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BEEBY HOUSE - 6 STORY OVAL SHAPE OFFICE BUILDING DESIGN - UNIVERSITY PROJECT

Bays	Slab	Slab Depth	Internal Beams	Edge Beams in X	Edge Beams in Y	Internal Columns	Edge Columns	Overall Height	Cost £/m2	Time
6*3	Post Tentioning Slab	440	-	-	-	750*750	750*500	20.4	1455	184.5
6*3	Hollowcore in Y	200	650*2400	900*600	350*225	700*700	700*300	21.3	1363	198.5
6*3	Ribbed Slab Wide Beam in Y	275	725*2400	725*1200	325*600	700*700	700*425	21.75	1436	205.5
7*2	Post Tensioning Slab	370	-	-	-	750*750	750*500	19.62	1465	163.5
7*2	Hollowcore in Y	350	650*2400	800*600	650*225	750*750	750*550	21.3	1399	177.5
7*3	Post Tensioning Slab	335	-	-	-	650*650	650*325	19.41	1340	187
7*3	Hollowcore in Y	200	525*2400	775*450	350*225	600*600	600*325	20.55	1280	201
7*3	Ribbed Slab Wide Beam in Y	275	600*2400	600*1200	325*600	600*600	600*400	21	1346	222
8*2	Post Tensioning Slab	370	-	-	-	750*750	750*425	19.62	1447	188.5
8*2	Hollowcore in Y	350	525*2400	650*600	650*225	750*750	750*475	20.55	1375	202.5
8*3	Post Tensioning Slab	285	-	-	-	600*600	600*325	19.11	1259	165
8*3	Hollowcore in Y	200	425*2400	625*450	350*225	550*550	550*350	20.15	1216	179
8*3	Ribbed Slab Wide Beam in Y	275	475*2400	475*1200	325*600	550*550	550*400	20.25	1292	200
8*3	Two way slab	195	725*300	625*300	625*300	550*550	550*350	21.75	1266	193
9*2	Post Tensioning Slab	370	-	-	-	750*750	750*400	19.62	1411	184.5
9*2	Hollowcore in Y	350	500*2400	550*600	650*225	700*700	450*450	20.4	1349	198.5
9*2	Ribbed Slab Wide Beam in X	310	675*2400	375*600	675*1200	650*650	650*450	21.45	1446	220
9*2	Two way slab	230	525*450	800*450	800*450	650*650	650*450	22.5	1420	212.5

Design Moment, M_{ed}

$M_{Ed} = M + e_i N_{Ed} \geq e_0 N_{Ed}$

where
M= moment from 1st order analysis
$e_i N_{Ed}$ = effect of imperfections

$e_i = 4.45 \times 10^{-3}$

$e_0 = \frac{h}{30} = \frac{0.7}{30} = 0.023$

$M_{ed\,YY} = 181.38 + (4.45 \times 10^{-3} \times 10873.5) = 229.76$

$e_0 N_{ed} = 250$

$M_{ed\,ZZ} = 114.8 + (4.45 \times 10^{-3} \times 10873.5) = 163.18$

$e_0 N_{ed} = 250$

Imperfection need only be taken in one direction- where they have the most unfavourable effect

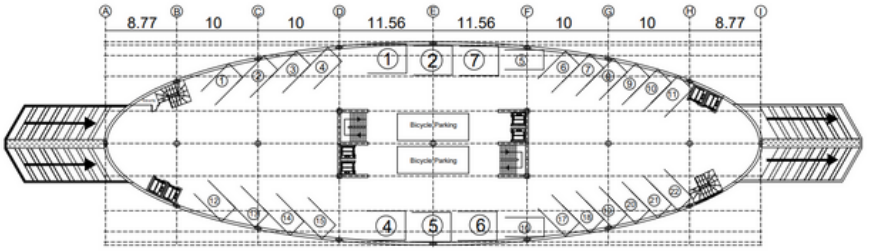
$\rightarrow use \quad M_{Ed\,ZZ} = 250 \qquad M_{Ed\,YY} = 229.76$

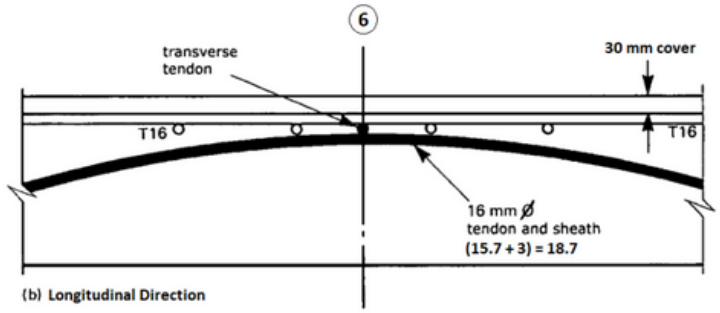
$\frac{M_{Ed\,YY}}{b \times h^2 \times f_{ck}} = \frac{229.76}{0.7^3 \times 35 \times 1000} = 0.02$ $\qquad \frac{N_{Ed}}{b \times h^2 \times f_{ck}} = \frac{10873.5}{0.7^3 \times 35 \times 1000} = 0.63$

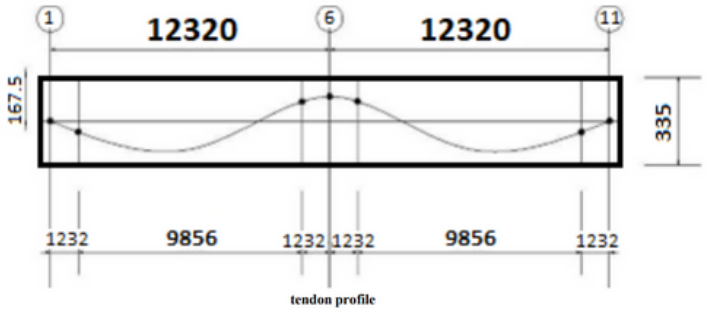
$d_2 = 35 + 8 + \frac{32}{2} = 59$ $\qquad \frac{d_2}{h} = \frac{59}{700} = 0.085$ $\qquad A_s = \frac{0.1 \times 700 \times 700 \times 35}{400} = 4287 mm^2$

$\frac{A_s \times f_{yy}}{b \times h \times f_{ck}} = 0.1$ $\qquad n \times \pi \times r^2 = A_s$ $\qquad n = \frac{4287}{\pi \times 12.5^2} = 8.73$

Use 10 Ø25







What?

- Generate **various feasible layouts** for the building.
- Perform **analysis** and **desig**, accompanied by detailed **hand calculation reports**.
- Produce comprehensive **2D construction drawings**.

How?

- Utilize **Concept Excel sheets** to generate **diverse layout options** tailored to **client requirements**.
- Calculate applied loads and establish **load combinations** through Excel sheets, **identifying critical load cases**.
- Conduct a thorough analysis and design of structural elements (e.g., **post-tension flat slab**, **columns**, **shear walls**, **retaining walls**) using **hand calculations** in compliance with **Euro codes**.
- Create a **3D architectural model** in **Revit** for visual representation.
- Develop **2D construction drawings** using **AutoCAD**