USAID | WEST BANK/GAZA
FROM THE AMERICAN PEOPLE

AE Services for the Transportation Feasibility for Linking the West Bank and Gaza Strip (294-C-00-05-00233-00)

Inception Report

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CONTENTS

1. Introduction

1.1 Overview

The physical isolation of the West Bank and the Gaza Regions from each other and to some extent from other trading partners, acts as a significant constraint on the development of the Palestinian economy— restricting internal flows of goods and people and limiting external trade. The proposed West Bank-Gaza Strip transport link will reduce these constraints and promote reintegration of the domestic market. Without a transport link that provides reliable, efficient, low-cost and secure trade between the two Palestinian areas, economic prosperity and the fulfillment of the national aspirations will remain elusive. The transport link would also reduce market distortions by lowering production costs and increasing the overall competitiveness of the Palestinian economy. Ultimately, the transportation link would significantly benefit the populations of both regions of Palestine.

The current study being under taken at the bequest of USAID and supported by the World Bank is to examine alternative transport linkages between the West Bank and the Gaza Strip, and determine the most economically rational option. Although the study will be conducted using sound engineering practices and economic methods, it must be recognized that political considerations will play an important and possibly deciding role in determining future scope of this project.

The study itself will focus only on the technical dimensions of the selection process—engineering, environmental cost effectiveness factors and to a lesser extent, the social impacts of the transportation link. The conceptual design of the proposed transportation link must take into account Israeli concerns, including security, environmental and cultural resource preservation, regulations, and policies. The physical linkage should also be designed to address the common undertaking of the State of Israel and the Palestine Authority to provide a secure and efficient connection between the West Bank and Gaza Regions, without creating a new physical divide within the borders of Israel proper.

The transportation scenarios presently under consideration are as follows:

- Scenario 1: Railway link – only;
- Scenario 2: A dual carriage highway – only;
- Scenario 3: Combination of highway and railway.

For each of the three scenarios there might be several alternative alignments. In addition, the study will evaluate different cross sectional options, including at grade, and sunken (below grade) alternatives. The study will consider within the cross section of the transport link the possibility of transmitting water, gas, and electricity.

While a large number of alternatives might be investigated, more intensive analysis will be given to those that best meet the project criteria (as established in USAID's RFP) so that they might be evaluated based on technical feasibility, economic value, and whether Israeli security and environmental requirements can be met.

The remainder of this document provides details on our technical approach to implementing the study, including summaries of information already collected, identification of additional data needs and sources, and further exposition of analytical methods that will be employed for each resource area covered in the study. The document also details the LBG activities that have been conducted to date and summarizes the progress made on the various analyses that are being undertaken in support of the feasibility study.

1.2 Team Mobilization

Team mobilization has taken considerable effort and time over the past month. Derek Sherman's, (LBG's Team Leader), initial visit to Israel began on the 3rd of October 2005. He was able to meet with USAID officials on several occasions (10/3/05, 10/06/05 and 10/28/05) as well as the World Bank (9/22/05 and 10/07/05). Due to the large number of Israeli holidays in October, it was decided to delay mobilization of the rest of the team until the last week of October in order to conserve project resources. A briefing at World Bank's headquarters was attended by the Contractor's Washington DC based Team members on 17 of October. Meeting notes of this meeting are found in Annex A.

Table 1-1 summarizes through November the mobilization of the Team to Israel.

Table 1-1. Team Mobilization through November

Name	Arrival Date	Expected Departure Date
Derek Sherman	October 26	December 14
Ken Callaway	October 27	December 10
Jan Zicha	October 26	November 24
Ian Seed	October 31	November 10
Michael Nyquist	November 7	December 14
Michael Gaffen	November 2	December 7
Ariel Cushnir	November 11	December 1
Alan Karnovitz	November 11	December 1

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1.3 Subcontractors

During the month of October, the Contractor (the Louis Berger Group or LBG) has been in constant contact with its two subcontractors:

- Tedem Civil Engineer of Haifa, Israel (Tedem) responsible for assisting with the conceptual designs;
- Universal Group of Palestine (Universal), responsible for assisting with the forecasts and the supporting services required to complete the demand forecasts.

During the first month, the LBG had to finalize the sub-contract arrangements with both sub-contractors. In addition, an exchange of information and data took place over this period so that all parties fully understand their respective responsibilities and obligations.

Tedem has developed some preliminary alignments and data gathered. The procurement of 1:20,000 scale digital maps is underway. This should improve the overall reliability of the basic topographic data used to set the alignments. The alignment engineering efforts will be centered at Tedem's offices in Haifa.

Economic data is being collected and compiled by Universal Group and a bibliography of relevant studies covering the transport sector as well as the power, gas, telecommunications and water sectors. Because of restrictions on Palestinian travel between Palestine and Israel[1], meeting with Palestinian members of the Team has been limited but productive. So far the LBG and Universal have benefit from generosity of the World Bank by allowing us to conduct these meetings at World Bank's offices in Jerusalem.

[1] The Contractor's personnel are not allowed to travel to Gaza.

LBG is planning to have coordination meetings jointly with the Israeli's and Palestinian's subcontractors to exchange basic information and coordinate all aspects of the study. Here too because of the restrictions of travel by Palestinian team members in the study, LBG will continue to face difficulties in arranging these meetings and has sought the assistance of USAID for help to obtain travel permits for the Palestinian members of the Team. .

2. Alignment Analysis

Several alternative transportation corridors have been identified from earlier studies; to date the data available from these earlier efforts are quite general. They indicate topographically promising routes, and do not necessarily differentiate between the highway and railway alignments. From the data available, they are more conceptual than detailed alignments. Longitudinal profiles do not exist. At this point, the more promising alignments are being identified so that more detailed engineering of each can be completed so that the capital costs can be estimated. From this analysis, operational and economic solutions can be determined.

2.1 Common Alignments

2.1.1 Alternative Alignments

As a point of departure some 4 alignments are be investigated on the basis of 1:50,000 scale mapping. In the weeks to come additional ones will be considered. Briefly, they are:

Alternative 1: Utilizes a corridor mostly defined by existing roads, and a short section of an existing semi-abandoned railway. The mountain pass used by Hw 35 appears to offers also a suitable railway approach to Tarkumyia near Hebron without a tunnel, and under two per cent gradient.

Alternative 2: This alignment follows Highway (Hw) 334 to Beit Kama to southwest, then proposed Hw 6 to the north and Hw 35 to the east. This route is longer than the one of Hw 6.

Alternative 3: Deviates from the Alternative 2 at Beit Kama, and continues southeast. It passes settlement, Dvira and ends on Palestinian territory at a substantial distance south from Hebron. It offers a connection to a West Bank area at a considerable distance from Hebron that may have its own advantages from the point of view of future Palestinian transportation policies.

Alternate 4: IMG Sunken Road Alternative[2]: The IMG alternative follows the true east direction along the riverbed of Hashikma that carries water in winter time. This alternative is based on the preference for below-grade alignment options. Perhaps for this reason, the IMG alternative does not utilize the mountain pass followed by Hw 35. It affords a major tunnel under a mountainous area before reaching Tarkumyia near Hebron.

Alignment studies reflected in the Report by the Committee for Examination of Alternatives for Safe Passage between Gaza and Hebron, 2001.

Only the summary of this report is available in English. The associated alignment drawings are sought and will be evaluated.

[2] The Sunken Territorial Link – Beit Hanoun to Tarqumia, August 2005, IMG, in cooperation with the Ministry of Transportation under EU funding.

1. Sunken Highway on Hashikma-Adurim Routes

The predecessor of IMG Alternative produced by Shiloni follows the Hashikma river bed to the east and then turns north to follow Highway 35 to Tarkumyia near Hebron.

2. Alignment of proposed Highway 33

This alternative is included in a proposal submitted by Frahng. This proposal was unavailable during writing this report.

3. Proposals by Abdin Co.

4. Tunnel version by Polishuk

5. Elevated bridge road by Vittorio Immanuel de Sevilla and Domenico de Bernardinis

6. Monorail by Dan Shormon of IRTT and HITACHI

2.1.2 Gaza Terminus

The alternatives studied so far end at indistinct locations on Gaza territory among houses and streets. Since the old south-north coastal railway shown on the maps has been dismantled in the fifties while parts of it have been reportedly built over, a new corridor through heavily populated areas of Gaza will be extremely difficult to establish. For this reason, alternative approaches to Gaza and to the continuation of the alignment through the city will be considered. The exact terminus of the railway has to be determined while the road will connect with the existing road network.

The new alternatives should incorporate a terminal located at a suitable site on Palestinian territory, and with consideration of future access to the planned deep-water port.

2.1.3 West Bank Terminus

A relatively flat area exists south of Tarkumyia which could be utilized for a container terminal. The alignment alternatives seeking direct access to Hebron end in the vicinity of this town. This is also a likely terminal of the rail alternative. The terrain steeply rises towards Hebron from this point and will require capital-intensive railway engineering structures to continue in the area of Judean Mountains. For this reason, future extension of the line and its direction is closely related to future transportation demand

2.2 Some Technical Features of the Railway Connection

The railway option is assumed to be a conventional mixed traffic railroad capable of transporting passengers and freight between the Gaza and Hebron areas. The report prepared by the Committee for Examination of Alternatives for Safe Passage between Gaza and Hebron, 2001, apparently compares an advanced highway solution with a rail technology operating in a very traditional manner. A new comparison will be developed that would consider more advanced railway technology. Its added advantages would likely improve the competitiveness of railway alternatives. For this reason, the Berger Team will recommend technological update and modifications of current standards to optimize the railway solution for the Gaza-West Bank Connector.

2.2.1 Railway Design Parameters

The following are some initial thoughts on the railway design parameters:

Compliance with European Union (EU) Interoperability Standards: The compliance with EU Interoperability standards will have numerous benefits. It will increase the supply base of railway-related products and services. It will standardize the requirements for equipment, as well as loading, transportation, unloading and storage of containers necessary for international trade.

Design Speed: Presently, the Israel Railways has a maximum design speed of 160 kph. This design speed could be increased to the upper limit of the conventional medium speed range for mixed traffic operations that is normally considered to be 200 kph. Even when only passenger trains would reach this limit, the railway quality necessary to accommodate 200 kph speeds will minimize the track maintenance intensity without a major cost increase in comparison with a lower speed track design options. The speeds above 200 km/h belong to the high-speed range that is unnecessary in this case.

The availability of increased operational speeds will increase the transportation capacity of the line, and/or ensure future capacity expansions. Also, track maintenance trains will occupy the track less frequently then in the case of a standard low speed railroad because the design and construction features needed for implementation of a high quality railroad result in a major reduction of track maintenance. The track quality necessary for 200 kph speed will result in reduced track maintenance in comparison with lesser design features considered satisfactory at low speed ranges.

The increased operating speed of freight trains is achievable. Cost efficient locomotives that are designed for operating speeds of150 kph and for 2.5 per cent maximum gradients are available.

The increased design speed provides a high degree of security. A minimum operational speed can be specified within the 100 to 130 kph range for all trains. The fast movement will eliminate any undesirable exit or entry of unauthorized persons regardless of the type of alignment, be it at grade, in a tunnel, or on a bridge.

Axle Loads: The axle loads have been increasing trend worldwide. While only a decade ago the 24 tons axle load was the maximum European axle load limit, 30 tons is being considered. It is recommended to design the railroad for this kind of axle loads even when the line may seldom carry vehicles that heavy. The carrying capacity reserve will result in reduced track maintenance intensities, and would provide an added capacity reserve for potential future traffic expansions.

Dynamic Envelope of the Rail Vehicles and Structural Clearances: The dynamic envelope should be compatible with Israeli railway standard, or with European Compatibility Standards. One of the methods of freight transportation is to drive loaded highway trucks on specially designed flatcars as it is practiced in Austria for environmental reasons. Such a solution may require an oversize dynamic outline. Coordination with highway standards will be necessary in such a case.

Other Considerations: The other track parameters are derived from the parameters mentioned above and will be given detailed attention in the course of the project.

2.2.2 Site Conditions

The design, cost and overall technical success of the potential railway heavily depends on the quality and extent of geotechnical data provided to the design team. The dynamic aspects of track/train interaction have a strong geodynamic component and the requirements on the foundation analyses and construction exceeds limits acceptable for highway design. A search for the documentation on boring logs made during previous

projects in the area. Numerous previous structural and oil exploration activities have produced documents relevant to the western part of the line located in the relatively flat section of the route.

Large settlements have reportedly damaged the existing railroad from Gea to Kiryat Gat located to the north of the proposed alignments. A 3.5 km section of this line is utilized in Alternative 1. Information on the type and depth of water-sensitive soils and/or otherwise unstable soils in the area is important from the earliest stages of the project.

Geotechnical exploration by remote sensing methods using engineering geophysics in lieu of extensive drilling is a desirable alternative. The drilled borings are costly and time consuming and do not provide a density that is sufficient during the alignment selection. They are usually made only after the exact location of the final alignment has been decided. As a result, the geotechnical aspect of the line becomes an afterthought and may generate major costs.

The best alternative should be selected based on a geotechnical map of the entire interest area because soil conditions are equally significant as topographic features. However, the cost of traditional core drilling program would be astronomical. For this reason, an alternative is to undertake geotechnical exploration of the area by remote sensing methods of engineering geophysics that is capable of providing excellent information at relatively low cost.

Several engineering methods will be investigated. Introductory evaluation is based on thermal infrared imagery of Landsat Thematic Mapping Program, low angle photography and associated evaluative programs. The ground-based exploration employs the microseismic method of Controlled-Source Spectral Analysis of Surface Waves, microgravimetry, electromagnetic method, and ground penetrating radar. The time and cost of completing these investigations will be reviewed in the next few weeks.

2.3 Road Considerations

The road design analysis will begin in the coming week.

3.0 Environmental Analysis

3.1 Background - Existing Environmental Conditions

The area where the proposed transport link will be built is characterized by the existence of a rich variety of ecosystem types ranging from coastal plains to arid and semi-arid hilly environment with some forested areas. The region in general is recognized as containing a high biodiversity, although some species are already under the threat of extinction due to adverse environmental conditions such as human population pressure, poor solid waste management, water pollution, misuse of pesticides, and clearing of the land's vegetative cover for urbanization and/or farming purposes. In addition, development of a transport corridor might induce secondary environmental effects associated with other developments that might spin off this project.

Israeli environmental organizations, academic centers, and government agencies have a very high level of environmental awareness and scientific knowledge. Combined, sensitive environments and environmental awareness are factors that contribute in making this a very sensitive project.

Identifying and reducing the potential environmental impacts the project might generate, will have a positive effect not only on the ecology of the region but also on the political support needed for its implementation and its socio-economic viability.

Consequently, if properly planned the West Bank-Gaza corridor could provide a venue to promote regional cooperation in environmental issues (research, conservation, implementation of environmental regulations) and augment the positive effects of the project.

The objectives of the environmental evaluations are to:

- Identify any previous studies and data gaps in and near the study area
- Develop a preliminary pool of information to be used in the decision-making process and selection of alternatives
- Identify environmental issues of concern among stakeholders
- Assess the impacts that the various alternatives might have on the local environment
- Provide recommendations for future evaluations to be incorporated in the Environmental Assessment

3.2 Methodology

The methodology to be implemented in the evaluation of environmental issues associated with the proposed transport corridor will take into consideration both the site specific impacts of construction and operation activities, as well as the secondary environmental and social effects the corridor can have at a regional level. It is also important to emphasize that a project of this magnitude will require (under both Israeli and Palestinian environmental regulations) the implementation of an in-depth Environmental Assessment (EA) to complement and strengthen any existing data. Consequently, it will be necessary to prepare an Environmental Scoping Statement that can be used to identify data gaps. Once these gaps are identified, and the alternatives are more clearly defined, it will be possible to develop the environmental requirements for a future EA.

Scoping Statement: The Scoping Statement and future EA should take into consideration compliance with Environmental Regulations (Israel/Palestine), and should follow environmental guidelines for transport projects established by Israel, USAID, and the World Bank. An evaluation of these guidelines and regulations will be included in the Scoping Statement and/or Final Report for this project. Since the proposed transport corridor may generate important environmental and social changes it will be necessary to include requirements for public consultations. These consultations can assist in providing the general public with clarifications on the objectives of the project and its potential impacts. The potential issues of friction with the general public, academic institutions, NGOs, and Government officials may include, among others, land use (selection of agricultural land vs. natural habitats), habitat fragmentation, landscaping/aesthetics, impacts to sensitive habitats and associated fauna and flora, and crossings for area residents. In a previous study, (conducted by the Israeli Ministry of Regional Cooperation in February 2001) the examining Committee summarized their environmental-regional concerns. These concerns can be used as an initial benchmark for a) establishing types of information required during this project, b) identify the data gaps and steps to obtain additional information, and c) planning of the public consultations.

As part of the characterization of existing data and identification of data gaps the Berger team will:

a) Meet with government agencies responsible for the environmental regulation of development activities in order to incorporate available information as well as potential concerns.
b) Meet with academic centers to obtain scientific information on the study area and attend to their opinion with respect to the proposed project
c) Meet with relevant NGOs

The Contractor's environmental expert will maintain continuous contact with USAID to inform on the results of consultation activities and determine further steps or any necessary changes to the work approach.

Screening: Once sufficient information is available and screened, the team will proceed to conduct a preliminary evaluation and impact analysis. The approach for characterizing the environmental impacts of the proposed corridor will take into consideration the potential each alternative has to generate low, medium, or high impacts. Since no actual field work and sampling will be performed during this feasibility study, an attempt will be made to characterize impacts based on existing information, consultations, and professional opinion that will emerge from site visits to the proposed corridor. The gathered information will be then processed utilizing a semi-quantitative method developed by Conesa-Fernandez-Vitora (1995). This methodology for impact characterization can be limited by data availability, and it will not include all the elements that will be obtained during the subsequent in-depth Environmental Assessment. However, it can provide sufficient information to be used in the decision-making process for the selection of alignment alternatives. It comprises of the following steps:

- Documental information review followed by consultation with specialists having performed environmental or socioeconomic analyses in the area.
- Review of updated baseline studies that were based on fieldwork and appropriate protocols.
- Identification of the environmental parameters affected by the project actions. In this case, excavation, earth hauling and disposal activities are some significant examples.
- Preparation of a Cause–Effect Matrix (CEM), adapted from Leopold's matrix, for each project alternative, to contrast the different activities against the environmental components and processes that could be affected. For the purpose of the CEM preparation, the environment will be divided into four components (depending on data availability):
    1. Physical Media: including geology, geomorphology, tectonics, hydrology, hydrogeology, soils and climate
    2. Aquatic Media including aquatic flora and fauna and associated habitats characterization
    3. Terrestrial Media including flora, fauna and habitat characterization
    4. Socio – economic and cultural media, including demographics, health, heritage aspects, and landscape (and other hedonic assets).
- Impact Identification

The collected environmental and socio-economic information of the affected areas will be used to identify the nature and extent of the potential impacts that can be caused by construction and operations activities. The impacts will be classified in Direct and Indirect ones.

Examples of Impacts on biological media to be assessed include:

- Removal of the existing vegetative cover
- Loss of habitat due to clearing activities, fill, cut and terrain preparation.
- Habitat fragmentation due to access construction, utilities and major works,
- Movement impediment of the fauna between alignment sides (barrier effect)

Impact Analysis: Impact analysis will include an evaluation of habitat alteration and its effects on resident biological communities as well as migratory species, diversity, protected species, and ecosystem health.

Examples of direct impacts over the social media relate to:

- Injury or death resulting from labor accidents during construction
- Landscape alteration as a result of the removal of existing cover
- Traffic increase in the area
- Social and ecological pressure due to construction camps on surrounding communities as a result of new demands in health services, transportation, alimentation and labor provision.
- Chemical contamination because of accidental spills
- Visual impacts
- Health risks: inadequate management of solid and hazardous waste, solvents, acids, chlorine, oils, and other chemicals.

Indirect impacts, many of them positive, such as employment and income generation, health and communication improvements, and externalities arising from the projects exploitation will also be assessed.

Impact quantification: Impact significance will be assessed based on the preparation of a Significance Matrix using a multi criteria approach. Elements that constitute the matrix include the following:

- Sign (+/-)
- Degree of Perturbation (DP)
- Risk of occurrence (RO)
- Extension (EX)
- Duration (D)
- Reversibility (RV)

Sign (+/-): Impact sign refers to the beneficial or prejudicial character of the different Project actions on environmental elements.

Degree of Perturbation (DP): Refers to the degree of disturb the action causes over a particular environmental factor in the specific field of occurrence. It ranges between 1-12 where 12 correspond to a total destruction situation and 1 is a minimal effect.

Risk of Occurrence (RO): Refers to the frequency of the effect, whether cyclical or recurrent, unpredictable or constant along time. Continuous effects are assigned a value of 4; periodical is 2, and 1 to discontinuous occurrence.

Extension (EX): Refers to the theoretical area of influence of the impact related to the Project overall area (% of impacted area). If the action produces a spot effect, the impact is considered localized (1). If, on the contrary, it has a generalized influence over the project, the impact shall be considered total (8); intermediate situations correspond to partial impacts (2) and extensive impacts (4).

Duration (D): Refers to the period the effect remains and after which the affected environmental factor would return to the initial condition either by natural or corrective measures. If the effect lasts less than one year, it is considered that the action produces a short effect (1); between 1 and 10 years, it is considered permanent (4).

Reversibility (RV): Refers to the possibility of reconstitution of the affected element, that is, the possibility to return to the initial conditions previous to the action, by natural means, once the former stops acting over the affected media. A short term is assigned a value of 1; mid term is 2, and irreversible effects are assigned a value of 4.

The significance of the impact results from the following equation:

$$IS = +/- (PD+RO+EX+D+RV)$$

Table 3-1 shows the Impact Significance Ranking system

Table 3-1. Environmental Impact Significance Ranking

SIGN		DEGREE OF PERTURBATION (DP)	
Beneficial Impacts	+	Low	1
Negative Impacts	-	Medium	2
		High	4
		Very high	8
		Total	12
EXTENSION (EX)		**DURATION (D)**	
Spot	1	Brief	1
Partial	2	Temporary	2
Extensive	4	Permanent	4
Total	8		
Critical	12		
RISK OF OCCURRENCE (RO)		**IMPACT SIGNIFICANCE (IS)**	
Irregular or discontinued	1	The significance of the impact varies between 5 and 36. Scores between 29 and 36 are considered very high; high between 23 and 28; medium between 17 y 22; low between 11 and 16, and very low between 5 and 10.	
Periodical	2		
Continuous	4		
REVERSIBILITY (RV)			
Short term	1		
Middle term	2		
Long term	4		

Source: Adaptad from "Guía Metodológica para la Evaluación del Impacto Ambiental", 2nd. Ed. Madrid, 1995", by Vicente Conesa F.

Once the impact evaluation is completed, the team will discuss the results and provide recommendations.

3.3 Data and other requirements

The team will collect primary and secondary sources of information. Primary sources include site visits and consultation with Israeli and Palestinian experts and government officials. Secondary sources include published scientific studies from academic centers in the region and the United States, previous environmental evaluations located at the Ministries of Environment and other government agencies, as well as electronic sources, evaluation of maps, data processed via a geographic information system (GIS), and site records.

3.4 Analysis Options and Design Risks of Over and Under Infrastructure Projects

There are a number of potential environmental risks and uncertainties associated with development of the corridor, and establishing these risks should be an important component of the Environmental Assessment. As part of this study the Berger team will identify these risks and provide recommendations for specific environmental studies to be implemented in the future. Among the potential risks are those associated with increase transport, accidents and spills. Political uncertainties can add a certain level of risk such as additional pressure on local environments due to security reasons.

3.5 Social Impacts

Environmental conditions are directly correlated with socio-economic conditions. It is anticipated that construction of the corridor could provide a benefit to all the residents in the West Bank, Gaza and Israel and subsequently contribute to improve environmental conditions. Similarly, improved environmental conditions

such as pollution reduction and other environmental management measures can have a positive effect on health of the population and an improved quality of life. This study can provide the decision makers with a sound foundation for improved socio-economic development in Palestine and regional cooperation with Israel, Jordan, and/or other countries of the region. There is also an important positive relationship between environmental improvement and effective utilization of new infrastructure. For example, if the technical recommendations for energy sources are adopted (e.g. electric power supplied by clean natural gas from Gaza instead of the current coal power facilities, and re-directed to the West bank via the proposed corridor), then the environmental conditions (air quality in the coastal plains) will also improve through the reduction of greenhouse gas emissions from fossil plants.

3.6 Assessment the Potential for Archaeological and Cultural Heritage Sites

Objectives of the archaeological and cultural heritage sites potential assessment are to:

1. Develop a cultural context for the region;
2. Identify any previously recorded archaeological and cultural heritage sites in and near the study area;
3. Assess the potential for additional unrecorded archaeological and cultural heritage sites in the study area; and
4. Assess the impact that the project may have on such sites.

This will be accomplished through background research conducted in the United States by Berger archaeologists, and in Israel and/or Palestine by a qualified subconsultant. No systematic cultural resource survey or archaeological excavation will take place for this study.

3.6.1 Methodology

Background research will be conducted in the United States and Israel to develop a cultural context outlining the prehistory and history of the region. The context will serve as a framework to develop a model of site location and expected site types in the study area, and to assess the significance of any such sites that may be present in regards to Israeli, Palestinian, and other cultural patrimony. This research will also seek to identify applicable International, Israeli, and Palestinian laws pertaining to archaeological and cultural sites, and the implications of such laws for the development project.

3.6.2 Data Requirements

Objective 1: Development of a cultural context of the region will require research in scholarly books and journals available at research institutions in the United States and on-line using the world wide web.

Objective 2: Identifying previously recorded archaeological and cultural heritage sites will require research at the Israeli Antiquities Authority (IAA) in Jerusalem where records pertaining to current and past archaeological investigations in the country are housed. Depending on how comprehensive IAA records are, it may also be necessary to examine similar records held by the Palestinian Antiquities Authority.

Research in Israel and Palestine will be contracted to a qualified subconsultant or directly to the IAA. It will be necessary to provided to the subconsultant/IAA with detailed maps showing the route of the study corridor(s) so that the proper IAA maps and site records can be referenced. All information gathered by the subconsultant/IAA will need to be provided to the Berger archeological team in English for further analysis.

Objective 3: Assessing the archaeological and cultural heritage site potential in the study area will be accomplished by analysis of the data collected. Depending on the nature of that data, a geographic information system (GIS) may be used to assist in developing a model of site location.

Objective 4: Assessment of the impacts the project may have any known and potential archaeological and cultural heritage sites will be realized in the larger scope of the feasibility study when alternative routings and means of construction are considered.

3.6.3 Outcome of Analysis

The study will culminate in a technical report assessing the potential for archaeological and cultural heritage sites in the study area and providing recommendations for any further investigations that may be necessary. Recommendations could include systematic archaeological survey in areas where no previous survey has been conducted, and testing or excavation at any newly or previously identified archaeological sites to evaluate significance and/or mitigate adverse effects from the project. It may also be possible to recommend preferred corridors to minimize impact to archaeological and cultural heritage sites.

4.0 Traffic Analysis - Project Implementation Schedule

At this stage of our study, a generic project implementation schedule has been developed to assist the project economists with their forecast of traffic. They need to know what is a probable opening year for the transport link.

In preparing the schedule, only five major activities are considered. They are:

Preliminary design to follow from this study aimed at resolving issues not resolved or identified as requiring more intensive analysis than given in the present study;

Permitting activities including Environmental Assessment, Archeological and Cultural Assessments, and Other Israeli Permitting requirements including public hearings and consultations and Land Acquisition;

Preparation of the Final Design and Tender Documents to be done in parallel with the permitting activities described above;

Tendering and award of the construction contracts to be done at the completion of the permitting activities;

Construction and Commissioning.

Table 4-1 summarizes this analysis:

Table 4-1. Assumptions for Short and Longer Implementation of the Project

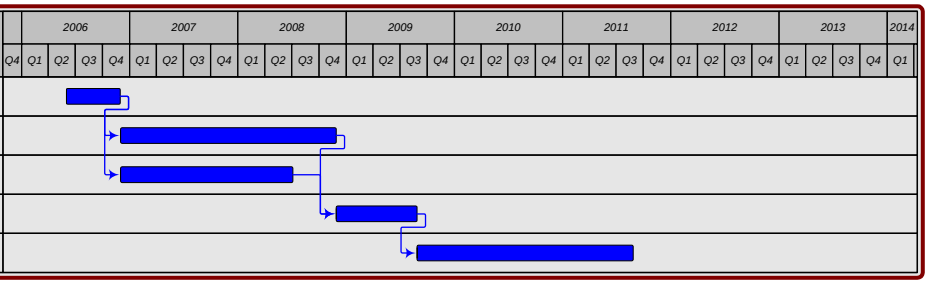
Activity	Minimum Duration (Year)	Longer Duration (Year)	Very Long Duration (Year)
Preliminary Design	0.50	0.75	
Permitting & Land Acquisition	2.00	3.00	5.00
Final Design & Tender Docs	1.85	2.75	
Tendering and Award	0.75	1.00	
Construction/Commissioning	2.00	3.00	3.50
Time to Completion in Years	5.75	8.25	+3.50
Year Completed	2011	2014	~2018

Even the most optimistic timing indicates almost 6 years duration to complete the project. With more pessimistic assumptions, over 8 years are required to complete the project. Based on experience gained in implementing, the extension of the Cross Israel Highway (Highway 6), the time allotted for permitting activities is probably too short. This 84 km extension of the highway to Be'er Shiva will take over 10 years to implement.
This information is summarized in the Gannt Chart, Figure 2-1.

Figure 4-1: Short and Longer Project Implementation Schedule

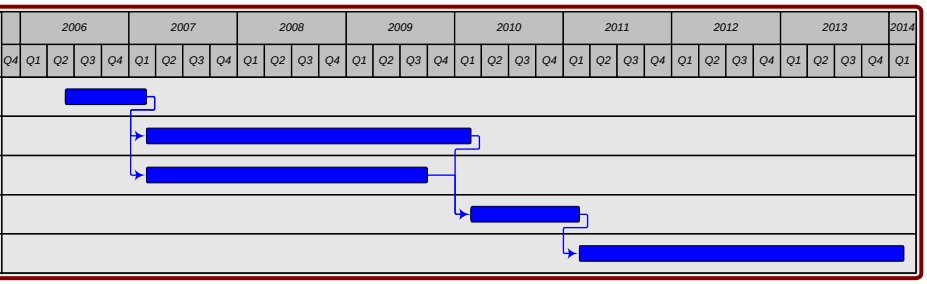
5.75 Year Schedule - Short

ID	Task Name	Start	End	Duration
1	Preliminary Design	6/1/2006	11/29/2006	26w
2	Permitting, Environmental Ass't & Archeological Ass't	12/1/2006	11/27/2008	104w
3	Final Design	12/1/2006	7/4/2008	83.20w
4	Tender and Award	11/28/2008	8/27/2009	39w
5	Construction/Commission	8/23/2009	8/22/2011	104w



8.25 Year Schedule - Long

ID	Task Name	Start	End	Duration
1	Preliminary Design	6/1/2006	2/28/2007	39w
2	Permitting, Environmental Ass't & Archeological Ass't	3/1/2007	2/24/2010	156w
3	Final Design	3/1/2007	9/30/2009	135w
4	Tender and Award	2/25/2010	2/23/2011	52w
5	Construction/Commission	2/24/2011	2/19/2014	156w



More detailed and accurate estimates of the duration of various project related activities will be made during this study.

4.1 Traffic Analysis- Purpose and Methodology

The purpose of the traffic analysis is to determine the demand for and characteristics of the passenger and freight travel in the Gaza – West Bank Corridor so that such information can be used in the Transportation Feasibility Study Linking the West Bank and Gaza Strip (WBG).

Forecasts for future travel demand will be based on low, high and most likely scenarios for future economic growth. The scenarios are described below in Section 3.3. Furthermore, the travel demand will be forecasted for each of three alternative concepts for providing corridor transport service: (a) a road-only alternative, (2) a rail-only alternative, and (3) a multi-modal alternative.
Results from the traffic analysis will be one of the inputs to the conceptual designs for the alternatives and to the determination of the most cost-effective alternative.

4.1.1 Sources of Travel Demand:

In the case of travel between the West Bank and Gaza Strip, passenger travel demand in the transport link will result from the following socio-economic activities:

- Commuter travel, by workers residing in the southern portion of the West Bank around Hebron and commuting to their work sites in the Gaza or visa versa;
- Work-related travel, as required for the conduct of economic activities located in the Gaza Strip and the West Bank;
- Personal travel for social, shopping, health service, educational and recreational activities;
- Administrative travel by Palestinian Authority or local government employees; and Tourism travel.

Freight transport demand between the West Bank and Gaza Strip is or will be caused by the follow flows of:

- Commodities produced on the West Bank and consumed in the Gaza or produced in the Gaza and consumed on the West bank,
- Commodities imported to and exported from the southern portion of the West Bank by way of the proposed new international port at Gaza,
- Imports to and exports from Jordan that potentially could be diverted to the proposed new port at Gaza, and
- Commodity shipments between Jordan and Egypt by way of the Gaza – West Bank corridor.

4.1.2 Sources of Traffic Growth:

Typically the sources of future road and/or rail traffic include:

Existing traffic and its growth due to normal increases in population and social and economic activities;

Traffic diverted from other routes or transferred from other modes of transport; and

Generated traffic due to improved transport services including

- ► Increased frequency of service resulting in more trips,
- ► Induced traffic that is not currently making the trip at all,
- ► Traffic resulting from changes in land use or intensity of land use in the transport corridor, and
- ► Travel purposes that could be satisfied by travel to alternative destinations.

With respect to the West Bank and Gaza Strip (WBG) transport corridor, existing traffic levels are depressed because of the frequent interruption in service, high costs and low door to door speeds. Most of the existing traffic with origins or destinations in Gaza will divert to the WBG transport Corridor. Thus, the forecasted future passenger and freight traffic in the WBG Corridor will be almost entirely accounted for by generated traffic. Of the four types of generated traffic identified above, there will be no traffic resulting from the change in land use or intensity of the land use within Israel.

4.2 Methodology

A base map for the WBG Corridor study will show:

Limits of the WBG Corridor's area of influence,

Boundaries of administrative jurisdictions, the Governates,

Important existing transport routes and terminals for passengers and freight, and

Planned transport improvements affecting the WBG Corridor.

The study area will be divided into zones for use in defining locations where travel demand originates and is destined. These zones will consist of the Governates plus Jordan, Egypt, Israel and the ports.

Travel purposes for passenger travel and commodity types transported for freight vehicles will be defined.

The base year (2004 or 2005) information describing the independent population, economic and land use variables that can be used for predicting travel demand will be assembled by Governate.

Official government forecasts for population, economic and other independent variables that can be used for predicting future travel demand will be obtained and reviewed.

The Consultant will then prepare 10 and 15 year forecasts for the population, economic and other variables for each of the alternative Scenarios outlined below under Section 3.3.

For each type of passenger and freight travel demand, the relationship of travel demand to population, economic and other variables will be establish, e.g. elasticities.
Establish the parameters for predicting the mode choice (road or rail) for each type of passenger and freight transport demand.

Predict the future travel demand of each type of passenger and freight travel and by transport mode for each of three alternative concepts for providing corridor transport service: (a) a road-only alternative, (2) a rail-only alternative, and (3) a multi-modal alternative. This will also include travel demand predictions for alternative road and rail alignments, i.e. alternative terminal point locations in the West Bank and the Gaza.

Inputs of travel demand for Activity 4 of the Scope of Work, *Development of Conceptual Designs*, will be made, specifically relating road cross-section dimensions to forecasted road traffic demand, relating road pavement thickness to forecasted freight vehicles and their axle loads, and relating rail requirements to forecasted traffic demand.

Traffic forecast inputs for Activity 7, *Determining the Most Cost-Effective Transport Solutions*, specifically the economic benefit analyses will be prepared. To determine the most cost effective alternative taking into consideration construction and maintenance costs and operating costs including road vehicle operating costs and railway operating costs.

4.2.1. Data

The Berger team is in the process of obtaining source documents, assembling, reviewing and analyzing the following types of information expected to have an impact of the corridor traffic forecasts.

Population census by administrative jurisdiction:

- ► Northern Governates on the West Bank Bethlehem, Jenin, Jericó, Jerusalem, Nablus, Qalqiliya, Ramallah, Salfit, Tubas and Tulkarm and
- ► Southern Governates in the West Bank: Hebron,
- ► Gaza Strip Govenates: Deir Al-Balah, Gaza and North Gaza, Khan Yunis and Rafah.

Employment by economic sector and by administrative jurisdiction.

Household incomes by administrative jurisdiction.

Motor vehicle ownership by administrative jurisdiction.

Economic data (i.e., GDP and GDP/capita) and production and consumption of major commodities by economic sector (e.g., agriculture, fishing, mining, manufacturing inputs and outputs, and wholesale and retail trade) and by administrative jurisdiction.

Imports and exports by commodity class, i.e.: manufactured goods, food, live animals, machinery, transport equipment, mineral fuels and lubricants, chemicals and related products, beverages and tobacco, crude materials, animal and vegetable oils.

Information about tourism and indicating demand for and potential of tourism travel.

Identification on public transport bus operators, routes, schedules, frequency of service, fares, ridership and operating cost.

Vehicle purchase, operating and maintenance costs by cost component.

Road traffic information::

Traffic counts including, if available, information from check points such that would indicate the origin and destination (O-D) of trips.

Existing transport travel times by route segment and costs per passenger-km and ton-km.

4.3 Forecast Scenarios

In the World Bank's Infrastructure Assessment three short-term economic scenarios and one medium-term one are modeled:

Scenario "A" – Political Stagnation – fewer curfews and marginally greater access to Israeli labor markets with limited growth in GDP

Scenario "B" – Political Progress – Lower restrictions on the movement of goods and people resulting in greater remittances with accelerating growth in GDP.

Scenario "C" Political Deterioration – frequent closures and limited access to Israeli labor market with decreasing growth of the GDP.

Scenario "D" Continuing Political and Economic Progress over a 5-year period to 2008/9 and is a longer term variation of Scenario B.

These are basically short and medium term economic development scenarios placed within the political context of the relations between Palestinian and Israeli over these periods of time. They do foretell of a longer-term dependence of the Palestinian economy on its linkages with Israel. For all scenarios and over the medium and long-term periods, the economic growth and development of Palestine will depend to a large extent on how it maintains its economic and political relationship with Israel.

The first three forecast scenarios cover a period of 10 to 15 years; the 25 -year forecast will assume a continuation of these trends.

Scenario "A": Moderate Political Progress and Partial but Incomplete Reform of the Economy – Most Likely

The economic and political relationships with Israel will remain correct but will not be strong. Over the period, internal growth will depend to a large extent on the remittances received from labor working in Israel. However, the openness of the Palestinian economy will be restrained from its full potential due to only moderate political and economic reforms. Because of these constraints, Palestinian entrepreneurs will have only limited access to the Israeli economy. Its comparative advantage will not be realized.

Cooperation between both economies will occur mainly in the areas of tourism but not much elsewhere. Due to partial and incomplete reforms to the economy, it will not be streamlined and long tem improvements in productivity will be small. The dependence on the public sector is reduced. Although the private sector will take on greater importance it will not be seen as an "engine" of growth. It will be constrained by regulation,

control and lack of transparency. External trade and economic relations with its immediate neighbors, Egypt and Jordan, will grow but will not achieve their potential because of internal restrictions.

Scenario "B": Continued Political Progress and Economic Reform – Optimistic Scenario.

The economic and political relationships with Israel will remain cordial and good allowing trade and commerce to develop between the two. Initially, internal growth will depend to a large extent on the remittances received from labor working in Israel. However, with greater openness of the economy, Palestinian entrepreneurs will make good use of their comparative advantage relative to the Israeli economy - its size, strength, and proximity to Palestine. With greater demand for labor in Palestine it will depend on less on remittances from labor and will develop increase value added domestic opportunities.

Initially, strong cooperative ties between Israel and Palestine economies will occur in the area of tourism and agriculture. They will help to develop linkages with other sectors of their economies. Due to continued reforms to the Palestinian economy it will become more competitive and streamlined resulting in large improvements in productivity. The dependence on the public sector will be greatly reduced, and the private sector will become the "engine" of growth for the economy. External trade and economic relations with its immediate neighbors, Egypt and Jordan, will also grow but not to the extent that they do with Israel.

Scenario "C": Limited Political Progress and Few Economic Reforms – Pessimistic Scenario

The economic and political relationships with Israel will remain highly variable from good to poor but they will create an economic environment of uncertainty. Over the period, internal growth will overly depend on the remittances received from labor working in Israel. However, the lack of openness of the Palestinian economy will limit internal growth due to only a lack of political and economic reforms.

Palestinian entrepreneurs will have very limited access to the Israeli economy due to limited cooperation between the two. Cooperation, which will occur, will be mainly in the areas of tourism. Due to partial and incomplete reforms to the economy, improvements in productivity will be small. The dependence on the public sector and lack of reform will reduce the private sector's role as an "engine" of growth. Private sector is constrained by over regulation and control, corruption and lack of transparency. External trade and economic relations with its immediate neighbors, Egypt and Jordan, will grow and be seen as the main bright spots of growth, but they will not achieve their full potential because of internal restrictions.

Scenario "D" for the long-term is the same as Scenario "B".

Each of these scenarios will impact the economy and its growth differently and can be summarized in quantitative terms in the following table:

Table 4-2. Growth Assumptions for the Economic Scenario

	Socio-Economic Sectors	Scenario A Most Likely	Scenario B Optimistic	Scenario C Pessimistic
1	Population Growth	Medium	Low	High
2	GDP Growth	Medium	High	Low
3	GDP per Capita	Medium	High	Low
4	Traffic Growth			
	Freight	Medium	High	-Low
	Passenger	Medium	High	-Low
5	Power Consumption			
	Per Capita	Medium	High	+Low
	Total	Medium	High	+Low
6	Gas Consumption			
	Per Capita	Medium	High	+Low
	Total	Medium	High	+Low
7	Water Consumption			
	Per Capita	Medium	High	+Low
	Total	Medium	High	+Low
8	Telecommunications			
	Per Capita	Medium	High	Low
	Total	Medium	High	Low

Notes: Assumed in Scenario "C" that power, gas and water are subsidized to a greater (+) or lesser (-) extent inflating demand in this scenario. In the coming month, values will be substituted in the table and will be utilized to determine a range of demand using the transportation link between the West Bank and Gaza.

5. Utilities (Power, Gas, Water and Telecommunications)

5.1 Background

Electricity, water and gas are strategic and crucial ingredients for economic growth. In particular, the availability of secure and reliable electricity and water are essential to attract foreign direct investment in this region for industrial development. Electricity and water are vital for residential requirements and gas is highly desirable but is mainly bottled for used in residential cooking.

The situation has been exacerbated by the strong natural growth of population, returning expatriates and rising expectations based on the relatively high energy and consumption levels in Israel. Reducing this formidable gap between suppressed demand and constrained utility supplies in the West Bank and Gaza will not only require significant investment financing for new infrastructure, but a strong expansion in income to purchase and maintain utility facilities. The West Bank-Gaza corridor could provide a valuable component by including conduits in the design to facilitate the transfer of electricity, water and gas between the two regions. This corridor could also provide a potential conduit for other utility requirements including telecommunications and Internet traffic.

The *West Bank and Gaza Infrastructure Assessment* prepared by the World Bank in December 2004 is a starting point for the Team's investigations into these four sectors. No attempt is made to repeat the study's findings or of the supporting studies commissioned by the World Bank in preparing it. The findings of this study indicate that: 1) a large investment is required in these sectors in the next 3 years and further into the future. The absorptive capacity to implement these investments and the willingness of donors to fund them will depend upon the political climate over the mid-term. and 2) In parallel, institutional and other reforms are needed in each of the sectors to ensure that the investments will achieve their intended long term purpose – improving the economy and social well being of the people of Palestine.

Electricity: The Israel electric company [IEC] transmits and distributes electricity to all of Israel and the Palestinian Authority. The IEC has 10 GW of primarily fossil fueled generating capacity. Some Palestinian municipalities, including Nablus and Janin, generate their own electricity from small power plants. There has been a severe shortage of electric power with low reserve levels, particularly during the hot summer period due to the expanding requirement for environmental control from air conditioning. The new Israeli electricity sector law requires privatization of this sector and the move to independent generation, transmission and distribution entities in each region. This move could encourage the utilization of the corridor for independent power producers.

Gas: The natural gas grid is expected to expand due to increasing economic and environmental requirements, particularly for electricity generation. The Natural Gas reserves location offshore Gaza could provide a substantial resource for the natural gas grid and for a new gas power electric power facility in Gaza.

Water: Both the West Bank and Gaza suffer from a chronic shortage of water, which not only prevents sustained economic development but is also damaging to the health of the people and the natural environment. Ground water supplies have increasingly become polluted as a result of use of agricultural chemicals, and inadequate sewage treatment. Over-pumping of wells is making groundwater increasingly brackish, particularly in Gaza. Use of the corridor for transportation of water will be of some value, but this facility will only be of major benefit if and when an additional source of bulk water supply is identified.

5.2 Methodology

The methodology is to evaluate the diverse existing studies available and provided for the PA, and use multi-objective and regional solutions for the utility sector. The options of utilizing the WBG corridor to facilitate utility exchange requirements will be the central focus of this analysis, providing both quantitative and qualitative assessments.

The approach for determining the potential corridor flow requirements for this sector is to develop a range of anticipated demand, for the mid to long term period, for the various utilities, for each region [West Bank and Gaza], and each of the [18?] Governates. The demand requirements could be significantly different in the industrial areas and more developed communities than the rural and farming areas. Supply options will be mated to demand, initially by providing services from expanded existing major sources, where feasible. Alternative supply options will include the development of new resources, particularly exploiting the natural gas reserves off the coast of Gaza not only to augment the gas supply, but to provide additional electric power. Desalination of seawater on the Gaza coast is a serious option, particularly when coupled with increased power availability. The feasibility of utilizing the corridor for facilitating energy and water interchange will be the focal point of this sector of the analysis.

5.3 Data and other Requirements

Electricity & Gas: Energy balances, providing data on energy and electric power supply, demand and transfer patterns between the West Bank and Gaza will be an important basis for investigation. The effective

analysis will be dependent on documents, data and information available from the PA and Israeli sources. Israeli Electric Co. [IEC] is the current provider of electricity in the region and their data is the most reliable available for current and anticipated supply and demand levels. The PA will be the source of projected and alternative growth requirements for residential, industrial and commercial requirements over the longer term period. Additional potential energy data will be provided by appropriate agencies in Israel and the Palestine regions, Palestinian Ministry of Energy and Natural resources, Palestinian Distribution Companies and the potential developers of the natural gas resources off Gaza, including British Gas [BG], East Mediterranean Gas Co. [EMG], INGL, ENI and Paz Oil.

Water: Data will be obtained, primarily from the PA, concerning population projections and water demand. Data for potable and agricultural demands will be considered separately. Existing bulk supply arrangements will be reviewed, not only in terms of existing quantity, but also in terms of sustainability of the supply in both quantitative and qualitative terms. Information will be obtained from the PA, USAID, World Bank and other relevant international funding agencies on plans for augmentation of the existing bulk supplies. Existing studies on re-use of wastewater, particularly for agricultural purposes will be analyzed.

Time-frame: The time-frame for data development will include:

a. A short-term period, 3 to 5/6 years, designed to achieve rapid improvements in availability of services in each sector, utilizing existing infrastructure and infrastructure currently being developed, within the available financial and implementing constraints;
b. A mid-term period, 5/6 to 10 years, assuming an expanded infrastructure, and assuming the provision of a wide range of growing services to all Palestinians by the end of the period;
c. A longer-term projection, to 25 years, designed to incorporate innovative strategies to expand energy, electric power and water supply to the diverse populations in the West Bank/Gaza and the nearby region.

5.4 Analysis Options and Design Risks

There are a number of potential risks and uncertainties in developing utility requirements over the longer term period required for this analysis.

Electricity & Gas: The electric power grid is currently dependent upon the Israel Electric Co [IEC] generating capacity, transmission and distribution systems. The IEC transmission grid is a closed loop system connecting power stations to the major load centers throughout Israel and to the Palestinian Authority. There are several small electric generation facilities in the West Bank area. They produce around 5% of the total demand. An expansion of the current electric grid by IEC would not require the connector for electric power transmission. However, the potential for the construction of a new large electric power generator in Gaza, utilizing the natural gas resources off the coast, could provide a substantial output above the requirements of the Gaza region, and a transmission line, via the corridor to the West Bank would be essential. A similar development of the Natural Gas resources offshore Gaza, for residential requirements in the Gaza region could also expand the grid to the West Bank, via the connector. A short term potential alternative is the reverse transfer of natural Gas from the West Bank to Gaza from Jordan. A long term agreement for natural gas shipments from Egypt to Aqaba in Jordan and then to a power plant in Northern Jordan is under construction. The potential of extending this Egypt-Jordan pipeline, named the Arab Gas Pipeline [AGP] and increasing its capacity to include the West Bank region could include the initial transfer of natural gas from the West Bank to Gaza via the corridor. There is also the potential cooperation involving the integration of the national power transmission grids into a regional power network. This would provide a number of benefits, including allowing the power companies to take advantage of different peak demand periods, reduce the need for reserve capacity, and provide outlets for reserve generating capacity. The connector could participate in this by providing additional electric power capacity between the two regions.

Water: The water sector has significant constraints, which could limit the value of this corridor for resource transfer. Existing water supplies are dependent on domestic aquifers and rainfall to recharge the system. The recharge areas of the aquifer systems are mostly along the upper mountain slopes and ridges in the northern West Bank region. Water resources are consumed locally and are generally not transferred over long distances. The West Bank is a water constrained area and the Gaza region is in a water crisis situation due to the continued shortage of supply and poor quality of the brackish groundwater. Continued over-exploitation of Gaza groundwater could lead to intrusion of seawater into the aquifer, severely limiting its long-term usefulness. A seawater desalinization plant in Gaza, potentially powered by natural gas, could provide substantial quantities of potable water, but there is suppressed demand in the Gaza region which would have to be at least partially satisfied before transfer to the West Bank areas becomes an option. Other innovative options for water transfer include water imports from Turkey via a Gaza seaport, and reused wastewater for agriculture requirements, both using the corridor. With these uncertainties in mind, it will be difficult to determine an appropriate size for a corridor pipeline. However, if, in the short term, the corridor is to be built, including only provision for a future pipeline, being over-generous in the sizing of that provision, is unlikely to be expensive, particularly within the overall framework of the project.

Telecommunications: Telecommunications requirements could provide an option for the connector permitting expanded telephone, television, radio and internet communications between the regions. However, advanced technologies could limit the need for and effectiveness of this corridor. The substantial growth of cell phone use, utilizing local transmitter towers has rendered land based telephone lines partially redundant. Television and radio towers can transmit beyond the constraints of local geography. Internet communications, in part based on land lines, are expanding and the demand will be substantial, including the voice over internet protocol [voip] which can become a dominant factor over the next decade.

5.5 Economic and Social Impacts

It is anticipated that the utilization of the transport corridor for the transmission of electricity, gas, and water and for telecommunications could provide benefits to all the residents in the West Bank and Gaza and to Israel. This study can provide the decision makers with insights into a regional energy strategy aimed at improving socio-economic development of Palestine.

The effective utilization of utility infrastructure, including electricity, gas, water, oil, and telecommunications is an essential indicator of economic progress. The range of current and anticipated measures, including baseline infrastructure data will present an indication of the improved living conditions of the population that can be provided by enhanced utilization of the utility infrastructure. The physical environment will improve since the incremental requirements for both electricity and water can be powered by clean natural gas from Gaza, replacing the existing dominance of five coal power facilities in Ashkelon and Hadera. This will reduce greenhouse gas emissions from fossil plants and improve the air environment in the southern and coastal regions. The IEC plans to spend over $1 billion to reduce pollution from the coal facilities and the move to clean natural gas from Gaza could reduce this requirement.

6. Schedule

There has been a little slippage in the schedule due to the large number of Israeli holidays in October. However, even with the anticipated Eid Holidays planned for the first week of November in Palestine, the Contractor believes that by the end of November the project will be largely back on track. The MS Project Schedule for the study is shown on the next page as Figure 5-1. This includes some updating of the original schedule.

The proposal and SOW did not fully consider the submittal of draft Final Report for the Study. The environmental and social components of the study will be submitting as draft final reports. The original schedule did not anticipate doing so for the other components of the study since a formal submittal was not planned. A draft Final Report is highly desirable since it allows key stakeholders an opportunity to review the findings and recommendations made by the Contractor. The stakeholders' comments on the draft Final Report are then considered and included as part of the Final Report. Presentation meetings to key stakeholders and stakeholder review with submission of their formal comments will take at least a month to complete, and an additional 2 weeks should be allotted for the Contractor to revise the draft Final Report and to incorporate the comments into the Final Report. Because of the complexity of the project the time to review the draft Final Report might take longer than a month, but the duration of the review period is difficult to predict with any precision. The issue of a draft Final Report should be discussed at the earliest possible time since the Final Report is now effectively a draft Final Report.

The Figure 6-1 does not include any fundamental changes form the schedule included in the proposal and incorporated as part of the contract.

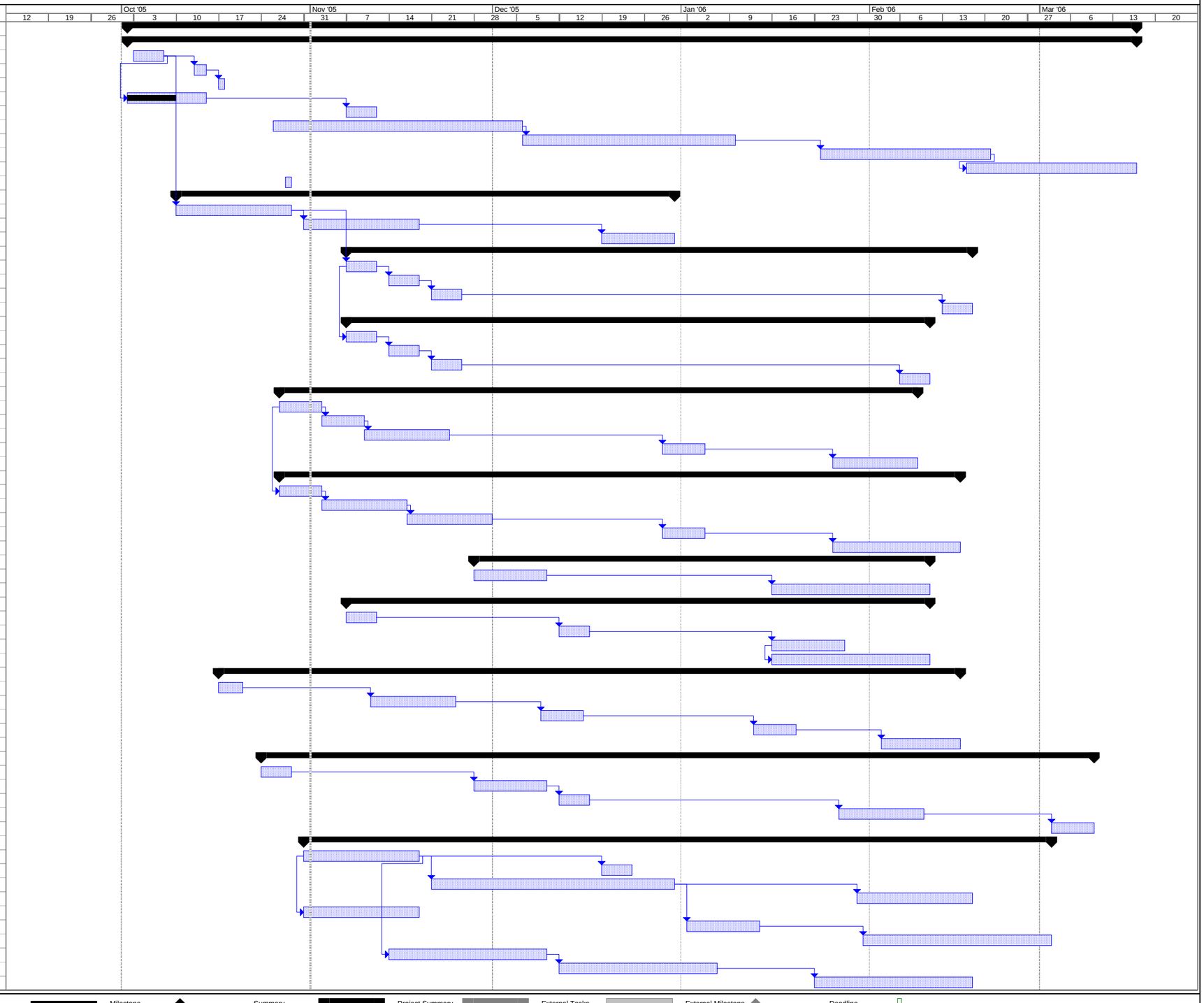
Figure 6-1: Study Schedule

(please see next page)

Schedule for the Feasibility Study

Feasibility Study Linking the West Bank and Gaza Strip

ID	Task Name	Duration	Start	Finish	Predecessors
1	**West Bank and Gaza Strip Study**	**119 days**	**Sun 10/2/05**	**Thu 3/16/06**	
2	**Project Management Activities**	**119 days**	**Sun 10/2/05**	**Thu 3/16/06**	
3	Briefing in Israel	5 days	Mon 10/3/05	Fri 10/7/05	
4	Briefing in Washington	2 days	Thu 10/13/05	Fri 10/14/05	3FS+1 day
5	Team Mobilization	1 day	Mon 10/17/05	Mon 10/17/05	4
6	Start Up Activities	10 days	Sun 10/2/05	Fri 10/14/05	3
7	Establish Corridors	5 days	Mon 11/7/05	Fri 11/11/05	6FS+15 days
8	Prepare Inception Report	29 days	Wed 10/26/05	Mon 12/5/05	
9	Prepare Progress Report	25 days	Tue 12/6/05	Mon 1/9/06	8
10	Coordinate All Activities	20 days	Tue 1/24/06	Mon 2/20/06	9FS+10 days
11	Prepare Final Report	20 days	Fri 2/17/06	Thu 3/16/06	10FS-2 days
12	Conduct Workshops (Timing to be determined)	1 day	Fri 10/28/05	Fri 10/28/05	
13	**Development of Demand Forecasts**	**60 days**	**Mon 10/10/05**	**Fri 12/30/05**	
14	Collect Existing Data	15 days	Mon 10/10/05	Fri 10/28/05	3
15	Prepare Road and Rail Forecasts	15 days	Mon 10/31/05	Fri 11/18/05	14
16	Progress Report	10 days	Mon 12/19/05	Fri 12/30/05	15FS+20 days
17	**Water Transmission Assessment**	**75 days**	**Mon 11/7/05**	**Fri 2/17/06**	
18	Collect Existing Data	5 days	Mon 11/7/05	Fri 11/11/05	14FS+5 days
19	Prepare Water Forecasts	5 days	Mon 11/14/05	Fri 11/18/05	18
20	Conceptual Designs	5 days	Mon 11/21/05	Fri 11/25/05	19
21	Draft Final Report	5 days	Mon 2/13/06	Fri 2/17/06	20FS+40 days
22	**Power Transmission Assessment**	**70 days**	**Mon 11/7/05**	**Fri 2/10/06**	
23	Collect Existing Data	5 days	Mon 11/7/05	Fri 11/11/05	18SS
24	Prepare Power Forecasts	5 days	Mon 11/14/05	Fri 11/18/05	23
25	Prepare Conceptual Designs	5 days	Mon 11/21/05	Fri 11/25/05	24
26	Draft Final Report	5 days	Mon 2/6/06	Fri 2/10/06	25FS+50 days
27	**Evaluation of Highway Alignments**	**75 days**	**Thu 10/27/05**	**Wed 2/8/06**	
28	Establish Corridors	5 days	Thu 10/27/05	Wed 11/2/05	
29	Field Review Alignment	5 days	Thu 11/3/05	Wed 11/9/05	28
30	Prepare Conceptual Designs	10 days	Thu 11/10/05	Wed 11/23/05	29
31	Prepare Progress Report	5 days	Thu 12/29/05	Wed 1/4/06	30FS+25 days
32	Prepare Detailed Costs	10 days	Thu 1/26/06	Wed 2/8/06	31FS+15 days
33	**Evaluation of Rail Alignments**	**80 days**	**Thu 10/27/05**	**Wed 2/15/06**	
34	Establish Corridors	5 days	Thu 10/27/05	Wed 11/2/05	28SS
35	Field Review Agreement	10 days	Thu 11/3/05	Wed 11/16/05	34
36	Prepare Conceptual Designs	10 days	Thu 11/17/05	Wed 11/30/05	35
37	Prepare Progress Report	5 days	Thu 12/29/05	Wed 1/4/06	36FS+20 days
38	Prepare Detailed Costs	15 days	Thu 1/26/06	Wed 2/15/06	37FS+15 days
39	**Development of Railway Cost Estimates**	**55 days**	**Mon 11/28/05**	**Fri 2/10/06**	
40	Prepare Costs for Operations and Maintenance	10 days	Mon 11/28/05	Fri 12/9/05	
41	Prepare Costs for Operations and Maintenance	20 days	Mon 1/16/06	Fri 2/10/06	40FS+25 days
42	**Evaluation of Terminals**	**70 days**	**Mon 11/7/05**	**Fri 2/10/06**	
43	Conceptual Designs	5 days	Mon 11/7/05	Fri 11/11/05	
44	Prepare Costs	5 days	Mon 12/12/05	Fri 12/16/05	43FS+20 days
45	Prepare Costs	10 days	Mon 1/16/06	Fri 1/27/06	44FS+20 days
46	Prepare Detailed Costs	20 days	Mon 1/16/06	Fri 2/10/06	45SS
47	**Environmental Assessment**	**88 days**	**Mon 10/17/05**	**Wed 2/15/06**	
48	Initial Corridor Study	4 days	Mon 10/17/05	Thu 10/20/05	
49	Prepare Impact Study	10 days	Fri 11/11/05	Thu 11/24/05	48FS+15 days
50	Progress Report	5 days	Fri 12/9/05	Thu 12/15/05	49FS+10 days
51	Draft Final Report	5 days	Fri 1/13/06	Thu 1/19/06	50FS+20 days
52	Final Report	9 days	Fri 2/3/06	Wed 2/15/06	51FS+10 days
53	**Social Impact Study**	**99 days**	**Mon 10/24/05**	**Thu 3/9/06**	
54	Corridor Study	5 days	Mon 10/24/05	Fri 10/28/05	
55	Social Impact Study	10 days	Mon 11/28/05	Fri 12/9/05	54FS+20 days
56	Progress Report	5 days	Mon 12/12/05	Fri 12/16/05	55
57	Draft Final Report	10 days	Fri 1/27/06	Thu 2/9/06	56FS+15 days
58	Final Report	5 days	Fri 3/3/06	Thu 3/9/06	57FS+15 days
59	**Local Engineering Support**	**89 days**	**Mon 10/31/05**	**Thu 3/2/06**	
60	Geology	15 days	Mon 10/31/05	Fri 11/18/05	
61	Geology II	5 days	Mon 12/19/05	Fri 12/23/05	60FS+20 days
62	Land Appraisal	30 days	Mon 11/21/05	Fri 12/30/05	60
63	Land Appraisal II	15 days	Mon 1/30/06	Fri 2/17/06	62FS+20 days
64	Alignment Engineer	15 days	Mon 10/31/05	Fri 11/18/05	60SS
65	CADD Technician	10 days	Mon 1/2/06	Fri 1/13/06	62
66	CADD Technician II	23 days	Tue 1/31/06	Thu 3/2/06	65FS+11 days
67	Environmental Technician	20 days	Mon 11/14/05	Fri 12/9/05	60FS-5 days
68	Quantity Surveyor/Cost	20 days	Mon 12/12/05	Fri 1/6/06	67
69	Quantity Surveyor/Cost	20 days	Mon 1/23/06	Fri 2/17/06	68FS+10 days



Project: West Bank-Gaza Strip
Date: Tue 11/1/05

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

7. Pending Issues

There are no major pending issues. However, there are some minor ones that should be addressed:

Meeting with Israeli and Palestinian Officials. It would be highly desirable to meet periodically with Israeli and Palestinian government officials to discuss technical issues. This process will result in a study that is more likely to be accepted at the technical level.

The Draft Final Report: The issue of whether or not a Draft Final Report should be prepared and when it should be submitted, should be addressed as soon as possible so the schedule can be revised accordingly. See Section 5 of this report for more discussion of this issue.

Terminus of the Road and Rail Links: The road and rail alignments will connect to different areas of the Gaza Strip and the West Bank. What is unclear is how far into each the road and rail links have to penetrate. For instance, the railway could go as far as Hebron or could terminate with a station near Tarqumiya. However, the added distance through steep terrain could add considerably to the cost of the rail link. In the case of Gaza Strip, the railway line should eventually go to the port; however, to connect to the port is beyond the scope of this study so where its terminus should be is unclear.

ANNEX A: Briefing Notes of a Meeting at the World Bank

Washington D.C.

October 17, 2005

Briefing Notes of a Meeting with the World Bank in Washington D.C.

Date: October 17, 2005
Location: World Bank HQ
Purpose: Discuss World Bank's Perspective on West Bank/Gaza Transportation Link Project

Attendees: **World Bank**: Ibrahim Dajani, Infrastructure Engineer,
Mohammad Mustafa, Lead Private Sector Development

LBG: Pat Quinn, Principal in Charge
Ariel Cushnir, Environmental Specialist
Michael Gaffen, Power utilities Specialist
Ian Seed, Water Utilities
Jan Zicha, Railroad Engineer
Alan Karnovitz, Economist

Summary: The two project leaders from the World Bank provided LBG Team members with their perspectives of the West Bank Gaza Transportation Link Economic Feasibility Study. They emphasized the great importance that the World Bank places on the successful conclusion of the project, while acknowledging the large technical challenges faced by LBG in performing the various analyses required by the Statement of Work within the time-frame allotted. The World Bank (the "Bank") believes that the future economic development of the Palestinians is contingent on the construction of a linkage that would allow for the free flow of goods and services between the Gaza Region and the West Bank.

The Bank is strongly committed to helping the project move forward and will aid in any effort required to obtain data from both the Palestinian Government and the Government of Israel (GOI). They noted that PALTRADE has good data on Palestinian Trade and that the consulting firm TSG recently conducted a comprehensive review of Palestinian trade facilities.

The Bank believes that the study should be forward looking and consider different economic development scenarios over a long-term period (e.g., 25 years). Hence, in sizing the proposed link, the study should not base its scenarios on the current status of development. For example, alternatives should be assessed so that the transportation link would be able to accommodate the flow of goods from the proposed Gaza Seaport. The study should also include scenarios in which the Gaza Airport would be reopened.

The Bank asserted that the study should assume that a future seaport would be of medium size and located in the same area as the one proposed earlier. The Seaport would take at least 5 years to develop as a medium-sized port and would be designed to operate as a roll on- roll-off port. However, the size and scale of operations of the reopened airport is not clear at this time. The Bank acknowledges that the spectrum of outcomes resulting in different levels of demand for the proposed transportation link is great and that probabilities of any single outcome filled with great uncertainty. For example, the Bank was told by the GOI that they would strongly prefer an extension of the Israeli railroad line as the permanent link. The extension would be owned and operated by the Israelis. The GOI also expected that this alternative would be included in the study, although that alternative is not considered viable by either the Bank or the Palestinians. The Israelis are also seeking for the study to consider a tunnel option. Whether such an option would be totally underground or only have portions underground is not certain. A cut and cover option was also discussed as a more economically viable alternative.

The Bank also discussed how the transportation link would tie into the current transportation network in the West Bank. Much of the West Bank infrastructure is in a state of disrepair and much improvement is needed.

A brief discussion was also devoted to the proposed utilities element of the study. The Bank believes that this component of the study should be a conceptual design only.

Finally, the Bank suggested that LBG meet with the Palestinians in Jerusalem and discouraged any travel to either Nablus or Ramallah. They noted that the Bank had no space in the offices and suggested that LBG rent space in the Claridge Hotel, which is located across the street from the Bank's offices.