

CZECH TECHNICAL UNIVERSITY
UNIVERSITAT POLITÈCNICA DE VALÈNCIA

FINAL PROJECT

SINGLE FAMILY HOUSE

Student: Mercedes Esteve Montesinos

Tutors: Frantisek Kulhanek/ Milagro Iborra



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DESCRIPTIVE MEMORY

The point of this Project is the construction of a single family house.

CHARACTERISTIC'S PLOT

The edification will be constructed in a rectangular plot. The topography is practically plane, but it is 1,15 meters lower than the level street. The determination of characteristics of soil are specified in the relevant geotechnical study.

The building is situated in an urban zone in Vinarós, it has an area of 570 m², and this location and situation are considerate adecuated in order to the use of the house, and compliance of the County Zoning Rules of the plot.

INFORMATION ABOUT THE LOCATION

The road into the building is planned from a public thoroughfare and it's going to be totally surfaced.

The potable water comes from the mains municipal supply and it counts with canalization for the connection planned in front of the plot.

There is plumbing municipal supply in front of the plot, which is connected to the interior mains of the edification through its own connection.

The electricity supply it's going to be made from the low voltage distribution running on public roads.

The plot is situated in urban ground non-consolidated and its use is residential for detached house. The corresponding plots, have square geometry. Its limits are: Front accesses directly with the main road and with north orientation, the rest sides are limited with others plot.

COMPARATED TABLE WITH URBANISTIC REGULATIONS	
COUNTY ZONING RULES	
EDIFICATION ZONE INSOLATE UNIFAMILIAR	PROJECT
Minimum plot area 400 m ²	570.00 m ²
Minimum distane to one of principal edge 12 m.	15.06 m
Minimum distance to principal edge 4 m.	6.00 m
Edificability 0.50 m/m ² : 285 m ²	129.78 m ²
Maximum occupation plot 50%	22.77 %

REQUIREMENT PROGRAM:

It is propose a program of needs based on the construction of a detached house on ground floor and first floor.

The facade composition should be attractive, but simple constructive characteristics, with conventional materials.

The housing should respond to a typology for residence and contain the following minimum elements:

- Kitchen, living-room, 4 bedrooms, 2 bathrooms, toilet, closet, pantry, reserve waste storage, terraces and garage.

ENVIRONMENT AND PROJECT DESCRIPTION:

The present project has been redacted in order to compliance the County Zoning Rules, and particularly the following regulations:

- Rules and orders of Generalitat Valenciana
- Basics rules and technical of buildings.
- General municipal management urban plan of Vinaròs.
- Law of Soil. RD 2/2008, of 20 of June.
- Royal decree regulation of urban planning and land management (ROGTU)
- Urban Land Law, LUV. RD 16/2005, 30 of December.
- Law 3/2004, de 30 de junio, BUILDING MANAGEMENT (LOFCE).
- DC/09, Design conditions and quality, Decreet 151/2009 de 2 de October.
- Technology standards

ANOTHERS REGULATIONS:

CONTENT	TYPE OF REGULATION
TECHNICAL BUILDING CODE (CTE)	
STRUCTURE	
DB SE-AE STRUCTURAL SAFETY. Actions of the building	RD 314/06
FIRE	
DB SI SAFETY IN CASE OF FIRE	RD 314/06
UTILIZATION	
DB SU SAFETY OF USE	RD 314/06
HEALTHINESS	
DB HS HEALTHINESS	RD 314/06
NOISE	
DB HR NOISE PROTECTION	RD 1371/07
ENERGY	
DB HE ENERGY SAVING	RD 314/06
PROFESSIONAL ACTIVITIES	
FUNCTION	
Law Building Management	Law 38/99
Foreman Builder. Faculties and responsibilities	RD 265/71
Responsibilities of builders Order 22/10/63	Law 22/94
CONSTRUCTION PROJECT MANAGEMENT	
TECHNICAL BUILDING CODE (CTE)	RD 314/2006
Aproval of protection against noise DB-HR and modification of RD 314/2006	RD 1371/2007
Rules of order and attendance book.	Order 09/06/71
Final certificate of location works	Order 20/01/72
Collection of amounts anticipated in housing	Law 57/68
Sale and lease housing information	RD 515/89

STRUCTURE	
NCSE-02. CONSTRUCTION STANDAR EARTHQUAKE-RESISTANT	RD 997/02
CONCRETE STRUCTURAL INSTRUCTION (EHE)	RD 1247/08
PROTECTION	
BASIC PROCESS FOR ENERGY EFFICIENCY CERTIFICATION	RD 47/07
REGULATION OF FACILITIES OF FIRE PROTECTION	RD 19 42/93
CLASSIFICATION OF CONSTRUCTION PRODUCTS AND ELEMENTS OF CONSTRUCTION	RD 110/2008
REGULATION WHICH DEVELOPES NOISE LAW	RD 1367/2007
NOISE LAW	Law 37/03
THERMAL SYSTEM	
REGULATION OF THERMAL SYSTEM IN BUILDINGS RITE-2007	RD 1027/07
FUEL	
TECHNICAL REGULATION OF DISTRIBUTION AND USE OF FUEL	RD 919/06
CHANGE OF RULES OF REGULATIONS AND TECHNICAL INSTRUCTION	RD 1523/99
ELECTRICITY	
REGULATIONS FOR HIGH VOLTAGE OVERHEAD LINES	D 3151/68
SECURITY REQUIREMENTS IN POWER DEVELOPEMENT	RD 7/88
REGULATIONS AND RULES ABOUT ELECTRICAL CONNECTIONS	RD 2949/82
REGULATION OF LOW ELECTROTECHNICAL CURRENT TECHNIQUESAND ADDITIONAL FACILITIES ITC-BT-01 A 51	RD 842/02
SPECIFICATIONS	
TECHNICAL ESPECIFICACIONES	Order 04/06/73
INSTRUCTION FOR THE RECEIPT OF CEMENT	RD 1797/03
TECHNICAL SPECIFICATION, WATER PIPES	Order 28/07/74
TECHNICAL SPECIFICATION, DRAINAGE PIPES	Order 15/09/86

COMPLIANCE OF REGULATIONS

BASIC REQUIREMENTS RELATING TO THE FUNCTIONALITY (SU)

Use, so that the layout and dimensions of the spaces and the provision of facilities to facilitate the proper conduct of the functions provided in the building.

As for the dimensions of the units has followed the provisions of the Decree of habitability in force.

Minimum size of the enclosures (according to DC/09)

TYPES	AREA (m2)
Simple bedroom	6
Doble bedroom	8
Kitchen	5
Living-room	16
Bathroom	3
Toilet	1.5

The areas provided in the house, object of the project.

		AREAS (M ²)	
FLOOR	DENOMINATION	USEFUL	BUILT
Ground Floor	Kitchen	13.95	73.02
	Living-room	27.55	
	Hall	14.82	
	Pantry	2.84	
	38.23	Bath	3.23
		Storage room	3.70
		Garage	29.17
		Porch	2.20
First	Cover terrace (50%)	16.33	18.53
	Room 1	14.07	97.57
	Room 2	11.28	
	Room 3	13.50	
	Room 4	13.15	
	Dressing Room	5.95	
	Bathroom 1	5.59	
	Bathroom 2	4.15	
	Corridor 1	4.71	
Corridor 2	5.67		
Terrace	Corridor 3	2.16	13.02
Total		194.02	240.37

The house is equipped with all basic services and the telecommunications

Housing is planned in such a way as to ensure telecommunication services (under specific telecommunications project) and telephone and audiovisual.

BASIC REQUIREMENTS FOR STRUCTURE

The structure of the building is going to be resolved with reinforced concrete and can be decomposed, for purposes of calculation, in: Foundations, supports, floors and unique elements.

The geometric description of the structure which is included in the plans for Execution Project shall be constructed and controlled in accordance with what indicated in the Technical Building (CTE) and EHE. The interpretation of plans and implementation requirements of the structure are ultimately subject to the directives and orders during the Construction of it imparts the Architect of the work.

The frameworks are made with a total depth of 25 + 5 cm, interaxis concrete vault of 70 cm.

Joists and complementary distribution, filling of breasts and compression layer of 5 cm. thick, all executed as established under current legislation. The framework will be concrete vault.

Based in the geotechnical study, adopted the following principles of typology and calculation of foundation and construction features of the same:

A system using strip footings with walls of 0.20 m supported on them.

Concrete elements will be carried out in situ with reinforced concrete H-25 N/mm², maximum size 20 mm. placed on structure formed by walls, pillars, beams bands, wrought beams and slabs, pouring consistency and compacted with vibrating plastic, steel bars B-500-S.

Transverse joints will shrink every 25 m², with distances between them not exceeding 5.00 m. being the depth of not less than 1/3 the thickness and width of 3 mm. The sill will include its corresponding mesh and bituminous waterproofing.

BASIC REQUIREMENTS FOR SAFETY:

1. Structural safety (**CTE DB SE**), so that will not occur in the home, or parts thereof, which originate damage or affect the foundation, supports, beams, slabs, bearing walls or other structural elements, and directly compromise the mechanical strength and stability of the house.
2. Safety in case of fire (**CTE DB SI**), so that occupants can evacuate the house safely, it can limit the spread of fire within the home itself and the adjacent and to allow the performance of firefighting equipment and rescue.

Urban conditions: housing is easily accessible to firefighters.

Outer space immediately next to housing meets the sufficient conditions for the intervention of fire fighting services.

All structural elements are fire resistant for longer than the largest sector of fire resistance.

Access is guaranteed because the holes complain the conditions of separation. There is no incompatibility of uses.

There must not be type of material due to its low fire resistance, flammability or toxicity may adversely affect the safety of the building or its occupants.

3. Utilization safety (**CTE DB SUA**), so that normal use of the building is no risk of accidents to people.
The configuration of spaces, fixed or movable elements that are installed in the home, are designed so that they can be used for its intended purpose within the limitations of use of the building described later without risk of accidents involving for users.
The riser of stairs is 20 cm, at most, and the footprint of 22 cm, at least. The size of all signs shall be measured at each step, depending on the direction of travel. (Section 4.2)

BASIC REQUIREMENTS FOR HABITABILITY.

1. Hygiene, health and environmental protection (**CTE DB HS**), so as to achieve acceptable conditions of safety and sealing in the air inside the building and it does not deteriorate the environment in their immediate environment, ensuring proper management of all types of waste.

The home meets the requirements of habitability, energy efficiency and functionality required for this use.

The entire building is provided with means which prevent the presence of water or moisture from inadequate atmospheric precipitation, from the ground or fused, and has means to prevent penetration or, where appropriate, enable their evacuation without producing damage.

The house has adequate means to provide the hygienic equipment provided safe water for consumption in a sustainable manner, providing sufficient operating flow without altering the properties suitability for consumption and preventing the potential returns that may contaminate the network, incorporating means for saving and control of water. All equipment will have their own individual siphon.

The house has adequate means for removing the wastewater generated independently with atmospheric precipitation.

2. Protection against noise (**CTE DB HR**), so that the perceived noise does not endanger the health of people and enable them to successfully carry out their activities.

All vertical structural elements (interior partitions, partition walls of properties or different users, partition walls of properties or different users, partition walls of interior common areas, walls separating the engine rooms, facades) have sound insulation required for applications provided on the premises that they enclose.

All horizontal construction elements (generally slabs separating each floor, walkable roofs and slabs separating engine room), have sound insulation required for the intended uses in dependencies that are limiting.

3. Energy saving and thermal insulation (**CTE DB HE**), so as to achieve a rational use of energy necessary for the proper use of the house.

The house has a fitting enclosure to limit energy demand required to achieve thermal comfort depending on the climate of the city of Vinaròs, the intended use and the summer and winter.

The insolation and inertia characteristics, air permeability and exposure to sunlight, allow reducing the risk of surface humidity and interstitial condensation that could damage the features of the envelope.

Taken into account especially the treatment of thermal bridges to limit heat gains or losses and avoid hygrothermal problems in them.

The house has adequate lighting facilities to the needs of their users while providing an energy efficient control system that allows to adjust the ignition to the actual occupation of the area as well as a regulatory system that optimizes the use of natural light in areas that meet certain conditions.

The hot water demand will be covered in part by incorporating a system of collection, storage and use of low-temperature solar energy appropriate to the global solar radiation from its location and the hot water demand of house.

BASIC REQUIREMENTS FOR FIRE

The aim of the basic requirement "Safety in case of fire" is to reduce to acceptable limits the risk that users of a building suffer damage caused by a fire of accidental origin, due to the characteristics of their design, construction, use and maintenance.

CTE SI-1. Interior propagation:

Fire resistance of walls, ceilings and doors that define sectors of fire EI60.
In garage the fire resistance of elements that delimit the sector will be EI 120.

CONSTRUCTIVE MEMORY

JUSTIFICATION

SOIL

The geotechnical study has been done in accordance with the parameters set out in Article 3 of Basic Document SE-C del CTE.

LAYERS
VEGETAL SOIL
STRATIFIED ROCKS

Description of layers:

1. Arable land:
Work layer of soil loose, easy removal with means and/or demolition landfill areas, debris, etc.
2. Stratified rocks:
This layer is composed of stratified rocks forming a layer of indefinite thickness.

In view of this, the foundation plan will be to the depth specified in it, considered as adequate quality and suitable land to build the planned construction.

Not found the water table at a depth of foundation provided.

Admissible tension of soil

According to the classification adopted and the depth of foundations outlined in the plans, could be adopted permissible tensile soil of 2.00 kg/cm². The experience in this type of land and application of the allowable pressure recorded, shows that this tension can be adopted work with confidence. Anyway, will build on the second layer, the foundation being designed for not exceed the 2.00 kp/cm² in any point.

FOUNDATIONS

Due to the type of work, terrain features and ease of construction, the foundation will be adopted based on surface type: STRIP FOOTING.

The method of calculation used for the design of footings and their reinforcement is reflected in the regulation EHE-08.

STRUCTURE

The resistant structure of the building is projected by: WALLS OF CHARGE done by concrete blocks, PERIMETER REINFORCEMENT BEAMS, COLUMNS AND BEAMS.

It will be of concrete HA-25/B/20/IIb, and steel B500S, and cement CEM II/A-L 42,5 R.

SLAB

Slabs will be formed by semijoints of prestressed concrete, for the loads and bending moments calculate, ceramic blocks, filling of breasts and compression layer will be implemented with concrete f_{ck} : 250 kg/cm², and steel f_{yk} : 5000 kg/cm².

BUILDING ENVELOPE

There will be two kinds of envelopes:

1. The construction system consist on brick wall of 12 cm thickness cladding.
2. The construction system will consist in one leaf of white perforated facebrick.

All exterior brick walls have an air chamber (inside of its, is placed thermal insulation) and an interior partition of 7 cm, plus coatings.

SEWERAGE:

Downspouts pipes and storm sewer shall be PVC diameters indicated on the plans, placing prefabricated valve boxes at the locations listed in the project. The horizontal sewerage system will be of PVC as well, and their travels and diameters listed in the corresponding plane.

The minimum slope will be 2 %.
This network will connect to public sewer.

ROOF

Walkable and non-walkable terrace.

PARTITIONS

Clay brick walls of 7 cm placed on edge and united with gypsum rows the last row, and with portland cement mortar the rest.

CONTINUOUS COATING

A gypsum plaster base on vertical and horizontal walls of interior rooms.

In external walls, portland cement mortar without screeded and floated or colored coating monolayer.

- Pieces of gres ceramic.
- Granite stone for steps.
- Concrete garage and storage room.
- Granite worktop of 2 cm thickness on kitchen furniture.
- Tiling in kitchen, toilet and bath with ceramic tile to delivery to the ceiling.
- On terraces and exterior spaces of ceramic slip.
- Rain guard on windows and doors, Ulldecona's stone.
- Halls, stairs clad with granite stone.
- Placated smooth veneer plaster on ceilings in bathrooms and kitchen, and facilities walkways.

WALLS FINISHES

Wet areas: tiled with ceramic tiles premium rate.
Rest of housing: Painting all the walls with high quality plastic paint.

All the walls of the house will be treated with anti-mildew and antibacterial

FLOORING

Floor tiles inside large ceramic Porcelanosa premium rate, with baseboard.
Wet areas: tiled with ceramic tiles premium rate.

INTERIOR CARPENTRY

Prefames are made of pine wood. Plain internal passing doors are varnished heat-treated beech wood, with corresponding fittings, handles and knobs.

Kitchen wood furniture with varnished heat-treated beech, pull handles of stainless steel and wood doors. Base unit prepared to 45 cm dishwasher.

Stairs banister of lacquered aluminium, compliance regulations with the risk of falls specified in CTE-SU1, Section 3.

EXTERIOR CARPENTRY

Monoblock type P.V.C. in color and aluminium roller blinds.
Reinforced entrance door of PVC in color, with inspection window, handle and security lock. Prefame is made of aluminium.

External railings work with stainless steel handrails.

FALL SAFETY CONDITIONS (CTE DB SUA)

1. Height > 0.55 m. → Handrail or protective element:

DESIGN:

- Not scalable (support points will not exist in the height between 200 mm and 700 mm above the ground level or above the line of inclination of a straight)

- Minimum height:
 - Interior building: 0,90 m
 - Exterior building: 0,90 m
- Bars separation < 0.10 m

HORIZONTAL RESISTANCE TO PUSH ON TOP SURFACE

(Apart. 3.2.1 from Basic Document SE-AE)

- 1,6 KN/m

2. Opening windows with height above floor < 0.90 m → Safety glass or wired glass, panels or handrails.

HORIZONTAL RESISTANCE TO PUSH ON TOP SURFACE.

- 1,6 KN/m

Locksmith

All elements will be of stainless steel conveniently painted and finishes.

PUMBLING

The plumbing will be made based on standard copper tubes, hanging from the ceiling and mounting into walls.

The domestic distribution network will be hot and cold water with their diameters, keys and accessories for its perfect working order. It placed taps in each local wet.

The sanitary ware will be white vitreous porcelana from Roca in bathrooms and toilets. All chromed single-lever taps.

The sink will be single and stainless steel.

ELECTRICITY

The electrical system will be implemented strictly following the ITC-BT 25 in force, and the project plans.

- Electrification level: 9200 W (Elevated Electrification) because the useful area is $194 \text{ m}^2 > 160 \text{ m}^2$ and the prevision of electrical conditioning. The electrical network will have six circuits, with protectional box IP55, magneto-thermal differential...

- General switch: 40 A.
- Power switch control
- Differential switch

CIRCUITS:

- C6. Lighting
- C7. Outlets
- C8. Forecast of electric heating
- C9. Forecast of air conditioning
- C10. Separated dryer
- C12. Provision of additional circuits

The interior installation will be made based networks mounting in walls, with semi-rigid plastic pipes with the copper wiring sections concerned.

The mechanisms and fittings will be of the series Simon.

T.V. antenna installation and telephony equipment acquisition, amplification and distribution, including making connection to earth and pre-installation for digital platform

Will place the earthing buried to provide a contact tension of less than 24 V in any mass of the building and a lower resistance of 20 Ohms, from the furthest point of the installation.

INSULATIONS

Insulating walls with polyurethane foam of 4 cm. sprayed in the interior leaf of brick wall and 25 kg/m^3 density.

GLASSES

Glass chamber Climalit 4/8/4 in windows, and 4/6/4 in doors.

VARIOUS

- Fencing of plot consists of concrete block factory plastered with mortar colored monolayer.
- Mailbox, single-family housing, with front slot for card input, and door and metal body colored exterior finish ixox.
- Plate medium vitoceramica.
- Slimline hood, midrange
- Bar in the kitchen made of wood like kitchen cabinets.
- Versatile mid-range oven
- Wood kitchen cabinets finished in natural beech veneer, wooden doors, straight edges, straight lines matte stainless steel handles, wall units, worktop and fume extractor for housing, low furniture in preparation for 45cm dishwasher.

SUSTAINING BUILDING

Justification of soil characteristics and parameters to be considered for the calculation of the structural system for the foundation.

According to the CTE-DB-SB-AE Shares and the NCSR Earthquake Resistant Construction Standard-02, the city is a basic acceleration zone less than 0.04 g where g is the acceleration of gravity. The seismic acceleration is less than 0.06 g so therefore no need for special measures for seismic reasons.

Basis of calculation

- Methods of calculation

The sizing of sections is done by the Theory of Boundary Limits States (DB-SE Section 3.2.1) and Service Limit States (DB-SE Section 3.2.2). The behavior of the foundation should be checked against the bearing capacity (strength and stability) and the ability to service.

- Checks

The checks of limit states are based on the use of a suitable model for the foundation system chosen and the soil in support of it.

- Loads:

Wind actions (CTE DB SE-AE)

In general, ordinary buildings are not sensitive to the dynamic effects of wind. This document does not cover Basic slenderness constructs above 6, which itself must be considered such effects.

The building is situated in zone A:

Velocity of air = 26 m/s

Wind dynamic pressure = 0,42 kN/m²

It has been considered the loads in building according DB-SE-AE, and geotechnic loads which are transmitted through the soil, according the document DB-SE (4.2 – 4.2 – 4.4).

As provided in the DB-SE-AE in Table 3.1 and Annex C, and EHE-08 the gravitational action and the live load, partition and snow that have been considered for calculation the structure of the building are specified:

Levels	Overload	Partition overload	Slab self-weight	Floor and coating overload	Total load
Level1 Sanitary slab 1	2,00 KN/m ²	1,00 KN/m ²	4,00 KN/m ²	1,00 KN/m ²	8,00 KN/m ²
Level2 Sanitary slab 2	4,00 KN/m ²	1,00 KN/m ²	4,00 KN/m ²	-	9,00 KN/m ²
Level 3 First floor 1	2,00 KN/m ²	1,00 KN/m ²	4,00 KN/m ²	1,00 KN/m ²	8,00 KN/m ²
Level 4 First floor 2	2,00 KN/m ²	1,00 KN/m ²	4,00 KN/m ²	1,00 KN/m ²	8,00 KN/m ²
Level 5 Terrace floor 1	1,00 KN/m ²	1,00 KN/m ²	4,00 KN/m ²	1,00 KN/m ²	7,00 KN/m ²

Level 6 Terrace floor 2	1,00 KN/m ²	1,00 KN/m ²	4,00 KN/m ²	1,00 KN/m ²	7,00 KN/m ²
Level 7 Coffer floor	1,00 KN/m ²	-	4,00 KN/m ²	1,00 KN/m ²	6,00 KN/m ²

GEOTECHNICAL STUDY:

- **Generalities:**
Analysis and design of the foundation require prior knowledge of the soil support characteristics, the type of building planned and the environment where the building is located.
- **Admissible tension considered:**
2.0 kp/cm²

STRUCTURAL SYSTEM

Data and the started hypothesis will be determined, the requirements program, the bases of calculation and procedures or methods used for the entire structural system as well as the characteristics of the materials.

This house is projected to meet the essential requirements of mechanical strength and stability, fire safety, hygiene, health, environment and safety in use. Compliance with these requirements is expected to meet during the life of 50 years.

It is no considered seismic action because the location of the building is not very exposed to earthquakes, according to NCSE-02.

FOUNDATION:

- **Requirement program:**

Isolated house with ground and first floors divided into four levels. The ground floor will be in sanitary slab on two levels and the first floor will be on one-way slabs, divided into two levels.

- **Characteristic of materials:**

It will be all in HA-25 reinforced concrete strip footings on a clean concrete layer of HM20, B500 S steel and B500 T for electrowelded mesh. There is a perimeter reinforced concrete beams, and a wall of concrete block. It is placed a polyethylene sheet above wall of concrete blocks to avoid moisture by capillarity.

- **Regulations considered in the materials used**

- Concrete: EHE- CTE
- Steel: CTE-DB-SE
- Concrete blocks: RB-90, UNE-ENV 1996-1-1.

BEARING STRUCTURE:

- **Requirements program:**

Isolated house with ground floor on two levels in one of which is the garage and one storage and the other social area level. The second floor contains the rooms on two floors and the staircase that leads to a walkable terrace.

- **Structural analysis model:**

It is performed a three-dimensional structural analysis by matrix methods of stiffness forming bar elements that define the structure: columns, beams, joists and cross beams.

- **Characteristics values for loads:**

The values loads are collected above in compliance of DB-SE-AE.

- **Characteristics of materials:**

It will be all in HA-25 reinforced concrete slab, beams and columns, with B500 S steel and B500T for electrowelded mesh.

The HA-25 concrete shall conform in size aggregates and dosage to the provisions of EHE, requiring a minimum compressive strength of 25 N/mm² at 28 days with normal control.

- **Regulations considered in the materials used**

- Concrete: EHE- CTE
- Steel: CTE-DB-SE

HORIZONTAL STRUCTURE:

- **Requirements program:**

Isolated house with ground floor on two levels in one of which is the garage and one storage and the other social area level. The second floor contains the rooms on two floors and the staircase that leads to a walkable terrace.

- **Structural analysis model:**

Use of one-way slab with light elements of ceramic block, with an interaxis of 70 cm.

The sizing of sections is performed according to the theory of limit states EHE Instruction. The calculation method of the floors is via a calculation on the assumption of plane continuous beam using the matrix method of stiffness or displacement, with an elastic analysis as EHE hypothesis.

The depth of the one-way slabs of concrete with prestressed joists will exceed the minimum established in the EHE (Art. 50) for the design conditions, materials and anticipated loads, so it does not need to check arrow.

$$H_{\min} = \frac{\delta_1 \cdot \delta_2 \cdot L}{C} = \frac{1.13 \cdot 0.974 \cdot 5.40}{20} = 0.289 \text{ m} \rightarrow H = 30 \text{ cm.}$$

Being;

$$- \delta_1 = (q/7)^{0.5}$$

$$\delta_1 = (9.00/7)^{0.5} = 1.13$$

$$- \delta_2 = (L/6)^{0.25}$$

$$\delta_2 = (5.4/6)^{0.25} = 0.974$$

$$- L \text{ (maximum span of slab)} = 5.4 \text{ m (slab 2)}$$

$$- C \text{ (coefficient table 50.2.2.1.b)} = 20$$

- **Characteristic of materials involved:**

The data sections of columns and beams, and the reinforcement of the slab, beams and slabs negative, and other structural elements will be defined in the relevant structure plans. The HA-25 concrete shall conform in size aggregates and dosage to the provisions of EHE, requiring a minimum compressive strength of 25 N/mm² at 28 days, Normal control. The steel used shall be corrugated B500S and steel for welded mesh B500T.

- **Regulations considered in the materials used**

- Concrete: EHE- CTE
- Steel: CTE-DB-SE
- Slab and joists: EHE

ENVELOPE SYSTEM:

Constructive definition of the various subsystems of the building envelope, with description of their behavior regarding loads to which it is subject (self-weight, wind, earthquake, etc.) against the fire, safety use, removal sewage and behavior against moisture, noise and thermal insulation, and their basis of calculation.

The thermal insulation of these subsystems, the maximum expected energy demand of the building for summer and winter conditions and energy efficiency based on performance of proposed facilities in accordance with CTE DB-HE2.

CONSTRUCTIVE DEFINITION OF SUBSYSTEMS:

1. ENVELOPES:

The following types of enclosures:

EXTERIOR SHEET:

Enclosure consisting of a exterior sheet of perforated brick 25x12x10, injected polyurethane foam of 4 cm inside the air chamber of 6 cm.

Envelope of a sheet of white perforated facebrick of 24x12x5 cm, without vertical joint placement, anchored in slab by steel corrugated rods 10 mm diameter and angle made with the same type of rod.

INTERIOR SHEET:

Interior sheet will be made by hollow brick 24x12x7 cm, received with cement CEM IIA-P 32, 5R, to coated, level and plumb, and grouting.

2. EXTERIOR CARPENTRY:

The exterior carpentry will be of P.V.C. medium series with thermal break, monoblock system with glass glazing with chamber Climalit type 4/8/4, and blind aluminum color. Its leaves can be sliding, swing and tilt swing (see plan of carpentry).

3. OUTDOOR TERRACE:

The project has two kinds of terrace.

1. Walkable terrace:
Consisting of: Layer of concrete cell with slope formation minimum height of 10 cm. and slope to 2%, 2 cm mortar layer thickness, asphalt waterproofing 4kg/m², placed with torch-extruded polystyrene thermal insulation with 4 cm thick, 3cm thick mortar layer-pavement terraces made with mortar mixed of 2 cm thick.
Expansion joints

2. Non walkable terrace:
Consisting of:
Layer of concrete cell with slope formation minimum height of 10 cm., and slope of 2%, asphalt waterproofing 4kg/m², mortar layer of 3 cm thick, and rasilla flooring with drip cap.
Even expansion joints.

4. **OUTSIDE FLOOR:**

One-way sanitary slab with pretensed self-resistance joist of HA, ceramic block and compression layer 5 cm, 70 cm between axis, 25 +5 edge, negative reinforcement and electrowelded mesh 150x300 cm and diameter 5 mm, with concrete HA/25 and steel B500S, perimetral beams and lintels. Stair slab with a thickness of 20 cm, dimensions and reinforcement according to plan.

5. **WALLS IN CONTACT WITH NO HABITABLE SPACE AND A DEPTH GREATER THAN 0.50 m.**

Wall made of concrete block of 20x20x40 cm, with breast filled with concrete with two grates round of 10 mm diameter., provided each 20 cm, cutting capillarity with waterproof sheet, received with cement mortar M-40a (1:6).

Leaving interior holes of 40x20 cm in the lining of the sanitary slab for air circulation, and holes in enclosure walls to put louvers on all facades.

BEHAVIOUR OF SUBSYSTEMS.

Each of the building elements listed above have a behavior and a basis of calculation with respect to the dead load, wind, earthquake, fire, safety of use, water evacuation, response to moisture, thermal and acoustic insulation provided in the Enforcement Regulations of the CTE.

FINISHING SYSTEMS

It is shown the characteristics and requirements of the finishes and the parameters to comply the requirements of functionality, safety and livability (detailed finishes here are those that have proceeded to describe in the specification).

EXTERIOR FINISHES:

Monolayer mortar scraping color finish, waterproofing thickness of 2 cm. Compound of cement I/45-B, sand and water repellent. Complying with the rules of lighting in the section of the CTE-DB-HE facades and conditions of section 2.3 of the CTE-DB-HS.

Continuous coating of white cement.

Sandstone cladding for facade, on screeded walls and taken with gripping material or similar.

Metal cladding for chimney barbecue on screeded walls and taken with adhesive material or similar.

INTERIOR COATING

Garnished gypsum plaster finish. Complaining the conditions of reaction to fire in the chapter on Reaction to fire of building materials, coatings of the CTE-DB-SI. There will be a double layer of plastic paint on walls and ceilings.

ROOFS:

WALKABLE TERRACE-

Layer of cell concrete with slope formation minimum height of 10 cm. and slope to 2%, average thickness of 15 cm, 2 cm mortar thick layer, asphalt waterproofing 4kg/m², placed with torch, thermal insulation of extruded polystyrene with 4 cm. type roof-mate, layer of mortar of 3 cm, pavement on terraces made with rustic stoneware made with mixed mortar 2 cm thick.

TERRACE NO WALKABLE-

Aerated concrete layer with slope formation minimum height of 10 cm. and slope to 2%, average thickness of 15 cm., mortar layer 3 cm thick concrete layer cell of 2 cm. thick, even in auctions, forming expansion joints, completely finished.

In compliance with the enforcement in the roof section in the CTE-DB-HE and Section 2.4 covers the CTE-DB-HS.

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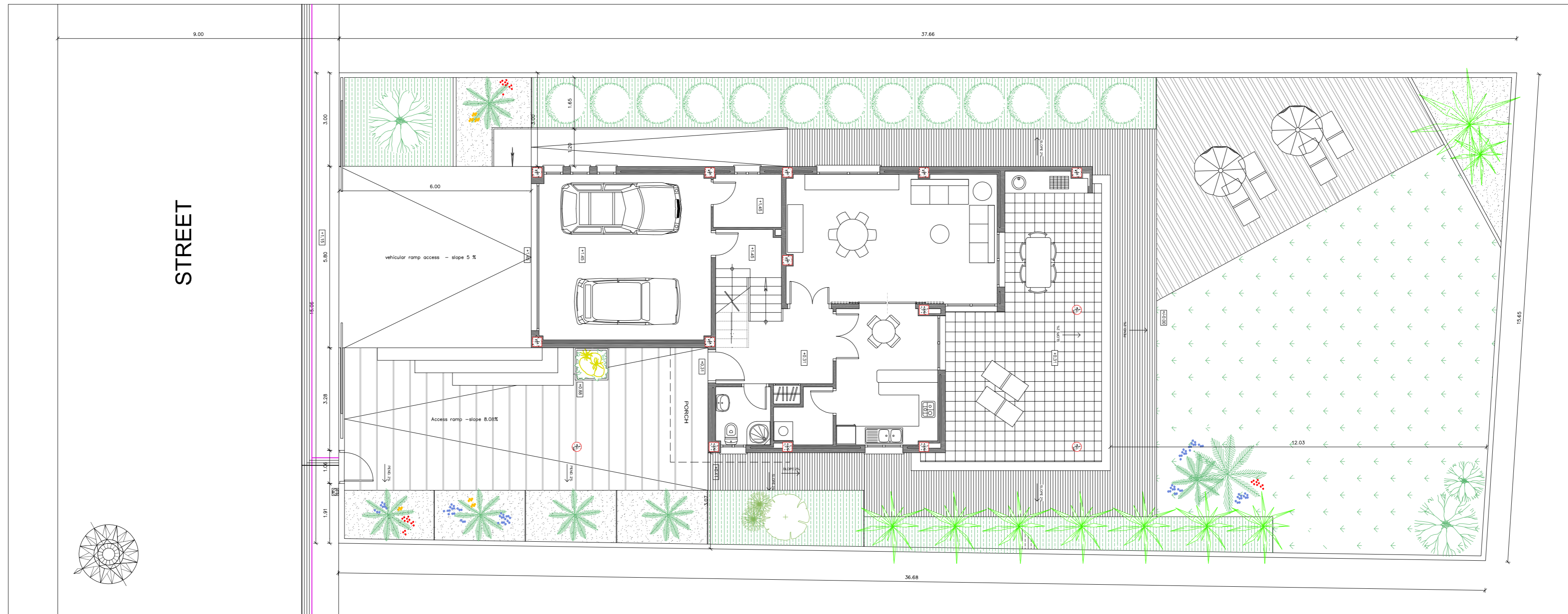
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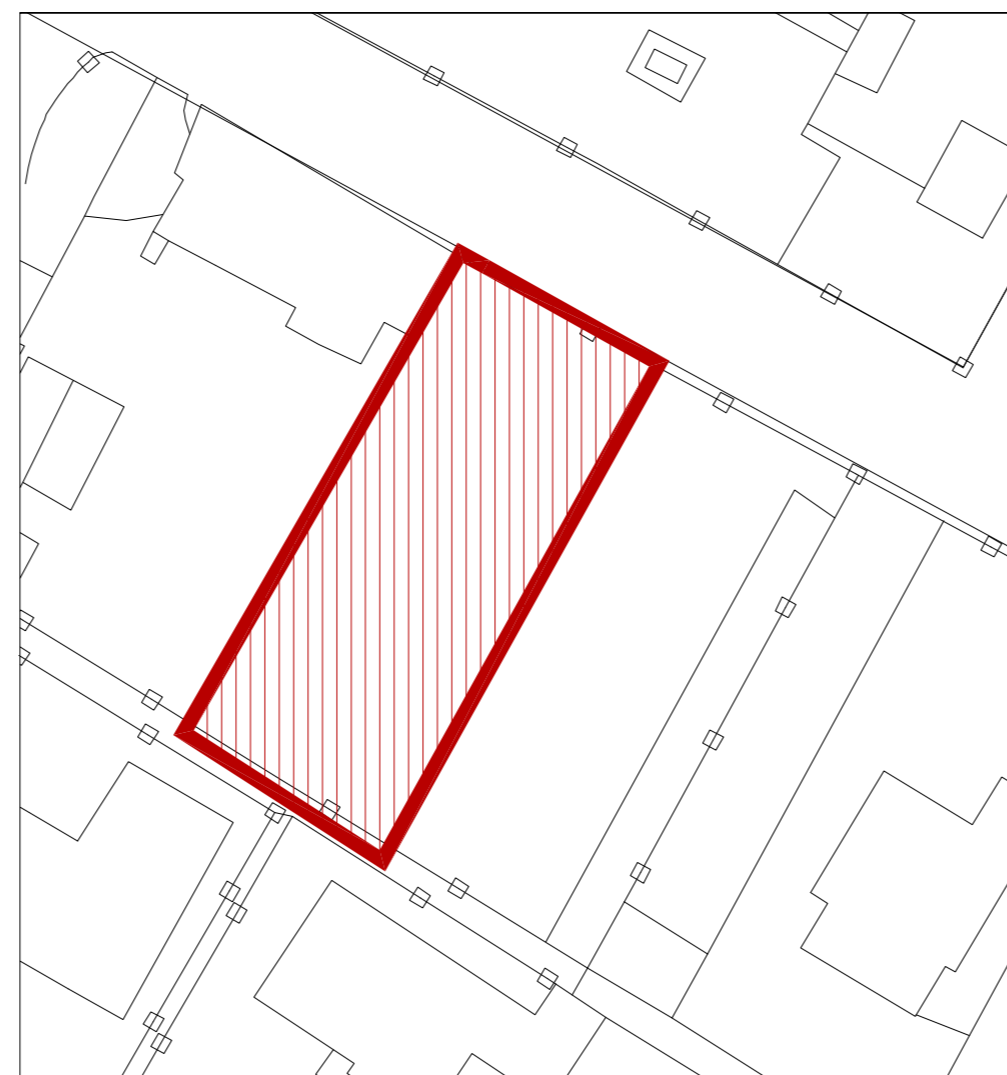
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EMPLACEMENT.....SCALE: 1/100

LEGEND	
WATER MAIN	—
TELECOMMUNICATION MAIN	—
ELECTRICAL MAIN	—
PUBLIC LIGHT	—
SEWER MAIN	—

COMPARATED TABLE WITH URBANISTIC REGULATIONS	
PLAN GENERAL MUNICIPAL DE ORDENACIÓN	
ZU-6 Edification zone insolate unifamiliar.	Project
Minimum plot area 400 m ²	570.00 m ²
Minimum distance to one of principal edge 12m.	15.06 m
Minimum distance to principal edge 4 m.	6.00 m
Minimum distance to lateral edge 3 m.	3.00 m
Edificability 0.50 m / m. : 285 m ²	129.78 m ²
Maximum occupation plot 50%	22.77%



SITUATION Scale: 1/500

FINAL PROJECT
SINGLE FAMILY HOUSE

EMPLACEMENT AND SITUATION

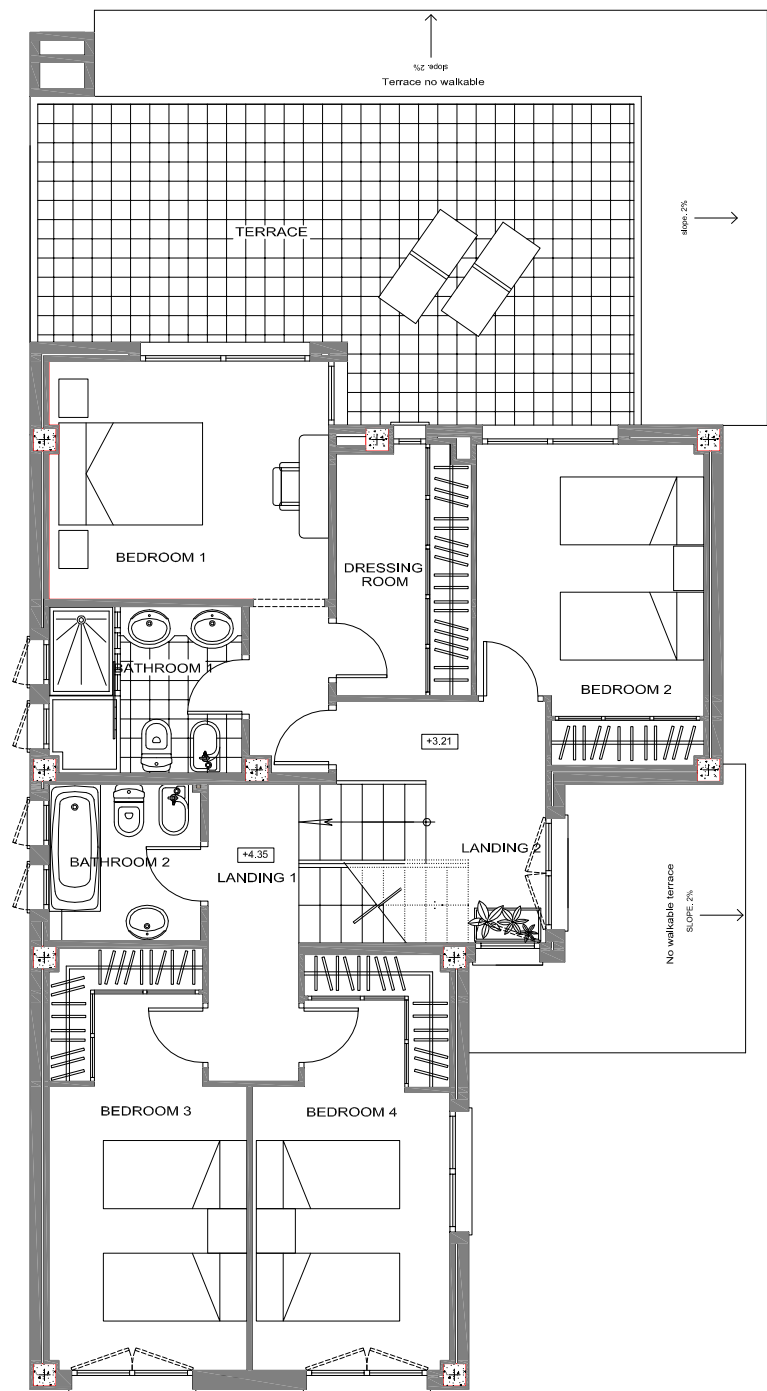
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MERCEDES ESTEVE MONTESINOS
TUTORS:
FRANTISEK KULHANEK / MILAGRO IBORRA

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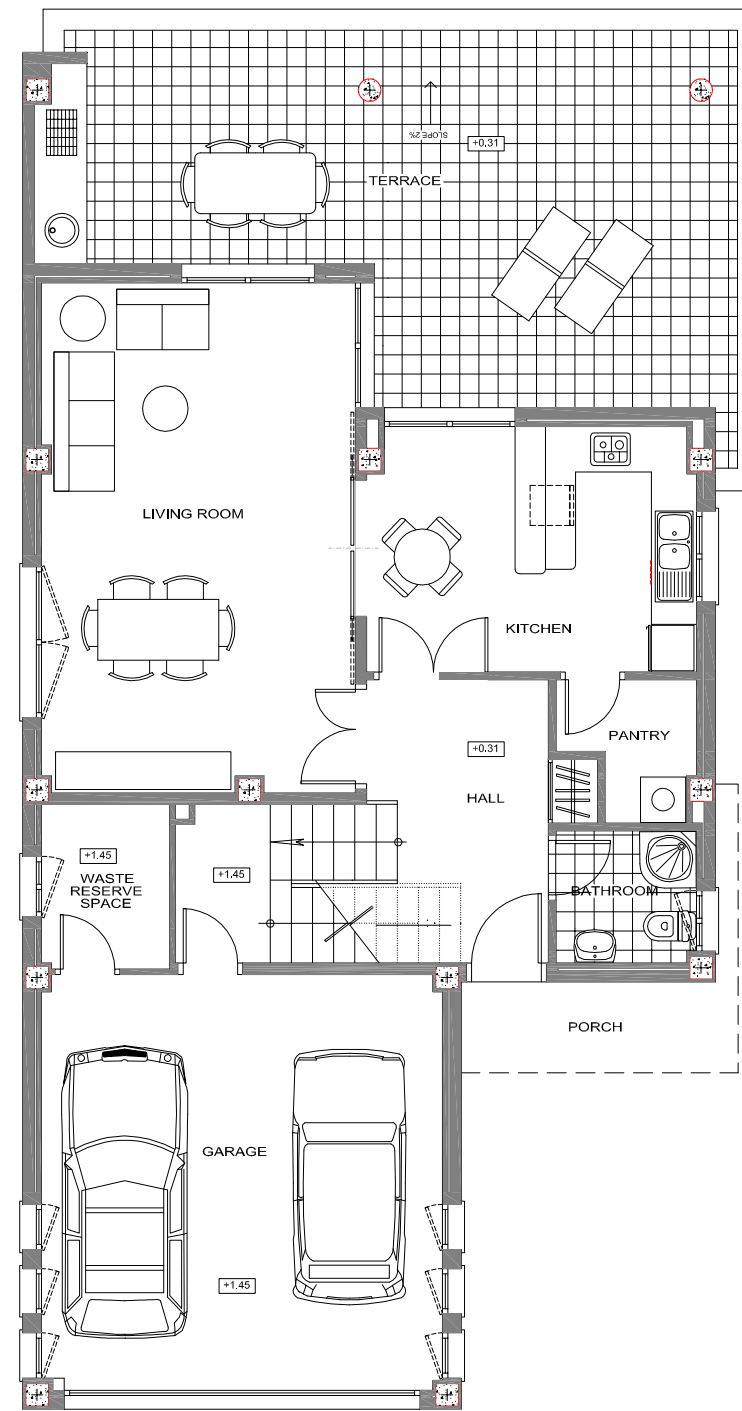
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PLAN Nº:

1



FIRST FLOOR



GROUND FLOOR



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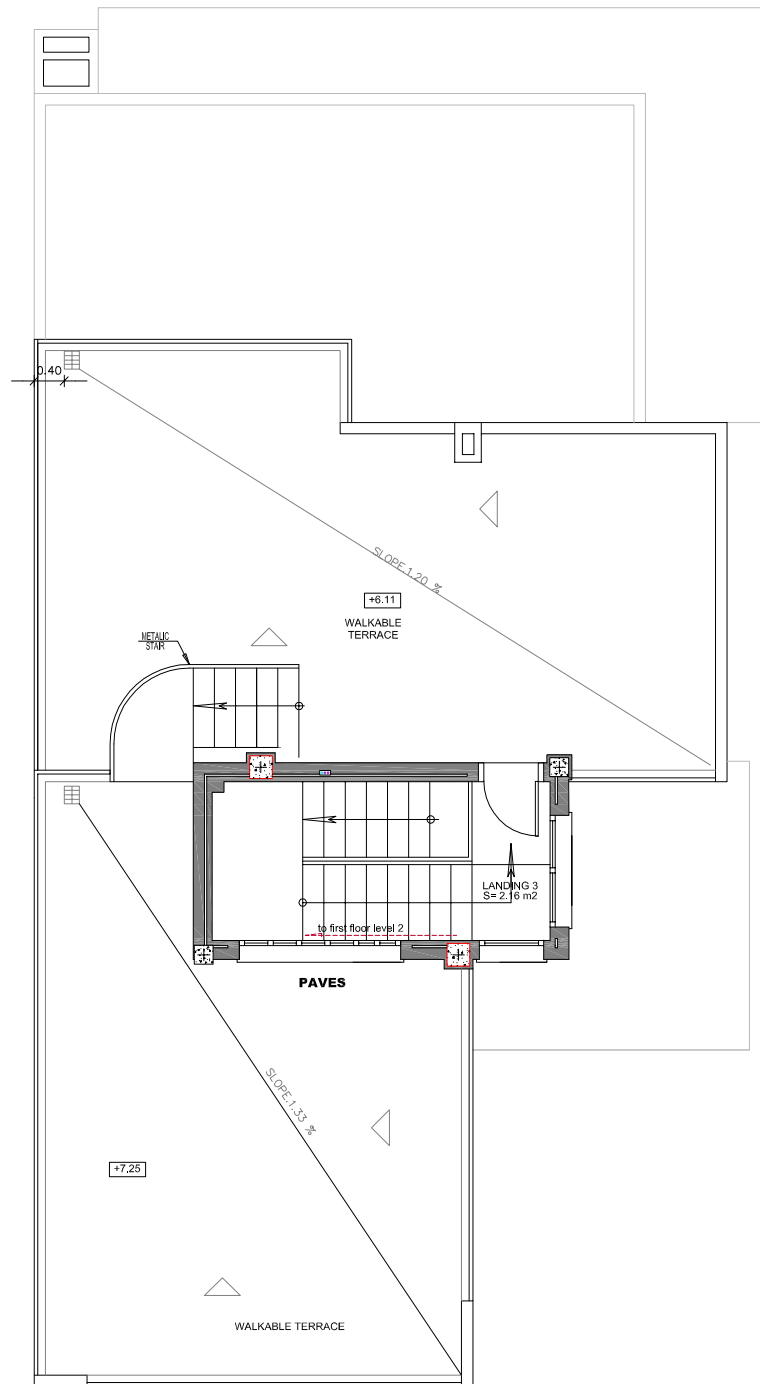
DISTRIBUTION FLOORS

SCALE:
1/100

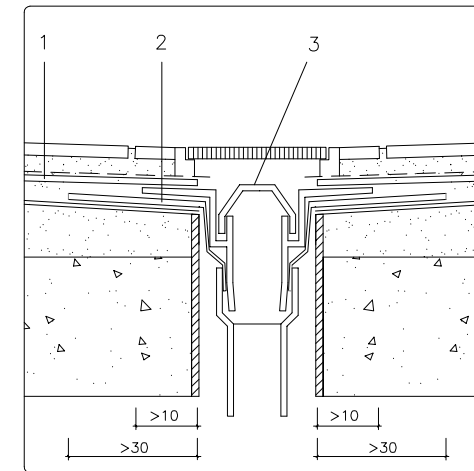
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PLAN Nº:

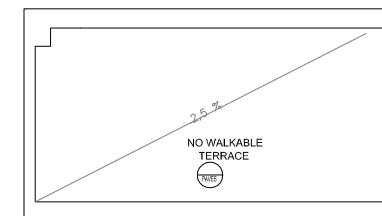
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ROOF PLANT



- 1. WATERPROOFING
- 2. WATERPROOFING REINFORCEMENT
- 3. DRAINAGE



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ROOF DISTRIBUTION

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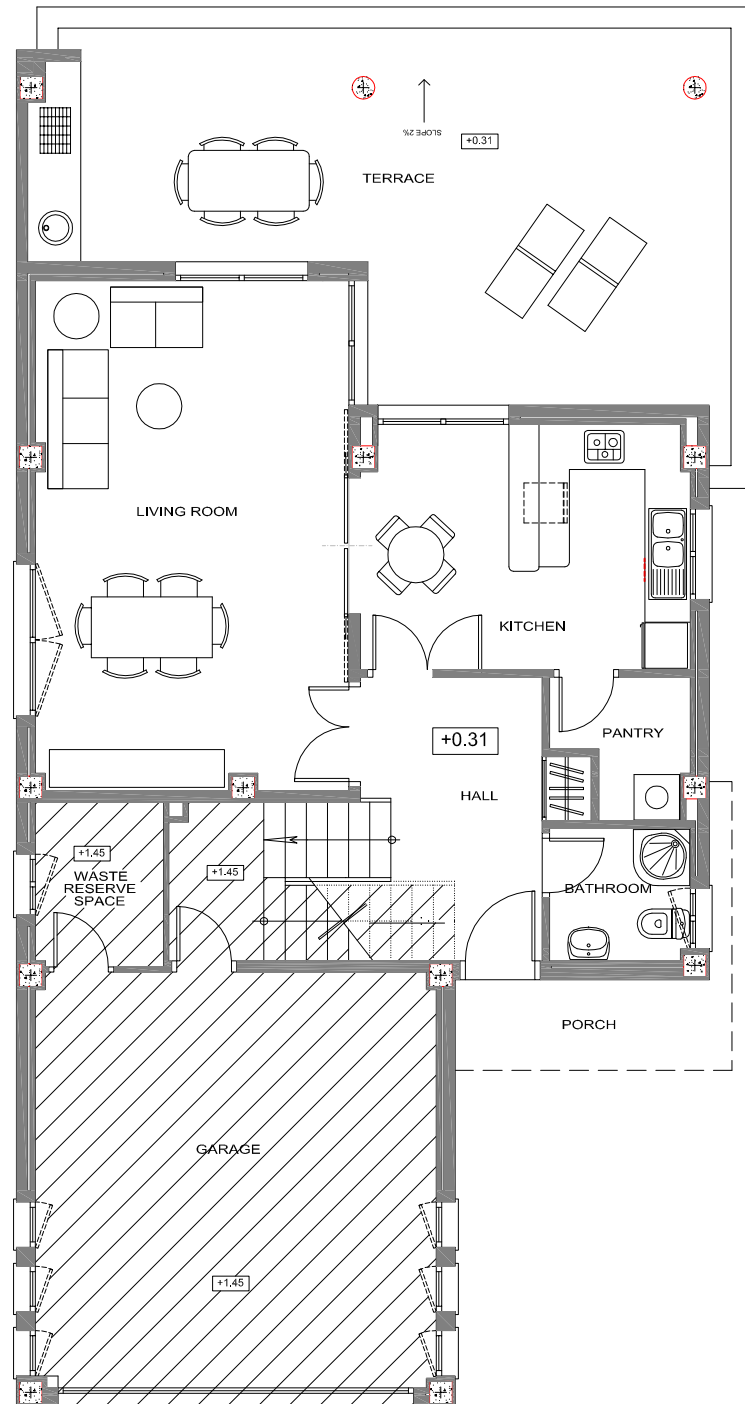
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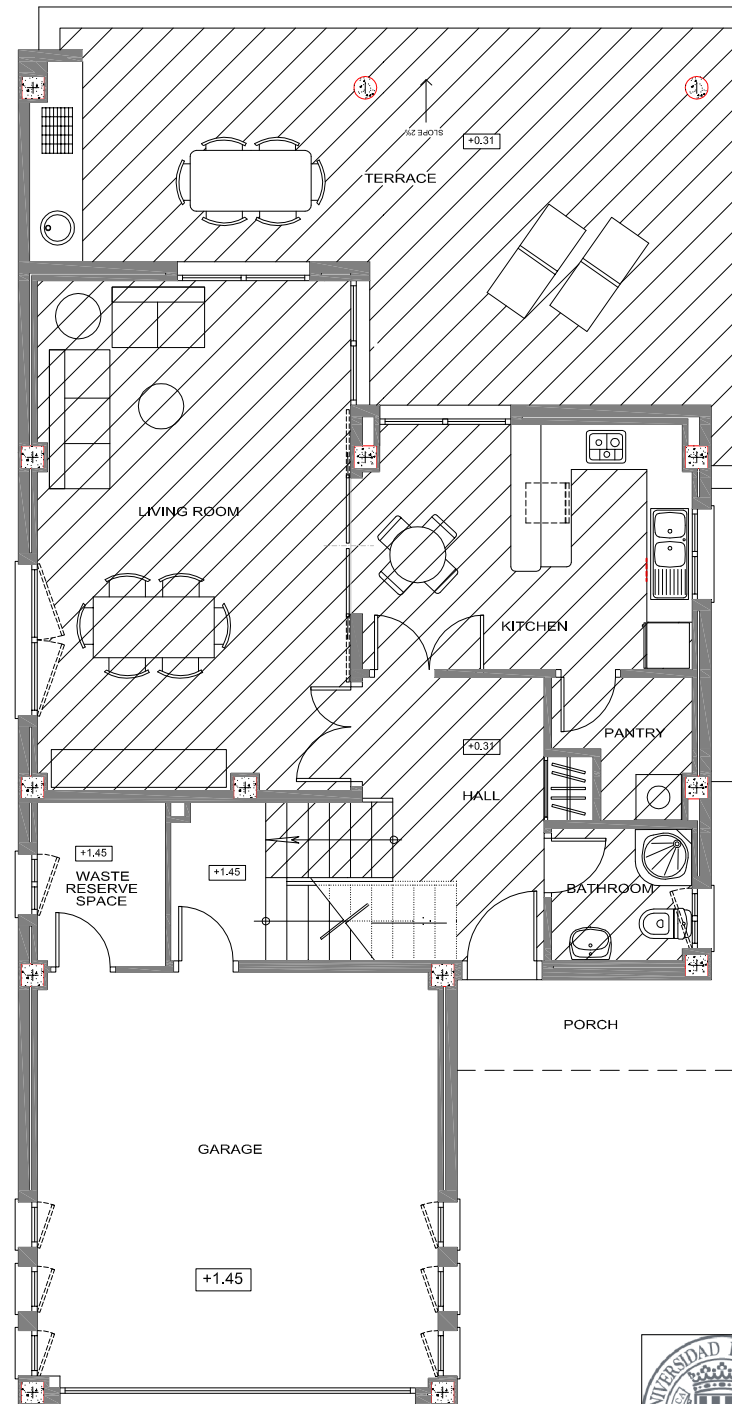
PLAN Nº:

TUTORS:
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3



LEVEL 1 (+0.31 m)



LEVEL 2 (+1.45 m)



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DISTRIBUTION FLOORS

SCALE:
1/100

STUDENT:

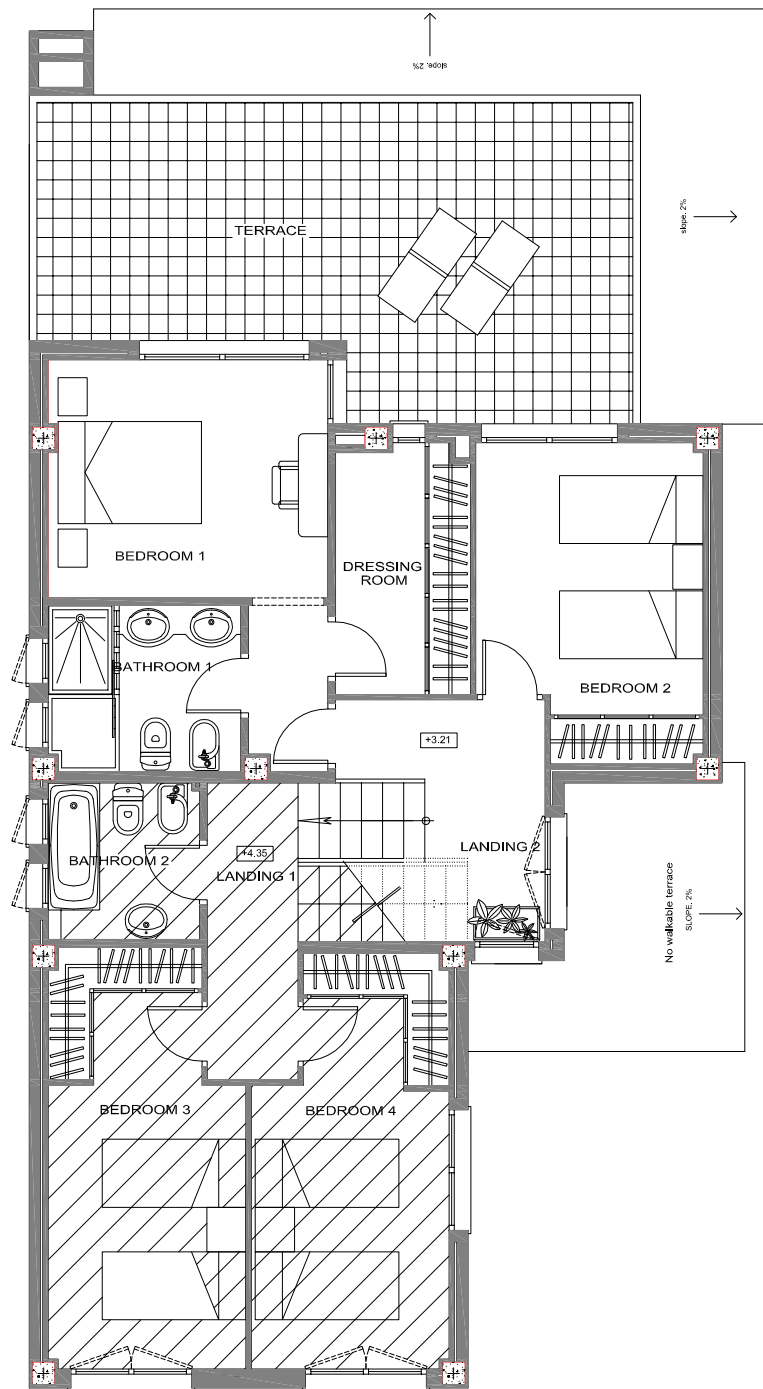
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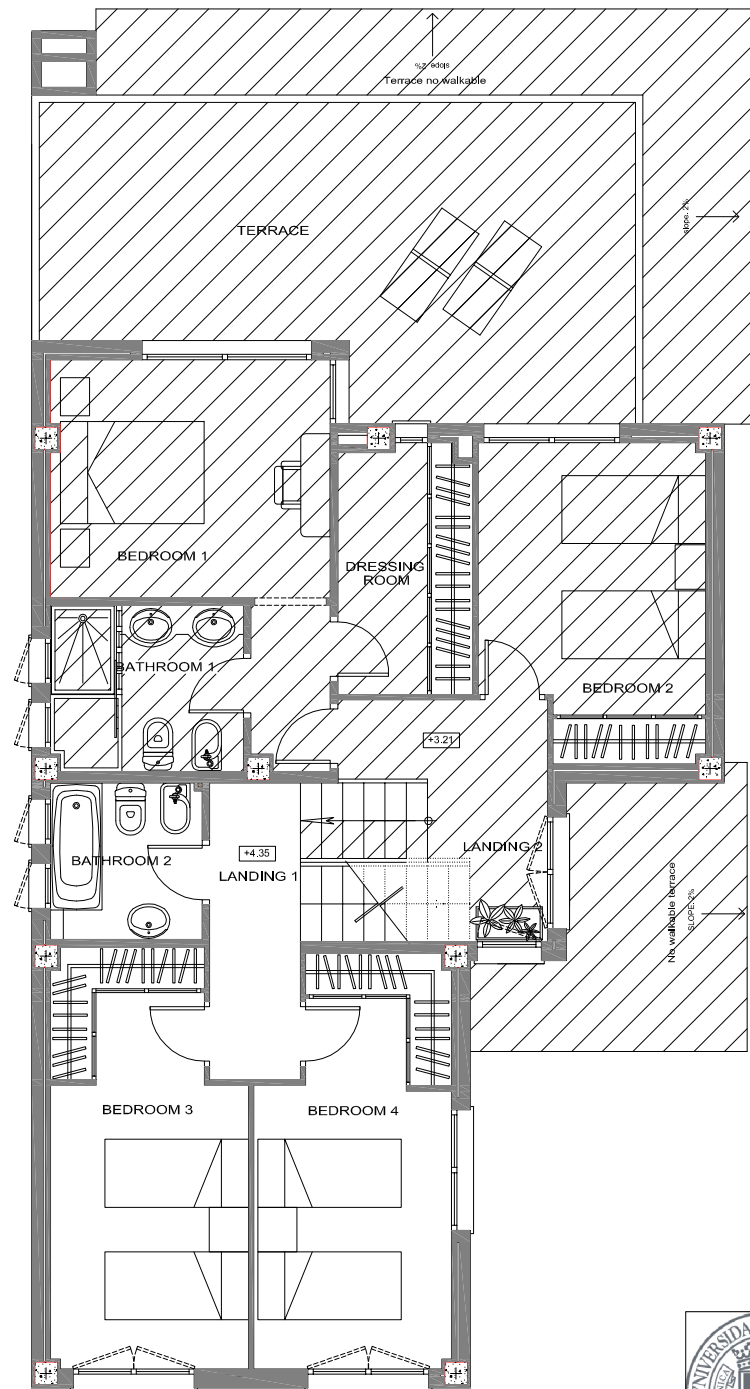
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PLAN Nº:

4



LEVEL 3 (+3.21 m)



LEVEL 4 (+4.35 m)



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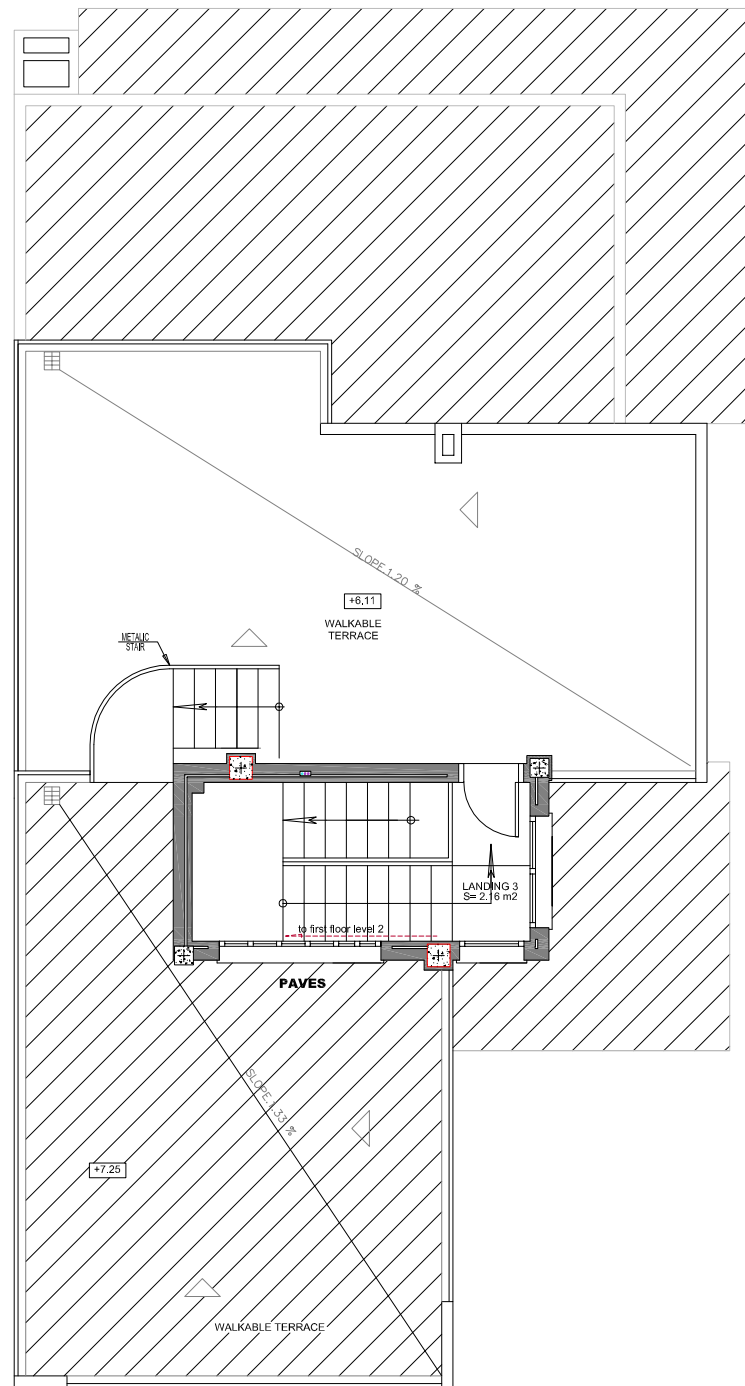
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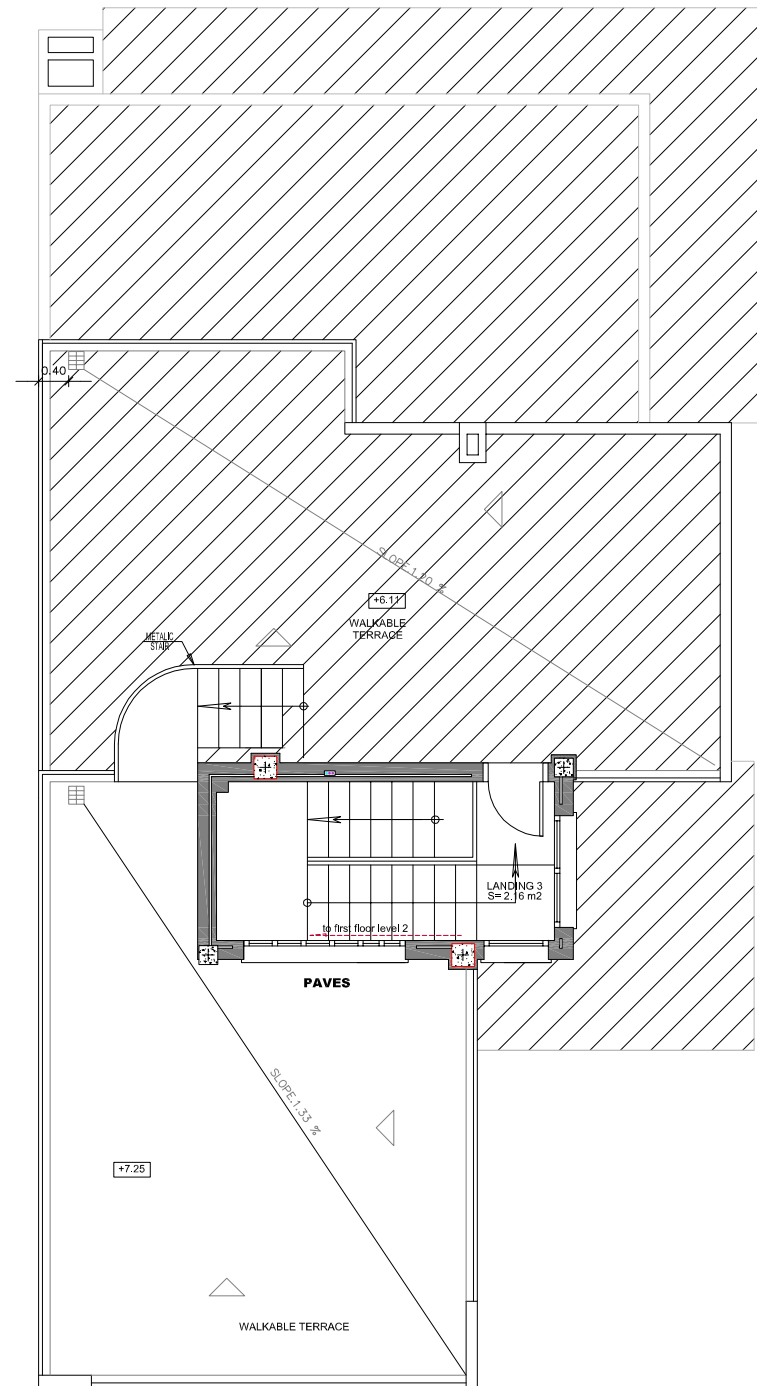
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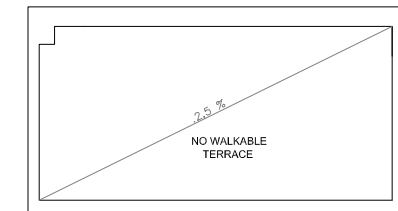
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LEVEL 5 (+6.11 m)



LEVEL 4 (+7.25 m)



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ROOF DISTRIBUTION

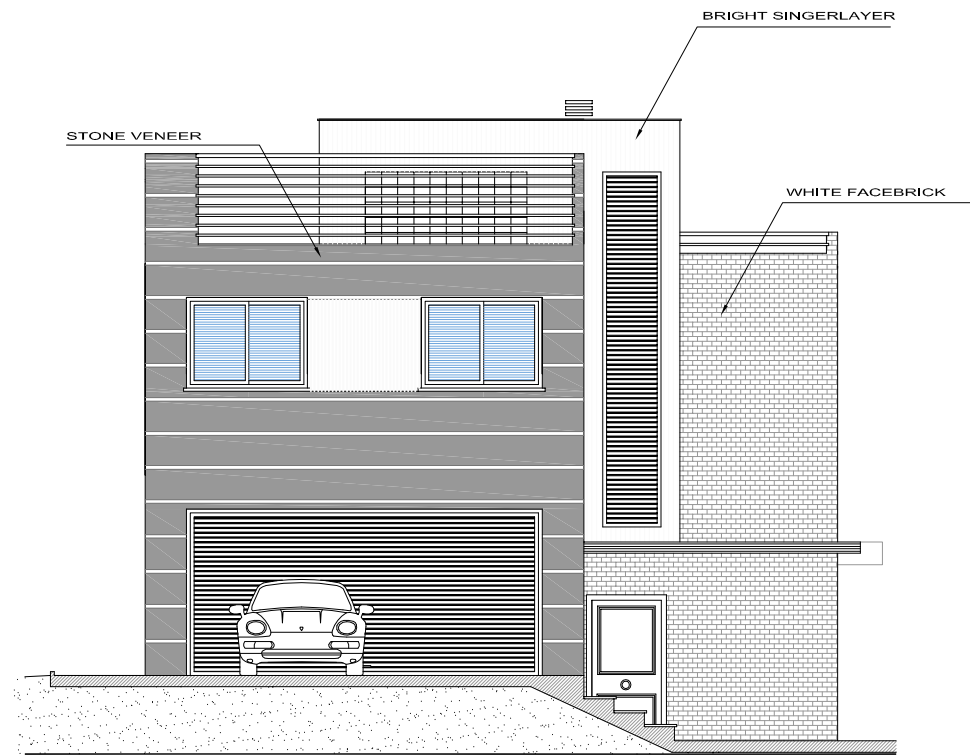
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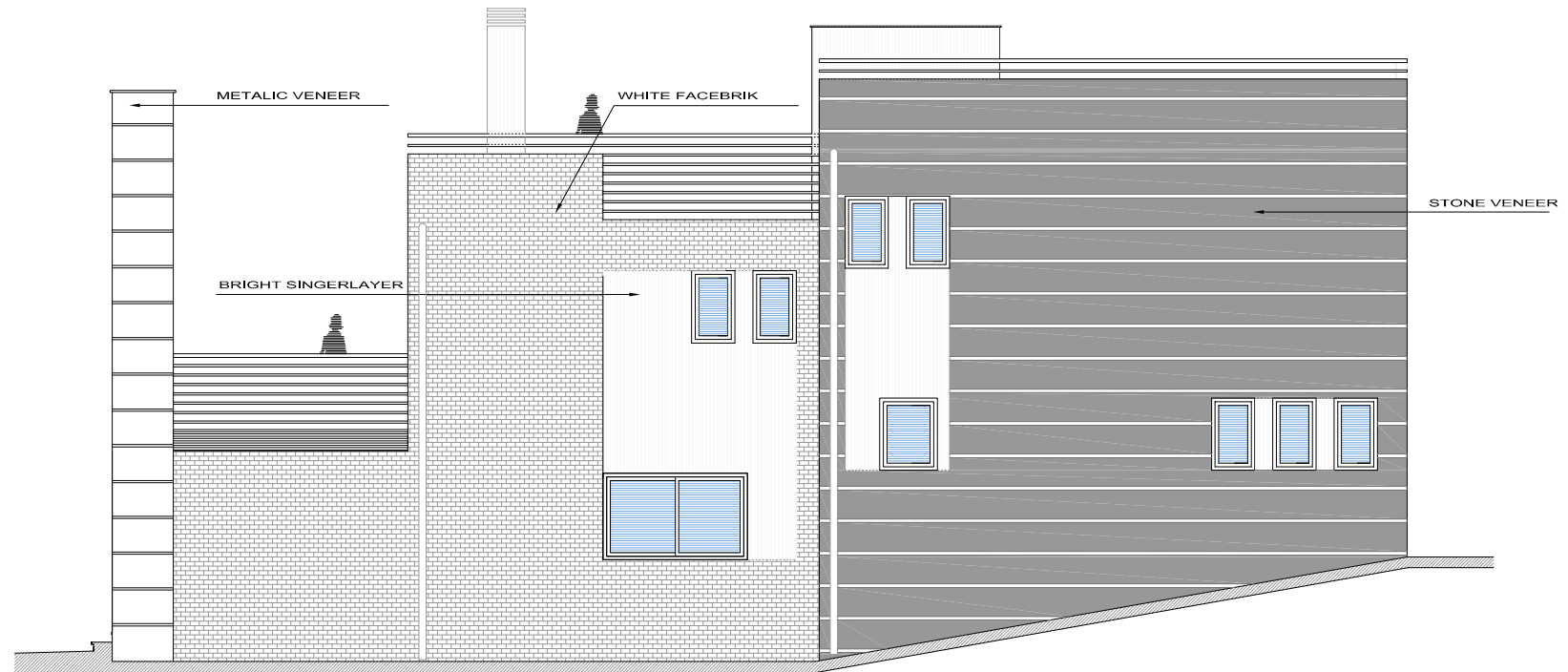
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TUTORS:
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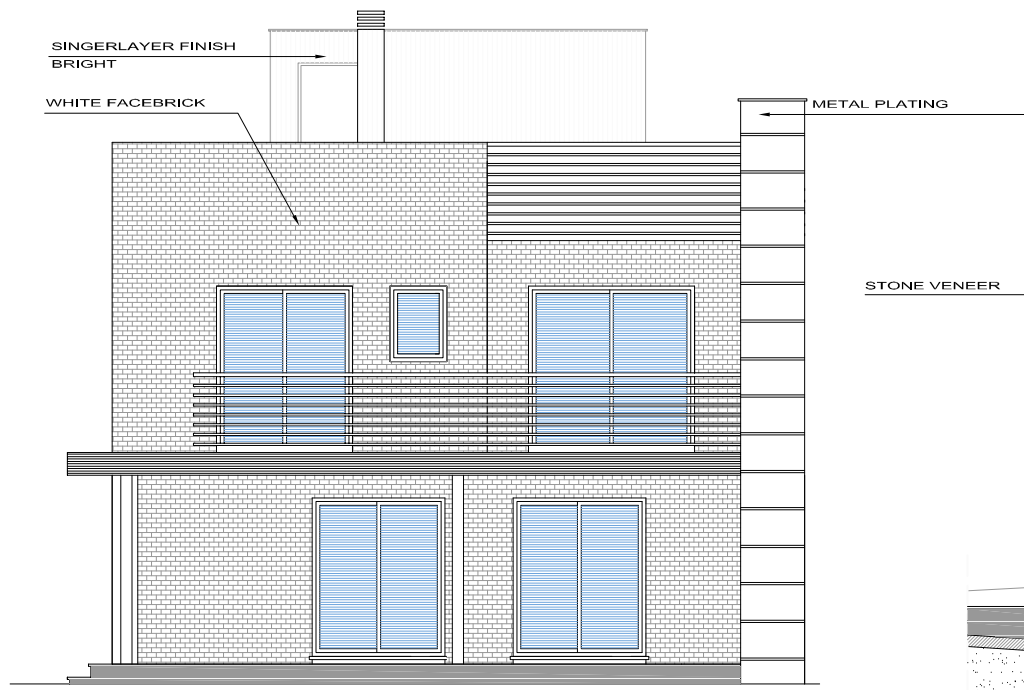
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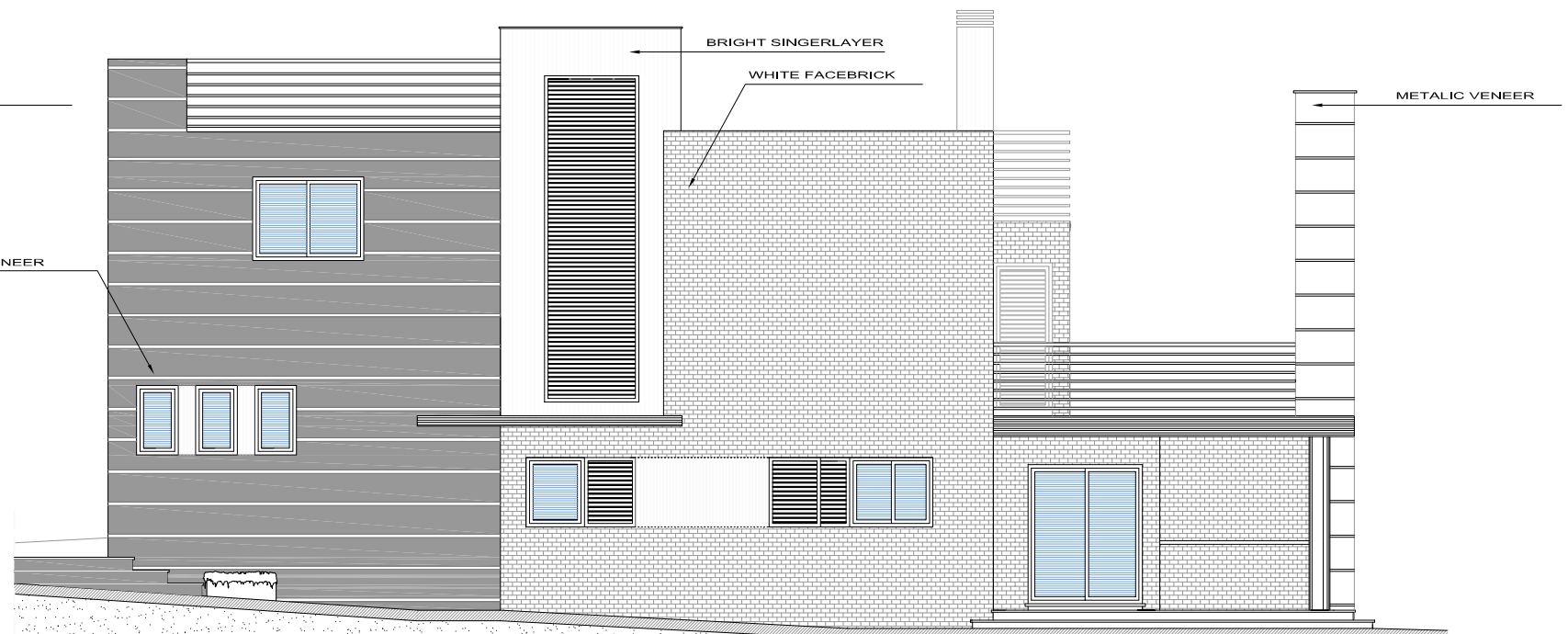
PRINCIPAL ELEVATION



FACADE LEFT SIDE



POSTERIOR FACADE



FACADE RIGHT SIDE



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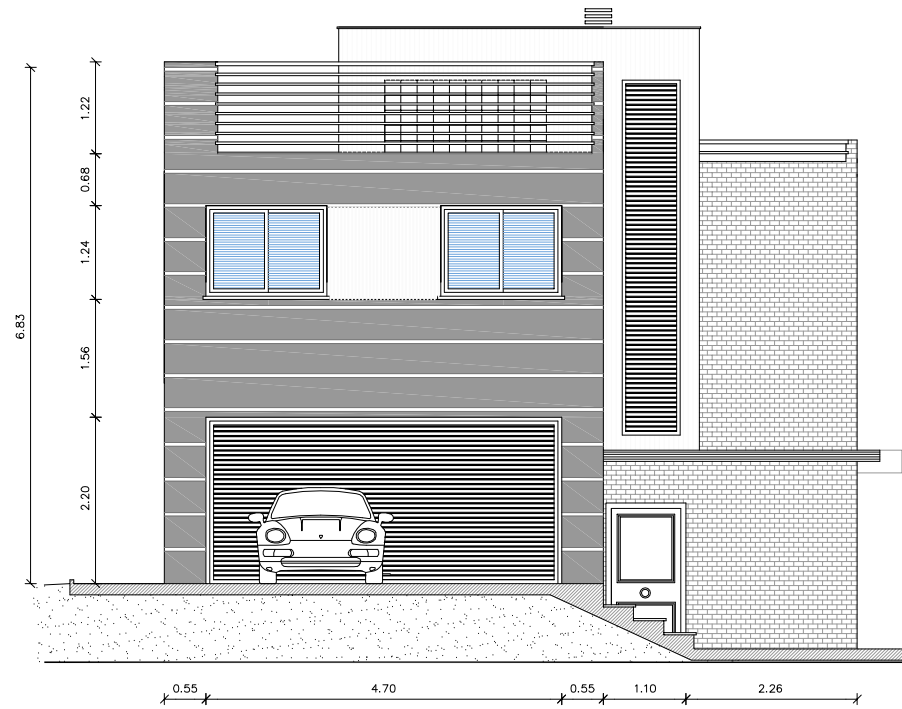
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FACADES

SCALE:
1/100

PLAN Nº:

7



PRINCIPAL ELEVATION



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ANNOTATION PRINCIPAL

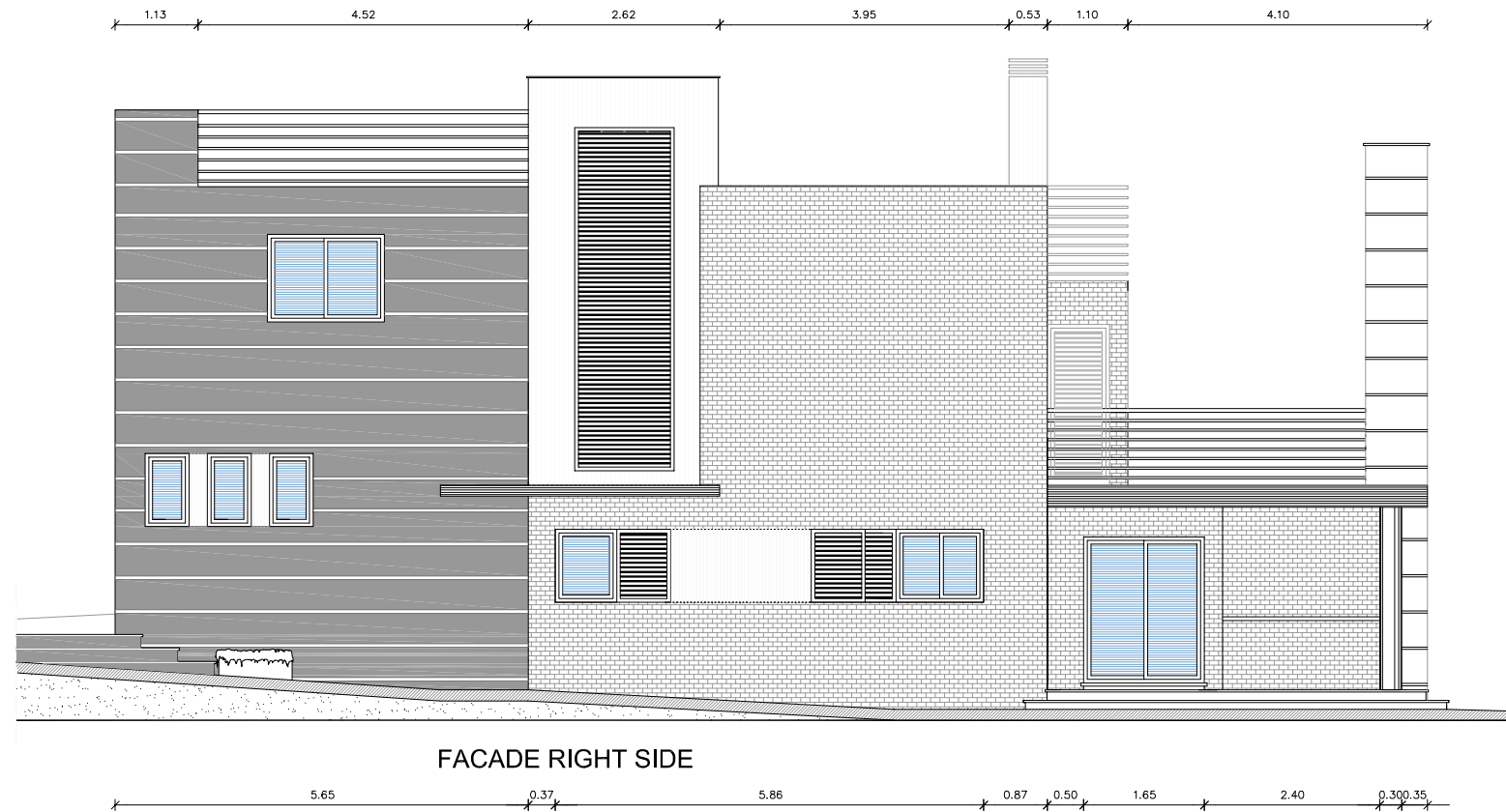
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STUDENT:
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TUTORS:
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PLAN Nº:

8



FINAL PROJECT
SINGLE FAMILY HOUSE

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ANNOTATION RIGHT SIDE

SCALE:
1/100

STUDENT:

MERCEDES ESTEVE MONTESINOS

TUTORS:

FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

9



FINAL PROJECT
SINGLE FAMILY HOUSE

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ANNOTATION LEFT SIDE

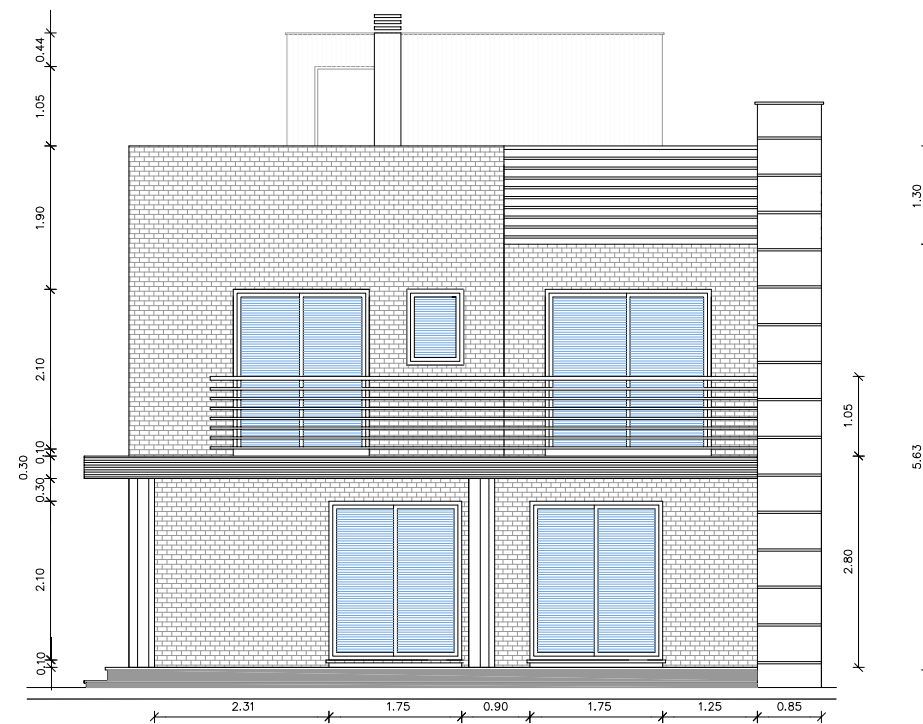
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STUDENT:
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TUTORS:
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

10



POSTERIOR FACADE



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SINGLE FAMILY HOUSE

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ANNOTATION POSTERIOR

SCALE:
1/100

STUDENT:

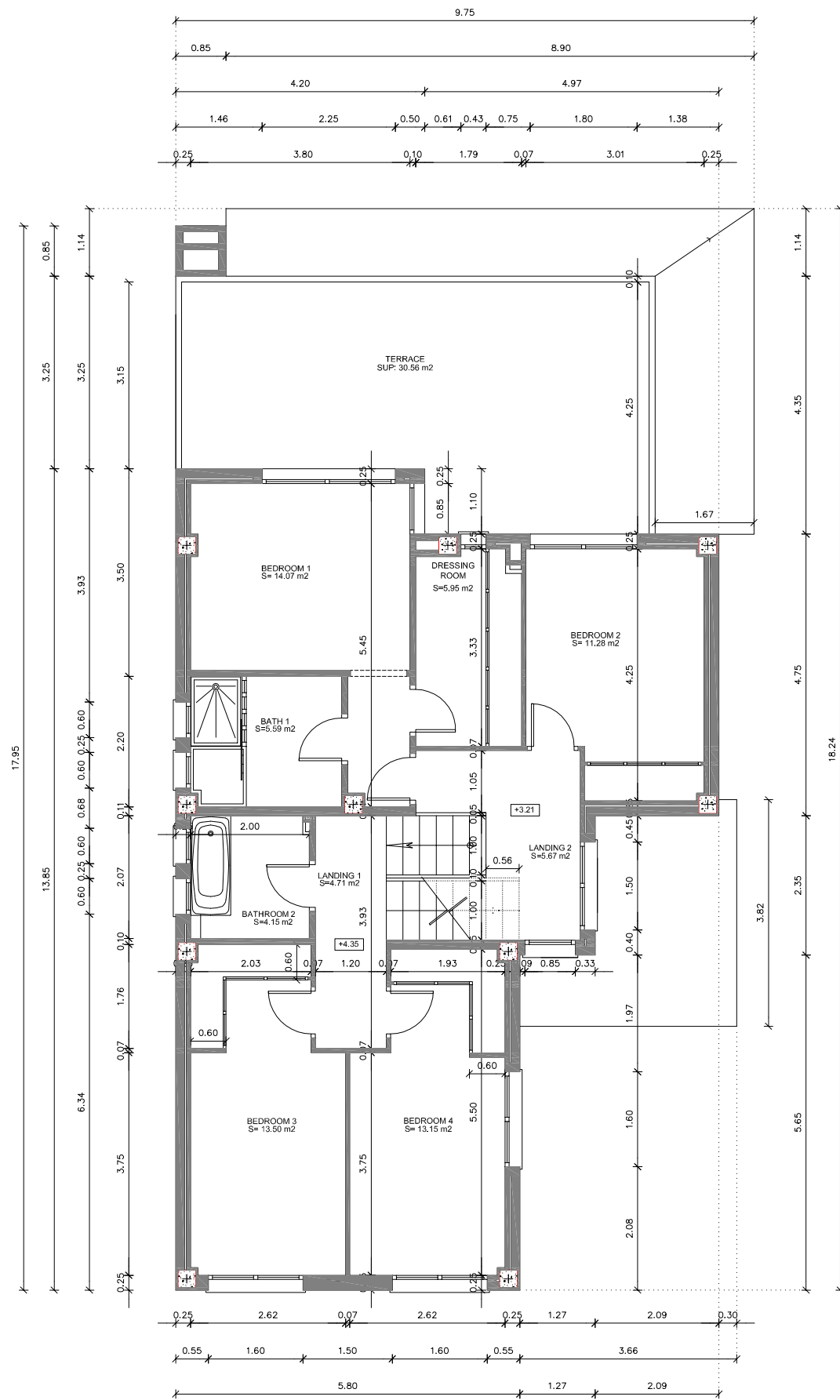
MERCEDES ESTEVE MONTESINOS

TUTORS:

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PLAN Nº:

11



FIRST FLOOR

TABLE OF AREAS			
FLOOR	DENOMINATION	USEFUL	CONSTRUCTED
GROUND	GARAGE AND STOR.	32.87 m ²	38.23 m ²
	DWELLING	62.39 m ²	73.02 m ²
	TERRACE AND PORCH (50%)	18.53 m ²	18.53 m ²
FIRST	DWELLING	78.07 m ²	97.57 m ²
TERRACE	DWELLING	2.16 m ²	13.02 m ²
TOTAL AREAS		194.02 m²	240.37 m²

TABLE OF USEFUL AREAS		
FLOOR	DENOMINATION	USEFUL
FIRST	BEDROOM 1	14.07 m ²
	DRESSING ROOM	5.95 m ²
	BATHROOM 1	5.59 m ²
	BEDROOM 2	11.28 m ²
	BEDROOM 3	13.50 m ²
	BEDROOM 4	13.15 m ²
	LANDING 1	4.71 m ²
	LANDING 2	5.67 m ²
TERRACE	LANDING 3	2.16 m ²



FINAL PROJECT
SINGLE FAMILY HOUSE

JUNE 2012

AREAS AND DIMENSIONS GROUND FLOOR

SCALE:
1/100

STUDENT:

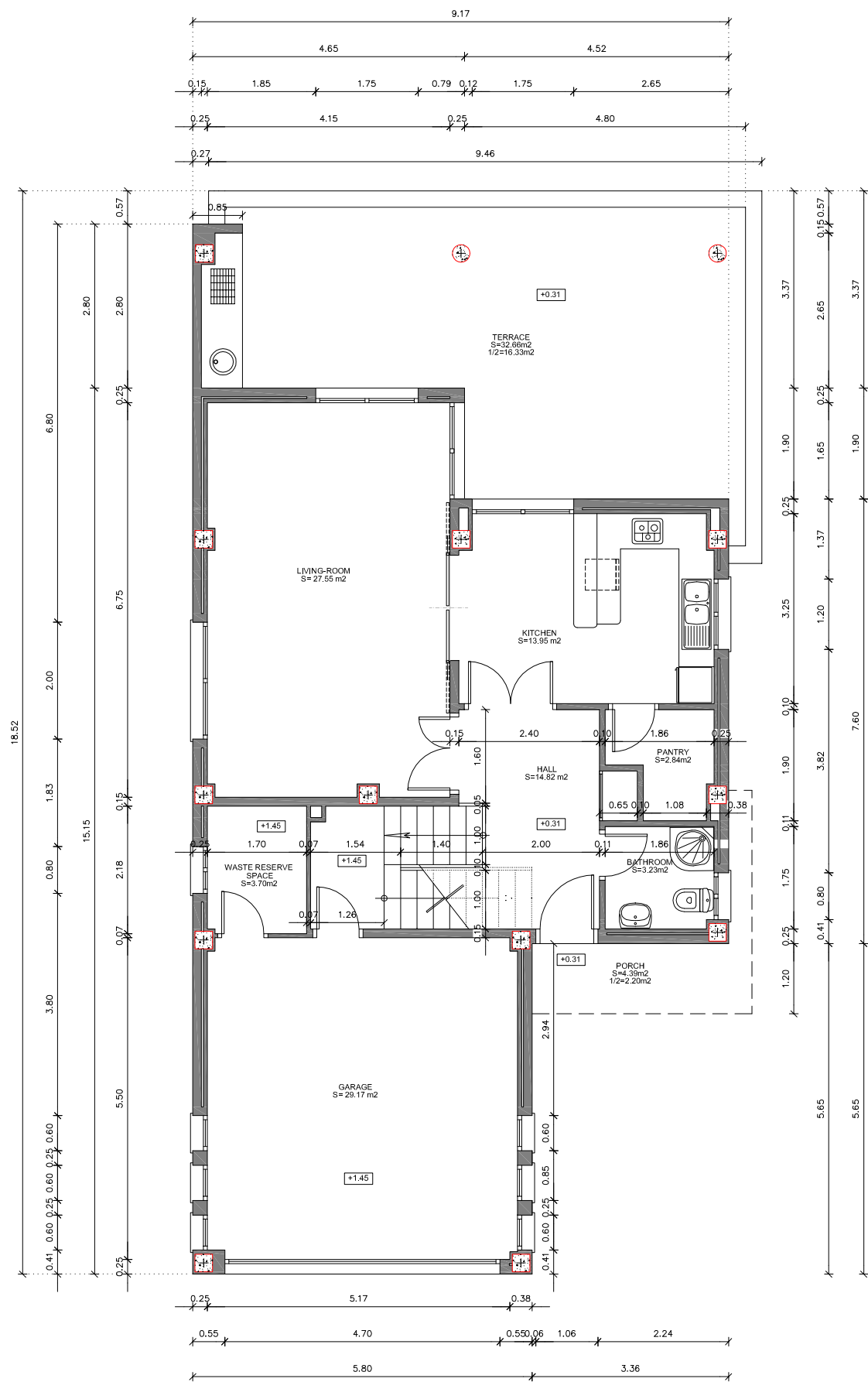
MERCEDES ESTEVE MONTESINOS

TUTORS:

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PLAN Nº:

12



GROUND FLOOR

TABLE OF AREAS			
FLOOR	DENOMINATION	USEFUL	CONSTRUCTED
GROUND	GARAGE AND STOR.	32.87 m2	38.23 m2
	DWELLING	62.39 m2	73.02 m2
	TERRACE AND PORCH (50%)	18.53 m2	18.53 m2
FIRST	DWELLING	78.07 m2	97.57 m2
TERRACE	DWELLING	2.16 m2	13.02 m2
TOTAL AREAS		194.02 m2	240.37 m2

TABLE OF USEFUL AREAS		
FLOOR	DENOMINATION	USEFUL
GROUND	KITCHEN	13.95 m2
	LIVING-ROOM	27.55 m2
	HALL	14.82 m2
	PANTRY	2.84 m2
	BATHROOM	3.23 m2
	WASTE RESERVE SPACE	3.70 m2
	GARAGE	29.17 m2
	PORCH	2.20 m2
COVER TERRACE (50%)		16.33 m2



FINAL PROJECT
SINGLE FAMILY HOUSE

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AREAS AND DIMENSIONS FIRST FLOOR

SCALE:
1/100

STUDENT:

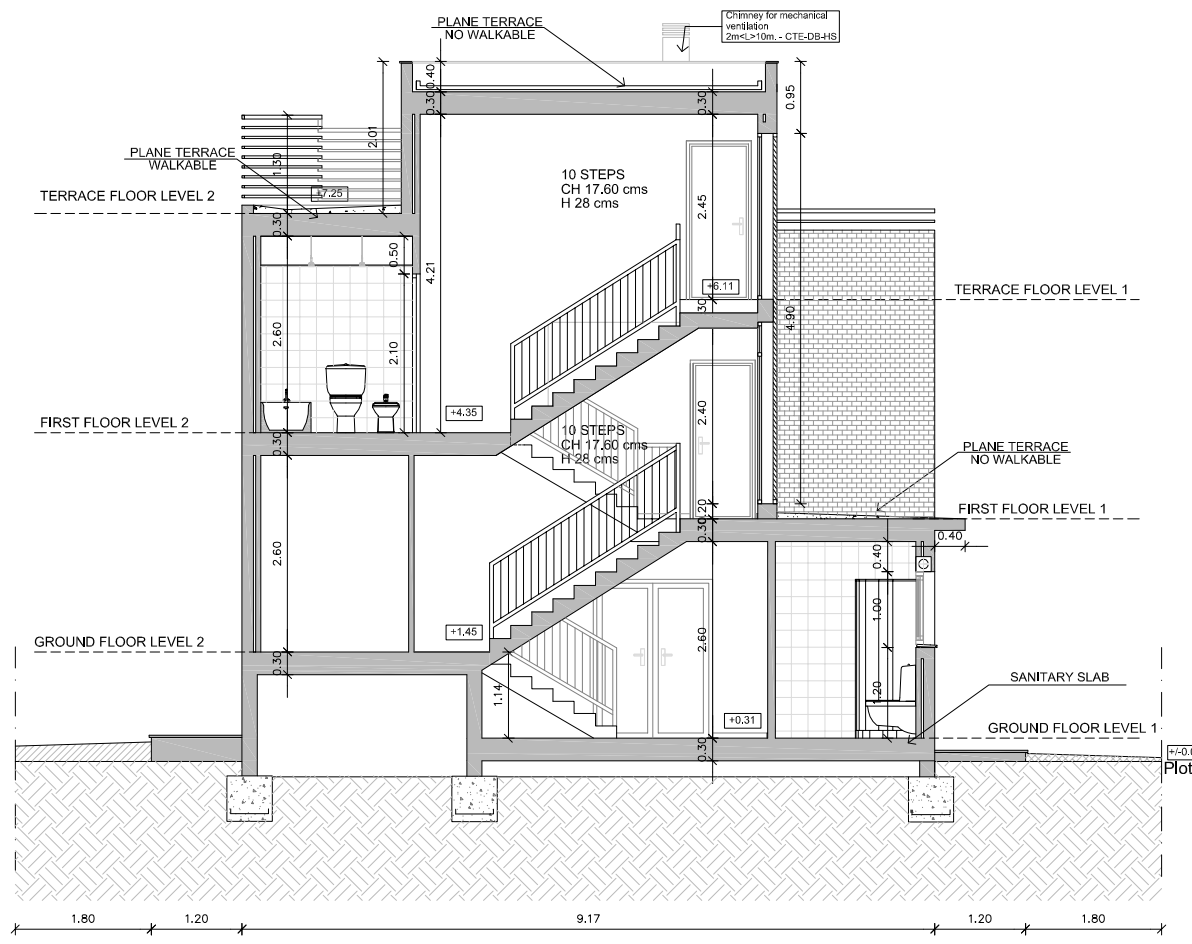
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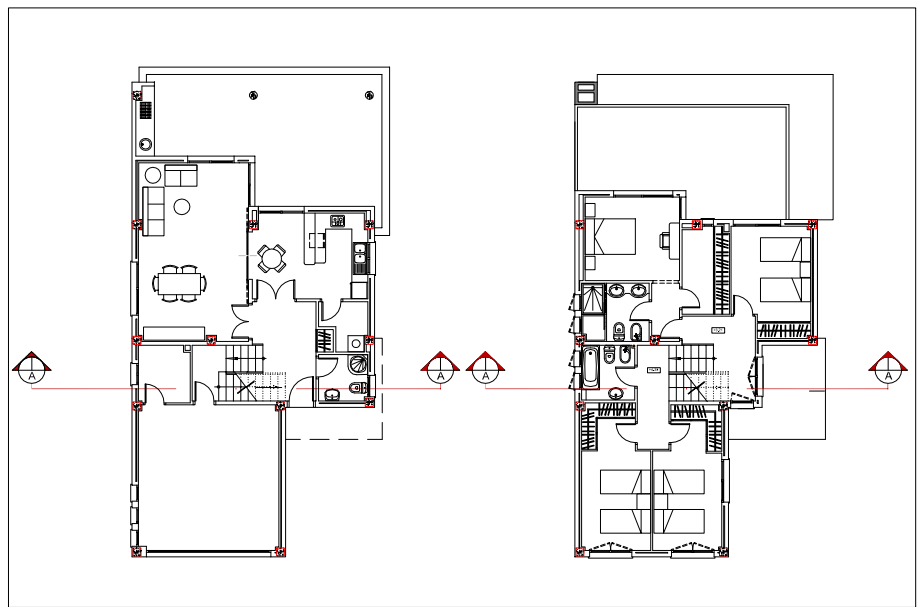
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PLAN Nº:

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SECTION A-A



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SINGLE FAMILY HOUSE

JUNE 2012

SECTION AA'

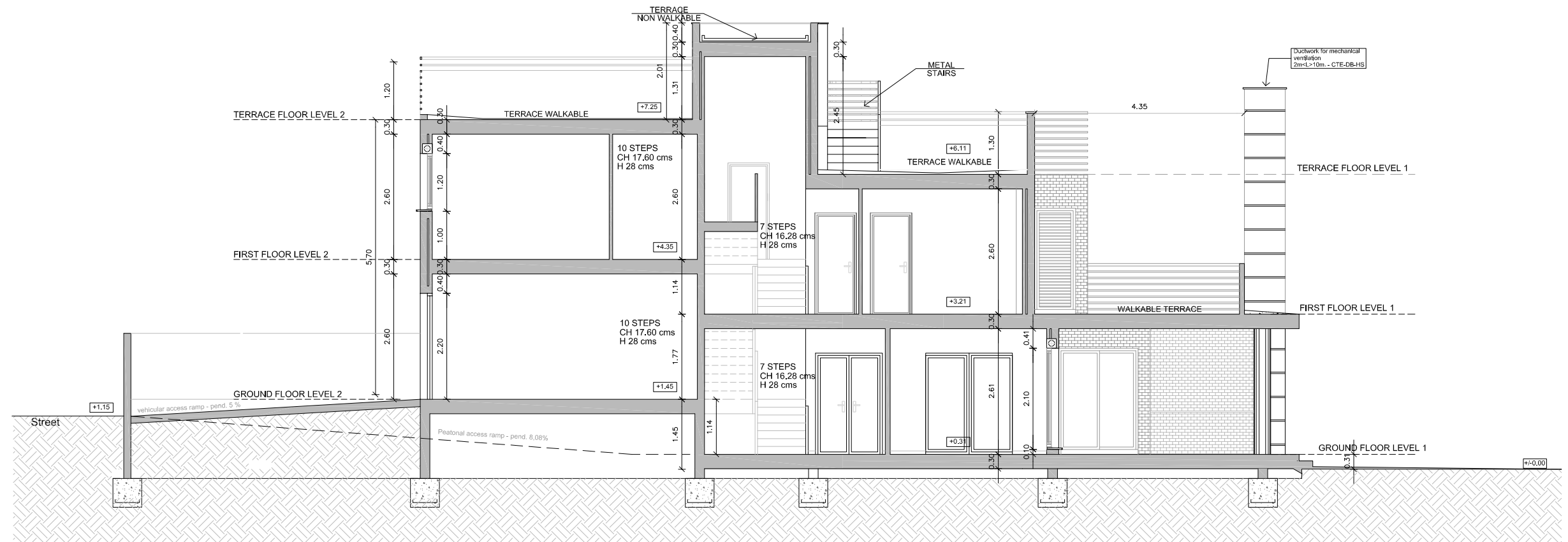
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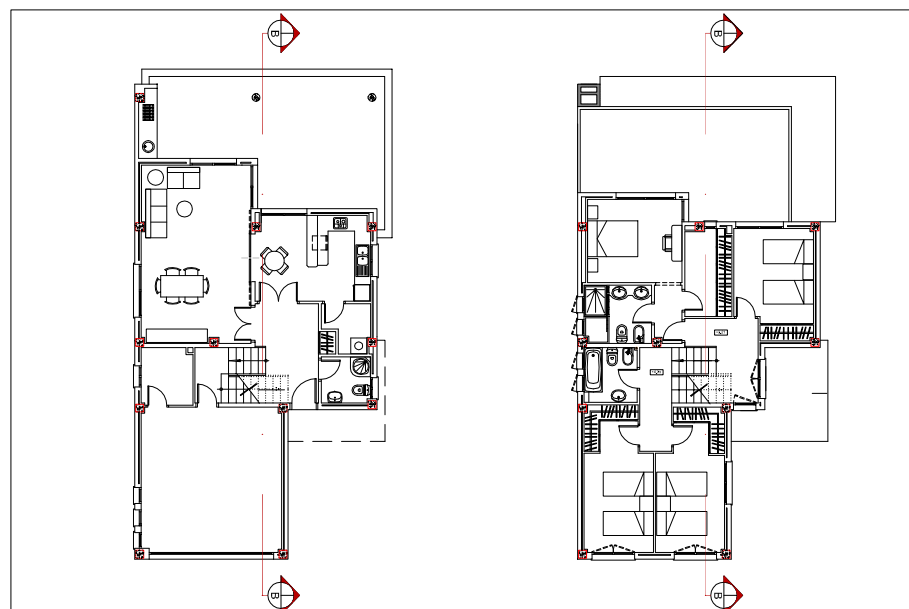
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PLAN Nº:

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SECTION B-B'



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SINGLE FAMILY HOUSE

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SECTION BB'

SCALE:
1/100

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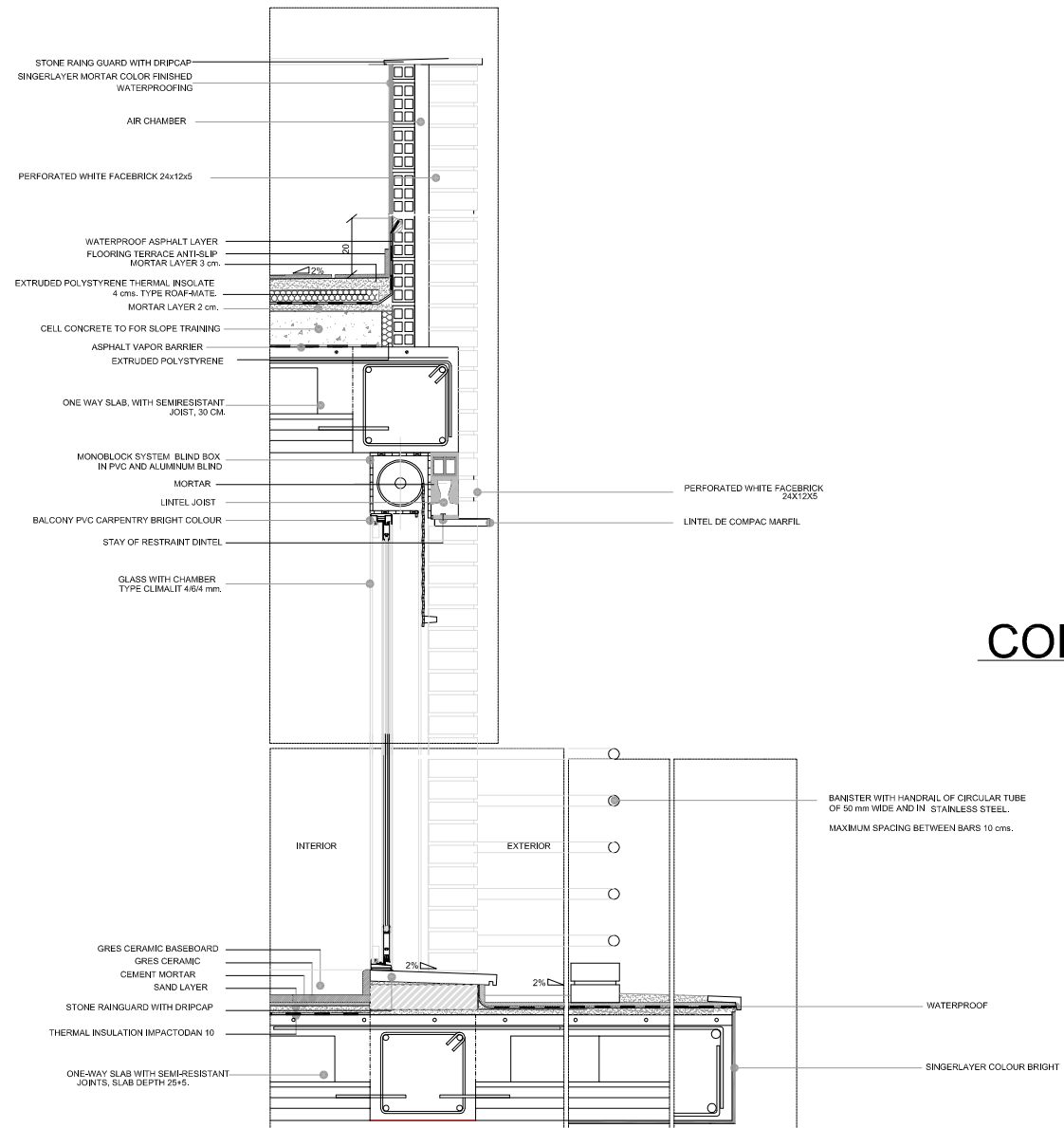
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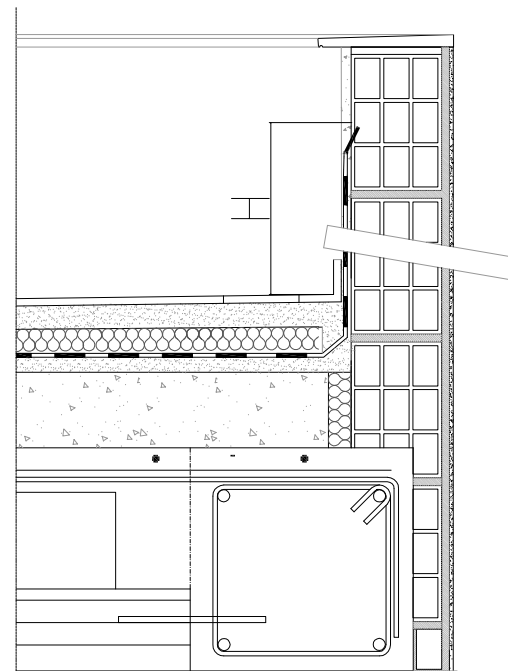
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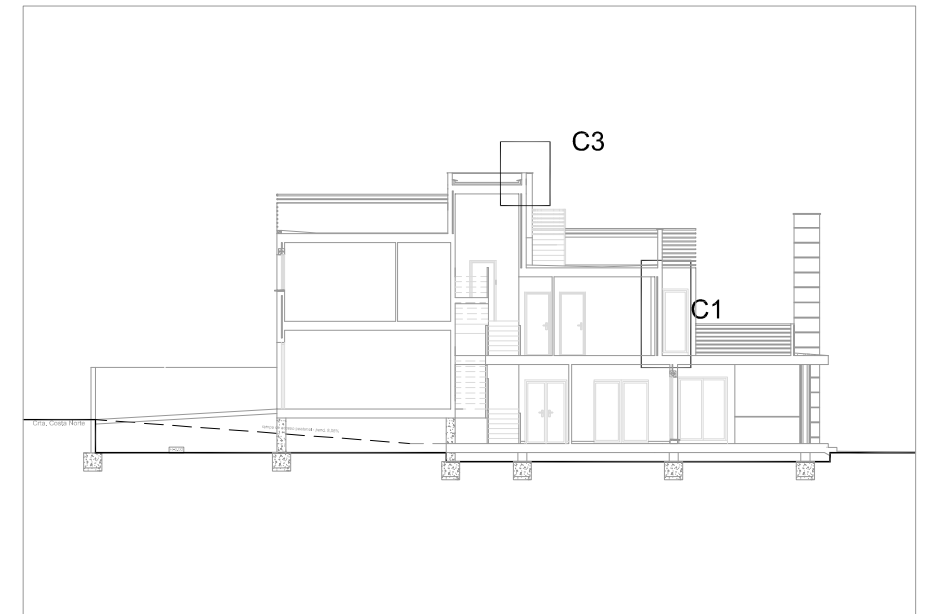
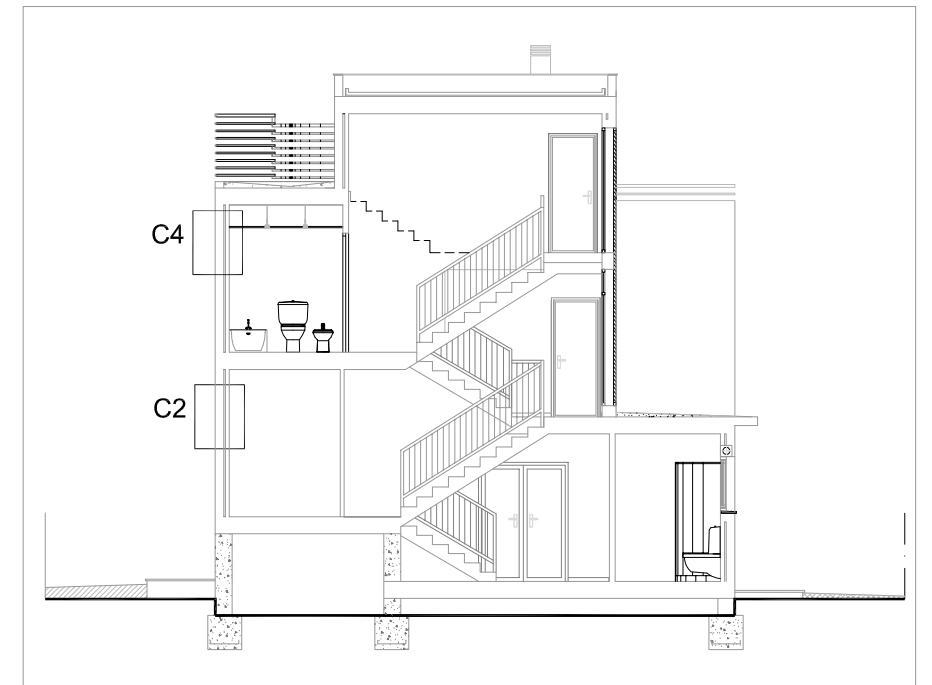
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CONSTRUCTIVE SECTION C1
Scale: 1/20



CONSTRUCTIVE SECTION C3
Scale: 1/10



FINAL PROJECT
SINGLE FAMILY HOUSE

JUNE 2012

DETAILS

SCALE:
1/20

STUDENT:

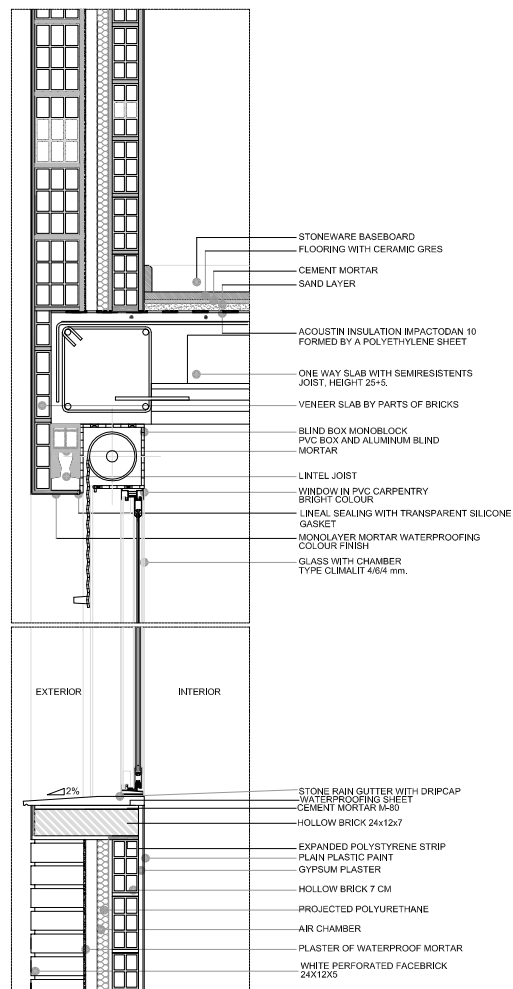
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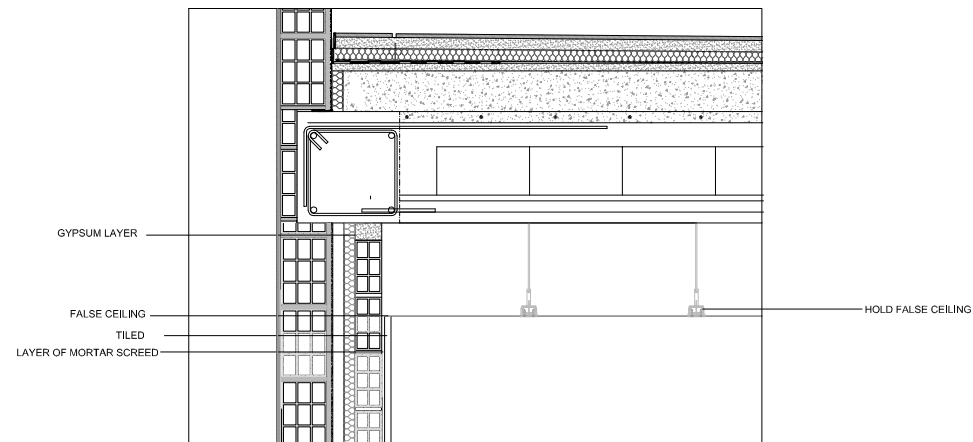
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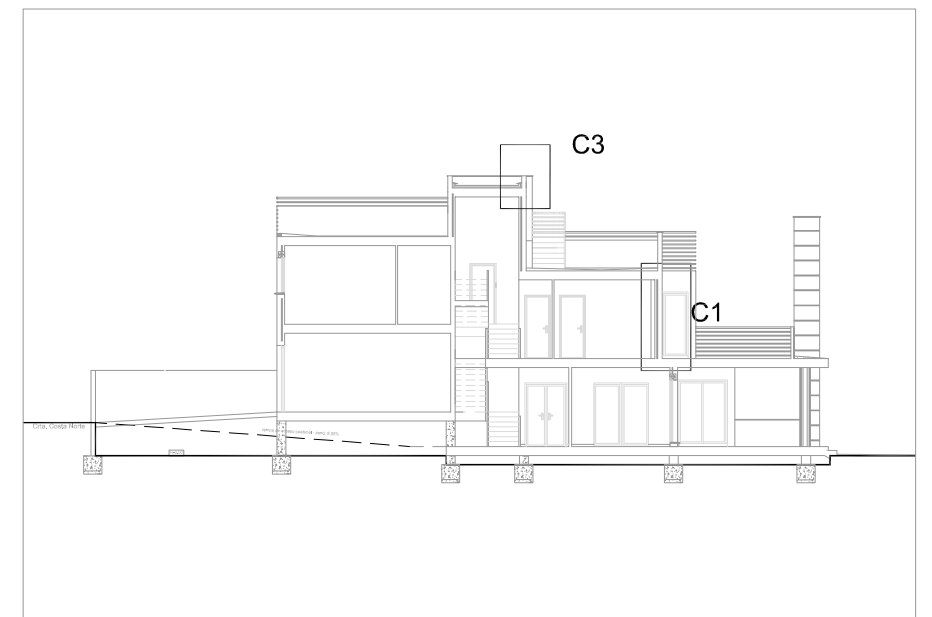
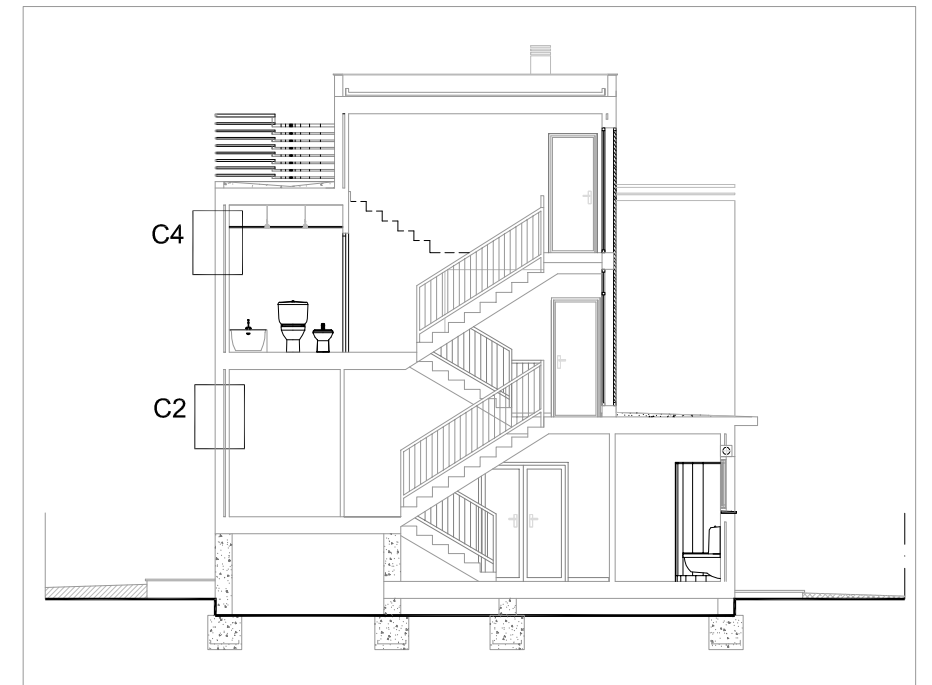
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CONSTRUCTIVE SECTION C2
Scale: 1/20



CONSTRUCTIVE SECTION C4
Scale: 1/20



FINAL PROJECT
SINGLE FAMILY HOUSE

JUNE 2012

DETAILS

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1/20

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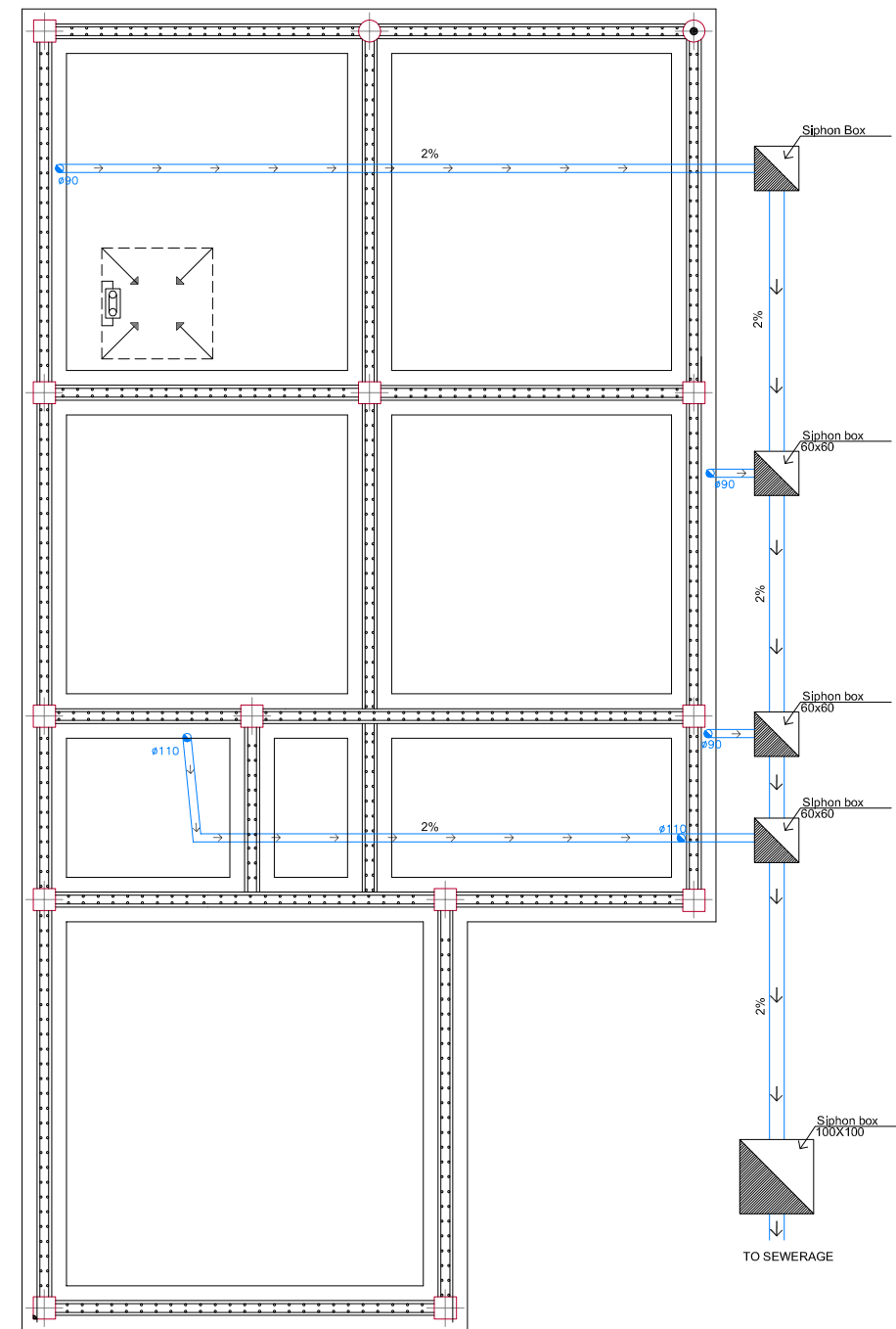
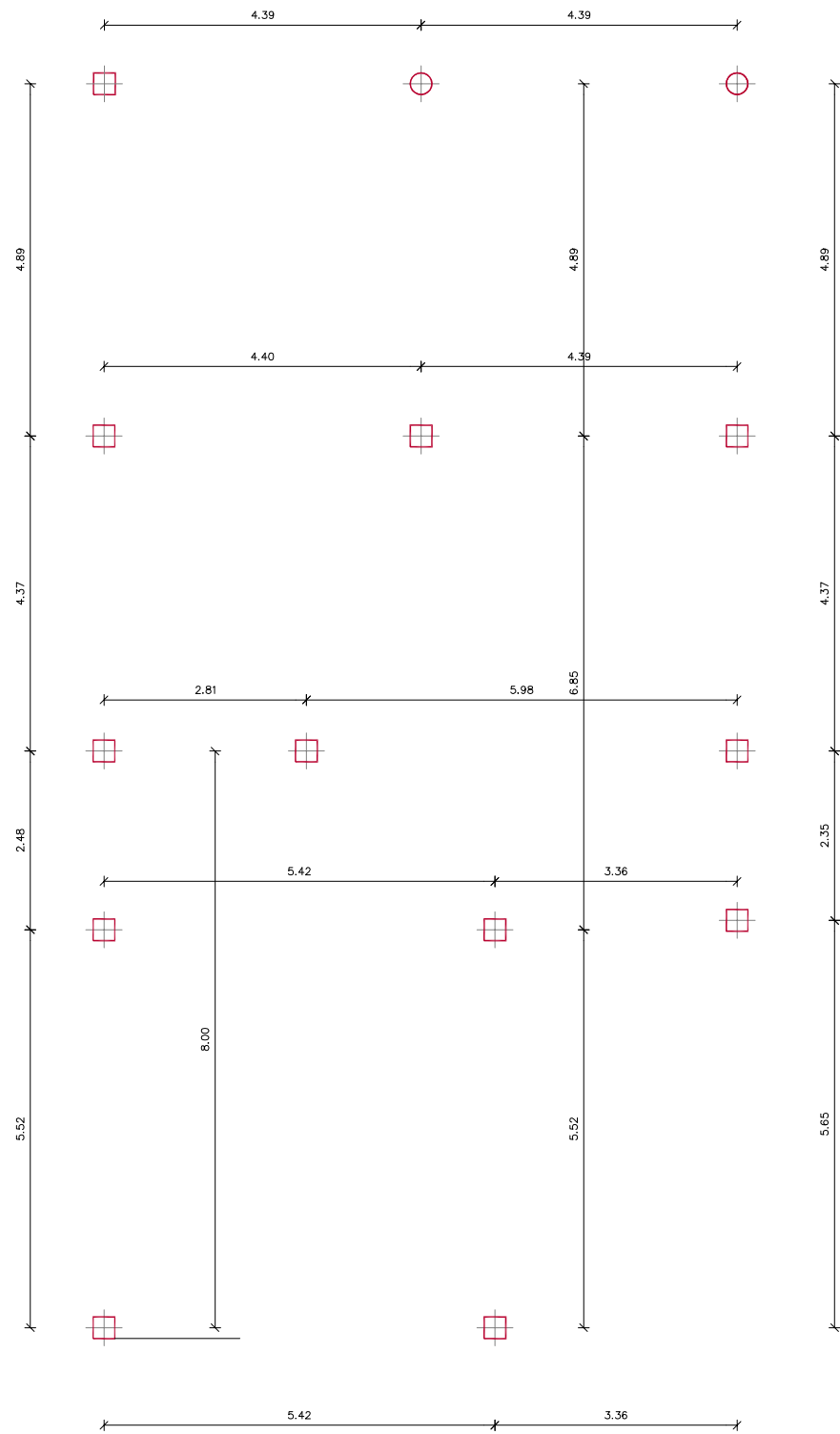
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TUTORS:

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PLAN Nº:

17



FINAL PROJECT

SINGLE FAMILY HOUSE

JUNE 2012

FOUNDATION AND LAYOUT

SCALE:
1/100

STUDENT:

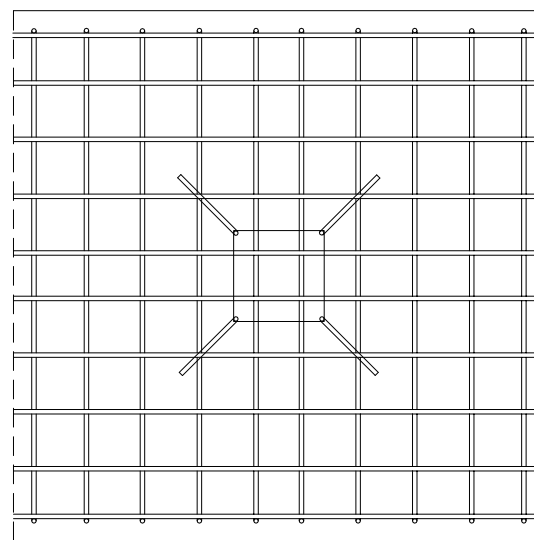
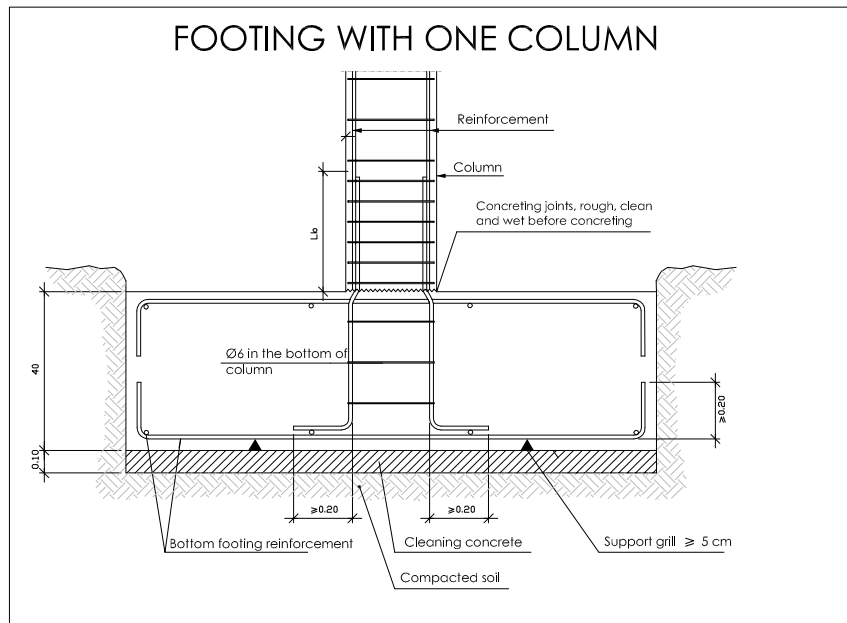
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TUTORS:

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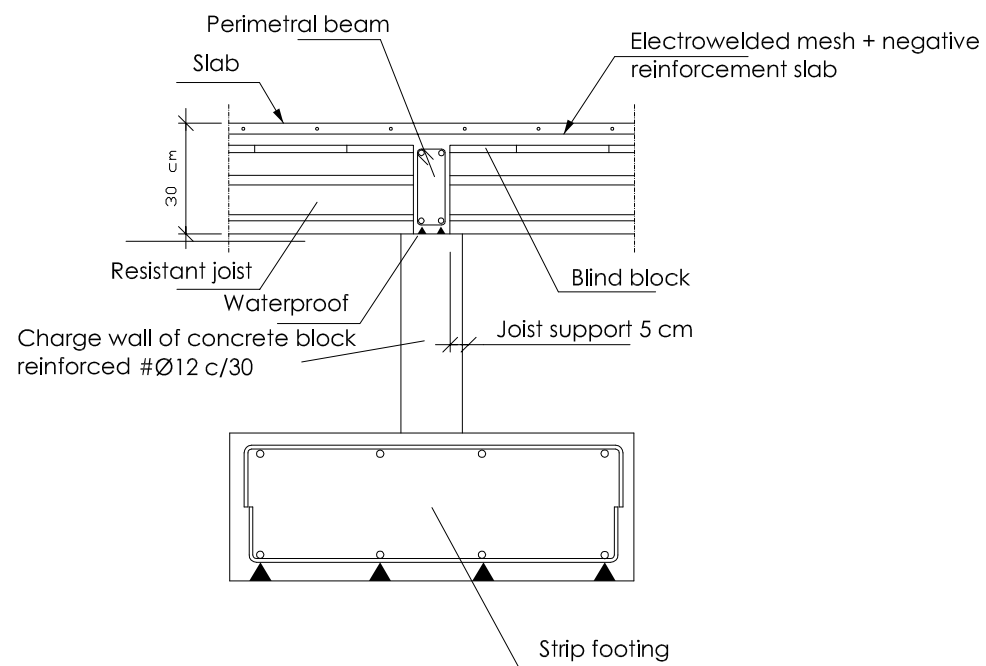
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18

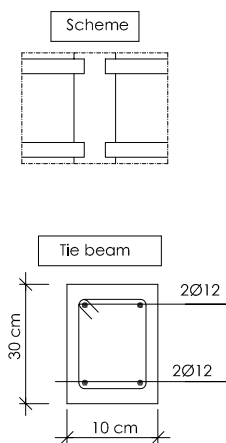


Materials characteristics - Footings									
Materials	Concrete						Steel		
	Control		Characteristics				Control		Characteristics
Element Zone/Floor	Control level	Safety factor	Type	Cement type	Maximum relation W/C	Max/min cement amount (kg/m³)	Control level	Safety factor	Type
All elements	Statistical	$\gamma_c = 1,50$	HA-25/B/20/lb	CEM II/A-L 42,5R	0,60	400 / 275	Normal	$\gamma_s = 1,15$	B-500-S
Loads	Normal	$\gamma_{Q1,50}$ $\gamma_{Q1,60}$	Adapted to the EHE Instruction						
Notes									
- Statistical Control in EHE, equivalent to Normal Control. - Overlaps, according to EHE - The steel used must be guaranteed with a recognized distinctive, Sedl CIETSID, CC-EHE...									
Nominal covers									
			1- Cover cleaning concrete 10 cm 2- Topcover 5 cm 3- Lateral cover in contact with soil ≥ 7 cm 4- Lateral free cover 5 cm						
Geotechnical data			- Admissible tension of soil = 0'20 MPa (2'0 kp/cm²)						
Anchorage length in the bottom of columns									
Reinforcement	Without dynamic loads		With dynamic loads						
	B-400-S	B-500-S	B-400-S	B-500-S					
Ø12	25 cm	30 cm	40 cm	50 cm					
Ø14	40 cm	45 cm	50 cm	60 cm					
Ø16	45 cm	50 cm	60 cm	70 cm					
Ø20	60 cm	65 cm	80 cm	100 cm					
Ø25	80 cm	100 cm	110 cm	130 cm					

FOOTING UNDER WALL



Layout of opposing joists with negative reinforcement place above them.



FINAL PROJECT SINGLE FAMILY HOUSE

JUNE 2012

DETAILS FOUNDATION

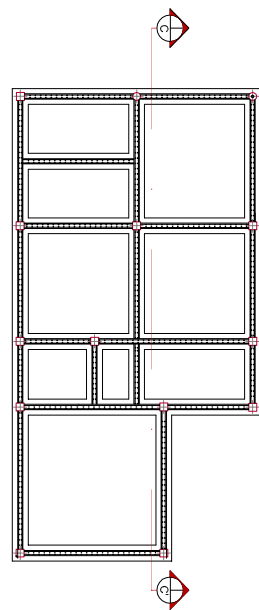
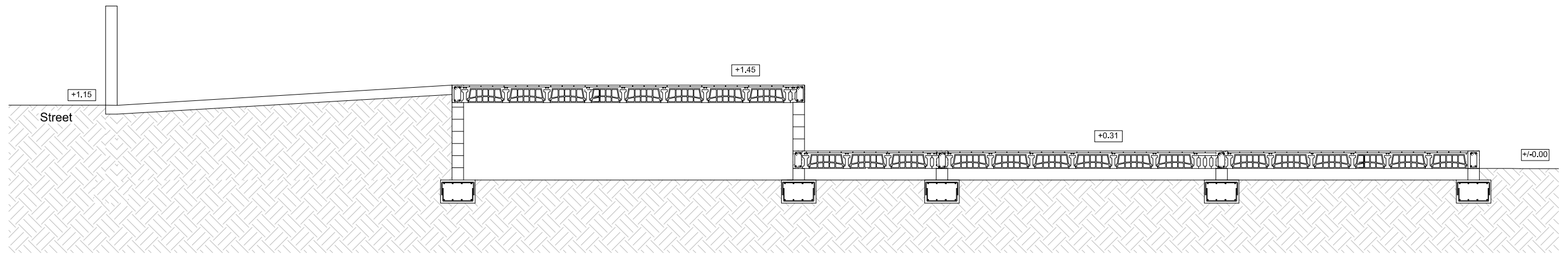
SCALE:
1/100

STUDENT:
MERCEDES ESTEVE MONTESINOS

TUTORS:
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

19



FINAL PROJECT
SINGLE FAMILY HOUSE

JUNE 2012

SECTION C-C' FOUNDATION

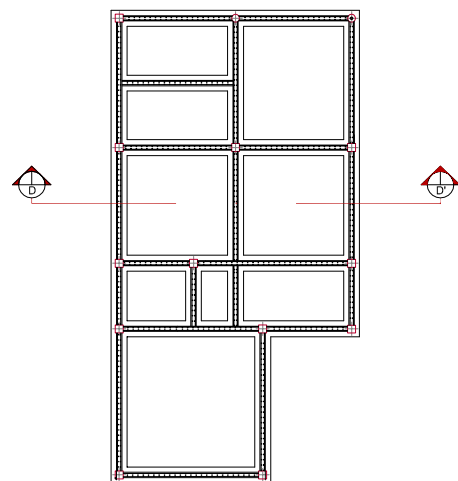
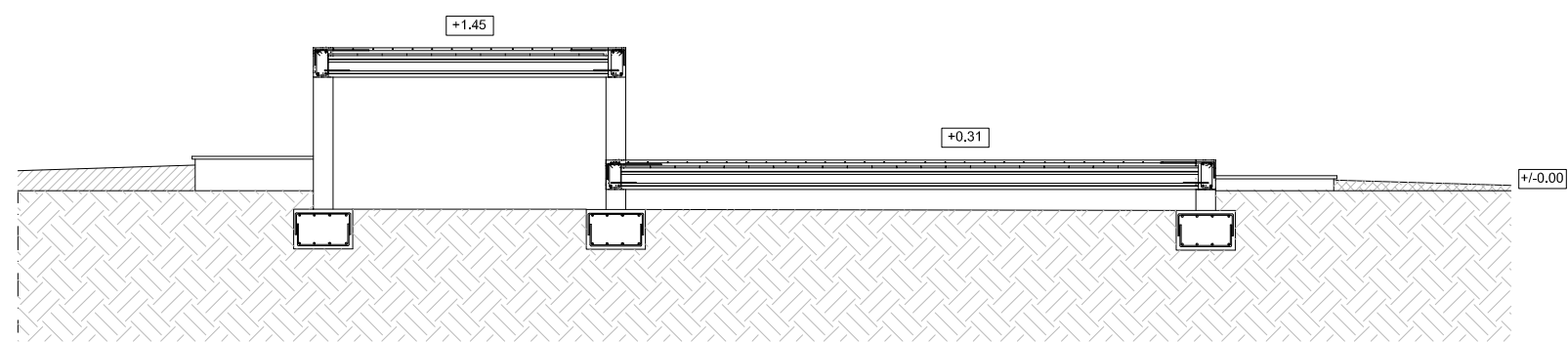
SCALE:
1/75

STUDENT:
MERCEDES ESTEVE MONTESINOS

TUTORS:
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

20



FINAL PROJECT
SINGLE FAMILY HOUSE

JUNE 2012

SECTION D-D' FOUNDATION

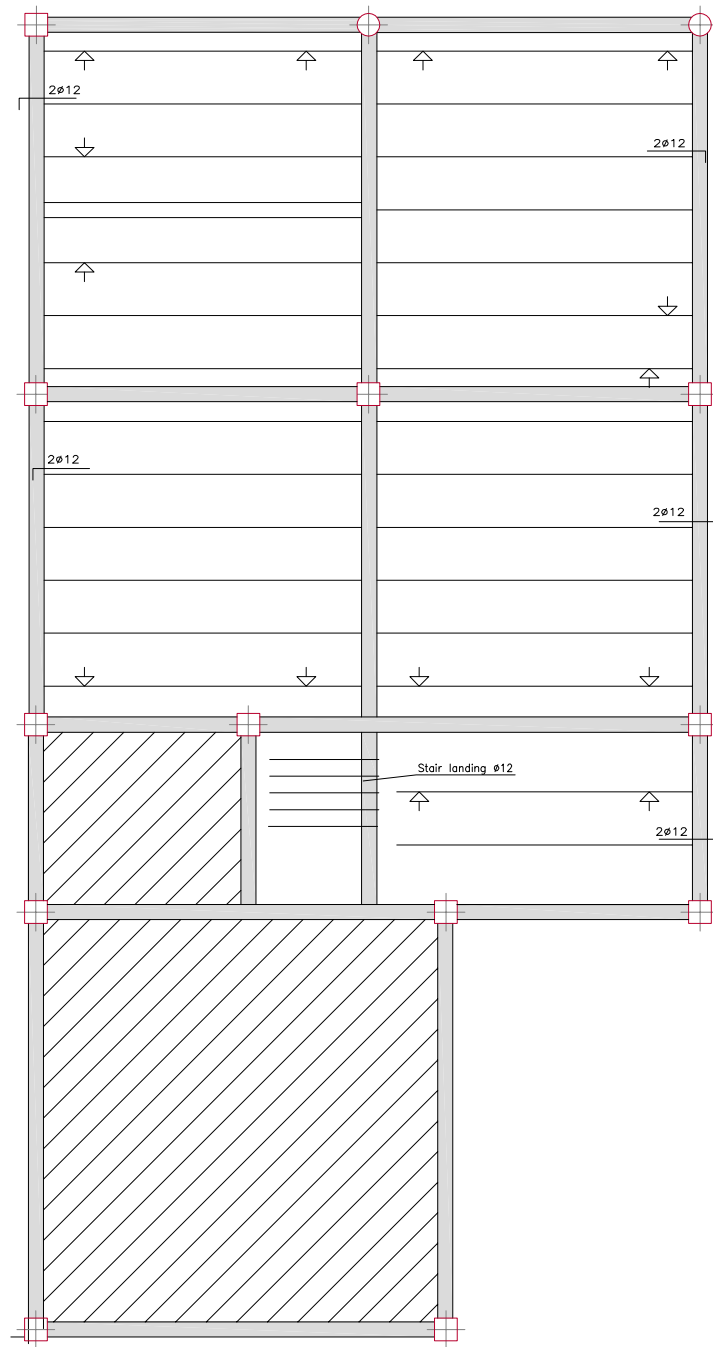
SCALE:
1/75

STUDENT:
MERCEDES ESTEVE MONTESINOS

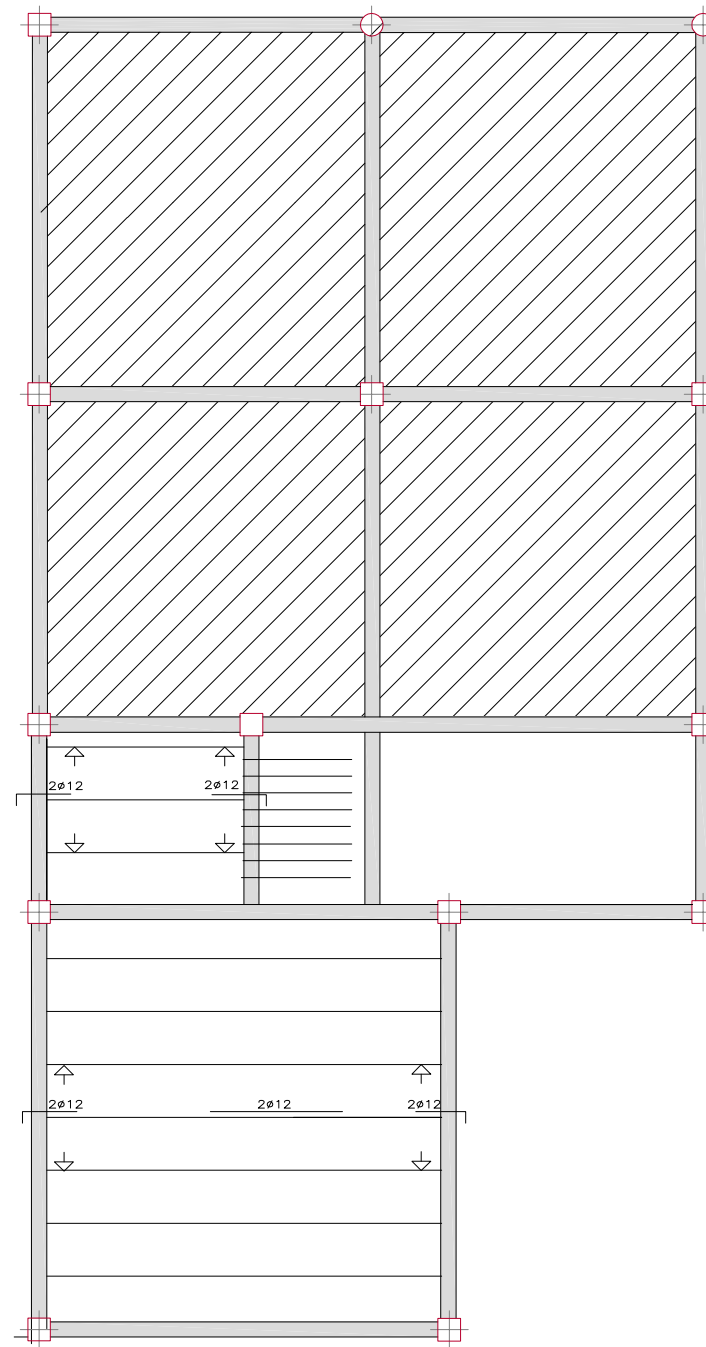
TUTORS:
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

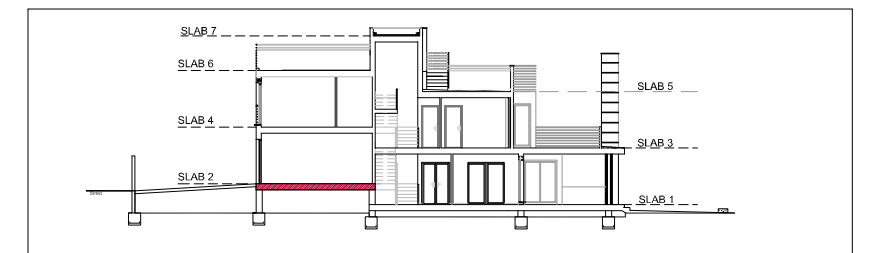
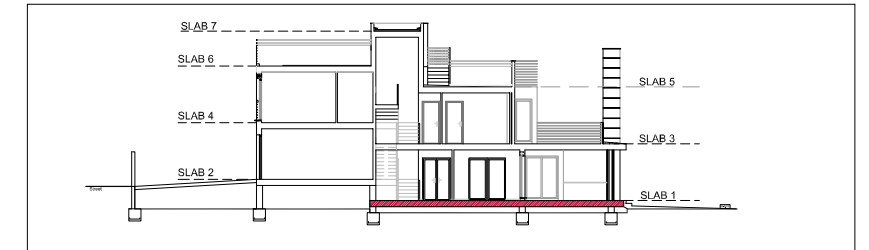
21



SLAB 1



SLAB 2



FINAL PROJECT
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JUNE 2012

STRUCTURE

SCALE:
1/100

STUDENT:

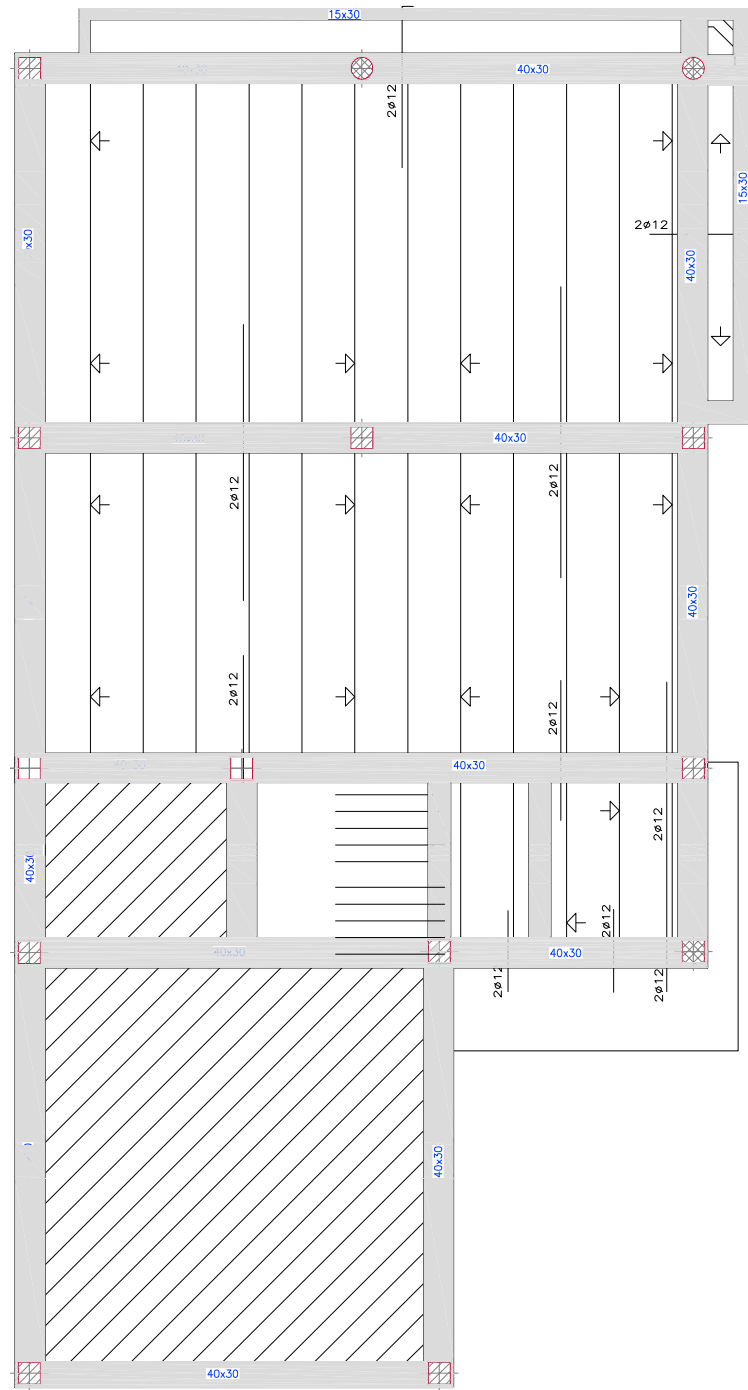
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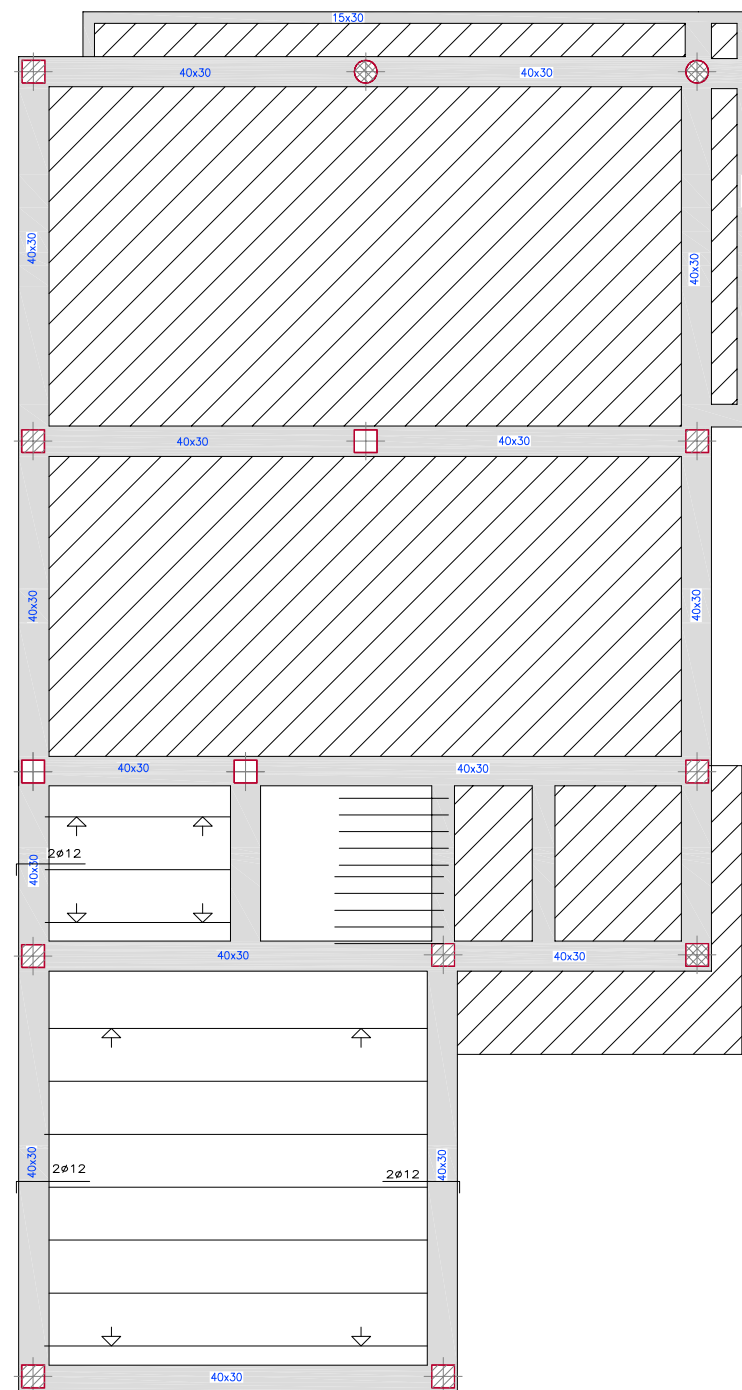
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

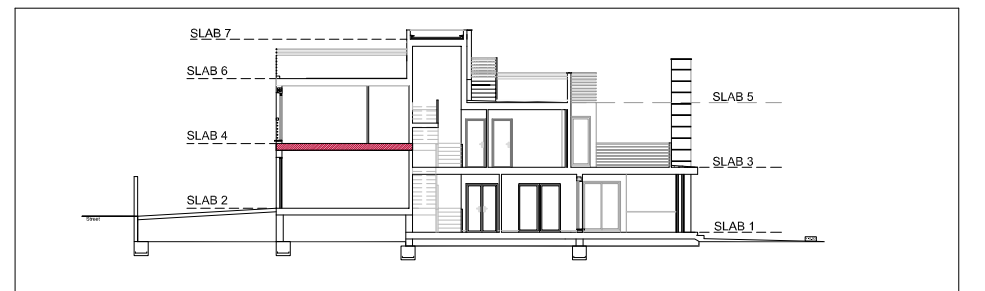
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SLAB 3



SLAB 4



FINAL PROJECT
SINGLE FAMILY HOUSE

JUNE 2012

STRUCTURE

SCALE:
1/100

STUDENT:

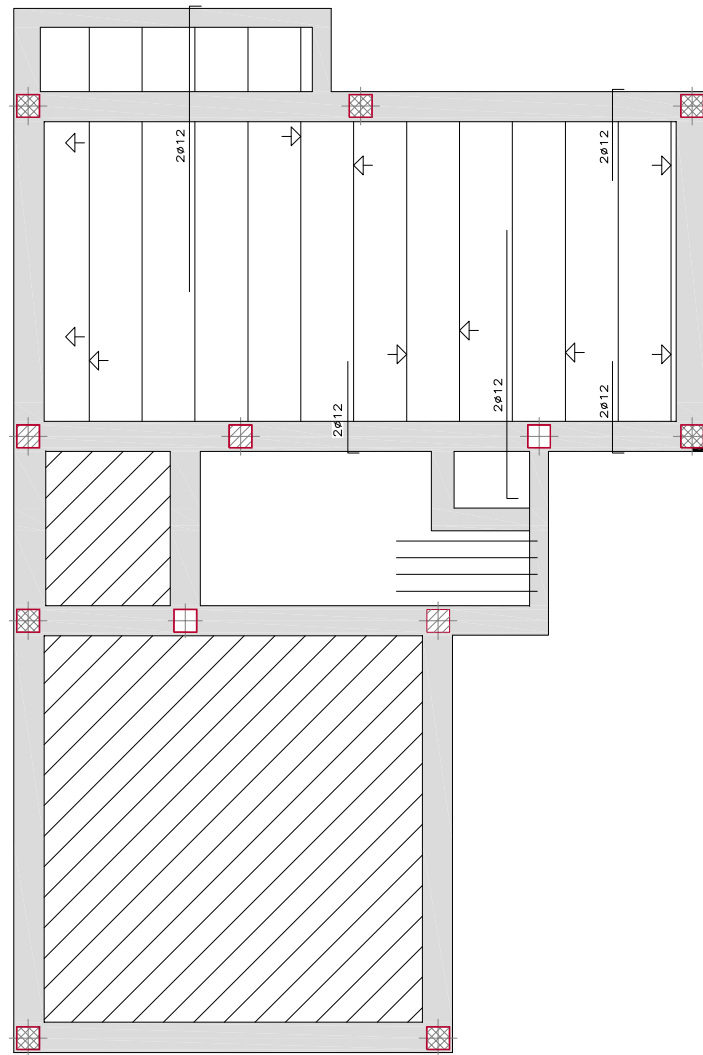
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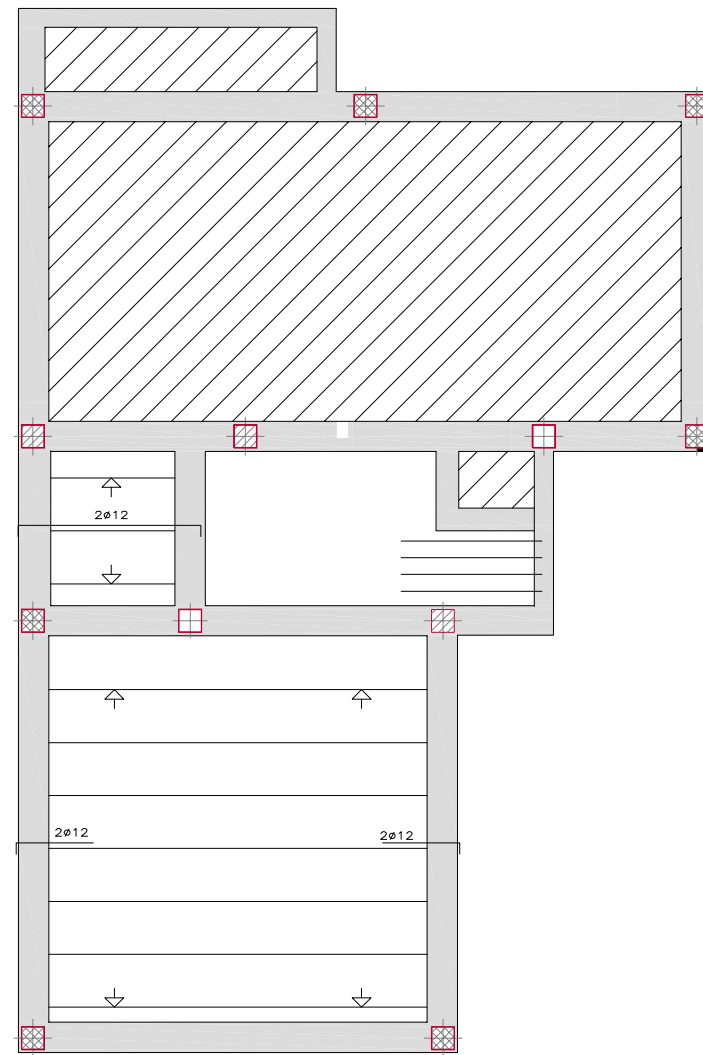
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

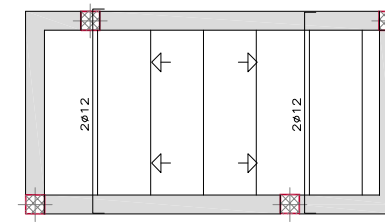
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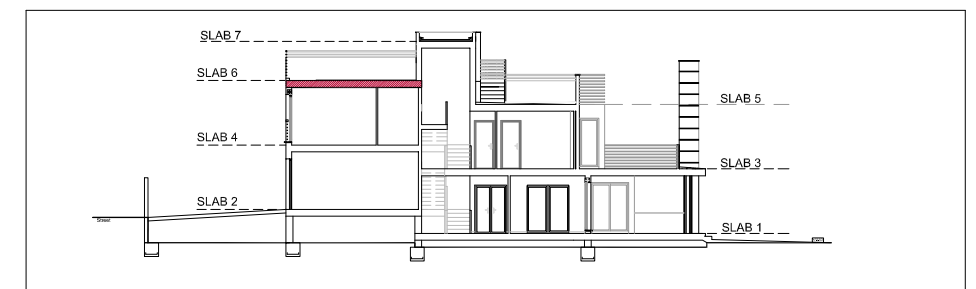
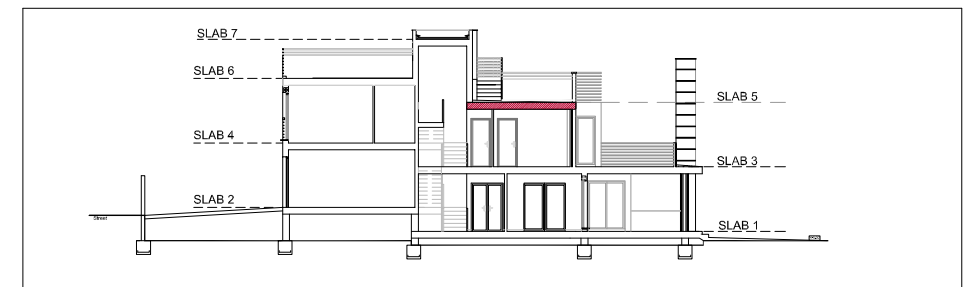
SLAB 5



SLAB 6



SLAB 7



FINAL PROJECT
SINGLE FAMILY HOUSE

JUNE 2012

STRUCTURE

SCALE:
1/100

STUDENT:

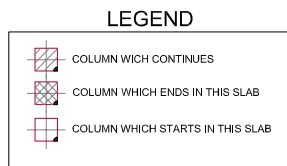
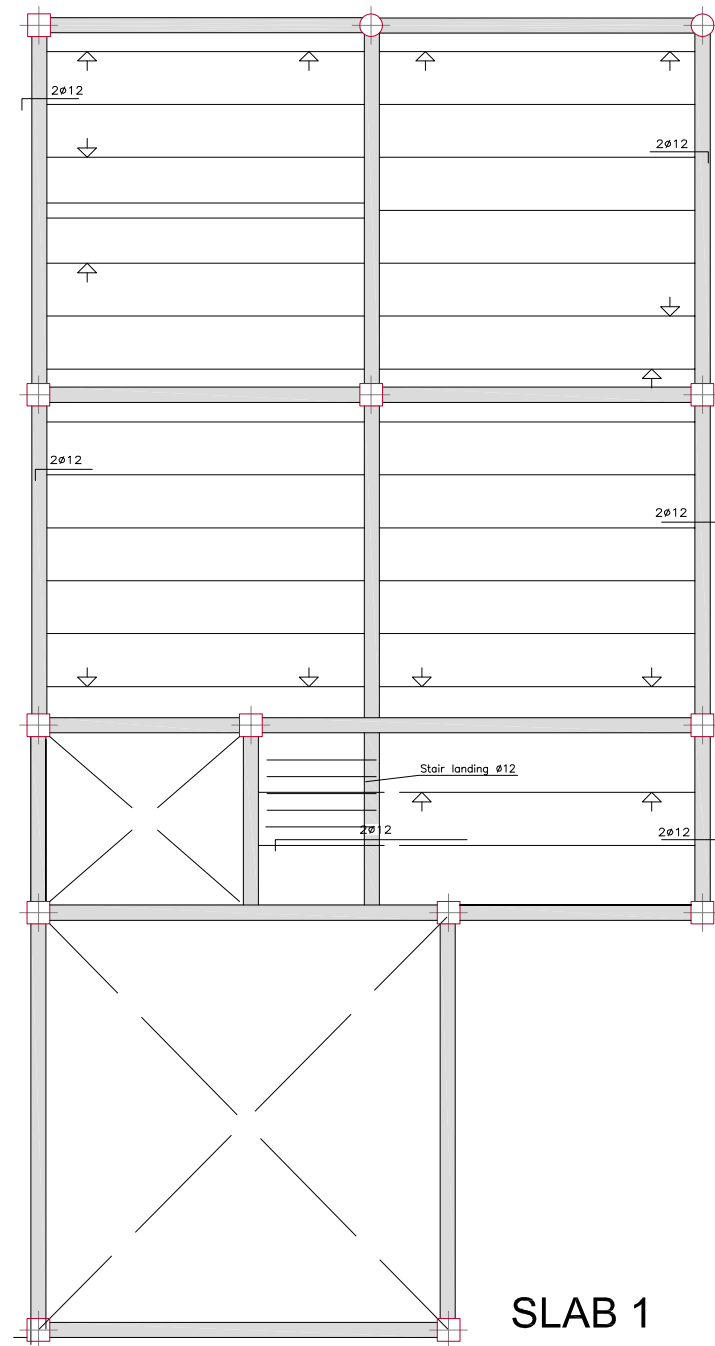
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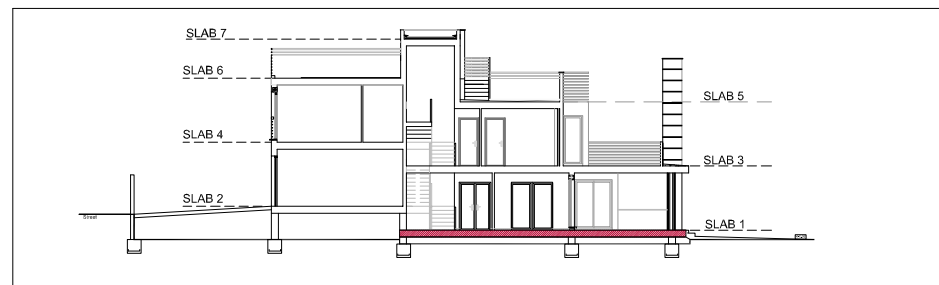
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

24



SLAB 1



Material characteristics																			
Materials	Concrete						Steel												
	Control		Characteristics				Control		Characteristics										
Element Zone/Floor	Control level	Safety factor	Type	Cement type	Maximum relation W/C	Max/min cement amount (kg/m³)	Control level	Safety factor	Type										
All elements	Statistical	$\gamma_c = 1,30$	HA-25/B/20/IB	CEM II/A-L 42,5R	0,55	400 / 300	Normal	$\gamma_s = 1,15$	B-500-S										
Notes																			
- Statistical Control in EHE, equivalent to Normal Control. - Overlaps, according to EHE - The steel used must be guaranteed with a recognized distinctive, Seal CIETSID, CC-EHE...																			
Nominal covers																			
			Negative reinforcement 1- Upper, 3 cm 2- Lateral cover: 3,5 cm Plane beams 3- Upper, 3,5 cm 4- Lateral cover: 5 cm 5- Inferior 3,5 cm																
Slab data																			
<table border="1" style="display: inline-table; vertical-align: top;"> <thead> <tr> <th colspan="2">Loads</th> </tr> </thead> <tbody> <tr> <td>Self-weight</td> <td>4.0 KN/m²</td> </tr> <tr> <td>Use overload</td> <td>2.0 KN/m²</td> </tr> <tr> <td>Dead loads</td> <td>2.0 KN/m²</td> </tr> <tr> <td>Total load:</td> <td>8.0 KN/m²</td> </tr> </tbody> </table>										Loads		Self-weight	4.0 KN/m²	Use overload	2.0 KN/m²	Dead loads	2.0 KN/m²	Total load:	8.0 KN/m²
Loads																			
Self-weight	4.0 KN/m²																		
Use overload	2.0 KN/m²																		
Dead loads	2.0 KN/m²																		
Total load:	8.0 KN/m²																		
Electrowelded mesh: ME 15x30 5 B500T 																			



FINAL PROJECT
SINGLE FAMILY HOUSE

JUNE 2012

SANITARY SLAB 1

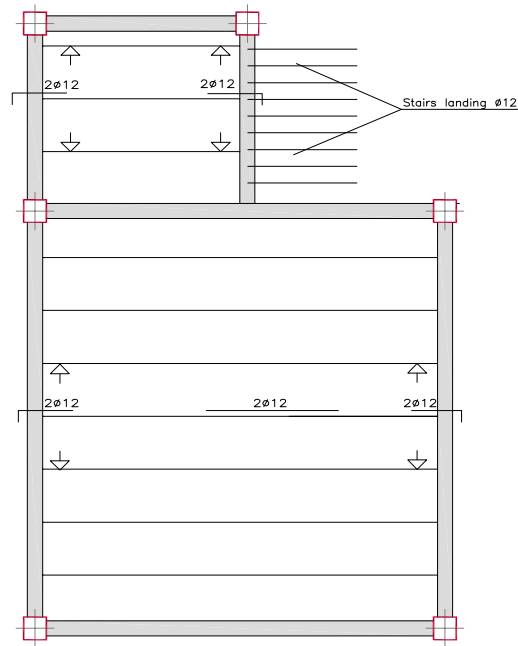
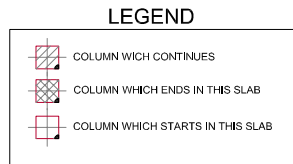
SCALE:
1/100

STUDENT:
MERCEDES ESTEVE MONTESINOS

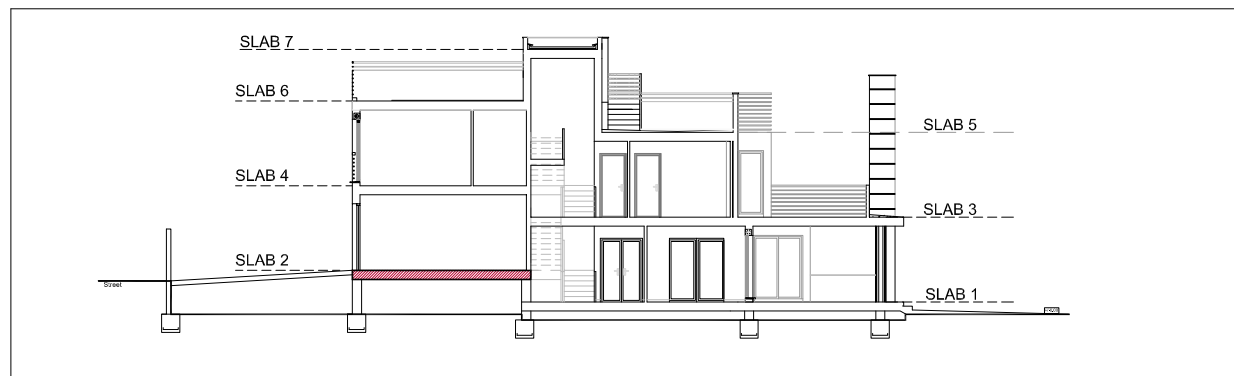
TUTORS:
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

25



SLAB 2



Material characteristics																			
Materials	Concrete					Steel													
	Control		Characteristics			Control		Characteristics											
Element Zone/Floor	Control level	Safety factor	Type	Cement type	Maximum relation W/C	Max/min cement amount (kg/m³)	Control level	Safety factor	Type										
All elements	Statistical	$\gamma_c = 1.50$	HA-25/B/20/lb	CEM II/A-L 42.5R	0.55	400 / 300	Normal	$\gamma_s = 1.15$	B-500-S										
Notes																			
- Statistical Control in EHE, equivalent to Normal Control. - Overlaps, according to EHE. - The steel used must be guaranteed with a recognized distinctive, Seal CIETSID, CC-EHE...																			
Nominal covers																			
			Negative reinforcement 1- Upper, 3 cm 2- Lateral cover: 3.5 cm Plane beams 3- Upper, 3.5 cm 4- Lateral cover: 5 cm 5- Inferior 3.5 cm																
Slab data																			
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">Loads</th> </tr> </thead> <tbody> <tr> <td>Self-weight</td> <td style="text-align: right;">4.0 KN/m²</td> </tr> <tr> <td>Use overload</td> <td style="text-align: right;">4.0 KN/m²</td> </tr> <tr> <td>Dead loads</td> <td style="text-align: right;">1.0 KN/m²</td> </tr> <tr> <td>Total load:</td> <td style="text-align: right;">9.0 KN/m²</td> </tr> </tbody> </table>			Loads		Self-weight	4.0 KN/m²	Use overload	4.0 KN/m²	Dead loads	1.0 KN/m²	Total load:	9.0 KN/m²	Electrowelded mesh: ME 15x30 5 B500T 						
Loads																			
Self-weight	4.0 KN/m²																		
Use overload	4.0 KN/m²																		
Dead loads	1.0 KN/m²																		
Total load:	9.0 KN/m²																		



FINAL PROJECT SINGLE FAMILY HOUSE

JUNE 2012

SANITARY SLAB 2

SCALE:
1/100

STUDENT:

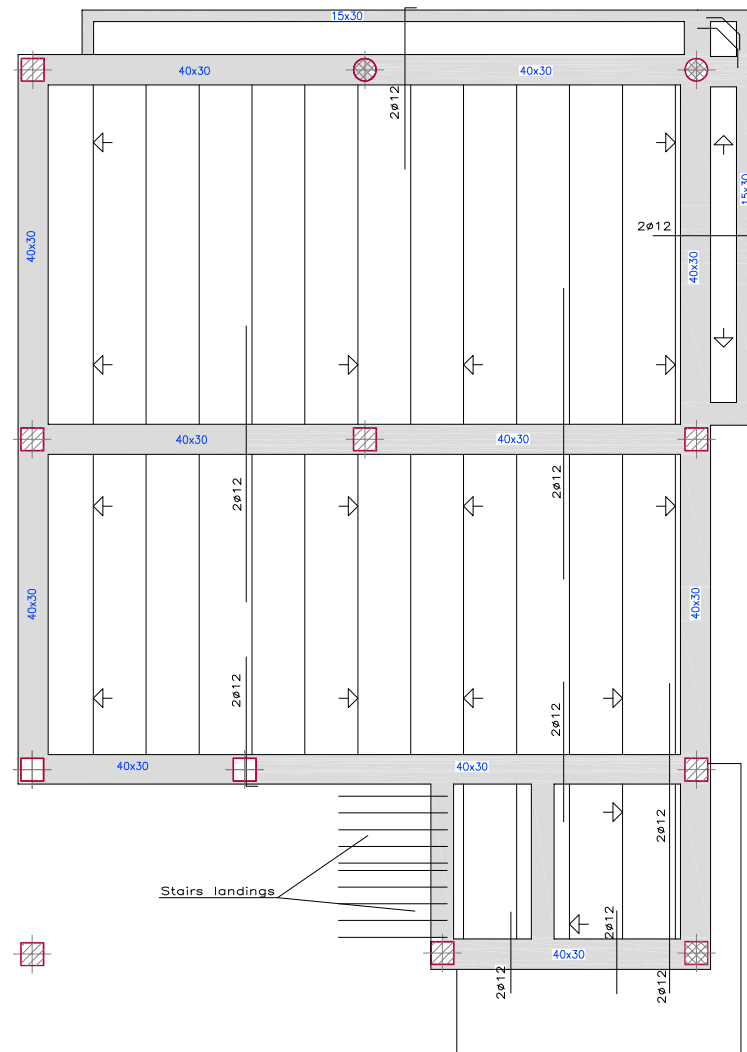
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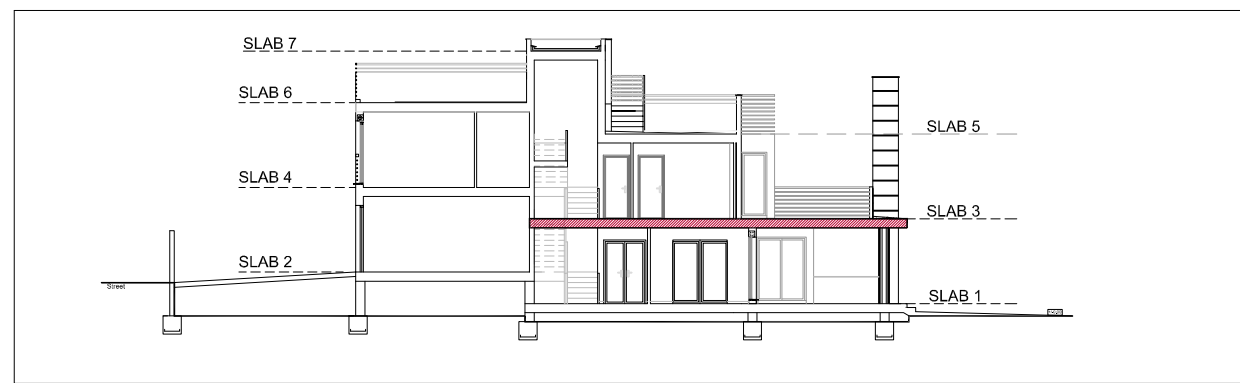
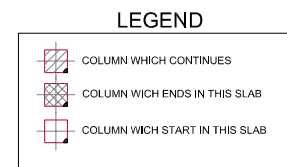
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

26



SLAB 3



Material characteristics									
Materials	Concrete					Steel			
	Control		Characteristics			Control		Characteristics	
Element Zone/Floor	Control level	Safety factor	Type	Cement type	Maximum relation W/C	Max/min cement amount (kg/m³)	Control level	Safety factor	Type
All elements	Statistical	$\gamma_c = 1.50$	HA-25/B/20/fib	CEM II/A-L 42.5R	0.55	400 / 300	Normal	$\gamma_s = 1.15$	B-500-S

Notes

- Statistical Control in EHE, equivalent to Normal Control.
- Overlaps, according to EHE
- The steel used must be guaranteed with a recognized distinctive, Seal CIETSID, CC-EHE....

Nominal covers slab

Negative reinforcement

- 1- Upper, 3 cm
- 2- Lateral cover: 3.5 cm

Plane beams

- 3- Upper, 3.5 cm
- 4- Lateral cover: 5 cm
- 5- Inferior 3.5 cm

Slab data

Loads	
Self-weight	4.0 KN/m²
Use overload	2.0 KN/m²
Dead loads	2.0 KN/m²
Total load:	8.0 KN/m²

Electrowelded mesh: ME 15x30 5 B500T

Nominal covers beams

Beams with same slab height

- 1- Upper, 3.5 cm
- 2- Lateral cover: 5 cm
- 3- Inferior 3.5 cm



FINAL PROJECT
SINGLE FAMILY HOUSE

JUNE 2012

SLAB 3

SCALE:
1/100

STUDENT:
MERCEDES ESTEVE MONTESINOS

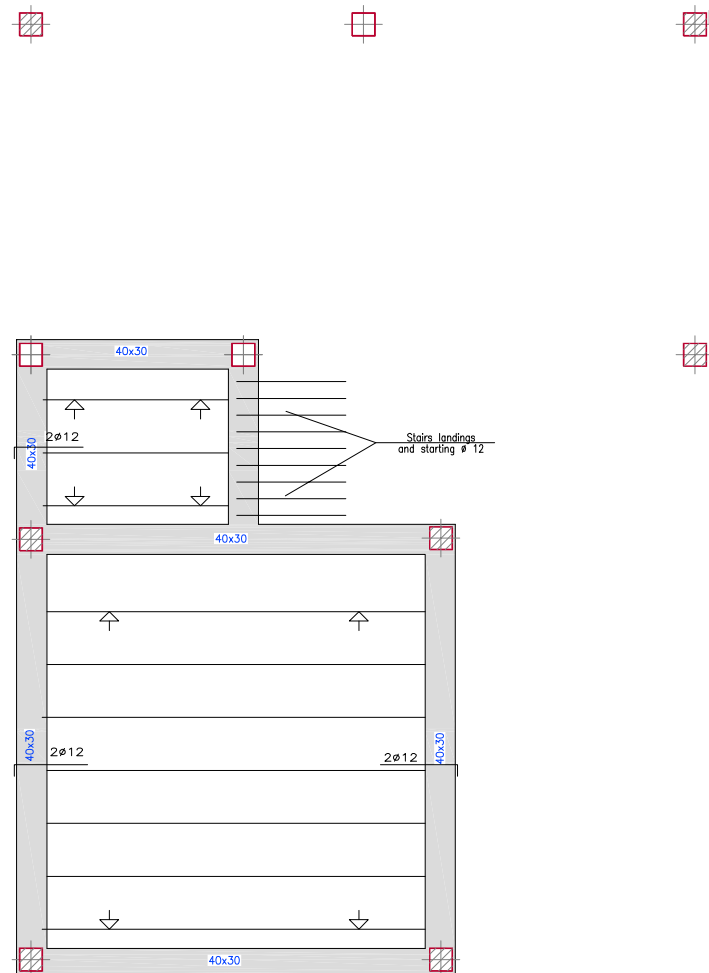
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FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

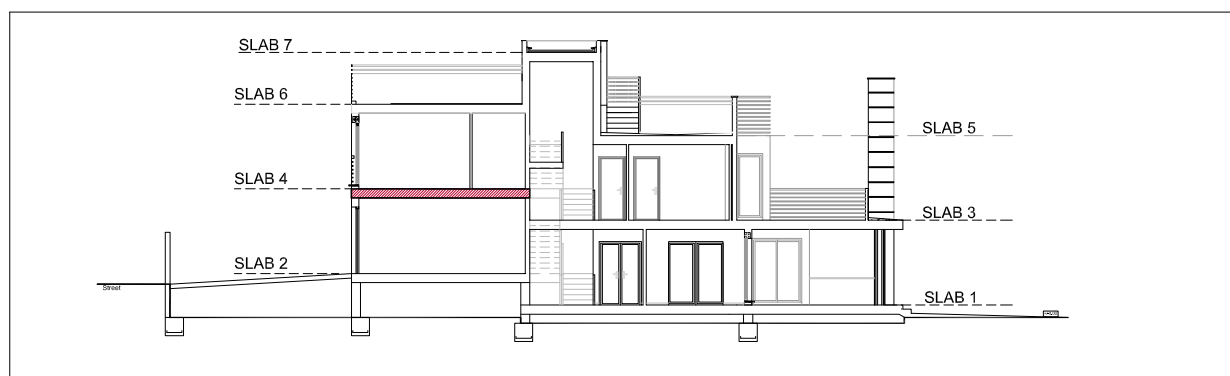
27

LEGEND

	COLUMN WHICH CONTINUES
	COLUMN WHICH ENDS IN THIS SLAB
	COLUMN WHICH STARTS IN THIS SLAB



SLAB 4



Material characteristics																			
Materials ← Element Zone/Floor	Concrete					Steel													
	Control		Characteristics			Control		Characteristics											
	Control level	Safety factor	Type	Cement type	Maximum relation W/C	Max/min cement amount (kg/m³)	Control level	Safety factor	Type										
All elements	Statistical	$\gamma_c = 1.50$	HA-25/B/20/B	CEM III/A-L 42.5R	0.55	400 / 300	Normal	$\gamma_s = 1.15$	B-500S										
Notes																			
- Statistical Control in EHE, equivalent to Normal Control. - Overlaps, according to EHE - The steel used must be guaranteed with a recognized distinctive, Seal CIETSID, CC-EHE...																			
Nominal covers slab																			
			Negative reinforcement 1- Upper, 3 cm 2- Lateral cover: 3.5 cm																
			Plane beams 3- Upper, 3.5 cm 4- Lateral cover: 5 cm 5- Interior 3.5 cm																
Slab data																			
<table border="1"> <thead> <tr> <th colspan="2">Loads</th> </tr> </thead> <tbody> <tr> <td>Self-weight</td> <td>4.0 KN/m²</td> </tr> <tr> <td>Use overload</td> <td>2.0 KN/m²</td> </tr> <tr> <td>Dead loads</td> <td>2.0 KN/m²</td> </tr> <tr> <td>Total load:</td> <td>8.0 KN/m²</td> </tr> </tbody> </table>			Loads		Self-weight	4.0 KN/m²	Use overload	2.0 KN/m²	Dead loads	2.0 KN/m²	Total load:	8.0 KN/m²	Electrowelded mesh: ME 15x30 5 B500T 						
Loads																			
Self-weight	4.0 KN/m²																		
Use overload	2.0 KN/m²																		
Dead loads	2.0 KN/m²																		
Total load:	8.0 KN/m²																		
Nominal covers beams																			
			Beams with same slab height 1- Upper, 3.5 cm 2- Lateral cover: 5 cm 3- Interior 3.5 cm																



FINAL PROJECT
SINGLE FAMILY HOUSE

JUNE 2012

SLAB 4

SCALE:
1/100

STUDENT:

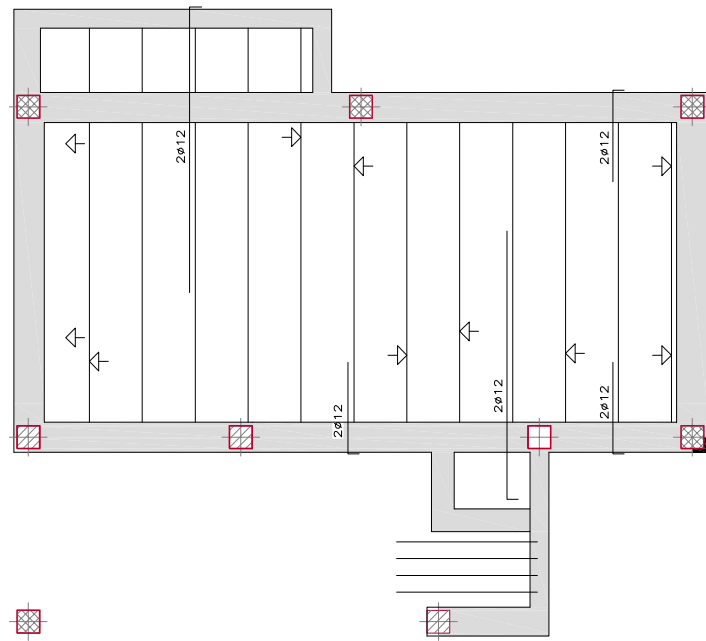
MERCEDES ESTEVE MONTESINOS

TUTORS:

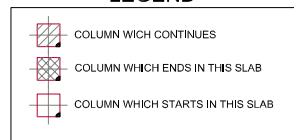
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

28



LEGEND



SLAB 5



Material characteristics									
Materials	Concrete						Steel		
	Control		Characteristics				Control		Characteristics
Element Zone/Floor	Control level	Safety factor	Type	Cement type	Maximum relation W/C	Max/min cement amount (kg/m ³)	Control level	Safety factor	Type
All elements	Statistical	$\gamma_c = 1.50$	HA-25/B/20/Bb	CEM III/A-L 42.5R	0.55	400 / 300	Normal	$\gamma_s = 1.15$	B-500-S

Notes

- Statistical Control in EHE, equivalent to Normal Control.
- Overlaps, according to EHE
- The steel used must be guaranteed with a recognized distinctive, Seal CIETSID, CC-EHE....

Nominal covers slab

Slab data

Loads	
Self-weight	4.0 KN/m ²
Use overload	1.0 KN/m ²
Dead loads	2.0 KN/m ²
Total load:	7.0 KN/m ²

Electrowelded mesh: ME 15x30 5 B500T

Nominal covers beams



FINAL PROJECT
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SLAB 5

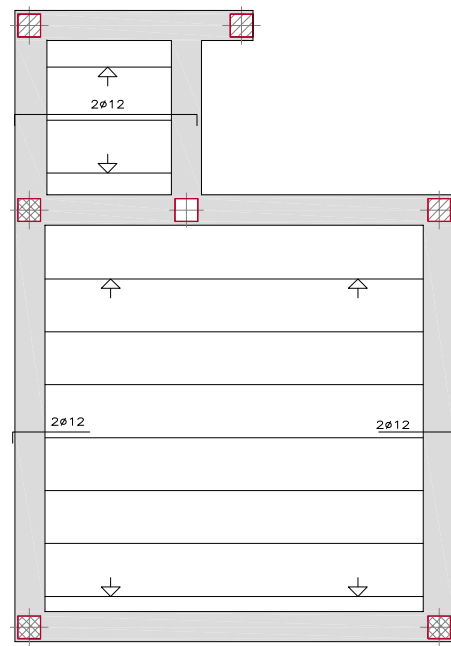
SCALE:
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STUDENT:
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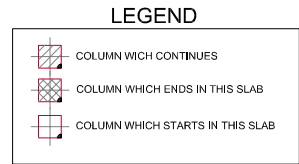
TUTORS:
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

29



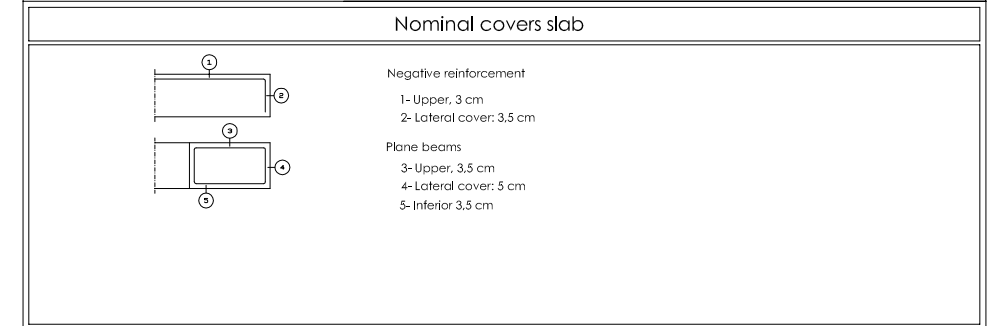
SLAB 6



Material characteristics									
Materials	Concrete					Steel			
	Control		Characteristics			Control		Characteristics	
Element Zone/Floor	Control level	Safety factor	Type	Cement type	Maximum relation W/C	Max/min cement amount (kg/m³)	Control level	Safety factor	Type
All elements	Statistical	$\gamma_c = 1.50$	HA-25/B/20/B	CEM I/A-L 42.5R	0.55	400 / 300	Normal	$\gamma_s = 1.15$	B-500-S

Notes

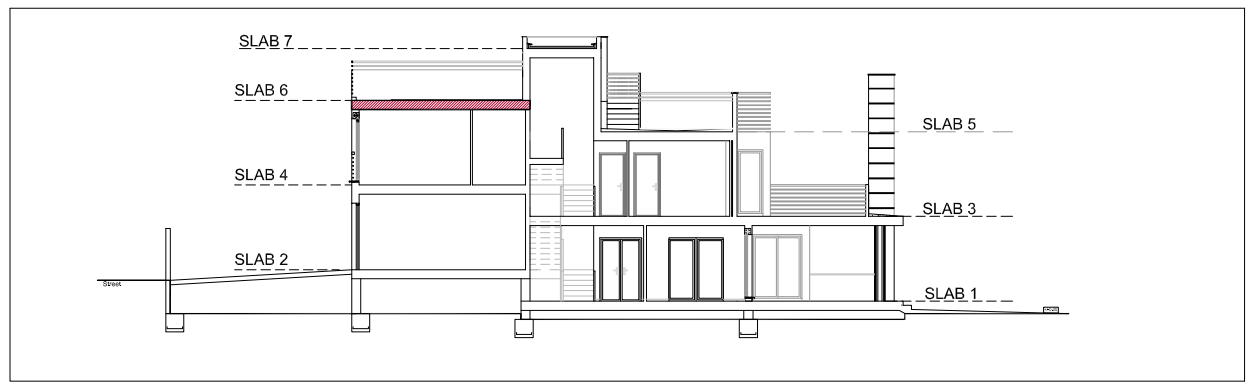
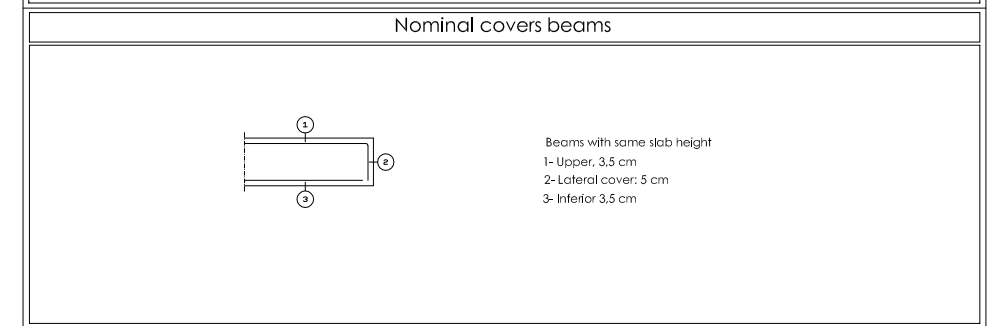
- Statistical Control in EHE, equivalent to Normal Control.
- Overlaps, according to EHE
- The steel used must be guaranteed with a recognized distinctive, Seal CIETSID, CC-EHE...



Slab data

Loads	
Self-weight	4.0 KN/m²
Use overload	1.0 KN/m²
Dead loads	2.0 KN/m²
Total load:	7.0 KN/m²

Electrowelded mesh: ME 15x30 5 B500T



FINAL PROJECT
SINGLE FAMILY HOUSE

JUNE 2012

SLAB 6

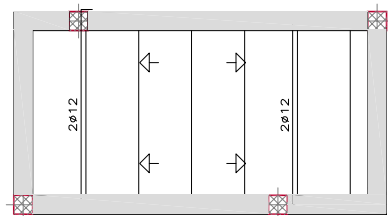
SCALE:
1/100

STUDENT:
MERCEDES ESTEVE MONTESINOS

TUTORS:
FRANTISEK KULHANEK / MILAGRO IBORRA

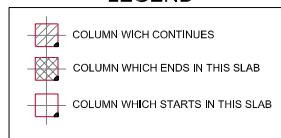
PLAN Nº:

30



SLAB 7

LEGEND



Material characteristics																			
Materials	Concrete						Steel												
	Control		Characteristics				Control		Characteristics										
Element Zone/Floor	Control level	Safety factor	Type	Cement type	Maximum relation W/C	Max/min cement amount (kg/m³)	Control level	Safety factor	Type										
All elements	Statistical	$\gamma_c = 1.50$	HA-25/B/20/11b	CEM III/A-L 42.5R	0.55	400 / 300	Normal	$\gamma_s = 1.15$	B-500-S										
Notes																			
- Statistical Control in EHE, equivalent to Normal Control. - Overlaps, according to EHE. - The steel used must be guaranteed with a recognized distinctive, Seal CIETSID, CC-EHE...																			
Nominal covers slab																			
			<p>Negative reinforcement</p> <p>1- Upper, 3 cm 2- Lateral cover: 3.5 cm</p> <p>Plane beams</p> <p>3- Upper, 3.5 cm 4- Lateral cover: 5 cm 5- Inferior 3.5 cm</p>																
Slab data																			
<table border="1"> <thead> <tr> <th colspan="2">Loads</th> </tr> </thead> <tbody> <tr> <td>Self-weight</td> <td>4.0 KN/m²</td> </tr> <tr> <td>Use overload</td> <td>1.0 KN/m²</td> </tr> <tr> <td>Dead loads</td> <td>1.0 KN/m²</td> </tr> <tr> <td>Total load:</td> <td>6.0 KN/m²</td> </tr> </tbody> </table>			Loads		Self-weight	4.0 KN/m²	Use overload	1.0 KN/m²	Dead loads	1.0 KN/m²	Total load:	6.0 KN/m²	<p>Electrowelded mesh: ME 15x30 5 B500T</p>						
Loads																			
Self-weight	4.0 KN/m²																		
Use overload	1.0 KN/m²																		
Dead loads	1.0 KN/m²																		
Total load:	6.0 KN/m²																		
Nominal covers beams																			
			<p>Beams with same slab height</p> <p>1- Upper, 3.5 cm 2- Lateral cover: 5 cm 3- Inferior 3.5 cm</p>																



FINAL PROJECT
SINGLE FAMILY HOUSE

JUNE 2012

SLAB 7

SCALE:
1/100

STUDENT:

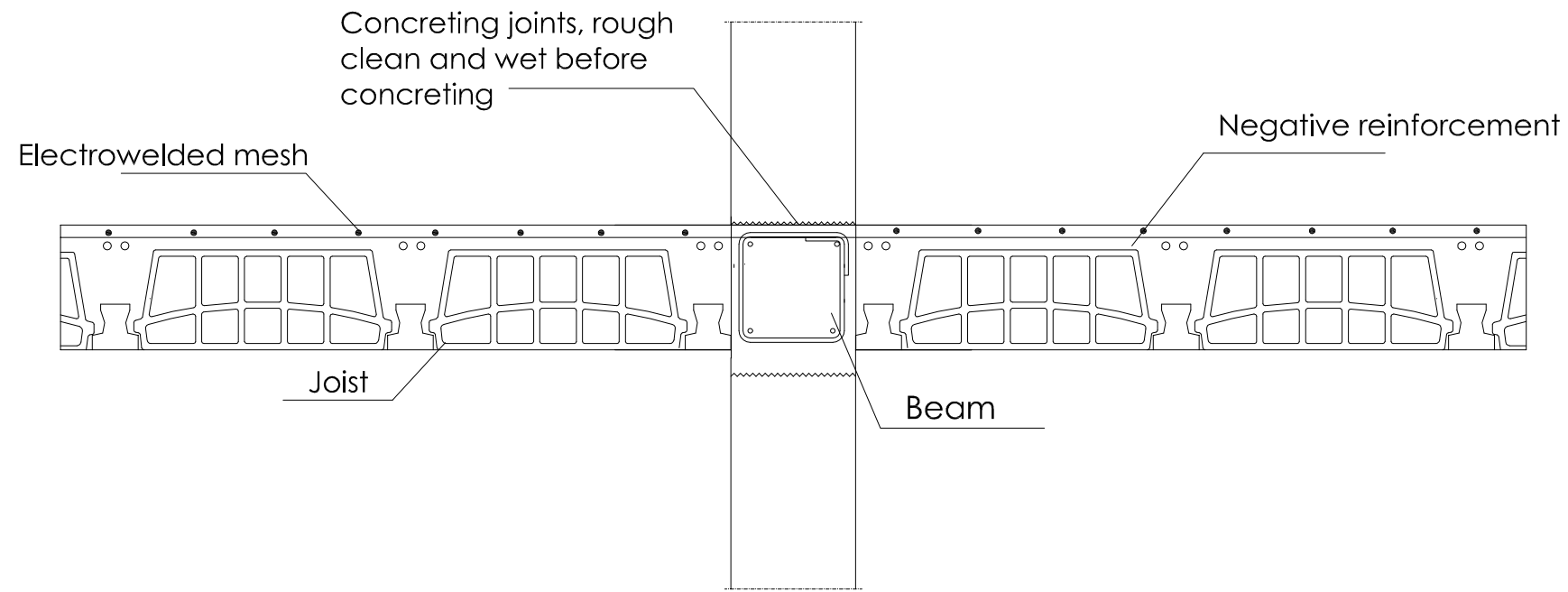
MERCEDES ESTEVE MONTESINOS

TUTORS:

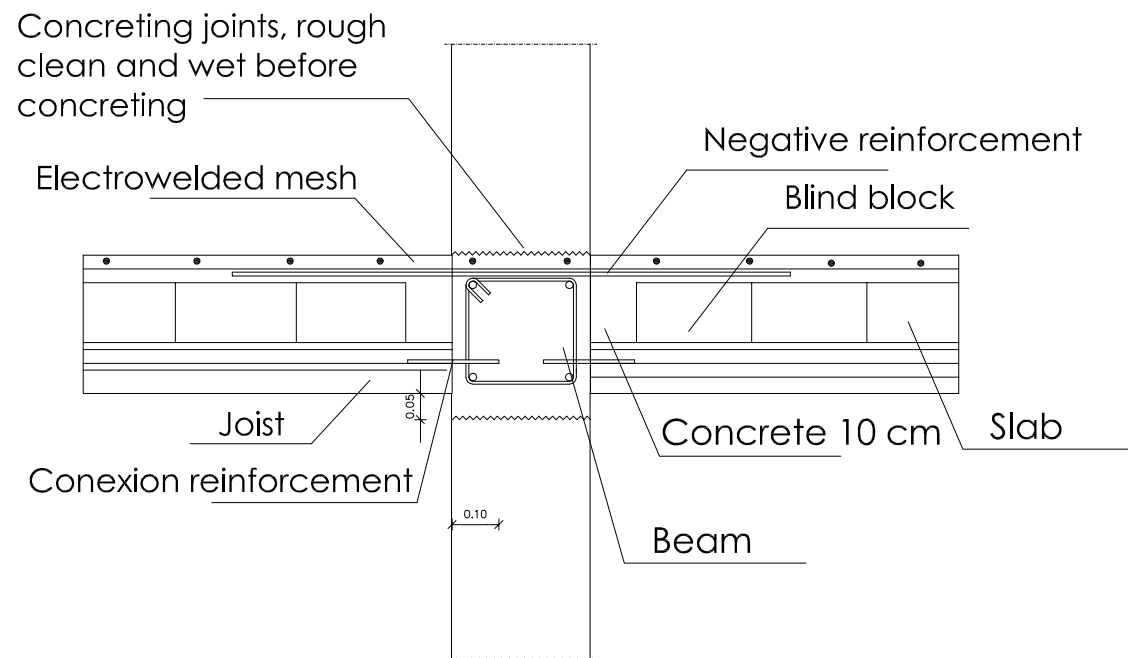
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

31



TRANSVERSAL SECTION



LONGITUDINAL SECTION



FINAL PROJECT
SINGLE FAMILY HOUSE

JUNE 2012

SLAB DETAILS

SCALE:
1/100

STUDENT:

MERCEDES ESTEVE MONTESINOS

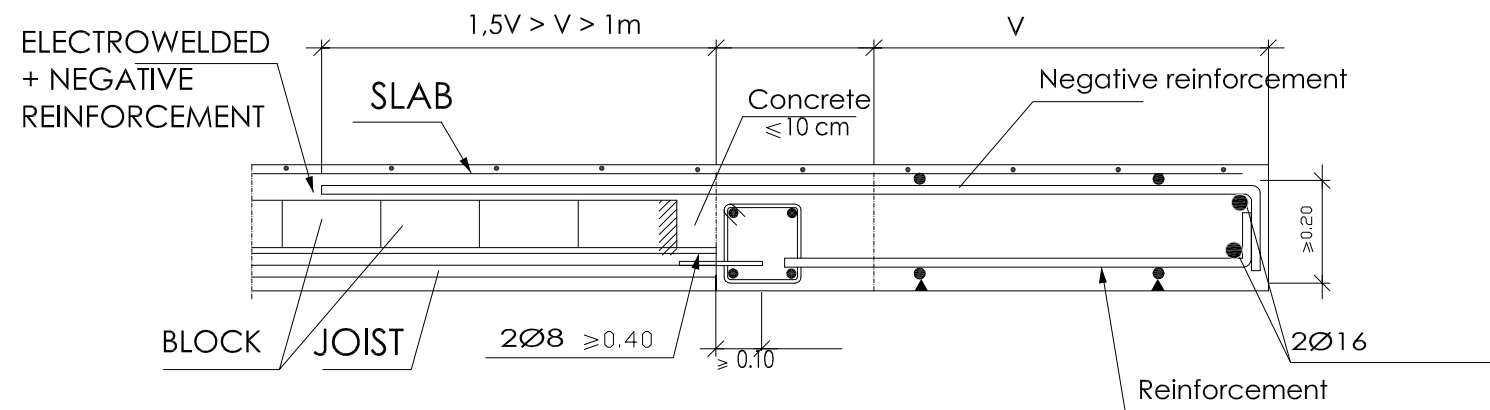
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FRANTISEK KULHANEK / MILAGRO IBORRA

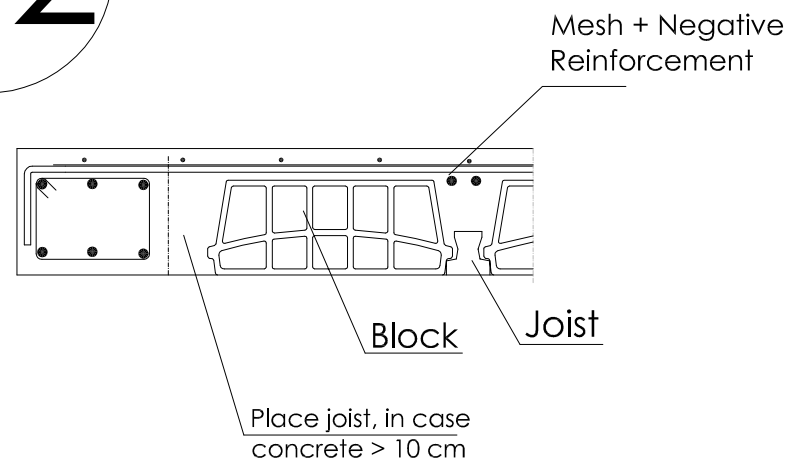
PLAN Nº:

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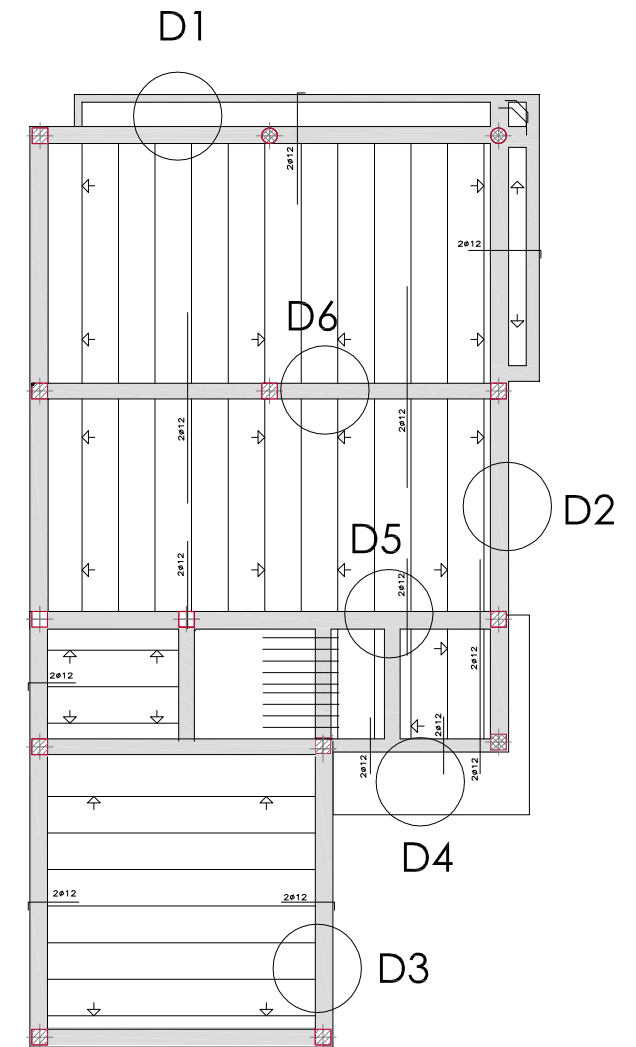
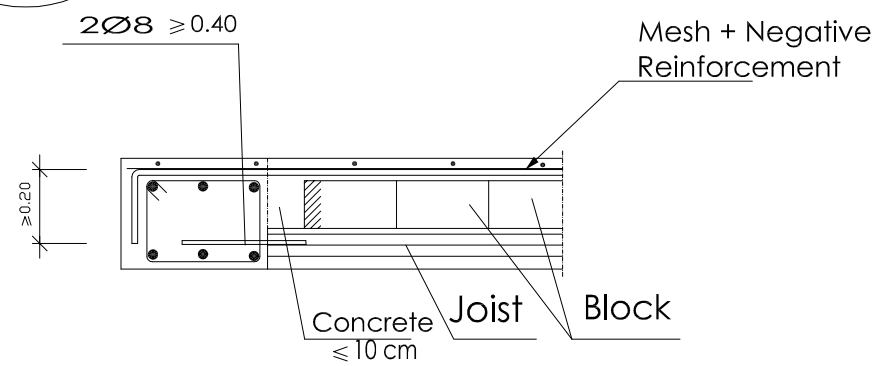
D1



D2



D3



FINAL PROJECT SINGLE FAMILY HOUSE

JUNE 2012

SLAB DETAILS

SCALE:
1/100

STUDENT:

MERCEDES ESTEVE MONTESINOS

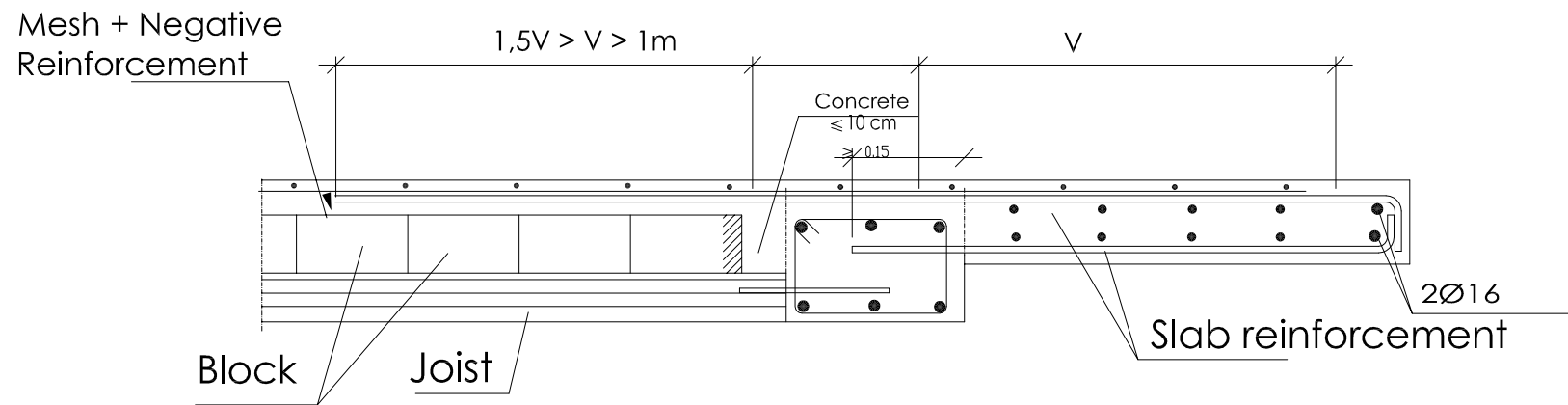
TUTORS:

FRANTISEK KULHANEK / MILAGRO IBORRA

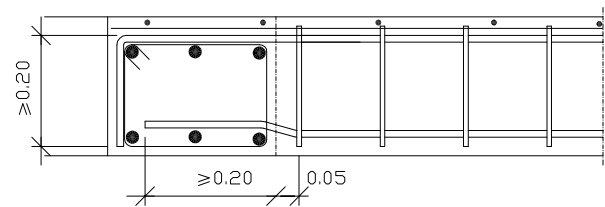
PLAN Nº:

33

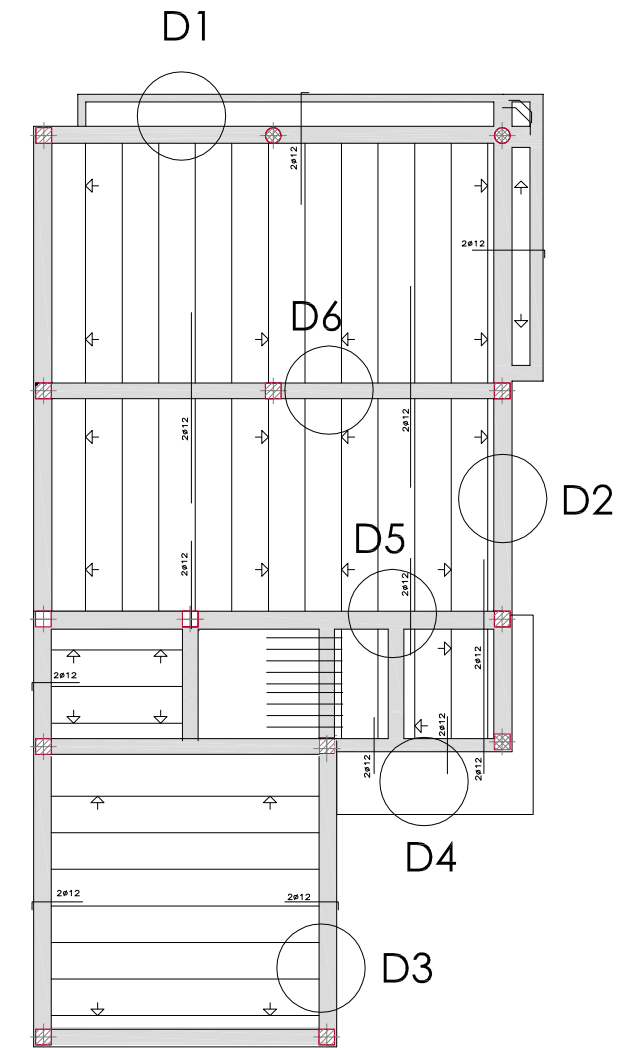
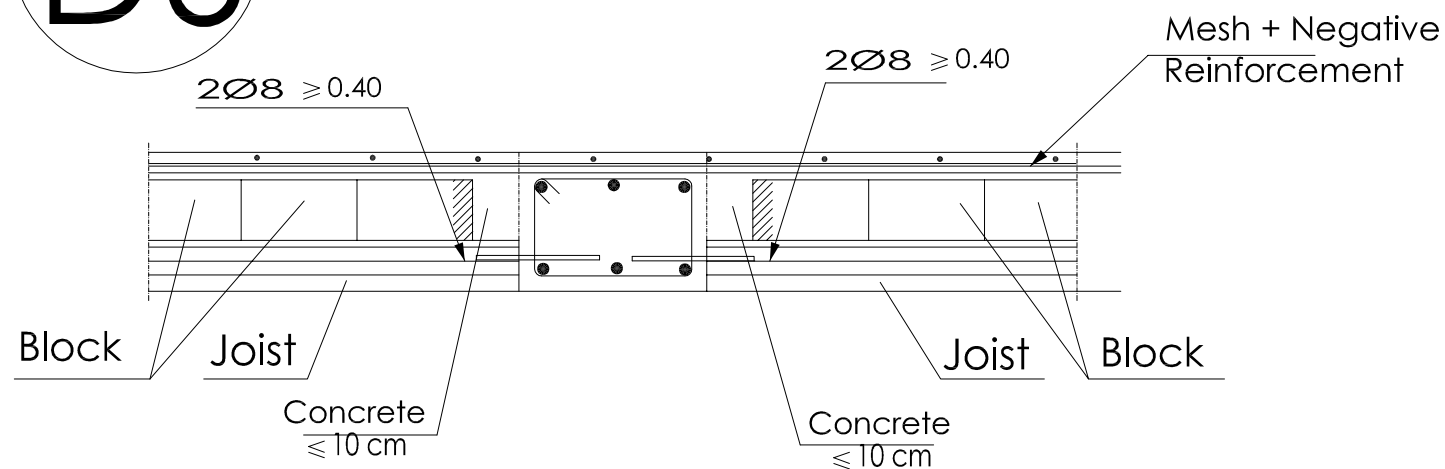
D4



D5



D6



FINAL PROJECT SINGLE FAMILY HOUSE

JUNE 2012

SLAB DETAILS

SCALE:
1/100

STUDENT:

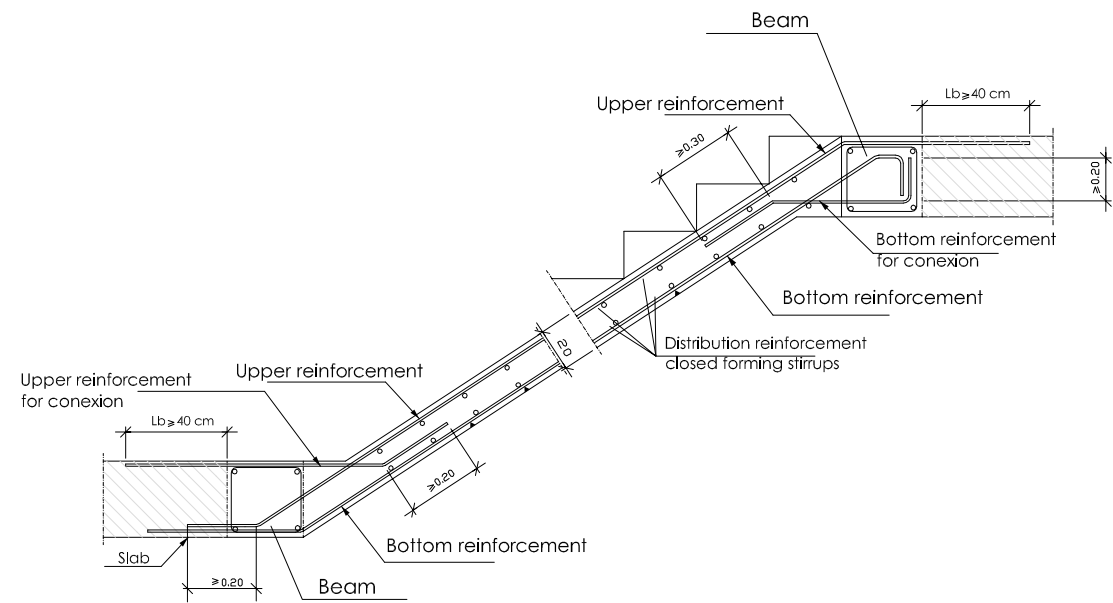
MERCEDES ESTEVE MONTESINOS

TUTORS:

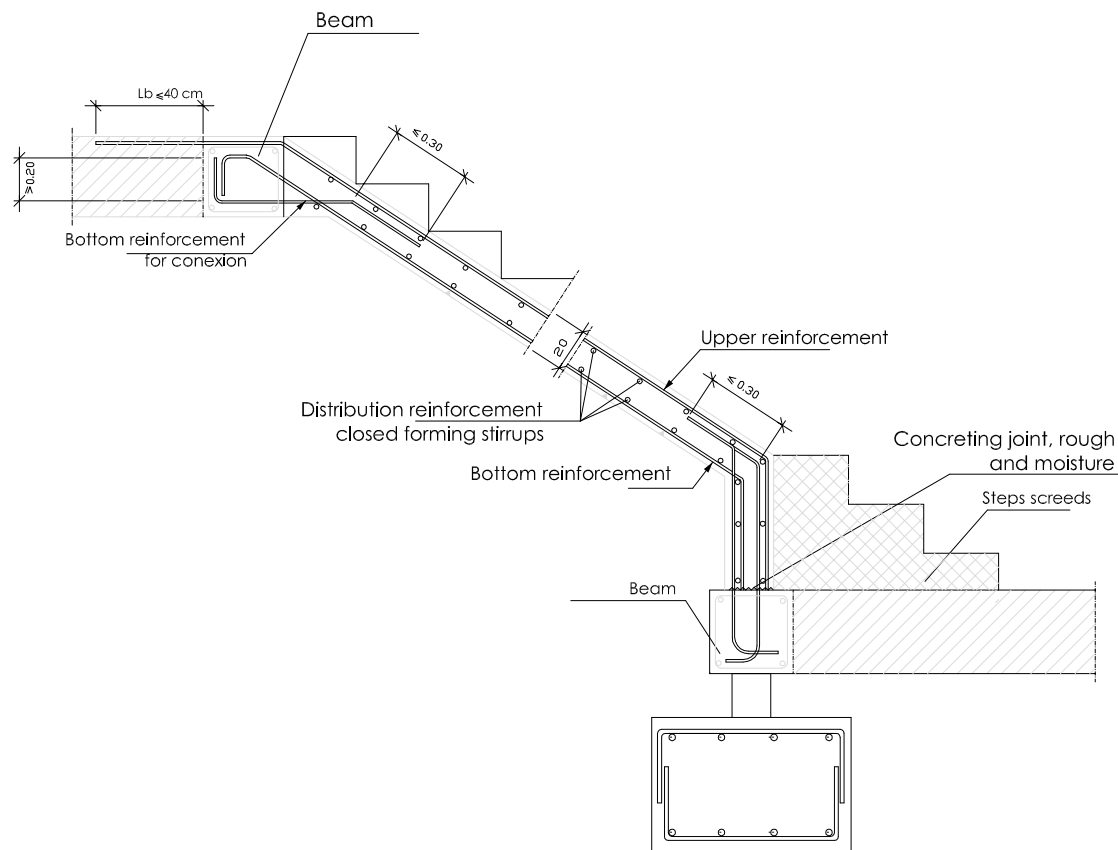
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

34

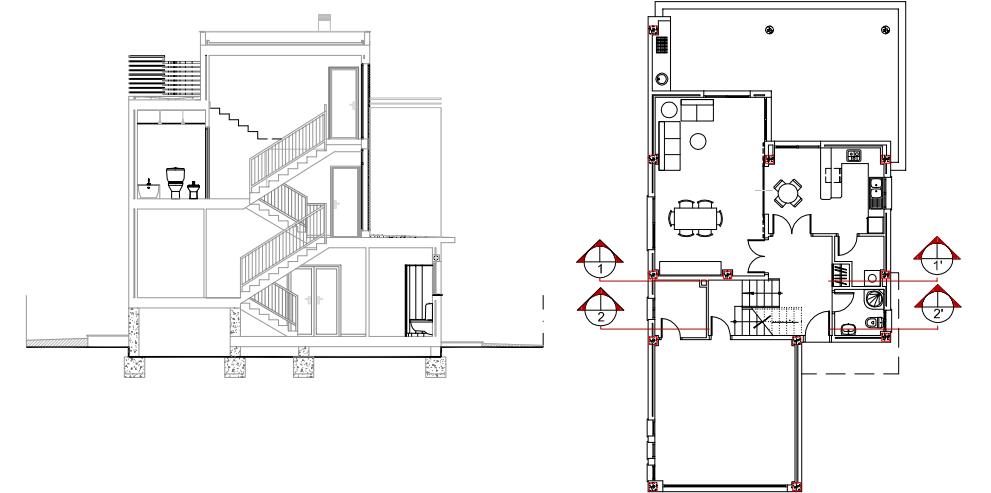


SECTION 2-2'



SECTION 1-1'

Material characteristics									
Materials	Concrete					Steel			
	Control	Safety factor	Type	Cement type	Maximum relation W/C	Max/min cement amount (kg/m³)	Control level	Safety factor	Type
Element Zone/Floor	Statistical	$\gamma_c = 1.50$	HA-25/B/20/11b	CEM II/A-L 42.5R	0.55	400 / 300	Normal	$\gamma_s = 1.15$	B-500-S
All elements									
Loads	Normal	$\gamma_G = 1.50$ $\gamma_Q = 1.60$	Adapted to the EHE Instruction						
Notas									
- Statistical Control in EHE, equivalent to Normal Control. - Overlaps, according to EHE - The steel used must be guaranteed with a recognized distinctive, Seal CIETSID, CC-EHE....									
Nominal covers									



FINAL PROJECT
SINGLE FAMILY HOUSE

JUNE 2012

STAIR DETAILS

SCALE:
1/100

STUDENT:

MERCEDES ESTEVE MONTESINOS

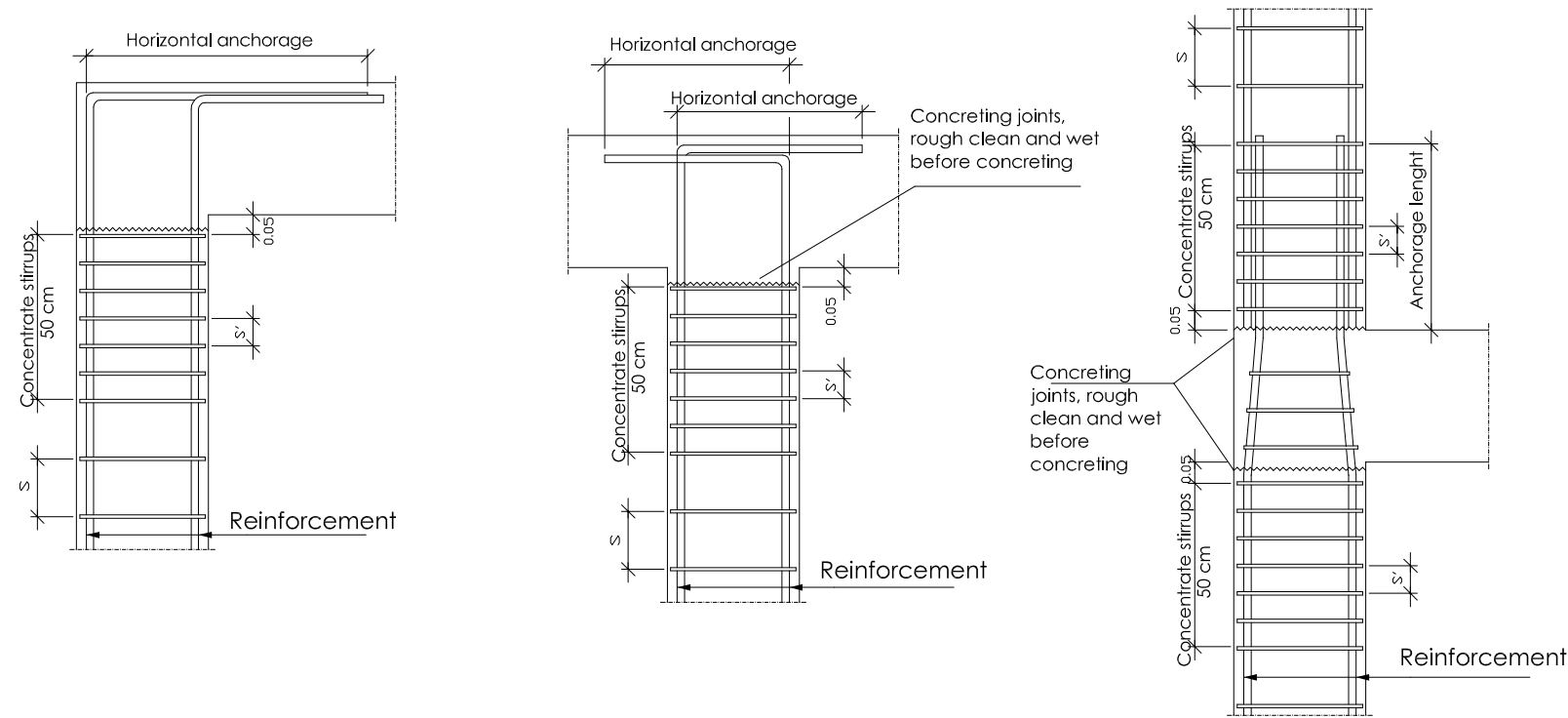
TUTORS:

FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

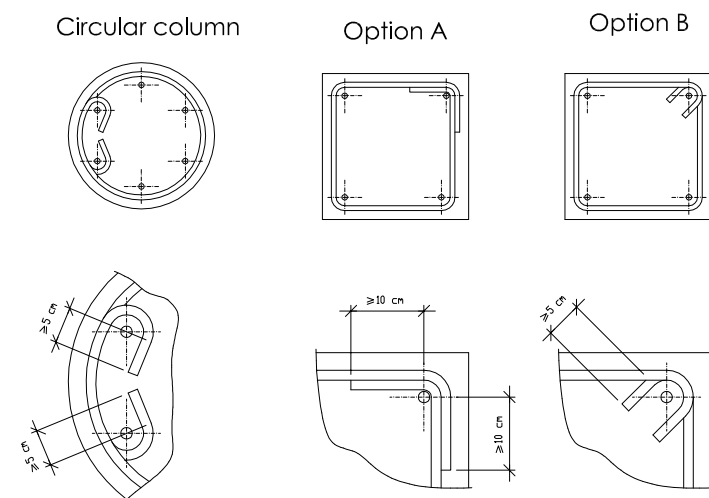
35

DETAILS OF ANCHORAGE BARS IN COLUMNS



Material characteristics									
Materials	Concrete						Steel		
	Control		Characteristics				Control		Characteristics
Element Zone/Floor	Control level	Safety factor	Type	Cement type	Maximum relation W/C	Max/min cement amount (kg/m ³)	Control level	Safety factor	Type
All elements	Statistical	$\gamma_c = 1,50$	HA-25/B/20/IIb	CEM II/A-L 42,5R	0,55	400 / 300	Normal	$\gamma_s = 1,15$	B-500-S
Loads	Normal	$\gamma_G = 1,50$ $\gamma_Q = 1,60$	Adapted to the EHE Instruction						
Notes									
- Statistical Control in EHE, equivalent to Normal Control. - Overlaps, according to EHE - The steel used must be guaranteed with a recognized distinctive. Seal CIETSID, CC-EHE...									
Nominal covers									
			1- Lateral cover, 3 cm 2- Topcover in last floor 3 cm						

DETAILS OF STIRRUPS AND BARS PLACING IN COLUMNS



FINAL PROJECT SINGLE FAMILY HOUSE

JUNE 2012

DETAILS COLUMNS

SCALE:

STUDENT:

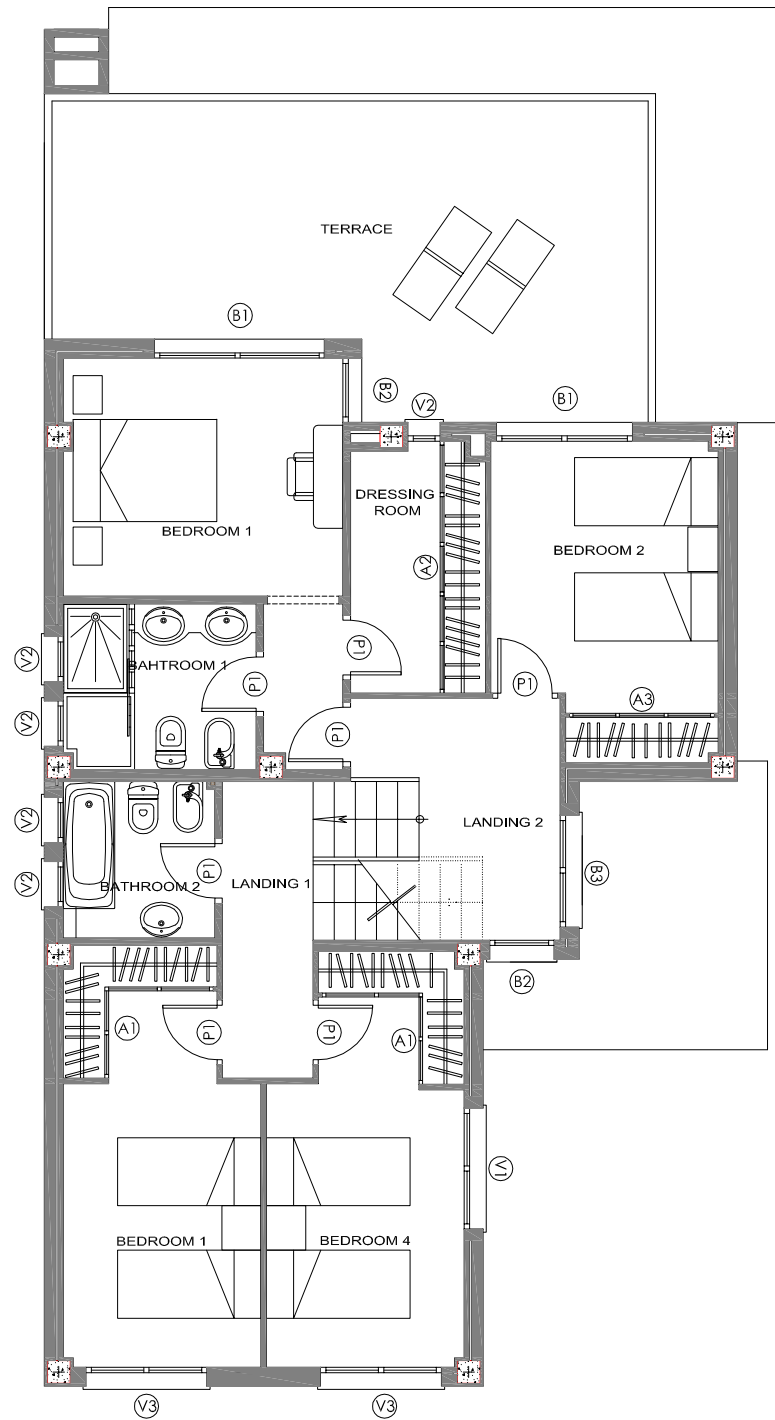
MERCEDES ESTEVE MONTESINOS

TUTORS:

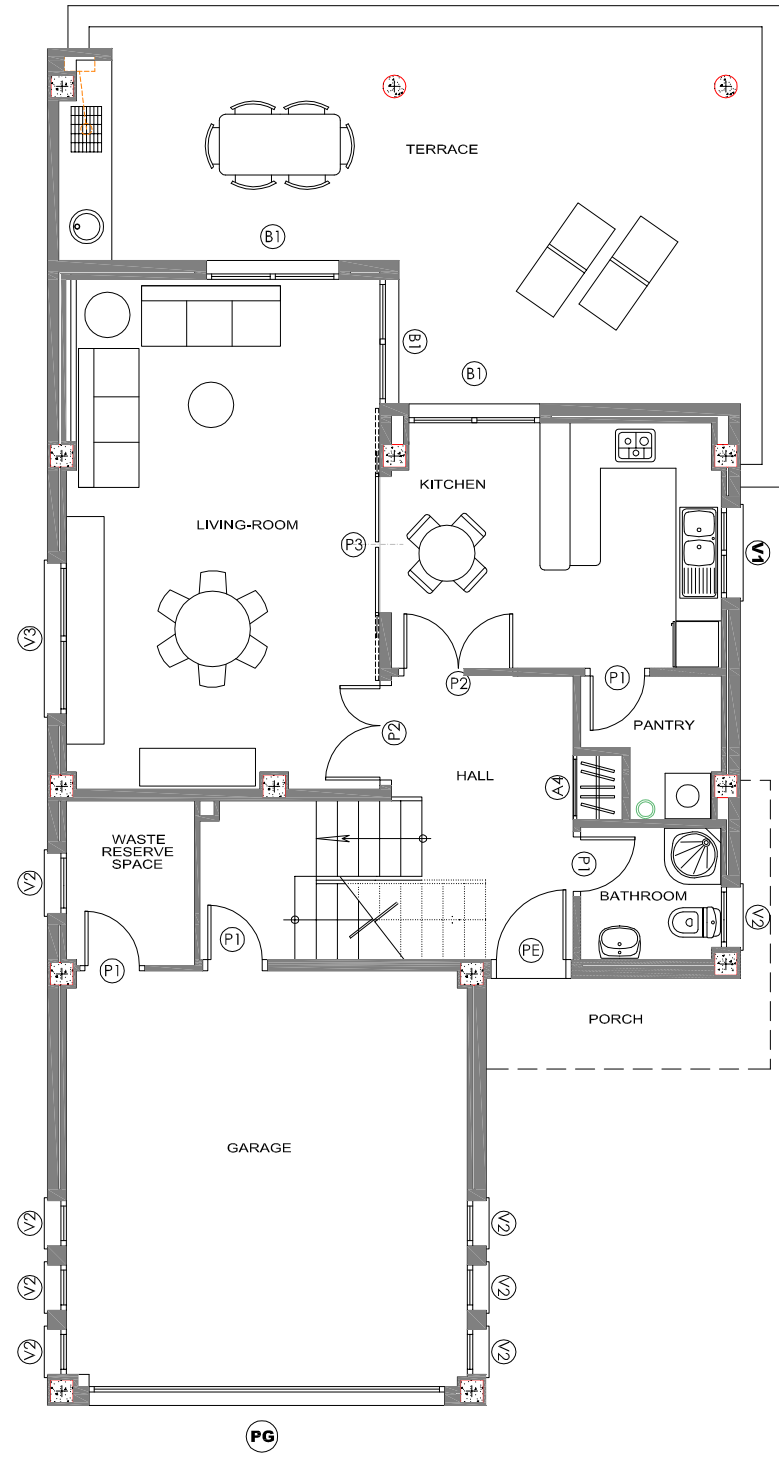
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

36



FIRST FLOOR



GROUND FLOOR



FINAL PROJECT
SINGLE FAMILY HOUSE

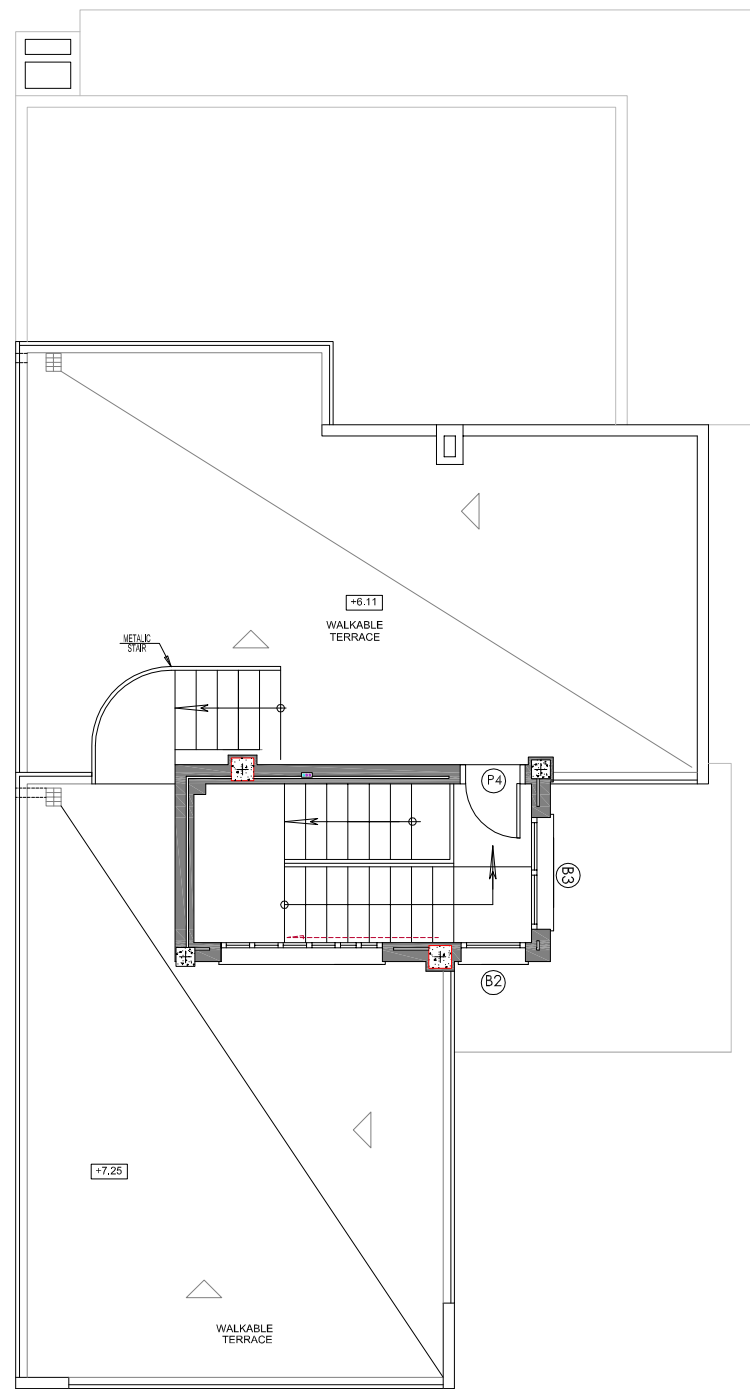
JUNE 2012

CARPENTRY SUMMARY

SCALE:
1/100

STUDENT:
MERCEDES ESTEVE MONTESINOS
TUTORS:
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:
37



ROOF PLANT



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SINGLE FAMILY HOUSE

JUNE 2012



CARPENTRY SUMMARY ROOF

SCALE:
1/100

STUDENT:
MERCEDES ESTEVE MONTESINOS

PLAN Nº:

TUTORS:
FRANTISEK KULHANEK / MILAGRO IBORRA

38

EXTERIOR CARPENTRY ALUMINUM					
TYPE	VEHICLE SLIDING DOOR ACCESS TO HOUSING	TYPE	FENCE DOOR	TYPE	LM
UNITS	1 UNIT	UNITS	1 UNIT	UNITS	0.85 x 4.90 -FIXED (1 Un) 1.50 x 4.90 -FIXED (1 Un) 0.60 x 1.00 -MOVING (2 Un) 0.80 x 1.00 -MOVING (1 Un)

EXTERIOR PVC CARPENTRY EXTERIOR											
TYPE	V1	TYPE	V2	TYPE	V3 FOLDING WINDOWS	TYPE	B1	TYPE	B2	TYPE	B3
UNITS	1 un.- 1.20 x 1.00 1 un.- 1.60 x 1.20	UNITS	1 un.-0.40 x 0.80 10 un.-0.60 x 1.00 2 un.-0.80 x 1.00	UNITS	un.- 2.00 x 1.20 2 un.- 1.60 x 1.20	UNITS	1 un.-1.65 x 2.10 2 un.-1.75 x 2.10 1 un.-1.80 x 2.10 1 un.-2.25 x 2.10	UNITS	1 un.-0.85 x 2.10 1 un.-0.85 x 2.20 1 un.-0.85 x 2.35	UNITS	1 un.-1.50 x 2.20 1 un.-1.50 x 2.35
TYPE	ED										
UNITS	1 UNIT										

INTERIOR WOOD CARPENTRY							
TYPE	P1	TYPE	P2	TYPE	P3	WARDROBE 2 DOORS	A1
UNIT	11	UNIT	2	UNIT	1	UNIT	4
WARDROBE 5 DOORS	A2	WARDROBE 3 DOORS	A3	TYPE	A4		
UNIT	1	UNIT	1	UNITS	1		

EXTERIOR GALVANIZED CARPENTRY			
TYPE	PG	TYPE	P4
UNITS	1 UN. - 4.70 x 2.20	UNITS	1 UNIT



FINAL PROJECT

SINGLE FAMILY HOUSE

JUNE 2012

CARPENTRY

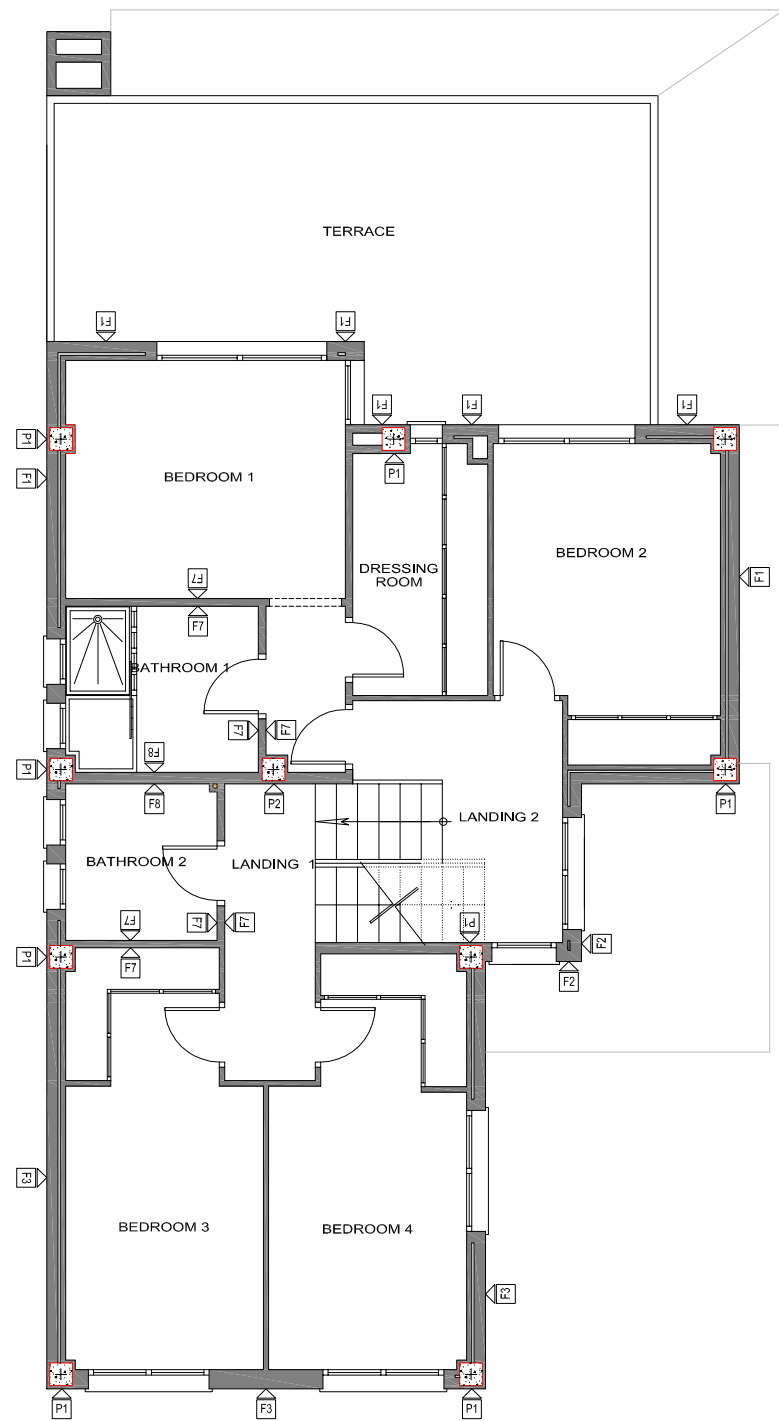
SCALE:
1/100

STUDENT:
MERCEDES ESTEVE MONTESINOS

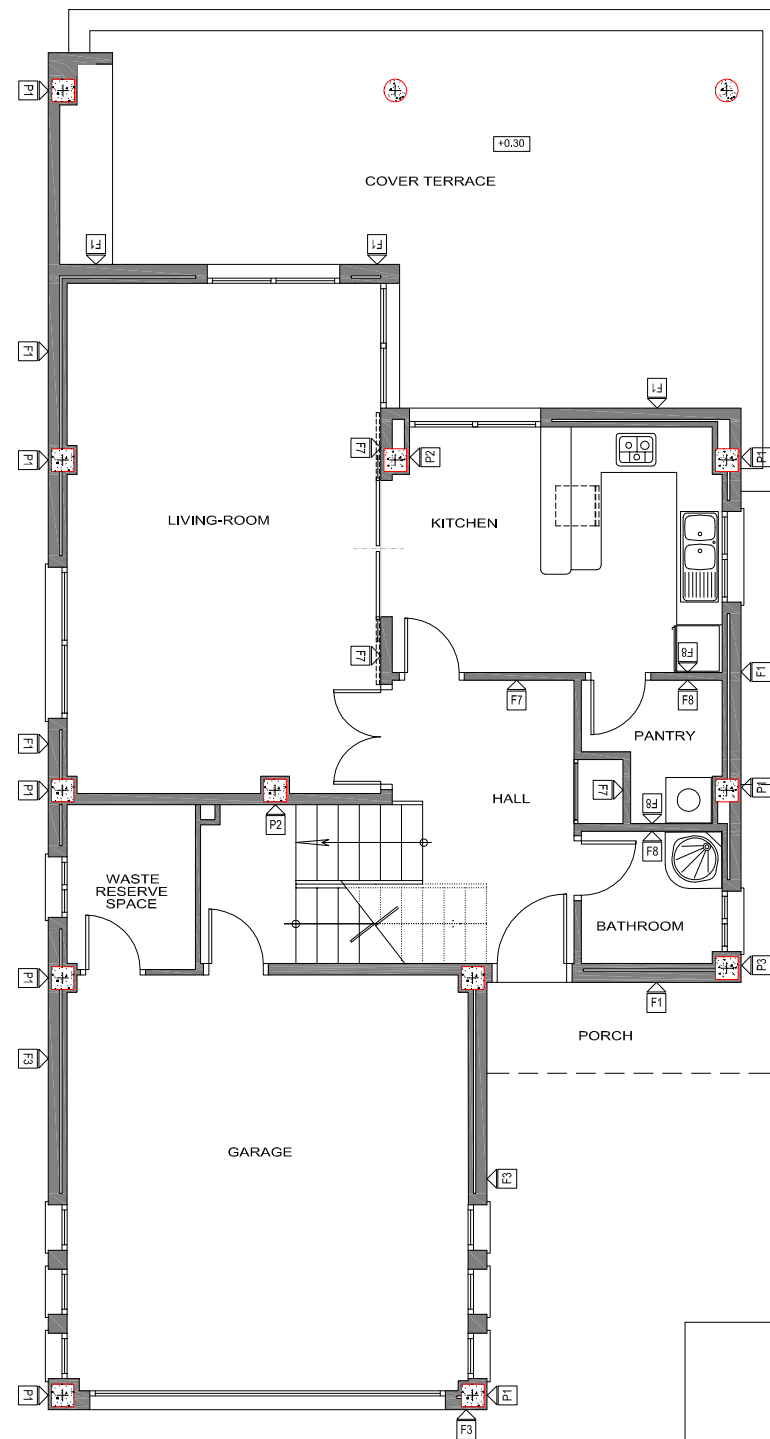
TUTORS:
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

39



FIRST FLOOR



GROUND FLOOR

INTERIOR AND EXTERIOR ENVELOPES

EXTERIOR WALLS	<p>F1 (exterior with facebrick)</p>
	<p>F2 (exterior in slingerlayer)</p>
	<p>F3 (exterior stone veneer)</p>
INTERIOR HOUSING	<p>F7 (partition between wet and dry zones)</p>
	<p>F8 (partition between wet zones)</p>
	<p>F9 (partition between dry zones)</p>
COLUMNS	<p>P1 (cover exterior columns)</p>
	<p>P2 (cover interior columns)</p>
	<p>P3 (cover external columns)</p>

FINAL PROJECT
SINGLE FAMILY HOUSE

ENCLOSURE AND PARTITIONS

JUNE 2012

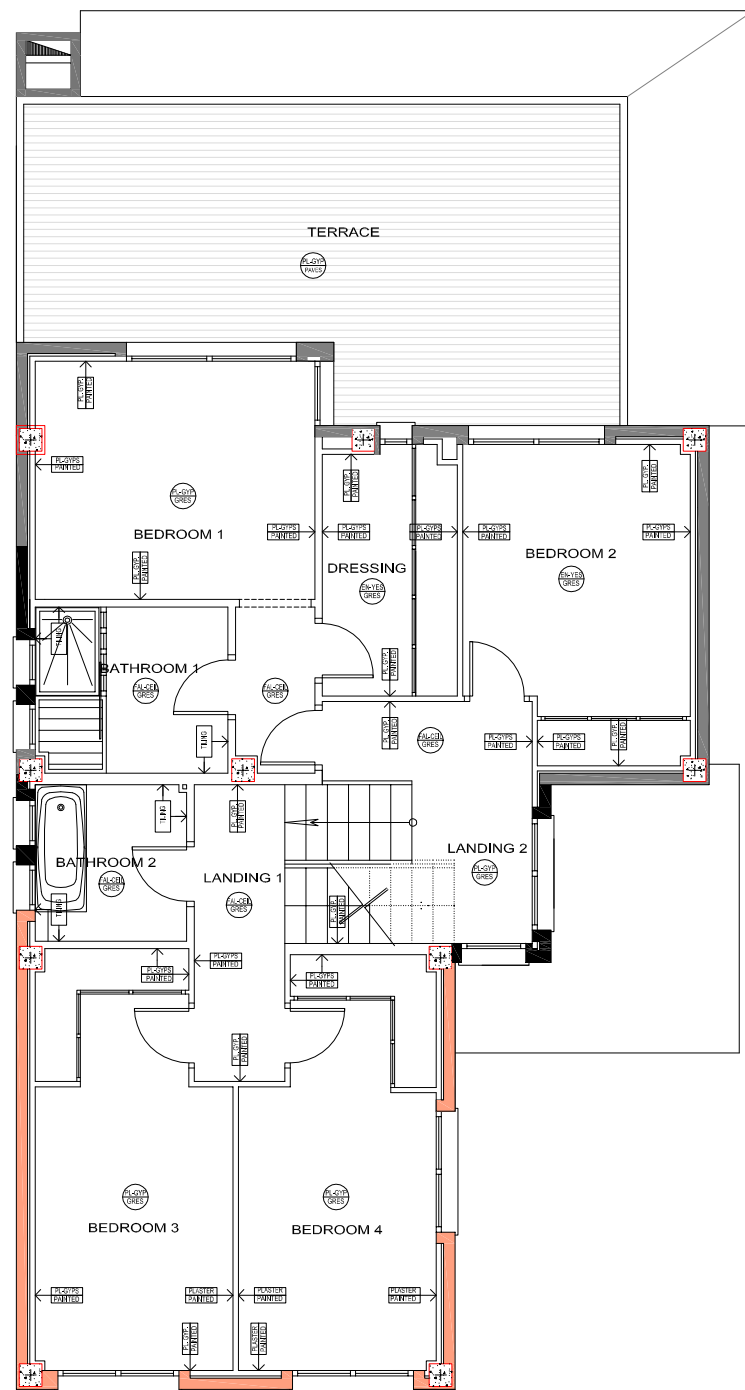
SCALE:
1/100

STUDENT:
MERCEDES ESTEVE MONTESINOS

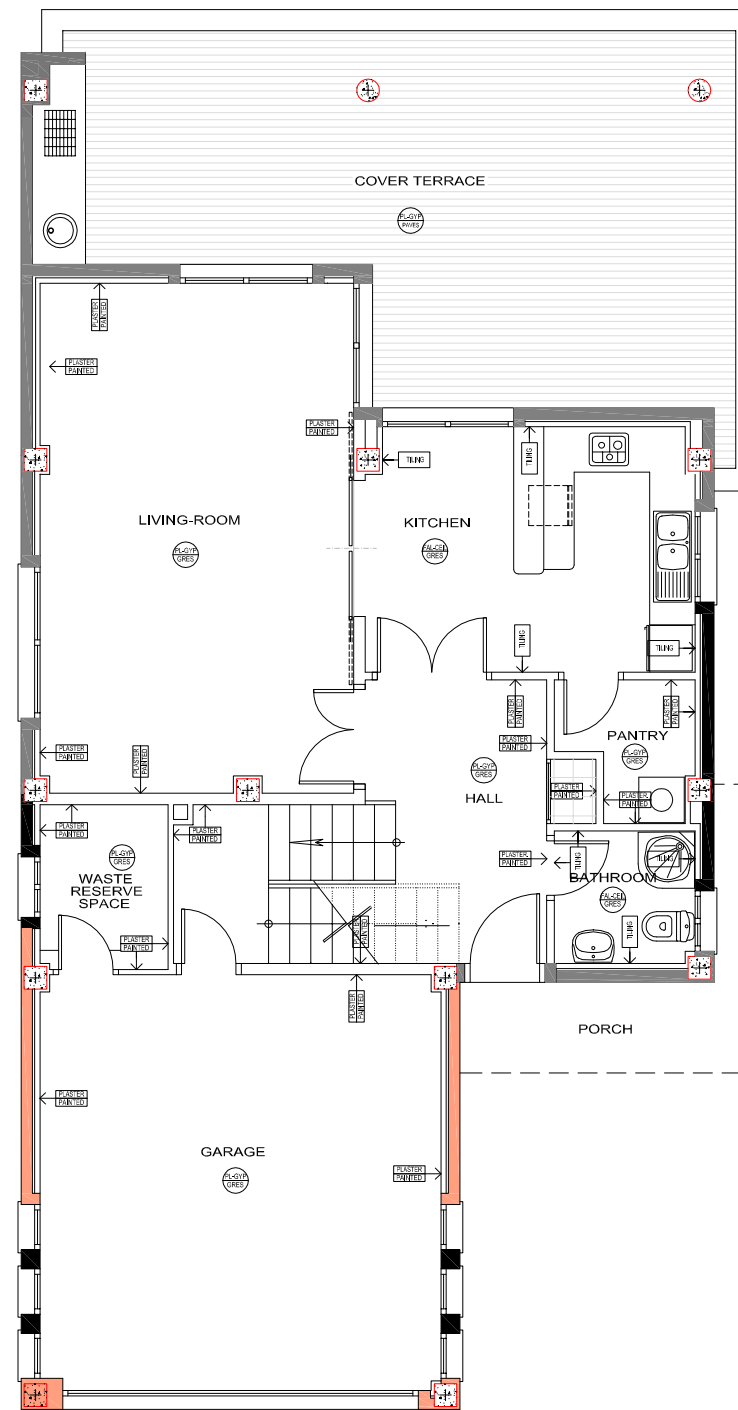
TUTORS:
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

40



FIRST FLOOR



GROUND FLOOR

Legend	
	Ceiling covering
	Floor covering
	Walls covering
GRES	Interior flooring of ceramic gres
GRES EXT.	Exterior flooring of anti-split gres
MARMOL	Country marmol cover
PL-GYP	Plaster in ceiling with gypsum and painted with plastic paint
PLASTER	Plaster mounting walls with gypsum and painted with plastic paint
FAL-CEIL	Pladur false ceiling painted with plastic paint
TILING	Tiling with ceramic tile of big format
MONOLAYER	Exterior cover with one-layer with scraped finish
ENDUFIN	Coating with plaster mortar and painted with plastic paint
	Coating facade with bright colour monolayer
	Coating face with white monolayer
	Enclosure with white facebrick 24x12x5 cm
	Plated metal plate
	False ceiling plain Pladur
	False removable ceiling Pladur



FINAL PROJECT

SINGLE FAMILY HOUSE

JUNE 2012

FINISHES

SCALE:
1/100

STUDENT:

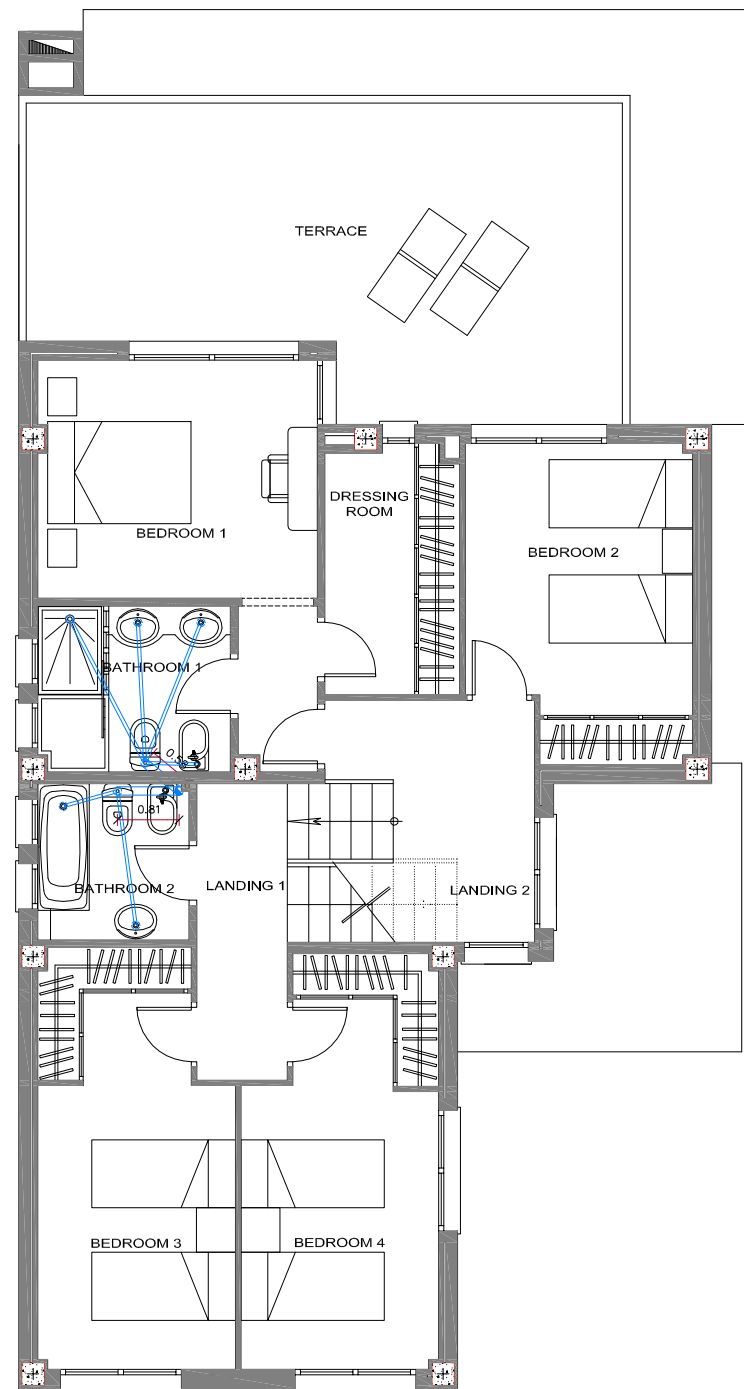
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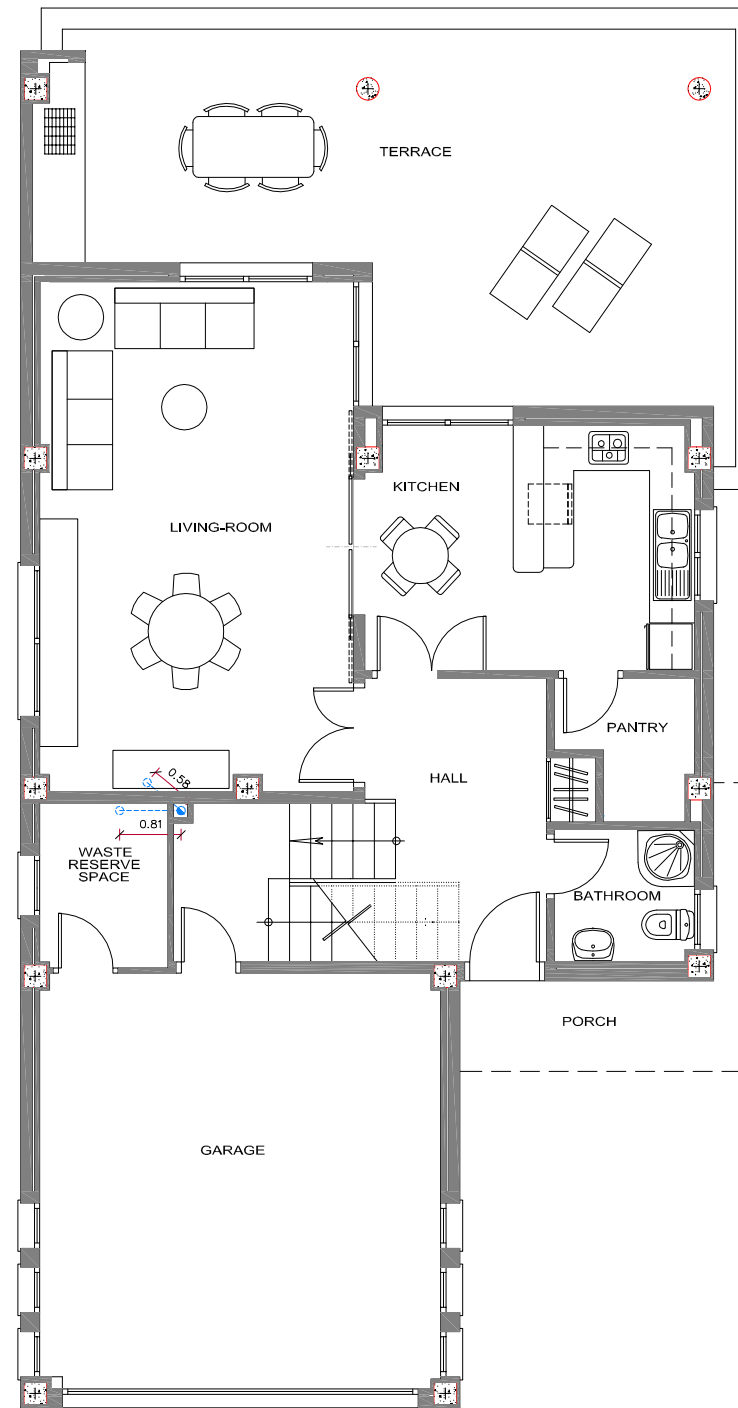
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

41

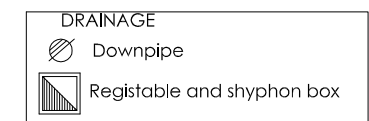


FIRST FLOOR



GROUND FLOOR

Drainage bathrooms	
P.V.C.	
Sink	32 mm.
Shower	40 mm.
Tub	40 mm.
Bide	32 mm.
Toilet	110 mm.
Dishwasher	40 mm.
Washer	40 mm.



FINAL PROJECT
SINGLE FAMILY HOUSE

JUNE 2012

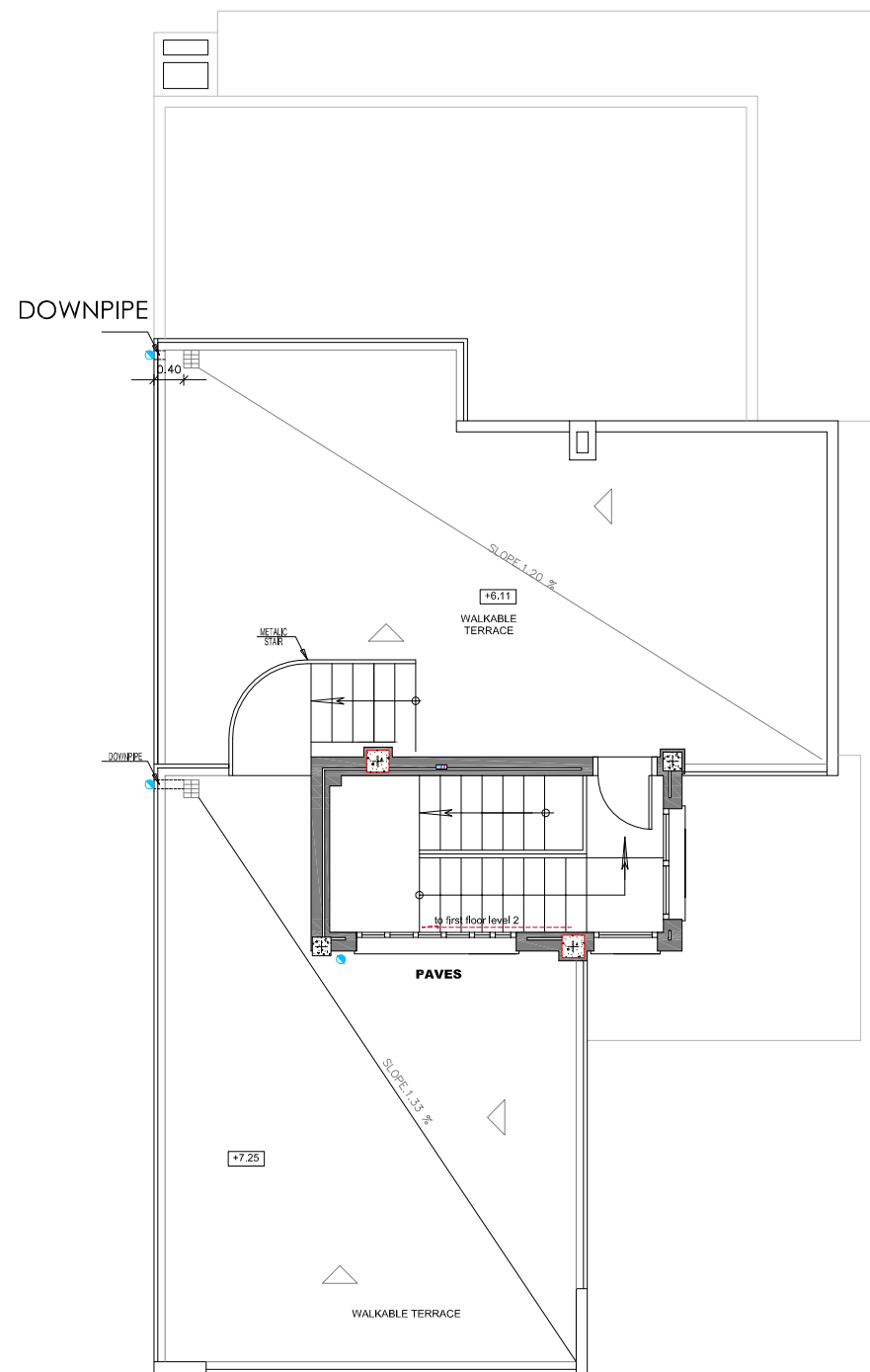
SEWERAGE SYSTEM

SCALE:
1/100

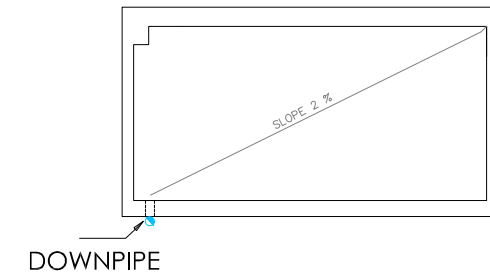
STUDENT:
MERCEDES ESTEVE MONTESINOS
TUTORS:
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

42



ROOF PLANT



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JUNE 2012



SEWERAGE ROOF

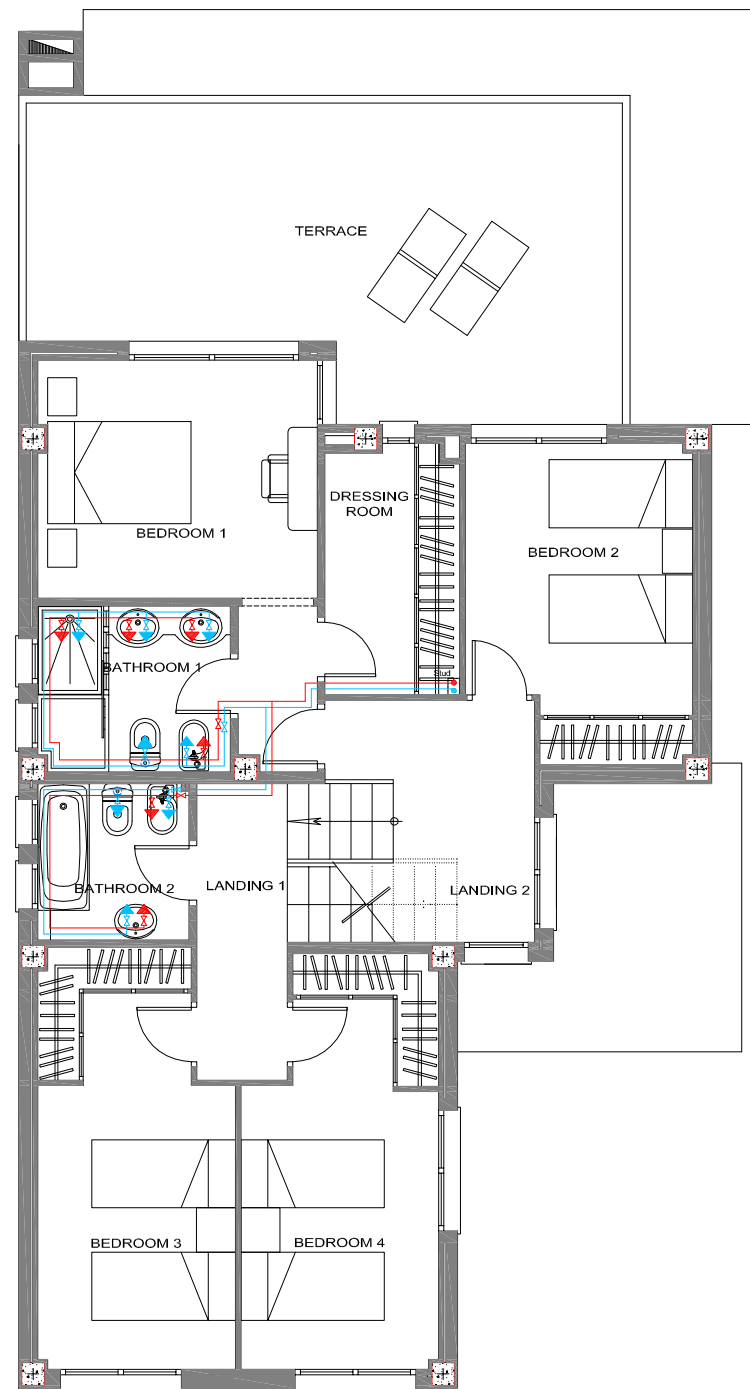
SCALE:
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STUDENT:
MERCEDES ESTEVE MONTESINOS

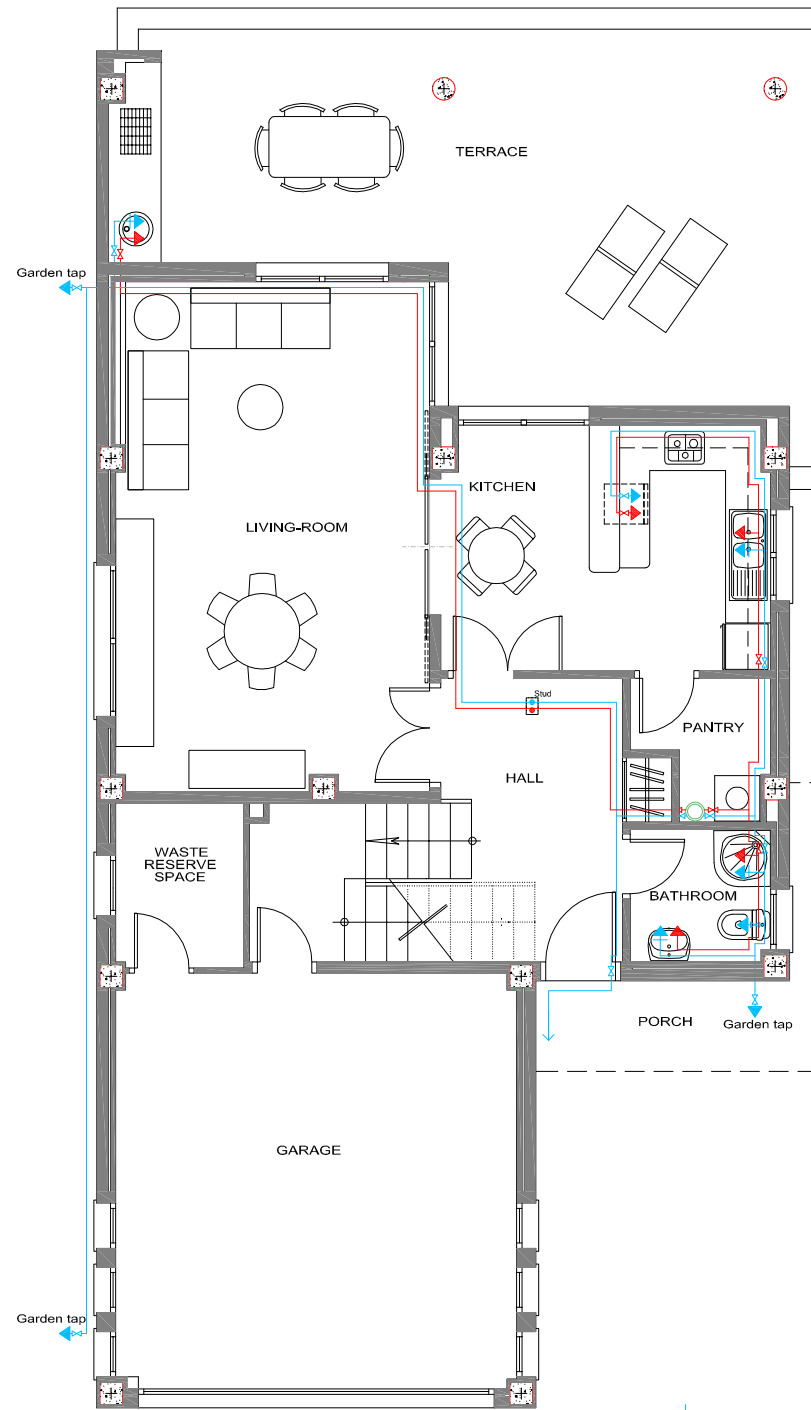
PLAN Nº:

TUTORS:
FRANTISEK KULHANEK / MILAGRO IBORRA

43



FIRST FLOOR



GROUND FLOOR

SIMBOLOGY		
PLUMBING FACILITIES		
	Water supply	
	Main Tap Fitch	
	General Water Meter	
	Tap stop	
	Amount of water	
	Conduction of Cold water	
	Conduction of Hot water	
	Supply tap of Sanitary ware of Cold water	
	Supply tap of Sanitary ware of Hot water	
	Electric Storage Tank 100 l	
INSTALLATION OF CONDUCTION MATERIALS (CTE DB HS4)	Cold water	Hot water
Branch to complete bathroom	Copper 20	Copper 20
Branch to complete toilet	20	20
Branch to laundry, sink and washed machine	20	20
Branch to complete bathroom to cold and hot water	20	
Branch to complete toilet to cold and hot water	20	
Branch to laundry, sink and washed machine, cold and hot w.	20	20
Water supply to tub and drain	20	20
Water supply to sink and drain	12	12
Water supply to videt and drain	12	12
Water supply to WC and drain	12	



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SINGLE FAMILY HOUSE

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PLUMBING

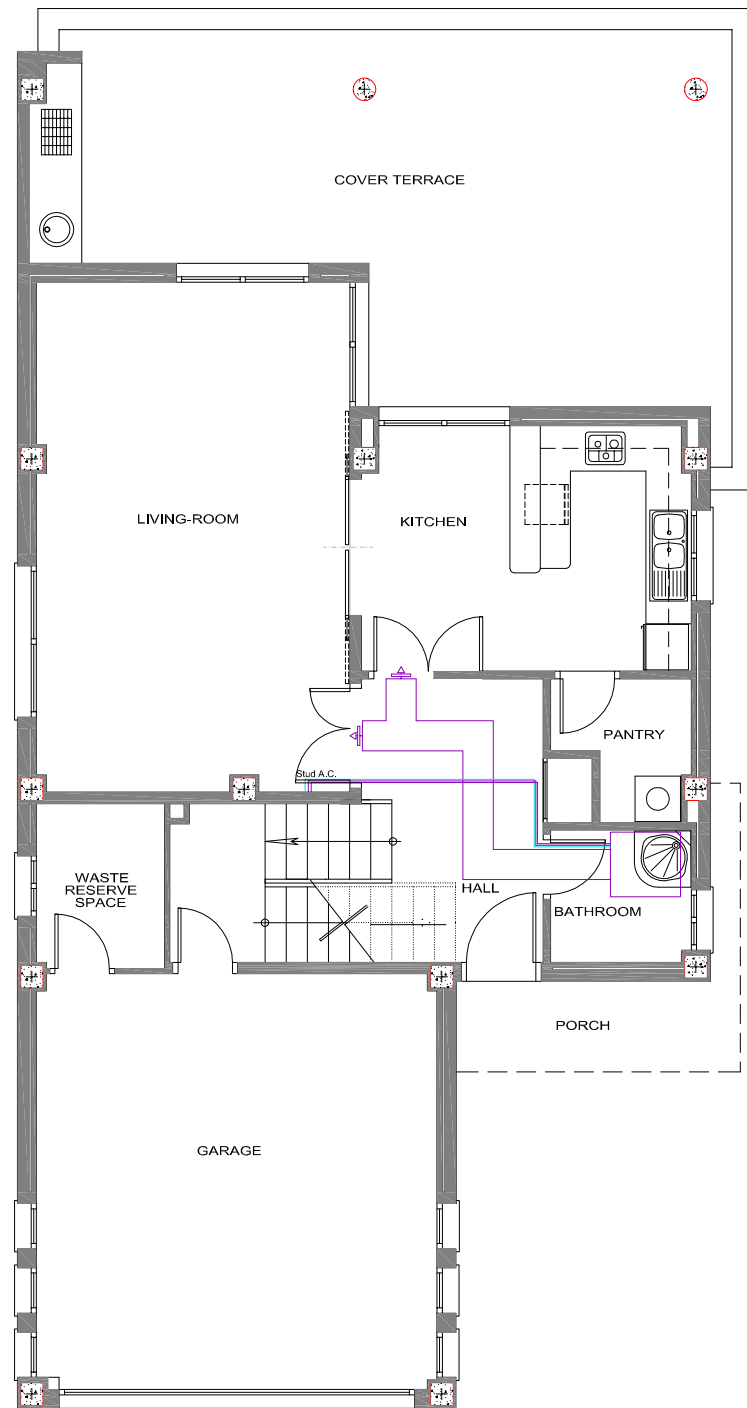
SCALE:
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STUDENT:
MERCEDES ESTEVE MONTESINOS

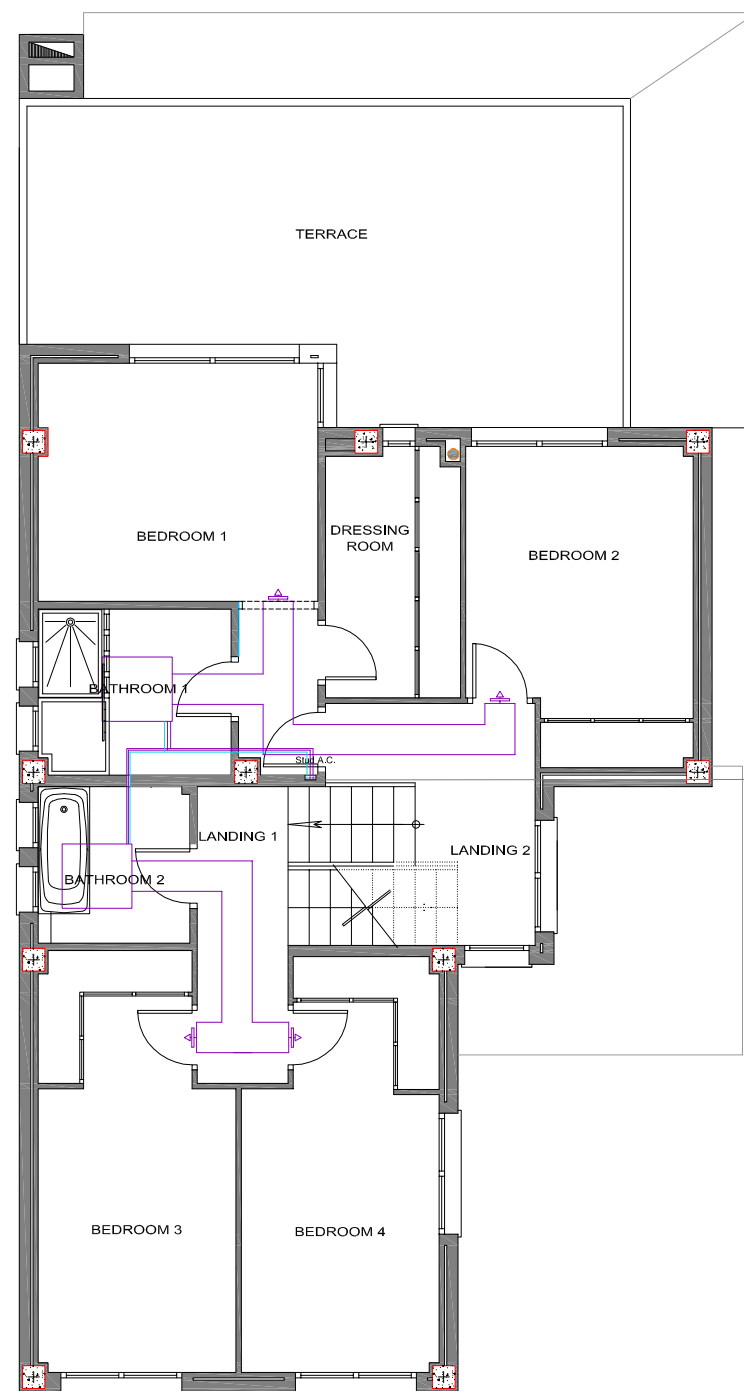
TUTORS:
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

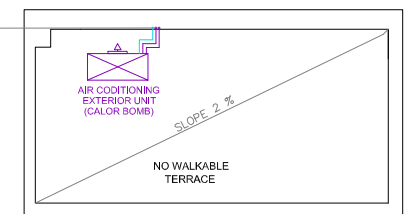
44



GROUND FLOOR



FIRST FLOOR



FINAL PROJECT SINGLE FAMILY HOUSE

JUNE 2012

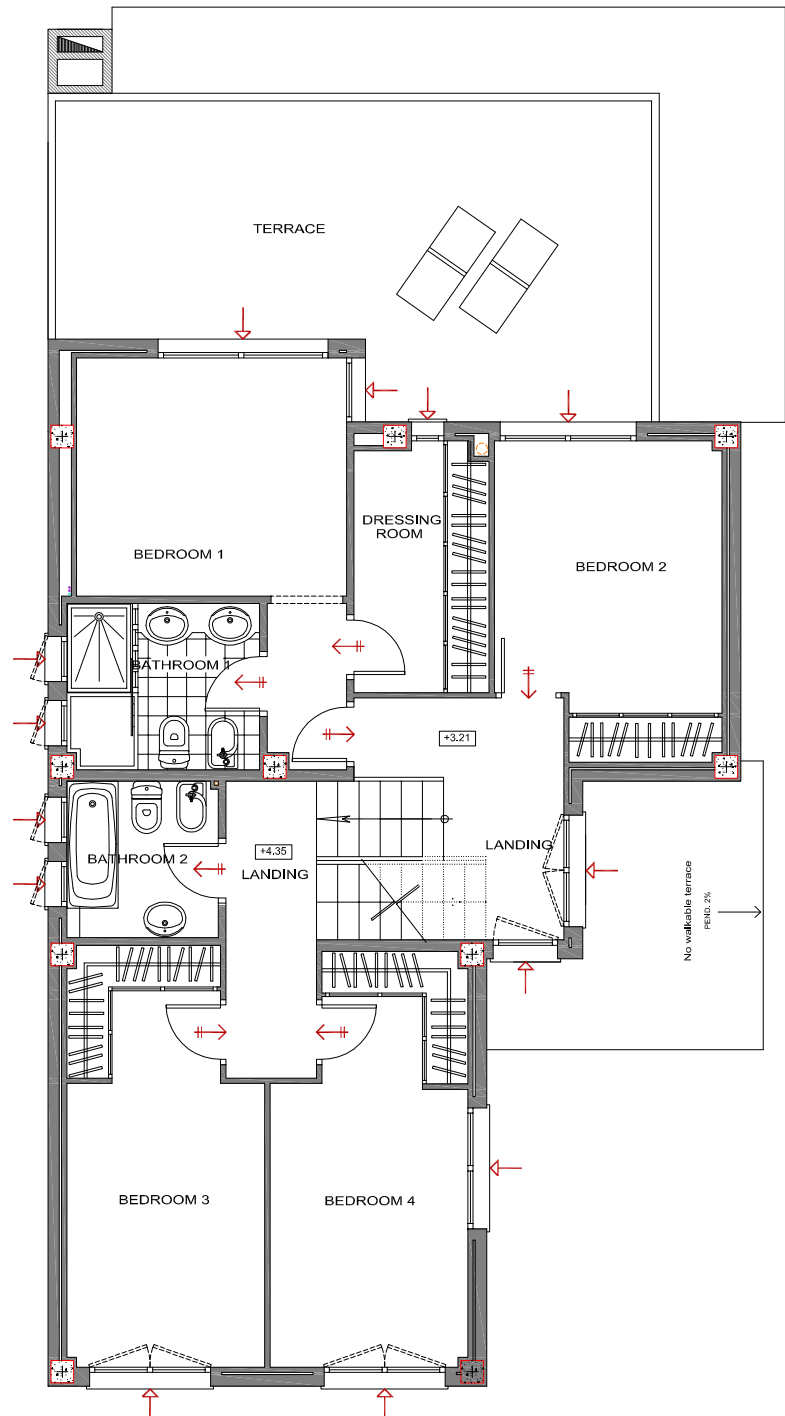
AIR CONDITIONING

SCALE:
1/100

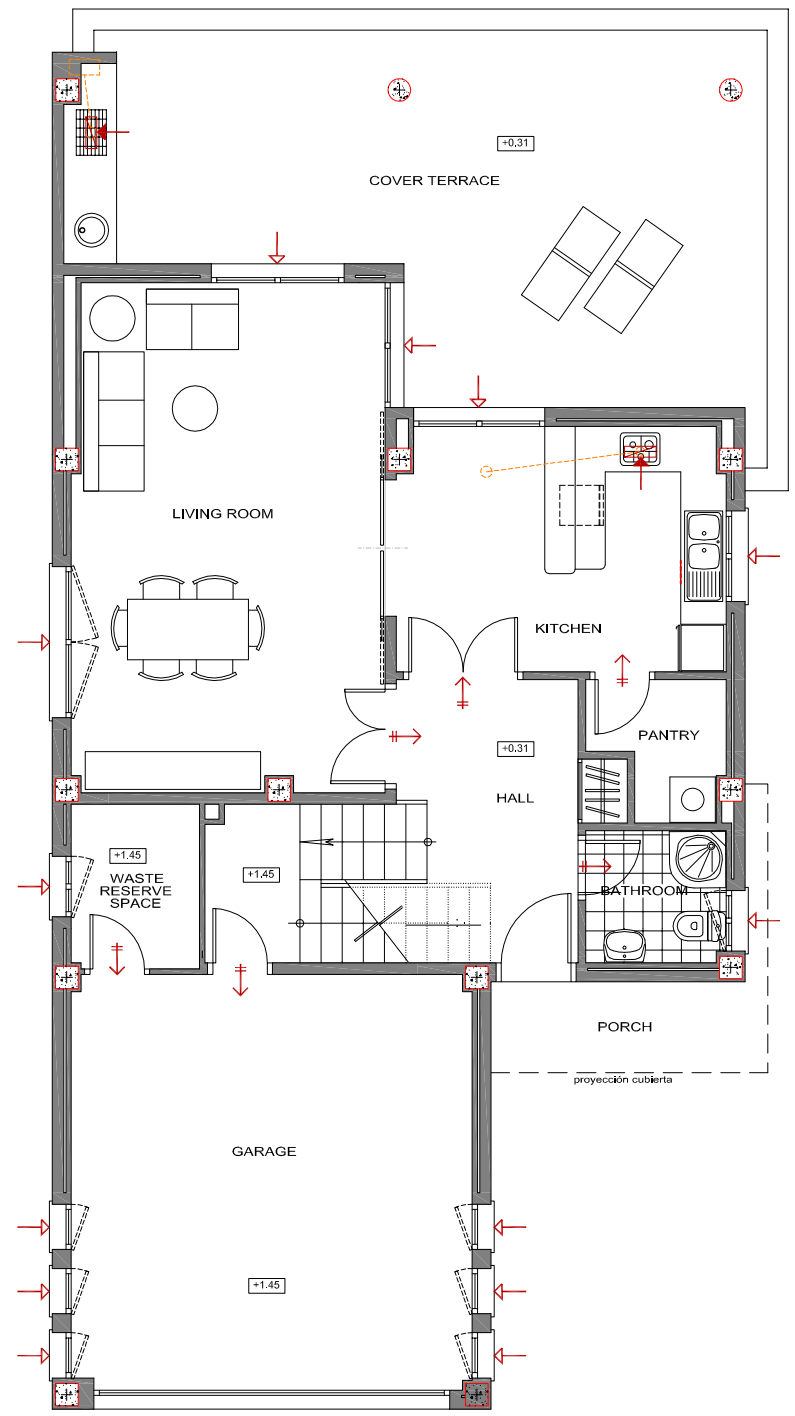
STUDENT:
MERCEDES ESTEVE MONTESINOS
TUTORS:
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

45



FIRST FLOOR



GROUND FLOOR

VENTILATION

- Individual duct
- Multiple duct
- Finish on roofs

COMPLIANCE REGULATION CTE-DB-HS3:
(Apart. 3.1.1. DE HS3)

- Admission opening
- Exhaust opening
- Pass opening
- Exhaust ductwork



FINAL PROJECT

SINGLE FAMILY HOUSE

JUNE 2012

VENTILATION

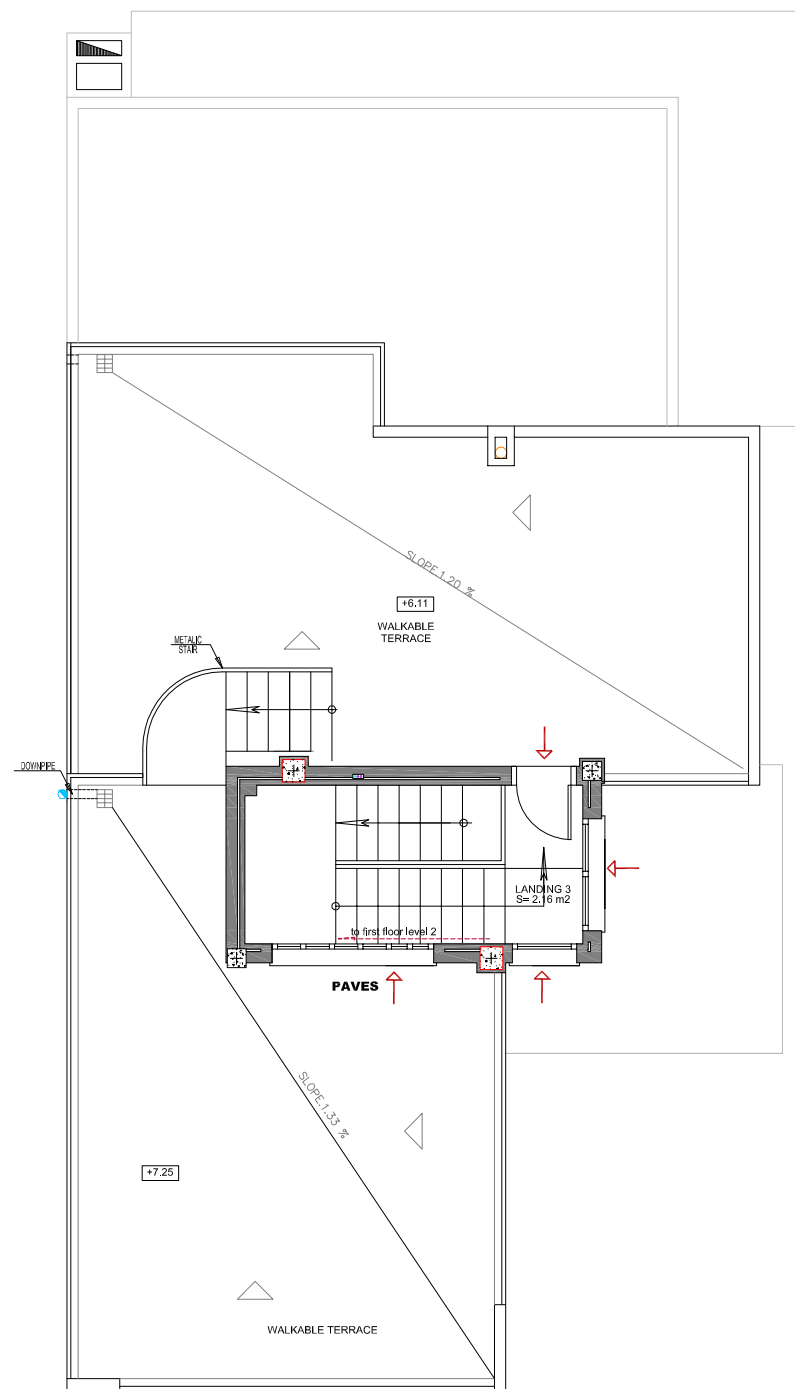
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STUDENT:
MERCEDES ESTEVE MONTESINOS

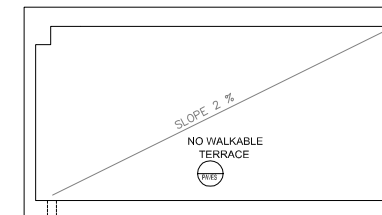
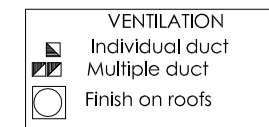
TUTORS:
FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

46



ROOF PLANT



FINAL PROJECT

SINGLE FAMILY HOUSE



VENTILATION ROOF

JUNE 2012

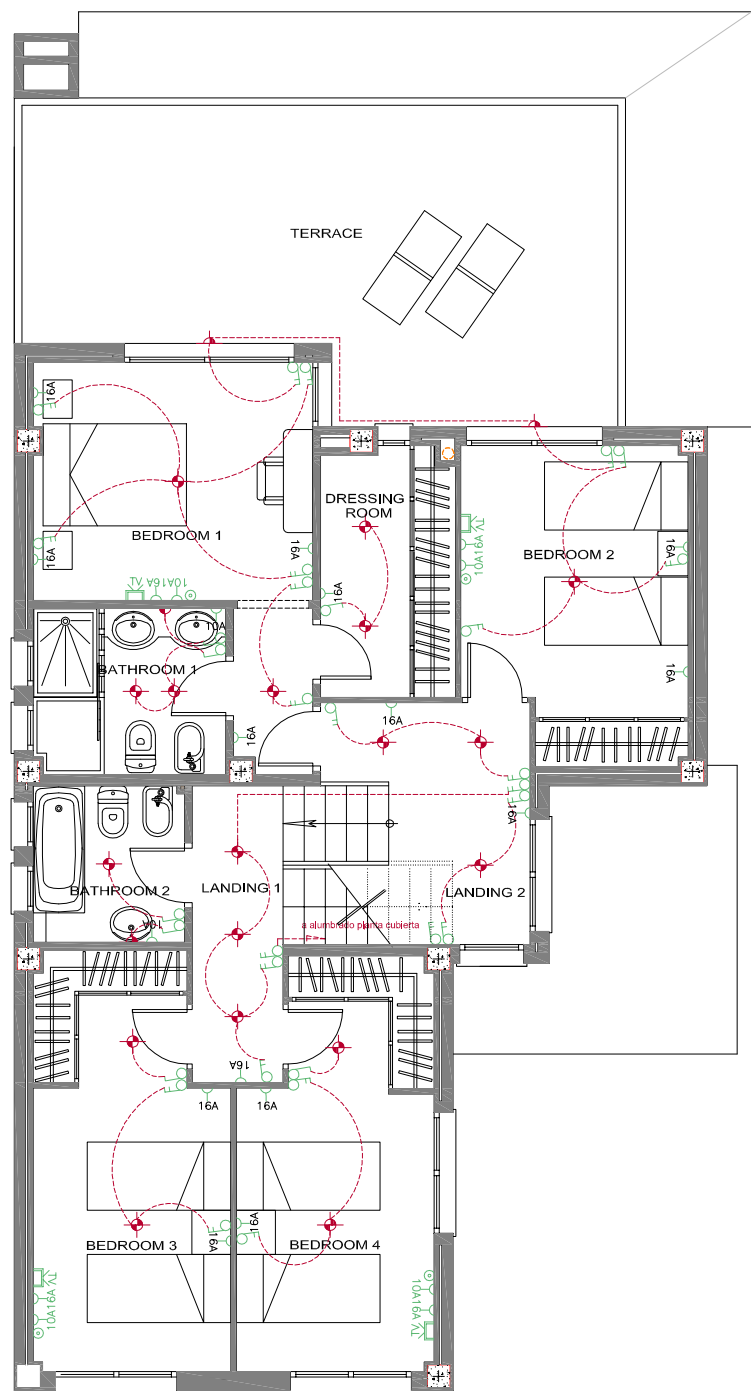
SCALE:
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STUDENT:
MERCEDES ESTEVE MONTESINOS

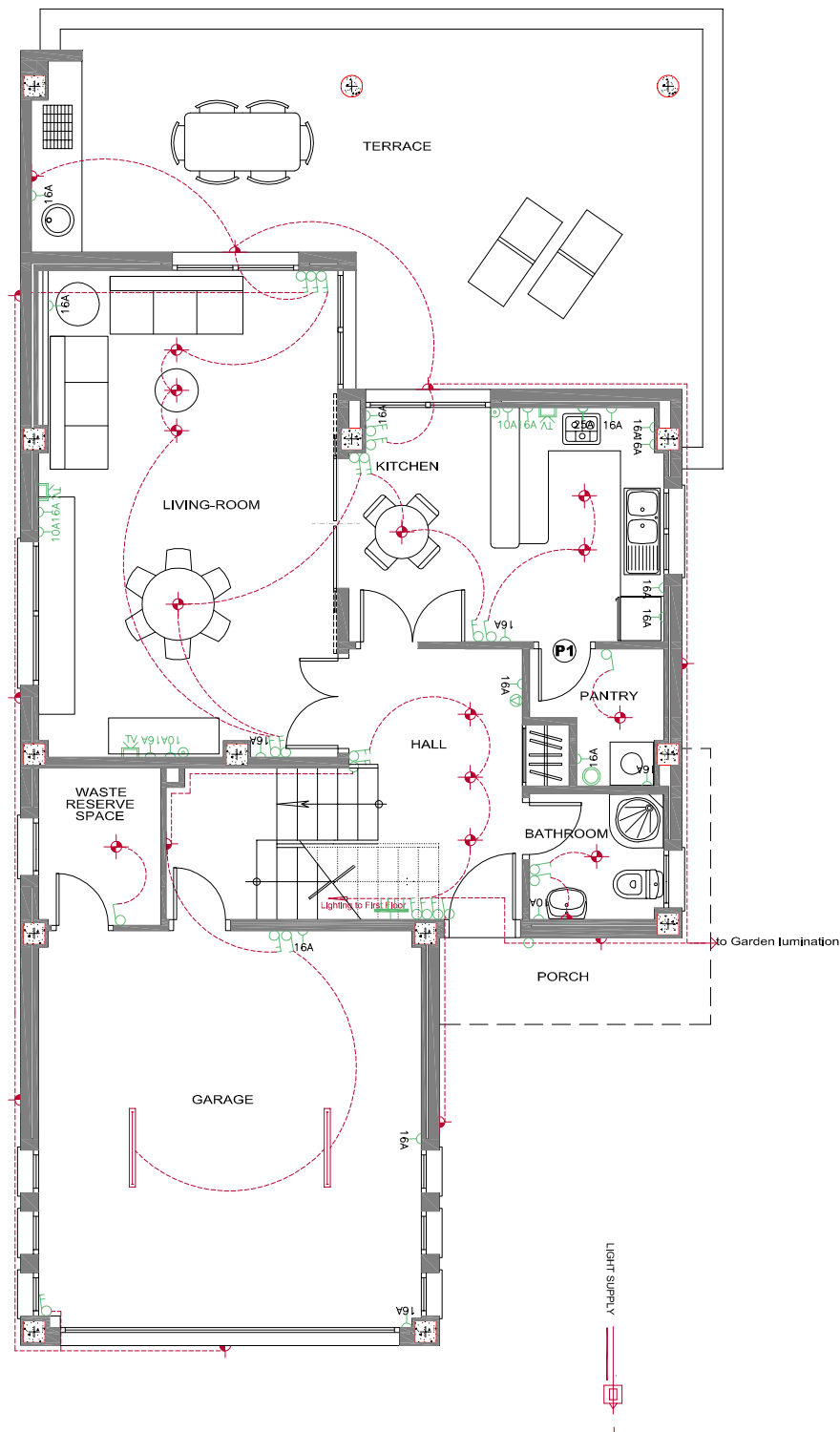
PLAN Nº:

TUTORS:
FRANTISEK KULHANEK / MILAGRO IBORRA

47

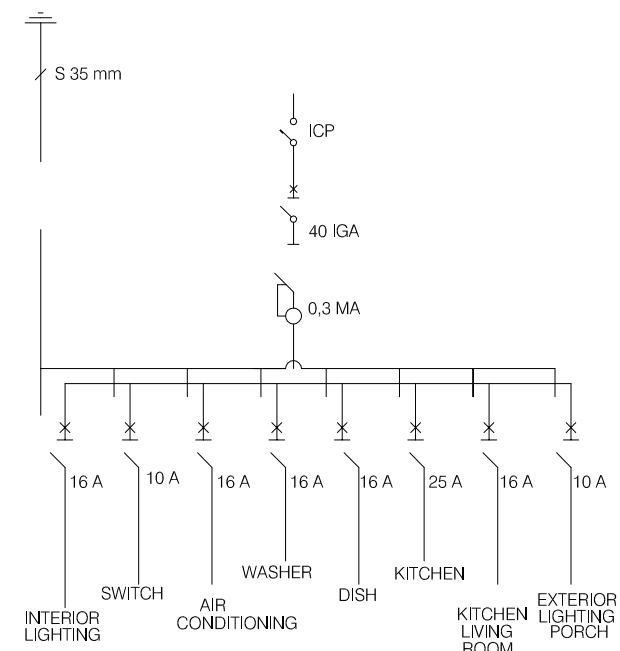


FIRST FLOOR



GROUND FLOOR

SYMBOLISM	
ELECTRICAL FACILITIES	
	Meter box
	Electricity supply
	Electrical Protection box
	Main Distribution Board
	Unipolar break switch
	Switch
	Three-pole break switch
	Light point
	Electrical outlet
	Fluorescent of 60 W
	Outlet in contact with ground point.
	25A outlet in contact with ground point.
	Doorbell button
	Bell or buzzer
	TV antenna socket
	Telephone.
	Electric boiler
	Entryphone Street
	Entryphone Housing
	Community antenna
	Lighting arrestor
GROUNDING SYSTEM	
	Driving buried
	Earthing rod
	Connexion box



FINAL PROJECT

SINGLE FAMILY HOUSE

JUNE 2012

ELECTRICITY

SCALE:
1/100

STUDENT:

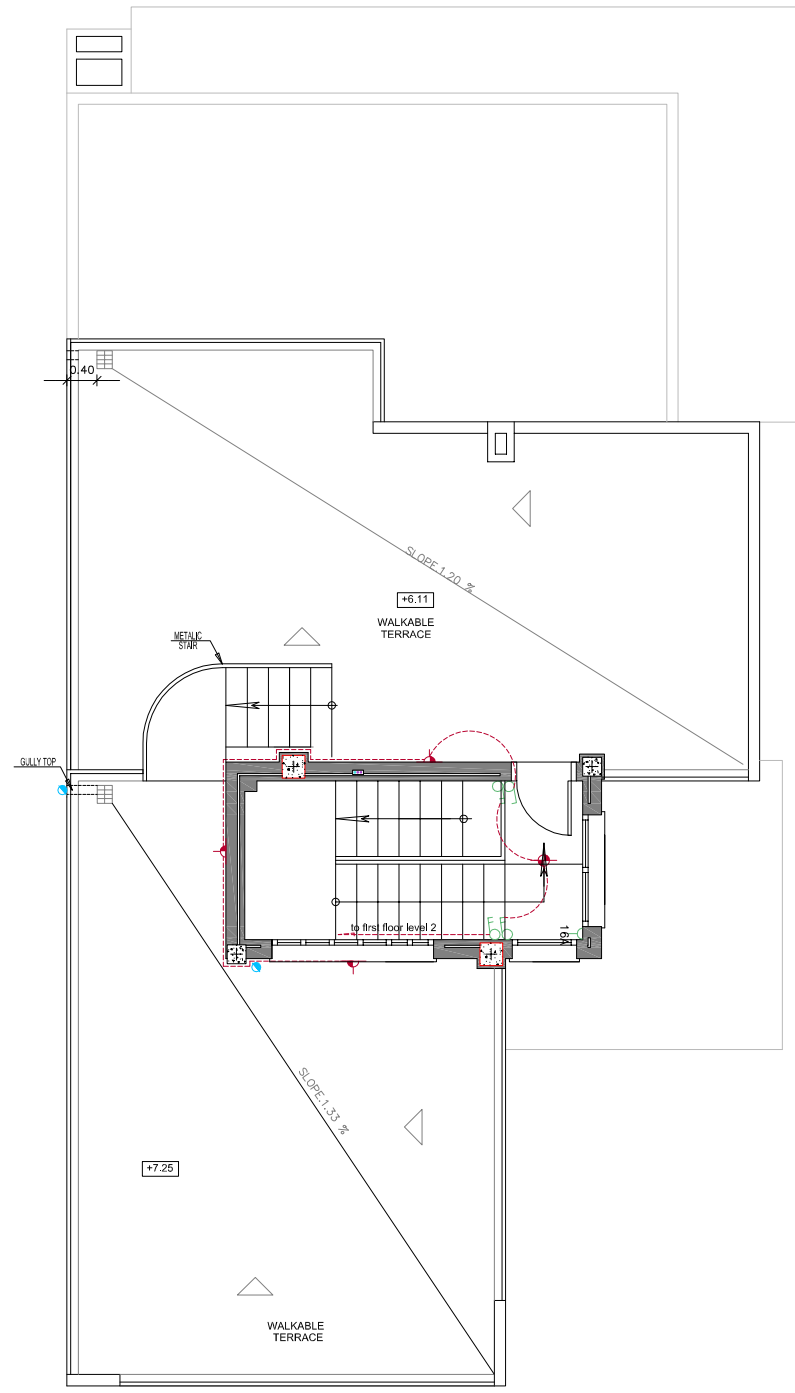
MERCEDES ESTEVE MONTESINOS

TUTORS:

FRANTISEK KULHANEK / MILAGRO IBORRA

PLAN Nº:

48



ROOF PLANT

SYMBOLISM	
ELECTRICAL FACILITIES	
	Meter box
	Electricity supply
	Electrical Protection box
	Main Distribution Board
	Unipolar break switch
	Switch
	Three-pole break switch
	Light point
	Electrical outlet
	Fluorescent of 60 W
	Outlet in contact with ground point.
	25A outlet in contact with ground point.
	Doorbell button
	Bell or buzzer
	TV antenna socket
	Telephone.
	Electric boiler
	Entryphone Street
	Entryphone Housing
	Community antenna
	Lighting arrestor
GROUNDING SYSTEM	
	Driving buried
	Earthing rod
	Connexion box



FINAL PROJECT

SINGLE FAMILY HOUSE

JUNE 2012

ELECTRICITY

SCALE:
1/100

STUDENT:
MERCEDES ESTEVE MONTESINOS

TUTOR:
FRANTISEK KULHANEK / MILAGROS IBORRA

PLAN Nº:
49