ATTACHMENT # 4 SPECIFICATIONS

The main features of the work will be detailed below. The work will be performed at the Tolemaida Military Fort.

GENERAL DESCRIPTION OF THE PROJECT

The project entails building an enlargement of a helicopters wash platform. The works will be completed at the Tolemaida Military Fort (Department of Cundinamarca).

The contractor shall submit in its proposal a detailed description of the scope for the items he/she deems necessary (additional information as described in these paragraphs) as well as additional works included or the different methods of implementation of each activity.

DETAILED INFORMATION OF THE PROJECT

The following are the main features of the work all costs included:

1. PRELIMINARS

1.1 Calculations and technical studies

The contractor shall include all calculations and technical studies needed to develop the project based on the information provided with these terms of reference. These calculations and studies include among others: structural, electrical, soil survey, levels and drainage of rain water, etc.

The contractor shall perform the calculations, designs and additional details required for the proper completion of the works, fulfilling the Colombian construction codes for each of the activities to be based on information provided and subject to review by the COR for approval prior to begin construction.

The works should be designed and constructed in accordance with the Rules of Design Earthquake-Resistant Construction and NSR-10, the rules of the Ministry of Environment and the NEC, RAS, ICONTEC, etc., as applicable to each of the requirements. The contractor shall submit with its proposal, additional information on design, calculations, etc., with pre-design and pre-calculations. These pre-designs must be submitted in the proposal along with the resume of the designer. When the contract is awarded, the contractor shall deliver the final designs and complete documentation with drawings signed and certified by the registered specialist engineer / architect in each of the areas of the items to be listed. Reports of calculation for each specialty of the project shall be delivered to the COR.

For technical specifications of the project the contractor shall refer to the rules currently applicable FAA and INVIAS (National Institute of Roads) for each of the items that should be consulted by the contractor, such as:
P-154 Sub-base, P-501 granular base or any other that applies to the project.

1.2 Campsite and temporary facilities

The contractor shall build a temporary campsite in galvanized sheets and / or wood, or supply and install a container. This campsite is used primarily for office management and auditing, warehousing and storage (of materials that may suffer loss or damage from exposure to the outdoors), dressing room for field personnel (provided with all the essentials for personal hygiene, comfort, ventilation, and protection against the weather).

The location of this campsite will be in a place coordinated by the contractor, the commander of the battalion and the COR. The contractor will be responsible for the safety of items left in this place and must remove the campsite upon completion of the work, leaving the area under the same conditions as before the works began.

Temporary restrooms

The contractor shall provide portable toilets for both physiological needs such as personal hygiene or otherwise they shall be made of materials similar to those of the campsite. Construction of septic tanks or pouring of residual waters produced by personal hygiene or by work elements shall not be allowed.

Temporary facilities

It is required to review a map of the campsite location, fencing, and temporary services (water, electricity, telephone, etc.) before beginning installation, for approval by the COR. All these facilities shall be removed by

the contractor with the COR's approval before finalizing the work. The site shall be left as found prior to the start of the work with grass, sidewalks, etc. This dismounting along with the installation shall be quoted a total price and shall be included in the total project value.

Temporary services

The eventual provision of any service by the end user to the contractor shall be of untied aid and eventual temporary suspension, failures or permanent suspension, will not lead to any financial claim and / or delays or similar justification by the contractor. The contractor shall provide alternative means for these situations.

Site security

The contractor shall provide security services for the work area and campsites. Neither the embassy nor the battalion shall be responsible for payment of security service or for items left on site.

1.3 Temporary enclosure

The workplace must be completely isolated from the areas surrounding the lot or workplace. Similarly, if materials storage is built, it should be closed in the same way. To this end, an enclosure of synthetic canvas and wooden poles every 2 metes should be built, tempered with wires at the top, middle and bottom. There will be installed supports in the access door on each side and in the changes of direction. This enclosure will have a single double-hinged access for machinery, vehicles and personnel entrance. During the execution of the work the contractor must be aware of the maintenance and repair of the enclosure so that is always kept in top condition.

1.4 Localization and replanting

This item refers to the location and replanting for the various stages and elements of the project, using surveying instruments to lift and locate precisely, according to the architectural layout, all the elements to be built. The building area is indicated in drawing 2 plus the over-wide and connections. This work must be performed by a qualified professional who in addition to the plans should establish levels. Everything will be referenced in securely anchored wooden bridges.

The contractor shall supply all materials required to establish the planimetric and altimetric benchmarks, such as stakes and field books, etc. The COR may review the location of the axes. However, this does not exonerate the contractor from his/her responsibility for errors in locating or leveling any portion of the work. Prior to locating and laying out the work, the necessary datum or tie points, both horizontal and vertical, as well as the boundaries of the terrain to be occupied must be defined and approved.

The temporary BM and reference axes are to be placed at sites where they do not interfere with the execution of the work and need not be removed, so as to permit their subsequent control at any point during the course of the work. No marks made with paint of any type, scratches, nails, centering, etc. will be permitted on any current building or structure. Once the layout and location are complete, the contractor shall submit a scheme for approval, including the location of existing structures and vegetation.

Note: The contractor shall submit the field book and shop drawings with definitive levels of the grade and subgrade lines to the COR for approval before starting work.

2. EARTHWORKS

2.1 Excavation

The contractor shall make the excavations necessary to execute the works and shall be prepared to excavate in any type of material, using the appropriate methods, equipment and tools. When starting to excavate, the contractor shall have on hand the study of aerial, surface or underground interference, in order to avoid damaging pipes, boxes, wiring, posts, hoses, wells or other elements or structures existing in the work area or adjacent to it. Should the excavation interfere with sewers or pipes, the contractor shall build at his/her cost, adequate support or protection for these installations.

The depth of the excavations and fills shall vary according to the works to be executed and the calculations done by the contractor. The excavated material shall not be stored at the top of the excavation. It shall be lifted immediately to the trucks and transported to an authorized dump located outside the Military Fort.

The contractor shall provide the excavation sites, signs, caution and provisional demarcation. The demarcation is done with three yellow plastic tape and 8 centimeters thick resting on temporary sleeping well secured to the

floor or placed on concrete mobile bases, to prevent unauthorized persons, aircraft, vehicles, and animals from suffering accidents. All drains sink tops and catch pits of utility network should be kept free to prevent them from becoming clogged or damaged.
Any over excavation caused by a cave-in, deficiency of the material existing in the zone or other reasons, shall be the contractor's responsibility, who shall fill at his cost the over excavation with granular material previously approved, until the required excavation section has been set.
Excess material from excavation and cleanup shall be removed based on the above regarding cleanup. It is the responsibility of the contractor the management of surface water and groundwater evacuation and otherwise, as well as the provision and maintenance of drainage and pumping systems required to stabilize slopes and prevent water from entering excavations.
The minimum depth of excavation shall be 0.80 m.
Within this item is included in the demolition of the concrete curb bordering the existing road connecting the hangar and heliports, which is at one side of the future platform B.

2.2 Subgrade compaction
In all areas to build the soil at the bottom of the excavation shall be compacted before starting the filling, using self-propelled mechanical equipment and / or manual. A density equivalent to a deformation of not over 2 mm between one load and the following with the compaction equipment and / or equivalent to the non-marking of the footsteps of a person with a body weight exceeding 75 kg. The selection of compaction equipment shall be approved by the COR and shall conform to the characteristics of plasticity of the material to be compacted.
If during the process of compaction of the subgrade material there are failures or soft spots these should be replaced promptly by excavation and fill as appropriate items, except that if in the opinion of the COR, the failure is due to over-compaction and / or misuse of compaction equipment, in which case the replacement of material shall be executed by the contractor.

2.3 Geotextile
The contractor shall supply and install a non-woven geotextile layer of polypropylene long fiber with a density greater than or equal to 160 g/m2, type NT-1600 of Pavco or equivalent that shall be approved by the COR. The minimum overlap shall be 0.60 m unless the strips are sewn in which case it may be reduced to only 0.30 m. The non-woven geotextile should cover the entire bottom of the excavation, up the edges of the excavation, as indicated in drawing 8.

2.4 Filling material
This item includes the supply, spreading and compaction of filling material: 60 cm. thicknesses for the concrete platform and 70 cm. thicknesses for the asphalt areas. Therefore, it includes the provision of all labor, materials, equipment and performing of all work necessary to carry out the required compacted filling work. Before starting the filling the ground that shall serve as base must be completely free of vegetation, organic soil and construction waste materials and must be compacted. The surfaces shall not have flood or stagnant water areas.
Materials for fillings shall be obtained from sources authorized by all applicable environmental regulations and by law, to be selected by the contractor and approved by the COR. At least 7 days before the contractor proposes to begin the work of filling, he/she shall submit for the Embassy's consideration all sources of materials and operating permits as well as representative samples and results of laboratory tests. The supply of samples and testing shall not be of additional payment.

- **Granular sub-base filling**
  It shall be supplied, spread and compacted sub-base material according to alternate gradations and features presented in the table below without mixing, in layers of not more than 0.15 m thick compacted and a density equal to or greater than 95% of that obtained in laboratory on the same material using the Modified Proctor test. The total filling thickness is 40 cm.

ALTERNATE GRANULOMETRY

SUBBASE TYPE	**A**	**B**	**C**	**D**
SIEVE No		**PERCENTAGE PASSING IN WEIGHT**		
3"	100	100	100	100
1 ½"	-	100	-	58-100
1"	50-90	-	100	-
¾"	-	50-90	-	44-100
3/8"	-	-	50-90	35-100
#4	30-70	30-70	40-80	25-95

#40	5-30	5-30	8-30	17-80
#200	0-15	0-15	5-20	5-25

The index of plasticity shall be less than 6 and the liquid limit shall be less than 40.

- **Granular base fill**

It shall be supplied, spread and compacted a layer of granular base according to granulometry indicated below, compacted with a density equal or over 100% of the maximum density obtained in the laboratory using the Modified Proctor test. The total base fill thickness is 30 cm for the asphalt platforms and 20 cm for the concrete platform.

LIMIT GRANULOMETRY

SIEVE	**1 ½"**	**1"**	**¾"**	**3/8"**	**#4**	**#10**	**#40**	**#200**
PASSING%	100	70-100	60-90	45-75	30-60	20-50	10-30	5-10

The liquid limits and plastic index of the material as well as its physical characteristics and origin shall be submitted for approval by the COR, as required by the INVIAS. This material shall not exhibit plasticity.

2.6 Protection of existing pipes

This item includes protection of concrete in Portland cement with compression strength over 210 Kg/cm^2 , of existing pipelines that carry the electrical connections, compressed air and water to the existing wash points of helicopters. Reinforcing steel to protect the pipelines shall be in four corrugated rods 3/8"diameter rod with corrugated strips in 1/4" in diameter at a distance of 0.20 m. each. The protection of each tube is a square section of 20 cm. x 20 cm. 5 cm thick in concrete inside a bed of river sand on which the corresponding pipeline must be located. View details on drawing 8.

In case the contractor damages the pipelines he/she shall repair them and leave in perfect condition with no cost for the embassy.

3. STRUCTURES

3.1 Concrete Platforms

This work involves the construction of two (2) platforms in particular as helicopters washing area: platform A and platform B, connected with platforms on asphalt. These jobs should be executed in accordance with the following specifications:

- Helicopter UH-60L (Black hawk). Other helicopters that will use the platforms are the UH-1H – II, and MI 17.
- Frequency of use = 1 parking daily average, 12 months per year, for 15 years.
- Empty weight = 5216 Kg (11500 Lb).
- Maximum weight = 10659 Kg (23500 Lb).
- Total length = 19.76 m (64 ft 10 in).
- The slope (pumping) on each platform shall not exceed 2% (Aeronautical Regulation of Colombia –RAC-6.2.2.7.).
- Any other one that applies for the project.

The construction of concrete platforms includes the supply, framing, placing, curing, leveling, grooving, and finishing in Portland cement concrete with flexural strength over 41 Kg/cm2 with nominal thickness 20 cm. The concrete shall poured by strips (chess pour system is not allowed) and post-curing coating Diamond Hard or equivalent type recommended by the manufacturer.

In all cases this item includes all activities and provisions necessary to shape the hard concrete required with the exception of supply and set up of reinforcement steel in other item.

The contractor shall follow the criteria for the mix design for concrete made on site as required by code NSR-10

Concrete platforms shall have the same level of the existing pavement. Pavement finish shall be slotted with distance less or equal to 1 cm.

The contractor shall submit for the Embassy approval the final construction drawings showing in detail the exact size of structural and reinforcement elements, and the distance between each surrounding element, specially the location of the existing concrete boxes. The platforms shall be done according to the architectural drawings supplied, according to the rulings established in NSR-10.

This work includes laboratory tests required. Six (6) beams shall be used as samples for testing each concrete casting, or for five (5) m^3 maximum, in order to test two (2) beams after 7 days, two (2) beams after 28 days and leave the remaining 2. The results of laboratory tests should be timely submitted to the COR.

3.2 Reinforcing steel for slabs

All steel reinforcing rods, regardless of the nominal specified diameter and strength shall be included for this item, where the kilogram (Kg) includes providing, transportation, cutting, forming, waste, black wire tie, provisional support with spacers to the frame or floor as appropriate, and additional steel conducting additional overlaps, and placement of steel quantified by cutting primers revised and/or developed by the contractor. Reinforcing steel for the concrete platforms shall be in corrugated 3/8" rods in two directions, with a distance of 0.20 m Double grill shall be built, one top and one bottom, separated 1/3 of the thickness of the slab. Each slab must have its independent grills.

3.3 Reinforcement steel for transfer dowels

This item includes provision and installation of all reinforcement steel for dowels in 1" diameter smooth rods, 50 cm length and embedded 25 cm in each slab for the platform with distance of 30 cm between them. These dowels shall be installed at half the thickness of the slab.

3.4 Contractions and constructions joints

Construction joints shall be done by interruption between concrete casts. This joint shall also include dowels as indicated in drawings 6 and 7.

Contraction and constructions joints shall be done by cutting hardened concrete with diamond disc, with depth equal or over ¼ of the total thickness of the slabs. Joints shall be cut within 14 hours.

The Joints shall be filled with elastic sealant resistant to fuels, Masil Carburante Sikaflex 15 ML SI or equivalent, including support drawstring, Sikarod or equivalent (joint filler). Adherents and other material, as well as procedures shall be recommended by the manufacturer.

3.5 Concrete reinforcement of existing boxes and wells

This item includes the construction and extension of the walls in the existing boxes and reinstall of frames, concrete lids in Portland cement with flexural strength over 41 Kg/cm^2 so that the lids are leveled with the new concrete platforms A and B, allowing the respective future inspections of the existing boxes

3.6 Asphaltic base

This item relates to the priming of granular base with liquid asphalt or asphalt emulsion, adhesive irrigation and supply, placement and compaction of Asphalt Base MDC-1 with a thickness of 6 cm. The total area of the base asphalt is 972.60 m2. The contractor shall ensure that with levels achieved, there is adequate drainage and no water puddles are present.

The installed material shall comply with the Standards of INVIAS 450-02 for their manufacture, transportation, placement, and compaction, and it shall be certified by the plant that supply it. The material shall be extended only with asphalt paver (finisher).

3.7 Asphaltic surface layer

This item refers to the adhesive irrigation on the asphalt base with liquid asphalt or asphalt emulsion, and to supply, placement and compaction of the Asphaltic Surface Layer type MDC-2 with a 4 cm thickness. The total area of the asphaltic surface layer is 972.60 $m^{2.}$ The contractor shall ensure that with the levels achieved there is adequate drainage and no water puddles are present.

The installed material shall comply with the rule of INVIAS 450-02 for their manufacture, transportation, placement, and compaction, and it shall be certified by the plant to supply it. The material shall be extended only with asphalt finisher.

NOTE

- The contractor to whom the project is awarded shall present plans for surveys, sections of platforms, informative diagrams showing materials, dimensions, diameters, etc., and catalogs and tests of materials to select the project finishes. All this shall be submitted to the COR prior to being sent to production, transported to the site of work or installed.
- All work must be done without interfering with the operations and circulation in the area.

The following drawings are enclosed:
01. Current location.
02. Project localization.
03. Detail plant project.
04. Detail platform A.
05. Detail platform B.
06. Construction joints detail platform A.
07. Construction joints detail platform B.
08. Detail construction platforms.