0.50	
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+										
2	Eq. 6.10a	81.0	11.1	1.60	0.50	83.2	11.1	1.60	0.50	
	Eq. 6.10b	82.5	11.1	1.60	0.50	84.8	11.1	1.60	0.50	
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+										
1	Eq. 6.10a	74.0	15.6	2.25	0.50	48.0	15.3	2.21	0.50	
	Eq. 6.10b	75.2	15.6	2.24	0.50	48.4	15.3	2.21	0.50	
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+										
0	Eq. 6.10a	69.7	11.3	1.64	0.50	64.7	11.0	1.59	0.50	
	Eq. 6.10b	71.0	11.3	1.64	0.50	66.1	11.0	1.59	0.50	
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+										
-1	Eq. 6.10a	53.1	9.9	1.43	0.50	53.2	9.7	1.41	0.50	
	Eq. 6.10b	54.0	9.9	1.43	0.50	54.4	9.7	1.41	0.50	
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+										

GEOMETRY & LONGITUDINAL REINFORCEMENT

+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+										
Storey 6	Clear height(m):2.50 hcr(m):0.50 X-sect. RECT by(m):0.50 bz(m):0.50									
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+										
Vertical steel ratio:	0.0090, Bars: 4Φ18 & 8Φ14									
	2Φ18 & 2Φ14 along by 2Φ18 & 2Φ14 along bz									
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+										
Storey 5	Clear height(m):2.50 hcr(m):0.50 X-sect. RECT by(m):0.50 bz(m):0.50									
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+										
Vertical steel ratio:	0.0090, Bars: 4Φ18 & 8Φ14									
	2Φ18 & 2Φ14 along by 2Φ18 & 2Φ14 along bz									
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+										
Storey 4	Clear height(m):2.50 hcr(m):0.50 X-sect. RECT by(m):0.50 bz(m):0.50									
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+										
Vertical steel ratio:	0.0090, Bars: 4Φ18 & 8Φ14									
	2Φ18 & 2Φ14 along by 2Φ18 & 2Φ14 along bz									
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+										
Storey 3	Clear height(m):2.50 hcr(m):0.50 X-sect. RECT by(m):0.50 bz(m):0.50									
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+										
Vertical steel ratio:	0.0090, Bars: 4Φ18 & 8Φ14									
	2Φ18 & 2Φ14 along by 2Φ18 & 2Φ14 along bz									
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+										
Storey 2	Clear height(m):2.50 hcr(m):0.50 X-sect. RECT by(m):0.50 bz(m):0.50									
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+										
Vertical steel ratio:	0.0090, Bars: 4Φ18 & 8Φ14									
	2Φ18 & 2Φ14 along by 2Φ18 & 2Φ14 along bz									
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+										

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|Storey 1 Clear height(m):3.50 hcr(m):0.60 X-sect. RECT by(m):0.50 bz(m):0.50|
+-----+
| Vertical steel ratio: 0.0090, Bars: 4Φ18 & 8Φ14 |
|          2Φ18 & 2Φ14 along by 2Φ18 & 2Φ14 along bz |
+-----+
|Storey 0 Clear height(m):2.50 hcr(m):0.50 X-sect. RECT by(m):0.50 bz(m):0.50|
+-----+
| Vertical steel ratio: 0.0090, Bars: 4Φ18 & 8Φ14 |
|          2Φ18 & 2Φ14 along by 2Φ18 & 2Φ14 along bz |
+-----+
|Storey -1 Clear height(m):2.50 hcr(m):0.50 X-sect. RECT by(m):0.50 bz(m):0.50|
+-----+
| Vertical steel ratio: 0.0090, Bars: 4Φ18 & 8Φ14 |
|          2Φ18 & 2Φ14 along by 2Φ18 & 2Φ14 along bz |
+-----+
|Starter bars at base: 4Φ18 & 8Φ14 |
|          2Φ18 & 2Φ14 along by 2Φ18 & 2Φ14 along bz |
+-----+

```

COLUMN DESIGN MOMENT RESISTANCE MR_{d,c} (for minN/maxN)

Storey	Locat.	Direction of MR _d Vector :							
		+y		-y		+z		-z	
		(kNm)		(kNm)		(kNm)		(kNm)	
6	Top	243.9/	255.8	-243.9/	-255.8	243.9/	255.8	-243.9/	-255.8
	Base	248.4/	260.0	-248.4/	-260.0	248.4/	260.0	-248.4/	-260.0
5	Top	283.2/	339.4	-283.2/	-339.4	283.2/	339.4	-283.2/	-339.4
	Base	286.8/	341.4	-286.8/	-341.4	286.8/	341.4	-286.8/	-341.4
4	Top	344.5/	364.9	-344.5/	-364.9	344.5/	364.9	-344.5/	-364.9
	Base	346.5/	366.5	-346.5/	-366.5	346.5/	366.5	-346.5/	-366.5
3	Top	361.6/	384.1	-361.6/	-384.1	361.6/	384.1	-361.6/	-384.1
	Base	363.3/	385.2	-363.3/	-385.2	363.3/	385.2	-363.3/	-385.2
2	Top	375.9/	396.7	-375.9/	-396.7	375.9/	396.7	-375.9/	-396.7
	Base	377.2/	397.4	-377.2/	-397.4	377.2/	397.4	-377.2/	-397.4
1	Top	387.7/	403.0	-387.7/	-403.0	387.7/	403.0	-387.7/	-403.0
	Base	389.0/	403.3	-389.0/	-403.3	389.0/	403.3	-389.0/	-403.3
0	Top	396.8/	403.5	-396.8/	-403.5	396.8/	403.5	-396.8/	-403.5

	Base	397.5/ 403.3	-397.5/ -403.3	397.5/ 403.3	-397.5/ -403.3
--	------	--------------	----------------	--------------	----------------

-----+

-1	Top	402.3/ 406.9	-402.3/ -406.9	402.3/ 406.9	-402.3/ -406.9
----	-----	--------------	----------------	--------------	----------------

	Base	402.6/ 405.7	-402.6/ -405.7	402.6/ 405.7	-402.6/ -405.7
--	------	--------------	----------------	--------------	----------------

-----+

SUM OF BEAM DESIGN MOMENT RESISTANCES, MRd,b, AROUND JOINT

-----+

Storey	Locat.	Direction of MRd Vector :			
--------	--------	---------------------------	--	--	--

		+y	-y	+z	-z
--	--	----	----	----	----

		(kNm)	(kNm)	(kNm)	(kNm)
--	--	-------	-------	-------	-------

6	Top	87.7	154.4	235.9	235.9
---	-----	------	-------	-------	-------

	Base	173.6	230.4	249.4	249.4
--	------	-------	-------	-------	-------

-----+

5	Top	173.6	230.4	249.4	249.4
---	-----	-------	-------	-------	-------

	Base	173.6	230.4	249.4	249.4
--	------	-------	-------	-------	-------

-----+

4	Top	173.6	230.4	249.4	249.4
---	-----	-------	-------	-------	-------

	Base	173.6	230.4	249.4	249.4
--	------	-------	-------	-------	-------

-----+

3	Top	173.6	230.4	249.4	249.4
---	-----	-------	-------	-------	-------

	Base	173.6	230.4	242.2	242.2
--	------	-------	-------	-------	-------

-----+

2	Top	173.6	230.4	242.2	242.2
---	-----	-------	-------	-------	-------

	Base	117.2	203.3	242.2	242.2
--	------	-------	-------	-------	-------

-----+

1	Top	117.2	203.3	242.2	242.2
---	-----	-------	-------	-------	-------

	Base	30.3	101.4	158.7	158.7
--	------	------	-------	-------	-------

-----+

0	Top	30.3	101.4	158.7	158.7
---	-----	------	-------	-------	-------

	Base	30.3	90.7	164.7	164.7
--	------	------	------	-------	-------

-----+

-1	Top	30.3	90.7	164.7	164.7
----	-----	------	------	-------	-------

	Base	0.0	0.0	0.0	0.0
--	------	-----	-----	-----	-----

-----+

DESIGN OF TRANSVERSE REINFORCEMENT IN SHEAR (for maxN/minN)

-----+

Storey	Des. Shear	Provided Ties			strut angle		VR,s		VR,max	
--------	------------	---------------	--	--	-------------	--	------	--	--------	--

	VEd (kN)	dia.	legs	spacing-s	(deg)	(middle-kN)		(middle-kN)		
--	----------	------	------	-----------	-------	-------------	--	-------------	--	--

	y z	(mm)	y z	middle-mm	y z	y z	y z	y z	y z	
--	-----	------	-----	-----------	-----	-----	-----	-----	-----	--

-----+

6 maxN	68. 104.	6	4.0	4.0	170	22 22	334. 334.	629. 629.		
--------	----------	---	-----	-----	-----	-------	-----------	-----------	--	--

minN	68. 104.					22 22	323. 323.	629. 629.		
------	----------	--	--	--	--	-------	-----------	-----------	--	--

5	maxN	58.	63.	6	4.0	4.0	170	22	22	376.	376.	629.	629.
	minN	54.	59.					22	22	352.	352.	629.	629.
4	maxN	53.	57.	6	4.0	4.0	170	22	22	419.	419.	629.	629.
	minN	56.	60.					22	22	381.	381.	629.	629.
3	maxN	52.	56.	6	4.0	4.0	170	22	22	461.	461.	629.	629.
	minN	52.	56.					22	22	409.	409.	629.	629.
2	maxN	52.	54.	6	4.0	4.0	170	22	22	504.	504.	629.	629.
	minN	52.	54.					22	22	438.	438.	629.	629.
1	maxN	32.	38.	6	4.0	4.0	170	22	22	474.	474.	629.	629.
	minN	32.	39.					22	22	418.	418.	629.	629.
0	maxN	17.	4.	6	4.0	4.0	170	22	22	582.	582.	629.	629.
	minN	17.	4.					22	22	501.	501.	629.	629.
-1	maxN	7.	4.	6	4.0	4.0	170	22	22	615.	615.	629.	629.
	minN	7.	4.					22	22	535.	535.	629.	629.
CONFINEMENT REINFORCEMENT AT COLUMN ENDS (for maxN/minN)													
Story	Wwd-req.		aWwd-req.		Stirrups					Wwd-prov.		aWwd-prov.	
					dia.	legs	spacing-mm	base top		base top			
					(mm)	y	z	base top					
6	0.00	0.00	0.000	0.000	6	4.0	4.0	110	110	0.131	0.131	0.078	0.078
5	0.00	0.00	0.000	0.000	6	4.0	4.0	110	110	0.131	0.131	0.078	0.078
4	0.00	0.00	0.000	0.000	6	4.0	4.0	110	110	0.131	0.131	0.078	0.078
3	0.00	0.00	0.000	0.000	6	4.0	4.0	110	110	0.131	0.131	0.078	0.078
2	0.00	0.00	0.000	0.000	6	4.0	4.0	110	110	0.131	0.131	0.078	0.078
1	0.08	0.00	0.138	0.000	8	4.0	4.0	110	110	0.233	0.233	0.139	0.139
0	0.00	0.00	0.000	0.000	6	4.0	4.0	110	110	0.131	0.131	0.078	0.078

```
| -1 | 0.00 0.00|0.000 0.000| 6  4.0  4.0  110  110| 0.131 0.131| 0.078 0.078|
+-----+
```

3A 2.6. COLUMN C11

```
*-----*
* COLUMN: 11 *
*-----*
* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *
*-----*
```

NORMAL STRESS-RESULTANTS

```
*-----*
| STOREY: 6 | Base | Top |
|Actions Combination| My Mz N | My Mz N |
|-----+----- (kNm) ---- (kNm) ----- (kN) -+----- (kNm) ---- (kNm) ----- (kN) -|
| EN1990 Eq. 6.10a | -33.0 -21.9 121.1 | 40.1 31.7 99.8 |
| EN1990 Eq. 6.10b | -31.4 -20.8 113.1 | 38.2 30.1 95.0 |
| G+ψ2Q+E +X +Y/maxN| 27.4 99.8 156.1 | 85.0 190.2 140.3 |
| G+ψ2Q+E -X +Y/maxN| -71.1 99.8 156.1 | -31.9 190.2 140.3 |
| G+ψ2Q+E +X -Y/maxN| 27.4 -128.8 156.1 | 85.0 -148.2 140.3 |
| G+ψ2Q+E -X -Y/maxN| -71.1 -128.8 156.1 | -31.9 -148.2 140.3 |
| G+ψ2Q+E +X +Y/minN| 27.4 99.8 7.3 | 85.0 190.2 -8.5 |
| G+ψ2Q+E -X +Y/minN| -71.1 99.8 7.3 | -31.9 190.2 -8.5 |
| G+ψ2Q+E +X -Y/minN| 27.4 -128.8 7.3 | 85.0 -148.2 -8.5 |
| G+ψ2Q+E -X -Y/minN| -71.1 -128.8 7.3 | -31.9 -148.2 -8.5 |
+-----+
```

```
| STOREY: 5 | Base | Top |
|Actions Combination| My Mz N | My Mz N |
|-----+----- (kNm) ---- (kNm) ----- (kN) -+----- (kNm) ---- (kNm) ----- (kN) -|
| EN1990 Eq. 6.10a | -27.9 -17.6 248.9 | 27.0 15.4 227.6 |
| EN1990 Eq. 6.10b | -26.5 -16.8 232.6 | 25.7 14.7 214.5 |
| G+ψ2Q+E +X +Y/maxN| 30.1 87.6 331.8 | 66.7 103.0 316.0 |
| G+ψ2Q+E -X +Y/maxN| -67.0 87.6 331.8 | -31.0 103.0 316.0 |
| G+ψ2Q+E +X -Y/maxN| 30.1 -111.0 331.8 | 66.7 -82.6 316.0 |
| G+ψ2Q+E -X -Y/maxN| -67.0 -111.0 331.8 | -31.0 -82.6 316.0 |
| G+ψ2Q+E +X +Y/minN| 30.1 87.6 3.8 | 66.7 103.0 -11.9 |
| G+ψ2Q+E -X +Y/minN| -67.0 87.6 3.8 | -31.0 103.0 -11.9 |
| G+ψ2Q+E +X -Y/minN| 30.1 -111.0 3.8 | 66.7 -82.6 -11.9 |
| G+ψ2Q+E -X -Y/minN| -67.0 -111.0 3.8 | -31.0 -82.6 -11.9 |
+-----+
```


STOREY: 4		Base			Top		
Actions Combination	My	Mz	N	My	Mz	N	
	(kNm)	(kNm)	(kN)	(kNm)	(kNm)	(kN)	
EN1990 Eq. 6.10a	-28.0	-19.1	375.5	28.4	19.1	354.2	
EN1990 Eq. 6.10b	-26.6	-18.2	351.0	27.0	18.1	332.9	
G+ψ2Q+E +X +Y/maxN	33.3	96.3	507.9	70.8	119.1	492.2	
G+ψ2Q+E -X +Y/maxN	-70.3	96.3	507.9	-33.3	119.1	492.2	
G+ψ2Q+E +X -Y/maxN	33.3	-121.6	507.9	70.8	-93.9	492.2	
G+ψ2Q+E -X -Y/maxN	-70.3	-121.6	507.9	-33.3	-93.9	492.2	
G+ψ2Q+E +X +Y/minN	33.3	96.3	-1.6	70.8	119.1	-17.4	
G+ψ2Q+E -X +Y/minN	-70.3	96.3	-1.6	-33.3	119.1	-17.4	
G+ψ2Q+E +X -Y/minN	33.3	-121.6	-1.6	70.8	-93.9	-17.4	
G+ψ2Q+E -X -Y/minN	-70.3	-121.6	-1.6	-33.3	-93.9	-17.4	

STOREY: 3		Base			Top		
Actions Combination	My	Mz	N	My	Mz	N	
	(kNm)	(kNm)	(kN)	(kNm)	(kNm)	(kN)	
EN1990 Eq. 6.10a	-26.5	-18.4	502.0	27.1	18.5	480.8	
EN1990 Eq. 6.10b	-25.3	-17.5	469.2	25.8	17.6	451.1	
G+ψ2Q+E +X +Y/maxN	34.3	96.7	683.0	69.0	104.9	667.3	
G+ψ2Q+E -X +Y/maxN	-69.4	96.7	683.0	-33.1	104.9	667.3	
G+ψ2Q+E +X -Y/maxN	34.3	-121.1	683.0	69.0	-80.4	667.3	
G+ψ2Q+E -X -Y/maxN	-69.4	-121.1	683.0	-33.1	-80.4	667.3	
G+ψ2Q+E +X +Y/minN	34.3	96.7	-6.2	69.0	104.9	-21.9	
G+ψ2Q+E -X +Y/minN	-69.4	96.7	-6.2	-33.1	104.9	-21.9	
G+ψ2Q+E +X -Y/minN	34.3	-121.1	-6.2	69.0	-80.4	-21.9	
G+ψ2Q+E -X -Y/minN	-69.4	-121.1	-6.2	-33.1	-80.4	-21.9	

STOREY: 2		Base			Top		
Actions Combination	My	Mz	N	My	Mz	N	
	(kNm)	(kNm)	(kN)	(kNm)	(kNm)	(kN)	
EN1990 Eq. 6.10a	-28.7	-24.2	628.5	27.3	20.5	607.2	
EN1990 Eq. 6.10b	-27.3	-23.0	587.4	26.0	19.5	569.4	
G+ψ2Q+E +X +Y/maxN	32.1	85.2	849.7	65.4	84.2	833.9	
G+ψ2Q+E -X +Y/maxN	-70.0	85.2	849.7	-29.2	84.2	833.9	
G+ψ2Q+E +X -Y/maxN	32.1	-117.2	849.7	65.4	-57.1	833.9	
G+ψ2Q+E -X -Y/maxN	-70.0	-117.2	849.7	-29.2	-57.1	833.9	
G+ψ2Q+E +X +Y/minN	32.1	85.2	-2.3	65.4	84.2	-18.1	
G+ψ2Q+E -X +Y/minN	-70.0	85.2	-2.3	-29.2	84.2	-18.1	
G+ψ2Q+E +X -Y/minN	32.1	-117.2	-2.3	65.4	-57.1	-18.1	
G+ψ2Q+E -X -Y/minN	-70.0	-117.2	-2.3	-29.2	-57.1	-18.1	

STOREY: 1	Base			Top		
Actions Combination	My	Mz	N	My	Mz	N
	(kNm)	(kNm)	(kN)	(kNm)	(kNm)	(kN)
EN1990 Eq. 6.10a	-12.5	-7.5	759.9	17.7	14.3	731.5
EN1990 Eq. 6.10b	-11.9	-7.2	709.6	16.8	13.6	685.5
G+ψ2Q+E +X +Y/maxN	33.7	103.8	1001.8	43.6	44.3	980.8
G+ψ2Q+E -X +Y/maxN	-50.2	103.8	1001.8	-20.3	44.3	980.8
G+ψ2Q+E +X -Y/maxN	33.7	-113.8	1001.8	43.6	-25.4	980.8
G+ψ2Q+E -X -Y/maxN	-50.2	-113.8	1001.8	-20.3	-25.4	980.8
G+ψ2Q+E +X +Y/minN	33.7	103.8	23.6	43.6	44.3	2.6
G+ψ2Q+E -X +Y/minN	-50.2	103.8	23.6	-20.3	44.3	2.6
G+ψ2Q+E +X -Y/minN	33.7	-113.8	23.6	43.6	-25.4	2.6
G+ψ2Q+E -X -Y/minN	-50.2	-113.8	23.6	-20.3	-25.4	2.6

FOR NEGLIGIBLE 2ND-ORDER EFFECTS IN COLUMN, per EC2 pa.5.8.3.1, 5.8.3.2, 5.8.7.2

Storey	Combination	column direction x				column direction z			
	of actions	slenderness	column	slenderness	column	slenderness	column	slenderness	column
	per EN1990	limit	actual	eff.10	req.size	limit	actual	eff.10	req.size
		(m)				(m)			
6	Eq. 6.10a	270.9	17.4	1.50	0.30	256.6	8.0	1.61	0.70
	Eq. 6.10b	273.9	17.4	1.50	0.30	259.4	8.0	1.61	0.70
5	Eq. 6.10a	176.4	17.1	1.48	0.30	167.7	8.0	1.61	0.70
	Eq. 6.10b	179.8	17.1	1.48	0.30	170.8	8.0	1.61	0.70
4	Eq. 6.10a	157.6	17.2	1.49	0.30	156.6	8.0	1.61	0.70
	Eq. 6.10b	160.6	17.2	1.49	0.30	160.1	8.0	1.61	0.70
3	Eq. 6.10a	136.1	17.2	1.49	0.30	137.0	8.0	1.62	0.70
	Eq. 6.10b	138.8	17.2	1.49	0.30	139.6	8.0	1.62	0.70
2	Eq. 6.10a	120.8	17.4	1.51	0.30	120.6	8.1	1.63	0.70
	Eq. 6.10b	123.6	17.4	1.51	0.30	123.6	8.1	1.63	0.70
1	Eq. 6.10a	100.4	24.2	2.10	0.30	93.0	11.2	2.26	0.70
	Eq. 6.10b	102.5	24.2	2.09	0.30	94.9	11.2	2.26	0.70

GEOMETRY & LONGITUDINAL REINFORCEMENT

Storey 6 Clear height (m):2.50 hcr (m):0.70 X-sect. RECT by (m):0.70 bz (m):0.30

```

| Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14 |
|           2Φ16 & 3Φ14 along by 2Φ16 & 1Φ14 along bz |
+-----+
|Storey 5 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.70 bz(m):0.30|
+-----+
| Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14 |
|           2Φ16 & 3Φ14 along by 2Φ16 & 1Φ14 along bz |
+-----+
|Storey 4 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.70 bz(m):0.30|
+-----+
| Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14 |
|           2Φ16 & 3Φ14 along by 2Φ16 & 1Φ14 along bz |
+-----+
|Storey 3 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.70 bz(m):0.30|
+-----+
| Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14 |
|           2Φ16 & 3Φ14 along by 2Φ16 & 1Φ14 along bz |
+-----+
|Storey 2 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.70 bz(m):0.30|
+-----+
| Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14 |
|           2Φ16 & 3Φ14 along by 2Φ16 & 1Φ14 along bz |
+-----+
|Storey 1 Clear height(m):3.50 hcr(m):0.70 X-sect. RECT by(m):0.70 bz(m):0.30|
+-----+
| Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14 |
|           2Φ16 & 3Φ14 along by 2Φ16 & 1Φ14 along bz |
+-----+
|Starter bars at base: 4Φ16 & 8Φ14 |
|           2Φ16 & 3Φ14 along by 2Φ16 & 1Φ14 along bz |
+-----+

```

COLUMN DESIGN MOMENT RESISTANCE $M_{Rd,c}$ (for minN/maxN)

```

+-----+
|Storey|Locat.|          Direction of MRd Vector          : |
|      |      |      +y      |      -y      |      +z      |      -z      |
+-----+-----+-----+-----+-----+-----+
|      |      |      (kNm)   |      (kNm)   |      (kNm)   |      (kNm)   |
+-----+-----+-----+-----+-----+-----+
|  6  | Top  |  84.1/ 103.5| -84.1/ -103.5|  340.9/  370.5| -340.9/ -370.5|
|      | Base |  86.3/ 105.4| -86.3/ -105.4|  344.2/  373.4| -344.2/ -373.4|
+-----+-----+-----+-----+-----+-----+
|  5  | Top  |  83.6/ 123.0| -83.6/ -123.0|  340.2/  401.3| -340.2/ -401.3|
|      | Base |  85.8/ 124.6| -85.8/ -124.6|  343.4/  403.8| -343.4/ -403.8|
+-----+-----+-----+-----+-----+-----+

```

4	Top	82.8/ 139.3	-82.8/ -139.3	339.0/ 427.7	-339.0/ -427.7
	Base	85.0/ 140.6	-85.0/ -140.6	342.3/ 429.9	-342.3/ -429.9
+-----+					
3	Top	82.2/ 152.7	-82.2/ -152.7	255.8/ 449.6	-255.8/ -449.6
	Base	84.4/ 153.8	-84.4/ -153.8	341.4/ 451.3	-341.4/ -451.3
+-----+					
2	Top	82.7/ 163.2	-82.7/ -163.2	338.9/ 466.2	-338.9/ -466.2
	Base	84.9/ 164.1	-84.9/ -164.1	342.2/ 467.6	-342.2/ -467.6
+-----+					
1	Top	85.6/ 170.6	-85.6/ -170.6	343.2/ 477.6	-343.2/ -477.6
	Base	88.5/ 171.6	-88.5/ -171.6	347.5/ 479.0	-347.5/ -479.0
+-----+					

SUM OF BEAM DESIGN MOMENT RESISTANCES, MRd,b, AROUND JOINT

Storey	Locat.	Direction of MRd Vector :			
		+y	-y	+z	-z
		(kNm)	(kNm)	(kNm)	(kNm)
6	Top	83.4	58.5	170.8	188.3
	Base	134.6	86.9	223.2	232.7
+-----+					
5	Top	134.6	86.9	223.2	232.7
	Base	134.6	86.9	223.2	232.7
+-----+					
4	Top	134.6	86.9	223.2	232.7
	Base	134.6	86.9	170.8	236.2
+-----+					
3	Top	134.6	86.9	170.8	236.2
	Base	134.6	86.9	170.8	204.1
+-----+					
2	Top	134.6	86.9	170.8	204.1
	Base	109.6	58.5	116.0	158.0
+-----+					
1	Top	109.6	58.5	116.0	158.0
	Base	0.0	0.0	0.0	0.0
+-----+					

DESIGN OF TRANSVERSE REINFORCEMENT IN SHEAR (for maxN/minN)

Storey	Des. Shear	Provided Ties		strut angle	VR,s		VR,max	
		dia.	spacing-s		(middle-kN)	(middle-kN)		
		y	z	(deg)	y	z	y	z
		(mm)	middle-mm					
6	maxN	37.	83.	22	216.	355.	490.	545.

minN	37.	83.		22	22	203.	315.		490.	545.					
+-----+															
5 maxN	32.	78.	6	5.0	3.0	170		22	22	230.	397.		490.	545.	
minN	30.	76.						22	22	203.	315.		490.	545.	
+-----+															
4 maxN	31.	77.	6	5.0	3.0	170		22	22	245.	440.		490.	545.	
minN	29.	76.						22	22	202.	313.		490.	545.	
+-----+															
3 maxN	31.	78.	6	5.0	3.0	170		22	22	259.	482.		490.	545.	
minN	29.	71.						22	22	202.	312.		490.	545.	
+-----+															
2 maxN	31.	67.	6	5.0	3.0	170		22	22	272.	522.		490.	545.	
minN	30.	71.						22	22	202.	313.		490.	545.	
+-----+															
1 maxN	72.	188.	6	5.0	3.0	170		22	22	261.	490.		490.	545.	
minN	45.	146.						22	22	204.	318.		490.	545.	
+-----+															

CONFINEMENT REINFORCEMENT AT COLUMN ENDS (for maxN/minN)

+-----+													
Story	Wwd-req.		aWwd-req.		Stirrups				Wwd-prov.		aWwd-prov.		
	base	top	base	top	dia.	legs	spacing-mm		base	top	base	top	
					(mm)	y	z	base	top				
+-----+													
6	0.00	0.00	0.000	0.000	6	5.0	3.0	110	110	0.177	0.177	0.055	0.055
+-----+													
5	0.00	0.00	0.000	0.000	6	5.0	3.0	110	110	0.177	0.177	0.055	0.055
+-----+													
4	0.00	0.00	0.000	0.000	6	5.0	3.0	110	110	0.177	0.177	0.055	0.055
+-----+													
3	0.00	0.00	0.000	0.000	6	5.0	3.0	110	110	0.177	0.177	0.055	0.055
+-----+													
2	0.00	0.00	0.000	0.000	6	5.0	3.0	110	110	0.177	0.177	0.055	0.055
+-----+													
1	0.08	0.00	0.092	0.000	6	5.0	3.0	75	110	0.260	0.177	0.097	0.055
+-----+													

3A 2.7. COLUMN C12

* COLUMN: 12 *

 * Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *

NORMAL STRESS-RESULTANTS

STOREY: 6	Base			Top		
Actions Combination	My	Mz	N	My	Mz	N
	(kNm)			(kNm)		
EN1990 Eq. 6.10a	-5.2	-74.1	255.3	3.7	88.9	234.1
EN1990 Eq. 6.10b	-4.9	-70.6	241.0	3.4	84.7	223.0
G+ψ2Q+E +X +Y/maxN	112.9	-2.1	189.3	163.1	113.2	173.5
G+ψ2Q+E -X +Y/maxN	-119.8	-2.1	189.3	-158.2	113.2	173.5
G+ψ2Q+E +X -Y/maxN	112.9	-95.7	189.3	163.1	4.2	173.5
G+ψ2Q+E -X -Y/maxN	-119.8	-95.7	189.3	-158.2	4.2	173.5
G+ψ2Q+E +X +Y/minN	112.9	-2.1	151.3	163.1	113.2	135.5
G+ψ2Q+E -X +Y/minN	-119.8	-2.1	151.3	-158.2	113.2	135.5
G+ψ2Q+E +X -Y/minN	112.9	-95.7	151.3	163.1	4.2	135.5
G+ψ2Q+E -X -Y/minN	-119.8	-95.7	151.3	-158.2	4.2	135.5

+-----+

STOREY: 5	Base			Top		
Actions Combination	My	Mz	N	My	Mz	N
	(kNm)			(kNm)		
EN1990 Eq. 6.10a	-5.2	-63.4	515.0	5.9	61.6	493.8
EN1990 Eq. 6.10b	-4.9	-60.4	486.2	5.6	58.6	468.1
G+ψ2Q+E +X +Y/maxN	111.3	1.8	391.2	123.3	83.9	375.5
G+ψ2Q+E -X +Y/maxN	-118.2	1.8	391.2	-115.5	83.9	375.5
G+ψ2Q+E +X -Y/maxN	111.3	-85.5	391.2	123.3	-2.6	375.5
G+ψ2Q+E -X -Y/maxN	-118.2	-85.5	391.2	-115.5	-2.6	375.5
G+ψ2Q+E +X +Y/minN	111.3	1.8	295.6	123.3	83.9	279.9
G+ψ2Q+E -X +Y/minN	-118.2	1.8	295.6	-115.5	83.9	279.9
G+ψ2Q+E +X -Y/minN	111.3	-85.5	295.6	123.3	-2.6	279.9
G+ψ2Q+E -X -Y/minN	-118.2	-85.5	295.6	-115.5	-2.6	279.9

+-----+

STOREY: 4	Base			Top		
Actions Combination	My	Mz	N	My	Mz	N
	(kNm)			(kNm)		
EN1990 Eq. 6.10a	-4.4	-64.2	774.3	4.5	64.6	753.1
EN1990 Eq. 6.10b	-4.2	-61.1	731.0	4.3	61.6	712.9
G+ψ2Q+E +X +Y/maxN	122.9	2.5	592.4	131.8	87.1	576.6
G+ψ2Q+E -X +Y/maxN	-128.8	2.5	592.4	-125.8	87.1	576.6
G+ψ2Q+E +X -Y/maxN	122.9	-87.3	592.4	131.8	-1.7	576.6
G+ψ2Q+E -X -Y/maxN	-128.8	-87.3	592.4	-125.8	-1.7	576.6

G+ψ2Q+E +X +Y/minN	122.9	2.5	440.3		131.8	87.1	424.5	
G+ψ2Q+E -X +Y/minN	-128.8	2.5	440.3		-125.8	87.1	424.5	
G+ψ2Q+E +X -Y/minN	122.9	-87.3	440.3		131.8	-1.7	424.5	
G+ψ2Q+E -X -Y/minN	-128.8	-87.3	440.3		-125.8	-1.7	424.5	

+-----+							
	STOREY:	3		Base		Top	
Actions Combination				My	Mz	N	
				My	Mz	N	
				(kNm)	(kNm)	(kN)	
				(kNm)	(kNm)	(kN)	
EN1990 Eq. 6.10a				-4.3	-61.7	1033.9	
EN1990 Eq. 6.10b				-4.0	-58.7	976.0	
G+ψ2Q+E +X +Y/maxN				127.6	2.1	792.9	
G+ψ2Q+E -X +Y/maxN				-133.3	2.1	792.9	
G+ψ2Q+E +X -Y/maxN				127.6	-83.5	792.9	
G+ψ2Q+E -X -Y/maxN				-133.3	-83.5	792.9	
G+ψ2Q+E +X +Y/minN				127.6	2.1	585.8	
G+ψ2Q+E -X +Y/minN				-133.3	2.1	585.8	
G+ψ2Q+E +X -Y/minN				127.6	-83.5	585.8	
G+ψ2Q+E -X -Y/minN				-133.3	-83.5	585.8	

+-----+							
	STOREY:	2		Base		Top	
Actions Combination				My	Mz	N	
				My	Mz	N	
				(kNm)	(kNm)	(kN)	
				(kNm)	(kNm)	(kN)	
EN1990 Eq. 6.10a				-2.1	-69.7	1293.9	
EN1990 Eq. 6.10b				-1.9	-66.4	1221.6	
G+ψ2Q+E +X +Y/maxN				127.1	-7.2	990.8	
G+ψ2Q+E -X +Y/maxN				-129.9	-7.2	990.8	
G+ψ2Q+E +X -Y/maxN				127.1	-84.8	990.8	
G+ψ2Q+E -X -Y/maxN				-129.9	-84.8	990.8	
G+ψ2Q+E +X +Y/minN				127.1	-7.2	734.7	
G+ψ2Q+E -X +Y/minN				-129.9	-7.2	734.7	
G+ψ2Q+E +X -Y/minN				127.1	-84.8	734.7	
G+ψ2Q+E -X -Y/minN				-129.9	-84.8	734.7	

+-----+							
	STOREY:	1		Base		Top	
Actions Combination				My	Mz	N	
				My	Mz	N	
				(kNm)	(kNm)	(kN)	
				(kNm)	(kNm)	(kN)	
EN1990 Eq. 6.10a				-3.6	-19.0	1559.4	
EN1990 Eq. 6.10b				-3.4	-18.0	1471.5	
G+ψ2Q+E +X +Y/maxN				146.7	9.3	1185.8	
G+ψ2Q+E -X +Y/maxN				-151.5	9.3	1185.8	
G+ψ2Q+E +X -Y/maxN				146.7	-34.4	1185.8	
G+ψ2Q+E -X -Y/maxN				-151.5	-34.4	1185.8	

G+ψ2Q+E +X +Y/minN	146.7	9.3	894.7		80.1	40.1	873.7	
G+ψ2Q+E -X +Y/minN	-151.5	9.3	894.7		-77.2	40.1	873.7	
G+ψ2Q+E +X -Y/minN	146.7	-34.4	894.7		80.1	9.6	873.7	
G+ψ2Q+E -X -Y/minN	-151.5	-34.4	894.7		-77.2	9.6	873.7	

+-----+							
	STOREY:	0		Base		Top	
Actions Combination				My	Mz	N	
				My	Mz	N	
				(kNm)	(kNm)	(kN)	
EN1990 Eq. 6.10a				-2.9	-2.6	2084.8	
EN1990 Eq. 6.10b				-2.8	-2.5	1969.1	
G+ψ2Q+E +X +Y/maxN				19.2	1.2	1537.6	
G+ψ2Q+E -X +Y/maxN				-23.2	1.2	1537.6	
G+ψ2Q+E +X -Y/maxN				19.2	-4.8	1537.6	
G+ψ2Q+E -X -Y/maxN				-23.2	-4.8	1537.6	
G+ψ2Q+E +X +Y/minN				19.2	1.2	1241.2	
G+ψ2Q+E -X +Y/minN				-23.2	1.2	1241.2	
G+ψ2Q+E +X -Y/minN				19.2	-4.8	1241.2	
G+ψ2Q+E -X -Y/minN				-23.2	-4.8	1241.2	

+-----+							
	STOREY:	-1		Base		Top	
Actions Combination				My	Mz	N	
				My	Mz	N	
				(kNm)	(kNm)	(kN)	
EN1990 Eq. 6.10a				-0.2	-1.1	2613.3	
EN1990 Eq. 6.10b				-0.1	-1.0	2469.6	
G+ψ2Q+E +X +Y/maxN				11.2	3.2	1887.4	
G+ψ2Q+E -X +Y/maxN				-11.5	3.2	1887.4	
G+ψ2Q+E +X -Y/maxN				11.2	-4.7	1887.4	
G+ψ2Q+E -X -Y/maxN				-11.5	-4.7	1887.4	
G+ψ2Q+E +X +Y/minN				11.2	3.2	1593.6	
G+ψ2Q+E -X +Y/minN				-11.5	3.2	1593.6	
G+ψ2Q+E +X -Y/minN				11.2	-4.7	1593.6	
G+ψ2Q+E -X -Y/minN				-11.5	-4.7	1593.6	

FOR NEGLIGIBLE 2ND-ORDER EFFECTS IN COLUMN, per EC2 pa.5.8.3.1, 5.8.3.2, 5.8.7.2

+-----+										
Storey	Combination	column direction x				column direction z				
	of actions	slenderness	column	slenderness	column	slenderness	column	slenderness	column	
	per EN1990	limit	actual	eff.10	req.size	limit	actual	eff.10	req.size	
+----- (m) -----+										
6	Eq. 6.10a	161.0	8.0	1.62	0.70	177.6	17.3	1.50	0.30	
	Eq. 6.10b	162.9	8.0	1.62	0.70	179.6	17.3	1.50	0.30	

	5		Eq. 6.10a		126.5	8.0	1.61	0.70		123.2	17.1	1.48	0.30	
			Eq. 6.10b		128.1	8.0	1.61	0.70		125.0	17.1	1.48	0.30	
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+														
	4		Eq. 6.10a		107.6	8.0	1.61	0.70		108.4	17.2	1.49	0.30	
			Eq. 6.10b		109.0	8.0	1.61	0.70		110.0	17.2	1.49	0.30	
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+														
	3		Eq. 6.10a		94.0	8.0	1.61	0.70		94.0	17.4	1.51	0.30	
			Eq. 6.10b		95.3	8.0	1.61	0.70		95.5	17.4	1.51	0.30	
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+														
	2		Eq. 6.10a		73.4	8.0	1.62	0.70		84.4	17.7	1.53	0.30	
			Eq. 6.10b		74.2	8.0	1.62	0.70		86.0	17.7	1.53	0.30	
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+														
	1		Eq. 6.10a		72.6	11.1	2.24	0.70		63.6	23.9	2.07	0.30	
			Eq. 6.10b		74.0	11.1	2.24	0.70		64.7	23.8	2.06	0.30	
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+														
	0		Eq. 6.10a		54.9	8.0	1.63	0.70		25.3	16.8	1.45	0.30	
			Eq. 6.10b		55.7	8.0	1.62	0.70		24.8	16.7	1.45	0.30	
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+														
	-1		Eq. 6.10a		47.7	7.1	1.43	0.70		48.9	15.5	1.34	0.30	
			Eq. 6.10b		48.0	7.1	1.43	0.70		49.6	15.5	1.34	0.30	
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+														

GEOMETRY & LONGITUDINAL REINFORCEMENT

+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+														
	Storey	6	Clear height(m):	2.50	hcr(m):	0.70	X-sect. RECT by(m):	0.30	bz(m):	0.70				
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+														
	Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14													
	2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz													
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+														
	Storey	5	Clear height(m):	2.50	hcr(m):	0.70	X-sect. RECT by(m):	0.30	bz(m):	0.70				
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+														
	Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14													
	2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz													
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+														
	Storey	4	Clear height(m):	2.50	hcr(m):	0.70	X-sect. RECT by(m):	0.30	bz(m):	0.70				
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+														
	Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14													
	2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz													
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+														
	Storey	3	Clear height(m):	2.50	hcr(m):	0.70	X-sect. RECT by(m):	0.30	bz(m):	0.70				
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+														
	Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14													
	2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz													
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+														

```

+-----+
|Storey 2 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.30 bz(m):0.70|
+-----+
| Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14 |
|           2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz |
+-----+
|Storey 1 Clear height(m):3.50 hcr(m):0.70 X-sect. RECT by(m):0.30 bz(m):0.70|
+-----+
| Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14 |
|           2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz |
+-----+
|Storey 0 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.30 bz(m):0.70|
+-----+
| Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14 |
|           2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz |
+-----+
|Storey -1 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.30 bz(m):0.70|
+-----+
| Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14 |
|           2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz |
+-----+
|Starter bars at base: 4Φ16 & 8Φ14 |
|           2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz |
+-----+

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COLUMN DESIGN MOMENT RESISTANCE MRd,c (for minN/maxN)

```

+-----+
|Storey|Locat.|          Direction of MRd Vector          :          |
|      |      |          +y          |          -y          |          +z          |          -z          |
+-----+-----+-----+-----+-----+-----+-----+-----+
|      |      | (kNm) | (kNm) | (kNm) | (kNm) | (kNm) | (kNm) |
+-----+-----+-----+-----+-----+-----+-----+
| 6 | Top | 369.6/ 376.6 | -369.6/ -376.6 | 102.9/ 107.5 | -102.9/ -107.5 |
|   | Base | 372.5/ 379.5 | -372.5/ -379.5 | 104.8/ 109.3 | -104.8/ -109.3 |
+-----+-----+-----+-----+-----+-----+-----+
| 5 | Top | 395.3/ 410.7 | -395.3/ -410.7 | 119.3/ 128.8 | -119.3/ -128.8 |
|   | Base | 397.9/ 413.1 | -397.9/ -413.1 | 120.9/ 130.3 | -120.9/ -130.3 |
+-----+-----+-----+-----+-----+-----+-----+
| 4 | Top | 418.1/ 438.8 | -418.1/ -438.8 | 133.4/ 146.1 | -133.4/ -146.1 |
|   | Base | 420.4/ 440.8 | -420.4/ -440.8 | 134.8/ 147.3 | -134.8/ -147.3 |
+-----+-----+-----+-----+-----+-----+-----+
| 3 | Top | 438.0/ 461.0 | -438.0/ -461.0 | 145.6/ 159.9 | -145.6/ -159.9 |
|   | Base | 440.0/ 462.5 | -440.0/ -462.5 | 146.8/ 160.8 | -146.8/ -160.8 |
+-----+-----+-----+-----+-----+-----+-----+
| 2 | Top | 455.2/ 477.2 | -455.2/ -477.2 | 156.2/ 170.4 | -156.2/ -170.4 |

```

	Base	456.8/	478.2	-456.8/	-478.2	157.2/	171.1	-157.2/	-171.1
+-----+									
1	Top	469.6/	487.4	-469.6/	-487.4	165.4/	181.4	-165.4/	-181.4
	Base	471.3/	488.2	-471.3/	-488.2	166.5/	181.6	-166.5/	-181.6
+-----+									
0	Top	489.4/	492.7	-489.4/	-492.7	181.8/	183.2	-181.8/	-183.2
	Base	490.1/	492.4	-490.1/	-492.4	182.0/	182.4	-182.0/	-182.4
+-----+									
-1	Top	491.8/	486.3	-491.8/	-486.3	181.1/	169.7	-181.1/	-169.7
	Base	491.4/	484.4	-491.4/	-484.4	180.3/	168.9	-180.3/	-168.9
+-----+									

SUM OF BEAM DESIGN MOMENT RESISTANCES, MRd,b, AROUND JOINT

+-----+									
Storey	Locat.	Direction of MRd Vector :							
		+y	-y	+z	-z				
		(kNm)		(kNm)		(kNm)		(kNm)	
6	Top	149.3	149.3	59.0	108.3				
	Base	294.4	249.6	116.4	187.6				
+-----+									
5	Top	294.4	249.6	116.4	187.6				
	Base	294.4	249.6	116.4	186.0				
+-----+									
4	Top	294.4	249.6	116.4	186.0				
	Base	315.2	259.0	116.4	187.6				
+-----+									
3	Top	315.2	259.0	116.4	187.6				
	Base	281.7	258.1	87.9	157.3				
+-----+									
2	Top	281.7	258.1	87.9	157.3				
	Base	272.6	241.0	87.9	126.8				
+-----+									
1	Top	272.6	241.0	87.9	126.8				
	Base	168.5	168.5	188.5	208.8				
+-----+									
0	Top	168.5	168.5	188.5	208.8				
	Base	131.7	131.7	188.5	208.8				
+-----+									
-1	Top	131.7	131.7	188.5	208.8				
	Base	0.0	0.0	0.0	0.0				
+-----+									

DESIGN OF TRANSVERSE REINFORCEMENT IN SHEAR (for maxN/minN)

Storey	Des. Shear		Provided Ties				strut angle		VR,s		VR,max	
	VEd (kN)		dia. legs		spacing-s		(deg)		(middle-kN)		(middle-kN)	
	y	z	(mm)	y	z	middle-mm	y	z	y	z	y	z
6 maxN	66.	47.	6	3.0	5.0	170	22	22	363.	219.	545.	490.
6 minN	66.	45.					22	22	350.	215.	545.	490.
5 maxN	68.	24.	6	3.0	5.0	170	22	22	412.	235.	545.	490.
5 minN	67.	24.					22	22	385.	226.	545.	490.
4 maxN	67.	23.	6	3.0	5.0	170	22	22	460.	251.	545.	490.
4 minN	67.	23.					22	22	420.	238.	545.	490.
3 maxN	71.	23.	6	3.0	5.0	170	22	22	508.	268.	545.	490.
3 minN	71.	23.					22	22	455.	250.	545.	490.
2 maxN	63.	19.	6	3.0	5.0	170	22	22	547.	283.	556.	490.
2 minN	63.	19.					22	22	490.	262.	545.	490.
1 maxN	43.	11.	6	3.0	5.0	170	22	22	521.	272.	545.	490.
1 minN	44.	11.					22	22	468.	254.	545.	490.
0 maxN	9.	1.	6	3.0	5.0	170	26	22	626.	327.	629.	490.
0 minN	9.	1.					24	22	581.	302.	584.	490.
-1 maxN	0.	1.	6	3.0	5.0	170	29	22	678.	356.	678.	490.
-1 minN	0.	1.					27	22	631.	330.	634.	490.

CONFINEMENT REINFORCEMENT AT COLUMN ENDS (for maxN/minN)

Story	Wwd-req.		aWwd-req.		Stirrups				Wwd-prov.		aWwd-prov.		
	base top		base top		dia. legs		spacing-mm		base top		base top		
			(mm)	y	z	base top							
6	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055
5	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055
4	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055
3	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055

G+ψ2Q+E -X -Y/maxN	-132.5	-66.5	835.2		-116.7	-4.9	819.4	
G+ψ2Q+E +X +Y/minN	136.8	6.7	611.4		112.4	59.7	595.7	
G+ψ2Q+E -X +Y/minN	-132.5	6.7	611.4		-116.7	59.7	595.7	
G+ψ2Q+E +X -Y/minN	136.8	-66.5	611.4		112.4	-4.9	595.7	
G+ψ2Q+E -X -Y/minN	-132.5	-66.5	611.4		-116.7	-4.9	595.7	

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STOREY: 1	Base			Top				
Actions Combination	My	Mz	N	My	Mz	N		
	(kNm)	(kNm)	(kN)	(kNm)	(kNm)	(kN)		
EN1990 Eq. 6.10a	1.5	-5.6	1303.0		-2.1	21.4	1274.7	
EN1990 Eq. 6.10b	1.5	-5.3	1227.2		-2.0	20.4	1203.1	
G+ψ2Q+E +X +Y/maxN	153.7	17.0	998.1		81.6	28.7	977.1	
G+ψ2Q+E -X +Y/maxN	-151.6	17.0	998.1		-84.4	28.7	977.1	
G+ψ2Q+E +X -Y/maxN	153.7	-24.4	998.1		81.6	-0.4	977.1	
G+ψ2Q+E -X -Y/maxN	-151.6	-24.4	998.1		-84.4	-0.4	977.1	
G+ψ2Q+E +X +Y/minN	153.7	17.0	744.1		81.6	28.7	723.1	
G+ψ2Q+E -X +Y/minN	-151.6	17.0	744.1		-84.4	28.7	723.1	
G+ψ2Q+E +X -Y/minN	153.7	-24.4	744.1		81.6	-0.4	723.1	
G+ψ2Q+E -X -Y/minN	-151.6	-24.4	744.1		-84.4	-0.4	723.1	

-----+

STOREY: 0	Base			Top				
Actions Combination	My	Mz	N	My	Mz	N		
	(kNm)	(kNm)	(kN)	(kNm)	(kNm)	(kN)		
EN1990 Eq. 6.10a	0.8	23.2	1786.2		-1.3	-27.2	1757.9	
EN1990 Eq. 6.10b	0.8	22.1	1684.5		-1.3	-26.0	1660.4	
G+ψ2Q+E +X +Y/maxN	21.4	18.3	1321.3		75.5	-16.9	1300.3	
G+ψ2Q+E -X +Y/maxN	-20.3	18.3	1321.3		-77.3	-16.9	1300.3	
G+ψ2Q+E +X -Y/maxN	21.4	12.3	1321.3		75.5	-19.0	1300.3	
G+ψ2Q+E -X -Y/maxN	-20.3	12.3	1321.3		-77.3	-19.0	1300.3	
G+ψ2Q+E +X +Y/minN	21.4	18.3	1063.5		75.5	-16.9	1042.5	
G+ψ2Q+E -X +Y/minN	-20.3	18.3	1063.5		-77.3	-16.9	1042.5	
G+ψ2Q+E +X -Y/minN	21.4	12.3	1063.5		75.5	-19.0	1042.5	
G+ψ2Q+E -X -Y/minN	-20.3	12.3	1063.5		-77.3	-19.0	1042.5	

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STOREY: -1	Base			Top				
Actions Combination	My	Mz	N	My	Mz	N		
	(kNm)	(kNm)	(kN)	(kNm)	(kNm)	(kN)		
EN1990 Eq. 6.10a	0.1	6.3	2267.1		-0.3	-13.1	2238.8	
EN1990 Eq. 6.10b	0.1	6.0	2139.6		-0.3	-12.4	2115.5	
G+ψ2Q+E +X +Y/maxN	10.9	8.0	1640.2		14.6	-6.0	1619.2	
G+ψ2Q+E -X +Y/maxN	-10.8	8.0	1640.2		-14.9	-6.0	1619.2	
G+ψ2Q+E +X -Y/maxN	10.9	0.4	1640.2		14.6	-11.2	1619.2	

G+ψ2Q+E -X -Y/maxN	-10.8	0.4	1640.2		-14.9	-11.2	1619.2	
G+ψ2Q+E +X +Y/minN	10.9	8.0	1384.1		14.6	-6.0	1363.1	
G+ψ2Q+E -X +Y/minN	-10.8	8.0	1384.1		-14.9	-6.0	1363.1	
G+ψ2Q+E +X -Y/minN	10.9	0.4	1384.1		14.6	-11.2	1363.1	
G+ψ2Q+E -X -Y/minN	-10.8	0.4	1384.1		-14.9	-11.2	1363.1	

FOR NEGLIGIBLE 2ND-ORDER EFFECTS IN COLUMN, per EC2 pa.5.8.3.1, 5.8.3.2, 5.8.7.2

Storey	Combination	column direction x				column direction z					
		of actions	slenderness	column	slenderness	column	of actions	slenderness	column		
		per EN1990	limit	actual	eff.10	req.size	per EN1990	limit	actual	eff.10	req.size
		(m)				(m)					
6	Eq. 6.10a	186.2	8.0	1.61	0.70	196.4	17.4	1.51	0.30		
	Eq. 6.10b	188.2	8.0	1.61	0.70	198.6	17.4	1.51	0.30		
5	Eq. 6.10a	127.3	7.9	1.60	0.70	134.5	17.4	1.51	0.30		
	Eq. 6.10b	129.2	7.9	1.60	0.70	136.6	17.4	1.51	0.30		
4	Eq. 6.10a	116.9	7.9	1.60	0.70	118.8	17.5	1.52	0.30		
	Eq. 6.10b	118.8	7.9	1.60	0.70	120.7	17.5	1.52	0.30		
3	Eq. 6.10a	101.7	7.9	1.60	0.70	102.9	17.6	1.53	0.30		
	Eq. 6.10b	103.4	7.9	1.60	0.70	104.6	17.6	1.53	0.30		
2	Eq. 6.10a	92.7	8.0	1.61	0.70	92.4	17.9	1.55	0.30		
	Eq. 6.10b	94.3	8.0	1.61	0.70	94.2	17.8	1.54	0.30		
1	Eq. 6.10a	77.2	11.1	2.24	0.70	62.1	23.9	2.07	0.30		
	Eq. 6.10b	78.5	11.1	2.24	0.70	63.1	23.9	2.07	0.30		
0	Eq. 6.10a	62.5	8.1	1.63	0.70	69.1	16.8	1.45	0.30		
	Eq. 6.10b	63.6	8.1	1.63	0.70	70.4	16.7	1.45	0.30		
-1	Eq. 6.10a	51.9	7.1	1.42	0.70	52.7	15.5	1.34	0.30		
	Eq. 6.10b	52.8	7.0	1.42	0.70	53.6	15.5	1.34	0.30		

GEOMETRY & LONGITUDINAL REINFORCEMENT

Storey	6	Clear height(m):2.50	hcr(m):0.70	X-sect. RECT by(m):0.30	bz(m):0.70
Vertical steel ratio: 0.0097, Bars: 4Φ16 & 8Φ14					
2Φ16 & 1Φ14 along by 2Φ16 & 3Φ14 along bz					


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+-----+
|Storey  5 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.30 bz(m):0.70|
+-----+
| Vertical steel ratio: 0.0097, Bars:  4Φ16 &  8Φ14 |
|           2Φ16 &  1Φ14 along by  2Φ16 &  3Φ14 along bz |
+-----+
|Storey  4 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.30 bz(m):0.70|
+-----+
| Vertical steel ratio: 0.0097, Bars:  4Φ16 &  8Φ14 |
|           2Φ16 &  1Φ14 along by  2Φ16 &  3Φ14 along bz |
+-----+
|Storey  3 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.30 bz(m):0.70|
+-----+
| Vertical steel ratio: 0.0097, Bars:  4Φ16 &  8Φ14 |
|           2Φ16 &  1Φ14 along by  2Φ16 &  3Φ14 along bz |
+-----+
|Storey  2 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.30 bz(m):0.70|
+-----+
| Vertical steel ratio: 0.0097, Bars:  4Φ16 &  8Φ14 |
|           2Φ16 &  1Φ14 along by  2Φ16 &  3Φ14 along bz |
+-----+
|Storey  1 Clear height(m):3.50 hcr(m):0.70 X-sect. RECT by(m):0.30 bz(m):0.70|
+-----+
| Vertical steel ratio: 0.0097, Bars:  4Φ16 &  8Φ14 |
|           2Φ16 &  1Φ14 along by  2Φ16 &  3Φ14 along bz |
+-----+
|Storey  0 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.30 bz(m):0.70|
+-----+
| Vertical steel ratio: 0.0097, Bars:  4Φ16 &  8Φ14 |
|           2Φ16 &  1Φ14 along by  2Φ16 &  3Φ14 along bz |
+-----+
|Storey -1 Clear height(m):2.50 hcr(m):0.70 X-sect. RECT by(m):0.30 bz(m):0.70|
+-----+
| Vertical steel ratio: 0.0097, Bars:  4Φ16 &  8Φ14 |
|           2Φ16 &  1Φ14 along by  2Φ16 &  3Φ14 along bz |
+-----+
|Starter bars at base:  4Φ16 &  8Φ14 |
|           2Φ16 &  1Φ14 along by  2Φ16 &  3Φ14 along bz |
+-----+
                COLUMN DESIGN MOMENT RESISTANCE MRd,c (for minN/maxN)
+-----+
|Storey|Locat.|           Direction of MRd Vector           : |

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			+y		-y		+z		-z	
		(kNm)		(kNm)		(kNm)		(kNm)		
6	Top	364.7/	370.8	-364.7/	-370.8	99.8/	103.7	-99.8/	-103.7	
	Base	367.8/	373.7	-367.8/	-373.7	101.8/	105.6	-101.8/	-105.6	
5	Top	386.9/	400.9	-386.9/	-400.9	114.0/	122.7	-114.0/	-122.7	
	Base	389.7/	403.5	-389.7/	-403.5	115.7/	124.3	-115.7/	-124.3	
4	Top	407.0/	426.6	-407.0/	-426.6	126.5/	138.6	-126.5/	-138.6	
	Base	409.4/	428.7	-409.4/	-428.7	128.0/	139.9	-128.0/	-139.9	
3	Top	425.0/	447.9	-425.0/	-447.9	137.6/	151.7	-137.6/	-151.7	
	Base	427.2/	449.7	-427.2/	-449.7	139.0/	152.8	-139.0/	-152.8	
2	Top	441.2/	464.9	-441.2/	-464.9	147.6/	162.4	-147.6/	-162.4	
	Base	443.1/	466.3	-443.1/	-466.3	148.7/	163.3	-148.7/	-163.3	
1	Top	455.6/	477.3	-455.6/	-477.3	156.5/	170.5	-156.5/	-170.5	
	Base	457.7/	478.7	-457.7/	-478.7	157.8/	171.4	-157.8/	-171.4	
0	Top	481.4/	491.6	-481.4/	-491.6	173.3/	182.2	-173.3/	-182.2	
	Base	482.6/	492.0	-482.6/	-492.0	174.1/	182.2	-174.1/	-182.2	
-1	Top	492.6/	490.8	-492.6/	-490.8	182.1/	179.4	-182.1/	-179.4	
	Base	492.8/	490.2	-492.8/	-490.2	182.0/	178.6	-182.0/	-178.6	

SUM OF BEAM DESIGN MOMENT RESISTANCES, $M_{Rd,b}$, AROUND JOINT

Storey	Locat.	Direction of M_{Rd} Vector :			
		+y	-y	+z	-z
		(kNm)		(kNm)	
6	Top	233.3	175.1	59.0	108.3
	Base	272.6	272.6	87.9	144.7
5	Top	272.6	272.6	87.9	144.7
	Base	272.6	272.6	87.9	133.3
4	Top	272.6	272.6	87.9	133.3
	Base	281.7	281.7	87.9	133.3
3	Top	281.7	281.7	87.9	133.3
	Base	272.6	272.6	87.9	126.8

2	Top	272.6	272.6	87.9	126.8
	Base	259.0	259.0	59.0	108.3
1	Top	259.0	259.0	59.0	108.3
	Base	131.7	131.7	188.5	158.7
0	Top	131.7	131.7	188.5	158.7
	Base	131.7	131.7	204.3	149.5
-1	Top	131.7	131.7	204.3	149.5
	Base	0.0	0.0	0.0	0.0

DESIGN OF TRANSVERSE REINFORCEMENT IN SHEAR (for maxN/minN)

Storey	Des. Shear		Provided Ties			strut angle		VR,s		VR,max		
	VEd (kN)		dia.	legs	spacing-s	(deg)		(middle-kN)		(middle-kN)		
	y	z	(mm)	y	z	middle-mm	y	z	y	z	y	z
6 maxN	103.	46.	6	3.0	5.0	170	22	22	355.	216.	545.	490.
minN	103.	44.					22	22	344.	213.	545.	490.
5 maxN	62.	18.	6	3.0	5.0	170	22	22	397.	230.	545.	490.
minN	62.	18.					22	22	373.	222.	545.	490.
4 maxN	62.	16.	6	3.0	5.0	170	22	22	438.	244.	545.	490.
minN	61.	16.					22	22	402.	232.	545.	490.
3 maxN	63.	16.	6	3.0	5.0	170	22	22	478.	258.	545.	490.
minN	63.	16.					22	22	431.	242.	545.	490.
2 maxN	61.	15.	6	3.0	5.0	170	22	22	518.	271.	545.	490.
minN	61.	15.					22	22	461.	252.	545.	490.
1 maxN	41.	9.	6	3.0	5.0	170	22	22	489.	261.	545.	490.
minN	41.	9.					22	22	442.	245.	545.	490.
0 maxN	9.	6.	6	3.0	5.0	170	25	22	594.	310.	599.	490.
minN	9.	6.					23	22	555.	288.	562.	490.
-1 maxN	0.	6.	6	3.0	5.0	170	27	22	641.	336.	643.	490.
minN	0.	6.					25	22	601.	313.	605.	490.

-----+-----													
CONFINEMENT REINFORCEMENT AT COLUMN ENDS (for maxN/minN)													
-----+-----													
Story	Wwd-req.		aWwd-req.		Stirrups					Wwd-prov.		aWwd-prov.	
		base top		base top	dia.	legs	spacing-mm		base top		base top		
				(mm)	y	z	base top						
-----+-----													
6	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055
5	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055
4	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055
3	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055
2	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055
1	0.08	0.00	0.110	0.000	8	3.0	5.0	100	110	0.346	0.315	0.113	0.098
0	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055
-1	0.00	0.00	0.000	0.000	6	3.0	5.0	110	110	0.177	0.177	0.055	0.055
-----+-----													

3A 3. DESIGN OF BEAMS IN SHEAR

3A 3.1. FRAME A

-----+-----													
SHEAR FORCES - ULS DESIGN OF TRANSVERSE REINFORCEMENT													
-----+-----													
* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *													
-----+-----													
STOREY:	6	* BEAMS:	1	2	3	4	5						
-----+-----													
SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMR _{d,b} /SMR _{d,c} , AROUND JOINT													
-----+-----													
Beam	Beam end & direction of MRd Vector:												
	Left End	+y		Left End	-y		Right End	+y		Right End	-y		

```

+-----+----- (kNm) -----+----- (kNm) -----+----- (kNm) -----+----- (kNm) -----+
*-----*
| 1 | 83.4 / 102.9 | 58.5 / 102.9 | 186.8 / 377.2 | 226.6 / 377.2 |
| 2 | 186.8 / 377.2 | 226.6 / 377.2 | 241.0 / 370.8 | 241.0 / 370.8 |
| 3 | 241.0 / 370.8 | 241.0 / 370.8 | 241.0 / 370.8 | 241.0 / 370.8 |
| 4 | 241.0 / 370.8 | 241.0 / 370.8 | 226.6 / 377.2 | 186.8 / 377.2 |
| 5 | 226.6 / 377.2 | 186.8 / 377.2 | 58.5 / 102.9 | 83.4 / 102.9 |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|Beam: 1 |
| Seismic Shear (kN)- L End: maxVEd: 57.3 minVEd: -0.2 minV/maxV: 0.00|
| Seismic Shear (kN)- L End: maxVEd: 70.7 minVEd: 13.2 minV/maxV: 0.19|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
|-----+-(m)---+----- (kN) -----+-(mm)---+----- (mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 51.4 41.4| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.40| 58.9 38.7| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 64.8 47.6| 96 | 7 8 95 | 23 | 389.7 | 389.7 |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|Beam: 2 |
| Seismic Shear (kN)- L End: maxVEd: 79.4 minVEd: -12.3 minV/maxV:-0.16|
| Seismic Shear (kN)- L End: maxVEd: 82.8 minVEd: -8.9 minV/maxV:-0.11|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
|-----+-(m)---+----- (kN) -----+-(mm)---+----- (mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 73.5 43.0| 96 | 7 8 95 | 25 | 389.7 | 389.7 |
|Centre| 4.30| 71.1 37.1| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 77.0 46.0| 112 | 6 8 110 | 25 | 367.7 | 367.7 |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|Beam: 3 |
| Seismic Shear (kN)- L End: maxVEd: 80.0 minVEd: -11.0 minV/maxV:-0.14|
| Seismic Shear (kN)- L End: maxVEd: 80.0 minVEd: -11.0 minV/maxV:-0.14|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
|-----+-(m)---+----- (kN) -----+-(mm)---+----- (mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 74.2 43.6| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.30| 68.5 34.8| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 74.2 43.6| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|Beam: 4 |

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|      Seismic Shear (kN)- L End: maxVEd:  82.8 minVEd:  -8.9 minV/maxV:-0.11|
|      Seismic Shear (kN)- L End: maxVEd:  79.4 minVEd: -12.3 minV/maxV:-0.16|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+- (m)---+----- (kN)-----+- (mm)---+----- (mm)---+- (deg)---+- (kN)---+- (kN)---|
|L End | 0.50| 77.0 46.0| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.30| 71.1 37.1| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 73.5 43.0| 96 | 7 8 95 | 23 | 389.7 | 389.7 |
+-----+
|Beam: 5 |
|      Seismic Shear (kN)- L End: maxVEd:  70.7 minVEd:  13.2 minV/maxV: 0.19|
|      Seismic Shear (kN)- L End: maxVEd:  57.3 minVEd:  -0.2 minV/maxV: 0.00|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+- (m)---+----- (kN)-----+- (mm)---+----- (mm)---+- (deg)---+- (kN)---+- (kN)---|
|L End | 0.50| 64.8 47.6| 96 | 7 8 95 | 25 | 389.7 | 389.7 |
|Centre| 4.40| 58.9 38.7| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 51.4 41.4| 112 | 6 8 110 | 25 | 367.7 | 367.7 |
+-----+
*-----*
STOREY: 5 * BEAMS: 1 2 3 4 5
*-----*
SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT
+-----+
| Beam|          Beam end & direction of MRd Vector:          |
|      | Left End  +y | Left End  -y | Right End  +y | Right End  -y |
|-----+----- (kNm)-----+----- (kNm)-----+----- (kNm)-----+----- (kNm)-----+
*-----*
| 1 | 134.6 / 224.5 | 86.9 / 224.5 | 280.3 / 789.1 | 263.0 / 789.1 |
| 2 | 280.3 / 789.1 | 263.0 / 789.1 | 281.7 / 771.9 | 281.7 / 771.9 |
| 3 | 281.7 / 771.9 | 281.7 / 771.9 | 281.7 / 771.9 | 281.7 / 771.9 |
| 4 | 281.7 / 771.9 | 281.7 / 771.9 | 263.0 / 789.1 | 280.3 / 789.1 |
| 5 | 263.0 / 789.1 | 280.3 / 789.1 | 86.9 / 224.5 | 134.6 / 224.5 |
+-----+
|Beam: 1 |
|      Seismic Shear (kN)- L End: maxVEd:  82.9 minVEd:  -6.8 minV/maxV:-0.08|
|      Seismic Shear (kN)- L End: maxVEd:  77.3 minVEd: -12.4 minV/maxV:-0.16|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|

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```

|-----+- (m) ---+----- (kN) -----+- (mm) --+----- (mm) --+- (deg) -+--- (kN) ---+--- (kN) --|
|L End | 0.50| 77.0 45.2| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.40| 71.1 36.3| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 71.5 43.8| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
|Beam: 2 |
| Seismic Shear (kN)- L End: maxVED: 85.2 minVED: -20.8 minV/maxV:-0.24|
| Seismic Shear (kN)- L End: maxVED: 91.3 minVED: -14.7 minV/maxV:-0.16|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
|-----+- (m) ---+----- (kN) -----+- (mm) --+----- (mm) --+- (deg) -+--- (kN) ---+--- (kN) --|
|L End | 0.50| 79.4 42.4| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.30| 79.5 37.7| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 85.4 46.5| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
|Beam: 3 |
| Seismic Shear (kN)- L End: maxVED: 87.7 minVED: -18.6 minV/maxV:-0.21|
| Seismic Shear (kN)- L End: maxVED: 87.7 minVED: -18.6 minV/maxV:-0.21|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
|-----+- (m) ---+----- (kN) -----+- (mm) --+----- (mm) --+- (deg) -+--- (kN) ---+--- (kN) --|
|L End | 0.50| 81.9 43.6| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.30| 76.1 34.8| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 81.9 43.6| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
|Beam: 4 |
| Seismic Shear (kN)- L End: maxVED: 91.3 minVED: -14.7 minV/maxV:-0.16|
| Seismic Shear (kN)- L End: maxVED: 85.2 minVED: -20.8 minV/maxV:-0.24|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
|-----+- (m) ---+----- (kN) -----+- (mm) --+----- (mm) --+- (deg) -+--- (kN) ---+--- (kN) --|
|L End | 0.50| 85.4 46.5| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.30| 79.5 37.7| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 79.4 42.4| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
|Beam: 5 |
| Seismic Shear (kN)- L End: maxVED: 77.3 minVED: -12.4 minV/maxV:-0.16|
| Seismic Shear (kN)- L End: maxVED: 82.9 minVED: -6.8 minV/maxV:-0.08|
+-----+

```

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)
L End	0.50	71.5	43.8	112	6 8 110	23	367.7
Centre	4.40	71.1	36.3	330	15 8 330	22	133.2
R End	0.50	77.0	45.2	112	6 8 110	23	367.7

-----+

STOREY: 4 * BEAMS: 1 2 3 4 5

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT

Beam	Beam end & direction of MRd Vector:			
	Left End +y	Left End -y	Right End +y	Right End -y
	(kNm)	(kNm)	(kNm)	(kNm)
1	134.6 / 259.1	86.9 / 259.1	310.9 / 852.1	272.6 / 852.1
2	310.9 / 852.1	272.6 / 852.1	294.4 / 828.0	294.4 / 828.0
3	294.4 / 828.0	294.4 / 828.0	294.4 / 828.0	294.4 / 828.0
4	294.4 / 828.0	294.4 / 828.0	272.6 / 852.1	310.9 / 852.1
5	272.6 / 852.1	310.9 / 852.1	86.9 / 259.1	134.6 / 259.1

-----+
|Beam: 1
| Seismic Shear (kN)- L End: maxVEd: 81.6 minVEd: -9.9 minV/maxV:-0.12|
Seismic Shear (kN)- L End: maxVEd: 80.4 minVEd: -11.1 minV/maxV:-0.14

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)
L End	0.50	75.7	44.3	112	6 8 110	23	367.7
Centre	4.40	69.8	35.8	330	15 8 330	22	133.2
R End	0.50	74.6	44.7	112	6 8 110	23	367.7

-----+
|Beam: 2
| Seismic Shear (kN)- L End: maxVEd: 91.5 minVEd: -22.7 minV/maxV:-0.25|
Seismic Shear (kN)- L End: maxVEd: 93.2 minVEd: -21.0 minV/maxV:-0.23

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)
L End	0.50	85.6	42.8	112	6 8 110	23	367.7
Centre	4.30	81.5	37.3	330	15 8 330	22	133.2


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|R End | 0.50| 87.3 46.2| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
|Beam: 3 |
| Seismic Shear (kN)- L End: maxVEd: 90.1 minVEd: -21.0 minV/maxV:-0.23|
| Seismic Shear (kN)- L End: maxVEd: 90.1 minVEd: -21.0 minV/maxV:-0.23|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 84.3 43.6| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.30| 78.6 34.8| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 84.3 43.6| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
|Beam: 4 |
| Seismic Shear (kN)- L End: maxVEd: 93.2 minVEd: -21.0 minV/maxV:-0.23|
| Seismic Shear (kN)- L End: maxVEd: 91.5 minVEd: -22.7 minV/maxV:-0.25|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 87.3 46.2| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.30| 81.5 37.3| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 85.6 42.8| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
|Beam: 5 |
| Seismic Shear (kN)- L End: maxVEd: 80.4 minVEd: -11.1 minV/maxV:-0.14|
| Seismic Shear (kN)- L End: maxVEd: 81.6 minVEd: -9.9 minV/maxV:-0.12|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 74.6 44.7| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.40| 69.8 35.8| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 75.7 44.3| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
*-----*
STOREY: 3 * BEAMS: 1 2 3 4 5
*-----*
SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT
+-----+
| Beam| Beam end & direction of MRd Vector: |
| | Left End +y | Left End -y | Right End +y | Right End -y |

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```

+-----+----- (kNm) -----+----- (kNm) -----+----- (kNm) -----+----- (kNm) -----+
*-----*
| 1 | 139.5 / 288.0 | 86.9 / 288.0 | 310.9 / 902.7 | 272.6 / 902.7 |
| 2 | 310.9 / 902.7 | 272.6 / 902.7 | 294.4 / 875.1 | 294.4 / 875.1 |
| 3 | 294.4 / 875.1 | 294.4 / 875.1 | 294.4 / 875.1 | 294.4 / 875.1 |
| 4 | 294.4 / 875.1 | 294.4 / 875.1 | 272.6 / 902.7 | 310.9 / 902.7 |
| 5 | 272.6 / 902.7 | 310.9 / 902.7 | 86.9 / 288.0 | 139.5 / 288.0 |
+-----+-----+-----+-----+-----+-----+
|Beam: 1 |
| Seismic Shear (kN)- L End: maxVEd: 81.7 minVEd: -10.7 minV/maxV:-0.13|
| Seismic Shear (kN)- L End: maxVEd: 81.2 minVEd: -11.2 minV/maxV:-0.14|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
|-----+-(m)---+----- (kN) -----+-(mm)---+----- (mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 75.9 43.7| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.40| 70.0 36.4| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 75.3 45.2| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+-----+-----+-----+-----+-----+
|Beam: 2 |
| Seismic Shear (kN)- L End: maxVEd: 91.8 minVEd: -22.4 minV/maxV:-0.24|
| Seismic Shear (kN)- L End: maxVEd: 92.9 minVEd: -21.3 minV/maxV:-0.23|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
|-----+-(m)---+----- (kN) -----+-(mm)---+----- (mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 86.0 43.0| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.30| 81.1 37.1| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 87.0 46.0| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+-----+-----+-----+-----+-----+
|Beam: 3 |
| Seismic Shear (kN)- L End: maxVEd: 90.1 minVEd: -21.0 minV/maxV:-0.23|
| Seismic Shear (kN)- L End: maxVEd: 90.1 minVEd: -21.0 minV/maxV:-0.23|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
|-----+-(m)---+----- (kN) -----+-(mm)---+----- (mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 84.3 43.6| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.30| 78.6 34.8| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 84.3 43.6| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+-----+-----+-----+-----+-----+
|Beam: 4 |

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|      Seismic Shear (kN)- L End: maxVEd:  92.9 minVEd: -21.3 minV/maxV:-0.23|
|      Seismic Shear (kN)- L End: maxVEd:  91.8 minVEd: -22.4 minV/maxV:-0.24|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+- (m)---+----- (kN)-----+- (mm)---+----- (mm)---+- (deg)---+- (kN)---+- (kN)---|
|L End | 0.50| 87.0 46.0| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.30| 81.1 37.1| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 86.0 43.0| 112 | 6 8 110 | 23 | 367.7 | 367.7 |

```

```

+-----+
|Beam: 5 |
|      Seismic Shear (kN)- L End: maxVEd:  81.2 minVEd: -11.2 minV/maxV:-0.14|
|      Seismic Shear (kN)- L End: maxVEd:  81.7 minVEd: -10.7 minV/maxV:-0.13|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+- (m)---+----- (kN)-----+- (mm)---+----- (mm)---+- (deg)---+- (kN)---+- (kN)---|
|L End | 0.50| 75.3 45.2| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.40| 70.0 36.4| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 75.9 43.7| 112 | 6 8 110 | 23 | 367.7 | 367.7 |

```

```

+-----+
*-----*
STOREY: 2 * BEAMS: 1 2 3 4 5

```

```

+-----+
SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT
+-----+
| Beam|          Beam end & direction of MRd Vector:          |
|      | Left End  +y | Left End  -y | Right End  +y | Right End  -y |
|-----+----- (kNm)-----+----- (kNm)-----+----- (kNm)-----+----- (kNm)-----+
*-----*
| 1 | 134.6 / 311.4 | 86.9 / 311.4 | 310.9 / 941.0 | 272.6 / 941.0 |
| 2 | 310.9 / 941.0 | 272.6 / 941.0 | 294.4 / 913.5 | 294.4 / 913.5 |
| 3 | 294.4 / 913.5 | 294.4 / 913.5 | 294.4 / 913.5 | 294.4 / 913.5 |
| 4 | 294.4 / 913.5 | 294.4 / 913.5 | 272.6 / 941.0 | 310.9 / 941.0 |
| 5 | 272.6 / 941.0 | 310.9 / 941.0 | 86.9 / 311.4 | 134.6 / 311.4 |

```

```

+-----+
|Beam: 1 |
|      Seismic Shear (kN)- L End: maxVEd:  80.0 minVEd: -11.5 minV/maxV:-0.14|
|      Seismic Shear (kN)- L End: maxVEd:  82.0 minVEd:  -9.5 minV/maxV:-0.12|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|

```

```

|-----+- (m) ---+----- (kN) -----+- (mm) --+----- (mm) --+- (deg) -+--- (kN) ---+--- (kN) --|
|L End | 0.50| 74.1 43.1| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.40| 70.3 37.0| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 76.2 45.9| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
|Beam: 2 |
| Seismic Shear (kN)- L End: maxVED: 92.3 minVED: -21.9 minV/maxV:-0.24|
| Seismic Shear (kN)- L End: maxVED: 92.4 minVED: -21.8 minV/maxV:-0.24|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
|-----+- (m) ---+----- (kN) -----+- (mm) --+----- (mm) --+- (deg) -+--- (kN) ---+--- (kN) --|
|L End | 0.50| 86.4 43.4| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.30| 80.7 36.7| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 86.5 45.6| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
|Beam: 3 |
| Seismic Shear (kN)- L End: maxVED: 90.1 minVED: -21.0 minV/maxV:-0.23|
| Seismic Shear (kN)- L End: maxVED: 90.1 minVED: -21.0 minV/maxV:-0.23|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
|-----+- (m) ---+----- (kN) -----+- (mm) --+----- (mm) --+- (deg) -+--- (kN) ---+--- (kN) --|
|L End | 0.50| 84.3 43.6| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.30| 78.6 34.8| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 84.3 43.6| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
|Beam: 4 |
| Seismic Shear (kN)- L End: maxVED: 92.4 minVED: -21.8 minV/maxV:-0.24|
| Seismic Shear (kN)- L End: maxVED: 92.3 minVED: -21.9 minV/maxV:-0.24|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
|-----+- (m) ---+----- (kN) -----+- (mm) --+----- (mm) --+- (deg) -+--- (kN) ---+--- (kN) --|
|L End | 0.50| 86.5 45.6| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.30| 80.7 36.7| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 86.4 43.4| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
|Beam: 5 |
| Seismic Shear (kN)- L End: maxVED: 82.0 minVED: -9.5 minV/maxV:-0.12|
| Seismic Shear (kN)- L End: maxVED: 80.0 minVED: -11.5 minV/maxV:-0.14|
+-----+

```

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ s	angle	provided	provided
-----+- (m)-----	----- (kN)-----	-----+- (mm)-----	----- (mm)-----	----- (deg)-----	----- (kN)-----	----- (kN)-----	-----
L End	0.50	76.2	45.9	112	6 8 110	23	367.7 367.7
Centre	4.40	70.3	37.0	330	15 8 330	22	133.2 346.8
R End	0.50	74.1	43.1	112	6 8 110	23	367.7 367.7

-----+

STOREY: 1 * BEAMS: 1 2 3 4 5

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT

Beam	Beam end & direction of MRd Vector:			
	Left End +y	Left End -y	Right End +y	Right End -y
+-----+-----	----- (kNm)-----	----- (kNm)-----	----- (kNm)-----	----- (kNm)-----
1	149.3 / 329.2	86.9 / 329.2	259.0 / 966.9	259.0 / 966.9
2	259.0 / 966.9	259.0 / 966.9	272.6 / 942.9	272.6 / 942.9
3	272.6 / 942.9	272.6 / 942.9	272.6 / 942.9	272.6 / 942.9
4	272.6 / 942.9	272.6 / 942.9	259.0 / 966.9	259.0 / 966.9
5	259.0 / 966.9	259.0 / 966.9	86.9 / 329.2	149.3 / 329.2

-----+
|Beam: 1 |
| Seismic Shear (kN)- L End: maxVEd: 79.7 minVEd: -12.0 minV/maxV:-0.15|
Seismic Shear (kN)- L End: maxVEd: 82.5 minVEd: -9.2 minV/maxV:-0.11

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ s	angle	provided	provided
-----+- (m)-----	----- (kN)-----	-----+- (mm)-----	----- (mm)-----	----- (deg)-----	----- (kN)-----	----- (kN)-----	-----
L End	0.50	73.8	41.0	112	6 8 110	23	367.7 367.7
Centre	4.40	70.7	39.1	330	15 8 330	22	133.2 346.8
R End	0.50	76.6	48.0	112	6 8 110	23	367.7 367.7

-----+
|Beam: 2 |
| Seismic Shear (kN)- L End: maxVEd: 83.4 minVEd: -16.9 minV/maxV:-0.20|
Seismic Shear (kN)- L End: maxVEd: 87.4 minVEd: -12.9 minV/maxV:-0.15

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ s	angle	provided	provided
-----+- (m)-----	----- (kN)-----	-----+- (mm)-----	----- (mm)-----	----- (deg)-----	----- (kN)-----	----- (kN)-----	-----
L End	0.50	77.5	44.0	112	6 8 110	23	367.7 367.7
Centre	4.30	75.7	36.1	330	15 8 330	22	133.2 346.8

R End	0.50	81.6	45.0	112	6	8	110	23	367.7	367.7
+-----+										
Beam: 3										
	Seismic Shear (kN)- L End: maxVEd: 85.9 minVEd: -16.9 minV/maxV:-0.20									
	Seismic Shear (kN)- L End: maxVEd: 85.9 minVEd: -16.9 minV/maxV:-0.20									
+-----+										
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max			
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided		
-----+	-(m)---+	-----	-(kN)-----+	-(mm)---+	-----	-(mm)---+	-(deg)---+	-(kN)---+	-(kN)---	
L End	0.50	80.2	43.6	112	6	8	110	23	367.7	367.7
Centre	4.30	74.4	34.8	330	15	8	330	22	133.2	346.8
R End	0.50	80.2	43.6	112	6	8	110	23	367.7	367.7
+-----+										
Beam: 4										
	Seismic Shear (kN)- L End: maxVEd: 87.4 minVEd: -12.9 minV/maxV:-0.15									
	Seismic Shear (kN)- L End: maxVEd: 83.4 minVEd: -16.9 minV/maxV:-0.20									
+-----+										
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max			
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided		
-----+	-(m)---+	-----	-(kN)-----+	-(mm)---+	-----	-(mm)---+	-(deg)---+	-(kN)---+	-(kN)---	
L End	0.50	81.6	45.0	112	6	8	110	23	367.7	367.7
Centre	4.30	75.7	36.1	330	15	8	330	22	133.2	346.8
R End	0.50	77.5	44.0	112	6	8	110	23	367.7	367.7
+-----+										
Beam: 5										
	Seismic Shear (kN)- L End: maxVEd: 82.5 minVEd: -9.2 minV/maxV:-0.11									
	Seismic Shear (kN)- L End: maxVEd: 79.7 minVEd: -12.0 minV/maxV:-0.15									
+-----+										
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max			
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided		
-----+	-(m)---+	-----	-(kN)-----+	-(mm)---+	-----	-(mm)---+	-(deg)---+	-(kN)---+	-(kN)---	
L End	0.50	76.6	48.0	112	6	8	110	23	367.7	367.7
Centre	4.40	70.7	39.1	330	15	8	330	22	133.2	346.8
R End	0.50	73.8	41.0	112	6	8	110	23	367.7	367.7
+-----+										

3A 3.2. FRAME B

+-----+

SHEAR FORCES - ULS DESIGN OF TRANSVERSE REINFORCEMENT

```

+-----+
* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *
*-----*

```

```

STOREY: 6 * BEAMS: 6 7

```

```

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT

```

```

+-----+
| Beam|          Beam end & direction of MRd Vector:          |
|      | Left End  +y | Left End  -y | Right End  +y | Right End  -y |
+-----+-----+-----+-----+-----+-----+
|      | (kNm)      | (kNm)      | (kNm)      | (kNm)      |
+-----+-----+-----+-----+-----+
| 6  | 217.9 / 380.2 | 116.0 / 380.2 | 218.0 / 380.2 | 218.0 / 380.2 |
| 7  | 218.0 / 380.2 | 218.0 / 380.2 | 87.7 / 380.2 | 154.4 / 380.2 |
+-----+-----+-----+-----+-----+

```

```

|Beam: 6
|      Seismic Shear (kN)- L End: maxVED: 148.6 minVED: 50.0 minV/maxV: 0.34|
|      Seismic Shear (kN)- L End: maxVED: 90.9 minVED: -7.6 minV/maxV:-0.08|
+-----+

```

```

|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
+-----+-----+-----+-----+-----+-----+-----+
|L End | 0.50| 136.8 106.0| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.60| 125.1 88.2| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 79.2 71.9| 96 | 7 8 95 | 23 | 389.7 | 389.7 |
+-----+-----+-----+-----+-----+

```

```

|Beam: 7
|      Seismic Shear (kN)- L End: maxVED: 104.5 minVED: 20.9 minV/maxV: 0.20|
|      Seismic Shear (kN)- L End: maxVED: 120.1 minVED: 36.4 minV/maxV: 0.30|
+-----+

```

```

|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
+-----+-----+-----+-----+-----+-----+-----+
|L End | 0.50| 92.8 85.0| 96 | 7 8 95 | 25 | 389.7 | 389.7 |
|Centre| 4.50| 96.6 75.1| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 108.3 92.9| 112 | 6 8 110 | 25 | 367.7 | 367.7 |
+-----+-----+-----+-----+-----+

```

```

STOREY: 5 * BEAMS: 6 7

```

```

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT

```

```

+-----+
| Beam|          Beam end & direction of MRd Vector:          |

```

```

|      | Left End  +y | Left End  -y | Right End  +y | Right End  -y |
+-----+----- (kNm) -----+----- (kNm) -----+----- (kNm) -----+----- (kNm) -----+
*-----*
| 6 | 294.0 / 734.1 | 171.4 / 734.1 | 302.0 / 734.1 | 272.2 / 734.1 |
| 7 | 302.0 / 734.1 | 272.2 / 734.1 | 173.6 / 734.1 | 230.4 / 734.1 |
+-----+-----+-----+-----+-----+-----+
|Beam: 6 |
| Seismic Shear (kN)- L End: maxVED: 178.2 minVED: 46.5 minV/maxV: 0.26|
| Seismic Shear (kN)- L End: maxVED: 94.5 minVED: -37.2 minV/maxV:-0.39|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+----- (kN) -----+-(mm)---+----- (mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 166.4 113.8| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.60| 154.7 96.0| 330 | 18 8 280 | 22 | 157.0 | 346.8 |
|R End | 0.50| 82.7 64.1| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+-----+-----+-----+-----+-----+
|Beam: 7 |
| Seismic Shear (kN)- L End: maxVED: 122.7 minVED: -5.6 minV/maxV:-0.05|
| Seismic Shear (kN)- L End: maxVED: 146.6 minVED: 18.2 minV/maxV: 0.12|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+----- (kN) -----+-(mm)---+----- (mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 111.0 79.8| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.50| 123.1 80.3| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 134.8 98.1| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+-----+-----+-----+-----+-----+
*-----*
STOREY: 4 * BEAMS: 6 7
*-----*
SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT
+-----+-----+-----+-----+-----+-----+
| Beam| Beam end & direction of MRd Vector: |
|      | Left End  +y | Left End  -y | Right End  +y | Right End  -y |
+-----+----- (kNm) -----+----- (kNm) -----+----- (kNm) -----+----- (kNm) -----+
*-----*
| 6 | 294.0 / 609.8 | 171.4 / 609.8 | 318.3 / 631.2 | 279.4 / 631.2 |
| 7 | 318.3 / 631.2 | 279.4 / 631.2 | 173.6 / 609.8 | 230.4 / 609.8 |
+-----+-----+-----+-----+-----+-----+
|Beam: 6 |
| Seismic Shear (kN)- L End: maxVED: 173.9 minVED: 41.0 minV/maxV: 0.24|

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```

|          Seismic Shear (kN)- L End: maxVEd: 100.0 minVEd: -33.0 minV/maxV:-0.33|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+- (m)---+----- (kN)-----+- (mm)---+----- (mm)---+ (deg)---+ (kN)---+ (kN)---|
|L End | 0.50| 162.2  110.7| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.60| 150.4  92.9| 330 | 17 8 290 | 22 | 151.6 | 346.8 |
|R End | 0.50| 88.2   67.2| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
|Beam: 7
|          Seismic Shear (kN)- L End: maxVEd: 128.2 minVEd: -3.1 minV/maxV:-0.02|
|          Seismic Shear (kN)- L End: maxVEd: 144.1 minVEd: 12.8 minV/maxV: 0.09|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+- (m)---+----- (kN)-----+- (mm)---+----- (mm)---+ (deg)---+ (kN)---+ (kN)---|
|L End | 0.50| 116.4  81.6| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.50| 120.6  78.5| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 132.3  96.3| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
*-----*
STOREY: 3 * BEAMS: 6 7
*-----*
SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT
+-----+
| Beam|          Beam end & direction of MRd Vector:          |
|     | Left End  +y | Left End  -y | Right End  +y | Right End  -y |
+-----+----- (kNm)-----+----- (kNm)-----+----- (kNm)-----+----- (kNm)-----+
*-----*
| 6 | 303.4 / 595.2 | 171.4 / 595.2 | 336.2 / 633.7 | 287.4 / 633.7 |
| 7 | 336.2 / 633.7 | 287.4 / 633.7 | 173.6 / 595.2 | 230.4 / 595.2 |
+-----+
|Beam: 6
|          Seismic Shear (kN)- L End: maxVEd: 173.3 minVEd: 37.2 minV/maxV: 0.21|
|          Seismic Shear (kN)- L End: maxVEd: 103.8 minVEd: -32.3 minV/maxV:-0.31|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+- (m)---+----- (kN)-----+- (mm)---+----- (mm)---+ (deg)---+ (kN)---+ (kN)---|
|L End | 0.50| 161.5  109.0| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.60| 149.8  91.2| 330 | 17 8 290 | 22 | 151.6 | 346.8 |
|R End | 0.50| 92.0   68.9| 112 | 6 8 110 | 23 | 367.7 | 367.7 |

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+-----+
|Beam: 7|
|
| Seismic Shear (kN)- L End: maxVED: 132.5 minVED: -2.1 minV/maxV:-0.02|
| Seismic Shear (kN)- L End: maxVED: 143.0 minVED: 8.4 minV/maxV: 0.06|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 120.7 82.4| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.50| 119.5 77.8| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 131.3 95.6| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
*-----*
STOREY: 2 * BEAMS: 6 7
*-----*
SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT
+-----+
| Beam|
|      | Beam end & direction of MRd Vector:
|      | Left End +y | Left End -y | Right End +y | Right End -y |
+-----+------(kNm)-----+------(kNm)-----+------(kNm)-----+------(kNm)-----+
*-----*
| 6 | 278.7 / 704.4 | 169.1 / 704.4 | 336.2 / 739.0 | 287.4 / 739.0 |
| 7 | 336.2 / 739.0 | 287.4 / 739.0 | 173.6 / 704.4 | 230.4 / 704.4 |
+-----+
|Beam: 6|
|
| Seismic Shear (kN)- L End: maxVED: 165.4 minVED: 34.1 minV/maxV: 0.21|
| Seismic Shear (kN)- L End: maxVED: 106.8 minVED: -24.5 minV/maxV:-0.23|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 153.7 106.5| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.60| 141.9 88.7| 330 | 16 8 310 | 22 | 141.8 | 346.8 |
|R End | 0.50| 95.1 71.4| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
|Beam: 7|
|
| Seismic Shear (kN)- L End: maxVED: 134.1 minVED: -0.5 minV/maxV: 0.00|
| Seismic Shear (kN)- L End: maxVED: 141.4 minVED: 6.8 minV/maxV: 0.05|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---|

```

L End	0.50	122.4	83.6	112	6 8 110	23	367.7	367.7
Centre	4.50	117.9	76.6	330	15 8 330	22	133.2	346.8
R End	0.50	129.6	94.4	112	6 8 110	23	367.7	367.7

STOREY: 1 * BEAMS: 6 7

-----*

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT

-----+

Beam	Beam end & direction of MRd Vector:			
	Left End +y	Left End -y	Right End +y	Right End -y
-----	-----	-----	-----	-----
(kNm)	(kNm)	(kNm)	(kNm)	(kNm)

-----*

6	251.9 / 749.0	133.2 / 749.0	279.4 / 781.0	279.4 / 781.0
7	279.4 / 781.0	279.4 / 781.0	117.2 / 749.0	203.3 / 749.0

-----+

|Beam: 6 |

| Seismic Shear (kN)- L End: maxVED: 154.4 minVED: 35.7 minV/maxV: 0.23|

| Seismic Shear (kN)- L End: maxVED: 105.2 minVED: -13.4 minV/maxV:-0.13|

-----|

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
-----	-----	-----	-----	-----	-----	-----	-----
(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)	

L End	0.50	142.6	101.9	112	6 8 110	23	367.7	367.7
-------	------	-------	-------	-----	---------	----	-------	-------

Centre	4.60	130.9	84.1	330	15 8 330	22	133.2	346.8
--------	------	-------	------	-----	----------	----	-------	-------

R End	0.50	93.4	76.0	112	6 8 110	23	367.7	367.7
-------	------	------	------	-----	---------	----	-------	-------

-----+

|Beam: 7 |

| Seismic Shear (kN)- L End: maxVED: 116.8 minVED: 7.7 minV/maxV: 0.07|

| Seismic Shear (kN)- L End: maxVED: 133.2 minVED: 24.1 minV/maxV: 0.18|

-----|

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
-----	-----	-----	-----	-----	-----	-----	-----
(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)	

L End	0.50	105.1	85.9	112	6 8 110	23	367.7	367.7
-------	------	-------	------	-----	---------	----	-------	-------

Centre	4.50	109.7	74.2	330	15 8 330	22	133.2	346.8
--------	------	-------	------	-----	----------	----	-------	-------

R End	0.50	121.4	92.0	112	6 8 110	23	367.7	367.7
-------	------	-------	------	-----	---------	----	-------	-------

-----+

-----*

STOREY: 0 * BEAMS: 6 7

-----*

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT

```

+-----+
| Beam|          Beam end & direction of MRd Vector:          |
|      | Left End  +y | Left End  -y | Right End  +y | Right End  -y |
+-----+----- (kNm) -----+----- (kNm) -----+----- (kNm) -----+----- (kNm) -----+
*-----*
| 6 | 134.3 / 780.8 | 30.3 / 780.8 | 168.6 / 802.3 | 168.6 / 802.3 |
| 7 | 168.6 / 802.3 | 168.6 / 802.3 | 30.3 / 780.8 | 101.4 / 780.8 |
+-----+

```

```

|Beam: 6
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+----- (kN) -----+-(mm)---+----- (mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 75.5 98.1| 330 | 3 8 330 | 22 | 133.2 | 346.8 |
|Centre| 4.60| 63.8 80.3| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 63.4 79.8| 330 | 3 8 330 | 22 | 133.2 | 346.8 |
+-----+

```

```

|Beam: 7
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+----- (kN) -----+-(mm)---+----- (mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 71.4 88.2| 330 | 3 8 330 | 22 | 133.2 | 346.8 |
|Centre| 4.50| 60.7 71.9| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 72.4 89.7| 330 | 3 8 330 | 22 | 133.2 | 346.8 |
+-----+

```

```

*-----*
STOREY: -1 * BEAMS: 6 7
*-----*

```

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMR_{d,b}/SMR_{d,c}, AROUND JOINT

```

+-----+
| Beam|          Beam end & direction of MRd Vector:          |
|      | Left End  +y | Left End  -y | Right End  +y | Right End  -y |
+-----+----- (kNm) -----+----- (kNm) -----+----- (kNm) -----+----- (kNm) -----+
*-----*
| 6 | 111.3 / 799.8 | 30.3 / 799.8 | 140.2 / 807.3 | 140.2 / 807.3 |
| 7 | 140.2 / 807.3 | 140.2 / 807.3 | 30.3 / 799.8 | 90.7 / 799.8 |
+-----+

```

```

|Beam: 6
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|

```

	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)
L End	0.50	61.1	91.5	330	3 8 330	22	133.2 346.8
Centre	4.60	49.4	73.8	330	15 8 330	22	133.2 346.8
R End	0.50	57.7	86.4	330	3 8 330	22	133.2 346.8

Region	Length	Ties design	shear	max tie	Prov. ties	strut	VR,s	VR,max	
		Seismic	Non-Seis.	spacing	No. Φ	s	angle	provided	provided
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)		
L End	0.50	61.5	91.0	330	3 8 330	22	133.2	346.8	
Centre	4.50	49.7	73.2	330	15 8 330	22	133.2	346.8	
R End	0.50	58.8	86.9	330	3 8 330	22	133.2	346.8	

3A 3.3. FRAME C

SHEAR FORCES - ULS DESIGN OF TRANSVERSE REINFORCEMENT

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35(mm) *

STOREY: 6 * BEAMS: 10 11 12 13 14

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, $SMR_{d,b}/SMR_{d,c}$, AROUND JOINT

Beam	Beam end & direction of MRd Vector:			
	Left End +y	Left End -y	Right End +y	Right End -y
	(kNm)	(kNm)	(kNm)	(kNm)
10	83.4 / 403.5	58.5 / 403.5	149.3 / 163.2	149.3 / 163.2
11	149.3 / 163.2	149.3 / 163.2	233.3 / 492.7	175.1 / 492.7
12	233.3 / 492.7	175.1 / 492.7	175.1 / 492.7	233.3 / 492.7
13	175.1 / 492.7	233.3 / 492.7	175.1 / 163.2	175.1 / 163.2
14	175.1 / 163.2	175.1 / 163.2	58.5 / 403.5	83.4 / 403.5

Beam	Seismic Shear (kN)	L End: maxVED:	minVED:	minV/maxV:
10		61.2	7.2	0.12

Seismic Shear (kN)- L End: maxVED: 63.3 minVED: 9.3 minV/maxV: 0.15									
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max		
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided	
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)		
L End	0.50	55.3	44.1	112	6 8 110	23	367.7	367.7	
Centre	4.40	51.5	35.9	330	15 8 330	22	133.2	346.8	
R End	0.50	57.4	44.8	96	7 8 95	23	389.7	389.7	
+-----+									
Beam: 11									
Seismic Shear (kN)- L End: maxVED: 71.1 minVED: -1.1 minV/maxV:-0.02									
Seismic Shear (kN)- L End: maxVED: 71.6 minVED: -0.6 minV/maxV:-0.01									
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max		
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided	
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)		
L End	0.50	65.2	42.2	96	7 8 95	25	389.7	389.7	
Centre	4.30	59.8	37.9	330	15 8 330	22	133.2	346.8	
R End	0.50	65.7	46.8	112	6 8 110	25	367.7	367.7	
+-----+									
Beam: 12									
Seismic Shear (kN)- L End: maxVED: 67.5 minVED: 1.5 minV/maxV: 0.02									
Seismic Shear (kN)- L End: maxVED: 67.5 minVED: 1.5 minV/maxV: 0.02									
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max		
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided	
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)		
L End	0.50	61.8	43.6	112	6 8 110	23	367.7	367.7	
Centre	4.30	56.0	34.8	330	15 8 330	22	133.2	346.8	
R End	0.50	61.8	43.6	112	6 8 110	23	367.7	367.7	
+-----+									
Beam: 13									
Seismic Shear (kN)- L End: maxVED: 70.8 minVED: -4.0 minV/maxV:-0.06									
Seismic Shear (kN)- L End: maxVED: 74.5 minVED: -0.3 minV/maxV: 0.00									
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max		
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided	
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)		
L End	0.50	64.9	46.8	112	6 8 110	23	367.7	367.7	
Centre	4.30	62.7	37.9	330	15 8 330	22	133.2	346.8	
R End	0.50	68.6	42.2	96	7 8 95	23	389.7	389.7	
+-----+									

```

|Beam: 14
|
|      Seismic Shear (kN)- L End: maxVEd: 66.6 minVEd: 10.1 minV/maxV: 0.15|
|      Seismic Shear (kN)- L End: maxVEd: 60.4 minVEd: 3.9 minV/maxV: 0.06|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 60.7 44.8| 96 | 7 8 95 | 25 | 389.7 | 389.7 |
|Centre| 4.40| 54.8 35.9| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 54.5 44.1| 112 | 6 8 110 | 25 | 367.7 | 367.7 |
+-----+
*-----*
STOREY: 5 * BEAMS: 10 11 12 13 14
*-----*
SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT
+-----+
| Beam|          Beam end & direction of MRd Vector:          |
|      | Left End  +y | Left End  -y | Right End  +y | Right End  -y |
+-----+------(kNm)-----+------(kNm)-----+------(kNm)-----+------(kNm)-----+
*-----*
| 10 | 134.6 / 810.4 | 86.9 / 810.4 | 294.4 / 333.8 | 249.6 / 333.8 |
| 11 | 294.4 / 333.8 | 249.6 / 333.8 | 272.6 / 979.0 | 272.6 / 979.0 |
| 12 | 272.6 / 979.0 | 272.6 / 979.0 | 272.6 / 979.0 | 272.6 / 979.0 |
| 13 | 272.6 / 979.0 | 272.6 / 979.0 | 249.6 / 333.8 | 294.4 / 333.8 |
| 14 | 249.6 / 333.8 | 294.4 / 333.8 | 86.9 / 810.4 | 134.6 / 810.4 |
+-----+
|Beam: 10
|
|      Seismic Shear (kN)- L End: maxVEd: 88.1 minVEd: 0.9 minV/maxV: 0.01|
|      Seismic Shear (kN)- L End: maxVEd: 69.6 minVEd: -17.6 minV/maxV:-0.25|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 82.2 49.0| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.40| 76.4 40.0| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 63.7 40.0| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
|Beam: 11
|
|      Seismic Shear (kN)- L End: maxVEd: 86.9 minVEd: -20.1 minV/maxV:-0.23|
|      Seismic Shear (kN)- L End: maxVEd: 90.6 minVEd: -16.4 minV/maxV:-0.18|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |

```

	Seismic Non-Seis.		spacing	No. Φ	s	angle	provided	provided
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)	
L End	0.50	81.0	41.7	112	6 8 110	23	367.7	367.7
Centre	4.30	78.9	38.4	330	15 8 330	22	133.2	346.8
R End	0.50	84.7	47.3	112	6 8 110	23	367.7	367.7
+-----+								
Beam: 12								
Seismic Shear (kN)- L End: maxVEd: 85.9 minVEd: -16.9 minV/maxV:-0.20								
Seismic Shear (kN)- L End: maxVEd: 85.9 minVEd: -16.9 minV/maxV:-0.20								
+-----+								
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max	
		Seismic Non-Seis.		spacing	No. Φ	s	angle	provided
		(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)
L End	0.50	80.2	43.6	112	6 8 110	23	367.7	367.7
Centre	4.30	74.4	34.8	330	15 8 330	22	133.2	346.8
R End	0.50	80.2	43.6	112	6 8 110	23	367.7	367.7
+-----+								
Beam: 13								
Seismic Shear (kN)- L End: maxVEd: 90.6 minVEd: -16.4 minV/maxV:-0.18								
Seismic Shear (kN)- L End: maxVEd: 86.9 minVEd: -20.1 minV/maxV:-0.23								
+-----+								
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max	
		Seismic Non-Seis.		spacing	No. Φ	s	angle	provided
		(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)
L End	0.50	84.7	47.3	112	6 8 110	23	367.7	367.7
Centre	4.30	78.9	38.4	330	15 8 330	22	133.2	346.8
R End	0.50	81.0	41.7	112	6 8 110	23	367.7	367.7
+-----+								
Beam: 14								
Seismic Shear (kN)- L End: maxVEd: 69.6 minVEd: -17.6 minV/maxV:-0.25								
Seismic Shear (kN)- L End: maxVEd: 88.1 minVEd: 0.9 minV/maxV: 0.01								
+-----+								
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max	
		Seismic Non-Seis.		spacing	No. Φ	s	angle	provided
		(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)
L End	0.50	63.7	40.0	112	6 8 110	23	367.7	367.7
Centre	4.40	76.4	40.0	330	15 8 330	22	133.2	346.8
R End	0.50	82.2	49.0	112	6 8 110	23	367.7	367.7
+-----+								

STOREY: 4 * BEAMS: 10 11 12 13 14								

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMR_{d,b}/SMR_{d,c}, AROUND JOINT

Beam end & direction of MRd Vector:									
Beam	Left End +y		Left End -y		Right End +y		Right End -y		
	(kNm)		(kNm)		(kNm)		(kNm)		
10	134.6	510.4	86.9	510.4	294.4	547.3	249.6	547.3	
11	294.4	547.3	249.6	547.3	272.6	857.1	272.6	857.1	
12	272.6	857.1	272.6	857.1	272.6	857.1	272.6	857.1	
13	272.6	857.1	272.6	857.1	249.6	547.3	294.4	547.3	
14	249.6	547.3	294.4	547.3	86.9	510.4	134.6	510.4	
Beam: 10									
Seismic Shear (kN)- L End: maxVEd: 86.7 minVEd: -0.6 minV/maxV:-0.01									
Seismic Shear (kN)- L End: maxVEd: 71.1 minVEd: -16.2 minV/maxV:-0.23									
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max		
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided	
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)		
L End	0.50	80.8	47.9	112	6 8 110	23	367.7	367.7	
Centre	4.40	74.9	39.0	330	15 8 330	22	133.2	346.8	
R End	0.50	65.2	41.1	112	6 8 110	23	367.7	367.7	
Beam: 11									
Seismic Shear (kN)- L End: maxVEd: 87.3 minVEd: -19.7 minV/maxV:-0.23									
Seismic Shear (kN)- L End: maxVEd: 90.2 minVEd: -16.8 minV/maxV:-0.19									
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max		
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided	
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)		
L End	0.50	81.4	42.0	112	6 8 110	23	367.7	367.7	
Centre	4.30	78.4	38.1	330	15 8 330	22	133.2	346.8	
R End	0.50	84.3	47.0	112	6 8 110	23	367.7	367.7	
Beam: 12									
Seismic Shear (kN)- L End: maxVEd: 85.9 minVEd: -16.9 minV/maxV:-0.20									
Seismic Shear (kN)- L End: maxVEd: 85.9 minVEd: -16.9 minV/maxV:-0.20									
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max		
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided	
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)		
L End	0.50	80.2	43.6	112	6 8 110	23	367.7	367.7	

```

|Centre| 4.30| 74.4 34.8| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 80.2 43.6| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
|Beam: 13 |
| Seismic Shear (kN)- L End: maxVED: 90.2 minVED: -16.8 minV/maxV:-0.19|
| Seismic Shear (kN)- L End: maxVED: 87.3 minVED: -19.7 minV/maxV:-0.23|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 84.3 47.0| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.30| 78.4 38.1| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 81.4 42.0| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
|Beam: 14 |
| Seismic Shear (kN)- L End: maxVED: 71.1 minVED: -16.2 minV/maxV:-0.23|
| Seismic Shear (kN)- L End: maxVED: 86.7 minVED: -0.6 minV/maxV:-0.01|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 65.2 41.1| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.40| 74.9 39.0| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 80.8 47.9| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
*-----*
STOREY: 3 * BEAMS: 10 11 12 13 14
*-----*
SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT
+-----+
| Beam| Beam end & direction of MRd Vector: |
| | Left End +y | Left End -y | Right End +y | Right End -y |
+-----+------(kNm)-----+------(kNm)-----+------(kNm)-----+------(kNm)-----+
*-----*
| 10 | 134.6 / 226.5 | 86.9 / 226.5 | 315.2 / 787.4 | 259.0 / 787.4 |
| 11 | 315.2 / 787.4 | 259.0 / 787.4 | 281.7 / 771.7 | 281.7 / 771.7 |
| 12 | 281.7 / 771.7 | 281.7 / 771.7 | 281.7 / 771.7 | 281.7 / 771.7 |
| 13 | 281.7 / 771.7 | 281.7 / 771.7 | 259.0 / 787.4 | 315.2 / 787.4 |
| 14 | 259.0 / 787.4 | 315.2 / 787.4 | 86.9 / 226.5 | 134.6 / 226.5 |
+-----+
|Beam: 10 |
| Seismic Shear (kN)- L End: maxVED: 86.0 minVED: -2.9 minV/maxV:-0.03|

```

Seismic Shear (kN)- L End: maxVEd: 73.4 minVEd: -15.5 minV/maxV:-0.21									
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max		
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided	
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)		
L End	0.50	80.2	47.5	112	6 8 110	23	367.7	367.7	
Centre	4.40	74.3	38.5	330	15 8 330	22	133.2	346.8	
R End	0.50	67.6	41.5	112	6 8 110	23	367.7	367.7	
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+									
Beam: 11									
Seismic Shear (kN)- L End: maxVEd: 91.5 minVEd: -21.1 minV/maxV:-0.23									
Seismic Shear (kN)- L End: maxVEd: 91.6 minVEd: -21.0 minV/maxV:-0.23									
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max		
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided	
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)		
L End	0.50	85.6	42.2	112	6 8 110	23	367.7	367.7	
Centre	4.30	79.8	37.9	330	15 8 330	22	133.2	346.8	
R End	0.50	85.7	46.8	112	6 8 110	23	367.7	367.7	
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+									
Beam: 12									
Seismic Shear (kN)- L End: maxVEd: 87.7 minVEd: -18.6 minV/maxV:-0.21									
Seismic Shear (kN)- L End: maxVEd: 87.7 minVEd: -18.6 minV/maxV:-0.21									
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max		
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided	
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)		
L End	0.50	81.9	43.6	112	6 8 110	23	367.7	367.7	
Centre	4.30	76.1	34.8	330	15 8 330	22	133.2	346.8	
R End	0.50	81.9	43.6	112	6 8 110	23	367.7	367.7	
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+									
Beam: 13									
Seismic Shear (kN)- L End: maxVEd: 91.6 minVEd: -21.0 minV/maxV:-0.23									
Seismic Shear (kN)- L End: maxVEd: 91.5 minVEd: -21.1 minV/maxV:-0.23									
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max		
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided	
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)		
L End	0.50	85.7	46.8	112	6 8 110	23	367.7	367.7	
Centre	4.30	79.8	37.9	330	15 8 330	22	133.2	346.8	
R End	0.50	85.6	42.2	112	6 8 110	23	367.7	367.7	
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+									

```

|Beam: 14
|
|      Seismic Shear (kN)- L End: maxVEd:  73.4 minVEd: -15.5 minV/maxV:-0.21|
|      Seismic Shear (kN)- L End: maxVEd:  86.0 minVEd:  -2.9 minV/maxV:-0.03|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      | |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50|  67.6  41.5| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.40|  74.3  38.5| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50|  80.2  47.5| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
*-----*
STOREY:  2 * BEAMS:  10  11  12  13  14
*-----*
SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT
+-----+
| Beam|          Beam end & direction of MRd Vector:          |
|      | Left End  +y | Left End  -y | Right End  +y | Right End  -y |
+-----+------(kNm)-----+------(kNm)-----+------(kNm)-----+------(kNm)-----+
*-----*
| 10 | 134.6 / 262.3 | 86.9 / 262.3 | 281.7 / 849.5 | 258.1 / 849.5 |
| 11 | 281.7 / 849.5 | 258.1 / 849.5 | 272.6 / 827.5 | 272.6 / 827.5 |
| 12 | 272.6 / 827.5 | 272.6 / 827.5 | 272.6 / 827.5 | 272.6 / 827.5 |
| 13 | 272.6 / 827.5 | 272.6 / 827.5 | 258.1 / 849.5 | 281.7 / 849.5 |
| 14 | 258.1 / 849.5 | 281.7 / 849.5 | 86.9 / 262.3 | 134.6 / 262.3 |
+-----+
|Beam: 10
|
|      Seismic Shear (kN)- L End: maxVEd:  85.2 minVEd:  -3.5 minV/maxV:-0.04|
|      Seismic Shear (kN)- L End: maxVEd:  74.0 minVEd: -14.7 minV/maxV:-0.20|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      | |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50|  79.4  46.9| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 4.40|  73.5  38.0| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50|  68.2  42.1| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
|Beam: 11
|
|      Seismic Shear (kN)- L End: maxVEd:  85.6 minVEd: -19.0 minV/maxV:-0.22|
|      Seismic Shear (kN)- L End: maxVEd:  89.5 minVEd: -15.1 minV/maxV:-0.17|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |

```

	Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided
-----+-(m)-----	-----+(kN)-----	-----+(mm)-----	-----+(mm)-----	-----+(deg)-----	-----+(kN)-----	-----+(kN)-----	
L End	0.50	79.7	42.5	112	6 8 110	23	367.7 367.7
Centre	4.30	77.7	37.6	330	15 8 330	22	133.2 346.8
R End	0.50	83.6	46.5	112	6 8 110	23	367.7 367.7
+-----+							
Beam: 12							
Seismic Shear (kN)- L End: maxVEd: 85.9 minVEd: -16.9 minV/maxV:-0.20							
Seismic Shear (kN)- L End: maxVEd: 85.9 minVEd: -16.9 minV/maxV:-0.20							

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
	Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided
-----+-(m)-----	-----+(kN)-----	-----+(mm)-----	-----+(mm)-----	-----+(deg)-----	-----+(kN)-----	-----+(kN)-----	
L End	0.50	80.2	43.6	112	6 8 110	23	367.7 367.7
Centre	4.30	74.4	34.8	330	15 8 330	22	133.2 346.8
R End	0.50	80.2	43.6	112	6 8 110	23	367.7 367.7
+-----+							
Beam: 13							
Seismic Shear (kN)- L End: maxVEd: 89.5 minVEd: -15.1 minV/maxV:-0.17							
Seismic Shear (kN)- L End: maxVEd: 85.6 minVEd: -19.0 minV/maxV:-0.22							

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
	Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided
-----+-(m)-----	-----+(kN)-----	-----+(mm)-----	-----+(mm)-----	-----+(deg)-----	-----+(kN)-----	-----+(kN)-----	
L End	0.50	83.6	46.5	112	6 8 110	23	367.7 367.7
Centre	4.30	77.7	37.6	330	15 8 330	22	133.2 346.8
R End	0.50	79.7	42.5	112	6 8 110	23	367.7 367.7
+-----+							
Beam: 14							
Seismic Shear (kN)- L End: maxVEd: 74.0 minVEd: -14.7 minV/maxV:-0.20							
Seismic Shear (kN)- L End: maxVEd: 85.2 minVEd: -3.5 minV/maxV:-0.04							

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
	Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided
-----+-(m)-----	-----+(kN)-----	-----+(mm)-----	-----+(mm)-----	-----+(deg)-----	-----+(kN)-----	-----+(kN)-----	
L End	0.50	68.2	42.1	112	6 8 110	23	367.7 367.7
Centre	4.40	73.5	38.0	330	15 8 330	22	133.2 346.8
R End	0.50	79.4	46.9	112	6 8 110	23	367.7 367.7
+-----+							

STOREY: 1 * BEAMS: 10 11 12 13 14							

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMR_{d,b}/SMR_{d,c}, AROUND JOINT

Beam end & direction of MRd Vector:									
Beam	Left End	+y	Left End	-y	Right End	+y	Right End	-y	
	(kNm)		(kNm)		(kNm)		(kNm)		
10	109.6	292.0	58.5	292.0	272.6	899.8	241.0	899.8	
11	272.6	899.8	241.0	899.8	259.0	874.5	259.0	874.5	
12	259.0	874.5	259.0	874.5	259.0	874.5	259.0	874.5	
13	259.0	874.5	259.0	874.5	241.0	899.8	272.6	899.8	
14	241.0	899.8	272.6	899.8	58.5	292.0	109.6	292.0	
Beam: 10									
Seismic Shear (kN)- L End: maxVED: 77.7 minVED: 1.9 minV/maxV: 0.02									
Seismic Shear (kN)- L End: maxVED: 68.6 minVED: -7.2 minV/maxV:-0.10									
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max		
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided	
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)		
L End	0.50	71.8	44.8	112	6 8 110	23	367.7	367.7	
Centre	4.40	65.9	35.9	330	15 8 330	22	133.2	346.8	
R End	0.50	62.7	44.2	112	6 8 110	23	367.7	367.7	
Beam: 11									
Seismic Shear (kN)- L End: maxVED: 84.7 minVED: -15.6 minV/maxV:-0.18									
Seismic Shear (kN)- L End: maxVED: 86.1 minVED: -14.2 minV/maxV:-0.16									
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max		
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided	
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)		
L End	0.50	78.8	43.1	112	6 8 110	23	367.7	367.7	
Centre	4.30	74.4	37.0	330	15 8 330	22	133.2	346.8	
R End	0.50	80.3	45.9	112	6 8 110	23	367.7	367.7	
Beam: 12									
Seismic Shear (kN)- L End: maxVED: 83.4 minVED: -14.4 minV/maxV:-0.17									
Seismic Shear (kN)- L End: maxVED: 83.4 minVED: -14.4 minV/maxV:-0.17									
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max		
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided	
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)		
L End	0.50	77.6	43.6	112	6 8 110	23	367.7	367.7	

```

|Centre| 4.30|    71.9    34.8|  330 | 15  8 330 |  22 | 133.2 | 346.8 |
|R End | 0.50|    77.6    43.6|  112 |  6  8 110 |  23 | 367.7 | 367.7 |
+-----+-----+-----+-----+-----+-----+-----+-----+
|Beam: 13|
|      Seismic Shear (kN)- L End: maxVED:  86.1 minVED: -14.2 minV/maxV:-0.16|
|      Seismic Shear (kN)- L End: maxVED:  84.7 minVED: -15.6 minV/maxV:-0.18|
+-----+-----+-----+-----+-----+-----+-----+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50|    80.3    45.9|  112 |  6  8 110 |  23 | 367.7 | 367.7 |
|Centre| 4.30|    74.4    37.0|  330 | 15  8 330 |  22 | 133.2 | 346.8 |
|R End | 0.50|    78.8    43.1|  112 |  6  8 110 |  23 | 367.7 | 367.7 |
+-----+-----+-----+-----+-----+-----+-----+
|Beam: 14|
|      Seismic Shear (kN)- L End: maxVED:  68.6 minVED:  -7.2 minV/maxV:-0.10|
|      Seismic Shear (kN)- L End: maxVED:  77.7 minVED:   1.9 minV/maxV: 0.02|
+-----+-----+-----+-----+-----+-----+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50|    62.7    44.2|  112 |  6  8 110 |  23 | 367.7 | 367.7 |
|Centre| 4.40|    65.9    35.9|  330 | 15  8 330 |  22 | 133.2 | 346.8 |
|R End | 0.50|    71.8    44.8|  112 |  6  8 110 |  23 | 367.7 | 367.7 |
+-----+-----+-----+-----+-----+-----+-----+
*-----*
STOREY:  0 * BEAMS:  10  11  12  13  14
*-----*
SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT
+-----+-----+-----+-----+-----+-----+-----+-----+
| Beam|          Beam end & direction of MRd Vector:          |
|     | Left End  +y | Left End  -y | Right End  +y | Right End  -y |
+-----+------(kNm)-----+------(kNm)-----+------(kNm)-----+------(kNm)-----+
*-----*
| 10 | 111.3 / 152.7 | 30.2 / 152.7 | 168.5 / 938.2 | 168.5 / 938.2 |
| 11 | 168.5 / 938.2 | 168.5 / 938.2 | 131.7 / 912.9 | 131.7 / 912.9 |
| 12 | 131.7 / 912.9 | 131.7 / 912.9 | 131.7 / 912.9 | 131.7 / 912.9 |
| 13 | 131.7 / 912.9 | 131.7 / 912.9 | 168.5 / 938.2 | 168.5 / 938.2 |
| 14 | 168.5 / 938.2 | 168.5 / 938.2 | 30.2 / 152.7 | 111.3 / 152.7 |
+-----+-----+-----+-----+-----+-----+-----+
|Beam: 10|
+-----+-----+-----+-----+-----+-----+-----+

```

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided provided
-----+- (m)-----	----- (kN)-----	-----+- (mm)-----	----- (mm)-----	----- (deg)-----	----- (kN)-----	----- (kN)-----	
L End	0.50	70.2	92.8	330	3 8 330	22	133.2 346.8
Centre	4.40	58.4	75.0	330	15 8 330	22	133.2 346.8
R End	0.50	65.1	85.1	330	3 8 330	22	133.2 346.8

-----+
|Beam: 11 |

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided provided
-----+- (m)-----	----- (kN)-----	-----+- (mm)-----	----- (mm)-----	----- (deg)-----	----- (kN)-----	----- (kN)-----	
L End	0.50	70.5	87.6	330	3 8 330	22	133.2 346.8
Centre	4.30	60.6	72.5	330	15 8 330	22	133.2 346.8
R End	0.50	72.3	90.3	330	3 8 330	22	133.2 346.8

-----+
|Beam: 12 |

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided provided
-----+- (m)-----	----- (kN)-----	-----+- (mm)-----	----- (mm)-----	----- (deg)-----	----- (kN)-----	----- (kN)-----	
L End	0.50	72.0	89.9	330	3 8 330	22	133.2 346.8
Centre	4.30	60.1	71.9	330	15 8 330	22	133.2 346.8
R End	0.50	72.0	89.9	330	3 8 330	22	133.2 346.8

-----+
|Beam: 13 |

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided provided
-----+- (m)-----	----- (kN)-----	-----+- (mm)-----	----- (mm)-----	----- (deg)-----	----- (kN)-----	----- (kN)-----	
L End	0.50	72.3	90.3	330	3 8 330	22	133.2 346.8
Centre	4.30	60.6	72.5	330	15 8 330	22	133.2 346.8
R End	0.50	70.5	87.6	330	3 8 330	22	133.2 346.8

-----+
|Beam: 14 |

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided provided
-----+- (m)-----	----- (kN)-----	-----+- (mm)-----	----- (mm)-----	----- (deg)-----	----- (kN)-----	----- (kN)-----	
L End	0.50	65.1	85.1	330	3 8 330	22	133.2 346.8
Centre	4.40	58.4	75.0	330	15 8 330	22	133.2 346.8
R End	0.50	70.2	92.8	330	3 8 330	22	133.2 346.8


```

+-----+
*-----*
STOREY: -1 * BEAMS: 10 11 12 13 14
*-----*

```

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT

```

+-----+
| Beam|          Beam end & direction of MRd Vector:          |
|      | Left End  +y | Left End  -y | Right End  +y | Right End  -y |
+-----+-----+-----+-----+-----+-----+
|      | (kNm)      | (kNm)      | (kNm)      | (kNm)      |
*-----*
| 10 | 101.4 / 0.0 | 30.2 / 0.0 | 131.7 / 964.6 | 131.7 / 964.6 |
| 11 | 131.7 / 964.6 | 131.7 / 964.6 | 131.7 / 942.3 | 131.7 / 942.3 |
| 12 | 131.7 / 942.3 | 131.7 / 942.3 | 131.7 / 942.3 | 131.7 / 942.3 |
| 13 | 131.7 / 942.3 | 131.7 / 942.3 | 131.7 / 964.6 | 131.7 / 964.6 |
| 14 | 131.7 / 964.6 | 131.7 / 964.6 | 30.2 / 0.0 | 101.4 / 0.0 |
+-----+

```

```

|Beam: 10
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      | |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)--+------(kN)-----+-(mm)--+------(mm)--+-(deg)--+---(kN)--+---(kN)--|
|L End | 0.50| 59.5 89.5| 330 | 3 8 330 | 22 | 133.2 | 346.8 |
|Centre| 4.40| 47.7 71.7| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 58.7 88.4| 330 | 3 8 330 | 22 | 133.2 | 346.8 |
+-----+

```

```

|Beam: 11
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      | |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)--+------(kN)-----+-(mm)--+------(mm)--+-(deg)--+---(kN)--+---(kN)--|
|L End | 0.50| 59.5 88.4| 330 | 3 8 330 | 22 | 133.2 | 346.8 |
|Centre| 4.30| 48.5 71.7| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 60.2 89.5| 330 | 3 8 330 | 22 | 133.2 | 346.8 |
+-----+

```

```

|Beam: 12
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      | |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)--+------(kN)-----+-(mm)--+------(mm)--+-(deg)--+---(kN)--+---(kN)--|
|L End | 0.50| 60.3 89.9| 330 | 3 8 330 | 22 | 133.2 | 346.8 |
|Centre| 4.30| 48.4 71.9| 330 | 15 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 60.3 89.9| 330 | 3 8 330 | 22 | 133.2 | 346.8 |
+-----+

```

-----+-----										
Beam: 13										
-----+-----										
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max			
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided		
-----+- (m)-----	-----+ (kN)-----	-----+- (mm)-----	-----+ (mm)-----	-----+ (deg)-----	-----+ (kN)-----	-----+ (kN)-----				
L End	0.50	60.2	89.5	330	3 8 330	22	133.2	346.8		
Centre	4.30	48.5	71.7	330	15 8 330	22	133.2	346.8		
R End	0.50	59.5	88.4	330	3 8 330	22	133.2	346.8		
-----+-----										
Beam: 14										
-----+-----										
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max			
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided		
-----+- (m)-----	-----+ (kN)-----	-----+- (mm)-----	-----+ (mm)-----	-----+ (deg)-----	-----+ (kN)-----	-----+ (kN)-----				
L End	0.50	58.7	88.4	330	3 8 330	22	133.2	346.8		
Centre	4.40	47.7	71.7	330	15 8 330	22	133.2	346.8		
R End	0.50	59.5	89.5	330	3 8 330	22	133.2	346.8		
-----+-----										

3A 3.4. FRAME 1

-----+-----										
SHEAR FORCES - ULS DESIGN OF TRANSVERSE REINFORCEMENT										
-----+-----										
* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *										
-----+-----										
STOREY: 6 * BEAMS: 22 21										
-----+-----										
SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT										
-----+-----										
Beam	Beam end & direction of MRd Vector:									
	Left End	+y	Left End	-y	Right End	+y	Right End	-y		
-----+-----	-----+-----	-----+-----	-----+-----	-----+-----	-----+-----	-----+-----	-----+-----	-----+-----		
(kNm)	(kNm)	(kNm)	(kNm)	(kNm)	(kNm)	(kNm)	(kNm)	(kNm)		
-----+-----										
22	188.3 /	369.5	170.8 /	369.5	419.6 /	277.2	419.6 /	277.2		
21	419.6 /	277.2	419.6 /	277.2	170.8 /	403.5	188.3 /	403.5		
-----+-----										
Beam: 22										
Seismic Shear (kN)- L End: maxVEd: 91.4 minVEd: -45.5 minV/maxV:-0.50										

```

|          Seismic Shear (kN)- L End: maxVEd: 112.6 minVEd: -24.3 minV/maxV:-0.22|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      | |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+- (m)---+----- (kN)-----+- (mm)---+----- (mm)---+ (deg) ---+ (kN)---+ (kN)---|
|L End | 0.50| 84.7 35.2| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 3.65| 99.2 36.0| 330 | 13 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 105.9 46.1| 96 | 7 8 95 | 23 | 389.7 | 389.7 |

```

Beam: 21

```

|          Seismic Shear (kN)- L End: maxVEd: 110.6 minVEd: -26.2 minV/maxV:-0.24|
|          Seismic Shear (kN)- L End: maxVEd: 93.3 minVEd: -43.6 minV/maxV:-0.47|

```

```

|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      | |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+- (m)---+----- (kN)-----+- (mm)---+----- (mm)---+ (deg) ---+ (kN)---+ (kN)---|
|L End | 0.50| 103.9 44.7| 96 | 7 8 95 | 25 | 389.7 | 389.7 |
|Centre| 3.65| 97.2 34.6| 330 | 13 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 86.6 36.6| 112 | 6 8 110 | 25 | 367.7 | 367.7 |

```

STOREY: 5 * BEAMS: 22 21

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, $SMR_{d,b}/SMR_{d,c}$, AROUND JOINT

```

| Beam|          Beam end & direction of MRd Vector:          |
|     | Left End  +y | Left End  -y | Right End  +y | Right End  -y |
|-----+----- (kNm)-----+----- (kNm)-----+----- (kNm)-----+----- (kNm)-----+
| 22 | 232.7 / 768.6 | 223.2 / 768.6 | 492.8 / 633.7 | 492.8 / 633.7 |
| 21 | 492.8 / 633.7 | 492.8 / 633.7 | 223.2 / 810.4 | 232.7 / 810.4 |

```

Beam: 22

```

|          Seismic Shear (kN)- L End: maxVEd: 128.1 minVEd: -75.9 minV/maxV:-0.59|
|          Seismic Shear (kN)- L End: maxVEd: 143.0 minVEd: -61.0 minV/maxV:-0.43|

```

```

|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      | |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+- (m)---+----- (kN)-----+- (mm)---+----- (mm)---+ (deg) ---+ (kN)---+ (kN)---|
|L End | 0.50| 121.4 37.0| 96 | 7 8 95 | 25 | 389.7 | 389.7 |
|Centre| 3.65| 129.6 34.2| 330 | 13 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 136.3 44.3| 112 | 6 8 110 | 25 | 367.7 | 367.7 |

```

```

+-----+
|Beam: 21|
|      Seismic Shear (kN)- L End: maxVED: 141.3 minVED: -62.7 minV/maxV:-0.44|
|      Seismic Shear (kN)- L End: maxVED: 129.8 minVED: -74.2 minV/maxV:-0.57|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---+
|L End | 0.50| 134.6  42.8| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 3.65| 127.9  32.6| 330 | 13 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 123.1  38.5| 96 | 7 8 95 | 23 | 389.7 | 389.7 |
+-----+
*-----*
STOREY: 4 * BEAMS: 22 21
*-----*
SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT
+-----+
| Beam|          Beam end & direction of MRd Vector:          |
|      | Left End  +y | Left End  -y | Right End  +y | Right End  -y |
+-----+------(kNm)-----+------(kNm)-----+------(kNm)-----+------(kNm)-----+
*-----*
| 22 | 232.7 / 823.9 | 223.2 / 823.9 | 492.8 / 739.0 | 492.8 / 739.0 |
| 21 | 492.8 / 739.0 | 492.8 / 739.0 | 223.2 / 777.3 | 232.7 / 777.3 |
+-----+
|Beam: 22|
|      Seismic Shear (kN)- L End: maxVED: 127.9 minVED: -76.2 minV/maxV:-0.60|
|      Seismic Shear (kN)- L End: maxVED: 143.3 minVED: -60.8 minV/maxV:-0.42|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---+
|L End | 0.50| 121.2  36.9| 96 | 7 8 95 | 25 | 389.7 | 389.7 |
|Centre| 3.65| 129.8  34.2| 330 | 13 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 136.5  44.4| 112 | 6 8 110 | 25 | 367.7 | 367.7 |
+-----+
|Beam: 21|
|      Seismic Shear (kN)- L End: maxVED: 141.3 minVED: -62.8 minV/maxV:-0.44|
|      Seismic Shear (kN)- L End: maxVED: 129.9 minVED: -74.2 minV/maxV:-0.57|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---+

```

L End	0.50	134.5	42.9	112	6 8 110	23	367.7	367.7
Centre	3.65	127.8	32.8	330	13 8 330	22	133.2	346.8
R End	0.50	123.2	38.4	112	6 8 110	23	367.7	367.7

STOREY: 3 * BEAMS: 22 21

-----*

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMR_{d,b}/SMR_{d,c}, AROUND JOINT

-----+

Beam	Beam end & direction of MR _d Vector:			
	Left End +y	Left End -y	Right End +y	Right End -y
-----	-----	-----	-----	-----
(kNm)	(kNm)	(kNm)	(kNm)	(kNm)

-----*

22	232.7 / 870.8	223.2 / 870.8	426.1 / 781.0	426.1 / 781.0
21	426.1 / 781.0	426.1 / 781.0	170.8 / 771.8	236.2 / 771.8

-----+

|Beam: 22

| Seismic Shear (kN)- L End: maxVED: 116.7 minVED: -73.0 minV/maxV:-0.63|

| Seismic Shear (kN)- L End: maxVED: 140.1 minVED: -49.6 minV/maxV:-0.35|

-----|

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
-----	-----	-----	-----	-----	-----	-----	-----
(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)	

L End	0.50	110.0	37.4	112	6 8 110	23	367.7	367.7
-------	------	-------	------	-----	---------	----	-------	-------

Centre	3.65	126.6	33.7	330	13 8 330	22	133.2	346.8
--------	------	-------	------	-----	----------	----	-------	-------

R End	0.50	133.3	43.9	112	6 8 110	23	367.7	367.7
-------	------	-------	------	-----	---------	----	-------	-------

-----+

|Beam: 21

| Seismic Shear (kN)- L End: maxVED: 127.0 minVED: -52.2 minV/maxV:-0.41|

| Seismic Shear (kN)- L End: maxVED: 119.3 minVED: -59.9 minV/maxV:-0.50|

-----|

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
-----	-----	-----	-----	-----	-----	-----	-----
(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)	

L End	0.50	120.3	42.6	112	6 8 110	23	367.7	367.7
-------	------	-------	------	-----	---------	----	-------	-------

Centre	3.65	113.6	32.4	330	13 8 330	22	133.2	346.8
--------	------	-------	------	-----	----------	----	-------	-------

R End	0.50	112.6	38.7	112	6 8 110	23	367.7	367.7
-------	------	-------	------	-----	---------	----	-------	-------

-----+

-----*

STOREY: 2 * BEAMS: 22 21

-----*

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMR_{d,b}/SMR_{d,c}, AROUND JOINT

```

+-----+
| Beam|          Beam end & direction of MRd Vector:          |
|      | Left End  +y | Left End  -y | Right End  +y | Right End  -y |
+-----+----- (kNm) -----+----- (kNm) -----+----- (kNm) -----+----- (kNm) -----+
*-----*
| 22 | 204.1 / 908.6 | 170.8 / 908.6 | 394.7 / 802.3 | 394.7 / 802.3 |
| 21 | 394.7 / 802.3 | 394.7 / 802.3 | 170.8 / 829.0 | 204.1 / 829.0 |
+-----+

|Beam: 22          |
|      Seismic Shear (kN)- L End: maxVEd: 111.6 minVEd: -53.9 minV/maxV:-0.48|
|      Seismic Shear (kN)- L End: maxVEd: 121.0 minVEd: -44.5 minV/maxV:-0.37|
|-----|

|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+----- (kN) -----+-(mm)---+----- (mm)---+(deg)---+(kN)---+(kN)---|
|L End | 0.50| 104.9  38.2| 96 | 7 8 95 | 25 | 389.7 | 389.7 |
|Centre| 3.65| 107.6  33.0| 330 | 13 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 114.3  43.1| 112 | 6 8 110 | 25 | 367.7 | 367.7 |
+-----+

|Beam: 21          |
|      Seismic Shear (kN)- L End: maxVEd: 119.6 minVEd: -46.0 minV/maxV:-0.38|
|      Seismic Shear (kN)- L End: maxVEd: 113.1 minVEd: -52.5 minV/maxV:-0.46|
|-----|

|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+----- (kN) -----+-(mm)---+----- (mm)---+(deg)---+(kN)---+(kN)---|
|L End | 0.50| 112.9  42.1| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 3.65| 106.1  31.9| 330 | 13 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 106.3  39.2| 96 | 7 8 95 | 23 | 389.7 | 389.7 |
+-----+
*-----*

STOREY: 1 * BEAMS: 22 21
*-----*

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT
+-----+
| Beam|          Beam end & direction of MRd Vector:          |
|      | Left End  +y | Left End  -y | Right End  +y | Right End  -y |
+-----+----- (kNm) -----+----- (kNm) -----+----- (kNm) -----+----- (kNm) -----+
*-----*
| 22 | 158.0 / 936.8 | 116.0 / 936.8 | 294.7 / 807.3 | 294.7 / 807.3 |
| 21 | 294.7 / 807.3 | 294.7 / 807.3 | 116.0 / 877.3 | 158.0 / 877.3 |
+-----+

```

Beam: 22									
Seismic Shear (kN)- L End: maxVEd: 89.8 minVEd: -32.5 minV/maxV:-0.36									
Seismic Shear (kN)- L End: maxVEd: 99.6 minVEd: -22.7 minV/maxV:-0.23									

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max		
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided	
-----	+- (m)	-----	(kN)	-----	+- (mm)	-----	(mm)	-----	+- (deg) ---- (kN) ---- (kN) --
L End	0.50	83.1	38.4	112	6 8 110	23	367.7	367.7	
Centre	3.65	86.2	32.7	330	13 8 330	22	133.2	346.8	
R End	0.50	92.9	42.9	96	7 8 95	23	389.7	389.7	
+-----+									
Beam: 21									
Seismic Shear (kN)- L End: maxVEd: 98.6 minVEd: -23.7 minV/maxV:-0.24									
Seismic Shear (kN)- L End: maxVEd: 90.8 minVEd: -31.5 minV/maxV:-0.35									

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max		
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided	provided	
-----	+- (m)	-----	(kN)	-----	+- (mm)	-----	(mm)	-----	+- (deg) ---- (kN) ---- (kN) --

3A 3.5. FRAME 2

+-----+									
SHEAR FORCES - ULS DESIGN OF TRANSVERSE REINFORCEMENT									
+-----+									
* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *									

STOREY: 6 * BEAMS: 28 27									

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT									
+-----+									
Beam	Beam end & direction of MRd Vector:								
	Left End	+y	Left End	-y	Right End	+y	Right End	-y	
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
28	126.8 /	107.8	59.0 /	107.8	302.2 /	380.2	302.2 /	380.2	
27	302.2 /	380.2	302.2 /	380.2	59.0 /	380.2	108.3 /	380.2	

```

+-----+
|Beam: 28|
|
|      Seismic Shear (kN)- L End: maxVED: 112.2 minVED: 41.1 minV/maxV: 0.37|
|      Seismic Shear (kN)- L End: maxVED: 146.8 minVED: 75.8 minV/maxV: 0.52|
|-----|

```

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided provided
-----+-(m)-----	-----+(kN)-----	-----+(mm)-----	-----+(mm)-----	-----+(deg)-----	-----+(kN)-----	-----+(kN)-----	-----
L End	0.50	98.7	110.2	112	6 8 110	23	367.7 367.7
Centre	5.60	120.0	113.4	330	18 8 330	22	133.2 346.8
R End	0.50	133.4	133.8	96	7 8 95	23	389.7 389.7

```

+-----+
|Beam: 27|
|
|      Seismic Shear (kN)- L End: maxVED: 148.6 minVED: 77.5 minV/maxV: 0.52|
|      Seismic Shear (kN)- L End: maxVED: 110.5 minVED: 39.3 minV/maxV: 0.36|
|-----|

```

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided provided
-----+-(m)-----	-----+(kN)-----	-----+(mm)-----	-----+(mm)-----	-----+(deg)-----	-----+(kN)-----	-----+(kN)-----	-----
L End	0.50	135.2	135.0	96	7 8 95	25	389.7 389.7
Centre	5.60	121.8	114.7	330	18 8 330	22	133.2 346.8
R End	0.50	97.0	109.0	112	6 8 110	25	367.7 367.7

```

*-----*
STOREY: 5 * BEAMS: 28 27
*-----*

```

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, $SMR_{d,b}/SMR_{d,c}$, AROUND JOINT

Beam	Beam end & direction of MRd Vector:			
	Left End +y	Left End -y	Right End +y	Right End -y
-----+-----	-----+(kNm)-----	-----+(kNm)-----	-----+(kNm)-----	-----+(kNm)-----
28	187.6 / 237.4	116.4 / 237.4	327.4 / 734.1	327.4 / 734.1
27	327.4 / 734.1	327.4 / 734.1	116.4 / 734.1	187.6 / 734.1

```

+-----+
|Beam: 28|
|
|      Seismic Shear (kN)- L End: maxVED: 138.3 minVED: 42.6 minV/maxV: 0.31|
|      Seismic Shear (kN)- L End: maxVED: 145.3 minVED: 49.6 minV/maxV: 0.34|
|-----|

```

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided provided
-----+-(m)-----	-----+(kN)-----	-----+(mm)-----	-----+(mm)-----	-----+(deg)-----	-----+(kN)-----	-----+(kN)-----	-----


```

|L End | 0.50| 124.9 120.6| 96 | 7 8 95 | 25 | 389.7 | 389.7 |
|Centre| 5.60| 118.5 103.1| 330 | 18 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 131.9 123.5| 112 | 6 8 110 | 25 | 367.7 | 367.7 |
+-----+
|Beam: 27 |
| Seismic Shear (kN)- L End: maxVED: 148.1 minVED: 52.4 minV/maxV: 0.35|
| Seismic Shear (kN)- L End: maxVED: 135.5 minVED: 39.9 minV/maxV: 0.29|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 134.6 125.5| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 5.60| 121.2 105.1| 330 | 18 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 122.1 118.6| 96 | 7 8 95 | 23 | 389.7 | 389.7 |
+-----+
*-----*
STOREY: 4 * BEAMS: 28 27
*-----*
SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT
+-----+
| Beam| Beam end & direction of MRd Vector: |
| | Left End +y | Left End -y | Right End +y | Right End -y |
+-----+------(kNm)-----+------(kNm)-----+------(kNm)-----+------(kNm)-----+
*-----*
| 28 | 187.6 / 276.5 | 116.4 / 276.5 | 327.4 / 631.2 | 327.4 / 631.2 |
| 27 | 327.4 / 631.2 | 327.4 / 631.2 | 116.4 / 631.2 | 186.0 / 631.2 |
+-----+
|Beam: 28 |
| Seismic Shear (kN)- L End: maxVED: 135.9 minVED: 40.2 minV/maxV: 0.30|
| Seismic Shear (kN)- L End: maxVED: 147.7 minVED: 52.0 minV/maxV: 0.35|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 122.5 118.8| 96 | 7 8 95 | 25 | 389.7 | 389.7 |
|Centre| 5.60| 120.9 104.9| 330 | 18 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 134.3 125.2| 112 | 6 8 110 | 25 | 367.7 | 367.7 |
+-----+
|Beam: 27 |
| Seismic Shear (kN)- L End: maxVED: 150.2 minVED: 54.8 minV/maxV: 0.36|
| Seismic Shear (kN)- L End: maxVED: 133.1 minVED: 37.7 minV/maxV: 0.28|
+-----+

```

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ s	angle	provided	provided
-----+- (m)---+----- (kN)-----+- (mm)---+----- (mm)---+ (deg)---+ (kN)---+ (kN)---							
L End	0.50	136.8	127.2	112	6 8 110	23	367.7 367.7
Centre	5.60	123.4	106.9	330	18 8 330	22	133.2 346.8
R End	0.50	119.7	116.8	112	6 8 110	23	367.7 367.7

+-----+

STOREY: 3 * BEAMS: 28 27

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT

+-----+

Beam	Beam end & direction of MRd Vector:			
	Left End +y	Left End -y	Right End +y	Right End -y
+-----+----- (kNm)-----+----- (kNm)-----+----- (kNm)-----+----- (kNm)-----+				
28	187.6 / 307.8	116.4 / 307.8	327.4 / 633.7	327.4 / 633.7
27	327.4 / 633.7	327.4 / 633.7	116.4 / 633.7	187.6 / 633.7

|Beam: 28

| Seismic Shear (kN)- L End: maxVEd: 135.1 minVEd: 39.4 minV/maxV: 0.29|
| Seismic Shear (kN)- L End: maxVEd: 148.5 minVEd: 52.9 minV/maxV: 0.36|

|-----|

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ s	angle	provided	provided
-----+- (m)---+----- (kN)-----+- (mm)---+----- (mm)---+ (deg)---+ (kN)---+ (kN)---							
L End	0.50	121.6	118.4	112	6 8 110	23	367.7 367.7
Centre	5.60	121.7	105.2	330	18 8 330	22	133.2 346.8
R End	0.50	135.1	125.6	112	6 8 110	23	367.7 367.7

+-----+

|Beam: 27

| Seismic Shear (kN)- L End: maxVEd: 151.0 minVEd: 55.4 minV/maxV: 0.37|
| Seismic Shear (kN)- L End: maxVEd: 132.6 minVEd: 36.9 minV/maxV: 0.28|

|-----|

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ s	angle	provided	provided
-----+- (m)---+----- (kN)-----+- (mm)---+----- (mm)---+ (deg)---+ (kN)---+ (kN)---							
L End	0.50	137.6	127.6	112	6 8 110	23	367.7 367.7
Centre	5.60	124.2	107.3	330	18 8 330	22	133.2 346.8
R End	0.50	119.1	116.4	112	6 8 110	23	367.7 367.7

+-----+

STOREY: 2 * BEAMS: 28 27

-----*
 SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT

-----+
 | Beam| Beam end & direction of MRd Vector: |
 | | Left End +y | Left End -y | Right End +y | Right End -y |
 +-----+----- (kNm) -----+----- (kNm) -----+----- (kNm) -----+----- (kNm) -----+

| 28 | 162.0 / 332.0 | 87.9 / 332.0 | 317.3 / 739.0 | 317.3 / 739.0 |
 | 27 | 317.3 / 739.0 | 317.3 / 739.0 | 87.9 / 739.0 | 157.3 / 739.0 |
 +-----+
 |Beam: 28 |

| Seismic Shear (kN)- L End: maxVED: 131.2 minVED: 45.3 minV/maxV: 0.34 |
Seismic Shear (kN)- L End: maxVED: 142.7 minVED: 56.7 minV/maxV: 0.40

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)
L End	0.50	117.8	118.2	96	7 8 95	25	389.7
Centre	5.60	115.8	105.5	330	18 8 330	22	133.2
R End	0.50	129.2	125.8	112	6 8 110	25	367.7

-----+
 |Beam: 27 |
 | Seismic Shear (kN)- L End: maxVED: 145.2 minVED: 59.9 minV/maxV: 0.41 |
Seismic Shear (kN)- L End: maxVED: 128.0 minVED: 42.8 minV/maxV: 0.33

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)
L End	0.50	131.7	128.0	112	6 8 110	23	367.7
Centre	5.60	118.3	107.6	330	18 8 330	22	133.2
R End	0.50	114.6	116.1	96	7 8 95	23	389.7

-----+

STOREY: 1 * BEAMS: 28 27

-----*
 SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT

-----+
 | Beam| Beam end & direction of MRd Vector: |
 | | Left End +y | Left End -y | Right End +y | Right End -y |
 +-----+----- (kNm) -----+----- (kNm) -----+----- (kNm) -----+----- (kNm) -----+

```

| 28 | 133.3 / 352.8 | 87.9 / 352.8 | 301.1 / 781.0 | 301.1 / 781.0 |
| 27 | 301.1 / 781.0 | 301.1 / 781.0 | 87.9 / 781.0 | 126.8 / 781.0 |
+-----+
|Beam: 28|
|      Seismic Shear (kN)- L End: maxVED: 121.2 minVED: 42.1 minV/maxV: 0.35|
|      Seismic Shear (kN)- L End: maxVED: 145.8 minVED: 66.7 minV/maxV: 0.46|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 107.8 114.1| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 5.60| 119.0 109.6| 330 | 18 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 132.4 129.9| 96 | 7 8 95 | 23 | 389.7 | 389.7 |
+-----+
|Beam: 27|
|      Seismic Shear (kN)- L End: maxVED: 149.1 minVED: 70.9 minV/maxV: 0.48|
|      Seismic Shear (kN)- L End: maxVED: 117.0 minVED: 38.9 minV/maxV: 0.33|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 135.7 132.3| 96 | 7 8 95 | 25 | 389.7 | 389.7 |
|Centre| 5.60| 122.2 112.0| 330 | 18 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 103.6 111.7| 112 | 6 8 110 | 25 | 367.7 | 367.7 |
+-----+
*-----*
STOREY: 0 * BEAMS: 28 27 26
*-----*
SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT
+-----+
| Beam|          Beam end & direction of MRd Vector:          |
|      | Left End  +y | Left End  -y | Right End  +y | Right End  -y |
+-----+------(kNm)-----+------(kNm)-----+------(kNm)-----+------(kNm)-----+
*-----*
| 28 | 174.0 / 181.6 | 30.3 / 181.6 | 177.0 / 802.3 | 177.0 / 802.3 |
| 27 | 177.0 / 802.3 | 177.0 / 802.3 | 188.5 / 568.8 | 208.8 / 568.8 |
| 26 | 188.5 / 568.8 | 208.8 / 568.8 | 30.3 / 0.0 | 158.2 / 0.0 |
+-----+
|Beam: 28|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|

```

```

|-----+- (m)---+----- (kN)-----+- (mm)---+----- (mm)---+- (deg)---+- (kN)---+- (kN)---|
|L End | 0.50| 87.9 126.9| 330 | 3 8 330 | 22 | 133.2 | 346.8 |
|Centre| 5.60| 74.5 106.6| 330 | 18 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 81.4 117.1| 330 | 3 8 330 | 22 | 133.2 | 346.8 |
+-----+
|Beam: 27 |
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+- (m)---+----- (kN)-----+- (mm)---+----- (mm)---+- (deg)---+- (kN)---+- (kN)---|
|L End | 0.50| 81.8 117.6| 330 | 3 8 330 | 22 | 133.2 | 346.8 |
|Centre| 5.60| 74.2 106.1| 330 | 18 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 87.7 126.4| 330 | 3 8 330 | 22 | 133.2 | 346.8 |
+-----+
|Beam: 26 |
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+- (m)---+----- (kN)-----+- (mm)---+----- (mm)---+- (deg)---+- (kN)---+- (kN)---|
|L End | 0.50| 82.4 121.7| 330 | 3 8 330 | 22 | 133.2 | 346.8 |
|Centre| 5.70| 69.5 102.0| 330 | 19 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 82.9 122.4| 330 | 3 8 330 | 22 | 133.2 | 346.8 |
+-----+
*-----*
STOREY: -1 * BEAMS: 28 27 26
*-----*
SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT
+-----+
| Beam|          Beam end & direction of MRd Vector:          |
|      | Left End  +y | Left End  -y | Right End  +y | Right End  -y |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 28 | 158.2 / 0.0 | 30.3 / 0.0 | 180.9 / 807.3 | 180.9 / 807.3 |
| 27 | 180.9 / 807.3 | 180.9 / 807.3 | 188.5 / 351.7 | 208.8 / 351.7 |
| 26 | 188.5 / 351.7 | 208.8 / 351.7 | 30.3 / 0.0 | 150.5 / 0.0 |
+-----+
|Beam: 28 |
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+- (m)---+----- (kN)-----+- (mm)---+----- (mm)---+- (deg)---+- (kN)---+- (kN)---|
|L End | 0.50| 81.8 122.6| 330 | 3 8 330 | 22 | 133.2 | 346.8 |

```

Centre	5.60	68.4	102.2	330	18 8 330	22	133.2	346.8
R End	0.50	81.0	121.4	330	3 8 330	22	133.2	346.8
+-----+								
Beam: 27								
+-----+								
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max	
		Seismic Non-Seis.	spacing	No. Φ s	angle	provided	provided	
-----+	(m)-----	(kN)-----	+(mm)-----	(mm)-----	(deg)-----	(kN)-----	(kN)-----	
L End	0.50	79.8	120.2	330	3 8 330	22	133.2	346.8
Centre	5.60	68.7	103.4	330	18 8 330	22	133.2	346.8
R End	0.50	82.1	123.8	330	3 8 330	22	133.2	346.8
+-----+								
Beam: 26								
+-----+								
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max	
		Seismic Non-Seis.	spacing	No. Φ s	angle	provided	provided	
-----+	(m)-----	(kN)-----	+(mm)-----	(mm)-----	(deg)-----	(kN)-----	(kN)-----	
L End	0.50	82.7	123.3	330	3 8 330	22	133.2	346.8
Centre	5.70	69.3	103.0	330	19 8 330	22	133.2	346.8
R End	0.50	81.0	120.7	330	3 8 330	22	133.2	346.8
+-----+								

3A 3.6. FRAME 3

+-----+								
SHEAR FORCES - ULS DESIGN OF TRANSVERSE REINFORCEMENT								
+-----+								
* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *								

STOREY: 6 * BEAMS: 31 30								

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, $SMR_{d,b}/SMR_{d,c}$, AROUND JOINT								
+-----+								
Beam	Beam end & direction of MRd Vector:							
		Left End +y	Left End -y	Right End +y	Right End -y			
-----+	(kNm)-----	(kNm)-----	(kNm)-----	(kNm)-----	(kNm)-----	(kNm)-----	(kNm)-----	

31	108.3 /	103.8	59.0 /	103.8	235.9 /	380.2	235.9 /	380.2
30	235.9 /	380.2	235.9 /	380.2	59.0 /	380.2	108.3 /	380.2
+-----+								

```

|Beam: 31
|      Seismic Shear (kN)- L End: maxVED: 78.3 minVED: 17.9 minV/maxV: 0.23|
|      Seismic Shear (kN)- L End: maxVED: 105.2 minVED: 44.8 minV/maxV: 0.43|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+----- (kN)-----+-(mm)---+----- (mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 69.5 70.8| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 5.60| 87.6 75.7| 330 | 18 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 96.4 89.1| 96 | 7 8 95 | 23 | 389.7 | 389.7 |
+-----+
|Beam: 30
|      Seismic Shear (kN)- L End: maxVED: 106.7 minVED: 45.6 minV/maxV: 0.43|
|      Seismic Shear (kN)- L End: maxVED: 77.5 minVED: 16.4 minV/maxV: 0.21|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+----- (kN)-----+-(mm)---+----- (mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 97.9 90.2| 96 | 7 8 95 | 25 | 389.7 | 389.7 |
|Centre| 5.60| 89.1 76.8| 330 | 18 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 68.7 69.7| 112 | 6 8 110 | 25 | 367.7 | 367.7 |
+-----+
*-----*
STOREY: 5 * BEAMS: 31 30
*-----*
SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT
+-----+
| Beam|          Beam end & direction of MRd Vector:          |
|      | Left End +y | Left End -y | Right End +y | Right End -y |
+-----+----- (kNm)-----+----- (kNm)-----+----- (kNm)-----+----- (kNm)-----+
*-----*
| 31 | 144.7 / 226.6 | 87.9 / 226.6 | 249.4 / 734.1 | 249.4 / 734.1 |
| 30 | 249.4 / 734.1 | 249.4 / 734.1 | 87.9 / 734.1 | 144.7 / 734.1 |
+-----+
|Beam: 31
|      Seismic Shear (kN)- L End: maxVED: 93.7 minVED: 20.7 minV/maxV: 0.22|
|      Seismic Shear (kN)- L End: maxVED: 102.4 minVED: 29.4 minV/maxV: 0.29|
|-----|
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |      |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+-(m)---+----- (kN)-----+-(mm)---+----- (mm)---+-(deg)---+-(kN)---+-(kN)---|
|L End | 0.50| 84.9 77.5| 96 | 7 8 95 | 25 | 389.7 | 389.7 |

```

Centre	5.60	84.8	69.0	330	18 8 330	22	133.2	346.8
R End	0.50	93.6	82.3	112	6 8 110	25	367.7	367.7

-----+

|Beam: 30 |

| Seismic Shear (kN)- L End: maxVEd: 104.8 minVEd: 31.8 minV/maxV: 0.30|

| Seismic Shear (kN)- L End: maxVEd: 91.3 minVEd: 18.3 minV/maxV: 0.20|

-----|

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max	
		Seismic Non-Seis.	spacing	No. Φ s	angle	provided	provided	
-----+- (m)-----	----- (kN)-----	-----+- (mm)-----	----- (mm)-----	----- (deg)-----	----- (kN)-----	----- (kN)-----	-----	
L End	0.50	96.0	84.0	112	6 8 110	23	367.7	367.7
Centre	5.60	87.2	70.7	330	18 8 330	22	133.2	346.8
R End	0.50	82.5	75.8	96	7 8 95	23	389.7	389.7

-----+

STOREY: 4 * BEAMS: 31 30

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT

-----+

Beam	Beam end & direction of MRd Vector:			
	Left End +y	Left End -y	Right End +y	Right End -y
-----+-----	----- (kNm)-----	----- (kNm)-----	----- (kNm)-----	----- (kNm)-----
31	140.8 / 261.6	87.9 / 261.6	249.4 / 609.8	249.4 / 609.8
30	249.4 / 609.8	249.4 / 609.8	87.9 / 609.8	133.3 / 609.8

-----+

|Beam: 31 |

| Seismic Shear (kN)- L End: maxVEd: 91.5 minVEd: 19.1 minV/maxV: 0.21|

| Seismic Shear (kN)- L End: maxVEd: 104.0 minVEd: 31.6 minV/maxV: 0.30|

-----|

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max	
		Seismic Non-Seis.	spacing	No. Φ s	angle	provided	provided	
-----+- (m)-----	----- (kN)-----	-----+- (mm)-----	----- (mm)-----	----- (deg)-----	----- (kN)-----	----- (kN)-----	-----	
L End	0.50	82.7	76.5	96	7 8 95	25	389.7	389.7
Centre	5.60	86.4	70.0	330	18 8 330	22	133.2	346.8
R End	0.50	95.2	83.4	112	6 8 110	25	367.7	367.7

-----+

|Beam: 30 |

| Seismic Shear (kN)- L End: maxVEd: 106.0 minVEd: 34.7 minV/maxV: 0.33|

| Seismic Shear (kN)- L End: maxVEd: 88.4 minVEd: 17.1 minV/maxV: 0.19|

-----|

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
--------	--------	-------------------	---------	------------	-------	------	--------


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|          |          |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+- (m)---+----- (kN)-----+- (mm)---+----- (mm)---+-- (deg)---+-- (kN)---+-- (kN)---+
|L End | 0.50| 97.3 85.1| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 5.60| 88.5 71.7| 330 | 18 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 79.6 74.8| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
*-----*
STOREY: 3 * BEAMS: 31 30
*-----*
SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT
+-----+
| Beam|          Beam end & direction of MRd Vector:          |
|      | Left End +y | Left End -y | Right End +y | Right End -y |
+-----+----- (kNm)-----+----- (kNm)-----+----- (kNm)-----+----- (kNm)-----+
*-----*
| 31 | 133.3 / 290.7 | 87.9 / 290.7 | 249.4 / 595.2 | 249.4 / 595.2 |
| 30 | 249.4 / 595.2 | 249.4 / 595.2 | 87.9 / 595.2 | 133.3 / 595.2 |
+-----+
|Beam: 31
|      Seismic Shear (kN)- L End: maxVEd: 90.2 minVEd: 18.9 minV/maxV: 0.21|
|      Seismic Shear (kN)- L End: maxVEd: 104.2 minVEd: 32.9 minV/maxV: 0.32|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |          |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+- (m)---+----- (kN)-----+- (mm)---+----- (mm)---+-- (deg)---+-- (kN)---+-- (kN)---+
|L End | 0.50| 81.4 76.4| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 5.60| 86.6 70.1| 330 | 18 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 95.4 83.5| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
|Beam: 30
|      Seismic Shear (kN)- L End: maxVEd: 106.2 minVEd: 34.9 minV/maxV: 0.33|
|      Seismic Shear (kN)- L End: maxVEd: 88.2 minVEd: 16.9 minV/maxV: 0.19|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
|      |          |Seismic Non-Seis.|spacing| No. Φ  s | angle |provided|provided|
|-----+- (m)---+----- (kN)-----+- (mm)---+----- (mm)---+-- (deg)---+-- (kN)---+-- (kN)---+
|L End | 0.50| 97.4 85.2| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 5.60| 88.6 71.9| 330 | 18 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 79.4 74.6| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
+-----+
*-----*
STOREY: 2 * BEAMS: 31 30

```

 SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMR_{d,b}/SMR_{d,c}, AROUND JOINT

+-----+
 | Beam| Beam end & direction of MRd Vector: |
 | | Left End +y | Left End -y | Right End +y | Right End -y |
 +-----+----- (kNm)-----+----- (kNm)-----+----- (kNm)-----+----- (kNm)-----+

 | 31 | 126.8 / 314.5 | 87.9 / 314.5 | 242.2 / 704.4 | 242.2 / 704.4 |
 | 30 | 242.2 / 704.4 | 242.2 / 704.4 | 87.9 / 704.4 | 126.8 / 704.4 |
 +-----+

|Beam: 31 |
 | Seismic Shear (kN)- L End: maxVEd: 89.5 minVEd: 20.2 minV/maxV: 0.23 |
Seismic Shear (kN)- L End: maxVEd: 102.9 minVEd: 33.6 minV/maxV: 0.33

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)
L End	0.50	80.7	76.4	96	7 8 95	25	389.7
Centre	5.60	85.3	70.1	330	18 8 330	22	133.2
R End	0.50	94.1	83.4	112	6 8 110	25	367.7

|Beam: 30 |
 | Seismic Shear (kN)- L End: maxVEd: 105.0 minVEd: 35.7 minV/maxV: 0.34 |
Seismic Shear (kN)- L End: maxVEd: 87.4 minVEd: 18.1 minV/maxV: 0.21

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max
		Seismic Non-Seis.	spacing	No. Φ	s	angle	provided
	(m)	(kN)	(mm)	(mm)	(deg)	(kN)	(kN)
L End	0.50	96.2	85.2	112	6 8 110	23	367.7
Centre	5.60	87.4	71.9	330	18 8 330	22	133.2
R End	0.50	78.6	74.6	96	7 8 95	23	389.7

 STOREY: 1 * BEAMS: 31 30

 SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMR_{d,b}/SMR_{d,c}, AROUND JOINT

+-----+
 | Beam| Beam end & direction of MRd Vector: |
 | | Left End +y | Left End -y | Right End +y | Right End -y |
 +-----+----- (kNm)-----+----- (kNm)-----+----- (kNm)-----+----- (kNm)-----+

 | 31 | 108.3 / 333.3 | 59.0 / 333.3 | 242.2 / 749.0 | 242.2 / 749.0 |
 +-----+

```

| 30 | 242.2 / 749.0 | 242.2 / 749.0 | 59.0 / 749.0 | 108.3 / 749.0 |
+-----+
|Beam: 31 |
| Seismic Shear (kN)- L End: maxVED: 83.4 minVED: 21.4 minV/maxV: 0.26|
| Seismic Shear (kN)- L End: maxVED: 101.7 minVED: 39.7 minV/maxV: 0.39|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
+-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---+
|L End | 0.50| 74.6 74.0| 112 | 6 8 110 | 23 | 367.7 | 367.7 |
|Centre| 5.60| 84.2 72.5| 330 | 18 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 92.9 85.8| 96 | 7 8 95 | 23 | 389.7 | 389.7 |
+-----+
|Beam: 30 |
| Seismic Shear (kN)- L End: maxVED: 104.9 minVED: 42.9 minV/maxV: 0.41|
| Seismic Shear (kN)- L End: maxVED: 80.2 minVED: 18.2 minV/maxV: 0.23|
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
+-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---+
|L End | 0.50| 96.1 88.1| 96 | 7 8 95 | 25 | 389.7 | 389.7 |
|Centre| 5.60| 87.3 74.8| 330 | 18 8 330 | 22 | 133.2 | 346.8 |
|R End | 0.50| 71.4 71.7| 112 | 6 8 110 | 25 | 367.7 | 367.7 |
+-----+
*-----*
STOREY: 0 * BEAMS: 31 30 29
*-----*
SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, SMRd,b/SMRd,c, AROUND JOINT
+-----+
| Beam| Beam end & direction of MRd Vector: |
| | Left End +y | Left End -y | Right End +y | Right End -y |
+-----+-(kNm)-----+-(kNm)-----+-(kNm)-----+-(kNm)-----+
*-----*
| 31 | 111.3 / 170.7 | 30.3 / 170.7 | 158.7 / 780.8 | 158.7 / 780.8 |
| 30 | 158.7 / 780.8 | 158.7 / 780.8 | 188.5 / 546.5 | 158.7 / 546.5 |
| 29 | 188.5 / 546.5 | 158.7 / 546.5 | 30.3 / 0.0 | 150.5 / 0.0 |
+-----+
|Beam: 31 |
+-----+
|Region|Length|Ties design shear|max tie|Prov. ties | strut | VR,s | VR,max |
| | |Seismic Non-Seis.|spacing| No. Φ s | angle |provided|provided|
+-----+-(m)---+------(kN)-----+-(mm)---+------(mm)---+-(deg)---+-(kN)---+-(kN)---+

```

L End	0.50	58.2	81.7	330	3	8	330	22	133.2	346.8
Centre	5.60	49.4	68.4	330	18	8	330	22	133.2	346.8
R End	0.50	55.8	78.2	330	3	8	330	22	133.2	346.8

-----+
|Beam: 30 |

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max			
		Seismic Non-Seis.	spacing	No. Φ s	angle	provided	provided			
-----+--	(m)---+-----	(kN)-----+--	(mm)---+-----	(mm)---+--	(deg)---+--	(kN)-----	(kN)---+--			
L End	0.50	53.7	75.3	330	3	8	330	22	133.2	346.8
Centre	5.60	51.0	71.2	330	18	8	330	22	133.2	346.8
R End	0.50	59.8	84.5	330	3	8	330	22	133.2	346.8

-----+
|Beam: 29 |

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max			
		Seismic Non-Seis.	spacing	No. Φ s	angle	provided	provided			
-----+--	(m)---+-----	(kN)-----+--	(mm)---+-----	(mm)---+--	(deg)---+--	(kN)-----	(kN)---+--			
L End	0.50	83.5	123.3	330	3	8	330	22	133.2	346.8
Centre	5.70	70.1	102.9	330	19	8	330	22	133.2	346.8
R End	0.50	81.8	120.7	330	3	8	330	22	133.2	346.8

-----+

STOREY: -1 * BEAMS: 31 30 29

SUM OF BEAM/COLUMN DESIGN MOMENT RESISTANCES, $SMR_{d,b}/SMR_{d,c}$, AROUND JOINT

-----+
| Beam|

Beam end & direction of MRd Vector:								
	Left End	+y	Left End	-y	Right End	+y	Right End	-y
-----+--	(kNm)-----	+-----	(kNm)-----	+-----	(kNm)-----	+-----	(kNm)-----	+-----
31	101.4 /	0.0	30.3 /	0.0	164.7 /	799.8	164.7 /	799.8
30	164.7 /	799.8	164.7 /	799.8	204.3 /	332.8	149.5 /	332.8
29	204.3 /	332.8	149.5 /	332.8	30.3 /	0.0	150.5 /	0.0

31	101.4 /	0.0	30.3 /	0.0	164.7 /	799.8	164.7 /	799.8
30	164.7 /	799.8	164.7 /	799.8	204.3 /	332.8	149.5 /	332.8
29	204.3 /	332.8	149.5 /	332.8	30.3 /	0.0	150.5 /	0.0

-----+
|Beam: 31 |

Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max			
		Seismic Non-Seis.	spacing	No. Φ s	angle	provided	provided			
-----+--	(m)---+-----	(kN)-----+--	(mm)---+-----	(mm)---+--	(deg)---+--	(kN)-----	(kN)---+--			
L End	0.50	54.0	80.5	330	3	8	330	22	133.2	346.8
Centre	5.60	45.2	67.2	330	18	8	330	22	133.2	346.8

R End	0.50	53.2	79.3	330	3 8 330	22	133.2	346.8
+-----+								
Beam: 30								
+-----+								
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max	
		Seismic Non-Seis.	spacing	No. Φ s	angle	provided	provided	
-----+--	(m)---+-----	(kN)-----+--	(mm)---+-----	(mm)---+--	(deg)---+--	(kN)---+--	(kN)---+--	
L End	0.50	51.5	77.3	330	3 8 330	22	133.2	346.8
Centre	5.60	46.2	69.2	330	18 8 330	22	133.2	346.8
R End	0.50	55.0	82.5	330	3 8 330	22	133.2	346.8
+-----+								
Beam: 29								
+-----+								
Region	Length	Ties design shear	max tie	Prov. ties	strut	VR,s	VR,max	
		Seismic Non-Seis.	spacing	No. Φ s	angle	provided	provided	
-----+--	(m)---+-----	(kN)-----+--	(mm)---+-----	(mm)---+--	(deg)---+--	(kN)---+--	(kN)---+--	
L End	0.50	82.4	122.8	330	3 8 330	22	133.2	346.8
Centre	5.70	68.9	102.5	330	19 8 330	22	133.2	346.8
R End	0.50	81.3	121.2	330	3 8 330	22	133.2	346.8
+-----+								

3A 4. DESIGN OF WALLS

3A 4.1. WALL W1

* WALL :	1						

* Concrete:	C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm)						

* GEOMETRY							

* M-V AT STORY LEVELS - ANALYSIS FOR DESIGN SEISMIC ACTION - N DUE TO G+ ψ 2Q							
*-----+							
X-Sect.: RECT.						bw (m): 0.30	lw (m): 4.00
Total/Critical Height (m):	19.00/4.00						
+-----+							
STORY	Seismic action	My	Vy	Mz	Vz	N	
-----+-----+-----		(kNm)-----	(kN)-----	(kNm)-----	(kN)-----	(kN)-----	
6-Top	+E	108.1	59.3	-677.6	231.7	333.3	
	-E	-108.1	-59.3	677.6	-231.7	264.2	

6-Base	+E		69.8	59.3	-468.2	231.7	333.3	
	-E		-69.8	-59.3	468.2	-231.7	264.2	
5-Base	+E		71.1	50.1	-854.7	479.1	684.2	
	-E		-71.1	-50.1	854.7	-479.1	516.2	
4-Base	+E		80.6	55.2	-1809.5	637.0	1034.7	
	-E		-80.6	-55.2	1809.5	-637.0	764.8	
3-Base	+E		90.5	57.2	-3226.6	783.9	1384.3	
	-E		-90.5	-57.2	3226.6	-783.9	1010.8	
2-Base	+E		79.0	47.7	-5149.6	917.1	1728.9	
	-E		-79.0	-47.7	5149.6	-917.1	1257.0	
1-Base	+E		164.4	56.2	-10734.9	1548.1	2093.3	
	-E		-164.4	-56.2	10734.9	-1548.1	1537.0	

-----+

ENVELOPES OF DESIGN MOMENTS AT STORY BASE - STORY DESIGN SHEARS (MAGNIFIED)

-----+

STORY	Seismic action	Myd	Vyd	Mzd	Vzd	Nd	
-----+	-----+	(kNm)	(kN)	(kNm)	(kN)	(kN)	----
6-top	+Mx +Mz / maxN	208.0	2.4	2264.3	343.7	0.0	
	-Mx +Mz / maxN	-8.2	-116.2	2264.3	343.7	0.0	
	+Mx -Mz / maxN	208.0	2.4	-2263.8	-351.3	0.0	
	-Mx -Mz / maxN	-8.2	-116.2	-2263.8	-351.3	0.0	
	+Mx +Mz / minN	208.0	2.4	2264.3	343.7	264.2	
	-Mx +Mz / minN	-8.2	-116.2	2264.3	343.7	264.2	
	+Mx -Mz / minN	208.0	2.4	-2263.8	-351.3	264.2	
	-Mx -Mz / minN	-8.2	-116.2	-2263.8	-351.3	264.2	
-----+							
6-base	+Mx +Mz / maxN	-0.9	2.4	3962.2	343.7	333.3	
	-Mx +Mz / maxN	-140.5	-116.2	3962.2	343.7	333.3	
	+Mx -Mz / maxN	-0.9	2.4	-3947.7	-351.3	333.3	
	-Mx -Mz / maxN	-140.5	-116.2	-3947.7	-351.3	333.3	
	+Mx +Mz / minN	-0.9	2.4	3962.2	343.7	264.2	
	-Mx +Mz / minN	-140.5	-116.2	3962.2	343.7	264.2	
	+Mx -Mz / minN	-0.9	2.4	-3947.7	-351.3	264.2	
	-Mx -Mz / minN	-140.5	-116.2	-3947.7	-351.3	264.2	
-----+							
5-base	+Mx +Mz / maxN	17.1	16.0	5661.9	715.6	684.2	
	-Mx +Mz / maxN	-125.1	-84.1	5661.9	715.6	684.2	
	+Mx -Mz / maxN	17.1	16.0	-5637.9	-721.9	684.2	
	-Mx -Mz / maxN	-125.1	-84.1	-5637.9	-721.9	684.2	
	+Mx +Mz / minN	17.1	16.0	5661.9	715.6	516.2	
	-Mx +Mz / minN	-125.1	-84.1	5661.9	715.6	516.2	
	+Mx -Mz / minN	17.1	16.0	-5637.9	-721.9	516.2	

	-Mx -Mz / minN	-125.1	-84.1	-5637.9	-721.9	516.2
+-----+						
4-base	+Mx +Mz / maxN	24.6	17.2	7362.2	952.2	1034.7
	-Mx +Mz / maxN	-136.6	-93.2	7362.2	952.2	1034.7
	+Mx -Mz / maxN	24.6	17.2	-7327.6	-958.7	1034.7
	-Mx -Mz / maxN	-136.6	-93.2	-7327.6	-958.7	1034.7
	+Mx +Mz / minN	24.6	17.2	7362.2	952.2	764.8
	-Mx +Mz / minN	-136.6	-93.2	7362.2	952.2	764.8
	+Mx -Mz / minN	24.6	17.2	-7327.6	-958.7	764.8
	-Mx -Mz / minN	-136.6	-93.2	-7327.6	-958.7	764.8
+-----+						
3-base	+Mx +Mz / maxN	39.5	22.6	9063.1	1172.5	1384.3
	-Mx +Mz / maxN	-141.6	-91.7	9063.1	1172.5	1384.3
	+Mx -Mz / maxN	39.5	22.6	-9016.6	-1179.1	1384.3
	-Mx -Mz / maxN	-141.6	-91.7	-9016.6	-1179.1	1384.3
	+Mx +Mz / minN	39.5	22.6	9063.1	1172.5	1010.8
	-Mx +Mz / minN	-141.6	-91.7	9063.1	1172.5	1010.8
	+Mx -Mz / minN	39.5	22.6	-9016.6	-1179.1	1010.8
	-Mx -Mz / minN	-141.6	-91.7	-9016.6	-1179.1	1010.8
+-----+						
2-base	+Mx +Mz / maxN	22.9	11.4	10765.2	1372.2	1728.9
	-Mx +Mz / maxN	-135.1	-84.0	10765.2	1372.2	1728.9
	+Mx -Mz / maxN	22.9	11.4	-10704.5	-1379.0	1728.9
	-Mx -Mz / maxN	-135.1	-84.0	-10704.5	-1379.0	1728.9
	+Mx +Mz / minN	22.9	11.4	10765.2	1372.2	1257.0
	-Mx +Mz / minN	-135.1	-84.0	10765.2	1372.2	1257.0
	+Mx -Mz / minN	22.9	11.4	-10704.5	-1379.0	1257.0
	-Mx -Mz / minN	-135.1	-84.0	-10704.5	-1379.0	1257.0
+-----+						
1-base	+Mx +Mz / maxN	133.3	38.9	10789.1	2315.6	2093.3
	Corres. base MRd	871.3		14001.8	at vd =	0.105
	-Mx +Mz / maxN	-195.5	-73.5	10789.1	2315.6	2093.3
	Corres. base MRd	871.3		14001.8	at vd =	0.105
	+Mx -Mz / maxN	133.3	38.9	-10680.6	-2328.7	2093.3
	Corres. base MRd	871.3		14001.8	at vd =	0.105
	-Mx -Mz / maxN	-195.5	-73.5	-10680.6	-2328.7	2093.3
	Corres. base MRd	871.3		14001.8	at vd =	0.105
	+Mx +Mz / minN	133.3	38.9	10789.1	2315.6	1537.0
	Corres. base MRd	824.5		12868.0	at vd =	0.077
	-Mx +Mz / minN	-195.5	-73.5	10789.1	2315.6	1537.0
	Corres. base MRd	824.5		12868.0	at vd =	0.077
	+Mx -Mz / minN	133.3	38.9	-10680.6	-2328.7	1537.0

	Corres. base MRd	824.5	12868.0	at vd = 0.077	
	-Mx -Mz / minN	-195.5	-73.5	-10680.6	-2328.7 1537.0
	Corres. base MRd	824.5	12868.0	at vd = 0.077	

DESIGN IN SHEAR W/O SHORT-SHEAR-SPAN EFFECTS (Web diagonal compression/tension)

Storey and location	Magn. factor	Design shear	dia. maxVE	legs	Horizontal bars spacing	strut angle	Resistance VR,s	Resistance VR,max
		(kN)	(mm)		(mm) max./provided	(deg)	(kN)	(kN)
6 Along bz	1.5	351	8	2	165 165	22	2119.2	2979.3
5 Along bz	1.5	721	8	2	165 165	22	2119.2	2979.3
4 Along bz	1.5	958	8	2	165 165	22	2119.2	2979.3
3 Along bz	1.5	1179	8	2	165 165	22	2119.2	2979.3
2 Along bz	1.5	1379	8	2	165 165	22	2119.2	2979.3
1 Along bz	1.5	2328	8	2	165 150	22	2331.2	2979.3

VERTICAL / HORIZONTAL / HOOP REINFORCEMENT (Story and base of above)

	BOUNDARY ELEMENTS						WEB REINFORCEMENT			Addit
	STOR	Dimens.	Vertical bars	Hoops	omega-wd	Vertical	Horizontal	Joint		
		dia tot end side	dia. sh	Req/Prov	dia. sv	No.	dia. sh	reinf		
+-----+	---(m)---	---(mm)---	---(mm)---	---	---(mm)---	---	---(mm)---	---	+(mm2)+	
	6 0.25X0.30	20 10 4 3	8 140 0.00 0.24	8 160 22	8 165	0				
	5 0.30X0.30	20 12 4 4	8 140 0.00 0.22	8 160 21	8 165	0				
	4 0.35X0.30	20 14 4 5	8 140 0.00 0.21	8 160 21	8 165	0				
	3 0.40X0.30	20 16 4 6	8 140 0.00 0.19	8 160 20	8 165	0				
	2 0.60X0.30	20 18 4 7	8 140 0.00 0.19	8 160 18	8 165	0				
	1 0.60X0.30	20 18 4 7	8 140 0.00 0.19	8 160 18	8 150	0				
	0 0.60X0.30	20 18 4 7	8 140 0.00 0.19	8 160 18	8 150	0				

3A 4.2. WALL W3

```

*-----*
* WALL :      3
*-----*
* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *
*-----*
* GEOMETRY
* M-V AT STORY LEVELS - ANALYSIS FOR DESIGN SEISMIC ACTION - N DUE TO G+ψ2Q *
+-----+
|X-Sect.: RECT.                | bw (m): 0.25 | lw (m): 4.00 |
|Total/Critical Height(m):19.00/4.00          |              |              |
+-----+
| STORY | Seismic action|      My      Vy      Mz      Vz      N      |
|-----+-----+----- (kNm)----- (kN)----- (kNm)----- (kN)----- (kN)---|
| 6-Top |      +E      |      0.0      2.7      0.0     130.5    195.3 |
|      |      -E      |      0.0     -2.7      0.0    -130.5    195.3 |
| 6-Base|      +E      |      8.1      2.7     -391.5    130.5    195.3 |
|      |      -E      |     -8.1     -2.7     391.5    -130.5    195.3 |
| 5-Base|      +E      |      5.3      2.3     -551.1    171.9    390.6 |
|      |      -E      |     -5.3     -2.3     551.1    -171.9    390.6 |
| 4-Base|      +E      |      6.2      1.0    -1142.3    278.5    585.9 |
|      |      -E      |     -6.2     -1.0    1142.3    -278.5    585.9 |
| 3-Base|      +E      |      9.1      2.9    -2142.0    388.0    781.2 |
|      |      -E      |     -9.1     -2.9    2142.0    -388.0    781.2 |
| 2-Base|      +E      |      6.3      2.0   -3444.8    478.6    976.5 |
|      |      -E      |     -6.3     -2.0    3444.8    -478.6    976.5 |
| 1-Base|      +E      |     57.6     14.1   -3974.0    200.2   1196.8 |
|      |      -E      |    -57.6    -14.1    3974.0    -200.2   1196.8 |
| 0-Base|      +E      |     15.8     24.5    -840.6   1044.6   1392.1 |
|      |      -E      |    -15.8    -24.5     840.6  -1044.6   1392.1 |
| -1-Base|      +E      |     10.0      8.6    -672.2     61.3   1587.4 |
|      |      -E      |    -10.0     -8.6     672.2    -61.3   1587.4 |
+-----+
ENVELOPES OF DESIGN MOMENTS AT STORY BASE - STORY DESIGN SHEARS (MAGNIFIED)
+-----+
| STORY | Seismic action |      Myd      Vyd      Mzd      Vzd      Nd      |
|-----+-----+----- (kNm)----- (kN)----- (kNm)----- (kN)----- (kN)---|
| 6-top | +Mx +Mz / maxN |      0.0      2.7     1989.3    194.3      0.0 |
|      | -Mx +Mz / maxN |      0.0     -2.7     1989.3    194.3      0.0 |
|      | +Mx -Mz / maxN |      0.0      2.7    -1990.8   -197.2      0.0 |
|      | -Mx -Mz / maxN |      0.0     -2.7    -1990.8   -197.2      0.0 |

```

		+Mx +Mz / minN		0.0	2.7	1989.3	194.3	195.3	
		-Mx +Mz / minN		0.0	-2.7	1989.3	194.3	195.3	
		+Mx -Mz / minN		0.0	2.7	-1990.8	-197.2	195.3	
		-Mx -Mz / minN		0.0	-2.7	-1990.8	-197.2	195.3	
+-----+									
	6-base	+Mx +Mz / maxN		8.1	2.7	2390.6	194.3	195.3	
		-Mx +Mz / maxN		-8.1	-2.7	2390.6	194.3	195.3	
		+Mx -Mz / maxN		8.1	2.7	-2382.0	-197.2	195.3	
		-Mx -Mz / maxN		-8.1	-2.7	-2382.0	-197.2	195.3	
		+Mx +Mz / minN		8.1	2.7	2390.6	194.3	195.3	
		-Mx +Mz / minN		-8.1	-2.7	2390.6	194.3	195.3	
		+Mx -Mz / minN		8.1	2.7	-2382.0	-197.2	195.3	
		-Mx -Mz / minN		-8.1	-2.7	-2382.0	-197.2	195.3	
+-----+									
	5-base	+Mx +Mz / maxN		5.3	2.3	2791.5	256.5	390.6	
		-Mx +Mz / maxN		-5.3	-2.3	2791.5	256.5	390.6	
		+Mx -Mz / maxN		5.3	2.3	-2774.9	-259.1	390.6	
		-Mx -Mz / maxN		-5.3	-2.3	-2774.9	-259.1	390.6	
		+Mx +Mz / minN		5.3	2.3	2791.5	256.5	390.6	
		-Mx +Mz / minN		-5.3	-2.3	2791.5	256.5	390.6	
		+Mx -Mz / minN		5.3	2.3	-2774.9	-259.1	390.6	
		-Mx -Mz / minN		-5.3	-2.3	-2774.9	-259.1	390.6	
+-----+									
	4-base	+Mx +Mz / maxN		6.2	1.0	3193.0	416.2	585.9	
		-Mx +Mz / maxN		-6.2	-1.0	3193.0	416.2	585.9	
		+Mx -Mz / maxN		6.2	1.0	-3167.3	-419.2	585.9	
		-Mx -Mz / maxN		-6.2	-1.0	-3167.3	-419.2	585.9	
		+Mx +Mz / minN		6.2	1.0	3193.0	416.2	585.9	
		-Mx +Mz / minN		-6.2	-1.0	3193.0	416.2	585.9	
		+Mx -Mz / minN		6.2	1.0	-3167.3	-419.2	585.9	
		-Mx -Mz / minN		-6.2	-1.0	-3167.3	-419.2	585.9	
+-----+									
	3-base	+Mx +Mz / maxN		9.1	2.9	3595.2	580.2	781.2	
		-Mx +Mz / maxN		-9.1	-2.9	3595.2	580.2	781.2	
		+Mx -Mz / maxN		9.1	2.9	-3559.0	-583.7	781.2	
		-Mx -Mz / maxN		-9.1	-2.9	-3559.0	-583.7	781.2	
		+Mx +Mz / minN		9.1	2.9	3595.2	580.2	781.2	
		-Mx +Mz / minN		-9.1	-2.9	3595.2	580.2	781.2	
		+Mx -Mz / minN		9.1	2.9	-3559.0	-583.7	781.2	
		-Mx -Mz / minN		-9.1	-2.9	-3559.0	-583.7	781.2	
+-----+									
	2-base	+Mx +Mz / maxN		6.3	2.0	3997.9	716.0	976.5	

		-Mx +Mz / maxN		-6.3	-2.0	3997.9	716.0	976.5	
		+Mx -Mz / maxN		6.3	2.0	-3950.1	-719.8	976.5	
		-Mx -Mz / maxN		-6.3	-2.0	-3950.1	-719.8	976.5	
		+Mx +Mz / minN		6.3	2.0	3997.9	716.0	976.5	
		-Mx +Mz / minN		-6.3	-2.0	3997.9	716.0	976.5	
		+Mx -Mz / minN		6.3	2.0	-3950.1	-719.8	976.5	
		-Mx -Mz / minN		-6.3	-2.0	-3950.1	-719.8	976.5	
+-----+									
	1-base	+Mx +Mz / maxN		57.6	14.1	3999.0	300.1	1196.8	
		Corres. base MRd		308.0		5491.1	at vd =	0.072	
		-Mx +Mz / maxN		-57.6	-14.1	3999.0	300.1	1196.8	
		Corres. base MRd		308.0		5491.1	at vd =	0.072	
		+Mx -Mz / maxN		57.6	14.1	-3949.0	-300.7	1196.8	
		Corres. base MRd		308.0		5491.1	at vd =	0.072	
		-Mx -Mz / maxN		-57.6	-14.1	-3949.0	-300.7	1196.8	
		Corres. base MRd		308.0		5491.1	at vd =	0.072	
		+Mx +Mz / minN		57.6	14.1	3999.0	300.1	1196.8	
		Corres. base MRd		308.0		5491.1	at vd =	0.072	
		-Mx +Mz / minN		-57.6	-14.1	3999.0	300.1	1196.8	
		Corres. base MRd		308.0		5491.1	at vd =	0.072	
		+Mx -Mz / minN		57.6	14.1	-3949.0	-300.7	1196.8	
		Corres. base MRd		308.0		5491.1	at vd =	0.072	
		-Mx -Mz / minN		-57.6	-14.1	-3949.0	-300.7	1196.8	
		Corres. base MRd		308.0		5491.1	at vd =	0.072	
+-----+									
	0-base	+Mx +Mz / maxN		31.2	24.5	3977.1	1051.9	1392.1	
		-Mx +Mz / maxN		-31.2	-0.3	3977.1	25.8	1392.1	
		+Mx -Mz / maxN		31.2	0.0	-3970.9	7.3	1392.1	
		-Mx -Mz / maxN		-31.2	0.0	-3970.9	7.3	1392.1	
		+Mx +Mz / minN		31.2	0.0	3977.1	7.3	1392.1	
		-Mx +Mz / minN		-31.2	0.0	3977.1	7.3	1392.1	
		+Mx -Mz / minN		31.2	0.0	-3970.9	7.3	1392.1	
		-Mx -Mz / minN		-31.2	0.0	-3970.9	7.3	1392.1	
+-----+									
	-1-base	+Mx +Mz / maxN		2.4	10.6	2650.0	729.4	1587.4	
		-Mx +Mz / maxN		-2.4	-0.1	2650.0	2.3	1587.4	
		+Mx -Mz / maxN		2.4	0.0	-2648.7	0.8	1587.4	
		-Mx -Mz / maxN		-2.4	0.0	-2648.7	0.8	1587.4	
		+Mx +Mz / minN		2.4	0.0	2650.0	0.8	1587.4	
		-Mx +Mz / minN		-2.4	0.0	2650.0	0.8	1587.4	
		+Mx -Mz / minN		2.4	0.0	-2648.7	0.8	1587.4	
		-Mx -Mz / minN		-2.4	0.0	-2648.7	0.8	1587.4	

 DESIGN IN SHEAR W/O SHORT-SHEAR-SPAN EFFECTS (Web diagonal compression/tension)

Storey and location	Magn. factor	Design shear maxVEd	dia. legs	Horizontal bars spacing	sh max./provided	strut angle	Resistance VR,s	Resistance VR,max	
		(kN)	(mm)	(mm)		(deg)	(kN)	(kN)	
6 Along bz	1.5	197	8	2	200	200	22	1748.4	2482.8
5 Along bz	1.5	259	8	2	200	200	22	1748.4	2482.8
4 Along bz	1.5	419	8	2	200	200	22	1748.4	2482.8
3 Along bz	1.5	583	8	2	200	200	22	1748.4	2482.8
2 Along bz	1.5	719	8	2	200	200	22	1748.4	2482.8
1 Along bz	1.5	300	8	2	200	200	22	1748.4	2482.8
0 Along bz	1.5	1051	8	2	200	200	22	1748.4	2482.8
-1 Along bz	1.5	729	8	2	200	200	22	1748.4	2482.8

VERTICAL / HORIZONTAL / HOOP REINFORCEMENT (Story and base of above)

STOR	Dimens.	BOUNDARY ELEMENTS				WEB REINFORCEMENT				Addit Joint					
		Vertical bars dia tot	end	side	Hoops dia. sh	omega-wd Req/Prov	Vertical dia. sv	No.	Horizontal dia. sh		reinft				
	(m)	(mm)		(mm)	(mm)		(mm)		(mm)	(mm2)					
6	0.60X0.25	14	9	3	3	8	105	0.00	0.24	8	200	14	8	200	0
5	0.60X0.25	14	9	3	3	8	105	0.00	0.24	8	200	14	8	200	0
4	0.60X0.25	14	9	3	3	8	105	0.00	0.24	8	200	14	8	200	0
3	0.60X0.25	14	9	3	3	8	105	0.00	0.24	8	200	14	8	200	0
2	0.60X0.25	14	9	3	3	8	105	0.00	0.24	8	200	14	8	200	0
1	0.60X0.25	14	9	3	3	8	105	0.00	0.24	8	200	14	8	200	0
0	0.60X0.25	14	9	3	3	8	105	0.00	0.24	8	200	14	8	200	0
-1	0.60X0.25	14	9	3	3	8	105	0.00	0.24	8	200	14	8	200	0
-2	0.60X0.25	14	9	3	3	8	105	0.00	0.24	8	200	14	8	200	0

3A 4.3. WALL W5

 * WALL : 5

* Concrete: C25 - Long. Reinforcement: S500 - Stirrups: S500 - Cover: 35 (mm) *

* GEOMETRY *
 * M-V AT STORY LEVELS - ANALYSIS FOR DESIGN SEISMIC ACTION - N DUE TO G+ψ2Q *
 +-----+

|X-Section U flanges(m): 1.80, web(m): 3.60, stubs(m): 0.00 0.00(m)-thick |
Tot./Cr.Height(m): 19.00/ 3.60, flange / web thickness (m): 0.25 / 0.25

STORY	Seismic action	My	Vy	Mz	Vz	N
		(kNm)	(kN)	(kNm)	(kN)	(kN)
6-Top	+E	0.0	-628.5	0.0	-63.7	289.2
	-E	0.0	628.5	0.0	63.7	289.2
6-Base	+E	-1885.5	-628.5	191.0	-63.7	289.2
	-E	1885.5	628.5	-191.0	63.7	289.2
5-Base	+E	-2218.3	-458.3	214.8	-75.4	578.5
	-E	2218.3	458.3	-214.8	75.4	578.5
4-Base	+E	-2738.0	-668.8	415.9	-104.6	867.7
	-E	2738.0	668.8	-415.9	104.6	867.7
3-Base	+E	-4374.9	-976.9	774.3	-144.7	1156.9
	-E	4374.9	976.9	-774.3	144.7	1156.9
2-Base	+E	-7657.6	-1380.0	1306.8	-196.8	1446.1
	-E	7657.6	1380.0	-1306.8	196.8	1446.1
1-Base	+E	-14277.1	-1797.3	1744.5	-131.6	1777.2
	-E	14277.1	1797.3	-1744.5	131.6	1777.2
0-Base	+E	-5057.0	-3073.4	45.1	-566.5	2066.4
	-E	5057.0	3073.4	-45.1	566.5	2066.4
-1-Base	+E	-3186.4	-624.0	238.5	-64.6	2355.7
	-E	3186.4	624.0	-238.5	64.6	2355.7

+-----+
 ENVELOPES OF DESIGN MOMENTS AT STORY BASE - STORY DESIGN SHEARS (MAGNIFIED)
 +-----+

STORY	Seismic action	Myd	Vyd	Mzd	Vzd	Nd
		(kNm)	(kN)	(kNm)	(kN)	(kN)
6-top	+Mx +Mz / maxN	-2705.1	-942.8	-165.3	-94.9	0.0
	-Mx +Mz / maxN	2705.1	942.8	-165.3	-94.9	0.0

		+Mx -Mz / maxN		-2705.1	-942.8	165.8	96.0	0.0	
		-Mx -Mz / maxN		2705.1	942.8	165.8	96.0	0.0	
		+Mx +Mz / minN		-2705.1	-942.8	-165.3	-94.9	289.2	
		-Mx +Mz / minN		2705.1	942.8	-165.3	-94.9	289.2	
		+Mx -Mz / minN		-2705.1	-942.8	165.8	96.0	289.2	
		-Mx -Mz / minN		2705.1	942.8	165.8	96.0	289.2	
+-----+									
	6-base	+Mx +Mz / maxN		-4959.4	-942.8	-442.4	-94.9	289.2	
		-Mx +Mz / maxN		4959.4	942.8	-442.4	-94.9	289.2	
		+Mx -Mz / maxN		-4959.4	-942.8	439.1	96.0	289.2	
		-Mx -Mz / maxN		4959.4	942.8	439.1	96.0	289.2	
		+Mx +Mz / minN		-4959.4	-942.8	-442.4	-94.9	289.2	
		-Mx +Mz / minN		4959.4	942.8	-442.4	-94.9	289.2	
		+Mx -Mz / minN		-4959.4	-942.8	439.1	96.0	289.2	
		-Mx -Mz / minN		4959.4	942.8	439.1	96.0	289.2	
+-----+									
	5-base	+Mx +Mz / maxN		-7213.7	-687.5	-719.2	-112.7	578.5	
		-Mx +Mz / maxN		7213.7	687.5	-719.2	-112.7	578.5	
		+Mx -Mz / maxN		-7213.7	-687.5	713.1	113.6	578.5	
		-Mx -Mz / maxN		7213.7	687.5	713.1	113.6	578.5	
		+Mx +Mz / minN		-7213.7	-687.5	-719.2	-112.7	578.5	
		-Mx +Mz / minN		7213.7	687.5	-719.2	-112.7	578.5	
		+Mx -Mz / minN		-7213.7	-687.5	713.1	113.6	578.5	
		-Mx -Mz / minN		7213.7	687.5	713.1	113.6	578.5	
+-----+									
	4-base	+Mx +Mz / maxN		-9468.0	-1003.2	-996.4	-156.4	867.7	
		-Mx +Mz / maxN		9468.0	1003.2	-996.4	-156.4	867.7	
		+Mx -Mz / maxN		-9468.0	-1003.2	986.9	157.5	867.7	
		-Mx -Mz / maxN		9468.0	1003.2	986.9	157.5	867.7	
		+Mx +Mz / minN		-9468.0	-1003.2	-996.4	-156.4	867.7	
		-Mx +Mz / minN		9468.0	1003.2	-996.4	-156.4	867.7	
		+Mx -Mz / minN		-9468.0	-1003.2	986.9	157.5	867.7	
		-Mx -Mz / minN		9468.0	1003.2	986.9	157.5	867.7	
+-----+									
	3-base	+Mx +Mz / maxN		-11722.3	-1465.4	-1273.8	-216.3	1156.9	
		-Mx +Mz / maxN		11722.3	1465.4	-1273.8	-216.3	1156.9	
		+Mx -Mz / maxN		-11722.3	-1465.4	1260.4	217.6	1156.9	
		-Mx -Mz / maxN		11722.3	1465.4	1260.4	217.6	1156.9	
		+Mx +Mz / minN		-11722.3	-1465.4	-1273.8	-216.3	1156.9	
		-Mx +Mz / minN		11722.3	1465.4	-1273.8	-216.3	1156.9	
		+Mx -Mz / minN		-11722.3	-1465.4	1260.4	217.6	1156.9	
		-Mx -Mz / minN		11722.3	1465.4	1260.4	217.6	1156.9	

+-----+						
2-base	+Mx +Mz / maxN	-13976.5	-2070.0	-1551.6	-294.5	1446.1
	-Mx +Mz / maxN	13976.5	2070.0	-1551.6	-294.5	1446.1
	+Mx -Mz / maxN	-13976.5	-2070.0	1533.4	296.1	1446.1
	-Mx -Mz / maxN	13976.5	2070.0	1533.4	296.1	1446.1
	+Mx +Mz / minN	-13976.5	-2070.0	-1551.6	-294.5	1446.1
	-Mx +Mz / minN	13976.5	2070.0	-1551.6	-294.5	1446.1
	+Mx -Mz / minN	-13976.5	-2070.0	1533.4	296.1	1446.1
	-Mx -Mz / minN	13976.5	2070.0	1533.4	296.1	1446.1
+-----+						
1-base	+Mx +Mz / maxN	-14277.1	-2695.9	-1755.7	-196.8	1777.2
	Corres. base MRd	15560.8		7833.9	at vd =	0.064
	-Mx +Mz / maxN	14277.1	2695.9	-1755.7	-196.8	1777.2
	Corres. base MRd	15560.8		7833.9	at vd =	0.064
	+Mx -Mz / maxN	-14277.1	-2695.9	1733.3	197.9	1777.2
	Corres. base MRd	15560.8		6419.9	at vd =	0.064
	-Mx -Mz / maxN	14277.1	2695.9	1733.3	197.9	1777.2
	Corres. base MRd	15560.8		6419.9	at vd =	0.064
	+Mx +Mz / minN	-14277.1	-2695.9	-1755.7	-196.8	1777.2
	Corres. base MRd	15560.8		7833.9	at vd =	0.064
	-Mx +Mz / minN	14277.1	2695.9	-1755.7	-196.8	1777.2
	Corres. base MRd	15560.8		7833.9	at vd =	0.064
	+Mx -Mz / minN	-14277.1	-2695.9	1733.3	197.9	1777.2
	Corres. base MRd	15560.8		6419.9	at vd =	0.064
	-Mx -Mz / minN	14277.1	2695.9	1733.3	197.9	1777.2
	Corres. base MRd	15560.8		6419.9	at vd =	0.064
+-----+						
0-base	+Mx +Mz / maxN	-14277.1	3073.4	-1395.0	562.5	2066.4
	-Mx +Mz / maxN	14277.1	-34.4	-1395.0	-3.9	2066.4
	+Mx -Mz / maxN	-14277.1	0.0	1396.2	-3.9	2066.4
	-Mx -Mz / maxN	14277.1	0.0	1396.2	-3.9	2066.4
	+Mx +Mz / minN	-14277.1	0.0	-1395.0	-3.9	2066.4
	-Mx +Mz / minN	14277.1	0.0	-1395.0	-3.9	2066.4
	+Mx -Mz / minN	-14277.1	0.0	1396.2	-3.9	2066.4
	-Mx -Mz / minN	14277.1	0.0	1396.2	-3.9	2066.4
+-----+						
-1-base	+Mx +Mz / maxN	-8566.3	2617.5	-523.3	320.0	2355.7
	-Mx +Mz / maxN	8566.3	-8.0	-523.3	0.2	2355.7
	+Mx -Mz / maxN	-8566.3	0.0	523.4	0.2	2355.7
	-Mx -Mz / maxN	8566.3	0.0	523.4	0.2	2355.7
	+Mx +Mz / minN	-8566.3	0.0	-523.3	0.2	2355.7
	-Mx +Mz / minN	8566.3	0.0	-523.3	0.2	2355.7

		+Mx -Mz / minN		-8566.3	0.0	523.4	0.2	2355.7	
		-Mx -Mz / minN		8566.3	0.0	523.4	0.2	2355.7	

DESIGN IN SHEAR W/O SHORT-SHEAR-SPAN EFFECTS (Web diagonal compression/tension)

Storey and location	Magn. factor	Design shear maxVEd	Horizontal bars dia. max./provided	legs	spacing	sh	strut angle	Resistance VR,s	Resistance VR,max
		(kN)	(mm)		(mm)		(deg)	(kN)	(kN)
6 WEB	1.5	942	8	2	200	200	22	1573.5	2234.5
6 FLANGES	1.5	96	8	2x 2	200	200	22	1573.5	2234.5
5 WEB	1.5	687	8	2	200	200	22	1573.5	2234.5
5 FLANGES	1.5	113	8	2x 2	200	200	22	1573.5	2234.5
4 WEB	1.5	1003	8	2	200	200	22	1573.5	2234.5
4 FLANGES	1.5	157	8	2x 2	200	200	22	1573.5	2234.5
3 WEB	1.5	1465	8	2	200	200	22	1573.5	2234.5
3 FLANGES	1.5	217	8	2x 2	200	200	22	1573.5	2234.5
2 WEB	1.5	2070	8	2	200	150	22	2098.0	2234.5
2 FLANGES	1.5	296	8	2x 2	200	150	22	1573.5	2234.5
1 WEB	1.5	2695	10	2	250	135	28	2705.3	2705.3
1 FLANGES	1.5	197	10	2x 2	250	135	22	1966.9	2234.5
0 WEB	1.5	3073	10	2	250	85	37	3104.9	3104.9
0 FLANGES	1.5	562	10	2x 2	250	85	22	1966.9	2234.5
-1 WEB	1.5	2617	10	2	250	145	27	2636.3	2636.3
-1 FLANGES	1.5	319	10	2x 2	250	145	22	1966.9	2234.5

VERTICAL / HORIZONTAL / HOOP REINFORCEMENT (Story and base of above)

STO	Location	Dimensions (m)	Vert. dia #	Hoops dia s	Req	Prov	WEB dia sv	Horiz. dia sh	Addit Joint Reinf
			(mm)	(mm)			(mm)	(mm)	(mm2)
6	CORNERS	0.25X.25	18 4	8 110	0.00	0.30	WEB 8 200	8 200	0
	EDGES	0.15X.25	18 4	8 110	0.00	0.43	FLG 8 200	8 200	
5	CORNERS	0.25X.25	20 4	8 110	0.00	0.30	WEB 8 200	8 200	0
	EDGES	0.15X.25	20 4	8 110	0.00	0.43	FLG 8 200	8 200	
4	CORNERS	0.25X.25	20 5	8 110	0.00	0.30	WEB 8 200	8 200	0
	EDGES	0.15X.25	20 5	8 110	0.00	0.26	FLG 8 200	8 200	

3	CORNERS	0.25X.25	20	7	8	110	0.00	0.37	WEB	8	200	8	200	0
	EDGES	0.25X.25	20	7	8	110	0.00	0.26	FLG	8	200	8	200	
2	CORNERS	0.35X.25-0.35X.25	20	12	8	110	0.00	0.22	WEB	8	200	8	150	0
	EDGES	0.35X.25	20	12	8	110	0.00	0.24	FLG	8	200	8	200	
1	CORNERS	0.40X.25-0.55X.25	20	12	8	110	0.00	0.22	WEB	8	200	10	135	0
	EDGES	0.40X.25	20	12	8	110	0.00	0.24	FLG	8	200	10	250	
0	CORNERS	0.40X.25-0.55X.25	20	12	8	110	0.00	0.22	WEB	8	200	10	85	0
	EDGES	0.40X.25	20	12	8	110	0.00	0.24	FLG	8	200	10	250	
-1	CORNERS	0.40X.25-0.55X.25	20	12	8	110	0.00	0.22	WEB	8	200	10	145	0
	EDGES	0.40X.25	20	12	8	110	0.00	0.24	FLG	8	200	10	250	
-2	CORNERS	0.40X.25-0.55X.25	20	12	8	110	0.00	0.22	WEB	8	200	10	145	0
	EDGES	0.40X.25	20	12	8	110	0.00	0.24	FLG	8	200	10	250	

3A 5. DESIGN OF FOUNDATION ELEMENTS

3A 5.1. FOOTING F7

FOOTING OF COLUMN : 7										
Undr. shear strength in seismic design situation: 270kPa in Eqs.6.10a/b: 300kPa										
Friction angle & cohesion under drained conditions for Eqs.6.10a/b: 20deg,50kPa										
footing depth h(m): 0.80 footing plan dimension(m): //y by= 2.00 //z bz= 2.00										
found. depth (m): 0.80 column X-sect.dimensions(m): //y cy=0.50 //z cz=0.50										
column axis eccentricity(m): //y ay=0.00 //z az=0.00										
FOUNDATION DESIGN FORCES AT FOOTING CENTRE - SOIL BEARING PRESSURE & CAPACITY										
Combination	Cap-Des	N	My	ey/by	Vy	Mz	ez/bz	Vz	Soil Bearing	
of Actions	magnif.	total							press./capacity	
+-----+-----+-(kN)-(kNm)----- (kN) - (kNm)----- (kN)----- (kPa)-----+										
EN1990 Eq. 6.10a*	-	4207	-1	0.000	0	0	0.000	0	1052.4/1284.5	
EN1990 Eq. 6.10b*	-	3975	-1	0.000	0	0	0.000	0	994.3/1284.5	
G+ψ2Q+E +X/+Y/max	3.000	2861	21	0.005	9	27	0.004	11	728.0/1686.0	

G+ψ2Q+E -X/+Y/max	2.909		2859	25	0.005	12	26	0.004	11	728.3/1686.1
G+ψ2Q+E +X/-Y/max	3.000		2861	21	0.005	9	28	0.004	11	728.2/1685.9
G+ψ2Q+E -X/-Y/max	2.909		2859	25	0.005	12	27	0.004	11	728.4/1686.0
G+ψ2Q+E +X/+Y/min	3.000		2744	21	0.005	9	27	0.004	11	698.8/1686.0
G+ψ2Q+E -X/+Y/min	2.930		2746	25	0.005	12	27	0.005	11	699.9/1686.1
G+ψ2Q+E +X/-Y/min	3.000		2744	21	0.005	9	28	0.004	11	698.9/1685.9
G+ψ2Q+E -X/-Y/min	2.930		2746	25	0.005	12	27	0.005	11	700.0/1686.0

*Note: The most unfavourable outcome of the application of 6.10a/6.10b applies.

ULS DESIGN OF FOOTING IN SHEAR & PUNCHING SHEAR

Combination of Actions	Shear stress vEd sect.//y	Shear sect.//z	Resist. vRd,c	Punching shear at distance av max stress	av: crit. distance	Resistance (2d/av)vRd
	vEdy/bzd	VEdz/byd		maxvEd	(m)	(kPa)
EN1990 Eq. 6.10a*	16.8	16.8	328.1	576.9	0.5	1009.6
EN1990 Eq. 6.10b*	15.9	15.8	328.1	544.4	0.5	1009.6
G+ψ2Q+E +X/+Y/max	11.6	11.6	328.1	393.4	0.5	1009.6
G+ψ2Q+E -X/+Y/max	11.6	11.6	328.1	393.4	0.5	1009.6
G+ψ2Q+E +X/-Y/max	11.6	11.7	328.1	393.5	0.5	1009.6
G+ψ2Q+E -X/-Y/max	11.6	11.6	328.1	393.5	0.5	1009.6
G+ψ2Q+E +X/+Y/min	11.1	11.2	328.1	377.1	0.5	1009.6
G+ψ2Q+E -X/+Y/min	11.1	11.2	328.1	377.5	0.5	1009.6
G+ψ2Q+E +X/-Y/min	11.1	11.2	328.1	377.1	0.5	1009.6
G+ψ2Q+E -X/-Y/min	11.1	11.2	328.1	377.6	0.5	1009.6

*Note: The most unfavourable outcome of the application of 6.10a/6.10b applies.

ULS DESIGN OF TWO-WAY REINFORCEMENT AT FOOTING BOTTOM

Maximum bending moments				Reinforcement				
Vert. section //bz	Vert. section //by	Bar dia.	//by	//bz	spacing	No.	spacing	No.
MEdy/bz	MEdz/by	Combinat.	Combinat.		(mm)	(mm)	(mm)	(mm)
286.8	1	286.5	1	12	110	18	110	18

3A 5.2. FOOTING F8

```

+-----+
FOOTING OF COLUMN :      8
Undr. shear strength in seismic design situation: 270kPa in Eqs.6.10a/b: 300kPa
Friction angle & cohesion under drained conditions for Eqs.6.10a/b: 20deg,50kPa
+-----+
|footing depth h(m): 0.80|footing plan dimension(m): //y by= 1.80 //z bz= 1.80|
|found. depth (m): 0.80 |column X-sect.dimensions(m): //y cy=0.50 //z cz=0.50|
|
|column axis eccentricity(m): //y ay=0.00 //z az=0.00|
+-----+

```

FOUNDATION DESIGN FORCES AT FOOTING CENTRE - SOIL BEARING PRESSURE & CAPACITY

Combination of Actions	Cap-Des magnif.	N total	My (kNm)	ey/by	Vy (kN)	Mz (kNm)	ez/bz	Vz (kN)	Soil Bearing press./capacity (kPa)
EN1990 Eq. 6.10a*	-	2734	17	0.000	0	0	0.004	0	850.4/1236.4
EN1990 Eq. 6.10b*	-	2574	17	0.000	0	0	0.004	0	800.6/1236.3
G+ψ2Q+E +X/+Y/max	3.000	2549	52	0.006	27	26	0.011	10	814.8/1671.1
G+ψ2Q+E -X/+Y/max	3.000	2549	9	0.006	2	26	0.002	10	799.3/1679.1
G+ψ2Q+E +X/-Y/max	3.000	2549	52	0.006	27	27	0.011	11	815.0/1671.2
G+ψ2Q+E -X/-Y/max	3.000	2549	9	0.006	2	27	0.002	11	799.6/1678.8
G+ψ2Q+E +X/+Y/min	3.000	1109	52	0.013	27	26	0.026	10	371.3/1666.3
G+ψ2Q+E -X/+Y/min	3.000	1109	9	0.013	2	26	0.005	10	355.1/1676.3
G+ψ2Q+E +X/-Y/min	3.000	1109	52	0.014	27	27	0.026	11	371.6/1666.5
G+ψ2Q+E -X/-Y/min	3.000	1109	9	0.014	2	27	0.005	11	355.3/1675.9

*Note: The most unfavourable outcome of the application of 6.10a/6.10b applies.

ULS DESIGN OF FOOTING IN SHEAR & PUNCHING SHEAR

Combination of Actions	Shear stress vEd sect.//y (kPa)	Shear stress vEdz/byd (kPa)	Shear Resist. vRd,c (kPa)	Punching shear max stress (kPa)	Punching shear av: crit. distance (m)	Punching shear Resistance (kPa)
EN1990 Eq. 6.10a*	0.0	0.0	328.1	293.6	0.5	1009.6
EN1990 Eq. 6.10b*	0.0	0.0	328.1	276.0	0.5	1009.6
G+ψ2Q+E +X/+Y/max	0.0	0.0	328.1	278.7	0.5	1009.6
G+ψ2Q+E -X/+Y/max	0.0	0.0	328.1	274.7	0.5	1009.6
G+ψ2Q+E +X/-Y/max	0.0	0.0	328.1	278.7	0.5	1009.6
G+ψ2Q+E -X/-Y/max	0.0	0.0	328.1	274.8	0.5	1009.6
G+ψ2Q+E +X/+Y/min	0.0	0.0	328.1	121.6	0.5	1009.6

G+ψ2Q+E -X/+Y/min	0.0	0.0	328.1	117.6	0.5	1009.6
G+ψ2Q+E +X/-Y/min	0.0	0.0	328.1	121.7	0.5	1009.6
G+ψ2Q+E -X/-Y/min	0.0	0.0	328.1	117.7	0.5	1009.6

-----+

*Note: The most unfavourable outcome of the application of 6.10a/6.10b applies.

-----+

ULS DESIGN OF TWO-WAY REINFORCEMENT AT FOOTING BOTTOM

-----+

Maximum bending moments				Reinforcement			
Vert. section //bz	Vert. section //by	Bar dia.	//by	//bz			
MEdy/bz	Combinat.	MEdz/by	Combinat.	spacing	No.	spacing	No.
+- (kNm/m)	-----+-	(kNm/m)	-----+-	(mm)	-----	(mm)	-----
173.8	1	170.9	1	12	150	11	150

-----+

3A 5.3. FOOTING F12

-----+

FOOTING OF COLUMN : 12

Undr. shear strength in seismic design situation: 270kPa in Eqs.6.10a/b: 300kPa

Friction angle & cohesion under drained conditions for Eqs.6.10a/b: 20deg, 50kPa

-----+

|footing depth h(m): 0.80|footing plan dimension(m): //y by= 2.00 //z bz= 1.50|

|found. depth (m): 0.80 |column X-sect.dimensions(m): //y cy=0.70 //z cz=0.30|

| |column axis eccentricity(m): //y ay=0.00 //z az=0.00|

-----+

FOUNDATION DESIGN FORCES AT FOOTING CENTRE - SOIL BEARING PRESSURE & CAPACITY

-----+

Combination of Actions	Cap-Des magnif.	N total	My ey/by	Vy	Mz ez/bz	Vz	Soil Bearing press./capacity
-----+	-----+	(kN)	(kNm)	(kN)	(kNm)	(kN)	(kPa)
EN1990 Eq. 6.10a*	-	2694	0 0.000	0	-1 0.000	0	898.6/1150.8
EN1990 Eq. 6.10b*	-	2538	0 0.000	0	-1 0.000	0	846.6/1150.8
G+ψ2Q+E +X/+Y/max	3.000	2241	55 0.005	27	15 0.012	5	773.4/1607.3
G+ψ2Q+E -X/+Y/max	3.000	2241	56 0.005	27	15 0.013	5	773.5/1607.2
G+ψ2Q+E +X/-Y/max	2.079	2105	38 0.004	18	13 0.009	5	721.1/1610.2
G+ψ2Q+E -X/-Y/max	2.079	2105	38 0.004	18	13 0.009	5	721.2/1610.1
G+ψ2Q+E +X/+Y/min	3.000	1359	55 0.008	27	15 0.020	5	480.1/1609.2
G+ψ2Q+E -X/+Y/min	3.000	1359	56 0.008	27	15 0.021	5	480.2/1609.1
G+ψ2Q+E +X/-Y/min	1.906	1520	35 0.005	17	12 0.012	4	524.5/1611.4

|G+ψ2Q+E -X/-Y/min| 1.906 | 1520 35 0.005 17 12 0.012 4 524.6/1611.4|

-----+

*Note: The most unfavourable outcome of the application of 6.10a/6.10b applies.

-----+

ULS DESIGN OF FOOTING IN SHEAR & PUNCHING SHEAR

-----+

Combination of Actions	Shear stress vEd		Shear Resist. vRd,c	Punching shear at distance av		
	sect.//y vEdy/bzd	sect.//z VEDz/byd		max stress maxvEd	av: crit. distance (2d/av)	Resistance vRd
	(kPa)		(kPa)	(kPa)	(m)	(kPa)

EN1990 Eq. 6.10a*	0.0	0.0	328.1	263.0	0.5	1009.6
-------------------	-----	-----	-------	-------	-----	--------

EN1990 Eq. 6.10b*	0.0	0.0	328.1	247.4	0.5	1009.6
-------------------	-----	-----	-------	-------	-----	--------

G+ψ2Q+E +X/+Y/max	0.0	0.0	328.1	224.6	0.5	1009.6
-------------------	-----	-----	-------	-------	-----	--------

G+ψ2Q+E -X/+Y/max	0.0	0.0	328.1	224.7	0.5	1009.6
-------------------	-----	-----	-------	-------	-----	--------

G+ψ2Q+E +X/-Y/max	0.0	0.0	328.1	209.1	0.5	1009.6
-------------------	-----	-----	-------	-------	-----	--------

G+ψ2Q+E -X/-Y/max	0.0	0.0	328.1	209.1	0.5	1009.6
-------------------	-----	-----	-------	-------	-----	--------

G+ψ2Q+E +X/+Y/min	0.0	0.0	328.1	136.7	0.5	1009.6
-------------------	-----	-----	-------	-------	-----	--------

G+ψ2Q+E -X/+Y/min	0.0	0.0	328.1	136.7	0.5	1009.6
-------------------	-----	-----	-------	-------	-----	--------

G+ψ2Q+E +X/-Y/min	0.0	0.0	328.1	150.3	0.5	1009.6
-------------------	-----	-----	-------	-------	-----	--------

G+ψ2Q+E -X/-Y/min	0.0	0.0	328.1	150.3	0.5	1009.6
-------------------	-----	-----	-------	-------	-----	--------

-----+

*Note: The most unfavourable outcome of the application of 6.10a/6.10b applies.

-----+

ULS DESIGN OF TWO-WAY REINFORCEMENT AT FOOTING BOTTOM

-----+

Maximum bending moments				Reinforcement			
Vert. section //bz		Vert. section //by		Bar dia.	//by		//bz
MEdy/bz	Combinat.	MEdz/by	Combinat.	spacing	No.	spacing	No.
(kNm/m)		(kNm/m)		(mm)	(mm)	(mm)	(mm)

181.0	1	156.5	1	12	150 10	150	13
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-----+

3A 5.4. FOOTING F13

-----+

FOOTING OF COLUMN : 13

Undr. shear strength in seismic design situation: 270kPa in Eqs.6.10a/b: 300kPa

Friction angle & cohesion under drained conditions for Eqs.6.10a/b: 20deg, 50kPa

-----+

|footing depth h(m): 0.80|footing plan dimension(m): //y by= 2.00 //z bz= 1.50|

|found. depth (m): 0.80 |column X-sect.dimensions(m): //y cy=0.70 //z cz=0.30|
 | | |column axis eccentricity(m): //y ay=0.00 //z az=0.00|

+-----+

FOUNDATION DESIGN FORCES AT FOOTING CENTRE - SOIL BEARING PRESSURE & CAPACITY

+-----+

Combination of Actions	Cap-Des magnif.	N total	My	ey/by	Vy	Mz	ez/bz	Vz	Soil Bearing press./capacity
		(kN)	(kNm)		(kN)	(kNm)		(kN)	(kPa)
EN1990 Eq. 6.10a*	-	2348	0	0.002	0	6	0.000	0	785.6/1149.9
EN1990 Eq. 6.10b*	-	2208	0	0.002	0	6	0.000	0	738.9/1149.9
G+ψ2Q+E +X/+Y/max	3.000	1956	53	0.012	25	36	0.014	25	687.2/1603.6
G+ψ2Q+E -X/+Y/max	3.000	1956	52	0.012	25	36	0.014	25	687.1/1603.6
G+ψ2Q+E +X/-Y/max	2.479	1889	43	0.008	21	22	0.012	21	655.1/1607.2
G+ψ2Q+E -X/-Y/max	2.479	1889	43	0.008	21	22	0.012	21	655.0/1607.2
G+ψ2Q+E +X/+Y/min	3.000	1187	53	0.020	25	36	0.022	25	432.1/1603.4
G+ψ2Q+E -X/+Y/min	3.000	1187	52	0.020	25	36	0.022	25	431.9/1603.4
G+ψ2Q+E +X/-Y/min	2.283	1279	40	0.010	19	20	0.016	19	449.9/1608.6
G+ψ2Q+E -X/-Y/min	2.283	1279	40	0.010	19	20	0.016	19	449.8/1608.6

+-----+

*Note: The most unfavourable outcome of the application of 6.10a/6.10b applies.

+-----+

ULS DESIGN OF FOOTING IN SHEAR & PUNCHING SHEAR

+-----+

Combination of Actions	Shear stress vEd sect./y	Shear stress vEd sect./z	Shear Resist. vRd,c	Punching shear max stress maxvEd	Punching shear at distance av distance	Punching shear Resistance (2d/av)vRd
	(kPa)	(kPa)	(kPa)	(kPa)	(m)	(kPa)
EN1990 Eq. 6.10a*	0.0	0.0	328.1	229.2	0.5	1009.6
EN1990 Eq. 6.10b*	0.0	0.0	328.1	215.2	0.5	1009.6
G+ψ2Q+E +X/+Y/max	0.0	0.0	328.1	197.2	0.5	1009.6
G+ψ2Q+E -X/+Y/max	0.0	0.0	328.1	197.2	0.5	1009.6
G+ψ2Q+E +X/-Y/max	0.0	0.0	328.1	188.6	0.5	1009.6
G+ψ2Q+E -X/-Y/max	0.0	0.0	328.1	188.6	0.5	1009.6
G+ψ2Q+E +X/+Y/min	0.0	0.0	328.1	120.6	0.5	1009.6
G+ψ2Q+E -X/+Y/min	0.0	0.0	328.1	120.6	0.5	1009.6
G+ψ2Q+E +X/-Y/min	0.0	0.0	328.1	127.3	0.5	1009.6
G+ψ2Q+E -X/-Y/min	0.0	0.0	328.1	127.2	0.5	1009.6

+-----+

*Note: The most unfavourable outcome of the application of 6.10a/6.10b applies.

+-----+

ULS DESIGN OF TWO-WAY REINFORCEMENT AT FOOTING BOTTOM

+-----+

Maximum bending moments				Reinforcement					
Vert. section //bz		Vert. section //by		Bar dia.	//by		//bz		
MEdy/bz	Combinat.	MEdz/by	Combinat.	spacing	No.	spacing	No.		
+- (kNm/m)	-----	+- (kNm/m)	-----	--- (mm)	--- (mm)	-----	--- (mm)		
156.6	1	136.6	1	12	150	10	150	13	

3A 5.5. FOOTING OF WALL W5

Undr. shear strength in seismic design situation: 270kPa in Eqs.6.10a/b: 300kPa
Friction angle & cohesion under drained conditions for Eqs.6.10a/b: 20deg, 50kPa

footing depth h(m): 0.80		Footing plan dimension(m): //y by=4.50 //z bz=2.50					
found. depth (m): 0.80		Member section outline(m): //y cy=3.60 //z cz=1.80					
		Member axis eccentricity(m): //y ay=0.00 //z az=0.00					

FOUNDATION DESIGN FORCES AT FOOTING CENTRE - SOIL BEARING PRESSURE & CAPACITY

Combination of Actions	Cap-Des magnif.	N total	My (kNm)	ey/by	Vy (kN)	Mz (kNm)	ez/bz	Vz (kN)	Soil Bearing press./capacity
EN1990 Eq. 6.10a*	-	3700	0	0.000	0	0	0.000	0	329.0/1738.9
EN1990 Eq. 6.10b*	-	3349	0	0.000	0	0	0.000	0	297.8/1738.9
G+ψ2Q+E+X/+Y/maxN	1.114	4936	4104	0.185	694	208	0.017	71	720.3/1649.6
G+ψ2Q+E-X/+Y/maxN	1.114	4936	4104	0.185	694	208	0.017	71	720.3/1649.6
G+ψ2Q+E+X/-Y/maxN	1.114	4936	4104	0.185	694	207	0.017	72	720.3/1649.7
G+ψ2Q+E-X/-Y/maxN	1.114	4936	4104	0.185	694	207	0.017	72	720.3/1649.7
G+ψ2Q+E+X/+Y/minN	1.114	4936	4104	0.185	694	208	0.017	71	720.3/1649.6
G+ψ2Q+E-X/+Y/minN	1.114	4936	4104	0.185	694	208	0.017	71	720.3/1649.6
G+ψ2Q+E+X/-Y/minN	1.114	4936	4104	0.185	694	207	0.017	72	720.3/1649.7
G+ψ2Q+E-X/-Y/minN	1.114	4936	4104	0.185	694	207	0.017	72	720.3/1649.7

*Note: The most unfavourable outcome of the application of 6.10a/6.10b applies.

ULS DESIGN OF FOOTING IN SHEAR & PUNCHING SHEAR

Combination of Actions	Shear stress sect.//y	vEd sect.//z	Shear Resist.	Punching shear at distance av max stress	av: crit. Resistance
	vEdy/bzd	VEdz/byd	vRd,c	maxvEd	distance (2d/av)vRd
	-----	-----	-----	-----	-----
	(kPa)	(kPa)	(kPa)	(kPa)	(m)

EN1990 Eq. 6.10a*	0.0	0.0	328.1	0.0	0.4	0.0	
EN1990 Eq. 6.10b*	0.0	0.0	328.1	0.0	0.4	0.0	
G+ψ2Q+E+X/+Y/maxN	0.0	0.0	328.1	0.0	0.4	0.0	
G+ψ2Q+E-X/+Y/maxN	0.0	0.0	328.1	0.0	0.4	0.0	
G+ψ2Q+E+X/-Y/maxN	0.0	0.0	328.1	0.0	0.4	0.0	
G+ψ2Q+E-X/-Y/maxN	0.0	0.0	328.1	0.0	0.4	0.0	
G+ψ2Q+E+X/+Y/minN	0.0	0.0	328.1	0.0	0.4	0.0	
G+ψ2Q+E-X/+Y/minN	0.0	0.0	328.1	0.0	0.4	0.0	
G+ψ2Q+E+X/-Y/minN	0.0	0.0	328.1	0.0	0.4	0.0	
G+ψ2Q+E-X/-Y/minN	0.0	0.0	328.1	0.0	0.4	0.0	

*Note: The most unfavourable outcome of the application of 6.10a/6.10b applies.

ULS DESIGN OF TWO-WAY REINFORCEMENT AT FOOTING BOTTOM

Maximum bending moments				Reinforcement			
Vert. section //bz		Vert. section //by		Bar dia.	//by		//bz
MEdy/bz	Combinat.	MEdz/by	Combinat.	spacing	No.	spacing	No.
+- (kNm/m)		+- (kNm/m)		--- (mm)	--- (mm)	--- (mm)	---
72.4	10	21.8	8	12	150 16	150	30

3A 5.6. COMMON FOOTING OF WALLS W3 AND W4

Undr. shear strength in seismic design situation: 270kPa in Eqs.6.10a/b: 300kPa
Friction angle & cohesion under drained conditions for Eqs.6.10a/b: 20deg, 50kPa

footing depth h(m): 1.00	Footing plan dimension(m): //y by=4.00 //z bz=5.00
found. depth (m): 1.00	Member section outline(m): //y cy=3.60 //z cz=4.00
	Member axis eccentricity(m): //y ay=0.00 //z az=0.00

FOUNDATION DESIGN FORCES AT FOOTING CENTRE - SOIL BEARING PRESSURE & CAPACITY

Combination of Actions	Cap-Des magnif.	N total	My ey/by	Vy	Mz ez/bz	Vz	Soil Bearing press./capacity
		+- (kN)	-(kNm)	-(kN)	-(kNm)	-(kN)	-(kPa)
EN1990 Eq. 6.10a*	-	5280	0 0.000	0	4 0.000	2	264.1/1814.4
EN1990 Eq. 6.10b*	-	4790	0 0.000	0	4 0.000	2	239.6/1814.4
G+ψ2Q+E+X/+Y/maxN	2.155	3674	79 0.005	36	2629 0.143	265	260.3/1663.7
G+ψ2Q+E-X/+Y/maxN	2.155	3674	79 0.005	36	2629 0.143	265	260.3/1663.7

G+ψ2Q+E+X/-Y/maxN	2.182		3674	80	0.006	37	2668	0.145	265	261.9/1662.2
G+ψ2Q+E-X/-Y/maxN	2.182		3674	80	0.006	37	2668	0.145	265	261.9/1662.2
G+ψ2Q+E+X/+Y/minN	2.155		3674	79	0.005	36	2629	0.143	265	260.3/1663.7
G+ψ2Q+E-X/+Y/minN	2.155		3674	79	0.005	36	2629	0.143	265	260.3/1663.7
G+ψ2Q+E+X/-Y/minN	2.182		3674	80	0.006	37	2668	0.145	265	261.9/1662.2
G+ψ2Q+E-X/-Y/minN	2.182		3674	80	0.006	37	2668	0.145	265	261.9/1662.2

*Note: The most unfavourable outcome of the application of 6.10a/6.10b applies.

ULS DESIGN OF FOOTING IN SHEAR & PUNCHING SHEAR

Combination of Actions	Shear stress vEd		Shear Resist.	Punching shear at distance av	av: crit.	Resistance
	sect.//y vEdy/bzd	sect.//z vEdz/byd				
	(kPa)	(kPa)	(kPa)	(kPa)	(m)	(kPa)
EN1990 Eq. 6.10a*	0.0	0.0	309.3	0.0	0.5	0.0
EN1990 Eq. 6.10b*	0.0	0.0	309.3	0.0	0.5	0.0
G+ψ2Q+E+X/+Y/maxN	0.0	0.0	309.3	0.0	0.5	0.0
G+ψ2Q+E-X/+Y/maxN	0.0	0.0	309.3	0.0	0.5	0.0
G+ψ2Q+E+X/-Y/maxN	0.0	0.0	309.3	0.0	0.5	0.0
G+ψ2Q+E-X/-Y/maxN	0.0	0.0	309.3	0.0	0.5	0.0
G+ψ2Q+E+X/+Y/minN	0.0	0.0	309.3	0.0	0.5	0.0
G+ψ2Q+E-X/+Y/minN	0.0	0.0	309.3	0.0	0.5	0.0
G+ψ2Q+E+X/-Y/minN	0.0	0.0	309.3	0.0	0.5	0.0
G+ψ2Q+E-X/-Y/minN	0.0	0.0	309.3	0.0	0.5	0.0

*Note: The most unfavourable outcome of the application of 6.10a/6.10b applies.

ULS DESIGN OF TWO-WAY REINFORCEMENT AT FOOTING BOTTOM

Maximum bending moments				Reinforcement			
Vert. section //bz		Vert. section //by		Bar dia.	//by		//bz
MEdy/bz	Combinat.	MEdz/by	Combinat.	spacing	No.	spacing	No.
(kNm/m)		(kNm/m)		(mm)		(mm)	
0.0	0	13.5	10	12	150 33	150	26

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Author(s): P. Bisch, E. Carvalho, H. Degee, P. Fajfar, M. Fardis, P. Franchin, M. Kreslin, A. Pecker, P. Pinto, A. Plumier, H. Somja, G. Tsionis

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Abstract

This document is a Technical Report with worked examples for seismic design of buildings following the Eurocodes. It summarizes important points of the Eurocode 8 for the seismic design of concrete and steel buildings including foundations utilizing a common generic building as a basis.

An overview of EN 1998 is presented at the first section with focus on the performance requirements and compliance criteria for structures, ground conditions and seismic actions. An introduction to the example reinforced concrete building with its geometrical and material properties as well as the main assumptions for analysis and the detailed structural analysis calculations are presented in the second chapter. Specific rules for design of the building for ductility and the design of concrete foundation elements are presented in the following chapters. For the sake of completeness, the details of design and detailing of the same example as a steel building with three different configurations, namely; with (i) steel moment resisting frames, (ii) composite steel concrete moment resisting frames, and (iii) composite steel concrete frames with eccentric and concentric bracings is also presented. Key concepts of base isolation are summarized by utilizing the example building. Seismic performance assessment and retrofitting according to EN 1998-Part 3 is explained in the last part of the report.

The reinforced concrete/steel building (worked example) analyzed in this report was prepared and presented at the workshop “Eurocode 8: Seismic Design of Buildings” that was held on 10-11 February 2011 in Lisbon, Portugal. The workshop was organized by JRC with the support of DG ENTR and CEN and in collaboration with CEN/TC250/Sub-Committee 8 and the National Laboratory for Civil Engineering (Laboratorio Nacional de Engenharia Civil - LNEC, Lisbon).

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