**ANNEX D: Technical Specification for Light rehabilitation of Silingar High School**

#### **1. General**

This specification defines the requirements for rehabilitating the Silingar High School, covering activities such as removal and installation of Isogam, roofing installation, concrete preparation, waterproofing, plastering, carpentry works for door and window, welding works for door and window, iron sheet works, installation of door and window locks, and exterior and interior painting. Compliance with local building codes and industry standards is mandatory to ensure quality, safety, and durability.

1.1 Materials

1.1.1 Materials shall always be utilized according to technical rules and best Professional practice.

1.1.2 Supporting documents and certificates shall attest to the origin and quality of materials.

1.1.3 Brand names, or proven equivalents, shall be submitted by the Contractor before delivery.

1.2 Delivery

1.2.1 The Contractor shall transport to the site all materials and equipment needed to carry out the work, regardless of the distance of transport, before payment authorization. Delivery scheduling is very important.

1.2.2 Split deliveries as justification for price increase will not be accepted.

1.3 Storage

1.3.1 The Contractor may be required to provide a plan showing locations of material storage and storage methods.

1.3.2 The Contractor will be responsible for all costs of storage or damaged materials.

1.3.3 If storage locations interfere with smooth construction operations, the Contractor will vacate and relocate the storage immediately.

2. CONSTRUCTION PROCESS

2.1 BoQ, Drawing, SoW, and Specifications

* + 1. The Contractor shall follow all drawings, BoQ, SoW, and specifications.
  1. Material specifications

The contractor should follow the required specifications for the materials.

2.3 Dimensions and Layout

2.3.1 Dimensions and layout of structures and materials shall be in accordance with Contract

Documents

2.3.2 The Contractor is responsible for checking all measurement dimensions and layout for accuracy and matching and will assume responsibility for improper checking or any misinterpretation of any mismatched measurement dimensions and he will submit written suggestions for modifications and changes to the dimensions if required.

2.3.3 Dimensions and measurements shall not be changed without prior approval

3. ENVIRONMENTAL MANAGEMENT

# 3.1. Compliance with Environmental Laws and Regulations

The Contractor shall conform to Afghanistan’s Laws on Protection of Environment and other relevant legislation and as well as adhere to YVO’s environmental policy. Environmental laws and regulations, be they national or local, related to the following, but not limited to:

* 1. Noise;
  2. Vibration;
  3. Air pollution;
  4. Water contamination;
  5. Solid waste disposal;
  6. Liquid waste disposal;
  7. Sanitary conditions

**DESCRIPTION AND GENERAL REQUIREMENTS**

**1.1 Excavation**

* + 1. Excavate for buildings, site improvements, and utilities. Foundation tranches should be excavated to the exact width and height as shown in the drawing.
    2. Should consider the roles for the removal of soil from the roof. Should provide legal (village-approved) disposal of excavated materials.

CAST-IN-PLACE CONCRETE

**1. DESCRIPTION & GENERAL REQUIREMENTS**

The work specified in this section consists of the construction of all concrete structures and requirements for concrete mixes and testing of concrete mixes. This work shall include, but not be limited to the construction work of PCC which should be well mixed in mixer and should result as the required Mark of the concrete.

Concrete structures shall be constructed in accordance with this Specification section and in conformity with the lines, grades, dimensions, and notes shown on the Drawings.

**2. MATERIALS**

**2.1 Cement**

2.1.1 Type: Use Portland Cement, Type I, meeting the requirements of ASTM C150 (AASHTO M85). The cement must be fresh and manufactured no more than three months prior to use.

**2.2 Aggregates**

2.2.1 Aggregates shall consist of clean, crushed rock and natural sand. The combination must be approved by the Engineer to ensure the specified concrete mix ratio and strength grade are achieved.

**2.3 Formwork**

2.3.1 Formwork shall consist of plywood or metal panels, designed to meet structural requirements and ensure straight, perpendicular, and visually acceptable finishes. Planking may be used only with prior approval and inspection.

**3. CONSTRUCTION REQUIREMENTS AND PROCEDURES**

# Concrete Mixing

* + 1. General mixing will be with a machine mixer.
    2. All concrete shall be power machine mixed and machine vibrated.
    3. The approved type of mixer shall have a drum rotating about a horizontal or inclined axis and must be kept in good condition at all times. The drum shall rotate at the appropriate speed as approved by the Engineer.
    4. About 10 percent of the water required for the batch shall enter the drum in advance of the cement and aggregates, and the remainder of the water shall be added gradually while the drum is in action so that all the water is in the drum by the end of the first quarter of the mixing time. The concrete shall be mixed until a mixture of uniform color and consistency is obtained. For a mixer with a capacity of 750 liters or less, mixing shall continue for at least one and one-half minutes after all the water has been added. For each additional 500-litre capacity or fraction thereof, the minimum mixing time shall be increased by 15 seconds.
    5. The amount of concrete mixed in any one batch shall not exceed the rated capacity of the mixer. The whole of the batch shall be removed before materials for a fresh batch enter the drum. On cessation of work, including all stoppages exceeding 20 minutes, the mixers and all handling plants shall be washed with clean water. Any deposits of old concrete in the drum shall be cleaned out by rotating clean aggregate and water in the drum before any fresh concrete is mixed.
    6. Concrete mixed as specified above shall not be modified by the addition of water or in any other manner to facilitate handling or for any other reason.
    7. The Contractor shall carry out the design of concrete mixes under the supervision of the Engineer.
    8. In cold weather conditions, appropriate precautions must be taken to ensure proper concrete placement, curing, and protection, in accordance with best practices for cold weather concreting.

#### **1. Removal of Existing Isogam from the Roof**

* **Description**: Removal of existing Isogam material from the roof and transportation to a suitable disposal site with all necessary accessories.
* **Quantity**: 540 m³
* **Construction Method**:
  + Safely strip off the Isogam material without damaging the roof.
  + Transport the removed material to a licensed waste disposal site using appropriate vehicles.
* **Safety Standards**:
  + Workers must wear appropriate PPE, including gloves and masks.
  + Ensure proper fall protection equipment for roof workers.

#### **2. Installation of 4 mm Iranian Isogam on the roof**

* **Description**: Installation of 4 mm thick Iranian Isogam (38-40 kg) over the roof, measuring 14x40 meters, including all relevant work.
* **Quantity**: 540 m²
* **Construction Method**:
  + Clean the roof surface before installation.
  + Apply primer to enhance adhesion.
  + Lay down and heat-seal Isogam sheets using a blowtorch.
* **Safety Standards**:
  + Use heat-resistant gloves and protective gear.
  + Maintain proper ventilation during the heating process.

#### **3. Exterior Painting of the Building**

* **Description**: Apply two coats of 100% weather-resistant (weather-shed) paint on the exterior walls of the building, including surface cleaning and preparation.
* **Quantity**: 410 m²
* **Construction Method**:
  + Clean the walls to remove dust, grease, and loose paint.
  + Apply a base primer if necessary.
  + Apply two coats of weather-resistant paint using a roller or brush.
* **Safety Standards**:
  + Ensure scaffolding is stable and secure.
  + Workers should use masks to avoid inhalation of paint fumes.

#### **4. Oil Painting of Doors, Windows, and Vents**

* **Description**: Painting doors, windows, and vents with two coats of oil paint, including all necessary preparation and requirements.
* **Quantity**: 170 m²
* **Construction Method**:
  + Sand and clean the surfaces to remove old paint and dirt.
  + Apply a primer coat where needed.
  + Use brushes or rollers to evenly apply two coats of oil paint.
* **Safety Standards**:
  + Ensure adequate ventilation in enclosed spaces.
  + Workers must use protective gloves and masks.

#### **5. Oil Painting of the Blackboard**

* **Description**: Apply two coats of oil paint on the blackboard to meet all requirements.
* **Quantity**: 21 m²
* **Construction Method**:
  + Sand and clean the blackboard surface.
  + Apply a primer for better adhesion if required.
  + Use a fine brush or roller to apply the paint for a smooth finish.
* **Safety Standards**:
  + Provide proper ventilation.
  + Protect surrounding areas from paint splatter

#### **6. Installation of the Hall Door**

* **Description**: Install a hall door made of local wood (2x5x2 meters), including all related tasks.
* **Quantity**: 1 No
* **Construction Method**:
  + Measure and prepare the doorframe for installation.
  + Install the wooden door with hinges and locks.
  + Test the functionality after installation.
* **Safety Standards**:
  + Use proper lifting tools for heavy wooden doors.
  + Secure the work area to avoid accidents.

#### **7. Installation of Small Locks for Windows and Doors**

* **Description**: Installation of small locks on windows and doors, including all related tasks.
* **Quantity**: 15 No
* **Construction Method**:
  + Select lock types suitable for each window or door.
  + Align and drill holes for installation.
  + Test functionality after securing locks.
* **Safety Standards**:
  + Use proper hand tools and safety gloves.
  + Ensure locks are safely installed to prevent tampering.

#### **8. Installation of Handles for Windows and Doors**

* **Description**: Install handles for windows and doors, including all related tasks.
* **Quantity**: 7 No
* **Construction Method**:
  + Align handles on the windows or doors.
  + Secure handles using screws and check for proper functionality.
* **Safety Standards**:
  + Use appropriate tools to prevent hand injuries.
  + Ensure proper alignment for smooth operation.

#### **9. Carpentry Work for Windows and Doors**

* **Description**: Complete carpentry work for windows and doors with all necessary requirements.
* **Quantity**: 5 No
* **Construction Method**:
  + Measure, cut, and shape wood to required sizes.
  + Assemble parts and fix them to the structure using appropriate tools.
* **Safety Standards**:
  + Use protective gloves and goggles during cutting and assembly.
  + Ensure stability of wooden components.

#### **10. Installation of 4 mm Glasses for doors and windows**

* **Description**: Purchase and install 4 mm thick glass for doors and windows, including local Chufti and all necessary requirements.
* **Quantity**: 10 m²
* **Construction Method**:
  + Measure window or door frames for glass cutting.
  + Fix glass in position using appropriate adhesive or fittings.
* **Safety Standards**:
  + Wear safety goggles and gloves to handle glass.
  + Dispose of any broken glass safely.

**11. Installation of Doors and Windows frame from Local Wood**

* **Description**: Purchase and installation of doors and windows made from local wood, including all requirements.
* **Quantity**: 16 No
* **Construction Method**:
  + Prepare frames to match door and window dimensions.
  + Securely fit wooden doors and windows into frames using appropriate hinges, screws, and tools.
  + Apply protective wood treatment if required.
* **Safety Standards**:
  + Use appropriate PPE during installation.
  + Ensure frames are properly secured to avoid accidents.

**12. Installation of Latch Locks**

* **Description**: Purchase and install good-quality latch locks, including all requirements.
* **Quantity**: 8 No
* **Construction Method**:
  + Select high-quality latch locks suitable for each door.
  + Align locks accurately and secure them using screws or bolts.
* **Safety Standards**:
  + Wear gloves to avoid injury while handling tools.
  + Test locks for secure functionality.

**13. Installation of Iron Sheet Gutter (18 Gauge)**

* **Description**: Purchase and install Iran sheet gutters (18 gauge) with all necessary requirements.
* **Quantity**: 15 meters
* **Construction Method**:
  + Measure and cut gutters to required lengths.
  + Secure gutters to the roof edge using brackets and screws.
  + Seal joints with silicone or waterproof sealant.
* **Safety Standards**:
  + Use harnesses and secure scaffolding during installation.
  + Ensure gutters are free from sharp edges to prevent cuts.

**14. Plastering of Building Edges**

* **Description**: Plastering of building edges with 200 Mark ratio mortar, including all related tasks.
* **Quantity**: 20 m²
* **Construction Method**:
  + Prepare a mix of 200 Mark mortar.
  + Apply evenly to building edges using a trowel.
  + Smooth and level the plaster surface.
* **Safety Standards**:
  + Use gloves to handle mortar.
  + Ensure proper scaffolding for edge work.

**15. Repair of Bathrooms Using Brick Masonry for giving extra Hight with cement mortar**

* **Description**: Repair bathroom walls using first-class bricks and mortar.
* **Quantity**: 6 m³
* **Construction Method**:
  + Remove damaged sections of walls.
  + Lay bricks in alignment using mortar as an adhesive.
  + Cure the wall for a minimum of 7-14 days.
* **Safety Standards**:
  + Wear gloves and helmets during bricklaying.
  + Ensure safe storage of materials to avoid tripping hazards.

**16. Plastering Inside and Outside of Bathrooms, M200**

* **Description**: Apply 200 Mark ratio mortar for plastering both inside and outside surfaces of bathrooms.
* **Quantity**: 90 m²
* **Construction Method**:
  + Clean surfaces and prepare 200 Mark mortar.
  + Apply a base coat and finish with a smooth top coat.
* **Safety Standards**:
  + Ensure adequate ventilation when plastering indoors.
  + Use PPE to protect hands and eyes.

**17. Repair work of floor PCC of the building and bathroom**

* **Description**: Repair plaster and PCC floor of the building and bathrooms using 200 Mark mortar.
* **Quantity**: 3 m³
* **Construction Method**:
  + Remove damaged plaster and PCC layers.
  + Apply new plaster and pour PCC for floors.
  + Allow sufficient curing time for durability.
* **Safety Standards**:
  + Use gloves and boots to avoid skin contact with cement.
  + Maintain a clean work area to avoid slipping.

**18. Installation of Metal Toilet Doors from (20) Gauge Iron Sheet and (2) Inch angle Iron, (1.8x0.7) Size**

* **Description**: Install bathroom doors made from 20-gauge iron sheets with 2-inch frame angle iron.
* **Quantity**: 2 No
* **Construction Method**:
  + Prepare frames and cut iron sheets to fit.
  + Fix doors to frames with heavy-duty hinges.
* **Safety Standards**:
  + Ensure proper handling of iron sheets to avoid cuts.
  + Use welding helmets and gloves during assembly.

**19. Welding and Installation of Bathroom Door Locks**

* **Description**: Welding and installation of locks on bathroom doors with all requirements.
* **Quantity**: 6 No
* **Construction Method**:
  + Weld lock components securely to the doors.
  + Check alignment and test functionality after installation.
* **Safety Standards**:
  + Ensure a fire extinguisher is available during welding.
  + Use proper eye and face protection.

**20. Oil Painting of Bathroom Doors**

* **Description**: Apply two coats of oil paint to bathroom doors.
* **Quantity**: 16 m²
* **Construction Method**:
  + Clean and sand the doors.
  + Apply primer and finish with two coats of oil-based paint.
* **Safety Standards**:
  + Ensure well-ventilated work areas.
  + Avoid contact with paint fumes using masks.

**21. Preparation and Installation of new Iron Sheet Doors for Bathrooms**

* **Description**: Prepare and install iron sheet doors (18 gauge) using 1.5-inch angle iron for the door frame (1.8m x 1m) with all related tasks.
* **Quantity**: 1 No
* **Construction Method**:
  + Measure and cut iron sheets and angle irons to specified dimensions.
  + Weld angle irons to form the frame and attach the sheet to the frame.
  + Install the door securely using hinges and test for proper functionality.
* **Safety Standards**:
  + Use welding helmets, gloves, and other PPE during preparation and installation.
  + Ensure safe handling of heavy iron sheets and tools.

**22. Installation of Steel Beam for Bathroom Roof**

* **Description**: Purchase and install steel beams (7 cm x 14 cm, 4 mm thick) with anti-rust treatment for the bathroom roof.
* **Quantity**: 31 m
* **Construction Method**:
  + Measure and cut beams to the required length.
  + Apply anti-rust treatment to beams before installation.
  + Secure beams in place using welding or bolts as needed.
* **Safety Standards**:
  + Ensure proper scaffolding or ladders are in place during installation.
  + Wear protective gear while welding or handling beams.

**23. Preparation of 3cmm Khar Wooden planks for Bathroom Roof**

* **Description**: Prepare wooden planks for bathroom roof construction with all requirements.
* **Quantity**: 55 m²
* **Construction Method**:
  + Cut wooden planks to size and treat them with anti-termite and water-resistant coatings.
  + Install the planks securely over the roof beams.
  + Nail or screw planks into place for added stability.
* **Safety Standards**:
  + Use gloves and safety goggles while handling wood and tools.
  + Secure ladders or scaffolding while working at height.

**24. Installation of Iron Gutters, 1m**

* **Description**: Prepare and install iron gutters (18 gauge, 1 meter in length) with all requirements.
* **Quantity**: 4 No
* **Construction Method**:
  + Measure and cut the iron sheets to form gutters.
  + Secure gutters to the roof edge using screws or brackets.
  + Seal joints with waterproofing materials to prevent leaks.
* **Safety Standards**:
  + Use harnesses and proper scaffolding while working at height.
  + Wear gloves to avoid injuries from sharp edges.

**25. Removal of Damaged Iron Sheets from Bathrooms and transportation**

* **Description**: Remove damaged iron sheets from bathrooms and transport them to a suitable location.
* **Quantity**: 1 Lamsum
* **Construction Method**:
  + Carefully unscrew and remove damaged iron sheets.
  + Stack and transport sheets to a designated disposal area.
* **Safety Standards**:
  + Use gloves and helmets during removal to prevent injuries.
  + Ensure proper lifting techniques to avoid strain or accidents.

**26. Exterior Painting of Bathrooms, Weather Shed, 100%**

* **Description**: Apply two coats of 100% weather-shed paint on the exterior of bathrooms.
* **Quantity**: 150 m²
* **Construction Method**:
  + Clean and prepare exterior surfaces.
  + Apply a base coat followed by two coats of weather-shed paint.
  + Ensure even coverage and finish.
* **Safety Standards**:
  + Use ladders or scaffolding safely when painting high areas.
  + Wear masks to avoid inhalation of paint fumes.

**27. Interior Painting of Bathrooms, plastic, 75%**

* **Description**: Apply two coats of 75% paint on the interior walls of bathrooms.
* **Quantity**: 210 m²
* **Construction Method**:
  + Clean and sand interior surfaces.
  + Apply primer, followed by two coats of high-quality paint.
  + Allow adequate drying time between coats.
* **Safety Standards**:
  + Ensure proper ventilation to avoid paint fume accumulation.
  + Use PPE, including gloves and masks, during application.

**28. Installation of Tarpaulin Sheets on the Roof**

* **Description**: Purchase and install tarpaulin sheets on the roof with all requirements.
* **Quantity**: 55 m²
* **Construction Method**:
  + Cut tarpaulin sheets to fit the roof dimensions.
  + Secure sheets using nails or adhesive to prevent displacement.
* **Safety Standards**:
  + Avoid sharp objects near tarpaulin sheets to prevent tearing.
  + Use proper footwear for working on roofs.

**29. PCC Concrete Roofing for Bathrooms**

* **Description**: Apply PCC concrete (200 Mark ratio, 7 cm thickness) on the roof of bathrooms, including all related tasks.
* **Quantity**: 4 m³
* **Construction Method**:
  + Prepare a 200 Mark ratio concrete mix.
  + Pour concrete evenly over the roof surface.
  + Compact and smoothen the surface, allowing proper curing time.
* **Cold Weather Concrete Application**

Cold weather conditions can significantly impact the placement and curing of concrete. By the American Concrete Institute (ACI) guidelines, cold weather is defined as a period when the air temperature drops below 5°C (40°F) for three consecutive days, or when the temperature is expected to fall below 5°C (40°F) for three days in a row during the curing process. During such conditions, special precautions must be taken to ensure the proper hydration, strength development, and overall durability of the concrete.

**Protective Measures:**

1. **Temperature Maintenance:** Concrete should be protected to prevent freezing during the initial set and curing period. According to ACI 306R-16 (Guide to Cold Weather Concreting), concrete temperature must be maintained at or above 10°C (50°F) for at least the first 24 hours following placement. After the concrete reaches an early strength of 3.5 MPa (500 psi), the level of protection may be reduced. If the concrete has not reached this strength, protection must be maintained until the required compressive strength is achieved.
2. **Curing Methods:** To ensure adequate curing, two layers of protection should be applied to the freshly placed concrete:
   * The first layer should consist of plastic sheeting or tarpaulin placed at a sufficient distance from the concrete surface to allow for air circulation.
   * The second layer should include thermal insulation, such as glass wool, to trap heat and prevent the temperature of the concrete from dropping below the required level.

The curing period must continue until the concrete attains its desired compressive strength, ensuring that moisture is retained within the mix. In cases where the moisture content drops below 40%, supplementary water must be added to maintain consistency.

1. **Avoiding Freeze/Thaw Damage:** Freshly placed concrete must not be exposed to freezing temperatures until it has attained sufficient strength (at least 3.5 MPa or 500 psi) to prevent damage. If cold weather conditions occur outside the winter months, such as in spring or autumn, newly placed concrete should be covered for a minimum of 24 hours to protect it from freezing.
2. **Temperature Control in Mixing:** The water and aggregates used in the concrete mix should be preheated to ensure that the mix temperature is adequate for proper hydration and curing. The concrete mix temperature should be monitored carefully to maintain a temperature range between 10°C (50°F) and 32°C (90°F) to promote proper strength development. Materials contaminated with ice, snow, or other harmful chemicals should not be used in the mix, as these can adversely affect the concrete’s performance.
3. **Admixtures:** The use of accelerating admixtures may be considered to speed up the hydration process and reduce curing time in cold weather. However, these admixtures should only be used in compliance with ACI 306R-16 guidelines, and their application should not compromise the integrity or long-term durability of the concrete. Any admixture used must not introduce harmful effects such as corrosion of embedded reinforcement (rebar) or alter the mix’s performance under freezing conditions.
4. **Calcium Chloride:** The use of calcium chloride as an accelerator is not recommended in cold weather concreting. While it may accelerate curing, calcium chloride can lead to corrosion of embedded steel reinforcement, which undermines the long-term durability of the concrete. Alternative, non-chloride accelerators should be used if needed.

**Conclusion:**

All concrete placement and curing activities during cold weather must adhere to ACI 306R-16 guidelines to ensure that the concrete achieves its desired performance. Adequate protection, moisture retention, and temperature control must be maintained to avoid freezing and to allow for proper curing and strength development. Monitoring of environmental conditions and the use of appropriate curing techniques will help mitigate the risks associated with cold weather concreting and ensure the durability and integrity of the finished structure.

* **Safety Standards**:
  + Wear gloves and boots while handling concrete.
  + Ensure safe mixing and pouring techniques to avoid spillage.

**30. Installation of 4 mm Isogam on the bathroom roofs**

* **Description**: Purchase and install 4 mm Isogam sheets (38-40 kg) on the bathroom roofs with all necessary requirements.
* **Quantity**: 60 m²
* **Construction Method**:
  + Clean and prepare the roof surface.
  + Apply adhesive and install Isogam sheets, ensuring proper alignment.
  + Seal edges and overlaps for waterproofing.
* **Safety Standards**:
  + Use masks to avoid inhaling adhesive fumes.
  + Ensure safe handling of heavy Isogam sheets.

**31. Interior Painting of the administrative Rooms**

* **Description**: Apply two coats of 75% paint on the interior of the office rooms.
* **Quantity**: 300 m²
* **Construction Method**:
  + Prepare surfaces by cleaning and sanding.
  + Apply primer and two coats of paint evenly.
  + Allow adequate drying time between coats.
* **Safety Standards**:
  + Ensure proper ventilation during painting.
  + Use ladders or scaffolding safely.

**32. Installation of Bathroom Ventilation Pipe**

* **Description**: Purchase and install a 3-inch pipe for bathroom ventilation with all requirements.
* **Quantity**: 18 m
* **Construction Method**:
  + Measure and cut ventilation pipes to fit.
  + Secure pipes in place using brackets or supports.
  + Seal joints to prevent air or moisture leaks.
* **Safety Standards**:
  + Wear gloves and safety goggles while cutting pipes.
  + Ensure proper alignment and secure fittings to prevent accidents.

**3. Quality Assurance and Inspection**

* All materials utilized must comply with the specifications outlined in this document and be procured from approved suppliers.
* Monitor the quality of work at each stage to ensure compliance with the specified requirements.
* A final inspection will be conducted by a qualified engineer or project supervisor to verify that all work meets the established standards.

**4. Health and Safety**

* Comply with all relevant health and safety regulations, including those pertaining to working at heights, handling hazardous materials, and operating machinery.
* All workers are required to wear appropriate personal protective equipment (PPE) at all times.
* Site safety will be regularly monitored, and a fully stocked first aid kit will be readily accessible.
* Emergency procedures must be established and effectively communicated to all personnel.

### ****5. Documentation and Handover****

Upon project completion, the contractor will provide the following documentation:

* Certificates of materials and warranty information for all major materials used.
* Inspection and testing reports verifying that the work meets all specified requirements.
* A comprehensive final project report, including as-built drawings and any modifications to the original design.
* Final handover note/report shall be approved by Provincial Education Department.