MINISTRY OF COMUNICATION S AND TRANSPORT

INFRASTRUCTURE UNDERSECRETARIAT

GENERAL DIRECTORATE OF FEDERAL ROADS

ENVIRONMENTAL IMPACT MANIFEST, REGIONAL MODE, FOR THE PROJECT: «ROAD ZACAPU – HIGHWAY MEXICO GUADALAJARA, SUBSTRETCH KM 11+600 TO 19+600, IN THE STATE OF MICHOACAN »

December 2006

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CHAPTER I

GENERAL INFORMATION REGARDING THE PROJECT, PETITIONER, AND PARTY IN CHARGE OF THE ENVIRONMENTAL IMPACT STUDY

I.1. General Project Information

I.1.1. Project code

I.1.2. Name of the Project

Environmental Impact Manifest, Regional Mode, for the project: "**Road Zacapu - E.C Highway Mexico-Guadalajara, substretch Km 11+600 to Km 19+600, in the State of Michoacan**"

I.1.2. [sic] Information regarding the sector and type of project

I.1.2.1. Sector

General Communication Ways.

I.1.2.2. Sub-sector

Road Infrastructure

I.1.2.3. Type of Project

Construction of a new type A2 road.

The stretch has a total length of 8.000 km, beginning at km 11+600 and ending at km 19+600. The construction and operation of a two-lane road, with a crown 12 km wide, Tpe A2, according to the classification of the SCT. From Km 18+600 the trace enters the current road from Villa Jimenez towards Panindícuaro, therefore in this kilometer only an extension of the already existing shall be necessary to comply with the specifications.

I.1.3. Risk study and modality

Does not apply. None of the substances listed in the Hazardous Substances Lists will be used in amounts exceeding the reporting limits stated by environmental authorities.

I.1.4. Location of the Project

I.1.4.1. Streets

The trace shall begin from an intersection with the state road of Zacapu to Villa Juarez, at 500 m northeast of the town Los Espino (UTM coordinates X= 210,669 and Y= 2'203,22 in the 14Q quadrant). Completion of the project is at km 19+600 (UTM coordinates X= 211,583 and Y= 2'210,791 in the 14Q quadrant) at the intersection with the highway Atlacomulco – Guadalajara.

I.1.4.2. State

State of Michoacan

I.1.5.3. Municipalities

Zamora, Ecuandureo, Yurécuaro and La Piedad.

I.1.5. Project's useful life time

An estimate of two years for preparing the site and construction are required.

Once in operation, the project has and undetermined duration, provided it receives adequate maintenance, specially to avoid landslides of the road and deposits of material on the road.

I.1.6. Filing of legal documents

Exhibit 1 includes all legal documents requires, among others:

- Appointment and ID of legal representative
- Statement under oath of consultant
- Professional registry of consultant

I.2. General Information of Petitioner

I.2.1. Name or Legal Name

General Directorate of Federal Roads

I.2.2. Federal Taxpayer Identification Number

SCT- 850101- 8I9

I.2.3. Name of Legal Representative

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General Director of Federal Roads

I.2.4. Petitioner's Address for Notifications

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I.3 Responsible for the preparation of the Environmental Impact Study

I.3.1. Name or Trade Name

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I.3.2. Federal Taxpayer Identification Number

SIO010726-CW0

I.3.4. Name of Technician Responsible of the Study

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CHAPTER II

DESCRIPTION OF WORKS OR ACTIVITIES, AND THE PARTIAL DEVELOPMENT PLANS OR PROGRAMS (IF ANY)

II.1. General Information Regarding the Project

II.1.1. Nature of the project

The project consists of the construction of a paved road (Type A2 according to the road classification by the Ministry of Communications and Transport (S.C.T.)). The road will have the following features: roadway width of 7 m, crown width 12 m, hard shoulders 2.5m.

The maximum speed will be 110 m/h, the road will have 2%-6% slope and a maximum curvature of 0°30'.

The stretch with impacts and mitigation measures which will be described in the study includes Km 11+600 to Km 19+600. At its starting point, it connects with the first stage of the trace (UTM coordinates X= 210,669 and Y= 2'203,22, close to Villa Jimenez) and it ends at the intersection with the Highway Mexico, Guadalajara, in the municipality of Panindícuaro (UTM coordinates X= 211,583 and Y= 2'210,791)

The project has a final length in trace of 8.00 km, and is located in the municipalities of Jimenez and Panindícuaro, in the state of Michoacan.

ANTECEDENTS

Modernization of the Zacapu – Highway Mexico-Guadalajara Road is made up by two section: the first section will only extend the stretch existing (from km 3+100 to km 11+600); for the second section a new trace is projected (from km 11+500 to km 18+820) and an extension of the last stretch (km 18+820 to km 19+600). The new trace has as purpose to move around the population of Villa Jiménez (15+345 inhabitants in 2005), enabling better and safer transit both for drivers and inhabitants of Villa Juarez.

This study provides the environmental impact study corresponding to the second section of the project (construction of the road from Zacapu to the intersection with the Highway Mexico-Guadalajara, sub-stretch km 11+600 to km 19+600).

II.1.2. Justification and Objectives

This project has as purpose to achieve better traffic and safety for land transportation between Zacapu and the cities of Morelia and Guadalajara, through road 15. The project achieves this purpose based on its high specifications (two lanes with broad hard shoulder and reduced turning radios)

and bypass for San Antonio Tariacuri, La Estación, Villa Jimenez, El Ranchito and Huandacuca.

By avoiding crossing small towns, the travel time is reduced and the wear of vehicles and streets, paved or pebbled, and the possibility of accidents inside population areas is reduced.

The TDPA expected is of 3,693 vehicles, with a mix of vehicles type A 70%, type B 10% and type C 20%.

II.1.3 Physical location

The project is located in the State of Michoacan de Ocampo (Figure II.1). The trace extends over the municipalities of Jimenez (form km 11+600 to 16+720= and Panindícuaro (from km 16+720 to 19+600).

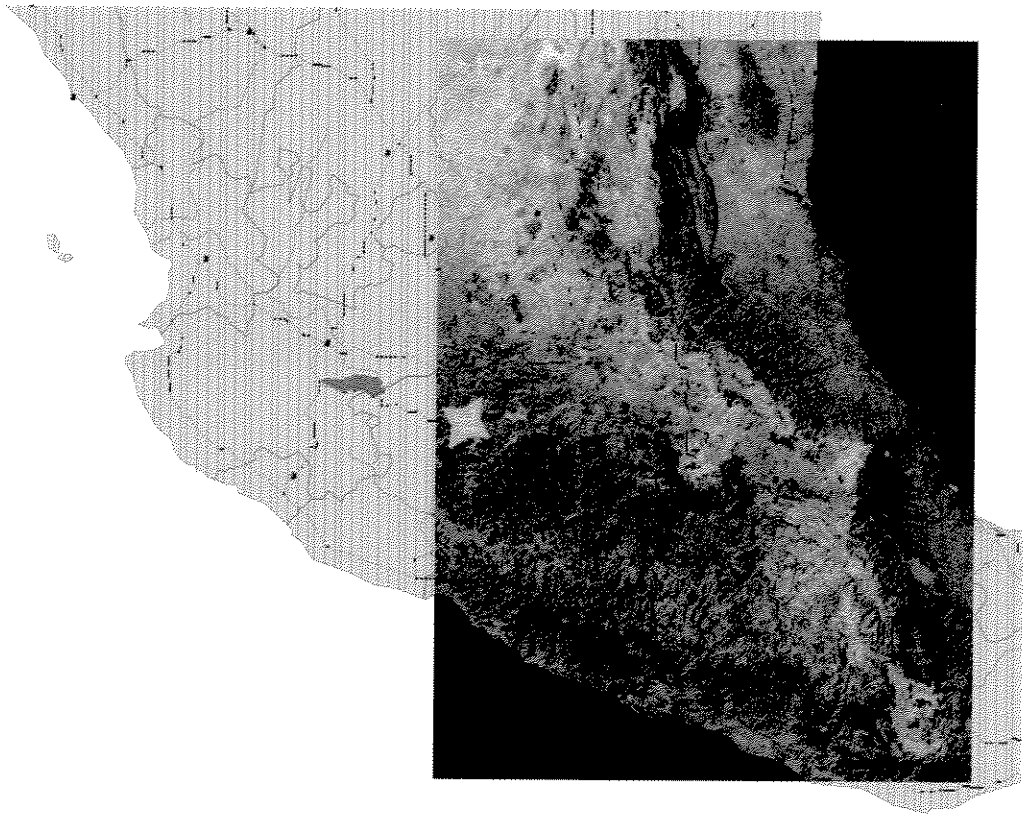

Figure II.1. Sketch of the general location of the project, to the north of the state of Michoacan. Corresponding to the west side of quadrant 13Q[1]. Orientation of the trace is south to north.

[1] For convenience, coordinates of the trace reported in this document were projected to quadrant 14Q.

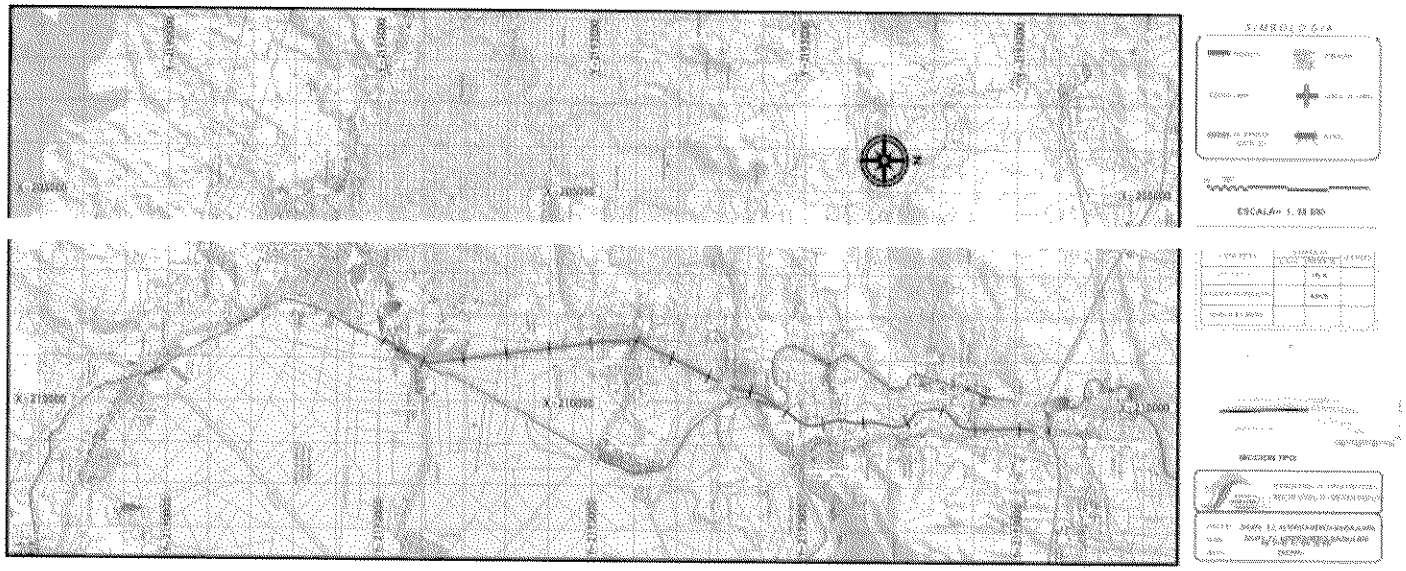

Figure II.2. Project location. It runs south to north. A star indicates the starting point of the project (Km11+600) and another the end point (km 19+600). This manifest shall describe and assess the environmental impact of the substretch (corresponding to new works, of better specifications and the stretch avoiding VillaJuarez and other small towns)

Table II.1. UTM Coordinates of the Project. Quadrant 14Q.

	UTM COORDINATES	
Chaining	X	Y
11+600	210669	2203222
11+750	210693	2203370
12+000	210731	2203617
12+250	210770	2203864
12+500	210899	2204075
12+750	211042	2204280
13+000	211185	2204485
13+250	211322	2204693
13+500	211386	2204934
13+750	211449	2205176
14+000	211513	2205418
14+250	211505	2205667
14+500	211488	2205916
14+750	211471	2206165
15+000	211454	2206415
15+250	211431	2206664
15+500	211406	2206912
15+750	211382	2207161
16+000	211357	2207410
16+250	211287	2207647
16+500	211187	2207876
16+750	211087	2208105
17+000	211071	2208328
17+250	211201	2208542
17+500	211331	2208755
17+750	211461	2208969
18+000	211548	2209194
18+250	211542	2209444
18+500	211535	2209694
18+750	211530	2209944
19+000	211529	2210194
19+250	211553	2210443
19+500	211575	2210692
19+600	211582	2210791

II. 2. Specific Project Features

II.2.1. General Works Description

Construction, operation and maintenance of the new A2-type road with 2 transit lanes and 12.00m wide at its crown (figure 11.3). It also includes one vehicle crossing, 3 intersections (two at level and one overcrossing), two bridges (Table II.2), as well as 31 minor drainage works (mostly concrete pipe) (Table III.3).

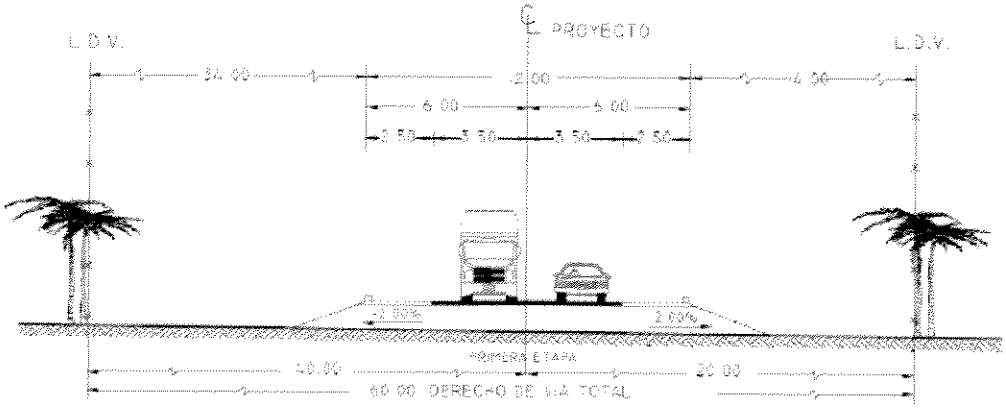

Figure II.3 Cross-section of the project. From Km 11+600 t 19+460 a new body will be built with the characteristics shown in the image.

Tabla II.2. Relación de componentes del proyecto (obras mayores).

Milestone (Km)	Type	Remarks	Sup.
11+600.00	INTERSECTION	Level intersection	7.2
12+834.19	P.S.V.	Bridge over railroad (77 m)	
14+445.00	INTERSECTION	Overcrossing intersection	4.4
16+780.00	BRIDGE	River w/o name. (Length 30 m)	
18+060.00	INTERSECTION	Level intersection	2.6
18+446.50	BRIDGE	River w/o name. (Length 64 m)	

Drainage, both minor and major, was designed to service the specific hydraulic conditions in the drippings detected in the area. The correct hydraulic functioning of the works enables a longer duration of the projected road, and avoids affectation son the local drainage pattern.

Table II.3 List of minor drainage Works.

Milestone	Concrete pipe	Other than concrete pipe	Mat excavation A (m_3)	Mat excavation B (m_3)
12+185.50	TC-1.20 m		28	111
12+240.00	TC-1.20 m		31	20
12+313.70	TC-1.20 m		77	52
12+374.00	TC-1.20 m		153	102
12+520.00	TC-1.05 m		8	5
12+925.43	2TC-1.50 m	32	22	
13+430.00		L-4.0x2.5 m	71	284
13+504.00		B-2.0x1.5 m	81	323
13+848.50	TC-1.20 m		5	19
15+080.00	TC-1.20 m		6	24
15+440.00		L-4.0x2.5 m		205
15+955.37	TC-1.20 m			10
16+000.00		L-6.0x4.5 m		263
16+029.16	TC-1.20 m			7
16+181.69	TC-1.20 m			8
16+240.00	TC-1.20 m			13
16+456.27		L-1.5x1.0 m		15
16+539.37	TC-1.20 m			7
16+682.95		L-6.0x2.0 m		218
17+016.80	TC-1.20 m			10
17+058.38		L-1.5x1.0 m		20
17+163.45		L-1.5x1.0 m		30
17+246.75	TC-1.20 m			12
17+313.34	TC-1.20 m			6
17+391.82	TC-1.20 m			7
17+519.87	TC-1.20 m			12
17+620.83	TC-1.20 m			8
17+694.88	TC-1.20 m			6
17+801.73	TC-1.20 m			7
17+928.11	TC-1.20 m			8
18+039.91		L-2.5x1.0 m		45

II. 2.2. Surfaces

The project has 60 meters in width of right of way. The total surface under the right of way is of 62.20 Ha, of which 20.32 Ha correspond to the line in between zeros, where the clearing, stripping, creation of embankment or leveling will take place. The crown area only represents 20% of the surface with right of way in the project (Table II.4).

Table II.2. Surface taken by the Project Activities

Activities	Ha	Total Percentage of the Area
Permanent		
Right of way	62.2	100%
Area in between zero line, to clear and level	34.52	55.5%
Stripping	16.72	26.9%
Leveled and overpass intersections	14.2	22.8%
PSV	0.03	0.0%
Road crown	9.60	15.4%
Provisional		
Material banks	Two loan banks are under commercial operation. The Project proposes opening a bank with an approximate surface of 0.65 Ha. The other four banks in commercial operation are being considered for use but no decision has been made yet.	

II.2.3. Access roads to the area where works or activities are developed

In order to access the different work front to be occupied during the construction of the road, the existing dirt roads mentioned bellow: To get to the first three kilometers of the project access is via Santa Gertrudis and La Virgen, to access the following five kilometers from Villa Jimenez and the current road to Panindicuaro. Therefore, it will not be necessary to build any access roads and the impact thereof is not considered.

II.2.4. Selection of the route

Inhabitants of the area were surveyed with regard their preference between two alternatives: toll highway (a brand new trace) or a road (part of the extension to that already existing and the bypass of Villa Jimenez). The population decided for the second.

The technical development of the route analyzed the information by sections, through photo-interpretation studies, topographic, geological studies and of material banks; also using data of geological materials existing in the region where the road is to be built, as well as the characteristics, volumes and geographical location of the materials that may be used. An important part is compliance with the specifications and the land movement economy.

II.2.5 Current use of land on the site

According to the cartography of INEGI (Use of land and vegetation, scale 1:250,000), the project's site corresponds fully to irrigation agriculture. The trace of the site allows determining that while the dominance of agricultural activity is evident, there are also other distinguishable uses: Protected Natural Area (around the volcanic cone named Hoya Alberca de los Espinos) and gallery forest (on the borders between plots and the federal zone of channels and steams, between kilometer xx and xx, between Villa Jimenez and Zipimeo).

The road trace and its right of way extends for the nearby Villa Jimenez and Panindicuaro. The towns of Zipimeo, Barrio La Piedad and El Fresno de la Reforma are at the western side of the trace and El Ranchito and Huandacuca are located to the east.

II.2.5.1 Priority Attention Areas

The trace do not cross nor is adjacently located to the Protected Natural Areas of federal jurisdiction, nor does it cross historic sites or indigenous important zones. We do not know that it crosses archeological zones or conservation zones and/or restricted exploitation. On the other hand, the trace crosses through gallery forest zones, a type of habitat which gathers restricted distribution species.

The trace cross, in a tangential manner, the northeast side of the state reserve called "La Alberca de los Espinos", a reservation decreed on January 16, 2003 with an approximate area of 142.12 hectares. It is a tourist site, but unlinked to evident conservation strategy. In fact, one of the loaning banks, in commercial operation, is located within the reserve. The project does not generate new impacts on the site, because the trace was deviated to avoid entering to this area. The right of way of the project gets into it a few meters, but it is not contemplated the carrying out of preparation activities of the site nor construction. Chapter III will analyze the congruency of the project with the protection guidelines of this reserve and the proposals for compliance or bonding.

The sub-stretch is relatively close to a natural zone under protection: the site of Ramsar del Humedal and the Protected Natural Area of the Zacapu Lagoon and its riverside Tzacapo Tacanendam, decreed by the Ministry of Urbanism and Environment of the State of Michoacan in October 2006. This site is constituted by the Zacapu Lagoon and is located at 8.5 Km from the beginning of the trace. We should point out that the Zacapu Valley and the flowerings under protection are outside the right of way of the project, so they are not crossed by the trace nor is it contemplated the carrying out of activities which can damage them.

In fact, the agriculture and livestock activities of the zone has caused evident alterations over the original conditions of the natural communities of the zone, in more than 80% of its surface.

II.2.6 Description of the required services

Electricity

The electrical power necessary for the use or certain equipments, such as welding gear, used for some of the drainage works. Electrical power will be supplied through portable power plants of internal combustion. Power- a 2,500 watts system will be required.

Fuels

The fuel will be mainly gasoline and diesel for vehicles, machinery, and equipment.

During the construction stage the fuel supply will be performed in metal or plastic container to avoid loss due to evaporation. Said containers must be safe for transportation to the site of the machinery or device requiring gasoline. Fuel will be taken from the Zacapu, Villa Jimenez or in Panindicuaro gas station, in plastic or metal containers safe for the transportation of fuel. Due to the short distance from the gas station to the site of works, we do not consider that storing fuel will be necessary.

Based on the PEMEX regulations, the Land Transport regulations of SCT and NOM- 001- SCT2- 1994, NOM- 020- SCT2- 1994, the maximum transportation volume of the Federal Public Service or particular vehicles authorized for the gasoline transportation service is 20,000 liters at points not authorized by PEMEX. The stations may only store fuel in 55-gallon drums in covered trucks (with a maximum of 12 to 12 drums) and it is recommended that the maximum storage quantity is the necessary for only three days of operation, in order to minimize the fire risks. Occupational hazard precautions shall be taken which imply the use of fuels. The required volumes vary, but it is estimated that a weekly consumption is from 4,000 to 5,000 liters of fuel and from 2,000 to 3,000 liters of diesel.

Water requirements

The use of raw water is variable, in accordance with the specific activities that are carried out in that day or days. The main consumption of raw water are for the mix preparation and irrigation. For the work in rough roads 100 liters/m^3 is needed, this amount of water includes the conformation of embankments in the work and the dumping bank, as well as in the conformation of sub-base and cut compacting.

Raw water will be supplied by means of tankers. We estimate a weekly consumption of 200 to 300 m^3 during construction.

Potable water requirements

The use of potable water is also variable, in accordance with the amount of workers, the intensity of activities, climate, and relative humidity that is on the work zone. Potable water will be supplied in plastic 20-liter demijohns which will

be purchased by the contracting party in the nearby commercial establishments from the work. We estimate a weekly consumption of 500 to 600 liters (25 to 30 demijohns).

Explosives requirements

None

Machinery requirements

In an approximate manner, we anticipate the following machinery:

MACHINERY	NUMBER	TIME (MONTH)
Loader	4	14
D-8 tractor	4	12
14 m^3 trucks	20	14
Grader	4	14
Sheet compacter	3	14
Goat-leg type compacter	3	14
Vibrating roller compacter	3	12
1000-liter tanker	4	12
3-ton truck	4	14
¾-ton truck	7	14
1-cement sack mixer	8	14

II.2.7. Description of works and provisional and associated activities

The opening of access ways is not contemplated because the existing ones are considered enough for the moving of materials and equipment.

There will not be any construction of camps or warehouses because the existing ones are considered enough for the workers to spend the night. The repairs can be made in Zacapu or Morelia.

Environmental impact corresponding to engineering camps, work offices, maneuver yards, workshops or warehouses are not included in the study. In the event that the contracting party requires enabling this type of infrastructure, it shall apply and obtain for the corresponding permits, including, if necessary, the environmental impact authorization.

In the event complementary works are needed, such as offices in front of the works, camps or warehouses, the contracting party shall follow the Concept Catalog established by the SCT. In this case, it is recommended that the asphalt plant or plants are located inside a material bank or banks in commercial exploitation.

It is expected the use of three bank materials, two of them in commercial operation (Table II.5). Additional banks are not included in this study. Neither the asphalt plants.

Table II.5 Loan banks

Location	Use	Volume	Name	In operation
Km 11+400 D/I 1500 m	Sub-slope	100,000	La Fortuna	Commercial
Km 12+000 D/I 150 m	Sub-slope	60,000	La Alberca	Commercial
Km 13+000 D/D 100m	Embankment	12,800	No name	New opening
Km 19+600 different distances	Rough roads	Not defined	Three banks in operation	Commercial

II.2.8 General work schedule

The project has total construction duration of 24 months, in accordance with the activity schedule. It is estimated to begin in the first semester of 2004, according to the date of issue, if applicable, of the resolution on environmental impact matters and the development of the acquisition of the lands in the rights of way as well as the tender and signing of the contract with the constructing company.

The following schedule shall be taken into account by the participants in the tender. In the event of amendments, these may be justified by the proposing party.

Table II.6. Activity schedule for the construction of the project

	Bi-monthly periods											
Activities	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Environmental impact preventive measures												
Clearing												
Cleaning												
Leveling												
Environmental impact corrective measures												
Embankment body												
Drainage works												
Rough roads and paving												
Signaling												

II.3 Site preparation and construction

In this stage, the land shall be left in the proper conditions for the beginning of the construction of the highway such as clearing and cleaning in addition to earth movements such as cuts and embankments.

Clearing: A clearing must be carried out in the embankment, the affected vegetation shall be the ecotone of the gallery forest and the deciduous tropical forest, as well as the extensions in the deciduous tropical forest from middle to high degrees of perturbation located in the zero line. This activity consists of:

- Trimming and cutting of trees and shrubs.
- Rubbing, consisting of eliminating weeds, grass or seed residues.
- Unrooting, consisting of taking out logs, stumps with roots or by cutting them.
- Cleaning, consisting on retiring the product of the clearing work to the place indicated in Chapter VI hereof. (MM5).

The volume of affected wood species are included in Annex 6.

The 35% of the trace shall not cross through conserved vegetation but in farming lands (active and inactive).

Cleaning: this activity is carried out to withdraw the first soil stratum and try to fond the land with the better quality in order to construct rough roads, in this case, the cleaning shall be an average of 0.20 m (Annex 8 includes the plant plans and the profile per each km^2). In total, a volume of 41,195 m^3 of cleaning material shall be obtained for the construction of the embankment body, cuts and cleaning of the embankment. Such material shall be handled as set forth in the mitigation measures numbers 5 and 7 (Chapter VI of this Manifest).

Leveling: shall be made in accordance with the land conditions and with compliance with the project specifications. The procedure consists in carrying out the extraction of soil and rock until reaching the required depth, the leveling base will be compacted with a depth of 0.10 m until reaching 90% of its maximum volumetric dry weight of the Proctor test. The product of the diggings shall compensate for the construction of embankments. The remaining material shall be destined to compensation works (MM5, Chapter VI).

Due to that the land has slopes lower than 15%, in the major part of the run, the cuts are lower than 4 meters in its highest point. We have expected at least 9 excavation sites of cuts greater than 5 meters in the following locations: km 11+950 (20 meter cut), 120+054 (6 meter), 12+120 (9 meter), 12+350 (9 meter), 12+700 (16 meter), 13+220 (7.4 meter), 13+640 (16 meter), 14+360 (15 meter), 14+760 (9 meter).

The cleaning in cuts and excavations and the embankment clearing shall produce 41,195 m^3 of material. Also, part of the excavation material can be used. In this project, it is estimated a waste of about 200,191 m^3 of cut materials and excavations and 4,107 m^3 of box material for embankment clearing, totaling 2104,598 m^3 which may be disposed in accordance with the provisions set forth in the mitigation works (M5 and M7, Chapter VI).

Table II.7. Breakdown of material volumes per clearing and waste

Concept	M^3
Clearing cut	12,981
Clearing for embankment cleaning	28,214
Excavation cut waste	200,191
Waste from excavation boxes for embankment clearing	4,107

Drainage works: Before constructing the embankments on streams and draining, the minor drainage works shall be constructed which are included in Table II.3. as well as the structures of the bridges in kilometers 12+834.189 (PSV), 16+780.00 (30-meter long), 18+446.50 (64-meter long).

The excavations for the structures of drainage works shall be carried out up to the clearing level that is indicated in the project or that indicated by the supervision with a fatigue capacity of natural land of 1.80 kg/cm^2, in order to do this, the excavation shall be tuned to receive the structural elements of the executive project.

The material product of the excavation shall be used for the protection of sewers.

The filling material used for the protection of the slabs supported in the boards can be made from the materials coming from excavations and/or from the banks for the construction of rough roads, compacted in layers of 20 cm on both sides of the work up to a minimum of 90% if its laboratory P.V.S.M.

The masonry for the construction of the boards of the slabs, head walls and contention walls shall be of 3rd class and will be constructed with the indicated bank stone joined with mortar of sand-cement with a proportion of 1:5.

The masonry that will be constructed in the back of the boards of the slabs supported in contention boards or walls shall be 30 cm thick as from where the transversal drains clay or PVC tubes that will be placed in the boards or walls with a spacing of 3.00 meters.

The *zampeado* shall be constructed of 3rd-class masonry joining the stone with sand-cement mortar 1:5 of 30 cm thick and shall be used for the construction of the slab sewers, between the boards, between the entry and exit wings of these works, in the sidewalk coverings and/or where the supervision indicates.

For the construction of bridges it is necessary that the excavation is carried out under the boards and piles, until reaching a layer of homogeneous material of greater resistance, usually under the level of the river bank.

From this point, the casting of the distribution piles and plates begins, which, support the columns. Normally, these activities are carried out during the dry season and the work is done on dry land. The columns support a distribution tie in which pre-manufactured ties are placed. The upper face of the ties supports a concrete slab and the bearing surface, that shall be of the same concrete.

The columns support a distribution tie in which pre-manufactured and pre-tensed ties are placed with clearances up to 35 meters, economic length for columns with low height. The ties in "T" shape normally require seven of them to complete a section of 12.5 and 10.5 width with pedestrian sidewalks, edges and parapets.

The upper face of the ties supports a thin concrete slab and the surface of the bearing which can be of the same concrete or from flexible pavement.

The sidewalk usually contains ducts for the installation of electric lighting, as the case may be, or to house electric, optic fiber, or water cables, taking into account that these elements shall be needed in the future.

Embankment body: Shall use material from the loan banks, as per the corresponding stretch, which shall have a compacting process of 30-cm layers passing through the leveler and then to the compacter until reaching the 30% of the dry volumetric weight for the Porter test.

The sublevel layer shall be construed using the material of the authorized banks as per the stretch, then, the rocks will be removed from the site, adding water until compacting to 95% of its maximum volumetric dry weight for the Porter test, in layers of 15 cm until reaching a minimum width of 30 cm both in the cut zones as in the embankments. Ditches and counter-ditches shall be construed in the requiring stretches.

The structures for pavement shall be construed in layers which shall be as per the Construction Standards of the SCT, Book 3.

The hydraulic base shall be construed of the bank material indicated in Table II.3 which shall be sieved up to a maximum size of 3.8 cm and shall be placed in the stretch in a manner that when mixed with water and compacted at 98% of it maximum dry volumetric Porter weight.

The stabilized based shall be construed of materials coming from the banks (Table II.3) and shall be crushed and sieved in the bank to obtain a maximum of 3.8 cm fine. The material shall carry the construction stretch so when extended it is applied with 5% of Portland cement with respect to the free volumetric material and the necessary water. A layer will be conformed that, when mixed and compacted at 100% of its maximum dry volumetric weight, a layer of 15 cm is obtained.

A impregnation spraying shall be placed so that, when once the base is finished, sweeped and with no loose material, the impregnation spraying is applied for agglutination, the spraying shall be applied with an Type RR-3K asphalt emulsion or similar with a dosage of 0.8 to 1.2 L/m^2.

The bonding spraying has the purpose of joining the pavement layers and shall be applied once the impregnation spraying has dried out, a asphalt emulsion of quick breakage Type RR-3K or similar will be carried out with a dosage of 0.6 to 1.0 L/m^2.

The asphalt layer shall be construed using asphalt concrete of the plant, the glanurometry of the rocky material shall be of 1.9 cm fine and Type AC-20 asphalt cement. 100% of its maximum volumetric weight determined by the Marshall test so a 10 cm thickness is obtained. The layer shall be placed at a minimum temperature of 120^{0}C and begin the compacting process at 110^{0}C.

The seal spraying is placed to water-proof such layer and avoid water filtrations and detachments, a seal spraying with asphalt emulsion of quick breakage RR-3K or similar with a proportion of 1.4 to 1.8 liters per square meter shall be applied, covering it immediately with rocky material 3rd type on a variable amount of 9 to 11 p/m^2. The rocky and asphalt materials shall comply with the material quality standards indicated in Book 4 of the SCT technical specifications.

Intersections: The construction of 3 intersections is considered, 2 of which would be at level and one at sub-level. The sub-level intersection (Km 14+445) is projected for the communication with the Zipimeo-Villa Jimenez road, while the other two intersections at level are located at the beginning and end of the sub-stroke, the one located at Km 11+600 allows the communication with Tariacuri (to the southeast) and Villa Jimenez (to the northeast). The intersection located in Km 18+060 allows communication to Fresno de la Reforma (to the west) and Huandacuca (to the south).

Complementary works: With the purpose of providing adequate protection to the dirt roads and pavement, it is necessary to construct complementary works such as: curbs, gutters, channels and culverts that will allow for a quick and easy flow of the pluvial water concentrated on the bearing surface, in accordance with climatologic data from the region where the work site is located.

Hydraulic concrete curbs

Hydraulic concrete curbs will be constructed in the locations indicated on the project. Curbs will be F'c= 150 kg/cm^2 with a 144 cm^2 section as indicated on the project (Appendix 8), using aggregates that comply with the specified quality standards. Hydraulic concrete cased gutters left or right of the cuts will have a compression resistance of F'c= 150 kg/ cm^2 and ten (10) of thickness, according to the project specifications, using gravel and sand aggregates from the bank indicated on Table II.3.

Hydraulic concrete culverts and channels: Culverts on the embankment slopes, concrete cased channels, and those required for protection and flow of pluvial water on the bearing surface and drainage works outlet will be constructed using hydraulic concrete with compression fatigue of F'c= 150 kg/cm^2 using gravel and sand aggregates from the material banks (Table II.3)

Signals: Finally, horizontal and vertical signals will be installed: preventive, restrictive, and informative signals, as specified on the signal project.

Transportation for dirt roads and volumes per kilometer specifications can be consulted in the project's plants and profiles, and a summary is included in Table II.5 (Appendix 8).

Table II.8 Work volumes, movement of dirt

Work	Volume (m^3)
Clearing volume	41,195
Usable cut volume	1,753,095
Non-usable cut volume	54,928
Volume of pavement from borrowing bank (Tlazalal Bank, in operation)	102,218
Volume of rough road from borrowing bank (La Fortuna Bank, in operation)	100,000
Volume of rough road from borrowing bank (La Alberca Bank, in operation)	60,000
Volume of rough road from borrowing bank (Unnamed Bank, new opening)	12,800
Four borrowing banks, in commercial operation, loan for rough roads	Undefined

II.4 Operation Program

II.4.1 Operation Program

Works referred to in this section are those of operation and preservation of the bodies once they are built: repainting of the lane dividing lines, replacement of signals and warnings, repairing the asphalt course, periodical cleaning of the course, right of way and hydraulic works, as well as maintaining the green areas.

The Corrective and preventive preservation programs mentioned below, as well as the routine preservation program of SCT, must be observed in order to maintain the roads, to provide an adequate service, and a longer useful life.

Preventive and corrective preservation program by SCT.

1. Initial fortnightly program for prevention and protection, which must be updated annually. The updated fortnightly programs must be delivered to the SCT center.

2. Obtain the current service index or IRI of the bearing surface, to outline the homogeneous stretches. For pavement assessment, proceed as indicated by the Mexican Pavement Protection System, or the system applicable to the road.

3. Assess the state of gutters and culverts, and to repair those showing problem at the time of inspection. Proceed as indicated in appendix PC- 2 corresponding to the Preventive Preservation Program of SCT for undertaking of the corresponding studies.

4. Inspect the sites and signals that show irregularities. For signal assessment, proceed as indicated in appendix PC- 5 corresponding to the Preventive Preservation Program of SCT.

5. Hire the execution of studies concerning the status of the roads. Send the completed study to the corresponding SCT center, indicating the solution alternative deemed adequate.

6. Prepare the alternative works program approved by SCT for reconstruction works if necessary, in accordance with the study outcomes. Settle the execution of the program along with the corresponding General Direction of SCT Center.

7. Supervise the execution of the works in progress permanently until conclusion, performing quality control of the works.

Routine preservation program.

1. Perform daily road inspections in order to identify areas of problem and correcting them, regarding:

a. Fences and right of way invasion. Reforestation, when necessary.

b. Landslide, garbage, and bearing surface cleaning.

c. Lack of signals that pose a hazard to the users or that may cause disorientation.

2. Perform weekly road inspections (or whenever necessary), or to take immediate action when required, in order to detect and correct problems regarding:

a. Regular signals and barriers

b. Drainage works

c. Complementary drainage works

d. Potholes, patching, cracks, deformation, etc, of the pavement.

e. Withdrawal or censorship of non- authorized advertisement.

f. Gutter and right of way cleaning.

g. Road damage due to accidents.

h. Top ditches and sub-drainages.

i. Boxes and/ or input and output channels of drainage works.

j. Local cut failure.

k. Poles and warning signs

l. Weeding and pruning.

II.4.2 Maintenance Program

Replacement of signals will be performed whenever necessary with the purpose of providing an adequate signal layout to prevent accidents.

Slope maintenance involves daily checking of the slopes, in order to report any landslides, with the purpose of cleaning the material and check for possible pavement damage on a daily basis using loaders and dump trucks.

Overall pavement maintenance can be performed constantly as routine maintenance performing tasks such as patching, seal irrigation, replacement of stone material, warning signs, paint, etc.

Maintenance is performed on a daily basis according to the stretch and deterioration state. Accordingly, periodical maintenance activities must be performed including patching, re-leveling, course relaying, and general maintenance. Periodicity must be included according to the pavement state reports and the general maintenance program throughout the useful life of the road.

Preventive Maintenance

This stage consist of undertaking preservation works where no special or large size tools are required for procedures such as signal replacement, slope maintenance, lamp checking, painting, and bearing surface material replacement.

Major Maintenance

This type of maintenance consists of works where a lane or transit body of the road must be closed in order to perform relaying of courses or major maintenance of the bearing surface, and to install warning signs.

Service Level Verification

This activity consists of test scanning the area with four passenger design vehicles to determine the level of service of the road.

Review Scanning

Review Scanning is a control and supervision-oriented series of activities for maintenance works and road operation.

The project will not be forsaken, provided that it is a road with high specifications and continuous use.

Actions to be performed in the event of spillage of hazardous substances due to accidents.

The immediate intervention of the authorities will be requested: The State's Communication Department, Civil Protection and the State's Urbanism and Environment Department, which shall determine the level of hazardousness of

the substance spilled and to carry out the protection plans to the civil population and to the environment, as necessary.

II.4.3 Personnel and supply requirements during the construction phase

II.4.3.1 Personnel

In the construction of the project, workers, machinery operators, officials, official supervisors, resident and supervisor participate. The amount of workers and supervisors varies depending on the activities and specific needs of the project, which vary as the work is progressing. In a general manner, it is estimated the employment of between 80 and 120 workers during the construction.

Table II.9 Personnel required during the preparation phase and the construction of the project.

Stage	No. of workers	Type of employment	Activity
Preparation of site	80	6 months	Topographic, geo-hydrological uprising. Clearing, cleaning, stomp removal, etc
Construction of the project	120	24 months	Leveling, rough roads, placement of bases, drainage works and signaling

II.4.3.2 Materials and substances

In order to prepare the site only, fuel is required for the machinery. For the construction it might require, also, electricity for certain equipment as well as lubricants and solvents. For rough roads and pavement rocky materials and water is used. The estimated volume of water required for the compacting of embankments as well as the irrigation to avoid of dust is approximately 30 m^3.

Other materials or substances are required for their personnel such as potable water (in 20-liter demijohns) and raw water for ordinary use (transported in tankers).

Machinery used on the operation of the road consists of a pick- up truck to transport the personnel and crews required for the road operation. Regarding maintenance, pipes will be required to irrigate the green areas, for vegetation maintenance, and lighting in zones of the road that require so. Furthermore, a truck will be necessary for debris and garbage collection after cleaning works of the course and annex works such as sewers, drains, and gutters, as well as for work quadrille transportation. Eventually, equipment will be required for minor maintenance such as patching, and collocation or replacement of the signals and paint on the bearing surface.

Table II.10 Materials and substances.

Material	Supply source	Amount required
Gravel, sand and lime from material banks	Borrowing banks	179,362 m^3
Type B material	Leveling compensations	64,123 m^3
Type AC- 20 asphalt cement (to be mixed with bank material at a 150 L/m^3 ratio)	Supply company	114,254 L
Paint	Supply company	66 L
Vertical signs	Supply company	32 pieces

II.4.4 Residues and waste

Solid wastes. Wastes from ground and vegetation remains resulting from clearing and stripping. A portion of the cleared material can be donated to the local inhabitants to be used as fire wood and lumber (in the case of trees or woody bushes). Another type of waste will be those produced by the leveling, a portion of these will be used for the construction of the fill; the remainder will be used in the manner explained in the following paragraph.

The material produced by clearing and stripping that is not donated will be used according to Chapter VI, to furnish unused material banks for the growth of the vegetation. The stone material produced by the leveling cuts will be placed in material banks left unused after the work has concluded.

It is estimated that 74 workers (with a maximum of 120 to 140) will be employed, and the project shall have an approximate duration of 24 months, although not every activity will be performed simultaneously. It is expected that 80% of the domestic type wastes will be generated in their original locations and only 20% in the work sites. Considering the garbage generation factor of 0.450 kg/person, the domestic wastes generated in the work sites are expected to be approximately 4,860 kg in total for the entire operation.

It is expected that this generation will be produced by waste such as paper bags, card board, glass and plastic packages, among others (12 kg per month maximum); as well as empty cans including some content of paint, solvents, oil or lubricant, used oil and greased burlap, these last ones can not be considered hazardous due to their volume, nevertheless they must be handled separately from the purely domestic wastes. Therefore, two separate litter containers must be used, one for domestic wastes and the other for any material that came in contact with any type of solvent, oil, paint, lubricant or grease. The first container will be delivered to the municipal garbage disposal system, and the second container will be disposed in the nearby gas stations to be handled along with their own wastes.

The repair and maintenance of construction vehicles shall generate waste in the mechanical or electric workshops. The major repairs shall be carried out in the cities of Zacapu, La Barca or Morelia. These works are obliged to comply with the Rulings of the General Law on Ecologic Equilibrium and Environment Protection as well as with the NOM-003-SCT2-1994 and NOM-011-SCT2-1994.

It will be strictly forbidden to perform a mayor overhaul to the machinery in the work site or any site other than the authorized workshops, including for activities such as oil change.

Other types of solid wastes will be produced by the litter generated by the road users. Generally these types of waste consist in paper, tin cans, food remains, plastic bags, etc. Given the rural characteristics of the area, it is likely to encounter rubble and construction waste. These wastes will have to be collected periodically and transferred to disposal sites that that comply with the regulations for the final disposal of domestic wastes.

Liquid wastes. The project is not expected to generate liquid waste. Due to the workers' hygiene, they may be some discharges, but the volume is not considered relevant. As some of the workers will be local, the discharges would have been made, even without the realization of the project.

For this project, and as a mitigation measure for the proper handling of toilet waste, it is established that portable toilets (saniseco or SIDRO) will be installed in the work sites, and the company providing this service will be responsible for the maintenance of this equipment.

The work operation will consider the construction of adequate slopes for the disposal of the water from the bearing surface.

The asphalt plant will be placed above a cement and concrete surface to avoid asphalt leaks.

Emissions to the atmosphere. The construction activities produce dust (due to the movement of rocks and sediments) and gases (due to combustion). The zone has adequate conditions for the fast emission dispersion. In any event, the machinery shall comply with the official standards that regulate contaminant emissions.

The vehicular transit considered in the project will imply emissions of sulfur dioxide, nitrogen oxide, carbon monoxide, hydrocarbons, and suspended particles. The quantities and concentrations of the emissions will vary depending on the quantity of vehicles, the fuel consumption, and the condition of the engines. The operation of the project shall allow a reduction in the emission levels measured by time unit or kilometer, since the new road will expedite the journey and will avoid traffic congestion due to town crossings.

CHAPTER III
LINK WITH THE PLANNING INSTRUMENTS AND APPLICABLE LEGAL ORDINANCES

III.1. Link with the National and Regional Sector Policies

Link with the National Program of the Road and Communication Sector 2001-2006

Guideline	Link
Strategic Line 1.1 Modernization of road corridors through regional coverage projects. Line of action 1.1.1 National Program of Federal Road Construction and Modernization Permanent efforts are carried out to construct new roads improving the communication towards regions and towns, and to modernize and extend the capacity of existing roads with security or traffic jam problems. One hundred eleven trenches of the net, are required to perform works in, which shall allow to have 89 percent of the total length of 14 corridors at the end of 2006 modernized (Page 83, Chapter 4).	This project modernizes the road infrastructure of Zacapu towards Panindícuaro and, therefore, the trunk with the Guadalajara highway. The project shall release part of the traffic in the current state road and reduce the accident risk, both for vehicles and for inhabitants of the surrounding towns.

Link with the State Plan of the Development for Michoacán 2003-2008

Chapter VI. LOOKING FOR AN EQUAL AND SUSTAINABLE ECONOMIC DEVELOPMENT

Guideline	Compliance proposal
Most of the territory in the northern part of the state is influence by the people, capital, merchandise and information flow shaft joining the region city of Mexico center... with the third urban and economic crowd of the country: the Metropolitan Guadalajara Zone. Such flow shaft is supported by the unfinished highway Mexico City – Guadalajara, to which the Sahuayo, La Piedad, Zamora-Jacona and Morelia accesses are connected, and through which the Patzcuaro and Uruapan accesses: that is to say, articulates the most important cities from the north of Michoacán (Page 75).	Project is an improvement for transportation between Zacapu and the Guadalajara highway, which shall allow speeding up the economic flow in the central portion of the Michoacán Low-lying area.

Infrastructure Programs for Development. The state highway net shall be extended to better link, among others, the city of Zitácuaro, Ciudad Hidalgo, Morelia, Zacapu, Apatzingán, Uruapan, Zamora, La Piedad and Sahuayo (Page 76).	

In Chapter VII. ENVIRONMENT AND SUSTAINABILITY

Consideration	Compliance proposal
The most important urban centers, in the regional vehicle flows crossings is in conflict with the traffic trench of its main areas, or with the minor locations structures inherited from the pass and inappropriate for extensive use (Page 88).	This project prevents crossing with minor locations, which shall help to make easier the vehicle flow traffic in these locations, derived from foreign transit.

Link with the Territorial Ecological Ordinance for the State of Michoacán

In accordance with the provision set forth in the State Plan of Development for Michoacán 2003-2008, regarding the Environment and Sustainability, the Territorial Ecologic Ordinance (OET, acronym in Spanish), is under preparation for the State of Michoacán. Currently, a technical study has been completed and several information on water, ANPs, Ramsar sites, UMA, mining extraction and stone banks (III and IV Government Report) is being included thereto. The State Plan establishes that the OET shall be the main instrument for any environmental policy, in order to induce and regulate the appropriate use of natural resources existing in certain space.

Jointly, and based on an appropriate regional, territorial, ecologic ordinance are prepared in order to guide recovery programs for productive potentiality and environmental cleaning up (municipal swage, treatment, rural zone building of latrines, sustainable management of municipal of solid waste, etc.), giving options for industrial uses of swage and for promotion of recycling and reuse industries for solid waste.

Regarding the urban matters, the OET, takes into consideration the establishment of general guidelines for ecologic regulating of human settlings to prevent and correct the regional environmental impact of population centers. This action is specifically important in an entity where the fast growing of urban zones has combined with fill or no planning and lack of strict mechanisms for soil use regulation.

The New Regionalization

The government of the state of Michoacán, implemented a new regionalization to plan the development as from 2004, with three basic criteria:

1. Municipality as indivisible unit,
2. Hydrographic basin,
3. Socio-economic functionality, defined by the medium cities and the paved roads joining them.

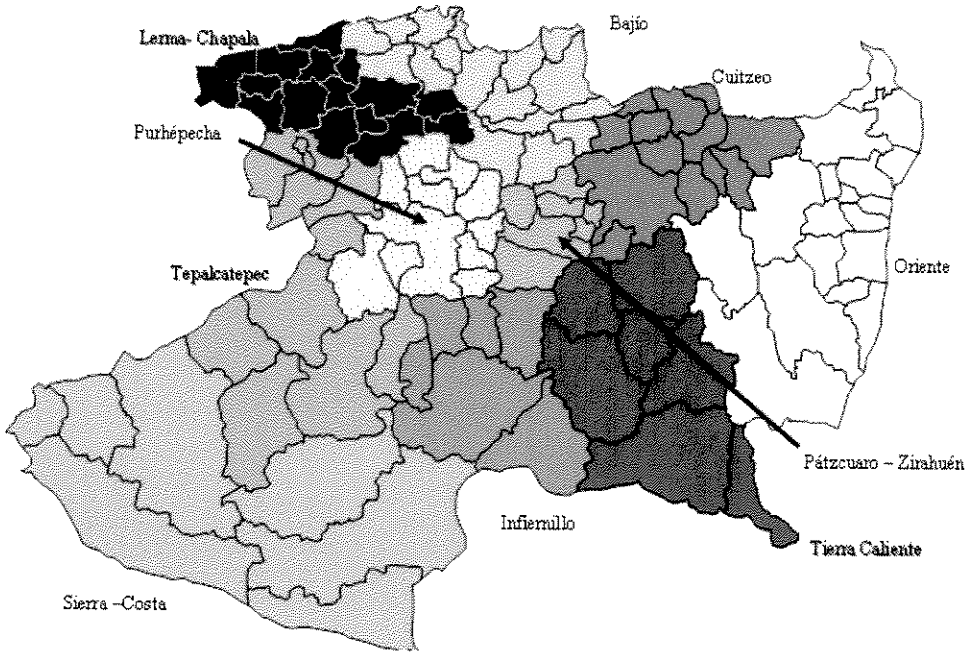

Figure II.1. Map of the new regionalization for the state of Michoacán (2004).

In this way, the state of state of Michoacán has been divided in ten having regional planning and development Subcommittees (SUPLADER) as concertation spaces where instances and entities converge to plan and manage resources.

REGIONS	SUPLADER MEMBERS	SUPLADER COMPONENTS
I. Lerma Chapala II. Bajío III. Cuitzeo IV. Oriente V. Teaplcatepec Vi. Purépecha VII. Pátzcuaro-Zirahuén VIII. Tierra Caliente IX. Sierra Costa X. Infiernillo	Sustainable District Boards for Rural Development Basin Boards Regional Units for Sustainable Forestry Management Civil Society Organizations	

The project in question is inserted in region II, known as Bajío; currently the Secretaría de Planeación y Desarrollo (SEPLADE) [Ministry of Planning and Development], through Suplader II Bajío, prepares the Regional Development Plan which is in its final preparation stage. Strategies and policies derived from this plan are listed below:

Table III.1 Relevance of the project with the Development Plan of Bajío region II.

Development Area	Project Link
Water (urban, rural, management, treatment, recycling, etc.)	In the construction stage of the work, the normativity in force shall be observed to use the water and its final disposal, including the provisions established by the municipal authorities.
Sustainable agriculture and Livestock	Foster for these activities shall be directly reinforced by the highway existence, due to the prompt mobilization of people and goods.
Migration and shipments	
Sustainable social tourism	The project is not related to these development policies.
Zones with flow risk	Reforestry in high zones with native species
Erosion and soil pollution	The project shall follow the normativity in force on solid waste management and the provision set forth by the municipal authorities to use garbage domes in construction stages and operation of the project.
Handling of solid residues	
Trading (internal and exogenous, for example, Guanajuato, Jalisco, State of Mexico and Federal District).	The project is in compliance with the foster for goods, merchandise and region services trading.

III.2. ANALYSIS OF THE APPLICABLE ENVIRONMENTAL NORMATIVE LAWS AND INSTRUMENTS

Compliance of the regulations regarding environmental protection

General Ecologic Balance and Environmental Protection Law (LGEEPA)

Guideline	Compliance proposal
Articles 28, 30, and 35, through which it is established that the sponsor of a project must obtain the corresponding authorization from the Ministry in regard to the environmental impact. The type of projects that require the authorization are indicated, as well as the resolution that might be issued by the Ministry.	This document has been prepared as a part of the request presented by the sponsor, and the technical elements that will evaluated by the SEMARNAT personnel in order to deliver a resolution.

Regulations of the LGEEPA regarding assessment of environmental impact

Guideline	Compliance proposal
Article 5.- Whoever intends to perform any of the following works or activities are required to have the previous authorization issued by the Ministry in regard to the environmental impact, section b) general routes of communication in which the construction of roads has been indicated.	This project includes construction of a road, therefore the authorization regarding environmental impact is requested.
Article 11.- Statements of environmental impact shall be submitted as of regional mode when regarding: paragraph I Industrial and Aquatic Parks, aquatic farms larger than 500 hectares, roads and railroad tracks, nuclear energy generation projects, dams and, in general projects altering the hydrologic basins.	These projects include construction of road, with supplementary works, as three trunks, two bridges and minor drainage works. In compliance with paragraph I, it is submitted on a regional mode.
Article 13.- Statement of environmental impact, as of regional mode, shall include the following information: I. General data for the project, sponsor, and individual responsible for the environmental impact study; II. Description of the works and activities, and if applicable, of the partial programs or plans for development; III. Links between the planning instruments and the applicable judicial guidelines; IV. Description of the regional environmental system, and indication of the development trends and of the regional deterioration; V. Identification, description and evaluation of the environmental, cumulative, and residual impacts of the regional environmental system; VI. Strategies for the prevention and mitigation of the environmental, cumulative, and residual impacts of the regional environmental system; VII. Regional environmental forecast, and if applicable, alternative evaluations; and VIII. Identification of the methodological instruments and technical elements that support the results presented by the environmental impact manifestation.	In this document, each chapter corresponds to a paragraph of Article 13.

General Law for Wild life

Guideline	Compliance proposal
Article 18.- The proprietors and rightful owners of the lands where the wild life is distributed will have the right to the sustainable use of these lands and will have the obligation to aid the preservation of the habitat according to the terms established in this Law. Likewise, they will be entitled to transfer this prerogative to third parties, withholding the right to participate in the benefits derived from the aforementioned use. Owners and legitimate persons possessing such plots of land, as well as third parties performing the benefit, shall be joint responsible for the negative effects that the latter may have to preserve the wild life and habitat thereof.	SCT, once the easement right is released, shall be the owner of the plots of land and may perform the use[2] 1 of the wild fauna. Applicant shall be interested in trading in any form whatsoever the form, but shall require performing the collection of examples of plants and animals, to comply with the mitigation measure 3 as indicated in Chapter VI.
Article 19. The authorities that intervene in the activities related to the use of the land, water and other natural resources for agricultural, livestock, fish farms, forestry and other purposes will act in accordance to the provisions established this Law, and will adopt the required measures to ensure that the aforementioned activities are performed in a manner that prevents, repairs, compensates, or minimizes any negative effect of these activities on the wild life and its habitat	For this project the mitigation measures (Chapter VI) trending to minimize the negative effects of construction and operation of struck on wild life and habitat thereof are designed.
Articles 29 through 31 of Chapter VI state that the capture and management of wild fauna shall be dissent and respectful and cause as minor stress as possible.	The mitigation measures include, among others, the proposal to rescue wild fauna, which implies to scare away through noise and catch and transport in canvas bags such fauna. The environmental impact supervisor shall verify that management thereof is in compliance with articles 29 through 31. Mitigation measure 1 (Chapter VI) establishes the guidelines to prevent that the personnel captures, disturbs or damages the wild fauna.

Compliance with the state regulations regarding environmental protection

[2] Use of examples parts or derived from wild species, through collection, capture or hunting.

General Law of Ecologic Balance and Environmental Protection for the State of Michoacán de Ocampo (Official Gazette of the State, November 22, 2004).

Guideline	Compliance proposal
Articles 96, 139 and 154 of the law establish the guidelines and criteria to preserve and protect the soil, water and atmosphere resources, respectively.	Guidelines of these articles shall be in compliance with the federal legislation (LGEEPA). Use and management of natural resources during the preparation stages for the site, construction and operations of the project, shall be in compliance with the provision set forth in both laws.
Article 163. It is set forth that use of minerals or substances not reserved for the federation, constituting the nature deposit, similar to land components, such as rocks or products resulting from fragmentation thereof, which may be used for and in the construction, the industry or for hornament purpose, shall require the authorization from the ministry, which shall state the environmental protection and ecologic restoration measures that may be implemented in the extraction banks and in the management and processing facilities.	This document is prepared as part of the request submitted by the applicant, and includes the technical elements as regards the use of material banks, in order to be assessed by the state authority regarding such matters, in coordination with the SEMARNAT for the preparation of its resolution.

Compliance with the regulations regarding communication roads

Law of National Property

Guideline	Compliance proposal
Paragraph IX and X of article 29 define the bridges, road and highways as common use goods. Article 30 defines who has the right to use the common goods, as well as the permitted uses.	The road infrastructure contemplated in this project shall be of common use. In the operation stage, the SCT shall be in charged of verifying that the uses and users of the road correspond with anything establish therefore.
Article 22 defines the construction, conservation and exploitation of the roads and bridges as a public right. Therefore, SCT is responsible for the sale and purchase through the interested parties, for the expropriation of lands, for the construction, and for the material banks required. SCT is authorized to use national land and sea territory, as well as the exiting materials contained within in accordance to the legal provisions.	The purchase and sale transaction or expropriation of plots of land necessary to perform the easement right release procedure in such away that it is in compliance with the article and by means of a resolution with the current owners. The need to place fences to the surrounding plots of land is not still final. If necessary, the plots of land shall provide

	conditions that prevent the pass of livestock to the road, for security reasons.
Article 27 establishes that Ministry may demand of the plots of lands surrounding the roads to place fences or delimit the roads, for security reasons, as require, regarding the easement right.	

Expropriation Law (1997)

Guideline	Link
Article 10 establishes that the price set as indemnity for the expropriated good will be equivalent to the commercial value set, and in the case of real states, the value must not be lower to the fiscal value assigned in the cadastral or tax collectors offices.	The negotiations for the release of the right of way must be performed with the necessary discretion. No tensions are expected given that the municipal authorities have expressed their intention to have the road built

Standards

The Mexican Official Standards (NOM) in regard to the environmental impact are a tool that allow the environmental authorities to establish permissible requirements, specifications, conditions, procedures, goals, parameters, and limits that will have to be observed in regions, zones, basins, or ecosystems for the use of the natural resources through the development of economic activities, use of goods, supplies, ad processes. In addition, NOMs perform an essential role in the generation of a confident judicial environment and promote the technological change with the purpose of providing a more efficient protection of the environment.

Table III.2. Mexican Official Standards issued by SEMARNAT in regard to the Project

Mexican Official Standard	NOM Specification	Project application
WATER CONTAMINATION		
NOM-001-SEMARNAT-1996. Establishes the maximum permitted limits of the pollutant content in the residual discharges in national waters and goods.	4.1 The concentration of basic pollutants, heavy metals and cyanides in the residual water discharges in national waters and goods must not exceed the maximum permitted limits in Tables 2 and 3 of the Mexican Official Standard. The potential hydrogen (pH) permissible range is 5 to 10 units.	The project will avoid the toilet discharges through the use of portable toilets, as described in the mitigation measure 1.
NOM-002-SEMARNAT.1996. Establishes the maximum permitted limits of pollutant content in the residual water discharges in the urban and municipal sewer system.	4.1 The maximum permitted limits of the pollutants in the residual waters discharged in the urban and municipal sewers must not exceed the figures established in Table 1. IN the case of greases and ails the average is calculated in relation to the flow rate, resulting from the analysis performed to each of the simple samples.	The standard applies for discharges in the sewer systems, it is expected for the workers to contribute to the discharges through the residual water generated by toilet use, showers, dish washing and laundry. Given that a large quantity of the workers will be local, it is reasonable to assume that their daily activities would have produced the same amount of discharges, and therefore the pollutant load increase is insignificant
WATER CONTAMINATION		
NOM-041-SEMARNAT-1999. Establishes the maximum permitted limits for pollutant gas emissions produced form the exhausts of the automotive vehicles in circulation fueled by gasoline.	The standard is mandatory for the individuals responsible for the automotive vehicles fueled with gasoline, with the exception of machinery intended for the construction industry, among others (section 1 of the referred Standard)	The compliance with this standard will be accomplished through the mitigation measure 2, which establishes the inspection of emissions produced by light, medium and heavy trucks employed in the preparation, construction and maintenance of the project.

Mexican Official Standard	NOM Specification	Project application
NOM-045-SEMARNAT-1996. Establishes the maximum permitted levels for the opacity of the smoke produced by the exhausts of automotive vehicles in circulation fueled with diesel o mixtures that include diesel as a fuel.	The standard is mandatory for the individuals responsible for the automotive vehicles fueled with diesel, with the exception of machinery intended for the construction industry, among others (section 1 of the referred Standard)	The compliance with this standard will be accomplished through the mitigation measure 2, which establishes the inspection of emissions produced by trucks employed in the preparation, construction and maintenance of the project according to the terms established in Tables 1 and 2 of the Standard in regard to the vehicular gross weight.
NOM-050-SEMARNAT-1993. Establishes the maximum permitted levels for the gas pollutant emissions produced by the exhausts of automotive vehicles in circulation fueled by blended petroleum gas, natural gas or other alternative fuels.	The standard is mandatory for automotive vehicles in circulation, but does not apply for machinery intended for construction, among others. It is necessary to verify the compliance with Table 2, which indicates the maximum levels permitted for gas emissions produced by the exhausts of the multiple use or utility vehicles in circulation, in consideration of the year-model.	The compliance with this standard will be accomplished through the mitigation measure 2, which establishes the inspection of emissions produced by light, medium and heavy trucks employed in the preparation, construction and maintenance of the project.
NOM-085-SEMARNAT-1994. The atmospheric pollutants – fixed sources – for fixed sources that employ solid, liquid o gas fossil fuels, or any of their combinations, and establishes the maximum permitted levels for the emissions to the atmosphere, total suspended particles, sulfur dioxide, and nitrogen oxide…	5.1 The maximum permitted levels of smoke emissions to the atmosphere, total suspended particles, nitrogen oxides, and sulfur dioxide produced by the combustion equipment of the fixed sources referred to in this Mexican Official Standard are established in Tables 4 and 5. 6.1.1.1. A log of the operation and maintenance of the combustion equipment must be kept, also including the measurement and analysis of the emissions, and the quality certificates of the fueled employed.	In this particular case, the equipments employed in the asphalt plant are considered fixed sources, for which the compliance with the terms established in Tables 4 and 5 must be considered, in regard to the pollutant emission to the atmosphere (smoke, total suspended particles, nitrogen oxide, and sulfur dioxide). Its compliance is considered in the mitigation measure 2 (Chapter VI).

Mexican Official Standard	NOM Specification	Project application
NOM-081-SEMARNAT-1994. Establishes the maximum permitted limits for the noise emissions produced by fixed sources and the method for its measurement.	5.3 The following procedure must be applied in order to obtain the noise level produced by a fixed source: An initial recognition; a field measurement; the processing of the measurement data, and; the preparation of the measurement report. 5.4 The maximum permitted limits for the noise level produced by fixed sources in calculation "A" are established in Table 1.	The expected noise levels are within the compliance range of NOM-081-SEMARNAT-1994, in regard to activities in the public road: 68 dB(A) between 6:00 and 22:00 hours, and 65 dB(A) in the remainder of the day. In any case, the contractor must comply with mitigation measure 1, and also perform the two moth noise evaluation and inform the results to the municipal and federal authorities. In the case of exceeding the permitted values, the contractor must indicate the adjustments employed to correct the exceeding values.
NATURLA RESOURCES		
NOM-005-SEMARNAT-1997. Establishes the procedure, criteria and specifications required to perform the use, transportation and storing of tree bark, branches and whole plants.	1.1. This standard is must be complied with in all the national territory and has the purpose of establishing the required procedures, criteria and technical and administrative specifications to perform the sustainable use, transportation, and storing of tree bark, branches, and whole plants in natural populations, with the exception of Candelilla (*Euphorbia* ssp.).	MM4 (chapter IV) explains the proper storing procedures which comply with this standard. Although this is not mandatory for this work, as mentioned earlier.

Mexican Official Standard	NOM Specification	Project application
NOM-007-SEMARNAT-1997. Establishes the procedures, criteria, and specifications required for the use, transportation, and storing of branches, leafs, flowers, fruits, and seeds.	1.1. This standard is must be complied with in all the national territory and has the purpose of establishing the required procedures, criteria and technical and administrative specifications to perform the sustainable use, transportation, and storing of branches, leafs or tendrils, flowers, fruits, and seeds. 7.1. This standard is mandatory in the case of individuals performing the use, transportation and storing of branches, leafs or tendrils, flowers, fruits, and seeds in natural populations.	This project will not use nor the commercialize plants in whole or in parts, nevertheless, the rescue and transplantation of the specimens established in Chapter VI is considered as part of the vegetation protection, rescue, and recuperation program (mitigation measure 4). In concern to seed handling during the reforestation activities, the terms established in section 4.1.6 of the Standard, although this the compliance with standard is not mandatory in the case of this project.
NOM_025-semarnat-1995. Establishes the characteristics that must be observed in the marking methods for lumber rolls, as well as the guidelines for their use and control.	1.1. This Standard establishes the characteristics that must be observed in the marking methods for lumber rolls, as well as the guidelines for their use and control, and is applicable for the individuals responsible for the use of forestry lumber products.	This project will not use nor commercialize lumber rolls, although clearing activities will be performed (Appendix 6), and therefore the marking will be preformed according to mitigation measure 5.
PROTECTED SPECIES		
NOM-059-SEMARNAT.2001. Environmental protection – Mexico's Wild Life and Vegetation Native Species – Endangered category and specifications for their inclusion, exclusion or change – List of endangered species.	The standard establishes the list of species in a protection category and the appropriate procedures for the modification of the list. The endangered species list is presented in the normative Appendix II.	SAR does not distribute any endangered wild life or vegetation species included in the listing of this Standard.

Protection of natural areas

The road lay out described in this project does not enter in natural areas protected under federal jurisdiction. The layout crosses tangentially an area protected under state jurisdiction, la Alberca Los Espinos. This is an Ecologic Preservation Zone[3] with a 142-12-31.25 hectares surface. This is a cinder cone which has in its crater a water body and plants surrounding it makes it a tourist attraction in the region.

This is an area which regulates the micro weather and captures rain water, allowing infiltration into the underground, and contributes to maintenance of springs existing in the place. The inner part of the cone leave different plants: *Quercus sp., Salix humboldiana, Casimiroa, edulis, Prosopis laevigata, Taxodium mucronatum, Faxinus sp., Acacia farnesiana,* etc. and endemic fishes, such as: *Alloophurus robustus, Chirsotoma bartoni, Goodea atripinnis and Notropis calientitis,* which are threatened aquatic species, unique in Mexico. This is a shelter and a place where the wild flora and fauna may nest. Also the protection condition, it has five stone banks on which the plant cover has disappeared and the soil has become eroded.

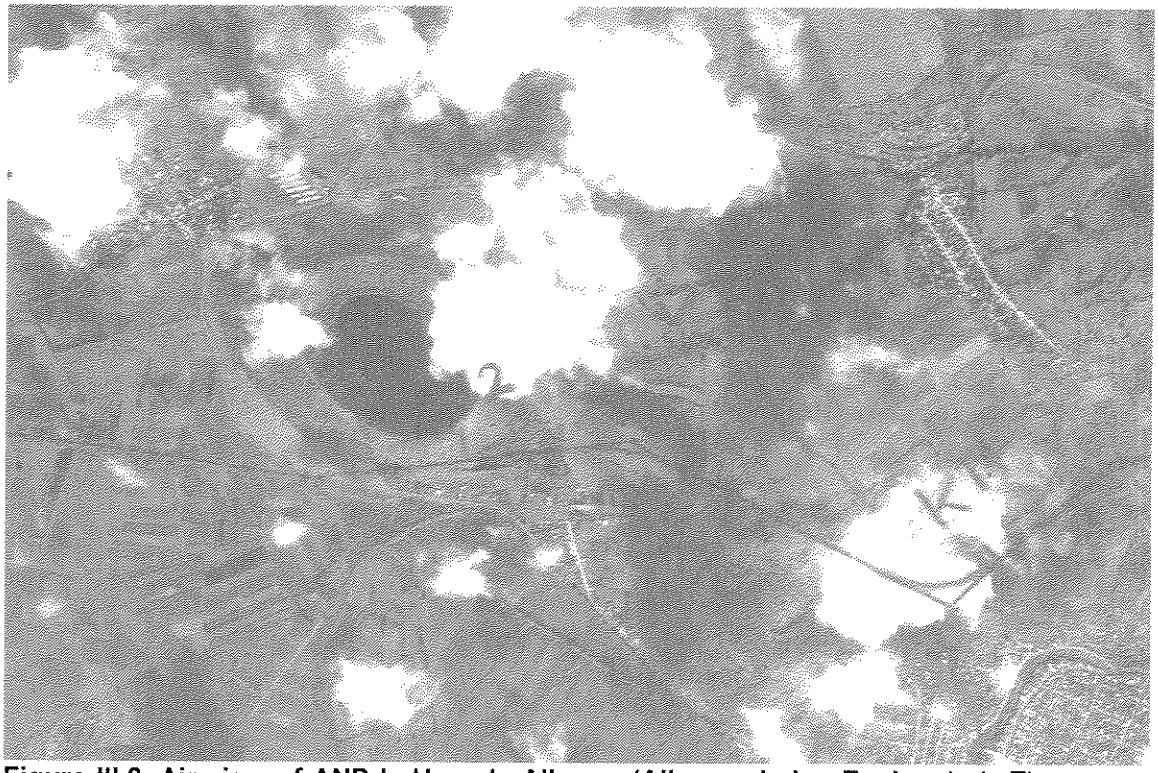

Figure III.2. Air view of ANP la Hoya la Alberca (Alberca de los Espinos). A: The crater, B: the hillsides; C: Beginning of the project, D: larger image of the lay out, E: Loan bank. Nearby locations are indicated, Los Espinos (LE), Villa Jiménez (VJ) and Zipimeo (Zi). The north is not covered in this image.

[3] In accordance with the state la of ecologic balance, the preservation zones are comprised by the state and/or the municipalities in zones surrounding the human settlements, to preserve one or more ecosystems (Official Gazette of the State of Michoacán, November 22, 2004).

It is worth mentioning that topographic limits in this ANP was based on the metes with the Zacapu-Puruándiro road, and with private plots of land and *(ejidos)*. (Official Gazette of the State of Michoacán, March 14, 2003), which comprise the Ecologic Preservation Zone, with the infrastructure already existing in the zone. In this context, the road lay out of this project crosses besides this ANP, and enters up about 120 m (considering the right limit of the project road) besides the preservation pligon. The plant coverage in this site is induced grazing land and very disturbed dry tropical forest (due to the closest with the current road, there are even several constructions). It is not likely that the project affects on a notorious way the current condition of the ANP. To such regard, the opinion by the Ministry of Urbanism and Environment shall be requested in order to know if the projected work is located in the buffer zone of the preservation zone and if applicable, to comply with any provision stated to such regard.

Below there is a review of the management and preservation policies for the ANP Alberca Los Espinos and compliance proposed in the project.

Table III.3 Compliance of the project with the ANP Alberca Los Espinos management policies, Municipality of Jiménez

Guideline	Compliance Proposal
Article 2. The Ministry of Urbanism and Environment shall not authorize the execution of public or private works, nor the exploitation of stone material banks or any other material within the core zones of ANP, when the same affects diversity and ecologic balance or purpose of this decree.	The project shall not be performed within the core zones of the protected natural area. The project is within the classification of the buffer zone but the Management Program has not been published yet.
Article 3. It shall be strictly forbidden that the projects of works affecting the minimum indispensable conditions for hibernation (seek) an reproduction of unique aquatic species existing in the place are authorized, as well as the introduction of exotic species that may affect the environment of the species already existing in such place.	The project shall perform the stripping of secondary plants, clearing and cuts in a 1.4 Ha surface on the lower part of the hillside and besides the current road (figure 3.2), but the plants on the coned hillside will not be affected. No material disturbances for vegetation or aquatic species is foreseen, and exotic species will not be introduced.
Article 6. It shall be strictly forbidden construction of any kind of edifications or facilities which are not destined for the purposes stated in this decree, in accordance with the management program for the area in question, and of al those actions causing degradation of the area, and in the places where the stone materials have been used shall be made the corrections necessary to restore the damages caused.	Construction of the project shall not cause nor increase degradation of the zone, since the activities shall be performed over the area which currently is very disturbed, besides the current road.

Source: ANP Decree. Official Gazette of the State of Michoacán. March 14, 2003.

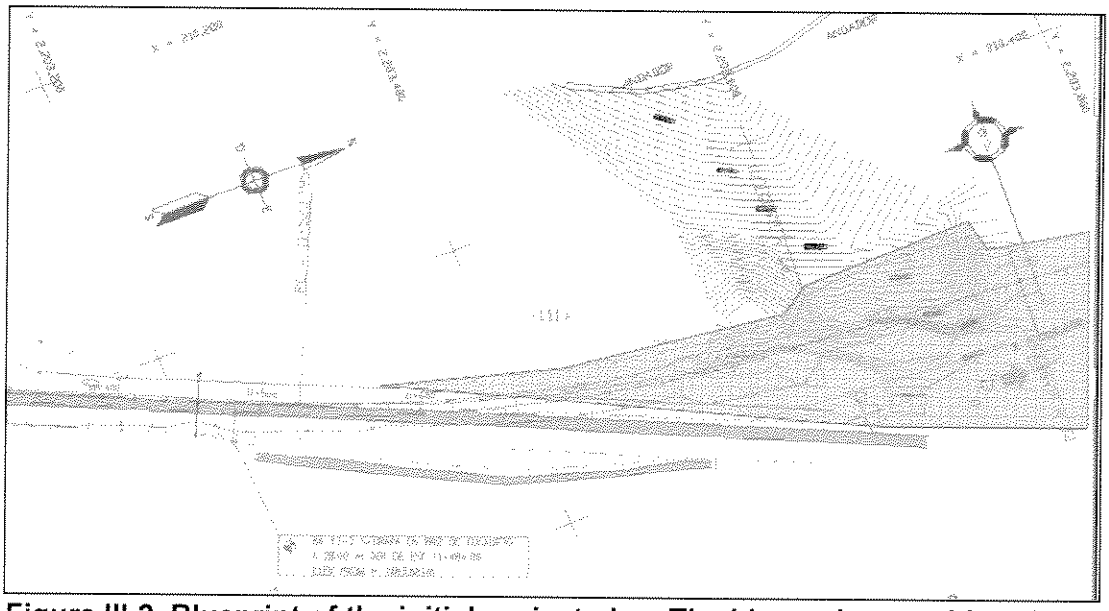

Figure III.2. Blueprint of the initial project plan. The blue polygon with red edge indicates the ANP surface where the project is to be carried out (approximately 2.4 Ha). It should be taken into consideration that from such surface, the stripping and excavations will be performed only in 1.4 Ha, a zone which presents secondary plants of the dry tropical forest with isolated trees and herbaceous on the zone which is closest to the current road.

Another protected area which is relatively near the Zacapu Lagoon and its Bank, Tzacapo Tacanendam, in the municipality of Zacapu. Decreed as National Park on February 27, 2003, the area has a surface of 56-34-99.123 Ha, and is located at 13 Km to the southern part of Los Espinos locality.

The Zacapu Lagoon is a natural water body with about 20 cold water springs (19ºC) which rise to the southeastern end of the Zacapu valley, among which La Angostura, La Zarcita, Ojo de Agua and others small springs are outstanding due to their importance in the inner part of the lake side vessel. The side is still in good preservation conditions and is one of the few places with a high diversity of endemic fishes, inside the basin, some which are threaten and other in extinction risk, such as: *Hubbisna turner* (Cherehuita), *Skiffia sp.* (Carangua), the Achoque *Ambistoma anderson* and the endemic species for the lagoon (*Allotoca zacapuensis*). It has a broad range of organisms that makes it as rich as that existing in Patzcuaro, Zirahuén and Cuitzeo; there are also some aquatic species such as turtles, crams, frogs and coots. This place has about 1.1 per cent of the total population of the Mexican ducks *(Anas [platyrhynchos] diazi)*. The area included wooded and not wooded peat bogs, as well as underground water deposits, among other type of wet lands.

It is worth mentioning that the project does not cross the Zacapu Lagoon and its bank Tzacapo Tacanendam, since the same are located at more than 10 Km away from the road layout.

The ANP management program for the Zacapu Lagoon and its bank Tzacapo Tacanendam was also analyzed, but given the remoteness and nature of the project it is not feasible to try to perform a compliance analysis. The abovementioned program is

basically focused in preventing and regulating the urban development, the fishing and agricultural activities, tourism and protection of wet lands (presented as reference in Exhibit 9).

Other state or municipal Regulatory Instruments

We have municipal development plants for all Municipalities involving the road layout. The development strategies and policies identified and prioritized by the population of such entities and the relevance of the project to such regard are resumed below.

Table III.4. Link of the project with development policies of Zacapu, Jiménez and Panindicuaro municipalities.

Development area	Strategy	Compliance Proposal
Ecology and environment	Foster the construction of swage and treatment and watering. Foster rural areas reforestry. Construct a sanitary filling in Panindícuaro. Restore 30% of the Panindícuaro drainage net. Construct and restore the Sanitary and Rain Swage System. River cleaning up.	The project shall handle solid residues, and use water which complies with the federal and state environmental standards.
Health, Social Development, Poverty Fight	Development of health, social integration, equity, care to elder and handicap people programs.	The project indirectly contributes to comply with this strategy by providing a urban infrastructure work necessary for development of such activities. Freight reduction is allowed, which indirectly foster the trading and improves competitively. The project complies with the approaches on reactivation and improvement of road infrastructure in the zone.
Industry and Commerce	Improves and extend the infrastructure of trading and supply, locating the areas that do not have a permanent coverage with their current infrastructure.	
Urban Development, public services, traffic and habitat	It is proposed to obtain optional routes for vehicle release. Achieve the integral development of the municipality by constructing the urban and road infrastructure necessary by improving the primary roads of the municipality.	
Road infrastructure	Extend the rural road net. Provide maintenance and restoring to roads, rough dirt track and paths to collect harvest.	
Civil Protection Public Security	Reinforce human resources and material for fire department, public security department, justice procurement and law application.	The broad project is not directly related to these actions, indirectly it makes easier the transportation of people whether fire fighters, policemen or students, artists or sport men.
Education, Culture and Sports	Foster and spread on a local, State and National basis the historical and cultural wealth by using the communication means and exchange programs. Increase the sport infrastructure in the municipality and restore the existing infrastructure, as applicable.	

Economic, Agricultural and Forestry Promotion	- Spread and promote tourist sites and infrastructure of the Zacapu municipality supporting the organization of fairs, exhibitions, conventions and congresses.	The project indirectly contributes and fosters tourism, trading of products. It also releases the traffic routes.
Improvement of income	- Foster the development, protection, preservation and use of forestry resources in the municipality. - Foster the technologic innovation and productive improvement processes in the rural and urban fields to increase productivity and support distribution and trading of products, produced in the municipality. - Restore and extend the agricultural, fishing, aquatic and livestock infrastructure.	It also releases the local routes from foreign traffic and reduces its wear.
Institutional Strengthening and transparent government	Coverage for public services among the most blackguards groups will be the scale to be used to measure the progress related to the municipality social development.	The highway project is not directly related to these actions.
Regional Development and Planning	Integration and establishment of equal relations with the region, considering as important areas the following. a) Communication means. b) Strengthening of an industrial zone	Construction of the road contributes positively in both guidelines identified for regional development.