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Appendix A – GANT CHART

41936 - Advanced Building Design

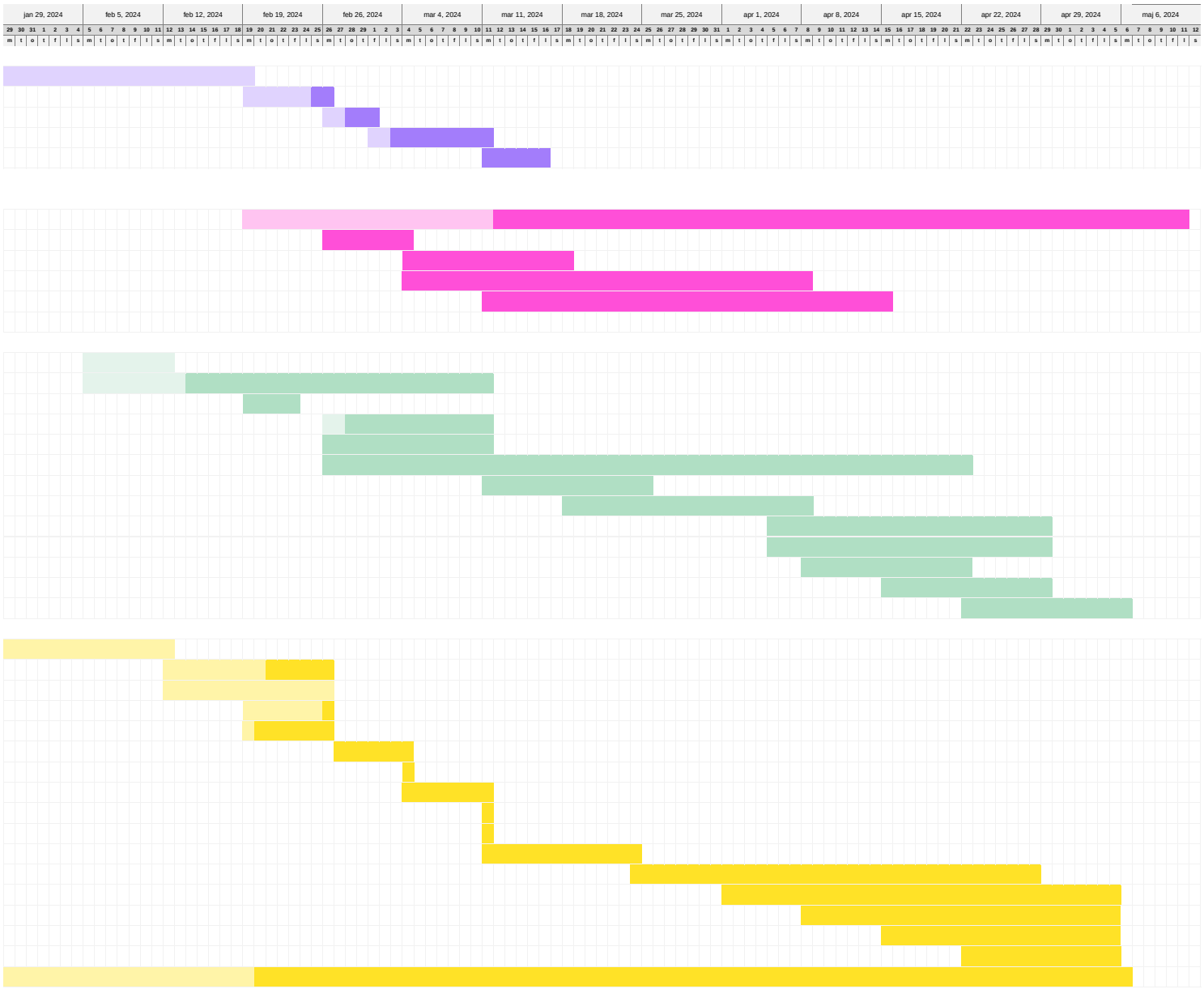
Group 06 13-week period

Project start: 29-01-24

Display week: 1

TASK	ASSIGNED TO	PROGRESS	START	END
Architecture				
Psycical model	ALL	100%	29-01-24	19-02-24
Concept sketches	ARCH	80%	19-02-24	26-02-24
Designing 1. floor	ARCH	50%	26-02-24	01-03-24
Design floorplan	ALL	25%	01-03-24	11-03-24
Designing facade	ARCH	0%	11-03-24	16-03-24
Structure				
Integrating with the rest of the group		21%	19-02-24	05-06-24
Determining a structural system + material		0%	26-02-24	04-03-24
PRELIM. - Dimensioning + placement om mem		0%	04-03-24	18-03-24
Determining the different loads + LC		0%	04-03-24	08-04-24
Dimensioning + placement om members		0%	11-03-24	15-04-24
MEP				
Design requirements - F	ALL	100%	05-02-24	12-02-24
Design floor plans	ALL	25%	05-02-24	11-03-24
Average ventilation flow rate and space	MEP	15%	19-02-24	23-02-24
Simple daylight model	MEP	15%	26-02-24	11-03-24
Vertical and horizontal rc	MEP	0%	26-02-24	11-03-24
Thermal comfort evaluation	MEP	0%	26-02-24	22-04-24
IDA ICE	MEP	0%	11-03-24	25-03-24
U-value calculation	MEP, ARC	0%	18-03-24	08-04-24
Detailed daylight simulat	MEP	0%	05-04-24	29-04-24
Detailed ventilation syst	MEP	0%	05-04-24	29-04-24
Hydronic system desgin	MEP	0%	08-04-24	22-04-24
Be18	MEP	0%	15-04-24	29-04-24
BIM model	MEP	0%	22-04-24	06-05-24
PM				
Define requirements	PM	100%	29-01-24	12-02-24
Benchmark Building	ALL	60%	12-02-24	26-02-24
Team Contract	ALL	100%	12-02-24	26-02-24
Create Project Plan	PM	90%	19-02-24	26-02-24
Design Management Scl	ALL	20%	19-02-24	26-02-24
Setup BIM-model with gr	PM	0%	27-02-24	04-03-24
ICT Contract	ALL	0%	04-03-24	04-03-24
Work on indv. models	ALL	0%	04-03-24	11-03-24
BIM check	PM	0%	11-03-24	11-03-24
KPI & requirement check	PM	0%	11-03-24	11-03-24
Drawings and 3D-view	ALL	0%	11-03-24	24-03-24
Detailed BIM models	ALL	0%	24-03-24	28-04-24
Gather LCA-info from tea	PM	0%	01-04-24	05-05-24
LCA analysis	PM	0%	08-04-24	05-05-24
KPI & requirement check	PM	0%	15-04-24	05-05-24
Writing report	PM	0%	22-04-24	05-05-24
Group Coordination	PM	23%	29-01-24	06-05-24

Insert new rows ABOVE this one



Appendix B – LCI for LCA

Building model					Input til LCAbyg			
SUBJECT	Building components	Quantities	Constructions	Materials in Danish / EPD name	Quantities	Unit	Levetid [år] / Lifetime [yr.]	remarks/ comments
STR	Terrain	[m²]						
Terrain	Terrain	1588,8	Beton 900mm	C35/C45 fabriksbeton	0,9	m3/m2	120	see argument in subject repport section 7
			Armering	Celsa steel		kg/m2	120	EPD Celsa steel - S-P-00308. Amount from standardconstruction
			Afretningslag	Uniplan Estrich	0,05	m3/m2	120	EPD: MD-23124-DA
			Trykfast isolering	Sundolitt EPS Climate 33mm	7,6	m2/m2	80	EPD:MD-22132-EN . Thickness=250mm equals to 7,6m2/m2
STR,ARC, MEP, PM	External walls	[m²]						
External facade	External walls	5707 m2	Maling	Flugger PRO 5	0,345	kg/m2	15	EPD: S-P-03212 . 8 m2 paint pr. Liter, decide on 2 layers, resulting in 0,345 kg/m2 pr side. Mængder jf. https://www.flugger.dk/produkter/flutex-10/flutex-10
			Grunder	Overflade, facademaling, grundere, sillkat	0,185	kg/m2	50	8 m2/L for one layer. You only ground in year 0, why lifetime is set to 50 yr. Quantities jf. https://www.flugger.dk/tapet-filt-og-spartel/spartel/sandpl-lh/sandplast-lh
			Gipsplader	Gyproc Climate	2	m2/m2	60	EPD - NEPD-5165-4476-EN. 2 layers.
			Insulation	Isover formstykker 37, 300 mm	0,3	m3/m2	80	NEPD-2612-1324-EN
			Wood structure (c/c 60 lodret) lægter 45x300mm lægter	konstruktionstræ af fyr og gran, savede og tørrede (Forbrænding EoL)	10	kg/m2	120	Calculated width density for construction wood on 450 kg/m3
			Fibercementpalde	Windstopper Extreme	1	m2/m2	80	EPD: MD-21010-EN_rev1
			Stålskinnesystem 10 mm thickness (c/c 60 mm)	Stål, valsede profiler og plader	1,45	kg/m2	120	Weigth pr m2 has been calculated from product specific data from gyprocs ER70 which weigths 0,56 kg/m
			Fibercement facadeplade	Swisspearl Deco	1	m2/m2	80	EPD: MD-20045-EN_rev5
	Terracotta sunshading	1902 m2	Lersten	Lersten	263	kg/m2	120	We have used EPD for bunt clay. Calculations are made on quantities extractions from revit.
	Ext wall basement	1385,00	isolering	Isover formstykker 37, 300 mm	1,16	m2/m2	60	EPD: NEPD-2612-1324-EN
			Concrete wall	Beton vægelementer, 20 cm tyk væk med 16 - 25 kg armering (11% udsparinger)	3,5	m2/m2	120	thickness 700mm
STR, ARC, PM	Slab	[m2]						
Slabs	Slabs above ground	23950 m2	Afretningslag	Uniplan Estrich	0,05	m3/m2	120	EPD: MD-23124-DA
			Trinlydsdug	Aucustic silence 1550	1	m2/m2	120	EPD: md23147-da
			Hollow core slabs	CRH hollow core slabs 270mm	0,67	m2/m2	120	EPD: MD-21065-DA, When the product is 270mm heigh, the quantity is set to be 180/270=0,667
			Brandbeskyttende isolering	Rockwool Conlit 36 mm	1,00	m2/m2	60	EPD: NEPD-4119-3333 (RW 55722)
	Basement slabs	1331 m2	Afretningslag	Uniplan Estrich	0,05	m3/m2	120	EPD: MD-23124-DA
			Hollow core slabs	CRH hollow core slabs 270mm	0,67	m2/m2	120	EPD: MD-21065-DA, When the product is 270mm heigh, the quantity is set to be 180/270=0,667
			Brandbeskyttende isolering	Rockwool Conlit 36 mm	1,00	m2/m2	60	EPD: NEPD-4119-3333 (RW 55722)
Floor	Tiles floor	832,32	Tiles	Keramikfliser, glaseret	1	m2/m2	80	
			Mørter	Mørtel, fliseklæber	3,1	kg/m2	80	Quantity from constuction build up from LCAbyg5.2 called: Gulv, gulvklinker
	Wood floor	20496,73	Wood floor	Trægulv, stavparket 22 mm	1	m2/m2	80	
Suspended Ceiling	Gypsum ceiling	21329,05	Acoustic perforated gypsum plates	Perforeret gipsplade 13 mm	1	m2/m2	40	
			Ophæng, stålskinnesystem	Stål, valsede profiler og plader	2	kg/m2	40	Satnadard value for suspended celing
STR,ARC	Internal walls	[m²]						
Internal walls	Basement internal walls	1385 m2	Concrete wall	Beton vægelementer, 20 cm tyk væk med 16 - 25 kg armering (11% udsparinger)	0,5	m2/m2	120	Amount is 0,5m2/m2 because the wall only is 10cm thick
	Core load bearing internal walls	4884 m2	Concrete wall	Beton vægelementer, 20 cm tyk væk med 16 - 25 kg armering (11% udsparinger)	1	m2/m2	120	Danish Branche EPD
	Wood structure int. - non load bearing wall	33600 m2	Wood structure (45/70 mm pr 600mm)	Konstruktionstræ af fyr og gran, savede og tørrede (Forbrændring EoL)	3,2	kg/m2	100	Calculated width density for construction wood on 450 kg/m3 and c/c distance at 600mm.
			Insulation	Isover formstykker 37, 70 mm	0,3	m3/m2	80	EPD: NEPD-2612-1324-EN
			Gipsplader	Gyproc Climate	4	m2/m2	60	EPD - NEPD-5165-4476-EN. 2 layers.
			Maling	Flugger PRO 5	0,7	kg/m2	15	EPD: S-P-03212 . 8 m2 paint pr. Liter, decide on 2 layers, resulting in 0,345 kg/m2 pr side. Mængder jf. https://www.flugger.dk/produkter/flutex-10/flutex-10
			Grunder	Overflade, facademaling, grundere, sillkat	0,35	kg/m2	50	8 m2/L for one layer. You only ground in year 0, why lifetime is set to 50 yr. Quantities jf. https://www.flugger.dk/tapet-filt-og-spartel/spartel/sandpl-lh/sandplast-lh
	Internal glass walls	572 m2	Standard construction from LCAbyg2023	Glas 4 mm	25	kg/m2	40	Standard construktion
				Aluminiumsprofil	0,4	kg/m2	60	Standard construktion
				EPDM-tætning til aluminumsprofil	0,13	kg/m2	30	Standard construktion
STR	Columns and beams	m						
	D22-400	2142m	Steel	Deltabeam stålprofil	161,3	kg/m	120	Weigth from table in Deltabeam EPD: https://media.peikko.com/file/dl/i/PyEAXQ/N8CzEFtBmtgkrHixe9I70w/EPD_DELTABEAM_March2022.pdf?fv=1539, when no fit a mean value has been used between the to sizes that comes closes
			Concrete	Fabriksbeton C30/C37	24	kg/m	120	Volume from standard construction in LCAbyg2023
	D50-500	396m	Steel	Deltabeam stålprofil	237,15	kg/m	120	Weigth from table in Deltabeam EPD: https://media.peikko.com/file/dl/i/PyEAXQ/N8CzEFtBmtgkrHixe9I70w/EPD_DELTABEAM_March2022.pdf?fv=1539, when no fit a mean value has been used between the to sizes that comes closes
			Concrete	Fabriksbeton C30/C37	455,0	kg/m	120	Volume from standard construction in LCAbyg2023

Composite beams	DR26-230	924m	steel		133	kg/m	120	Weigth from table in Deltabeam EPD: https://media.peikko.com/file/dl/i/PyEAXQ/N8CzEFtBmtgkrHixe9J70w/EPD_DELTABEAM_March2022.pdf?v =1539, when no fit a mean value has been used between the to sizes that comes closes
			Concrete	Fabriksbeton C30/C37	221,8	kg/m	120	Volume from standard construction in LCAbyg2023
	DR22-250	264m	Steel		133,0	kg/m	120	Weigth from table in Deltabeam EPD: https://media.peikko.com/file/dl/i/PyEAXQ/N8CzEFtBmtgkrHixe9J70w/EPD_DELTABEAM_March2022.pdf?v =1539, when no fit a mean value has been used between the to sizes that comes closes
			Concrete	Fabriksbeton C30/C37	221,8	kg/m	120	Volume from standard construction in LCAbyg2023
Columns 1	360x360mm	456 m	Armering	Celsa steel	25,4	kg/m	120	EPD Celsa steel - S-P-00308
			Concrete	Fabriksbeton C45/55 CEM I	0,13	m3/m	120	
Columns 2	360x360mm	608 m	Armering	Celsa steel	39,7	kg/m	120	EPD Celsa steel - S-P-00308
			Concrete	Fabriksbeton C45/55 CEM I	0,13	m3/m	120	
Columns 3	420x420mm	608 m	Armering	Celsa steel	39,7	kg/m	120	EPD Celsa steel - S-P-00308
			Concrete	Fabriksbeton C45/55 CEM I	0,1764	m3/m	120	
Columns 4	480x480mm	456 m	Armering	Celsa steel	39,7	kg/m	120	EPD Celsa steel - S-P-00308
			Concrete	Fabriksbeton C45/55 CEM I	0,2304	m3/m	120	
Columns 5	600x600mm	456 m	Armering	Celsa steel	39,7	kg/m	120	EPD Celsa steel - S-P-00308
			Concrete	Fabriksbeton C45/55 CEM I	0,36	m3/m	120	
Columns 6	600x600mm	304 m	Armering	Celsa steel	39,7	kg/m	120	EPD Celsa steel - S-P-00308
			Concrete	Fabriksbeton C45/55 CEM I	0,36	m3/m	120	
ARC	**Doors**	**[stk]**						
Doors	Door, int. Glass	301,0	Door, int. Glass	Spånplade	11,16	kg/stk	40	Standard construction from LCAbyg2023
				Træ, fyrretræ	10	kg/stk	40	
				Overflade, indendørsmaling, emulsions maling, slidstærk	1,443	kg/stk	40	
				Rude, 3-lags	1,11	m2/stk	40	
	Steel fire door	50,0	Steel fire door	Dør, stål, indv.	1,9	m2/stk	60	900x2100 = 1,9 m2/stk
	Steel double door	50,0	Steel double door	Dør, stål, indv.	4,2	m2/stk	60	2100x2000 = 4,2 m2/stk
	Door int.	117,0	Door int.	Spånplade	11,16	kg/stk	40	Standard construction from LCAbyg2023
				Træ, fyrretræ	10	kg/stk	40	
				Overflade, indendørsmaling, emulsions maling, slidstærk	1,443	kg/stk	40	
ARC	**Glassfacades**	**[m^2]**						
Ext. windows	Glass façade	4468,0	Curtainwall	Curtainwall facade med 3-lags ruder, aluminium	1	m2/m2	50	Standard contruction from LCAbyg2023
STR,ARC	**Roof**	**[m^2]**						
Roof	Roof	1479 m2	Tagbelægning, tagpap	Derbicolor NT patch roofing	1	m2/m2	40	2 layer equals lifetime of 40 years. EPD: MD-23005-EN. According to EPD the lifetime is 50 years
			Hollow core slabs	CRH hollow core slabs 270mm	0,67	m2/m2	120	EPD: MD-21065-DA, When the product is 270mm heigh, the quantity is set to be 180/270=0,667
			Brandbeskyttende isolering	Rockwool Conlit 36 mm	1,00	m2/m2	60	EPD: NEPD-4119-3333 (RW 55722)
			Insulation (trykfast) 400 mm thickness	Sundolitt EPS Climate 33mm	12,12	m2/m2	40	EPD:MD-22132-EN . Thickness= 400mm equals to m2/m2
STR,ARC	**Stairs and ramps**	**[stk]**						
	concrete stairs			Betontrappe etagehøj	2,6	stk/stk	80	the EPD accounts for a concrete stair in a vertical heigth of 1.44m, our stairs pr. floor is 3,8 - meaning that we need 3,8/1,4=2,6 stk/stk. We have to staircases in each core resulting in 40 stk + the one in the atrium.
	Installations	**[m] or [stk]**						
Ventilation	Ducts	4155,28	Ø250 ventilation duct		3,18	kg/m	50	Ref fanen 'Ventialtion', weigth in kg/m is found here: https://itsolution.lindab.com/lindabwebproductsdoc/pdf/documentation/ads/dk/technical/sr.pdf. Quantities is provided by MEP
	Air handling unit		Air handling unit	10 000 m3/h	18	stk/stk	50	Quantities is provided by MEP
Water	dard value for office / school build	m2	Vand, kontorer, Skoler og Daginstitutioner /Standardværdi)		1	m2/m2	50	BR18 (2023) standard value for water
Heat	dard value for office / school build	m2	Varme, Ventilation og køl, kontorer, Skoler og Daginstitutioner /Standardværdi)		1	m2/m2	50	BR18 (2023) standard value for heat, ventilation and cooling - because we have the specific values from ventilation this value has been multiplied with 0,66 assuming that they each provide a third of the emissions.
Afløb	dard value for office / school buildings		Afløb, kontorer, Skoler og Daginstitutioner /Standardværdi)		1	m2/m2	50	BR18 (2023) standard value for heat
	Elevators	**[stk]**						
Elevators		2	elevators	Elevator, grundkomponenter pr stk	1	stk/stk	25	
			Components pr floor	Elevator, elementer pr etage	20	stk/stk	25	

Appendix C – LCC Inventory molio references

Hours Spend			
Quantity	Unit	Unit price	Comments
468	h	900	8 h pr week + ekstra when hand in + 3 week course. 2 persons
936	h	900	8 h pr week + ekstra when hand in + 3 week course. STR have registered ekstra of 50 hours. 4 persons
702	h	900	8 h pr week + ekstra when hand in + 3 week course. 3 persons
702	h	900	8 h pr week + ekstra when hand in + 3 week course. 3 persons

Operational Costs					
	Quantity	Unit	Unit price	Sum [dkk]	Comments
District heating	427000	kWh	0,52	206.507	Value from MEP Be18 calculation
Electricity	308780	kWh	1,77	546.541	Value from MEP Be18 calculation

RISK / management				
Quantity	Unit	Unit price	Sum [dkk]	Comments
RISK / management factor of 15% of construction sum			**148.739.458**	After consulting with course responsible

Excavation Cost						
Molio name	**Molio no.**	**Quantity**	**Unit**	**Unit price [dkk]**	**Sum [dkk]**	**Comments**
Bygningsbasis, administrationsbygninger	03.90.01,14	29572	m2	808,14	**23.898.316**	
Construction site costs SUM					**6.625.344**	SUM of expenses below insertet in LCCbyg
Byggekran Topkit MD 285 A – leje	02.15,10				5.913.617,62	Crane expensive estimation
Affaldscontainer, leje pr. dag	02.81,02	1	stk		42.918,24	4 containers for 24 month
Lysmast 12 m, 3 x 400 W LED, drift/leje, pr. uge	02.61,04	1	stk		52.365,88	Expenses for 2 years of rent.
Leje, letvogn til 8 personer, toilet/bad og køkken	02.01,02	40	Mdr x stk		292.069,44	2 trailers for 20 month corresponding to construction scheduale
Jernplader 11,25 m², 22 mm, håndtering og kørsel	02.11,05	420	m2		61.247,13	Plates for vehicles
Opvarmning af letvogn/mandskabsmodul pr. dag	02.05,01	2*450	Dage pr stk		173.181,42	2 trailers for 2 years equal approximately 900
Rengøring af letvogn/mandskabsmodul pr. dag	02.05,02	2*450	Dage pr stk		89.950,77	2 trailers for 2 years equal approximately 900

Construction Costs						
Molio name	Molio no.	Quantity	Unit	Unit price [dkk]	Sum [dkk]	Comments
Krybekælderdæk, 250 mm beton støbt på stedet	(23)11.30,03	1588,8	m2	2.054,41*7,2=**14.789**	23.496.763	Terrein - Consulting with STR. Because og thickness 1500mm mm we multiply the unitprice with 7,2.
Kælderydervæg, 490 mm beton/leca termblokke	(21)11.23,05	2420	m2	6841,24*1,4=**9577,8**	23.178.276	After consulting with STR the basement is set as the ext basement walls with a thickness of 700mm. This construction will work as the foundation. We multiply the unitprice with1,4
Fundamenter, fugt- og varmeisolering	03.15.43,03	2420	m2	659,99	1.597.176	Insulation in basement walls
Facadeelement af beton/320mm isolering/puds	(21)31.20,02	5707	m2	4196	23.949.509	Façade wall of concrete and with 300mm insulation – see LCI for construction build up. This one comes the closes.
Træskelet 45 x 45 mm, EI 30	(22)25.05,01	33600	m2	561,3	18.859.680	Int. wall. Wood construction
Dækelement beto, 180 x 1.197 x 2.400 mm	(23)21.10,02	25281	m2	1.190	30.084.390	Slabs concrete hollow core
Præfabrikeret betontrappe med repos	(24)31.05,01	40	m2	108.239,44	4.329.578	Prefabricated staircase
Indervæg af armeret beton, t = 200 mm	(22)21.11,04	4.884	m2	2.184,67	10.669.928	Quantities from STR. Consulting with chosen molio material with STR
Tagdæk, beton 215 x 12.000 mm	(2711.14,03	1.479	m2	1.184,7	1.752.171	Information from ARC
Bøgeparket, type Bøg Nordic Harmony	(43)25.04.04	20496,7	m2	993,9	20.370.974	Wood flooring
Vindue alu, 1.308 x 1.318 mm, 3 lags	(31)43.26,03	4468	m2	5.248	23.448.064	In Sigma its in pieces, one piece equals 1,7 m2, which means we have 2628 pieces. The unitprice for 1 m2 is 1/1,7=0,58 * 8.922 =5.248
Systemvæg, glaselementer, 12 mm hærdet glas	(22)27.20,01	572	m2	3.231,6	1.848.281	Int. glass walls
Akustikloft Gyptone Base 31, skjult, kant D2	(35)12.05,04	21.329	m2	556,45	11.868.522	Area is area of wooden floors + tiles floor.
Akrylmaling, robust på gipsplader	04.24.41,01	33600	m2	418	14.044.800	Times two because the walls are two-sidet. EP 209*2=418.
Tillæg, 12,5 mm gipsplade på en side	(22)24.05,03	13.970	m2	328	11.020.800	Price is for one place, we have two plates each side which equals EP x 4: 82*4=328
Facadeelement af tegl, U-værdi 0,13 W/m²K	(21)32.40,01	1902	m2	5187*2=**10.374**	19.731.348	For the terracotta sunscreens we use normal bricks because it is the same material but multiplies it with 2 for buffer, because it is a more unique production and the buildup work will also require more
Personelevator, tillæg pr. ekstra stop	(66)11.05,02	40	Floors total pr. elevator stop	37.503,07		
Betonbjælke 400 x 600 mm, synlig overflade	04.10.82,08	389	m3	13.452,69	5.233.096	Columns (large). M3 has been calculated for column type 4-6 based on length and dimensions from the LCI
Betonbjælke 250 x 400 mm, synlig overflade	04.10.82,06	245,6	m3	17.467,01	4.289.898	Columns (smal) M3 has been calculated for column type 1-3 based on length and dimensions from the LCI

Beton 40 MPa ekstra aggr., søjle/bjælke	04.10.50,08	367	M3	3.887,36	1.426.661	Beams. Concrete fill out in deltabeams, m3 calculated from length and dimensions from the LCI.
Tagfolie/mineraluld, betontag, U-værdi 0,06 W/m²K	(47)16.20,03	1479	M2	1.464,51	2.166.010	Roofing

Installations Costs

	Molio no.	Quantity	Unit	Unit price [dkk]	SUM [dkk]	Comments
VVS-anlæg, øvrige, administrationsbygn.	05.90.04,14	29.572	m2	376,9	8.813.263,25	Installation of VVS system
Ventilation, administrationsbygninger	(59)57.05,14	29.572	m2	1.107,44	25.894.751,73	Installation of ventilation system
Fjernvarmeanlæg, administrationsbygninger	(59)56.10,14	29.572	m2	448,19	10.479.705,03	Installation of heat source
Køling, administrationsbygninger	(59)55.05,09	29.572	m2	168,77	3.946.228,22	Installation of cooling system
Elinstallationer, administrationsbygninger	(69)63.05,14	29.572	m2	986,15	23.043.049,39	Installation of elektricitet system
Spildevandsinstallationer, administrationsbygn.	(59)52.05,14	29.572	m2	88,76	2.624.899,44	Installation of wastewater system
Vandinstallationer, administrationsbygn.	(59)53.05,14	29.572	m2	176,06	5.206.529,12	Installation of usewater system

Maintenance Costs

LCCbyg name/ molio name	Area	Unit price	Sum pr. yr. [dkk]	Comment
Vinduer, udvendigt – pudsning krævende	4468 m²	37,5	167.550	Area from LCI, unit price and freq included in LCCbyg, Freq 2x pr year
Trapper, hårde – renhold, let	504 m²	2,25	1.134	Unit price and freq included in LCCbyg. Freq 100x pr year
Toilet/badefaciliteter	572 m²	6	3.432	Area from LCI, unit price included in LCCbyg. Freq 252x pr year
Belægninger, løse, grus mv.	420 m²	15	6.300	Unit price included in LCCbyg. Freq 1x pr year
Bevoksninger, parkpræg	50 m²	20	1.000	Unit price included in LCCbyg. Freq 1x pr year
Gulve, hårde – renhold, almindelige	20496 m²	1,3	26.645	Area of wooden floors, Unit price included in LCCbyg. Freq 100x pr year
Døre - renhold	989 m²	2	1978	Door area from LCI is calculated to be 989m2, cleaning of doors, Freq 26x pr yr
Solafskærmning renhold	1902 m²	12,5	23.775	Unit price and freq included in LCCbyg, Freq 2x pr yr
Vinduer, indvendigt – renhold alm	4468 m²	30	134.040	Unit price and freq included in LCCbyg, Freq 2x pr yr
Renovation - sække, middel belastning (214)10.05,012	29572 m²	12,51	369.946	For handling the daily waste
Rengøre arb.plads høj kvalitet 252 dg/år	29572 m²	158,99	3.258.659	For cleaning of office interior high quality
Brugsvand, drift, administationsbygninger (09.25.01,01)	29572 m²	30	915.407,17	Unit price 31 dkk pr m2 pr year for use water. Freq 1 pr year
Kontorer install., akut+ planlagt vedligehold ((238)10.55,017 + (238)10.55,018)	29.572 m²	77,4	2.288.873	Values for maintenance of installations. The cost pr. yr.
Vicevært, inkl. pasning af varmecentral ((246)10.05,011)	29572 m²	39	1.153.952,67	per m2 for janitor pr yr. Freq 1 pr yr
Administrationsbygninger, afledningsafgifter (213)10.10,024	29572 m²	237,69	7.028.696	Unit price pr m2 pr year. Freq 1 pr yer

Appendix D – LCCbyg export, Group Costs

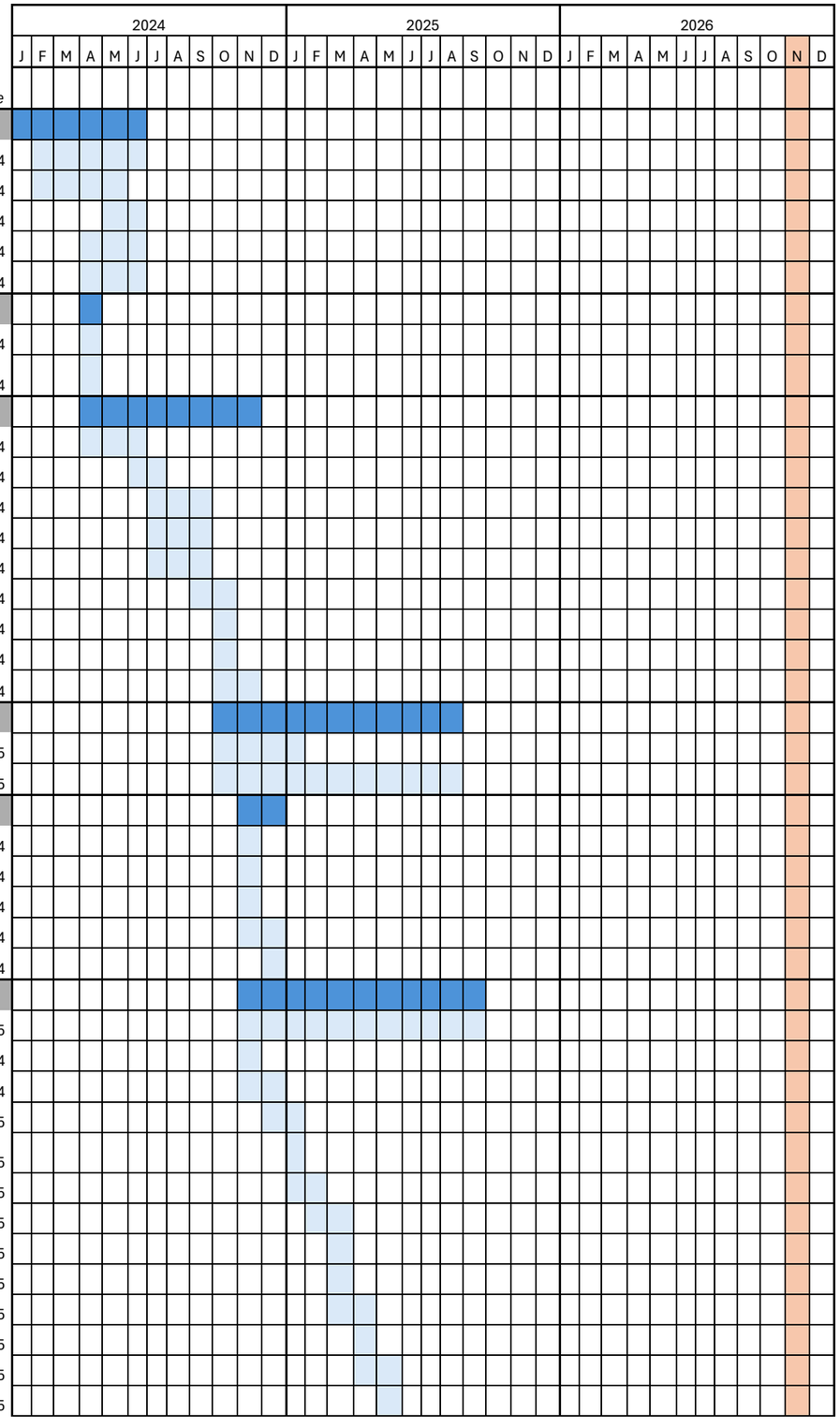
AlternationIndex	Navn	Koe	Anskaffele	Engangsudgift	Vedligehold	Udskiftning	Forvaltning	Forsyning	Renhold	Løbende indtægt	Engangsindtægt	Restværdi	Nutidsværdi	Årsomkostning
0	Hours spend		0	-2527200	0	0	0	0	0	0	0	0	-2527200	-138432
0	Construction cost		-254864678	0	-70191011	-31083818	0	0	0	0	0	26951877	-329187629	-18031824
0	Operatinal Cost		0	0	0	0	0	-26916631	0	0	0	0	-26916631	-1474405
0	Maintenance Cost		0	0	0	0	0	0	-504859265	0	0	0	-504859265	-27654542
0	Installation Costs		0	-97582005	0	0	0	0	0	0	0	0	-97582005	-5345224
0	Excavation		0	-30523660	0	0	0	0	0	0	0	0	-30523660	-1671986
0	Risk / manegement buffer 15%		0	-148739458	0	0	0	0	0	0	0	0	-148739458	-8147462
0	Sum		-254864678	-279372324	-70191011	-31083818	0	-26916631	-504859265	0	0	26951877	-1140335849	-62463875

Appendix E- Be18 key numbers extracted 19.06.2024

Model: AssignmentD	SBi Beregningskerne 10.19.7.22
Be18 nogletal: Assignment D	
Transmissionstab, W/m²	
Transmissionstabsramme, almindelig	12,4
Transmissionstabsramme, lavenergi	11,4
Transmissionstab, beregnet	9,6
Renoveringsklasse 2, kWh/m² år	
Energiramme Renoveringsklasse 2, uden tillæg	95,1
Tillæg for særlige betingelser	0,0
Samlet energiramme	95,1
Samlet energibehov	39,2
Renoveringsklasse 1, kWh/m² år	
Energiramme Renoveringsklasse 1, uden tillæg	71,4
Tillæg for særlige betingelser	0,0
Samlet energiramme	71,4
Samlet energibehov	39,2
Energiramme BR 2018, kWh/m² år	
Energiramme BR 2018, uden tillæg	41,0
Tillæg for særlige betingelser	0,0
Samlet energiramme	41,0
Samlet energibehov	39,2
Energiramme lavenergi, kWh/m² år	
Energiramme lavenergi, uden tillæg	33,0
Tillæg for særlige betingelser	0,0
Samlet energiramme	33,0
Samlet energibehov	39,2
Bidrag til energibehovet, kWh/m² år	
Varme	17,2
El til bygningsdrift	12,9
Overtemperatur i rum	0,0
Netto behov, kWh/m² år	
Rumopvarmning	10,6
Varmt brugsvand	6,5
Køling	5,1
Udvalgte elbehov, kWh/m² år	
Belysning	6,8
Opvarmning af rum	0,0
Opvarmning af varmt brugsvand	0,1
Varmepumpe	0,0

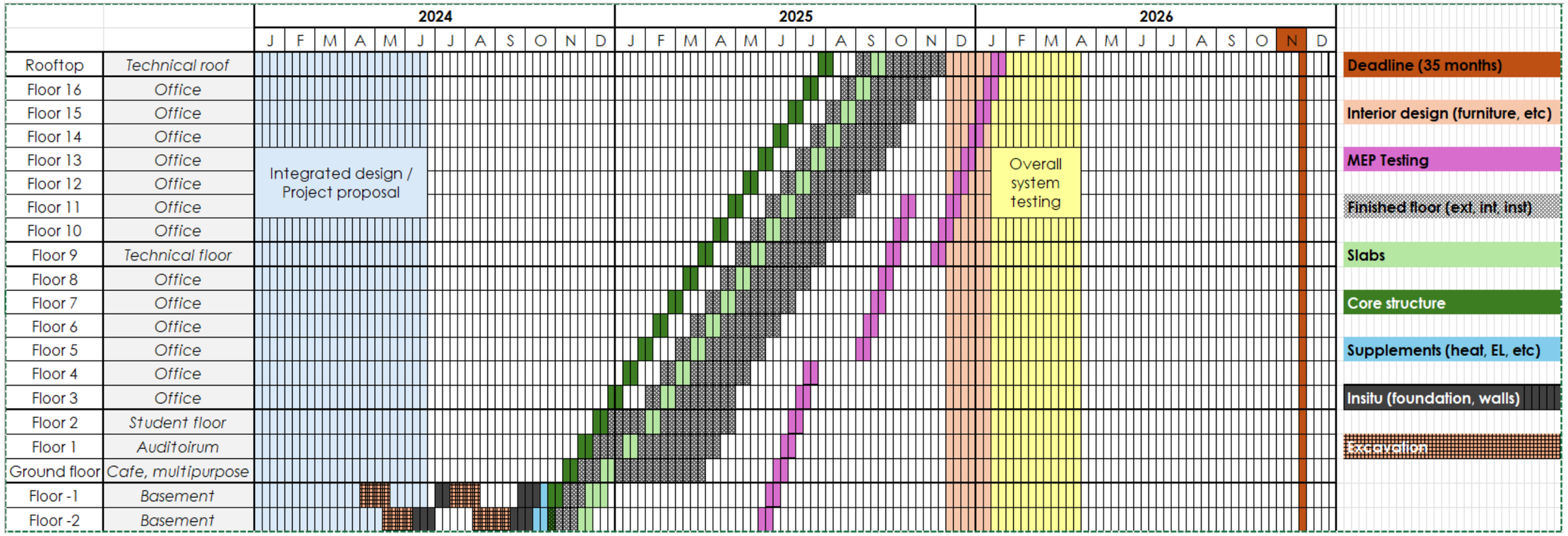
Appendix F – Construction Schedule (Gantt-chart)

Job description	*Duration*	*Start date*	*End date*
Project	154		
Integrated design phase	91	29.01.24	26.06.24
Project proposal	105	29.01.24	09.05.24
Revision of project proposal	28	09.05.24	10.06.24
Cost estimation	49	08.04.24	23.06.24
Construction schedule	49	08.04.24	23.06.24
Construction area	14		
Establishment of construction area	14	01.04.24	14.04.24
Main supplies and equipment delivery	7	08.04.24	14.04.24
Excavation and foundation	203		
Excavation for retaining walls	56	15.04.24	09.06.24
Casting of retaining walls	49	09.06.24	21.07.24
Excavation of site/basement	63	01.07.24	15.09.24
Dewatering	56	08.07.24	15.09.24
Anchoring of retaining walls	21	01.07.24	15.09.24
Sewer and pipe laying	14	16.09.24	06.10.24
Foundations (insitu)	14	07.10.24	27.10.24
Inspections of foundations	2	28.10.24	29.10.24
Establishment of installations	6	29.10.24	03.11.24
Insitu construction	294		
Casting of ramp	91	28.10.24	26.01.25
Casting of core	294	28.10.24	17.08.25
Supplements	35		
Sewer work and drain	7	04.11.24	10.11.24
Electricity main supply	7	11.11.24	17.11.24
Domestic water main supply	7	18.11.24	24.11.24
District heating main supply	7	25.11.24	01.12.24
Heating, EL, Ventilation	7	02.12.24	08.12.24
Prefabricated construction	287		
Staircase implementation	287	18.11.24	14.09.25
-2. floor (walls, beams, slab)	14	18.11.24	24.11.24
-1. floor (walls, beams, slab)	14	25.11.24	22.12.24
Groundfloor (walls, beams, slab)	21	09.12.24	05.01.25
1. floor (auditorium) (walls, beams, slab)	21	06.01.25	26.01.25
2. floor (walls, beams, slab)	14	27.01.25	16.02.25
3. floor (walls, beams, slab)	14	17.02.25	02.03.25
4. floor (walls, beams, slab)	14	03.03.25	16.03.25
5. floor (walls, beams, slab)	14	17.03.25	30.03.25
6. floor (walls, beams, slab)	14	31.03.25	13.04.25
7. floor (walls, beams, slab)	14	14.04.25	27.04.25
8. floor (walls, beams, slab)	14	28.04.25	11.05.25
9. floor (walls, beams, slab)	14	12.05.25	25.05.25

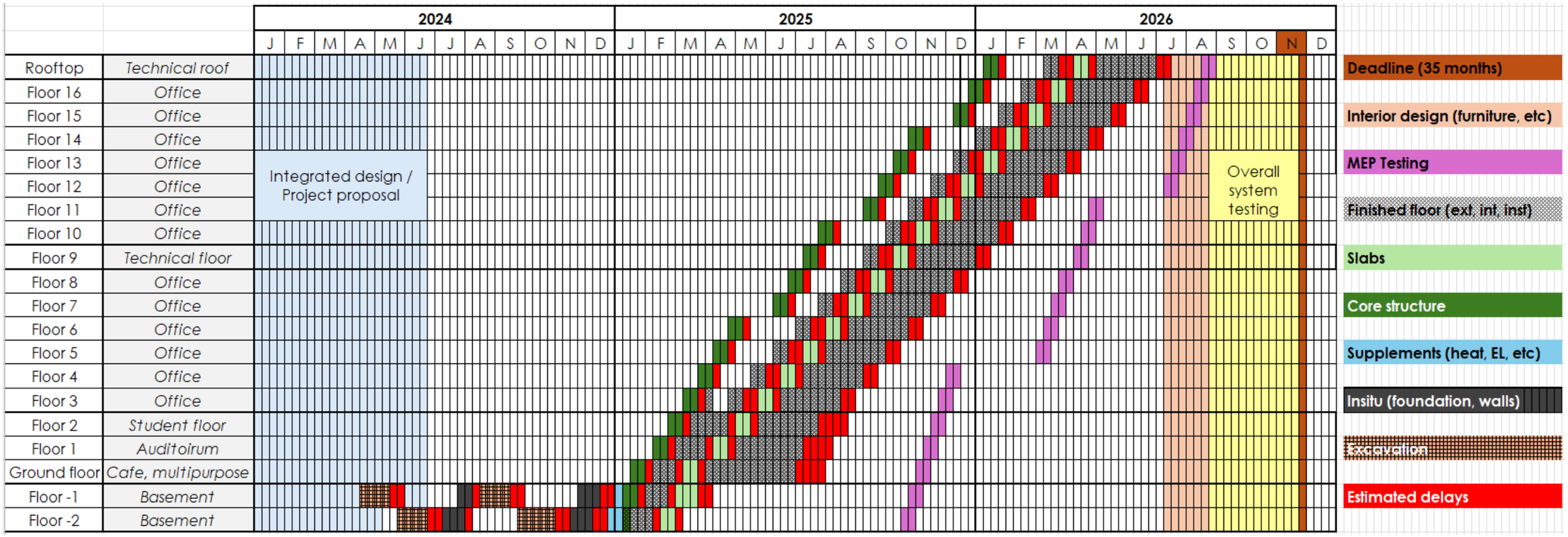


10. floor (walls, beams, slab)	14	26.05.25	08.06.25
11. floor (walls, beams, slab)	14	09.06.25	22.06.25
12. floor (walls, beams, slab)	14	23.06.25	06.07.25
13. floor (walls, beams, slab)	14	07.07.25	20.08.25
14. floor (walls, beams, slab)	14	21.08.25	03.08.25
15. floor (walls, beams, slab)	14	04.08.25	17.08.25
16. floor (walls, beams, slab)	14	18.08.25	31.08.25
Rooftop (slab)	7	01.09.25	07.09.25
Roof	14		
Finishing roof construction	14	08.09.25	21.09.25
Facade	238		
Groundfloor facade	14	03.03.25	16.03.25
1. floor (auditorium) facade	14	17.03.25	30.03.25
2. floor facade	14	31.03.25	13.04.25
3. floor facade	14	14.04.25	27.04.25
4. floor facade	14	28.04.25	11.05.25
5. floor facade	14	12.05.25	25.05.25
6. floor facade	14	26.05.25	08.06.25
7. floor facade	14	09.06.25	22.06.25
8. floor facade	14	23.06.25	06.07.25
9. floor facade	14	07.07.25	20.07.25
10. floor facade	14	21.07.25	03.08.25
11. floor facade	14	04.08.25	17.08.25
12. floor facade	14	18.08.25	31.08.25
13. floor facade	14	01.09.25	14.09.25
14. floor facade	14	15.09.25	28.09.25
15. floor facade	14	29.09.25	12.10.25
16. floor facade	14	13.10.25	26.10.25
Interior build	203		
Covering floors	175	03.03.25	30.11.25
Installations	175	03.03.25	30.11.25
Suspended ceilings	175	03.03.25	30.11.25
Interior walls and surfaces	175	03.03.25	30.11.25
Finishes	56	03.03.25	30.11.25
Interior design	49		
Furnitures	49	01.12.25	18.01.26
Decorations	49	01.12.25	18.01.26
Office installations	49	01.12.25	18.01.26
Overall System Final Testing and Commisioning			
Overall system testing		19.01.26	19.04.26
MEP Testing		26.05.25	01.02.26
Clearing of construction site	14		
Inspection of construction	7		
Certification	7		

Appendix G – Construction Schedule LBS (no risk)



Appendix H – Constructions Schedule LBS (with risk)



Appendix I – DGNB Matrix

DGNB				Goal	PRO	ENV	ECO	SOC	TEC	Final score		68%
					79%	80%	70%	54%	60%			
Criteria		Deliverables	MAX PTS	Points	PM	ARC	STR	MEP				Renference
PRO5.1	**Comprehensive project breif (A)**		**45**	45								
	PRO5.1.1	Requirement- description 15 pts - Main objectives of the project - Size - Quality - Financial framework - Time frame		15	R							See "Beats" in Client report
	PRO5.1.2	Priorities 15 pts - KPIs		15	R							Are defined in **Assignment 1**
	PRO5.1.3	Plot and surroundings 15 pts - Acces - connection to existing parts/systems of campus - Transport - Parking		15		R						See Siteplan in Client report
PRO5.2	**Transdiciplinary collaboration and co-design.**		**120**	120								
	PRO5.2.1	Early process plan for transdiciplinary collaboration between subjects along the design proces. Specify purpose and intended output for each interaction + 20pts		20	R							Se appendix **Contract** and **Gantt_Chart_Group_6** for early process plan for transdiciplinary collaboration between subjects.
	PRO5.2.2	Evidence of transdiciplinary design integration in the plan sektion drawing. 50 pts		50		R	I	I				See Assignment B
	PRO5.2.3	Documentation and description of transdiciplinary worksheet between subject. 50 pts		50	R							See section "Integrated Design" in PM subject report. This specific Matrix also works as evidence for transparancy.
PRO5.3	**Sustainability aspects in tender phase.** address and document your integration of sustainability aspects as part of the Client repport 1.		**60**	10								

	PRO5.3.1	Defining sustainability aspects in Week-4 submission (A) 10pts E.g. Area of opportunities, potential considerations etc.		10	R								Defining sustainability aspects in early stage. - Choosing materials based on LCA variation study to minimize emissions **(see PM subject repport)** - Integrating reuse of water, se **indicator XX** - Focus on exterior areas for improvement of biodiversity and social sustainability (see ARC subject repport) - Focusing not only on CO2-eq pr m2 but also on CO2-eq pr desk **(see ARC subject repport and CO2/desk)** - Design for flexibility so that there is a potential of change of use in the future for different future needs (see STRUCTUAL repport, no loadbearing walls only cores which mean the function easily could change over years) (flyt tekst over og referer til PM subject repport sectionXX)
	PRO5.3.2	Inclusion of general sustainability aspects in Week-8 submission (B) 20pts. E.g. net-zero strategies, good use of space, inclusion of public green areas etc.											
	PRO5.3.3	Inclusion of technical sustainability aspects in client report (C) 30pts E.g. ease of cleaning and maintenance, circular design, optimisation of materials, material recovery etc.											
PRO5.4	**End user concideration during design process** Requirements to the consideration of intended end users throughout the design process as well as in decision making. User centerd design enables the building desing team to integrate additional user attributes early on in the process and use the information to guide the decision making process later on.		**70**	70									

		Development of early understanding of intended end users and their attributes. in the form 3 personas. + 30 pts		30	R								(flyt tekst over og referer til PM subject repport sectionXX) Made by PM's in week 2: Persona 1: The office worker - Background/ experiences: this persona is estimated to be a settled adult with family that has a full-time job, which means that this is the main occupation. Age will be around 30-60. - Needs: to have a working station, good chair, water, WC-facilities, electricity, WIFI, able to get a proper lunch, daylight - Behaviours/ nice to have: two screens for more efficient workflow, height adjustable table for health reasons, coffee, a locker to store your computer or other personal items overnight, when you sit at the same desk the sun will - Goals: to have a work place where you feel comfortable and where you can be efficient and concentrated. Because it's the job is their main occupation there is also a goal for social stimulation and the surroundings need to invite to that. Persona 2: The student - Background/ experiences: this persona is estimated to be a young student on DTU that come to the building to study. - Needs: a space for studying either alone or in groups, water, WC-facilities, electricity, WIFI, possibility to buy/get food or snacks - Behaviours/ nice to have: they will only come for group work or for individual studying which means that the main purpose for students to sit there is to be able to get some work done without being disturbed or disturbing others - Goals: to finish group work or assignments in nice surroundings that supports concentration and Persona 3: Service worker - Background/ experiences: this persona is estimated to an adult who works a lot by themselves and have the communication with the other service workers - Needs: water, WC-facilities, electricity, WIFI, possibility to buy/get food or snacks - Behaviours/ nice to have: they will often walk around in the building and thereby easy access and elevators are preferred and then to have a space where they can store items and coordinate daily activities. - Goals: to have a nice workflow and making sure everything runs smoothly for the employees, office workers and students
		Provide evidence that the building affords the ability of the three concidered personas, to perform their everyday task. In accordance with project manual. +40 pts		40	R	I		I					See PM Subject Report DGNB Documentation section.
PRO5.5	**Comprehensive project breif** Requirements in this criteria is to be integrated as part of the Client report		**55**	30									
	PRO5.5.1	The building as a whole -> Characteristics of the structural shell (including core and any load bearing elements) -> Volume, total GFA [Total buildup area], average GFA [Total GFA/number of floor], UA [Useable area, without walls and core], number of floors -> Construction schedule		15									See client report "Beats" and PM Subject report "Construction Schedule"
	PRO5.5.2	Individual rooms 15pts ->Characteristics (Usage, special design etc.) ->Can be adapted/modified to different usage (if applicable) ->Room height/headroom [False ceiling height] ->Surfaces finishes/treatment		15									See floorplan and section in client report and ARCH subject report

	PRO5.5.3	Effects on users and on the public 25pts ->Typical/possible content: ->Suitability of rooms and systems ->Comfort ->Health ->Aesthetics ->Image										
ENV1.1	**Building Life Cycle Assessment**		**350**	300								
	ENV1.1.1	Evaluate carbon budget, allocation, with the help of an early LCA model +40 pts (B) Variation study of at least 3 different subjects, e.g. ARCH (material choice), MEP (energy consumption), STR (volume optimisation) etc. +30 pts (B) An LCA model is built according to the requirement of BR18 +30 pts (C)		100	R	I	I	I				See section 7.1 in PM subject repport
	ENV1.1.2	Lv1: 9 kg CO2 eq / m2 year 100pts										
		Lv2: 8 kg CO2 eq / m2 year 150pts										
		Lv3: 7.32 kg CO2 eq / m2 year 200pts		200	R							The LCA achieves 6,74 kg CO2 eq / m2 year, see LCI and section 7 Ligfe cycle Assesment in PM subject repport
		Lv4: 6,55 kg CO2 eq / m2 year 250pts										
ENV1.2	**Sustainable ressource use**		**50**	0								
		All wood used in the building process is considered in this criterium both in the finished building and during the construction process, including wood panels, HDF etc., to shield of the building site or used in onsite molds. 50 % of all wood is FSC/PEFC certified 50pts										
ENV1.3	**Primary energy need and degree covered by renevable energy** Degree of the buildings energy need covered or supplyed by renevable energy sources either on site or externally through energy grid.		**50**	50								
		Lv1: >5% of primary energy need, covered by renewable energy sources 30pts										
		Lv2: >8% of primary energy need, covered by renewable energy sources 50pts		**50**	R							See PM subject report DGNB Documentation.

ENV1.4	**Water use and wasterwater reduction** Despite the plentiful supply of water in Denmark, there is an increased need for drinking water of high quality. At the same time, treatment of wastewater at the plant is costly. Reduction and separation of gray and blue water is therefore preferred, as well as innovations and solutions that recirculate or reduce the water used and wastewater (graywater) discharge of the building.		**50**	50								
		Reduction of water and wastewater 50pts		50	R							See PM subject report Waste water management
ECO2.1	**Flexibility and adaptability**		**150**	30								
	ECO2.1.1	> Space efficiency UA [Usable area, without walls and core], GFA[Total GFA/number of floors] between: 0.48 - 0.75 + 30pts		30	R							GFA= 29572 UA equal to the area we have wooden floors = 20.496 UA/GFA =70%, achieving 30 point
	ECO2.1.2	> Ceiling height: Ceiling height >= 3.00m + 30pts										
	ECO2.1.3	> Building Depth (facade to core for typical office space): 5.00 m <= Building depth <= 8.25m 30pts, 6.25m <= Building depth <= 7.25m 60pt										
	ECO2.1.4	>Vertical Access: GFA / number of cores between 400m2 and 1200m2 30pts										
ECO2.2	**LCC and continues cost estimation** Three costing estimation to be carried out:		**200**	200								
	ECO2.2	> Total design cost (design team man-hours, recorded and projected) +100 pts		100	R							See PM Appendix C for inventory for hours spend
		> Total construction cost + 50 pts		50	R							See PM Appendix C for inventory. For results see section 6 in PM subject report. Construction costs (incl. costs for installations, excavation) covers 41% of total costs, see PM subject report section 6
		> Total maintenance cost over 50 years + 50 pts		50	R							See PM Appendix C for inventory for maintenance. Maintenance covers 44% of total costs
ECO2.3	**Commercial access**		**150**	120								
		> Dedicated space for waste collection and access for garbage trucks to building +40pts		40		R						See Client Report Core and Basement
		> Parking entrance considers delivery vehicles +50pts		50		R						See Client Report Core and Basement
		> Building entrance and elevators enables commercial access +30pts		30		R						See Client Report Core and Basement
		> Drop-off and pick-up areas are provided +30pts										
SOC3.1	**Design for all** Universal design following national guideline - BR18		**200**	80								
		Users of the building are defined and types of disabilities and needs are described +80 pts		80	R	R						See DGNB Documentation *Design for all*

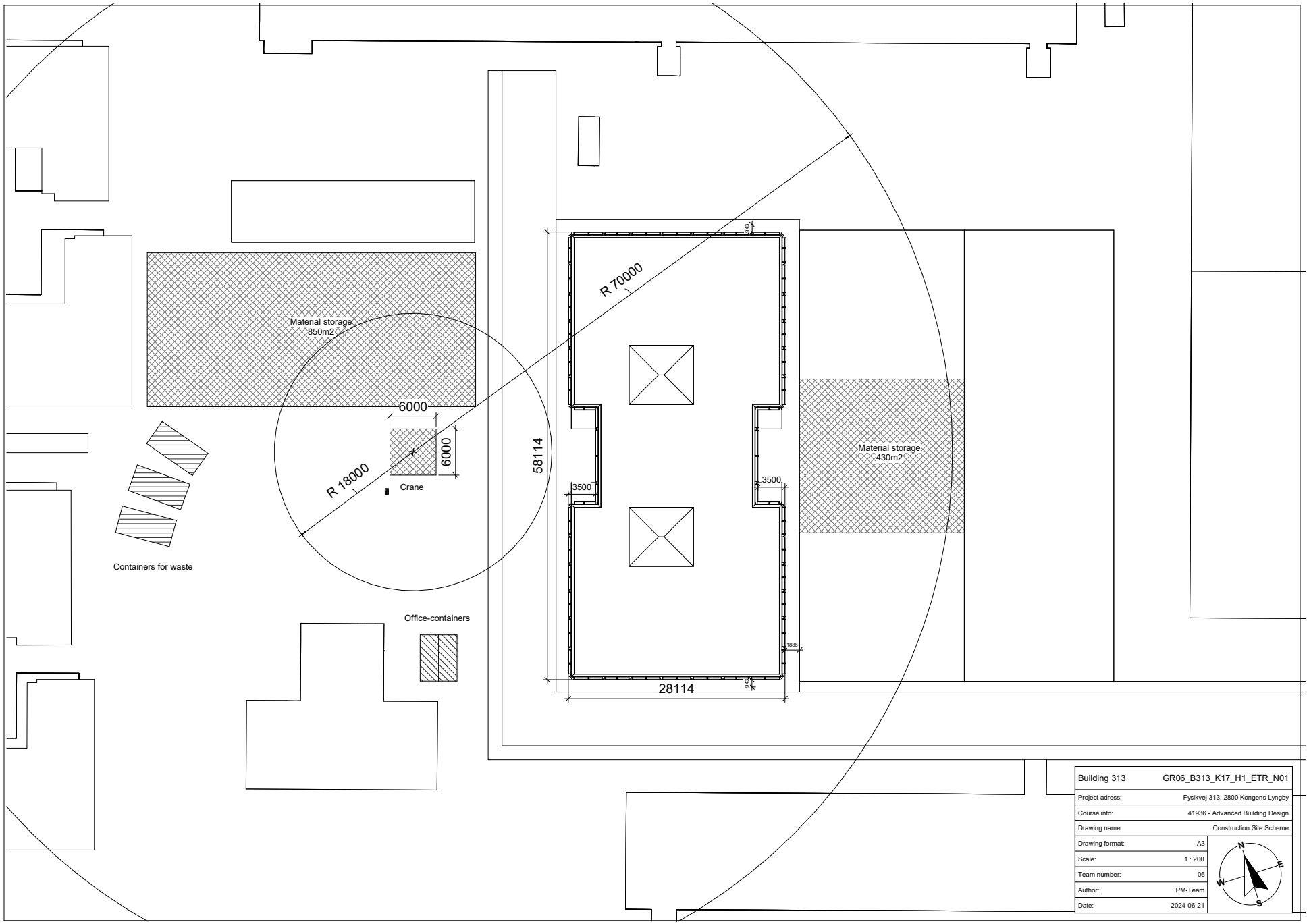
		Design following BR18 clause §49, §51-58, §61 where applicable to the required level of detail of the course +40pts										
		Design following BR18 clause §214-217,220 where applicable to the required level of detail of the course +40 pts										
		Design following BR18 clause §244, 246, §401 where applicable to the required level of detail of the course +40pts										
SOC3.2	**Technical user experience**		**300**	188								
	SOC3.2.1	Operative temperatur	30									
		Lv1: Operative temperature at workplace according to EN 15251 Cat 3 +10pts										
		Lv2: Operative temperature at workplace according to EN 15251 Cat 2 +20pts										
		Lv3: Operative temperature at workplace according to EN 15251 Cat 1 +30pts										
	SOC3.2.1	Indoor humidity	20									
		RH > 25% at least 95% of the operating hours (heating period) +10pts										
		Absolute humidity < 12g/kg (cooling period) +10pts										
	SOC3.2.3	Air exchange rate	**75**									
		Lv1: Air exchange rate at workplace meets EN 16798 Cat 3 +25pts										
		Lv2: Air exchange rate at workplace meets EN 16798 Cat 2 +50pts		50				R				Can be found in the MEP report section "Ventilation"
		Lv3: Air exchange rate at workplace meets EN 16798 Cat 1 +75pts										
	SOC3.2.3	Daylight availability	**25**									
		Lv1: 300lux > 50% daylight hours > 40% reference plan 15pts										
		Lv2: 300lux > 50% daylight hours > 50% reference plan 18pts		18				R				Can be found in the MEP report section "Daylight"
		Lv3: 300lux > 50% daylight hours > 55% reference plan 20pts										
		Lv4: 300lux > 50% daylight hours > 60% reference plan 25pts										
	SOC3.2.5	Visual contact	**30**									
		Lv1: Viewout >80% space = Minimum +15pts										
		Lv2: Viewout >90% space = Medium +20pts										
		Lv3: Viewout >100% space = High +30pts		30				R				There are no objects at the window blocking the viewout. This can be seen from facade drawings.
	SOC3.2.6	Glare	**30**									
		Lv1: DGP (occupied hours) <5% = Minimum 15pts										

		Lv2: DGP (occupied hours) <4% = Medium 20pts										
		Lv3: DGP (occupied hours) <3% = High 30pts										
	SOC3.2.7	Acoustic concept formulated during the planning process	**90**									
		Consider acoustic comfort in the design +90pts		90				R				The acoustic concept is formulated and documentet in MEP report section "Acoustics"
TEC4.1	**Ease of recovery and recycling**		**165**	90								
	TEC4.1.1	Awarded per % of the components that achieve the level. Per component group. E.g. 100% of structural elements are at level 3 + 40% of facades are at level 2 = 100% x 20pts + 40% x 10pts = 20 + 4 = 24pts										
		> Lv1. Material recovery - be used as a secondary raw material for use outside of building construction +5pts										
		> Lv2. Material recovery in building construction - be used for production of a new building component +10pts										
		> Lv3. Material recovery to create comparable product - be reused for equivalent building component +20 pts										
		>Lv4. Material Reuse - remain unchanged and be reused for equivalent building component +25pts										
	TEC4.1.2	Potential for adaptability and future use. Develop a conceptual layout of the building for potential future adaptation, from office/public building to living or student accommodation. The concept should be designed from a representative floor of the building and include a highlight of the major changes needed for the adaptations, including utility, floor plan, heat, and ventilation. +90pts		90		R						The structural part is basedc on the cores and columns. This creates great flexibility for furture redesign of the building and its function. The light construction of the interior walls makes it possible to remove the interior and creata new spaces. The building has great potential for student housing, where the floors can be divided into smaller student rooms and toilet facilities can be shared.
TEC4.2	**Ease of cleaning building components** Exterior and interior surfaces		**40**	30								
		> Description of façade cleaning feasibility +10pts										calculated with price for heavy duty cleaning for all m2 of facade, meaning it demands a lift to be able to clean - freq is 2 times pr year, see PM subject repport Appendix C tables for maintenance costs.
		>Description of interior surfaces cleaning feasibility +10pts		10		R	I					PM subject repport Appendix C tables for maintenance costs for descriptions, frequencies and prices
		> Guidelines to reduce wastewater +20pts		20		R						See DGNB Documentation *Guidance for cleaning and waterreduction*
TEC4.3	**Mobility infrastructure** Bicycle infrastructure is critical to reduce green house gas emission as part of personal transport. Encuragin more sustainable means of transportation is therefore key also to the health and well being of employees and students.		**60**	20								
	TEC4.3.1	Bicycle infrastructure										

		Lvl 1 +20pts -> Anti-theft measures for bicycles -> Maintenance facilities are available -> Weather protection is available for the bicycle parking		20	R							See PM Subject Report Section DGNB Documentation
		Lvl 2 +20pts including lvl 1 requirements -> Lighting is available for parking facilities/spaces -> 50cm between each rack for straight parking rack for easy access										
		Lvl 3 +30pts including lvl 1-2 requirements -> Larger parking spots for cargo bikes -> Access the parking space with automatic door										
	TEC4.3.2	User comfort for cycling users										
		Available shower facilities >Available changing rooms >Available storage facilities										
	Quality of the building envelope Transmission and diffusion via envelope surface components		**50**	50								
TEC4.4		Lv1: Average U-value of exterior wall < min. Building Regulation requirement +20pts										
		v2: Average U-value of exterior wall < -15% of min. Building Regulation requirement +30pts										
		Lv3: Average U-value of exterior wall < -30% of min. Building Regulation requirement +50pts		**50**				R				Building Regulation Requirement: minimum requirements for U-value of exterior walls and basement walls towards ground: 0.30 W/m2K. Our U-value exterior walls 0.21 W/m2K Our U-value basement walls: 0.18 W/ m2K U-value weighted average: 0.207 W/ m2K Max U-value: 0.21 W/ m2K U-values are presented in the MEP report section "Building Envelope"
TEC5.6		Lvl3: Performance based FS design Including universal design										
TEC5.7	**Use and integration of building technology** Passive building concept		**35**	20								
		Planning and implementation for a passive building concept designed to reduce the primary energy demand caused by the technical systems in building operation										

		-> Arrangement and compactness of the building structure, proportion of window area, -> Use of daylight (light redirection) -> Solar radiation protection -> Storage mass and insulation -> Natural ventilation -> Passive heating -> Passive cooling		**20**				R			- +5 for arrangement and compactness of the building structure, proportion of window area: A large focus during the design phase was to create a compact building, that still fulfills indoor thermal climate and daylight requirements. The window area is designed with a size that lets daylight into the building while not having overdimensions of glazed area +5 for use of daylight: windows are placed with optimal use of daylight in the height of 0.85 m from the floor. Permanent desk areas are placed close to windows to ensure optimal use of daylight. +5 for solar radiation: on the southern and south-eastern facade windows with a low g-value are used to prevent overheating from solar radiation while on the northern facade windows have a higher g-value to make use of internal heat loads. +5 for storage mass and insultaion: the bulding envelope is designed with low U-values.

Appendix J – Construction site scheme



Building 313	GR06_B313_K17_H1_ETR_N01
Project adress:	Fysikvej 313, 2800 Kongens Lyngby
Course info:	41936 - Advanced Building Design
Drawing name:	Construction Site Scheme
Drawing format:	A3
Scale:	1 : 200
Team number:	06
Author:	PM-Team
Date:	2024-06-21

N E S W

Appendix K – ICT Contract

BEP - BIM
Process Manual (A402) EN

Building 313, DTU Campus

Design of the new office building 313 at DTU campus for course 41936 – Advanced Building Design.

Client (Appointing party): DTU	**Date: 2024-06-23**
[ARCH] Architect **3 students**	**Rev./ v.: 04**
[MEP] MEP Engineer **2 students**	**Rev. date: 2024-06-22**
[STR] Structural Engineer **4 students**	**Project number: Team 06**
[PM] Project Manager **3 students**	**Prepared by: Project Managers**

Revision log

Version	Date	Description
01	2024-04-08	Creation of document
02	2024-04-29	Additions and corrections
03	2024-05-04	Corrections
04	2024-06-22	Corrections in accordance with work in the 3-week period

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0 General

0.1 Responsibilities for BIM on the project

Statement of which party, or which parties, have overall responsibility for compliance with the content of the BIM process manual.

The Project Manager has the overall responsibility for compliance with the content of the BIM process manual.

0.2 Supplementary documents

Listing of documents necessary to gain an overview of the project. In addition to the document names, also state the background to the documents, and possibly a brief description of the content and relationship with the process manual.

From DTU Learn -> 41936 Advanced Building Design Spring 24 -> Content -> Project -> [Building 313, Project and site requirements, Space (Client) Requirements, BEATS, KPIs, DGNB-lite]

0.3 BIM requirements in tender invitation

Account of which parts of the project's BIM provisions also cover contractors, and must form part of the tender documents.

The tender documentation must impose the following requirements on contractors:

Area	Description	Responsibility

1 Classification

1.0 Background

1.0.1 Classification generally

Listing of the various areas covered by the use of classification on the project.

There are requirements for classification and identification on the project

1.0.2 Responsibilities for classification

Statement of which parties have overall responsibility for compliance with points in relation to classification. Should roles and responsibilities be defined elsewhere, this needs only to refer to the relevant section.

Each party is individually responsible for classification and identification codes in its own design documentation

1.1 Purpose of use of classification and identification

Should a classification system and/or an identification systems be used, state the purpose for which the systems must be able to be used.

The purpose of coding is to create unequivocal identification across the design documentation. Coding must be started in the conceptual design and continued up to and including the handover date

1.2 Scope of classification and identification

Account of the use of classification and/or identification on the project, and which parts of the project and which parts of the design documentation are covered by the classification and identification requirements.

All buildings, construction elements, systems and spaces in the project – and shown in building models, in specifications, bills of quantities or drawings – must be classified and identified.

1.3 Classification system

Statement of the classification system – or classification systems – used on the project. A classification system divides the parts of the project according to overall standardised classes based on shared characteristics. E.g. 'Wall', 'Window', 'Fitting' etc.

All teams will use BIM7AA as the classification system

1.4 Identification method

Statement of the identification system – or identification systems – used on the project. An identification system creates a unique identification of the project's parts at the project level. Identification is usually created at the type or occurrence level. E.g. 'construction element type 1' or 'construction element no. 1'.

All teams will use BIM7AA as the identification method

2 Digital communication

2.0 Background

2.0.1 Digital communication generally

Listing of the various areas covered by the use of digital communication on the project.

All written communication on the project must be carried out digitally.

The chosen communication platform is: Microsoft Teams.

All exchange and archiving of documents must be via the communication platform.

In principle, Microsoft Teams or Messenger will be used for written communication.

Agreements discussed in person should be documented as well as possible via notes or other forms of written documentation and stored on the communication platform.

2.0.2 Responsibilities for communication

Statement of which parties have overall responsibility for compliance with points in relation to digital communication. Should roles and responsibilities be defined elsewhere, this needs only to refer to the relevant section.

The project PM-Team is responsible for coordinating digital communication.

2.0.3 Digital tools and systems used

Listing of the tools and systems used by the parties to the project for digital communication. Tools and systems can be common to all, or individual for each individual company.

The list will usually only contain the most central tools which it is important for everyone to have access to.

The following tools and systems are used on the project:

Tool/system	Area of use	Parties
Microsoft Teams	*Written communication*	*All*
Messenger	*Written communication*	*All*
Microsoft Word (.docx)	*Text documents in editable form*	*All*
Microsoft Excel (.xlsx)	*Spreadsheets in editable form*	*All*
Revit 2024	*3D-modelling*	*All*
Rhino 7	*Existing site model*	*PM*
ArchiCAD	*Initial floorplan designs & conceptual designs*	*ARCH*
Solibri	*Clash detection and consistency checks*	*PM*
Enscape	*Visualizations & renderings*	*PM & ARCH*

2.1 Written communication

2.1.1 Written communication

Statement of which parts of written communication must be carried out digitally, and which standards the various types of communication must comply with.

Written communication on the project must take place digitally. This means that Microsoft Teams or Messenger is used for day-to-day written communication, and that minutes, memos etc. must be prepared and archived in digital formats on the project communication platform.

There is no requirement for standardisation of communication through these platforms.

Other written communication must comply with the rules for documents on the construction project as specified below.

2.1.2 Notification

Description of the extent and method of notification of availability of new and revised files to be used on the project.

When new and revised documents are uploaded to the communication platform, the relevant parties must be notified, if the uploaded material affects other parties.

This must take place via the communication platform's built in notification system or the "posts" function in Microsoft Teams. This ensures that the notification is registered in the communication platform log.

2.1.3 Documentation of communication

Description of how documentation of communication is to be handled.

Each party on the project must be able to document continuously the communication which the party has been a part of.

This is regardless of which type of communication is used e.g. by e-mail, phone, etc. If a communication is not automatically documented (e.g. as with a phone conversation), any communication and any decisions must subsequently be documented, e.g. in a memo or e-mail sent to the relevant parties.

2.2 Exchange of files

2.2.1 Documents and files

Description of which type of documents and files occur on the project, the file formats in which they are to be exchanged, when they are to be exchanged, and method of exchange.

The table below lists the document types on the project:

Document/ file type	File format	Frequency of exchange	Method of exchange
Minutes	*.xlsx*	*Every week*	*Communication platform*
Notes	*.PDF, .docx*	*Ongoing*	*Communication platform*
Agreements	*.PDF, .docx*	*Ongoing*	*Communication platform*
Construction Programme	*.PDF, .docx*	*Ongoing*	*Communication platform*
Discipline models	*IFC 4x3 & .rvt*	*Cf. clause 4.1.4*	*Communication platform*

Drawings	*.PDF*	*Ongoing*	*Communication platform*
Time and delivery plans	*.PDF, .xlsx*	*Ongoing*	*Communication platform*
General: Editable documents	*.docx, .xlsx*	*Ongoing*	*Communication platform*
Clash detection documentation	*IFC 4x3*	*At change of phase*	*Communication platform*

2.3 File and folder structure

2.3.1 File naming

Description of method of naming files on the project.

All files on the project must be named in accordance with example figure 30 from Molio, A104 Document Management - R1.June2015, based on examples 10.8 and 10.9 with a serial number added. I.e. documents must be named with the following information:

- *Project ID*
- *Location*
- *Discipline*
- *Document name*
- *Serial number*

Drawings must be named with the following information:

- *Project ID*
- *Location*
- *Discipline*
- *Type of view*
- *Floor*
- *Serial number*

Models must be named with the following information:

- *Project ID*
- *Location*
- *Discipline*
- *Filetype*
- *Serial number*

A filename must be unique and unequivocal and may not be changed during design and construction.

Examples of naming:

- *Document – LCC documentation no.1: GR06_B313_M11_C03_LCC documentation_N01*
- *Drawings - Architect drawing file 2. floor plan no. 1: GR06_B313_K01_H1_E01_N01*
- *Discipline model - Architect discipline model 5: GR06_B313_K01_F3_N05*

2.3.2 Folder structure

Description of which folder structure is used for which parts of the project.

Naming of folders on the communication platform must be in accordance with Molio, A104 Document Management – R1.June2015, in accordance with the example in chapter 10.7

2.3.3 Change control

Description of which method of change control is to be used on the project, and which type of documents this covers.

For all files except Revit models, the serial number will be used as the indicator of change control when important changes are made. As all members share files in Microsoft Teams versions are automatically stored in the SharePoint, but will only be accessed if needed i.e. these versions will not be visible in the communication platform, but implicitly stored and accessible for all versions and users.

For Revit models, backups are automatically created in the Network Folder, and will therefore be used as version history. If important changes are made, the serial number will be used to indicate change control.

2.4 Metadata

2.4.1 Metadata

Description of whether metadata is to be associated with files on the project, and if so, which metadata and which method of dealing with metadata are to be used on the project.

Metadata name ID	Danish name	Value
Name	*Navn*	*Name with text*
Modified	*Ændret*	*Date (DD.mm)*
Modified By	*Ændret af*	*Name with text*
Number	*Nummer*	*Version number (01.0)*

3 Establishment of communication platform

3.1 Provision of communication platform

Statement of which party is to provide the digital communication platform(s) used on the project, the purpose served by each platform, and the duties of the provider. Should there be rules for data ownership, these must also be written here.

The following communication platforms are available on the project, for use for the stated purposes:

Platform	***Platform type***	***Area of use***	*Provider*
Microsoft Teams	*Project web*	*File sharing*	*Client*
Microsoft Teams	*Supervision platform*	*Reporting and commenting in connection with supervision*	*Client*
Solibri	*BCF server*	*Registration and communication of problems with building models, including the results of clash detection*	*Team*
DTU Learn	*Handover portal*	*Supporting digital handover, incl. approval procedures*	*Client*
Microsoft Excel	*Spreadsheet*	*Registration and communication of deficiencies on the project*	*Team*
Revit 2024	*BIM server*	*For sharing, display and coordination of models*	*Team*

The provider must ensure operation the communication platforms, and that they comply with any requirements of the ICT Executive Orders.

Ownership of data on the respective platforms belongs to the provider. Each party with access to the respective platforms is entitled to make copies of the data in accordance with allocated rights and the methods offered by the platform concerned.

3.2 Administration of communication platform

Statement of which party has overall responsibility for compliance with matters in connection with administration of the communication platform(s). Should roles and responsibilities be defined elsewhere, this needs only to refer to the relevant section.

The project BIM manager (The PM-Team) is responsible for administration of the communication platform.

Administration consists of:

- *Setting up users*
- *Allocation of rights*
- *Setting up folder structure*

4 Digital design

4.0 CAD/BIM - background

4.0.1 CAD/BIM generally

Summary of the various areas covered by CAD/BIM on the project.

Digital building models must be used by all disciplines on the project.

All disciplines are responsible for preparation of discipline model(s) for their respective disciplines.

Each discipline is responsible for coordinating the models with regards to interfaces and overlaps with other discipline.

4.0.2 Responsibilities for CAD/BIM

Statement of which parties have overall responsibility for compliance with points in relation to CAD/BIM compliance. Should roles and responsibilities be defined elsewhere, this needs only to refer to the relevant section.

The project BIM manager (PM-Team) is responsible for coordinating the CAD/BIM area.

4.0.3 CAD/BIM tools and systems used

Listing of the tools and systems used by the parties to the project for CAD/BIM work. Tools and systems can be common to all, or individual for each individual company.

The list will usually only contain the most central tools which it is important for everyone to have access to.

If these tools are listed elsewhere, refer to the relevant location.

Refer to the summary in section 2.0.3 of this document.

4.0.4 Model and drawing schedules

Statement of the model and drawing schedules to be used on the project, including an overview of what each schedule must contain, and which party must set up and maintain each schedule.

Schedules was used for the needed information about amounts of materials and objects for the PM's. The PM-member, Jonas, was responsible for these schedules.

4.1 Building models

4.1.1 Principles of modelling and objects

Should principles of modelling and objects apply, these must be described below. Typical areas are setting geometry and detailing, and any modelling issues that may have an effect on the exchange and/or export of the building models. It may be useful to refer to predefined standards or methods.

is based on the publication "Building element specifications for selected construction elements in building and landscaping models" (prepared by Digital Konvergens and BIM7AA) for setting the phased minimum requirements for detailing of the geometry.

Objects must

- *be geometrically correct, with relevant data provided in accordance with the section 'Attributes'*
- *correctly categorised, using the tools built into the method for doing so*
- *be capable of export to the correct IFC categories in the IFC export without post-processing of the IFC models*
- *be coded in accordance with the classification and identification method defined for the project*

4.1.2 Attributes

Statement of which attributes must be associated with which objects and potentially the method/standard to be used and in which phases. The emphasis must be on the attributes which affect interdisciplinary coordination, and an account of how discipline-specific attributes are to be dealt with must be given, including which attributes and associated values can to be taken as valid in the discipline models.

The following attributes must be shown on all objects in all building models from the conceptual design onwards:

Attribute name	Description	Property Set (IFC)	Source
Description	*Description of object*	*Revit Property Set*	*Identity Data*
BIM7AA	*Classification code*	*Revit Property Set*	*Identity Data*

Objects with the above attributes must have values completed for all the above attributes.

Should objects in the models not be able to be coded for technical and/or modelling reasons, the value '[N/A]' must be stated as the value of the attributes concerned.

Only attributes listed in these overviews can be taken as approved, and their values as valid.

4.1.3 Phases, model content and usage

Description of the content available in the models at the relevant phases of the project, and the areas of use for which the models have been prepared.

It may help to refer to external publications and/or references which give an account of the details of content etc., or to refer to standards for e.g. information levels.

The table below give an account of which parts each discipline model must contain in each phase of the project, and the purposes for which the models are intended in the phase concerned.

A Solibri license has not yet been provided by the client at the date of this document. The table below is therefor only used as a guidance and is not in any way binding.

Phase	Discipline	Contents	Application
Initial Design	*All*	*Cf. YBL 2018*	*Drawings and models.*
Tender Design	*All*	*Cf. YBL 2018*	*Drawing production (including detail drawings)* *Extracting quantities (see chapter 6)* *Consistency and clash detection*
Final Design	*All*	*Cf. YBL 2018*	*Fixing potential errors or wanted changes in the model or drawings (including detail drawings)* *Extracting quantities (see chapter 6)* *Consistency and clash detection*

For further clarifications of the content of individual discipline models and interfaces between the disciplines, use table "BIM7AA BIM Detailing and Responsibility (BDA)"

4.1.4 Exchange of models

Statement of how models are to be exchanged, including the purpose of the exchange, which models are to be exchanged in which formats, and the times at which the exchanges occur.

All teams will collaborate via a central model on the BIM server. Each member will create a local copy of the central model and exchange information to other users via the "collaboration" function in Revit. Each team will have a dedicated worksheet in this model.

Each team must work in their dedicated worksheet, and actively exchange changes via the "collaborate" function in Revit 2024.

Separate models will be created from each worksheet containing the different disciplines after the consistency and clash detection has been completed. This is done to accommodate the hand in format.

Purpose	Models to be exchanged	Format	Time
Basis of engineering discipline models, landscape, and drawing production	• *Central model (ARCH Worksheet)*	*Cf. clause 2.2.1*	*Ongoing (every time changes are saved)*
Coordination of engineering and architectural model	• *Central model (ARCH, STR, MEP Worksheet)*	*Cf. clause 2.2.1*	*Ongoing (every time changes are saved)*
Interdisciplinary consistency and clash detection.	• *Central model (All worksheets)*	*Cf. clause 2.2.1*	*According to phases in 4.1.3*

Responsibilities

The owners of local copies of the central model must ensure that their changes meet the agreed quality requirements, and that the changes are exchanged via the "collaboration" function every time changes are made.

The owners of local copies of the central model are responsible for ensuring that the latest changes are loaded when working on the model. This should be done every time the model is opened.

The recipient is responsible for checking that the models exchanged are exchanged on time, and that they comply with the agreed quality. If they are not of the necessary quality, the sender must be made aware of this as quickly as possible.

4.1.5 Assembly into common model

Statement of the procedure and responsibilities for assembling discipline models into a common model

The models will already be assembled into a common model i.e. the central model. The BIM-manager (PM-team) will ensure that the BIM-server and collaboration within is working correctly.

Each disciplinary model can be identified individually from the worksheets along with the geometry and data related o the discipline.

4.1.6 Software specific items

Statement of any special matters in relation to the software used.

4.2 Drawing production

4.2.1 Drawing generation and standards

Statement of any requirements for how drawings are generated, and which drawing standard or standards are used on the project, including any layer structure.

All drawings that can be generated from the building models must be generated from the building models.

No drawing standard is used, but the following rules must be withheld.

4.2.2 Model label

Statement of the scope and content of model labels for building models. The purpose of the model label is to collate and clarify information about the building model. The model label can be placed either directly in the model or on a 'page' set up for printing directly in the model.

Contents (EN)	Indhold (DK)	Data type

4.2.3 Title block

Statement of the scope and content of the title block included in 2D drawings and digital plots. The title block is often company-specific, but if a project-specific title block is used, it can be defined and shown below.

All drawings exchanged must contain a title block.

A common title block will be used for all the drawings. The title block contains the following:

Project name

Project address

Drawing number according to 2.3.1

Drawing name

Drawing scale

Sheet size

Responsible team

Date

A north arrow

4.2.4 Text and dimensioning

Statement of specific requirements for text and dimensioning of drawings and in models.

The text sizes should follow the already applied dimensions in the common title block.

4.3 Coordinate, elevation and grid systems

4.3.1 Coordinate and elevation system

Statement of which over-arching reference system is used: A fully over-arching system, typically using a national system. Used for locating the construction project in a national/global context. May be divided into several systems, e.g. plane coordinate system (X and Y direction) and elevation system (Z direction).

A project-based coordinate system will be used for the models. This follows the Project Base Point in Revit 2024

4.3.2 Project-specific coordinate system

Statement of the project-specific coordinate system used: A system specific to the construction project, possibly rotated relative to the overall reference system. Used to locate the project in the local/project-specific context.

The Project Base Point is placed at the bottom left corner of building 313. The angle of the buildings (Angle to True North) is set to 17.55 degrees just like the angle of the rest of DTU Campus.

4.3.3 Modular grid

Statement of the modular grid used: A building-specific system used to define the building geometry.

A modular grid is used in all worksheets to ensure smooth collaboration and sizing. The grid will follow the overall dimensions of the outside perimeter and the structural system.

4.3.4 Insertion point

Statement of the common point to be used as insertion point. An insertion point is the point at which a building model is inserted, either in another building model or in a drawing file.

The insertion point will be the same as the Project Base Point, as this serves at the Project Origin.

4.3.5 System of units

Statement of which unit/s is/are used on the project, and in which situations.

The unit used is millimetres (mm).

The scale 1:1 must be used throughout the model, except for drawings.

4.5 Consistency and clash detection

4.5.1 Consistency and clash detection to be included

Listing of consistency and clash detection to be carried out on the project, who is responsible and timing/frequency of these.

Consistency and clash detection must be carried out in accordance with the following table:

All building models must must be checked individually and jointly.

A Solibri license has not yet been provided by the client at the date of this document. The table below is therefor not completed, as the team needs more time with the software in order to fill out the table

Check	Phase	Responsibility	Milestones
Clash detection			
Checking of spaces			

4.5.2 Methods of consistency and clash detection

Statement of which methods must be used for individual checks, and when these may be documented.

Clash detection

Clash detection will be done with Solibri in the phases stated in 4.1.3. The documentation will be carried out according to 4.5.3

A Solibri license has not yet been provided by the client at the date of this document.

4.5.3 Documentation

Statement of the requirements for documentation of checks carried out, and when and how these must be submitted.

A Solibri license has not yet been provided by the client at the date of this document.

4.6 Sectioning

4.6.1 Subdivision of building models

Should the project be large enough to make it necessary to divide the building models into several models, an account must be given of the parts into which the building will be subdivided, and the principles of sectioning.

4.7 Amendments to building models

4.7.1 Registration of amendments to building models

If specific working methods and/or systems are to be used to register amendments to the building models, these must be described here, including the areas of responsibility of each party.

IT systems are not used to register amendments to the building models.

In principle, a party wishing to use the building model is responsible for informing themselves of any amendments made from previous versions

5 Digital Tendering

5.0 Background

5.0.1 Digital Tendering generally

Summation of the different areas covered by digital tendering to be performed on the project.

Tendering of the project must be performed digitally, using the tender platform DTU Learn provided by the client.

The system will handle the whole tender, including

- *all documentation included in the tender*
- *dealing with deadlines*
- *dealing with queries*
- *dealing with the tender submission itself*

Deadlines are as per the project's main programme.

5.0.2 Responsibilities for digital tendering

Statement of which parties have overall responsibility for compliance with points in relation to digital tendering. Should roles and responsibilities be defined elsewhere, this needs only to refer to the relevant section.

The PM team is responsible for coordinating digital tendering.

All teams are responsible for the Client Report.

Each team is responsible for their own Subject Report.

5.0.3 Digital tools and systems used

Listing of which tools and systems are to be used by the parties to the project in connection with digital tendering. Tools and systems can be common to all, or individual for each individual company.

The list must only contain any special tools for the tendering process. Tools which can also be used elsewhere in the project (e.g. for memos, contracts, building models etc.) must be listed in the section of the BIM process manual relevant to the tools.

The following tools and systems must be used for digital tendering on the project:

Tool/system	Area of use	Parties
DTU Learn	*Dealing with tender invitation, including all documents and files included in the tender.* *Dealing with deadlines, and receipt and evaluation of tender.*	*All*

5.1 Provision of tender invitation portal

If a system is used to invite and submit tenders on the project, this must be described, including who is responsible for its operation.

Tendering of the project must be performed digitally, using the tender platform DTU Learn provided by the client.

The client is responsible for operation of the portal (up times etc.) and for the portal being capable of complying with relevant legislation.

5.2 Administration of tender invitation portal

If a system is used to imitate and submit tenders on the project, the party responsible for its administration must be described below.

5.3 Tender documents

5.3.1 Digital structure of the tender documents

According to YBL2018, the digital structure of the tender documents must be described in the invitation to tender. An account must be given below of who is responsible for this, and where this is described.

5.3.2 Bills of quantities

Description of the format and content of the project bills of quantities, including a statement of who prepares which parts, and who is to co-ordinate the bills of quantities for the various disciplines.

5.3.3 Change control

Description of the format and content of the project bills of quantities, including a statement of who prepares which parts, and who is to co-ordinate the bills of quantities for the various disciplines.

5.4 File formats

Description of the file formats in which the different type of documents and files in the digital tender invitation must be available.

Document/ file type	File format
BIM model – ARCH:	*.ifc*
BIM model – ARCH:	*.rvt*
BIM model – STR:	*.ifc*
BIM model – STR:	*.rvt*
BIM model – MEP:	*.ifc*

BIM model – MEP:	*.rvt*
Subject Report – ARCH:	*.pdf*
Subject Report – STR:	*.pdf*
Subject Report – MEP:	*.pdf*
Subject Report – PM:	*.pdf*
Client Report	*.pdf*

6 Bill of quantities

6.1 Quantities in the invitation to tender

If the project is to be tendered using quantities, an account of the method for this must be given below, including the use of measurement rules.

6.2 Building models

Statement of the extent to which building models and quantities from building models are used as the basis of the bill of quantities.

6.3 Description of quantities

Statement of how quantities must be described in the tender, including a statement of how the tender is built up, and a statement of how the tender is to be calculated.

7 Digital submission

7.0 Background

7.0.1 Digital submission generally

Summary of the various areas on the project covered by digital submission.

All discipline models.

All Subject Reports.

The Client Report.

Appendices in the above areas.

7.0.2 Responsibilities for digital submission

Statement of which parties have overall responsibility for compliance with points in relation to digital submission. Should roles and responsibilities be defined elsewhere, this needs only to refer to the relevant section.

The PM team is responsible for correct digital submission.

7.0.3 Digital tools and systems used

Listing of which tools and systems are to be used by the parties to the project in connection with digital submission. Tools and systems can be common to all, or individual for each individual company.

The list must only contain any special tools for submission. Tools which can also be used elsewhere in the project (e.g. for memos, contracts, building models etc.) must be listed in the section of the BIM process manual relevant to the tools.

The following tools and systems must be used for digital tendering on the project:

Tool/system	Area of use	Parties
DTU Learn	*Dealing with digital submission, including dealing with documents and files included in the submission.*	*All*

7.0.4 Programme for digital submission

Listing of milestones and deadlines connected with the submission. If there is a main programme for the project in which these items appear, it is sufficient to refer to this.

The following milestones with the following parties apply to digital submission:

Milestone	Party	Deadline
A: Analyse	*All*	*2024/02/25*
B: Drawings and Options	*All*	*2024/03/24*
C: BIM	*PM*	*2024/05/09*
C: Reports	*All*	*2024/05/09*
D: BIM	*PM*	*2024/06/21*
D: Reports	*All*	*2024/06/21*

D: Presentation	*All*	*2024/06/25*

7.1 Project documentation

Definition of digital project documentation on the project. Digital project documentation typically comprises the documentation that has been prepared on an ongoing basis throughout the construction project, and which thus documents the process of the project. Items below give an account of what precisely the submission of digital project documentation must contain, possibly by reference to other relevant sections to avoid repetition, and including the format required for the documentation, the method of submission to be used, and time/s for the submission.

7.2 'As built' documentation

Documentation of the building – also known as 'as built' – is a separate service with its own statements of content and levels. The item below can summarise and give an account of the digital format in which the documentation must be submitted, including the method and time of submission.

7.3 Handover for operation – Documentation

Description of the file formats in which the different type of documents and files in the digital submission must be available.

The table below lists the document types on the project:

The BIM manager must prepare templates for construction element and room schedules and a document schedule.

Form of submission
The following documentation is included in the submission:

Documentation	Contents	Format

7.4 Handover for operation – Data

Description of which type of data are included in digital submission and for which type of construction elements, rooms etc.

Data on rooms		
Description	**Property**	**P_set***
Data for construction elements		

7.5 Digital snagging lists

If digital snagging lists are used on the project, state below how these are to be used.

8 Digitisation of existing conditions

8.0 Background

8.0.1 Digitisation of existing conditions generally

Summary of the various areas on the project covered by digitisation of existing conditions.

A 3d model of the site needs to be included in all relevant models and drawings.

There is no requirements to the level of detail of the site model.

8.0.2 Responsibilities for digitisation of existing conditions

Statement of which parties have overall responsibility for items in connection with digitisation of existing conditions being complied with. Should roles and responsibilities be defined elsewhere, this needs only to refer to the relevant section.

The BIM manager (PM team)

8.0.3 Digital tools and systems used

Listing of which tools and systems are to be used by the parties to the project in connection with digitisation of existing conditions. Tools and systems can be common to all, or individual for each individual company.

The list must only contain any special tools for digitisation. Tools which can also be used elsewhere in the project (e.g. for memos, contracts, building models etc.) must be listed in the section of the BIM process manual relevant to the tools.

An existing 3D model of the site provided in a different course in the format '.3dm' will be imported into Revit 2024 as the digital conditions. (see section 2.0.3 for more detail on the software used)

8.1 Areas, buildings, services and disciplines covered

8.1.1 Scope of digitisation

Listing of what is covered by digitisation.

The following will be digitised:

- *General geometry of existing buildings*
- *Separation of levels in existing buildings*
- *General geometry of topography*

8.1.2 Relevant disciplines for digitisation

Listing of which discipline and aggregate models must be prepared in connection with digitisation of existing conditions.

An architectural model will be used

8.2 Basis of digitisation of existing conditions

8.2.1 Documentation from the client

Listing of the documentation issued by the client as the basis of digitisation.

No model has been provided by the client

8.2.2 Supplementary documentation and registration

Listing of which methods of registration are used on the project as a supplement to the documentation issued by the client.

8.3 Building models

8.3.1 Principles of modelling and objects

Any applicable principles of modelling and objects must be described below. Typical areas are setting geometry and detailing, and any modelling issues that may have an effect on the exchange and/or export and on the building models. It may be useful to refer to predefined standards or methods.

Cf. chapter 4

8.3.2 Attributes

Statement of which attributes must be associated with which objects and potentially the method/standard to be used. These may arise from the client's direct requirements or attributes which are considered necessary to add to support the future use of the models.

Cf. chapter 4

8.3.3 Model content and application

Description of the content available in the models, and which areas of use the models must be designed to support.It may help to refer to external publications and/or references which give an account of the details of content etc., and/or to refer to standards such as information levels.

Cf. chapter 4

8.3.4 Exchange of models

Statement of how models are to be exchanged, including the purpose of the exchange, which models are to be exchanged in which formats, and the times at which the exchanges occur.

Models are to be exchanged in accordance with the following table.

The owners of the local models synchronized with the central model will be responsible for the changes made.

Purpose	Models to be exchanged	Format	Time
Interdisciplinary coordination/ assembly into common mode	*All worksets*	*Cf. chapter 4*	*Ongoing*
Splitting common model into individual fields	*ARCH* *STR* *MEP*	*Cf. chapter 4*	*Before assignment C* *Before assignment D*

8.3.5 Assembly into common model

Statement of the procedure and responsibilities for assembling discipline models into a common model

Assemble is done via the collaboration function in Revit 2024

8.3.6 Quality assurance

Statement of the extent and responsibilities for the quality assurance of building models. State for both discipline and aggregate models, including statement of which documentation must be available at which time.

Quality Assurance cf. clause 4.1.4 and 4.4.

8.3.7 Software specific items

Statement of any special matters in relation to the software used.

In accordance with Cl. 4.1.6

8.4 Drawing production

8.4.1 Drawings prepared

Listing of the drawings to be produced as part of digitisation of existing conditions, and the formats in which these are to be prepared.

The following will be prepared before assignment D (final hand-in):

Site-plan

Floorplans of all the relevant floors

Basement plans

Details of all relevant building elements

Sections of all relevant areas

Front views

8.4.2 Model label

Statement of the scope and content of model labels for building models. The purpose of the model label is to collate and clarify information about the building model. The model label can be placed either directly in the model or on a 'page' set up for printing directly in the model.

In accordance with clause 4.2.1

8.4.3 Title block

Statement of the scope and content of the title block included in 2D drawings and digital plots. The title block is often company-specific, but if a project-specific title block is used, it can be defined and shown below.

In accordance with clause 4.2.2

8.4.4 Text and dimensioning

Statement of specific requirements for text and dimensioning of drawings and in models.

In accordance with clause 4.2.3

8.5 Coordinate, elevation and grid systems

8.5.1 Coordinate and elevation system

Statement of which over-arching reference system is used: A fully over-arching system, typically using a national system. Used for locating the construction project in a national/global context. May be divided into several systems, e.g. plane coordinate system (X and Y direction) and elevation system (Z direction).

In accordance with clause 4.3.1

8.5.2 Project-specific coordinate system

Statement of the project-specific coordinate system used: A system specific to the construction project, possibly rotated relative to the overall reference system. Used to locate the project in the local/project-specific context.

In accordance with clause 4.3.2

8.5.3 Modular system

Statement of the modular grid used: A building-specific system used to define the building geometry.

In accordance with clause 4.3.3

8.5.4 Insertion point

Statement of the common point to be used as insertion point. An insertion point is the point at which a building model is inserted, either in another building model or in a drawing file.

In accordance with clause 4.3.4

8.5.5 System of units

Statement of which unit/s is/are used on the project, and in which situations.

In accordance with clause 4.3.5

9 Special visualisations

9.0 Background

9.0.1 Special visualisations generally

Summary of the various areas on the project covered by special visualisations.

Outside perspectives

Ground floor (entrance)

1. floor (auditorium)

2. floor (student spaces)

5. floor (standard office space)

16. floor (observatory)

9.0.2 Responsibilities for special visualisations

Statement of which parties have overall responsibility for compliance with points in relation to special visualisations. Should roles and responsibilities be defined elsewhere, this needs only to refer to the relevant section.

The BIM-manager

9.0.3 Digital tools and systems used

Listing of which tools and systems are to be used by the parties to the project in connection with special visualisations. Tools and systems can be common to all, or individual for each individual company.

The list must only contain any special tools for visualisation. Tools which can also be used elsewhere in the project (e.g. for memos, contracts, building models etc.) must be listed in the section of the BEP - BIM process manual relevant to the tools.

Basically, modelling tools in accordance with clause 2.0.3 are to be used.

Special tools are shown under the individual visualisations

9.1 Photo-realistic visualisations

9.1.1 The extent of photo-realistic visualisations

Listing of the photo-realistic visualisations to be prepared, their purpose, and any special conditions for all or for specific visualisations.

See 9.01

9.2 Spatial representations

9.2.1 The extent of spatial representations

Listing of the spatial representations to be prepared, their purpose, and any special conditions for all or for specific representations.

See 9.01

9.3 Architectural photography

9.3.1 Scope of architectural photography

Listing of the photos to be taken, their purpose, and any special conditions for all or for specific photographs.

9.4 Animations, videos and interactive presentations

9.4.1 Scope

Listing of the material to be prepared, their purpose, and any special conditions for all or for specific parts of the material.

VR according to the criteria's given by the teachers

10 Other digital services

10.1 Name of service

10.1.1 Description of the service

Description of the service and listing of the various areas on the project covered by, affected by or interfacing with the service.

10.1.2 Responsibilities for the service

Statement of which parties have overall responsibility for compliance with points in relation to the service. Should roles and responsibilities be defined elsewhere, this needs only to refer to the relevant section.

10.1.3 Digital tools and systems used

Listing of which tools and systems are to be used by the parties to the project in connection with the service. Tools and systems can be common to all, or individual for each individual company.

The list must only contain any special tools for the service. Tools which can also be used elsewhere in the project (e.g. for memos, contracts, building models etc.) must be listed in the section of the BEP - BIM process manual relevant to the tools.