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1 EXECUTIVE SUMMARY

1.1 Developer's General Information

The sponsor of the Honduras Tourist Corridor Project is the Secretariat of Public Works, Transportation and Housing of Honduras (here on SOPTRAVI, for its initial in Spanish). This Secretariat was founded in 1957 and is in charge of formulation, coordination, execution and assessment of policies regarding housing, public infrastructure works, and road, urban and transportation systems, as well as public works' concessionary regime.

Its general information is shown as follows:

Developer:	Secretary of State in Public Works, Transportation and Housing
Location:	La Bolsa Borough, in front of the hospital and San Jorge Clinics, Comayagüela, M.D.C, Francisco Morazán Department. Honduras.
Legal Representative:	Mary Suyen Suazo guerrero
License Number:	07265
Web Page:	www.soptravi.gob.hn

1.1.1 Consultant's Name and Registration

The Environmental Technical Documents from the Honduras Tourist Corridor Project have been developed by "The Louis Berger Group, INC", jointly with local company "Ingeniería y Ambiente de Sula", who has the registration number RE-0017-2003 of the Secretariat of Natural Resources and Environment (here on SERNA, for its initials in Spanish), in accordance to the regulations established within the Environmental Impact Assessment System of the Honduran legislation (SINEA – Agreement No. 189-2009).

1.2 Brief Description of Project, Work, or Activity

The Honduran Government, through the National Commission for the Public-Private Alliance *(Comisión Nacional para la Alianza Público-Privada* - COALIANZA, for its initials in Spanish,), and the Secretariat of Public Works, Transportation, and Housing (*Sectetaría de Obras Públicas, Transporte y Vivienda* – SOPTRAVI, for its initials in Spanish), under the framework of the Law for the Promotion of the Public-Private Alliance, conceived and granted by the International Public Procurement, the construction and operation of Honduras Tourist Corridor. From this process, the project was awarded to Atlantic Highway Consortium (*Consorcio Autopistas del Atlántico, S.A. de C.V.*), comprised by the companies GRODCO, S. en C.A. from Colombia and PRODECON, S.A. de C.V. from Honduras.

The Honduras Tourist Corridor Project includes the following components:

1. The design and construction for the tuning of the highway section that joins: San Pedro Sula – El Progreso (17.50 km); La Barca – El Progreso (36.50 km); Camalote –Tela (62.66 km), and Tela – Ceiba (97.00 km).
2. The road widening to four lanes, two on each direction for the highway section that joins: La Barca – El Progreso of 36.50 km and Camalote – Tela of 62.66 km.
3. A completely new construction of the Bypass of the City of El Progreso,: Bypass of the City of El Progreso of 5.94 km.
4. The rehabilitation of "La Democracia" Bridge and the construction of a new, four-lane bridge in Santa Rita.

The objectives of the concession of the Honduras Tourist Corridor Project are:

1. Decrease traveling times, through the provision of a wearing surface in optimum conditions, with signs meeting national and international standards.
2. Doubling the lanes and separating the circulation direction between La Barca - El Progreso - Tela.
3. Introducing ongoing routine road maintenance for the duration of the concession (30 years).
4. The provision of equipment and staff for security and the assistance of the road's users during the term of the concession (30 years).
5. The public-private alliance will introduce a positive flow of resources to the Honduran state for the construction of the infrastructure, job creation, without making the lavish initial investments required for the infrastructure works. These investments, which are ensured by the private sector, will be paid off as the project generates its benefits.

The term of execution of all the works of the Honduras Tourist Corridor Project is 34 months and these are expected to begin in 2014.

The Project considers only four (4) stages: 1) Planning; 2) Tuning; 3) Construction/Road Widening; and 4) Operation and Maintenance. It is important to clarify that a specific phase for abandonment is not considered since the road operation is ongoing, permanent, and does not assume a specific time of termination. The activities that will be carried out for each stage of the Project are:

<u>Planning Stage:</u>

- The award by the State of the plots affected, specifically those sites that require the construction of a new bridge in the road widening sections.
- Broadcasting the project through the Citizen Involvement Plan.
- Creation of the technical environmental documents and request of the Environmental Permit. (Regulation of the National System of Environmental Impact Assessment SINEIA – Agreement Number 189-2009).
- Processing of the corresponding permits (for example: tree felling permit, water use, exploitation of material quarries, etc.)
- Relocation of Public Service utilities.

- Preparation of the Work Program.
- Creation of the Traffic Detours Plan during the Construction Stage.
- Location of the sources of construction materials' supply.

These activities do not have an impact on the environment, they simply define and limit the areas to be affected, as well as the natural resources and infrastructures or public services that will be affected by the work's final design. However, it is important to point out that all these activities will be necessary to continue with the execution of the next three stages: the tuning, construction, and operation and maintenance stages.

Tuning Stage

The term Tuning is the activity of selective rehabilitation with a tendency to renovate the road's initial condition in order to comply with the levels of service set in the Concession Contract. This tuning stage will have a duration of 10 months for each one of the highway sections that make up the Tourist Corridor. The activities considered in this stage are listed below:

- Location and Operations of Temporary Facilities: This activity considers the selection of the site for the location, construction, and/or acquisition or rent of the temporary facilities near the work site and the operation of said facilities, during the time foreseen according to the workplan (these can be temporary or semi-temporary). These facilities will consist of, at least:

  - Temporary field offices for the engineers and for the administrative staff.
  - Rest areas, dining areas, and restrooms for the workers (especially on the road widening sections)
  - Storage areas for materials and equipment.
  - Temporary parking for machinery.

  It is also foreseen to be included in this activity the change in land use, the removal of the vegetation cover, land grading, construction of offices, authorization and implementation of the mechanical yard, construction and adaptation of the access roads, adaptation of parking zones and whatever is necessary for safety (perimeter fence) and comfort of the workers.

- Preparation of the Site of the Project: The actions foreseen are the cleaning, cutting, and removal of grasslands on both sides of the road and road dividers throughout the alignments, within the existing right of way or easement. It is included as well the tree felling within the existing right of way or easement, since these are considered as risks to the user, blocking visibility.

- Placement of Wearing Course or Layout of the Surface Course: This activity consists of placing, distributing, and compacting the foundation (usually a crushed granular foundation) and the transportation and placement of the wearing course or surface course, of the material (asphalt or

concrete), and the thickness defined in the design, from its site of preparation (concrete or asphalt plant) up to the placement site. For the placement of concrete pads, after the foundation is created and in those areas where the concrete pads are required (for example: areas with wearing courses, platforms, etc.), the structure with reinforcing rods and the pouring of concrete will be carried out.

- Maintenance of Drainage Work: It consists of the cleaning and removal of debris, soil, residues, sand, or any other material, from ditches, man holes, and gutters; minor repairs made to ditches, man holes, gutters, discharge heads; or any other drainage work that requires it.

- Bridge Maintenance: This activity is more specific and is based on the inspection of structures that make up the bridges (for example, the brackets, abutments, beams, etc.), as well as the cleaning and repair of joints, rails, sewages, wearing courses, etc. The purpose of this activity is to keep the bridge in good conditions, repairing deteriorated secondary members, keeping the waterway free of obstructions that would not allow the free flow of water, and keeping the bridge area clean in its lower and upper parts.

- Building: The buildings that are considered for this activity include a toll house for each highway section[1] and administrative offices for the staff and the National Police. This activity is divided itself in the foundation, construction of concrete and steel structures (considering columns, structural walls, beams, among others), masonry (those works that can be made from concrete blocks or terracotta blocks, as shown in the blueprints), placement of doors, windows, stairways, installation of roofs and covers, trims, furnishings (considering only its design, specification, amounts, dimensions, and location in a final blueprint), indoor and outdoor lighting, bathrooms, and kitchen.

- Exploitation and Transport of Stone Material from the Materials Quarries: This activity consists of the cutting (exploitation) and transportation of stone material used for repairing the road from its borrowing source (dry or alluvial bank) up to the work site.

- Usage of Water Sources: This activity consists in collecting and transporting the water resource from surface bodies of water within the project's area of influence up to the site where the water is required, for those works that require it (compacting, concrete casting, irrigation, etc.). The collection of the resource is usually made through pumping from source body of water (river with permanent or semi-permanent flow), up to the temporary storage deposit from where it will be transported to the site's work area.

- Signaling and Lighting: It involves the supply, installation, and placement of lighting posts with its fixtures, containment barriers (New Jersey type) for the roads, and the traffic signals, both vertical and horizontal, including accessories such as posts, frames, and boards that are of the mandatory, preventive, and informative types, and of permanent nature throughout all the road according to Technical Specifications.

[1] The building activity for the Tela - La Ceiba Highway section is not included, as it is not part of the Concession Contract.

- Management of Construction's Work Waste and Solid Residues: This activity consists in the collection, separation, transportation, and disposal of excess materials and waste from the construction that result from any of the activities mentioned above (even by the removal or abandonment of temporary facilities), as well as of the solid and liquid, hazardous or non-hazardous, home or industrial use residues that result from the operation of the temporary facilities.

Construction Stage

After finishing the Tuning Stage, the road widening work will start in the Construction Stage, which includes the activities mentioned in the previous Stage and other activities related to the construction itself, such as:

- Preparation of the Work Site: The removal of vegetation cover and tree felling within the existing right of way or easement, demolition of existing infrastructures or buildings, construction of temporary traffic detours (mainly in intersections with other roads), and relocation of public service utilities within the roadway tracing are all required.
- Excavation, cuts, and landfill formation: Its actions correspond to the excavation or cuts of slopes into ramps, with heavy machinery, and the movement of soil within the existing right of way or easement. However, the formation of landfills or embankments consists of the placement, distribution, and compacting of the filler material, whether from material quarries (activity described in the Tuning Stage) or from the cuts, according to the required design specifications.
- Construction of Drainage Work: It includes the necessary excavations for the placement of gutters, sub-drainages, ditches, and other works that enable the draining of the rainwater, both longitudinally and cross-sectionally.
- Bridge Construction: In the case of the construction of bridges, notwithstanding their length, height or design, the activities include the adaptation to the waterway and the construction of the temporary detour (in the event it is feasible and required), the construction of the bridge itself, through the excavation for foundation support and abutments (substructure), the casting and placement of pillars based on the height and distance between one and other shown in the design, the placement of cement beams and, finally, the restitution of the waterway to its initial condition.
- Withdrawal from Temporary Facilities and Machinery: It refers to the withdrawal or abandonment or dismantling of the temporary facilities. The main actions include cleaning and restoration of the area (within the restoration the scarification of the land, the removal of any structure that will be disposed of, placement of vegetable cover, the revegetation, and even the reforestation, if applicable, can be considered). However, prior to the dismantling there is always the possibility that these facilities be used in the operations and maintenance stage or in any other compatible use.

Operation and Maintenance Stage

The Operation and Maintenance Stage begins with the delivery of the entire road work and its reopening to the general public. In order to keep the road in safe operating conditions within the design perspective, it is

necessary to carry out road maintenance activities, drainage work, bridge work, and the signaling and lighting (where applies), all of which are considered in a Concession Contract with a duration of 30 years[2].

During this Stage, the following services that will be of benefit to the users of this path will be implemented free of charge in all the Highway sections of the Hondurs Tourist Corridor Project[3]:

- Emergency Central Service, that will work twenty-four (24) hours a day: In order to attend emergency requests and/or accidents that occur in the highway sections of the Honduras Field tripist Corridor Project, through the Emergency Center, transmitting them to or setting up the requests to the National Police, a hospital center, medical center, polyclinic, or similar, insurance company, as applicable.
- Emergency Real Time Communication System: The terminals shall be located at a maximum distance of 25 kilometers between each one of them. This system will allow, at least, making free calls exclusively to the Emergency Center.
- Ambulance Service: In order to attend to the wounded and transport them to a hospital center, medical center, polyclinic, as appropriate.
- Vehicle Transport Service: For vehicles that end up damaged in the road, transporting them to the closest service station, which shall not be more than seventy (70) kilometers away.
- An Office for the Use of the National Police of Honduras: This office shall be next to the locations of the areas of each toll unit, with its basic equipment and electricity, in order to support the surveillance and control activities.

1.3 Summary of the Features of the Project's Area of Influence

Next, we present a summary of the characteristics of Base Line of the Project's area of influence for each of the highway sections that make up the Honduras Tourist Corridor.

1.3.1 La Barca – El Progreso Highway Section

The La Barca - El Progreso highway section goes from the Central and West-Central area of the country. This highway section starts at the intersection of Route CA-5 which runs from the city of San Pedro Sula to the town of La Barca in the Municipality of Santa Cruz de Yojoa, Department of Cortés, then runs along the alignment through the Municipality of Santa Rita, and end up at the Pelo River Bridge in the Municipality of El Progreso, Department of Yoro, turning into an alternate route towards the city of San Pedro Sula and being a connector to the Atlantic Region of Honduras with the purpose of promoting tourist development, as well as interconnecting vast cattling and agricultural regions. See Figure 1-1.

[2] The Operation and Maintenance Stage of the Tela - Ceiba Highway section will be responsibility of SOPTRAVI, as it is not part of the Concession Contract.
[3] The services of the Operation and Maintenance Stage are not included for the Tela - La Ceiba Highway section as these are not part of the Concession Contract.

Figure 1-1. Geographic Location of La Barca – El Progreso Highway Section

Source: http://www.sinit.hn/index.php

In this highway section of 36.5 km, there will be a selective tuning or rehabilitation of the entire highway section placing asphalt surface of approximately 5 cm and the construction of a toll house, a stage that will have a duration of 10 months. After this, the road widening of the two additional lanes will be carried out throughout the entire highway section; this stage will have a duration of 12 months. Also, the construction of a new, four-lane bridge over the Humuya River, is considered for this highway section, an activity that will have a duration of 12 months.

1.3.1.1 Physical Environment

The highway section subjected to road widening is characterized by two-lane asphalt road, one lane for each direction, with subsequent accesses and many urban zones with variable density, present throughout the alignment. It is also possible to locate extensive areas with crops such as sugar cane, African palm, and bananas; as well as areas dedicated to livestock activities.

The La Barca - El Progreso alignment crosses many bodies of water of the permanent and intermittent type, being these rivers and main river gorges the Zacatales River, Humuya River, El Cacao River gorge, Pileta River gorge, Agua Blanca River gorge, Piedra de Afilar River gorge, La Ruidosa River gorge, La Zacarosa River gorge, Guacamaya River, Las Minas River gorge, and Camalote River.

Therefore, the need to build eight (8) structures for vehicle passing in order to cross these natural courses of water arises. The location, geometric features, and the side of the location of these structures are presented in Table 1-1:

Table 1-1. List of Bridges to be Constructed

Approximate Initial Station	Name	Total Length	Lanes	Side of the Location of the New Bridge (La Barca - El Progreso direction)
5+400	Zacatales River	60.00	4	Right
10+900	Bridge over Humuya River	240.00	4	New Bridge
12+100	Negro Bridge	30.10	2	Center (*)
17+800	Agua Blanca River gorge	24.90	2	Center (*)
20+400	Bálsamo River or Piedras de Afilar	14.75	4	Right
26+000	Guacamaya River gorge	24.60	2	Right
26+600	Las Minas River gorge	74.60	2	Right
34+650	Camalote River	50.05	2	Left

Note (*): Will be enlarged over the existing axis.

In this highway section the construction of a new bridge over the Humuya River is considered; the bridge collapsed on June 28, 2009, one month after the earthquake that made several damages took place, and is currently being replaced by a provisional parallel passage. Additionally, there are 5 concrete boxes and structures for minor drainage, such as gutters, made from reinforced concrete and piping of different diameters, located here. Said structures are turned into mandatory passage of the geometric tracing, and are the objects of, road widening and/or duplication to respond to the objectives of the road project.

As production zones and water replenishment, the micro-watershed of the Pelo River is located in the Mico Quemado Mountain Range and provides the water for human consumption in 70% of El Progreso Municipal capital. It is important to mention that in this highway section extensive and highly-productive water resources are very characteristic.

According to Simmons' classification it is possible to locate in this highway section four types of soils: Alluvial soils, Sulaco soils, Urupas soils, and soils from the Valleys. These, in general, present use capacity that are found in the agroforestry and intensive crop rotation categories.

There are two geologic formations present: the Qal - Quaternary Alluvium formation, from the Cenozoic Era, which corresponds to recent continental and marine sediments, including piedmont deposits and gravel terraces, flood plains, and basin deposits. On the other hand, the formation Qv - Flows and volcanic cones of the quaternary formation and includes andesites and pyroclastic debris.

According to Zúñiga's climate classification, this highway section is characterized by a very rainy, windward weather. The average annual rainfall is estimated at 2,200 mm; the average annual absolute low temperature is 6°C and the absolute high is 39.6°C.

In terms of the natural threats, the Municipal Emergency Plan (2010) reports that the Municipality of El Progreso has been very much affected by periodical flooding given its location downstream from the Ulúa and Pelo Rivers that, given the large amounts of water that run through them during rainy periods or during an extreme event, these easily run off their waterways and affect the population, their assets, and their crops. In these cases, to reduce the risk of flooding of both the road and the surrounding terrains, the necessary hydrological studies were carried out for the appropriate design of the hydraulic engineering works of this highway section, therefore avoiding the unnecessary water accumulation.

Lastly, due to the orography of where this highway section is located, the area of the project presents a low risk of landslide threats.

1.3.1.2 Biological Environment

The most outstanding protected area of the Municipality of El Progreso is the Mico Quemado National Park, located in the Eastern side of the urban area of El Progreso. This protected area is located approximately 2.30 kilometers from the nearest point of the highway section, located outside the project's area of influence.

Fauna

In order to carry out a representative inventory of the fauna in this highway section where the highway is expected to be widened, thirteen (13) points were strategically selected. In each point, a tour or field trip was performed in order to collect information regarding the fauna present in the vegetation areas, roads, and sources of water in an area of approximately 50 meters on both sides of the existing road, with the following data to report:

- Birds: During the diagnostic carried out, the observation of birds was made by sight and audition. For their identification, prismatic binoculars 10 X 42 mm were used and two bird identification guides for the area were consulted. In this highway section 18 families, 27 genders, and 29 species were identified, all residents and none found in a special category.
- Herpetofauna: With the help of a herpetological hook and a metal rake, micro habitats such as rotten logs, rocks, leaf litter zones were exhaustively checked, trying to cover the different types of micro habitat that the herpetofauna species use as shelter. During the field trips, there were sightings of 3 families, 3 genders, and 3 species of lizards, among which the following are found: spiny-tailed iguana (*Ctenosaura similis*), brown basilik (*Vaialiscus vitattus*), and Central American Ameiva (*Ameiva festiva*); however, due to the type of ecosystem in the surrounding areas it is possible to find *Coleonix mitratus*, *Norops tropidonotus*, *iguana*, and *Sceloforus sp.*, among others that are not reported during the field trip but, given the composition of the ecosystem, the presence of these species is feasible.
- Ichthyofauna: Interviews to the residents of the communities surrounding the areas were carried out in order to determine the presence of species. In the rivers, the same methodology was applied, but in this case some fishermen were consulted to recognize the species present in the area by their common name. Observation trips were also performed, but catching nets were not

used. The endemic species reported for this highway section are: *Agonostomus monticola* and *Joturus pichardi.* The native species are: *Astianax fasciatus, Dormitator maculatus, Poecilia sp.1, Poecilia sp.2, Centropomus sp.* and *Paracromis managuensis.* As exotic species, *Oerochromis sp.* is reported.

- Mammalian Fauna: The species of mammalian fauna were identified with the help of fact sheets of mammals of Honduras. Interviews were also carried out with community members to inquire about the sightings of species of mammals in this highway section. The areas with greater vegetation cover were located within the community and, with the fact sheets on mammals, the residents pointed out they had seen stripped skunks of the *conepatus mesolucus* genus and *guazalos* (*Didelphis marsupialis*).

Flora

In the 13 points assessed throughout the highway section, 39 tree species were reported and distributed in 19 families and 36 genders, none of these species are found on the CITES' protected species list.

1.3.1.3 Socioeconomic Environment

The municipalities within the Socioeconomic Area of Influence of this highway section are: Santa Cruz de Yojoa, in the Department of Cortés and the municipalities of Santa Rita and El Progreso, in the Department of Yoro. The population estimate for the year 2010, carried out by the Honduran National Institute of Statistics *(Instituto Nacional de Estadísticas de Honduras* - INEH, for its initials in Spanish), for the municipalities of the socioeconomic area of influence, is presented on Table 1-2:

Table 1-2. Estimate of Population by Municipalities, Rural and Urban Area 2010

Department/ Municipality	Urban Population			Rural Population			TOTAL
	Male	Female	Total	Male	Female	Total	
Cortés	602,170	655,009	1,257,179	157,306	155,806	313,112	1,570,291
Santa Cruz de Yojoa	15,420	16,102	31,523	24,589	23,746	48,335	79,858
Yoro	141,171	152,487	293,658	131,475	126,967	258,442	552,100
El Progreso	84,916	92,535	177,451	13,406	13,572	26,978	204,429
Santa Rita	7,153	7,654	14,807	2,559	2,336	4,895	19,702

Source: *Instituto Nacional de Estadísticas de Honduras* (Honduran National Institute of Statistics). Population Projections by Departments and Municipalities. 2010.

In terms of urban and rural population of the Municipalities of the socioeconomic area of influence for the year 2010, it can be seen that in the Municipality of Santa Cruz de Yojoa, the population is largely rural, with 60.5%. On the other hand, in the case of the Municipalities of El Progreso and Santa Rita, it can be seen that the largest percentage of the population is urban, representing 87% and 75%, respectively.

This distribution of the urban and rural population is reflected in the economy of the Municipality of Santa Cruz de Yojoa, which is concentrated in the development of large-scale farm eggeries and livestock farms within the Municipality. There is also the recent development of the tourist sector given the presence of the country's only natural lake, increasing the hotel and food services infrastructure on the lakefront of Yojoa Lake, as well as the Joya Grande Zoo.

Even though the population of the Municipality of Santa Rita is also dedicated to farming and livestock activities, there is evidence of some informal businesses or sale stands the right of way. Meanwhile, the economy of the Municipality of El Progreso is also linked, in great part, to agricultural activities, mainly the production of African palm as well as staple crops (corn and beans); the El Porvenir Industrial Processing Zone is found in the area and companies dedicated to toll manufacturing operate.

1.3.2 El Progreso – Tela Highway Section

The El Progreso - Tela Highway section is aligned by route the CA-13 of the country's main road system and it is a segment of the routes of Central American Integration. The CA-13 route develops by the coastal plain parallel to the Caribbean Sea or the Antilles of the Honduran territory. This section starts at abutment number 2 of La Democracia Bridge over Ulúa River (Zone 16P, 412399.88 mE, and 1703049.68 mN) will go through a new bypass of the city of El Progreso, then it will follow the same alignment of the road towards Tela and end up at Highland Creek bridge (Zone 16P, 453615.84 mE, and 1744914.90 mN). See ¡Error! No se encuentra el origen de la referencia..

Figure 1-2. Geographic Location of the Project

Source: http://www.sinit.hn/index.php

In this highway section of 68.5 km, the first thing will be to carry out a selective tuning or rehabilitation of the entire highway, placing asphalt surface of approximately 5 cm and the construction of a toll house, a stage

that will have a duration of 10 months. After this, the road widening to four (4) lanes (two additional lanes throughout the entire highway section) will be carried out; this stage will have a duration of 24 months.

The El Progreso – Tela highway section has been divided into four sub-sectiones that are detailed as follows:

- Section I - El Progreso - Chindongo, with an approximate length of 12.0 km: This section starts at abutment number 2 of La Democracia Bridge over the Ulúa River and includes a bypass of the city of El Progreso. This bypass has an approximate length of 5.9 km, and ends around 200 meters before the bridge over Camalote River gorge. This section where the new bypass will be built is an area that has been undisturbed and is considered, according to the Municipal Development Plan with Focus on El Progreso Land Use Zoning, as Natural Protection Zones (ZPN-1) identified as Zones of Water Resources. In this case, it is required that the Municipal Council grants the authorization for the change in land use, before starting the construction of this highway section.
- Section II – Chindongo – El Aguacate, with an approximate length of 18.1 km: This Section starts at Chindongo River gorge and ends in the community of El Aguacate, going through the communities of Guaymitas, Las Delicias, and Toyos.
- Section III - El Aguacate – La Mulera, with an approximate length of 21.5 km: This Section starts at the community known as El Aguacate, going through its 21.5 km of road by many communities that, due to their size or location along the side of the existing highway, are very important communities, such as: Las Metalias, Cooperativa Lempira, Pajuiles, Los Planes, Santiago, Zoilabé up to the community of La Mulera, to end at the bridge over San Alejo River.
- Section IV - La Mulera – Tela, with an approximate length of 16.5 km: From the bridge over San Alejo River, this section continues developing with a predominantly NW direction, going through a series of communities located on both sides of the existing highway, among which we can mention: San Alejo at one kilometer on the left side of the road, Cooperativa San Martín, La Montañita, Los Cerritos, Cooperativa Quebrada de Arena, Cooperativa Flores del Guano, Buena Vista, in the urban area of Tela, and just before the Highland Creek Bridge, where this highway section ends.

1.3.2.1 Physical Environment

Throughout the El Progreso - Tela alignment, there are many bodies of water of the permanent and intermittent type, being the main rivers and river gorges the ones presented in Table 1-3. In this case, the construction of 28 boxes or crates and 22 bridges is needed, both of them with different dimensions.

Table 1-3. Bodies of water that run through the alignment

Number	Name	Location	Number	Name	Location
1	Camalote River gorge	5+600	26	Metalias River 2	33+300
2	El Porvenir River	7+900	27	River gorge, Metalias 3	33+800

Number	Name	Location	Number	Name	Location
3	La Núñez River gorge	8+730	28	La Roca River gorge	33+900
4	Agua Blanca River	9+820	29	Pajuiles River gorge	34+900
5	Chindongo River	11+300	30	Pajuiles River	35+500
6	La Cuarenta No. 1 River gorge	14+070	31	Mezapa River	36+200
7	Las Delicia del Jute River gorge	15+300	32	La Amargosa River gorge	37+800
8	La Cuarenta No. 2 River gorge	16+000	33	Santiago River	41+400
9	Toyos River	17+370	34	Cuarenta y Uno River gorge	41+500
10	Guaymitas River	17+700	35	Santiago River gorge	42+000
11	La Colorada River gorge	19+000	36	Zoilabe River	45+700
12	El Sapo River gorge	20+430	37	Buenos Aires River gorge	47+000
13	San Jerónimo River gorge	20+980	38	San Alejo River	49+150
14	Guaymón River	22+600	39	La Mulera River	51+200
15	El Zorrillo River gorge	23+400	40	Los Jutes River gorge	53+300
16	Las Delicias River gorge	24+130	41	Avícola Las Palomas River gorge	55+000
17	Las Lichas River gorge	24+930	42	La Fragosa River	56+700
18	Las Flores River gorge	25+100	43	El Junco River gorge	57+500
19	Congo River	25+950	44	Los Morales River gorge	58+350
20	Chirichil River	26+400	45	El Junco River	58+600
21	La Galana River gorge	26+900	46	La Esperanza River gorge	60+000
22	El Zorrillo River gorge	23+400	47	La Esperanza River	61+000
23	Potrillo River	31+000	48	Venecia River gorge	63+000
24	Las Metalias River gorge	31+900	49	Lancetilla River	67+700
25	Metalias River 1	33+000	50	Highland Creek River	68+600

Source: The Concessionary, based on a field trip.

Just as in La Barca - El Progreso Highway section, this section is characterized by extensive and highly productive water resources, as well as rocks with local and limited underground water resources.

In terms of soil, according to Simmons, section I, El Progreso - Chindongo, will develop over alluvial soils. In section II, Chindongo - El Aguacate, it is possible to find soils from the Valley, Toyos soils, and Tomalá soils, being these very fertile soils used predominantly for technical crops, such as African palm. In Section III, El Aguacate - La Mulera, presents as well Toyos soils, which are occupied with subsistence crops, such

as corn and beans, in a shifting agriculture system and a considerable surface dedicated to free grazing. Lastly, in Section IV La Mulera - Tela, there are alluvial soils with presence of sand.

There are two geologic formations present: the Qal - Quaternary Alluvium formation, from the Cenozoic Era, which corresponds to recent continental and marine sediments, including piedmont deposits and gravel terraces, flood plains, and basin deposits. On the other hand, Intrusive rocks (Ki), comprise granites, diorites, tonalites of variable ages.

Based on Zúñiga's climate classification, within the project area the following climates can be found: very rainy, windward (El Progreso), very rainy, tropical (El Progreso, El Negrito), very rainy with regular rain distribution (Tela), and very rainy with rainy winter (Tela). According to the data provided by the National Meteorological Service of Honduras (June, 2013), at the Yoro Climatological Station the annual rainfall is estimated at 2,200 mm and, at the Tela Climatological Station, the annual rainfall mean is of 2,800 mm. The average relative humidity in Yoro is 75% and in Tela, 82%. An average annual temperature of 27°C is present, being the months of May, June, and July the hottest, with an average temperature of 29°C, and the coldest months, December and January, present temperatures ranging between 23 and 24°C.

According to the National Territory Information System, PNUD's (2011) flood threat coverage presents a flood plain with recurrence higher than 50 years in areas near the alignment. The areas that have a tendency to flooding are located in the communities near the Ulúa River in the Municipality of El Progreso; in the communities of Guaymón, Toyos, Nuevo San Antonio, and El Naranjo, in the Municipality of El Negrito; and near to the communities of Zoilabé, El Jute, Los Cerritos, El Guano, El Junco, and La Tarralosa, in the Municipality of Tela. Again, to reduce the risk of flooding of both the road and the surrounding terrains, the necessary hydrological studies were made for the appropriate design of the hydraulic engineering works of this highway section, therefore avoiding the unnecessary water accumulation.

Finally, due to the orography of where this highway section is located, the area of the project presents a low risk to landslide threats.

1.3.2.2 Biological Environment

The Tuning and road widening of the El Progreso - Tela Highway section will have no affect over protected areas. However, for descriptive purposes, the protected areas near the alignment are presented as reference of its conservation status and species reported.

- Mico Quemado National Park, located in the sector of the urban area of El Progreso, is found approximately at 4 kilometers from the point closest to the alignment.
- Lancetilla Botanical Garden and Research Center: It is located 1 km from the alignment and is one of the most important protected areas of Honduras, which receives a great amount of visitors per year.
- Punta Sal National Park: Created by Decree 154-94 and is located 2 km. from the alignment.

Fauna

In order to carry out a representative inventory of the fauna in this highway section where the highway is expected to be widened, thirteen (13) points were strategically selected. In each point, a tour or field trip was performed in order to collect information regarding the fauna present in the vegetation areas, roads, and sources of water in an area of approximately 50 meters on both sides of the existing road and in the area where the new bypass of the City of El Progreso will be built, with the following data to report:

- Birds: Specifically in the area where the new bypass will be located, 12 bird species were identified, 11 of these are common species and the Roadside hawk, which is an important species as it is found at the end of the food chain and is found as well in Appendix II of CITES. In the remaining part of the highway section, 8 orders, 23 genders, and 25 species of resident birds were recorded and, of these, 3 are included in Appendix II of CITES: 2 species of birds of prey (hawks) and one hummingbird species.
- Herpetofauna: During the field trips, there were sightings of 3 families, 3 genders, and 3 species of lizards, among them the spiny-tailed iguana (*Ctenosaura similis*), brown basilik (*Basiliscus vitattus*), and the whiptail lizard (*Cnemidophorus sp.*). However, by the type of ecosystem it is possible to find in the surrounding areas the *pichetes bandera* (*Norops sp)*, iguanas (*iguana iguana*), and *pichete rayado* (*Sceloforus sp.*), among others. It is also possible to find amphibian species such as *Hyla Microcephala, Smilisca bahudini, sinax staufferi Lithobates* and, luckily, the red-eyed frogs, *Duelmanohila salvavida* (endemic) or *Agalychnis.*
- Ichthyofauna: The endemic species reported for this highway section are: *Agonostomus monticola and Joturus pichardi.* The native species are: *Rhamdia laticauda, Astianax fasciatus, Dormitator maculatus, Poecilia sp.1, Poecilia sp.2, Alfaro huberi, Lutjanus sp., Centropomus sp, and Paracromis managuensis.* As exotic species, *Oerochromis sp.* is reported.
- Mammalian Fauna: There have been reports of sightings of stripped skunks of the *conepatus sp.* genus, opossums (*Didelphis marsupialis*) on the highway and, in the zone near the Botanical Garden, there have been occasional sightings of jaguars (*pantera onca*) near the highway. This species is reported for the Lancetilla Botanical Garden and for the Janeth Kawas National Park.

Flora

In the area where the new bypass will be located, there were sightings of 16 plant species, mainly plants used for human consumption: Mango, papaya, cassava, guava, sugarcane, and occasionally, species such as charcoal, *indio desnudo* (*Bursera simaruba*), *guarumo* (*Cecropia obtusifolia Bertol*), willow, *guazuma* (*Guazuma ulmifolia*), and a group of teaks. Additional to these species, there are some sections where African Palm can be found.

In the 13 points assessed in this highway section, 64 species of trees distributed in 58 families and 28 genders were reported. At the 31 km+ 600 mark a tree with many epiphytes species was found. Among the species there were cactus (*Risalis vaccifera*), orchids, ferns, and bromeliads. These 4 groups of plants are found in the categories under protection by CITES.

1.3.2.3 Socioeconomic Environment

The municipalities with in the Socioeconomic Area of Influence of this highway section are El Progreso and El Negrito, in the Department of Yoro, and the Municipality of Tela in the Department of Atlántida. The population estimate for the year 2010, carried out by INEH (Honduran National Institute of Statistics), for the municipalities of the socioeconomic area of influence is presented on Table 1-4:

Table 1-4. Estimate of Population by Municipalities, Rural and Urban Area 2010

Department/ Municipality	Urban Population			Rural Population			TOTAL
	Male	Female	Total	Male	Female	Total	
Yoro	141,171	152,487	293,658	131,475	126,967	258,442	552100
El Progreso	84,916	92,535	177,451	13,406	13,572	26,978	204,429
El Negrito	9,564	9,940	19,504	12,424	12,126	24,550	44,054
Atlántida	128,350	138,003	266,353	71,801	69,397	141,198	407,551
Tela	22,179	23,354	45,533	21,330	20,780	42,110	87,664

Source: *Instituto Nacional de Estadísticas de Honduras* (Honduran National Institute of Statistics). Population Projections by Departments and Municipalities. 2010.

In terms of urban and rural population of the socioeconomic area of influence for this highway section it can be seen that, in the Municipality of El Progreso, most of the population is located in the urban area (87%); in contrast, in the Municipalities of El Negrito and Tela, the urban population decreases to 56% and 52%, respectively.

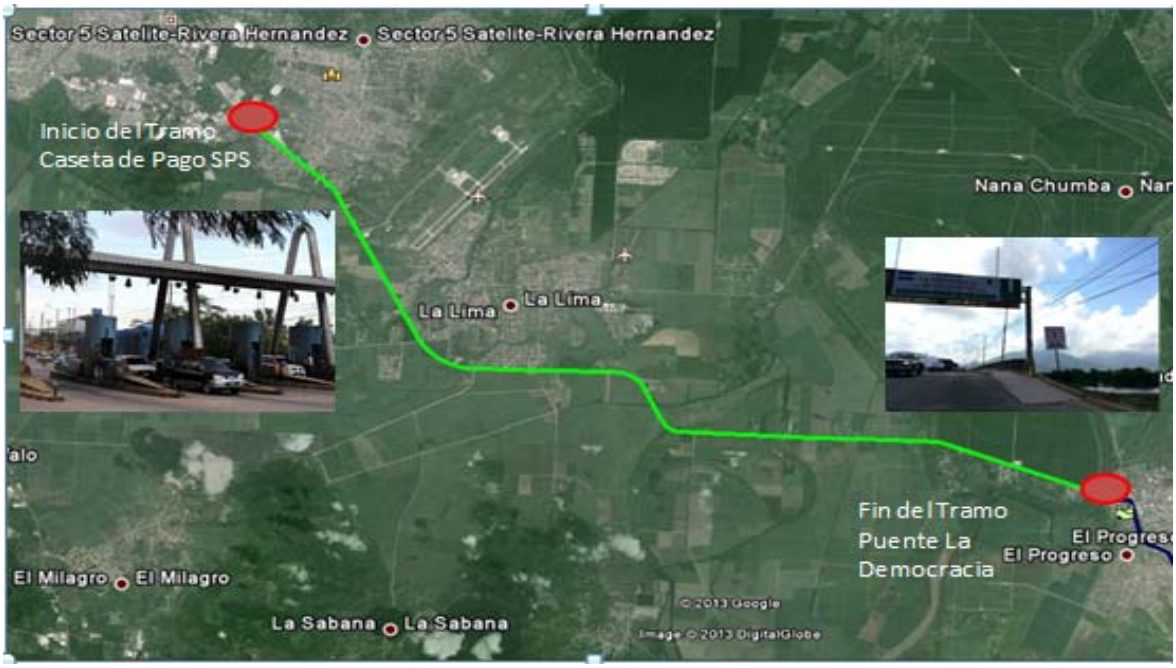
The economic development of the Municipality of El Progreso is varied; most of the economically active population (EAP) is concentrated mainly in the Business Activities sector (with 27.27% share), followed by the Manufacturing Industry with 23.60%, the Services sector with 13.64%, the Agricultural sector with 6.6%, and the rest of the EAP is distributed in the remaining economic activities. In contrast, a considerable amount of the inhabitants of the Municipality of El Negrito work on agricultural production (staple crops, coffee, plantains, rice, tobacco, citrus fruits, vegetable crops, and fruits) and cattle farming. The predominant activities in the Municipality of Tela are related to the economy's primary sector, mainly oriented to agriculture and cattle farming, activities characterized by the presence of traditional, non-technical production systems. Within the services (the tertiary sector), the Municipality has mainly businesses dedicated to trade, transportation, and tourism.

1.3.3 San Pedro Sula – El Progreso Highway Section

The San Pedro Sula – El Progreso highway section is located in one of the main road systems of Honduras, the CA-13, specifically joining the Municipalities of San Pedro Sula, La Lima, and San Manuel in the Department of Cortés and the Municipality of El Progreso, in the Department of Yoro. This section

starts after crossing the toll house in the city of San Pedro Sula, up to the bridge of La Democracia, in the Municipality of El Progreso. See Figure 1-3:

Figure 1-3. Geographic Location of San Pedro Sula – El Progreso Highway section



Source: http://www.sinit.hn/index.php

In this 17.5 km highway section, there will be a selective tuning or rehabilitation of the highway with the replacement of concrete pads wherever it is necessary, the maintenance of sewage and bridge works, horizontal and vertical signals, and the construction of a toll house, an activity that will have a duration of 10 months. It is included, as well, the rehabilitation of the central segment of La Democracia Bridge which fell down in the year 2009 due to an earthquake; this activity will have a duration of 24 months.

1.3.3.1 Physical Environment

Throughout the San Pedro Sula - El Progreso alignment there are many bodies of water, being the main ones the Chotepe Canal, Chamelecón River, Ulúa River, and gore of the Chasnigua River.

In the Municipality of San Pedro Sula, the underground water sources contribute with 70% of the annual water production supplied to the area's population. As for the Municipality of El Progreso, the only micro-watershed declared as a Water Production Zone is the Pelo River micro-watershed located in the Mico Quemado Mountain Range. The Highway section, in its entirety, is found in areas of highly-productive water resources.

There are alluvial soils, soils from the Valleys, and Tomalá soils, with use capacity adequate intensive crop rotation.

There are two geologic formations present: the Qal - Quaternary Alluvium formation, from the Cenozoic Era, which corresponds to recent continental and marine sediments, including piedmont deposits and gravel terraces, flood plains, and basin deposits. On the other hand, Intrusive rocks (Ki), comprise granites, diorites, tonalites of variable ages.

According to Zúñiga's climate classification, the following climates are present in the project's area: very rainy, windward and very rainy, tropical. The annual rainfall is estimated at 1,210 mm and the monthly average temperature varies from 24°C in December and January, to 29°C in May and June.

In terms of natural threats, some of the bodies of water with records related to flooding are the Ulúa and Pelo Rivers in the Municipality of El Progreso. As for this highway section the construction of new drainage works is not considered, only maintenance of the existing ones will be carried out, removing sediments and solid residues in order to allow the continuous flow of runoffs, which intends to reduce the risk of flooding of the areas surrounding this highway section.

Again, there are no areas with tendencies of landslide risk in this highway section since its path is over flat terrains.

1.3.3.2 Biological Environment

Near the alignment of the San Pedro Sula - El Progreso highway section there are no protected areas located.

Fauna

Since in this highway section there will be no modifications made to the highway's structure, the diagnostic field trip was made continuously and no station transepts were made. This highway section is found in a traditionally urban zone, with low diversity reported. Three orders, 7 genders, and 7 species were identified, all residents and none recorded in the CITES appendices. This low diversity can be the result of the low diversity of flora species.

Flora

In the field trip through this highway section, 13 species of trees distributed in 7 families and 13 genders were reported. Some of these are: *Bursera simaruba* (L.) Sarg*. Acacia fistula* L, *Cecropia peltata* L, *Cocos nucifera L,* among others.

1.3.3.3 Socioeconomic Environment

The municipalities within the Socioeconomic Area of Influence of this highway section are: San Pedro Sula, La Lima, San Manuel, and El Progreso. The population estimate for the year 2010, carried out by the *INEH*

(Honduran National Institute of Statistics), for the municipalities of this socioeconomic area of influence is presented on Table 1-5:

Table 1-5. Estimate of Population by Municipalities, Rural and Urban Area 2010

Department/ Municipality	Urban Population			Rural Population			TOTAL
	Male	Female	Total	Male	Female	Total	
Cortés	602,170	655,009	1,257,179	157,306	155,806	313,112	1,570,291
San Pedro Sula	330,975	353,036	684,011	18,251	17,185	35,436	719,447
La Lima	25,585	29,103	54,688	4,399	4,128	8,528	63,216
San Manuel	17,041	19,081	36,122	8,356	8,983	17,339	53,461
Yoro	141,171	152,487	293,658	131,475	126,967	258,442	552100
El Progreso	84,916	92,535	177,451	13,406	13,572	26,978	204,429

Source: INEH. Population Projections by Departments and Municipalities. 2010.

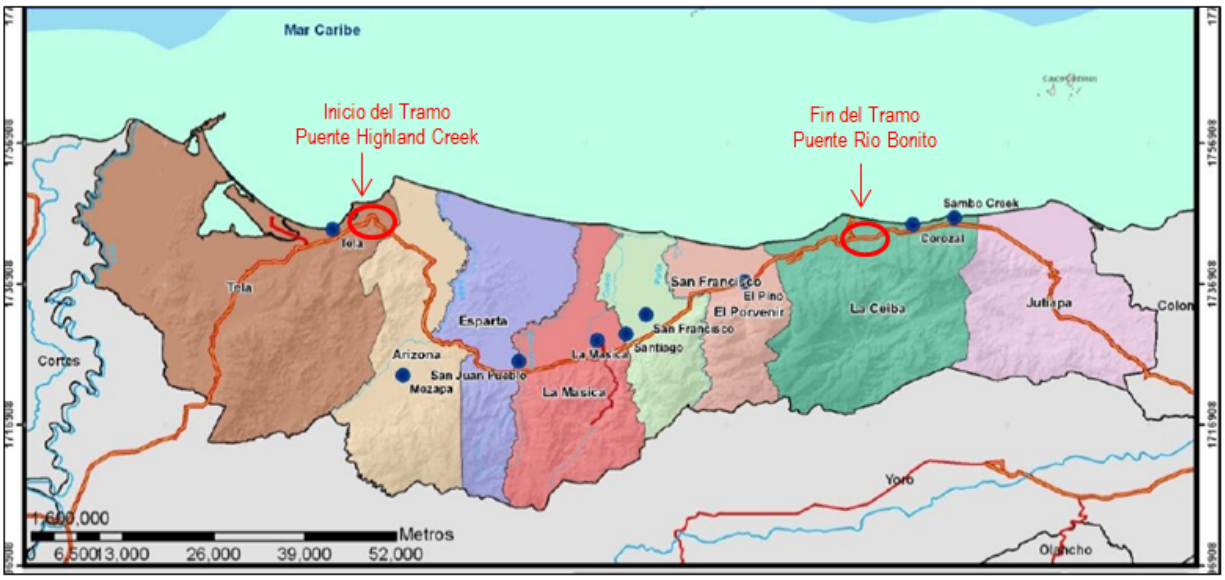
In terms of the urban and rural population of the socioeconomic area of influence, it can be seen that in the Municipality of San Pedro Sula most of the population, 95%, resides in urban areas, while the remaining 5% lives in the rural areas. These majority of urban population is more or less the same for the Municipality of La Lima, with 86%, and the Municipality of El Progreso, with 87% of the population. However, in the Municipality of San Manuel, only 67.5% of the population resides in urban areas.

The main economic activities of the Department of Cortés are represented by the Manufacturing Industry (29%), followed by the Wholesale Business, Retail Business, Hotels, and Restaurants (21.80%), and lastly, the Agriculture, Forestry, Hunting, and Fishing (12.52%). Among the economic activities of the Department of Yoro, the agricultural activities with banana, sugar cane, African palm, plantain, coffee, maize, rice, beans crops are found, as well as livestock activities.

1.3.4 Tela – La Ceiba Highway Section

The Tela - Ceiba highway section is locate in one of Honduras' main road system, the CA-13, joining specifically the Municipalities of Tela, Arizona, Esparta, La Masica, San Francisco, El Porvenir, and La Ceiba in the Department of Atlántida. This highway section starts at the bridge over Highland Creek River (15°46'55.10" - 87°26'2.44") and ends on the bridge over Bonito River (15°44'41.73" - 86°52'7.57") in the Municipality of La Ceiba (see Figure 1-4). In this 97 km highway section, there will be a selective tuning or rehabilitation of the highway with the placement of 5 cm of asphalt surface, the maintenance of sewage and bridge works, and horizontal and vertical signaling, an activity that will have a duration of 12 months.

Figure 1-4. Geographic Location of Tela – La Ceiba Highway section



Source: http://www.sinit.hn/index.php

1.3.4.1 Physical Environment

Throughout the Tela - La Ceiba alignment there are many bodies of water, being the main rivers and river gorges: Highland Creek River, Nutria River, San Antonio River, Santiago River, Plátano River, De Arena River gorge, Hicaque River, Saco River, Coloradito River, Arizona River, León River, Chiquito River, Grande River gorge, Lombardía River gorge, El Espinoso River gorge, Perla River, Alegre River gorge, Agua Tibia River gorge, San Juan River, El Oro River gorge, Agua Caliente River gorge, Bijagualosa River gorge, San Antonio River gorge, Colinas River gorge, Montenegro River gorge, Cuero River, La Presa River gorge, Jimerito River, Cuyamel River, Las Camelias River, Del Trapiche River gorge, Coloradito River, Porvenir River, and Bonito River.

According to the hydrogeologic map, there are moderately productive, local, and extensive water resources throughout the alignment of the Tela - La Ceiba highway section. Also, in areas near the Municipality of Esparta there are rocks with limited and local underground water resources present.

In this highway section there are different types of soils present, such as: Tomalá, Toyos, alluvial soils, soils from the Valleys, and beach sand soils. These soils present different use capacities being the main ones: soils for intensive and extensive crops, and protective forest and selective felling areas.

Based on Zúñiga's climate classification, the region presents a very rainy tropical climate which is characterized by abundant rains all year round without a marked winter season; the average temperatures are permanently around 25°C. The average annual rainfall ranges between 2,000 and 3,000 mm.

Based on the coverage of flooding threats of the National Territory Information System, there is a large flood plain with recurrence higher than 50 years throughout this highway section. The areas or communities with tendencies of flooding in a 1 km radius from the highway section are mentioned below:

- Municipality of Tela: La Ica, San Alejo, El Guano (Col. La Montañita, Col Flores del Guano, kilometer ten), El Junco (Col. Buena Vista, Las Flores), Tarralosa, Puerto Arturo, Tela (kilometer four), El Triunfo de la Cruz (kilometer seven, El Boquete, Las Delicias, Finca Miramar).
- Municipality of Arizona: Arizona (Dakota, Arizona), San Francisco de Saco, Atenas de San Cristóbal or kilometer 16, Hicaque (Col. 16), la Leona or kilometer twelve.
- Municipality of Esparta: Las Américas N°1 and Lombardía or Curva.
- Municipality of La Masica: San Juan Pueblo (Hacienda Pineda, Agua Tibia), El Oro (El Oro, Hda. Fidel Martínez), Agua Caliente, San Antonio, Monte Negro (Bda. Villalobos), El Desvío, El Naranjal (El Japón, Colonia El Paraíso, El Naranjal).
- Municipality of San Francisco: Santa Ana (Las Delicias and Santa Ana) and Saladito.
- Municipality of El Porvenir: La Ruidosa, Caracas (Perlas and Caracas), La Unión (Curva), El Pino (El Playón), López Bonito.

Since in this highway section the construction of new drainage works is not considered, there will be maintenance activities of the existing drainage and sewage works in order to remove the sediments and solid residues to allow the continuous flow of runoffs.

No nearby areas with tendencies of landslides are found in this highway section.

1.3.4.2 Biological Environment

With the Tuning of the Tela - La Ceiba highway section there will be no affect over protected areas. The closest to the alignment are: Punta Izopo National Park located 1.90 km from the alignment and Pico Bonito National Park, located 1.41 km from the alignment.

Fauna

Since in this highway section there will be no modifications made to the highway's structure, the diagnostic field trip was made continuously and no station transepts were made.

- Birds: During this field trip, 5 orders, 19 genders, and 20 species resident of the area were identified. None of them are listed species in CITES.
- Herpetofauna: During the field trips, the presence of 3 families, 3 genders, and 3 species of lizards were seen, among them the spiny-tailed iguana (*Ctenosaura similis*), brown basilik (*Basiliscus vitattus*), and the whiptail lizard (*Cnemidophorus sp.*).

- Ichthyofauna: The endemic species reported for this highway section are: *Agonostomus monticola and Joturus pichardi.* The native species are: *Rhamdia laticauda, Astianax fasciatus, Dormitator maculatus, Poecilia sp.1, Poecilia sp.2, Alfaro huberi, Lutjanus sp., Centropomus sp, and Paracromis managuensis.* As exotic species, *Oerochromis sp.* is reported.
- Mammalian Fauna: There are reports that in the road there have been sightings of striped skunks of the *conepatus sp*. genus, opossum, and *Didelphis marsupialis*.

Flora

In the field trip through this highway section, 53 species of trees distributed in 26 families and 49 genders were reported. Species with economic value can be seen in this highway section, among which the following can be found: pine (*Pinus caribaea*), cedar (*Cedrela odorata*), laurel tree (*Cordia alliodora*), and oak tree (*Swietenia macrophylla*), of the exotic species teak (*Tectona grandis*) and, before arriving to the City of La Ceiba, the most abundant species is *Racospera mangium*, the native plant of Australia. Of these species, the only one recorded in the CITES list is the oak, *Swietenia macrophylla King*.

1.3.4.3 Socioeconomic Environment

The municipalities within the Socioeconomic Area of Influence of this highway section are: Tela, Arizona, Esparta, La Masica, San Francisco, El Porvenir, and La Ceiba, all located in the Department of Atlántida. The population estimate for the year 2010, carried out by the *INEH* (Honduran National Institute of Statistics), for the municipalities of the socioeconomic area of influence, is presented on Table 1-6:

Table 1-6. Estimate of Population by Municipalities, Rural and Urban Area 2010

Department/ Municipality	Urban Population			Rural Population			TOTAL
	Male	Female	Total	Male	Female	Total	
Atlántida	128,350	138,003	266,353	71,801	69,397	141,198	407,551
Tela	22,179	23,354	45,533	21,330	20,780	42,110	87,644
Arizona	2,428	2,699	5,127	8,044	8,205	16,249	21,376
Esparta	-	-	-	8,142	7,947	16,089	16,089
La Masica	5,533	6,411	11,944	8,258	8,000	16,258	28,202
San Francisco	2,996	3,475	6,471	2,800	2,779	5,579	12,050
El Porvenir	7,685	7,404	15,090	4,038	3,390	7,428	22,517
La Ceiba	85,748	92,667	178,414	3,985	3,431	7,416	185,831

Source: *Instituto Nacional de Estadísticas de Honduras* (Honduran National Institute of Statistics). Population Projections by Departments and Municipalities. 2010.

In terms of urban and rural population of the Municipalities of the socioeconomic area of influence, it can be seen that in the Municipality of Tela 65% of the population is urban. In the case of the Municipality of Arizona, 24% of the population is urban, while in the Municipality of Esparta, the entire population is considered as rural. In the Municipality of La Masica 42% of the population is urban, in San Francisco,

approximately 54% of the population is considered as urban. Finally, in the case of the Municipalities of El Porvenir and La Ceiba the urban population represents 67% and 96%, respectively.

The predominant economic activities in almost all the Municipalities of the socioeconomic area of influence of this highway section are related to the economy's primary sector, mainly oriented to agriculture and cattle farming, activities characterized by the presence of traditional, non-technical production systems. In the case of the Municipality of La Ceiba the predominant activities are related to the tertiary sector of the economy, mainly oriented to business, financial services, construction, transport, tourism, among others.

1.4 Identification of the environmental impact caused by the Project

The identification of the environmental impacts was performed following the Leopold Matrix model (modified) – according to the Environmental Assessment and Control Manual from the Secretary of Natural Resources and Environment (*Secretaría de Recursos Naturales y Ambiente* – SERNA, for its initials in Spanish), where the interaction between "Project Activities" and "Affected Components or Environments" are assessed. The environment or components are divided in: 1) Aquatic; 2) Atmospheric; 3) Terrestrial; 4) Biotic; 5) Socio-economic; 6) Historic and Cultural; and 7) Landscape.

A list of significant environmental impacts is obtained as a manner of forecast with the elaboration of the Modified Leopold Matrix, which will be generated on various Stages of the Project. Environmental importance matrixes (MIIA) are elaborated taking as a basis the Modified Leopold Matrix in order to grant an important value to each one of the identified impacts.

Below you will find the main environmental impacts of moderate and serious importance generated by the project, being shown by affected system.

1.4.1 Affectation upon the Atmosphere

Basically you can say that throughout all the Highway sections forming the Touristic Corridor, the air quality is good. All the highway sections cross over urban and rural zones, with presence of several industries, towns and light traffic. Likewise, the project is developed over a completely open area with a great amount of trees, crops and cattle farming areas, thus enabling the dispersion of contaminants and particles.

The most important impacts on air quality are related to the Development and Construction Stages, and obtain more importance on the road widening of the highway sections of La Barca – El Progreso – Tela, since significant amounts of particles in suspension (dust) will be generated as a result of excavations and earthworks over the widening areas of the road as well as quarry areas, also because of dirt track activities due to the operation of heavy equipment upon soils lacking of vegetation. The affectation of air quality will be a result of development activities (maintenance and repair of the causeway and bridges) on San Pedro Sula – El Progreso and Tela – Ceiba highway sections, not including the widening of roads, besides the increase of heavy traffic.

Gas emissions and resulting combustion particles from equipment and machinery motors being used will result in an additional contribution of polluting agents to current air quality, although this additional

contribution will not significantly affect air quality if mitigating measures referring to preventive maintenance of all machinery are used in the Work.

The layout of the surface course and the exploration of quarries require the use of heavy equipment and machinery, reason why noise levels will increase on site indirectly affecting nearby communities. For this reason, a Work Program including a schedule regulating operation of machinery will be established.

Even with the increase of estimated vehicular volume, the initial condition to the concentration of pollutants and particles is not expected to be altered within the operation stage, mainly because the location of these highway sections over completely wide open spaces, allowing the dispersion of these pollutants and particles.

1.4.2 Affectation upon the aquatic system

An alteration of the hydrological regime will occur during the execution of the bridge construction mainly on the road widening highway sections (La Barca – El Progreso-Tela), since it is required to temporarily alter the course of a channel while the foundations of a bridge and its abutments are under construction. This alteration of the channel's courses will result in temporary changes over the hydrological regime of the waterway, causing mild erosion and sedimentation processes.

The construction of the city's Bypass of El Progreso (El Progreso – Tela Highway section) will create a barrier for natural torrents modifying its course; in addition, the paving of the bypass will produce a small change over the local torrent and will probably reduce water infiltration into the water table. However, it is possible the impact for the decrease of the infiltration area is not significant due to municipal zoning for land use of nearby areas to the bypass (Preservation established areas ZPN-1) identified as Zones of Water Resources.

On the other hand, an impact upon the quality or pollution of water will be produced during the exploitation of alluvial quarries over the Development and Construction Stage, since an increase of cloudiness will be produced due to the resuspension of riverbed materials and possible oil spills from engine motors and exploitation equipment.

1.4.3 Affectation upon the Terrestrial System

Among the main impacts to the terrestrial system we can find the affectation by soil compaction, the extraction or loss of soil and the increase of erosive processes, all of these as a result of on site preparation activities, excavation, cut and creation of landfills, and exploitation and transportation of rocky material from quarries in the road widening over the highway sections (La Barca – El Progreso – Tela) and the area of the new bypass at El Progreso city. Work interventions cause a direct breakdown or soil compaction as a result for the road construction and required earthworks, besides the extraction or soil loss specifically over quarries and sloping side cross section areas. In the meantime, an increase within erosion processes will occur when the surface soil is left without vegetation cover being subject to direct action from water and wind.

The polluting impact of the soil due to accidental spill of fuel and/or lubricants, as well as asphalt products or wastes will occur with the development of activities such as preparation of the site, excavation, cut and creation of landfills, exploitation of quarries and layout of surface courses on the Development and Construction Stages. This impact has been considered of medium importance since the produced impact would be reduced with the adoption of good engineering practices and maintenance of the machines.

Over the Operation Stage, the impacts upon the soil are limited to the exploitation of the same quarries for the extraction of material in order to carry out maintenance activities, mainly patching. The amount of required soil, the short duration of these activities, and the use of previously exploited areas will result in a low importance produced impact.

1.4.4 Affectation upon the Biological System

The National System of Protected Areas of Honduras (*Sistema Nacional de Áreas Protegidas de Honduras* – SINAPH, for its initials in Spanish) has established protected areas at adjoining places to the Honduras Tourism Corridor Project (i.e. Lancetilla Botanic Garden), not none of these will be affected by Project's works.

The impacts or affectations to be produced over the surrounding fauna and flora are related to on site preparation activities (cleaning and removal of herbaceous vegetation and tree felling) due to the road widening of the existing two-lane section into four lanes within the right of way or easement area, specifically over the La Barca – El Progreso - Tela highway sections.

At the entrance of Tela community, very close to Lancetilla Botanic Garden, there is a very abundant vegetation on both sides of the road, which is very important to preserve, reason why typical design section has been designed with a reduction of lane's dimensions and the construction of retaining walls, as a mitigation measure against the impact that the road construction may cause to these species of great historic and conservation value.

A calculation of timber-yielding resources and the creation of an exploitation and reforestation plan are recommended previous to the cut and before the construction, taking into account we can find species of commercial importance within plant species reported on road highway sections.

In addition to the affectation of the flora and the habitat alteration, certain perturbation or direct alteration of terrestrial and aquatic fauna will be produced, mainly on construction sites of bridges and on the construction of the new bypass for El Progresso city.

The impacts upon the biological system are reduced over the Operation and Maintenance Stage, since it only requires tree pruning and cleaning of green areas, without carrying out the removal or felling of the area's vegetation, thus likewise reducing the disturbance of terrestrial and aquatic, flora and fauna.

1.4.5 Affectation upon the Socio-economic system

Several affectations will be produced to private land upon the Planning Stage of the Honduras Tourism Corridor Project, specifically over the road widening of La Barca – El Progreso highway section. These

affectations will occur over construction areas of new bridges. Because it is a Government Project, in these cases in particular the evaluation of the compensation must be performed in accordance to article 81 of the Property Law of Honduras.

The modification of vehicular traffic, risk increase of occupational accidents, risk increase of transmission of diseases, and the increase of Public Health problems are being suggested as negative impacts from the socio-economic environment of the Project within the Development and Construction Stages.

The troubles for road users because of project works are also identified as negative socio-economic impact for this Project during the construction stage. Many of the activities considered by this work will bother users and communities close to project alignment, reason why the Concessionaire will have to implement a Work Plan where work schedules are established thus preventing affectations to everyday activities from the Project's socioeconomic influence community areas. In addition, the permanent disclosure and communication with the community is being suggested throughout the Communication Plan and Project Disclosure Campaign.

The relocation of utilities is planned for on site Preparation activity of the road widening highway sections (La Barca- El Progreso – Tela) due to the roadway's widening into four lanes. The need to have a Relocation Utility Program is suggested for this impact.

As positive impacts throughout all the stages of the Project we have job creation, although most job creation will occur during the construction stage and in fewer amounts during operation and maintenance. This Project's activities will engage a great amount of local labor, mainly from the socioeconomic influence area of the Project, for which Education and Training plans are being considered for a better working performance.

Yet more important are the impacts to be produced at the Operation and Maintenance Stage, since this Tourism Corridor Project will result in transit time and fuel savings with the expansion and optimization of the causeway. Also, road safety at all highway sections will be increased, thus reducing the amount of car accidents.

1.4.6 Affectation upon Cultural and Archeological Resources

It has been confirmed throughout field trip performed on July 1, 2013, with personnel from the Honduran Institute of Anthropology and History (*Instituto Hondureño de Antropología e Histórica* – IHAH, for its initials in Spanish) that no affectations to cultural or archeological resources will occur over any of the Honduras Tourist Corridor Project highways sections.

A release certificate of the area, for all the highway sections of this Project has been received from IHAH.

1.4.7 Affectation to the Landscape

The activities will focus within the existing road's right of way or easement, specifically over the road widening highway sections (La Barca – El Progreso –Tela). These areas already suffered certain alteration

when the construction of these highway sections was performed, thus turning into previously invaded areas.

Certain activities have been considered to have an affectation in the landscape such as: the location and operation of provisional facilities, the building (mainly construction of toll booths and concessionaire's management offices), traffic signs and night illumination or lighting.

1.5 Description of foreseen mitigation measures for each type of identified environmental impact

The Environmental Management Plan (*Plan de Gestión Ambiental* – PGA, for its initials in Spanish) describes the programs to be executed by the Developer in order to prevent and minimize environmental impacts during planning, development, construction and operation and maintenance activities of the Project.

PGA's objectives are:

1. To offer SOPTRAVI (the Developer) a document where all identified measures are listed by the consultant in order to prevent, minimize, mitigate and/or compensate potential negative impacts arising from the Project's execution, as well as to strengthen positive impacts;

2. To establish parameters and variables to be used for assessing the environmental quality of the Project's influence area;

3. To establish mechanisms so proper authorities can follow up with environmental variables of the Project and implement required controls;

4. To design prevention and response mechanisms against accidents and contingencies;

5. To ensure the compliance with social and environmental goals of the Project, including the compliance with Equator Principles and the International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability.

Environmental programs which should be implemented in order to prevent, mitigate and/or compensate previously identified negative environmental impacts and to strengthen positive impacts are presented as follows (see Table 1-7).

Table 1-7. Description of expected mitigation measures for each environmental impact

System	Impact	Mitigation Measure	Entity Responsible of Execution	Frequency	Stage	Regulatory body
Aquatic	1a. Alteration of Hydrological regime	• Not to perform material extraction activities at the center of the river's channel, but over proper and marked sites by INHGEOMIN. • Monitoring and Control Program for preventing damage to other areas. • Prevent pit formations and deposit of materials over natural channel torrents, and to prevent stacking of materials above 2m high.	The Concessionaire The environmental agent	Permanent	Construction	• Environmental Municipal Units • UGA SOPTRAVI • SERNA
	1b. Decay in quality or water pollution	• Solid and Liquid Waste Management Program. • Contingency Program: Spill Prevention and Control of polluting substances (oils, fuels, paints, etc.).	The Concessionaire The environmental agent	Permanent	Development Construction Operation	• Environmental Municipal Units • UGA SOPTRAVI • SERNA • Health Secretary
		• Water monitoring Plan over bridge construction places	The Concessionaire The environmental agent	Biannually	Construction	• Environmental Municipal Units • UGA SOPTRAVI • SERNA
Atmospheric	2a. Decay in quality or air pollution	• Preventive Maintenance program for vehicles and construction equipment (a good mechanical condition is required). • Compliance Program for Vehicle Emission Control.	The Concessionaire The environmental agent	Permanent	Development Construction Operation	• Environmental Municipal Units • UGA SOPTRAVI • SERNA • Health Secretary • DNT
		• Monitoring Plan for ambient air and labor quality over control points where most sensitive receptors are located throughout the highway sections.	The Concessionaire The environmental agent	Biannually	Development Construction Operation	
	2b. Dust generation and/or bad odors	• Program for controlling dust emission and for preventing bad odors	The Concessionaire The environmental agent	Permanent	Development Construction Operation	

System	Impact	Mitigation Measure	Entity Responsible of Execution	Frequency	Stage	Regulatory body
Atmospheric	2c. Increase of noise levels	• Preventive Maintenance Program for vehicles and construction equipment (a good mechanical condition of machines' mufflers is required). • Work Program: Avoid as possible to work on resting hours or night shifts, otherwise notify ahead of time to those affected. • Provide workers exposed to 80 dB or higher with hearing protection devices.	The Concessionaire The environmental agent	Permanent	Development Construction Operation	• Environmental Municipal Units • UGA SOPTRAVI • SERNA • Health Secretary • DNT
		• Ambient and Labor Noise Monitoring Plan	The Concessionaire The environmental agent	Biannually	Development Construction Operation	
		• Labor Vibration Monitoring Plan	The Concessionaire The environmental agent	Biannually	Development Construction Operation	
Terrestrial	3a. Affectation for soil compaction	• Vigilance and Control Program; AID's delimitation in order to prevent damages to other areas. • If required at the work completion, to hoe compacted soil due to the crossing of heavy machinery or provisional facilities, and to cover it with garden soil for its subsequent revegetation.	The Concessionaire The environmental agent	Permanent	Development Construction Operation	• Environmental Municipal Units • UGA SOPTRAVI • SERNA
	3b. Decay in quality or soil pollution	• Contingency Program: Prevent as possible accidental spills of polluting substances into the soil. • Contingency Program: Spill Prevention and Control of polluting substances (oils, fuels, paints, etc.). • Solid and Liquid Waste Management Program.	The Concessionaire The environmental agent	Permanent	Development Construction Operation	
	3c. Extraction or soil loss	• Vigilance and Control Program; AID's delimitation in order to prevent damages to other areas.	The Concessionaire The environmental agent	Permanent	Development Construction Operation	

System	Impact	Mitigation Measure	Entity Responsible of Execution	Frequency	Stage	Regulatory body
Biotic	4a. Loss of vegetation cover	• Rescue Program for Flora and Fauna • Reforestation Plan and Ecological compensation payment • Vigilance and Control Program; AID's delimitation in order to prevent damages to other areas.	The Concessionaire The environmental agent	Permanent	Planning Construction	• Environmental Municipal Units • UGA SOPTRAVI • SERNA • CFI
	4b. Alteration or elimination of terrestrial or aquatic fauna	• Vigilance and Control Program; Prevent predation and/or habitat alteration of species	The Concessionaire The environmental agent	Permanent	Development Construction Operation	• Environmental Municipal Units • UGA SOPTRAVI • SERNA • CFI
Socio-economic	5b. Modification of local vehicular traffic	• Work Program: To perform expected traffic signs on the Traffic Management Program. • Coordination with the Traffic National Directorate (DNT) and • Permanent disclosure campaign: To report communities about scheduled works	The Concessionaire The environmental agent	Permanent	Development Construction Operation	• Environmental Municipal Units • SOPTRAVI • SERNA • DNT
	5e. Risk increase of transmission of diseases	• Health and Hygiene Program for prevention of contagious diseases	The Concessionaire The environmental agent	Permanent	Development Construction Operation	• Environmental Municipal Units • SOPTRAVI • SERNA • Health Secretary
	5f. Risk increase of occupational accidents	• Risk and Accident Prevention Plan. • To have first-aid kits and ambulance services. • Training register of workers in first aids and emergency measures	The Concessionaire The environmental agent	Permanent	Development Construction Operation	• Environmental Municipal Units • SOPTRAVI • SERNA • Health Secretary • Ministry of Labor

System	Impact	Mitigation Measure	Entity Responsible of Execution	Frequency	Stage	Regulatory body
	5h. Increase of Public Health problems due to solid and liquid waste generation	• Solid Waste Disposal and Collection Program. • To have portable restrooms for workers and a company in charge of cleaning at least twice a week.	The Concessionaire The environmental agent	Permanent	Development Construction Operation	• Environmental Municipal Units • SOPTRAVI • SERNA • Health Secretary
	5i. Trouble for nearby communities due to Project works	• Work plan: To establish a work schedule preventing affectation of daily community activities. • Work Program: To perform expected traffic signs on the Traffic Management Program. • Coordination with the Traffic National Directorate (DNT) and • Disclosure and Communication Plan: To have a permanent disclosure campaign for affected communities	The Concessionaire The environmental agent	Permanent	Development Construction Operation	• Environmental Municipal Units • SOPTRAVI • SERNA • Health Secretary
	5j. Changes in land use	• Implementation of a Camp and Facility Management Program • Selection according to Municipal Land Use Planning.	The Concessionaire The environmental agent	Permanent	Development Construction	• Environmental Municipal Units • SOPTRAVI • SERNA • Health Secretary
Landscape	7a. Alteration or changes within landscape and environmental aesthetics	• Work Program: To perform expected traffic signs on the Traffic Management Program. • Vigilance and Control Program; AID's delimitation in order to prevent damages to other areas.	The Concessionaire The environmental agent	Permanent	Development Construction Operation	• Environmental Municipal Units • SOPTRAVI • SERNA • Health Secretary

Source: The Consultant

1.6 Description of Public Consultation performed

Concerning the Environmental Assessment Impact, the purpose of a public consultation is to perform a disclosure process and to open a space for discussion and contribution from interested individuals so the final decision regarding the environmental viability of a specific activity, work or project includes this important social element.

Citizen involvement was obtained through the development of several activities out of which we can mention the following:

- Interviews with Stakeholders: These interviews where performed during June, 2013, obtaining the participation of the following authorities:

    - Municipal Mayor of Santa Rita: Wilmer Noé Mejía
    - Municipal Councilors of Santa Rita: Héctor Amaya, Fany Arlet, María Marlenis Yánez, José Santos Rodríguez, Suli Mejía.
    - Municipal Assistance of Santa Rita: Jenny Chávez
    - Chief of the Environmental Municipal Unit of Santa Rita: Maximino Guevara Meza.
    - Municipal Councilor of El Progreso: Oscar Armando Rubí
    - Public Works Chief of El Progreso: Rommel Cano
    - Chief of the Environmental Municipal Department of El Progreso: Ana Zulay Rivas
    - Internship student: Alejandra Gallo
    - Legal Consultant of El Progreso: Maynor López
    - Chief of the Urban Planning Department of El Progreso: Gloria Edith Medina
    - Municipal Mayor of Tela: David Zaccaro
    - Councilor of Tela: Eva Ruth Vanegas
    - Manager of the Environmental Municipal Unit of Tela: Miguel Ordoñez
    - Deputy Manager of the Municipal Unite of Tela: Rafael Milla

Briefings and work meetings: Several work meetings have been performed between the Developer (SOPTRAVI), the Public – Private Alliance Promotion Commission (COALIANZA), the Natural Resources and Environment Secretary (SERNA), Environmental Control and Assessment General Directorate (DECA), Atlantic Highway Consortium (Concessionaire) and consultants preparing technical environmental documents. In addition, field trips over the Tourism Corridor highway sections have been performed with the Developer and Honduran Institute of Anthropology and History (IHAH) personnel.

According to SINEA's regulations, regarding Category 2, 3 and 4 projects, works or activities, the Bidder will notify once the start of the Environmental Impact Assessment (EIA), on an one-eight page in a local coverage newspaper (if any) and another media with national coverage. In addition, to the above, the start

of the EIA will be forecast on a national coverage radio station and a local coverage radio station within the location or department, on hours of major audience at least three times a day, on air time of until one minute and no less than 15 seconds.

Also, a sign will be placed on the grounds where the project will be developed indicating the name of the project, work or activity, its location, Bidder's phone number and address where citizens can obtain further information of the Project.