CONSTRUCTION OF KENNELS
FOR THE ANTINARCOTICS POLICE UNIT
IN PUERTO BOLIVAR- ECUADOR

GENERAL DESCRIPTION

The project shall be conducted according to the plans and specifications detailed in this document. It is located in the Antinarcotics Police Unit of Puerto Bolivar, El Oro province, Ecuador.

The purpose of the contract is to build eight kennels for the Antinarcotics Police Unit according to the following work:

- Construction of ten kennels according to the architectural drawings A001 and A002 and to the structural drawings E001 and E002. Contractor shall construct the kennels with metallic structure and thermal and acoustic roof. Also, the Contractor shall verify the existing soil in order to confirm the foundation type to guarantee the structure's stability, for this purpose contractor shall present a soil survey and the structural recommendations. If these recommendations determine that it is needed to develop a new design or improve the foundation's design established in the drawings and specifications deliver in this contract, Contractor shall develop the design and request the approval of the Contracting Officer (CO) according to the process determine for contract modifications.

- Construction of the potable water system for the kennels. The water connection shall be from the existing water supply service. The Contractor shall include all the accessories needed to connect the kennels to the existing water system. Following the specifications that are stated in the project and according to drawing I001, the constructor shall provide, place, connect, fix and test in the site all the pipes, accessories and special items, as well as the required valves, which all together will serve to conduct potable water from the main connection to the different points of the building.

  The system shall follow the regulations of the Ecuadorian Construction Code, the American Water Works Association (AWWA), and the National Standard Plumbing Code (NSPC).

  The Contractor shall repair any areas damaged in performing this work**.**

- Construction of the sewage and rain water system for kennels according to drawing I001 and the connection to the existing system. The Contractor shall provide, place, connect, and satisfactorily test the pipes, revision/inspection points and other devices of the sewage and rain water systems in the new building until their final disposal.

- Construction of the electric systems for kennels according to drawing I002. The electrical supply shall be from the existing electrical system. The design shall follow the norms and regulations of the local electric company. The electric system also includes a ventilation system according to drawing I002.

- Construction of a new fence in the kennels area with concrete masonry units (CMU), plastered with cement and stucco, and finally painted with enamel. For this purpose contractor shall also dismount the existing fence, and relocate the existing barbed wire over the new fence according to drawing A001 and A002.

The proposal should include all materials, hand labor, transportation, materials testing, and technical advice that will be needed in order to totally finish the project and complying with all the specifications stated in this document, so as the installations will immediately start their optimum performance.

1. GENERAL SPECIFICATIONS

1.1 Compliance with Specifications

All work shall be carried out in strict compliance with all contract clauses and these technical specifications. In the event that the Contractor discovers discrepancies contained in the various design/technical documents, Contractor must immediately notify the Contracting Officer Representative (COR) before taking any other action.

1.2 Quantities

The Contractor shall provide the quantities required by the specifications and drawings and the proposal.

This contract is based on a lump sum priced solicitation. Any quantities indicated in the specifications and drawings are for reference only and the Contractor is responsible for providing quantities needed to complete the work, without any price adjustment after award.

1.3 Trials and Tests

Materials, permanent equipment, its accessories and other elements destined to the work, shall be subject to trials and tests necessary to verify their compliance with specifications, properties and characteristics, in accordance with permitted requirements and tolerances, in line with the use for which they have been intended. Materials, equipment, accessories or elements that have not been accepted by the COR or GTM, shall be withdrawn from the work site or replaced, at Contractor's cost.

Laboratory tests can be carried out, according to the specific case, at the work site or in laboratories previously authorized by the COR. Materials that bear quality certificates issued by INEN or its equivalent, do not need to be routinely tested. Costs of laboratory trials and tests shall be for the account of Contractor. The COR or GTM shall be able to carry out special trials and tests at any time.

1.4 Work Execution

The different items of the construction program shall be carried out in a gradual and progressive manner, without initiating work that could later be affected by other items that have not been concluded or that lack an adequate support or safety, taking care that work that has been finished is not affected by weather or other elements.

Contractor shall be responsible for maintaining quality of work by following proper operation procedures in construction.

Throughout the different stages of construction work, Contractor shall obtain approval, either from the COR or the GTM, in order to continue with subsequent stages of construction. Before receiving approval to continue through various stages of work, samples of completed work shall be tested to verify the quality of the work.

2. CONSTRUCTION SPECIFICATIONS FOR STRUCTURES

2.1 Work description

The structural design of the kennels building stated that the structures should be made of metallic structure with a concrete foundation; therefore the whole design has been carried out based on the following materials:

Simple Concrete:	F'c = 140 Kg/cm2 for concrete layers F'c = 180 Kg/cm2 for sidewalks, curbs, patios F'c = 210 Kg/cm2 for foundations, mooring chains, columns, beams, slabs, stairs, retaining walls.
Steel Reinforcement:	Corrugated bars, with a flow limit of Fy=4200 Kg/cm2 as per the plans.

Regarding the foundations design for the new building, it is required that all the soil load transfer elements will be defined according to the recommendations and results of the soil survey.

The concrete floor shall be built over a soil improvement. This improvement shall be done with a compacted Sub-base type 3 with a minimum thickness of 50 cm. Also, the compacted soil will fulfill the Modified Proctor test (95%).

The contractor shall build ten kennels located according to drawings G002. This building shall be constructed with metallic structure painted with two layers of antirust paint and two layers of enamel supported over concrete columns. The kennels shall have a pre-painted metallic roof with polyurethane thermo and acoustic layer for insulation; the metallic roof plate shall have 0.40 mm thickness (roof type Master Compuesto from Rooftec or other with similar or superior characteristics).

2.2 Steel Reinforcement (4200 Kg/cm2)

Steel reinforcement is the group of necessary operations in order to cut, bend, give form to reinforcing bars, and placing them according to the structural drawings to form reinforced concrete. Heat laminated wrought iron shall be used, of the following type:

- Corrugated of extra hard grade (A-63/42) with a fluency limit of fy= 4.200 Kg/cm², in all elements of the main structure: foundation, columns, beams, slabs, joist hangers and stairs.

This fluency limit shall have to be justified and defined in the stress-deformation curves. Likewise, the reinforcement bars shall fulfill the following specifications:

- INEN-136 Standard specifications for structural steel.
- ASTM – 370 & 372 Standard method and definitions for the mechanical test of steel products.
- INEN-102 Standard specifications for corrugated steel ingot bars for concrete reinforcement.

The reinforcement bars, in order to guarantee its task of adherence, must fulfill the minimum prerequisites from: “corrugations of corrugated steel bars for concrete reinforcement ASTM-305” and shall be free from excessive oxidation, scales or other substances that affect the good adherence of the concrete with the reinforcement.

In the case that another type of steel is used, this must be subject to adherence test, in a Laboratory of Materials Resistance.The elastic module of reinforcement steel must be in the order of 2'100.000 Kg/cm2.

Bending Steel Reinforcement

Reinforcement steel shall be bent in accordance to the working drawings and instructions of the details with the tolerance shown as permissible. This operation shall be carried out in cold and at a moderate speed by mechanical means. Heating is not allowed at any of the reinforcement bars for their bending. Steel Reinforcement shall not be removed nor bent so as to cause cracks of any nature on the bars. The bars bent or folded in a different way than that of the design and shown in the working drawings, shall have to be rejected.

Placing Reinforcement, Ducts and Cables

The formwork shall be placed clean of scales and free from oxides, paint, grease, or of layers that destroy or adversely affect its adherence. When a delay is produced in the emptying of concrete, the reinforcement must be re-inspected and cleaned whenever necessary.

The armatures will be disposed of in accordance with the instruction in the working drawings and will be tied between them to the plank molding, in such a way that movements are not experienced during the pouring, vibrating and compacting of concrete. Fixing of steel reinforcement shall be made with non-tempered wire whose size shall not be smaller than N° 18. The vertical joist hangers shall always pass by the outsides of the main reinforcement and shall be tied with wire to it.

Reinforcement steel shall be separated for its protection at a specified distance in the working drawings of structure details of the face of formworks by means of solid elements not less than 2cm. in height. No coupling will be allowed without the corresponding approval, except in places indicated in the working drawings. In general, the couplings must be made in accordance with the details determined in the structural drawings.

2.3 Electro Welded Mesh

The work includes the supply, transportation, cutting and placing of electro-welded mesh that shall have the dimensions and location according to the project drawings.
The electro-welded mesh to be used in the project should not have scales, oils, clay, corrosion, paint or coatings of foreign materials that might decrease or make the adherence disappear. Corrugated meshes must meet the ASTM-A 497 standard, while smooth meshes must meet the ASTM-A 185 standard (Fy=5000 kg/cm2).

All electro-welded meshes must be installed in a safe manner and with the required elements to make sure that it is correctly coated, linked and anchored and that enough space is left between the formwork. The mesh must be of the adequate quality and well-installed. An incorrect installation or a bad-quality mesh will not be accepted as it does not comply with the instructions of drawings or specifications.

The cuttings on the mesh must be made with a shear in accordance with the requested dimensions. The placing of this reinforcement in the case of slabs must be carried out to the height specified in the structural working drawings. If dealing with cement floors at a distance of 2 centimeters from the level of the finished floor.

The overlap between meshes shall be 20 cm minimum or whatever is detailed in the structural drawings. Fastening between meshes shall be made with #18 galvanized wires in double loop.

2.4 Metallic Structure

The construction and placing of the metallic structure must be according the following specifications such us: AISC, AISI, ASTM AND AWS, assuring the construction has the same quality as used in modern metallic structures hard wears.

The structural steel sections of plates, pipes and screws must be of a similar material as used commonly by the national factories, that fulfill the following norms and that shall also follow the structural drawings details of the project:

TYPE	NORM	**Fy** (min) k.s.i Kg/cm^2)	**Fu** k.s.i (Kg/cm^2)	CONSIDERATIONS
Steel Section Hot-rolled	ASTM A570	40 (2818)	55 (3875)	Covers hot-rolled carbon steel sheet and strip of structural quality
Steel Section Cold-rolled	ASTM A36	36 (2532)	58 (4086)	Covers carbon structural steel shapes, plates, and bars of structural quality for use in general structural purposes.
Structural Pipes	ASTM A500	33 (2325)	45 (3170)	Covers cold-formed welded and seamless carbon steel round, square, rectangular, or special shape structural tubing for welded, riveted, or bolted construction for general structural purposes.
Plates	ASTM A36	36 (2532)	58 (4086)	Covers carbon structural steel shapes, plates, and bars of structural quality for use in general structural purposes.
Screws	ASTM A325	Ft=44 ksi	Fv=21ksi	Covers the chemical, mechanical, and dimensional requirements for two types of heavy hex structural bolts made of quenched and tempered steel that are intended for use in structural connections.

For the analysis and structural design it have been considered that the Cold-rolled Frames a minimum effort FY=2400kg/cm2, with a twist per cent in a test tube of 8.0

inches no less than 7%, or less than 10% for a 2.0 inches test tube, according with the ATSM A370-77.

All the different steel sections that are part of the metallic structure should be cleaned and aligned according to the design. Each piece shall be properly placed according to the structural drawings, and shall be checked up for the correct alignment and providing safety assurance. Material that is not aligned or that does not meet with security standards must be rejected automatically.

2.4.1 Welded Connections

The size of the fillet weld along the corners of the connected parts must be equal to the thickness of the connected part whenever it is less than ¼ of inches (6.35 mm), and up to 1/16 inches (3.17mm) lees than the thicker part whenever it is of more than ¼ inches.

Whenever it is possible, weld should lap for finishing the fillet weld, which should not exceed as twice as the thicker of the fillet itself. These turning points are used to reduce the effort, especially for eccentric connection.

The minimum length of the fillet weld must be 4 times the nominal size of the fillet. If the real length of the weld is minor to this value then the wide of the effective weld must be reduce in a quarter of its size.

The electrode to be used is E7013 of 1/8, 3/16, and ¼ as required. This electrode with low use of nitrogen, guarantees the quality of the work to be done. The welded techniques, the confection, the finishes and quality, as the methods used, must follow the Section 3 “Workmanship” and Section 4 “Technique” of the Structural Welding Code, AWS D1.1-77 (American Welding Society).

All the structures to be welded must be clear of rust, dust and other wastes that should been removed after the cleaning procedures.

The preparation of sharp-edges by gas cutting, if practicable, shall be performed by mechanical guided torch. The parts to be welded must be nearly in contact, but in no case shall be separated by more than 3/16 of inch (3.17mm). The separation between surfaces, splicing of the pieces to be joined, should not exceed 1 / 16 inch.

The pieces should fit well on the contact surfaces that are not sealed enough with the weld to make it watertight after they have been painted.

The pieces to be welded must be carefully aligned, requiring a correction when there is a misalignment greater than 1 / 8 of an inch. In correcting the pieces must not have a slope greater than two degrees (7 / 16 inches by 12 inches).

If it is practical a flat welding the work shall be positioned for such purpose.

The procedure and sequence of the welding in the assembly and joining of the structure’s parts must be such as to prevent distortion and minimize torque.

The work to be performed shall be perfectly anchored using secure supports during the welding process in order to control distortion. Before the procedure is done, the distortion should be controlled by the angular calculation and twist of each piece.

2.4.2 Screwed Connections

For connections and supporting points, shall use screws of high resistance according to ASTM A325, (SAE 5) with a minimum effort of rupture of 7381 kg/cm2, type 1, which are screws of medium carbon steel.

The holes used for the screws shall be of 1/16 inch larger than the diameter of the screw itself. Holes can be puncture or drilled, but shall be completely cylindrical, except of course for the slotted holes at the mobile supports.

The contact surfaces of screwed connections and all its accessories should be totally clean, and waste free in order to obtain an uniform connection.

2.4.3 Anchors

Contact surfaces between concrete elements (columns and beams) and metal elements in which the structure will be supported, shall have a satisfactory finish so that there is a uniform transmission of efforts from the metallic elements to the concrete.

The anchors shall be done according drawing details. During the concrete work, anchors that need to be installed according to the structural drawings shall be verified permanently so that the correct position is guaranteed.

2.4.4 Painting of Metallic Structure

All steel work should be completely cleaned of scales, rust, slag, splatter or oil flows and other materials that do not allow performing a perfect paint work.

All the metallic structure should have two layers of antirust paint to protect it, and two extra layers of enamel paint as the construction requirements are needed. The paint work should be done evenly, paying special attention to joints and other open spaces.

The paint must be applied over all the structure visible or no, and on dry surfaces. All the faults that occur in transporting or assembling the metallic structure shall be corrected on site.

2.4.5 Gas Cutting Procedures

It is allowed to cut the materials with a blow torch if the tension is greater than the specified, and they would be checked afterwards to avoid any extra slice or pieces not flattened by the procedure.

2.4.6 Manufacture and Mounting

Contractor shall perform the necessary operations to cut, fold, weld, paint and others necessary for the manufacture and mounting of a structure on a structural shape.

The purpose is to have available a structure made with structural cold formed steel sections, made from bent metal sheets and shall consist of the provision, manufacturing and mounting of said structure in accordance with the working drawings and project specifications.

Contractor shall present a manufacturing and mounting plan to the COR before the work is done. This plan shall be approved by the COR, and also shall include all the safety and quality standards. In this plan the contractor shall include the technique that will be used in the mounting process according to the best engineering practice that is possible to be performed. If the COR requires that such plan needs to be improved, Contractor will correct the plan without any additional cost to the contract.

3. POTABLE WATER CONECCTION

3.1 Work description

The potable water supply comes from the existing water system. The contractor shall be responsible for connecting the potable water from the existing system to the new buildings. All materials shall satisfy international norms and regulations including, as applicable, ISO, ASTM, ASHTO, ASSHO, ANSI, AWWA, VDE, USAS, ASA, EET, EPCEA, NEMA, EEQ, IEC, NEC, INEN, IEOS.

3. 2 Cold water interior network

3.2.1 Work description

The potable water network shall be constructed, and the contractor shall place, connect, fix, and test in the site, following the outlines and levels indicated in the project's plans, all the pipes, accessories and special parts, as well as the group of valves that will distribute the potable water from the main connection to the different points. The potable water system is formed by the following elements: main connection, distribution of cold potable water.

The technical specifications, which are the subject of this document, have been based in the specifications used in Ecuador. In the cases where there are required norms and specifications from local institutions, these demands should be satisfied. All the materials should satisfy the international known norms and requirements or the ones used as reference (ISO, ASTM, ASHTO, ASSHO, ANSI, AWWA, VDE, USAS, ASA, EET, EPCEA, NEMA, EEQU, IEC, NEC, INEN, IEOS).

3.2.2 Pipes And Accessories

- Polyvinyl Chloride Pressure Pipes and accessories (PVC). The polyvinyl chloride pressure pipes and accessories (PVC) shall comply with INEN norms 1366 and 1373.
- The pipes shall be installed according to the specifications or drawings. The connections between the pipes and accessories shall thread, and a sealing substance shall be used, such as permatex.
- The pipes that will be anchoraged to walls or floors shall be tested and checked for leaks before they are permanently coat plastered or the floors are installed.
- The pipes threads shall be taper thread and the length shall be according to the accessories that will be installed. The pipe threads extremes shall be scarified and their interior should be cleaned before their installation.
- Gate valves. Gate valves shall be used in the pipes lines so as to control the water flow through the pipes. These valves shall be hooked up to rounded pipes and accessories or through PVC pipe adaptors.
- The threads shall be American standard. The principal element and closing mechanism shall be made of brass and have a hand wheel, for a working

pressure of 8 Mpa (8.8 Kg/cm2). These will be wedged, rising stem, double disk. These shall be located according to the plans.

- Backwater valves. The backwater valves in the pipelines shall have to bear a working pressure of 8 Mpa (8.8 Kg/cm2), swinging type, brass threads, and shall be located according to the plans/drawings.
- Discharge valves. These valves shall be placed in the highest points of the hot water pipe lines and the type used shall be a float ball made of cast iron; the disk activated by the float ball shall be made of copper. These shall be located according to the plans/drawings.
- Tests, cleaning and purification. The pipes' cleaning shall be done through pressure wash with a minimum speed of 0.75m/sec. The pipes shall be tested using a pressure equal to one and a half specified working pressure, minimum during two hours, and neither filtrations nor leaks shall be present. The system purification shall be done with chlorine, gas or calcium hypochlorite at 70%, and applying final solutions of 50 ppm, during 24 hours. The concentration of chlorine residues shall be checked at the furthest point of the net, and these residues shall be of minimum 10 p.p.m.
- Pipes hangers. The hanging pipes shall be secured with clamps that will be anchorages to the slab using iron hanger racks, as well as the vertical pipelines that shall be anchored to the ducts' walls in which they will be installed. Te diameters of the clamps and racks will be as follows:

Pipes Diameter	Clamps Dimensions		Racks Diameters
	T	W	
½ to 2"	½"	1 ½"	3/8"
2" to 3"	¼"	2"	½"
3" to 4"	3/8"	2"	5/8"
4" to 8"	3/3"	3"	¾"

T= thickness W= width

Pipes´ hose. Metal hoses shall be placed in the structures where the pipes will pass through. These ducts shall be made preferably of cast iron or steel, unless another material is approved by the COR or GTM. The hose length shall be equal to the thickness of the element it will pass through. The Contractor, according to the norms contained in the Ecuadorian Code, will determine the minimum diameter of the hoses. If there are places where it will not be able to place a hose, then the pipes will be embedded to the structure it will pass through and joints will be placed at both sides of the embedded section.

4. SEWAGE, RAIN WATER AND VENTILATION SYSTEMS

4.1 Work description

The system includes all the pipes and accessories of the horizontal branches for collection from the sanitary devices, their connections to the pipes in the columns, evacuation vertical leaders and their prolongation to the existing sewer network.

This system shall be built according to the specifications and drawings. The pipes shall go through ducts or embedded in the slab and/or in the masonry, and all the derivations pertaining to the toilets shall have a diameter of 110 mm. All other drainages pertaining to other elements or sanitary devices shall have a diameter of 50mm. The minimum slope for the collector branches will be of 1%. The rainwater leaders, as well as the horizontal branches and collectors, with their respective accessories shall be made of PVC type B.

The ventilation system is formed by a primary network, which consists of the prolongation of the sewage leaders to the buildings' roofs; and, on secondary ventilation network that starts on the group of sanitary ware (i.e. toilets, urinals, washbasins) and then it is fitted to the primary ventilation network.

The system is formed by pipes and accessories of PVC type A. In parts where ventilation columns will be formed, these shall be made of PVC pipes of 75mm in diameter with a slope towards the device of 0.5%.

4.2 Pipes and Accessories

- The pipes and accessories for the drainages and ventilation will be made of Polyvinyl chloride (PVC). The polyvinyl chloride pipes (PVC), as well as their respective accessories will comply with INEN norms 1333 and 1374.
- The joints between the PVC pipes and accessories shall be made using a cleaning compound and a glue solution, or the joints could be done using elements with tapped extremes, if approved by the COR or GTM.
- Floor sumps. The floor sumps shall be vertically adjusted to the floor level. For diameters of 3" or more, the body will be made of galvanized cast iron, brass strainer, and polish nickel finished. For diameters of 2" or less, the body and the strainer shall be made of brass and polish nickel finished.
- Roof and terrace sumps. The rainwater sumps in roofs and terraces shall be formed by semi-rounded iron racks, like a cage, so as to enable a quick flow of the rainwater, but that, at the same time, will prevent the entrance of garbage or other materials that could plug the leaders. The exterior sumps, located in the first floor, shall be formed by flat iron racks. In both cases, before they are placed, the racks shall have two coats of non-corrosive paint.
- Check boxes. The check boxes shall be built according to the specifications and drawings.
- House connection shall be made from principal internal network to the external existent network.

5. ELECTRIC SYSTEM AND ELECTRONICS

The contractor shall implement the electric system to meet the basic requirements identified in the specifications and the contractor's proposal, according to the Ecuadorian Electric Code. The Contractor shall carry out all the required jobs so the installations remain provided with electric power, being based on the specifications here pointed out. The electric installations should be made so that the possibilities of fire spread are reduced to the minimum.

The electric power supply shall comply with the ASTM - B3, - B8; UL 62, 83, 1581 specifications. These cables shall have insulating protection, and be moisture resistant. These cables are for use in electric systems in buildings and control panel connections where the voltage is not higher than 600V and maximum 60°C temperature service. Intermediate unions will not be accepted in the placement between boxes. The contractor shall use insulating tape for the unions in the boxes.

5.1 Internal Wiring

5.1.1 Work description

All of the characteristics of the Main Board require a strict electric service that shall be according to the existing electric structure, the basic electric requirements stated in drawings, and the requirements of the Local Electric Company. Therefore the contractor shall build the electric system according to the regulations of the local company.

5.1.2 General Electric Board

The principal electric board (TP) shall be installed at the kennels building. It shall follow the distribution diagram proposed by the contractor which shall be approved by the COR or GTM. The boards shall be General Electric, Square D, or equivalent United States type. Before installation, the contractor shall obtain the approval of the materials from the COR or GTM.

5.2 Electric distribution

The following work is required:

5.2.1 Illumination

The illumination shall conform to the lighting requirements of the building in each area stated in drawing I002. The interior area shall be illuminated by 100 watt lights located in ceramic supports.

The lighting installations shall be built with PVC conduit pipe. The conductor class shall be THHN No. 12 AWG for the phase and the neutral, while the ground connection shall be with 14 AWG conductor.

5.2.2 Power Outlets

The contractor shall install the power outlet system according the following requiremenets:

The principal objective is to give the power connection to the electric equipment at every place outside the building.

The installations shall be built with PVC conduit pipe. The conductor class shall be THHN No. 10 AWG and it shall have a ground connection No 12 AWG. The outlets shall be doubles and polarized of 15 to 120V. The power outlet shall conform to the quality norms UL or CIE (for exterior outlets).

5.2.3 Ground net

The contractor should build a ground network connection for the principal boards to have a proper protection of the different systems.

5.3 Conduit System

This system is formed by elements that serve to conduct the cables that are part of the different electrical and electronic circuits. This system is formed principally by the main pipes, boxes for conductor's connections, and outlets.

5.3.1 Pipes

The contractor shall install all electric and electronics wiring inside reinforced PVC conduit pipes. All the installations shall be hidden (they can be placed inside the concrete) through the conduit pipes, with sufficient screw thread to permit its fixation to the boxes.

The contractor shall install conduit pipe by means of clamps with a maximum spacing of 2 meters between clamps. The bend of the rigid conduit tubes shall not be curved at an angle less than 90°. In the extremes between two consecutive boxes, curves shall not be permitted to exceed more than two 90° angles.

The visible pipes shall be painted with enamel. The pipes and conductors shall be continuous (without joints) between two boxes or consecutive accessories.

The pipe's curve radio shall conform to the National Ecuadorian Electrical Code.
Different diameters that shall be used in the project shall be showed next to pipe's line. The diameter of the pipe to be used shall be enough to house all the designed conductors.
During the construction, the pipes shall be covered at the ends, because it is needs to avoid cluttering inside the pipes. Before the conductors are installed, all pipes shall be cleaned.

5.3.2 Boxes

The boxes have two objectives: 1) to let the conductors feed the electrical circuits, and 2) to serve as connection boxes for specific parts.

The following requirements apply to the boxes to be installed:

- For the lights, detectors, clocks, fire alarm, and junction boxes or ensembles: Metallic galvanized boxes, octagonal, big and deep of 100 x 54 mm and 1.3 mm of thickness (4'' x 2 – 1/8'' x 1/20´´).
- For exit lights, when more than ten conductors # 12 AWG meet, but no more than 15 conductors, manuals stations of fire alarm, special exits, and junction boxes or ensembles: metallic galvanized boxes, rectangular and deep of 100x54x54mm. and 1.3mm. of thickness.
- For the power outlets, phones, televisions, and electric door: Metallic galvanized boxes, rectangular and deep to 100x54x54mm., 1.3mm. volume.
- For the ensemble boxes in electric suppliers: the metal box shall comply with the requirement and the dimensions according to the designed pipes, and be of Condulet brand name type, or better.
- For distribution and ensemble boxes in the electronics systems: iron boxes of 1.3 mm (1/20'') thickness shall be painted with anticorrosive painting and enamel, with a front door and lock, the bottom of the box shall contain a 2 cm thick piece of wood, except for the telephone system boxes that shall be completely galvanized.

5.4.3 Conductor

Once the brickworks are finished, the contractor shall clean all the pipes and boxes of the respective conductors.

Before the conductors are installed in the pipes, the contractor shall place inside the pipes a 16 AWG galvanized wire as guide to make the process easier.

Graffito and talc may be used to make the conductor installation process easier for those conductors of bigger sections in suppliers of electric and electronic circuits.

The contractor shall not make connections inside the pipes, every ensemble shall be done in the respective box connection.

For the interior electric installations, copper wiring shall be used. The PVC pipes shall be insulated to support 600 V, and shall be use in each distribution and supply circuits similar to THHN or TW type.

To identify the phases, neutral system and ground system, the conductors shall have different color insulation as follows:

- The ground conductor always shall be green;
- The neutral conductor always shall be white; and
- The phase's conductor or return phase shall be black, red or blue;
- Except for the supply that has a black color because of its diameter

The conductors installed for the different circuits should have a conduction area that allows the down tension approximately 3% or less with respect to nominal voltage between every exit and the distribution board.

The conductors installed for the supply between the distribution boards and transformer must have a conduction area that allows the down tension approximately 2.5 % or less with respect to nominal voltage.

In the illumination or power circuits, the percentage of conduction shall be reduced for the installation of various conductors in the same pipe, as follow:

- 1 or 3 conductors 100 %
- 4 or 6 conductors 80 %
- 7 or 24 conductors 70 %

The number of conductors that can be installed inside the pipe shall not exceed what is allowed by the Ecuadorian National Electric Code.

6. CONSTRUCTION FINISHES

6.1 Exterior walls

The contractor shall complete the exterior walls with concrete blocks units in accordance with the material specification, finished with plastering (cement and sand), planed with cement that makes it possible to obtain a smooth surface, leveled and without cracks or ruptures. The finish shall be with enamel paint in 1.20m in high and rubber paint (the rest) in accordance with the material specification except for the surfaces in which a coating shall be placed with ceramic wall tiles. In accordance with the height and width of each wall, the contractor shall ensure that sufficient anchorages are used or other elements necessary to prevent cracks or ruptures.

6.2 Interior walls

The contractor shall complete the interior walls with pressed blocks in accordance with the material specification, finished with plastering (cement and sand), planed with stucco that makes it possible to obtain a smooth surface, leveled and without cracks or ruptures. The finish shall be with ceramic tiles in 1.80m in high and enamel paint (the rest) in accordance with the material specification. The areas that will be covered by ceramic tile do not need the stucco process. In accordance with the height and width of each wall the contractor shall ensure that sufficient anchorages are used or other elements necessary to prevent cracks or ruptures.

6.5 Floors

The interior areas will be covered with ceramic floor tiles, while the side walk and patios shall be concrete (finished the surfaces to grade and cross section with a metal float, trawled smooth and finished with a broom moistened with clear water). Ceramic tiles shall follow the materials specifications.

7. MATERIALS SPECIFICATIONS

7.1 Mechanical compacting of natural soil filling

Compacting filling refers to the filling formed by horizontal layers of 20cm thickness with the respective humidity required by the material as per the Proctor test, in order to achieve its maximum compacting. Each layer shall be uniformly compressed in its whole surface using pneumatic rammers, until obtaining the maximum compacting that these tools shall enable. The material coming from the excavations shall be used, and these should be free of organic residues. The contractor shall obtain the approval of the COR or GTM for the material that shall be used in the filling. Before carrying out the filling activities, the contractor shall ensure that the land is cleaned and free of garbage. Compacting shall be performed in accordance with the MOP-001-F 93, 305-2.04 regulation.

7.2 Compacted Select Fill (Type 3)

The compacted select fill type 3 refers to soil improvement. The filling formed by horizontal layers of 20cm thickness with Type 3 material and the respective humidity required by the material as per the Proctor test, in order to achieve its maximum compacting. Each layer shall be uniformly compressed in its whole surface using pneumatic rammers, until obtaining the maximum compacting that these tools shall enable. The Project COR - GTM shall approve beforehand the material that shall be used in the filling. Before carrying out the filling activities, the land should be cleaned and free of garbage. Compacting shall be performed in accordance with the MOP-001-F 93, 305-2.04 regulation.Also the selected fill type 3 shall be mixed with cement (50kg of cement per m3) in order to improve the material fill.

7.3 Steel Reinforcement

The steel reinforcement is the set of operations necessary for cutting, forming, bending, forming clasps, and placing the steel rods to create the reinforced concrete, in accordance with the designs. Reinforced steel shall be placed with corrugated rods (fy=4200 kg/cm2) meeting the Ecuadorian standard INEN 102. The rods shall not have faults and shall be free from oxidation, oil, scarifications or any material that affects the adherence with the concrete. Contractor shall ensure that steel materials are properly stored to avoid rusting. In the event that rusting occurs, Contractor shall clean the steel materials.

The distances to which the rods have to be placed shall be considered from center to center, unless otherwise indicated. The exact position, the overlaps, the size and the form of the rods must be built as the drawings show; it must be strongly fixed exactly in its place, by metallic supports, separators, etc., so it does not suffer movement during the dump of the concrete. The contractor shall not correct any errors by re-bending. The contractor shall use No. 18 wire for fastening.

7.4 Rip Rap Concrete

Rip rap concrete is the concrete made with large stones and concrete (Ecuadorian standard INEN 1762). In order to construct the grounded rip rap, the contractor shall place layers as follows: 15 cm of concrete, one stone layer placed by hand, which shall be covered with a concrete layer. The stones shall not be placed in distance less than 5 cm, among them and in the margins of the molds. The contractor shall use a mixture of concrete (f´c= 180 kg/cm2) with clean hard stones and about 20 cm of diameter or more, in portions of 60% and 40% respectively, and the materials shall be saturated before creating the mixture. Stony materials shall be in accordance to ASTM standard. The mix quantities shall be according to rip rap concrete design.

7.5 **Simple Concrete** (140 kg/cm2)

Concrete is the resulting hardened product from the mixture of cementing Portland, water, and stony aggregates in adequate dosage. It can have additives for the purpose of obtaining special qualities. The specified resistance of concrete shall not be less than 140 kg/cm2 according to the design. It shall meet the requirements of the settlement test (A= 7 to 10 cm.), and the specified resistance shall be verified on the 7th, 14th, and 28th days, for which the contractor shall present the respective samples to the COR or GTM for approval. The contractor shall take no less than 3 samples per every 5 cubic meters. Stony materials shall be in accordance to ASTM standard. The mix quantities shall be according to simple concrete design

7.6 **Simple Concrete** (180 kg/cm2)

Concrete is the resulting hardened product from the mixture of cementing Portland, water, and stony aggregates in adequate dosage, it can have additives for the purpose of obtaining special qualities. The specified resistance of concrete shall not be less than 180 kg/cm2 according to design. It shall meet the requirements of the settlement test (A= 7 to 10 cm.), and the specified resistance shall be verified on the 7th, 14th, and 28th days, for which the contractor shall present the respective samples to the COR or GTM for approval. The contractor shall take no less than 3 samples per every 5 cubic meters. Stony materials shall be in accordance to ASTM standard. The mix quantities shall be according to simple concrete design.

7.7 **Simple Concrete** (210 Kg./cm2)

Concrete is the resulting hardened product from the mixture of cementing Portland, water, and stony aggregates in adequate dosage, it can have additives for the purpose of obtaining special qualities. The specified resistance of concrete shall not be less than 210 kg/cm2 according to design. It shall meet the requirements of the settlement test (A= 7 to 10 cm.), and the specified resistance shall be verified on the 7, 14 and 28 days, for which the contractor shall present the respective samples to the COR or GTM for approval. The contractor shall take no less than 3 samples per every 5 cubic meters. Stony materials shall be in accordance to ASTM standard. The mix quantities shall be according to simple concrete design.

7.8 Masonry Brick Wall (15x20x40cm &/or 10x20x40cm)

A masonry brick wall is the union of concrete brick units with mortars, in accordance with manufacturer's standards. The parapets are bricks in form and of regular size. Concrete bricks shall be constructed utilizing mortar of cement and sand (dosage 1:6) and must obtain a minimum of 20 kg/cm2 resistance. The bricks shall be completely saturated in clean water before use. Bricks shall be leveled horizontally and vertically, with the vertical unions on the parapet center and lower block, in order to obtain a good connection. The mortar should be placed in the base and in the sides of the parapets in a thickness no less than 1 cm (Mortar 1:5). The concrete brick wall shall be elevated in horizontal, successive and uniform rows until reaching the levels, forms, and dimensions according to the architectural drawings. The contactor shall anticipate the passage of sewerages, health facilities, electric installations, or other systems, as well as including the placement of frameworks, mop boards, windows, banisters, etc. The unions with reinforced concrete columns shall be reinforced with 6 mm round iron rods, which are to be 60 cm in length, spaced greater than 50 cm apart.

7.9 Plastering with Stucco

Plastering is the group of actions carried out in order to put a layer of plaster, mortar of sand cement, lime or another material, in walls, columns, beams, etc, in order to obtain a uniform regular surface, cleaned and with a smooth finish. The corners and angles shall be rounded on surfaces that are uniform, smooth, and free of marks. Concrete elements exposed to the view like brick, blocks, stones, beams, columns, ceiling, etc., shall be plastered. The surfaces shall be cleaned and wet before applying the finish. The surface shall be rough and with a treatment that produces the required adherence. The first layer shall have an average thickness of 1.5 to 2 cm. of mortar cement-sand 1:3, the finish shall be a smooth surface. After the placement of this layer, for 72 hours the surface shall be wet for treatment purposes. The surfaces should be regular and uniform, without deficiencies, cracks or fissures. The connections of two surfaces (e.g. where walls and ceilings meet) shall be formed properly so that it is perfectly defined and leveled.

7.10 Ceramic floor tiles

The final finish according to the plans shall be covered with ceramic tiles of 30x30,7 mm thickness, waste resistance for high traffic areas, fixed with Bondex Premium, duly aligned and leveled. The union (e=2mm) shall be sealed with a sealer recommended by the manufacturer and mixed with Groutex additive or equivalent. The quality shall be first-rate, accredited by a manufacturer. The builder shall prepare sketches for the distribution and placement of tiles with details, types, colors, joints, fringes and its relation to the ceramic walls, for approval by the COR or GTM. In addition, the surface shall be free of oil, powder or other elements that affect the required placement process recommended by the manufacturer. Before placing the tile, the contractor should obtain the COR or GTM's approval. The ceramic tile shall be from Graiman or other manufacturer with the same or better characteristics, and the placement shall be Ary Tierra cod.13250 (Graiman).

7.11 Ceramic Interior Wall Tiles

The proposed wall areas shall be coated with ceramic tile size 20x30 cm, white color, placed with Bondex Premium, duly aligned and leveled, with 7mm tick and 5 mohs resistance. The union (e=3mm) shall be sealed with a sealer recommended by the manufacturer and mixed with Groutex additive or equivalent. The quality shall be first-rate, accredited by a manufacturer. In addition, the surface shall be free of oil, powder, or other elements that affect the required placement process recommended by the manufacturer. Before placing the tile, the contractor shall obtain the COR or GTM's approval. The ceramic tile shall be placed in the kennels's walls from floor to ceiling.

The ceramic tile type shall be from Graiman or other manufacturer with the same or better characteristics, and the placement shall be Blanco Brillante cod.38000 (Graiman).

7.12 Rubber and Enamel Paint

The contractor shall color the finished surfaces with a thin, elastic, and fluid film, in order to obtain proper effects, protection against normal use, outdoor effects, and chemical agents. The paints shall be resistant to the effects of solar light, and maintain elasticity in order to prevent cracks that would occur in natural temperature variations. This paint shall be made of first quality pigments; easy to apply; resistant to the action of the outdoors and to the chemical reactions; waterproof and washable; and shall not form any type of transparent film. The final finish shall be of first quality. The surfaces that are going to be painted shall be free from oils, dust and any other foreign substance. Before applying the paint the contractor shall treat the surfaces with number 80 sandpaper, and base films, sealers, or adequate substance shall be used to cover pores. The contractor shall obtain the approval of the COR or GTM for this process. For each case, the plastering of cavities, cracks, and scrapes, shall be carried out afterwards using special adherent materials, of easy drying and long durability. If required, scaffolding shall use for the application process. Vinyl Acrylic and TAN enamel (from Condor - Ecuadorian precedence) is the type of paint that shall be used or one containing the same or superior characteristics. For Blocks 1,2 and 3 the contractor shall use Vinyl – acrylic paint, while in Blocks 3 and 5 enamel shall be used.

7.13 Doors

These elements are defined in the detail stated in drawing A002. The materials to be use for the manufacture shall be the same or better characteristics to those indicated in drawings. Before installation, the contractor shall obtain the approval of the COR.

7.14 Thermal and Acoustic Roof.

To cover the kennels area contractor shall use metallic roof pre-painted, with polyurethane thermo and acoustic layer for insulation, the metallic roof plate will have 0.40 mm thickness (roof type Master Compuesto from Rooftec or other with similar or

superior characteristics). Contractor shall follow all the recommendations from the manufacturer.

7.15 Geo-Grid Biaxial BX 1100

Contractor shall provide and install geo-grid for all the kennels' platform according to drawing E-001 in order to provide an appropriate surface for the soil improvement. Geo-grid shall be type BX1100 or other with similar or superior features. The geo-grid must meet the following quality requirements:

- Dynamic load by the tensile strength at 5% strain, according to method GRI-GG1 (Geosynthetic Research Institute).
- Sustained load capacity / structural integrity through strength tests on the boards, according to the methods GRI - GG2. (Geosynthetic Research Institute).
- Geo-grid should have a flexural rigidity according to ASTM-1388-1364 and have a torsional stiffness according to the methodology used by the U.S. Army Corps of Engineers. The geogrids are manufactured from polymer resins altpeso molecular and must meet the following properties:

FEATURES	MAIN DIRECTION (MD)	TRANSVERSAL DIRECTION (XD)
Tensile strength at 5% strain (kN / m)	8.46	13.42
Join Effort (kN / m)	11.2	17.1
Flexural rigidity (x 1000 mg - cm)	250	250
Torsion stiffness(cm – kg / deg)	3.2	3.2
Initial tensile modulus (kN / m)	204.5	328.5
Long-term ultimate strength (kN / m)	NA	NA
Product Composition	High density polypropylene resistant strain (SRPP) with UV protection (ASTM 4218)	
Product Type	Integrally formed structural geo-grid	
Load transfer mechanism	Positive mechanical interlocking	

The geo-grid is unrolled manually on the ground prepared as described in the previous section. To ensure good behavior, geo-grid rolls shall overlap at least 30 cm. or according to Schedule # 1. In the overlap, the beginning of the second coil is placed below the end of the first.

In case the geo-grid is damaged during any stage of its installation, the damaged section shall be repaired by the Contractor, without any additional cost for the government.

SCHEDULE # 1.
Overlap Requirements

FOR SUBGRADE SOIL RESISTANCE (C.B.R.) *	OVERLAP NO SEWING (cm)
< 1	90
1 - 3	60
> 3	30

* According to test INV E - 148

Over the geo-grid shall be placed the specified granular material in the project and the thickness determined in the respective design using a vehicle rear discharge and extend uniformly, maintaining a thickness of not less than two hundred millimeters (250 mm) between the geo-grid and the wheels, to prevent it from breaking prior to compaction of the aggregate.

The granular material shall always extend in the longitudinal direction of the geog-rid or route.

8. DRAWING FILES

The following drawings for this project are attached:

DESCRIPTION	DRAWING	AutoCAD FILE
Site Plan - Actual Status	G001	K9 Puerto Bolivar.dwg
Site Plan - New Kennels	G002	K9 Puerto Bolivar.dwg
Plan View – Cover Plan	A001	K9 Puerto Bolivar.dwg
Sections and Elevations - Doors details	A002	K9 Puerto Bolivar.dwg
Foundations – Typical frame	E001	K9 Puerto Bolivar.dwg
Structural Details – Structure for cover	E002	K9 Puerto Bolivar.dwg
Water and Sewage Systems	I001	K9 Puerto Bolivar.dwg
Electric Systems	I002	K9 Puerto Bolivar.dwg