TERMS OF REFERENCE
TVET FACILITIES UPGRADING: DETAILED ENGINEERING DESIGN, COST ESTIMATE AND CONSTRUCTION SUPERVISION SERVICES OF DESIGN FIRM 3 – CS41

A. BACKGROUND INFORMATION

1. Mongolia has received a Loan (loan no. 3243) from the Asian Development Bank (ADB) toward the cost of Skills for Employment Project, and intends to apply a portion of the proceeds of this Loan to eligible payments for these consulting services.
2. The project shall enhance capacity of the Technical and Vocational Education Training Providers to deliver training programs in certain occupations. This enhancement refers to training curriculum development, teacher capacity strengthening, building environment improvement and equipment provision.

B. OBJECTIVE

3. The main objective and scope of the assignment is to (1) prepare complete Detailed Engineering Design and (2) conduct Construction Supervision during the construction period.
4. For the architectural planning purposes of the practical training related building, facility, room or area, it is to be assumed that about 15 students would be involved in the practical trainings, subject to specific instruction(s) that may be issued by the Client for any given practical training related building, facility, room or area.
5. This Terms of Reference covers:
   (1) Ulaanbaatar Construction Polytechnic College (Attachment No. 1)
   (2) Uvurkhangai Vocational Training and Production Center (Attachment No. 2)
   (3) Arkhangai Vocational Training and Production Center (Attachment No. 3)

C. CONSULTING SERVICE REQUIREMENTS

Minimum qualification criteria

6. Prospective firms should meet the minimum qualification criteria specified in Table 1 and are required to submit the following documentation/information at Expression of Interest stage:

   (1) Company registration certificates, special license.
   (2) Copies of Certificates of Project Completion and Acceptance or equivalent Certification from their previous related studies / design / contract.
   (3) Company profile.
   (4) Any other document or information required as per Expression of Interest template.

TABLE 1 – FIRM – MINIMUM QUALIFICATION CRITERIA

Item	Requirement ("x" apply)
License	If issued under framework of order no. 89 dated 07 May 2013 of Minister of Construction and Urban Development - ☒ 1.2.1 – 1-10 story building architecture, landscaping, elevation, structure **or** ☒ 1.2.2 - 1-16 story building architecture, landscaping, elevation, structure, permanent equipment planning ☒ 1.2.4 – internal water, sewerage, heating, ventilation, air conditioning, external branch line ☒ 1.2.5 – internal light, electricity, external branch line, internal communication, fire and other signaling, local area network, security systems, instrumentation and control ☒ 1.2.6 – feasibility study, cost estimating

	If issued under framework of order no. 11 dated 19 January 2018 of Minister of Construction and Urban Development - ☒ 3T-3.1 or 3T-4.1 – Architecture, structure, internal organizational planning, design of building ☒ 3T-6.1 or 3T-7.1 – internal water supply, sewerage system, external branch line, related facility technological design of building ☒ 3T-6.2 or 3T-7.2 – internal heating supply, ventiliation system, external branch line, related facility technological design of building ☒ 3T-6.3 or 3T-7.3 – internal lighting, electrical supply system, external branch line, related facility technological design of building. Instrumentation and control, automation design of condominium, public and industrial building ☒ 3T-6.4 or 3T-7.4 – internal radio communication, fire and other alarm system, information system design, security system, related facility technological design, computer local area network and external branch line of building ☒ 3T-8.1 – external general plan, landscaping, topography design ☒ 3T-11.1 or 3T-11.2 – cost estimating of building civil works
Similar experience	At least 1 similar contract completed during last 4 years.
Status of special license	Active

Indicative person-month inputs of key experts (intermittent)

7. Prospective firms are expected to engage an indicative total of 38.0 person-months of national experts, as summarized in Table 2.

TABLE 2 – SUMMARY OF KEY EXPERT REQUIREMENTS

Position	**Person months**
Team Leader (one of the engineers below, preferably Architect)	6.8
Architect	6.5
Structural Engineer	7.5
Heating, Ventilation and Air Conditioning Engineer	5.9
Electrical Engineer	4.5
Communication, Signaling, Information Engineer	2.4
Water and Sewerage Engineer	2.4
Cost Estimator	2.0
Total	**38.0**

8. Short listed firms are required to submit the information as per Request for Proposals document, including CVs of Key Experts at Request for Proposal stage. Key experts should have the qualifications and assignment specific experience as specified in Table 3.

TABLE 3 - KEY EXPERTS – REQUIRED QUALIFICATION AND EXPERIENCE

Position	**Qualifications**
Team Leader (one of the engineers below, preferably Architect)	- At least 10 years of proven experience in management of construction design and construction supervision work by team of engineers. - Consulting Engineer or Consulting Architect.
Architect	- At least Bachelor in architecture.

	- Certified Engineer. - At least 10 years of relevant experience in design of buildings. - At least 10 years of experience in construction supervision. - At least performed 1 similar design and supervision contract in the past 4 years. - Proficient in CAD or Revit technology and 3-dimensional conceptual skills.
Structural Engineer	- Civil Engineer in Structural Engineering. - Certified Engineer. - At least 8 years of relevant experience in the design, construction supervision. - Literacy in Structural Analysis Software and proficient in CAD or Revit technology.
Heating, Ventilation and Air Conditioning Engineer	- Mechanical Engineer in Heating Engineering. - Certified Engineer. - At least 8 years of relevant experience in the design, construction supervision of modern technology and design experience in heating and air-conditioning in green/passive technology buildings. - At least performed 1 similar design and supervision contract in the past 4 years. - Proficient in CAD or Revit technology.
Electrical Engineer	- Electrical Engineer. - Certified Engineer. - At least 8 years of relevant experience in the design, construction supervision. - Literacy in renewable energy design and regulations, experience in participation of green building designs*. - Literacy Building Management System (BMS)*. - At least performed 1 similar design and supervision contract in the past 4 years. - Proficient in CAD or Revit technology.
Communication, Signaling, Information Engineer	- Communications Engineer. - Certified Engineer. - At least 6 years of relevant experience in the design, construction supervision. - At least performed 1 similar design and supervision contract in the past 4 years. - Literacy in renewable energy design and regulations, experience in participation of green building designs*. - Literacy Building Management System (BMS)*. - Proficient in CAD or Revit technology.
Water and Sewerage Engineer	- Mechanical Engineer in Water supply and Sewerage Engineering. - Certified Engineer. - At least 6 years of relevant experience in the design, construction supervision. - At least performed 1 similar design and supervision contract in the past 4 years. - Proficient in CAD or Revit technology.
Cost Estimator	- Cost Estimator with at least 5 years of experience in cost estimating. - Engineer. - Certified Professional Cost Estimator. - Skills in reading building drawings and estimating building and material costs. - At least performed 2 similar cost estimate work in the past 3 years.

* One of the engineers, Electrical or Communication, can satisfy this criterion.

D. GENERAL AND ENVIRONMENTAL REQUIREMENTS

9. All designs, surveys, calculations and other deliverables shall comply with the applicable national and international legislation, codes, norms, standards and procedures.
10. The Consultant shall have the sole responsibility for the adequacy, correctness and completeness, quality, reliability, and accuracy of all the deliverables produced by the Consultant.
11. All the design and engineering solutions shall be functional, easy to maintain, sustainable, safe, and responsive to gender, the age of students, and special needs.
12. The Consultant must consult with the Project Implementation Unit in the process of assuming the tasks.
13. The Consultant will be responsible for all transport, communication and logistic support required to effectively undertake the assignment, except where set out otherwise.
14. Environmental safeguards:
    1. The consultant is supposed to include or reflect facilities, equipment and measures that aim to mitigate project impacts on environment and prevent from risks on human health and safety. These facilities, equipment and measures will be specified in the Environmental Management Plan which will be completed and provided to the Consultant during the design development process.
    2. Environmental protection related costs specified in the Environmental Management Plan shall be considered and included within the construction costs.
    3. Related domestic environmental laws, such as Law on Water, Law on Plants, Law on Prevention of Soil Erosion and Desertification, and other relevant laws, regulations and standards regarding environment, human health and safety and ADB's Safeguard Policy Requirements (SPS 2009) shall be taken into account when developing the design works.
    4. The Client, through its Project Implementation Unit, retains all the rights to impose environmental protection related requirements on the project design during the development process and reject the design works if its requirements are not fulfilled to a satisfactory level.
    5. The consultant is supposed to work closely with the environmental specialist of the Project Implementation Unit regarding information exchange such as location of construction site and facilities, scope of construction work, public consultation results and potential impact receptor survey.

E. CLIENT'S INPUT AND COUNTERPART PERSONNEL

15. Services, facilities and property to be made available to the Consultant by the Client: NONE
16. Professional and support counterpart personnel to be assigned by the Client to the Consultant's team: NONE
17. Client will provide the following inputs, project data and reports to facilitate preparation of the deliverables: any data available with the Ministry or the Center, if any.

Attachment no. 1

ULAANBAATAR CONSTRUCTION POLYTECHNIC COLLEGE
SCOPE OF SERVICES / DELIVERABLES

TABLE 1: SCOPE OF SERVICES AND DELIVERABLES

* Due = Elapsed time after Effective Date of Contract in calendar days

Description, Language, no. of copies	Key Content	Due*
The Detailed Engineering Design:		
Deliverable 1 (Mongolian) Hard copy – 3 copies	- Architectural Conceptual preliminary designs (at least 2 options as appropriate).	10
Deliverable 2 (Mongolian, the Design in English) Hard Copy – 3 copies	- Final Agreed Architectural Conceptual Design together with the geotechnical survey (for new building, new underground utilities), topo mapping (for new building, new underground utilities), all the power, heating, water supply, sewage, and communication supply calculations. - Assistance to the Client in obtaining permissions for the provision of power, heating, water supply, sewage and communication supply calculations, if it is necessary to obtain these permissions (at Consultant cost). - Permission and terms of reference for Planning and Architecture from Aimag Architect, if it is necessary to obtain this permission (at Consultant cost). - State Expertise Opinion on Geotechnical survey (payment for the Geotechnical survey is to be paid from the provisional sum, payment for this is expertise at Consultant cost).	24
Deliverable 3 (Mongolian and English except engineering calculations) Hard Copy – 4 copies + soft copy in native and PDF	- Detailed design that include the associated engineering calculations, detailed architectural and engineering designs, all discipline drawings with notes, bill of quantities (that provides sufficient information on the quantities of Works to be performed to enable bids to be prepared efficiently and accurately), technical specifications (that present a clear statement of the required specifications, standards of the materials, plant, other supplies, and workmanships to be provided). - Cost estimate. - Information for personnel requirements, construction equipment requirements, licensing requirements to be possessed by the contractor. Construction plan / schedule.	45
Deliverable 4 (Mongolian and English) Hard copy – 3	- Permission on the engineering lines for the provision of power, heating, water supply, sewage, heating and communication, if it is necessary to obtain these permissions (at Consultant cost). - Permission for Planning and Architecture from Aimag/Capital Architect, if it is necessary to obtain this permission (at Consultant cost). - Permission for Safety from the related Emergency Management Official / Agency (at Consultant cost). - State Expertise Opinion (payment to the Construction Development Center is to be paid from the provisional sum).	75
Activity (Mongolian	Assistance in preparing responses to requests for clarifications received from bidders.	

and English)		
Construction Supervision during the construction period: Architect, Structural Engineer, HVAC Engineer, Electrical Engineer, Communication Engineer, Water and Sewerage Engineer (6 persons), 3 engineers visit the site 7 times, 5 engineers visit the site 5 times (total 46 visits), the stages are: inception, foundation, 1st floor, 2nd floor, hidden works, tests, preliminary commissioning, final commissioning.		
Deliverable 5 (Mongolian) Hard copy – 1	Construction supervision plan and quality check tools. Permission to commence the Works.	
Deliverable 6 (Mongolian) Hard copy – 1	Construction supervision (both author and on behalf of client) to ensure that the construction works are carried out as specified in the works contract and document all critical elements throughout the construction.	40% of civil works achieved
Deliverable 7 (Mongolian) Hard copy – 1	Construction supervision (both author and on behalf of client) to ensure that the construction works are carried out as specified in the works contract and document all critical elements throughout the construction. Assistance in accepting the Works through the Acceptance Commission.	Final Acceptance Certificate is issued
Deliverable 8 (Mongolian) – Hard copy 1	Defect Notice during warranty period	

Ulaanbaatar Construction Polytechnic College shall be hosting Assessment and Certification Center for Construction Sector. Occupations covered are:

1. Building Interior and Exterior finisher
2. Energy-efficient building structure (blocks) assembler
3. Construction electrician
4. Drywall finisher
5. Construction machinery operator

TABLE 2: SCOPE OF CIVIL WORKS (CONCEPTUAL)

The below descriptions, dimensions, sketch drawings and functions are all preliminary and subject to check, revision if necessary and verification and validation by the Consultant.

Figure 1 shows Master Plan of Ulaanbaatar Construction Polytechnic College.

1. One (1) story 72m x 12m workshop building to be demolished (Figure 1, Position 3). This building is connected to power supply, heating, water supply and sewage services. This existing building consists of:
   - Main part 60m x 12m x 3.4m height. Built in 1974. Load bearing system is load bearing masonry external walls and internal reinforced concrete framing with precast slabs and middle axis columns.
   - The annex 12m x 12m was built later, it is with brick walls and timber roof structure.

2. A new workshop building will be built (Figure 1, Position 3) - Two story building with footprint of 70m x 15m. 1st floor height floor to ceiling about 4.5m, 2nd floor height floor to ceiling height about 3.0m. There shall be a 6m floor to ceiling high loft section for Reinforced Concrete Worker /Form works/ practical training room. It is envisaged that about 20-30% of the first floor shall have 2 story enclosure to accommodate for locker room, teacher room and some theoretical training area. Refer to table below for spacing requirements to the building.

Table 1. Preliminary Spacing Requirements for New Workshop

#	Occupation / Workshop Name	Min floor space m2	Location Requirement	Other Requirements
	Construction Sector Key Occupations			
1	Drywall Finisher	130	Shall be on 1st floor, should have direct access to outside	Minimum Ceiling height – 4.5m
2	Energy-efficiency building structure assembler	100		Minimum Ceiling height – 4.5m
3	Interior/Exterior Finisher /Plastering/	100	Shall be on 1st floor, should have direct access to outside	Moisture removing system
4	Interior/Exterior Finisher /Paper finishing works/	100	Shall be on 1st floor	Moisture removing system Minimum Ceiling height – 4m
5	Interior/Exterior Finisher /Ceramic tile and stone works/	100		Moisture removing system
6	Construction Machinery Operator	50		
	Other Occupations			
7	Lathe Milling	200	Shall be on 1st floor, should have direct access to outside	The current location is the workshop to be demolished, all current equipment will move to this new workshop
8	Welding	190	Shall be on 1st floor, should have direct access to outside. The Occupation deals with gas welding, plan accordingly for gas storage.	The current location is the workshop, which will be demolished, thus all current equipment layout, ventilation and gas piping systems will be kept.
9	Renewable Energy	50		Access to the roof for solar panels installation
10	Reinforced Concrete Worker /Form works/	150	Shall be on 1st floor, should have direct access to outside	Minimum Ceiling height – 6m, shall have a lifting hoist of 1tn
11	Reinforced Concrete Worker /Concrete works/	100		
12	Reinforced Concrete Worker /Reinforcement works/	100	1st floor location will be preferable	
	General requirements			
13	Separate restrooms for women and men. Restroom accessible for people with disabilities.			
14	Each workshop shall have teacher's room, locker area and storage of tools & materials, wash basin (hand and equipment and tools wash); a total area of these three rooms will be approximately 20-25% of total workshop area.			
15	To be provided with all services such as, but not limited to: water, sewerage, heating, ventilation, electrical 220/380V, building management system (BMS), telecommunications including internet, cable TV, fire detection and alarm system, CCTV, intruder signaling etc.			

16	Fire Alarm Control Panel (FACP), CCTV, intruder signaling shall be controllable and monitorable at the dispatch center located in building under position 1 at Figure 1.

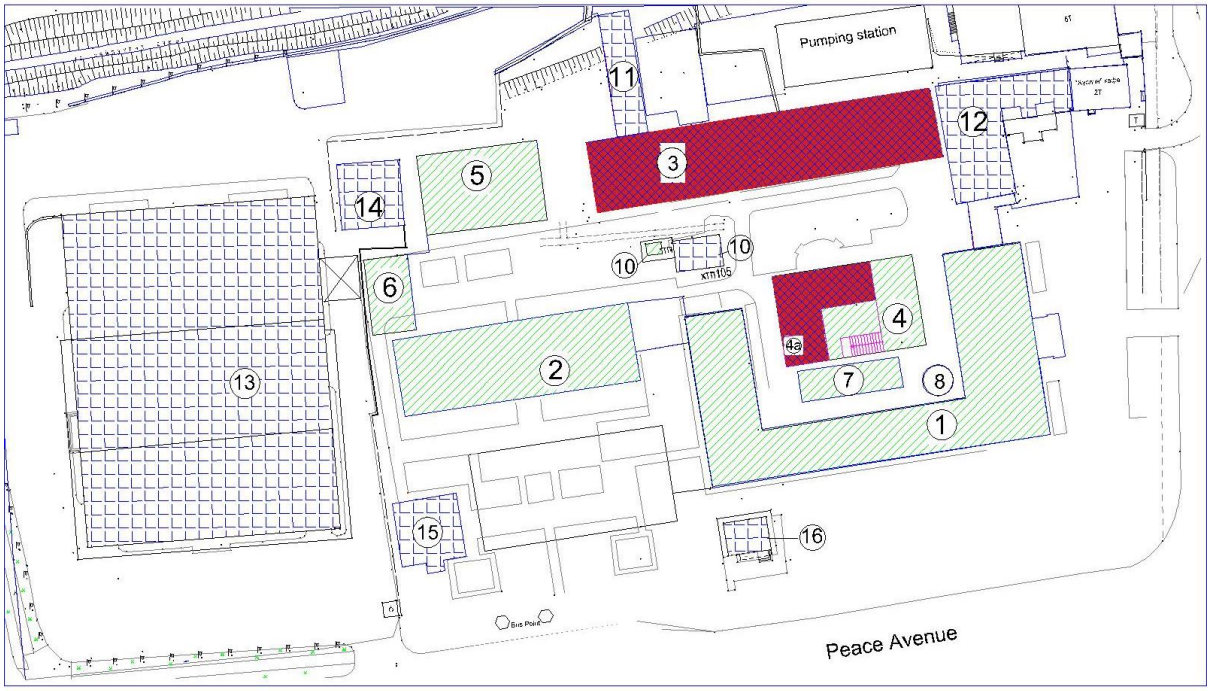
3. A part of existing workshop will be renovated (Figure 1, Position 4A) - The entire workshop building is a 2 story sandwich building with 16.4m x 30.8m size. This building is connected to power supply, heating, water supply and sewage services. There will be 4 electrical and 2 plumbing shops on the 2nd floor. Two (2) electrical training shops are existing at this workshop and one shop will be relocated from Building 2, Figure 1. Some re-planning shall be done for about 50% of the 2nd floor, and about 80 m2 shall be repaired.

Table 2. Tentative scope of civil works

#	Shop Name	Min Floor Space m2	Required Cvil Works
	Re-planning space for the Electrical shops on the 2nd floor		
1	Electrical workshop #1	55	- Re-planning of second floor partial space for accommodating 4 electrical shops.
2	Electrical workshop #2	50	
3	Electrical workshop #3	65	
4	Electrical laboratory	65	

4. Landscaping
   - Landscaping works will be done at front and west side of the new workshop (Position 3, Figure 1).

FIGURE 1. MASTER PLAN /CURRENT SITUATION/
ЗУРАГ 1. ЕРӨНХИЙ ТӨЛӨВЛӨГӨӨ /ОДООГИЙН БАЙДАЛ/



NOTE:	**ТАЙЛБАР:**
1. Classroom building #1	1. Хичээлийн байр №1
2. Classroom building #2	2. Хичээлийн байр №2
3. **Project Intervention** – New – Workshop 70m x 15m x 2 story	3. **Төслийн хөрөнгө оруулалт** – Шинэ барилга – Дадлагын байр 70м х 15м х 2 давхар
4. **Project Intervention** – Workshop Electrical workshop 235m2 /also accomodates Masonry, Ventilation, Electrical, Plumbing/	4. **Төслийн хөрөнгө оруулалт** – Засварын ажил – Дадлагын байр Цахилгааны дадлагын орчин 235м2 /Өрөг, Салхивч, Цахилгаан, Сантехникийн дадлагын газар мөн дотор нь байрлана/
5. Workshop /Carpentry/	5. Дадлагын байр /Мужаан/
6. Workshop /Auto repair/	6. Дадлагын байр /Авто машины засвар/
7. Warehouse	7. Агуулах
8. Ceremony ger	8. Хүндэтгэлийн өргөө
9. Power sub-station	9. Цахилгааны дэд өртөө
10. Power sub-station	10. Цахилгааны дэд өртөө
11. Garage	11. Гараж
12. Branch of Ullaanbaatar University	12. Улаанбаатар Их сургуулийн салбар
13. Max Mall shopping center	13. Max Mall Их дэлгүүр
14. Power sub-stattion of Max Mall	14. Max Mall Их дэлгүүрийн цахилгааны дэд өртөө
15. Mongolian Association of Civil Engineers	15. Монголын Барилгын инженерүүдийн холбоо
16. City toilet	16. Нийтийн бие засах газар

PICTURE 1. WORKSHOP /To be demolished/
ЗУРАГ 1. ҮГТ – Дадлагын байр /Буулгана/

ATTACHMENT NO. 2

UVURKHANGAI VOCATIONAL TRAINING AND PRODUCTION CENTER
SCOPE OF SERVICES / DELIVERABLES

TABLE 1: SCOPE OF SERVICES AND DELIVERABLES

* Due = Elapsed time after Effective Date of Contract in calendar days

Description, Language, no. of copies	Key Content	Due*
The Detailed Engineering Design:		
Deliverable 1 (Mongolian, the Design in English) Hard Copy – 3 copies	- Measurement drawings for project buildings and the related utility lines. Topo mapping (related with the winter solar greenhouse and vegetable storage facility), necessary power, heating, water supply, sewage, and communication supply calculations. - Assistance to the Client in obtaining permissions for the provision of power, heating, water supply, sewage and communication supply calculations, if it is necessary to obtain these permissions (at Consultant cost).	30
Deliverable 2 (Mongolian and English except engineering calculations) Hard Copy – 4 copies + soft copy in native and PDF	- Detailed design that include the associated engineering calculations, detailed measurement and engineering designs, all discipline drawings with notes, bill of quantities (that provides sufficient information on the quantities of Works to be performed to enable bids to be prepared efficiently and accurately). - Cost estimate. - Information for personnel requirements, construction equipment requirements, licensing requirements to be possessed by the contractor. Construction plan / schedule.	80
Deliverable 3 (Mongolian and English) Hard copy – 3	- Permission on the engineering lines for the provision of power, heating, water supply, sewage and communication, if it is necessary to obtain these permissions (at Consultant cost). - Permission for Safety from the related Emergency Management Official / Agency (at Consultant cost). - State Expertise Opinion (payment to the Construction Development Center is to be paid from the provisional sum).	110
Activity (Mongolian and English)	Assistance in preparing responses to requests for clarifications received from bidders.	
Construction Supervision during the construction period: 4 engineers visit the site 3 times for 2 days for each visit including travel time (total 24 days, 12 visits), the stages are: 40% of civil works achieved, 60% - 70% of civil works achieved, final commissioning.		
Deliverable 4 (Mongolian) Hard copy – 1	Construction supervision plan and quality check tools. Permission to commence the Works.	
Deliverable 5 (Mongolian) Hard copy – 1	Construction supervision (both author and on behalf of client) to ensure that the construction works are carried out as specified in the works contract and document all critical elements throughout the construction.	- 40% of civil works achieved - 60%-70% of civil works achieved

Deliverable 6 (Mongolian) Hard copy – 1	Construction supervision (both author and on behalf of client) to ensure that the construction works are carried out as specified in the works contract and document all critical elements throughout the construction. Assistance in accepting the Works through the Acceptance Commission.	Final Acceptance Certificate is issued
Deliverable 7 (Mongolian) – Hard copy 1	Defect Notice during warranty period	

Uvurkhangai Vocational Training and Production Center will receive the project investment for following occupations:

1. Wool & cashmere technology worker
2. Farmer, greenhouse
3. Construction Electrician

TABLE 2: SCOPE OF CIVIL WORKS (CONCEPTUAL)

The below descriptions, dimensions and functions are all preliminary and subject to check, revision if necessary and verification and validation by the Consultant.

Figure 1 - Master Plan of Uvurkhangai VTPC.
The following civil works activities will be implemented from the project investment:

1. A part of classroom building #2 shall be rehabilitated (Position 5a at Figure 1). The building was built in 1974. The entire building is a 4 story building with 12.8m x 56m size and has connections to centralized power, heating, water and sewage lines, these lines were renewed in 2015. However, all internal engineering systems and flat roof bituminous layers have little to no updates from the construction time.
   The building was initially built as a dormitory, but in 2001 a building function was changed as (a) an accommodation for teachers' family (12.8m x 12m, 1-4 floors), (b) classrooms (12.8m x 44m, 1-3 floors) and (c) dormitory for adult students (12.8m x 12m, 4th floor).

   The Wool & cashmere technology worker' workshop space will be allocated on the 1st floor with 12.8m x 44m size (Figure 2).

Table 1. Tentative scope of civil works

#	Shop Name	Min floor space m2	Required Rehabilitation Works
1	Storage for raw materials	About 250	Location shall be on the 1st floor, shall have a direct access to outside
2	Grading and Cleaning room		Location shall be close to the raw materials storage Shall have a proper ventilation
3	Washing, drying, hair separation, dyeing, re-orientation process shop		The shop shall have access to water and sewage, dedicated ventilation. The sewage from that shop shall have mechanical pre-treatment system before reaching the central sewage line. The electrical system shall be coordinated with equipment layout.
4	Yarning, knitting, linking process room		The electrical system shall be coordinated with equipment layout.
5	Storage for final products	7	
6	Storage for equipment, tools, kits, etc.	7	
7	Classroom	70	Includes area for 30 students (55m2) and teachers (15m2)
8	Teachers' office	20	Internet, separate room
9	Separate locker for men and		

	women		
10	Separate restrooms for men and women		
	General requirements		
11	- The internal heating system of entire building will be renewed. - The internal water supply and sewage systems of entire building will be renewed, except the teachers' accommodation part. - The roof of entire building shall be rehabilitated. - The electrical system of the wool & cashmere technology worker' workshop area shall be rehabilitated. - The wool & cashmere technology worker' workshop to be provided with all services such as, but not limited to: water, sewerage, heating, ventilation, electrical 220/380V, telecommunications including internet, fire detection and alarm system etc.		

2. Workshop building (Position 3a at Figure 1). The building was built in 1974 (Position 3 at Figure 1). It is one story building with 18m x 90m size and has connections to centralized power, heating, water and sewage lines, which were renewed in 2015. However, all internal engineering systems are from 1974; and only 50% of flat roof were renewed in 2010.
   The Construction Electrician workshops will be allocated in the rooms # 108, 112, and 113 (Figure 3).

Table 2. Tentative scope of civil works

#	Shop Name	Min floor space m2	Required Rehabilitation Works
	Construction Electrician Workshops		
1	Electrical workshop #108	81m2	The indoor electrical system shall be renewed for new equipment layout for these rooms. Painting of walls and ceiling, changing of doors, windows, floor finishing for these rooms.
	Electrical workshop # 112	58.5m2	
2	Electrical workshop #113	54m2	
3	Restroom area	121.5m2	The full set of rehabilitation works for the entire restroom area.
	General requirements		
4	The internal heating system of entire building (Position 3, Figure 1) will be re-calculated and renewed (2430m2).		
5	The 50% of entire roof shall be rehabilitated (810m2) and 8 ventilation fans on that roof shall be renewed.		
6	To be provided services such as, but not limited to: connection to the existing telecommunications including internet, fire detection and alarm system, etc.		

3. A part of classroom building #1 shall be rehabilitated (Position 2a at Figure 1, and Figure 4). It is a three story building from 1974 with 12m x 48m total size and has connections to centralized power, heating, water and sewage lines, which were renewed in 2015. The building has a flat roof which was not repaired since construction time.

   That building heating and water supply system is directly connected with a heating and water supply center located in the connecting bridge (Position 4 at Figure 1); these pipes are in extremely used up condition. In addition the flat roofs of building (Position 4 at Figure 1) and Administration building (Position 1 at Figure 1) have serious leakage problems – see Pic 1.1.

   There will be the Construction Electrician classroom – # 204 and Greenhouse farmer classroom – #304 (Figure 4).

Table 3. Tentative scope of civil works

#	Shop Name	Min floor space m2	Required Rehabilitation Works
	Construction Electrician & Greenhouse Farmer Classrooms		

1	Construction Electrician Classroom #204	90	The indoor electrical system shall be renewed for new equipment layout. Painting of walls and ceiling, changing of doors, windows, floor finishing.
2	Greenhouse farmer Classroom #304	90	
3	Restroom area, 1-3 floors	24*3=72	Re-planning and the full set of rehabilitation works for the entire restroom area on all 3 floors.
	General requirements		
4	The entire flat roof of Position 2 at Figure 1, Classroom Building #1, shall be rehabilitated (580m2).		
5	The entire flat roof of building (Position 4 at Figure 1), Annexing bridge, shall be rehabilitated (300m2).		
6	The entire flat roof of Position 1 at Figure 1, Administration building, shall be rehabilitated (1300m2).		
7	The heating distribution center located in the Annexing bridge and heating supply pipes from this center to the building (position 3 at Figure 1) shall be renewed (approximately 70m).		
8	To be provided with all services such as, but not limited to: ventilation, electrical 220/380V, telecommunications including internet for Construction Electrician & Greenhouse Farmer Classrooms		

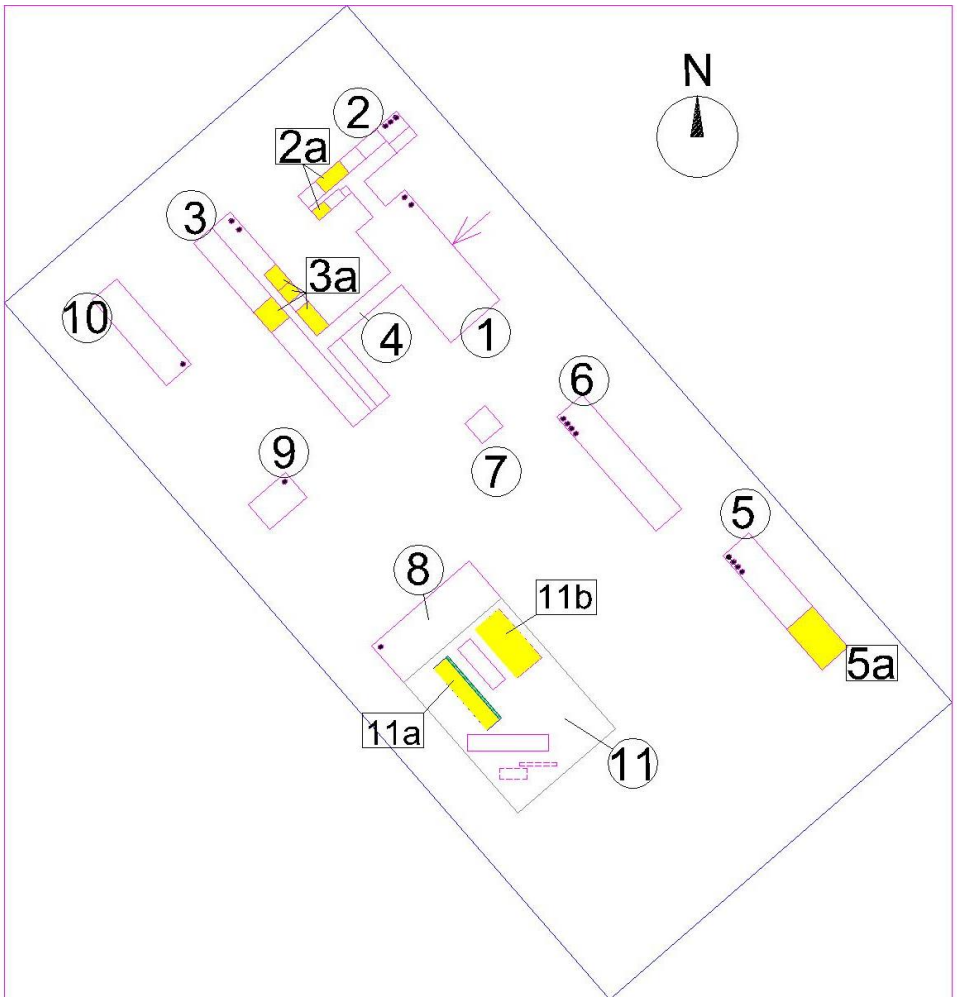
4. A new facility will be built (Position 11b at Figure 1) – A winter solar greenhouse with 6m x 30m (Pic 1.3) will be located in the school farm. The design firm shall be provided with the full detailed engineering drawing for winter solar greenhouse, prepared by others. The design firm shall make drawings for external heating, water, electrical and other utilities. This winter greenhouse is 6m x 30m size plus tambour 6m x 3m.

5. A new facility shall be built (Position 11c at Figure 1) – A vegetable storage. Refer to table below for spacing requirements to the building.

Table 4. Preliminary Spacing Requirements for Vegetable storage

#	Facility Name	Capacity	Requirements
	Vegetable Storage		
1	Vegetable storage	60tn	The location will be in the position where the old greenhouse remains are at the school farm area (Pic 1.2). Shall have proper ventilation. Shall have an adequate heating device.
2	Tambour		To reduce heat loss
	General requirements		
3	To be provided all services such as, but not limited to: ventilation, electrical 220/380V, heating and lighting.		

FIGURE 1. MASTER PLAN
ЗУРАГ 1. ЕРӨНХИЙ ТӨЛӨВЛӨГӨӨ



NOTE:	**ТАЙЛБАР:**
1. Administration building	1. Захиргааны барилга
2. **Project Intervention** – Repair – Classroom building #1	2. **Төслийн хөрөнгө оруулалт** – Засварын ажил – Хичээлийн 1-р байр
3. **Project Intervention** – Repair – Construction Electrician	3. **Төслийн хөрөнгө оруулалт** – Засварын ажил – Барилгын цахилгаанчин
4. Annex – a canteen	4. Хүзүүвч – оюутны цайны газар
5. **Project Intervention** – Repair – Classroom building #2 – Wool & cashmere technology worker workshop	5. **Төслийн хөрөнгө оруулалт** – Засварын ажил – Хичээлийн 2-р байр – Ноос, ноолуурын технологийн ажилтан
6. Dormitory #1	6. Оюутны байр
7. Power sub-station	7. Цахилгааны дэд өртөө
8. Garage	8. Гараж
9. Carpentry workshop	9. Мужааны дадлагын байр
10. Heating station	10. Халаалтын зуух
11. **Project Intervention** – Greenhouse farmer's area	11. **Төслийн хөрөнгө оруулалт** – Хүлэмжийн фермерийн хэсэг
11.a. **Project Intervention -** New - winter solar greenhouse	11.a. **Төслийн хөрөнгө оруулалт** – Шинэ - өвлийн нарлаг хүлэмж
11.b. **Project Intervention -** New vegetable storage facility	11.b. **Төслийн хөрөнгө оруулалт -** Шинэ – ногооны зоорь

FIGURE 2. CLASSROOM BUILDING #2, FIRST FLOOR LAYOUT
ЗУРАГ 2. ХИЧЭЭЛИЙН 2-Р БАЙР, 1-Р ДАВХРЫН БАЙГУУЛАЛТ

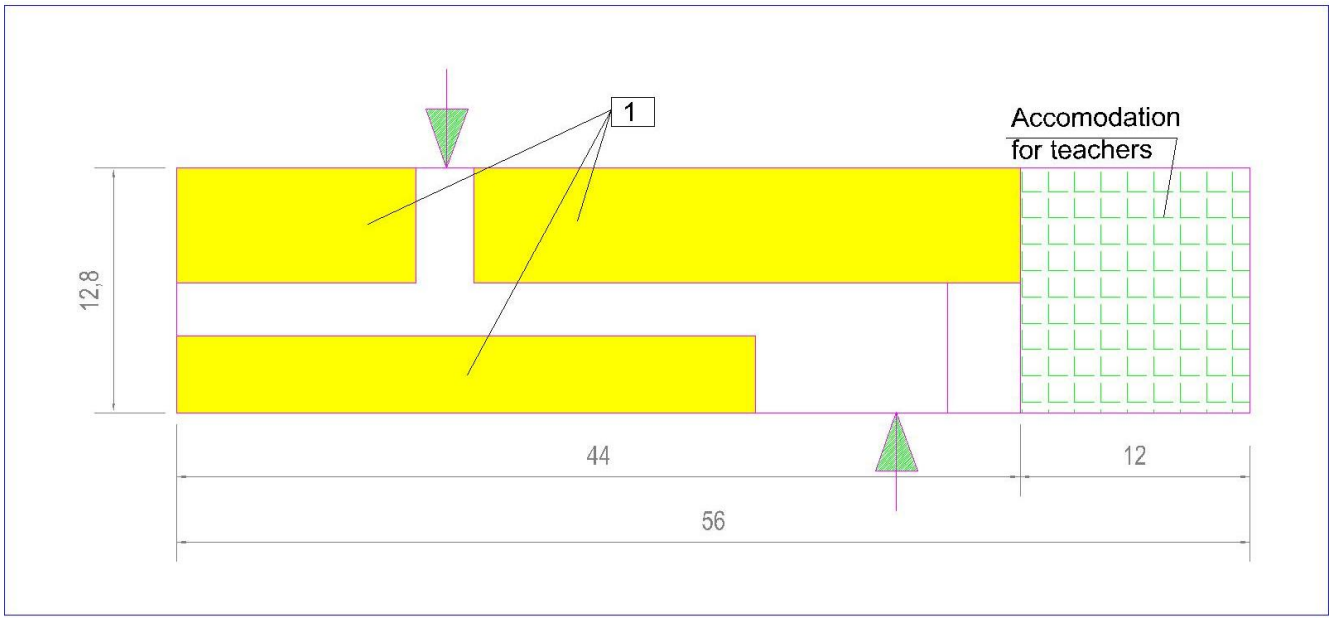


FIGURE 3. WORKSHOP BUILDING
ЗУРАГ 3. ДАДЛАГЫН БАЙР

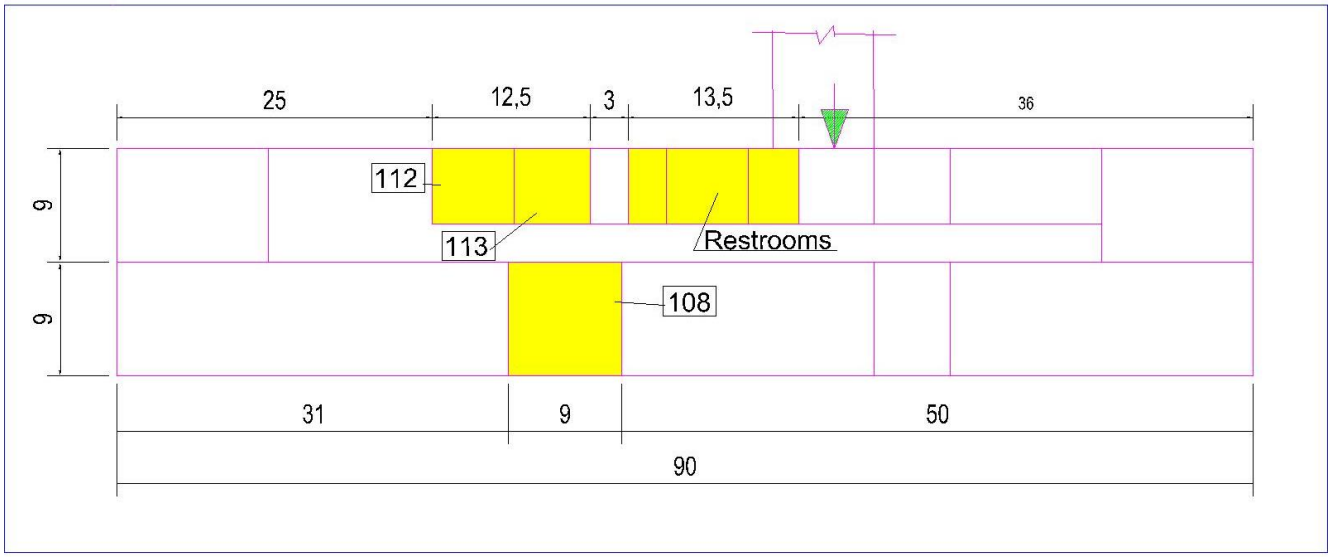
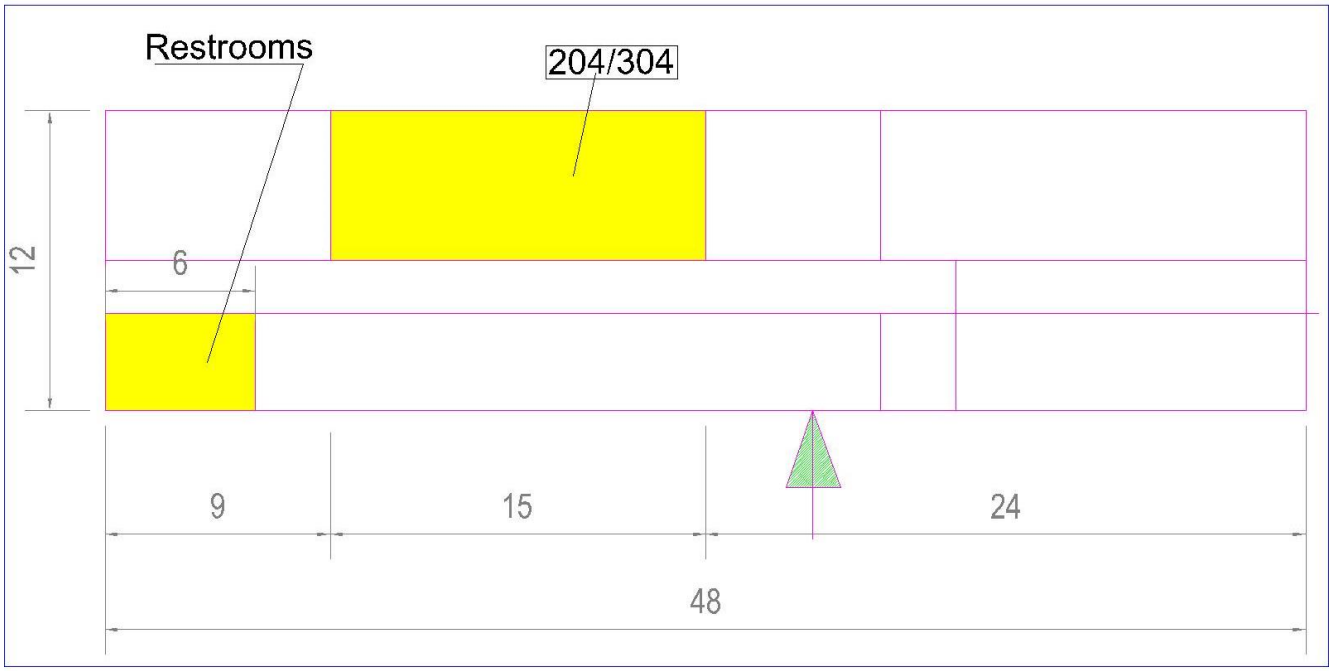


FIGURE 4. CLASSROOM BUILDING #2
ЗУРАГ 4. ХИЧЭЭЛИЙН 2-Р БАЙР



Picture 1

Pic 1.1 Roof leakage / Дээврээс ус гоожсон байдал

Pic 1.2 The old greenhouse remains / Хүлэмжний үлдэгдэл

Pic 1.3 A winter solar greenhouse / Өвлийн нарлаг хүлэмж

ATTACHMENT NO. 3

ARKHANGAI VOCATIONAL TRAINING AND PRODUCTION CENTER
SCOPE OF SERVICES / DELIVERABLES

TABLE 1: SCOPE OF SERVICES AND DELIVERABLES

* Due = Elapsed time after Effective Date of Contract in calendar days

Description, Language, no. of copies	Key Content	Due*
The Detailed Engineering Design:		
Deliverable 1 (Mongolian) Hard copy – 3 copies	- Architectural Conceptual preliminary designs (at least 2 options as appropriate).	40
Deliverable 2 (Mongolian, the Design in English) Hard Copy – 3 copies	- Final Agreed Architectural Conceptual Design together with the geotechnical survey (for new building, new underground utilities), topo mapping (for new building, new underground utilities), all the power, heating, water supply, sewage, and communication supply calculations. - Assistance to the Client in obtaining permissions for the provision of power, heating, water supply, sewage and communication supply calculations, if it is necessary to obtain these permissions (at Consultant cost). - Permission and terms of reference for Planning and Architecture from Aimag Architect, if it is necessary to obtain this permission (at Consultant cost). - State Expertise Opinion on Geotechnical survey (payment for the Geotechnical survey is to be paid from the provisional sum, payment for this is expertise at Consultant cost).	70
Deliverable 3 (Mongolian and English except engineering calculations) Hard Copy – 4 copies + soft copy in native and PDF	- Detailed design that include the associated engineering calculations, detailed architectural and engineering designs, all discipline drawings with notes, bill of quantities (that provides sufficient information on the quantities of Works to be performed to enable bids to be prepared efficiently and accurately), technical specifications (that present a clear statement of the required specifications, standards of the materials, plant, other supplies, and workmanships to be provided). - Cost estimate. - Information for personnel requirements, construction equipment requirements, licensing requirements to be possessed by the contractor. Construction plan / schedule.	100
Deliverable 4 (Mongolian and English) Hard copy – 3	- Permission on the engineering lines for the provision of power, heating, water supply, sewage, heating and communication, if it is necessary to obtain these permissions (at Consultant cost). - Permission for Planning and Architecture from Aimag/Capital Architect, if it is necessary to obtain this permission (at Consultant cost). - Permission for Safety from the related Emergency Management Official / Agency (at Consultant cost). - State Expertise Opinion (payment to the Construction Development Center is to be paid from the provisional sum).	130
Activity (Mongolian	Assistance in preparing responses to requests for clarifications received from bidders.	

and English)		
Construction Supervision during the construction period: 5 engineers visit the site 4 times for 2 days for each visit including travel time (total 20 visits, 40 days), the stages are: inception, foundation, hidden works, tests, preliminary commissioning, final commissioning.		
Deliverable 5 (Mongolian) Hard copy – 1	Construction supervision plan and quality check tools. Permission to commence the Works.	
Deliverable 6 (Mongolian) Hard copy – 1	Construction supervision (both author and on behalf of client) to ensure that the construction works are carried out as specified in the works contract and document all critical elements throughout the construction.	40% of civil works achieved 60%-70% of civil works achieved
Deliverable 7 (Mongolian) Hard copy – 1	Construction supervision (both author and on behalf of client) to ensure that the construction works are carried out as specified in the works contract and document all critical elements throughout the construction. Assistance in accepting the Works through the Acceptance Commission.	Final Acceptance Certificate is issued
Deliverable 8 (Mongolian) – Hard copy 1	Defect Notice during warranty period	

Vocational and Training Production Center of Arkhangai aimag shall receive the project investment for following occupations:

1. Wool & cashmere processing technology worker
2. Forestry worker
3. Farmer, vegetable

For the architectural planning purposes of the practical training related building, facility, room or area, it is to be assumed that about 15 students would be involved in the practical trainings, subject to specific instruction(s) that may be issued by the Client for any given practical training related building, facility, room or area.

TABLE 2: SCOPE OF CIVIL WORKS (CONCEPTUAL)

The below descriptions, dimensions and functions are all preliminary and subject to check, revision if necessary and verification and validation by the Consultant.

Figure 1 - Master Plan of Arkhangai VTPC. The school complex is located 6 km far from the aimag center; it has own engineering systems, including power sub-station, heating station, water well and sewage tank. A new building for the Wool & cashmere processing technology worker shop will be built and some rehabilitation works of sewage tank and dormitory restrooms shall be made.

Also, the school has several farms in different locations, but the project will deal with the only one farm with a total area of 3 hectare, which is situated in the north of aimag center. At this farm, a vegetable storage facility and classroom building and water well buildings shall be repaired.

1. A new building will be built (Position 19 at Figure 1). Function of this new building: Wool & Cashmere Processing Technology Worker shop. The exact location of this new building shall be verified by the design consultant and changed if necessary. The Wool & Cashmere Processing Technology Worker shop shall be:

- It is a one story building with a total net area of about 480m2, total gross area of about 540m2.
- There shall be following shops and facilities: Storage for raw materials 15m2, Grading and Cleaning room 20m2, Washing, drying, hair separation, dyeing, re-orientation process shop 100m2, Yarning, knitting, linking process room 100m2, Storage for final products 15m2, Storage for equipment, tools, kits, etc. 15m2, Classroom 70m2, Teachers' office 20m2, Separate locker for men and women, separate restrooms for men and women.
- The indoor electrical system shall be in line with the equipment layout; electrical wiring 220/380V.
- General ventilation of the building, dedicated ventilation for some equipment will be provided.
- The sewage from that shop shall have mechanical pre-treatment system before reaching the central sewage line. Sewage of this building shall be connected to sewage tank (Position 10 in Figure 1). This sewage tank shall be expanded under Item 2 of this table.
- Telecommunications including internet, fire detection and alarm system, CCTV, intruder signaling etc.
- External heating, water and sewage, power and communication lines to be designed.

2. An existing facility shall be expanded (Position 10 on Figure 1). It is a sewage tank which was built in 1974 for serving the dormitory with 200 bed capacity and its canteen for serving of 80 students (Position 2 on Figure 1). Following rehabilitation works shall be required:
   - Rehabilitation of existing external sewage pipe from the dormitory to the sewage tank (approximately 40m length).
   - Increase the capacity of the tank, with the purpose of minimizing the empting process.
   - The tank with increased capacity will serve the new workshop for the Wool & Cashmere Processing Technology Worker.
   - All works shall be defined by the design consultant, if required a new location shall be determined by the design consultant.

3. A part of existing building shall be rehabilitated (Position 2a at Figure 1). It is a dormitory building; it is 3 story building; there are a canteen, medical room and 4 classrooms on the 1st floor, 2nd and 3rd for dormitory purpose.
   - Rehabilitate separate male and female restrooms in each of three floors, establish a shower and laundry room on the 1st floor. Total area is 120m2.

4. An existing facility shall be rehabilitated (Pic 1.6) – A vegetable storage facility is located in the school farm area. It has a timber structure elements and its capacity is 50tn.
   - Roof and some structure elements shall be rehabilitated.
   - Doors shall be changed and thermo insulated.
   - Shall have proper ventilation.
   - Shall have adequate lighting and electrical system (220/380).
   - Shall have an adequate heating device (220/380).
   - Shall have function of a wind lock - tambour.

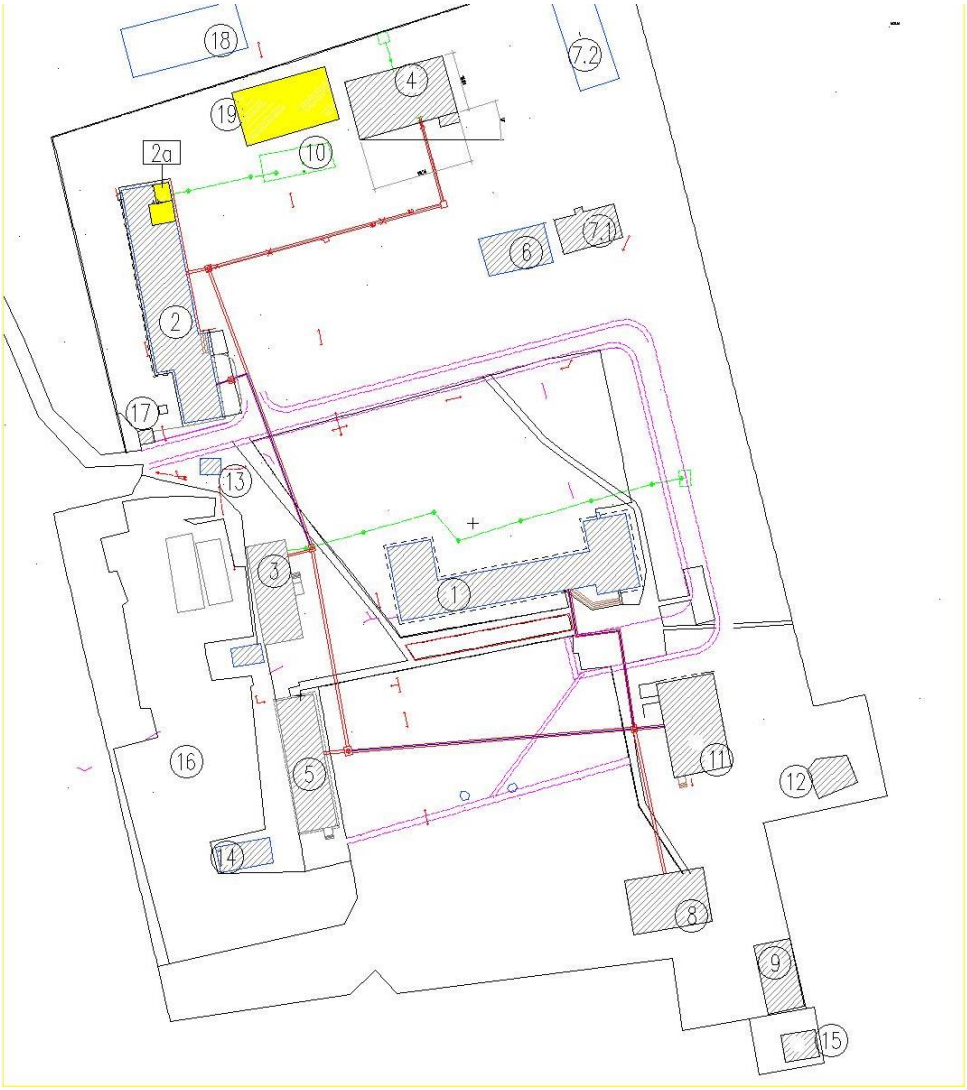
5. An existing building shall be rehabilitated (Pic 1.5). The building is located in the school farm. Its size is 10m x 17m and hosts 4 classrooms.
   - Rehabilitation of roof.
   - Rehabilitation of indoor electrical and heating system.
   - Replace all windows and doors.
   - Interior finishing.

6. A part of existing facilities shall be rehabilitated (Pic 1.1-1.4). These are two water wells located

separately in the school farm.

- New deep water well pump for each of two the wells.
- The two well buildings will be rehabilitated.

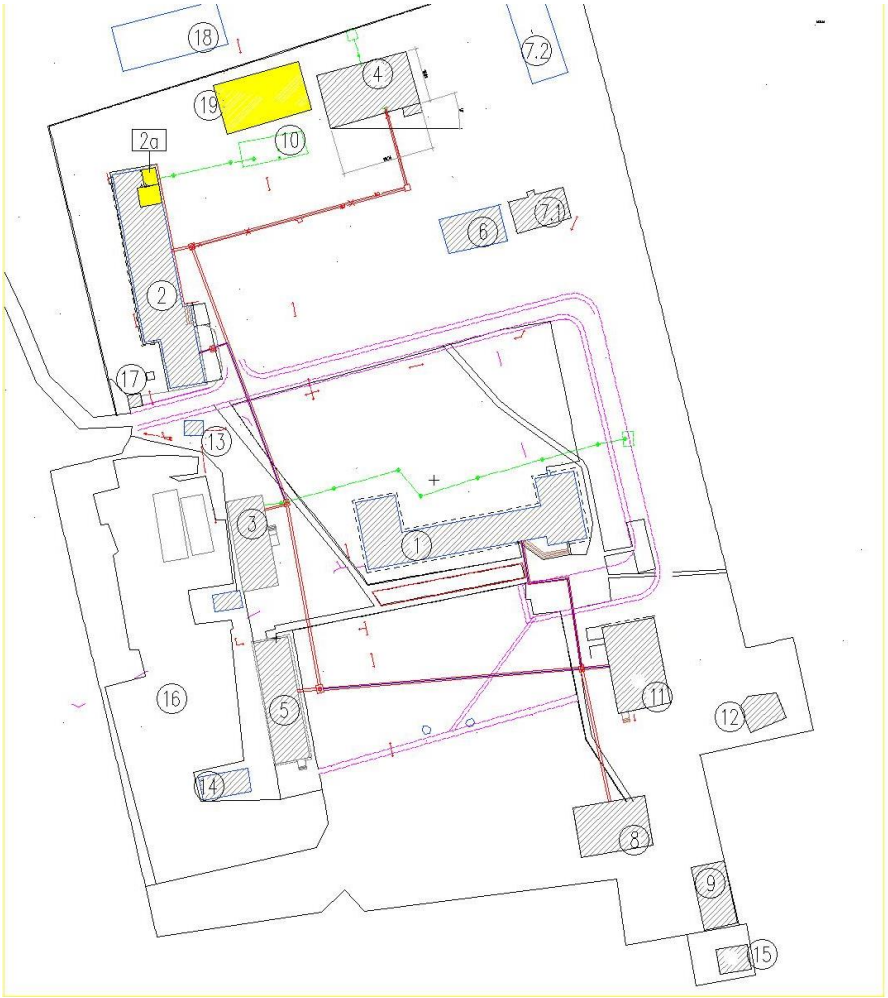
FIGURE 1. MASTER PLAN
ЗУРАГ 1. ЕРӨНХИЙ ТӨЛӨВЛӨГӨӨ



NOTE:	**ТАЙЛБАР:**
1. Classroom building	1. Хичээлийн байр
2. **Project Intervention** – Repair – Dormitory, canteen	2. **Төслийн хөрөнгө оруулалт** – Засвар – Дотуур байр, гал тогоо
3. Workshop - cooking class	3. Тогоочийн дадлагын байр
4. Workshop - plumbing, electrician, welding	4. Сантехник, гагнуур, цахилгааны дадлагын байр
5. Workshop - carpentry, interior finisher	5. Мужаан, барилгын заслын дадлагын байр
6. Workshop - milk products	6. Сүү, сүүн бүтээгдэхүүний дадлагын байр
7. Warehouse (7.1 and 7.2)	7. Агуулах
8. Cultural center	8. Соёлын төв
9. Sport hall	9. Спорт заал
10. **Project Intervention** – Repair – Sewage tank	10. **Төслийн хөрөнгө оруулалт** – Засвар – Бохирын цооног
11. Heating station	11. Халаалтын зуух
12. Vegetable storage facility	12. Ногооны зоорь

13. Power sub-station 14. Greenhouse 15. Chicken house 16. Plantation area 17. Guard point 18. Dormitory Remains 19. **Project Intervention** – New – A new workshop building – Wool & cashmere technology worker - the exact location shall be determined by the design consultant	13. Цахилгааны дэд өртөө 14. Хүлэмж 15. Тахианы байр 16. Ногооны талбай 17. Манаачийн байр 18. Дотуур байрны үйлдэгдэл 19. **Төслийн хөрөнгө оруулалт** – Шинэ – Ноос, ноолуурын технологийн ажилтны дадлагын байр – байрлалыг зураг төслийн зөвлөх

FIGURE 1. MASTER PLAN
ЗУРАГ 1. ЕРӨНХИЙ ТӨЛӨВЛӨГӨӨ



NOTE: 20. Classroom building 21. **Project Intervention** – Repair – Dormitory, canteen 22. Workshop - cooking class 23. Workshop - plumbing, electrician, welding 24. Workshop - carpentry, interior finisher 25. Workshop - milk products 26. Warehouse (7.1 and 7.2) 27. Cultural center 28. Sport hall 29. **Project Intervention** – Repair – Sewage	**ТАЙЛБАР:** 20. Хичээлийн байр 21. **Төслийн хөрөнгө оруулалт** – Засвар – Дотуур байр, гал тогоо 22. Тогоочийн дадлагын байр 23. Сантехник, гагнуур, цахилгааны дадлагын байр 24. Мужаан, барилгын заслын дадлагын байр 25. Сүү, сүүн бүтээгдэхүүний дадлагын байр 26. Агуулах 27. Соёлын төв 28. Спорт заал 29. **Төслийн хөрөнгө оруулалт** – Засвар – Бохирын

tank 30. Heating station 31. Vegetable storage facility 32. Power sub-station 33. Greenhouse 34. Chicken house 35. Plantation area 36. Guard point 37. Dormitory Remains 38. **Project Intervention** – New – A new workshop building – Wool & cashmere technology worker	цооног 30. Халаалтын зуух 31. Ногооны зоорь 32. Цахилгааны дэд өртөө 33. Хүлэмж 34. Тахианы байр 35. Ногооны талбай 36. Манаачийн байр 37. Дотуур байрны үйлдэгдэл 38. **Төслийн хөрөнгө оруулалт** – Шинэ – Ноос, ноолуурын технологийн ажилтны дадлагын байр

PICTURE 1
ЗУРАГ 1

Pic 1. 1 Water well #1 Гүний худгийн барилга

Pic 1.2 Inside of water well building #1
Гүний худгийн барилгын доторх байдал

Pic 1. 3 Water well #2 Гүний худгийн барилга

Pic 1.4 Inside of water well building #2
Гүний худгийн дотор

 Pic 1.5 Classroom building in the school farm Фермерийн дадлагын талбай дахь хичээлийн байр	 Pic 1.6 Vegetable storage facility / Ногооны зоорь