COLLEGIO
DEI TECNICI DELLA
INDUSTRIALIZZAZIONE EDILIZIA
www.cte-it.org

IN COLLABORAZIONE CON

ASSOCIAZIONE ITALIANA
CALCESTRUZZO ARMATO E
PRECOMPRESSO
www.associazioneaicap.it

Nome Relatore

MEDIA PARTNER

21 Marzo 2024

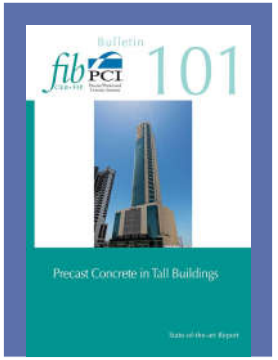
EDIFICI ALTI: PROGETTAZIONE E INDUSTRIALIZZAZIONE EDILIZIA

INTESA SAN PAOLO

con il patrocinio di

con il contributo incondizionato di

Bollettino fib 101:
Precast Concrete
in Tall Buildings



Torre INTESA SAN PAOLO

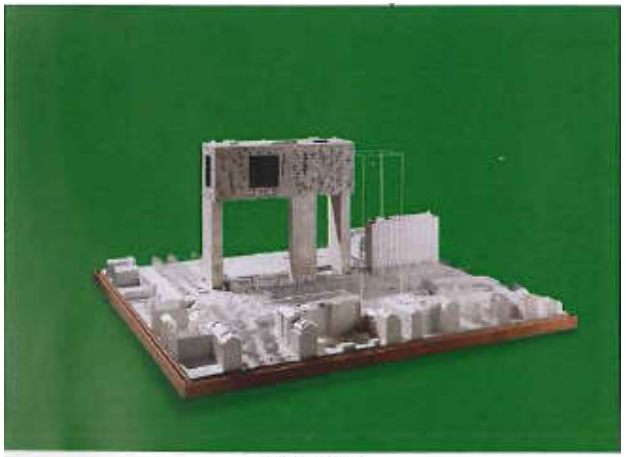
Hugo Corres Peiretti
Universidad Politecniva de Madrid
FHECOR Ingenieros Consultores

Intesa – San Paolo

Intesa – San Paolo. Italia

RENZO PIANO

DOMINIQUE PERRAULT



MVRDV

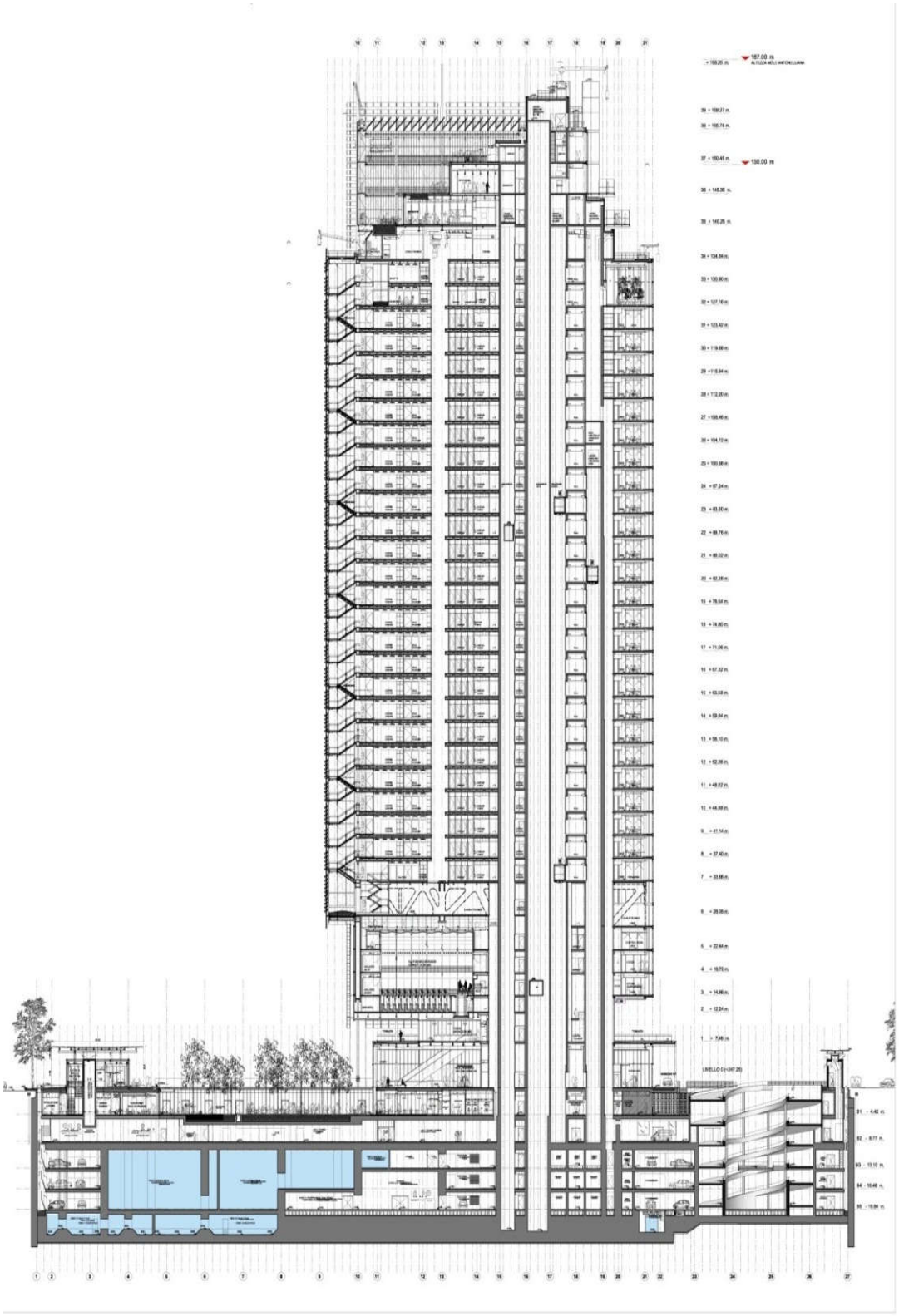
DANIEL LIBESKIND

ESTUDIO LAMELA

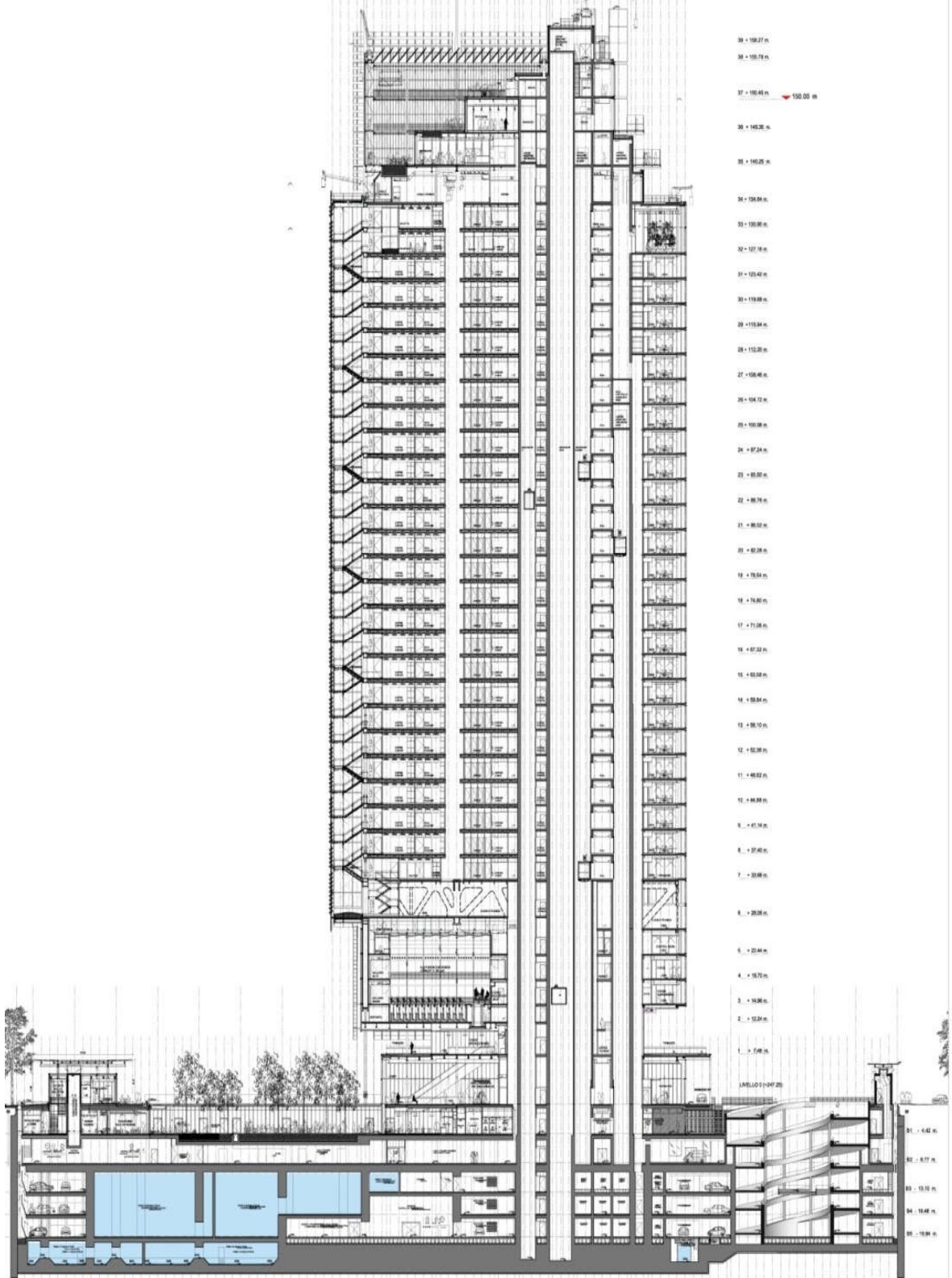
HIROSHI HARA

1 Introducción

Intesa San Paolo.



1 Introducción



3

Datos del proyecto

Proyecto	Torre Agbar
)Arquitectoo	Jean Nouvel
Localización	Barcelona. (España)
Fecha	2005
tipología	losa maciza postesada
propiedad	Aguas de Barcelona
cliente	Dragados
alcance de la obra	revisión de proyecto

España**/2005**

Torre Agbar

3

Datos del proyecto

Proyecto	Torre de Cristal
Arquitect o	César Pelli
Localización	Madrid.(España)
Fecha	Diciembre 2009
tipología	estructura metálica
alcance de la obra	asistencia técnica
cliente	Dragados, S.A.

España**/2009**

Torre de Cristal

3

Datos del proyecto

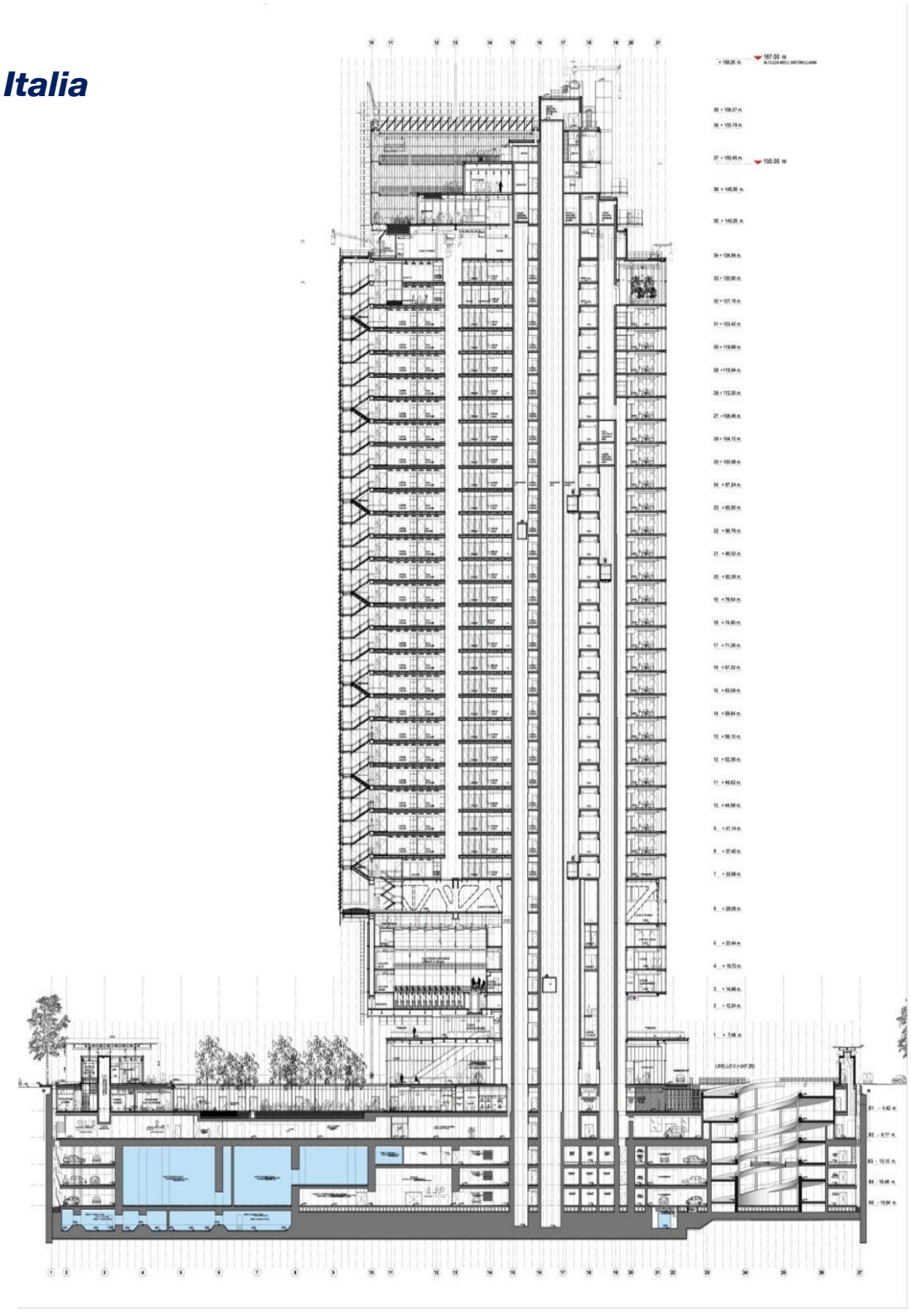
Proyecto	Puerto de Triana Tower
Arquitecto	Pelli, Clarke & Pelli Arquitectos
Localización	Sevilla (España)
Fecha	En construcción
características	180.0m alto, rascacielos
alcance de la obra	concepción estructural
cliente	Ayesa

España/**En construcción**

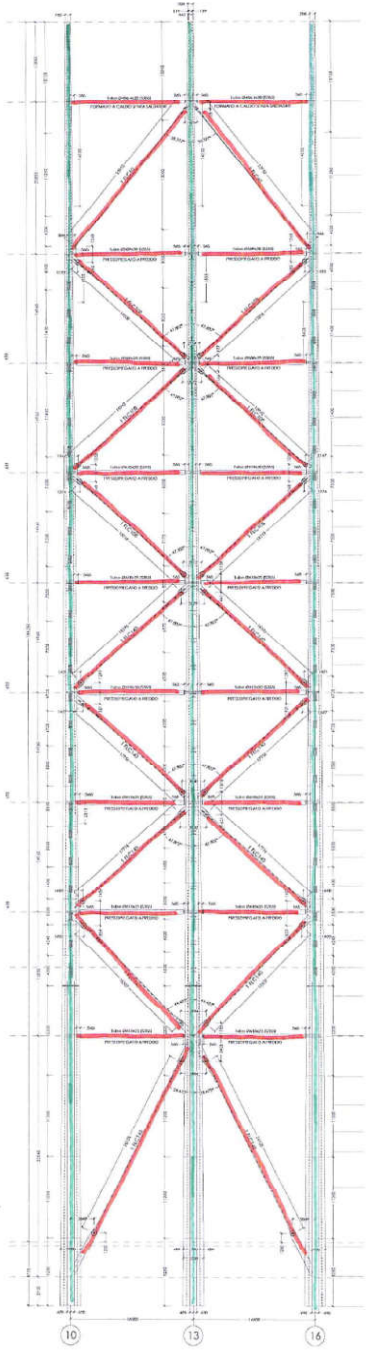
Torre Puerto de Triana

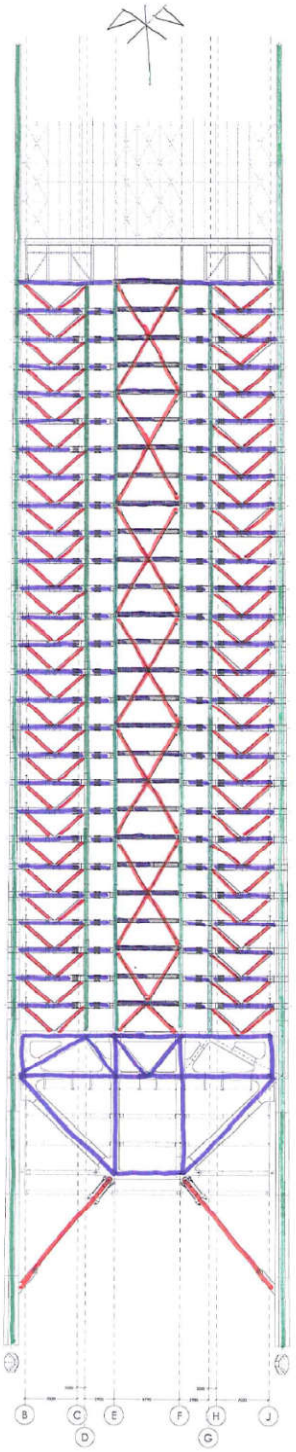
Intesa – San Paolo

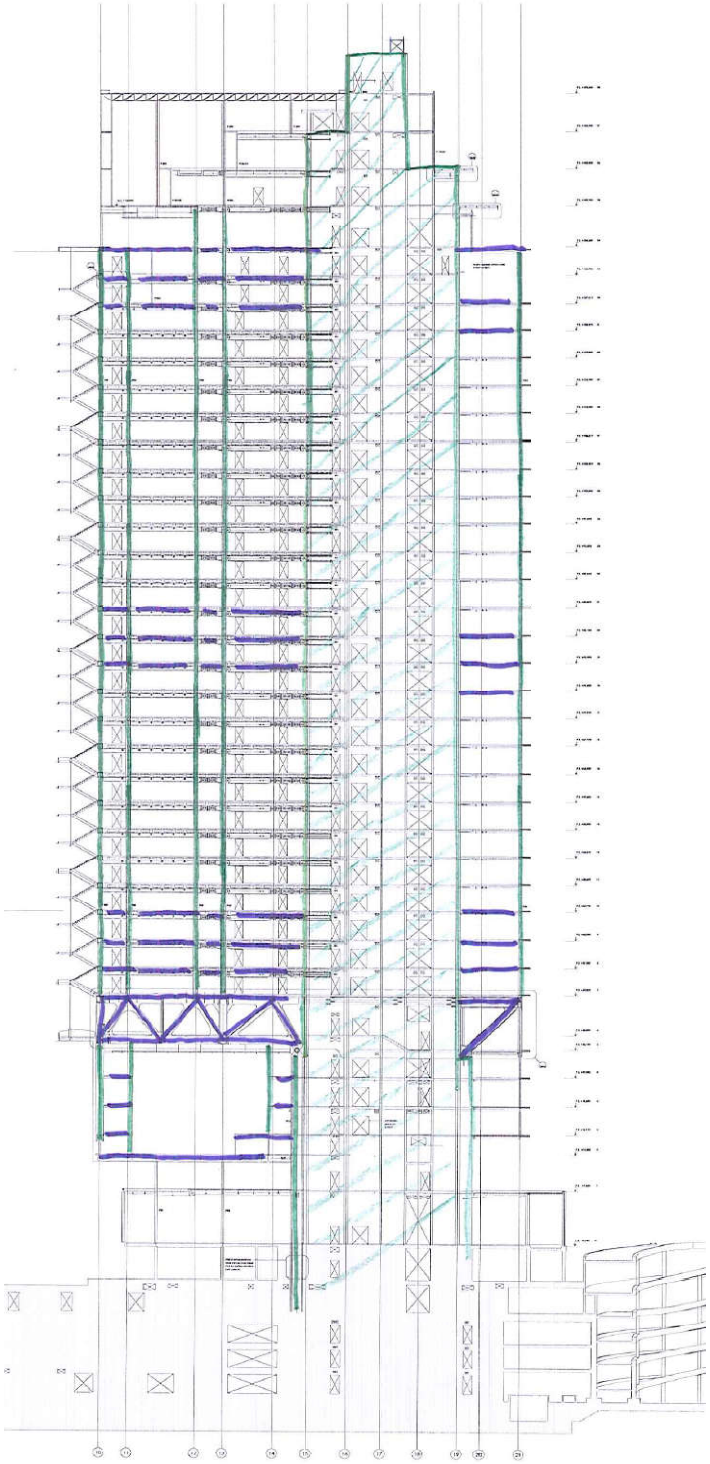
3 Intesa – San Paolo. Italia



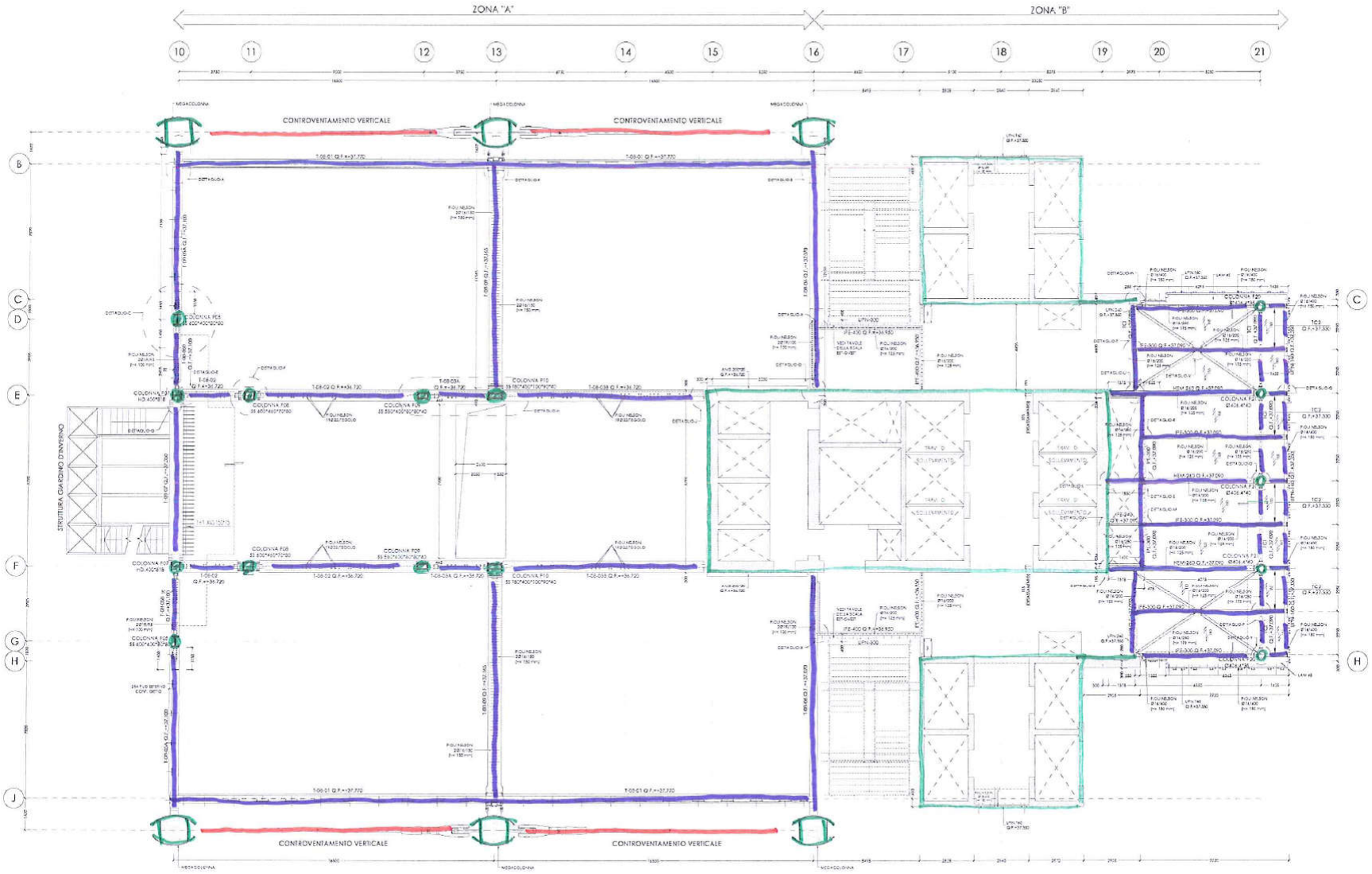
3 Intesa – San Paolo. Italia







3 Intesa – San Paolo. Italia



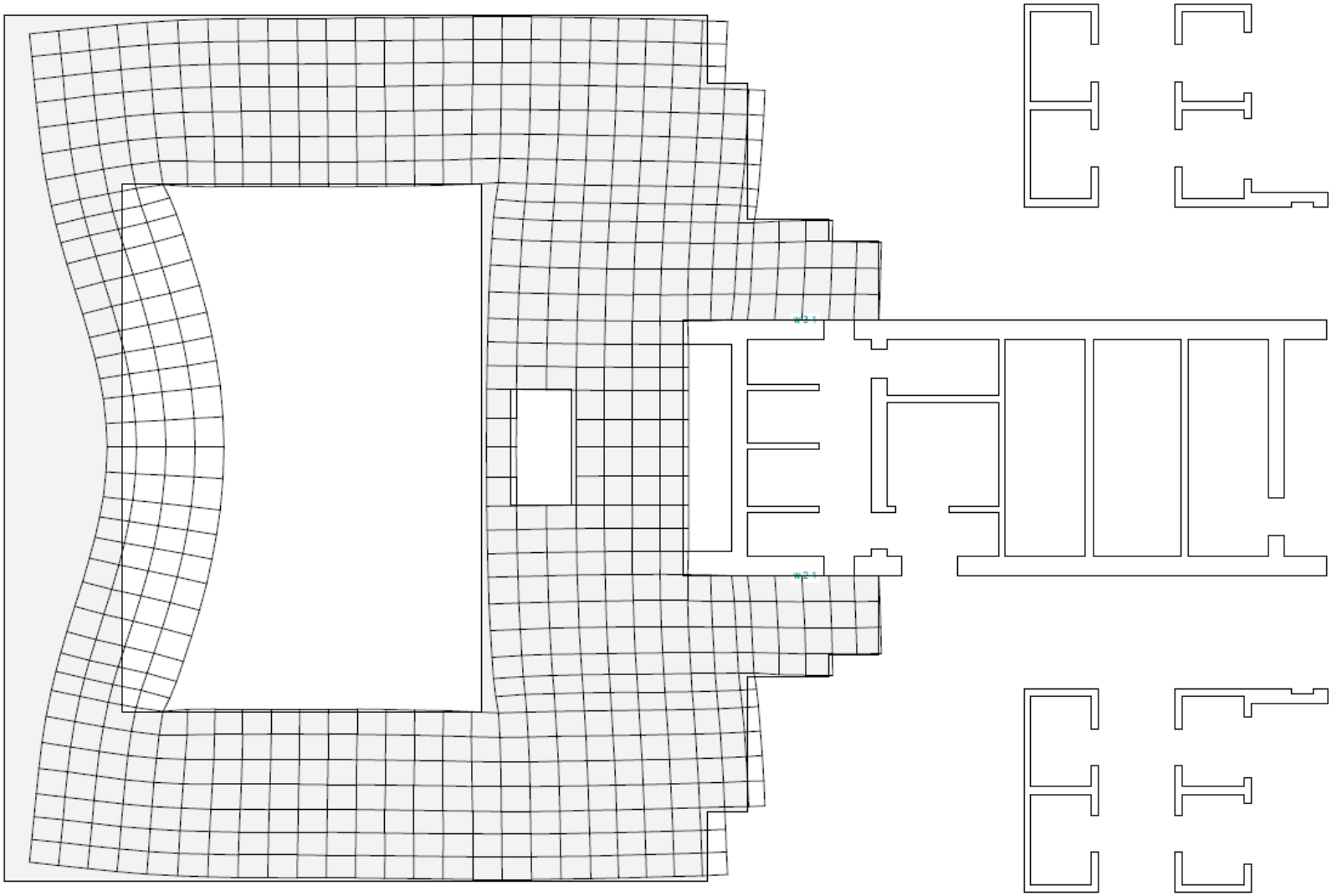
Hanged Levels - Stressed skin design
Livello 3

Page 50
17.01.11, 16:49

FHECOR Ingenieros Consultores S.A. abe

Cedrus-5 - Version 1.30

Bending deflection: Load case LC1, Scale exaggeration factor: 20000.0



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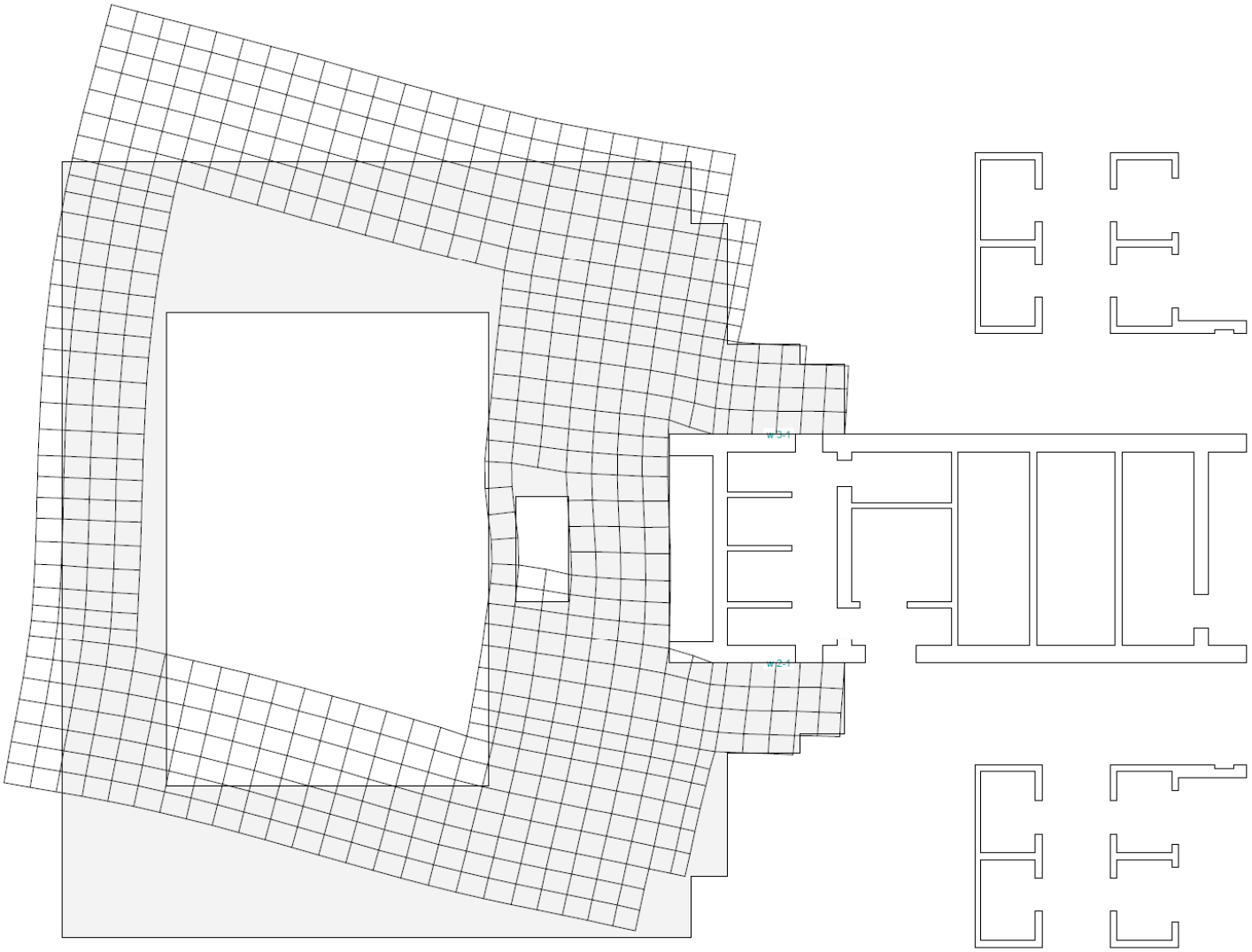

COMPORTAMIENTO HORIZONTAL
Liv-5

Page 6
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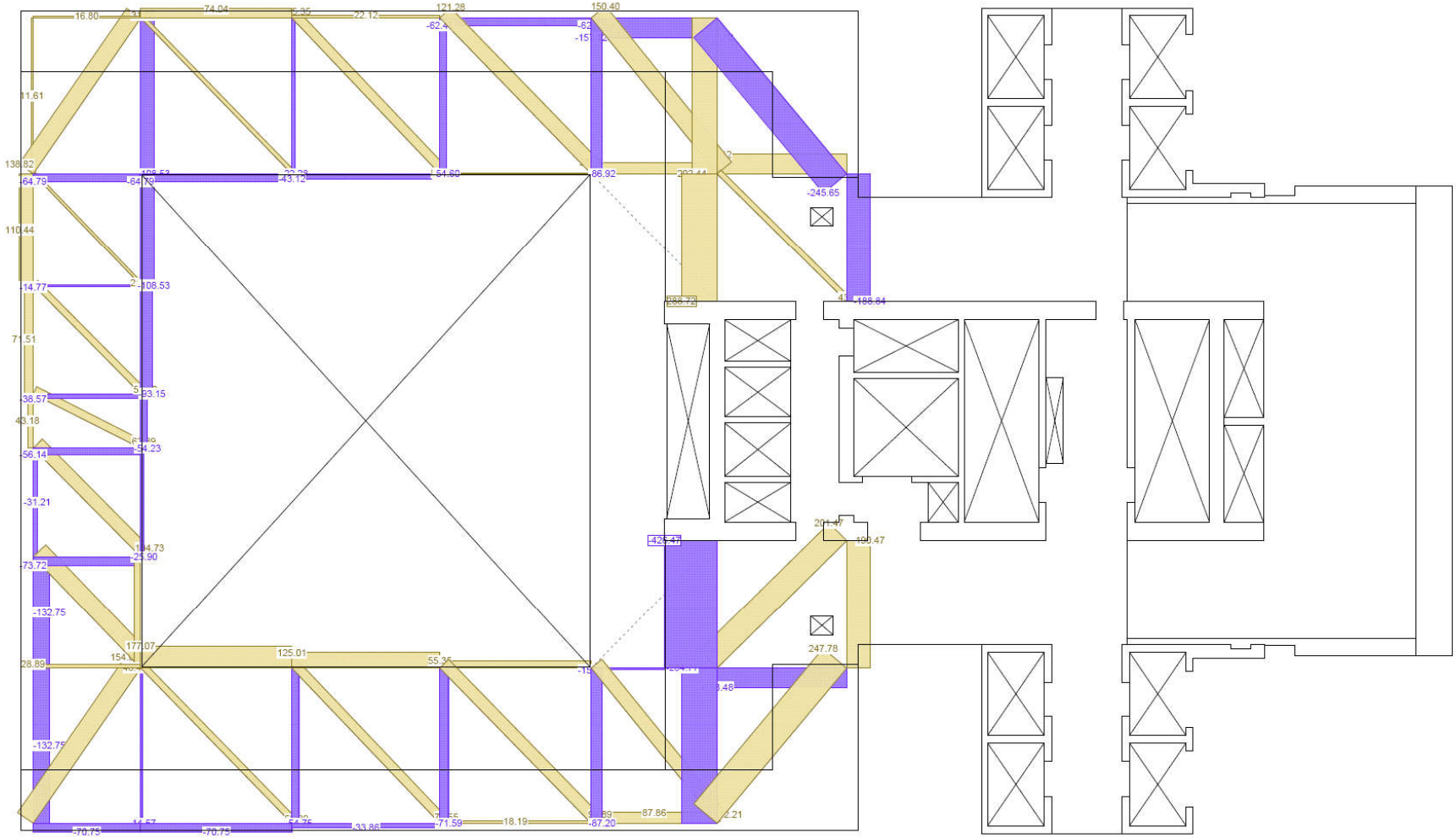
FHECOR Ingenieros Consultores S.A. abe

Statik-5 - Version 1.31

Section force N [kN] for: LC14

Scale 1 :154.7



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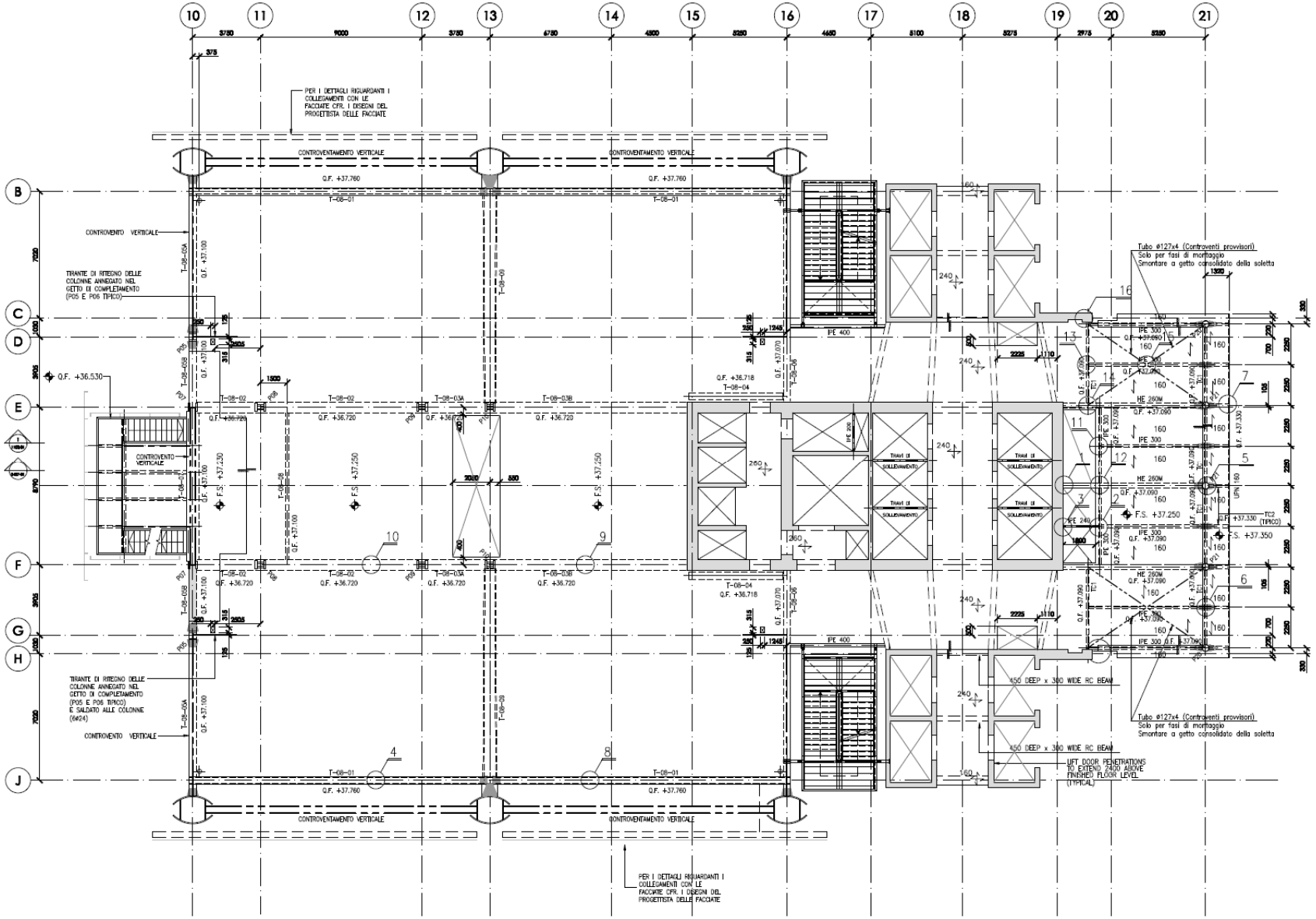
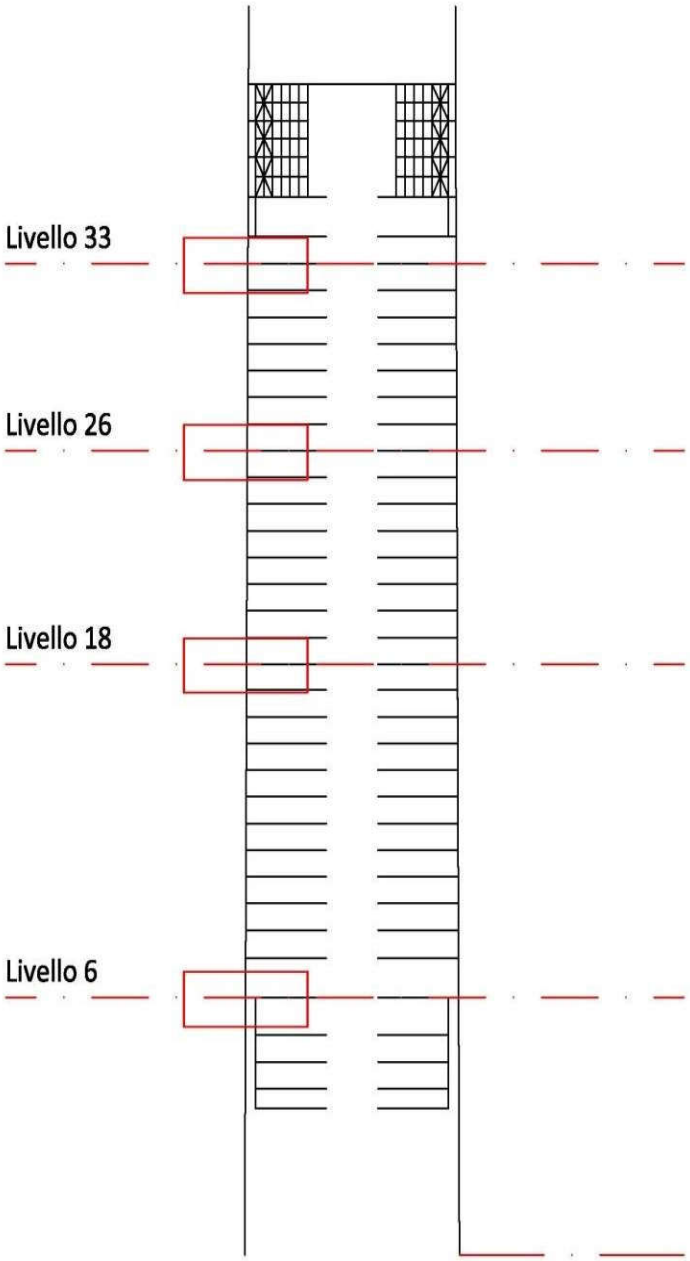


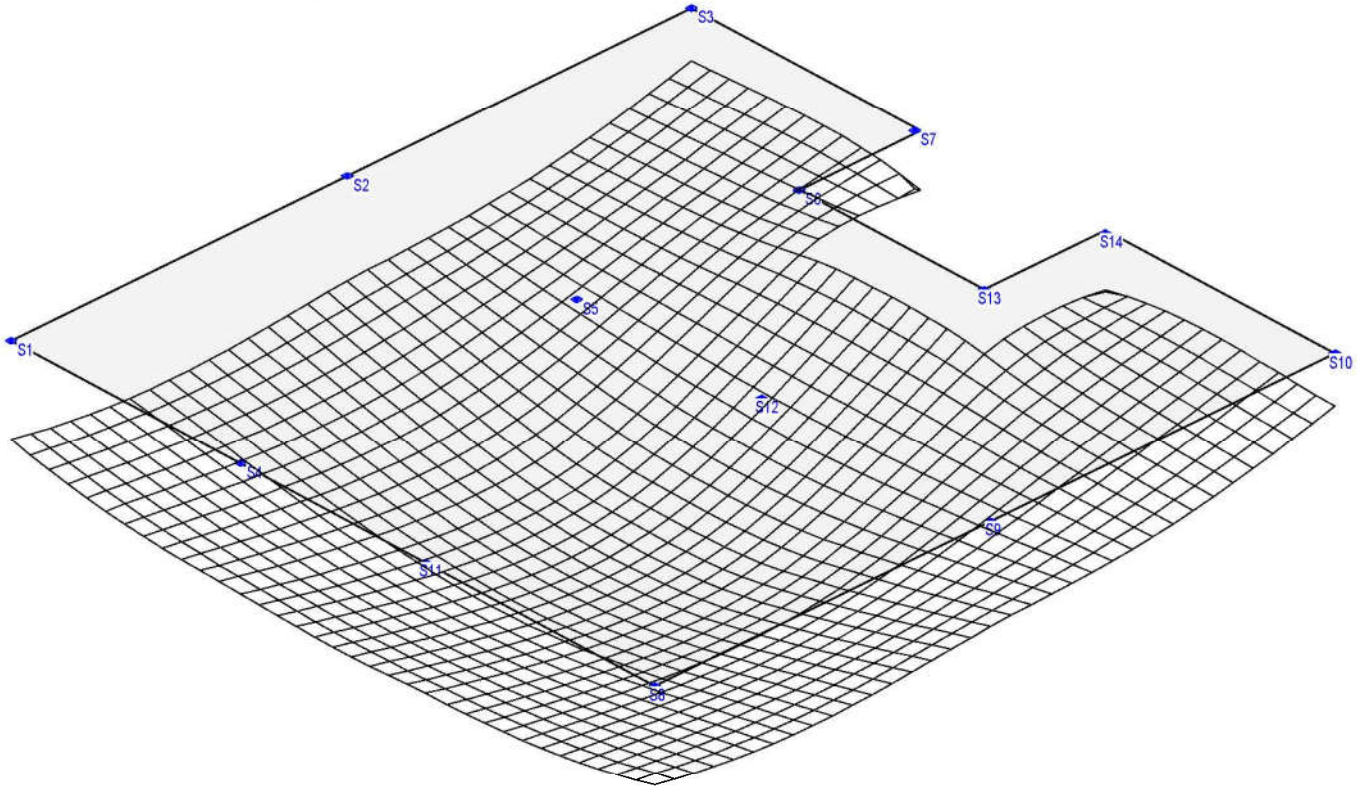
PIANTA GENERALE DEL LIVELLO 8



TORRE INTESA SAN PAOLO
Portico Asse 16

DEFORMACIONES FORJADOS RETRACCION, FLUAGE, TEMP		Page 21
CD5-project		28.09.10, 20:48
FHECOR Ingenieros Consultores S.A.	sam	Cedrus-5 - Version 2.00

Bending deflection: Load case L18-FC, Scale exaggeration factor: 100.0



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DEFORMACIONES FORJADOS RETRACCION, FLUAGE, TEMP CD5-project	Page 22 28.09.10, 20:48
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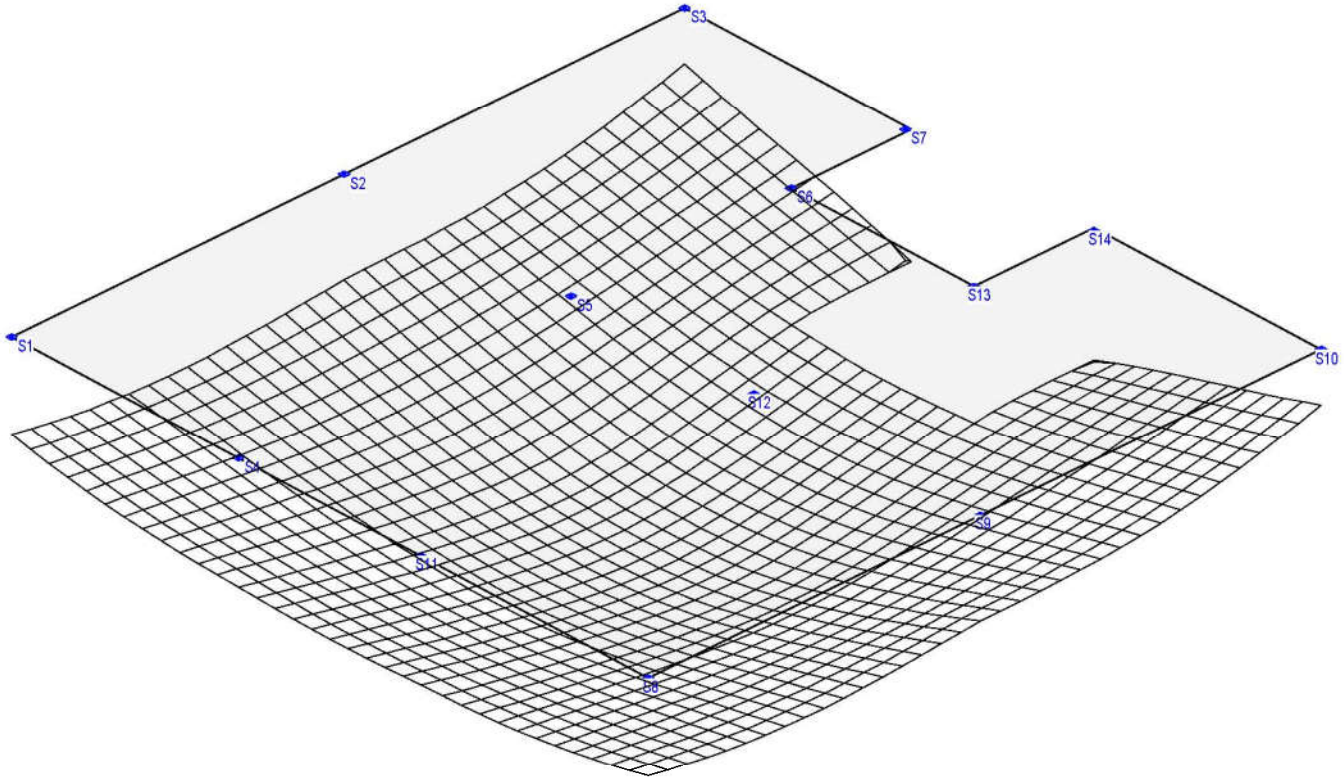

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DEFORMACIONES FORJADOS RETRACCION, FLUAGE, TEMP	Page 23
CD5-project	28.09.10, 20:48
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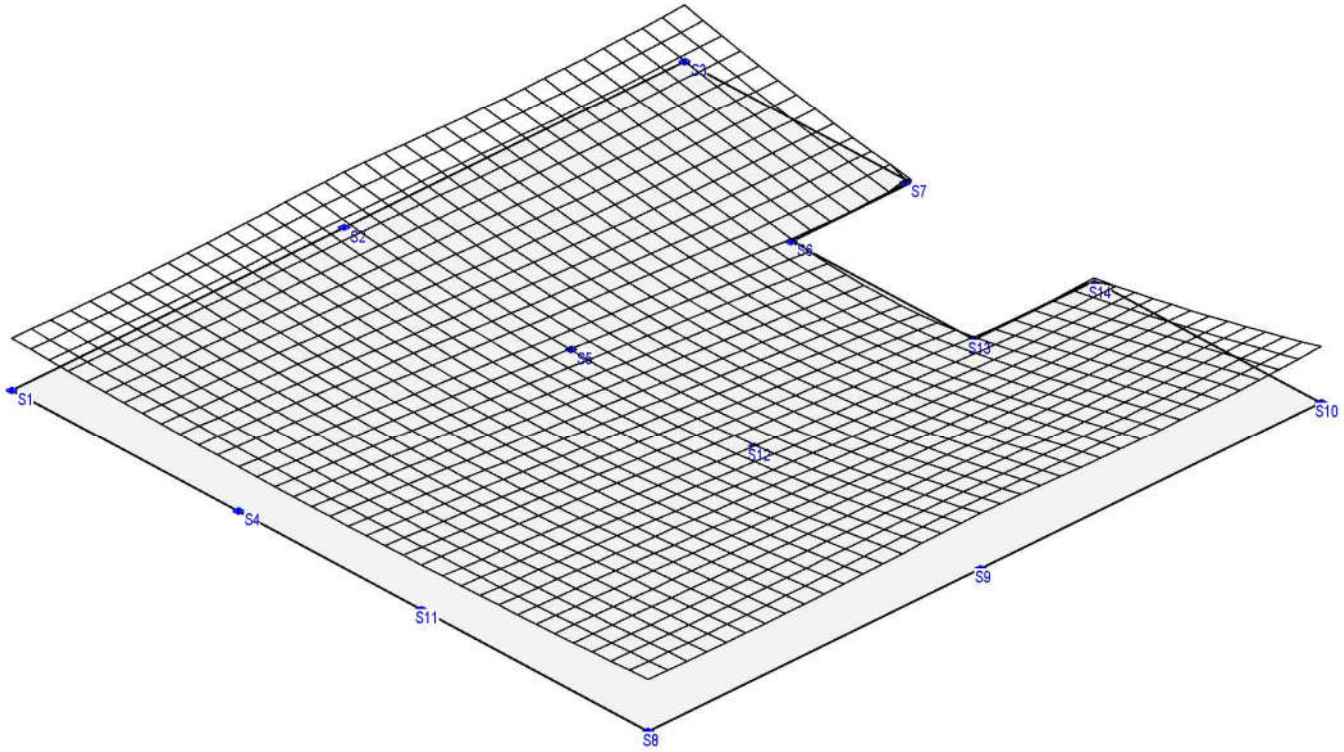

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DEFORMACIONES FORJADOS RETRACCION, FLUAGE, TEMP	Page 24
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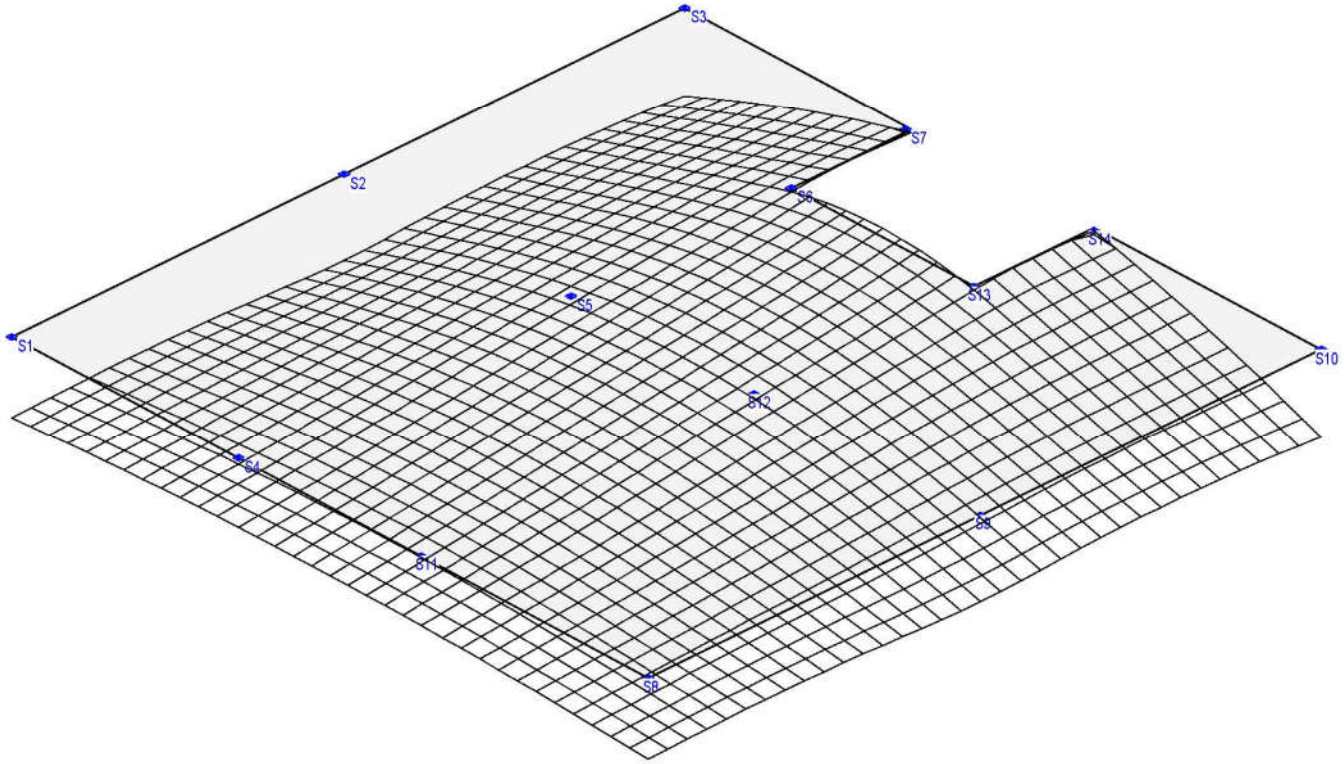

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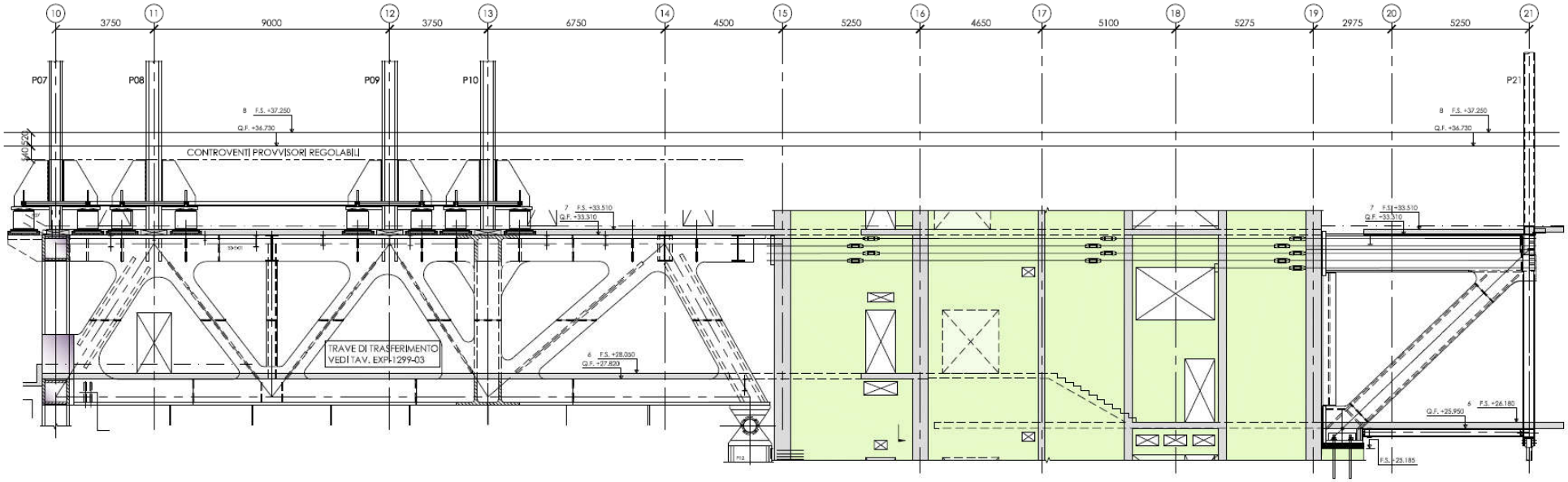
SISTEMA TEMPORANEO A MARTINETTO ALLA BASE DELLA COLONNE PER COMPENSARE LE DEFORMAZIONI DELLE STRUTTURE DI TRANSFERIMENTO CARICHI

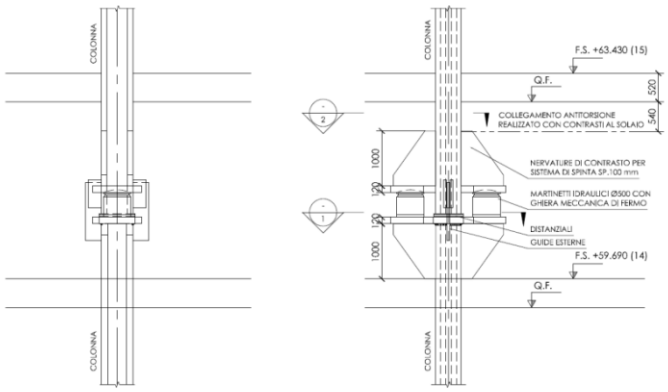
PICCHETTO F

SCALA 1:100



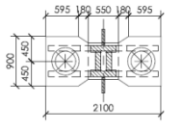
SISTEMA DI INSERIMENTO DEI MARTINETTI PER I LIVELLI 14-15
(IN ANALOGIA CON LIVELLI 22-23 E 30-31)

SCALA 1:50



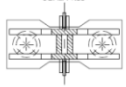
SEZ.1

SCALA 1:50



SEZ.2

SCALA 1:50



SISTEMA DI INSERIMENTO DEI MARTINETTI PER I LIVELLI 7-8

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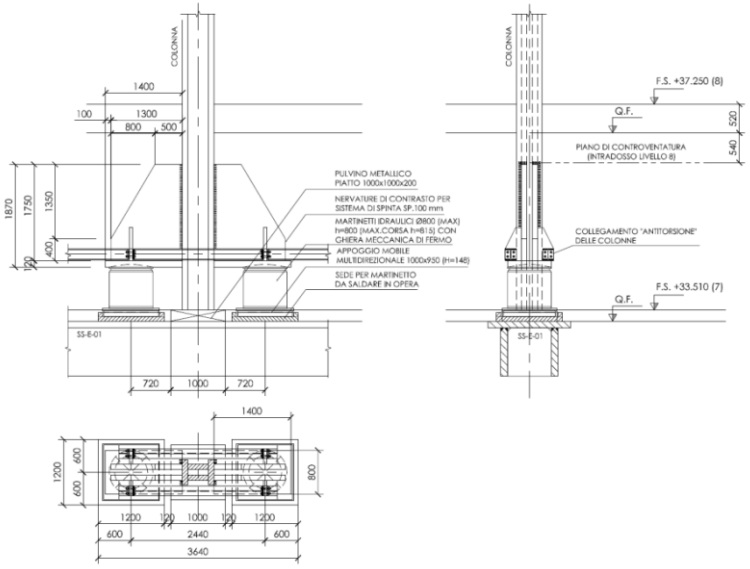
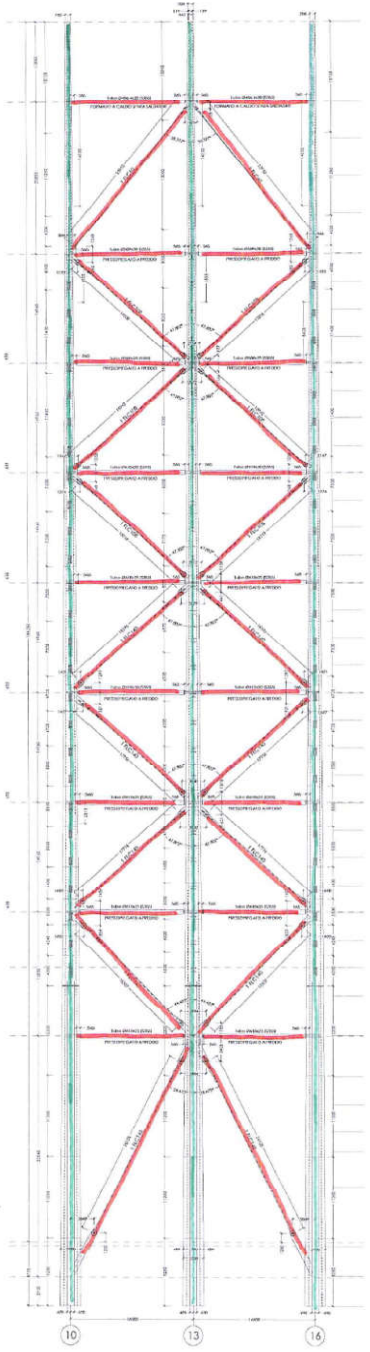
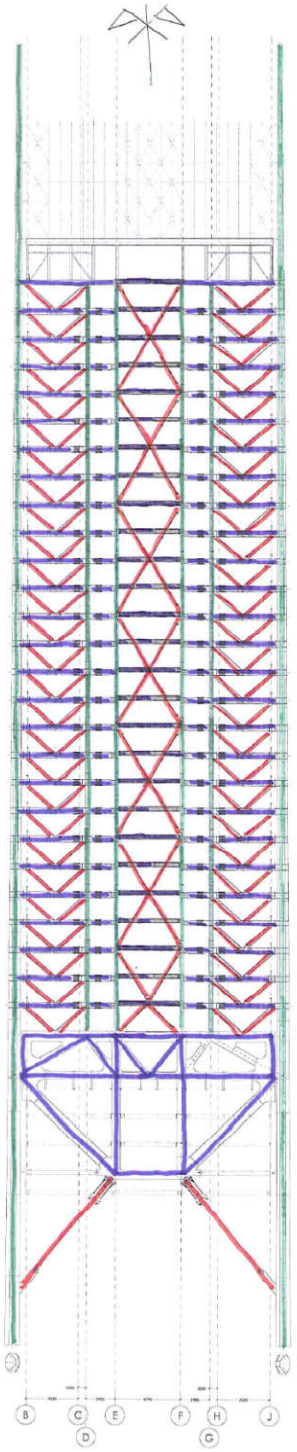
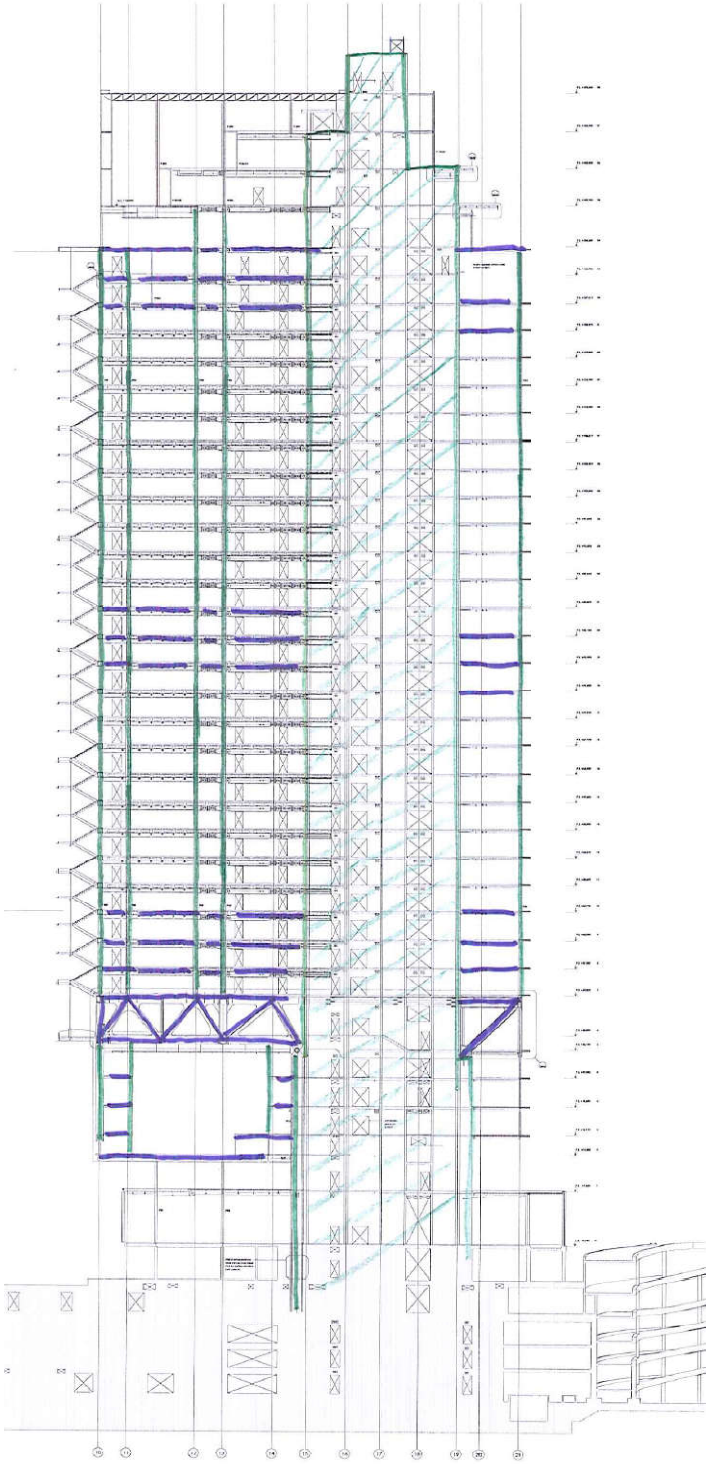
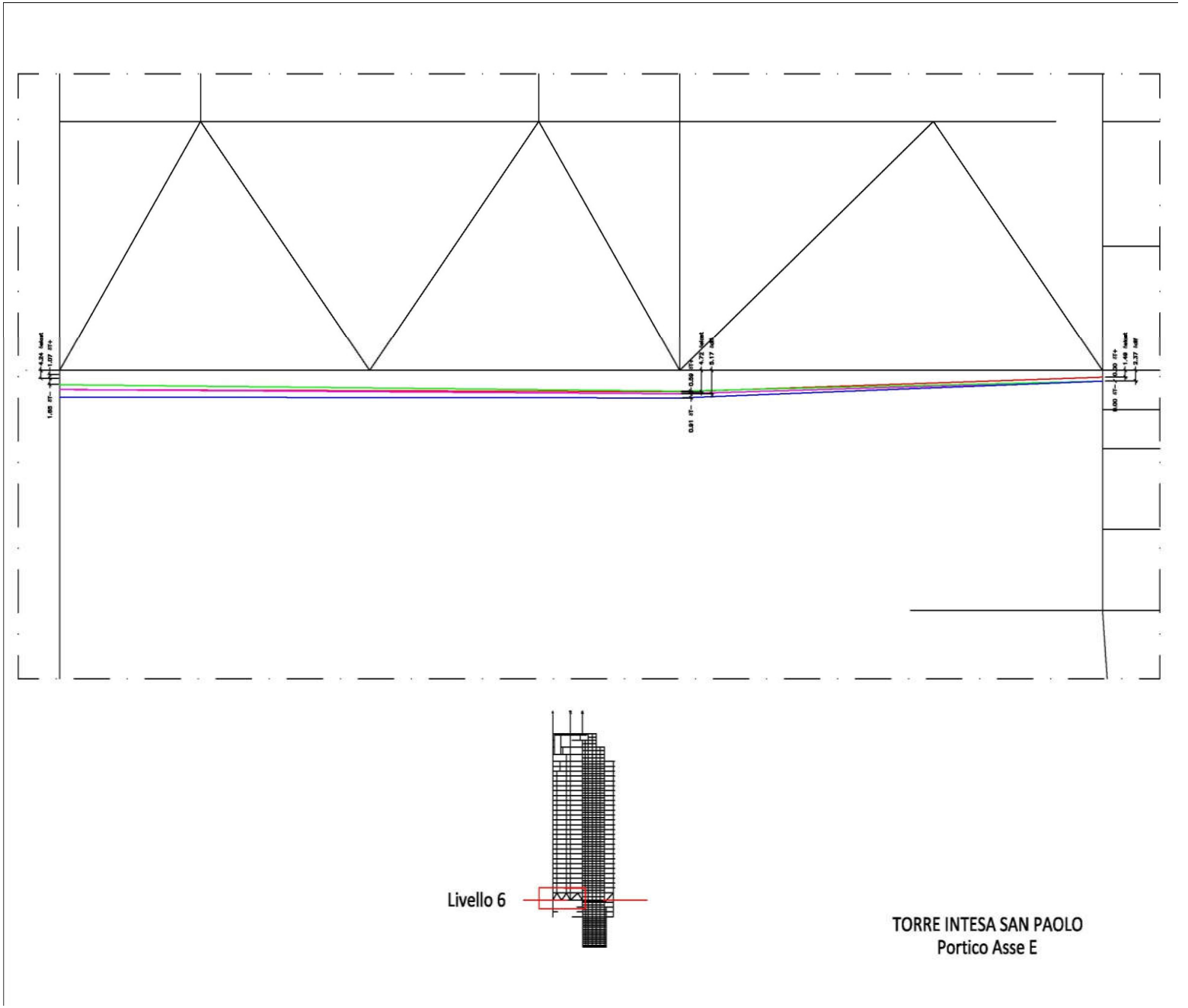


Intesa – San Paolo





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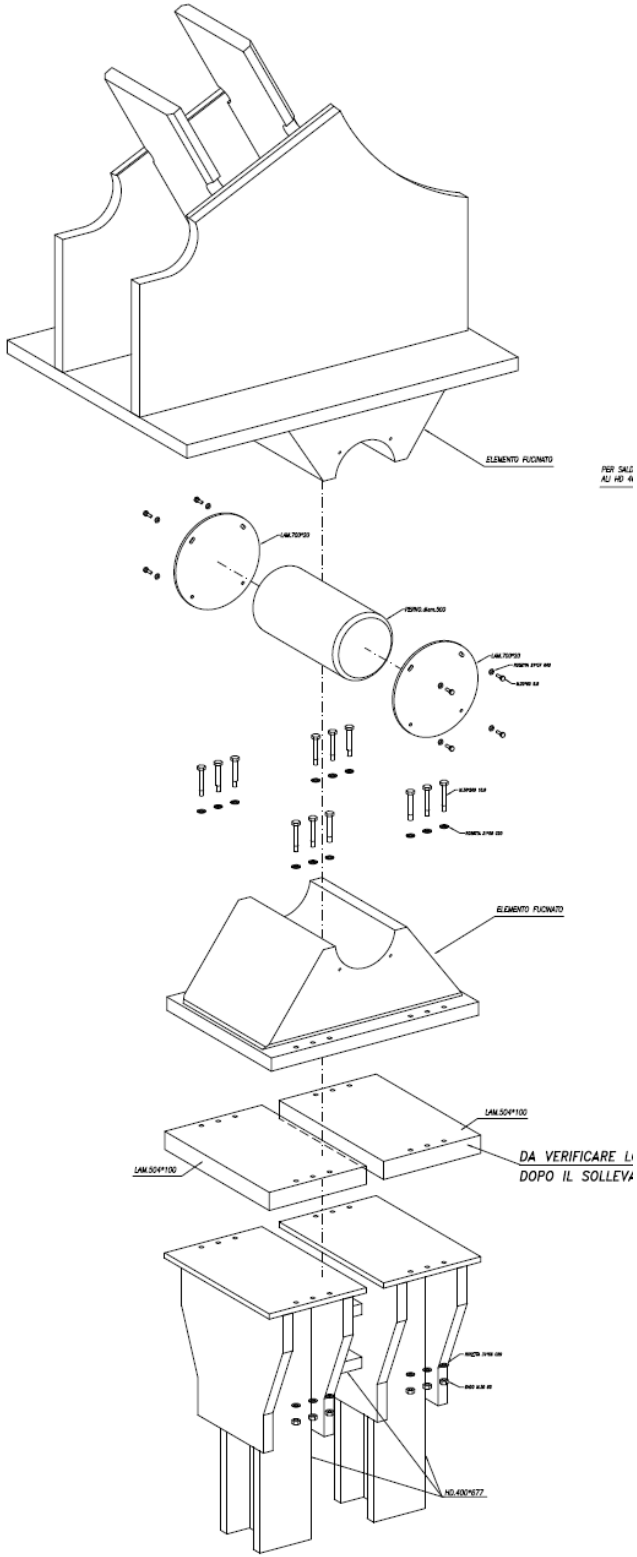
TORRE INTESA SAN PAOLO
Portico Asse E

Intesa – San Paolo. Italia



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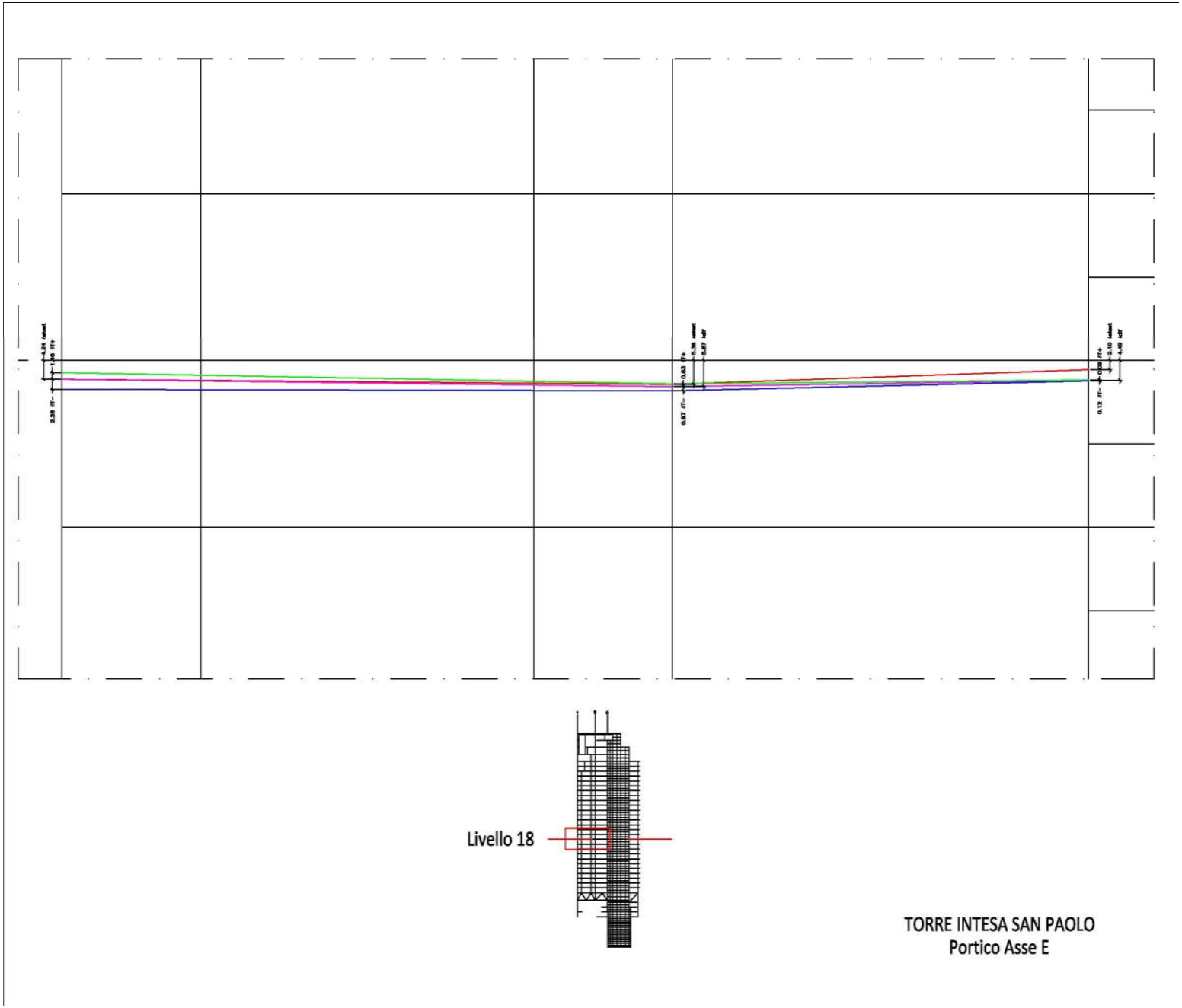
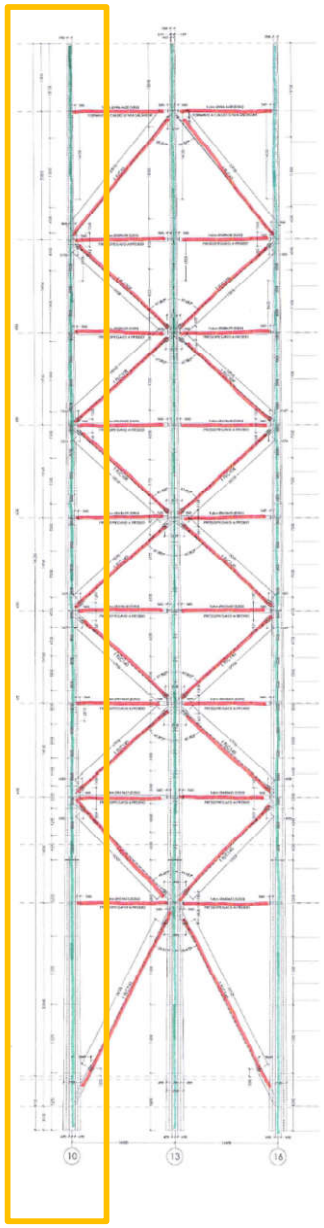
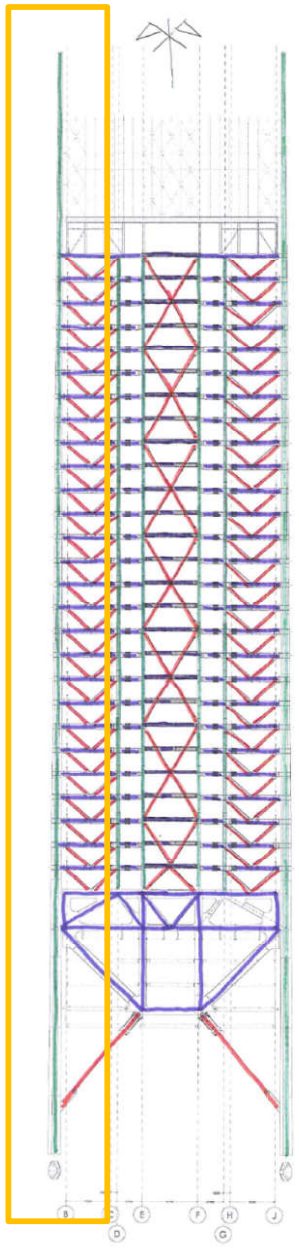
Intesa – San Paolo. Italia


Livello 18
TORRE INTESA SAN PAOLO
Portico Asse E

Intesa – San Paolo





▪ MEGA-COLONNE (IV)

- Sezione al di sotto della struttura di trasferimento

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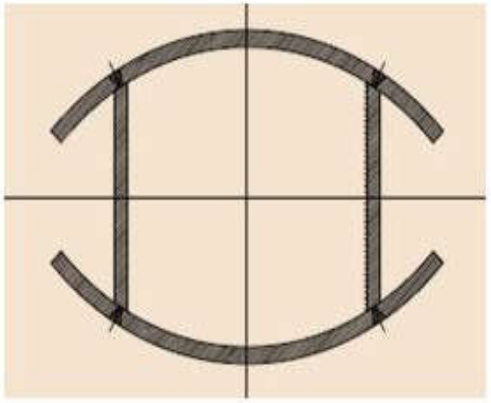
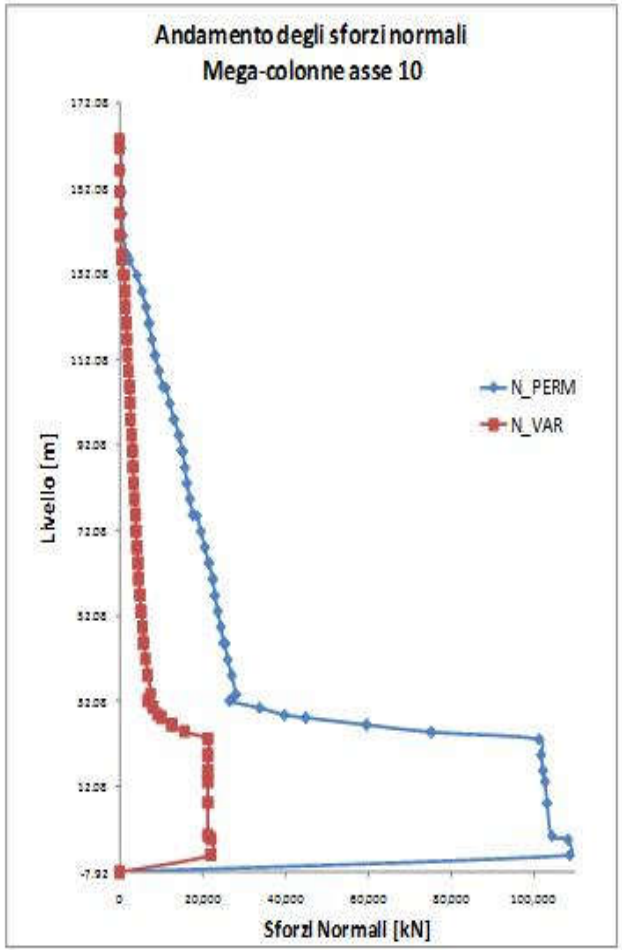
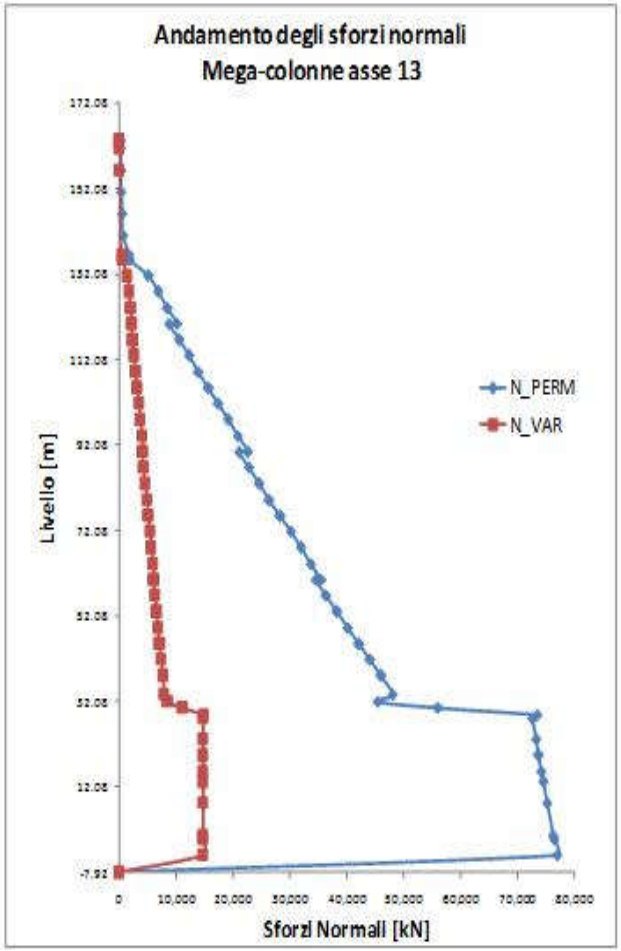
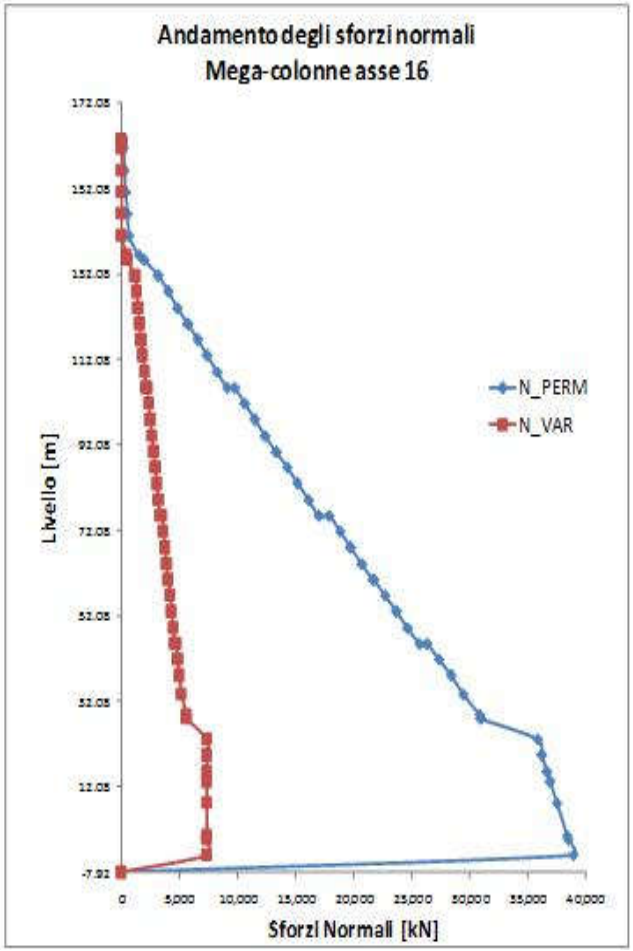


MEGA-COLONNE (II)

- Andamento sforzo normale:

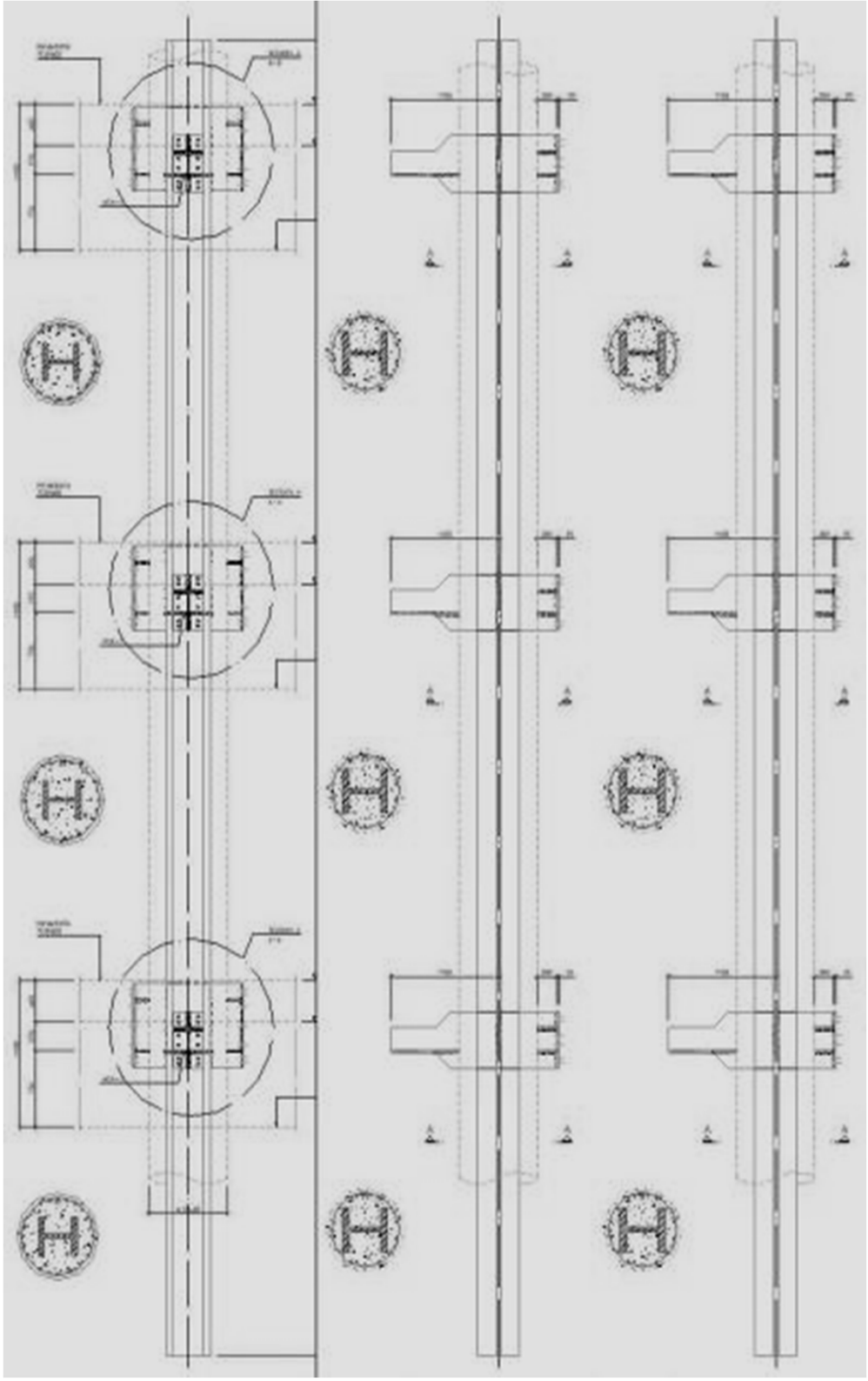






Torre de Cristal

Torre de Cristal



Torre de Cristal

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- Sezione al di sotto della struttura di trasferimento

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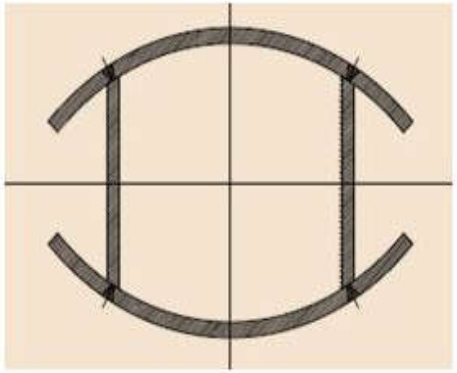

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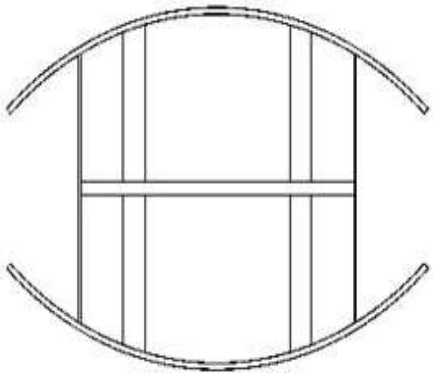

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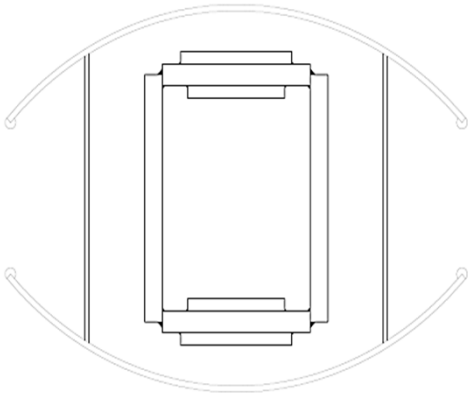

MEGA-COLONNE (V)

- Sezione al di sopra della struttura di trasferimento

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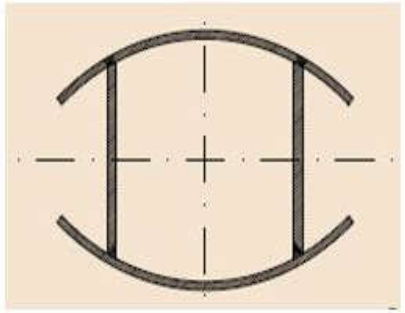

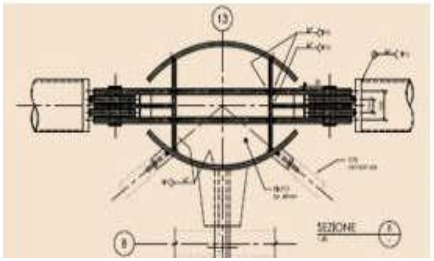

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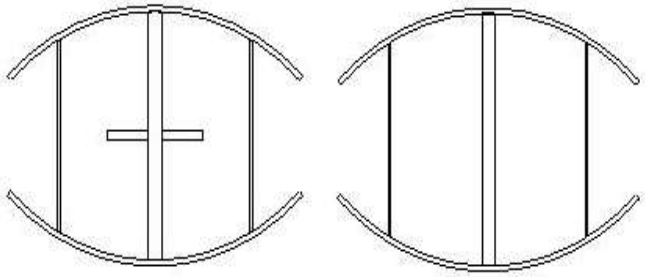

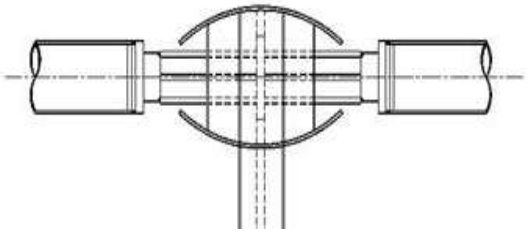

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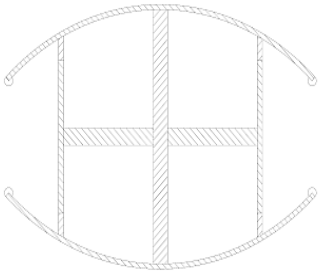
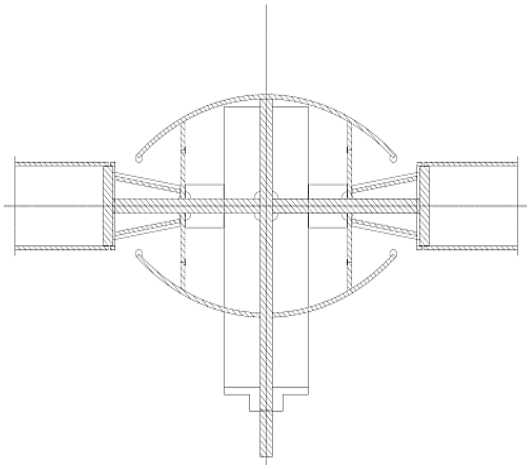
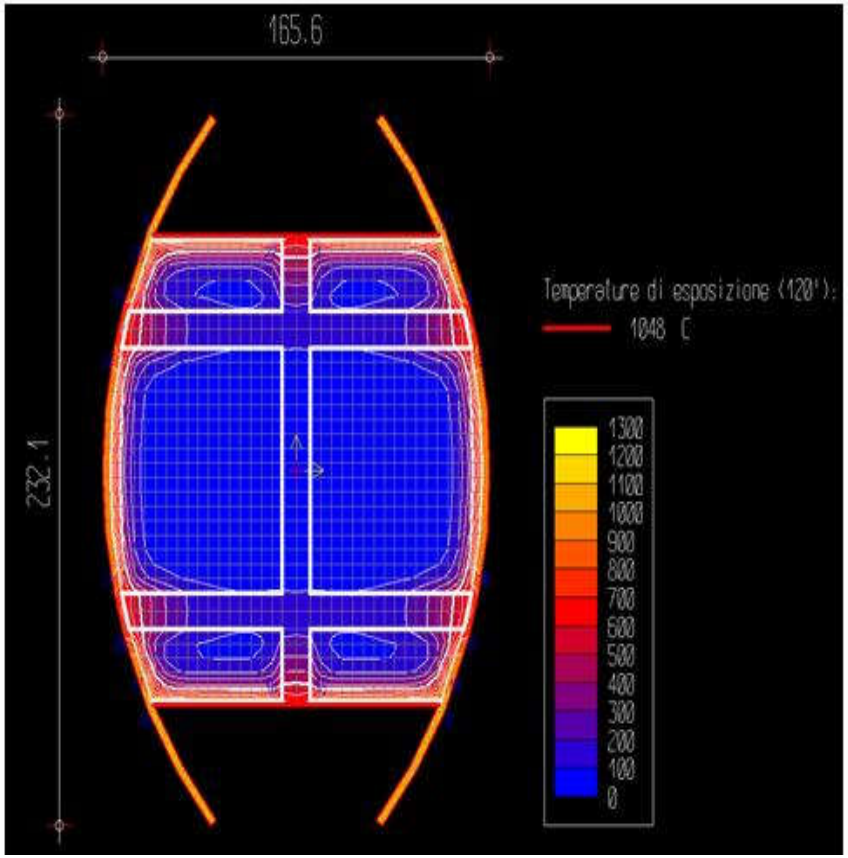
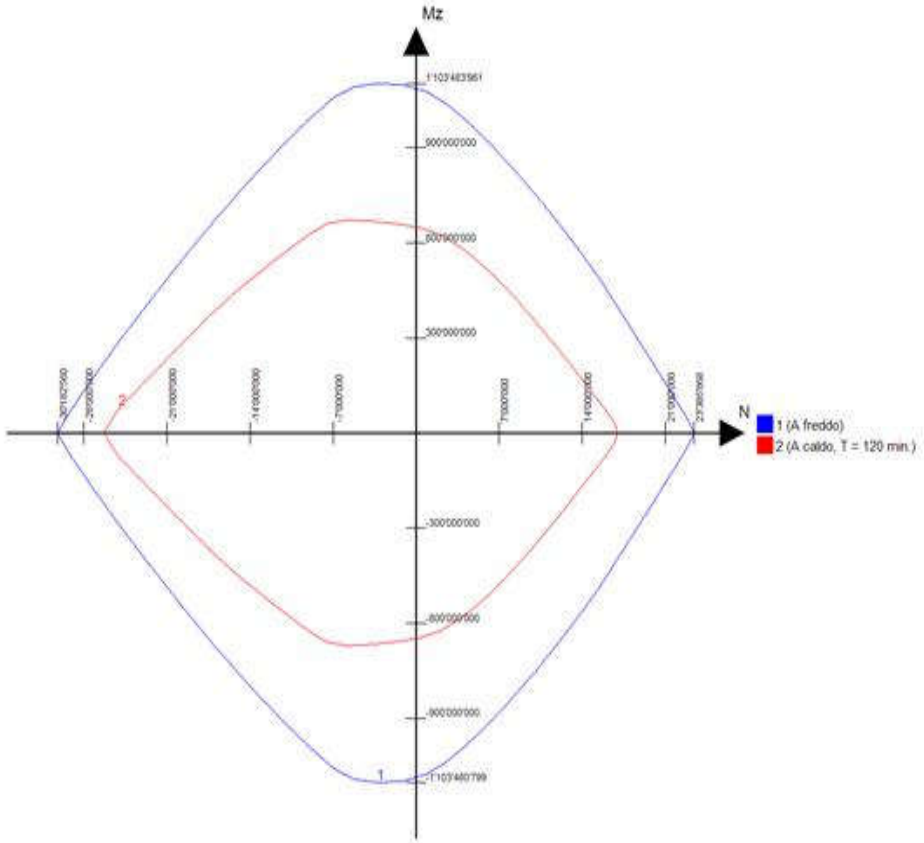


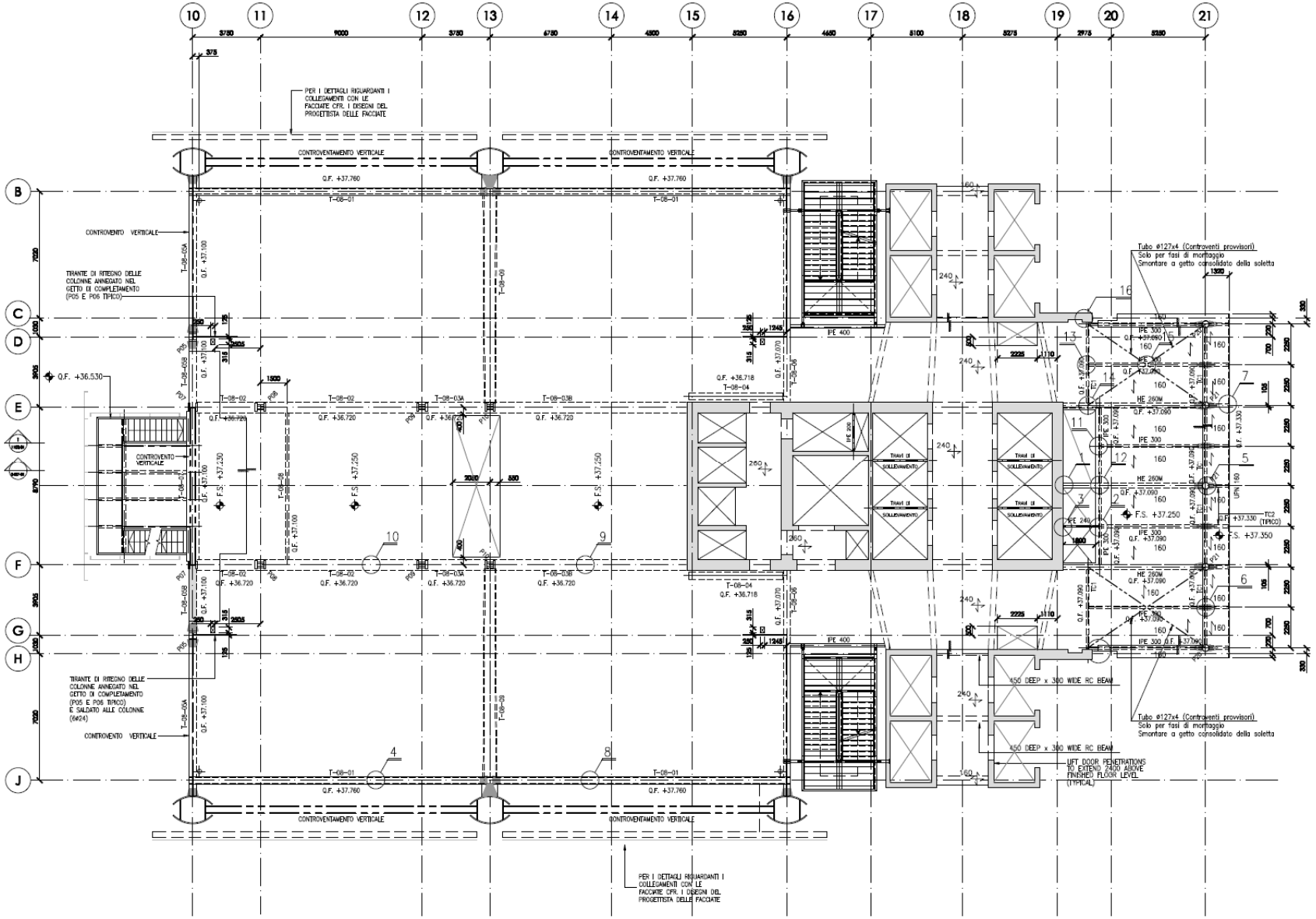


▪ MEGA-COLONNE (VII)

- Resistenta al fuoco

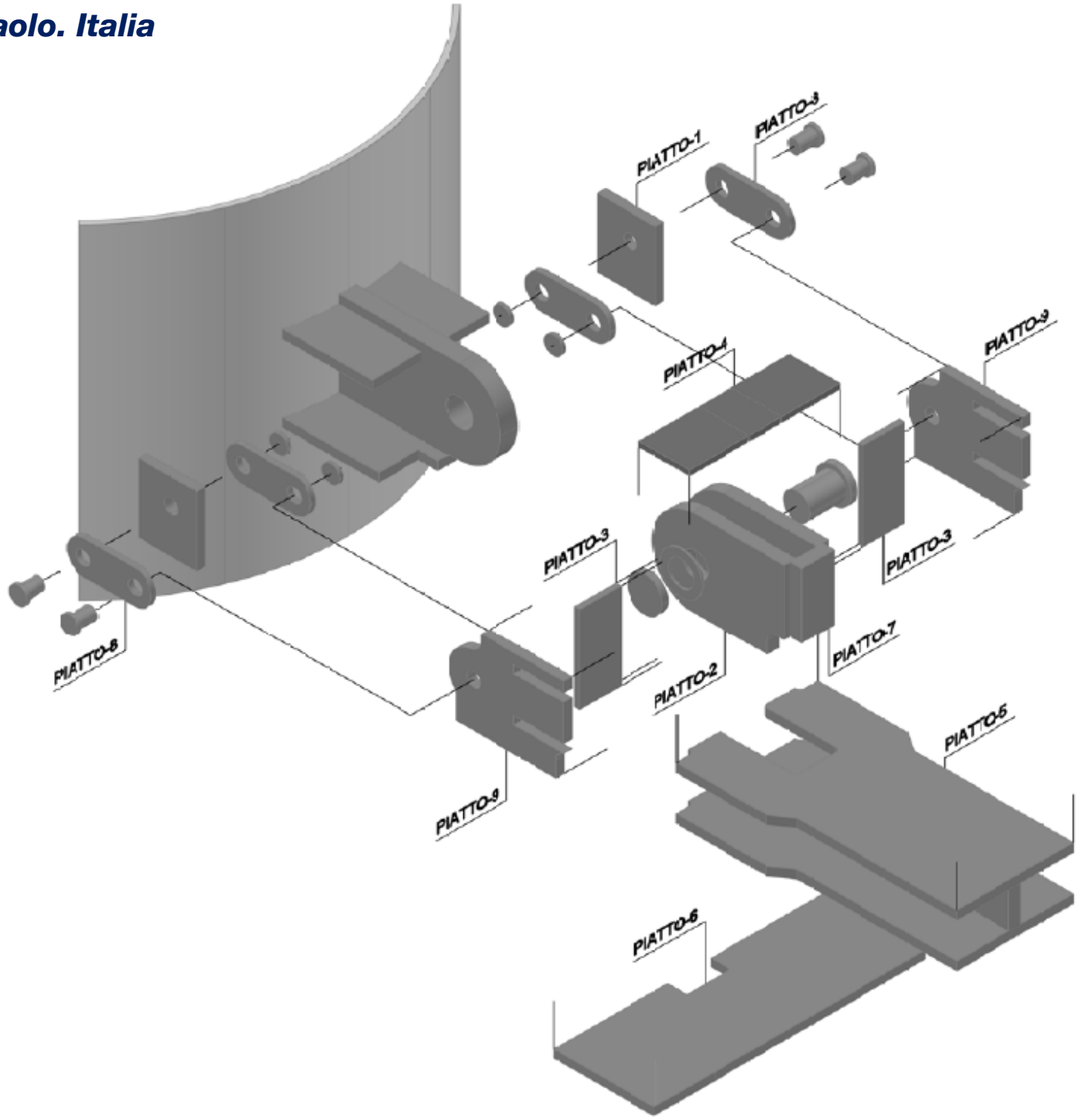




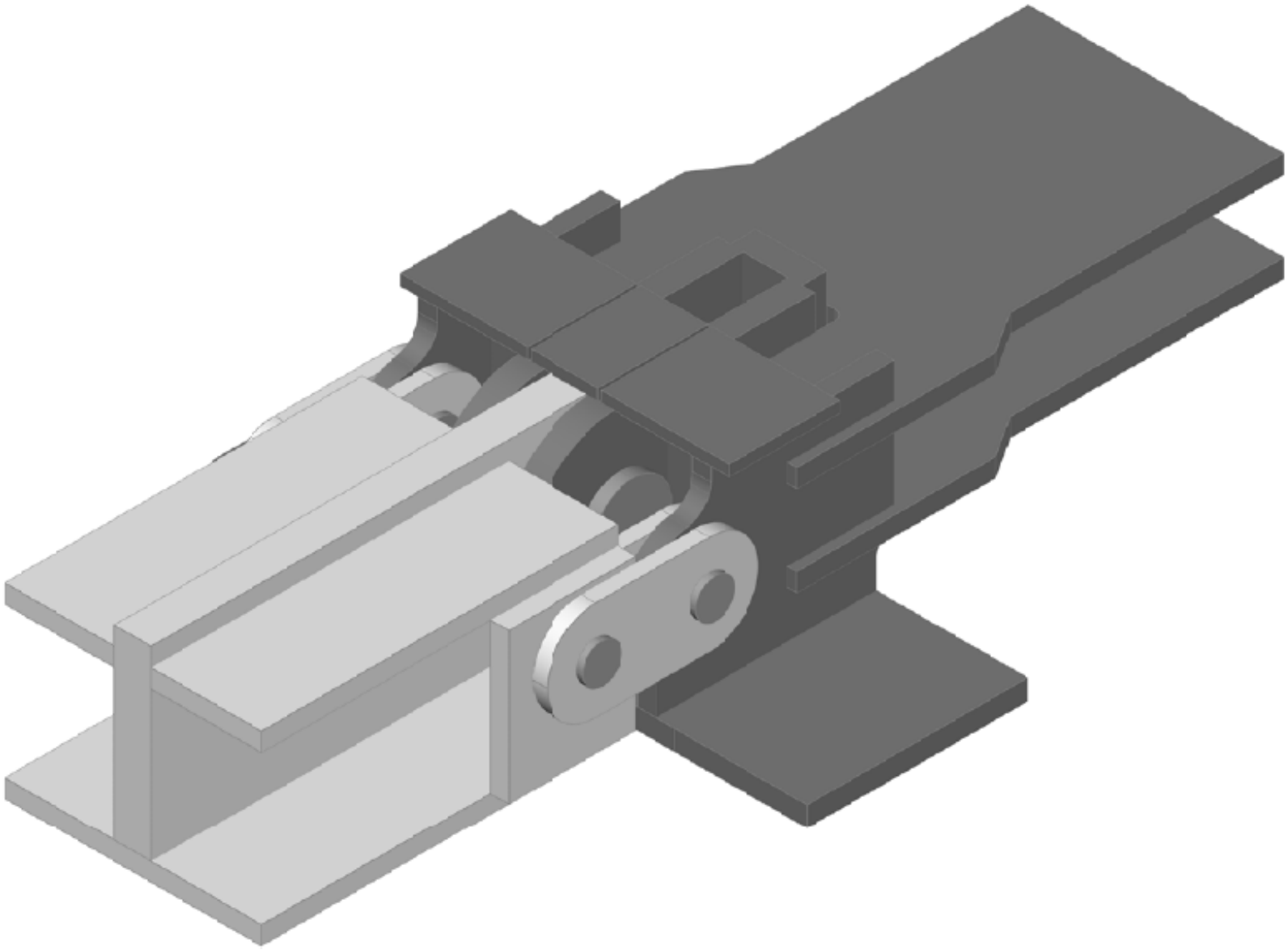


PIANTA GENERALE DEL LIVELLO 8

Intesa – San Paolo. Italia

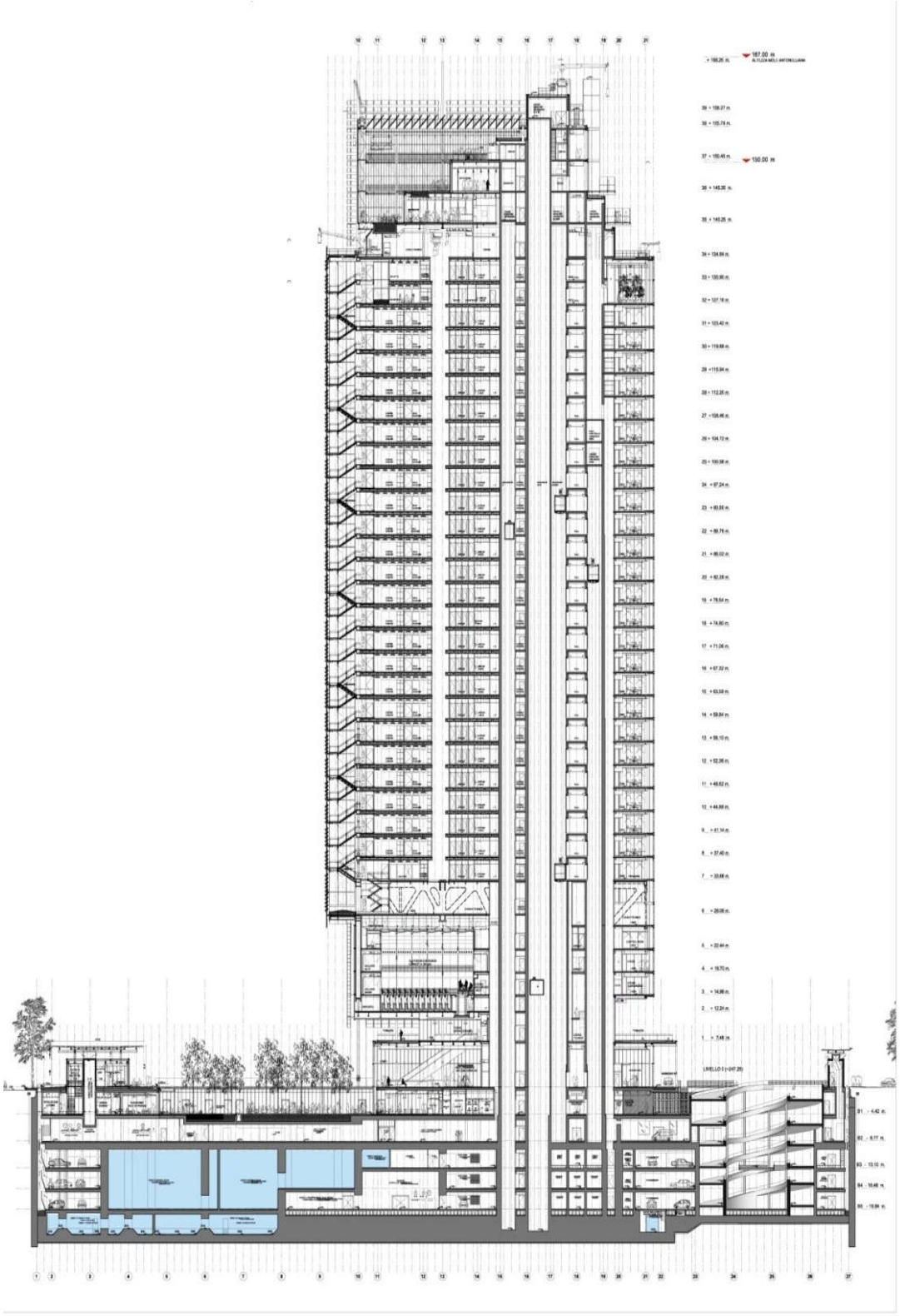


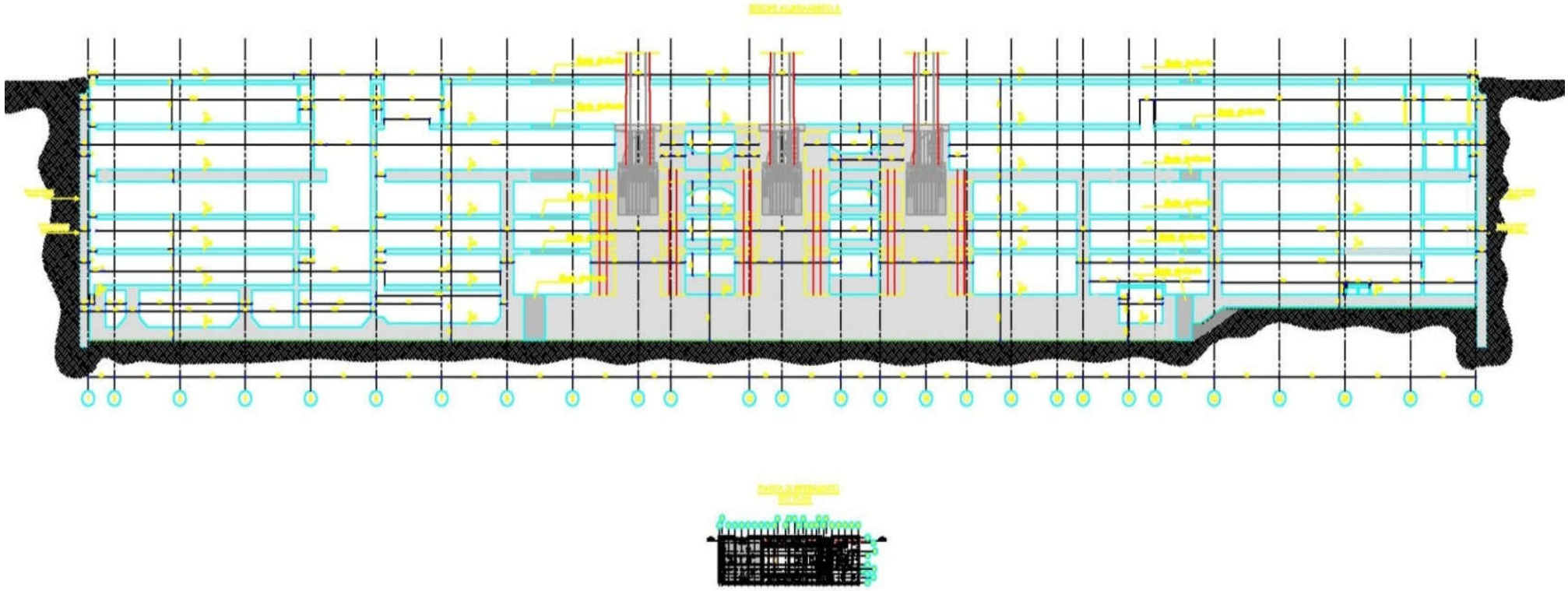
Intesa – San Paolo. Italia

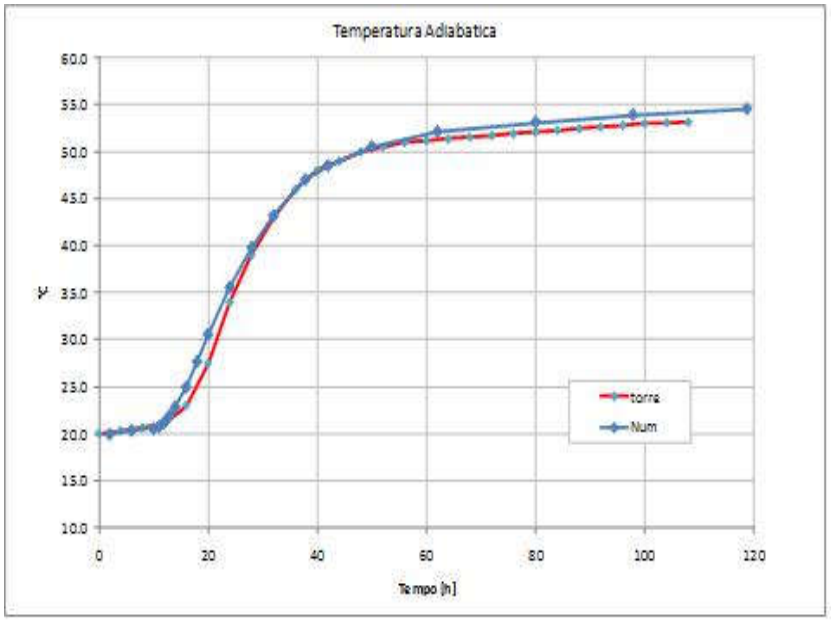


3 *Intesa – San Paolo. Italia*

Intesa – San Paolo



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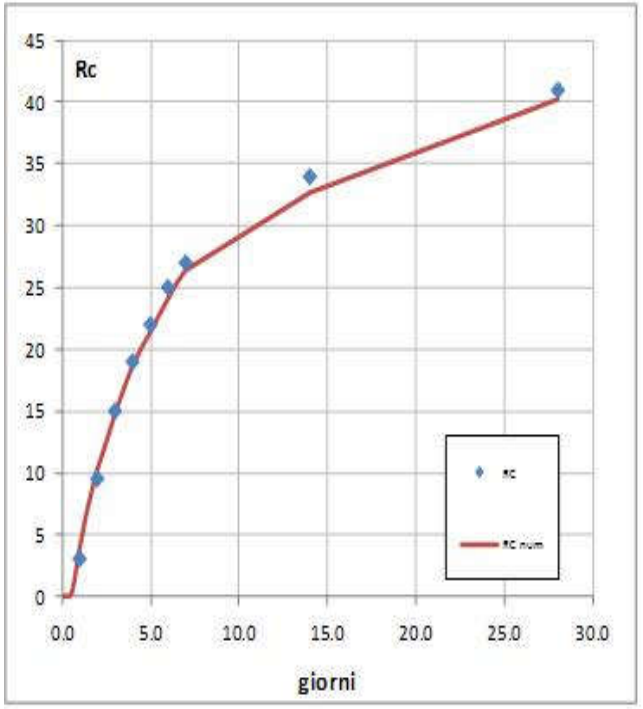
°C
Tempo [h]
torre
Num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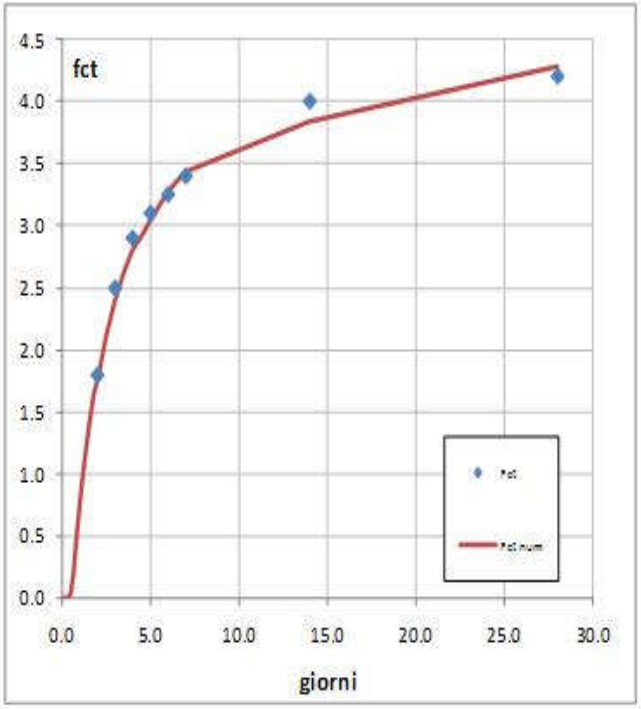
Rc
Rc num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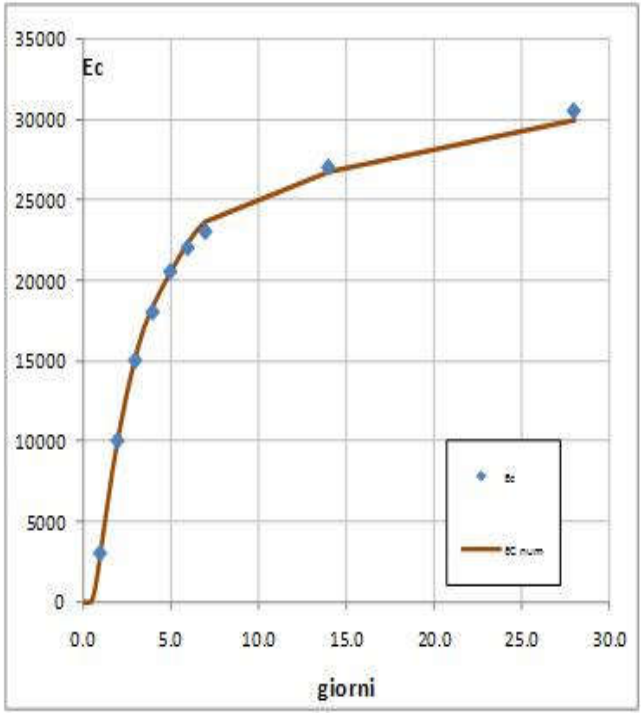
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giorni
Ec
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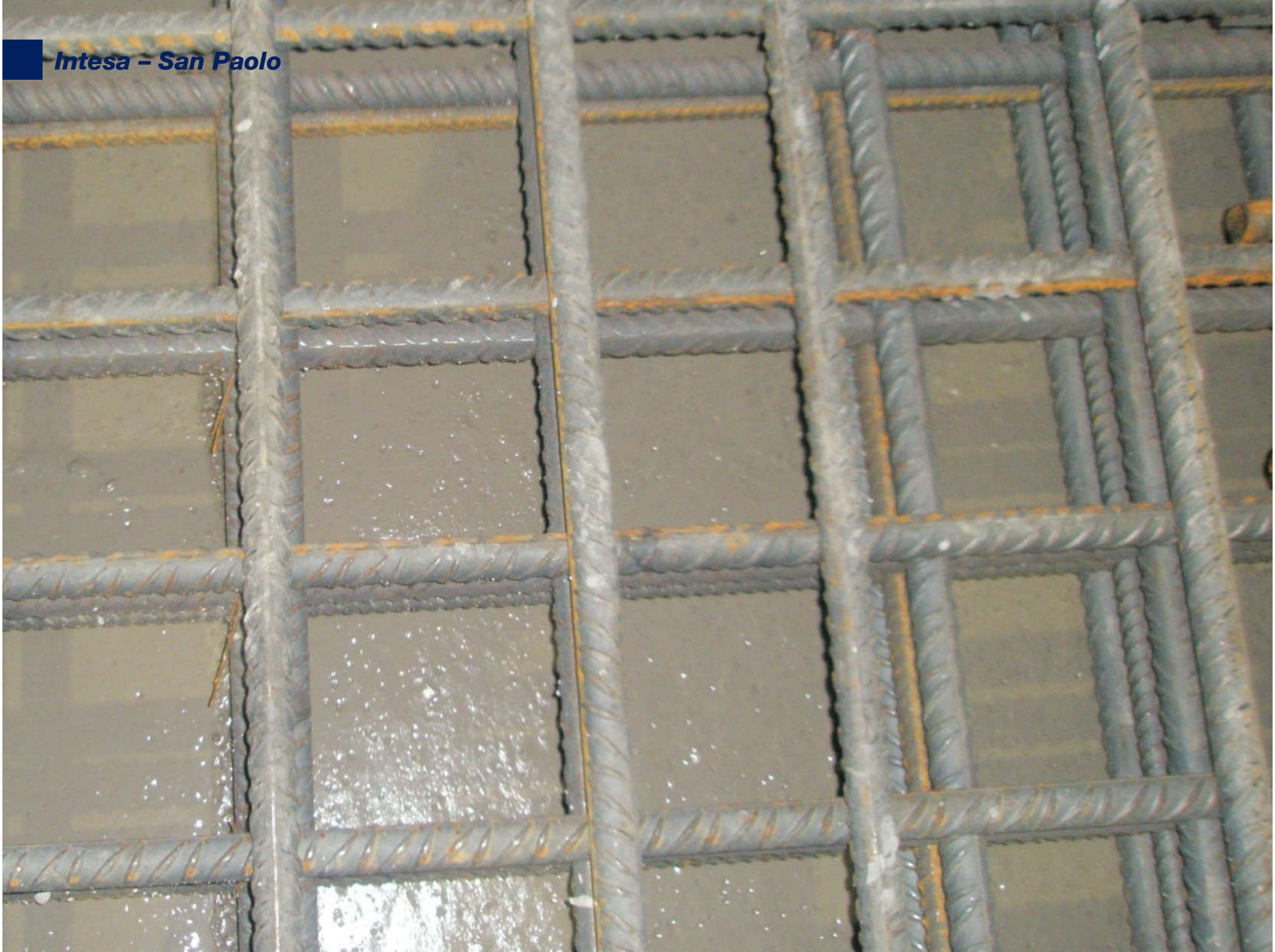
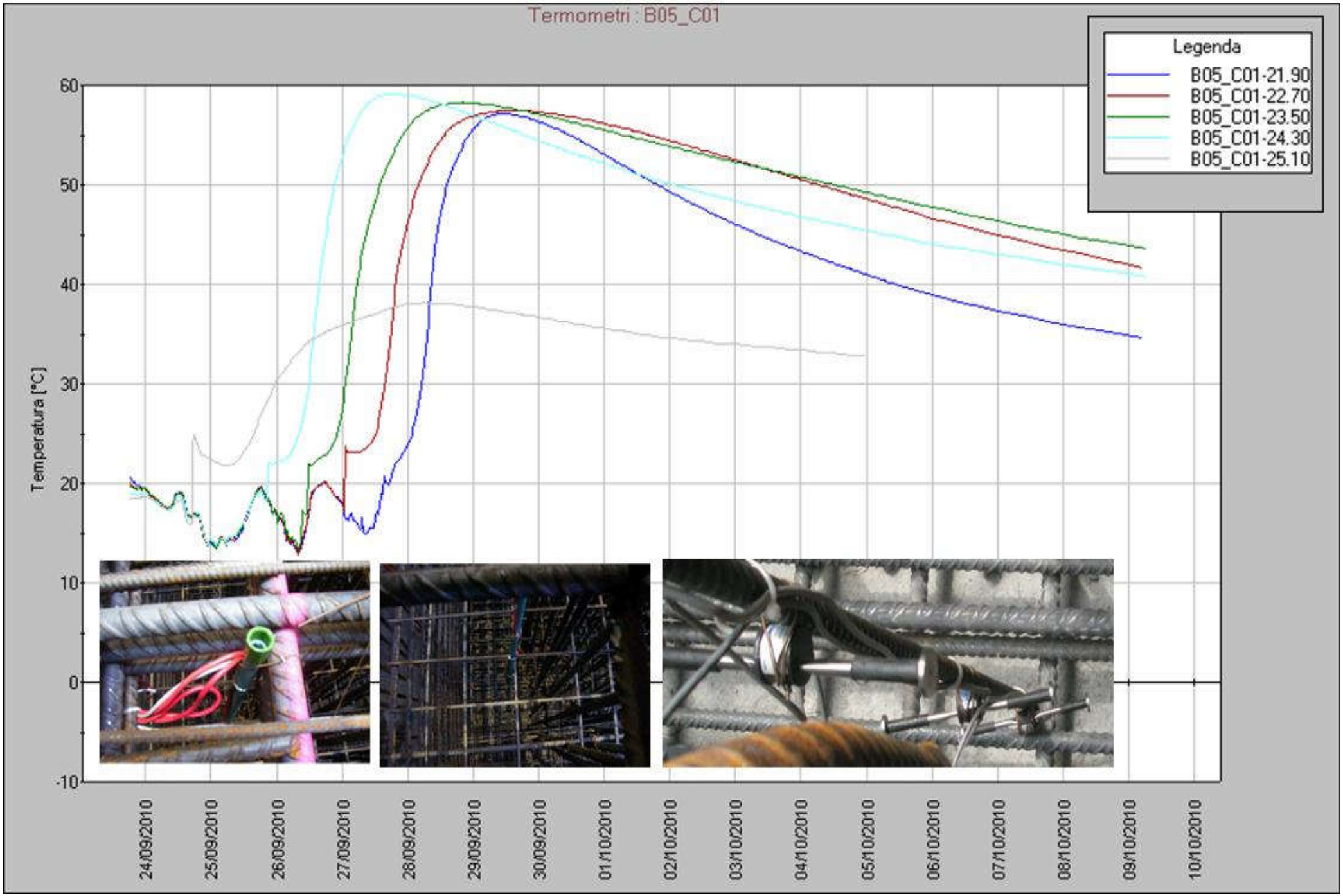
Intesa – San Paolo

Intesa – San Paolo

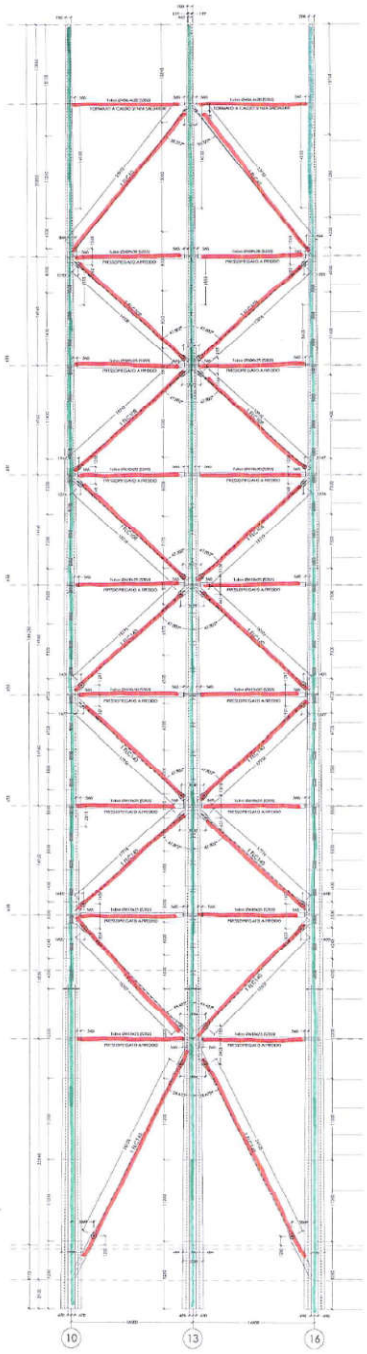


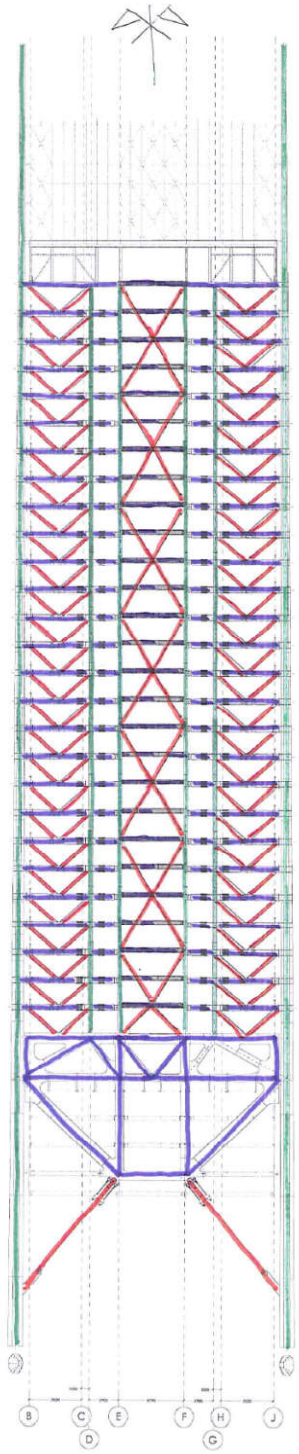
Intesa – San Paolo

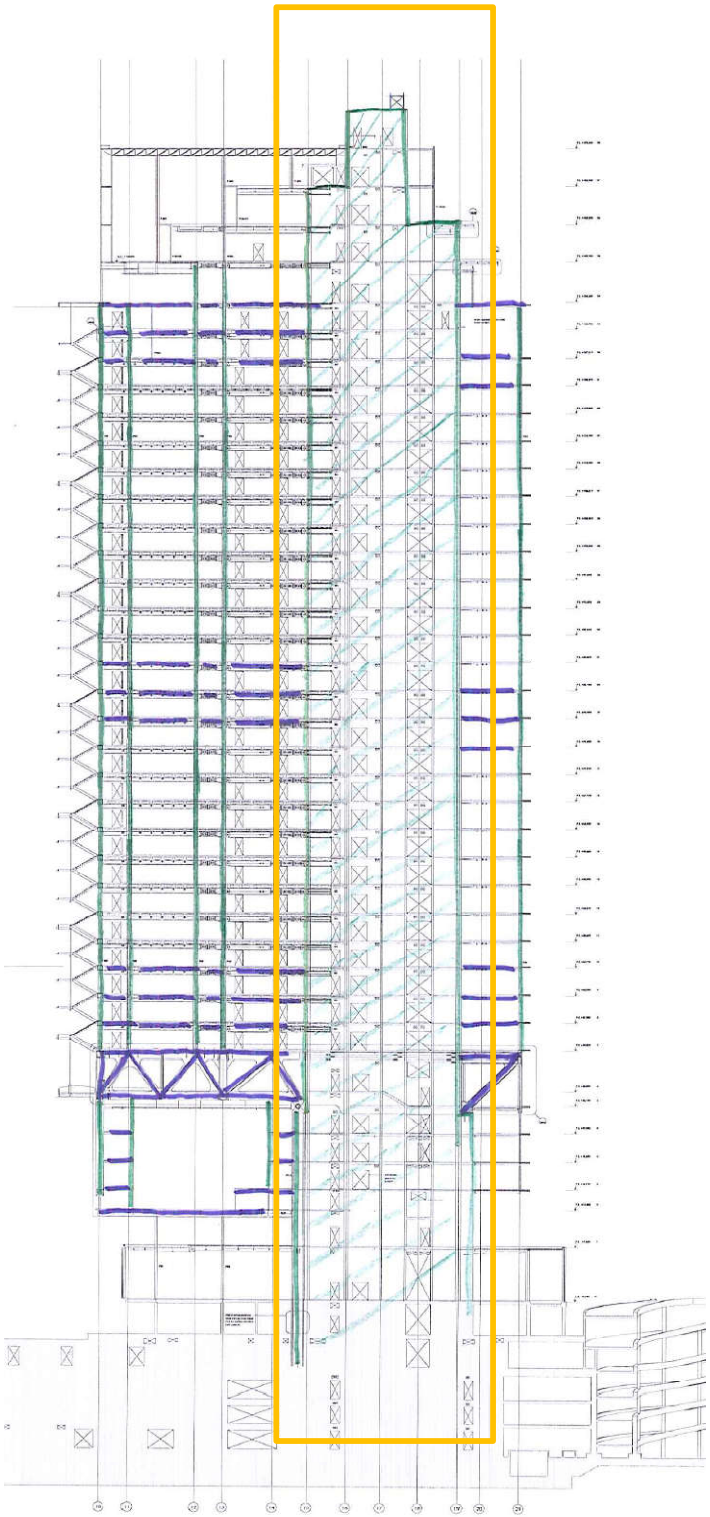
Resultados Losa cimentacion 09-23



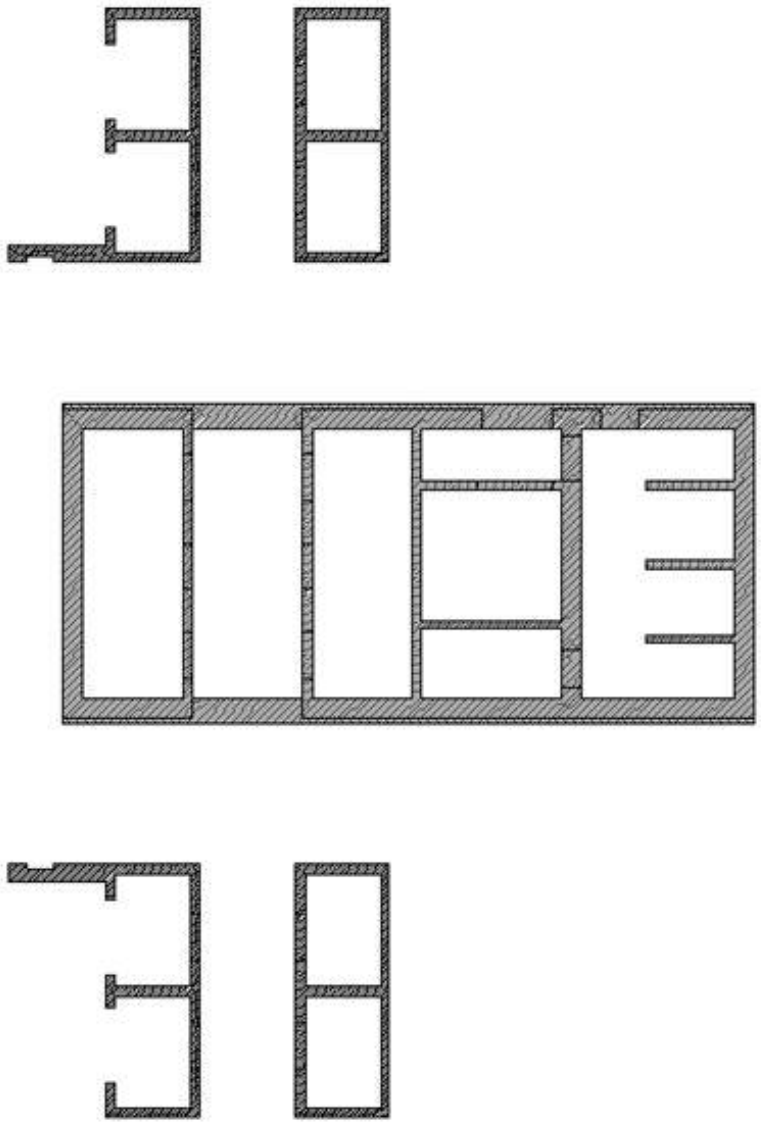
3 Intesa – San Paolo. Italia

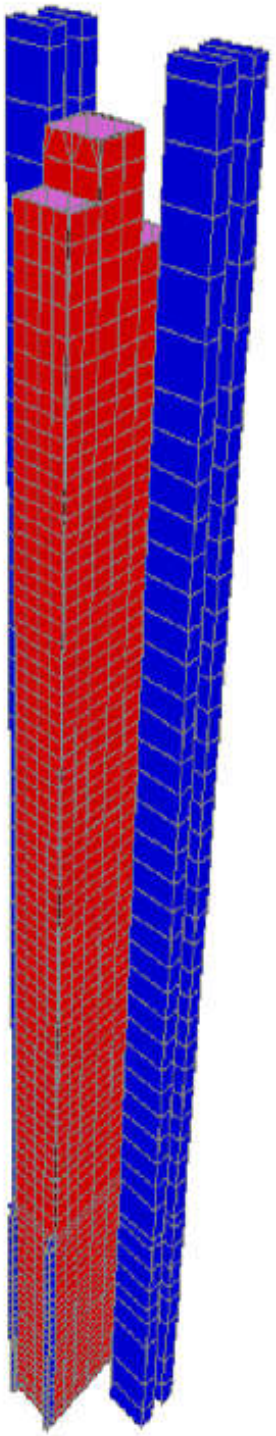




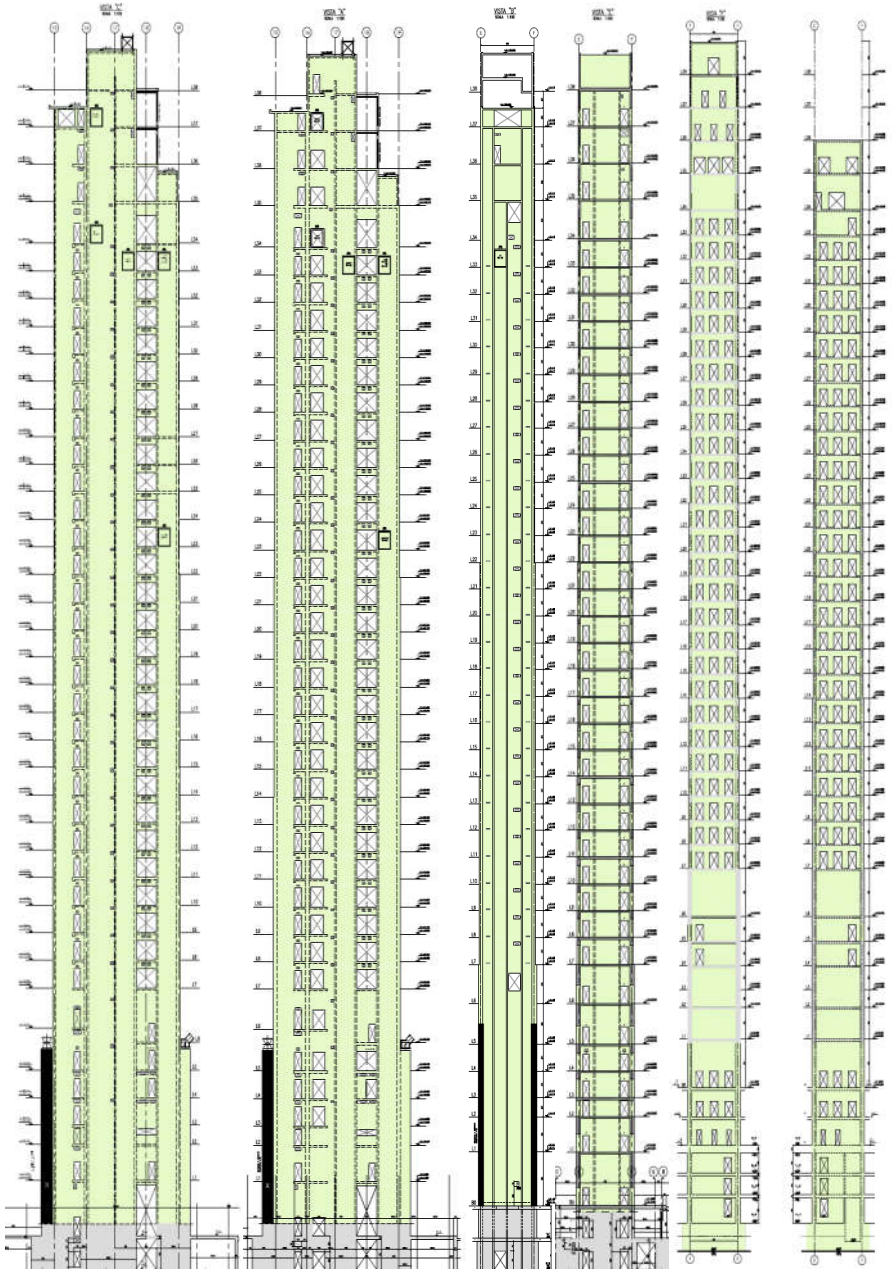


Intesa – San Paolo. Italia



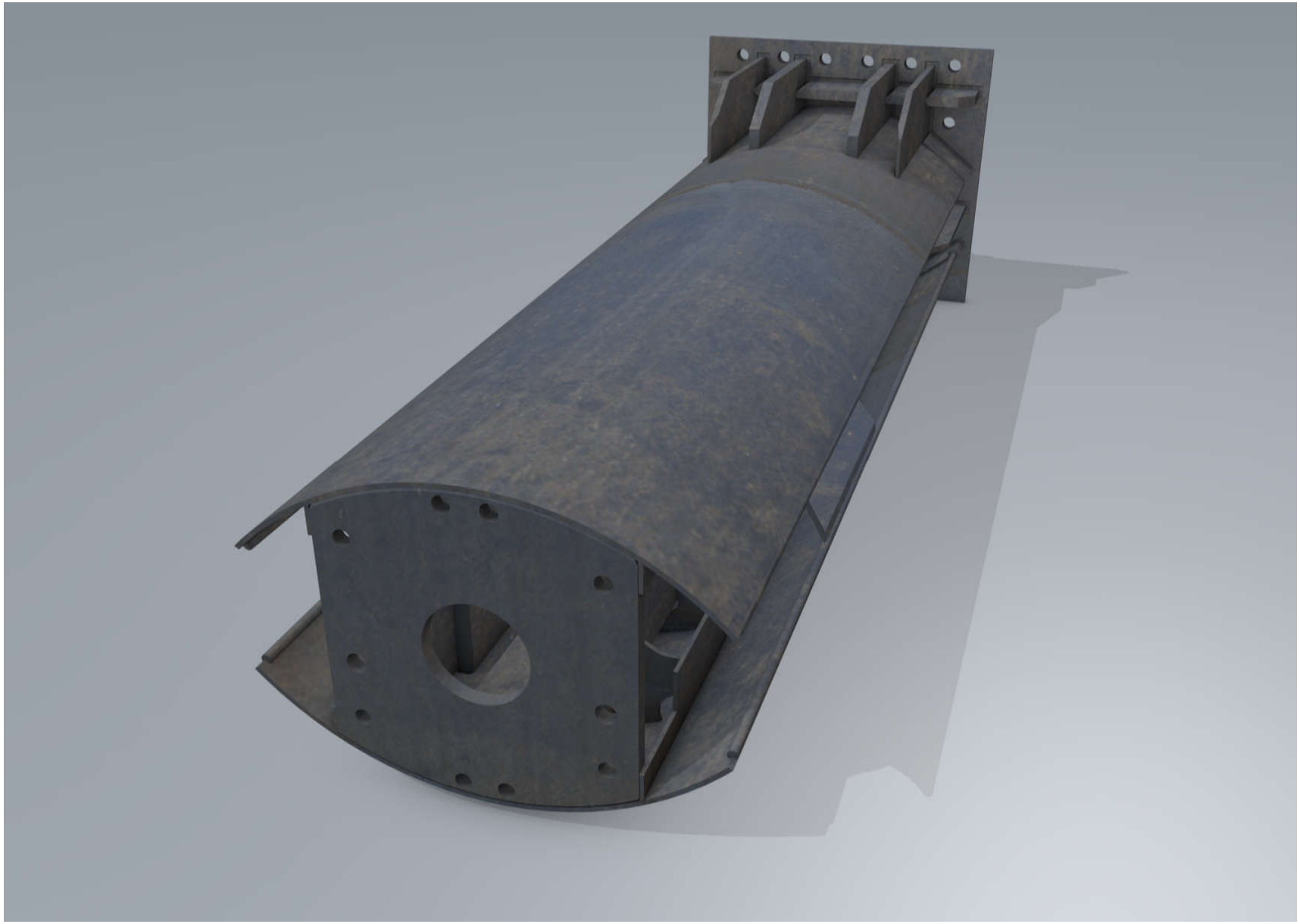


3 Intesa – San Paolo. Italia

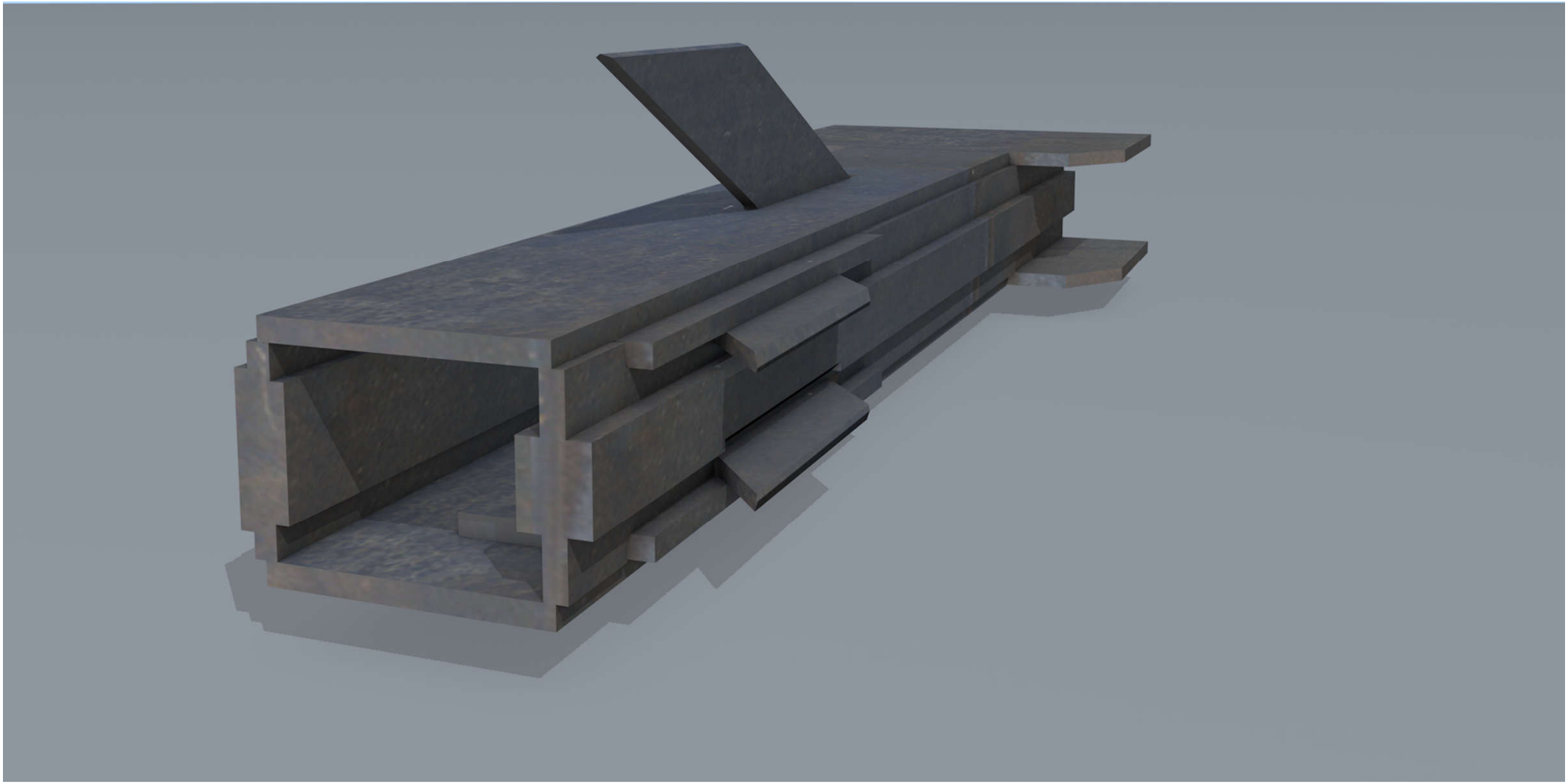


Intesa – San Paolo. Italia

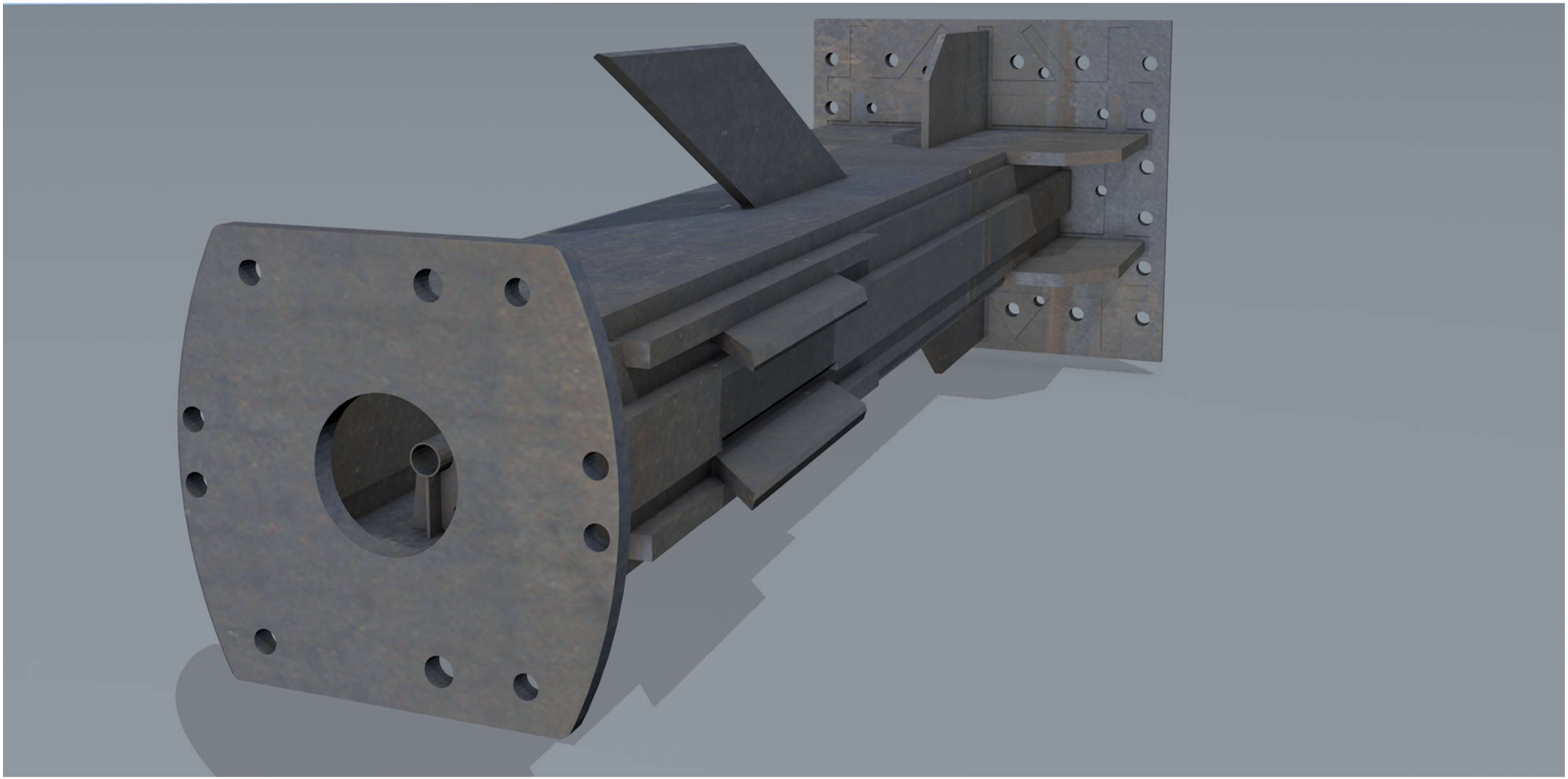
3 Intesa – San Paolo. Italia



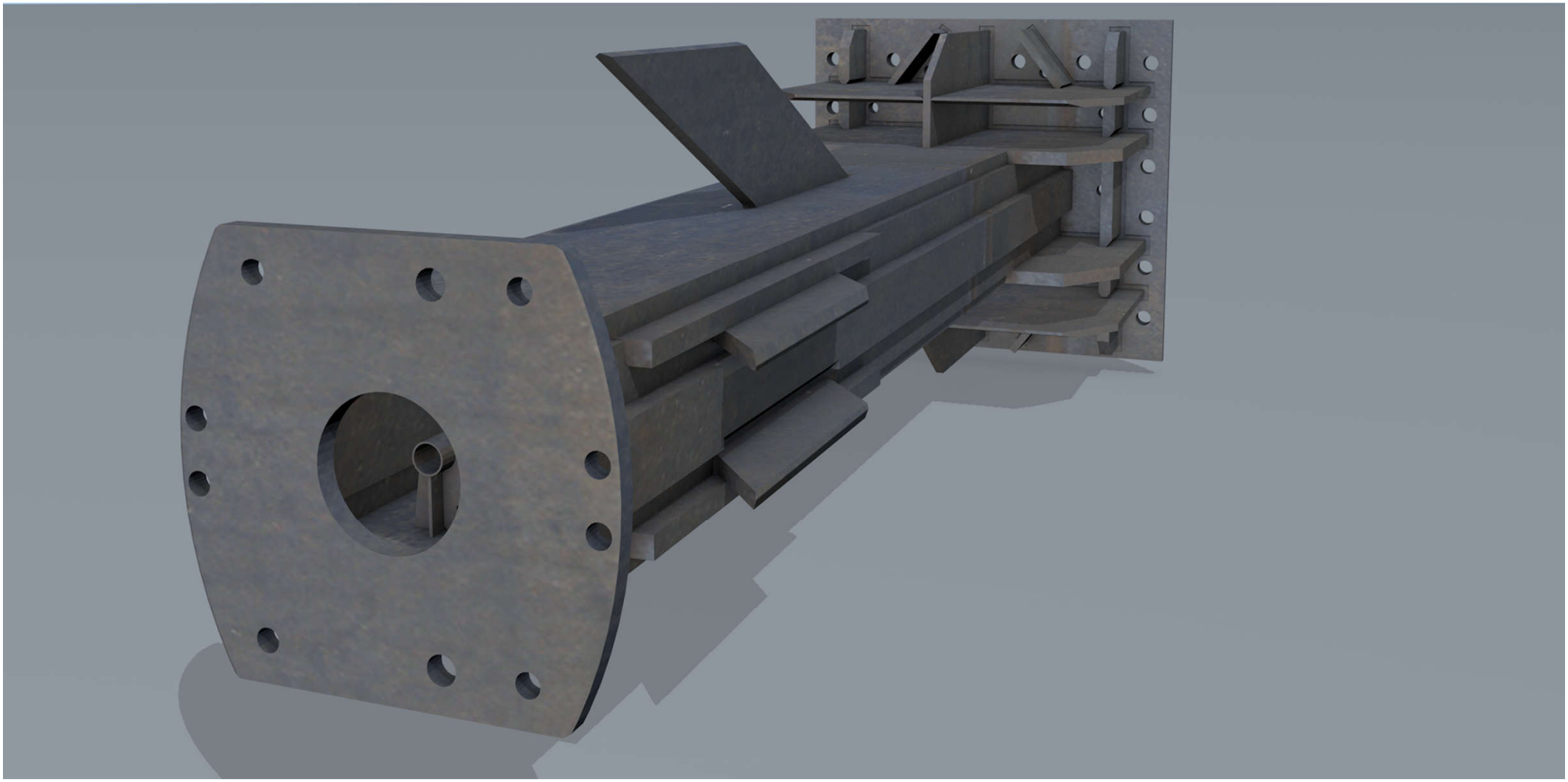
Assiemaggio/saldatura di un concio di base



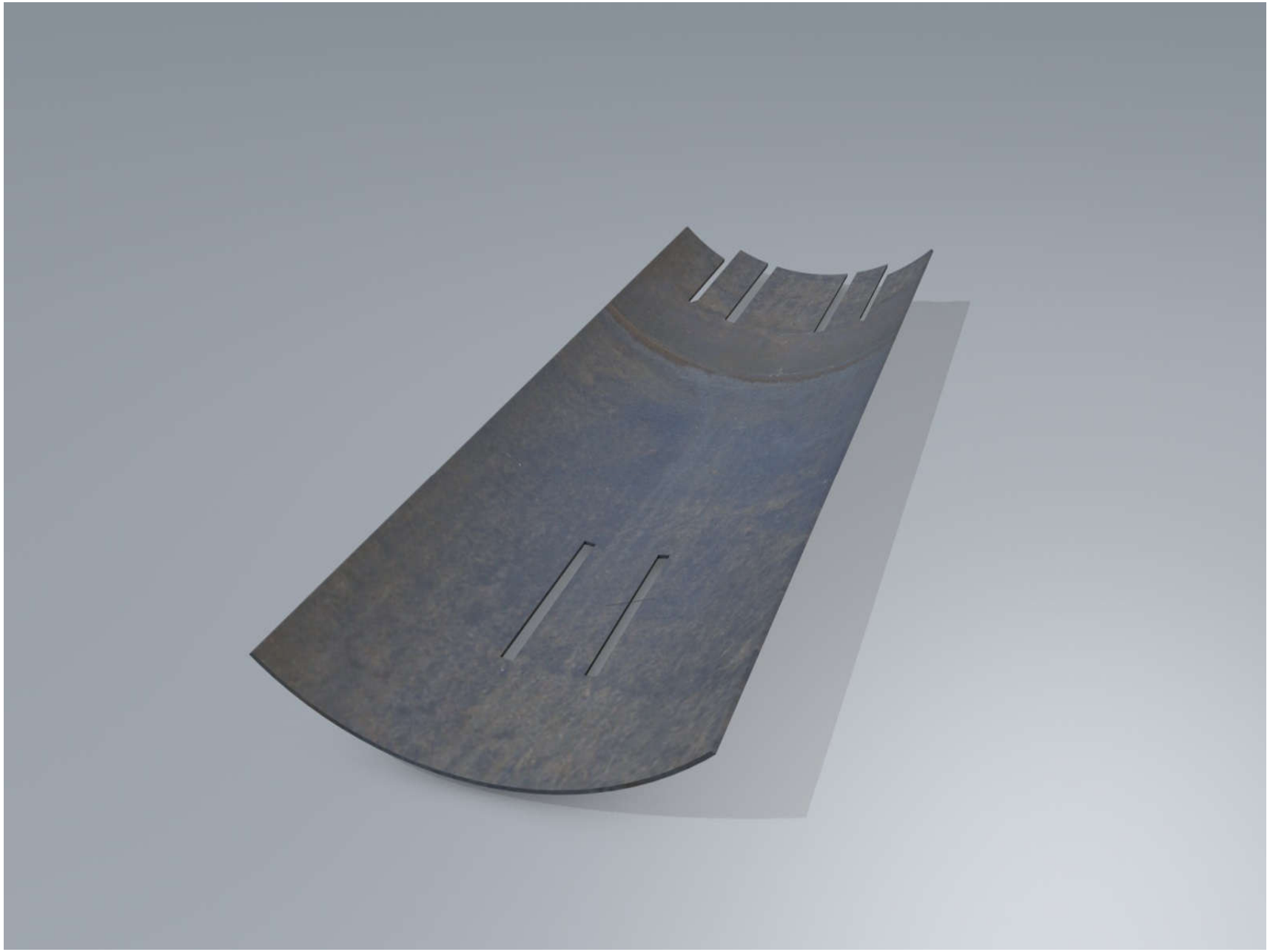
Assiemaggio/saldatura di un concio di base: il nucleo interno



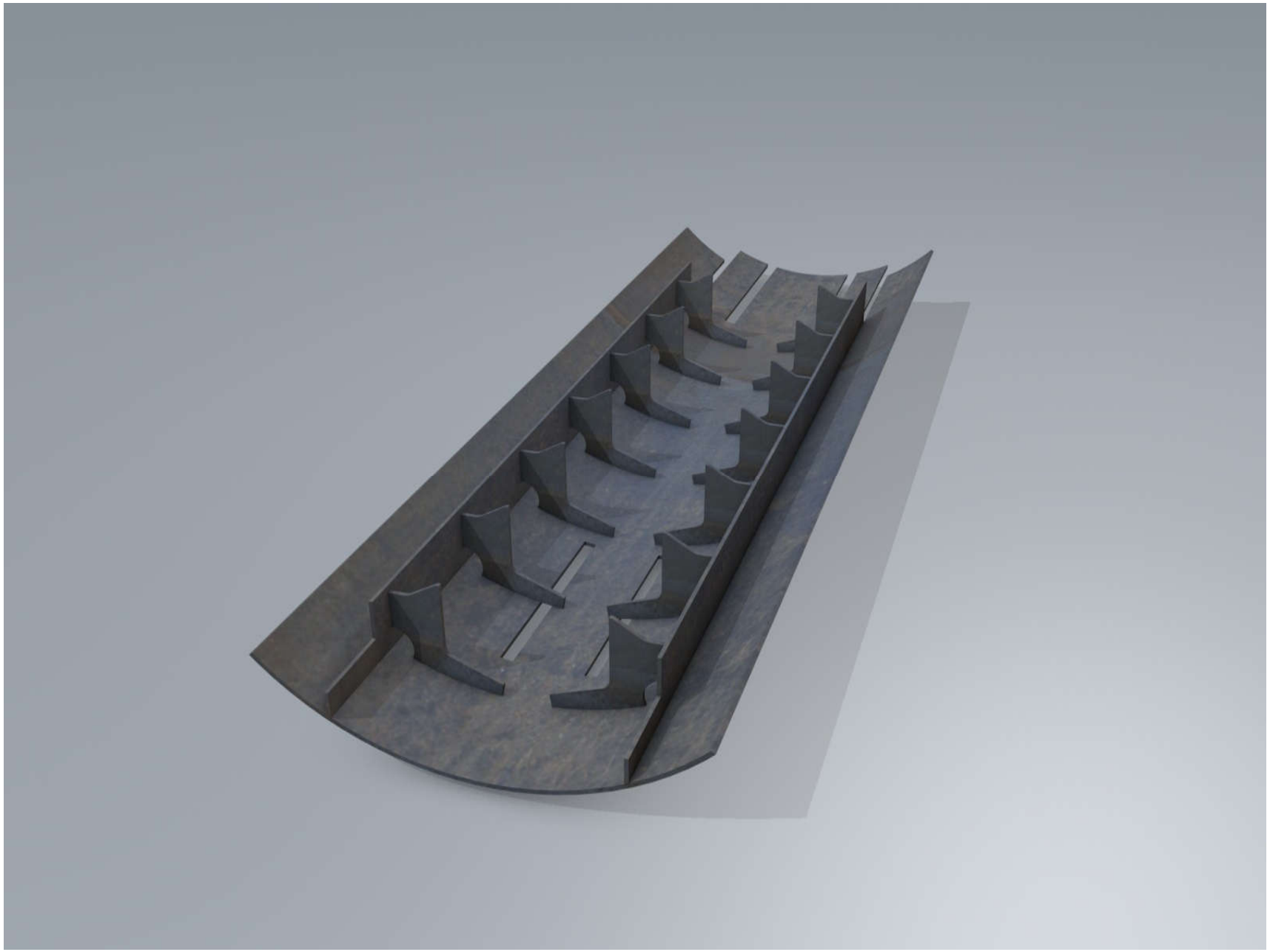
Assiemaggio/saldatura di un concio di base: accoppiameto delle flange di testa



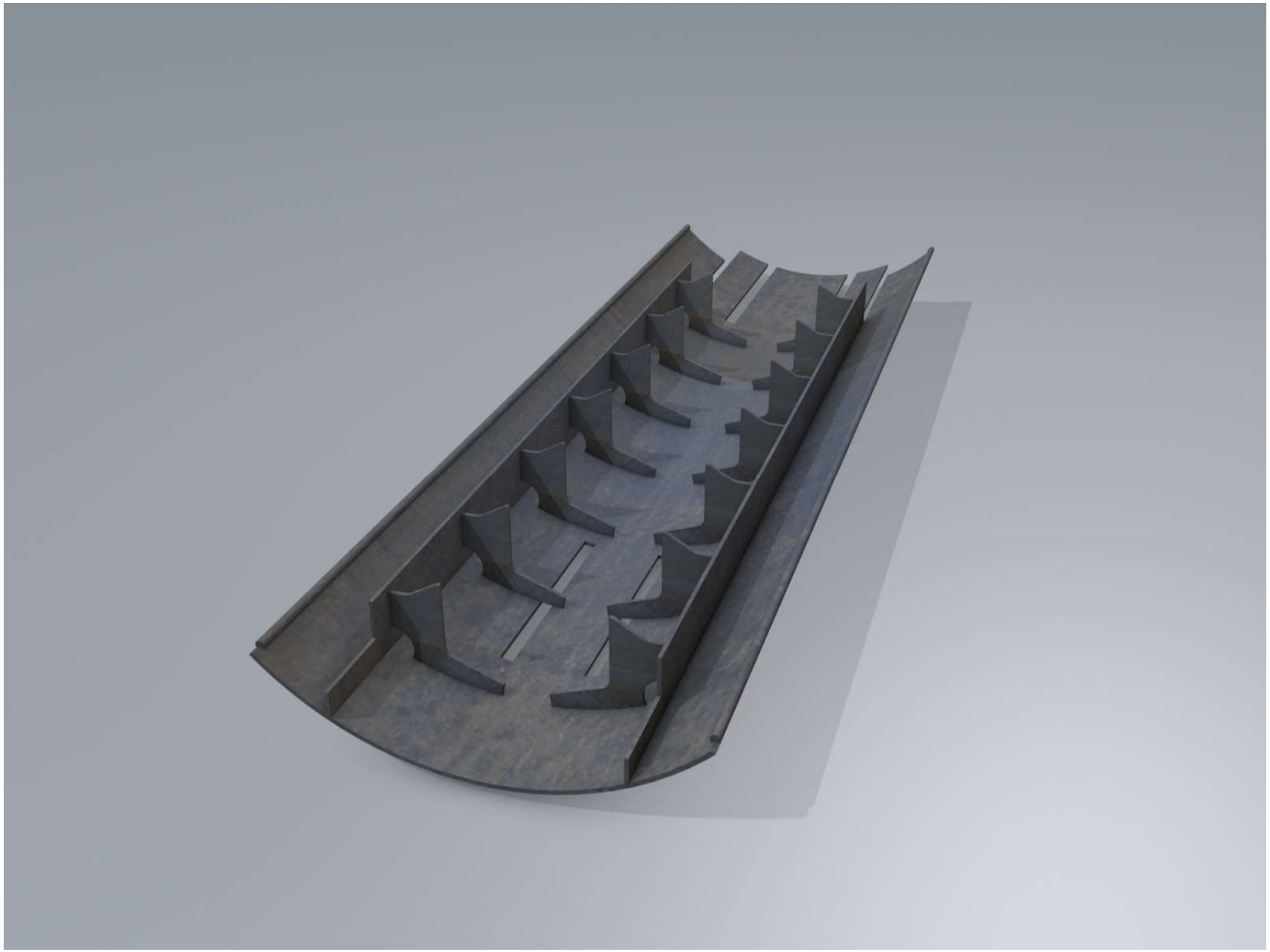
Assiemaggio/saldatura di un concio di base: completamento delle costole di base



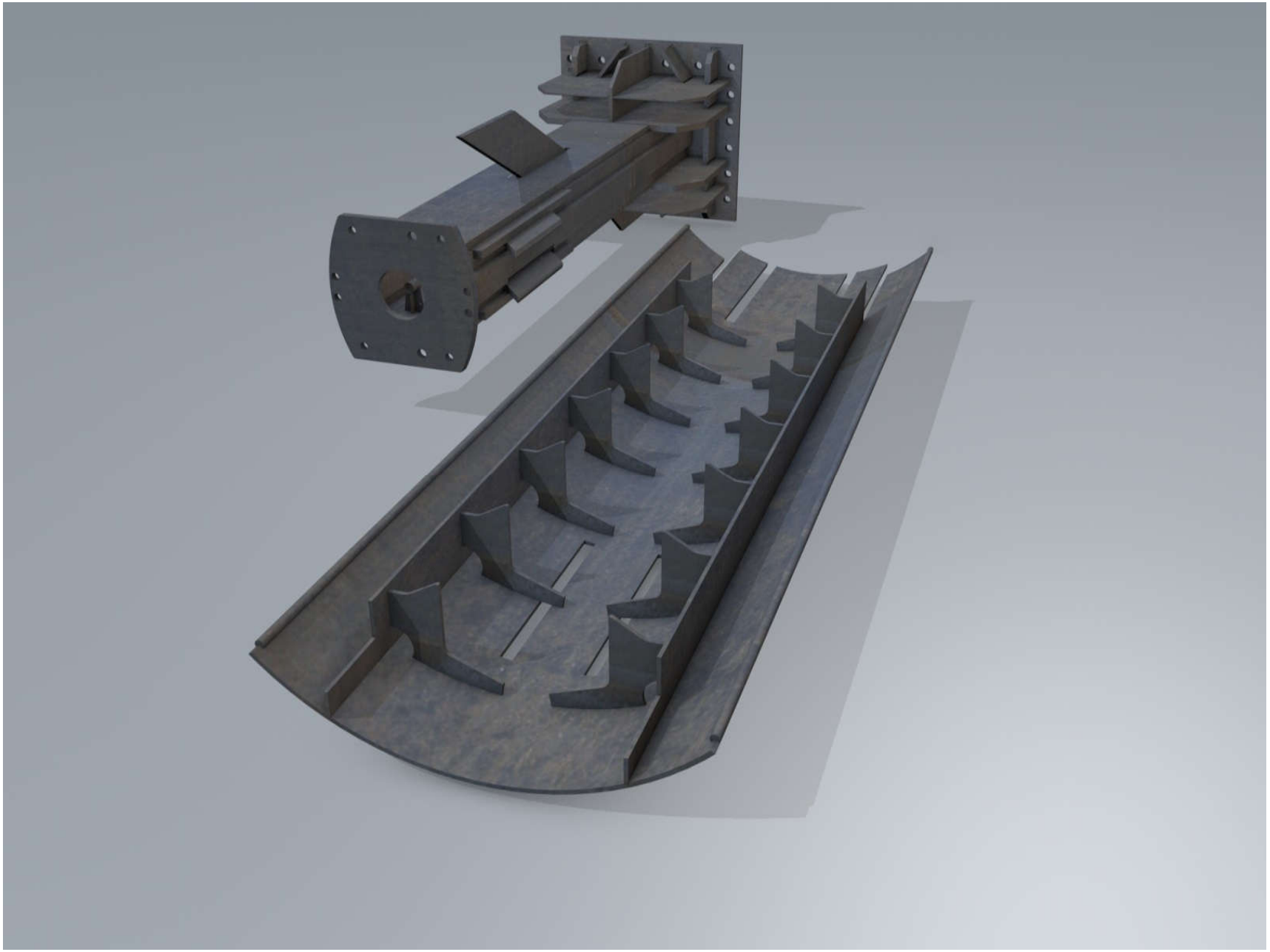
Assiemaggio/saldatura di un concio di base: preparazione dei gusci



Assiemaggio/saldatura di un concio di base: vestizione dei gusci



Assiemaggio/saldatura di un concio di base: vestizione dei gusci con i tondi di finiture lungo le estremità



Assiemaggio/saldatura di un concio di base: accoppiamento dei gusci sul nucleo interno

Assiemaggio/saldatura di un concio di base

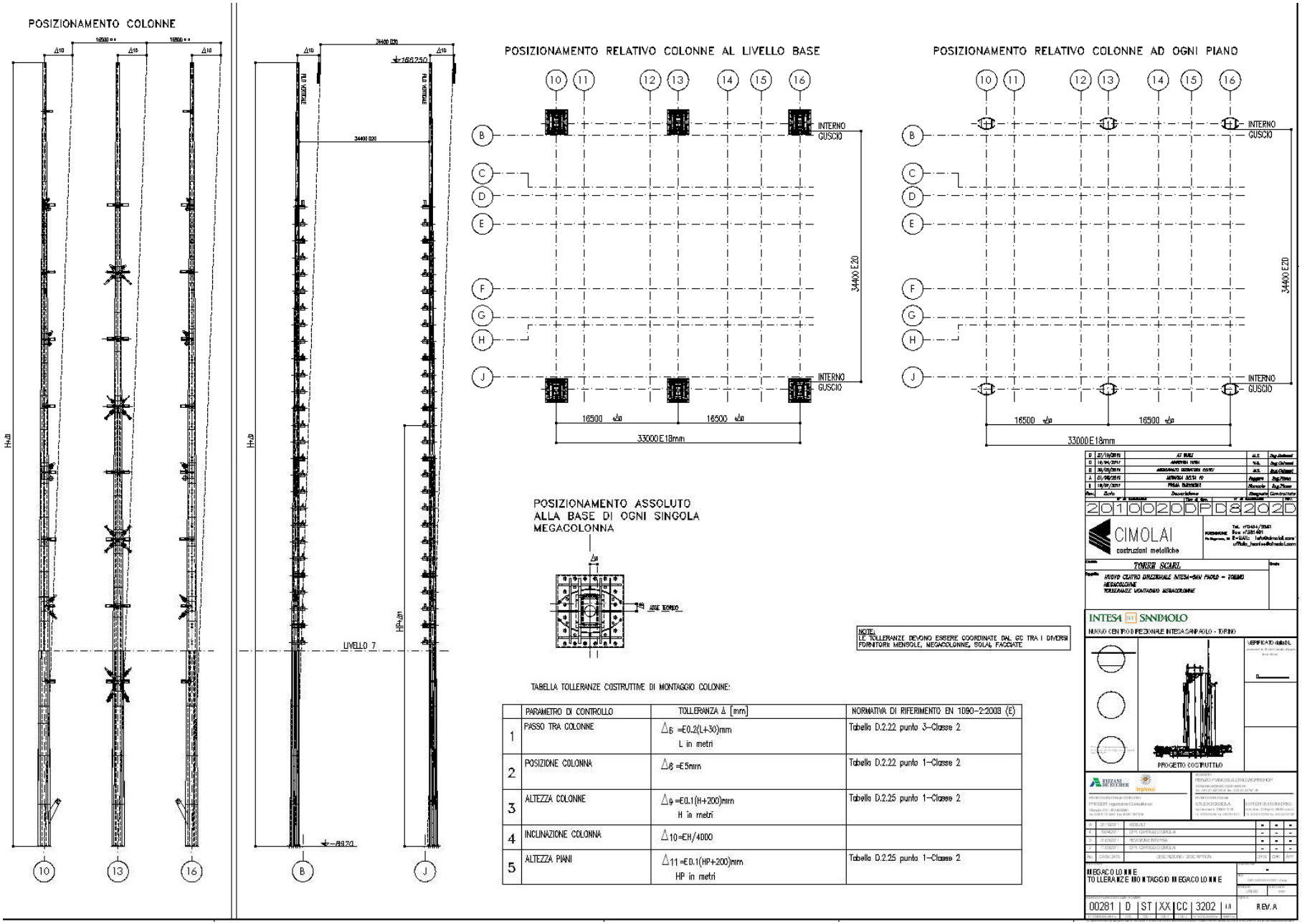
La prova di carico in officina su un concio campione della Megacolonna asse 13 liv. P14

3 Intesa – San Paolo. Italia

Dettaglio: il giunto flangiato

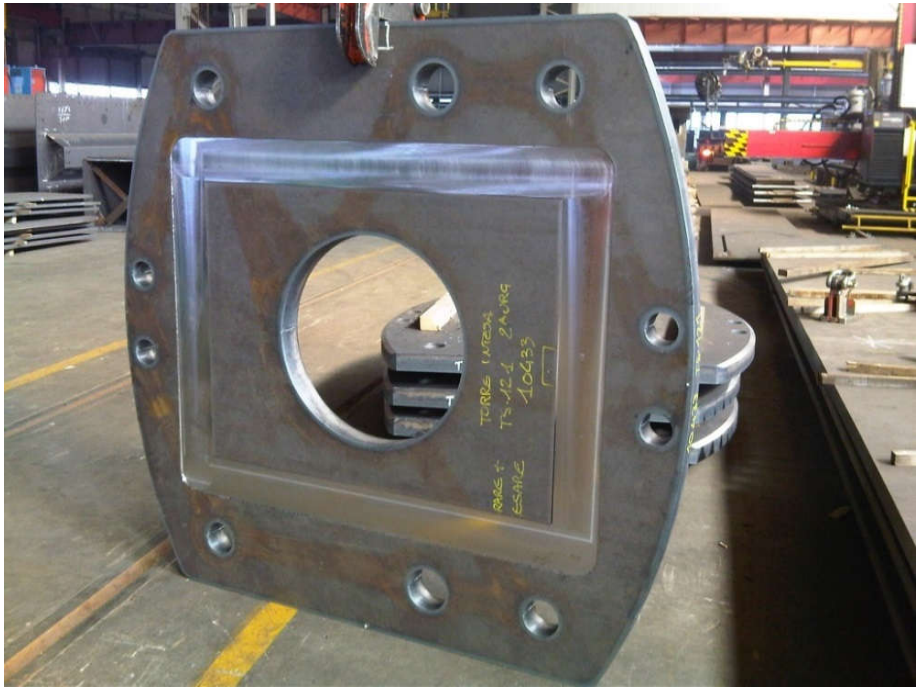
Il montaggio di n.3 conci

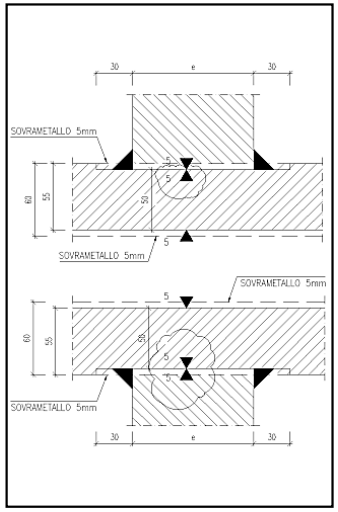
Intesa – San Paolo. Italia



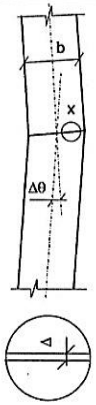
	PARAMETRO DI CONTROLLO	TOLLERANZA Δ [mm]	NORMATIVA DI RIFERIMENTO EN 1090-2:2008 (E)
1	PASSO TRA COLONNE	$\Delta_6 = \pm 0.2(L+30)$mm L in metri	Tabella D.2.22 punto 3–Classe 2
2	POSIZIONE COLONNA	$\Delta_8 = \pm 5$mm	Tabella D.2.22 punto 1–Classe 2
3	ALTEZZA COLONNE	$\Delta_9 = \pm 0.1(H+200)$mm H in metri	Tabella D.2.25 punto 1–Classe 2
4	INCLINAZIONE COLONNA	$\Delta_{10} = \pm H/4000$	
5	ALTEZZA PIANI	$\Delta_{11} = \pm 0.1(HP+200)$mm HP in metri	Tabella D.2.25 punto 1–Classe 2

3 Intesa – San Paolo. Italia





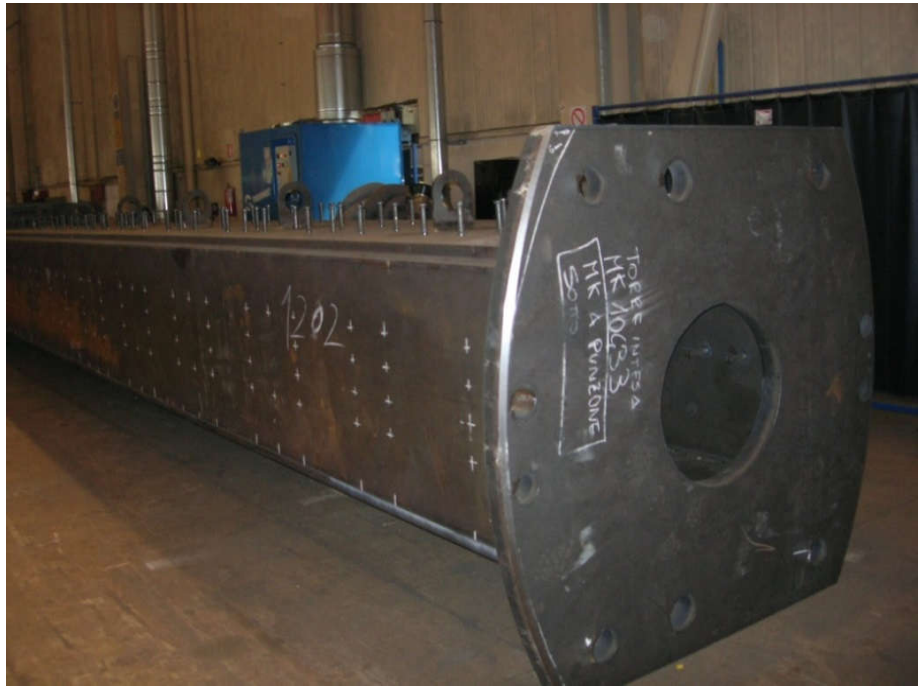
D.1.13 Essential erection tolerances – Full contact end bearing

No	Criterion	Parameter	Permitted deviation Δ
1		Local angular misalignment Δθ occurring at the same time as gap Δ at point "X"	Δθ = ± *h*/500 where *h* is the storey height (see D.1.11 No4) and at the same time: • Δ = 0,5 mm over at least two thirds of the area, and • Δ = 1,0 mm maximum locally

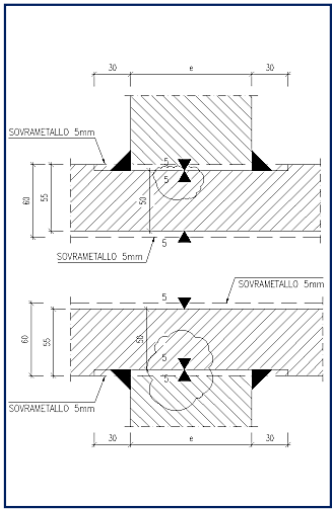
Assiemaggio/saldatura carpenteria: fresatura delle teste dei conci e delle piste sulle flange

Intesa – San Paolo. Italia

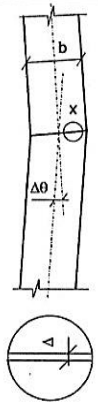
Saldatura flange



Fresatura flange



D.1.13 Essential erection tolerances – Full contact end bearing

No	Criterion	Parameter	Permitted deviation Δ
1		Local angular misalignment Δθ occurring at the same time as gap Δ at point "X"	Δθ = ± *h*/500 where *h* is the storey height (see D.1.11 No4) and at the same time: • Δ = 0,5 mm over at least two thirds of the area, and • Δ = 1,0 mm maximum locally

EN 1090-2:2008 Tab. D.1.13

Assiemaggio/saldatura carpenteria: saldatura e fresatura delle flange

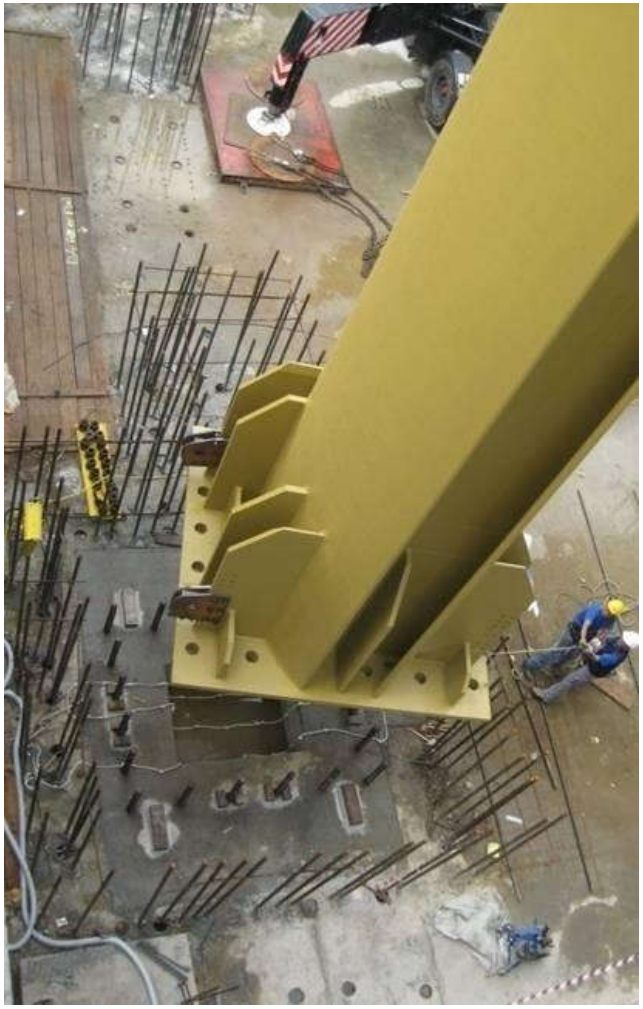
La produzione in officna delle megacolonne

La topografia delle Megacolonne in cantiere: cenni

3 Intesa – San Paolo. Italia

3 *Intesa – San Paolo. Italia*

3 Intesa – San Paolo. Italia



3 Intesa – San Paolo. Italia

3 Intesa – San Paolo. Italia

3 Intesa – San Paolo. Italia

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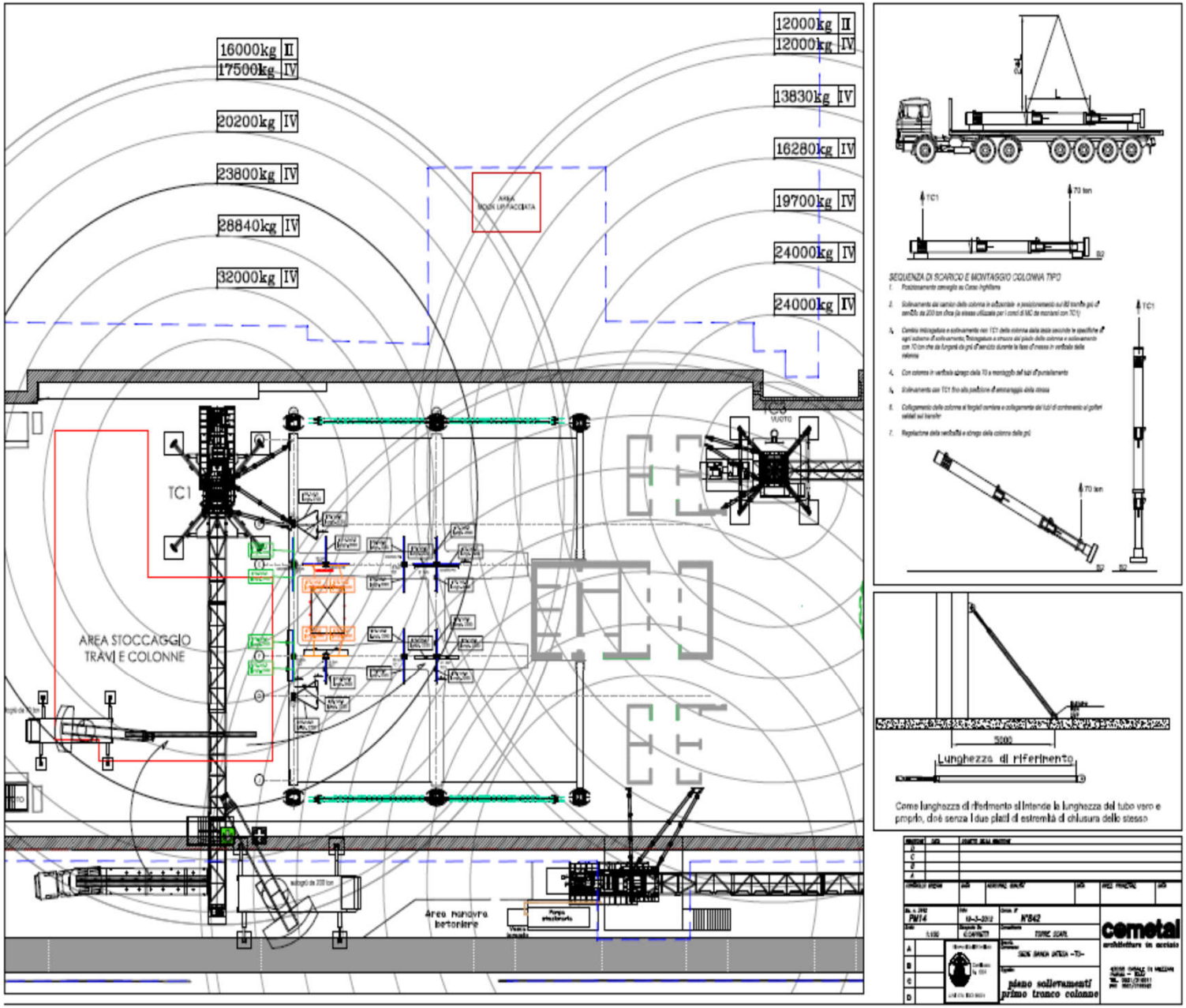
3 *Intesa – San Paolo. Italia*

Intesa – San Paolo. Italia



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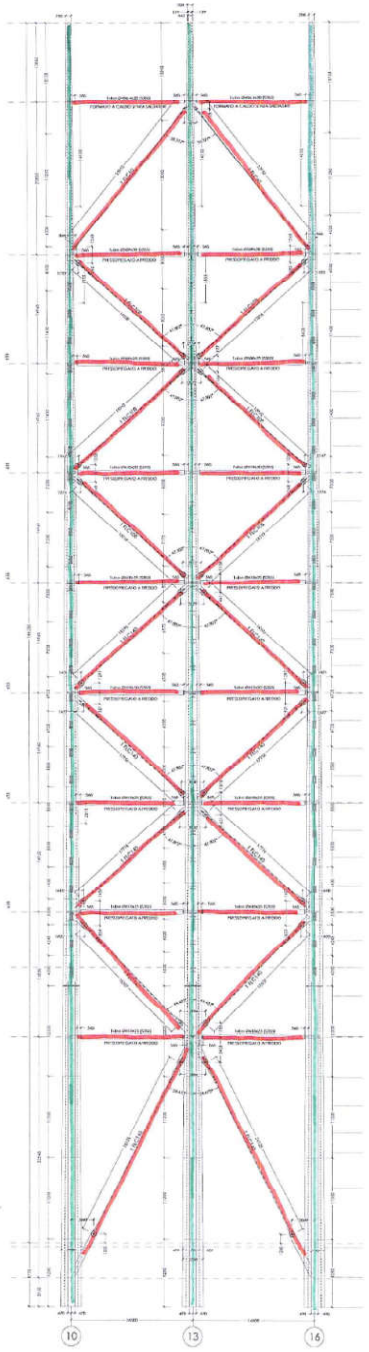
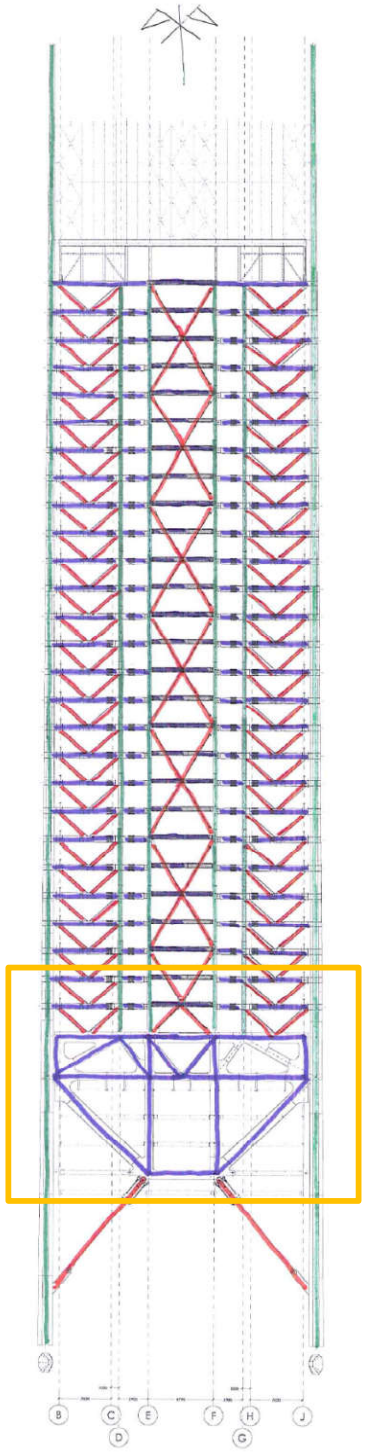
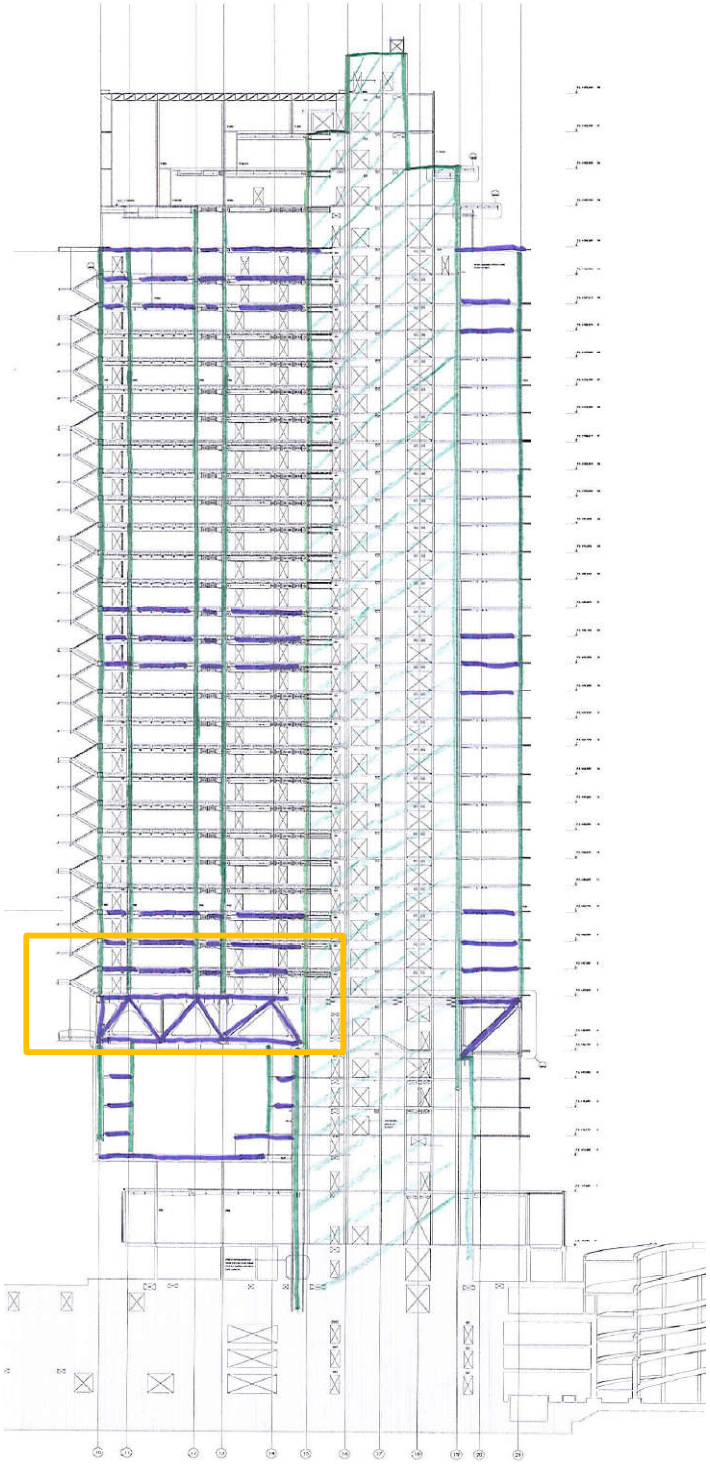
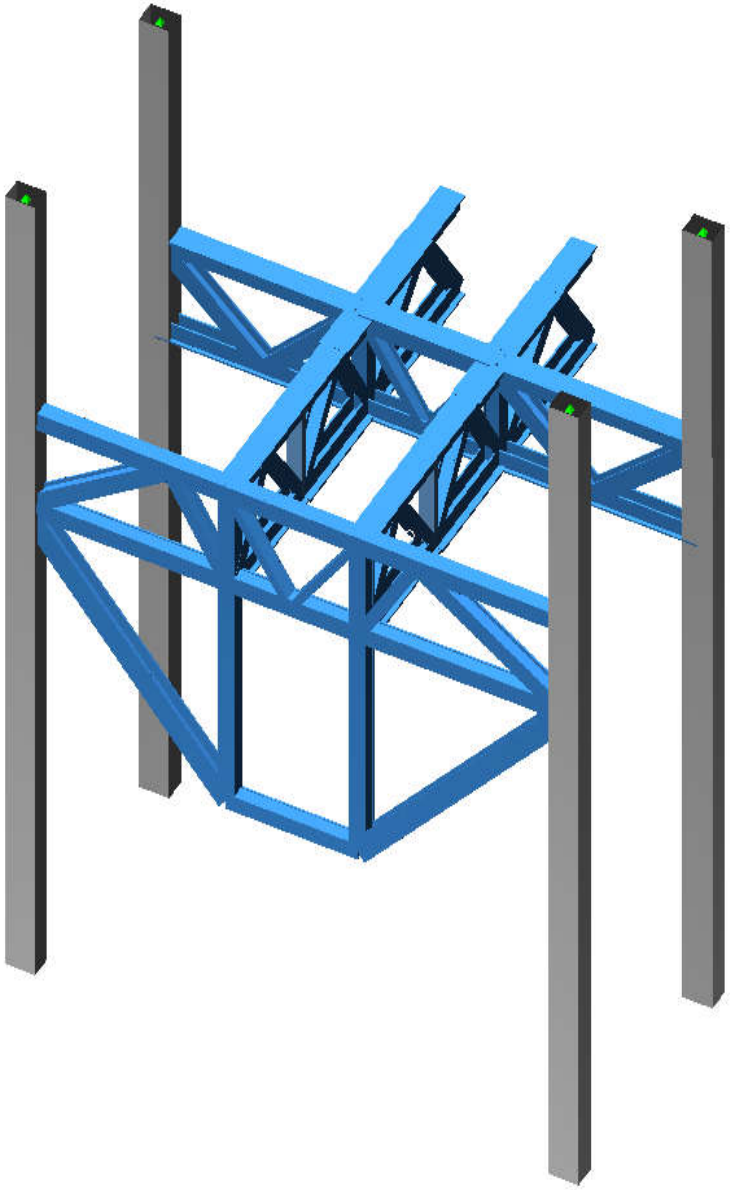


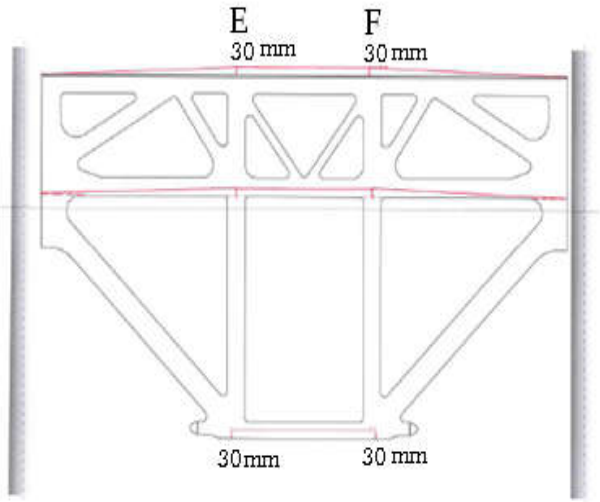




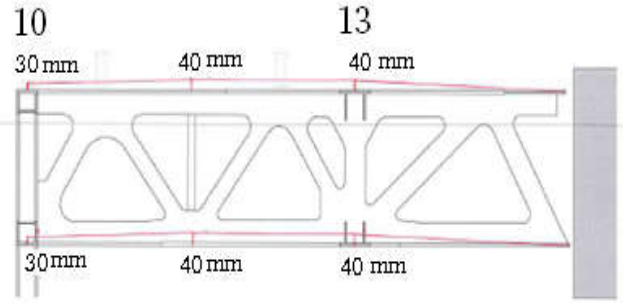
Intesa – San Paolo



Contramonta asse 10



Contramonta asse E/F



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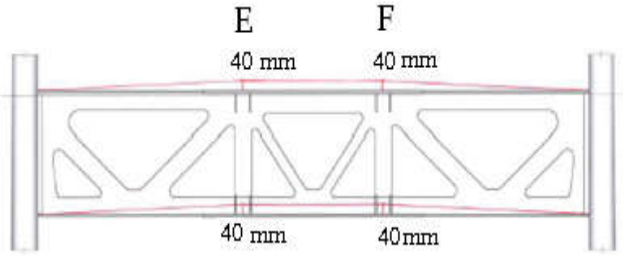
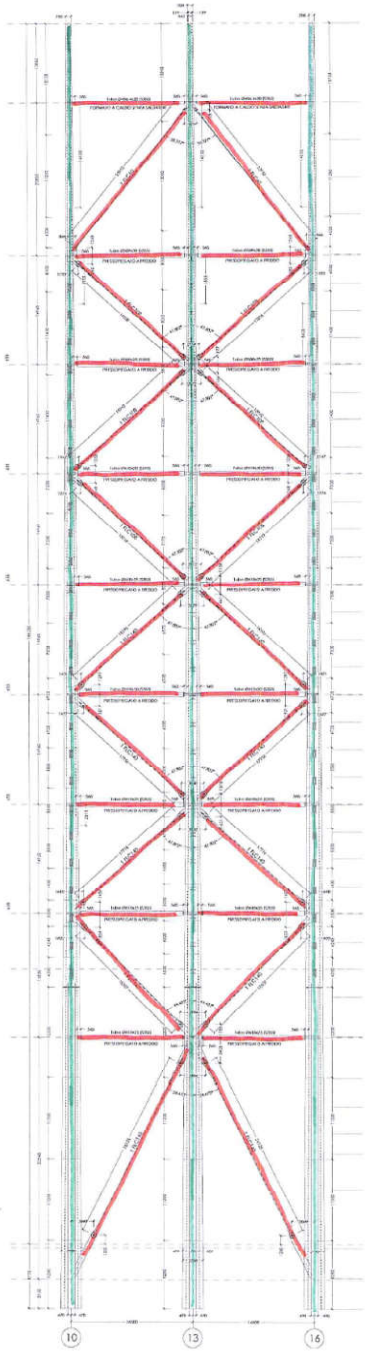
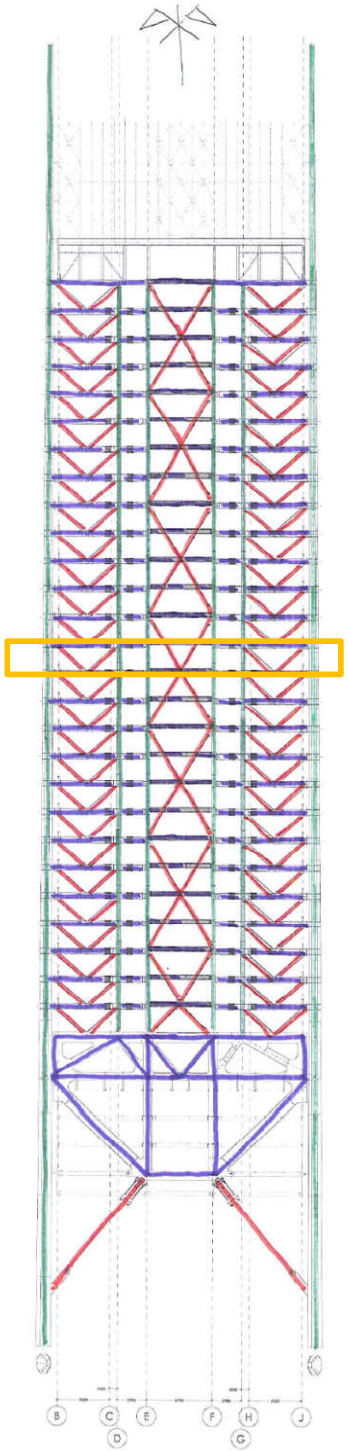
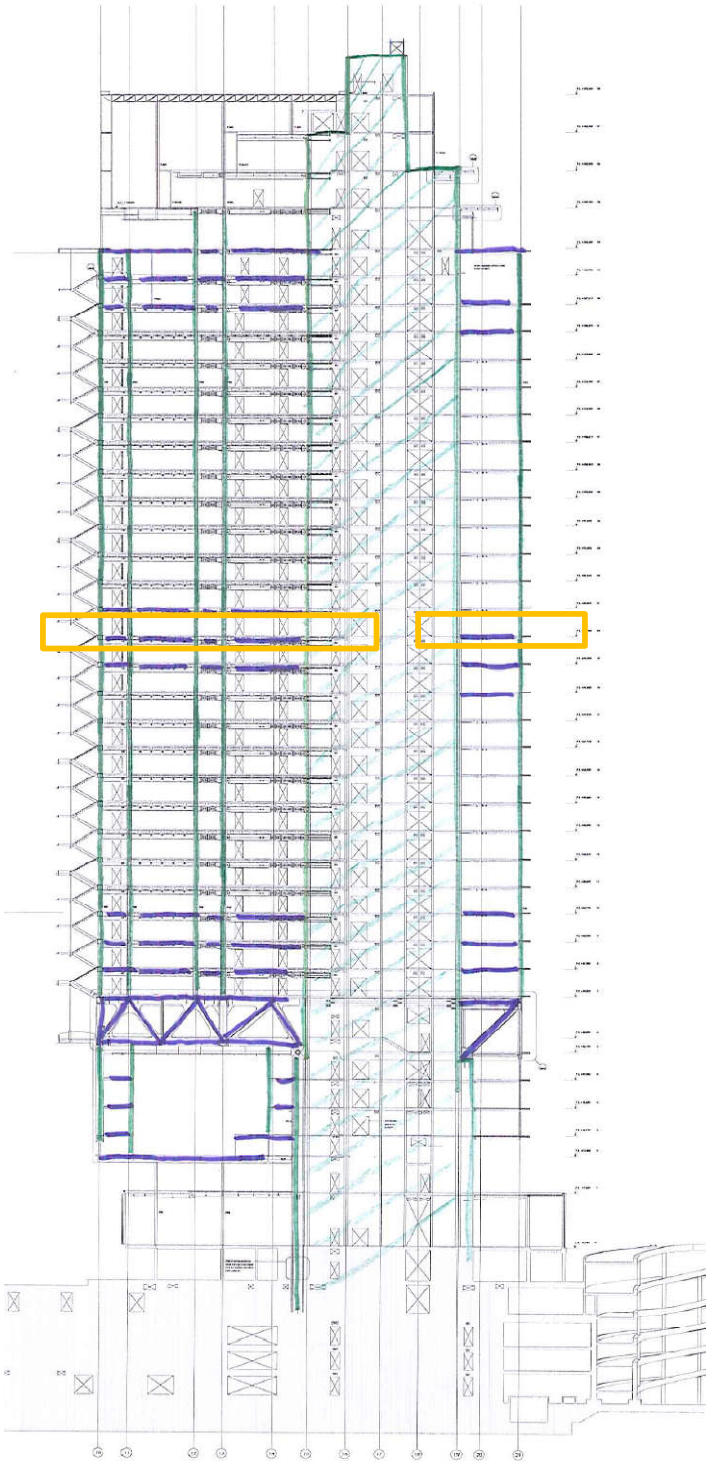


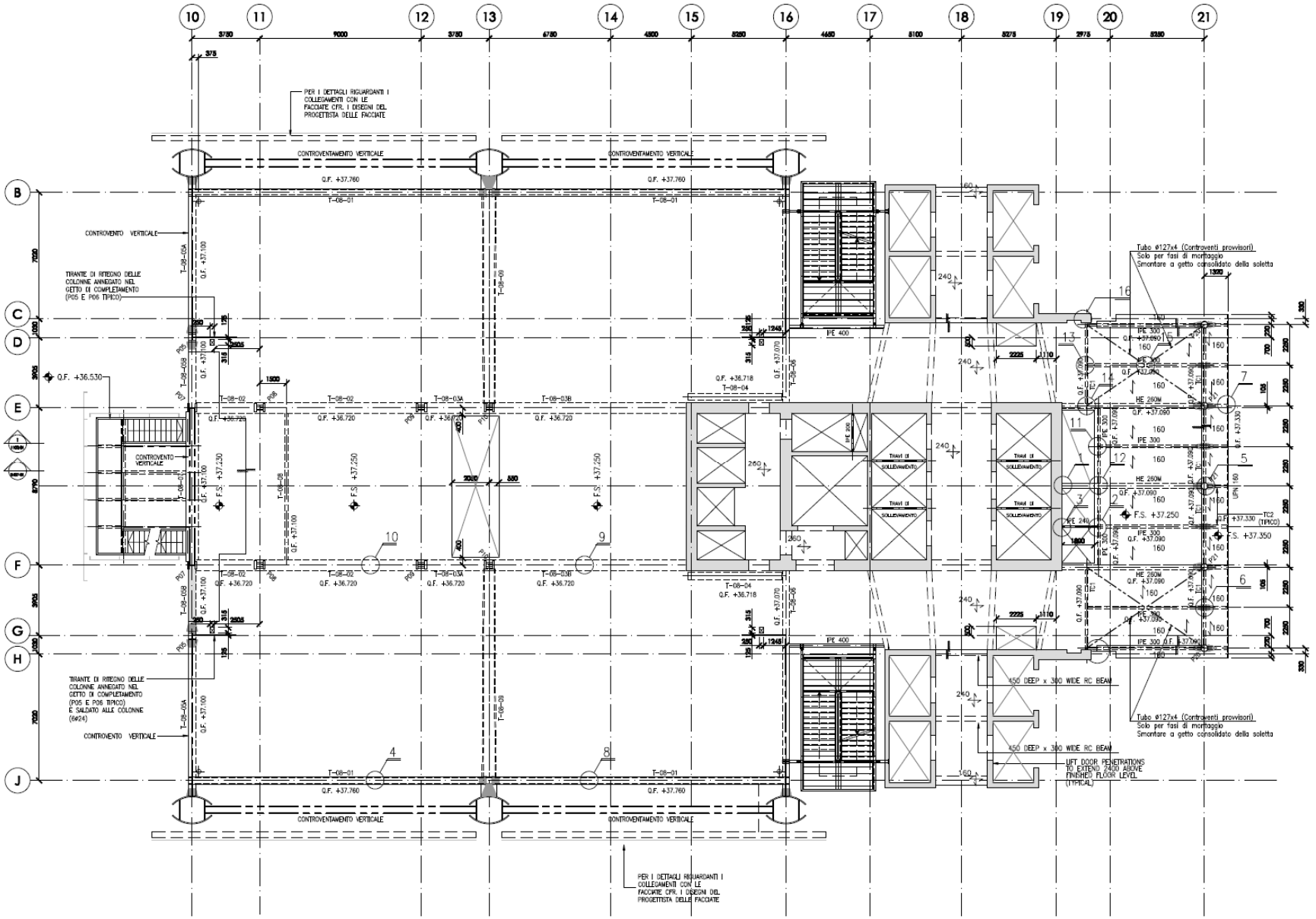

24 gennaio 2012

Intesa – San Paolo

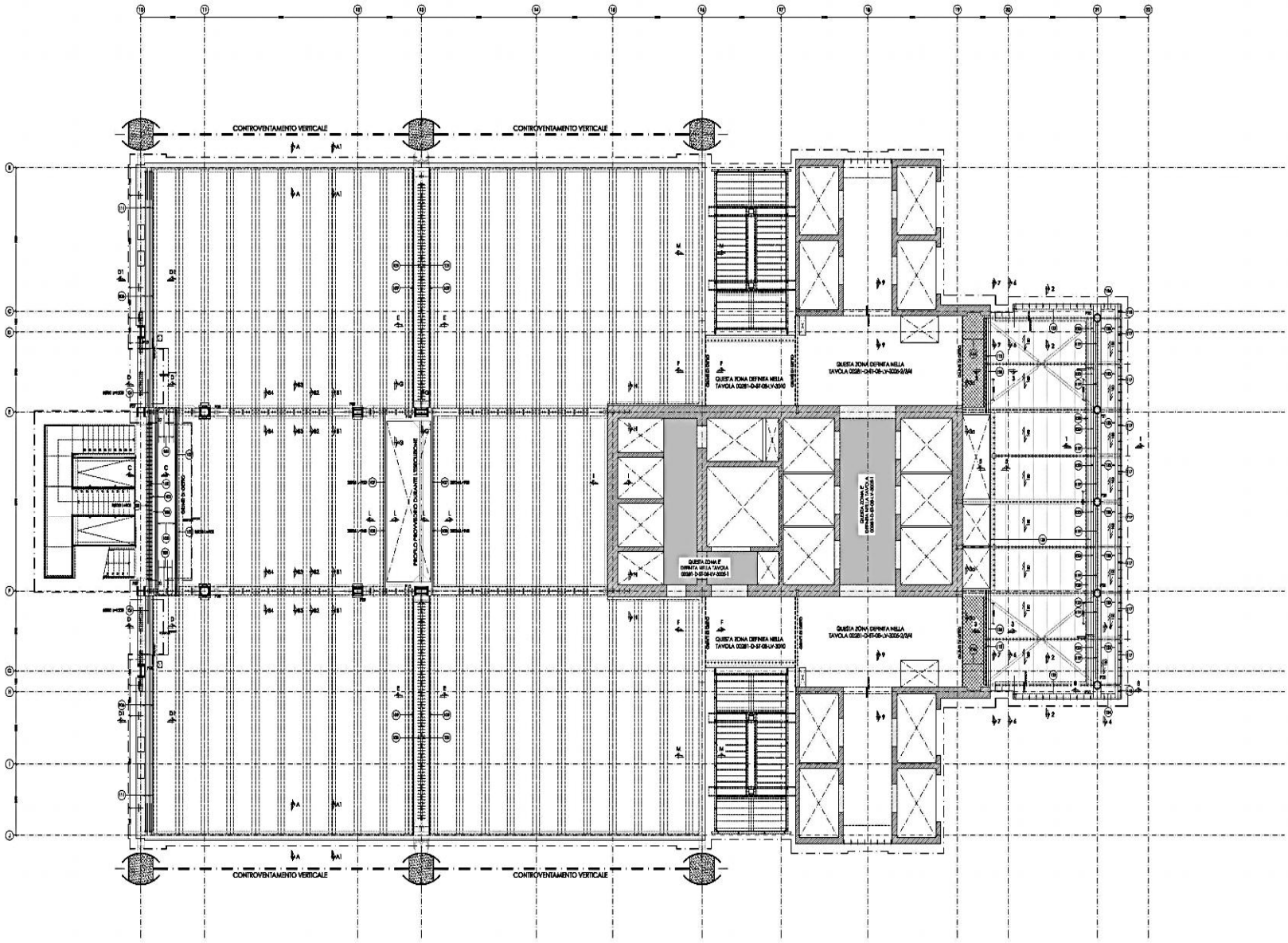








PIANTA GENERALE DEL LIVELLO 8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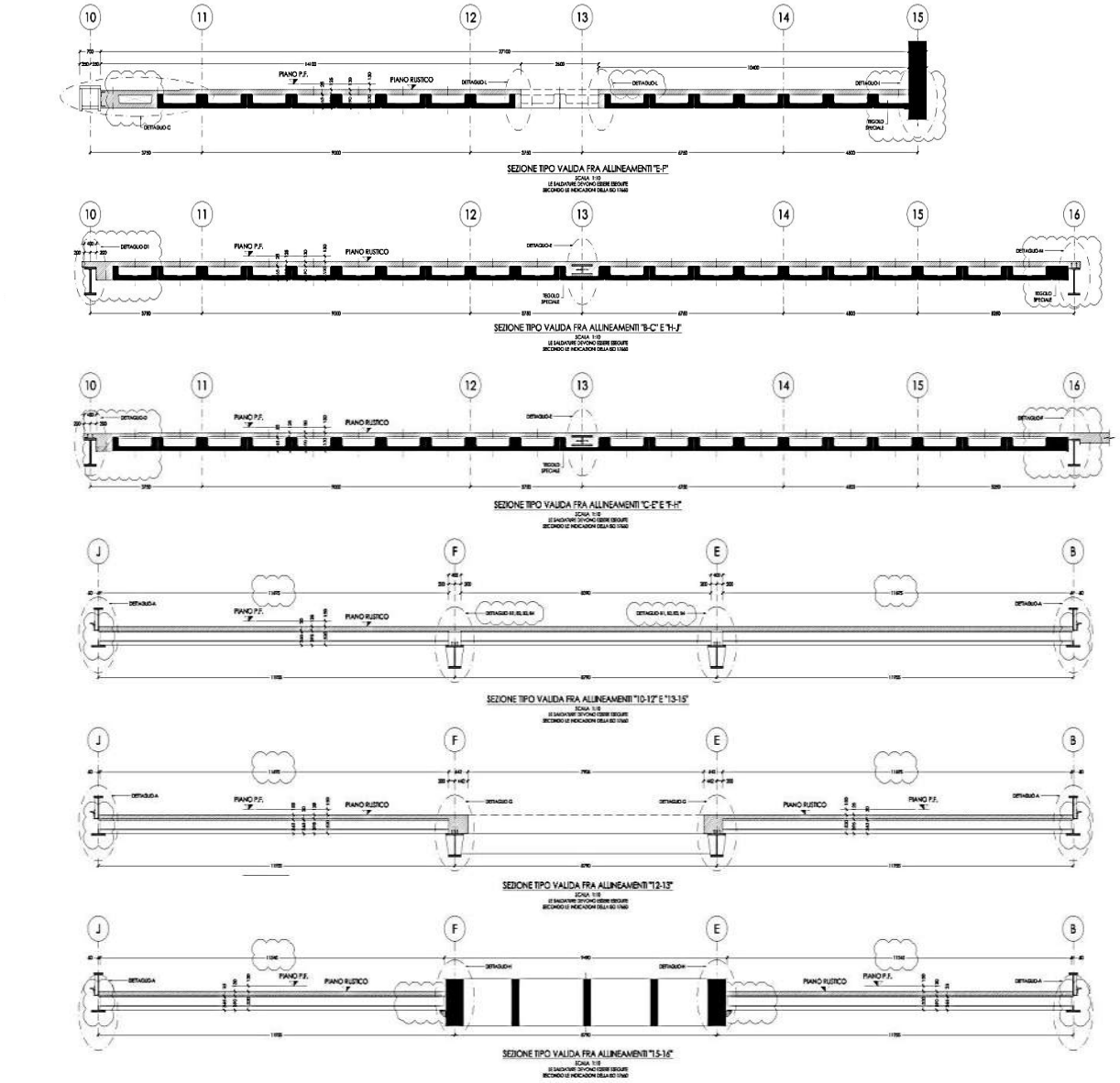
PLANTA P8



NOTE:
PER I TEGOLI PREFABBRICATI,
FARE RIFERIMENTO ALLE TAV.:
00281-D-ST-GG-LV-3122/3121/3122-1

MATERIALI

CALCESTRUZZO:

PIEGATURE ARMATURA

P.F. PAVIMENTO FINITO
F.S. FINITO STRUTTURALE

INTESA SANPAOLO

NUOVO CENTRO DIREZIONALE INTESA SANPAOLO - TORINO

PROGETTO COSTRUTTIVO

APPROVATO dalla DL

APPROVATO con PRESCRIZIONI dalla DL

RESPINTO dalla DL

No.	DATA/DATE	DESCRIZIONE / DESCRIPTION	DIRK.	APP.
8	01/03/2012	CORREZIONE GRIGLIE CANTIERO	-	-
7	15/05/2012	COMMENTI PER CNAS	-	-
6	29/10/2011	PER EMISSIONE ESECUTIVI	-	-
5	21/07/2011	COMMENTI, AGGIORNAMENTO NAZIONALITA' TEGOLI E PREFABBRICATI	-	-

PIANO LIVELLO 8 - LATO NORD E SUD
SEZIONI
DETTAGLI ARMATURA

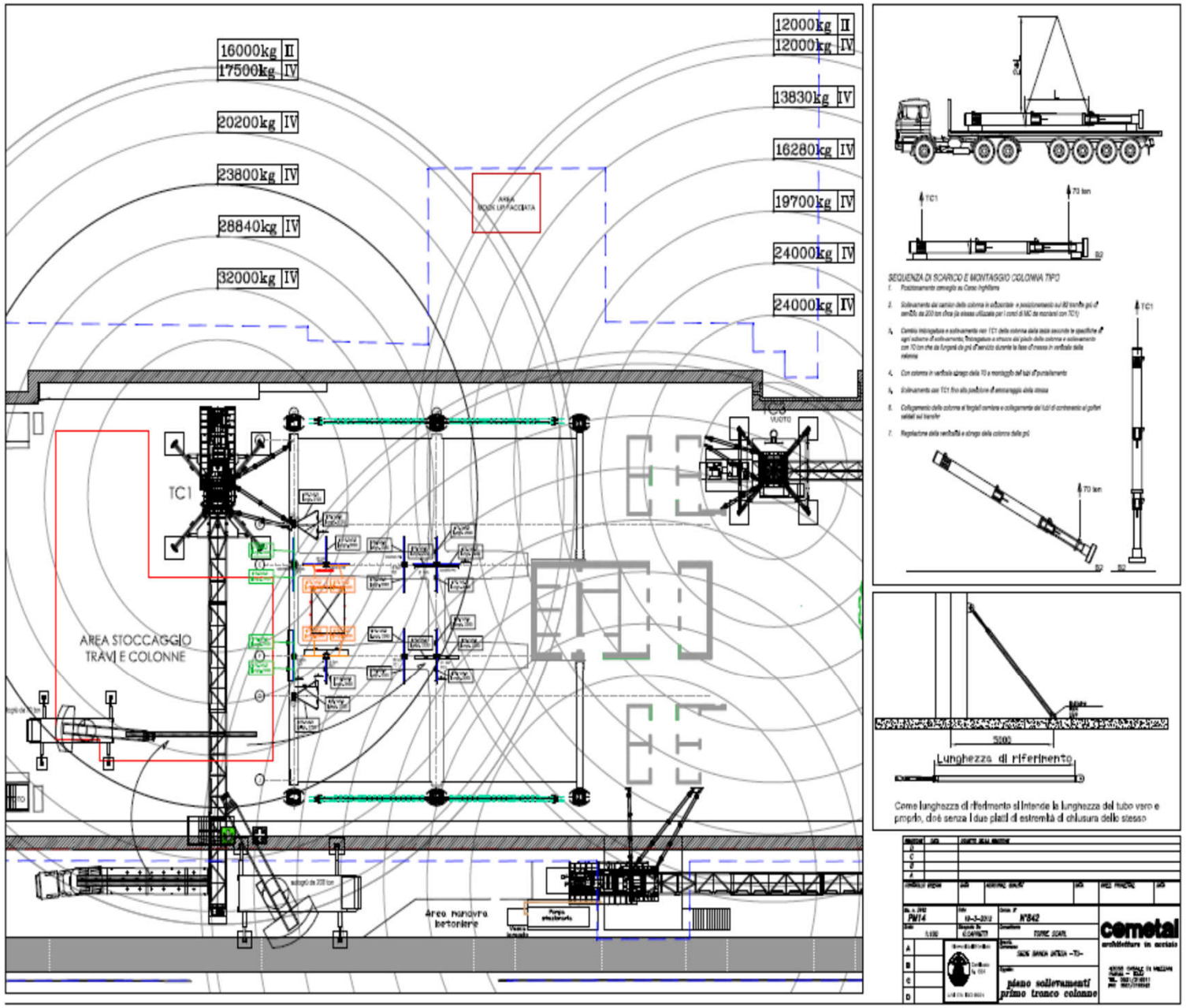
1:40

00281 | D | ST | 08 | LV | 3006 | 1/A

REV. 08

Torre de Cristal

Intesa – San Paolo


16000kg II
17500kg IV
20200kg IV
23800kg IV
28840kg IV
32000kg IV
12000kg II
12000kg IV
13830kg IV
16280kg IV
19700kg IV
24000kg IV
24000kg IV
TC1
AREA STOCCAGGIO TRAVI E COLONNE
Area manovra betoniere
VUOTO
70 ton
SEQUENZA DI SCARICO E MONTAGGIO COLONNA TIPO
Lunghezza di riferimento
Come lunghezza di riferimento si intende la lunghezza del tubo vero e proprio, cioè senza i due piatti di estremità di chiusura dello stesso
cemetal
architetture in acciaio
piano sollevamenti primo tronco colonne

Intesa – San Paolo

Intesa – San Paolo


9/611
TV
12


70
80
DJ R 862AG
AB 23925
VOLVO


Intesa – San Paolo
doka

Intesa – San Paolo

Intesa – San Paolo

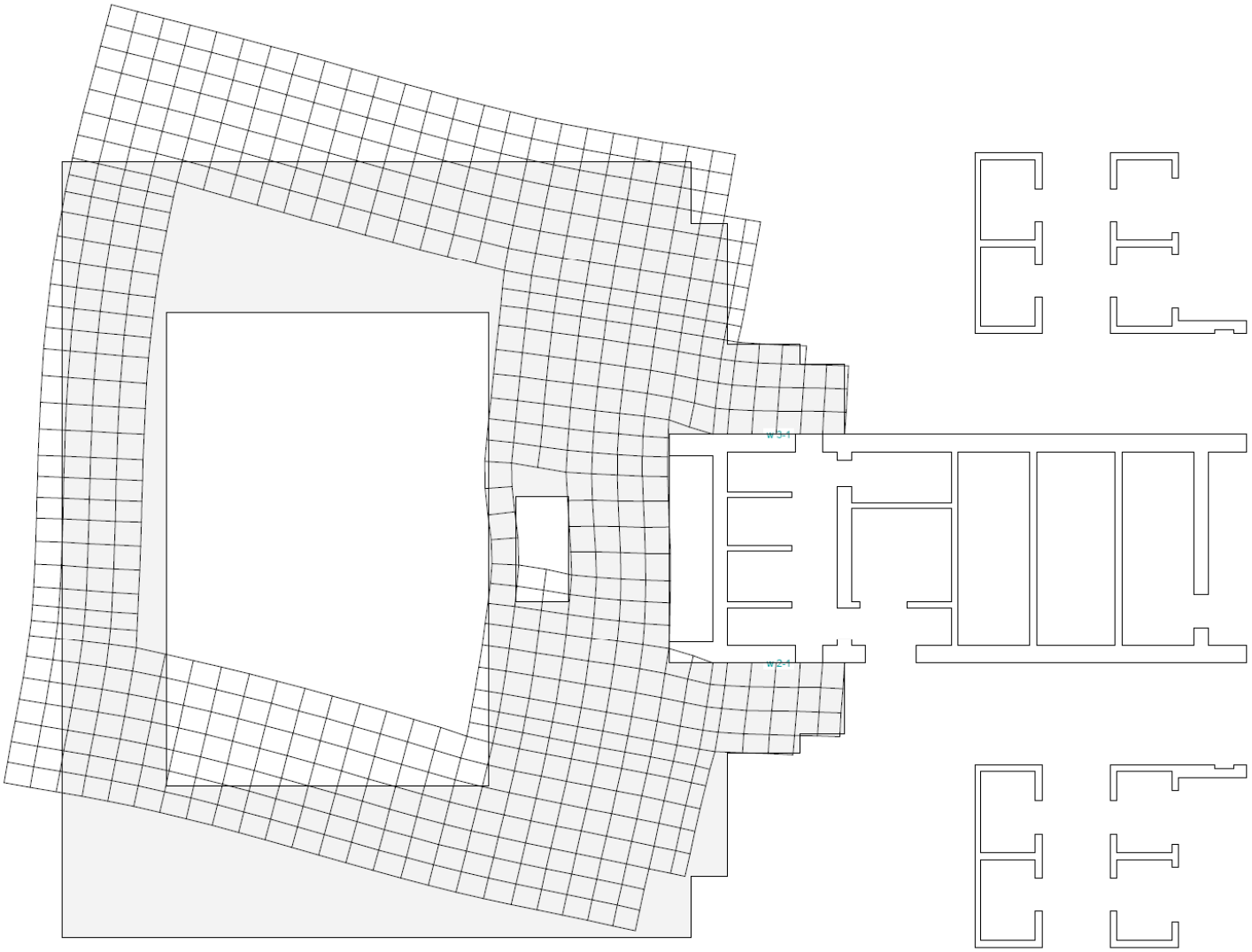
Intesa – San Paolo

3

Intesa – San Paolo. Italia

Intesa – San Paolo

Bending deflection: Load case LC12, Scale exaggeration factor: 5000.0



COMPORTAMIENTO HORIZONTAL
Liv-5

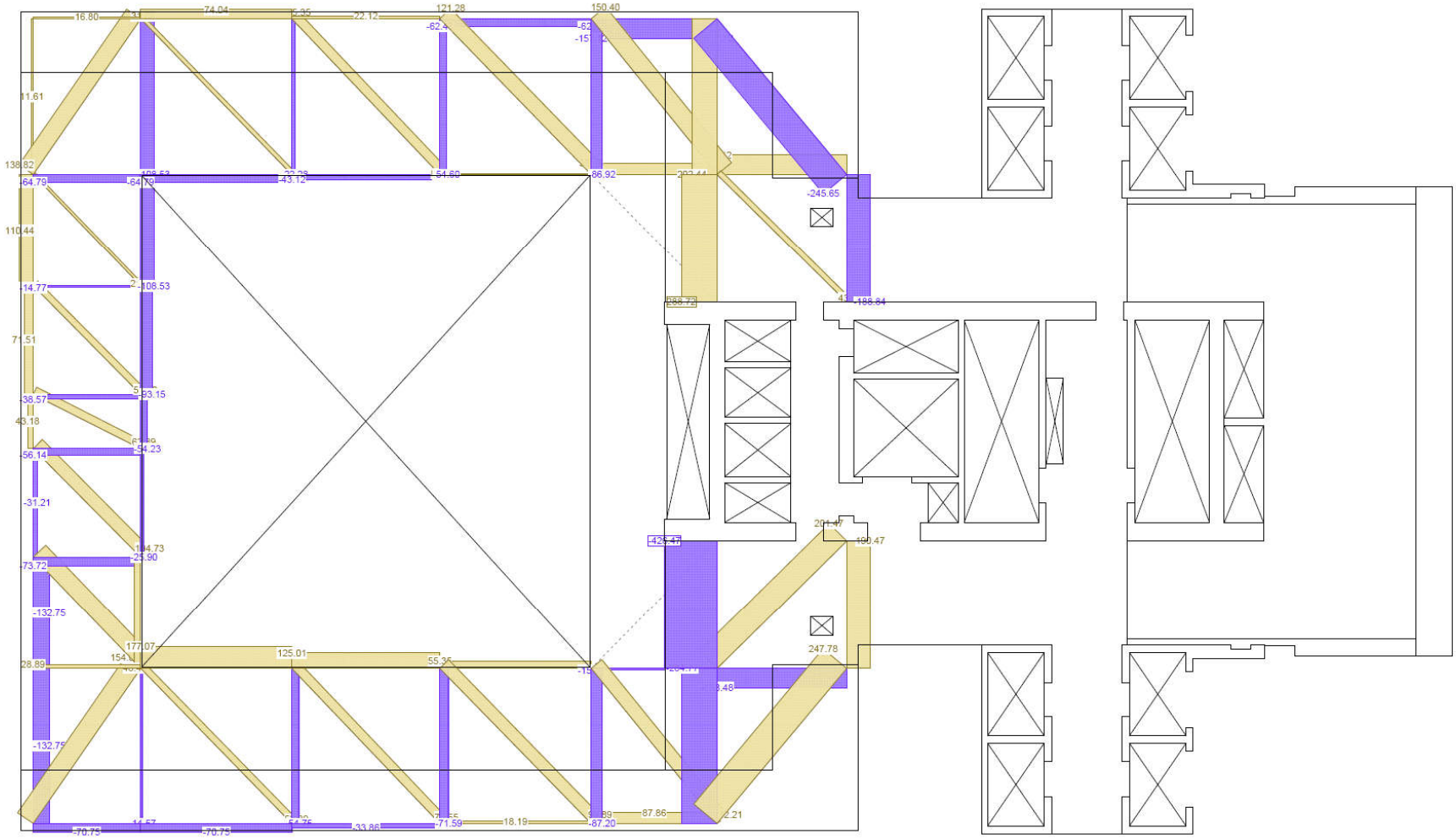
Page 6
17.01.11, 22:25

FHECOR Ingenieros Consultores S.A. abe

Statik-5 - Version 1.31

Section force N [kN] for: LC14

Scale 1 :154.7



Nr.:

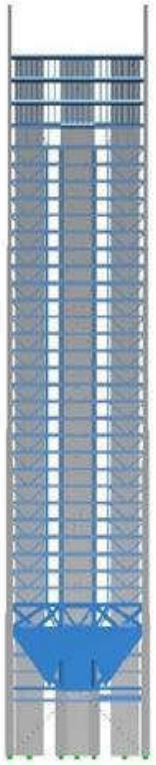
C:\Documents and Settings\abe\Mis documentos\Ed - Torre Intesa\FORJADOS COLGADOS\COMPORTAMIENTO HORIZONTAL\Liv-5.S5P

ANALISI E MODELLI REALIZZATI PROG. COSTRUTTIVO – STRUTTURA FUORI TERRA

MODELLO DI DETTAGLIO
FACCIATA SUD (ASSE 10)

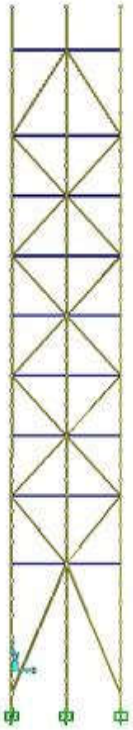
SAP2000

STATIK



MODELLO DI DETTAGLIO
FACCIATA EST-OVEST

SAP2000



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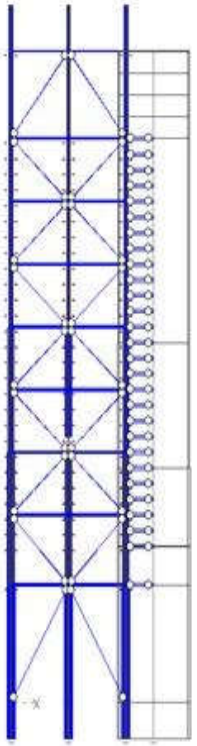
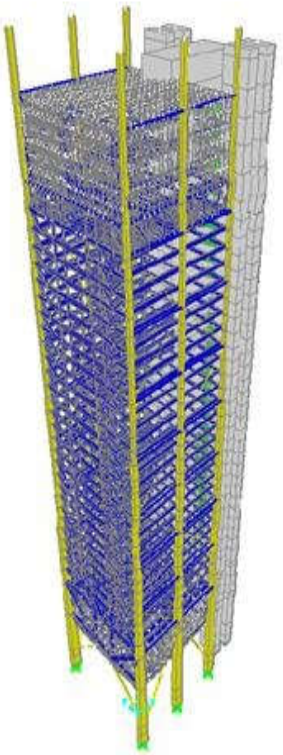


MODELLO GLOBALE
STRUTTURA FUORI TERRA

SAP2000



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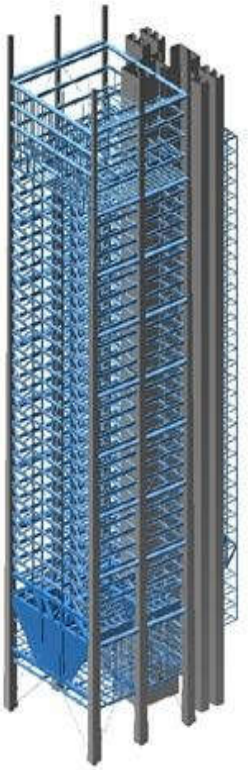
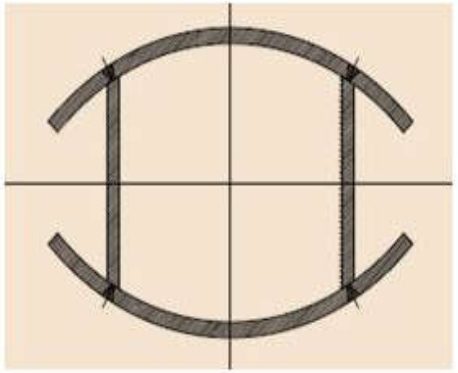


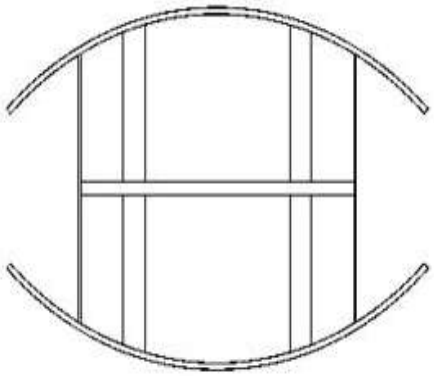
MEGA-COLONNE (IV)

- Sezione al di sotto della struttura di trasferimento

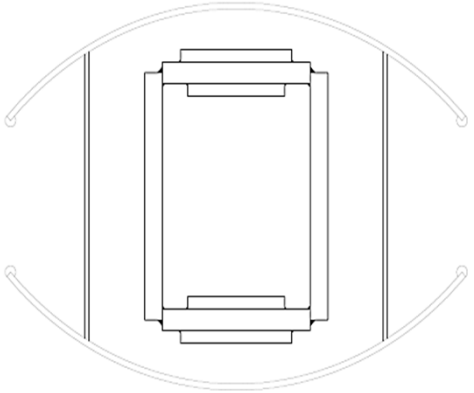
Progetto



Proposta

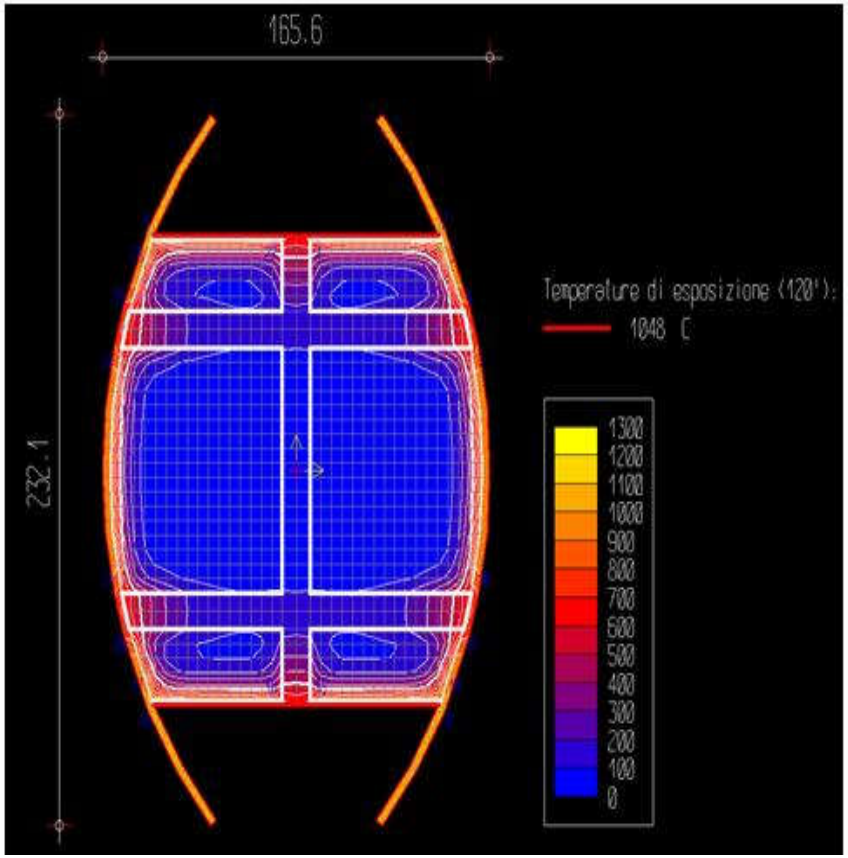


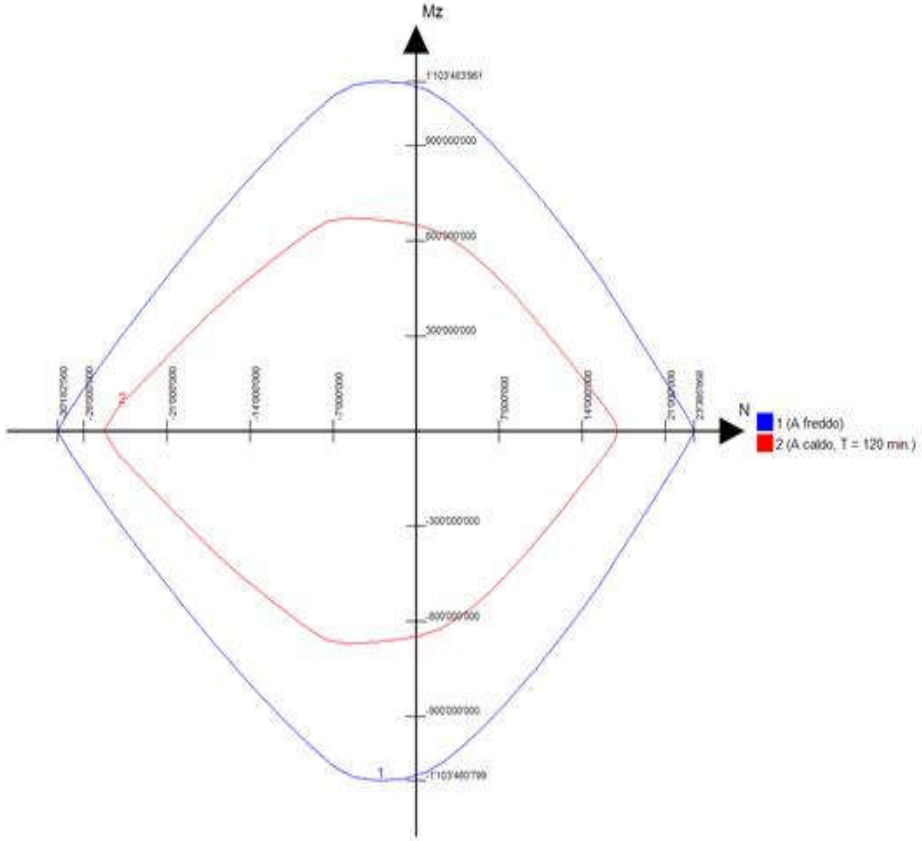
Progetto costruttivo



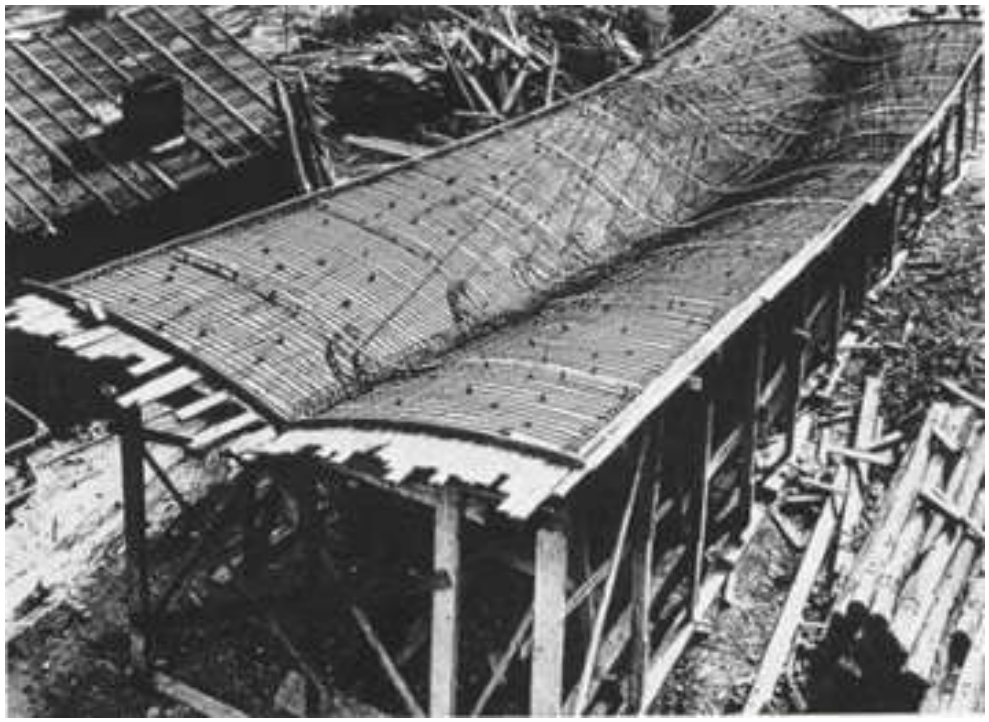
▪ MEGA-COLONNE (VII)

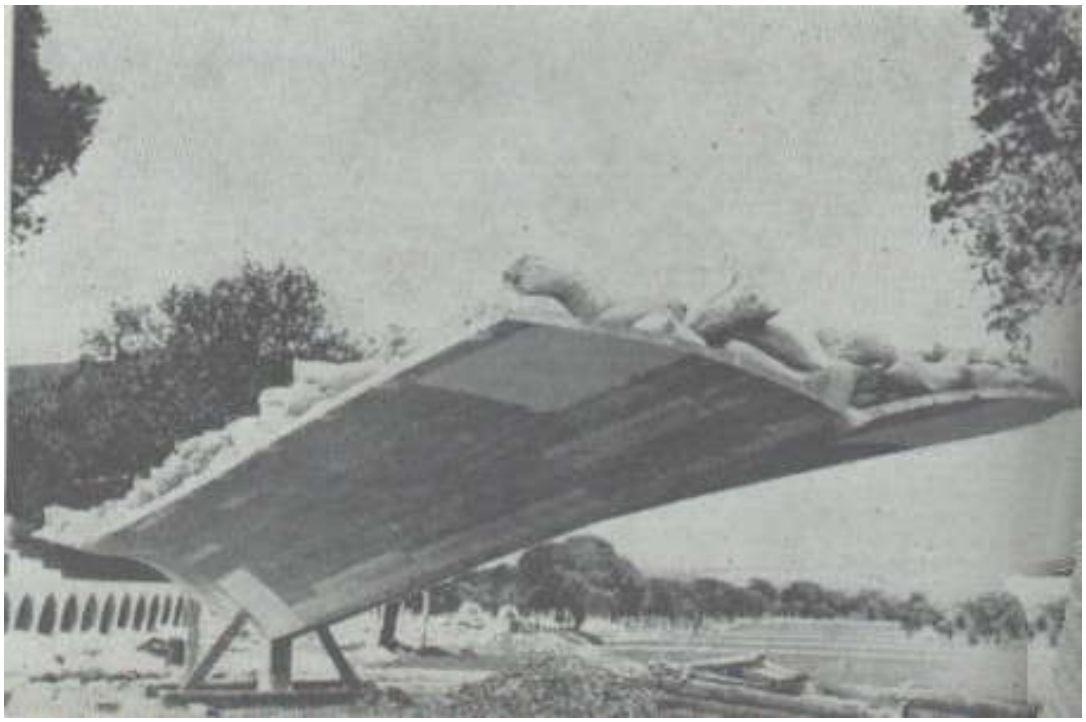
- Resistenta al fuoco



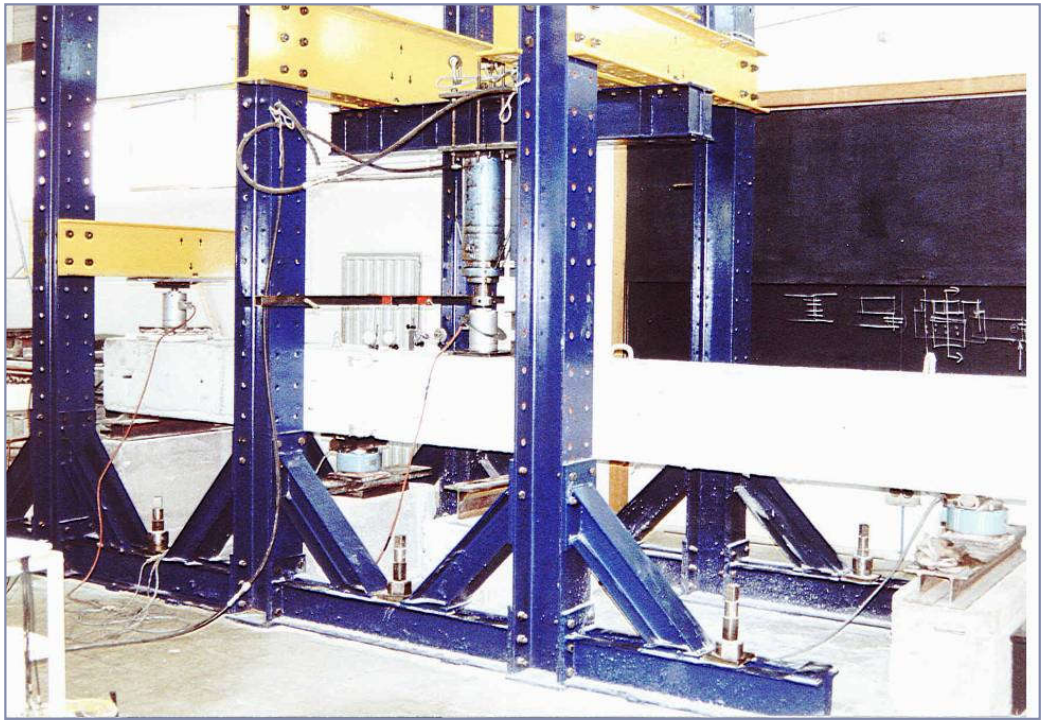


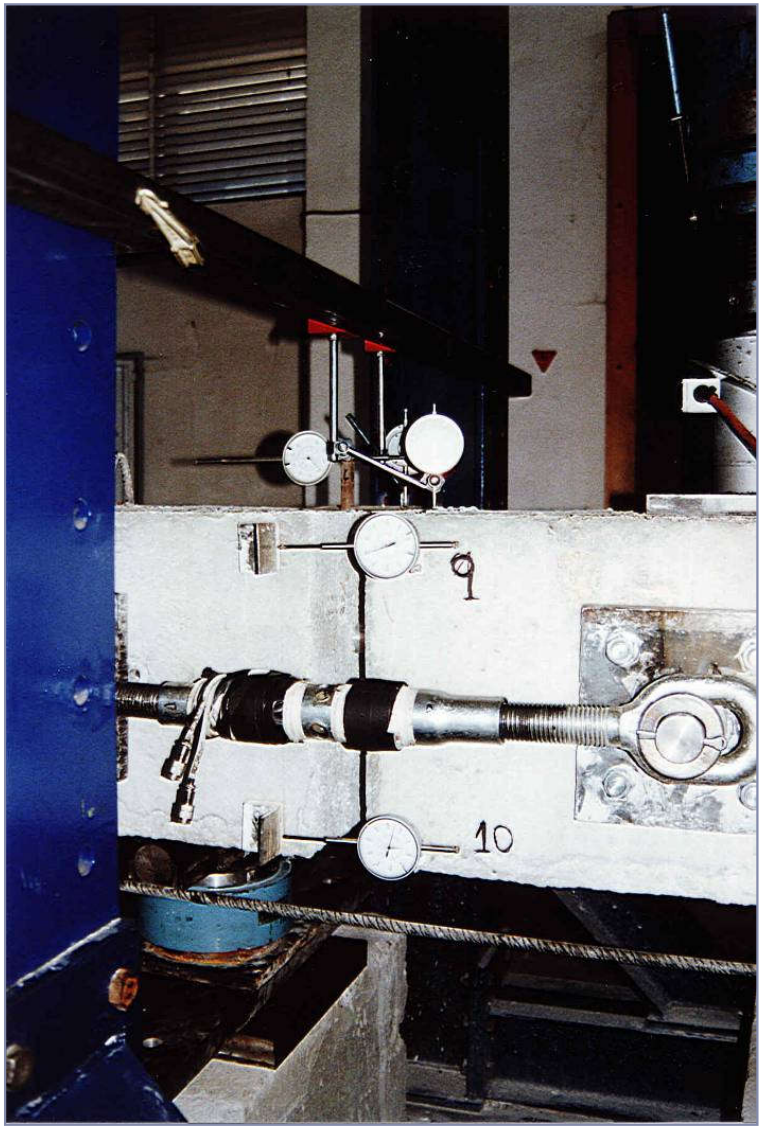
4 Fortalezas y debilidades. Algunas reflexiones

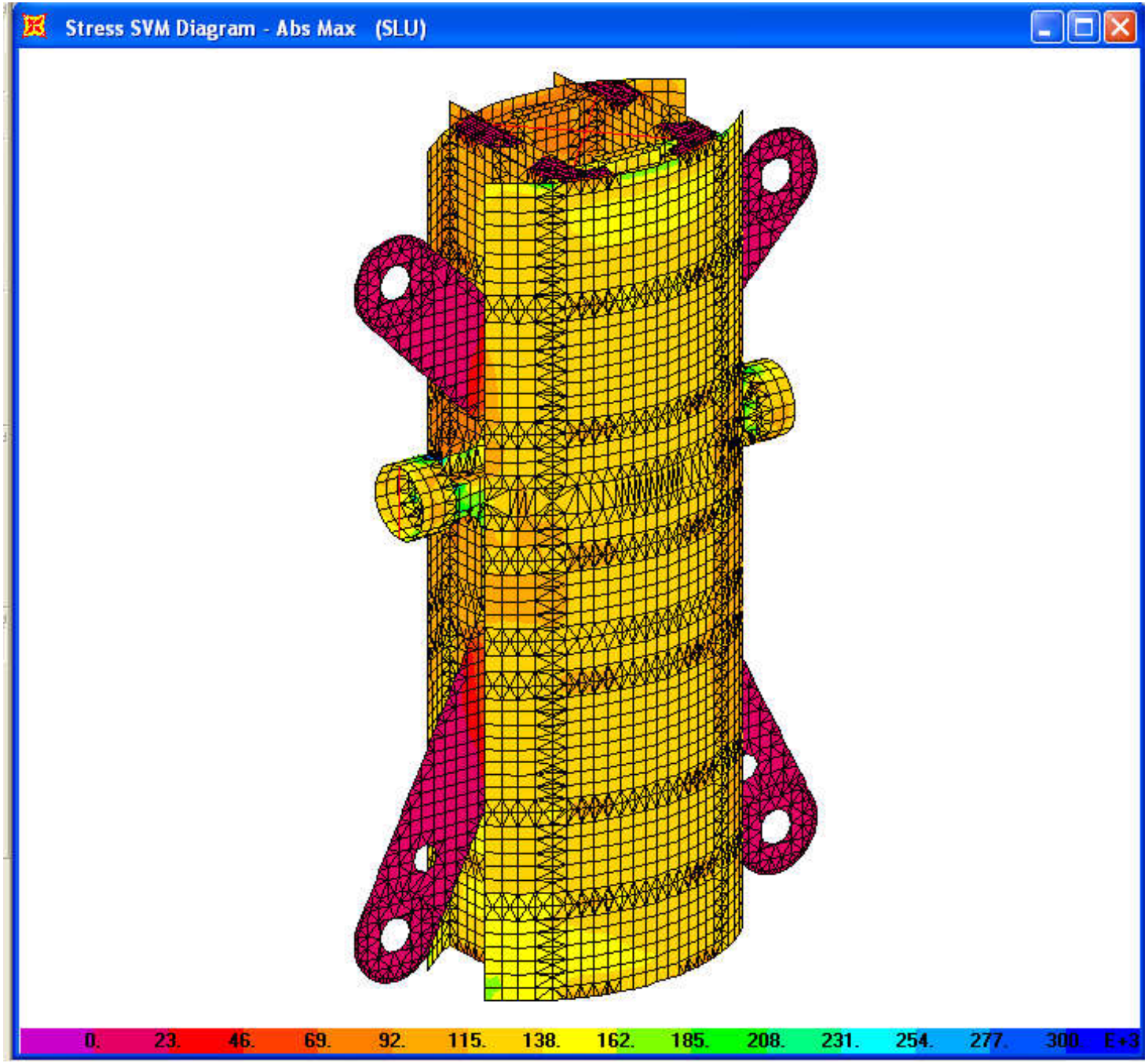




4 Fortalezas y debilidades. Algunas reflexiones



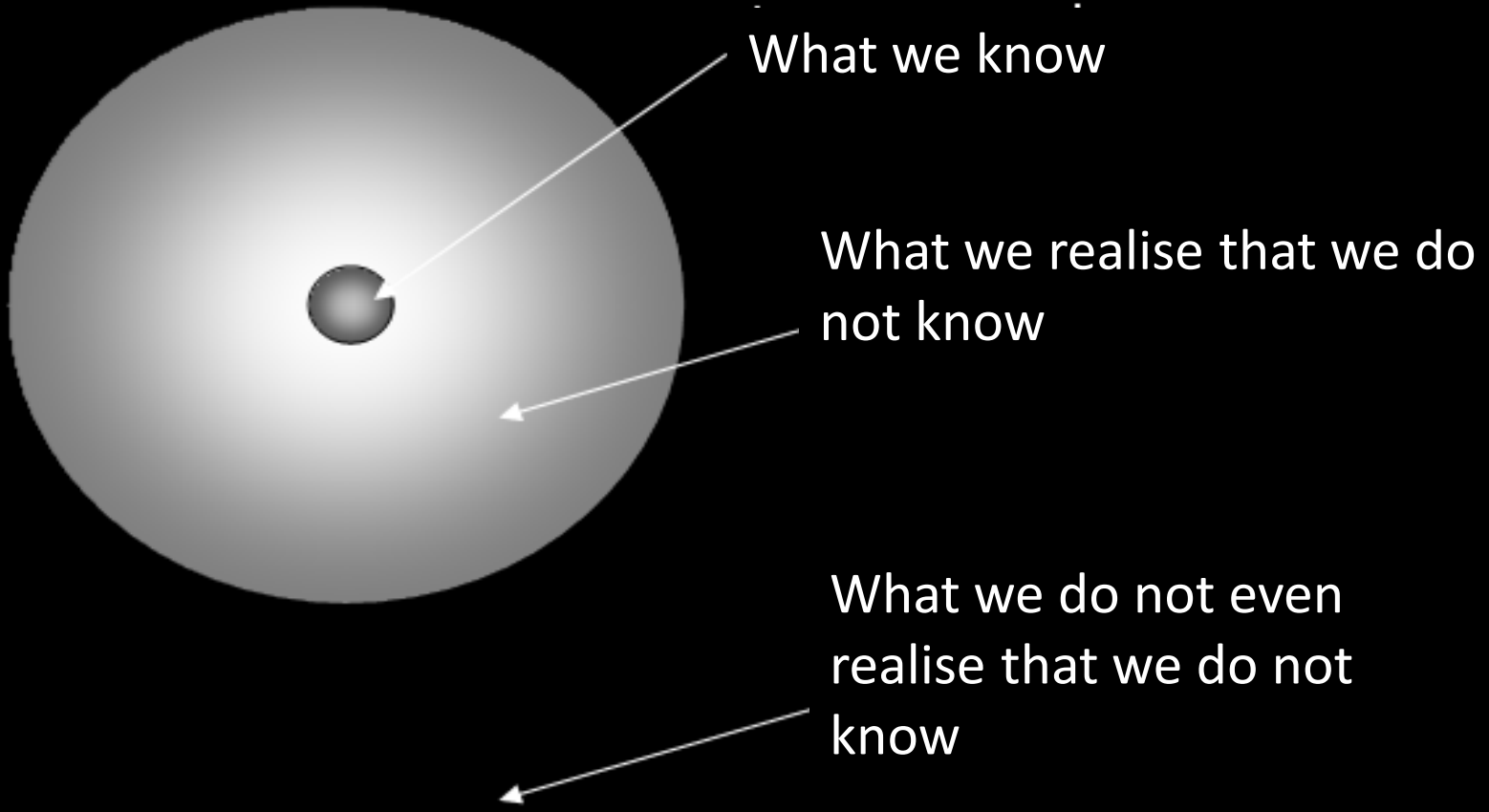



Stress SVM Diagram - Abs Max (SLU)
0.
23.
46.
69.
92.
115.
138.
162.
185.
208.
231.
254.
277.
300.
E+3

La prova di carico in officina su un concio campione della Megacolonna asse 13 liv. P14

“Engineering is the art of modeling materials we do not wholly understand, into shapes we cannot precisely analyse, so as to withstand forces we cannot properly assess, in such a way that the public at large has not reason to suspect the extent of our ignorance.”

President of the Institution of Civil Engineers 1946



5 Consideraciones finales