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TECHNICAL SPECIFICATIONS

"CONSTRUCTION OF RESEARCH GREENHOUSE"

At
BENGUET STATE UNIVERSITY, LA TRINIDAD, BENGUET
AUGUST 2023

GENERAL PROVISIONS AND REQUIREMENTS

SECTION 1 - SPECIFIC

1. SCOPE OF WORK

a. The work covered under this contract shall include the construction of the greenhouse including supervision, labor and the supply of materials, equipment and services necessary to properly conduct and produce the desired work output. Included herein are General Requirements, Site Works, Plain & Reinforced Concrete, Masonry, Welding, Electrical & Auxiliary, Plumbing Works, Others Items and Drip Irrigation, Automation and Fertigation System. General cleaning/demobilization of all temporary works and structures for an efficient, smooth and up to date completion of the contract.

2. CONTRACT DRAWINGS

a. Details and extent of work are shown on the drawings accompanying these specifications.
b. Sketches and other details not shown in plans shall be furnished by the Benguet State University architect or engineer during the pace of construction.

3. PARTS OF THE SPECIFICATIONS

a. These specifications shall include the following parts whose applicable provisions are binding in the contract:

Section I	-	Specific
Section II	-	General Conditions
Section III	-	Mobilization
Section IV	-	Concrete and Masonry
Section V	-	Carpentry and Lumber
Section VI	-	Tinsmith Works
Section VII	-	Doors and Windows
Section VIII	-	Painting Works
Section IX	-	Plumbing and Water Service System
Section X	-	Electrical Works
Section XI	-	General Cleaning and Demobilization

b. Works performed under any of the following parts of the Specifications shall not be paid separately, but the cost thereof shall be considered as having been included in the lump sum contract price.

c. These specifications are intended to supplement the provisions of PD 1096 otherwise known as the National Building Code of the Philippines and its IRR in order to provide the proper design and construction. ***In case of discrepancies between plans and specifications, these specifications shall prevail.*** It is the duty of the Contractor to examine both carefully, compare and verify dimensions and data furnished by BSU in case of discrepancies between figures and drawings, the matter should be brought immediately to the BSU architect or engineer before any adjustments shall be made by the Contractor.

SECTION II - GENERAL CONDITIONS

1. **WORKMANSHIP**
   a. All operations required under any and all parts of the Specifications shall be undertaken in a neat, workmanlike manner. Only skilled personnel with sufficient experience in similar operations shall be allowed to undertake the same.

2. **CLEARING, GRUBBING, GRADING AND FILLING**
   a. The contractor shall clear, grub, and grade the proposed greenhouse location for a distance of four (2) meters in all directions outside the building line without extra compensation. Provided, however, that he shall not be required to clear beyond existing street lines, should the said street line be nearer than those of the four (2) meters to any building line.

3. **EXCAVATION AND BACKFILL**
   a. The contractor shall make the necessary excavation of whatever materials maybe encountered, for all foundations to the extent required and the grade indicated on the drawings, without extra compensation.

4. **ELECTRICITY AND WATER SUPPLY**
   a. The contractor shall provide at his own expense electricity and ample supply of fresh water, sufficient for all construction purposes.

5. **INSPECTION OF THE SITE**
   a. The tender may deem to have been based on data, regarding physical conditions of the site. The contractor acknowledges and warrants that he has inspected and examined the site and the surroundings and has satisfied himself by submission of his bid as to the nature of the work and materials necessary for the completion of the project, the means of access to the site, the accommodation he may require, and that he has obtained for himself, all the necessary information as to risks, contingencies and other circumstances which may have influenced or affected his bid. NO increase in cost or extension of time will be considered for the failure to inspect and examine the site condition.

6. **CHANGES**
   a. The BSU architect or engineer reserves the right to make slight changes in details of work or materials as he may deem advisable. These changes may include revision or modifications of shapes or dimensions of elements that may involve additional expenses to the contractor shall be covered by appropriate adjustment of the contract price.

7. **CONFLICT BETWEEN PLANS, SPECIFICATIONS AND BILL OF MATERIALS & ESTIMATES**
   a. Should there be any conflict between indications on drawings, provisions in specifications, bill of materials and estimates shall be referred to the BSU architect or engineer for his/her decisions on the matter and whose opinion shall be final.

   b. Any omission in the specifications of work or works to be undertaken but necessary for the completion of work, shall be undertaken by the contractor as if indicated on the drawings, without extra compensation. Such works shall be done in the usual manner as required as to quality of both materials and workmanship.

8. **REJECTIONS**
   a. Materials or workmanship not in reasonable conformance with the provisions of these specifications shall be rejected at any time during the progress of the work. The contractor shall receive copies of reports of rejection of materials and workmanship made by the authorized technical representative of BSU. Any part of the work that he has been done and is not of the quality required by reasonable interpretation of the plans and specifications shall be torn down or removed immediately and rebuilt or otherwise remedy such work in accordance with the requirements of the plans and specifications.

9. **VARIATION ORDER / CHANGE ORDER / EXTRA WORK ORDER**

a. Any changes or deviations made on plans, specifications, bill of materials and estimates should be referred and reported to the BSU architect or engineer for proper documentation prior to implementation.
b. All IRR of RA 9184 regarding Variation Order, Change Order or Extra Work Order should be strictly followed.

10. ESTABLISHED GRADE LINE AND PREPARATION OF SITE

a. The contractor shall inspect and examine the individual site conditions. No increase in cost or extension of time will be considered for failure to examine site condition.
b. Care shall be taken to protect and maintain adjacent properties, trees, materials and such other facilities such as conduits, drains sewers, pipes and other wires that are to remain in the property. Restore without cost to BSU all properties may be affected during the performance of work.
c. ***All unusable materials and debris resulting from the performance of work shall be removed from the premises and salvageable material shall be hauled and stacked neatly by the contractor to BSU storehouse.***
d. Remove all earth and sub-grade materials unsuitable for the preparation of the sub-grade for the items of construction. Clear and remove shrubs, stumps, roots and other vegetation from the site.

SECTION III - MOBILIZATION

1. SCOPE

a. The work shall include mobilization of equipment, manpower, hauling of materials, and necessary tools needed for the proper and smooth completion of the project.

SECTION IV - CONCRETE AND MASONRY WORK

1. SCOPE

a. The work includes the furnishing of labor, equipment and materials, and the performing of all necessary operations in connection with the concrete and masonry works for the construction of the said research greenhouse.

2. MATERIALS

a. Concrete hollow blocks (CHB) shall be of superior and approved quality of size 4"x 8"x 16", sound and free from cracks and other imperfections.
b. Sand and gravel shall be well graded and free from any deleterious materials.
c. Cement and aggregates shall be stored in a manner as to prevent their deterioration or the intrusion of foreign matter that will deteriorate the quality or which has been damaged shall be tested by standard mortar test to determine its suitability for use.
d. Mortar shall be workable, cement-sand mixture and attaining a 28-day compressive strength of 1500 psi.
e. Concrete Aggregates shall conform to the "Specifications for Aggregates" (ASTM G33 latest revision). The maximum size of the aggregates shall not be larger than one-fifth 1/5 of the narrowest dimension between side of the forms of the member of which concrete is to be used, not larger than three-fourths (3/4) of the minimum clear spacing between individual reinforcing bars in no case larger than two (2) inches in diameter.
f. Reinforcing steel bars for columns, beams, footing, pedestal walls, etc., shall be a structural grade deformed bars. Ties and stirrups of beams and columns as well as slab reinforcements may be plain bars unless noted in the plans or specified herein.
g. Forms shall conform to the shape, lines and dimensions of the members as called for on plans, and shall be substantial and sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied so as to maintain position and shape.
h. Plywood, metal, plastic materials or surfaced lumber forms shall be used where it will be best given the most advantage in the specific concrete work involved.
i. Unless otherwise ordered, forms and shoring shall not be disturbed and shall remain in place for minimum period of 24-hours.

3. CONCRETE AND MASONRY WORK

a. Before placing reinforcement and before pouring concrete, remove all loose rusts, mill, oil or other adhering materials which tend to reduce or destroy band between concrete and reinforcement.

b. Reinforcing steel bars shall be cut, bent, lapped or splice as recommended by the ACI codes. Splices where permitted, shall provide sufficient lap (not less than 60 times the diameter of the bars to be deformed) to transfer the stress between bars by bond and shear, and shall secured in place by the use of tie wires not smaller than No.16 gauge. Splices in adjacent bars shall be staggered.
c. Reinforcing steel bars shall be placed accurately and secured in place by use of concrete or metal supports, spacers or ties to firmly hold them in their proper positions during pouring and setting of concrete.
d. Reinforcing steel bars shall not be bent or straightened in any manner that will injure the materials. Bars with kinks or bends shall not be used.
e. Reinforcing steel bars shall have protective covering not less than three-fourths (3/4) inches of concrete in slabs that are not exposed to the ground; not less than one and a half inches (1-1/2"), in beam, girders, and columns, and not less than (3") for footing on soil.
f. All horizontal and vertical bars as the case maybe shall be anchored 20 bar diameters into the concrete footing, columns and beams.
g. All horizontal the reinforcement shall be tied to the vertical reinforcement at every intersection with no. 16 G.I. tie wire.

Concrete:
Design working stresses for concrete based on the following 28 days of ultimate compressive strength:

1. Footing, Columns, Bearing Walls	3,000 psi
2. Slab of fill	2,500 psi

Reinforcement:
1. All mild reinforcement steel shall be of new Billet Structural Grade (fy=33,000 psi) deformed bars conforming to ASTM A-615.
2. All detailing, fabrication and installation of reinforcing bars must follow the ACI Manual Standard Practices for Detailing Reinforced Concrete Structures (ACI-315.65).
3. All reinforcement shall be continuous with a minimum length of laps for splices as per corresponding notes in ACI Detailing Manual.

Walls:
1. See Architectural Drawings for concrete and masonry walls not shown on the structural drawings.
2. Wall reinforcement shall be wired together and double curtain braced apart.

Clearances:
Minimum concrete cover shall be as follows:

1. Footing	0.076 m clear
2. Columns	0.038 m clear
3. Walls	0.019 m clear
4. Beams	0.038 m clear
5. Slabs	0.019 m clear

Dowels:
Provide dowels for walls starting on beams.

Foundation:
1. Except otherwise shown, excavations shall be made as near as possible to the neat lines required by the size and shape of the structure.
2. Backfill shall be placed in layers not exceeding 0.15m in depth. Each layer must be moisten as directed and thoroughly compacted before placing the next layer.

Pouring Schedule and Removal of Forms:
1. The Contractor shall submit for in the approval schedule of concrete pouring and location of construction joints to the architect or engineer of the institution at least four (3) days prior to pouring.
2. All chases and openings on slabs and walls shall be approved by the architect or engineer of the institution.

3. The Contractor shall furnish and maintain adequate forms and shoring until the concrete members have attained its curing period.

Work Item	Description
1. **Foundation**	Reinforced Concrete("Class A" mixture, 1:2:4); with the necessary reinforcing bars as indicated in the structural plan.
2. **Columns**	Reinforced Concrete ("Class A" mixture, 1:2:4); with the necessary reinforcing bars as indicated in the structural plan.
3. **Beams**	Reinforced Concrete ("Class A" mixture, 1:2:4); with the necessary reinforcing bars as indicated in the structural plan.
4. Floor Slabs	
4.1 All Floor Slab	Reinforced Concrete ("Class B" mixture, 1:2.5:5); with the necessary reinforcing bars as indicated in the structural plan.
4.1.a Finishing	Granite Floor Tiles Non-skid tile for ramp
5. Walls	
5.1 Exterior Walls	4" Hollow Concrete Blocks (CHB) with concrete mix in the hollow core and with reinforcing bars as indicated in the Structural Plan. Plain Cement Plaster finished with groove accent on both side unless otherwise specified.
5.1.a Finishing	Semi-Gloss Latex by Boysen/Davies or equivalent
5.2 Interior Walls	Plain Cement Plaster in Paint coat finish by Boysen/ Davies or equivalent.
5.2.a Finishing	Paint Cement Plaster finish
5.2.b Divisions	
5.3 Molding	Plain Cement Plaster finish
5.3 Facade Accessories	N/A

4. CONCRETE PROPORTION AND CONSISTENCY

a. The unit of measurement shall be cubic foot. One bag of cement shall be considered as one cubic foot. Water shall be measured as to ensure the desired quantity of successive batches.
b. The re-tempering of concrete, i.e. mixing with additional cement, aggregate or water shall not be permitted.
c. Water shall be removed from excavation before concrete is deposited. Any continuous flow of water into the excavation shall be directed through side drains to a slump or be removed by other approved methods to avoid washing the freshly deposited concrete and forms shall be thoroughly wetted.
d. Concrete shall be conveyed to forms as rapidly as practicable, by methods which shall prevent segregation or loss of ingredients. There shall be no free vertical drop greater than 1.5 meters. Approval of BSU shall be obtained before starting any concrete pour. Concrete shall be worked readily into the corners and angles of the forms around all reinforcement and embedded items by depositing the concrete as close as possible to its final position in the forms.
e. If possible, concreting shall be done continuous until section is completed. When stoppage of concrete operations occurs, construction joints shall be placed either horizontal or vertically as indicated by BSU and provided with shear keys or dowels to develop bond.
f. Pouring of concrete for foundations shall be done after BSU has verified the actual soil conditions at the site and approved the start of concreting. No footing shall rest on fill.

g. The contractor shall not pour any concrete until BSU inspects and approves the conditions of forms, reinforcement and embedment's.
h. For reduction or additions, on the contract sum due to deletion or extra involved, cast-in-place concrete shall be measured in cubic meter and payment shall be based on the actual volume using the unit prices on the proposal form.

5. CURING

All concrete shall be moist in an approved method of combination applicable to local conditions. Surface of the concrete shall be kept continuously wet by covering with water, by continuously spraying, or by covering with water, by continuously spraying, or by covering with burlap or other approved materials thoroughly saturated with water and keeping the covering wet by spraying or intermittent hosing. Water for curing shall be free from any elements which might cause objectionable staining or discoloration of the concrete.

6. REPAIR OF CONCRETE

a. Imperfections shall be repaired and shall be completed within 24 hours after removal of forms.
b. Fins shall be nearly removed from exposed surfaces.
c. Damaged or honeycomb concrete must be removed to reach sound concrete and should be replaced with dry pack, rich mortar or concrete with pea gravel.
d. Voids which appear upon the removal of forms shall be drenched with water and immediately filled with materials of the same composition as that used in the surface and smooth with a wood spatula of float.
e. Large bulges and abrupt irregularities that protrude shall be removed by brushing, hammering and grinding.
f. All materials, procedures and operations used in the repair of concrete shall be approved by BSU.
g. The cost of materials, labor and equipment used in the repair shall be the sole responsibility of the contractor.

7. CONCRETE SLAB ON FILL

All concrete shall be moist in an approved method of combination applicable to local conditions. Surface of the concrete shall be kept continuously wet by covering with water, by continuously spraying, or by covering with water, by continuously spraying, or by covering with burlap or other approved materials thoroughly saturated with water and keeping the covering wet by spraying or intermittent hosing. Water for curing shall be free from any elements which might cause objectionable staining or discoloration of the concrete.

8. CONCRETE SLAB ON FILL

a. Concrete slab on fill shall be laid on a prepared foundation. Sub-grade shall be rolled, rammed, or tamped layer by layered to a thoroughly compacted foundation.

9. CEMENT FINISH FOR CONCRETE AND CHB SURFACES

a. All concrete surfaces including those indicated as "Cement Plaster" on drawings shall be given a fine finish.

b. The cement surface shall be kept wet for four (4) hours before the required finish is applied.

10. INSPECTION

a. Concrete shall be proportional, mixed, and placed in the presence of BSU representative, ample notice shall be given before mixing is recommenced.

11. CONCRETE HOLLOW BLOCKS

a. Concrete hollow blocks shall be thoroughly wetted with water and embedded-in and cemented together with mortar. All blocks shall be laid plumb, true to line with level and accurately spaced courses breaking joints with the course below. Horizontal and vertical mortar joints shall be 3/8" thick with full mortar average on the face shells and the webs surrounding the cells to be completely filled. All blocks joints shall be struck flush to smooth even surface. Provide reinforcements as shown or specified and completely fill the cell with mortar to completely encase the reinforcement.

b. Vertical and horizontal reinforcements shall be provided and hollow comes where such reinforcements run through shall be full filled with class "A" concrete. Unless otherwise indicated in the drawings, reinforcements shall consists of 10mm diameter vertical and horizontal bars spaced at 600mm on centers securely anchored to columns of frames and to the existing walls

c. Mortar for joints and finishing plasters shall consist of one (1) part cement, (2) parts of sand, and minimum amount of water. Mortar joints shall be neatly trowelled and scraped of excess mortar.

d. Prior to laying, blocks shall be uniformly moistened but not soaked; joints shall be neatly trowelled and scraped of excess mortar.

SECTION V- CARPENTRY WORKS AND LUMBER

1. SCOPE OF WORK

a. The contractor shall furnish all labor, materials, tools, and services necessary to complete all rough and finish carpentry work shown on the drawings or herein specified.

2. GENERAL

a. Lumber shall be well seasoned, dry and free from large, loose and unsound knots, spas, shakes or other imperfections that may impair its strengths, durability or appearance. All exposed wood work shall be smoothly dressed and well sand-papered.

b. All moldings shall de mitered at corners and capped at angles. Factory made doors, transoms, and windows, completely assembled with sash fitted in place, shall be used upon approval.

3. PLYWOOD BOARDS

a. All plywood boards shall be of superior quality and thickness as indicated on plans.

4. FRAMES

a. All framing doors and windows shall be done, as much as possible with carefully fitted mortise and tendon joints. Frames shall be rabbeted and cut with under cuts for water drips.

5. WALLS AND PARTITIONS

a. Partitions shall be ¼" thick plywood on 2" x 3" HORIZONTAL AND VERTICAL STUDS AT 500 mm O.C. both ways. All walls shall be doubled (unless otherwise specified), shall be kiln-dried on 2"x 3" superior quality framing.

6. MISCELLANEOUS WOODWORK

a. All other items of wood work not mentioned in the specifications not included in those items specifically excluded from the building construction, and needed to complete woodwork, shall be done in accordance with shop drawings and to be furnished later.

7. CEILING

a. Interior exterior ceiling shall be ¼" thick plywood on 2"x 2" ceiling joist spaced at 600mm O.C. both ways or as specified on plans.

8. HARDWARES

a. The contractor shall likewise furnish and install necessary hardware to leave the work complete, although not specifically mentioned herein. All such hardware shall conform in superior quality and finish to the rest of the hardware specified. Sample shall be approved by the BSU Architect or Engineer before installing.

b. All door locksets shall be KW 400, Kwikset.

c. All entrance doors for toilets shall be provided with door knobs and specified locks.

d. 3½" x 3½" STANLEY. All flush doors with a width not more than 90cm. shall have three hinges, and four hinges, and four hinges for more than 90cm.

SECTION VI - TINSMITHRY and WELDING WORKS

1. **SCOPE OF WORK**
    a. The work consists of furnishing all labor, tools, equipment and materials needed in the performance of operations relative to the fabrication, delivery to site, and installation, completion as required and specified.

2. **MATERIALS**
    2.a. Roofing
    a. Use 0.4mm pre-painted long span, rib type, dark green metal roofing.
    b. Sheet shall be laid with end laps as indicated on the drawings, the minimum end lap shall be 30mm and the minimum side lap shall be 2 ½" rib wide. Steel sheets shall be fastened to the purlins at every alternate corrugation.
    c. Ridges, valleys, and hips shall be pre-painted with minimum thickness of 0.4mm.
    d. Ridge rolls shall lap at least 30cm over the roofing sheets. The ridge roll shall be fastened to the roofing sheets at every alternate corrugation.
    e. Valley rolls shall lap at least 30cm over the roofing sheets. The ridge roll shall be fastened to the roofing sheets at every fourth corrugation.
    f. Flashing shall be pre-painted with minimum thickness of 0.4mm. For corrugated sheets whose corrugations run parallel to the walls, one wing of the flashing sheets shall be corrugated to match the corrugations of the roofing sheets and shall be wide enough to cover at least 3 corrugations. All fascia boards shall be installed with flashings.

    2.b. Roof Framing
    a. All connections of materials specified to be used on the roof framing shall be fully welded and finished in an orderly and desirable manner.
    b. No part of the roof frame shall be exposed to weather especially moist and rain.

SECTION VII - DOORS AND WINDOWS

1. **SCOPE OF WORK**
    a. The contractor shall furnish all materials, labor, equipment, tools and services necessary to complete all work specified and shown on drawings. This work shall include the installation of steel windows with materials specification as stated on the schedule of Windows on Plan.
2. **ALUMINUM WINDOWS**
    a. Windows shall be furnished and installed with high quality and durable hardware for smooth operation. It shall be supplied with 6mm clear plate glass properly and sufficiently mounted with silicon sealant inside and outside of the window glass/ pane.

3. **DOORS**
    a. The type of doors shall be in accordance with the schedule of doors indicated and as reflected on plans.
    b. It shall be furnished and installed with high quality and durable hardware for smooth and convenient operation. All connections of the door assembly and its accessories shall be fully welded and done on a workmanlike and desirable manner.

4. **DIMENSION TO BE VERIFIED**
    a. All dimensions of openings as shown on drawings must be verified by the contractor.

SECTION VIII - PAINTING WORKS

1. **GENERAL**
    a. The manufacture's painting specification of Davies Paints, Boysen Paints or its equivalent as to quality shall be considered part of these specifications.

2. **SCOPE OF WORK**
    a. The contractor shall furnish all labor, equipment, materials and services required to complete the entire painting work herein called for. Painting work shall include the painting of all interior and exterior masonry work, metal work, wallboards, etc., as specified herein after the required there to.
    b. The contractor shall be furnish all tools, brushes, spraying equipment, tackles, scaffolding, ladders, pails, pans and other equipment required to complete the entire painting work.

3. WORKMANSHIP

a. All work shall be done by skilled painters in a workman like manner by being brushed or sprayed on the surfaces. All paints etc., shall evenly applied so as to be free from sags, runs, crawls, or other paint defects. All coats shall be of minimum brush marks. All brushes shall be clean and in good condition, heavy brushes are preferred.
b. All paints shall be thoroughly stirred so as to keep the pigment evenly in suspension when paint is being applied.
c. No paintings shall be done under conditions that are unsuitable for the production of good results. No oil painting shall be done on damp weather.
d. All coats shall be thoroughly dry before the succeeding coat is applied. Allow at least twenty-four (24) hours between coats unless otherwise specified by the manufacturer.
e. Painting coats are specified and intended to cover surfaces perfectly, if surfaces are not fully covered, further coats shall be applied to attain the desired evenness of the paint application.
f. All parts of the molding shall be left clean and true to details. All findings shall be uniform as to sheen, color, and texture except when glazing is required.

4. MATERIALS

a. All paints and painting materials shall be as manufactured by Boysen or Davies Paints Philippines Inc. or equivalent.
b. All paint materials shall be delivered at the site in their original containers, with labels intact and seals unbroken.
c. With the exception of ready-mixed materials in original containers all mixing shall be done at the jobsite. No materials are to be reduced or changed except as specified by the manufacturer of the said materials. The use of white zinc (lithopone) will not be allowed.
d. A place will be designated by the BSU architect or engineer for the storage of paint materials and tools. Whenever it may be necessary to change the location of his storage space, the contractor shall promptly move to the newly designated place. The storage space floor shall be adequately protected from damage and from paint. Paints shall be kept covered at all times and safeguarded to prevent fire.

5. COLORS

a. All colors of paint and varnishes shall be in accordance with color scheme as approved by BSU.

6. PROTECTION

a. Protect all electrical plates, surface hardware, etc. during the painting operations.
b. All floors, other surfaces and equipment shall be protected during the painting operations by any method acceptable and approved by the BSU Architect or Engineer.

7. PREPARATION OF SURFACES

a. Before applying paint finish, all surfaces must be thoroughly dry, clean and free from dust, grease, and dirt and properly prepared to receive finish. Boysen/Davies paint or equivalent and Varnish Remover shall be used.
b. No painting shall be done at any time unless the surface to be treated is thoroughly dry. The contractor shall inspect all surfaces to be painted and shall report all defects therein to the BSU architect or engineer prior to painting. The architect or engineer will cause these defects to be remedied. The commencing to the work by the contractor indicates his acceptance of the surface to be painted.
c. Wood surface shall be sand papered to a smooth and even surface duster. Blemishes on surfaces to be varnished shall be corrected. After primer stain coat all cracks and nail holes shall be filled with putty. Putty used in stained work shall batch the stained wood.
d. Brick, stucco, and concrete surfaces shall be free from excess mortar. Treat surfaces with Davies/Boysen or equivalent Masonry Neutralizer brushing the surface free of loose crystals when dry. New plaster must be allowed to dry thoroughly. Places in walls must be repaired with plastic patch-deep holes with matching plaster.

e. Metal surfaces shall be cleaned, free of mill scale, rust and foreign matter by scrapping flame cleaning, sand blasting or wire brushing. Loosed and scaling point shall be scraped and fire-brushed to sound metal surface.
f. Manufacturer's requirements for preparation of surfaces shall be considered apart of these specifications.

8. PAINTING SCHEDULE

a. Wood (ceiling)

Skim Coat	:	Boysen/ Davies or equivalent
Primer	:	Boysen/Davies or equivalent Flat Wall Enamel
Second Coat	:	Boysen/Davies or equivalent Flat Latex, White
Third Coat	:	Boysen/Davies or equivalent Semi-gloss, Latex, White

b. Exterior Wall

Primer	:	Boysen/Davies or equivalent Acrytex Cast B_5715
Second Coat	:	Boysen/Davies or equivalent Wallguard, Semi-gloss Latex
Third Coat	:	Boysen/Davies or equivalent Wallguard, Semi-gloss Latex

c. Interior Wall

Primer	:	Boysen/Davies or equivalent Flat Latex
Second Coat	:	Boysen/Davies or equivalent Semi-gloss Latex, White
Third Coat	:	Boysen/Davies or equivalent Semi-gloss Latex, White

d. Roofing

Primer	:	Boysen/Davies or equivalent Red Oxide
Second Coat	:	Boysen/Davies or equivalent Roof Guard, Baguio Green
Third Coat	:	Boysen/Davies or equivalent Roof guard, Baguio Green

e. Steel Window

Primer	:	Boysen/Davies or equivalent Red Oxide
Second Coat	:	Boysen/Davies or equivalent Permacoat Gloss Latex Paint

f. Other Wood Surfaces

Baseboard	:	Boysen/Davies or equivalent Chocolate Brown
Door Jamb	:	Boysen/Davies or equivalent Raw Siena

SECTION IX - PLUMBING AND WATER SERVICE SYSTEM

2. SCOPE OF WORK

a. The works shall include the following;

- Supply and the installation of pipes and fittings for all sanitary lines and water line.
- Supply and installation of all plumbing fixture shown in the drawings and described in this specification.
- Installing a system of drain, soil, vent, waste and building sewer.
- Connecting building sewer to the constructed septic tank.

3. GENERAL

a. Piping shall be standard G.I. Pipe schedule 40 of size as indicated on the drawing or as specified herein. The main service line shall connect to the water tank.
b. Minimum fairly constant, service pressure at a point outlet discharge shall not be less than 8 psi for all fixtures except for direct flush valves, for which it shall not be less than 15 psi and except where special equipment is used requiring higher pressure.
c. Piping for sanitary lines shall be standard PVC pipe. Water closets, urinals, lavatories, sink and floor drain pipes shall connect water directly to soil pipes leading to the septic tank. Every water closet and lavatory shall be provided with individual shut-off. Every plumbing fixture shall be separately provided with vented vitae sealed trap placed close to the fixtures. The open and end of

the vent pipes shall be entirely covered with no.16 mesh copper wire. Floor drains shall be nicked plated.

d. The body of clean-out ferrules shall conform the thickness of the required pipe and fittings of the same material, and shall extend not less than one quarter inch (1/4") above the hub. The Clean-out plug shall be provided with raised nut of recessed socket from removal, in accordance with the American Standard Tapered Pipe Threads.

e. Clean-out shall be of the same nominal size as the pipes up to four (4") inches and not less than four (4") inches for larger pipes.

4.PERFORMANCE TEST

a. It shall be the responsibility of the contractor to test all the system of the entire plumbing installation for proper operational condition. The test shall be conducted in the presence of the BSU Project Architect or Engineer.

5. MATERIALS

a. All plumbing fixtures shall be within the Philippine Standard.

6. PLUMBING FIXTURES AND ACCESSORIES

a. Stainless gooseneck faucets durable of high quality

7. INSTALLATION

a. All fixtures shall be installed firmly and carefully to avoid injury to the item. They shall be installed with high quality workmanship to the satisfaction of BSU.

SECTION X - ELECTRICAL WORK

1. SCOPE OF WORK

a. Work covered by this specification shall include furnishing all labor, materials, equipment and services required to construct and install the complete electrical system shown on accompanying plans and specified herein. All work shall be in accordance with the governing codes and regulation and with the specifications, except when the same shall conflict with such codes, etc., in which case the latter shall then govern.

b. Under this section of the specifications, the contractor shall provide all materials and equipment and perform all the work necessary for the drawings as herein specified; except as otherwise excluded, as which without excluding the generality of the foregoing, shall include but not limited to the following principal items of work.

- A complete wiring for the exterior and interior lighting and power system, including all feeders, branch circuit and connections to all lighting power outlets.
- All general lighting fixtures and lamps
- Grounding system of all electrical equipment
- Optional items of work
- If anything has been omitted in any items of work on materials usually furnished, which are necessary for the completion of the electrical works as outlined herein before, such must be hereby included in this section of the work.

2. CODES, REGULATIONS AND ORDINANCES

a. The electrical items under this contract is to be installed according to the requirements of the latest Philippine Electrical Code, the rules and regulations of the Authority concerned and the requirements of the Power Company. Nothing contained in these specifications or shown on the drawings shall be construed as to the conflict with the National and Local Ordinances or Laws governing the installation of electrical work, and all laws and ordinances are hereby made part of these specifications, the contractor is required to meet the requirements thereof.

3. PLANS AND DRAWINGS

a. The contract drawing, which constitutes an integral part of this contract, shall serve as working drawings. They indicate the general layout of the complete

electrical system and show arrangements of feeders, circuits, outlets, switches, control panel board, fixture and other works.

b. The Contractor shall follow all plans to avoid possible installation conflicts. Should drastic changes from the original plan be necessary to resolve such conflicts, the contractor shall notify the BSU Architect or Engineer and shall secure from him written approval and agreement concerning necessary changes and adjustments before alteration of the installation work will commence.

4. MINOR MODIFICATIONS

a. The plans as drawn are based upon architectural plans and details and show conditions as accurately as possible to indicate them in scale. The plans are diagrammatical and do not necessarily show all fittings, etc., necessary to fit the conditions. The locations of lighting fixtures, convenience outlets, and switches shown on plan are approximate.

5. MATERIAL STANDARDS

a. All materials shall be new and shall conform to the standard specified in the Philippines Electrical Codes and other such as IIEE for every case where such a standard has been established for the particular type of materials in questions.
b. All materials on all systems shall comply with the following specifications, unless specifically accepted, and all materials where not specified shall be of the best of their respective kind.
c. Sample of all materials shall be submitted for approval as required by BSU.
d. All electrical materials shall be new and shall meet the requirements and shall bear the inspection label, wherever standards have been established.
e. The entire installation shall be free from improper ground and from short circuits.
f. It shall be the responsibility of the contractor to test all the systems of the entire electrical installations for proper operational condition.
g. The contractor shall do all the cutting and fitting required for the installation of the electrical items and coordinate with the work of other trades, in accordance with the drawings and in the manner satisfactory to BSU.

6. WIRE AND CABLE

a. All wires shall be copper, soft-drawn and annealed, shall be of 98% conductivity shall be smooth and fine of a cylindrical form and shall within the actual size called for.
b. All wires and cables shall comply with the requirements as to the particular usage.
c. All wires and cables for lighting and power system shall be moisture and heat resistant rubber or thermoplastic insulate.
d. No wire smaller than # 12 shall be used for convenience outlet.
e. All wires and cables shall be as manufactured by PHELPS DODGE.

7. PIPES

a. Wiring shall be done in RSC and CPC pipe, for steel conduit, it shall be of standard weight mild steel hot galvanized, with an interior coating.
b. Wiring running on walls shall be in a 20mm PVC molding.
c. No wire shall be pulled into any conduit until the conduit system is completely in all details and in the case of concealed work.
d. The end of all conduits shall be tightly plugged to exclude plaster, dust and moisture while the building is in the process of construction. All conduit ends shall be reamed to remove all burrs.

8. OUTLETS BOXES AND FITTINGS

a. All outlets of whatever kind for all system there shall be provided suitable fitting, which shall be either a box or other device especially designed to receive the type of fittings to be mounted thereon.

9. JUNCTION AND PULL BOXES

a. Junction and pull boxes (PVC) shall be provided as indicated or as required for facilitating and pulling of wires and cables. Junction and pull boxes in finished places shall be located and installed with the permission and to the satisfaction of the BSU Architect and Engineer.

contract. Any damage done by him or his employees shall be repaired at his own expense, without any additional compensation beyond the contract price.

The contractor shall be held responsible for the repairs to have own or other made necessary by the defective workmanship or careless of other crafts.
Any damage to any part or part of the structure of the structure of the building caused by the contractor shall be repaired at his own expense.

6. WARRANTY AND GUARANTEES

The contractor shall guarantee all works specified are free from the defective workmanship and materials, and will remain so far for a period of 1 year from the date of acceptance of the work. Any defects, appearing within the aforesaid period, shall be remedied by the contractor at his own expense.

7. WORKMANSHIP

The work throughout shall be executed in the best and most thorough manner under the redirection of and to the satisfaction of the BSU Engineer and Architect and shall have the power to reject any works and materials which, in his judgment, are not in full accordance therewith.

8. MANNER OF PAYMENT

The contractor shall be paid through progress billing and shall submit a request for the payment corresponding to the percentage of work accomplished with statement of work accomplishment and the project photos before and after each activity as attachment. Such request shall be verified by the monitoring and inspection committee or its duly appointed representative. Benguet State University shall have the right to deduct from the contractor's progress billing such amount as may be necessary to cover the third party's liabilities, as well as the uncorrected defects in the projects.
The payment shall be subjected to retention of ten percent (10%) referred to as the "retention money" in accordance with pertinent provisions of RA 9184.

Prepared by:

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