Client:	[redacted] Report No. 200001-CR-000
Title:	[redacted]ndoor Sports Hall Roof
Project:	[redacted] Sports Hall Roof
Method:	See Within
Acceptance Criteria:	See Within
Remarks:	

Verification Method
x Design Review Method
x Alternate Calculation
p Qualification Test
p Other
p No Verification Necessary

Results: See body of calculation

Computer Programs Used	Program Name	Version/Revision	License
	CEDRUS-8	1.00	Prestressing (V) Walls (S)

REVISIONS

Revision No.	0
Description	Calculation Report
Total Pages (Cumulative)	28
Developed/Originated By/ Date	[redacted]
Checked by/ Date	[redacted]
Approved by/ Date	[redacted]

MATRiSEB

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REPORT COVER SHEET

[redacted]

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1. GENERAL PRINCIPLE OF CALCULATIONS

1.1 Slab Design

Indoor Sports Hall Roof Slab extends 18 m in Y direction and 32 m in X direction. The slab has to support loads within a limited thickness of 60 cm.

The slab is reinforced with post-tensioned bonded tendons in y direction and rebars in both orthogonal directions. In the scope of this work slab model developed considering only the region designed with prestressed concrete. The other interior slabs and supporting columns are not included in the scope.

1.2 Main Data

1.2.1 *Codes*

The calculations are made according to the [redacted]

Other references and literature on post-tensioned floors currently used are:

- [redacted] SIA (Technical rules for the design and he execution of prestressed concrete at ultimate limit state)
- American code ACI 318 (Building code requirements for reinforced concrete)
- "Design of prestressed concrete structures",by Prof. T. Y. LI, (Wiley ed.)
- Several publications from the PTI (Post-Tensioning Institute)

1.2.2 *Materials*

Concrete: $f_{c28} = 30\ \mathrm{N/mm^2}$ at 28 days (characteristic strength at 28 days on cylinder)

Tendons: T 15 Z, grade 1860, section 150 mm^2
Initial jacking force: 209 kN (0.75fpu)

Reinforcement Steel: $f_y = 420\ \mathrm{N/mm^2}$

1.2.3 *Loading*

Own weigh calculated with specific weight of concrete 25 kN/m^3
Superimposed dead loads: 1.00 kN/m^2
Live loads: 5.0 kN/m^2

1.2.4 *Post-tensioning*

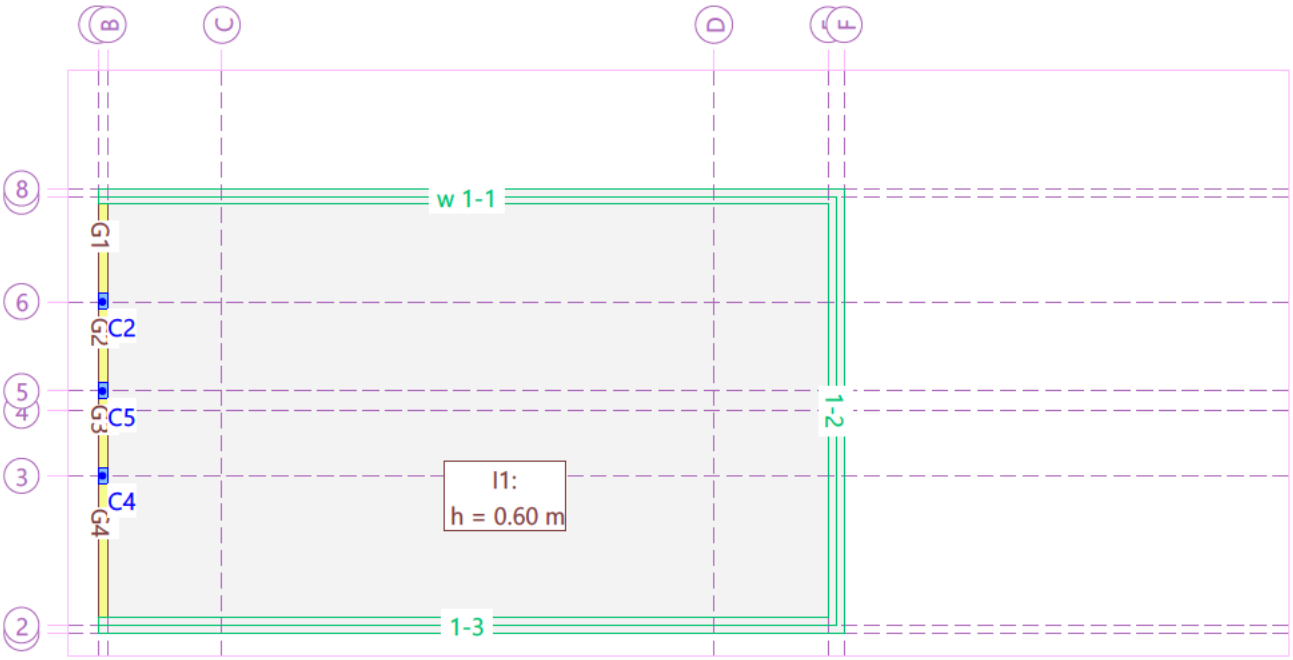
Post-tensioning is introduced as an external force, according to the load-balancing method described by T.Y.LIN.

Profiles of the tendons are parabolic and linear.

Losses due to elastic shortening, shrinkage and creep of concrete, friction of cables, steel relaxation and anchorage sets are taken into account. The calculations of the losses are made according to the Swiss code SIA.

STRUCTURE

Scale 1 :330.7



STRUCTURE DATA

MATERIALS Code: SIA

ID	Type	Member	E [kN/mm²]	ν	ρ [t/m³]	α [‰]	Class
CS	Concrete	Slab	36.40	0.17	2.50	0.010	C40/50
R	Reinforcement ste	(general)	205.00	0.30	8.00	0.012	B500B
P	PT Steel	(general)	195.00	0.30	8.00	0.012	Y1860

MATERIAL Concrete

ID	Class	$-\eta_{fc}f_{ck}$ [N/mm²]	E_{cm} [kN/mm²]	f_{ctm} [N/mm²]	τ_{cd} [N/mm²]	$f_{ck,cube}$ [N/mm²]
CS	C40/50	-36.30	36.40	3.50	1.25	50.00

MATERIAL Reinforcement steel

ID	Class	$-f_{sk}$ [N/mm²]	E_s [kN/mm²]	f_{sk} [N/mm²]	ε_{ud} [‰]	$k_s f_{sk}$ [N/mm²]	Ductility [m]
R	B500B	-500.00	205.00	500.00	45.0	540.00	high ductility

MATERIAL PT Steel

ID	Class	$-f_{p0.1k}$ [N/mm²]	E_s [kN/mm²]	$f_{p0.1k}$ [N/mm²]	ε_{ud} [‰]	f_{pk} [N/mm²]
P	Y1860	-1600.00	195.00	1600.00	20.0	1860.00

MATERIAL BOXES: Isotropic

Id		Geometry		Materials		
		Slab thickness [m]	Top surface level [m]	f_E	Body	Reinforcement
I1		0.60	0	1.000	CS	R

MATERIAL BOXES: Distance to edge and basic reinforcement

Id	Reinforcement cover				Basic reinforcement			
	u_{XT} [cm]	u_{YT} [cm]	u_{XB} [cm]	u_{YB} [cm]	as_{XT} [cm²/m]	as_{YT} [cm²/m]	as_{XB} [cm²/m]	as_{YB} [cm²/m]
I1	3.0	3.0	3.0	3.0	-	-	-	-