Fachhochschule Oldenburg Ostfriesland Wilhelmshaven
University of Applied Sciences

Final Report

Sustainable Tourism In Shirvan National Park, Azerbaijan

Infrastructure and Development, Basic Design Criteria

("Nachhaltiger Tourismus im Nationalpark Shirvan, Azerbaijan")

Summer 2007

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2. Management Summary

The technical goal of the project was to provide first-hand feasibility checks, drafts and key figures for the future technical infrastructure in the National Park of Shirvan (SNP).

With respect to the special eco-touristic brand message and future development impulses that SNP is hoped to bring to the national and international public, the following design criteria had been agreed upon from the outset:

- application of natural, renewable energy supplies,
- special respect to natural, ecologically acceptable ways of water treatment and processing
- state-of-the-art, low-energy and efficiency design
- use of natural, local materials wherever possible,
- closely adapted to local techniques and traditions,
- well in line with the social and economic development of the adjacent areas

Finally, we identified opportunities for well-targeted cooperations with industry partners from North West Germany within the construction projects to come.

To start, we had to assess demand volumes and potential economic side affects. In Azerbaijan, we spent four days in SNP, interviewing, measuring, and talking to local partners in shopfloors, office and machinery buildings, information centers, restaurants and private homes. The other days were filled with talks in the ministry, a full day with meetings at five Universities and other academic units including DAAD and GTZ, and one day of excursion to the future MNER training center in Baku downtown, mainly for a rapid technical assessment of the technical conditions and potential future uses.

SNP can now proceed directly from design to operational planning. Key figures for power and water supply, numbers of guests to be hosted and a draft design for buildings and infrastructure are available. German partners in East Frisia have been involved, by print media, personal talks and through a workshop hosted by FHOOW which focussed on future academic cooperation. The City of Emden has shown interest in student exchange programs beyond the currently already existing options. A follow-up visit of German partners to Baku in spring 2008 is being planned.

Exhibit 1 **Meeting with the Ministry: Closing Meeting an MNER**

From left to right: Gila Altmann, H.E. Mr. Hussein Baghirov , Minister of Ecology and Natural Resources (2nd from left), next: the project team, Brigitte Nolopp (manager), Andreas Görlich (expert)

3. Shirvan National Park (SNP)

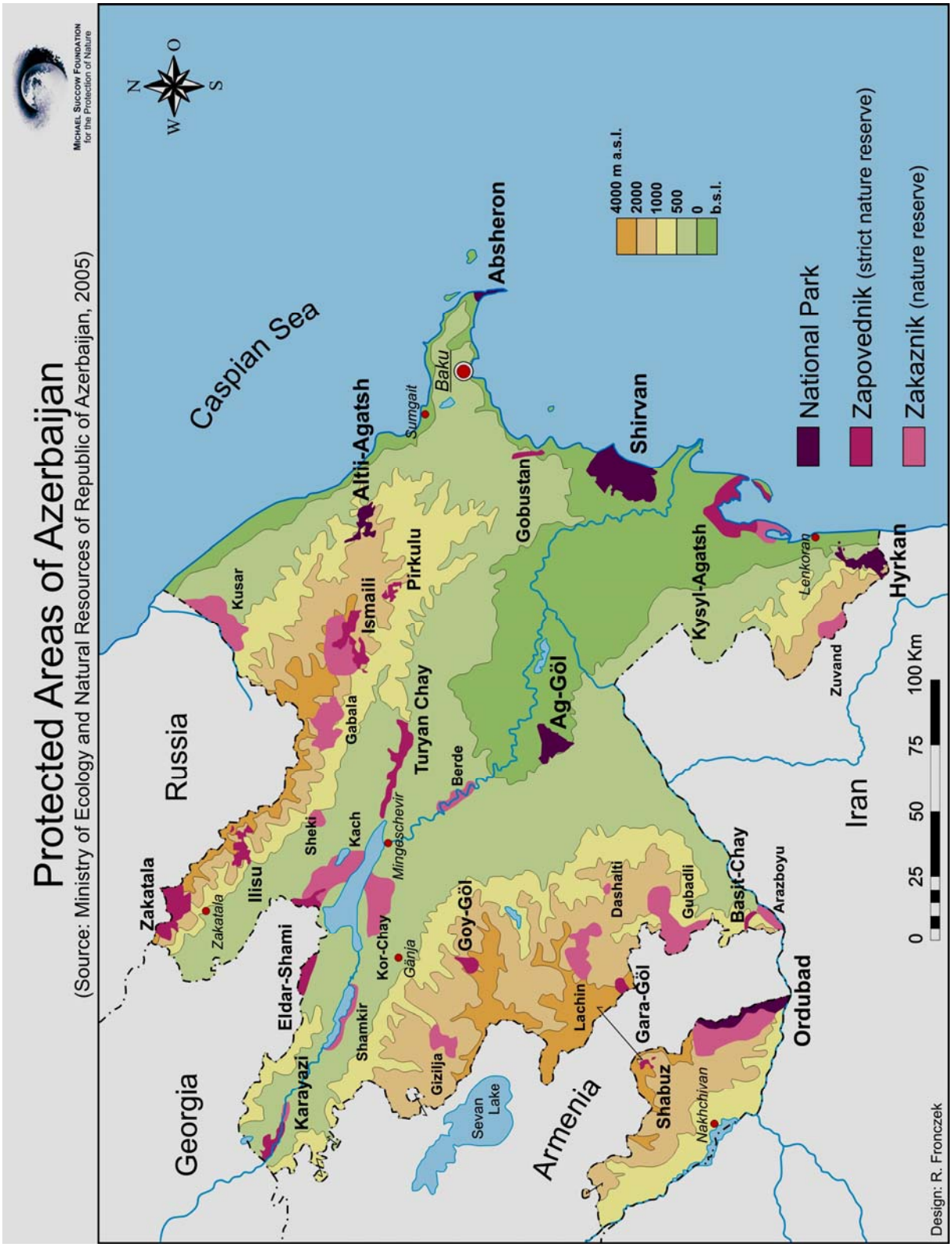


Exhibit 2 **SNP as part of Azerbaijan**

“Shirvan National Park (SNP), founded in 2003, is the first national park of the country (54,400 ha). Its main conservation objective is the protection of one of the last remaining Goitred Gazelle (Gazella subgutturosa subgutturosa) populations in Azerbaijan as well as waterfowl…

Exhibit 3 Waterfowl and goitred gazelles (photo: Hartmut Müller)

...the socio-economic situation of the coastal region is additionally affected by the effects of the risen Caspian Sea level which increased the high unemployment rate and out-migration... With the establishment of the national park land uses carried out by locals (e.g. livestock grazing) were prohibited while land use practices of national interest (military training and oil drilling) could continue...The inclusion of the adjacent national park region in the management is required for settling the current land use conflicts... The development of eco-tourism and the sustainable utilisation of gazelles are suggested as strategies to economically compensate villagers for land use restrictions ....”[1]

“Shirvan always had economical, political, military, strategic and cultural significance. Sedentary population was occupied with farming is guided by artificial irrigation (grain-growing, vine-growing, gardening, cotton-growing etc), cattle-breeding (mainly sheep-

[1] 2005 4 Andrea Burmester Socio-economic situation and land use conflicts in the Shirvan National Park Region, Azerbaijan. Published by Archiv für Naturschutz und Landschaftsforschung (ISSN 0003-9306), volume 4, 2005.

breeding), handicraft (silk-weaving, engraving, carpet-making etc). It was exported mainly oil, salt, raw silk, cotton, copper crockery, saffron, weapons, natural paints, fish, medicinal herbs, different materials etc from Shirvan. Shirvan was one of the main local and foreign centers of trade. It was situated on the crossroads of important trade roads.“2

SNP is surrounded by major roads that connect Russia with Persia. It has only begun to become a place of nature conservation. Active oil drilling is still in place, hunters still cross the borderlines to shoot gazelles, industrial and military scrap from unquiet times can be found all over the place. We were told that Japanese companies bought it up and only wait for the world market metal prices to become more favourable before they will remove it. We also found that the steppe lake inside SNP is part of a sophisticated water management system and has particular importance as a buffer reservoir for the inner lowland parts of the Kura estuary. Accordingly, any future development needs to respect both the interests of nature conservation and of people living next to it, and should seek an early and intense dialogue with stakeholders from the national and international oil and gas industry.

2 AOS Azerbaijan Ornitological Society, http://www.aos.az/eng/index.php?cats=tourism&fopen=areas download of Dec 18, 2007

4. Estimated Volume of Demand

The key market figures of the project are the numbers of visitors expected in Shirvan National Park.

How fast they may grow depends of the overall ecotouristic development process that the country is presently pushing forward. Uncertainties are still high, target groups are diverse, but the modular approach we are suggesting should provide sufficient flexibility toward numbers and habits of the guests to come.

On average, a million guests from abroad travel into Azerbaijan for a host of different reasons. However, only few of them ever leave the city limits of Baku, and an even lesser number enters the country for the explicit purpose of adventure travel, let alone conscious ecotourism. However, that number will certainly grow as soon as Azerbaijan starts to promote is scenic natural beauty with by an even slightly more vigorous marketing effort.

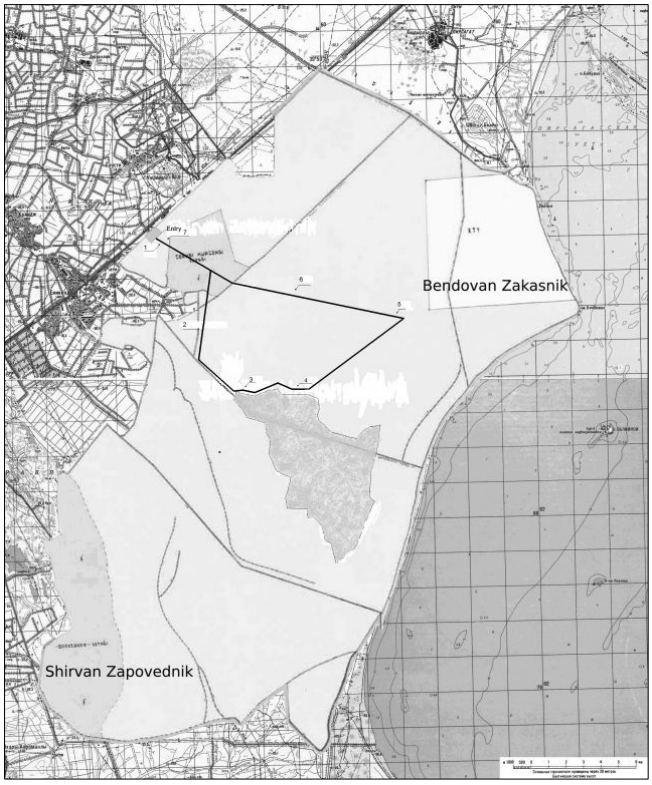
We did not find any track records of explicit nature travel so far in official statistics. However, we had some good opportunity to talk to experts and interns in and around of Baku to build a robust picture of numbers the National Park will have to handle in the next few years. It has been assembled from official statistical data, historic numbers of visitors to Shirvan National Park (SNP), interviews with people working in SNP and at the information booth of a neighbouring tourist hot spot, Ghobustan visitor center.

Target Group	Total Number	week-end	during the week	total No. of guests / year
Expatriates in BAKU (mainly British and US)	20.000			
week-end (24 x / year)	10 .. 100	50		1.200
during the week (120 warm days/year)	10 .. 30		10	1.200
Sales thru local tour operators, word of mouth in clubs, associations, Corporate Human Resources Departments, Presentations to the English-speaking Public				
Local Bacunians				
week-end	20 .. 100	50		1.200
during the week	20		20	2.400
Sales thru local tour operators				
Local Schools				
2 or 3 classes per each warm week	50			3.000
Organization thru local school authorities and governor				
Hard-Core Travellers incl. Ornithologists	per each of 50 weeks		20	1.000
Organization mainly by travellers themselves, but TV and scientific articles can enhance their number at short notice				
Extraordinary Events may, however, easily attract quite a number of busses from Baku with 50 seats each	*40*	***2.000***		
total Numbers		100	50	**10.000**
Given all uncertainties, this number may vary between 5.000 and 15.000 guests, but should come up to rather 20.000 within the next tree years at the latest				

Exhibit 4 Shirvan National Park / Numbers of Visitors expected 2008

With this guiding key figure in hand, we will now summarize our findings and proposals for the different parts of the park within the next chapters.

5. Subproject Entrance Area



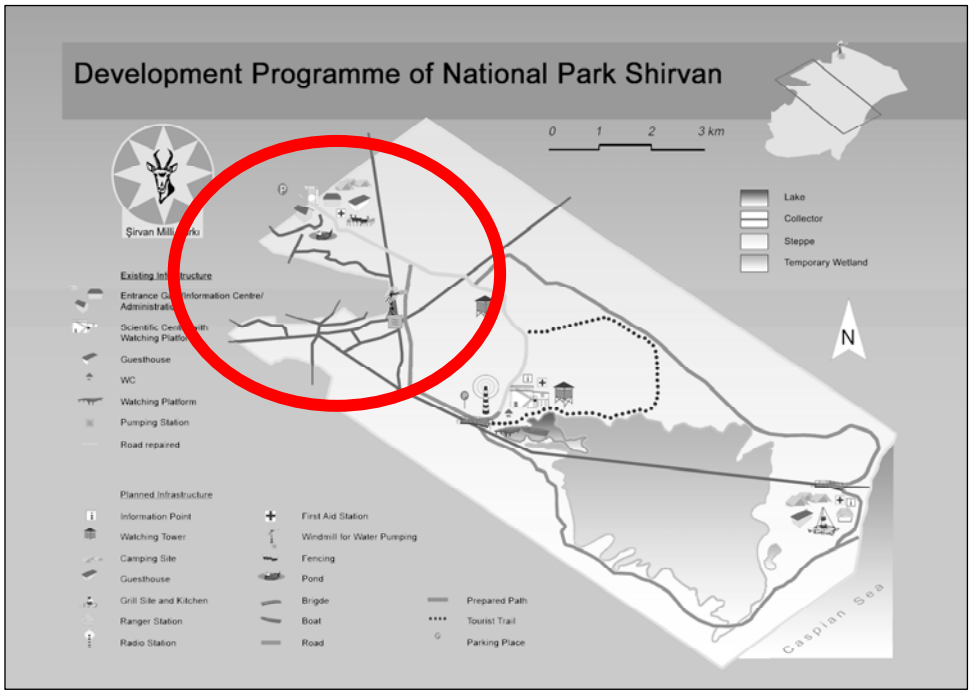


Exhibit 5 **SNP Entrance Area (red circle)**

The upper map shows Shirvan located south of Baku on the Caspian Coast. The lower map shows the main roads inside the park, connecting the steppe lake with the entrance area.

The entrance area will receive literally all visitors with a wide range of needs in quality and volume.

1. In particular native repeat tourists who come only for a few hours of relaxation will appreciate a scenic recreation area with opportunities for a bit of exercise, walking, easy entertainment and, due to local habits, individual places for family barbecues. That offers a positive opportunity for the National Park – these visitors will pay or entry tickets, souvenirs and refreshments, they may want to shop in the neighbouring villages, but do not necessarily put a great ecological burden to the larger inner parts of the park itself. In particular to educate and entertain the children a small area should give access to live animals which may be observed from close distance, and, within reason, also be fed, touched and cuddled.
2. Another target group will appreciate a good piece of detailed information, and quite a few of them will ask for guided tours, binoculars, assistance in a number of ways from experienced guides and rangers.
3. Few guests will wish to stay for a number of days and ask for respective facilities, from moderate lodging and conference equipment to basic internet communication and various sources of information (detailed maps, scientific literature and guidance, specimens and the like). They will be hosted in the already existing guest houses.

To meet these demands, the entrance area will offer ticketing, refreshments, souvenirs and parking

For a few years to come, we recommend a makeover of the existing building, see Drawing Z 1.1.1. Parking lots are already in place next to the main road. As shown in plan Z 2.3 they can easily be enlarged to host up to 50 buses and 500 cars at any time.

Exhibit 6 **Entrance Building as in 2007**

Shirvan National Park Information Center
This building will be a first of it kind for Azerbaijan: a conference and information facility that offers a broad scope of education and „edutainment“ around

- ecology, nature conservation, national parks
- renewable energy, climate protection and sustainable architecture and construction

It goes without saying that renovation and construction works in SNP will exemplify that message in and by themselves. High insulation standards for the buildings, use of wind and solar energy, reed bed or soil filter sewage systems as an innovative alternative for waste water treatment etc. will be not only on display by information posters but also up and running. The most important room of this building will be the conference hall that can also host scientific exhibitions. Four office rooms will accommodate SNP administration and the director's office. Another meeting room will be available for small visitor groups and a kitchenette will be in place for refreshments, coffee and tea along with a lounge for rangers and other SNP staff and scientific guest and field personnel. A series of draft designs for this principal building is provided with drawings Z2.

Director's House: Residential Building
This building accommodates the director of the National Parks and his private or personal guests. It has a particular meaning as it will demonstrate many options for private home owners: local materials for passive, energy-saving insulation, which is of special importance in the cold winter months and during hot summer periods (temperature may go up beyond 40° C). The layout is provided with drawing Z 1.1.2.

Restaurant and Shop Area for Local Products / Water and Observation Tower
We already mentioned the meaning of barbecue and grill facilities in the recreational culture of Azerbaijan. The already existing building will be renovated and made over as the central facility of this area, offering at least 20 places for outdoor seating and cooking around it, inside a small shop for local crafts (pottery, carpets, metal ware), and tea and drinks for families who do not bring their own supplies. The balcony on top will serve as a viewing platform.

Guest Houses
The already existing buildings feature two bedrooms each and a small restroom. They need to be made over for year-around use to use interns and junior scientists. They presently suffer from very poor thermal insulation standards, all the more they may serve as good practice examples afterwards to demonstrate that subsequent additional thermal insulation can be achieved also in existing buildings and with reasonably cheap local materials and techniques. The status quo and a proposal for the thermal insulation are provided with drawing Z 1.1.4.

Exhibit 7 Already existing buildings to be made over: guest house and restaurant

Restrooms

By local tradition, restrooms and showers are preferred to be situated aside from the main living area. They will be both designed and built by local partner firms. German partners can add design water and energy saving design features.

Reed Bed and / or Soil Filter Waste Water Treatment

In line with the local flora, we recommend to construct wetlands or reed beds for waste water treatment. Under the assumption that on average 100 - 150 guests will come for week-ends and about 40 staff will be here all year, and also assuming a few water-saving features to be in place we expect about 8 m^3/d of waste water.

Waste water will be processed and cleaned step by step in

- a settling pit of 15 m^3 ,
- a pond of 80 m^2 in size
- a planted soil filter of roughly 300 m^2

A draft design is given in Z4. This part of the project should be considered a pilot, providing a blueprint for the neighbouring homeowners and communities, and a technical training workshop should be designed and provided for local craftspeople.

6. Subproject Lake House

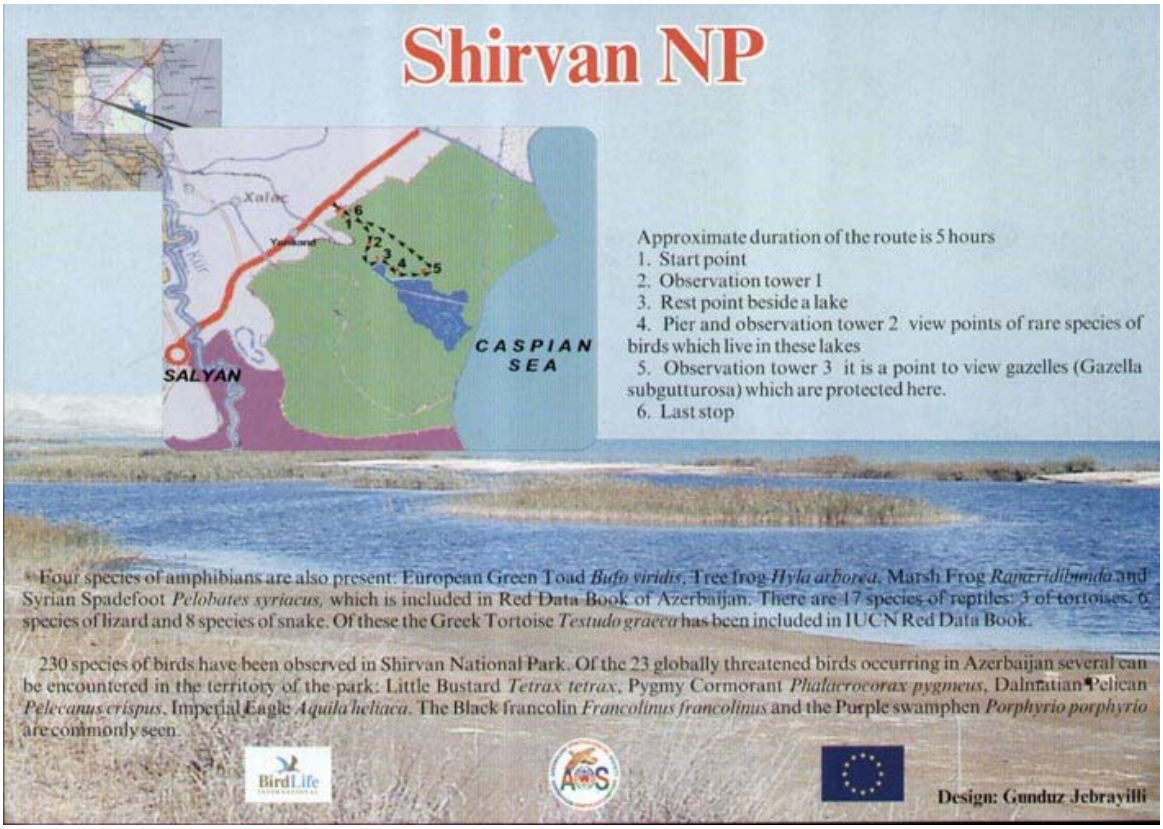


Exhibit 8 Location of the lake and visitors' foot path[3]

The picture above shows the typical picture of the Shirvan steppe lake: a spacious lowland area with a highly fluctuating water level, also serving as a reservoir for neighbouring farmlands. The lake is of critical importance for a great number of migrating birds and object of interest to ornithologists all over the world.

See the blue-cheeked bee-eater to the right.

The lake is also the principal destination of the visitors' footpath. A smallish youth hostel close by is available. As the present director of SNP puts high priority to environmental education, we suggest to build another, new lake house hostel next to the existing one, large enough to host up to 50 students or school children at a time . That will allow for a very valuable experience: classes can come and stay a full week, which will bring about a much more profound understanding of the impressive nature of Shirvan with its complex ecosystem and precious biodiversity.

3 Homepage of AOS, http://www.aos.az/eng/index.php?cats=aos&fopen=maps, download of Dec 18,2007

Sketches and drawings of the appendix show three alternative buildings, adapted to local habits with passive, natural air conditioning and rooms for girls and boys strictly apart from each other. The existing building needs a moderate makeover and can host individual travellers, bird spotters and scientists. There is also more room for lounges and kitchenettes.

For restrooms and showers we suggest the same as for the entrance area. Waste water treatment should be provided by another planted soil filter, smaller than in the entrance area, for an average load of 70 people in peak months. That will call for a capacity of 7m³ of waste water in one day, including a settling pit of 12 m³, a pond of 70m² and a planted soil filter of 250 m². Please find more details in drawings under number 4.

This system should also serve as a pilot, see above.

Energy supply for the lake area should be a fully autonomous system, certainly another pilot and blueprint for other national parks and remote areas in general. While in the winter period we propose to use gas as an additional thermal energy source, in summer it will be reasonable to provide electricity and warm water only by solar and wind energy. Drinking water as of today is still provided by car in large barrels, but it might be a good idea to process it on the premises from the waters of the regional collector system. This would be another expert special task to look into in a subsequent project. However, water for minor sanitary purposes (flush toilets, wet flower beds or cooling of the terrace on hot summer days) can be processed with simple filter systems at very short notice.

Exhibit 9 **The Lake House (May 2007)**

7. Subproject Training Center, Baku

We suggest to run this object all year round, in particular as staff from National Parks may even prefer to spend the winter months studying rather than the principal holiday seasons when many guests need to be taken care of.

This requires major investment to better insulate the existing buildings, using glass or mineral wool and a second wall with vertically perforated bricks. White plaster and paint will provide additional protection during hot summer periods. It may be worth another, additional effort to try and design a passive, zero-energy air condition concept. A heat pump in connection with a solar thermal system should be sufficient for the winter period. A potential German supplier for solar applications like this may be the IfE GmbH in Emden. The great plus of such a pilot solution would be its demonstrative effect so close to the high-rising building sites of Baku City.

The Training Center provides a very interesting open area in its rear area: it would allow for small “paradise garden” right in the face of the run-down neighbouring industrial lots. Clay plaster and reed insulation might be used for a few small huts for overnight guests. There is also room enough for quite a few trees to provide shadow and moderated micro climate. A small soil-filter or constructed wetland for domestic waste water could also provide water for the garden, while warm fresh water for the huts can come from solar thermal units.

The large hall behind the main building is in no good condition and has been abandoned long ago. With respect to the cracks in the supporting walls we recommend to either conduct a thorough static recalculation prior to any further activities or to take the whole building down right away.

Exhibit 10 **Training Center, Main Building**

Exhibit 11 **Training Center, Large Hall**

Exhibit 12 **Training Center, Rear Area**

Outlines and ground plans of the existing training centers can be found in the appendix, chapters Z 3.

8. Subproject Melioration Pump

Shirvan plains receive their waters from the river Kura and its tributaries. A distinct pattern of poor annual rainfalls with a clear peak in November calls for explicit flood and drought management. The annual precipitation in Shirvan is approximately as follows:

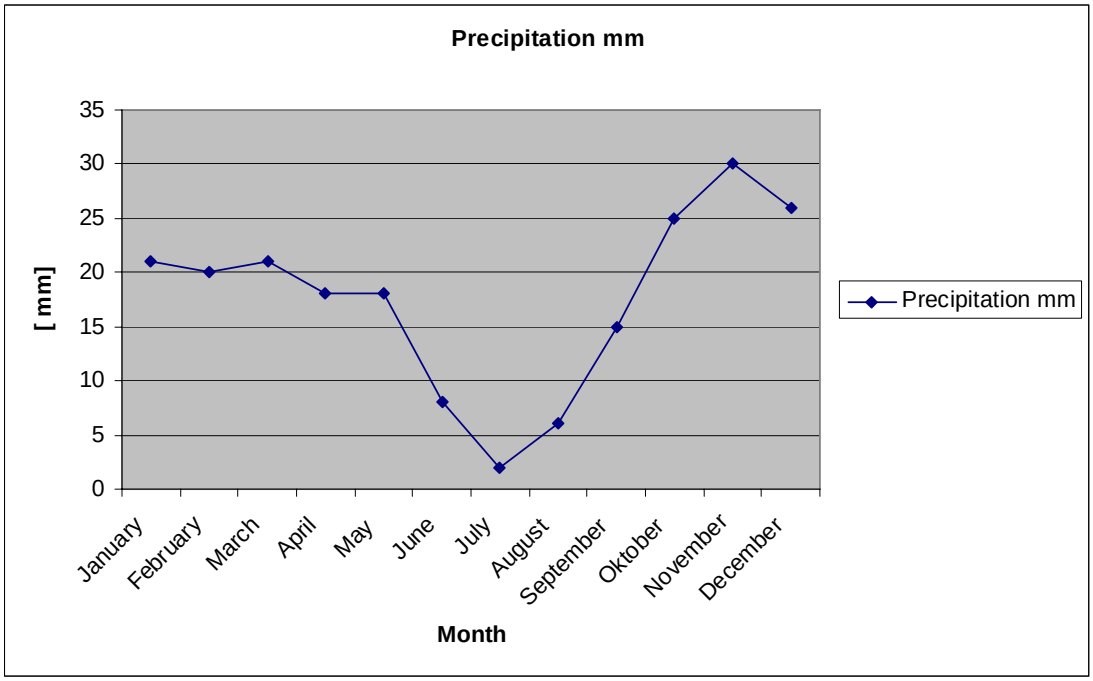


Exhibit 13 **Rainfall Patterns of Shirvan Area**

The water is needed to water the crops, but also to fight progressive salinization due to the low annual precipitation and the high evaporation. The fields are therefore flooded in winter/spring in order to wash the salt out of the soil. To make that possible, for many decades Kura waters have been distributed through a finely branching network of irrigation canals, so-called "collectors".

Within this water management system, a pump station operates next door to the National Park. When we arrived for initial talks, the director pointed out that this machine is of overriding concern to the National Park management.

The pump is actually the only source that supplies water to the steppe lake all year round. Should it seize to work, the water of the lake would evaporate and the place would turn into an unfriendly salt mesh, finally a dry, salty pan, and the Park, featuring the gazelles in the first place, would lose his second most important attraction and biosphere. So all future plans for Shirvan call for a risk management component to deal with this uncertainty. As no other sources of information were available either at MNER or at the National Park itself, we decided to take a ride outside of the park and do some interviews on the premises of the pump station and the adjacent village.

Our goal was to find out how high the risk of losing the pump might be, and, much more important, why the pump was operating at all, and what might motivate the present operator to take care of it also in the mid-term and long-term future. What we found is the following.

The station has been in place for a long time. There used to be four pump units before 1990, however, since all but one of the pumps have been removed or stolen.

Today three men live next to the pump in a small hut, caring for continuous operation of the remaining one pump unit with a power consumption of 60kW, which is up and running literally day and night. We took ample time to interview them and their patron who joint our discussion soon after we had arrived.

Exhibit 14 Pump at Work

As for the risk of longer interruptions we found good news concerning the motivation of the operators. Large areas between Shirvan National Park and the higher inland are in fact located below the level of the Caspian Sea and even lower than SNP itself. For that reason, and to avoid both salinization and out-of-range water levels, the farmers have to pump water out of their low-lying area in their own best interest, and they deliberately use the steppe lake as a flexible buffer reservoir.

This man-made constellation is happily in line with the ecologic needs of the local animals, in particulars fish, reptiles and water fowl, which are perfectly adapted to varying levels of water. This insight came to SNP management and MNER experts as a great relief.

Being ourselves from East Frisia was helpful to finally assess this special issue. Our German home region itself is partly located below the level of the North Sea and pumping even sweet water pf premium quality out into the sea is something we are very familiar with from our daily professional lives.

Exhibit 15 **Pump Station from Within**

Exhibit 16 **Pump Station Operational Setting**

Of course, the present situation with the ever-lurking technical risk of losing the one single pump is no optimum for all parties involved.

So it is urgently to be recommended that the pump be backed-up to ensure safe year around operation. Following suggestions are made for the melioration pump:

1. development of an ecologically compatible water management system (preservation of Lake Shirvan; reducing water wastage in agriculture, household and industry)
2. modernising the pump station
3. installation of 2 wind generators of approximately 100 kW each to power the pump station. This will additionally demonstrate this technology and determine the regional potential for wind energy.

9. Building Layouts

9.1. Overview

Various persons were interviewed concerning a traditional architecture that is adapted to the local climate and executed with local materials. While it was asserted that such a building style exists, we found it still difficult to get hold of responsible contact persons. So we had some desk research conducted on Islamic architecture in hot-arid regions. The results can be summarized as follows:

- Sleeping quarters must be strictly segregated as to male and female
- Rooms are often grouped around a central courtyard. The building should have a clearly defined centre.
- Living quarters are very private. The private residence is a protected area that is only opened progressively.
- To adapt the building to the prevalent climate, the walls are rendered thick, often of clay or rough local stone, buildings shade each other and windows are small and set back in the wall, shaded by shutters.
- Sanitary buildings are often built separate from the main house. This keeps the house (ritually) "pure" or "clean"
- Special buildings are cooled by water ponds

These aspects were accounted for in the designs by the FHOOW (Mrs Többen) in the following manner:

Design of the National Park House - Variant 1 (Z 2.1.1 and Z 2.1.2)

- Single story design
- Large entrance hall as centre of building
- Central pond for cooling and as an inviting space
- Public area to the right of the entrance
- Office space (private) to the left
- Lighting/ventilation partly by clerestory (roof windows)
- Small windows

Design of the National Park House Variant 2 (Z 2.1.3 - Z 2.1.5)

- Building in three levels, thereby reducing surface area
- Lower levels partly subterranean, these will be cool in summer
- Entrance hall which leads to the exhibition area in the "basement" and from which stairs lead to the administrative area in the upper floor
- Separate, private, administrative area in the upper floor

Design of the Accommodation Building Variant 1.1 (Z 2.2.1)

- Circular building with central courtyard
- Separate male and female areas
- Interior space shaded by rooms, lighting and ventilation by clerestory (roof windows)
- Only one building containing all rooms

Design of the accommodation building Variant 1.2 (Z 2.2.2)

- Two circular buildings
- Male and female areas strictly separated
- Possibility of erecting only one building, the other can be built as required

Design of the Accommodation Building Variant 2 (Z 2.2.3)

- one rectangular building
- physical separation of male and female areas
- should be chosen if no artisans are available who can set up a round building.

9.2. Heating requirement

Reliable temperature measurements for Shirvan are not yet available, but as a proxy it can be assumed that the annual pattern will be roughly resemble the climate of Baku, which 70 km north on the same coastline.

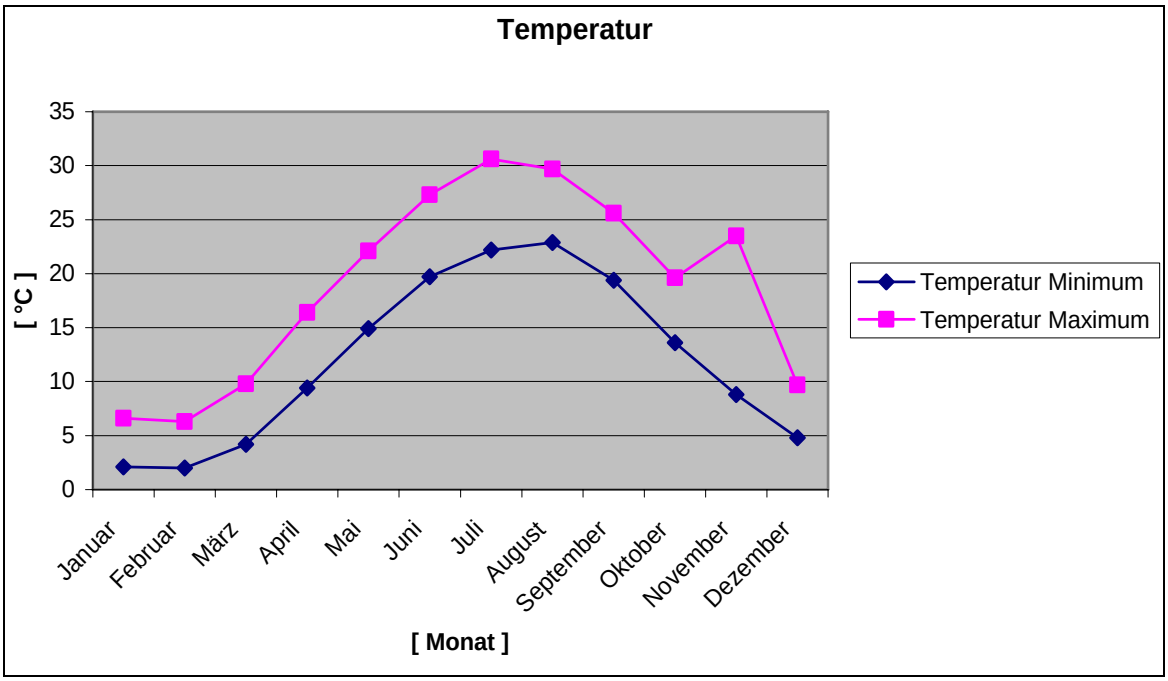


Exhibit 17 Baku: Annual Temperature Pattern

This temperature graph shows that it is necessary to provide heating in winter. The energy required for room heating is strongly dependent of the utilization concept as well as the type and thickness of thermal insulation.

An estimated calculation as to the energy required to heat all buildings to a temperature of 15° to 20° during the coldest 3 months came to the following result:

- 590 kWh/d for all buildings in the entrance area
- 400 kWh/d for all buildings in the lake area

The calculations were made under the following premises:

- existing buildings are not insulated
- new buildings should have cavity bricks walls, but no additional thermal insulation
- new roofs are to be insulated to a thickness of 6 cm

Considering such high energy consumption, we suggest:

- additional insulation (e.g. reed insulation mats) in new buildings
- very good roof insulation
- insulating the guest houses

It is furthermore recommended to reduce the utilization in winter

9.2.1. Entrance Area

Building	**Utilization / Heating**
Ticket/Kiosk building	the building should not be used in winter
National Park House	Offices, kitchen, ranger room and conference room heated, hall and exhibition area not heated
Sanitary building - heating	Room temperature 15°
Sanitary building - warm water	for rangers' showers
Living quarters	normal heating (15° - 20°)
Guest house 1	additional insulation to U = 0,25
Guest house 2	insulation kept as is in order to demonstrate difference to guest house 1
Restaurant	no winter use

9.2.2. Lake Area

Building	Utilization / Heating
existing building	Kitchen, recreation room, rangers' room, guest room heated
sanitary building	severely restricted heating
overnight accommodation building	no winter use

These measures will reduce the energy requirement to

- 150 kWh/d in the entrance area
- 120 kWh/d in the lake area (or zero, if winter usage is ceased anyhow)

9.3. Estimation of electricity requirement

In order to plan the energy supply, it is necessary to estimate the electricity consumption. Under the premises mentioned in the appendices, the normal daily electricity consumption will be

- 270 kWh/d in the Entrance Area (App A1)
- 150 kWh/d in the Lake area (App A3)

The connection rating should therefore be follows:

- 45 kW in the entrance Area
- 22 kW in the Lake Area

This calculation does not yet include current requirement for cooling. Cooling load (i.e. the energy that is to be transported out of the building) was estimated as follows:

- 680 kWh/d for the entrance Area
- 860 kWh/d for the Lake area

Assuming a cooling load of 3 kWh requires about 1 kW of electricity, this only requires

- 230 kWh/d for the Entrance area
- 290 kWh/d for the Lake Area

These estimates highlight the importance of a renewable energy concept. This includes:

- buildings designed for minimal heat radiation in winter and minimal cooling requirement in summer
- diminishment of lighting requirement already by initial building design
- gas-fired kitchen ranges
- development of a concept for solar cooling
- development of a usage pattern that permits no inefficient load peaks

10. Academic Contacts

We conducted initial interviews with the following partners:

organization		first name	surname
Azerbaijan University of Architecture and Construction	Mrs.	Dr. Gulchora	Mammadova
Geological Institute of Azerbaijan	Mr.	Dr. Akif	Ali-Zadeh
Nobel Oil	Mr.	Dr. Michal	Nosiadek
Deutscher Akademischer Austauschdienst (DAAD)	Mrs.	Dr.Ulrike	Mitter
Azerbaijan Tourism Institute	Mr.	Dr. Jafar	Jafarov
Republic of Azerbaijan, Ministry of Ecology and Natural Resources, MNER	Mr.	Dr. Hartmut	Müller
German Technical Cooperation	Mr.	Dr. Franz	Heinzmann
Republic of Azerbaijan, Ministry of Ecology and Natural Resources, MNER	Mr.	Issa	Aliyev
Baku State University	Mrs.	Lala	Bayramova
Azerbaijan Language University	Mrs.	Dr. Seadet	Zeynalova
Azerbaijan Technical University	Mr.	Issa	Khalilov
Azerbaijan Technical University	Mr.	Amiroglu	Mamedov
Azerbaijan State Oil Academy	Mr.	Prof. Ramiz	Humbatov

There is wide-spread interest in joint academic effort, exchange programs and research schemes concerning ecotourism and climate change. Priority seems to be to the new ATI Azerbaijan Tourism Institute for the obvious reason of attracting foreign travellers, and in the mid and long term also with the Technical University as potential partner of FHOOW with focus on wind and solar pilot projects.

11. Contacts Established

Results were brought back to Emden and bilateral talks have started with SMEs (small and medium enterprises) in the German partner region. Discussions are on their way, including partners from wind and solar energy, building industry, but also with interested academic partners at the departments of Economics and Social Sciences, the latter with respect to building civil mechanisms in the tourism industry. The Department of Economics has expressed very positive initial interest towards an academic cooperation and exchange program and a memorandum of understanding between FHOOW and ATI Azerbaijan Tourism Institute as an immediate spin-off of the contacts made is being finalized while we are still writing this report.

A workshop at FHOOW was held to disseminate the report also to other scientists, including Prof. Dr. Klemann, Prof. Dr. Lohmüller, Prof. Dr. Elsner and the former president of FHOOW, Prof. Dr. Anne Friedrichs. Also present Mr. Kenke, department of business development at the district council of Aurich (very right).

Exhibit 18 Workshop at FHOOW presenting results to local audience

12. Next Steps

Task / **Claim**	Pilot application / demonstration of	In Charge
Construction of buildings in SNP, use of local building materials with traditional architecture und interior design **Renaissance of Azerbaijan tradition and knowledge in architecture**	high insulation standard to reduce AC power demand passive air conditioning in summer reed and natural materials for insulation	Local architects with know-how support form Baku universities and FHOOW. Special components may be sourced from East Frisia (water management know-how, water-saving solutions for the buildings, solar applications, special design issues with respect to passive air conditioning)
Conference building **Create a distinguished building with a ground-breaking message to the region and all of Azerbaijan**	local high eco-profile materials clay (walls and plaster), reed (insulation) water-saving devices, passive air conditioning	
Residential Building **Azerbaijan model family home, low cost, low energy**		
Guest House 1 made over **"Before and After"**	low-energy coat for a pre-1990 building	
Detailed Design of Entrance Area - **Barbecue and garden area for families** - **Live animals to be met close-up** - **Shop with local arts and crafts (carpets, pottery)**	number of visitors up in particular: native families, children value to local economy	MNER / SNP Management Local landscaping firm
Special Programs for Entrance Area: - **edutainment for the whole family** - **excursions and programs for schools**	new leisure and outdoor experience nature conservation as a regular subject in school, for kids of all ages	Local development group Teachers / Environmental Organizations of AZ ATI Azerbaijan Tourism Institute
Constructed Wetlands / Planted Soil Filter Entrance Area	nature-friendly, easy-to-handle waste water treatment	ARGO Engineering Association, Norden (design, construction, training of local crew)

Task / **Claim**	Pilot application / demonstration of	In Charge
Makeover of old lake house / planning, building	environmental education with overnight stays	Universities, NGOs, organizations of further education for teaching and school personnel
New lake house, planning, building **"A summer residence to experience nature close-up"**	local building techniques, special architecture will be part of the learning experience	
Design of lake Area with concept of use and open space architecture	to serve week-long environmental education programs for schools	
Plan and build technical infrastructure for lake area: autonomous energy supply water supply	- small wind power - energy storage / buffer battery - sweet water treatment (from collector network) - solar cooling and cooking	Potential suppliers: IFE Company, Emden Conergy, Hamburg ARGO
Water management concept for Shirvan Lowland	- management plan - new pumps - wind power supply to pump station	ARGO / FHOOW Local engineering company IFE, Conergy or other wind turbine producers

13. Calculation of Key Figures

Appendix A 1

Electricity Consumption - Entrance Area

	Power Consumption	Quantity	Total load	Operating time	Daily consumption
	Watt	pcs	Watt	h/d	KWh
Information Building					
PC incl. Monitor	600	8	4800	8	38,40
Incandescent Lamps	60	17	1020	4	4,08
Fluorescent Lamps 1200 mm	40	50	2000	2	4,00
Stove	10000	1	10000	3	30,00
Coffee Machine	1000	1	1000	2	2,00
Dishwasher	3500	1	3500	2	7,00
Refrigerator	1000	1	1000	12	12,00
Washing Machine	3300	1	3300	2	6,60
Air Conditioner	0	1	0		0,00
Residence Entrance Area					
PC incl. Monitor	600	1	600	4	2,40
Incandescent Lamps	60	28	1680	1	1,68
Fluorescent Lamps 1200 mm	40	0	0	0	0,00
Stove	10000	1	10000	1	10,00
Coffee Machine	1000	1	1000	0,25	0,25
Dishwasher	3500	1	3500	1	3,50
Refrigerator	1000	1	1000	12	12,00
Washing Machine	3300	1	3300	1	3,30
Air Conditioner	0	1	0	0	0,00
Entrance Building - Old					
Incandescent Lamps	60	5	300	4	1,20
Fluorescent Lamps 1200 mm	40	4	160	4	0,64
Restaurant					
Incandescent Lamps	60	2	120	2	0,24
Fluorescent Lamps 1200 mm	40	3	120	8	0,96
Stove	10000	1	10000	6	60,00
Coffee Machine	1000	1	1000	4	4,00
Dishwasher	3500	1	3500	4	14,00
Refrigerator	1000	1	1000	12	12,00
Washing Machine	3300	1	3300	2	6,60
Air Conditioner	0	1	0	0	0,00
Guest House 1					
Incandescent Lamps	60	4	240	1	0,24
Fluorescent Lamps 1200 mm	40	3	120	2	0,24
Stove	4000	1	4000	1	4,00
Coffee Machine	1000	1	1000	0,5	0,50
Water Boiler	5000	1	5000	1	5,00
Refrigerator	1000	1	1000	12	12,00
Washing Machine	3300	1	3300	0,5	1,65
Air Conditioner	0	1	0	0	0,00
Guest House 2					
Incandescent Lamps	60	4	240	1	0,24
Fluorescent Lamps 1200 mm	40	3	120	2	0,24
Stove	4000	1	4000	1	4,00
Coffee Machine	1000	1	1000	0,25	0,25
Water Boiler	5000	1	2500	1	2,50
Refrigerator	1000	0	0	12	0,00
Washing Machine	3300	0	0	0,5	0,00
Air Conditioner	0	1	0	0	0,00
			0		0,00
Illumination Outside	100	4	400	6	2,40
Pump for Planted Soil Filter	400	1	400	3	1,20
		Total kW	90,52		271,31
		Coincidence Factor	0,5		Power Consumption
		Total Load kW	45,26		

Appendix A2

Calculation of Illumination

	m2	Lx	Lumen	Tube 1200 mm	Incandescent 60 Watt
				3000 Lumen	730 lumen
Information Building Variant 1					
Large Room	**140**	**300**	**42000**	**14,0**	**3**
Conference Room	**44**	**300**	**13200**	**4,4**	**2**
Kitchen	**15**	**400**	**6000**	**2,0**	**3**
Toilets	**50**	**200**	**10000**	**3,3**	
Offices	**75**	**300**	**22500**	**7,5**	**3**
Recreation Room	**55**	**301**	**16555**	**5,5**	**4**
Foyer	**190**	**200**	**38000**	**12,7**	**2**
	569		**Total**	**49,4**	**17,0**
Residence					
Corridor	**12**	**200**	**2400**		**3,3**
Bathroom	**12**	**200**	**2400**		**3,3**
Kitchen	**12**	**300**	**3600**		**4,9**
Living Area	**24**	**200**	**4800**		**6,6**
Office	**16**	**300**	**4800**		**6,6**
Bedroom 1	**12**	**100**	**1200**		**1,6**
Bedroom 2	**12**	**100**	**1200**		**1,6**
			Total		**27,9**
Entrance Building - Old					
Corridor	**21**	**200**	**4200**	**1**	**5,8**
Room - left	**16**	**200**	**3200**	**1**	**4,4**
Room - right	**11**	**200**	**2200**	**1**	**3,0**
WC	**5**	**200**	**1000**	**1**	**1,4**
			Total	**4**	**14,5**
Restaurant					
Ground Floor	**18**	**300**	**5400**	**2**	**7,4**
Upper Floor	**17**	**100**	**1700**	**1**	**2,3**
			Total	**3**	**9,7**
Guest House 1					
Corridor	**5**	**200**	**1000**		**1,4**
Bathroom	**4**	**200**	**800**		**1,1**
Room - right	**14**	**200**	**2800**		**3,8**
Room - straight ahead	**14**	**200**	**2800**		**3,8**
			Total		**10,1**
Guest House 2					
Corridor	**5**	**200**	**1000**		**1,4**
Bathroom	**4**	**200**	**800**		**1,1**
Room - right	**14**	**200**	**2800**		**3,8**
Room - straight ahead	**14**	**200**	**2800**		**3,8**
			Total		**10,1**

Appendix A 3

Electricity Consumption - Lake Area

	Power Consumption	Quantity	Total Consumption	Operating Time	Daily Consumption
	Watt	Stk	Watt	h/d	KWh/d
alle zusammen					
PC incl. Monitor	600	2	1200	8	9,60
Incandescent Lamps	60	44	2640	4	10,56
Fluorescent Lamps 1200 mm	40	120	4800	2	9,60
Stove	10000	2	20000	5	100,00
Coffee Machine	1000	2	2000	2	4,00
Dishwasher	3500	2	7000	2	14,00
Refrigerator	1000	3	3000	12	36,00
Washing Machine	3300	1	3300	2	6,60
		Total	43,94		190,36
		Coincidence Factor	0,5		Total Consumption
		Total Consumpti	21,97		

Appendix A4

Calculation of Illumination - Lake Area

	m2	Lx	Lumen	Tube 1200 mm	Incandescent 60 Watt
				3000 Lumen	730 lumen
Existing Accomodation Building					
Area	150	300	45000	15,0	
Accomodation Building - small Rotunda					
House 1	414	300	124200	41,4	20,0
House 2	414	300	124200	41,4	20,0
				82,8	40,0
Sanitary Building					
Area	144	200	28800	9,6	4,0

Appendix A5

Thermal Transmission Coefficient of different Wall and Roof Constructions

Layer	Layer Thickness	Thermal Conductivity	Thermal Transmission Coefficient
	in m	W/mK	m^2*k/W
Existing walls - single brick			
Resistance to heat transfer - inside			0,12
Cement Brick	0,2	0,75	0,27
Exterior Plaster	0,02	0,87	0,02
Resistance to heat transfer - outside			0,08
Resistance to thermal transmission			0,49
Thermal Transmission Coefficient U	W/m^2*k		2,04

Existing Walls - two Brick			
Resistance to heat transfer - inside			0,12
Cement Brick	0,4	0,75	0,53
Exterior Plaster	0,02	0,87	0,02
Resistance to heat transfer - outside			0,08
Resistance to thermal transmission			0,76
Thermal Transmission Coefficient U	W/m^2*k		1,32

Existing Wall - cavity Blocks			
Resistance to heat transfer - inside			0,12
Cement Brick	0,4	0,75	0,53
Cavity Blocks	0,2	0,6	0,33
Exterior Plaster	0,02	0,87	0,02
Resistance to heat transfer - outside			0,08
Resistance to thermal transmission			1,09
Thermal Transmission Coefficient U	W/m^2*k		0,92

New Walls - only cavity blocks			
Resistance to heat transfer - inside			0,12
Cavity Blocks	0,4	0,6	0,67
Exterior Plaster	0,02	0,87	0,02
Resistance to heat transfer - outside			0,08
Resistance to thermal transmission			0,89
Thermal Transmission Coefficient U	W/m^2*k		1,12

New Walls - cavity bricks + insulation			
Resistance to heat transfer - inside			0,12
Cavity Blocks	0,6	0,6	1,00
Exterior Plaster	0,02	0,87	0,02
PUR Insulation Board	0,06	0,02	3,00
Resistance to heat transfer - outside			0,08
Resistance to thermal transmission			4,22
Thermal Transmission Coefficient U	W/m^2*k		0,24

Existing Walls - with new insulation			
Resistance to heat transfer inside			0,12
Cement Brick	0,4	0,75	0,53
Exterior Plaster	0,02	0,87	0,02
PUR Insulation Board	0,06	0,02	3,00
Exterior Plaster New	0,03	0,87	0,03
Resistance to heat transfer - outside			0,08
Resistance to thermal transmission			3,79
Thermal Transmission Coefficient U	W/m^2*k		0,26

Existing Roof			
Resistance to heat transfer inside			0,12
Plaster Board	0,03	0,21	0,14
Horizontal Air Layer			0,17
Roof Tiles	0,04	0,7	0,06
Resistance to heat transfer - outside			0,08
Resistance to thermal transmission			0,57
Thermal Transmission Coefficient U	W/m^2*k		1,75

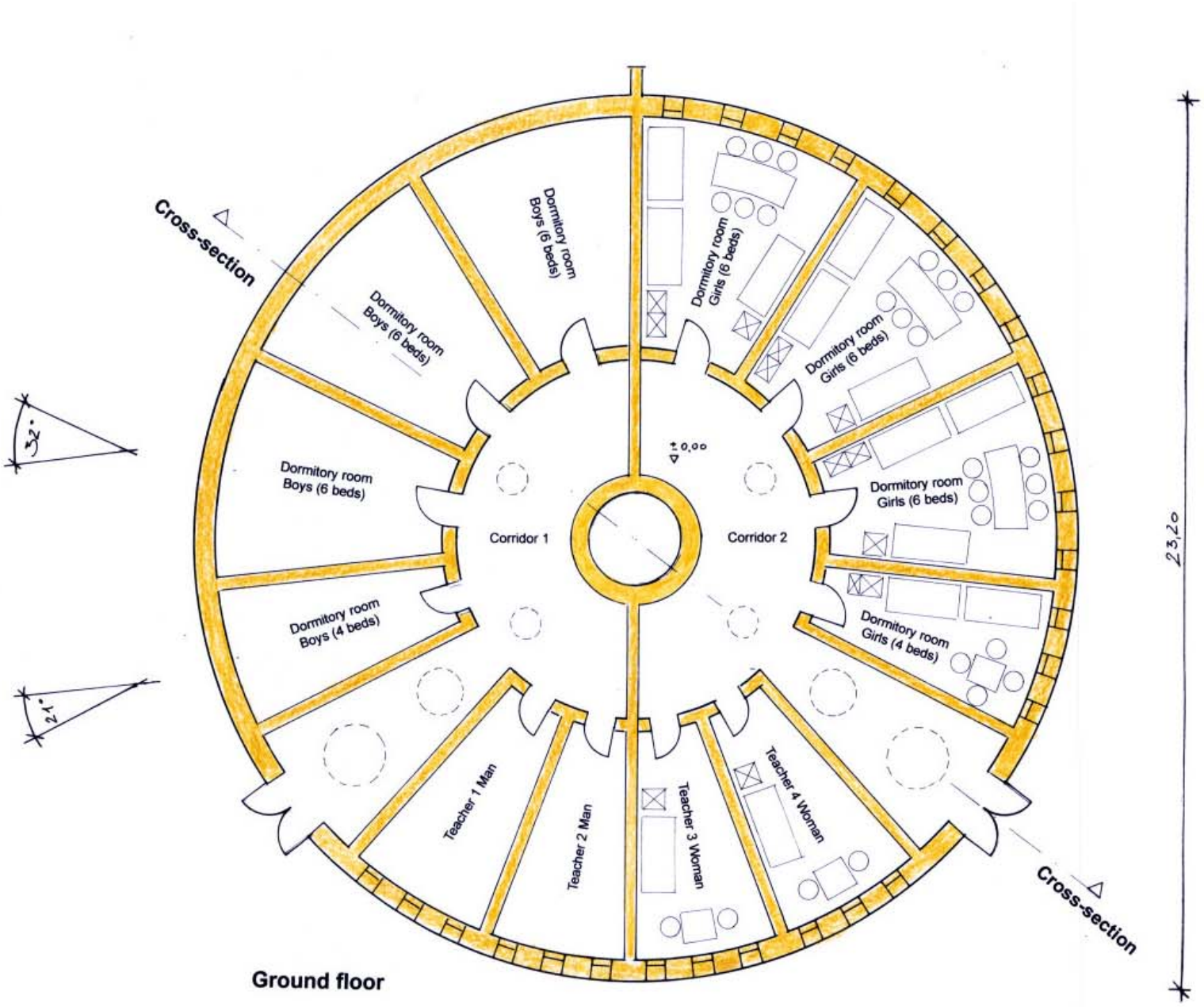
New insulated Roof			
Resistance to heat transfer - inside			0,12
Plaster Board	0,03	0,21	0,14
Horizontal Air Layer			0,17
Roof Tiles	0,04	0,7	0,06
PUR Insulation Board	0,06	0,02	3,00
Wärmeübergangswiderstand außen			0,08
Resistance to thermal transmission			3,57
Thermal Transmission Coefficient U	W/m^2*k		0,28

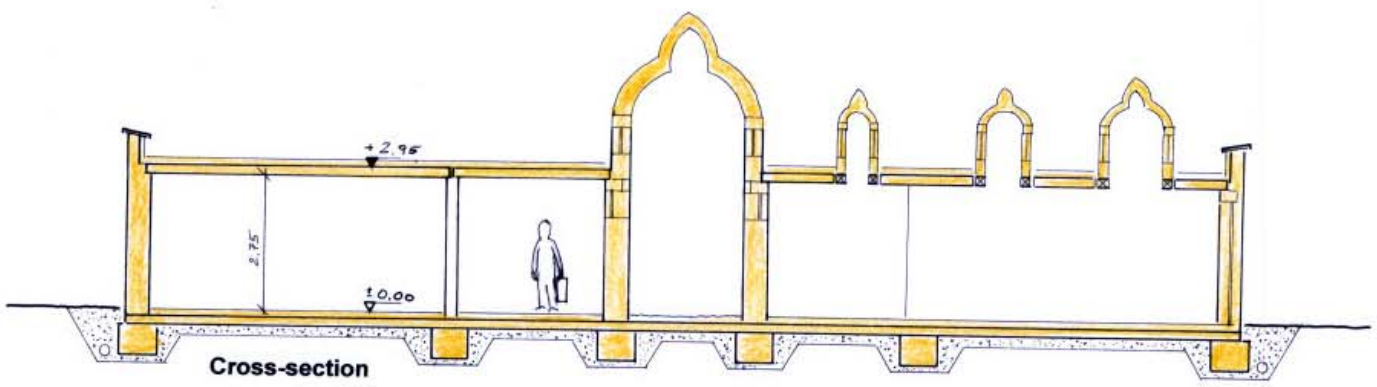
Thermal Transmission Coefficient U of Windows and Doors	W/m^2*k		0,90

New Walls - adobe + insulation with reed			
Resistance to heat transfer - inside			0,12
Adobe (Clay)	0,6	0,6	1,00
Exterior Plaster	0,02	0,87	0,02
Reed Insulation	0,12	0,055	2,18
Resistance to heat transfer - outside			0,08
Resistance to thermal transmission			3,40
Thermal Transmission Coefficient U	W/m^2*k		0,29

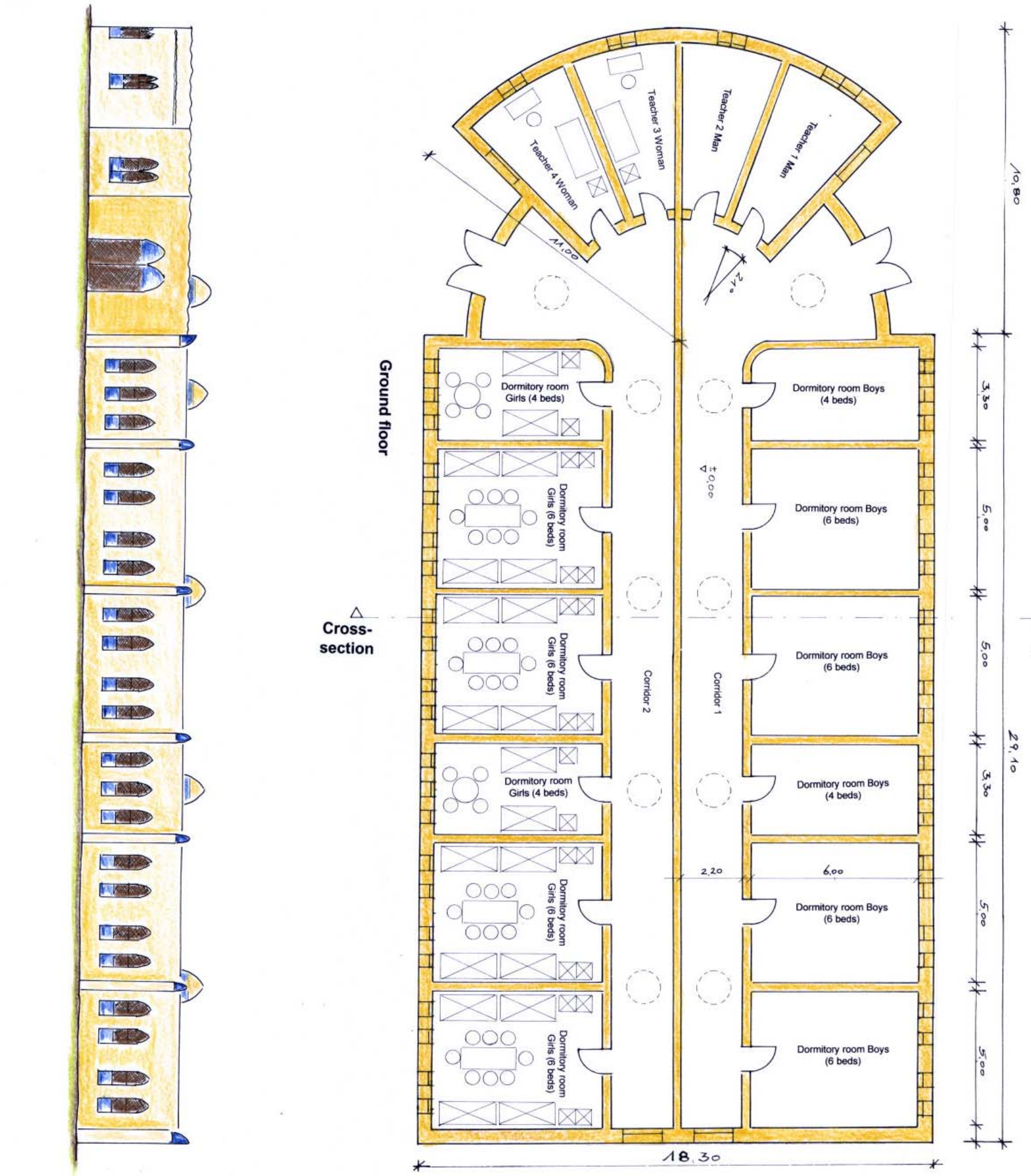
14. Colour Drawings

14.1. Lake House – the Dormitory (Accommodation House): Circular Ground Plan





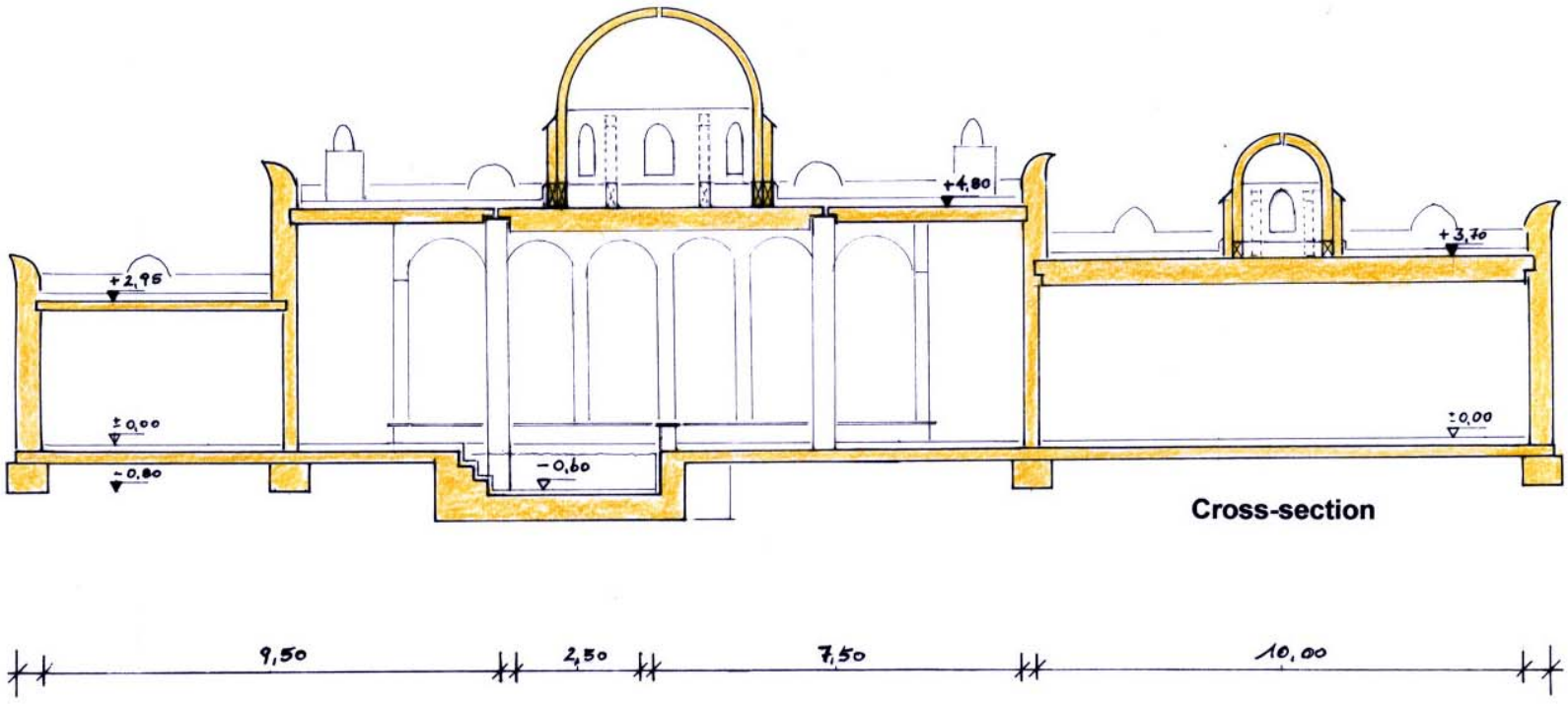
14.2. Lake House – the Dormitory (Accommodation House): Rectangular Ground Plan

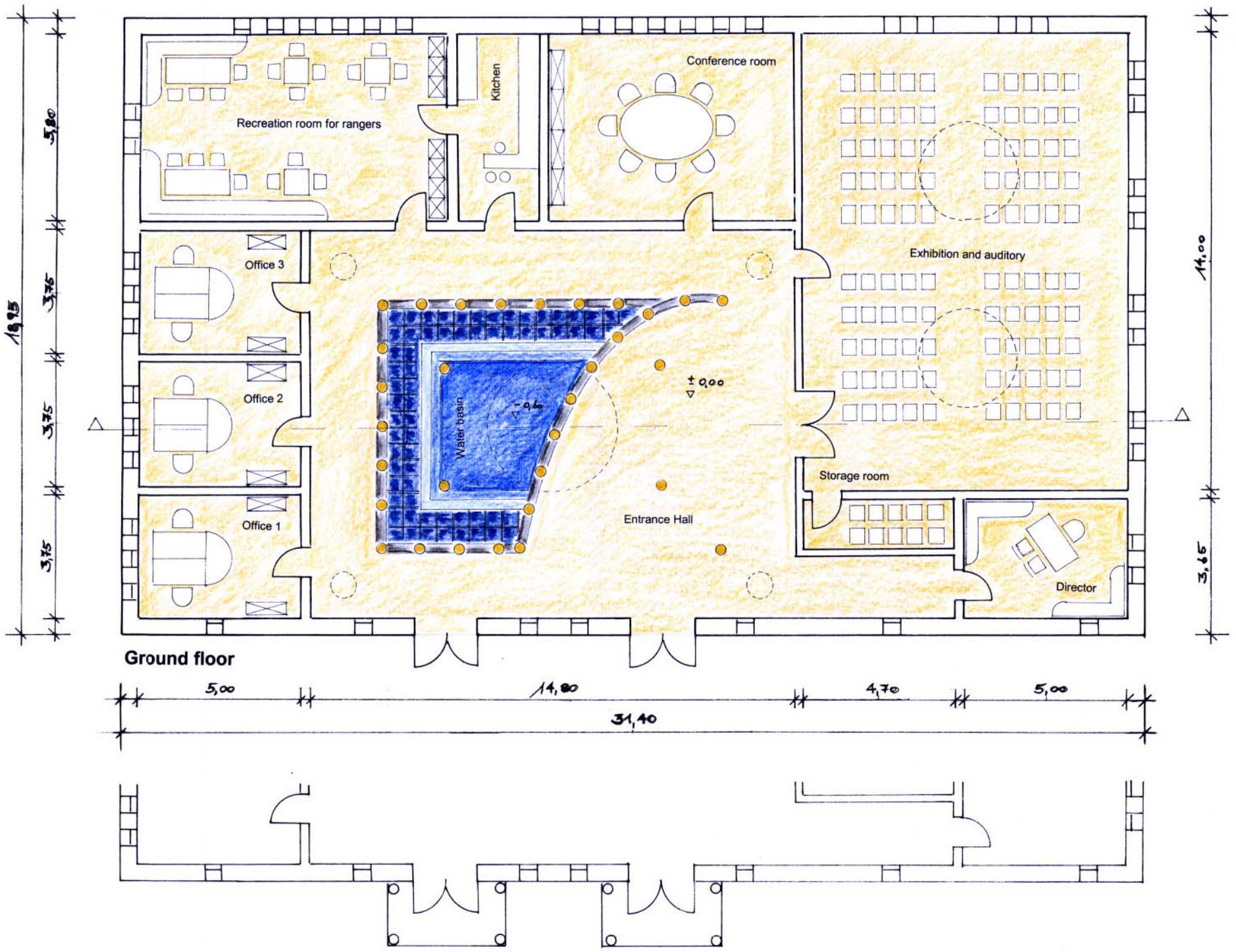


Projekt:
Sustainable Shirvan
Client:
Ministry of Ecology and Natrural Resources (MENR) of Azerbaijan
Sponsor:
Deutsche Bundesstiftung Umwelt
Projekt leader:
University of Applied Sciences Eastfriesland
Subprojekt:
Lake Area
Task:
Accomodation House
Variant 2
Plan
Ground floor, Views and cross-section

Engineer:	Scale:	Plan Nr.	Date:
G. Többen	1/100	8	22.08.2007

14.3. National Park House

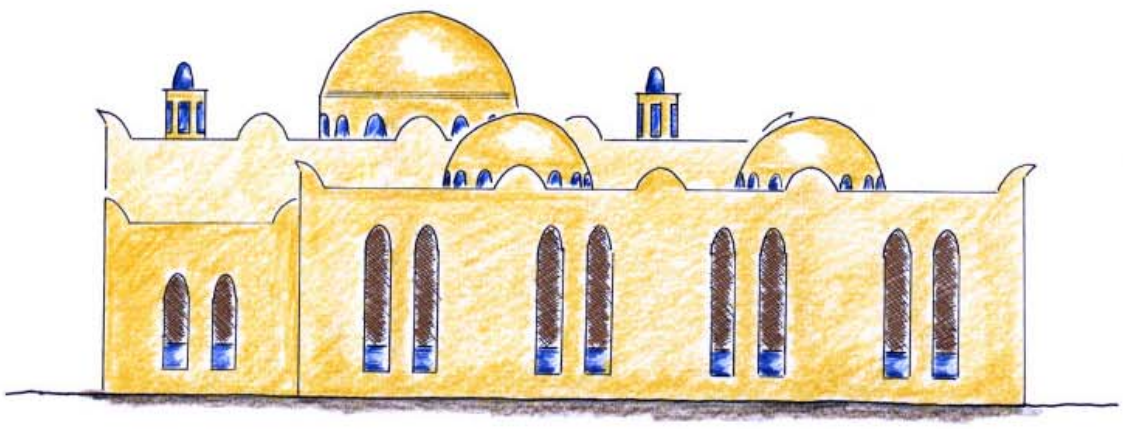




Projekt:
Sustainable Shirvan
Client:
Ministry of Ecology and Natrural Resources (MENR) of Azerbaijan
Sponsor:
Deutsche Bundesstiftung Umwelt
Projekt leader:
University of Applied Sciences Eastfriesland
Subprojekt:
Entrance Area Shirvan
Task:
National Park House
Varinat 1
Plan
Ground floor and cross-section

Engineer:	Scale:	Plan Nr.:	Date:
G. Többen	1/100	1	22.08.2007

14.4. Entrance Area with National Park House Variant 1



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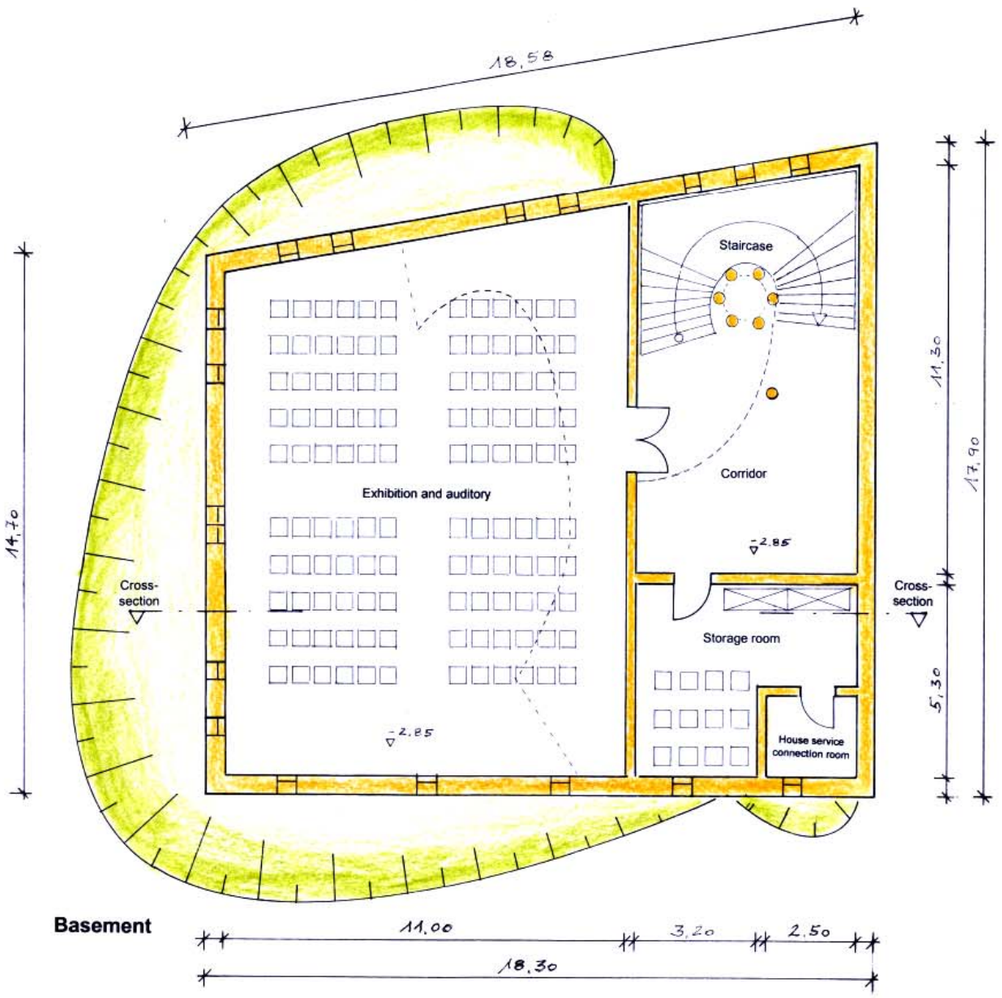
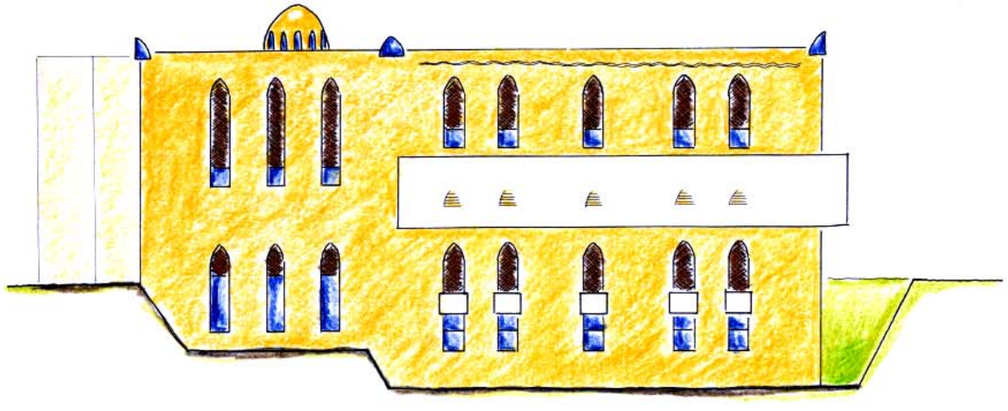
Sustainable Shirvan
Client:
Ministry of Ecology and Natrural Resources (MENR) of Azerbaijan
Sponsor:
Deutsche Bundesstiftung Umwelt
Projekt leader:
University of Applied Sciences Eastfriesland
Subprojekt:
Entrance Area Shirvan
Task:
National Park House
Varinat 1
Plan
Views and General arragementplan Var. 3

Engineer:	Scale:	Plan Nr.:	Date:
G. Többen	1/100 and 1/1250	2	22.08.2007

14.5. National Park House Variant 2, Basement and Views

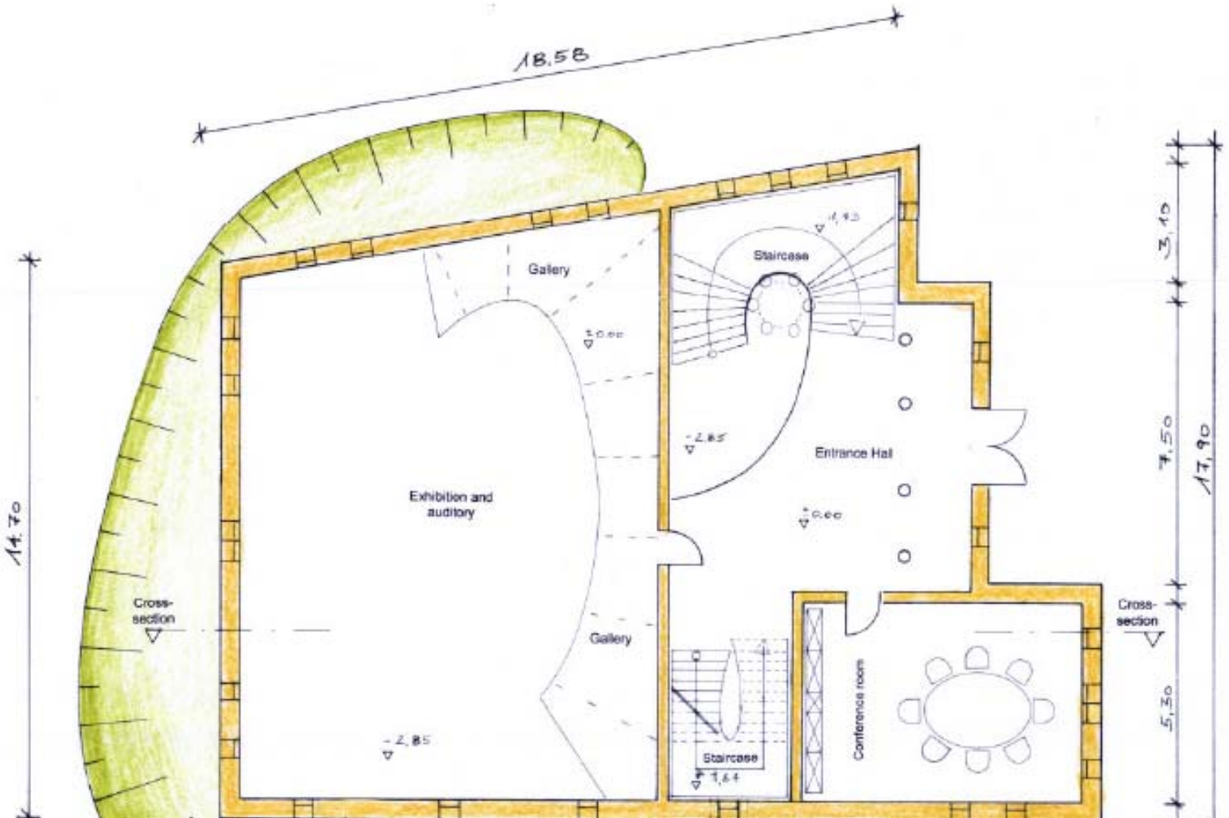


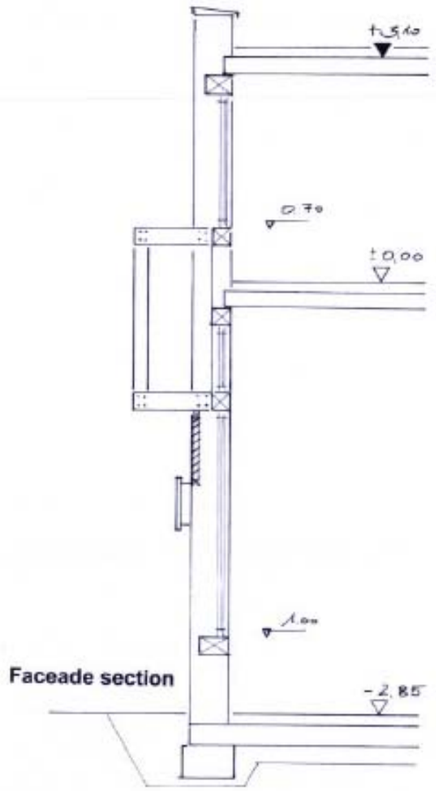


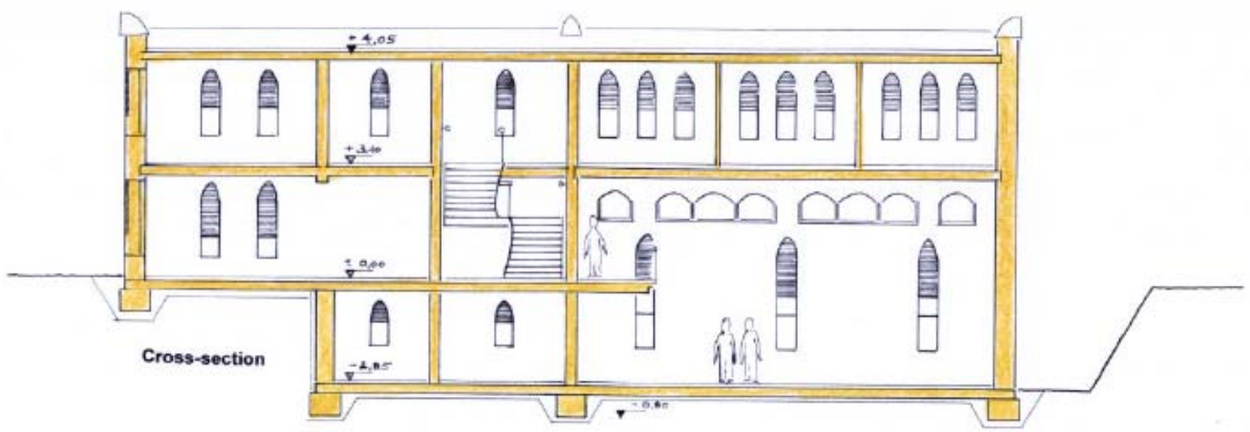
Projekt:
Sustainable Shirvan
Client:
Ministry of Ecology and Natrural Resources (MENR) of Azerbaijan
Sponsor:
Deutsche Bundesstiftung Umwelt
Projekt leader:
University of Applied Sciences Eastfriesland
Subprojekt:
Entrance Area Shirvan
Task:
National Park House
Varinat 2
Plan
Basement and Views

Engineer:	Scale:	Plan Nr.:	Date:
G. Többen	1/100	3	22.08.2007

14.6. National Park House Variant 2 Ground Floor, Cross Section and Façade Section







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Client:
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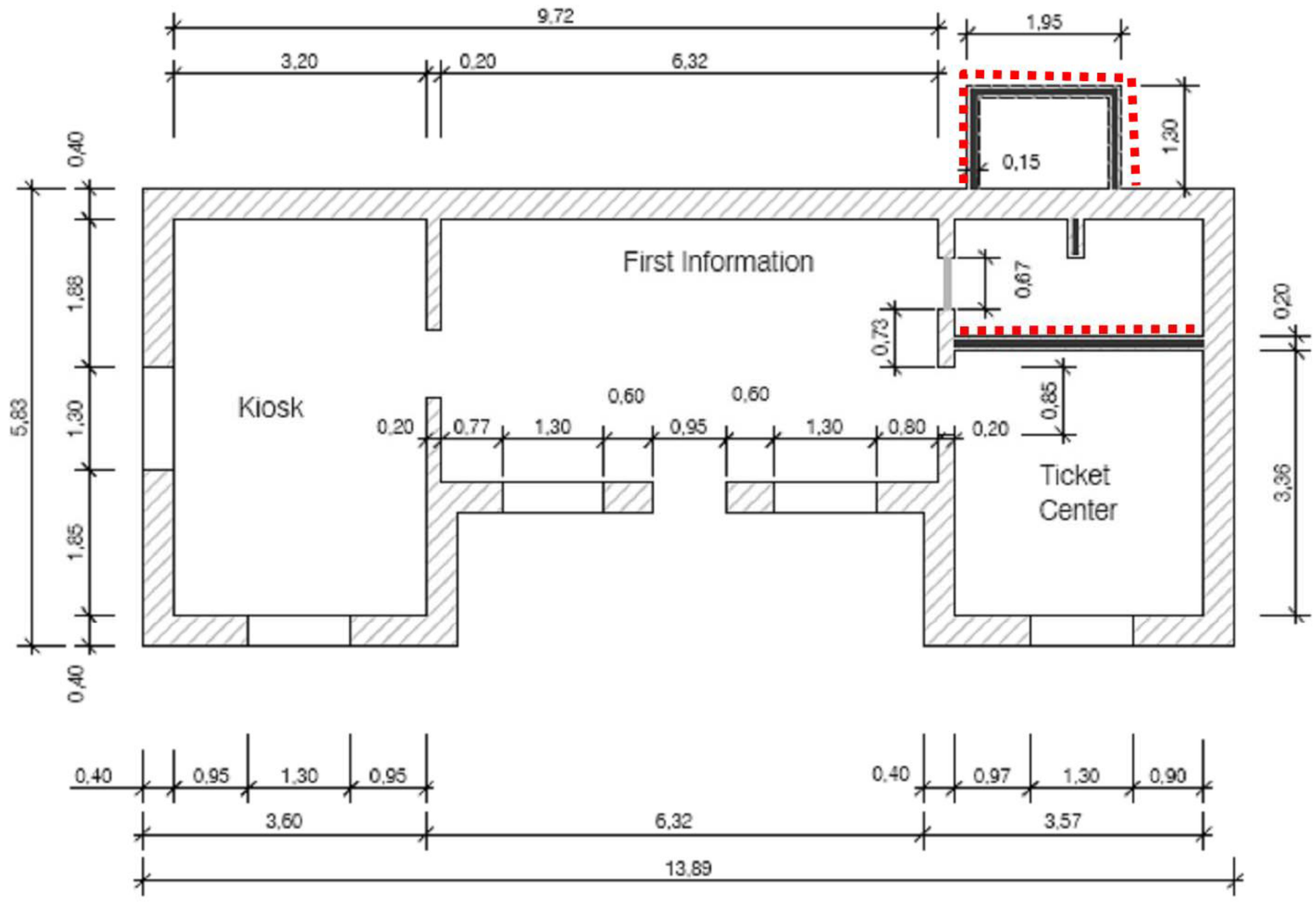
Sponsor:
Deutsche Bundesstiftung Umwelt
Projekt leader:
University of Applied Sciences Eastfriesland
Subprojekt:
Entrance Area Shirvan
Task:
Informationhouse
Variant 2
Plan:
Ground floor, Cross-section and Facade section

Engineer:	Scale:	Plan Nr.:	Date:
G. Többen	1/100 and 1/50	4	22.08.2007

14.7. National Park House Variant 2 Façade Alternative and General Arrangement

15. Drawings

15.1. Z.1.1.1 Entrance Building, Existing Ground Plan and Suggested Alterations



Walls to eliminate

Walls new

Demonstration aspects:

- cooled by lost heat of combined heat and power plant
- fueled by lost heat of combined heat and power plant
- Not used in cold times

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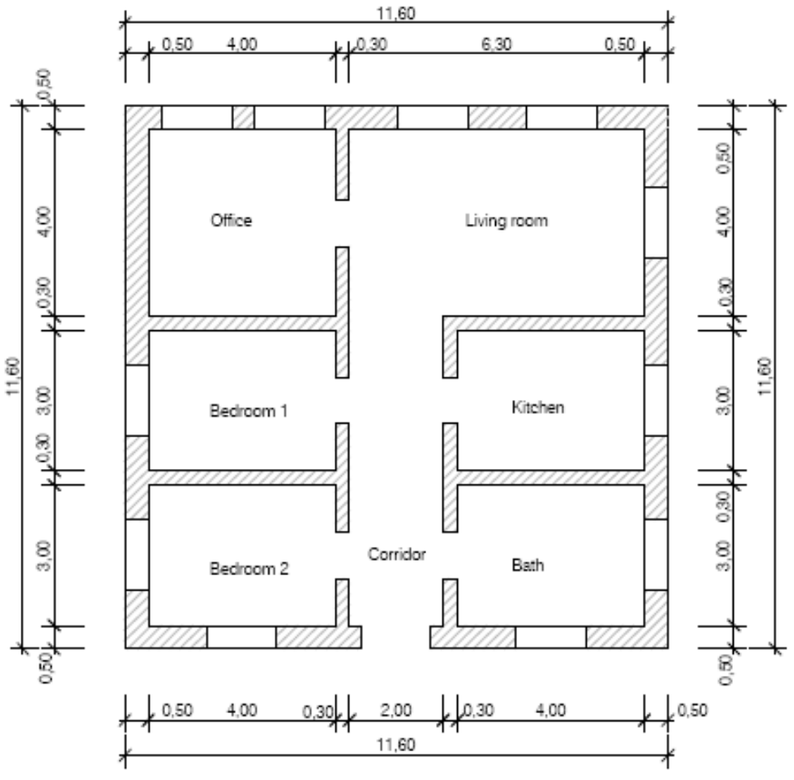
DBU

Projekt: Infrastructure and Development of Shirvan National Park		
Partner: Ministry of Ecology and Natural Resources (MENR), Baku, Azerbaijan		
Client: Deutsche Bundesstiftung Umwelt		
Projekt leader: University of Applied Sciences Oldenburg Ostfriesland Wilhelmshaven		
Subprojekt: Entrance Area		
Task: Entrance Building		
Plan: Existing Buildings and Suggested Alterations		
Engineer: Görlich	Drawing by: Janssen	Scale: 1:50
File: 200715 \ 31 Endbericht \ Zeichnungen \ NPH SHIRVAN Z1-1-1.dwg	Date: 05.07.2007	Plan Nr.: Z 1.1.1

15.2. Z.1.1.2 Entrance Area, Residence Building, Suggested Ground Plan



Demonstration aspects:

- fueled by rest heat of the combined heat and power plant
- Solar water heating
- Solar assisted air conditioning

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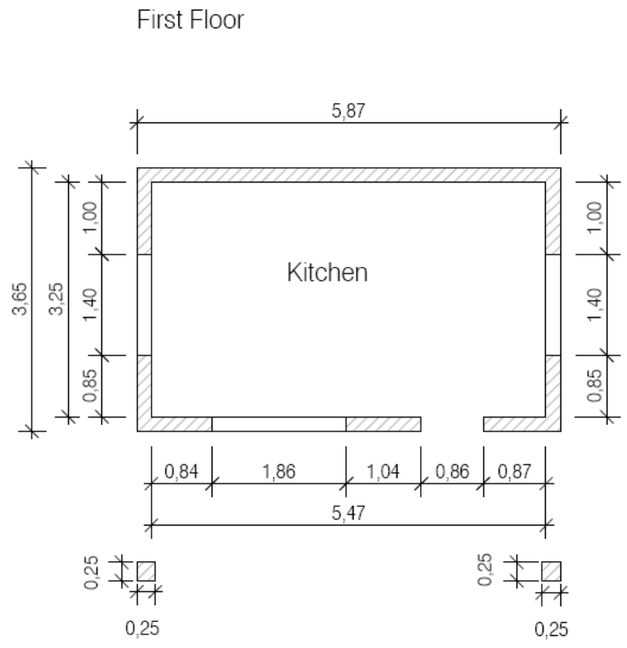
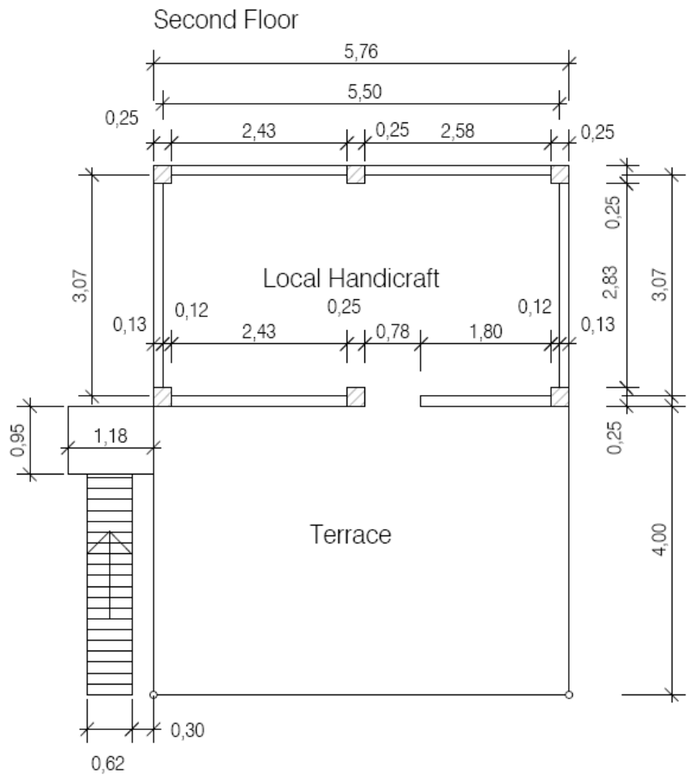
Client: Deutsche Bundesstiftung Umwelt		
Projekt leader: University of Applied Sciences Oldenburg Ostfriesland Wilhelmshaven		
Subprojekt: Entrance Area		
Task: Residence		
Plan: Suggested Ground Plan		
Engineer: Görlich	Drawing by: Janssen	Scale: 1:100
File: 200716 \ 31 Endbericht \ Zeichnungen \ NPH SHIRVAN Z1-1-2.dwg	Date: 05.07.2007	Plan Nr. : Z 1.1.2

15.3. Z.1.1.3 Restaurant and Local Handicraft Building





Demonstration aspects:

- Power from combined heat and power plant
- Grease seperator as part of the waste water purification

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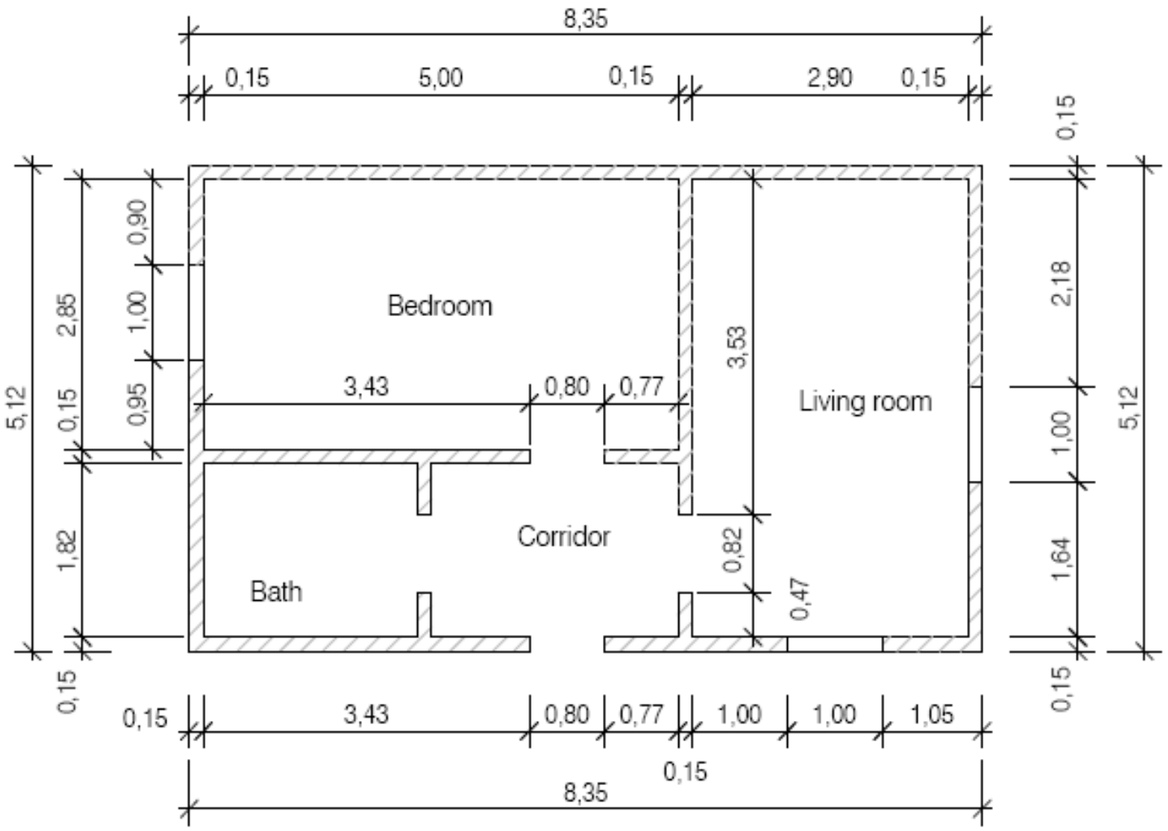
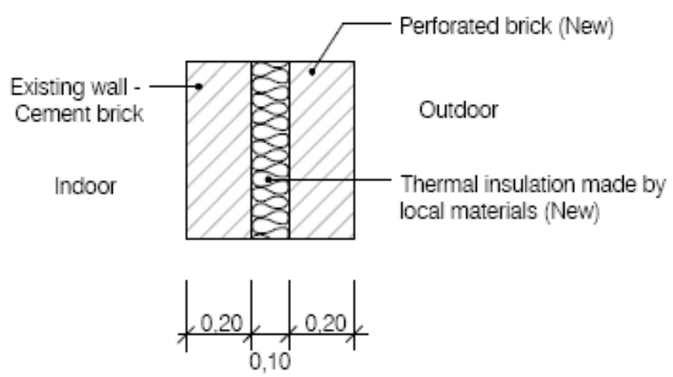
Projekt: Infrastructure and Development of Shirvan National Park		
Partner: Ministry of Ecology and Natural Resources (MENR), Baku, Azerbaijan		
Client: Deutsche Bundesstiftung Umwelt		
Projekt leader: University of Applied Sciences Oldenburg Ostfriesland Wilhelmshaven		
Subprojekt: Entrance Area		
Task: Restaurant and Local Handicraft Building		
Plan: Existing Ground Plan and Suggested Alterations		
Engineer: Görlich	Drawing by: Janssen	Scale: 1:50
File: 200716 \ 31 Endbericht \ Zeichnungen \ NPH SHIRVAN Z1-1-3.dwg	Date: 05.07.2007	Plan Nr. : Z 1.1.3

15.4. Z.1.1.4 Guest Houses, Existing Ground Plan and Suggested Alterations





Guest House 1

No changes as demonstration of an "old" building

Guest House 2

- Solar water accumulator
- Thermal wall and roof insulation as a demonstration of the effects of passive energy reduction

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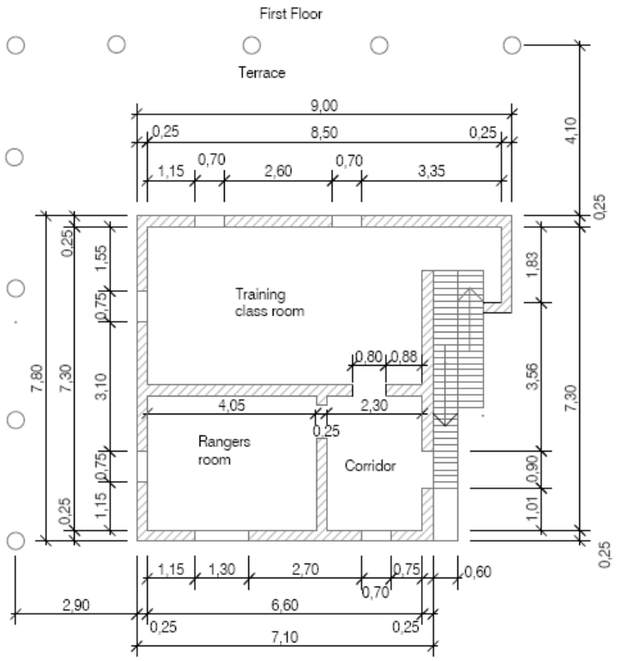
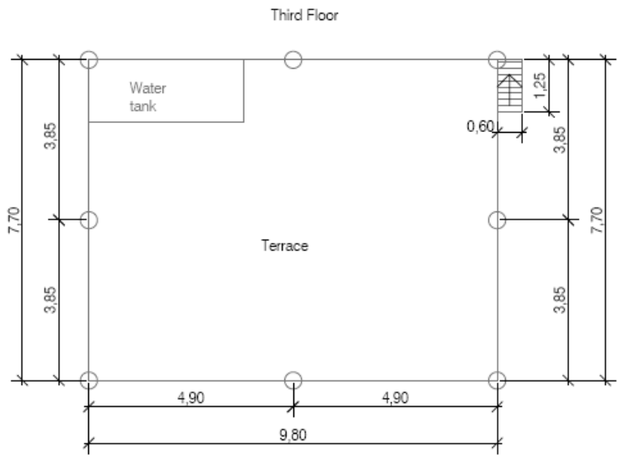
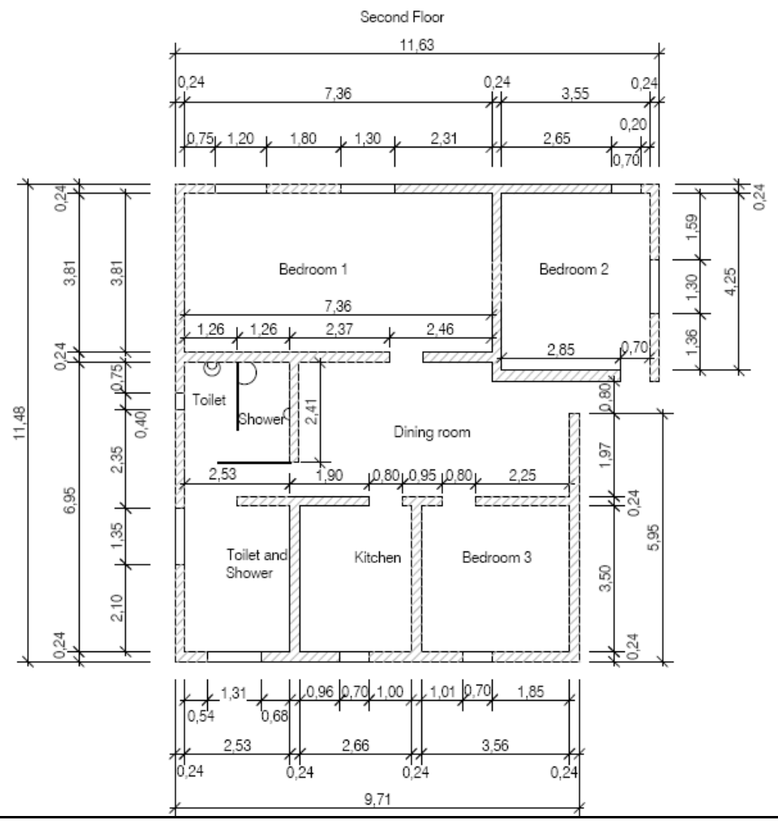
Client: Deutsche Bundesstiftung Umwelt		
Projekt leader: University of Applied Sciences Oldenburg Ostfriesland Wilhelmshaven		
Subprojekt: Entrance Area		
Task: Guest Houses		
Plan: Existing Ground Plan and Suggested Alterations		
Engineer: Görlich	Drawing by: Janssen	Scale: 1:50
File: 200716 \ 31 Endbericht \ Zeichnungen \ NPH SHIRVAN Z1-1-4.dwg	Date: 05.07.2007	Plan Nr. : Z 1.1.4

15.5. Z.1.2.1 Lake House – Minor Alternative, Existing Ground Plan and Suggested Alterations







Demonstration aspects:

- Island solution of energy supply by wind generator and / or photovoltaic
- Energy buffer by battery

Minor alternative

This alternative should be realized as a first step, if finances will be a problem.

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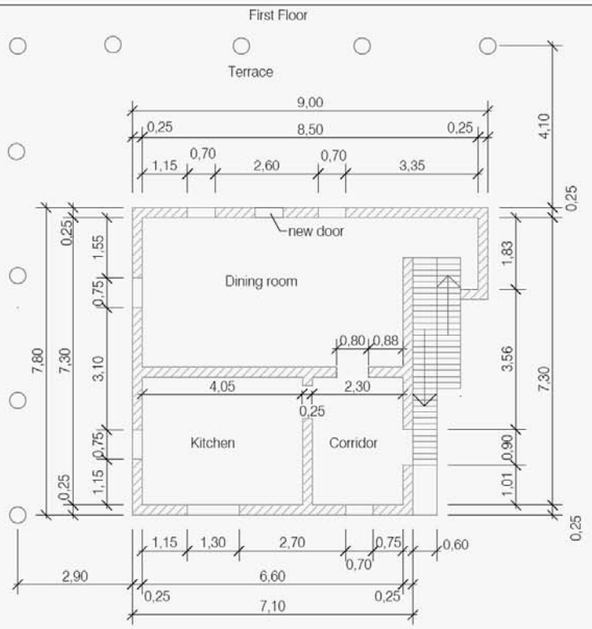
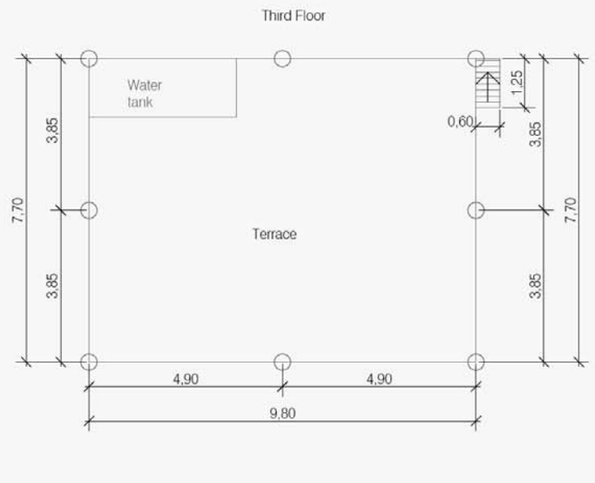
Client: Deutsche Bundesstiftung Umwelt		
Projekt leader: University of Applied Sciences Oldenburg Ostfriesland Wilhelmshaven		
Subprojekt: Lake Area		
Task: Lake House - Minor Alternative		
Plan: Existing Ground Plan and Suggested Alterations		
Engineer: Görlich	Drawing by: Janssen	Scale: 1:100
File: 200716 \ 31 Endbericht \ Zeichnungen \ NPH SHIRVAN Z1-2-1.dwg	Date: 05.07.2007	Plan Nr. : Z 1.2.1

15.6. Z 1.2.2 Lake House – Major Alternative, Existing Ground Plan and Suggested Alterations





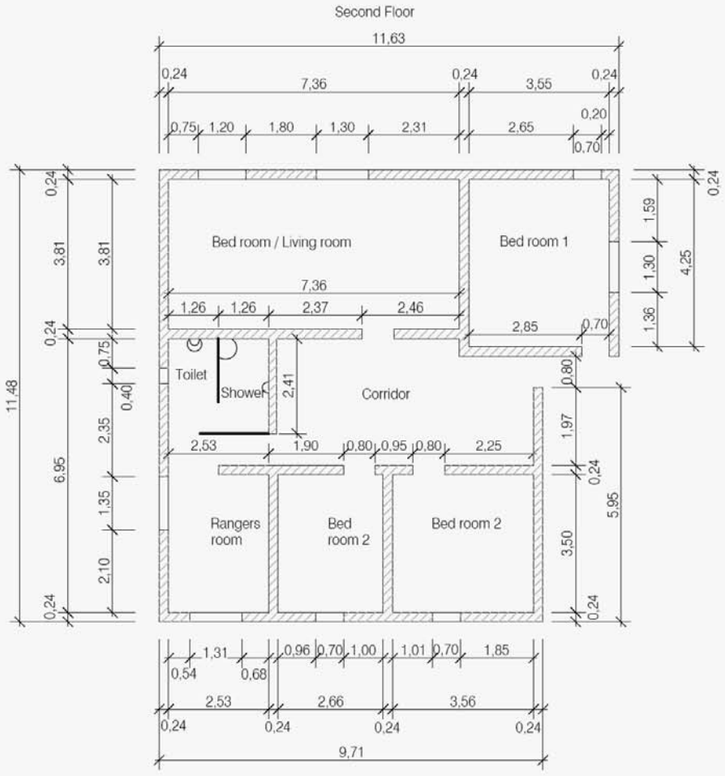
Second Floor

Demonstration aspects:

- Island solution of energy supply by wind generator and / or photovoltaic
- Energy buffer by battery

Major alternative

- Lake house heated in winter by wood or reed
- Second floor of Lake house for small groups and individual visitors



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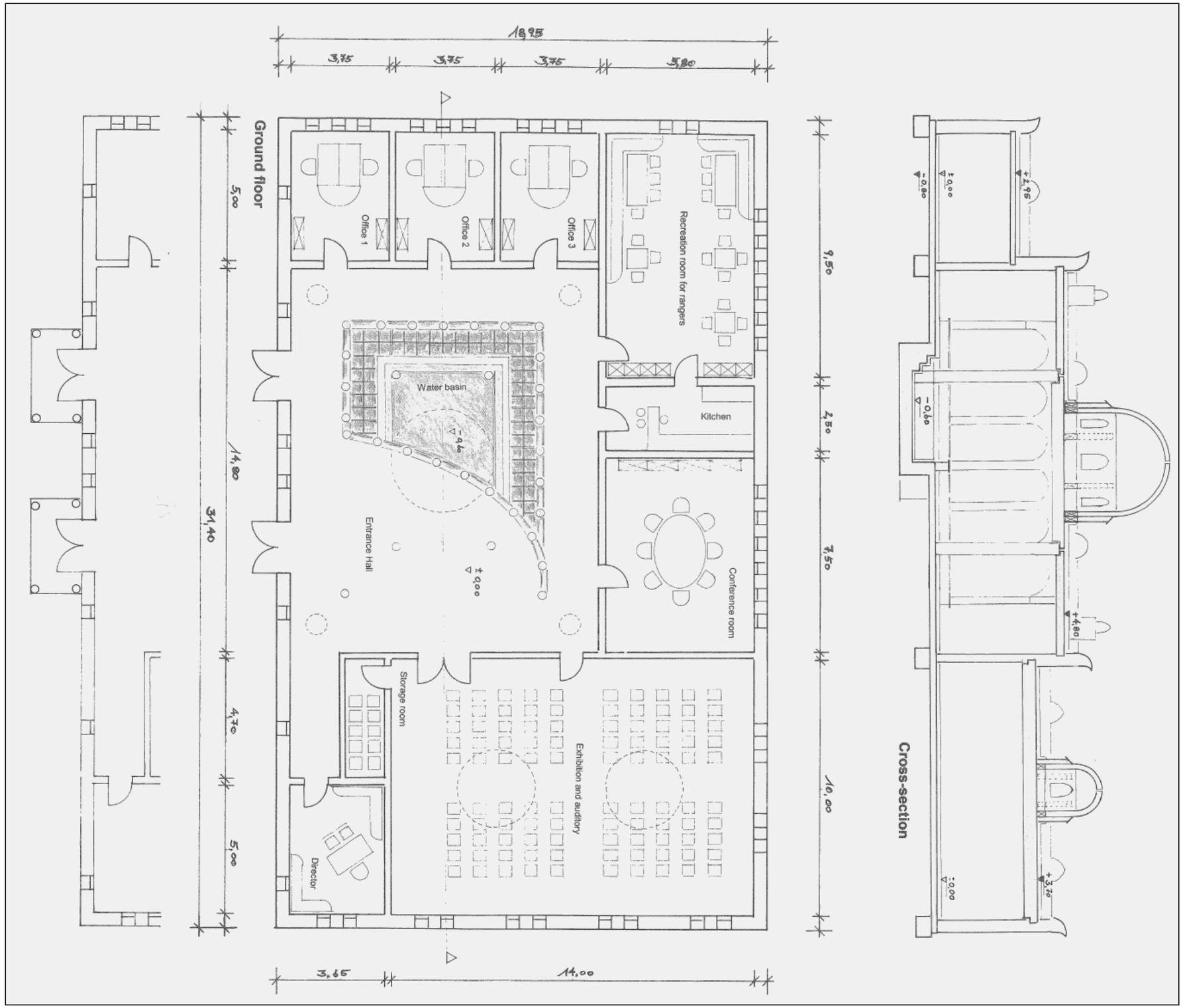
Projekt:	Infrastructure and Development of Shirvan National Park
Partner:	Ministry of Ecology and Natural Resources (MENR), Baku, Azerbaijan
Client:	Deutsche Bundesstiftung Umwelt
Projekt leader:	University of Applied Sciences Oldenburg Ostfriesland Wilhelmshaven
Subprojekt:	Lake Area
Task:	Lake House - Major Alternative
Plan:	Existing Ground Plan and Suggested Alterations

Engineer: Görlich	Drawing by: Janssen	Scale: 1:100
File: 200716 \ 31 Endbericht \ Zeichnungen \ NPH SHIRVAN Z1-2-2.dwg	Date: 05.07.2007	Plan Nr. : Z 1.2.2

15.7. Z.2.1.1 National Park House – Variant 1, Ground Floor and Cross Section



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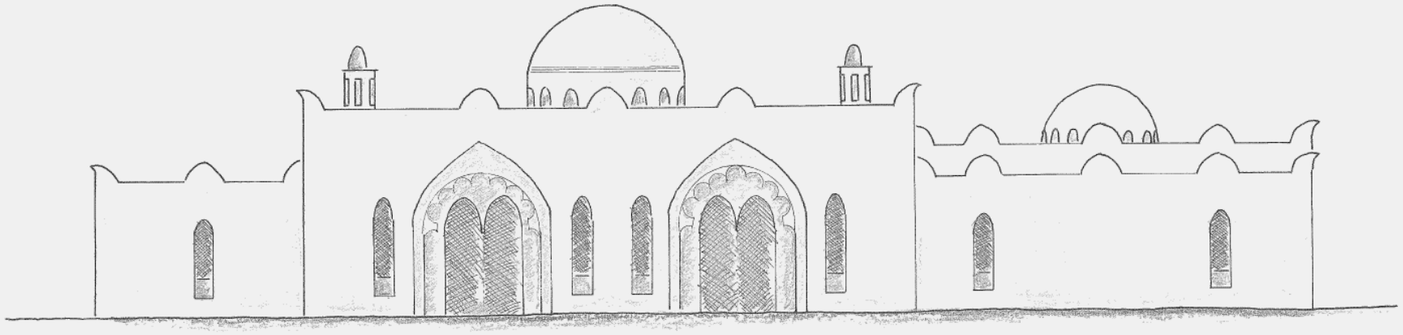
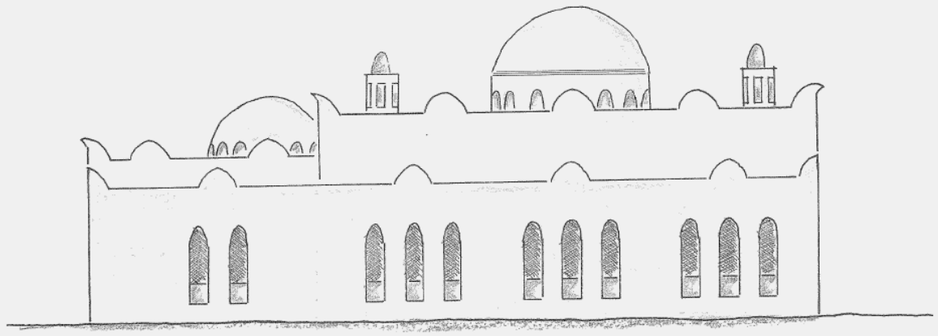
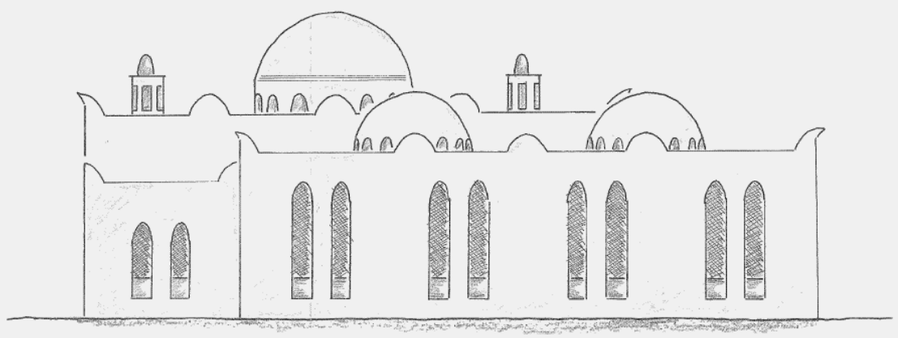
Partner: Ministry of Ecology and Natural Resources (MENR), Baku, Azerbaijan		
Client: Deutsche Bundesstiftung Umwelt		
Projekt leader: University of Applied Sciences Oldenburg Ostfriesland Wilhelmshaven		
Subprojekt: Entrance Area		
Task: National Park House - Variant 1		
Plan: Ground Floor and Cross Section		
Engineer: Többen	Drawing by: Többen	Scale:
File: 200716 \ 31 Endbericht \ Zeichnungen \ NPH SHIRVAN.dwg	Date: 05.07.2007	Plan Nr. : Z 2.1.1

15.8. Z.2.1.2 National Park House – Variant 1, Views







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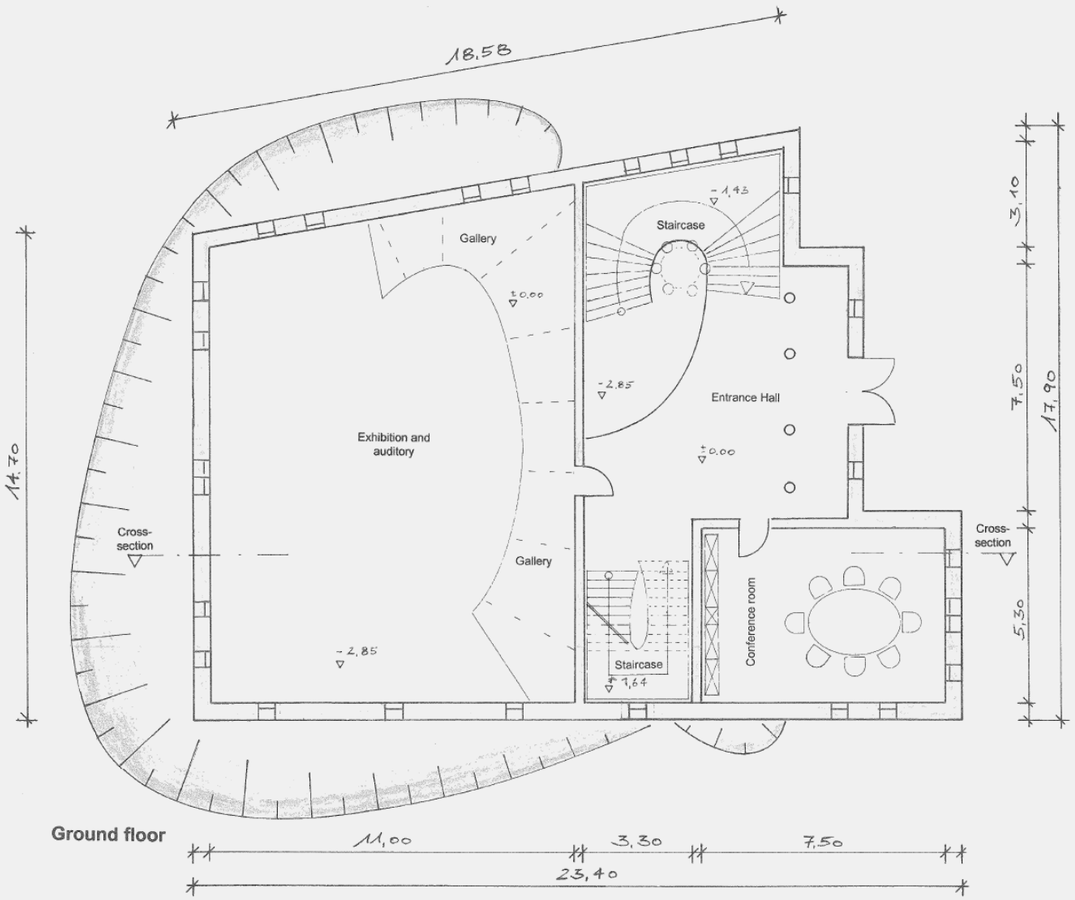
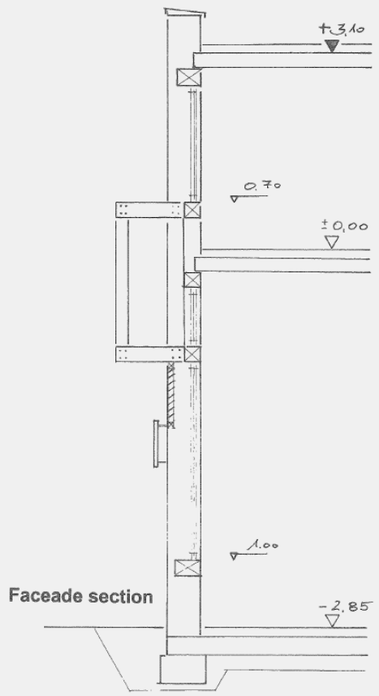
Partner: Ministry of Ecology and Natural Resources (MENR), Baku, Azerbaijan		
Client: Deutsche Bundesstiftung Umwelt		
Projekt leader: University of Applied Sciences Oldenburg Ostfriesland Wilhelmshaven		
Subprojekt: Entrance Area		
Task: National Park House - Variant 1		
Plan: Views		
Engineer: Többen	Drawing by: Többen	Scale:
File: 200716 \ 31 Endbericht \ Zeichnungen \ NPH SHIRVAN.dwg	Date: 05.07.2007	Plan Nr. : Z 2.1.2

15.9. Z 2.1.3 National Park House – Variant 2, Ground floor, Cross Section and Facade Section





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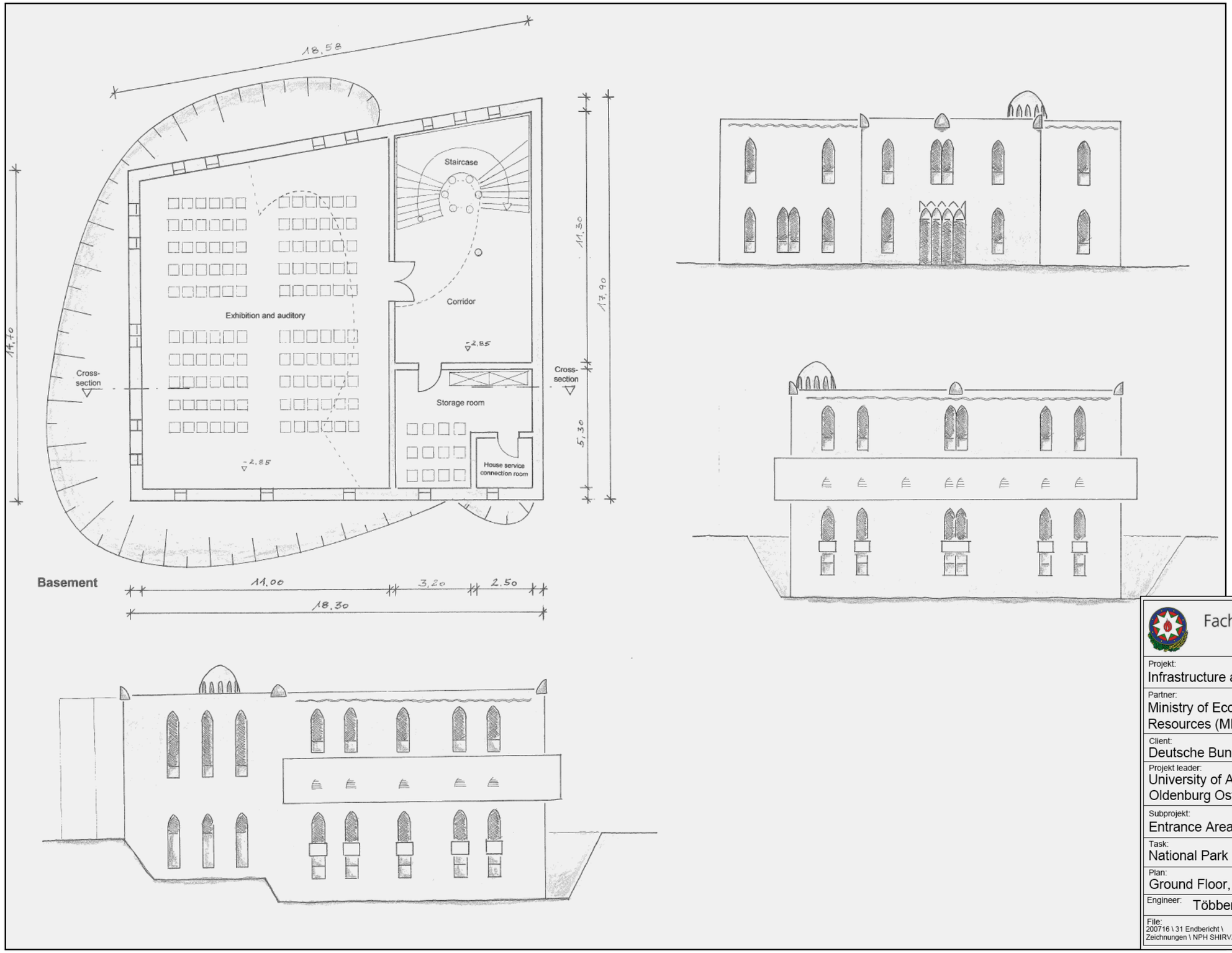
Client: Deutsche Bundesstiftung Umwelt		
Projekt leader: University of Applied Sciences Oldenburg Ostfriesland Wilhelmshaven		
Subprojekt: Entrance Area		
Task: National Park House - Variant 2		
Plan: Ground Floor, Cross Section and Facade Section		
Engineer: Többen	Drawing by: Többen	Scale:
File: 200716 \ 31 Endbericht \ Zeichnungen \ NPH SHIRVAN.dwg	Date: 05.07.2007	Plan Nr. : Z 2.1.3

15.10. Z 2.1.3.National Park House, Variant 2, Ground Floor, Cross and Facade Section



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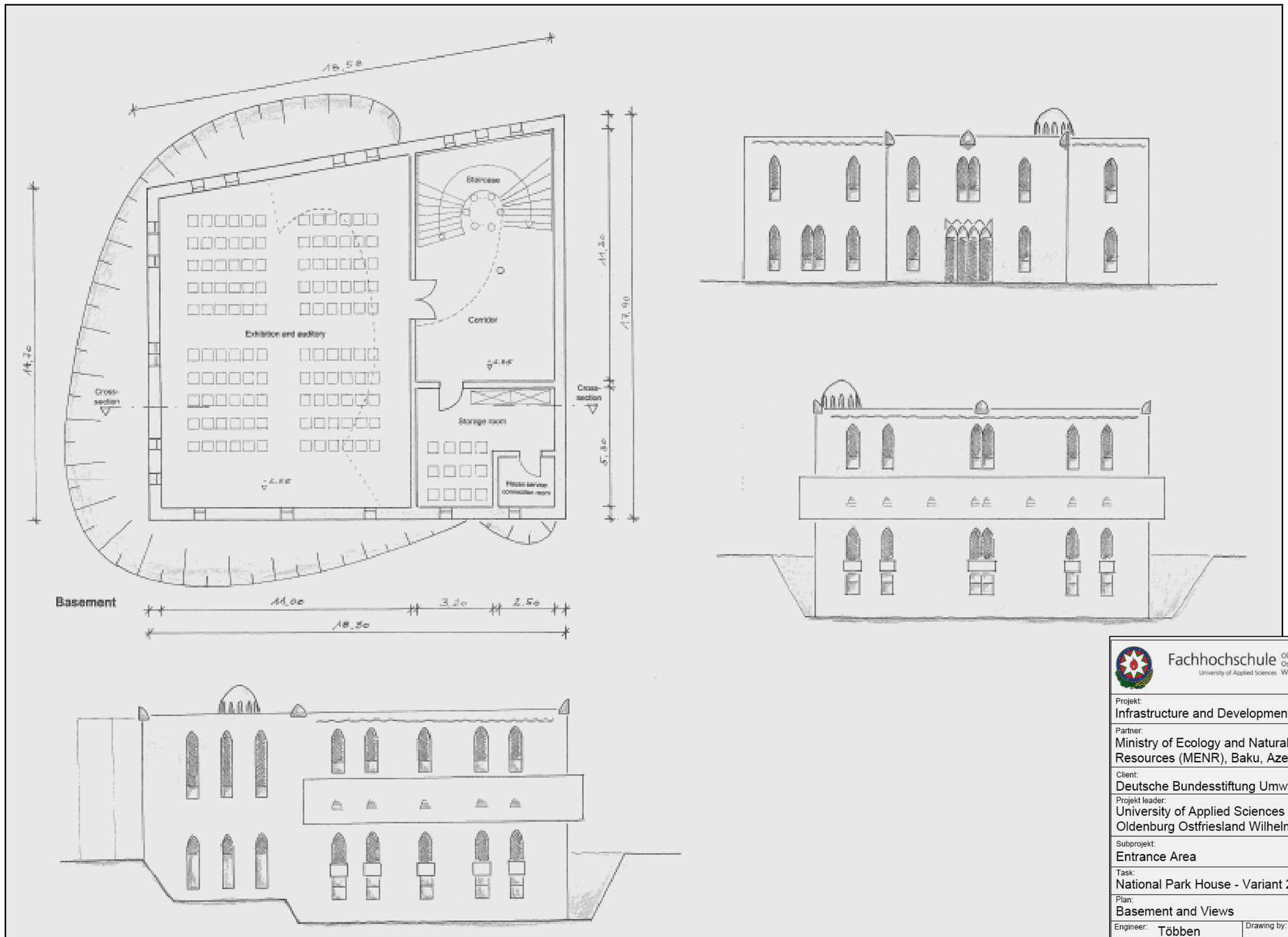
Client: Deutsche Bundesstiftung Umwelt		
Projekt leader: University of Applied Sciences Oldenburg Ostfriesland Wilhelmshaven		
Subprojekt: Entrance Area		
Task: National Park House - Variant 2		
Plan: Ground Floor, Cross Section and Facade Section		
Engineer: Többen	Drawing by: Többen	Scale:
File: 200716 \ 31 Endbericht \ Zeichnungen \ NPH SHIRVAN.dwg	Date: 05.07.2007	Plan Nr. : Z 2.1.3

15.11. Z.2.1.4 National Park House – Variant 2, Basement and Views



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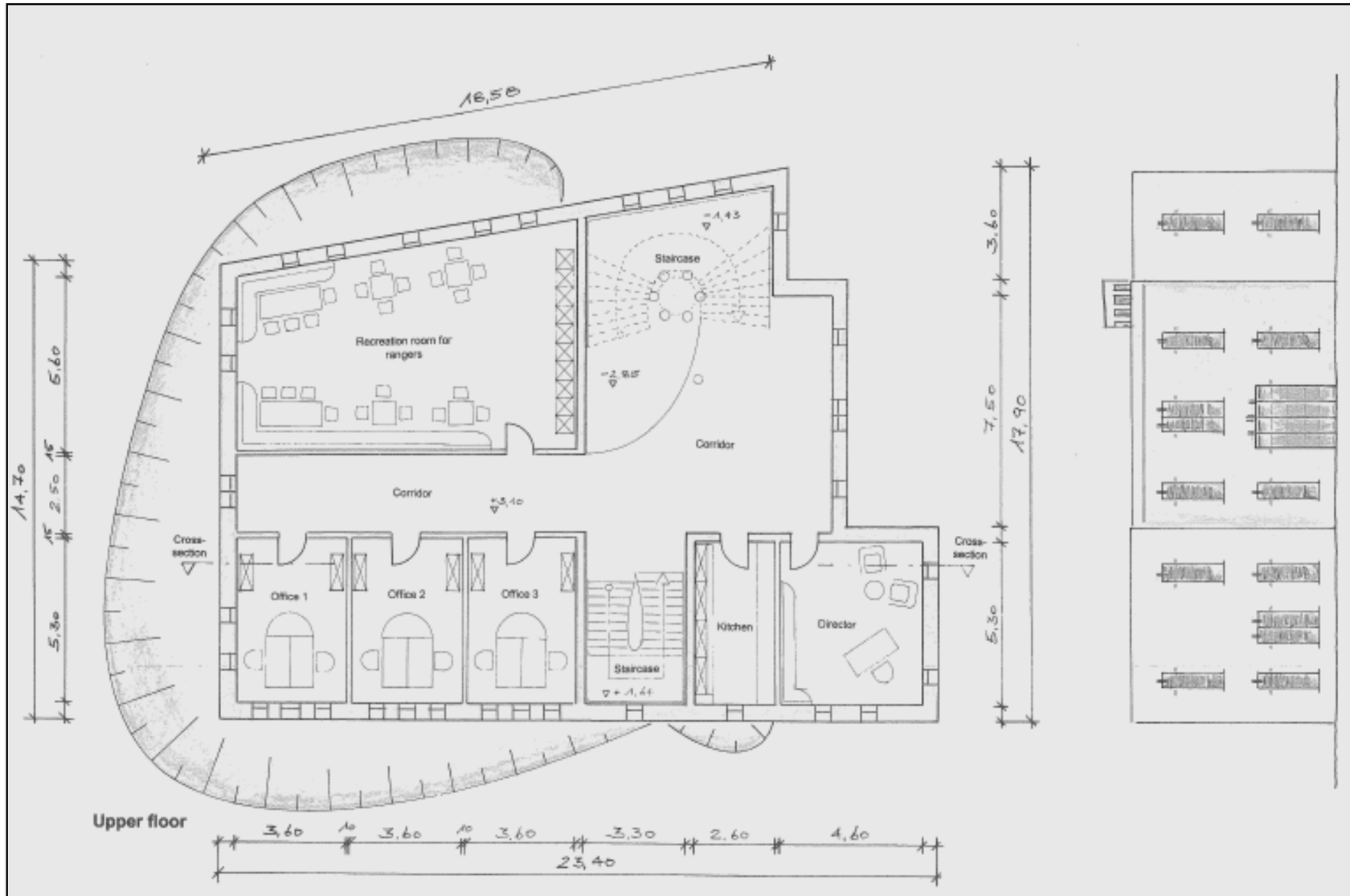
Partner: Ministry of Ecology and Natural Resources (MENR), Baku, Azerbaijan		
Client: Deutsche Bundesstiftung Umwelt		
Projekt leader: University of Applied Sciences Oldenburg Ostfriesland Wilhelmshaven		
Subprojekt: Entrance Area		
Task: National Park House - Variant 2		
Plan: Basement and Views		
Engineer: Többen	Drawing by: Többen	Scale:
File: 200716 \ 31 Endbericht \ Zeichnungen \ NPH SHIRVAN.dwg	Date: 05.07.2007	Plan Nr. : Z 2.1.4

15.12. Z 2.1.5 National Park House – Variant 2, Upper Floor and Alternative Façade



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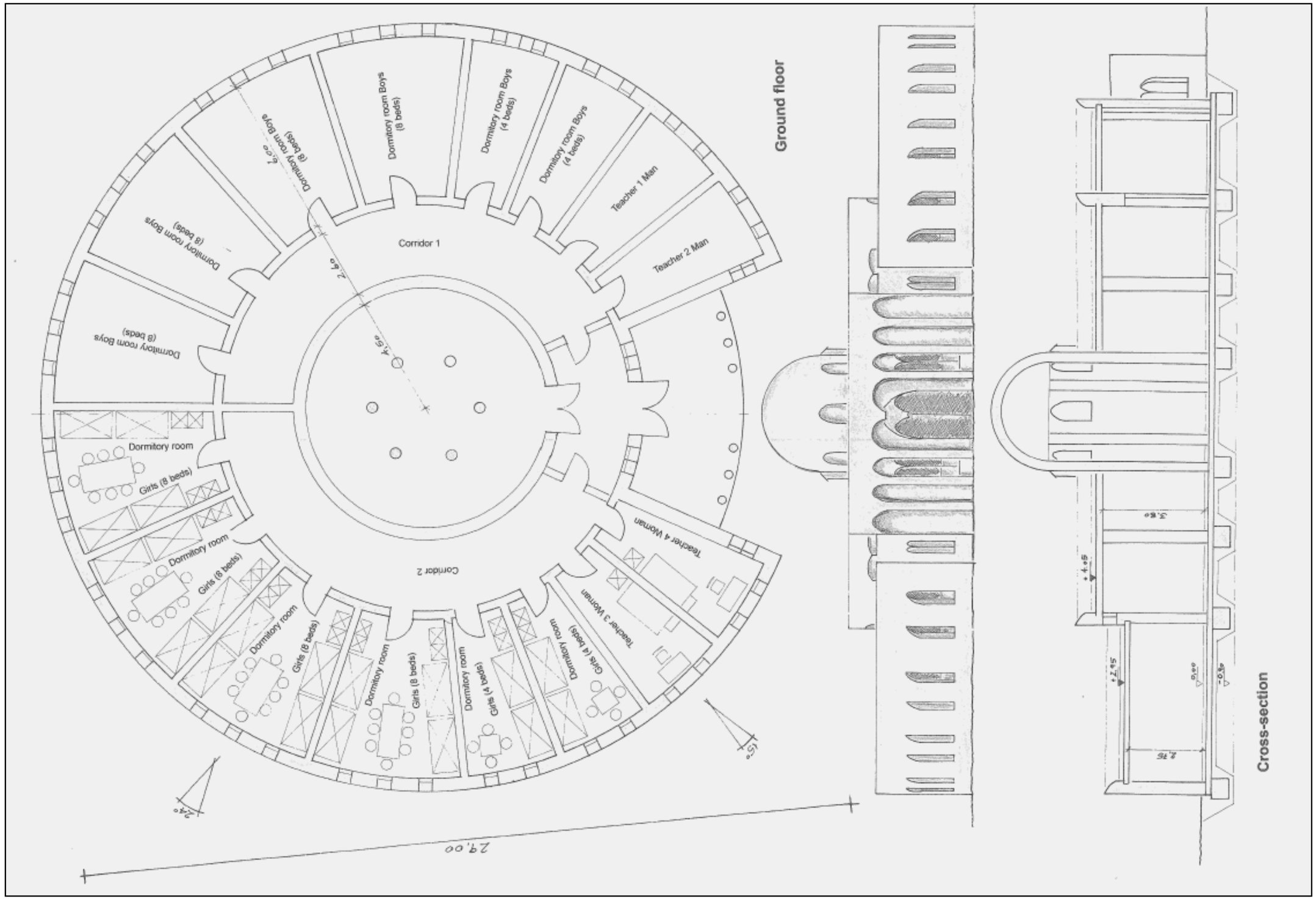
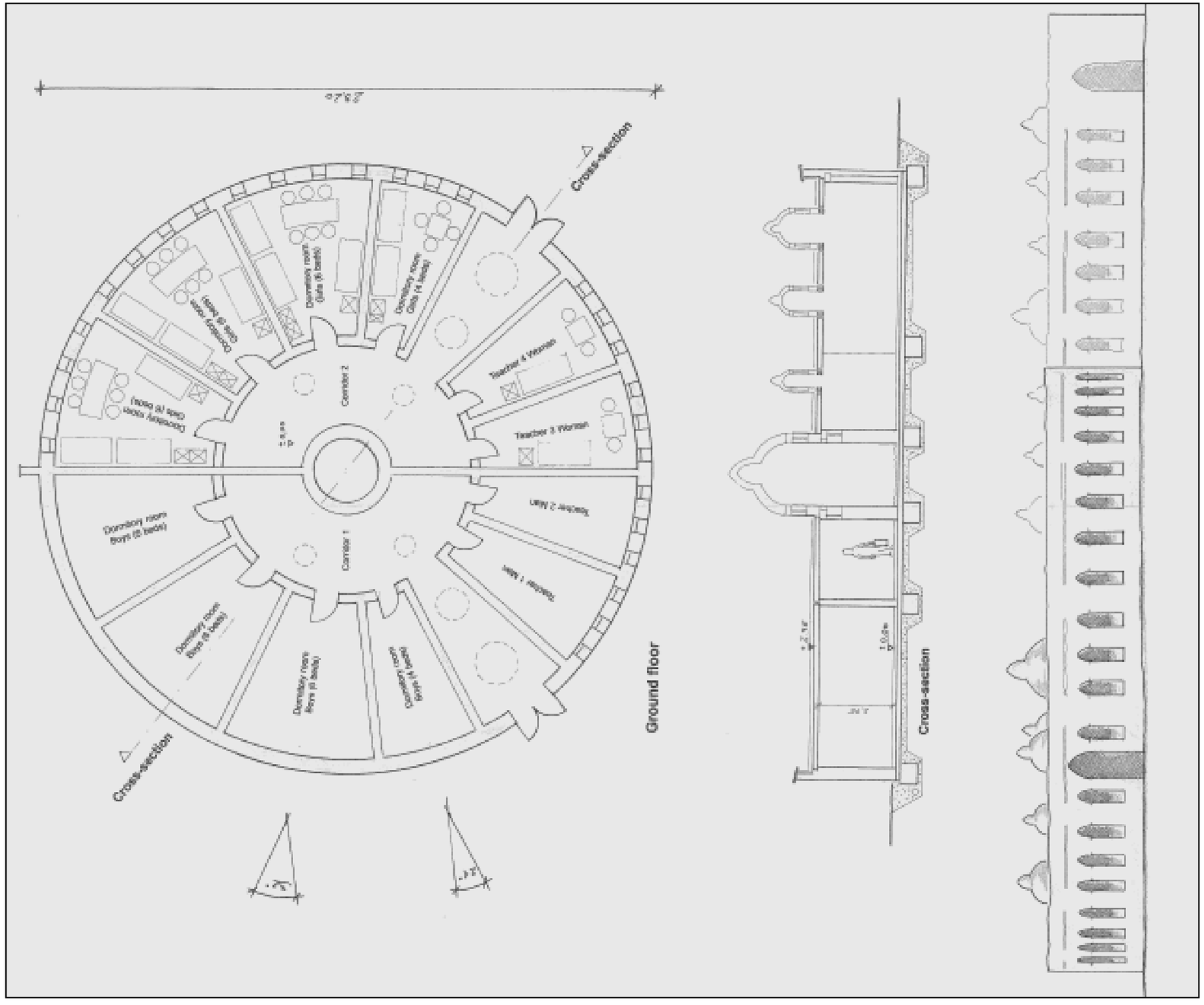
Partner:	Ministry of Ecology and Natural Resources (MENR), Baku, Azerbaijan
Client:	Deutsche Bundesstiftung Umwelt
Project leader:	University of Applied Sciences Oldenburg Ostfriesland Wilhelmshaven
Subproject:	Entrance Area
Task:	National Park House - Variant 2
Plan:	Upper Floor and Alternative Facade

Engineer:	Drawing by:	Scale:
Többen	Többen	
File: 200716 \31 Endbericht \ Zeichnungen \NPH SHIRVAN.dwg	Date: 05.07.2007	Plan Nr. : Z 2.1.5

15.13. Z 2.2.1 Lake Area, Acc. House, Variant 1.1, Ground floor, Views and Cross Sections



15.14. Z.2.2.2 Lake Area Acc. House Variant 1.2, Ground Floor, View and Cross Section



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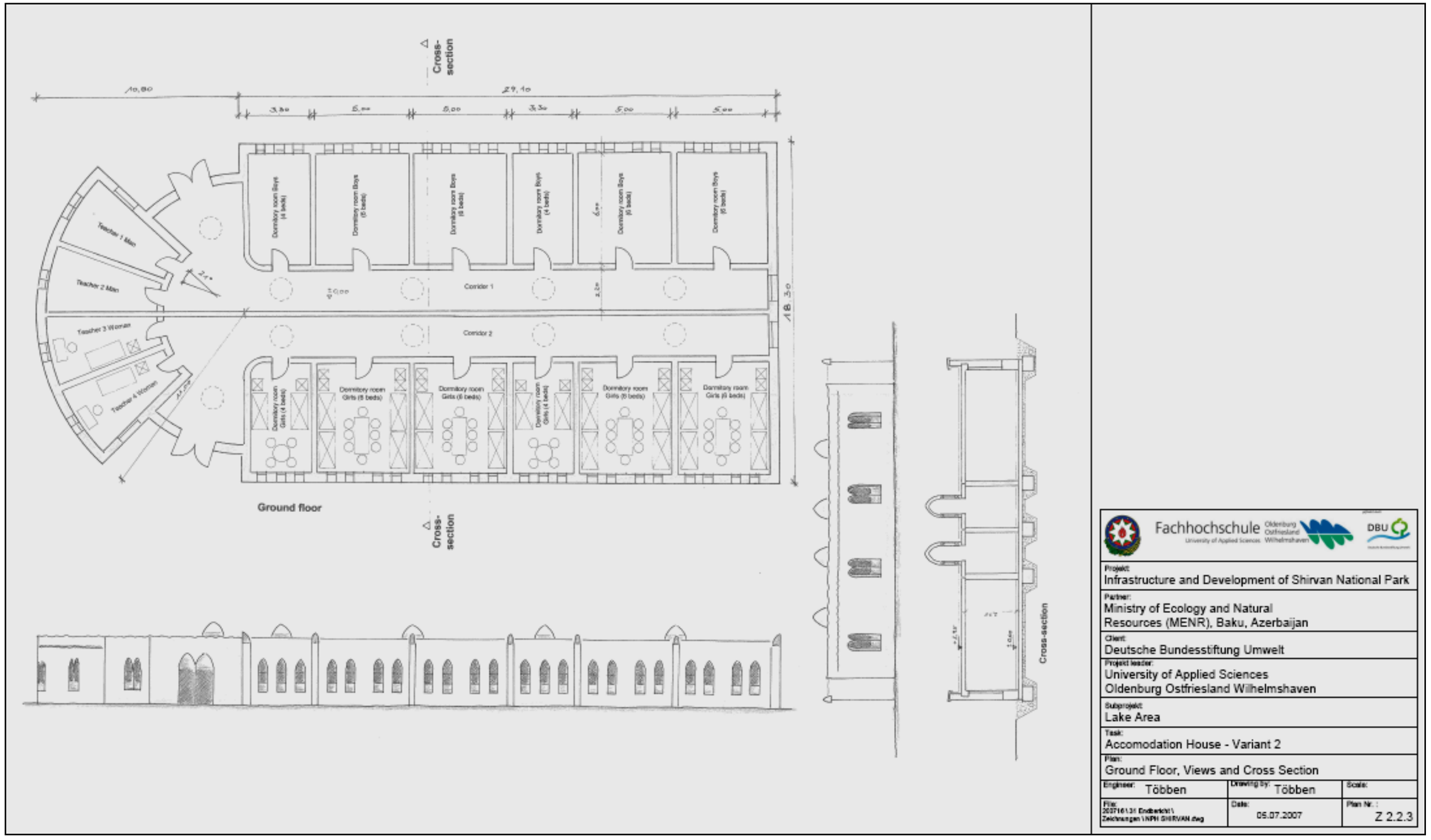
Project: Infrastructure and Development of Shirvan National Park	
Partner: Ministry of Ecology and Natural Resources (MENR), Baku, Azerbaijan	
Client: Deutsche Bundesstiftung Umwelt	
Project leader: University of Applied Sciences Oldenburg Ostfriesland Wilhelmshaven	
Subproject: Lake Area	
Task: Accomodation Houses - Variant 1.2	
Plan: Ground Floor, View and Cross Section	
Engineer: Többen	Drawing by: Többen
File: 200716 \ 01 Endbericht \ Zeichnungen \ NPK SHIRVAN.dwg	Date: 05.07.2007
Scale:	Plan Nr.: Z 2.2.2

15.15. Z.2.2.3 Accommodation House Variant 1.2, Ground Floor, View and Cross Section



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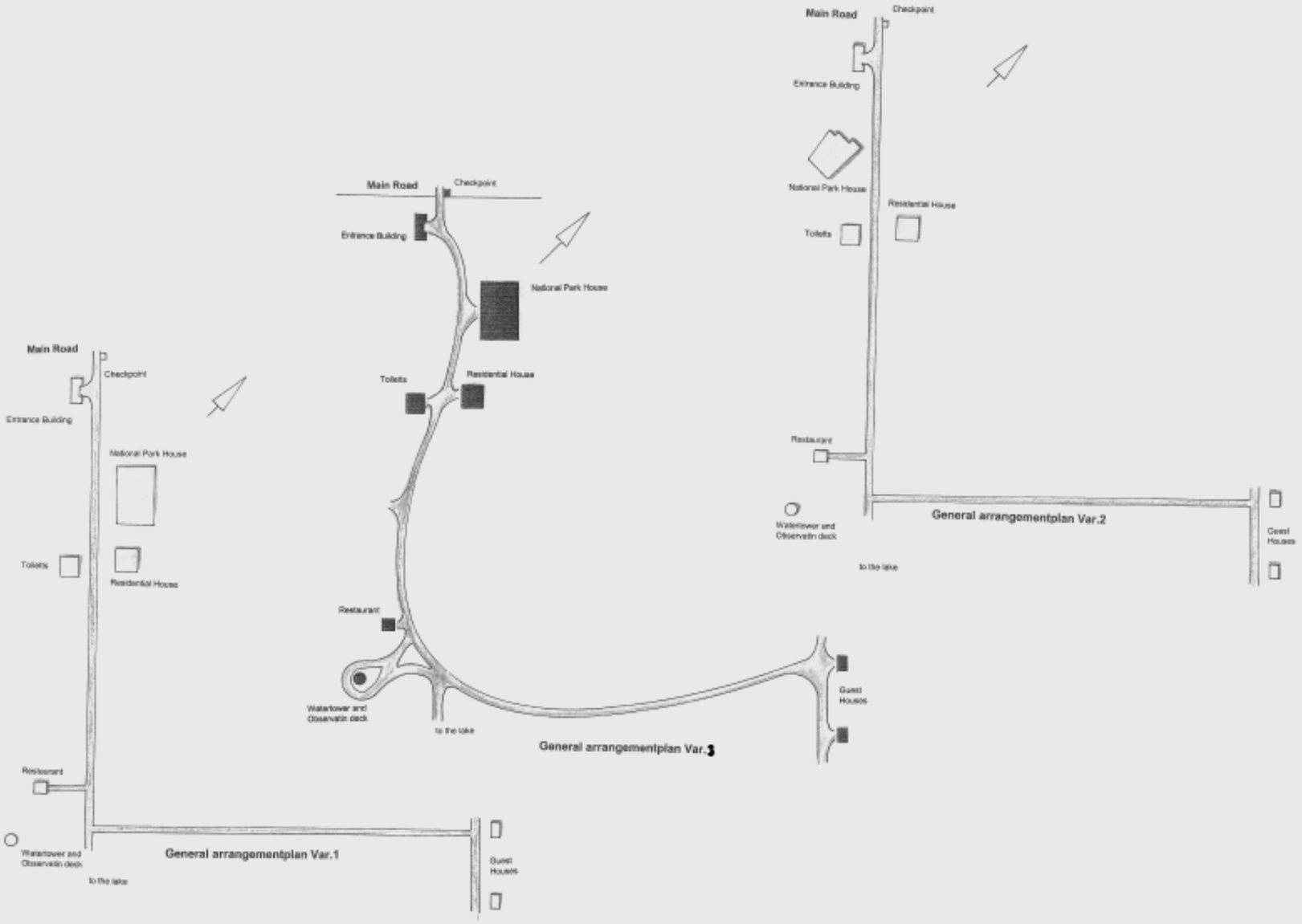
Projekt:	Infrastructure and Development of Shirvan National Park
Partner:	Ministry of Ecology and Natural Resources (MENR), Baku, Azerbaijan
Client:	Deutsche Bundesstiftung Umwelt
Project leader:	University of Applied Sciences Oldenburg Ostfriesland Wilhelmshaven
Subprojekt:	Lake Area
Task:	Accomodation House - Variant 2
Plan:	Ground Floor, Views and Cross Section

Engineer:	Drawing by:	Scale:
Többen	Többen	
File: 200716\3\ Endbericht\ Zeichnungen \INPH SHIRVAN.dwg	Date: 05.07.2007	Plan Nr.: Z 2.2.3

15.16. Z 2.3 –Entrance Arrangements, Variants 1, 2 and 3, Ground Plan



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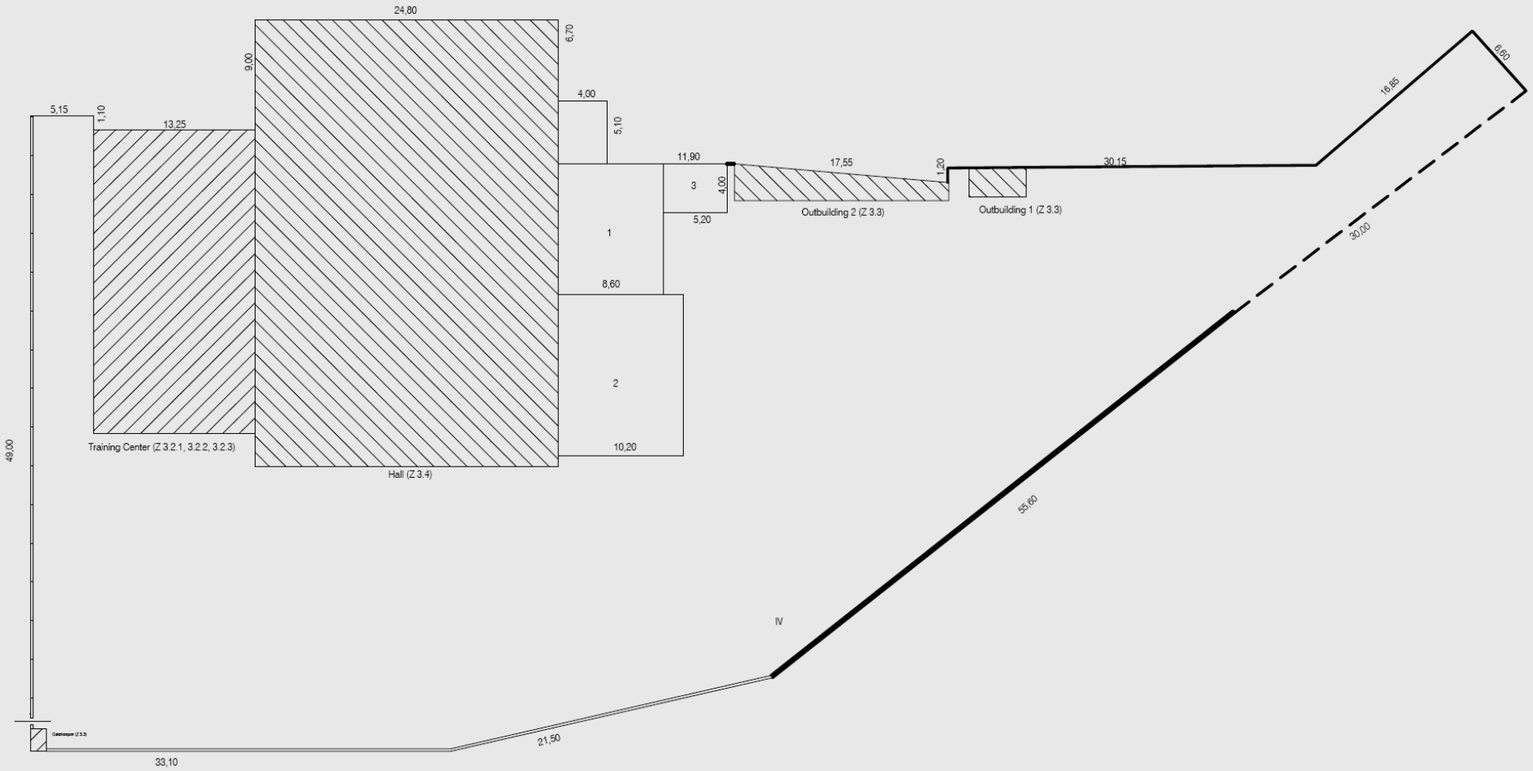
Project: Infrastructure and Development of Shirvan National Park		
Partner: Ministry of Ecology and Natural Resources (MENR), Baku, Azerbaijan		
Client: Deutsche Bundesstiftung Umwelt		
Project leader: University of Applied Sciences Oldenburg Ostfriesland Wilhelmshaven		
Subproject: Entrance Areas		
Task: General Arrangement Plan - Variant 1, 2 and 3		
Plan: Ground Plan		
Engineer: Többen	Drawing by: Többen	Scale:
File: 200716 \ 31 Endbericht \ Zeichnungen \ NPH SHIRVAN.dwg	Date: 05.07.2007	Plan Nr.: Z 2.3

15.17. Z. 3.1 Training Center (Institute for Requalification), Site Plan



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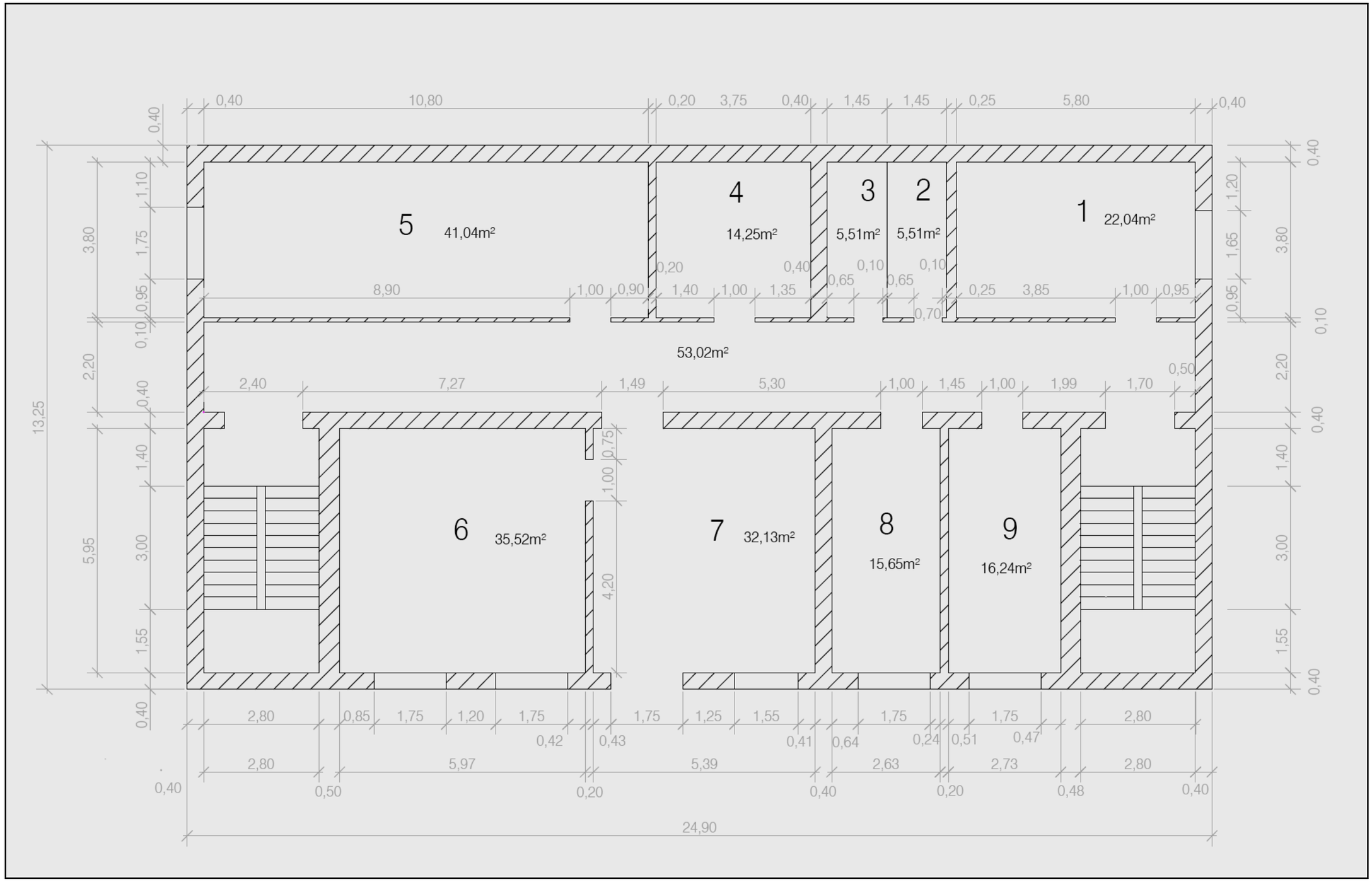
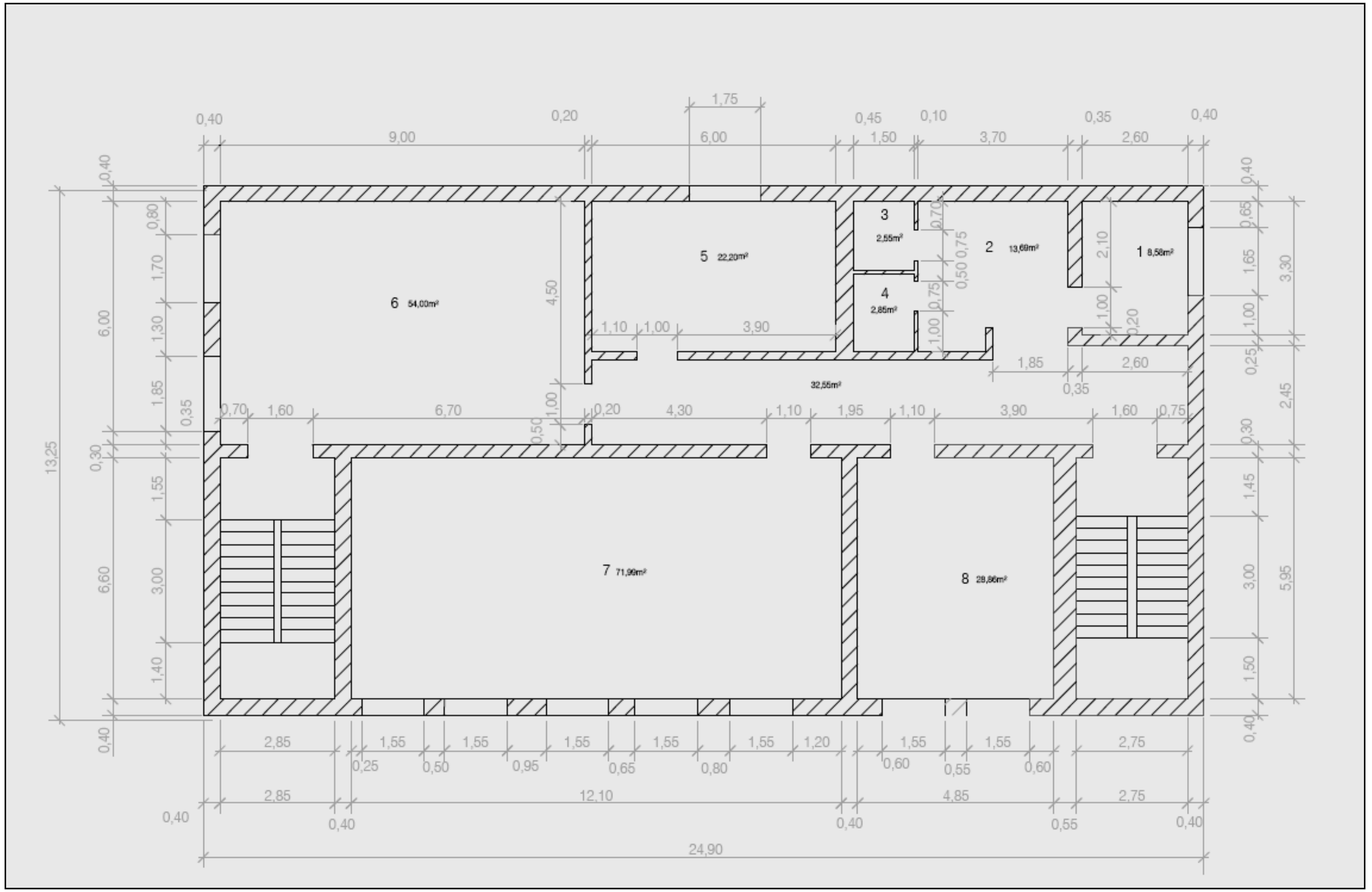
Projekt: Infrastructure and Development of Shirvan National Park		
Partner: Ministry of Ecology and Natural Resources (MENR), Baku, Azerbaijan		
Client: Deutsche Bundesstiftung Umwelt		
Projekt leader: University of Applied Sciences Oldenburg Ostfriesland Wilhelmshaven		
Subprojekt: Institute for Requalification, Baku		
Task: Survey of Area		
Plan: Site Plan		
Engineer: Görlich / Altmann	Drawing by: Göhnert / Bruns	Scale: 1:250
File: 200716 \ 31 Endbericht \ Zeichnungen \ NPH SHIRVAN BESTAND.dwg	Date: 05.07.2007	Plan Nr. : Z 3.1

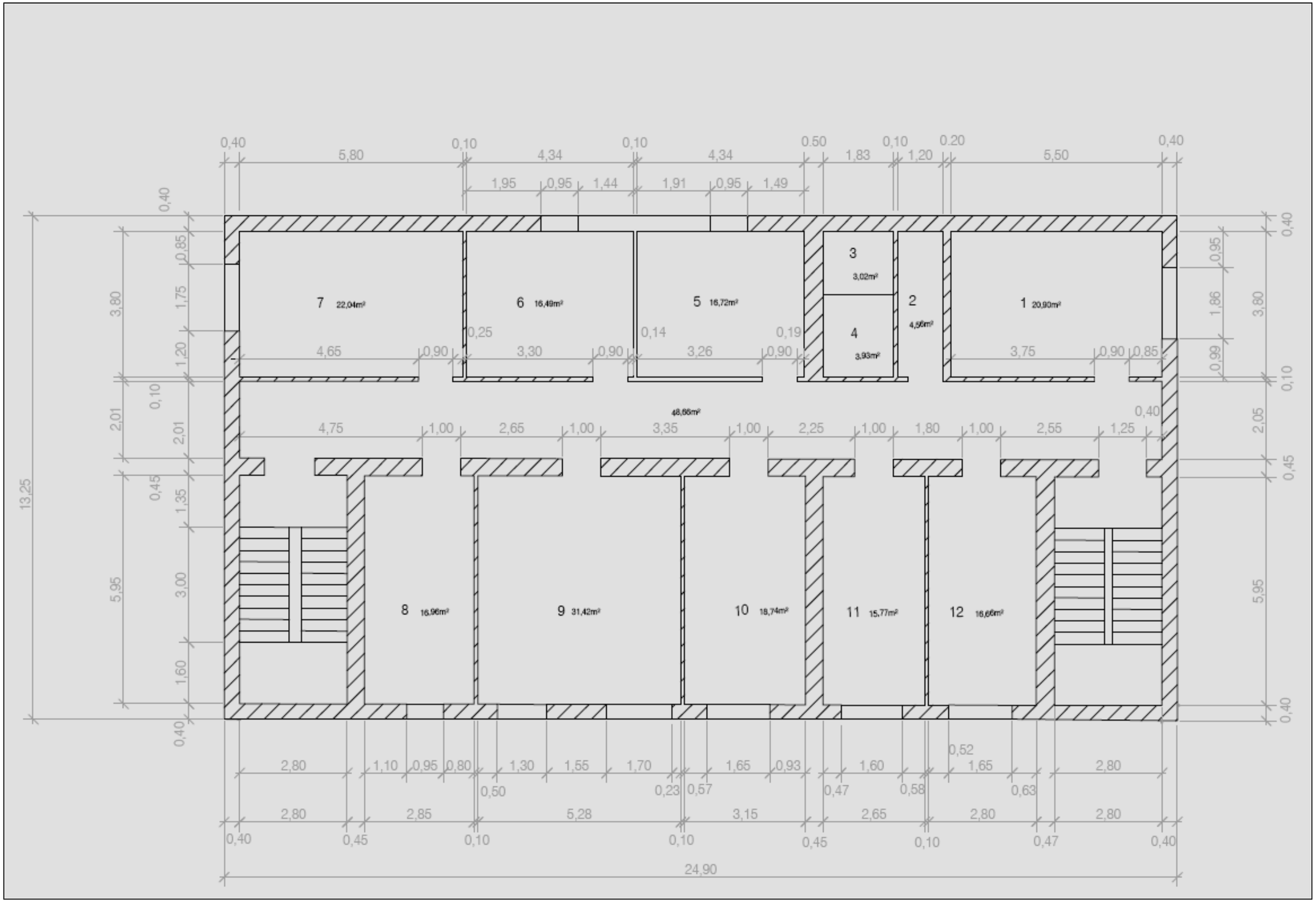
15.18. Z.3.2.1 Training Center, 1st Floor, Ground Plan



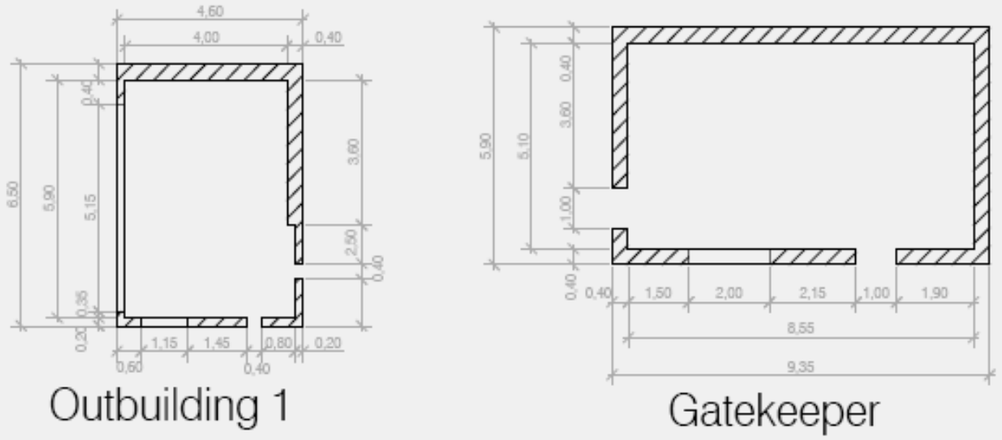
15.19. Z.3.2.2 Training Center, 2nd Floor, Ground Plan



15.20. Z. 3.2.3 Training Center, 3rd Floor, Ground Plan

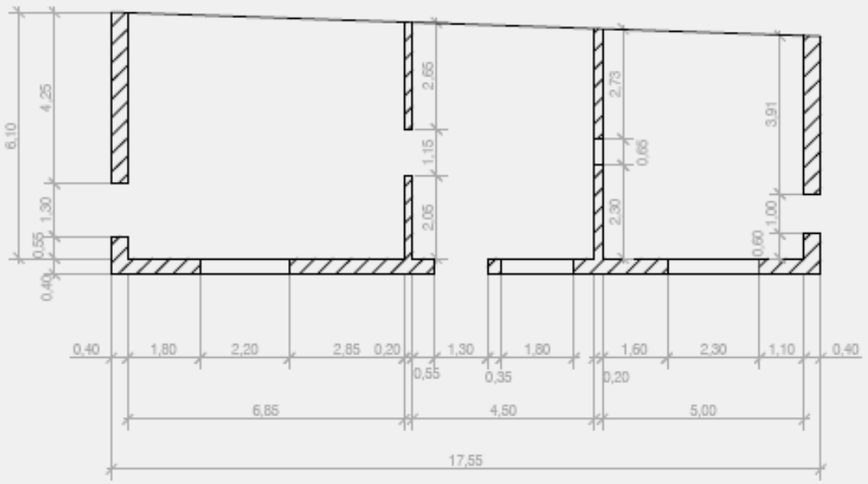


15.21. Z.3.3 Training Center, Survey of Area, Outbuildings



Outbuilding 1

Gatekeeper



Outbuilding 2

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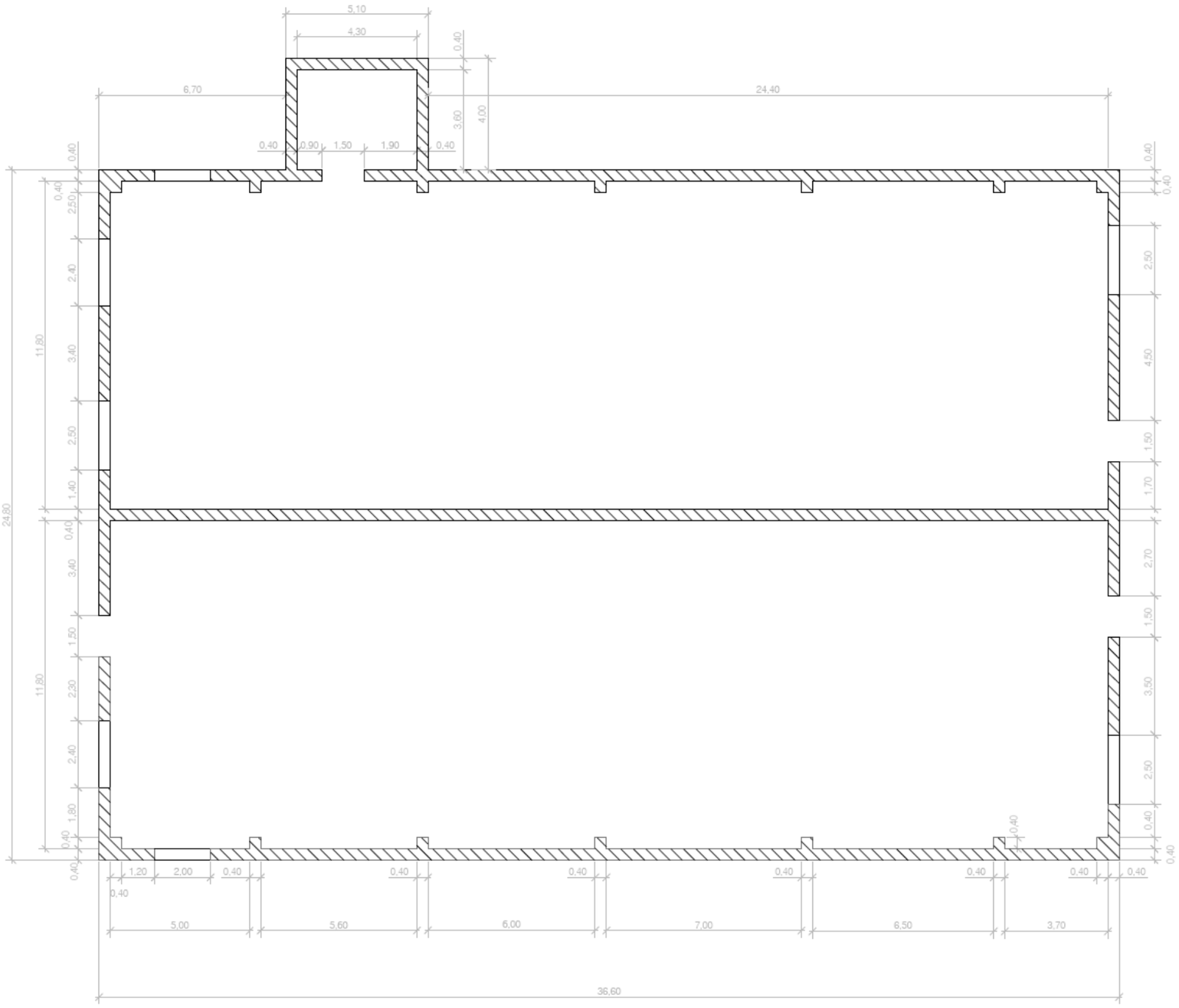
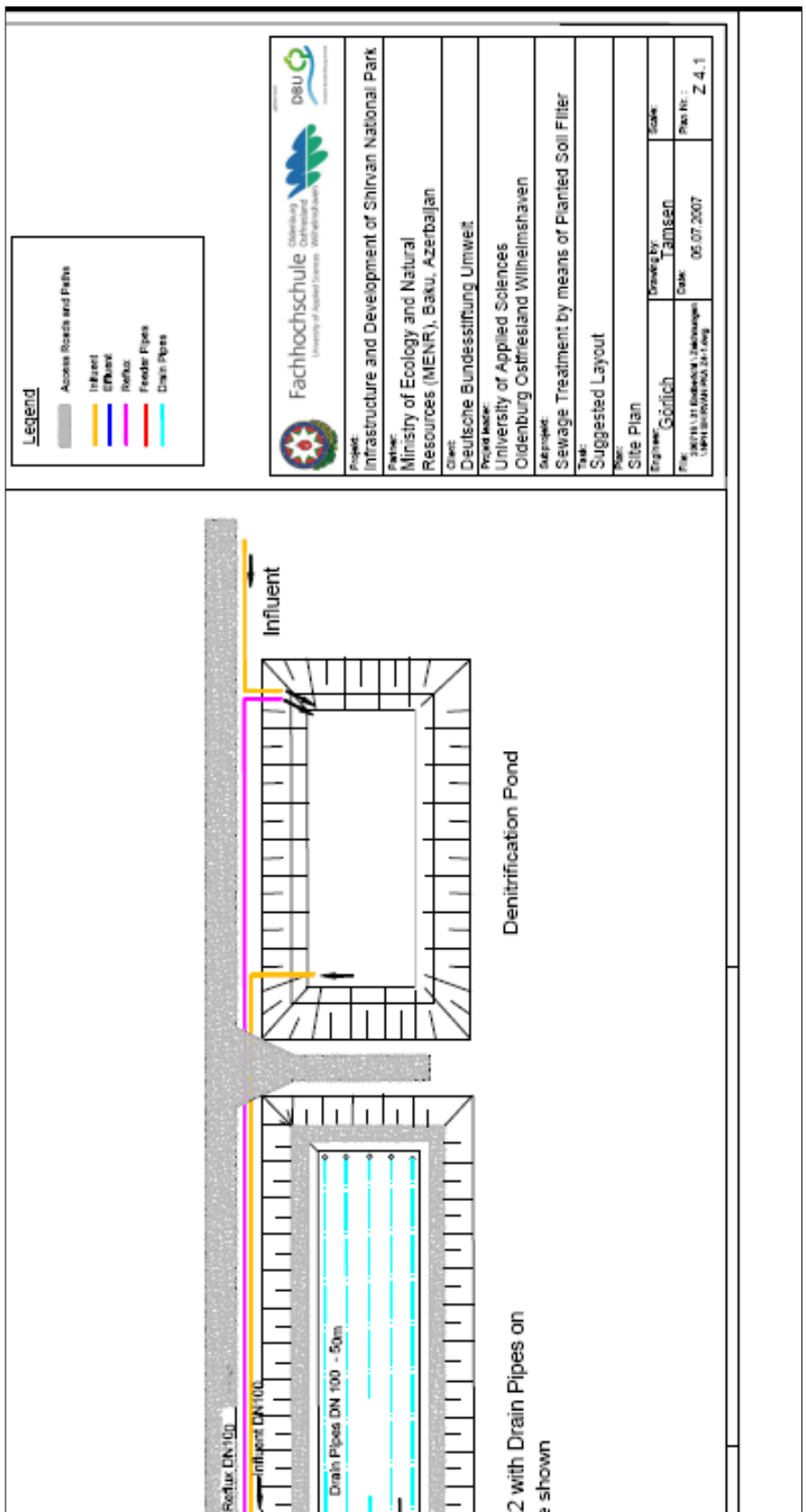
Projekt:	Infrastructure and Development of Shirvan National Park
Partner:	Ministry of Ecology and Natural Resources (MENR), Baku, Azerbaijan
Client:	Deutsche Bundesstiftung Umwelt
Projekt leader:	University of Applied Sciences Oldenburg Ostfriesland Wilhelmshaven
Subprojekt:	Institute for Requalification, Baku
Task:	Survey of Area
Plan:	Outbuildings

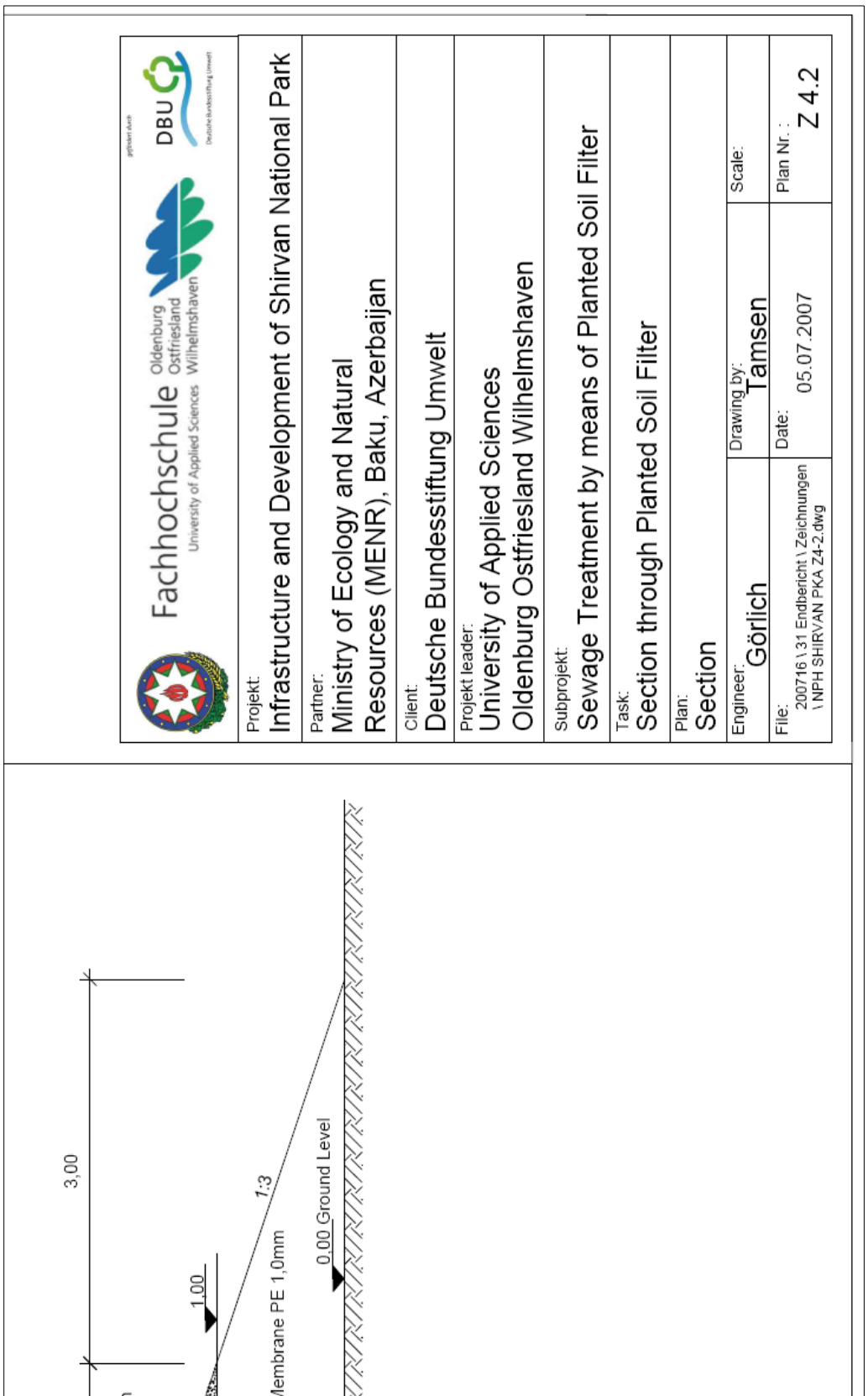
Engineer:	Drawing by:	Scale:
Görlich / Altmann	Göhnert / Bruns	1:100
File: 200716 \ 31 Endbericht \ Zeichnungen \ NPH SHIRVAN BESTAND.dwg	Date: 05.07.2007	Plan Nr. : Z 3.3

15.22. Z.3.4 Training Center, Hall

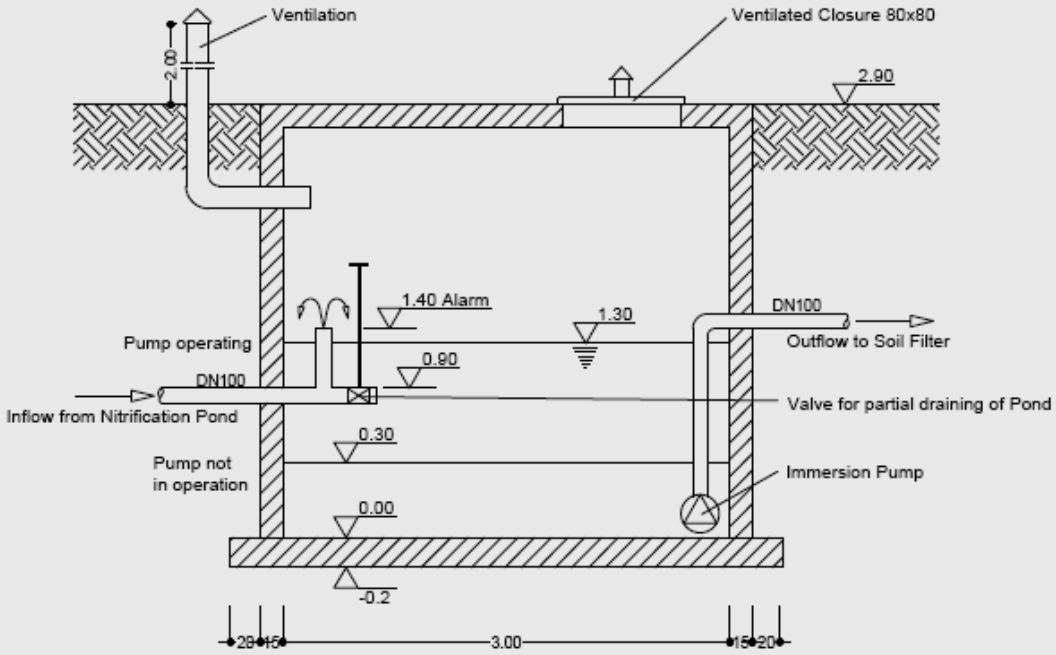


15.23. Z.4.1 and Z 4.2 Planted Soil Filter , Layout and Section





15.24. Z.4.3 Section through Feeder Pump Station



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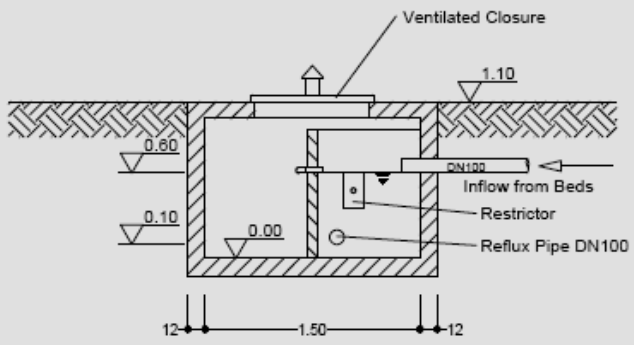
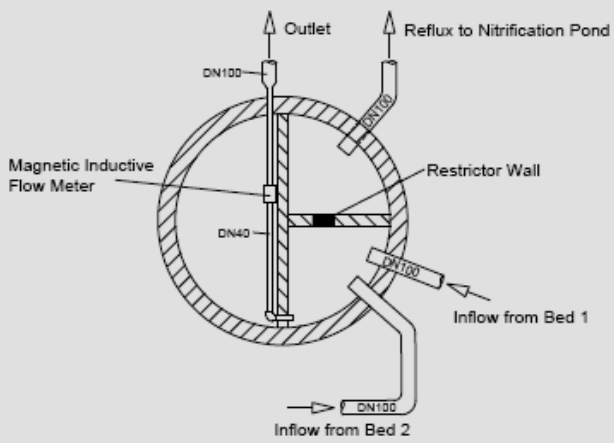
Partner: Ministry of Ecology and Natural Resources (MENR), Baku, Azerbaijan		
Client: Deutsche Bundesstiftung Umwelt		
Projekt leader: University of Applied Sciences Oldenburg Ostfriesland Wilhelmshaven		
Subprojekt: Sewage Treatment by means of Planted Soil Filter		
Task: Section through Feeder Pump Station		
Plan: Section		
Engineer: Görlich	Drawing by: Tamsen	Scale:
File: 200716 \ 31 Endbericht \ Zeichnungen \ NPH SHIRVAN PKA Z4-3.dwg	Date: 05.07.2007	Plan Nr. : Z 4.3

15.25. Z.4.4. Sewage Treatment: Section through Effluent Inspection Chamber





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Partner: Ministry of Ecology and Natural Resources (MENR), Baku, Azerbaijan		
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Projekt leader: University of Applied Sciences Oldenburg Ostfriesland Wilhelmshaven		
Subprojekt: Sewage Treatment by means of Planted Soil Filter		
Task: Section through Effluent Inspection Chamber		
Plan: Section		
Engineer: Görlich	Drawing by: Tamsen	Scale:
File: 200716 \ 31 Endbericht \ Zeichnungen \ NPH SHIRVAN PKA Z4-4.dwg	Date: 05.07.2007	Plan Nr. : Z 4.4