

19.5. RESETTLEMENT

19.5.1. INTRODUCTION.

When resettlement or relocation issues arise within a large-scale infrastructure project, full compensation must be prepared prior to any construction activities. Legal system concerned with the resettlement issue in the event of any public construction project are specified in Chapters VII and VIII of Law 388 [DAPD, 1997] as follows;

Chapter VII: Acquisition of properties for voluntary alienation and judicial expropriation.

Article 58 Reasons of public utility

Article 59 Competent entities.

Article 60 Approval of the expropriation with the plot.

Article 61 Modifications to the procedure of voluntary alienation.

Article 62 Procedure for the expropriation.

Chapter VIII: Expropriation via administration.

Article 63 Reasons of public utility.

Article 64 Conditions of urgency.

Article 65 Approaches for the urgency declaration.

Article 66 Determination of the administrative character.

Article 67 Compensation and forms of payment.

Article 70 Effects of the decision of expropriation via administration.

Article 71 Process contentious administration.

Article 72 Application of the procedure to other cases of expropriation via administration.

19.5.2. COMPENSATION

Basically, the following four types of compensations are considered in the event of any resettlement issues related with the infrastructure project in Bogota City.

(1) TRMITE: Fifty (50) percent of the certification of land price in any legal document (i.e., almost identical to one and a half (1.5) percent of land price is compensated to the owner of the land.

(2) TRASTEIO: 220,000 Colombian Pesos are paid for the relocation of the commercial facility.

(3) TRASTEIO VIVIENDA: 120,000 Colombian Pesos are paid for the relocation of the tenant living within the apartment complex concerned.

(4) PERDIDA DE INGRESOS: Classified into further sub-categories: i.e., (1) the amount equivalent to the past six month profits is paid to the business owner, and (2) the amount equivalent to current three month tenant rent is paid to the apartment owner.

Based on the evaluation of each various items listed above, total amount of all required compensations is calculated. Then, multiplying the Social Factor that accounts for any detailed aspects of the property concerned (e.g., location environment, and building age)

which is usually less than one, final amount of compensation will be determined (IDU personal communication, 1999).

19.5.3. EXPROPRIATION ESTIMATION

As described in previous section, approximately 122,388 m² of private lands that include 215 houses must be expropriated within this project (see Table 19.5-1). All houses counted in Table 19.5-1 are located in either of Estratos 2 or 3, so the resettlement plan must be prepared for the relocation of those people. Note that relocation place should be located within Estrato 2 or 3, that is identical to the previous one. There is no information related with the number of houses to be taken at the San Victorino Central Urban Bus terminal Site, therefore, the number of the houses was estimated by the following procedure;

$$512 \text{ (people)} / 3.85 \text{ (people/family)} = 133 \text{ families} = 133 \text{ houses}$$

where: 512 people is after 1993 demography census, and 3.85 people/house is from government statistical report [DAPD, 1997].

Table 19.5-1 Land Acquisition

Expressway	Bus-lane	Central UBT	Suburban BT	Total
5,013 m ² (35 Houses)	18,350 m ² (47 houses)	23,750 m ² (133 houses)	69,660 m ² (0 houses)	116,773 m ² (215 houses)

Note: Central UBT and Suburban BT stand for "Central Urban Bus Terminal" and "Suburban Bus Terminal", respectively. Numbers in parenthesis indicates the number of houses to be expropriated,

19.5.4. RESETTLEMENT PLAN

It is essential to prepare the resettlement program in order to proceed with the entire project smoothly even though it is hard to implement any resettlement action programs related with the infrastructure project under current situation of Bogota. Most of people living in lower Estratos (e.g., Estratos 1 – 3) tend to spend the whole compensation money for other things, sometimes, totally different from buying new house or land [IDU, personal communication, 1998]. To avoid this non-constructive wasting, there is a plan, so-called "Plan de Gestion". In that program, some experts are hired as helpers/or advisors for the people who do not have any idea how to use their compensation money.

In general, it is better to have a resettlement survey in order to determine how many families are willing to move into new resettlement places. When resettlement issues arose in the past infrastructure projects across the world, usually almost one-third of entire families have been relocated into new resettlement places prepared by government [Tsuchihashi personal communication, 1999]. Figure 19.5-1 shows the example of new resettlement place to be prepared for this project. Here, it is assumed that the land for this place will be provided by Bogota City free of charge and nearly one-third of entire 72 families summarized above will be moved into this new settlement place. Table 19.5-2 summarizes the outline of this place. The construction cost of this resettlement place is summarized in Chapter 16. Again, it is strongly recommended to have more intensive resettlement surveys prior to embark into the construction activities of this project.

In that overall plan, the Central Urban Bus Terminal site planned within this study is not delineated within the development program of the area. Therefore, it would be more beneficial if that current renewal plan and urban bus terminal planning are integrated. Through this integration, more significant activity core of this renewal development plan would be created. In that case, the local land use and construction plan must meet the requirements and convenience of resident and bus users.

19.6. ENVIRONMENTAL MANAGEMENT

19.6.1. INTRODUCTION

Effective environmental management during pre-construction and construction requires the establishment of effective institutional arrangements for the implementation of the Environmental Management Plan (EMP). In general, any environmental management program should be carried out as an integrated part of project planning and its execution, making a significant and continuous contribution to the overall development of the scheme. It must not be regarded merely as an activity limited to monitoring and regulating activities using a pre-determined checklist of required actions. Rather, it must interact dynamically as the project implementation proceeds, dealing flexibly with environmental impacts – both expected and unexpected as they arise. For this reason, the plan provides for periodic audits, which will evaluate compliance of on-site environmental management practices with the EMP requirements and also to refocus the plan itself in the light of experience and issues arising.

19.6.2. OBJECTIVES

The main purpose of the EMP is to ensure that the various environmental protection measures selected through the project planning phase are implemented during the construction phase, so that the environmental degradation and pollution resulting from construction activities will be minimized. Specific objectives of the plan are to:

1. Define organizational and administrative arrangements for the environmental monitoring, including the definition of responsibilities of staff, coordination, liaison and reporting procedures.
2. Discuss procedures for pro-active environmental management, so that potential problems can be identified and mitigation measures to be adopted prior to the construction commencement.

19.6.3. SCOPE OF ENVIRONMENTAL MANAGEMENT PLAN

The EMP is concerned with the environmental impacts due to the new bridge construction and the controlling procedures as well as the social impacts of the proposed project with regard to health, school, and energy and water supply including impacts on socio-economic activities. The health and safety of the construction workers will also be controlled by legislation or regulations.

19.6.4. METHODOLOGY

The basic approach to prepare the management plan comprises of following parts:

- 1) Reviews of the mitigation plan.
- 2) Discussions with engineering staff engaged on the design phase of the project.
- 3) Experience gained through past relevant environmental monitoring activity.

19.6.5. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Within the EMP, the Engineer's role is to monitor the activities of the contractors and to take action under the terms of the contract to prevent and minimize the environmental damage. Basically, there are three factors to be considered in order to have an organized and efficient EMP; i.e., (1) the contractors' organization, (2) the resident engineer's organization, and (3) the liaison, coordination and reporting among each section of the project.

(1) Contractors' Organization.

The tender documents should require the contractor to state clearly his/or her environmental policy. The clear specification of the responsibility for the environmental protection within the contractor's organization is a critical factor for the achievement of a good environmental control. Therefore, it is necessary to ask contractors to submit their proposals for the environmental management. Basically, these proposals must contain the following items:

- 1) Clear statement of their environmental policy.
- 2) Their own organizational framework, in particular, the assignment of an engineer to take overall responsibility, to manage environmental control facilities on daily basis and to liaise with the Resident Engineer's monitoring team.
- 3) Designation of principal pollution control facilities, including procedures for the disposal of construction wastes, and of contingency plans in the event of facility failures.
- 4) Proposed environmental monitoring procedures in order to ensure that facilities are operating satisfactorily and problems are being dealt with promptly.
- 5) Environmental awareness training program for the workforce.

(2) Resident Engineer's Organization (REO)

Following arrangement might be necessary when the staffing structure for the project is finalized. Ultimate responsibility for environmental matters within the REO will rest with the Project Manager (PM), and with the Chief Resident Engineer (CRE) being responsible for daily direction and management. It will be necessary to have an Environmental Monitor (EM) who will be able to make occasional visits to sites, and a full-time local Assistant Environmental Monitor (Assistant EM) who will be responsible for daily monitoring of projects. The Environmental Monitor (EM) should have suitable experience in the environmental management.

A brief description of the responsibilities of each team member follows:

1) Environmental Monitor (EM)

The EM has to act at two different levels. Firstly, he/or she has to give overall advice and define the general procedures which will include environmental reports. Secondly side, he/or she will be involved in the establishment of the daily monitoring procedures. The major tasks for EM are items (a – c) which represent the first level interest, and items (d – p) as the second level.

- a) To review and make him/or herself familiar with the EMP, including advice on:
 - The environmental management framework.
 - Reporting and liaison requirements.

- Key environmental issues.
 - Monitoring strategy.
 - Data management.
 - Environmental control measure.
- b) To carry out periodic environmental audits of the project in order to:
- Identify any environmental performance deficiencies and advise how to address these.
 - Assess the degree of compliance with the EMP achieved on site.
 - Review the continuing relevance of the EMP in the light of experience, and instigate changes where appropriate.
 - Review the organization and administrative frameworks for the environmental management.
 - Review environmental monitoring data and its management.
 - Review environmental problems arisen and how these have been dealt with.
 - Propose changes to the environmental management procedures and framework and identify the need for additional measures to control environmental degradation.
- c) To provide ad-hoc advice on environmental issues to the PM, CRE and Assistant EM.
- d) To establish an effective environmental monitoring, sampling and analysis program.
- e) To establish routine management, liaison and reporting systems, including the establishment of the environmental database.
- f) To evaluate the results of the monitoring program and to advise REs of required action.
- g) To prepare routine management reports.
- h) To advise the CRE/PM on the contractors' proposals for site establishments in terms of landscape, drainage, erosion control, liquid and solid hazardous waste management, fuel and chemical storage and site restoration.
- i) To review the contractors' proposals for pollution control facilities and to advise on its adequacy.
- j) To study the mitigation measures proposed by the contractors and to recommend safeguards.
- k) To co-ordinate the sampling and analysis program with a nominated laboratory.
- l) To liaise and report on a routine basis with the Urban Development Institute (IDU), and with the Technical Administrative Department of Environment of the Capital District of Bogota (DAMA).
- m) To train and support the Assistant EM.
- n) To recommend the procurement of the equipment required for the environmental monitoring.
- o) To advise on the need for expert assistance.

2) Assistant Environmental Monitor

The following are fundamental routine tasks for the Assistant EM:

- a) To undertake environmental monitoring through site inspections on a daily basis and to notify the EM/or the REs of any problems.
- b) To conduct the routine sampling and analysis programs, and to take ad-hoc samples when necessary.
- c) To look after the environmental monitoring equipment and to advise the EM or REs of defects, problems or replacement/or additional requirements.
- d) To assist the EM in the analysis of results, preparation of reports and with other duties as required.
- e) To be responsible for the daily management of the database system to be established.
- f) To liaise with the local communities and to act as a channel for their concerns.

Sometimes, the Assistant EM has to take over the tasks f, g, k and l of EM's, summarized earlier.

(3) Liaison, Co-ordination and Reporting

1) Liaison with the Contractors

The Assistant EM will attend a weekly site meeting of the relevant contractors' staff and address environmental shortcomings arisen there. From the contractor's side, the attendance of the senior manager and the engineer responsible for the environmental protection would be preferable for this meeting. From the consultant's side, the EM or Assistant EM and the RE/or CRE will attend. These meetings should be minuted.

2) Liaison with Central Government.

As we mentioned above, the Assistant EM will prepare a short monthly report for submission to the relevant agencies such as the IDU and the DAMA, and will be available to attend progress meetings when required.

3) Liaison with the Local Community

Liaison with the local community will be important during the construction period in order to ensure that their views are being taken into account and that problems and nuisances such as noise and dust are reduced to the minimum. All complaints must be recorded, and also, these records should show what action was taken, and when, and what monitoring is necessary.

4) Consultant's Internal Co-ordination and Reporting

The Environmental Monitoring Team will prepare a monthly report, which should not be lengthy, but will summarize issues carried over from the previous report, stating whether they have been resolved or are on-going, and new issues arising. This should be included in a general monthly progress report to be submitted to the IDU. It is not envisaged that formal meetings will be required for the internal management of the environmental program, and that ad-hoc meeting would be adequate.

(4) Environmental Management and Audit Program

The first several months of the construction phase will be important for the EMP establishment. It is anticipated that the Program should be audited annually, but that the first audit should be carried out after six months in order to review the establishment of the

management systems and procedures. The processes of environmental management should be continuously evolving and improving as the project proceeds.

19.7. ENVIRONMENTAL MONITORING

19.7.1. INTRODUCTION

Main objectives of the environmental monitoring are to provide a continuous feedback on project implementation to identify actual or potential successes/or problems at early stage, and to implement timely adjustments to whole project management work. Monitoring is a continuous assessment of project implementation and must be an integrated part of good management by Engineer during the construction.

19.7.2. OBJECTIVES

The objective of the monitoring system is to assist the project management through:

- 1) Defining requirements and procedures for the environmental monitoring (type of equipment to be used, monitoring schedule, parameters to be monitored and so on).
- 2) Identifying targets and objectives for the project implementation.
- 3) Keeping environmental records for the project evaluation.
- 4) Identifying problems arising from the project, and figuring out procedures for the environmental remediation in the event of the pollution or similar incidents.
- 5) Providing readily available results of related environmental analysis for the decision making.

19.7.3. SCOPE OF THE MONITORING PLAN

The scope of the monitoring plan is:

- 1) To identify the monitoring tasks to be undertaken by EM during the construction phase.
- 2) To identify the nature and the schedule of the monitoring.
- 3) To identify samples to be taken for analysis and parameters to be measured.

19.7.4. METHODOLOGY

The basic approach to prepare this monitoring plan comprises:

- 1) Reviews of the mitigation plan discussed earlier, and in particular, of the monitoring requirements identified for the construction phase of the project.
- 2) Discussions with engineering staff engaged in the project design and planning.
- 3) Consideration of the environmental monitoring experience.

19.7.5. ENVIRONMENTAL MONITORING

The aim of the monitoring plan is to develop a cost-effective approach to monitor the contractors' environmental performance. Certain parameters (e.g., roadside air quality, noise and vibration and so on) can be monitored through measurements, and others can only be monitored through observation (e.g., tree cut-down). Careful observations made through this monitoring work, established by a forward planning, is a key part for a

successful environmental management to prevent problems (or at least to limit their effects).

Baseline data to be summarized in this project will help to define the requirements for the site restoration and provide a basis for the comparison of effects during the construction. Post project audit should be carried out to examine the success of the site restoration and evaluate the effectiveness of the mitigation measures adopted.

19.7.6. MONITORING REQUIREMENTS

The monitoring requirements of the Monitoring Program were identified in the Mitigation Plan. The Engineer should be responsible for monitoring the activities of the contractor, and the EM and the Assistant EM should assist the Engineer in the monitoring which requires measurements, based on responsibilities discussed earlier.

The monitoring activities can be divided into the following two groups; one which can be carried out through measurement, and one which will be carried out through observation. Figure 19.7-1 shows the suggested relationship between the Client, Engineer and Contractor's teams.

Table 19.7-1 provides more detailed descriptions of the activities to be undertaken for each of the monitoring requirements. It is strongly recommended that corresponding clauses should be developed for the inclusion in the bid documents. The monitoring requirements for the air quality, noise and vibration, and groundwater to be followed will be the responsibility of the EM.

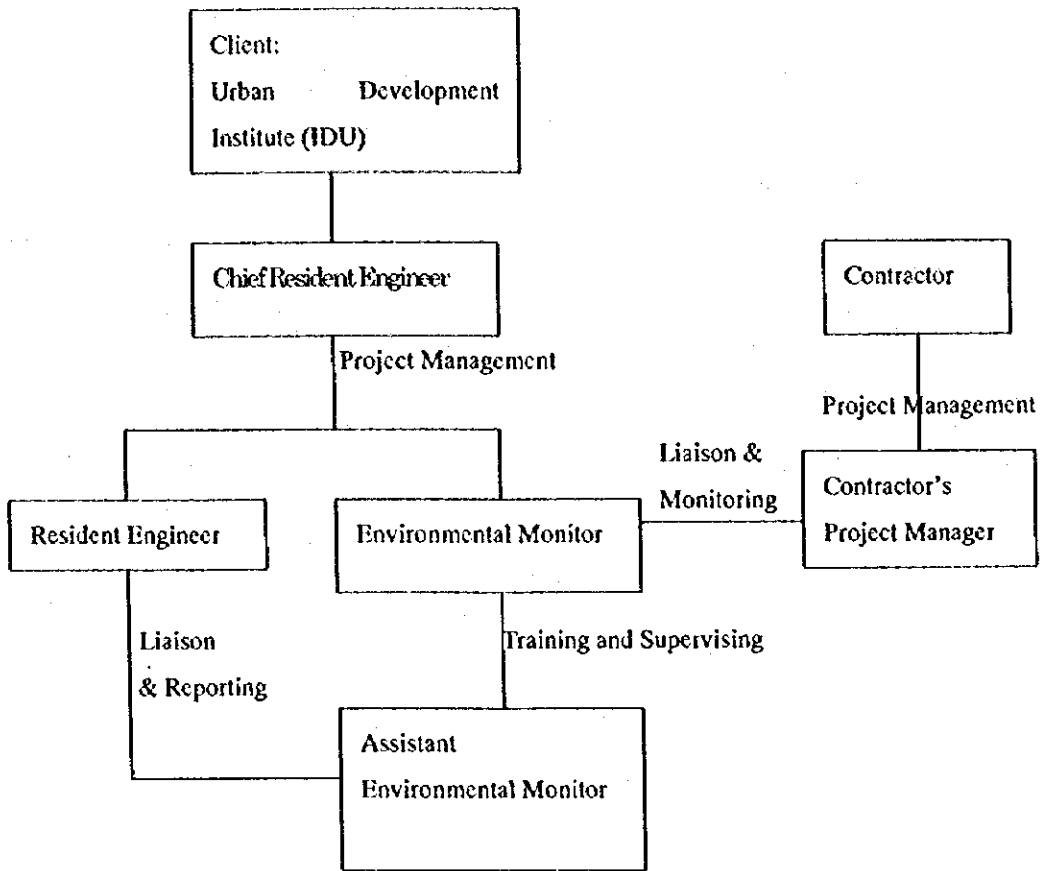


Figure 19.7-1 Relationship among Client, Engineer and Contractor's team.

Table 19.7-1 Monitoring Activities and Indicators

Monitoring Issue	Monitoring Method	Positive Indicator
Soils	Engineer should make a daily inspection of earthworks, and ensure that slopes are suitably graded. Once earthworks are complete, Engineer should monitor restoration measures implemented by Contractor, such as revegetation or use of geotextiles.	Absence of rills, gullies or other erosion features.
Vegetation	Engineer should ensure that excessive clearance of vegetation is avoided. Contractor must seek approval of Engineer prior to clearance. Re-planting or relocation of trees should be done with the coordination of DAMA.	Area of vegetation to be cleared to be minimized. Relocation/or replanting be coordinated with DAMA.
Birds	No monitoring required.	N.A.
River Sedimentation	Engineer should monitor sedimentation of major tributaries and sand-bar generation at down stream side of new routes for safe flood control.	No trace of significant sedimentation and of new sand bar generation. Secure safe river space and make local water flowing smooth.
Groundwater Level	Engineer should periodically monitor regional groundwater level distribution and enhanced consolidation to be caused by groundwater level drawdown.	No big groundwater level fluctuation. No regional vegetation change. Minimize aquifer consolidation.
Land Take	Engineer to ensure contractor gives advance warning of any land take or demolition. The Urban development Institute (IDU) to arrange compensation for land loss where necessary. New houses to be built prior to demolition.	Land-take and house demolition minimized. Relocation program well prepared.
Road Safety	Engineer should monitor the condition of trucks arriving at the site and keep a record of night driving.	No road accidents related with project. Night driving kept to minimum.
Waste Material	Engineer to ensure waste dumping site for construction waste material, soil, and so on.	No illegal disposal of waste material.
Noise and Vibration	Noise measurement should be carried out at the center and the boundary of the work site and at the nearest sensitive receiver.	Noise levels at the nearest sensitive receiver should not exceed the Bogota environmental standards.
Air Pollution	Observations should be made on the level of dust generated during construction activities. Dampening down should be carried out if levels are unacceptable. Further details on the method to be used are provided in following sections.	Deposition of dust on surfaces should decrease with increased dampening.

Table 19.7-1 Monitoring Activities and Indicators (continued)

Monitoring Issue	Monitoring Method	Positive Indicator
Water Resources	Engineer should monitor the occurrence of dried-up wells to be caused by groundwater level drawdown during the construction period.	No significant water quality degradation recognized throughout construction period.
Landscape	Engineer should make visual inspection of earthworks to ensure that excessive excavation is not being carried out. Temporary screening may be appropriate in some cases.	Landscape alteration reduced to the minimum. Townscape amenity improved.
Complaints	Engineer should inspect the record of complaints made by local residents, to be kept by Contractor, and should check that action is taken quickly and that the number of complaints does not rise significantly.	Number of complaints decreases.

(1) Noise and Vibration

The purpose of the noise and vibration monitoring is to limit nuisance to local residents and to the workforce, and the noise should be measured frequently during the construction. Potential sources of the noise include a heavy construction plant and vehicles. An ad-hoc approach should be taken, depending on the type of activities in progress and their location on site in relation to sensitive receivers. Background noise level must be measured before the project commencement.

(2) Dust

The objective of the dust monitoring is to control nuisance to both local residents and the workforce on site. Monitoring site should be located in areas where there are sensitive receivers. Generally, the dust generation is the most severe along unpaved access roads and at areas where loose materials are handled (e.g., industrial wastes site, stockpiles and so on). Based on those facts, the monitoring station sites should be determined. Parameter to be monitored is the weight of the dust accumulated within a specific time period (e.g., 1 week – 1 month). Background dust level must be measured before the project commencement, and remedial measures will be taken where more than 50 % increase of the background dust level occurs.

(3) Groundwater Level

The objective of the groundwater monitoring is to observe a change in the regional water balance during the construction. Several monitoring wells should be installed in order to establish a proper monitoring network, and the monitoring will determine whether there is a severe drawdown/or uprising, that will lead to regional aquifer consolidation/or vegetation change.

(4) Groundwater Quality

Monitoring can be made by the monitoring system, described previously. Parameters to be monitored include: organoleptic conditions such as color and odor; physico-chemical characteristic such as turbidity, conductivity, sulfate and aluminum content; undesirable substances such as nitrates and hydrocarbons; toxic substances such as chromium, lead and pesticide. Polluted discharge from road surfaces can be assessed either by heavy metal content or suspended matter.

(5) Water Quality

It is essential to have periodic water quality tests during the construction phase of the project in order to check the water quality pumped from excavations and discharges from construction sites, and to monitor the effects of any localized pollution due to human activities and spills. Monitoring of the ambient water quality will determine whether there are likely to be problems for downstream uses, whereas monitoring of the effluents will help to identify the source of the problem and the remedial action. Parameters to be monitored should reflect the type of contaminants likely to be detected. For example, contamination caused by the concrete may be detected through increased pH levels.

19.7.7. MANPOWER AND BUDGETING

It is envisaged that the Engineer will carry out the construction environmental monitoring program as a part of the contract. The EM will be employed on a full-time basis. The Assistant EM will be full-time, and will report to the Engineer, and the EM. The cost of implementing the monitoring plan will include the full-time salary of the EM and Assistant EM. It may be necessary to employ an international environmental expert for the initial training of EMs and subsequently to attend at audit time. The estimated cost of this monitoring plan implementation will be summarized as an environmental protection cost in next section.

19.8. ENVIRONMENTAL MANAGEMENT COSTS

Environmental protection costs are of two types: components of the bridge construction works (e.g., drains, vegetation), and technical support. Generally, the cost of direct environmental protection measure such as drainage works is included in the estimation of the direct construction cost. The cost for the other items is summarized as environmental management costs (see Table 19.8-1).

The environmental technical support for the project consists of following five components: (1) hiring environmental personnel, (2) local consultation, (3) training and co-ordination meeting, and (4) facilitation.

The local consultation consists of developing and implementing a briefing for contractor personnel, and preparation/or implementation of workshops for local officials. The estimated cost of this item is 18,440,000 Colombian Pesos.

The training and meeting coordination involve workshops, and quarterly gatherings for exchanging information and compatible decision-making by officials and experts in different departments. The estimated cost is 8,400,000 Colombian Pesos.

Additional 1,000,000 Colombian Pesos is recommended for facilitating activities, miscellaneous, diverging project activities, including environmental monitoring.

Total cost of the environmental technical support, including a 10 percent contingency allocation is 33,340,000 Colombian Pesos.

Table 19.8-1 Cost Estimates of Environmental Program for Bogota Expressway and Bus way Project

Item	Unit Price [C. Peso]	Q'ty	Amount [C. Peso]
Hiring Environmental Staff			
Environmental Monitor	1,044,000	1 person/yr	12,528,000
Assistant EM	451,000	1 person/yr	5,412,000
Short-Term Consultation Services			
Contractor Crew Briefing on-site		L.S.	100,000
Workshop Preparation/Implementation	100,000	4	400,000
Training and Meeting Co-ordination			
Workshop Participants	60,000	20 persons, 4 meetings	4,800,000
Coordination Meetings	60,000	15 persons, 4 meetings	3,600,000
Facilitation (L.S.)		L.S.	1,000,000
Base Technical Support and Assistance	*	*	5,000,000
Physical Contingency (10 percent)	*	*	500,000
Total	*	*	33,340,000

Note: Some unit prices listed above are estimated based on Article 10, entitled "Campo de Aplicacion", the Republic of Colombia.

