

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

BRAZIL

**REGIONAL TRANSPORTATION PLANNING
INFORMATION SYSTEM**

(TC-9811896-BR)

PLAN OF OPERATIONS

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BASIC SOCIOECONOMIC DATA

The basic socioeconomic data for Brazil available on the Internet at the following address:

<http://www.iadb.org/res/index.cfm?fuseaction=externallinks.countrydata>

INFORMATION AVAILABLE IN THE FILES OF RE1/FI1

PREPARATION:

1. “*Sistema de Apoyo a las Decisiones Basado en SIG para la Planificación en Transporte y Administración de Infraestructura. Informe Final*”. ATN/JF-6073-BO. BID. Prepared by: GAF mbH, GIS/Trans Ltd., and Geosystems S.R.L., Bolivia, November 2000.
2. “*Sistema de Apoyo para la Planificación de Transporte Regional y Gerenciamiento de Proyectos de Infraestructura mediante un SIG. Informe Final*”. ATN/JF-6074-CH. BID. Prepared by: GAF mbH, GIS/Trans Ltd., and GTI S.A., Santiago, Chile, November 2000.
3. “*Sistema de Apoyo para la Planificación de Transporte y Gerenciamiento de Proyectos Viales mediante un Sistema SIG. Informe Final*”. ATN/JF-6072-AR. BID. Prepared by: HTS Development, January 2001.
4. Spatial Information System for National Infrastructure Management and Planning. Plan of Operations. ATN/JF-7544-UR. BID. Prepared by: William Brooner, April 2001.

EXECUTION:

Annex III – Terms of Reference

ABBREVIATIONS

ANTAQ	<i>Agência Nacional de Transportes Aquaviários</i> (National Water Transportation Agency)
ANTT	<i>Agência Nacional de Transportes Terrestres</i> (National Land Transportation Agency)
BIT	<i>Banco de Informações e Mapas de Transportes</i>
CCPIT	<i>Comissão de Coordenação de Política da Informação em Transportes</i> (Coordination Commission for Transportation Information Policy)
CONAMA	<i>Comissão Nacional de Meio Ambiente</i> (National Environmental Commission)
DNIT	<i>Departamento Nacional de Infra-estrutura de Transportes</i> (National Department for Transportation Infrastructure)
GDSS	GIS-based Decision Support System
GEIPOT	<i>Empresa Brasileira de Planejamento de Transportes</i>
GIS	Geographic Information System
GIS-T	Geographic Information Systems for Transportation
GNSS	Global Navigation Satellite Systems
GPS	Global Positioning Systems
ICTs	Information and Communication Technologies
IIRSA	<i>Integración de la Infraestructura Regional Suramericana</i>
JCF	Japanese Trust Fund for Consultancy Services
LAN	Local Area Network
MERCOSUR	Southern Common Market
MT	Ministry of Transportation
NSDI-TPM	National Spatial Data Infrastructure for Transportation Planning and Management
PPA	<i>Plano Plurianual</i>
SITRA	<i>Sistemas de Informações Técnicas de Transporte</i>
SPNT	<i>Secretaria de Política Nacional de Transportes</i> (National Transportation Policy Secretariat)
STAN	Strategic Transportation Analysis

Regional Transportation Planning Information System

(TC-9811896)

EXECUTIVE SUMMARY

Beneficiary:	Ministry of Transportation (MT)	
Executing agency:	Inter-American Development Bank (IDB). The MT, through the National Transportation Policy Secretariat (<i>Secretaria de Política Nacional de Transporte (SPNT)</i>) will act as co-executing agency of the program.	
Target Beneficiaries	The following entities will be directly involved in this technical cooperation and will benefit from the solutions implemented and the training provided: MT (<i>SPNT</i> and the National Department for Transportation Infrastructure (<i>DNIT</i>)), the National Land Transportation Agency (<i>ANTT</i>) and the National Water Transportation Agency (<i>ANTAQ</i>).	
Financing:	IDB:	
	Japanese Trust Fund for Consultancy Services (JCF)	US\$750,000
	Local Counterpart, in kind contribution:	<u>US\$175,000</u>
	Total:	<u>US\$925,000</u>
Objectives:	This technical cooperation aims to improving and broadening transportation planning and decision-making at the MT through the design, development and implementation of planning and management solutions based on Geographic Information System (GIS). Once implemented, these solutions will provide the MT with analytical tools to support the implementation of transportation projects and a digital database. This database will be available to other public agencies, universities, the private sector and to the general public, for the development of their own applications.	
Execution Timetable:	Execution Period:	12 months
	Disbursement Period:	18 months
Special Contractual Conditions:	None.	
Exceptions to Bank Policies and Procedures:	None.	
Environmental/ social review:	The Committee on Environment and Social Impact (CESI) assessed the Technical Profile at its session TRG 42-99TRG 12-01, held on March 2001, and did not present any comments.	
Coordination with other Official Development Finance Institutions:	In developing this project, special attention will be paid to coordinate efforts with other official development finance Institutions, such as the World Bank, as mentioned in ¶1.16, to avoid duplication of efforts towards the completion of the technical cooperation.	

I. BACKGROUND AND JUSTIFICATION

A. Main issues

- 1.1 The Ministry of Transportation (MT) is responsible, at the national level, for the development of transportation planning studies. In the development of these studies the MT is increasingly using solutions that build upon geographic information technologies to improve the outreach, the efficiency and the timeliness of the studies developed. At the moment, the MT is seeking to incorporate planning methodologies that take advantage of and build upon the analytical tools now available with Geographic Information Systems (GIS)¹ to support the development of strategic studies, the development of impact studies of transportation projects and also to allow the consolidation in one database of all the information relevant to the area of regional transportation planning (including not only transportation infrastructure but also transportation services).
- 1.2 In addition to the MT, several other government agencies involved in transportation planning and/or transportation policy are also incorporating the use of solutions that build upon the use of geographic information technologies, including the National Department for Transportation Infrastructure (*Departamento Nacional de Infra-estrutura de Transportes (DNIT)*), the National Land Transportation Agency (*Agência Nacional de Transportes Terrestres (ANTT)*) and the National Water Transportation Agency (*Agência Nacional de Transportes Aquaviários – (ANTAQ)*). At the same time, various government agencies responsible for the transportation sector at the state level are also developing information technology solutions for transportation planning and management, which is leading to a significant increase in the amount of transportation information available.
- 1.3 In view of these needs, the MT has requested support from the Bank to enhance its present capabilities in the area of geographic information technologies. By bringing all transportation information together the MT will be able to consolidate one national transportation spatial database, which will then be made available to all interested users, including the Bank for the various transportation projects currently in the pipeline, and also to the general public. By incorporating a solution based on GIS the MT will have added analytical tools to develop the studies it is responsible for.
- 1.4 In planning processes where not only funds, but also the data available to base decisions on are limited, geographic information technologies (encompassing GIS, Remote Sensing, and Global Navigation Satellite Systems (GNSS), such as the Global Positioning System (GPS)), offer supporting tools for improved and effective decision-making. GIS-based solutions provide analytical capabilities that

¹ A collection of computer hardware, software, and geographic data for capturing, storing, updating, manipulating, analyzing, and displaying all forms of geographical referenced information.

can support a number of transportation planning and management related activities such as regional analysis of multi-modal transportation solutions, corridor selection, decisions that relate to maintenance and upgrading of transportation infrastructure, social and environmental impact analysis, and concession studies. Satellite imagery provides needed data to quickly update regional maps and transportation networks. GPS technology provides the means to capture geo-referenced data of existing pavement conditions and the possibility of developing tracking systems, much needed for highway safety.

- 1.5 In developing countries and, to a certain extent, even in relatively more developed countries, fully operational GIS systems integrated into decision-making processes were until recently often limited or nonexistent. The private sector often has a key role in real estate development, marketing and commodity transport, but it is primarily the public sector that carries out and consolidates comprehensive planning activities, including transportation and related infrastructure planning. Increasingly, GIS systems are being successfully implemented due to decreasing costs of computer power and wider availability of digital spatial data, as well as a refocus on planning processes, which recognize the growing need to incorporate environmental and social variables.
- 1.6 Regarding the preparation of this operation, various factors contributed to its delay. First, with the new requirements from the Brazilian Government about the processing of technical cooperations, the MT only succeeded to formalize its request to the Bank for support for this operation at the end of 2001. Furthermore, at the beginning of 2002, the functions carried out by the *Brazilian Transportation Planning Agency (Empresa Brasileira de Planejamento de Transportes (GEIPOT))*, the original primary beneficiary of this technical cooperation, were transferred to the Ministry of Transportation because GEIPOT ceased to exist as an institution. It was only in 2003 that the National Transportation Policy Secretariat (*Secretaria de Política Nacional de Transportes (SPNT)*) was defined and created, enabling the continuation of the preparation of this operation, given the responsibility for all planning activities within the MT.

B. Relationship to Bank's strategy for country and region

- 1.7 The strategy approved by the Bank for Brazil for the period 2000-2003 strengthened the focus in three of the areas the Bank had been working on, defined the environmental concern as a fourth primary work area, and underlined the regional integration issue. The areas of focus were conceptualized as follows: (1) reform and modernization of the State, (2) reduction of social inequalities and poverty, (3) competitiveness and access of Brazilian production and reduction of the "Brazil cost", and (4) environmental management and natural resources protection issues.
- 1.8 The new strategy for the period 2004-2007, in advanced stage of preparation, not only reaffirms the previous strategy but it also increases the Bank's support to the regional physical integration efforts in the areas of transportation,

telecommunications and energy markets, within the framework of the initiative for the Integration of the South American Regional Infrastructure (*Integración de la Infraestructura Regional Suramericana (IIRSA)*).

- 1.9 This Technical Cooperation follows the above stated directives aiming to increase the resources for government planning and management, by introducing new technical solutions that will support the definition of national transportation policies of the MT through the improvement of the decision making process about the expansion of transportation infrastructure which in turn will also contribute to competitiveness and modernization of the country, and, therefore, contributing also to the other long term strategies.

C. Relationship to other initiatives

- 1.10 Regional and South American integration was highlighted in the Multi-annual Plan (*Plano Plurianual (PPA)*) for the period 2004-2007, approved by Congress and handled by the Ministry of Planning, Budget and Management. This plan includes the construction and upgrading of 5,500 km of highways, construction of 2,400 km of railways and the implementation of 10,000 km of waterways. In the energy field, this plan foresees the increase in the capacity of electric energy generation by 14,000 MW and construction of an additional 12,000 km of transmission lines. Most of these initiatives could benefit from the results of this technical cooperation, especially in the use of the infrastructure management tools and the digital database, which will be made available to the MT.
- 1.11 Furthermore, this Technical Cooperation builds upon on-going initiatives within IIRSA, complementing actions related to the development of Information and Communication Technologies (ICTs), through the introduction of GIS technologies. The Bank has already supported 5 countries in the region with similar projects: Argentina, Bolivia, Chile, Peru and Uruguay, who as a result started using these technology-based solutions in transportation planning, as well as in infrastructure management. The increase in the use of these solutions, through this Technical Cooperation, will contribute to the definition of not only the integration and use of the national transportation networks but also to the definition of regional transportation solutions in all modalities, and especially in the frontier zones.
- 1.12 Although the applications developed are unique and relevant to the working environment which they have been created for, the GIS-based technology is the same and its applications are compatible, so the experience acquired in one project can be transferred to another. With this in mind, experts from Peru and Uruguay involved in the aforementioned projects supported by the Bank will be invited to share the lessons learned from the implementation of their projects at the “Introductory Project and Geographic Information System for Transportation (GIS-T) Seminar”, as mentioned in the Terms of Reference, Annex III (First phase, Task 1). Furthermore, the applications and management tools developed for the other projects will be made available including the GIS-based Decision

Support System (GDSS), which will be updated with the spatial data to be compiled and made available to the MT.

- 1.13 Experience acquired in these previous projects has been fundamental in the development of this project. The activities being proposed and the recommended approach to implementing the GIS-based solutions build upon the suggestions and observations made by those involved in the previous projects. The projects supported by the Bank demonstrated that solutions that build upon existing efforts have immediate use. These solutions should be developed and implemented in parallel with the strengthening of the coordination of the use of spatial data among the various government levels, through the definition of responsibilities for spatial data sets and implementation of sharing mechanisms.

D. Added value provided

- 1.14 This project will also provide an opportunity to evaluate previous transportation planning solutions and methodologies used by GEIPOT, such as the *Sistema de Informações Técnicas de Transporte (SITRA)* and the Strategic Transportation Analysis (STAN), and existing information systems such as the *Banco de Informações e Mapas de Transportes (BIT)*, maintained by the MT, from the perspective of the current needs and vision of the MT.
- 1.15 At the same time, the *Subsecretaria de Assuntos Administrativos (SAAD)* of the MT is undertaking a major task of restructuring all information management in a coordinated way through the *Comissão de Coordenação de Política da Informação em Transportes (CCPIT)*. This technical cooperation will contribute to this effort by focusing on information relevant to planning, contributing to understanding what are the needs of all agencies, and the development of a common data model for the various needs.
- 1.16 In the development of this project, consideration will be given to coordinate its activities with other on-going and planned related ones, specifically those projects that are being funded by other multilateral development banks. The following initiatives have been identified: i) the Port Information System developed by ANTAQ and already operational; ii) various supporting GIS-based systems developed by DNIT; and iii) the GIS-based information system to support the Supervision of Concessions System and the Environmental Management System, both to be initiated by ANTT with funds from the World Bank. This project will contribute to defining the relationship of all these systems in order to avoid the duplication of efforts in maintaining common data.
- 1.17 The Bank is preparing with the MT a transportation project that will directly benefit from this Technical Cooperation, which is the Modernization of the Florianópolis – Osório Highway Project (BR-0254). This Technical Cooperation will provide improved tools for supporting this operation, mainly during the execution phase improving the management of project related activities.

II. PROGRAM DESCRIPTION

A. Program goal and purpose

- 2.1 The goal of this Program is to improve and broaden the process of planning and decision-making in transportation at the MT. Its purpose is to design, develop and implement planning and management solutions based on GIS. The solutions, once implemented, will also provide the MT with additional analytical tools to support the implementation of transportation projects and a digital database. This database will be available to other public agencies, universities, the private sector, and to the general public, for the development of their own applications.

B. Components

- 2.2 A consulting firm with a team of international and national experts in developing GIS-based solutions for regional transportation planning and transportation infrastructure management will be identified and contracted to carry out the project. The project will include two phases: i) conceptual design of the system; and ii) system development, data compilation and training.
- 2.3 The two phases are further divided into a total of ten tasks, all to be performed by the consulting team. The first phase includes an introductory seminar, a needs assessment and the development of a conceptual design of the Regional Transportation Planning Information System, the development of a proposal for a National Spatial Data Infrastructure for Transportation Planning and Management (NSDI/TPM), and another seminar to present the reports of the two previous tasks. The second phase includes systems development, data compilation, implementation of solutions, training of the personnel that will use the system, and a wrap-up seminar. The phases and tasks are further expanded in the attached Terms of Reference (Annex III).
- 2.4 The main system solution to be developed will be the Regional Transportation Planning Information System. It will be a GIS-based solution, which will provide access to all the integrated data together with specific analytical tools, as identified in the need analysis in the first phase of the conceptual design of the system. The analytical tools available will also include network and locational analysis capabilities. To support data management a route calibrator and an event placement support systems will be developed. The route calibrator system will allow the MT to adjust the transportation network relating the spatial information to the real kilometers or to the legal landmarks of the route, tying this information to the real geographic coordinates of each point. The event placement will enable the placement of all events (such as landslides, multi-modal transportation points, and bridges) on the calibrated routes. Also, the following applications will be developed and implemented: i) the GIS-based Decision Support System (GDSS); and ii) a System for Freight and Passenger Flow Generation and Allocation.

- 2.5 Various sets of geo-referenced and attribute data will be compiled and integrated into the system developed. This will include a national spatial database, a regional database (States of *Rio Grande do Sul* and *Santa Catarina*, to improve the management of the project BR-0254, as mentioned in ¶1.17), the updating of the GDSS database, and satellite imagery. Hardware and software will also be acquired to support the development of the systems created and the training of the professionals. These will receive extensive training both at a basic and at an advanced level.

III. COST AND FINANCING

A. Summary cost table

- 3.1 The following table presents a summary of the estimated budget (see Annex II for the detailed expenses considered in each budget item).

BUDGET SUMMARY (IN US\$ EQUIVALENT)			
ITEM	TOTAL COST	JCF	LOCAL
Salary Cost			
National and International Professionals	218,000	218,000	
Overhead	239,800	239,800	
Total	457,800	457,800	
Direct Costs			
Travel expenses and Per Diem	125,400	125,400	
PC Workstations and Software	60,000	60,000	
Satellite Imagery	32,000	32,000	
<i>Total Estimated Budget Consulting Firm (A)</i>	<i>675,200</i>	<i>675,200</i>	
Administration Costs			
Specialized Supervisory Consultant	40,000	40,000	
Contingencies (5%)	34,800	34,800	
<i>Total Project Administration Costs (B)</i>	<i>74,800</i>	<i>74,800</i>	
National Administration Costs			
Office Support and Other Costs	75,000		75,000
Counterpart Professional Staff	100,000		100,000
<i>Total Local Administration Costs (C)</i>	<i>175,000</i>		<i>175,000</i>
<i>Total Project Costs to be Financed by JCF (A+B)</i>		<i>750,000</i>	
Total Estimated Budget (A+B+C)	925,000	750,000	175,000

B. Description and composition of financing

- 3.2 The total cost of the project will be the equivalent of US\$925,000, of which the Bank will provide non-reimbursable financing of up to US\$750,000 from the Japanese Trust Fund for Consultancy Services (JCF), in accordance with the attached estimated budget summary (Annex II).

- 3.3 The Bank's contribution, which amounts to 81.1% of the total project cost, will be used to finance a total of 47 person-months of consulting services and general support including computer equipment and digital data, and also the hiring of a specialized supervisory consultant.

C. Sustainability

- 3.4 The SPNT shall incorporate the solutions developed by the project and shall be responsible for maintaining the team of experts needed to manage the systems to be provided. Also, the SPNT shall include provisions in its yearly budget for the maintenance of the systems developed, such as software licenses and periodic upgrade of the hardware.

IV. EXECUTING AGENCY AND MECHANISM

- 4.1 Taking into account the Donor's Agreement, the Bank will be responsible for the project execution. The Country Office in Brazil (COF/CBR), as the unit with basic responsibility for the administration of this operation, will hire the consulting firm to carry out the project and RE1/FI1 will be responsible for the technical supervision, in coordination with COF/CBR and the MT. RE1/FI1 will be responsible for hiring the specialized supervisory consultant.
- 4.2 Prior the selection of the consulting firm, the co-executing agency will define a technical team of two experts to be responsible for directly supporting the work developed and to take over the project after implementation. In the execution of this Technical Cooperation the MT, the co-executing agency, will provide logistic support and also arrange for the cooperation of other institutions involved. Counterpart personnel will be identified and assigned to participate in training programs and courses.
- 4.3 The COF/CBR will make disbursements in accordance with a schedule to be negotiated with the consulting firm to be hired, upon acceptance by the Bank of the specific reports and products indicated in the Terms of Reference (see Annex III). The disbursement period is 18 months and the disbursements will be made upon previous approval by the co-executing agency.

V. MONITORING AND EVALUATION

- 5.1 It is envisaged that an international firm specialized in developing GIS applications for regional transportation and environmental planning, also employing local experts, will carry out the study. The study will cover a period of 12 months. Progress will be monitored and evaluated on the basis of schedule and deliverable products including reports, databases, and application development and training materials as detailed in the Terms of Reference. Specifically, an Inception Report (which will include a Work Plan and a Personnel Allocation

Plan for the project) and Monthly Progress Reports will be prepared, and Phase I documentation will include intermediate reports consisting of the Discovery and Needs Analysis Report and a National Spatial Data Infrastructure for Transportation Planning and Management Report (NDSI-TPM). Approval of the former will be required before initiating remaining tasks. During Phase II, documentation to be reviewed and approved will include an Applications Design Report and a Final Report. Executive Summaries will be included in all reports except from the Monthly Progress and the Inception Reports.

- 5.2 Considering the complexity level and the specifics of this GIS-based technology, a specialized supervisory consultant will also be hired to provide the required analysis of the reports, evaluate the products delivered, coordinate with local counterparts, and support the Bank's staff in the task of integrating this project with other GIS-related projects in the Region. This is as well supported with previous successful Bank experiences in similar projects, in which there was a specialized consultant designated to perform such tasks.

VI. PROGRAM BENEFITS AND RISKS

A. Program benefits and developmental impact

- 6.1 The project will have the following major benefits: (a) provide tools that will contribute to improving effectiveness and efficiency of government strategic planning, management decisions, and operations in the area of transportation planning and infrastructure management; (b) reduce costs in data management resulting from the elimination of redundant data collection and maintenance efforts; (c) provide an organizational structure that will contribute to collaboration among agencies with regard to the exchange of data and information; (d) contribute to increasing the flow of information from government to the private sector; (e) provide the ability to integrate diverse and disparate data; (f) increase technical capacity in the application of solutions based on geographic information technologies; and (g) make available and readily accessible georeferenced digital data bases.
- 6.2 The consolidation of database development and application designs is an important initiative that will contribute to and benefit other sectors as well such as health, education, environment and natural resources through the availability and coordination of transportation data. Readily available transportation data in digital format can be used to support studies that improve access to health care and education, and also environmental impact studies and the management of natural resources. For example, knowing the exact location of existing and planned transportation infrastructures is required to support diverse needs such as proposals of new environmental conservation areas and support fire emergency teams dealing with forest fires.

B. Target beneficiaries

- 6.3 Although the primary beneficiary will be the MT, and more specifically the SPNT, several other government agencies involved in transportation planning and/or transportation policy such as the *DNIT*, *ANTT* and *ANTAQ* will as well be involved in the definition of the solutions to be developed and implemented and will also benefit from the applications delivered and the spatial data compiled.
- 6.4 Three seminars will be carried out: a first one to introduce the project, a second to define the conceptual design and the proposal for the NSDI/TPM, and a final seminar to present the solutions delivered to professional teams of the above mentioned institutions and to other relevant ministries, such as the Ministry of Environment. In addition, specific training will be provided also to the professionals that will be taking over and maintaining the systems, as well as building upon the potential of the solutions developed. Basic training will be provided to two groups of up to 15 experts each, and advanced training will be provided to the group of core experts.

C. Risks

- 6.5 **Recurrent costs:** Benefits from GIS typically accrue in the medium-term as policies are developed, inter-agency procedures are established, agency coordination is strengthened, users become more sophisticated and data becomes more available. This project is intended to consolidate on-going efforts within the MT, while establishing a proposal for a national framework, in which this effort will be inserted, avoiding the duplication of efforts through the assignment of responsibilities. The full development of such system is an on-going process, which requires continued government support and demonstration of the benefits. In order to attain sustainability this project will require periodic updates and maintenance of the geographic databases developed. Also, staff will be required to attend continuous training to stay abreast of the latest technological advances, and equipment will have to be maintained and replaced, all of which will result in future costs.
- 6.6 These recurrent costs are common to all operations that involve the introduction of information systems technology and imply a commitment for continued funding from the various agencies involved. Experience gained in the other projects developed with Bank support, in particular the project in Peru, has revealed that projects that deliver specific operational products that do become part of the day-to-day activities of the beneficiary are more likely to secure management support and, thus, the commitment for addressing these recurrent costs needs. Additionally, to diminish even further this risk, this project includes actions to mobilize different actors, such as agencies, other ministries, the private sector, and universities, all of which will constitute an extended user group interested in keeping the system updated and reliable.

- 6.7 **Lack of inter-agency coordination:** Exchange and integration of diverse geographic data is critical to the successful use of GIS. Without cooperation and collaboration between agencies there is a risk that groups will adopt GIS-based solutions but remain isolated in their use, thereby not gaining the full benefits that result from inter-agency cooperation and the sharing of data. To mitigate this risk there is the *Comissão de Coordenação de Política de Transportes (CCPT)* mentioned in paragraph ¶1.15, and the project is structured to foster cooperation through the promotion of seminars and the proposal of the National Spatial Data of Infrastructure for Transportation Planning and Management (NSDI/TPM).

VII. ENVIRONMENTAL AND SOCIAL REVIEW

- 7.1 The proposed project has positive environmental and social implications. It will contribute to the quality of the environmental impact assessments for the regional transportation solutions, currently being developed with Bank participation, as well as to future projects. At the same time, training will be provided during the planned workshops and seminars on the use of the developed applications and the compiled data in carrying out social and environmental analysis.
- 7.2 The Terms of Reference (Annex III) also include important actions that will increase the positive impacts, such as the environmental and socio-economic information in the databases to be compiled (paragraphs ¶2.13 and ¶2.16; at the 1:50,000 scale a mosaic of satellite imagery will be produced which will be used for the development of land use type analysis contributing to identifying fragile ecosystems); inclusion of analytical tools that contribute to environmental and social analysis (paragraph ¶2.20 – Locational analysis tools), and; a specific request that the consulting firm include consultations to the National Environmental Commission (*Comissão Nacional de Meio Ambiente (CONAMA)*) on all the activities developed and that professionals from the environmental sector be invited to the seminar on the proposal of the NSDI/TPM.

Annex I

LOGICAL FRAMEWORK - TC-98-11896-BR

Non-Reimbursable Technical Cooperation for the design, development and implementation of a Regional Transportation Planning Information System

PROJECT SUMMARY	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
GOAL Improved and broadened process of planning and decision-making at Ministry of Transportation (MT).	1.Transportation planning and management related activities based on Geographic Information Systems (GIS).	1.Documents from MT, SPNT and DNIT, related to the use of the Geographic Information Technologies during the planning process and decision-making.	
PURPOSE To strengthen and expand existing Geographic Information Technologies at MT, and make the new digital databases available to other public agencies, universities and the private sector, for the development of their own applications and to the general public.	1.GIS solutions and spatial data effectively used by at least 10 professionals within the MT for transportation planning purposes, and, additionally, at least 30 professionals trained in accessing the spatial data before project completion. 2.The National Land Transportation Agency (ANTT), the National Water Transportation Agency (ANTAQ) and others at the state level have access to the applications and data, and are participating in the development of the spatial database and the NSDI-TPM proposal.	1.Final Report from the Consulting Firm and the evaluation to be carried out by the consultant to be hired as a supervisor of the project. 2.Periodic reports from MT, ANTT and ANTAQ including considerations on the advancement of the use of the solutions and the sharing of data and applications. 3.The specific activities carried out by DNIT to accompany the project BR-0254, using the solutions developed and the data compiled. 4.Number of web visitors and the number of registered users, based on site automatic count.	1. MT maintains budget commitment during project implementation and after incorporating the solutions. 2. MT experts keep interested in incorporating solutions in the development of their studies, building upon the solutions. 3. Other institutions take advantage of the applications and data developed. 4. The NSDI-TPM moves toward implementation.
OUTPUTS 1. Acquisition, installation, design, development and implementation of applications and compilation of databases (including mosaic of satellite imagery). 2. Improvement of the existing capacity among MT's personnel to guarantee sustainable and effective use of the solutions in the development of the studies. 3. Proposal for a National Spatial Data Infrastructure for Transportation Planning and Management – NSDI-TPM	1.1 Compilation of spatial data including satellite mosaic (total 1.455.000 sq.km of which 377.000 sq.km covering the regional database: <i>Rio Grande do Sul</i> and <i>Santa Catarina</i>) 1.2 Inclusion of all spatial data within the application solution as detailed in the ToR. 1.3 Deployment of solutions with software and hardware within MT, especially in the SNPT and DNIT as detailed in the ToR. 2. Training provided as determined in the ToR (30 professionals). 3. NSDI-TPM proposal defined and commitment from relevant institutions to follow the common framework for collection and use of transportation data for planning.	1.1 Monthly Progress Reports from the Consultant and periodic reports from COF/CBR and the consultant to be hired as supervisor. 1.2 and 1.3 Delivery of products as specified in the agreement with the consulting firm. 2. Seminar and training attendance reports. 3. NSDI-TPM Proposal discussed and comments received incorporated.	1. Sufficient interest and dedication on the part of MT to the consulting team. 2. Effective involvement from other national institutions.

<p>ACTIVITIES</p> <ol style="list-style-type: none"> 1. Contracting of consulting firm for systems design, spatial data compilation, development and training <ol style="list-style-type: none"> 1.1 Phase I – Systems Design (3 months from signing of contract) 1.2 Phase II – System Development, Data Compilation and Training (9 months after conclusion of Phase I) 2. Acquisition of hardware, software and satellite imagery (to be included in the contract of the consulting firm). 3. Hiring of consultant for specialized supervision 	<ol style="list-style-type: none"> 1. Project budget \$583,200 plus \$175,000 as local administrative counterpart for office and counterpart team. 2. Project budget \$92,000 3. Project budget \$40,000 plus \$34,800 for contingencies 	<ol style="list-style-type: none"> 1. Periodic disbursement and budget reports and on-line IDB project info for RE1 	<ol style="list-style-type: none"> 1. Sufficient interest and dedication on the part of MT providing necessary support to ensure proper performance by consulting firm. 2. MT personnel have the capacity to absorb the training and technology transfer from the consulting firm.
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ANNEX II

BRAZIL TC-9811896-BR

REGIONAL TRANSPORTATION PLANNING INFORMATION SYSTEM

BUDGET SUMMARY (IN US\$ EQUIVALENT)

Item	Quantity	Unit Cost (US\$)	Total Cost (US\$)
I. Salary Cost			
I.1 International Professionals	(months)		
I.1.1 Project Director	3	9,000	27,000
I.1.2 GIS-T Analyst (Transportation)	2	7,000	14,000
I.1.3 GIS Analyst	10	6,000	60,000
I.1.4 GIS/Systems Programmer	5	6,000	30,000
I.1.5 RS Analyst	2	3,000	6,000
I.1.6 Systems Analyst	4	6,000	24,000
Total Salary International Professionals	26		161,000
I.2 National Professionals	(months)		
I.2.1 GIS Analyst	4	4,000	16,000
I.2.2 GIS Database Technician	15	2,200	33,000
I.2.3 Systems Analyst	2	4,000	8,000
Total Salary National Professionals	21		57,000
Total Salary	47		218,000
		1.1	239,800
Total Salary and Overhead			457,800
III. Direct Costs for Consulting Firm			
III.1 Per diem	450	180	81,000
III.2 International Travel	10	4,000	40,000
III.3 Travel within study area	11	400	4,400
III.4 PC Workstations and Software	5	12,000	60,000
III.5 Satellite Imagery	1	32,000	32,000
Total Direct Costs Consulting Firm			217,400
Estimated Budget (A)			675,200
B. Project Administration Costs	(months)		
I. Specialized Supervisory Consultants	4	10,000	40,000
Total Project Administration Costs (B)			40,000
C. Contingencies	Total	5%	34,800
Total To Be Financed (A+B+C)			750,000
D. National Administration Costs			
I. Office Support and Other Costs	Unit		75,000
II. Counterpart Professional Staff	Total		100,000
Total National Administration Costs (C)			175,000
TOTAL ESTIMATED BUDGET			925,000

ANNEX III

Brazil

Regional Transportation Planning Information System

TC-9811896-BR

TERMS OF REFERENCE

I. PROJECT OBJECTIVES

- 1.1 The Ministry of Transportation (MT) is responsible, at the national level, for the development of transportation planning studies. In the development of these studies the MT is increasingly using solutions that build upon geographic information technologies to improve the outreach, the efficiency and the timeliness of the studies developed. At the moment, the MT is seeking to incorporate planning methodologies that take advantage of and build upon the analytical tools now available with Geographic Information Systems (GIS)¹ to support the development of strategic studies, the development of impact studies of transportation projects and also to allow the consolidation in one database of all the information relevant to the area of regional transportation planning (including not only transportation infrastructure but also transportation services).
- 1.2 In addition to the MT, several other government agencies involved in transportation planning and/or transportation policy are also incorporating the use of solutions that build upon the use of geographic information technologies, including the National Department for Transportation Infrastructure (*Departamento Nacional de Infra-estrutura de Transportes (DNIT)*), the National Land Transportation Agency (*Agência Nacional de Transportes Terrestres (ANTT)*) and the National Water Transportation Agency (*Agência Nacional de Transportes Aquaviários – (ANTAQ)*). At the same time, various government agencies responsible for the transportation sector at the state level are also developing information technology solutions for transportation planning and management, which is leading to a significant increase in the amount of transportation information available.
- 1.3 In view of these needs, the MT has requested support from the Bank to enhance its present capabilities in the area of geographic information technologies. By bringing all transportation information together the MT will be able to consolidate one national transportation spatial database, which will then be made available to all interested users, including the Bank for the various transportation projects currently in the pipeline, and also to the general public. By incorporating a solution based on GIS the MT will have added analytical tools to develop the studies it is responsible for.

¹ A collection of computer hardware, software, and geographic data for capturing, storing, updating, manipulating, analyzing, and displaying all forms of geographical referenced information.

- 1.4 In planning processes where not only funds, but also the data available to base decisions on are limited, geographic information technologies (encompassing GIS, Remote Sensing, and Global Navigation Satellite Systems (GNSS), such as the Global Positioning System (GPS)), offer supporting tools for improved and effective decision-making. GIS-based solutions provide analytical capabilities that can support a number of transportation planning and management related activities such as regional analysis of multi-modal transportation solutions, corridor selection, decisions that relate to maintenance and upgrading of transportation infrastructure, social and environmental impact analysis, and concession studies. Satellite imagery provides needed data to quickly update regional maps and transportation networks. GPS technology provides the means to capture geo-referenced data of existing pavement conditions and the possibility of developing tracking systems, much needed for highway safety.
- 1.5 The goal of this Program is to improve and broaden the process of planning and decision-making in transportation at the MT. Its purpose is to design, develop and implement planning and management solutions based on GIS. The solutions, once implemented, will also provide the MT with additional analytical tools to support the implementation of transportation projects and a digital database. This database will be available to other public agencies, universities, the private sector, and to the general public, for the development of their own applications.
- 1.6 The project will have the following major benefits: (a) provide tools that will contribute to improving effectiveness and efficiency of government strategic planning, management decisions, and operations in the area of transportation planning and infrastructure management; (b) reduce costs in data management resulting from the elimination of redundant data collection and maintenance efforts; (c) provide an organizational structure that will contribute to collaboration among agencies with regard to the exchange of data and information; (d) contribute to increasing the flow of information from government to the private sector; (e) provide the ability to integrate diverse and disparate data; (f) increase technical capacity in the application of solutions based on geographic information technologies; and (g) make available and readily accessible georeferenced digital data bases.
- 1.7 The consolidation of database development and application designs is an important initiative that will contribute to and benefit other sectors as well such as health, education, environment and natural resources through the availability and coordination of transportation data. Readily available transportation data in digital format can be used to support studies that improve access to health care and education, and also environmental impact studies and the management of natural resources. For example, knowing the exact location of existing and planned transportation infrastructures is required to support diverse needs such as proposals of new environmental conservation areas and support fire emergency teams dealing with forest fires.

- 1.8 Finally, the regional and South American integration was highlighted in the Multi-annual Plan (*Plano Plurianual (PPA)*) for the period 2004-2007, approved by Congress and handled by the Ministry of Planning, Budget and Management. This plan includes the construction and upgrading of 5,500 km of highways, construction of 2,400 km of railways and the implementation of 10,000 km of waterways. In the energy field, this plan foresees the increase in the capacity of electric energy generation by 14,000 MW and construction of an additional 12,000 km of transmission lines. Most of these initiatives could benefit from the results of this technical cooperation, especially in the use of the infrastructure management tools and the digital database, which will be made available to the MT.

II. SCOPE OF WORK

- 2.1 This technical cooperation includes a total of ten tasks that will be developed by the consulting firm in two phases, Systems Design and System Development, Data Compilation and Training.

a. Phase I – Systems design

- (i) Task 1 – Introductory Project and GIS-T Seminar;
- (ii) Task 2 - Institutional Assessment, Statement of Needs and Development of a Conceptual Design of the “Regional Transportation Planning Information System”;
- (iii) Task 3 – Development of a proposal for a “National Spatial Data Infrastructure for Transportation Planning and Management – NSDI-TPM”;
- (iv) Task 4 – Seminar to present the Conceptual Design of the “Regional Transportation Planning Information System” and the proposal for a National Spatial Data Infrastructure for Transportation Planning and Management – NSDI-TPM”;

b. Phase II - System development, data compilation, and training

- (i) Task 5 - Design of the Integrated Database Model and the Applications;
- (ii) Task 6 – Compilation of Geo-referenced Data and Attribute Data;
- (iii) Task 7 – Application Development, Integration, and Implementation;
- (iv) Task 8 – Software and Hardware Acquisition and Installation;

- (vi) Task 9 – GIS Implementation Seminar and Training, and;
- (vii) Task 10 – Final Report.

A. Phase I – Systems design

1. Task 1 - Introductory project and GIS-T seminar

- 2.2 The project must begin with an Introductory Project and GIS-T (Geographic Information Systems for Transportation) Seminar to the representatives and professional staff of the institutions involved. The seminar, which will be conducted as a whole-day activity, should bring together various guest speakers and experts in the field that will help promote, through their presentations, a common understanding of the benefits and advantages of GIS and its uses for regional transportation planning and management of transportation infra-structure and services, providing a forum for receiving comments and feedback, and an opportunity to discuss topics related to the scope of the project.
- 2.3 The Consulting Firm will be responsible for organizing the seminar, including all logistical arrangements, the seminar venue, the distribution of invitations, as well as for bringing as guest speakers, including covering travel and per diem expenses, a member of the technical team of the *Asesoría Técnica Despacho Ministerial* of the *Ministério de Transportes y Comunicaciones* (MTC) from Peru and a member of the technical team of the *Ministerio de Transportes y Obras Públicas* (MTOP) from Uruguay to provide a presentation of the implementation of GIS-T solutions within their respective institutions.
- 2.4 This seminar, as well as all other planned activities, should be conducted in Portuguese and all presentations and material distributed at the seminar should be made available on the web.

2. Task 2 - Institutional assessment, statement of needs and development of a conceptual design of the “Regional Transportation Planning Information System”

- 2.5 The Consulting Firm must analyze the work processes, information flow and current planning and decision-making capabilities of the Ministry of Transportation and associated entities. Based on questionnaire interviews to be carried out, which should include a discussion of flow and use of information, existing and planned hardware and software solutions, and network capabilities (WAN, LAN, etc.), the consulting team must provide an assessment of the present situation and develop a Statement of Needs and a Conceptual Design. The Consulting Firm must take into consideration present and planned capabilities of the Ministry of Transportation in terms of systems and GIS (hardware, software and network configuration).

- 2.6 The following report will be prepared and delivered: Discovery and Needs Analysis (DNA) Report presenting the results of the institutional assessment, a statement of needs and the conceptual design, and including a refinement and scheduling of the tasks to be developed during Phase II.
- 2.7 In the development of the “Conceptual Design” all activities already included within the scope of this operation should be considered as well as the activities that should be included in future operations. This report must also confirm and further specify in a more detailed manner the hardware and software to be acquired and/or allocated for the use of the project activities. Special attention should be given to the comparative analysis of the various possible software solutions, including consideration not only for the technical aspects, but also for the total cost of acquisition, facility of the available technical support, and annual operation and maintenance cost.

3. Task 3 – Development of a proposal for a “National Spatial Data Infrastructure for Transportation Planning and Management – NSDI-TPM”

- 2.8 An inventory of the existing geo-referenced data and attribute data (relevant to the area of transportation) in both government (Ministries, associated organizations and State-level organizations) and non-government organizations should be carried out. Through a questionnaire survey and targeted interviews with data users and providers, the study will provide a report on the status of the use of geo-referenced and attribute data (in both analog and digital format) in the area of transportation in Brazil. The objective of this inventory is two-fold: first it will provide a list of existing data available that could be used by the Ministry of Transportation, providing support to the development of the Conceptual Design, and secondly, it will provide the basis for a proposal of a “National Spatial Data Infrastructure for Transportation Planning and Management (NSDI-TPM)”.
- 2.9 This proposal for a “National Spatial Data Infrastructure for Transportation Planning and Management (NSDI-TPM)” should focus on the data needs for the area of transportation in Brazil, defining responsibilities for the compilation and management, presenting a proposal for the most adequate solution to facilitate the exchange of data (including considerations for the normalization of metadata standard), focusing more specifically on the data that falls within the responsibility of the Ministry of Transportation and the associated organizations.
- 2.10 The following report will be prepared and delivered: National Spatial Data Infrastructure for Transportation Planning and Management (NSDI-TPM) Report presenting the results of the inventory carried out and the proposal for an NSDI-TPM. This report must be made available on the web and will be revised before the conclusion of the project, updating and incorporating the comments received.

4. Task 4 – Seminar to present the conceptual design of the “Regional Transportation Planning Information System” and the proposal for a “National Spatial Data Infrastructure for Transportation Planning and Management – NSDI-TPM”

- 2.11 A one-day seminar will be conducted to present the proposal for a “Regional Transportation Planning Information System” and the proposal for a “National Spatial Data Infrastructure for Transportation Planning and Management – NSDI-TPM”.

B. Phase II – System development, data compilation, and training

5. Task 5 – Design of the integrated database model and the applications

- 2.12 With the Bank’s approval (in consultation with the Ministry of Transportation) of the *DNA Report*, the Consulting Firm must build upon the Conceptual Design, detailing the data model (geo-referenced data and attribute data), the Regional Transportation Planning Information System (including the analytical tools to be incorporated and the applications needed for data management, based on the concept of dynamic segmentation), the methodological and system solution for the freight and passenger flow generation and allocation models and the updating of the GIS-based Decision Support System (GDSS). These topics should be included in the Applications Design Report.

6. Task 6 – Compilation of geo-referenced data and attribute data

- 2.13 Compile, from existing sources, a national spatial database, at a minimum scale of 1:250,000, to be integrated into the Regional Transportation Planning Information System. At a minimum, the following geo-referenced data should be included: transportation network, transportation infrastructure, other types of infrastructure (energy, communications, etc.), administrative boundaries (including socio-economic data), municipalities, hydrography, conservation areas, indigenous areas, land use, land cover, and environmental and economic zoning.
- 2.14 Update the geo-referenced data that refers to transportation networks and transportation infrastructure and services. This will consist in the updating of the existing vector data and associated attribute data using the various existing geo-referenced databases maintained by the Ministry of Transportation, the National Department for Transportation Infrastructure – DNIT, the National Land Transportation Agency – ANTT, the National Water Transportation Agency – ANTAQ and by the state transportation organizations. The Ministry of Transportation will support the Consulting Firm in contacting the state organizations to request the needed geo-referenced data (including the attribute data).

- 2.15 Update of the spatial database of the GIS-based Decision Support System - GDSS which is used to study integration corridors and transportation alternatives at a continental level. The updating process will consist of the improvement of the geo-referenced data for Brazil through the incorporation of the vector database described in the previous paragraph.

- 2.16 A regional-level spatial database (desired scale 1:50.000), of the Florianopolis - Osorio Highway (Modernization of the Rodovia Florianopolis – Osorio Highway (BR-0254)), which should include the States of *Santa Catarina* and *Rio Grande do Sul*, will be developed to support more specific studies such as social-environmental vulnerability studies. The same geo-referenced layers listed in paragraph ¶2.13 should be compiled at a more detailed scale. As an integral part of this spatial database, the proponent must provide a mosaic of satellite images, acquired since the year 2000, covering not only the States of *Rio Grande do Sul* and *Santa Catarina*, but also the States of *São Paulo*, *Minas Gerais*, *Rio de Janeiro* and *Paraná*. The satellite imagery is needed to support the study of the occupation along the right-of-way and the interpretation of land use patterns within the area of influence of the project. The imagery should be used by the consulting firm to update the transportation network and the transportation infrastructure and services that can be interpreted from the satellite imagery for the States of *Santa Catarina* and *Rio Grande do Sul*.

- 2.17 The delivered satellite imagery must be geo-referenced individually and corrected to the proposed level of accuracy and included into the spatial database as additional layers. A multi-user license is needed, as the imagery will be shared by various institutions.

7. Task 7 – Application development, integration, and implementation

- 2.18 Develop of the Regional Transportation Planning Information System, including the integration of the geo-referenced data and the attribute data. At a minimum, the compiled geo-referenced data should be included with the following attribute data: specific information from the area of transportation; information on transportation projects developed, being both implemented and planned; information on concession areas; historical freight and passenger transportation data; social-economical data; statistical transportation data; current status of the transportation infra-structure and services, etc. The system must enable easy access to all the information, either through attribute-based queries or through querying the spatial data.

- 2.19 The systems solutions developed for the above system should be based on the concept of dynamic segmentation, and should include also the development of specific applications that will facilitate the management of the database such as a route calibrator and an event placement. Similar solutions were developed for the GIS-T project which the Bank

developed in Peru (ATN/JF-7023-PE – GIS Strengthening to Support Regional Transportation Studies and Highway Planning and Privatization).

- 2.20 The system should include network analysis and locational analysis capabilities, to enable the carrying out of spatial analysis using the existing compiled data. Network analysis refers to the capability of modeling and analyzing connected linear features with the incorporation of analytical tools which enable routing analysis, accessibility analysis, shortest path, service areas, traveling salesman problem, etc. Locational analysis refers to the capability to model and carry out spatial analysis of cell-based raster data, including the incorporation of appropriate analytical tools, such as surface analysis, terrain analysis and map algebra.
- 2.21 Implement of a methodology and a system to generate and allocate freight and passenger flow, with the possibility of defining forecasts and carrying out simulations to elaborate future scenarios. The solution to be proposed by the Consulting Firm should take into consideration the existing system, which is based on STAN™ – Strategic Transportation Analysis software.
- 2.22 Integration of the updated geo-referenced database into the GIS-based Decision Support System (GDSS). This system was developed in previous GIS-T projects supported by the Bank and will be made available to this project.

8. Task 8 – Software and hardware acquisition and installation

- 2.23 Hardware and GIS software will be purchased by the Consulting Firm and installed. These computers are to be networked into the existing LAN. Details of the hardware and software to be purchased are included in the Specific Guidelines.

9. Task 9 – GIS implementation seminar and training

- 2.24 Following the development and conclusion of the previous activities, the following seminar and training will be provided:
 - (i) GIS Implementation seminar – a one-day seminar will be given to the same audience of the initial seminar, presenting the final solution implemented and demonstrating the possible uses of the analytical tools and the spatial data in supporting the needs of the Ministry.
 - (ii) Basic GIS-T training – a hands-on training of at least 40 hours should be provided to two groups of up to 15 professionals each presenting an introduction to the systems developed and implemented, focusing more specifically on the basic concepts of geographic information systems and the basic analytical tools available with the Regional Transportation Planning Information System. The

focus should be on providing the necessary understanding on how the compiled geo-referenced database and the analytical tools being provided can be used. During the training the data compiled for the project should be used.

- (iii) Advanced GIS-T training_– a hands-on training of at least 80 hours should be given to a group of 10 professionals on the following topics: network analysis, locational analysis, use of the GIS-based Decision Support System (GDSS), and use of the solution implemented for the generation and allocation of freight and passenger flow.
- 2.25 For the training, all needed *User Manuals* must be completed for distribution. Also, the Data Dictionary and the Metadata must be completed and distributed prior to training. All seminars and training will be conducted in Portuguese. All materials made available must be provided in Portuguese (optionally English versions may also be provided).

10. Task 10 – Final report

- 2.26 A Draft Final Report and subsequent Final Report must be prepared summarizing the previous reports together with an analysis and feedback from the implementation seminars, and recommendations for future activities. The Final Report must include also a 5-page Executive Summary in both Portuguese and English.

III. PRODUCTS AND SERVICES

- 3.1 The products and services described in this section are part of the deliverables. All of the reports shall be presented to the Ministry of Transportation and to the Bank for review in a total of 5 copies in both hard copy and digital format. For the Final Report 10 copies will be presented after approval by the Bank.

A. Reports

- 3.2 Inception Report (15 days after contract signing) - The Inception Report will present the Consultant's Work Plan and Personnel Allocation Plan for the project, with any modifications agreed to during negotiations. This report should also indicate any special circumstances that might affect the timing or the successful development of the work.
- 3.3 Discovery and Needs Analysis (DNA) Report (Task 2) - This report will present the results of the Institutional Assessment, Statement of Needs and the Conceptual Design and will include a refinement and scheduling of the tasks to be developed during Phase II. Approval of this report by the Bank, in consultation with the Ministry of Transportation, is needed before beginning the activities of Phase II.

- 3.4 National Spatial Data Infrastructure for Transportation Planning and Management (NSDI-TPM) Report (Task 3) – This report should present the results of the inventory carried out and the proposal for a NSDI-TPM. This Report must be made available on the web and will be revised by the Consulting Firm before the conclusion of the project, updating and including the comments received.
- 3.5 Applications Design Report (Task 5) – This report should detail the Conceptual Design, detailing the data model (geo-referenced data and attribute data), the detailing of the Regional Transportation Planning Information System (including the analytical tools to be incorporated and the applications needed for the management of the data, based on the concept of dynamic segmentation), the methodology and system solution for the freight and passenger flow generation and modal allocation models, and the updating of the GIS-based Decision Support System (GDSS). This report should include also an outline of the Data Dictionary and Metadata information to be developed for the digital data produced and included as part of the applications.
- 3.6 Draft Final Report (Task 10) - A Draft Final Report will be prepared summarizing the three previous reports, a description of the activities carried out during the development of the project, together with an analysis and feedback from the implementation seminars, and including recommendations for future activities.
- 3.7 Final Report (Task 10) - The Final version of the Report will be presented after review and comments from the Ministry of Transportation and the Bank of the draft version and will include the CDs described in paragraph ¶3.21.
- 3.8 Monthly Progress Reports - During the first ten (10) calendar days of each month the Consulting Firm should deliver by e-mail (electronically) a brief report covering the activities of the prior month, which should specify the personnel allocated, advances in the period by category of the work, and the projections for completion.
- 3.9 Executive Summaries – Executive summaries in both Portuguese and English must be included in all reports except from the Monthly Progress and the Inception reports.

B. Databases (Task 6)

- 3.10 Spatial data and attribute data – the spatial data compiled for Task 6.
- 3.11 Satellite imagery - all satellite imagery products acquired during the development of the project. All the imagery will be geo-referenced to the same projection and coordinate system used for the vector data.

C. Applications

- 3.12 Regional Transportation Planning Information System – the application developed including the user manuals. Includes also the specific applications developed such as the route calibrator and the event placement.
- 3.13 Network analysis and locational analysis capabilities
- 3.14 System for freight and passenger flow generation and allocation – the implemented application including user manuals.
- 3.15 GIS-based decision support system (GDSS).

D. Hardware and software

- 3.16 Computer hardware and software acquisition and installation (Task 8) - as detailed in the 'Specific Guidelines'.

E. Training materials

- 3.17 Training materials (Tasks 1,4 and 9) - all training materials utilized for the various seminars and trainings should be delivered in both the original format and in HTML format (a set of training materials should be provided to each trainee and a total of 5 sets of training material in both hard copy and digital format should be provided to the Bank and the Ministry of Transportation).
- 3.18 Data dictionary and metadata - a Data Dictionary must be developed with the listing of all the data compiled and with Metadata information for the digital data produced by the consulting firm (5 sets of Data Dictionary and Metadata in both hard copy and digital format).

F. Ownership

- 3.19 All reports and relevant data such as maps, images, diagrams, plans, statistics and supporting data acquired, compiled or prepared in the course of the services shall be considered confidential and shall be the absolute property of the Bank and the Ministry of Transportation. The Bank and the Ministry of Transportation, to the extent permitted by the vendor or the original owners, will own the copyright to any spatial data, including remotely sensed imagery, created or acquired for use in the Project, including the right to reproduce, distribute, disseminate and publish.

- 3.20 The Bank will own the copyright of programs written to implement all applications except for existing previous applications already developed by the Consulting Firm and if specifically stated in the technical proposal, in which case the Bank's rights will be limited to using such applications in this project and similar Bank supported projects. In both cases the Bank will authorize the beneficiaries to use the applications developed to support the activities implemented by this project.
- 3.21 All spatial data, the applications developed, the reports, the training material and the presentations given at the seminars will be delivered in digital format, written on CD-ROMs, to the Bank and to the Ministry of Transportation (a total of 10 copies). The spatial data shall be copied in the format they were created in as well as in an industry-standard export format. All the data included in the CD-ROM must have associated metadata information. The Consulting Firm shall deliver all these materials to the Bank and to the Ministry of Transportation upon completion of the services, together with the Final Report. The Consulting Firm may retain a copy of such materials but may not use them for purposes unrelated to this contract without prior written permission from the Bank.
- 3.22 The Consulting Firm must include on the CD-ROMs produced and in all reports and publication materials (including the web site) a statement clearly indicating that in the development of the products and project activities support was provided by the Bank and the Japan Trust Funds for Consultancy Services (JCF).

F. Environment

- 3.23 The Consulting Firm must ensure during the development of all activities that there is direct consultation to CONAMA (*Comissão Nacional de Meio Ambiente*), for the various environmental units and the environmental authorities at the decentralized levels (States and Municipalities), making sure that their needs are understood and considered in the development of the various tasks of this project. The project will make available to these sectors the spatial data being compiled. The consulting firm should also ensure that these authorities, experts and technicians are invited to the seminar that will be conveyed to discuss the National Spatial Data Infrastructure for Transportation Planning and Management.

IV. QUALIFICATIONS OF THE CONSULTING FIRM AND CONSIDERATIONS FOR THE TECHNICAL PROPOSAL

- 4.1 Given the nature of the work, the Consulting Firm must have extensive expertise and familiarity in the development of GIS-based solutions for regional transportation planning and transportation infrastructure and services management and the current status of GIS technology. The utilization of an integrated team drawing from local and international

expertise is expected. The consulting firm will allocate the personnel necessary for the successful completion of the project in accordance with the methodology proposed, the work program and the staff allocation plan, which will form part of the proposal and, as such, it is the exclusive responsibility of the Consulting Firm to determine the specialties and timing of the professionals to be used. The following table may be considered to be a minimum composition of an acceptable project team and presents an estimate of professional involvement. This estimate is made for orientation purposes only.

Professional Expertise	Estimated Time (months)
Project Director	3
GIS-Transportation Analyst	2
GIS Analyst	14
Systems/GIS Programmer	5
Remote Sensing Analyst	2
Systems Analyst	6
GIS Database Technician	15

- 4.2 The Project Director should have no less than 10 years of international experience in managing projects of similar content and complexity. The Director should have had demonstrable experience in the development and implementation of GIS-based solutions and working ability to communicate in Portuguese. The post of Director may be combined with one or more of the other positions listed.
- 4.3 The listed professionals (excluding the GIS Database Technicians) should have at least 5 years of relevant experience. Those professionals that will be working in Brazil should be able to communicate adequately in Portuguese.
- 4.4 In their *Proposals*, the Consulting Firms should give special attention to the following items:
 - a. Seminars and training - provide descriptions of the format of the seminars and the approach to the training environment.
 - b. Digital data - indicate understanding of the existing data to be used in compiling the digital data (spatial and non-spatial) and discuss the methodology for developing each spatial database (specifying hardware, software, data sources and methodological procedures to be used).
 - c. Map projection and referencing system - provide an understanding of the issues of

having different sources of spatial data utilizing different map projections and different referencing systems.

- d. Satellite imagery - discussion of existing satellite imagery, indicating the choice made, along with supporting arguments having in mind the intended use of the imagery. Satellite imagery must be recent (year 2000 onwards) and with minimum cloud coverage. Indicate and discuss the choice of control points for correcting the imagery and the level of accuracy expected after final processing.
- e. Applications - indicate design considerations for developing the applications and also conceptual issues and practical solutions for integrating spatial and non-spatial data.
- f. Quality assurance and quality control - describe issues of quality and level of confidence of the spatial data to be compiled and of the applications that will be developed and describe how QA/QC will be incorporated into the project. As part of the discussion of quality control of the spatial data indicate any metadata and cartographic standards that shall be followed.
- g. Manuals and user help capabilities for the applications developed provide a description of the format of all the Manuals (user, programmer, analyst, etc.) and also the Help capabilities to be included in the system.
- h. Schedule of deliverables - provide a schedule of deliverables. In the development of this schedule the consulting firm must consider that the Bank and the Ministry of Transportation will need to have up to 30 days to analyze and approve the *Discovery and Needs Analysis Report* and the *Draft Final Report*.
- i. Schedule of personnel allocation - provide a schedule of personnel allocation, indicating extent of involvement and location.
- j. Portuguese - All reports, user manuals, and all other materials shall be produced in Portuguese (the Consulting Firm may provide additional versions or copies in English).
- k. Budget - The proponent must provide a budget broken-down by task. The satellite imagery and hardware and software should be budgeted as separate budget items. A total estimate of the number of scenes to be acquired should be provided together with a unitary price.

V. DURATION OF PROJECT

- 5.1 The work should be conducted in a period of no longer than 12 months. The Draft Final Report should be delivered 10 months after the beginning of the activities,

with the final 2 months needed for its review and for the delivery of the Final Report, which must include all spatial data.

VI. REPORTING RELATIONSHIPS

- 6.1 The executing agency is the Inter-American Development Bank (IDB). The co-executing agency of the project is the Ministry of Transportation through the National Transportation Policy Secretariat - SPNT (*Secretaria de Política Nacional de Transportes*).
- 6.2 The administration of this technical cooperation will be the responsibility of the Bank's Country Office in Brazil (COF/CBR), being responsible also for the disbursements. The Technical Supervision of the study will be the responsibility of the Bank's Finance and Basic Infrastructure Division 1 (RE1/FI1) in coordination with the Bank's Country Office in Brazil (COF/CBR).