A. GENERAL REQUIREMENTS

TS-1 General

1.1 Provision

The Contractor shall perform all the required scope of works for the SLSU-San Juan in compliance with this Technical Specifications.

1.2 Drawings and Specifications

Drawings and specification are intended to complement each other, so that if anything is shown on the drawings, but not mentioned in the specifications, or vise versa, it is to be furnished and built as though specifically set forth in both. If any discrepancies occur in the drawings or specifications, the same shall be referred to the Engineers assigned in the project before proceeding with the work. The Engineer's decision on such discrepancies shall be final provided that the said discrepancies will not incur any additional cost and will not sacrifice the structural integrity of any building.

1.3 Large scale drawings shall have preference over smaller scale drawings and figured dimensions shall have preference over scaled dimensions.

1.4 The Engineer may, during the progress of the work furnish additional drawings specifications and instructions for new items of work as may be necessary, for the proper and adequate implementation of the work. The Contractor shall implement the additional work in accordance with drawings, specifications and instruction. Such additional drawings, specifications and instruction shall be deemed part of the Contract Documents.

1.5. Minor Change

The Contractor shall submit to the Engineer a construction methodology to implement the works. The methodology shall include the provision of adequate water supply for the building.

1.6 Applicable Standards and Codes

The following terms listed or referred herein or indicated in the drawings are to be used for reference and latest edition of the publication to the date of these specifications shall apply.

ASTM	-	American Society for Testing and Materials
ACI	-	American Concrete Institute
AISC	-	American Institute of Steel Construction
ANSI	-	American National Standard Institute
CRSI	-	Concrete Reinforcing Steel Institute
AWS	-	American Welding Society
ASSHTO	-	American Association of State Highway and Transportation Office

1.7 The Contractor may use local standards and codes equivalent to those referred in this Technical Specifications.

PS	-	Philippine Standard
NBC	-	National Building Code of the Philippines
NSC	-	National Structural Code of the Philippines
PCP	-	Plumbing Code of the Philippines
PEC	-	Philippine Electrical Code

TS-2 Construction Schedule and Execution Plan

The Contractor shall submit a construction schedule in the form of PERT/CPM or Bar chart, including equipment and manpower utilization schedule for approval by the Engineer.

TS-3 Permit

Prior to the execution of the work, the contractor shall secure the necessary building permit and post the permit number to the construction site visible to the public.

TS-4 As-Built Drawings and Construction Log Book

The Contractor shall submit an as-built plan of the project including the records of construction activities during implementation as a requirement for final payment.

TS-5 Construction Photograph

The Contractor shall submit progress photographs as supporting documents for every progress payment.

B. SITEWORKS

TS-6 Earthworks

6.1 Materials

a. The Contractor shall supply all labor, plant, materials equipment and other facilities required to complete all earthworks in an acceptable manner as shown on the drawings and as specified herein. This work shall include clearing, staking, excavation, sub-base, preparation, backfilling, compaction and trimming for final grades where the building shall be erected. It also includes utility service connection for sewer, water supply, and all appurtenances in accordance with the contract and/or as maybe directed by the Engineer if applicable.

b. All filling materials, whether native to the site or imported, shall be free of debris, roots, vegetation or other deleterious materials, sand and gravel shall be free of any clods of stones larger than 50 mm in their dimension.

c. Excavated materials that can be compacted to the required density and acceptable to the Engineer may be used for backfilling.

d. Bedding materials shall be in accordance with the specification as accepted by the Engineer. The material shall be hard and durable stone, with a maximum size of 24mm (1") graded by weight as follows:

Sieve Size (square opening)	Percent by weight
24 mm (1 inch)	90 – 100
19 mm (3-4 inch)	10 – 50
12 mm (1/2 inch)	0 – 20
9.5 mm ((3/8 inch)	0 – 10

e. Coarse sand shall consist of clean, inert, hard, durable material free from loam or clay, surface coating and deleterious materials. The Contractor shall submit samples for testing with the supervision of the Engineer and shall pass the required specification prior to installation.

f. Selected fill material shall be graded mixture of fine coarse grained material with less than 35% passing the number 200 sieve. The Contractor shall submit samples of the materials he proposes to use, showing that it can be compacted to the required density.

6.2 Scope of work

a. The area at least two (2) meters around the building shall be cleared of rubbish, loams, refuse, grass, roots and other perishable or objectionable matter.

b. All unsuitable materials that lie within the operational area shall be removed and disposed from the site, to a dump designated by the Engineer or spread in locations and manner approved by the Engineer. Clearing may be undertaken by any method, which is not detrimental to the work, nor wasteful for earth materials.

c. The building shall be staked out and all lines and grades as shown on the plans shall be established accurately before the start of excavation. Basic batter boards and reference marks shall be erected before the construction of the foundation.

d. Trenching and drilling for water, sewer or storm drainage, if applicable, shall be done according to line and depths as shown in the drawings. Any trenches shall be sufficient width to accommodate the proper laying, installation and joining of pipes. Lines and depths not indicated on the drawings shall be determined by the Engineer before laying of pipelines is done. All trenches shall be fully backfilled upon approval by the Engineer in accordance with the elevations as indicated on the plans. If the Contractor did not attain the required elevation at the end of the day,

the Engineer shall require the contractor to place warning signs at the periphery of the excavated area.

e. Where trenches for water, sewer and storm drainage pipelines require the removal of road pavements, the contractor shall obtain written permit from the Municipal Engineering Office. The Contractor shall restore such pavements to their original or better condition without any additional cost to the Owner.

f. The excavation lines shown on the drawings are solely for the purpose of computing quantities for pavement purposes. The Owner specifically does not warrant the actual sides can be made to the excavation lines shown.

g. The Contractor shall design, furnish, install, and maintain such sheeting and bracing as may be required to support the side of excavation if scouring arises. Care shall be taken to prevent voids outside the sheeting. Prior to installation of any sheeting and bracing, the Contractor's proposed method of installation shall be approved by the Engineer.

h. All sheeting and bracing, upon completion of the works, shall be carefully removed without endangering the new installations and the existing utilities or adjoining property as well.

i. All voids caused by withdrawal of sheeting shall be immediately refilled with sand and compacted by ramming with suitable tools, watering or any method directed by the Engineer.

j. Wood sheeting shall not be withdrawn if driven below the bottom of any drain, and under no circumstances shall any wood sheeting be cut off at a level lower than 0.30m above the top of the drain.

k. The contractor shall leave in place to be embedded in the backfill, all sheeting, bracing, etc. which the Engineer may direct him in writing to leave in place at any time during the progress of the work for the purpose of preventing injury to structures, utilities, or property, whether public or private.

l. Excavation shall include the removal of all materials of whatever nature encountered including all obstructions of any nature that would interfere with the proper execution and completion of the work. The removal of these materials shall conform to the lines and grades shown on drawings as ordered by the Engineer. If scouring arises the Contractor shall immediately furnish and install sheeting to secure the sides of the excavation and notify the Engineer for verification and approval. The Contractor may submit other method of excavation for any unstable ground encountered, whether by shoring or by sloping excavation. The

Engineer shall immediately notify the Contractor the acceptable method to avoid and avoid damages to the adjoining property or utilities.

m. Excavation to a depth greater than that shown on the drawings may be required without any additional costs. The depth and extent of over excavation shall be to the approval of the Engineer.

n. The materials to be used for backfilling maybe either selected material, gravel, or other materials that is acceptable. The material used shall be placed in layers, brought to optimum moisture content and compacted to ninety (90%) percent of the modified AASHTO Standard.

o. Bedding material shall be sand or crushed rock as previously specified. Bedding material shall be placed in layer to a minimum depth of 100mm and compacted to 95% of modified AASHTO compaction, prior to installation of pipes or concreting of structure.

p. Initial backfill to a depth of 150mm above the pipe shall be carried out using coarse sand. The backfill shall be carried out in layers not exceeding 150 mm compacted thicknesses of 95% compaction.

q. Te remainder of the backfill shall be from excavated material subject to the approval of the Engineer.

r. Filling shall be carried up in layers not exceeding 150 mm compacted thicknesses. Compaction shall be carried out using, vibratory compactors or other equipment suitable to achieve a reliable and uniform compaction to the specified standard. Manual compaction methods will be acceptable upon approval of the Engineer.

s. The Contractor shall give special attention to the effect of his operations. He shall take special care to maintain, trim, and level the surrounding area around the building during construction period.

C. CONCRETE

TS-7 General

This section includes all operations necessary for the supply and delivery of all materials, labor, equipment and all associated activities necessary to complete the work conforming to the following standards:

ASTM C-31	Method of Making and Curing Concrete Test Specimens in the Field
ASTM C-33	Specification for Concrete Aggregates
ASTM C-39	Method of Test for Compressive Strength of Molded Cylindrical Concrete Specimens

ASTM C-94	Specification for Ready-Mixed Concrete
ASTM C-143	Test for Slump of Portland Cement Concrete
ASTM C-150	Specification for Portland Cement
ASTM A-615	Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement

TS-8 Materials

8.1 All cement shall be Portland cement and shall be Type 1, conforming to ASTM C-150.

8.2 Fine and coarse aggregates shall be obtained from the approved source as conforming to DPWH standard specifications and shall conform to ASTM C-33.

8.3 Water shall be potable and free from deleterious amounts of acids, alkalis, oils or organic matter.

8.4 Admixtures shall only be used with the prior written consent of the Engineer. Admixtures shall not contain calcium chloride. The use of an admixture shall not change the required quantities of cement specified and the quantity of admixture used and method of mixing shall be in accordance with the manufacturer's instruction as the case may be.

8.5 Reinforcement steel shall be deformed steel bars conforming to Structural Grade (Phil. Standard) grade 40. Shapes and dimensions shall be as indicated on the drawings.

TS-9 Quality of concrete

9.1 The quality of concrete shall comply with the "National Structural Code of the Philippines, Volume 1" and with the specific requirements outlined in the various sections of this specification.

9.2 Testing of samples from concrete pours shall be as required by the "National Structural Code of the Philippines, Volume 1".

9.3 Tests of specimens shall be deemed acceptable provided they meet the requirements of the "National Structural Code of the Philippines, Volume 1".

9.4 Should further testing of the finished concrete be necessary but test specimens are not available, it shall be carried out in accordance with the approved procedures laid down in "National Structural Code of the Philippines, Volume 1".

9.5 Hardened concrete that is deemed not to comply with this specification, but which the Engineer permits for testing, shall be subject for compressive strength.

9.6 Any concrete will be rejected under this specification if the results fail to meet the requirements of "National Structural Code of the Philippines, Volume 1".

9.7 Hardened concrete may also be rejected and the Engineer has the option to let the Contractor to demolish the rejected portion for any one of the following conditions:

a. It is porous, segregated or honeycombed.
b. Its placing has been so interrupted that there is a construction or similar joint not in accordance with the National Structural Code of the Philippines, Volume 1.
c. The reinforcing steel it incorporates has been displaced.
d. Construction tolerances have not been met.
e. The required surfaced finish has not been met.
f. The concrete can be shown to be otherwise defective.

TS-10 Scope of Works and Methods of Construction

10.1 Concrete shall not be placed until all formworks, installation of reinforcement, and the preparation of surfaces have been approved by the Engineer. Prior to concreting the Contractor shall submit a proposed pouring schedule for the various stages of the work for approval by the Engineer. No concrete shall be poured with out the Engineer's approval presence. Subsequently, the Contractor shall give the Engineer twenty four (24) hours notice of his intention to proceed with the next stages of the work.

10.2 All batches of mortar or concrete shall be adjusted to the capacity of the mixer. If hand mixing shall be allowed, the batch shall be so proportioned as to use only full bag batches. In case ready mixed concrete shall be used, it must comply with ASTM C-94 and all the requirements therein.

10.3 All mortar and concrete shall be used while fresh and when there is no evidence of initial setting. No tampering of mortar or concrete will be allowed.

10.4 Ready mixed concrete (i.e., off-site transit mixer concrete) shall comply with ASTM C-94 and the requirements herein. Batch deliveries shall not exceed the rated capacity specified for the mixer by its manufacturer. The Contractor shall submit affidavits, for the approval of the Engineer, certifying that the proposed mix to be supplied shall satisfy the requirements of these specifications.

10.5 The accuracy of weighing equipment and the accuracy of batching shall comply with the applicable requirements of ASTM C-94 and its reference standards. The materials shall be so measured as to give the required mix proportions. Cement and aggregates shall be measured by weight or any other method approved by the Engineer.

10.6 The device employed to measure and discharge the amount of water for the mixture shall be capable of adjustment and checking.

10.7 Water carried by the aggregate, in excess of that giving a saturated surface-dry condition shall be considered as part of the required mixing water.

10.8 Concrete shall be mixed until the materials are uniformly distributed. The time of mixing shall not be less than one and one half (1 ½) minutes after all ingredients are in the mixer.

10.9 No concrete shall be placed until the required bedding had been laid and compacted, the necessary reinforcement, forms, and false work had been installed, had attained the required elevation, inspected and approved by the engineer. Before depositing concrete, all debris, foreign matter, dirt and water shall be removed from the forms, and the surface of any concrete previously placed shall be cleaned and brushed with cement paste.

10.10 No concrete shall be placed on filled ground until it has attained the required compaction and approved by the Engineer.

10.11 All concrete shall be placed in daylight or under such lighting condition that may be approved by the Engineer as the case may be.

10.12 The method and manner of placing concrete shall be such as to avoid the possibility of segregation of the concrete or the displacement of the reinforcement. Where troughs or chutes are used in placing concrete, the angle of inclination with respect to the horizontal shall not exceed thirty (30) degrees.

10.13 Concrete shall not be allowed to drop into place from a height exceeding one (1) meter.

10.14 The placing of concrete shall be evenly regulated to avoid the depositing of a large quantity at any one point. Concrete in horizontal layers shall be deposited as near as practicable to its final position in the forms.

10.15 Concrete shall be deposited in a continuous operation as far as it is practicable to avoid initial setting starting in any part of the work before another fresh concrete shall be placed against it.

10.16 Compaction of concrete shall be by immersion type of vibrator. Vibration shall be limited to the time necessary to produced thorough compaction of the concrete without segregation. Under no circumstances, vibrator shall be used to move concrete laterally, nor shall it be allowed to penetrate concrete in the previous batch.

10.17 During placing and until curing, all new concrete shall be protected against the harmful effects of exposure to the elements and to running water.

10.18 When concrete hardens sufficiently, it must be covered with damp, closed-woven burlap or similar material, or clean sand, which shall be kept thoroughly saturated over a period of fourteen (14) days. Where wood forms are used, they shall be kept wet for the same period to prevent openings at the joints and drying out of the concrete.

10.19 If the temperature of the surrounding air is higher than 32 degree Celsius prior the pouring of concrete, the following shall procedures must be applied by the Contractor:

a. The formwork shall be continually sprayed with cold water in advance of the concreting and excess water shall be removed from the inside of the forms immediately prior to the placement of concrete.

b. The reinforcement of the formwork, if metal forms are used, shall be protected from the effects of hot winds and direct sunlight.

c. Suitable barriers shall be provided to protect the freshly placed concrete from wind, shall be covered and allow the concrete to harden sufficiently.

d. The concrete shall be held to a temperature of 32 degree Celsius during pouring.

e. The concrete shall be mixed, transported, placed and compacted as rapidly as possible and shall be then covered with an impervious membrane and shall kept wet for curing.

TS-11 Finishing of Concrete

11.1 Allowable deviations from plumb or level and from the alignment, profile grades and dimensions shown on the drawings are defined as "tolerances" and are to be distinguished from irregularities in finish. Surface irregularities are classified as abrupt or gradual. Off sets caused by displaced or misplaced from sheeting, form lining, form section, loose knot or knots or otherwise defective form timber will be considered as abrupt irregularities and will tested by either a straight edge or its equivalent for curved surfaces.

11.2 Immediately after removal of forms, all pins and loose material shall be removed. "Honey-combed" aggregate pockets, voids and holes shall be cut back to solid concrete. All repairs of imperfections in concrete shall be completed within twenty four (24) hours after removal of forms.

TS-12 Formworks

12.1 The contractor shall be responsible for the design, erection and adjustment of all formwork and false work in accordance with the National Structural Code of the Philippines, Volume 1.

12.2 All materials used in the construction and support of formwork shall be of timber or any alternative materials upon approval of the Engineer. For beams and slabs, use not less than 12 mm (1/2") thick plywood forms for exposed concrete while 20 mm (3/4") thick T & G or plyboards for covered concrete.

12.3 It shall be the Contractor's responsibility to ensure that the forms are placed to the shape, lines and dimensions as indicated on the drawings, and they shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete. The Contractor shall ensure that the forms are

maintained rigidly in position and be sufficiently tight to prevent excessive leakage of mortar.

12.4 All debris particularly chipping, shaving and sawdust, shall be removed from the interior of the forms before the concrete is placed.

12.5 Before any pouring of concrete, the Engineer shall inspect the formwork and reject any materials of forms that do not conform to this specification.

12.6 The deflection of forms between joints and/or studs shall no exceed one five-hundredth (1/500) of the joints or stud spacing.

TS-13 Grouting

The Contractor, prior the pouring of another batch of concrete on hardened concrete surface grouting shall be made. Before any grouting operation, all surfaces to be grouted shall be cleared of extraneous materials.

TS-14 Rebar

14.1 All steel bars to be used during construction should be in accordance with the guidelines of "National Structural Code of the Philippines, Volume 1"

14.2 The tolerances on cutting and bending of reinforcement shall be in accordance with the provisions stipulated in the constructions notes of the approved plans and specifications.

14.3 Lap splicing or welding of reinforcement, if approved by the Engineer, of reinforcement shall comply with the National Structural Code of the Philippines, Volume 1. It shall not be carried out within 75mm of a bend having an internal diameter less than 12 bar diameter.

D. MASONRY

The scope of the work covers the furnishing of all labor, equipment and materials for the erection of walls made of non load bearing, 100mm and/or 150mm thick concrete hollow blocks. For exterior walls use 150mm thick CHB, and for interior walls use 100mm thick CHB.

TS-15 Materials

15.1 All materials supplied under the Contract shall conform to the requirements of the Philippine Standard Association and the National Structural Code of the Philippines, Volume 1.

15.2 Recommended strength of CHB for both exterior & interior walls of the building shall not be less than 450 psi.

15.3 Portland cement mortar for laying concrete hollow blocks shall consist of one (1) part Portland cement, and three (3) parts sand.

15.4 Mortar materials shall be accurately measured by volume and thoroughly mixed until evenly distributed throughout the batch. Unless otherwise approved by the Engineer, mixing by batch shall be by mechanical mixer of not less than two (2) minutes per batch.

15.5 Masonry materials shall be handled with care to prevent chipping and breakage. Masonry units with crack shall not be installed and shall be replaced immediately. Material for concrete masonry units shall be stacked on platform and covered or stored in any other approved manner that will protect these materials from contact with the soil and exposure to the weather. Cement shall be stored off the ground under water tight cover and away from sweating walls and other damp surfaces until ready for use. Damage or deteriorated materials shall be removed from the premises.

15.6 All steel reinforcement for masonry works shall be in accordance with the approved plan and details as shown on the drawings.

TS-16 Methods of Construction

16.1 All masonry units shall be laid plumbed, leveled and accurately spaced. Wall intersection shall be toothed alternately. End of walls shall be in vertical line.

16.2 All masonry units shall be wetted before laying. The blocks shall be laid in mortar bedding in such a way that no cracks are formed between the blocks and the mortar at the time the masonry units are placed.

16.3 The concrete blocks shall be adjusted to its final position while mortar is still soft and plastic to insure a good bond.

16.4 The position of the concrete block shall not be shifted after the mortar has stiffened.

16.5 All horizontal and vertical joints must be filled solid with 3/8-inch (9.5mm) thick mortar unless otherwise specified or detailed on the drawings. Any patching necessary to fill the joints should be completed.

16.6 All vertical masonry wall reinforcement shall be anchored to concrete wall footings and roof beam. Likewise horizontal reinforcements should be anchored to column bars and shall be tied to every vertical masonry wall reinforcements.

16.7 Filling of CHB cells shall be carried out in stages not exceeding 3 courses at a time and the concrete properly compacted without disturbing the newly laid concrete blocks.

16.8 The filler concrete shall be stopped at a level about thirty six (36) mm. (1 ½ in.) below the top of the blocks laid, when filling of concrete shall be stopped for more than one (1) hour.

16.9 At the completion of the work, all excess mortar on masonry surfaces and mortar spilled on floor slabs shall be removed.

E. FINISHES

TS-17 Plastering

17.1 General
The work includes the furnishing of materials, equipment, methods and the labor necessary to complete all plastering in accordance with the drawings and specified herein.

17.2 Materials

All materials specified herein shall be subject to the specification of manufacturers and to the approval of the Engineer.

a. Portland Cement shall conform to ASTM C-150), Type 1.

b. Sand shall be hard, well washed, clean and free from deleterious materials conforming to ASTM C-40.

c. Lime Shall be hydrated lime with the requirement that calcium oxide (CaO) and the magnesium oxide (MgO) shall not exceed eight (8) percent by weight calculated

d. Water shall be potable, clean and free form organic matter, acids and alkalis.

17.3 Delivery and Storage

Manufactured materials shall be delivered in the original unbroken packages and containers bearing the name and brand of the manufacturer. Cement materials shall be kept away from the sweating walls and damp surfaces until ready for use. Damage or deteriorated materials shall be removed from the premises.

17.4 Mixture

Plaster shall be the thoroughly mixed with the proper amount of water until uniform in color consistency. Tampering shall not be permitted and all plaster that has begun to stiffen shall be discarded. Cement mortar shall be of three (3) coat application. Each coat shall be proportional as follows: one (1) part Portland Cement, three (3) parts sand and one fifth part lime putty.

17.5 Methods of Construction

a. Surfaces to receive plaster shall be cleaned of all loose particles, dust, cracks and other foreign matter. Before the plastering work is started, masonry surfaces shall be wetted thoroughly with a fog, spray of clean water to produce a uniformly moist condition. Corner beads, screeds and other accessories shall be check carefully for alignment before work is started.

b. The coat shall be applied with sufficient pressure to fill the grooves in hollow blocks or concrete surface to prevent air pockets and secure a good bond. The coat shall be lightly scratch and broom. Each coat of cement plaster shall be kept moist for four (4) hour after application and then allowed to dry.

c. Finish and final coat shall not be applied until the first coat has seasoned for 7 days. Before the application of the finish coat, the concrete surface shall be evenly moistened with a fog coat; the first shall be floated first to a true and even surface then toweled in a manner that will force the sand particles down into the plaster. Plastered surfaces shall be smooth and free from rough areas, toweled marks, checks and blemishes. Thickness of plaster shall be 9mm (3/8") on vertical concrete and on masonry.

d. On wall finishing, exterior and interior finishes shall be plain cement plaster finish or whatever is specified on the drawing.

e. Toilet wall finishes shall be vitrified glazed ceramic tiles wainscoting. (Refer to ceramic tile work for detailed information).

f. Plastering work shall be finished level, square and true within a tolerance of 5 millimeter in 4.8 meters without cracks, wakes, blisters, pits, projections and other imperfections. Plaster work shall be formed carefully around corners, contours and well-up to screeds. Care shall be taken to prevent sagging and drooping of applications. There shall be no visible junction marks, in the finish coat where one day's work adjoins the other.

g. Upon completion of the building and when directed, all loose, cracked, damaged, or defective plastering shall be cut out and re-plastered in a satisfactory and approved manner. All pointing and patching of plastered surfaces, and plaster work abutting of adjoining any other finish work, shall be done in neat and acceptable manner. Plaster droppings shall be removed from all surfaces. Exposed plastered surfaces shall be left in a clean unblemished condition ready to receive paint or other finish. Protective covering shall be removed from floors and other surfaces, and all rubbish and debris shall be removed from the building.

18.1 Cleaning

Upon completion of the work the Contractor shall remove from the building all used materials, debris, all paint spots on the floor, washing of window glass, hardware fixture, etc. All work performed under this Section shall be left clean and acceptable to the Engineer.

18.2 Guarantee

The Contractor shall guarantee his work for a period of one (1) year, when using the materials specified by the Engineer. The Contractor shall repair all defects

due to faulty material or workmanship caused by him without any additional compensation for the period specified.