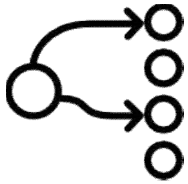
MULTI – STOREY SOCIAL HOUSING

Group 8: Jonas Namesen
Aleksandra Kowalczyk
Ahsanullah Hafizi

INDEX

GROUP ORGANISATION

Contract
Meetings
Planning
Logbook



OUTLINE PROPOSAL

Case
Legal scrutiny
Design process
Tender

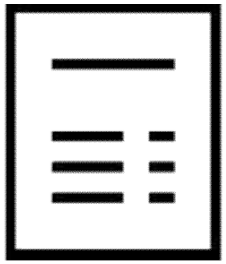
SCHEME DESIGN

Analyses
Final drawing and documentation
Price

INDIVIDUAL PRESENTATIONS

Jonas Namensen
Aleksandra Kowalczyk
Ahsanullah Hafizi

GROUP WORK



Contract

Weekly meetings

Written minutes and short term planning

Folder structure based on BIPS A104

PLANNING

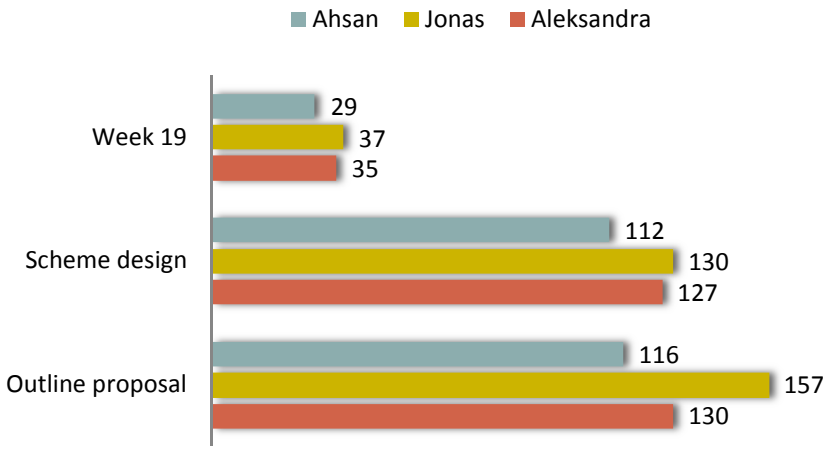
Activity list

Precedence diagram

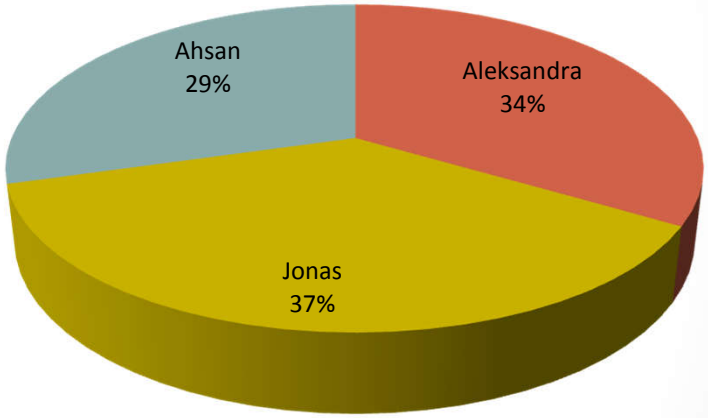
MS project
- Group and indyvidual planning
- Weekly updating hours
- Plan work for each week

GROUP LOGBOOK

Work during phases



Total time per person



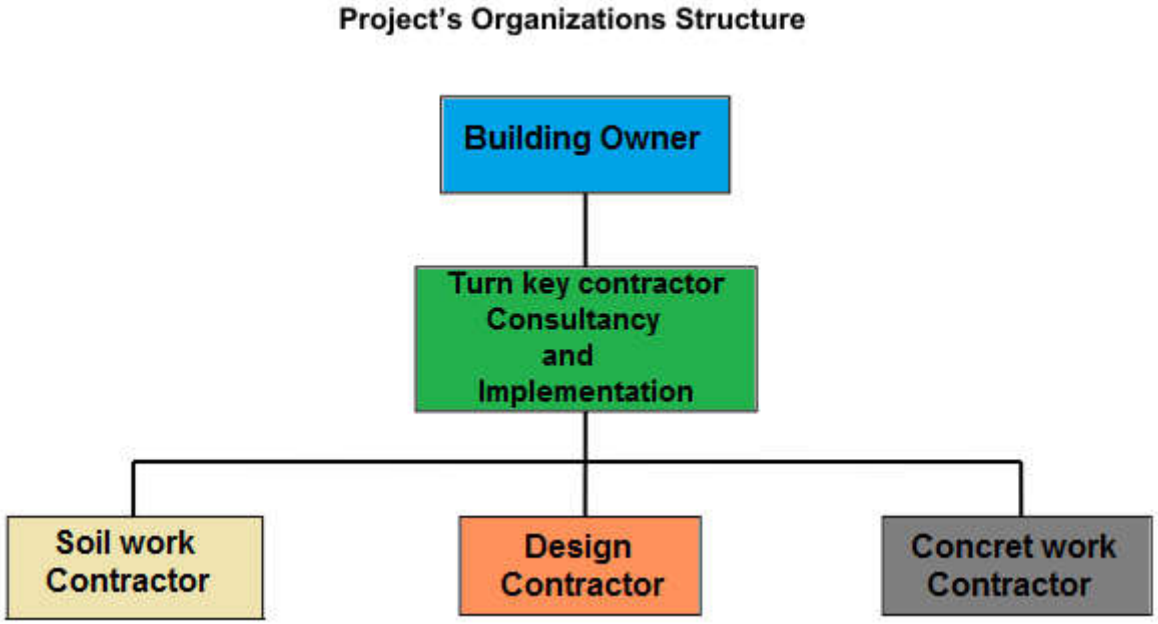
ROLES

Consultancy A/C group
Turn-key contructor

Outline proposal
Scheme design
Tender

Subcontractor

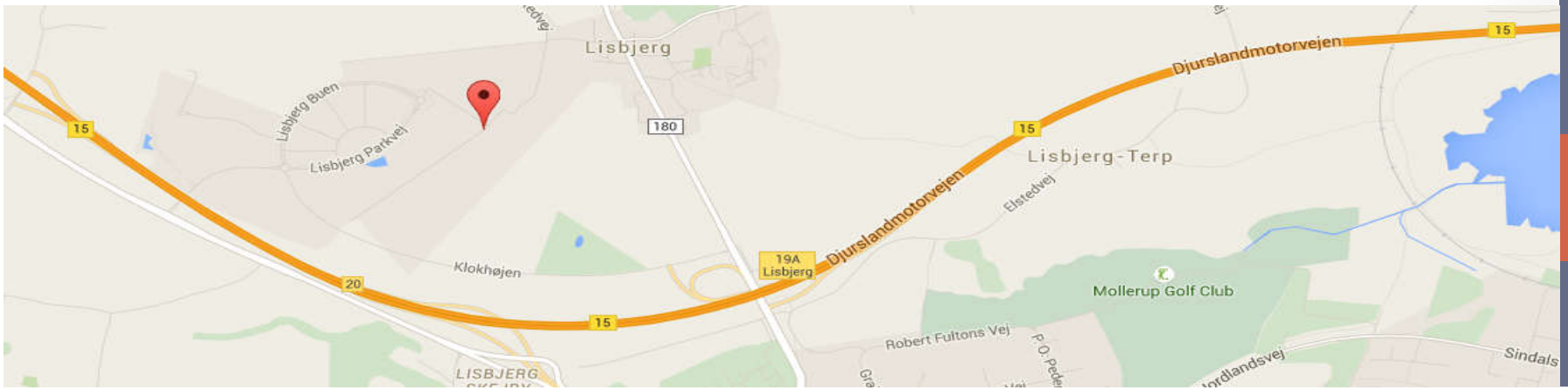
Design
Implementation



OUTLINE PROPOSAL

Building owner:
Housing cp- operative 2010

Case:
Multi-Storey social housing



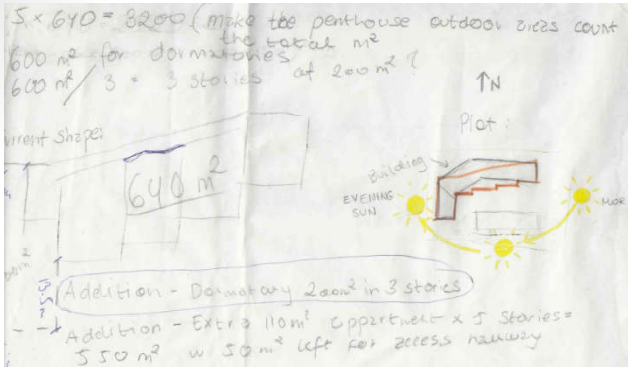
LEGAL SCRUTINY

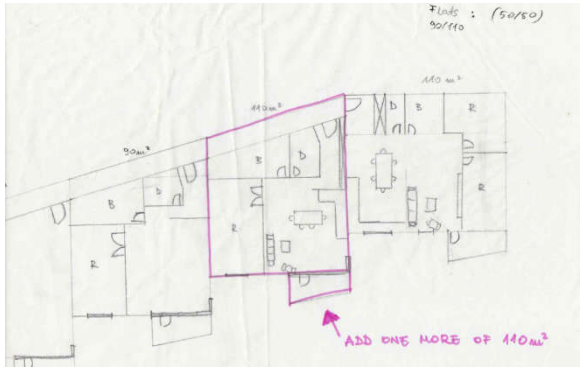
Craftsman checklist

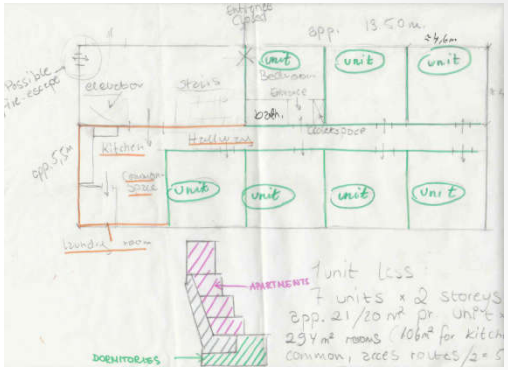
GC93 – legal scrutiny

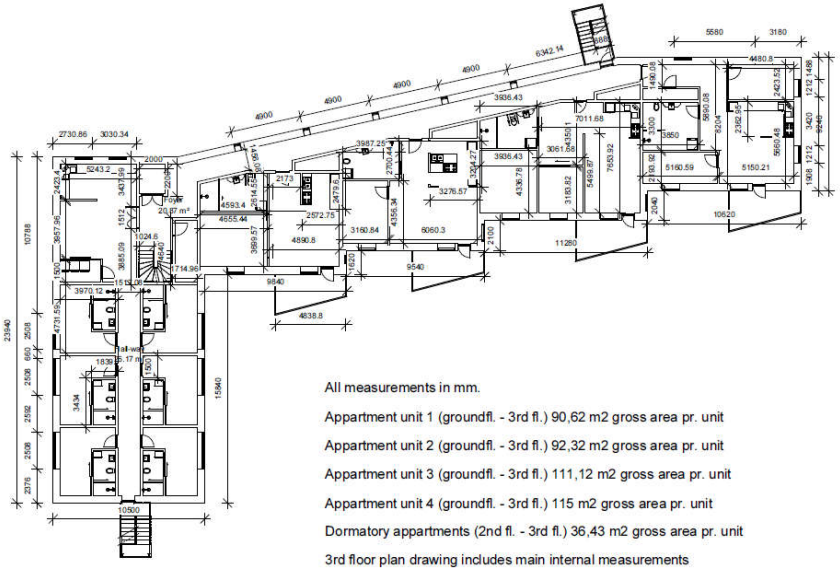
GC93 art	Deviation/addition	What will you do?
1. Para 2	All design costs must be included in the bid. All expenses pertaining to the work must be included in the bid, unless it is expressly stated that a specific expense is not included in the bid.	In the bid should be also included: - Service costs - Planning process - Construction works
2. Para 2	It is up to the turnkey contractor to ensure that the information and requirements are not inconsistent with the law, other government regulations, easements and other similar rights over the property. The turnkey contractor shall acquaint himself with conditions on the ground and perform the additional studies required for bidding.	In this phase we as a turnkey contactor must be sure that we do everything according to the law and other requirements because we are responsible for the design and construction site, coordination and defects.

DESIGN PROCESS









All measurements in mm.

Appartment unit 1 (groundfl. - 3rd fl.) 90,62 m2 gross area pr. unit

Appartment unit 2 (groundfl. - 3rd fl.) 92,32 m2 gross area pr. unit

Appartment unit 3 (groundfl. - 3rd fl.) 111,12 m2 gross area pr. unit

Appartment unit 4 (groundfl. - 3rd fl.) 115 m2 gross area pr. unit

Dormatory appartments (2nd fl. - 3rd fl.) 36,43 m2 gross area pr. unit

3rd floor plan drawing includes main internal measurements

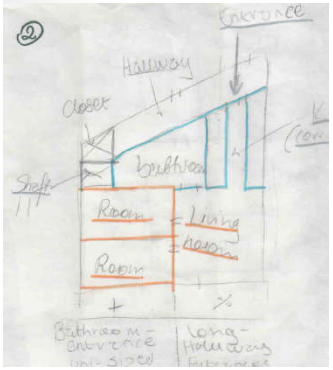
Placement on the plot

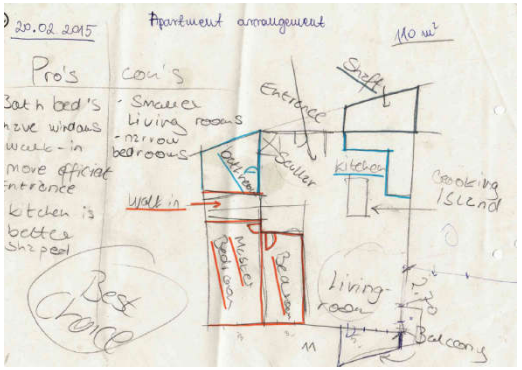
Shape of the building

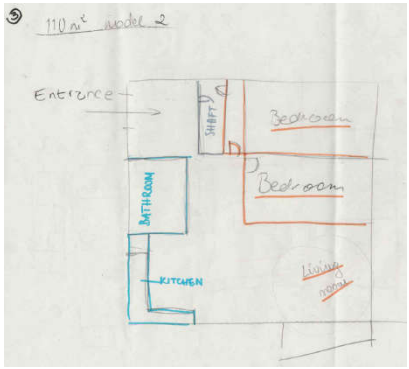
Additional apartment

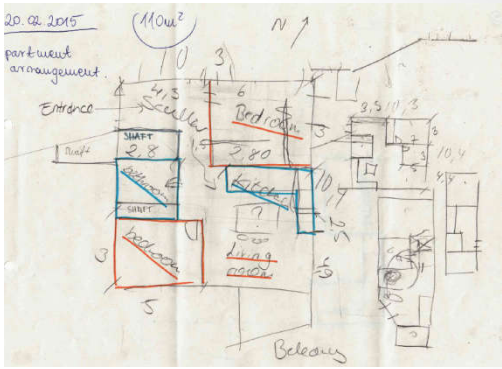
Dormitories and business area

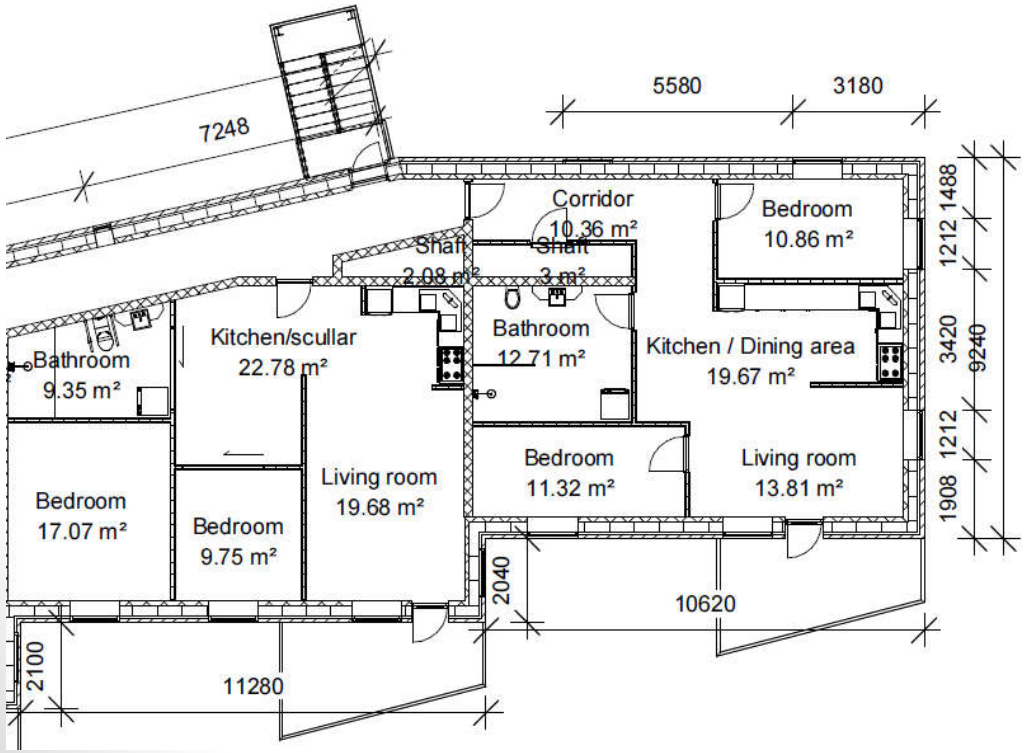
DESIGN PROCESS









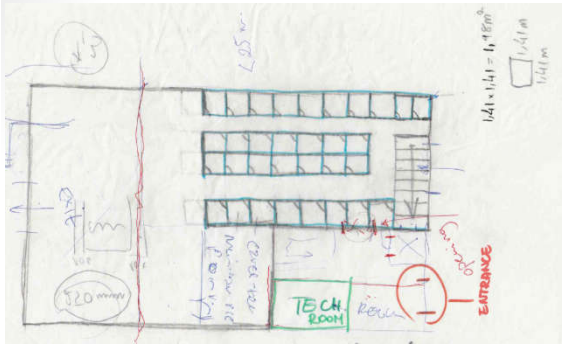


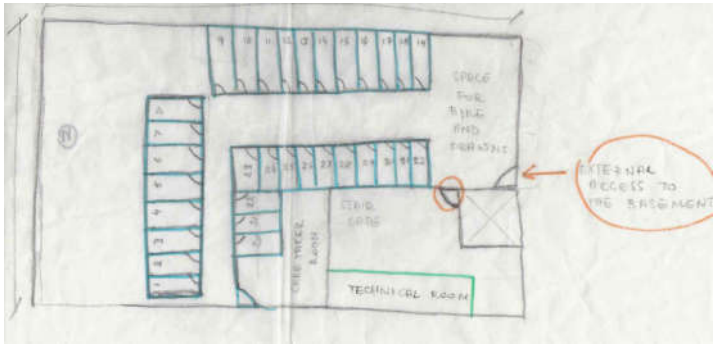
Placement kitchen and bathroom next to each other and shaft

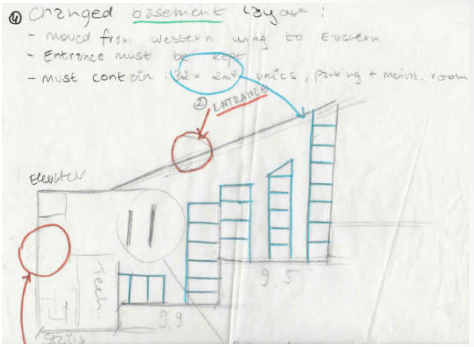
Arrangement of the kitechen

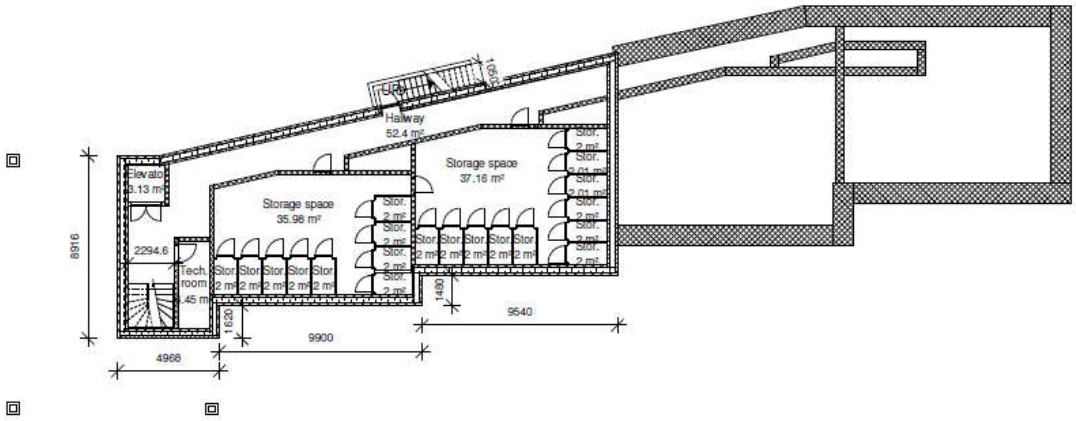
Daylight analyses in rooms

DESIGN PROCESS





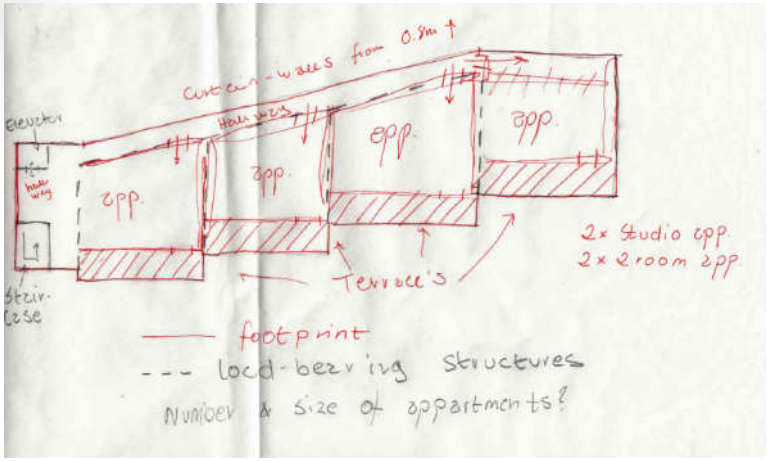




Placement of the basement

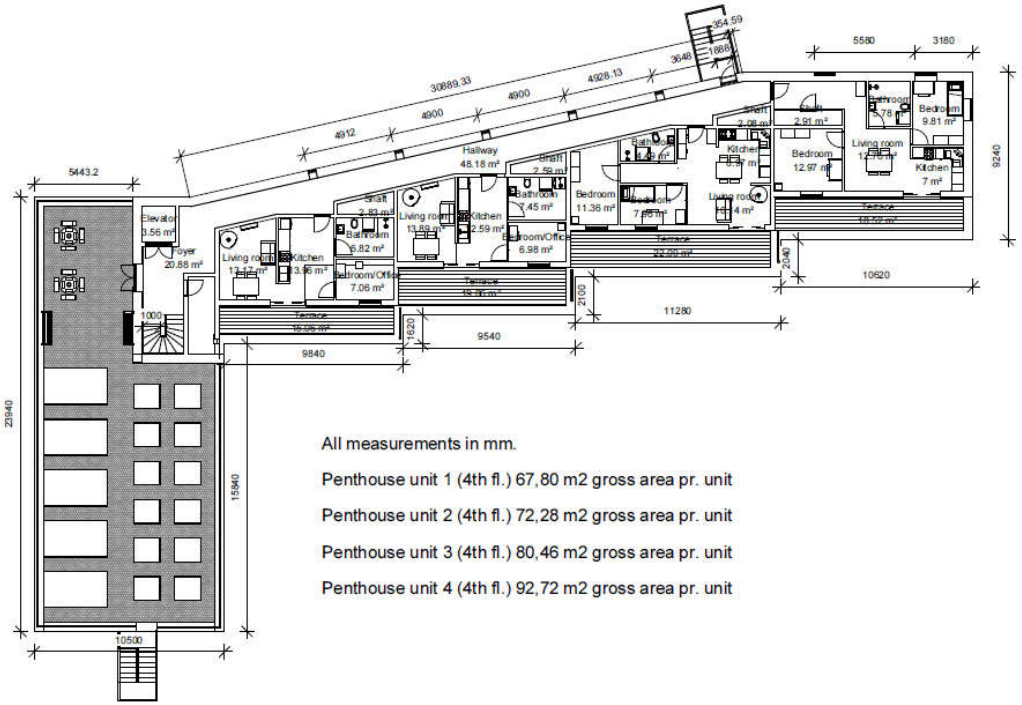
- Arrangement of storages
- Terrain level
- Columns under business area

DESIGN PROCESS



Layout of 4th floor

- Keep load bearing structure
- Uncovered terraces
- Common garden



All measurements in mm.

Penthouse unit 1 (4th fl.) 67,80 m2 gross area pr. unit

Penthouse unit 2 (4th fl.) 72,28 m2 gross area pr. unit

Penthouse unit 3 (4th fl.) 80,46 m2 gross area pr. unit

Penthouse unit 4 (4th fl.) 92,72 m2 gross area pr. unit

TENDER

COMPETITION

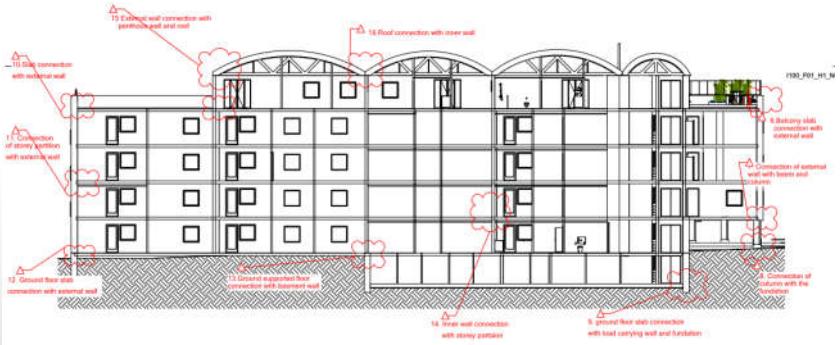
BID

TURN-KEY CONTRACTOR AGREEMENT

SCHEME DESIGN

SCRUTINIZING

Risk areas
Analyses
Material choices
Building component journal
Details



FINAL PRODUCT

Drawings
Documentation

PRICE

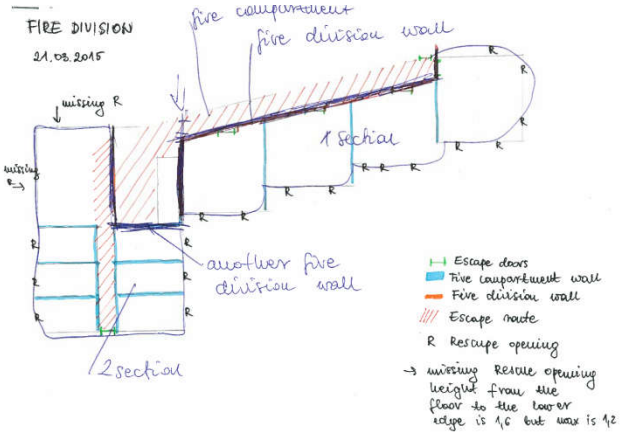
Successive estimation
V&S price book

Estimate	Business	2 173 287
Uncertainty, +/-		153 893
Uncertanty, %		7,1%
Price per m2		10866,434

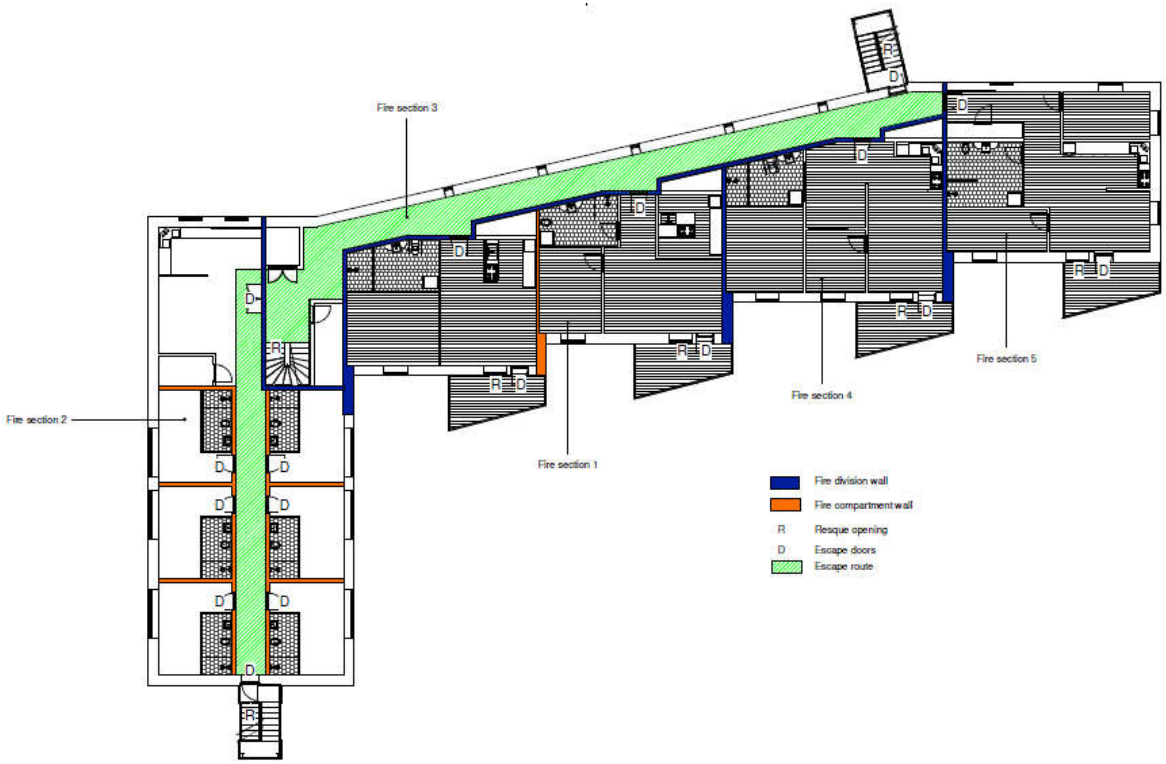
Estimate	Youth flats		1 545 803
Uncertainty, +/-			121 330
Uncertanty, %			7,8%
Price per m2		DKK	6 963,08

Estimate	Apartments		23 421 849
Uncertainty, +/-			1 971 302
Uncertanty, %			8,4%
Price per m2		DKK	6 933,64

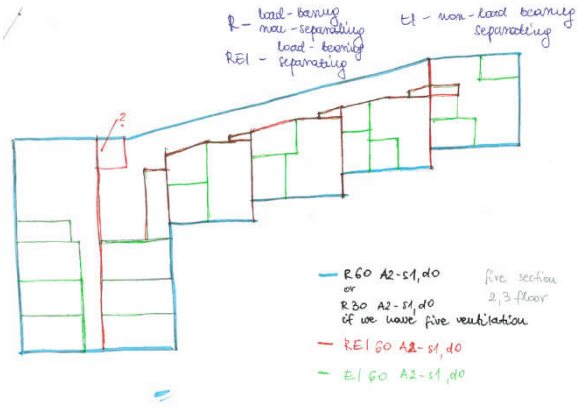
FIRE



- Usage category 4
- Maxium area of fire section 600m2
- Fire compartment - dwelling

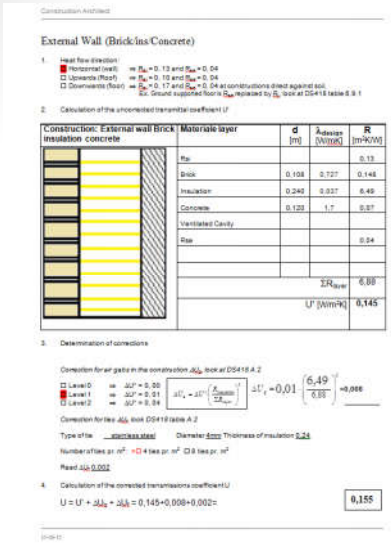


FIRE



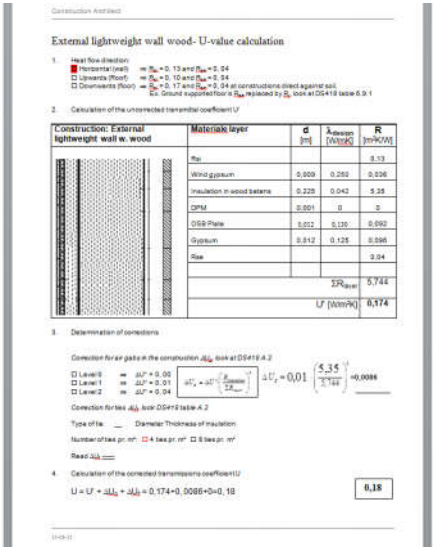
- Building components classification
- Fire spread
- Escape routes

ENERGY



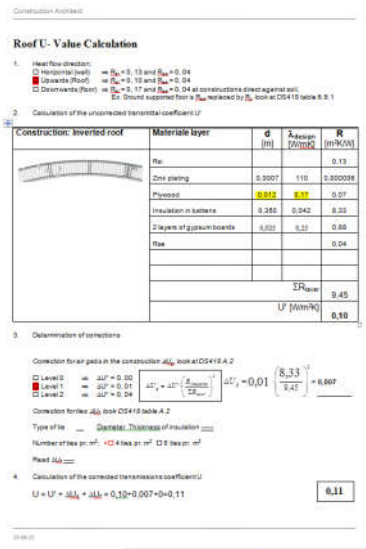
External Wall (Brick/ins/Concrete)

Construction: External wall Brick insulation concrete	Materiale layer	d [m]	λdesign [W/mK]	R [m²K/W]
	Rsi			0,13
	Brick	0,108	0,727	0,148
	Insulation	0,240	0,037	6,49
	Concrete	0,120	1,7	0,07
	Ventilated Cavity			
	Rse			0,04
			ΣR layer	6,88
			U' [W/m²K]	0,145



External lightweight wall wood- U-value calculation

Construction: External lightweight wall w. wood	Materiale layer	d [m]	λdesign [W/mK]	R [m²K/W]
	Rsi			0,13
	Wind gypsum	0,009	0,250	0,036
	Insulation in wood batens	0,225	0,042	5,35
	OPM	0,001	0	0
	OSB Plate	0,012	0,130	0,092
	Gypsum	0,012	0,125	0,096
	Rse			0,04
			ΣR layer	5,744
			U' [W/m²K]	0,174



Roof U- Value Calculation

Construction: Inverted roof	Materiale layer	d [m]	λdesign [W/mK]	R [m²K/W]
	Rsi			0,13
	Zinc plating	0,0007	110	0,000006
	Plywood	0,012	0,17	0,07
	Insulation in battens	0,350	0,042	8,33
	2 layers of gypsum boards	0,025	0,23	0,88
	Rse			0,04
			ΣR layer	9,45
			U' [W/m²K]	0,10

- BR10 demands
- U-value calculations
- Energy frame calculation

Key numbers, kWh/m² year

Energy frame in BR 2010

Without supplement	Supplement for special conditions	Total energy frame
53,2	0,0	53,2
Total energy requirement		50,8

Energy frame low energy buildings 2015

Without supplement	Supplement for special conditions	Total energy frame
30,4	0,0	30,4
Total energy requirement		43,9

Energy frame Buildings 2020

Without supplement	Supplement for special conditions	Total energy frame
20,0	0,0	20,0
Total energy requirement		32,4

Contribution to energy requirement

Heat	34,2
El. for operation of bulding	6,6
Excessive in rooms	0,0

Net requirement

Room heating	17,6
Domestic hot water	15,8
Cooling	0,0

Selected electricity requirements

Lighting	0,0
Heating of rooms	0,0
Heating of DHW	0,3
Heat pump	0,0
Ventilators	6,3
Pumps	0,3
Cooling	0,0
Total el. consumption	37,3

Heat loss from installations

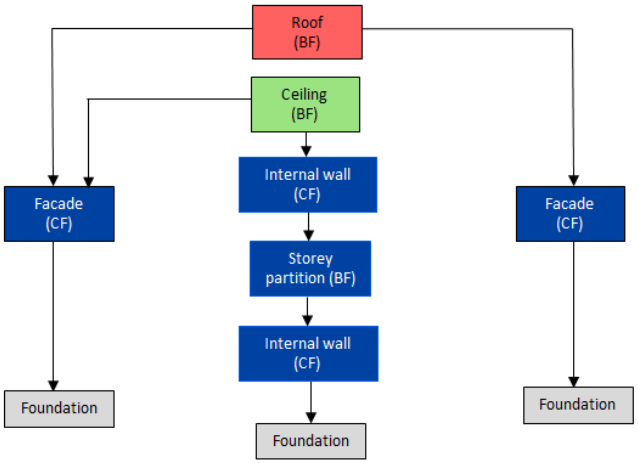
Room heating	0,7
Domestic hot water	2,7

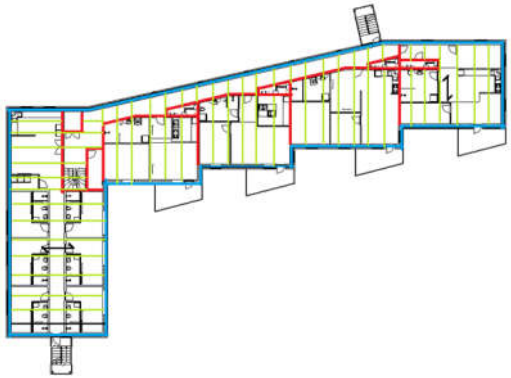
Output from special sources

Solar heat	0,0
Heat pump	0,0
Solar cells	0,0
Wind mills	0,0

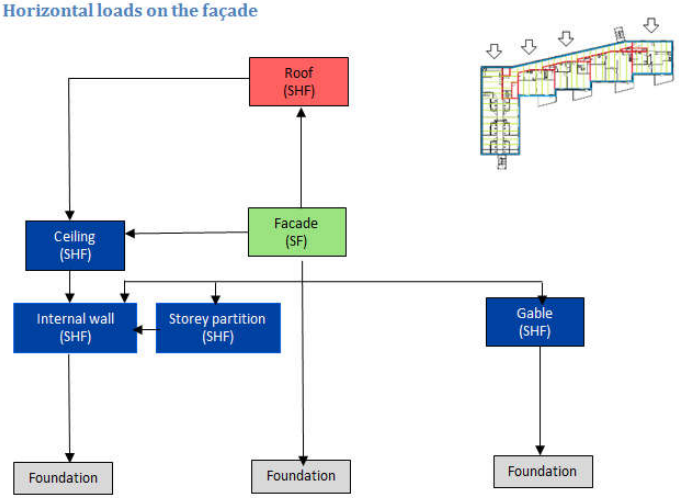
STATIC

Vertical loads

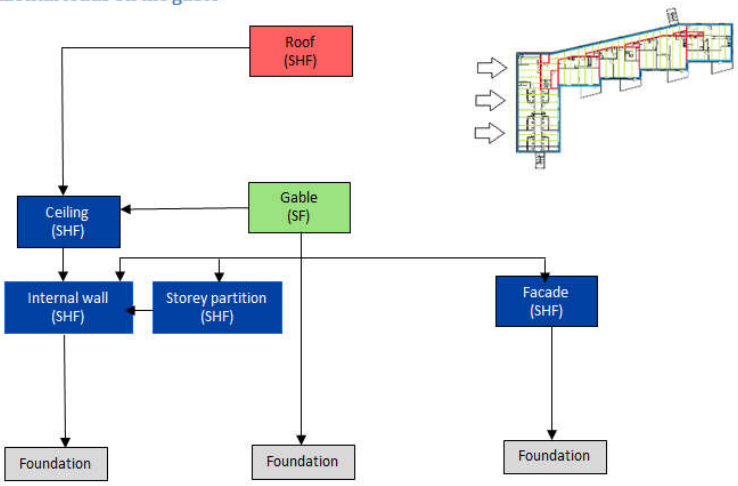




Horizontal loads on the façade



Horizontal loads on the gable



SOUND

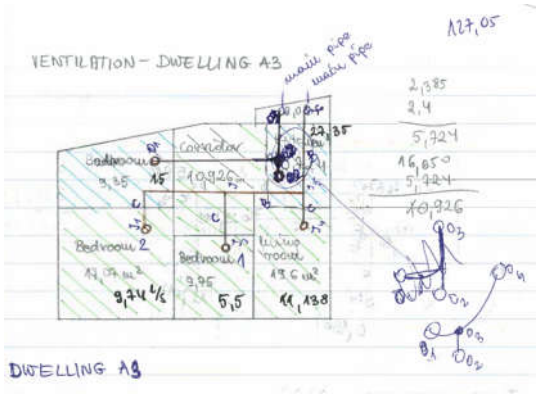
The 3 types of sound

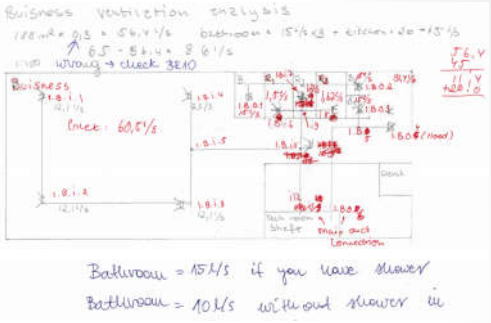
- Airborne sound
- Impact sound
- Reverberation

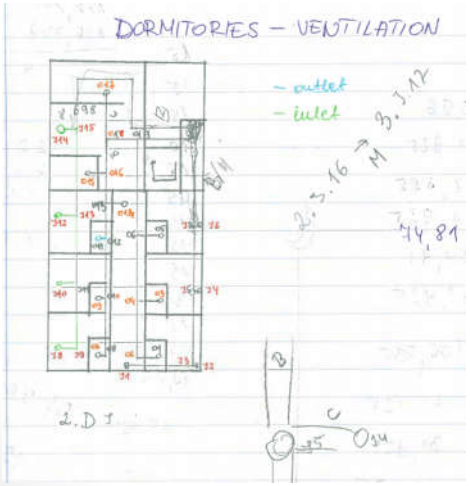
Sound classes of constructions

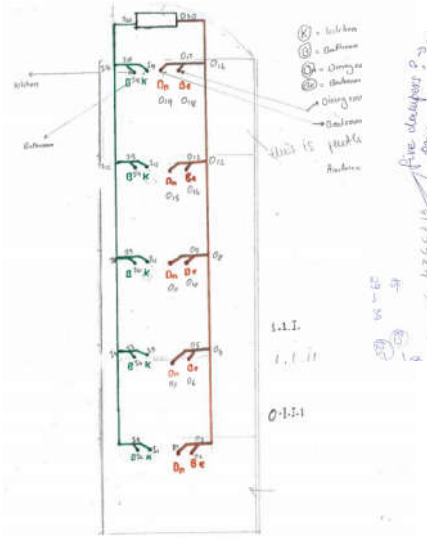
- Internal seperating walls – Class C (R45 dB)
- Internal loadbearing walls - Class B (R50 dB)
- Terrace decks - Class B (R50 dB)
- Storey seperating slabs - Class B (R50 dB)

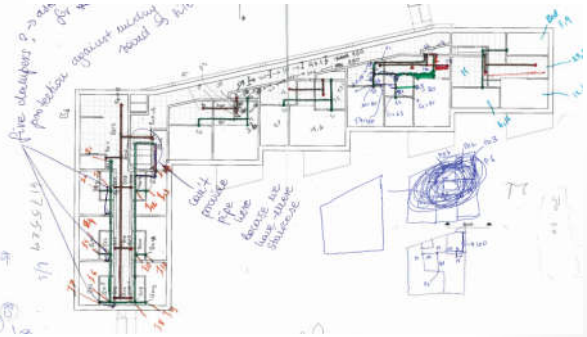
VENTILATION WORKING PROCESS



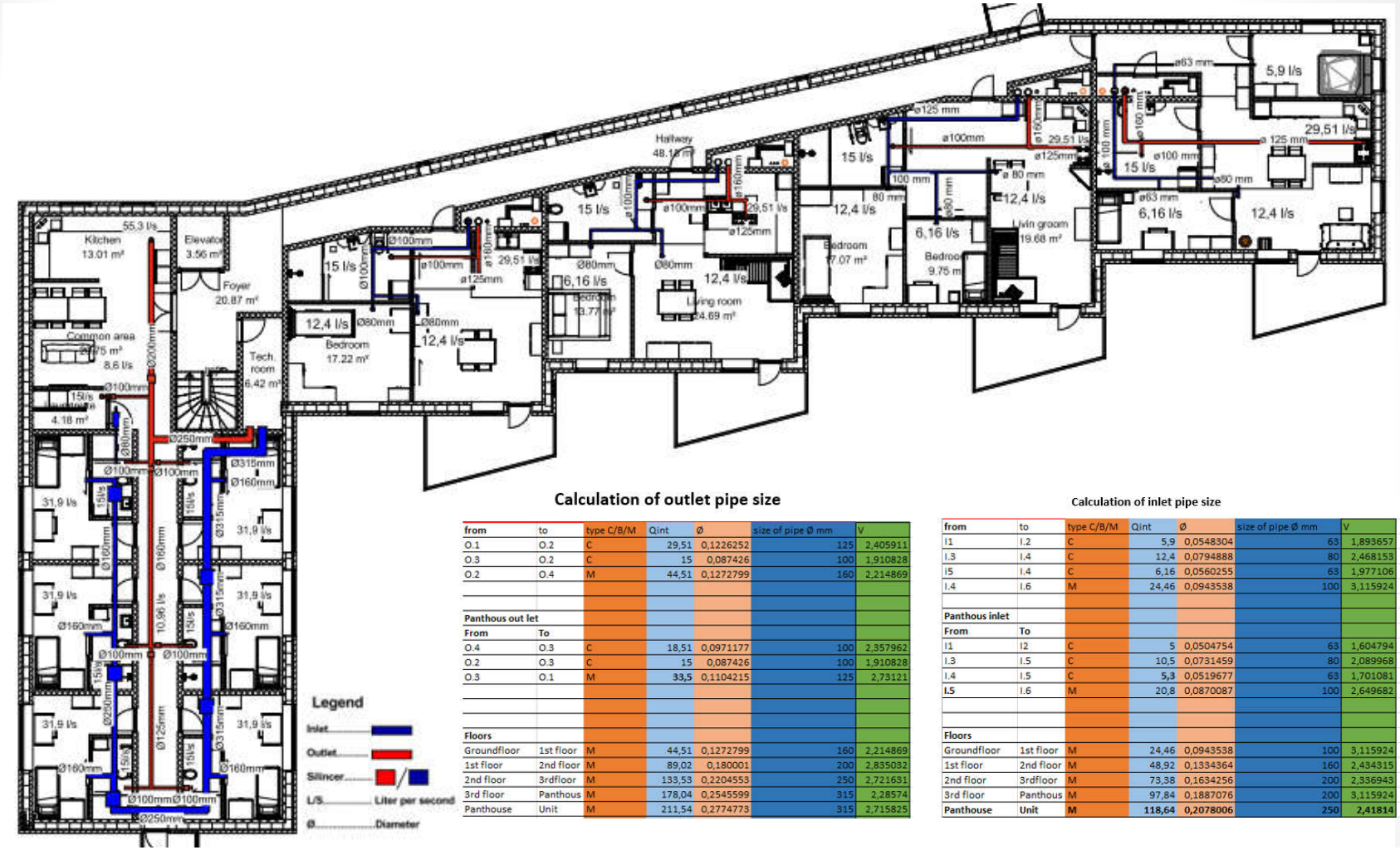








VENTILATION CALCULATION

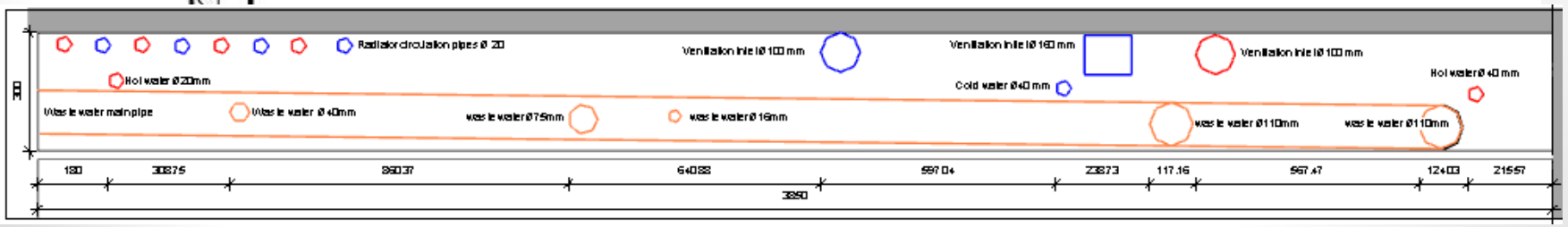


Calculation of outlet pipe size

from	to	type C/B/M	Qint	Ø	size of pipe Ø mm	V
O.1	O.2	C	29,51	0,1226252	125	2,405911
O.3	O.2	C	15	0,087426	100	1,910828
O.2	O.4	M	44,51	0,1272799	160	2,214869
Panthous out let						
From	To					
O.4	O.3	C	18,51	0,0971177	100	2,357962
O.2	O.3	C	15	0,087426	100	1,910828
O.3	O.1	M	33,5	0,1104215	125	2,73121
Floors						
Groundfloor	1st floor	M	44,51	0,1272799	160	2,214869
1st floor	2nd floor	M	89,02	0,180001	200	2,835032
2nd floor	3rdfloor	M	133,53	0,2204553	250	2,721631
3rd floor	Panthous	M	178,04	0,2545599	315	2,28574
Panthouse	Unit	M	211,54	0,2774773	315	2,715825

Calculation of inlet pipe size

from	to	type C/B/M	Qint	Ø	size of pipe Ø mm	V
I1	I.2	C	5,9	0,0548304	63	1,893657
I.3	I.4	C	12,4	0,0794888	80	2,468153
I5	I.4	C	6,16	0,0560255	63	1,977106
I.4	I.6	M	24,46	0,0943538	100	3,115924
Panthous inlet						
From	To					
I1	I2	C	5	0,0504754	63	1,604794
I.3	I.5	C	10,5	0,0731459	80	2,089968
I.4	I.5	C	5,3	0,0519677	63	1,701081
I.5	I.6	M	20,8	0,0870087	100	2,649682
Floors						
Groundfloor	1st floor	M	24,46	0,0943538	100	3,115924
1st floor	2nd floor	M	48,92	0,1334364	160	2,434315
2nd floor	3rdfloor	M	73,38	0,1634256	200	2,336943
3rd floor	Panthous	M	97,84	0,1887076	200	3,115924
Panthouse	Unit	M	118,64	0,2078006	250	2,41814



PRICE

Price excl. VAT: 69.243.319 DKK

VAT 25%: 11.624.548

Contract price incl. VAT: 80.867.867 DKK

INDIVIDUAL PRESENTATIONS

Jonas Juul Namensen

Aleksandra Kowalczyk

Ahsanullah Hafizi

INDIVIDUAL PRESENTATION

Jonas Juul Namensen

Design: Masonry - brick work

Specialization

Designer w. focus on the masonry subcontract for brickwork

Jonas Namensen

Agenda

- Work proces
- Agreements & specification
- Design
- Constructions
- Execution




Work process
& phase progression

Outline proposal

Scheme design

D.D.1 / D.D.2

Specialization

Agreements, documentation & specification

- Case specification GC93 (General conditions) a thorough description of the case as a whole
- A work specification B102, a trade specific agreement between T.K and S.C
- The work specification, building on information given in the GC93, includes information such as plans for health and safety, control plans and refferences to the relevant drawings

Main building drawings including measurements relevant to brick work:

- I100 – FO1 – H1 – NO7
- I100 – FO1 – H1 – NO8
- I100 – FO1 – H1 – NO9
- I100 – FO1 – H1 – NO10
- I100 – FO1 – H1 – NO11
- I100 – FO1 – H2 – NO1
- I100 – FO1 – H2 – NO2
- I100 – FO1 – H2 – NO3
- I100 – FO1 – H2 – NO4
- I100 – FO1 – H3 – NO1
- I100 – FO1 – H3 – NO2
- I100 – FO1 – H3 – NO3

Drawings regarding detail solutions:

- I100 – FO1 – H5 – NO3
- I100 – FO1 – H5 – NO6
- I100 – FO1 – H5 – NO7
- I100 – FO1 – H5 – NO9
- I100 – FO1 – H5 – NO10
- I100 – FO1 – H5 – NO11

A small snip from the list of drawings

Case:Lisbjerg multi-storey housing, Tender control plan No. of case:I101 Date: 12.05.2015 Rev: Page 1 of 2

Location: Lisbjergvej, 8200 Lisbjerg Contract/building component: Masonry contract, brickworks (external facades)

Pos. No.:	Subject:	Method/How	Frequency :	Time:	Demands:	Demands to documentation:	Who/ Responsible:	Carried out / Reference:
W.S. 3.5.3	Bricks on pallets, mortar in bags (right amount & condition)	Counting, visual inspection	beginning	When receiving, plan of delivery	Matching with order details	BCJ	supplier	Supplier + craftsman on site
W.S. 3.5.3	Accessability to work stations on scaffolds	inspection	beginning	Before execution	Full accessibility to work stations	PHS. Case spec. GC92	Contractor, work environment coordinator	Craftsmen, site manager
W.S. 3.5.3	Wall ties prepared	inspection	beginning	Before execution	4 pr. M2	BCJ, detail drawing	contractor	Concrete s.c
W.S. 3.5.3	Water proof membrane	inspection	beginning	Before execution	No penetrations	BCJ, detail drawing	contractor	Concrete s.c
W.S. 3.5.9	insulation	Delivery notes, check placement	beginning	During the operation of wall up		Delivery notes	contractor	supplier
W.S. 3.5.9	Straightness	measure	constant	During the operation of wall up	Variations in B.C.S	Delivery notes	contractor	craftsmen
W.S. 3.5.6	Mortar strength/quality	visual	2 layers each wall	During the operation of wall up	180mm and 38mm	Photo	contractor	Supplier + craftsman
	Openings	Measure	Once/ during	During the operation wall up	Variations in B.C.S	Agreement/meetings	contractor	Craftsman
W.S. 3.5.3	Height quotas	Measure	Upon completion	after the operation of wall up	As notated on building drawings	Delivery notes	contractor	Craftsman / S.C

The schedule included in the tender control plan

Designing the building component

- Bricks according to brief or client demand
- Grey toned with matching mortar in fugues
- Possible producers
- Chosen as example for project material:

Risk areas of the building component

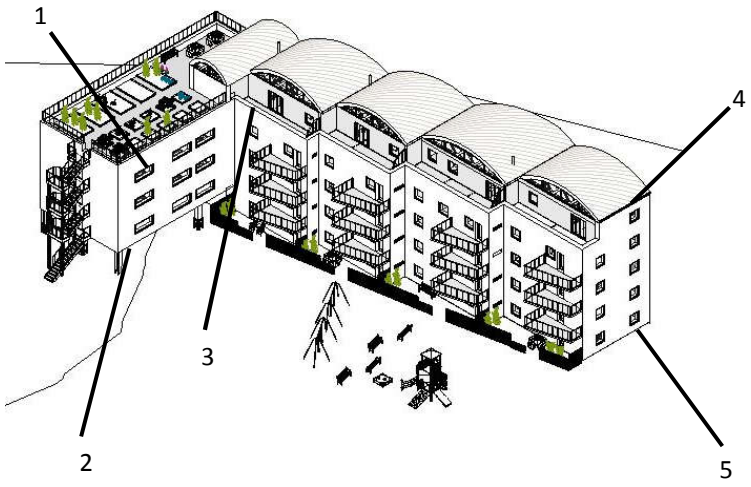
1: Lintels above window and door openings

2: Pre-tensed beams, spanning over collumns

3: Enclosure of opening at wall-top

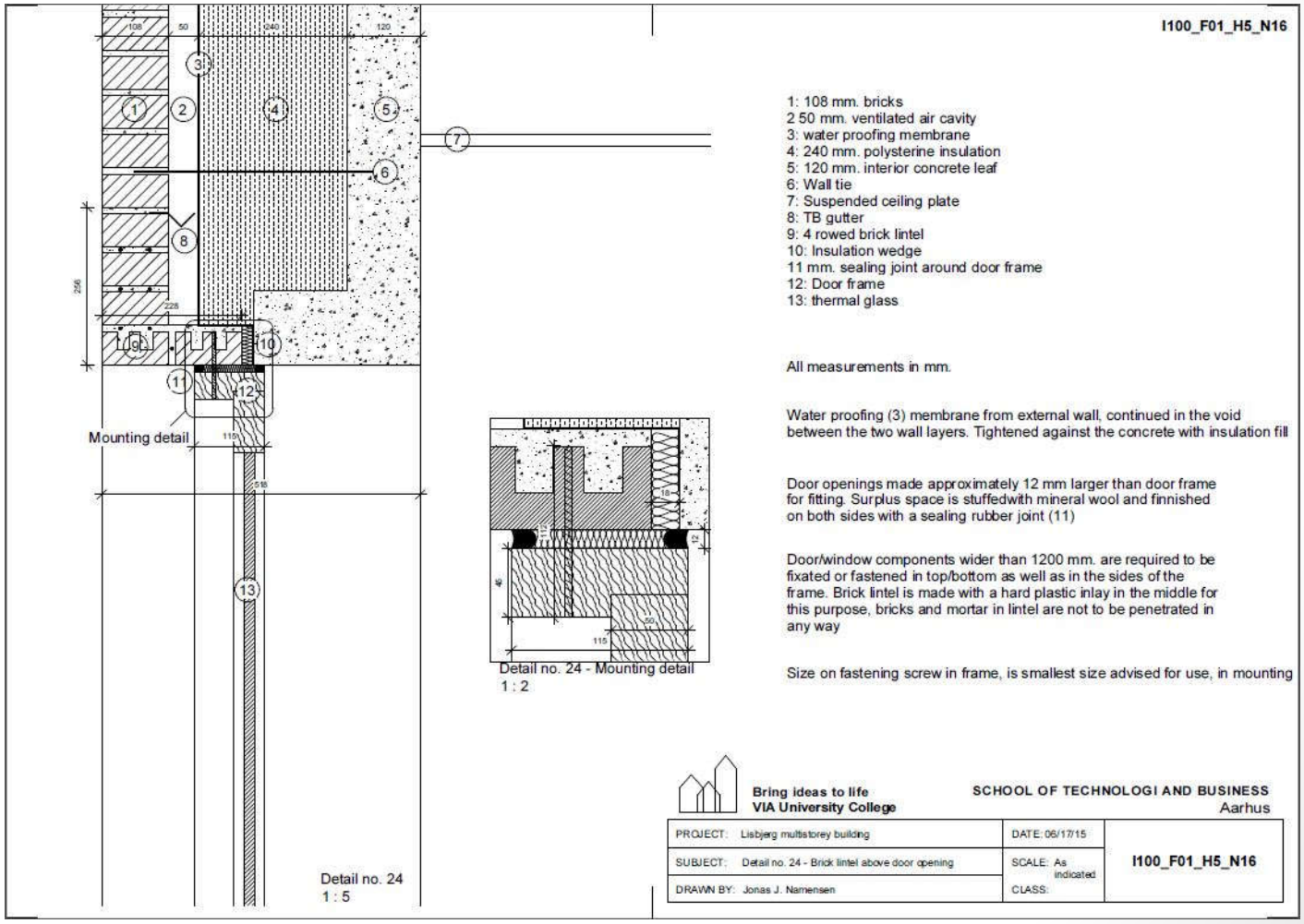
4: Facade ending by the fascia at the roof

5: External wall standing on the foundation



Contents and built of the building part

- Bricks
- Mortar
- Wall ties
- TB gutter
- Lintels
- Beams



Execution of the works

Amounts of materials:

- A total of 129.024 stones on 1152 pallets
- 86 Big bags of mortar mixture w. 1500 kg. in each

*De præcise værdier for en bestemt leverance kan fås ved henvendelse til A/S Randers Tegl	
Forbrug	63 stk/m²
Palletering:Dansk Normalformat	112 eller 80 stk med plasthætte

LEVERING
RAPID AALBORG CEMENT leveres i 5 kg poser, 25 kg sække (svarende til 20 l) og 1500 kg bigbags. Alle med rød markering

Brick walls

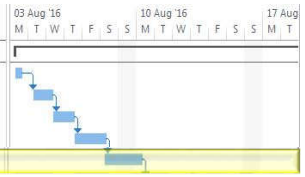
Mængde: 1 **Samlet KP:** 1.881.415,48 **Timer:** 2.877,66 **Løn:** 1.146.803,84 **Materialer:** 668.681,63 **Leje/Materiel:** 65.929,95 **UE:** 0,00

Position	Nr	Tekst	*	Kategori	Enhed	Mængde	Enhedspris	Kostpris	Samlet EP	Samlet KP	Prisreg.
								1.881.415,48		**1.881.415,48**	
1.2.1.1.1	(22)22.05,01	Indervæg af tegl, t = 108 mm	TBE		m2	2.048	918,66	1.881.415,48	918,66	1.881.415,48	1

Ressource expenditure

- A total of 18 workers throughout the scheduled work period
- An estimated Price of 1.881.415 dkk. Excl. VAT

	Task Mode	Task Name	Baseline Work	Work	Actual Work	Start	Finish	Predecessors	Resource Names	Add New Column
1		**Construction time schedu**	**249,2 days**	**249,2 days**	**0 days**	**Mon 03-08-1**	**Fri 28-08-15**			
2		Soil work	20 days	20 days	0 days	Mon 03-08-1	Mon 03-08-1			
3		Concrete foundation w	20 days	20 days	0 days	Tue 04-08-15	Wed 05-08-1	2		
4		Basement walls	10 days	10 days	0 days	Wed 05-08-1	Thu 06-08-15	3		
5		Ground supported floo	15 days	15 days	0 days	Thu 06-08-15	Sat 08-08-15	4		
6		External walls	20 days	20 days	0 days	Sat 08-08-15	Mon 10-08-1	5		



Thank you for your time

Sources of information, found at:

Randers tegl product data (Unika atika sten)
Portland Aalborg, RAPID CEMENT product data
Dimensions in accordance with commissions from DS 1048
DS/EN 998-2 Specifikation af mørtel til murværk – Del 2: Muremørtel
Murerhåndbogen page 12
Murerhåndbogen page 16
DS/INF 167, murerhåndbogen page 16
Murerhåndbogen page 28
Murerhåndbogen page 22
www.mur-tag.dk

INDYVIDUAL PRESENTATIONS

Aleksandra Kowalczyk

Implementation: Concrete works

CONTENTS

PLANNING – IMPLEMENTATION PHASE

TURN-KEY CONTRACTOR

Invitation tender letter

Case specification

Work specification

Health and safety plan

Tender time schedule

Relevant drawings

TURN-KEY CONTRACTOR

Drawings

Quantities

Analyses

Manhours calculation

Formwork

Construction time schedules

Materials price

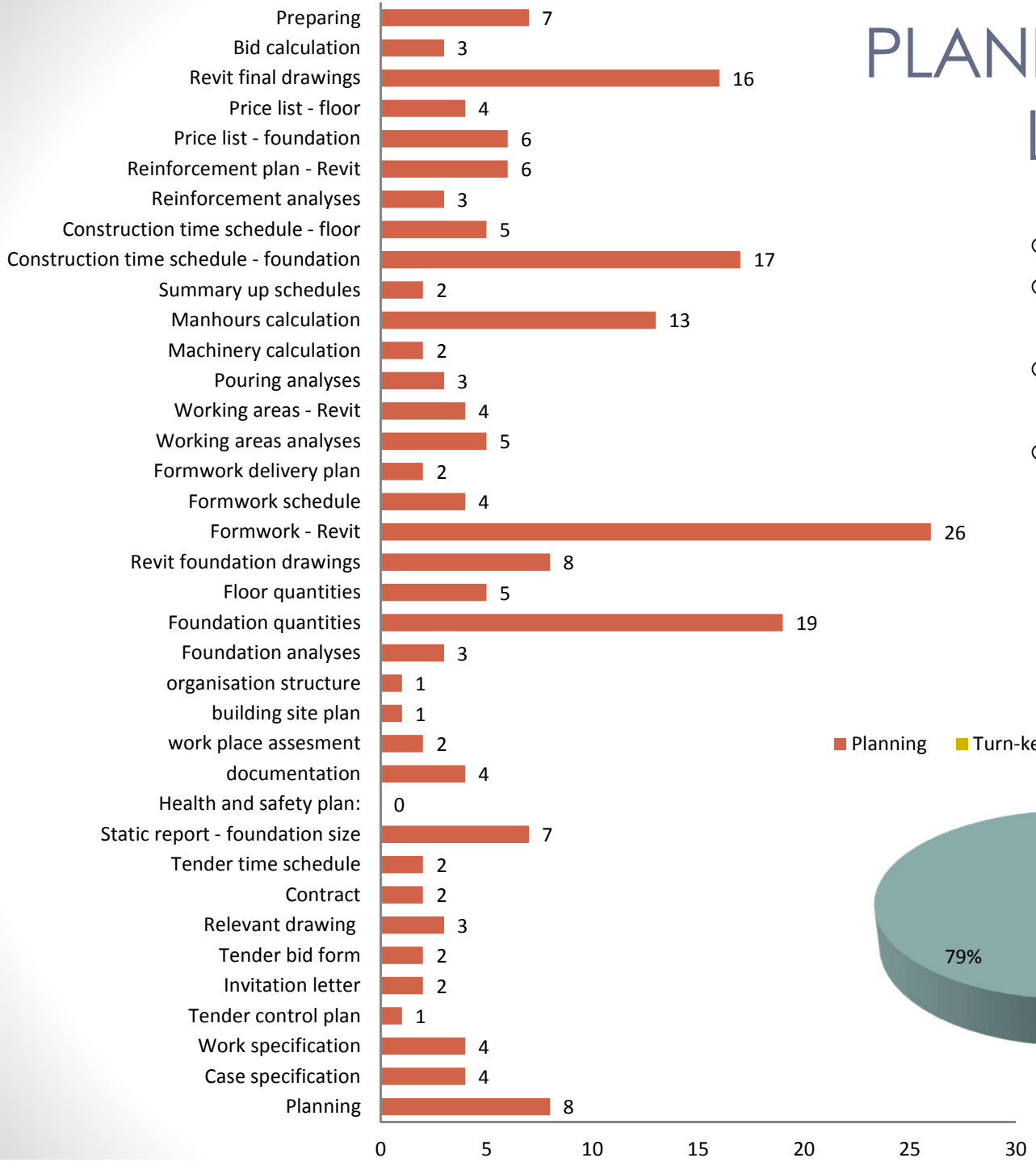
Machinery price

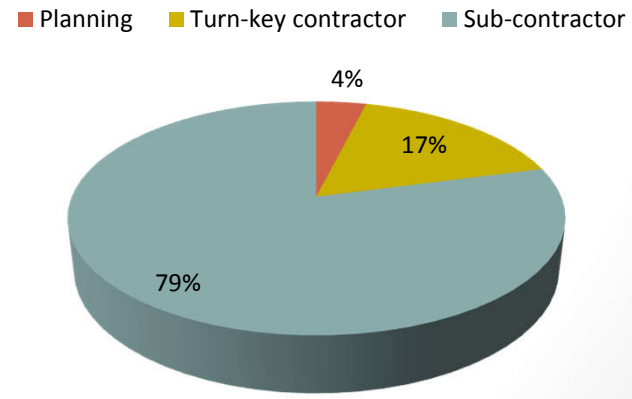
Price lists

Bid calculations

PLANNING AND LOGBOOK

- Activity list
- Precedence diagram
- Each Tuesday – weekly planning
- Daily updating hours





ROLES

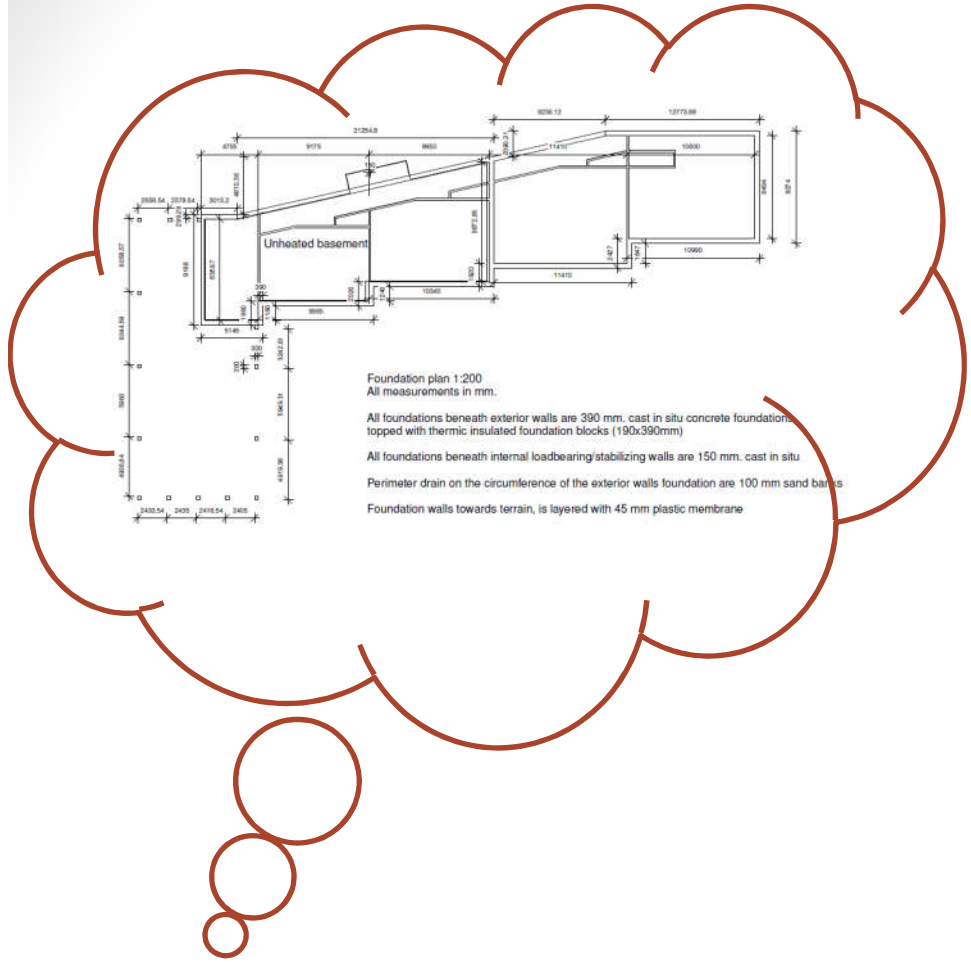
TURN-KEY CONTRACTOR

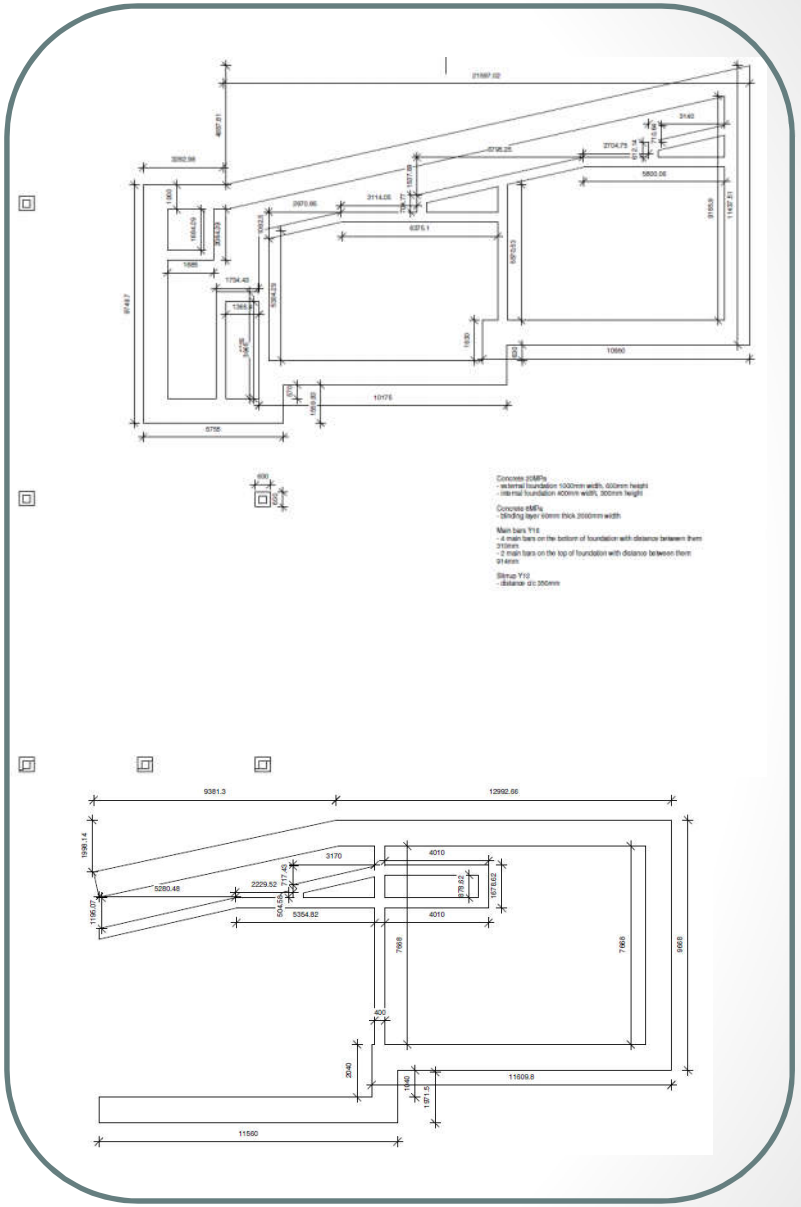
Invitation tender leter
Case specification
Work specification
Relevant drawings
Tender time schedule
Health and safety plan

SUB-CONTRACTOR

Analyses
Quantities
Work flow plan
Resources
Time frame
Tender bid

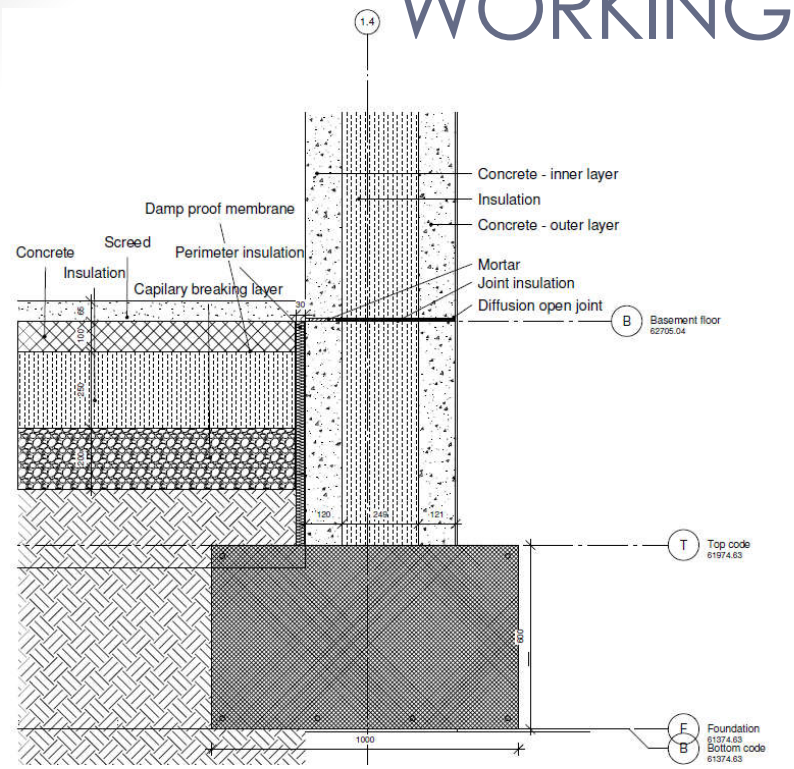
ANALYSES

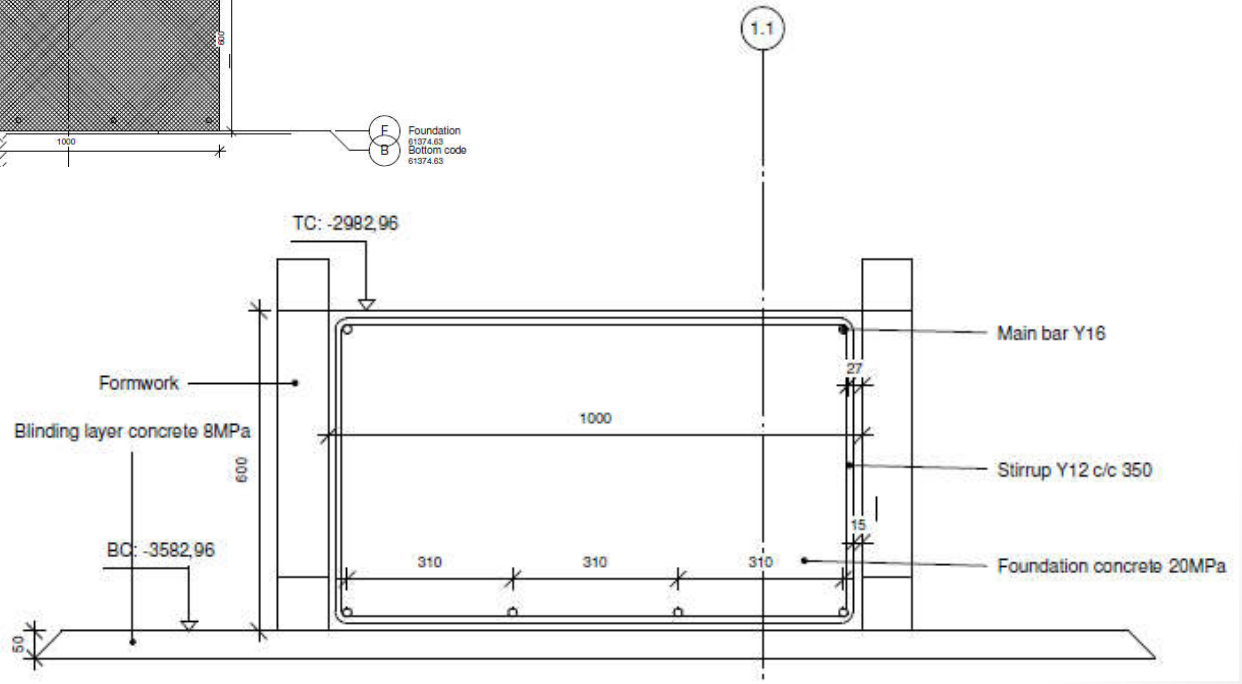




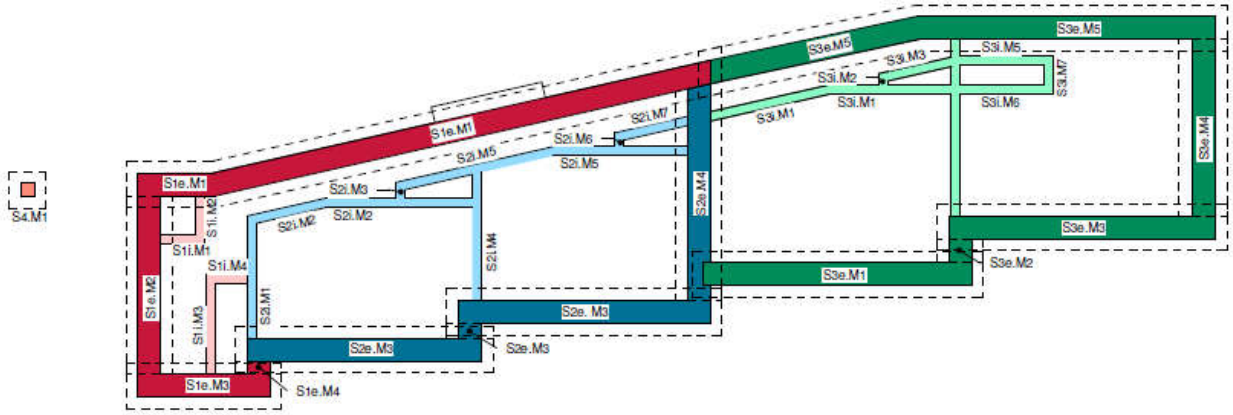
- Size of foundation
- Changing of all measurment
- Changing amount of reinforcement

WORKING DRAWING



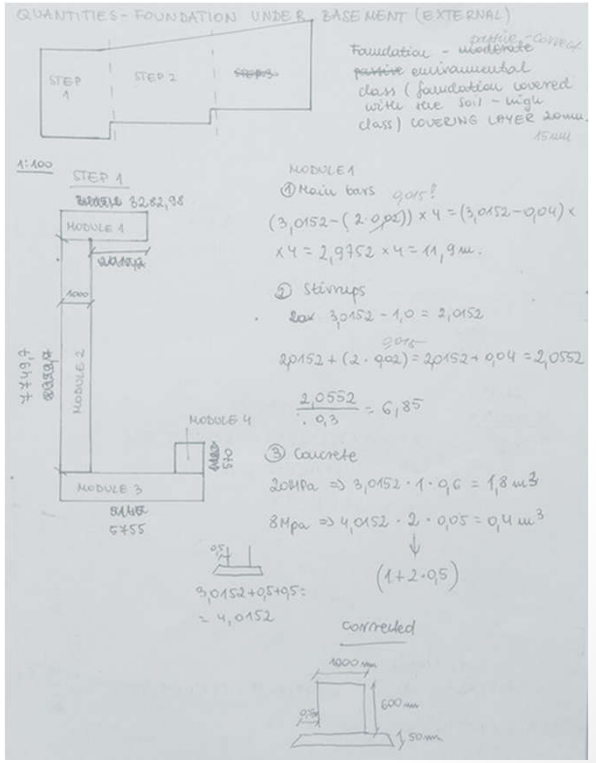


QUANTITY



Step 1 external foundations
Step 1 internal foundations
Step 2 external foundations
Step 2 internal foundations
Step 3 external foundations
Step 3 internal foundations
Step 4 foundations under columns

S1e.M1 - step 1 external foundation.module 1
S1i.M1 - step 1 internal foundation. module 1



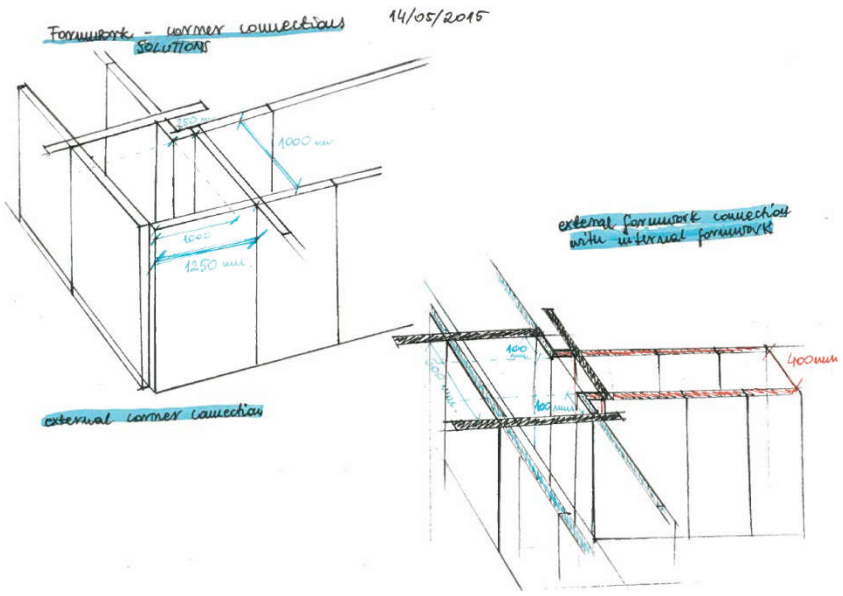
FOUNDATION

- Main bars
- Stirrups
- Concrete
- Blinding layer

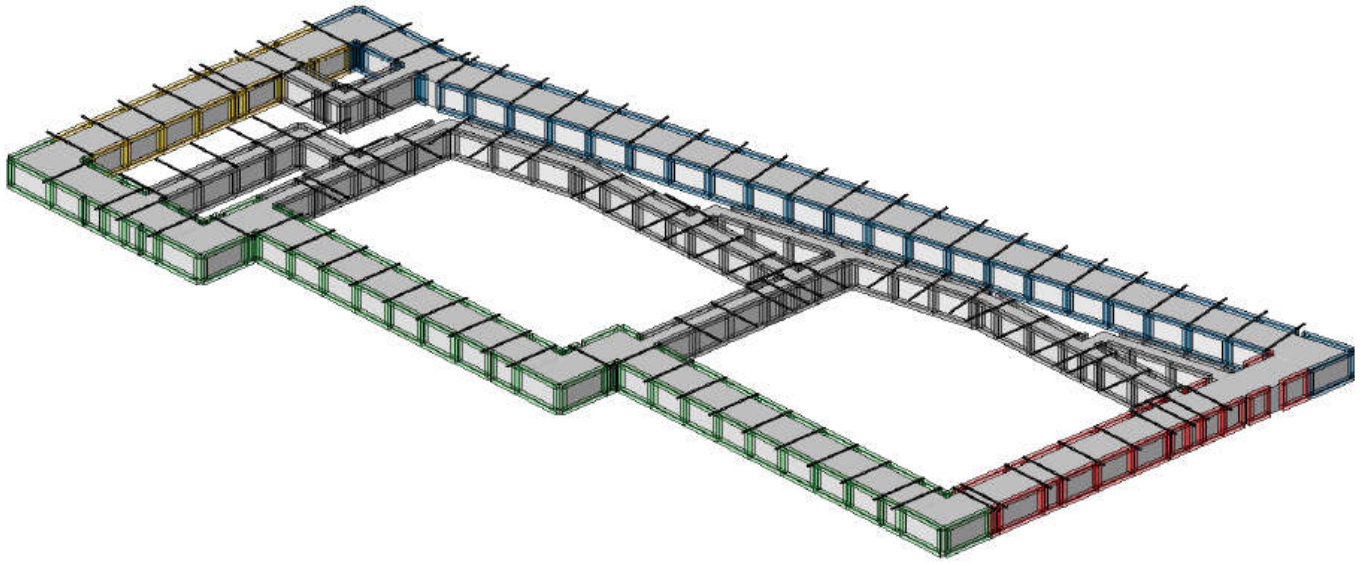
FLOOR

- Capillary breaking layer
- Insulation
- Reinforcement mesh
- Concrete Screed

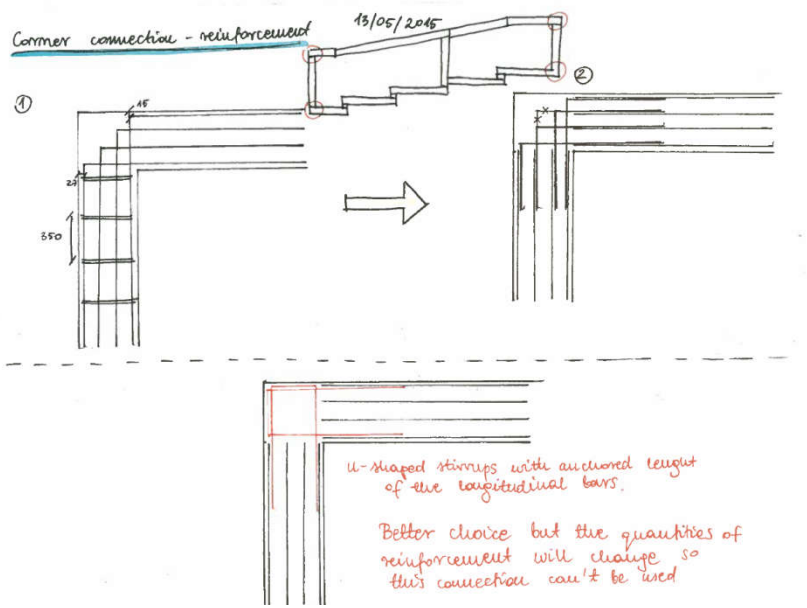
FORMWORK ANALYSES

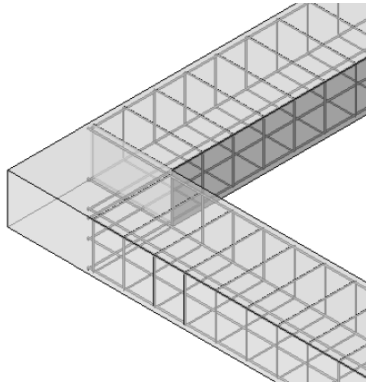


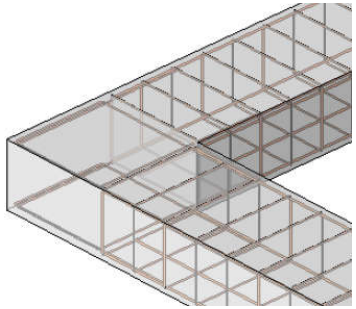
- Formwork producer: Paschal
- Product: Raster kassette, height 750mm, various lenght



REINFORCEMENT ANALYSES







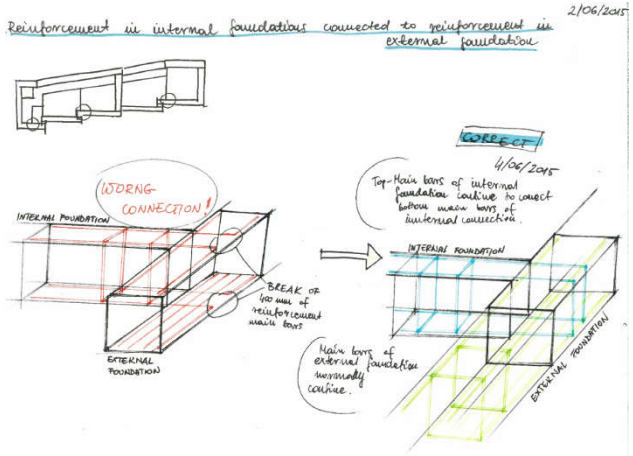
Overlapping reinforcement in the corner:

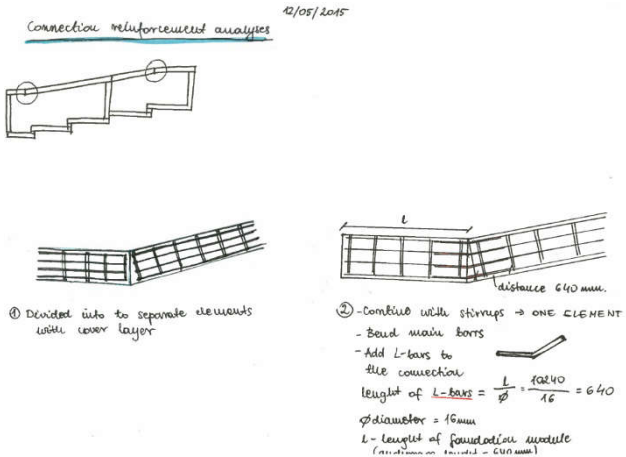
- Risk of cracks
- Problem with consistency of conrete

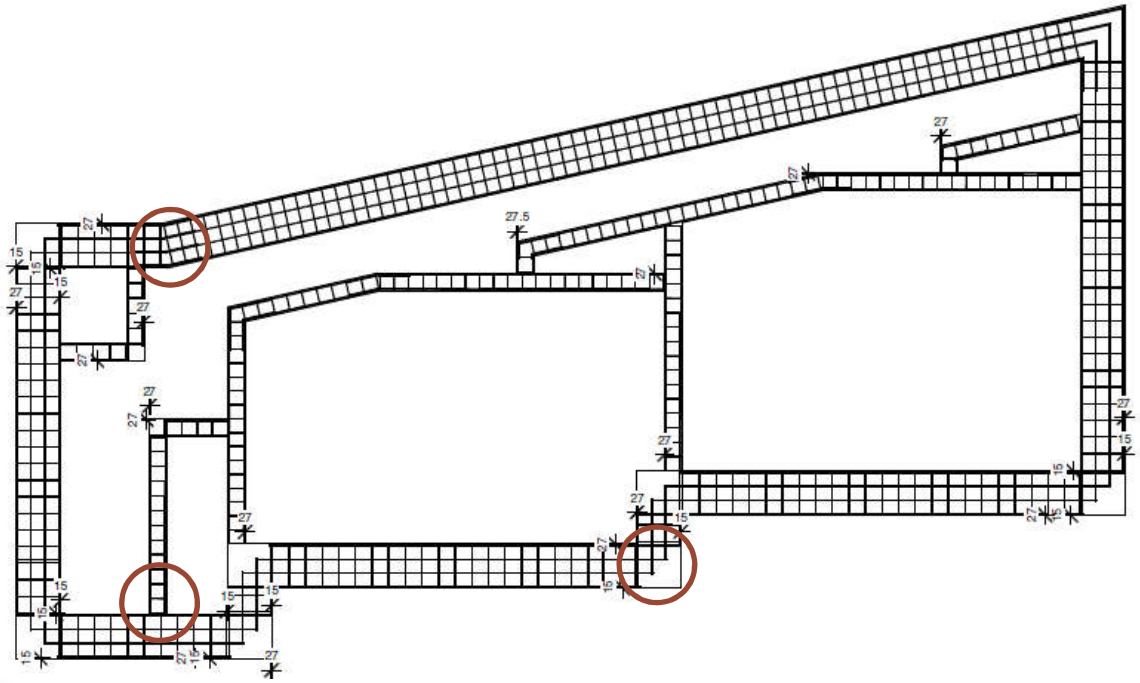
Solution:

- U-shapped stirrups
- L-bars

REINFORCEMENT CONNECTIONS



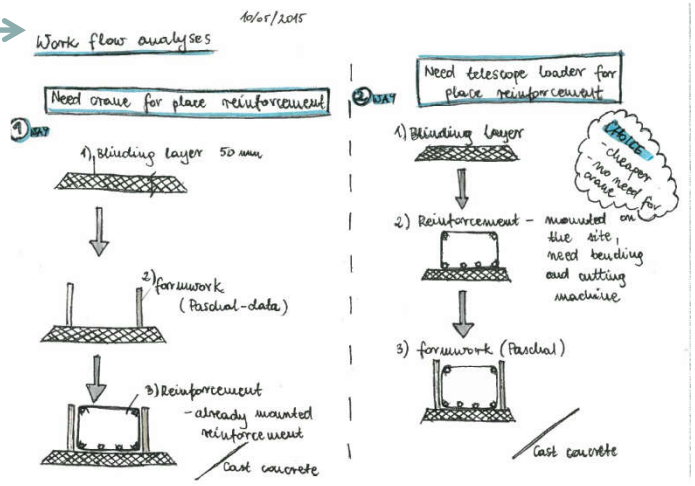




WORK FLOW PLAN

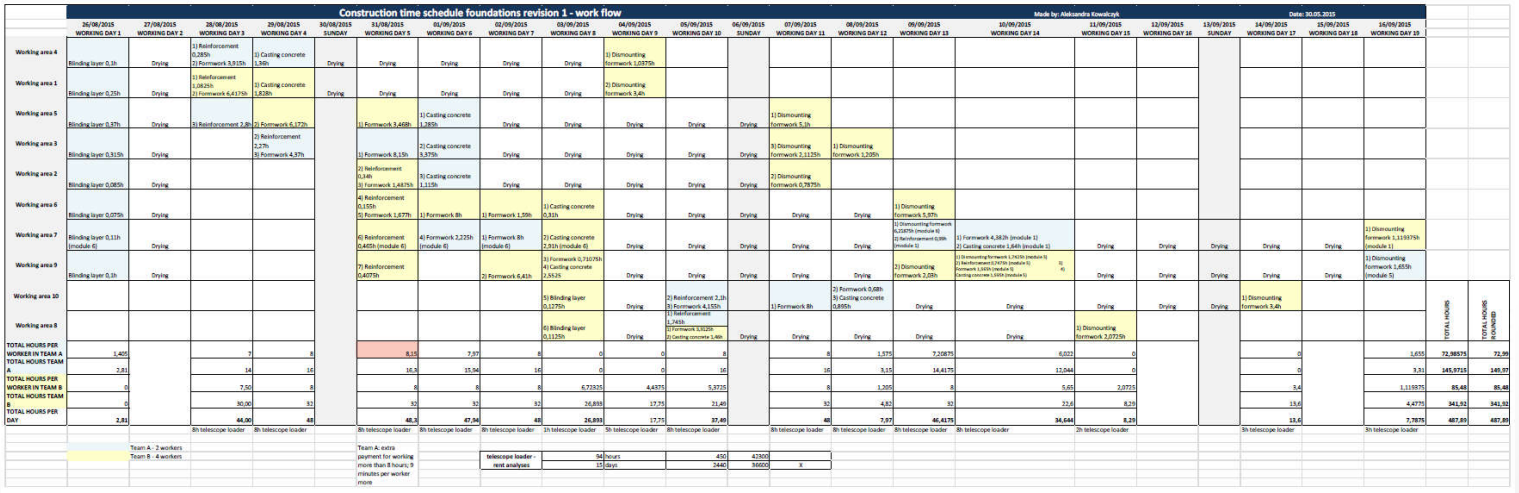
Calculation of manhours

Pos.:	Concrete work foundations			Name:	Aleksandra Kowalczyk	
	Conveyor belt			Date:	23.05.2015	
				Case:	Multi storey bulding	
	Activity:	Casting concrete 20MPa		Reference:	Foundations - external under basement	
		Module 1				
Calc. Quant.:	15,26	m3		0,4	h/m3	
Guiding time:					24,00	min/m3
				add.mat.		
		Add. Small quant.		7%	1,68	
			Total		25,68	
conditions:		Difficulty of the work		10%	2,57	
		Volume	OK	0%	0,00	
		Weather / season	Rain	2%	0,51	
		Other	No	0%	0,00	
			Total		28,76	
Workrelated allowance:						
		Scaffolding	No	0%	0,00	
		Other	No	0%	0,00	
		Total per m3			28,76	min/m3
		Total minutes			438,90	min



Tender time schedule:

- 20 day for foundation
- 15 days for ground supported floor



TENDER BID

- Workers salary
- Machinery price
- Materials price

Price list:

- Foundation
- Ground supported floor

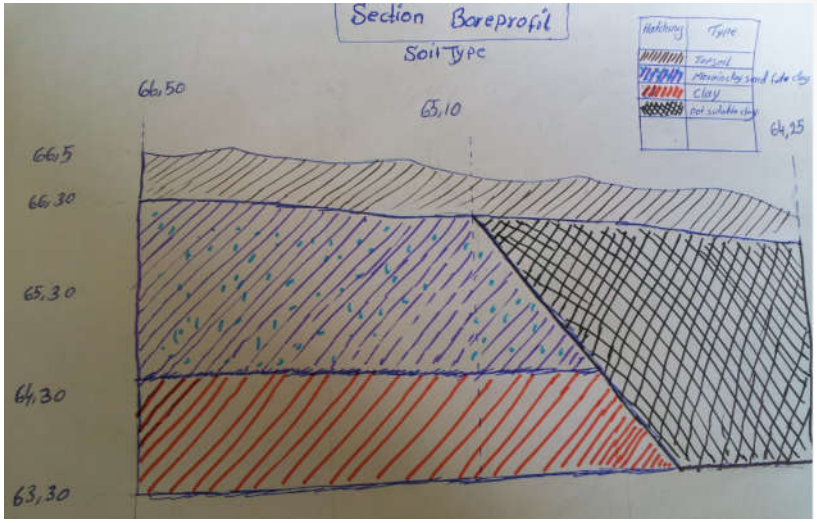
Concrete bid		Made by: Aleksandra Kowalczyk	Date: 04.06.2015
Area		Price for wages machinery and materials	
Foundation		616407,83	
Ground supported floor		479032	
Total price		1095439,83	
CM own production	15%	164315,97	
Price with CM		1259755,80	
Price with administration cost	9%	113378,02	
Financing and guarantees	2%	25195,12	
Site manager	1 month	50000	
Foreman	1 month	40000	
Company profit	15%	188963,37	
TOTAL PRICE		**1677292,31**	

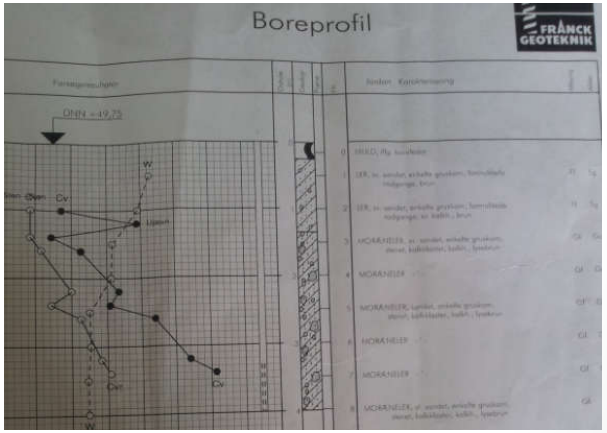
INDYVIDUAL PRESENTATION

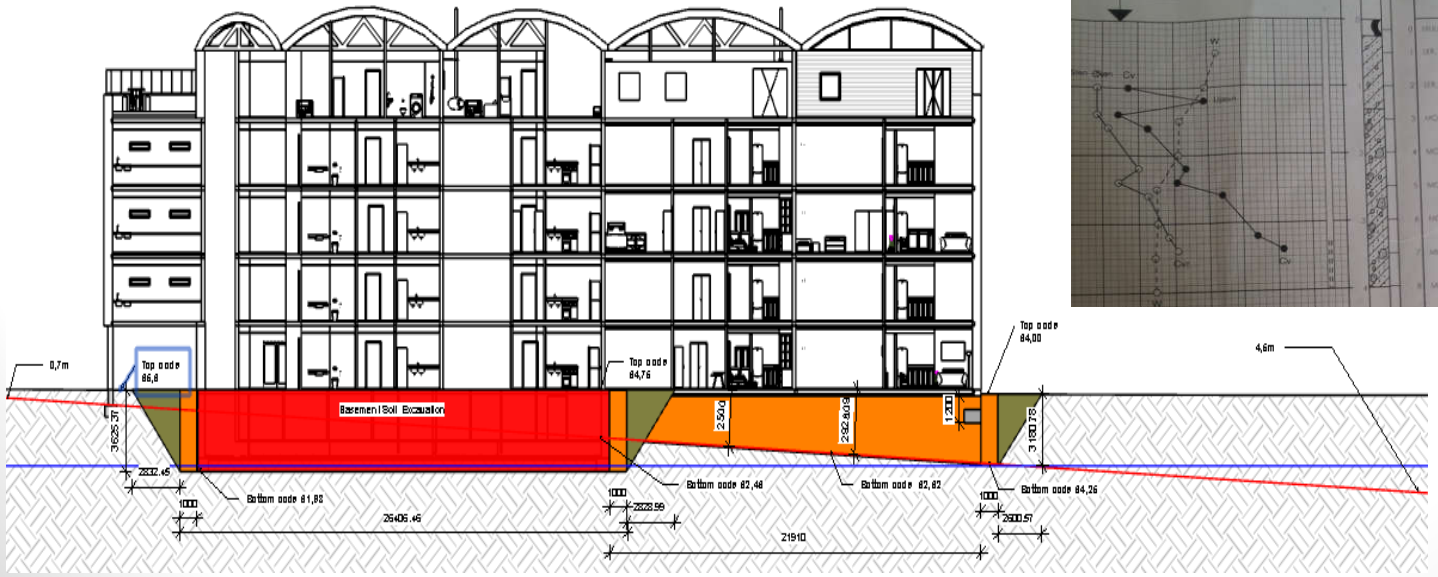
Ahsanullah Hafizi

Implementation: Soil work

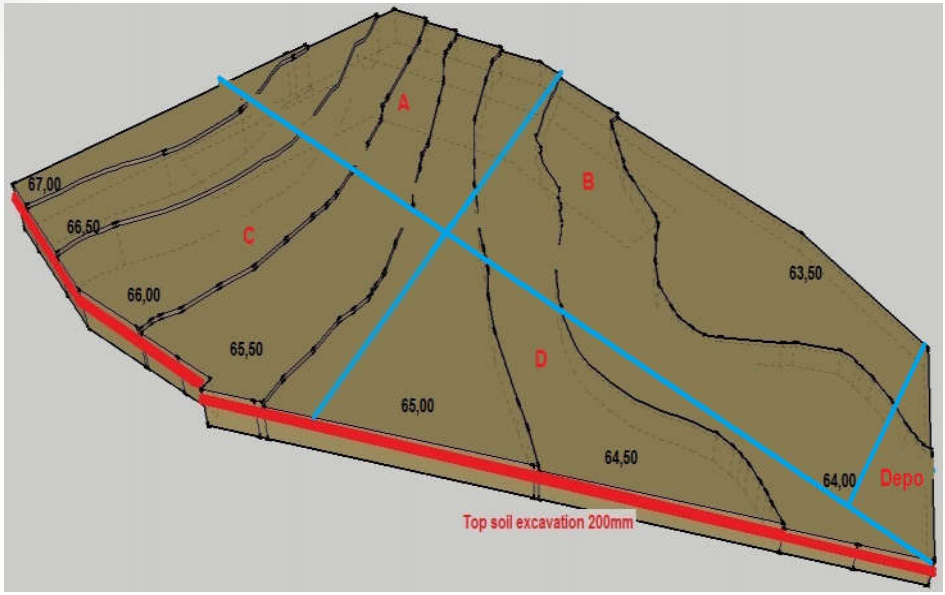
TERRAIN AND SOIL TYPE ANALYSES

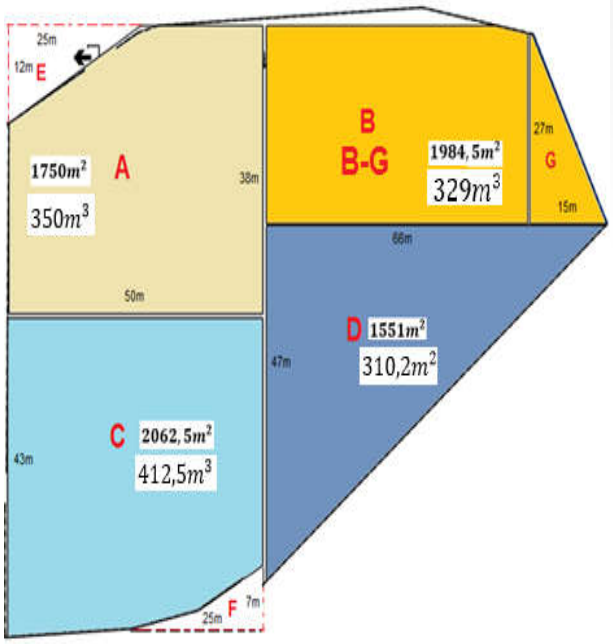






CALCULATION OF TOP SOIL EXCAVATION

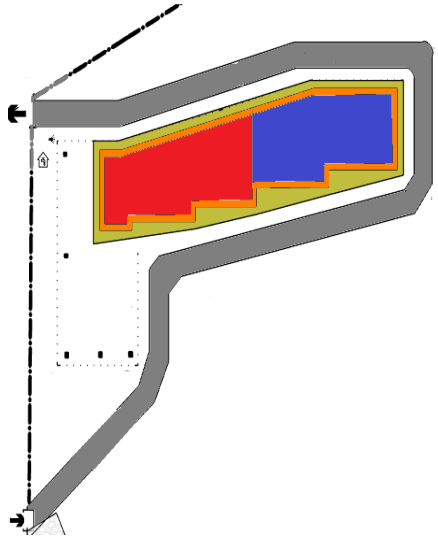




TEMPORARY ROAD

$Area\ of\ the\ road$
$= 150 \cdot 3 = 450m^2$

$Volume_{gravel}$
$= 150 \cdot 3 \cdot 0{,}15 = 67{,}5\ m^3$



$$A_{area} = 50 \cdot 38 - \left(12 \cdot \frac{25}{2}\right) = \mathbf{1750m^2}$$

$$A_{volume} = 50 \cdot 38 \cdot 0{,}2 - \left(12 \cdot 25 \cdot \frac{0{,}2}{2}\right) = \mathbf{350m^3}$$

$$B_{area} = 66 \cdot 27 + \left(15 \cdot \frac{27}{2}\right) = \frac{3969}{2} = \mathbf{1984{,}5m^2}$$

$$B_{volume} = 66 \cdot 27 \cdot 0{,}2 = 396m^3 - (15 \cdot 27 \cdot 0{,}2 \div 2) = \mathbf{329m^3}$$

$$C_{area} = 43 \cdot 50 - \left(25 \cdot \frac{7}{2}\right) = \frac{4125}{2} = \mathbf{2062{,}5m^2}$$

$$C_{volume} = 43 \cdot 50 \cdot 0{,}2 - \left(25 \cdot 7 \cdot \frac{0{,}2}{2}\right) = \mathbf{412{,}5m^3}$$

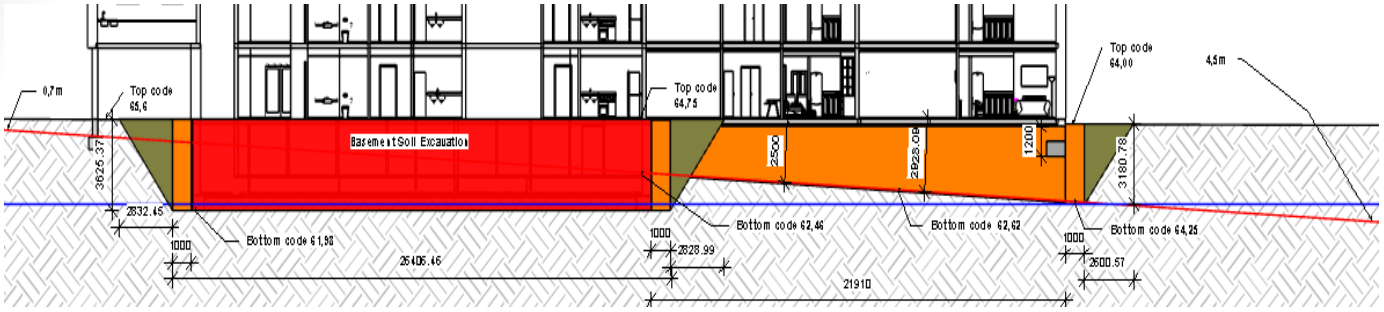
$$D_{area} = 66 \cdot \frac{47}{2} = \mathbf{1551m^2}$$

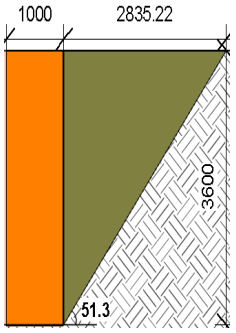
$$D_{volume} = 66 \cdot 47 \cdot \frac{0{,}2}{2} \approx \mathbf{310{,}2m^2}$$

Total area of top soil excavation = 1750 + 1984,5 + 2062,5 + 1551 = **7348m²**

Total top soil excavation = 350 + 558,9 + 412,5 + 310,2 ≈ **1401,7 m³**

BASEMENT SOIL EXCAVATION



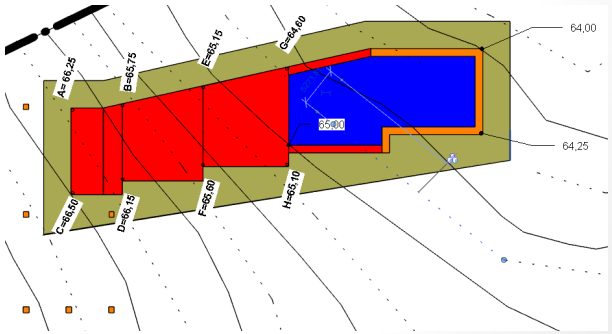


$$Basement_{angle} = 3{,}6 \cdot 2{,}8 \cdot 98 \div 2 = 493\ m^3$$

$$Backfilling = 3{,}6 \cdot 1 \cdot 98 = 352 m^3$$

Soil calculation - grid method © NGH 2007

Sheet nr.:	1	Exc. by:	Ahsanullah Hafizi		Date:	10-06-2015		Revision:				Sagsnavn:	Lisbjerg Soil excavation				
Denomination	Side length		Area	Area (manuel)	Existing level at				Future level at				Calculated hights				Average	Volume
(areal)	a [m]	b [m]	m²	m²	h1 [m]	h2 [m]	h3 [m]	h4 [m]	h1 [m]	h2 [m]	h3 [m]	h4 [m]	h1 [m]	h2 [m]	h3 [m]	h4 [m]	h [m]	m³
Transferred from sheet no.:																		
Basement soil excavation				333,70	66,25	64,60	66,50	65,10	62,63	60,98	62,88	61,48	3,62	3,62	3,62	3,62	3,62	1208
Weak soil excavation				311,89	64,75	64,00	65,00	64,25	62,46	60,82	62,20	61,25	2,29	3,18	2,80	3,00	2,82	879
Working area soil excavation																		352
working angle soil excavation																		493
Top soil excavation																		1401
Columns soil excavation																		13
Foundations working are soil excavation																		18
Foundations angle soil excavation																		60
Soil excavation for temporary road																		67
To be transferred to sheet no.:																		4491



MACHINERY CALCULATION #1

Machine hour calculation: Excavatake away				Calculation of transport			
Soil to move to depot		1682	m^3	Choice of vehicle: Scania R114CB			
Bucket size		2,00	m^3				
Choice of Machine: Excavator Volvo EC210C				Max load pr vehicle:		0	kg
				Max number of m3		12,00	m^3
				Do not exceed the maximum payload		22.200	
Pos.nr:							
Text	**Formel.**	**Quantity**	**Unit**	**Text**	**Formel.**	**Quantity**	**Unit**
Bucket size		2,00	m^3	Max. Weigth		22.200	kg
		1682	m^3	Distance to tip		0,5	km
Density		1850	kg/m^3	Speed		20	km/t
Efficiency		0,6	Faktor	Max volume.	(max weigth/soildensity)/loadingfactor	12,00	m^3
Cyclus time		30	Sek	Drivingtime total	2*(distance*60min/h)/avarage speed	3,00	min
				Loadingtime	Max volum/bucketsize*(cyklustime/60)	5,68	min
Loadind factor	0,8	0,8	Faktor	Unloading time		1,00	min
				Maneuvretime		1,60	min
Bucket factor		1,1	Faktor				
				Circulationtime	Loadingtime+drivingtime+maneuvre+ unloa	11,28	min
Production.	Bucketsize*(3600/cyclus time)	126,72	m^3/time	Lorrys production	(60min/h/ circulationtime)*max.volume	63,82	m^3/time
	*Efficience.*bucket						
				Number off truks		2,0	
Hours total		13	Hours	Hours total		27	Hours

MACHINERY CALCULATION #2

Machine hour calculation: Excavatake away				Calculation of transport			
Soil to move to Oliehaven		3708	m^3	Choice of vehicle: Scania R114CB			
Bucket size		2,00	m^3				
Choice of Machine: Excavator Volvo EC210C				Max load pr vehicle:		0	kg
				Max number of m3		12,00	m^3
				Do not exceed the maximum payload		22.200	
Pos.nr:							
Text	**Formel.**	**Quantity**	**Unit**	**Text**	**Formel.**	**Quantity**	**Unit**
Bucket size		2,00	m^3	Max. Weigth		22.200	kg
		3708	m^3	Distance to tip		13	km
Density		1850	kg/m^3	Speed		50	km/t
Efficiency		0,6	Faktor	Max volume.	(max weigth/soildensity)/loadingfactor	12,00	m^3
Cyclus time		30	Sek	Drivingtime total	2*(distance*60min/h)/avarage speed	31,20	min
				Loadingtime	Max volum/bucketsize*(cyklustime/60)	5,68	min
Loadind factor	0,8	0,8	Faktor	Unloading time		1,00	min
				Maneuvretime		1,60	min
Bucket factor		1,1	Faktor				
				Circulationtime	Loadingtime+drivingtime+maneuvre+ unloa	39,48	min
Production.	Bucketsize*(3600/cyclus time)	126,72	m^3/time	Lorrys production	(60min/h/ circulationtime)*max.volume	18,24	m^3/time
	*Efficience.*bucket						
				Number off truks		6,9	
Hours total		29	Hours	Hours total		203	Hours

MACHINERY PRICE #1

Summary s(**Calculation** — **Top soil Calculation - Lisbjerg** — **Page 1**

Frontpage! ***Soilworks***

Date 05-06-2015
Name Ahsanullah Hafizi

180 Ownproduction				Wages					MAT		Machines				Grossprice
POS NR.	Activity	Unit	Quantity	Minuts pr. unit	Hours total	Wages Total kr.	Daywage 10%	SOC. 45%	Unit price	Materials	Unit price	Materials rent/run	Netto price	Factor	Gross price
A+B+C+D	**Top soil to take to Depo on the site**	**m3**	**1682,00**		0	0	0,00	0,00		0		0	0	1,22	0
	Excavator Volvo EC210C	hrs	13,00	60,00	13	2.340	234,00	1.158,30		0	680,00	8.840	12.572	1,22	15.332
	Dumper Hydrema 912 (2 trucks cerculation)	hrs	27,00	60,00	27	4.860	486,00	2.405,70		0	560,00	15.120	22.872	1,22	27.892
					0	0	0,00	0,00	68,00	0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
Total to summary up					40	7.200	720,00	3.564,00		0		23.960	35.444		43.224

MACHINERY PRICE #2

Calculation											***Soilworks***				**PAGE: 2**
0 **Ovnproduction**				**Wages**					**MAT**		**Machines**				**Grossprice**
POS NR.	Activity	Unit	Quantity	Minuts pr. unit	Hours total	Wages Total kr.	Daywage 10%	SOC. 45%	Unit price	Materials	Unit price	Materials rent/ run	Netto proce	Factor	Gross price
Fun+Bas	**Raw soil to take away to Oliehaven**	**m3**	**3708,00**		0	0	0,00	0,00	76,00	281.808		0	281.808	1,22	343.668
	Excavator Volvo EC210C	hrs	29,00	60,00	29	5.220	522,00	2.583,90		0	680,00	19.720	28.046	1,22	34.202
	Dumper Hydrema 192 (7 trucks)	hrs	203,00	60,00	203	36.540	3.654,00	18.087,30		0	560,00	113.680	171.961	1,22	209.709
	Dynpac compactor ILG Honda (working area)	hrs	18,00	60,00	18	3.240	324,00	1.603,80		0	90,00	1.620	6.788	1,22	8.278
	Dynpac compactor ILG Honda (Driver)	hrs	18,00	60,00	18	3.240	324,00	1.603,80		0		0	5.168	1,22	6.302
	wheel loader CAT 950C	hrs	215,00	60,00	215	38.700	3.870,00	19.156,50		0	680,00	146.200	207.927	1,22	253.569
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
Total to summary up					483	86.940	8.694,00	43.035,30		281.808		281.220	701.697		855.728

MATERIALS PRICE

0 Ownproduction				Wages					MAT		Machines				Grossprice
POS NR.	Activity	Unit	Quantity	Minuts pr. unit	Hours total	Wages Total kr.	Daywage 10%	SOC. 45%	Unit price	Materials	Unit price	Materials rent/ run	Netto price	Factor	Gross price
Sand buy	Buy Sand for infilling weak area and working	**m3**	2408,00		0	0	0,00	0,00	270,00	650.160		0	650.160	1,22	792.878
Gravel	Bye gravel Teporary road	m3	67,00		0	0	0,00	0,00	530,00	35.510		0	35.510	1,22	43.305
	Fuel	hrs	505,00		0	0	0,00	0,00	68,00	34.340		0	34.340	1,22	41.878
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
					0	0	0,00	0,00		0		0	0	1,22	0
Total to summary up					0	0	0,00	0,00		720.010		0	720.010		878.061

1 page

TILBUDSKALKULATION

EMNE: Samleside **Jordarbejde**

PAGE: 25

0 Ownproduction

				Wages					MAT		Machines				Grossprice
POS NR.	Activity	Unit	Quantity	Minuts pr. unit	Hours total	Wages Total kr.	Daywage 10%	SOC. 45%	Unit price	Materials	Unit price	Materials rent/ run	Netto prce	Factor	Gross price
Page 1					40	7.200	720,00	3.564,00		0		23.960	35.444	7.780,39	43.224
Page 2					483	86.940	8.694,00	43.035,30		281.808		281.220	701.697	154.031,11	855.728
Page 3					0	0	0,00	0,00		720.010		0	720.010	158.050,98	878.061
Total					523	94.140	9.414	46.599		1.001.818		305.180	1.457.151	319.862	1.777.014

Calculation

Case: Namn on the building site

Frontpage
Date
Name

Soil works

			Wages					Materials		Machines			
			Hours total	Wages Total	Unex. kr	Unex. hours	SOC. 0%	Materials		Machines rent	Netto price	CM kr	Gross price
Soil works			523	94.140	9.414	63	46.599	1.001.818		305.180	1.457.151	319.862	1.777.014
												0	
Rig/ unrig site			0	0	0	0	0	0			0	0	0
												0	
Running site			0	0	0	0	0			1.000	1.000	220	1.220
	I alt		523	94.140	9.414	63	46.599	0 1.001.818	0	306.180	1.458.151	320.082	1.778.233
Driving payment	0,00		Key in your own amounts								0	0	0
										Total	1.458.151	320.082	1.778.233
	Months		Monthly unitprice										
contract manager	0,40		50.000								20.000		20.000
Foreman	0,60		40.000								24.000		24.000
Winterbidding list													0
Riscs													0
Stipulated payments													0
					Productionprice exl manegment and stipulated payments						1.458.151		
					Productionprice incl. manegment and stipulated payments						1.502.151	320.082	
										Price excl wvinter and sti. Pay.			1.778.233
										Price incl. wvinter and sti. Pay.			1.822.233
										CM Soilworks			18,00

THE PRICE

Calculation	Case: Lisbjerg			
Soil works			Dato : 06-05-2015 Name : Ahsanullah Hafizi	
	Costs			
Example taken from the book A T 2 page 385				
Variabel costs			1457151	
Rig/ unrig site			0	
Running site			1000	excl driving money
Variabel costs total			**1458151**	
Contribution margin				
CM own p.	18,00%	Key your own CM from own. Pr.	**1778233**	Price is excl winter and stipulated benefits
		Profit total	**320082**	**18,00%** Profit incl Capacati/ financing cost
Fix the riscs if there are any.			0	Key in the total in thousand kr.
Capacati costs in relation to the budget				
Administration costs		9,0%	160041	
Financing		1,0%	17782	
The margin after paying the capasity costs			1600410	
			142259	**8%** Profit (after Capacati/ financing cost)
Gross ownproduction			1778233	
Conversionfactor			1458151	1,22
Social costs		45%	Key in your own costs from the calculation ef the salarycalculation	
Wage factor		180 kr		

Bid list

Project: Multi-Story building Lisbjerg

Soil works

The undersigned would hereby, and in accordance with specifications and drawings of the tender documents of 2015.05.11 offer to execute the aforementioned contract to fixed price and time for the following exclusive VAT:

Total sum excusive VAT:	**1778233 Kr**
VAT (25%):	**444558 Kr**
Total sum including VAT:	**2222791 Kr**

Sum in writing: Two million two hundred twenty one thousand two hundred sixty seven

Reservations:

.....

Date: 10-06-2015

Company: Group 8. Architecture construction management and technology

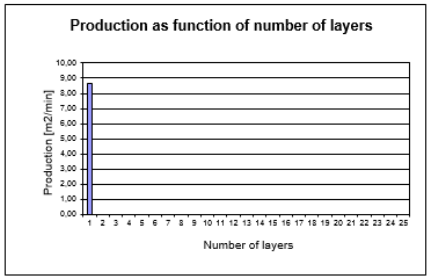
Address: Halmstagade 2 Aarhus N

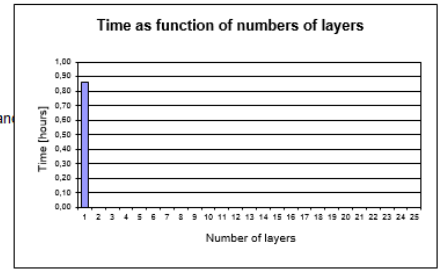
Signature: Ahsanullah

Compacting - time calculation ® NGH 2007

Mark of the manufacturer:	PLADEVIBRATOR DYNAPAC LG 300 (HONDA)	
Driving speed:	2,50 km/h = 41,67 m/min	
Plate/roller width:	0,50 m	
Effective compaction depth:	0,15 m	
Total compaction depth:	0,15 m	
Number of crossing:	2	
Additional time for reversements:	Small area 100 - 500 m2	+20%
Number of layers to be compact:	1,00	
Production 1 lag:	8,68 m^2/min	
Area to be compact:	450,00 m^2	
Time 1 layer:	51,84 min = 0 timer 52 min	

Remark: Effective compaction depth is the maximum layer thickness the maschine can han
Total campacting depth is the depth that all together should be campacted.

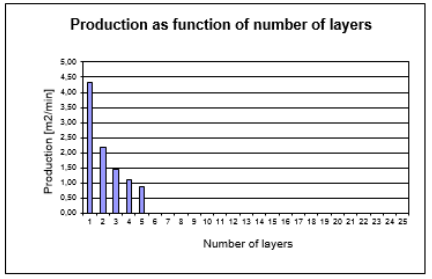


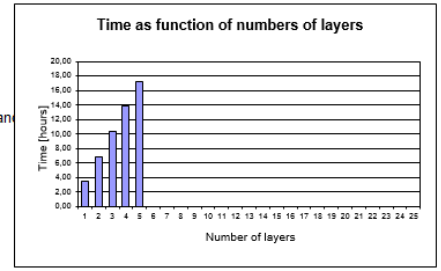


Compacting - time calculation ® NGH 2007

Mark of the manufacturer:	PLADEVIBRATOR DYNAPAC LG 300 (HONDA)	
Driving speed:	2,50 km/h = 41,67 m/min	
Plate/roller width:	0,50 m	
Effective compaction depth:	0,50 m	
Total compaction depth:	2,50 m	
Number of crossing:	4	
Additional time for reversements:	Small area 100 - 500 m2	+20%
Number of layers to be compact:	5,00	
Production 1 lag:	4,34 m^2/min	
Production 5 layer (full depth):	0,87 m2/min	
Area to be compact:	900,00 m^2	
Time 1 layer:	207,36 min = 3 timer 27 min	
Time 5 layer (full depth):	1036,80 min = **17 timer 17 min**	

Remark: Effective compaction depth is the maximum layer thickness the maschine can han
Total campacting depth is the depth that all together should be campacted.





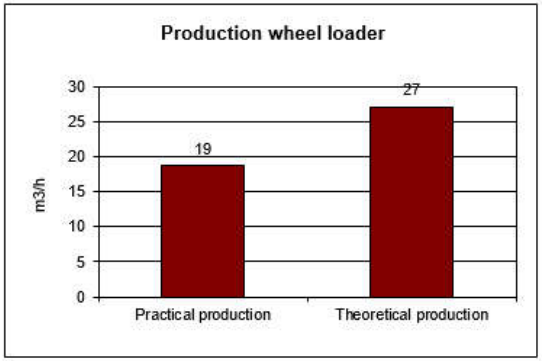
Production wheel loader - practical © NGH 2007

Personal factor =	0,83	10 min. rest per hour	Normally 10 min. rest per hour.
Qualification factor =	1,15	Good	The drivers qualifications.
Visibility factor =	1,00	Clearsighted weather	Weather condition.
Coupling factor =	0,90	Cooperation	Cooperation between two or more mashines.
Kind of work factor =	0,80	Optimal operation: Large excavation, work in gravel pit Average = 0,80	Kind of work.
Mashine stop factor =	1,00	Substitute mashines are avaiable in few hours	In Western Europe substitute mashines are avaiable fast.
Loading eff. factor =	1,00	The excavator is placed above the level of the vehicles	The location of the excavator.

Efficiency factor C = k_p x k_f x k_s x k_k x k_a x k_{ms} x k_{le}

C = 0,69

Practical production = 19 m3(solid)/h



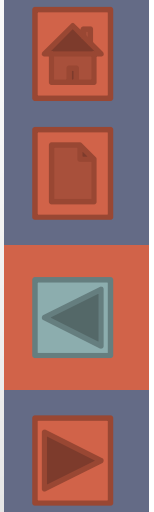
Case: Lisbjerg Soil work Number of vihicales				Contract: Soil w							Company: Group 8		
											Page: 1		
											Name: Ahsanullah Hafizi		
Summary up schedule			**Subject**								Date:10-06-2015		
Subjects	Quantity	Hours	hours per day	Total days per vehical on site	pag	pag	page	page	page	page11	Price	Unit	
Dumper Hydrema	4	231	8	10							157080	Kr	
Wheel loader	3	215	8	6							146200	kr	
Excavator Volvo	2	42	8	2,6							28560	kr	
Dynpac compactor	2	18	8	2,2							1620	kr	
Dynpac driver	2	18	8	2,3							4968	kr	
Total	**13**	**524**		**23,1**							**338428**	**kr**	

CONSTRUCTION TIME SCHEDULE

	Week 20												Week 21						
Machinary	M/ 8 hours	Executed by	T/ 8 hours	Executed by	W/ 8 hours	Executed by	T/ 8 hours	Executed by	F/ 8 hours	Executed by	S	SU	M/ 8 hours	Executed by	T/ 8 hours	Executed by	W/ 8 hours	Executed by	T/ 8 hours
	03-08-2015		04-08-2015		05-08-2015		06-08-2015		07-08-2015		08-08-2015	09-08-2015	10-08-2015		11-08-2015		12-08-2015		13-08-2015
Survey the site	1day	Ground worker																	
Clear the site	same day	soil worker																	
Removing of top soil	I scavator and 2 dymper hydrema 1 wheel loader	soil worker	I scavator and 2 dymper hydrema 1 wheel loader	Soil worker															
Making temporery road					1 dynpac compactor and 1 wheel loader 2 hours	Soil worker compactor man													
							2 Excavator 4 hydrema	Soil worker	2 Excavator 4 hydrema	Soil worker			2 Excavator 4 hydrema	Soil worker	2 Excavator 4 hydrema	Soil worker	2 Excavator 4 hydrema	Soil worker	2 Excavator 4 hydrema
Compacting the foundation and working area.																			

	Week 23											Week 24		
	F/ 8 hours		S/ 8 hours	SU/ 8 hours	M/ 8 hours	Executed by	T/8hours	Executed by	W/8 hours	Executed by	T/8 hours	Executed by	T	W
	14-08-2015		15-08-2015	16-08-2015	17-08-2015		18-08-2015		19-08-2015		20-08-2015			
Soil worker	2 Excavator 4 hydrema	Soil worker			2 Excavator 4 hydrema	Soil worker								
							3 Wheel loader and 2 compactor with drivers	Soil work Compactor	3 Wheel loader and 2 compactor with drivers	Soil work Compactor	3 Wheel loader and 2 compactor with drivers	Soil work compactor		

CONTENTS



Main building drawings

Foundation plan

Basement floor plan

Groundfloor plan

1st floor plan

2nd floor plan

3rd floor plan

4th floor plan

Appartment units 1 & 3 - handicaped

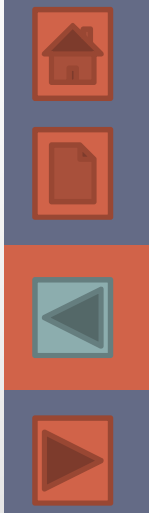
Appartment units 2 & 4

Penthouse & dormitory units

Location plan

Situation plan

Building site plan



Technical installation drawings

Heating plans

Groundfloor sewer plan

1st floor sewer plan

2nd floor sewer plan

3rd floor sewer plan

4th floor sewer plan

Electricity plans

Shaft aranngement 1

Shaft aranngement 2

Groundfloor plumbing plan

1st floor plumbing plan

2nd floor plumbing plan

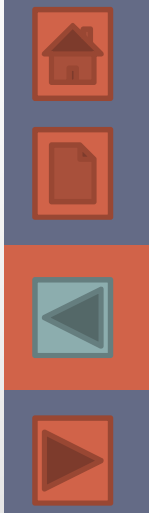
4th floor plumbing plan

Groundfloor ventilation plan

1st floor ventilation plan

2nd floor ventilation plan

4th floor ventilation plan



Detail drawings #1

Detail no. 2 Storey partition / external wall

Detail no. 3 Beam connection w. displaced slab

Detail no. 4 Storey sep. Slab / internal load bearing wall

Detail no. 9 Groundfl. Slab connection w. foundation

Detail no. 12 Groundfl. Slab connection w. external wall

Detail no. 13 Groundfl. Slab connection w. basement wall

Detail no. 15 External wall-top connection with roof

Detail drawings #2

Detail no. 18 Balcony connection on external wall

Detail no. 20 Facade corner, plan section

Detail no. 21 External wall-top, penthouse terrace

Detail no. 23 External wall ending around window

Detail no. 24 Brick lintel mounted above door openings