	EMBASSY OF THE UNITED STATES OF AMERICA Bogotá, Colombia NARCOTICS AFFAIRS SECTION (NAS)	**PROJECT:** PSIB-Lodging and Office **PLACE**: Fluvial Marines battalion No. 10 in Guapi, Cauca	**Number of Pages: 26** **Request # 17848** **Date:** December 28, 2010

ATTACHMENT NUMBER 3E
TECHNICAL SPECIFICATIONS

A translation to Spanish will be given as a courtesy. If a discrepancy is found between the version in Spanish and the version in English, the version in English will prevail.

GENERAL DESCRIPTION OF THE PROJECT

The project consists in the construction of 6 modules (Buildings) follow as:

- Two (2) dormitories of 5.7 m. x 3.9 m. for housing suboficiales with capacity for 12 persons in double bunkbeds, together with the respective electrical installations and finishes
- One (1) restroom of 5.7 m. x 3.9 m. to be use by the suboficiles, together with the respective electrical installations, finishes and sanitary devices.
- One (1) Kitchen of 5.7 m. x 3.9 m. to be use by the suboficiles, together with the respective electrical installations and finishes. This module includes one area to laundry and one area to panty.
- One (1) living/dining room of 5.7 m. x 3.9 m., together with the respective electrical installations, finishes and sanitary devices.
- One (1) communication offices of 5.7 m. x 3.9 m., together with the respective electrical installations and finishes.
- Exterior works that include, grading, filling material, turfing, utilities systems, connections and sidewalks

The cost of this work includes materials, tools and labour, and all necessary operating costs, such as personnel transportation and board and lodging for personnel. See description, location, specifications and designs in the following paragraphs and on the attached plans.

We clarify that the Contractor must verify all measures and must become familiar with the terrain and existing conditions prior to the submittal of its quotation. Based on these terms of reference, we have supplied guideline measurements in order for the contractor to check the drawings, the chart with quantities, and for it to physically check the workplace.

In no case will these figures commit the Embassy to paying additional amounts if the resulting measurements on site are different from the information supplied in such drawings and the description attached.

The Contractor to whom the contract is awarded must prepare the construction drawings for approval. The specifications described below apply to each work front mentioned above.

GENERAL SPECIFICATIONS FOR THE PROJECT

This work consists of constructing 6 modules in masonry into Fluvial Marines Battalion No. 10 in Guapi, Department of Cauca. The construction should be completely hermetic, and the materials should be capable of withstanding a tropical rainy climate.

The costs of the buildings that is to be put up also includes masonry, roof and floor, electrical, hydraulic and sanitary facilities and installations, and doors, locks, air conditioning, sanitary fittings, and finishes as indicated. The building should comply with Standards the current version of the Colombian Seismic Resistance Code (NSR Standard, 1998).

The contractor will be responsible for board and lodging for the construction team on the work site (away from the base), or as arranged with Base personnel. The contractor should be sat the Base to receive the material, and will be responsible for unloading the material and transporting it to the actual work site.

The building should be erected at least 20 cm. above the ground, with the respective steps being at each access point.
The place where the buildings are to be located at the Base is shown on Plan No. T1. Designs and dimensions are likewise shown on the attached plans (see Plans A1 to A5).

1. PRELIMINARY ACTIVITIES

1.1 Camp site and others

Camp site: The contractor shall build a temporary work camp in galvanized metal plates or a container to store construction elements, including dressing rooms for the personnel at the worksite, equipped with everything to meet personal hygiene, comfort, and ventilation requirements and protection against weather conditions.
The location of this work camp will be coordinated among the contractor, the laboratories director and the Embassy Representative. The contractor will be responsible for the elements left in this location and must remove the work camp when the works are finished, leaving the area in the same condition in which it was delivered.
Temporary enclosure: The workplace shall be completely isolated from the zones or roads that surround the lot or the work area. Also, if a material storage area is built, it must also be enclosed. To do so, a polypropylene enclosure will be built (H= 2.1 m.) using perfectly driven wooden posts every 2 m. and pulled taut with wire on the top, in the middle, and on the bottom. Props must be installed on each side of the access door and on the swinging joints. The enclosure must have only one dual gate access through which machinery, vehicles, and personnel will enter. During the performance of the works, the contractor must take care of the maintenance and repair of the enclosure, in such a manner as to always keep it in optimum conditions.
Calculations: The Contractor shall make all calculations, designs and additional details required for the proper completion of works, and must comply with the Colombian Codes for each activity to be carried out, based on the information supplied, and must submit them for the approval of the Embassy Representative prior to construction initiation. The structures must follow the architecture in place.
The works must be designed and built pursuant to the Colombian Code for Standard NSR-98 Earthquake-resistant Buildings or current standard, NEC, RAS, the Ministry of the Environment, and ICONTEC, INVIAS, etc., as they apply in each case for every need.
Once the contract is awarded the contractor shall review provided designs, produce shop drawings and submit them for approval with additional information of designs, calculations etc.; The contractor shall include full documentation signed and certified by the engineer registered in each one of the areas of the listed items.
Notice board: The Contractor shall install a notice board on job site where identify clearly the name of the architect designer and their respective professional license, the name of the Builder, building height, number of stories, type of building, areas to build and number of the resolution of the construction license. The size of the board shall be according to the request of the municipality of Guapi.

1.2 Locating and layout:

Using precision topography instruments, the contractor will survey the area, based on the design supplied. The bidder must double-check the measures of the area assigned.

This job must be done by an expert professional who, in addition to the planimetry, must establish the levels. Everything must be referenced using strongly fastened wooden headers. The contractor must supply all of the materials to build the planimetry references, the altimeter references, such as stakes and field logs, etc.

The contracting party will review the location of the axes, but this does not waive the contractor of its responsibility, in the event of an error in locating or leveling, in any portion of the works. To initiate the locating and laying out, the points of reference or ties required, whether horizontal or vertical, must be defined and approved, as well as the borders of the terrain to occupy.

The temporary BM and references axes must be located in spots that do not intervene with the performance of the works, where it will not be necessary to remove them, in order to enable later control at any given time during the works. Paint marks of any kind, scrape marks, nails, centering pegs, etc… are prohibited in the present edifications or base structures. After doing the locating and laying out of the kennels, the contractor must submit a schema including the location of the structures and existing trees and shrubs, for approval.

This activity must include the value of the locating and laying out of the foundations, the slab, walls, etc. The price of the other activities that require locating and laying out will be included in the value of each activity.

After doing the laying out and locating, the contractor must submit a schema including the location of the structures for approval.

This activity must include the location and laying out value for foundations and slabs.

The area is the following: 250 m2

1.3 Existing curb demolition:

The Contractor shall demolish and remove a existing sidewalk located in the area where it will build the 6 modules (see drawing T1).

The contractor will be responsible for damage caused to rubble while they will be withdrawn. The works include demolition tools and transportation in trucks to authorized sites.

1.4 Excavation:

The items included within this chapter include the clearing, grubbing, excavation and removal needed to carry out all works regarding this contract. Any damage to the site during the execution of these activities will be borne by the Contractor. The excavation works include minor tools, machinery, dump truck transportation to authorized sites in the region, and labor.

At the excavation sites and access points, the Contractor will provide, all signs, warning signs and temporary enclosure. The work zone must be enclosed using 8-cm. wide yellow plastic safety tape strips nailed to and / or supported on the floor, and must at least have three strips to protect persons, vehicles and animals from possible accidents. The installation and removal cost implied will be included in the cost of each activity.

The Contractor must be prepared to excavate any type of material, using the appropriate methods, equipment and tools. When initiating the excavation work, the Contractor must have prepared a list with aerial, surface or underground interference research, in order to abstain from damaging pipes, cables, posts, hoses, wells or other elements or structures that exist in the excavation area and / or in the access points. If the excavation and / or removal interfere with sewage systems, piping, cables or other elements, the Contractor must proceed to support or protect them appropriately. The Contractor must keep all plugs, covers and sumps in the public utility systems located near the excavation sites free from waste, in order to avoid their obstruction or damage.

The Contractor will be responsible for the stability of all temporary slopes. The Contractor will also be responsible for handling surface water and for evacuating underground water or any other type of water, and for supplying and maintaining the drainage and pumping systems required to stabilize slopes and to avoid water from entering the excavations.

The excavation will have average depth of the terrain medium line of 0.40 m. plus the foundations.

1.5 Compacting the Subgrade:
In all areas that are to be built on, the subgrade resulting from the excavation work should be compacted before a start is made on filling, using self-powered equipment (excavation width greater than 2.5m.) and/or manual equipment in narrow areas, until a density is obtained which is equivalent to a deformation of not more than 2 mm. between one run and the next with the compacting equipment (in the case of self-powered equipment) and until such time as the footprints of a person weighing more than 75 kg. do not show in compacting areas.
The compacting equipment that is chosen should be approved by the on-site Embassy representative, and should be in line with the plasticity features of the material that is to be compacted. If any faults or soft points appear in the subgrade during the compacting process, these should be replaced promptly by means of excavations followed by filling with the corresponding materials, unless the fault is due, in the opinion of the on-site Embassy representative, to over-compacting and/or incorrect use of the compacting equipment, in which case the material should be replaced at the expense of the contractor.

1.6 Supply and installation of Geotextile NT 2000:
Shall be supplying and installing a geotextile layer not woven of long fiber of polypropylene with density major or equal to 160 gr/m2, type Pavco NT-2000 or equivalent approved. The minimal overlaps will be 0,60 m. except if the stripes are sewed in whose case they will be able to come down to only 0,30 m. The not woven geotextile will have to cover the whole fund of the excavation, rising for the rims of the excavated booth, and bend 2 m above the filling material in all directions.

1.7 Filling Material:
The portion of the works specified in this item includes the supply of all labor, materials, equipment, and the execution of all works needed to do the filling that the works require. The filling materials thickness will change according at foundation area for each one the works.
Before starting the filling work, the terrain to be used as a base must be completely rid of vegetation, organic soil, and construction debris and the surfaces must not have any flooded areas or areas with stagnant water. The subgrade level must be compacted before applying the layer of filling.
Filling materials will be obtained from the sources selected by the Contractor, approved by the Embassy.
At least seven (7) days before the Contractor intends to initiate the filling work, it must submit the materials sources to Embassy consideration and must present representative samples and the results of the lab assays. Supplying the samples and the assays will not result in any additional payment.
The filling materials are made of gravel materials that do not contain any organic silt, plant matter, garbage, solid waste materials or debris. The maximum size of the materials is five (5) centimeters. The fine contents (the percentage that passes through a #200 sieve) must be less than twenty percent (20%), and the material plasticity index that passes through a #40 sieve must be less than 8%. The materials for filling will be compacted in successive symmetrical layers of minimum ten (10) centimeters and maximum fifteen (15) cm. at 95% of the modified proctor. According to a soil investigation done, the filling material may be selected granular material called fine gravel from the Island (Rio Guapi). The compacting methods and equipment used must have Embassy approval.
The minimum thickness of the filling material layer to be installed is 50 cm minimum.

1.8 Concrete subfloor:
The concrete structure, metallic structure and other constructions shall be built and installed according to the standards contained in the NSR-98 code. The designs shall be reviewed by the Contractor, verifying the fulfillment of these standards. If it is found that in the design changes shall be made in order to fulfill the standards, this changes shall be taken into account when the proposal is prepared, in such a way that when the project is executed, it is built totally according to the current normatively.
This activity includes the execution of the corresponding laboratory tests as required. The Contractor shall take 6 sample cylinders for concrete resistance tests per pouring or per each 5 m3, in order to test 2 cylinders at 7 days, 2 cylinders at 28 days and leave 2 cylinders as proof samples. The results of the laboratory tests shall be given at the right time to the Embassy Representative.

Vapour Barrier. Once the fill material has been completed (gravel cushion), a steam boom ('Polisec' or similar) should be fitted over the whole area, and extra 40 cm. shall go up by the walls of excavation. Interior overlap joints should be at least 15 cm. wide, and should be fixed or sealed in place using adhesive tape or similar at least 5 cm. wide and compatible with the membrane. The steam boom itself should be in polyethylene at least 0.152 mm. (6 mils.) thick or some other equivalent material which has the same characteristics and features. The contractor should supply a representative sample and technical details of the product that is to be installed, for approval.

Concrete slab T = 12 Cms: These works include the construction (Equipment, forming, placing, leveling and smooth finished) of a 12-cm. thick concrete slab or plate, with 21 Mpa resistance; any difference of more than 3 mm. above or below this specification will be repaired by default (by finishing or passing a polishing machine), and such costs will be assumed by the Contractor. This slab must have a grid with 7.5 mm rebar, with spaces every 15 cm. on both sides the grid shall ser placed in slab center. *The slab should have joints every 2 meters*. Equally it will have to have a slope of 0.5 % towards the exterior. The dimension is indicated in each drawing.

1.9 Link beam 3000 psi concrete of 0.30x0.40 m

These works include the construction (Equipment, forming, placing, levelling and smooth finished) of a 30x40 cm. concrete beam, with 21 Mpa resistances; this beam must have a rebar as is indicated in each drawing.

1.10 Cyclopean concrete foundation:

This item consists of constructing cyclopean concrete foundation, comply the positions and dimensions stipulated on the approved structural plans for the project should be adhered to, and included is the supply of all materials, labour, facilities and equipment that might be required. The contractor will supply and install all straightedges which might be necessary for restraining and shaping the concrete, and will lay all reinforcement steel that might be needed, in accordance with the approved structural plans. 40% of rock of 15-20 cm. average size and 60% of concrete with a resistance of at least 3000 psi will be used. The entire construction process should comply with NSR-98 requirements or current standard, specifically Chapters C.1 - General Requirements, C.3 - Materials, C.4 - Durability Requirements, C.5 - Concrete Quality, Mix and Laying, C.6 - Straightedges, Embedded Pipework and Construction Joints, and C.7 - Reinforcement Details, all in accordance with Chapter C.2 - Definitions.

1.11 Reinforcement:

The reinforcement that is to be used (420 Mpa.) on the different concrete structures will be as stipulated for this type of structure in NSR-98 or current standard. In the case of the electro-welded mesh, when quoting for this, the contractor should include it in the price of the respective item required, based on the plans and recommendations by the manufacturer.

1.12 Concrete sidewalk E= 0.10 m.:

This item includes concrete sidewalks in accordance to the dimensions indicated in plan no. 1.

As minimum one is due to use concrete of 3000 PSI. The cured shall be made with white "antisol" or similar. The joints must be filled with joint sealant. Minimum thickness of 0.10m, with electro welded mesh of 6mm. The minimum depths of the excavations will be of 0.30m for the concrete slab and sidewalks. The filling can be make with filling material approved, compacted in maximum thicknesses of 15cm, until obtaining 95% of the modified proctor. A minimum 3 density by each 15 cm is due to be taken.

2. STRUCTURE

2.1 Metallic Structure:

The practice of manufacturing and set-up of metallic elements will be adjusted to the last edition of the norms about construction seismic resistant norm NSR-98, included in title F or current standard. For the manufacturing

and welding of elements that are considered as principals, only qualified personnel will be used and with adequate tools, with previous authorization.
In the event that any material or manufactured element is defective, due to bad raw material quality or bad hand labor or because any other reason and does not meet with specification requisites and/or plans and drawings, the right to rejection or demanding its correction could be demanded. Materials or elements that have been rejected or that require correction will be changed or corrected under THE CONTRACTOR´S cost.
The structure that is at sight must be perfectly finished and profiles type "C" due to use.
Metallic per files for dorsal belts and beams of the building are of thin sheets formed in hot ASTM A-1011 Grade 50 with values of Fy=35.15 Kg/mm², Fu=45.70 Kg/mm² and a minimum elongation of 20% meeting requisites demanded for allowed materials for this used and contemplated in the NSR-98 norm or current standard.
The structure shall be protected with a corrosion protection coating 3mils thick and 2 layers of finished thickness 6 mils with paint type marine.

Unless otherwise specified all work will be done in accordance with applicable part of the most recent editions of the norms indicated below, complemented with particular specifications of the contract and the ones indicted in plans and drawings.
Norms about seismic resistant constructions NSR-98 title F or current standard.
A.I.S.C. - "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings"; ASD/LRFD.
A.W.S. "American Welding Society Specifications".
A.S.T.M. "American Society for Testing and Materials".
S.S.P.C. "Steel Structures Painting Council".
ICONTEC Normas 1920, 1950, 1971 y 1985.
ANSI "American National Standard Institute"

2.2 Top beam and roof beam:
These works include the construction (Equipment, forming, placing, levelling and smooth finished) of 15x20 cm. concrete top beam, with 21 Mpa resistances and concrete roof beam of 10x15 with 21 Mpa resistances; these beams must have a rebar as is indicated in each drawing.

2.3 Reinforcement:
The reinforcement that is to be used (420 Mpa.) on the different concrete structures will be as stipulated for this type of structure in NSR-98 or current standard. In the case of the electro-welded mesh, when quoting for this, the contractor should include it in the price of the respective item required, based on the plans and recommendations by the manufacturer.

3. ROOF
3.1 Roof tiles:
The roof will be made of interconnected panels with insulation sandwich type cover with polyurethane, type **California de DINALSA** for roof or equivalent, minimum thickness of 1". Both faces should be of factory-painted galvanized sheet thickness 0.7/0.5 with a minimum of ten-year guarantee. This item includes roof paneling for the building (see plan No. A2 to A5, E3, E4) and for the sidewalk zone (see plan No. A1 to A5, E1 to E3)
All connections erections and joints should have an independent mechanical system for fixing the joint and an excellent finish. The cost of the roof shall include all joints and supporting items from the factory.
The inside of the roof shall have a good aesthetic finish, same as the interior and the roof shall have an overhang of at least 0.85 m. on two sides Axes A, B y D, F. The finish color of interior and exterior sides of the roof shall be white and approved by the COR.
The contractor must consider for the finished of the bottom part of the roof that all the ties between walls and covers shall be finished or shall include a molding to assure the good appearance of the space.

3.2 Ridge:
The contractor shall supply and install a ridge along axe C'-C' (See plans No. A2 to A5, E3, E4). The ridge shall be smooth with cap to seal the ridge and completely hermetic during rainy days.

4. MASONRY

4.1 Masonry in block:
Perimeter and internal wall that divides the kitchen' laundry of the panty will be built from floor to ceiling, as shown on the plans (See plans No. A1 to A5 y E1 to E4) for each building. These walls should be built on 39x15x19 cm. concrete block type at least 0,15 m wide, plaster on both sides with mortar 1:3 thickness 1.5 cm. minimum.
Walls will be made of the top quality materials stated under each item. Block dimensions will be uniform, with edges well finished and surfaces even (in the case of smooth blocks). Mechanical cutting of parts will be used. Walls will be built at the places shown on the plans, with both faces plaster. Joints should not be larger than 1.2 cm. or smaller than 0.7 cm. In the case of visible masonry, joints will be fluted (1 cm. deep). Any deviation from the vertical in a wall three meters high or less will be not more than 3 mm. either way. Sticking mortar in the proportion of 1:3 will be used. All masonry and stands will be painted with Pintuco 'Coraza' paint or similar, and the colour will be chosen by the contracting party.
Inside and outside walls will be painted white according to existing buildings near to the site where the modules will be built.
The cost of walls shall include all joints and structural items**. Samples should be submitted before purchasing and installing them for approval.**
This item includes a low wall 0.20m. high at each shower entrance, dividing off the front of each shower. The lateral divisions between showers should be of 1.80m height.

5. FLOOR AND WALL FINISHES

5.1 Wall tile:
The **w**all tile shall be installed in the interior bathrooms, in 30 x 30 cm. ceramic tiles EGEO type or equivalent until 1.80 m. of height on interior walls, showers walls and the upper part of the washbasin area. The cost of the tiling includes waterproof plaster, the suitable joint material for where walls and tiling meet, joint sealer plastic wines, etc. **Samples should be submitted before purchasing and installing them for approval.**

5.2 Floor tiles:
These floors will be fitted in the bath rooms, and will consist of 34x 34cm. DUROPISO type or equivalent, non-slip ceramic tiles commercial traffic 5, with the corresponding ceramic tile skirting. This item includes floor-tile join material and floor smoothed down.. **Samples should be submitted before purchasing and installing them for approval.**

5.3 Vinyl commercial floor 2 mm. :
The contractor shall install an additional low commercial traffic vinyl floor finish 'VINISOL' type at least 2 mm. thick, in squares of 30x30 cm.. The color of the flooring shall be gray.
The contractor shall apply an insulating material and/or joint item between floor and finish, so as to ensure stability and avoid the floor expanding or lifting as a result of changes in temperature. Skirting should be of PVC, 7 cm height, gray color, installed according to manufacture instructions without joints, installed in all areas, except in the bathrooms where ceramic tile will be placed. **Samples should be submitted before purchasing and installing them for approval.**

5.4 Plaster 1:4 T=1.5 cm. including edges and expansions joints.
Before preparing the plasters, the totality of the raglets for electrical, hydrosanitary, gas, telephone, tv, etc. facilities shall be made before applying the mortars; raglets shall be duly tested according to instructions set in the specifications of these chapters. Besides, walls must be cleaned free of any grease or mortar remaining from the execution of the masonry, and humidified to receive the plaster. In straight walls it is indispensable to execute

vertical master guides at maximum clearances of 2.00 M, so as to obtain perfectly coursed and adjusted mortar. After the initial setting of the master guides, the mortar shall be applied against the wall using a trowel and leveling with aluminum rulers supported on the master guides.
Once the setting has started, it shall be made thinner with wooden trowel using a mix from the same plaster to fill cracks or porosities. Thickness maximum average shall be 15 cm.. The surface must have a perfect plumb line and be completely smooth.

5.5 Three coats of vinyl shell on plaster:
3 coats of protective vinyl (Coraza type) covering, white smoke color, shall be applied on the clean and finished surface of interior plaster; the coats shall be applied in different way so as to achieve better fix. It includes the paint of window and door interior bays, plaster under plate, cutting edges, expansions and drain pipes. The contractor shall apply this paint for the whole outer surface of façade and partition walls, at the heights indicated on drawings, after that the graniplast will be installed.

5.6 Graniplast façade:
On the walls in façade shall be executed the application works of graniplast (Esgrafiado type) in the color chosen by the COR on samples submitted previously by the contractor. All surfaces are going to be painting shall be carefully cleaned with dry cloth removing dust, grease and waste, repairing gaps and chips, showing a finished completely leveled, uniform and smooth. In opinion of the COR, the finished is not satisfactory or when presenting spots or undulations, should be scraping and applied a new layer.
The Graniplast shall be applied as minimum in one layer of 2.5 mm. thickness follow to process even and tidy following the manufacture instructions; also could not be applied on wet surfaces or before the previous hand this completely dry.

6. ELECTRICAL INSTALLATIONS

Electrical Standard Scope
Any electrical installation which is done by the contractor shall comply with the following electrical standards: NTC 2050 last upgrade and chapters 1,2,3,4 and section 645,NEC 250 last upgrade, NTC 3471/UL 67, EIA/TIA 607, EIA/TIA 568-569 last upgrade, ANSI/IEEE C62.41-C62.45, NEPA 780, NTC 4552, IEEE-80, IEEE-77 and RETIE last upgrade. The bidder shall include in his proposal catalogs and technical sheets of materials, parts and elements to be used in the project. The awarded contractor shall also count with an electrical/electronics engineer, who shall manage and control the execution of the electrical and communication work, the proposed electrical/electronics engineer shall also sign the installation conformity and material conformity acts requested on RETIE. The bidder shall include in his proposal the curriculum vitae of the proposed engineer.

IMPORTANT

The required civil work for the underground raceway system shall include the costs for repairing the affected areas during the project execution (Sidewalks, pavements, green areas and concretes among others). The awarded contractor shall comply with civil and electrical Colombian Constructions standards even if the affected areas do not.

The bidder shall submit catalogs and technical spread sheets for all the materials to be used during the construction project. Lack of information and omission of such data shall consider the proposal as invalid and shall not be taken into the awarding process.

6.1 Preventive maintenance of the Middle and Low voltage system
The bidder shall quote for supply a preventive maintenance service, which shall include the following issues: supply and install metallic enclosures, painting, galvanic tapes, accessories, adapters, electrical fusibles, fuse holders, cleaning and preventive maintenance of the middle and low voltage system, which are located in the “H”

structure such as shown in the image above. The awarded contractor shall contact the local electrical company "Empresa Electrica de Guapi- EnerGuapi SA E.S.P" in order to coordinate the requested work in this technical paper.

6.2 Connectors for Low voltage (LV)

The bidder shall quote for supply and install a barrage system, which connects from the existing LV system either LV services for the battalion and the new complex to be built by the awarded contractor. This item includes the electrical LV work necessaries to intervene the existing LV main circuit, installing a barrage set for current capacity up to 500A for each phase, neutral and ground lines each one, insulation voltage up to 600V, similar or equal to 3M, reference LE-0000-0625-0, or RETIE certified, each set of four outputs for phases, neutral and ground. The bidder shall quote for supply and install a holder/organizer as well as an enclosure IP 66 for the barrage set to be provided. The issues to be provided and installed shall be approved by installation underwater and underground.

6.3 Main circuit branch

The bidder shall quote for supply and install a new main circuit branch, running form the junction box in front of the H structure, which is the current main circuit of the military base, to the new general distribution panel board, which shall be placed beside the Transmission and Monitoring Building (TMB), such as indicated in plan E1. The estimated distance between both locations is 40 meters. The bidder shall verify such distance adjusting his proposal if so. The new main circuit branch shall by a tetra-pole system THHN/THWN AWG 4XNo.1/0+ TXNo2. The bidder shall quote for supply and install a set of industrial three-pole breakers, thermo-magnetic trigger, and current protection capacity of 3X150A, which shall be installed in the new distribution panel board to be supplied and installed by the awarded vendor. The new current breaker shall be new brand such as Merlin Gerin, ABB, Siemens or equivalent RETIE certified

6.4 Underground Raceway

The bidder shall quote for building an underground raceway according to Colombian standard CS208. The bidder shall quote for supply and install two (2) pipes, four (4) inches each one, PVC EB type, new brand COLMENA or RETIE certified equivalent. The new underground raceway shall count with a safety tape as indicated by Colombian standard CS273. The segment has a length of 40 meters approximately, which runs from the structure in "H" to the new circuit panel board located in the TMB. The bidder shall verify the real distance, adjusting it in his proposal if so. The extremes of the ducts to be installed shall count with "chamber" terminals. The electrical tubes shall be sealed to avoid the entrance of animals, insects or water and it shall be done according to Colombian standard NTC 2050-305.G.

6.5 Junction boxes for main circuit branch

The bidder shall quote for supply and install one (1) new junction box Colombian standard CS274. The new box shall be placed as showed in the plan E1.

6.6 New electrical circuit board

The bidder shall quote for supply and install a new electrical panel board, which allows the electrical distribution for the proposed services on the new facilities. The new panel board shall have space for the main breaker (as requested before, 3X150A), barrages for phases, neutral and ground (copper). The phases' barrages shall be protected by an acrylic sheet o any other RETIE certified mechanism, in order to avoid direct manipulation (Dead front). The new panel board to be supplied and installed shall be in metal and it shall comply with Colombian standard NTC 3475 or US standard UL67. The new panel boar shall have a current capacity up to 400A (See capacity accordingly in NTC 3475, table 11.2), voltage isolation rate 600VAC and interruptive current capacity up to 10KA.

The awarded contractor shall install the new main breaker and the secondary circuit breaker protections for the new facilities: 2 sub-officials' dormitories, dining/leaving room, sub-official's restroom, kitchen/ laundry's room and TMB. The power capacity list for the new breakers is available in the electrical annex "Electrical calculations.xls". The new breakers shall be new brand and RETIE certified such as ABB, Siemens or Merling Gerin.

The new panel board shall count with a power meter PM210, which shall be supplied and installed by the awarded contractor.

The new panel board shall also have a TVSS unit class C, which shall comply with US standard ANSI/IEEE C62.41-C62.45, interruption capacity up to 200KA, protection modes L-L-L-N, L-G, reject filtering rated > -30dB, led indicator of status, operational voltage 208VAC/120VAC, three pole system. The unit shall be installed internally or externally. The bidder shall annex in his proposal the NEMA LS-1 format, specifying the equipment's technical sheet to be supplied.

The new panel board shall be placed into a metallic enclosure IP 66, NEMA 3R, which shall be supplied and installed by the awarded contractor. The new enclosure shall have frontal door, lock, inspection window and external signaling. This new enclosure shall be placed beside of the TMB, as it shown in plan E2.

The new enclosure shall be connected with the new junction box CS 274 by mean of PVC EB tubes and curves (adapter type "elbow"). The base of the enclosure shall have a set of poke-thru, in order to allow access of the main circuit branch as well as the distribution of the secondary circuit branches into the new panel board. The new enclosure shall have four (4) penetrations and they shall finish in PVC terminals (chamber type), four inches each one.

The new enclosure shall be made in CR BWG No 18-20 and it shall be painted with special treatment in order to support the outdoor conditions, oxidation, water and salinity of the current area. The internal spaces shall comply with the US standard IEEE-142. Colombian standard NTC 2050 and RETIE shall be considered during installation. The minimum dimensions for the new metallic enclosure are as follows: 70cm (front), 40cm (depth) and 170cm (height).

6.7 Secondary distribution panel boards cabling

The proposal shall quote for supply and install the wiring system required for each secondary panel board, which shall be located on the new facilities: 2 sub-officials' dormitories, dining/leaving room, sub-official's restroom, kitchen/laundry's room and TMB. The current capacity for the breaker is listed on the electrical annex "electrical calculations.xls". The new cabling to be used shall be type AWG THHN/THWN and their caliber are listed in the electrical annex "electrical calculations.xls"

6.8 Secondary distribution panel boards underground raceway

The bidder shall quote for supply and install the distribution piping system, which shall be made in PVC EB, such as in the plan E2. The new raceway shall comply with Colombian standard CS 208. The awarded vendor shall use the same Colombian standard even if the tube caliber is 1 ½ inches. The electrical annex "Electrical

Calculations.xls" contains the information regarding on distances and amount of tubes to be required by each new building.
The secondary electrical panel boards shall be connected to the distribution panel board by using a PVC EB embedded tube in the wall. The constructive details are depicted in plan E2, in fact this portion of the work applies to all new facilities (Except the MTB, since there is not necessary to use underground raceway due to building is just beside main panel board).

6.9 Junction boxes for secondary circuit panel boards
The bidder shall quote for supply and install three (3) new junction boxes Colombian standard CS274. The new boxes shall be placed as showed in the plan E2.

6.10 Secondary distribution panel boards
The bidder shall quote for supply and install the new secondary distribution panel boards. The new panel board shall be installed on each new facility. The units to be supplied and installed shall be single- phase type, new brand Legrand, Luminex or RETIE certified, barrages for phase, neutral and ground, insulation voltage up to 600VAC and current interruptive capacity up to 10KA. The circuit capacity for each board is depicted in annexed file "Electrical Calculations.xls". The new panel boards shall be marked according to NAS COR instructions. The plan E2 indicates the location for each of the new panel boards. This item does not include the boards in TMB.

6.11 Secondary circuit board for TMB
The bidder shall quote for supply and install the new secondary distribution panel boards, which shall be placed into the TMB. These new panel boards to be supplied and installed are placed as shown in exhibit E5. The panel board shall be three pole type, new brand Legrand, Luminex or similar RETIE certified. The new panels shall have barrage for phases, neutral and ground, insulation voltage up to 600VAC and current interruptive capacity up to 10KA.
The unregulated panel board shall connect a new essential panel board. The essential panel board and the unregulated panel board shall be connected each other by an insulated transformer 6KVA, which shall be located as indicated in exhibit E5. The new essential panel board shall have a by-pass key, to connect a new UPS 6KVA to be supplied and installed by awarded contractor. The by-pass key will allow disconnect and remove UPS device in case of being necessary. The new essential board, UPS and insulation transformer shall comply with standard NTC 2050 sections 517-160a.4, 645 and 700.

6.12 Secondary circuits cabling
The bidder shall quote for supply and install the new cabling system for each of the new circuit on the new facilities. The expected wiring shall be type THHN/THWN AWG 3XNo.12. The information regarding wire's caliber is attached in annexed file "Electrical calculations.xls". The plans E2-E5 indicate the pathways and circuit distribution to be supplied and installed by the awarded contractor.

6.13 Secondary circuit raceway
The bidder shall quote for supply and install of ¾ inch ducts PVC EB, which shall be embedded into wall as showed in the plan E2-E5 and ¾ inch ducts EMT for exposed piping installation. This raceway system shall apply to all new facilities. The new raceway shall run up to each duplex receptacle, socket, light switch, GFCI receptacle, three -pole receptacles for dryers and washer machines, air conditioning units and fans among other electrical devices specified in this paper. The raceway for secondary system shall have metallic junction boxes, 10cmX10cm each one, which shall be embedded or exposed as indicated in plans.

6.14 Raceway for MTB
The bidder shall quote for supply and install two metallic raceways, electrostatic painting and treatment for high salt density environment, metallic divisor, cold rolled sheet caliber BWG No. 18, grounded by insulated conductor type THHN/THNW AWG No. 10, which shall be screwed each meter along each raceway. Each raceway shall have dimensions of 10cmX5cm. The raceways depart from communication closet. The new raceways are located

according to plan E5-E7. The raceways are deployed in the perimeter, one over the baseboard, this raceways carries in the data and power services and the second one 10 cm above work surface, which carries in radio HF and VHF lines.

6.15 UPS 6 KVA

The bidder shall quote for supply and install of a UPS 6KVA, true online system, double conversion, three-phase, which shall have LAN port for management purposes (it shall have NIC), to be deployed in communication closet, batteries for 30 minutes under full power load. The unit shall be new brand, APC or Powerware, time of manufactured shall not be over six months (this time includes import process to Colombia). Suggested UPS brand PowerWare (Eaton) reference 9135.

6.16 Single-phase receptacle with grounding pin.

The bidder shall quote for supply and install single-phase receptacles duplex type, 120VAC/15A, white color, which shall be distributed according to plan E3. The new receptacles to be provided and installed shall be placed 40cm over the finished floor level. The new receptacle shall be marked accord to NAS-COR instructions.

6.17 GFCI receptacles 110VAC/15A

The bidder shall quote for supply and install single phase receptacles duplex type, 120VAC/15A,NEMA 5-15R, GFCI class, which shall be placed on the wet areas such as restrooms, laundry and kitchen. For outdoor areas the bidder shall quote for supply and install waterproof receptacles and its own outdoor cover. The new receptacles shall include a metallic rectangle box. The new receptacles to be installed on restroom shall be placed 20cm over the sink's surface level, and the units to be installed on the outdoor areas shall be placed 40cm over the finished floor. The new units to be used on the laundry module (washer machines) shall use a duplex receptacles NEMA 5-20R GFCI. The power receptacles to be used by dryers and washer machines shall be placed 150 cm from finished floor level.

6.18 Air Extractor

The bidder shall quote for supply and install a set of receptacles to feed the proposed air extractor to be located in the restrooms. The power output shall include piping and wiring as well as the new device, which shall be 110V appliance, 300 m3/h and 15 cm grid with protector. The new units shall be placed on the metallic windows 2.00 meters height from finished floor level. The final location is according to E8

6.19 TV outlet

The bidder shall quote for supply and install a TV drops, coaxial and male adapter type, UHF/VHF analogue antenna with 20 elements and mast (Materials for connection and adapters shall be also included into quotation), TV amplifier, signal splitter six out/ one in, junction boxes and EMT piping according to distance and location as shown in plan E11. Each new TV drop shall include the piping portion as well as the poke thru in ceiling. The piping is installing along the ceiling as shown in plan E11. Each TV line shall run up to a junction box, which shall have a signal VHF/UHF splitter. The splitter "in" port shall be directly connected into a VHF/UHF TV amplifier of 20-25dB and it shall be placed on the top of the roof and tied to the antenna's mast (2 meters). On the top of the antenna's mast, the awarded contractor shall supply and install an air terminal, Franklin type, which shall have the same technical features as depicted in the lightning protection item of this paper. Each TV drop shall be placed 220cm from finish floor level.

6.20 Three-pole point- Laundry zone

The bidder shall quote for supply and install a three-pole point for the new laundry zone; this new point will enable a future installation of a dryer machine. The new point shall include metallic box, cabling, current protection and duct as requested in the electrical annexed "Electrical Calculations.xls". The new three-phase point shall run independently from the new distribution panel board designed for all the new buildings.

6.21 Energy-Saving Lamps
The bidder shall quote for supply and install the amount of lamps as shown in Plan E4. The new lamps shall include the electrical access service point (tube type EMT ¾'' for exposed installation or PVC with same caliber if embedded installation, cabling and light switch), bulb 40Watts, appliances, and accessories for proper installation. The lamps shall be fixed to the metallic ceiling on each building.

6.22 Decorative lamp (turtle appliance)
The bidder shall quote for supply and install incandescent decorative lamps. The contractor should submit samples of different possible types of lamps that shall be fitted, so that the Embassy may select the best option. The lamps shall be placed hallways and facades, such as shown in E4. The lamps shall have an independent light switch. The lamps include the electric plug (piping, cabling and switch). The lamps' electrical ducts shall be embedded in the new building's walls. The lamps shall be placed 20cm over the doors' lintel level.

6.23 Air conditioning (AC)
The bidder shall quote for supply and install an Air Conditioning (AC) unit type mini-split, well known market brand such as York, LG. The expected cooling capacity for the unit is 18KBTU. The bidder shall also quote for supply and install and AC of 24KBTU for the TMB, same technical features as depicted previously. The units shall be type three- pole (208V). The contractor shall place the unit such as shown in plan E8. The AC unit shall be mounted the same level of current ceiling. This item shall include the price for all fixing and retention elements, accessories, electrical piping, drains and external devices (condenser) in order to warranty a well functioning. The required civil works shall be also included and quoted. The AC shall be electrically connected from the new unregulated power board. If electrical connection, suggested by the bidders, is two phases, then recalculations shall be submitted by him, adjusting materials and prices according to new needs.
The AC condenser unit shall be overlapped over circular rubber appliance, 2 ½ inches external diameter, with internal hole ½" and 2 inches thickness, this way shall warranty that condenser AC unit shall not contact the concrete on site (On green areas the awarded contractor shall built concrete pads according to specifications as stated in chapters Preliminaries and Concretes), the unit is placed over a concrete pad. The expected location is showed in plan E5. The bidder shall quote for a total of four units: 2 units for sub-official's dormitories, one for dining/leaving room and one for the infants' dormitory

6.24 AC circuit branch
The bidder shall quote for supply and install a three-pole circuit branch for each AC unit. This work shall include duct installation and cabling such as requested in electrical annex "Electrical Calculations.xls". The new circuit branches shall run independently from the complex's distribution panel board, ending in a three-pole breaker 3X30A (thermo-magnetic trigger). The AA circuit branches are independent from the single-pole panel board of each new building. This also includes the condenser unit. The bidder shall quote for supply and install a box with current protection, just for those areas when AA units are designed to be placed. Running form the new box, the awarded contractor shall connect the secondary circuits for the AC units, according to the manufacturer's instructions. The submitted proposal shall include the price of the requested boxes, breakers, rectangular boxes, ducts, cabling and elements for proper installation of the new AC units. In case of bidder may have an alternative system , for example an AC two-pole system, he shall recalculate and adjust the electrical designs accordingly.

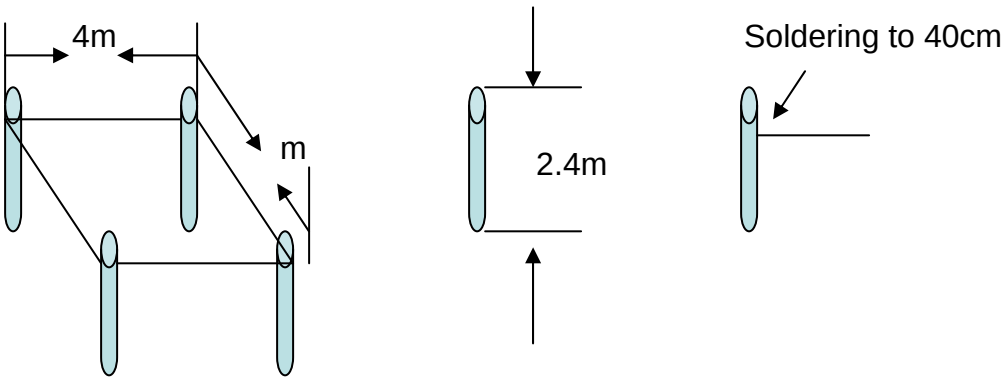
6.25 Grounding system
The bidder shall quote for supply and install a new grounding system as requested as follows. The new panel board shall count with its own grounding barrage and also with a master grounding barrage. The electrical network shall be grounded into a new grounding system, with impedance lower than two (2) Ohms. The new Master barrage shall connect the grounding line that runs from the power substation, the grounding line from the new distribution panel board and the grounding lines which are running to each of the new buildings.
The new master grounding bar shall be made in copper electro-tinned with 15mm of thickness, 20 cm length and 7 cm width. The new master grounding bar shall be placed into a metallic enclosure, which shall be embedded in wall. The new metallic enclosure shall be IP 54 and shall have door and lock. The minimum dimensions are as

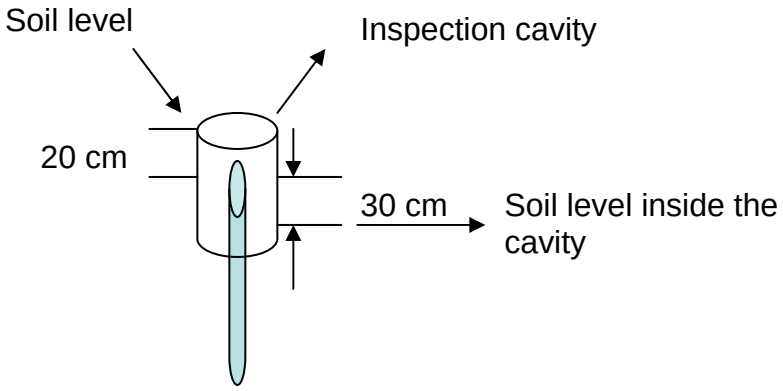
follows: 30cm length, 15 cm height and 10 cm depth. The new grounding enclosure and the main panel board are communicated each other by using two pipes PVC 4 inch each one, which shall be installed underground. The piping installation shall include "bell" terminals at the end of each side. The grounding lines shall be marked, including names of each circuit.
The grounding system shall be composed by four electrodes and forming a square figure. Every electrode shall be separated 3 meters each others. Each electrode shall include its own inspection concrete box and it shall have a concrete cover and a free space between the visible end and the land of at least 30cms.
In case that current soil conditions do not allow obtaining the required impedance value as requested in this technical paper, the bidder shall conduct a grounding analysis in order to diagnose the type of soil treatment for being used to improve the expected value of impedance. The awarded contractor shall certify the system by the following sheet:

Impedance value according to IEE 142-4.1.2
Electrodes material NEC 250-52-c (2)
Electrodes size and diameter NEC 250-52-c (3)
Electrodes separation NEC 250-56
Connection quality NEC 250-70
Conductor's gauge network NEC 250-50 (d)
Conductor's gauge for grounding NEC 250-66C
Conductor qualities NEC 250-50
Low power interconnection NEC 250-68
Electrodes accessibility NEC 250-68
Grounding barrage EI/TIA 607-5.4
Flowing current IEEE 1100 table 4.3

The electrodes shall be caliber 5/8'', 2.44 length, copper 99%. The grounding line shall be made in copper AWG #1/0. The plan E7 depicts grounding installation.

Note: The electrodes' inspection cavities shall contain a soil treatment such as Favigel or Hidrosolta, in order to improve soil conductivity and homogeneity features.





6.26 Grounding system for secondary panel boards

The new secondary circuit boards shall be grounded by a line that shall run from the main distribution panel board to be installed and provided by the awarded contractor. The secondary panel board shall be connected to a master grounding bar, which shall receive all grounding lines; in fact this one shall be provided and installed by the awarded contractor. The new barrage shall be made in copper, electro tinned and shall include holes, which shall be distanced each one as per NEMA standard. The new barrage shall be placed into a grounding box and it shall have door and electrical isolators. The new grounding barrage shall have the following dimensions: 2.5 cm width, 10 cm length and 6mm thickness. This kind of barrage shall be placed on each new building. The bidder shall also quote for supply and install a new grounding system composed by one grounding electrode, such new grounding system shall be built on each new module. The electrodes shall be made in copper 99%, caliber 5/8'' and 2.44 m length. The plan E9 depicts grounding installation.

Note: The electrodes' inspection cavities shall contain a soil treatment such as Favigel or Hidrosolta, in order to improve soil conductivity and homogeneity features.

6.27 Lightning protection

Due to current conditions on the area, construction type, surrounding constructions and forest and the amount of users, which shall inhabit and work on the new buildings, the risk analysis concludes that expected risk factor is rated as 70; in fact such value is considered as HIGH RISK according to Colombian standard NTC 4552. The bidder shall quote for supply and install a new lightning protection system, which shall be composed by four solid electrodes in copper 99.9%, Franklin type, 0,5 m length and caliber 16 mm. The system shall also have two downpipes, which are done in copper lines AWG No.2. The lightning system shall be installed on each new building. The copper ring shall run on the roof and shall be held by RETIE certified terminals HLC HX 5/16'' X

2 ¼ ’’ and GAR Burndy 1626. The electrodes shall be rigidly placed on the roof by a threaded terminal. The plan E10 depicts lightning distribution.

6.28 Telephone drops

The bidder shall quote for supply and install telephone drops, which shall run along the Dining/Leaving Module. The system shall count with embedded raceway through the walls and it shall be done in duct PVC caliber ½ ’’. The system shall have three telephone drops; in fact, each one shall include wiring, RJ11 port and rectangle box. The internal telephone lines shall finish on a telephone strip rule S110 for 10 pairs capacity. The telephone strip rule shall be placed into a metallic box such as showed in plan E11.

6.29 Data drops

The bidder shall quote for supply and install seven (7) duplex data drop, ANSI/TIA/EIA 568-B.2-1 CAT 6, which shall be certified according to stated standard. The data drops are located as shown in plan E6. Each data access point shall have jack connector, wiring, faceplate and marking icon, marking rings to identify both ends of the data drop. The bidder shall quote for supply fourteen patch cords seven feet each one (for work place) and fourteen patch cords five feet each one (Telecommunication closet administration). The bidder shall quote well known trades such as AMP, Siemon or Panduit. The wiring certification shall be done by using a cabling network analyzer, which shall have a calibration certificate issued with no more than six months. The data drops shall be installed into the raceway that runs over the level of the baseboard.

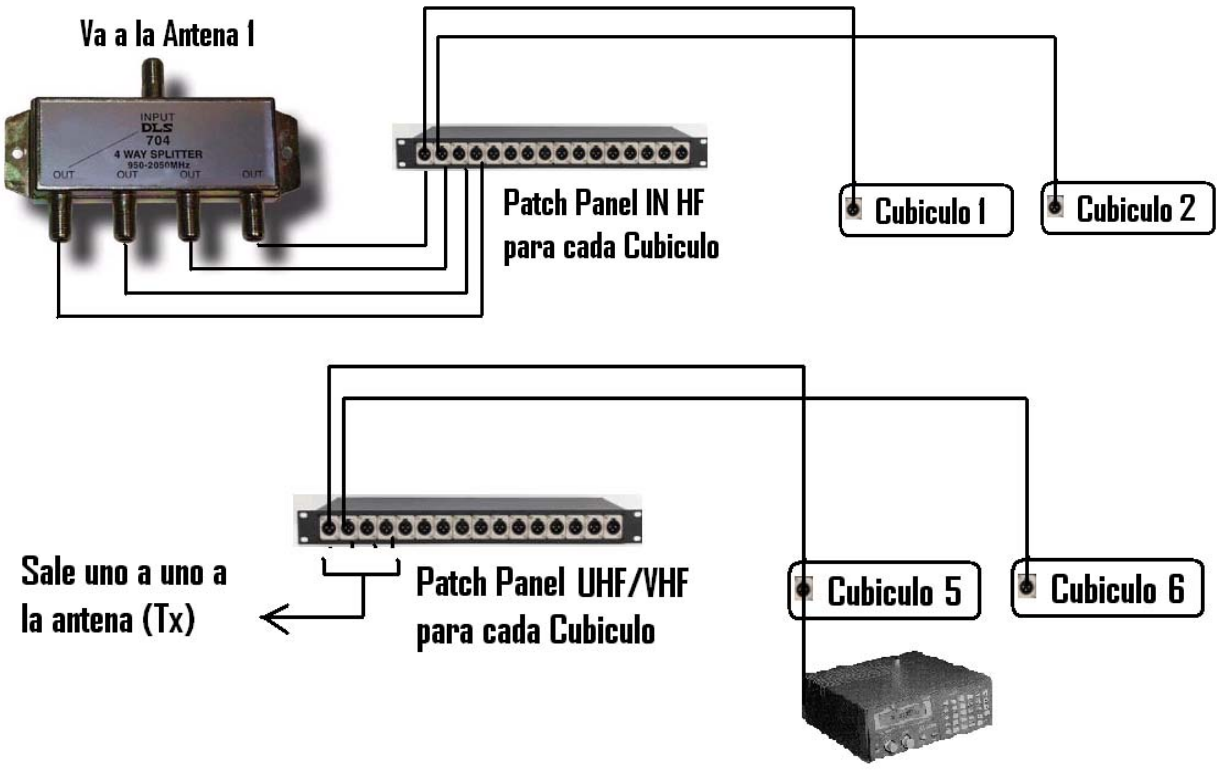
6.30 Telecommunication closet (TC)

The bidder shall quote for supply and install a telecommunication closet of 81 inches height. The new TC shall be metallic, painted with electrostatic painting, built in cold rolled caliber BWG No. 16. The new TC shall have door with lock and ventilation mesh as well as two fans on top. The TC shall have a grounding barrage; taking into account that TC’s grounding bar is connected with master barrage by using an insulated conductor THHN/THWN AWG No. 8 and connecting both metallic raceways by using an insulated conductor THH/THWN AWG No. 10. The TC shall have a power strip, which shall have the following features: TVS class A, current interruption of 12KA, EMI/RFI filter, 5 duplex outputs 120VAC/15A, manufactured by well know vendor and RETIE certified.
The TC shall be divided in three parts, the first one, shall be used for data purposes and it shall have one patch panel 24 ports UTP, CAT 6 ANSI/TIA/EIA-568-B.2-1 certified and horizontal and vertical wiring organizers. The second part shall be used for radio purposes and it shall have two patch panels, the first one for 24 PL259 ports (HF) and the second one for ten “N” ports (VHF/UHF). RF cabling shall be place on top of the TC, Data cabling shall be placed in the middle of the TC and the UPS unit shall be placed in the bottom of the TC. TC distribution is shown as following image.

6.31 RF drops

The bidder shall quote for supply and install a distribution RF network. The annexed plan E8 shows the required distribution of the RF drops. A total of 24 single ports for HF and six single ports for VHF/UHF are required in this project. Both systems shall run through metallic raceway located above surface work. Both HF and VHF/UHF are canalized into the same raceway but they cannot be mixed each other. The HF ports shall finish in coaxial terminal PL259 and the ports for VHF/UHF shall finish in coaxial terminal N. The awarded contractor shall provide 24 coaxial patch cord with terminals PL259 (Male/Female) and six coaxial patch cords with terminals N (Male/Female). For HF cabling the awarded contractor shall use RG259 and RG59 for VHF/UHF. The connection point to HF antennas shall count with signal splitters1in-4out, which shall be supplied and installed by the awarded contractor. Connection diagram is shown below (Each HF antenna is replicated in four cubicles or work surfaces, for a total of four HF antennas, therefore each operator will be able to select any of the four radios in any of the four desks). For VHF/UHF radio, the system works with six independent radios. Note: There is capacity up to six cubicles but only four cubicles shall have radio connection at once. Only one VHF/UHF radio is available per port.

The cabling entrance point shall consist of two junction boxes, metallic, NEMA 3R, 30cmX30cmX30cm, which shall connect the TC by means of galvanized 2 inch pipe. The new junction boxes to be supplied and installed shall have inspection door. Each box shall have incoming duct, connecting the roof in order to receive aerial cabling (UH, VHF, UHF). Connection diagram is shown in plan E7. The junction boxes are left at finish floor level. Accessories for installation shall be included in bid.



Note: Texts are intentionally left in Spanish.

6.32 Marking codes

The texts and fonts to be used in the project shall be submitted by the awarded contractor, in order to get the COR-NAS's approval.

6.33 Main circuit branch cabling
The wiring to be used for phases shall be labeled by colors tapes in yellow, blue and red. Neutral colored in white and grounding in green. The main circuit branch shall be labeled by using solid plastic marks, size 10cmX5cm, fonts in white and background in black. The font size is selected on site. The new labels shall be placed on the new junction boxes.

6.34 Secondary branch cabling
For cabling gauge bigger than (AWG No4, 2, 1/0, etc) or equal to AWG No. 6, the contractor shall observe the same protocol depicted in the previous item. For cabling gauge such as AWB No. 8, 10 and 12, the contractor shall use colored cabling in red, yellow and blue for each phase (not repeating each others) neutral in white and ground in green. The secondary circuits shall have plastic moorings, holding the cabling every 1.5 meters. The secondary branches shall be labeled by solid plastic marks, size 10cmX5cm , fonts in white and background in black. The font size is selected on site. The new labels shall be placed on the new junction boxes

6.35 Indoor buildings cabling
The contractor shall use colored cabling in red, yellow and blue for each phase (not repeating each others) neutral in white and ground in green. The contractor shall install solid plastic marks on faceplates/ The marks shall have the following dimensions 3cmX1cm, fonts colored in white and background colored in black.

6.36 Emergency power system

Generalities
The bidder shall quote for supply and install a new power generator system, not older than one year of construction. The plant will supply energy of 220/127 volts, PRIME service. This will be transported to the commuter of automatic transference. All electrical plant components, as well as the accessories equipment must be new and of a recognized commercial brand with a stay in shop and production less than one year. The electrical plant must be manufactured in accordance with the specific requites of the norms ASA, ASTM, NEMA, SAE or DIN.

Description of Emergency Power System
The Emergency Power System (EPS) shall be conformed by a Diesel engine attached directly to an electrical generator, through semi-flexible coupling of steel disc, including controls and protection equipment. This generator shall be designed for supplying a three phase system with four lines, 220 /127 Volt, 60 Hz and shall supply an effective power up to 65 KVA at Guapi (Valle), Colombia

Service Condition
The EPS shall be installed in Guapi (Valle) with an average temperature of 28 degrees Celsius. It will be located in an outdoor area. The bidder shall quote the installation of the sound isolated cabin for reducing the engine noise during operation.

Grounding
Canalization, electrical wiring and control between the electrical plant and the automatic transference panel shall be provided by the contractor, making use of the local infrastructure. All required civil works like masonry and concretes shall be included in the global price if required. The bidder is responsible to specify: Characteristic of the exhaust duct and Characteristic of the intake and outtake air duct. The EPS supplier shall be in charge of the supply and set-up of: Cabin of sound isolation– isolated, automatic starter / coordinated with transfer panel, Motor-Generator, Fuel tank, Batteries, Battery charger, coupling for air intake grids, Muffler and exhaust pipes. To connect and assemble motor-generator, fuel tank, and ground connections supplied. If the motor-generator set-up is going to be over an anti-vibration base, he shall supply shock absorbers and bases for them.

Equipment Characteristics

Generator

The Generator shall be synchronized, 4 poles, without brushes, with a capacity of 65KVA effective for the Guapi(Valle) and it will function on premium. A power factor of 0.80 frequency 60 Hz, three phases, 4 treads to work with tension of voltage service at full capacity of 220 Volts. Velocity of 1.800 RPM. The rotor must be dynamically balanced with a system of one or 2 cushions and flexible coupling to the motor. The output must be three passed with complete wave rectification and components in solid state. It shall be of static type, mounted over a common axle of rotor and of easy access for maintenance and inspection. The voltage regulation required is lower than +2.0% of normal voltage variation of charge range. The instant voltage dropping must not be greater than 2.5 % when full charge of 0.80 factor of potency is applied. The alternator shall allow a voltage recuperation in a time lapse no greater than 2 seconds, after an abrupt change in load, between 25% and 100% of the capacity of the alternator has occurred, it will have a rheostat to adjust the necessary adjustments (+5%). The alternator cooling will be done by a centrifugal fan low noise and gives necessary cooling for the rotor and with starter. The alternator isolation will be NEMA, class H (tropic type), by epoxy resin that gives adequate protection from the local environment and abrasion. The alternator must supply, without overheating, an auxiliary capacity of 100% of its nominal capacity with a power factor of 0.80. Connection box shall be set for 4 cables. (3 phases and neutral) and 12 terminals.

Diesel Engine

The Engine shall be Diesel, turbocharged, cold start, 4 stages, line cylinders or shape type V, normal operation velocity up to 1800 RPM, with the necessary characteristics and capacity to impulse the generator under the established conditions of functioning. It will have an automatic regulation system during operation; the vendor shall include a metallic base with anchoring bolts for engine and generator as a whole. Output potency will not be greater than 1.5 BHP/KW at 1800 RPM and to the conditions established for operation.

Fuel System

The fuel to be used for proper operation under climate conditions shall be Diesel fuel oil made in Colombia. The engine shall be in operation capacity during long periods of time with low loads so it must have necessary elements to prevent carbon build up. Each cylinder must have its own fuel injector controlled by a governor, injection valve and replaceable filters. It is also acceptable the system of a common fuel injector. The supplier shall include a tank that allows feeding to the injector by gravity if engine base tank has not the capacity to provide up to 8 working hours support. The contractor shall provide the location, connection works and support structure in accordance with manufacturer recommendations and local facilities. This fuel tank shall be equipped with:

Automatic floating device that controls fuel supply
Will have a plug to empty the tank
Breather
Top lid for fuel intake
Register valve for machine fuel intake
Supply the flexible coupling in 3/8” cooper pipe to connect the plant supplied
Shall have a measuring stick for level control

Lubrication System

Engine lubrication shall be “forced type” by a pump with positive displacement that allows lubrication on all movable parts with a total flow filter that can be replaced. Lubrication system shall have a cooling system by means of level indicator.

Velocity Regulator
The engine will be equipped by a velocity regulator of totally closed construction, with self lubricating system, able to control velocity with a 5% precision in all the range of maximum charge. It shall interrupt fuel supply when the machine reaches high velocity limit guaranteed by manufacturer.

Cooling System
The engine shall have a cooling system by water with enough capacity to maintain an adequate temperature of the engine functions at full load. It is equipped with a water re-circulating pump, centrifugal type and thermostatic valve. The water cooling system shall be done by a radiator. The vendor shall supply the cooling system with all elements required for its optimum performance such as: Pumps, valves, solenoids. thermostat and all required accessories.

Air Supply
Air supply to the engine shall have 1 or more filters dry type and replicable element. The manufacturer shall supply all elements such as: hoses, support and inlets to be incrusted in the wall to leave it outside of the cabin.

Exhaust System
The vendor shall design, built and set-up a complete system for the evaluation of exhaust gases from the plant. An escape ducts system shall be done in accordance of the size, so back pressure over the exhaust system shall not go back, allowing the engine to produce maximum capacity required for its proper performance. Taking into account the plant operation, noise could be high and annoyance; the system shall have a muffler of noise absorption type for critical use, with flexible metal hose to facilitate installation. All piping and ducts that are within reach, shall be covered with a glass fibre blanket or covering with aluminium foil.

Starting System

The engine must be equipped with an electric star-up system, with enough capacity to accelerate the engine up to a velocity, which shall allow the engine to start under stipulated conditions for the place of operation of the plant. The electrical engine shall be fed by batteries and it shall have a solenoid for start-up and a clutch BENDIX type or equivalent

Protection System
The engine shall be equipped with automatic controls with alarm indicators (audible and visual) so the engine stops in each of the following failures:
Low oil lubrication pressure
High water temperature
Engine over velocity limits
Automatic shut-off by lack of fuel
Overcharge

Instrument Panel
The following elements shall be installed in the panel to control the engine:
Lubrication pressure manometer gauge
Thermometer for cooling water temperature
Amp meter for battery charge
Start-up button and stop button for the engine
Protection elements mentioned above
Engine work time register

Battery Equipment
The vendor shall supply an appropriate battery system with enough capacity that allows the start-up of the engine for a period of 2 minutes. The battery equipment shall be supplied with an automatic charger semiconductor rectified type with the capacity to supply continuous charge to the batteries plus a 25% and must allow that the batteries take energy from the normal intake as the emergency intake. Compensation shall allow variations in feeding tension of + 10% over the voltage of 120 volts and frequency variations of + 5% over the nominal value of 60 cycles. The charger will have: A volt-meter, automatic switch, switch selector of indicating lights for low charge and fast charge as web ground indication. Batteries are rectifier will be completely supplied with supports for batteries, connection cables, terminals and other necessary elements.

Starting and Topping Control
With the plant a panel will be supplied for the start-up operation and shut-off of the plant, this panel must include:
A device that when receiving the stop signal of flow of normal energy, will give an adequate series of start-up cycles and stop cycles and that as son as the motor starts, it stops feeding to the battery circuit.
A switch, 4 position selector
Manual: Where automation is eliminated and allows the manual start-up of the plant
Stopping (shut – off): When automation is eliminated of the start-up system
Automatic: Where is disconnected the sequence of automatic operation
Test: Where a fault is simulated in the energy supply and allows to start-up generator

Sound Isolated Cabin
The cabin shall be of modular type, self supported and anchored to the floor, made with metallic panels with isolation treatment and of dissemble type. The cabin's parts shall allow an easy assembling and disassembling, lateral access doors and small windows to allow observation from outside of the controls. Panels shall be made in Cold Rolled sheet caliber No. 14 with a surface finish in weather resistant paint. In the panel interior the acoustic treatment will be improved with noise absorbing material (mineral wool or equivalent) held, and made rigid with a mesh or metallic supports. Cold air entrance will be by generators side and will be a blind with a structure allowing noise reduction. The air exit in front of the radiator will be noise reducing in panels against current adequately dimensioned.

Electronic Transfer cell
The vendor shall provide the electronic cell which shall allow the system to star-up the plant under automatic and manual conditions. The system shall have a digital panel for programming all related events for provide an adequate system star-up. The electronic programmable interface allows the user to set-up over and under voltage parameters, respond time for star-up, shut down and recovery of the electrical engine system. The system shall provide mechanic and electrical protection. The system shall use motorized contactors and current protection is based on required power system (10KVA + 10%). The electronic transfer shall be installed inside of a metallic cell; the panels shall be made in Cold Rolled sheet caliber No. 14 with surface finish in weather resistant and electrostatic paint. All parts and components (wiring, contactors and electronics panels and controls) shall be done by a well know brand. The manufacturing date shall not be superior to six (6) months

General notes
Tests
Before the equipment is installed, the manufacturer shall supply 2 copies of test protocol indicating obtained data from a test done by the manufacturer of the motor-generator, during a period of 45 minutes with a 100% load in continuous form. The vendor shall have into account the visit of the COR to perform the tests, shall supply all necessary equipment for this test (such as testing banks, cabling and accessories) and the availability of an engineer expert on the matter and able to respond inquiries during the performance of the tests in the contractors

installations. Tests shall be done in Bogota DC. Before accepting the installation, the equipment shall be tested at full load during a period of 12 hours to demonstrate that it functions in automatic start-up and supporting / with standing total load in the place of operation. Temperatures of the generator bobbin must be measured with adequate equipment. All parts and equipment required for this task, such as testing bank, shall be certified and shall have a recent calibration certificate (No more than a year). For the noise condition, it is considered enough to be guarantee is 65 db at two (2) meters away from the radiator.

Installation
The vendor shall be in charge, under his responsibility of plant installation described above meeting all, descriptions, specifications and manufacturer's equipment plans.

Maintenance Manual
The vendor shall release with the equipment 2 copies (photocopies) of all plans corresponding to systems of construction for masonry, electrical and mechanical of the motor-generator and transfer cell. In the same way, two 2 hard covered copies of manual of operation shall be given with the equipment including: Brand, model and serial number of all elements and accessories that conform the EPS, detailed instructions about the handling and maintenance of all device, as well as technical manual of service, operating curves, space parts list and all adequate information for preventive maintenance as oils, grease and others that must be used for lubrication and time tables for it.

Marking
The electrical works shall be marked by means by labels, directories and electrical plans shall be placed on site. The vendor shall provide a fire extinguisher according with NFPA regulations, type ABC, including signaling icon and wall marks. Once the vendor finishes the works, then he shall provide AS-built plans including electrical diagrams, wiring gauges, pathways. Technical information from each installed device shall be included.

Warranties
The vendor shall provide three on-site visits during warranty time (one year).

Grounding lines' labeling
The grounding lines which are running from the main distribution panel board shall be marked. These marks shall be done in solid plastic, 5cmX3cm, fonts colored in red and background colored in yellow.

Panel board labeling
The main distribution panel board, the breaker on the substation's main panel board, the new distribution panel board for each module (building) and their breakers shall be marked. All marks shall be done in solid plastic, fonts colored in white and background colored in black. The following dimensions are expected:

10cmX5cm, for the main distribution panel board
5cmX3cm, for each distribution panel board
5cmX3cm, breaker on the substation; main panel board

All panel boards shall have their own single diagram, load diagram and all circuits shall be labeled.

Junction boxes labeling
The new CS274 junction boxes shall be marked by using a metallic mark, size 10cmX10cm and low relief. The inspection cavities for the grounding system shall also be marked by using a metallic mark, size 5cmX5cm and low relief.

Metallic enclosures

All metallic enclosures shall be labeled by using solid plastic marks, fonts colored in white and background colored in black. The contractor shall also use safety signaling for the panel boards' doors.

7. HYDROSANITARY FACILITIES

7.1 Hydraulic installations

This includes all facilities inside the bathrooms, kitchen, plus the outside connection point for linking to the water connection for each building, and the respective stop cock. The hydraulic connection for the modules should be connected to this existing system. It includes PVC RDE 21 piping, excavation, backfill, covers, hydraulic tests, etc. The main connection distance will be 30 meters. (See Plan No. HS1 to HS4).

In the bathroom area, one stop cock should be installed for each washbasin section, another one for the toilets, another for the urinals, and a further one for the showers. These hydraulic installations will be quoted by hydraulic points to toilets, washbasin, urinals and showers.

For effects of this project contractor should quote the connection using PVC 1" pipe from the line of pressure that will crosses in front of the new Buildings until each module.

7.2 Sanitary facilities

Plan No. HS2 a HS4 - System of hidrosanitary Networks – indicates the location of the main sewer network of the modules. This item includes drains from washbasins, urinals, showers and toilets, and pipework leading to an outside collection box (the necessary boxes are included). The boxes, with their respective covers, will be located as near as possible outside, and the connection will be made from these to the outside sewage drainage line from the Base until existing box. Each box will be made of concrete with its respective handle and cover.

The stipulated diameters are 3" for washbasins, floor drains and urinals, and 4" for toilets. Drains include grilles (with sosco) and they should be fitted in the centre of each bathroom block area. Pipework should be fitted previously inside the walls.

The outputs for reventilation should have a grid PVC 20 x 20 cm.

Installation for the gas supply.

The Contractor shall supply and install a Liquid Petroleum Gas (LPG) system for the kitchen. The required work shall include the gas tanks; feed pipe system work to the gas cookers, from the corresponding points where the gas cylinders will be located.

The cylinders storage area shall be located at the exterior corner of the panty in the kitchen block.

This item includes two (2) cylinder tanks of 100 pounds capacity each one , and equipped with a pressure regulator having a pressure relief valve.

8. SANITARY FITTINGS

The sanitary fittings that are shown on Plan No. A1, HS3, HS4 be fitted:

- Continuous washbasins made of reinforced plastic, synthetic marble or similar, with washbasin integrated and institutional resistant faucets. It must count on a wall protection (Salpicadero) of minimum 0.10m height, front cover (Babero) of minimum 0.20 m. height and all necessary supports to ensure a good attachment to the wall.
- Institutional-type toilets (with section cover)
- Institutional urinals with the corresponding taps.
- Shower faucets of wall (with hot and cold water), resistant.
- One ceramic soap dish in each shower
- Small ceramic soap dish for each washbasin.
- Metal towel hooks for each shower.
- Metal hooks on toilet doors for hanging objects on.

- Sink in masonry, waterproof plaster, totally with wall tiles and dimensions of 0.90 m length and 0.70 m. width. The sink shall be made on site in concrete with electro welded mesh and texture with slots. Includes water tank, faucet and grill with sosco.

9. METAL CARPENTRY

9.1 Door and doorframe (P1).

Supply and installation of a door and doorframe (wall wide) of cold rolled sheet, gage 18, panel type, both faces plain, thickness = 0.04 M, Schlage Orbit matte chromo lock for entrance, 4 hinges and stops. It includes two (2) coats of rust-resistant and weatherproof enamel, gray color. The door shall be 2.00 m height; width shall be 0.90 m and the left or right opening, according to the corresponding space. The doorframe shall be mounted when the respective masonry is being carried out. The void of it shall be filled with 3000 PSI concrete in order to the frame become bordered and rigid.

9.2 Windows (V-1)

Windows will be fitted as shown on Plans Nos. A1-A5. Frames will be of natural aluminum, in which natural glass 4 mm. thick will be fitted. The windows will be of the sliding type, with handle and mosquito netting well-fitted and also shall include the windowsill with its dropper in aluminum. Each window shall be of the following minimum dimensions: 0.90 m wide and 1.80 m. height and must be installed to 1.10 m. from the finished floor; in order to give space to the installation of the air conditioning units in an overall height of 2.30m.
The windows of the baths must have two lateral modules in metallic blind, each one of 0.80m of length and in the central part natural glass. It must have a height of 0.60m and be installed to 1.70m from the floor.

9.3 Louver-type aluminium grill and frame with mosquito netting (R-1)

Consist of louver- type color matte natural aluminum. It shall be built according to dimensions indicated on the drawing, profile ALN 315 with frame in balance profile in aluminum heavy duty type series M-3831 matte natural color. It includes all fixtures required for perfect functioning and fiberglass screen.
For modules that have air conditioning the angeo will be replaced by glass 4 mm.

9.4 Windows (R-2)

The bathrooms windows and some of dormitories shall have two lateral modules in metallic blinds each one 0.50 m in length and the central module in glass; also shall have a height of 0.60 m and to be installed to 2.30 m on the floor.

9.5 Bathroom divisions

Bathroom divisions should be fitted, with doors to toilets and showers.

- Toilet divisions will be of cantilever in stainless steel, SOCODA type or equivalent. The divisions will be 1.60m. high separated 0.20m from floor for a total height of 1.80m and include door with bolt. The doors should open inwards (see Plan No. A1).
- Shower doors will consist of strong aluminium profiles of minimum 2” wide and acrylic sheets at least 5 mm thick. The doors should have a horizontal bar, dividing the acrylic surface into two sections for greater stability and serving as a towel holder to the external part.
- The divisions will be 1.60 m high plus a border of 0.20 m, and there should be a base to separate each shower in front. These divisions include door with bolt. The doors should open inwards.

9.5 Hardware

The outer door should have altogether a simple knob lock with key on the outside and button inside and bolt, main door Schlage Orbit type H-Orbit ref. 380 or equivalent, color matte chromo for entrance with 3 keys set.

10. GLASES AND MIRRORS

10.1 Glass mirror, plain and polished edge t= 4 mm

Supply and installation of glass mirror with plain and polished edge, thickness = 4 mm. It shall be fixed to the wall by applying tape and silicone. As far as possible, complete sheets shall be used in order to prevent breakage of it that would affect the bathroom aesthetics. The mirror shall be 1.00 m high and the same length of the washbasin.

10.2 Glasses

This item includes the supply and installation of a rough glass of 4 mm. of thickness, in excellent conditions It including all fixtures required for perfect functioning.

11. MISCELANEOUS

11.1 Stainless steel wash-hand basins (including big table) and furniture

Supply and installation of a stainless steel wash-hand basin, gage 14, embedding system, perfectly finished on the kitchen table with measures 4.9 x 0.60 m.

The contractor shall supply and install post-formed Formica fitted kitchen furniture, white colour, with stainless steel worktop. This worktop shall include the corresponding holes for the one sink, with high cold water mixer taps, and water drainage area at the side.

The furniture shall have doors and the corresponding upper drawers with interior shelf.

The doors and drawers of the fitted kitchen furniture shall have a stainless steel handle, to make them easier to open.

The fitted kitchen furniture shall have its base in formic.

11.2 Supply and installation of a gas stove.

The contractor shall provide and install a stove gas type domestic overlap with four (4) burners for propane in stainless steel. The stove shall be type HACEB - CUB AREZZO CG 60 stainless EE or equivalent.

11.3 Supply and installation of a extractor hood.

The contractor shall supply and install an extractor hood in stainless steel, with an electric motor for extraction of smells of three speeds. The extractor includes the necessary bindings and electrical installations and switches so that the extractor hood is operating correctly. Also shall include the corresponding greaseproof filter with activated carbon and its lamp. The extractor hood shall be of the type HACEB - ASSENTO CR 60 stainless steel or equivalent.

12. EXTERIRO HYDROSANITARY WORKS

This chapter includes the work required to build hydraulic system that connected modules and the main connection to evacuate the sewage of each module as shown in the plans.

12.1Hydraulic main connection

The contractor shall build network of drinking water from the existing system aqueduct of the base to the area where the buildings were located and make the respective connection for each one. The hydraulic connection for the modules should be connected to this existing system. It includes PVC RDE 21 piping, excavation, backfill, covers, hydraulic tests, 2 valves with its box, etc. The main connection distance will be 3.0 meters. (See Plan No. T1, HS1).

12.2 Sewer main connection

The contractor shall build sewer network from the modules to be built to the inspection box located in front of the existing septic tank. The sewer connection should be Novafort pipe type or equivalent diameter 4 inches and it includes piping, excavation, backfill, covers, hydraulic tests, etc. The main connection distance will be 18 meters. (See Plan No. T1, HS2).

12.3 Hidrosanitary collection boxes.
These boxes shall be in "tolete" masonry or cement block, integrally waterproofed plastered, with cover in reinforced concrete with retractable handle. The boxes that are not confined in sidewalks or concrete slabs shall include an anchoraging border in reinforced concrete of minimum 0.10m, to avoid that the cover damages. This item includes 1.00x 1.00 m. (internal measurements) to each building. (See plan No. T1, HS4).

12.4 Piping.
The pipe to be used is of 4" PVC sanitary NOVAFORT type.
The installation of the pipe will have to be executed with the verification of the relocation of the levels -bottom of the ditch and upper level of the pipe. Plastic Band indicating sanitary pipe shall be installed to a depth of 30 cm.

The contractor, who is awarded the contract, shall submit construction plans of the each building before assembling it, including structural, hidrosanitary, and electrical plans.

DIAGRAMMATIC PLANS ARE ATTACHED, WHICH SHOULD BE RECTIFIED IN ORDER TO ADAPT THEM TO THE MEASUREMENTS OF THE SYSTEM. ALL MATERIAL AND COLOURS HAVE TO BE APPROVED BY NAS BEFORE ITS PURCHASE AND INSTALLATION.

The plans listed below are attached.

1. General site plan and location
2. Architectural
3. Structural
4. Hydrosanitaries
5. Electricals